Michigan Mobility 2050: Freight Performance – Bottlenecks and Supply Chains

A transportation plan for a connected future.

Michigan Department of Transportation

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Abbreviations and Acronyms

AI	artificial intelligence
EV	electric vehicle
ICE	internal combustion engines
JIS	just-in-sequence
JIT	just-in-time
MM2050	Michigan Mobility 2050
NHS	National Highway System
NPMRDS	National Performance Management Research Data Set
OEM	original equipment manufacturer
USMCA	United States-Mexico-Canada Agreement

Introduction

Michigan Mobility 2050 (MM2050) builds on the foundation laid in the prior plan, Michigan Mobility 2045 (MM2045). In 2021, WSP prepared the Multimodal Freight Trends report in support of MM2045. To support MM2050, this white paper provides updates to address trends that have emerged or developed significantly since the 2021 Multimodal Freight Trends report. Trends covered in this white paper include trade restructuring and disruption since the COVID-19 pandemic, e-commerce growth and impacts, advances in freight technology, recent threats to the workforce, major changes in freight rail and the continued emergence of alternative fueling as one response to climate change.

Congestion Impact on Truck Freight Movement

Overview

Roadway congestion increases the cost of truck freight movement by adding both travel delay and schedule unreliability. This section quantifies the economic impacts of congestion on truck travel across Michigan's National Highway System (NHS) for the calendar year 2025.

Methodology

This analysis applies the methodology from the National Cooperative Highway Research Program (NCHRP) Research Report 925, Estimating the Value of Truck Travel Time Reliability, to estimate congestion impacts for trucks using travel time data from the Federal Highway Administration National Performance Management Research Data Set (NPMRDS). The analysis evaluates NHS roadway segments represented in NPMRDS by traffic message channel segments.

The approach estimates congestion in two parts:

1. Recurring congestion (typical day-to-day delay relative to free-flow conditions).
2. Non-recurring congestion (unpredictable delay associated with incidents, weather, work zones and other disruptions).

These impacts are calculated in time units and then monetized using the truck travel time and reliability valuation parameters recommended in NCHRP Report 925, with all values escalated to 2025 dollars.

Truck bottlenecks were identified using a relative threshold approach. Bottlenecks are defined as roadway segments in the top 5 percent (95th percentile) of truck user costs per mile.

Separate thresholds were applied for urban and rural areas to reflect differences in congestion magnitude and operating characteristics. Urban locations typically experience higher traffic volumes and more persistent delays, while rural locations may experience fewer congestion events that are more severe when disruptions occur. Applying a single statewide threshold would disproportionately identify metropolitan locations and underrepresent high-impact bottlenecks in rural corridors.

Urban and rural classifications follow the NPMRDS designations based on the U.S. Census Bureau's urbanized area definitions.

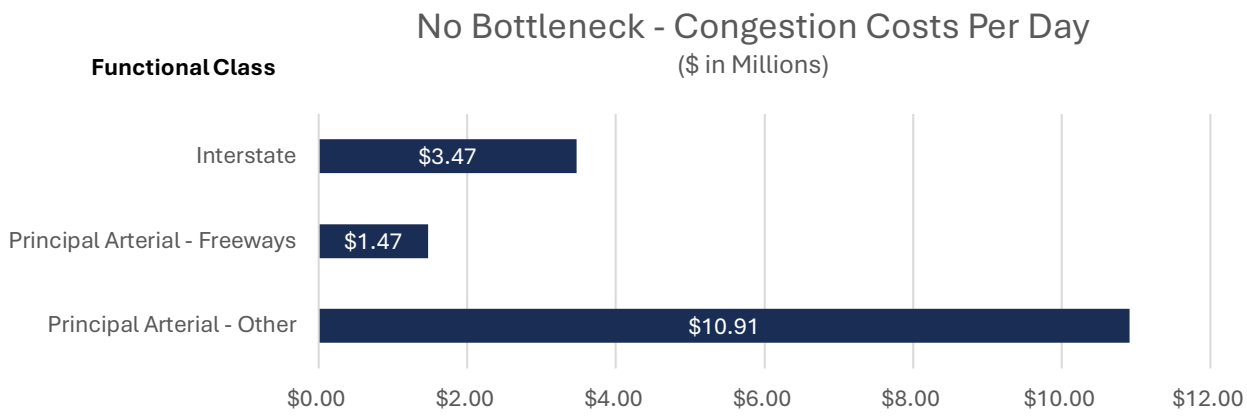
Results Summary

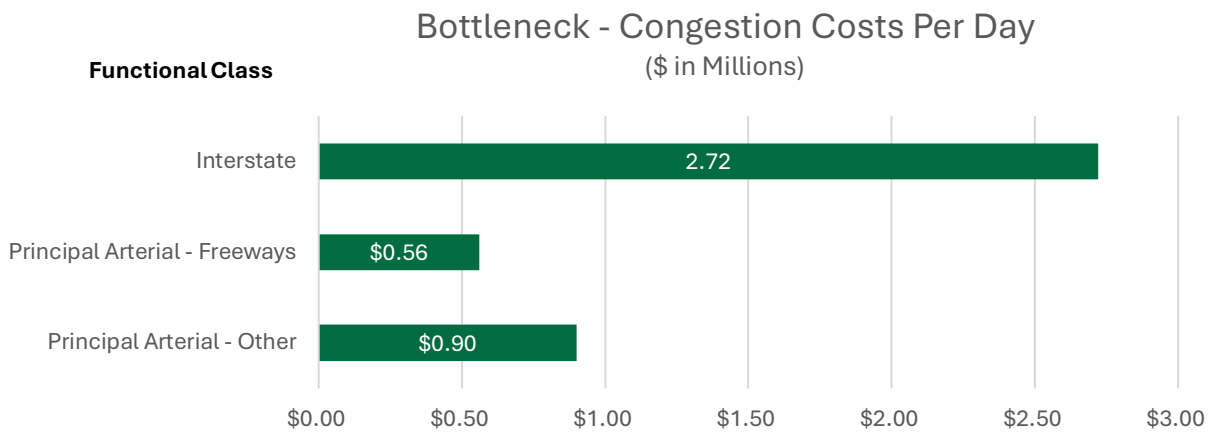
Statewide Congestion Costs

Congestion costs were estimated across the full NHS network monitored by NPMRDS, not limited to bottleneck segments. This systemwide assessment captures the broader freight impacts of recurring delay and unreliability across production-to-distribution supply chains. Congestion costs represent more than delay alone; they also reflect reliability impacts that affect scheduling, productivity and logistics planning.

Interstates contribute almost 31 percent of total truck congestion costs, even though they account for approximately 19 percent of the total NHS network mileage. Other freeways and arterials account for 69 percent of total congestion costs and 79 percent of mileage. At identified truck bottlenecks, interstates account for approximately 65 percent of the congestion costs while representing 53 percent of the bottleneck mileage. Figure 1 shows congestion costs by functional class and bottleneck category.

Figure 1 - Congestion Costs by Functional Class and Bottleneck Category





Source: WSP Analysis of 2025 NMPRDS Data.

Truck Bottlenecks

Analysis of truck travel time and reliability on Michigan's NHS identified 622 high-cost truck bottlenecks, defined as roadway segments within the 95th percentile of user costs per mile. Collectively, these bottlenecks generate an estimated $4.2 million per day in congestion costs. Table 1 summarizes bottleneck characteristics by location and roadway context.

Table 1. Truck Bottleneck Thresholds and Totals

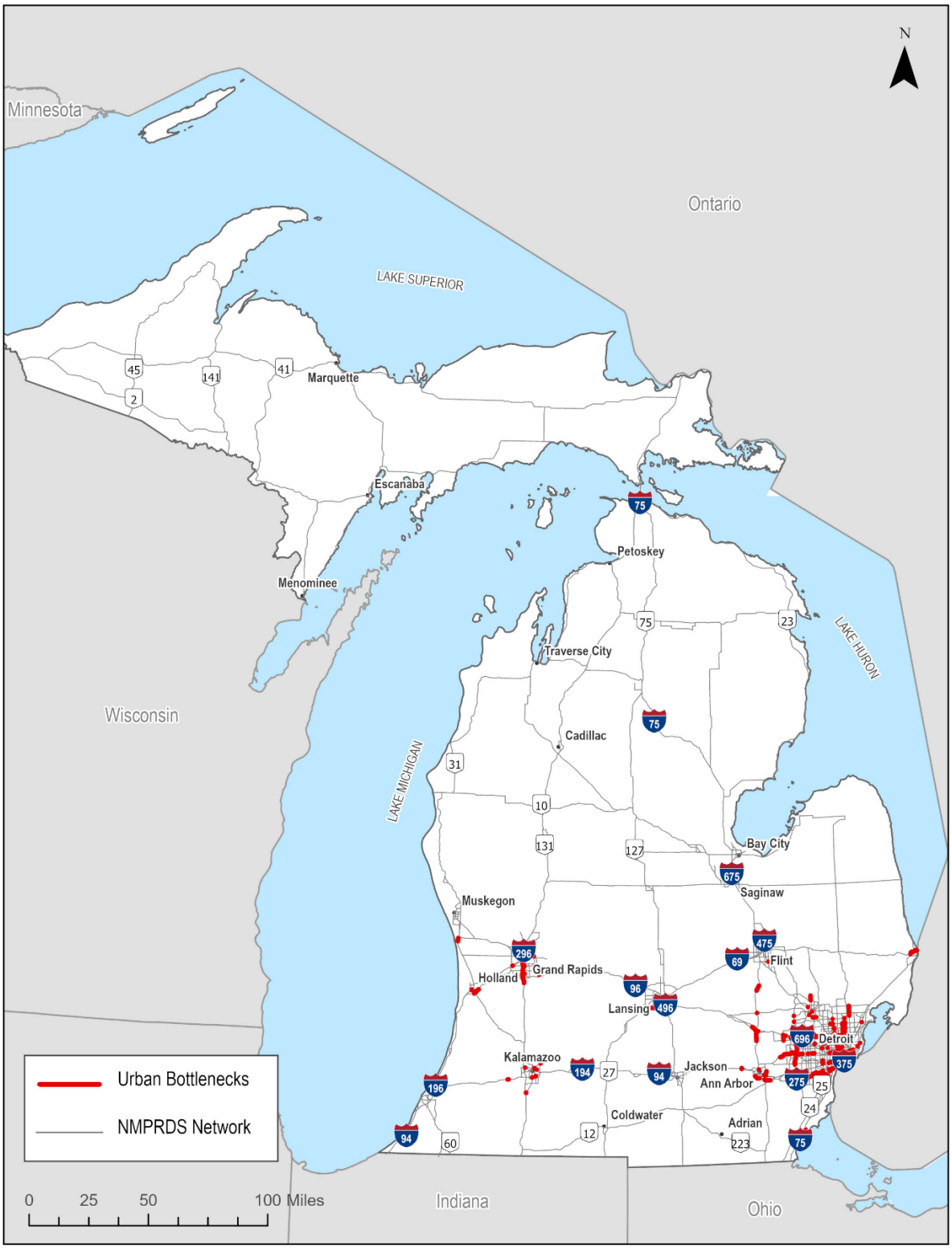
Bottleneck Location	User Cost Threshold ($/mile-day)	Bottleneck Centerline Roadway Miles	Number of Bottleneck Segments (TMCs)
Urban	$8,910	181	474
Rural	$3,264	180	148
Total	NA	361	622

Source: WSP Analysis of 2025 NMPRDS Data and NCHRP Report 925.
Key: TMC = traffic message channel; NA = not applicable

Of the identified bottlenecks, 474 are in urban areas, accounting for approximately $3.1 million per day in congestion costs (refer to Figure 2). Urban congestion impacts are heavily concentrated in southeast Michigan. More than 60 percent of identified urban bottlenecks statewide occur in the Detroit region, including 227 bottlenecks in Wayne County (Detroit) and 155 bottlenecks in surrounding counties, including Oakland, Macomb, Washtenaw, Livingston, St. Clair, Lapeer and Monroe.

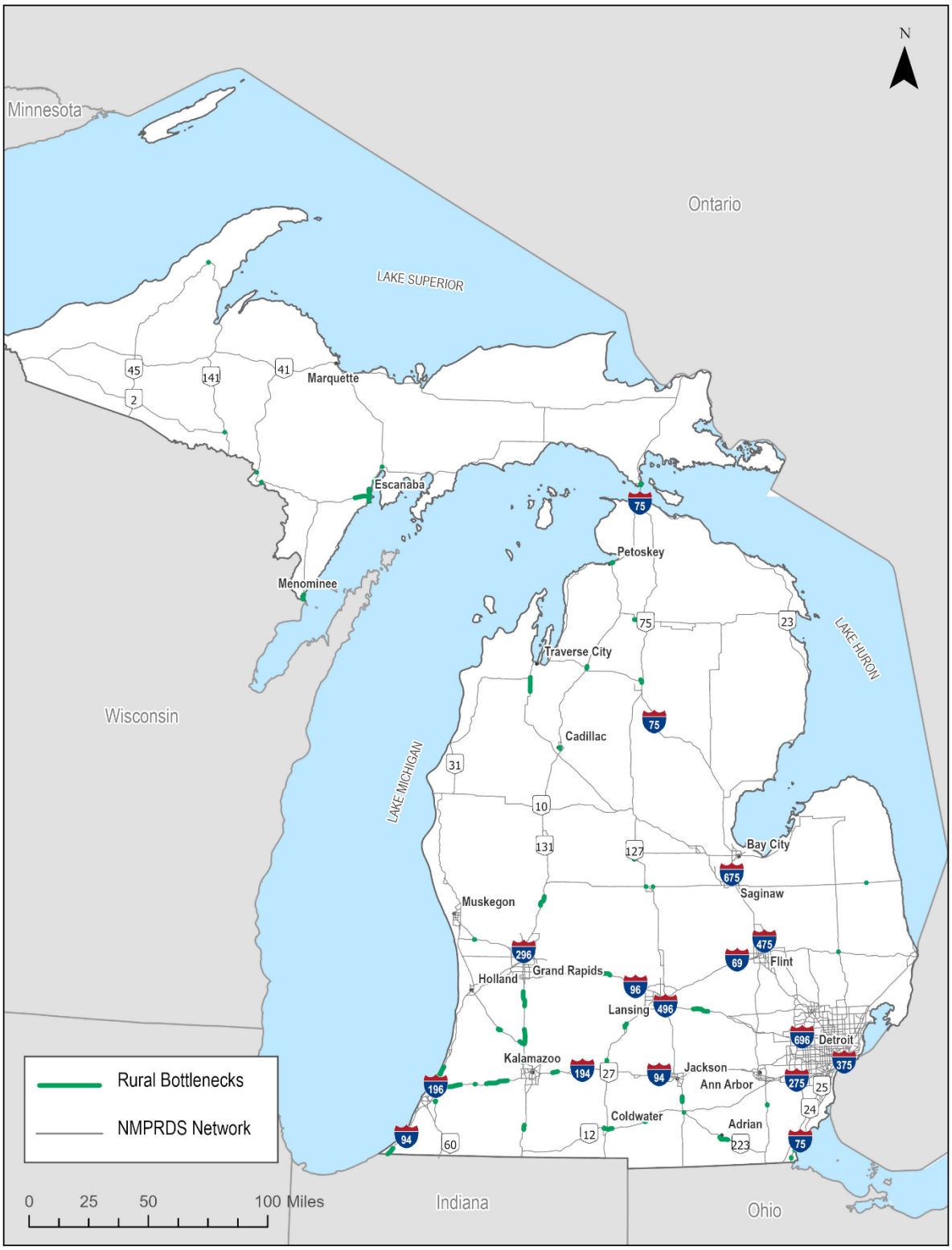
Figure 3 shows the remaining 148 bottlenecks are in rural areas, generating approximately $1.1 million per day in congestion costs.

Figure 2 - Urban Truck Bottlenecks



Source: WSP Analysis of 2025 NMPRDS Data and NCHRP Report 925.

Figure 3 - Rural Truck Bottlenecks



Source: WSP Analysis of 2025 NMPRDS Data and NCHRP Report 925.

Michigan Automotive Supply Chain

Michigan's mobility industry is a major player in the state's economy, contributing about 27 percent of Michigan's gross state product and up to $348 billion in gross economic output from direct, indirect and induced activities, resulting in about 1.2 million jobs.[1] Analysis from the Alliance for Automotive Innovation notes that the state's automotive sector alone accounted for $69.4 billion in gross state product and 447,500 jobs in 2023.[2] Michigan is home to about 19 percent of the national vehicle manufacturing output, with about 2 million units of light-duty vehicles produced in 2024, accounting for 19 percent of all U.S. automotive production. This industry in Michigan is supported by a highly dense local supplier network, with 95 out of the 100 top automotive suppliers to North America having a presence within the state. It is also home to about 25 original equipment manufacturers (OEMs) and more than 2,000 mobility parts suppliers.

Before the COVID-19 pandemic, Michigan's auto sector thrived on lean, just-in-time (JIT) practices and deep integration with suppliers and manufacturers in Canada and Mexico. However, during the pandemic, the auto supply chain in Michigan faced resiliency issues and production disruptions, costing an estimated $12 billion in lost output from 2020 to 2022. This led to increased adoption of mitigating strategies, including investments in technology to enhance visibility across the supply network, nearshoring and inventory policies.[3] The rest of this section examines Michigan's automotive supply chain in detail, including key trends such as the expansion of electric vehicle (EV) and battery manufacturing, cross-border flows, logistics operations and an outlook on future risks. Each section highlights pre- and post-pandemic differences where relevant.

Michigan Automotive Supply Chain Design

Michigan hosts all Big Three U.S. automakers' headquarters or major operations: General Motors and Ford are headquartered in Detroit and Dearborn, respectively, and Stellantis North America in Auburn Hills. The state's automotive ecosystem spans OEM assembly plants, Tier 1 system suppliers, and Tier 2 and 3 component makers, as well as specialized tooling, robotics,[4] and research and development firms. Tier 1 suppliers supply systems and major auto components like large-scale modules, seating, electronics and powertrains, while Tier 2 and 3 mostly supply parts, raw materials and subcomponents such as steel and plastic. Table 2 showcases a few examples of Michigan automotive suppliers.

Table 2 - Michigan Automotive Supply Chain Multi-Tier Supplier Network

Tier	Supplier	Services
Tier 1	Magna International	Body structures, seating, powertrains
Tier 1	Robert Bosch	Electronics, braking systems, and sensors
Tier 1	BorgWarner	Drivetrain and powertrain components (EV)
Tier 2 and 3	AmeriSteel	Automotive-grade steel
Tier 2 and 3	Musashi NA	Transmission and suspension parts
Tier 2 and 3	Sunroof Express	Original equipment sunroof replacement

[1] *MichAuto. 2026. "Mobility Industry's Economic Contribution in Michigan." Accessed on May 15, 2026.*

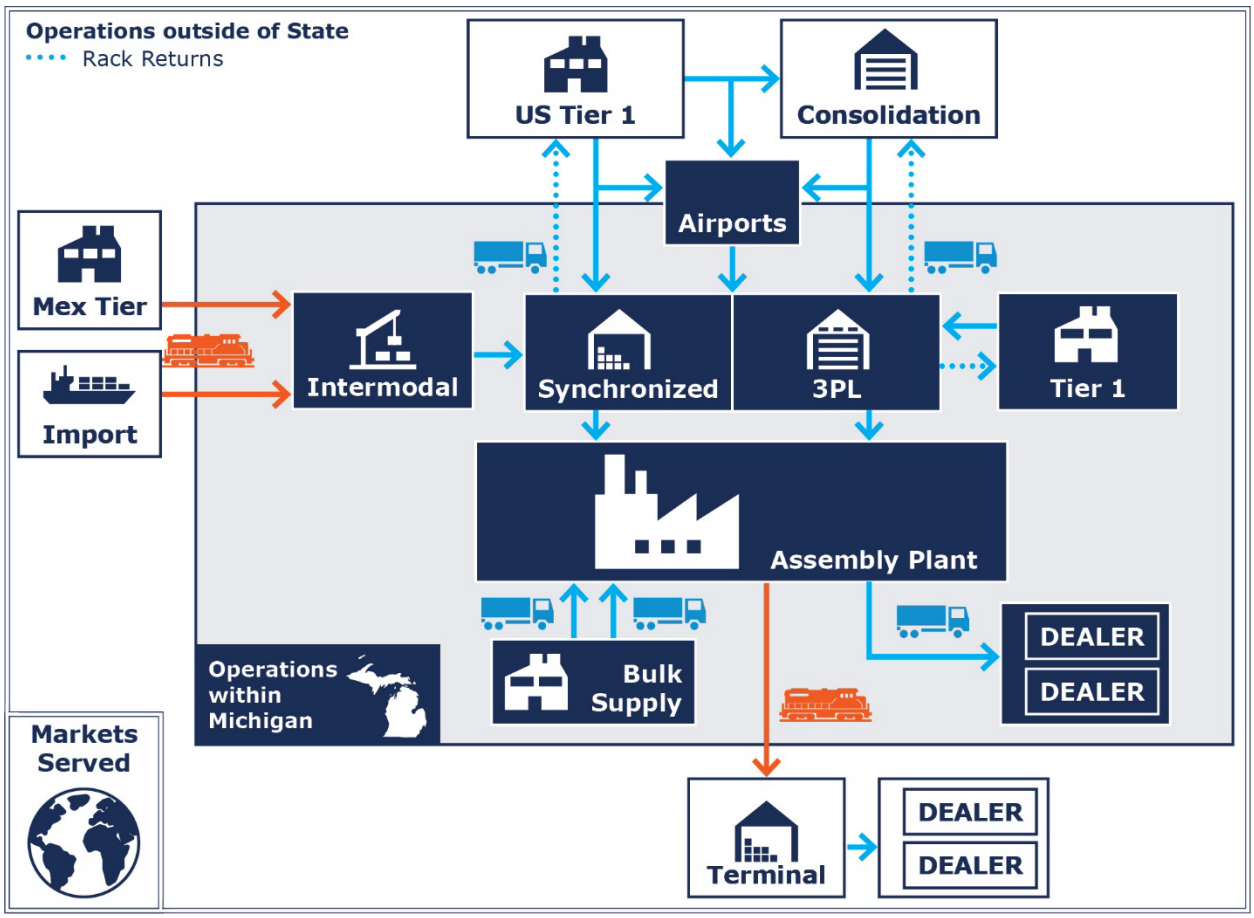
[2] *Alliance for Auto Innovation. 2025. "Autos Drive Michigan Forward." Accessed on May 21, 2026.*

[3] *Ibid.*

[4] *Ibid.*

Figure 4 demonstrates a rich network of in-state supply chain facilities that support the OEM. Though in-state Tier 2 and 3 suppliers are not shown, a large network of these businesses supports the operations of hundreds of Tier 1 suppliers in Michigan. Intermodal transportation infrastructure within the state also supports regional supply chain processing flows from integrated partners in Mexico and Canada.

Figure 4 - Michigan Automotive Supply Chain



Overall, the key Michigan automotive supply chain design indicates that the pre-COVID supply chain was optimized for cost and efficiency with minimal slack. This supply chain had the following attributes, which persist to the present:

Tiered supplier network:

- OEMs: Assembly plants
- Tier 1 suppliers: Feed OEMs
- Tier 2 and 3 suppliers: Feed Tier 1 suppliers

Localization (adapting supply chains to local markets) with select regional integration - short lead times and frequent deliveries:

- Dense concentration in southeast Michigan
- Extended network across Ontario, Canada and Mexico (production and parts sourcing)

Logistics and modal design - precise scheduling and synchronized flows:

- Predominantly truck-based JIT delivery to consolidation points and assembly plants
- Rail/intermodal used for bulk materials like steel and heavy parts
- Air freight is used selectively for critical shortages, such as semiconductors
- Finished vehicles are shipped by truck to regional markets and by rail to national markets, with local truck delivery

Centralized production model:

- Assembly plants operate with JIT and just-in-sequence (JIS) delivery
- Support from third-party logistics firms, consolidation centers

Reverse logistics:

- Use of returnable containers increases supply chain visibility and reduces waste
- EV battery logistics focusing on repairing and recycling EV batteries

Warehouse network design optimized for JIT:

- Minimize storage time with cross-dock facilities
- Serve as sortation centers to support JIS
- Support reverse logistics

Routing:

- Specialized routing to support time-critical logistics
- Requires knowledge of heavy haul truck routes in Michigan

Supply Chain Visibility and Resiliency

The pandemic disruption underscored how opaque supply chains hindered rapid response. Opacity in supply chains refers to the extent of information blind spots and poor communication between companies and lower-tier suppliers. Maersk states that there has been a sharp decline in C-Suite mentions of supply chain resiliency or visibility from 2022 to 2024. "More C-Suite mentions typically signal that trends are in the early or early adopter stage, while fewer indicate movement toward full integration or the industry standard."[5] Post-2020, digitization accelerated, leading to 35 percent of Michigan auto suppliers adopting technologies for tracking inventory logistics, compared to about 20 percent in 2020. Generally, this push to enhance real-time supply chain monitoring to combat bottlenecks has led to increased investments in supply chain control towers; personalized dashboards of data, key business metrics and events across the

[5] *Maersk. 2026. Supply Chain Visibility. Accessed on: May 22, 2026.*

supply chain; electronic data interchange integration; technologies that facilitate business-to-business workflows in digital format (such as emails); and analytics. Following the disruptions due to COVID, many firms are marginally lengthening inventory buffers for critical parts (especially semiconductors), though still striving to keep inventory efficient. Other initiatives like the Michigan Economic Development Corp.'s Connex Michigan are connecting local suppliers with OEM needs to improve supply chain matching and diversification.

Post-COVID, there has been an uptick in resiliency strategy adoption across the Michigan automotive industry. Initial focus on single-sourcing and minimal safety stock has given way to dual sourcing of key components, strategic stockpiling and nearshoring to reduce over-reliance on overseas shipments. For example, General Motors struck strategic U.S. production deals for semiconductors (for example, with GlobalFoundries) to secure chip supply, while Ford invested in domestic battery plants to localize EV components. Overall, key Michigan automotive industry supply chain resiliency strategies include the following:[6]

- Multi-sourcing and buffer inventory to counteract shortages from potential disruptions.
- Multi-tier supply chain visibility to enhance responsiveness to disruptions.
- Investments and partnerships in critical product development are needed to avoid production halts or safety hazards.
- Supplier base diversification into new industries such as EVs. Digital tools also enhance resilience. Supply chain "control towers" and predictive risk analytics help foresee disruptions (for example, weather and port delays) and act proactively.

As EV adoption in the state evolves, there are some notable differences in resilience strategies between internal combustion engine (ICE) vehicles and EVs,[7]highlighted in Table 3. It is worth noting that the EV supply chain requires fewer mechanical components, depends heavily on critical materials (like lithium), and has new supplier tiers that are not applicable to ICE.

Table 3 - Pre-COVID Versus Post-COVID Resilience Strategies

Dimension	ICE Model (Pre-COVID)	EV Model (Post-COVID Shift)
Supplier visibility	Tier 1-focused	Deep-tier (raw materials)
Sourcing	Global, cost-driven	Regional and diversified
Inventory	Lean JIT	Strategic buffers
Risk focus	Component supply	Materials and technology supply
Integration	Limited	High (vertical integration)

Key: EV = electric vehicle; ICE = internal combustion engine; JIT = just-in-time

In summary, Michigan's post-COVID supply chain aims to retain its trademark efficiency while embedding more transparency and flexibility to absorb shocks.

[6] *Foley and Lardner LLP. "Securing the Future: Tackling Automotive Material Challenges in a Changing World."*
[7] *Ibid.*

Michigan EV and Battery Supply Chain

Michigan has been at the forefront of the EV transition, hosting major facilities for EVs and components. In 2023, the state secured more than 13 percent of the national EV manufacturing investments, totaling roughly $17 billion.[8] This is indicative of the adoption trends, which show the state's registered EV or hybrid vehicle fleet rising from 1.3 percent in 2020 to 3.9 percent in 2025, according to the Michigan Economic Development Corp.

Figure 5 shows a simplified version of Michigan's EV supply chain, including EV assembly plants and battery plants as core components.

Figure 5 - Michigan Electric Vehicle Supply Chain

Before 2020, Michigan's EV manufacturing was limited (Chevrolet Bolt, hybrid components) and battery production was modest. Since 2021, EV manufacturing has ramped up, spurred by the coronavirus recovery and climate policy momentum (including the Inflation Reduction Act of 2022's incentives), leading to several gigafactory projects within the state.

However, since federal incentives for EVs were discontinued in 2025, coupled with shifting consumer preferences and the rollback of stricter fuel-economy regulations, demand dropped significantly, with impacts felt throughout the supply chain.

Terlep details the stark disparity between corporate projections and market reality. While GM initially forecasted the production of 600,000 electric trucks, it realized only 11,000 actual sales for the Silverado EV in 2025, which has led to staff reductions at the Magna International battery facility in St. Clair, Michigan.[9]

The author also cites the elimination of more than $20 billion in previously announced EV facility investments in 2025. The downstream consequences for the supply chain have been severe; many Tier 1 and Tier 2 suppliers have been unable to absorb the massive, unrecouped upfront costs of dedicated assembly lines following sudden vehicle program cancellations, leading to dozens of underutilized or empty EV parts plants.[10] Other Michigan battery factories have pivoted to energy storage to salvage billions

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[8] *Michigan Economic Development Corp. 2023. "Michigan a Top State for Electric Vehicle & Battery Investments."*
[9] *Sharon Terlep. 2026. "America Now Has an EV Rust Belt. High Gas Prices Won't Rescue It." Accessed on: May 28, 2026.*
[10] *Michael C. Anderson. 2026. "EV 'Rust Belt?' Why Flexible Manufacturing Could Be Suppliers' Path Forward." Accessed on: May 28, 2026.*

in EV investments.[11] Whether spikes in fuel prices in 2026 will be enough to shift consumer sentiment toward EVs or alter manufacturer production plans remains to be seen.

Cross-Border Automotive Relationships - Canada and Mexico

Michigan's auto supply chain is fundamentally binational and trinational thanks to decades of integration under the North American Free Trade Agreement (now United States-Mexico-Canada Agreement [USMCA]). Canada and Mexico are Michigan's top trading partners by far. In 2025, Canada and Mexico received approximately $21.2 billion (36 percent) and $16.6 billion (29 percent), respectively, of Michigan's exports, mainly vehicles and parts. However, while trade between Michigan and Canada is more balanced, its imports from Mexico ($78.9 billion in 2025) vastly exceed its exports ($16.6 billion), since Mexico supplies vast quantities of parts and assembled vehicles to Michigan. Outbound flows from Michigan often include engines, transmissions and machinery, while inbound flows are parts, modules and fully assembled models.

As a result, the Michigan automotive sector is a significant contributor to cross-border traffic between Mexico and Canada. According to the Cato Institute, "Mexico and Canada are both the main sources of U.S. imports of motor vehicles and motor vehicle parts, and the major purchasers of U.S. exports of these same products."[12]

The following subsections highlight insights from Transearch data echoing the deeply integrated supply chains between these countries and Michigan's automotive sector.

Truck Outbound Flows: Outbound truck data show that Canada is the largest non-U.S. destination for Michigan automotive freight, led by Ontario. These flows reflect high-frequency, relatively short-distance movements consistent with tightly integrated cross-border production networks.

Mexico also appears as a significant outbound truck destination, indicating Michigan's role in supplying longer-haul automotive supply chains extending into Mexico. Compared with Canada, Mexico-bound shipments are fewer in destinations but remain substantial in volume and value (Table 4).

Rail Outbound Flows: Outbound rail flows from Michigan are more geographically concentrated than truck flows. Canadian destinations are prominent, reinforcing the role of rail in handling heavier or consolidated automotive shipments between Michigan and Canada.

No Mexico destinations appear in the Transearch data, which suggests that Michigan-Mexico automotive movements rely primarily on truck rather than rail in the observed data.

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[11] Kurt Nagl. 2026. "Michigan battery factories pivot to energy storage to salvage billions in EV investments." Accessed on: May 28, 2026.

[12] Cato Institute. 2025." Seven Charts Showing How Canada/ Mexico Tariffs Would Harm the US Auto Industry." Accessed on: May 22, 2026.

Table 4 - Michigan Automotive Outflows by Mode

Mode	Country	Count	Tons (100,000)	Value ($B)
Rail	Canada	40	2.57	2.79
Truck	Canada	3,454	4.15	5.96
Truck	Mexico	2,716	3.03	3.20

Truck Inbound Flows: Inbound truck origin data confirm Canada as a major source of automotive freight entering Michigan, consistent with two-way parts exchange and cross-border production sharing. These flows closely mirror outbound truck patterns, emphasizing reciprocity in Michigan-Canada automotive logistics (Table 5).

Mexico tells its own unique story. The data indicates that incoming trucks from Mexico are higher than those generated from Canada, with less than half of Canada's tonnage. It suggests that less heavy automotive components are trucked in via Mexico.

Rail Inbound Flows: Inbound rail origins further emphasize Canada's importance to Michigan's automotive system. Rail shipments entering Michigan are dominated by U.S. and Canadian origins, reflecting rail's role in longer-haul and higher-tonnage movements.

Similar to the rail outbound flows, Transearch data provides no Mexico rail origins, reinforcing the truck-centric nature of Michigan-Mexico automotive flows.

Table 5 - Michigan Automotive Inflows by Mode

Mode	Country	Count	Tons (100,000)	Value ($B)
Rail	Canada	31	6.46	6.83
Rail	Mexico	3	0.07	0.06
Truck	Canada	6,135	24.79	15.06
Truck	Mexico	8,361	11.67	8.81

Through-Flows: Through-flows measure the role Michigan plays as a corridor for automotive freight. They are characterized by freight movements that did not originate and terminate within the state (Table 6).

These through-flows highlight Michigan's position as a continental freight corridor, linking Canada with the U.S. Midwest and South, and indirectly with Mexico-oriented routes. Such movements contribute to congestion, infrastructure wear and operational demands independent of Michigan's internal economic activity.

Table 6 - Michigan Automotive Through-Flows by Mode and Trip End

Country	Count	Trip End	Tons (100,000)	Value ($B)
Canada	18,950	Destination	13.72	16.12
USA	18,177	Destination	14.78	10.48
Canada	17,767	Origin	14.74	10.43
Mexico	369	Origin	0.03	0.04

Through-flows significantly expand Michigan's freight footprint, adding more than 55,000 trucks to its highways. This underscores the importance of corridor planning that includes external origins and destinations.

Internal-External and USA Flows: The section provides aggregate internal-external flows by mode as well as inbound and outbound U.S. flows. U.S. flows depict freight traffic between Michigan and the rest of the United States, while internal-external flows represent cross-border freight traffic passing through Michigan with one of the trip ends located within the U.S. (Table 7). The data highlights that, regardless of mode, the state of Michigan is a net exporter of automotive goods to the rest of the country.

Table 7 - USA - Michigan and Through-Flows by Mode

Mode	Count	Tons (100,000)	Value ($B)	Traffic Type
Rail	405	39.57	42.87	Outbound
Truck	62,531	62.64	59.25	Outbound
Rail	183	21.89	22.07	Inbound
Truck	48,913	42.47	34.12	Inbound
Truck	19,003	13.73	16.13	Through with U.S. Origins
Truck	18,177	14.78	10.48	Through with U.S. Destinations

Key system level observations include:

- Canada dominates Michigan's automotive freight relationships across inbound, outbound and through-movements, and across both truck and rail modes.
- Mexico's interaction with Michigan shows an imbalance in truck flows, with outbound flows equating to about a third of inbound. Due to the low labor cost in Mexico,[13] this is consistent with longer-distance trucking of labor-intensive auto components.
- Rail supports Michigan-Canada connectivity but plays a limited role in Mexico-linked automotive movements.
- Michigan is a net exporter of automotive goods to the rest of the United States.

Supply Chain Operations and Logistics Practices in Michigan

The Michigan auto industry's operations are renowned for lean manufacturing and tightly integrated logistics, specifically:

JIT and Lean Production: Pioneered by Toyota and widely adopted by Detroit automakers, JIT means parts arrive exactly when needed on the assembly line, minimizing inventory. Michigan's dense local network of suppliers allows one- to two-day delivery windows, enabling assembly plants to hold only hours' worth of parts in stock. This reduces carrying costs and floor space needs, boosting efficiency and lowering cost per vehicle. However, it increases vulnerability to disruptions.

[13] *Center for Strategic and International Studies. 2025. "From Monterrey to Michigan to Mississauga: The Engine Driving U.S. Competitiveness." Accessed on: May 28, 2026.*

Sequencing and Kitting: This is typically applied by Tier 1 suppliers that provide sequenced deliveries, assembling parts in the precise build order of vehicles moving down the line. For instance, a seat supplier in Michigan might deliver sets of seats in the exact color/trim sequence needed for each vehicle in production order, ensuring a seamless installation at the OEM plant. Similarly, kitting is used (grouping parts by vehicle build) to speed assembly and reduce errors.

Cross-Docking Logistics: Michigan's distribution centers often serve as cross-dock hubs, meaning inbound parts shipments from multiple sources are rapidly unloaded and sorted into mixed loads for final delivery without long storage. This technique supports JIT by allowing consolidation of components for the same plant from various suppliers into one truck, reducing empty miles, improving load factors and ensuring timely, synchronized arrivals.

Transportation Modes: Trucking is the major transportation mode for Michigan's local inbound auto logistics. Due to short distances among many suppliers and the urgency of deliveries, trucks handle the majority of inbound part volumes. Rail is crucial for outbound deliveries of finished vehicles (for example, new vehicles from Michigan plants often travel by rail to distant markets) due to cost efficiency and the protection of enclosed railcars. Air freight is rarely used (due to high cost) except in emergencies (for example, flying in critical parts to avoid a plant shutdown). Maritime via the Great Lakes is also another mode that is sparingly used for automotive freight, although (reportedly) there is interest in the planned container terminal at Monroe.

As mentioned earlier, there have been some changes to this practice to accommodate disruptions. These include increasing inventory, nearshoring and diversified sourcing.

Supply Chain Outlook and Risk Analysis

Semiconductors and AI Competition: The global semiconductor supply remains a strategic vulnerability. Looking ahead, a new challenge arises: massive demand for advanced chips from AI and data center sectors. As AI booms, chipmakers prioritize high-margin data-center chips (like GPUs and advanced memory) over lower-margin auto-grade chips, which could eventually lead to high costs or stalling production lines.[14] To mitigate, Michigan OEMs are forging new partnerships (for example, GM's direct deals with chip fabricators in the United States) and redesigning electronics to use more readily available chips, as well as upgrading to newer generation chips.

Geopolitical and Energy Risks: The 2026 conflict with Iran has caused petroleum supplies to diminish and fuel costs to rise. This means increased transportation costs for all modes at all lengths of haul, and shortages of raw materials from petroleum derivatives for Michigan's auto industry. Whether it affects the types of engines consumers want in automobiles remains to be seen.

Medium-Term Outlook:

- *Supply Chain Evolution:* Expect continued investment in regional manufacturing (for example, chips and batteries) to insulate Michigan's auto supply chain from global shocks.

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14 S&P Global. "DRAM makers prioritize AI data center demand, sparking automotive semiconductor shortage."

- *Technology and Industry:* More automation in logistics will further strengthen supply chain management and increase visibility, which will better help firms fortify against disruptions.
- *North American Integration Under the USMCA:* The cross-border synergy will remain strong, with Michigan benefiting from nearshoring trends. More investments in Mexico and Canada still favor Michigan's network, since those components usually flow through or to Michigan's auto industry.
- *Energy Transition Challenges:* In the evolution of EVs, Michigan's supply chain must expand into critical minerals and battery materials. IRA incentives encourage domestic battery material processing, potentially leading to new supply chain players (for example, battery recyclers) setting up in Michigan.

Conclusions and Key Takeaways

Michigan's automotive supply chain is in a unique position, dealing with the traditional internal combustion engine supply chain and the recent EV supply chain. Yet, this underscores the major role Michigan plays in the overall automotive industry, especially when considering its manufacturing footprint, highly networked supplier base, well-integrated cross-border supply chain and significant economic contribution toward gross domestic product and employment. COVID-19 served as a stress test that revealed both vulnerabilities and adaptability. The industry responded by improving visibility (Internet of Things, data), diversifying supply and adjusting JIT practices for resilience without abandoning efficiency.

Looking ahead, Michigan is leveraging federal and state support to secure next-generation supply chains that will position it for long-term competitiveness. However, risks such as global semiconductor chip supply tensions with a burgeoning AI sector and volatile geopolitics can still impact Michigan's auto sector materially.[15]

In summary, the Michigan automotive supply chain is becoming more technologically advanced, regionally integrated and strategically resilient in the post-pandemic era. As a result, this leads to more optimized Michigan automotive supply chain operations as demands for new investments and strategies to enhance resiliency increase. Balancing the need for efficiency to keep costs down and resiliency to quickly adapt to shocks remains forefront for stakeholders in the region but the state's current infrastructure provides the best platform to achieve this balance and stay a global automotive leader.

[15] *CNBC. 2026. "Engine trouble ahead? How the Strait of Hormuz standoff threatens luxury auto giants."*