MICHIGAN FREIGHT PLAN

Supplement to the 2040 MI Transportation Plan

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MICHIGAN FREIGHT PLAN

Supplement to the 2040 MI Transportation Plan

"The value and importance of the production and movement of goods in and around Michigan cannot be disputed."

Dear Michiganders:

As governor, moving Michigan forward and making this state as prosperous and successful as possible is always my most important goal.

By creating a job-friendly environment and making smart, responsible investments in critical areas like transportation, government and business can work together to make our state a better place for all Michiganders. This Michigan Freight Plan is one avenue to help guide those investments and further the state's economic reinvention.

Transportation is vital to economic activity and a well-maintained transportation infrastructure serves the needs of business and industry, just as it serves the needs of travelers. The value and importance of the production and movement of goods in and around Michigan cannot be disputed. Supporting continued infrastructure investment to ensure the seamless movement of those goods is essential to Michigan's ability to attract new businesses and industries to this great state.

Freight is so vital to the economy and Michigan's future that the 21st Century Infrastructure Commission, created in 2016, included several freight-related recommendations among the 110 recommendations it put forward for 21st century infrastructure systems that are safe, reliable, efficient, and cost-effective for all Michigan taxpayers. The commission's vision of Michigan as a center of international trade requires developing freight infrastructure that will meet the modern-day demands of a globalized economy.

The Michigan Freight Plan provides a comprehensive overview of Michigan's freight infrastructure assets, needs, and challenges. It illustrates the importance of the movement of freight to the continued renewal of the state's economy. It offers a plan to fuel the economic momentum Michigan has enjoyed over the past several years.

I look forward to Michigan's continued and growing economic prosperity.

Sincerely,

Rick Snyder
Governor

Dear Michiganders:

It is my pleasure to present to you the Michigan Freight Plan, a supplement to the 2040 MI Transportation Plan: Moving Michigan Forward.

This freight plan was created with the hard work and dedication of an extensive team of staff from the Michigan Department of Transportation (MDOT). In addition, the Federal Highway Administration, Michigan Commission for Logistics and Supply Chain Collaboration, Freight Advisory Committee stakeholders, and the general public helped shape this document in many ways throughout the public involvement process. For those of you who participated along the way, thank you.

This plan shows Michigan has an extensive transportation infrastructure system that supports more than $862 billion in economic activity on an annual basis, from ports to rail and highways to runways. In addition, it identifies issues that need to be addressed in the state in order for Michigan's transportation system to continue to move goods and people in a safe, timely, and reliable manner. MDOT and the freight industry are also preparing for paradigm-shifting and emerging technologies such as connected and automated vehicles and their impacts to freight transportation.

The Michigan Freight Plan allows the State of Michigan to access National Highway Freight Program funding and plan for long-term freight infrastructure needs. Freight transportation is closely tied to economic development in Michigan and is critical to the state's role as a major domestic and global trade partner.

The connections between transportation, freight, and economic activity are impossible to ignore. The Michigan Freight Plan provides an accurate picture of Michigan's current transportation assets and needs, paving the way for future progress to be made in support of freight activity and investment in the state.

We look forward to continuing the conversation about freight investment needs in the state of Michigan, and partnering with those who are interested in growing the state's economy.

Sincerely,

Kirk T. Steudle
Director

"Freight transportation is closely tied to economic development in Michigan and is critical to the state's role as a major domestic and global trade partner."

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INTRODUCTION

The Michigan Department of Transportation (MDOT) recognizes the importance of freight mobility in support of the movement of goods and products across Michigan. A safe, efficient, and well-maintained transportation network supports cost-effective freight movement, economic development, and improved quality of life. The freight transportation system of Michigan is an important element of economic competitiveness, especially as the state continues to expand its role as a major domestic and global trade partner.

The purpose of the Michigan Freight Plan is to provide a comprehensive overview of the state's freight transportation system, including existing assets, system performance, and investments required to ensure long-term success. The Freight Plan is a multi-modal and intermodal resource, providing an overall framework for freight system improvements and priorities. The Freight Plan serves as an element of the 2040 MI Transportation Plan: Moving Michigan Forward (2040 MITP), and integrates its overall vision, goals, objectives, strategies, and decision-making principles.

"The freight transportation system of Michigan is an important element of economic competitiveness, especially as the state continues to expand its role as a major domestic and global trade partner."

THE PLAN IS ORGANIZED INTO THE FOLLOWING SECTIONS:

Section 1, *Plan Overview,* establishes the context for creation of the Michigan Freight Plan. The most recent federal transportation bill, the Fixing America's Surface Transportation (FAST) Act, requires each state that receives funding under the National Highway Freight Program to develop a State Freight Plan that provides a comprehensive plan for the immediate and long-range planning activities and investments of the state with respect to freight. The FAST Act encourages state departments of transportation to create multi-modal freight plans. Many of the required elements for state freight plans are contained in MDOT's existing state long-range plan, 2040 MITP, and are referenced throughout this document. Information required to comply with the FAST Act that was not already contained within the 2040 MITP is included in this document, which is to be considered a supplement to the current state long-range plan and associated white papers.

Section 2, *Strategic Goals,* includes a description of national freight goals as established in the FAST Act. In addition, 2040 MITP goals are described and linked to the national freight goals to demonstrate the alignment of state and federal priorities for the movement of freight, and their contribution to economic development and improved quality of life.

Section 3, *Economic Context of Freight Planning,* delves into the justification for a focus on freight planning in today's economy and includes a brief summary of current freight movement patterns in Michigan. An introduction is provided to the state's Logistics and Supply Chain Strategic Plan, which continues the focus on building and maintaining a strong economic foundation for business with transportation as its backbone.

Section 4, *Freight Programs and Institutions,* includes an overview of grant and loan programs available to support freight movement; current fiscal constraints on freight-related investments; and a listing of educational institutions, associations, partnerships, and regional freight planning initiatives present in Michigan.

Section 5, *State Freight Transportation Assets,* provides further details on existing transportation assets, data on freight movement by tonnage and value, and key freight industry and natural resource locations throughout Michigan.

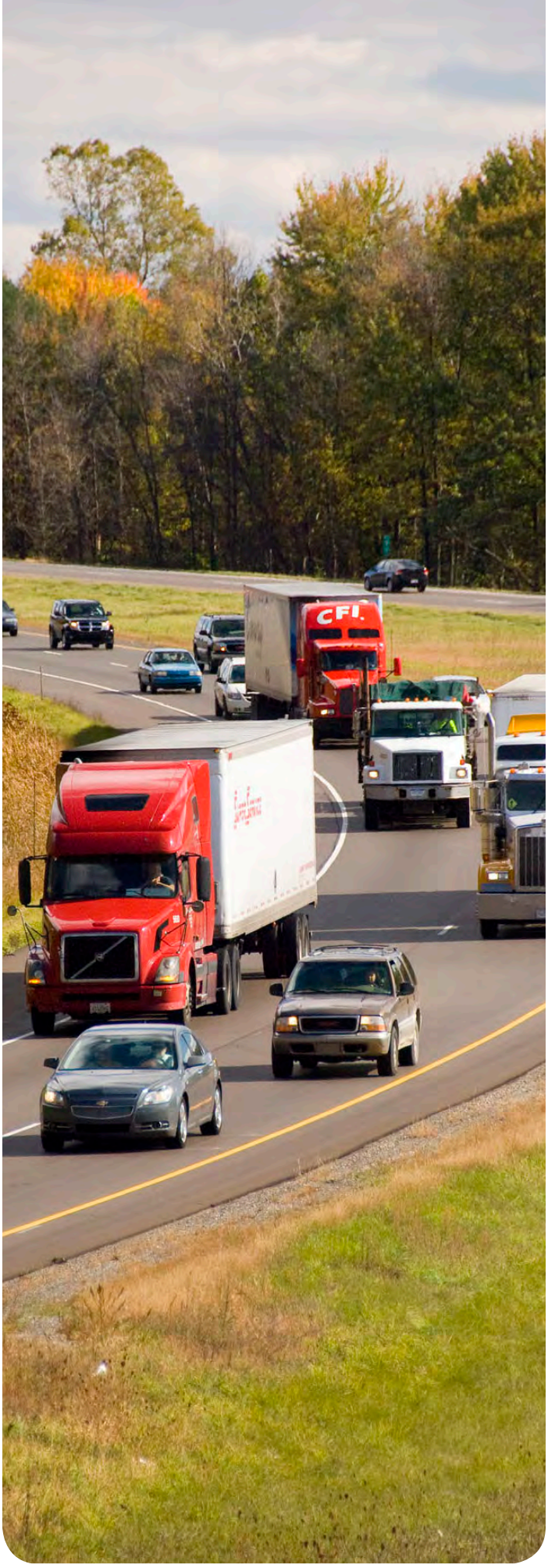
Section 6, *System Condition and Performance,* describes 2040 MITP performance measures as they relate to the goals and objectives that guide transportation investment decisions in Michigan. MDOT maintains a number of tracking systems that provide a quick snapshot as to how the department is performing in relation to the performance measures that have been established through the state's long-range planning process, including measures related to the movement of freight.

Section 7, *20-Year Freight Forecast,* presents modal forecasts through 2040 for highway, rail, aviation and marine commodity movements using information from the Transearch database maintained by IHS Global Insight. Transearch is a planning tool that allows users to analyze current and future freight flows by origin, destination, commodity, and transport mode.

Section 8, *Overview of Trends, Issues, and Strategies,* includes a summary of the existing trends, issues, and strategies in Michigan as they relate to the movement of freight across the state by all modes, including a discussion of specific freight bottlenecks and highway conditions that impact efficient freight movement.

Section 9, *The State's Decision-Making Process,* presents the approach Michigan used to identify eligible critical urban and rural corridors and discusses the corridor-based analysis conducted during the state's long-range planning process. The section also gives an overview of the public involvement and stakeholder engagement process conducted throughout the creation of the Michigan Freight Plan. In addition, a description is provided of the methods used to create the eligible list of critical and rural freight corridors in Michigan.

Section 10, *Freight Investment Plan (FIP),* contains fiscally constrained freight projects planned over a five-year period. Supplemental sections of the FIP also include projects on highways and other modes of transportation, which are not fiscally constrained, but are critical to the continued efficient functioning of Michigan's transportation system as a whole.



1 PLAN OVERVIEW

FREIGHT DEFINED

Freight is defined as any good, product, or raw material carried by a commercial means of transportation - including air, highway, rail, water, and pipeline. The activities involved in the management of how and where freight moves are defined as logistics. The growing need for freight services resulting from increased consumer demand in Michigan, congestion, and the ability of transportation infrastructure to support such demand is a challenge. In light of existing market forces and other factors that will increase the cost of moving goods, freight planning is an important component of the statewide and metropolitan planning process.

When trucks carrying goods to market or factory are delayed in traffic, the result can be reduced productivity, increased operational costs, and decreased fuel efficiency. In 2015, delays on Michigan's National Highway System (NHS) were estimated to cost the trucking industry more than $576 million. In the United States, the industry experienced more than 996 million hours of delay on the NHS as a result of traffic congestion. This delay is the equivalent of 362,243 commercial truck drivers sitting idle for an entire working year. These bottlenecks were estimated to add more than $63.4 billion in added truck industry operational costs.[1] Those costs ripple throughout the economy, affecting the cost of goods for businesses and consumers alike.

FIXING AMERICA'S SURFACE TRANSPORTATION (FAST) ACT

The Michigan Freight Plan was originally created in 2013 in response to recommendations outlined in the previous federal surface transportation authorization bill, Moving Ahead for Progress in the 21st Century (MAP-21). The plan was updated to its current version to reflect additional requirements in the new bill, the FAST Act, enacted in 2015.

Section 8001 of the FAST Act made important reforms to freight provisions from MAP-21. Because freight transportation is critical to the economic vitality of the United States, a source of dedicated funding was created through the FAST Act, the National Highway Freight Program (NHFP). Each state that receives funding through the NHFP must develop a comprehensive freight plan that provides for the immediate and long-range planning activities and investments of the state with respect to freight.

In addition to the NHFP, the FAST Act created a new discretionary freight-focused grant program, Fostering Advancements in Shipping and Transportation for the Long-Term Achievement of National Efficiencies (FASTLANE). In 2017, this program was replaced with Infrastructure for Rebuilding America (INFRA) grants. This program allows states, metropolitan planning organizations (MPOs), local governments, tribal governments, special purpose districts and public authorities (including port authorities), and other parties to apply for funding to complete projects that improve safety and hold the greatest promise to eliminate freight bottlenecks and improve critical freight movements.

The FAST Act also required the United States Department of Transportation (USDOT) to create a draft National Freight Strategic Plan to implement the goals of the new National Multimodal Freight Policy. The draft National Freight Strategic Plan addressed the conditions and performance of the multimodal freight system and identified strategies and best practices to improve intermodal connectivity and performance of the national freight system, and mitigate the impacts of freight movement on communities.

As required by Congress, USDOT has designated a highway-only Primary Freight Network (PFN) of not more than 27,000 centerline miles of existing roadways to help identify key corridors of freight movement. While highways are an important component of moving freight, USDOT recognized that large quantities of materials and products move over other freight modes, and many of these goods will also move over multiple modes before reaching their final destination. The highway-only PFN failed to present a comprehensive picture of critical freight corridors. Therefore, USDOT also proposed a draft Multimodal Freight Network (MFN) in the National Freight Strategic Plan that encompasses not only highways, but also other roads, railways, navigable waterways, and pipelines, key seaports, airports, and intermodal facilities necessary for the efficient and safe movement of freight in our country.

Another strong focus in the FAST Act was performance measures. Freight projects are required to have adequate funding sources identified, demonstrate improvements

1 American Transportation Research Institute, "Cost of Congestion to the Trucking Industry: 2017 Update." http://atri-online.org/wp-content/uploads/2017/05/ATRI-Cost-of-Congestion-05-2017.pdf

In general, a "freight project" is defined as any surface transportation project eligible for assistance under 23 U.S.C. that improves the movement of freight. Eligible project types include:

- **Construction, reconstruction, rehabilitation, and operational improvements directly relating to improving freight movement;**
- **Intelligent Transportation Systems (ITS) and other technology directly relating to improving freight movement;**
- **Efforts to reduce the environmental impacts of freight movement on the primary freight network;**
- **Railway-highway grade separation;**
- **Geometric improvements to interchanges and ramps;**
- **Truck-only lanes;**
- **Climbing and runaway lanes;**
- **Truck parking facilities eligible for funding under Jason's Law;**
- **Real-time traffic, truck parking, roadway condition, and multi-modal transportation information systems;**
- **Improvements to freight intermodal connectors; and**
- **Improvements to truck bottlenecks.**

to the efficient movement of freight, and meet national performance targets. The FAST Act continues MAP-21's overall performance management approach, within which states invest resources in projects that collectively will make progress toward national goals for freight movement and economic vitality.

STATE FREIGHT ADVISORY COMMITTEE

In the FAST Act, USDOT recommended that states use a collaborative process for freight planning that involves all of the relevant stakeholders acting within or affected by the freight transportation system. To help accomplish this, USDOT strongly encouraged states to establish, continue, or expand membership in State Freight Advisory Committees. The Commission for Logistics and Supply Chain Collaboration (LSC), created in Public Act 76 of 2013, serves as Michigan's Freight Advisory Committee. The 10-member commission represents private business, transportation, border operators, local economic development agencies, and higher education. The Commission is supplemented by technical advisors representing constituencies required by the FAST Act. The LSC's mission is to advise state agencies on initiatives to improve the efficiency and cost-effectiveness of supply chain management for business.

PLAN DEVELOPMENT PROCESS

Since 2009, MDOT has maintained the Freight Coordination Group (FCG), an internal advisory committee comprised of staff involved in freight planning, research, and programming, with representatives from the central office and seven MDOT regions. In addition to MDOT staff, representatives from the Federal Highway Administration (FHWA) Michigan Division participate as well. MDOT relied on the expertise of FCG and public input as this plan was developed.

MDOT also involved members of Michigan's Freight Advisory Committee, the LSC, in the development of the Freight Plan. To maintain consistency with state long-range planning requirements, MDOT provided stakeholders and the general public the opportunity to provide comment on the Freight Plan. See Section 9 for more information on the public involvement process for the Freight Plan.

CONNECTION TO 2040 MI TRANSPORTATION PLAN, FIVE-YEAR TRANSPORTATION PROGRAM, AND STATE TRANSPORTATION IMPROVEMENT PROGRAM

MDOT's current long-range plan, the 2040 MITP, was adopted in September 2016, as the second update to the 2030 MI Transportation Plan (2030 MITP), completed in 2007. The 2030 MITP contains 17 technical and 11 strategic reports that include many of the elements required for a state freight plan as described in the FAST Act. These include identification of trends, needs, issues, policies, strategies, and performance measures as they relate to freight and the transportation system as a whole. Those technical and strategic reports will be referred to throughout this document. In addition to the technical and strategic reports from the 2030 MITP, the 2040 MITP update includes a series of 23 white papers that reflect newly available data and explain the variety of changes that took place in Michigan between 2012 and 2016. MDOT has produced additional state-level planning documents that serve as valuable resources for this plan. They include the Michigan State Rail Plan (2011) and the Michigan Airport System Plan (2017).

Projects in the Freight Investment Plan (FIP), located in Section 10 of the plan, were taken from MDOT's 2018-2022 Five-Year Transportation Program using criteria important to the movement of freight. MDOT's project selection for trunkline projects to be included in the Five-Year Program begins with the annual Call for Projects process with the MDOT regions. Since projects in the FIP are partially funded with federal aid provided under the Federal Aid Transportation Program, they are also included in the 2017-2020 State Transportation Improvement Program (STIP) and will be included in the 2020-2023 STIP.

Implementation of the MITP and Five-Year Program is accomplished through a four-year STIP. The STIP and respective 13 MPO Transportation Improvement Program (TIP) documents identify the projects that will be implemented and how they are to be financed. The projects that are selected for the STIP and TIPs are the result of the needs and policies identified in the MITP, the Five-Year Transportation Program, and each MPO's long-range plan. These projects are developed in coordination with the MPOs, representing urbanized areas, and with rural task forces (RTFs) and small urban areas, representing the state's rural areas. The planning process relies on the participation of state and local government officials, public and private transit providers, organizations representing the customers and providers of transportation in Michigan, and the general public.

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2 STRATEGIC GOALS

NATIONAL FREIGHT GOALS

The Michigan Freight Plan aligns with Michigan's state long-range transportation plan goals and with the national freight goals established in FAST Act. The Michigan Freight Plan was developed to meet national freight goals and support the overarching goals of the 2040 MITP. The national freight goals are summarized as follows:

- **Improve the contribution of the freight transportation system to economic efficiency, productivity, and competitiveness;**
- **Reduce congestion on the freight transportation system;**
- **Improve the safety, security, and resilience of the freight transportation system;**
- **Improve the state of good repair of the freight transportation system;**
- **Use advanced technology, performance management, innovation, competition and accountability in operating and maintaining the freight transportation system;**
- **Reduce adverse environmental and community impacts of the freight transportation system.**
- **Improve the flexibility to support multi-state corridor planning and the creation of multi-state organizations to increase the ability of states to address multimodal freight connectivity; and**
- **Improve the short- and long-distance movement of goods that travel across rural areas between population centers, between rural areas and population centers, and from the nation's ports, airports, and gateways to the National Multimodal Freight Network.**

2040 MI TRANSPORTATION PLAN GOALS

In September 2016, MDOT redeveloped and adopted its long-range transportation plan, the 2040 MITP, to reflect new data, describe changes that had taken place throughout the state between 2013 and 2016, and maintain the 20-year planning horizon required by FHWA. Many of the technical reports are referenced throughout this document.

The mission, goals, objectives, and rationale from the 2035 MITP were reaffirmed in the 2040 MITP. A series of white papers was developed to catalogue the many changes that took place, including new collaborations, changes in freight volumes, socioeconomic changes, and other topic areas. Figure 1 on the next page illustrates how the national freight goals are linked to the 2040 MITP goals.

The following goals, established in the 2030 MITP, were reaffirmed in the 2035 and 2040 MITP:

System Improvement: Modernize and enhance the transportation system to improve mobility and accessibility.

Efficient and Effective Operations: Improve the efficiency and effectiveness of the transportation system and transportation services, and expand MDOT's coordination and collaboration with partners.

Safety and Security: Continue to improve transportation safety and ensure the security of the transportation system.

Stewardship: Preserve transportation system investments, protect the environment, and utilize public resources in a responsible manner.

The 2040 MITP identified the following goals that are specific to the Corridors of Highest Significance (COHS) that were extensively detailed in the Corridors and International Borders Report, and again reaffirmed in the Corridors and International Borders White Paper:

Modal Choice: Provide choices for user segments, connectivity between modes, and connectivity between activity centers for a seamless transition between modes.

Freight Adequacy: Support for Michigan businesses, industry, freight shippers, and haulers to improve economic competitiveness.

Figure 1 - Linkage between 2040 MITP Goals and National Highway and Multimodal Freight Goals

2040 MITP Goals ▶ / National Freight Goals ▼	Efficient and Effective Operations	System Improvements	Safety and Security	Stewardship	Modal Choice	Freight Adequacy
Enhance economic efficiency, productivity, and competitiveness	●	●	●	●	●	●
Reduce congestion and bottlenecks	●	●	●		●	●
Improve safety, security, and resiliency	●	●	●	●	●	●
Improve state of good repair	●	●	●	●	●	●
Use advanced technology to improve the safety, efficiency, productivity and reliability of the network	●		●	●	●	●
Reduce adverse environmental and community impacts	●	●	●	●	●	●
Improve the short- and long-distance movement of goods	●	●	●	●		●

3 ECONOMIC CONTEXT OF FREIGHT PLANNING

An efficient and well-maintained transportation system provides the backbone for all economic activity. Efficient transportation systems move goods and people throughout local, regional, national, and international economies in a safe, timely, and reliable manner. Transportation is very closely tied to economic development and is a vital part of the nation's and Michigan's overall economic competitiveness. Both USDOT and MDOT identify the link between transportation and the economy as a top priority.

Statistics indicate that the demand for transportation grows with economic activity. In Michigan, commercial vehicle miles traveled (VMT) has historically grown at an even higher rate than the Gross State Product (GSP), suggesting that economic growth is strongly linked to transportation in Michigan.

Michigan's three largest industries - manufacturing, agriculture and tourism - are highly dependent on good transportation systems. An efficient and dependable transportation system can lower costs, enhance competitiveness, and support just-in-time inventory systems for business.

BORDER CROSSINGS AND INTERNATIONAL TRADE

Michigan's border crossings are vital links for international commerce and are critical to the well-being of the local, state, and national economies. As reported by the Research and Innovative Technology Administration – Bureau of Transportation Statistics, the United States and Canada conduct the world's largest bilateral trade relationship, exceeding $1.8 billion per day in 2014, about $660 billion for the year. After a downturn in cross-border trade in 2009, imports and exports started increasing again and now are at an all-time high. Michigan continues to be the leading state trading with Canada, with more than $74 billion in 2014.

The Ambassador Bridge is the busiest commercial border crossing in the nation, with almost 2.5 million trucks crossing

in 2014, as reported by the Public Border Operators Association. The Blue Water Bridge in Port Huron is the second-busiest on the northern border, with nearly 1.6 million trucks. Transportation equipment is the leading product crossing Michigan's border with Canada. Auto companies have several plants that move products between Michigan and Ontario, and in 2014 more than $42 billion of transportation equipment passed through the border at Detroit.

STATEWIDE FREIGHT MOVEMENT SNAPSHOT

Tonnage originating, terminating, or moving through Michigan totaled more than 479 million tons in 2014, the most recent available data for all modes. Trucking accounted for 65 percent of tonnage moved, while rail handled 21 percent, water handled 14 percent, and aviation carried less than 1 percent (Figure 2). The value of all freight movements throughout Michigan in 2014 was worth nearly $862 billion, with trucks handling 73 percent of the goods moved by value, rail handling 23 percent, airborne handling 3 percent, and waterborne modes handling 1 percent (Figure 3).

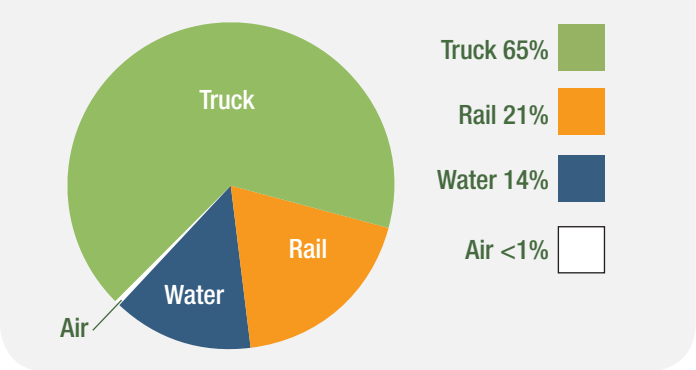
Major commodities moved throughout the state by truck include nonmetallic metals such as sand and gravel (75.6 million tons), agricultural commodities (38.6 million tons), and food products (32 million tons).

For rail, coal (18.5 million tons), chemical products (14.1 million tons), and metallic ores (12.4 million tons) were the top commodities moved by tonnage in Michigan in 2014, with coal being all inbound, chemicals mostly through-movements, and metallic ores mostly through outbound movements from the iron mines in Marquette County.

Nonmetallic minerals (21.9 million tons) were the leading commodity shipped by water in Michigan in 2014, mostly outbound from limestone quarries in northern Michigan.

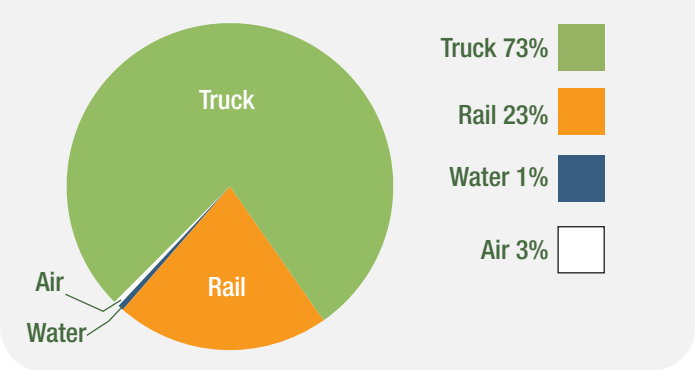
In terms of air freight, the Detroit Wayne County International Airport continued to handle the majority of high-value, time-sensitive products typically shipped by air at 206,291 tons in 2014. Detroit Willow Run (62,043 tons), Grand Rapids (41,041 tons), Lansing (22,948 tons), and Flint (12,030 tons) make up the next tier of cargo airports.

Figure 2 - Michigan Commodity Movement Totals: Modal Split by Tonnage (2014)



Source: MDOT Statewide and Urban Travel Analysis

Figure 3 - Michigan Commodity Movement Totals: Modal Split by Value (2014)



Source: MDOT Statewide and Urban Travel Analysis

3 ECONOMIC CONTEXT FOR FREIGHT PLANNING

LOGISTICS AND SUPPLY CHAIN STRATEGIC PLAN

In addition to the vision and goals set forth in the 2040 MITP, Gov. Rick Snyder and his administration have embraced an asset-based economic development approach to improving the state's economy, with a focus on building and maintaining a strong economic foundation for business. One key component is the presence of a safe, efficient, and low-cost logistics and supply chain network in Michigan. As a result, MDOT works closely with the Michigan Economic Development Corp. (MEDC) and the Michigan Department of Agriculture and Rural Development (MDARD) through a formal partnership intended to help achieve the economic development goals of the state and accelerate economic success for businesses.

This state agency partnership released the Logistics and Supply Chain Vision 2013-2020 that further refines the mission of the State of Michigan in regard to creating a positive business environment for economic growth:

> *"To lower cost, reduce time and remove risk for firms by developing an efficient logistics and supply chain ecosystem that leverages our assets and provides opportunities for collaboration and partnership."*

The vision to reinvent Michigan to become a center of international trade requires developing an infrastructure that will meet the modern day demands of a globalized economy. Michigan has significant transportation assets, which serve intermodal freight traffic from around the world, including two of the country's busiest international border crossings in Detroit and Port Huron, four Class I railroads, a network of interstate highways, the St. Lawrence Seaway, many commercial port facilities, and the major cargo-carrying airports of Willow Run and Detroit Metro. Michigan's robust freight infrastructure assets are described in greater detail in Section 5 of this plan.

4 FREIGHT PROGRAMS AND INSTITUTIONS

This section provides a summary of the programs and institutions that support the mobility and efficient movement of freight in Michigan.

MDOT's approach to freight planning is intended to increase economic productivity and promote economic growth by recognizing freight needs in the long-range planning process. The importance of freight to the economic vitality of the state has long been identified in the long-range transportation planning conducted at MDOT.

PUBLIC FUNDING FOR FREIGHT-RELATED INVESTMENTS

Michigan does not have a separate funding mechanism specifically for freight projects. Limited funding at the state level, and limitations on how federal funding can be spent, hinder MDOT's ability to complete needed freight projects. The state Legislature must annually appropriate any funds for freight transportation projects and funding is rarely provided to some modes, such as marine transportation. MDOT does not receive any dedicated funds for freight, except through the National Highway Freight Program (NHFP).

NHFP funds must be obligated for projects that contribute to the efficient movement of freight on the National Highway Freight Network (NHFN), and are consistent with the planning requirements of sections 134 and 135 of title 23, United States Code. For each fiscal year, a state may obligate not more than 10 percent of the total NHFP apportionment for freight intermodal or freight rail projects. Projects using NHFP funding must be identified in the freight investment plan portion of the state freight plan. Federal-aid funding is limited to roads classified in the Functional Classification System as a collector or higher. This limits investments in local roads serving industries directly or connecting to the higher functioning federal-aid system.

STATEWIDE INVESTMENT NEEDS

Michigan has a strong transportation network that has served the general populace and business community well for many years. On Jan. 1, 2017, the gasoline tax increased from 18.7 to 26.3 cents per gallon, and the diesel fuel tax increased from 15.0 to 26.3 cents per gallon. The motor fuel tax was also applied to natural gas (CNG) as well. Fuel tax rates will be tied to inflation beginning in 2022 to remedy the decline in purchasing power of the fuel tax. Registration fees for most cars and trucks were also increased by 20 percent on Jan. 1, 2017. New electric car fees of $100 per year, and $30 for plug-in hybrid cars, attempt to equalize road-user fees for vehicles that use little or no taxed fuel. The user-fee increases are estimated to generate an additional $600 million per year for the Michigan Transportation Fund. Starting in 2019, income tax revenues will be appropriated for roads, increasing from $150 million to $600 million over three years, until 2021. The general fund revenues will be distributed to roads agencies only, under the usual Act 51 of 1951 formula.

Despite the revenue growth, increased funding is necessary to support freight activity and investment in the state. When additional funding is made available, a number of significant infrastructure projects will be able to move forward that can continue to improve the movement of freight throughout Michigan.

4 FREIGHT PROGRAMS AND INSTITUTIONS

GRANT AND LOAN PROGRAMS

MDOT maintains a number of grant and loan programs that provide financial support to projects designed to enhance the movement of freight.

Transportation Economic Development Fund

MDOT's Office of Economic Development manages the Transportation Economic Development Fund (TEDF). Enacted in 1987, the TEDF was created to assist in the funding of highway, road, and street projects necessary to support economic growth. Eligible entities include MDOT, county road commissions, and all city and village road agencies. Available funding each year from the TEDF is approximately $40 million, when fully funded for all categories. The program's mission is to serve as a catalyst for economic growth and enhance the state's ability to compete in the global marketplace while improving the quality of life for the residents of Michigan. The goal of the TEDF is to provide funding for transportation projects to:

- **Improve the network of highway services essential to economic competitiveness;**
- **Improve accessibility to target industries as a catalyst for economic growth;**
- **Support private initiatives that create or retain jobs; and**
- **Encourage economic development and redevelopment efforts that improve the health, safety, and welfare of Michigan residents.**

The types of projects eligible for TEDF assistance are:

Category A - Road projects related to target industry development and redevelopment opportunities.

Category C - Road improvements in urban counties to reduce traffic congestion.

Category D - Road improvements in rural counties to create an all-season road network.

Category E - Road improvements essential to the development of commercial forests in Michigan.

Category F - Road improvements that support an all-season road network in the urban areas of rural counties.

Note: Category B was eliminated in 1993.

Freight Economic Development Program

The Freight Economic Development Program helps new or expanding businesses connect to the rail system. The program provides low-interest loans that can cover up to 50 percent of rail infrastructure costs at new or expanded facilities. The loans are designed to be forgiven if contractually obligated shipping commitments are met over the five-year repayment period. The program has approximately $8 million available.

Michigan Rail Loan Assistance Program

The Michigan Rail Loan Assistance Program (MiRLAP) provides no-interest loans to preserve railroad infrastructure through track maintenance and rehabilitation projects. Up to 90 percent of the eligible project costs can be covered by the loans, limited to $1 million per project. Loans have a 10-year repayment period. Eligible projects include any type of construction or rehabilitation work that is associated with permanently affixed track materials and related structures, such as bridges and culverts. The program has approximately $5 million available annually.

State Infrastructure Bank Loans

State Infrastructure Bank (SIB) loans are available to any eligible public entity as defined in Title 23 USC, Title 49 USC, or Public Act 51 of 1951. This program takes a multi-modal approach to financing transportation projects; therefore, highway, transit, rail and intermodal projects are eligible.

The program is focused on:

- Accelerating the delivery of projects by providing financial assistance quickly, especially during emergency situations;
- Increasing the financial viability of transportation projects by reducing borrowing costs; and
- Attracting new public and private investment in transportation infrastructure.

Office of Aeronautics Loan Program

The Office of Aeronautics Loan Program allows a publicly owned airport to borrow up to $100,000 for airport-related projects. The interest rate on the loan, established annually by the state treasurer, is currently at 3.2 percent per annum (September 2016). Repayment is scheduled in yearly installments over a maximum 10-year period. Loans are often used by sponsors for their local match obligation in capital improvement projects; however, a loan may not exceed 90 percent of the sponsor's match of the overall project cost.

Michigan Strategic Fund

The Michigan Strategic Fund (MSF) was created by P.A. 270 of 1984 and has broad authority to promote economic development and create jobs. Housed in the Michigan Economic Development Corp., the MSF approves grants and loans under several individual programs. While not created specifically to address the needs of freight transportation, the MSF has provided loans to local port authorities for maritime infrastructure construction.

FREIGHT-RELATED INSTITUTIONS

A number of freight-related institutions are present and active throughout Michigan. The following list is not exhaustive, but represents many of the industry associations and educational institutions that focus on freight interests in Michigan. MDOT coordinates with each of the following groups on a project-by-project basis during times of stakeholder engagement for plan studies and long-range planning updates.

Associations

The Michigan Railroads Association (MRA) is a nonprofit trade association that represents the interests of the freight railroads operating in Michigan. MRA members range in size from large Class I carriers to smaller regional carriers and short-line railroads. MRA members account for more than 95 percent of all rail freight moved in Michigan.

The Michigan Trucking Association (MTA) is a statewide, full-service trade association that has promoted the interests of Michigan motor carriers since 1934. The mission of the MTA is to serve the interests of the trucking industry; enhance the industry's image, efficiency, productivity and competitiveness; promote highway safety; provide educational programs; and work for a healthy business environment.

The Michigan Grain Dealers Association, the forerunner of the Michigan Agri-Business Association, was formed on June 25, 1903. The primary interest of the group is to further the development and prosperity of businesses engaged in agriculture.

Educational Institutions

Michigan State University, Supply Chain Management Program

The Supply Chain Management Program at Michigan State University (MSU) integrates topics from manufacturing operations, purchasing, transportation, and physical distribution into a unified course of study. This is the most widely recognized program in the United States that offers integration among these critical, value-adding components to enhance global competitiveness.

University Research Corridor

The University Research Corridor is an alliance between MSU, the University of Michigan, and Wayne State University to transform, strengthen, and diversify the state's economy. University Research Corridor partners have formed this alliance to improve understanding of the vital role the three universities have played, and will play, in revitalizing the state's economy.

Additional University Research

The following research agencies have completed multiple studies with and for the department, including work on freight topics related to traffic reliability, border crossing delay, ITS applications to reduce traffic congestion, and commercial vehicle safety.

- Michigan State University Canadian Studies Center
- Michigan State University Supply Chain Management Program
- Michigan Tech Research Institute
- Michigan Tech Transportation Institute
- University of Michigan Transportation Research Institute (UMTRI)
- Center for Automotive Research (CAR)

4 FREIGHT PROGRAMS AND INSTITUTIONS

REGIONAL FREIGHT PLANNING AND BORDER PARTNERSHIPS

This section provides an overview of the regional freight planning initiatives and border partnerships that MDOT participates in, including multi-state freight corridors, multi-state metropolitan areas, and other regional groups of states and provinces.

Great Lakes Regional Transportation Operations Coalition

MDOT is a member of the Great Lakes Regional Transportation Operations Coalition (GLRTOC), which is made up of Michigan's neighboring state DOTs (Illinois, Indiana, Wisconsin, and Minnesota), and toll authorities in Indiana, Illinois, and Ontario, Canada. GLRTOC collaborates on initiatives that improve cross-regional highway operations in support of regional economic competitiveness and improved quality of life. Plans and strategies designed to achieve the coalition's goals include efficient freight operations, reliable mobility, traffic incident management, and emergency traffic operations.

Next Michigan Development Corporations

A major economic development effort in Michigan has been the creation of seven Next Michigan Development Corporations (NMDCs), as designated by the Michigan Strategic Fund through Public Act 275 of 2010.

NMDCs were created to foster economic opportunities in Michigan and promote economic growth focused on multi-modal transportation. NMDCs in Michigan include:

- Port Lansing Next Michigan Development Corp.
- West Michigan Economic Partnership
- I-69 International Trade Corridor
- Superior Trade Zone
- Northern Nexus
- Detroit Next Michigan Development Corp.
- VantagePort

MAASTO Truck Parking Information and Management System

States in the Mid-America Association of Transportation Officials (MAASTO) region have joined together in developing a multi-state Truck Parking Information and Management System (TPIMS), which provides truckers with real-time information on availability of parking at specific locations. TPIMS systems help address truck parking demand along corridors, where some lots may be full and others open, reducing the time drivers spend searching for parking spots where they can rest, and increasing safety for truckers and other drivers. Additional information on the MAASTO TPIMS project can be found on page 70.

Mid-America Freight Coalition

The Mid-American Freight Coalition (MAFC) is a regional organization that cooperates in the planning, operation, preservation, and improvement of transportation infrastructure in the Midwest. This region includes 10 states (Illinois, Indiana, Iowa, Kansas, Kentucky, Michigan, Minnesota, Missouri, Ohio, and Wisconsin) that share key interstate corridors, inland waterways, and the Great Lakes. These 10 states signed a Memorandum of Understanding in October 2006 demonstrating their willingness to meet freight demands through regional cooperative efforts. The MAFC is built upon the work of the Upper Midwest Freight Corridor Study (UMFCS).

Northwoods Rail Transit Commission

The Northwoods Rail Transit Commission was created with the mission to sustain and enhance safe, reliable, and efficient rail service critical to the businesses, communities, and economies in northern Wisconsin and Michigan's Upper Peninsula. The Commission is comprised of 13 Wisconsin counties and nine Michigan counties.

Eastern Border Transportation Coalition

The Eastern Border Transportation Coalition (EBTC) is a nonprofit membership organization created in 1994 dedicated to improving the movement of people and goods between the United States and Canada. EBTC members are the state transportation agencies of Michigan, New York, Vermont, and Maine; and the Canadian provinces of Ontario, Quebec, New Brunswick, Nova Scotia, Newfoundland, and Labrador.

Transportation Border Working Group

The mission of the Transportation Border Working Group (TBWG) is to promote the safe, secure, efficient, and environmentally responsible movement of people and goods across the U.S.-Canada border. It brings together transportation and border agencies to coordinate transportation planning, policy implementation, and the deployment of technology to enhance infrastructure and operations on the northern border. It was established in 2000.

Public Border Operators Association

The Public Border Operators Association (PBOA) is a bi-national membership organization representing the publicly owned and operated international bridge and tunnel crossings between the province of Ontario and the states of Michigan and New York. Current members include the Blue Water Bridge Authority, Buffalo and Fort Erie Public Bridge Authority, Detroit-Windsor Tunnel, MDOT, Niagara Falls Bridge Commission, Ogdensburg Bridge and Port Authority, Sault Ste. Marie Bridge Authority, Seaway International Bridge Corp., and Thousand Islands Bridge Authority.

North American Strategy for Competitiveness

North American Strategy for Competitiveness (NASCO) is a coalition of North American governments, businesses, and educational institutions specifically focusing on solutions for needs and requirements in the areas of transportation, energy, logistics, infrastructure, security, and the development of a skilled workforce. NASCO's ultimate objective is to have a globally competitive transportation network.

International Bridge, Tunnel and Turnpike Association

The International Bridge, Tunnel, and Turnpike Association (IBTTA) was founded in 1932 and is the worldwide association for owners and operators of toll facilities and the businesses that serve tolling. Its mission is to advance toll-financed transportation. MDOT is a member.

5 STATE FREIGHT TRANSPORTATION ASSETS

The Michigan freight system is a multi-modal and interconnected network. This section provides a comprehensive inventory of the state's major freight transportation infrastructure assets, including an overview of highway, rail, marine, aviation, and pipeline assets; warehousing and intermodal facilities; and freight gateways and corridors that pass through Michigan.

FREIGHT PROFILE

The Michigan Freight Profile Technical Report and updated Michigan Freight Profile White Paper describe freight movements by all modes, commodities moved, mobility issues, and strategies employed by MDOT to alleviate the issues identified through extensive study and stakeholder engagement. The two documents cover several of the items required in the FAST Act in regard to the completion of a freight asset inventory and will be referenced heavily throughout this section.

The freight-intensive industries that are important to state and/or national economic priorities include agriculture, mining, forestry/timber, warehousing, trucking, and automobile manufacturing. MDOT manages a regularly updated statewide employer database that provides employment figures, industry categories, and the physical location of businesses throughout the state.

FREIGHT INFRASTRUCTURE ASSETS

The most recent multi-modal freight data shows that, in 2014, Michigan's transportation infrastructure moved more than 479 million tons of freight, valued at nearly $862 billion. Trucking accounted for 65 percent of the tonnage moved, followed by rail at 21 percent, water at 14 percent, and air at less than 1 percent.[2] Figure 4 identifies the major freight infrastructure assets in Michigan, including international crossings, cargo port locations, active rail lines, cargo airports, and the trunkline system.

Highway Network

MDOT manages a road network consisting of interstate highways, U.S. highways, and state-designated M-routes. This system consists of 9,669 route miles. A more detailed inventory of highway assets can be found in the Highway/Bridge Technical Report and the updated Highway/Bridge White Paper.

In 2014, trucking accounted for 65 percent of the tonnage moved in the state and 73 percent of tonnage moved by value. Nearly every customer product is moved by truck at one point en route to the end user. Trucks moved more than 308 million tons of freight in 2014 at an estimated value of $630 billion, with transportation equipment valued at $139 billion (Table 1). The trucking industry plays a key role in today's globally integrated economy, handling the essential "last mile" commodity movements that other modes are simply not able to accomplish.

Table 1 - Top Commodities Moved by Truck in Michigan (2014)

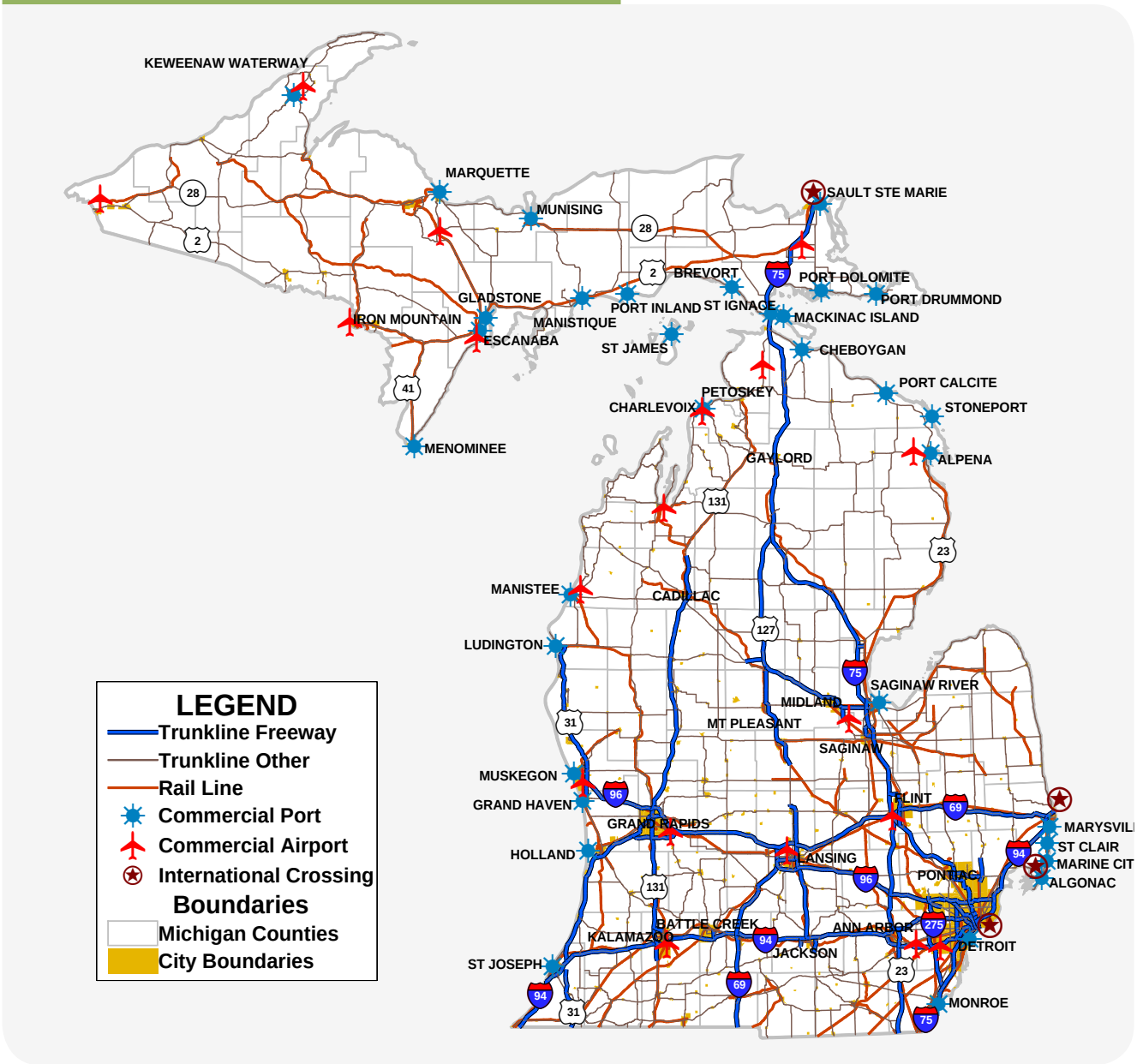
Commodities	Tons (M)
Nonmetallic minerals	75.63
Farm Products	38.64
Food Products	32.08
Primary Metal Products	17.48
Waste or Scrap Material	16.61

Commodities	Value (B)
Transportation Equipment	$139.01
Machinery	$64.01
Secondary Traffic	$63.38
Chemical Products	$60.18
Food Products	$53.11

Source: MDOT Statewide and Urban Travel Analysis
Transearch Database, IHS Global Insight, Inc.

2 Michigan Department of Transportation, State Long-Range Transportation Plan, 2040 MI Transportation Plan, Michigan Freight Profile White Paper.

Figure 4 - Michigan Major Freight Infrastructure



Corridors with the highest commercial volumes have remained consistent over the past decade. I-75 between Detroit and Toledo remains the busiest corridor with 15,500 trucks per day; I-94 (Detroit Industrial Freeway) through Romulus and Taylor has 14,300; I-94 near Battle Creek has 12,400; I-94 between Benton Harbor and the Indiana state line has 11,400; and I-696 through Warren carries 10,400 trucks per day.

5 STATE FREIGHT TRANSPORTATION ASSETS

Intermodal Connectors

National Highway System (NHS) intermodal connectors link major intermodal facilities not otherwise located on the NHS with the other four subsystems that make up the NHS. A list of freight intermodal connectors in Michigan is shown below (Table 2). Airport, port, and rail/truck intermodal terminals are key generators of commercial vehicle miles traveled (VMT), and MDOT included these road segments as part of the prioritization criteria for the list of freight projects statewide located in Section 10.

Table 2 - Michigan Freight Intermodal Connectors

Facility	Type	Connector Description	Connector Length (Miles)
Detroit - CP Rail System Oak Yard	Truck/Rail Facility	Served by an existing route	0
Detroit - Willow Run Airport	Airport	US-12 (entrance to I-94)	1.9
Detroit Junction/Livernois Intermodal Terminal	Truck/Rail Facility	Mercier Street (terminal to Wyoming Avenue and Dix Avenue), Wyoming Avenue (Mercier Street to US-12)	3.2
Detroit Metro Wayne County Airport	Airport	Merriman Road (Eureka Road to I-94)	3.5
Detroit-Windsor Truck Ferry/Lafarge/McCoig Terminals	Port Terminal	Springwells Court (terminal to Jefferson Avenue)	0.5
Ferndale - CN North America Moterm	Truck/Rail Facility	Fern Street (terminal to Fair Street), Fair Street (Fern Street to M-102)	0.3
Flint - Bishop Airport	Airport	Served by an existing NHS route	0
Gerald R. Ford International Airport (Grand Rapids)	Airport	44th Street (M-37 to Patterson), Patterson Avenue (44th Street to M-11)	2.9
Kalamazoo/Battle Creek International Airport	Airport	Portage Road (entrance to I-94)	0.5
Lansing Capital Region International Airport	Airport	Capitol City Boulevard (entrance to Grand River Boulevard)	0.5
Lower Detroit River Port	Port Terminal	Jefferson Avenue (port to Dragoon Street)	0.7
Lower Detroit River Port	Port Terminal	Clark Street (port to Fort Street)	0.4
Lower River Rouge - Port #1	Port Terminal	Marion Industrial Highway (port to Jefferson Avenue)	0.6
Lower River Rouge - Port #2	Port Terminal	Brennan Avenue (port to Jefferson Avenue)	0.2

Facility	Type	Connector Description	Connector Length (Miles)
Ludington Ferry Terminal	Ferry Terminal	US-10 (terminal to US-31)	3.6
Mackinaw Ferry Terminal	Ferry Terminal	Huron Avenue (terminal to M-108 to I-75)	1.7
Marquette Port	Port Terminal	Hampton Street (terminal to US-41/M-28)	0.1
New Boston Auto Ramp	Truck/Rail Facility	Sibley Road (terminal to I-275)	0.4
Norfolk Southern - Delray	Truck/Rail Facility	Served by an existing NHS route	0
Norfolk Southern - Oakwood	Truck/Rail Facility	Hess Street (terminal to Schaefer Highway), Schaefer Highway (Hess Street to I-75)	0.5
Norfolk Southern - Triple Crown	Truck/Rail Facility	S. Wabash Street to Dix Avenue to Outer Drive to Outer Drive to Schaefer Highway to I-75	0.8
Oakland County International Airport	Airport	Served by an existing NHS route	0
Saginaw River - Lower (Port) #1	Port Terminal	Marquette Street (port to Truman Parkway)	0.2
Saginaw River - Lower (Port) #2	Port Terminal	Woodside Drive (Pine Street to Trumbull Street)	1.8
Saginaw River - Upper (Port) #1	Port Terminal	Westervelt Road (port to Kochville Road), Kochville Road (Westervelt Road to Adams Road), Adams Road (Kochville to I-75)	1.5
Saginaw River - Upper (Port) #2	Port Terminal	Served by an existing NHS route	0
Saginaw/Midland/Bay City International Airport	Airport	Garfield Road (entrance to M-47)	3.2
Sawyer International Airport	Airport	Served by an existing NHS route	0
St. Ignace Ferry Terminal	Ferry Terminal	I-75 Business Loop (terminal to US-2)	2
St. Joseph Port	Port Terminal	Served by an existing NHS route	0
Traverse City, Cherry Capital Airport	Airport	Airport Access Road (entrance to US-31/M-72)	0.5
Upper River Rouge - Port #1	Port Terminal	Forman Avenue to Flora Street to Reisner Avenue to Fort Street	0.4
Upper River Rouge - Port #2	Port Terminal	Dix Avenue (port to Livernois Avenue), Oakwood Boulevard (Dix Avenue to Schaefer Highway), Schaffer Highway (Oakwood Boulevard to I-75)	0.8
Upper River Rouge - Port #2	Port Terminal	Dix Avenue (port to Livernois Avenue)	3.4
Woodhaven - APL	Truck/Rail Facility	King Road (terminal to Allen Road), Allen Road (King Road to West Road)	1.4

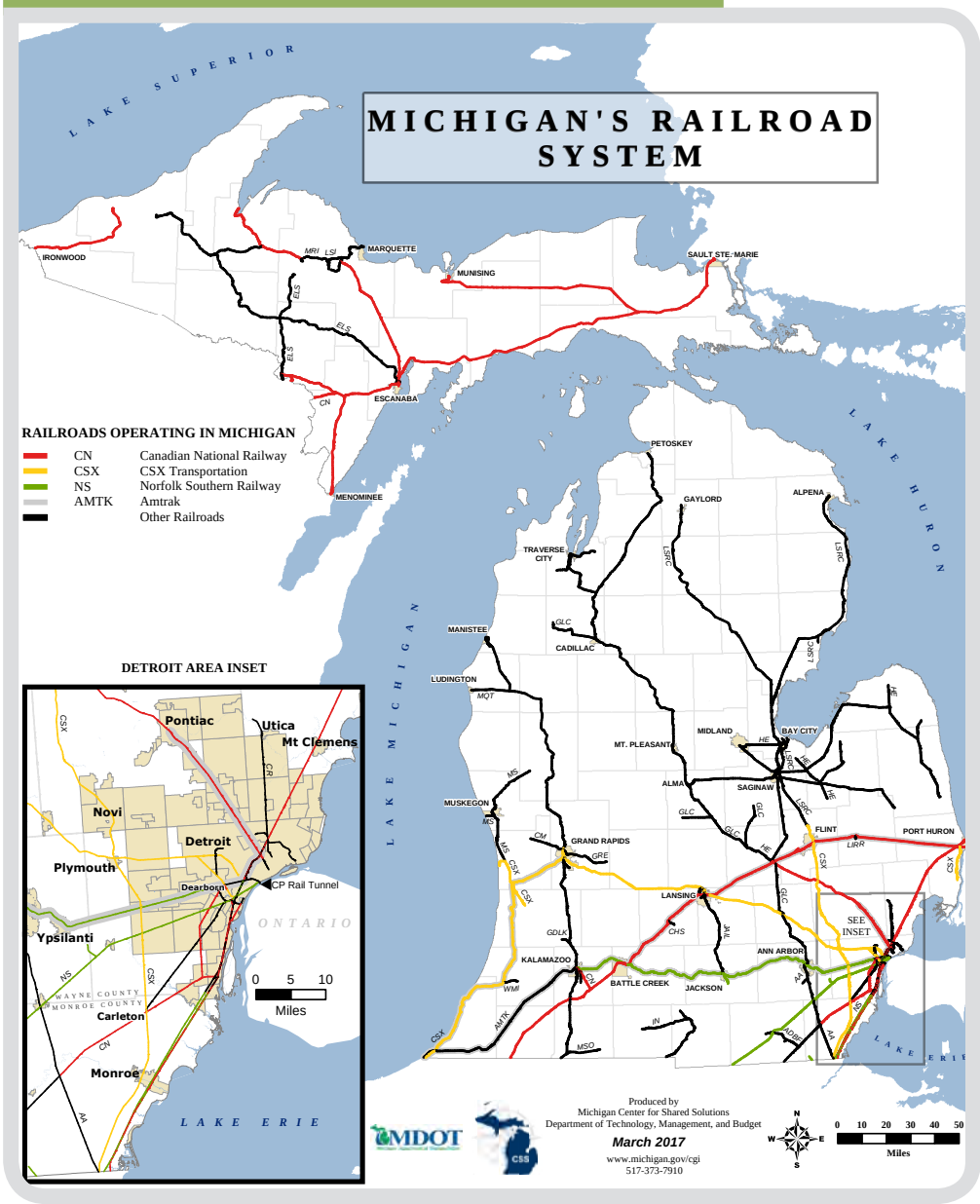
5 STATE FREIGHT TRANSPORTATION ASSETS

Rail System

Michigan has 26 freight railroads that operate on approximately 3,600 miles of track in the state. The following is a map of active rail and state-owned rail as of 2017 (Figure 5).

The freight railroad industry is almost exclusively privately owned and financed, with railroad companies owning and maintaining the track infrastructure. Railroad companies invest more than $200 million annually to preserve Michigan's rail infrastructure.[3] The limited exceptions to the private sector funding of rail infrastructure include MDOT's two loan programs and the 665 miles of state-owned rail lines operated under lease by five freight railroads.

Figure 5 - Michigan Active Rail (2017)



3 Maintenance-of-way expenditures reported for 2016 totals $219,295,372. Michigan Department of Treasury, Bureau of Local Governments, Assessment and Certification Division.

In 2014, railroads carried almost 101 million tons of freight, approximately 21 percent of total commodity movements for all modes. Rail is an especially cost-effective alternative for heavy and bulky commodities, and is commonly the preferred transport method for hazardous materials.[4]

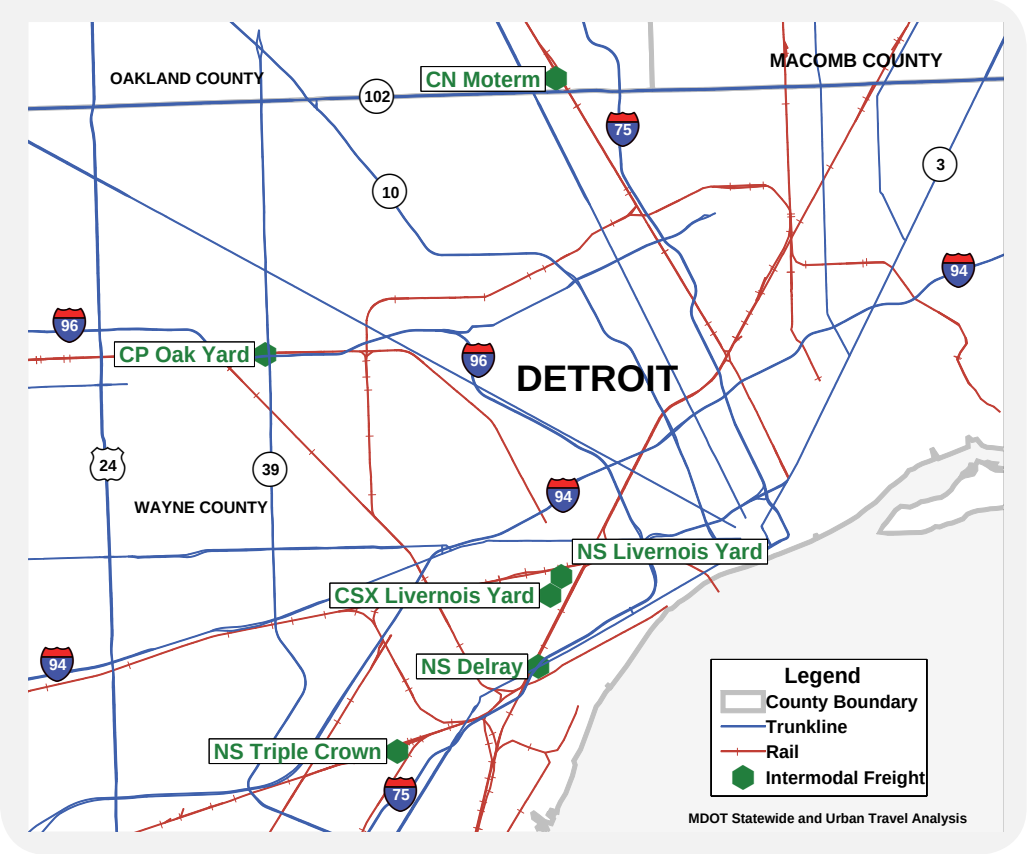
Table 3 - Top Commodities Moved by Rail in Michigan (2014)

Commodities	Tons (M)
Coal	18.50
Chemical Products	14.15
Metallic Ores	12.35
Transportation Equipment	8.83
Primary Metal Products	6.41

Commodities	Value (B)
Transportation Equipment	$82.96
Chemical Products	$52.65
Misc. Mixed Shipments	$24.21
Primary Metal Products	$11.10
Paper and Pulp Products	$4.86

Source: MDOT Statewide and Urban Travel Analysis Transearch Database, IHS Global Insight, Inc.

Figure 6 - Detroit Area Freight Terminals



The Michigan State Rail Plan was completed in 2011 to maintain compliance with the federal Passenger Rail Investment and Improvement Act of 2008 (PRIIA) requirements. This Freight Plan was prepared in coordination with the development of an updated State Rail Plan, to be completed in conjunction with the next MDOT Long-Range Plan. The Michigan State Rail Plan documents the ownership and operational details of Class I, Class II, Class III, and switching/terminal railroads in Michigan. It also establishes a long-term vision for Michigan's rail system and outlines a recommended program of prioritized investments over the next 20 years. Detailed information on Michigan's physical rail infrastructure assets can be found in the Existing Conditions Technical Memoranda of the Rail Plan.

Intermodal rail is growing rapidly within the railroad industry. Container movements between truck and rail offer efficiencies in long-distance freight movements and overseas trade. Michigan presently has six rail intermodal facilities, all located in southeast Michigan. The Detroit Intermodal Freight Terminal (DIFT) project, a public/private collaboration between MDOT, other government agencies, and four Class I railroads, will alleviate many current mobility issues with the issues with the expansion and relocation of terminals, along with improved highway and rail access. Figure 6 above identifies the locations of existing intermodal terminals in the Detroit area.

4 American Association of State Highway and Transportation Officials. Freight-Rail Bottom Line Report.

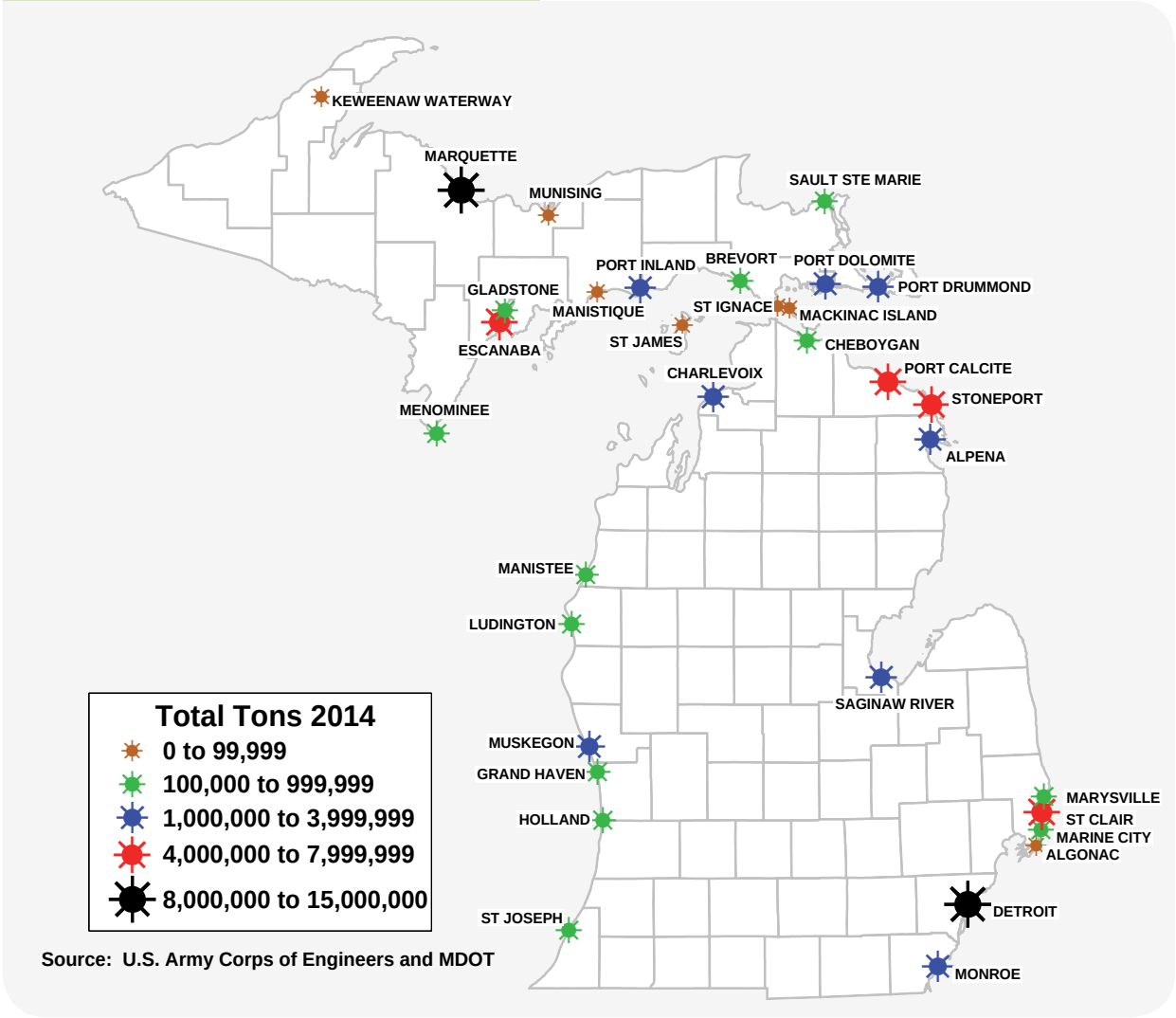
5 STATE FREIGHT TRANSPORTATION ASSETS

Marine Transportation

Marine transportation is an essential component of Michigan's freight transportation system. The Great Lakes and St. Lawrence Seaway form a maritime transportation system extending 2,300 miles from the gulf of the St. Lawrence Seaway on the Atlantic Ocean to the western end of Lake Superior. Michigan's 3,200 miles of shoreline along four of the five Great Lakes contain 33 active cargo ports that ship or receive cargo (Figure 7). The Michigan Freight Profile Technical Report contains detailed information on Michigan's maritime assets.

The maritime system is a partnership between the public and private sectors. The federal government generally maintains the infrastructure by way of congressionally authorized navigation channels, aids-to-navigation, and other marine services. The private sector typically provides the marine terminals, cargo vessels, and necessary access channels to reach the public channels. MDOT maintains a listing of all publicly and privately owned marine facilities throughout the state and works in partnership with the U.S. Army Corps of Engineers (USACE) and the Michigan Department of Environmental Quality (MDEQ) on issues impacting maritime navigation.

Figure 7 - Michigan Cargo Ports (2014)



Source: U.S. Army Corps of Engineers and MDOT

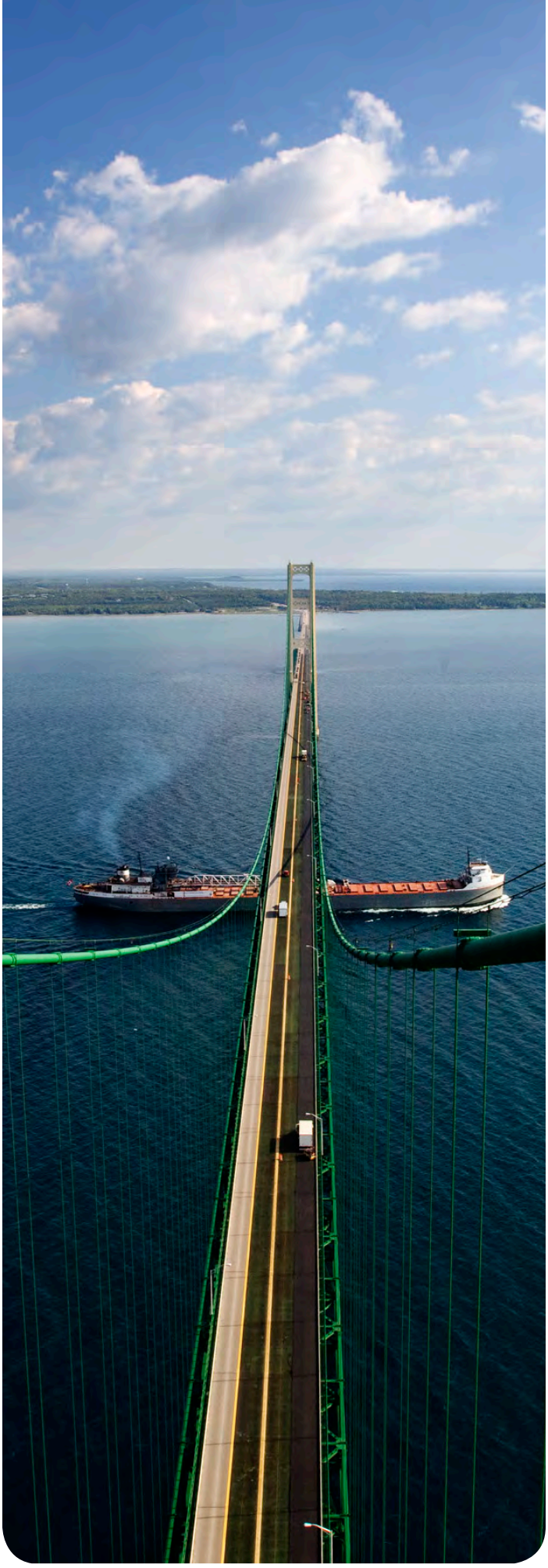
Ensuring continued investment in the marine transportation system is essential to Michigan's economic well-being.The United States and Canadian ports and terminals on the Great Lakes - St. Lawrence Seaway system move about 180 million tons of cargo each year. As a result of maritime activity on the system, $33.6 billion in business revenue was received by firms supplying cargo handling and vessel services, and inland transportation services in the U.S.[5] Ports provide a vital service, particularly for the mining industries in the Upper Peninsula and northern Lower Peninsula. Michigan's vast water resources are unique and the Great Lakes shipping corridor provides a significant transportation option.

Table 4 - Top Commodities at Michigan Ports (2014)

Commodity Tonnage Rank	Tons (Millions)
Nonmetallic Ores	21.95
Metallic Ores	15.63
Coal	15.56
Petroleum or Coal Products	5.48
Clay, Cement, Glass or Stone Products	3.85

Commodity Value Rank	Value (Millions)
Petroleum or Coal Products	$5,691.01
Metallic Ores	$1,477.31
Crude Petroleum and Natural Gas	$663.23
Chemical Products	$626.87
Coal	$588.06

Source: MDOT Statewide and Urban Travel Analysis



5 The Economic Impacts of the Great Lakes - St. Lawrence Seaway System, 2011. http://greatlakesseaway.org/wp-content/uploads/2015/04/Econ-Study-Exec-Sum-Final-Oct-18.pdf

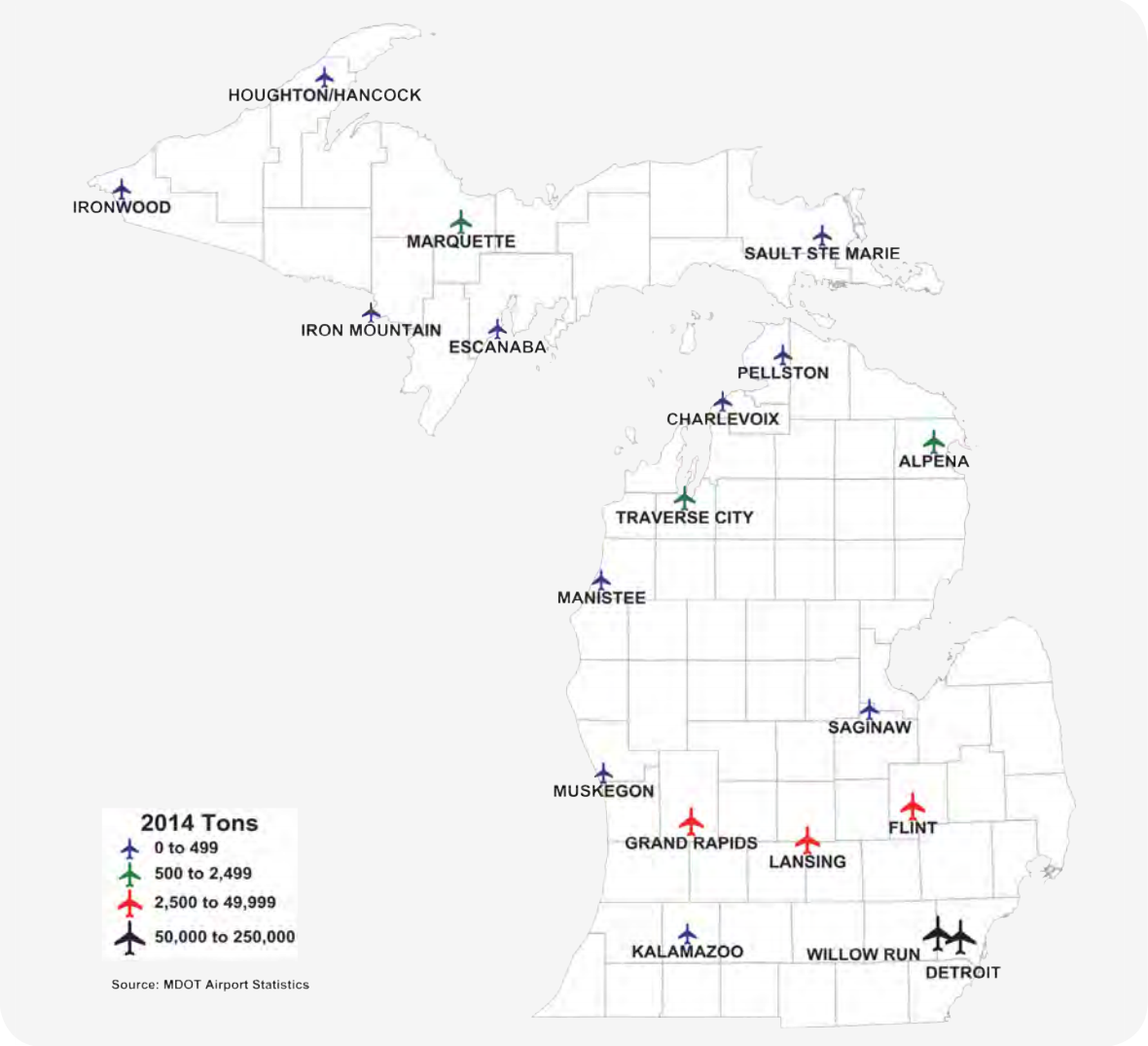
5 STATE FREIGHT TRANSPORTATION ASSETS

Airport System

Aviation provides a truly global transportation network. Airports are important economic generators, with air passenger and air freight activity reflecting major economic benefits to many communities. The Michigan Aviation System Plan 2017 (MASP 2017) documents the planning process that identifies the role of public-use airports in Michigan through the year 2040.

Although it makes up a relatively small percentage of the state's freight transportation in terms of tonnage moved, air cargo services are particularly important for high-value and time-sensitive commodities. A significant number of Michigan's 226 public-use airports are capable of supporting air cargo operations. Michigan has 17 airports with scheduled air carrier service that also report the handling of air cargo. In addition, air cargo statistics are reported by Detroit Willow Run Airport, which does not offer scheduled air carrier service. Five airports in the state accommodate air cargo tonnage at high enough levels to receive federal cargo entitlement funding from the Federal Aviation Administration. These airports include Detroit Willow Run, Detroit Metro, Grand Rapids, Lansing, and Flint.

Figure 8 - Scheduled Air Service Airports by Tonnage (2014)



Additional air cargo capacity exists in the state of Michigan. Three former Air Force bases (AFB) have been transferred to local agency ownership, including Sawyer AFB in Marquette County, Wurtsmith AFB in Oscoda County, and Kincheloe AFB in Chippewa County. These former military air bases maintain long runways that are capable of accommodating nearly all commercial cargo aircraft types. In addition, Oscoda-Wurtsmith Airport is currently equipped to handle maintenance, repair, and overhaul of a variety of large air carrier and freighter aircraft types. The Aviation White Paper provides details on airport infrastructure, while the Michigan Freight Profile White Paper includes specific mobility issues facing the aviation sector.

Michigan moved 349,368 tons of air cargo in 2014. Households, businesses, and governments spend about $7 billion annually on aviation and aviation-related services. Local airports are strong economic engines for local communities, both as freight ports and as facilitators for entrepreneurs involved in airport-dependent businesses.

Table 5 - Top Air Cargo Airports by Tonnage (2014)

Airport	Total Tons	Inbound Tons	Outbound Tons
Detroit	206,291	114,726	91,565
Willow Run	62,043	32,915	29,128
Grand Rapids	41,041	18,368	22,673
Lansing	22,948	12,611	10,336
Flint	12,030	6,658	5,371
Traverse City	1,407	814	593
Iron Mountain	465	243	222
Alpena	561	348	212
Saginaw	82	76	6
Pellston	406	283	123
Escanaba	497	354	143
Other Origins	1,595	1,014	581
Total	**349,368**	**188,413**	**160,955**

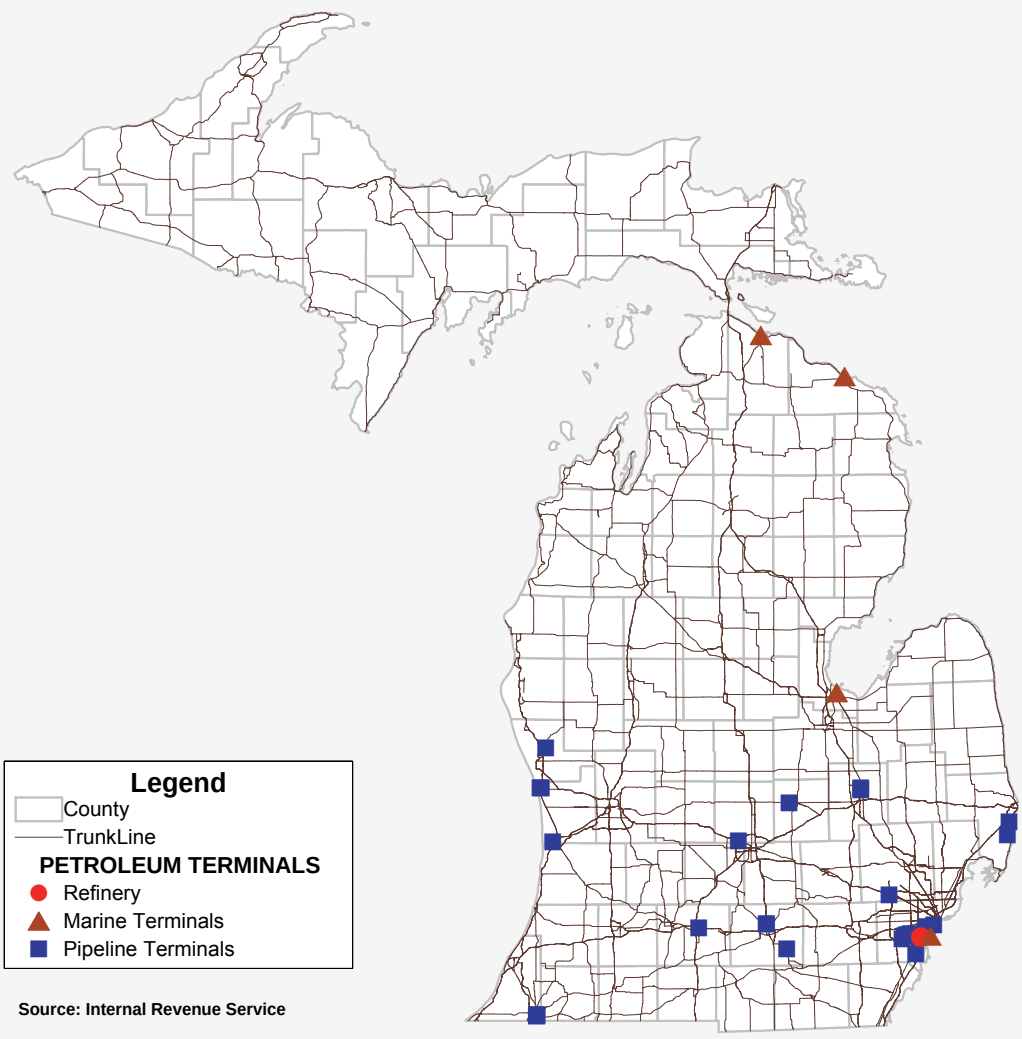
Source: MDOT Statewide and Urban Travel Analysis Section

5 STATE FREIGHT TRANSPORTATION ASSETS

Pipelines

Although MDOT does not oversee pipeline infrastructure, it maintains a geographic database of petroleum pipeline terminal locations (Figure 9). These sites are major generators of petroleum movements to consumption areas. Keeping updated location information benefits the department's freight modeling efforts by allowing the simulation of origin/destination patterns on state highway infrastructure. The following map depicts pipeline terminal locations.

Figure 9 - Petroleum Terminals and Refineries in Michigan



Source: Internal Revenue Service

KEY FREIGHT INDUSTRY AND NATURAL RESOURCE LOCATIONS

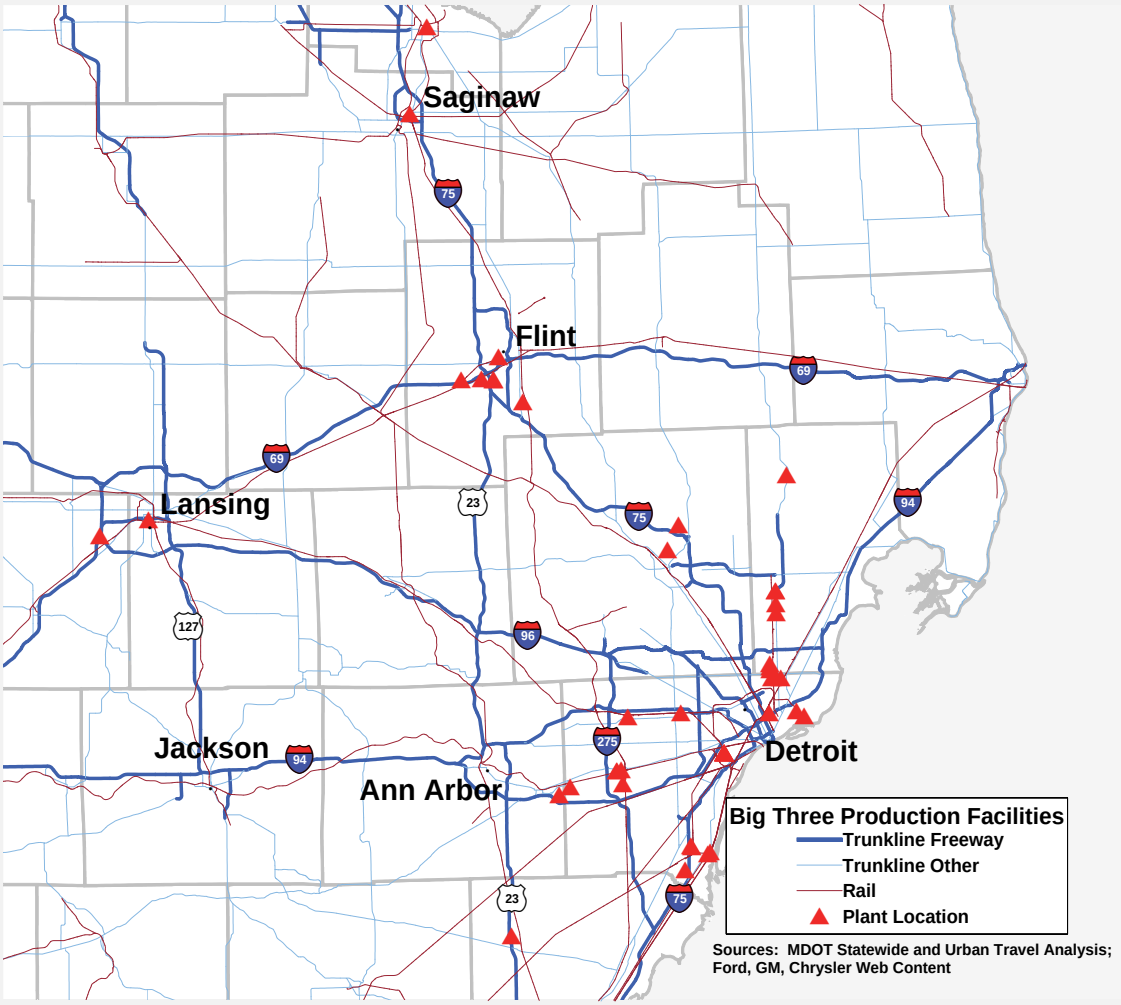
Businesses and industries involved in everything from manufacturing to agricultural production depend on the movement of goods. Easy access to high-quality transportation infrastructure is often a fundamental consideration for businesses in deciding where to locate. MDOT places strong emphasis on system preservation and system-wide integration of all modes to ensure that shippers and carriers are able to make the most efficient and cost-effective use of the transportation assets Michigan has to offer.

The following section highlights the location of warehousing terminals and the major industries in Michigan, including auto manufacturing, mining, agriculture, and logging.

Auto Manufacturing Industry

Michigan is home to the nation's auto industry and is the headquarters of General Motors, Ford, and Chrysler. Transportation equipment is a predominant freight commodity moving throughout southern Michigan, with shipments between suppliers and the major production plants occurring in a continuous cycle. The "just-in-time" delivery of auto parts and products relies on multiple modes of transportation across the state, as well as between neighboring states and Canada. The following map depicts the assembly plants and major production facilities of the Big Three auto companies, all of which are located near major trunkline facilities and rail infrastructure assets (Figure 10).

Figure 10 - Chrysler, Ford, and GM Production Facilities



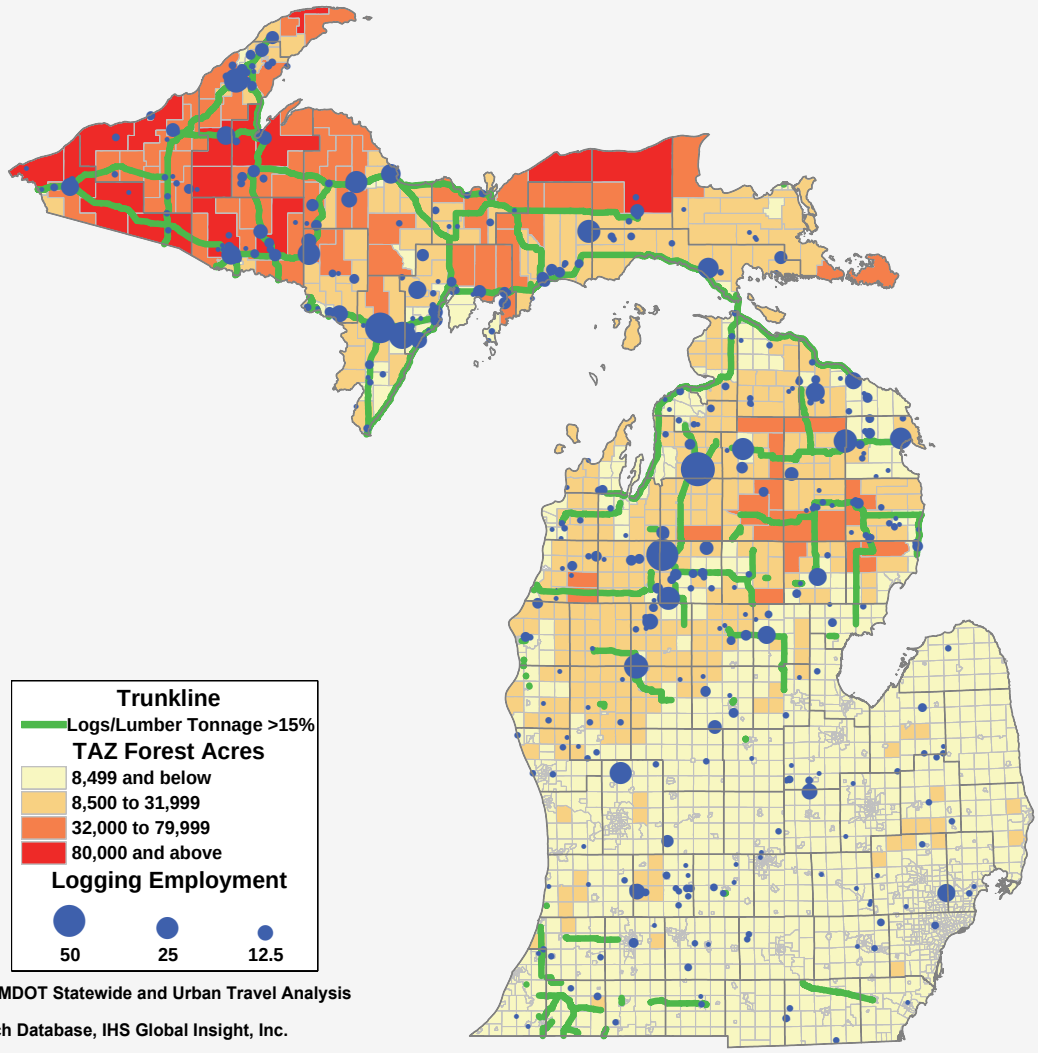
5 STATE FREIGHT TRANSPORTATION ASSETS

Logging Industry

Michigan's Upper Peninsula and northern Lower Peninsula are flush with a mix of hardwoods and pines. Michigan is a leading producer of wood products, including furniture and a variety of paper products. MDOT's employer database provides the location of logging employment, sawmills, paper mills, and other facilities using timber (Figure 11).

Quite often, logging sites are located in rural areas, making local forest roads essential to support the logging industry in Michigan. The following map portrays the location of logging employment, acres of forest land aggregated to Traffic Analysis Zone (TAZ) and the location of state roads where logs and lumber make up more than 15 percent of all commodity weight traveling on the roadway.[6]

Figure 11 - Michigan Logging Locations



Sources: MDOT Statewide and Urban Travel Analysis

Transearch Database, IHS Global Insight, Inc.

6 Traffic analysis zones or TAZs, are typically small area neighborhoods or communities that serve as the smallest geographical basis for travel demand model forecasting systems. http://tmiponline.org/Clearinghouse/Items/Technical_Synthesis_-_Defining_Traffic_Analysis_Zones.aspx

Agricultural Production

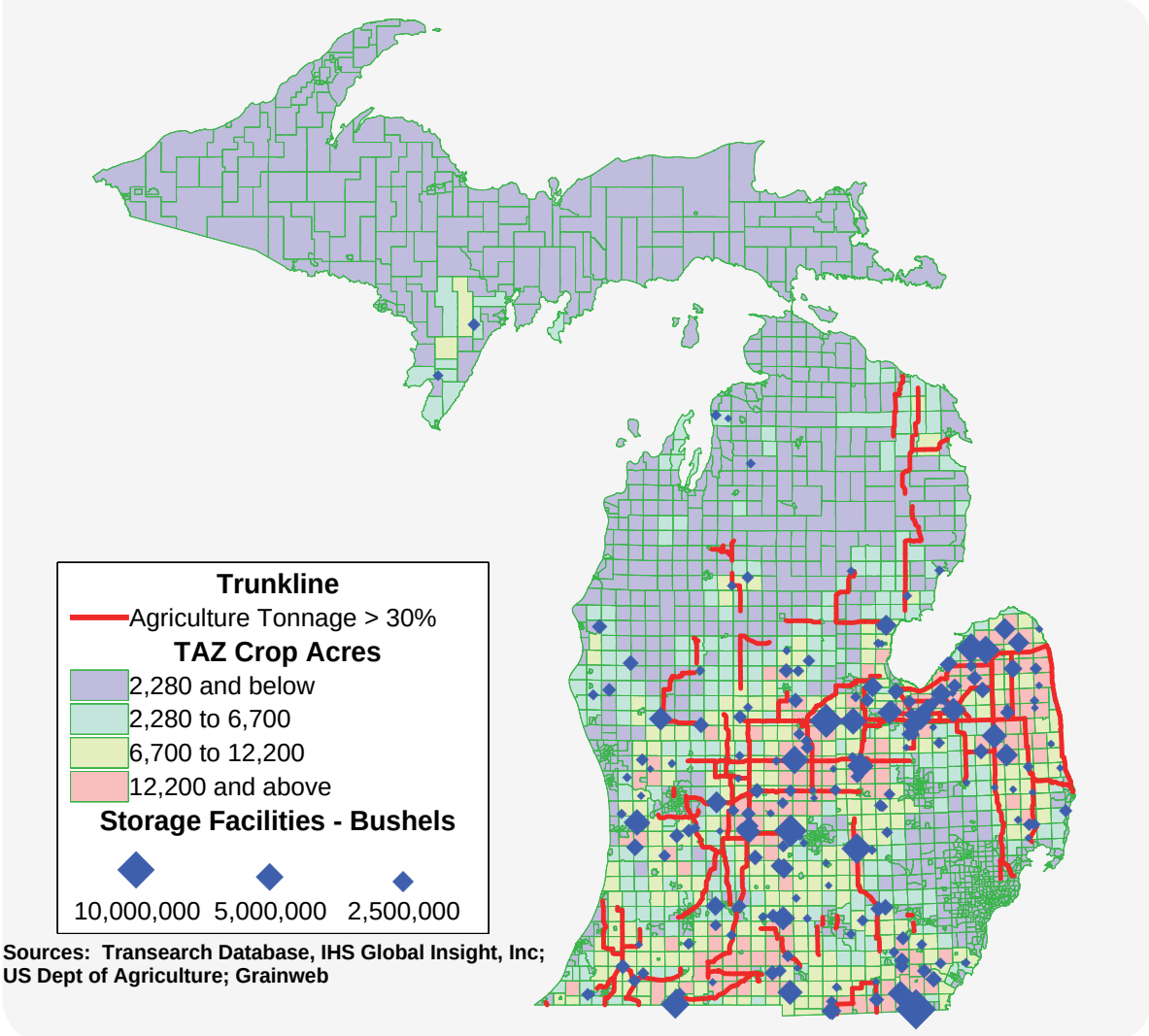
The southern half of Michigan's Lower Peninsula is home to the majority of productive agricultural land in Michigan, due in part to the longer growing season. There also are large orchard and vineyard areas along the Lake Michigan shore of the Lower Peninsula and agricultural activity in the southern tip of the Upper Peninsula. (Figure 12).

In line with the national initiative to double exports, Gov. Snyder has stated his goal to double Michigan's agriculture exports and increase the economic impact of the agriculture industry. The state's initiatives, coupled with the trend of agriculture activity moving northward, has placed additional emphasis on the quality of the transportation infrastructure in the Thumb Area, the Saginaw Bay region, the northern Lower Peninsula, and throughout south central Michigan.

In addition, recent presentations by the Michigan Agri-Business Association indicate that the movement of agricultural activity northward has raised concerns about the adequacy of transportation resources in the northern Lower Peninsula and Upper Peninsula.[7] The concerns related to non-highway modes (rail and water freight) become even more critical in light of the fact that road infrastructure may be inadequate compared to the lower third of Michigan.

Agricultural products are typically first shipped from rural areas and on local roads, followed by routes along state trunkline while en route to production, storage, and market facilities. The following map shows the major concentration of agriculture production. State roads that handle more than 30 percent of overall tonnage in farm products are indicated in red.

Figure 12 - Crop Concentration and Storage Facilities



Sources: Transearch Database, IHS Global Insight, Inc; US Dept of Agriculture; Grainweb

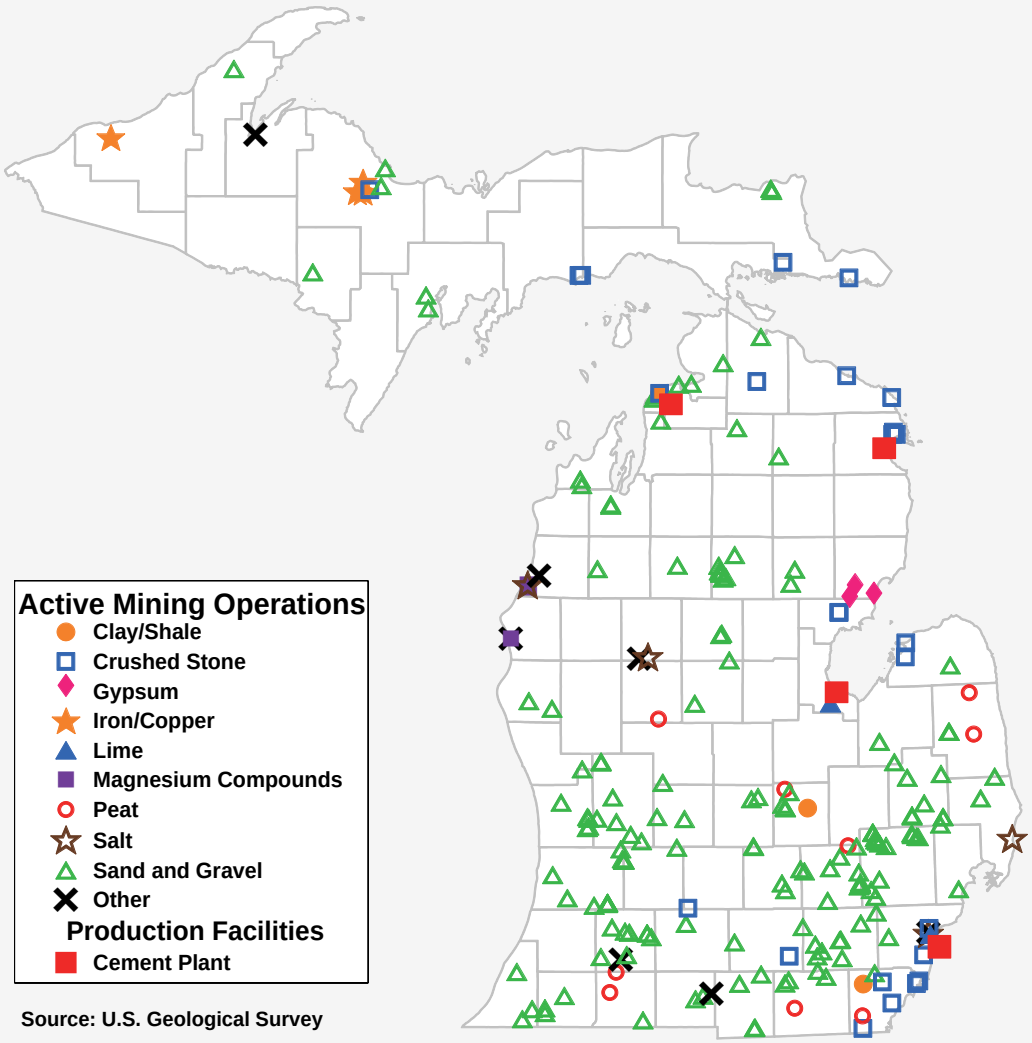
7 Michigan Agriculture in the Global Economy, James E. Byrum, March 2013, http://ippsr.msu.edu/policy/presentations/13MIAg.pdf.

5 STATE FREIGHT TRANSPORTATION ASSETS

Mining Industry

Michigan has a vast supply of raw natural resources mined for use by the manufacturing industry (Figure 13). Metallic and nonmetallic ores move through the state by truck, rail, and water. Michigan also is a leader in the supply of sand and gravel, much of which moves by truck directly to construction sites within the state. Limestone and iron ore are prevalent in northern Michigan and move by rail and water. The following map displays the location of various mining and plant facilities throughout the state as of 2014.

Figure 13 - Michigan Natural Resource Operations

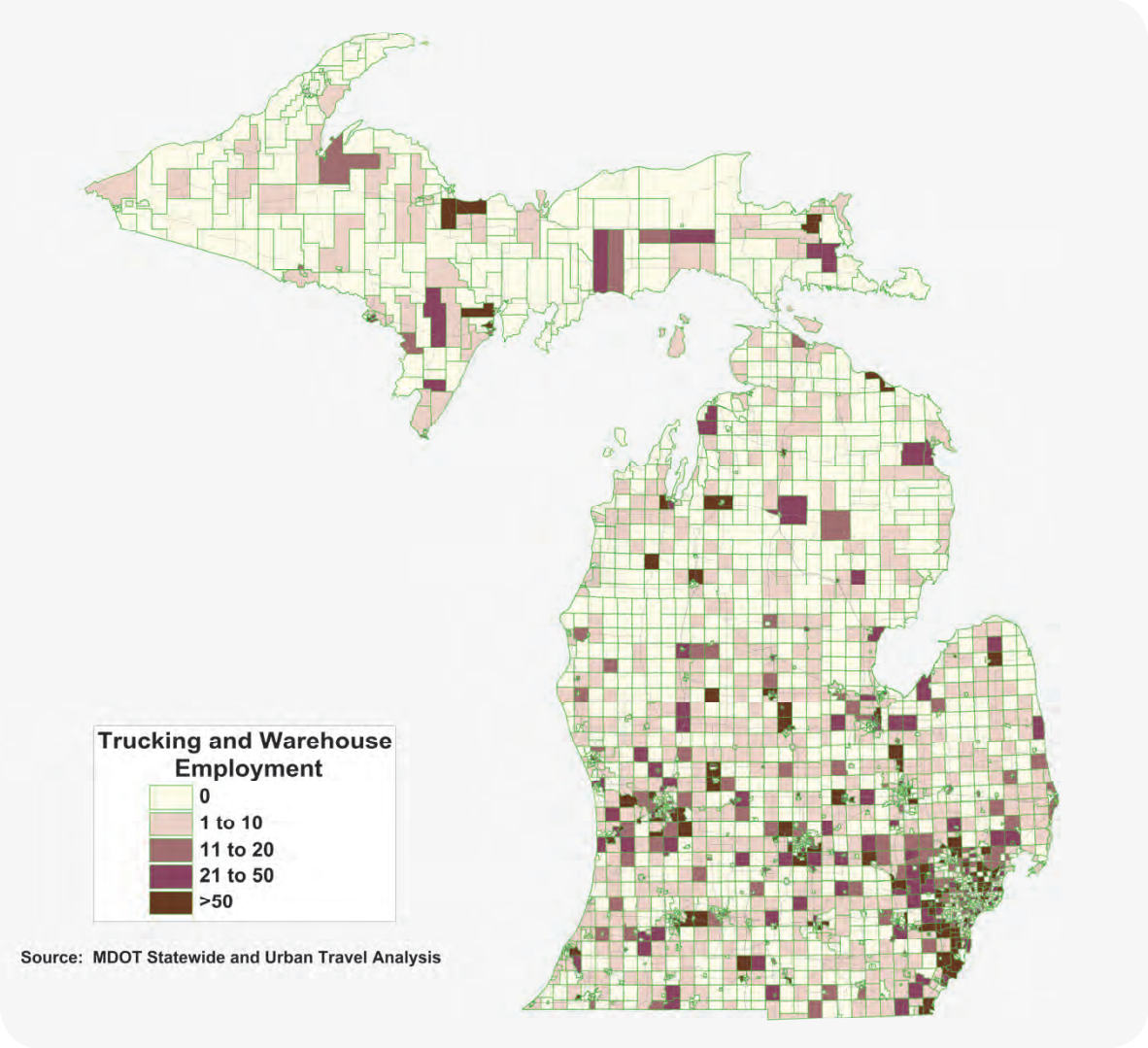


Source: U.S. Geological Survey

Warehouse and Trucking Employment Centers

Although not a specific commodity type, an essential ingredient in the supply chain networks of many businesses is the location of warehousing facilities and the presence of trucking companies. These types of businesses tend to locate outside of city centers, near freeways, and in close proximity to the intersection of major highways. Ease of access and the presence of large population centers are dominant factors in determining where to locate warehouse facilities. Major retail distribution centers are included in this category as they are often key truck freight generators. The following map (Figure 14) depicts trucking and warehouse employment concentrations, aggregated by TAZ.

Figure 14 - Warehouse and Trucking Employment



6 SYSTEM CONDITION AND PERFORMANCE

This section provides an overview of the goals used by MDOT to guide investments that are intended to address the conditions and performance of the state's freight transportation system. A detailed analysis of the conditions and performance of the state's infrastructure can be found in the Conditions and Performance Technical Report. In addition, when freight performance targets are established by MDOT, they will be incorporated into the planning process.

2040 MI TRANSPORTATION PLAN PERFORMANCE MEASURES

MDOT has actively implemented performance-based program development and asset management since 1997, when the State Transportation Commission (STC) established state trunkline pavement and bridge goals. The Corridors of Highest Significance – Performance Metrics White Paper describes how the 2040 MITP evaluated the state trunkline system by performance and ranked the corridors based on level of significance. Section 8, under Highway Issues and Strategies, contains information on freight reliability measures in accordance with the FAST Act performance measure rules. MDOT's long history with performance measures has enabled the department to develop robust measurement capabilities. Performance measures for Michigan's transportation infrastructure were selected using system-wide goals and objectives. The Goals, Objectives, and Performance Measures Report presents the four system-wide goals, their associated objectives as they relate to MDOT's mission - Integration, Economic Benefit, and Quality of Life - and the selection criteria used to develop the performance measures. Each of the four goal areas and associated objectives from the 2040 MITP are summarized as follows:

Goal: Stewardship

Preserve transportation system investments, protect the environment, and utilize public resources in a responsible manner.

The Stewardship Goal focuses on MDOT's role and responsibilities associated with being good stewards of Michigan's resources. This is based on a holistic view of resources, including funding transportation assets (e.g., highways, rail lines, airports, etc.), the physical human environment, and the Michigan economy.

Goal: Safety and Security

Continue to improve transportation safety and ensure the security of the transportation system.

The Safety and Security Goal continues MDOT's long-standing commitment to build, maintain, and operate the safest transportation system possible. The objectives under the Safety and Security Goal emphasize traditional safety initiatives aimed at reducing fatalities, injuries, and crashes/incidents, as well as efforts to address transportation system security needs.

Goal: System Improvement

Modernize and enhance the transportation system to improve mobility and accessibility.

The System Improvement Goal emphasizes the various areas where MDOT can make direct investments or encourage investments by other entities to improve the efficiency and effectiveness of Michigan's transportation system. The objectives focus on improvements to modernize, expand, and connect the system to support economic growth and better facilitate the movement of goods, people, and services.

Goal: Efficient and Effective Operations

Improve the efficiency and effectiveness of the transportation system and transportation services, and expand MDOT's coordination and collaboration with partners.

The Efficient and Effective Operations Goal reflects MDOT's desire to achieve the greatest possible performance from Michigan's existing transportation assets and future system improvements. This goal also addresses the importance of operating a transportation system and providing services to ensure citizens and stakeholders have modal choices. The objectives associated with this goal area focus on the application of technology, stronger coordination and collaboration with public and private stakeholders, and improved intermodal transfers.

TRACKING THE PERFORMANCE OF MICHIGAN'S INFRASTRUCTURE

To achieve the goals that have been established, it is necessary to monitor the performance of the system. MDOT formalized its approach to improving, measuring, and reporting the condition of its transportation networks with the STC's 1997 adoption of the pavement condition goals. Since then, MDOT has developed performance measures to reflect a broader range of the transportation system.

Asset Management

MDOT follows an asset management approach to maintain Michigan's transportation system. Asset management provides a solid foundation that allows transportation professionals to monitor the transportation system and optimize the preservation, improvement, and timely replacement of assets through cost-effective management, programming, and resource allocation decisions.

Transportation System Condition Report

MDOT uses the Transportation System Condition Report, which is updated twice a year, to provide a quick snapshot of whether or not the department is achieving the state long-range plan goals laid out above. The measures are organized around the four major goal areas of the 2040 MITP - Stewardship, Safety and Security, System Improvement, and Efficient and Effective Operations. While the individual measures reported may change over time, the close connection to the 2040 MITP goals ensures that the focus and importance of the reporting remains constant. The measures included in the report are only a representative sample of the countless measurements and data collections monitored by MDOT in the course of overseeing the building, maintenance, and operation of the state's transportation system. It is viewed as a work in progress. The selection of measures may change as the report is refined, as experience dictates, and as new federal requirements for performance measurement are put into place.

Michigan Dashboard

Gov. Snyder implemented the Michigan Dashboard (Mi Dashboard), which provides a quick assessment of the state's performance in key areas, including economic strength, health and education, value-for-money government, quality of life, and public safety. Mi Dashboard includes an infrastructure dashboard, which provides a way for the public to track the progress of many key infrastructure elements important to them. This includes those related to freight movements, and draws upon many of the measures MDOT already was using in its investment and programming decisions.

More information about MDOT's performance can be found on the MDOT website at www.michigan.gov/mdot.

7 20-YEAR FREIGHT FORECAST

This section provides a 20-year forecast of freight transportation demands, broken down by mode of transportation and Standard Transportation Commodity Code (STCC), including the projected demands for intrastate, inbound, outbound, and through-interstate transportation of freight. The estimated projections are based on 2014 Transearch data from IHS Global Insight. The tables below summarize the freight forecasts for each mode. Detailed forecast tables by mode begin on page 42.

Table 6 - Summary of Freight Forecasts by Mode

Movement Type	2014 (Tons in Millions)	2040 (Tons in Millions)	Growth Percent (2014 -2040)
Highway Freight Forecast			
Overall	308	486	58%
Intrastate (Michigan to Michigan)	111	146	31%
Outbound (Michigan to Other)	82	108	31%
Inbound (Other to Michigan)	85	144	69%
Through-Trips (Origin and Destination Outside Michigan)	30	89	194%
Waterborne Freight Forecast			
Overall	65	69	7%
Intrastate (Michigan to Michigan)	10	9	-11%
Outbound (Michigan to Other)	31	40	30%
Inbound (Other to Michigan)	24	20	-16.1%
Rail Freight Forecast			
Overall	101	148	49.8%
Intrastate (Michigan to Michigan)	5	6	4.8%
Outbound (Michigan to Other)	21	28	28.2%
Inbound (Other to Michigan)	33	31	-5.6%
Through-Trips (Origin and Destination Outside Michigan)	34	77	124.3%
Air Freight Forecast			
Overall	0.266	0.462	73.4%
Intrastate (Michigan to Michigan)	0.002	0.003	85.2%
Outbound (Michigan to Other)	0.143	0.262	82.4%
Inbound (Other to Michigan)	0.121	0.197	62.5%

HIGHWAY FREIGHT FORECAST

Overall truck freight movements are projected to increase 57.6 percent by 2040, from 308 million tons in 2014 to 486 million tons in 2040. Intrastate truck freight movements are projected to increase less rapidly at 31.1 percent by 2040, from 111 million tons in 2014 to 146 million tons by 2040. Outbound truck freight movements are projected to increase similarly at 31.2 percent by 2040, from 90 million tons in 2014 to 108 million tons in 2040. Inbound truck freight movements are projected to increase 69.2 percent by 2040, from 85 million tons in 2014 to 144 million tons in 2040. Through-truck freight movements, those not stopping in Michigan, are projected to increase 193.5 percent by 2040, from 30 million tons in 2014 to 89 million tons in 2040.

Table 7 - Michigan Truck Freight Movements (2014-2040): Overall (Tons)

Commodity	STCC	2014	2020	2030	2040	Growth % 2004-2040
Agriculture	1	38,636,176	39,705,258	43,336,613	48,351,087	25.1%
Primary Forest Materials	8	90,825	101,483	110,905	121,489	33.8%
Fresh Fish	9	22,807	26,781	33,108	40,166	76.1%
Metallic Ores	10	99,023	96,252	103,016	108,992	10.1%
Coal	11	73,115	78,661	74,257	74,914	2.5%
Crude Petroleum and Natural Gas	13	65,576	86,586	137,299	222,605	239.5%
Nonmetallic Ores and Minerals	14	75,626,112	83,336,891	88,613,160	94,088,423	24.4%
Ordnance	19	161,847	185,066	224,122	265,927	64.3%
Food Products	20	32,081,922	34,384,224	40,773,594	48,874,635	52.3%
Tobacco Products	21	59,349	49,738	35,122	24,761	-58.3%
Textile Mill Products	22	492,359	548,866	588,259	686,180	39.4%
Apparel or Finished Textiles	23	257,396	269,786	282,987	335,896	30.5%
Lumber and Wood Products	24	9,965,062	11,575,978	12,452,559	13,101,642	31.5%
Furniture and Fixtures	25	1,959,998	2,641,395	3,983,855	6,227,912	217.8%
Paper and Pulp Products	26	7,072,591	7,857,353	9,695,232	12,193,646	72.4%
Printed Matter	27	1,449,826	1,264,980	1,362,028	1,533,469	5.8%
Chemical Products	28	13,549,733	17,858,211	23,829,540	31,608,194	133.3%
Petroleum or Coal Products	29	11,051,643	10,182,000	10,165,233	10,444,328	-5.5%
Rubber and Plastics	30	6,714,161	8,549,120	10,708,228	13,232,671	97.1%
Leather Products	31	64,772	66,339	72,046	80,099	23.7%
Clay, Cement, Glass or Stone Products	32	16,377,880	20,448,710	25,677,260	32,300,592	97.2%
Primary Metal Products	33	17,480,901	19,267,638	23,789,391	29,585,069	69.2%
Fabricated Metal Products	34	6,869,588	7,912,581	9,801,992	11,922,543	73.6%
Machinery	35	4,748,732	6,074,652	8,864,040	13,091,329	175.7%
Electrical Equipment	36	3,499,487	4,750,524	6,702,372	9,467,230	170.5%
Transportation Equipment	37	12,880,896	15,276,874	18,110,045	21,886,815	69.9%
Technical Instruments and Equipment	38	582,085	750,162	1,146,761	1,721,406	195.7%
Misc. Manufacturing Products	39	914,630	1,061,512	1,280,151	1,656,392	81.1%
Waste or Scrap Metal	40	16,616,625	18,826,419	22,171,389	25,475,506	53.3%
Misc. Freight Shipments	41	4,091	5,111	6,580	8,575	109.6%
Misc. Mixed Shipments	46	900,414	1,362,160	2,487,314	4,541,853	404.4%
Secondary Traffic	50	28,126,495	32,600,632	41,187,206	52,973,671	88.3%
	TOTAL	308,496,117	347,201,943	407,805,664	486,248,017	57.6%

Table 8 - Michigan Truck Freight Movements (2014-2040): Michigan to Michigan (Tons)

Commodity	STCC	2014	2020	2030	2040	Growth % 2014-2040
Agriculture	1	14,768,907	14,803,954	15,335,868	15,542,271	5.2%
Primary Forest Materials	8	3,514	4,419	4,724	4,701	33.8%
Fresh Fish	9	6	6	7	8	33.3%
Metallic Ores	10	2,000	2,872	4,007	5,049	152.5%
Nonmetallic Ores and Minerals	14	49,925,581	55,333,569	58,934,948	62,421,495	25.0%
Ordnance	19	62,541	78,236	95,115	109,483	75.1%
Food Products	20	4,509,222	4,487,005	4,953,290	5,383,752	19.4%
Tobacco Products	21	208	278	283	231	11.1%
Textile Mill Products	22	21,580	21,336	14,596	10,709	-50.4%
Apparel or Finished Textiles	23	17,370	16,007	11,553	9,368	-46.1%
Lumber and Wood Products	24	4,369,461	4,936,564	5,256,715	5,286,822	21.0%
Furniture and Fixtures	25	116,314	146,614	167,977	175,711	51.1%
Paper and Pulp Products	26	720,829	746,096	841,809	946,920	31.4%
Printed Matter	27	163,847	134,367	141,124	152,768	-6.8%
Chemical Products	28	1,510,912	1,890,175	1,929,252	1,719,619	13.8%
Petroleum or Coal Products	29	3,085,037	2,296,097	2,379,353	2,571,397	-16.6%
Rubber and Plastics	30	531,839	661,871	722,558	751,266	41.3%
Leather Products	31	1,314	1,322	1,402	1,233	-6.2%
Clay, Cement, Glass or Stone Products	32	5,994,841	7,282,492	8,799,377	10,406,475	73.6%
Primary Metal Products	33	2,778,150	2,803,401	3,021,857	3,041,716	9.5%
Fabricated Metal Products	34	1,316,135	1,478,303	1,723,742	1,934,906	47.0%
Machinery	35	349,966	409,492	490,108	582,351	66.4%
Electrical Equipment	36	291,722	403,513	524,148	654,532	124.4%
Transportation Equipment	37	1,713,893	2,004,303	2,130,007	2,321,827	35.5%
Technical Instruments and Equipment	38	77,924	95,946	133,855	169,461	117.5%
Misc. Manufacturing Products	39	162,316	179,102	182,283	191,754	18.1%
Waste or Scrap Metal	40	4,350,530	4,970,372	5,721,714	6,402,475	47.2%
Secondary Traffic	50	14,348,604	16,579,564	20,183,013	24,951,047	73.9%
	TOTAL	111,194,563	121,767,276	133,704,685	145,749,347	31.1%

7 20-YEAR FREIGHT FORECAST

Table 9 - Michigan Truck Freight Movements (2014-2040): **Michigan to Other (Tons)**

Commodity	STCC	2014	2020	2030	2040	Growth % 2014-2040
Agriculture	1	10,288,465	10,261,008	10,407,354	10,665,499	3.7%
Primary Forest Materials	8	7,029	8,701	9,659	10,559	50.2%
Fresh Fish	9	89	105	136	179	101.1%
Metallic Ores	10	2,708	3,699	5,218	7,133	163.4%
Crude Petroleum and Natural Gas	13	28,055	34,423	46,735	63,629	126.8%
Nonmetallic Ores and Minerals	14	16,425,424	15,624,194	14,611,789	14,634,589	-10.9%
Ordnance	19	79,559	83,530	86,142	84,484	6.2%
Food Products	20	12,890,411	12,846,765	14,290,965	15,967,547	23.9%
Tobacco Products	21	17	26	34	40	135.3%
Textile Mill Products	22	67,890	85,617	104,194	144,352	112.6%
Apparel or Finished Textiles	23	25,175	21,950	16,960	18,278	-27.4%
Lumber and Wood Products	24	2,428,629	2,762,545	2,727,985	2,601,590	7.1%
Furniture and Fixtures	25	670,929	810,186	960,445	1,066,150	58.9%
Paper and Pulp Products	26	2,433,708	2,599,341	3,090,013	3,705,950	52.3%
Printed Matter	27	596,226	475,393	499,918	542,059	-9.1%
Chemical Products	28	2,549,477	3,005,211	3,621,379	4,523,721	77.4%
Petroleum or Coal Products	29	3,590,316	1,930,773	1,817,292	1,950,635	-45.7%
Rubber and Plastics	30	2,837,203	3,510,358	4,041,141	4,353,610	53.4%
Leather Products	31	3,626	3,727	4,445	5,210	43.7%
Clay, Cement, Glass or Stone Products	32	2,047,950	2,353,892	2,827,299	3,440,682	68.0%
Primary Metal Products	33	4,883,287	5,223,400	6,303,130	7,621,847	56.1%
Fabricated Metal Products	34	2,590,374	2,790,556	3,308,965	3,741,585	44.4%
Machinery	35	1,872,222	2,215,039	2,900,469	3,658,045	95.4%
Electrical Equipment	36	867,070	1,150,023	1,512,633	1,921,774	121.6%
Transportation Equipment	37	4,090,705	4,684,610	5,205,242	5,836,239	42.7%
Technical Instruments and Equipment	38	216,937	272,499	395,377	521,279	140.3%
Misc. Manufacturing Products	39	336,930	344,791	333,802	343,274	1.9%
Waste or Scrap Material	40	4,860,186	5,671,658	6,978,381	8,425,008	73.3%
Misc. Freight Shipments	41	930	1,237	1,767	2,592	178.7%
Secondary Traffic	50	5,298,071	5,880,169	7,914,315	11,744,867	121.7%
	TOTAL	81,989,598	84,655,426	94,023,184	107,602,406	31.2%

Table 10 - Michigan Truck Freight Movements (2014-2040): Other to Michigan (Tons)

Commodity	STCC	2014	2020	2030	2040	Growth % 2014-2040
Agriculture	1	11,088,440	11,397,652	12,614,549	14,330,986	29.2%
Primary Forest Materials	8	61,844	67,424	71,077	75,225	21.6%
Fresh Fish	9	12,132	13,979	16,574	18,795	54.9%
Metallic Ores	10	77,348	71,264	72,155	70,996	-8.2%
Coal	11	39,345	41,490	32,314	27,588	-29.9%
Crude Petroleum and Natural Gas	13	2,611	3,155	4,094	5,312	103.4%
Nonmetallic Ores and Minerals	14	8,451,402	11,420,517	13,918,097	15,639,727	85.1%
Ordnance	19	12,017	11,919	22,078	33,962	182.6%
Food Products	20	10,088,198	11,277,856	13,211,065	15,322,974	51.9%
Tobacco Products	21	55,971	45,714	31,303	21,058	-62.4%
Textile Mill Products	22	232,302	238,863	206,232	188,017	-19.1%
Apparel or Finished Textiles	23	162,103	162,716	145,732	131,218	-19.1%
Lumber and Wood Products	24	2,270,026	2,785,904	3,034,049	3,296,364	45.2%
Furniture and Fixtures	25	676,536	949,461	1,482,182	2,414,538	256.9%
Paper and Pulp Products	26	1,971,398	2,083,584	2,284,205	2,505,645	27.1%
Printed Matter	27	515,527	450,812	457,631	497,405	-3.5%
Chemical Products	28	5,378,269	7,358,562	9,174,096	10,276,890	91.1%
Petroleum or Coal Products	29	3,390,047	4,763,183	4,487,677	3,952,973	16.6%
Rubber and Plastics	30	2,042,864	2,635,213	3,222,836	3,857,248	88.8%
Leather Products	31	41,173	37,827	32,032	23,613	-42.6%
Clay, Cement, Glass or Stone Products	32	7,223,812	9,310,744	11,641,443	14,531,167	101.2%
Primary Metal Products	33	6,147,696	6,637,060	7,893,618	9,380,048	52.6%
Fabricated Metal Products	34	2,154,927	2,598,566	3,210,049	3,893,358	80.7%
Machinery	35	1,089,357	1,466,114	2,159,082	3,232,072	196.7%
Electrical Equipment	36	1,668,083	2,269,982	3,119,260	4,276,907	156.4%
Transportation Equipment	37	4,282,330	5,241,569	6,376,858	7,764,435	81.3%
Technical Instruments and Equipment	38	213,213	266,556	384,585	554,055	159.9%
Misc. Manufacturing Products	39	264,248	324,649	403,558	507,880	92.2%
Waste or Scrap Material	40	6,555,008	7,189,207	8,237,071	9,091,525	38.7%
Misc. Freight Shipments	41	953	1,228	1,494	1,818	90.8%
Misc. Mixed Shipments	46	310,688	470,013	858,248	1,567,166	404.4%
Secondary Traffic	50	8,420,730	10,070,534	12,997,799	16,157,106	91.9%
	Total	84,900,598	101,663,317	121,803,043	143,648,071	69.2%

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Table 11 - Michigan Truck Freight Movements (2014-2040): Through-Trips (Tons)

Commodity	STCC	2014	2020	2030	2040	Growth % 2014-2040
Agriculture	1	2,490,363	3,242,645	4,978,842	7,812,332	213.7%
Primary Forest Materials	8	18,438	20,940	25,445	31,004	68.2%
Fresh Fish	9	10,581	12,691	16,391	21,185	100.2%
Metallic Ores	10	16,967	18,415	21,636	25,815	52.1%
Coal	11	33,770	37,171	41,943	47,327	40.1%
Crude Petroleum and Natural Gas	13	34,911	49,008	86,470	153,664	340.2%
Nonmetallic Ores and Minerals	14	823,706	958,611	1,148,325	1,392,612	69.1%
Ordnance	19	7,730	11,381	20,787	37,998	391.6%
Food Products	20	4,594,091	5,772,597	8,318,273	12,200,362	165.6%
Tobacco Products	21	3,153	3,721	3,501	3,433	8.9%
Textile Mill Products	22	170,587	203,050	263,237	343,102	101.1%
Apparel or Finished Textiles	23	52,748	69,113	108,741	177,032	235.6%
Lumber and Wood Products	24	896,947	1,090,965	1,433,810	1,916,867	113.7%
Furniture and Fixtures	25	496,216	735,134	1,373,252	2,571,513	418.2%
Paper and Pulp Products	26	1,946,656	2,428,331	3,479,206	5,035,132	158.7%
Printed Matter	27	174,225	204,409	263,354	341,237	95.9%
Chemical Products	28	4,111,075	5,604,263	9,104,813	15,087,965	267.0%
Petroleum or Coal Products	29	986,244	1,191,946	1,480,912	1,969,323	99.7%
Rubber and Plastics	30	1,302,254	1,741,678	2,721,693	4,270,547	227.9%
Leather Products	31	18,659	23,463	34,167	50,043	168.2%
Clay, Cement, Glass or Stone Products	32	1,111,277	1,501,582	2,409,141	3,922,269	253.0%
Primary Metal Products	33	3,671,768	4,603,777	6,567,786	9,541,458	159.9%
Fabricated Metal Products	34	808,152	1,045,156	1,559,237	2,352,693	191.1%
Machinery	35	1,437,186	1,984,007	3,314,382	5,618,861	291.0%
Electrical Equipment	36	672,611	927,007	1,546,331	2,614,019	288.6%
Transportation Equipment	37	2,793,968	3,346,393	4,400,939	5,964,314	113.5%
Technical Instruments and Equipment	38	74,011	115,160	232,943	476,612	544.0%
Misc. Manufacturing Products	39	151,136	212,970	360,508	613,484	305.9%
Waste or Scrap Material	40	850,902	995,181	1,234,222	1,556,498	82.9%
Misc. Freight Shipments	41	2,207	2,647	3,319	4,165	88.7%
Misc. Mixed Shipments	46	589,726	892,147	1,629,067	2,974,687	404.4%
Secondary Traffic	50	59,089	70,365	92,079	120,641	104.2%
	TOTAL	30,411,354	39,115,924	58,274,752	89,248,194	193.5%

WATERBORNE FREIGHT FORECAST

Overall waterborne freight movements are projected to increase by 6.8 percent by 2040, from 65 million tons in 2014 to 69 million tons in 2040. Intrastate waterborne freight movements, those moving from one Michigan port to another, are projected to decrease by 11 percent by 2040, from 10 million tons in 2014 to 9 million tons by 2040. Outbound waterborne freight movements are projected to increase 30.4 percent by 2040, from 31 million tons in 2014 to 40 million tons in 2040. Inbound waterborne freight movements are projected to decrease 16.1 percent by 2040, from 24 million tons in 2014 to 20 million tons in 2040.

Table 12 - Michigan Marine Freight Movements (2014-2040): Overall (Tons)

Commodity	STCC	2014	2020	2030	2040	Growth % 2014-2040
Agriculture	1	12,545	15,849	22,805	32,818	161.6%
Fresh Fish	9	161	193	259	346	114.9%
Metallic Ores	10	15,627,829	11,755,093	11,924,766	12,576,193	-19.5%
Coal	11	15,558,811	11,505,214	9,383,649	8,005,005	-48.6%
Crude Petroleum and Natural Gas	13	1,199,655	1,716,239	3,118,951	5,668,397	372.5%
Nonmetallic Ores and Minerals	14	21,453,942	22,954,373	24,478,251	26,104,852	21.7%
Food Products	20	505	705	1,214	2,157	327.1%
Textile Mill Products	22	27	32	40	50	85.2%
Apparel or Finished Textiles	23	5	7	8	10	100.0%
Lumber and Wood Products	24	1,525	2,422	2,684	3,400	123.0%
Furniture and Fixtures	25	36	54	102	196	444.4%
Paper and Pulp Products	26	1,252	1,656	2,593	4,064	224.6%
Printed Matter	27	12	14	17	21	75.0%
Chemical Products	28	380,632	425,065	515,350	620,147	62.9%
Petroleum or Coal Products	29	5,480,806	5,603,576	5,624,776	5,696,536	3.9%
Rubber and Plastics	30	167	224	352	554	231.7%
Clay, Cement, Glass or Stone Products	32	3,848,991	4,773,532	6,436,322	8,929,483	132.0%
Primary Metal Products	33	831,814	805,992	855,793	927,232	11.5%
Fabricated Metal Products	34	39,265	43,358	53,182	70,031	78.4%
Machinery	35	2,052	2,736	4,429	7,202	251.0%
Electrical Equipment	36	398	497	604	779	95.7%
Transportation Equipment	37	4,819	5,949	7,776	10,599	119.9%
Technical Instruments and Equipment	38	21	34	72	151	619.0%
Misc. Manufacturing Products	39	43	60	109	188	337.2%
Waste or Scrap Material	40	69,306	86,351	120,880	170,205	145.6%
Mail	43	10,611	11,595	13,049	14,599	37.6%
Misc. Mixed Shipments	46	27,380	34,634	47,228	71,399	160.8%
	TOTAL	64,552,610	59,745,454	62,615,261	68,916,614	6.8%

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Table 13 - Michigan Marine Freight Movements (2014-2040): Michigan to Michigan (Tons)

Commodity	STCC	2014	2020	2030	2040	Growth % 2014-2040
Metallic Ores	10	3,121,942	2,057,454	1,761,298	1,544,259	-50.5%
Crude Petroleum and Natural Gas	13	428	488	526	572	33.6%
Nonmetallic Ores and Minerals	14	5,859,925	6,394,688	6,365,948	6,070,834	3.6%
Lumber and Wood Products	24	271	392	300	240	-11.4%
Chemical Products	28	30,602	25,921	25,588	23,498	-23.2%
Petroleum or Coal Products	29	191,989	204,669	181,274	151,555	-21.1%
Clay, Cement, Glass or Stone Products	32	622,852	736,713	850,220	945,422	51.8%
Primary Metal Products	33	56,481	48,984	44,877	38,572	-31.7%
Fabricated Metal Products	34	6,072	7,548	9,905	12,916	112.7%
Machinery	35	271	320	458	608	124.4%
Transportation Equipment	37	205	295	402	656	220.0%
Mail	43	4,939	5,396	6,073	6,794	37.6%
Misc. Mixed Shipments	46	12,356	13,711	14,742	17,735	43.5%
Transportation Equipment	37	293	421	327	300	299
Technical Instruments and Equipment	38	7	9	11	15	20
Misc. Manufacturing Products	39	10,751	13,712	15,672	17,699	19,985
Waste or Scrap Material	40	4,919	6,971	7,404	7,851	8,355
Misc. Freight Shipments	41	13,134	15,297	16,621	18,378	20,724
	TOTAL	9,908,332	9,496,580	9,261,611	8,813,661	-11.0%

Table 14 - Michigan Marine Freight Movements (2014-2040): **Michigan to Other (Tons)**

Commodity	STCC	2014	2020	2030	2040	Growth % 2014-2040
Agriculture	1	12,545	15,849	22,805	32,818	161.6%
Fresh Fish	9	161	193	259	346	114.9%
Metallic Ores	10	8,630,250	6,508,599	6,993,279	7,713,558	-10.6%
Coal	11	700,373	760,228	852,424	960,396	37.1%
Crude Petroleum and Natural Gas	13	1,199,226	1,715,751	3,118,426	5,667,825	372.6%
Nonmetallic Ores and Minerals	14	12,562,782	13,068,271	14,087,576	15,410,889	22.7%
Food Products	20	505	705	1,214	2,157	327.1%
Textile Mill Products	22	27	32	40	50	85.2%
Apparel or Finished Textiles	23	5	7	8	10	100.0%
Lumber and Wood Products	24	254	362	659	1,208	375.6%
Furniture and Fixtures	25	35	52	98	188	437.1%
Paper and Pulp Products	26	1,252	1,656	2,593	4,064	224.6%
Chemical Products	28	308,023	353,234	438,954	540,516	75.5%
Petroleum or Coal Products	29	4,685,116	4,767,505	4,819,099	4,915,676	4.9%
Rubber and Plastics	30	167	224	352	554	231.7%
Clay, Cement, Glass or Stone Products	32	2,407,738	2,838,495	3,526,128	4,458,246	85.2%
Primary Metal Products	33	49,085	35,474	32,413	30,975	-36.9%
Fabricated Metal Products	34	4,371	6,058	11,284	22,180	407.4%
Machinery	35	1,762	2,389	3,926	6,517	269.9%
Electrical Equipment	36	398	498	604	779	95.7%
Transportation Equipment	37	4,206	5,117	6,671	9,003	114.1%
Technical Instruments and Equipment	38	21	34	72	151	619.0%
Misc. Manufacturing Products	39	41	58	104	181	341.5%
Waste or Scrap Material	40	69,306	86,351	120,880	170,205	145.6%
Mail	43	2,972	3,247	3,654	4,089	37.6%
Misc. Mixed Shipments	46	2,988	3,341	3,316	3,481	16.5%
	TOTAL	30,643,609	30,173,730	34,046,838	39,956,062	30.4%

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Table 15 - Michigan Marine Freight Movements (2014-2040): Other to Michigan (Tons)

Commodity	STCC	2014	2020	2030	2040	Growth % 2014-2040
Metallic Ores	10	3,875,637	3,189,041	3,170,189	3,318,375	-14.4%
Coal	11	14,858,437	10,744,986	8,531,225	7,044,609	-52.6%
Nonmetallic Ores and Minerals	14	3,031,235	3,491,414	4,024,727	4,623,130	52.5%
Lumber and Wood Products	24	1,000	1,668	1,724	1,951	95.1%
Furniture and Fixtures	25	1	2	4	8	700.0%
Printed Matter	27	12	14	17	21	75.0%
Chemical Products	28	42,008	45,910	50,808	56,133	33.6%
Petroleum or Coal Products	29	603,702	631,402	624,403	629,306	4.2%
Clay, Cement, Glass or Stone Products	32	818,401	1,198,325	2,059,974	3,525,815	330.8%
Primary Metal Products	33	726,248	721,534	778,503	857,685	18.1%
Fabricated Metal Products	34	28,822	29,752	31,992	34,935	21.2%
Machinery	35	19	27	45	76	300.0%
Transportation Equipment	37	408	538	704	939	130.1%
Misc. Manufacturing Products	39	1	2	4	7	600.0%
Mail	43	2,701	2,951	3,321	3,716	37.6%
Misc. Mixed Shipments	46	12,037	17,582	29,170	50,182	316.9%
Waste or Scrap Material	40	70,628	98,474	103,695	108,935	114,682
Misc. Freight Shipments	41	10,079	11,873	13,410	15,555	18,442
	TOTAL	24,000,669	20,075,148	19,306,810	20,146,888	-16.1%

RAIL FREIGHT FORECAST

Overall rail freight movements are projected to increase 49.8 percent by 2040, from 101 million tons in 2014 to 148 million tons in 2040. Intrastate rail freight movements are projected to increase 4.8 percent by 2040, from 5 million tons in 2014 to 6 million tons by 2040. Outbound rail freight movements are projected to increase 28.2 percent by 2040, from 21 million tons in 2014 to 28 million tons in 2040. Inbound rail freight movements are projected to decrease 5.6 percent by 2040, from 33 million tons in 2014 to 31 million tons in 2040. Through-rail freight movements, those not stopping in Michigan, are projected to increase 124.3 percent by 2040, from 34 million tons in 2014 to 77 million tons in 2040.

Table 16 - Michigan Rail Freight Movements (2014-2040): Overall (Tons)

Commodity	STCC	2014	2020	2030	2040	Growth % 2014-2040
Agriculture	1	4,197,873	4,187,396	4,498,672	4,855,203	15.7%
Fresh Fish	9	2,240	2,642	3,425	4,448	98.6%
Metallic Ores	10	12,346,754	11,200,597	12,315,742	14,759,366	33.9%
Coal	11	18,502,848	13,832,755	12,354,647	10,791,903	-41.7%
Crude Petroleum and Natural Gas	13	4,451,053	5,840,932	8,620,693	13,351,446	200.0%
Nonmetallic Ores and Minerals	14	4,251,080	5,045,688	5,881,360	6,662,551	56.7%
Ordnance	19	880	1,283	2,377	4,406	400.7%
Food Products	20	3,348,112	3,779,148	4,753,545	6,183,214	84.7%
Tobacco Products	21	240	222	183	151	-37.1%
Textile Mill Products	22	7,120	8,428	10,873	14,056	97.4%
Apparel or Finished Textiles	23	9,680	9,926	11,177	16,163	67.0%
Lumber and Wood Products	24	3,798,992	4,421,548	5,230,118	6,252,551	64.6%
Furniture and Fixtures	25	19,160	27,597	48,824	88,179	360.2%
Paper and Pulp Products	26	3,743,440	4,147,160	4,763,705	5,579,663	49.1%
Printed Matter	27	8,280	9,777	12,637	16,334	97.3%
Chemical Products	28	14,151,414	17,338,042	23,033,564	31,304,101	121.2%
Petroleum or Coal Products	29	5,130,493	5,480,452	5,837,342	6,616,647	29.0%
Rubber and Plastics	30	79,240	108,071	172,815	277,604	250.3%
Leather Products	31	1,120	1,361	1,829	2,457	119.4%
Clay, Cement, Glass or Stone Products	32	3,333,708	4,032,730	5,013,197	6,345,304	90.3%
Primary Metal Products	33	6,409,596	6,887,236	8,197,927	9,601,360	49.8%
Fabricated Metal Products	34	26,720	34,390	50,824	77,087	188.5%
Machinery	35	89,316	114,856	178,320	287,908	222.3%
Electrical Equipment	36	75,120	100,363	158,879	254,852	239.3%
Transportation Equipment	37	8,831,963	10,578,972	11,669,773	12,358,938	39.9%
Technical Instruments and Equipment	38	2,880	4,613	9,733	20,537	613.1%
Misc. Manufacturing Products	39	16,680	23,420	39,695	68,279	309.3%
Waste or Scrap Material	40	2,813,548	2,872,359	3,185,161	3,487,514	24.0%
Misc. Freight Shipments	41	194,200	161,301	121,215	101,270	-47.9%
Empty Trucks	42	16,240	19,970	27,655	39,719	144.6%
Freight Forwarder Traffic	44	2,640	3,282	4,633	6,766	156.3%
Misc. Mixed Shipments	46	4,677,640	5,137,286	6,315,849	7,965,676	70.3%
Hazardous Waste	48	405,240	504,443	635,802	793,894	95.9%
	TOTAL	100,945,510	105,918,246	123,162,191	148,179,547	49.8%

7 20-YEAR FREIGHT FORECAST

Table 17 - Michigan Rail Freight Movements (2014-2040): Michigan to Michigan (Tons)

Commodity	STCC	2014	2020	2030	2040	Growth % 2014-2040
Metallic Ores	10	10,301,991	8,851,029	9,363,215	10,998,759	8.6%
Nonmetallic Ores and Minerals	14	645,104	716,830	703,789	727,429	12.8%
Food Products	20	3,168	3,911	5,381	6,390	101.7%
Lumber and Wood Products	24	318,640	311,368	283,722	249,413	-21.7%
Paper and Pulp Products	26	41,720	47,009	50,458	52,991	27.0%
Chemical Products	28	55,800	59,847	65,730	67,761	21.4%
Petroleum or Coal Products	29	10,000	10,567	9,910	8,948	-10.5%
Primary Metal Products	33	47,440	43,994	52,166	59,132	24.6%
Transportation Equipment	37	320,240	325,644	247,070	186,438	-41.8%
Waste or Scrap Material	40	15,320	14,417	15,352	15,602	1.8%
Waste or Scrap Material	40	4,080	6,008	6,616	7,258	8,003
Misc. Freight Shipments	41	5,080	6,238	7,172	7,861	8,491
Shipping Containers	42	504	573	596	598	603
	TOTAL	5,498,956	5,065,609	5,169,989	5,763,183	4.8%

Table 18 - Michigan Rail Freight Movements (2014-2040): **Michigan to Other (Tons)**

Commodity	STCC	2014	2020	2030	2040	Growth % 2014-2040
Agriculture	1	3,494,583	3,381,767	3,456,068	3,465,762	-0.8%
Metallic Ores	10	1,613,609	1,950,447	2,511,415	3,235,924	100.5%
Crude Petroleum and Natural Gas	13	18,512	22,204	23,698	23,969	29.5%
Nonmetallic Ores and Minerals	14	1,779,088	2,143,032	2,463,524	2,711,426	52.4%
Food Products	20	493,256	515,122	609,184	738,298	49.7%
Apparel or Finished Textiles	23	2,920	2,117	1,059	689	-76.4%
Lumber and Wood Products	24	604,400	609,104	554,034	496,985	-17.8%
Furniture and Fixtures	25	3,280	3,990	4,217	3,871	18.0%
Paper and Pulp Products	26	1,289,800	1,382,116	1,444,667	1,507,071	16.8%
Chemical Products	28	1,268,952	1,343,690	1,581,075	1,832,046	44.4%
Petroleum or Coal Products	29	460,780	475,407	461,291	436,714	-5.2%
Rubber and Plastics	30	7,200	9,520	15,124	24,626	242.0%
Clay, Cement, Glass or Stone Products	32	465,660	548,069	633,961	694,242	49.1%
Primary Metal Products	33	1,499,812	1,474,178	1,662,372	1,664,529	11.0%
Fabricated Metal Products	34	4,400	4,944	6,020	7,180	63.2%
Machinery	35	20,400	20,164	20,717	21,358	4.7%
Electrical Equipment	36	20,000	26,853	43,418	70,535	252.7%
Transportation Equipment	37	5,444,119	6,584,624	7,203,576	7,227,308	32.8%
Misc. Manufacturing Products	39	680	792	971	1,317	93.7%
Waste or Scrap Material	40	1,727,368	1,654,740	1,773,912	1,831,311	6.0%
Misc. Freight Shipments	41	113,160	93,985	70,607	58,969	-47.9%
Shipping Containers	42	2,560	3,164	4,511	6,678	160.9%
Misc. Mixed Shipments	46	1,392,640	1,346,000	1,518,361	1,779,052	27.7%
Hazardous Waste	48	2,880	4,811	5,960	7,331	154.5%
	TOTAL	21,730,059	23,600,840	26,069,742	27,847,191	28.2%

7 20-YEAR FREIGHT FORECAST

Table 19 - Michigan Rail Freight Movements (2014-2040): Other to Michigan (Tons)

Commodity	STCC	2014	2020	2030	2040	Growth % 2014-2040
Agriculture	1	88,965	88,855	92,906	93,076	4.6%
Metallic Ores	10	371,070	326,297	347,226	403,644	8.8%
Coal	11	18,502,848	13,832,755	12,354,647	10,791,903	-41.7%
Crude Petroleum and Natural Gas	13	3,160	5,278	9,189	15,864	402.0%
Nonmetallic Ores and Minerals	14	469,136	642,088	835,941	1,002,249	113.6%
Food Products	20	629,140	649,169	696,931	734,227	16.7%
Apparel or Finished Textiles	23	2,760	2,541	1,754	1,619	-41.3%
Lumber and Wood Products	24	1,181,432	1,455,638	1,769,894	2,110,898	78.7%
Paper and Pulp Products	26	676,040	753,618	890,451	1,039,082	53.7%
Chemical Products	28	2,182,984	2,669,633	3,098,083	3,413,866	56.4%
Petroleum or Coal Products	29	1,566,193	1,482,354	1,183,397	1,098,185	-29.9%
Rubber and Plastics	30	1,240	1,735	2,818	4,576	269.0%
Clay, Cement, Glass or Stone Products	32	928,728	1,129,143	1,304,356	1,494,827	61.0%
Primary Metal Products	33	2,121,348	2,075,268	2,181,308	2,183,109	2.9%
Fabricated Metal Products	34	5,440	7,919	13,787	24,265	346.0%
Machinery	35	10,480	12,450	15,381	18,814	79.5%
Electrical Equipment	36	5,200	5,928	6,216	6,272	20.6%
Transportation Equipment	37	1,553,308	1,858,989	1,943,316	2,077,661	33.8%
Misc. Manufacturing Products	39	720	760	688	654	-9.2%
Waste or Scrap Material	40	196,752	210,086	234,761	255,389	29.8%
Misc. Freight Shipments	41	81,040	67,316	50,608	42,301	-47.8%
Shipping Containers	42	2,040	2,354	2,836	3,518	72.5%
Misc. Mixed Shipments	46	2,437,480	2,739,876	3,325,579	4,054,995	66.4%
Hazardous Waste	48	260,800	324,994	391,252	449,768	72.5%
	TOTAL	32,974,851	30,118,184	30,550,707	31,143,775	-5.6%

Table 20 - Michigan Rail Freight Movements (2014-2040): **Through (Tons)**

Commodity	STCC	2014	2020	2030	2040	Growth % 2014-2040
Agriculture	1	614,325	716,774	949,698	1,296,365	111.0%
Fresh Fish	9	2,240	2,642	3,425	4,448	98.6%
Metallic Ores	10	60,084	72,824	93,886	121,040	101.5%
Crude Petroleum and Natural Gas	13	4,429,381	5,813,449	8,587,806	13,311,613	200.5%
Nonmetallic Ores and Minerals	14	1,357,752	1,543,737	1,878,107	2,221,446	63.6%
Ordnance	19	880	1,283	2,377	4,406	400.7%
Food Products	20	2,222,548	2,610,946	3,442,049	4,704,299	111.7%
Tobacco Products	21	240	222	183	151	-37.1%
Textile Mill Products	22	7,120	8,428	10,873	14,056	97.4%
Apparel or Finished Textiles	23	4,000	5,268	8,363	13,855	246.4%
Lumber and Wood Products	24	1,694,520	2,045,438	2,622,467	3,395,255	100.4%
Furniture and Fixtures	25	15,880	23,606	44,607	84,308	430.9%
Paper and Pulp Products	26	1,735,880	1,964,417	2,378,130	2,980,518	71.7%
Printed Matter	27	8,280	9,777	12,637	16,334	97.3%
Chemical Products	28	10,643,678	13,264,872	18,288,676	25,990,427	144.2%
Petroleum or Coal Products	29	3,093,520	3,512,124	4,182,743	5,072,800	64.0%
Rubber and Plastics	30	70,800	96,816	154,873	248,402	250.9%
Leather Products	31	1,120	1,361	1,829	2,457	119.4%
Clay, Cement, Glass or Stone Products	32	1,939,320	2,355,518	3,074,880	4,156,234	114.3%
Primary Metal Products	33	2,740,996	3,293,796	4,302,080	5,694,590	107.8%
Fabricated Metal Products	34	16,880	21,527	31,017	45,642	170.4%
Machinery	35	58,436	82,241	142,222	247,735	323.9%
Electrical Equipment	36	49,920	67,583	109,246	178,045	256.7%
Transportation Equipment	37	1,514,296	1,809,715	2,275,812	2,867,531	89.4%
Technical Instruments and Equipment	38	2,880	4,613	9,733	20,536	613.1%
Misc. Manufacturing Products	39	15,280	21,868	38,035	66,308	334.0%
Waste or Scrap Material	40	874,108	993,115	1,161,136	1,385,213	58.5%
Shipping Containers	42	11,640	14,453	20,309	29,523	153.6%
Freight Forwarder Traffic	44	2,640	3,282	4,633	6,766	156.3%
Misc. Mixed Shipments	46	847,520	1,051,410	1,471,908	2,131,629	151.5%
Hazardous Waste	48	141,560	174,638	238,590	336,796	137.9%
	TOTAL	34,177,724	41,587,743	55,542,330	76,648,728	124.3%

AIR FREIGHT FORECAST

Overall air freight movements are projected to increase by 73.4 percent by 2040, from 266,255 tons in 2014 to 461,630 tons in 2040. Intrastate air freight movements are projected to increase by 85.2 percent by 2040, from 1,599 tons in 2014 to 2,961 tons by 2040. Outbound air freight movements are projected to increase 82.4 percent by 2040, from 143,476 tons in 2014 to 261,705 tons in 2040. Inbound air freight movements are projected to increase 62.5 percent by 2040, from 121,180 tons in 2014 to 196,964 tons in 2040.

Table 21 - Michigan Air Freight Movements (2014-2040): Overall (Tons)

Commodity	STCC	2014	2020	2030	2040	Growth % 2014-2040
Agriculture	1	2,456	2,701	3,196	4,079	66.1%
Primary Forest Materials	8	12	14	17	21	76.5%
Fresh Fish	9	781	533	375	445	-43.1%
Metallic Ores	10	40	46	52	59	48.9%
Coal	11	32	25	22	20	-36.6%
Nonmetallic Ores and Minerals	14	332	385	480	596	79.5%
Ordnance	19	12	18	34	63	418.1%
Food Products	20	5,784	6,562	8,522	11,193	93.5%
Tobacco Products	21	12	12	10	7	-37.4%
Textile Mill Products	22	9,698	10,568	9,499	9,248	-4.6%
Apparel or Finished Textiles	23	320	452	863	1,640	413.0%
Lumber and Wood Products	24	518	672	952	1,367	163.8%
Furniture and Fixtures	25	5,098	7,343	13,433	25,110	392.5%
Paper and Pulp Products	26	2,231	2,850	4,522	7,303	227.3%
Printed Matter	27	5,004	5,003	5,669	6,435	28.6%
Chemical Products	28	16,090	19,703	27,522	39,623	146.3%
Petroleum or Coal Products	29	1,778	1,851	2,076	2,469	38.8%
Rubber and Plastics	30	5,665	7,047	8,883	11,478	102.6%
Leather Products	31	70	76	107	149	113.8%
Clay, Cement, Glass or Stone Products	32	2,936	3,716	5,403	8,056	174.4%
Primary Metal Products	33	5,362	6,734	10,059	15,377	186.8%
Fabricated Metal Products	34	6,717	8,138	10,987	14,767	119.8%
Machinery	35	20,898	27,417	40,434	59,871	186.5%
Electrical Equipment	36	20,974	27,065	36,366	48,161	129.6%
Transportation Equipment	37	26,785	31,522	37,097	42,785	59.7%
Technical Instruments and Equipment	38	11,058	13,524	18,681	23,789	115.1%
Misc Manufactoring Products	39	6,139	7,191	8,239	9,785	59.4%
Waste or Scrap Metal	40	77	100	144	209	171.0%
Misc Freight Shipments	41	120	123	127	141	18.2%
Mail	43	6,562	7,170	8,069	9,027	37.6%
Misc Mixed Shipments	46	3,185	2,097	2,603	3,707	16.4%
Small Packaged Freight	47	99,509	89,413	91,381	104,650	5.2%
	TOTAL	**266,255**	**290,067**	**355,823**	**461,630**	**73.4%**

Table 22 - Michigan Air Freight Movements (2014-2040): **Michigan to Michigan (Tons)**

Commodity	STCC	2014	2020	2030	2040	Growth % 2014-2040
Agriculture	1	35	33	30	30	-14.2%
Primary Forest Materials	8	0	0	0	0	0.0%
Fresh Fish	9	4	4	6	7	67.4%
Metallic Ores	10	0	0	0	0	-34.3%
Coal	11	1	1	1	0	-53.8%
Nonmetallic Ores and Minerals	14	4	5	5	5	25.6%
Ordnance	19	0	0	0	0	0.0%
Food Products	20	42	41	50	56	32.8%
Tobacco Products	21	0	0	0	0	-57.5%
Textile Mill Products	22	29	26	20	17	-41.7%
Apparel or Finished Textiles	23	0	0	0	0	0.0%
Lumber and Wood Products	24	4	4	4	4	-1.5%
Furniture and Fixtures	25	11	13	16	17	57.4%
Paper and Pulp Products	26	8	8	8	8	-3.0%
Printed Matter	27	18	17	19	21	17.2%
Chemical Products	28	75	95	112	129	73.2%
Petroleum or Coal Products	29	5	4	5	6	5.6%
Rubber and Plastics	30	41	51	58	64	57.9%
Leather Products	31	0	0	0	0	0.0%
Clay, Cement, Glass or Stone Products	32	13	16	21	26	107.8%
Primary Metal Products	33	27	30	40	50	86.1%
Fabricated Metal Products	34	69	83	99	112	62.4%
Machinery	35	177	230	316	421	137.1%
Electrical Equipment	36	117	189	288	402	242.6%
Transportation Equipment	37	52	62	67	77	49.7%
Technical Instruments and Equipment	38	52	69	102	139	166.2%
Misc Manufactoring Products	39	15	19	24	30	100.9%
Waste or Scrap Metal	40	0	0	0	0	0.0%
Misc Freight Shipments	41	2	3	3	4	70.4%
Mail	43	0	0	0	0	0.0%
Misc Mixed Shipments	46	1	1	1	2	102.8%
Small Packaged Freight	47	796	832	1,019	1,332	67.4%
	TOTAL	**1,599**	**1,839**	**2,315**	**2,961**	**85.2%**

Table 23 - Michigan Air Freight Movements (2014-2040): Michigan to Other (Tons)

Commodity	STCC	2014	2020	2030	2040	Growth % 2014-2040
Agriculture	1	1,286	1,474	1,930	2,711	110.8%
Primary Forest Materials	8	12	14	17	21	76.9%
Fresh Fish	9	70	81	103	130	85.3%
Metallic Ores	10	27	36	43	51	85.0%
Coal	11	6	3	2	1	-77.9%
Nonmetallic Ores and Minerals	14	259	303	388	496	91.9%
Ordnance	19	12	17	33	61	420.7%
Food Products	20	4,204	4,948	6,660	9,099	116.4%
Tobacco Products	21	4	4	4	3	-21.7%
Textile Mill Products	22	5,559	6,358	5,226	4,399	-20.9%
Apparel or Finished Textiles	23	286	427	822	1,602	459.7%
Lumber and Wood Products	24	414	540	800	1,199	189.9%
Furniture and Fixtures	25	4,624	6,765	12,773	24,353	426.6%
Paper and Pulp Products	26	1,711	2,324	3,858	6,443	276.5%
Printed Matter	27	2,138	2,412	3,007	3,590	67.9%
Chemical Products	28	9,733	12,308	18,339	28,473	192.5%
Petroleum or Coal Products	29	1,714	1,804	2,022	2,412	40.7%
Rubber and Plastics	30	2,510	3,214	4,622	6,823	171.9%
Leather Products	31	51	65	96	143	178.1%
Clay, Cement, Glass or Stone Products	32	2,152	2,787	4,322	6,823	217.1%
Primary Metal Products	33	4,093	5,344	8,410	13,450	228.7%
Fabricated Metal Products	34	4,134	5,112	7,406	10,793	161.1%
Machinery	35	13,428	17,234	26,653	42,318	215.1%
Electrical Equipment	36	8,970	12,154	16,716	22,768	153.8%
Transportation Equipment	37	20,160	23,809	28,088	32,133	59.4%
Technical Instruments and Equipment	38	4,650	5,914	8,687	11,449	146.2%
Misc Manufactoring Products	39	1,646	1,665	1,652	1,820	10.6%
Waste or Scrap Metal	40	77	99	144	209	171.3%
Misc Freight Shipments	41	40	31	23	23	-43.4%
Mail	43	2,691	2,940	3,309	3,702	37.6%
Misc Mixed Shipments	46	1,585	606	734	1,458	-8.0%
Small Packaged Freight	47	45,230	27,881	20,431	22,748	-49.7%
	TOTAL	143,476	148,675	187,320	261,705	82.4%

Table 24 - Michigan Air Freight Movements (2014-2040): Other to Michigan (Tons)

Commodity	STCC	2014	2020	2030	2040	Growth % 2014-2040
Agriculture	1	1,134	1,195	1,236	1,338	17.9%
Primary Forest Materials	8	0	0	0	0	24.0%
Fresh Fish	9	708	447	267	308	-56.4%
Metallic Ores	10	12	10	9	8	-32.7%
Coal	11	25	21	19	18	-25.4%
Nonmetallic Ores and Minerals	14	69	77	87	95	36.4%
Ordnance	19	0	0	1	2	341.3%
Food Products	20	1,538	1,573	1,812	2,038	32.5%
Tobacco Products	21	8	7	5	4	-45.0%
Textile Mill Products	22	4,109	4,184	4,254	4,831	17.6%
Apparel or Finished Textiles	23	33	25	41	38	14.1%
Lumber and Wood Products	24	101	127	149	165	62.9%
Furniture and Fixtures	25	463	564	644	740	59.8%
Paper and Pulp Products	26	512	517	655	852	66.6%
Printed Matter	27	2,849	2,573	2,642	2,824	-0.8%
Chemical Products	28	6,282	7,300	9,071	11,021	75.4%
Petroleum or Coal Products	29	59	43	49	51	-13.2%
Rubber and Plastics	30	3,115	3,782	4,202	4,590	47.4%
Leather Products	31	18	11	10	6	-68.0%
Clay, Cement, Glass or Stone Products	32	771	913	1,060	1,207	56.4%
Primary Metal Products	33	1,243	1,360	1,609	1,877	51.0%
Fabricated Metal Products	34	2,514	2,943	3,482	3,862	53.6%
Machinery	35	7,292	9,953	13,465	17,132	134.9%
Electrical Equipment	36	11,887	14,721	19,362	24,991	110.2%
Transportation Equipment	37	6,573	7,651	8,942	10,575	60.9%
Technical Instruments and Equipment	38	6,356	7,541	9,893	12,201	92.0%
Misc Manufactoring Products	39	4,478	5,507	6,563	7,935	77.2%
Waste or Scrap Metal	40	0	0	0	0	21.7%
Misc Freight Shipments	41	77	89	101	114	49.0%
Mail	43	3,871	4,229	4,760	5,325	37.6%
Misc Mixed Shipments	46	1,600	1,489	1,867	2,247	40.5%
Small Packaged Freight	47	53,483	60,700	69,930	80,570	50.6%
	TOTAL	121,180	139,554	166,189	196,964	62.5%

8 OVERVIEW OF TRENDS, ISSUES AND STRATEGIES

As specified in Section 70202 of the FAST Act, a state freight plan must identify significant freight system trends, needs, and issues in the state. MDOT included an extensive multi-modal discussion of freight-related trends, issues, and strategies, including the use of ITS to improve safety and efficiency, in the Michigan Freight Profile White Paper. A recap is included in the following section.

FREIGHT TRENDS

The trends reported in the updated Michigan Freight Profile White Paper include a significant increase in both the value and tonnage of freight moved throughout Michigan. The mix of commodities moving by each mode has stayed relatively the same, with manufacturing production the major driver of Michigan freight totals. The auto industry continues to play a crucial role in the overall totals of freight movements in the state. The value of all freight movements in Michigan in 2014 was nearly $862 billion, approximately a 65 percent increase from 2009, a recession year that experienced fewer movements of transportation equipment.

Overall, freight movement throughout the state is recovering and projections indicate that Michigan remains on track to benefit from increased economic activity in the years to come. Looking at national and regional economic forecasts and using past trends, MDOT can better prepare itself for future freight concerns.

- **Connected and automated vehicles (CAV) and other emerging technologies, including truck platooning, will continue to advance rapidly.**
- **The private sector will continue to control the movement of freight using both privately and publicly owned infrastructure.**
- **Trucks will continue to move more freight than any other mode.**
- **Highway congestion will continue in the future. Truck freight will continue to experience predictable and unpredictable delays.**
- **Productivity gains are expected to be realized through the use of more efficient truck configurations.**
- **Rail intermodal traffic will continue to grow in major traffic corridors.**
- **Consistent with a national trend, Michigan's rail infrastructure is increasingly owned and operated by short-line, regional, and switching/terminal railroads.**
- **If/when mergers occur between eastern and western U.S. railroads, additional Michigan intermodal traffic will be shifted to rail.**
- **Michigan's ports will continue to handle predominantly bulk cargoes.**
- **Logistics patterns, particularly for retail goods, are expected to change as a result of expanded e-commerce, truck driver shortages, and potentially fluctuating fuel costs.**
- **Increased consumer demand for online shopping and overnight delivery of purchases will increase air cargo volumes.**

TRENDS IN CONNECTED AND AUTOMATED VEHICLES AND EMERGING TECHNOLOGY

MDOT continues its tradition of being a cutting-edge state transportation department and a leader among transportation agencies around the country. The 2040 MITP goals of promoting safety and security, and operating an efficient and effective transportation system are some of the driving influence behind MDOT's leadership in connected and automated vehicle (CAV) technology. This emerging technology is advancing rapidly, and is being embraced to improve safety and capacity of the existing transportation system.

The following section summarizes a few of the advancements MDOT is incorporating to foster the integration of new transportation technology in Michigan. The department is preparing for the paradigm-shifting technologies of CAV that have the potential to provide more effective movement of goods throughout the state. Additionally, several other emerging technologies are being monitored, such as intelligent transportation systems (ITS), Internet of things, e-commerce and 3-D printing.

Connected and Automated Vehicles

CAV technology is already being incorporated into many new vehicles through safety systems that warn the driver to stay in their lane, or even stop the vehicle, if the driver is distracted before an incident occurs. These systems exemplify the early stages of CAV technology increasingly demanded by consumers. MDOT must be ready for the changes these technologies will bring to the use and maintenance of the road network, whether mandated by the government or demanded by consumers.

The technology currently exists, or will exist soon, to allow CAVs to become a part of the public vehicle fleet. As a state transportation agency, MDOT is planning and preparing for the changes required to support and take advantage of CAV technology.

What's the Difference?

Connected vehicles and automated vehicles are two different technologies that are both developing and will have fundamental impacts on transportation. A connected vehicle is a car or truck that is equipped with dedicated short-range communication devices, primarily a two-way radio frequency reserved by the federal government for transportation safety purposes. This allows the car to either communicate with other vehicles on the roadway or with roadway infrastructure,

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such as traffic lights. This communication is often referred to as vehicle-to-vehicle (V2V) or vehicle-to-infrastructure (V2I), and is already being incorporated into new vehicles and roadway infrastructure. MDOT is focused primarily on V2I testing and implementation, as this technology is dependent on infrastructure outfitted with sensors and communication devices.

Examples of MDOT efforts in this field, which involve infrastructure communicating to the vehicle or operator, include:

- **Signal Phase and Timing**
- **Truck Parking Availability**
- **International Border Delay**

Initiatives the department is using to improve operations internally include:

- **Pavement Condition Monitoring**
- **Road Weather Information Systems (RWIS)**
- **Work Zone Management**

Automated vehicles, also known as autonomous vehicles, are cars or trucks that sense their surroundings with such techniques as radar, light detection and ranging technology, global positioning systems (GPS), and computer vision. The vehicle uses these technologies to identify its location in the environment, thereby determining an appropriate navigation path and keeping itself on the road while avoiding obstacles. This potentially can allow the passenger in the car to be just that, a passenger, and not an operator, although this technology is still in its very beginning phases.

The Mid America Association of State Transportation Officials (MAASTO) Truck Parking Information Management System (TPIMS) is an example of CAV implementation. To address the safety issues associated with driver fatigue and illegal truck parking, MDOT developed the TPIMS. TPIMS currently assesses truck parking availability along 130 miles of the I-94 corridor in southwest Michigan, one of the busiest truck corridors in the state. TPIMS identifies available truck parking and shares that information with commercial vehicle drivers in real time. The TPIMS segment of the I-94 corridor contains five public rest areas with maximum truck parking capacity of less than 160 spaces, and more than 1,000 additional spaces at private truck stops. At the public truck parking locations, MDOT uses pavement sensors to gauge parking space availability and communicates that information to MDOT's advanced traffic management systems (ATMS). At private truck stops, MDOT contracts with a private-sector firm, Truck Smart Parking Services (TSPS), to interface with truck stop owners, and install cameras and traffic counters at access points; this data is then used to gauge the number of parking spots available based on an "in-out" analysis. TSPS then communicates that information to MDOT for rebroadcast through ATMS. MAASTO submitted and was awarded a TIGER grant in 2015 to expand TPIMS in Michigan and on corridors throughout the Midwest. The goal is to implement TPIMS on the busiest truck routes on as many miles as funding will allow. Multiple routes were selected across eight of the 10 MAASTO states. The intent is for the signs and technology to have a consistent "look and feel" across states so that commercial drivers can easily identify the information. The project was awarded $25 million in 2016.

Implementation and Test Facilities through Planet M

Planet M represents the collective mobility efforts across the state of Michigan around the technologies and services that enable the movement of people and goods. The entire state and the auto industry are transforming into the global center for mobility. Working in partnership with automobile manufacturers and suppliers, universities, local agencies and a number of others in the public and private sectors, MDOT has started to develop the infrastructure needed for a connected vehicle environment in southeast Michigan. By 2020, more than 300 miles of freeway and the surrounding arterial network in Metro Detroit will be outfitted with the communications equipment needed to support V2I technology. The connected vehicle environment is envisioned to encompass the four basic foundations of any connected vehicle system: supporting infrastructure, equipped vehicles and/or motorists, data and applications, and the communications network needed to support the system. For information, please visit the Planet M website.

Examples of test projects for freight include truck platooning. The U.S. Army Tank Automotive Research, Development and Engineering Center (TARDEC) and MDOT have partnered to test communications technology for Army vehicles along I-69. This technology will increase safety, efficiency and the looming shortage of truck drivers. This also has the potential to increase capacity of the freeways and reduce fuel consumption, saving money and reducing emissions.

New Technology

Intelligent Transportation Systems (ITS): ITS is a combination of electronics, telecommunications and information technology for the transportation system. It is not only for highways, but includes all modes of transportation. Examples of ITS include systems for traffic management, public transportation management,

emergency management, traveler information (dynamic message signs), advanced vehicle control and safety (red light warning systems), commercial vehicle operations (truck parking information system), and railroad grade crossing safety. The ITS infrastructure investments are also a precursor to connected vehicles by laying the groundwork for communications technology.

Advances in Supply Chains and Logistics: The term "logistics" in this context refers to the way firms organize themselves in relation to transportation, warehousing, inventories, customer service and information processing. The development of new technologies has created a revolution in how businesses communicate and operate, and how consumers shop. Consumers are increasingly using the Internet for home and business purchases, fueling growth in air and truck logistic networks. New technologies and business processes are emerging that enable firms to reduce costs by substituting e-commerce and just-in-time (JIT) deliveries for large inventories, multiple warehouses and customer service outlets. Logistics management continues to evolve with the adoption of e-business practices and various forms of JIT delivery.[8]

E-commerce: E-commerce and e-business, currently estimated by industry sources to account for 10 percent of retail business, are expected to continue to increase, which will result in changes to how freight moves and impacts the transportation network. The nature of these movements may evolve to more single-package deliveries to individual residential or business addresses via mail or package delivery services rather than to retail establishments in larger shipments and vehicles. E-business may affect transportation demand, as it requires fast, on-time delivery, typically directly to the consumer. The success of e-commerce relies on the ability of the transportation system to deliver goods quickly and making returns convenient and prompt. MDOT will work toward accommodating the growth in e-commerce by supporting an efficient freight transportation system.

Unmanned Aerial Systems (UAS): Unmanned Aerial System, or "drones," are poised to revolutionize the efficient movement of goods across a multi-modal transportation system. Rapidly advancing technological capabilities, coupled with new and refined federal and state policies, ensure not only safe integration of UAS into an existing transportation framework but also attempts to spur further innovation in the movement of goods and passengers in an autonomous system. Michigan continues to seek opportunities to support this emerging sector by establishing an Unmanned Aerial System Task Force housed within MDOT.

Internet of Things (IoT): IoT comprises an expansive system of connected remote sensors that can communicate real-time information, both to one another and a central controller, and perform remote control functions. Essentially, IoT creates a connection between the physical and digital worlds. Examples of an IoT application could be a large office building that can monitor and control the pace of its elevators to optimize departures of cars from an attached parking structure and sync with traffic lights, as well as with intelligent vehicles to minimize traffic congestion during rush hour. This system, as imagined, offers several potential benefits - including reduced fuel consumption, fewer greenhouse gas emissions, less time spent in traffic, and possibly even fewer collisions. These technologies will depend on communications infrastructure that can adapt to new demands and the changing nature of technology. [9] As potential technological changes are identified, the state will need to ensure changes are developed deliberately to protect the safety and security of individuals while balancing with concerns about privacy and autonomy.

3-D Printing: 3-D printing is a transformational technology with potential to significantly impact the future of transportation and the global supply chain. In essence, 3-D printing is an additive technology used for making three-dimensional solid objects from a digital file. 3-D printed objects are created by a highly specialized device that prints successive layers of a material from the bottom upward in a continuous fashion. The 3-D printing industry is on the verge of reaching a critical mass for global implementation. Worldwide 3-D printing is projected to grow from $3.1 billion in revenue in 2013 to $12.8 billion in 2018. By 2020, the industry is expected to generate more than $21 billion a year.[10]

8 FHWA, Overview of Logistics and Industry Re-Organization. https://ops.fhwa.dot.gov/freight/freight_analysis/econ_methods/microecon_frmwk/sec_2.htm

9 Michigan 21st Century Infrastructure Commission Report, November 2016. http://www.infrastructureusa.org/michigan-21st-century-infrastructure-commission-report/

10 The Implications of 3-D Printing for the Global Logistics Industry, John Manners-Belland and Ken Lyon, Supply chain 24/7, Jan. 23, 2014, http://www.supplychain247.com/article/the_implications_of_3d_printing_for_the_global_logistics_industry.

3-D printing is regarded as having the potential to emerge from a niche market to a significant and viable alternative to manufacturing. 3-D printing will cause a shift (the extent yet to be determined) in the manufacturing landscape to more localized production, resulting in more on-demand production, smaller inventories, and shorter, simpler supply chains. Zero to minimal inventories could also eliminate the need for some freight. Overall, 3-D printing has the potential to significantly impact the logistics and transportation industry, and alter national and international trade.

For more information, visit the MITP White Paper on Connected and Automated Vehicles and New Technology.

ISSUES AND PERFORMANCE BARRIERS

MDOT included an extensive multi-modal discussion of freight-related issues and strategies to address them in the Michigan Freight Profile White Paper. The issues are included in the following section, with more detailed information about the strategies in place to address them included in the white paper.

When traffic delay due to congestion is predictable, it is possible for shippers to adjust to accommodate a different timetable or a longer delivery time. However, unpredictable delay, often weather-related or crash-induced, can cause higher costs in plant operations and supply chains, bringing a stop to manufacturing activity and damaging the viability of Michigan's freight-dependent industries. Construction zones also can tie up traffic and cause delay, and multiple construction zones within one statewide corridor add significant time to trips of long distances that are common for freight shipments.

Prevention and efficient management of incidents associated with sporadic delays on the highway, aviation, port, and rail systems are likely to enhance the efficiency of freight movement in Michigan, removing freight barriers to Michigan's optimal economic performance.

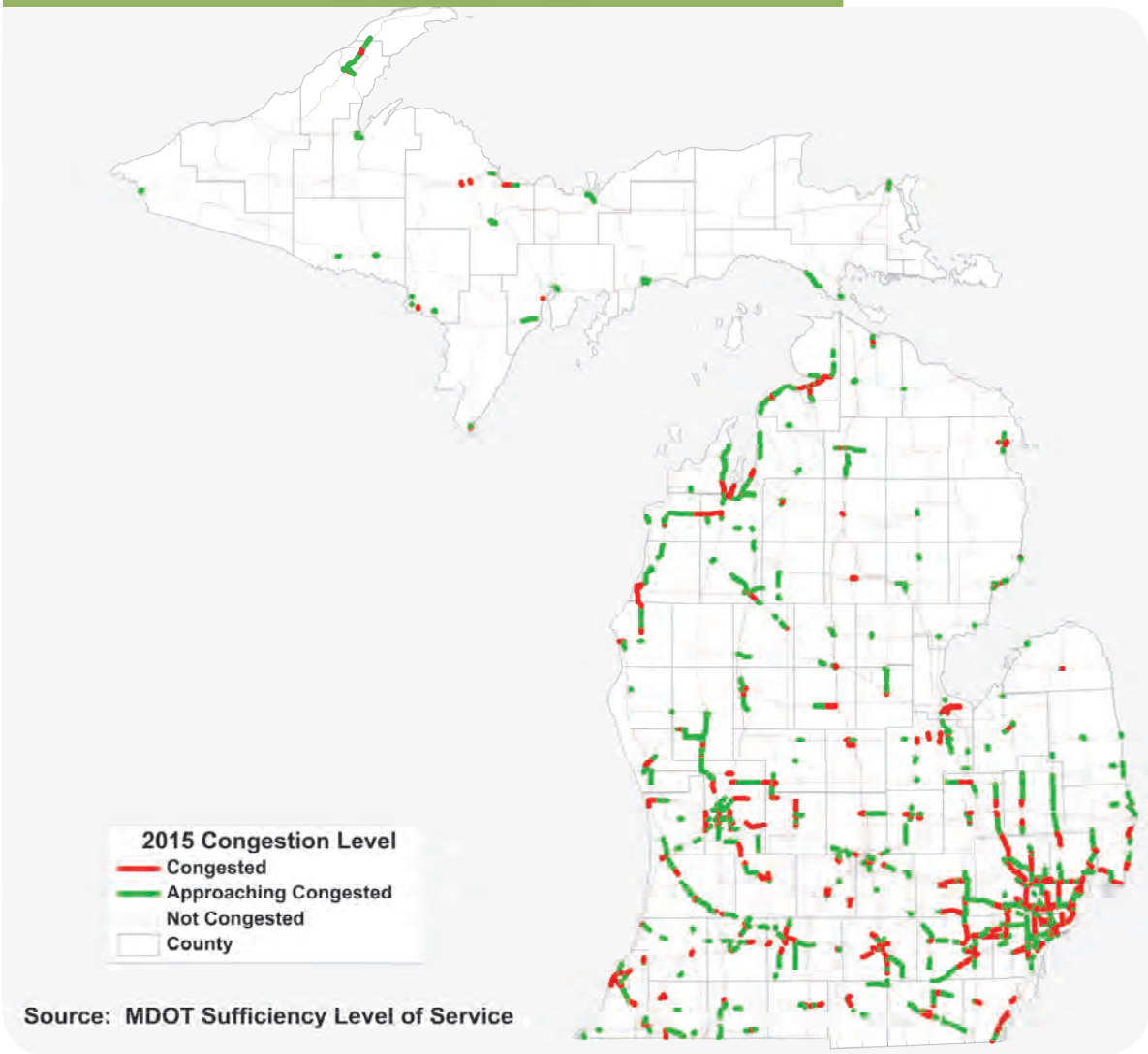
8 OVERVIEW OF TRENDS, ISSUES AND STRATEGIES

HIGHWAY ISSUES AND STRATEGIES

Travel Time/Congestion

Michigan has congested corridors, mainly during peak-hour traffic in urban areas (Figure 15). On an annual basis, MDOT calculates the level of service (LOS) of highway facilities in order to effectively monitor congested roadways. LOS is represented using an A-F scale as described in the Highway Capacity Manual (2010 Edition), with "A" representing the best operating conditions and "F" representing the worst. Figure 15 portrays trunkline congested segments rated "F" for freeways and "E" or "F" for other highways and arterials. Freeways that are labeled LOS "D" or "E" are considered to be "approaching congestion," as are other highways and arterials labeled as LOS "D."

Figure 15 - Michigan Congested Roadways (2015)



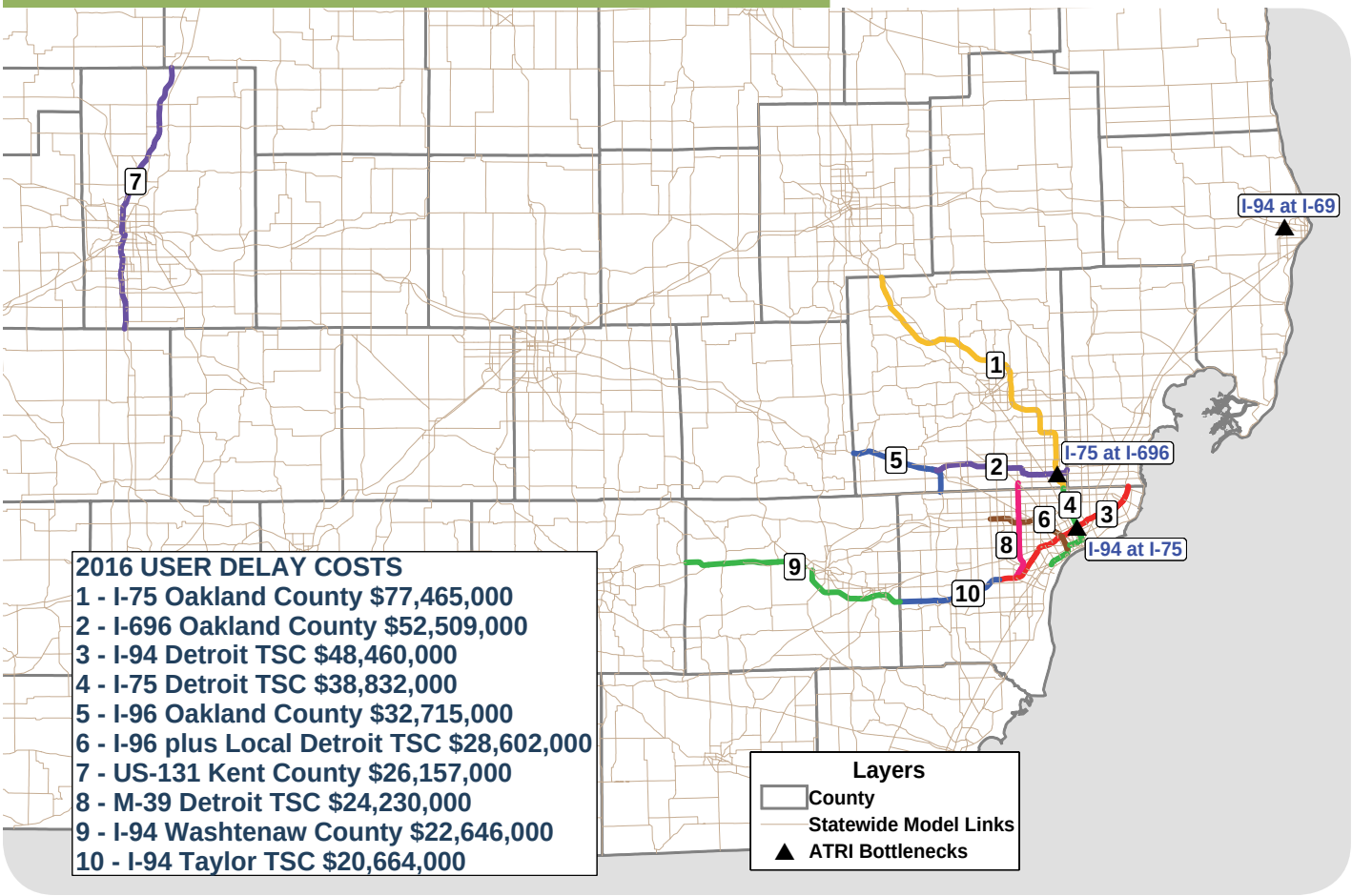
Highway Bottlenecks

Highway bottlenecks resulting in user-delay costs are monitored by MDOT. MDOT's Operations Division is using a tool called the Regional Integrated Transportation Information System (RITIS) to locate bottlenecks and calculate user cost-delay figures. Originally implemented along the I-94 corridor, the system has been expanded to include all Michigan freeways. Reports are created on a variety of performance measures, including average peak-period speeds, reliability index, congestion severity, and user-delay costs for passenger and freight vehicles. The annual Freeway Congestion and Reliability Report produced by MDOT details the corridors in each MDOT region and ranks them by total user-delay cost.

For this purposes of the Freeway Congestion and Reliability Report, user-delay cost is calculated by multiplying delay x hourly volume x hourly user cost. Delay is calculated by taking the difference between actual speeds when they fall below 60 mph and the posted speed limit. User-delay cost calculations do not start until speeds are below 60 mph. This is to eliminate counting the delay caused by slower commercial vehicles, which until recently operated under a 60 mph speed limit on Michigan's freeways (now 65 mph). Freight and passenger traffic are not separated out in the Freeway Congestion and Reliability Report. However, both commercial and passenger traffic counts are used as the hourly user costs vary significantly for commercial and passenger vehicles. Once speeds drop below a certain level in congested areas, passenger vehicles and commercial trucks travel at roughly the same speed.

Figure 16 highlights the top 10 corridors in the state with the highest user-delay costs for 2016. Also included in the map are the three locations in Michigan identified by the American Transportation Research Institute (ATRI) in their top 100 national freight bottlenecks. The methodology used in the ARTI study is similar to that used by MDOT. They estimate the cost associated with trucks traveling below free-flow speeds.

Figure 16 - Michigan Highway Freight Bottlenecks



Strategy: MDOT will calculate freight reliability measures in accordance with the FAST Act performance measure rules. A Truck Travel Time Reliability (TTTR) Index will measure travel time reliability on the interstate system, and the index will assess freight movement for five time periods. MDOT will set two and four-year targets in May 2018 and will begin assessing the interstate reliability for trucks with a baseline performance report in October 2018. Dedicating resources toward problem corridors will help the department reduce congestion, maintain infrastructure conditions, and improve the efficiency of the system for freight movement. For more information, visit the FHWA Transportation Performance Management website.

Strategy: MDOT continues to repair and reconstruct poor highway pavements and bridges each year. Improvements to highway infrastructure help create travel-time savings for households and businesses. This investment creates jobs, provides economic benefits for Michigan, and helps support a transportation system attractive to the freight industry.

Strategy: There are currently three transportation management centers in Michigan: in Detroit, in Grand Rapids, and a statewide one in Lansing. Each center uses closed-circuit television cameras, detection equipment, and dynamic message signs to manage traffic on regional and statewide freeways. The centers are focused on incident management activities and traveler information with the goal of improving the safety and mobility of the traveling public. ITS helps improve commercial freight movement travel times by warning shippers of problems and providing travel options in congested areas.

Highway Safety

In 2015, the number of crashes involving a truck in Michigan numbered more than 11,890, with 78 being fatal. This is a reduction from the 12,763 truck crashes and 94 fatalities recorded in 2014. MDOT maintains a crash database of all incidents reported to MSP. Figure 17 shows the location of truck or bus crashes in 2015. The department updates this information annually and uses the database to determine high-risk areas for further review. Also included in the map are the top rollover locations identified by ATRI from crash data between 2001 and 2009.

Strategy: Since implementing a cable median barrier program in 2008, MDOT has installed 333 miles of barrier. The department will continue to install the barriers in the future as needed. Results from other states that have had the barriers for a longer period of time than Michigan have shown a 90 percent reduction in cross-median crashes, which are some of the more severe and fatal highway crashes. MDOT contracted with Wayne State University to conduct a research study to determine the effectiveness of cable median barrier. The results of the research showed that after the barriers were installed, crossover crash rates on those highway segments fell by 87 percent, and the barriers successfully contained 97 percent of the vehicles that hit them.

Strategy: The department began installing rumble strips on Michigan's state trunkline system in 2008. Rumble strips are a proven and cost-effective countermeasure to lane departure crashes brought on by driver drowsiness, distraction, and/or inattention. To date, 5,700 miles of centerline and 1,700 miles of shoulder rumble strips have been placed.

Figure 17 - Truck and Bus Crashes and ATRI Rollover Locations (2015)

Strategy: MDOT's Operations Field Services Division is reviewing the list of top rollover locations in Michigan provided by ATRI, and inspects the locations to identify possible changes in speed, design, sign placement and use, sightlines, or other factors in order to improve safety.

Strategy: In 2017, Michigan raised its speed limit on some rural freeways from 70 to 75 mph for light-weight vehicles and from 60 to 65 mph for trucks on most freeways. Speed limits for all vehicles were raised to 65 mph on certain rural non-freeway highways. These new speed limits for trucks reduce conflicts with passenger vehicles by not increasing the differential in limits between the two classes of vehicles.

8 OVERVIEW OF TRENDS, ISSUES AND STRATEGIES

Truck Size and Weight

Overweight vehicles on state roadways can severely harm pavement quality and reduce the life expectancy of the road. At the same time, MDOT wants to encourage the efficient movement of heavy commodities that are typical of Michigan's major industries. Allowing greater truck weights, supported by more axles, allows trucks to move more goods at reduced costs while limiting pavement damage.

Strategy: The Commercial Vehicle Strategy Team (CVST) was established in 2005 to systematize the partnership between MDOT and the Michigan State Police (MSP) Commercial Vehicle Enforcement Division. The team's Infrastructure Subcommittee has studied new practices and technologies, enabling more efficient enforcement of truck weight and size laws. The team establishes priorities among projects that improve enforcement, such as weigh-in-motion (WIM) equipment, wireless WIM monitoring, the Truck Weight Information System (TWIS), and weigh-station upgrades. MDOT and MSP continuously review weigh-station operations and alternative enforcement strategies, with the goals of improving enforcement effectiveness and safety while reducing costs for truck operators.

Strategy: Michigan has adjusted its truck size and weight limits to comply with recent changes in federal law, allowing longer combinations for delivering new vehicles. In advance of amendments to state law, MSP has adjusted enforcement practices to match federal law and instructed local motor carrier officers and prosecutors to do the same. MDOT and MSP continue to evaluate proposed amendments to truck size and weight limits for lower logistics cost to assure that changes can be made safely and in compliance with federal law.

Strategy: MDOT's process for issuing permits for movements of indivisible oversize or overweight loads includes a routing system that delivers to the permit holder a precise route taking into consideration all structures, clearances, and other restrictions. Special restrictions may be applied to permits to cover construction projects and other transient events, or conditions such as peak traffic periods, holidays, and hours of darkness.

MDOT is also working with the Mid-America Freight Coalition (MAFC) on oversize overweight permitting harmonization efforts in the MAASTO region to enhance the efficient movement of goods and to reduce congestion and traffic delays.

Truck Parking

MDOT has developed a statewide deployment plan for the Truck Parking Information and Management System (TPIMS). The deployment plan was developed by working with internal and external stakeholders to identify locations where truck parking shortages are creating potential safety hazards by truck drivers making unsafe parking decisions. While the deployment of these technologies will be heavily based upon availability of funding and priorities identified by the statewide ITS Steering Committee, this technology has proven to be an effective way to provide truckers with relevant real-time truck parking availability information, allowing them to make well-informed parking decisions.

Strategy: To sustain the currently deployed system, MDOT has developed a number of contracts to support the system operations and maintenance. All operations and maintenance of the TPIMS system on private truck stops is handle by a third party vendor. All TPIMS technologies deployed at MDOT rest areas and within MDOT right of way (ROW) is maintained by MDOT's statewide ITS maintenance contractor. All operations of TPIMS technologies in MDOT ROW is managed by MDOT's Statewide Transportation Operations Center (STOC).

Jurisdictional Roadway Issues

Trucks pay user fees for the use of road facilities. However, trucks are not permitted on all roadways due to local ordinances. A lack of consistency in access to trade centers with special regulations on trucks creates a barrier for the movement of goods to markets utilizing these goods.

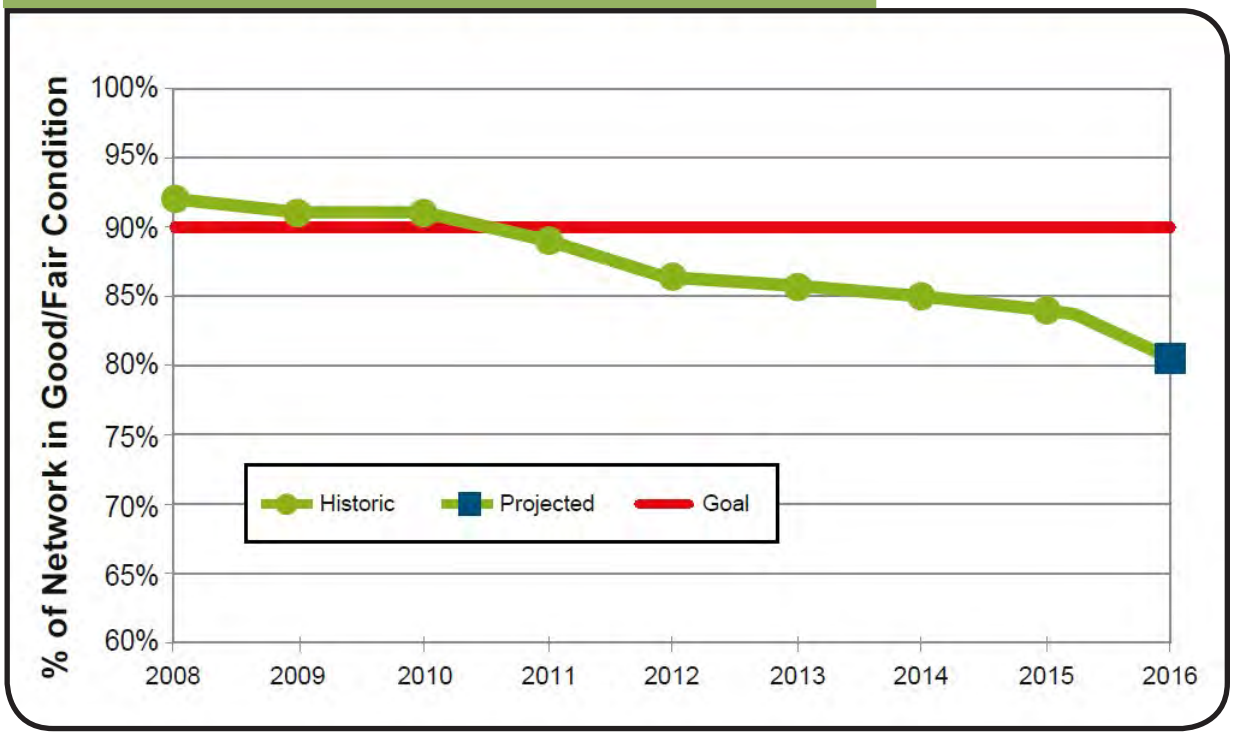
Strategy: MDOT has established procedures for ensuring compliance with federal law regarding truck access off the national network to shippers, destinations, and services. When necessary, MDOT resolves complaints regarding reasonable access over roads under local jurisdiction and issues decisions regarding weight and size restrictions.

Pavement Condition

MDOT uses remaining service life (RSL) data to monitor the performance of pavement on the trunkline system and to make program development and project selection decisions. RSL measures a pavement's overall condition and is defined as the estimated remaining time in years until a pavement's most cost-effective treatment requires either reconstruction or major repair. When pavements reach an RSL of two years or less, they are considered to be "poor," meaning they require these more expensive fixes. MDOT employs an asset management approach that implements short, medium, and long-term improvements to maintain overall pavement health, and strives to employ an appropriate mix of fixes to keep its pavement infrastructure in the best condition possible. However, without adequate funding, more sections of pavement are expected to slip into poor condition, requiring higher costs to repair them in the long run.

The graph below represents historic state trunkline system condition based on RSL. In 2007, MDOT surpassed its goal of 90 percent of pavement in good or fair condition, and maintained this condition through 2010. As the graph demonstrates, the deterioration rate since 2011 has been about 1 percent per year. However, this is forecasted to accelerate considerably in the coming years. Additional revenue from increases to the state gas tax and vehicle registration fees, alongside general fund transfers, will help to slow pavement deterioration, but projections indicate these funds are not enough to meet pavement goals in future years or to even sustain current conditions. As required by Act 51 of 1951, this new revenue must be distributed to more than 600 transportation agencies in Michigan. While this will help to slow the decline of infrastructure throughout the state, critical trunkline routes will not receive enough funding to improve overall pavement conditions.

Figure 18 - MDOT Historic Trunkline Pavement Condition



Source: MDOT, SSMS, as of October 2016

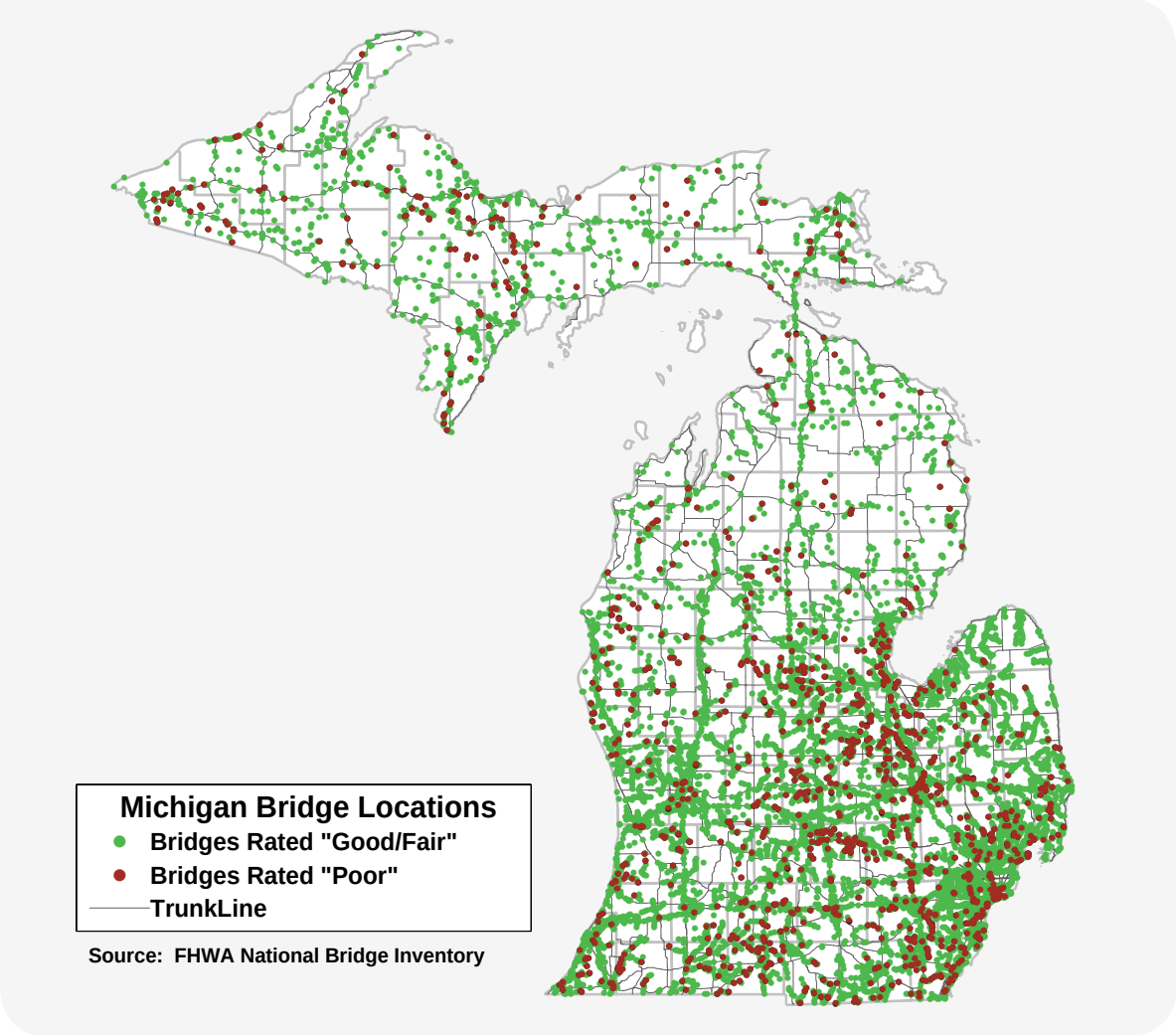
8 OVERVIEW OF TRENDS, ISSUES AND STRATEGIES

Bridge Condition

MDOT's Bridge Management System (BMS) is an important part of the overall asset management process. BMS is a strategic approach to linking data, strategies, programs, and projects into a systematic process to ensure achievement of desired results. An important BMS tool used by MDOT to develop preservation policies is the Bridge Condition Forecasting System (BCFS). Working from the current bridge condition, bridge deterioration rate, project cost, expected inflation, and fix strategies, BCFS estimates the future condition of the state trunkline bridge system. Michigan met its freeway bridge condition goal of 95 percent in good or fair condition in fall 2016. MDOT made significant progress in order to meet its freeway bridge goal; however, projections indicate that, without additional funding, Michigan will be unable to sustain the freeway bridge condition and conditions are projected to decline.

Bridge condition is very important to the reliable movement of truck freight on the system. The most recently updated statistics in May 2017 show that 229 bridges were determined to be structurally deficient out of the 4,478 bridges under MDOT's jurisdiction. The following map depicts the condition of all bridges in Michigan in 2016 (Figure 19).

Figure 19 - MDOT Bridge Ratings (2017)



RAIL ISSUES AND STRATEGIES

The Michigan State Rail Plan, adopted in 2011, provides a complete assessment of system issues in Michigan and recommendations for improvements. Below is a brief summary of some of the most important rail issues in the state.

Track and Bridge Condition

Track is generally kept in a condition appropriate for its current use. Unlike the highway system that assigns speeds by the classification of the route, railway speeds are assigned by condition of the track. As warranted, railroads can quickly make modest track improvements to maintain or raise train speeds. However, on low-volume lines, poor track condition can become difficult to address when revenue generated by that segment of track isn't sufficient to cover investments that are needed to continue the level of service.

Bridge condition is critically important due to the lack of alternative routing. There are currently 24 functionally deficient bridges out of the 215 bridges on the MDOT-owned rail system.

Strategy: MDOT's Michigan Rail Loan Assistance Program (MiRLAP) provides competitive loans to preserve and improve the existing rail network.

Strategy: Railroads are federally required to inspect bridges at least annually. As funding is available, MDOT makes strategic investments in the bridges on the MDOT-owned rail system.

Rail Capacity

Unit train capacity is of wide concern. Agricultural products are one of the largest commodities moved by rail. The use of unit trains – entire trains carrying a single commodity – are particularly important for Michigan's agricultural industry to remain economically competitive. Current configurations constrain capacity at rail yards and limit the ability to handle unit trains.

Volume capacity on the rail system currently is only an isolated issue in Michigan. The ability to accommodate increased capacity is of concern, particularly in the Metro Detroit area, with federal freight forecasting models predicting approximately 50 percent growth in tonnage by 2040. Also, the existing Detroit River Rail Tunnel cannot accommodate certain double-stack containers and taller Automax railcars. Growth in demand from the auto industry and other existing and potential customers is hampered by this inefficiency.

Strategy: MDOT continues to partner with Class I railroads to develop the Detroit Intermodal Freight Terminal (DIFT). This project will expand throughput capacity by consolidating multiple terminals and providing equipment and infrastructure upgrades needed in this competitive industry.

Strategy: MDOT has long supported the construction of a replacement rail tunnel between Detroit and Windsor. Numerous meetings have been held with the owners of the existing tunnel to address technical issues and potential funding sources.

8 OVERVIEW OF TRENDS, ISSUES AND STRATEGIES

Rail Congestion/Travel Times

Bottlenecks in the rail system have hindered movements, mainly in the urbanized communities in the Detroit region. Freight trains often wait at locations for other trains to pass before being able to continue.

Strategy: As part of the DIFT project, connections will be improved to alleviate long delays at several junctions in Metro Detroit. Multiple train movements will be enabled at junctions where trains are frequently delayed for hours while waiting for other trains to pass. Also, improved highway access to the DIFT will provide a more efficient flow of trucks into and out of the facility, improving rail intermodal operations. A project to create an efficient connection of the east-west track owned by Conrail and the north-south track owned by Grand Trunk Western Railroad (CN) was completed in 2015.

Public Safety

Michigan has approximately 4,600 public at-grade crossings. Approximately 50 percent of the state's public crossings have active-warning devices. While there has been an approximate 20 percent reduction in the average number of car-train crashes over the past five years, crashes still occur at both active and passive crossings.

Strategy: MDOT has the regulatory responsibility to assess the physical condition and safety needs for all public crossings in the state. MDOT works to review each public crossing every two years. In addition, MDOT funds safety enhancements and surface improvements on roads under local jurisdiction and on state trunklines.

Positive Train Control

Positive Train Control (PTC) is a federally mandated safety system that is designed to automatically stop a train before a train-train collision, derailment due to speed, movement because of a misaligned track switch, or unauthorized entrance into a work zone. It is required to be fully implemented by 2020. It applies to larger Class I railroads' mainlines that move hazardous materials and on any railroad mainlines with regularly scheduled intercity or commuter passenger rail. Shortline railroads also may be impacted when they interchange with and/or have trackage rights over PTC-equipped track. The federal safety mandate requires significant investment by the railroad industry to develop, implement and maintain PTC. In particular, many shortlines lack sufficient funding to implement and maintain PTC if/when impacted. New shippers served on a PTC-equipped track may also find the up-front costs of a mainline turnout cost-prohibitive.

Strategy: Seek funding opportunities available through the Federal Railroad Administration.

Strategy: While it does not directly cover the cost of a mainline turnout, MDOT's Freight Economic Development Program offers assistance to new or expanding businesses with other costs to access the rail network.

Railcar Shortage

Some shippers, particularly in the forestry industry and occasionally in the agricultural industry, have experienced difficulties obtaining sufficient numbers of railcars to transport their products. This is often a result of seasonal demands, competing demands from other shippers, or the aging of some specialized types of railcars.

Strategy: MDOT continues to work with shippers and railroads to study the extent of railcar shortages and to find a resolution.

Rail Accessibility

Many of the rail lines in the northern Lower Peninsula carry small volumes of freight traffic and serve as "feeder" lines with connections only to the south. Maintaining rail access in rural portions of the state is essential for the state's economy. Many rail lines in this region were abandoned or sold by the major rail carriers as they become economically unviable.

Strategy: MDOT has purchased some of these rail lines to continue to make rail accessible to businesses and has upgraded rail infrastructure to accommodate continued service. MDOT currently owns 665 miles of active track and contracts with five private rail operators to provide service on those lines.

Strategy: MDOT provides a competitive rail loan program: the Freight Economic Development Program provides loans to assist new or expanding businesses with access to the rail network. The Legislature increased the 2018 state budget for the Freight Economic Development Program. Both programs are intended to ensure the rail network remains a viable option for rail-dependent businesses.

Rail Track Limitations

Railcars capable of carrying 286,000 pounds are becoming the nationwide standard for certain commodities, particularly agricultural products. Some are now even moving up to 315,000 pounds. This allows for more efficient handling of products for shippers but requires upgraded infrastructure. The requirement for upgraded infrastructure is more likely to be a problem for lines owned or operated by short-line or regional carriers. Without infrastructure improvements, shippers cannot capitalize on the efficiencies (and cost savings) that the larger cars offer.

Strategy: MDOT's MiRLAP program is available for the improvement of existing railroad infrastructure, including upgrading track to accommodate heavier railcars.

AIR ISSUES AND STRATEGIES

Willow Run Airport Limitations

Detroit Willow Run Airport is a major air freight facility in the state. Due to the relatively short length of its runways, fully loaded wide-body aircraft must take off from Willow Run with only enough fuel to get them to Detroit Metro Airport, 10 miles away, where the plane can obtain a full tank of fuel and use the longer runways to continue flying to their various long-distance destinations. Though a costly procedure, the latest Master Plan has shown that lengthening runways at Willow Run is not currently feasible due to lack of land availability and other financial and political obstacles.

Strategy: Though currently not feasible, MDOT will continue to monitor the ability to extend runways in support of existing and future air cargo operations. Should the opportunity arise, MDOT will support extension of the primary runway to approximately 9,000 feet in total overall length, provided it is justified by determination of a particular critical aircraft model.

Retaining Cargo Services

The economic downturn and cost of fuel have negatively impacted air cargo services at many airports. Retaining and recruiting air services continues to be a challenge for the industry.

Strategy: MDOT has allocated funding for the Air Service Program for fiscal year 2017. This is a state and local program that aims to retain cargo services by giving grants to airports that enable them to market their cargo facilities and for capital improvements to enhance facilities. The program also increases airport marketability for the recruitment of new business to the air cargo industry.

All-Weather Airports

Airports that are not available in bad weather hamper the movement of freight, as seasonal changes can reduce certain freight movements.

Strategy: MDOT has continued an initiative to make more Michigan airports all-weather accessible by employing Global Positioning System (GPS) instrument approach systems and Automated Weather Observation System (AWOS) units. GPS systems alleviate the need for expensive ground navigation aids while the AWOS provides readily available weather information to aircraft. MDOT continues to work with airport communities to assist those in need of accessibility. Approximately 83 percent of the Tier 1 and Tier 2 airports defined in the Michigan Aviation System Plan (MASP 2017) are now all-weather accessible.

MARINE ISSUES AND STRATEGIES

Dredging Backlog

While the Michigan Freight Plan primarily identifies capital needs, maintenance of the commercial navigation channels in Michigan's ports is the most significant issue facing marine transportation in Michigan. Sedimentation from coastal and land processes is continually deposited into the navigation channels and must be removed by annual or periodic dredging. Most of the commercial ports are federal navigation projects for which the U.S. Army Corps of Engineers is responsible for maintenance dredging. The Harbor Maintenance Trust Fund, which is funded by the Harbor Maintenance Tax imposed on commercial cargoes, was established to provide funding for maintenance dredging. Unfortunately, only about half the tax revenues collected to date have been spent as authorized by Congress, leaving many of Michigan's commercial ports inadequately maintained. Approximately $9 billion paid into the HMTF remains unspent on harbor maintenance, having been used by Congress to pay down the national debt. Fortunately, the Water Resources Reform and Development Act of 2014, as amended by the Water Resources Development Act of 2016, set a target of 100 percent distribution by 2025 of all new harbor maintenance taxes collected. A backlog of dredging will still remain an issue.

Strategy: Michigan will continue to work with Congress, regional agencies, other states, and the shipping industry to encourage the federal government to use the funds in the Harbor Maintenance Trust Fund for their intended purpose.

Soo Locks

Congress has authorized construction of a new large lock that will replace two functionally obsolete locks constructed during World War I that are now closed. This new lock will be similar in size to the existing and aging Poe Lock, the only lock capable of accommodating 1,000-foot-long vessels and other slightly smaller vessels that collectively handle 85 percent of the tonnage passing through the St. Mary's Falls Canal. This will create much-needed redundancy for the waterway, as any failure of or problem with the nearly 50-year-old Poe Lock would create delays that would be lengthy and financially devastating to the many industries that rely on cargoes that pass through the locks.

Strategy: MDOT was heavily involved in the planning phases for a new lock. Preliminary construction has begun, but a lack of funding has stalled the project. The department will continue to work with the U.S. Army Corps of Engineers, the Great Lakes community, and Congress to promote the advancement of the project. The Corps is expected to complete a major economic reevaluation report in late 2017, which hopefully will provide justification to obtain the remaining federal funding required.

Regulatory Harmonization

Most waterborne commerce moving on the Great Lakes consists of interstate or international movements. In addition, various ports in several states may compete to handle much of the overseas traffic entering or leaving the lakes. As a result of these realities, harmonization of government regulations at both the national and state levels is important to ensure a "level playing field" for shippers, carriers, and ports. Two examples of the lack of regulatory harmonization that negatively impact Michigan's ports are customs inspection policies and ballast water regulations. Federal customs inspection rules are interpreted differently among U.S. Customs and Border Protection offices in various Great Lakes states. Because of a restrictive interpretation by the office in Michigan, clearance of international containerized or palletized cargoes are not permitted at Michigan's ports but is allowed at ports in neighboring states. For ballast water, regulation varies among the states and Michigan's more restrictive requirements have limited the ability of Michigan's ports to handle overseas cargoes. It is important that protective state, federal, and international standards are applied consistently and implemented in a timely manner to the shipping industry so as not to place states or regions at a competitive disadvantage

Strategy: MDOT and other Michigan officials will continue to monitor these issues and work with local, state, and federal agencies and legislators in an effort to harmonize maritime regulations that serve to hinder development of both domestic and international shipping. It is critical for Great Lakes ports to be subject to the same standards and interpretation of government regulations.

Local Port Infrastructure Improvements/Services

Local port improvement projects, including new or expanded marine terminals, improvements to navigation channels, or new marine services, are periodically proposed or undertaken by local governments, development organizations, or the private sector. These improvements will allow the ports to increase or at least maintain their volumes of waterborne commerce and provide Michigan's businesses and industries with modal transportation alternatives. Local governments should also be cognizant of the importance of port facilities to their local and regional economies. Ordinances or policies that restrict truck access to marine terminals or limit the types of commodities handled can have significant economic impacts.

Strategy: MDOT will continue to work with local and private interests to improve port infrastructure and services by providing technical assistance and help in identifying public funding opportunities when available.

Strategy: MDOT will also work with local communities to ensure they recognize the economic importance of commercial port facilities and encourage them not to implement ordinances or policies that negatively affect the movement of goods by marine transportation.

8 OVERVIEW OF TRENDS, ISSUES AND STRATEGIES

BORDER CROSSING ISSUES AND STRATEGIES

Border Delay/Congestion

Michigan has four highway border crossings with Canada. The Ambassador Bridge in Detroit and the Blue Water Bridge in Port Huron are ranked first and second, respectively, in the number of truck crossings each year on the U.S.-Canada border. Other crossings include the International Bridge in Sault Ste. Marie and the Detroit-Windsor tunnel. In addition, there are two ferry services across the St. Clair River at Marine City and Algonac that accommodate trucks. Additional rail crossings are located in Sault Ste. Marie and Detroit. Heightened security risks due to world events have led the Department of Homeland Security to impose stricter inspections of trucks, resulting in longer wait times and higher costs for shippers. Trucks crossing the border can experience up to several hours of delay waiting in long queues leading to the bridges to clear customs inspection. This delay costs companies that do business in the United States and Canada tremendously.

Strategy: The Gordie Howe International Bridge, a planned second bridge between Detroit and Windsor, Ontario, will provide additional border-crossing capacity for passengers and freight. The new bridge will also create a redundancy in the system to alleviate the risk of potential closures of the Ambassador Bridge. Moving international freight will improve as a result of this project. An Environmental Impact Statement was completed and a Record of Decision was granted by FHWA. In addition, The U.S. Coast Guard issued a bridge permit and the U.S. Department of State issued a Presidential Permit to the State of Michigan to construct, operate, and maintain the bridge. A procurement process is underway to select a private-sector partner to design, construct, finance, operate, and maintain the bridge. Right-of-way acquisition, demolition of existing structures, and survey activities are underway and construction is expected to begin in 2018.

Strategy: MDOT has planned an expansion of the Blue Water Bridge plaza to improve traffic flow in Port Huron. The proposed expansion will provide a new customs processing and inspection area for commercial vehicles, including 12 new primary inspection lanes. It also includes 15 commercial vehicle loading/unloading docks that will allow Customs and Border Patrol (CBP) officers to unload and inspect the contents of a commercial vehicle. This should drastically reduce delays at this crossing. MDOT continues to seek funding for the project through federal grant programs.

Strategy: The Free and Secure Trade (FAST) program is a joint program between the United States, Canada, and Mexico. The FAST program allows quicker processing for commercial carriers who have completed background checks and fulfilled certain eligibility requirements. Benefits include dedicated lanes for greater speed and efficiency in processing trans-border shipments; reduced number of inspections resulting in reduced delays at the border; and priority, front-of-the-line processing CBP inspections. Also, the Automated Commercial Environment (ACE) program continues to be expanded by the CBP. ACE modernizes and enhances trade processing with features that will consolidate and automate border processing, and will provide a centralized online access point to connect CBP and the trade community. While both are federal programs, MDOT promotes their benefits in order to reduce border delays.

Strategy: Implementing a border wait time measurement system is a shared U.S.-Canada vision for perimeter security and economic competitiveness. Having a system to measure border wait times will allow accurate information to be shared with the traveling public, as well as improve the predictability of wait times for shippers. The United States and Canada have been working cooperatively to implement border wait time systems at the top 20 high-priority U.S.-Canada land border crossings. All four of Michigan's highway border crossings are included on this list. Technology is currently in place at the Blue Water Bridge and is underway at the other Michigan-Ontario crossings.

9 THE STATE'S DECISION-MAKING PROCESS

This section includes information on how the state conducted outreach to stakeholders and the public, and project prioritization methodology.

STAKEHOLDER ENGAGEMENT AND PUBLIC INVOLVEMENT

Plan development relied extensively on the freight-related goals, language, and data included in the 2040 MITP. Completed in 2016, the updated long-range plan implemented an engagement strategy that included face-to-face meetings, Webinars, Internet postings, social media, e-mail communications, and other activities designed to engage the public early and continuously. The technical reports, which highlighted Michigan's freight assets, needs, and issues, helped lay the necessary groundwork for the Michigan Freight Plan.

In December 2016, MDOT developed a strategy for ensuring compliance with the guidelines outlined in the FAST Act for the creation of a state freight plan. This included identifying data elements that the current 2040 MITP was lacking that needed to be compiled for the Freight Plan. In January 2017, a timeline was developed for the completion of the Freight Plan, which included periodic progress reports to department leadership, the Commission for Logistics and Supply Chain Collaboration (LSC), and the State Transportation Commission (STC), and the Freight Coordination Group. In February 2017, MDOT developed a Public And Stakeholder Involvement Plan and received approval from FHWA Michigan Division.

Upon completion of the draft plan, MDOT implemented a public involvement strategy for notifying and soliciting comments from key stakeholders and the general public during a 30-day review and comment period. MDOT issued a news release on Aug. 28 announcing the availability of the document at MDOT region and Transportation Service Center (TSC) offices, and promoted a Sept. 12 Webinar for discussing it in more detail. The department posted the document to its Freight Plan website and shared it through the social networking sites Twitter and Facebook.

E-blasts were sent to key stakeholder groups, including state legislators, airports, chambers of commerce, shipping firms, economic development agencies, trade associations, and other state and federal entities interested in advancing freight transportation in Michigan. Michigan's Freight Advisory Committee, the Commission for Logistics and Supply Chain, was provided with a notice to share the draft plan with their constituents. MDOT notified the 12 federally recognized sovereign tribal governments whose lands are located within the state. In addition, the public also was invited to enter comments through MDOT's website.

INVESTMENT DECISION GUIDANCE: A CORRIDOR-BASED APPROACH

Freight must travel seamlessly along geographic corridors, with a choice of transportation modes between locations or activity centers within and outside Michigan. To support this, MDOT chose to focus on a corridor-based strategy linking economic activity centers throughout Michigan. The corridor approach has allowed MDOT to gain a better understanding of economic conditions and needs statewide.

The corridor-based analysis conducted during development of the 2040 MITP found that specific corridors serve and support specific economic sectors. By improving specific corridors, the shippers, businesses, and industries dependent on those corridors can be strengthened, further supporting Michigan's economic competitiveness.

Corridors of Highest Significance - National/ International and Statewide Corridors

A significant portion of the 2030 MITP was focused on the development of the COHS (Figure 20). Corridors were designated and named based on the primary travel origin and destination they serve: national/international, statewide, regional, or local. COHS include national/international and statewide designated trunkline corridors and are defined as:

An integrated, multi-modal system of transport infrastructure along geographic corridors that provides a high level of support for the international, national, and state economies. These corridors connect activity centers within and outside Michigan and serve the movements of people, services, and goods vital to the economic prosperity of the state.

Regionally and Locally Significant Corridors

Michigan's economy includes many local and regional economic activity centers throughout the state in addition to the corridors that support the international, national, and state economies. In identifying the COHS, it became

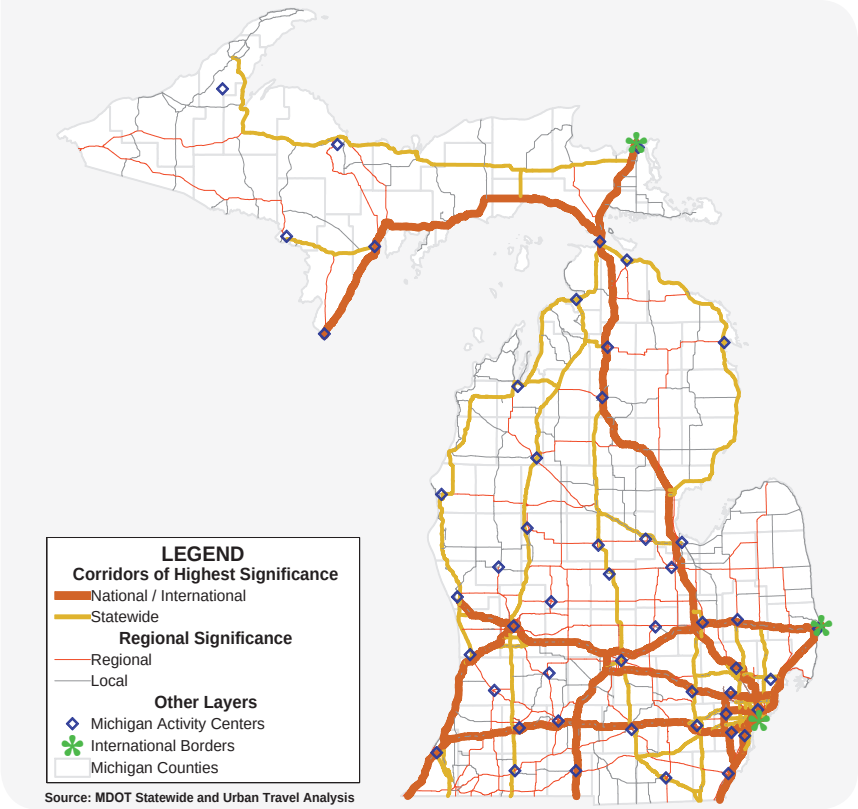
clear that certain corridors support regional economies and are vital components of the transportation network and the state's economic health. These corridors were identified as regionally and locally significant corridors and are defined as:

An integrated, multi-modal system of transportation infrastructure along geographic corridors that provides a high level of support for a specific sub-state region of Michigan's economy. These corridors connect to and augment the COHS and serve the movements of people and goods within or between activity centers.

Because the corridors are multi-modal and not limited to highways, service areas were defined to include population and employment within a 20-mile geographic area around the corridor, called the 20-mile band, which covers 10 miles on each side of the trunkline (Figure 21). COHS are not ranked; instead, they are based on the type of travel they carry. Even though the COHS do not include the entire state transportation network, they serve a very large segment of the travel needs of Michigan's businesses and encompass nearly 93 percent of the state's population.

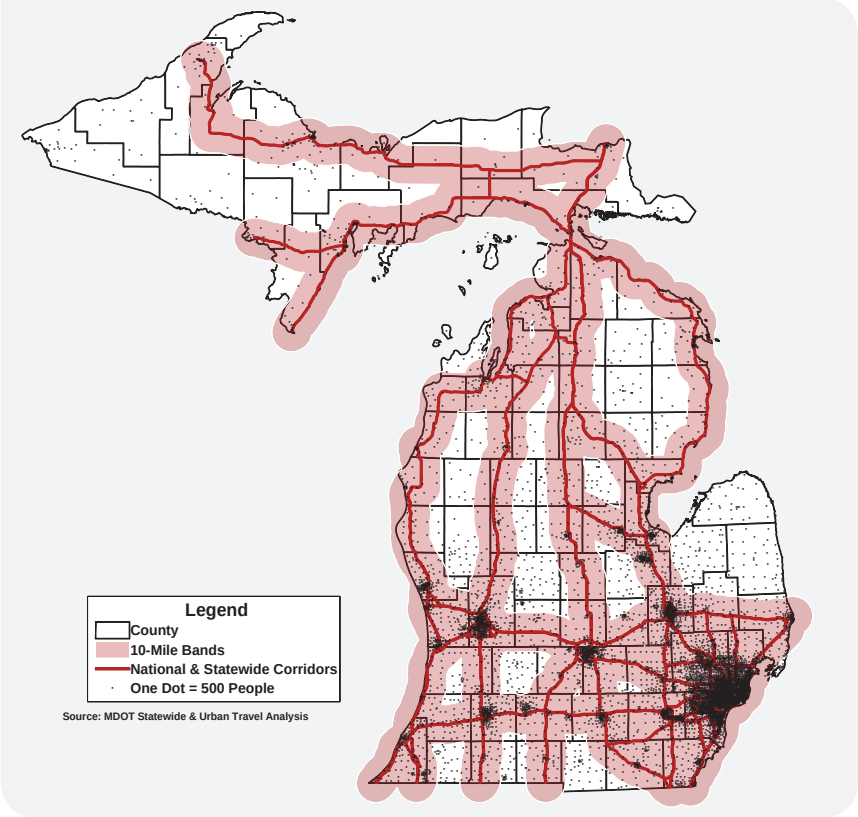
For more information on these corridors, please see the Corridors and International Borders Technical Report, the Corridors and International Borders White Paper, and the MI Corridors of Significance Profile Summary on the Web at www.michigan.gov/slrp.

Figure 20 - Corridors of Highest Significance: National/International and Statewide



Source: MDOT Statewide and Urban Travel Analysis

Figure 21 - Population Within 10 Miles of a Corridor of Highest Significance



Source: MDOT Statewide & Urban Travel Analysis

9 THE STATE'S DECISION-MAKING PROCESS

CRITICAL RURAL AND URBAN FREIGHT CORRIDORS

Overview

The National Highway Freight Network (NHFN) consists of four subsystems:

- **Primary Highway Freight System (PHFS)**
- **Portions of the Interstate System not part of the PHFS**
- **Critical Rural Freight Corridors (CRFCs)**
- **Critical Urban Freight Corridors (CUFCs)**

The FAST Act introduced CRFCs and CUFCs, which are meant to be important freight corridors that provide connectivity to the NHFN. By designating CRFCs and CUFCs, states will make them eligible for use of National Highway Freight Program (NHFP) formula funds and Infrastructure for Rebuilding America (INFRA) Grant Program funds.

There is a mileage limit in Michigan of 150 rural miles and 75 urban miles.

Designation Authority

States take the lead on designating all CRFCs, as well as CUFCs in metropolitan areas with a population less than 500,000, in consultation with the MPOs.

MPOs with a population greater than 500,000 – the Southeast Michigan Council of Governments (SEMCOG) and the Grand Valley Metro Council (GVMC) – take the lead in designating CUFCs within their metropolitan area, in consultation with the state.

Route Designation Criteria

FHWA developed the following criteria for selecting CUFCs and CRFCs. Proposed routes must meet at least one of the required elements to be eligible for designation.

Critical Rural Freight Corridors:

1. A rural principal arterial roadway that has a minimum of 25 percent of the annual average daily traffic of the road measured in passenger vehicle equivalent units from trucks.
2. Provides access to energy exploration, development, installation, or production areas.
3. Connects the PHFS or the Interstate System to facilities that handle more than 50,000 20-foot equivalent units per year (containers) or 500,000 tons per year of bulk commodities.
4. Provides access to a grain elevator, an agricultural facility, a mining facility, a forestry facility, or an intermodal facility.
5. Connects to an international port of entry.
6. Provides access to significant air, rail, water, or other freight facilities in the state.
7. Is determined by the state to be vital to improving the efficient movement of freight and is of importance to the economy of the state.

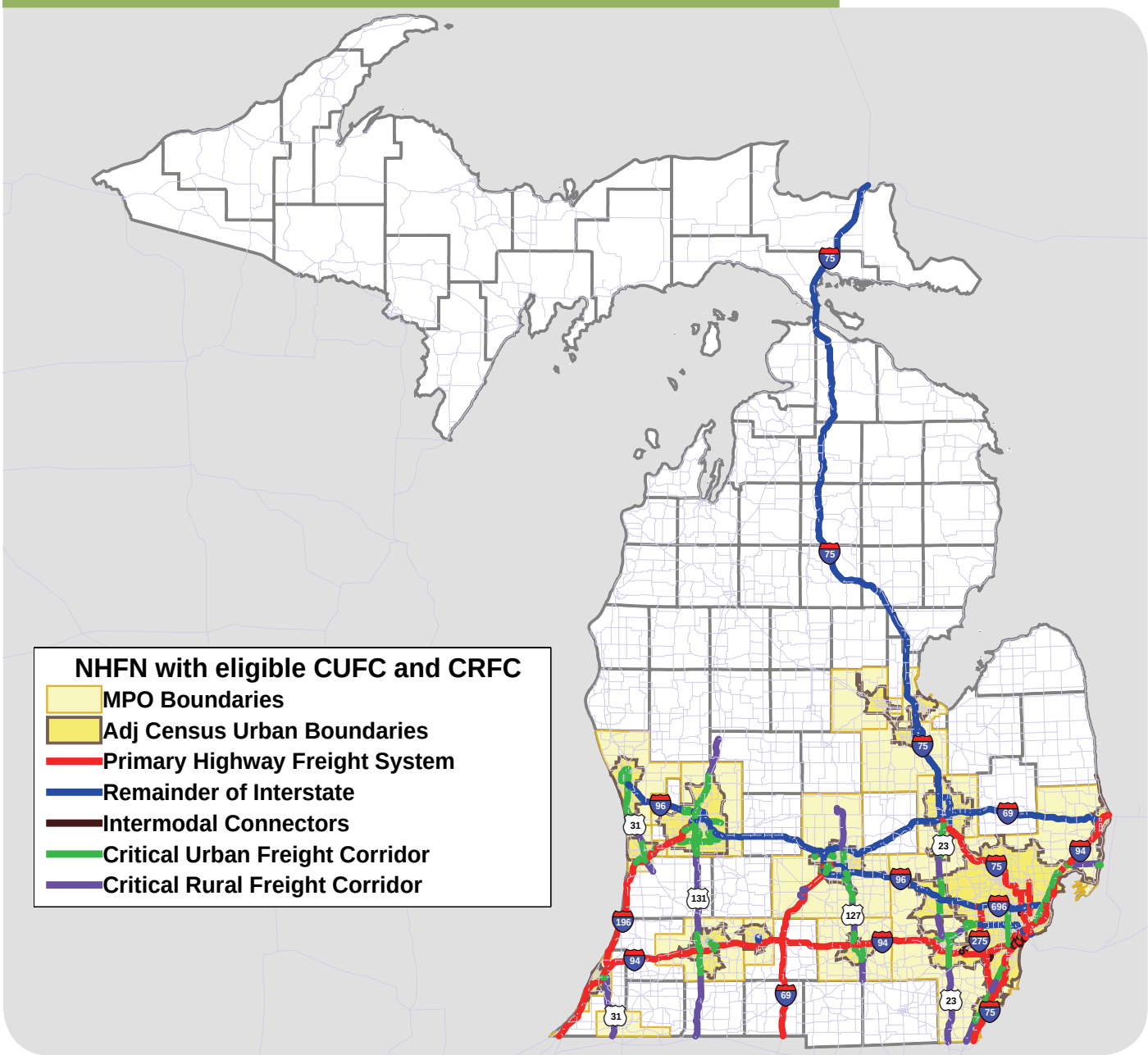
Critical Urban Freight Corridors:

1. Connects an intermodal facility to the PHFS, the Interstate System or an intermodal freight facility.
2. Is located within a corridor of a route on the PHFS and provides an alternative highway option important to goods movement
3. Serves a major freight generator, logistic center, or manufacturing and warehouse industrial land.
4. Is important to the movement of freight within the region, as determined by the MPO or the state.

Michigan's Approach to Designation

Given the limited mileage, Michigan identified qualifying routes in the state, based on the FHWA criteria above. Figure 22 shows eligible routes that meet the required criteria. Please see Appendix A for a detailed list of the eligible routes.

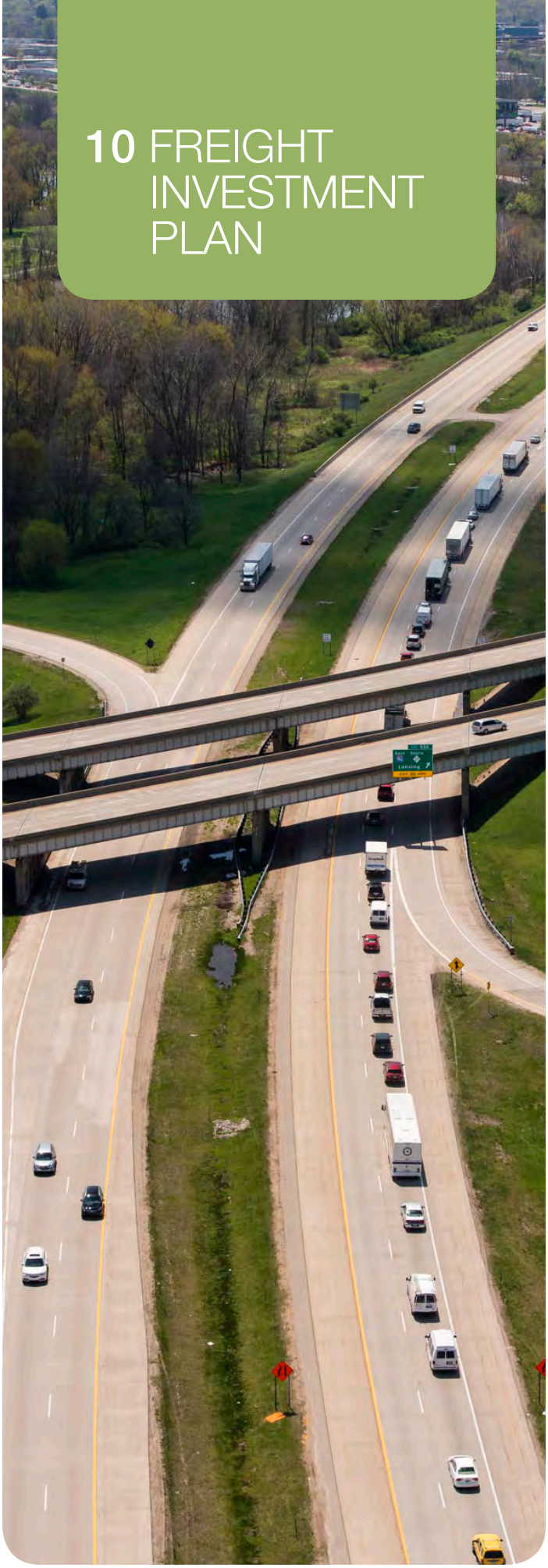
Figure 22 - National Highway Freight Network and Eligible CUFC/CRFC



As projects are proposed on these routes that need freight formula funds or will request an Infrastructure for Rebuilding America (INFRA) grant, formal designation of the route will need to occur, and concurrence by FHWA requested. The designated CRFCs/CUFCs will be a rolling set of routes. A formal process for revisiting the designations will be necessary when the mileage limit is reached.

There is no deadline for designation of CFCRs or CUCRs. Using this approach, Michigan defined a set of qualifying CUFCs and CRFCs without regard to mileage, and will seek formal designation of those routes as necessary based on funding needs. This approach helped Michigan arrive at statewide agreement as to which routes should be designated, since the mileage limits posed a challenge. MDOT worked in close coordination with the MPOs and other transportation partners on developing the approach and eligible route list.

10 FREIGHT INVESTMENT PLAN



FREIGHT INVESTMENT PLAN

Michigan's FAST Act Freight Investment Plan for FY 2018-2022

The passage of the Fixing America's Surface Transportation (FAST) Act on Dec. 4, 2015, offered state departments of transportation the opportunity to obtain dedicated freight funding if the state developed a comprehensive Freight Plan and a Freight Investment Plan (FIP). The FIP must include fiscally constrained projects over a five-year period.

FAST Act freight appropriations are formula-based funding available to states. Table 25 shows the FAST Act freight appropriations to MDOT. Projects that are included in the fiscally constrained portion of the FIP are eligible for freight funding.

Table 25 - NHFP Appropriations by Fiscal Year for 2016-2020*

2016	2017	2018	2019	2020
$30,000,386	$28,510,851	$31,154,701	$35,217,845	$39,130,938

*Appropriations after 2 percent State Planning and Research (SPR) set-aside.

MDOTs FIP includes fiscally constrained freight projects from the Five-Year Transportation Program (FY 2018-2022) that have the greatest impact on the movement of freight. These projects have been identified as critical to the movement of freight throughout Michigan and are essential for the state's economic vitality and competitiveness in the global marketplace. Projects in the FIP are in various stages of development and NHFP funding may be used for development phase activities, such as preliminary engineering or construction activities.

MDOT established base criteria in order to develop the FIP. All projects eligible to use freight formula funds are located on the National Highway Freight Network (NHFN).

Projects were weighed relative to their importance to the movement of freight. Four criteria were used to prioritize the freight projects on the NHFN:

1. **Commercial Traffic:** Commercial Annual Average Daily Traffic (CAADT) on the NHFN was used to determine which projects on the NHFN carried the most commercial traffic. Projects were included that had an average CAADT higher than 3,000. This criteria was chosen to keep the highest traveled routes in good condition and provide congestion relief when possible.
2. **Project Cost:** To ensure support for larger projects that have the greatest impact and scales of economy, any project that had a construction cost greater than $10 million was included.

3. **Network Connectivity:** These are roads that provide access between major intermodal facilities and the other four subsystems making up the National Highway Freight Network. Projects that provided additional connectivity to the NHFN, international border crossings, or were within 30 miles of an intermodal connector were included.
4. **Commodity Value:** To highlight routes that move the freight with the highest value, projects with an average commodity value in excess of $114 billion were included. The $114 billion threshold captures projects in the top 10 percent of Michigan's transportation network in terms of value.

All projects included in the FIP, shown on table 27, met one or more of the criteria effectively and are eligible for FAST Act freight appropriations.

STRATEGY FOR USING FAST ACT FREIGHT FUNDS

The costs of projects included in the five-year FIP far exceed FAST Act freight funding available to Michigan. Below are the projects for which MDOT has used, or plans to use, NHFP apportionments. Projects are identified through the period that funding is authorized through the FAST Act (FY 2020).

49 U.S.C. 70201 states that FIPs can be updated more frequently than the five-year requirement for the entire State Freight Plan. Michigan's FIP will be updated on an annual basis. During the annual amendment of the FIP, MDOT may revise NHFP-funded projects as construction schedules are adjusted or as opportunities arise to use up to 10 percent of NHFP funds for intermodal projects.

TABLE 26 – PROJECTS USING NHFP FUNDS FOR FISCAL YEARS 2016-2020

FY	Region	County	Route	Location	Description	Estimated Total Funding	Total Federal	Non-Federal	NHFP Funds
2016	Grand	Kent	I-196	Over the Grand River	Deep Overlay	$2,700,925	$2,430,832	$270,093	$1,547,108
2016	Metro	Wayne	I-75	Over the Rouge River	Deck Replacement	$88,340,619	$79,506,559	$8,834,061	$20,535,422
2016	Metro	Wayne	I-75	Over Goddard Road and Sexton Kilfoil Drain	Bridge Replacement	$58,905,780	$53,015,199	$5,890,578	$7,917,856
2017	Metro	Wayne	I-75	Over Goddard Road and Sexton Kilfoil Drain	Bridge Replacement	$58,905,780	$53,015,199	$5,890,578	$28,510,851
2018	Metro	Oakland	I-75	From north of 13 Mile Road to Coolidge Highway	Reconstruction, Modernization, and Capacity	$351,000,000	$287,293,501	$63,706,499	$31,154,701
2019	University	Monroe	I-75	I-75 from Ohio state line to Erie Road	Concrete Reconstruction	$73,516,000	$66,164,400	$7,351,600	$35,217,845
2020	Bay	Saginaw	I-75	Hess Road to south I-675 interchange	Reconstruction	$39,182,155	$35,263,940	$3,918,215	$35,263,940
2020	Bay	Saginaw	I-75	Two bridges in Saginaw County	Bridge Replacement	$14,675,779	$13,208,201	$1,467,578	$3,866,998

TABLE 27 - FREIGHT INVESTMENT PLAN

FY	Region	County	Route	Location	Description	Est Total Funding	Federal	Non-Federal
2018	Metro	Wayne	I-94	Cass Avenue, French Road, Brush Street, and Second Street bridges	Bridge Replacements	$59,400,000	$52,590,000	$6,810,000
2018	University	Jackson	I-94	M-60 to Sargent Road	Reconstruction	$41,053,689	$36,948,320	$4,105,369
2018	Metro	Wayne	I-75 N	Six bridges over I-75	Substructure Patching and Slope Repair	$1,930,686	$1,737,618	$193,070
2018	Bay	Genesee	I-475	Carpenter Road to Clio Road	Reconstruction	$39,215,665	$35,294,098	$3,921,567
2018	Metro	Wayne	I-75	Junction with 12 Mile Road	Connected Vehicle Infrastructure and Integration	$400,000	$400,000	-
2018	Grand	Kent	EB I-96	West River Drive to the Grand River	Asphalt Reconstruction	$4,181,000	$3,762,900	$418,100
2018	Southwest	Berrien	I-196	Under M-63	Bridge Replacement	$4,595,223	$4,135,701	$459,522
2018	University	Jackson	I-94	I-94 over Conrail and the Grand River	Bridge Replacement	$20,176,820	$18,159,138	$2,017,682
2018	Grand	Kent	US-131	10 Mile Road north to 14 Mile Road	Concrete Reconstruction	$38,400,000	$31,430,400	$6,969,600
2018	Metro	Oakland	I-75	From North of 13 Mile Road to Coolidge Highway	Reconstruction, Modernization, and Capacity	$351,000,000	$287,293,501	$63,706,499
2018	Metro	Oakland	I-75	From 8 Mile Road to North of 13 Mile Road	Reconstruction, Modernization, and Capacity	$ 575,000,001	$470,637,502	$104,362,499
2018	Grand	Kent	EB I-96	Under westbound I-196	Bridge Replacement	$12,438,801	$11,194,921	$1,243,880
2018	Southwest	Berrien	NB I-196	I-94 to north of M-63	Rehabilitation and Reconstruction	$16,500,000	$14,850,000	$1,650,000
2018	Southwest	Berrien	I-94	Indiana state line to M-239	Two-Course Asphalt Resurfacing	$7,256,480	$6,530,832	$725,648
2018	Bay	St. Clair	I-69	Port Huron to county line	Connected Vehicle Infrastructure and Integration	$345,000	$345,000	-
2018	Metro	Wayne	NB I-75	Eureka Road, Northline Road, and US-24 connector	Deck Replacement	$20,134,568	$18,121,112	$2,013,456
2018	Metro	Wayne, Monroe	I-75	From I-275 to M-39	ITS Infrastructure and Device Installation	$4,870,000	$3,986,095	$883,905
2018	Grand	Kent	I-196	Fuller Avenue to eastbound I-196	Fuller Avenue On Ramp Extension	$775,000	$634,338	$140,662
2018	University	Jackson	I-94	Northbound and southbound M-106 over I-94	Bridge Replacement	$14,077,201	$12,669,481	$1,407,720
2018	Metro	Macomb	I-696	Mound Road to Neiman Road	Concrete Pavement Inlay	$64,600,000	$52,875,100	$11,724,900

10 FREIGHT INVESTMENT PLAN

TABLE 27 - FREIGHT INVESTMENT PLAN CONTINUED

FY	Region	County	Route	Location	Description	Est Total Funding	Federal	Non-Federal
2019	Metro	Wayne	WB I-94	From I-96 to Conner Street	Dynamic Lane Use	$10,000,000	$8,185,000	$1,815,000
2019	Metro	Wayne	EB I-94	At Conrail Railroad (X01 of 82025)	Railroad Bridge Replacement	$33,100,000	$27,092,350	$6,007,650
2019	Metro	Wayne	EB I-94	At Conrail Railroad (X02 of 82024)	Railroad Bridge Replacement	$32,600,000	$26,683,100	$5,916,900
2019	University	Monroe	NB I-75	Nine bridges on I-75 in Monroe County	Bridge Replacements	$30,087,000	$27,078,300	$3,008,700
2019	Metro	Wayne	EB I-94	E. Grand Boulevard over I-94	Bridge Replacement	$32,100,000	$26,273,850	$5,826,150
2019	Metro	Wayne	EB I-94	At Fortenac Street (S08 of 82024)	Bridge Replacement	$10,200,000	$8,348,700	$1,851,300
2019	Metro	Wayne	EB I-94	At Burns Street (S12 of 82024)	Bridge Replacement	$9,500,000	$7,775,750	$1,724,250
2019	Metro	Wayne	EB I-94	At Grand River Avenue (S17 of 82024)	Bridge Replacement	$31,900,000	$26,110,150	$5,789,850
2019	Metro	Wayne	NB I-75	At Milwaukee Avenue (S17 of 82251)	Bridge Replacement	$10,000,000	$8,185,000	$1,815,000
2019	Grand	Kent	I-196	Fuller Avenue To I-96	Reconstruction	$19,799,000	$17,819,100	$1,979,900
2019	Bay	Bay	I-75	Three bridges in Bay County	Deck Replacement	$7,748,788	$6,973,910	$774,878
2019	University	Monroe	I-75	Over Raisin River	Overlay - Epoxy	$9,652,118	$8,686,906	$965,212
2019	Metro	Oakland	I-75	South of M-59 to Genesee County line	Connected Vehicle Infrastructure and Integration	$317,500	$317,500	-
2019	Grand	Ionia	I-96	I-96 under Cutler Road	Bridge Replacement	$4,080,060	$3,672,055	$408,005
2019	University	Monroe	I-75	I-75 from Ohio state line to Erie Road	Concrete Reconstruction	$73,516,000	$66,164,400	$7,351,600
2019	Bay	Bay	I-75	M-13 connector to Beaver Road	Unbonded Concrete Overlay	$21,843,698	$19,411,828	$2,431,870
2019	Metro	Oakland	I-96	From I-275 to county line	ITS Infrastructure and Device Installation	$7,000,000	$5,729,500	$1,270,500

TABLE 27 - FREIGHT INVESTMENT PLAN CONTINUED

FY	Region	County	Route	Location	Description	Est Total Funding	Federal	Non-Federal
2020	University	Eaton	I-496	From I-96 to Lansing Road	Concrete Reconstruction	$30,000,000	$27,000,000	$3,000,000
2020	University	Eaton	I-69	Calhoun County line to M-50	Major Rehabilitation	$28,416,667	$25,575,001	$2,841,666
2020	Southwest	Kalamazoo	I-94	East of Lovers Lane to east of Portage Road	Road Reconstruction and Widen	$32,497,837	$26,599,481	$5,898,358
2020	Southwest	Kalamazoo	I-94	From Portage Road to Sprinkle Road	Road and Bridge Reconstruction	$34,060,074	$27,878,171	$6,181,903
2020	Grand	Ottawa	EB I-196	West of 32nd Avenue to Kent County line	Reconstruction	$14,100,000	$12,690,000	$1,410,000
2020	Bay	Saginaw	I-75	Hess Road to south I-675 interchange	Reconstruction	$39,182,155	$35,263,940	$3,918,215
2020	Bay	Saginaw	I-75	Two bridges in Saginaw County	Bridge Replacement	$14,675,779	$13,208,201	$1,467,578
2020	Metro	Wayne	I-275	South of M-153 to 5 Mile Road	Milling and Asphalt Resurfacing	$34,600,000	$28,320,100	$6,279,900
2021	Metro	Wayne	I-96	I-96	ITS Infrastructure and Device Installation	$1,010,316	$826,943	$183,373
2021	Metro	Wayne	I-275	Northline Road to M-153	Milling and Asphalt Resurfacing	$49,520,000	$40,532,120	$8,987,880
2021	Grand	Kent	EB I-96	At M-21	Interchange Redesign and Upgrading	$2,015,000	$1,649,278	$365,722
2021	University	Clinton	I-69	I-96 to Airport Road	Reconstruction	$41,754,900	$37,579,410	$4,175,490
2021	University	Monroe	NB I-75	Four bridges on I-75 in Monroe County	Bridge Replacement	$17,020,000	$15,318,000	$1,702,000
2021	Bay	Bay	I-75	Beaver Road to Cottage Grove Road	Unbonded Concrete Overlay	$16,243,838	$14,619,454	$1,624,384
2021	University	Jackson	I-94	I-94 at Elm Road	Reconstruction	$17,723,968	$15,951,571	$1,772,397
2021	University	Livingston	I-96	Chilson Road to Dorr Road	Concrete Pavement Inlay	$15,680,000	$14,112,000	$1,568,000
2021	North	Cheboygan	NB I-75	Levering Road to south of Hebron Town Hall Road	Unbonded Concrete Overlay	$21,235,200	$17,381,011	$3,854,189

TABLE 27 - FREIGHT INVESTMENT PLAN CONTINUED

FY	Region	County	Route	Location	Description	Est Total Funding	Federal	Non-Federal
2021	Bay	St. Clair	EB I-69	Riley Center Road to M-19	Major Rehabilitation	$24,220,449	$21,798,404	$2,422,045
2021	Grand	Kent	I-196	Over the Grand River	Deck Replacement	$5,381,255	$4,843,130	$538,125
2021	Metro	Wayne	WB I-94	Conner Avenue to Chene Street	Reconstruction	$200,000,000	$180,000,000	$20,000,000
2021	Southwest	Berrien	EB I-94	Britain Avenue to I-196	Reconstruction	$73,812,750	$66,431,475	$7,381,275
2021	University	Monroe	I-75	Under Laplaisance Road	Bridge Replacement	$10,200,000	$9,180,000	$1,020,000
2021	Grand	Kent	I-96	Thornapple River Drive to Whitneyville Avenue	Concrete Pavement Inlay	$10,500,000	$9,450,000	$1,050,000
2021	University	Monroe	I-75	Erie Road to Otter Creek Road	Concrete Reconstruction	$72,000,000	$64,800,000	$7,200,000
2022	Southwest	Calhoun	I-69	N Drive north to Eaton County line	Reconstruction	$31,200,000	$28,080,000	$3,120,000
2022	Metro	Wayne	I-375	South of I-75/I-375 interchange to Jefferson Avenue	Concrete Reconstruction	$165,000,000	$148,500,000	$16,500,000
2022	Southwest	Berrien	I-94	St. Joseph River to Britain Avenue	Reconstruction	$46,250,000	$41,625,000	$4,625,000
2022	North	Cheboygan	SB I-75	South of Hebron Town Hall Road to US-31	Unbonded Concrete Overlay	$20,000,000	$16,370,000	$3,630,000
2022	Southwest	Berrien	I-94	Pipestone Road (Exit 29)	Interchange Redesign and Upgrading	$1,800,000	$1,473,300	$326,700
2022	Bay	Genesee	I-69	Fenton Road to M-54	Reconstruction	$54,236,062	$48,812,456	$5,423,606
2022	Metro	Wayne	I-96	Under Hubbell Avenue and Fullerton Avenue	Deck Replacement	$6,046,950	$5,442,256	$604,694
2022	Grand	Ionia	EB I-94	Bliss Road east to M-66	Reconstruction	$18,300,000	$16,470,000	$1,830,000
2022	North	Emmett	I-75	From Old M-108 to Mackinac Bridge	Milling and Asphalt Resurfacing	$5,119,500	$4,190,311	$929,189

Multimodal Freight Projects as a Supplement to the FIP

The Michigan Freight Plan is a multimodal document, but there are limitations of FIP project eligibility as defined by Title 23 for highway funding. Because of this, MDOT also included other significant highway and multimodal freight projects that are not programmed in MDOT's Five-Year Transportation Program in the FIP. The cost estimates for these projects should be considered preliminary and are not necessarily the responsibility of the state or other public sector jurisdictions.

The following list includes highway, marine, aviation and rail projects that do not have fiscal constraint or are non-highway modes, but play a significant role in Michigan's freight network. Projects have been previously identified in the 2040 MITP, the Michigan State Rail Plan, the Michigan Aviation System Plan, and other major planning documents.

The rail projects include only proposed or planned capital projects and studies identified by the industry. This project list is not fiscally constrained, therefore most projects do not have a dedicated funding source. Projects shown were prioritized by the industry, and do not necessarily represent MDOT's prioritization of rail projects in Michigan.

TABLE 28 - MULTIMODAL PROJECTS: RAIL

Project	Region	County	Description	Estimated Cost
Detroit Intermodal Freight Terminal -- Terminals	Metro	Wayne	Construct/expand intermodal terminals	$257,000,000
Detroit Intermodal Freight Terminal -- Rail Interlockers*	Metro	Wayne	Re-construct rail interlockers (junctions)	$86,700,000
Detroit Intermodal Freight Terminal -- Highway Access	Metro	Wayne	Re-construct highway access	$79,000,000
New Detroit-Windsor Rail Tunnel	Metro	Wayne	Construct new rail tunnel	$400,000,000
Adrian & Blissfield Rail Road Reconnection	University	Lenawee	Reconnect A&B RR lines with Toledo, switching terminal to elminate crossings and re-route hazmat outside of Adrian.	$7,500,000
Norfolk Southern Track Upgrades	Metro	Wayne	DIFT line of track upgrades, including new powered crossovers, additional main line tracks, signalization, etc.	$50,000,000
West Michigan Railroad Freight Connections	Southwest	West Michigan	Proposed new freight connections in west Michigan.	$10,000,000
Lake State Railway Company Mackinaw Subdivision Relay	Bay/North	Bay, Arenac, Ogemaw, Roscommon, Crawford	Replace 73 miles of joined 105-pound rail with 115-pound continuous welded rail.	$33,000,000
Ann Arbor Railroad CTC Signal	University	Monroe	Replace CTC signal system.	$1,342,000

*Includes CSX Delray Interlocker Modernization for $4 million

TABLE 29 - MULTIMODAL PROJECTS: MARINE

Project	Region	County	Description	Estimated Cost
New Soo Lock	Superior	Chippewa	Construct new lock	$580,000,000
Soo Locks Asset Renewal	Superior	Chippewa	Upgrade Poe and McArthur locks	$10,700,000

TABLE 30 - MULTIMODAL PROJECTS: HIGHWAY

Project	Region	County	Description	Estimated Cost
Gordie Howe International Bridge	Metro	Wayne	Construct new border crossing	N/A*
Blue Water Bridge	Bay	St. Clair	Plaza expansion	$274,600,000
I-94	Metro	Wayne	Reconstruct I-94	$2,752,600,000
I-75	Metro	Wayne	Reconstruct I-75	$1,331,400,000

*The Windsor-Detroit Bridge Authority (WDBA) is a not-for-profit Canadian Crown corporation created in 2012 that will manage the design, construction, operation, and maintenance of the Gordie Howe International Bridge through a public-private partnership. Costs will be recovered through user tolls.

TABLE 31 - MULTIMODAL PROJECTS: AVIATION

Project	Region	County	Description	Estimated Cost
Detroit Willow Run Airport	Metro	Wayne	Runway/taxiway construction, etc.	$36,850,000
Detroit Metropolitan Wayne County Airport	Metro	Wayne	Runway/taxiway construction, etc.	$269,030,000
Flint Bishop International Airport	Bay	Genesee	Taxiway/road/apron design and construction	$5,350,000
Grand Rapids Gerald R. Ford International Airport	Grand	Kent	Apron/terminal construction, equipment, etc	$48,024,200
Lansing Capital Region International Airport	University	Clinton	Runway/taxiway rehabilitation, etc.	$22,172,500

APPENDIX A CRITICAL URBAN AND RURAL FREIGHT CORRIDORS

COLUMN	DESCRIPTION
MDOT REGION	MDOT region where corridor is located
COUNTY	Michigan county where corridor is located
MPO AREA	The MPO area in which the corridor is located and the party consulted with
DESIGNATING PARTY	Specifies MPO or MDOT designation
CUFC	Critical Urban Freight Corridor designated
START	Starting point of the CUFC
END	Ending point of the CUFC
PHFN CONNECTIVITY	Connects an intermodal facility to the Primary Highway Freight System (PHFS) (YES or NO)
INTERSTATE CONNECTIVITY	Connects an intermodal facility to the Interstate System (YES or NO)
INTERMODAL CONNECTIVITY	Connects an intermodal facility to another intermodal freight facility (YES or NO)
ALTERNATIVE ROUTE OPTION	Is located within a corridor of a route on the PHFS and provides an alternative highway option important to goods movement (YES or NO)
FREIGHT GENERATOR	Serves a major freight generator, logistic center, or manufacturing and warehouse industrial land (YES or NO)
SIGNIFICANT FREIGHT CORRIDOR	Is important to the movement of freight within the region (YES or NO)
COHS	MDOT Statewide and National Corridor of High Significance (COHS) (YES or NO)
MILES	Length of the corridor in miles

ELIGIBLE CRITICAL URBAN FREIGHT CORRIDORS

CUFC	MDOT Region	COUNTY	MPO AREA	DESIGNATING PARTY	START	END	PHFN CONNECTIVITY	INTERSTATE CONNECTIVITY	INTERMODAL CONNECTIVITY	ALTERNATIVE ROUTE OPTION	FREIGHT GENERATOR	SIGNIFICANT FREIGHT CORRIDOR	COHS	MILES
US-131	Southwest	Kalamazoo	Kalamazoo Area Transportation Study	MDOT	South Street	US-131 BR	x					x	x	13.6
US-131	Kent	Kent	Grand Valley Metropolitan Council	Grand Valley Metropolitan Council	100th Street	17 Mile Road	x					x	x	32.3
M-39	Metro	Wayne	SEMCOG	SEMCOG	I-94	M-10	x	x		x	x	x		13.8
US-31	Southwest	Berrien	Southwest Michigan Planning Comission	MDOT	Yore Road	I-94	x					x	x	1.1
US-31	Grand	Ottawa	Macatawa Area Coordinating Council	MDOT	I-196	Barry Street	x					x	x	11
US-31	Grand	Ottawa	West Michigan Shoreline Regional Development Commission	MDOT	Lincoln Street	US-31 BR	x					x	x	11.5
M-6	Grand	Ottawa	Grand Valley Metropolitan Council	Grand Valley Metropolitan Council	I-196	Ottawa/Kent County Line	x	x				x		2.6
M-6	Grand	Kent	Grand Valley Metropolitan Council	Grand Valley Metropolitan Council	Ottawa/Kent County Line	I-96	x	x				x		16.9
US-23	University	Washtenaw	SEMCOG	SEMCOG	Judd Road	M-14	x					x	x	12.8
US-23	University	Washtenaw	SEMCOG	SEMCOG	5 Mile Road	Livingston County Line	x					x	x	2.7
US-23	University	Livingston	SEMCOG	SEMCOG	Washtenaw County Line	Crouse Road	x					x	x	16.3
US-23	University	Livingston	SEMCOG	SEMCOG	Foley Road	Shiawassee Avenue	x					x	x	2
US-23	Bay	Genesee	Genesee County Metropolitan Planning Comission	MDOT	Shiawassee Avenue	I-75	x					x	x	12.5
M-14	University	Washtenaw	SEMCOG	SEMCOG	I-94	M-153	x	x				x		10.5

ELIGIBLE CRITICAL URBAN FREIGHT CORRIDORS CONTINUED

CUFC	MDOT Region	COUNTY	MPO AREA	DESIGNATING PARTY	START	END	PHFN CONNECTIVITY	INTERSTATE CONNECTIVITY	INTERMODAL CONNECTIVITY	ALTERNATIVE ROUTE OPTION	FREIGHT GENERATOR	SIGNIFICANT FREIGHT CORRIDOR	COHS	MILES
M-14	Metro	Wayne	SEMCOG	SEMCOG	Washtenaw County Line	I-96/I-275	x	x				x		6.4
US-127	University	Jackson	Region 2 Planning Commission	MDOT	Henry Road	I-94	x					x	x	5.4
US-127	University	Jackson	Region 2 Planning Commission	MDOT	I-94	Hart Road	x					x	x	7
US-127 BR	University	Jackson	Region 2 Planning Commission	MDOT	I-94	US-127	x					x		6.3
5 Mile Road	Metro	Wayne	SEMCOG	SEMCOG	Napier Road	Beck Road					x	x		2
Beck Road	Metro	Wayne	SEMCOG	SEMCOG	M-14	5 Mile Road					x	x		1
26 Mile Road	Metro	Macomb	SEMCOG	SEMCOG	I-94	Macomb County Line	x			x		x		1.2
King Road	Bay	St. Clair	SEMCOG	SEMCOG	Marine City Highway	West Boulevard	x			x		x		0.5
West Boulevard	Bay	St. Clair	SEMCOG	SEMCOG	King Road	M-29	x			x		x		0.5
M-29	Bay	St. Clair	SEMCOG	SEMCOG	West Boulevard	Water Street	x			x		x		0.6
Water Street	Bay	St. Clair	SEMCOG	SEMCOG	M-29	Ferry Dock	x			x		x		0.3
23 Mile Road	Metro	Macomb/ Wayne	SEMCOG	SEMCOG	Gratiot Avenue	I-94	x	x		x		x		0.6
Gratiot Avenue	Metro	Macomb/ Wayne	SEMCOG	SEMCOG	I-94	23 Mile Road	x	x		x		x		22.2
E. Front Street	University	Monroe	SEMCOG	SEMCOG	I-75	East end of road	x		x		x	x		1.3
Telegraph Road	University	Monroe	SEMCOG	SEMCOG	3rd Street	I-275				x		x		13.8
Telegraph Road	University	Monroe	SEMCOG	SEMCOG	Carleton Rockwood Road	Wayne County Line				x		x		2.2
Telegraph Road	Metro	Wayne	SEMCOG	SEMCOG	Wayne County Line	Dix Toledo Road				x		x		3.5
Dix Toledo Road	Metro	Wayne	SEMCOG	SEMCOG	Telegraph Road	I-75				x		x		2.4
US-31 BR (Seaway Drive/ Shoreline Drive)	Grand	Muskegon	WestPlan	MDOT	I-96	US-31	x		x		x	x		9.5
Sprinkle Road	Southwest	Kalamazoo	Kalamazoo Area Transportation Study	MDOT	I-94	M-43	x				x	x		4.1
I-94 BL	Southwest	Kalamazoo	Kalamazoo Area Transportation Study	MDOT	I-94	Kilgore Road	x				x	x		1
W. Grand River Avenue	University	Clinton	TCRPC	MDOT	I-96	Waverly Road			x		x			3.2

ELIGIBLE CRITICAL URBAN FREIGHT CORRIDORS CONTINUED

CUFC	MDOT Region	COUNTY	MPO AREA	DESIGNATING PARTY	START	END	PHFN CONNECTIVITY	INTERSTATE CONNECTIVITY	INTERMODAL CONNECTIVITY	ALTERNATIVE ROUTE OPTION	FREIGHT GENERATOR	SIGNIFICANT FREIGHT CORRIDOR	COHS	MILES
N. Grand River Avenue	University	Ingham	TCRPC	MDOT	Waverly Road	Capitol City Boulevard			x		x			0.8
Capitol City Boulevard	University	Ingham	TCRPC	MDOT	N. Grand River Avenue	Clinton County Line			x		x			0.2
Capitol City Boulevard	University	Clinton	TCRPC	MDOT	Ingham County Line	W. Circle Drive			x		x			0.2
M-100	University	Eaton	TCRPC	MDOT	W. Eaton Highway	Winstanley Boulevard					x			0.3
Winstanley Boulevard	University	Eaton	TCRPC	MDOT	M-100	Lowes Distribution					x			0.3
Lansing Road	University	Eaton	TCRPC	MDOT	I-69	Waverly Road					x			3.7
Davis Highway	University	Eaton	TCRPC	MDOT	Guinea Road	N. Canal Road					x			1
Millet Highway	University	Eaton	TCRPC	MDOT	Guinea Road	Creyts Road					x			2
N. Canal Road	University	Eaton	TCRPC	MDOT	Davis Highway	W. Mt. Hope Highway					x			2
Creyts Road	University	Eaton	TCRPC	MDOT	Lansing Road	I-496					x			2.4
W. Mt. Hope Highway	University	Eaton	TCRPC	MDOT	N Canal Road	Lansing Road					x			2.7
S. Waverly Road	University	Eaton/ Ingham	TCRPC	MDOT	Lansing Road	I-496					x			0.4
Cedar Street	University	Ingham	TCRPC	MDOT	US-127	W. Howell Road					x			0.4
W. Howell Road	University	Ingham	TCRPC	MDOT	Cedar Street	US-127					x			0.2
Hogsback Road	University	Ingham	TCRPC	MDOT	W. Howell Road	Josephine Lane					x			0.6
Holt Road	University	Ingham	TCRPC	MDOT	Depot Street	US-127					x			1.3
Bristol Road	Bay	Genesee	Genesee County Metropolitan Planning Comission	MDOT	I-69	Van Slyke Road			x		x			2.8
S. Dix Street	Metro	Wayne	SEMCOG	SEMCOG	S. Wabash Road	Oakwood Boulevard			x		x			0.6
Oakwood Boulevard	Metro	Wayne	SEMCOG	SEMCOG	S. Dix Street	Schaefer Highway					x			0.3
Livernois Ave	Metro	Wayne	SEMCOG	SEMCOG	I-94	I-75			x		x			2.3

CUFC	MDOT Region	COUNTY	MPO AREA	DESIGNATING PARTY	START	END	PHFN CONNECTIVITY	INTERSTATE CONNECTIVITY	INTERMODAL CONNECTIVITY	ALTERNATIVE ROUTE OPTION	FREIGHT GENERATOR	SIGNIFICANT FREIGHT CORRIDOR	COHS	MILES
US-127	University	Clinton	TCRPC	MDOT	I-69	Ingham County Line						x	x	3.4
US-127	University	Ingham	TCRPC	MDOT	Clinton County Line	I-496						x	x	3.2
US-127	University	Ingham	TCRPC	MDOT	I-96	Holt Road						x	x	3.1
US-127	University	Ingham	TCRPC	MDOT	Howell Road	Barnes Road						x	x	5.3
M-40	Southwest	Allegan	Macatawa Area Coordinating Council	MDOT	US-31	52nd Street					x			3.4
I-196 BL	Grand	Ottawa	Macatawa Area Coordinating Council	MDOT	I-196	Main Street					x			0.5
Main Street	Grand	Ottawa	Macatawa Area Coordinating Council	MDOT	I-196 BL	M-121					x			0.1
M-121	Grand	Ottawa	Macatawa Area Coordinating Council	MDOT	Main Street	Felch Street					x			0.6
M-11 (28th Street)	Grand	Kent	Grand Valley Metropolitan Council	Grand Valley Metropolitan Council	US-131	Madison Avenue					x	x		1.1
Walker Avenue	Grand	Kent	Grand Valley Metropolitan Council	Grand Valley Metropolitan Council	3 Mile Road	4 Mile Road					x			1.1
3 Mile Road	Grand	Kent	Grand Valley Metropolitan Council	Grand Valley Metropolitan Council	Walker Avenue	Fruit Ridge Avenue					x			2
Fruit Ridge Avenue	Grand	Kent	Grand Valley Metropolitan Council	Grand Valley Metropolitan Council	3 Mile Road	4 Mile Road					x			1
M-21	Grand	Kent	Grand Valley Metropolitan Council	Grand Valley Metropolitan Council	I-96	Pettis Avenue					x			5.2
36th Street	Grand	Kent	Grand Valley Metropolitan Council	Grand Valley Metropolitan Council	US-131	Eastern Avenue					x			1.6
Eastern Avenue	Grand	Kent	Grand Valley Metropolitan Council	Grand Valley Metropolitan Council	36th Street	44th Street					x			1
44th Street	Grand	Kent	Grand Valley Metropolitan Council	Grand Valley Metropolitan Council	US-131	Eastern Avenue					x			1.8
Clay Avenue	Grand	Kent	Grand Valley Metropolitan Council	Grand Valley Metropolitan Council	36th Street	Terminus South of 54th Street					x			3.1
54th Street	Grand	Kent	Grand Valley Metropolitan Council	Grand Valley Metropolitan Council	Clyde Park Avenue	Clay Avenue					x			0.4
Clyde Park Avenue	Grand	Kent	Grand Valley Metropolitan Council	Grand Valley Metropolitan Council	54th Street	58th Street					x			0.6
68th Street	Grand	Kent	Grand Valley Metropolitan Council	Grand Valley Metropolitan Council	Clyde Park Avenue	US-131					x			0.3

ELIGIBLE CRITICAL URBAN FREIGHT CORRIDORS CONTINUED

CUFC	MDOT Region	COUNTY	MPO AREA	DESIGNATING PARTY	START	END	PHFN CONNECTIVITY	INTERSTATE CONNECTIVITY	INTERMODAL CONNECTIVITY	ALTERNATIVE ROUTE OPTION	FREIGHT GENERATOR	SIGNIFICANT FREIGHT CORRIDOR	COHS	MILES
Clyde Park Avenue	Grand	Kent	Grand Valley Metropolitan Council	Grand Valley Metropolitan Council	68th Street	84th Street					x			2
84th Street	Grand	Kent	Grand Valley Metropolitan Council	Grand Valley Metropolitan Council	Clyde Park Avenue	US-131					x			0.7
76th Street	Grand	Kent	Grand Valley Metropolitan Council	Grand Valley Metropolitan Council	Clyde Park Avenue	US-131					x			0.6
Madison Avenue/ Roger Chaffee Boulevard	Grand	Kent	Grand Valley Metropolitan Council	Grand Valley Metropolitan Council	M-11 (28th Street)	44th Street					x			2.1
Hall Street	Grand	Kent	Grand Valley Metropolitan Council	Grand Valley Metropolitan Council	Freeman Street	US-131					x			1
Freeman Street	Grand	Kent	Grand Valley Metropolitan Council	Grand Valley Metropolitan Council	Railroad Tracks	Hall Street					x			0.2
M-11 (28th Street)	Grand	Kent	Grand Valley Metropolitan Council	Grand Valley Metropolitan Council	I-196	Chicago Drive					x			0.8
Chicago Drive	Grand	Kent	Grand Valley Metropolitan Council	Grand Valley Metropolitan Council		Godfrey Avenue					x			3.5
Godfrey Avenue	Grand	Kent	Grand Valley Metropolitan Council	Grand Valley Metropolitan Council		Hall Street					x			0.6
Patterson Avenue	Grand	Kent	Grand Valley Metropolitan Council	Grand Valley Metropolitan Council	36th Street	M-37					x			2.6
52nd Street	Grand	Kent	Grand Valley Metropolitan Council	Grand Valley Metropolitan Council	M-37	Kraft Avenue					x			1.3
44th Street	Grand	Kent	Grand Valley Metropolitan Council	Grand Valley Metropolitan Council	M-37	Patterson Avenue					x			0.9
36th Street	Grand	Kent	Grand Valley Metropolitan Council	Grand Valley Metropolitan Council	M-37	I-96 ramps					x			2.8
M-37	Grand	Kent	Grand Valley Metropolitan Council	Grand Valley Metropolitan Council	36th Street	M-6					x			3.7
Turner Street	Grand	Kent	Grand Valley Metropolitan Council	Grand Valley Metropolitan Council	West River Drive	Ann Street					x			0.9
100th Street	Grand	Kent	Grand Valley Metropolitan Council	Grand Valley Metropolitan Council	S. Kent Drive	Division Avenue					x			0.4
													Total Eligible Miles	**341.6**

APPENDIX A CRITICAL URBAN AND RURAL FREIGHT CORRIDORS

COLUMN	DESCRIPTION
MDOT REGION	MDOT region where corridor is located
COUNTY	Michigan county where corridor is located
MPO AREA	The MPO area in which the corridor is located (if applicable) and the party consulted with
DESIGNATING PARTY	Specifies MPO or MDOT designation
CUFC	Critical CRFC Freight Corridor designated
START	Starting point of the CRFC
END	Ending point of the CRFC
AADT	Rural principal arterial roadwaya minimum of 25 percent of the annual average daily traffic of the road measured in passenger vehicle equivalent (PVE) units from trucks (YES or NO)
ENERGY PRODUCTION	Provides access to energy exploration, development, installation, or production areas (YES or NO)
UNIT SIZE/CARGO TONS	Connects PHFS or Interstate System to facilities that handle more than 50,000 20-foot equivalent units per year or 500,000 tons per year of bulk commodities (YES or NO)
AGRICULTURAL CONNECTION	Provides access to a grain elevator, an agricultural facility, a mining facility, a forestry facility or an intermodal facility (YES or NO)
PORT OF ENTRY CONNECTION	Connects to an international port of entry (YES or NO)
FREIGHT FACILITY ACCESS	Provides access to significant air, rail, water, or other freight facilities (YES or NO)
SIGNIFICANT FREIGHT CORRIDOR	Is important to the to improving the efficient movement of freight within the state (YES or NO)
COHS	MDOT Statewide and National Corridor of High Significance (COHS) (YES or NO)
MILES	Length of the corridor in miles

ELIGIBLE CRITICAL RURAL FREIGHT CORRIDORS

CRFC	MDOT REGION	COUNTY	MPO AREA	DESIGNATING PARTY	START	END	AADT	ENERGY PRODUCTION	UNIT SIZE/CARGO TONS	AGRICULTURAL CONNECTION	PORT OF ENTRY CONNECTION	FREIGHT FACILITY ACCESS	SIGNIFICANT FREIGHT CORRIDOR	COHS	MILES
US-131	Southwest	St. Joseph	N/A	MDOT	Michigan and Indiana Border	Kalamazoo County Line	x		x				x	x	22.3
US-131	Southwest	Kalamazoo	Kalamazoo Area Transportation Study	MDOT	Kalamazoo County Line	South Street			x				x	x	2.8
US-131	Southwest	Kalamazoo	Kalamazoo Area Transportation Study	MDOT	US-131 BR	Allegan County Line	x		x				x	x	6.3
US-131	Southwest	Kent	N/A	MDOT	Allegan County Line	Kent County Line			x				x	x	24.2
US-131	Grand	Kent	Grand Valley Metro Council	MDOT	Kent County Line	100th Street			x				x	x	1
US-131	Grand	Kent	Grand Valley Metro Council	MDOT	17 Mile Road	Montcalm County Line			x				x	x	5.7
US-131	Grand	Montcalm	N/A	MDOT	Montcalm County Line	Edgar Road			x				x	x	9.9
US-31	Southwest	Berrien	Southwest Michigan Planning Comission	MDOT	Michigan and Indiana Border	1 Mile North of Matthew Road			x				x	x	9.8
US-31	Southwest	Berrien	N/A	MDOT	1 Mile North of Matthew Road	St. Joseph River			x				x	x	7.2
US-31	Southwest	Berrien	Southwest Michigan Planning Comission	MDOT	St. Joseph River	Napier Road			x				x	x	4.2
Napier Road	Southwest	Berrien	Southwest Michigan Planning Comission	MDOT	US-31	Yore Road			x				x	x	0.7
US-31	Grand	Ottawa	Macatawa Area Coordinating Council	MDOT	Barry Street	Fillmore Street			x				x	x	6.1
US-31	Grand	Ottawa	West Michigan Shoreline Regional Development Commission	MDOT	Fillmore Street	Lincoln Street			x				x	x	4.5

ELIGIBLE CRITICAL RURAL FREIGHT CORRIDORS CONTINUED

CRFC	MDOT REGION	COUNTY	MPO AREA	DESIGNATING PARTY	START	END	AADT	ENERGY PRODUCTION	UNIT SIZE/CARGO TONS	AGRICULTURAL CONNECTION	PORT OF ENTRY CONNECTION	FREIGHT FACILITY ACCESS	SIGNIFICANT FREIGHT CORRIDOR	COHS	MILES
US-23	University	Monroe	SEMCOG	MDOT	Michigan and Ohio Border	Washtenaw County Line	x		x				x	x	25.5
US-23	University	Washtenaw	SEMCOG	MDOT	Washtenaw County Line	Judd Road	x		x				x	x	4.1
US-23	University	Washtenaw	SEMCOG	MDOT	M-14	5 Mile Road	x		x				x	x	5.1
US-23	University	Livingston	SEMCOG	MDOT	Crouse Road	Foley Road	x		x				x	x	7
M-14	University	Washtenaw	SEMCOG	MDOT	M-153	Wayne County Line			x				x	x	5.3
US-127	University	Jackson	Region 2 Planning Commission	MDOT	Baseline Road	Henry Road							x	x	5
US-127	University	Jackson	Region 2 Planning Commission	MDOT	Hart Road	Vicary Road							x	x	7.2
Marine City Highway	Bay	St. Clair	SEMCOG	MDOT	Macomb County Line	King Road					x		x		11.2
Telegraph Road	University	Monroe	SEMCOG	MDOT	Michigan and Ohio Border	3rd Street							x		9
Telegraph Road	University	Monroe	SEMCOG	MDOT	I-275	Carleton Rockwood Road							x		3.7
US-127 BR	University	Clinton	TCRPC	MDOT	US-127	W. Walker Road						x			1.5
Tolles Drive	University	Clinton	TCRPC	MDOT	US-127 BR	Technical Drive						X			0.4
Technical Drive	University	Clinton	TCRPC	MDOT	Tolles Drive	Technical Drive Termini						X			0.1
W. Walker Road	University	Clinton	TCRPC	MDOT	US-127 BR	Zeeb Drive						X			
M-100	University	Clinton	TCRPC	MDOT	I-96	W. Eaton Highway						x			2.1
S. Cochran Road	University	Eaton	TCRPC	MDOT	I-69	M-50						X			2.6
W Shepherd Street	University	Eaton	TCRPC	MDOT	M-50	Reynolds Road						X			0.9
Reynolds Road	University	Eaton	TCRPC	MDOT	W. Shepherd Street	Reynolds Road Termini						X			0.5

ELIGIBLE CRITICAL RURAL FREIGHT CORRIDORS CONTINUED

CRFC	MDOT REGION	COUNTY	MPO AREA	DESIGNATING PARTY	START	END	AADT	ENERGY PRODUCTION	UNIT SIZE/CARGO TONS	AGRICULTURAL CONNECTION	PORT OF ENTRY CONNECTION	FREIGHT FACILITY ACCESS	SIGNIFICANT FREIGHT CORRIDOR	COHS	MILES
Lansing Road	University	Eaton	TCRPC	MDOT	I-69	Packard Highway						X			0.8
Packard Highway	University	Eaton	TCRPC	MDOT	M-50	Lansing Road						X			1.4
M-52	University	Ingham	TCRPC	MDOT	I-96	E. Grand River Avenue				x		X			0.7
US-127	University	Clinton	TCRPC	MDOT	US-127 BR	I-69							x	x	17
US-127	University	Ingham	TCRPC	MDOT	Holt Road	Howell Road							x	x	3.1
US-127	University	Ingham	TCRPC	MDOT	Barnes Road	Jackson County Line							x	x	7.1
M-40	Southwest	Ottawa	Macatawa Area Coordinating Council	MDOT	52nd Steet	136th Steet				x		x			4
														Total Eligible Miles	**230.2**

MICHIGAN
FREIGHT PLAN

Supplement to the 2040 MI Transportation Plan