



MICHIGAN DEPARTMENT OF TRANSPORTATION



Key Findings



MI Transportation Plan Moving Michigan Forward

2005-2030 State Long-Range Transportation Plan



MI Transportation

MICHIGAN LONG-RANGE TRANSPORTATION PLAN



Prepared for
**The Michigan Department
of Transportation**

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March 2007



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Executive Summary

MI Transportation Plan is a comprehensive, forward-looking approach to addressing the state of Michigan's transportation needs to the year 2030. Significant effort went into the development of *MI Transportation Plan*, culminating in the final 2030 State Long-Range Transportation Plan document. "*MI Transportation Plan: Moving Michigan Forward*" sets forth the decision principles that will be the foundation of our transportation investments, providing strategies that will presents options to achieve Michigan's goals for the future.

Significant effort went into the development of the plan. Seventeen technical reports were created, representing hundreds of pages of data and analysis examining issues for every mode of transportation, as well as important related topics such as the environment, land use, and economy. Dozens of public meetings were held to obtain customer and stakeholder input. Surveys were conducted, and future trends were examined to gain a better understanding of the state of transportation in Michigan today in addition to where transportation needs to go to support the Michigan of tomorrow. This *Key Findings* report is a synthesis of this endeavor.

"*MI Transportation Plan: Moving Michigan Forward*" grew out of work that began in 2003 with the initiation of a statewide project called "The Transportation Summit: Connecting Michigan." This effort involved hundreds of Michigan residents, dozens of action team meetings, public forums, and two large-scale summit meetings, held in December 2003 and again in December 2004. The summit process resulted in a long-range vision for transportation in Michigan:

"Michigan will lead the 21st century transportation revolution as it led innovation in the 20th century. We will move people and goods with a safe, integrated, and efficient transportation system that embraces all modes, is equitably and adequately funded, and socially and environmentally responsible. Michigan's transportation community will work together to ensure that resources are in place to deliver the system."

To support the development of the 2030 State Long-Range Transportation Plan, the Michigan Department of Transportation (MDOT) wanted to expand this conceptual vision into one that would provide more detail and, therefore, could be used to better guide plans and investments

in the future. Its key elements and findings, as embodied in the preferred vision of the Michigan transportation system, follow.

Michigan's 2030 integrated transportation system will be the foundation of the state's economic vitality and will help sustain the quality of life for its residents. Transportation providers throughout the state will work together to address the system's needs holistically. Michigan's future transportation system will be:

Purposeful: Michigan's 2030 integrated transportation system will be the foundation of the state's economic vitality and will help sustain the quality of life for its residents.

Prioritized: Capacity improvements will be needed, but the first priority will be physical or technological improvements to enhance efficiency, mobility, and access.

Coordinated: All transportation providers will work together to address the system's needs holistically. All modes will be maintained, preserved and protected as one system, since they are some of the state's most important physical assets.

Safe: Safety will be a primary goal. It will be addressed, as each improvement is planned and implemented. Personal and systemwide security will be enhanced, including border security.

Advanced: MDOT will embrace technology and technological development. The department will use innovation in every aspect of what it builds, how it builds, and in every service that is provided.

Integrated: System integration will be achieved for both passenger and freight movement through improvement in modal services and effective intermodal connections. The system will be responsive to the public's demand for more transit, bicycle, and pedestrian choices. The need for freight and passenger movement will be balanced, and the system will accommodate both without compromising goals for safety or economic competitiveness.

Appropriate to the Setting: Transportation will not only be integrated between modes, it will also be integrated with land use, economic, and environmental systems. Transportation solutions will be regionally sensitive, sustainable, and energy efficient. Infrastructure improvements will be tailored to the community, natural settings and will be planned cooperatively so customers and partners are satisfied with the results.

Flexibly Funded: Transportation financing will be diversified to include new methods and techniques, but public funds will remain dedicated to transportation purposes. Funding will be flexible so that money can be allocated to meet the highest priority user needs.

Responsive: MDOT will be an open and flexible organization, responsive to customer needs and with a transparent, accountable decision-making process. MDOT will be proactive and adaptable, able to identify and respond to change as needed.

This *MI Transportation Plan* document provides the decision principles to achieving this vision for Michigan's transportation system. The plan encapsulates an understanding of:

- Each component of Michigan's transportation system;
- How system components are integrated to serve the public;
- Anticipated changes in the economic, human, and physical environment in which the system operates;
- Long-term performance goals, objectives and measure for the system;
- Barriers and opportunities and other issues related to system performance to the year 2030;
- Expected system conditions and performance in the year 2030; and
- Recommended policy, planning, and investment strategies for managing the system.

Goals

After extensive public involvement and analysis to develop a more specific set of vision statements, four goals were identified to help make the Preferred Public Vision a reality:

- **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.

Objectives under each goal area are associated with three categories: 1) Integration, 2) Economic Benefit, and 3) Quality of Life. Each provides a tight link between *MI Transportation Plan* and MDOT's Mission statement:

Providing the highest quality integrated transportation services for economic benefit and improved quality of life.

Technical Reports

Linked to each element listed above are the *MI Transportation Plan* technical reports (TR). The TRs are individual analyses ranging from travel characteristics to modal programs to socioeconomic conditions to safety/security, and are summarized in this plan document. They are snapshots of conditions that provide the platform from which all analysis springs, and are



the core work that is the technical foundation for *MI Transportation Plan*. The technical reports range from 60 to 200 pages each, and provide an in-depth analysis using MDOT's latest data, analytical tools, and professional insight. They provide a resource for MDOT for years to come, and represent a library of transportation reference material for Michigan, in essence, "Michigan's Transportation Book."

Key Findings

The demographics in Michigan will be changing in the next 25 years. These changes will have an impact on decision-making for transportation planning, transportation finance, and transportation facilities design.

- From 1980 to 2005, the state population grew at an average annual rate of 0.4 percent; forecast show that 96 percent (1.16 million) of the 1.2 million-population increase (2005-2030) will be in the 65 and older age group during from 2005 to 2030.
- The national shift from a manufacturing economy to an increasingly service-oriented economy will accentuate the role of non-basic jobs, markets, and activities in Michigan for 2005 to 2030.

Michigan's transportation system provides the backbone for all economic activities within the state. The transportation system, including roads, transit, non-motorized facilities and intermodal facilities, plays an integral role in supporting the state and region's economy, along with the quality of life for residents. Transportation investments are part of the state's overall economic development strategy. Both the United States Department of Transportation (US DOT) and MDOT identify the link between transportation and the economy as their top priority.

- In the last decade, trade between the US and Canada has increased over 75 percent, and trade between Michigan and Canada was up 32 percent. The province of Ontario imported nearly 97 percent of Michigan's total exports to Canada in 2002. These figures show that US-Canada trade is ever increasing, and that Michigan is at the forefront.

Several long-term trends affect Michigan's economy and transportation system. These trends will change Michigan's economic structure and transportation patterns.

- The decline of automobile and other manufacturing.
- Aging of the state's population.
- Workforce availability and migration and population growth.

Data from the MI Travel Counts program undertaken by MDOT in 2004/2005 is the foundation of the travel characteristics analysis.

- Work trips account for the largest share of Michigan's trips.

- The most frequent daily trip pattern for men is home-work-home, while for women it is home-other-home. "Other" includes pickup/drop-off/accompany trips, which accounts for the largest percent of trip purposes for women.
- Friday is the busiest travel day in Michigan.
- Peak travel times are for trips departing between 7:00 a.m. and 9:00 a.m. and between 3:00 p.m. and 6:00 p.m.
- Air transportation accounts for a larger share of long-distance business trips than for other purposes.
- The non-driving population and households without vehicles available still predominantly rely on private vehicles to access activities, but they tend to utilize walk and transit more than the driving population and households with autos available.

Michigan has been an important freight gateway to the US from Canada for many years, with some of the busiest border crossings. Intermodal freight movements, with shipment of containerized goods by water, train and truck, are increasing. Cost-effective, time-sensitive transportation gives a competitive advantage to manufacturing and service-based industries. Michigan is in a unique position to expand and capitalize on its status as a global gateway. For that reason, the safe, reliable movement of freight on the state's key modal corridors is crucial to Michigan's future economic vitality.

- The safe, reliable movement of freight on the state's highway corridors and intermodal connections are keys to Michigan's future economic vitality and quality of life.
- In 2003, Michigan's multi-modal transportation system facilitated the movement of approximately 670 million tons of freight with an estimated value exceeding \$1 trillion.
- Trucking accounts for 70 percent of the goods moving in Michigan by weight, followed by rail (18 percent) and water (12 percent).
- Air cargo, while often-high value comprises less than one percent of Michigan freight movements by weight.
- Commodity movements measured by value further increase the importance of highways as the underpinning of Michigan's commerce, as the truck modal share has increased to 86 percent.

In order to support Michigan's economic vitality, the transportation system must ensure the aviation system provides seamless and complete access to key activities. The provision of high value economic services, business hospitality, recreation, and just in time production (and other supply chain activities) are directly supported by Michigan's aviation system.

- Michigan's aviation system in 2005 served over 40 million passengers on scheduled air carrier aircraft at 17 commercial service airports.

- Over 3.5 million operations (takeoffs and landings) were made at Michigan's 236 public-use airports in 2005.

MI Transportation Plan focuses on the state trunkline highways managed by MDOT. It is very important to know that trunkline highways are not just road pavement and bridges. They also include non-pavement infrastructure such as signs, pavement marking, guardrails, signals, safety, drainage structures, weigh stations, non-motorized facilities, lighting, and pump houses. They are an integral part of the system MDOT manages.

- Overall pavement conditions on the statewide trunkline system have steadily improved in the last 10 years, from 64-percent good in 1996 to 86-percent good in 2005.
- MDOT has reached the pavement non-freeway goal of 85-percent good (two years early). On the freeway network, the system has steadily improved to reach a condition of 88-percent good, while MDOT continues to work toward achieving the goal of improving the network to 95-percent good by 2007.
- Overall conditions on the statewide trunkline bridges have progressively improved since 1998, from 78-percent good in 1998 to 84-percent good in 2005.
- In 2003, MDOT achieved the bridge condition goal of 85-percent good or fair on the non-freeway network, and attained 84-percent good or fair on the freeway network. MDOT continues to work toward achieving the bridge goals by 2008.

Public transit in Michigan is a compilation of local public and non-profit service providers. Service providers range from multi-county transportation authorities with independent boards and local taxing authority to transit agencies or departments that serve a single county or city to private non-profit agencies that provide targeted service.

- Michigan has 79 local public transportation systems and 40 specialized transit service providers. These 79 providers plus their subcontractors is the backbone of Michigan's public transit network.
- Michigan is served by one or both of these services in all 83 counties.
- Although all Michigan counties have some public transportation, there are still gaps in service.

The state's ability to plan for intercity bus service is limited since much of the service is determined by decisions within the private marketplace.

- For Intercity Rail ridership between October 1, 2000 and September 30, 2005, the Blue Water (Port Huron-Chicago) transported 483,726 passengers, operated 1.2 million train-miles; the Pere Marquette (Grand Rapids – Chicago) transported 376,593 passengers and operated 642,400 train-miles, and on the two state-supported routes combined, Amtrak transported 860,319 passengers, and operated 1.8 million train-miles.

- For Intercity Bus ridership, between October 1, 2000, and September 30, 2005, for state-subsidized routes, Greyhound Lines transported 285,752 passengers, operating in excess of 4.4 million bus-miles over three Upper Peninsula routes. For this same period, Indian Trails transported 195,596 passengers, operating in excess of 2.3 million bus-miles over two Lower Peninsula routes. Overall, the five routes carried 481,348 passengers in excess of 6.7 million miles.

The operational performance of the system pertains to the mobility provided by the system in all of its components to connect users with activities. The mobility available on the highway and transit components of Michigan's transportation system is two key aspects of operational performance.

- Congestion is getting worse with time, with 28 percent of state trunkline miles projected to be at or approaching congested conditions by 2030.
- While 28 percent of the mileage is projected to be at or approaching congestion 55 percent of the vehicle miles of travel (VMT) and 45 percent of the commercial-vehicle miles traveled (CVMT) is associated with these roads.
- From 2004 to 2030 there is projected to be a 145-percent increase in congested miles, a 257-percent increase in congested VMT, and a 361-percent increase in congested CVMT.

Funding

Projected funding is not sufficient to sustain Michigan's transportation system, even at current levels of service. Federal funding for improvements to the surface transportation system is largely derived from excise taxes levied on the sale of motor fuel, large trucks and trailers, truck tires and the use of heavy vehicles. These taxes are deposited in the Highway Trust Fund (HTF). The funds within the HTF are distributed to federal programs and to the states by formulas established in the authorizing legislation.

- Federal aid accounted for approximately 37 percent of all MDOT revenues in FY 2005.
- In 2005, the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) reauthorization was signed into law authorizing \$6.5 billion in apportioned funding for Michigan's transportation system for FY 2005 through 2009.
- SAFETEA-LU increased Michigan's rate of return on every dollar sent to the federal Highway Trust Fund Highway Account from 90.5 cents to 92 cents.
- SAFETEA-LU contained 171 earmarked transportation projects, with a value of \$643 million. SAFETEA-LU earmarks provided financial support for intercity passenger, rail, and aviation projects and programs
- SAFETEA-LU contained about \$120 million in transit assistance for Michigan.

Sixty-two percent of MDOT's funding in 2005 was generated at the state level and managed through the Michigan Transportation Fund (MTF). The MTF is the distribution fund for transportation revenues. Public Act 51 of 1951 known as "Act 51," mandates how these funds are distributed and spent. The two main sources of state funding are vehicle registration taxes and motor fuel taxes.

- Michigan's current gasoline tax rate is 19 cents per gallon. This tax is fixed per gallon of gasoline sold and is independent of the price of gasoline. The current diesel fuel tax rate is 15 cents per gallon.
- Act 51 mandates how transportation funds are distributed between units of government or between the state, cities and counties and the order in which programs receive funding.
- The State Trunkline Fund (STF) receives 39.1 percent of the remainder of the MTF after several appropriations are made directly to specific programs and jurisdictions
- The Comprehensive Transportation Fund (CTF) receives up to 10 percent of the MTF, but only after the specific statutory deductions is completed. The resulting share for CTF is a little over eight percent.

Fiscal Year 2005 revenues and past trends by mode were used as a basis for future funding projections. State and federal forecasted transportation revenues by mode available in the year 2030:

- Federal highway revenues are expected to increase at an annual rate of 4.9 percent.
- State highway revenues (excluding bond revenues) are expected to increase at an annual rate of four percent.
- Federal transit and intercity/freight revenues are expected to increase at an annual rate of 4.3 percent.
- State transit and intercity/freight revenues are expected to increase at an annual rate of three percent.

An assessment of state transportation revenues, needs and gaps under MDOT's current revenue and investment trends was conducted. The analysis shows:

- The state has \$81 billion (in Base Year 2005 dollars, or \$2005) in transportation needs over the life of the plan.
- The total revenues available over the life of the plan is estimated at \$37 billion (in Base Year 2005 dollars, or \$2005), leaving a gap of \$44 billion.
- The increases in base case revenues in all categories are not keeping up with the escalation in costs (assumed five percent) over the 25-year period, thus there is a net loss in buying power.

- The additional revenues needed over the life of the plan just to keep the buying power of the base year are \$6.33 billion.

Implementation of MI Transportation Plan

The Preferred Vision for an integrated transportation system to serve users will be achieved by making planning decisions consistent with systems integration. At the highest level, the first decision pertains to the investment of statewide revenues into funding categories and programs that maybe leveraged to support integrated projects and programs. Key principles for statewide investment decisions are:

- When improving a system component, consider and make allowances for improvements that may be needed in integrated components.
- Seek investments that leverage funding, remove barriers to connectivity, realize opportunities to improve connectivity and enhance integration for multiple components.
- Assess the complexity of user needs and activities when conducting corridor studies.
- Allow greater flexibility and innovation in funding for needs that are more complex.
- Assess how connections to and within complex activity centers can be improved for overall corridor performance.
- Recognize that investments in one mode on a complex corridor or in an activity center are likely to generate needs or benefits on other modes.
- Coordinate with partners and stakeholders to understand corridor complexity, and maximize financial, and performance leverage for other modes or jurisdictions.
- Consider linkages between land use and performance of system components.

Ultimately, Michigan will achieve a seamless, integrated system one project at a time and one decision at a time. The ultimate beneficiaries of an integrated system are Michigan's people and businesses, integration will empower those who use the transportation to achieve their human and economic potential with greater freedom from the barriers to safety, mobility, and sustainability.

Implementation Strategy

Achieving the Preferred Vision involves a systems planning approach. The implementation strategy for *MI Transportation Plan* is to manage MDOT's transportation assets as a system of integrated, multi-modal corridors. *MI Transportation Plan* includes a multi-modal corridor-based analysis, identifying 19 Corridors of Highest Significance. The specific rationale of how corridors are defined and identified is given in the *Corridors and International Borders Report*. These multi-modal corridors are defined in terms of their overall value to Michigan's economy. Each corridor is evaluated with respect to its travel conditions and needs and its unique

performance barriers and opportunities. Objectives are offered for each corridor congruent with input from the public during the development of *MI Transportation Plan*. Broad, policy-based strategies are provided for each multi-modal corridor to take advantage of economic opportunities or address transportation barriers and gaps on the corridors.

MI Transportation Plan's Corridors of Highest Significance are defined as:

An integrated, multi-modal system of transportation infrastructure along geographic corridors that provide 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.

MI Transportation Plan's Corridors of Highest Significance are not ranked but are defined based on the type and amount of services accessed. The figure below illustrates the corridors geographically.



Source: Michigan Department of Transportation Statewide and Urban Travel Analysis Section

MDOT has taken a corridor approach to its long-range transportation planning process because it provides a method to integrate all modes of transportation with the specific and unique needs, the economic condition, and goals of each sub-state region. Specifically, this corridor approach:

- Focuses on identifying an integrated multi-modal system of highly significant corridors within Michigan;
- Focuses on evaluating and maximizing the mobility and connectivity among these corridors;
- Facilitates evaluating and making focused, multi-modal strategic recommendations targeted to the unique conditions and transportation needs of each corridor, economic sector, and sub-state region (specific strategies and recommendations can be developed and applied to regional priorities, or economic sectors);
- Facilitates coordination with MPOs, economic regions, and MDOT regions;
- Presents recommendations that can comprehensively address multiple needs at a single location;
- Provides consistency between transportation improvements and planned state and local growth and economic development patterns;
- Sets the direction for modal policies to ensure integration; and
- Produces corridor specific strategies that:
 - _ Include capital, operational, and management investment procedures; and
 - _ Bridge the gap between policy and strategy and lead to implementation.

We heard from our Economic Advisory Group, stakeholders and the public that MDOT must develop and support a multi-modal transportation system that provides a balance between urban/rural, passenger/freight, residents/tourists, technology/agriculture, transit/highway, and community decision-making/need, as well as to maximize the use of non-motorized transportation opportunities. Corridor-focused analyses can lead to strategies that achieve this balance. Delivering an integrated system depends on corridor management plans that are both multi-jurisdictional and multi-modal in their focus.



Chapter 1

Introduction to MI Transportation Plan

MI Transportation Plan is a comprehensive, forward-looking approach to addressing the state of Michigan's transportation needs to the year 2030. Significant effort went into the development of *MI Transportation Plan*, culminating in the final 2030 State Long-Range Transportation Plan document. "*MI Transportation Plan: Moving Michigan Forward*" sets forth the decision principles that will be the foundation of our transportation investments, providing strategies that will presents options to achieve Michigan's goals for the future.

Significant effort went into the development of the plan. Seventeen technical reports were created, representing hundreds of pages of data and analysis examining issues for every mode of transportation, as well as important related topics such as the environment, land use, and economy. Dozens of public meetings were held to obtain customer and stakeholder input. Surveys were conducted, and future trends were examined to better understand not just the state of transportation in Michigan today, but where transportation needs to go to support the Michigan of tomorrow. This *Key Findings* report is a synthesis of this endeavor.

Chapter 2 provides a snapshot of the diverse components that make up the multi-modal transportation system in Michigan.

Chapter 3 provides the Preferred Vision for 2030, which contains the common themes of what the transportation system should look like in 2030, reflecting what we have heard throughout this process from the public, stakeholders, and MDOT.

Chapter 4 "sets the table" for transportation in Michigan by providing snapshots of different aspects of Michigan's transportation system. These snapshots are drawn from the technical reports prepared for *MI Transportation Plan*.

Chapter 5 provides the analyses of the modal needs, which are based on performance deficiencies, where performance is set by the performance standards that will support the Preferred Vision.

Chapter 6 discusses the concepts and definitions of System Integration, and how it has been applied in developing the Plan.

Chapter 7 compares the needs of the 24 transportation categories with likely available funds to meet those needs. The financial and systems “gaps” are summarized, and three investment strategies are provided as a means to address the funding gap.

Chapter 8 lists strategies, policies, rule/law changes, and specific implementation actions.

The implementation section, **Chapter 9**, describes the development of the Borders and Corridors effort and the hierarchy of the corridors. It describes steps and specific actions that will be taken to implement the Plan.



Chapter 2

Summary of Transportation Assets

Our multi-modal transportation system is crucial to our state economy. **Table 1** and **Figures 1 through 8** provide a snapshot of the diverse components that make up that system. While MDOT does not own all of these assets, we can exert varying degrees of influence over the system as a whole.

Table 1: Summary of Michigan’s Transportation Assets

9,695	Miles of State Highways with 4,413 Bridges Serving 83 Counties
109,874	Miles of County Roads and Municipal Streets, with 6,398 Bridges
217	Carpool Parking Lots totaling 8,292 Parking Spaces
202	Miles of (ITS) Intelligent Transportation System Infrastructure along state highways
236	Public Use Airports
1,428	Non-motorized “Rails-to-Trails” Miles Plus Thousands of Miles of Bike Lanes along Roadways
209	Licensed Intercity/Charter Bus Companies
78	Local Public Transportation Systems
40	Specialized Transportation Services – Primarily for elderly and disabled persons
148	MDOT-sponsored MichiVans – Commuter Vanpools
21	Ferry Service Routes
40	Commercial Cargo Ports
50	Smaller Ports with Other Commercial Activities
27	Railroads Operating on approximately 3,700 Route Miles of Track – Includes 521 Route Miles of Passenger Rail Route Usage

Source: MDOT 2005 Data

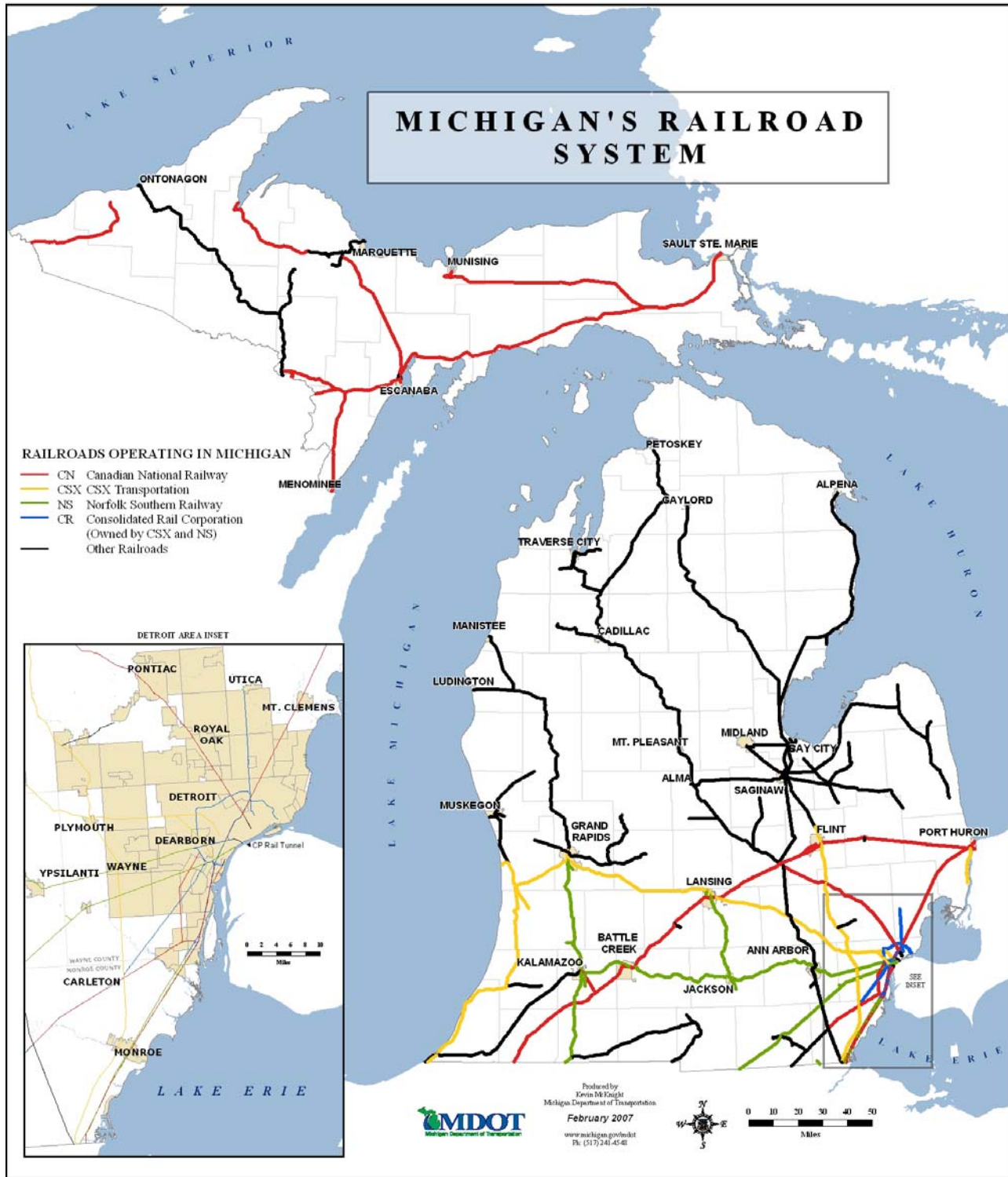
MDOT has direct jurisdiction over some of these assets. We provide funding to other governmental agencies, which have assets under their own jurisdiction. We also have regulatory authority in certain areas. Finally, in *MI Transportation Plan*, we provide policy direction for all of our public and private transportation system partners.

Figure 1: Michigan's State Trunkline System



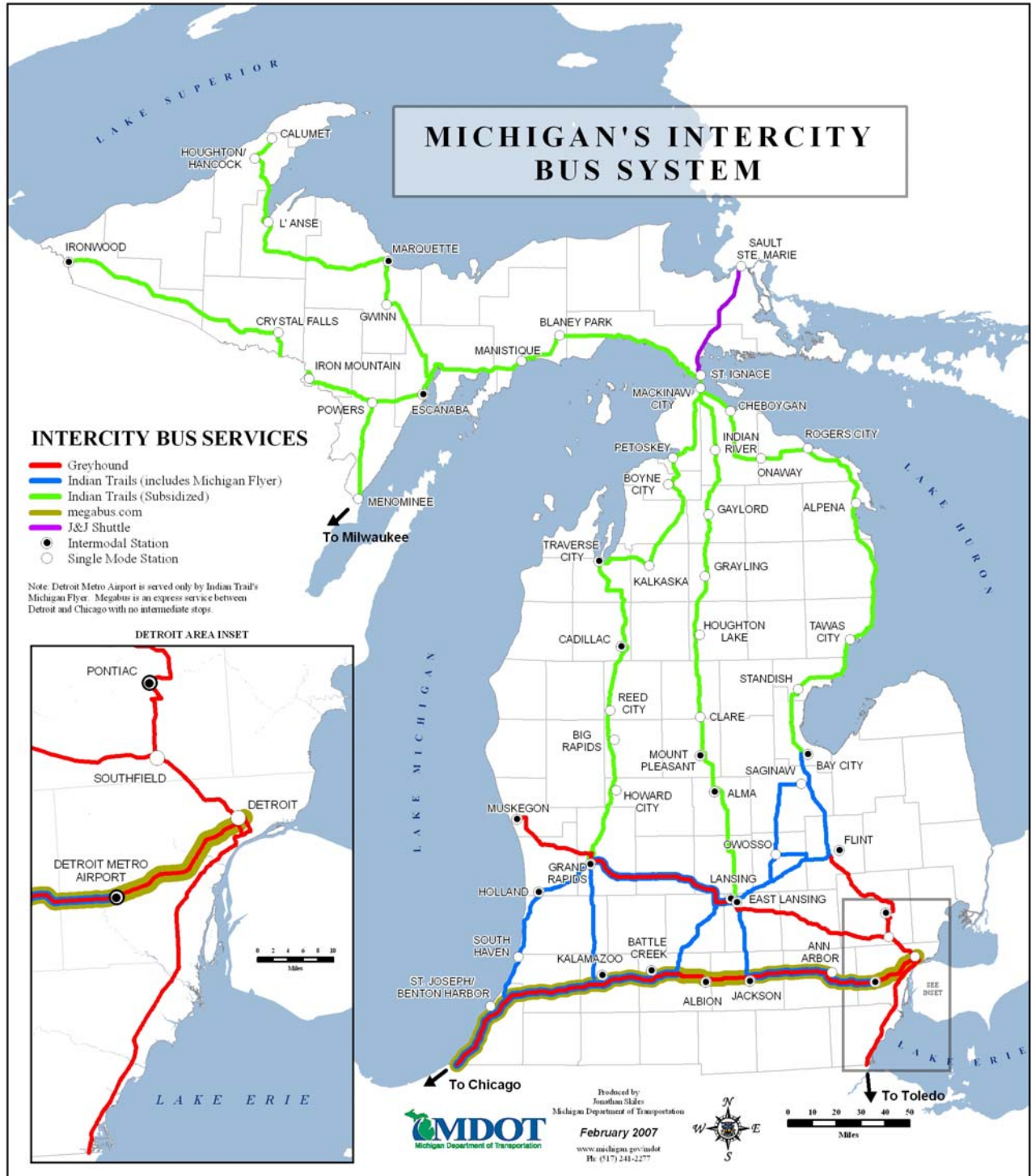
Source: Michigan Department of Transportation

Figure 2: Michigan's Railroad System



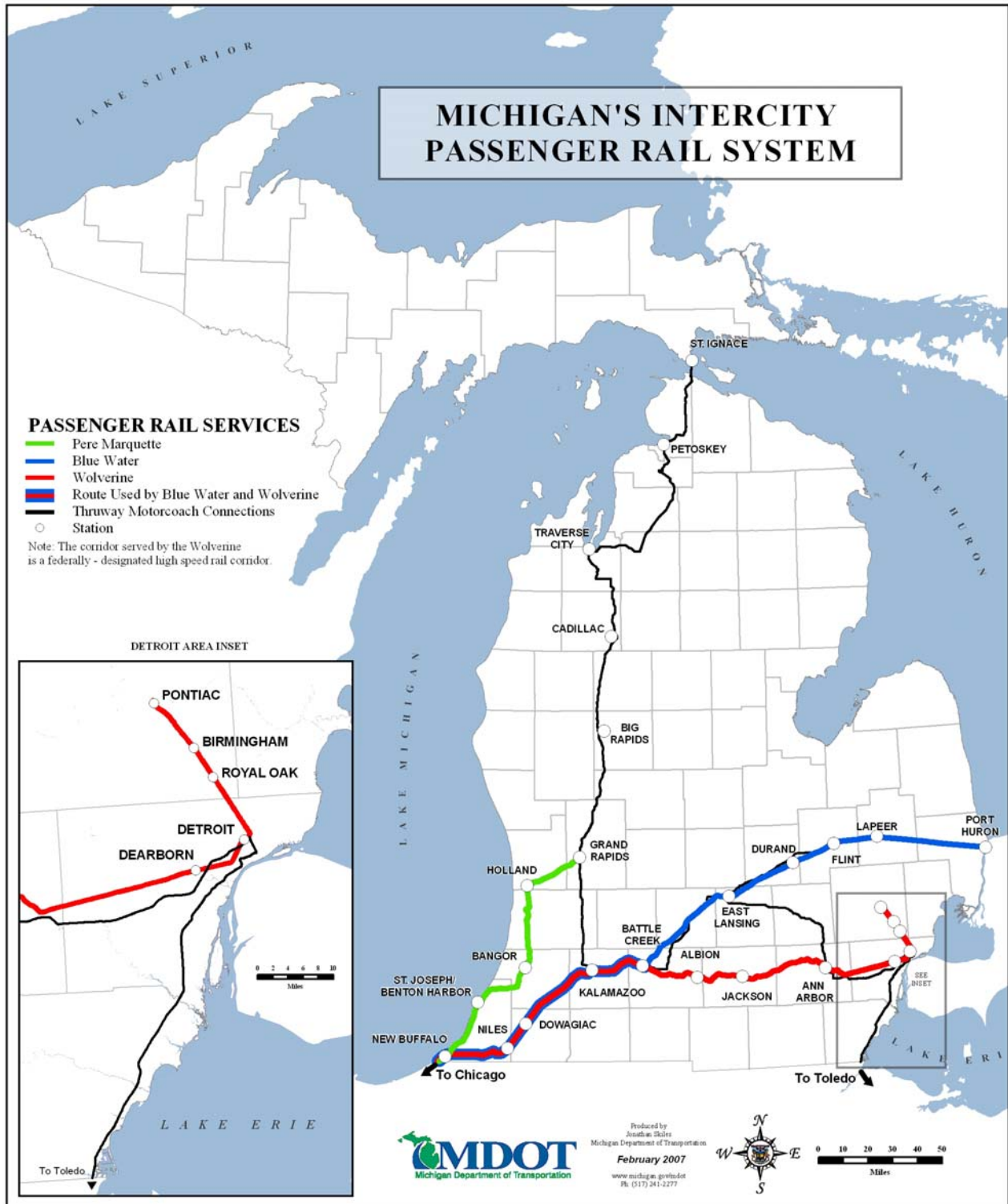
Source: Michigan Department of Transportation

Figure 3: Michigan's Intercity Bus System



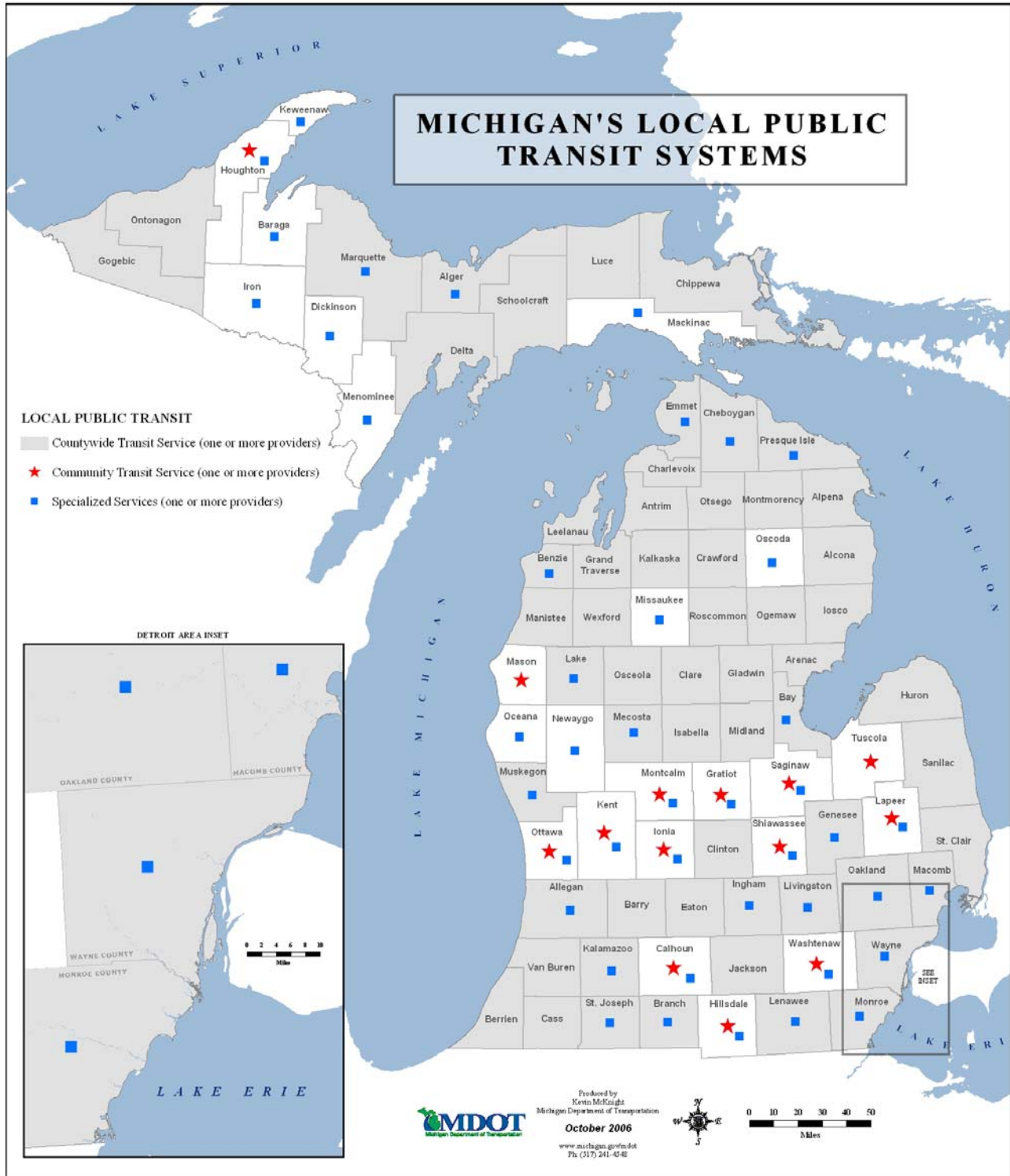
Source: Michigan Department of Transportation

Figure 4: Michigan's Intercity Passenger Rail System



Source: Michigan Department of Transportation

Figure 5: Michigan's Local Public Transit Services



Source: Michigan Department of Transportation

Figure 6: Michigan's Carpool Lots



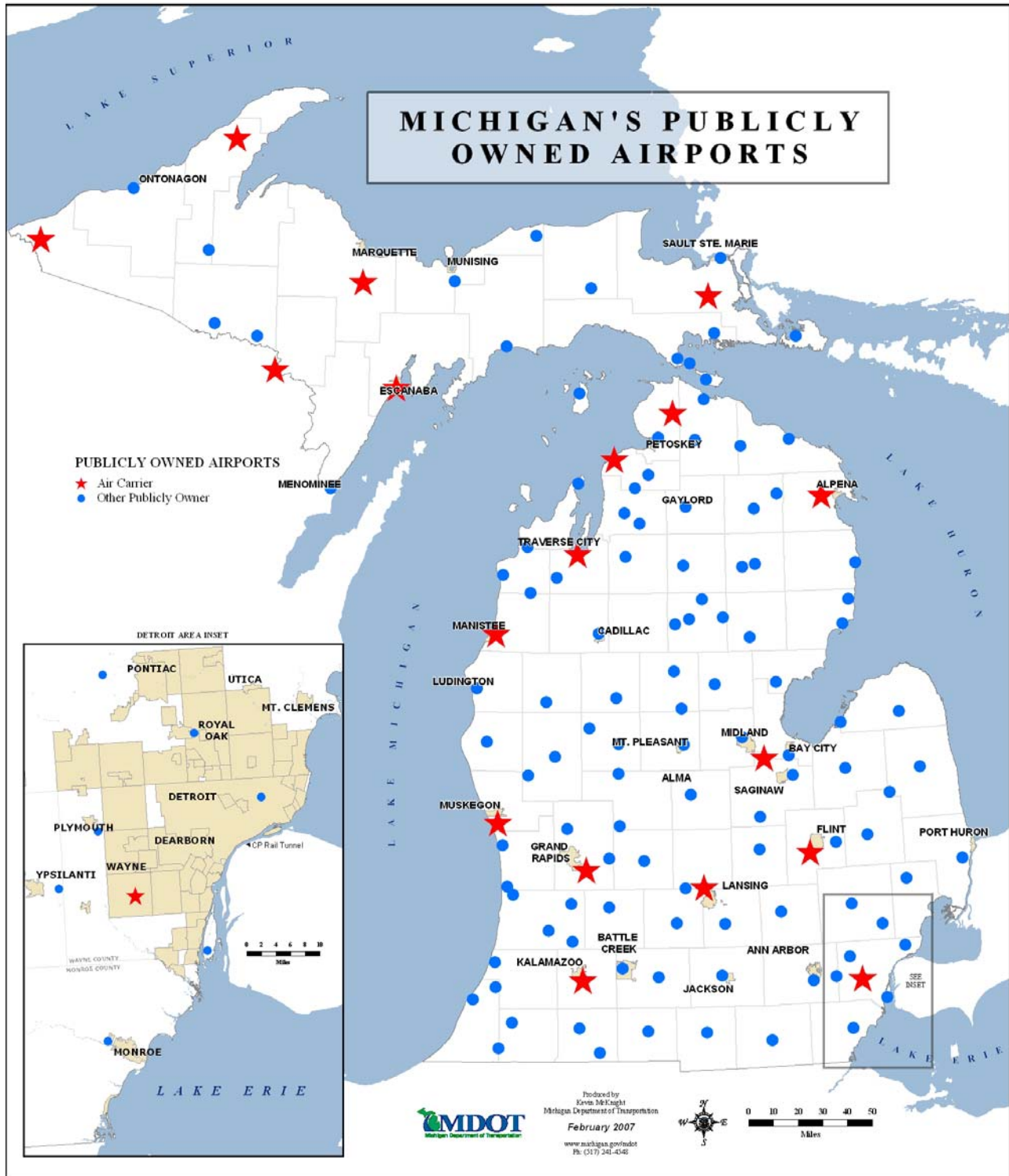
Source: Michigan Department of Transportation

Figure 7: Michigan's Cargo Ports



Source: Michigan Department of Transportation

Figure 8: Michigan's Publicly Owned Airports



Source: Michigan Department of Transportation



Chapter 3

Preferred Vision of the MI Transportation Plan

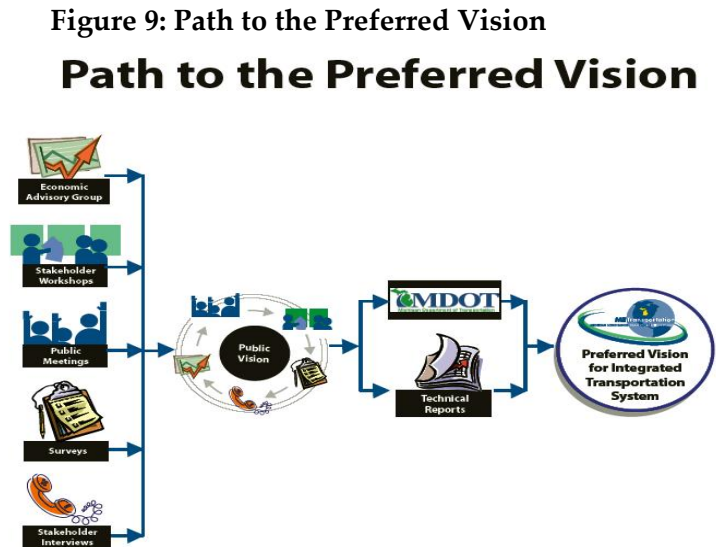
3.1 Development of the Preferred Vision

3.1.1 Development of the 2030 Preferred Vision of the Michigan Transportation System

The 2030 Preferred Vision of the Michigan transportation system is one of the foundations of the *MI Transportation Plan*. A vision is a description of the preferred future, capturing the best elements of the past and present to be continued, and the most attractive elements of the future that are desired. The best visions are flexible enough to change as you move toward them. The vision for the *MI Transportation Plan* is based on three inputs: the extensive public involvement process that resulted in a 2030 Preferred Public Vision; the technical reports that analyzed conditions and context related to the current transportation system; and the experience and expertise MDOT's Leadership Team. **Figure 9** shows how these three inputs relate to each other and to the final 2030 Vision.

The 2030 Preferred Vision is based on work that began in 2003 with the initiation of a statewide project called “The Transportation Summit: Connecting Michigan.” This effort involved hundreds of Michigan residents, dozens of action team meetings, public forums, and two large-scale summit meetings, held in December 2003 and again in December 2004. The summit process resulted in the publication of a long-range vision for transportation in Michigan:

“Michigan will lead the 21st century transportation revolution as it led innovation in the 20th century. We will move people and goods with a safe, integrated, and efficient transportation system that embraces all modes, is equitably and adequately funded, and socially and environmentally responsible. Michigan’s transportation community will work together to ensure that resources are in place to deliver the system.”



Source: Wilbur Smith Associates

To support the development of the 2030 State Long-Range Transportation Plan, MDOT wanted to expand this conceptual vision into one that would provide more detail and, therefore, could be used to better guide plans and investments in the future.

The extensive public involvement process gathered ideas and concepts from the public, stakeholders, and Economic Advisory Group. During the first round of input, these groups provided their ideas for the vision for Michigan’s 2030 integrated transportation system. This information was summarized into the draft Preferred Public Vision. In the second phase of public involvement, each activity probed for feedback to the initial draft of the Preferred Public Vision and the vision was revised to reflect their comments.

The 2030 Preferred Public Vision is a transportation system oriented toward choices, access, integration, and regional sensitivity. The public views transportation as fundamental to economic development and quality of life in Michigan. They desire a 2030 transportation system, which is innovative, holistic, sustainable, environmentally sound, and energy-efficient.

However, as shown in **Figure 9**, public input is just one of three inputs needed for the development of the final 2030 Preferred Vision.

The technical reports (TR) and the experience and knowledge of MDOT’s leaders are equally important. In October 2006, MDOT’s senior leaders participated in a visioning workshop,

which used a scenario planning exercise. Scenario planning is a strategic planning technique that is used to develop flexible long-term plans and is based on the development of a number of “possible futures.” These scenarios combine information about the future (such as demographics, geography, and existing condition information) with plausible alternative social, technical, economic, and political trends, which are key driving forces. Scenario planning helps stimulate discussion of issues that are difficult to know or understand and prompts leaders to think beyond a simple trend line of the status quo. This scenario planning exercise allowed the team to focus on the values of the Preferred Public Vision and to apply the values identified by the public to a “real world” situation. The results, therefore, are a deeper understanding of the individual values and an initial understanding of strategies that can be used to implement the integrated transportation system. The elements that were common to all the scenarios are the strategies that are essential to the integrated transportation system under any future circumstances. These elements were melded with the Preferred Public Vision to create the 2030 Vision of the Michigan Transportation System. The vision and the key values that support it are described below.

3.1.2 The Preferred Vision

Michigan’s 2030 integrated transportation system will be the foundation of the state’s economic vitality and will help sustain the quality of life for its residents. Transportation providers throughout the state will work together to address the system’s needs holistically. Michigan’s future transportation system will be:

Purposeful: Michigan’s 2030 integrated transportation system will be the foundation of the state’s economic vitality and will help sustain the quality of life for its residents.

Prioritized: Capacity improvements will be needed, but the first priority will be physical or technological improvements to enhance efficiency, mobility, and access.

Coordinated: All transportation providers will work together to address the system’s needs holistically. All modes will be maintained, preserved and protected as one system, since they are some of the state’s most important physical assets.

Safe: Safety will be a primary goal. It will be addressed, as each improvement is planned and implemented. Personal and systemwide security will be enhanced, including border security.

Advanced: MDOT will embrace technology and technological development. The department will use innovation in every aspect of what it builds, how it builds, and in every service that is provided.

Integrated: System integration will be achieved for both passenger and freight movement through improvement in modal services and effective intermodal connections. The system will be responsive to the public’s demand for more transit, bicycle, and pedestrian choices.

The need for freight and passenger movement will be balanced, and the system will accommodate both without compromising goals for safety or economic competitiveness.

Appropriate to the Setting: Transportation will not only be integrated between modes, it will also be integrated with land use, economic, and environmental systems. Transportation solutions will be regionally sensitive, sustainable, and energy efficient. Infrastructure improvements will be tailored to the community, natural settings and will be planned cooperatively so customers and partners are satisfied with the results.

Flexibly Funded: Transportation financing will be diversified to include new methods and techniques, but public funds will remain dedicated to transportation purposes. Funding will be flexible so that money can be allocated to meet the highest priority user needs.

Responsive: MDOT will be an open and flexible organization, responsive to customer needs and with a transparent, accountable decision-making process. MDOT will be proactive and adaptable, able to identify and respond to change as needed.

3.1.3 Household Participation Studies

Two Household Participation Studies (HPS) were conducted during the development of the *MI Transportation Plan* and provided input into the Public Vision.

The first HPS was conducted in March 2006 on a stratified sample of Michigan residents to determine the level of public satisfaction with different aspects of system performance, to ascertain key values the general public holds with regard to the transportation system, and to identify particular issues of concern for segments with special needs as well as traditionally under-served populations. Major findings of the first HPS focused on the public's satisfaction with MDOT and the transportation system and future agenda items viewed as important by the public.

In general, the public is satisfied with MDOT and the information it provides. Michigan residents are more likely to see transportation getting better than worse, and they overwhelmingly believe improving Michigan's transportation system is critical to improving the state's economy and job situation.

The public's top agenda items for transportation are pavement quality, traffic flow, and faster/more efficient completion of highway projects. Following that agenda, the public wants safer highways, greater availability of long-distance and public transportation options, and a greater effort to take the public's needs and views into consideration in transportation decision-making.

The second HPS was conducted in December 2006 to gauge public reaction and acceptance of the 2030 Preferred Vision for an Integrated Transportation System, the findings of the technical reports, and revenue funding questions for the future transportation system.

In the second Household Participation Study, a random statewide sample of 1,100 adults in Michigan, the public strongly supports the Preferred Vision for state transportation. After presenting the vision, broken down into eight components, three-quarters (75 percent) of the respondents say the vision is very important to Michigan's future, with another 19 percent saying it is somewhat important. Two of the eight components of the vision are the ones that the public is more likely to say needs most improving: 1) *to modernize, expand, and connect the system to support economic growth and better facilitate the movement of goods, people, and services*; and 2) *to make the transportation system physically and economically accessible to all residents of Michigan*. However, what is most striking is how *each* of the eight components taps into a significant subset of the public. Each component has anywhere from seven percent to 18 percent saying it needs the most improving—suggesting that each of the eight components is vital for a complete preferred vision for the public.

The public is quite divided over the question of higher revenues for the transportation system. One-half (50 percent) of the public agree with the statement that *[they] oppose higher state taxes even if the money is earmarked for transportation*. The public is also evenly split (42-percent agree and 41-percent disagree) that *the state government has sufficient revenues to adequately meet its transportation needs in the future*. However, three-quarters (75 percent) of the public disagree that *the transportation system in Michigan is fine and has little need for improvement*.

In this, the second of two household studies, we found stronger support, when using different questions, for alternative modes of transportation. In the Phase 1 study, 61 percent of residents polled chose building and maintaining highways while 27 percent chose alternative modes of transportation when presented with the two options in a forced choice question. However, in this study, 84 percent of the public agreed with the statement that *Michigan transportation planning for the future should focus more on all modes of transportation—such as public transportation, non-motorized travel, and intercity rail—not just car and truck traffic*. Thus, for the public, maintaining and building highways may be the most important, but there should also be more focus on alternative modes.

3.1.4 Tribal Consultation

Government-to-government consultation was conducted with the 12 federally recognized Tribes in Michigan. The transportation needs of American Indians today, including tribal members with disabilities, are no different from the needs of most people who live in rural areas, but they can often be more pronounced.

The Tribal governments support the Preferred Vision developed through our participation process and the four goal areas. Of particular concern is connecting the system to support economic growth and making the transportation system physically and economically accessible to all.

The consultation process resulted in common issues and expectations emerging from the sovereign tribes of Michigan. These include:

- Developing funding and partnering arrangements;
- Economic development;
- Safe and quality transportation systems;
- Pedestrian safety;
- Access to rural transit; and
- Land use and cultural preservation.

3.1.5 Economic Advisory Group

The Economic Advisory Group (EAG) was comprised of representatives from the 10 economic sectors in Michigan, appointed by MDOT's Director, and Transportation Commissioner James Rosendall. The EAG provided strategic direction in the development of the Public Vision to the stakeholder workshops and public open houses. Three rounds of EAG meetings were held: March 2006, June 2006, and November 2006.

3.1.6 Stakeholder Workshops

The purpose of the workshops was to provide an opportunity to those individuals and organizations an opportunity to "roll up their sleeves" in highly interactive sessions, and maximize input from groups with a vested interest and knowledge of the state's transportation system. An initial list of stakeholders was invited to participate in this process for the first round of workshops. This list grew as awareness and interest in *MI Transportation Plan* increased.

Three rounds of stakeholder workshops were held in the same time frame as the EAG meetings. The first round, held in March 2006, was in Lansing, Detroit, and Escanaba. An additional location was added to the other two rounds of workshops. The second round was held in June 2006 in Grand Rapids, Grayling, Marquette, and Detroit. The final round was held between November 27 and December 1, 2006, in Gaylord, Escanaba, Lansing, and Warren.

3.1.7 Public Open Houses

Two rounds of public open houses were held: the first in June 2006, and the second in August 2006. A total of 26 open houses were held around the state, 12 in the first round, and 14 in the second. The purpose of these open houses was to inform, educate, and solicit input from the public about the vision developed with input from the EAG meetings, stakeholder interviews, stakeholder workshops, the Transportation Summit, and household participation studies.

3.1.8 Web-based CommentWorks

In addition to the activities and meetings described above, input was sought through an online system called CommentWorks, which was on the *MI Transportation Plan's* Web site:

www.michigan.gov/slrp. The public could submit comments by email, which were tracked and tallied by the CommentWorks system. In an effort to reach out to those who do not have Internet access, MDOT forged a partnership with the state's library system. Librarians actively encouraged their patrons to access the Internet through the libraries' computers to complete an online questionnaire to solicit further input to the Public Vision. Two rounds of Public Vision online surveys were conducted: the first in a four-week period from mid-June to mid-July 2006, and the second in December 2006. The first round generated over 1900 responses.

3.1.9 Participation Findings

There is a generally shared view that transportation choices must be expanded in Michigan, responding to dominant trends such as the shifting energy picture and the aging of the population. A central assumption is that transportation is vital to the economic future of the state, and that a goal should be enhancing economic vitality.

There is a broad consensus that Michigan's transportation system must accommodate all modes of transportation, in particular: transit, non-motorized travel, and intercity rail (preferably high-speed). The public is consistent in its desire that access to transportation not be limited by income, rather that transportation be economically accessible.

Participants in the public process emphasized transit in all regions and in all of the public open house sessions. When given the opportunity to discuss transit, the public expressed consistent support for a multi-modal approach to transportation. Access for all demographic groups, choice, and innovation are preferred, rather than business as usual. Even those in small and rural communities expressed a desire for transit alternatives, along with intercity travel alternatives.

The public believes strongly that transportation modes must be integrated in order to facilitate seamless mobility. As part of this holistic view, freight movement was of concern to all stakeholder groups. Enhanced ways of moving freight and coordinating that movement with car and passenger traffic is desired. Preferences were expressed for improved air access, particularly to the north, and for better use and coordination of airports and other ports. A desire for innovation in water-borne transport is also part of the long-range vision.

There is an expectation that alternative and creative ways of paying for transportation choices must be developed and applied to all modes. The idea that a simple model of roads and gas taxes will suffice in the future as it has in the past is no longer accepted. The public expressed a desire for such financing methods as public/private partnerships, toll roads, and new user fees.

In addition, stakeholders were clear in the belief that transportation planning must be tied to land use and community design. It was clear that they see MDOT playing a lead role in integrating land use and transportation. Regional issues must be taken into account in planning and implementation.

There is also a strong sentiment that the future transportation system be environmentally friendly, aesthetic or even beautiful, and sensitive to community and environmental context.

The public is well aware of the current and likely future energy picture, and expressed a clear expectation that future transportation will be energy efficient. Given the state's history as a technology leader in transportation, included in the vision is that the state once again will take the lead, not just in energy efficiency, but also in guiding the nation toward new transportation alternatives.

Each region has its local interests as well, but it is the commonality that is most striking. In each meeting, there was concern expressed about whether the long-range vision will be implemented, or whether it will be back to business as usual. While it is recognized that cars, trucks, and roads will remain central to the future of transportation, the public also believes strongly that a multi-mode approach is critical to the future. The challenge will be to develop a plan that makes such a future vision a reality. MDOT must commit to a robust program for involving and educating the public over time in order for this vision to become real.



Chapter 4

Defining the Problem Statement – The Technical Reports

4.1 Introduction to the Technical Reports

The MI Transportation Plan workflow and scope was carefully crafted to provide a continuing flow of analysis, technical information, public outreach, visioning, and professional discourse to allow MDOT to reach critical conclusions about its transportation present and evaluate several transportation “futures.” MDOT included an exhaustive, far-reaching effort to reach its citizens and other stakeholders multiple instances, each time mining different perspectives from its citizens.

Each element of MI Transportation Plan is linked to a series of the Technical Reports.

Each element of MI Transportation Plan is inexorably linked. The public outreach efforts are linked to the public visioning, which is linked to defining performance goals and objectives, which are linked to the financial analysis. The financial analysis is linked to the conditions and performance analysis, which is linked to the investment packages and gap analysis. The investment packages and gap analysis is linked to the recommended investment package, which is linked to the Preferred Vision and an integrated transportation system in Michigan, which is linked to a vibrant economy, improved transportation quality and choice, and, ultimately, linked to a better quality of life.

Linked to each element listed above are the *MI Transportation Plan* Technical Reports (TRs). The TRs are individual analyses ranging from travel characteristics to modal programs to socioeconomic conditions to safety/security, which are summarized in this section. The technical reports are snapshots of conditions that provide the platform from which all analysis springs, and are part of the core work that is the technical foundation for *MI Transportation Plan*.

The technical reports ranged from 60 to 200 pages each, and are intended to provide depth of analysis using MDOT's latest data, analytical tools, and professional insight. They provide a resource for MDOT for years to come, and represent a library of transportation reference for Michigan, in essence, "Michigan's Transportation Book."

Each TR is posted on the *MI Transportation Plan* Web site; thus, the reader desiring detailed information is directed to the full document.

4.2 Socioeconomics/ Demographics

Almost all of Michigan's population increase will be in the 65 and older age group.

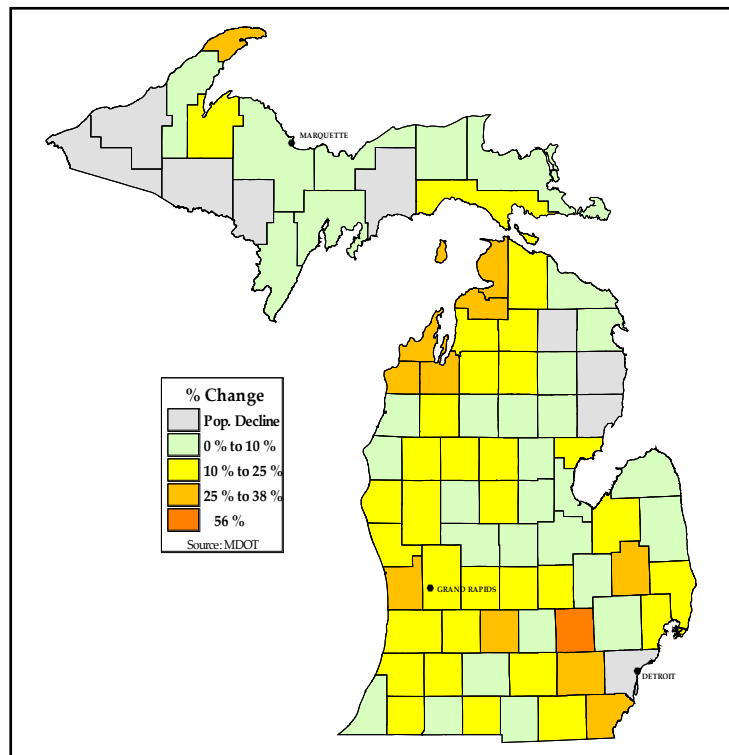
The *Socioeconomics Technical Report* identifies historical, existing, and projected conditions relative to population, employment, households, income, vehicle availability, migration, and environmental justice, and discusses their respective implications for statewide transport.

The demographics in Michigan will be changing in the next 25 years. These changes will have an impact on decision-making for transportation planning, transportation finance, and transportation facilities design. The following is an overview of the findings of the population, households, employment, income, and environmental justice analysis.

4.2.1 Population

- From 1980 to 2005, the state population grew at an average annual rate of 0.4 percent; forecasts show that 96 percent of the 1.2 million population increase will be in the 65 and older age group from 2005 to 2030;
- The overall population growth will continue, albeit at a much slower pace (see **Figure 10**).

Figure 10: Projected Population Change, by County, 2005-2030



Source: Michigan Department of Transportation

The age distribution will significantly change from 2005 to 2030:

- The “senior” population (age 65 and over) will dramatically increase to more than 20 percent of the population and will be the dominant socioeconomic change. This will make mobility issues for this group increase in importance.
- The prime working age population (25-64) will decrease from 55 percent to 47 percent of the state’s population; the under-25 population group will slightly decrease from approximately 35 percent to 32 percent.

4.2.2 Households

- The number of households is expected to increase about 19 percent from 2005 to 2030. The fastest growth will occur in single-person households, which are expected to grow 37 percent during this period.
- For two-person households, the increase is expected to be 28 percent. The number of relatively large households (those with four or more people) is expected to decline by about 0.5 percent from 2005 to 2030.
- Overall, average household size will continue to decrease, while the growth in the number of households will continue.

Michigan’s households will increase 19 percent, with single-person households growing fastest.

4.2.3 Employment

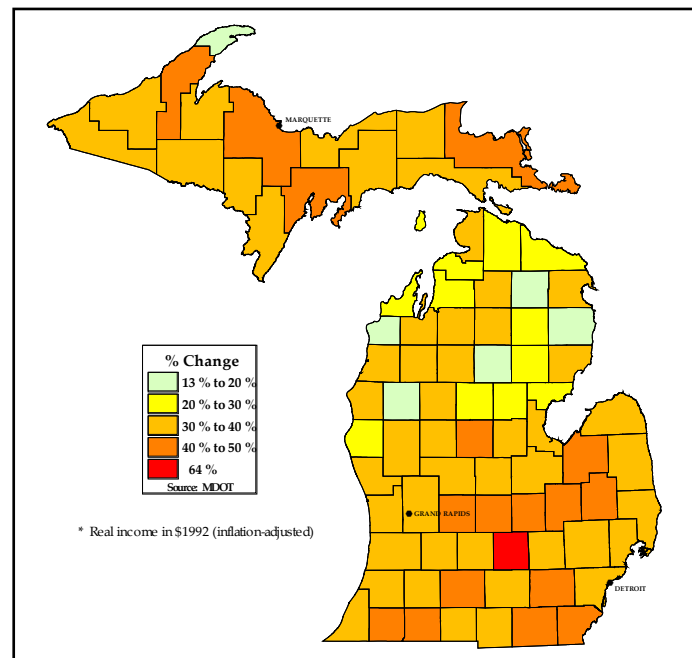
- The great majority of the jobs are in the southern portion of the Lower Peninsula, primarily in the major metropolitan areas, and this will continue for the next 25 years. Basic employment is projected to decline during the 2005 to 2030 planning period. The growth in Michigan’s employment has been completely driven by non-basic industries, and this will continue.
- The national shift from a manufacturing economy to an increasingly service-oriented economy will accentuate the role of non-basic jobs, markets, and activities in Michigan for 2005 to 2030.
- Overall, the labor force will tighten relative to the past 15 years. The labor force has grown by approximately 500,000 people in the past 15 years, yet will only increase by approximately 200,000 from 2005 to 2030.

Growth in Michigan’s employment has been completely driven by non-basic industries, and this will continue.

4.2.4 Income

- The metropolitan areas with the highest employment and population concentrations also generally had the highest personal income per capita.
- In the lowest income brackets, there is also the potential for income to affect auto ownership. Rising levels of disposable income for low-income, zero-auto households may allow them to purchase a vehicle. **Figure 11** provides a graphic depiction of the projected change in income over the next 25 years.

Figure 11: Projected Change in Personal Income per Capita, 2005-2030



Source: Michigan Department of Transportation

4.2.5 Environmental Justice

The increasing diversity of Michigan's population requires the involvement of Environmental Justice (EJ) stakeholders early in the project development process. *MI Transportation Plan* included an outreach to these populations throughout the overall development of the plan to complement the statistical and geographic identification of key areas in the technical report.

4.3 Economic Indicators

An efficient and well-maintained transportation system provides the backbone for all economic activity. The transportation system, including roads, transit, non-motorized facilities, aviation, marine, and intermodal facilities, plays an integral role in supporting the state and region's economy and the quality of life for residents. Transportation investments are part of the state's overall economic development strategy. Both the United States Department of Transportation and MDOT identify the link between transportation and the economy as their top priority.

An efficient transportation system saves time and cost for individuals and business, advances productivity and competitiveness, which promotes economic growth. Statistics indicate that the demand for transportation grows along with economic activities. In the United States (US), transportation is a major component of the economy in terms of Gross Domestic Product (GDP), employment, and expenditure. Transportation is even more important for Michigan because transportation vehicle manufacture is Michigan's largest industry.

Several long-term trends affect Michigan's economy and transportation system. These trends include the decline of automobile and other manufacturing, aging of the state's population, workforce availability, and migration and population growth. These trends will change Michigan's economic structure and transportation patterns.

The US economy is experiencing a strong recovery from recession. GDP has grown at more than three percent during the last two years. Productivity growth has been strong. Light vehicle sales remain above 16 million units. The US economic outlook is favorable. Real GDP can be expected to grow at 2.8 percent during 2007, and projected unemployment is 4.7 percent for both 2006 and 2007. The forecasted Consumer Price Index (CPI), an indicator of the general level of prices, is a moderate 2.8 and 2.2 percent for 2006 and 2007, respectively.

Michigan's economy continues to lag behind the national economy as the state struggles to transition its economy from a manufacturing intensive economy to a more service based economy. Evidence of this lag is the fact that Michigan's real Gross State Product (GSP) experienced only about half the rate of growth of the national economy and wage and salary employment declined by 0.2 percent in 2005. The state's unemployment rate reached 6.7 percent during 2005 compared to 5.1 percent for the US. Michigan's personal income increased 3.4 percent in 2005. The state's sluggish economic performance is largely attributable to its dependence on the automotive manufacturing sector, which has been undergoing a dramatic restructuring. As a result, Michigan's manufacturing market share has eroded and the state has not been able to replace the resulting lost manufacturing jobs.

The most recent Michigan forecast released on August 31, 2006, through the University Of Michigan Research Seminar in Quantitative Economics (RSQE), sees a brighter job situation for private non-manufacturing. The service industry, led by health services, is expected to sustain its growth.

Current forecasts are that Michigan's economy is expected to continue to exhibit weak growth in the near term, due in large part to the fact that Michigan-based auto manufacturers will continue to lose market share. Employment is expected to continue to decline in 2006 by 0.2 percent. However, due to productivity gains, income is forecast to grow 4.2 percent and 4.4 percent in 2006 and 2007, respectively.

Forecast risk is inherent in the economic outlook for the US and Michigan. Some of the principal uncertainties faced are shocks in oil prices, greater-than-expected or slower-than-expected business investment and export growth, and inflation.

Michigan's improving transportation system and other state assets: including a skilled labor force, its natural environment, and well-established manufacturing sector will contribute to help the state overcome its economic challenges.

4.4 Travel Characteristics

Data from the *MI Travel Counts* program undertaken by MDOT in 2004/2005 is the foundation of the travel characteristics analysis. The objective of the program was to obtain household travel information for input into the MDOT Statewide and Metropolitan Planning Organization (MPO) travel demand models.

Key results answer the four high-level questions: (1) who travels in Michigan; (2) why people travel in Michigan; (3) how people travel in Michigan; and (4) when people travel in Michigan. Special analysis also provides information regarding long-distance trips and the implications of travel characteristics for the development of an integrated transportation system.

4.4.1 Who Travels in Michigan?

- Households with more persons, workers, income, and vehicles generate more trips. Households in urban areas make more trips than those in rural areas.
- Workers make more trips than non-workers do; however, non-workers (including persons under the age of 15) make 43 percent of Michigan's trips.
- Men make fewer but longer trips than women; women age 36-64 have the highest trip rate.

4.4.2 Why People Travel in Michigan

- Work trips account for the largest share of Michigan's trips, followed by pickup/drop-off/accompany trips.
- As a group, women ages 21-64 make more trips than men of the same age group do for non-work purposes. In contrast, men ages 21-64 have a higher rate of work trips than women of the same age group do.
- The most frequent daily trip pattern for men is home-work-home, while for women it is home-other-home. "Other" includes pickup/ drop-off/accompany trips, which accounts for the largest percent of trip purposes for women.

4.4.3 How People Travel in Michigan

- The predominant mode, by far, is use of the private automobile. School bus and walking are secondary modes.
- High-occupancy vehicle trips account for 41 percent of Michigan's trips.
- The non-driving population and households without vehicles available still predominantly rely on private vehicles to access activities, but they tend to utilize walk and transit more than the driving population and households with autos available.
- Walk trips only account for four percent of the total trips and transit for one percent.

- Work trips have the lowest vehicle occupancy rate, while social/recreation trips have the highest.

4.4.4 When People Travel in Michigan

- Friday is the busiest travel day in Michigan.
- Late summer is the time of the year in which most trips occur.
- Peak travel times are for trips departing between 7:00 and 9:00 a.m. and between 3:00 and 6:00 p.m.

4.4.5 Long-Distance Travel

- A large share of recreational long-distance trips is within the state.
- Pleasure is the most common purpose for long-distance trips.
- In rural areas, personal business accounts for a large share of long-distance trips.
- Air transportation accounts for a larger share of long-distance business trips than for other purposes.

4.5 Metropolitan Planning Organizations/Regional Planning Agencies

This TR considers Metropolitan Planning Organization (MPO) and Regional Planning Agency (RPA) plans and/or planning processes in Michigan in the context of how they may support and complement the overall vision and goals of *MI Transportation Plan*. This TR also highlights issues not currently addressed in MPO/RPA plans that may complement *MI Transportation Plan* in subsequent planning at the regional and metropolitan levels.

4.5.1 Findings

- At a general policy level, the transportation goals articulated by MPOs, RPAs, and MDOT are in-sync with each other. Local Long-Range Transportation Plans (LRTPs) and Transportation Improvement Programs (TIPs) developed by MPOs can provide tools through which MDOT can ensure priorities articulated in *MI Transportation Plan* are implemented.
- One of the most effective ways to integrate MDOT and MPO/RPA plans and priorities is for MDOT to continue to enhance its involvement in regional planning activities and processes.
- The *MI Transportation Plan* process will be an important platform for expanding the discussion of the transportation-land use connection across Michigan.

- Freight movement, particularly trucking, is a major concern for MPOs and there is general understanding this is an interregional issue requiring state involvement and support.
- The corridor planning approach will be used to identify clear priorities and establish local and state commitments to various types of improvements in the corridors.
- The asset management process, via the Michigan Transportation Asset Management Council, has proven to be particularly useful for enhancing the effectiveness of roadway management and for demonstrating the value of regional planning to local officials.
- The long-term viability of public transit services in rural and non-metropolitan regions of Michigan, as currently structured, is threatened by a lack of funding and support from local officials. There is a need to help maintain service levels on and/or “reinvent” small transit systems to sustain their operational feasibility.

4.5.2 Conclusions

There is a great deal of regional and metropolitan-level transportation planning occurring throughout Michigan today. However, there remains a strong home rule tradition that presents a challenge to the execution of plans in a truly inter-jurisdictional manner. MDOT and the MPOs/RPAs will need to provide additional leadership to advance the planning and implementation of cross-jurisdictional public passenger transportation services and connectivity between passenger modes. Such efforts would need to occur in cooperation with local governments and public and private service providers. In addition, MPOs, RPAs, and MDOT will continue to work together to actively engage the county road commissions in the metropolitan and regional planning processes. Such engagement will lead to more consistency between priorities and needs identified through the MPO and RPA planning processes and the funding decisions of road commissions.

4.6 Highway & Bridge

The objective of the *Highway & Bridge Technical Report* is to provide an overview of Michigan’s trunkline roadway system. In Michigan, there are three separate types of government agencies (over 600 individual agencies) which have responsibility for the state’s roadways:

- State of Michigan over state trunkline highways;
- 83 county road commissions over county roads; and
- 533 incorporated cities and villages over municipal streets.

MI Transportation Plan focuses on the state trunkline highways managed by MDOT. It is very important to know that trunkline highways are not just road pavement and bridges. They also include non-pavement infrastructure such as signs, pavement marking, guardrails, signals, safety, drainage structures, weigh stations, non-motorized facilities, lighting, and pump houses.

They are an integral part of the system MDOT manages. The *Highway & Bridge Technical Report* presents information on the inventory of system assets, system condition, system performance, as well as issues and considerations that may impact MDOT's ability to meet customer needs and to meet and sustain its current system condition goals.

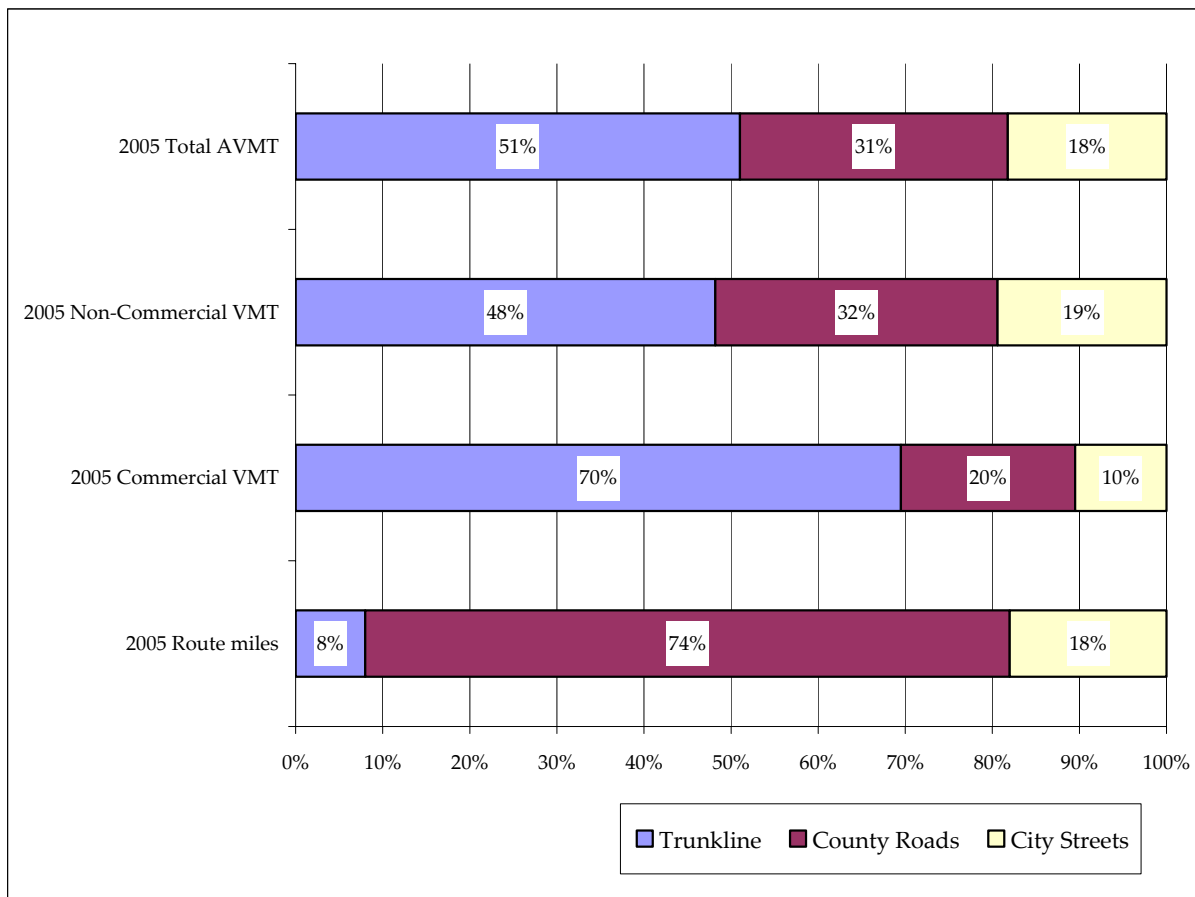
Highlights of MDOT transportation assets are summarized in the following sections.

4.6.1 Trunkline System Inventory

- MDOT has jurisdictional responsibility for approximately 9,700 route-miles of state trunkline highways, which consist of all the "I", "M", and "US" numbered highways, and 4,413 bridges. Michigan's system of state trunkline highways, county roads, and city streets totals 119,570 miles.
- The state trunkline system, managed by MDOT, comprises eight percent (9,695 miles) of Michigan's roadway network and carries 51 percent of total statewide traffic (see **Figure 12**). County roads and city streets together consist of 92 percent (109,875 miles) of Michigan's roadway system but they only carry half of the statewide traffic.
- MDOT has jurisdictional responsibility for approximately 4,413 trunkline-bridges having over 49 million square-feet of bridge deck area (see **Figure 13**). Nearly 1,700 (approximately 40 percent of total trunkline bridges) of MDOT's bridges are on major freeways (I-75, I-94, I-96 or I-69). MDOT bridges are much larger and carry more traffic than local jurisdiction bridges. Although MDOT is responsible for 41 percent of the state bridges, this accounts for 75 percent of the bridge deck area of all Michigan's highway bridges.
- Highway non-pavement infrastructure addressed in this technical report includes signs, pavement marking, guardrails, signals, safety, drainage structures, weigh stations, non-motorized facilities, lighting, pump houses, carpool parking lots (CPLs), rest areas, and Type II noise abatement barriers.

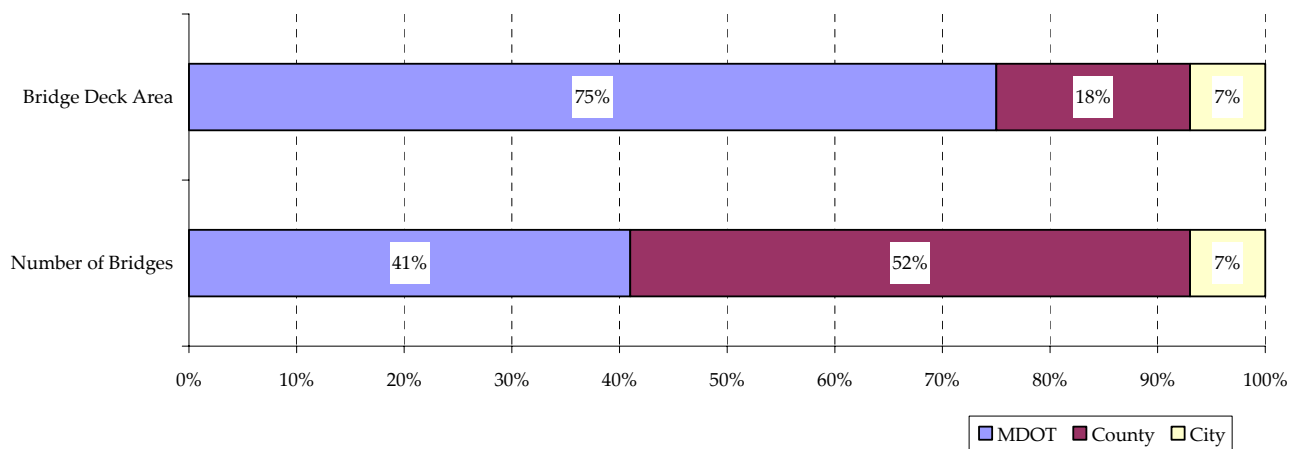
The state trunkline highways are only eight percent of all highway miles, but carry more than half the traffic.

Figure 12: Percent Distribution of Route Miles & AVMT by Jurisdiction



Source: 2005 Highway Performance Monitoring System (HPMS)

Figure 13: Percent Distribution of Number of Structure & Bridge Deck Area by Jurisdiction



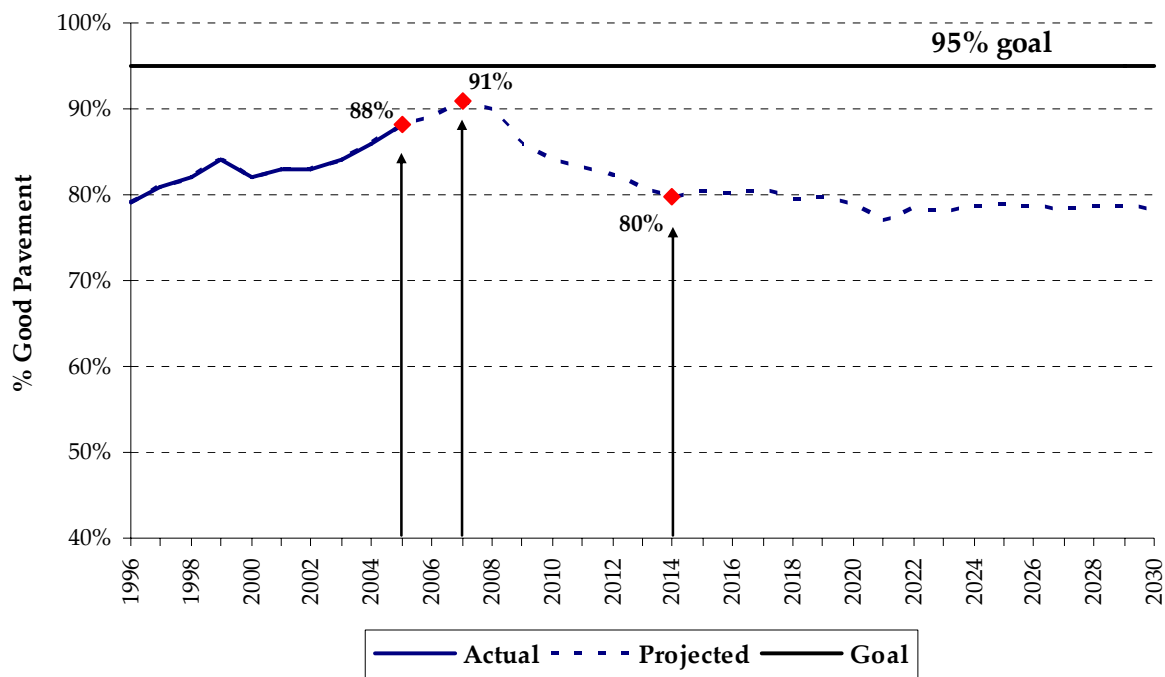
Source: Michigan Department of Transportation, Transportation Management System (TMS)

4.6.2 Trunkline System Condition

The overall condition of the system can be described in terms of pavement, bridge, and non-pavement infrastructure condition. It is generally projected that conditions will deteriorate over the next 10 years if today’s funding levels continue.

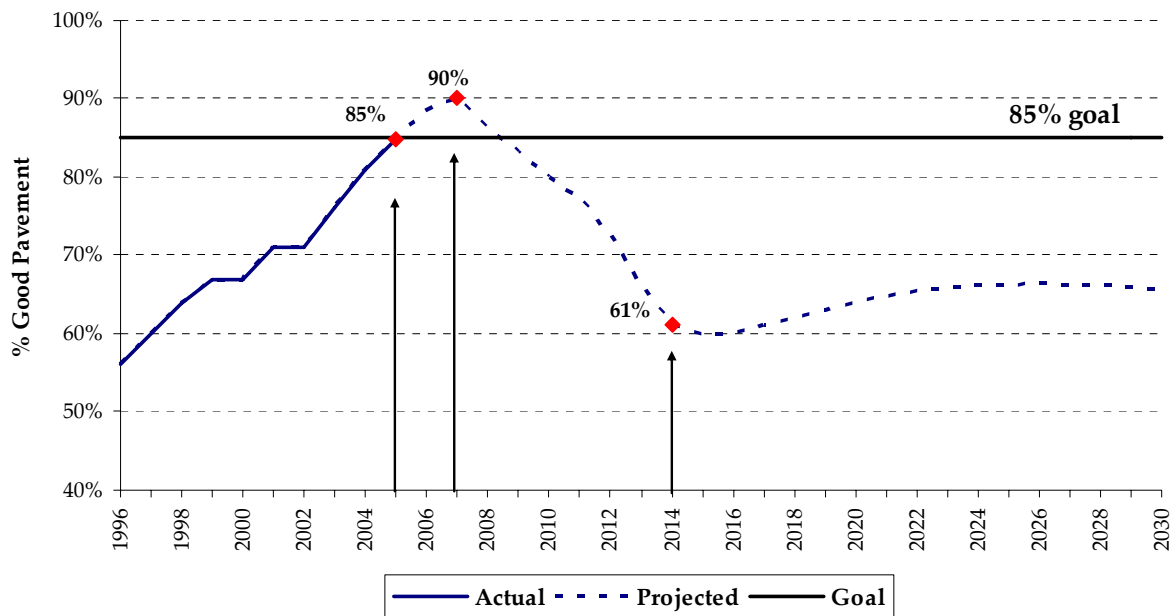
- Pavement Condition Goal:** MDOT’s goal of having 95 percent of pavement in good condition on the freeway system and 85 percent on the non-freeway system by 2007 has led to significant improvements in recent years (Figures 14 and 15).

Figure 14: Statewide Trunkline System (Freeway Only)



Source: Michigan Department of Transportation, Road Quality Forecasting System

Figure 15: Statewide Trunkline System (Non-Freeway Only) Long-Term Pavement Condition Trend



Source: Michigan Department of Transportation, Road Quality Forecasting System

- Overall pavement conditions on the statewide trunkline system have steadily improved in the last 10 years, from 64-percent good in 1996 to 86-percent good in 2005. At this time, MDOT has reached the non-freeway goal of 85-percent good (two years early). On the freeway network, the system has steadily improved to reach a condition of 88-percent good, while MDOT continues to work toward achieving the goal of improving the network to 95-percent good by 2007.

MDOT achieved the pavement condition goal for non-freeways two years ahead of schedule.
- With the help of additional resources through bonding, such as the *Preserve First* and *Jobs Today* programs, the near-term outlook for the state’s freeway pavements is projected to improve until it reaches a level of 91-percent good in 2007, but falling short of the freeway goal of 95 percent. Over the long-term, MDOT projects that freeway pavement conditions will begin to decline until they reach approximately 80-percent good in 2014, and remain at that level to 2030. Similarly, the non-freeway pavement condition has benefited from the bonding programs and will continue improving, even exceeding the 85-percent goal in 2007. Like the freeways, it is expected to begin declining until reaching approximately 60-percent good in 2014 where it will remain under 70 percent through 2030.

- **Bridge Condition Goal:** MDOT's goal of having 95 percent of bridges in good condition on the freeway system and 85 percent on the non-freeway system by 2008 has led to steady improvements in recent years.
 - Overall conditions on the statewide trunkline bridges have progressively improved since 1998, from 78-percent good in 1998 to 84-percent good in 2005. At this time, the bridge condition is approaching the level of 85-percent good on the non-freeway network and 84-percent good on the freeway network. MDOT continues to work toward achieving the bridge goals by 2008.
 - At existing funding levels, the outlook for the state's freeway bridge condition is not expected to meet its goal to have 95 percent of freeway bridges in good or fair condition by 2008.
- **Non-Pavement Infrastructure Condition**
 - The pavement condition of the CPLs show that 85 percent are in good condition and 96 percent are in good to fair condition, with an average Pavement Surface Evaluation and Rating (PASER) rating of 7.2 out of 10.
 - Currently 37 rest areas have 500,000 or more visitors each year, with only 60 percent of those being of the current design and considered in good condition at the end of 2005.

4.6.3 Trunkline System Performance

Highway and bridge performance is considered with respect to mobility, connectivity, importance of non-pavement infrastructure, and deployment of special technology.

- Congestion affects the mobility performance of Michigan's roadways. For urban freeways, 15 percent (six percent of the statewide total) of the vehicle miles traveled (VMT) is congested and 40 percent (17 percent of the statewide total) of the VMT is approaching congested conditions. While for urban non-freeway trunkline, 20 percent (four percent of the statewide total) of the VMT is congested and 23 percent (five percent of the statewide total) of the VMT is approaching congested conditions.
- At current funding levels (with the currently planned projects), 43 percent (18 percent of the statewide total) of urban freeway VMT will be congested and 29 percent (12 percent of the statewide VMT) of the VMT will be approaching congested conditions. While 39 percent (eight percent of the statewide total) of the urban non-freeway trunkline VMT will be congested and 23 percent (five percent of the statewide total) of the VMT will be approaching congested conditions by 2030.
- Connectivity to different types of activities and facilities is related to both the geographic location of the activities throughout the state, and the available highway drive times. For freight facilities, connectivity to particular industry sectors in freight-intensive activity centers is more important than for other types of employment centers.

- Special technology deployment areas of special interest include Intelligent Transportation Systems (ITS), the Vehicle Infrastructure Initiative (VII), Permanent Traffic Recorders (PTR), and Weigh-in-Motion (WIM) detectors.

4.6.4 Issues and Challenges

Special issues and considerations for highway and bridge planning in *MI Transportation Plan* include:

- At current funding levels, pavement deterioration and congestion are both expected to worsen in the long-term; increased funding is needed to preserve the system condition. Resources for roadway improvements will also be needed to support overall performance through highway investments.
- Identify important attributes of the roadway system from a user's perspective. To that end, a study entitled *The Driver Perceptions of Roadway Characteristics* was conducted, which involved an analysis of user insights on important characteristics for Michigan's roadways. The findings of the study indicated that pavement condition, safety, and smoothness on roadways were ranked as the most important roadway characteristics for everyday users.
- The Federal Highway Administration's (FHWA) current bridge sufficiency ratings place less emphasis on the condition of bridge decks, overlooking important safety and preservation issues on Michigan's bridges. The bridge sufficiency formula affects the funding available for Michigan's bridges and creates a challenge for improving bridges with decks in need of improvement.

4.7 Transit

Public transit in Michigan is a compilation of local public and non-profit service providers. Service providers range from multi-county transportation authorities with independent boards and local taxing authority to transit agencies or departments that serve a single county or city to private non-profit agencies that provide targeted service. Service levels and types are defined at the local provider level. Both MDOT and the USDOT/Federal Transit Administration (FTA) provide financial support, technical assistance, and compliance oversight, but neither agency determines the types and levels of service.

Michigan is:

- Served by 79 local public transportation systems and 40 specialized transit service providers. These 79 providers plus their subcontractors is the backbone of Michigan's public transit network.
- All 83 counties are served by one or both of these services.

Although all Michigan counties have some public transportation, there are still gaps in service. In some counties, service is limited to a single provider within the community; for some communities there is no night or weekend service. Using local transit to cross county lines can be difficult or impossible in many areas of the state.

Transit service in Michigan grew significantly between 1990 and 2004; transit ridership grew in almost all areas of the state, except Detroit.

Michigan’s public transit systems are categorized as urban and non-urban (rural) based on their service area population.

- Urban transit systems transported 78.6 million passengers in 2004 and non-urban area systems carried more than 6.5 million passengers.

Between 1990 and 2004, urban and non-urban service grew significantly. However, ridership growth did not keep pace with the increase in the level of service, decreasing 15 percent statewide. Most of that decrease is associated with the Detroit Department of Transportation, which experienced service cuts and changes in their counting procedures during this period that may overstate the decrease. Outside the city of Detroit, however, ridership has increased in many areas of the state.

- In 2004, an additional 1.5 million passengers were transported through the Specialized Service Program, which is a 26-percent increase since 1999.

Figure 16: Map of Local Public Transit Services



Source: Michigan Department of Transportation

Public transit services also include a state-managed commuter vanpool service, two public ferry operators, and an automated rail system in the city of Detroit. At the end of Fiscal Year (FY) 2005, the MichiVan Commuter Vanpool Program included 148 vans carrying 1,130 commuters. In FY 2005, the Detroit People Mover carried more than 1.5 million passengers and the two state-supported marine passenger services carried approximately 894,000 passengers combined.

New transit systems in the city of Detroit, southeast Michigan, the Ann Arbor to Detroit corridor, and the greater Grand Rapids area are being studied and planned in anticipation of accessing federal “New Starts” funding.

4.7.1 Transit Funding

Michigan's public transportation systems and providers are supported with a combination of state, federal, and local funds. In FY 2006, Michigan will receive over \$154 million in federal transit funds under the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU). Federal formula and discretionary funds are provided directly to MDOT and individual transit systems. State support for transit exceeds the level of federal support. Since 1972, the state has provided funds for the provision of transit services.

New transit systems in the city of Detroit, southeast Michigan, the Ann Arbor to Detroit corridor, and the greater Grand Rapids area are being studied and planned.

In FY 2006, Comprehensive Transportation Funds (CTF) appropriations for transit exceeded \$188 million. The largest of the CTF programs was the Local Bus Operating Assistance program, with a \$163.3 million appropriation in FY 2006.

4.7.2 Transit Issue Agenda

Based on prior policy and planning documents, and issues on the national transit agenda, the *Transit Technical Report* provided a draft issue agenda (and possible actions) for transit as a starting point for discussion in the State Long-Range Planning process. This issue agenda included:

Increase Cooperation/Coordination among Transportation Providers

Possible action items:

- Establish local or regional task forces to work toward coordinating transit service at the local and regional levels.
- Explore methods to encourage the sharing of best practices in transportation coordination.
- Fully integrate multi-modal transportation into the planning, decision-making, and implementation of the transportation system at the local, regional, and state level.
- Advance regional transportation planning and service coordination in Michigan's urban areas, including federal New Starts planning underway in the Greater Grand Rapids area and southeast Michigan and regional service planning by the Regional Transit Coordination Council.

Increase Transit Use and Usability

Possible action items:

- Develop clearinghouse information resources on transit services.

- Develop better ways to integrate transit planning and land use planning and development decisions.
- Incorporate innovation, new technology, and information into our transit systems with a particular emphasis on innovations, technologies, and information strategies that address the needs of the aging population.
- Develop education tools and incentives to encourage utilization of public transportation, with a particular emphasis on education and incentives that address the needs of the aging population.
- Make use of gap analysis tools to determine if gaps in service exist in a specific region and measure people's perceptions of gaps in service.
- Continue to focus on transit safety and security.
- Promote performance measurement as a method to improve transit service and increase ridership.

Ensure Adequate Funding for Transit

- Implement coordination of funds at the state and local levels.
- Establish more predictability in state transit funding.
- Explore alternative options for local funding of public transportation, including secure financial support for new transportation services, such as regional transportation services being planned in the Greater Grand Rapids area and southeast Michigan.

4.8 Intercity Passenger

The *Intercity Passenger Technical Report* summarizes key policy, planning, and operational information relevant to understanding the status in 2005 of intercity passenger transportation in Michigan, potential emerging transportation issues, and future directions.

4.8.1 Overview of Intercity Passenger Services

For the state of Michigan, intercity passenger services include both intercity bus and passenger rail. The primary carriers are the National Railroad Passenger Corporation (Amtrak), Greyhound Lines, Inc., and Indian Trails Inc., a Michigan based intercity/charter operator.

Intercity passenger rail services are provided by Amtrak along three major corridors in Michigan: the Pere Marquette (Grand Rapids-Chicago), the Blue Water (Port Huron-Chicago) and the Wolverine (Pontiac-Detroit-Chicago) corridors. There are 22 stations in Michigan that provide rail passengers the opportunity to access passenger train transportation along the three routes. The Pontiac-Detroit-Chicago corridor is one of the original federally designated High

Speed Corridors. Statewide ridership and revenue for the Michigan intercity passenger rail services reached an all time high in 2005.

Intercity passenger bus service is provided by two principal intercity bus carriers operating in Michigan: Greyhound Lines, Inc. and Indian Trails, Inc. Greyhound Lines and Indian Trails provide daily, regular route-based intercity bus service to 127 Michigan communities. These carriers provide safe, affordable and reliable transportation service in designated transportation corridors. Subsidized bus service in Michigan has emerged in response to carrier service reductions. As carrier decisions are made, MDOT reviews the affected routes and makes a determination on whether or not to provide a subsidy for the service, based on available financial resources to sustain the service. Currently, all intercity bus service in the Upper Peninsula and Northern Lower Peninsula is subsidized.

Figure 17: Michigan Statewide Intercity Passenger Rail Routes and Stations



Source: Michigan Department of Transportation

Figure 18: Intercity Bus Service, 2006



Source: Michigan Department of Transportation

4.8.2 MDOT's Support of Intercity Passenger Service

MDOT's role in intercity passenger services is to support and supplement the services provided by the individual carriers to help maintain public intercity passenger transportation as a viable mode of travel in Michigan. The state has a three-pronged approach to intercity passenger service:

- MDOT uses state and/or federal funds to contract with the carriers to provide route service that would not otherwise exist;
- MDOT provides state and/or federal funds to enhance the intercity passenger infrastructure, which helps improve the transportation experience for intercity passengers and reduce costs for the carriers; and
- MDOT works with the carriers in an effort to maintain and enhance intercity passenger service in Michigan, including connectivity with other passenger modes.

4.8.3 Intercity Passenger Ridership

For intercity rail ridership between October 1, 2000 and September 30, 2005, the Blue Water (Port Huron-Chicago) transported 483,726 passengers, operated 1.2 million train-miles; the Pere Marquette (Grand Rapids-Chicago) transported 376,593 passengers and operated 642,400 train-miles, and on the two state-supported routes combined, Amtrak transported 860,319 passengers, and operated 1.8 million train-miles.

For Intercity Bus ridership, between October 1, 2000, and September 30, 2005, for state-subsidized routes, Greyhound Lines transported 285,752 passengers, operating in excess of 4.4 million bus-miles over three Upper Peninsula routes. For this same period, Indian Trails transported 195,596 passengers, operating in excess of 2.3 million bus-miles over two Lower Peninsula routes. Overall, the five routes carried 481,348 passengers in excess of 6.7 million bus miles.

4.8.4 Intercity Passenger Service Plans

A long-range plan for intercity passenger rail has been developed in cooperation with eight other midwestern states. The Midwest Regional Rail Initiative (MWRRI) is an ongoing effort of the state departments of transportation in Illinois, Indiana, Iowa, Michigan, Minnesota, Missouri, Nebraska, Ohio, and Wisconsin to develop an improved and expanded passenger rail system in the midwest. The MWRRI plan calls for a 3000-mile network serving nine states, with Chicago being the hub.

Intercity bus carriers are involved with short and long-range planning to address the needs of their riders and their business. Private intercity bus companies must operate profitably. They monitor system information to make adjustments in routes and schedules to better serve their ridership and to meet corporate goals and objectives. Changes that are made by one carrier may affect the service provided by another carrier. Likewise, any changes made by Amtrak may affect the intercity bus service. There are also adjustments to schedules throughout the year to address seasonal variations in ridership.

The state's ability to plan for intercity bus service is limited since much of the service is determined by decisions within the private marketplace. For example, Greyhound's nationwide network transformation (2004 to 2006) resulted in service loss to several Michigan communities and a realignment of its service between Detroit and Chicago. These changes

were made independently by Greyhound. The only role the state could play was to review the impact of the decisions on intercity bus service and determine if a state response was warranted or possible. It is important to note that the presence of two private sector carriers in Michigan means the state must be sensitive to private sector competition and corporate confidentiality issues when working with one or both carriers on future service issues.

4.9 Non-motorized Transportation (Bicycle/Pedestrian)

MDOT maintains over 2,560 miles of roadways with paved shoulder wider than four-feet (the minimum width recommended for accommodating bicycle access on non-freeway trunkline routes). Paved shoulders are often the best way to accommodate bicyclists in rural areas and benefits motor vehicles by helping to preserve pavement condition. The addition of a wide paved shoulder to a road benefits bicyclists as well as pedestrians.

MDOT has recently allowed limited construction of shared-use paths (and/or sidewalks) within trunkline right-of-way throughout the state.

The maintenance of these facilities is normally the responsibility of the local jurisdiction. In some parts of the state, where trunkline routes are known to be popular for large bicycle touring groups, MDOT has committed to expanding the paved shoulder width (to as much as eight-feet) to safely facilitate the numerous bicyclists that can be involved on these tours.

Michigan is proud to be first in the nation in the total number of converted rails-to-trails, with 1,428 miles in 2005. These rail trails and other shared-use trails provide non-motorized linkages between communities and points of interest across the state, some stretching up to 90 miles. **Figure 19** is a map of existing rail trails statewide.

In terms of condition of the system, it has become more critical to assess the condition and to have good maintenance practices now that the system is older. In the past, investment focused on new infrastructure. MDOT is now encouraging plans for long-term maintenance at the time of construction; some maintenance activities are eligible for state funding.

Figure 19: Michigan Rail Trails, 2005



Source: Michigan Department of Transportation

As for safety issues, Michigan's new Strategic Highway Safety Plan incorporates a Pedestrian and Bicycle Safety Action Plan that identifies specific short-term and medium-range steps to help achieve goals. In addition, MDOT is currently working to train engineers, planners, stakeholders, and designers to consider pedestrian and bicyclist safety in roadway planning and design, consistent with MDOT's Context-Sensitive Solutions (CSS) policy. This should ensure a safe connected network for non-motorized users, which helps create safer roadways for all users.

- Funding for the planning, development, and maintenance of non-motorized facilities for bicyclist and pedestrians is obtained through a number of state and federal sources. Each source of funding has limitations on how it can be used. There are also other sources for local and alternative funding sources such as local foundations and non-profit organizations throughout the state.

4.10 Aviation

Michigan's aviation system in 2005 served over 40 million passengers on scheduled air carrier aircraft at 17 commercial-service airports. Over 3.5 million operations (takeoffs and landings) were made at Michigan's 236 public-use airports in 2005. As emphasized by the \$60.4 billion in goods exported internationally in 2004, Michigan's commerce depends upon a quality multi-modal transportation system. Aviation is an important element of that system, transporting both people and goods quickly, safely, and efficiently. Additionally, Michigan's extensive tourism industry requires efficient air transportation to support development. Focal points of the aviation programs are to:

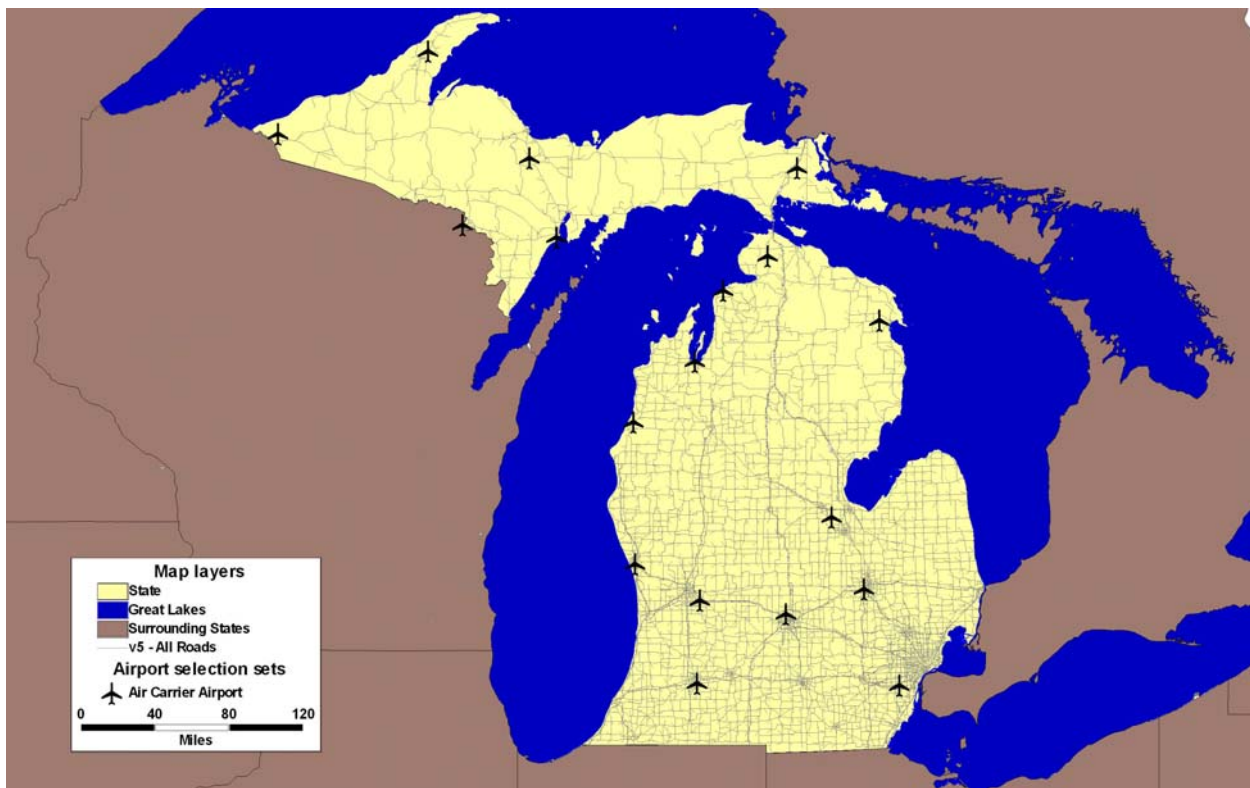
- Improve accessibility of Michigan's commercial, business, industrial, and recreational areas;
- Facilitate development and improvement of scheduled passenger and freight service facilities at air carrier airports which enable and encourage personal, recreational, and business travel to Michigan locations and meet community air travel needs; and
- Preserve and improve Michigan's aviation infrastructure, including both airport facilities and services.

As of 2005, there were 236 public-use airport facilities throughout Michigan, 130 of which were publicly owned. Although both types of facilities are open to the public, ownership plays an important role in at least two ways. First, publicly-owned airports tend to continue functioning as airports over the long-haul with a sense of stability that is important to users of the airports. They are more readily accepted as a community asset. Privately-owned airports are far more likely to drift into and out of public use and consequently are less reliable as a long-term transportation resource. Additionally, privately-owned airports are often under extreme pressure from developers and others for conversion into non-aviation uses such as housing or

commercial developments. Once converted to another use, the likelihood of replacing one airport with another is remote at best.

Federal, state, and local funds are available for airport development. Currently, federal funds for airport capital improvement and airport development come from the Federal Aviation Administration (FAA) through enabling legislation (Vision 100, Century of Aviation Reauthorization Act) and appropriations legislation (Omnibus bill). The money comes from user fees (Airways and Airports Trust Fund) and general funds.

Figure 20: Airports with Commercial Service



Source: Michigan Department of Transportation Statewide and Urban Travel Analysis Section

The provision of high value economic services, business hospitality, recreation, and just in time production (and other supply chain activities) are directly supported by Michigan's aviation system. The total amount of air cargo moved through Michigan airports in 2005 exceeded 259.9 million pounds.

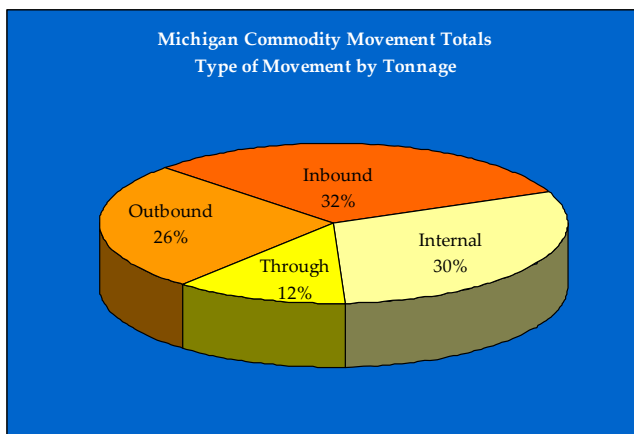
4.11 Freight

In today's business environment, cost-effective, time-sensitive transportation services are increasingly a strategy for competitive advantage in manufacturing and service-based industries. Globalization of the US economy has grown at a rapid pace over the past several

decades, and Michigan has been at the forefront of the industrial globalization trend. Michigan’s manufacturers shop the world for components and subassemblies to manufacturing processes. The movement of goods by truck, rail, air, and water is vital to Michigan’s economy, especially manufacturing and agriculture, two of Michigan’s largest economic sectors. The safe, reliable movement of freight on the state’s highway corridors and intermodal connections are keys to Michigan’s future economic vitality and quality of life.

In 2003, Michigan’s multi-modal transportation system facilitated the movement of approximately 670 million tons of freight with an estimated value exceeding \$1 trillion. Inbound shipments comprise the largest type of freight movement in Michigan. In 2003, inbound commodities accounted for 32 percent of all freight movements in Michigan by tonnage and 34 percent by value. Outbound commodities accounted for 26 percent of all

Figure 21: Michigan Commodity Movements by Type



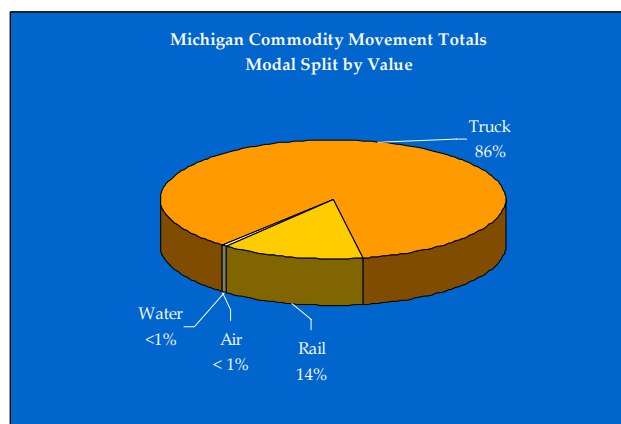
Source: Wilbur Smith Associates, MI Transportation Plan Freight Technical Report

value. **Figure 21** shows the nature of Michigan freight movements for shipment direction by tonnage.

Figure 22 shows the modal share by value for Michigan freight movements. Highways are the dominant mode for Michigan’s commodity movements. Trucking accounts for 70 percent of the goods moving in Michigan by weight, followed by rail (18 percent) and water (12 percent). Air cargo comprises less than one percent of Michigan freight movements by weight. Commodity movements measured by value further increase the importance of

flows by tonnage and 29 percent by value. Internal movements accounted for 30 percent of the total by weight, but only 20 percent by value. The relatively low value of internal freight movements reflects the large volumes of farm and natural resource products moving locally which carry a lower value per ton than most manufacturing products. Through shipments (those goods-movement trips where the origin and destination both lie outside Michigan) accounted for 12 percent of the total movements by weight and 17 percent by

Figure 22: Michigan Commodity Flow Value by Mode



Source: Wilbur Smith Associates, MI Transportation Plan Freight Technical Report

highways as the underpinning of Michigan’s commerce, as the truck modal share increases to 86 percent. In terms of value, the modal share carried by railroads declines slightly to 14 percent, while the water transport mode drops precipitously to approximately one percent. Air cargo flows, while often high-value, remain less than one percent of the overall value of freight movements.

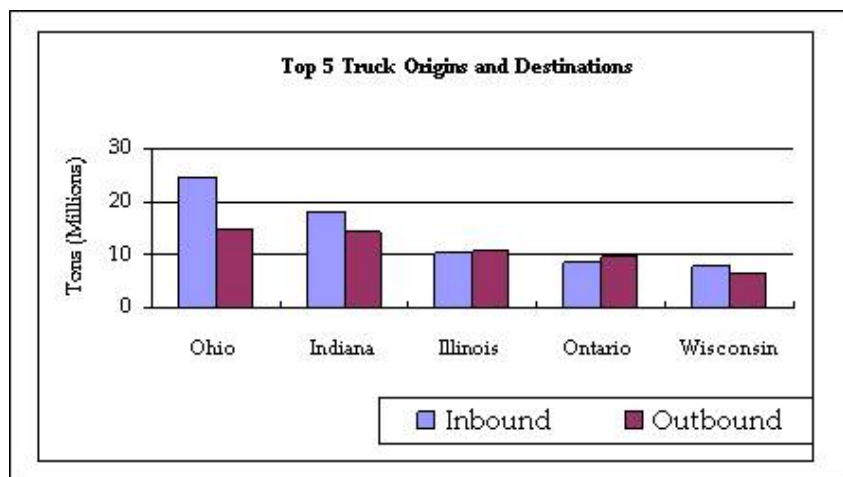
The world’s largest bilateral trade relationship exists between the US and Canada, with Michigan positioned as a leader in international trade. Goods and passengers moving across Michigan’s borders significantly impact the economies of Michigan and Ontario, and the economies of the US, Canada, and other nations. In the last decade, trade between the US and Canada has increased over 75 percent, and trade between Michigan and Canada was up 32 percent. The province of Ontario imported nearly 97 percent of Michigan’s total exports to Canada in 2002. These figures show that US–Canada trade is ever increasing, and that Michigan is at the forefront.

4.11.1 Trucking

Nearly every product consumed in the US at some point moves by truck. In Michigan, the trucking industry employs one in every 11 residents. In 2003, nearly 474 million tons of freight moved in, out, within, and through Michigan by truck, with an estimated value exceeding \$1 trillion. Nonmetallic Ores and Minerals were the top commodities moving by truck by weight, with sand and gravel moving to construction areas making up the largest portion. Secondary Traffic was the leading commodity moving on trucks by value, including secondary movements to and from warehouse distribution centers, and intermodal terminals.

In 2003, 111 million tons of outbound truck shipments left Michigan for other destinations, while 127 million tons moved into Michigan by truck. The top origins and destinations for truck shipments are concentrated in the Great Lakes region. **Figure 23** shows the top truck origins and destinations by tonnage.

Figure 23: Top Michigan Freight Origins/Destinations



Source: Wilbur Smith Associates, MI Transportation Plan Freight Technical Report

4.11.2 Rail

In 2003, Michigan’s railroads carried nearly 120 million tons of freight, with an estimated value exceeding \$162 billion. In 2003, over 26 million tons of freight left Michigan by rail, with Transportation Equipment being the most common movement (36 percent by tonnage, 80 percent by value).

Illinois, Ohio, and Indiana are the leading rail freight destinations. Of nearly 42 million tons of inbound rail shipments, the greatest volume by weight is coal, which ranks eighth by value.

Rail intermodal shipments, including ocean and domestic containers and truck trailers loaded on rail flatcars, are most often used for consumer goods and subassembly components. Between 2001 and 2005, US railroad intermodal volumes grew by 32 percent, and in 2003 truck-rail, intermodal business became the number one source of railroad freight revenue. In 2003, Michigan's rail intermodal movements totaled 7.7 million tons, valued at over \$24 billion.

The map in **Figure 24** below shows the key rail freight corridors for goods moving in, out, within, and through Michigan in 2003. **Figure 24** also highlights the key role that Michigan plays in the national economy, as well as the significant volume of commerce being conducted between Michigan and its neighbors in the Great Lakes region.

Figure 24: Key National Corridors for Michigan Commodities Moving by Railroad



Source: Michigan Department of Transportation

4.11.3 Water

In 2003, Michigan's ports handled more than 78 million tons of freight valued at more than \$5 billion. Most of the waterborne commerce at Michigan's 40 cargo ports consists of bulk cargoes. Stone, sand, iron ore, and coal accounted for 86 percent of the freight total. Cement, petroleum,

and chemicals account for another 12 percent. These materials are used in the steel, construction, agriculture, and petroleum industries throughout the Great Lakes region. The steel industry alone accounts for about half of Michigan’s total waterborne commerce.

4.11.4 Air

Generally, air cargo services are provided for high-value and time-sensitive commodities to ensure secure, expeditious delivery. Air is often used to ship manufactured goods when problems arise with individual truck or rail shipments, or when mechanical failures occur. Three primary segments of the air cargo industry include integrated express service, commercial service, passenger airlines/freight forwarding, and all-cargo carriers.

4.12 Land Use

As Michigan’s land continues to be developed, the state’s population is living in less dense and more land-consuming settings. For example, Michigan’s average population density was 3.8 persons per-acre in the early 1980s and dropped to 2.8 person’s per-acre by the late 1990s. This trend is an indicator of the continued spread of “urban sprawl” in Michigan.

Urban sprawl is spreading throughout Michigan and driving increasing demand for transportation infrastructure.

Transportation and land use have a complex and synergistic relationship. Changes in transportation technology and availability can precipitate both positive and negative changes to land use patterns. Changes in land use patterns usually change the demand for transportation facilities and services. The evaluation of transportation problems therefore requires focusing not only on mobility and safety, but also on land use and access.

Institutional and statutory obstacles undermine coordinated land use/transportation planning in Michigan.

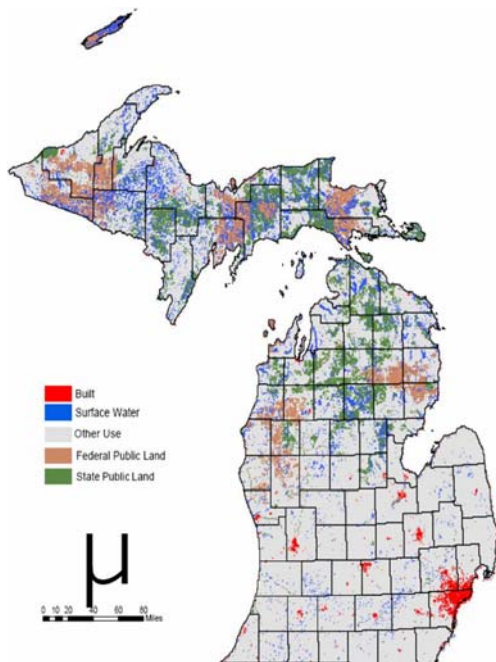
Michigan development patterns have been similar to those in much of the country. Like much of the US, with increasing personal wealth and the increasing modal shift to the automobile in the mid to late 1900s, notable land use changes have taken place in Michigan.

Laws affecting land use decision-making make inter-jurisdictional coordination difficult to achieve.

Most notable is the spreading urbanization, which both from rural residents moving closer to the cities for job opportunities and from people moving to suburbs from parts of the older urban core.

As shown in **Figures 25** and **26**, if current land use patterns continue, between 1.5 and 2 million more acres of land area will be urbanized in 2020. This is a 63–87-percent increase over 1990 levels and is as much land as served 9.2 million residents in 1978. If current land use patterns continue, by 2040, Michigan’s built or developed areas will increase by 178 percent. That would mean that 17 percent of Michigan would be developed, compared to the present nine percent.

Figure 25: Built Land Area in Michigan, 1980



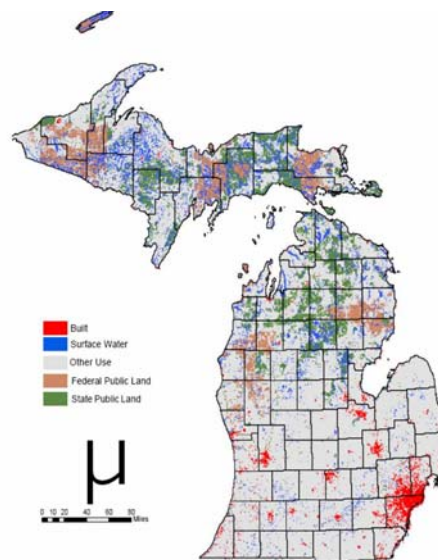
Source: Final Report, MI Land Resource Project, 2001

- There is a similar lack of vertical coordination between local, state, and federal governmental entities on land use planning and management. Laws affecting land use decision-making in Michigan make inter-jurisdictional coordination difficult to achieve as well. For example, some laws require planning for specific projects but not coordination between local master plans or transportation plans.

Developing a cooperative land use-planning framework that encourages considering the regional consequences of local decisions is an essential aspect of a regional cooperation agenda. When coupled with a regional approach to providing services, local governments are finding real savings and

- Since the early 1990s, however, various studies and efforts undertaken by and in the state of Michigan have pointed to a lack of interagency and inter-governmental coordination regarding land use.
- A key reason for the lack of land use coordination is primacy of home rule in Michigan. More than 1,800 units of local government, including cities, villages, townships, and counties, have legal authority to engage in land use planning and/or zoning in Michigan.
- Home rule/local control emphasizes independence, not inter-dependence; Michigan’s planning statutes encourage, but do not require, neighboring governmental units to communicate with each other during land use-planning processes.

Figure 26: Built Land Area in Michigan, 2020 Projected



Source: Final Report, MI Land Resource Project, 2001

making more efficient use of public investments. Combined or shared services, leveraged purchasing power, and joint equipment and facilities agreements can free capital for other financial needs.

4.13 Safety

The *Safety Technical Report* identifies the results of MDOT's FY 2005 safety program and its accomplishments. Preservation and the safety of Michigan's existing transportation system are MDOT's highest priorities. In 2005, MDOT invested more than \$1 billion on system preservation through the repair and maintenance of Michigan's roads and bridges. In addition, more than half the 2005 investment programmed for capacity improvements went toward preserving the existing roadway adjacent to those new lanes, thereby helping to grow Michigan's economy simultaneously through both preservation and capacity enhancement.

The investments in Michigan's transportation system also focused on a comprehensive safety program and increased emphasis on senior mobility and expanded work zone safety efforts. As part of MDOT's 2005 Highway Safety Program, \$58 million, or nearly 4.5 percent of the highway program, was committed to the design, construction, and placement of signs, pavement markings, guardrail, traffic signals, and other safety improvement projects on the state trunkline system. The funding of the department's Highway Safety Program has increased 47 percent since 1996.

MDOT has adopted the goal of reducing fatalities on all Michigan roadways by 2008. The 2004 statewide rate was 1.14 per 100 million vehicle-miles traveled while the nationwide average was 1.5. To maintain this goal by 2008 for all roadways, the safety program focused on the department's assets of traffic control devices and driver information systems in an effort to improve the safety of the driver, another asset.

As part of its Five-Year Plan, MDOT will continue with the current Traffic and Safety Program and its evaluation of devices in five identified areas: Senior Mobility, Traffic Operations, Pedestrians, Roadway Delineation, and the Safety Improvement Program. When additional funding sources have been identified, it is recommended to increase the Comprehensive Safety Program to \$73 million.

The department's return on its investment in the Traffic and Safety Program will be:

- Make Michigan's highway system one of the safest in the country;
- Raise Traffic and Safety equipment/material standards up to the rest of the country;
- Reduce crashes and fatalities; and,
- Improve Senior Mobility and Safety.

The Governor's Traffic Safety Advisory Commission (GTSAC) oversees and monitors implementation of these plans. The fatality rate for accidents is a major issue that was addressed by the commission. **Figure 27** provides a graphic depiction of fatalities from traffic accidents in Michigan.

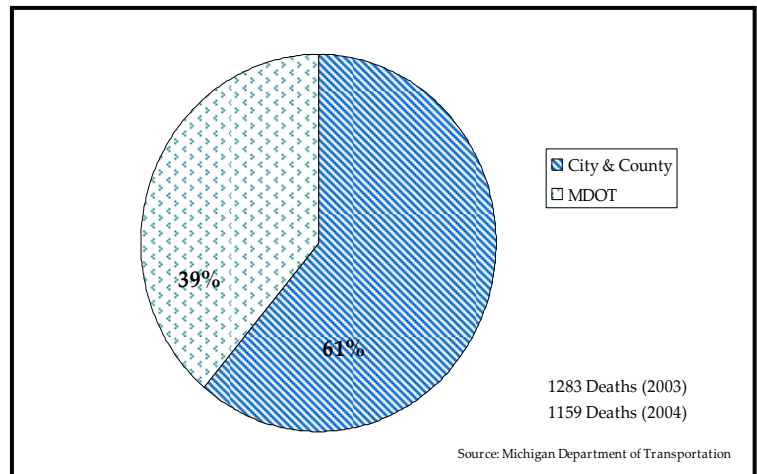
4.14 Security

The *Security Technical Report* presents an overview of the authority, responsibilities, programs, policies, strategies, and activities currently in place by MDOT and the state of Michigan to ensure that the Michigan Transportation System continues to operate without interruption. It addresses all modes of transportation and MDOT's preparedness to deal with security and emergency situations caused by "all hazards." The term "all hazards" (or multiple hazards) includes any incident, disaster or attack. The incident could be man-made (technological, act of terrorism), or an act of nature such as flooding, fog, or major snow and ice storms. It includes programs such as emergency response to crashes and weather events; programs, strategies, and activities focused on terrorism and acts of destruction; as well as programs, strategies, and activities designed to address multiple hazards.

MDOT has been involved in the state's traditional emergency management for more than 50 years. Early programs included the "civil defense plans." Following the events of September 11, 2001, MDOT updated and expanded its emergency preparedness programs and security role to cover all modes of transportation through the Transportation Risk Assessment and Protection (TransRAP) Team. The TransRAP Team also serves as the transportation subcommittee of the Michigan Critical Infrastructure Protection (CIP) Committee, an advisory panel reporting to the Michigan Homeland Protection Board created by Governor Granholm through Executive Order 2003-06.

MDOT's transportation security programs, strategies, and activities go beyond "guards and gates"; they are a multi-layered, "all hazards" approach. In general, MDOT's strategy is to prevent, respond, and recover. MDOT's strategy includes identifying potential targets (such as key bridges and high-volume roadways or transit facilities), working with its partners to assess and correct weaknesses, developing programs to strengthen and protect potential targets and points of entry into the state, and quickly and efficiently responding to and recovering from all hazards.

Figure 27: Michigan Traffic Deaths



MDOT's security strategy is "prevent, respond, and recover."

Security, by nature, often includes stopping or slowing travelers to inspect and confirm it is safe to move ahead. Transportation, by nature, is intended to move travelers without interruption. These two purposes can be in conflict. The strategies and approaches presented in the *Security Technical Report* reflect a balance between these competing purposes. MDOT's transportation security preparedness efforts are designed to address the physical security enhancements while continuing to facilitate mobility.

4.15 Environmental

MDOT deals with many environmental laws and regulations that touch every aspect of our operation. It is a continual challenge to develop a transportation system that is efficient, safe, and responsive to the needs of the user while being compliant with all environmental regulations and sensitive to the preservation of natural and cultural resources. The *Environmental Technical Report* identifies: 1) existing sensitive environmental resources in the state that include forests, parks, recreation areas, wildlife areas, water resources, farmland, threatened and endangered plant and animal species, air quality, and historic and archaeological sites; 2) how these resources may be impacted by transportation investments; 3) what current environmental policies, procedures, and strategies at the state and federal level affect the planning, design and construction of transportation systems; and, 5) how an integrated approach entails safeguarding the state's natural resources by managing the trade-offs between valuable activities and access to those activities regardless of travel mode.

The MDOT Project Planning Division in the Bureau of Transportation Planning is responsible for environmental compliance and ensuring that MDOT is a good steward of environmental resources. In addition, MDOT has several environmental stewardship efforts that help to protect and maintain existing ecosystems and mitigate for transportation system impacts. These include:

- In 2005, MDOT completed construction of its first two-wetland banks, creating a total of 80 acres of wetlands. This effort will ultimately create bank sites in most of Michigan's watersheds, benefiting both future projects requiring mitigation and the environment with the advanced construction of wetlands.
- MDOT supports research into various aspects of wetland creation and preservation, including the control of invasive species, Northern White Cedar Restoration, Forested Wetland Creation Research, and a Natural Wetlands Study.
- MDOT biologists review permit applications requesting use of state right-of-way for other activities; the biologists advise on ways to avoid, minimize, or mitigate damage to plants.
- MDOT staff have created guidance materials and training for maintenance staff to teach them how to manage endangered plants along our roads.

In 2005, MDOT completed construction of its first two-wetland banks.

- MDOT has created a plan to protect roadside habitat of the endangered Karner Blue Butterfly.
- MDOT supports research of the impact of road salts on wetlands and the use of rain gardens for improved water quality.

MDOT has created a plan to protect roadside habitat of the endangered Karner Blue Butterfly.

4.16 Finance

Purpose

The *Finance Technical Report* provides information on the federal and state laws that govern the collection and distribution of transportation revenues in the state of Michigan and provides an estimate of the funds available to the Michigan Department of Transportation (MDOT) to support its transportation system.

Key highlights of the report are provided in the following sections.

Federal and State Funding

Federal funding for improvements to the surface transportation system is largely derived from excise taxes levied on the sale of motor fuel, large trucks and trailers, truck tires and the use of heavy vehicles. These taxes are deposited in the Highway Trust Fund (HTF). The funds within the HTF are distributed to federal programs and to the states by formulas established in the authorizing legislation.

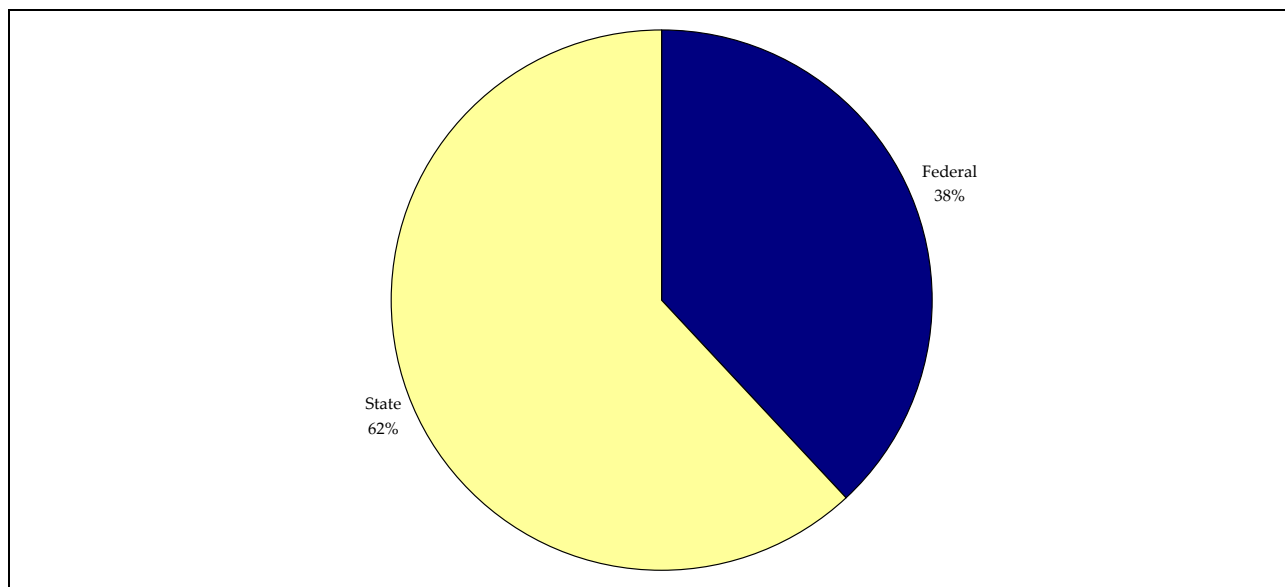
- Federal aid accounted for approximately 38 percent of all MDOT revenues in FY 2005.
- In 2005, the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) reauthorization was signed into law authorizing \$6.5 billion in apportioned funding for Michigan's transportation system for FY 2005 through 2009.
- SAFETEA-LU increased Michigan's rate of return on every dollar sent to the federal Highway Trust Fund Highway Account from 90.5 cents to 92 cents.
- SAFETEA-LU contained 171 earmarked transportation projects, with a value of \$643 million. SAFETEA-LU earmarks provided financial support for inter-city passenger, rail, and aviation projects and programs
- SAFETEA-LU contained about \$120 million in transit assistance for Michigan.

Sixty-two percent of MDOT's funding in 2005 was generated at the state level and managed through the Michigan Transportation Fund (MTF). The MTF is the distribution fund for transportation revenues. Public Act 51 of 1951 known as "Act 51," mandates how these funds are distributed and spent. The two main sources of state funding are vehicle registration taxes and motor fuel taxes.

- Michigan’s current gasoline tax rate is 19 cents per gallon. This tax is fixed per gallon of gasoline sold and is independent of the price of gasoline. The current diesel fuel tax rate is 15 cents per gallon.
- Act 51 mandates how transportation funds are distributed between units of government or between state, cities and counties and the order in which programs receive funding.
- The State Trunkline Fund (STF) receives 39.1 percent of the remainder of the MTF after several appropriations are made directly to specific programs and jurisdictions
- The Comprehensive Transportation Fund (CTF) receives up to 10 percent of the MTF, but only after the specific statutory deductions is completed. The resulting share for CTF is a little over eight percent.

Figure 28 shows the percent of federal and state transportation funding (all modes) that was appropriated to MDOT in FY 2005.

Figure 28: FY 2005 Federal and State Transportation Funding Appropriated to MDOT



Source: Michigan Department of Transportation

Table 2 summarizes the state and federal financial baseline amounts, which were used for forecasting future transportation revenue by mode. These amounts represent Fiscal Year 2005 funding levels with the exception of the state transit and state intercity passenger and freight program amounts, which were established using the Fiscal Years 2001 through 2005 annual average.

Table 2: State and Federal Financial Baseline Amounts, which were used for Forecasting Future Transportation Revenue by Mode (in Millions)

Program	Federal	State	Total
Highway Capital and Maintenance Program	\$689.5	\$751.3	\$1,440.8
Transit Program	\$23.8	*\$185.8	\$209.6
Intercity Passenger and Freight Program**	***\$1.4	* \$20.4	\$21.8
Aeronautics Program	\$103.4	\$11.0	\$114.7
Total MDOT Transportation Revenue	\$818.1	\$968.8	\$1,786.9

Source: Michigan Department of Transportation, Bureau of Transportation Planning, Multi-modal Transportation Services Bureau

* Calculated using FY 2001 through FY 2005 annual average.

** Includes Intercity Bus, Passenger Rail, Rail Freight and Marine/Port programs.

*** Dedicated entirely to the Intercity Bus program. No baseline revenue for the Passenger Rail, Rail Freight or Marine Port programs.

Federal and State Funding Trends

Federal and state funding for highways has grown over the last 20 years. Over the TEA-21 period 1998 - 2003, federal revenues to MDOT peaked in 2002. During the SAFETEA-LU time period, 2005 - 2009, federal revenues to Michigan are expected to increase at a rate of 3.6 percent. State revenue growth is largely a result of vehicle registration tax increases due to vehicle price inflation. However, fuel tax revenues have remained fairly level in recent years.

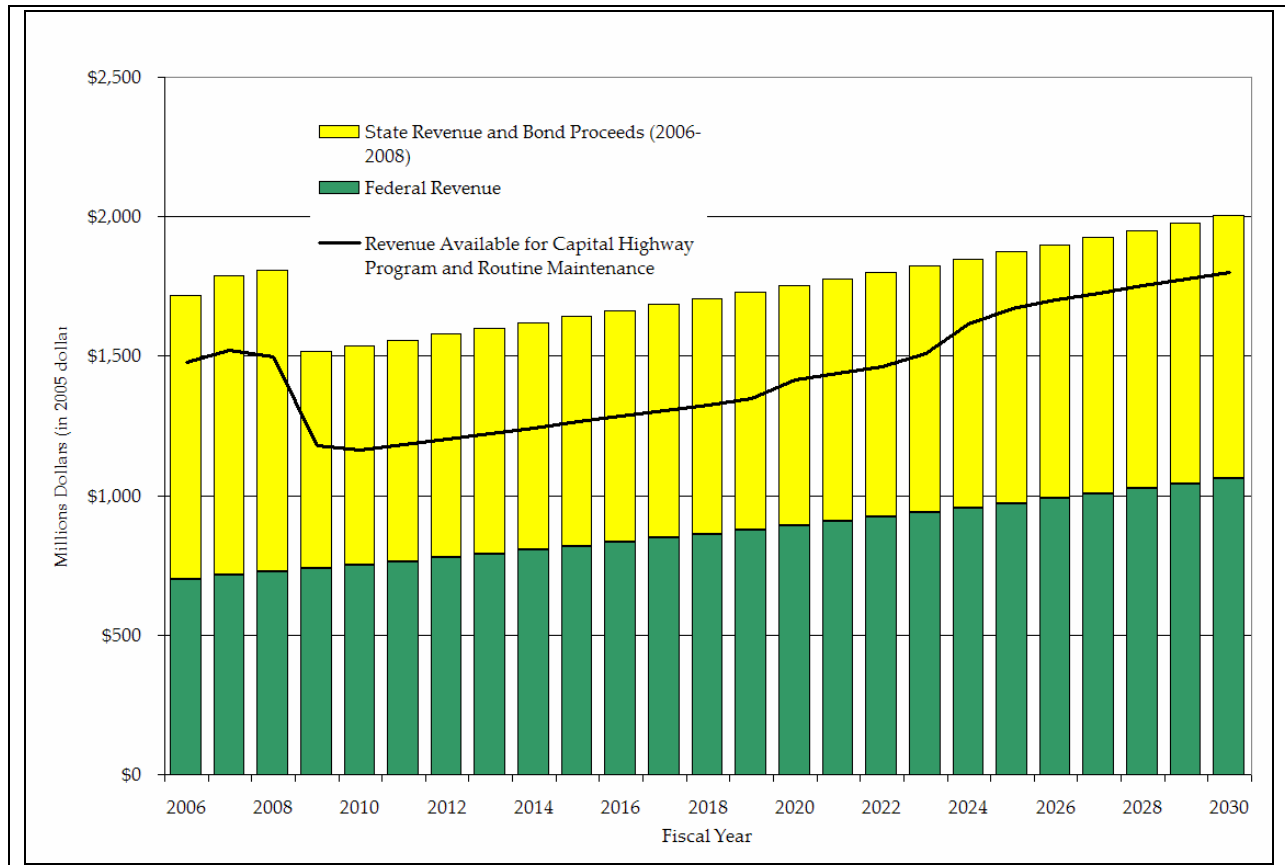
SAFETEA-LU provides a record level of federal transit funding, \$52.6 billion over six years (2004 - 2009), which is an increase of 46 percent over the amount in TEA-21. The Comprehensive Transportation Fund provides state funding for local transit, and a variety of other programs. While the revenues within the CTF have grown historically, they have been inconsistent in recent years; revenue was redirected to the General Fund and the STF. The reductions have impacted programs, which rely on CTF funding.

Revenues for aviation are largely from the federal government, through the Federal Aviation Administration. For FY 2006, Michigan is anticipating up to \$120 million in federal funds for airport capital improvements and development. The State Aeronautics Fund is the state source of funds for aviation projects at Michigan airports. The aviation fuel excise tax generates the greatest share of revenue to the fund. At three cents per gallon, the tax has not been increased since its inception.

Federal and State Revenue Forecasts

Fiscal Year 2005 revenues and past trends by mode were used as a basis for future funding projections. **Figure 29** reflects the total anticipated federal and state revenue forecast, along with anticipated revenues available for the Capital Highway Program and Routine Maintenance.

Figure 29: Total Anticipated Federal and State Revenue Forecast



Source: Michigan Department of Transportation

Table 3 summarizes the total (state and federal) forecasted transportation revenues by mode available in the year 2030.

- Federal highway revenues are expected to increase at an annual rate of 4.9 percent.
- State highway revenues (excluding bond revenues) are expected to increase at an annual rate of four percent.
- Federal transit and intercity/freight revenues are expected to increase at an annual rate of 4.3 percent.
- State transit and intercity/freight revenues are expected to increase at an annual rate of three percent.

Table 3: Total (State and Federal) Forecasted Transportation Revenues by Mode Available in the Year 2030 (in Millions)

	FY 2006 – FY 2030 Estimate		
	Federal	State	Total
Highway Program	\$21,726.5	\$21,179.8	\$42,906.3
Transit Program	\$696.0	\$4,716.9	\$5,412.9
Intercity Passenger and Freight Program*	**\$41.1	\$517.4	\$558.5
Aeronautics Program	\$1,791.0	\$219.5	\$2,010.5
Total MDOT Transportation Revenue Forecast	\$24,254.6	\$26,633.6	\$50,888.2

Source: Michigan Department of Transportation, Bureau of Transportation Planning
Multi-modal Transportation Services Bureau, Aviation Services Division

* Includes Intercity Bus, Passenger Rail, Rail Freight and Marine/Port programs.

** Forecast dedicated entirely to the Intercity Bus program. No forecasted revenue for the Passenger Rail, Rail Freight or Marine Port programs.

Long-Range Transportation Revenue Issues

Federal and state revenues are subject to unforeseen changes in the economy, unforeseen changes in policy direction and changes in technology. These unknowns are difficult to quantify but certainly could affect the forecasts within this report. Some of the long-range transportation issues noted in this report include:

- The Federal Highway Trust Fund will be in deficit by the year 2010 unless changes are made in the federal funding structure.
- Changes in automotive fuel efficiency (and subsequent fuel tax revenues) may force changes in how transportation revenues need to be collected.
- The erosion of purchasing power for transportation needs due to the lack of tax indexing at the federal and state level.



Chapter 5

Conditions and Performance of the Transportation System

5.1 Pavement Condition

Maintaining the condition of Michigan’s highways and bridges is critical to ensure responsible stewardship of the state’s transportation assets and support system performance in the long-term. Table 4 shows the lane miles where today’s pavement condition must be improved to meet Michigan’s pavement goals of 85-percent good for non-freeway facilities and 95-percent good for freeway facilities.

Table 4: Number of Lane Miles That Need Improvement to Meet Pavement Goals

<i>Estimated Backlog Reconstruction Needs 2005</i>	<i>Reconstruction Lane Miles</i>		<i>Total Backlog Reconstruction Lane Miles</i>	<i>Total System Lane Miles by Region</i>	<i>Regions as a Percentage of Statewide Need</i>
	<i>Freeway</i>	<i>Non-Freeway</i>	<i>Lane Miles</i>	<i>Lane Miles</i>	<i>Reconstruction</i>
MDOT Bay Region	145	42	188	4,272	23.2%
MDOT Grand Region	69	8	77	2,771	9.6%
MDOT Metro Region	161	116	276	4,436	34.2%
MDOT North Region	32	19	51	4,572	6.3%
MDOT Southwest Region	64	22	85	3,433	10.6%
MDOT Superior Region	11	47	57	3,960	7.1%
MDOT University Region	62	11	73	4,052	9.1%
Statewide Total	543	264	807	27,496	100.0%

Source: Michigan Department of Transportation Sufficiency Data, 2005

Note: Lane miles may differ slightly from Highway Performance Monitoring System. (Different source)

5.2 Bridges

Like highways, Michigan's bridges require ongoing rehabilitation, replacement, and maintenance to maintain desired conditions and support system performance. MDOT estimates that 410 freeway and 54 non-freeway bridges need rehabilitation or replacement today. These bridges represent MDOT's backlog in bridge replacement/rehabilitation and preventive maintenance needs. This backlog is summarized by MDOT region in **Table 5**.

Table 5: Number of Bridges that Need Improvement to Meet Bridge Goals

<i>Estimated Backlog Bridge Needs 2005</i>	<i>Bridge Replacements</i>		<i>Bridges Requiring Preventative Maintenance</i>		<i>Total Bridges with Existing Needs in 2005</i>	
	<i>Freeway</i>	<i>Non-Freeway</i>	<i>Freeway</i>	<i>Non-Freeway</i>	<i>**Replacement</i>	<i>Maintenance</i>
MDOT Bay Region	103	32	67	3	135	70
MDOT Grand Region	6	0	54	3	6	57
MDOT Metro Region	192	14	83	2	206	85
MDOT North Region	0	0	11	2	0	13
MDOT Southwest Region	39	0	39	3	39	42
MDOT Superior Region	0	0	2	3	0	5
MDOT University Region	70	8	57	2	78	59
Statewide Total	410	54	313	18	464	331

Source: Michigan Department of Transportation

**Replacement includes Replacement and Rehabilitation

5.3 Public Transit

To broadly measure trends in transit systems performance, the study team examined changes in key indicators typically used in the public transportation industry. The data include performance measures as reported in the National Transit Database (NTD), including agencies that reported to the NTD only.

The condition of the public transportation fleet statewide, as measured in the NTD by the average age of the vehicles and usage rates, has remained largely steady between 1996 and 2004. As shown in **Table 6**, the average age of buses shows a modest improvement in the age of the vehicles between 1996 and 2004. In 1996, the average age of the fleet was 9.1 years, decreasing to 6.4 in 2001 (suggesting some new vehicles entering the fleet), and increasing again in 2004 to 7.9. Also shown in **Table 6**, the age of the demand-response vehicle fleet is virtually unchanged between the design years with 4.2 years in 1996 and 4.3 years in 2004.

Table 6: Transit Fleet Size and Average Age in Years

	<i>Fleet Size</i>				<i>Average Age of Fleet in Yrs</i>	
	<i>Bus</i>	<i>Demand-Response</i>	<i>Light Rail</i>	<i>Total</i>	<i>Bus</i>	<i>Demand-Response</i>
1996	1,461	458		1,919	9.1	4.2
2001	1,738	863	12	2,613	6.4	3.6
2004	1,586	910	12	2,508	7.9	4.3

Source: Federal Transit Administration National Transit Database

Note: Includes Michigan transit agencies reporting to NTD at year shown only.

Usage indicators such as peak-to-base ratio of transit vehicles needed for regular service and the percentage of spare vehicles available to operators suggest modest improvements in the period between 1996 and 2004. The average peak-to-base ratio in 1996 was 1.6, 2004 shows improvement to 1.4 (see Table 7). In 1996, on average, Michigan operators had 26-percent spares; this increased to 30 percent in 2004, exceeding the FTA recommended industry guideline of 20 percent. Michigan's percent spare ratios reflect Michigan's smaller systems, where spare ratios tend to be higher, as well as overall effective management of bus and demand-response fleet. The percent of spares for the demand-response fleet shows similar patterns - operators had a spare rate of approximately 27 percent in 1996 and 2004.

Table 7: Transit Fleet Vehicle Usage

	<i>Average Peak-to-Base Ratio</i>		<i>Average Percent Spares</i>	
	<i>Bus</i>	<i>Demand-Response</i>	<i>Bus</i>	<i>Demand-Response</i>
1996	1.6	n/a	26.5	26.9
2001	1.4	n/a	19.8	22.3
2004	1.4	n/a	30.3	27.3

Source: Federal Transit Administration National Transit Database

Note: Includes Michigan transit agencies reporting to NTD at year shown only.

Does not include light rail vehicles.

5.4 Operational Performance of the System

5.4.1 Highways

The operational performance of the system pertains to the mobility provided by the system in all of its components to connect users with activities. The mobility available on the highway and transit components of Michigan's transportation system are two key aspects of operational

performance that lend themselves to analysis in this report. If MDOT were to remedy today’s congestion by adding lane miles to the trunkline system, it would require adding 722 lane miles of trunkline freeway and 1,387 miles of trunkline non-freeway to the statewide system. It would increase the overall size of the trunkline system by more than seven percent. **Table 8** shows the number of lane miles that would need to be added to Michigan’s trunkline system to remedy today’s congestion by adding lanes to the trunkline system.

Table 8: Number of Lane Miles Needed to Remedy Congestion

<i>Estimated Backlog</i>	<i>Expansion Lane Miles for Congested Facilities in 2005</i>		<i>Total Backlog for Expansion Lane Miles</i>	<i>Total System Lane Miles by Region in 2005</i>	<i>Regional Shares of Overall Statewide Increases In Lane Miles</i>
	<i>Freeway</i>	<i>Non-Freeway</i>	<i>Lane Miles Added</i>	<i>Lane Miles</i>	<i>% of Statewide Lane Miles Added</i>
MDOT Bay Region	41	130	171	4,272	8.1%
MDOT Grand Region	62	201	262	2,771	12.4%
MDOT Metro Region	417	285	702	4,436	33.3%
MDOT North Region	3	270	273	4,572	13.0%
MDOT Southwest Region	29	204	233	3,433	11.1%
MDOT Superior Region	0	43	43	3,960	2.1%
MDOT University Region	170	254	423	4,052	20.1%
Statewide Total	722	1,387	2,109	27,496	100.0%

Source: Michigan Department of Transportation Sufficiency Data, 2005

Note: Lane miles may differ slightly from Highway Performance Monitoring System. (Different source)

5.4.2 Fixed-Route Transit

As shown in **Tables 9 and 10**, for fixed-route bus services in the state of Michigan, indicators of service efficiency and cost-effectiveness increased between 1996 and 2004, likely reflecting a combination of inflation as well as some real increases in both operating and capital expenses. It is also noteworthy that two of the key costs driving transit-operating expenses increased significantly during this time period: insurance and fuel. **Table 9** shows that corresponding indicators relating to unlinked passenger trips shows increases in costs between 1996 and 2001, followed by decreases in vehicle revenue miles and revenue hours. This data suggests that after 2001 service effectiveness improved with more passengers served per mile and per hour. Statewide unlinked passenger trips per vehicle revenue hour were marginally lower in 2004 (\$20.15) than in 1996 (\$20.39).

Table 9: Fixed Route Bus Service Efficiency

	<i>Vehicle-Revenue Mile</i>	<i>Average Annual Percent Change</i>	<i>Vehicle-Revenue Hour</i>	<i>Average Annual Percent Change</i>	<i>Passenger Mile</i>	<i>Average Annual Percent Change</i>	<i>Unlinked Passenger Trip</i>
1996	\$4.23		\$56.98		\$0.77		\$2.99
2001	\$4.88	3.1%	\$64.72	2.7%	\$0.95	4.5%	\$3.73
2004	\$5.56	4.7%	\$74.45	5.0%	\$1.20	9.0%	\$4.60

Source: Federal Transit Administration National Transit Database

Note: Includes Michigan transit agencies reporting to NTD at year shown only. Does not include light-rail vehicles.

Table 10: Fixed Route Bus Service Cost-Effectiveness

	<i>Vehicle-Revenue Mile</i>	<i>Average Annual Percent Change</i>	<i>Vehicle-Revenue Hour</i>	<i>Average Annual Percent Change</i>
1996	\$1.54		\$20.39	
2001	\$1.63	1.3%	\$20.69	0.3%
2004	\$1.58	-1.1%	\$20.15	-0.9%

Source: Federal Transit Administration National Transit Database

Note: Includes Michigan transit agencies reporting to NTD at year shown only. Does not include light-rail vehicles.

5.4.3 Demand-Response Transit

Similar to the performance indicators for fixed-route service, the demand-response data also suggests increasing operating cost ratios between 1996 and 2004. Indicators of service effectiveness, however, suggest improvement between 1996 and 2004; both unlinked passenger trips per vehicle-revenue mile and per vehicle-revenue hour were lower in 2004 than in 1996, suggesting improved service effectiveness. This data is shown in **Tables 11 and 12**. Numbers are rounded.

Table 11: Fixed Route Bus Service Efficiency

	<i>Vehicle-Revenue Mile</i>	<i>Average Annual Percent Change</i>	<i>Vehicle-Revenue Hour</i>	<i>Average Annual Percent Change</i>	<i>Passenger Mile</i>	<i>Average Annual Percent Change</i>	<i>Unlinked Passenger Trip</i>
1996	\$2.57		\$34.65		\$2.23		\$13.53
2001	\$3.54	7.6%	\$45.61	6.3%	\$3.20	8.7%	\$17.79
2004	\$3.98	4.2%	\$55.58	7.3%	\$3.54	3.5%	\$20.56

Source: Federal Transit Administration National Transit Database

Note: Includes Michigan transit agencies reporting to NTD at year shown only.

Table 12: Fixed Route Bus Service Cost-Effectiveness

	<i>Vehicle-Revenue Mile</i>	<i>Average Annual Percent Change</i>	<i>Vehicle-Revenue Hour</i>	<i>Average Annual Percent Change</i>
1996	\$0.23		\$3.05	
2001	\$0.22	-2.4%	\$2.94	-3.6%
2004	\$0.21	-4.0%	\$2.98	1.4%

Source: Federal Transit Administration National Transit Database

Note: Includes Michigan transit agencies reporting to NTD at year shown only.

5.4.4 Safety Performance

The *Safety Technical Report of MI Transportation Plan* explores safety performance in depth. Overall, crashes and fatalities in Michigan have decreased in the 10-year period from 1994 to 2004, even as vehicle registrations, population, and vehicle miles traveled have increased. Improvements in Michigan's safety performance are supported by education, enforcement, and engineering solutions, which include but are not limited to the reconstruction of trunkline roadways, where appropriate.

5.5 Performance Measures for 2030

5.5.1 MI Transportation Plan Goals

MI Transportation Plan sets forth four major goal areas, each with its associated objectives and performance measures:

1. Stewardship
2. Safety and Security
3. System Improvement
4. Efficient and Effective Operations

5.5.1.1 Goal Area 1: Stewardship

Preserve transportation system investments, protect the environment, and utilize public resources in a responsible manner. The Stewardship Goal focuses on MDOT's roles and responsibilities associated with being good stewards of Michigan's resources. The goal is based on a holistic view of resources to include funding, physical transportation assets (e.g., highways, transit systems, and airports), the physical and human environment, and the Michigan economy. The objectives under the Stewardship Goal incorporate issues and topics that were addressed in the following current *MI Transportation Plan* goal areas: Preservation, Strengthening the State's Economy, Transportation Services Coordination, Environment and Aesthetics, and Land Use Coordination.

5.5.1.2 Goal Area 2: 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 both traditional safety initiatives aimed at reducing fatalities, injuries, and crashes/incidents, as well as efforts to address new transportation system security needs in the wake of 9/11 and increased threat from terrorism.

5.5.1.3 Goal Area 3: System Improvement

Modernize and enhance the transportation system to improve mobility and accessibility. The System Improvement Goal emphasizes the various areas where MDOT can either make direct investments or support and encourage investments by other entities to improve the efficiency and effectiveness of Michigan's transportation system. The objectives under the System Improvement Goal focus on improvements to modernize, expand, and connect the system to support economic growth and better facilitate the movement of goods, people, and services. The goal area also identifies the importance of considering local values during the planning, design, and implementation of system improvements.

5.5.1.4 Goal Area 4: 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 get the greatest possible performance from Michigan's existing transportation assets and future system improvements. The goal area also addresses the importance of operating a transportation system and providing services to ensure citizens and stakeholders have modal choices. The recommended objectives under this area focus on the application of technology, stronger coordination and cooperation with public and private sector partners, and improved intermodal transfers.

5.5.2 MI Transportation Plan Performance Measures

Based on the goals and objectives of the *MI Transportation Plan*, performance measures were identified to benchmark and quantify how MDOT's programs satisfy the goals and objectives. The measures are overarching measures of the system impact on Michigan, and as mode-specific measures for components of the transportation system.

5.5.2.1 Overarching Measures

The following measures strive to quantify MDOT's or the Michigan transportation system's performance at either a multi-modal or total program level. In some cases, the measures are a roll-up of program-level measures or also apply to specific programs.

- Economic Impact
- Safety
- Customer/Stakeholder Satisfaction Rating
- System Integration
- Congestion and Delay

5.5.2.2 Highway and Bridge Measures

The following measures are ways to quantify MDOT's highway and bridge conditions and performance. They support programmatic targets for roadway preservation, modernization, and expansion in the plan.

- Roadway Condition
- Bridge Condition
- Safety
- Congestion and Delay
- Access Management

5.5.2.3 Public Transportation Measures

The following measures are ways to quantify the conditions and performance of MDOT's public transportation infrastructure and services. They support the plan's emphasis on a seamless and multi-modal system.

- Transit Fleet Condition
- Transit Safety
- Transit System Coverage

5.5.2.4 Aviation Measures

The following measures are used to quantify issues accounting for needs on the state's aviation infrastructure. They support the plan's understanding of aviation needs and requirements.

- Runway Pavement Condition
- Aviation Security
- Aviation System and Operations Improvements

5.5.2.5 Bike/Pedestrian Measures

The following measures are areas that quantify the performance of non-motorized bicycle and pedestrian infrastructure. They support the plan's emphasis on a seamless and multi-modal system.

- Bike/Pedestrian Safety
- Bike/Pedestrian Accessibility

5.6 2030 Conditions, Performance, and Deficiencies

In order to maintain Michigan's pavement condition goals to the year 2030, additional investment will be required. **Table 13** shows the expected accruing needs for pavement resurfacing and preventive maintenance in Michigan by MDOT region to the year 2030.

Table 13: 2030 Accruing Needs for Pavement Resurfacing and Preventive Maintenance

<i>Estimated Accruing Reconstruction Needs to 2030</i>	<i>Reconstruction Lane Miles</i>		<i>Total Accruing Reconstruction Lane Miles</i>	<i>Total System Lane Miles by Region</i>	<i>Regions as a Percentage of Statewide Need</i>
	<i>Freeway</i>	<i>Non-Freeway</i>	<i>Lane Miles</i>	<i>Lane Miles</i>	<i>Reconstruction</i>
MDOT Bay Region	917	353	1,270	4,272	14.8%
MDOT Grand Region	656	205	861	2,771	10.0%
MDOT Metro Region	1,708	577	2,285	4,436	26.6%
MDOT North Region	342	465	807	4,572	9.4%
MDOT Southwest Region	920	274	1,195	3,433	13.9%
MDOT Superior Region	183	467	650	3,960	7.6%
MDOT University Region	1,238	279	1,517	4,052	17.7%
Statewide Total	5,964	2,620	8,584	27,496	100.0%

Source: Michigan Department of Transportation Sufficiency Data, 2005

Note: Lane miles may differ slightly from Highway Performance Monitoring System. (Different source)

In addition to the backlog in bridge replacement and maintenance needs, to achieve MDOT's bridge goals will require additional bridge replacement/ rehabilitation and maintenance activities to the year 2030. **Table 14** summarizes the expected accruing bridge replacement and maintenance activities needed to consistently achieve MDOT's bridge condition goals to the year 2030. In the time horizon of *MI Transportation Plan*, approximately 2,290 of Michigan's trunkline bridges will need replacement or rehabilitation, and 2,335 will require preventive maintenance projects. Michigan's non-pavement highway system assets include carpool lots, rest areas, drainage structures, and noise walls. Their condition is important both for the integration of the system and for the performance of Michigan's roadways. Non-motorized system conditions are measured primarily by the prevalence of four-foot-wide shoulders on Michigan's non-freeway trunklines. Four-foot-wide shoulders have increased from 2,337 route miles of Michigan's system in 2001, to 2,561 in 2005.

Table 14: 2030 Accruing Bridge Replacement and Maintenance Activities

<i>Estimated Accruing Bridge Needs to 2030</i>	<i>Bridge Replacements</i>		<i>Bridges Requiring Preventive Maintenance</i>		<i>Total Bridges with Accruing Needs to 2030</i>	
	<i>Freeway</i>	<i>Non-Freeway</i>	<i>Freeway</i>	<i>Non-Freeway</i>	<i>**Replacement</i>	<i>Maintenance</i>
MDOT Bay Region	269	85	282	78	354	360
MDOT Grand Region	262	54	275	50	316	325
MDOT Metro Region	581	66	610	61	647	671
MDOT North Region	99	70	104	65	169	169
MDOT Southwest Region	196	61	205	56	257	261
MDOT Superior Region	19	119	20	109	138	129
MDOT University Region	340	69	357	63	409	420
Statewide Total	1,766	524	1,853	482	2,290	2,335

Source: Michigan Department of Transportation

**Replacement includes Replacement and Rehabilitation

Improvements in transit, non-motorized facilities, and carpool lots and changes in land use may all be leveraged to improve mobility on the integrated system. The *Integration Technical Report of MI Transportation Plan* addresses possible sources of leverage to use improvements on different components to moderate the needs for costly expansion projects. MDOT's leverage in delivering an integrated system is important both because of users' need for an integrated system based on the 2030 Preferred Public Vision of *MI Transportation Plan*, and because of the costs of adding lanes to MDOT's trunkline system. **Table 15** shows the number of new lane miles that would have to be added to the trunkline system to provide uncongested operational performance, if roadways alone must be improved to carry increase in traffic to the year 2030 (this is in addition to the lane miles needed to address the expansion backlog shown in the previous table).

Table 15: Number of New Lane Miles Needed to Provide Uncongested Operational Performance

<i>Estimated Accruing Expansion Needs to 2030</i>	<i>Expansion Lane Miles for Congested Facilities to 2030</i>		<i>Total Backlog for Expansion Lane Miles</i>	<i>Total System Lane Miles by Region in 2005</i>	<i>Regional Shares of Overall Statewide Increases In Lane</i>
	<i>Freeway</i>	<i>Non-Freeway</i>	<i>Lane Miles Added</i>	<i>Lane Miles</i>	<i>% of Statewide Lane Miles</i>
MDOT Bay Region	1	174	175	4,272	7.9%
MDOT Grand Region	60	235	295	2,771	13.4%
MDOT Metro Region	349	403	751	4,436	34.0%
MDOT North Region	0	209	209	4,572	9.5%
MDOT Southwest Region	3	185	188	3,433	8.5%
MDOT Superior Region	0	28	28	3,960	1.2%
MDOT University Region	230	332	562	4,052	25.5%
Statewide Total	642	1,564	2,207	27,496	100.0%

Source: Michigan Department of Transportation Sufficiency Data, 2005

Note: Lane miles may differ slightly from Highway Performance Monitoring System. (Different source)

If lane miles are added to address congestion on state roadways to the year 2030, the addition of 2,207 new lane miles would increase Michigan’s lane miles by an additional eight percent (which would combine with the 7.5-percent increase in lane miles for today’s congestion for an overall 2030 system with 15 percent more lane miles than exist today). More than one-third of these new lane miles would have to be added in the Metro Region, with the least amount of additional lane miles added in the lesser densely populated Bay and Superior regions.



Chapter 6

Systems Integration

6.1 Introduction

One goal of *MI Transportation Plan* is to present the different aspects of the transportation system in an integrated manner. The technical reports of *MI Transportation Plan* describe the separate programs and infrastructure assets that make up the system. In reality, however, all of Michigan's transportation assets and programs are part of one system, the integrated transportation system.

What is an integrated transportation system? The public, when using transportation, does not think in terms of separate sets of assets (highways, transit, non-motorized, aviation, intercity passenger, freight, and so on). For the user, there is simply a need to travel from one place to another, whether it is to participate in an activity or to move goods.

An integrated transportation system allows users to easily and seamlessly travel from one place to another, or move goods from one place to another, using a variety of modes.

For example, if a user needs to get to work and does not own a car, he/she may walk on a sidewalk to the bus stop, board the bus, ride to a stop near work, cross the street at the crosswalk and get to work. The trip works for the user if it goes well: the walk to the bus is safe and easy, the bus is on time, the bus does not crash or break down, and it is possible to safely cross the street. If any of these conditions are not met, the trip really does not work. The system is not fully integrated if any one transportation element fails to perform.

From the user's perspective, the need for an integrated system is clear. Developing and delivering an integrated transportation system, from government's perspective, is more challenging for a variety of reasons. Legal requirements, safety or engineering requirements, funding considerations, land use planning, or the need for coordination among civil jurisdictions may inhibit the ability to provide an integrated transportation system. Overcoming these limitations is no small task.

Within the context of *MI Transportation Plan*, the *Integration Technical Report* examines a very complicated set of factors that impact the public's need for and the state's ability to deliver an integrated transportation system. The report offers concepts and principles for decision-making that can support an integrated system at the state level. The report is not intended as a stand-alone document; it is most meaningful when taken in the greater context of *MI Transportation Plan* and the other technical reports that support it.

This is a synopsis of the information in the *Integration Technical Report*; for a complete understanding of the principles offered here, it may be necessary to read the full report.

6.2 The Integrated System and Michigan's Economy

Michigan's existing transportation network has functioned well for many years. Businesses rely on transportation to help them produce and ship goods, or perform services. People use transportation to shop, work, recreate, attend school, visit the doctor, as well as many other daily activities.

A more fully integrated transportation system can boost Michigan's economic vitality. An integrated variety of transportation modes will encourage the economic participation of people and businesses in a greater number and variety of activities, all of which have the potential to enhance Michigan's economic performance. An integrated transportation system can also save money by reducing transportation costs or increasing efficiency. The more integrated the transportation system is, the easier and more cost-effective it is for people and businesses to participate in the activities that drive Michigan's economy.

6.3 The User's Need for an Integrated System

Some transportation user needs are more complex than others are. A person with simple transportation requirements may drive straight to a workplace with on-site parking, eat lunch in the office or work through lunch, and then drive straight home again at the end of the day, encountering only the roadway aspect of the transportation system.

A person with more complex transportation needs may drive to work, wait at a railroad crossing while a train passes, park a few blocks away, walk to the office, take a break at lunch to go jogging, walk to a market near work on the way back to the car at the end of the day, and then drive home. This person's transportation requirements are more complex. The person with complex transportation needs requires more aspects of infrastructure and services for the system to work. Some aspects of the user's complex needs arise from necessity (crossing the railroad tracks, parking a few blocks from the office) while others arise from user choices (jogging at lunch, walking to the market). Delivering an integrated system becomes more challenging in locations where transportation user needs are more complex.

6.4 Activities Supported by an Integrated System

Just like transportation users, some activities have more complex transportation requirements than others. Some activities, like a doctor's visit, are essential, and must occur using whatever transportation alternative is most directly available. This activity will probably occur in one place and will be directly accessed by the person's primary mode of transportation. Even the doctor and his staff probably used a single primary means of transportation to get to the office. Office supplies probably arrive by a single primary mode of transportation: a single unit delivery truck. Overall, this activity involves limited transportation choices and a limited number of aspects of the transportation system. For that reason, it is seen as having less complex transportation requirements.

Other activities rely on more complex transportation use, especially discretionary activities that may or may not occur, depending on how convenient or accessible the activity is. For example, if an individual plans to attend a sporting event, he/she could simply drive to the event and drive home. However, if the transportation options are there, that individual may choose to get off the highway to stop at a restaurant on the way to the arena, ride a shuttle to the game, and then decide to unwind at a club across the street from the arena before going home. The social and recreational activities (eating at a restaurant, attending the sporting event, socializing at the club) are part of a chain of activities where decisions are made somewhat spontaneously about where to go, when, and how. The chain of activities involves a wider range of transportation choices (stopping at the restaurant, walking to the club). The chain is further complicated when one considers that the opposing sports team probably flew to town for the game, or that during the winter the restaurant uses fresh produce trucked in from the South.

This example also helps clarify how an integrated transportation system can better support economic activity. If any aspect of the transportation system makes it more difficult or less desirable, for an individual to engage in the chain of activities, he/she may simply not bother to use them. The economic activity that might occur is lost.

6.5 Integrating Activity Centers and Corridors

An activity center exists wherever a large number of transportation users and a large variety of activities (businesses, education, shopping, health care, industry, recreation) are clustered. Corridors connect activity centers with each other and with users outside the activity center.

Delivering an integrated system is far more challenging in activity centers because the transportation users and their activities have more complicated transportation requirements. Integrated connections are needed at the corridor and throughout the activity center. Activity centers require a greater emphasis on modal balance and integration to ensure the best possible access to the widest variety of activities. Integrating transportation in an activity center means making decisions about how to arrange and deliver a transportation system that connects to the corridor and meets the needs of a variety of potential users and activities.

6.6 Removing Barriers and Realizing Opportunities for Integrated System Performance

A performance “barrier” is a condition on the transportation system that makes it more difficult, more expensive, or impossible for an activity to take place. Suppose, for example, a person drives on a congested road to a unique market, only to find that the nearest parking is across the street. The congestion on the road to the market and lack of a crosswalk or sidewalk could be barriers to system performance. The individual may find it harder, more dangerous, or more expensive to go to the market. Even if the crosswalk exists, but the road is highly congested, there is still a performance barrier.

“Opportunities” are conditions on the transportation system that make it easier, less expensive, or possible for an activity to take place that may not otherwise occur. For example, if a scenic byway could attract people from throughout the nation to vacation, hike, and walk in Michigan, the byway provides an opportunity to stimulate tourism, recreational, and health-related activities that would otherwise not occur.

Removal of transportation performance barriers and the realization of opportunities are key to improving the integrated system performance and fulfilling Michigan’s economic potential.

6.7 Funding the Integrated System

Transportation users, desire seamless transportation access to activities, but the programs and revenues supporting Michigan’s transportation system are not structured that way. Instead, they are geared to particular modes or particular aspects of transportation. For example, separate federal and state programs support roadways, airports, and transit. Some federal funds are geared to particular programs like safety, or improving air quality by reducing congestion.

There are not sufficient revenues overall to invest as much as might be desirable in all aspects of the transportation system. It is possible, however, to leverage transportation investments to integrate the system more completely. This can be done by investing in work that directly or indirectly provides benefit to more than one mode. A leveraged investment is one that improves the performance of more than one mode at the same time, or reduces the need for investment elsewhere in the integrated transportation system.

For example, investment in a roadway preservation project may also provide an opportunity to improve crosswalks and pedestrian access to transit stops. The roadway project may also improve the safety or reliability of transit and commercial vehicles. Investing funds where there is a high potential for leverage is a way to support the integrated system.

6.8 Decision Principles for the Integrated System

An integrated transportation system to achieve the Preferred Vision and to serve users may be achieved by making planning decisions consistent with systems integration. At the highest level, the first decision pertains to the investment of statewide revenues into funding categories and programs that can be leveraged to support integrated projects and programs. Key principles for statewide investment decisions are:

- Invest financial resources to preserve existing system components;
- When improving a system component, consider and make allowances for improvements that may be needed in integrated components;
- Seek investments that provide leverage, remove barriers, realize opportunities, and improve integration for multiple components; and,
- Assess performance objectives with respect to all modes.

When funding is available, additional decisions can be made about how and where to implement projects to better integrate transportation elements in Michigan's corridors and activity centers. These decisions should take into account the complexity of the transportation needs of the users and activities affected by the project.

That assessment should occur in the scoping of transportation improvements. Key principles for corridor implementation strategies are:

- Implement strategies one project at a time;
- Assess the complexity of user needs and activities when conducting corridor studies;
- Allow greater flexibility and innovation in funding for needs that are more complex;
- Assess how connections to and within complex activity centers can be improved for overall corridor performance;
- Recognize that investments in one mode on a complex corridor or in an activity center are likely to generate needs or benefits on other modes;
- Coordinate with partners and stakeholders to understand corridor complexity and maximize financial and performance leverage for other modes or jurisdictions; and
- Consider linkages between land use and performance of system components.

Integrating transportation hinges on the ability to keep all potential transportation users in mind when making choices about how to invest resources, implement programs, or develop projects. Ultimately, the development and delivery of an integrated transportation system occurs one project at a time, one decision at a time.

MI Transportation Plan provides decision principles needed to realize the vision of a fully integrated system.



Chapter 7

Gap Analysis and Investment Packages

Purpose

An assessment of state transportation revenues, needs and gaps under MDOT's current revenue and investment trends was conducted. The statewide long-term transportation needs for the department were split and costed into eight categories:

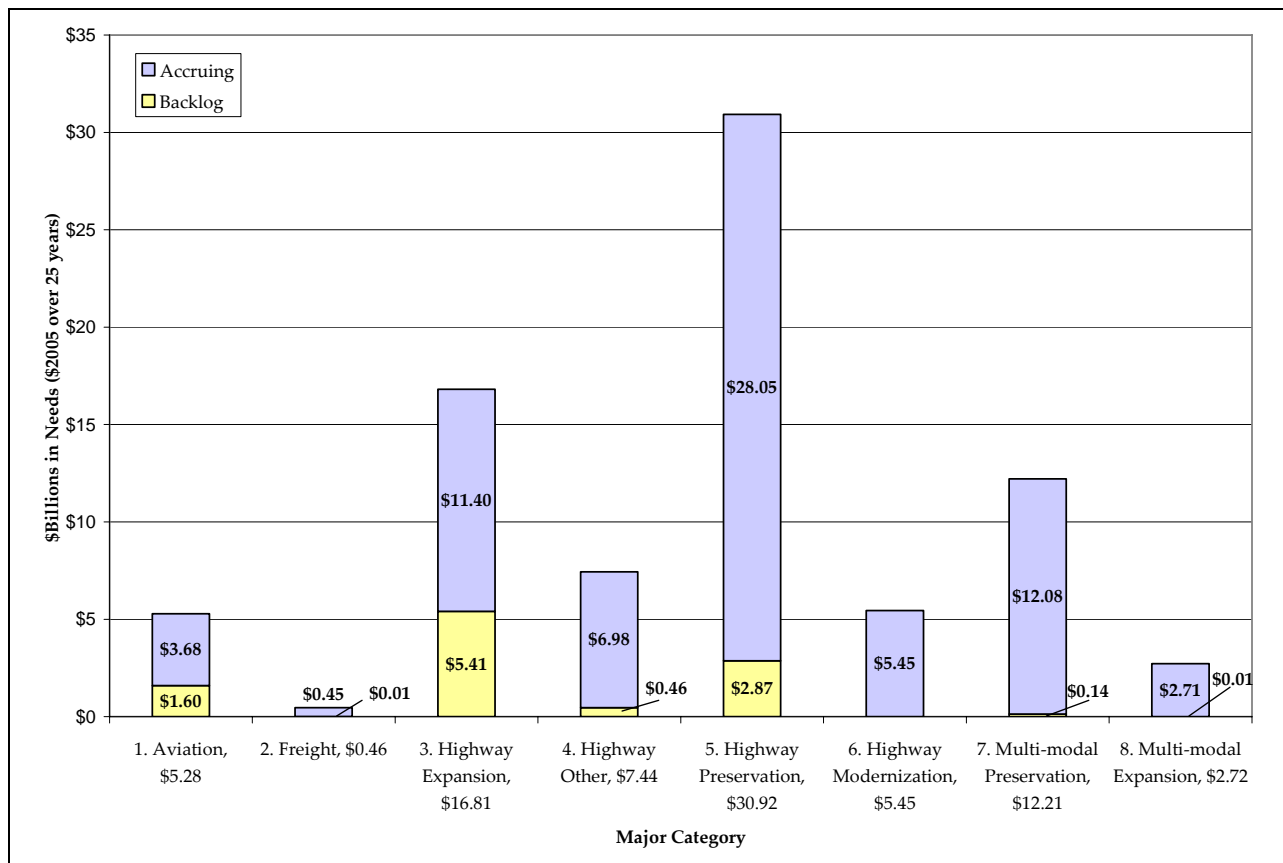
1. *Aviation.* Preservation and modest expansion of aviation facilities;
2. *Freight.* Preservation and modest expansion of rail and marine facilities, as well as investment in preserving and modernizing roadway infrastructure to support safe and efficient goods movement;
3. *Highway Expansion.* New capacity on trunkline facilities;
4. *Highway Other.* Miscellaneous capital improvements to trunkline facilities such as electrical, drainage, etc.;
5. *Highway Preservation.* Maintenance, rehabilitation, resurfacing, and replacement of pavements and bridges;
6. *Highway Modernization.* Safety and operational improvements, such as ITS and signalization coordination;
7. *Multi-modal Preservation.* On-going transit facilities, carpool, and bike/pedestrian facilities; and
8. *Multi-modal Expansion.* Adding new capital to bus transit and rail passenger facilities, expanding transit and rail passenger service, carpool lots, and bike/pedestrian facilities.

The analysis shows:

- The state has \$81 billion (in Base Year 2005 dollars, or \$2005) in transportation needs over the life of the plan.

- The total revenues available over the life of the plan is estimated at \$37 billion (in Base Year 2005 dollars, or \$2005), leaving a gap of \$44 billion.
- The increases in base case revenues in all categories are not keeping up with the escalation in costs (assumed five percent) over the 25-year period, thus there is a net loss in buying power.
- The additional revenues needed over the life of the plan just to keep the buying power of the base year are \$6.33 billion.

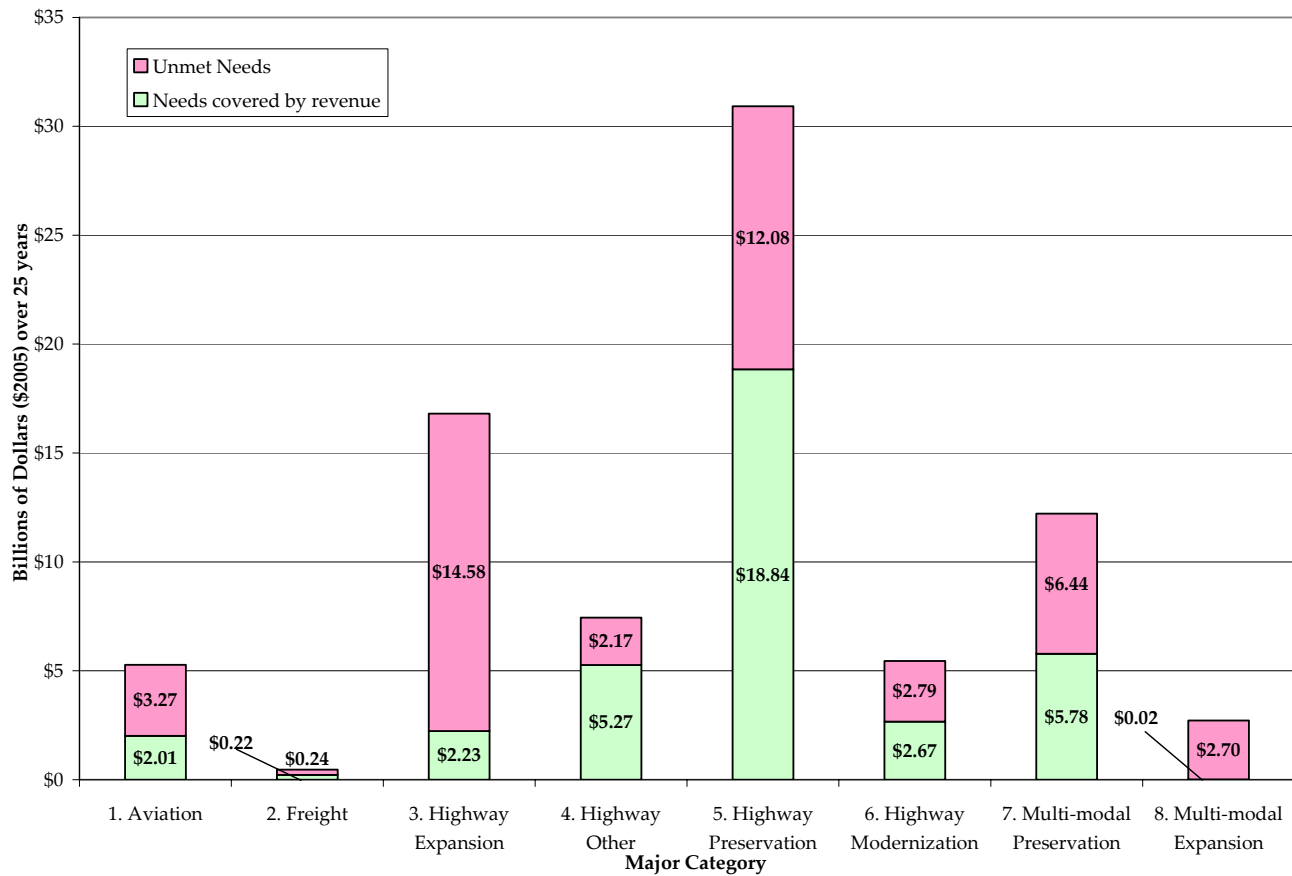
Figure 30: Statewide Long-Term Transportation Needs, by Major Category



Source: Wilbur Smith Associates

Over the 25-year plan (2005-2030), the state has a significant gap in transportation revenues, compared to transportation needs. The revenues available are only \$37 billion (\$2005), which leaves a revenue gap of approximately \$44 billion (\$2005). The gaps for eight major categories are shown in Figure 31. Highway Expansion and Highway Preservation have the largest gap, totaling almost \$27 billion together. Multi-modal Preservation has the next highest gap of well over \$6 billion.

Figure 31: Revenue Gap, by Major Category



Source: Wilbur Smith Associates

Investment Packages

Investment packages are simply different ways to invest transportation revenues. They consider how changes in revenue and policies, such as allocation of state transportation revenues between modes, may impact the performance and condition of Michigan’s transportation infrastructure and programs. The future investment scenarios presented in this report are intended to be illustrative only. Comparing investment packages provides insight into how different investment levels may affect Michigan’s transportation system performance and program goals. It is important to note that the information presented here is not a statement of Administration policy. Any analysis attempting to use the information presented in this report to determine a target program size would require a whole series of additional policy and technical assumptions that go well beyond what is reflected in these examples.

Four illustrative investment packages are presented to address the \$44 billion projected revenue gap. These are:

1. *“Business as Usual.”* The “Business as Usual” package explores the implications of living with the revenue gaps described in the base case presented. This future assumes no state transportation revenues beyond those associated with the base case revenues and an allocation of these funds among state programs in ways consistent with how revenues are allocated today.
2. *“Change the Mix.”* The “Change the Mix” package explores the implications of seeking to improve efficiency by investing projected revenues into a different mix of programs. This future also assumes no state transportation revenues beyond those associated with the base case revenues. “Change the Mix” considers reducing Highway Preservation revenues to allocate more funds to Multi-modal Preservation and Highway Modernization programs associated with the seamless and multi-modal system consistent with the Preferred Vision of *MI Transportation Plan*.
3. *“Move Ahead.”* The “Move Ahead” package explores the implications of raising additional revenue beyond those associated with the base case revenues by 16 percent and investing the additional revenue into Multi-modal Preservation and Highway Modernization programs without taking projected revenues away from existing programs. The “Move Ahead” package accounts for \$6.21 billion in new revenue over the life of the plan and still represents a \$38 billion revenue gap.
4. *“Flexible New Revenue.”* The “Flexible New Revenue” package explores the implications of raising additional revenue through the “Move Ahead” scenario as well as dedicated new revenue sources to support system preservation, both consistent with the Preferred Vision of *MI Transportation Plan*. The “Flexible New Revenue” future entails increasing overall state transportation revenues by 42 percent to preserve existing assets and to invest in Multi-modal Preservation and Highway Modernization programs. The “Flexible New Revenue” package accounts for \$15.68 billion in new revenue over the life of the plan and still represents a \$28 billion revenue gap.

The four illustrative investment packages are summarized in **Table 16**. The “Business as Usual” and the “Change the Mix” packages have no revenue increase over the base case revenues, while “Move Ahead” and “Flexible New Revenue” packages show increase in revenues.

Table 16: Summary of Four Investment Packages (in \$2005 over 25 years)

#	High-Level Category	Needs	1. Business as Usual	2. Change the Mix	3. Move Ahead	4. Flexible New Revenues
1	Aviation	\$5.28B	\$2.01B [38% of need]	\$2.01B	\$2.01B	\$2.01B
2	Freight	\$0.46B	\$0.22B [48% of need]	\$0.22B	\$0.27B (\$0.05B) [59% of need]	\$0.27B (\$0.05B) [59% of need]
3	Highway Expansion	\$16.81B	\$2.23B [13% of need]	\$2.23B	\$2.23B	\$3.55B (\$1.32B) [21% of need]
4	Highway Other	\$7.44B	\$5.27B [71% of need]	\$5.27B	\$5.27B	\$5.27B
5	Highway Preservation	\$30.92B	\$18.84B [61% of need]	\$16.02B (-\$2.83B) [52% of need]	\$20.70B (\$1.86B) [67% of need]	\$27.54B (\$8.69B) [89% of need]
6	Highway Modernization	\$5.45B	\$2.67B [49% of need]	\$3.61B (\$0.94B) [66% of need]	\$3.72B (\$1.05B) [68% of need]	\$4.33B (\$1.66B) [79% of need]
7	Multi-modal Preservation	\$12.21B	\$5.78B [47% of need]	\$7.66B (\$1.88B) [63% of need]	\$9.02B (\$3.24B) [74% of need]	\$9.73B (\$3.95B) [80% of need]
8	Multi-modal Expansion	\$2.72B	\$0.02B [1% of need]	\$0.02B	\$0.02B	\$0.02B
	Total	\$81.30B	\$37.03B	\$37.03B	\$43.24B (\$6.21B)	\$52.71B (\$15.68B)
	Revenue Gap		\$44.26B	\$44.26B	\$38.06B	\$28.59B

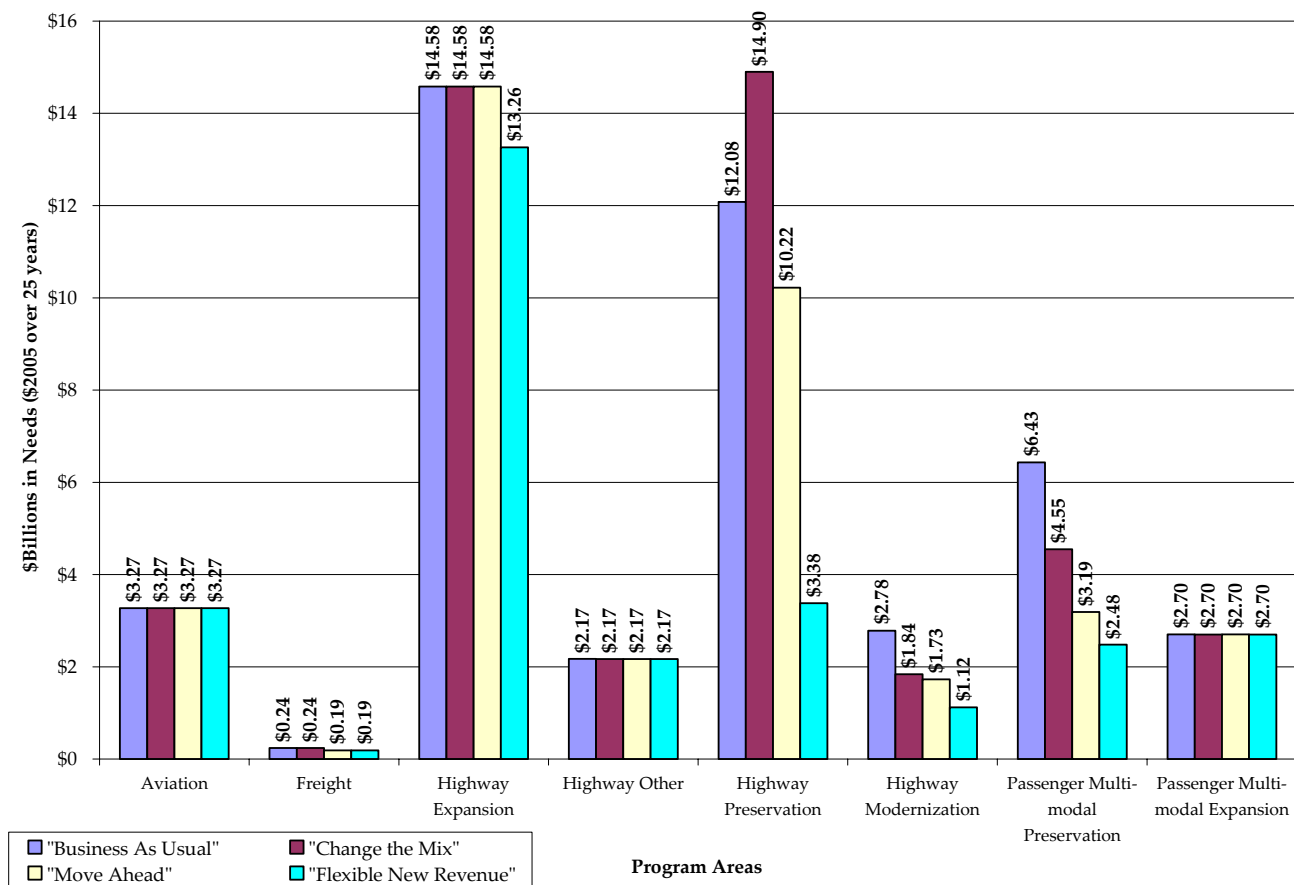
Source: Wilbur Smith Associates

Note: Figures shown in parentheses “()” provide the difference between the investment package and the base case revenues.

Each possible future considered on the previous table leaves unmet needs for all of Michigan’s state transportation programs. The investment packages can be viewed as illustrations of a succession of possible ways to spend increasing streams of revenue, with “Business as Usual” and “Change the Mix” representing the baseline, and “Move Ahead” and “Flexible New Revenue” representing increases in funding levels. As possible funding levels increase, the packages seek to balance the investment of those funds against unmet needs based on the Preferred Vision, plan goals, and decision principles of *MI Transportation Plan*.

Comparing the investment packages side-by-side with respect to the percentage of needs met for different program areas additionally illustrates the choices for allocating projected and potential revenues. **Figure 32** compares the unmet needs, by program area, left by each of the four possible futures. While the dollar amounts of unmet needs are shown and compared, some categories can provide different increments of services—for example, dollars spent on capital for commuter rail will provide a different level of service than investments in express bus. These decisions are not made in this analysis.

Figure 32: Unmet Needs under Four Investment Packages



Source: Wilbur Smith Associates

Out of all of Michigan’s transportation programs, the deepest shortfalls are in Highway Preservation and Highway Expansion. This is due to both the size of Michigan’s highway system and the expense of improving a lane mile of highway relative to the expense of other types of improvements.

Because the Preferred Vision, goals, and decision principles of *MI Transportation Plan* seek to leverage investment in Multi-modal and Highway Modernization programs to offset Highway Expansion needs, Highway Preservation becomes the deepest need of concern among the investment packages. While the revenue gap for this category deepens in the “Change the Mix” package, as new revenues become available under “Move Ahead” and “Flexible New Revenue” packages, the shortfall in preservation revenue narrows sharply. Each of the illustrative investment packages represents successive steps in reducing the shortfalls in Multi-modal Preservation and Highway Modernization programs, both of which are expected to leverage with the widest range of other categories.

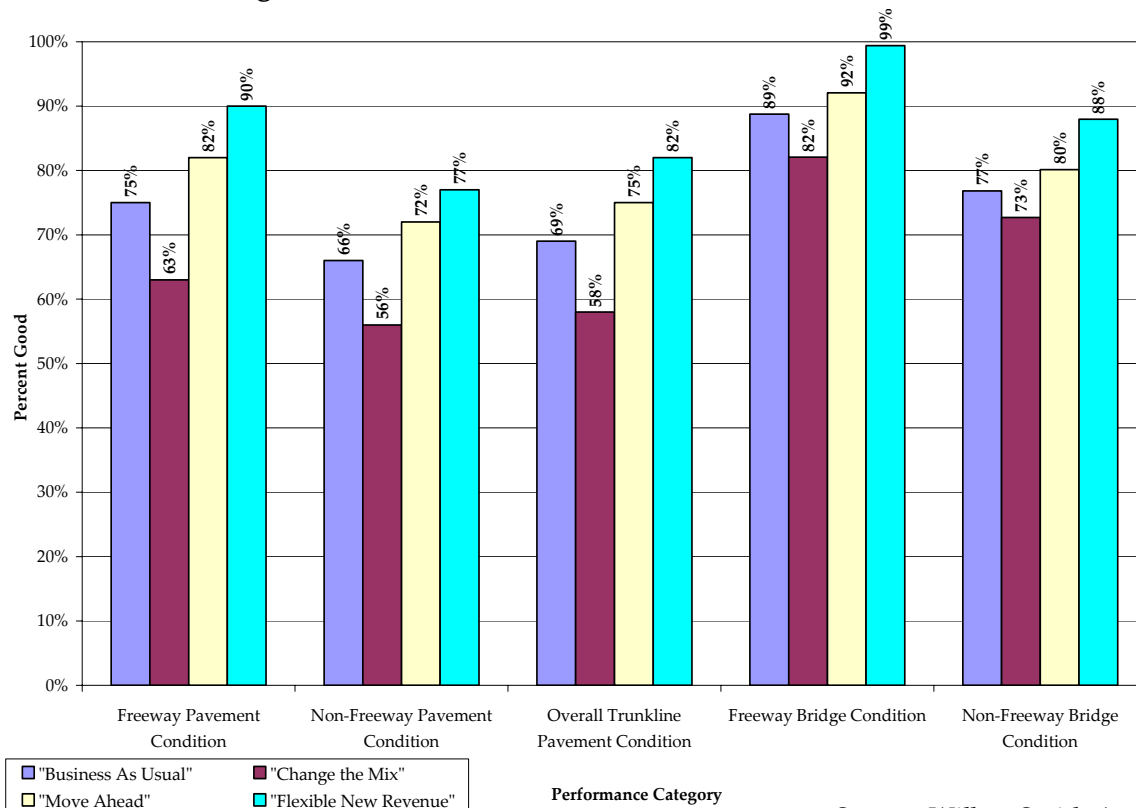
None of the four illustrative investment packages considered has sought to remedy unmet needs in Michigan’s Aviation or Highway Other categories. This is largely due to the relative lack of potential leverage for these categories to directly or indirectly offset needs on other

modes. If additional revenue streams can be identified for these categories, they may be considered in the ultimate preferred investment level as a variation of the “Flexible New Revenue” approach.

The system performance impacts of Highway Preservation and Highway Expansion investments are more quantifiable than the impacts of investment in Multi-modal Preservation, Highway Modernization, and other program areas. However, it is understood that investment in Highway Modernization and Multi-modal Preservation programs is likely to mitigate unmet needs in Highway Preservation and Highway Expansion through the effects of direct and indirect leverage as described in the *Integration Technical Report of MI Transportation Plan*.

The direct performance impacts of different levels of investment in Highway Preservation are analyzed using MDOT’s forecasting systems for road quality and bridge conditions. The comparative direct highway impacts of the four investment packages are summarized in **Figure 33**.

Figure 33: Percent of “Good” Pavement and Bridge Conditions in 2030 under Four Investment Packages



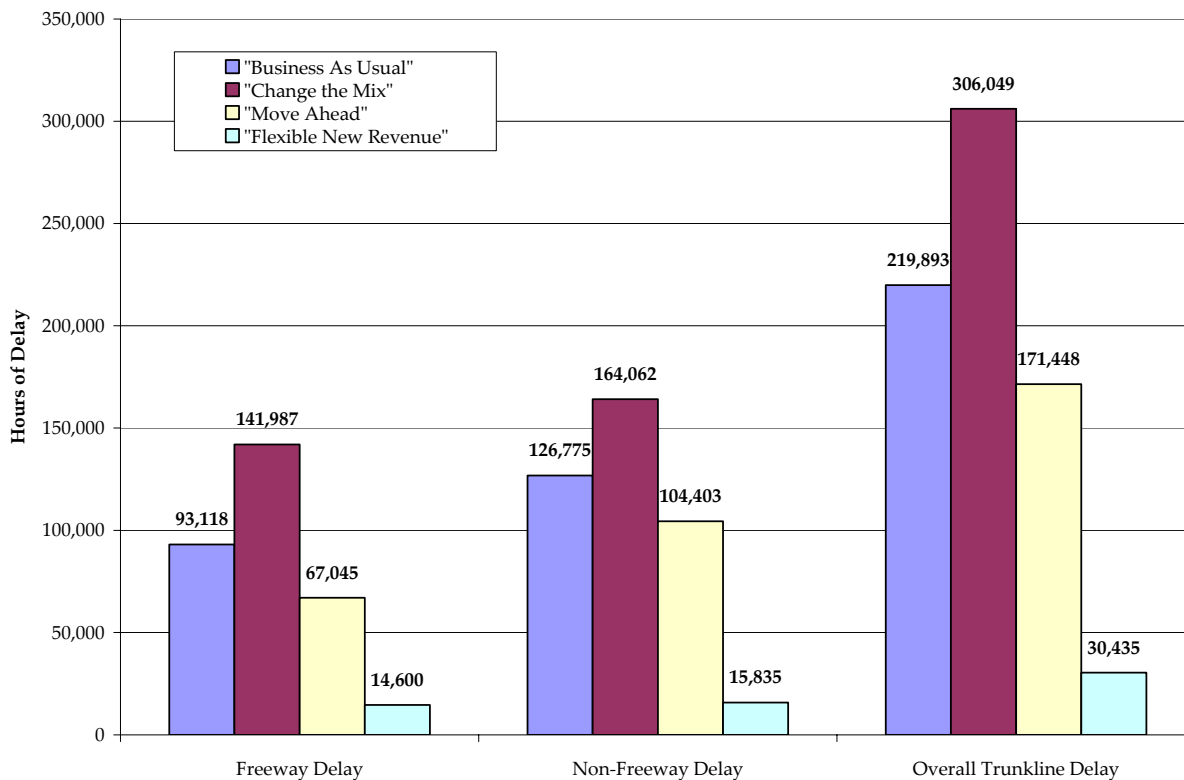
Source: Wilbur Smith Associates

With the exception of “Change the Mix,” each successive illustrative package involving additional revenue achieves an associated improvement in both bridge and pavement condition for freeways and non-freeways. The sharpest increases are in the “Flexible New Revenue” package for trunkline pavements. When preservation revenues are scarce, bridges receive a

higher priority; therefore, the variation in bridge conditions between investment packages is less marked than in pavement conditions.

Mobility on the trunkline highway system can be estimated in terms of hours of delay. Investments in improved highway pavement and bridge condition can reduce anticipated delay due to poor pavement or poor bridge condition (which reduces travel speeds, or may affect highway routing). Investment in additional lanes for congested facilities through expansion programs can also reduce delay and increase the portion of the system that is uncongested in 2030. **Figure 34** illustrates the relative impacts of the four investment packages on daily delay expected in year 2030.

Figure 34: Estimated Daily Delay in 2030 under Four Investment Packages



Source: Michigan Department of Transportation Post-processing of Statewide Travel Demand Model

The results show that delay is less sensitive to the quantifiable impacts of Highway Preservation and Highway Expansion funding between the investment packages. This is largely because the relationship between preservation investment and delay is less direct than the relationship between preservation and condition. The comparison shows that the investment levels of “Move Ahead” and “Flexible New Revenue” each have the potential for significant savings in delay. The “Flexible New Revenue” package contributes even more significantly to reduction in delay through a greater focus on system modernization and the addition of more lane miles than the other packages.

Based on the comparison of these illustrative investment packages, some general conclusions can be made:

1. *Reducing preservation revenues can undermine other programs.* Pursuit of the vision of *MI Transportation Plan*, by reallocating scarce revenues from preservation to other programs, can adversely affect travel times and travel costs. These impacts may undermine the potential leverage gained by other investments in Multi-modal or Modernization programs. At lower levels of investment, the unit cost of Highway Preservation is higher, further draining revenues from other programs. Consequently, reallocating revenues from preservation to other areas is not recommended for the preferred investment level.
2. *Modest investments of additional revenues in Highway Preservation and Multi-modal Preservation, when balanced with other categories, can support the vision.* Even modest investments in Highway Preservation and Multi-modal Preservation, when balanced with targeted Highway Expansion and Highway Modernization, can help reduce revenue shortfalls in these areas. The analysis shows that investment levels that fall short of the 85-percent and 95-percent good pavement and bridge condition targets still offer significant improvement in travel time and delay when compared to “Business as Usual.”
3. *Additional revenue sources will be needed for Highway Expansion or Multi-modal Expansion programs.* Projected revenues cover less than 14 percent of Highway Expansion needs and less than one percent of Multi-modal Expansion needs. None of the illustrative investment packages significantly changes this percentage. This is because the analysis in this report has not identified or validated any revenue source robust enough to cover a large share of expansion needs. The problem of system expansion is further exacerbated by the fact that if the system expands, the associated preservation needs will also rise.
4. *Future investment levels may consider a “flexible new” revenue source for Multi-modal Expansion programs, given the strong multi-modal focus of the Preferred Vision.* However, the source would have to be sufficient to not only progress towards the \$27.2 billion expansion need, but also to cover the additional preservation cost of an expanded multi-modal program. If expansion of highways is a consideration in the future, market based solutions such as tolling or other types of user fees may be considered as variations of “Flexible New Revenue.”
5. *At the very least, buying power should be preserved.* The differences in what we can buy today from what we can buy tomorrow is growing over the life of the plan and will result in a \$6.33 billion loss in buying power. The “Move Ahead” future calls for an additional \$6.2 billion over the life of the plan; this is just short of preserving the buying power. The “Business As Usual” and the “Change the Mix” investment packages, however, are significantly short of preserving this buying power. The future investment levels should, at the very least, preserve the buying power.



Chapter 8

Policy and Strategy Recommendations

This chapter outlines the recommended strategies and policies of the *MI Transportation Plan*, divided into three categories:

- Funding;
- Land Use and Coordination; and,
- Program (Mode)-specific.

8.1 Funding Strategies and Policies

Three strategies are discussed below.

8.1.1 Flexibility in the Allocation of State Resources for the Transportation System

The CTF is used for transit, marine, freight, and intercity passenger, while the State Trunkline Fund (STF) is used for the maintenance and expansion of the trunkline highways. The allocation of funding to each of these state-controlled funds is “hard-coded” in law in Act 51 and does not provide the flexibility to make funding decisions across modes. To achieve the vision, more flexibility to “flex” funds between the modal funding programs (i.e., CTF or STF) will be needed.

This could be taken one-step further in that the state funds (those funds from the MTF not going to locals), whether they are for transit or highway could be placed into the Integrated State Transportation Fund (ISTF), in lieu of the dollars being placed into two rigid funds. The controls from the legislature could be that as long as the department is following the long-range planning funding goals, they have the flexibility to make the decisions as needed.

8.1.2 Bonding

Using bonds does not provide new revenues -- it simply is a cash-flow tool that makes future revenues available today, with a premium paid on top of the cash needed (i.e., interest) in exchange for the making the funds available now. This is a critical cash-flow tool, which MDOT has successfully used in the past, but one that can have a negative impact on the available funds in the out-years of the plan. We need to be cautious in the use of bonds without new revenue sources. This practice can lead to reduced funds, again, in the out-years.

8.1.3 Tolling

The state of Michigan may want to consider tolls (i.e., fees paid by the direct users of roadways) on new lanes (only) of existing and congested roadways, as well as on new limited-access facilities. This could partially provide the ability to bond projects, since this would include new user fees to support the bonding.

According to the second Household Participation Survey, 50 percent of respondents felt that we should find alternative ways to finance transportation in the future, other than just the gas tax, so that we are less reliant on it. This would include, among other methods, toll roads.

As we implement *MI Transportation Plan*, a more detailed analysis of revenue and investment strategies will be required. This will allow decision makers to adopt new funding policies.

8.2 Land Use and Coordination Strategies and Policies

8.2.1 Inter-jurisdictional Facilitator for Transportation

There is a great deal of regional and metropolitan-level transportation planning occurring throughout Michigan today. However, there remains a strong home rule tradition that presents a challenge to execution of plans in a truly inter-jurisdictional manner. MDOT could assume a strong role in efforts such as corridor and transit planning that facilitates inter-jurisdictional efforts to address transportation needs and work closely with regional bodies that undertake these efforts.

8.2.2 MDOT's Role in Regional Planning

One of the most effective ways to integrate MDOT and MPO/RPA plans and priorities is for MDOT to continue to enhance its involvement in regional planning activities and processes.

8.2.3 Transportation-Land Use Connection

The MI Transportation Plan process provided an important platform for expanding the discussion of the transportation-land use connection across Michigan.

8.2.4 Establish Minimum Development Standards

Many land use advocates have suggested that residential development policies and plans should at least consider clustered residential areas. This approach would provide outdoor open space and a density of housing that can be easily serviced by public transit. It would also begin eliminating the linear development that sometimes accompanies urban sprawl. Another option proposed in urban and metropolitan areas is mixed-use development, by which residential space exists above, or adjacent to commercial development. This could mean that every shopping outlet, such as for food and/or pharmaceutical needs, could be housed in the same structure as dwellings. Such a configuration would eliminate the need to drive a vehicle to the grocery store, drug store, or bank, thereby reducing an individual's dependency on the automobile for access to essentials of life.

8.2.5 Consider Long-Term Comprehensive Land Use Policies

There are land use development tools that have been proposed, and some may require legislative action and/or local initiative. Some of these that came out of our consultation process for consideration include:

- Transfer of Development Rights;
- Farmland Preservation Program;
- Purchase of Development Rights;
- Development/Infrastructure Concurrency Requirements;
- General Service Districts or Urban Growth Boundaries;
- Inter-governmental Development Agreements;
- Inter-jurisdictional Growth Management; and
- Regional Impact Coordination.



Chapter 9

Implementation of MI Transportation Plan

9.1 Borders and Corridors

9.1.1 Introduction

As part of the development of *MI Transportation Plan*, MDOT conducted a multi-modal corridor-based analysis. The decision to conduct a multi-modal corridor-based analysis was grounded in the belief that specific corridors serve and support specific economic sectors. By improving specific corridors in an integrated, multi-modal approach, the businesses and industries dependent on these corridors will be strengthened, as will be Michigan's economic competitiveness.

The findings, analysis, and implementation recommendations from the corridor-based analysis are presented in the *Corridors and International Borders Report*. The report presents an integrated, multi-modal analysis of the journey of people and the supply chain movements of goods along 19 Corridors of Highest Significance. The report defines these multi-modal corridors and their value to Michigan. It evaluates the travel conditions and needs on each corridor by identifying opportunities and barriers to movement such as gaps or missing or defective links that hinder economic growth. It describes objectives for each corridor as were discussed in the many public meetings during the development of *MI Transportation Plan*. The report suggests broad, policy-based strategies that may take advantage of economic opportunities or address transportation barriers and gaps on the corridors.

The Corridors and International Borders Report also describes Michigan's international border crossings and the issues that may impact international travel and the global competitiveness of Michigan. It includes a separate addendum or executive summary organized by *MI Transportation Plan's* 17 economic regions. The *Economic Regions Corridor Summary* document presents brief economic and corridor profiles and key strategies for the Corridors of Highest Significance within each of the *MI Transportation Plan* economic regions.

9.1.2 Corridors of Highest Significance

While all travel routes and modes are important to MDOT, certain corridors carry the highest value and volumes of goods, services, and people, providing a higher level of support for the economy or specific economic sectors of the economy and Michigan’s overall transportation system. These travel routes and modes are *MI Transportation Plan’s* 19 Corridors of Highest Significance (see Figure 35).

Figure 35: Corridors of Highest Significance



Source: Michigan Department of Transportation Statewide and Urban Travel Analysis Section

They are an integrated, multi-modal system of transportation infrastructure along geographic corridors that provide 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.

MI Transportation Plan's Corridors of Highest Significance are not ranked but are defined based on the type of travel they carry. MDOT's Corridors of Highest Significance include facilities that also serve sub-state regional travel and economies (Table 17).

Table 17: MDOT's Corridors of Highest Significance

Corridors of National / International Significance	
Corridor:	General Description:
A Mackinaw City–St. Ignace / Wisconsin	Starts in St. Ignace and follows US-2 to M-35 in Escanaba; follows M-35 to Menominee; ends at Wisconsin border.
B Sault Ste. Marie / Bay City	Starts at Canadian border in Sault Ste. Marie; follows I-75 and ends at Bay City.
C Bay City–Midland–Saginaw / Flint / Detroit	Starts in Bay City and follows I-75 to Detroit.
D Muskegon / Grand Rapids / Lansing / Detroit	Starts in Muskegon and follows I-96 through Grand Rapids, Lansing, Livonia and ends in Detroit.
E Detroit / Chicago	Starts in Detroit and follows I-94 through Ann Arbor; ends at Indiana border.
F Grand Rapids / Chicago	Starts in Grand Rapids and follows I-196 through Holland to I-94; follows I-94 and ends at Indiana border.
G Port Huron / Detroit / Toledo	Starts at Canadian border in Port Huron; follows I-94 to I-75 in Detroit; follows I-75 and ends at Ohio border.
H Port Huron / Lansing / Indianapolis	Starts at Canadian border in Port Huron; follows I-69 through Lansing; ends at Indiana border.
J Port Huron / Chicago	Starts at Canadian border in Port Huron; follows I-69 through Lansing to I-94; follows I-94 and ends at Indiana border.
K I-696	Starts at I-96 in Farmington Hills and follows I-696; ends at I-94.
L I-275	Starts at I-96/I-696 interchange in Farmington Hills and follows I-275; ends at I-75.

Source: Wilbur Smith Associates

MI Transportation Plan's Corridors of Highest Significance represent a subset of Michigan's multi-modal transportation system. While they include only part of the system (for example 34 percent of the roadways and 67 percent of the rail miles), they serve a large segment of the travel needs of Michigan's businesses and citizens (71 percent of the total vehicle miles and 96

percent of the rail-ton miles.) **Table 18** compares the summary of the combined attributes of the Corridors of Highest Significance to the entire statewide transportation system.

Table 18: Comparisons – Existing Statewide Infrastructure Totals to Corridors of Highest Significance including International Border Crossings

<i>Mode</i>		<i>Statewide Total</i>	<i>National and Statewide Corridors</i>	<i>% National and Statewide Corridors</i>
Highway	State-Highway Miles	9,703	3,279	34%
	Total-Vehicle Miles	144 billion	102 billion	71%
	Passenger-Vehicle Miles	131 billion	91.7 billion	70%
	Commercial-Vehicle Miles	13 billion	10.6 billion	81%
	Truck-Ton Miles	52.8 billion	46.5 billion	88%
	Truck-Value Miles	134.6 trillion	125 trillion	93%
Rail	Rail-Track Miles	3,590	2,405	67%
	Rail-Ton Miles	15.2 billion	14.6 billion	96%
	Rail-Value Miles	20.5 trillion	19.9 trillion	97%
Aviation	Commercial Airports	17	17	100%
	General Aviation Airports	236	178	75%
Marine	Ferry Services	21	12	57%
	Cargo Ports	40	34	85%
	Waterborne Tonnage	78.7 million	67 million	85%
Transit	Passenger-Rail Miles	568	568	100%
	Intercity Bus Stations	39	37	95%

Source: Michigan Department of Transportation Statewide and Urban Travel Analysis Section, 2006

Table 19: Comparison of corridor values based on some of the characteristics used to define each corridor’s value

	% Population w/in 20 miles buffer zone	% Jobs w/in 20 miles buffer zone	Avg. ADT	Student Population	Commercial Enplanements	Visitor Day/ year (million)	Truck Freight avg. tons (million)	Truck Freight \$ avg. value (billion)	Rail Freight avg. Tons (million)	Rail Freight \$ avg. value (billion)	Number of Border Crossings
A Mackinaw City–St. Ignace/Wisconsin	0.6%	0.7%	5,500	2,400	9,600	3.5	7.0	\$10.1	4.0	\$1.6	
B Sault Ste. Marie / Bay City	3.0%	2.9%	12,000	14,000	15,000	16	15.6	\$30.0	0.2	\$0.1	1
C Bay City–Midland– Saginaw/Flint/Detroit	31.9%	33.6%	83,000	164,500	883,000	32	28.0	\$63.5	2.4	\$1.9	4
D Muskegon/Grand Rapids/Lansing/Detroit	37.8%	40.2%	64,400	242,000	1,500,000	40	18.7	\$56.2	9.9	\$14.4	4
E Detroit/Chicago	31.3%	30.2%	54,300	222,000	18,000,000	44.4	60.2	\$204.2	9.1	\$16.0	4
F Grand Rapids/Chicago	8.8%	11.1%	32,400	111,000	1,300,000	20.3	49.0	\$135.6	11.5	\$14.0	
G Port Huron/Detroit/Toledo	26.7%	23.1%	76,200	115,000	124,000	30	32.8	\$107.8	11.3	\$17.6	8
H Port Huron/Lansing/Indianapolis	11.5%	11.4%	28,500	110,000	870,000	20	26.0	\$78.9	n/a	n/a	4
J Port Huron/Chicago	15.7%	15.9%	35,500	156,500	1,100,000	28	45.3	\$141.8	26.0	\$40.9	4
K I-696	25.3%	27.1%	164,000	55,500	n/a	5.6	16.3	\$51.4	n/a	n/a	
L I-275	14.3%	15.8%	92,000	72,700	18,000,000	29	2.0	\$1.5	10.0	\$10.4	
M Houghton/Marquette/Sault Ste. Marie	1.4%	1.4%	5,100	15,000	103,000	7.8	4.7	\$8.0	2.8	\$0.4	1
N Petoskey/Grand Rapids/Indiana	11.6%	13.3%	21,000	118,000	1,300,000	23	10.1	\$17.0	1.8	\$2.9	
P Mackinaw City–St. Ignace/Holland	6.2%	6.7%	14,000	21,000	303,000	23	3.8	\$6.5	1.2	\$0.2	
Q Benton Harbor/Indiana	1.5%	1.5%	13,300	7,000	2,800	3	10.7	\$18.9	n/a	n/a	
R Flint/Toledo	10.1%	10.1%	50,100	105,000	560,000	11.2	29.6	\$64.2	4.4	\$4.3	
S Mackinaw City–St. Ignace /Alpena/ Standish	1.1%	1.1%	5,000	2,000	9,700	9.7	1.0	\$1.1	0.5	\$0.1	
T Grayling/Jackson	6.7%	7.5%	20,200	110,000	311,000	15	6.0	\$11.7	1.1	\$2.5	
U Jackson/Toledo	2.8%	2.2%	16,000	18,000	12,000	6.7	4.3	\$10.2	n/a	n/a	

Source: Wilbur Smith Associates, 2006



9.1.3 Implementation of the Findings and Recommendations of the Corridors and International Borders Report

The *Corridors and International Borders Report* identifies objectives and provides multi-modal corridor policies and strategies that focus on what can be done to link the quality of its transportation system to the economic vitality of Michigan. The report identifies and profiles the multi-modal corridors and international border crossings whose efficient operations are critical to keeping Michigan economically competitive. The report is only an initial step in identifying and implementing the best strategies, policies, programs, and priorities to address the issues and conditions raised in each of the individual corridor profiles and *Economic Regions Corridor Summaries*. Several next steps are needed to use the findings to implement a comprehensive multi-modal corridor based transportation program that supports Michigan in its efforts to regain its leadership position as a global economic engine.

9.1.3.1 Importance of being a Corridor of Highest Significance

Improvements to specific corridors serving particular economic sectors can improve Michigan's economic competitiveness. A corridor-based analysis allows for the development of a vision with specific goals for achieving the vision within a regional or corridor area. An examination of the areas allows MDOT to pinpoint any bottlenecks, gaps, or obstacles to identify remedies, in order to provide functional and efficient movements throughout the transportation network.

It follows that improvements to specific corridors serving particular economic sectors can improve Michigan's economic competitiveness. These beliefs are confirmed based on the study findings of this report, through the corridor profiles in **Chapter 6** of the *Corridors and International Borders Report*, and in the *Economic Regions Corridor Summaries*. **Section 3.3** of the *Corridors and International Borders Report* also presents and discusses how MDOT will treat the Corridors of Highest Significance differently from the other corridors in the state. It includes specific practices to guide the management, operations, and investment decisions relative to transportation facilities within *MI Transportation Plan's* Corridors of Highest Significance.

9.1.3.2 Performance Measures

MI Transportation Plan identified performance measures that are available to be used to evaluate the Corridors of Highest Significance. These corridor measures are a subset of, and consistent with, the performance measures used for *MI Transportation Plan*. The measures evaluate the objectives and desired system characteristics which were articulated during the plan development process by the public, EAG, MDOT leadership, and MDOT staff. A performance measures analysis for the Corridors of Highest Significance are separate from this document. This performance evaluation is critical as part of understanding and quantitatively comparing the conditions and need for each corridor. Conducting a performance measure evaluation of the Corridors of Highest Significance is a crucial part of the implementation phase of *MI Transportation Plan*.

9.1.3.3 Strategies, Policies, and Programs

A number of issues and corridor conditions (such as congestion, aging infrastructure, need for modernization, additional support for public transit, etc.) are repeatedly identified in multiple corridor profiles and are identified as barriers to economic growth and competitiveness. A number of similar strategies are identified in multiple corridors to address these issues. MDOT will set priority strategies, programs, and policies that will be applied consistently to all of the Corridors of Highest Significance or applied to individual corridors addressing the specific issues.

A comprehensive set of strategies, policies, and programs are presented in **Chapter 5** and detailed in **Appendix D** of the *Corridors and International Borders Report*. The strategies presented are consistent with MDOT policy, the *MI Transportation Plan* vision and are compatible with the political environment and structure of Michigan. As appropriate, MDOT will identify and adopt special corridor focused strategies and programs from the listings in **Appendix D** of the *Corridors and International Borders Report*.

For example, there is no one solution for congestion. Increasing intercity bus service or passenger rail service in a Corridor of Highest Significance will likely reduce the number of autos in that corridor, hence the congestion. Transportation System Management (TSM) and/or Transit/Travel Demand Management (TDM) strategies can also help. TSM / TDM must be coordinated at local level to be successful. For these strategies, MDOT will continue to work with and through local governments, MPOs, and RPOs to:

- Help design and produce education programs for the public and businesses;
- Help facilitate implementation of TSM/TDM projects; and
- Provide incentives for local governments to adopt these programs.

9.1.3.4 Corridor Plans

Corridor studies will be conducted and corridor plans developed for each Corridors of Highest Significance. The studies will identify the primary industrial sectors supported by the corridor and identify their industry specific transportation needs. The plans will present a detailed set of programs, policies, and projects needed to improve the economic competitiveness of each corridor. The plans will address corridor opportunities, freight adequacy, barriers, gaps, and missing links. The plans will present a prioritized list of projects and programs needed and ideas for funding and partnerships, both financial and operational needs for each corridor.

9.2 Next Actions for MDOT

The implementation of *MI Transportation Plan* entails managing Michigan's system of corridors in an integrated fashion. Corridor management plans are one of the implementation tools for the plan. As indicated in the above summary of Michigan's borders and corridors, corridors are multi-modal elements of Michigan's transportation system connecting the state's activity centers.

9.2.1 Corridor Management

Because corridors may span multiple MDOT regions, involving different agencies within the department, a collaborative approach to corridor implementation will be taken. Implementation of corridor management plans entails:

- Developing multi-jurisdictional corridor management teams for each of Michigan's Corridors of Highest Significance.
- Developing integrated, multi-modal corridor studies for each corridor to define and address the actions needed to support the users and activities dependent on each corridor.

9.2.2 Corridor Management Teams

Because jurisdictional boundaries have been identified throughout *MI Transportation Plan* as a key issue for the transportation system, multi-jurisdictional teams are vital to improvement of the system. A corridor management team is a group of public and private actors with role in improving corridor performance. Corridor management teams may typically involve:

- MDOT;
- MPO or RPA staff for areas dependent on the corridor;
- Representatives of county and municipal land use planning, economic development and public works agencies;
- Representatives of port authorities (air or sea); and
- Representatives of major transportation carriers including:
 - Transit organizations;
 - Intercity passenger service providers (including rail);
 - Passenger air carriers;
 - Trucking and shipping carriers;
 - Air cargo carriers; and
 - Railroads.

The purpose of a corridor management team is to:

- Understand and characterize the needs of specific user groups for each corridor and activities supported by transportation on the corridor.
- Identify existing and emerging performance barriers and opportunities to enhance the value of the corridor to its users.
- Reduce and manage jurisdictional and other issues that may threaten corridor performance under the goals and objectives of *MI Transportation Plan*.

- Scope and implement corridor management plans consistent with the Preferred Vision, goals and objectives of *MI Transportation Plan*.

9.2.3 Integrated Corridor Management Plans

Corridor management plans are sets of improvement actions, policies, and practices intended to remove performance barriers on a corridor and maximize its value to users. Corridor management plans involve:

- Identifying corridor users and the activities for which they utilize the corridor;
- Identifying performance barriers and opportunities adversely affecting users of each corridor; and
- Pinpointing projects, policies, and other specific actions the corridor management team can take to reduce or remove performance barriers to the best degree possible under the preferred investment strategy of *MI Transportation Plan*.

Delivering an integrated system depends on corridor management plans that are both multi-jurisdictional and multi-modal in their focus. The following decision principles from *MI Transportation Plan* will support an integrated approach to developing and implementing corridor management plans.

9.2.3.1 Implement Strategies One Project at a Time

Because each project is different, there is no one-size-fits-all approach to delivering an integrated system. Decisions about how to scope projects and which components to improve ultimately depend on the complexity of users and activities served by each project. Implementation approaches can be very different depending on the nature of user needs, activities supported by the system, and the context of improvements. For example, an integrated approach to a rural corridor where grain elevators and farm-to-market roads are critical assets will be different from a densely populated urban corridor with a large concentration of retail and academic centers where fixed-route transit systems, extensive urban pedestrian networks, and local street systems are available.

9.2.3.2 Assess the Complexity of Users and Activities When Conducting Corridor Studies

Corridor studies include an assessment of the relative complexity of users and activities served by the corridor. This involves identifying user segments, their activities, and the potential for leverage among modes.

9.2.3.3 Allow Greater Flexibility and Innovation in Funding for Needs that are more Complex

For example, improving pedestrian access in an urban retail center served by transit involves complex decisions about system components. This means that investment in this corridor should involve more flexible funding and require more planning decisions than preserving a

farm-to-market road. However, this does not mean that the downtown pedestrian retail center is more important, or warrants more funding, than the farm-to-market road. Integration pertains more to the flexibility of funds than to the total importance of a project or financial amount of need.

9.2.3.4 Assess How Connections to and Within Complex Activity Centers Can Be Improved for Overall Corridor Performance

For example, if a corridor serves a major tourist and recreational center frequented by older tourists, the arrangement of modal components must take into account the connectivity of local modal systems required by these users. Something as simple as the absence of a crosswalk from a hotel to a bus stop, or a turning radius at an intersection inappropriate for older drivers could provide a performance barrier making the entire corridor less accessible to complex users.

9.2.3.5 Recognize that Investments in One Mode on a Complex Corridor or in an Activity Center are Likely to Generate Needs or Benefits on Other Modes

For example, modernizing a roadway in a tourist/recreational area is more likely to require scope and funding for bicycle, pedestrian, and transit elements than a similar roadway improvement on a road to a mine. In another example, when an airport is expanded or improved, supporting roadways may require expansion and improvement to realize the full value of the airport investment.

9.2.3.6 Coordinate with Partners and Stakeholders to Understand Corridor Complexity and Maximize Financial and Performance Leverage for Other Modes or Jurisdictions

For example, it may be possible to coordinate with county and municipal partners to plan for the improvement of sewer lines or other utilities when state roadways are reconstructed. In another example, it may be possible to plan capacity expansion in conjunction with local growth management policies to manage travel demand and overall expansion needs.

9.2.3.7 Consider Linkages between Land Use and Performance of System Components

For example, it may be possible to work with local planning and public works agencies to manage development pressure for a new interchange, finding ways to support changes in development without affecting freeway system performance. In a similar way, system performance can be enhanced and preserved by collaborating with local planning and zoning officials on strategies like access management for principal arterials. MDOT defines access management as a set of proven techniques that can improve safety and reduce traffic congestion while assuring safe and reasonable access to properties adjacent to a roadway.

*Providing the highest quality integrated transportation services
for economic benefit and improved quality of life*



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