

MICHIGAN DEPARTMENT OF TRANSPORTATION



**State Long-Range Transportation Plan
2005-2030**

**Investing to
Achieve the Vision**

*Prepared for
The Michigan Department
of Transportation
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Prepared by



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MITransportation

MICHIGAN LONG RANGE TRANSPORTATION PLAN



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Executive Summary

Investing to Achieve the Vision (IAV) of the *MI Transportation Plan* described here will provide balanced transportation by investing in all transportation modes. This illustrative example examines investment levels that will support system integration and efficiency by strategically investing in those elements that have the most potential to also address needs on other modes and enhance system performance.

The IAV is based on the “Flexible New Revenue” illustrative approach identified in the *Revenue Gap and Investment Packages Report*. Meeting Michigan’s highway and bridge preservation targets while implementing the seamless multi-modal system called for in the *Preferred Vision* requires revenues beyond those currently expected to be available. It will also call for greater flexibility of Michigan Public Act 51 of 1951, known as “Act 51,” to use and invest state transportation revenues in keeping with the goals of *MI Transportation Plan*.

Consistent with the *Preferred Vision*, goals, objectives and decision principles of *MI Transportation Plan*, the IAV is designed to provide balanced transportation by investing in all transportation modes. The *MI Transportation Plan*’s primary focus is on the parts of the transportation system that the Michigan Department of Transportation (MDOT): 1) has jurisdiction over, 2) provides funding for, or 3) regulates. The IAV is also designed to support system integration and efficiency by strategically investing in those elements of the system with the maximum potential to address critical needs on all modes and enhance overall system performance.

The statewide long-term transportation needs for the department are 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 freight facilities;
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 following table summarizes investment levels in different elements of Michigan's transportation system under the illustrative IAV when compared to the base case, "Business as Usual" alternative.

<i>Investing to Achieve the Vision Program Levels</i>					
<i>Program</i>	<i>"Business as Usual"</i>		<i>"Investing to Achieve the Vision"</i>		
	<i>Revenue Invested (\$billions)</i>	<i>% of Revenue Invested</i>	<i>Revenue Invested (\$billions)</i>	<i>% of Revenue Invested</i>	<i>Difference in Revenue versus "Business as Usual" (\$billions)</i>
Aviation	\$2.01	5.4%	\$2.37	4.4%	\$0.36
Freight	\$0.22	0.6%	\$0.27	0.5%	\$0.05
Highway Expansion	\$2.23	6.0%	\$3.55	6.6%	\$1.32
Highway Other	\$5.27	14.2%	\$5.27	9.8%	\$0.00
Highway Preservation	\$18.84	50.9%	\$27.54	51.4%	\$8.70
Highway Modernization	\$2.67	7.2%	\$4.33	8.1%	\$1.66
Multi-modal Preservation	\$5.78	15.6%	\$9.73	18.2%	\$3.95
Multi-modal Expansion	\$0.02	0.1%	\$0.51	1.0%	\$0.49
Total	\$37.04	100.0%	\$53.57	100.0%	\$16.53

Source: Wilbur Smith Associates

Investing in this way requires raising additional revenues (over and above the historical rate of revenue increases, which is already built into the base case assumptions). This combination of flexible new revenue sources is preferred because the *Revenue Gap and Investment Packages Report of MI Transportation Plan* shows the "Business as Usual" is insufficient to support the plan vision while preserving the state's pavement and bridge assets. By making investments in the areas indicated in the above table, Michigan can expect superior road and bridge conditions, less congested roadways and a more efficient and seamless transportation system than under "Business as Usual," which represents a pattern of investment consistent with existing policies. Under the IAV, Michigan can expect freeway and non-freeway pavement conditions of 90-percent and 77-percent good, respectively, compared to 75-percent and 66-percent good under "Business as Usual."

Pursuing this strategy, it is estimated that Michigan travelers can expect 78,500 fewer daily hours of congestion delay on freeways and 111,000 fewer daily hours of delay on non-freeway trunklines than under the "Business as Usual" strategy. This represents an 86-percent reduction in system delay under the IAV than under "Business as Usual." The following table

summarizes the anticipated differences in system performance under this IAV in 2030 when compared to “Business as Usual.”

<i>Performance Measure</i>	<i>Highway Condition or Performance Area</i>	<i>Level Achieved with "Business as Usual"</i>	<i>Level Achieved With " IAV Investment Levels "</i>	<i>Change In Performance With " IAV Investment Levels "</i>
Pavement Condition	Freeway Percentage Good (Remaining Service Life)	75%	90%	15%
	Non-Freeway Percentage Good (Remaining Service Life)	66%	77%	11%
	Systemwide Percentage Good (Remaining Service Life)	69%	82%	13%
Bridge Condition	Freeway Percentage Good Bridges Achieved	89%	99%	10%
	Non-Freeway Percentage Good Bridges Achieved	77%	88%	11%
Delay Due to Congestion or Deficient Road/Bridge Condition	Freeway Delay (Daily-Vehicle-Hours)	93,118	14,600	-78,518
	Non-Freeway Delay (Daily-Vehicle-Hours)	126,775	15,835	-110,940
	Trunkline System Delay (Daily-Vehicle-Hours)	219,893	30,435	-189,458
Highway Miles Without Congestion	Percentage of Freeway Miles Uncongested in 2030	78%	81%	3%
	Percentage of Non-Freeway Miles Uncongested in 2030	90%	92%	2%
	Percentage of Freeway Miles Approaching Congested in 2030	28%	29%	1%
	Percentage of Non-Freeway Miles Approaching Congested in 2030	14%	13%	-1%

Source: Michigan Department of Transportation Road Quality Forecasting System, Bridge Condition Forecast System, and Statewide Travel Demand Model

This IAV would also improve the overall state of Michigan’s economy, with the economic benefits of the improved transportation system outweighing the potential adverse impacts of raising flexible new revenue (taxes). In 2030, it is anticipated under the IAV, Michigan will have 13,000 additional jobs, an \$19.6 billion increase in Gross State Product, and a \$16.3 billion increase in personal income that would not occur under “Business as Usual.” These estimates are based on the analysis reported in the *Economic Impact Analysis of MI Transportation Plan*.

The IAV is offered as an illustrative investment and revenue strategy for achieving the vision of *MI Transportation Plan* and as a framework for assessing the economic and performance feasibility and impact of investing in programs in ways consistent with the plan. As implementation tactics are refined, program budgets and revenue instruments may be further analyzed to identify the best possible future under *MI Transportation Plan*. However, the analysis of this IAV supports three general conclusions:

- Flexible new sources of revenue can be raised to support the vision of *MI Transportation Plan* in ways that are beneficial to the state’s economy in the long-term;
- Investment in preserving roadway and bridge components can provide both performance and economic benefits while providing a solid basis for multi-modal and modernization programs to make the system more seamless; and
- Flexible new revenues can support the preservation and expansion of Michigan’s multi-modal infrastructure, as well as the modernization of Michigan’s road and bridge system. Such revenues can be raised in ways that enhance both economic vitality and transportation efficiency.
- Flexible new sources of revenue will need to be raised to support the vision of *MI Transportation Plan* in ways that are beneficial to the state’s economy in the long-term. Investing to Achieve the Vision requires revenues that can support the preservation and expansion of Michigan’s multi-modal infrastructure, as well as the modernization of Michigan’s road and bridge system. Such revenues can be raised in ways that enhance both economic vitality and transportation efficiency, and MDOT will pursue these alternatives, particularly with respect to public-private partnerships (PPPs). Investing to Achieve the Vision, MDOT will also identify and advance innovative, multi-modal programs, financing, and solutions to improve safety, mobility, and economic competitiveness within the Corridors of Highest Significance to achieve the vision.

Chapter 1. Investing to Achieve the Vision Package

The *Investing to Achieve the Vision of MI Transportation Plan* is based on the “Flexible New Revenue” illustrative approach to meeting transportation needs as supported by the *Revenue Gap and Investment Packages Report*. This *Investing to Achieve the Vision (IAV)* document illustrates an investment strategy that provides balanced transportation by investing in all transportation modes. Key elements include:

- Potential sources of flexible new revenue;
- Suggested levels of investment in different program areas; and
- Anticipated performance and economic impacts of transportation programs described in *MI Transportation Plan*.

The IAV is not intended as a detailed project-level program or budgetary arrangement for implementing all transportation improvements in the life of the plan. It is understood that specific programs, funding mechanisms, and policy changes associated with implementation will determine the actual program budgets and allocation of resources to 2030. The IAV is, instead, offered as a way to demonstrate the financial feasibility, as well as the performance and economic benefits associated with making investments supporting the goals and decision principles of *MI Transportation Plan*. The IAV represents a holistic assessment of general funding levels, revenue allocations, and anticipated benefits to Michigan associated with supporting programs under the *Preferred Vision*, goals, objectives, and decision principles of *MI Transportation Plan*.

1.1 Rationale

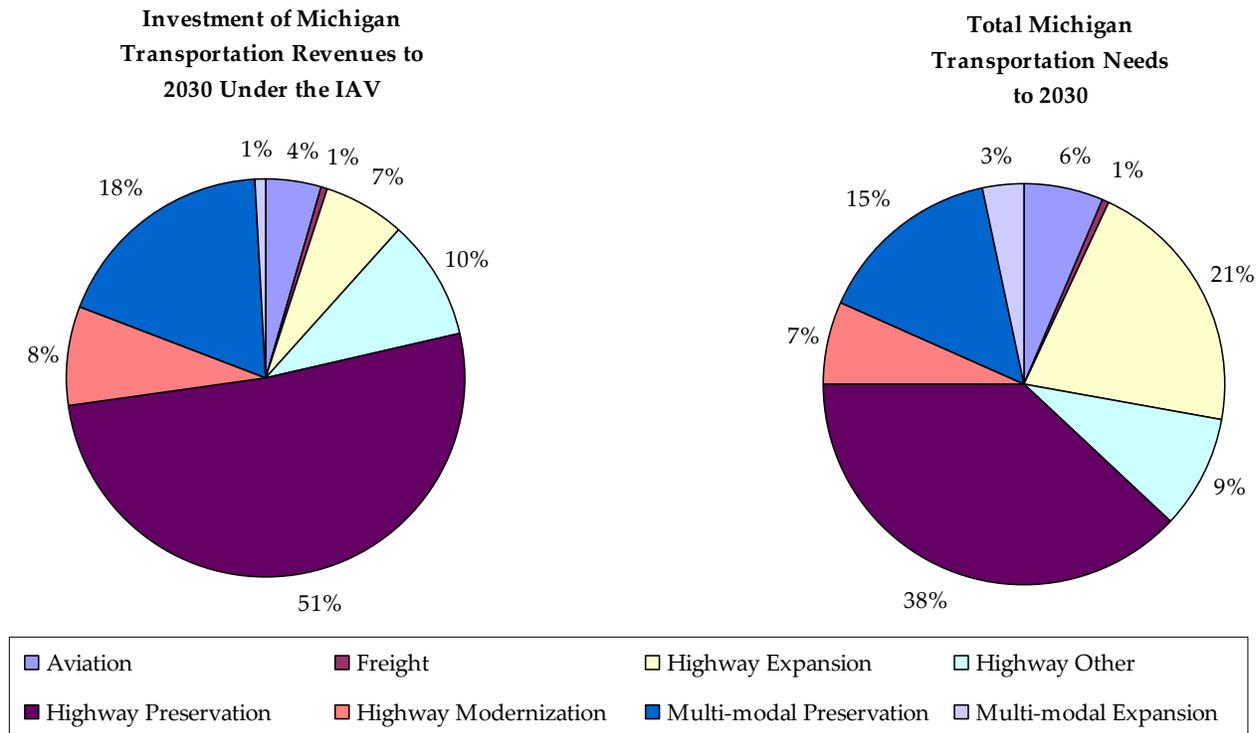
The *Revenue Gap and Investment Packages Report* of *MI Transportation Plan* finds that the greatest performance impact on Michigan’s transportation system can be supported by a “Flexible New Revenue” strategy. This means that multiple sources of additional revenue are needed to support the seamless multi-modal vision of *MI Transportation Plan* while maintaining the road and bridge preservation targets of 85-percent good for non-freeway trunkline roads and bridges and 95-percent good for freeway roads and bridges.

Even when the continuation of traditional levels of revenue increases and modest additional revenues are considered, the *Revenue Gap and Investment Packages Report* finds that revenues would fall short of these targets. The “Flexible New Revenue” concept underlying the IAV introduces small increments of additional revenue sources for Roadway Preservation, Roadway Modernization, Aviation, and Multi-modal Expansion.

The IAV assumes that in addition to the \$37.04 billion of revenue associated with the historic increases in the “Business as Usual” scenario, an additional \$16.53 billion can be generated. This illustration adds \$360 million for aviation, and an additional \$9.97 billion for other programs not considered in the “Flexible New” example. **Figure 1** illustrates the allocation of

revenues under the IAV in comparison to the needs found in the *Revenue Gap and Investment Packages Report of MI Transportation Plan*.

Figure 1: Needs and Revenue Allocation – Investing to Achieve the Vision



Source: Wilbur Smith Associates

The IAV invests the new revenues first in highway preservation, raising highway preservation funding from \$18.84 billion under “Business as Usual” to \$27.54 billion. This significant \$8.70 billion increase in highway preservation accounts for 87 percent of new revenue assumed for this illustration to be provided by sources other than the fuel taxes and ensures road and bridge infrastructure condition adequate to support the modernization and multi-modal programs suggested in the *Preferred Vision of MI Transportation Plan*.

The remaining \$1.27 billion (over 25 years) in suggested flexible new revenue (from non-fuel tax revenue) is combined with the \$6.2 billion in other revenue to cover the preservation and expansion of Michigan’s multi-modal passenger transportation programs (\$4.44 billion investment above the level provided in the “Business as Usual” scenario over 25 years); investment in Intelligent Transportation Systems (ITS), safety, and other roadway modernization programs (\$1.66 billion above the level provided by “Business as Usual” over 25 years), targeted expansion projects on Michigan’s highways (\$1.32 billion above the level

provided by “Business as Usual” over 25 years), and increased investment in freight systems (\$50 million above the level provided by “Business as Usual” over 25 years).

The investments levels illustrated here are expected to require policy changes in the Act 51 distribution of state transportation revenues and reflect the potential to leverage preservation, modernization and expansion investments to support the seamless network envisioned in *MI Transportation Plan*.

The highest level of investment is in highway preservation because, as noted in decision principles of the *Integration Technical Report*, highway conditions provide leverage for other systems, which often depend on highway components. The preservation of multi-modal elements, which include transit, non-motorized, and car pool parking infrastructure, is recommended for the second highest increase from the flexible new revenues in this illustration. This investment is intended to ameliorate the growing needs for multi-modal infrastructure and services found in the *Revenue Gap and Investment Packages Report* and supports high-leverage projects as described in the *Integration Technical Report* of *MI Transportation Plan*. High levels of flexible new revenue are also recommended for investment in ITS, safety, and other roadway modernization programs because of their high potential for leverage to achieve a seamless transportation system, and described in the *Integration Technical Report* of *MI Transportation Plan*. Some of the additional revenue is also invested in freight systems because of their multi-modal and intermodal nature and their potential for leverage and economic impact.

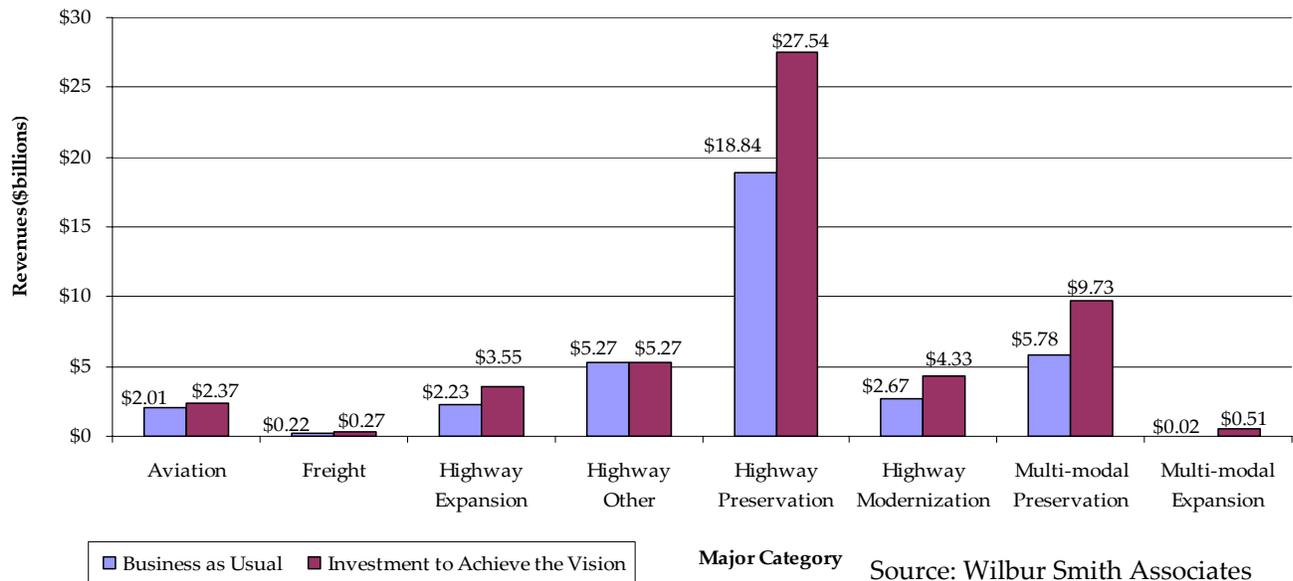
Table 1 and **Figure 2** illustrate how the IAV invests additional revenues into each of these programs at levels exceeding those available under the “Business as Usual” scenario.

Table 1: Investing to Achieve the Vision Program Levels

<i>Investing to Achieve the Vision Program Levels</i>					
<i>Program</i>	<i>“Business as Usual”</i>		<i>“Investing to Achieve the Vision”</i>		
	<i>Revenue Invested (\$billions)</i>	<i>% of Revenue Invested</i>	<i>Revenue Invested (\$billions)</i>	<i>% of Revenue Invested</i>	<i>Difference in Revenue versus “Business as Usual” (\$billions)</i>
Aviation	\$2.01	5.4%	\$2.37	4.4%	\$0.36
Freight	\$0.22	0.6%	\$0.27	0.5%	\$0.05
Highway Expansion	\$2.23	6.0%	\$3.55	6.6%	\$1.32
Highway Other	\$5.27	14.2%	\$5.27	9.8%	\$0.00
Highway Preservation	\$18.84	50.9%	\$27.54	51.4%	\$8.70
Highway Modernization	\$2.67	7.2%	\$4.33	8.1%	\$1.66
Multi-modal Preservation	\$5.78	15.6%	\$9.73	18.2%	\$3.95
Multi-modal Expansion	\$0.02	0.1%	\$0.51	1.0%	\$0.49
Total	\$37.04	100.0%	\$53.57	100.0%	\$16.53

Source: Wilbur Smith Associates

Figure 2: Investment in Programs to Achieve the Vision



Overall, when compared to “Business as Usual,” the IAV provides 46-percent more revenue for roadway preservation, 68-percent more revenue for preserving multi-modal programs, 62-percent more revenue for modernization programs, 59-percent more for highway expansion, and 22-percent more for freight. The IAV also provides an additional \$490 million for the expansion of Michigan’s transit programs and an additional \$360 million for aviation over 25 years. However, even with these increases, the package leaves shortfalls in most categories, most notably covering a relatively small portion of the roadway expansion need, providing for only a small share of needed expansion of multi-modal programs while leaving the same gap in “Highway Other” programs left by “Business as Usual.” Because the investments of the IAV are concentrated in high-leverage categories, there is the potential for investment under the IAV to mitigate some of Michigan’s roadway expansion and other needs by improving performance through roadway modernization.

1.2 Unmet Needs

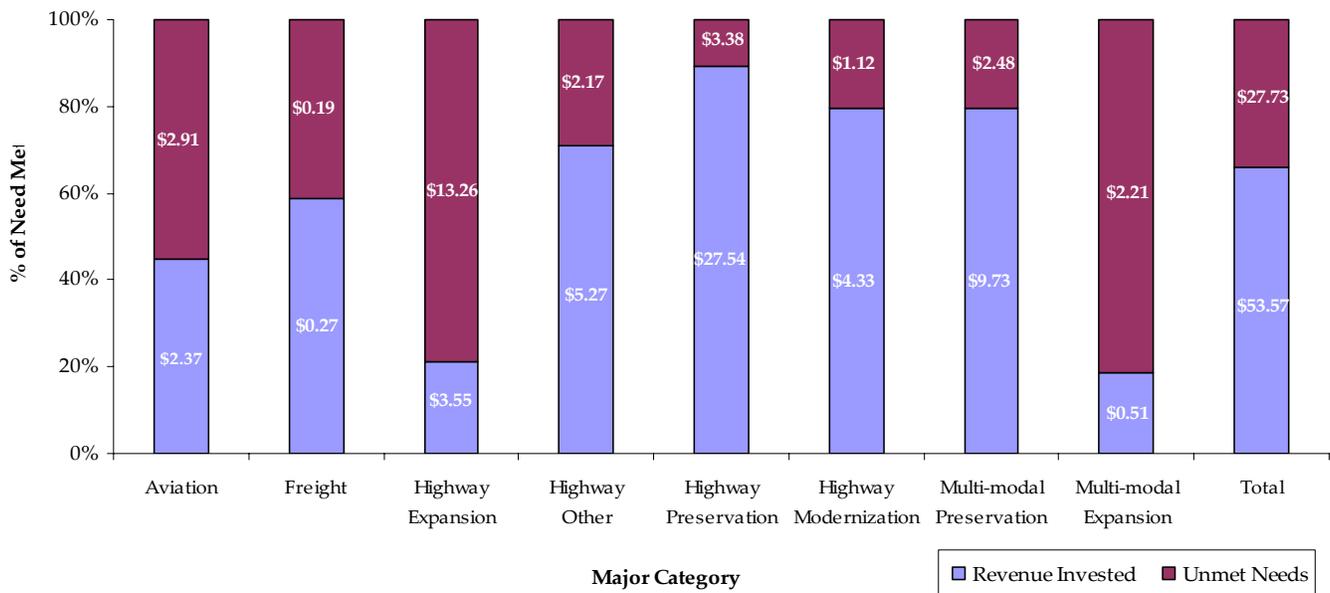
The IAV demonstrates that providing both new revenue and flexibility to invest in high-leverage programs, it is possible to significantly reduce many anticipated gaps on Michigan’s transportation system. The gaps under this illustration are much smaller than under “Business as Usual,” and are balanced between different programs. **Table 2** and **Figure 3** compare the projected revenues invested in each area against the projected needs for each program area, contrasting the IAV scenario to the “Business as Usual” baseline.

Table 2: Needs Met Under Investing to Achieve the Vision Levels

Program	"Business as Usual"			"Investing to Achieve the Vision Levels"		
	Revenue Invested (\$billions)	Total Needs (\$billions)	% of Needs Met by this Package	Revenue Invested (\$billions)	% of Needs Met by this Package	Difference in % Needs Met vs. "Business as Usual"
Aviation	\$2.01	\$5.28	38.1%	\$2.37	44.9%	6.8%
Freight	\$0.22	\$0.46	47.8%	\$0.27	58.7%	10.9%
Highway Expansion	\$2.23	\$16.81	13.3%	\$3.55	21.1%	7.9%
Highway Other	\$5.27	\$7.44	70.8%	\$5.27	70.8%	0.0%
Highway Preservation	\$18.84	\$30.92	60.9%	\$27.54	89.1%	28.1%
Highway Modernization	\$2.67	\$5.45	49.0%	\$4.33	79.4%	30.5%
Multi-modal Preservation	\$5.78	\$12.21	47.3%	\$9.73	79.7%	32.4%
Multi-modal Expansion	\$0.02	\$2.72	0.7%	\$0.51	18.7%	18.0%
Total	\$37.04	\$81.30	45.6%	\$53.57	65.9%	20.3%

Source: Wilbur Smith Associates

Figure 3: Needs Met Under Investing to Achieve the Vision Levels



Source: Wilbur Smith Associates

The IAV addresses more than 65 percent of Michigan’s overall transportation investment needs. Addressing 89 percent of roadway and bridge preservation needs, it maximizes the condition of Michigan’s current roadway assets to support other programs under the vision. Also by covering 79 percent of modernization needs, it provides opportunities to offer operational, ITS and safety improvements to mitigate unmet roadway expansion needs on trunkline highways. This package also covers nearly 80 percent of the cost of maintaining today’s level of multi-modal programs and 21 percent of highway expansion needs.

This represents a 28-percent increase in the share of roadway preservation needs met as compared to the “Business as Usual,” case, a 37-percent increase in the share of needs met for multi-modal programs over “Business as Usual,” and a 30-percent increase in the share of roadway modernization needs met. The IAV also increases the share of met freight needs by 11 percent, with almost an eight-percent increase in the share of roadway expansion needs met.

1.3 Condition and Performance Implications

The expected conditions and performance of Michigan’s transportation system under the IAV are superior to maintaining “Business as Usual.” Michigan’s highway conditions under this scenario exceed today’s conditions, while today’s existing bottlenecks on urban freeways are removed. This package also partially mitigates accruing mobility and safety problems through modernization and multi-modal programs in ways consistent with the vision. Further, increased investment in highway preservation provides a solid foundation for these complementary investments, bringing Michigan’s conditions of pavements and bridges to levels close to 85-percent good on non-freeways and 95-percent good on freeways by the year 2030. **Table 3** shows the expected Michigan highway system conditions and performance under the IAV.

Table 3: Highway System Conditions and Performance Implications of Investing to Achieve the Vision Levels

<i>Performance Measure</i>	<i>Highway Condition or Performance Area</i>	<i>Level Achieved with "Business as Usual"</i>	<i>Level Achieved with "Investing to Achieve the Vision Levels"</i>	<i>Change In Performance with "Investing to Achieve the Vision Levels"</i>
Pavement Condition	Freeway Percentage Good (Remaining Service Life)	75%	90%	15%
	Non-Freeway Percentage Good (Remaining Service Life)	66%	77%	11%
	Systemwide Percentage Good (Remaining Service Life)	69%	82%	13%
Bridge Condition	Freeway Percentage Good Bridges Achieved	89%	99%	10%
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Delay Due to Congestion or Deficient Road/Bridge Condition	Freeway Delay (Daily-Vehicle-Hours)	93,118	14,600	-78,518
	Non-Freeway Delay (Daily-Vehicle-Hours)	126,775	15,835	-110,940
	Trunkline System Delay (Daily-Vehicle-Hours)	219,893	30,435	-189,458
Highway Miles Without Congestion	Percentage of Freeway Miles Uncongested in 2030	78%	81%	3%
	Percentage of Non-Freeway Miles Uncongested in 2030	90%	92%	2%
	Percentage of Freeway Miles Approaching Congested in 2030	28%	29%	1%
	Percentage of Non-Freeway Miles Approaching Congested in 2030	14%	13%	-1%

Source: Michigan Department of Transportation Road Quality Forecasting System, Bridge Condition Forecast System, and Statewide Travel Demand Model

With the IAV, investment of \$27.54 billion in highway preservation to the year 2030 yields freeway and non-freeway pavement conditions of 90-percent good and 77-percent good respectively. While still short of Michigan’s 95 and 85-percent good targets, this level of pavement and bridge condition is superior to that which could be achieved under a “Business as Usual” scenario. For bridges, this investment level supports 99-percent good freeway bridges and 88-percent good non-freeway bridges, exceeding the targets of 95-percent and 85-

percent good. Furthermore, the flexibility of new revenues in the IAV makes funds available for complementary investments in other categories expected to improve overall system performance in ways not as readily measurable as pavement condition. The combined effect of resolving existing and accruing deficient pavement and bridge conditions and investing in highway expansion would save more than 189,000 hours of daily delay by the year 2030 when compared to the “Business as Usual” scenario. The mobility impacts of the IAV are most readily observed as reductions in delay as noted above.

While recurring delay remedied by the IAV occurs on a relatively small percentage of overall system route miles, the removal of bottlenecks under the IAV can be seen in an estimated reduction in overall congested route miles in 2030. The increased capacity supported by funding additional lanes as well as expansion of multi-modal passenger services also is expected to reduce Michigan’s congested freeway miles by at least one percent from what is expected under “Business as Usual.” With smaller gaps in multi-modal preservation and highway modernization programs than “Business as Usual,” the IAV is expected to have travel time and mobility savings beyond those quantifiable in the above analysis. Funding a wide range of programs and adding to a better-maintained highway infrastructure, the IAV offers more opportunities than any of the packages in the *Revenue Gap and Investment Packages Report of MI Transportation Plan* to manage remaining gaps through direct and indirect leverage between project types.

Overall, the IAV is desirable because it demonstrates that:

- A dedicated additional revenue stream for preserving Michigan’s basic highways can combine with other flexible revenue sources to serve as a “rising tide” , freeing other revenues for programs consistent with the *MI Transportation Plan* vision;
- With more revenues available to be spent on other programs Michigan can gain significant savings in travel time and system delay; and
- The flexibility among programs facilitated by a flexible new revenue stream offers significant potential for leverage between MDOT programs, potentially improving performance while also mitigating unmet needs.

Chapter 2. IAV Leverage Potential

The *Integration Technical Report of MI Transportation Plan* introduces the concept of leverage between different types of projects as a way to improve efficiency of transportation investments. The above analysis examines quantifiable changes in highway system conditions available under the IAV. The analysis treats investments in non-highway investments as potential factors mitigating shortfalls in system performance. However, currently, there is no data or known methodology for quantifying the degree to which investment in statewide non-highway categories can reduce or mitigate the need for highway investments in the aggregate.

For this reason, it is possible that the above analysis will understate the potential reductions in percentage of the system congested under the IAV from what is anticipated under “Business as Usual.” Multi-modal programs and roadway modernization under the IAV could yield a system that outperforms “Business as Usual” by a larger magnitude than can be measured above. Therefore, the concept of leverage is offered as a rationale for the design of the IAV under the “Flexible New Revenue” principle set forth in the *Revenue Gap and Investment Packages Report*. When funding is available, the application of leverage in the development of projects, and in the delivery of programs is a key success factor for implementing *MI Transportation Plan* under the IAV.

2.1 Goals, Objectives, Measures

The IAV illustration is offered as the preferred pathway to the vision of *MI Transportation Plan* given the economic and policy constraints expected to the year 2030. The IAV utilizes investment in different types of programs as ways to achieve the goals of the plan. Implementation of the IAV would entail relaxing the constraints of Michigan Public Act 51 of 1951 (Act 51) regarding the allocation of state transportation revenues among programs, and requires additional revenue sources for transportation. The economic utility of investing these revenues from Michigan’s economy into the state transportation system is further explored in **Chapter 4, Economic Impact**.

Given the assumed revenue levels of the IAV, and the strategies considered in the *Revenue Gap and Investment Packages Report of MI Transportation Plan*, the IAV is found to be the improvement strategy most consistent with the *MI Transportation Plan* goals of:

- *Stewardship*. Preserve transportation system investments, protect the environment, and utilize public resources in a responsible manner.
- *Safety & Security*. Continue to improve transportation safety and ensure the security of the transportation system.
- *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.

Table 4 further describes how the IAV is superior to “Business as Usual” in achieving these overarching goals of the plan.

Table 4: Plan Goals under Investing to Achieve the Vision Levels vs. “Business as Usual”

<i>Goal</i>	<i>“Business as Usual”</i>	<i>“Investing to Achieve the Vision Levels”</i>
1. Stewardship	Concentrates scarce revenues on preserving existing assets.	Seeks dedicated revenue stream for most expensive and depreciable assets (highway infrastructure).
2. Safety & Security	Invests in modernization needs where possible; however, revenues are limited.	Preserves existing assets while covering a significant share of safety, ITS, and modernization programs.
3. System Improvement	Allows expansion of urban freeways.	By increasing funding for multiple categories, maximizes potential for improvement through leverage across multiple modes and programs.
4. Efficient and Effective Operations	Seeks efficiency by investing scarce revenues in preserving assets before “fixes” become more costly.	Seeks efficiency in preservation expenditures by dedicating revenue to early and comprehensive “fixes” to most expensive assets. Manages costly expansion needs by high levels of investment in modernization programs.

Source: Wilbur Smith Associates

2.2 Statewide Investment Decision Principles

In the *Integration Technical Report of MI Transportation Plan*, the overall plan goals are assessed with respect to the specific performance barriers and opportunities faced by the users of each of MDOT’s programs described in the other technical reports. Based on the issues raised in the technical reports, the overall goals, and vision of the plan, decision principles for statewide investments are offered. The decision principles provide criteria for deciding the relative merits and disadvantages of possible investment strategies. The four decision principles offered in the *Integration Technical Report* are:

- *Invest financial resources to preserve existing system components.* Preserving existing components is critical to prevent new performance barriers from arising. For example, bus capital funds used to replace an aging bus on an existing line can help ensure continued reliable service. If this capital is not maintained, the access, safety, and mobility of not only transit but also roadways and other modes may be affected.
- *When improving a system component, consider and make allowances for improvements that may be needed in integrated components.* For example, expanding transit service and placing a bus stop in a residential area may prompt the need for sidewalks and pedestrian access to the new transit stops.
- *Seek investments that provide leverage, remove barriers, realize opportunities, and improve integration for multiple components.* For example, investment in expanding or paving carpool parking lots may help mitigate some highway expansion needs by reducing the number of single-occupancy vehicles on the road at peak hours. In another example, investment in reconstructing a roadway with a wider shoulder may also support the provision of bicycle lanes to improve non-motorized performance.
- *Assess performance objectives with respect to all modes.* For example, reducing fatality, injury, and crash/incident rates is a performance objective. Achieving this objective may entail the provision of other modal alternatives for users with special safety needs, the provision of bicycle and pedestrian infrastructure on roadways, and ensuring that transit vehicles and drivers are equipped for safe operations.

The IAV is the result of an application of these decision principles to the different strategies considered in the *Revenue Gap and Investment Packages Report*. **Table 5** assesses the relative strengths of the IAV in comparison with “Business as Usual” with respect to the decision principles of *MI Transportation Plan*.

Table 5: Statewide Decision Principles Applied to Investing to Achieve the Vision Levels vs. “Business as Usual”

<i>Decision Principle</i>	<i>“Business as Usual”</i>	<i>“Investing to Achieve the Vision”</i>
Preserve Existing Components	<p>Advantage: Largest share of investment is for preservation of roads, bridges and transit.</p> <p>Disadvantage: Lacks resources to meet preservation goals.</p>	<p>Advantage: Adequately preserves highway assets, narrows multi-modal gaps.</p> <p>Disadvantage: More costly [however net economic benefit is greater (See Chapter 4, Economic Impact)].</p>
Complementary Investments	<p>Advantage: Balances gaps across different program areas.</p> <p>Disadvantage: Cannot complement highway expansion with multi-modal expansion.</p>	<p>Advantage: Narrows gaps in most complementary programs. Explicit investment in each modal category.</p> <p>Disadvantage: Still leaves gaps in many programs.</p>
Seek Leverage	<p>Advantage: Makes some provision for modernization, despite large gaps.</p> <p>Disadvantage: Inadequate revenues to concentrate revenue in high-leverage programs.</p>	<p>Advantage: Makes revenue available for modernization and multi-modal programs.</p> <p>Disadvantage: Still leaves gaps in many programs.</p>
Assess Performance for All Modes	<p>Advantage: Balances gaps across modes.</p> <p>Disadvantage: Leaves significantly greater performance gap in multi-modal preservation than roadway and bridge preservation.</p>	<p>Advantage: High road quality supports other modes. Increased coverage of non-highway modes as well.</p> <p>Disadvantage: Balanced investment in modes still leaves pavement and bridge condition below 85 and 95 good percent targets.</p>

Source: Wilbur Smith Associates

Chapter 3. IAV Comparison to “Business as Usual”

3.1 Needs and Investments

Both the IAV illustration and “Business as Usual” baseline case leave unmet needs for all of Michigan’s state transportation programs. However, with the increased level of funding and flexibility of the IAV, Michigan is expected to have greater success in balancing the investment of those funds against unmet needs based on the *Preferred Vision*, plan goals, and integration decision principles as described in the previous chapter.

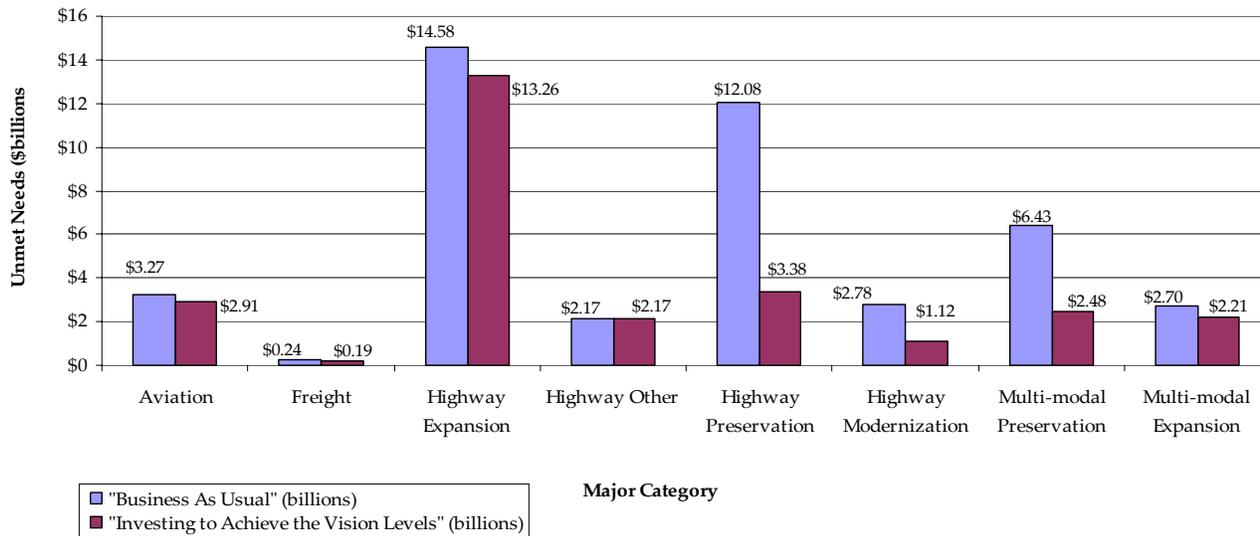
Comparing the IAV with the expected outcome of “Business as Usual” with respect to the percentage of needs met for different program areas further illustrates why the IAV is desirable for allocating projected and potential revenues. **Table 6** and **Figure 4** compare the unmet needs by program area for the four possible scenarios.

Table 6: Comparative Unmet Needs by Program IAV Compared to “Business as Usual”

<i>Program</i>	<i>“Business As Usual” (billions)</i>	<i>“Investing to Achieve the Vision Levels” (billions)</i>
Aviation	\$3.27	\$2.91
Freight	\$0.24	\$0.19
Highway Expansion	\$14.58	\$13.26
Highway Other	\$2.17	\$2.17
Highway Preservation	\$12.08	\$3.38
Highway Modernization	\$2.78	\$1.12
Multi-modal Preservation	\$6.43	\$2.48
Multi-modal Expansion	\$2.70	\$2.21
Total Needs	\$44.26	\$27.73

Source: Wilbur Smith Associates

Figure 4: Unmet Needs under Investing to Achieve the Vision Levels vs. Business as Usual



Source: Wilbur Smith Associates

Of all of Michigan’s transportation programs, the deepest shortfalls are in highway preservation and 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 roadway modernization programs to offset highway expansion needs, highway preservation represents the largest area of highway investment in the IAV. **Figure 4** shows that the IAV significantly reduces the level of unmet needs in this category. From **Figure 4**, it is also visible that the IAV balances investment of flexible new revenues across modes and programs, meeting the greatest share of needs in categories that may achieve leverage on mitigating needs in other categories.

3.2 Comparative System Performance

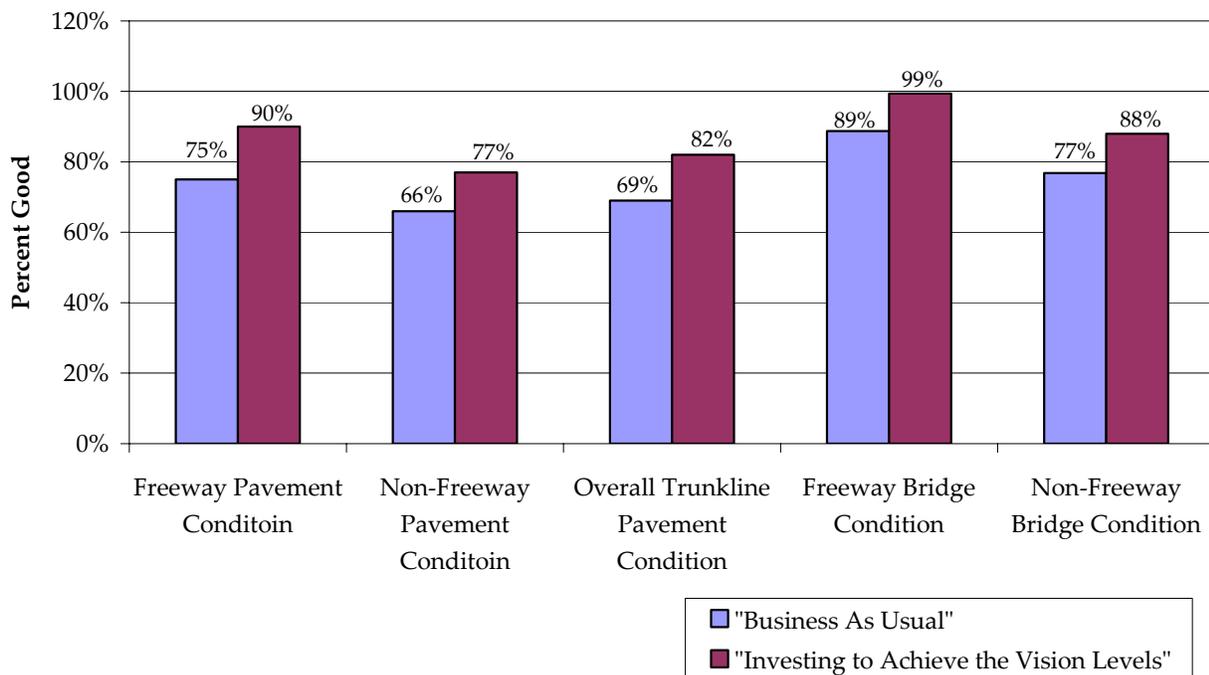
The increased level and flexibility of revenues under the IAV provide the opportunity to greatly improve the condition and performance of Michigan’s highway infrastructure to the year 2030. The total mobility benefit of investment in multi-modal and roadway modernization in the investment packages cannot be quantified at this time. However, it is possible to see the degree to which the increasing investment of new revenues in preservation and expansion reduce travel times, both through improved pavement and bridge conditions and through added capacity. **Table 7** and **Figure 5** compare the IAV with the “Business as Usual” status quo with respect to the percentage of the system that is expected to have good pavement and bridge conditions under each investment scenario.

Table 7: Percent “Good” Pavement and Bridge Conditions Investing to Achieve the Vision Levels vs. Business as Usual

<i>Program</i>	<i>“Business As Usual”</i>	<i>“Investing to Achieve the Vision Levels”</i>
Freeway Pavement Condition	75%	90%
Non-Freeway Pavement Condition	66%	77%
Overall Trunkline Pavement Condition	69%	82%
Freeway Bridge Condition	89%	99%
Non-Freeway Bridge Condition	77%	88%

Source: Michigan Department of Transportation Road Quality Forecasting System and Bridge Condition Forecast System

Figure 5: Percent “Good” Pavement and Bridge Conditions under the Investing to Achieve the Vision Levels vs. “Business as Usual”



Source: Michigan Department of Transportation Road Quality Forecasting System and Bridge Condition Forecast System

The analysis highlights the superior pavement and bridge conditions achieved when flexible new revenues are invested in highway preservation under the IAV. When preservation revenues are scarce, bridges receive a higher priority; hence, 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 travel time and delay due to poor pavement condition (which reduces travel speeds or may affect highway routing). Investment in additional lanes for congested facilities through expansion programs can also reduce travel time and increase the portion of the system, which is uncongested in 2030.

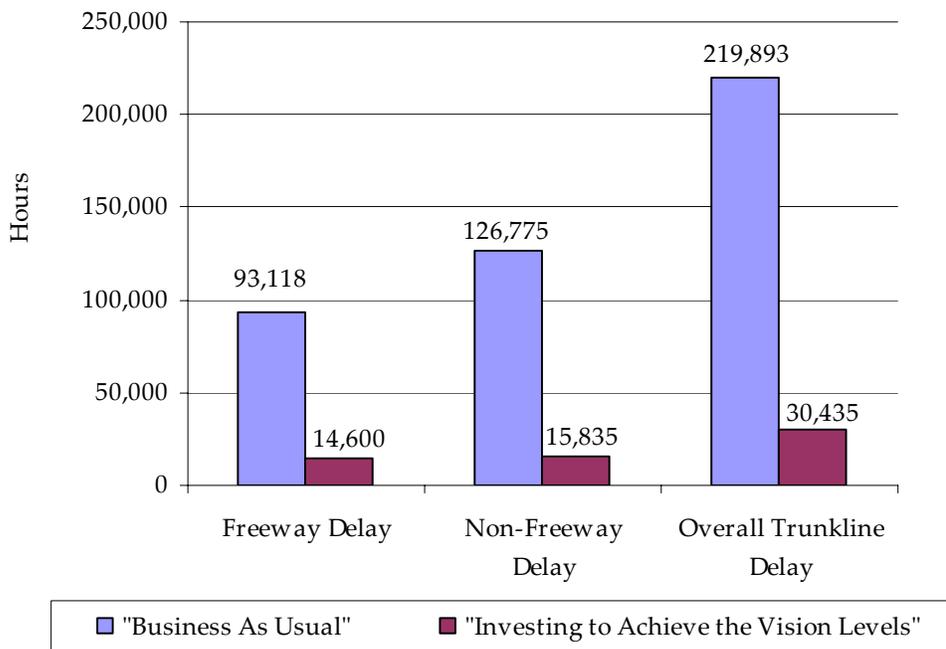
Table 8 and **Figure 6** compare the daily system delay due to congestion (in hours) in the year 2030 under the IAV when compared to investing at the “Business as Usual” status quo.

Table 8: Daily Hours of Vehicle Travel and Delay in 2030 under the IAV

<i>Mobility Measure</i>	<i>“Business as Usual”</i>	<i>“Investing to Achieve the Vision”</i>
Freeway Delay	93,118	14,600
Non-Freeway Delay	126,775	15,835
Overall Trunkline Delay	219,893	30,435

Source: Michigan Department of Transportation Post Processing of Statewide Travel Demand Model

Figure 6: Daily Hours of Vehicle Travel and Delay under the Investing to Achieve the Vision Levels vs. "Business as Usual"



Source: Michigan Department of Transportation Post Processing of Statewide Travel Demand Model

The results show congested delay is significantly reduced with the allocation of added flexible new revenue provided by the IAV. The actual changes in delay may be sharper than indicated in **Table 8** and **Figure 6** because timesavings associated with modernization and multi-modal passenger investments cannot be quantified in the same way as highway investments.

Chapter 4. Economic Impact

The initial chapters of this report set forth the IAV illustration, its rationale and its benefits for Michigan in terms of transportation system performance under the vision, goals and principles of *MI Transportation Plan*. To achieve these benefits for system conditions and performance, the IAV involves investing substantially more revenue relative to “Business as Usual.” The ability to raise the levels of flexible new revenues from Michigan’s economy to support the IAV is critical to the effectiveness of *MI Transportation Plan* and the ability to gain support the new revenue depends, in large part, on the potential economic and other benefits of the IAV compared to the adverse impact that may be associated with raising the flexible new revenues. To assess the overall economic impact of raising revenues and investing them in a manner consistent with the IAV, economic impact analysis that evaluates the potential trade-offs of investing more in transportation and raising taxes to pay for the increased investments is conducted.

In this chapter, we present the estimated economic impacts that can potentially be generated from the IAV. The analysis addresses the full impact of the IAV, applying appropriate methods for assessing investment in all surface transportation programs in addition to improvements in international border crossings, and improvements in aviation. The discussion in this chapter highlights the estimation of economic impacts and impact results. A detailed discussion of the methodologies for estimation can be found in the *Methodologies of Estimating Economic Impacts* report.

It is important to note that the economic analyses of *MI Transportation Plan* investment scenarios are not directly comparable to the Five-Year Program economic benefits assessment conducted by MDOT, working with the University of Michigan and the Economic Development Research Group. The Five-Year Transportation Program is cyclical in nature. Program development is a year-long, multi-stage process where a new fifth year is added and program/project adjustments are made to other years. MDOT’s current investment strategy focuses investments on the preservation of the existing transportation system and on the delivery of a limited number of capacity improvement projects. However, the investment program selected for inclusion in the “*Economic Impact Analysis of the Michigan Transportation Investment Packages*” utilized different strategies. The package investments were selected in order to maximize the reduction of congestion and delay. These projects are primarily located on high-volume roadways in urbanized areas, represent the very best return of investment, and are in keeping with the high-level analysis being performed for *MI Transportation Plan*.

4.1 Impact of the IAV

Because there is a direct linkage between the performance of the state’s transportation system and its economic performance, the higher level of investment will give rise to greater economic returns for the state and its residents. The IAV program results in economic returns of nearly \$70 billion in Gross State Product (GSP), over \$80 billion in personal income and travel time

savings and more than 43,000 permanent full-time equivalent jobs. This translates into \$1.64 in economic benefits for Michigan residents for every one dollar invested in transportation. In comparison, the “Business as Usual” program gives rise to over \$60 billion in economic impacts and nearly 30,000 permanent full-time equivalent jobs. The benefit estimates for both packages should be considered the lower bound of potential benefits because, due to data limitations, the analysis does not fully account for all of the benefits arising from the proposed transportation investments. Specifically, the analysis does not fully capture social and environmental benefits or the full value of logistics cost savings to Michigan businesses, both of which can be very significant. The complete analysis can be found in the *Methodologies of Estimating Economic Impacts* and *Economic Impact Analysis of the Michigan Transportation Investment Packages* reports.

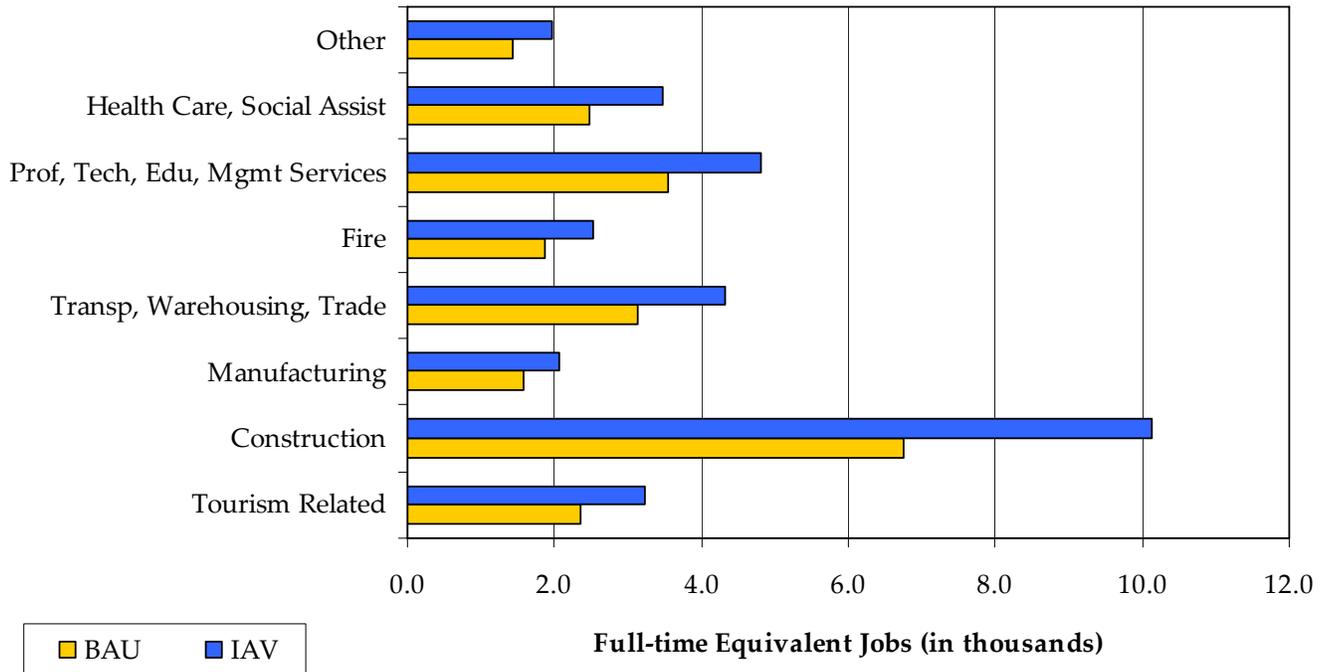
Table 9: Economic Impacts of the Investing to Achieve the Vision Over 2007-2030

<i>Economic Benefits 2007-2030</i>				
	<i>Business as Usual (BAU)</i>	<i>Investing to Achieve Vision (IAV)</i>	<i>Diff. = IAV - BAU</i>	<i>% Increase IAV over BAU</i>
Total Employment (in thousands permanent jobs)	30	43	13	43.3%
Gross State Product (in billion of 2005\$)	\$50.0	\$69.6	\$19.6	39.2%
Personal Income (in billion of 2005\$)	\$38.4	\$54.7	\$16.3	42.4%
Personal Travel Time Savings Benefits (in billions of 2005\$)	\$22.2	\$27.1	\$4.9	22.1%

Source: Wilbur Smith Associates

* Both the “Business as Usual” and “Investing to Achieve the Vision” packages include separate analysis of aviation and border crossing improvements.

Figure 7: Employment Benefits by Industry to the Year 2030 IAV Compared with BAU



Source: Wilbur Smith Associates

4.1.1 How the IAV Supports Better Economic Performance

The IAV is expected to improve Michigan’s economic performance by removing barriers that inhibit economic activity in the state. The *Integration Technical Report* provides an overview of specific performance barriers to economic performance and how balanced investments in different system elements can overcome these barriers. The IAV represents a balanced approach to transportation, under the decision principles for an integrated system. By investing in this way, the IAV makes economic activities possible in Michigan that would not otherwise occur. The IAV also enhances the quality and value of Michigan’s economic activities across industries by making transportation of passengers and freight to and from the activities more efficient and less costly.

The IAV removes and reduces barriers to Michigan’s economic performance by:

- 1. Reducing Travel Time for Commuters**

With its balanced approach to investment, the IAV both reduces congestion and the delay associated with deteriorating pavements and bridges. These savings in travel time leverage with accessibility of transit, bicycle pedestrian facilities and other transportation resources to make workers more available for jobs, and to make a better range of jobs available to workers.

2. Reducing Transit Costs for Shippers and Carriers in Michigan's Industries

By investing in roadway preservation more than "Business as Usual", the IAV safeguards the viability of Michigan's commercial truck routes. The IAV also reduces costly delay for commodities shipped by truck and enhances reliability for multi-modal commodities by also investing in aviation, rail and ports. With these investments, the IAV creates a more favorable business climate for Michigan's business and industry.

3. Making Markets More Accessible to Michigan's Consumers and Businesses

By investing in both highway expansion and passenger multi-modal programs, the IAV makes it easier for Michigan's residents to make trips to engage in consumer markets. This expands the range of opportunities for consumers over "Business as Usual." By reducing travel times and costs, the IAV also makes more time and household disposable income available for Michigan's residents to spend time and money participating in Michigan's markets. For businesses, the IAV invests in both passenger and freight, highway and multi-modal programs making the commodities of production more accessible for doing business.

4. Improving Michigan's Potential to Benefit from Cross-border Trade

Michigan benefits from cross-border trade when overall economic conditions in the state are more favorable than conditions in Canada. By reducing the cost of doing business for Michigan's businesses and improving the accessibility of the border crossing, the IAV increases the likelihood that cross-border trade with Canada will result in more economic activity on the Michigan side of the border.

5. Improving the Efficiency of Michigan's Accessibility by Air

The IAV's additional investment in Aviation over Business as Usual is expected to contribute to the reliability and efficiency of air travel to and from the state. Reliable air transportation for both people and commodities is expected to enhance Michigan's business climate by removing the potential barriers to the provision of professional services and manufacturing industries. This represents a lower cost of doing business for Michigan firms, and an enhanced quality of life for residents of the state. Both the enhanced quality of life and the reduced costs of doing business make time and money available for residents and visitors to engage in more activity on Michigan's economy.

4.1.2 Economic Impact Conclusions

Michigan's transportation system is a vital asset to the state's economy. The investment made in all elements of the transportation system under "Business as Usual" is expected to be responsible for 30,000 jobs in Michigan and contribute nearly \$50 billion to the Gross State Product to the year 2030. Because the transportation system is such a major area of public expenditure and has such a profound impact on Michigan's economy, it is critical that Michigan's people and businesses benefit from the appropriate investment level. The IAV illustration provides a strategic way to invest in Michigan's transportation system that protects

the jobs, income and GSP available from “Business as Usual”, and expands these impacts by creating approximately 13,000 more jobs and \$16.3 billion in personal income for Michigan’s residents with an overall GSP approximately \$19.6 billion higher than would otherwise be possible.

Chapter 5. Conclusion

Analysis of the IAV illustration for *MI Transportation Plan* demonstrates that with sufficient levels and flexibility in new revenue sources, Michigan can make significant progress towards the goals, principles, and vision of *MI Transportation Plan*. Investment in a range of mutually supporting and integrated modal programs can significantly reduce revenue gaps to the year 2030, resulting in significant performance impacts across the system over “Business as Usual.” The analysis further demonstrates that drawing these revenues both from Michigan’s economy and from available federal programs can result in more jobs, personal income, and a more robust gross state product than if revenues are not raised and invested in a manner consistent with the IAV.

Drawing from the conclusions of the *Revenue Gap and Investment Packages Report* of *MI Transportation Plan* and the comparison of this IAV to the “Business as Usual” alternative, this strategy is desired based on:

- *Improving Michigan’s Economic Vitality.* The above analysis shows that Michigan is expected to gain jobs, citizens are expected to gain personal income, and the overall state’s economy is expected to be served by investing in the transportation system in a manner consistent with the IAV.
- *Preserving Michigan’s Transportation Assets.* The IAV offers a level of investment in road and bridge preservation, which comes closer to meeting the state’s “percent good” targets than any other strategy considered in *MI Transportation Plan*. By ensuring this “backbone” for an integrated system, this IAV offers maximum leverage for the state to benefit from complementary investments in other programs.
- *Investing in a Seamless and Multi-modal System.* By providing flexibility and investment to preserve and expand multi-modal programs and roadway modernization projects the IAV supports investments to improve access and mobility on multiple modes. The revenue and investments supported by the IAV provide a way to significantly close gaps that interfere with system integration.

Investment in Michigan’s transportation system can support the safety, mobility, and economic vitality of Michigan’s citizens and communities. This document has explored an investment avenue to address projected shortfalls in Michigan’s transportation programs by raising and strategically investing flexible new revenue in the system to the year 2030. The analysis has also demonstrated both the performance and the economic implications of pursuing the *Preferred Vision* of *MI Transportation Plan* under these constraints. Implementation of *MI Transportation Plan* at the Investing to Achieve the Vision Level utilizes the results of these analyses and the supporting technical reports and planning process to arrive at a future that preserves vital assets as efficiently as possible while making revenue available for balanced transportation across the system.



MI Transportation
MICHIGAN LONG RANGE TRANSPORTATION PLAN



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

