CITY OF NOVI CITY COUNCIL
JUNE 26, 2023

SUBJECT: Adoption of Resolution approving the City's Transportation Asset Management Plan (TAMP).

SUBMITTING DEPARTMENT: Department of Public Works, Engineering Division

BACKGROUND INFORMATION:

Public Act 51 governs the distribution of transportation funds in Michigan. A Transportation Asset Management Council (TAMC) was established to promote better asset management practices among local road agencies and to ensure effective investment of Act 51 funds in Michigan roads and bridges. In 2018, Public Act 325 amended Public Act 51 to require road agencies responsible for 100 or more certified centerline mile of public roads to submit asset management plans to the TAMC. The City, whose certified Act 51 mileage was 195.69 miles as of July 1, 2022, reports its transportation projects and associated costs to the TAMC annually. Per the PA 325 amendment, the City submitted its Transportation Asset Management Plan (TAMP) to the TAMC earlier this year for review. The only element needed to be in compliance with the state is proof of acceptance by the City Council, which this resolution will satisfy.

Engineering consultant, OHM Advisors, assisted staff with completing asset management plans for the City's pavement, bridges, culverts, and signals. The four categories were combined into the TAMP that was submitted to the TAMC. Please see the attached TAMP for more details regarding the City's asset management plans.

RECOMMENDED ACTION: Adoption of Resolution approving the City's Transportation Asset Management Plan (TAMP).

CITY OF NOVI

COUNTY OF OAKLAND, MICHIGAN

RESOLUTION
CITY OF NOVI TRANSPORTATION ASSET MANAGEMENT PLAN

Minutes of a Meeting of the City Council of the City of Novi, County of Oakland, Michigan, held in the City Hall of said City on _____, _____, at ____o'clock P.M. Prevailing Eastern Time.

PRESENT: Councilmembers_____

ABSENT: Councilmembers_____

The following preamble and Resolution were offered by Councilmember _____and supported by Councilmember _____.

WHEREAS ; the City of Novi is a Public Act 51 Local Road Agency responsible for 100 or more certified miles of road and

WHEREAS ; the Michigan Transportation Asset Management Council (TAMC) was established to expand the practice of asset management statewide and

WHEREAS ; Public Act 325 amended Public Act 51 of 1951 to require road agencies responsible for 100 or more certified centerline miles of public road to submit asset management plans to TAMC and

WHEREAS ; The City of Novi submitted a Transportation Asset Management Plan (TAMP) to the TAMC for review and

WHEREAS ; a requirement for the TAMP to be approved by TAMC is the proof of acceptance by the local road agency's governing body.

NOW THEREFORE, IT IS THEREFORE RESOLVED that the City of Novi's Transportation Asset Management Plan is approved by the City Council.

AYES:

NAYS:

RESOLUTION DECLARED ADOPTED.

_____
Cortney Hanson, City Clerk

CERTIFICATION

I hereby certify that the foregoing is a true and complete copy of a resolution adopted by the City Council of the City of Novi, County of Oakland, and State of Michigan, at a regular meeting held this _____ day of _____, 2023, and that public notice of said meeting was given pursuant to and in full compliance with Act No. 267, Public Acts of Michigan, 1976, and that the minutes of said meeting have been kept and made available to the public as required by said Act.

_____
Cortney Hanson, City Clerk
City of Novi

City of Novi's Transportation Asset Management Plan

A plan describing the City of Novi's transportation assets and conditions.

Prepared by:
OHM Advisors

CONTENTS

toc.

TABLE OF FIGURES

TABLE OF TABLES

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 Novi's (Novi) 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 Novi is meeting its obligations to maintain the public assets for which it is responsible.

This plan identifies Novi's assets and condition and how the City 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 some of Novi's obligations towards meeting these requirements. However, this plan and its supporting documents are intended to be much more than a fulfillment of required reporting. This asset management plan helps to demonstrate Novi's responsible use of public funds by providing elected and appointed officials as well as the general public with the inventory and condition information of Novi's assets, and it gives taxpayers the information they need to make informed decisions about investing in Novi's 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 Novi 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 Novi (Novi) has historically had 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. Novi is responsible for maintaining and operating over 194 center lane miles of roads and 12 bridge structures. It is also responsible for 70 culverts and participates in a cost share of 50 signals (being wholly responsible for 23).

This 2022 plan identifies Novi’s transportation assets and their condition as well as the strategy that the City uses to maintain and upgrade particular assets given Novi’s condition goals, priorities of network’s road users, and resources. An updated plan is to be released approximately every 3 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 City of Novi DPW.

1. PAVEMENT ASSETS

Novi is responsible for 194 center line 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: major road network, which is prioritized for state-level funding, and local road network.

Inventory of Assets

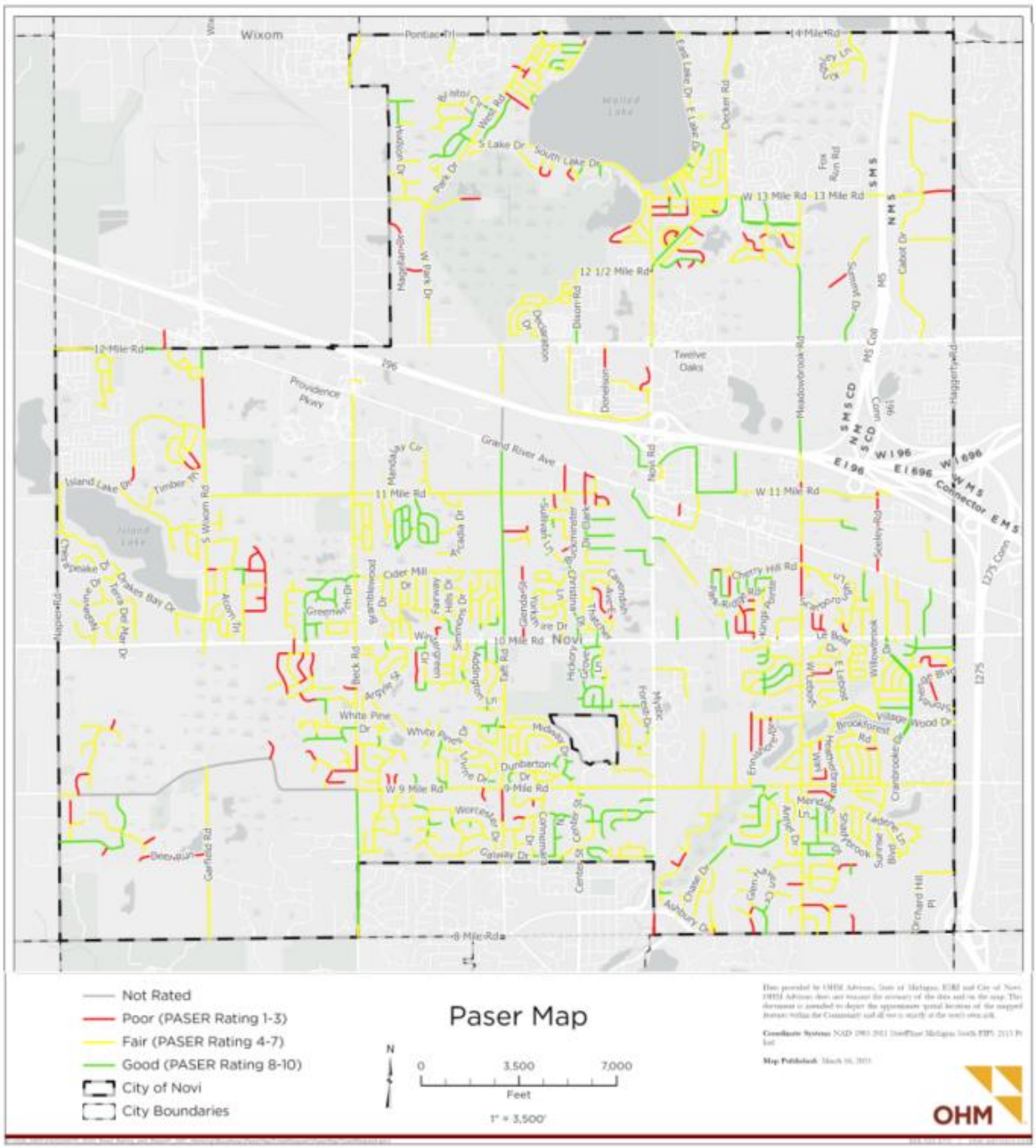


Figure 1: Map showing location or roads managed by Novi

The current condition for 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) and for unpaved roads in blue

Of Novi's 194 miles of road, 31 miles are classified as major and 163 miles are classified as local (Figure 1 identifies these paved roads in green, yellow, and red with the colors being determined based on the road segment's condition). In addition, Novi has several miles of unpaved roads

More detail about these road assets can be found in Novi's Roadsoft database or by contacting Novi DPW.

Types

Novi has multiple types of pavements in its jurisdiction, including concrete, asphalt, seal coat and gravel. Figure 2 shows a breakdown of these pavement types for all of Novi's road assets.

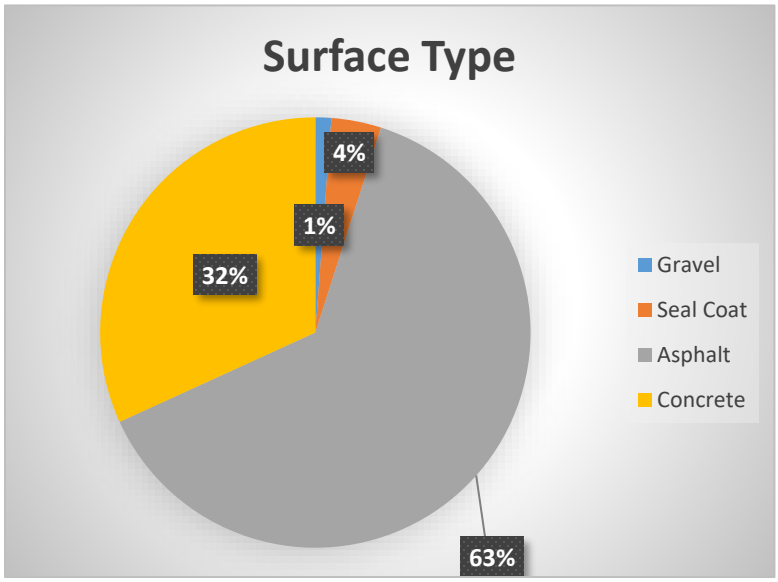


Figure 2: Pavement type by percentage maintained by Novi.
Undefined pavements have not been inventoried in Novi's's asset management system to date, but will be included as data becomes available.

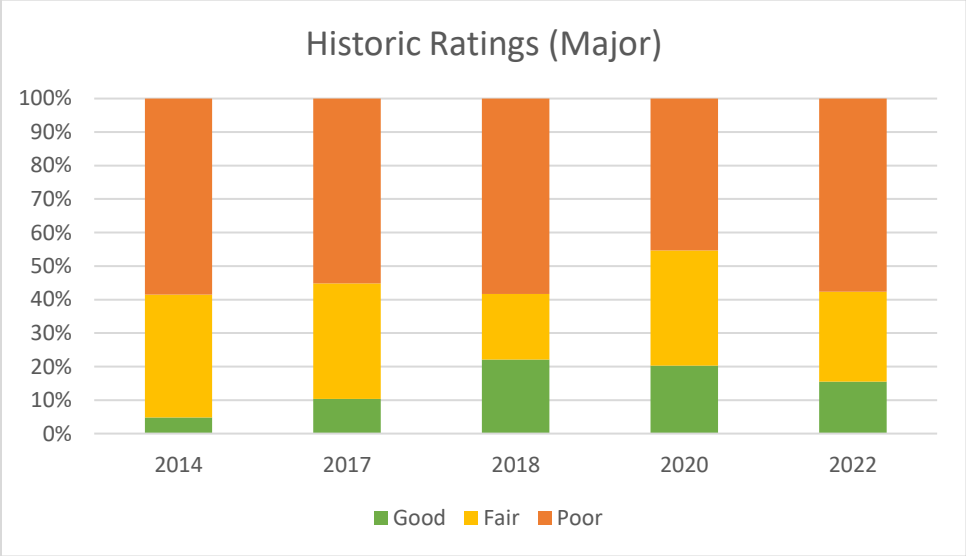
Condition, Goals, and Trend

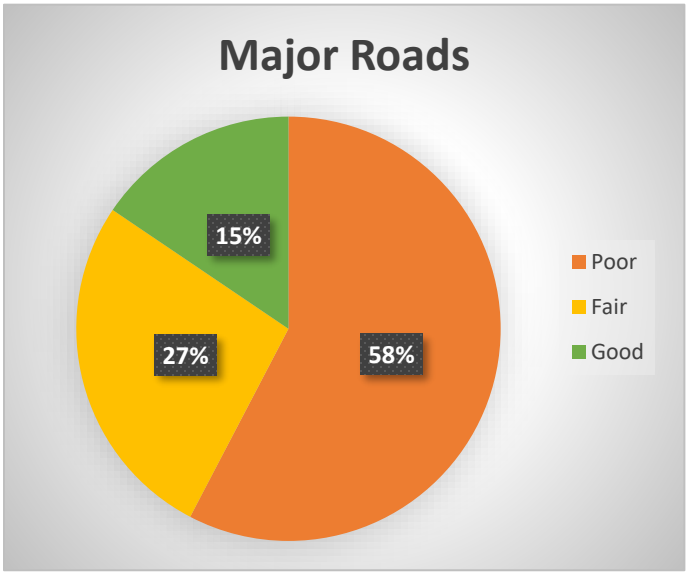
Paved Roads

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. Novi collects PASER data every two years on 100 percent of those portions of its major and local networks that are eligible for federal funding. In addition, Novi uses its own resources to collect PASER data on 100% percent of its major and local networks that are not eligible for federal funding.

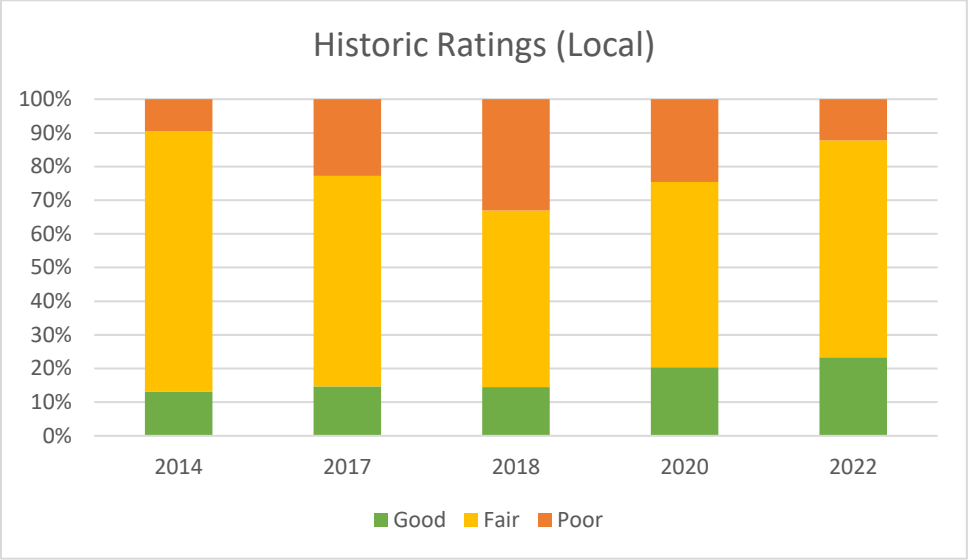
Novi's 2022 paved city major road network has 17 percent of roads in the TAMC good condition category, 32 percent in fair, and 51 percent in poor (Figures 3). The paved city local road network has 20 percent in good, 54 percent in fair, and 26 percent in poor (Figure 4).

Novi's long-range goal for the major network is to have 26% of roads in good condition, 42% in fair condition, and 32% in poor condition to meet the State average, and for the local network is to maintain the current 19% of roads in good condition, 54% in fair condition, and 27% in poor condition (Figures 3 and Figure 4). Figures 3 and Figure 4 illustrate the historical and current condition (solid bars) of Novi's major and local networks, respectively.





Figures 3: major network condition, goals, and trend



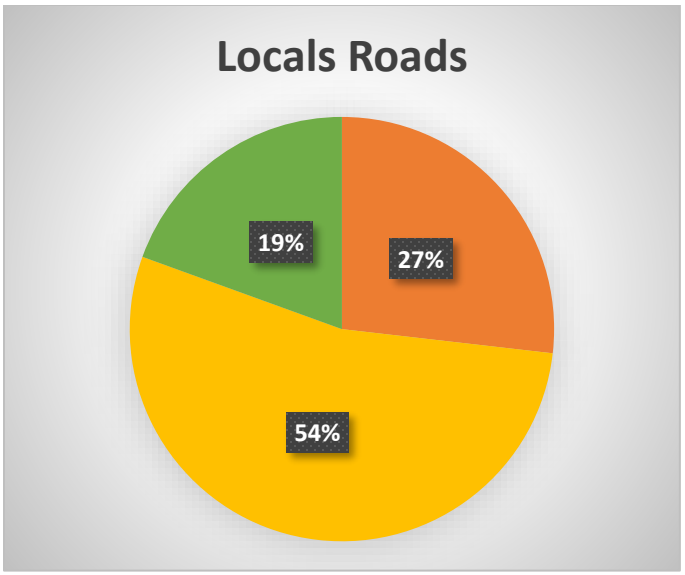


Figure 4: local network condition, goals, and trend

Unpaved Roads

Unpaved roads within the City of Novi are maintained by the DPW and contracted projects. Data is collected with PASER Gravel, however due to the limited number of gravel roads in the City and their overall good condition, the City does not use the data generated to perform projects.

Modelled Trends, Gap Analysis, and Planned Projects

Modelled Trends & Gap Analysis

The Roadsoft network analysis of Novi's planned projects for the major and local networks from the currently-available budget allows Novi to maintain the existing conditions, with slight improvement towards the pavement condition goals given the projects planned for the next three years.

Results from Roadsoft for the major and local network condition models indicate that the necessary additional work needed to meet the agency condition goal would cost approximately an additional $1,000,000 per year and an appropriate mix of fixes (moving away from primarily reconstruction and focusing on rehabilitation). Recent excessive inflation of construction costs over the last 2 years adds significant uncertainty to the adequacy of future budgets ability to maintain the necessary funding levels to address road asset needs.

Planned Projects

Novi has projects planned for the next three years. These projects are identified in the City's budget, and show cased on the City's website https://cityofnovi.org/services/public-works/better-roads-ahead.

2. BRIDGE ASSETS

Novi is responsible for 12 bridges that provide safe service to road users across the agency network. Novi 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

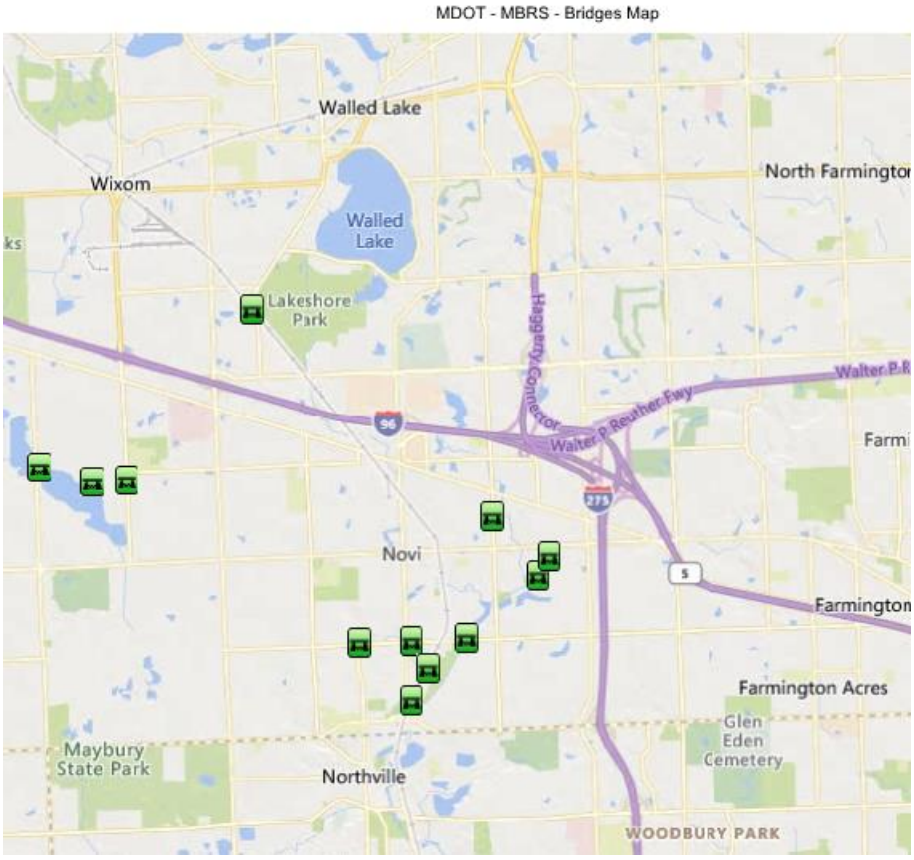


Figure 5: Map illustrating locations of Novi's bridge assets

Novi has 12 total bridges in its road and bridge network; these bridges connect various points of the road network, as illustrated in Figure 5. These bridge structures can be summarized by type, size, and condition, which are detailed in Table 1. More information about each of these structures can be found in Novi's MiBRIDGE database or by contacting the City of Novi DPW. Assessment of Novi's Bridge Assets is shown below.

Bridge ID	Total Deck Area (sq ft)	Condition: Structurally Deficient, Posted, Closed			2022 Condition		
		Struct. Defic	Posted	Closed	Poor	Fair	Good
8246	2771						X
8247	1848					X	
8248	3192					X	
12769	9586						X
13828	2047	X			X		
13858	n/a					X	
13859	n/a						X
13860	n/a						X
13861	n/a						X
13862	n/a						X
14274	n/a	X			X		
14275	n/a						X
Total SD/Posted/Closed		**2**		**0**			
Total	**12**	**2**			**2**	**3**	**7**
Percentage (%)		**17**	**0**	**0**	**17**	**25**	**58**

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 Novi's bridge network based on the NBIS is 7 structures rated good, 3 structures rated fair, and 2 structures rated poor.

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. Novi has 2 structures that are posted for load restriction. 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. Novi has 0 structures that are closed.

The goal of the program is the preservation and safety of Novi's bridge network.

Programmed/Funded Projects, Gap Analysis, and Planned Projects

Novi budgets approximately $300,000 in total funding for the years 2022-2026. Preventive maintenance is a more effective use of these funds than the costly alternative of major rehabilitation or replacement.

Since Novi 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 $75,000 per year for the next three years on preventive maintenance of bridges. Novi does not plan to replace any bridges within the next three years. By performing the aforementioned preventive maintenance and replacement of bridge structures, Novi should achieve its goal of keeping its overall bridge network at the same condition.

Due to the limited City funds for bridge projects, Novi plans to apply for local agency bridge funding for the Ashbury bridge in 2026 if funds are available. If funds are unavailable, the City will pursue additional funding sources, including the possibility of general fund expenditures for the replacement.

3. CULVERT ASSETS

The City of Novi exercises awareness of its culvert assets. The City participated in a pilot culvert assessment program to begin collecting data on the locations and conditions of City owned culverts.

Inventory of Assets

At present, Novi tracks inventory and condition data of its culvert assets. Novi has inventoried 70 culverts, which is all of the culverts that Novi owns. Of Novi's tracked and rated culverts, Novi has 39 culverts considered good, 17 culverts considered fair, 7 culverts considered poor per 2017 inspections. (see Appendix C *Culvert Asset Management Plan Supplement*).

More detail about these culvert assets can be obtained by contacting the City DPW.

Goals

The goal of Novi's asset management program is the preservation of its culvert network. Novi is responsible for preserving 70 inventoried culverts as well as any un-inventoried culverts that underlie its entire road network. The goal of future asset management plans is to further assess the culvert network and more fully incorporate it into the City's compliance plan.

Planned Projects

Novi's policy is to replace or repair culvert assets concurrent with projects affecting road segments carried by the particular culverts. Novi also includes culvert assets in scheduled maintenance projects affecting road segments carried by the particular culverts.

4. SIGNAL ASSETS

The City of Novi exercises awareness of its traffic sign and signal assets. When pavement project planning occurs within the City, existing signals in the project area are evaluated. If the signals are found to be deficient, new or upgraded signals are added to the project plan and budget.

Inventory of Assets

At present, Novi tracks only inventory data for traffic signals. The City has inventoried the traffic signals, within the City boundaries which the City owns, however condition assessments have not occurred.

More detail about these traffic signal assets can be obtained by contacting the City DPW. The City of Novi maintains 23 signals and participates in a cost share for another 27 with the Road Commission for Oakland County and several other entities, including MDOT.

Goals

The goal of Novi's asset management program is the preservation of its traffic signals. Novi is responsible for preserving the inventoried traffic signals as well as any un-inventoried traffic signals along its entire road network. The goal of future asset management plans is to further assess the signal network and more fully incorporate it into the City's compliance plan.

Planned Projects

Novi's 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. Novi partners with the Road Commission for Oakland County, and adheres to regular maintenance and servicing policies outlined in the *Michigan Manual of Uniform Traffic Control Devices*.

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. Novi 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.cityofnovi.org/services/finance/budget-and-multi-year-financial-plan.

Novi has a total **average** budget for pavement asset management of approximately $9,000,000 per year.

Anticipated Revenues & Expenses

Novi receives funding from the following sources:

- **State funds** – One of Novi's sources of transportation funding is 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. The City of Novi has a local tax millages in its road-funding budget. The road millage is used for local road projects and is one of the key reasons that the City's local roads are maintained in an average condition well above the State average for local roads.
- **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 «agencyshort» to construct or maintain its roads, or roads under joint or neighboring jurisdictions, including state trunkline maintenance and non-maintenance services and preservation.

Novi 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 "activit[ies] undertaken to preserve the integrity of the existing roadway system."[2]

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

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 highway, road, street, or bridge".[3] Preventive maintenance activities are "planned strategy[ies] 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 Novi's 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 Table (below) details the revenues and expenditures for the City of Novi.

Table 1: Annual Fiscal-Year Revenues & Expenditures per Fiscal Year

REVENUES			EXPENDITURES		
Item	**Estimated $**	**Percent of Total**	**Item**	**Estimated $**	**Percent of Total**
State funds	6,634,737	51.1	Construction & capacity improvement (CCI)	891,766	7.7
Federal funds	0	0.0	Preservation & structural improvement (PSI)	8,802,609	75.6
Contributions for local units	189,711	1.5	Routine maintenance	180,339	1.5
Interest, rents, and other	452,969	3.5	Winter maintenance	771,539	6.6
Taxes (Road Millage)	5,711,021	44.0	Trunkline maintenance	1,002,646	8.6
			Administrative	0	0.0
			Other	0	0.0
TOTAL	12,988,438	100	TOTAL	11,648,899	0

Verify the information in this table. You can find your agency's information in the TAMC dashboard at https://www.mcgi.state.mi.us/mitrp/tamcDashboards.

[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 Novi 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. These key transportation links in Novi's road network, including those that meet the following types of situations:

A. **Geographic divides:** Areas where a geographic feature (river, lake, mountain or limited access road) limits crossing points of the feature

B. **Emergency alternate routes for high-volume roads:** Roads which are routinely used as alternate routes for high volume roads or roads that are included in an emergency response plan

C. **Limited access areas:** Roads that serve remote or limited access areas that result in long detours if closed

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

Our road network includes the following critical assets: Beck Road, Wixom Road and Novi Road (north of 12 mile). These roads serve high traffic commercial and residential areas, along with hospitals and schools, and provide critical access to I-96 and M-14.

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

INTERNAL CORDINATION & PLANNING

Novi maintains drinking water, sanitary and storm sewer assets in addition to transportation assets. Novi 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 Novi owns are listed in the following asset management plans: drinking water distribution system asset management plan, wastewater collection system asset management plan, storm sewer system asset management plan. 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.

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

E. Roads which are in poor condition that have a subsurface infrastructure project planned which will destroy more than half the lane with will be rehabilitated or reconstructed full width using transportation funds to repair the balance of the road width.

F. 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.

G. Subsurface utility projects will be coordinated to allow all under pavement assets to be upgraded in the same project regardless of ownership.

H. Significant road reconstruction projects will not be completed until agency owned sub surface utilities are upgraded to have at least a 40 years of remaining service life.

EXTERNAL COORDINATION & PLANNING

The City of Novi maintains an excellent and informative website, where upcoming projects are posted well in advance of the construction. Project plans are shared with local franchise utility share holders (such as Consumers Energy, and DTE) along with other large utility and road owning agencies such as GLWA, RCOC and MDOT. Infrastructure owners are encouraged to discuss planned projects that would disrupt transportation services or cause damage to pavements. Projects which may cause damage to pavements in good or fair condition are discussed and mitigation measures are proposed to minimize the impact to pavements. Mitigation measures include rescheduling and coordinating projects to maximize value and minimize disruptions and cost to the public.

8. PROOF OF ACCEPTANCE

PUBLIC ACT 325

CERTIFICATION OF TRANSPORTATION ASSET MANAGEMENT PLAN

Certification Year: 2022

Local Road-owning Agency Name: City of Novi

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 Victor Cardenas	Printed Name Carl Johnson
Title Interim City Manager	Title Chief Financial Officer
Date 4-11-23	Date 4-11-23

Due every three years based on agency submission schedule

Submittal Date: _____

See attached council meeting minutes and/or resolution.

A. PAVEMENT ASSET MANAGEMENT PLAN

An attached pavement asset management plan follows.

B. BRIDGE ASSET MANAGEMENT PLAN

An attached bridge asset management plan follows.

C. 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.

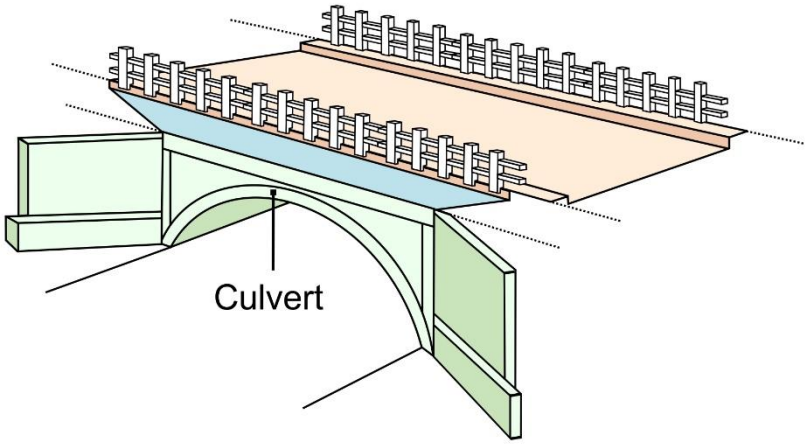


Figure C-1: Diagram of a culvert structure

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.

D. 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.

E. 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

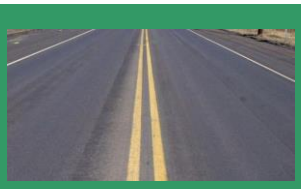
PASER: Pavement Surface Evaluation and Rating

R&R: reconstruction and rehabilitation programs

TAMC: (Michigan) Transportation Asset Management Council

US: trunkline abbreviation for routes on the US Highway system

City of Novi
2022 Pavement
Asset Management Plan



A plan describing the City of Novi's roadway assets and conditions

Prepared by:
OHM Advisors

CONTENTS

TABLE OF FIGURES

TABLE OF TABLES

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 Novi's (Novi) 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 Novi is meeting its obligations to maintain the public assets for which it is responsible.

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

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

Novi owns and/or manages 194.306 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.

The City of Novi has a limited unpaved road network. The unpaved roads are maintained periodically by both City maintenance and contracted projects to remain in fair or better condition.

An asset management plan is required by Michigan Public Act 325 of 2018, and this document represents fulfillment of some of Novi's obligations towards meeting these requirements. This asset management plan also helps demonstrate Novi's responsible use of public funds by providing elected and appointed officials as well as the general public with inventory and condition information of Novi'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). Novi 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 Novi (Novi) 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. Novi is responsible for maintaining and operating over 194.306 centerline of roads.

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

Questions regarding the use or content of this plan should be directed to the DPW at 26300 Lee BeGole Dr, Novi, MI 48375 or at (248) 735-5640 and/or communityrelations@cityofnovi.org. https://www.cityofnovi.org/services/public-works/better-roads-ahead. Key terms used in this plan are defined in Novi's comprehensive transportation asset management plan (also known as the "compliance plan") used for compliance with PA 325 or 2018.

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

Pavement Primer

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

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

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

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

Surfacing

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

Paved Surfacing

Typical benefits and tradeoffs for hard surface types include:

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

- **Composite pavements:** Composite pavement is a combination of concrete and asphalt layers. Typically, composite pavements are old concrete pavements exhibiting ride-related issues that were overlaid by several inches of HMA in order to gain more service life from the pavement before it would need reconstruction. Converting a concrete pavement to a composite pavement is typically used as a "holding pattern" treatment to maintain the road in usable condition until reconstruction funds become available.
- **Sealcoat pavement:** Sealcoat pavement is a gravel road that have been sealed with a thin asphalt binder coating that has stone chips spread on top (not to be confused with a chip seal treatment over HMA pavement). This type of a pavement relies on the gravel layer to provide structure to support traffic, and the asphalt binder coating and stone chips shed water and eliminate the need for maintenance grading. Nonetheless, sealcoat pavement does require additional maintenance steps that asphalt and gravel do not require and does not last as long as HMA pavement, but it provides a low-cost alternative for lightly-trafficked areas and competes with asphalt for ride quality when properly constructed and maintained. Sealcoat pavement can provide service for ten or more years before the surface layer deteriorates and needs to be replaced.

Unpaved Surfacing

Typical benefits and tradeoffs for non-hard surfacing include:

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

Pavement Condition

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

Pavement condition data is also important because it allows road owners to evaluate the benefits of preventive maintenance projects. This data helps road owners to identify the most cost-effective use of road construction and maintenance dollars. Further, historic pavement condition data can enable road owners to predict future road conditions based on budget constraints and to determine if a road network's condition will improve, stay the same, or degrade at the current or planned investment level. This analysis can help determine how much additional funding is necessary to meet a network's condition improvement goals.

Paved Road Condition Rating System

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

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

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

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

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

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

The TAMC's good, fair, and poor categories are based solely on the definitions, above. Therefore, caution should be exercised when comparing other condition assessments with these categories because other

condition assessments may have “good”, “fair”, or “poor” designations similar to the TAMC condition categories but may not share the same definition. Often, other condition assessment systems define the “good”, “fair”, and “poor” categories differently, thus rendering the data of little use for cross-system comparison. The TAMC’s definitions provide a statewide standard for all of Michigan’s road-owning agencies to use for comparison purposes.

PASER data is collected 100 percent every two years on all federal-aid-eligible roads in Michigan. The TAMC dictates and funds the required training and the format for this collection, and it shares the data regionally and statewide. In addition, Novi collects 100% percent of its paved non-federal-aid-eligible network using its own staff and resources on the same rating schedule.

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 Novi 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.

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.

The IBR System™ gathers reliable condition assessment data for unpaved road by evaluating three features—surface width, drainage adequacy, and structural adequacy—in comparison to a baseline, or generally considered “good”, road. These three assessments come together to generate an overall 1-10 IBR number. A high IBR number reflects a road with wide surface width, good drainage, and a well-designed and well-constructed base, whereas a low IBR number reflects a narrow road with no ditches and little gravel. A good, fair, or poor assessment of each feature is not an endorsement or indictment of a road’s suitability for use but simply provides context on how these road elements compare to a baseline condition.

Figure 2 illustrates the range over which features may be assessed. The top example in Figure 2 shows an unpaved road with a narrow surface width, little or no drainage, and very little gravel thickness. Using the IBR System™, these assessments would yield an IBR number of “1” for this road. The middle example in Figure 2 shows a road with fair surface width, fair drainage adequacy, and fair

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

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

Pavement Treatments

Selection of repair treatments for roads aims to balance costs, benefits, and road life expectancy. All pavements are damaged by water, traffic weight, freeze/thaw cycles, and sunlight. Each of the following treatments and strategies—reconstruction, structural improvements, capital preventive maintenance, and others used by Novi—counters at least one of these pavement-damaging forces.

Reconstruction

Pavement reconstruction treats failing or failed pavements by completely removing the old pavement and base and constructing an entirely new road (Figure 3). Every pavement has to eventually be reconstructed and it is usually done as a last resort after more cost-effective treatments are done, or if the road requires significant changes to road geometry, base, or buried utilities. Compared to the other treatments, which are all improvements of the existing road, reconstruction is the most extensive rehabilitation of the roadway and therefore, also the most expensive per mile and most disruptive to regular traffic patterns. Reconstructed pavement will subsequently require one or more of the previous maintenance treatments to maximize service life and performance. A reconstructed road lasts approximately 20 years or more and

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

costs $750,000 to $1,200,000 per lane mile depending on the type. The following descriptions outline the main reconstruction treatments used by Novi.

Full-depth Concrete Repair

A full-depth concrete repair removes sections of damaged concrete pavement and replaces it with new concrete of the same dimensions (Figure 3). It is usually performed on isolated deteriorated joint locations or entire slabs that are much further deteriorated than adjacent slabs. The purpose is to restore the riding surface, delay water infiltration, restore load transfer from one slab to the next, and eliminate the need to perform costly temporary patching. This repair lasts approximately twelve years and typically costs $100,000-$300,000 per mile depending on the frequency of patching.

Ditching (for Unpaved Roads)

Water needs to drain away from any roadway to delay softening of the pavement structure, and proper drainage is critical for unpaved roads where there is no hard surface on top to stop water infiltration into the road surface and base. To improve drainage, new ditches are dug or old ones are cleaned out. Unpaved roads typically need to be re-ditched every 15 years at a cost of $50,000 per mile.

Gravel Overlay (for Unpaved Roads)

Unpaved roads will exhibit gravel loss over time due to traffic, wind, and rain. Gravel on an unpaved road provides a wear surface and contributes to the structure of the entire road. Unpaved roads typically need to be overlaid with four inches of new gravel every 15 years at a cost of $125,000 per mile.

Structural Improvement

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

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 ten years and costs $200,000 to $350,000 per lane mile. The top layer of severely damaged pavement can be removed by the milling, a technique that helps prevent structural problems from being quickly reflected up to the new surface. Milling is also done to keep roads at the same height of curb and gutter that is not being raised or reinstalled in the project. Milling adds $30,000 per lane mile to the HMA overlay cost.

Crush and Shape

During a crush and shape treatment, the existing pavement and base are pulverized and then the road surface is reshaped to correct imperfections in the road's profile (Figure 4). An additional layer of gravel is often added along with a new wearing surface such as an HMA overlay or chip seal. Additional gravel and an HMA overlay give an increase in the pavements structural capacity. This treatment is usually done on rural roads with severe structural distress; Adding gravel and a wearing surface makes it more prohibitive for urban roads if the curb and gutter is not raised up. Crush and shape treatments last approximately 15 or more years and cost $500,000 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 Novi.

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). Novi seals pavement cracks early in the life of the pavement to keep it functioning as strong as it can and for as long as it can. Crack

sealing lasts approximately two years and costs $8,000 per lane mile. Even though it does not last very long compared to other treatments, it does not cost very much compared to other treatments. This makes it a very cost effective treatment when Novi looks at what crack filling costs per year of the treatment's life.

Fog Seal

Fog sealing sprays a liquid asphalt coating onto the entire pavement surface to fill hairline cracks and prevent damage from sunlight (Figure 5). Fog seals are best for good to very good pavements and last approximately two years at a cost of $15,000 per lane mile.

Chip Seal

A chip seal, also known as a sealcoat, is a two-part treatment that starts with liquid asphalt sprayed onto the old pavement surface followed by a single layer of small stone chips spread onto the wet liquid asphalt layer (Figure 5). The liquid asphalt seals the pavement from water and debris and holds the stone chips in place, providing a new wearing surface for traffic that can correct friction problems and helping to prevent further surface deterioration. Chip seals are best applied to pavements that are not exhibiting problems with strength, and their purpose is to help preserve that strength. These treatments last approximately five years and cost $30,000 per lane mile.

Slurry Seal/Microsurface

A slurry seal or microsurface's purpose is to protect existing pavement from being damaged by water and sunlight. The primary ingredients are liquid asphalt (slurry seal) or modified liquid asphalt (microsurface), small stones, water and portland cement applied in a very thin (less than a half an inch) layer (Figure 5). The main difference between a slurry seal and a microsurface is the modified liquid asphalt used in microsurfacing provides different curing and durability properties, which allows microsurfacing to be used for filling pavement ruts. Since the application is very thin, these treatments do not add any strength to the pavement and only serves to protect the pavement's existing strength by sealing the pavement from sunlight and water damage. These treatments work best when applied before cracks are too wide and too numerous. A slurry seal treatment lasts approximately four years and costs $40,000 per lane mile, while a microsurface treatment tends to last for seven years and costs $65,000 per lane mile.

Partial-Depth Concrete Repair

A partial-depth concrete repair involves removing spalled (i.e., fragmented) or delaminated (i.e., separated into layers) areas of concrete pavement, usually near joints and cracks and replacing with new concrete (Figure 6). This is done to provide a new wearing surface in isolated areas, to slow down water infiltration, and to help delay further freeze/thaw damage. This repair lasts approximately five years and typically costs $100,000-$250,000 per mile depending on the frequency of the deteriorated joints.

Maintenance Grading (for Unpaved Roads)

Maintenance grading involves regrading an unpaved road to remove isolated potholes, washboarding, and ruts then restoring the compacted crust layer (Figure 6). Crust on an unpaved road is a very tightly

compacted surface that sheds water with ease but takes time to be created, so destroying a crusted surface with maintenance grading requires a plan to restore the crust. Maintenance grading often needs to be performed three to five times per year and each grading costs $1000 per mile.

Dust Control (for Unpaved Roads)

Dust control typically involves spraying chloride or other chemicals on a gravel surface to reduce dust loss, aggregate loss, and maintenance (Figure 6). This is a relatively short-term fix that helps create a crusted surface. Chlorides work by attracting moisture from the air and existing gravel. This fix is not effective if the surface is too dry or heavy rain is imminent, so timing is very important. Dust control is done two to four times per year and each application costs $1,500 per mile.

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

Maintenance

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

1. PAVEMENT ASSETS

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

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

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

The Novi is responsible for a total of 194.306 centerline of public roads, as shown in Figure 7.

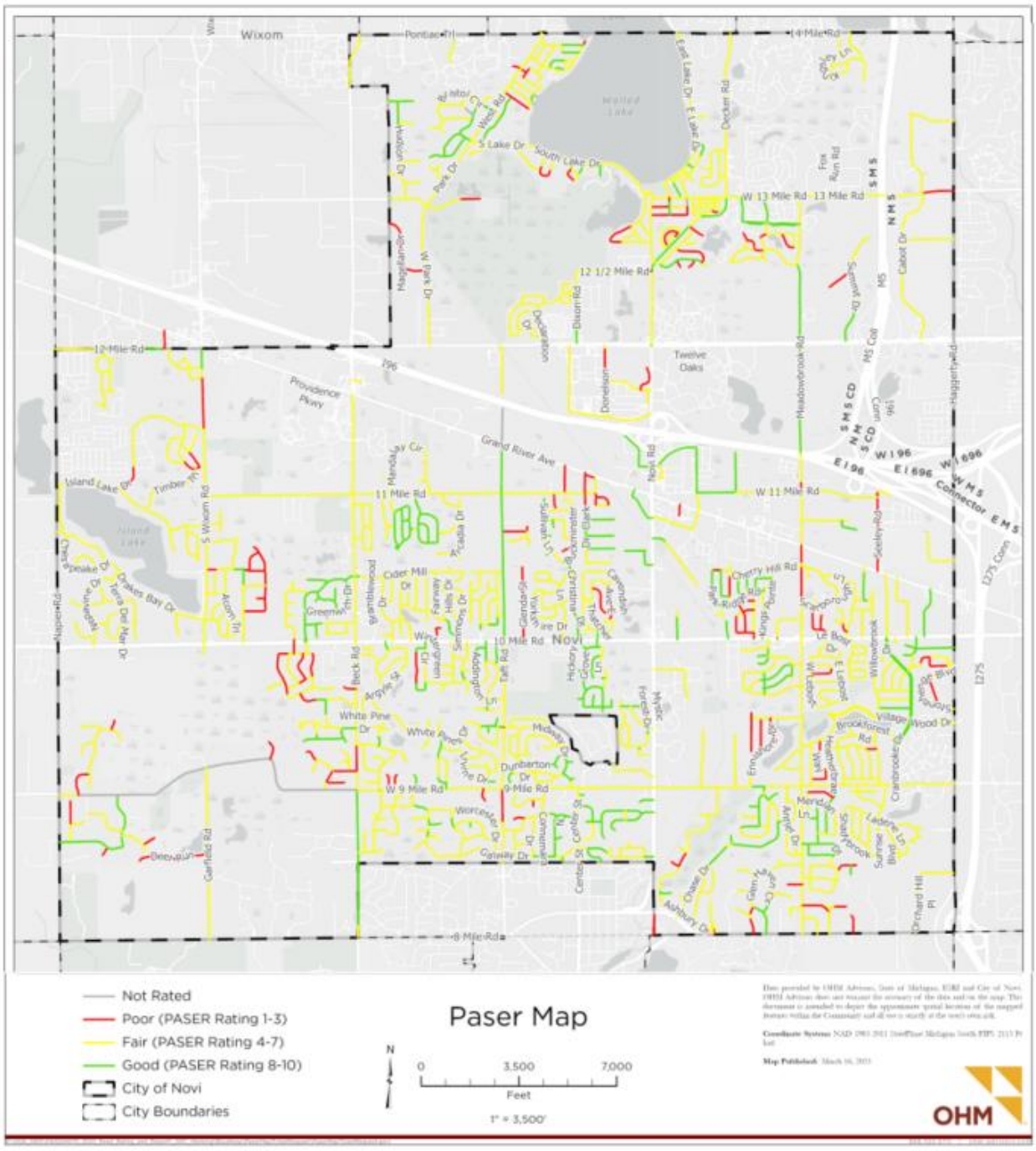


Figure 7: Map showing location of Novi's paved roads (i.e., those managed by Novi) and their current condition for paved roads with green for good (i.e., PASER 10, 9, 8), yellow for fair (i.e., PASER 7, 6, 5), and red for poor (i.e., PASER 4, 3, 2, 1), as well as the location of Novi's unpaved roads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

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 Novi 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 Novi that are classified as city major and city local roads. Figure 9 illustrates this breakdown of the road network within Novi's jurisdiction.

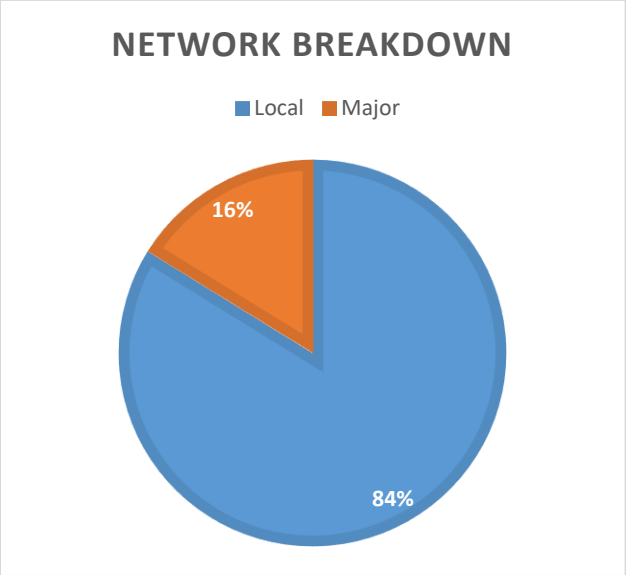


Figure 8: Percentage of city major and city local roads for Novi.

Novi also owns and manages 2.741 miles of unpaved roads.

Types

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

Figure 11 illustrates the percentage of various pavement types that Novi has in its network.

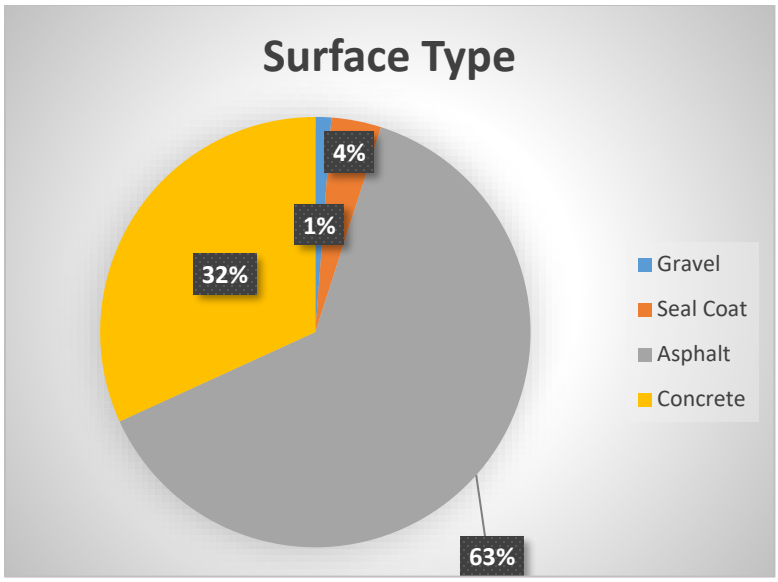


Figure 9: Pavement type by percentage maintained by Novi. Undefined pavements have not been inventoried in Novi's asset management system to date, but will be included as data becomes available.

Locations

Locations and sizes of each asset can be found in Novi'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. Novi 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 Novi 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

Novi 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. Novi 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.

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

Novi's 2022 paved city major road network has 17 percent of roads in the TAMC good condition category, 32 percent in fair, and 51 percent in poor (Figure 10A). The paved city local road network has 20 percent in good, 54 percent in fair, and 26 percent in poor (Figure 10B).

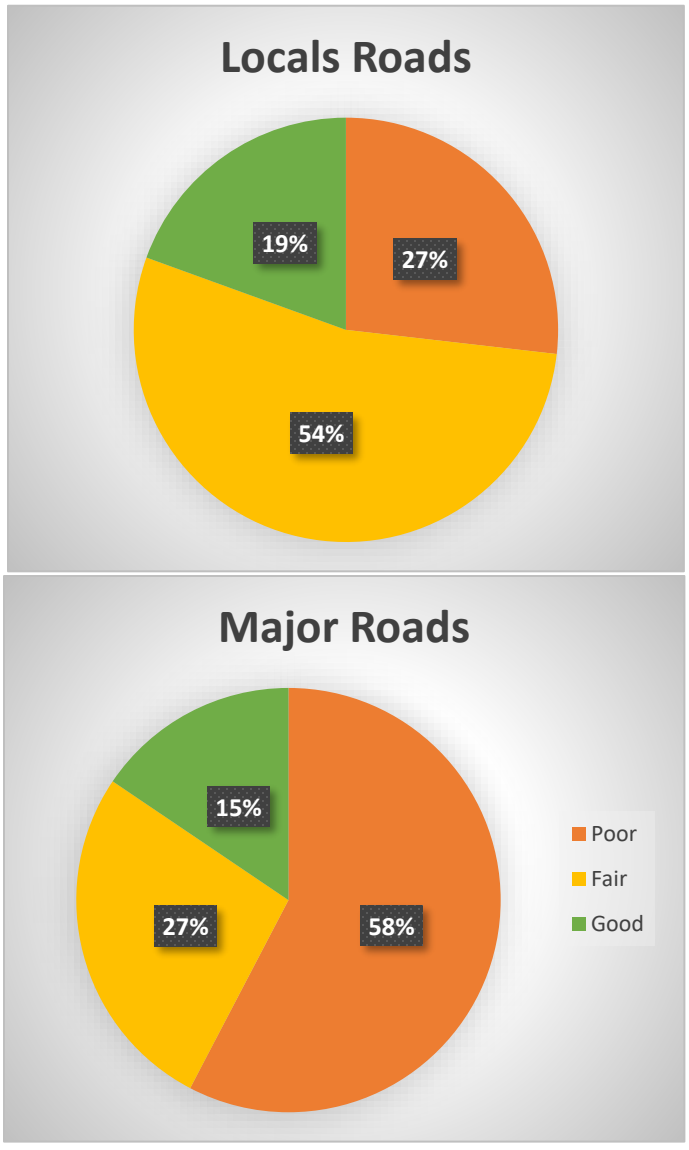


Figure 10: (A) Left: Novi paved city major road network conditions by percentage of good, fair, or poor, and (B) Right: paved city local road network conditions by percentage of good, fair, or poor

In comparison, the statewide paved city major road network has 35.5 percent of roads in the TAMC good condition category, 30.8 percent in fair, and 33.6 percent in poor (Figure 11A). The statewide paved city local road network has 35.5 percent in good, 30.8 percent in fair, and 33.6 percent in poor (Figure 11B). Comparing Figure 10A and Figure 11A shows that Novi's paved city major road network is worse than similarly-classified roads in the rest of the state, while Figure 10B and Figure 11B show that Novi'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.

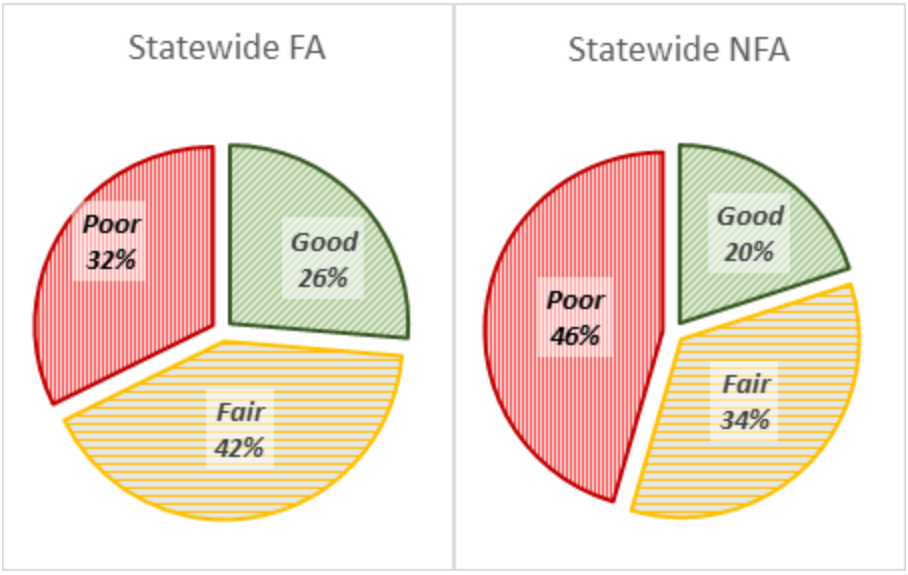


Figure 11: (A) Left: Statewide paved city major road network conditions by percentage of good, fair, or poor, and (B) Right: paved city local road network conditions by percentage of good, fair, or poor

The City of Novi has funded local road projects through an annual millage. This has significantly improved the conditions of the local roads over the past 8 years. The major roads have been funded with a mix of federal aid funds and the City budget. Due to the length and age of the City's major roads, additional funding is needed to ensure that the major roads meet or exceed the state average.

Figure 12 and Figure 13 show the number of miles for Novi's roads with PASER scores expressed in TAMC definition categories for the paved city major road network (Figure 12) and the paved city local road network (Figure 13). Novi 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.

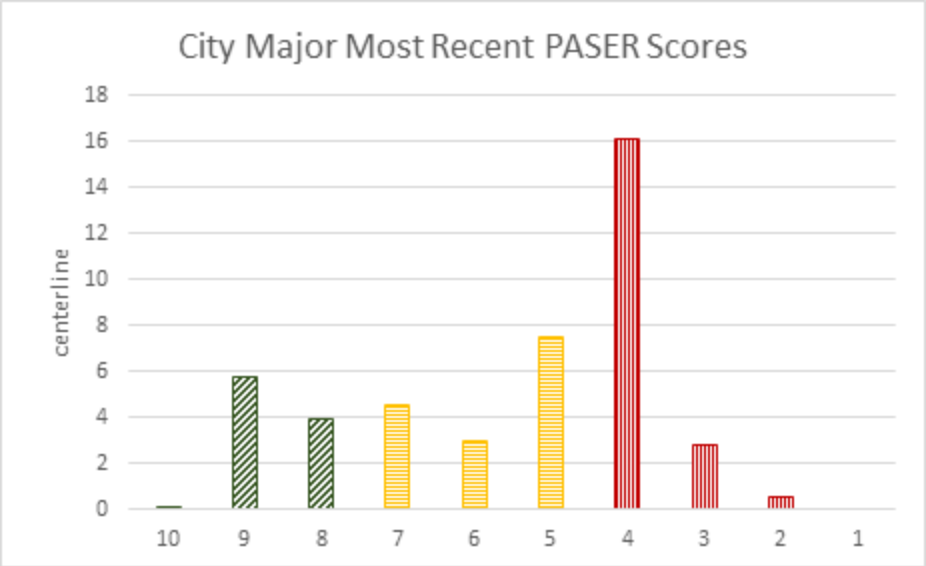


Figure 12: Novi paved city major road network conditions. Bar graph colors correspond to good/fair/poor TAMC designations.

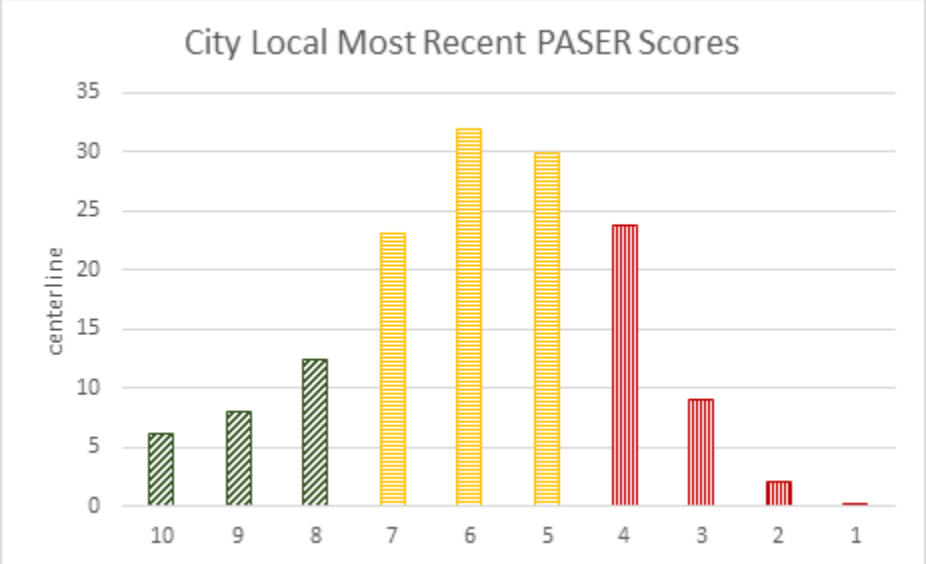


Figure 13: Novi paved city local network condition by PASER rating. Bar graph colors correspond to good/fair/poor TAMC designations.

Figure 14 illustrates Novi's entire paved road network divided by the TAMC good/fair/poor 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 PASER data is located at https://www.mcgi.state.mi.us/tamcMap/.

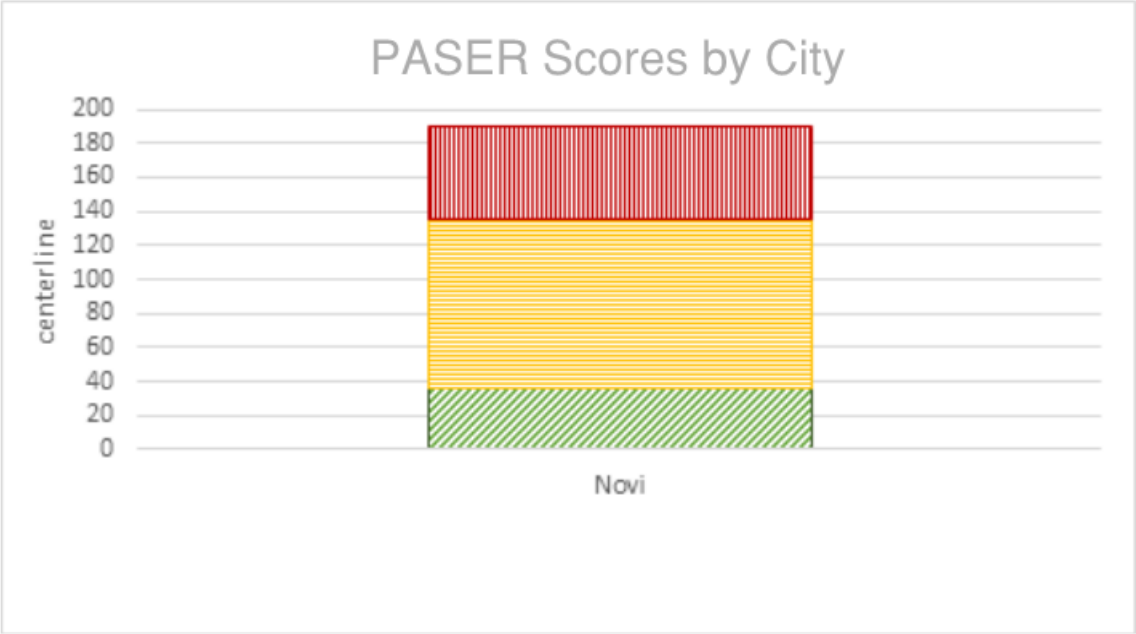


Figure 14: Number of miles of paved road divided in categories of good (PASER 10, 9, 8), fair (PASER 7, 6, 5), and poor (PASER 4, 3, 2, 1).

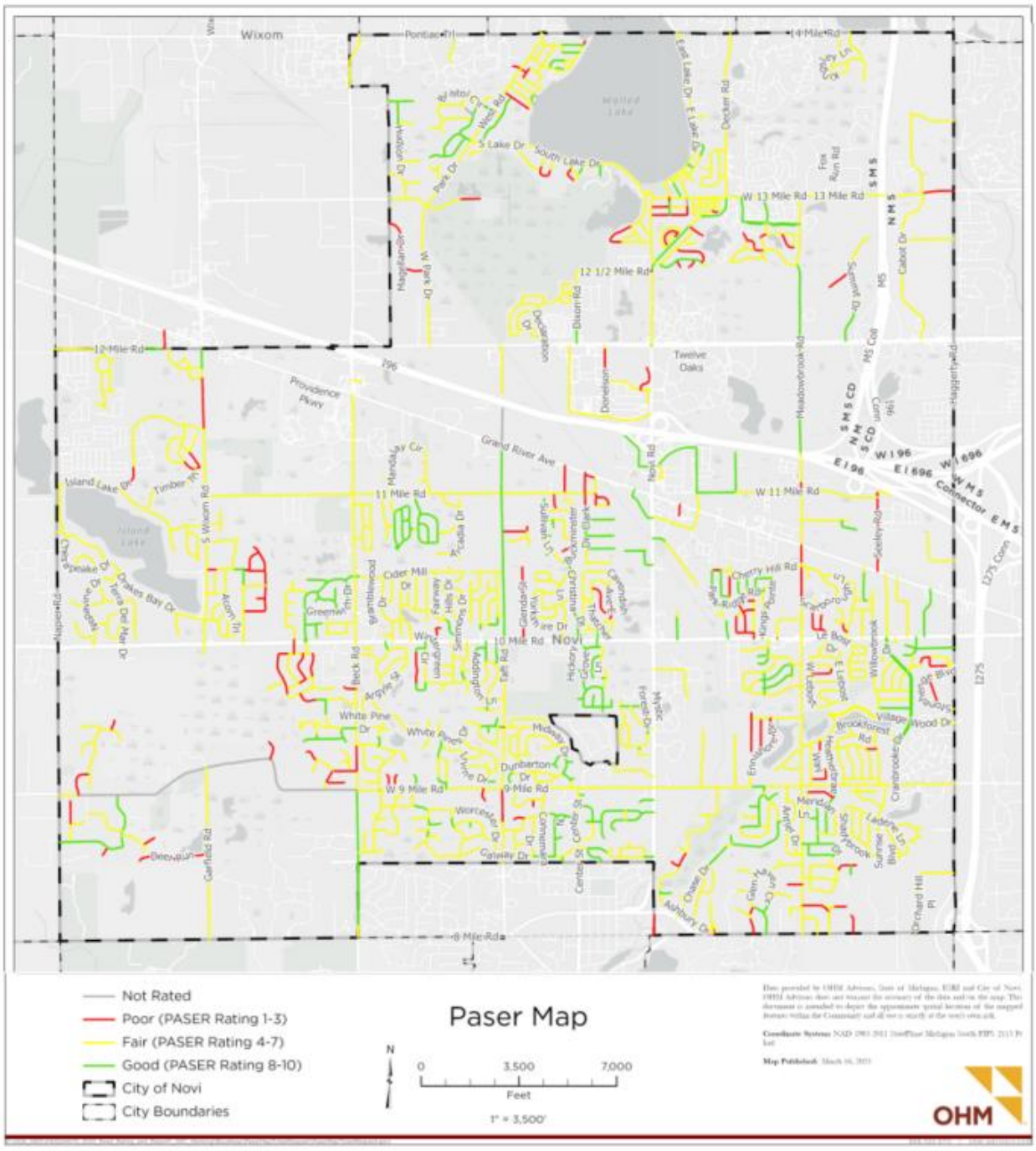


Figure 15: Map of the current paved road condition in good (PASER 10, 9, 8) shown in green, fair (PASER 7, 6, 5) shown in yellow, and poor (PASER 4, 3, 2, 1) shown in red. Only Roads owned by Novi are shown.

Historically, the overall trend in quality of Novi's paved city major roads has been increasing or holding over the last 7 years, as can be observed in Figure 19.

Comparing Novi'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 the trend locally as in the rest of the state.

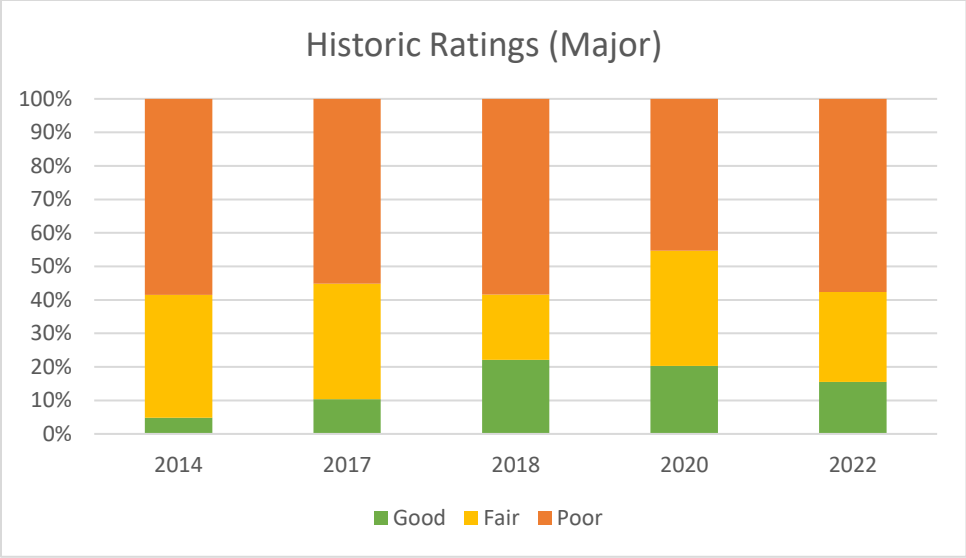


Figure 16: Historical Novi paved city major road network condition trend.

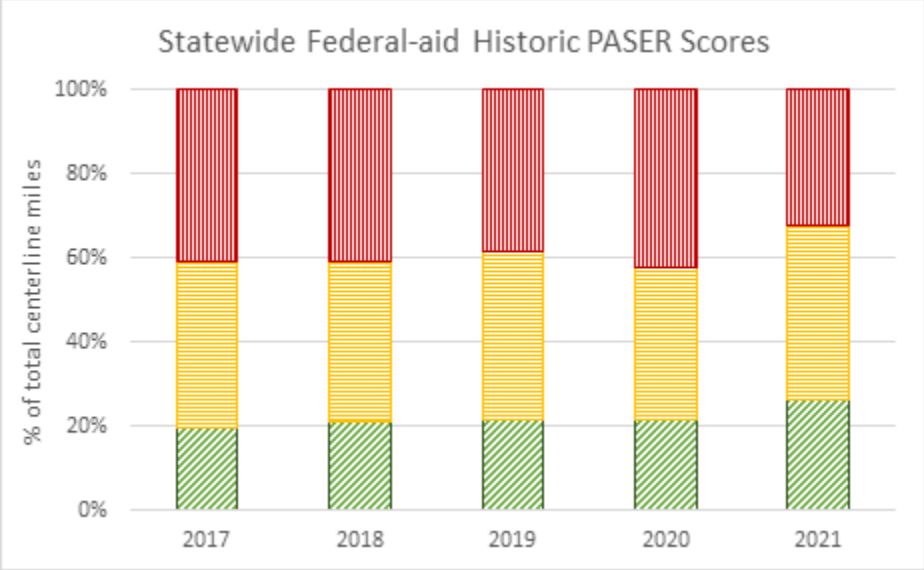


Figure 17: Historical statewide city major road network condition trend

Historically, the overall quality of Novi's paved city local roads have been increasing than the paved city major road network because they lack a source of state and federal funding and therefore must be

supported locally. Figure 18 illustrates the condition of the paved city local road network in Novi while Figure 19 illustrates these conditions statewide.

Comparing Novi'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 that the City of Novi is significantly ahead of the trend in the rest of the state. The year-to-year variation in the paved city local road network is likely due to the fact that only a portion of the network is collected each year, both locally and statewide. This variation is likely a result of reporting bias since a representative sample of roads is not collected each year.

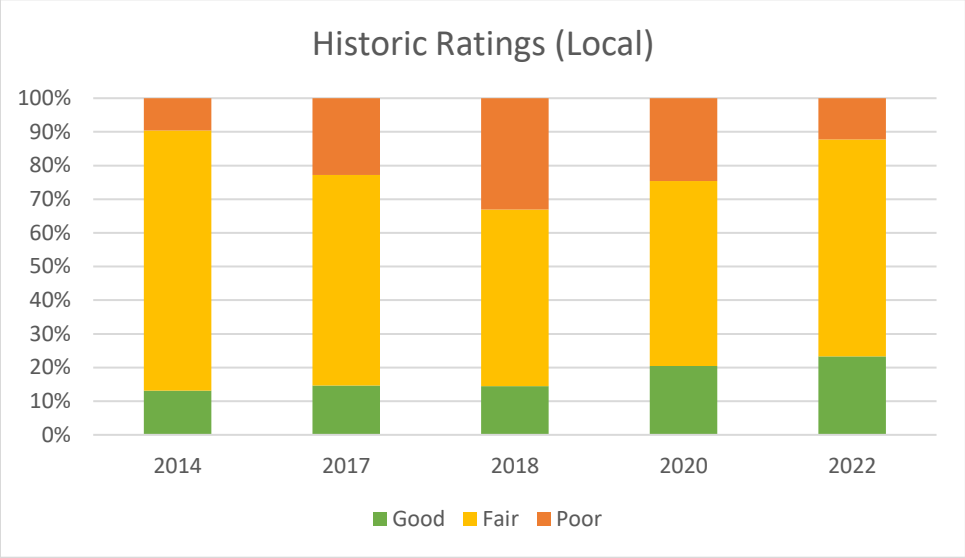


Figure 18: Historical Novi paved city local road network condition trend

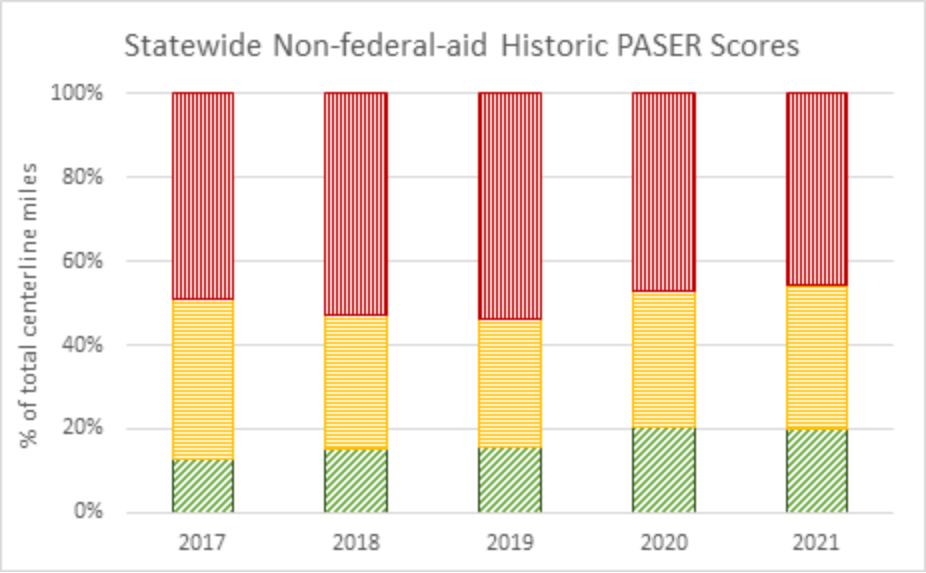


Figure 19: Historical statewide paved city local road network condition trend

Goals

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

Goals for Paved City Major Roads

The overall goal for Novi's paved city major road network is to maintain or improve road conditions network-wide at 2020 levels. The baseline condition for this goal is illustrated in Figure 20.

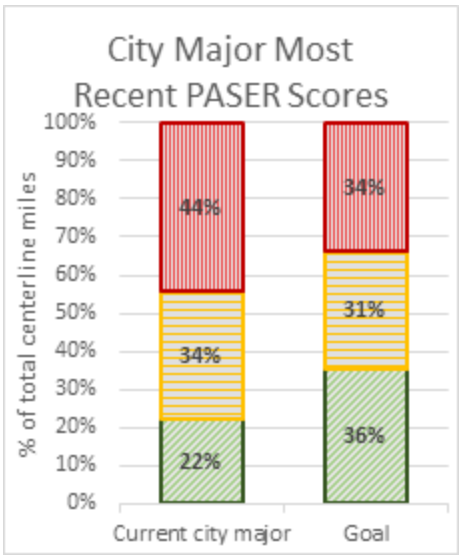


Figure 20: Novi's 2022 city major road network condition by percentage of good/fair/poor

Novi'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).
2. Move 10% percent of paved city major roads out of the poor category.

Goals for Paved City Local Roads

The overall goal for Novi's paved city local road network is to maintain or improve road conditions network-wide at 2022 levels. The baseline condition for this goal is illustrated in Figure 21.

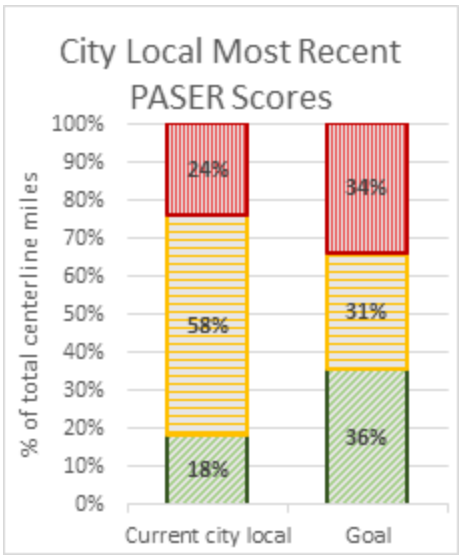


Figure 21: Novi 2022 paved city local road network condition by percentage of good/fair/poor

Novi'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).
2. Increase the percentage of good conditions roads of paved city local roads.

Goals for Unpaved Roads

The overall goal for Novi's unpaved road network is to maintain road conditions network-wide at 2022 levels. The baseline condition for this goal is illustrated in Figure 22.

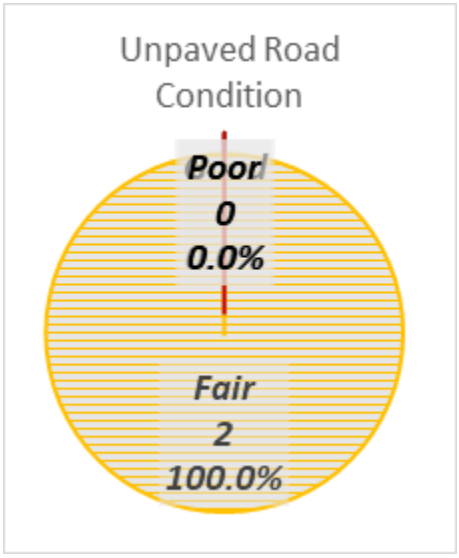


Figure 22: Novi's 2022 unpaved road network condition by percentage of good/fair/poor

Our year-round unpaved roads will be maintained at their current structural adequacy assessments and current drainage adequacy assessments for roads where these two IBR elements are assessed as good or fair. Currently, all of Novi's year-round unpaved roads have good or fair structural adequacy and all have good or fair drainage adequacy. Year-round unpaved roads that have either or both of these two categories assessed as poor will be strategically upgraded as funding is available to address, first, drainage issues and, then, structural issues. Surface widths will be addressed on an as-needed basis to provide service or to address safety issues. Seasonal roads will be addressed to provide passability and safety but do not have a goal associated with them.

Modelled Trends

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

Novi 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 Novi's financial resources can be found in the *2. Financial Resources* section.

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

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

Table 1: Service Life Extension (in Years) for Pavement Types Gained by Fix Type[1]

Fix Type	Life Extension (in years)*			PASER
	Flexible	Composite	Rigid	
HMA crack treatment	1-3	1-3	N/A	6-7
Overband crack filling	1-2	1-2	N/A	6-7
One course non-structural HMA overlay	5-7	4-7	N/A	4-5****
Mill and one course non-structural HMA overlay	5-7	4-7	N/A	3-5
Single course chip seal	3-6	N/A	N/A	5-7†
Double chip seal	4-7	3-6	N/A	5-7†
Single course microsurface	3-5	**	N/A	5-6
Multiple course microsurface	4-6	**	N/A	4-6****
Ultra-thin HMA overlay	3-6	3-6	N/A	4-6****
Paver placed surface seal	4-6	**	N/A	5-7
Full-depth concrete repair	N/A	N/A	3-10	4-5***
Concrete joint resealing	N/A	N/A	1-3	5-8
Concrete spall repair	N/A	N/A	1-3	5-7
Concrete crack sealing	N/A	N/A	1-3	4-7
Diamond grinding	N/A	N/A	3-5	4-6
Dowel bar retrofit	N/A	N/A	2-3	3-5***
Longitudinal HMA wedge/scratch coat with surface treatment	3-7	N/A	N/A	3-5****
Flexible patching	**	**	N/A	N/A
Mastic joint repair	1-3	1-3	N/A	4-7
Cape seal	4-7	4-7	N/A	4-7
Flexible interlayer “A”	4-7	4-7	N/A	4-7
Flexible interlayer “B” (SAMI)	4-7	4-7	N/A	3-7
Flexible interlayer “C”	4-7	4-7	N/A	3-7
Fiber reinforced flexible membrane	4-7	4-7	N/A	3-7
Fog seal	**	**	N/A	7-10
GSB 88	**	**	N/A	7-10
Mastic surface treatment	**	**	N/A	7-10
Scrub seal	**	**	N/A	4-8

* The time range is the expected life extending benefit given to the pavement, not the anticipated longevity of the treatment.

** Data is not available to quantify the life extension.

*** The concrete slabs must be in fair to good condition.

**** Can be used on a pavement with a PASER equal to 3 when the sole reason for rating is rutting or severe raveling of the surface asphalt layer.

† For PASER 4 or less providing structural soundness exists and that additional pre-treatment will be required for example, wedging, bar seals, spot double chip seals, injection spray patching or other pre-treatments.

[1] Part of Appendix D-1 from *MDOT Local Agency Programs Guidelines for Geometrics on Local Agency Projects* 2017 Edition Approved Preventive Maintenance Treatments

Roadsoft Pavement Condition Forecast to Forecast Future Trends

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

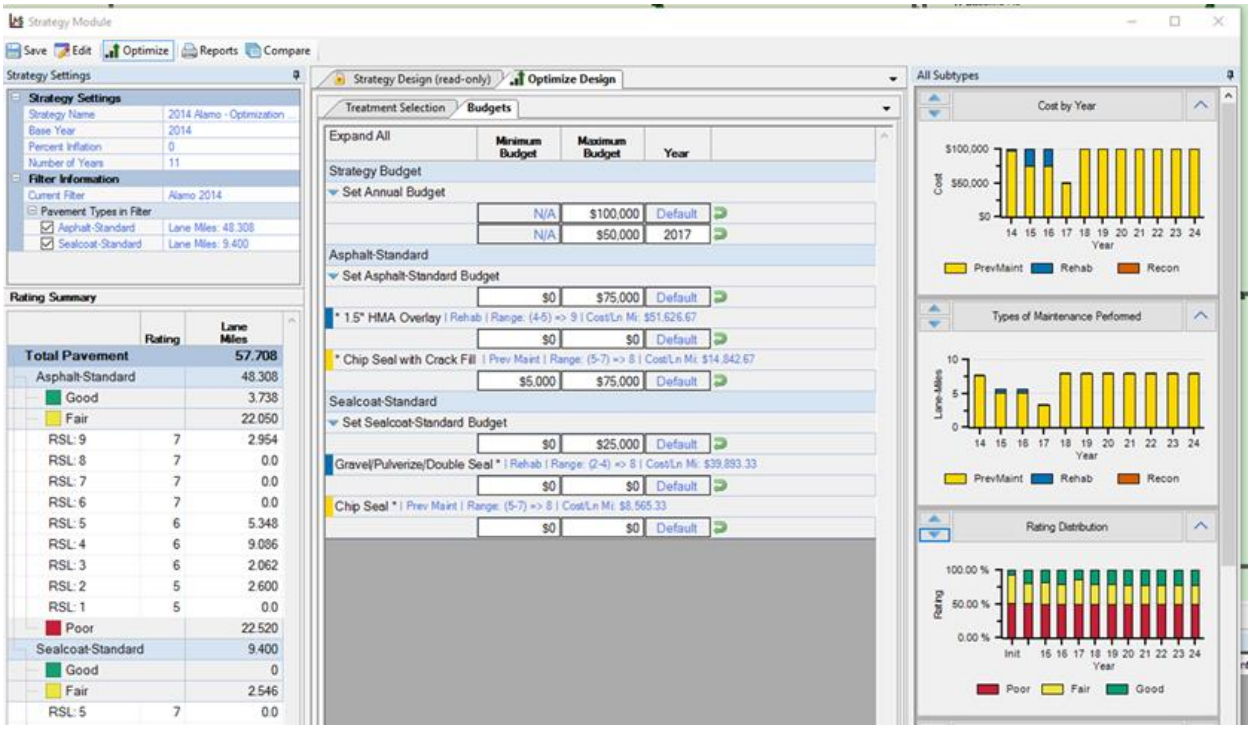


Figure 23: Pavement condition forecast model in the software program Roadsoft.

Paved City Major Roads

Table 4 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 4 are the average treatment volume of planned projects

scheduled to be completed in 2023-2026. See Appendix A of this plan for details on planned projects. Full model inputs and outputs are included in Appendix D.

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

Treatment Name	Annual Miles of Treatment	Years of Life	Trigger-Reset
[Crack Seal]	3	1	6-7, 6–7
[Patching]	1	5	5, 6-8
[Rehab]	3	10-15	3, 4-9
[Recon]	2	21	1, 2, 3-10

Results from the Roadsoft network condition model for the city major roads are shown in Figure 32. The Roadsoft network analysis of Novi's planned projects from its currently-available budget allows Novi to improve the number of good roads in the reach its pavement condition goals given the projects planned for the next three years.

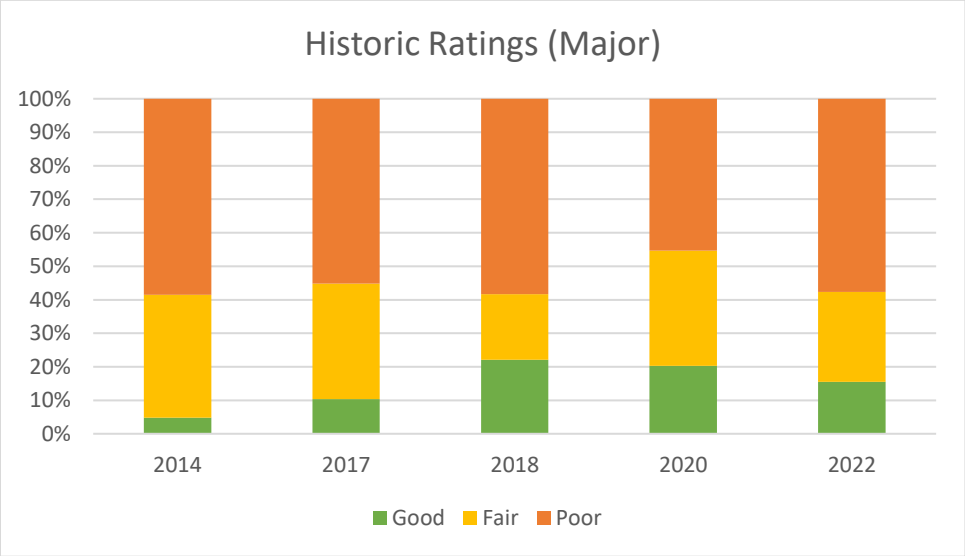


Figure 23: Condition trend good/fair/poor changes to Novi network condition from past projects on the city road network. Based on the past trend, and currently projected funding levels, the trend of decreasing poor and increasing good/fair roads will continue.

Paved City Local Road

A screenshot of Roadsoft's pavement condition model and the associated output is shown in Figure 24.

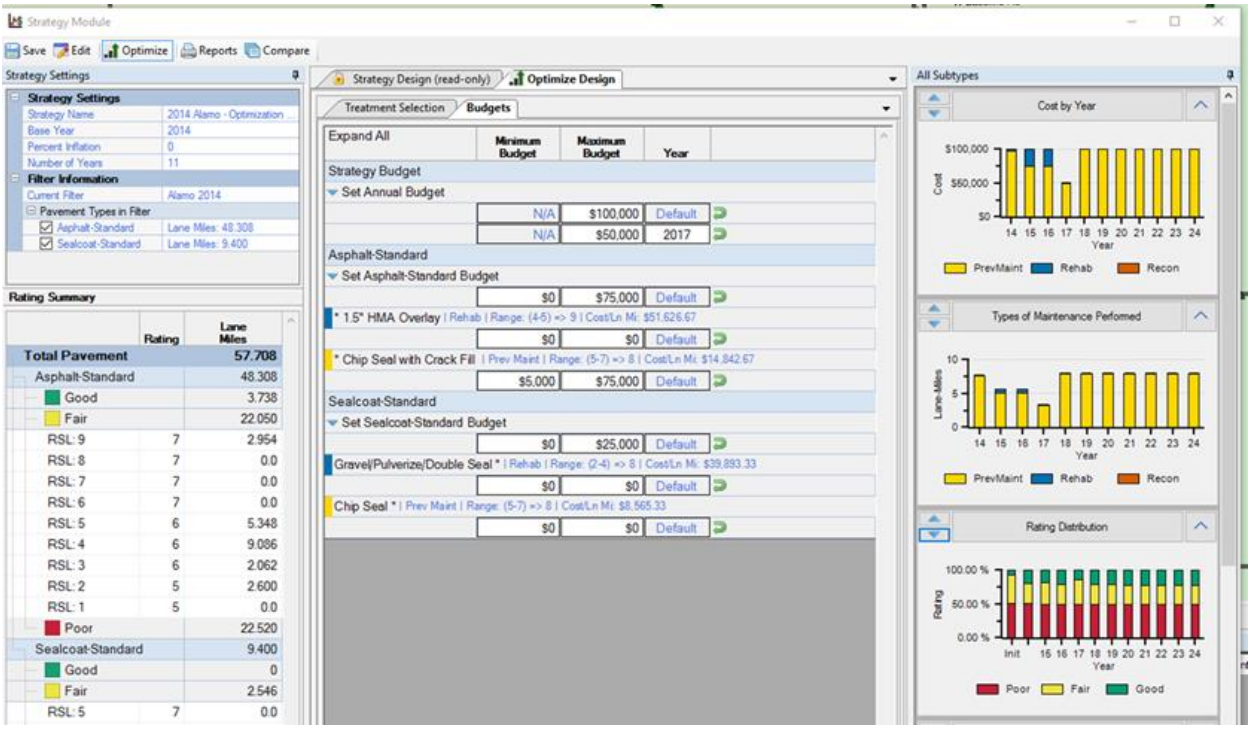


Figure 24: Pavement condition forecast model in the software program Roadsoft.

Table 5 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 5 are the average treatment volume of planned projects scheduled to be completed in the next 3 years. Actual amounts will vary based on the specific projects selected in each year. Details on planned projects are included in Appendix A, and full model inputs and outputs are included in Appendix D.

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

Treatment Name	Annual Miles of Treatment	Years of Life	Trigger-Reset
[Crack Seal]	12	1	7–7
[Patching]	2	5	5, 6-8
[Rehab]	4	13	3, 4-9
[Recon]	4	24	1, 2, 3-10

Results from the Roadsoft network condition model for the paved city local roads are shown in Figure 25. The Roadsoft network analysis of Novi's planned projects from its currently available budget does allow Novi to reach its pavement condition goal given the projects planned for the next five years.

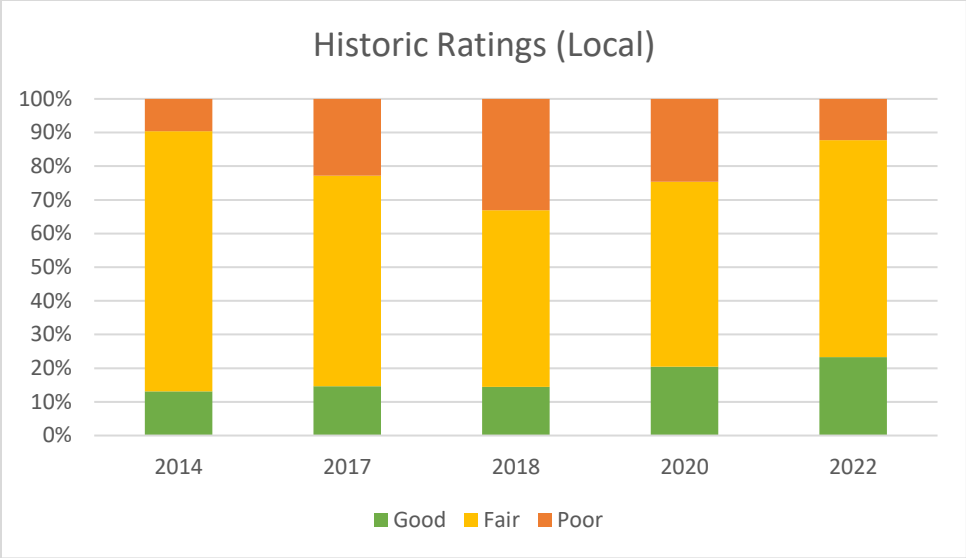


Figure 25: Past trend of good/fair/poor changes to Novi network condition from completed projects on the paved city local road network. The City has slowly expanded funding for local roads and will continue to reduce the percentage of poor roads.

Planned Projects

Novi plans construction and maintenance projects several years in advance. A multi-year planning threshold is required due to the time necessary to plan, design, and finance construction and maintenance projects on the paved 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 Novi to alter initial plans. Project planning information is used to predict the future condition of the road networks that Novi 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 2022-2024, Novi plans to do the following projects:

Paved City Major Projects

Novi is currently planning the construction and maintenance projects listed in Appendix A for the paved city major road network. The total cost of these projects is approximately $20 million.

Paved City Local Projects

Novi is currently planning the construction and maintenance projects listed in Appendix A for the paved city local road network. The locations of planned projects can be seen on the City's website. The total cost of these projects is approximately $4 million annually.

Unpaved Road Projects

Novi is currently planning the maintenance streets on an as needed basis. Periodic chip and slurry seals will be utilized as the existing surface deteriorates. The total cost of these projects is approximately $700,000.

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

Gap Analysis

The current funding levels that Novi receives appear to be sufficient to maintain the existing network conditions, and possibly meet the goals for improving the paved city major road network, the paved city local road network, and the unpaved road network. The *1. Pavement Assets*: *Goals* section of this plan provides further detail about the goals and the *1. Pavement Assets*: *Modelled Trends* section provides further detail on the shortfall given the current budget. However, Novi 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

Novi 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 8 and Table 9 illustrate the network-level model inputs used for this simulation. Full model inputs and outputs are available upon request.

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

Pavement Condition Forecast

Treatment Name	Annual Miles of Treatment	Years of Life	Trigger-Reset
[Crack Seal]	3	1	7–7
[Patching]	1	5-8	5, 6-8
[Rehab]	3	10-15	3, 4-9
[Recon]	2	21	1, 2, 3-10

Table 5: Roadsoft Modelled Trends, Planned Projects, and Gap Analysis for 's Road Assets—Pavement Condition Forecast and Gap Analysis: Roadsoft Annual Work Program for Paved City Local Road Network Forecast

Pavement Condition Forecast

Treatment Name	Annual Miles of Treatment	Years of Life	Trigger-Reset
[Crack Seal]	12	1	7–7
[Patching]	2	5	5, 6-8
[Rehab]	4	13	3, 4-9
[Recon]	4	24	1, 2, 3-10

Additional Work Necessary to Overcome Deficit

Treatment	Annual Miles of Treatment	Years of Life	Trigger-Reset
[Crack Seal]		1	7–7
[Patching]		5	5, 6-8
[Rehab]		13	3, 4-9
[Recon]		24	1, 2, 3-10

Results for the paved city local road network from the Roadsoft network condition model given the inputs in Table 9 are shown in Figure 26 below. Results indicate that the necessary additional work needed to meet the agency condition goal could cost and additional $1,000,000 per year.

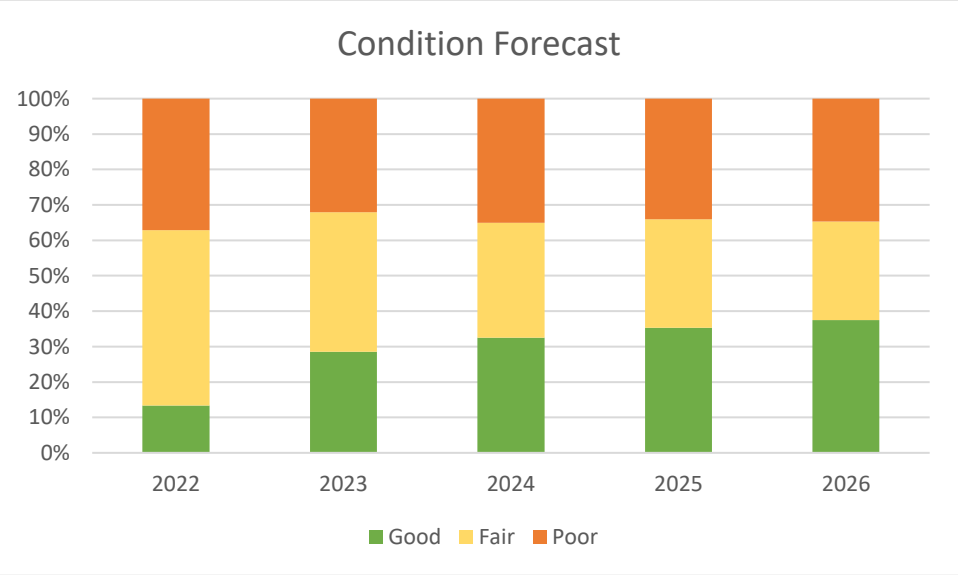


Figure 26: Forecast good/fair/poor Changes to Novi Network Condition from planned projects on the city paved road network.

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. Novi 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.cityofnovi.org/services/finance/budget-and-multi-year-financial-plan.

Novi has a total budget for pavement asset management of approximately $9,000,000 per year.

City Major Network

Novi has historically spent $2,000,000 to $4,000,000 annually on pavement-related projects. Over the next three years, Novi plans to spend $5,500,000 annually 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), City contributions, and federal/state programs.

City Local Network

Novi has historically spent $2,000,000 to $3,300,000 annually on pavement-related projects. Over the next three years, Novi plans to spend $9,900,000 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), bonds, millages, City contributions.

3. RISK OF FAILURE ANALYSIS

Transportation infrastructure is designed to be resilient. The system of interconnecting roads and bridges maintained by Novi 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. These key transportation links in Novi's road network, including those that meet the following types of situations:

- **Geographic divides:** Areas where a geographic feature (river, lake, mountain or limited access road) limits crossing points of the feature
- **Emergency alternate routes for high-volume roads:** Roads which are routinely used as alternate routes for high volume roads or roads that are included in an emergency response plan
- **Limited access areas:** Roads that serve remote or limited access areas that result in long detours if closed
- **Main access to key commercial districts:** Areas where large number or large size business will be significantly impacted if a road is unavailable.

Our road network includes the following critical assets: Beck Road, Wixom Road and Novi Road (north of 12 mile). These roads serve high traffic commercial and residential areas, along with hospitals and schools, and provide critical access to I-96 and M-14.

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

INTERNAL CORDINATION & PLANNING

Novi maintains drinking water, sanitary and storm sewer assets in addition to transportation assets. Novi 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 Novi owns are listed in the following asset management plans: drinking water distribution system asset management plan, wastewater collection system asset management plan, storm sewer system asset management plan. 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.

Novi 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 with 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.
- Significant road reconstruction projects will not be completed until agency owned sub surface utilities are upgraded to have at least a 40 years of remaining service life.

EXTERNAL COORDINATION & PLANNING

The City of Novi maintains an excellent and informative website, where upcoming projects are posted well in advance of the construction. Project plans are shared with local franchise utility share holders (such as Consumers Energy, and DTE) along with other large utility and road owning agencies such as GLWA, RCOC and MDOT. Infrastructure owners are encouraged to discuss planned projects that would

disrupt transportation services or cause damage to pavements. Projects which may cause damage to pavements in good or fair condition are discussed and mitigation measures are proposed to minimize the impact to pavements. Mitigation measures include rescheduling and coordinating projects to maximize value and minimize disruptions and cost to the public.

APPENDIX A: PAVED CITY PLANNED PROJECTS

FY 2021-22 BUDGET: Capital Improvement Program (ADOPTED 5/10/2021)

https://arcg.is/0Xby0W0

	ID#	Project Name	CIP Category	GL Fund #	GL#	FY 2021-22 YR 1	FY 2022-23 YR 2	FY 2023-24 YR 3	FY 2024-25 YR 4	FY 2025-26 YR 5	FY 2026-27 YR 6	Total Budget CIP
1	102-01	Neighborhood Roads Rehabilitation, Repaving, and Reconstruction Program	Roads	LOCAL STREET FUND 203	203-203.00-864.XXX	$ 3,100,000	$ 3,000,000	$ 3,200,000	$ 2,500,000	$ 2,500,000	$ 2,500,000	$ 16,800,000
2	ENG066	Cranbrooke Drive Reconstruction (9 Mile Road to Village Wood Road) net of design	Roads	LOCAL STREET FUND 203	203-203.00-865.186	$ 2,191,460	$ -	$ -	$ -	$ -	$ -	$ 2,191,460
				DRAIN FUND 210	210-211.00-865.186	$ 283,580	$ -	$ -	$ -	$ -	$ -	$ 283,580
3	ENG060	10 Mile Road Rehabilitation and Operational Enhancements (Meadowbrook Road to Haggerty Road) RCOC; city share costs only - reimbursement October 2023 $3.6M; City utilizing interfund borrowing to advance fund project; net of design see 085-81	Roads	MUNICIPAL STREET FUND 204	204-204.00-865.187	$ 495,000	$ -	$ -	$ -	$ -	$ -	$ 495,000
4	162-01	12 Mile Road Widening (Beck Road to Cabaret Drive) RCOC; City Share unknown ($300,000 ROW in FY 2021-22; construction TBD)	Roads	MUNICIPAL STREET FUND 204	204-204.00-865.034	$ 300,000	$ -	$ -	$ -	$ -	$ -	$ 300,000
5	ENG057	Novi Road Rehabilitation (9 Mile Road to 10 Mile Road) RCOC; city share costs only	Roads	MUNICIPAL STREET FUND 204	204-204.00-865.221	$ 212,430	$ -	$ -	$ -	$ -	$ -	$ 212,430
6	ENG058	Wixom Road Rehabilitation & Left Turn Lane Addition (10 Mile Road to City Limits) secured outside funding FAC $1,294,020; net of city share costs	Roads	MAJOR STREET FUND 202	202-202.00-865.214	$ 84,390	$ 514,510	$ -	$ -	$ -	$ -	$ 598,900
7	ENG059	Taft Road Rehabilitation (City Limits to 10 Mile Road) secured FAC funding $910,080; net of City share costs	Roads	MAJOR STREET FUND 202	202-202.00-865.218	$ 73,660	$ 369,850	$ -	$ -	$ -	$ -	$ 443,510
8	ENG067a	GLWA 14 Mile Water Main Transmission Redundancy Route Project - ROAD PORTION (Road Restoration along 11 Mile, Meadowbrook, and 13 Mile Roads) net of design; city share costs only SEE ENG067b	Roads	MAJOR STREET FUND 202	202-202.00-976.089	$ -	$ 3,178,664	$ -	$ -	$ -	$ -	$ 3,178,664
9	082-30	11 Mile Road Rehabilitation (Beck Road to Taft Road) net of design	Roads	MAJOR STREET FUND 202	202-202.00-865.182	$ -	$ 2,083,630	$ -	$ -	$ -	$ -	$ 2,083,630
10	ENG008	Lee BeGole Drive Reconstruction (11 Mile Road to Terminus) net of design	Roads	MAJOR STREET FUND 202	202-202.00-865.183	$ -	$ 1,098,620	$ -	$ -	$ -	$ -	$ 1,098,620
11	ENG011	Novi Road Rehabilitation (13 Mile Road to 14 Mile Road)	Roads	MAJOR STREET FUND 202	202-202.00-865.268	$ -	$ -	$ 2,601,829	$ -	$ -	$ -	$ 2,601,829
12	ENG013	Meadowbrook Road Reconstruction (Grand River Avenue to 11 Mile Road)	Roads	MAJOR STREET FUND 202	202-202.00-865.213	$ -	$ -	$ 936,830	$ -	$ -	$ -	$ 936,830
13	ENG010	Meadowbrook Road Rehabilitation (Cherry Hill Road to Grand River Avenue)	Roads	MAJOR STREET FUND 202	202-202.00-865.677	$ -	$ -	$ 623,500	$ -	$ -	$ -	$ 623,500
14	132-28	West Park Drive Rehabilitation (West Road to Pontiac Trail)	Roads	MAJOR STREET FUND 202		$ -	$ -	$ -	$ 2,508,140	$ -	$ -	$ 2,508,140
15	132-27	11 Mile Road Rehabilitation (Taft Road to Clark Street) net of design	Roads	MAJOR STREET FUND 202	202-202.00-865.177	$ -	$ -	$ -	$ 1,325,800	$ -	$ -	$ 1,325,800
16	132-26	11 Mile Road Rehabilitation (Wixom Road to Beck Road) net of design	Roads	MAJOR STREET FUND 202	202-202.00-865.181	$ -	$ -	$ -	$ -	$ 1,558,110	$ -	$ 1,558,110
17	ENG016	13 Mile Road Rehabilitation (M-5 to Haggerty)	Roads	MAJOR STREET FUND 202		$ -	$ -	$ -	$ -	$ 1,423,510	$ -	$ 1,423,510
18	102-04	Old Novi Road Rehabilitation (Novi Road to 13 Mile Road)	Roads	MAJOR STREET FUND 202	202-202.00-865.180	$ -	$ -	$ -	$ -	$ 830,690	$ -	$ 830,690
19	ENG037	13 Mile Road Rehabilitation (Old Novi Road to Novi Road)	Roads	MAJOR STREET FUND 202	202-202.00-865.679	$ -	$ -	$ -	$ -	$ 788,620	$ -	$ 788,620

	ID#	Project Name	CIP Category	GL Fund #	GL#	FY 2021-22 YR 1	FY 2022-23 YR 2	FY 2023-24 YR 3	FY 2024-25 YR 4	FY 2025-26 YR 5	FY 2026-27 YR 6	Total Budget CIP
20	162-06	Beck Road Widening (10 Mile Road to 11 Mile Road); includes signal modernizations pursue outside funding	Roads	MAJOR STREET FUND 202		$ -	$ -	$ -	$ -	$ -	$ 10,453,620	$ 10,453,620
21	162-03	Beck Road Widening (9 Mile Road to 10 Mile Road); includes signal modernizations pursue outside funding	Roads	MAJOR STREET FUND 202		$ -	$ -	$ -	$ -	$ -	$ 10,044,160	$ 10,044,160
22	132-25	Beck Road Widening (8 Mile Road to 9 Mile Road); includes signal modernizations pursue outside funding	Roads	MAJOR STREET FUND 202	202-202.00-865.091	$ -	$ -	$ -	$ -	$ -	$ 9,806,080	$ 9,806,080
23	162-07	Beck Road Widening (11 Mile Road to Providence Drive/Central Park Boulevard) pursue outside funding	Roads	MAJOR STREET FUND 202		$ -	$ -	$ -	$ -	$ -	$ 5,935,970	$ 5,935,970
24	ENG038	Flint/Bond Street Realignment & Reconstruction - Phase 2 (Terminus to Grand River Avenue); aka Southwest Quadrant Ring Road net of design	Roads	LOCAL STREET FUND 203	203-203.00-865.270	$ -	$ -	$ -	$ -	$ -	$ 890,970	$ 890,970
25	ENG042	Roundabout (Taft Road and 9 Mile Road) secured HSIP Grant $600K	Intersections & Signals	MAJOR STREET FUND 202	202-202.00-863.514	$ -	$ 71,840	$ 506,150	$ -	$ -	$ -	$ 577,990
26	ENG068	Neighborhood Sidewalk Repair Program Per City Council @ 4/21/21 Budget session, $400,000 annually instead of $400,000 only in FY 2021-22	Sidewalks & Pathways	MUNICIPAL STREET FUND 204	204-204.00-967.xxx	$ 200,000	$ 200,000	$ 200,000	$ 200,000	$ 200,000	$ 200,000	$ 1,200,000
				GENERAL FUND 101	101-442.20-967.xxx	$ 200,000	$ 200,000	$ 200,000	$ 200,000	$ 200,000	$ 200,000	$ 1,200,000
27	085-81	Segment 80B, 81A, & 81B -- 10 Mile Road (South Side; Meadowbrook Road to Haggerty Road) - 8' Pathway net of design partially funded by RCOC see ENG060	Sidewalks & Pathways	MUNICIPAL STREET FUND 204	204-204.00-974.475	$ 1,210,000	$ -	$ -	$ -	$ -	$ -	$ 1,210,000
28	ENG061	Segment 49 -- 10 Mile Road (North side, West of Wixom Road) - 10' Boardwalk and 6' Sidewalk	Sidewalks & Pathways	MUNICIPAL STREET FUND 204	204-204.00-974.483	$ -	$ -	$ 178,480	$ -	$ -	$ -	$ 178,480
29	ENG069	Segment 4040 (Off-road paved) -- Meadowbrook Road (Village Wood Lake Park to Chattman Drive) - 5' sidewalk & 8' pathway along with boardwalk over wetlands potential grant funding	Sidewalks & Pathways	MUNICIPAL STREET FUND 204		$ -	$ -	$ -	$ -	$ 359,300	$ -	$ 359,300
30	ENG070	Segment 101c, 102, 104b -- Napier Road (East side; ITC Community Sports Park entrance drive to Villa Barr Art Park) - 8' Pathway potential grant funding	Sidewalks & Pathways	MUNICIPAL STREET FUND 204		$ -	$ -	$ -	$ -	$ 263,810	$ -	$ 263,810
31	ENG063	Segment 178 -- 12 Mile Road (South side; East of Albert Street) - 6' Sidewalk	Sidewalks & Pathways	MUNICIPAL STREET FUND 204	204-204.00-974.485	$ -	$ -	$ -	$ -	$ 136,320	$ -	$ 136,320
32	ENG062	Segment 45 -- 12 Mile Road (South side, Northwest Neighborhood Park) - 6' Sidewalk	Sidewalks & Pathways	MUNICIPAL STREET FUND 204	204-204.00-974.484	$ -	$ -	$ -	$ -	$ 93,750	$ -	$ 93,750
33	133-08	Streambank Stabilization - Middle Rouge River (near Meadowbrook Lake)	Storm Sewer & Drainage	DRAIN FUND 210	210-211.00-865.146	$ 1,469,656	$ -	$ -	$ -	$ -	$ -	$ 1,469,656
34	093-10	Streambank Stabilization - Middle Rouge River (along Rotary Park)	Storm Sewer & Drainage	DRAIN FUND 210	210-211.00-865.140	$ -	$ 582,092	$ -	$ -	$ -	$ -	$ 582,092
35	ENG034	Basin Repairs - Orchard Hill Place	Storm Sewer & Drainage	DRAIN FUND 210	210-211.00-865.137	$ -	$ -	$ 276,771	$ -	$ -	$ -	$ 276,771
36	ENG051	Basin Cleanout - Leavenworth Regional (south of Grand River Avenue; east of Taft Road)	Storm Sewer & Drainage	DRAIN FUND 210	210-211.00-865.269	$ -	$ -	$ 108,929	$ -	$ -	$ -	$ 108,929
37	ENG071	Streambank Stabilization - Middle Rouge (between Novi Road and Ten Mile Road)	Storm Sewer & Drainage	DRAIN FUND 210		$ -	$ -	$ -	$ 1,578,110	$ -	$ -	$ 1,578,110
38	ENG050	Basin Cleanout - Bishop Creek Regional (north of Grand River Avenue; west of Meadowbrook Road)	Storm Sewer & Drainage	DRAIN FUND 210		$ -	$ -	$ -	$ -	$ 1,344,520	$ -	$ 1,344,520
39	153-02	Storm Drainage Improvement Pilot Project (Section 25)	Storm Sewer & Drainage	DRAIN FUND 210	210-211.00-865.144	$ -	$ -	$ -	$ -	$ 750,000	$ 750,000	$ 1,500,000

	ID#	Project Name	CIP Category	GL Fund #	GL#	FY 2021-22 YR 1	FY 2022-23 YR 2	FY 2023-24 YR 3	FY 2024-25 YR 4	FY 2025-26 YR 5	FY 2026-27 YR 6	Total Budget CIP
126	IFT005	Virtual Desktop (VDI) Server Replacements - 1 storage device, 5 servers, and 2 switches (every 6 years)	Technology	GENERAL FUND 101	101-205.00-986.031	$ -	$ 176,320	$ -	$ -	$ -	$ -	$ 176,320
127	CDB002	CD Tech Upgrades (Phase 2) - Electronic Plan Review and Management Web-Based Solutions Software - $12,000 annual fee for 3 years ONLY	Technology	GENERAL FUND 101	101-371.00-850.008	$ -	$ 60,220	$ -	$ -	$ -	$ -	$ 60,220
128	IFT006	Telephone Server Replacement (every 10 years)	Technology	GENERAL FUND 101	101-205.00-986.036	$ -	$ -	$ 38,400	$ -	$ -	$ -	$ 38,400
129	IFT007	Network Firewall Replacement-Civic Center (every 6 years)	Technology	GENERAL FUND 101	101-205.00-986.041	$ -	$ -	$ 31,340	$ -	$ -	$ -	$ 31,340
130	IFT009	Network Video Recorder Server Replacement - Civic Center (every 6 years)	Technology	GENERAL FUND 101	101-205.00-986.037	$ -	$ -	$ 19,920	$ -	$ -	$ -	$ 19,920
131	IFT010	Camera Server Replacement - Police Building (every 6 years)	Technology	GENERAL FUND 101		$ -	$ -	$ -	$ -	$ 98,210	$ -	$ 98,210
						$ 16,537,792	$ 15,997,417	$ 15,596,738	$ 18,024,870	$ 15,679,290	$ 48,505,850	$ 130,341,957

Totals By Fund

	FY 2021-22 YR 1	FY 2022-23 YR 2	FY 2023-24 YR 3	FY 2024-25 YR 4	FY 2025-26 YR 5	FY 2026-27 YR 6	Total Budget CIP
GENERAL FUND 101	$ 821,439	$ 1,308,878	$ 1,920,343	$ 6,298,700	$ 1,280,630	$ 1,165,050	$ 12,795,040
MAJOR STREET FUND 202	$ 158,050	$ 7,317,114	$ 4,668,309	$ 3,833,940	$ 4,600,930	$ 36,239,830	$ 56,818,173
LOCAL STREET FUND 203	$ 5,291,460	$ 3,000,000	$ 3,200,000	$ 2,500,000	$ 2,500,000	$ 3,390,970	$ 19,882,430
MUNICIPAL STREET FUND 204	$ 2,417,430	$ 200,000	$ 378,480	$ 200,000	$ 1,053,180	$ 200,000	$ 4,449,090
PARKS, RECREATION & CULTURAL SERVICES FUND 208	$ 147,970	$ 254,550	$ 141,610	$ 116,120	$ 231,440	$ 3,252,480	$ 4,144,170
DRAIN FUND 210	$ 1,897,430	$ 582,092	$ 385,700	$ 1,578,110	$ 2,094,520	$ 750,000	$ 7,287,852
CAPITAL IMPROVEMENT PROGRAM (CIP) FUND 400	$ 890,004	$ 934,507	$ 981,236	$ -	$ -	$ -	$ 2,805,747
GUN RANGE FACILITY FUND 402	$ -	$ -	$ -	$ 362,590	$ -	$ -	$ 362,590
ICE ARENA FUND 590	$ -	$ -	$ 200,000	$ 144,500	$ 860,060	$ -	$ 1,204,560
WATER AND SEWER FUND 592	$ 4,635,579	$ 2,018,316	$ 3,484,710	$ 2,990,910	$ 3,058,530	$ 3,507,520	$ 19,695,565
SENIOR HOUSING FUND 594	$ 278,430	$ 381,960	$ 236,350	$ -	$ -	$ -	$ 896,740
	$ 16,537,792	$ 15,997,417	$ 15,596,738	$ 18,024,870	$ 15,679,290	$ 48,505,850	$ 130,341,957

City of Novi
Capital Improvement Program
FY 2022-23 Budget
https://bit.ly/3JpVeG7

						BUDGET	PROJECTED		FORECAST			
	ID#	Project Name	CIP Category	GL Fund #	GL#	FY 2022-23 YR 1	FY 2023-24 YR 2	FY 2024-25 YR 3	FY 2025-26 YR 4	FY 2026-27 YR 5	FY 2027-28 YR 6	Total Budget CIP
1	102-01	Neighborhood Roads Rehabilitation, Repaving, and Reconstruction Program	Roads	LOCAL STREET FUND 203	203-203.00-864.XXX	$ 3,000,000	$ 4,300,000	$ 4,600,000	$ 6,000,000	$ 6,000,000	$ 6,000,000	$ 29,900,000
2	ENG073	Taft Road Rehabilitation (South City Limits to 10 Mile Road) & Roundabout at 9 Mile Road - net of design; city share costs only	Roads	MAJOR STREET FUND 202	202-202.00-865.271	$ 2,570,230	$ -	$ -	$ -	$ -	$ -	$ 2,570,230
3	ENG067a	GLWA 14 Mile Water Main Transmission Redundancy Route Project - STREET PORTION (Road Restoration along 11 Mile, Meadowbrook, and 13 Mile Roads) net of design; city share costs only	Roads	MAJOR STREET FUND 202	202-202.00-976.089	$ 1,719,990	$ -	$ -	$ -	$ -	$ -	$ 1,719,990
4	ENG077	12 Mile Road Reconstruction (Medina Boulevard to City Limits) including sidewalk segments 45 & 178	Roads	LOCAL STREET FUND 203	203-203.00-865.230	$ 1,373,350	$ -	$ -	$ -	$ -	$ -	$ 1,373,350
5	162-07	Beck Road Widening (11 Mile Road to Providence Drive/Central Park Boulevard)	Roads	MAJOR STREET FUND 202	202-202.00-865.226	$ 477,030	$ -	$ -	$ -	$ -	$ -	$ 477,030
6	ENG076	West Park Drive Rehabilitation (West Road to Pontiac Trail) including traffic signal modernization at South Lake Drive	Roads	MAJOR STREET FUND 202	202-202.00-865.228	$ 154,340	$ 2,798,820	$ -	$ -	$ -	$ -	$ 2,953,160
7	ENG075	Meadowbrook Road Rehabilitation (10 Mile to 11 Mile Road)	Roads	MAJOR STREET FUND 202	202-202.00-865.227	$ 64,710	$ 166,710			$ -	$ -	$ 231,420
8	ENG078	9 Mile Road Rehabilitation (Meadowbrook Road to Haggerty Road)	Roads	MAJOR STREET FUND 202	202-202.00-865.229	$ 46,540	$ 156,260	$ -	$ -	$ -	$ -	$ 202,800
9	ENG079	Industrial Business Parks Road Rehabilitation (Hudson Drive, Magellan Drive, Humboldt Drive, Desoto Court, Peary Court, and Ryan Court) - Local Street Fund Portion	Roads	LOCAL STREET FUND 203	203-203.00-865.248	$ 493,880	$ -	$ -	$ -	$ -	$ -	$ 493,880
	ENG079	Industrial Business Parks Road Rehabilitation (Hudson Drive, Magellan Drive, Humboldt Drive, Desoto Court, Peary Court, and Ryan Court) - Major Street Fund Portion	Roads	MAJOR STREET FUND 202	202-202.00-865.248	$ -	$ 1,690,530	$ -	$ -	$ -	$ -	$ 1,690,530
10	ENG058	Wixom Road Rehabilitation & Left Turn Lane Addition (10 Mile Road to City Limits); city share costs only	Roads	MAJOR STREET FUND 202	202-202.00-865.214	$ -	$ 156,380	$ 1,702,380	$ -	$ -	$ -	$ 1,858,760
11	082-30	11 Mile Road Rehabilitation (Beck Road to Taft Road) including Seg 37a Sidewalk (north side, Beck Road and East Mandalay Circle); net of design	Roads	MAJOR STREET FUND 202	202-202.00-865.182	$ -	$ -	$ 2,884,370	$ -	$ -	$ -	$ 2,884,370
12	ENG074	Novi Road Rehabilitation (13 Mile Road to 14 Mile Road) including traffic signal modernizations at 13 Mile Road, Waverly Drive, and 14 Mile Road	Roads	MAJOR STREET FUND 202	n/a	$ -	$ -	$ -	$ 4,200,970	$ -	$ -	$ 4,200,970
13	ENG081	Village Wood Road (Cranbrooke Drive to Haggerty Road) and Section 25 Storm Drainage Improvements; includes sidewalk construction - Street Fund portion	Roads	LOCAL STREET FUND 203	n/a	$ -	$ -	$ -	$ 1,786,910	$ -	$ -	$ 1,786,910
	ENG081	Village Wood Road (Cranbrooke Drive to Haggerty Road) and Section 25 Storm Drainage Improvements; includes sidewalk construction - Drain Fund portion	Roads	DRAIN FUND 210	n/a	$ -	$ -	$ -	$ 249,510	$ -	$ -	$ 249,510
14	ENG016	13 Mile Road Rehabilitation (M-5 to Haggerty)	Roads	MAJOR STREET FUND 202	n/a	$ -	$ -	$ -	$ 1,423,510	$ -	$ -	$ 1,423,510
15	132-26	11 Mile Road Rehabilitation (Wixom Road to Beck Road) includes Segment 52a pathway connection to ITC Trail; net of design	Roads	MAJOR STREET FUND 202	202-202.00-865.181	$ -	$ -	$ -	$ 1,172,540	$ -	$ -	$ 1,172,540
16	102-04	Old Novi Road Rehabilitation (Novi Road to 13 Mile Road)	Roads	MAJOR STREET FUND 202	202-202.00-865.180	$ -	$ -	$ -	$ 830,690	$ -	$ -	$ 830,690
17	ENG037	13 Mile Road Rehabilitation (Old Novi Road to Novi Road)	Roads	MAJOR STREET FUND 202	202-202.00-865.679	$ -	$ -	$ -	$ 788,620	$ -	$ -	$ 788,620
18	ENG080	Willowbrook Estates No. 3 Road Reconstruction and Storm Drainage Improvements (Glen Ridge Court, Rock Hill Lane, Maude Lea Circle, Ripple Creek Road) - Street Fund portion	Roads	LOCAL STREET FUND 203	n/a	$ -	$ -	$ -	$ -	$ 2,267,630	$ -	$ 2,267,630
	ENG080	Willowbrook Estates No. 3 Road Reconstruction and Section 25 Storm Drainage Improvements (Glen Ridge Court, Rock Hill Lane, Maude Lea Circle, Ripple Creek Road) - Drain Fund portion	Roads	DRAIN FUND 210	n/a	$ -	$ -	$ -	$ -	$ 758,870	$ -	$ 758,870

City of Novi
Capital Improvement Program
FY 2022-23 Budget
https://bit.ly/3JpVeG7

						BUDGET	PROJECTED		FORECAST			
	ID#	Project Name	CIP Category	GL Fund #	GL#	FY 2022-23 YR 1	FY 2023-24 YR 2	FY 2024-25 YR 3	FY 2025-26 YR 4	FY 2026-27 YR 5	FY 2027-28 YR 6	Total Budget CIP
19	ENG008	Lee BeGole Drive Reconstruction (11 Mile Road to Terminus); net of design	Roads	MAJOR STREET FUND 202	202-202.00-865.183	$ -	$ -	$ -	$ -	$ 1,236,500	$ -	$ 1,236,500
20	132-27	11 Mile Road Rehabilitation (Taft Road to Clark Street); net of design	Roads	MAJOR STREET FUND 202	202-202.00-865.177	$ -	$ -	$ -	$ -	$ 793,860	$ -	$ 793,860
21	162-06	Beck Road Widening (10 Mile Road to 11 Mile Road); includes signal modernizations - pursuing outside funding	Roads	MAJOR STREET FUND 202	n/a	$ -	$ -	$ -	$ -	$ -	$ 10,767,230	$ 10,767,230
22	162-03	Beck Road Widening (9 Mile Road to 10 Mile Road); includes signal modernizations - pursuing outside funding	Roads	MAJOR STREET FUND 202	n/a	$ -	$ -	$ -	$ -	$ -	$ 10,345,480	$ 10,345,480
23	132-25	Beck Road Widening (8 Mile Road to 9 Mile Road); includes signal modernizations - pursuing outside funding	Roads	MAJOR STREET FUND 202	202-202.00-865.091	$ -	$ -	$ -	$ -	$ -	$ 10,100,260	$ 10,100,260
24	ENG068	Neighborhood Sidewalk Repair Program (Street Fund portion)	Sidewalks & Pathways	MUNICIPAL STREET FUND 204	204-204.00-967.xxx	$ 200,000	$ 200,000	$ 200,000	$ 200,000	$ 200,000	$ 200,000	$ 1,200,000
	ENG068	Neighborhood Sidewalk Repair Program (General Fund portion; aka tree-related portion)	Sidewalks & Pathways	GENERAL FUND 101	101-442.20-967.xxx	$ 200,000	$ 200,000	$ 200,000	$ 200,000	$ 200,000	$ 200,000	$ 1,200,000
25	ENG069	Segment 4040 (Off-road paved) -- Meadowbrook Road (Village Wood Lake Park to Chattman Drive) - 5' sidewalk & 8' pathway along with boardwalk over wetlands	Sidewalks & Pathways	MUNICIPAL STREET FUND 204	n/a	$ -	$ -	$ -	$ 359,300	$ -	$ -	$ 359,300
26	ENG070	Segment 101c, 102, 104b -- Napier Road (East side; ITC Community Sports Park entrance drive to Villa Barr Art Park) - 8' Pathway	Sidewalks & Pathways	MUNICIPAL STREET FUND 204	n/a	$ -	$ -	$ -	$ 263,810	$ -	$ -	$ 263,810
27	133-08	Streambank Stabilization - Middle Rouge River (near Meadowbrook Lake)	Storm Sewer & Drainage	DRAIN FUND 210	210-211.00-865.146	$ 1,466,590	$ -	$ -	$ -	$ -	$ -	$ 1,466,590
28	093-10	Streambank Stabilization - Middle Rouge River (along Rotary Park)	Storm Sewer & Drainage	DRAIN FUND 210	210-211.00-865.140	$ -	$ 599,550	$ -	$ -	$ -	$ -	$ 599,550
29	ENG034	Basin Repairs - Orchard Hill Place	Storm Sewer & Drainage	DRAIN FUND 210	210-211.00-865.137	$ -	$ 492,940	$ -	$ -	$ -	$ -	$ 492,940
30	ENG051	Basin Cleanout - Leavenworth Regional (south of Grand River Avenue; east of Taft Road)	Storm Sewer & Drainage	DRAIN FUND 210	210-211.00-865.269	$ -	$ 108,920	$ -	$ -	$ -	$ -	$ 108,920
31	ENG071	Streambank Stabilization - Middle Rouge (between Novi Road and Ten Mile Road)	Storm Sewer & Drainage	DRAIN FUND 210	210-211.00-865.151	$ -	$ 164,190	$ 2,133,950	$ -	$ -	$ -	$ 2,298,140
32	ENG050	Basin Cleanout - Bishop Creek Regional (north of Grand River Avenue; west of Meadowbrook Road)	Storm Sewer & Drainage	DRAIN FUND 210	n/a	$ -	$ -	$ -	$ 1,344,520	$ -	$ -	$ 1,344,520
33	153-02	Storm Drainage Improvements- Section 25	Storm Sewer & Drainage	DRAIN FUND 210	210-211.00-865.144	$ -	$ -	$ -	$ -	$ -	$ 750,000	$ 750,000
34	WTS044	Sanitary Sewer Capacity Upgrades (Lanny's Influent & Drakes Bay Effluent) & Pump Station Rehabilitation (Drakes Bay & Wixom Pump Stations)	Sanitary Sewer	WATER AND SEWER FUND 592	592-592.00-976.123	$ -	$ 2,405,350	$ -	$ -	$ -	$ -	$ 2,405,350
35	WTS027	Sanitary Sewer Rehabilitation - Meadowbrook Glens Subdivision	Sanitary Sewer	WATER AND SEWER FUND 592	592-592.00-976.108	$ -	$ 704,450	$ -	$ -	$ -	$ -	$ 704,450
36	WTS022	Rouge Valley Sanitary Disposal System Improvements (Long-Term Corrective Action Plan (LTCAP)) Wayne County	Sanitary Sewer	WATER AND SEWER FUND 592	592-592.00-976.052	$ -	$ -	$ -	$ -	$ 2,100,000	$ -	$ 2,100,000

City of Novi
Capital Improvement Program
FY 2022-23 Budget
https://bit.ly/3JpVeG7

ID#	Project Name	CIP Category	GL Fund #	GL#	BUDGET FY 2022-23 YR 1	PROJECTED FY 2023-24 YR 2	PROJECTED FY 2024-25 YR 3	FORECAST FY 2025-26 YR 4	FORECAST FY 2026-27 YR 5	FORECAST FY 2027-28 YR 6	Total Budget CIP
			GENERAL FUND 101		$ 1,798,380	$ 2,092,050	$ 2,188,090	$ 14,152,650	$ 1,883,760	$ 1,080,600	$ 23,195,530
			MAJOR STREET FUND 202		$ 5,032,840	$ 4,968,700	$ 4,586,750	$ 8,416,330	$ 2,030,360	$ 31,212,970	$ 56,247,950
			LOCAL STREET FUND 203		$ 4,867,230	$ 4,300,000	$ 4,600,000	$ 7,786,910	$ 8,267,630	$ 6,000,000	$ 35,821,770
			MUNICIPAL STREET FUND 204		$ 200,000	$ 200,000	$ 200,000	$ 823,110	$ 200,000	$ 200,000	$ 1,823,110
			PARKS, RECREATION & CULTURAL SERVICES FUND 208		$ 70,140	$ 551,290	$ 116,120	$ 609,040	$ 3,579,420	$ 422,460	$ 5,348,470
			DRAIN FUND 210		$ 1,466,590	$ 1,365,600	$ 2,133,950	$ 1,594,030	$ 758,870	$ 1,106,490	$ 8,425,530
			CAPITAL IMPROVEMENT PROGRAM (CIP) FUND 400		$ 2,942,030	$ 981,230	$ 928,810	$ -	$ -	$ 1,192,690	$ 6,044,760
			GUN RANGE FACILITY FUND 402		$ -	$ -	$ 362,590	$ -	$ 111,190	$ -	$ 473,780
			ICE ARENA FUND 590		$ 900,330	$ 200,000	$ 144,500	$ 860,060	$ -	$ -	$ 2,104,890
			WATER AND SEWER FUND 592		$ 4,944,130	$ 8,232,300	$ 4,524,970	$ 7,544,950	$ 8,007,520	$ 4,592,570	$ 37,846,440
			SENIOR HOUSING FUND 594		$ 381,960	$ 555,610	$ -	$ -	$ -	$ -	$ 937,570
					$ 22,603,630	$ 23,446,780	$ 19,785,780	$ 41,787,080	$ 24,838,750	$ 45,807,780	$ 178,269,800

Total CIP by Fund

City of Novi

Capital Improvement Program

FY 2023-24 Budget

https://bit.ly/3iBOqxq

							BUDGET	PROJECTED		FORECAST			
	new request?	Who Did Request?	ID#	Project Name	CIP Category	GL Fund #	FY 2023-24 YR 1	FY 2024-25 YR 2	FY 2025-26 YR 3	FY 2026-27 YR 4	FY 2027-28 YR 5	FY 2028-29 YR 6	Total Budget CIP
1	NO	Department of Public Works	102-01	Neighborhood Roads Rehabilitation, Repaving, and Reconstruction Program	Roads	LOCAL STREET FUND 203	$ 4,450,000	$ 4,650,000	$ 4,575,000	$ 4,500,000	$ 6,000,000	$ 6,000,000	$ 30,175,000
2	NO	Department of Public Works	ENG058	Wixom Road Rehabilitation & Left Turn Lane Addition (10 Mile Road to City Limits) secured outside funding 1.47M; net of city share costs	Roads	MAJOR STREET FUND 202	$ 3,475,760	$ -	$ -	$ -	$ -	$ -	$ 3,475,760
3	NO	Department of Public Works	ENG079	Industrial Business Parks Road Rehabilitation (Hudson Drive, Magellan Drive, Humboldt Drive, Desoto Court, Peary Court, and Ryan Court)	Roads	MAJOR STREET FUND 202	$ 1,867,890	$ -	$ -	$ -	$ -	$ -	$ 1,867,890
4	YES	Department of Public Works	162-01	12 Mile Road Widening (Beck Road to Cabaret Drive) RCOC; estimated City share - design/ROW $1.0M & construction $1.7M (design currently underway; construction TBD)	Roads	MUNICIPAL STREET FUND 204	$ 355,000	$ -	$ -	$ 1,735,470	$ -	$ -	$ 2,090,470
5	NO	Department of Public Works	ENG075	Meadowbrook Road Rehabilitation (10 Mile to 11 Mile Road) secured outside funding 931K; net of city costs	Roads	MAJOR STREET FUND 202	$ 142,680	$ 1,298,810	$ -	$ -	$ -	$ -	$ 1,441,490
6	NO	Department of Public Works	ENG078	9 Mile Road Rehabilitation (Meadowbrook Road to Haggerty Road) secured outside funding 573K; net of city costs	Roads	MAJOR STREET FUND 202	$ 115,770	$ 1,343,620	$ -	$ -	$ -	$ -	$ 1,459,390
7	NO	Department of Public Works	162-07	Beck Road Widening (11 Mile Road to Grand River Avenue aka Providence Drive/Central Park Boulevard) (including signal modernization @ 11 Mile Road & updated DTE lighting) secured outside funding $4.7M; net of city costs	Roads	MAJOR STREET FUND 202	$ -	$ 3,473,970	$ -	$ -	$ -	$ -	$ 3,473,970
8	YES	Department of Public Works	ENG089	Novi Road Rehabilitation (8 Mile to 9 Mile); RCOC (Local share $633,701; Novi-share estimated @50%)	Roads	MUNICIPAL STREET FUND 204	$ -	$ 348,530	$ -	$ -	$ -	$ -	$ 348,530
9	NO	Department of Public Works	ENG093	West Park Drive Rehabilitation (12 Mile Road to Pontiac Trail) secured funding (1.7M); net of city costs	Roads	MAJOR STREET FUND 202	$ -	$ 247,850	$ 1,217,180	$ 1,217,180	$ -	$ -	$ 2,682,210
10	NO	Department of Public Works	ENG016	13 Mile Road Rehabilitation (M-5 to Haggerty) secured outside funding 523K; net of city costs	Roads	MAJOR STREET FUND 202	$ -	$ 68,240	$ 547,000	$ -	$ -	$ -	$ 615,240
11	NO	Department of Public Works	082-30	11 Mile Road Rehabilitation (Beck Road to Taft Road) including Seg 37a Sidewalk (north side, Beck Road and East Mandalay Circle) net of design	Roads	MAJOR STREET FUND 202	$ -	$ -	$ 3,119,780		$ -	$ -	$ 3,119,780
12	NO	Department of Public Works	ENG081	Village Wood Road (Cranbrooke Drive to Haggerty Road) and Section 25 Storm Drainage Improvements; includes sidewalk construction - Street Fund portion	Roads	LOCAL STREET FUND 203	$ -	$ -	$ 1,796,530	$ -	$ -	$ -	$ 1,796,530
	NO			Village Wood Road (Cranbrooke Drive to Haggerty Road) and Section 25 Storm Drainage Improvements; includes sidewalk construction - Drain Fund portion	Roads	DRAIN FUND 210	$ -	$ -	$ 251,910	$ -	$ -	$ -	$ 251,910
13	NO	Department of Public Works	ENG074	Novi Road Rehabilitation (13 Mile Road to 14 Mile Road) including traffic signal modernizations at 13 Mile Road, Waverly Drive, and 14 Mile Road	Roads	MAJOR STREET FUND 202	$ -	$ -	$ -	$ 4,327,000	$ -	$ -	$ 4,327,000
14	NO	Department of Public Works	132-26	11 Mile Road Rehabilitation (Wixom Road to Beck Road) includes Segment 52a pathway connection to ITC Trail; net of design	Roads	MAJOR STREET FUND 202	$ -	$ -	$ -	$ 1,469,920	$ -	$ -	$ 1,469,920
15	NO	Department of Public Works	132-27	11 Mile Road Rehabilitation (Taft Road to Clark Street); net of design	Roads	MAJOR STREET FUND 202	$ -	$ -	$ -	$ 1,055,350	$ -	$ -	$ 1,055,350
16	NO	Department of Public Works	102-04	Old Novi Road Rehabilitation (Novi Road to 13 Mile Road)	Roads	MAJOR STREET FUND 202	$ -	$ -	$ -	$ 863,970	$ -	$ -	$ 863,970

City of Novi

Capital Improvement Program

FY 2023-24 Budget

https://bit.ly/3iBOqxq

	new request?	Who Did Request?	ID#	Project Name	CIP Category	GL Fund #	BUDGET FY 2023-24 YR 1	PROJECTED FY 2024-25 YR 2	PROJECTED FY 2025-26 YR 3	FORECAST FY 2026-27 YR 4	FORECAST FY 2027-28 YR 5	FORECAST FY 2028-29 YR 6	Total Budget CIP
17	NO	Department of Public Works	ENG037	13 Mile Road Rehabilitation (Old Novi Road to Novi Road)	Roads	MAJOR STREET FUND 202	$ -	$ -	$ -	$ 796,740	$ -	$ -	$ 796,740
18	NO	Department of Public Works	ENG080	Willowbrook Estates No. 3 Road Reconstruction and Storm Drainage Improvements (Glen Ridge Court, Rock Hill Lane, Maude Lea Circle, Ripple Creek Road) - Street Fund portion	Roads	LOCAL STREET FUND 203	$ -	$ -	$ -	$ -	$ 2,343,310	$ -	$ 2,343,310
	NO			Willowbrook Estates No. 3 Road Reconstruction and Section 25 Storm Drainage Improvements (Glen Ridge Court, Rock Hill Lane, Maude Lea Circle, Ripple Creek Road) - Drain Fund portion	Roads	DRAIN FUND 210	$ -	$ -	$ -	$ -	$ 784,190	$ -	$ 784,190
19	NO	Department of Public Works	ENG008	Lee BeGole Drive Reconstruction (11 Mile Road to Terminus); net of design	Roads	MAJOR STREET FUND 202	$ -	$ -	$ -	$ -	$ 1,281,490	$ -	$ 1,281,490
20	NO	Department of Public Works	162-06	Beck Road Widening (10 Mile Road to 11 Mile Road); includes signal modernizations - pursuing outside funding	Roads	MAJOR STREET FUND 202	$ -	$ -	$ -	$ -	$ -	$ 13,159,260	$ 13,159,260
21	NO	Department of Public Works	162-03	Beck Road Widening (9 Mile Road to 10 Mile Road); includes signal modernizations - pursuing outside funding	Roads	MAJOR STREET FUND 202	$ -	$ -	$ -	$ -	$ -	$ 10,280,290	$ 10,280,290
22	NO	Department of Public Works	132-25	Beck Road Widening (8 Mile Road to 9 Mile Road); includes signal modernizations - pursuing outside funding	Roads	MAJOR STREET FUND 202	$ -	$ -	$ -	$ -	$ -	$ 9,780,420	$ 9,780,420
23	NO	Department of Public Works	ENG068	Neighborhood Sidewalk Repair Program (Street Fund portion)	Sidewalks & Pathways	MUNICIPAL STREET FUND 204	$ 200,000	$ 200,000	$ 200,000	$ 200,000	$ 200,000	$ 200,000	$ 1,200,000
	NO			Neighborhood Sidewalk Repair Program (General Fund portion; aka tree-related portion)	Sidewalks & Pathways	GENERAL FUND 101	$ 200,000	$ 200,000	$ 200,000	$ 200,000	$ 200,000	$ 200,000	$ 1,200,000
24	YES	Department of Public Works	ENG091	Beck Road Non-motorized Improvements (8 Mile Road to I-96); pursuing "Safe Streets and Roads for All grant" (5.6M)	Sidewalks & Pathways	MAJOR STREET FUND 202	$ -	$ 1,167,820	$ 1,167,820	$ -	$ -	$ -	$ 2,335,640
25	NO	Department of Public Works	ENG069	Segment 4040 (Off-road paved) -- Meadowbrook Road (Village Wood Lake Park to Chattman Drive) - 5' sidewalk & 8' pathway along with boardwalk over wetlands	Sidewalks & Pathways	MUNICIPAL STREET FUND 204	$ -	$ -	$ -	$ 379,420	$ -	$ -	$ 379,420
26	NO	Department of Public Works	ENG070	Segment 101c &104b -- Napier Road (East side; ITC Community Sports Park entrance drive to Villa Barr Art Park) - 8' Pathway	Sidewalks & Pathways	MUNICIPAL STREET FUND 204	$ -	$ -	$ -	$ 325,720	$ -	$ -	$ 325,720
27	YES	Department of Public Works	ENG030	Segment 66 -- Grand River Avenue (South side; Sixth Gate to Main Street) - 8' Pathway	Sidewalks & Pathways	MUNICIPAL STREET FUND 204	$ -	$ -	$ -	$ -	$ 139,990	$ -	$ 139,990

City of Novi
Capital Improvement Program
FY 2023-24 Budget
https://bit.ly/3iBOqxq

new request?	Who Did Request?	ID#	Project Name	CIP Category	GL Fund #	BUDGET FY 2023-24 YR 1	PROJECTED FY 2024-25 YR 2	PROJECTED FY 2025-26 YR 3	FORECAST FY 2026-27 YR 4	FORECAST FY 2027-28 YR 5	FORECAST FY 2028-29 YR 6	Total Budget CIP

Total CIP by Fund

GENERAL FUND 101	$ 905,960	$ 2,284,240	$ 1,900,750	$ 16,491,630	$ 1,172,220	$ 1,010,350	$ 23,765,150
MAJOR STREET FUND 202	$ 5,602,100	$ 7,600,310	$ 6,051,780	$ 9,730,160	$ 1,281,490	$ 33,219,970	$ 63,485,810
LOCAL STREET FUND 203	$ 4,450,000	$ 4,650,000	$ 6,371,530	$ 4,500,000	$ 8,343,310	$ 6,000,000	$ 34,314,840
MUNICIPAL STREET FUND 204	$ 555,000	$ 548,530	$ 200,000	$ 2,640,610	$ 339,990	$ 200,000	$ 4,484,130
PARKS, RECREATION & CULTURAL SERVICES FUND 208	$ 1,016,980	$ 496,120	$ 380,000	$ 2,438,600	$ 2,173,210	$ 584,430	$ 7,089,340
DRAIN FUND 210	$ 1,542,760	$ 3,868,360	$ 251,910	$ 1,497,360	$ 1,140,680	$ 750,000	$ 9,051,070
CAPITAL IMPROVEMENT PROGRAM (CIP) FUND 400	$ 1,140,390	$ -	$ -	$ -	$ 1,386,160	$ -	$ 2,526,550
GUN RANGE FACILITY FUND 402	$ -	$ -	$ 380,720	$ 111,190	$ -	$ -	$ 491,910
ICE ARENA FUND 590	$ 110,800	$ 144,500	$ 819,550	$ 525,330	$ -	$ -	$ 1,600,180
WATER AND SEWER FUND 592	$ 23,919,070	$ 4,527,290	$ 7,388,290	$ 9,006,080	$ 4,592,570	$ 4,500,000	$ 53,933,300
SENIOR HOUSING FUND 594	$ 499,260	$ 722,570	$ 366,000	$ 230,000	$ 413,730	$ 180,000	$ 2,411,560
	$ 39,742,320	$ 24,841,920	$ 24,110,530	$ 47,170,960	$ 20,843,360	$ 46,444,750	$ 203,153,840

APPENDIX B: MEETING MINUTES VERIFYING PLAN ACCEPTANCE BY GOVERNING BODY

Roads Committee

Presentation of Findings

February 22, 2021

CITY OF NOVI
cityofnovi.org

Novi Roads Committee

- Mayor Bob Gatt
- City Council Member/Committee Chair, Laura Marie Casey
- City Council Member, Andrew Mutch
- Citizen Representative, Brian Bartlett
- Citizen Representative, Alex Dinser
- City Manager, Pete Auger
- Director of Public Works, Jeff Herczeg
- Assistant Chief of Police, Erick Zinser
- City Planner, Barb McBeth
- CFO/Finance Director, Carl Johnson
- Community Relations Specialist, Nathan Mueller
- Consulting Engineer OHM Advisors, Tim Juidici
- Consulting Engineer AECOM, Mark Koskinen

Committee Scope and Timing

- **The committee was formed in December 2019 by City Council**
  - Work started in January, stopped due to COVID-19 in March and resumed in September

- **The objective was to develop a plan to prioritize road projects to maintain safety, improve road conditions and traffic flow, and explore funding opportunities**
  - The onset of the pandemic changed the focus slightly – the findings will not include funding recommendations as had initially been planned
  - The committee reviewed road funding, road jurisdiction, the impact of other government and private entities, road construction, asset management and the capital improvement planning process
    - Focus on (but not limited to) projects out through 2026

Novi Roads Basics (Roads 101)

- **The City's road network is 187 centerline miles of local and major roads**

- **There is a mix of jurisdictions between the City, Michigan Department of Transportation (MDOT) and the Road Commission for Oakland County (RCOC)**
  - The even-numbered Mile Roads and east-west borders are RCOC roads (8 Mile shared with Wayne County), and M-5 and I-96/696 are MDOT
  - Having multiple road jurisdictions in the City presents unique circumstances for maintenance, prioritization, and project planning

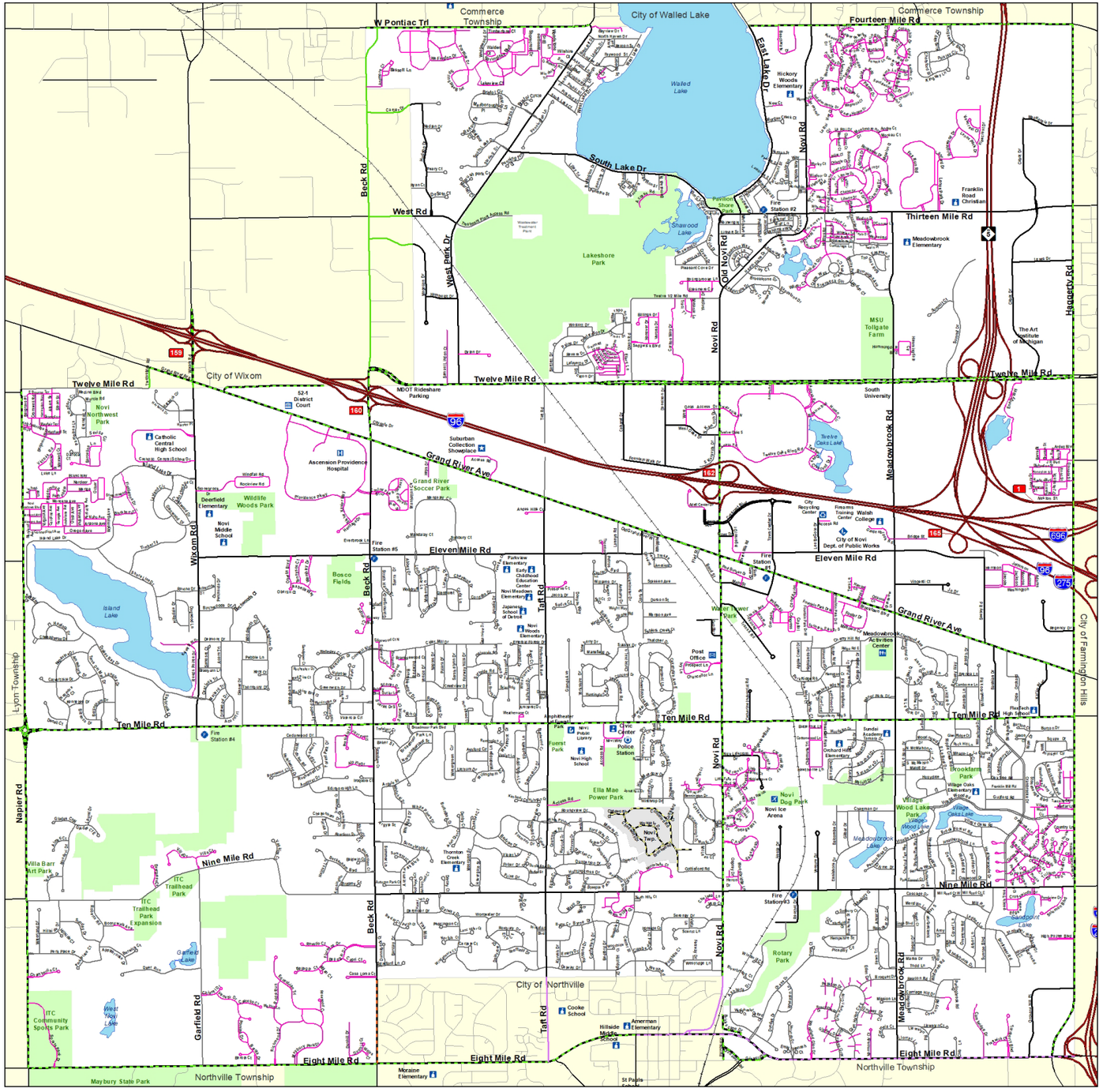
- **The City is required to submit a Transportation Asset Management Plan (TAMP)**
  - The committee reviewed a version we called the Road Report
  - The City completed the report early as a part of this committee's efforts (it's not due to the state until 10/1/22)
  - The Road Report also includes additional prioritization for the road CIP program from 2020-2024

- **The Committee endorsed the Road Report**

ROAD COMMISSION for OAKLAND COUNTY
QUALITY LIFE THROUGH GOOD ROADS – WE CARE

MDOT Michigan Department of Transportation

Roadway Jurisdiction



CITY OF NOVI
cityofnovi.org

Novi Roads Basics (Roads 101)

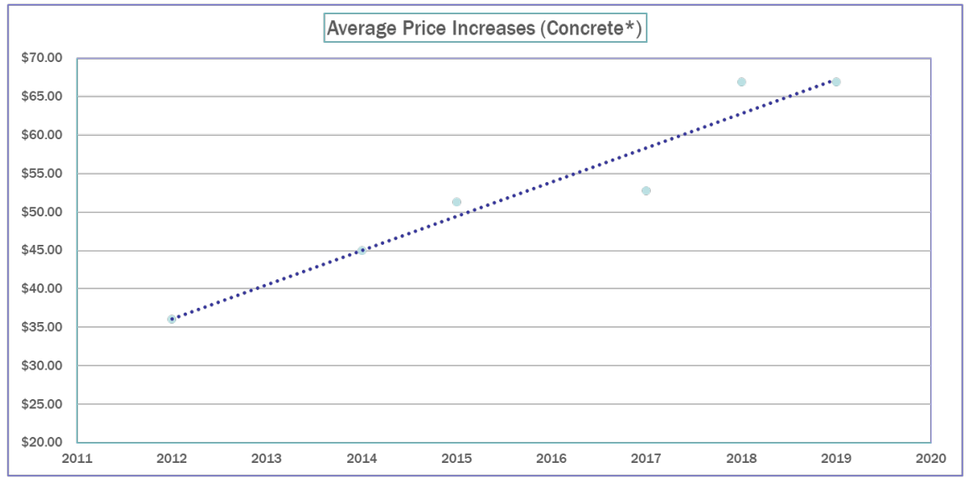
- **The City uses multiple criteria to prioritize projects**
  - There is no singular design prescription for road construction and each project is unique in community context
  - Projects are prioritized in a consistently changing landscape of revenue/budget/funding sources, development and constructability, and any other capital improvements that align with road construction (e.g. drains, water/sewer, sidewalks/pathways)

- **Equally, there are many considerations when finalizing a road design**
  - Boulevards enhance the driver experience and create aesthetically pleasing corridors
  - Driving in a roundabout is safer when compared to a traditional, signalized intersection and increases road capacity between 30-50%
  - Technological advances in pavement design should be/are considered for road projects

Road Costs

- Construction costs since 2012 have increased ~30% per square yard of material, which means that by maintaining the existing road funding levels, the City will see a flat or slight increase in network road condition moving forward

Surface	Type of Work	Range of Costs per Lane Mile (in 2020 dollars)
Asphalt	Structural Improvement/Rehabilitation	$300,000 – $500,000
Asphalt	Reconstruction	$800,000 – 1,250,000
Concrete	Structural Improvement/Rehabilitation	$350,000 - $500,000
Concrete	Reconstruction	$1,000,000 – $1,500,000



*concrete used as base line, but asphalt and aggregate prices have seen parallel increases

Current Road Funding

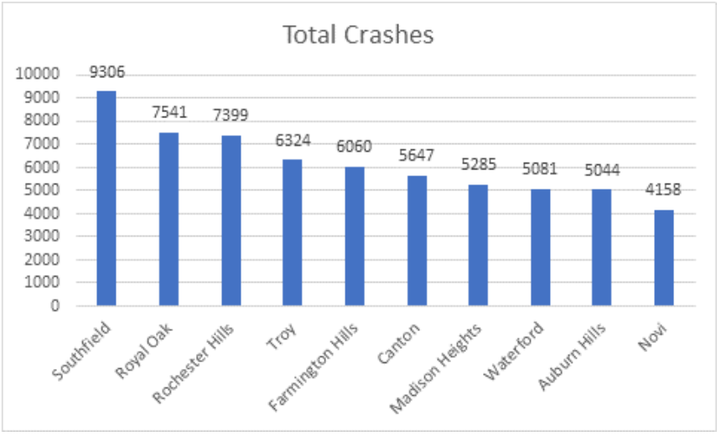
- **There are three primary road fund sources**
  - 202–Major Roads
  - Funded by Act 51 ~ $4M/year
  - 203–Local Roads
  - Funded by Act 51 ~ $1.5M/year
  - 204–Municipal Roads
  - Funded by Metro Act Revenue approx. $185,000/year
  - Funded by Trunkline Revenue approx. $113,000/year
  - Funded by dedicated road millage (1.5 mills), which has generated between $4.9-$5.3M/year to supplement 202 and 203

- **In general, the City has ~$11M of funds dedicated to roads per year. The City expends between $2-3M for maintenance, leaving $7-9M targeted for capital expenditures for road improvements and non-motorized projects**

Safety

- **Safety is a priority for Staff and Council and requires cross-departmental partnership**
  - Council focused on crash reductions at the most dangerous intersections following Thoroughfare Master Plan update in 2016
  - The City has implemented countermeasures like signal timing and signal modernization upgrades and road design improvements like roundabouts

- **Novi Police uses a Data-Driven Approach to Crime and Traffic Safety (DDACTS)**
  - By focusing efforts on where accidents are occurring, Novi Police can put additional presence in these areas and offer, among other benefits, highly visible traffic enforcement
    - Accidents are lower than comparable communities
    - Decreased overall accidents by 35.2% over 3 years (2018-2020)



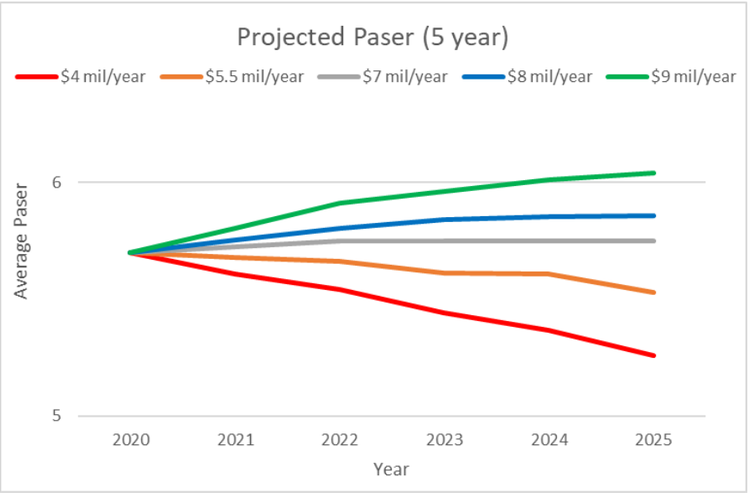
Safety

- **Due to advancements in winter maintenance operations by the City, weather-related crashes totaled only 8% of all accidents from 2018-2020**
  - Novi's Department of Public Works crews maintain all public roads in the City, except those maintained by the RCOC and MDOT

- **DPW follows these established priorities to systematically remove snow and ice from City roads**
  - Major roads, neighborhood entrances/exits, and municipal parking lots
  - Residential streets
  - Non-motorized routes abutting city-owned property

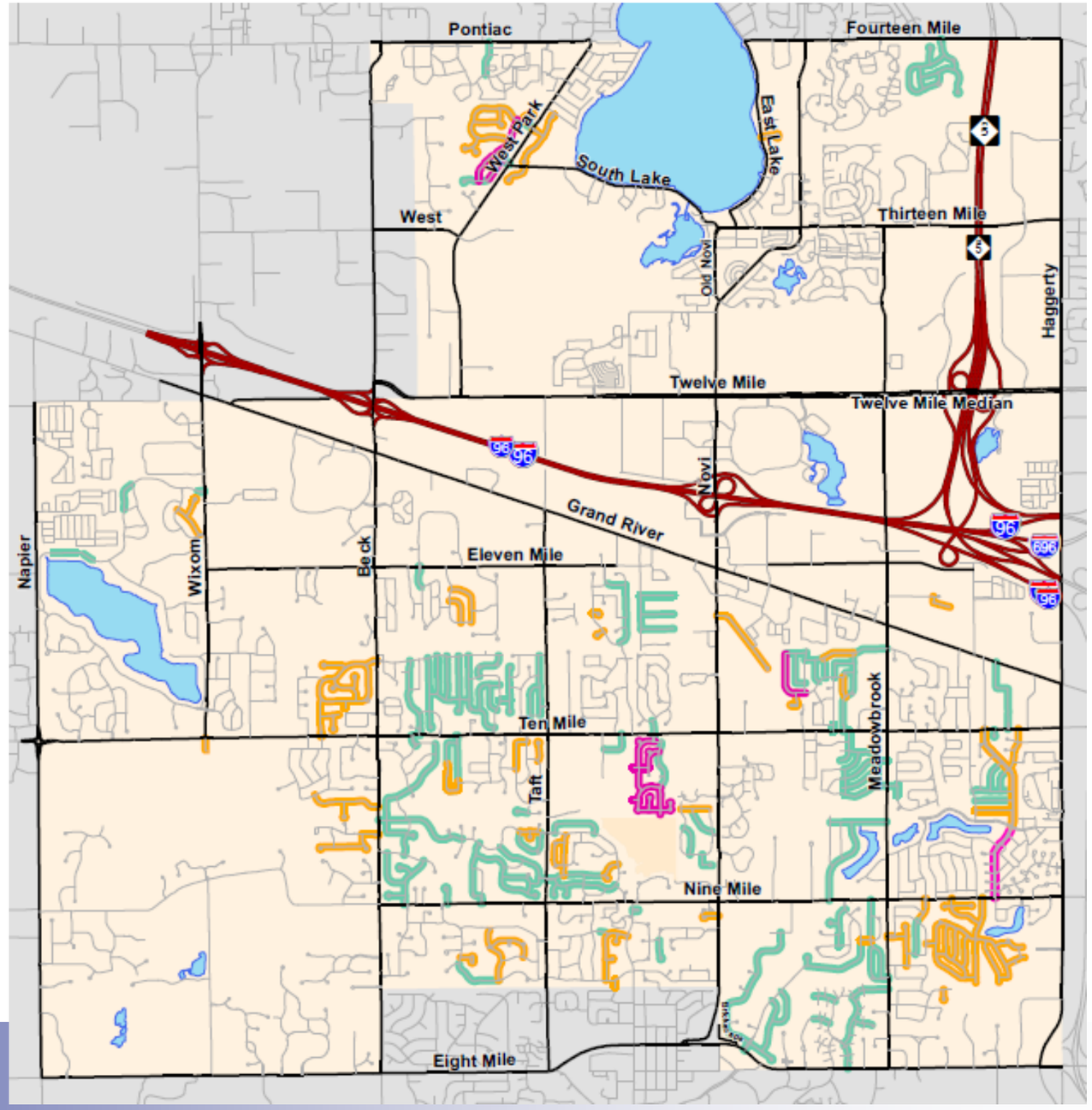
Neighborhood (Local) Roads

- **Local roads comprise 80% of Novi's total road network and ~155 centerline miles**
- **City Council has prioritized funding on local roads**
  - Neighborhood Road Program
  - Concrete Panel Repair
  - Capital Preventative Maintenance
- **These programs have proven to be successful**
  - Using a standard asset management tool, Pavement Surface Evaluation and Rating (PASER), Novi has seen an increase in PASER from 5.4 (2018) to 5.8 (2020)
- **Total dollars invested in the Neighborhood Road Program from 2014-2020 is ~$25M. At the end of 2023, the total investment in local roads will reach almost $40M in just over ten years' time**



cityofnovi.org

Neighborhood Roads Program 2014 – 2021



cityofnovi.org

Neighborhood Roads Program 2020

Holyoke Lane

Kerri Court

Major Roads and Traffic Improvements

- **Traffic congestion and capacity were some of the committee's most deliberated subjects**
  - Issues with congestion, primarily during peak times (rush hour), both impact and are impacted by residents, local businesses and traffic in the surrounding communities
  - Major road projects involve considerations different than those for local roads
    - Process: right-of-way acquisition, partnerships with other stakeholders, and funding obstacles
    - Consideration of neighboring communities and phasing to ease resident and regional traffic concerns

- **Novi's major roads are directly affected by regional traffic using the mixing bowl (I-96/696, 275, M-5) and any commuting traffic passing through the city**

- **The City has a strategy to pursue alternative funding and strong partnerships with other agencies**
  - RCOC, MDOT, Great Lakes Water Authority (GLWA)

Southwest Ring Road – Flint/Bond Street

Major Projects

Completed Projects

- Ring Roads - create alternate movement for the Grand River and Novi Road intersection *
  - Southeast - Main Street (early 2000s)
  - Northeast - Crescent to Town Center (2017)
  - Southwest – Bond Street to Flint (2020, Phase 2 connection to Grand River pending)
  - Northwest - Crescent to Grand River (2021)
- Napier and 10 Mile roundabout (2017) – improved traffic flow and safety at this historically dangerous intersection
- Novi Road over I-96 Bridge (2020) – bridge improvements, pedestrian sidewalk, and traffic signal improvements
- Grand River and Beck – Right turn lane extension (2015), Dual left turn lane (2016)

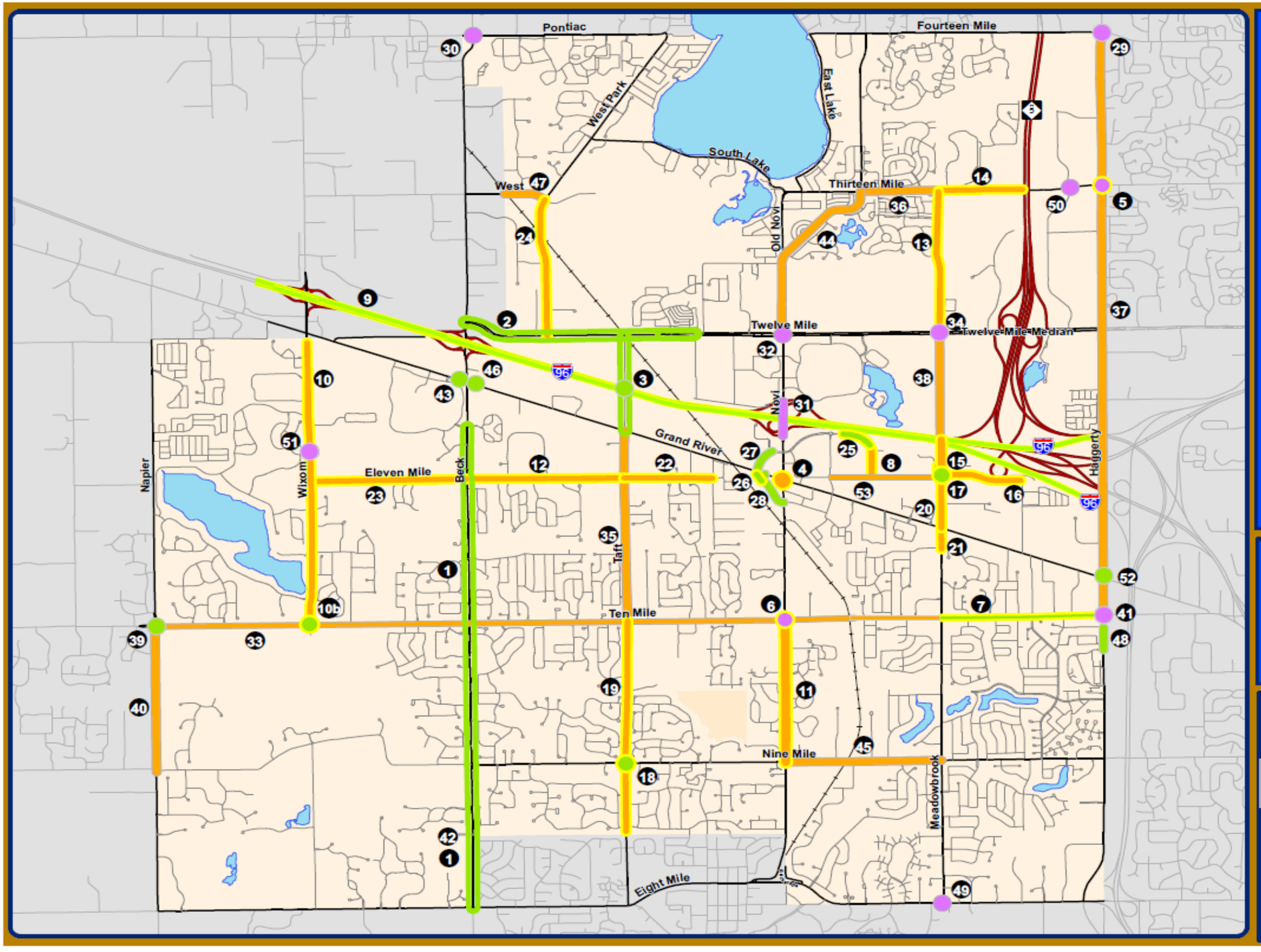
Planned Projects

- 10 Mile Road from Haggerty to Meadowbrook (2022) – continuous turn lane and selective widening *
- Taft and 9 Mile Roundabout (2022)
- Meadowbrook and 11 Mile Road – right turn lane on southbound Meadowbrook

Projects Under Consideration

- Beck Road –regional expansion (Novi, Wixom, Northville Twp.) from 6 Mile Road to Pontiac Trail, pursuing federal funding (4-lane boulevard, potential roundabout at 10 Mile Rd) *
- 12 Mile Road from Beck Road to Cabaret Drive – expand to 4-lane boulevard, RCOC project moving into to ROW acquisition *
- Ten Mile and Wixom Road, and 10 Mile and Taft Road –analyze cost benefit of roundabouts
- Crescent Road connection to Lee BeGole/11 Mile – northeast Ring Road addition
- Taft Road/ I-96 Bridge – bridge over I-96 with connection to 12 Mile Road

**committee identified pain points*



Major Road and Traffic Improvements

Completed (2014 - 2020), Planned, and Under Consideration

Legend

- Capacity Improvement, Under Consideration
- Capacity Improvement, Planned
- Capacity Improvement, Completed
- Road Surface Improvement, Planned
- Road Surface Improvement, Completed
- Intersection Improvment, Planned
- Intersection Improvment, Completed

0 1,100 2,200 4,400 6,600
Feet

1 inch = 3,312 feet

City of Novi
Engineering Division
Department of Public Works
26300 Lee BeGole Drive
Novi, MI 48375
cityofnovi.org

Map Author: Anjum/Runkel
Date: January 11, 2021
Project: Major Road/Traffic Improvements
Version #: 2.0

Long -Term Planning

- **As the City continues to grow, we will need to plan for the addition of more local roads and ensuring we are addressing current and future capacity needs**
  - The impact of COVID-19 on commuting and traffic should not be overlooked as the pandemic conditions improve
  - A larger look at changing mobility patterns is also required as improvements in mobility options (like electric and autonomous vehicles) grow

- **The City should develop a "maintenance vs. reconstruction" mindset**
  - Benchmarking through the Road Report
    - Refresh the report every 2 years to coincide with the PASER evaluation process (Pavement Surface Evaluation and Rating)
    - Renew the report every 5 years so there's a "living document"

- **The City must continue to foster and strengthen relationships and collaborative efforts across the region and state**

- **Evaluate City Road funding annually**
  - Council to set policy and prioritization for funding for local roads and mega projects

Final Recommendations

- **The Roads Committee endorses the Road Report and recommends that the City should:**
    - Utilize the Road Report as road program benchmarking document, including maintaining a schedule for updates
    - Focus on keeping the City's PASER rating at ~5.8
    - Verify the impact of the Flex Route before committing to other major projects
    - Continue to pursue funding for mega-projects (Beck Road, 12 Mile)
    - Continue to foster partnerships with other road entities
    - Evaluate City road funding annually
    - Reconvene the Roads Committee to develop funding recommendations and longer-term planning to complete their initial objective once the post-pandemic economy has stabilized
        - Plan for the Roads Committee to be involved in the Road Report renewal process every 5 years

Appendix

cityofnovi.org

Full Summarization of Findings

- The findings provided in this report focus on, but are not limited to, the time period from 2012 to present day and include projections out through 2026.
- $7-9M/year is targeted for capital expenditures for road improvements and non-motorized projects.
- The discoveries encompass the City road network that is 187 centerline miles of local and major roads. The entirety of the network totals 391 lane miles, which is centerline miles multiplied by number of lanes per segment.
- A Transportation Asset Management Plan (TAMP) is required for every local agency with 100 or more miles of roadway under their jurisdiction.
- The committee was tasked with the review and endorsement of the Road Report.
- Accidents are down 35.2% from the three years prior to 2018. Rear-end crashes are the most common occurrence (40% of all crashes). Weather related accounted for 8% of the total crashes reported. Conclusion, distracted driving is four times more likely to be the cause of a crash versus poor road conditions.
- Local roads, also referred to as neighborhood roads, is comprised of ~155 centerline miles and makes up around 80% of the total network.
- Novi has made significant investment in local roads from 2014-2020 (~$25M).
- Current asset management plan is performing adequately. However, 50% of the City's road network is in the "fair" range.
- It is estimated an additional $1.5M - $2M/year of road funding is required to continue an upward trend in PASER condition.
- Major Roads account for 20% of the system and are critical for traffic movement into and out of the city.

Full Summarization of Findings

- Traffic congestion and capacity issues, primarily during peak times (rush hour), both impacts and are impacted by residents, local businesses and traffic in the surrounding communities.
- The MDOT flex route project scheduled to begin in 2021 will have the most regional impact on capacity.
- There is no singular design prescription for road construction, and each project is unique in community context.
- Boulevards enhance the driver experience and create aesthetic corridors.
- Driving in a roundabout is safer when compared to a traditional, signalized intersection.
- Technological advances in pavement design should be/are considered for road projects.
- The Roads Committee endorses the Road Report and recommends the following:
  - Utilize Road Report as road program benchmarking document
  - Verify the impact of the Flex Route before committing to other projects
  - Continue to pursue funding for mega-projects (Beck Road, 12 Mile)
  - Continue to foster partnerships with other entities
  - Evaluate City road funding
  - Consider the impact of COVID-19 on revenue and the future of commuting traffic in the region

REGULAR MEETING OF THE COUNCIL OF THE CITY OF NOVI
MONDAY, FEBRUARY 22, 2021 AT 7:00 P.M.

Mayor Gatt called the meeting to order at 7:00 P.M.

In accordance with the provisions of the Open Meeting Act this meeting was held remotely.

PLEDGE OF ALLEGIANCE

ROLL CALL: Mayor Gatt, Mayor Pro Tem Staudt, Council Members Casey, Crawford, Fischer, Maday, Mutch

Mayor Gatt, present from City of Novi, Oakland County, State of Michigan
Mayor Pro Tem Staudt, present from the City of Novi, Oakland County, State of Michigan
Member Casey, present from the City of Novi, Oakland County, State of Michigan
Member Crawford, present from Orlando, Orange County, State of Florida
Member Fischer, present from City of Novi, Oakland County, State of Michigan
Member Maday, present from City of Novi, Oakland County, State of Michigan
Member Mutch, present from City of Novi, Oakland County, State of Michigan

ALSO PRESENT: Peter Auger, City Manager
Victor Cardenas, Assistant City Manager
Tom Schultz, City Attorney

APPROVAL OF AGENDA:

Mayor Pro Tem Staudt added Municipal Broadband to Mayor and Council Issues.

CM 21-02-019 Moved by Crawford, seconded by Casey; CARRIED UNANIMOUSLY

To approve the Agenda as amended.

Roll call vote on CM 21-02-019 **Yeas: Staudt, Casey, Crawford, Fischer, Maday, Mutch, Gatt**
Nays: None

PUBLIC HEARINGS: None

BOARDS AND COMMISSIONS CANDIDATE PRESENTATIONS:

Mayor Gatt explained that everybody will be given two-minutes to present to the City Council on why you want to be on the various Board or Commission that you are applying for. He asked that they keep in mind that they have their resume and their application. He stated that they will not be making any decisions that evening. They will announce their decisions at the next Council meeting. He said everybody will be given two minutes to present.

1. William Bluford – Building Authority

Mr. Bluford said he has been a proud Novi resident since 2008 and Novi had provided his family a great quality of life. He wanted to give back to his community. He became involved with the community back in 2015 and he graduated from the Novi Ambassador Academy. He said two years ago he was appointed to a partial term on the Building Authority in March of 2019. He stated that the the Building Authority meets as needed, and as such, he has not been involved in any meetings because there have not been any meetings of the Building Authority. He wished to be reappointed. He thought Novi was a top-notch community and he wanted it to remain that way. He said he wanted to volunteer and give back in some way. He tries to stay involved in the community. He stated he graduated from the Lakes Area Citizen Police Academy and the Michigan State Police Citizens Police Academy as well, and he is Vice President of the Broad of Directors for Meadowbrook Townhome's which is a Condo Association. He said in his professional life, he is Vice President of Huntington Technology which is a Managed Service Provider and IP Company. He said he was named as a next generation solution provider leader in 2020, which is a great professional honor. He hoped to be reappointed to the Building Authority or however the Council sees fit. He said if there is somewhere else, he could be a good fit; he was open to that was well. He was just looking forward to continuing to serve. Thank you.

2. Jeffrey Bowdell – Construction Board of Appeals

Mr. Bowdell said he has been a resident Novi for about 25 years. He said he has been on the Board of Appeals just about that long. He said he has been a building official for 33 years in different municipalities. He said they do not have to meet anywhere near as often as they used to many ears ago, but he served proudly. He said it was a technical committee, as he was sure Council knew. He said he was on his 17th Code Book, which is there every three years. He stated that he has quite a large background in building codes. He hoped to be reappointed, he enjoyed serving on the committee. He thought they have done a great job for the City because there are occasionally some big challenges that they deal with.

3. John Enkemann – Construction Board of Appeals

Mr. Enkemann said it took him more than two minutes to fill out the form to be reappointed. He has been on the Board for 28 years, 25 of them he has been the chairman and served with Mr. Bowdell and Mr. Qadeer. We do not meet very often, the questionnaire put us into a position or put him into a position of what he wanted to achieve over the future. With a board that does not meet very often it is hard to have a future to be able to predict. He mentioned that he would love to have all the Board Members get a raise. It has been offered, and 100% of zero is zero, but it would be great to be able to authorize us all being able to have active Code Books that you know would allow them to be able to make this committee consistent. He felt that consistency was important for a committee like this because there is a certain value to understanding how our board has performed on certain cases. He thought being able to have a certain

amount of consistency in those actions. He said he would love to serve more. He said he has been an architect for over 40 years.

4. Jan Lach – Beautification Commission

Ms. Lach said she has lived in Dunbarton Pines Subdivision for over 20 years. She said she was applying for the Beautification Commission. She said she was also in the first Citizen Novi Ambassador Academy as well, and she has also been through the Citizens Police Academy, and several of the other City supported programs over the years. She recently retired after 17 years with Michigan Medicine. She thought it was time to become engaged with the community, so she thought she would start with the Beautification Commission. She stated she has been a gardener her whole life since she was three, pretty much what she grew and planted, she got hooked on growing things. So, she has lived in a garden in several states. She has traveled throughout the United States and several overseas countries. She always observed how the proximity of the outdoor environment to the living spaces in the cities as the overall vitality of the area and the engagement of the citizens, and the quality of life to that. She believed that having access to the national environment is restorative and energizing for people especially in times of stress like this. A model of this is Michigan Medicine, where our priority in landscape at facilities was giving patients and families quick access to a pleasant outdoor environment where they can sit under and relax under a beautiful tree or look at bugs and butterflies along the walking path. There was also meant it was mostly beneficial for the staff just to have access when they are struggling with their stressful and busy situations at work. She said it was important for people, especially now. She said Novi has engaged citizens, we have the Beautification Commission and they have done a great job in creating this kind of atmosphere here in Novi. The subdivisions are inviting, and the parks look nice. The butterfly gardens are doing well, and they are independent. She said during the lockdown last spring she saw quite often how people enjoy their outdoor spaces. She said she would like to be part of that.

5. Cynthia Lang – Beautification Commission

Ms. Lang said she has been a resident of Novi for 15 years now. She has been on the Beautification Commission for about three and a half years. She stated that during that time she has been chair pretty much the entire time. She said she would like to continue to serve on the Beautification Commission because she thought they have some great projects ahead of us. She stated that during the last three and a half years they were able to get Novi certified by the National Wildlife Federation, and not many cities have that. She said that was exciting. They also have some other exciting projects in the future. They were a little bit stymied by the COVID, of course, but lost a little bit of momentum last years, but there are finally getting it back and trying to wrap up some of the existing projects that they have. She said they want to get some park signs at the entrances for the parks, we would like to get companies, individuals, whatever to design and implement some cool native plants around the areas. She said they would like to get into the schools more and do some educational presentations for the kids. She said she would like to see some of those projects through. She mentioned the butterfly gardens and said they would like to get some labels out there to identify the plants so that our

residents can really enjoy those plants and maybe see what they are so they can take those back to their homes and bring more pollinators into the City.

6. Kathleen Neighbors – Historical Commission (Withdrew application)

7. Shaun Page – Beautification Commission

Mr. Page said he was interested in the Beautification Committee. He said his background is a wine expert. He said he studies viticulture extensively, he has been to many vineyards around the world, around the country, he has brought in harvest many times over again. He said for the last 15 years she has worked for Celebrity Chefs which was very interesting, a lot of fun, but now he is a stay-at-home dad, and he does consulting work here and there. This is kind of my wheelhouse, he said he developed concepts for MGM Grand Resorts, restaurants, this is his passion, his livelihood, and just everything that he knows. He said he had a lot of ideas that he would like to present and hoped he would have the opportunity to do that. He stated this is everything that he does as part of the seed saving savers exchange, he does mushroom hunting, he is an avid fisherman, he does a lot of heirloom tomatoes which he is very passionate about. He said tomatoes are very similar to vines in the fact that they are open pollinated. He said there are a lot of cool things that you can do with plants and viticulture in general. He hoped he would have the opportunity to join the team. He said he has two children, and that is the reason why he took a step back from the corporate world. His family is his life and he truly loved Novi. He felt he would have a lot of things to bring to the table. He thanked everyone for giving him a chance and listening to him.

8. Dan Pierce – Historical Commission

Mr. Pierce said he has lived in Novi for almost 11 years. He would like to serve on the Novi Historical Commission because he believed preserving history is done through education. He said education is done and achieved through storytelling, and for the last 20 years he has been a storyteller. He served as the communications director for Ford Motor Company in their autonomous vehicle unit. His love for history started when he as a young child. He grew up just in the shadows of President James A. Garfield house in Cleveland, Ohio. He thought while President Garfield was not the most well-known president, living in his shadows of his long field of estate, he captivated him, and he wanted to learn more about history. He stated his family moved to Farmington Hills years later, and where his passion was further fueled by an incredible teacher at North Farmington High School. He stated that Mr. Maxwell, his favorite professor of all time, told him that it is not enough to know the basics when it comes to history. He would say anyone can know the date of the Gettysburg battle. It is up to us to remember the humidity and how it impacted that battle. That is the type of history you need to know. He said he attended the University of Missouri, received a journalism degree, but his passion for history forced him and compelled him to get a bachelor's degree in history as well. He has been using public relations to tell stories for big brands. He concluded that he would take this same knowledge that he has in storytelling and help preserve and protect the history of the City of Novi and tell our great stories. He thanked Council for their time.

9. Kamran Qadeer – Construction Board of Appeals

Mr. Kadir said he has been a resident of Novi since the year 2000. He said he was a licensed civil engineer, and he works for an engineering company in Novi. He has served on the Construction Board of Appeals for over two terms and was seeking reappointment to that same Board. He stated why he was interested in serving his community that he lived in. First, during his career, he has had a passion for serving on committees and engaged in professional organizations throughout his career. He said he would like to continue to do that and give back to the community that he lived in. Second, he felt his educational background and the experience over the years whether it is in site drainage, site development, transportation, roads, traffic, would be a good asset for this board. He said he could help the Construction Board of Appeals in understanding the contractor issues and the challenges that we face in the construction. He stated that past two terms are some of the lessens that we have learned, we have not had a whole lot of meetings. He explained that most of the cases that have been presented to the board have been mostly grading issues related to steeper driveway slopes, sidewalk slopes, drainage issues, and sometimes interpretation of the building codes and engineering standards. He said some of these are related to site constraints and we evaluate those individually and see what impacts it has on the neighboring owners and provide guidance to the applicants. He said he would like to continue to do that in the future. He thanked Council for their time.

Mayor Gatt said that was their last presenter and he thanked everyone on behalf of the entire City Council and all the staff, we appreciate your willingness to serve and we will make our decision as to who will be appointed to the Boards and Commissions at our next meeting.

PRESENTATIONS:

Mayor Gatt mentioned they had a presentation from the Roads Committee. The Roads Committee was formed before the world ever heard of COVID and it has been well over a year now. He explained that it consists of several different members of the community, and of the staff, and two of our City Council people which is committee chaired by Councilmember Casey. He said we will hear from them that evening although he believed they would not get any concrete recommendations that evening. There would not be any action item taken that evening. He was positive that during our upcoming budget hearing, this is going to be a very important part of their discussion. He turned over the presentation to Member Casey.

Member Casey said Brian Bartlett was going to do most of the presentation, but she wanted to say thank you to all the individuals who served on the Roads Committee. She said they have two Citizen Representatives, Brian Bartlett, and Alex Dinser. We had a lot of people from the City, some of the experts from the City were City Manager, Pete Auger, DPW Director, Jeff Herczeg, Assistant Chief of Police, Erick Zinser, City Planner, Barb McBeth, CFO/Finance Director, Carl Johnson, Community Relations Specialist, Nathan Mueller, Consulting Engineer, OHM Advisors, Tim Juidici, and Consulting Engineer,

AECOM, Mark Koskinen. She wanted to list the names and vocalize her thanks to them for their efforts working with us to come up with our findings. She asked Mr. Cardenas if he would go to the next slide.

Member Casey said the Mayor in his opening remarks noted that we formed our Roads Committee in December of 2019, we met about 12 times since that point, we had a work stoppage, if you will, in the middle of that, because of COVID. She stated that they have been working for about a year to come up with their findings. She said their initial objective was that we wanted to develop a plan that would help us as a Council to prioritize road projects with a couple of key focuses. The first, is to maintain safety. The second, was to improve road conditions and traffic flow. She said obviously, we wanted to come in with some recommendations for funding opportunities. She said the onset of the pandemic in the middle of their work has really changed their focus a bit. She explained that their findings are not going to be including those funding recommendations. She stated that do have recommendations for Council about how our Roads Committee might engage in the future. She went over some of the topics that they learned about and said they did learn a lot. She stated they reviewed road funding, road jurisdiction, the impact of other government and private entities, construction, asset management, and the capital improvement process. She concluded her portion of the presentation and said Mr. Bartlett will focus on, but not limited to projects out through the year 2026. With that, she gave Mr. Bartlett the floor and asked him to share what we as a committee have learned.

Mr. Bartlett highlighted Novi Roads Basics (Roads 101). He said basically we discussed our entire road network, which consists of 187 centerline miles of local and major roads, and those roads are split up into various jurisdictions. He explained that the even-numbered Mile Roads and the east-west boarders are owned by the Road Commission of Oakland County (RCOC), with Eight Mile being shared with Wayne County. He said we also have the freeways which are primarily Michigan Department of Transportation (MDOT), all these various road jurisdictions are necessary to coordinate funding. They also create unique circumstances that deal with maintenance and all kinds of project planning in the future. He stated the City is required to submit a Transportation Asset Management Plan (TAMP), that plan was due October 1, 2022. He said because of the committee's efforts, he acknowledged that it was completed about 18 months before it was due. He said they have additional prioritization for Capital Improvement Programs (CIP) for the next four to five years. He noted that the committee has endorsed the Road Report, and they are also dealing with the other organizations. He said our map, although busy, shows all the various jurisdictions of the roadways throughout the City of Novi. He expressed that improvements to these roads, depending on who the who is in the jurisdiction is a team effort between the City and the funding of those various jurisdictions.

Mr. Bartlett stated there is no singular design prescription for road construction and each project is unique in community context. He said the various roadways throughout the City, depending upon when they were built, and depending upon the City qualifications at the time, we have various roadways as far as concrete, drainage, asphalt, sidewalks, pathways drain, sewer and so forth. He stated any Capital Improvements that we are going to discuss from the individual roadway budget will consider that we are improving

upon that infrastructure. He said none of the funding that we are talking about in any of these cases deals with an infrastructure change. If you are going to be changing infrastructure, that is a different animal as far as what it is going to cost you to do per roadway mile. He said equally, there are some other considerations inside the City, boulevards enhance the driver experience, the aesthetics also keep some of the opposing traffic separated, which helps you increase safety. He stated they had a long session about driving and roundabouts. He said roundabouts are much safer than signalized intersections primarily because they move traffic based upon the capacity, the capacity needed at that time and the directions needed at that time. He said they have totally avoided front end collisions by a big factor in their safety. They also talked about technological advancements and pavement designs, and what should be considered for future road projects.

Mr. Bartlett explained that costs have increased approximately 30% per square yard and material, which means by maintaining our current level, our current road infrastructure is going to cost more than it did 12 years ago. Just like any other expenditures, it is also important to recognize that the roadway does have a lifespan. He noted that over a lifespan of a roadway, if you fixed it 10 years ago, in many cases, you are going to have to fix it again. The roadways are a living, breathing object structure, and that is part of the Pavement Surface Evaluation and Rating (PASER) Program that we will discuss a little bit later.

Mr. Bartlett stated there are three major sources of funds versus through major roads, there is Act 51 which means that the State hands out money that they collect from gasoline taxes and various other sources that are then dedicated to what is defined as a major roadway. Similarly, with Act 51, we get a certain amount of funds per year based upon the local roads. He said there are various municipal roadway funds for the local municipal roads, city streets that the City is in control of. In general, the City receives $11 million dollars of funds dedicated to roads per year. The general maintenance, general patching all those, filling potholes and so forth. It uses about $2 million to $3 million dollars a year, leaving $7 to $9 millions dollars targeted for capital expenditures for road improvements. This also includes non-motorized projects, such as the pathways and walkway projects.

Mr. Bartlett said one of the interesting parts of their discussion was in respect to traffic safety. He explained that part of that is the roadway itself, is the roadway well maintained with good shoulders, not a lot of potholes, and people are moving around and so forth. It also is how we remove snow, or do we keep the major infrastructure the major pathways open. He said it is how we handle key intersections such as the Data-Driven Approach to Crime and Traffic Safety (DDACTS) system where we monitor crime and traffic safety. Two good examples are the Novi Road Corridor between Novi and the freeway, and Grand River and back. How do we handle policing? It goes a lot further than just maintaining the road. He said we have a happy story is in total crashes when compared to our other sister suburbs, we are doing an excellent job in keeping the crash rate low. He stated when inspecting much of what we have, we found that many of the incidents were rear end crashes with driver distractions rather than what we could do with the roadways, which just makes our story all the better.

Mr. Bartlett said due to advancements in winter maintenance, or weather-related crashes which are only 8% of all our accidents from 2018 to 2020. He stated that removing snow and ice, which is a very popular topic with many of your constituents. He explained the priority are major roads, neighborhood entrances and exits, to be sure that you are sliding in and out of subdivision on residential streets and then for non-motorized routes abutting city-owned property. He said that 8% of all accidents were weather related, it appears that we are doing a fairly good job compared to our colleagues in other suburbs.

Mr. Bartlett said local roads are about 155 centerline miles of those 187 centerline miles that we discussed in our first slide. He explained that through the City Council, we prioritize the funding on local roads, as indicated, the local roads have a certain lifespan, they are going to need to be repaired on a regular basis, we have been using the standard asset management tool called Pavement Surface Evaluation and Rating (PASER). PASER basically goes through all the roads that the City of Novi owns and creates a rating for those individual roads. He went over the graph, basically as a guide for Council as far as what allocating money to this system should yield. Over the next five years, an allocation of about $7 million dollars a year keeps pace with where our PASER ratings are now, which simply means, we were allocating money to fix those roads, we should be able to maintain the overall systems PASER ratings as an aggregate. He said you should be able to essentially hold fast allocating less than that, they will see the $4 million dollar line and the roadway start to deteriorate. The PASER rating will show a higher rating of war and tear on the roads. He said the green line at $9 million dollars a year, we can expect the PASER rating to increase to above six. He said from the year 2018 to 2020 we have increased the PASER rating from 5.4 to 5.8, but the important thing about this is that it is not going to be a constant battle, it is an annual expenditure.

Mr. Bartlett explained what has been done from 2014 to 2018. He said it was easy to read with the wide roadway, you know color codes shows you what was done in 2019 to 202 and what is on target for this year. Another slide showed two separate examples of roadways within the City, one had a sewer infrastructure with asphalt and the other had a sewer infrastructure with concrete. He stated that there were some instances in the last years, we have been fortunate that concrete asphalt has increased a little bit faster than concrete. In some instances where concrete has been able to be a suitable replacement for asphalt. That is not the rule, that is all based upon the current cost of material.

Mr. Bartlett stated that they had several discussions of various capacity, and traffic issues, right away acquisitions and so forth. Primarily, what we have found is during most of the weekends, most of the off hours, traffic around Novi flows well. Our primary issues seemed to be focused on rush hours traffic, heavy impact, and heavy peak times. He said this is true on several surface roads. This is also true near the mixing bowl. He stated the mixing bowl is a MDOT controlled road that consists of I-96, I-696 to 275, and M-5. He said there is a flex lane effort scheduled for the freeways to analyze what happens there. The other part of the analysis that is separate from roads, is how we come out of this COVID-19 mess. How much is going to be the long-term impact from people who are working at

home, versus people who are having to travel to other areas through the Metro Area. We have a very strong alternative funding source, there are several people who affect the roads, most notably recently, the Great Lakes Water Authority (GLWA) when they come in and they have to say replace a water main or replace some pipes. They tear up a road they are an important source of funding that should be mentioned that we can also leverage to getting some of our roadway projects done.

Mr. Bartlett highlighted the project that is underway right now which is the Ring Road, which is partially complete with the north primary link that is not open at this point would be in the northwest corner. He hoped that was going to be completed this year. He said the major projects completed were the Crescent Ring Road, Napier and 10 Mile which is a full traffic circle, the nearby road over I-96 Bridge has been completed with pedestrian sidewalks and the Grand River and Beck Road intersection. He said some of the planned projects in the future are 10 Mile Road from Haggerty to Meadowbrook with a continuous turn and selective widening. Currently most of that roadway is a two-lane road which it can be a cause of accidents and tie ups. He said hopefully that extra turn lane is going to give us some relief there. Second, turning Taft and Nine Mile Road into roundabout. Currently it is a four way stop. Third, Meadowbrook Road at 11 Mile Road they will be putting in a right turn lane onto southbound Meadowbrook. He stated that projects under construction and many of these have been significantly impacted by COVID. He noted projects under consideration is a regional expansion of Beck Road. Beck road is currently a two-lane road in each direction, especially by the Medical Center, which makes getting to it from the north and south a bit of a challenge at time. He said 12 Mile Road from back to Cabaret expanding to a four-lane boulevard. If anyone has driven 12 Mile Road recently, it is kind of beat up once you past west of Fountain Walk. He stated that there are considerable tax benefits to some of those industrial parcels that are for sale there which could significantly help our tax base because they have great access to the freeway. It is just that the roadway is a bit deficient at this point. He said 10 Mile and Wixom and 10 Mile and Taft Road basically an hour analyzing roundabouts, Crescent Road connection and in the Taft Road Bridge, possibly an extra means of alleviating traffic that needs to cross the freeway.

Mr. Bartlett covers various roadway projects that deal with surface improvement and capacity plans. One of the capacity plans are the flex route. That is to be something they are looking to add on I-96. This is like the flex route, if anybody has been on US-23 from Ann Arbor north, where you will have a lane that is capable of being opened at certain hours of the day, so rather than having a shoulder, they have an extra lane of traffic, that is one of the things that they wanted to look at. One of the things we noted in our discussions is that if the green lines that deal with capacity improvements, these are projects that are going to likely require bond issues and are gong to be beyond the scope of just an annual City Council budget.

Mr. Bartlett said as the City continues to grow, we will need to address future capacity needs. This relates to the funding that we did not have the chance to deal with until we really get a grip over what COVID is left with. We should develop a maintenance versus reconstruction mindset and how do we refresh the roads. How do we keep the ho do we maximize that annual investment in the PASER system on an annual basis? He said

they suggested to evaluate the City road funding annually to set policy prioritization for funding for local roads and mega projects on an annual basis.

Mr. Bartlett said the final recommendations utilize road report is a real program benchmark, including a maintaining a schedule for updates, focus on keeping the City's PASER rating at 5.8. This would mean the choosing that middle line from the City Council graph as far as an annual funding goes, verify the impact of the flex route before committing to other major projects that also has the caveat with it of seeing what the flex route looks like with the COVID work at home situations. He said continuous assume we are pursuing funding for major projects in fostering project fostering partnerships with other entities. He said we also suggested reconvening the Roads Committee about every five years with the caveat that depending on where we stand with the COVID virus and possible funding, it may make sense to convene earlier than that, should we come out with the economy dictate.

Member Casey thanked Mr. Bartlett again for taking us through the presentation for her colleagues and all the people who are watching. She said this was the shorter version of the information that we digested and the recommendations that we have. She believed there was a report that was provided to Council in the Admin Packet. She thought the final report is somewhere in the vicinity of 500 pages. There is a wealth of information that we have available to Council and to the residents that really shows the study that we did and all of the recommendations that we have. She yielded the floor back in case Member Mutch wishes to be recognized.

Member Mutch thanked all the committee members who are involved and of course, Member Casey for leading us throughout this, this discovery and really putting a lot of time and effort into putting together this Roads Report. He thought that the presentation they heard that evening really covered all the areas that the committee covered. Member Mutch mentioned that Mr. Bartlett noted that one area we did not get to explore the way we wanted was the question of funding recommendations. He thought there are some funding items in there, that we can discuss at budget time, as you noted, Mr. Mayor, that will be our opportunity to have some more conversations about where we are going in terms of how much funding for the Neighborhood Roads Program, if there are some opportunities for some additional funding into Major Road Projects that we know, we need to get done. He said at the same time, as was noted several times in the presentation, he thought we do need to be mindful, taking our time to see what is going to happen on the financial side in terms of the impact of what we are going though with this pandemic. He thought that was the caution that we brought, we did not want to get too far ahead not knowing where that is. He thought going forward if we get a better handle on the finances, we feel more confident about the City's financial position going forward, that maybe in a year or two, hopefully sooner rather than later, it would be wise to have the Roads Committee reassemble and have that kind of conversation of that part of it. He thought while we may see changing traffic patterns, the City of Novi is continuing to grow. He said the impact of traffic on the City is very important to many of our residents, as we have heard time and again. He thought if the economy rebounds, and we see traffic pick up again, we do not want to wait too long before we have these conversations about how we fund some of these major projects that we still need to

complete. He wanted to get Beck Road done, he wanted to get 12 Mile Road done sooner rather than later. He wanted to thank everybody for a lot of hard work, there is a lot of great information in there.

Mayor Gatt thanked Member Mutch. He expected all the Councilmembers to be at that expert level as we head into the budget session and discuss this very important topic. He stated he will I talk with City Manager Auger and City Attorney Schultz and he believed they were going to keep the Roads Committee, will put a little pause on it. He said it is certainly not being disbanded by any means. The funding will be the next fun thing to talk about, we are now heading into budgets, and that is going to be a big topic. He thanked everyone again for a very thorough and robust report, and all your time and effort. It was very much appreciated.

MANAGER/STAFF REPORT: None

ATTORNEY REPORT: None

CONSENT AGENDA REMOVALS AND APPROVALS:

CM 21-02-020 Moved by Casey, seconded by Staudt; CARRIED UNANIMOUSLY

To approve the Consent Agenda as presented.

A. Approve Minutes of:
   1. February 8, 2021 - Regular Meeting

B. Enter executive session immediately following the regular meeting of February 22, 2021 for the purpose of discussion correspondence from legal counsel.

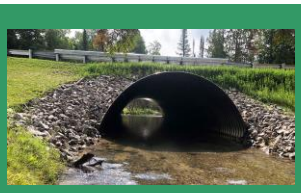
C. Approval of a three-year contract with two one-year renewal options with KMG Prestige Inc. for the management of Meadowbrook Commons, commencing on July 1, 2021with the final form of the agreement to be approved by the City Manager and City Attorney's office.

D. Consideration of approval of the final payments to Cadillac Asphalt, LLC for the 2018 and 2019 Neighborhood Road Program – Asphalt Streets in the amount of $77,166.18 and $48,686.36, respectively, plus interest earned on retainage.

E. Consideration of approval of the final payments to Great Lakes Contracting Solutions, Inc. for the 2018, 2019 and 2020 Concrete Panel Repair Programs in the amount of $28,181.64, $21,783.79 and $44,471.76, respectively, plus interest earned on retainage.

F. Approval of a license agreement with International Transmission Company (ITC) for construction of a non-motorized pathway connecting the existing ITC Trail to Wildlife Woods Park.

City of Novi
2022 Bridge
Asset Management Plan



A plan describing the City of Novi's transportation assets and conditions

Prepared by:
OHM Advisors

CONTENTS

TABLE OF FIGURES

TABLE OF TABLES

EXECUTIVE SUMMARY

As conduits for commerce and connections to vital services, bridges are among the most important assets in any community along with other assets like roads, culverts, traffic signs, traffic signals, and utilities that support and affect the road network. The City of Novi's (Novi) bridges, other road-related assets, and support systems are 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 bridges, 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 and bridge network in an efficient and effective manner. This asset management plan is intended to report on how Novi is meeting its obligations to maintain the bridges for which it is responsible.

This plan overviews Novi's bridge assets and conditions and explains how the City of Novi works to maintain and improve the overall condition of those assets. These explanations can help answer:

- What kinds of bridge assets Novi has in its jurisdiction and the different options for maintaining these assets.
- What tools and processes Novi uses to track and manage bridge assets and funds.
- What condition Novi's bridge assets are in compared to statewide averages.
- Why some bridge assets are in better condition than others and the path to maintaining and improving bridge asset conditions through proper planning and maintenance.
- How agency bridge assets are funded and where those funds come from.
- How funds are used and the costs incurred during Novi's bridge assets' normal life cycle.
- What condition Novi can expect of its bridge 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 Novi's bridge assets.

Novi owns and/or manages 12 bridges. Currently, 10 of the assets are in good or fair condition, while 2 bridges are rated as poor. No bridges are currently rated serious or critical.

An asset management plan is required by Michigan Public Act 325 of 2018, and this document represents fulfillment of some of Novi's obligations towards meeting these requirements. This asset management plan also helps demonstrate Novi's responsible use of public funds by providing elected and appointed officials as well as the general public with inventory and condition information of Novi's bridge assets, and gives taxpayers the information they need to make informed decisions about investing in 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 Novi 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 bridges in the City of Novi's road network. Asset management also provides a transparent decision-making process that allows the public to understand the technical and financial challenges of managing infrastructure with a limited budget.

The City of Novi (Novi) has adopted an "asset management" business process to overcome the challenges presented by having limited financial, staffing, and other resources while needing to meet safety standards and bridge users' expectations. Novi is responsible for maintaining and operating 12 bridges.

This 2022 plan outlines how Novi determines its strategy to maintain and upgrade bridge asset condition given agency goals, priorities of its bridge users, and resources provided. An updated plan is to be released approximately every three years to reflect changes in bridge conditions, finances, and priorities.

Questions regarding the use or content of this plan should be directed to the DPW at 26300 Lee BeGole Dr, Novi, MI 48375or at (248) 735-5640 and/or dpwrequests@cityofnovi.org. A copy of this plan may be accessed on our website at https://www.cityofnovi.org/services/public-works.

Key terms used in this plan are defined in Novi's comprehensive transportation asset management plan (also known as the "compliance plan") used for compliance with PA 325 or 2018.

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

Bridge Primer

Bridge Types

Bridges are structures that span 20 feet or more. These bridges can extend across one or multiple spans.

If culverts are placed side by side to form a span of 20 feet or more (for example, three 6-foot culverts with one-foot between each culvert), then this culvert system would be defined as a bridge. (Note: The Compliance Plan Appendix C contains a primer on culverts not defined as bridges.)

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

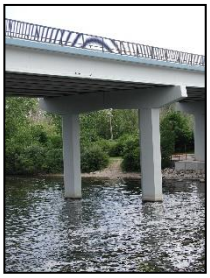


Figure 1: Girder bridge

The most common bridge design is the **girder system** (Figure 1). With this design, the bridge deck transfers vehicle loads to girders (or beams) that, in turn, transfer the load to the piers or abutments (see Figure 6).

Figure 2: Slab bridge

A similar design that lacks girders (or beams) is a **slab bridge** (Figure 2, and see Figure 6). A slab bridge transfers the vehicle load directly to the abutments and, if necessary, piers.

Truss bridges were once quite common and consist of a support structure that is created when structural members are connected at joints to form interconnected triangles (Figure 4). Structural members may consist of steel tubes or angles connected at joints with gusset plates.

Figure 3: Truss bridge

Another common bridge design in Michigan is the three-sided pre-cast box or arch bridge (Figure 4).

Michigan is also home to several unique bridge designs.

Adding another layer of complexity to bridge typing is the primary construction materials used (Figure 5). Bridges are generally constructed from concrete, steel, pre-stressed concrete, or timber. Some historical bridges or bridge components in Michigan may be constructed from stone or masonry.

Figure 4: Three-sided box bridge

Figure 5: Examples of common bridge construction materials used in Michigan

Bridge Condition

Michigan inspectors rate bridge condition on a 0-9 scale known as the National Bridge Inventory (NBI) rating scale (see Table for a summary of the NBI Rating scale). Elements of the bridge's superstructure, deck, and substructure receive a 9 if they are in excellent condition down to a 0 if they are in failed condition. A complete guide for Michigan bridge condition rating according to the NBI can be found in the MDOT Bridge Field Services' *Bridge Safety Inspection NBI Rating Guidelines* (https://www.michigan.gov/documents/mdot/BIR_Ratings_Guide_Combined_2017-10-30_606610_7.pdf).

Table 1: Summary of the NBI Rating Scale

NBI Rating	General Condition
9-7	Like new/good
6-5	Fair
4-3	Poor/serious
2-0	Critical/failed

Bridge Treatments

Replacement

Replacement work is typically performed when a bridge is in poor condition (NBI rating of 4 or less) and will improve the bridge to good condition (NBI rating of 7 or more). The Local Bridge Program, a part of MDOT's Local Agency Program, defines bridge replacement as full replacement, which removes the entire bridge (superstructure, deck, and substructure) before re-building a bridge at the same location (Figure 6). The decision to perform a total replacement over rehabilitation (see below) should be made based on a life-cycle cost analysis. Generally, replacement is selected if rehabilitation costs more than two-thirds of the cost of replacement. Replacement is generally the most expensive of the treatment options.

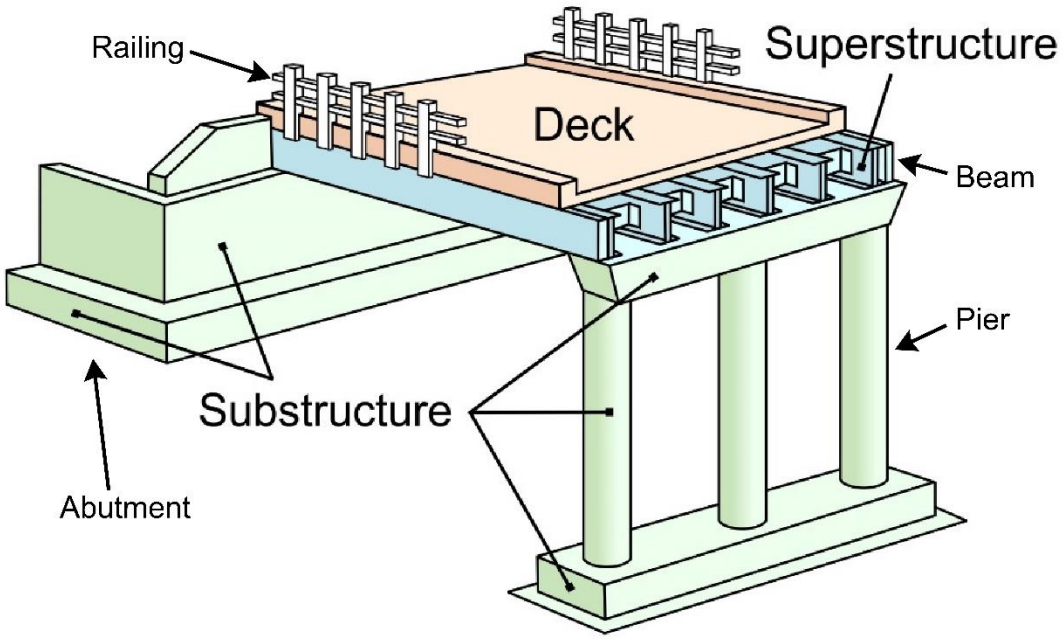


Figure 6: Diagram of basic elements of a bridge

Rehabilitation

Rehabilitation involves repairs that improve the existing condition and extend the service life of the structure and the riding surface. Most often, rehabilitation options are associated with bridges that have degraded beyond what can be fixed with preventive maintenance. Rehabilitation is typically performed on poor-rated elements (NBI rating of 4 or less) to improve them to fair or good condition (NBI rating of 5 or more). Rehabilitation can include superstructure replacement (removal and replacement of beams and deck) or deck replacement. While typically more expensive than general maintenance, rehabilitation treatments may be more cost-effective than replacing the entire structure.

- **Railing retrofit/replacement:** A railing retrofit or replacement either reinforces the existing railing or replaces it entirely (Figure 6). This rehabilitation is driven by a need for safety improvements on poor-rated railings or barriers (NBI rating less than 5).
- **Beam repair:** Beam repair corrects damage that has reduced beam strength (Figure 6). In the case of steel beams, it is performed if there is 25 percent or more of section loss in an area of the beam that affects load-carrying capacity. In the case of concrete beams, this is performed if there is 50 percent or more spalling (i.e., loss of material) at the ends of beams.
- **Substructure concrete patching and repair:** Patching and repairing the substructure is essential to keep a bridge in service. These rehabilitation efforts are performed when the abutments or piers are fair or poor (NBI rating of 5 or 4), or if spalling and delamination affect less than 30 percent of the bridge surface.

Preventive Maintenance

The Federal Highway Administration's (FHWA) *Bridge Preservation Guide* (2018) defines preventive maintenance as "a strategy of extending service life by applying cost-effective treatments to bridge elements…[that] retard future deterioration and avoid large expenses in bridge rehabilitation or replacements."

Preventive maintenance work is typically done on bridges rated fair (NBI rating of 5 or 6) in order to slow the rate of deterioration and keep them from falling into poor condition.

- **Concrete deck overlay:** A concrete deck overlay involves removing and replacing the driving surface. Typically, this is done when the deck surface is poor (NBI rating is less than 5) and the underneath portion of the deck is at least fair (NBI rating greater than 4). A shallow or deep concrete overlay may be performed depending on the condition of the bottom of the deck. The MDOT *Bridge Deck Preservation* matrices provide more detail on concrete deck overlays (see https://www.michigan.gov/mdot/0,4616,7-151-9625_24768_24773---,00.html).

- **Deck repairs:** Deck repairs include three common techniques: HMA overlay with or without waterproof membranes, concrete patching, deck sealing, crack sealing, and joint repair/replacement. An HMA overlay with an underlying waterproof membrane can be placed on bridge decks with a surface rating of fair or lower (NBI of 5 or less) and with deficiencies that cover between 15 and 30 percent of the deck surface and deck bottom. An HMA overlay without a waterproof membrane should be used on a bridge deck with a deck surface and deck bottom rating of serious condition or lower (NBI rating of 3 or less) and with deficiencies that cover greater than 30 percent of the deck surface and bottom; this is considered a temporary holdover to improve ride quality when a bridge deck is scheduled to undergo major rehabilitation within five years. All HMA overlays need to be accompanied by an updated load rating. Patching of the concrete on a bridge deck is done in response to an inspector's work recommendation or when the deck surface is in good, satisfactory, or fair condition (NBI rating of 7, 6, or 5) with minor delamination and spalling. To preserve a good bridge deck in good condition, a deck sealer can be used.

  Deck sealing should only be done when the bridge deck has surface rating of fair or better (NBI of 5 or more). Concrete sealers should only be used when the top and bottom surfaces of the deck are free from major deficiencies, cracks, and spalling. An epoxy overlay may be used when between 2 and 5 percent of the deck surface has delaminations and spalls, but these deficiencies must be repaired prior to the overlay. An epoxy overlay may also be used to repair an existing epoxy overlay. Concrete crack sealing is an option to maintain concrete in otherwise good condition that has visible cracks with the potential of reaching the steel reinforcement. Crack sealing may be performed on concrete with a surface rating of good, satisfactory, or fair (NBIS rating of 7, 6, or 5) with minor surface spalling and delamination; it may also be performed in response to a work recommendation by an inspector who has determined that the frequency and size of the cracks require sealing.

- **Steel bearing repair/replacement:** Rather than sitting directly on the piers, a bridge superstructure is separated from the piers by bearings. Bearings allow for a certain degree of movement due to temperature changes or other forces. Repairing or replacing the bearings is considered preventive maintenance. Girders and a deck in at least fair condition (NBI of 5 or higher) and bearings in poor condition (NBI rating of 4 or less) identifies candidates for this maintenance activity.
- **Painting:** Re-painting a bridge structure can either be done in totality or in part. Total re-painting is done in response to an inspector's work recommendation or when the paint condition is in serious condition (NBI rating of 3 or less). Partial re-painting can either consist of zone re-painting, which is a preventive maintenance technique, or spot re-painting, which is scheduled maintenance (see below). Zone re-painting is done when less than 15 percent of the paint in a smaller area, or zone, has failed while the rest of the bridge is in good or fair condition. It is also done if the paint condition is fair or poor (NBI rating of 5 or 4).
- **Channel improvements:** Occasionally, it is necessary to make improvements to the waterway that flows underneath the bridge. Such channel improvements are driven by an inspector's work recommendation based on a hydraulic analysis or to remove vegetation, debris, or sediment from the channel and banks (Figure 6).
- **Scour countermeasures:** An inspector's work recommendations or a hydraulic analysis may require scour countermeasures (see the *Risk Management* section of this plan for more information on scour). This is done when a structure is categorized as scour critical and is not scheduled for replacement or when NBI comments in abutment and pier ratings indicate the presence of scour holes.
- **Approach repaving:** A bridge's approach is the transition area between the roadway leading up to and away from the bridge and the bridge deck. Repaving the approach areas is performed in response to an inspector's work recommendation, when the pavement surface is in poor condition (NBI rating of 4 or less), or when the bridge deck is replaced or rehabilitated (e.g., concrete overlay).
- **Guardrail repair/replacement:** A guardrail is a safety feature on many roads and bridges that prevents or minimizes the effects of lane departure incidents. Keeping bridge guardrails in good condition is important. Repair or replacement of bridge guardrail should be done when a guardrail is missing or damaged, or when it needs a safety improvement.

Scheduled Maintenance

Scheduled maintenance activities are those activities or treatments that are regularly scheduled and intend to maintain serviceability while reducing the rate of deterioration.

- **Superstructure washing:** Washing the superstructure, or the main structure supporting the bridge, typically occurs in response to an inspector's work recommendation or when salt-

contaminated dirt and debris collected on the superstructure is causing corrosion or deterioration by trapping moisture.

- **Drainage system cleanout/repair:** Keeping a bridge's drainage system clean and in good working order allows the bridge to shed water effectively. An inspector's work recommendation may indicate drainage system cleanout/repair. Signs that a drainage system needs cleaning or repair include clogs and broken, deteriorated, or damaged drainage elements.
- **Spot painting:** Spot painting is a form of partial bridge painting. This scheduled maintenance technique involves painting a small portion of a bridge. Generally, this is done in response to an inspector's work recommendation and is used for zinc-based paint systems only.
- **Slope repair/reinforcement:** The terrain on either side of the bridge that slopes down toward the channel is called the slope. At times, it is necessary to repair the slope. Situations that call for slope repair include when the slope is degraded, when the slope has significant areas of distress or failure, when the slope has settled, or if the slope is in fair or poor condition (NBI rating of 5 or less). Other times, it is necessary to reinforce the slope. Reinforcement can be added by installing Riprap, which is a side-slope covering made of stones. Riprap protects the stability of side slopes of channel banks when erosion threatens the surface.
- **Vegetation control and debris removal:** Keeping the area around a bridge structure free of vegetation and debris safeguards the bridge structure from these potentially damaging forces. Removing or restricting vegetation around bridges prevents damage to the structure. Vegetation control is done in response to an inspector's work recommendation or when vegetation traps moisture on structural elements or is growing from joints or cracks. Debris in the water channel or in the bridge can also cause damage to the structure. Removing this debris is typically done in response to an inspector's work recommendation or when vegetation, debris, or sediment accumulates on the structure or channel.
- **Miscellaneous repairs:** These are uncategorized repairs in response to an inspector's work recommendation.

1. BRIDGE ASSETS

Novi seeks to implement an asset management program for its bridge structures. This program balances the decision to perform reconstruction, rehabilitation, preventive maintenance, scheduled maintenance, or new construction, with Novi's bridge funding in order to maximize the useful service life and to ensure the safety of the local bridges under its jurisdiction. In other words, Novi's bridge asset management program aims to preserve and/or improve the condition of its local bridge network within the means of its financial resources.

Nonetheless, Novi recognizes that limited funds are available for maintaining and improving the bridge network. Since preservation strategies like preventive maintenance are generally a more effective use of these funds than costly alternative management strategies like major rehabilitation or replacement, Novi seeks to identify those bridges that will benefit from a planned maintenance program while addressing those bridges that pose usability and/or safety concerns.

The three-fold goal of Novi's asset management program is the preservation and safety of its bridge network, increase of its bridge assets' useful service life by extending of the time that bridges remain in good and fair condition, and reduction of future maintenance costs. To quantify this goal, Novi specifically aims to have to have 90% or more of the agency's local bridges in fair to good condition and to have less than 10% classify as structurally deficient over its three-year plan.

Thus, Novi's asset management plan objectives are:

- To establish the current condition of the county's bridges
- To develop a "mix of fixes" that will:
    - Program scheduled maintenance actions to impede deterioration of bridges in good condition
    - Implement selective corrective repairs or rehabilitation for degraded bridge elements order to restore functionality
    - Identify and program those eligible bridges in need of replacement
- To identify available funding sources, such as:
    - Dedicated county resources
    - County funding through Michigan's Local Bridge Program
    - Opportunities to obtain other funding
- To prioritize the programmed actions within available funding limitations
- To improve the condition of bridges currently rated poor (4 or lower) and preserve bridges currently rated fair (5) or higher in their current condition in order to extend their useful service life.

Inventory

Novi is responsible for 12 local bridges. Table 2 summarizes Novi's bridge assets by type, sizes by bridge type, and condition by bridge type. Additional inventory data, condition ratings, and proposed preventive maintenance actions for each bridge are contained in the tables in Appendix 1. The bridge inventory data was obtained from MDOT MiBRIDGE and other sources, and the 2022 condition data and maintenance actions are taken from the inspector's summary report (see Appendix 1).

Types

Of the Novi's 12 structures with spans greater than 20 feet, 7 are culverts, and five are traditional bridge structures.

Locations and Sizes

Figure 7 illustrates the locations of bridge assets owned by Novi. Details about the locations and sizes of each individual asset can be found in Novi's MiBRIDGE database. For more information, please refer to the agency contact listed in the *Introduction* of this bridge asset management plan.

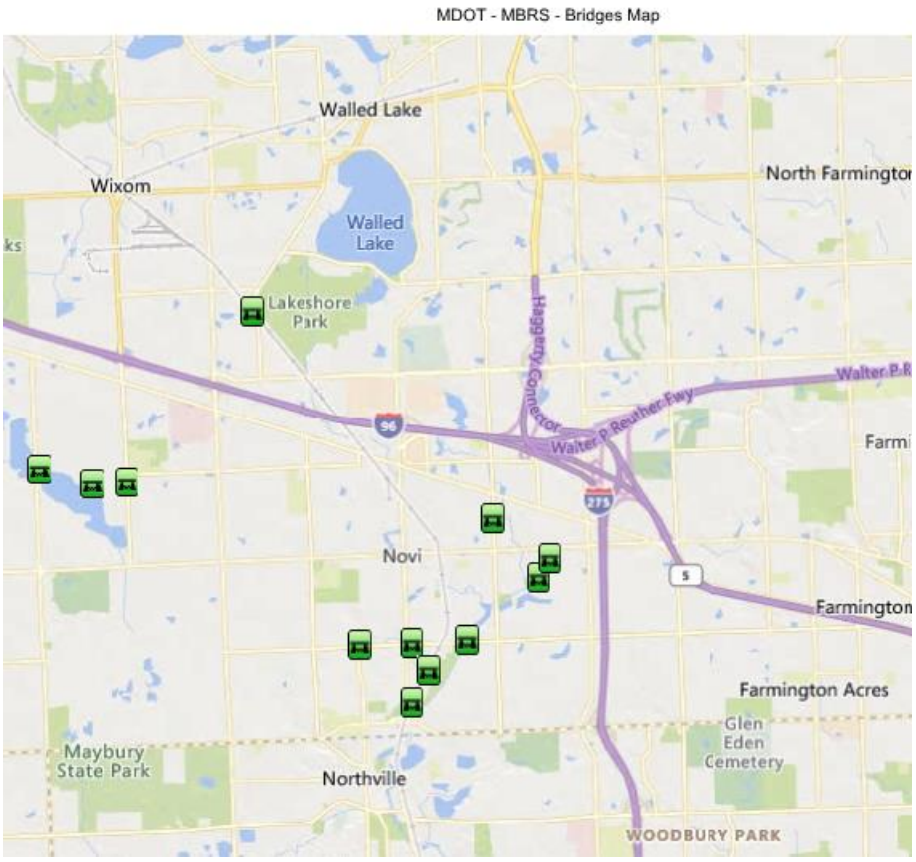


Figure 7: Map illustrating locations Novi's of bridge assets

Condition

Novi evaluates its bridges according to the National Bridge Inspection Standards rating scale, with a rating of 9 to 7 being like new to good condition, a rating of 6 and 5 being fair condition, and a rating of 4 or lower being poor or serious/critical condition. The current condition of Novi's bridge network is 7 (58%) are good, 3 (25%) are fair, and 2 (17%) are poor or lower.

Another layer of classification of Novi's bridge inventory classifies 2 (17%) bridges as structurally deficient, 0 bridges as posted, and 0 bridges as closed. Structurally deficient bridges are those with a deck, superstructure, substructure, and/or culvert rated as "poor" according to the NBI rating scale, with a load-carrying capacity significantly below design standards, or with a waterway that regularly overtops the bridge during floods. Posted bridges are those that have declined in condition to a point where a restriction is necessary for what would be considered a safe vehicular or traffic load passing over the bridge; designating a bridge as "posted" has no influence on its condition rating. Closed bridges are those that are closed to all traffic; closing a bridge is contingent upon its ability to carry a set minimum live load.

Bridge ID	Total Deck Area (sq ft)	Condition: Structurally Deficient, Posted, Closed			2022 Condition		
		Struct. Defic	Posted	Closed	Poor	Fair	Good
8246	2771						X
8247	1848					X	
8248	3192					X	
12769	9586						X
13828	2047	X			X		
13858	n/a					X	
13859	n/a						X
13860	n/a						X
13861	n/a						X
13862	n/a						X
14274	n/a	X			X		
14275	n/a						X
Total SD/Posted/Closed		**2**		**0**			
Total	**12**	**2**			**2**	**3**	**7**
Percentage (%)		**17**	**0**	**0**	**17**	**25**	**58**

Statewide, MDOT's statistics for local agency bridges show that 14% are poor and 86% are good/fair. Correspondingly, Novi has an 83% percentage of its bridges in fair/good condition versus the statewide average of 86% for local agency bridges. Statewide, 97% of local agency bridge deck area classified as structurally deficient compared to an 17% percentage of Novi's bridge deck area.

Goals

The goal of Novi's asset management program is the preservation and safety of its bridge network; it also aims to extend the period of time that bridges remain in good and fair condition, thereby increasing their useful service life and reducing future maintenance costs.

Specifically, this goal translates into long-range goals of having 90% of its bridges rated fair/good and having less than 10% classify as structurally deficient within four years.

Several metrics will be used to assess the effectiveness of this asset management program. Novi will monitor and report the annual change in the number of its bridges rated fair/good (5 or higher) and the annual change in the number of its bridges classified as structurally deficient.

Based on past inspection records and condition ratings, Novi will establish a baseline of past performance by determining the average period of time that a bridge remains in good or fair condition. The performance measure will be the increased average amount of time a bridge is in the good or fair condition status after implementation of the asset management strategy when compared to the baseline time before implementation.

Prioritization, Programmed/Funded Projects, and Planned Projects

Prioritization

Novi's asset management program aims to address the structures of critical concern by targeting elements rated as being in poor condition and to improve and maintain the overall condition of the bridge network to good or fair condition through a "mix of fixes" strategy. Therefore, Novi prioritizes bridges for projects by evaluating five factors and weighting them as follows: condition –20%, load capacity –10%, traffic –20%, safety –40%, and detour –10%. There are several components within each factor that are used to arrive at its score. Each project under consideration is scored, and its total score is then compared with other proposed project to establish a priority order.

Novi annually reviews the current condition of each of the its bridges using the NBIS inspection data contained in the *MDOT Bridge Safety Inspection Report* and the inspector's work recommendations contained in MDOT's *Bridge Inspection Report*. The inspection inventory and condition data are consolidated in spreadsheet format for Novi's bridges in Appendix 1. Novi then determines management and preservation needs and corresponding actions for each bridge, as well as inspection follow-up actions. The management and preservation actions are selected in accordance with criteria contained in the *Summary of Preservation Criteria* table (below) and adapted to Novi's specific bridge network.

Table 2: Summary of Preservation Criteria

Preservation Action	Bridge Selection Criteria	Expected Service Life
Replacement		
Total Replacement	• NBI rating of 3 or less [1] [2] • *OR* Cost of rehabilitation exceeds cost of replacement [1] • *OR* Bridge is scour critical with no counter-measures available [1]	70 years
Rehabilitation		
Superstructure Replacement	• NBI rating of 4 or less for the superstructure [1] [2] • *OR* Cost of superstructure and deck rehabilitation exceeds cost of replacement [1]	40 years [1]
Deck Replacement Epoxy Coated Steel Black Steel	• Use guidelines in MDOT's Bridge Deck Preservation Matrix [3] [4] • NBI rating of 4 or less for the deck surface and deck bottom [1] [2] • Deck bottom has more than 25% total area with deficiencies [1]	60+ years [3] [4]

Table 2: Summary of Preservation Criteria		
Preservation Action	**Bridge Selection Criteria**	**Expected Service Life**
	• *OR* Replacement cost of deck is competitive with rehabilitation [1]	
Substructure Replacement (Full or Partial)	• NBI rating of 4 or less for abutments, piers, or pier cap [1] [2] • Has open vertical cracks, signs of differential settlement, or active movement [1] • Pontis rating of 3 or 5 for more than 30 percent of the substructure [1] [5] • *OR* Bridge is scour critical with no counter-measures available	40 years [1*]
Steel Beam Repair	• More than 25% section loss in an area of the beam that affects load carrying capacity [1] • *OR* To correct impact damage that impairs beam strength [1]	40 years [1*]
Prestressed Concrete Beam Repair	• More than 5% spalling at ends of prestressed I-beams [1] • *OR* Impact damage that impairs beam strength or exposes prestressing strands [1]	40 years [1*]
Substructure Concrete Patching and Repair	• NBI rating of 5 or 4 for abutments or piers, and surface has less than 30% area spalled and delaminated [1] [2] • *OR* Pontis rating of 3 or 4 for the column or pile extension, pier wall, and/or abutment wall and surface has between 2% and 30% area with deficiencies [1] [5] • *OR* In response to inspector's work recommendation for substructure patching [1]	
Abutment Repair/Replacement	• NBI rating of 4 or less for the abutment [1] [2] • *OR* Has open vertical cracks, signs of differential settlement, or active movement	
Railing/Barrier Replacement	• NBI rating greater than 5 for the deck [1] [2] • NBI rating less than 5 for the railing with more than 30% total area having deficiencies [1] [2] • *OR* Pontis rating is 4 for railing [1] [5] • *OR* Safety improvement is needed [1]	
Culvert Repair/Replacement	• NBI rating of 4 or less for culvert or drainage outlet structure • *OR* Has open vertical cracks, signs of deformation, movement, or differential settlement	
Preventive Maintenance		
Shallow Concrete Deck Overlay	• NBI rating is 5 or less for deck surface, and deck surface has more than 15% area with deficiencies [1] [2] • NBI rating of 4 or 5 for deck bottom, and deck bottom has between 5% and 30% area with deficiencies [1] [2] • *OR* In response to inspector's work recommendation [1]	12 years
Deep Concrete Deck Overlay	• NBI rating of 5 or less for deck surface, and deck surface has more than 15% area with deficiencies [1] [2] • NBI deck bottom rating is 5 or 6, and deck bottom has less than 10% area with deficiencies [1] [2] • *OR* In response to inspector's work recommendation [1]	25 years
HMA Overlay with Waterproofing Membrane	• NBI rating of 5 or less for deck surface, and both deck surface and bottom have between 15% and 30% area with deficiencies [1] [2] • *OR* Bridge is in poor condition and will be replaced in the near future and the most cost-effective fix is HMA overlay [1]	

Table 2: Summary of Preservation Criteria		
Preservation Action	**Bridge Selection Criteria**	**Expected Service Life**
HMA Overlay Cap without Membrane	• Note: All HMA caps should have membranes unless scheduled for replacement within five years. • NBI rating of 3 or less for deck surface and deck bottom, and deck surface and deck bottom have more than 30% area with deficiencies. Temporary holdover to improve ride quality for a bridge in the five-year plan for rehab/replacement. [1] [2]	3 years
Concrete Deck Patching	• NBI rating of 5, 6, or 7 for deck surface, and deck surface has between 2% and 5% area with delamination and spalling [1] [2] • *OR* In response to inspector's work recommendation [1]	5 years
Steel Bearing Repair/Replacement	• NBI rating of 5 or more for superstructure and deck, and NBI rating 4 or less for bearing [2]	
Deck Joint Replacement	• Always include when doing deep or shallow concrete overlays [1] • NBI rating of 4 or less for joints [1] [2] • *OR* Joint leaking heavily [1] • *OR* In response to inspector's work recommendation for replacement [1]	
Pin and Hanger Replacement	• NBI rating of 4 or less for superstructure for pins and hangers [1] [2] • Pontis rating of 1, 2, or 3 for a frozen or deformed pin and hanger [1] [5] • *OR* Presence of excessive section loss, severe pack rust, or out-of-plane distortion [1]	15 years
Zone Repainting	• NBI rating of 5 or 4 for paint condition, and paint has 3% to 15% total area failing [1] [2] • *OR* During routine maintenance on beam ends or pins and hangers [1] • *OR* less than 15% of existing paint area has failed and remainder of paint system is in good or fair condition [1]	10 years
Complete Repainting	• NBI rating of 3 or less for paint condition [1] [2] • *OR* Painted steel beams that have greater than 15% of the existing paint area failing [1]	
Partial Repainting	• See Zone or Spot Painting	
Channel Improvements	• Removal of vegetation, debris, or sediment from channel and banks to improve channel flow • *OR* in response to inspector's work recommendation	
Scour Countermeasures	• Pontis scour rating of 2 or 3 and is not scheduled for replacement [1] [5] • OR NBI comments in abutment and pier ratings indicate presence of scour holes [1] [2]	

Approach Repaving	• Approach pavement relief joints should be included in all projects that contain a significant amount of concrete roadway (in excess of 1000' adjacent to the structure). The purpose is to alleviate the effects of pavement growth that may cause distress to the structure. Signs of pavement growth include:
	  ○ Abutment spalling under bearings [1]
	  ○ Beam end contact [1]
	  ○ Closed expansion joints and/or pin and hangers [1]	

Table 2: Summary of Preservation Criteria		
Preservation Action	**Bridge Selection Criteria**	**Expected Service Life**
	○ Damaged railing and deck fascia at joints [1] ○ Cracking in deck at reference line (45 degree angle) [1]	
Guard Rail Repair/Replacement	• Guard rail missing or damaged [2*] • *OR* Safety improvement is needed [2*]	
Scheduled Maintenance		
Superstructure Washing	• When salt contaminated dirt and debris collected on superstructure is causing corrosion or deterioration by trapping moisture [1] • *OR* Expansion or construction joints are to be replaced and the steel is not to be repainted [1] • *OR* Prior to a detailed replacement [1] • *OR* In response to inspector's work recommendation [1]	2 years
Drainage System Clean-Out/Repair	• When drainage system is clogged with debris [1] • *OR* Drainage elements are broken, deteriorated, or damaged [1] • *OR* NBI rating comments for drainage system indicate need for cleaning or repair [1] [2]	2 years
Spot Repainting	• For zinc-based paint systems only. Do not spot paint with lead-based paints. • Less than 5% of paint area has failed in isolated areas [1] • *OR* In response to inspector's work recommendation [1]	5 years
Slope Paving Repair	• NBI rating is 5 or less for slope protection [1] [2] • *OR* Slope is degraded or sloughed • *OR* Slope paving has significant areas of distress, failure, or has settled [1]	
Riprap Installation	• To protect surface when erosion threatens the stability of side slopes of channel banks	
Vegetation Control	• When vegetation traps moisture on structural elements [1] • *OR* Vegetation is growing from joints or cracks [1] • *OR* In response to inspector's work recommendation for brush cut [1]	1 year
Debris Removal	• When vegetation, debris, or sediment accumulates on the structure or in the channel • *OR* In response to inspectors work recommendation	1 year
Deck Joint Repair	• Do not repair compression joint seals, assembly joint seals, steel armor expansions joints, and block out expansion joints; these should always be replaced. [1] • NBI rating is 5 for joint [1] [2] • *OR* In response to inspector's work recommendation for repair [1]	
Concrete Sealing	• Top surface of pier or abutments are below deck joints and, when contaminated with salt, salt can collect on the surface [1] • *OR* Surface of the concrete has heavy salt exposure. Horizontal surfaces of substructure elements are directly below expansion joints [1]	
Concrete Crack Sealing	• Concrete is in good or fair condition, and cracks extend to the depth of the steel reinforcement [1] • *OR* NBI rating of 5, 6, or 7 for deck surface, and deck surface has between 2% and 5% area with deficiencies [1] [2]	5 years

Table 2: Summary of Preservation Criteria		
Preservation Action	**Bridge Selection Criteria**	**Expected Service Life**
	• *OR* Unsealed cracks exist that are narrow and/or less than 1/8" wide and spaced more than 8' apart [1] • *OR* In response to inspector's work recommendation [1]	
Minor Concrete Patching	• Repair minor delaminations and spalling that cover less than 30% of the concrete substructure [1] • *OR* NBI rating of 5 or 4 for abutments or piers, and comments indicate that their surface has less than 30% spalling or delamination [1] [2] • *OR* Pontis rating of 3 or 4 for the column or pile extension, pier wall and/or abutment wall, and surface has between 2% and 30% area with deficiencies [1] [5] • *OR* In response to inspector's work recommendation [1]	
HMA Surface Repair/Replacement	• HMA surface is in poor condition • *OR* In response to inspector's work recommendation	
Seal HMA Cracks/Joints	• HMA surface is in good or fair condition, and cracks extend to the surface of the underlying slab or sub course • *OR* In response to inspector's work recommendation	
Timber Repair	• NBI rating of 4 or less for substructure for timber members • *OR* To repair extensive rot, checking, or insect infestation	
Miscellaneous Repair	• Uncategorized repairs in response to inspector's work recommendation	

This table was produced by TransSystems and includes information from the following sources:

[1] MDOT, *Project Scoping Manual*, MDOT, 2019.

[2] MDOT, *MDOT NBI Rating Guidelines*, MDOT, 2017.

[3] MDOT, *Bridge Deck Preservation Matrix - Decks with Uncoated "Black" Rebar*, MDOT, 2017.

[4] MDOT, *Bridge Deck Preservation Matrix - Decks with Epoxy Coated Rebar*, 2017.

[5] MDOT, *Pontis Bridge Inspection Manual*, MDOT, 2009.

* From source with interpretation added.

In terms of management and preservation actions, Novi's asset management program uses a "mix of fixes" strategy that is made up of rehabilitation, preventive maintenance, and scheduled maintenance.

Replacement involves substantial changes to the existing structure, such as bridge deck replacement, superstructure replacement, or complete structure replacement, and is intended to improve critical or closed bridges to a good condition rating.

Rehabilitation is undertaken to extend the service life of existing bridges. The work will restore deficient bridges to a condition of structural or functional adequacy, and may include upgrading geometric features. Rehabilitation actions are intended to improve the poor or fair condition bridges to fair or good condition.

Preventive maintenance work will improve and extend the service life of fair bridges, and will be performed with the understanding that future rehabilitation or replacement projects will

contain appropriate safety and geometric enhancements. Preventive maintenance projects are directed at limited bridge elements that are rated in fair condition with the intent of improving these elements to a good rating. Most preventive maintenance projects will be one-time actions in response to a condition state need. Routine preventive work will be performed by the agency's in-house maintenance crews while larger, more complex work will be contracted.

Novi's **scheduled maintenance** program is an integral part of the preservation plan, and is intended to extend the service life of fair and good structures by preserving the bridges in their current condition for a longer period of time. Scheduled maintenance is proactive and not necessarily condition driven. In-house maintenance crews will perform much of this work.

Certain of the severely degraded and structurally deficient bridges require replacement or major rehabilitation. Several of the remaining bridges require one-time preventive maintenance actions to repair defects and restore the structure to a higher condition rating. Most bridges are included in a scheduled maintenance plan with appropriate maintenance actions programmed for groups of bridges of similar material and type, bundled by location.

The replacement, rehabilitation, and preventive maintenance projects are generally eligible for funding under the local bridge program, and any requests for funding will be submitted with City of Novi's annual applications.

To achieve its goals, The work has been prioritized by considering each individual bridge's needs, its importance, the present costs of improvements, and the impact of deferral (i.e., cost increase due to increased degradation). Novi's asset management program incorporates preservation of bridges currently rated fair (5) or higher in their current condition in order to extend their useful service life. The primary work activities used to meet this preservation objective include preventive maintenance. A bridge-by-bridge preservation—or maintenance—plan will be prepared based upon available funding.

Programmed/Funded Projects

Novi budgets $300,000 in total funding per year for the years 2023-2026. To maintain the current bridge condition, the City of Novi plans to spend $75,000 per year on preventive maintenance of bridges. Novi plans to replace 0 bridges until outside funding becomes available. By performing the aforementioned preventive maintenance of bridge structures, the City of Novi plans to maintain it's current network rating. If funds become available through the MDOT Local Bridge Program, the Ashbury bridge will be scheduled for replacement.

Novi will compile estimated costs of each typical management and/or preservation action using unit prices in the latest *Bridge Repair Cost Estimate* spreadsheet contained in MDOT's *Local Bridge Program Call for Projects*. The cost of items of varying complexity, such as maintenance of traffic, staged construction, scour counter-measures, and so forth, are computed on a bridge-by-bridge basis. The cost estimates will be reviewed and updated when the bridge asset management plan is updated.

Planned Projects

No major capital projects are planned at this point. If funding becomes available, the City of Novi will identify priority projects and fund them based upon the City's priority metric.

Gap Analysis

Several projects should be planned for the lowest rated bridges. However, when viewing the available funding, there is a funding gap. For projects that are unable to be completed at the current funding levels, the City of Novi will continue to monitor those bridge assets and take any necessary steps within its budget to prevent or mitigate a condition decline or a need to post or close the structure.

2. FINANCIAL RESOURCES

Anticipated Revenues

Any projects submitted to the local aid program that are not selected for funding will be considered for addition to the Novi's capital program.

Anticipated Expenses

Scheduled maintenance activities and minor repairs that are not affiliated with any applications, grants, or other funded projects will be performed by the agency's in-house maintenance forces and funded through the City's annual operating budget.

3. RISK MANAGEMENT

The City of Novi recognizes that the potential risks associated with bridges generally fall into several categories:

- Personal injury and property damage resulting from a bridge collapse or partial failure;
- Loss of access to a region or individual properties resulting from bridge closures, restricted load postings, or extended outages for rehabilitation and repair activities; and
- Delays, congestion, and inconvenience due to serviceability issues, such as poor quality riding surface, loose expansion joints, or missing expansion joints.

Novi addresses these risks by implementing regular bridge inspections and a preservation strategy consisting of preventive maintenance.

Novi administers the biennial inspection of its bridges in accordance with NBIS and MDOT requirements. The inspection reports document the condition of Novi's bridges and evaluates them in order to identify new defects and monitor advancing deterioration. The summary inspection report in Appendix 1 identifies items needing follow-up, special inspection actions, and recommended bridge-by-bridge maintenance activities.

Bridges that are considered "scour critical" pose a risk to Novi's road and bridge network. Scour is the depletion of sediment from around the foundation elements of a bridge commonly caused by fast-moving water. According to MDOT's *Michigan Structure Inventory and Appraisal Coding Guide*, a scour critical bridge is one that has unstable abutment(s) and/or pier(s) due to observed or potential (based on an evaluation study) scour. Bridges receiving a scour rating of 3 or less are considered scour critical. Novi has no bridges that are scour critical bridges.

Novi has no posted or closed bridges that are critical to accessing entire areas or individual properties within its jurisdiction.

The preservation strategy identifies actions in the operations and maintenance plan that are preventive or are responsive to specific bridge conditions. The actions are prioritized to correct critical structural safety and traffic issues first, and then to address other needs based on the operational importance of each bridge and the long-term preservation of the network. The inspection results serve as a basis for modifying and updating the operations and maintenance plan annually.

Appendix 1

The City of Novi plans to apply for funding through MDOT's Local Bridge Program for funding when the condition warrants action. Currently the City is not going to receive any funds for at minimum the next 3 years from this program. After the latest round of inspections, it is recommended that Novi apply for a replacement on the Ashbury bridge next year for 2026 funds.

Table: Type, Size, and Condition of City of Novi Bridge Assets

			Condition: Structurally Deficient, Posted, Closed			2022 Condition		
Bridge Type	Total Number of Bridges	Total Deck Area (sq ft)	Struct Deficient	Posted	Closed	Poor	Fair	Good
Prestressed Concrete	5	19444	1	0	0	1	2	2
Steel Culvert	3	2967	1	0	0	1	1	1
Precast Culvert	4	3984	0	0	0	0	0	4
Total SD/Posted/Closed			2	0	0			
Total	12	26395				2	3	7
Percentage			17%	0%	0%	17%	25%	58%