

Michigan Mobility 2050: Existing Conditions and Inventory

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Introduction

One of the key steps in developing and reaffirming a state long-range transportation plan is to establish a baseline on where the statewide multimodal transportation network is at the current time. Establishing an inventory of the existing conditions, performance and current level of service is critical to understanding how we need to plan for the future, and to maintain a certain state of good repair and level of performance. As discussed in the first task report, MM2050 covers the following overall statewide multimodal network:

- Roads: Federal-aid network including:
 - 28,421 lane miles of Michigan Department of Transportation (MDOT)-owned state trunkline roads.
 - 58,124 lane miles of locally owned roads.
 - 11,241 bridges greater than 20 feet long.
- Active Transportation:
 - 178 open rail trails/shared-use pathway with mileage totaling more than 2,750 tracked by the Rails to Trails Conservancy, along with hundreds of additional miles of shared-use pathways spread across the state.
 - 3 designated U.S. Bicycle Routes with mileage totaling just more than 1,000 miles.
- Transit:
 - 80-plus transit providers operating local and intercity buses, demand-response services and ferries.
- Rail:
 - 3,600 miles of private and state-owned freight and passenger rail corridors.
- Aviation (all airports):
 - 18 commercial airports.
 - 214 licensed, public-use airports.
- Ports:
 - 33 active commercial maritime ports.

This white paper discusses the overall inventory, condition and performance of the network as it pertains to asset management (condition, inventory, state of good repair) and overall performance management (as it pertains to how it impacts the users of the network - both people and freight), including safety, operations, accessibility, mobility, travel time reliability and overall congestion.

As MM2050 is a reaffirmation of the MM2045 plan, this report will provide an update of the information initially provided with a base year of 2018 and update this information to mostly the 2023-2024 time frame based on the available data provided. The inventory will be broken down according to transportation mode and then into the different asset and performance management categories.

Roads and Highways

Asset Inventory

This section provides a snapshot of highway roads and bridge assets of Michigan's current transportation system. It reviews both trunkline and non-trunkline assets, although the type of information kept for each is slightly different. MDOT only has direct jurisdiction over the trunkline system (I, M and US routes). The non-trunkline system is under the jurisdiction of county road commissions or incorporated cities and villages.

The inventory and condition data in this section are categorized by highway and bridge to provide available inventory and condition data specific to each category.

Highway Inventory

Highways connect residents, visitors and industries to every corner of Michigan and beyond, into three bordering states (Ohio, Indiana and Wisconsin) as well as Canada. This extensive transportation network system supports the quality of life and economic vitality in Michigan.

Trunkline highways are under the State of Michigan's jurisdiction. A non-trunkline highway is under county, city or village jurisdiction. A route's eligibility for federal aid is determined by National Functional Classification (NFC) and urban designation, as opposed to jurisdiction. MDOT works with local agencies (counties, cities, villages, metropolitan planning organizations (MPOs), and regional planning agencies (RPAs)) to collect data on non-trunkline roads via the Non-Trunkline Federal Aid Road Program (NTFA). The NTFA program, established in 2010, is a cross-agency traffic data collection program to meet Federal Highway Administration (FHWA) requirements of the Highway Performance Monitoring System (HPMS).

The NHS is a network of highways determined by the U.S. Department of Transportation (USDOT), in cooperation with states, local officials and MPOs, as important to the nation's economy, defense and mobility. It includes the Interstate system and a subset of highway systems, including the Strategic Highway Network (STRAHNET) and STRAHNET connectors, intermodal freight connectors and other principal arterials.

The extensive network of highways that connect Michigan with the rest of the country includes several interstates:

- I-94, which runs east and west and connects Port Huron, Detroit, Ann Arbor, Jackson, Battle Creek, Kalamazoo and St. Joseph, then to the west connecting to northwest Indiana and ultimately Chicago.
- I-96, which is north of I-94 and runs east and west connecting Detroit, Lansing, Grand Rapids and Muskegon.
- I-69, which runs north and south from northern Indiana to Lansing and then east and west, connecting Lansing, Flint and Port Huron. I-69 connects Michigan to Canada in Port Huron via the Blue Water Bridge and is the northern terminus of a corridor linking Canada with Mexico.
- I-75, which runs north and south from northern Michigan to Detroit and eventually all the way to Miami, Florida. The I-75 northern terminus at Sault Ste. Marie connects to Canada via the Sault Ste. Marie International Bridge and connects Michigan's Upper and Lower peninsulas via the Mackinac Bridge.

Michigan also has several auxiliary Interstate highways (I-196, I-275, I-696) near more densely populated areas of the state.

Highway Ownership

Interstates, US highways and Michigan (M) routes are under MDOT jurisdiction. Other federal-aid public roadways may be under the jurisdiction of other government agencies if they connect the roadway network to an airport, bus station, train terminal or military base. Responsibility for the remaining public road mileage falls to local governments, including counties, cities and villages.

MDOT has jurisdictional responsibility for trunkline federal-aid highways, which make up 8 percent of the inventoried highway network. Non-trunkline highways are under the jurisdiction of county road agencies and make up three quarters of the inventoried highway network. Privately owned roads are not inventoried. There is also a substantial network of non-federal-aid roads mostly owned by local governments that is not inventoried by MDOT. Currently, there is not a uniform approach to conducting inventory for this non-federal-aid mileage; some local governments collect roadway data but are not using the same system, while others do not currently collect data.

Table 1 shows roadway ownership by route miles and lane miles. The term "route mile" refers to a mile of road, regardless of how many lanes it contains. Roadway "lane miles" refer to the total number of lanes. For example, 1 mile of road with eight lanes has 8 lane miles. It should be noted that lane miles in this document follow the definitions in the FHWA HPMS Field Manual. As such, lane miles generally include only continuous through-travel lanes and exclude turn lanes, passing lanes, ramps, shoulders, rest areas and other auxiliary areas.

Table 1 - Michigan's Inventoried Mileage by Ownership Classification

Ownership Classification	Route Miles	% Total Route Miles	Lane Miles	% Total Lane Miles
State Trunkline	10,753.9	28.4%	28,421.7	32.8%
County Roads	22,691.2	60.0%	47,618.4	55.0%
City/Village Streets	4,380.5	11.6%	10,461.8	12.1%
Other Federal Aid	18.0	0.0%	44.2	0.1%
Total	37,843.6	100.0%	86,546.1	100.0%

Source: MDOT, Bureau of Transportation Planning, 2023 Michigan Road Statewide Statistics

Highway Travel (VMT)

Highway system usage can be measured in annual vehicle miles traveled (AVMT), which is calculated based on the volume of traffic, the length of roadway traveled and the period of time. MDOT collects traffic data that can be used to calculate VMT on all trunkline roadways. MDOT also works with partner agencies (counties, cities, villages, MPOs and RPAs) to collect traffic data from non-trunkline roads via the NFTA. All of this data is shared with the Michigan Transportation Asset Management Council (TAMC), a council formed to inventory and analyze transportation asset conditions and needs. The TAMC publishes an annual report from which some of the information in this report has been drawn.

Figures 1 and 2 show the percent of AVMT and route miles in 2023 for trunkline, county and city roadways. As seen, more than half of AVMT are on the trunkline system, which makes up only 8 percent of all route miles. Travel behaviors are strongly influenced by social and economic conditions, as has been seen from VMT trends during periods of high unemployment, such as the Great Recession, as well as the COVID-19 pandemic in which Michiganders were asked to remain at home.

Figure 1 - Michigan AVMT by System Ownership

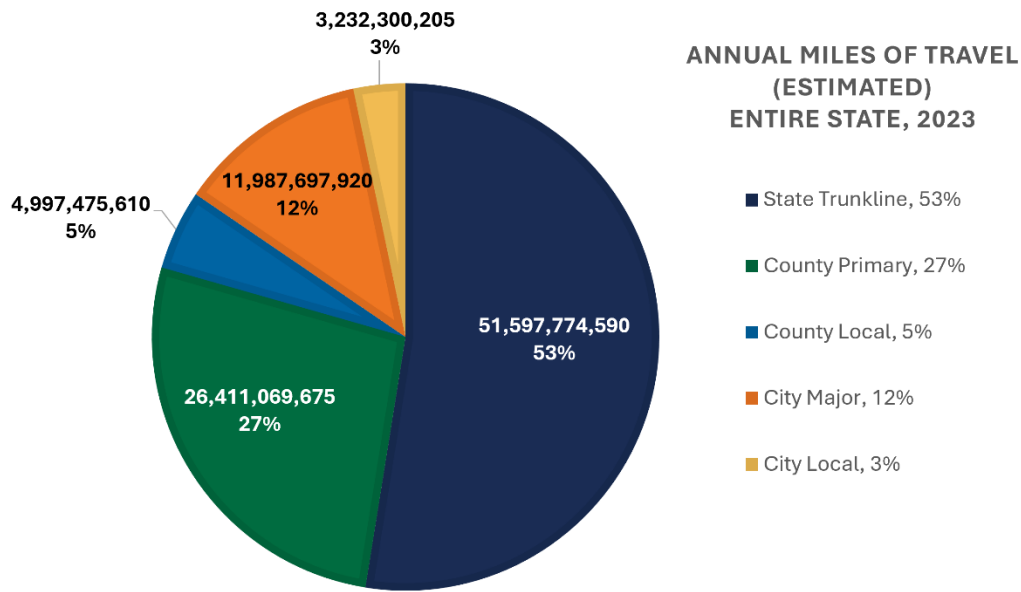
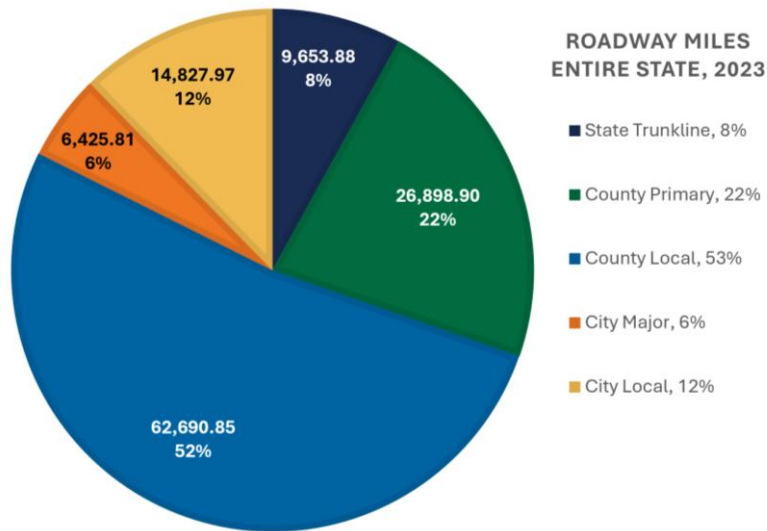


Figure 2 - Road Route Miles by System Ownership



Highways by Purpose

Highways are generally classified by the NFC System, as defined by Congress in 1968, to denote purpose. A road's functional classification is used to describe the characteristics of the road and the environment (i.e., access, divided, urban designation, daily traffic, mobility). FHWA uses functional classification to categorize roads according to their level of mobility and accessibility. Higher mobility highways (typically Interstates, freeways, arterials and major collectors) should be designed to have fewer driveways, intersections, interchanges, higher speeds and uniformity in traffic messaging. Lower mobility roads (generally minor collectors and local roads) provide access to local roads, commercial properties and private properties. They have lower speeds and traffic control is focused on the local environment.

The seven classifications as defined by FHWA include:

- **Interstates:** Designated by the U.S. Secretary of Transportation, these are the highest classification of arterials. Arterials serve long-distance travel with few access points and the highest speeds.
- **Other Freeways:** Similar to Interstates, arterial access points are primarily limited to ramps with divided travel lanes.
- **Other Principal Arterials:** Arterials that serve specific traffic generators and primarily have at-grade intersections managed by traffic devices.
- **Minor Arterials:** Arterials that connect higher arterial classifications with lower functional classifications.
- **Major Collectors:** Serve to funnel vehicles into the arterial network. Major collectors primarily have limited access, higher speed limits and more travel lanes than minor collectors.
- **Minor Collectors:** Serve as conduits between local roads and higher functional classification, with a focus on access over mobility.
- **Local Roads:** Provide access to specific properties.

Not surprisingly, most of the trunkline system routes are arterials of some kind. About 21 percent of the system's route miles are designated Interstates (see Table 2).

Table 2 - Michigan Trunkline System by Federal Functional Classification

Functional Classification	Route Miles	% Total Route Miles	Lane Miles	% Total Lane Miles
Interstate	1,238.6	11.5%	6,077.2	21.4%
Other Freeway	698.4	6.5%	2,959.8	10.4%
Other Principal Arterial	3,286.9	30.6%	9,032.8	31.8%
Minor Arterial	3,976.8	37.0%	8,396.6	29.5%
Major Collector	434.8	4.0%	878.9	3.1%
Minor Collector	0.0	0.0%	0.0	0.0%
Ramps and Turn Lanes	1,118.5	10.4%	1,076.3	3.8%
Total	10,753.9	100.0%	28,421.7	100.0%

Source: MDOT, Bureau of Transportation Planning, 2023 Michigan Road Statewide Statistics

Most route miles in the non-trunkline system are major collectors (Table 3), which are intended to provide traffic circulation. There are very few minor collectors and no local roads as part of the non-trunkline system. There are also few higher functional classification roads in the non-trunkline system, such as Interstate and other freeways, since most are owned and maintained by MDOT and are part of the trunkline system. The

majority of the non-trunkline system are highways intended to link local roads to arterial roads; therefore, they are classified as major collectors.

Table 3 - Michigan Non-Trunkline System by Federal Functional Classification

Functional Classification	Route Miles	% Total Route Miles	Lanes Miles	% Total Lane Miles
Other Principal Arterial	1,207.4	4.5%	4,330.2	7.4%
Minor Arterial	5,850.1	21.6%	13,554.5	23.3%
Major Collector	19,863.5	73.3%	39,972.2	68.8%
Urban Minor Collector	126.3	0.5%	256.1	0.4%
Ramps and Turn Lanes	42.4	0.2%	11.4	0.0%
Total	27,089.7	100.0%	58,124.4	100.0%

Source: MDOT, Bureau of Transportation Planning, 2023 Michigan Road Statewide Statistics

Existing Highway Conditions

This section deals with the physical characteristics of Michigan's roadways relative to desired conditions, in terms of lane widths, shoulder widths, and pavement health and condition. Given the number of road-miles that MDOT and its partner agencies must maintain, pavement condition is a key element in estimating existing and future highway investment needs.

Highway Lane Width

Lane width is important to consider for both capacity and safety reasons. Highways with higher functional classification typically have wider lanes to accommodate vehicles traveling at higher speeds, larger vehicles (buses and trucks) and limited access. The widest lanes are typically seen on Interstates, which experience high freight traffic. Arterials and major collectors may also have wider lanes to accommodate capacity, safety improvements such as a shared bicycle lane, and public transportation options. (Note that in some communities there has been a desire to install narrower lanes on arterials that run through busy urban areas to help manage vehicular traffic speeds and improve safety for nonmotorized users.)

Narrow lanes are more common on lower functional classification roads that provide access to communities and properties. These roads typically have many access points, pedestrian and bicycle accommodations, lower speeds and right-of-way limitations

Table 4 - Michigan Trunkline Route Miles by Lane Width

Functional Classification	Not recorded	<10'-Foot Lane Width	10-Foot Lane Width	11-Foot Lane Width	12-Foot Lane Width	>12-Foot Lane Width	% Total Route Miles
Interstate	1.2	0	0.5	0	1,180.4	56.4	13%
Other Freeway	0	0.4	0	3.7	687.1	7.1	7%
Other Principal Arterial	3	1.6	20.3	586.3	2,652.5	20.9	34%
Minor Arterial	2.9	7.4	25.7	1,621.9	2,306.9	13	41%
Major Collector	3.4	21.1	1	272.3	135.5	1.5	5%
Total	10.5	30.4	47.5	2,484.2	6,962.4	98.9	100%
Percent	0.1%	0.3%	0.5%	25.8%	72.3%	1%	100%

Source: MDOT, Bureau of Transportation Planning, MDOT Pavement Historical Database

Highway Shoulder Width

The management of shoulder width and conditions is a factor in roadway capacity, roadway safety and roadway accommodation. High-speed highways with few access points typically have wider shoulders, which can influence the capacity and safety of the roadway and provide the perception of more comfortable driving conditions. Wider, reinforced shoulders are sometimes included to accommodate oversized loads and large equipment such as farm or military implements, provide space for emergency pull offs, or facilitate multimodal transit options such as buses or trains.

Table 5 - Trunkline System Shoulder Widths by Route Miles (Right)

Functional Classification	<4-Foot Shoulder Width	4-8-Foot Shoulder Width	>8-Foot Shoulder Width	Not Recorded
Interstate	7.2	34.8	1,195.3	1.2
Other Freeway	0.1	33.1	665.1	0.5
Other Principal Arterial	636.7	1,081.4	1,563.3	3.5
Minor Arterial	312.6	2,579.6	1,082.7	2.9
Major Collector	84.5	301.5	45.4	3.4
Total	1,041.1	4,030.4	4,551.9	10.5
Percent	10.8%	41.8%	47.2%	0.1%

Source: MDOT, Bureau of Transportation Planning, MDOT Pavement Historical Database

Table 6 - Trunkline System Shoulder Widths by Route Miles (Left)

Functional Classification	<4-Foot Shoulder Width	4-8-Foot Shoulder Width	>8-Foot Shoulder Width	Not Recorded
Interstate	11.6	789.5	436.2	1.2
Other Freeway	1.5	615.3	81.6	0.5
Other Principal Arterial	670.3	1,229.4	1,381.8	3.5
Minor Arterial	325.3	2,594.2	1,055.3	2.9
Major Collector	83.8	309.9	37.8	3.4
Total	1,092.4	5,538.3	2,992.7	10.5
Percent	11.3%	57.5%	31.1%	0.1%

Source: MDOT, Bureau of Transportation Planning, MDOT Pavement Historical Database

Trunkline Pavement Conditions

Michigan evaluates the trunkline pavement health for a combination of long-term fixes (reconstruction), intermediate fixes (resurfacing and rehabilitation) or preventive maintenance. The key performance measure used by MDOT for the trunkline network is called the remaining service life (RSL), the estimated number of years before preventive maintenance is no longer cost-effective and more significant investments are required. In cases where the RSL approaches zero to two years, rehabilitation or reconstruction would be a more cost-effective solution. Each segment on MDOT's trunkline system is given a category number that corresponds to an RSL range and pavement condition. Table 7 shows the pavement health associated with each category number and RSL.

Table 7 - Remaining Service Life Categories

Category	RSL (Years)	Pavement Health
I	0-2	Poor
II	3-7	Fair
III	8-12	Good
IV	13-17	Good
V	18-22	Good
VI	23-27	Good
VII	28-32	Good
VIII	33-37	Good
IX	33-37	Good

Source: MDOT

As shown in Table 8, of the 30,042 mainline lane miles inventoried, 26,470 lane miles were in good or fair pavement condition; therefore, approximately 88 percent of the state trunkline system is in good/fair pavement health. The remaining is in poor condition. As a note, RSL-based information is currently only available for the state trunkline system.

Table 8 - Trunkline System Lane Miles in Good/Fair Pavement Health by RSL

Ownership	Lane Miles in Good/Fair Pavement Health	Total Miles Inventoried by RSL	Percent of Inventoried Mileage in Good/Fair Pavement Health
State	26,470	30,042	88%

While the RSL evaluates pavement based on the estimated projection of when a surface would need repair or replacement, the state also collects data for its roadways by measuring the following pavement condition metrics (PCM): International Roughness Index (IRI), cracking percent, and rutting (asphalt) or faulting (concrete). The highway is considered to be in poor condition when two of the four pavement condition metrics are poor. As shown in Table 9, 95 percent of inventoried state-owned trunkline miles are in good pavement condition when analyzed by the PCM.

Table 9 - Trunkline Lane Miles in Good Pavement Condition by PCM

Functional Classification	Lane Miles in Good Condition	Total Miles Inventoried	Percent of Inventoried Mileage in Good Condition
Interstate	3,825.8	5,356.1	71.4%
Non-Interstate NHS	5,494.9	11,629.9	47.2%
Other Freeway	1,885.8	2,811.3	67.1%

Functional Classification	Lane Miles in Good Condition	Total Miles Inventoried	Percent of Inventoried Mileage in Good Condition
Other Principal Arterial	3,608.1	8,811.4	40.9%
Minor Arterial	1.0	4.9	20.0%
Major Collector	0.0	2.2	0.0%

Source: MDOT, Bureau of Transportation Planning, 2023 Highway Performance Management System PM2

Non-Trunkline Pavement Conditions

MDOT and TAMC work with local agencies (counties, cities, villages, MPOs and RPAs) to collect condition data for non-trunkline roads. The TAMC adopted the Pavement Surface Evaluation and Rating (PASER), which was originally developed by the University of Wisconsin-Madison Transportation Information Center. PASER is a windshield survey (visual rating) that assesses a pavement segment's surface condition and then assigns that segment an appropriate rating of 1 (failed road) to 10 (new road). PASER ratings are grouped into good (8-10), fair (5-7) and poor (1-4) condition to help communicate the general state of a road network. The PASER system has been adopted by most local road agencies throughout Michigan.

MDOT and other county and local agencies provide the non-trunkline condition data to the Michigan TAMC for evaluation. The TAMC uses this information for their reporting tools and transparency efforts to assist in investment strategy discussions. The data is also used by local road agencies to help develop their Transportation Asset Management Plans (TAMP) that are required for agencies with more than 100 certified Act 51 miles.

Table 10 shows the percentage of non-trunkline lane miles in good or fair condition in 2024. Pavement conditions, particularly on the federal-aid system, have been improving steadily since 2015. Keep in mind that Table 10 represents approximately 45 percent of the entire non-trunkline network. TAMC focuses PASER collection on the federal-aid network, while other networks like non-trunkline are collected as funding and time permit.

Table 10 - Non-Trunkline Lane Miles in Good or Fair Condition (Data Collected 2023-2024)

Ownership	Lane Miles in Good or Fair Pavement Condition	Total Lane Miles Inventoried	% of Inventoried Mileage in Good or Fair Pavement Condition
County	29,382	45,238	65%
City or Village	6,370	10,883	59%
Private	40	56	71%
TOTAL	35,792	56,177	64%

Source: MDOT GIS

Bridge Inventory

Bridges and structures are crucial in the highway network for crossing natural barriers such as streams and rivers or man-made features such as roads. The National Bridge Inventory (NBI) maintains data for all public bridges and culverts greater than 20 feet long that carry vehicular traffic, which are referred to as bridges in this section.

MDOT-Owned Bridges

Table reports the number of bridges owned by MDOT by inventoried route functional classification in 2024. Approximately 28 percent of all bridges in the NBI owned by MDOT are located on the Interstate system while another 33 percent are classified as other principal arterials. In addition, MDOT also owns bridges that are located on minor arterial, major collector, minor collector or local routes.

Table 11 - National Bridge Inventory by Inventoried Route Functional Classification Owned by MDOT (2024)

Inventoried Route Classification	Number of Inventoried Bridges	% of Inventoried Bridges	Total Deck Area (Millions of Square Feet)	% of Total Deck Area
Principal Arterial - Interstate	1,251	28%	17.5	35%
Principal Arterial - Other	1,490	33%	15.3	31%
Minor Arterial	892	20%	7.6	16%
Major Collector	419	9%	4.4	9%
Minor Collector	65	1%	0.5	1%
Local	389	9%	3.9	8%
TOTAL	4,506	100%	49.2	100%

Source: 2026 TAMP Table and Chart Data; Pulled Sept. 18, 2025

Non-MDOT-Owned Bridges

MDOT works with local agencies (counties, cities, villages, MPOs and RPAs) to collect data on bridge ownership, use and condition for bridges not owned by MDOT. Included in this section are bridge authority bridges, which include the Sault Ste. Marie International Bridge, the Blue Water Bridges in Port Huron, and the Mackinac Bridge in St. Ignace/Mackinaw City.

Table 12 provides the number of non-MDOT owned bridges/authority bridges/international crossings by inventoried route functional classification. As shown, the majority of non-MDOT-owned bridges (82 percent) are on major collectors and local routes.

Table 12 - National Bridge Inventory by Inventoried Route Functional Classification (Not Owned by MDOT/authority bridges/international crossings) (2024)

Inventoried Route Classification	Number of Inventoried Bridges	% of Inventoried Bridges	Total Deck Area (Millions of Square Feet)	% of Total Deck Area
Principal Arterial- Interstate	6	0.1%	1.9	9.7%
Principal Arterial - Other	196	2.9%	2.1	10.7%
Minor Arterial	578	8.6%	3.6	18.4%
Major Collector	2,173	32.3%	6	30.7%
Minor Collector	478	7.1%	1	4.9%
Local	3,304	49.1%	5	25.6%
TOTAL	6,735	100%	19.6	100%

Source: 2026 TAMP Table and Chart Data; Pulled Sept. 18, 2025

MDOT Bridge Conditions

MDOT maintains a Bridge Management System (BMS) to coordinate the data, strategies, programs and projects for bridges and structures in the transportation network. MDOT follows the National Bridge Inspection Standards (NBIS) performance standard for inspection of bridges greater than 20 feet. The measures for the NBIS include values for substructure, superstructure, deck and culverts. Condition ratings range from 0 to 9 to help identify preventive maintenance, rehabilitation and replacement needs (Figure 3).

Figure 3 - National Bridge Inspection (NBI) Condition Ratings

NBI Condition Ratings			
7-9	Good Condition		Routine maintenance candidate.
5-6	Fair Condition		Preventative maintenance and minor rehabilitation candidate.
4	Poor Condition	Poor	Major rehabilitation or replacement candidate.
2-3		Serious or Critical	Emergency repair or high priority major rehabilitation or replacement candidate. Unless closely monitored it may be necessary to close until corrective action can be taken.
0-1		Imminent Failure or Failed	Major rehabilitation or replacement candidate. Bridge is closed to traffic.

Source: Michigan's 2018 Roads and Bridges (2018 TAMC Annual Report)

Bridge conditions vary year to year depending on deterioration, maintenance and rehabilitation efforts. The number of bridges inventoried may also vary somewhat year to year based on bridge rehabilitation efforts, bridge replacements and any new or decommissioned bridges. Because the total number may vary, conditions are presented here as a percentage of all bridges.

There were 4,506 bridges owned by MDOT (Table 13). In 2024, less than a third of the bridges were in good condition (23 percent), the majority were in fair condition (71 percent) and 6 percent of the bridges were in poor condition.

Table 13 - MDOT-Owned Bridges by Condition (2024)

NHS Designation	% of Bridges in Good Condition (Count)	% of Bridges in Fair Condition (Count)	% of Bridges in Poor Condition (Count)	Total (Count)
Principal Arterial - Interstate	25% (307)	70% (877)	6% (69)	100% (1,253)
Principal Arterial - Other	22% (333)	71% (1,063)	6% (94)	100% (1,490)
Minor Arterial	26% (235)	67% (600)	6% (57)	100% (892)
Major Collector	17% (71)	78% (326)	5% (22)	100% (419)
Minor Collector	12% (8)	82% (53)	6% (4)	100% (65)
Local	22% (84)	74% (289)	4% (16)	100% (389)
TOTAL	23% (1,038)	71% (3,208)	6% (262)	100% (4,506)

Source: 2026 TAMP Table and Chart Data; Pulled Sept. 18, 2025

Non-MDOT Bridge Conditions

Local agencies follow the NBIS for inspection of bridges. Included in this category of bridges are the bridge authority bridges and international crossings. As of 2024, there were 6,738 bridges in Michigan that were not owned by MDOT. Of those, 46 percent were in fair condition, 40 percent were in good condition and 14 percent were in poor condition (Table 14).

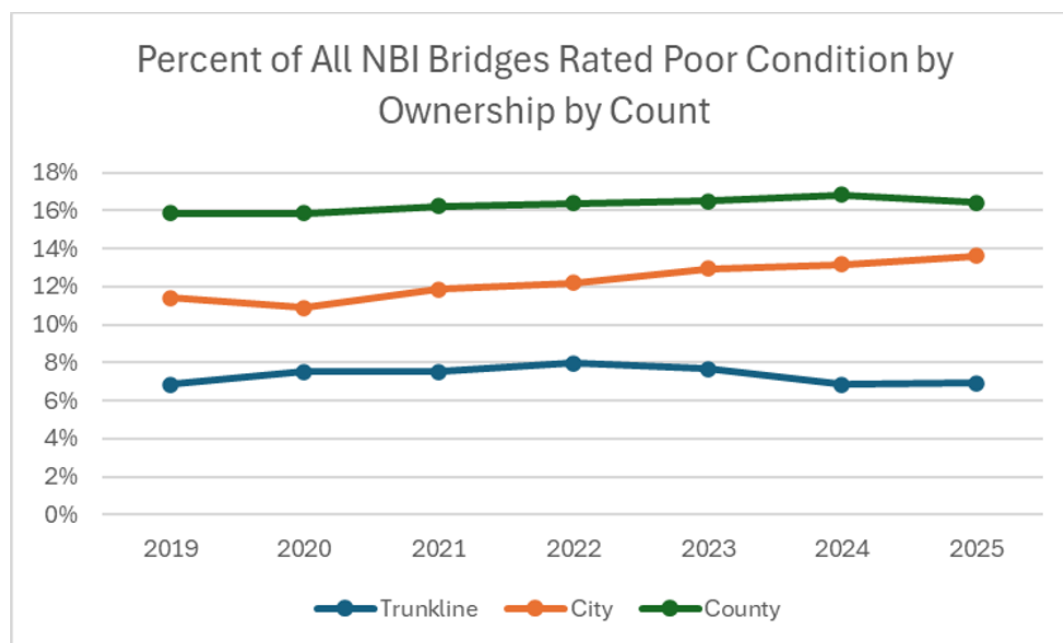
Table 14 - Non-MDOT Owned/Bridge Authority Bridges/International Crossings Conditions by Inventoried Route Functional Classification (2024)

Ownership Classification	% of Bridges in Good Condition	% of Bridges in Fair Condition	% of Bridges in Poor Condition	Total
Principal Arterial - Interstate	33% (2)	67% (4)	0% (0)	100% (6)
Principal Arterial - Other	42% (83)	44% (87)	13% (26)	100% (196)
Minor Arterial	41% (238)	45% (263)	13% (78)	100% (579)
Major Collector	39% (852)	48% (1,048)	13% (273)	100% (2,173)
Minor Collector	43% (204)	48% (229)	10% (46)	100% (479)
Local	39% (1,300)	44% (1,458)	17% (547)	100% (3,305)
TOTAL	40% (2,679)	46% (3,089)	14% (970)	100% (6,738)

Source: 2026 TAMP Table and Chart Data; Pulled Sept. 18, 2025

Like highways, bridges are evaluated for a combination of long-term fixes (reconstruction/replacement), intermediate fixes (rehabilitation) or preventive maintenance. Non-trunkline bridges are further reported as city or county-owned. Figure 4 shows general bridge condition trends from 2019 to 2025.

Figure 4 - Seven-Year Bridge Condition Trend (2019 to 2025)

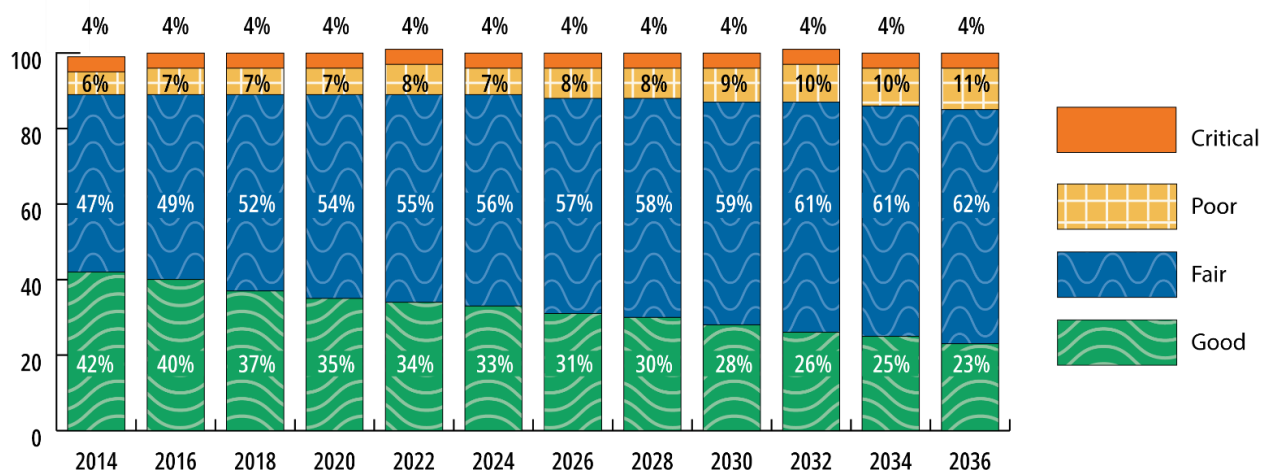


Source: [TAMC Bridges Dashboard](#)

Existing and Accruing Bridge Needs

MDOT evaluates the transportation network bridges and structures for rehabilitation or replacement. Maintaining or improving bridges rated in good or fair condition has been slowed due to ever increasing bridge rehabilitation and replacement needs due to aging infrastructure and rising bridge construction costs. Figure 5 from the 2024 TAMC Report shows overall bridge condition declining after 2024. Since bridge preservation and replacement needs are exceeding available funding, the overall condition of bridges in Michigan will continue to decline until there are significant investment increases.

Figure 5 - Bridge Condition Forecast: All Roadway Bridges (MDOT and Local Agency)



Source: 2024 TAMC Report

Drainage Structures

MDOT maintains an extensive inventory of drainage structures associated with the trunkline and non-trunkline highway system, important to maintaining safe highway conditions. Typically, the agency with jurisdiction over a roadway is responsible for the bridges and structures that are used to convey water, accommodate storm water runoff or provide for other water outfalls. MDOT has compiled an inventory of drainage structures to support prioritization of rehabilitation and replacement.

Table 15 - Inventoried MDOT Culverts by Region (2026)

MDOT Region	Number of Culverts	Statewide (Percent Inventory of Culverts)	Length in (Thousands of Feet)	Statewide (Percent Length of Culverts)
Bay	6,226	15%	575	15%
Grand	5,659	13%	581	16%
Metro	2,008	5%	247	7%
North	6,335	15%	544	15%
Southwest	12,252	29%	856	23%
Superior	5,233	12%	456	12%
University	5,144	12%	467	13%
STATEWIDE	42,860	100%	3,386	100%

Source: MDOT Ancillary Structures Unit GIS Data, 2026

Table 16 - Inventoried MDOT Pump Stations by Region (2026)

MDOT Region	Bay	Grand	Metro	North	Southwest	Superior	University	Statewide
Pump Stations	11	2	131	1	2	1	9	158

Source: MDOT TSMO, 2026

Traffic Signs

Traffic signs are a vital component of the roadway system and for driver safety. The functions of traffic signs are to provide regulations, warnings and guidance information for road users through the use of words, symbols and arrows. Traffic sign practices can vary between freeway and non-freeway trunklines and among rural, suburban and urban environments.

Traffic signs are required in many situations with a federal mandate that traffic signs are visible at nighttime through retroreflective sign material where light from a vehicle's headlights is reflected. Retroreflective traffic sign sheeting material degrades over time, with the average traffic sign service life ranging from 15 to 20 years, depending on the sheeting type, sign color and roadway environment.

MDOT manages traffic signs through an inventory system and corridor sign replacement projects where signs are replaced on a roadway section over a certain time frame. Corridor sign replacement also allows MDOT to bring traffic signs up to current engineering practices and review ways to better meet drivers' needs and safety.

Figure 6 - Examples of Sign Types

Regulatory



Warning



Guide and Information



Source: MDOT

Table 17 - Traffic Signs by MDOT Region, 2026

MDOT Region	Bay	Grand	Metro	North	Southwest	Superior	University	Statewide
Traffic Signs	59,630	50,630	64,960	51,430	38,430	31,600	44,580	341,260

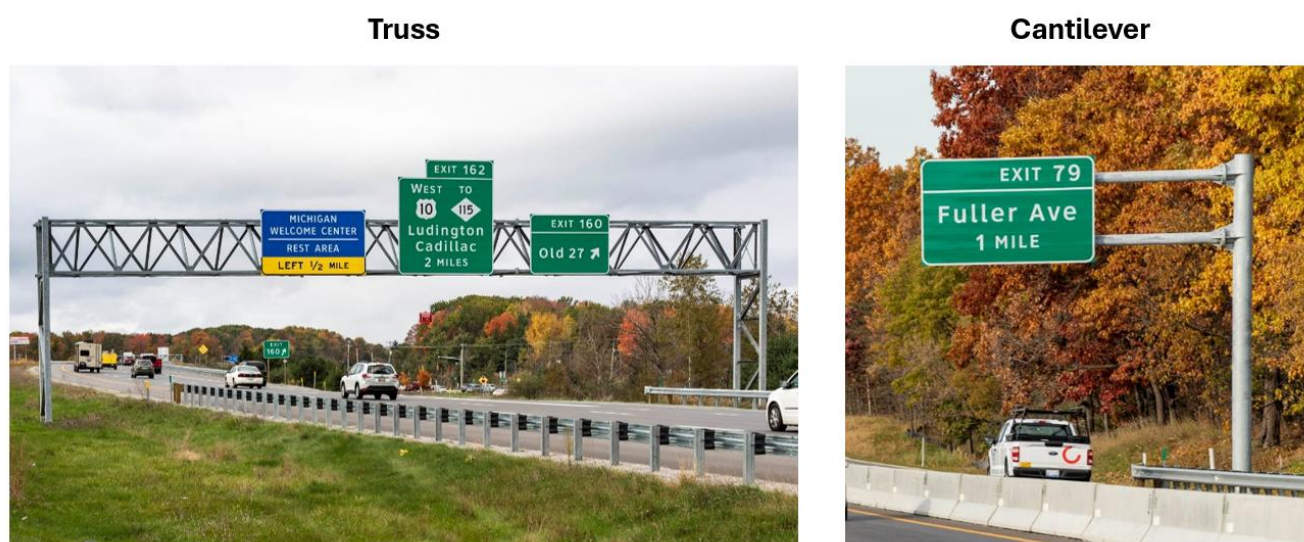
Source: MDOT

Overhead Sign Structures

MDOT overhead sign structures generally include truss and cantilever ancillary structures and may contain one or a grouping of traffic signs. Overhead sign structures are required for freeway-to-freeway interchanges or where a freeway travel lane becomes a mandatory exit lane. Overhead sign structures may also be used to convey regulatory lane use information or other critical roadway information. The majority of MDOT's overhead sign structures are used in urban environments, freeway applications or higher-volume trunklines.

The service life of an overhead sign structure can vary greatly by the structure type and roadway environment but can range between 20 and 40 years. The MDOT Ancillary Structures Program inspects these structures on a set timeframe to monitor the foundation, structure condition and past deterioration. The inspection and rating information is used by the Sign Unit for targeted overhead sign structure replacement.

Figure 7 - Examples of Overhead Sign Structures



Source: MDOT

Table 18 - Sign Structures by MDOT Region, 2026

MDOT Region	Bay	Grand	Metro	North	Southwest	Superior	University	Statewide
Sign Truss	107	131	333	9	68	11	154	813
Sign Cantilever	104	113	394	2	106	5	150	874

Source: MDOT

Transportation Systems Management and Operations (TSMO)

In Michigan, more than 60 percent of traffic congestion is generally due to nonrecurring issues, such as crashes and other incidents (25 percent), bad weather (15 percent), work zones (10 percent), poor signal timing (5 percent) and special events (5 percent). These issues can sometimes be addressed without capacity expansion through the application of TSMO, a toolbox of cost-effective strategies to improve mobility and safety. TSMO is

not limited to the use of intelligent transportation systems (ITS), although many TSMO strategies employ ITS equipment to accomplish their purposes.

MDOT's TSMO Mission

Operate and manage an optimized, integrated transportation network by delivering high-quality services for safe and reliable mobility for all users.

MDOT's TSMO Vision

- Integrate operations as a core MDOT program united with the execution of MDOT's overall mission.
- Inspire public confidence as a progressive and innovative national leader in the management and operations of our transportation system.
- Collaborate across program areas, leveraging technology and resources to achieve the best possible results.
- Maintain a sustainable and engaged operations workforce with exceptional knowledge, skills and abilities.

MDOT has implemented many TSMO strategies throughout Michigan by utilizing innovative technologies/strategies on existing roadway facilities. The benefits of TSMO are extensive with some of the key benefits being:

- **Efficient commutes:** Optimally timed traffic lights help vehicles move more smoothly through intersections. Harmonizing traffic lights can reduce travel times by 8 to 20 percent.
- **Clear routes:** Michigan Traffic Incident Management Effort (Mi-TIME) provides important training on quickly and safely clearing traffic incidents. So far, Mi-TIME has trained more than 5,600 responders.
- **Safer construction zones:** Technologies to safely manage construction zones help decrease the number of work zone crashes, injuries and deaths.
- **Ready access to travel information:** MDOT's [Mi Drive website](#) provides traffic and incident information 24 hours per day, seven days per week.
- **Fewer wasted gallons of gas:** Travelers don't burn fuel while idling in congestion, helping reduce vehicle emissions and air pollution, as well as more sustainable consumption of fossil fuels.

MDOT's TSMO Implementation and Strategic Plan organizes its efforts into the following 10 business areas.

- Traffic Incident Management (TIM)
- Work Zone Management
- Congestion (Recurring Management)
- Safety (All Modes)
- Modal Interaction and Integration
- Road Weather Management
- Field Equipment (ITS and Signals)
- Traffic Operation Centers and Traveler Information Systems
- Connected and Automated Vehicles
- Data and Decision Support Systems

Some of these areas do not strictly constitute a TSMO strategy but were elevated to the business area category to emphasize their ongoing importance to the success of MDOT's TSMO efforts.

The following sections describe TSMO strategies and programs currently utilized by MDOT to manage mobility and safety on its roadways. There is considerable overlap in the ITS-related tools used for various TSMO strategies, so various equipment operated by the state may be introduced in the discussion of one strategy and referenced again in other sections. For example, dynamic message signs are first introduced in terms of their work zone management benefits but are also an integral component of traveler information systems, traffic incident management and the management of recurring congestion.

Traffic Incident Management (TIM)

Traffic incidents are non-recurring events that cause a reduction in roadway capacity. While these events are non-recurring, they can have dramatic impacts on the system and its users when they do take place. These impacts can include secondary crashes due to queuing of vehicles, lost time and reduction in productivity, increased cost of goods and services, increased fuel consumption, reduced air quality and reduced quality of life by sitting in traffic. TIM is a term used to encompass the planned and coordinated multi-disciplinary processes used to detect, respond to and clear traffic incidents as quickly as possible while protecting the safety of on-scene responders and the traveling public.

- MDOT developed a partnership with multiple state and local law enforcement, fire and EMS services, local road agencies and towing services. This partnership, better known as Mi-TIME, has developed strategies to improve TIM, including:
 - Promoting and educating the use of high-visibility apparel for first responders.
 - Coordinating traffic incident response between all responders
 - Conducting training in traffic incident management for all stakeholder groups
 - Providing public education on safe, quick clearance and vehicle removal laws

Safety Service Patrol

MDOT operates a fleet of Safety Service Patrol vehicles to assist stranded and distressed road users in heavily populated areas of Michigan. The fleet is comprised of vans that provide stranded road users assistance, including:

- Servicing disabled vehicles by providing fuel, oil, and other system fluids.
- Clearing stranded vehicles and debris from driving lanes.
- Changing or inflating tires.
- Making minor mechanical repairs.

The Safety Service Patrol fleet operates on more than 450 miles of roadway in southeast Michigan. The fleet plays an important role in reducing travel times and improving safety on these heavily traveled roadways.

Closed-circuit Television (CCTV) Cameras

While there are a variety of ITS devices used to monitor roadway conditions, CCTV cameras allow MDOT staff to visually monitor roadway conditions such as traffic flow, congestion, the details of events that may be hindering traffic flow, and aid in maintenance. Cameras also require less maintenance than other ITS devices that require precise calibration to be effective, so they are used to provide redundancy if other devices are not working.

There are currently 1,008 cameras located along Michigan trunkline routes. The location of the cameras by MDOT region is shown in Table 19.

Figure 8 - CCTV Camera



Source: MDOT

Table 19 - CCTV Camera Location by MDOT Region, 2026

MDOT Region	Count
Bay	82
Grand	152
North	59
Superior	54
University	164
Metro	418
Southwest	79
Statewide	1,008

Source: MDOT

Work Zone Management

Work zones are dynamic situations that require heightened attention to safety. This is particularly true when they are located on roadways where traffic continues to operate, exposing both workers and road users to an elevated risk of a crash. To minimize the risk, MDOT has developed a Work Zone Safety and Mobility Manual (WZSM) to provide guidance on how to manage work zones. The primary goals of the WZSM are to reduce crashes and manage congestion due to work zones.

MDOT accomplishes the goals of the WZSM by implementing a Transportation Management Plan (TMP) for each project it undertakes. The TMP outlines the strategies MDOT will use to reduce crashes and manage congestion due to work zones. TMPs are introduced early in a project and are updated as necessary throughout the life of a project. Projects are categorized as significant or non-significant depending on their expected impact on traveler mobility. Projects are considered significant when they are predicted to result in greater than 10 minutes of delay (compared to normal conditions) for the entire duration of the project. These categorizations are important since significant projects require additional mobility analysis. Elements of a TMP include:

For Both Significant and Non-Significant Projects

- Temporary Traffic Control Plan (TTCP): Must include maintenance of traffic plans, details, special provisions and contracting documents.

For Significant Projects Only

- Traffic Operations Plan (TOP): Provides strategies and mitigation measures for operation and management of work zones, adjacent network corridors and the facilities impacted by the work zone, which includes all modes of transportation.
- Public Information Plan (PIP): Includes public/stakeholder information and communication strategies that will begin during the planning and design phases as well as during construction or operations activities.

- Performance Assessment Plan (PAP): During construction, the PAP documents traffic delays, travel times, queues and volumes. The information gathered in the PAP is used to monitor whether the goals of the TMP are being met; if not, MDOT may amend the TMP.

Dynamic Message Signs (DMS)

DMS assist with work zone management, congestion management, weather management and safety. They allow MDOT to share information on roadway conditions, travel times, safety and weather for a specific geographic area. Additionally, the signs are also used by law enforcement to share AMBER alerts and other safety/enforcement messages with the public. There are 305 DMS throughout Michigan, with a majority located on the Interstate system and near urban areas. Figure 9 shows a typical DMS. Table 20 shows the DMS count by MDOT region.

Figure 9 - Dynamic Message Sign



Source: MDOT

Table 20 - DMS Location by MDOT Region, 2026

MDOT Region	Bay	Grand	North	Superior	University	Metro	Southwest	Statewide
Count	23	44	5	8	51	141	33	305

Source: MDOT

Management of Recurring Congestion

Each MDOT region is responsible for congestion management of the roadway system within its jurisdiction. MDOT uses a tool called the Regional Integrated Transportation Information System (RITIS) to track performance measures to assist MDOT region staff in managing congestion within their regions. The MDOT Congestion and Reliability Unit manages the RITIS program, which measure the following:

- Delay: Calculated as the difference between actual speeds when they fall below 60 mph and the posted speed limit. This removes the delay caused by the lower average speeds from commercial vehicles as a factor.
- Delay Index: Calculated by adding the delay if a probe vehicle drove every segment of roadway once every ten minutes. This value is then divided by the length of the roadway segment. This allows users to make comparisons among corridors and identify areas that experience the most delay.
- Maximum Delay: The maximum calculated delay per segment throughout a year.
- Average Speed: Determined by calculating the space-mean speed of the worst ranked hour in the weekday AM peak (6-9 a.m.) and weekday PM peak (3-7 p.m.) periods for each segment of roadway. This is compared to the space-mean speed of the previous five-year period for the same hour.
- Congestion Severity: Calculated based on the worst hourly average speed experienced during the AM or PM peak period per traffic message channel (TMC) segment. A TMC segment is a standard for delivering real-time traffic information. They vary from a tenth of a mile long to several miles long.
- Travel Time Reliability: A measure of travel time consistency over a period of time. When travel times are unreliable, users are often late or must build in unproductive “buffer” time to allow for delays that may or may not occur. Travel times are considered reliable when the 95th percentile travel time remains close to the average travel time.
- 95th Percentile Travel Time: The amount of time a consumer should budget to be on time on average.
- Level of Travel Time Reliability (LOTTR): Calculated as a ratio of the 80th percentile travel time to a “normal” travel time (50th percentile). LOTTR measures the consistency and dependability of travel on a given road segment. The Federal Highway Administration (FHWA) deems a road segment to be unreliable if its LOTTR value exceeds 1.5.

The performance measures listed above are tracked at statewide and regional levels. These performance measures are utilized to assist in the resource allocation decision-making process. These congestion reliability measures are used to inform decision-making on certain funding templates, such as the Operations Template.

Microwave Vehicle Detection System (MVDS)

MVDS sensors are used by MDOT to collect roadway traffic data and assist in congestion management. The MVDS sensor is attached to a pole along the roadway (Figure 10), transmitting an electromagnetic signal from the sensor toward the roadway. When a vehicle is present, the signal is reflected back to the sensor. The data collected by the sensor can provide information on the volume, speed and length of vehicles. MVDS sensors are an instrumental part of MDOT’s TSMO strategy since they are non-intrusive (not needing to be built into the pavement), low cost and easy to maintain. However, MVDS sensors have limitations: they require accurate calibration, can be susceptible to weather and are limited to detecting four vehicle types by length. There are 815 MVDS sensors throughout the state; Table 21 shows the

breakdown by MDOT region. A majority of MVDS sensors are located on I, M and US routes.

Figure 10 - MVDS Sensor Shown on Roadside Pole



Source: MDOT

Table 21 - MVDS Sensor Location by MDOT Region, 2026

MDOT Region	Bay	Grand	North	Superior	University	Metro	Southwest	Statewide
Count	73	158	15	52	109	356	52	815

Source: MDOT

Road Weather Management

Weather has the potential to be a major disruption to the state’s transportation system. Severe weather events such as blizzards, tornados, severe thunderstorms and flooding can increase the risk of a crash or incident happening while traveling on the transportation system. While these events do not occur on a regular basis, when they occur, they can be quite serious for system users. Road weather management strategies involve implementation of traffic advisory, control and treatment strategies in direct response to anticipated or occurring roadway and visibility issues that result from forecasted or deteriorating weather conditions. This also includes providing proactive advisories and control strategies based on forecasted weather conditions and not just managing the impacts of those conditions.

MDOT’s Weather Responsive Traveler Information (Wx-TINFO) system brings together near-real-time weather and environmental information collected from fixed and mobile data sources. Within the Wx-TINFO system, MDOT’s TerraForm Manager (TFM) processes the weather data and provides automated weather alerts and DMS message recommendations to transportation operations center (TOC) operators. The goal of Wx-TINFO is to integrate multiple weather data sources into a collective program that provides more accurate, timely and effective messaging, thereby improving operating conditions during severe weather conditions. The Wx-TINFO provides MDOT the information necessary to address any weather conditions that potentially disrupt

transportation within the system. Additionally, the information is shared with other agencies and made publicly available so that individuals may alter or cancel their travel plans as appropriate.

Environmental Sensors

Environmental Sensor Stations (ESS) assist in weather management and are part of MDOT’s Road Weather Information System (RWIS) that feeds data to the Wx-TINFO. Traditional ESS sites were designed to provide the RWIS with pavement conditions and associated weather conditions that affected pavement conditions. The equipment typically includes several sensors that measure air and road surface temperatures, barometric pressure, wind speed, salt concentrations on the road surface, frost depth and dew point. Additionally, the equipment can house a camera that allows staff to visually verify conditions.

The ESS are an important means by which MDOT can monitor roadway conditions, and they allow MDOT to better address dangerous roadway conditions from weather-related conditions like drifting snow and ice. While the network of stations was initially only used by MDOT for maintenance coordination, the information the stations collect is now available to other agencies and the public through online access to the ESS cameras and weather data.

Table 22 shows the ESS count by MDOT Region. A majority of the ESS are located on US and M routes in relatively rural areas, which allows MDOT to

dispatch its limited resources to address roadway needs in rural areas.

As of 2020, MDOT is expanding the number of ESS in Michigan, which will impact both the Metro and Bay regions. Through workshops held with stakeholders, MDOT identified 24 new potential ESS sites as part of this effort.

Figure 11 - Environmental Sensor Station



Source: MDOT

Table 22 - Environmental Sensor Stations by MDOT Region, 2026

MDOT Region	Bay	Grand	North	Superior	University	Metro	Southwest	Statewide
Count	10	27	38	44	8	33	21	181

Source: MDOT

ITS and Signals

MDOT has been at the forefront of innovation as it relates to ITS. In the 1960s, MDOT began installing ITS devices on state roadways. The initial ITS devices included loop detectors, ramp meters, DMS, motorist-aid telephones, highway advisory radio, and CCTV surveillance systems. Over the past 60 years, MDOT has continued to be a national leader in implementing new technology. MDOT’s ITS Program has the following mission and vision:

Mission Statement: Provide high-quality, adaptive and integrated transportation technology solutions that improve safety and mobility for all users.

Vision Statement: Integrate MDOT's ITS program into all TSMO business areas and leverage both proven and emerging transportation technologies to sustainably enhance safety, mobility, economic benefit and support improved quality of life.

Deploying ITS devices throughout the state has made the system safer, more efficient and improved the quality of life for users, and provides the means for data collection and communication that is essential to MDOT's TSMO strategies.

Traffic Signals

Signals could in some ways be considered one of the earliest types of ITS devices used to manage traffic. They regulate the flow of traffic and improve safety at intersections and are typically installed at locations with high traffic volumes and/or crashes. While signals can assist with regulating the flow of traffic and ultimately reduce congestion, they also can increase congestion if the signal timings are not calibrated. Poorly timed signals may also increase driver frustration, leading to more aggressive driving, poor choices (i.e. gap acceptance) and increased risk of crashes.

MDOT launched its Central Signal Control System (CSCS) deployment in 2019, establishing a modern platform to monitor and manage traffic signals statewide while simultaneously upgrading critical field equipment. In addition to implementing the CSCS, the program included replacing or enhancing traffic signal controllers where necessary and improving communications infrastructure to ensure reliable system connectivity. Deployment occurred in multiple phases: Phase 1, completed between 2019 and 2021, connected approximately 350 signals; the BUILD Grant deployment from 2022 through 2025 added another 1,300 signals; and Phase 3, which includes the Local Agency Pilot and remaining available funds from 2023 through 2026, brings an additional 325 signals online. Through this multi-year investment, roughly 65 percent of MDOT-owned signals are now part of the connected system, including all signals directly maintained by MDOT. As of 2026, MDOT is also implementing a pilot to actively operate the CSCS at the TOC level, marking a significant new step in the agency's system-management capabilities.

Travel Time Signs

Travel time signs inform drivers of the current travel times to upcoming major junctions (Figure 12). This information allows drivers to make informed decisions on their route, which helps alleviate congestion since a driver can choose to use an alternative route if they notice the current travel time is longer than usual. As shown in Table 23, there are only 13 of these signs in the state. The equipment is less commonly used today since the same information can be displayed on a DMS.

Figure 12 - Travel Time Sign



Source: Google Maps (Street View)

Table 23 - Travel Time Sign Locations by MDOT Region

MDOT Region	Count
Bay	4
Grand	0
North	0
Superior	0
University	4
Metro	5
Southwest	0
Statewide	13

Source: MDOT

ITS Cabinets

ITS cabinets house device hardware and components that relay data to MDOT offices. Figure 13 shows a typical cabinet. In urban areas, these cabinets are often attached to poles or other infrastructure due to the lack of room along the right of way. Table 24 gives the number of cabinets by MDOT region. A majority of the ITS cabinets are located along I, M and US routes.

Figure 13 - ITS Cabinet



Source: Google Maps, 2019

Table 24 - ITS Cabinet Locations by MDOT Region

MDOT Region	Count
Bay	108
Grand	182
North	27
Superior	27
University	174
Metro	501
Southwest	84
Statewide	1,103

Source: MDOT

Flex Routes (Active Traffic Management)

Flex routes allow MDOT to dynamically manage the flow of traffic in response to changing conditions, using overhead signs to communicate how drivers should use specific lanes (Figure 14). "Flex route" is MDOT's public name for the strategy known as Active Traffic Management (ATM). MDOT built a 10.5-mile flex route system along US-23 in Washtenaw and Livingston counties between M-14 and I-96. After the success of the US-23 Flex Route, MDOT also built a flex route system along I-96 in Oakland County between Kent Lake Road and I-275/I-696.

Flex route corridors use ITS equipment, including overhead signs, cameras, and microwave vehicle detection sensors, to implement ATM strategies such as advisory speed limits and dynamic lane control, thus improving safety and travel times along the corridor.

Overhead signs provide road users with advisory speed limits and information on upcoming conditions in specific travel lanes, such as merging, lane closure and lane openings due to incidents or conditions ahead. By providing this information miles ahead of an incident, MDOT can manage traffic flow more smoothly and safely. Additionally, flex routes operate with a dynamic shoulder that can be converted to an additional traffic lane during peak periods, special events and unexpected congestion.

Figure 14 - Flex Route Overhead Signs



Source: MDOT

Traffic Operations Centers and Traveler Information Systems

TOCs are locations that house contracted operators who monitor traffic and manage traffic incident responses throughout the state, with an emphasis on Metro Detroit, west Michigan, Blue Water Bridge, and mid-Michigan freeways. The TOCs use data received by ITS devices located along freeways and are staffed with dispatchers who can coordinate with local law enforcement agencies and other transportation officials on incidents. Michigan has four TOCs:

- Statewide Transportation Operations Center (STOC)
- Southeastern Michigan Transportation Operations Center (SEMTOC)
- West Michigan Transportation Operations Center (WMTOC)
- Blue Water Bridge Transportation Operations Center (BWBTOC)

These TOCs respond to thousands of incidents over the course of a year and provide traveler information through DMS. For Fiscal Year (FY) 2025 (Oct. 1, 2024, through Sept. 30, 2025), the four TOCs responded to the following incidents:

STOC

- Managed 4,233 total unplanned events
- Conducted 51,696 communications
- Disseminated 36,961 unique messages to DMS throughout the five regions managed by STOC
- Dispatched 8,531 Safety Service Patrol vehicles

WMTOC

- Managed 7,014 unplanned events
- Conducted 32,129 communications
- Disseminated 10,765 unique messages to DMS throughout the Grand Region
- Dispatched 5,900 Safety Service Patrol vehicles

BWBTOC

- Managed 5,254 total unplanned events
- Conducted 20,912 communications
- Disseminated 6,234 unique messages to DMS throughout St. Clair County

SEMTOC

- Managed 14,034 total unplanned events
- Conducted 95,113 communications
- Disseminated 60,810 unique messages to DMS throughout Metro Region
- Dispatched 9,184 Safety Service Patrol vehicles

Connected and Automated Vehicles (CAVs)

MDOT's CAV efforts are guided by its 2021 CAV Program Strategic Plan, developed to articulate the program mission, vision and goals, to re-evaluate strategies in the current industry environment, to validate or modify existing and planned initiatives, and to identify gaps and opportunities for initiatives to support goal achievement. MDOT's CAV Plan identifies the following mission, vision and goals for future CAV efforts:

Mission: MDOT will work to ensure Michigan remains the national leader in the evolution of CAV technologies, to deliver enhanced transportation safety and reliability, providing economic benefit and improved quality of life.

Vision: MDOT's CAV Program will be recognized as a progressive and innovative leader, driving national efforts to explore and implement emerging mobility technologies.

Goals:

- *Serve as a national model to catalyze CAV deployment.* The USDOT and peer agencies will look to Michigan for a roadmap for how to plan, design, build and sustain CAV deployments, including identification of innovative business models for CAVs.
- *Establish foundational systems to support wide-scale CAV deployment.* MDOT will develop foundational systems and standards, such as data management, backhaul communications and IT/security standards to enable sustained deployment activity.
- *Make Michigan the go-to state for CAV research and development.* Michigan will have the combination of assets, human capital and experience necessary to keep current CAV research and development activities in the state and draw new activities here to create economic benefit for the state.
- *Accelerate CAV benefits to users.* MDOT will identify ways to add value for its customers today and in the near future during the transitional time frame of CAVs on public roadways.
- *Exploit mutual benefit opportunities between CAV technologies and other department business processes and objectives.* MDOT will explore ways to leverage CAV data, safety and operational benefits to support and enhance other business processes.
- *Use Michigan experience to lead dialogue on national standards and best practices.* MDOT will engage in industry groups, peer agency alliances and with the private sector to share experiences, support peer agency activities and guide vehicle-to-infrastructure (V2I) standards development.

Through the CAV program, MDOT collaborates with private sector partners to continue moving the technology forward. Michigan has created a friendly environment for companies to conduct research and development to help Michigan stay at the center of the auto industry in the future. By doing so, Michigan will reap the economic, safety and quality of life benefits this technology provides. Once fully deployed, CAVs are expected to make Michigan's roadways safer, more efficient and improve Michiganders' quality of life.

Dedicated Short-Range Communications (DSRC)

DSRC devices are used by MDOT to support its CAV efforts. CAVs provide driver assistance by transmitting and receiving data from all types of sources, including other vehicles, roadways, other infrastructure and mobile devices. DSRC devices work like Wi-Fi, transmitting a safe, fast, secure and reliable frequency to road users from roadway infrastructure. The information that is transmitted is related to safety and mobility in the given location.

To study this emerging technology, support it and realize its benefits, MDOT has installed nearly 300 DSRC devices throughout Michigan. The devices are predominantly located in southeastern Michigan in Metro Detroit. Table 25 shows the breakdown of DSRC devices by MDOT region.

Table 25 - DSRC Locations by MDOT Region

MDOT Region	Count
Bay	33
Grand	0
North	0
Superior	0
University	53
Metro	206
Southwest	5
Statewide	297

Welcome Centers and Rest Areas

MDOT has several Welcome Centers and rest areas throughout Michigan. These facilities provide road users a safe location to rest while on the road. Most facilities are open 24 hours a day and provide many amenities, including restrooms, picnic areas, pet exercise zones, paved parking and fresh drinking water. Additionally, the

Welcome Centers provide tourism information, as well as points of interest in the surrounding area and state. These facilities are located immediately adjacent to the roadway and allow safe and convenient exit and entrance onto the roadway. There are 61 rest areas, 14 of which are also Welcome Centers.

MDOT maintains rest areas along the trunkline highway system to support long-distance travelers, providing quick access to facilities that are open 24 hours a day. Rest areas vary in service from bathroom shelters with picnic tables and parking to large Welcome Centers with tourism information desks and indoor facilities. The Tustin Rest Area in MDOT's Grand Region is the only rest area classified as rustic, providing outhouse service only.

A 2012 evaluation reported that all but three rest areas provided a greater benefit to the transportation system than the cost for maintenance and upkeep. Evaluated benefits included travel time, comfort and convenience, tourism, safety and vehicle operations. Evaluated costs included amortized construction cost, annual operations cost and annual maintenance cost. The 2012 report suggested the consideration of:

- Implementing new rest area facilities for all but three existing rest areas (Hart, St. Ignace, and Topinabee).
- Filling facility gap on limited access freeways in the Grand and Southwest regions.
- Additioning commercial service facilities in the Lower Peninsula.
- Expanding rest areas on I-94 between the Indiana border and Detroit for additional truck parking.
- Providing additional nighttime truck parking on I-75 between Ohio and Saginaw.

Of facilities identified in the 2012 evaluation, six rest areas have since been permanently closed (Higgins, Lake Chemung, Houghton, Richmond, Westland and Walker) and several aging rest areas have experienced temporary closures for multiple months due to maintenance. The expected service life of a rest area is 40 years. Four Welcome Centers have buildings older than 40 years of age, with nine rest area buildings older than 40 years of age. In addition, another seven Welcome Centers and 51 rest areas will reach their 40-year life-cycle by the end of 2050.

Although some Welcome Centers are leased, all the rest areas are owned by MDOT and are jointly operated by MDOT staff and the Michigan Economic Development Corp. (MEDC). MDOT is responsible for repairs, replacement and upgrades to the facilities and grounds

Safety

The safety of roadway users is MDOT's number one priority. Most crashes are due to human error and completely avoidable. In 2002, the Governor's Traffic Safety Advisory Commission (GTSAC) was created to serve as the main forum for identifying key traffic safety challenges and for developing, promoting and implementing strategies to address these challenges. GTSAC is comprised of representatives of Michigan's departments of Community Health, Education, State, State Police and Transportation, along with the Governor's Office, Office of Highway Safety Planning, Aging and Adult Services Agency and local government. GTSAC releases the Strategic Highway Safety Plan (SHSP) every few years, which sets forth a plan to address the safety challenges throughout the state. The SHSP was last updated in 2023 and has the following mission, vision and goals:

- Mission: Applying the Safe System Approach through statewide strategies and initiatives that accommodate human mistakes and injury tolerance levels to move Michigan Toward Zero Deaths.

- Vision: Eliminate fatal and serious injury crashes on Michigan's roadways.
- Goals: Eliminate fatalities from 1,131 in 2021 to 0 by 2050. Eliminate serious injuries from 5,979 in 2021 to 0 by 2050.

While MDOT has seen an increase in fatal and injury crashes, the state is still a long way from achieving zero deaths. Tables 26 and 27 show crash statistics for the state and regions.

Table 26 - Statewide Crash Statistics

Year	Fatalities	Injuries	Total Crashes	Fatal Crashes	Injury Crashes
2020	1,083	60,986	245,432	1,010	44,417
2021	1,131	71,246	282,640	1,068	51,666
2022	1,123	70,281	293,341	1,053	51,066
2023	1,095	71,085	287,953	1,021	51,097
2024	1,099	71,316	288,880	1,012	51,202

Source: MDOT

Table 27 - Fatalities and Injuries by MDOT Region, 2020-2024

MDOT Region	2020 Fatalities	2020 Injuries	2021 Fatalities	2021 Injuries	2022 Fatalities	2022 Injuries	2023 Fatalities	2023 Injuries	2024 Fatalities	2024 Injuries
Bay	181	903	189	914	194	889	200	897	203	849
North	71	374	73	427	84	429	90	421	89	434
Grand	195	995	180	1,099	187	1,112	176	1,084	185	1,130
Southwest	99	557	136	607	115	555	121	565	98	547
Metro	355	1,641	344	1,899	354	1,698	308	1,827	315	1,768
Superior	35	249	44	239	37	222	33	204	39	200
University	147	714	165	794	152	877	167	877	170	853
Statewide	1,083	5,433	1,131	5,979	1,123	5,782	1,095	5,875	1,099	5,781

Source: MDOT

Commercial Vehicle Safety

Trucks and buses were involved in 5 percent of crashes in 2019; however, 0.6 percent of truck/bus-involved crashes resulted in at least one fatality, which is more than twice the rate compared to all crashes (0.6 percent versus 0.3 percent). The Michigan State Police has a Commercial Vehicle Enforcement Division (CVED) responsible for staffing and operating 14 weigh station facilities (at 10 locations around the state) and conducting road patrol activities focused on commercial vehicle enforcement. The CVED employs a variety of strategies to enforce commercial vehicle laws, including the use of fixed weigh stations, portable scales, wireless weigh-in-motion (WIM) and permanent intermittent truck weigh stations (PITWS) during mobile screening operations, and check-lane operations at designated areas such as rest areas.

TSMO and Safety

MDOT facilitated a research report, published in 2019, assessing TSMO for the state. This report found that as a function of vehicle miles traveled (VMT), between 2014 and 2018 Michigan spent \$54,126,469 per million VMT (MVMT) on TSMO strategies. This was less than the national average of \$61,372,061 per MVMT but greater than the median value of \$38,135,558 per MVMT. This report also analyzed the relationship between fatality reduction and safety funding per VMT, based on an analysis of 48 peer states. Michigan ranked 47th in state spending, with \$556,998 spent per billion VMT, and experienced a 6.2 percent increase in the frequency of fatalities over this period. When comparing crash rates, which consider traffic fatalities as a function of traffic volumes, Michigan experienced a 3.3 percent increase in the fatality rate (based on a five-year rolling average). When measured per capita, Michigan's change in fatality rate ranked 46th out of the 48 contiguous states. To better help Michigan reach its goals of reducing fatalities and serious injuries, one of the TSMO report's recommendations is to seek opportunities to increase the level of safety funding and/or consider shifting safety funding priorities to align with top performing peer states.

Safety Targets

Currently, Michigan's safety programs funding is provided by federal aid and distributed per Act 51 legislation requirements. This includes funding for both locally owned highways and trunkline highways. These funds help Michigan meet the federally mandated safety performance targets that include:

- The number of fatalities;
- The fatality rate per 100 million VMT;
- The number of serious injuries;
- The serious injury rate per 100 million VMT; and
- The total number of nonmotorized fatalities and serious injuries.

Under Section 148(g)(2) of title 23, United States Code (U.S.C.), an Older Driver and Pedestrian Special Rule was established. This special rule requires states, where the fatality and serious injury rate for drivers and pedestrians over the age of 65 per capita increased over the most recent two-year period for which data is available, to include strategies to address the increase in those rates in their next SHSP update. The FHWA uses a comparison of five-year rolling average rates of fatalities and serious injuries over a two-year spread. Additionally, Michigan has triggered the Vulnerable Road User (VRU) Special Rule. As such, the state is required to obligate not less than 15 percent of the amount apportioned under 23 U.S.C. 104(b)(3) for highway safety improvement projects to address the safety of VRUs. Consequently, Michigan will need to ensure the next SHSP includes strategies specifically aimed at reducing these crashes.

Safety Programs and Tools

Strategic Highway Safety Plan

Michigan's SHSP is published under the leadership of the GTSAC. The SHSP provides a comprehensive framework for reducing traffic fatalities and serious injuries on Michigan's public roads through the implementation of the Safe System Approach (SSA). Strategies based on the SSA are proactive, introduce redundancy in the system and promote shared responsibility between all stakeholders with the goal of eliminating fatalities and serious injuries. To reach that goal, the SHSP focuses on traffic safety issues organized into four broad emphasis areas: high-risk behaviors, at-risk road users, engineering infrastructure and system administration. The GTSAC established several action teams to address targeted safety concerns within each area. Combined, these action teams work to prevent deaths and serious injuries, design for human mistakes

and limitation, reduce speeds, promote shared responsibility, and proactively identify and address risks. The action teams are listed in Table 28, along with information regarding the number of fatalities (based on 2020-2024 data). As shown, the top safety issues in terms of number of fatalities include impaired driving, lane departure and intersection crashes, with occupant protection not far behind.

Table 28 - Michigan Action Team Safety Data, 2020-2024

Action Team	Fatalities
Impaired Driving Task Force	2,924
Commercial Motor Vehicle Safety	491
Distracted Driving	292
Drivers Aged 20 or Younger	705
Traffic Safety Engineering - Intersection	1,665
Traffic Safety Engineering - Lane Departure	2,389
Traffic Safety Engineering - Total	4,054
Occupant Protection	1,631
Pedestrian and Bicycle Safety	1,030
Older Driver Mobility and Safety	1,296
Motorcycle Safety	832

Source: Michigan Traffic Crash Facts

System Operations

This section provides a snapshot of the traffic operations of Michigan's highway system. Highway system reliability, or travel time reliability, is summarized using two reliability metrics, Level of Travel Time Reliability (LOTTR) and Planning Time Index (PTI). As previously described, highway congestion levels are based on volume to capacity (V/C) ratio (from the Statewide Travel Demand Model). All data reported in this section is from 2023 to remain consistent with other base data being summarized for this report.

Travel time reliability and congestion both help explain roadway travel conditions, but they are different concepts. Congestion, as measured by V/C ratio, indicates too much traffic for the available physical capacity of the roadway segment, resulting in speeds that are slower (sometimes much slower) than "normal," or "free flow," speed. Travel time reliability, on the other hand, measures how consistent the travel time is from one point to another, from one day to the next. Surveys have indicated that it is more important for travelers to have a consistent travel time to their destination than to have an uncongested route. If people understand that a route is congested, they can plan accordingly but if a route is unreliable, they really have no understanding of how long it will take to get to their destination, which creates greater frustration. In addition, segments of roads can be both congested and reliable (e.g., reliably congested), whereas others can be congested but unreliable.

MDOT has access to travel data from INRIX, a commercial provider of data. In contrast to detector-based data that relies on fixed roadside sensors to collect vehicle speed information, INRIX uses location information generated by GPS-equipped fleet vehicles, cell phones and connected navigation devices to process location data from their connected vehicle partners to compute real-time speed and travel time information. This information is shared with the University of Maryland Center for Advanced Transportation Technology (CATT) Lab to develop tools that monitor speeds, incidents, weather, special events, and other metrics. The two performance measures used to describe roadway travel time reliability are LOTTR and PTI.

The congestion data described comes from Michigan’s Statewide Travel Demand Forecasting Model. The thresholds were defined and applied by MDOT and reviewed by individual MPOs for concurrence. The statewide model does not include all federal aid roadways, so congestion data are only provided here for those roadway segments included in the model network.

Level of Travel Time Reliability (LOTTR)

The LOTTR measures the consistency and dependability of travel on a given road segment. The LOTTR is calculated as the ratio of the 80th percentile travel time to a “normal” travel time (50th percentile). The lower the LOTTR, the greater the reliability. The FHWA deems a road segment to be unreliable if the LOTTR value is greater than 1.5. For the purposes of this report, the LOTTR has been calculated for all segments (where data exists) on the Michigan Corridors of Highest Significance (COHS) system in directional miles. The LOTTR is calculated in directional miles since each side of a divided highway can perform differently. Directional miles include undivided highway mileage, both sides of divided highways and both directions of one-way pairs. MDOT established the following LOTTR thresholds for the purpose of classifying different highway segments:

- Unreliable: 1.5 or greater
- Approaching unreliable: 1.25-1.5
- Reliable: Less than 1.25

The LOTTR was calculated and reported for the following time periods and broken down by MDOT region:

- Morning peak period (AM): 7 - 9 a.m. (see Table 29)
- Mid-day period: 9 a.m. - 3 p.m. (see Table 30)
- Afternoon peak period (PM): 3 - 6 p.m. (see Table 31)
- Weekend: 7 a.m. - 6:00 p.m. (see Table 32)

The combined review of the LOTTR (see Table 33) presents the worst case LOTTR value for each highway segment over all the time periods evaluated. Data from spring/fall 2023 was used for all segments.

Statewide, most of the COHS is reliable in the AM peak period (87.8 percent to 100 percent, depending on the region). The PM peak period is the least reliable timeframe, with 2.1 percent of highway segments approaching unreliable and 1.8 percent of all highway segments unreliable. The most reliable timeframe for travel on the MDOT COHS system is the weekend (Table 32).

As can be expected, based on its sizeable population and employment, the Metro Region has the most directional miles of unreliable highways during any timeframe. Overall, the worst-case LOTTR for the Metro Region shows that 11.5 percent of highway miles are approaching unreliable and 14.1 percent are unreliable at some point during the week (Table 33).

Table 29 - LOTTR, AM Peak Period by Directional Miles by Region (Percent in Region)

MDOT Region	Reliable Miles	Reliable Percent	Approaching Unreliable Miles	Approaching Unreliable Percent	Unreliable Miles	Unreliable Percent
Bay	1,748.3	98.8%	16.5	0.9%	5.2	0.3%
Grand	1,385.5	96.4%	20.8	1.4%	31.1	2.2%
Metro	1,151.7	87.8%	67.8	5.2%	91.9	7.0%
North	1,745.5	100.0%	0.2	0.0%	0.7	0.0%
Southwest	839.7	97.9%	14	1.6%	3.6	0.4%
Superior	2,068.9	99.9%	1.7	0.1%	0.5	0.0%
University	1,332.3	96.5%	28.7	2.1%	20.3	1.5%
Statewide	10,271.8	97.1%	149.5	1.4%	153.3	1.4%

Source: INRIX, University of Maryland CATT Lab

Table 30 - LOTTR, Mid-day Period by Directional Miles by Region (Percent in Region)

MDOT Region	Reliable Miles	Reliable Percent	Approaching Unreliable Miles	Approaching Unreliable Percent	Unreliable Miles	Unreliable Percent
Bay	1,760.5	99.5%	4.4	0.2%	5.1	0.3%
Grand	1,403.6	97.7%	12.5	0.9%	21.2	1.5%
Metro	1,260.3	96.1%	32.2	2.5%	18.8	1.4%
North	1,745.6	100.0%	0.6	0.0%	0.1	0.0%
Southwest	832.7	97.1%	16.1	1.9%	8.5	1.0%
Superior	2,069.1	99.9%	1.8	0.1%	0.2	0.0%
University	1,360.9	98.5%	9.2	0.7%	11.3	0.8%
Statewide	10,432.7	98.7%	76.9	0.7%	65.1	0.6%

Source: INRIX, University of Maryland CATT Lab

Table 31 - LOTTR, PM Peak Period by Directional Miles by Region (Percent in Region)

MDOT Region	Reliable Miles	Reliable Percent	Approaching Unreliable Miles	Approaching Unreliable Percent	Unreliable Miles	Unreliable Percent
Bay	1,754.4	99.1%	7.8	0.4%	7.8	0.4%
Grand	1,371.1	95.4%	25.6	1.8%	40.7	2.8%
Metro	1,077.3	82.2%	129.1	9.8%	104.9	8.0%
North	1,745.5	100.0%	0.8	0.0%	0.1	0.0%
Southwest	833.9	97.3%	15	1.7%	8.5	1.0%
Superior	2,069.1	99.9%	1.9	0.1%	0.1	0.0%
University	1,314.2	95.1%	39.3	2.8%	27.8	2.0%
Statewide	10,165.4	96.1%	219.5	2.1%	189.8	1.8%

Source: INRIX, University of Maryland CATT Lab

Table 32 - LOTTR, Weekend by Directional Miles by Region (Percent in Region)

MDOT Region	Reliable Miles	Reliable Percent	Approaching Unreliable Miles	Approaching Unreliable Percent	Unreliable Miles	Unreliable Percent
Bay	1,761.4	99.5%	1.1	0.1%	7.5	0.4%
Grand	1,435.9	99.9%	1.2	0.1%	0.3	0.0%
Metro	1,282.7	97.8%	18.4	1.4%	10.1	0.8%
North	1,746.1	100.0%	0.1	0.0%	0	0.0%
Southwest	856.3	99.9%	0.9	0.1%	0.1	0.0%
Superior	2,067.9	99.8%	2.7	0.1%	0.4	0.0%
University	1,370.6	99.2%	1.2	0.1%	9.5	0.7%
Statewide	10,521.0	99.5%	25.6	0.2%	28	0.3%

Source: INRIX, University of Maryland CATT Lab

Table 33 - LOTTR, Worst Case by Directional Miles by Region (Percent in Region)

MDOT Region	Reliable Miles	Reliable Percent	Approaching Unreliable Miles	Approaching Unreliable Percent	Unreliable Miles	Unreliable Percent
Bay	1,731.4	97.8%	23.6	1.3%	15	0.8%
Grand	1,359.4	94.6%	32.7	2.3%	45.3	3.2%
Metro	976.2	74.4%	150.3	11.5%	184.8	14.1%
North	1,745.3	99.9%	0.4	0.0%	0.7	0.0%
Southwest	832.1	97.1%	16.7	1.9%	8.5	1.0%
Superior	2,066.8	99.8%	3.2	0.2%	1.1	0.1%
University	1,269.4	91.9%	56.1	4.1%	55.8	4.0%
Statewide	9,980.5	94.4%	282.9	2.7%	311.2	2.9%

Source: INRIX, University of Maryland CATT Lab

Planning Time Index (PTI)

The PTI is the second metric MDOT uses to describe the consistency and dependability of road segments. The PTI represents the total time a driver should allow to ensure on-time arrival to their destination 95 percent of the time. It is the comparison of the time that a driver would typically plan to travel a distance to the actual time it took. The PTI is calculated for the MDOT COHS highway system as the ratio of the 95th percentile travel time to the free flow travel time. Free flow speed is defined as the 85th percentile speed for weekday (Monday - Friday) nighttimes, between 10 p.m. and 5 a.m. The higher the PTI, the greater the unreliability of travel.

The PTI has been calculated for all directional miles in Michigan on the COHS, and where data was available. MDOT established thresholds as “reliable” if the PTI value is less than 1.8, “approaching unreliable” if the PTI is between 1.8 and 2.0, “moderately unreliable” if the PTI is between 2.0 to 3.0, and “severely unreliable” for PTI values greater than 3.0.

Tables 34-38 report the PTI by the AM peak period, mid-day period, PM peak period, weekend index and worst-case scenario, which are the same time periods as defined for LOTTR. However, the PTI metric paints a somewhat different picture of reliability compared to LOTTR.

As shown in the table, 95.3 percent of highway segments statewide are reliable during the AM peak commuting period. The PM peak period is the least reliable timeframe, with 3.3 percent of highway segments being severely

unreliable and another 3.1 percent being moderately unreliable. As seen with LOTTR, weekends are the most reliable timeframe for travel as measured by PTI values, as shown in Table 37. It should be noted that these are the worst case PTI for all periods of the day and it is reporting the 95th percentile travel time so only 5 percent of travel times would be longer.

The Metro Region has the least reliability of all regions for all periods of time analyzed, followed by the University and Grand regions. In the Metro Region during the PM peak period, 12.1 percent of highway segments are moderately unreliable, and 14.4 percent of highway segments are severely unreliable.

Table 34 - PTI, AM Peak Period by Directional Miles in Region (Percent in Region)

MDOT Region	Reliable Miles	Reliable Percent	Approaching Unreliable Miles	Approaching Unreliable Percent	Moderately Unreliable Miles	Moderately Unreliable Percent	Severely Unreliable Miles	Severely Unreliable Percent
Bay	1,733.7	97.9%	6.2	0.3%	14.7	0.8%	15.4	0.9%
Grand	1,359.0	94.5%	6.4	0.4%	46.5	3.2%	25.5	1.8%
Metro	1,051.0	80.1%	40	3.1%	94.3	7.2%	126	9.6%
North	1,745.4	99.9%	0.2	0.0%	0.1	0.0%	0.7	0.0%
Southwest	845.6	98.6%	1.4	0.2%	6.6	0.8%	3.6	0.4%
Superior	2,068.0	99.9%	1.1	0.1%	1	0.0%	1	0.0%
University	1,277.9	92.5%	14.5	1.0%	50.9	3.7%	38	2.8%
Statewide	10,080.6	95.3%	69.8	0.7%	214.1	2.0%	210.2	2.0%

Source: INRIX, University of Maryland CATT Lab

Table 35 - PTI, Mid-day Period by Directional Miles in Region (Percent in Region)

MDOT Region	Reliable Miles	Reliable Percent	Approaching Unreliable Miles	Approaching Unreliable Percent	Moderately Unreliable Miles	Moderately Unreliable Percent	Severely Unreliable Miles	Severely Unreliable Percent
Bay	1,733.7	97.9%	6.2	0.3%	14.7	0.8%	15.4	0.9%
Grand	1,359.0	94.5%	6.4	0.4%	46.5	3.2%	25.5	1.8%
Metro	1,051.0	80.1%	40	3.1%	94.3	7.2%	126	9.6%
North	1,745.4	99.9%	0.2	0.0%	0.1	0.0%	0.7	0.0%
Southwest	845.6	98.6%	1.4	0.2%	6.6	0.8%	3.6	0.4%
Superior	2,068.0	99.9%	1.1	0.1%	1	0.0%	1	0.0%
University	1,277.9	92.5%	14.5	1.0%	50.9	3.7%	38	2.8%
Statewide	10,080.6	95.3%	69.8	0.7%	214.1	2.0%	210.2	2.0%

Source: INRIX, University of Maryland CATT Lab

Table 36 - PTI, PM Peak Period by Directional Miles in Region (Percent in Region)

MDOT Region	Reliable Miles	Reliable Percent	Approaching Unreliable Miles	Approaching Unreliable Percent	Moderately Unreliable Miles	Moderately Unreliable Percent	Severely Unreliable Miles	Severely Unreliable Percent
Bay	1,719.3	97.1%	10.1	0.6%	23.9	1.3%	16.7	0.9%
Grand	1,308.7	91.0%	13.8	1.0%	58.3	4.1%	56.7	3.9%
Metro	905.6	69.1%	57.9	4.4%	158.9	12.1%	188.9	14.4%
North	1,727.4	98.9%	13.4	0.8%	4.8	0.3%	0.7	0.0%
Southwest	833.3	97.2%	6.9	0.8%	5	0.6%	12	1.4%

MDOT Region	Reliable Miles	Reliable Percent	Approaching Unreliable Miles	Approaching Unreliable Percent	Moderately Unreliable Miles	Moderately Unreliable Percent	Severely Unreliable Miles	Severely Unreliable Percent
Superior	2,068.4	99.9%	0.8	0.0%	1.4	0.1%	0.3	0.0%
University	1,217.2	88.1%	15	1.1%	74.2	5.4%	75	5.4%
Statewide	9,779.9	92.5%	118	1.1%	326.5	3.1%	350.3	3.3%

Source: INRIX, University of Maryland CATT Lab

Table 37 - PTI, Weekend by Directional Miles in Region (Percent in Region)

MDOT Region	Reliable Miles	Reliable Percent	Approaching Unreliable Miles	Approaching Unreliable Percent	Moderately Unreliable Miles	Moderately Unreliable Percent	Severely Unreliable Miles	Severely Unreliable Percent
Bay	1,746.1	98.6%	1.5	0.1%	11.4	0.6%	11.1	0.6%
Grand	1,424.2	99.1%	4.8	0.3%	7.3	0.5%	1.1	0.1%
Metro	1,190.1	90.8%	33.6	2.6%	53.8	4.1%	33.7	2.6%
North	1,741.4	99.7%	0.6	0.0%	4.3	0.2%	0	0.0%
Southwest	849.3	99.1%	1.7	0.2%	5.6	0.7%	0.7	0.1%
Superior	2,064.6	99.7%	3.5	0.2%	1.2	0.1%	1.7	0.1%
University	1,298.0	94.0%	17.3	1.3%	22.6	1.6%	43.4	3.1%
Statewide	10,313.7	97.5%	63.1	0.6%	106.2	1.0%	91.7	0.9%

Source: INRIX, University of Maryland CATT Lab

Table 38 - PTI, Worst Case by Directional Miles in Region (Percent in Region)

MDOT Region	Reliable Miles	Reliable Percent	Approaching Unreliable Miles	Approaching Unreliable Percent	Moderately Unreliable Miles	Moderately Unreliable Percent	Severely Unreliable Miles	Severely Unreliable Percent
Bay	1,695.4	95.8%	10.2	0.6%	33.4	1.9%	31	1.8%
Grand	1,285.0	89.4%	20.9	1.5%	66.6	4.6%	64.9	4.5%
Metro	769.7	58.7%	72.1	5.5%	203.9	15.5%	265.6	20.3%
North	1,720.3	98.5%	16.3	0.9%	9.1	0.5%	0.7	0.0%
Southwest	827.0	96.5%	9.2	1.1%	9.1	1.1%	12	1.4%
Superior	2,063.4	99.6%	3.4	0.2%	1.9	0.1%	2.3	0.1%
University	1,119.8	81.1%	27.7	2.0%	101.9	7.4%	131.9	9.6%
Statewide	9,480.5	89.7%	159.9	1.5%	425.9	4.0%	508.5	4.8%

Source: INRIX, University of Maryland CATT Lab

Highway Congestion

This section provides a snapshot of the congestion of Michigan's highway system. Highway system congestion is summarized in this section based on the volume-to-capacity (V/C) ratio, which is the number of vehicles that traverse a segment divided by its total vehicular capacity. The volume numbers came from the assignment results (for 2023) of the statewide model. The physical capacity of a segment was estimated using Highway Capacity Model (HCM) methods. Finally, the travel demand model was used to forecast 2023 volume/capacity ratios.

The following V/C ratio thresholds were used to define congested roadway segments:

Table 39 - V/C Ratio Thresholds

Classification	V/C Ratio	Description
Uncongested	< 0.7	The volume on a highway is less than 70 percent of the highway capacity. In general, traffic may travel at free-flow.
Approaching Congested	0.7 - 0.9	The volume on a highway is 70-90 percent of the highway capacity. In general, there is some traffic delay.
Congested	> 0.9	The volume on a highway is greater than 90 percent of the highway capacity. The highway is nearing capacity and traffic has slowed significantly.

Source: MDOT

Highway Congestion from Statewide Model

The following tables report the “worst case” congestion for roadway segments in Michigan’s statewide travel demand model. To identify the worst-case scenario, MDOT reviewed the AM and PM peaks for all roadway segments and used the most congested value or highest V/C ratio for each segment. Congestion is reported in directional miles and sorted by whether the highway is on the NHS, trunkline, interstate, freeway or a local road. It should be noted that the V/C ratios are an average for the entire AM or PM peak period, which is 7 - 9 a.m. for the AM peak period and 3 to 6 p.m. for the PM peak period. There could be very short periods during this timeframe when there is a higher level of congestion that is not captured in these data.

Tables 40 through 46 show the miles of congestion by region and roadway type. The mileage can be either directional miles or centerline miles depending on how the model link is coded in the travel demand model. Some model links are two-way links, so the mileage corresponds to centerline miles and some model links represent one direction of travel (i.e., interstates); thus, the mileage corresponds to directional miles.

Apart from the Metro Region, nearly 97 percent of the interstate roadway miles are uncongested (see Table 40). A little less than 90 percent of the interstate network in the Metro Region is uncongested (88 percent), with another 11.2 percent approaching congested conditions. The Metro Region reports the most congested highway miles in all categories. The non-interstate freeways perform slightly better in the Metro Region, with 92.5 percent uncongested (see Table 41).

In general, statewide, 97.1 percent of the NHS system for the trunkline roadways is uncongested and 97.6 percent of the NHS system for the non-trunkline roadways is uncongested. The non-NHS system has very little congestion. A total of 99.9 percent of the non-NHS trunkline roads is uncongested, and 97.6 percent of the non-NHS non-trunkline roads is uncongested.

Table 40 - Worst Case Congestion Miles, NHS, Trunkline, Interstates

MDOT Region	Uncongested (Miles)	Uncongested (Percent)	Approaching Congested (Miles)	Approaching Congested (Percent)	Congested (Miles)	Congested (Percent)
Bay	636	99.8%	1	0.2%	0	0.0%
Grand	350	97.0%	10.1	2.8%	0.5	0.1%
Metro	592	82.5%	118.6	16.5%	6.6	0.9%
North	301	100.0%	0	0.0%	0	0.0%
Southwest	465	99.1%	4.1	0.9%	0	0.0%
Superior	125	100.0%	0	0.0%	0	0.0%
University	561	94.7%	31.4	5.3%	0	0.0%
Statewide	3,029	94.6%	165.3	5.2%	7.1	0.2%

Source: MDOT Statewide Travel Demand Model

Table 41 - Worst Case Congestion Miles, NHS, Trunkline, Freeway (Non-Interstate)

MDOT Region	Uncongested (Miles)	Uncongested (Percent)	Approaching Congested (Miles)	Approaching Congested (Percent)	Congested (Miles)	Congested (Percent)
Bay	354	99.9%	0.4	0.1%	0	0.0%
Grand	497	94.5%	28.4	5.4%	0.2	0.0%
Metro	192	89.8%	21.4	10.0%	0.3	0.2%
North	111	100.0%	0	0.0%	0	0.0%
Southwest	121	100.0%	0	0.0%	0	0.0%
Superior	0	NA	0	NA	0	NA
University	340	90.6%	35.3	9.4%	0	0.0%
Statewide	1,615	94.9%	85.6	5.0%	0.6	0.1%

Source: MDOT Statewide Travel Demand Model

Table 42 - Worst Case Congestion Miles, NHS, Trunkline, Non-Freeway

MDOT Region	Uncongested (Miles)	Uncongested (Percent)	Approaching Congested (Miles)	Approaching Congested (Percent)	Congested (Miles)	Congested (Percent)
Bay	531	99.8%	1.1	0.2%	0	0.0%
Grand	402	98.9%	3.1	0.8%	1.3	0.3%
Metro	545	98.5%	7.6	1.4%	0.9	0.2%
North	650	100.0%	0.1	0.0%	0	0.0%
Southwest	226	99.9%	0.1	0.1%	0.2	0.1%
Superior	982	100.0%	0	0.0%	0	0.0%
University	350	98.7%	4.4	1.2%	0.2	0.1%
Statewide	3,686	99.5%	16.4	0.4%	2.6	0.1%

Source: MDOT Statewide Travel Demand Model

Table 43 - Worst Case Congestion Miles, NHS, All Trunkline

MDOT Region	Uncongested (Miles)	Uncongested (Percent)	Approaching Congested (Miles)	Approaching Congested (Percent)	Congested (Miles)	Congested (Percent)
Bay	1,521	99.8%	2.6	0.2%	0	0.0%
Grand	1,249	96.6%	41.6	3.2%	2.1	0.2%
Metro	1,329	89.5%	147.6	9.9%	7.8	0.5%
North	1,062	100.0%	0.1	0.0%	0	0.0%
Southwest	812	99.5%	4.2	0.5%	0.2	0.0%
Superior	1,107	93.9%	0	6.0%	0	0.0%
University	1,251	81.8%	71.2	17.5%	0.2	0.7%
STATEWIDE	8,330	96.8%	267.3	3.1%	10.3	0.1%

Source: MDOT Statewide Travel Demand Model

Table 44 - Worst Case Congestion Miles, Non-NHS, All Trunkline

MDOT Region	Uncongested (Miles)	Uncongested (Percent)	Approaching Congested (Miles)	Approaching Congested (Percent)	Congested (Miles)	Congested (Percent)
Bay	882	100.0%	0.2	0.0%	0	0.0%
Grand	721	99.1%	5.2	0.7%	1	0.1%
Metro	64	98.2%	1.1	1.7%	0.1	0.1%
North	909	100.0%	0	0.0%	0	0.0%
Southwest	545	100.0%	0	0.0%	0	0.0%
Superior	791	100.0%	0	0.0%	0	0.0%
University	554	98.8%	0	1.2%	0	0.0%
Statewide	4,466	99.8%	6.5	0.1%	1.1	0.0%

Source: MDOT Statewide Travel Demand Model

Table 45 - Worst Case Congestion Miles, NHS, Non-Trunkline

MDOT Region	Uncongested (Miles)	Uncongested (Percent)	Approaching Congested (Miles)	Approaching Congested (Percent)	Congested (Miles)	Congested (Percent)
Bay	118	98.8%	1.4	1.2%	0	0.0%
Grand	135	92.9%	9.1	6.3%	1.3	0.9%
Metro	849	96.4%	27.5	3.1%	4.4	0.5%
North	7	81.0%	0	0.0%	0	0.0%
Southwest	65	100.0%	1.5	2.2%	0	0.1%
Superior	0	0.0%	0	0.0%	0	0.0%
University	106	69.2%	1.8	1.7%	0	0.0%
Statewide	1,279	96.4%	41.3	3.1%	5.8	0.4%

Source: MDOT Statewide Travel Demand Model

Table 46 - Worst Case Congestion Miles, Non-NHS, Non-Trunkline

MDOT Region	Uncongested (Miles)	Uncongested (Percent)	Approaching Congested (Miles)	Approaching Congested (Percent)	Congested (Miles)	Congested (Percent)
Bay	4,034	99.1%	34.9	0.9%	2.5	0.1%
Grand	4,016	98.2%	63.4	1.5%	12.3	0.3%
Metro	1,761	94.4%	84.8	4.5%	20.1	1.1%
North	3,953	99.7%	8.1	0.2%	3.9	0.1%
Southwest	2,127	99.5%	9.7	0.5%	0.3	0.0%
Superior	2,903	99.9%	4	0.1%	0.4	0.0%
University	2,767	98.8%	27.7	1.0%	5.8	0.2%
STATEWIDE	21,562	98.7%	232.3	1.1%	45.3	0.2%

Source: MDOT Statewide Travel Demand Model

Active Transportation

Infrastructure and Environment

Michigan's Active Transportation Facilities

Michigan's active transportation network is made up of various types of facilities, some of which accommodate both pedestrians and bicyclists, while others are limited to one mode or the other. Choice of where to deploy each type is based upon geometric constraints, budget constraints, speed, volumes, land uses, crash history and risk, network considerations and user demand. Currently, with more than 600 road agencies and thousands of townships and parks departments all involved in building out the network, there is not a means to estimate the inventory that exists for these facilities by type, as a policy does not exist requiring asset management and inventory of multimodal facilities at statewide, regional or local levels. Recommendations and guidelines for implementation of an inventory plan for local agencies can be found in the Active Transportation Plan (ATP).

The ATP is intended to address a need for a comprehensive resource for multimodal planning in Michigan. Table 47 presents the types of facilities that serve pedestrians, bicyclists and motorists in either a dedicated or shared environment. Also shown is the general prevalence of the facility type in Michigan. Further details describing each facility is provided in the [MM2045 Active Transportation Plan Chapter 4](#).

Table 47 - Mode Types Permitted Per Facility

Facility	Prevalence in Michigan	Pedestrian	Bicyclists	Parked Vehicles	Moving Vehicles
Sidewalks	Common	Y	Y	N	N
Pedestrian Shared Streets	Common	Y	Y	Y	Y
Pedestrian Lanes	Uncommon	Y	N	N	N
Shared-Use Paths/Trails or Sidepaths	Common	Y	Y	N	N
Road Shoulders - Paved	Common	Y	Y	Y	N
Standard Striped Bike Lanes	Common	N	Y	N	N
Marked Shared Lanes (Sharrows)	Occasional	N	Y	N	Y

Facility	Prevalence in Michigan	Pedestrian	Bicyclists	Parked Vehicles	Moving Vehicles
Wide Outside Lane Curb Lane	Common	N	Y	Y	Y
Shared Roadways	Common	Y	Y	Y	Y
Separated/Buffered Bike Lanes	Common	N	Y	N	N
Bike Routes - Signed	Common	N	Y	Y	Y
Bike Boulevards/Neighborhood Greenways	Occasional	Y	Y	Y	Y
Advisory Bike Lanes/Shoulders	Occasional	Y	Y	N	Y
Yield Streets	Uncommon	Y	Y	Y	Y

Types of Active Transportation Facilities and Safety Treatments

To ensure that the needs of active transportation users are met, a variety of safety treatments and amenities can be deployed to support the active transportation network. Some are necessary to limit negative impacts (lighting), while others improve the utility of the facility (bicycle racks and convenient public restrooms). Active transportation facility amenities should be incorporated into the active transportation network design at the outset and should not be considered as “add-ons” or eliminated during budget refinement. The provision of these facilities is important to enhance safety and comfort for all active transportation users.

Active transportation facility amenities should be installed in locations throughout the nonmotorized network. Where each item should be installed depends upon the amenity, the network, and nodes and spokes in the system. For example, bike racks should be placed near businesses, schools and downtowns but not along a shared-use path in the middle of a residential neighborhood. Benches are appropriate to install in almost any location along the active transportation network. These supporting items enhance user experience, safety and satisfaction.

Following are examples of the safety features and amenities that should be considered during the design and development of active transportation networks.

Signs

Two types of signs should be deployed along all active and motorized transportation networks:

- **Safety Signs:** Signs for both motorists and active transportation users that makes them aware of potential conflicts. Safety signs includes pavement markings, in-road signs and signs located along transportation corridors, some of which may include flashing elements.
- **Wayfinding Signs:** Specialized signs that are designed to assist travelers in finding their way to destinations. These signs may simply be directional in nature or may be more elaborately designed structures that include kiosks with standardized community branding elements.

Figure 15 - Wayfinding Signs



Bicycle Intersection Safety Treatments

A number of safety elements can be implemented to reduce the conflicts between motorists and bicyclists.

- Protected intersections: These intersections should be deployed wherever busy active transportation routes cross busy motorized routes. Safety features may include:
 - Corner refuge islands
 - Forward stop bars for cyclists and a setback crossing area
 - Tight vehicular turning radii and narrow lanes to slow vehicular speeds
 - Pavement markings to indicate bicycle priority
 - Separated bike signal phasing.
- Bike lanes and bike boxes for positioning bicycles ahead of vehicles to minimize right-turn conflicts with vehicles and improve bicyclist visibility.
- Bicycle signals and phasing for dedicated bicycle movements through the intersection to eliminate conflicts with vehicles.
- Two-stage turn boxes provide bicyclists another way to make left-turns at multi-lane signalized intersections from the bike lane or separated bike lane.

Pedestrian Intersection Safety Treatments

A number of safety elements can be implemented to reduce the conflicts between motorists and pedestrians.

Pedestrian safety treatments include pavement markings, signalized crosswalks (high-intensity activated crosswalk (HAWK), rectangular rapid flash beacons), countdown timers, pedestrian call buttons (including those with audible warnings), leading pedestrian intervals, embedded pavement flashing beacons, refuge islands, bulb-out curbing,

etc. These differing interventions should be deployed based upon the network context, geometric constraints, number of users and crash history and risk, as well as the volume and speed of motorized traffic.

Pedestrian-friendly signal phasing such as leading pedestrian intervals (LPIs), which give pedestrians a three to seven-second head start prior to vehicles to establish their presence in the crosswalk before vehicles turn left or right on green, or turn right on red.

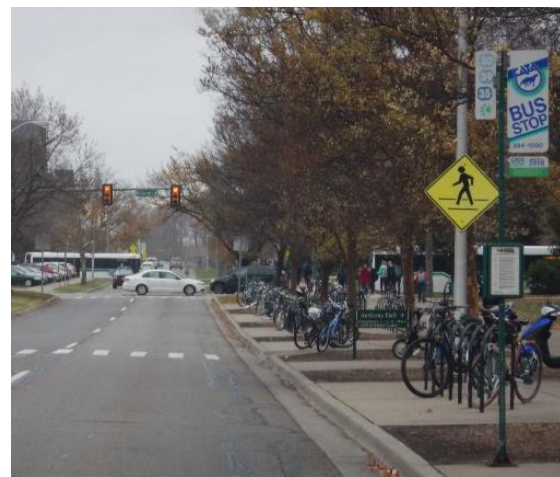
Pedestrian-Scale Lighting

Pedestrian-scale lighting is designed to illuminate the area of active transportation. Depending upon location, it may provide added safety or aesthetics to an area. Pedestrian lighting should be considered along all busy routes and in urbanized areas where personal safety may be a perceived or actual concern.

Bike Racks

Riders require the ability to lock their bikes at their destinations to prevent theft. Bike racks should be visibly located in convenient locations near entrances to all major locations. Protection from the elements is desirable.

Figure 16 - Bike Racks - East Lansing, Michigan



Bike Repair Stations

These stations include standardized tools, clamps to hold the bike during repair and pumps to fill tires. They should be located at major active transportation transition points, trailheads or along busy routes.

Bike-Sharing Stations

These centralized stations are located throughout a community where riders are able to pick up and drop off short-term rented bicycles and electric bikes (e-bikes).

Bike Storage

Bike storage is necessary for long-term storage of bikes either at destinations or at points related to first/last-mile access to public transit. This may include locked rooms or lockers to reduce vandalism. With the wider deployment of more expensive e-bikes, these storage facilities and charging stations at major destinations and transit stops will grow in importance.

Street and Path Trees

To ensure comfort of users during hot months, shade is an important tool that will increase use and decrease discomfort while providing visual

softening of the environment. Trees should be installed along all busy active transportation routes.

Street Furniture

These urban design features (including benches, trash receptacles, and drinking fountains) add comfort for active transportation users. Street furniture should be provided at all major transition points in urban and suburban locations and at vehicular parking areas.

Restrooms

Restrooms are a vital component of comfort for active transportation users. The type of facility is based on location and number of potential users. Downtowns, major transportation hubs and trailhead parking areas should offer public restrooms.

Vehicle Parking

Vehicle parking should be located at all trailheads. Convenience and sufficient quantity of parking spaces are vital.

Bus Shelters

Bus shelters are a key facility for public transit users, adding comfort and protection from the elements.

Current Network

Michigan's current active transportation network is comprised of many layers of entities and organizations providing both the planning and implementation of active transportation facilities. This has been in part due to the varying granularity needed for an active transportation system and the home rule form of local governance in Michigan. Like the motorized roadway system, the active transportation network is necessary to connect the multitude of destinations together ensuring that the network is convenient and optimizes the number of persons served. Major destinations and regional centers would be the focus of the statewide network while job centers, local parks, playgrounds, elementary schools and neighborhood commercial districts would be more appropriate to be planned for and considered at the local level.

Statewide Routes

There are 15 major statewide routes in Michigan, including the U.S. Bicycle Route (USBR) system, the Iron Belle Trail (IBT) (including a section of the North Country National Scenic Trail), the Great Lake-to-Lake Trail and the Underground Railroad Bicycle Route. These statewide routes consist of multi-use trails and on-road designations that may currently cross or have the potential to cross more than one region across the state. These routes connect different regions and assets across Michigan, from sandstone cliffs and beaches

to farmlands, small towns and major cities. These routes have been developed by different organizations and by different processes.

Since the development of MM2045, no new statewide routes have been initiated and changes to the existing statewide routes like the USBR system, IBT or Great Lake-to-Lake Trail have been minimal.

Both the USBR system and IBT efforts have varying degrees of MDOT and other state agency involvement in their designations. To formally designate a USBR, it must be part of the existing national corridor plan, all of the entities along the route must approve of the designation and MDOT must formally submit the application to the American Association of State Highway and Transportation Officials (AASHTO) Special Committee on Route Numbering. The initial designation of the IBT was an effort of the Governor's Office and the Michigan Department of Natural Resources (DNR), but MDOT worked with state, regional and local agencies to help implement gap-filling projects.

The Great Lake-to-Lake Trail system was developed by the Michigan Trails and Greenways Alliance with support from the Kresge Foundation. Local communities apply for MDOT's various federal pass-through grant programs, such as the Transportation Alternatives Program, to bring the projects to fruition.

The Underground Railroad Bicycle Route was created through a joint effort of the Center for Minority Health at the University of Pittsburgh and Adventure Cycling Association.

Due to Michigan's unique position on an international border, many statewide projects also extend connections to Canada. Both the USBR system and IBT link (or are planned to link) to Canada's Great Trail via bridges located in Detroit and Sault Ste. Marie. The Underground Railroad was designed for ferry access to Canada via Marine City. Routes that extend across regions offer various amenities and communities for hikers, bicyclists and other travelers to visit.

At the statewide level, four efforts have developed networks that cross large portions of the state as listed in Table 48. These statewide efforts have been completed by government agencies and nonprofits alike, often in collaboration. Regional efforts have been spearheaded by MDOT, the DNR, MPOs and nonprofit advocacy organizations, while local efforts are often led by recreational planning entities or local planning departments.

As the active transportation network continues to expand, it is important to identify gaps and determine opportunities for growth. Gaps can create deterrents for users who may have otherwise continued along a route. Removing gaps by building new route infrastructure helps connect communities and encourages bicyclists and pedestrians to travel to new areas. A review of existing gaps and planned efforts to close them for statewide route systems are included in the Gap Analysis section of the ATP.

Table 48 - Michigan Statewide Route Systems

System	Route	Mode	Length (Once Completed)	Percent Completion
USBR System	USBR 10	Bicycle	193 miles	100%
USBR System	USBR 20	Bicycle	325 miles	100%
USBR System	USBR 35	Bicycle	505 miles	100%
Iron Belle Trail	Hiking Route	Hiking	1,259 miles	72%
Iron Belle Trail	Biking Route	Bicycle	810 miles	64%

System	Route	Mode	Length (Once Completed)	Percent Completion
Great Lake-to-Lake Trails	#1 - South Haven to Port Huron	Hiking and Bicycle	275 miles	78%
Great Lake-to-Lake Trails	#2 - Muskegon to Bay City	Hiking and Bicycle	210 miles*	>90%
Great Lake-to-Lake Trails	#3 - Charlevoix to Alpena	Hiking and Bicycle	140 miles	100%
Great Lake-to-Lake Trails	#4 - Manistique to Marquette	Hiking and Bicycle	90 miles*	55%*
Great Lake-to-Lake Trails	#5 - Escanaba to Porcupine Mountains	Hiking and Bicycle	195 miles*	60%*
Underground Railroad Bicycle Route	Detroit Alternate	Bicycle	180 miles (approximately)	100%

*Estimated

U.S. Bicycle Route System

The USBR system is a national network of bicycle routes throughout the United States, with 14,000 miles established in 27 states and in Washington, D.C. AASHTO, along with the Adventure Cycling Association, have developed a National Corridor Plan that displays current designated USBRs and proposed undeveloped corridors. Routes proposed on the National Corridor Plan are conceptual and represented by 50-mile zones where a route may be developed. Routes are determined by first being nominated by state DOTs, followed by the approval of AASHTO. Routes must be on the National Corridor Plan before being considered for designation. When a bicycle route is approved to be part of the USBR system, it signifies support from all jurisdictions along the route.

Within Michigan, there are three AASHTO-designated routes:

- USBR 10 traverses the southern region of the Upper Peninsula, connecting St. Ignace to Iron Mountain. The 193-mile route utilizes the wide paved shoulders along US-2.
- USBR 20 is located in the Lower Peninsula and connects east-west between Algonac and Ludington. The route primarily runs along paved roads, many with paved shoulders and with a few portions of the route on rail trails and other pathways.
- USBR 35 traverses the western border of the Lower Peninsula, connecting New Buffalo on the border of Indiana north to Sault Ste. Marie. The route primarily runs along paved roads, many with paved shoulders and with a few portions of the route on rail trails and other pathways.

Changes to USBRs since MM2045 include an approximate 15-mile extension of USBR 20 south from Marine City to Algonac. This extension was necessary to allow for a ferry connection between the United States and Canada. Prior to this extension, users were able to cross into Canada at Marine City but that ferry ceased operations. To ensure continuity in a connection between the U.S. and Canada, the route was extended south to the crossing in Algonac, Michigan.

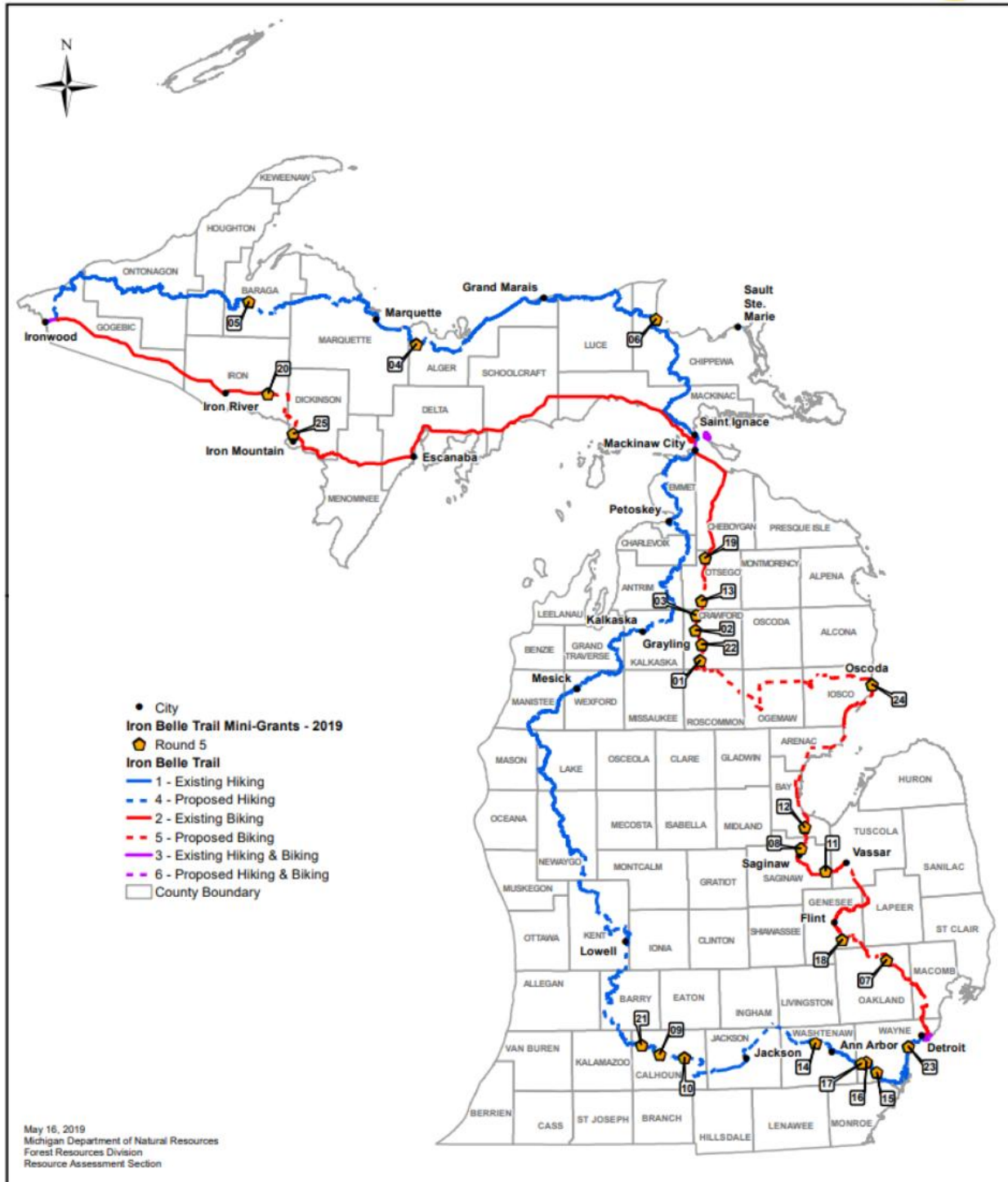
Iron Belle Trail

The IBT is comprised of two separate routes: one for hikers and one for bicyclists. Both trails extend between Belle Isle in Detroit and the city of Ironwood in the western portion of the U.P (Figure 17). According to the DNR, as of February 2026, 72 percent of the IBT is complete. In September 2025, the DNR completed a new segment of the IBT. The Ralph C. Wilson, Jr. Trail on Belle Isle, which is a segment of the IBT, is a 5.8-mile multi-use trail that circumnavigates the island and incorporates the southern terminus of the IBT.

The hiking trail is the western trail section in the Lower Peninsula and the northern trail section in the U.P, where it traverses along Lake Superior. It follows the North Country National Scenic Trail between Calhoun and Gogebic counties. The hiking trail is 1,259 miles long, and 72 percent of the trail is complete, with the remaining sections to be developed.

The bicycle trail is the more eastern trail section in the Lower Peninsula and the southern trail section in the U.P., where it follows US2, which overlaps USBR 10 (until USBR 10 leaves US-2 and crosses into Wisconsin at Iron Mountain). Existing sections of the trail utilize trails that have previously been developed by communities and at the county and state levels. The bicycle trail is 810 miles long, and 64 percent of the trail is complete, with the remaining sections to be developed.

Figure 17 - Michigan's Iron Belle Trail



Great Lake-to-Lake Routes

The Michigan Trails and Greenways Alliance has led the effort toward developing five Great-Lake-to-Lake Trails spread across the Upper and Lower peninsulas (Figure 18). The five routes include:

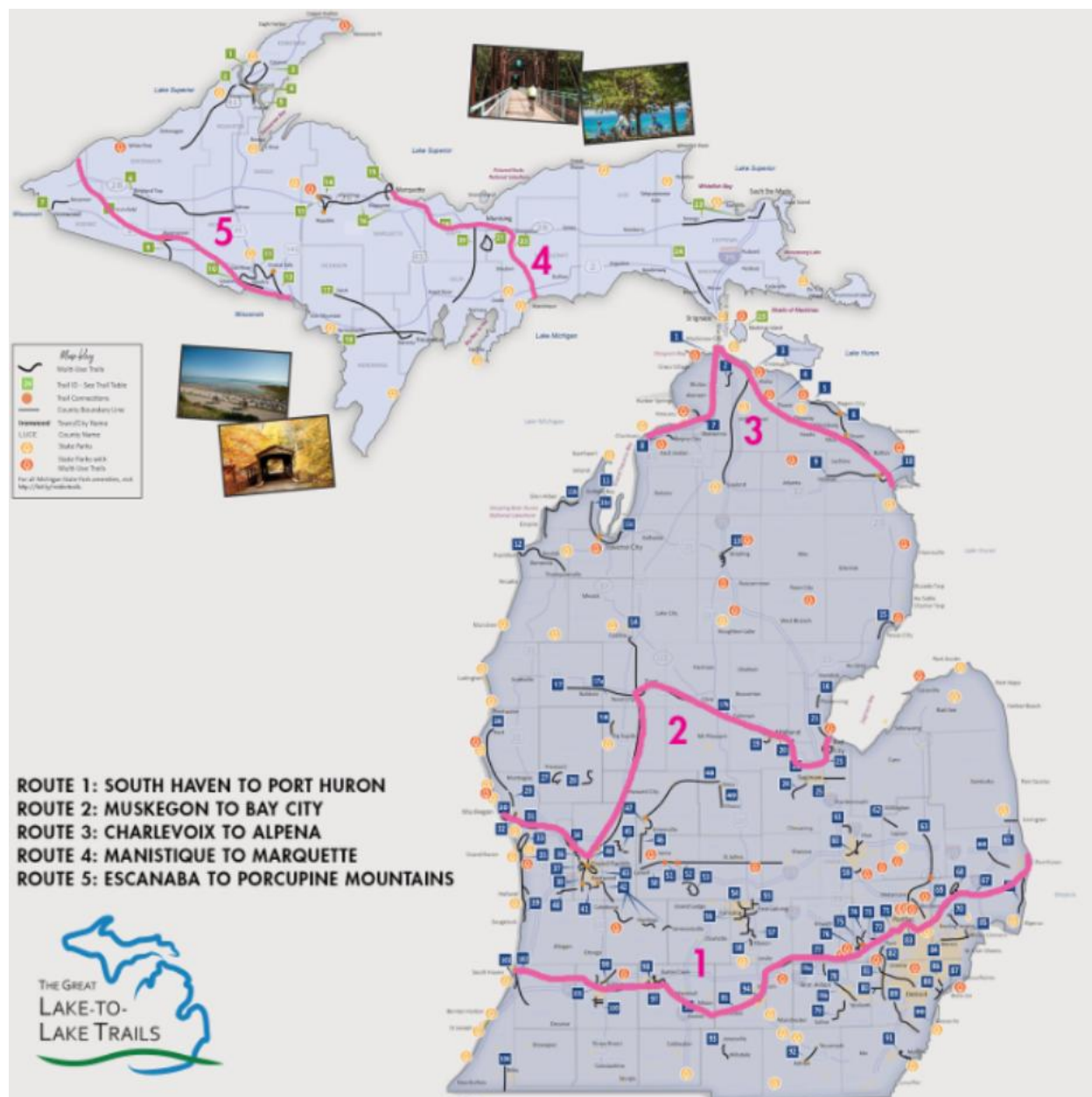
- South Haven to Port Huron
- Muskegon to Bay City
- Charlevoix to Alpena
- Manistique to Marquette
- Escanaba to the Porcupine Mountains

The trails are intended to be multi-use, available to both bicyclists and walkers, and separated from roadways. Route selection was informed by the location of existing trails; current gaps include temporary routes until more permanent off-road projects are available due to funding or improved land use opportunities. The Great Lake-to-Lake Trail project is envisioned to promote Michigan's tourism and nonmotorized transportation assets. The project includes a marketing/branding strategy to unify different trails and communities that are part of the larger trail, such as branding and signs to create a cohesive system.

Route #1 (between South Haven and Port Huron) is strategically positioned in proximity to two Amtrak lines running from Chicago to southeast Michigan. These connections allow for bike/train transportation opportunities to multiple major cities in Michigan. The Great Lake-to-Lake Trail #1's ribbon-cutting and inaugural group ride took place in September 2019.

Within Michigan, the Great Lake-to-Lake Trails will connect with a number of existing trails, including connecting to the IBT at various points and smaller regional trails, such as the Fred Meijer White Pine Trail State Park in Osceola County and the Van Buren Trail State Park in Van Buren County.

Figure 18 - Great Lake-to-Lake Trails



Underground Railroad Bicycle Route

The Underground Railroad Bicycle Route was established to mirror and memorialize the route of the Underground Railroad in the United States. The Underground Railroad was a secret network that was used by escaped former African American slaves to flee from the antebellum South through the free states to Canada. The primary route extends from Mobile, Alabama, to Owen Sound, Ontario, and covers 2,007 miles across eight states and two countries. There is a 505-mile alternate route that extends through the state of Michigan. Known as the UGRR Detroit Alternate, it departs from the main route in Oberlin, Ohio, and connects cyclists to Toledo and Detroit, eventually reaching Ontario north of Lake St. Clair (Figure 19). The route includes sections of on-road shoulders as well as nonmotorized trails, including the Kiwanis Trail between Adrian and Tecumseh.

The Underground Railroad Bicycle Route was designed to create connections across multiple states. To the south, the route connects to Ohio and continues to Alabama. To the north, there is a privately operated ferry that connects Algonac, Michigan, to Walpole Island, Ontario, crossing an international border. The route continues to Owen Sound, Ontario, a town founded by freedom seekers in 1841, with freed slaves beginning to settle in the area in the early 1830s. Within Michigan, bicyclists have many opportunities to connect to the Underground Railroad Bicycle Route, including the IBT in Detroit and the Border-to-Border Trail in Washtenaw County.

Figure 19 - Underground Railroad Bicycle Route - Detroit Alternate



Intermediate Regional Routes

Statewide routes provide the backbone for long distance bicycle travel and tourism. Many of these routes, however, are made up of, or provide connectivity to, shorter intermediate regional routes that provide important connections to communities and destinations throughout the state. Intermediate regional routes may include:

- Routes that are already segments of the existing or proposed statewide routes
- Routes that are spurs of the existing or proposed statewide routes
- Multi-community or multi-county routes that may become integrated into statewide routes or spurs

When these cross-county, or multi-county pathways, are developed and connected to more local trails and pathway systems, opportunities for expanded active transportation, recreation and tourism are multiplied.

These intermediate regional route networks play an important role in the state's expanding system of infrastructure for people walking and bicycling. Often, an intermediate regional route begins as a local trail or pathway that grows over time into an intermediate regional route providing greater opportunity for active transportation. As intermediate route networks are expanded and connected with one another, they become part of the statewide system.

One example of a developing statewide route that is made up of multiple intermediate regional routes already developed is the 210-mile Great Lake-to-Lake Trail Route #2 from Muskegon to Bay City. When complete (about 10 percent remains undeveloped), Route #2 will be a result of connecting multiple intermediate routes that include the Muskatawa Trail (26 miles), with sections of several other longer trails such as the Fred Meijer White Pine Trail State Park (94 miles), sections of the Pere Marquette Rail Trail and Pere Marquette State Trail (30 and 56 miles, respectively), Bay County Riverwalk Trail System (21 miles), Kent Trails (15 miles) and Muskegon Lake Shore Trail (12 miles).

Across the state, there are numerous intermediate regional routes currently not part of a potential statewide route that could, over time, become connections or part of new statewide routes. These include:

- I-275 Metro Trail
- Wadhams to Avoca Trail
- Betsie Valley Trail, Bill Nicholls Trail
- Jack Stevens Hancock Calumet Trail
- Houghton Waterfront and Houghton-Chassell Trails
- Clinton-Ionia-Shiawassee
- Sleeping Bear Dunes Heritage Trail

Many of these intermediate regional routes were developed over time and began as local routes or short segments. Recognizing this evolution and having a vision of statewide connectivity is how local and regional partners, along with state agencies and nonprofits, have been so successful in developing the world-class network of rail trails and pathways across the state.

Local Networks

Michigan's regional active transportation networks have been planned by a variety of organizations including MDOT region offices, MPOs and nonprofit entities. A majority of these government-led regional efforts occurred in the 2000s and early 2010s. Some of the regional efforts led by nonprofit entities started earlier, including TART and the Downriver Linked Greenways Initiative in 1998, and Top of Michigan Trails Council in 1995.

Local active transportation efforts led by municipalities and local nonprofits also date from the 1990s and 2000s. Examples include the Connor Creek Greenway Master Plan prepared by the Detroit Eastside Community Collaborative in 2003, while Ann Arbor adopted its first nonmotorized plan in 1992.

Walking is the most universal way of getting around. In fact, almost every trip begins and ends with some amount of walking. This includes transit, carpooling, bicycle and vehicular trips. Commutes are sometimes made by foot, especially when destinations are close and accessible pedestrian infrastructure is available. Walking is often the mode of choice for visiting neighborhood establishments. These may include trips to cafes or restaurants, or walking to school or the library. Walking as a form of exercise or recreation is also common. In many of these cases, walking as a form of getting around may be a choice, but many other people may be

dependent on walking. According to the 2024-2025 Michigan Household Travel Survey, just more than 7 percent of households in Michigan do not have a vehicle. In urban areas like Detroit, this percentage is much greater, approaching 19 percent of all households. Whether walking as a mode of transportation is a choice or not, pedestrian networks are a priority in our communities. The 2024-2025 survey found that while driving accounts for the majority of travel trips at 91.2 percent (including 47.1 percent driving alone and 44.1 percent shared rides), walking is the second-highest form of travel accounting for 4.3 percent of all trips. The fact that walking is the mode, being second-highest to driving reinforces the importance of accommodating pedestrian safety and mobility. In addition, people are more likely to choose to walk if the accompanying infrastructure is comfortable, convenient and enjoyable.

Biking is a favorite pastime and an important means of active transportation in Michigan. Many people enjoy biking to work, to appointments, for leisure or for other errands. As biking infrastructure is made available and barriers are removed, more individuals view biking as a feasible means of transportation. Biking as a form of recreation or exercise is also popular. There are many trails throughout Michigan for cyclists to use. From mountain biking trails in the U.P. to the IBT, which traverses the entire state, and many regional and community trails, there are many amenities for cyclists to enjoy. While many people may choose to travel by bike instead of by car, there are many people who may not have access to a car. In these situations, biking can be a preferred option for getting around. According to the 2024-2025 Michigan Household Travel Survey, biking accounts for 0.7 percent of all trips.

Michigan experiences all four seasons throughout the year and winter weather can inhibit people who rely on walking or bicycling to get around. Winter elements can affect a person's ability (and often a person's desire) to walk and bike. Slippery conditions caused by ice accumulation also contribute to safety concerns. A comfortable walking environment in winter requires a commitment to maintaining walking surfaces for pedestrians. A viable biking environment in winter requires a commitment to maintaining surfaces and keeping bike lanes and shared-use paths clear of snow and ice.

As the COVID-19 pandemic ramped up, people eager to remain active took to the state's many bike lanes, sidewalks and shared-use pathways and trails as a way to get exercise and engage socially in the outdoors. Communities across the state with active transportation networks celebrated this infrastructure to allow residents to engage with one another, while other communities sought new and similar opportunities. Having now emerged from the COVID-19 pandemic, communities large and small continue to leverage the increase in active transportation modes and have worked to expand their local active transportation networks. Some notable examples of local networks recently developed or expanding include:

Detroit: Several new segments of Riverfront pathway and many miles of bike lanes and separated bike lanes have been built in recent years.

Greater Lansing Area: New sections of shared-use path and a bridge over the Grand River in Delta Township, Eaton County, connecting local sidewalks and pathways to parks and other destinations.

Traverse City: Several new segments of shared-use path serving local transportation needs but also contributing to the regional network, including a path along the western shore of Boardman Lake connecting the nearby township with bike lanes and paths connecting to downtown. Another notable local and regional project includes the new segments of pathway and sidewalk along M-72/M-22 along the west bay.

Whitefish Township, Chippewa County: M-123 corridor improvements include wide sidewalk, lighting, signs and a crosswalk along M-123 in the downtown Paradise area.

City of Walker: In cooperation with the MDOT Grand Region, eliminated a major gap in the community's active transportation network with the reconstruction of the Fruit Ridge Avenue bridge over I-96. The bridge replacement resulted in interchange improvements along with the addition of a shared-use pathway on the structure. Through the elimination of this network gap, users are provided with connections to several regional trails.

These new local projects serve the walking and bicycling needs of local residents but also visitors to the community.

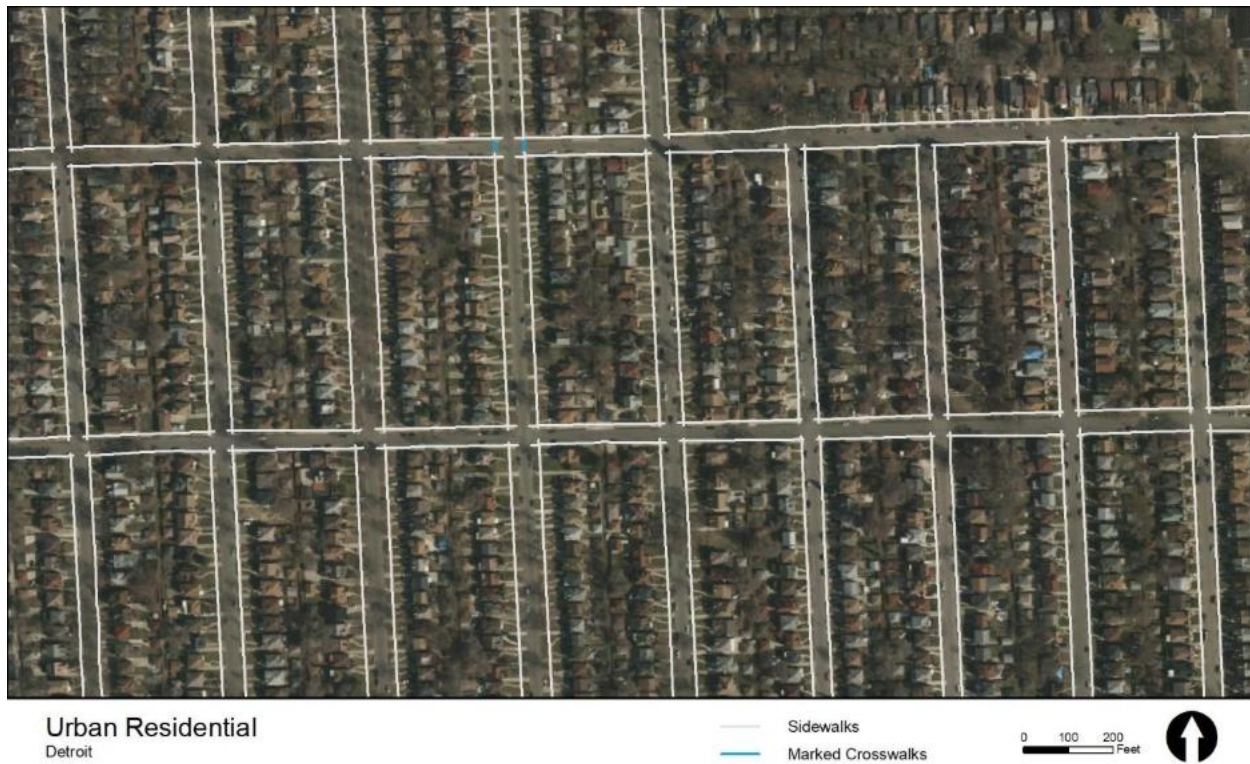
Local Pedestrian Network

Many Michigan cities are embracing and providing spaces that cater to pedestrians. Downtown areas throughout the state make pedestrians the priority with wide sidewalks, signalized crossings and streetscape amenities. Walkways along rivers and water features are increasingly popular features in major cities. Furthermore, Michigan's diverse set of land uses and a range of communities with different needs. Urban cities, suburban communities and rural towns all have a need for, and benefit from, pedestrian networks. An effective urban/rural distinction throughout the state is made using the Adjusted Census Urban Boundary (ACUB). Areas within an ACUB include an urban cluster where the minimum population is 5,000, or is an urbanized area as designated by the U.S. Census Bureau. Areas outside of the ACUB can be considered rural. To further delineate the ACUB area between urban and suburban, the census-convenient definition was used for delineation. Urban areas are comprised of city boundaries that are the principal city listed in the census' Metropolitan Statistical Areas.

Urban Network

In urban areas, continuous sidewalks should be provided on both sides of the street and if possible, separated from the street by a buffer or grass strip. Accessibility and adherence to Americans With Disabilities Act (ADA) guidelines are required for new construction and retrofit projects across the network with crosswalks at intersections that have been designed with pedestrians in mind. In urban areas, highways and railroads can be barriers for walkable connections, and communities should be vigilant and creative in making areas accessible to pedestrians where these barriers are present.

Figure 20 - Urban Residential Pedestrian Networks



Residential neighborhoods within urban communities tend to follow a rectangular grid pattern. Sidewalk systems are relatively complete but residential areas tend to have few marked crosswalks. Crosswalks are typically present closer to schools and major arterial roads. The sidewalk network has many connection points and walkers can utilize multiple route opportunities. Research has shown that, on average, smaller blocks are better for pedestrians.

Figure 21 - Urban Commercial Pedestrian Networks



Urban commercial areas are often built on a grid system, similar to residential areas. Often a mix of uses, such as residential, commercial and office uses are found within these districts. Sidewalk systems tend to be complete in urban commercial districts, and marked crosswalks are more prevalent. While networks may be near completeness, there may be more need for safety measures and accessible infrastructure as these spaces are often frequented by vehicles and pedestrians.

Suburban Network

Areas within the ACUB, but not within urban-designated cities, comprise the suburban area in Michigan. Suburban areas are found throughout the state but are mostly concentrated in the southern portion of the Lower Peninsula. In total, suburban areas in Michigan cover 4,216 square miles, or 7.4 percent of Michigan's total land area. In 2010, 60 percent of the state's population lived in suburban areas. Since these numbers are no longer available, the percent of population living in a suburban land use likely remains very similar in 2026. Together, urban areas and suburban areas deserve significant attention in constructing pedestrian networks, as they serve the greatest proportion of the state's population.

Suburban areas are similar to urban areas in their connectivity needs but may cover larger geographies. In neighborhoods and busier corridors, continuous sidewalks should be provided on both sides of the street and provide safe opportunities for crossing major roads. A municipality with a suburban character typically follows a land use pattern of tract subdivisions with mostly residential uses connected by arterial roads that are designed for travel by car. Arterial roads can be prone to safety and environment issues for pedestrians and should be a focus, as many community services are located along these types of roadways.

Figure 22 - Suburban Residential Pedestrian Network



Suburban residential neighborhoods often have more curvilinear streets and fewer intersections than the grid patterns of urban areas. This type of network often encourages lower traffic speeds and safer walking environments. These types of pedestrian networks are often used for recreational walking purposes but are often isolated from commercial centers. Routes tend to have fewer connection points, limiting certain route opportunities. Sidewalk connections are not always uniform, and there may be gaps depending on different subdivision developments. There tend to be few marked crosswalks in suburban neighborhoods except near schools or major arterial roads.

Figure 23 - Suburban Commercial Pedestrian Network



Commercial suburban areas are usually composed of commercial strip corridors that include retail uses and office parks. Designed for automobile convenience, commercial developments typically include large parking lots. Road designs often include boulevards with medians or five-lane roads with a center turn lane. Fast-moving traffic combined with multiple driveways can deter pedestrians from walking in these areas. Sidewalk connectivity in suburban commercial areas is also prone to gaps and often sidewalks are built only as development occurs.

Figure 24 - Suburban Industrial Pedestrian Network



While all community types include industrial uses, suburban areas commonly have concentrated corridors for industry businesses or factories. Industrial areas are frequented by commuters who travel to work at these businesses. Road design varies but is often designed for two-way traffic with little to no shoulder. Sidewalk networks tend to be incomplete or nonexistent in industrial areas. However, pedestrian networks should be given consideration as workers without access to a car need appropriate travel infrastructure.

Rural Network

Areas outside of the ACUB are considered rural areas in Michigan, amounting to 90.2 percent of Michigan's total land area. Rural areas are largely located in the U.P. and the northern portion of the Lower Peninsula. In 2020, the remaining 37 percent of Michigan's population resided in rural areas. Rural pedestrian networks face a unique challenge as communities with lower population density cover larger areas, making sidewalk construction expensive on a per capita basis. These larger areas should still aim to connect pedestrians with safe walking infrastructure.

In rural contexts, pedestrian mobility may look different than in urban or suburban areas. Where pedestrian volumes are lower, paved shoulders should be provided along major roads with adequate width to maintain safety between modes of transportation. Traffic speeds vary in rural areas but often allow for higher speeds where there is less foot traffic. However, many of Michigan's state parks and campgrounds are located amidst rural areas and experience increased pedestrian activity at various times of the year. In these areas connecting to and surrounding state parks, campgrounds and recreational settings where rural roadways with higher traffic speeds exist, more efforts to provide separated facilities for pedestrians or wider shoulders with rumble/mumble strips should be encouraged.

The makeup of Michigan's local government system, including counties, townships, cities and villages, entails a largely decentralized political system. While the large number of municipal jurisdictions affects policies

across the state, rural areas can often experience these divisions in a substantial way. There are typically a variety of guidelines regarding pedestrian networks, and uniform policies do not exist between adjacent municipalities. This can result in an inconsistent pedestrian network. For instance, one community may require sidewalks on both sides of a road or one side of a road, while the adjacent community may decide that shoulders are sufficient.

Figure 25 - Rural Residential Pedestrian Network



Rural residential areas are primarily composed of large residential lots where houses are set back from the road. Sidewalks are not often found in these areas. Instead, paved shoulders (where available) are often used to serve pedestrians. In some cases, combined bicycle/pedestrian signs are installed to signify to vehicles the possible presence of these types of users.

Figure 26 - Rural Residential Pedestrian Network



The configuration of rural commercial areas is typically arranged around the intersection of two major roads. Commercial areas may offer a variety of services and include local retail, convenience stores, restaurants and gas stations. Sidewalks are often available in these areas but do tend to have gaps or require pedestrians to cross to the opposite side of the road.

Local Bicycle Network

New local infrastructure is being built across the state to benefit and support cyclists.

Michigan has a diverse set of land uses and a range of communities with different needs. Urban cities, suburban communities and rural towns all have a need for, and benefit from, bicycle networks. As discussed in the Local Pedestrian Network section, an effective urban/rural distinction throughout the state is made using the ACUB. Areas within an ACUB include an urban cluster where the minimum population is 5,000 or is an urbanized area as designated by the U.S. Census Bureau. Areas outside of the ACUB can be considered rural. To further delineate the ACUB area between urban and suburban, the census-convenient definition was used for delineation. Urban areas are comprised of city boundaries that are the principal city listed in the census' Metropolitan Statistical Areas.

Urban Network

Bicycle infrastructure in urban areas can look very different based on the surrounding amenities. On busy streets that experience a lot of traffic, separated bike lanes are one way to help keep all modes of transportation as safe as possible. Separation from vehicle traffic, delineation with striped or green paint, directional markings and flexible delineators can all increase safety and aid cyclists to feel more comfortable in bicycling. These measures also communicate to motorists the need to share the road.

Residential neighborhoods within urban communities tend to follow a rectangular grid pattern. Sidewalk systems are relatively complete, and while cyclists can use the sidewalk, they must yield and give the right of way to pedestrians, and riding bicycles on sidewalks is generally discouraged for people older than 16. Many residential streets in urban areas are calm enough for many cyclists to feel comfortable using them. For this reason, infrastructure specific to cyclists is rarely built in smaller neighborhoods.

Urban commercial areas are often built on a grid system, similar to residential areas. Often a mix of uses, such as residential, commercial and office, are found within these districts. While sidewalks tend to be complete in urban commercial districts, there are also usually more pedestrians present. Due to increased traffic levels in urban commercial areas, these are areas that can often most benefit from added bicycle infrastructure.

Suburban Network

Suburban areas are similar in connectivity needs to urban areas but are generally less dense and may cover larger geographies. Where roads experience a high enough level of traffic that cyclists would be discouraged from riding in shared traffic, additional bicycle infrastructure should be considered and implemented when appropriate. A municipality with a suburban character typically follows a land use pattern of tract subdivisions with mostly residential uses connected by arterial roads that are designed for travel by car. Arterial roads without appropriate bicycle facilities can be prone to safety issues for cyclists but should be a focus as critical network connections and many community services are located along these types of roadways.

Suburban residential neighborhood road networks often utilize more curves and fewer intersections than the grid patterns of urban areas. This type of network often encourages lower traffic speeds and may make cyclists feel more at ease cycling in the street. People may utilize suburban residential streets to visit neighbors, for recreation or traveling to public institutions like schools and libraries. However, these areas are often isolated from commercial centers.

Commercial suburban areas are usually composed of commercial strip corridors that include retail uses and office parks. Designed for automobile convenience, commercial developments typically include large parking lots. Road designs include boulevards with medians or five-lane roads with a center turn lane. Fast-moving traffic combined with multiple driveways can deter cyclists from cycling in these areas. Some communities have paired multi-use paths within or adjacent to suburban commercial districts.

While all community types include industrial uses, suburban areas commonly have concentrated corridors for industry businesses or factories. Industrial areas are frequented by commuters who travel to work at these businesses. Road design varies but is often designed for two-way traffic with little to no shoulder. Bicycle infrastructure should be given consideration as workers without access to a car need appropriate travel infrastructure.

Many industrial parks have large setbacks, and some communities are taking advantage of these areas to build shared-use paths.

Rural Network

In rural contexts, cycling may look different than in urban or suburban areas. Paved shoulders should be provided along major roads with adequate width to support separation between modes of transportation. While rural roads require a higher stress tolerance for cyclists due to a higher interaction with traffic, rural areas often benefit from trails and shared-use paths that traverse communities.

Rural residential areas are primarily composed of large residential lots where houses are set back from the road. Unlike urban and suburban neighborhoods (where the streets can be relatively calm with lower speed limits), homes in rural areas are often situated on connector roads with higher speed limits. Paved shoulders, where available, are often the best option for cyclists but cyclists in these areas usually have a higher stress tolerance. In some cases, combined bicycle/pedestrian signs are installed to signify to vehicles the possible presence of these types of users. Some rural areas may pursue the creation of a shared-use path network along certain roadways offering connections to statewide/regional trail and pathway systems, essentially service spines to local pathway networks fed by shoulders where pathways aren't feasible.

The configuration of rural commercial areas is typically arranged around the intersection of two major roads. Commercial areas may offer a variety of services and include local retail, convenience stores, restaurants and gas stations. Sidewalks may be available in these areas, but similar to rural residential areas, if cyclists want to use the road, they will likely need to have a high stress tolerance.

Pedestrian and Bicycle Safety

Safety is a vital concern for every mode of travel but perhaps most serious for pedestrians and bicyclists as they represent the most vulnerable transportation users. Nonmotorized transportation users are the most at-risk in crash situations as their bodies and modes of transportation are not crashworthy, and at higher speeds, pedestrians and bicyclists are more severely injured than they would be in vehicle-to-vehicle collisions. From 2020 to 2024, pedestrians and bicyclists were involved in less than 1.5 percent of the crashes in the state, while disproportionately accounting for nearly 20 percent of fatalities. Every year in Michigan, thousands of preventable crashes occur involving motorists, pedestrians and bicyclists, and the state is faced with hundreds of fatalities each year as a result of these types of crashes. In the past, crashes involving injuries and deaths were considered an inevitable byproduct of motorized transportation. However, the reality that we know now is that preventive measures can be taken to prioritize traffic safety as a public health concern.

Between 2020 and 2024, there were an average of 1,923 pedestrian-related crashes (an average of 172 pedestrian-related fatalities) and an average of 1,413 bicycle-related crashes (an average of 31 bicycle-related fatalities) every year throughout the state of Michigan. On average, 9 percent of pedestrian-related crashes and 2.2 percent of bicycle-related crashes resulted in fatalities compared to an average of 0.3 percent of motorist-only crashes resulting in fatalities for the same five years. It is important to note that the crash numbers cited only represent reported crashes and therefore do not represent all the pedestrian and bicycle crashes in Michigan. Many minor crashes that do not involve an injury or \$1,000 in property damage are not reported, and crashes between pedestrians and bicycles not involving a motor vehicle are not included in this dataset.

Pedestrian Crash Analysis

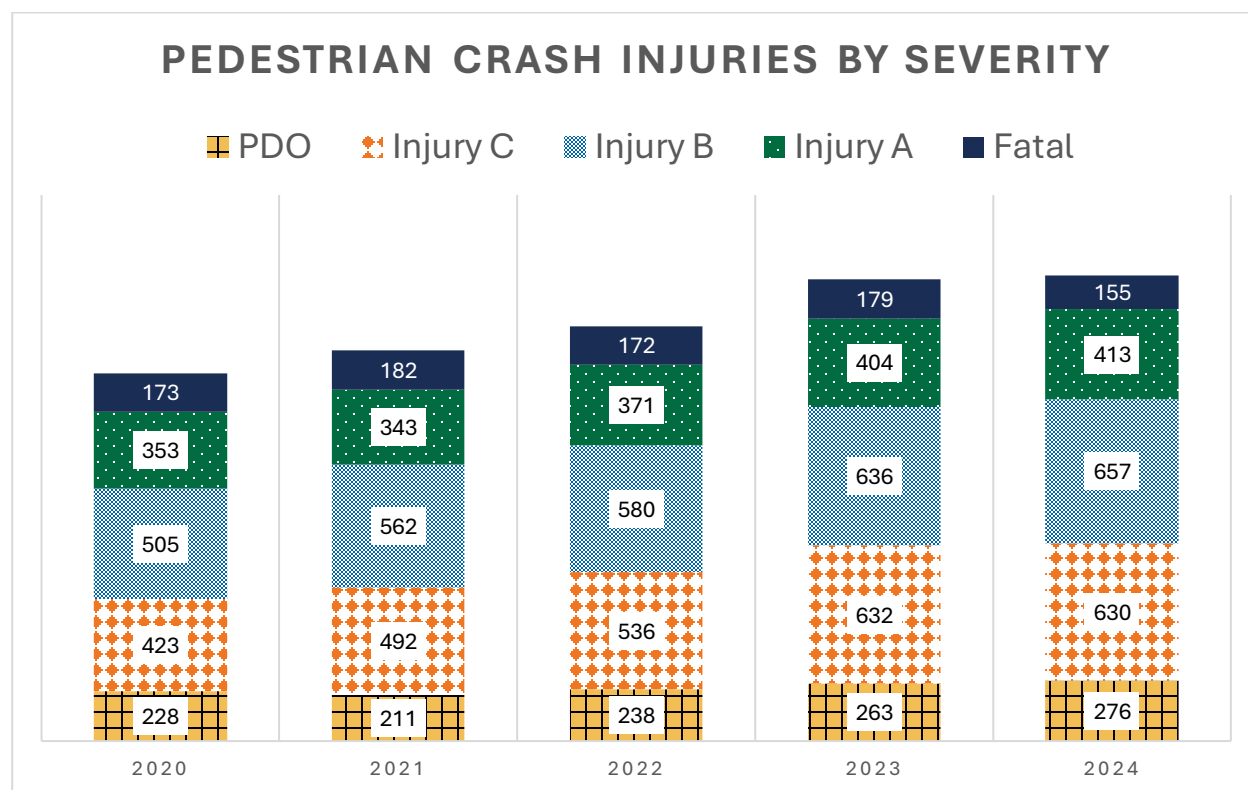
Shown in Figure 27 are the pedestrian-related crashes by severity type and year, and in Figure 28 frequencies and five-year rolling average for 2020 through 2024. A total of 9,614 crashes involving pedestrians occurred during this five-year period, representing an average of 1,923 pedestrian-related crashes per year and an average of 172 pedestrian-related fatalities per year.

- Most crashes involving pedestrians resulted in a possible injury (Category Injury C), comprising an average of 28.2 percent of pedestrian-related crashes annually.

- Non-incapacitating injuries (Category Injury B) were found in 30.6 percent of the pedestrian-related crashes and incapacitating injuries (Category Injury A) were found in 19.6 percent of pedestrian-related crashes.
- Only 12.6 percent of pedestrian-related crashes resulted in property damage-only (PDO) to vehicles with no injury to pedestrians.

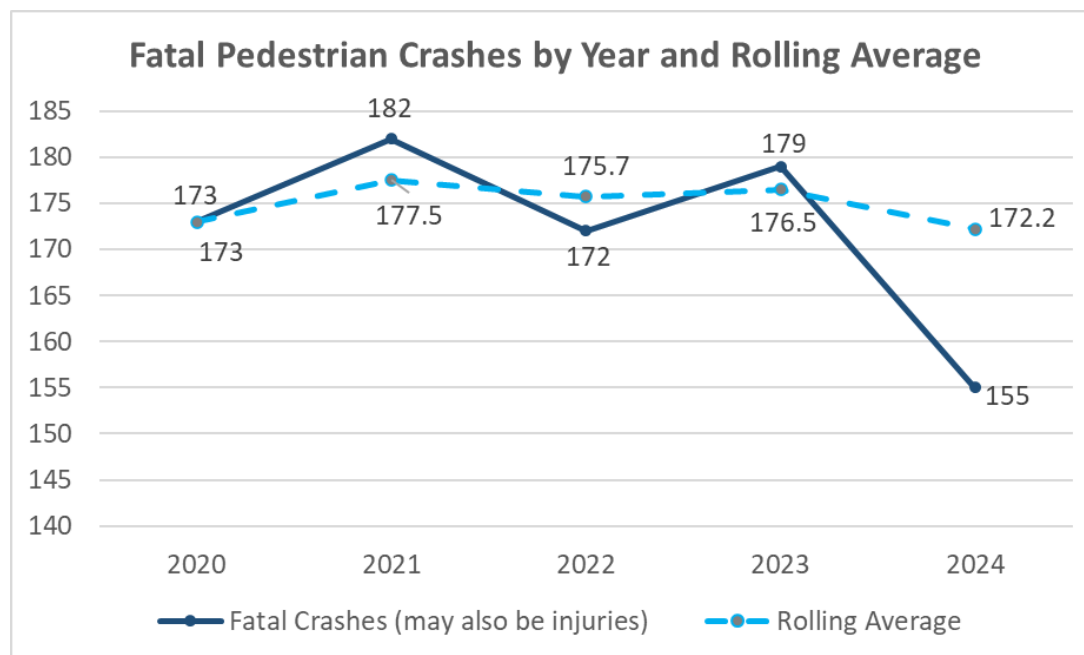
There was a decline from 179 pedestrian-related fatalities in 2023 to 155 in 2024. However, the rolling average of pedestrian-related frequency of fatalities held steady between 2020 and 2024. Fitting with the overall increase in pedestrian-related crashes each year from 2020 to 2024, there was an increase in Injury A, Injury B, Injury C, and PDO crashes nearly every year across the same timeframe.

Figure 27 - Pedestrian-Related Crashes by Severity Type by Year From 2020 to 2024



Source: Michigan Transportation Crash Analysis Tool, 2020-2024

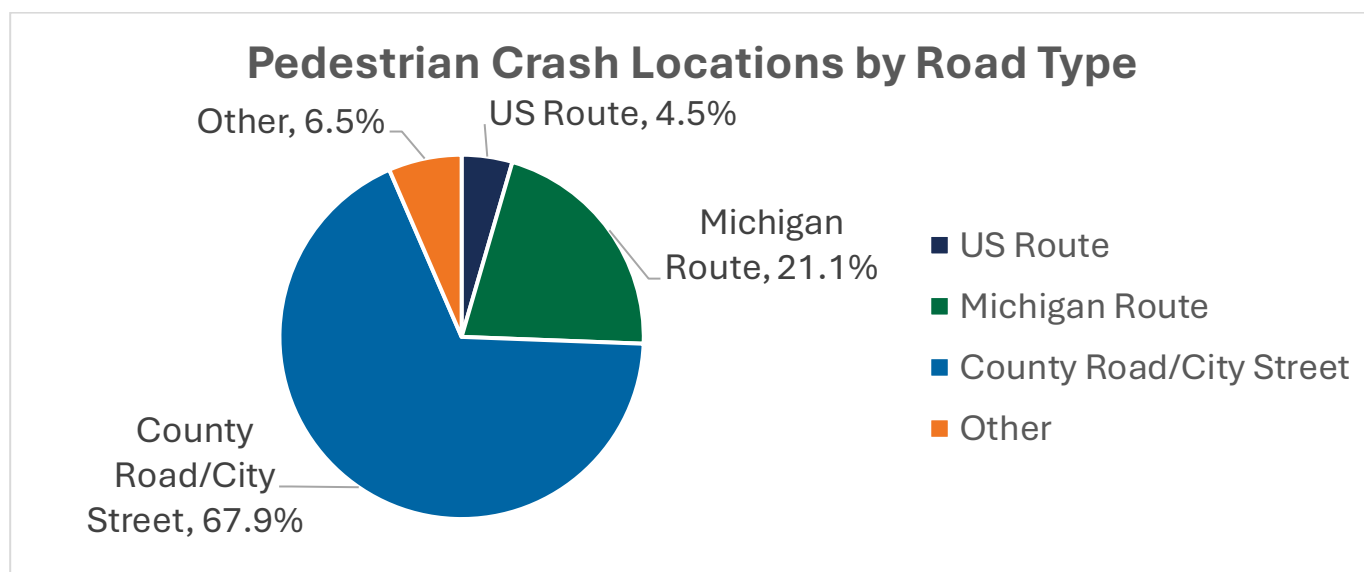
Figure 28 - Pedestrian-Related Frequency and Rolling Average From 2020 to 2024



Source: Michigan Transportation Crash Analysis Tool, 2020-2024

As shown in Figure 29, most pedestrian-related crashes (67.9 percent) that were reported to have occurred on county or city roadways. M-routes accounted for the next highest percentage of crashes (21.1 percent), while 4.5 percent of pedestrian crashes occurred on US-routes. The remaining 6.5 percent of pedestrian crashes occurred on "Other" routes (Interstates, Interstate business routes, US business routes, M business routes, connectors and unknown routes).

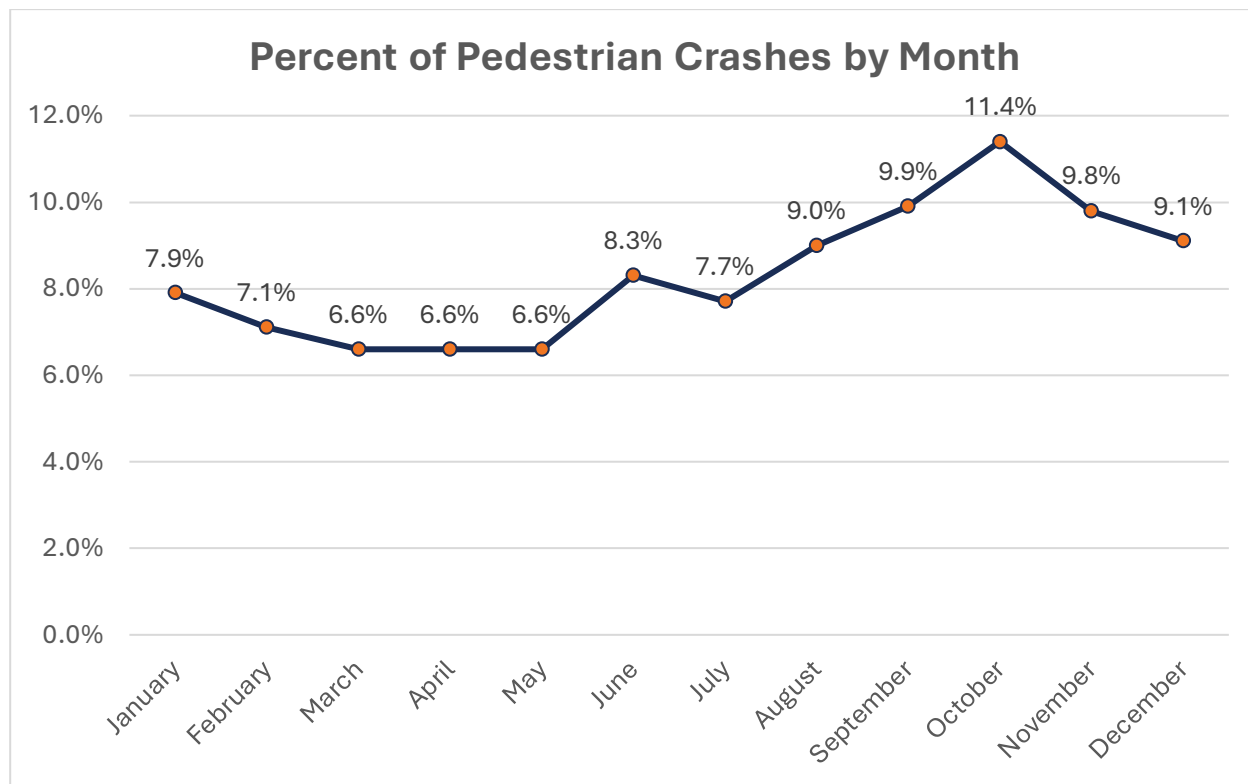
Figure 29 - Pedestrian-Related Crashes by Road Type



Source: Michigan Transportation Crash Analysis Tool, 2020-2024

Shown in Figure 30 is a plot of average percent of pedestrian-related crashes by month for the years 2020 through 2024. The fall and early winter months experienced the highest percentage of pedestrian-related crashes. While bicycling is a mode of transportation used primarily in the warmer months, walking is a mode of transportation that has higher participation year-round. According to Strava Metro Dashboard, walking activity is only slightly reduced during the winter months compared to bicycling which is significantly less. Reduced daylight hours during the fall and early winter months may be a contributing factor to pedestrian crashes at these times, when it may be more difficult and pedestrians may become wary to go outside and walk in the elements. Another contributing factor may be attributed to inclement weather during these months in Michigan. With not only increased precipitation and lower temperatures potentially decreasing the desire and/or ability to walk, difficulty for walking during the winter is compounded with lack of maintenance of sidewalks and snow blocking the sidewalks and curb ramps. During these winter situations, pedestrian safety is a concern, with pedestrians often having to choose between walking on snowy or icy sidewalks where they could slip and fall, or walking in roadway vehicle lanes that sometimes are the only travel space clear of snow.

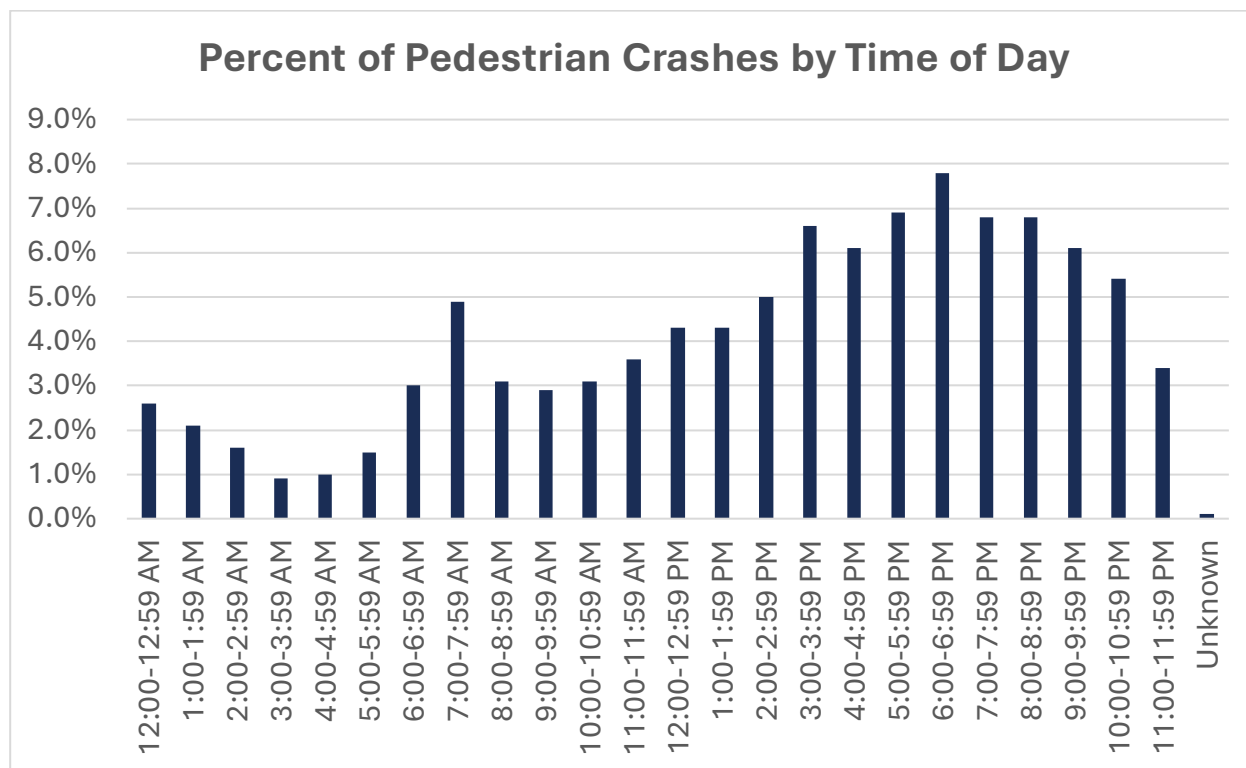
Figure 30 - Percent of Pedestrian-Related Crashes by Month



Source: Michigan Transportation Crash Analysis Tool, 2020-2024

Shown in Figure 31 is the percent of pedestrian crashes by time of day. 39.2 percent of pedestrian-related crashes occurred between the hours of 2 and 8 p.m., with the highest percentage between 6 and 7 p.m. (7.8 percent). A smaller spike also occurred in the morning between 7 and 8 a.m., with 4.9 percent of pedestrian-related crashes. The times of day with the peaks in pedestrian crashes are generally the times when vehicular traffic is also the heaviest.

Figure 31 - Percent of Pedestrian-Related Crashes by Time of Day



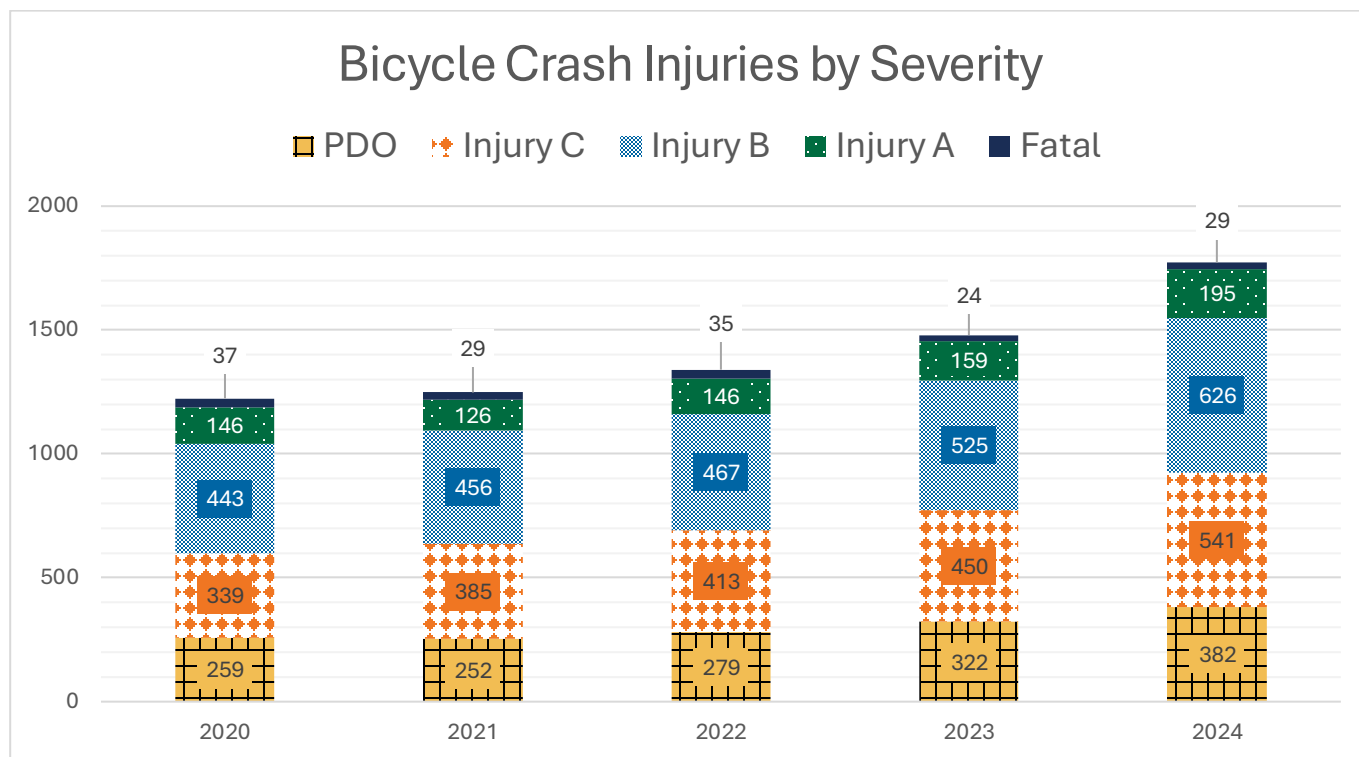
Source: Michigan Transportation Crash Analysis Tool, 2020-2024

Bicycle Crash Analysis

Shown in Figure 32 are the bicycle-related crashes by severity type and year, and Figure 33 are the frequencies and five-year rolling average for 2020 through 2024. Over this period, there was a total of 7,065 crashes involving bicyclists. The highest number of crashes occurred in 2024, with bicycle-related crashes increasing every year. Of the 7,065 crashes, 154 (2.2 percent) resulted in fatalities and on average, 31 bicycle-related fatal crashes occurred each year. For the same five-year period, only 0.3 percent of motorist-only crashes resulted in a fatality.

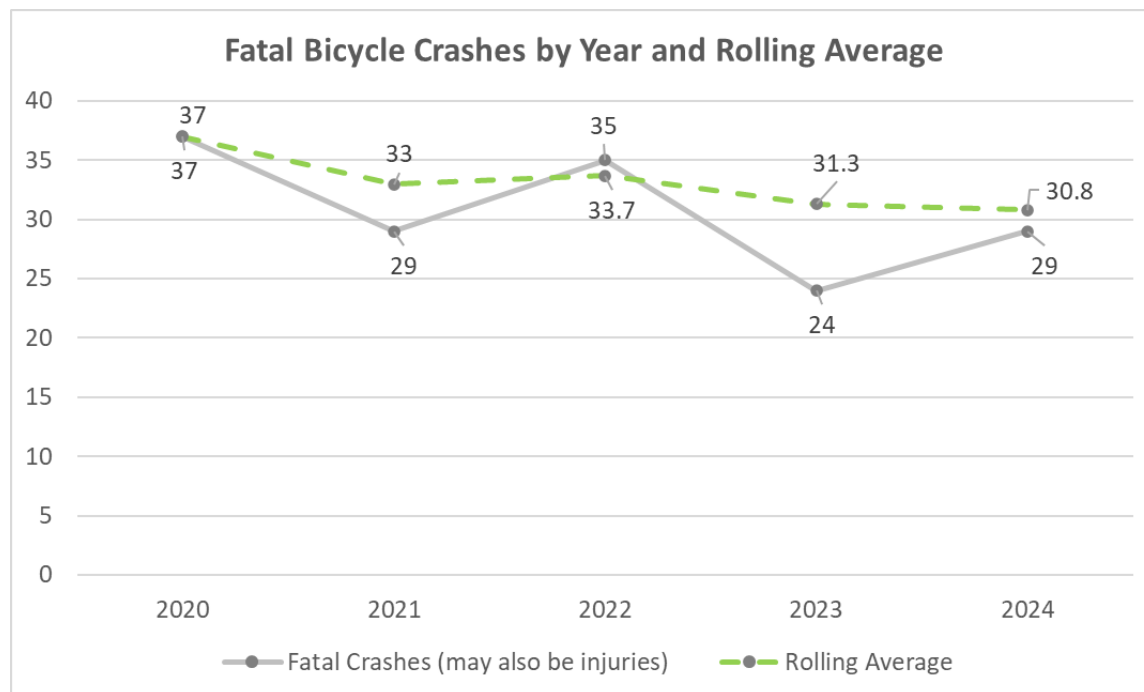
- Most crashes involving bicyclists involved possible injuries (Category Injury C), which comprises an average of 30.1 percent of the bicycle-related crashes annually.
- Non-incapacitating injuries (Category Injury B) occurred in 35.6 percent of bicycle-related crashes, and incapacitating injuries (Category Injury A) occurred in 10.9 percent of bicycle-related crashes.
- Of bicycle-related crashes, 21.1 percent resulted in PDO with no injury to the cyclist.
- The rolling average of bicycle-related frequency of fatalities shows a slight reduction between 2020 and 2024.

Figure 32 - Bicycle-Related Crashes by Severity Type by Year From 2020 to 2024



Source: Michigan Transportation Crash Analysis Tool, 2020-2024

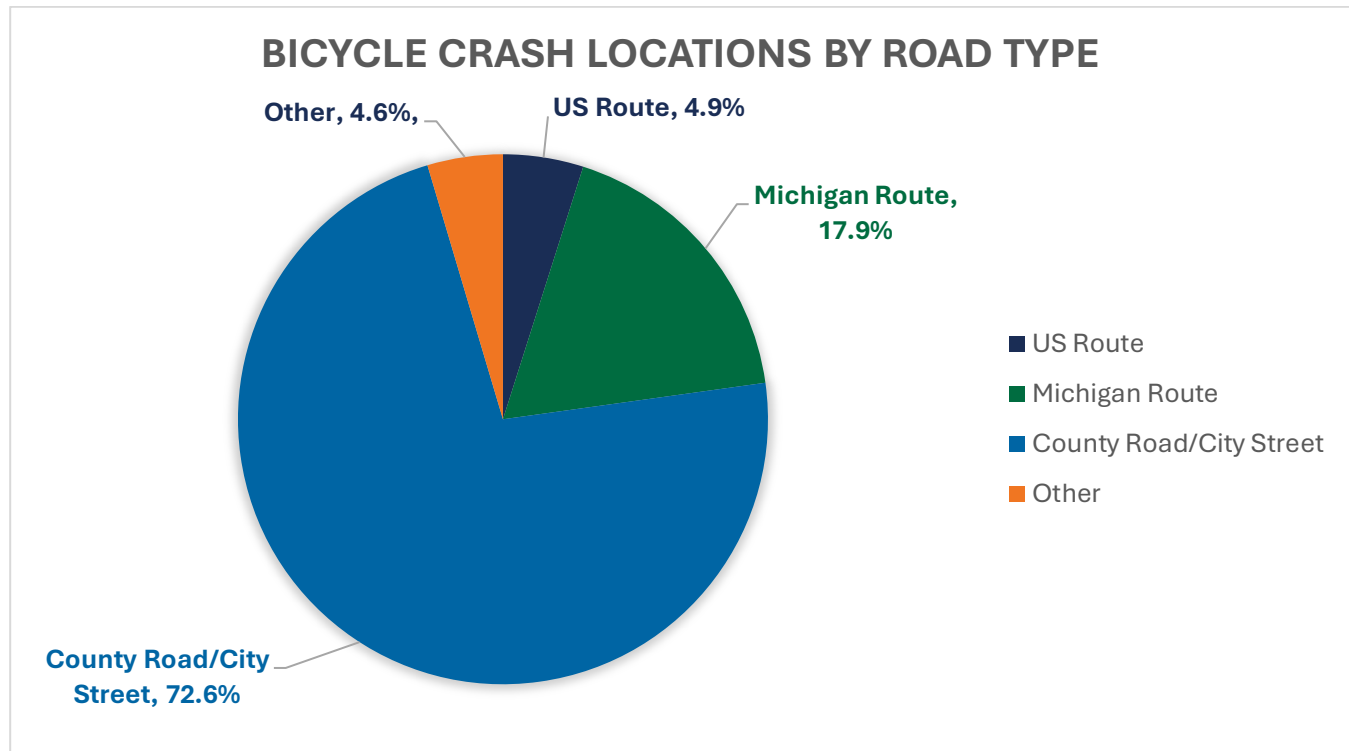
Figure 33 - Bicycle-Related Frequency and Rolling Average From 2020 to 2024



Source: Michigan Transportation Crash Analysis Tool, 2020-2024

Figure 34 presents a percent chart of bicycle-related crashes by road type for the years 2020 through 2024. As with pedestrian-involved crashes, the majority of bicycle-related crashes (72.6 percent) occurred on county or city roadways. M-routes accounted for the next highest percentage of crashes (17.9 percent) and 4.9 percent of bicycle crashes occurred on US-routes. The remaining 4.6 percent of bicycle crashes occurred on Other routes (Interstates, Interstate business routes, US business routes, M business routes, connectors and unknown routes).

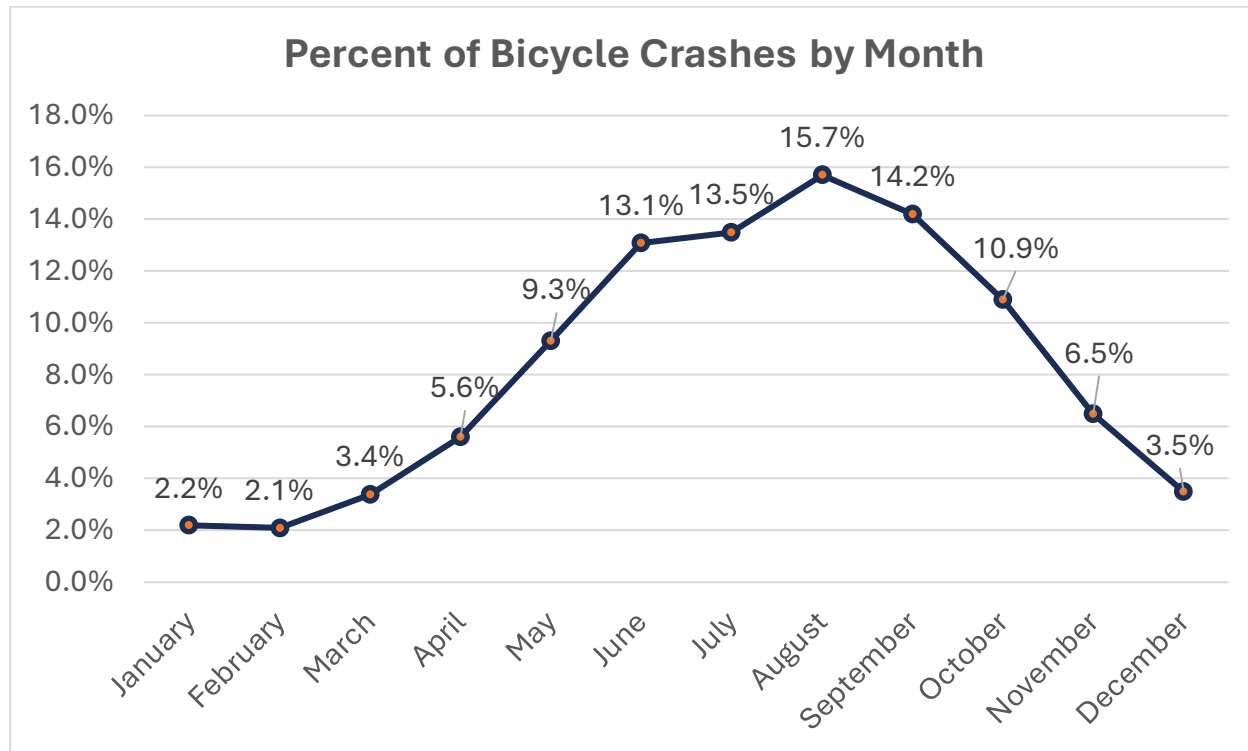
Figure 34 - Bicycle-Related Crashes by Road Type



Source: Michigan Transportation Crash Analysis Tool, 2020-2024

Shown in Figure 35 are the percent of bicycle-related crashes by month. More than one-half of all bicycle-related crashes (51.6 percent) occurred during the summer months between May and August. Although there are year-round cyclists, the winter months typically experience less bicycling activity in Michigan, according to Strava Metro Dashboard and permanent nonmotorized automated counters throughout the state, which is reflected in the lower number of crashes reported during the winter months.

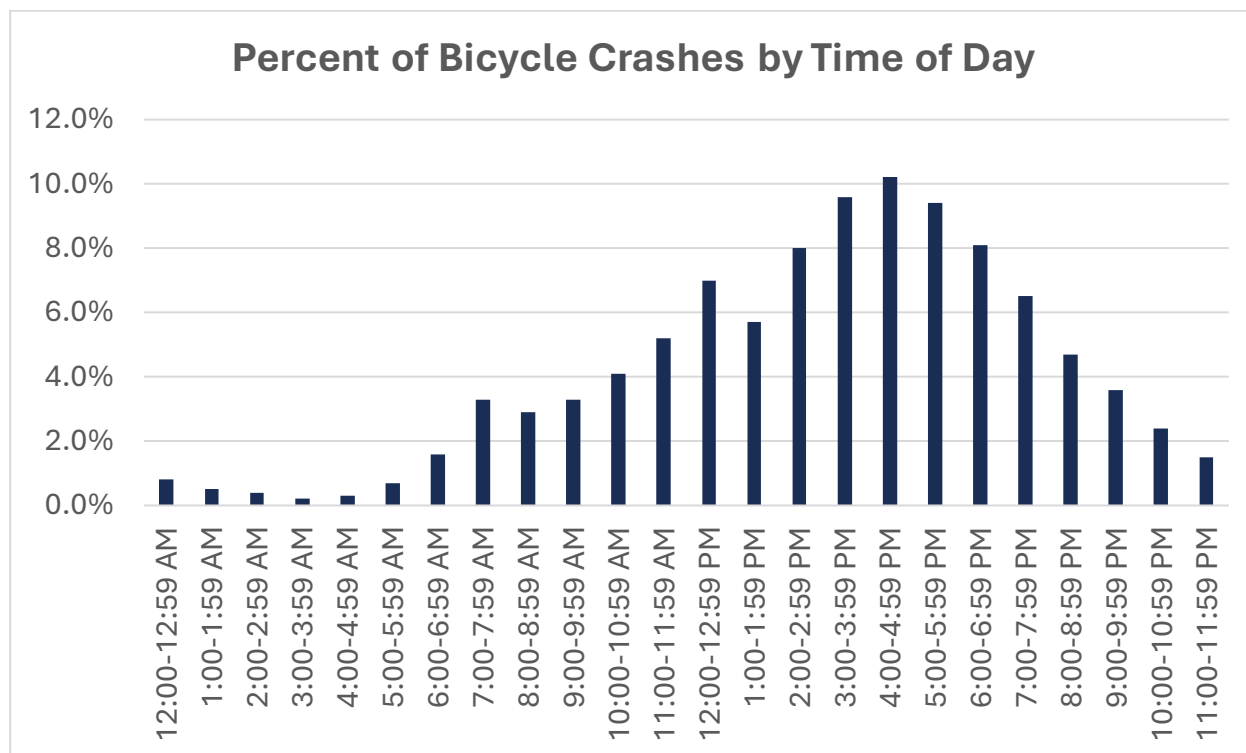
Figure 35 - Percent of Bicycle-Related Crashes by Month



Source: Michigan Transportation Crash Analysis Tool, 2020-2024

As shown in Figure 36, more than 50 percent occurred between the hours of 2 and 8 p.m., with nearly 20 percent of all bicycle-related crashes occurring between the hours of 4 and 6 p.m. A smaller spike also occurred in the morning between 7 and 8 a.m., with 3.3 percent of bicycle-related crashes. The times of day with the peaks in bicycle crashes are generally the times when vehicular traffic is also the heaviest.

Figure 36 - Percent of Bicycle-Related Crashes by Time of Day



Source: Michigan Transportation Crash Analysis Tool, 2020-2024

Aviation

This section summarizes the scheduled air services and general aviation facilities within Michigan. This information is reported in the 2017 Michigan Aviation System Plan (2017 MASP) commissioned by the MDOT Office of Aeronautics (AERO) as well as movement of people and cargo from the Federal Aviation Administration (FAA). The 2017 MASP, with refreshed data in 2024, explores the value and role of Michigan's airport network in providing access for all users to the larger air transportation network. Additionally, this plan serves as a resource for federal, state and local stakeholders to maintain and enhance the system for continued use. At the state level, the 2017 MASP provides guidance for distribution of state funding to support individual airport development and growth.

The FAA maintains a database extracted from the Air Carrier Activity Information System to support the FAA's Airport Improvement Program (AIP). This data provides information on both scheduled and non-scheduled air service airports; however, it does not report on all airports in Michigan.

The 2017 MASP evaluates public-use airports and sets aviation system goals. Through the results of the analysis of the MASP, 112 airports were acknowledged as being critical to the system and are discussed in the plan.

Scheduled Air Service

Airports with scheduled air service provide residents, visitors and businesses with a variety of services to connect Michigan within the state, with other states and internationally. Scheduled air services are essential to the movement of people and goods. The existing aviation operations for schedule service are quantified below by presenting both passenger enplanements and cargo tonnage.

There are 18 identified commercial airports in Michigan that offer regularly scheduled service for both people and cargo.

Commercial service airports enplane between 2,500 and 10,000 passengers annually. Air carrier airports support more than 10,000 passenger enplanements annually. Three of the 18 commercial airports provide scheduled passenger service to limited destinations:

- Charlevoix Municipal Airport, served by two airlines (Island Airways and Fresh Air Aviation) that offer scheduled and on-demand flights to Beaver Island, as well as other services such as aviation instruction.
- Gogebic-Iron County Airport, served by Denver Air Connection with two destinations (Chicago O'Hare International Airport and Minneapolis-Saint Paul International Airport).
- Manistee County-Blacker Airport, served by Contour Airlines with only one destination (Chicago O'Hare International Airport).

The 18 commercial airports in Michigan provide direct flights to hundreds of domestic destinations and many international destinations. A sampling of

Table 49 shows that the regions with the greatest number of air carrier and commercial service airports (Superior and North regions) are those with more limited highway connections. There are six commercial airports in the Superior Region and five in the North Region. More densely populated areas, such as the Metro, University, and Southwest regions, rely on fewer but larger airport facilities. The 2017 MASP reports that 97 percent of airports critical to the system meet the state aviation system goal to provide connections to landside transportation services.

Table 49 - Airports with Scheduled Air Service, by MDOT Region

MDOT Region	Airport Name	FAA Identifier	Airport Type
Bay	Bishop International Airport	FNT	Air Carrier
Bay	MBS International Airport	MBS	Air Carrier
Grand	Gerald R. Ford International Airport	GRR	Air Carrier
Grand	Muskegon County Airport	MKG	Air Carrier
Metro	Detroit Metropolitan Wayne County Airport	DTW	Air Carrier
North	Alpena County Regional Airport	APN	Air Carrier
North	Charlevoix Municipal Airport	CVX	Commercial Service
North	Cherry Capital Airport	TVC	Air Carrier
North	Manistee County-Blacker Airport	MBL	Commercial Service
North	Pellston Regional Airport of Emmet County	PLN	Air Carrier
Southwest	Kalamazoo/Battle Creek International Airport	AZO	Air Carrier
Superior	Chippewa County International Airport	CIU	Air Carrier
Superior	Delta County Airport	ESC	Air Carrier
Superior	Ford Airport	IMT	Air Carrier
Superior	Gogebic-Iron County Airport	IWD	Commercial Service
Superior	Houghton County Memorial Airport	CMX	Air Carrier
Superior	Sawyer International Airport	SAW	Air Carrier
University	Capital Regional International Airport	LAN	Air Carrier

Source: 2017 MASP - MDOT AERO. Note that MBL and CVX service fluctuates

the more frequent destinations is shown in Table 50.

Table 50 - Sample of Non-Stop Destinations from Scheduled Air Service Airports in Michigan

Domestic Destinations	International Destinations
Anchorage, AK	Amman, Jordan
Atlanta, GA	Amsterdam, Netherlands
Baltimore, MD/Washington, D.C.	Beijing, China
Beaver Island, MI	Cancun, Mexico
Boston, MA	Frankfurt, Germany
Charlotte Douglas, NC	London, United Kingdom
Chicago, IL	Mexico City, Mexico
Denver, CO	Montego Bay, Jamaica
Indianapolis, IN	Monterrey, Mexico
Louisville Muhammad Ali, KY	Montreal, Canada
Los Angeles, CA	Munich, Germany
Miami, FL	Nagoya, Japan
Minneapolis, MN	Ottawa, Canada
Nashville, TN	Paris, France
New York, NY	Puerto Vallarta, Mexico
Philadelphia, PA	Punta Cana, Dominican Republic
Phoenix, AZ	Rome, Italy
San Francisco, CA	Shanghai, China
Washington Dulles, DC	Tokyo, Japan
St. Louis, MO	Toronto, Canada

Source: Airport and Airline websites as of August 2016

As shown in Table 51, Michigan's 18 commercial airports are serviced by 31 different airlines, including both mainline and low-cost carriers, some providing international service while others serve limited destinations.

Table 51 - Passenger Airlines Servicing the State of Michigan

Airlines (A-I)	Airlines (J-Z)
AeroMexico	Japan Airlines
Air Canada	Jet Blue
Air Choice One	Korean Air
Air France	Lufthansa
Alaska Airlines	Midwest Express
Allegiant Airlines	North County Sky
American Airlines	Royal Jordanian
Avianca	Spirit Airlines
British Airways	Spirit of Australia, Qantas
Delta Air Lines	Spirit of Qatar
Emirates	Southwest Airlines
Envoy Air	Sun Country Airlines
Fresh Air Aviation	United Airlines
Frontier	Virgin Atlantic
Interjet	Volaris
Island Airways	

Source: List prepared from several sources:

<https://www.dfwairport.com/airlines/index.php>;

Charlevoix Municipal Airport Master Plan, June 2013;

[Gerald R. Ford International Airport](#)

The largest commercial service airport in Michigan is Detroit Metropolitan Wayne County Airport (DTW), located in the Metro Region. DTW has more than 85 percent of the state's scheduled service enplanements, with 17.4 million (as of 2018). The other six MDOT regions have far fewer enplanements, as shown in Table 52.

Table 52 - 2018 Scheduled Passenger Enplanements by MDOT Region

Region	FAA 2018 Record of Enplanements (Persons)
Bay	489,425
Grand	1,650,220
Metro	17,445,666
North	298,978
Southwest	152,947
Superior	144,442
University	184,160
TOTAL	20,365,838

Source: [Aeronautical Information Services AIV-A](#), FAA Commercial Service Airport, 2018

DTW also carries more than half of the state's scheduled service cargo (as calculated in tonnage), followed by Gerald R. Ford International Airport in the Grand Region, Willow Run Airport in the Metro Region, and Capitol Region International Airport in the University Region (see Table 53). Two regions (North and Southwest regions) currently have no scheduled service cargo.

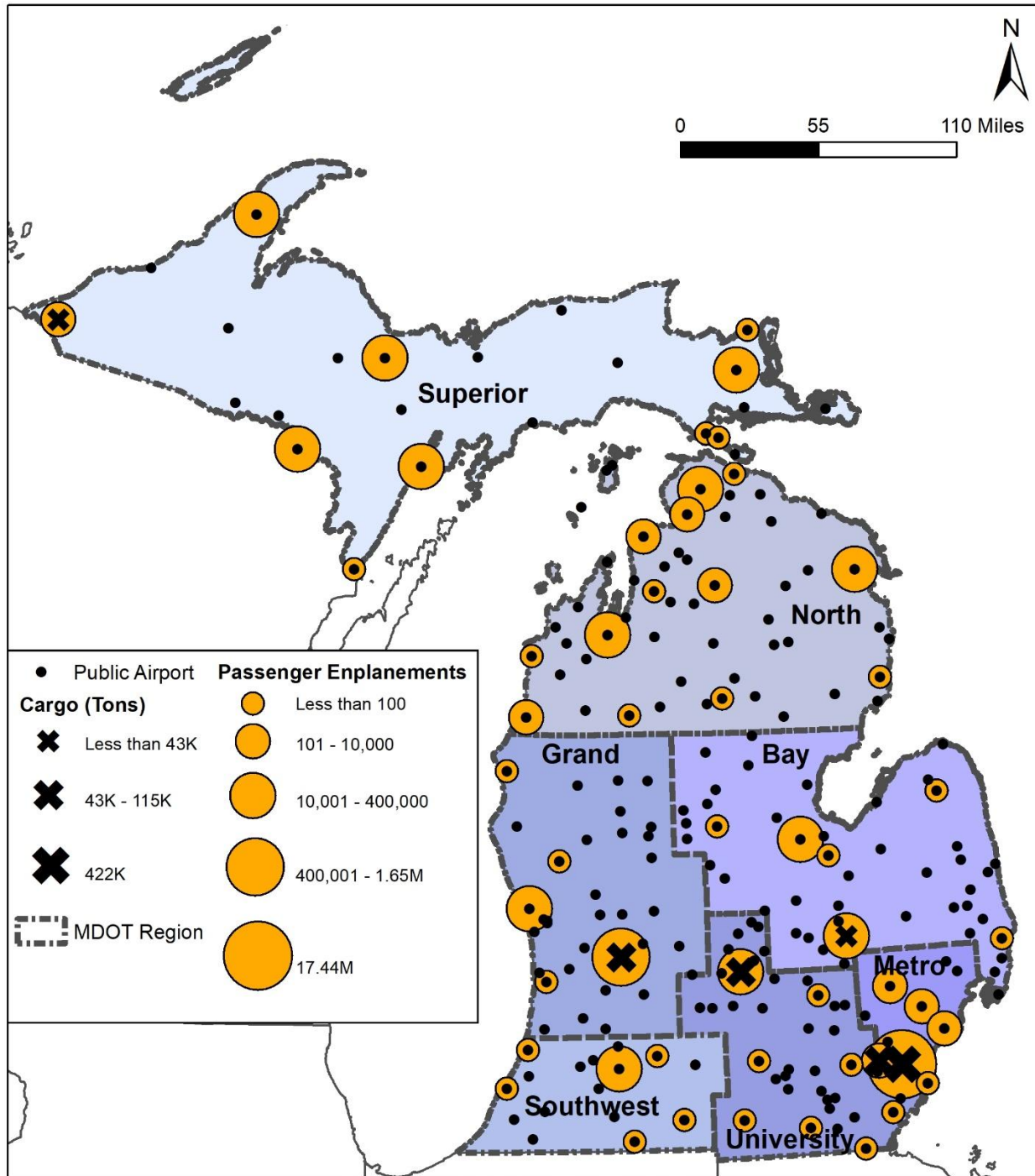
Table 53 - Scheduled Service Cargo Tonnage by Region

MDOT Region	Bay	Grand	Metro	North	Southwest	Superior	University	Statewide
FAA 2018 Record of Cargo (Tons)	42,865.5	114,829.0	530,675.1	0	0	2,640.1	101,417.4	792,427.1

Source: [FAA CY 2018 All-Cargo Airports by Landed Weight](#)

The geographic distribution of the passenger enplanements and cargo tonnage are shown in Figure 37. As expected, the Metro Region has the largest concentration of both scheduled passenger enplanements and cargo tonnage.

Figure 37 - Statewide Public Airports, Passenger Enplanements and Cargo (tons)



Source: Cargo and Passenger Enplanement Data from Federal Aviation Administration 2018 Reporting

General Aviation

General aviation (GA) facilities provide air access to locations across the state that may not be served by commercial service carriers. GA is used by individuals to reach locations that might otherwise require a commercial flight plus a lengthy drive, boat ride or transit trip to reach their destination. Businesses rely on GA to facilitate quick and efficient travel of personnel, minimize time away from work, provide dependable and flexible travel options to multiple destinations, and deliver goods on time. This section describes the GA facilities in the state, including the public-use facilities, private-use facilities and their dispersion among Michigan counties.

As of December 2024, data refreshed in the 2017 MASP confirmed the following GA licensed facilities in Michigan:

- 214 airports open to the public.
- 108 heliport bases, 101 of which are hospital/medical facilities.

Figure 38 features a map of licensed airports.

The Selfridge Air National Guard Base is owned by the United States Air Force and used exclusively for military purposes in the Metro Region. There are four additional airports in Michigan that have a military presence: Alpena County Regional Airport (North Region), Grayling Army Airfield (North Region), W.K. Kellogg Airport (Southwest Region) and Abrams Municipal Airport Grand Ledge (University Region). The Alpena County Regional Airport and Grayling Army Airfield include training centers. In addition, the state has more than 600 privately owned, private-use aviation facilities.

Figure 38 - Michigan's Public Use Airports and Reference Codes



Source: 2017 MASP

Of the 83 counties in Michigan, only three are without a licensed, public-use airport (Arenac, Baraga and Keweenaw). All three counties border on the Great Lakes and are adjacent to counties that have public airport services. Arenac County had a public-use airport until 2006, when the Standish Industrial Airport closed.

Based Aircraft

Based aircraft is a self-reported count of aircraft stored at a specific airport or storage facility for the majority of a given year by the operator of the facility. The number of based aircraft in an aircraft storage facility or hangar determines the facility needs to accommodate those aircraft and is one measure of aviation activity. General

aviation aircraft includes helicopters, gliders, ultralight aircraft, jets, single-engine aircraft, multi-engine aircraft and ultralight airplanes.

All based aircraft are registered with the state. There were approximately 5,250 registered aircraft in the state of Michigan in 2025, of which 80 airports are reporting through the National Plan of Integrated Airport Systems (NPIAS) to the FAA. The Selfridge Air National Guard Base only serves military operations and is not in the NPIAS.

The Metro Region has the most based aircraft, followed by the Grand and University regions, which are also the regions with the highest populations and cluster around Detroit. Superior has the least number of based aircraft in all categories.

Table 54 - Based Aircraft on Record with the FAA in 2020

MDOT Region	Validated Based Aircraft
Bay	817
Grand	876
Metro	1,304
North	516
Southwest	494
Superior	292
University	807
TOTAL	5,106

Source: FAA, Based Aircraft Inventory for NPIAS airports

State Airport Infrastructure Goals

The MASP classifies the state's airports into three categories of importance:

- Tier 1 airports respond to the essential and critical needs of the state airport system.
- Tier 2 airports respond to essential and critical needs of the state or the local community needs.
- Tier 3 airports offer services already provided by other airports or provide service to individuals or businesses.

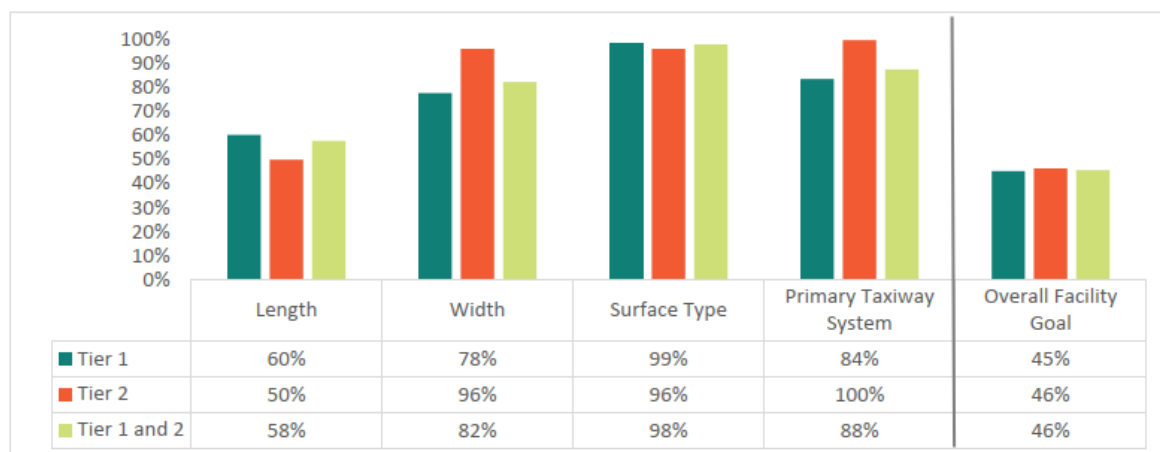
Tier 1 and Tier 2 airports (which comprise 112 of the state's 214 licensed, public-use airports) are defined as critical to the system and have been evaluated against a set of facility infrastructure goals for runways, lighting, basic services, weather and access. Tier 3 airports are considered secondary to the state airport system and their facilities are not expected to meet the goals; therefore, they are not included in the 2017 MASP evaluation.

Of the 112 inventoried airports (2017 MASP/2024 data refresh), less than half (43 percent) are deficient in at least one of the primary runway system development goals. In most cases, the deficiency is having insufficient runway length as defined for that category of airport. While nearly all the Tier 2 airports meet their runway width goal, only 79 percent of Tier 1 airports meet the recommended width. Nearly all airports meet the runway surface type goal. Figure 39 shows the percentage of Tier 1 and Tier 2 airports that meet various aspects of the state's runway system development goals.

The MASP also evaluates inadequacy in airports' runway lighting systems. Only 69 percent of Tier 1 airports meet the goal. As shown in Figure 40, the deficiency is mainly due to airports not having implemented high-intensity runway lights (HIRL).

With regard to development goals for basic pilot and aircraft services, the most significant deficiencies are lack of aircraft maintenance services and available staff. Nearly all airports met the goals for restrooms and fuel. All airports met the goals for aircraft parking, as shown in Figure 41.

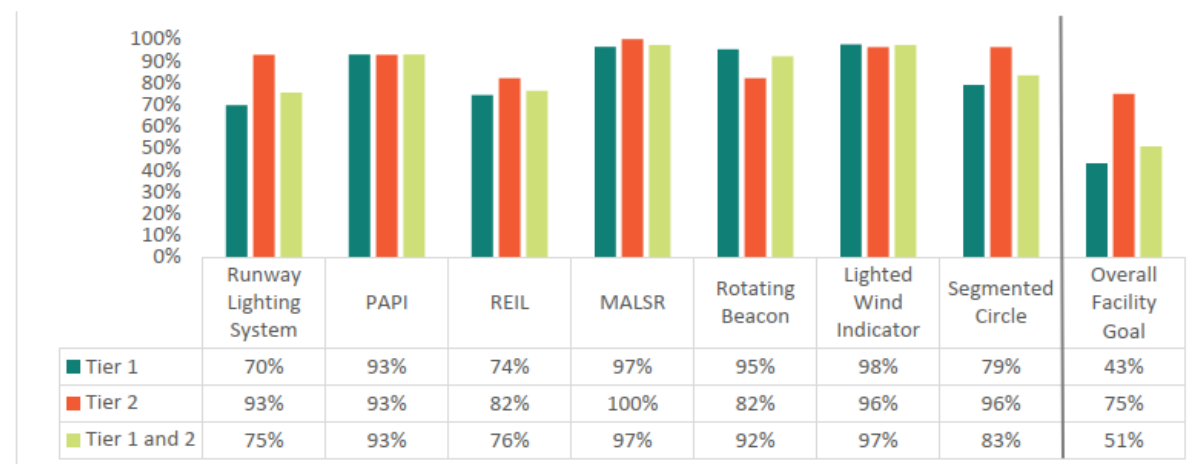
Figure 39 - Percentage of Airports Meeting Primary Runway System Development Goals



Source: MDOT AERO ASM, Facility Information Worksheets, MDOT Airport Directory, FAA Form 5010, FAA Digital-Chart Supplement (d-CS); Analysis by Mead & Hunt, 2017

Source: 2017 MASP

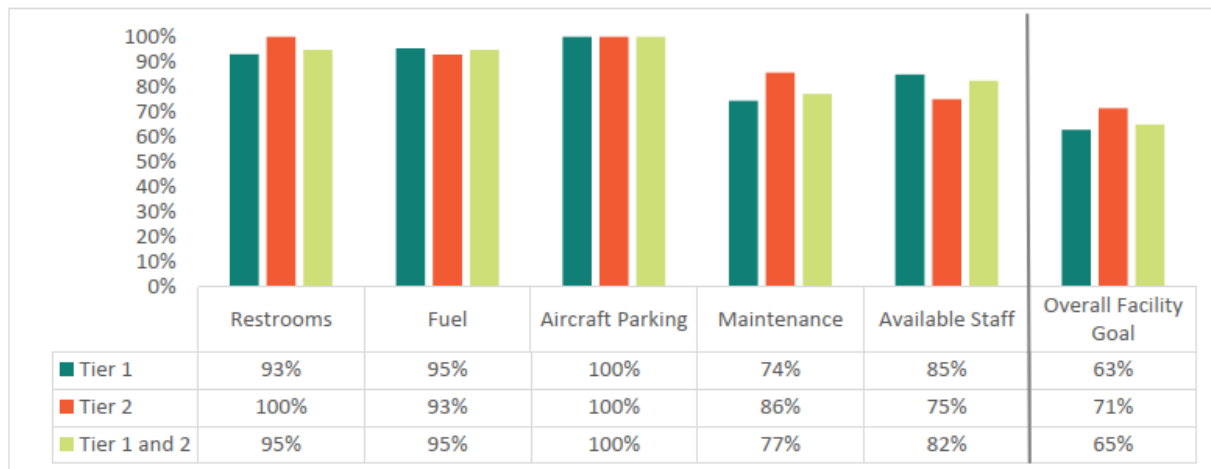
Figure 40 - Percentage of Airports Meeting Lighting and Visual Aids Development Goals



Source: MDOT AERO ASM, Facility Information Worksheets, MDOT Airport Directory, FAA Form 5010, FAA Digital-Chart Supplement (d-CS); Analysis by Mead & Hunt, 2017.

Source: 2017 MASP

Figure 41 - Percentage of Airports Meeting Basic Pilot and Services Development Goals



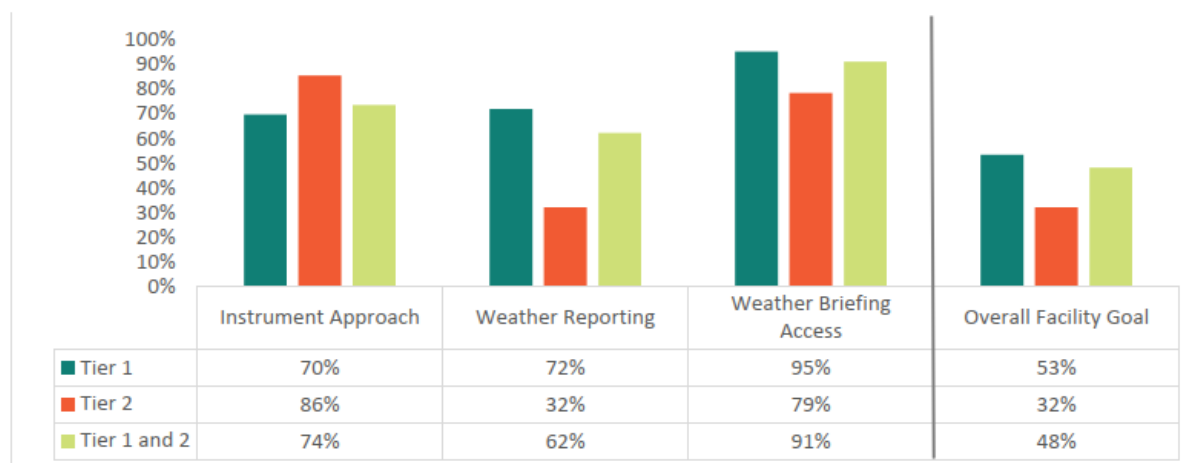
Source: MDOT AERO ASM, Facility Information Worksheets, MDOT Airport Directory, FAA Form 5010, FAA Digital-Chart Supplement (d-CS); Analysis by Mead & Hunt, 2017.

Source: 2017 MASP

Figure 42 shows airport performance related to all-weather access, including instrument approach, weather reporting and weather briefing access. Tier 2 airports perform poorly relative to this goal since not all Tier 2 airports are considered for preferred weather reporting development. Tier 1 and Tier 2 airports have relatively similar performance with regard to the goals for instrument approach. Nearly all Tier 1 airports meet the goal for weather briefing access.

In addition, the MASP evaluated airports for year-round access. Only two Tier 1 airports and five Tier 2 airports that have a goal to be year-round facilities do not meet the snow removal requirements and, therefore, are not open year-round.

Figure 42 - Percentage of Airports Meeting All-Weather Access Development Goals



Source: Source: MDOT AERO ASM, Facility Information Worksheets, MDOT Airport Directory, FAA Digital-Chart Supplement (d-CS); FAA Terminal Procedures; Analysis by Mead & Hunt, 2017.

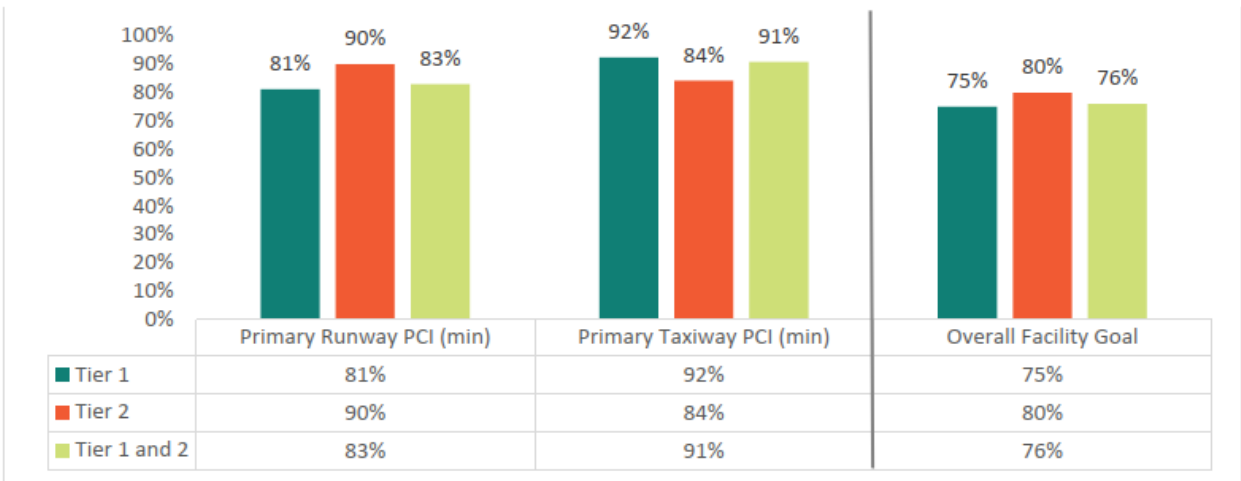
Source: 2017 MASP

Airport Pavement Conditions

The 2017 MASP reports pavement management and conditions based on the Airport Pavement Management System (APMS) tool, developed by Applied Pavement Technology Inc. to help identify failing pavements and prioritize pavement repair and rehabilitation projects at airports throughout the state. Airports are evaluated using the APMS on a three-year routine schedule to keep the APMS tool up to date with changing pavement conditions.

Airports that are paved but are not part of the state’s APMS were not included as part of the performance analysis in the MASP, unless values were specifically provided by the airport. This a minimum maintenance standard set by the FAA Airport Approach Category (AAC). The majority of inventoried airports (88 percent) meet the minimum Pavement Condition Index (PCI) goal for runways and the PCI goal for taxiways (81 percent). See Figure 43 for a graphic representation of the percentage of airports meeting minimum PCI standards.

Figure 43 - Percentage of Airports Meeting Minimum PCI Standards



Notes: Excludes runways and taxiways that have a turf surface or are not part of the MDOT Airport Pavement Management System (AMPS), unless a PCI was specifically provided by the airport. Performance excludes the following airports:

Tier 1 Airports Excluded from PCI Analysis			Tier 2 Airports Excluded from PCI Analysis		
Baldwin	Baldwin Municipal Airport	(non-APMS)	Frankenmuth	WM 'Tiny' Zehnder Field	(turf surface)
Brighton	Brighton Field	(non-APMS)	Gregory	Richmond Field	(turf surface)
Flushing	Dalton Airport	(non-APMS)	Lake City	Home Acres Sky Ranch	(turf surface)
Harsens Island	Harsens Island Airport	(turf surface)	Northport	Woolsey Memorial Airport	(turf surface)
Iron River	Stambaugh Airport	(non-APMS)	Pinconning	Gross Airport	(turf surface)
Jenison	Riverview Airport	(non-APMS)	Plainwell	Plainwell Municipal	(non-APMS)
<u>Taxiway Only:</u>			Watervliet	Watervliet Municipal Airport	
Detroit	Willow Run Airport	(not provided)	<u>Taxiway Only:</u>	Ottawa Executive Airport	(non-APMS)
			Atlanta	Atlanta Municipal Airport	(turf taxiway)

Source: MDOT Airport Pavement Management System (APMS), Facility Information Worksheets.

Source: 2017 MASP

Maritime

Michigan’s maritime ecosystem comprises 33 active commercial ports strategically located in cities such as Detroit, Monroe, Rogers City, Marquette and Sault Ste. Marie, supporting a multimodal transportation network essential to regional, national and international trade. As shipping is the most cost-effective transport service, many companies have historically been drawn to do business in Michigan and other Great Lake states, which

significantly aids the Michigan economy. The Soo Locks in Sault Ste. Marie are critical marine infrastructure, enabling efficient transit of more than 76 million short tons of cargo in 2017, valued at \$5.8 billion (Source: Michigan Maritime Strategy, 2026).

- Michigan's 3,200 miles of shoreline along four of the five Great Lakes contain 33 active cargo ports that ship or receive cargo.
- More than 10,000 miles of rivers and streams, 3,000 miles of water trails and more than 11,000 inland lakes
- Ten ferry operators.
- Michigan's ports handle 45.5 million tons of cargo valued at nearly \$7.4 billion annually.
- Carries 9 percent of the state's freight tonnage and 1 percent of the state's freight value.

Passenger Rail

Michigan's Intercity Passenger Rail Services

MDOT contracts with Amtrak to provide three services in Michigan, shown in Figure 44:

- The Blue Water, operating between Chicago and Port Huron,
- The Pere Marquette, operating between Chicago and Grand Rapids, and
- The Wolverine, operating between Chicago and Detroit/Pontiac.

The westbound trains of each service are primarily morning or early afternoon departures for Chicago from Michigan stations (the Wolverine has an evening westbound service). The eastbound schedules are the reverse, with only the Wolverine offering a morning eastbound train.

Figure 44 - Michigan Amtrak Service



The Michigan routes are part of Amtrak's state-supported corridor service network. Besides serving Michigan intrastate travel as well as access to Chicago, the Michigan services afford Michigan residents with connections to Amtrak's national network centered in Chicago. This also affords out-of-state travelers yet another means to get to Michigan.

Blue Water Service

The Blue Water service is a single train in each direction. The morning service departs Port Huron at 6:20 a.m. with a late morning arrival at 11:45 a.m. The return trip leaves Chicago at 4 p.m. and arrives back at Port Huron at 11:31 p.m. The Blue Water service route is 319 miles long, serving 11 stations.

Table 55 - Blue Water Schedule

Station	Train Number 365	Station	Train Number 364
Port Huron, MI	6:20 a.m.	Chicago, IL	4:00 p.m.
Lapeer, MI	7:08 a.m.	New Buffalo, MI	6:10 p.m.
Flint, MI	7:35 a.m.	Niles, MI	6:32 p.m.
Durand, MI	8:08 a.m.	Dowagiac, MI	6:43 p.m.
East Lansing, MI	8:54 a.m.	Kalamazoo, MI	7:11 p.m.
Battle Creek, MI	10:00 a.m.	Battle Creek, MI	7:38 p.m.
Kalamazoo, MI	10:26 a.m.	East Lansing, MI	9:00 p.m.
Dowagiac, MI	10:52 a.m.	Durand, MI	9:37 p.m.
Niles, MI	11:04 a.m.	Flint, MI	10:08 p.m.
New Buffalo, MI	11:24 a.m.	Lapeer, MI	10:34 p.m.
Chicago, IL	11:45 a.m.	Port Huron, MI	11:31 p.m.

Note: Effective Feb. 5, 2026

The Blue Water service operates over lines owned by three railroads and the State of Michigan: CN (159 miles), NS (39 miles), Amtrak (99 miles) and MDOT (22 miles).

Pere Marquette Service

The Pere Marquette Amtrak route travels between Grand Rapids and Chicago daily, operating on 176 route miles, serving five stations. The westbound train to Chicago departs Grand Rapids at 6 a.m. EST and arrives in Chicago at 9:08 a.m. CST, in time for the business day. The return train departs Chicago at 6:30 p.m. CST, convenient for a business day trip or a weekend shopping or entertainment trip. Of the three services, the Pere Marquette is the only one that does not operate over track owned by MDOT. It uses lines owned by CSX (135 miles) and NS (39 miles).

Table 56 - Pere Marquette Schedule

Station	Train Number 371	Station	Train Number 370
Grand Rapids, MI	6:00 a.m.	Chicago, IL	6:30 p.m.
Holland, MI	6:49 a.m.	St. Joseph-Benton Harbor, MI	9:14 p.m.
Bangor, MI	7:32 a.m.	Bangor, MI	9:50 p.m.
St. Joseph-Benton Harbor, MI	8:10 a.m.	Holland, MI	10:33 p.m.
Chicago, IL	9:08 a.m.	Grand Rapids, MI	11:34 p.m.

Note: Effective Feb. 5, 2026

Wolverine Service

The Wolverine, connecting Pontiac and Chicago, comprises several frequencies. Two westbound trains operate in the morning: one leaving Pontiac at 5:43 a.m. EST (departing Detroit at 6:26 a.m. EST) and arriving in Chicago at 10:32 a.m. CST and the second departing Pontiac nearly three hours later at 8:50 a.m. EST (departing Detroit at 9:35 a.m.) and arriving in Chicago at 2:02 p.m. CST in the afternoon. A third westbound train operates in the evening, leaving Pontiac at 5:28 p.m. EST (Detroit at 6:11 p.m.) and reaching Chicago at 10:40 p.m. CST.⁹

Table 57 - Wolverine Schedule (Westbound)

Station	Train Number 351	Train Number 353	Train Number 355
Pontiac, MI	5:43 a.m.	8:50 a.m.	5:28 p.m.
Troy, MI	5:56 a.m.	9:04 a.m.	5:41 p.m.
Royal Oak, MI	6:03 a.m.	9:12 a.m.	5:48 p.m.
Detroit, MI	6:26 a.m.	9:35 a.m.	6:11 p.m.
Dearborn, MI	6:44 a.m.	9:53 a.m.	6:29 p.m.
Ann Arbor, MI	7:14 a.m.	10:23 a.m.	7:00 p.m.
Jackson, MI	7:51 a.m.	10:58 a.m.	7:37 p.m.
Albion, MI	8:15 a.m.	-	-
Battle Creek, MI	8:48 a.m.	12:01 p.m.	8:33 p.m.
Kalamazoo, MI	9:16 a.m.	12:28 p.m.	9:00 p.m.
Dowagiac, MI	-	-	9:29 p.m.
Niles, MI	-	1:01 p.m.	9:42 p.m.
New Buffalo, MI	-	1:21 p.m.	10:02 p.m.
Hammond Whiting, IN (CST)	-	1:15 p.m.	9:54 p.m.
Chicago, IL (CST)	10:32 a.m.	2:02 p.m.	10:40 p.m.

Note: Effective Feb. 5, 2026

The eastbound operation has departures from Chicago at 6:45 a.m. CST, and 2:15 and 5:50 p.m. CST, with arrivals in Pontiac at 2:11, 9:29 p.m., and 1:01 a.m. EST. The corresponding Detroit arrival times are 2:01 and 7:51 p.m., and 12:11 a.m. EST.

Table 58 - Wolverine Schedule (Eastbound)

Station	Train Number 350	Train Number 352	Train Number 354
Chicago, IL (CST)	6:45 a.m.	2:15 p.m.	5:50 p.m.
Hammond Whiting, IN (CST)	7:11 a.m.	-	-
New Buffalo, MI	9:04 a.m.	4:31 p.m.	8:04 p.m.
Niles, MI	9:29 a.m.	4:52 p.m.	8:24 p.m.
Dowagiac, MI	9:40 a.m.	-	-
Kalamazoo, MI	10:14 a.m.	5:26 p.m.	8:58 p.m.
Battle Creek, MI	10:56 a.m.	6:03 p.m.	9:35 p.m.
Albion, MI	-	5:41 p.m.	10:03 p.m.
Jackson, MI	11:51 a.m.	6:55 p.m.	10:28 p.m.
Ann Arbor, MI	12:28 p.m.	7:35 p.m.	11:08 p.m.
Dearborn, MI	12:57 p.m.	8:11 p.m.	11:37 p.m.
Detroit, MI	1:25 p.m.	8:44 p.m.	12:10 a.m.
Royal Oak, MI	1:49 p.m.	9:05 p.m.	12:34 a.m.
Troy, MI	1:57 p.m.	9:12 p.m.	12:42 a.m.
Pontiac, MI	2:11 p.m.	9:29 p.m.	1:01 a.m.

Note: Effective Feb. 5, 2026

Similar to Blue Water Service, the Wolverine operates on track owned by CN (27 miles), NS (39 miles), Amtrak (99 miles) and MDOT (134 miles).

Amtrak Thruway Service

Amtrak also provides a non-rail service branded as Amtrak Thruway, using intercity buses that it owns and locally contracted transit buses to expand its network beyond its rail-served locations. The Thruway service extends Amtrak's network by 1,470 miles within Michigan. Figure 45 shows the extent of the network. Each of the bus services connect to Amtrak in Michigan, with the exception of the route serving Hancock and other U.P. locations. The connection with Amtrak for this bus service is Milwaukee.

Figure 45 - Extended Michigan Amtrak Network With Thruway Motorcoach Connections



The Thruway system provides guaranteed connections to Amtrak trains as well as through ticketing. Thruway routes are incorporated into Amtrak's online and printed schedules.

Michigan Passenger Rail System Stations

A significant portion of the population of Michigan has access to intercity passenger rail transportation. Eighty percent of Michigan's population lives within 25 miles of an Amtrak station, while 88 percent live within 50 miles of an Amtrak station. Very few residents do not have access to the state's passenger rail services.

The access to Michigan's passenger rail system is provided by 22 stations. Three stations are located in urban areas, 11 in suburban areas and eight in rural towns. The Wolverine serves the most Michigan locations (12 stations), followed by Blue Water (10 stations) and the Pere Marquette (four stations), as listed in Table 59.

Table 59 - Amtrak Services-Michigan Stations Served

Wolverine	Blue Water	Pere Marquette
Albion	Battle Creek	Grand Rapids
Ann Arbor	Dowagiac	Holland
Troy-Birmingham	Durand	Bangor
Battle Creek	Flint	St. Joseph
Dearborn	Kalamazoo	-
Detroit/Royal Oak	East Lansing	-
Dowagiac	Lapeer	-
Jackson	New Buffalo	-
Kalamazoo	Niles	-
New Buffalo	Port Huron	-
Niles	-	-
Pontiac	-	-

Five Michigan stations are served by two services: Battle Creek, Dowagiac, Kalamazoo, New Buffalo and Niles.

Station ownership is a mix of parties owning a mix of assets. The State of Michigan, through MDOT, participates in the ownership of eight stations, principally owning platforms and tracks; however, the state owns the Detroit and Pontiac station buildings. Amtrak has an ownership stake in seven stations, either in the station building itself or some element of the overall facility, such as the platform(s), track, or other. Local governments, local transit authorities, the freight railroads and Michigan State University own elements of stations.

Intermodal Connectivity

Intermodal connectivity is provided in several forms, with a number of stations having multiple means of access.

- **Personal Vehicle Access-Parking:** All stations have free parking facilities, with the exception of East Lansing and Kalamazoo, which charge parking fees. Other than Lapeer, overnight parking is permitted at all stations.
- **Local Transit Connections:** Albion is the only station without public transit connections. Transit connections range from streetcars (Detroit) to local bus service to dial-a-ride transit.
- **Intercity Bus Connections:** Thirteen of Michigan's passenger rail stations have connections with intercity bus services. Several bus operators serve passenger rail stations in the state. Bus lines serving the rail stations include Baron Bus Line, Greyhound, Indian Trails, and Miller Transportation, as well as Amtrak Thruway Motorcoach.
- **Active Transportation Connectivity:** Seven stations have bike storage.

Station Structures

All but two stations (New Buffalo and Royal Oak) are buildings. These other two stations have covered open platforms, providing some protection from inclement weather. Four stations are modern intermodal facilities: Dearborn, East Lansing, Holland and Troy.

Ticketing Service

Although online ticketing and e-tickets are increasing in their acceptance and use, many travelers still are more comfortable with hard copy tickets. Four of Michigan's stations (Ann Arbor, Battle Creek, Dearborn and Detroit) have staffed ticket offices. Several additional stations are equipped with ticket vending machines, while the remaining stations do not have on-site ticket sales equipment and rely on mobile, printed or onboard ticketing.

Michigan Passenger Rail Ridership

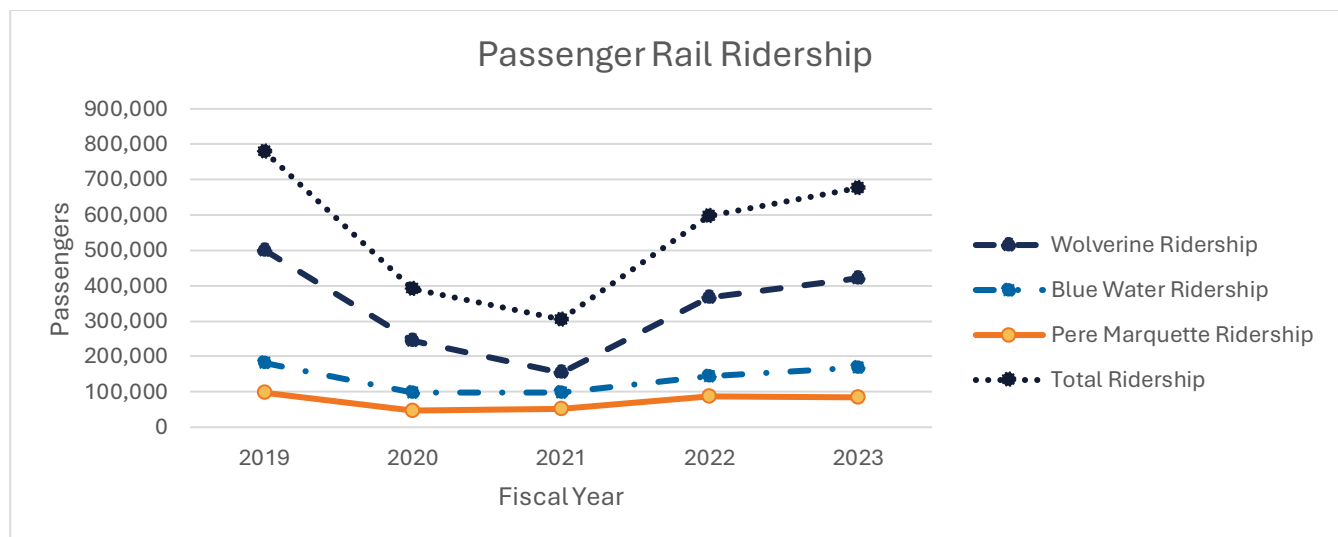
Passenger Rail Ridership Characteristics

Ridership by Service

Overall ridership decreased during the FY 2019-2023 period from 769,440 to 675,262.

Statewide ridership trends from 2019 to 2023 are driven by the Wolverine line, which accounted for about 64 percent of total passengers in 2019. All three lines experienced significant declines in 2020 and 2021, with ridership falling from 780,549 in 2019 to 304,958 in 2021. Recovery began in 2022 and continued in 2023, with state ridership reaching 675,262.

Figure 46 - Passenger Rail Ridership



Passenger Rail Market

Table 60 shows the most traveled city pairs.

Ridership is heavily focused on the Chicago market. No intermediate city pairs appear in the top 10. Ann Arbor-Kalamazoo (539 riders) and East Lansing-Kalamazoo (425 riders) are the two leading intrastate travel pairs.

The Michigan services play a significant role in Amtrak's Chicago market. Table 61 shows the leading markets for Chicago Amtrak service. On the basis of ridership, three Michigan locations are in the top 10. From a revenue perspective, Amtrak's long-distance services are prominent, as would be expected as fares are highly correlated with distance. However, Ann Arbor is a significant revenue generator.

Table 60 - Michigan Top City Pairs-Ridership FY 2023

Station Pairing	Riders
Ann Arbor-Chicago	115,991
Dearborn-Chicago	50,167
Detroit-Chicago	52,527
Kalamazoo-Chicago	45,790
East Lansing-Chicago	60,539
Grand Rapids-Chicago	39,996
Holland-Chicago	28,972
Troy-Chicago	25,412
Battle Creek-Chicago	13,039
Flint-Chicago	20,553

Table 61 - Chicago Top City Pairs-Ridership and Revenues

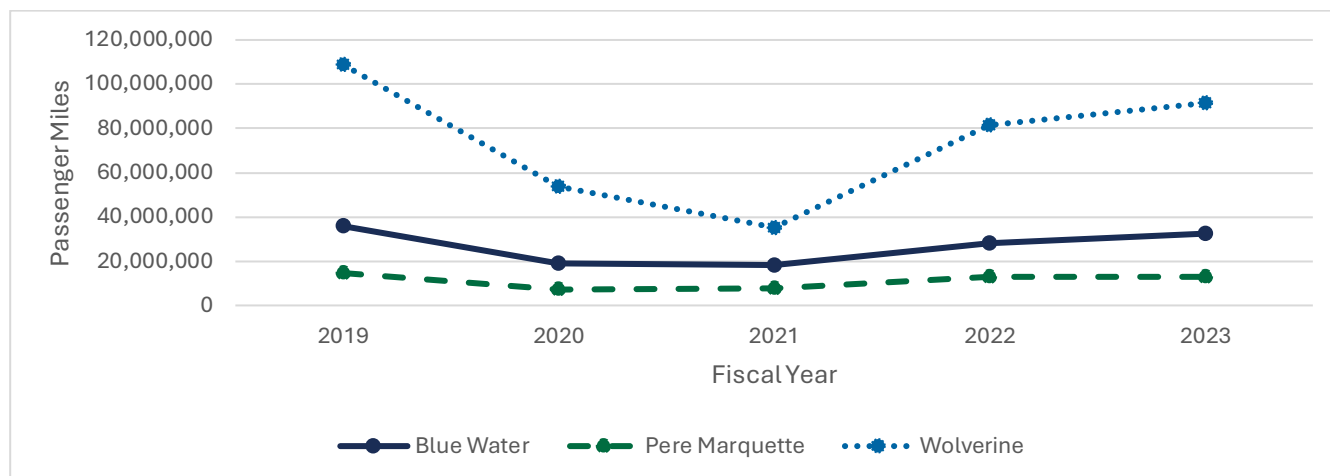
Chicago Top City Pairs: Ridership	Chicago Top City Pairs: Revenues
Milwaukee	Milwaukee
St. Louis	St. Louis
Milwaukee Airport	Washington, D.C.
Normal, IL	Los Angeles
Champaign, IL	Emeryville, CA
Ann Arbor, MI	Ann Arbor, MI
Springfield, IL	Seattle
Kalamazoo	New York
Sturtevant, WI	Denver
Dearborn, MI	Milwaukee Airport

Michigan Passenger Rail System Utilization

Service Utilization

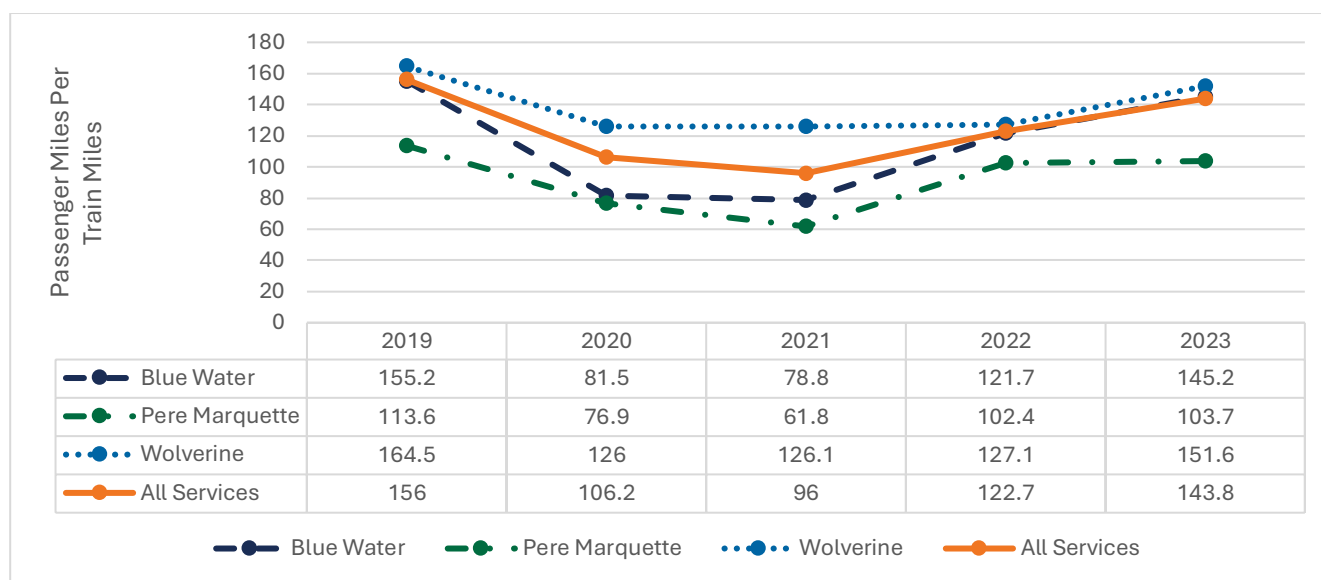
In 2023, Michigan's three passenger rail services generated 952,616 passenger miles, representing a 6.7 percent decrease from 2019 but a substantial recovery from the 2021 low. Figure 47 shows annual passenger miles for each service.

Figure 47 - Michigan Amtrak Service-Passenger Miles 2019-2023



Over the past five years, passenger miles across the three intercity passenger rail services reflect a sharp decline. A substantial recovery starts to happen in 2022. The Blue Water and Pere Marquette services have largely returned to near pre-pandemic performance. The Wolverine service represents the largest share of passenger miles but has not recovered from the 2019 peak. Overall, statewide passenger miles in 2023 are approaching pre-pandemic levels. Figure 48 compares the utilization of each service measured as number of passenger miles per train mile, or average passengers per train over the entire routes.

Figure 48 - Michigan Amtrak Service-Train Utilization 2019-2023



Blue Water has been the service with most consistent utilization, and until 2019 led the services in passenger miles per train miles when it was surpassed by Wolverine. The Wolverine has demonstrated increases in passenger utilization, growing from 119.8 passenger miles per train mile to 164.2 passengers per train mile, an improvement of 37 percent since 2015.

Station Use

While no metric is available to measure utilization, train boardings and alightings over time provide some insight into station utilization trends. The following three tables present station activity for FY 2019 and FY 2023 for each service ranked by compound annual growth.

Wolverine corridor stations experienced an overall ridership decrease of about 15.1 percent, declining from 990,856 passengers to 841,730 over the period analyzed. Most stations saw decreases, though New Buffalo experienced a slight increase of about 2.5 percent, making it the only station with growth. The largest decline occurred at Jackson, MI, which decreased by approximately 28.7 percent, followed by Kalamazoo (-21.6 percent) and Hammond-Whiting (-21 percent). Major ridership hubs such as Chicago, Ann Arbor and Detroit also saw notable decreases of 15.2 percent, 11.3 percent and 9 percent, respectively. Overall, the data indicates widespread ridership declines across the Wolverine corridor during this timeframe.

Table 62 - Wolverine: Station Boardings and Alightings

Station	Station Passengers: FY 2019	Station Passengers: FY 2023	Compound Annual Growth
Troy, MI	36,486	31,364	-14%
Albion, MI	2,295	2,084	-9.2%
New Buffalo, MI	15,408	15,791	2.5%
Detroit, MI	72,314	65,842	-9%
Chicago, IL	430,155	364,898	-15.2%
Ann Arbor, MI	156,674	139,036	-11.3%
Dearborn, MI	74,623	61,691	-17.3%
Kalamazoo, MI	85,471	67,011	-21.6%
Pontiac, MI	15,339	13,794	-10.1%
Michigan City, IN	3,398	0	-100%
Battle Creek, MI	29,585	23,710	-19.9%
Jackson, MI	23,651	16,863	-28.7%
Niles, MI	11,009	10,712	-2.7%
Royal Oak, MI	27,693	23,558	-14.9%
Dowagiac, MI	1,587	1,291	-18.7%
Hammond-Whiting, IN	5,168	4,085	-21%
Total	990,856	841,730	-15.1%

Blue Water ridership decreased 6.1 percent overall, dropping from 356,498 passengers in FY 2019 to 337,669 in FY 2023. While most stations saw declines, Niles experienced the largest growth, at 23.7 percent, followed by New Buffalo, at 8.9 percent. The largest decrease was in Port Huron, at -20.3 percent.

Table 63 - Blue Water: Station Boardings and Alightings

Station	Station Passengers: FY 2019	Station Passengers: FY 2023	Compound Annual Growth
Dowagiac, MI	3,252	3,505	7.8%
New Buffalo, MI	10,685	11,639	8.9%
Battle Creek, MI	10,673	10,304	-3.5%

Station	Station Passengers: FY 2019	Station Passengers: FY 2023	Compound Annual Growth
East Lansing, MI	69,210	68,822	-0.6%
Chicago, IL	162,429	152,270	-6.3%
Durand, MI	13,622	10,925	-19.8%
Kalamazoo, MI	28,673	26,940	-6%
Lapeer, MI	9,008	7,771	-13.7%
Flint, MI	27,881	23,885	-14.3%
Niles, MI	5,583	6,906	23.7%
Port Huron, MI	18,482	14,732	-20.3%
Total	359,498	337,699	-6.1%

Pere Marquette ridership declined about 11 percent overall. Most stations saw decreased, with the largest decline occurring in Bangor, at -26.9 percent. Grand Rapids was the only station to experience growth, increasing slightly by 0.1 percent.

Table 64 - Pere Marquette: Boardings and Alightings

Station	Station Passengers: FY 2019	Station Passengers: FY 2023	Compound Annual Growth
St. Joseph, MI	14,668	13,172	-10.2%
Bangor, MI	4,584	3,353	-26.9%
Chicago, IL	95,845	84,778	-11.6%
Holland, MI	37,292	29,489	-20.9%
Grand Rapids, MI	40,593	40,881	0.7%
Total	192,982	171,673	-11%

Passenger Rail Performance

Financial Performance

One of the more important metrics is the farebox recovery ratio, as it measures the extent that passenger ticket revenues cover operation expenses. It is similar to the operating ratio used by freight railroads.

Table 65 - 2023 Michigan Passenger Services Farebox Recovery Ratio

Route	Ticket Revenue	Operating Cost	Farebox Recovery Ratio
Blue Water	\$6,959,946.33	\$16,248,931.03	43%
Pere Marquette	\$3,665,821.49	\$6,986,618.32	52%
Wolverine	\$22,995,122.68	\$39,773,155.28	58%
Total	\$33,620,890.50	\$63,008,704.63	53%

As shown in Table 65, the Michigan services, overall, recover 53 percent of operating costs. Wolverine performs the best of all services, at 58 percent.

Table 66 provides another perspective on financial performance of Michigan passenger rail services, the shortfall in revenue per passenger based on the average passenger fares. It measures the required subsidy per passenger to financially break even. Statewide revenues fall short by \$43.52 per passenger.

Table 66 - 2023 Revenue Shortfall Per Passenger

Route	Ticket Revenue (Average Fare)	Average Operating Cost Per Passenger	Revenue Shortfall Per Passenger
Blue Water	\$41.22	\$96.23	(\$55.01)
Pere Marquette	\$42.70	\$81.39	(\$38.68)
Wolverine	\$54.681	\$94.57	(\$39.89)
Total	\$49.79	\$93.31	(\$43.52)

A complementary performance metric is the revenue shortfall per passenger mile traveled. It is similar to the revenue shortfall per passenger; however, it gives consideration to the distance passengers travel. Referring to Table 67, the combined Michigan services incur a shortfall of \$0.21 per passenger mile, with the Blue Water and Pere Marquette services having the greatest shortfalls. It should be noted that when miles are considered, the Blue Water has the greatest shortfall, whereas the Pere Marquette has the greatest shortfall when miles are not considered.

Table 67 - 2023 Revenue Shortfall Per Passenger Mile

Route	Revenue Per Passenger Mile	Operating Cost Per Passenger Mile	Shortfall Per Passenger Mile
Blue Water	\$0.21	\$0.50	(\$0.29)
Pere Marquette	\$0.28	\$0.54	(\$0.26)
Wolverine	\$0.25	\$0.43	(\$0.18)
Total	\$0.25	\$0.46	(\$0.21)

A third way to measure financial performance is the revenue shortfall per train mile. Blue Water had the largest shortfall.

Table 68 - 2023 Revenue Shortfall Per Train Mile

Route	Revenue Per Train Mile	Operating Cost Per Train Mile	Shortfall Per Train Mile
Blue Water	\$31.21	\$72.86	(\$41.65)
Pere Marquette	\$29.33	\$55.90	(\$26.57)
Wolverine	\$38.03	\$65.78	(\$27.75)
Total	\$35.29	\$66.14	(\$30.85)

Service Performance

On-Time Performance Metrics

The Passenger Rail Investment and Improvement Act of 2008 (PRIIA) established an 80 percent on-time arrival rate as a standard. Table 69 shows the all-station on-time performance (OTP) of the Michigan routes.

Table 69 - All-Stations OTP, FY 2023 Q3

Route	Percent OTP at All Stations
Blue Water	64%
Pere Marquette	82%
Wolverine	61%

Source: Quarterly Report on the Performance and Service Quality of Intercity Passenger Train Operations, FY 2023 Q3

Notes: Red indicates the PRIIA standard was not met.

Causes of Performance Deficiencies

Table 70 shows the two leading causes of Amtrak-attributable train delays for each service during the fourth quarter FY 2023 and total minutes of delay per 10,000 train miles, as well as amount of delay attributable to the leading causes.

All services experienced Amtrak-caused delays greater than the standard of 325 minutes per 10,000 train miles. The Blue Water experienced the greatest delay, with 2.2 minutes per 10,000 train miles. The major cause of delay was freight train interference and unused recovery time.

Table 70 - Total Delay and Top Two Largest Delay Codes for Amtrak-Responsible Delays, in Minutes of Delay per 10,000 Train Miles, FY 2023 Q4

Route	Largest Delay Code	Largest Delay Minutes	Second Largest Delay Code	Second Largest Delay Minutes
Blue Water	Freight Train Interference	2,211	Unused Recovery Time	2,157
Pere Marquette	Freight Train Interference	617	Slow Order Delays	513
Wolverine	Passenger Train Interference	4,941	Slow Order Delays	4,822

Source: Quarterly Report on the Performance and Service Quality of Intercity Passenger Train Operations, FY 2023 Q4

Customer Satisfaction

Table 71 summarizes customer satisfaction with each service based on an FRA survey. The Pere Marquette has the highest overall customer satisfaction score of the three Michigan services and exceeds the standard. However, it was below standard for on-board cleanliness and food service. The other two services also scored below standard for the food service. Blue Water did not meet standards for any category; the Wolverine was better than standard for its personnel.

Table 71 - Customer Satisfaction Indicator Scores, FY 2023 Q3

Service Metric	Standard	Blue Water	Pere Marquette	Wolverine
Overall Trip Satisfaction	82	75	80.8	71.8
Friendliness of Amtrak Personnel at the Boarding Station	80	81.8	93.1	82.4
Communications About Train Status	80	72.4	82.8	70.7
Comfort of Train Ride	80	77.3	74	74.3
Cleanliness of Train	80	79.3	82.7	77
Food and Beverage on the Train	80	59.2	65.2	57

Source: Quarterly Report on the Performance and Service Quality of Intercity Passenger Train Operations, FY 2023 Q3

Notes: Red indicates the PRIIA standard was not met.

Transit

Public Transit Introduction

MDOT's Office of Public Transportation (OPT) is responsible for administering and providing oversight of federal and state transit funding grants and provides technical assistance to the state's 21 urban public transit systems, 57 rural public transit systems and four ferry boat services. Public transportation plays a critical role in Michigan, connecting residents and visitors to the many opportunities offered throughout the state, supporting the state's vibrant economy, and is an important component to the state's overall transportation system. In 2023, more than 47 million rides were provided across all public transit systems in Michigan.

The following sections provide a high-level overview of the current state of public transportation services across Michigan, identifying existing challenges and outlining strategies and opportunities to improve the availability, reliability and quality of public transportation in the decades ahead.

Transit Benefits

Public transit provides several benefits to the communities served across Michigan, including improved air quality by lowering overall vehicle emissions, providing connectivity to employment, education, health care, social activities and other amenities available around the state. Public transit also provides an alternative to driving and is a lifeline for those without access to an automobile or are unable to drive, especially in more rural areas where mobility and connectivity to essential services may be especially challenging.

At both national and state levels, public transit plays a significant role in supporting the continued growth and vitality of the economy. For many millions in Michigan, public transit is a part of daily life that reliably connects them to employment opportunities. According to the American Public Transit Association (APTA), investment in transit systems yields significant returns to the communities served. At the national level, every \$1 invested in public transportation generates \$4 in economic returns and every \$1 billion invested in public transportation supports and creates more than 50,000 jobs. Additionally, every \$10 million in capital investment in public transportation yields \$30 million in increased business sales.¹

Public transit also plays a major part in building and sustaining healthy communities. Having access to reliable transportation options is the cornerstone to creating healthy communities. Transportation barriers are often cited as the reason many are unable to access the medical care they need. Past research has found that approximately 3.6 million people in the United States do not obtain medical care due to transportation barriers.² Transit operations across Michigan work to overcome transportation barriers in both urban and rural areas to help millions each year access the health care services needed to improve the overall well-being of the state.

One of the primary benefits of public transit in Michigan is the service's ability to connect people with employment and educational opportunities. In many of the same parallels with health care access,

¹ American Public Transit Association. [Public Transportation Benefits](#). 2020.

² Health Research & Educational Trust. (2017, November). [Social determinants of health series: Transportation and the role of hospitals](#). Chicago, IL: Health Research & Educational Trust.

transportation barriers can be the difference between employment and unemployment. Reliable and accessible public transit can overcome those barriers for those who do not have access to a car, those who chose not to drive or are unable to drive.

Strong public transit can also work to reduce congestion on crowded roadways, improve vehicle fuel efficiency, enhance community health by promoting more active forms of transportation and improve overall air quality in dense metro areas.

Types of Transit Services

Across the state of Michigan, public transit and mobility needs vary widely. To best meet the specific needs of rural, small towns and large urban metropolitan areas, transit systems provide a variety of transit modes, services and programs.

Generally, transit systems are grouped by the types of cities, regions or areas that they serve. The categories of agencies are described below.

Large Urban

Large urban transit providers serve urbanized areas with populations greater than 200,000, as reported in the previous decennial census. Large urban transit systems are generally characterized by having multiple fixed routes throughout a city or region, operating seven days a week and 20 or more hours on weekdays. These large systems may include a mix of transit modes and services that could include bus, bus rapid transit, streetcar, light rail, commuter bus or commuter rail. Today, there are eight large urban transit agencies in Michigan:

- Detroit Department of Transportation
- Detroit Transportation Corporation
- Suburban Mobility Authority for Regional Transportation (SMART)
- Ann Arbor Area Transportation Authority
- Capital Area Transportation Authority (CATA)
- Flint Mass Transportation Authority (MTA)
- Interurban Transit Partnership (The RAPID)
- Kalamazoo Central County Transportation Authority

These agencies are considered “direct recipients” of federal funds through FTA’s 5307 Urbanized Area Formula funding and FTA’s Section 5310 Enhanced Mobility of Seniors and Individuals with Disabilities programs. The 5307 Urban program is largely focused on capital expenditures. For areas with populations of 200,000 or more, the funding formula is based on a combination of transit vehicle revenue miles, passenger miles, fixed guideway revenue miles and fixed guideway route miles, as well as population and employment density.

Small Urban

Small urban transit operators share many traits of large urban systems, usually with fixed transit routes operating on most days of the week. Small urban transit agencies are bus-focused in terms of transit vehicles operated. These agencies operate in urbanized areas with populations between 50,000 and 199,999, according to the last decennial census. Michigan's 13 small urban transit agencies include:

- Battle Creek Transit
- Bay Metro Transportation Authority
- Blue Water Transportation Commission
- Jackson Area Transportation Authority
- Livingston Essential Transportation
- Muskegon Area Transit System
- Saginaw Transit Authority Regional Services
- Harbor Transit Multi-modal Transportation System
- Macatawa Area Express (MAX)
- Midland Dial-A-Ride
- Niles Dial-A-Ride
- SMART - Lake Erie Transit
- Twin Cities Area Transportation Authority

Apportionments of FTA 5307 formula funds for small urban agencies are the responsibility of the governor of each state or a designated recipient of these funds that are then allocated to each agency based on population and density.

Rural

Rural transit agencies operate in communities or areas with less than 50,000 in population (as reported in the last census) and can be a critical lifeline for residents in lower density areas of the state that have barriers to transportation access. There is a wide variety of transit service types in rural areas that serve various trip purposes, including transporting residents over long distances for access to health care, education-related trips, employment, social and recreational activities. Many rural transit agencies provide door-to-door service through an on-demand or pre-scheduled trip service.

The FTA utilizes a different funding program to support rural transit operators across the nation that is known as the 5311 - Rural Area Formula Program. Rural agencies may use 5311 funding for planning, capital expenses and operations. 5311 formula funds flow to state DOTs or federally recognized Native American tribes, then are allocated to various rural transit operators as subrecipients.

Currently there are [more than 60 rural transit agencies operating in Michigan](#).

Intercity Public Bus

Multiple intercity bus routes currently operate across Michigan, providing connections between major cities and towns, even making connections into neighboring states. Some intercity bus services are contracted by MDOT while other intercity bus services are subsidized by MDOT or are fully independently operated (Table 72). For the last several years, Indian Trails has been one of the primary operators of many intercity bus routes in the state. Greyhound also provides intercity services on more major routes between the largest metro areas in the state

and in the United States These intercity routes also provide connections to Amtrak and other fixed-route transit providers, increasing the range of mobility options for passengers in the state. There are currently 10 intercity bus routes operating in Michigan.

Table 72 - Intercity Bus Operators and Relationship with MDOT

Intercity Bus Routes	Contracted Service	Subsidized Service	Independent Operator
Baron's Bus Line FlixBus	N	N	Y
Greyhound	N	Y	N
MDOT Contracted Routes (Currently operated by Indian Trails) Huron Hiawatha Sleeping Bear Straits Superior	Y	Y	N
Indian Trails	N	Y	N
Miller Trailways*	N	N	Y

**Miller Transportation discontinued route from Port Huron to Detroit due to low ridership and closure of the Canadian border due to COVID-19 restrictions.*

Charter Bus

Public Act (PA) 432 of 1982 (The Motor Bus Transportation Act) regulates all commercial for-hire passenger vehicles/carriers operating in Michigan carrying nine passengers or more, including the driver. Carriers authorized under PA 432 are required to maintain levels of insurance based upon the number of passengers each vehicle contains, pay yearly fees to renew each registered vehicle and each vehicle must pass an annual vehicle safety inspection.

MDOT administers the requirements of PA 432 and employs three vehicle safety inspectors to inspect the registered vehicles at the carriers' location throughout the state.

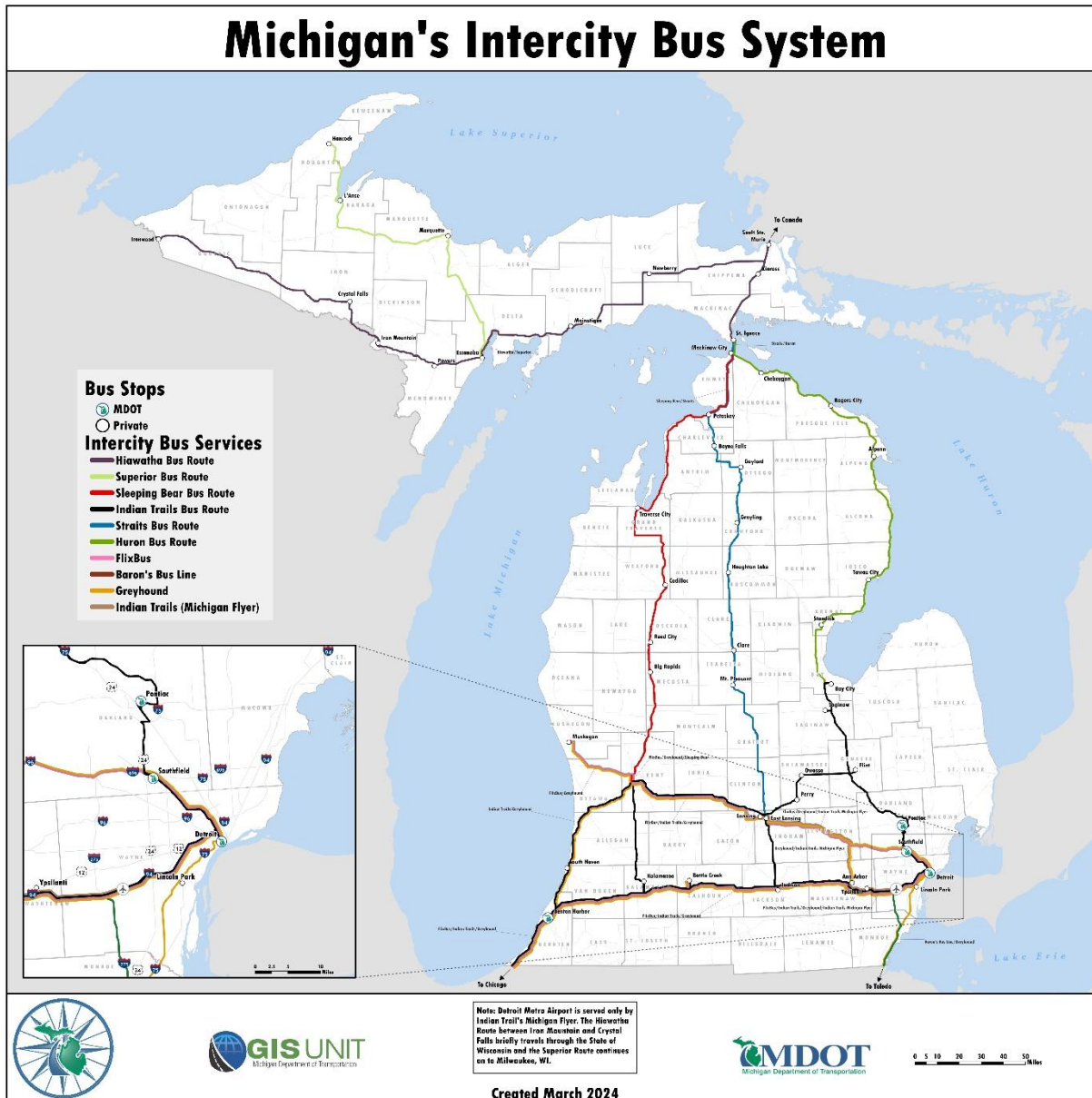
There are currently 137 commercial for-hire companies authorized in Michigan. The primary types registered with MDOT under PA 432 include:

- Charter bus: A motor vehicle with a minimum seating capacity of 33, including the driver, that is hired to transport a person or group of persons traveling from one location to another for a common purpose. A charter bus does not provide regular route service from one location to another.
- Party bus: A large motor vehicle usually derived from a conventional bus or coach but is modified and designed to carry 10 or more people for recreational purposes. Party buses can often include music systems, on-board bars and dancing poles. The basis for interior design of party buses are usually lighting effects based on modern LED panels and lasers as well as specially designed, comfortable seating (most often leather chairs) and a professional dance floor.
- Tour bus: A bus service that takes passengers sightseeing, with routes around tourist attractions.
- Intercity bus: A public transport service using coaches to carry passengers significant distances between different cities, towns or other populated areas. Unlike a transit bus service, which has

frequent stops throughout a city or town, an intercity bus service generally has a single stop at one location in or near a city and travels long distances without stopping at all.

- Shuttle bus: A bus service that transports passengers back and forth between two points and may include stops along the way (i.e., Michigan Flyer).

Figure 49 - Michigan Intercity Bus Routes



Ferries

Ferry services provide a vital transportation connection for passengers, automobiles, and commercial trucks to traverse the many waterways in and around the state of Michigan. Ferries operate on the Detroit River, Kalamazoo River, St. Clair River, St. Mary's River, Lake Charlevoix, Lake Huron, Lake Michigan and Lake Superior.

Table 73 provides a summary of all publicly and privately operated ferry services in Michigan and the services provided by each. Nearly all ferry operators transport passengers. Services that provide water transportation for cars and commercial trucks are more limited.

Table 73 - Michigan Ferry Services

Ferry Service	Area of Service	Passengers	Cars	Commercial Trucks	Bicycles
Detroit-Windsor Truck Ferry	Detroit River	-	-	X	-
Charlevoix County Transportation Authority	Lake Charlevoix	X	X	X (small)	X
Plaunt Transportation Company	Lake Huron	X	X	X	X
Shepler's Mackinac Island Ferry	Lake Huron	X	-	X	X
Star Line Mackinac Island Ferry	Lake Huron	X	-	-	X
Beaver Island Boat Co.	Lake Michigan	X	X	X	X
Lake Express	Lake Michigan	X	X	X (small)	X
Lake Michigan Car Ferry Service	Lake Michigan	X	X	X	X
Manitou Island Transit	Lake Michigan	X	-	-	-
St. James Marine	Lake Michigan	X	X	X	X
Grand Island Ferry Service	Lake Superior	X	-	X	X
Grand Portage Isle Royale Transportation Line	Lake Superior	X	-	-	-
Isle Royale Ferry Service	Lake Superior	X	-	-	-
Isle Royale National Park	Lake Superior	X	-	-	-
Saugatuck Chain Ferry	Kalamazoo River	X	-	-	X
Blue Water Ferry	St. Clair River	X	X	X	X
Champion Auto Ferry	St. Clair River	X	X	X	X
Russell Island Ferry Service	St. Clair River	X	-	-	X
Walpole-Algonac Ferry Line	St. Clair River	X	X	X (small)	X
Eastern Upper Peninsula Transportation Authority	St. Mary's River	X	X	X	X

Rideshare

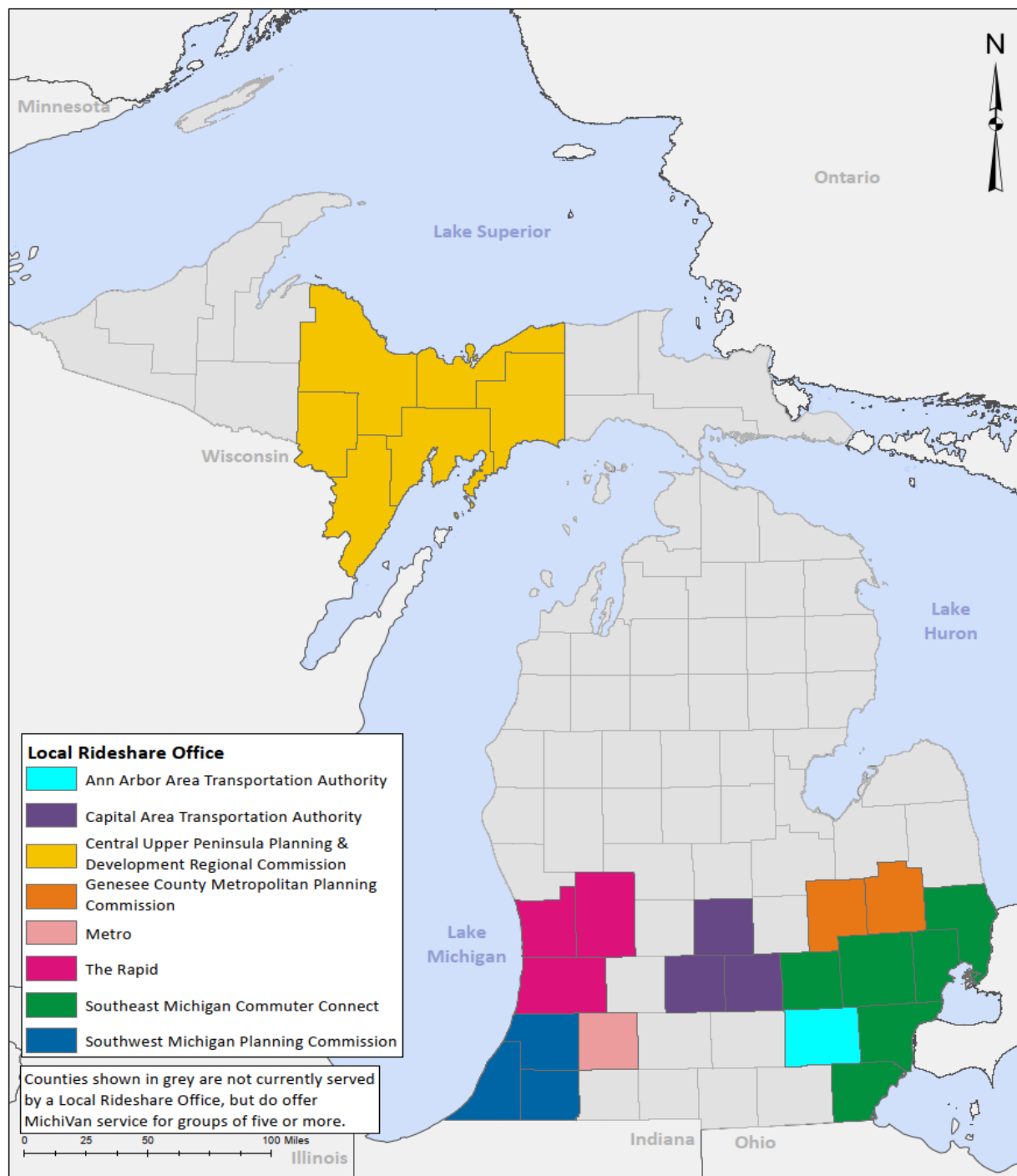
Ridesharing is a convenient way for commuters to travel to work, particularly for those who live greater distances from their places of employment. It helps commuters save on daily travel costs, including fuel, parking, and vehicle wear and tear, and helps reduce stress, congestion and improve air quality. Ridesharing

typically takes the form of carpools or vanpools formed by groups of commuters who have similar commute patterns, origins and destination areas. There are multiple local rideshare offices (LROs) across the state. These LROs help commuters find vacancies in existing vanpools/carpools or match people who are interested in forming a new carpool or vanpool. The Rapid and Ann Arbor Area Transportation Authority also provide vanpool services; the former does so themselves and the latter via a third-party contractor, Enterprise Inc. Most of these LROs offer a “guaranteed ride home” option for members when emergency travel home is required. This option is typically limited to a specific number of emergency trips per month or quarterly. Following is a list of LROs in the state, and Figure 50 displays the various counties where rideshare services are available.

- The Rapid (contracting with private carrier for service)
- Metro
- Southeast Michigan Commuter Connect
- Southwest Michigan Planning Commission
- Ann Arbor Area Transportation Authority
- Capital Area Transportation Authority
- Central Upper Peninsula Planning and Development Regional Commission
- Genesee County Metropolitan Planning Commission

MDOT also sponsors its own publicly available rideshare program called MichiVan. This vanpool service is operated by Enterprise Rideshare Services, which supplies vanpool groups with vehicles and manages the insurance, titling and other administrative needs. In 2025, the MichiVan program had 259 vehicles providing vanpool services providing 340,933 passenger trips.

Figure 50 - Rideshare Service Areas in Michigan



Public Transit Recent Trends

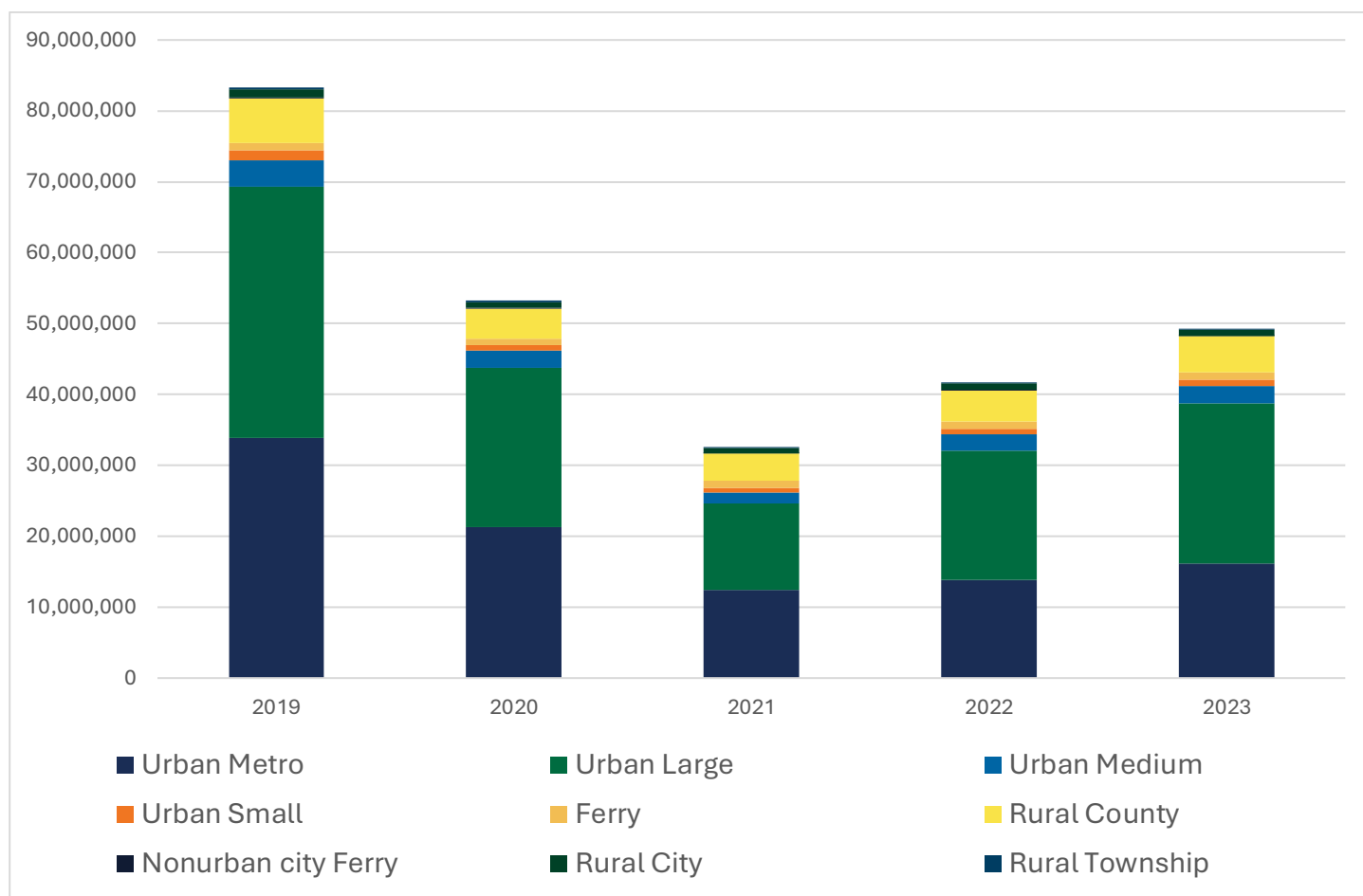
Ridership

Five-Year Public Transit Ridership Trend Statewide

Between 2019 and 2023, ridership on public transit systems has generally declined both in Michigan and across the United States. According to data from APTA³, total ridership in the United States decreased 6.9 percent in this five-year period, a decrease of more than 686 million trips.

The total ridership trend across all modes and agency designations in Michigan between 2019 and 2023 is presented in Figure 51.

Figure 51 - Total Transit Ridership, Five-Year Trend (2019-2023)



Source: MDOT Office of Passenger Transportation

³ American Public Transit Association. Ridership Report 2019. Quarterly and Annual Totals by Model. <https://www.apta.com/research-technical-resources/transit-statistics/ridership-report/>.

The five-year total ridership trend in Michigan parallels that of the nation. Between 2019 and 2023, ridership across all transit systems decreased by 30 percent, a decrease of more than 33 million trips. This is attributed to the national pandemic.

The greatest changes in total ridership in Michigan were largely experienced in the urbanized areas of the state. Rural areas of the state experienced more limited declines and, in some cases, small increases in ridership during this time.

APTA has suggested that the national downward trend in transit demand can be attributed to several national trends that include the COVID-19 pandemic emergency that has continued to impact ridership. Ridership recovery varies based on city size, with rural areas and small cities having recovered most of their ridership. APTA and OPT continue to promote new technologies and innovations to promote safe, efficient and industry best practices in public transportation.

Statewide Five-Year Revenue Service Hour Trends

While overall transit ridership has declined in the last five years, the total amount of revenue service hours of transit service available has increased. From 2019 to 2023, statewide transit revenue service hours decreased 77 percent, from 7,413,408 hours in 2019 to 5,741,086 in 2023. This is largely due to the worldwide pandemic, and while ridership is returning, we are still not back to pre-pandemic levels.

Operating Cost and Financial Five-Year Trend

Operating Cost Trend

Transit revenue service hours have experienced decreases in the past five years and operational expenses for transit services have continued to increase each year. In this same five-year period, transit ridership has declined.

Almost all categories of transit providers in Michigan have seen operational expenses increase between 2019 and 2023. The largest increase has been experienced in urbanized areas but rural service operators have also experienced operational costs growing by more than 10 percent in this five-year timeframe. Across the state, transit service expenses have risen nearly 15 percent since 2019, as seen in Table 74.

There are multiple factors that contribute to escalating transit operation expenses, several of which may be out of the direct control of transit agencies. Increased expenses may be caused by operator wages, fringe benefits (such as health insurance for employees), overtime pay, fuel prices, fleet and facilities maintenance, and several others. The rapid increase in health care costs for employees is likely one of the primary causes of the overall upward trend of transit expenses in Michigan but more refined research would be needed to define all causes of operational expense increase around the state.

Table 74 - Transit Operating Expenses Percent Increase, 2019-2023

Transit Provider Designation	Five-Year Percent Change
Urban Metro	10.4%
Urban Large	9.7%
Urban Medium	16.2%
Urban Small	11.6%
Nonurban	17.2%
TOTAL	65%

Source: MDOT Office of Passenger Transportation

Transit Fleet and Facilities

Transit Asset Management (TAM) Background and Purpose

TAM is a business model for monitoring and managing the condition of capital assets, including rolling stock, facilities, infrastructure and equipment used for public transit provision. By prioritizing funding for replacement of assets at the end of their useful life, transit providers can achieve and maintain a state of good repair, increasing safety, reliability and performance across the system. The FTA issued a final rulemaking in July 2016 requiring recipients and subrecipients of federal assistance under 49 U.S.C. Chapter 53 to develop a TAM plan (TAMP), due October 2018, and update it every four years. OPT updated the plan again in 2022.

TAMP and State of Good Repair Targets

Per the FTA's 2016 rulemaking, all TAMPs must meet certain minimum requirements. All covered providers must report their inventory of revenue vehicles, service vehicles, equipment worth more than \$50,000, and facilities, as well as the current condition of each asset. Asset state of good repair (SGR) differs by major asset class. Providers determine vehicle and equipment SGR by comparing an asset's age against the useful life benchmark (ULB) set for the asset type by the agency in reference to federal and state minimums. SGR for facilities is based on a condition assessment using the FTA's Transit Economic Requirements Model (TERM) rating system. To reach or maintain SGR, providers must describe the tools and processes used to support their investment decisions and submit a prioritized capital project list as part of the required TAMP. Tier I urban agencies must set SGR targets and further detail their TAM implementation strategies and commitments. Individual transit providers may choose to exceed the floor set by the FTA TAMP requirements. DOTs that allocate additional resources to providers, such as the matching funds provided by MDOT's OPT, may set more detailed or proactive requirements as a condition of eligibility.

Comprehensive TAMP Review

MM2045 was the first Michigan state long-range transportation plan to include a comprehensive review of TAMPs encompassing all urban, rural and nonprofit transit providers receiving federal funding from the FTA. Twenty-one Tier I large and small urban transit providers prepared and submitted standalone TAMPs. MDOT's TAM Group Plan covered the remaining 60 rural 5311 sub-recipients and 42 specialized services 5310 sub-recipients that do not receive Section 5307 funding. Nearly all TAMPs reviewed conformed to the FTA's core requirements. Tier II TAMPs varied significantly in composition, format, level of detail (particularly in how the agency planned to implement the TAMP) and frequency of updating, among other dimensions.

Some small urban providers, operating with limited staff and financial resources and likely producing a TAMP for the first time in 2018, required technical assistance to better incorporate TAM into their business processes. Many took advantage of FTA spreadsheet tools to produce their asset inventories and TAMPs. Data quality and plan completeness and uniformity issues, however, appeared during high-level review. One plan, for example, did not include annual SGR targets. Small providers that are focused on maintaining day-to-day operations for their riders may not be aware of the full scope of organizational strategies, data management and planning tools, or funding sources available to them.

Assessing Total Asset Value and Accumulated State of Good Repair Backlog

Due to a lack of uniformity in reporting asset inventory and condition, statewide indicators of asset value and accumulated backlog to maintain SGR cannot currently be quantified at either the aggregate level or for the major asset classes in dollar terms. As a result, the point-in-time capital needs to achieve SGR for Michigan's transit system remain uncertain.

Transit System Fleet Age/Condition

Fleet Age and Condition

As of 2018, the last available NTD reporting year,⁴ Michigan's 122 specialized service providers, large urban, small urban and rural public transit agencies (Tier I and Tier II) had an inventory of 4,255 revenue vehicles and 345 service vehicles. Across specialized service, Tier I and Tier II reporters, 17.4 percent (n=742) of revenue vehicles met or exceeded ULB. Nearly 33 percent of urban, 54 percent of rural and 54 percent of specialized services non-revenue vehicles are also past their ULB.

The following presents additional details regarding transit system fleet age and condition:

- Not more than 10 percent of automobiles or sport utility vehicles (SUVs) will exceed their ULB of seven years.
- Not more than 10 percent of vans will exceed their ULB of seven years.
- Not more than 10 percent of cutaways will exceed their ULB of 10 years.
- Not more than 15 percent of medium duty buses will exceed their ULB of 10 years.
- Not more than 15 percent of large revenue vehicles will exceed their ULB of 14 years.
- Not more than 40 percent of ferry boats will exceed ULB, which is 42 years.

Source: FTA National Transit Database 2018

Transit Facilities

Facility Condition

In 2022, Tier I, Tier II and specialized service providers reported 158 administration offices, parking facilities, maintenance facilities and transit stations for which they had capital responsibility.⁵ Table 75 presents the five categories of facility condition as defined by the FTA's TERM rating system.⁶

Table 75 - TERM Rating Scale

TERM Rating	Condition	Description
Excellent	4.8 - 5.0	No visible defects; new or near new condition; may still be under warranty if applicable
Good	4.0 - 4.7	Good condition but no longer new; may be slightly defective or deteriorated but is overall functional
Adequate	3.0 - 3.9	Moderately deteriorated or defective but has not exceeded useful life
Marginal	2.0 - 2.9	Defective or deteriorated; in need of replacement; exceeded useful life
Poor	1.0 - 1.9	Critically damaged or in need of immediate repair; well past useful life

Source: FTA

Transit Safety, Health and Security

Public Transit Agency Safety Plans (PTASP)

In summer 2018, the FTA published the final rule on PTASP that required transit agencies receiving Urbanized Area Formula funding to create safety plans that would implement Safety Management Systems (SMS). PTASPs require each agency to certify that it has a safety plan in place to evaluate and mitigate safety risks, and that

⁴ Federal Transit Administration. 2019. *National Transit Database, 2018 Vehicles (Forms A-30 & A-35)*

⁵ Federal Transit Administration. 2019. *National Transit Database, 2018 Facility Inventory (Form A-15)*.

⁶ Federal Transit Administration. [Performance Management](#).

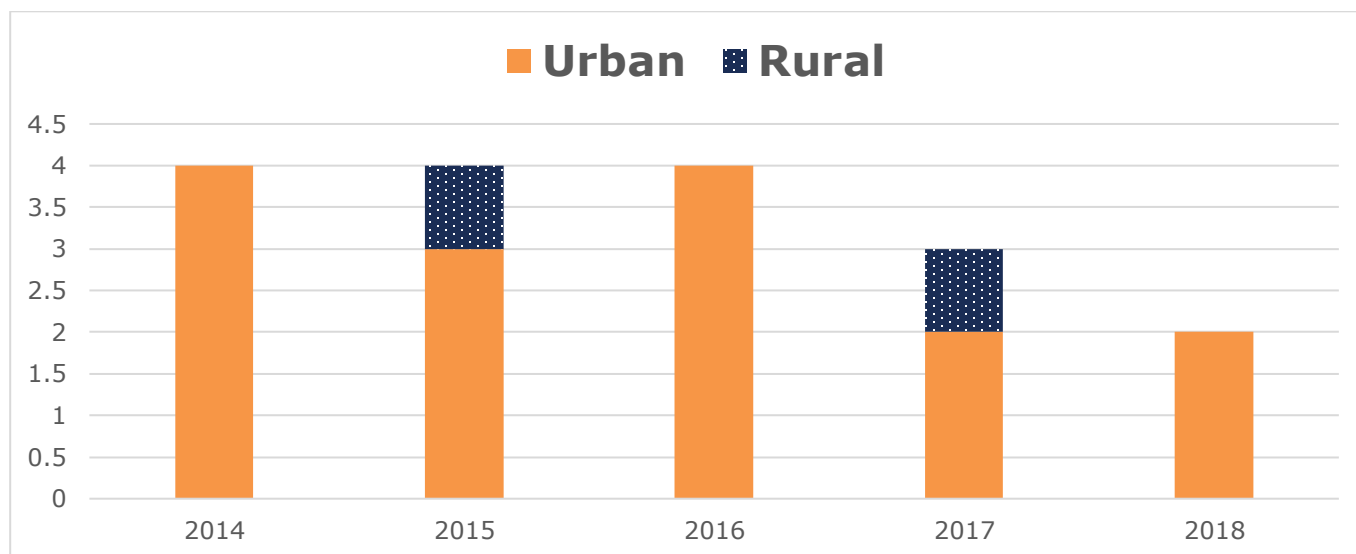
each plan includes safety performance targets aimed at improving the overall safety of transit systems. The PTASP rule became effective in July 2019 with a compliance deadline of Dec. 31, 2020. Transit agencies in urbanized areas across Michigan have developed agency safety plans that have established safety management systems that will improve an already highly safe mode of travel in the state.

Public Transit Agency Safety Trends

One of the key priorities of all transit agencies is to safely get passengers from origin to destination without incident. Since 1974, the FTA has maintained the NTD to keep a record of all injuries and fatalities that have occurred on transit systems nationwide. The NTD defines an injury as any incident requiring immediate medical attention away from the scene for one or more persons. In 2018, nearly 11,000 such injuries and 266 fatalities occurred nationwide.

To understand the rates at which transit riders are injured or killed within the state of Michigan, an analysis of the NTD data for the most recent five-year period (2014-2018) was undertaken. Injury and fatality data were further broken down into urban and rural areas to identify any trends. The results of the analysis can be found in Figures 52 and 53.

Figure 52 - Transit Fatalities 2014-2018



Source: FTA National Transit Database 2018

There are several trends evident in these figures. First, for both fatalities and injuries, incidents are taking place overwhelmingly in urban areas. In the last five years, only 11.7 percent of fatalities and 2 percent of injuries have occurred in rural areas. Second, fatalities have generally trended downward. 2018 reported the lowest rate of fatalities in the previous five-year period and shows a 50 percent decrease between 2016 and 2018. Third, injuries are trending upward. 2017 reported the highest rate of injuries in the previous four years and 2018 shows an 8 percent increase in the previous five-year period between 2014 and 2018.

Disaster Response and Recovery

MDOT and OPT have important roles in assisting with the planning, response and recovery from natural or human-made disasters. The Emergency Management Act (1976) allows for counties and municipalities to enter into mutual aid agreements with other counties, municipalities, public agencies (including transit) and private

sector agencies to respond to emergencies or natural disasters. As part of the [Michigan Emergency Management Plan](#) (MEMP), public transit agencies may serve a vital function in utilizing transit vehicles to evacuate persons from a disaster area. While public transit infrastructure may be utilized in disaster response, transit infrastructure itself (along with transit passengers) may be the target of terrorism or other disasters that agencies must plan, prepare and mitigate risks in the best manner possible. In FY 2020, MDOT and OPT provided funds to transit agencies to assist in the development of disaster response plans.

Conclusions

This white paper explains in extensive detail the state of Michigan's multimodal transportation network with its current inventory, conditions and overall performance (safety, usage, ridership and congestion). Extensive details on the highway network and each of its assets, along with the other modes (transit, rail, aviation, maritime and active transportation) provide Michigan a robust transportation network with extensive investments and infrastructure to maintain and modernize. Including information on more than 86,500 lane miles of federal-aid roads, more than 11,200 bridges, more than 3,750 miles of active transportation routes, more than 80 transit providers, 3,600 miles of rail corridors, 242 airports and 33 maritime ports provides a rich story of how the transportation system is operating and serving and connecting people, communities and the economy through transportation. This information is then used to further inform the performance of our system in the Performance Measures, Strategic Multimodal Corridors and System Performance Report white papers, along with the Needs Analysis, Financial Plan and Revenue Gap white papers, and are the cornerstone for strategies and implementation activities. Please review each of these white papers for more detailed information.