MinnesotaGO
A Collaborative Vision for Transportation

20-Year State Highway Investment Plan 2018-2037



DEPARTMENT OF TRANSPORTATION

January 2017

This page intentionally left blank.

DEPARTMENT OF TRANSPORTATION

January 2017

Dear People of Minnesota,

I am pleased to share with you the Minnesota 20-Year State Highway Investment Plan. This plan is the result of extensive collaboration during the past two years between the Minnesota Department of Transportation and residents, stakeholders and partners throughout Minnesota. It was updated along with the Statewide Multimodal Transportation Plan. MnDOT received over 12,000 responses from Minnesotans during the joint public outreach process. I want to thank everyone who took the time to participate both online and in-person and provide input on the plan.

MnSHIP directs capital investment for Minnesota's state highway system over the next twenty years. This fiscally constrained plan identifies investment priorities given current and expected funding. MnSHIP describes how MnDOT will use capital investments to repair, replace and improve the 12,000-mile state highway system. The plan also includes an estimate of the investment needs for the highway system based on the costs required to meet performance-based targets and other key system goals. MnDOT takes into account many factors in developing MnSHIP, including federal and state laws, MnDOT policy and current and projected conditions of the state highway system.

MnSHIP reflects the challenging reality of transportation funding and investment in Minnesota. The state highway system is aging. Much of the system was originally constructed during the buildout of the interstate system between the 1950s and the 1980s, and is now reaching the end of its service life. It will require increased capital investment and additional maintenance in the years ahead. As part of the MnSHIP process, MnDOT staff forecasted that the department will have approximately $21 billion to invest in state highways over the next twenty years, compared to approximately $39 billion in estimated needs. This results in an unmet need of $18 billion.

The 20-year investment direction established in MnSHIP focuses on maintaining the existing state highway system while making limited mobility investments. This approach reflects both MnDOT and stakeholder input and meets key requirements and agency commitments. It also continues a shift for MnDOT from building to maintaining the system. Despite this level of investment in maintaining the existing state highway system, the condition of the system is expected to deteriorate over the next twenty years.

The plan also reflects a commitment to accessibility for the state highway system. MnDOT believes that the transportation system must be accessible and safe for users of all abilities and incomes. To further that goal, MnSHIP increased the funding for accessible pedestrian infrastructure so that all state highways will be substantially compliant with the Americans with Disabilities Act no later than 2037. Under previous funding levels, compliance was expected to take more than fifty years.

The success of Minnesota's transportation system depends on the coordinated efforts of many public and private providers, and the investment priorities outlined in this plan provide a framework for those efforts. MnDOT will continue to involve residents, stakeholders and partners in the implementation of this plan and in future policy and investment decisions. Together, we can maintain and build a multimodal transportation system that achieves the Minnesota GO Vision to maximize the health of people, the environment and our economy.

Sincerely,



Charles A. Zelle
Commissioner

This page intentionally left blank.



Minnesota GO
A Collaborative Vision for Transportation

20-Year State Highway Investment Plan

Executive Summary

This page is intentionally left blank.

THE PURPOSE OF MNSHIP

The 20-Year Minnesota State Highway Investment Plan directs capital investment for Minnesota's state highway system. The plan must identify investment priorities given current and expected funding. It is updated every four years, as required by Minnesota Statute. This MnSHIP update spans the 20-year planning period from 2018 to 2037.

The Minnesota Department of Transportation takes into account many factors in developing MnSHIP. The plan prioritizes future investments to address the widening gap between highway revenues and construction costs. MnSHIP also considers federal and state laws, MnDOT policy, and current and expected future conditions on the state highway system. These factors are described in more detail in Chapter 2, "Key Factors and Assumptions."

MnSHIP describes how MnDOT will use capital investments to repair, replace, and improve the state highway system. The plan does not address how MnDOT funds the operation of the system or day-to-day maintenance.

RELATIONSHIP TO MNDOT'S PLANS AND PROGRAMS

MnSHIP is part of a "family of plans" that connects vision and policy direction for transportation in Minnesota to how MnDOT selects projects and makes improvements on the state highway system. The Statewide Multimodal Transportation Plan describes statewide objectives and strategies that help MnDOT and its partners make progress toward the Minnesota GO 50-Year Vision. MnSHIP links policies and objectives in the Minnesota GO 50-Year Vision and the Statewide Multimodal Transportation Plan with capital investments on the state highway system.

Investment Category Descriptions

MnDOT invests in the state highway system through various types of capital improvement projects. Some projects enhance the condition of existing infrastructure, while others add new infrastructure to the system. MnDOT tracks capital investment in highways by investment categories. Investment categories are components of projects. A single MnDOT project can include investment from multiple different investment categories. The 2013 version of MnSHIP identified 10 investment categories. This MnSHIP update includes four additional investment categories. The individual categories are separated into five major investment objective areas as illustrated in Figure ES-1.

Figure ES-1: MnSHIP Investment Categories and Objective Areas

SYSTEM STEWARDSHIP	TRANSPORTATION SAFETY	CRITICAL CONNECTIONS	HEALTHY COMMUNITIES	OTHER
• Pavement Condition • Bridge Condition • Roadside Infrastructure Condition • Facilities • Jurisdictional Transfer	• Traveler Safety	• Twin Cities Mobility • Greater MN Mobility • Freight • Bicycle Infrastructure • Accessible Pedestrian Infrastructure	• Regional + Community Improvement Priorities	• Project Delivery • Small Programs

20-Year Revenue Projection

During the next 20 years, MnDOT estimates that $21 billion in revenue will be available for capital investment on the state highway system – approximately $1 billion per year. This estimate assumes that no new major sources of revenue will be introduced and that the majority of MnDOT's future revenues will originate from the four main revenue sources (federal aid, state gas tax, tab fees and motor vehicle sales tax).

MnDOT anticipates that the actual amount of funding it receives from the State Trunk Highway Fund will increase by approximately 2 percent per year over the next 20 years. However, two key trends will make it increasingly difficult for MnDOT to sustain current conditions on the state highway system:

- Construction costs are growing more quickly than revenues: Expected revenues will lose buying power as construction costs continue to grow at an annual rate of 4.5 percent.

- Revenue growth continues to be slow: Vehicles are becoming more fuel efficient and vehicle miles travelled has remained flat over the last decade.

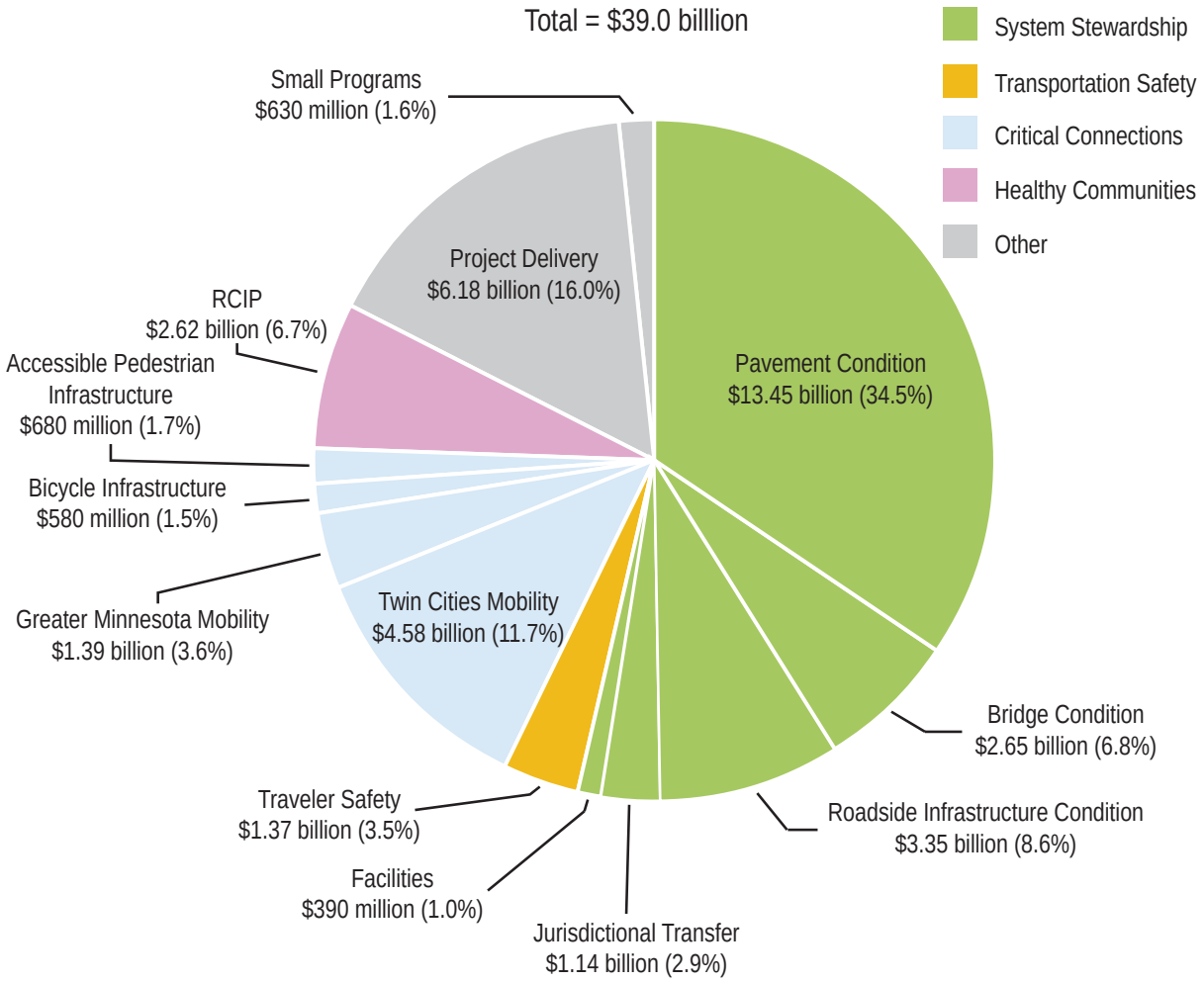
Summary of Needs

In developing its assumptions for MnSHIP, MnDOT projected the investments necessary to meet state highway transportation needs through 2037. This need was determined by the costs required to meet performance-based targets and other key system goals, such as advancing the state's economic vitality and supporting Minnesotans' quality of life. The total need for the Minnesota state highway system is calculated to be approximately $39 billion over 20 years. MnDOT estimates it will have $21 billion to invest in the state highway system over the same time period, resulting in an $18 billion funding gap. Figure ES-3 shows the distribution of the $39 billion need by investment category. This level of investment would ensure that the state highway system meets all federal and state performance requirements and makes substantial progress toward realizing the Minnesota Go Vision. It would also allow MnDOT to effectively manage its greatest risks in each investment category.

Figure ES-2: Comparison of Investment Needs and Available Revenue



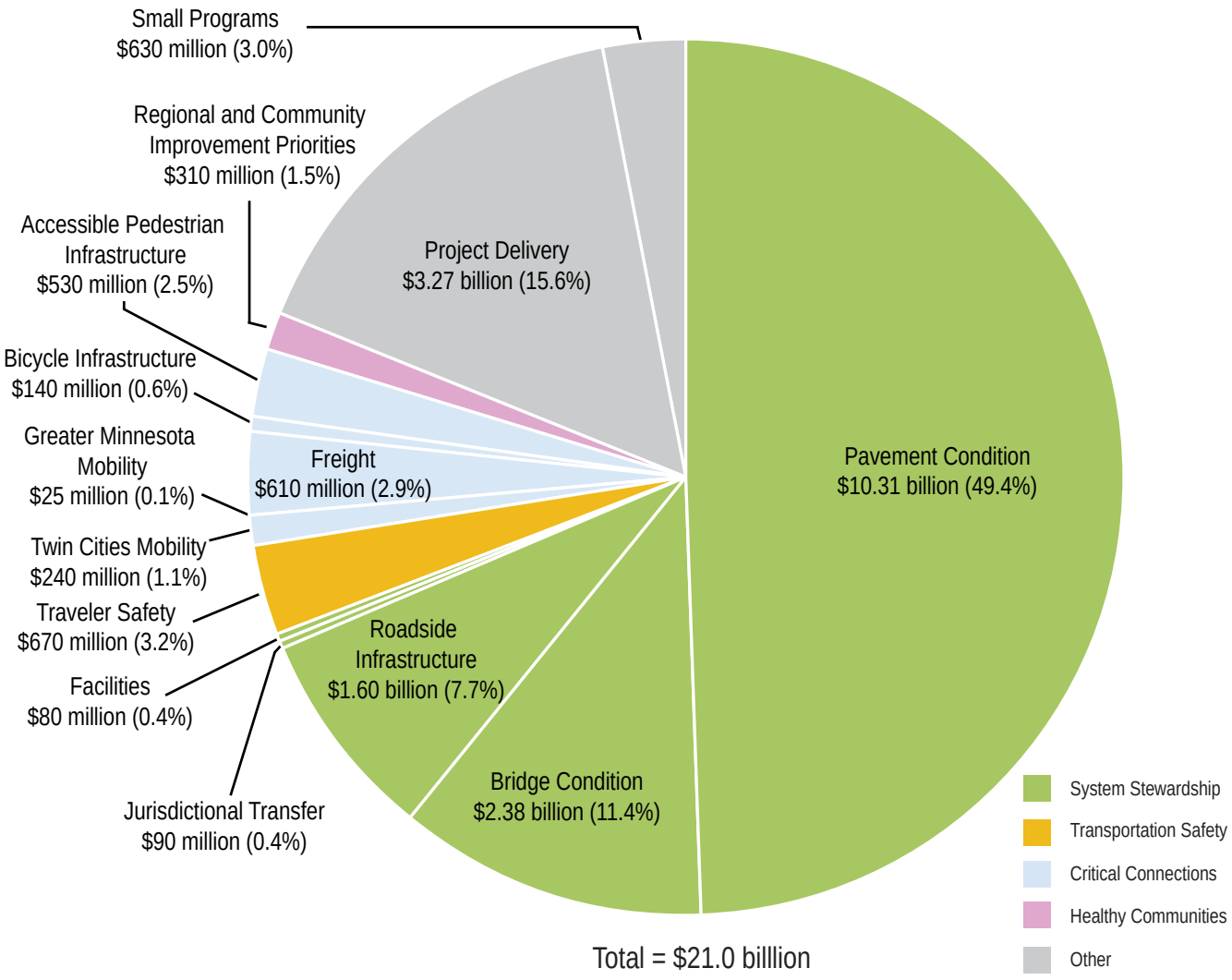
Figure ES-3: Transportation Needs During the Next 20 Years (by Investment Category)



Investment Summary

The 20-year investment direction established in MnSHIP focuses on maintaining the existing state highway system while making limited mobility investments. This approach reflects both MnDOT and stakeholder input and meets key requirements and agency commitments. It also continues a shift for MnDOT from being a builder of the system to the maintainer and operator of the system. The investment direction does not impact the projects already developed and programmed in Years 2018 through 2021. The priorities identified in this plan will be reflected in investments and projects starting in 2022. Figure ES-4 shows the distribution of expenditures through all years of the plan. Information on the investment direction in MnSHIP can be found in Chapter 5, "Investment Direction."

Figure ES-4: 20-Year Capital Highway Investment Direction



BIGGEST STRENGTHS

The investment direction makes progress toward goals in all four investment objective areas. MnDOT's priorities reflect the public's input that calls for a diversified approach, as well as one that prioritizes maintenance of the transportation system. Outcomes for each investment area include:

- System Stewardship: MnDOT focuses a majority of investment on maintaining the condition of roads, bridges, and roadside infrastructure. Federal targets for pavement and bridge condition are likely to be met.
- Transportation Safety: MnDOT will continue to focus on lower cost, proactive treatments aimed at preventing fatalities and serious injuries.
- Critical Connections: MnDOT commits to achieving substantial compliance with the Americans with Disabilities Act no later than 2037. MnDOT also commits to planned mobility investments in the Twin Cities metro area through 2023.
- Healthy Communities: Through the Transportation and Economic Development program, investments will be made to address local concerns through partnerships, design add-ons, and a few stand- alone projects to support economic competitiveness and quality of life.



BIGGEST DRAWBACKS

The investment approach offers a limited response to increasing infrastructure and multimodal needs. Several challenges remain, including:

- System Stewardship: Conditions of roads, bridges, and roadside infrastructure decline on NHS and non-NHS routes.
- Transportation Safety: Only a limited number of locations with a sustained crash history will be addressed.
- Critical Connections: The number and scope of mobility improvements decreases substantially, potentially reducing the ability to maintain reliable travel times in the Twin Cities area and Greater Minnesota. Resources are not available to address growing areas of the state.
- Healthy Communities: The investment direction limits MnDOT's ability to address local concerns.

PLAN OUTCOMES

MnDOT will make progress in all investment areas, but not all performance targets will be met (Figure ES-5). Pavement and bridge conditions are expected to worsen between 2018 and 2037. Travel time reliability in the Twin Cities is expected to decline due to projected regional growth.

Figure ES-5: Total Investments, Outcomes and Current Condition

INVESTMENT CATEGORY	OBJECTIVE AREA	CURRENT CONDITIONS (2017)	PROJECTED OUTCOME(S) IN 2037	TOTAL INVESTMENT (2018-2037)
Pavement Condition	System Stewardship	Meet MnDOT targets and Governmental Accounting Standards Board 34 thresholds for NHS and Non-NHS pavement condition. • Interstate: 1.9% poor • NHS: 3.0% poor • Non-NHS: 4.0% poor	NHS and Non-NHS pavement condition worsen. Interstate condition worsens but meets federal target. Maintain GASB 34 threshold on the NHS. • Interstate: 4.0% poor • NHS: 8.0% poor • Non-NHS: 18.0% poor	$10.31 billion
Bridge Condition	System Stewardship	Meet GASB 34 thresholds for NHS and Non-NHS for bridge condition. Only Non-NHS meets MnDOT targets for bridge condition. • NHS: 4.5% poor • Non-NHS: 1.3% poor	Non-NHS bridge conditions worsen, while NHS bridge condition is maintained. GASB 34 thresholds are met but NHS thresholds are not. • NHS: 5.0% poor • Non-NHS: 7.0-8.0% poor	$2.38 billion
Roadside Infrastructure Condition	System Stewardship	Roadside infrastructure condition does not meet targets. • Culverts: 13.0% poor • Deep Storm Water Tunnels: 24.0% poor • Overhead Sign Structures: 30.0% poor	The condition of all roadside infrastructure assets will be maintained. Condition targets for culverts, deep storm water tunnels and overhead sign structures will not be met. • Culverts: 14.0-15.0% poor • Deep Storm Water Tunnels: 23.0-24.0% poor • Overhead Sign Structures: 25.0% poor	$1.60 billion
Jurisdictional Transfer	System Stewardship	2,653 miles of misaligned roads. Transfer of misaligned roads will continue.	MnDOT will transfer over 900 miles of roadway between the state and local agencies.	$90 million
Facilities	System Stewardship	6.0% of rest areas in good condition and nearly half in poor condition. Repair or replacement of weigh scales is not keeping pace with need.	6.0% of rest areas will remain in good condition. Weigh scale and weigh station replacement will not keep pace resulting in outdated or inoperable sites.	$80 million
Traveler Safety	Transportation Safety	Safety improvements are made proactively with low cost/high benefit projects. Total fatalities and serious injuries have plateaued after decade-long decline.	Safety improvements made at a reduced rate. There is limited ability to address locations with high sustained crash rates. Total fatalities and serious injures may see an increase.	$670 million
			TOTAL	$21.0 BILLION

INVESTMENT CATEGORY	OBJECTIVE AREA	CURRENT CONDITIONS (2017)	PROJECTED OUTCOME(S) IN 2037	TOTAL INVESTMENT (2018-2037)
Twin Cities Mobility	Critical Connections	Congestion remains relatively flat. MnPASS express lanes and spot mobility improvements are completed where needed.	Travel time reliability likely to decrease. Investments made in two MnPASS corridors and six spot mobility improvements between 2018 and 2023.	$240 million
Greater Minnesota Mobility	Critical Connections	A few corridors of mostly urban highways have decreased reliability during peak travel times.	Corridors likely to see decreased travel time reliability. 6-10 low-cost capital improvements are completed.	$25 million
Freights	Critical Connections	-	-	$610 million
Bicycle Infrastructure	Critical Connections	The condition of the state bicycle network is maintained and new bicycle improvements are being made where needed.	Reduced investment in new improvements and maintenance of existing bicycle infrastructure leads to deterioration of bicycle network.	$140 million
Accessible Pedestrian Infrastructure	Critical Connections	Progress is being made towards ADA-compliant pedestrian infrastructure. Non-ADA pedestrian improvements are limited. • Sidewalks not ADA compliant: 54.0%	Infrastructure on the pedestrian network will be substantially compliant with standards. Some non-ADA projects will increase pedestrian access.	$530 million
Regional and Community Improvement Priorities	Healthy Communities	Economic development and quality of life improvements are being made through partnerships and project upgrades.	MnDOT will respond to 2-5 economic development opportunities per year through the TED program.	$310 million
Project Delivery	Other	Invest the amount necessary to deliver projects in the other categories.	Invest the amount necessary to deliver projects in the other categories.	$3.27 billion
Small Programs	Other	-	Continue to invest in small programs such as off-system bridges and historic properties.	$630 million
			TOTAL	$21.0 BILLION



RELATIONSHIP OF MNSHIP INVESTMENT DIRECTION TO PROJECT SELECTION

MnSHIP is not a project-specific plan. The investment direction established in MnSHIP is by investment category. MnDOT's districts select projects that follow the MnSHIP investment direction and help make progress toward MnDOT goals and objectives. These projects are presented in the 10-Year Capital Highway Investment Plan. The first four years of the CHIP make up the State Transportation Improvement Program. Projects in the STIP are well-defined and typically considered a commitment. The projects identified in the final six years of the CHIP are not commitments; they are anticipated to change as project development progresses and needs are better understood. The CHIP is updated annually to address new project-level information as well as infrastructure conditions and system performance. MnDOT districts are responsible for designing, delivering, and constructing selected projects.

Projects are implemented annually through the STIP which documents the projects that MnDOT will fund and deliver over the upcoming four years. Annual updates of the STIP allow MnDOT to make timely changes that incorporate new investment decisions based on new plan strategies, investment priorities, or system performance. Further information on project selection can be found in Chapter 5, "Investment Direction" and Appendix E: Financial Summary.

PRIORITIES FOR ADDITIONAL FUNDING

During the second round of the public outreach process, MnDOT asked stakeholders what their priorities would be should MnDOT receive any additional funding. The public was asked to prioritize which categories they would like to see MnDOT invest in, beyond what is being invested through the proposed investment direction. MnDOT senior leadership and key staff were also asked their preference for investing additional revenue. Figure ES-6 on the following page shows the ranking of stakeholder and MnDOT priorities for additional funding. Stakeholders and the public generally agreed that any extra funding MnDOT receives for capital improvements on the state highway network should be spent maintaining and repairing MnDOT's existing assets. For the public, poorly maintained pavements and bridges were seen as a safety issue. Both groups believed investment in capacity or mobility improvements are priorities but disagreed on the preferred investment category. There was also agreement that main street improvements are important.

Figure ES-6: 20-Year Capital Highway Investment Direction



Based on input from the public and transportation stakeholders and MnDOT's own internal priorities, MnDOT would prioritize spending additional funding on:

- Maintaining and repairing existing assets on the state highway system
- Strategically improving mobility and reliability at high priority locations on the National Highway System
- Reconstructing Main Streets

Such activities would allow MnDOT to limit the number of bridges and miles of pavement in poor condition, bringing the highway system closer to Interstate and NHS performance targets. Additional funding would increase MnDOT's ability to address deteriorating culverts, signage and other supporting infrastructure. MnDOT would also be able to address more urban reconstruction, or Main Street, projects. These projects allow local governments to improve amenities and facilities along the state highway. Mobility improvements in the Twin Cities area would be consistent with the Met Council's Transportation Policy Plan, such as constructing MnPASS lanes, and follow the strategies for Twin Cities Mobility listed in MnSHIP. Mobility improvements in Greater Minnesota would focus on the locations with the greatest performance issues and focus on low-cost/high benefit improvements. Completing these additional priority projects would allow MnDOT to cost-effectively meet long term performance targets and further advance the Minnesota GO Vision for transportation.

This page intentionally left blank.

Table of Contents

EXECUTIVE SUMMARY.....ES-1

CHAPTER 1.....1

Plan Overview

CHAPTER 2.....23

Key Factors and Assumptions

CHAPTER 3.....45

Investment Needs

CHAPTER 4.....61

Development of Investment Direction

CHAPTER 5.....75

Investment Direction

CHAPTER 6.....105

Priorities for Additional Revenue

CHAPTER 7.....121

Moving Forward

This page intentionally left blank.



Minnesota GO
A Collaborative Vision for Transportation

20-Year State Highway Investment Plan

Chapter 1

PLAN OVERVIEW

This page intentionally left blank.

PLAN OVERVIEW

Minnesota's 12,000-mile state highway system plays a key role in supporting the state's economy and quality of life. Businesses rely on the system to move their goods and raw materials throughout the state. In addition, state highways connect Minnesotans to other transportation networks and to state, national and global markets.

The Minnesota Department of Transportation is responsible for constructing, operating, and maintaining this system. The 20-Year Minnesota State Highway Investment Plan is MnDOT's vehicle for deciding and communicating capital investment priorities for the system for the next 20 years. MnSHIP is updated every four years and was last completed in 2013. This chapter provides an overview of Minnesota's state highway system and describes the role of MnSHIP in managing this important transportation network.

The key messages of Chapter 1 are:

- MnSHIP identifies capital investment priorities based on projected funding for Minnesota's 12,000-mile state highway system.
- MnDOT updates MnSHIP every four years to reflect changes in policy, transportation needs and trends, and revenue.
- MnSHIP connects vision and policy direction for transportation in Minnesota to project selection on the state highway system.
- Investments on the state highway system are allocated into 14 categories that make up five investment areas: System Stewardship, Transportation Safety, Critical Connections, Healthy Communities, and Other.



The Purpose of MnSHIP

MnSHIP directs capital investment for Minnesota's state highway system. The plan must identify investment priorities given current and expected funding. It is updated every four years, as required by Minnesota statute. This MnSHIP update spans the 20-year planning period from 2018 to 2037.

MnDOT takes into account many factors in developing MnSHIP. The plan prioritizes future investments to address the widening gap between highway revenues and construction costs. MnSHIP also considers federal and state laws, MnDOT policy, and current and expected future conditions on the state highway system. These factors are described in more detail in Chapter 2, "Key Factors and Assumptions."

MnSHIP describes how MnDOT will use capital investments to repair, replace, and improve the state highway system. The plan does not address how MnDOT funds the operation of the system or day-to-day maintenance. While decisions made in MnSHIP can clearly affect the operations and maintenance of the system, MnDOT is only in the beginning stages of explaining these impacts more effectively. This MnSHIP update starts to show how the lack of revenue for construction projects affects the experience of the user as well as MnDOT's operations budget.

RELATIONSHIP TO MNDOT'S PLANS AND PROGRAMS

MnSHIP is part of a "family of plans" that connects vision and policy direction for transportation in Minnesota to how MnDOT selects projects and makes improvements on the state highway system. The "family of plans" is shown in Figure 1-1. Together the plans serve as a framework for implementing a multimodal transportation system throughout Minnesota.

MnDOT updates the Statewide Multimodal Transportation Plan every four years. The plan describes statewide objectives and strategies that help MnDOT and its partners make progress toward the Minnesota GO 50-Year Vision. The SMTP is about more than just roadways and more than just MnDOT. However, MnDOT uses the SMTP objectives and strategies to inform a number of modal and system plans. These plans include MnSHIP as well as the State *Aviation System Plan*, the *Statewide Bicycle System Plan*, the *Statewide Freight System Plan*, the *Statewide Ports & Waterways Plan*, the *State Rail Plan*, the *Greater Minnesota Transit Investment Plan*, Statewide Pedestrian Plan and a collection of supporting plans. These modal and system plans are updated every four to six years. Some help to set specific investment direction, others focus more on general policy guidance, and some do both.

MnSHIP is a system investment plan because it sets investment direction for the state highway system. MnDOT has used performance-based planning to develop MnSHIP for more than ten years. As a performance based plan, MnSHIP uses measures and targets to assess system performance, identify needs, and develop investment priorities. Since MnSHIP is limited to existing and projected funding, the need for investments to be driven by performance-based criteria is increased. MnSHIP links policies and objectives in the Minnesota GO 50-Year Vision and the Statewide Multimodal Transportation Plan with capital investments on the state highway system.

Figure 1-1: MnDOT Family of Plans

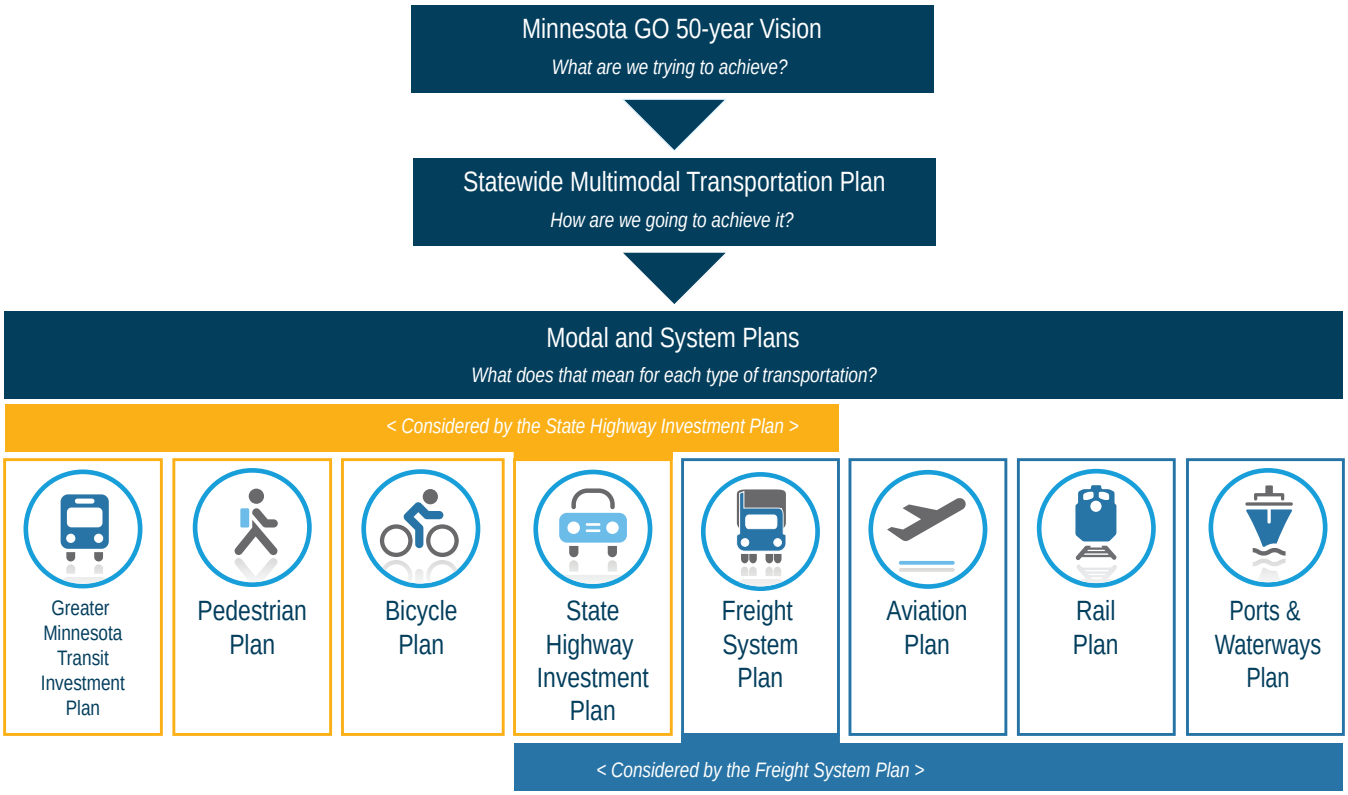


Figure 1-2: Policy to Projects



Relationship of MnSHIP Investment Direction to Project Selection

Guided by the Minnesota GO Vision and the Statewide Multimodal Transportation Plan, MnSHIP's investment priorities are set through an extensive planning process.

At the beginning of this process, technical work groups met to discuss current and projected conditions for state highways. MnDOT used performance measures and technical expertise to evaluate how different highway investments might advance the Minnesota GO Vision and the Statewide Multimodal Transportation Plan as well as system performance targets. MnDOT developed alternative investment approaches to solicit input from the public, local government transportation officials, and MnDOT staff on investment priorities. MnDOT used this input to set the investment direction for the state highway system for the next 20 years.

MnDOT's districts select projects that follow the MnSHIP investment direction and help make progress toward MnDOT goals and objectives. These projects are presented in the *10-Year Capital Highway Investment Plan* . The first four years of the CHIP make up the *State Transportation Improvement Program*. Projects in the STIP are well-defined and typically considered a commitment. The projects identified in the final six years of the CHIP are not commitments because they are anticipated to change as project development progresses and needs are better understood. The CHIP is updated annually to address new project-level information as well as infrastructure conditions and system performance. MnDOT districts are responsible for designing, delivering, and constructing selected projects.

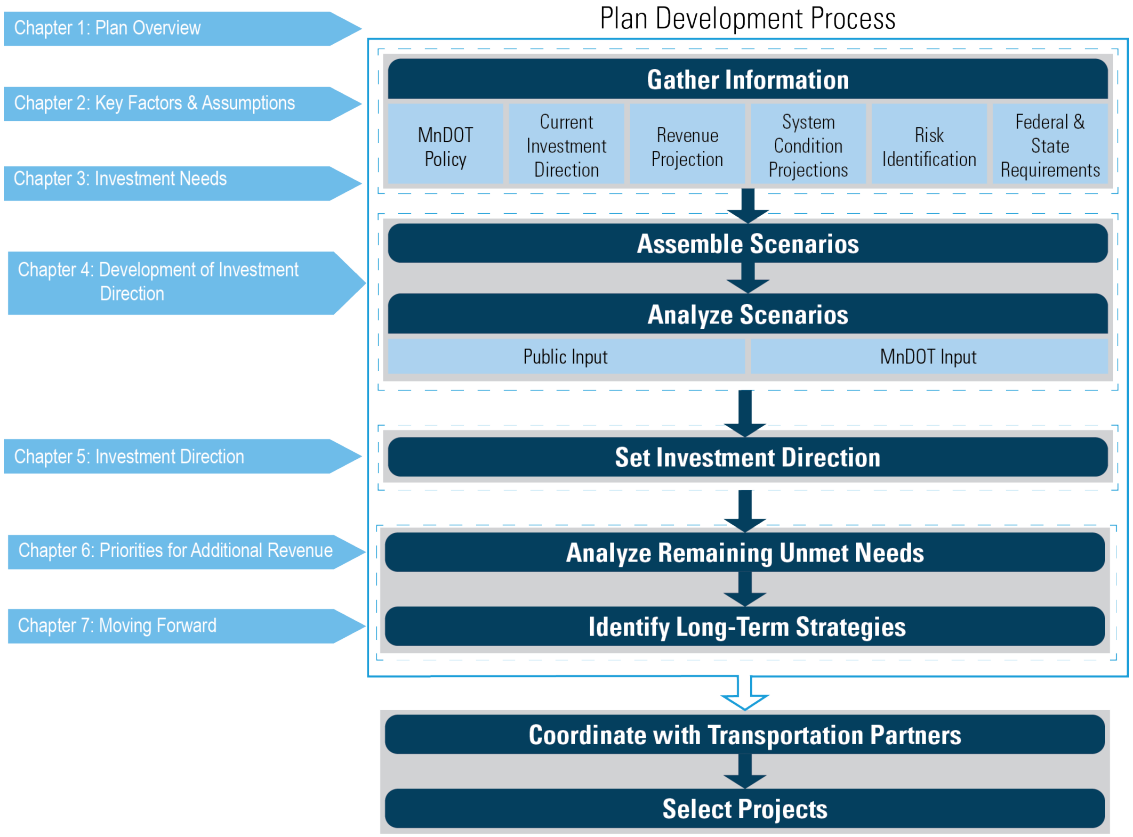
MnDOT districts work closely with a broad range of stakeholders through Area Transportation Partnerships. These partnerships provide a collaborative decision-making process for the selection of local projects that are recommended to receive federal funds. In addition, ATPs provide a local perspective on the district's list of programmed projects in the STIP.

Projects are implemented annually through the STIP which documents the projects that MnDOT will fund and deliver over the upcoming four years. Annual updates of the STIP allow MnDOT to make timely changes that incorporate new investment decisions based on new plan strategies, investment priorities, or system performance. MnDOT's high-level project selection process is shown in Figure 1-2 and further information on project selection can be found in Chapter 5, "Investment Direction" and Appendix E: Financial Summary.

Organization of Chapters

The chapters in this plan are based on the steps in the plan's development process, presented together in Figure 1-3. The first step in the MnSHIP planning process involves gathering information from various sources. Chapter 2: Key Factors and Assumptions covers the state and federal legislative requirements for MnSHIP as well as current system conditions and revenue

Figure 1-3: MnSHIP Chapters and Development Process



available for the plan. Chapter 3: Investment Needs describes the amount of money needed to meet performance targets and key objectives for each investment category.

The second step in the MnSHIP process involves developing investment scenarios and selecting a preferred scenario. Three scenarios were developed and presented to the public and transportation stakeholders during public outreach. The details of this process are described in Chapter 4: Development of Investment Direction.

The third step in the MnSHIP planning process is setting the investment direction. Once the results from public outreach were analyzed, MnDOT gathered input from internal staff and developed an investment direction for MnSHIP. This direction describes how MnDOT is going to invest in the state highway system for the next 20 years. The details of this investment direction

are presented in Chapter 5: Investment Direction.

The fourth step in the MnSHIP process is assessing the impacts and outcomes of the investment direction. Chapter 6: Priorities for Additional Revenue identifies gaps between the MnSHIP investment direction and desired outcomes and it identifies priorities for investment should additional revenue be made available. Chapter 7: Moving Forward identifies strategies to maximize the benefits of MnDOT's investment on the state highway system.

Once MnSHIP is complete, MnDOT districts select projects that follow the investment direction and strategies established in the plan. These planned and programmed projects are presented in the 10-Year CHIP.

Minnesota's State Highway System

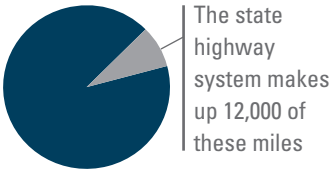
The state highway system is a multimodal network serving many different transportation users. These users include motorists, freight carriers, transit passengers, bicyclists and pedestrians. It also connects these users to other transportation systems, such as transit networks, rail, aviation, and waterways, as well as county and city roads.

The importance of the state highway system is demonstrated by its use. At 12,000 miles, the system comprises only 8 percent of Minnesota's total roadway miles, yet carries almost 60 percent of the vehicle miles traveled and moves the majority of freight. State highways are central to many communities in Minnesota and their conditions directly affect residents' quality of life.

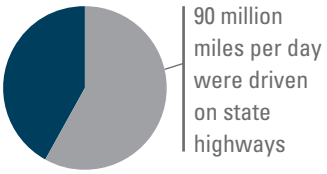
A strong economy depends upon a well-maintained and well-connected transportation network. Minnesota businesses rely on the state highway system's size, connections, and pavement and bridge conditions to carry freight throughout the state. To keep Minnesota economically strong into the future, MnDOT needs to maintain and improve the state highway system. The size and the age of Minnesota's transportation system demonstrate the scope of the state highway system's investment need:

- 50 percent of state highway pavements are more than 50 years old
- 40 percent of state highway bridges are more than 40 years old
- Minnesota ranks in the bottom half nationally for interstate pavement condition (33rd out of 50)[1]
- Minnesota ranks 13th nationally for bridge condition on state highways[2]

There are more than 141,000 miles of roadways in Minnesota



In 2015, more than 161 million miles per day were driven on Minnesota's roads

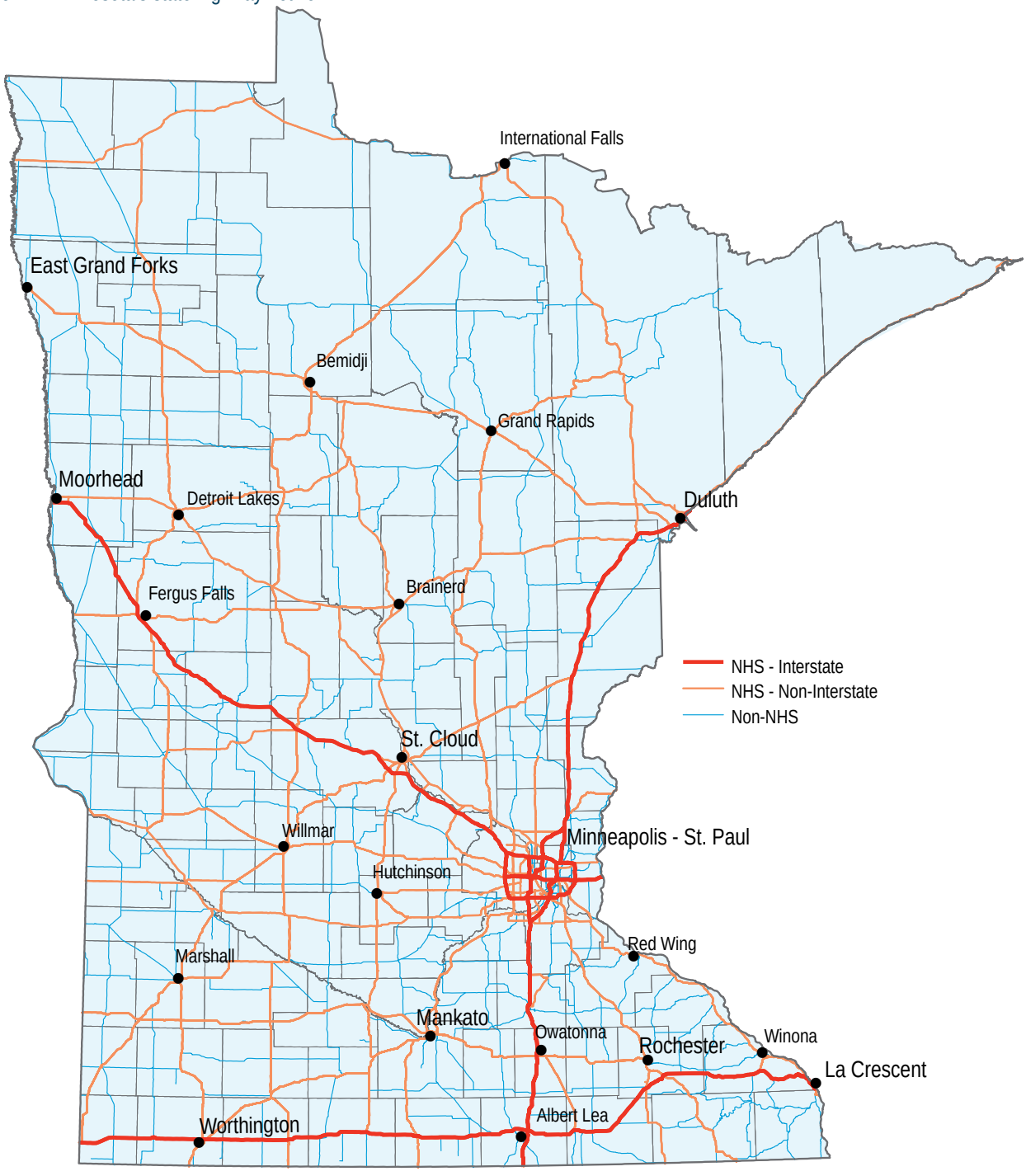


1 Federal Highway Administration 2014 Highway Statistics
2 http://www.fhwa.dot.gov/bridge/nbi/no10/owner15.cfm#f

WHICH ROADS MAKE UP THE STATE HIGHWAY SYSTEM?

The state highway system includes all Interstate highways, U.S. highways and Minnesota state highways. These roads fall into two categories: National Highway System roadways and non-NHS roadways. NHS roadways serve statewide and inter-state travel and are the primary connections between large urban areas throughout the state and beyond. Non-NHS state highways provide important connections for regional and local travel and generally carry lower traffic volumes. Figure 1-4 shows the extent of the state highway system.

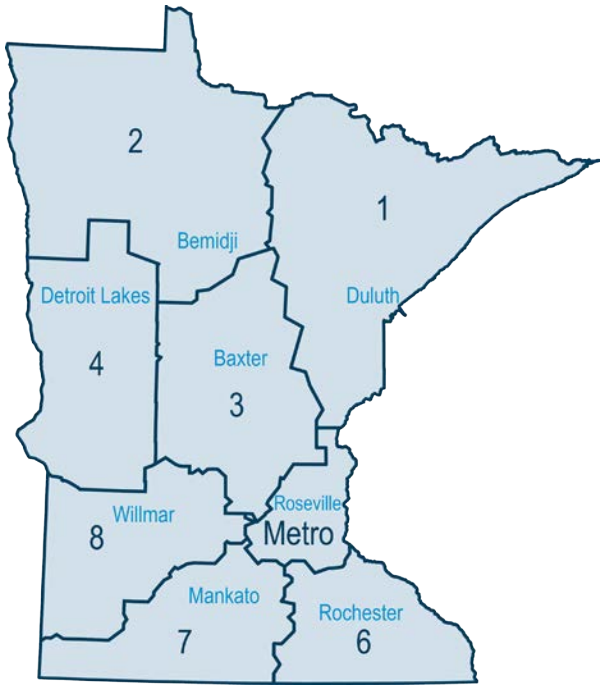
Figure 1-4: Minnesota's state highway network



MNDOT'S ORGANIZATION AND MANAGEMENT OF THE STATE HIGHWAY SYSTEM

State highway construction and maintenance responsibilities are divided into eight MnDOT districts. Figure 1-5 maps the district boundaries. MnDOT's Central Office headquarters are located in St. Paul, near the state Capitol building.

Figure 1-5: MnDOT district boundaries and their headquarters



What Trends Are Influencing Transportation?

The Minnesota GO 50-Year Statewide Vision and the Statewide Multimodal Transportation Plan identify challenges and opportunities facing Minnesota's transportation. Because transportation infrastructure can last up to 50 years or longer, it is important for MnDOT to monitor trends that influence the use and condition of the state's transportation system. This allows MnDOT to adapt roadway designs and operations as needed. Included in these considerations are:

- Minnesota's aging population. Minnesota's population as a whole will age significantly in the next 20 years. Just less than 14 percent of Minnesotans are over the age of 65.[1] The number of seniors in Minnesota will continue to grow until hitting a peak in the year 2035. At that point there are projected to be more than 1.2 million seniors in Minnesota (20 percent of Minnesotans). In 2035, for the first time, more Minnesotans will be older than 65 than under 18.

1 U.S. Census Bureau, 2010-2014 American Community Survey 5-Year Estimates

- More Minnesotans living in urban settings. Minnesota is becoming more urban in all parts of the state. Just over 70 percent of residents lived in urban areas with more than 2,500 people.[2] The number of people living in rural areas has stayed fairly level since 1900. Minnesota's urban population has grown during the same time. The State Demographer projects most Minnesota counties will grow in population over the next 30 years. The largest population growth is projected to occur in the Twin Cities region, with a smaller rate of growth in Greater Minnesota's urban communities.

- Aging Infrastructure. Minnesota faces a wave of aging pavements and bridges that are in need of maintenance or reconstruction. MnDOT typically reconstructs roadways when they are between 60 and 70 years old. Bridge replacement typically occurs at 70-80 years old. Additional needs for maintenance can be found on Minnesota's airports, railroads, ports, and waterways. These needs add to a seemingly ever-growing list of investments that must be made to maintain the quality of the state's public systems.

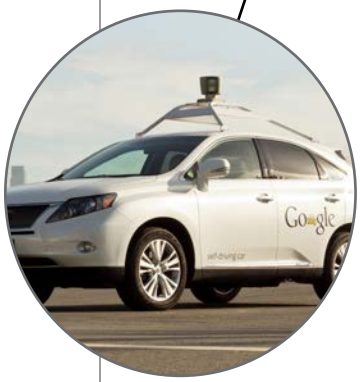
- New technology and mobility as a service. New companies and technologies have made people re-think how they travel, especially in urban areas. Mobility as a service offers new options to use the system through the "sharing economy." One example of mobility as a service is car sharing, which is available through companies like Zipcar in the Twin Cities, Mankato, and Winona. Other ride matching services like Uber and Lyft have seen rapid growth in recent years. Self-driving vehicles are emerging rapidly and have the potential to dramatically change the way society travels.

- Climate change. Climate change is already having major impacts in Minnesota and will continue to have impacts into the future. What these impacts will be is not always clear. More varied temperatures, precipitation levels, and frequency of extreme weather events will stress the transportation system. It is possible that these changes could increase maintenance costs and affect the way that Minnesotans travel.

- Persistent budget challenges. In the face of transportation funding challenges (discussed in detail in Chapter 2: Key Factors and Assumptions), MnDOT and its partners are placing more focus on innovative design, shared services, and other collaborative solutions to address and prioritize transportation needs.







2 2010 U.S. Census; The U.S. Census definition of urban is any community with a population over 2,500

Investment Category Descriptions

MnDOT invests in the state highway system through various types of capital improvement projects. Some projects enhance the condition of existing infrastructure, whereas others add new infrastructure to the system. There are many competing priorities for investment along the state highway system. MnDOT is responsible for selecting investments that best balance these priorities. This is especially challenging given the widening gap between MnDOT's projected transportation revenues and investment needs.

MnDOT tracks capital investment in highways by investment categories. Investment categories are components of projects. A single MnDOT project can include investment from multiple different investment categories. The 2013 version of MnSHIP identified 10 investment categories. This MnSHIP update includes four additional investment categories. The individual categories are separated into five major investment objective areas as illustrated in Figure 1-6.

Figure 1-6: MnSHIP Investment Categories and Objective Areas

SYSTEM STEWARDSHIP	TRANSPORTATION SAFETY	CRITICAL CONNECTIONS	HEALTHY COMMUNITIES	OTHER
• Pavement Condition • Bridge Condition • Roadside Infrastructure Condition • Facilities • Jurisdictional Transfer	• Traveler Safety	• Twin Cities Mobility • Greater MN Mobility • Freight • Bicycle Infrastructure • Accessible Pedestrian Infrastructure	• Regional + Community Improvement Priorities	• Project Delivery • Small Programs



SYSTEM STEWARDSHIP: CATEGORY DESCRIPTIONS

System Stewardship includes five investment categories: Pavement Condition, Bridge Condition, Roadside Infrastructure Condition, Facilities, and Jurisdictional Transfer.

Pavement Condition

MnDOT preserves the structural integrity and smoothness of its pavements through investment in the Pavement Condition category. MnDOT seeks to maximize the share of state highway pavement in good condition and minimize the share in poor condition. This category includes the repair or replacement of existing pavement on the state highway system. Typical improvements to pavements include:

- Overlays – Putting new pavement on top of old pavement to smooth the road surface
- Mill and overlays – Removing a few inches of the existing pavement and then putting new pavement on top
- Reconstruction projects – Completely rebuilding the road and the road base

MnDOT's largest and most widely used asset is its pavements. On an average day, there are more than 90 million vehicle miles traveled on Minnesota state highways. Most new pavements last approximately 15 to 30 years before deteriorating to a level that requires repair. Once pavements fall into poor condition, the costs to fully repair them increase significantly. As a result, larger capital investments are necessary on poor condition roadways if MnDOT wants to restore them to smooth pavement conditions.

Bridge Condition

The Bridge Condition category includes the repair or replacement of existing bridges on the state highway system. Construction of new bridges on the state system is also included in this category. Typical bridge improvements include replacement, rehabilitation, and painting. The Bridge Condition category does not include surrounding or supporting elements for bridges, such as signs, pavement markings, or lighting.

More than 4,500 of Minnesota's 20,000 bridges are on the state highway system and are maintained by MnDOT. Most bridges last 70 to 80 years before needing replacement, if maintained regularly. By planning bridge investments in a timely and cost-effective manner, MnDOT is able to maintain these vital connections.



Statewide Multimodal Transportation Plan

SYSTEM STEWARDSHIP OBJECTIVE

Strategically build, manage, maintain, and operate all transportation assets. Rely on system data and analysis, performance measures and targets, agency and partners' needs, and public expectations to inform decisions. Use technology and innovation to get the most out of investments and maintain system performance. Increase the resiliency of the transportation system and adapt to changing needs.





Roadside Infrastructure Condition

Roadside Infrastructure Condition includes an array of supporting infrastructure found on the state highway system. This infrastructure enhances the safe, informed and efficient movement of people and goods throughout the state.

Roadside infrastructure elements include:

- Drainage and culverts that carry water away from or under the road
- Guardrails, including cable-median barriers, and fencing that protect people and infrastructure
- Traffic signals, lighting, and Intelligent Transportation Systems that enhance safety and provide information
- Overhead signs and other structures, such as noise walls, retaining walls, and concrete barriers
- Signage, including traffic and directional signs
- Pavement markings

Roadside infrastructure improvements are often completed with a pavement or bridge project. MnDOT also conducts stand-alone projects, such as culvert replacement projects along segments of road with poor drainage or culverts.

Facilities

The Facilities investment category is a new category in this MnSHIP update. It includes the repair and maintenance of existing state highway rest areas and truck weigh stations. This category does not include buildings such as district headquarters, truck garages, or other operational buildings.

Rest areas serve as a refuge for drowsy drivers, support freight movement, and promote state and regional tourism. By providing adequate and properly spaced rest areas along the state highway network, MnDOT can meet the demand and expectations of the traveling public. Weight enforcement conducted at weigh stations ensure that freight being shipped to and through Minnesota is not overweight. Enforcement of Minnesota's truck size and weight laws increases safety and reduces damage to roadways and bridges.

Jurisdictional Transfer

Jurisdictional Transfer is a new investment category for this update of MnSHIP. It includes the costs associated with transferring ownership of a road to or from MnDOT. There is significant cost to complete jurisdictional transfers because roads are typically improved before they are transferred. When an agency has jurisdiction of a street or highway, that agency is responsible for the upkeep of that facility. These responsibilities remain with the agency until the jurisdiction is transferred to another roadway authority.

The objective of Jurisdictional Transfer is to ensure that Minnesota roads are owned and operated by the right level of government. Jurisdictional transfer is important because properly aligned roads provide the right level of service, and better meet customer expectations for maintenance, ride quality, and safety. Roads that are a low priority for one agency may be a higher priority for another agency. Jurisdictional transfer allows for a better alignment of roadway ownership with agencies' priorities.

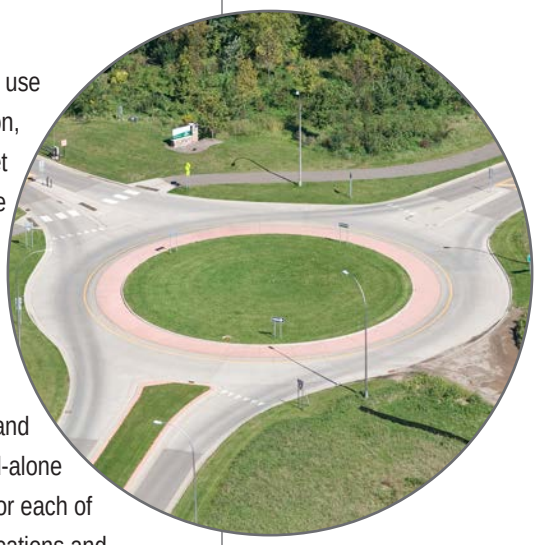
TRANSPORTATION SAFETY: CATEGORY DESCRIPTION

Traveler Safety

The Traveler Safety category includes investments in new highway safety improvements. Typical improvements include lower cost, high-benefit engineering solutions such as rumble stripes, lighting, signage, and new cable median barriers. MnDOT also invests in higher-cost treatments, such as signals, and reduced conflict intersections (e.g. roundabouts, median refuges, and reduced crossing u-turns). These higher-cost improvements are used to address sustained crash locations.

Vehicle crashes are the leading cause of death for people under the age of 25 and the fourth leading cause of death overall in the nation. Crash-related deaths and serious injuries create significant costs for individuals, families, and society. On average, more than one person died every day in 2015 on Minnesota roads (411 total) and more than three were seriously injured. MnDOT and its partners have made reducing fatalities and serious injuries a top priority through:

- The Toward Zero Deaths initiative. MnDOT and its partners use a data-driven, multi-disciplinary "four Es" approach – education, engineering, enforcement, and emergency services – to target and reduce fatalities and serious injuries. By implementing the TZD[1] approach, the state of Minnesota has seen a dramatic decline in traffic fatalities during the past decade.
- **Proactive lower cost, high-benefit safety features**. Lower cost safety improvements may be newly installed as part of a pavement project, including edge treatments (rumble stripes and rumble strips), guardrail, and pavement markings, or as stand-alone projects. MnDOT has also developed District Safety Plans for each of its eight districts. The plans prioritize strategies at high-risk locations and identify appropriate treatments that are proven to reduce fatal and serious injury crashes.



1 www.minnesotatzd.org

Statewide Multimodal Transportation Plan

TRANSPORTATION SAFETY OBJECTIVE

Safeguard transportation users as well as the communities the systems travel through. Apply proven strategies to reduce fatalities and serious injuries for all modes. Foster a culture of transportation safety in Minnesota.

- Improvements at sustained crash locations. These are locations with a consistently high crash rate over a five-year period compared to similar locations across the state. Improvements at these locations tend to be higher-cost intersection improvements and can be targeted for motorized and non-motorized modes. Projects in this category include improvements such as roundabouts and passing lanes.
- Railway-Highways Crossings. Traveler Safety funding is also used to address at-grade railway-highway crossings. Funding can be used for signal upgrades, crossing closures and consolidations, removal of visual obstructions, and roadway geometrics and grades.

Statewide Multimodal Transportation Plan

CRITICAL CONNECTIONS OBJECTIVE

Maintain and improve multimodal transportation connections essential for Minnesotans' prosperity and quality of life. Connections should help achieve progress in meeting performance measures and targets and to maximize social, economic, and environmental benefits. Strategically consider new connections.



CRITICAL CONNECTIONS: CATEGORY DESCRIPTIONS

There are five categories in which MnDOT invests to improve transportation connections: Twin Cities Mobility, Greater Minnesota Mobility, Bicycle Infrastructure, Accessible Pedestrian Infrastructure, and Freight. These investment categories comprise the Critical Connections investment area.

Twin Cities Mobility

The Twin Cities Mobility investment category includes projects to improve travel time reliability in the Twin Cities area. Congestion plays a major role in the daily lives of people in the Twin Cities area and is a serious and costly disruption for freight movement within and through the region. Managing congestion improves quality of life, safety, and air quality. Roughly half of all roadway travel in Minnesota occurs within the Twin Cities area, which contains just 9 percent of the total roadway miles in the state. In 2015, the Metropolitan Council completed its *2040 Transportation Policy Plan*. This plan continues a shift away from reliance on major highway capacity expansion projects toward lower-cost high-benefit strategies. The investment strategies for the Twin Cities Mobility category in MnSHIP align with the investment direction established in the 2040 Transportation Policy Plan, although available funding does not meet needs. Twin Cities Mobility investments include:

- **Active Traffic Management**: Operational improvements to help manage the effects of congestion, which include variable message signs, freeway ramp metering, dynamic signing and re-routing, dynamic shoulder lanes, reversible lanes, dynamic speed signs, and lane specific signaling.
- Spot mobility improvements: Lower cost, high-benefit projects that improve traffic flow and provide bottleneck relief at spot locations. These projects include freeway and intersection geometric design changes, short auxiliary lane additions, bus-only shoulders, and traffic signal modifications to ease merging and exiting traffic.

- MnPASS express lanes: Priced managed lane projects that provide a predictable, congestion-free travel option for transit users, those who ride in carpools, or those who are willing to pay. MnPASS lanes currently operate on I-394, I-35W, and I-35E. During peak drive times, MnPASS lanes are free for buses, vehicles with two or more occupants, and motorcycles; but single-occupant vehicles are charged a fee through an electronic device attached to the windshield.
- Major capacity investments.:Projects aimed at enhancing mobility, safety, multimodal, or freight movements such as improved or new interchanges. General-purpose lanes may be considered in order to correct lane continuity or in other rare instances where MnPASS has been evaluated and found not to be feasible.

The strategies listed above also benefit transit in many ways, such as bus-only shoulders, high occupancy vehicle bypass ramps, and MnPASS express lanes.

Greater Minnesota Mobility

The Greater Minnesota Mobility investment category replaced the Interregional Corridor Mobility category used in the previous MnSHIP. Through federal legislation, the National Highway System was expanded and performance measures for mobility on the NHS are being developed. Also, MnDOT's Statewide Freight System Plan identified the NHS as the freight priority network for trucking. For these reasons, the investment category was modified to reflect that the NHS is now the priority network for mobility investment in MnSHIP. Improvements in this category include projects that improve travel time reliability for people and freight on the NHS outside of the Twin Cities area. Typical investments include low-cost improvements such as upgraded signals, turn lanes, intersection improvements, or passing lanes.



Greater Minnesota Mobility's investment objective is to improve travel time reliability on the NHS. This network accounts for a majority of vehicle and freight traffic on Minnesota's highway system. Less reliable travel times along the system result in increased travel time and fuel costs. For freight, these disruptions decrease production, disrupt delivery schedules, and increase the costs of doing business.

Freight

The Fixing America's Surface Transportation Act, enacted in 2015, established a new National Highway Freight Program that allocates federal dollars to improve the efficient movement of freight. In response, MnDOT established a new Freight category for MnSHIP. The Freight category includes projects that are eligible for funding as part of the National Highway Freight Program. Eligible uses of program funds are broad and include improvements such as climbing lanes, traffic signal optimization, and railway-highway grade separation, among many others. As part of the FAST Act, states must





complete a freight investment plan to identify where these program funds will be spent. More detail on the program can be found on the Federal Highway Administration *website.*[2]

Bicycle Infrastructure

The Bicycle Infrastructure category includes reconstructed and new infrastructure to accommodate bicyclists along or across state highways. Typical improvements include bike lanes, signage for bicycle routes, crossings over or under state highways, at-grade crossings, and maintaining shoulders on identified priority routes.

Bicycle facilities are an important and growing part of the multimodal transportation network. MnDOT has the authority to add bicycle facilities on or across state highways and coordinates bicycle planning efforts with local units of governments to improve the state bicycle network and support local travel opportunities.

Historically, MnDOT has invested in bicycle infrastructure projects as part of other infrastructure investments, such as pavement or bridge projects. Beginning with the MnSHIP update in 2013, MnDOT started tracking bicycle infrastructure investments separately in order to better assess and address bicycle investment needs. The recently completed *Statewide Bicycle System Plan* provides guidance for investing in local and regional bicycle connections, a state bikeway network, and separated bicycle facilities. The plan recommends that 70 percent of the investments in this category fund projects to support local and regional networks with the remaining investment in an enhanced State Bikeway Network.

Accessible Pedestrian Infrastructure

The Accessible Pedestrian Infrastructure category includes reconstructed and new infrastructure to ensure safe, accessible, and convenient options for pedestrians travelling along or across state highways. Typical improvements include projects to bring curb ramps into compliance with the Americans with Disabilities Act standards, installation of accessible pedestrian signals, and pedestrian improvements such as crosswalks, sidewalks, signals, curb extensions, benches, and pedestrian refuges. MnDOT frequently coordinates Accessible Pedestrian Infrastructure improvements with other bridge and pavement projects to maximize the impact of MnDOT investments.

Pedestrian infrastructure is important because it serves the most basic and primary form of travel that is accessible to everyone. MnDOT's pedestrian network consists of more than 600 miles of sidewalk, more than 20,500 curb ramps, and more than100 pedestrian bridges.

In 2015, the state adopted the Minnesota Olmstead Plan. As it relates to transportation, the Olmstead plan requires that "people with disabilities will

2 http://www.fhwa.dot.gov/fastact/factsheets/nhfpfs.pdf

have access to reliable, cost-effective and accessible transportation choices that support the essential elements of life such as employment, housing, education, and social connections." As a result, MnDOT has taken action to address the needs of people with disabilities by instituting changes to its policies and business practices. MnDOT is committed to addressing existing non-compliant curb ramps, non-compliant sidewalks, and intersections without accessible pedestrian signals installed.

HEALTHY COMMUNITIES: CATEGORY DESCRIPTION

Regional and Community Improvement Priorities

Regional and Community Improvement Priorities are regional and locally-driven priorities beyond system performance needs. The RCIP investment category helps MnDOT deliver a well-rounded transportation investment program that advances objectives for which MnDOT may not have statewide performance targets. These objectives include improving multimodal connections, community livability, economic competitiveness, environmental health, and quality of life in Minnesota. RCIPs also include discretionary grant programs such as the Transportation Economic Development program.

Typical improvements include intersection improvements that support multimodal connectivity, bypass or turning lanes, access management solutions, spot capacity expansion projects, or flood mitigation investments.

OTHER: CATEGORY DESCRIPTION

Project Delivery

The Project Delivery category includes investments necessary to ensure the timely and efficient delivery of projects constructed on the state highway system. Resources are needed in a number of areas to effectively work with partners on improvements, deliver quality capital projects, and optimize MnSHIP investment. These areas include:

- Right of way - to purchase property adjacent to projects for construction and construction staging
- Consultant services to hire private consultants to supplement MnDOT staff and provide special expertise in preliminary engineering and detailed design work
- Construction incentives to promote or increase the likelihood of a desired outcome, such as early completion or meeting certain performance outcomes
- Supplemental agreements - to address unanticipated issues that develop during construction such as unknown contaminated soil

Statewide Multimodal Transportation Plan

HEALTHY COMMUNITIES OBJECTIVE

Make fiscally responsible decisions that respect and complement the natural, cultural, social, and economic context. Integrate land uses and transportation systems to leverage public and private investments.

Small Programs

The Small Programs category includes investments that are not specifically identified or prioritized within MnSHIP, but make up a part of MnDOT's overall capital investment. Small Programs typically respond to short-term, unforeseen issues or are used to fund one-time specialized programs that do not fit into a MnSHIP investment category. If funding is required beyond the short-term, an effort is made to incorporate the program into a MnSHIP investment category during the next MnSHIP update. Small Programs in MnSHIP include:

- Historic properties. This program addresses historic properties within MnDOT right of way
- Greater Minnesota Transit Investment. A small portion of funding is set aside for capital investments for transit in Greater Minnesota
- Off-System Bridges. Through federal funds, some funding is set aside to address local bridges not on the state highway system. This funding is separated and managed centrally in Small Programs

More information on investment areas and categories can be found in Appendix I: Investment Category Folios.





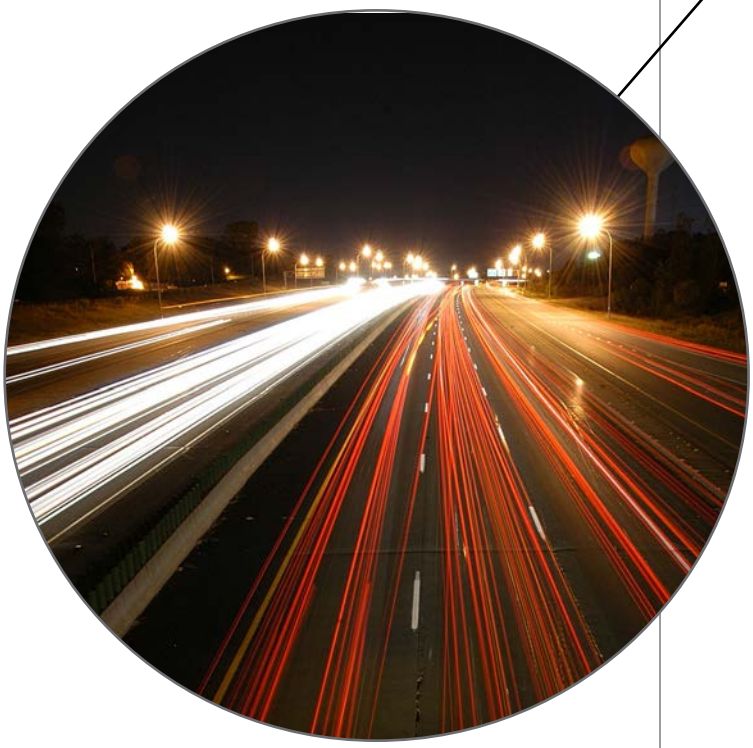


Notable Changes in this MnSHIP

Notable changes and improvements in this document compared to the 2013 MnSHIP include:

- Pursuing a more robust public and stakeholder input process that expanded the audience for MnDOT planning efforts and piloted new engagement techniques
- Identifying planned projects for six years beyond commitments in the STIP
- Identifying four new investment categories: Facilities, Freight, Jurisdictional Transfer, and Small Programs to better account for investments on the state highway system
- Responding to the new planning and programming requirements in federal legislation by creating a dedicated program for freight investment
- Designating the National Highway System as the priority network for investments on the state highway system
- Increasing investment in Project Delivery to address a better understanding of costs associated with delivering highway projects





This page intentionally left blank.



Minnesota GO
A Collaborative Vision for Transportation

20-Year State Highway Investment Plan

Chapter 2

KEY FACTORS AND ASSUMPTIONS

This page intentionally left blank.

KEY FACTORS AND ASSUMPTIONS

MnDOT considered or accounted for several key factors in establishing investment priorities for the state highway system. Some of these factors pose large challenges to both managing the existing infrastructure and making improvements to the system. These challenges include a widening gap between highway revenues and construction-related costs, federal and state legislative and performance requirements, MnDOT policy, and a large and aging highway system in need of repair and reconstruction. MnDOT analyzed these and other factors to guide the development of MnSHIP.

The key messages of Chapter 2 are:

- State law requires a fiscally constrained, performance-based 20-year capital investment plan for the state highway network every four years.
- MnDOT will have approximately $21 billion to invest in state highways over the next 20 years.
- The recent federal bill, the Fixing America's Surface Transportation Act, increases emphasis on freight investments through the creation of the National Highway Freight Program.
- MnDOT policy emphasizes investment toward the Minnesota GO Vision to maximize the health of the people, the environment, and the economy.
- The state highway system is aging. Because of its age, it will need increased capital improvements as well as additional maintenance in the years ahead.

MnSHIP is a fiscally constrained plan, meaning it sets investment priorities only for the revenues that are expected to be available over the next 20 years. Appendix E: Financial Summary presents an in-depth review of Minnesota's state highway funding.

Revenue Outlook

MnSHIP is a fiscally constrained plan, meaning it sets investment priorities only for the revenues that are expected to be available during the next 20 years. MnDOT identified the various revenue sources that are used to fund the state highway system and analyzed the trends affecting these revenues. This analysis provided the information necessary to develop revenue assumptions and projections for the 20-year planning period. Appendix E: Financial Summary presents an in-depth review of Minnesota's state highway funding.

Taxes and fees from four main revenue sources fund transportation improvements on Minnesota's state highways. These sources are:

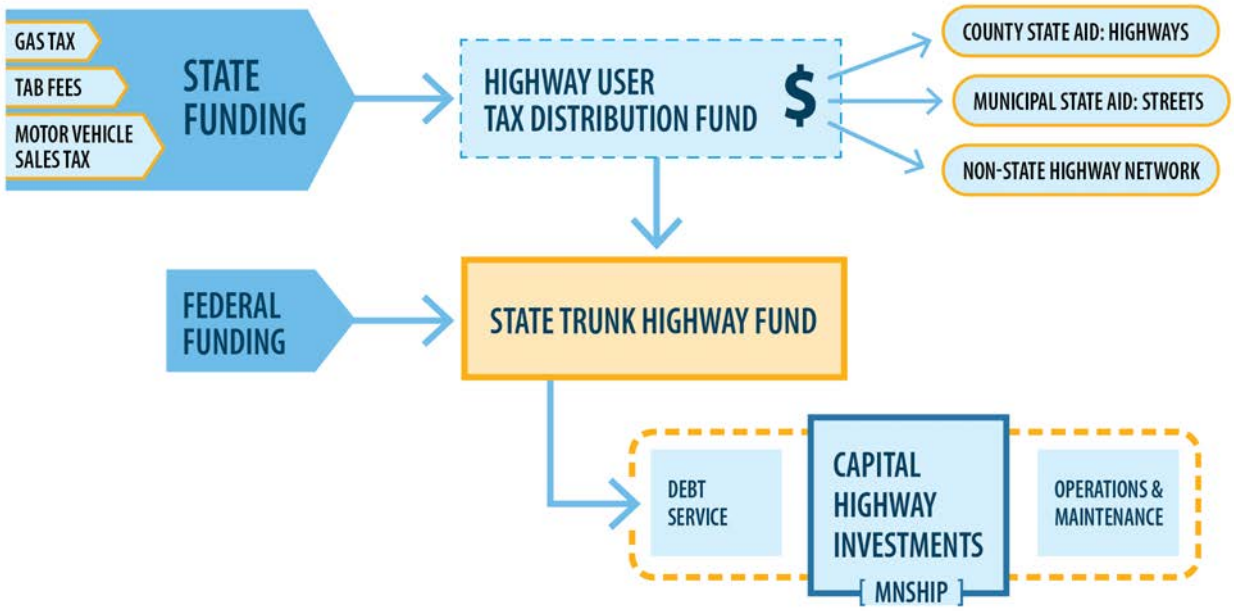
- Federal-aid (gas tax and General Funds)
- State gas tax (motor fuel excise tax)
- State tab fees (motor vehicle registration tax)
- State motor vehicle sales tax

The revenues from federal-aid go directly to the State Trunk Highway Fund (Figure 2-1), which funds capital improvements on the state highway system. Revenues from the main state sources, as well as smaller revenue sources, are pooled into the Highway User Tax Distribution Fund and divided between state highways, county roads, and city streets based on a Minnesota constitutional formula. Approximately 5 percent of these funds are set aside for the Non-State Highway Network (which includes the Flexible Highway Account, Township Roads Account, Township Bridges Account and the Department of Natural Resources). The remaining 95 percent is split among the State Trunk Highway Fund, County State Aid Highways, and Municipal State Aid Streets. The portion allocated from the highway fund to the State Trunk Highway Fund (62 percent) must first go toward any existing debt repayment from state highway bonding and is then divided among operations and maintenance activities and capital improvements on state highways. MnSHIP only considers the revenue available for capital improvements.

IMPACT OF TRANSPORTATION BONDS ON MNDOT'S REVENUES

In addition to the four main sources of funding, Minnesota also sells transportation bonds to support highway improvements. However, bonds should be understood as a financing approach, as they must be repaid with interest. For example, a series of transportation bonds were authorized in Minnesota Laws of 2008, Chapter 152 (also known as the "Chapter 152 Bridge Improvement Program") for $1.2 billion in bridge improvements on the state

Figure 2-1: Revenue Sources



highway system through 2018. To repay its Chapter 152 bonds, Minnesota currently has a 3.5 cent per gallon surcharge on top of its 25 cent per gallon gas tax rate.

More recently, the Legislature authorized $300 million in bonds through the Corridors of Commerce program. In the absence of any new, non-bond revenue, the bonds have to be repaid, with interest, from the $21 billion in revenue available for MnSHIP.

The primary purpose of these and other transportation bonds is to enable MnDOT to accelerate the delivery of projects and avoid construction cost increases due to inflation. While bonding is an important financing tool, there are practical limits to using debt to fund transportation improvements. MnDOT's current policy is to allow no more than 20 percent of annual state revenues to go toward debt repayment. MnDOT is currently near the highest allowable bond repayment level, reaching close to $240 million, or 17.5 percent during its highest year in 2018 before declining over the next 10 to 15 years. Minnesota state law requires MnDOT to make its annual debt repayments prior to making any other investments. Any potential bonding that comes after the adoption of this plan is not reflected in the investment direction set forth by MnSHIP.

20-YEAR REVENUE PROJECTION

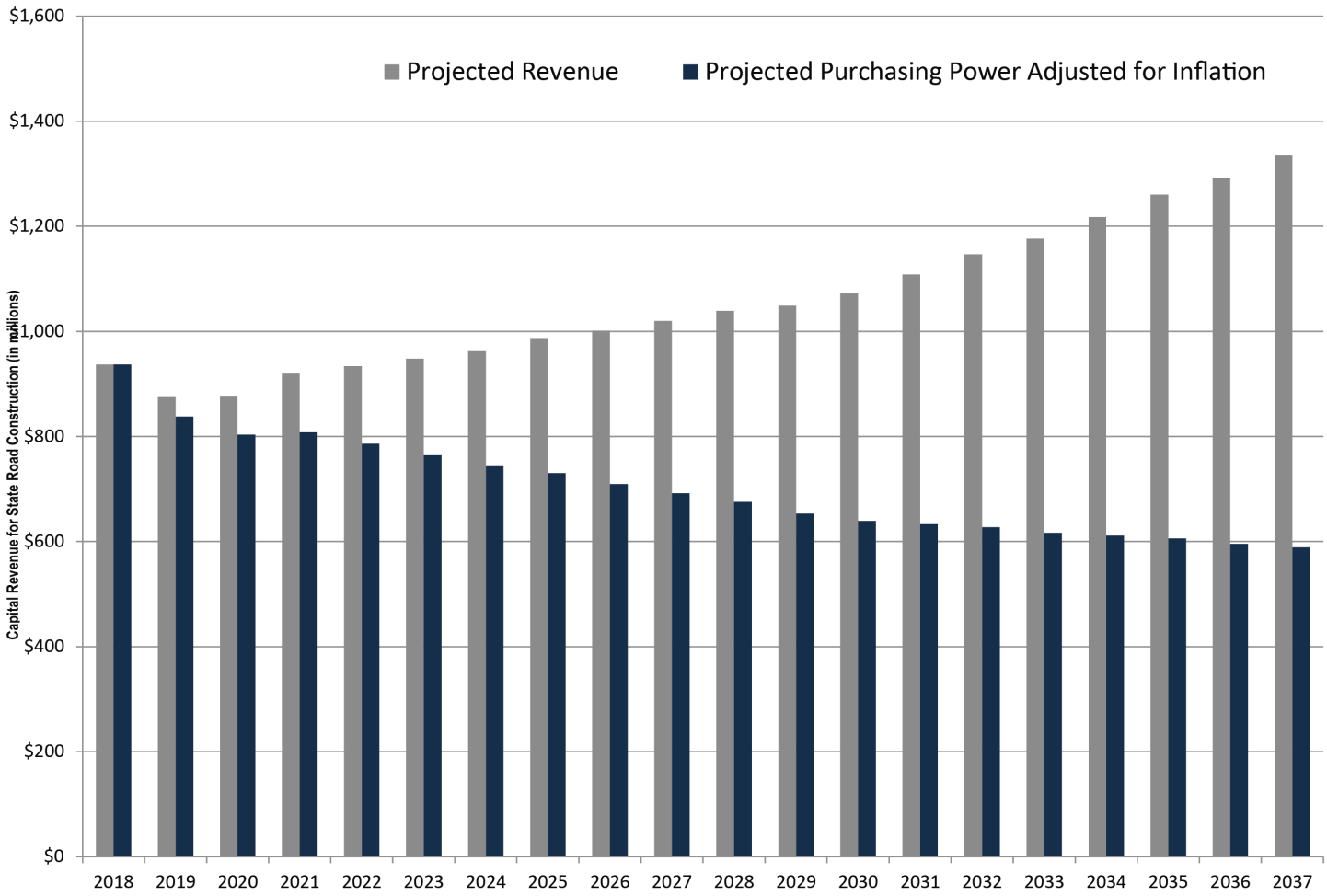
During the next 20 years, MnDOT estimates that $21 billion in revenue will be available for capital investment on the state highway system – approximately $1 billion per year. This estimate assumes that no new major sources of

revenue will be introduced and that the majority of MnDOT's future revenues will originate from the four main revenue sources shown in Figure 2-1.

MnDOT anticipates that the actual amount of funding it receives from the State Trunk Highway Fund will increase by approximately 2 percent per year over the next 20 years. However, two key trends will make it increasingly difficult for MnDOT to sustain current conditions on the state highway system:

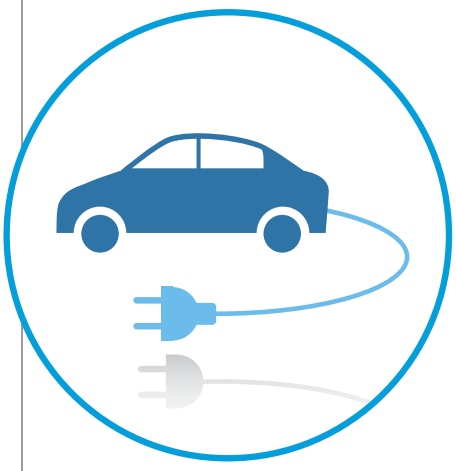
Construction costs are growing more quickly than revenues. Expected revenues will lose buying power over time as construction costs (e.g., fuel, raw materials, equipment, and labor) continue to grow at an annual rate of approximately 4.5 percent—a slight tapering off from the past decade—exceeding the annual revenue growth rate of approximately 2 percent (see Appendix E: Financial Summary). This imbalance was also a factor in the 2013 Minnesota State Highway Investment Plan, and is expected to persist as a long-term planning challenge. Figure 2-2 illustrates the impact of 4.5 percent inflation on annual buying power (blue) versus nominal revenues (grey) in future years of construction. The net effect is that inflation will erode over half the buying power of revenues by 2037, given the assumptions stated above.

Figure 2-2: Anticipated Construction Revenue by Year Including Adjustments for Inflation



Revenue growth continues to be slow. There are several explanations for why MnDOT expects revenues to grow more slowly between 2018 and 2037 as compared to previous years. These include:

- **Vehicle fuel efficiency is improving.** Minnesotans, as well as Americans in general, are driving more fuel-efficient vehicles and consuming less gasoline. Increased fuel efficiency has been required by the federal government through the Corporate Average Fuel Economy program. While improved fuel economy means lower vehicle air pollutant emissions and a positive impact on the environment, improved fuel economy also means fewer gas taxes collected, and the gas tax is one of the major sources of both federal and state revenue for transportation.
- Increase in hybrid and electric vehicles. Due to advances in engine and battery technologies, hybrid and electric vehicles are becoming more popular. These vehicles, whose lowered emissions are more environmentally friendly, consume less or no fuel. As a result, they contribute fewer revenues to the State Trunk Highway Fund.
- People are driving about the same distance. There was significant growth in the number of miles traveled on the highway system in the 1990s and early 2000s; however, this growth leveled off in 2004. While per capita VMT remains about the same, total VMT has shown a slight increase in the past couple of years. Total VMT is still expected to continue to increase along with economic and population growth over the next 20 years, but per capita VMT is projected to remain relatively flat due to demographic, technological, and behavioral changes. As a result, state motor fuel excise taxes will grow but not drastically. Federal-aid revenues, based on motor fuel excise taxes and transfers from the U.S. General Fund, are also expected to grow slowly over the next 20 years; increases in recent years are far less than decades past.



Federal Law

A new federal surface transportation bill, FAST Act, was signed into law on Dec. 4, 2015. It authorized approximately $305 billion in federal funding for fiscal years 2016 through 2020 for transportation projects. Minnesota's apportioned amount is consistent with the previous federal surface transportation bill, Moving Ahead for Progress in the 21st Century. The FAST Act continues many of the requirements first established in MAP-21 including the use of performance measures and emphasizing investment on the NHS.

The requirements in the FAST Act will affect MnDOT, as well as MnDOT's transportation partners, in several ways. Appendix F: Federal and state Legislative Requirements details the role the Statewide Multimodal

Transportation Plan and MnSHIP have in addressing the requirements in the FAST Act.

IMPACT OF THE FAST ACT ON MNSHIP

- Requires states to make progress toward nine national goals for the National Highway System. The national goal areas are (1) safety, (2) infrastructure condition, (3) congestion reduction, (4) system reliability, (5) freight movement and economic vitality, (6) environmental sustainability, (7) reduced project delivery delays, (8) improved resiliency and reliability of the transportation system and reduction or mitigation of stormwater impacts of surface transportation, and (9) enhancement of travel and tourism

- Requires states to adopt a long-range 20-year statewide transportation plan. The plan must use a performance-based approach to transportation decision-making to support the national goals. For MnDOT, MnSHIP is the plan that meets this requirement.

- Focuses performance requirements on the NHS. The FAST Act continues MAP-21's focus on managing the NHS to a higher level to make sure federal revenue is being used to meet national goals. It authorizes USDOT to establish performance measures to ensure progress toward the nine national goal areas. The legislation sets the target for NHS bridges in poor condition and USDOT will set targets for interstate pavement condition. States will set performance targets for most measures in coordination with Metropolitan Planning Organizations and providers of public transportation. MPOs are federally designated transportation planning organizations in urbanized areas over 50,000. A single effective date for finalizing all federal performance measures is expected in late 2016. States will adopt targets in coordination with MPOs within one year after final rulemaking; and MPOs will adopt targets within 180 days after states.



- Creates a program to fund freight projects. Perhaps the biggest change stemming from the FAST Act is a dedicated source of $12 billion in federal dollars for the National Highway Freight Program. Funds under this program are distributed to the states by a formula, and must be used for eligible projects that improve the efficient movement of freight across the National Highway Freight Network. The program is directed towards the highway network; however, up to 10 percent of the funds each state receives can be used for public or private freight facilities such as rail, water and intermodal facilities. Minnesota will receive approximately $20 million a year for this program.

State Requirements

State policy and legislative requirements had a strong influence on the development of MnSHIP. State legislative requirements for MnSHIP are contained in Minnesota Statues, section 174.03.

In addition to state legislative requirements, state performance requirements were a key factor for MnSHIP. In 2001, Minnesota adopted the Government Accounting Standards Board Statement 34 financial reporting requirements for the value and condition of its major infrastructure assets. One of the primary purposes of GASB 34 is to demonstrate to the public, and others, that the agency is maintaining its infrastructure in an acceptable condition and does not have any undisclosed liabilities looming in the future.

MnDOT is also responsible for carrying out programs initiated by the Minnesota State Legislature for projects on the state highway system, such as Corridors of Commerce.



IMPACT OF STATE REQUIREMENTS ON MNSHIP

- State Legislative Requirements. In 2010, state law defined requirements for the creation of a statewide highway 20-year capital investment plan (i.e., MnSHIP).The law required MnDOT to create a fiscally constrained, performance-based 20-year capital investment plan for the state highway system every four years. As part of the capital investment plan, MnDOT must analyze and track the effect of recent investments, identify needs, establish priorities for projected revenue, and identify strategies to ensure the efficient use of resources. State legislative requirements specific to MnSHIP and the MnSHIP chapter in which they are addressed are presented in Figure 2-3.
- State Performance Requirements. MnDOT reports to GASB by measuring the average pavement condition and bridge condition on the state highway system. Without additional revenues and investment, it is expected that by the end of MnSHIP (2037), pavement conditions will fall below the GASB thresholds. Allowing the state's assets to deteriorate beyond these thresholds could increase the cost of borrowing money for all state and local units of government in Minnesota, as the condition of those assets influences the bond rating of the entire state—not just that of MnDOT. In addition, system conditions falling below GASB 34 thresholds would indicate that other adverse outcomes are occurring on state highways, such as pavement failures requiring expensive fixes, more bridges with weight restrictions, and increased travel costs for all users.

Figure 2-3: Chapters in MnSHIP Addressing Minnesota Legislative Requirements for MnSHIP

2012 MINNESOTA STATUTES FOR MNSHIP (CHAPTER 174, SECTION 3, SUBD. 1C)	LOCATION IN MNSHIP
Incorporates performance measures and targets for assessing progress towards the state's transportation goals, objectives and policies identified [in this statute] for the state trunk highway system and for the Statewide Multimodal Transportation Plan.	• Chapter 2 • Chapter 3
Summarizes trends and impacts for each performance target over the past five years.	• Chapter 2
Summarizes amount and impact of investments over the past five years on each performance target, including a comparison of prior plan projected costs with actual costs.	• Chapter 2 • Appendix F
Identifies the investments required to meet the established performance targets over the next 20-year period.	• Chapter 3 • Appendix I
Projects available for state and federal funding over the 20-year period, including any unique, competitive, time-limited, or focused funding opportunities.	• Chapter 2 • Appendix E
Identifies strategies to ensure the most efficient use of existing transportation infrastructure, and to maximize the performance benefits of projected available funding.	• Chapter 5 • Chapter 7
Establishes investment priorities for projected funding, including a schedule of major projects or improvement programs for the 20-year period together with projected costs and impact on performance targets.	• Chapter 5 • CHIP
Identifies those performance targets identified under clause (1) not expected to meet the target outcome over the 20-year period together with alternative strategies that could be implemented to meet targets.	• Chapter 6 • Chapter 7



Three main improvements were made in this MnSHIP update to further align MnDOT's capital investment priorities with state legislative requirements.

Initially, MnDOT responded by including a list of major projects in the appendix of the 2013 MnSHIP. MnDOT has since created a stand-alone list of planned projects 10 years in advance called the 10-Year Capital Highway Investment Plan. This represents an expanded planning effort, as districts must account for funding uncertainty, limited information on future needs, and unanticipated events that affect the timing and scope of the identified projects. Including this extended plan of projects is a step toward a more transparent, reliable, and predictable planning process that enables the public to better understand MnDOT's decision-making process. This plan allows districts to conduct broader public engagement efforts surrounding projects in all 10 years. It also helps to achieve better transportation outcomes.

Second, MnDOT separated its capital investment projects into 14 investment categories to continue to more accurately track and analyze the effect of investments on performance targets and other agency goals. This expanded approach helped MnDOT establish its state highway investment priorities in a more detailed way. By breaking projects down into different investment categories, MnDOT can more reliably associate the amount of money it spends to achieve specific outcomes and goals of the agency. MnDOT has been tracking its investments in this manner since 2014, MnSHIP also presents information on past investment levels and their associated performance outcomes in this update. Future updates of MnSHIP will incorporate the impact of investment in each category.

Third, MnSHIP summarizes the dollar amount and impact of investments over the past five years on each performance target. The summary will include a comparison of projected costs with actual project costs. Details on this analysis are available in Appendix F: Federal and State Legislative Requirements.

In addition to the state legislative requirements specific to MnSHIP, the Minnesota State Legislature has also identified 16 goals of the state transportation system. These goals have guided the development of MnDOT's Family of Plans. Appendix F: Federal and State Legislative Requirements includes a table that lists each goal and its connection to the Minnesota GO Vision, the Statewide Multimodal Transportation Plan, and MnSHIP.

MnDOT created a stand-alone list of planned projects 10 years in advance called the 10-Year Capital Highway Investment Plan (CHIP). The CHIP is a step toward a more transparent, reliable, and predictable planning process that enables the public to better understand MnDOT's decision-making process.



MnDOT Policy

MnSHIP is one of MnDOT's system investment plans and is a member of MnDOT's Family of Plans. The Minnesota GO Vision and the Statewide Multimodal Transportation Plan provide over-arching guiding principles and objectives for transportation in Minnesota. The system investment plans use the guiding principles, objectives, and strategies from the Minnesota GO Vision and Statewide Multimodal Transportation Plan to guide investment decisions on the various transportation systems that MnDOT oversees.

MINNESOTA GO VISION AND STATEWIDE MULTIMODAL TRANSPORTATION PLAN

The Minnesota GO planning framework starts with the Minnesota GO Vision. Adopted in 2011, the Vision established eight guiding principles to move toward a multimodal transportation system that maximizes the health of people, the environment, and the economy. These principles are to be used collectively and are intended to guide policy and investment direction.

Figure 2-4: Minnesota GO Guiding Principles

MINNESOTA GO GUIDING PRINCIPLES
Leverage public investments to achieve multiple purposes. The transportation system should support other public purposes, such as environmental stewardship, economic competitiveness, public health, and energy independence.
Ensure accessibility. The transportation system must be accessible and safe for users of all abilities and incomes and provide access to key resources and amenities.
Build to a maintainable scale. Consider and minimize long-term obligations – do not overbuild; reflect and respect the surrounding physical and social context.
Ensure regional connections. Key regional centers need to be connected to each other through multiple modes of transportation.
Integrate safety. Systematically and holistically improve safety for all forms of transportation; be proactive, innovative, and strategic in creating safe options.
Emphasize reliable and predictable options. The reliability of the system and predictability of travel time are frequently as important as or more important than speed.
Strategically fix the system. Some parts of the system may need to be reduced while other parts are enhanced or expanded to meet changing demand.
Use partnerships. Coordinate across sectors and jurisdictions to make transportation projects and services more efficient.

The Statewide Multimodal Transportation Plan was updated in combination with MnSHIP. It identified objectives and strategies in five policy areas to make progress toward the Vision. The plan focused on multimodal solutions that ensure a high return-on-investment. The objectives and strategies are listed in no particular order and all are critical focus areas for the upcoming years. More information on these policy links can be found in Appendix F: Federal and State Legislative Requirements.

The Statewide Multimodal Transportation Plan was updated in combination with MnSHIP. It identified objectives and strategies in five policy areas to make progress toward the Vision.

Figure 2-5: Statewide Multimodal Transportation Plan Objectives

STATEWIDE MULTIMODAL TRANSPORTATION PLAN OBJECTIVES
Open Decision Making. Make transportation system decisions through processes that are inclusive, engaging, and supported by data and analysis. Provide for and support coordination, collaboration, and innovation. Ensure efficient and effective use of resources.
Transportation Safety. Safeguard transportation users as well as the communities the systems travel through. Apply proven strategies to reduce fatalities and serious injuries for all modes. Foster a culture of transportation safety in Minnesota.
Critical Connections. Maintain and improve multimodal transportation connections essential for Minnesotans' prosperity and quality of life. Connections should help achieve progress in meeting performance measures and targets and to maximize social, economic, and environmental benefits. Strategically consider new connections.
System Stewardship. Strategically build, manage, maintain, and operate all transportation assets. Rely on system data and analysis, performance measures and targets, agency and partners' needs, and public expectations to inform decisions. Use technology and innovation to get the most out of investments and maintain system performance. Increase the resiliency of the transportation system and adapt to changing needs.
Healthy Communities. Make fiscally responsible decisions that respect and complement the natural, cultural, social, and economic context. Integrate land uses and transportation systems to leverage public and private investments.

COMPLETE STREETS

MnDOT incorporates a complete streets approach as part of every project delivered. On all projects, MnDOT evaluates and balances the needs of all users (pedestrians, bicyclists, freight, transit, motor vehicles, etc.) during planning, scoping, design, construction, operations and maintenance of the state highway network. Project development analysis includes the access and mobility needs of user groups moving both along state highways and crossing state highways. The objective is not all modes on all roads, but rather interconnected and integrated networks for all users. Districts must

evaluate opportunities to address the needs of all users both at the individual project level and when developing Statewide Transportation Improvement Programs and 10-Year Capital Highway Investment Plans.

PERFORMANCE MEASURES POLICY

MnDOT formally adopts performance measures and targets through public planning processes or through review and approval by designated management groups. The MnSHIP planning process is one of the methods of adopting measures and targets. The measures included in this document are the formally adopted measures and targets for their associated investment category. MnDOT carefully considers existing commitments, relative priorities, and tradeoffs when adopting or modifying performance measures and targets.

All adopted performance measures and corresponding targets are included in the list of formally adopted performance measures and targets available on the MnDOT Performance Measures website[1].



PRIORITY NETWORK

MnDOT realized the importance federal legislation placed on managing and maintaining NHS roadways to higher standard and officially made it the state's priority highway network in 2015. The rationale for designating the NHS as the priority highway network included:

- Federal legislation requires performance measurement on the NHS.
- MnDOT's Freight Plan analyzed six different networks and identified NHS roadways as the priority freight network based on usage and flows.
- The NHS was used in the 2013 MnSHIP as a primary network for investing in pavements and bridges.
- Performance measures on the NHS are federally required.

Defining the NHS as the priority network allows MnDOT to better communicate the agency's work to the public while investing in roadways that carry the majority of vehicle trips.

1 https://www.dot.state.mn.us/measures/

Current System Conditions and Long-Term Trends

The state highway system is a large and aging network. It requires a mix of maintenance and capital investments in order to keep the system in a state of good repair. MnDOT actively seeks to minimize costs over the life of its assets through maintenance and capital investments. In particular, MnDOT's pavements face a growing need for reconstruction over the life of the plan.

Since the early 1990s, MnDOT has used performance measurement to evaluate its services and to guide its plans, projects, and investments. MnDOT tracks the condition of the state highway system and publishes this information in its Annual Minnesota Transportation Performance Report.

Historically, MnDOT has set targets designed to achieve optimal or desired performance levels in particular investment categories. These targets have typically been based on lowest life-cycle costs, customer expectations, or a policy priority. Others have been trend-based – set by looking at trends and outcomes associated with historical spending levels. More recently, MnDOT has established targets that it determines to be an acceptable risk, such as those targets identified for roadside infrastructure assets. While MnDOT continues to use some of these targets to estimate its investment needs, the current and projected future funding reality has made many performance targets such as NHS pavements and many roadside infrastructure components, unachievable in most cases.

The following sections describe the current conditions and long-term trends for each MnSHIP investment category.



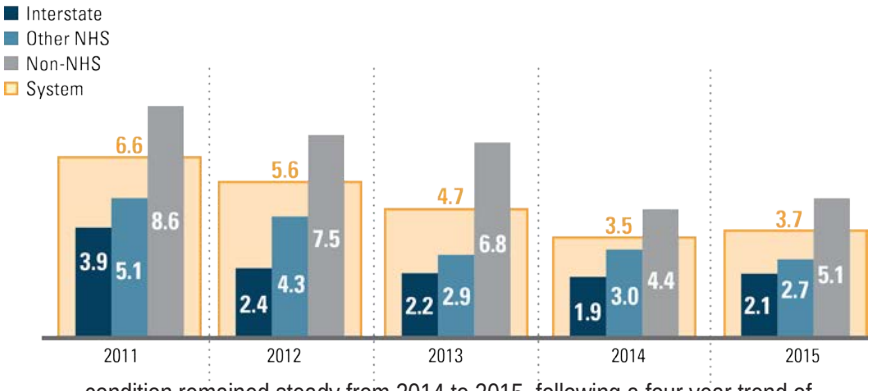
SYSTEM STEWARDSHIP: CONDITIONS AND TRENDS

Pavement Condition

Pavement deterioration is a serious risk facing MnDOT's state highway system – more than half of its pavements were constructed 50 or more years ago. MnDOT measures pavement conditions by tracking the percentage of Interstate, other NHS, and non-NHS in good and poor condition. Targets for NHS and non-NHS pavement condition are used to calculate needs (see Chapter 3, "Investment Needs"). MAP-21 and the FAST Act require MnDOT to assess NHS pavement conditions with yet-to-be finalized measures (and targets for Interstates) set by USDOT.

As shown in Figure 2-6, the percentage of pavements in poor

Figure 2-6: Percentage of Pavement Miles on State Highway System in Poor Condition

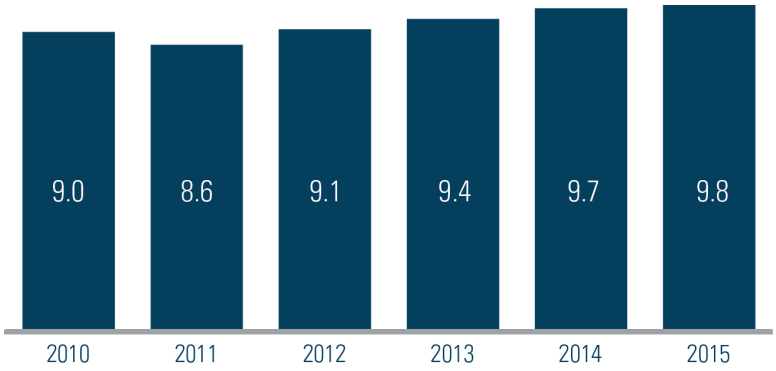


condition remained steady from 2014 to 2015, following a four year trend of improving pavement quality statewide. Overall, 3.7 percent (500 miles) of state highway miles were in poor condition in 2015, compared to 6.6 percent in 2011. The percentage of poor condition pavements varies between the three different types of state highway roads:

- Interstate pavements: 2.1 percent poor (39 miles), 74.5 percent good (1,383 miles)
- Other NHS pavements: 2.7 percent poor (155 miles), 71.5 percent good (4,104 miles)
- Non-NHS pavements: 5.1 percent poor (341 miles), 66.2 percent good (4,426 miles)

Overall, the average remaining service life of all state highway pavements has increased slightly over the past 6 years as shown in Figure 2-7.

Figure 2-7: Average Remaining Service Life in Years (all state highways)



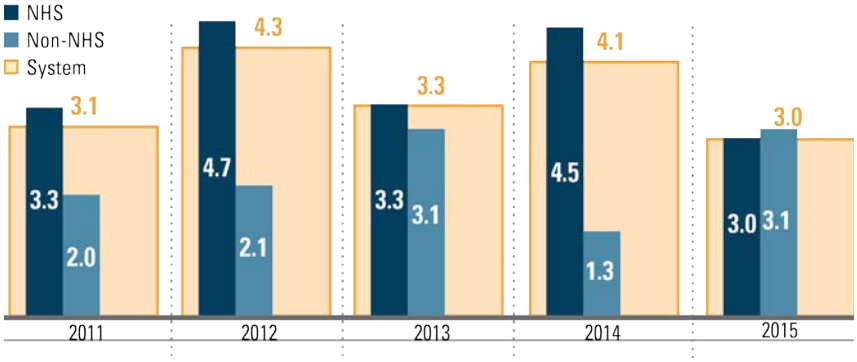
Bridge Condition

MnDOT is committed to a regular schedule of condition assessment and preventive maintenance to keep its bridges in good condition. Approximately 35 percent of MnDOT's bridges are more than 50 years old. Like state highway pavements, aging bridges require more costly improvements to be maintained in serviceable condition.

MnDOT measures its performance in Bridge Condition by reporting on the percent of deck area in poor condition through regular inspections. The condition measure includes ratings of the deck, the substructure and the superstructure evaluations of bridges on the state highway system. MnDOT set a goal that the share of NHS bridges in good structural condition should be 55 percent and those in poor structural condition should be 2 percent or less, measured by deck area. Bridges rated as being in poor condition are safe to drive on, but are approaching the end of their useful lives. Structurally unsafe bridges are closed promptly.

MnDOT is not currently meeting its target for NHS bridges in poor condition but is meeting targets for non-NHS bridges, as shown in Figure 2-8. As of 2014, the percent of NHS bridges in poor condition (4.5 percent) exceeded the maximum target of 2 percent poor but improved from a high of 4.7 percent poor in 2012.

Figure 2-8:Percentage of Bridge Deck Area in Poor Condition



Roadside Infrastructure Condition

MAP-21 required states to develop a risk-based Transportation Asset Management Plan for pavements and bridges on the NHS to improve or preserve asset condition and the performance of the system. MnDOT elected to expand the TAMP beyond the MAP-21 requirements and include all state-owned roads and bridges as well as highway culverts, deep storm water tunnels, overhead signs, and high-mast light towers. Since completion of the TAMP, MnDOT has expanded asset management planning to other roadside infrastructure - highway lights, intelligent transportation systems, noise walls, and signals. Both efforts identified performance measures and targets for assets not identified in federal legislation or the 2013 MnSHIP. These assets are included in this MnSHIP update. Additionally, the related infrastructure condition performance measures and targets will become part of MnDOT's formally adopted measures and targets. Performance for many roadside infrastructure assets is identified as part of an inspection process and typically measured by condition or age.

The TAMP process included an accurate assessment of current conditions for culverts, deep storm water tunnels and overhead sign structures. State owned

culverts are at 10 percent poor, while 24 percent of deep storm water tunnels are in poor condition and 30 percent of overhead sign structures are in poor condition.

Currently, MnDOT is able to address some of its roadside infrastructure needs as components of other projects. However, MnDOT has not been able to fix most assets at optimal points in their life cycles under the current investment program. Roadside infrastructure conditions will likely deteriorate unless additional investments are made.

Facilities Condition

Facilities is a new investment category. It includes all 52 MnDOT-owned rest areas and 10 weight enforcement operational buildings and weigh scales. The Facilities investment category does not include buildings such as district headquarters or other operational facilities. In 2015, MnDOT completed an assessment of all agency owned facilities. The assessment will help guide the development of performance measures and targets for facilities that don't currently have them. Performance for rest areas is based on the physical condition of the building and surrounding pavement and is ranked on a scale between excellent/good to extremely poor/beyond service life. Currently, the assessment determined that 6 percent of state owned rest areas were in good to excellent condition. At the current level of investment, nearly half of rest areas will be beyond their service life by the end of the plan, potentially resulting in the closure of rest areas. Weigh scales will also become outdated or closed, making it more difficult to enforce weight restrictions.



Jurisdictional Transfer

MnDOT does not currently measure performance in Jurisdictional Transfer. As part of the recently completed Minnesota Jurisdictional Realignment Study, MnDOT identified segments of road that could potentially be transferred based on ease of transfer. The study established a goal of reassigning jurisdiction of 1,181 miles of road. At the current rate, the goal will be achieved by 2080. During the past 10 years, MnDOT has transferred 170 miles of state highway roads primarily to counties. An average of 17 miles are transferred each year resulting in road improvements for communities throughout the state. Investment in Jurisdictional Transfer will allow MnDOT to continue to work with our local government partners to agree on and commit to additional roadway transfers that would align the travelers expectations of the facility with the proper level of investment and also lower future maintenance and capital costs to MnDOT.

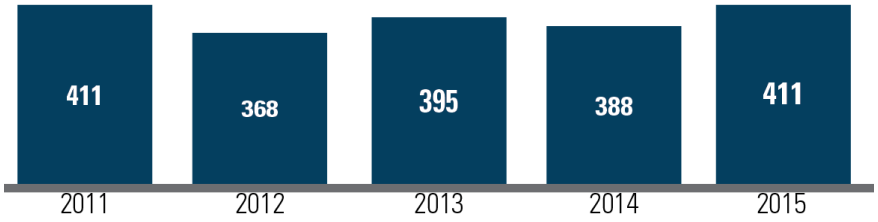
TRANSPORTATION SAFETY: CONDITIONS AND TRENDS

Traveler Safety

MnDOT tracks total traffic fatalities and serious injuries from vehicle crashes. MnDOT uses targets set by the Toward Zero Deaths program to measure its progress in Transportation Safety. MnDOT aims to help the state reach 300 or fewer fatalities and 850 or fewer serious injuries by 2020.

On an average day in 2015, at least one person died on Minnesota highways (411 deaths total in Figure 2-9). This vehicle crash-related fatality total is above the statewide Toward Zero Deaths goal of fewer than 300 deaths per year. With 1,127 serious injuries in 2015, Minnesota was below the TZD target of 1,200 or fewer serious injuries. After steep declines in fatalities at the end of the last decade, traffic and bicycle related fatalities have remained constant since 2011 while pedestrian and motorcycle fatalities saw an increase in 2015

Figure 2-9: Minnesota Traffic Fatalities on All State and Local Roads

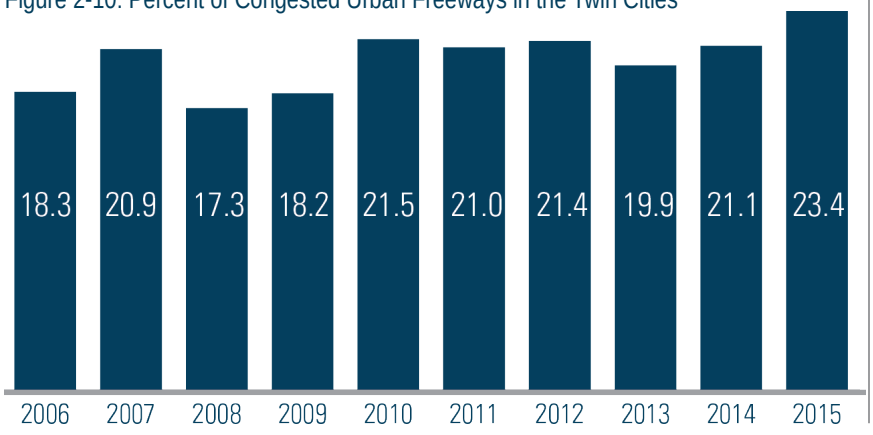


CRITICAL CONNECTIONS: CONDITION AND TRENDS

Twin Cities Mobility

MnDOT tracks congestion on Twin Cities NHS urban freeways by measuring the percentage of miles where vehicles are traveling below 45 miles per hour during morning or evening peak periods (5 to 10:00 A.M. and 2 to 7:00 P.M.). There was a large increase in congestion between 2014 (21.1 percent) and 2015 (23.4 percent). As shown in Figure 2-10, congestion increased steadily over the last two years. Increased economic activity and forecast population gains could worsen congestion over the plan years.

Figure 2-10: Percent of Congested Urban Freeways in the Twin Cities



MAP-21 requires MnDOT to adopt a system performance measure that advances the national goal of system reliability on the NHS. There is an additional requirement to develop a performance measure related to traffic congestion and on-road mobile source emissions in the Twin Cities metropolitan area. MnDOT will coordinate with the Metropolitan Council and other key stakeholders when it begins the process of developing the target.

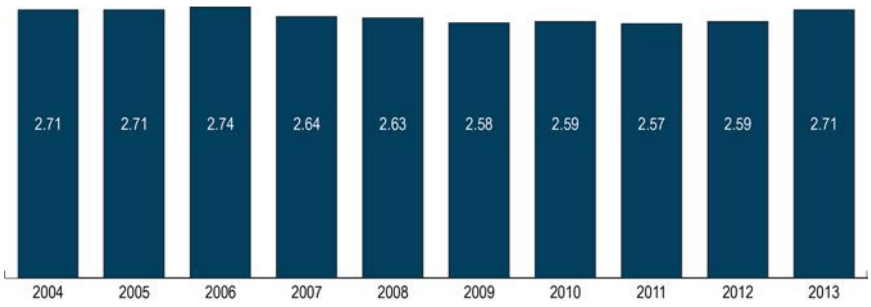
Greater Minnesota Mobility

MnDOT anticipates new federal performance measures and targets for mobility to be set for the NHS as a result of MAP-21. A notice of proposed rulemaking has been issued. Once the federal rules have been finalized, MnDOT can begin the process of setting the final targets. During the development of this plan, MnDOT received travel time data from the Federal Highway Administration. In 2015, the majority of the NHS roads in Greater Minnesota performed well with limited delays. Only a few corridors currently experience travel time delay. However, beyond 2021, several corridors could see an increase in travel time delay due to improving economic conditions.

Freight

Freight includes the movement of all goods that originate or terminate in Minnesota across all modes. This includes trucks and other heavy commercial vehicles, rails, water ports, pipelines and air transport. Truck-only trips remain the primary means of shipping goods by value, but the share moved by other modes is increasing. 2013 saw in increase in heavy commercial vehicle miles traveled on Minnesota highways, along with an increase in tons of freight shipped through rail (Figure 2-11). The Freight Investment Plan will help identify how the FAST Act Freight Program funds get invested on the new National Highway Freight Network.

Figure 2-11: Heavy Commercial Vehicle Miles Traveled on Minnesota State Highways 2004-2013 (billions)



Bicycle Infrastructure

MnDOT invests approximately 2 percent of pavement project costs and approximately 3 percent of bridge project costs, toward Bicycle Infrastructure improvements. While MnDOT does not currently measure statewide progress toward any specific performance measures related to bicycle facilities, it does track bicycle commuting trips within Minnesota's six most populous cities. While there was a drop in bicycle commuter trips throughout the state between the historic high of 2013 and 2014, daily bike ridership has remained consistent since 2006 and once a week ridership has remained relatively steady over the same period.

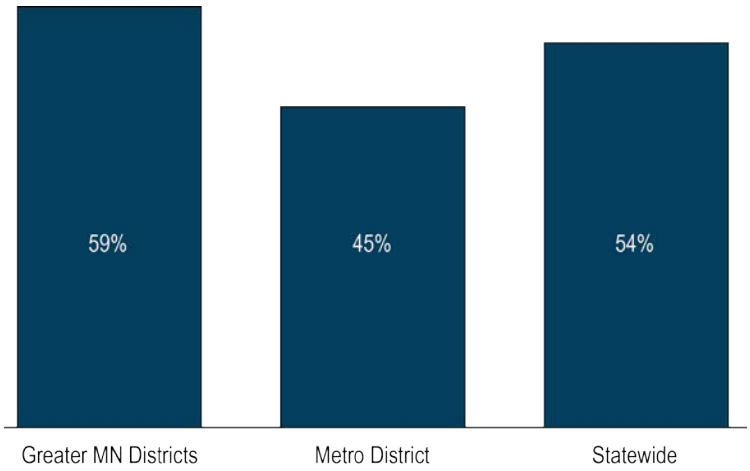
MnDOT finalized the Statewide Bicycle System Plan that provides direction for integrating bicycling into Minnesota's transportation network. This includes plans for each of the eight MnDOT districts as well as tools for practitioners to use in selecting facilities to be included in projects. The plan also recommends performance measures to help MnDOT prioritize and coordinate bicycle infrastructure investments on the state highway system.

Accessible Pedestrian Infrastructure

MnDOT uses two performance measures to track progress in Accessible Pedestrian Infrastructure. MnDOT tracks the percent of signalized intersections with accessible pedestrian signals and the percentage of the 620 miles of sidewalks within MnDOT's right of way that are not compliant with the 1990 Americans with Disabilities Act. MnDOT is making progress toward its goal of equipping all signalized state highway intersections with accessible pedestrian signals by 2030. As of 2014, 36 percent of all intersections had these signals installed, up from 28 percent in 2012. The current percentage of sidewalks that are non-compliant is 54 percent, as shown in Figure 2-12.

Sidewalks can be non-compliant for having a narrow width, a steep slope, having barriers, or being in poor condition.

Figure 2-12: Percent of State Highway Sidewalk Miles that are not Compliant with ADA Requirements in 2014



MnDOT also tracks the number of curb ramps that comply with the ADA standards. MnDOT continues to face challenges in achieving its curb ramp accessibility targets due to funding and project timing constraints. Of the more than 21,000 curb ramps inventoried throughout the state, less than half (approximately 10,000) were completely or partially meeting ADA standards. MnDOT's policy is to replace curb ramps that do not meet ADA requirements in all reconstruction and alteration level projects.

In addition, MnDOT will continue to update its inventory of pedestrian facilities within MnDOT's right-of-way and to reconstruct sidewalks as part of ADA projects and pavement and bridge projects.

HEALTHY COMMUNITIES: CONDITIONS AND TRENDS

Regional and Community Improvement Priorities

MnDOT measures its progress with respect to RCIPs by conducting customer satisfaction studies and consistently seeking input and collaboration opportunities with stakeholders. Beginning in 2010, MnDOT has responded in part to regional concerns and collaboration opportunities through the use of the Transportation Economic Development Program. The program is a joint effort between MnDOT and the Minnesota Department of Employment and Economic Development established to support highway improvement and public infrastructure projects that create jobs and support economic development.

OTHER: CONDITIONS AND TRENDS

Project Delivery

Project Delivery is critical to ensuring timely and efficient delivery on all projects constructed on the state highway system. While performance is not measured for this category, MnDOT tracks how much it has spent on Project Delivery investments as part of its overall investment program.

Historically, Project Delivery has accounted for approximately 16 percent of MnDOT's annual capital investment program. However, the Project Delivery percentage changes year-to-year based on the mix of investments it supports. For example, when MnDOT delivers a program that includes a number of expansion projects, it invests more on Project Delivery due to the increased need for right-of-way purchases and design of more complex projects. When the majority of MnDOT's program consists of asset preservation projects in settings that are not complex such as rural areas, a smaller percentage of its overall program goes toward Project Delivery. MnDOT strives to reduce the overall need for Project Delivery through innovative design, early project identification, and shared services.



Minnesota GO
A Collaborative Vision for Transportation

20-Year State Highway Investment Plan

Chapter 3

INVESTMENT NEEDS

This page intentionally left blank.

INVESTMENT NEEDS

Substantial capital investments are needed to keep Minnesota's 12,000-mile state highway system in a condition that supports a strong economy and a high quality of life for Minnesotans. Chapter 3 provides a cost analysis of the investments needed on the state highway system through the year 2037 in five investment objective areas: System Stewardship, Transportation Safety, Critical Connections, Healthy Communities, and Other. It discusses investment need for each MnSHIP investment category within the objectives areas and explains how MnDOT developed its needs assumptions.

The chapter also includes an estimate of the amount of funding needed to achieve performance targets and other key objectives in each investment category through the next 20 years.

The key messages of Chapter 3 are:

- MnDOT estimated its 20-year investment needs for the state highway system by aiming to achieve both performance targets and other key system goals consistent with the Minnesota GO Vision.
- Approximately $39 billion is needed over the next 20 years to achieve performance targets and other key system goals.
- Available revenue is estimated at $21 billion. As a result, the annual average shortfall is estimated at $900 million to meet all targets and goals.

Definition of Needs in MnSHIP

Transportation needs are defined as either the costs necessary to meet performance-based targets or the costs related to achieving key system goals. Satisfying both sets of transportation needs would allow MnDOT to align outcomes on the state highway system with the objectives outlined in the Minnesota GO Vision and the Statewide Multimodal Transportation Plan and/or manage the largest risks in its investment categories. MnDOT calculated the needs of each investment category based on this definition.

To arrive at the costs associated with meeting performance-based targets and other key goals for the state highway system, technical work groups used both performance measures and risk assessment to define performance levels in each investment category. Each performance level outlines a different amount of potential investment along with the improvements, outcomes, risks, and strategies associated with it. The highest performance level across the investment categories typically corresponds to the total need. The total need for the state highway system is estimated to be $39 billion over 20 years, compared to $21 billion in available revenue.

Appendix I: Investment Category Folios provides more detail regarding the performance levels for each category.

NEEDS ASSOCIATED WITH ACHIEVING PERFORMANCE TARGETS

As described in Chapter 2. Key Assumptions and Factors," MnDOT has used performance measures to help guide capital investment and operational decisions since the 1990s. The process of tracking, reviewing and reporting on conditions on the state highway system helps MnDOT and the public evaluate the impact and effectiveness of MnDOT programs.

Every year since 2008, MnDOT has published the Annual Minnesota Transportation Performance Report, which contains detailed information on the areas in which MnDOT tracks performance. The report includes a description of historical trends, current conditions, how MnDOT makes progress toward achieving targets, and anticipated outcomes based on planned investments through the four-year State Transportation Improvement Program.

Historically, MnDOT has set targets designed to achieve optimal or desired performance levels in particular investment categories. These targets have typically been based on lowest life-cycle costs, customer expectations or a policy priority. Others have been trend-based – set by looking at trends and outcomes associated with historical spending levels. More recently, MnDOT has also established performance targets that it determines to be an acceptable risk.

MnDOT used performance measures and costs associated with implementing performance-related strategies to develop its needs estimates in the following MnSHIP categories:

- Pavement Condition
- Bridge Condition
- Roadside Infrastructure Condition
- Traveler Safety
- Twin Cities Mobility
- Greater Minnesota Mobility
- Accessible Pedestrian Infrastructure



NEEDS ASSOCIATED WITH OTHER KEY SYSTEM GOALS

State highway system needs also include investments that are important for delivering an efficient and diversified program of capital improvements that achieve multiple benefits. While the categories listed below do not currently have established performance measures or targets, they are critical in helping MnDOT to make progress toward the Minnesota GO Vision:

- Jurisdictional Transfer
- Facilities
- Freight
- Bicycle Infrastructure
- Regional and Community Investment Priorities
- Project Delivery
- Small Programs

Without current performance measures or targets, MnDOT used alternative methods to estimate the needs in these categories. Needs were based on the following:

- The cost to achieve multimodal transportation objectives. The investment needs for Bicycle Infrastructure, and a portion of the needs for Accessible Pedestrian Infrastructure improvements—those unrelated to 1990 Americans with Disabilities Act compliance—are based on advancing current levels of investment to more adequately promote a

multimodal transportation network, as described in the Minnesota GO Vision, Statewide Multimodal Transportation Plan, and the ADA Transition Plan.

- The cost to manage greatest risks. MnDOT calculated needs for the RCIP category by determining the amount needed to manage the greatest risks in this category.
- The cost to support delivery of the capital program. Project Delivery needs were calculated as the costs necessary to bring projects from conception to completion based on historical expenditures in this area.
- The cost to implement programs. Investment need for the Small Programs and Freight categories is the expected amount of money available for those programs. The Freight category includes funding from the National Highway Freight Program, which is a new federal program created by the Fixing America's Surface Transportation Act.

Please note: Needs below are listed by objective category, however, the order does not reflect priority.







Summary of Needs

In developing its assumptions for MnSHIP, MnDOT projected the investments necessary to meet state highway transportation needs through 2037. As discussed above, the need was determined by the costs required to meet performance-based targets and other key system goals, such as advancing the state's economic vitality and supporting Minnesotans' quality of life. The total need for the Minnesota state highway system is calculated to be approximately $39 billion over 20 years. Figure 3-1 shows a comparision between available revenue and total need. Figure 3-2 shows the distribution of need by investment category. This level of investment would ensure that the state highway system meets all federal and state performance requirements and makes substantial progress toward realizing the Minnesota GO Vision. It would also allow MnDOT to effectively manage its greatest risks in each investment category. Figure 3-3 summarizes what MnDOT would be able to accomplish in each investment category under a program with no fiscal constraints.

Figure 3-1: Comparison of Investment Needs and Available Revenue

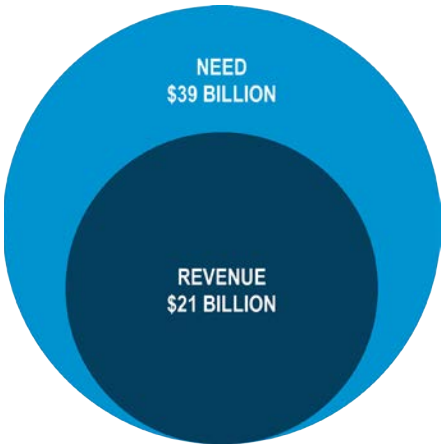


Figure 3-2: Transportation Needs During the Next 20 Years (by Investment Category)

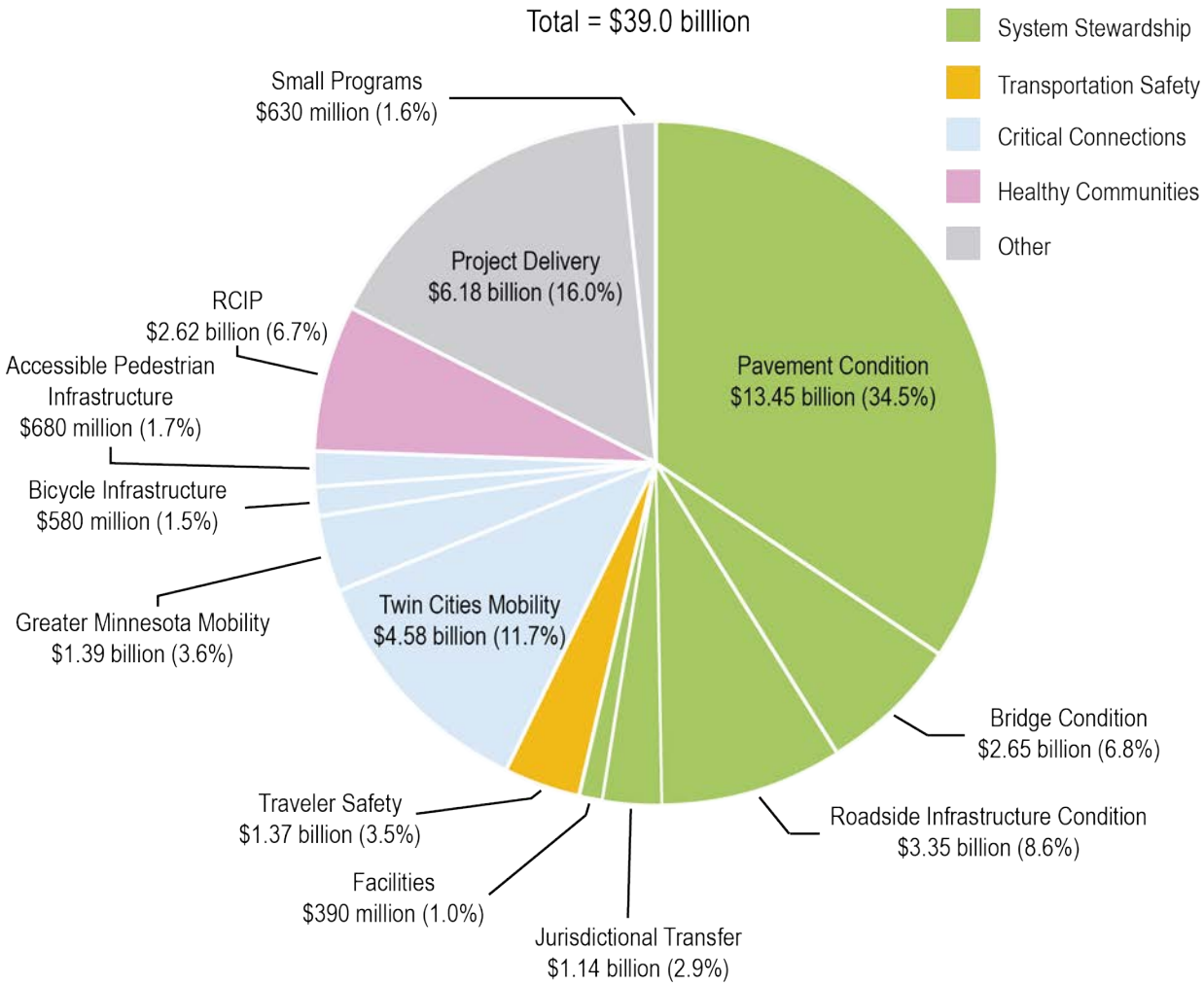


Figure 3-3: Transportation Needs During the Next 20 Years (by Investment Category)

INVESTMENT CATEGORY	OBJECTIVE AREA	20-YEAR OUTCOMES BASED ON PERFORMANCE TARGETS OR OTHER KEY SYSTEM GOALS	ESTIMATED 20-YEAR NEED	TOTAL (%) OF NEED
Pavement Condition	System Stewardship	Meet pavement performance target of 2.0% Poor condition on Interstates, 4.0% percent poor condition on non-Interstate NHS, 10.0% poor condition on non-NHS.	$13.44 billion	34.5%
Bridge Condition	System Stewardship	Meet bridge performance target of 2.0% poor condition on NHS bridges, 8.0% poor condition on non-NHS bridges.	$2.65 billion	6.8%
Roadside Infrastructure Condition	System Stewardship	Meet performance target of 10.0% poor condition for culverts and tunnels, 6.0% poor condition for signals, lighting, signs/sign structures, and ITS, 2.0% poor condition for noise walls.	$3.35 billion	8.6%
Jurisdictional Transfer	System Stewardship	Fully implement the 2014 Minnesota Jurisdictional Realignment Report by repairing and transferring approximately 1,200 miles of roadway (centerline).	$1.14 billion	2.9%
Facilities	System Stewardship	No rest areas or weigh stations beyond service life.	$390 million	1.0%
Traveler Safety	Transportation Safety	Meet an aggressive traffic fatalities target by implementing District Safety Plans at an increased rate, investing at most sustained crash locations.	$1.37 billion	3.5%
Twin Cities Mobility	Critical Connections	Build out the majority of MnPASS Express Lane and increase investments in strategic mobility.	$4.58 billion	11.7%
Greater Minnesota Mobility	Critical Connections	Invest in all operational and capital improvements at locations experiencing high travel time delay in Greater Minnesota.	$1.39 billion	3.6%
Bicycle Infrastructure	Critical Connections	Maintain existing bicycle facilities in good condition, complete stand-alone bikeway projects, and designate 8 state bikeways.	$580 million	1.5%
Accessible Pedestrian Infrastructure	Critical Connections	Bring all sidewalks, curb ramps, and signalized intersections to total ADA-compliance by 2037, double non-ADA pedestrian projects.	$680 million	1.7%
Regional and Community Improvement Priorities	Healthy Communities	Expand partnerships with stakeholders, cooperative agreements, regional priorities, proactive flood mitigation, main street reconstructions and increased landscaping.	$2.62 billion	6.7%
Project Delivery	Other	Efficiently deliver projects through adequate consultant services, supplemental agreements, construction incentives, and right-of-way acquisition.	$6.18 billion	16.0%
Small Programs	Other	Continue to fund unforeseen issues and historic property improvements.	$630 million	1.6%
		TOTAL	$39 BILLION	100%

SYSTEM STEWARDSHIP NEEDS

MnDOT estimates that it would cost $20.98 billion to meet performance targets and other key objectives for System Stewardship through 2037.

SYSTEM STEWARDSHIP	INVESTMENT NEED
Pavement Condition	$13.44 billion
Bridge Condition	$2.65 billion
Roadside Infrastructure Condition	$3.35 billion
Jurisdictional Transfer	$1.14 billion
Facilities	$390 million
Total	$20.98 billion

Pavement Condition Needs

Using the Pavement Management System model, MnDOT projected its future pavement needs for MnSHIP by calculating the 20-year investment needed to fulfill its performance goals. MnDOT used the following targets for the Interstate system, non-Interstate NHS, and non-NHS roadway pavement miles:

- Interstate pavements: 2.0 percent (or less) in poor condition
- Other NHS pavements: 4.0 percent (or less) in poor condition
- Non-NHS pavements: 10.0 percent (or less) in poor condition

These are targets that would best position MnDOT to meet its federal and state requirements while also meeting customers' ride quality expectations.

Pavement Condition need is estimated to be $13.44 billion. At this level of investment in Pavement Condition, MnDOT would be able to:

- Invest in NHS and non-NHS roads to meet all pavement condition targets by 2037



Bridge Condition Needs

MnDOT measures its bridge performance based on structural condition, and has established targets for bridges on NHS and non-NHS highways:

- NHS bridges: 2.0 percent (or less) in poor condition (by deck area)
- Non-NHS bridges: 8.0 percent (or less) in poor condition (by deck area)

MnDOT uses the Bridge Replacement and Improvement Management prioritization tool to identify its bridge investments. The total need amount in Bridge Condition is based on investing in all state highway bridges at optimal points in their life-cycles over the next 20 years. BRIM also accounts for other factors in ranking priority for bridge projects, such as traffic volume, highway





classification and special vulnerabilities.

Bridge Condition need is estimated to be $2.65 billion. At this level of investment in Bridge Condition, MnDOT would be able to:

- Meet all performance-based bridge needs including bridge culverts, tunnels, pedestrian bridges, and MnDOT-owned railroad bridges

ROADSIDE INFRASTRUCTURE CONDITION NEEDS

MnDOT measures its Roadside Infrastructure Condition performance based on structural condition and has established targets for some assets in the investment category. As part of the Transportation Asset Management Plan process, MnDOT developed goals or outcomes used to set targets for culverts, deep storm water tunnels, and overhead sign structures. MnDOT used the following targets for estimating need:

- Culverts: 10.0 percent (or less) in poor condition
- Deep storm water tunnels: 10.0 percent (or less) in poor condition
- Overhead sign structures: 6.0 percent (or less) in poor condition

MnDOT used targets for estimating need for other Roadside Infrastructure Condition assets, including ITS infrastructure, lighting, noise walls, signs and traffic signals. However, these targets have yet to be officially adopted.

Roadside Infrastructure Condition need is estimated to be $3.35 billion. At this level of investment in Roadside Infrastructure Condition, MnDOT would be able to:

- Meet performance targets (for those assets with accepted targets)
- Allocate a sizeable amount of funding to replace and repair assets at the end of their service life

MnDOT will continue to refine its approach to estimating needs in this category by improving its tracking of maintenance and capital investments, as well as inventories.

FACILITIES NEEDS

MnDOT completed an assessment of all MnDOT-owned facilities in 2015 to better understand the level of investment necessary to maintain these buildings in an acceptable condition. MnSHIP guides capital investments only in buildings and facilities along the state highway, which includes all rest areas and weigh stations (weigh scales and buildings).

Facilities need is estimated to be $390 million. At this level of investment in Facilities, MnDOT would be able to:

- Invest to maintain at least 50 percent of rest areas in good condition
- Expand weight enforcement activities and improve technologies

JURISDICTIONAL TRANSFER NEEDS

MnDOT calculated the need for jurisdictional transfer based on an analysis of the alignment, or ownership, of Minnesota's roads as outlined in the 2014 Minnesota Jurisdictional Realignment Project report. The identified needs are capital improvements to roads required to make a transfer from MnDOT to county or local governments or vice versa over the next 20 years.

Jurisdictional Transfer need is estimated to be $1.14 billion. At this level of investment in Jurisdictional Transfer, MnDOT would be able to:

- Leverage other state funding to repair and transfer 1,200 (centerline) miles of roads.

TRANSPORTATION SAFETY NEEDS

MnDOT estimates that it would cost approximately $1.37 billion to meet its Transportation Safety needs through 2037.

TRANSPORTATION SAFETY	INVESTMENT NEED
Traveler Safety	$1.37 billion

MnDOT estimated needs in Transportation Safety over the next 20 years by calculating the cost of implementing projects similar to those found in the District Safety Plans more quickly than the current rate. This would enable MnDOT to address many sustained crash locations while also continuing its support of the Toward Zero Deaths initiative.

Transportation Safety need is estimated to be $1.37 billion. At this level of investment, MnDOT would be able to:

- Implement identified low-cost, proactive projects more quickly than at the current rate
- Invest at most sustained crash locations







CRITICAL CONNECTIONS NEEDS

MnDOT estimates that it would cost approximately $7.23 billion to meet its targets and key objectives for Critical Connections through 2037.

CRITICAL CONNECTIONS	INVESTMENT NEED
Twin Cities Mobility	$4.58 billion
Greater Minnesota Mobility	$1.39 billion
Bicycle Infrastructure	$580 million
Accessible Pedestrian Infrastructure	$680 million
Total	$7.23 billion

TWIN CITIES MOBILITY NEEDS

MnDOT calculated its 20-year needs for Twin Cities Mobility by projecting the costs associated with implementing mobility strategies listed in the Metropolitan Council's 2040 Transportation Policy Plan. In doing so, MnDOT would build out a majority of planned MnPASS express lanes and double major capacity improvements within the next 20 years while continuing to invest in Active Traffic Management and spot mobility improvements. With new Federal Highway Administration performance measures expected for Twin Cities area NHS reliability or congestion, MnDOT and the Metropolitan Council may need to adjust these mobility strategies within the 20-year timeframe of MnSHIP.

Twin Cities Mobility need is estimated to be $4.58 billion. At this level of investment in Twin Cities Mobility, MnDOT would be able to:

- Continue expanding the Active Traffic Management system
- Invest in spot mobility improvements at an increased rate
- Build out a majority of planned MnPASS express lanes
- Substantially increase investment in major capacity projects

GREATER MINNESOTA MOBILITY

MnDOT calculated its 20-year needs for Greater Minnesota Mobility by analyzing highway corridors experiencing high travel time delay. Needs were calculated by estimating costs necessary to invest in all operational and capital improvements at these locations. With new FHWA performance measures expected for NHS reliability or congestion, MnDOT may need to adjust these mobility strategies within the 20-year timeframe of MnSHIP.

Greater Minnesota Mobility need is estimated to be $1.39 billion. At this level of investment in Greater Minnesota Mobility, MnDOT would be able to:

- Invest in both low-cost operational improvements and high-cost capital

improvements at locations experiencing high travel time delay in Greater Minnesota

FREIGHT NEEDS

At this time, MnDOT has not estimated its 20-year needs for freight on the state highway system. The investment in the Freight category identified in MnSHIP reflects the amount provided for the National Highway Freight Program as part of the FAST Act. Needs related to freight movement have been identified in other investment categories so there is no separate need category for freight in this MnSHIP update. The forthcoming Minnesota Freight Investment Plan will identify priorities for spending money for freight improvements.

BICYCLE INFRASTRUCTURE NEEDS

To estimate its 20-year needs, MnDOT calculated the costs required to invest in bicycle facilities concurrently with bridge and pavement improvements and make enhancements to bicycle infrastructure through standalone projects. MnDOT has completed its Statewide Bicycle System Plan which provides direction on how to support bicycling on Minnesota state highways through partnerships with locals, establishment of a priority bicycle network and traditional investments. This planning effort helped identify the public's preference for more local routes and separated bike lanes. MnDOT will continue to work with regional and local partners to identify priority routes for investments.

Bicycle Infrastructure need is estimated to be $580 million. At this level of investment in Bicycle Infrastructure, MnDOT would be able to:

- Keep existing bicycle facilities in good condition
- Make enhancements, such as separated bike lanes on yet-to-be-determined local priority networks
- Designate and sign eight state bikeways
- Continue to invest in the bicycle network concurrent with pavement and bridge projects

ACCESSIBLE PEDESTRIAN INFRASTRUCTURE NEEDS

MnDOT calculated the 20-year need for Accessible Pedestrian Infrastructure by determining the investment needed to bring all sidewalks and curb ramps into total compliance with ADA standards by 2037. MnDOT would also install Accessible Pedestrian Signals at all signalized intersections, and undertake strategic stand-alone projects to fill gaps in the sidewalk network or as part of complete streets projects.









Accessible Pedestrian Infrastructure need is estimated to be $680 million. At this level of investment in Accessible Pedestrian Infrastructure, MnDOT would be able to:

- Meet full ADA compliance of its existing pedestrian network by 2037
- Double the current level of investment in sidewalk and pedestrian enhancement and expansion projects as a part of pavement and bridge projects

HEALTHY COMMUNITIES

REGIONAL AND COMMUNITY IMPROVEMENT PRIORITIES NEEDS

MnDOT estimates that it would cost approximately $2.62 billion to meet its key objectives for Regional and Community Improvement Priorities or RCIPs through 2037.

REGIONAL AND COMMUNITY IMPROVEMENT PRIORITIES	INVESTMENT NEED
Regional and Community Improvement Priorities	$2.62 billion

RCIPs cover a range of improvements for which MnDOT does not have performance-based goals. The investment need associated with this objective is based on MnDOT's recent efforts and historical expenditures in this area. Investment at this level will allow MnDOT to continue to address local and regional concerns, such as economic development, proactive flood mitigation, urban reconstruction, and landscaping. MnDOT recognizes that the current level of spending likely does not capture the full array of non-performance-based needs and opportunities across the state.

RCIP need is estimated to be $2.62 billion. At this level of investment in RCIPs, MnDOT would be able to:

- Invest in three to seven transportation economic development projects per year
- Implement five to six urban reconstruction or Main Street projects per year
- Address high priority flood mitigation projects
- Expand landscaping investments in projects
- Expand opportunities to participate in local initiatives

OTHER NEEDS

MnDOT estimates that it would cost approximately $6.81 billion to meet its key objectives for Project Delivery and Small Programs through 2037.

OTHER	INVESTMENT NEED
Small Programs	$630 million
Project Delivery	$6.18 billion
Total	$6.81 billion

SMALL PROGRAMS NEEDS

MnSHIP assumes MnDOT will continue to need a fixed amount of funds throughout the 20-year timeframe to respond to short-term, unforeseen issues and continuing commitments. MnDOT currently plans approximately $32 million per year or 3 percent of its total projected revenue to cover investments in Small Programs.

Assuming that the current investment level is held constant throughout the next 20 years, approximately $630 million is needed to fund Small Programs. This MnSHIP update has reduced the size of Small Programs as rest area, weigh station and economic development investments have been incorporated into other MnSHIP investment categories.[1]

If MnDOT does not fully spend its annual allocation for Small Programs in a given year, it directs the funds toward its highest unaddressed risks in the capital program.

PROJECT DELIVERY NEEDS

MnDOT estimates that achieving its targets and key objectives in the areas of System Stewardship, Transportation Safety, Critical Connections and Health Communities would require approximately $6.18 billion in Project Delivery through 2037.

MnDOT analyzed the amount historically spent in this category to establish the proportion of the overall investment that would be required to design, engineer and construct projects during the next 20 years. Approximately 16 percent of MnDOT's annual capital investment typically goes to supporting the delivery of projects. The percentage of spending in project delivery has changed significantly since 2013 MnSHIP as a result of more thorough analysis of actual expenditures and increased requirements for MnDOT projects.

1 See Facilities and Regional and Community Improvement Priorities investment categories.





Comparison to the Needs in 2013 MnSHIP

MnDOT's previous 20-year state highway investment plan, completed in 2013, identified a total need of $30 billion. The plan projected $18 billion in revenue which resulted in a $12 billion funding gap. This MnSHIP update projected revenue of $21 billion and a total need of $39 billion, which resulted in an $18 billion funding gap. Between 2013 and 2016, the estimated unmet need grew by $6 billion. The primary reasons for growth in need include:

- The inclusion of two new categories (Jurisdictional Transfer and Facilities) which identify capital investment need not previously included in MnSHIP
- Better understanding of roadside infrastructure investment need due to asset management planning efforts
- Increased impacts of inflation as the years change from 2014-2033 to 2018-2037
- Increased Project Delivery investment as a result of the larger overall program as well as better estimation of need

However, not all needs have increased since 2013. The needs for Bridge Condition have decreased due to greater accuracy of the deterioration model and forecasted condition.









Minnesota GO
A Collaborative Vision for Transportation

20-Year State Highway Investment Plan

Chapter 4

DEVELOPMENT OF INVESTMENT DIRECTION

This page intentionally left blank.

DEVELOPMENT OF INVESTMENT DIRECTION

MnDOT used various factors including an extensive public engagement process to develop priorities for investments on the state highway system over the next 20 years. These priorities reflect the investment direction that identify levels of funding for MnSHIP investment. In developing the investment direction, MnDOT considered many criteria including:

- Federal and state requirements
- MnDOT policy goals and objectives
- Technical information on the condition of the state highway system
- Investment needed to maintain the system in a state of good repair
- Estimated revenue over the 20 years of the plan
- Management of key risks to the system
- Public and stakeholder input

The process helped MnDOT complete several key tasks including communicating future outcomes for the state highway system and gauging the degree to which different investment approaches align with public, stakeholder and agency expectations. The process also adjusted the investment direction to guide future capital investments.

The key messages of Chapter 4 are:

- MnDOT developed three investment approaches that highlight the potential 20-year outcomes on the state highway system to generate feedback and help shape investment priorities.
- The process used innovative strategies for in-person engagement, online engagement, and engagement of traditionally underserved communities.
- Participants in the public outreach process stated that MnDOT should invest in maintaining the existing pavement and bridges while making limited mobility improvements.
- MnDOT used the results of the public engagement process as well as internal MnDOT input to develop a 20-year investment direction.
- During a second round of public outreach, participants communicated they understood the rationale behind the investment decisions in MnSHIP but were generally dissatisfied about the investment direction and outcomes of the plan.

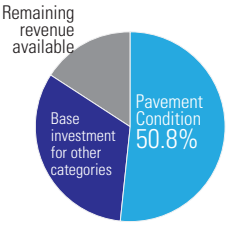
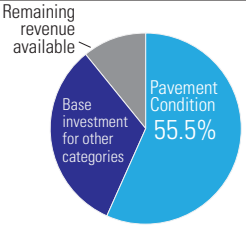
Development of Investment Approaches

To maintain existing infrastructure at today's condition levels for the next 20 years would require nearly all $21 billion of MnSHIP's available revenue. Given the limited revenue, MnDOT identified investment trade-off decisions that balance numerous competing priorities. To illustrate these trade-off decisions, MnDOT developed performance levels for each investment category and then packaged different performance levels from each category into three investment approaches.

DEVELOPMENT OF PERFORMANCE LEVELS

During the summer of 2015, MnDOT formed workgroups for each investment category. These workgroups, composed of planning and engineering staff from MnDOT as well as staff from other agencies, assisted in creating performance levels. Performance levels represent different levels of investment for each investment category to reach specific outcomes identified by the workgroup. Each category had three to five performance levels (Performance Level 0 to Performance Level 2, 3, or 4). MnDOT used both performance measures and risk to define a potential range of investment in each category. The lowest performance level, PL0, represents the minimum level of investment that is acceptable given MnDOT's responsibility for public safety and basic system functionality. The highest investment levels allow MnDOT to meet the goals and objectives for each investment category and to make more progress toward the Minnesota GO Vision. Each performance level corresponds with a different set of improvements, outcomes, risks, and risk management strategies (Figure 4-1). Appendix I: Investment Category Folios provides more information on how performance levels were developed.

Figure 4-1: Excerpt from the Pavement Condition Investment Category Folio

	Performance Level 0 *Lowest cost, greatest risk*	**Performance Level 1** *Lower cost, higher risk*
Investment Approach *(See Approach Folio)*	**Approach C** Corresponds with current investment	**Approach A, B**
Investment Level *Total* *Years 5-10 (2022-2027)* *Years 11-20 (2028-2037)*	**$8,447 M** $527.9 M/yr $527.9 M/yr 	**$9,242 M** $577.6 M/yr $577.6 M/yr 
Investment Description	Maintain current investment direction based on 2013 MnSHIP investment direction	Maintain Interstate at a level compliant with MAP-21. Maintain GASB 34 threshold on the NHS and Non-NHS system.

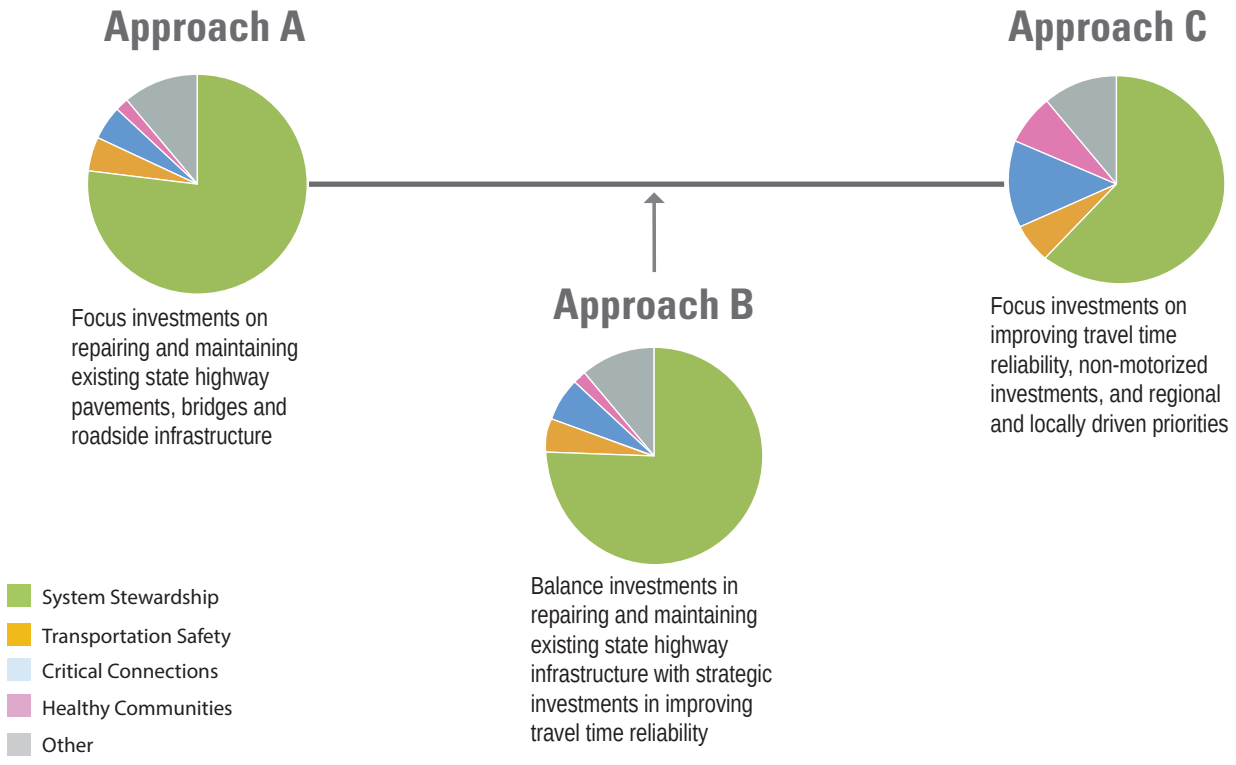
CONVERSION OF PERFORMANCE LEVELS INTO INVESTMENT APPROACHES

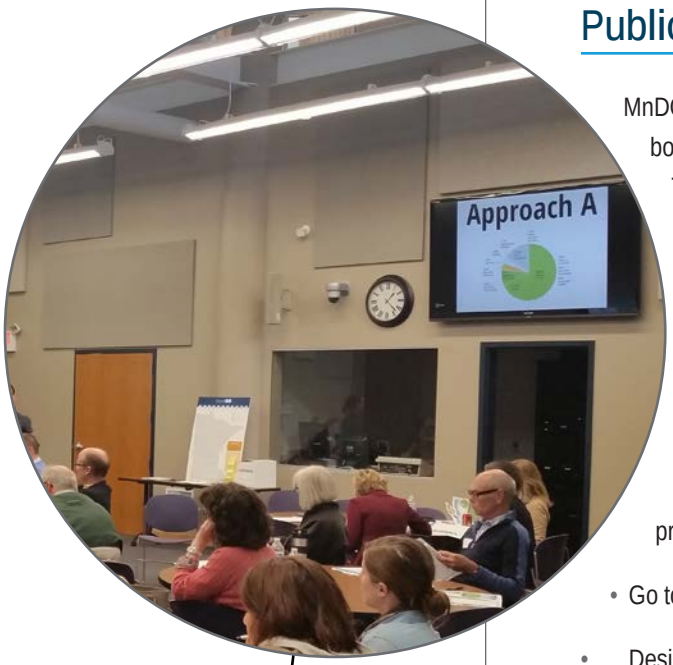
MnDOT packaged different combinations of performance levels for each of the investment categories into three investment approaches: A, B, and C. Each approach used the same baseline assumptions:

- $21 billion in revenue is available over the next 20 years (2018-2037)
- The size of the state highway system will not change
- Each investment category must be funded to at least the lowest performance level (PL 0)
- The Project Delivery investment category requires a constant amount of funding to deliver the program based on historical spending patterns
- MnDOT will meet Americans with Disabilities Act substantial compliance standards for pedestrian infrastructure by 2037
- MnDOT needs to meet federal and state legislative requirements

MnDOT used these three approaches to show how available funding could be divided among the investment categories over the next 20 years based on different priorities. This demonstrates a range of possible outcomes and risks (Figure 4-2).

Figure 4-2: Investment Approach Developed for Scenario Planning









Public Engagement Summary

MnDOT conducted an eight-month joint public outreach process for both MnSHIP and the Statewide Multimodal Transportation Plan. The process used innovative strategies for in-person engagement, online engagement, and engagement of traditionally underserved communities. MnDOT expanded its use of public engagement techniques from the 2013 plan including piloting several new tools to gather input from transportation partners, stakeholders and the public on priorities for investment. This feedback helped MnDOT identify priorities for developing the 20-year investment direction.

The MnSHIP engagement approach was based on the following principles:

- Go to the public and partners. Do not make them come to us
- Design tools to facilitate different levels of engagement. Individuals vary in interest and knowledge but everyone should be able to participate
- Be responsive and adaptive. Tailor tools and techniques to the needs of each specific group or event
- Partner with traditionally underserved communities to design an engagement approach that works for them
- Focus on involving more individuals and trying new things, but do not forget about traditional stakeholders and tested tools
- Collect data, regularly report on outreach activities, implement lessons learned, and fine-tune the approach

MnDOT made the decision to track demographics as a part of this outreach effort. All engagement tools that were completed anonymously asked participants to identify their zip code, age, gender, and race/ethnicity. Answering these questions was optional and voluntary. The project team collected and analyzed the data throughout the engagement effort to determine if certain populations were missed. The data helped refine the engagement strategy from month-to-month to address any shortfalls. After analyzing the data, MnDOT adjusted the engagement focus to increase the participation from traditionally underserved communities through targeted Facebook ads and a partnership with Emergency, Community, Health and Outreach (ECHO). The intended outcome was to reach a population that is representative of Minnesota's demographic makeup.

PUBLIC ENGAGEMENT

In-Person Engagement

MnDOT created multiple in-person opportunities for the public, stakeholders, and transportation partners to provide input on the priorities for the investment direction. MnDOT relied heavily on attending existing meetings, workplaces, and community events to seek input. In some cases, MnDOT had an hour on a meeting agenda to present. In other cases, MnDOT only had a few seconds to interact with people. With this in mind, MnDOT prepared multiple tools for various engagement settings to seek in-person input. Below are four different in-person settings used to gather input.

- Community Events
- Stakeholder Forums
- Partner and Stakeholder Briefings
- Workplace-Based Outreach



Online Engagement

MnDOT used several online tools to supplement the in-person engagement techniques. Online engagement was critical to reaching a larger audience. Online tools mirrored those used for in-person engagement. MnDOT created its first Online ADA Plan as part of the Public Participation Plan to ensure that all web-based engagement was accessible to persons with visual impairments. Below is a summary of the tools used for online engagement.

- Online Surveys
- Project Website
- Social Media
- Facebook Targeted Ads
- Stakeholder E-mail Updates



Traditionally Underserved Community Engagement

MnDOT provided specific outreach opportunities for traditionally underserved populations by piloting new engagement tools and techniques.

- Tribal Outreach
- Facebook Targeted Ads
- ECHO Outreach

A full public outreach summary is available in Appendix G: Planning Context Summary.

Figure 4-3: Most Frequently Selected Approach by Area

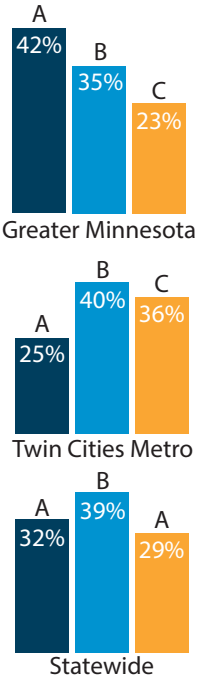
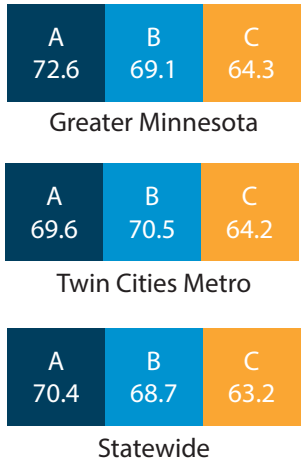


Figure 4-4: Highest Rated Approach by Area



PUBLIC ENGAGEMENT RESULTS

Scenario Preference

On average statewide, participants in the public outreach process preferred Approach B, no matter if they were transportation partners/stakeholders or the public. However, there were noticeable differences between the preferences of Twin Cities Metro Area and Greater Minnesota participants. As shown in Figure 4-3, Greater Minnesota preferred Approach A while the Twin Cities Metro Area preferred Approach B.

Scenario Rating

Participants who completed the roving survey rated Approach A the highest (Figure 4-4). However, Approach B rated very close to Approach A, only 1.7 lower. Similar to the results from the scenario preference, there were differences in the highest rated approach between Greater Minnesota and the Metro Area. Greater Minnesota rated Approach A highest while the Twin Cities Metro Area rated Approach B slightly higher than Approach A.

Most Important Investment Categories

At all outreach events, people selected their most important investment categories. The results are shown in Figure 4-5. Pavement Condition and Bridge Condition were the top two categories overall among both stakeholders and the public.

Figure 4-5: Most Selected Investment Categories



Key Themes from Public Engagement

Participants provided a short statement that captured their preferred investment priorities. The following are the key themes identified from the results. Figure 4-6 also summarizes comments received into a word cloud. The larger the word appears, the more often participants mentioned the word in comments received through outreach.

Figure 4-6: Word Cloud of Outreach Comments

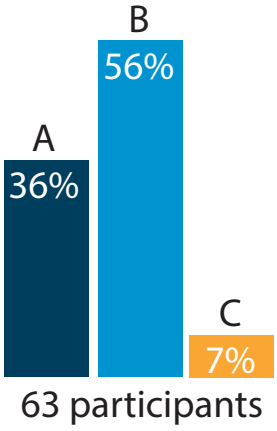


- Prioritize investment to maintain existing infrastructure. MnDOT should be prioritizing investments in pavements and bridges as well as supporting infrastructure. Participants saw deteriorating roadways and bridges as a major safety issue.
- Invest to improve travel time reliability and reduce travel time delay. While a majority of participants commented on maintaining existing infrastructure, participants' identified mobility both in Greater Minnesota and in the Twin Cities Metro Area as a concern. Many comments included statements about investing in existing infrastructure first but still making some mobility investments.

INPUT FROM SENIOR LEADERSHIP AND KEY AGENCY STAFF

Following the public engagement efforts, MnDOT leadership and key staff provided feedback on the different investment approaches and strategies. The group analyzed the scenarios in a manner that paralleled that of public outreach. Approach B was the preferred approach (Figure 4-7). Participants then identified where they might make adjustments to Approach B.

Figure 4-7: MnDOT Leadership and Staff Approach Preference







New Factors Influencing Investment Direction

MnDOT used the investment priorities in Approach B as the starting point to develop the investment direction based on the results of public outreach and internal analysis. To create an investment direction, MnDOT needed to address two new factors not considered in the development of the three approaches: a new federal transportation bill and a revised analysis of the amount of funding needed for Project Delivery.

FAST ACT

In December 2015, the federal government passed a new federal transportation bill. Fixing America's Surface Transportation Act. The FAST Act increased federal revenue projections in MnSHIP and created a new national freight program. MnDOT revised the 20-year revenue projections to account for these changes. The three approaches assumed $20 billion. The new revenue projections assumed $21 billion in available revenue over 20 years.

Roughly two thirds of the projected revenue increase is dedicated to the National Highway Freight Program. The FAST Act requires a freight investment plan to identify how funds from the National Highway Freight Program will be spent. Until then, MnSHIP is setting aside projected revenue from the National Highway Freight Program into a separate category called Freight. This category was not a part of the three approaches.

PROJECT DELIVERY REVISED ANALYSIS

A review of the investment needed to deliver projects determined that the funding used in the three approaches was too low (14 percent of the total program). MnDOT revised the analysis based on the average amount over the last three years and determined that spending needed to deliver projects was 16 percent of the capital program. The final investment direction reflects this change. MnDOT will use any efficiency in Project Delivery to program additional projects to maintain bridge and pavement conditions.

Setting of 20-Year Investment Direction

INVESTMENT CATEGORY ADJUSTMENTS

MnDOT needed to make changes from Approach B to handle the increase in Project Delivery in the MnSHIP investment direction. Several areas received lower amounts of investment to avoid any one category from receiving all of the impact. Changes included reducing Pavement Condition, Bridge Condition, Traveler Safety, Jurisdictional Transfer, Greater Minnesota Mobility and Bicycle Infrastructure.

SETTING A 20-YEAR INVESTMENT DIRECTION

In the 2013 MnSHIP, MnDOT divided the 20-year investment direction into two 10-year periods with different investment priorities. This allowed MnDOT to balance investment in expanding and maintaining the highway system in the first 10 years (2014-2023). During the second 10 years (2024-2033), a shift occurs as MnDOT focuses solely on maintaining the state highway system since the investment needed to preserve the system increases.

With this update to MnSHIP, the investment needed to maintain the system has grown. Likewise, MnDOT's ability to balance investments between expanding and maintaining the system is limited. If MnDOT were to continue with two separate 10-year investment periods, the differences between the two periods would be small. In addition, moving towards a 20-year investment direction eliminates the abrupt shift in investment priorities that existed in the 2013 version of MnSHIP. This change makes it easier for MnDOT districts to plan and deliver projects. For these reasons, MnDOT chose to develop a full 20-year investment direction instead of two 10- year investment periods.

The 20-year investment direction focuses on maintaining the existing state highway system while making limited mobility investments. Maintaining existing roadways surfaces, bridges, and other supporting infrastructure continues to make up more than two-thirds of total investment. Limited mobility investments are made in the Twin Cities Metro Area and Greater Minnesota. Figure 4-8 shows a comparison between this investment direction and the 2013 investment direction and outlines the factors for changes made with this MnSHIP update. Chapter 5 describes the investment direction and the outcomes that are projected.

Figure 4-8: Factors that Influenced the MnSHIP Investment Direction

INVESTMENT CATEGORIES	OBJECTIVE AREA	EXISTING INVESTMENT DIRECTION	UPDATED INVESTMENT DIRECTION	RATIONALE FOR ADJUSTING EXISTING DIRECTION
Pavement Condition	System Stewardship	48.6%	49.4%	Increase investment to maintain the system, though conditions decline. The NHS system is the priority network for investment and is held in better condition. MnDOT accepts more miles of non-NHS in poor condition. Public and internal feedback was to prioritize investment in maintaining the existing highway system.
Bridge Condition	System Stewardship	20.5%	11.4%	Recent increased investment has improved the condition of bridges. Greater accuracy of deterioration model and forecasted condition has led to increased efficiency of investments to maintain bridge condition. Enables MnDOT to invest less while maintaining acceptable bridge conditions.
Roadside Infrastructure Condition	System Stewardship	8.9%	7.7%	Maintain approximate current investment amount. Prioritize investment concurrent with pavement and bridge projects. Proactively address high-risk elements with stand-alone projects.
Jurisdictional Transfer	System Stewardship	N/A	0.4%	Invest in properly aligning the ownership of the system to provide the right level of service and better meet customer expectations.
Facilities	System Stewardship	N/A	0.4%	Maintain historical investment amount. Previously investment was split between Roadside Infrastructure and Small Programs
Traveler Safety	Transportation Safety	3.8%	3.2%	Slight reduction in investment in new safety improvements as many new improvements have been completed over the past decade. Primary factors in crashes include distracted driving which is difficult to address through capital investments. Rely on TZD program to focus on education and enforcement strategies to address these primary factors in crashes.
Twin Cities Mobility	Critical Connections	3.5%	1.1%	Maintain current investment through 2023 to deliver programmed and planned mobility projects. Consistent with Approach B, the most preferred approach.
Greater Minnesota Mobility	Critical Connections	0.0%	0.1%	Include investment to address mobility in Greater Minnesota as MnDOT develops the NHS performance measure. Consistent with Approach B, the most preferred approach.
Freight	Critical Connections	N/A	2.9%	Set-aside for investment from the National Highway Freight Program.
Bicycle Infrastructure	Critical Connections	1.2%	0.6%	Reduced investment in this category due to increased needs for maintaining the existing highway system, Project Delivery, and ADA improvements.
Accessible Pedestrian Infrastructure	Critical Connections	1.8%	2.5%	Increased investment needed to reach substantial ADA compliance with existing pedestrian infrastructure by 2037.
Regional and Community Improvement Priorities	Healthy Communities	3.8%	1.5%	Reduced investment in this category due to increased needs for maintaining the existing highway system, Project Delivery, and ADA improvements. Investment limited to the Transportation Economic Development program as well as cooperative agreements and minimal post-project landscaping needs.
Project Delivery	Other	8.3%	15.6%	Increased investment based on revised Project Delivery analysis.
Small Programs	Other	N/A	3.0%	Not included in overall investment direction in previous version of MnSHIP as investment was taken off the top. Reduced overall investment in Small Programs as several funding programs such as rest areas and weigh stations have been included in other investment categories.

Public Outreach on Draft Investment Direction



MnDOT conducted a second round of public outreach in spring 2016. This phase included four meetings across the state and one webinar to report on the results of fall 2015 outreach and gauge participants' understanding and acceptance of the content and outcomes of the draft investment direction.

Participants were generally dissatisfied about the investment direction and outcomes of the plan but understood why the trade-off decisions were made. The majority of participants thought the rationale behind the decisions was clear or very clear, signifying that MnDOT made progress toward a more transparent and accountable process. Although participants had differing priorities and did not agree with all of MnDOT's decisions, they frequently stated their appreciation for the structure, conversation, and transparency of both the fall and spring outreach processes.

WHAT IS POSITIVE ABOUT THE PLAN?

- It prioritizes maintaining the existing system first
- Mobility categories still get some level of funding
- It is the most responsible way to invest while still responding to the public's concerns
- MnDOT's continued, albeit limited, ability to partner with local agencies and stakeholders is preserved

WHAT IS NEGATIVE ABOUT THE PLAN?

- Funding levels are insufficient to meet stakeholder expectations
- No ability to meet most of the established targets for MnDOT's assets
- Not enough funding to complete urban reconstruction projects and improve main streets in towns across Minnesota
- Less funding for bicycle improvements than originally expected

OTHER TAKEAWAYS

- Need to educate stakeholders and legislators about funding shortfall
- Coordination with local partners is critical
- Pursue strategies to stretch available resources

This page intentionally left blank.



Minnesota GO
A Collaborative Vision for Transportation

20-Year State Highway Investment Plan

Chapter 5

INVESTMENT DIRECTION

This page is intentionally left blank.

INVESTMENT DIRECTION

The investment direction presented in this chapter prioritizes investments to maintain the existing state highway pavements and bridges while making limited mobility improvements over the next 20 years. The direction will guide investments so that transportation projects align with statewide goals as much as possible with available funding.

MnDOT districts select projects that are consistent with the investment direction in MnSHIP.

The key messages of Chapter 5 are:

- MnDOT will make progress in all investment areas, but not all performance targets will be met. Pavement condition is expected to decline significantly.
- MnDOT will put most of its available revenues toward maintaining the existing transportation system, which is consistent with public and stakeholder input.
- MnDOT will apply multiple strategies to optimize resources and achieve multiple purposes through its planned investments.

Project Selection

While MnSHIP sets MnDOT's investment priorities for a 20-year time period, MnDOT does not identify specific projects over the 20 years. MnDOT identifies potential projects in the first 10 years of the plan through the 10-Year Capital Highway Investment Plan. The CHIP translates the 20-year investment direction into planned and programmed projects that collectively achieve the outcomes identified in MnSHIP. The CHIP consists of two time periods. Projects in years 1-4 are a part of the State Transportation Improvement Program. Projects are programmed and scheduled in the STIP. MnDOT is committed to delivering these projects over the next four years. Projects in years 5-10 are not yet committed. They are in the budget, but project timing, scope and cost may change. Together, projects in years 1-10 comprise the 10-Year CHIP. The following sections explain how the investment direction will influence project selection in each year of the 20-year plan.

INFLUENCE OF INVESTMENT DIRECTION ON PROJECT SELECTION IN YEARS 1-4

In the first four years (2018-2021) of MnSHIP, MnDOT committed to projects in the STIP based on the investment direction in the 2013 MnSHIP. MnDOT spent funding to scope and develop these projects using that investment guidance. MnDOT tries to avoid any changes to projects in the STIP, if possible. Therefore, MnDOT is not changing projects in years 2018 to 2021 to reflect the updated investment direction.

INFLUENCE OF INVESTMENT DIRECTION ON PROJECT SELECTION IN YEARS 5-10

MnSHIP investment direction will guide project selection from 2022 through 2027 with the publishing of the 2018-2027 10-Year CHIP. MnDOT developed the current 2017-2026 10-Year CHIP before the MnSHIP investment direction was finalized. The current projects listed in the 10-Year CHIP will be updated to reflect the MnSHIP investment direction and MnDOT will work to try to limit the changes to these projects. New projects will need to be identified to ensure that selected projects follow the investment direction in this plan.

INFLUENCE OF INVESTMENT DIRECTION ON PROJECT SELECTION IN YEARS 11-20

MnDOT does not identify individual projects beyond 10 years in MnSHIP. Investment in those years is identified by investment category only. However, the CHIP is updated annually so new projects are added to Year 10 with each version of the CHIP. These new projects will follow the investment direction established in this document.

Additional information on project selection and investment programs can be found in Appendix E: MnSHIP Financial Summary.

Investment Summary

The 20-year investment direction focuses on maintaining the existing state highway system while making limited mobility investments. This approach reflects MnDOT and stakeholder input and meets key requirements and agency commitments. It also continues a shift for MnDOT from being a builder of the system to the maintainer and operator of the system. The investment direction does not affect the projects already developed and programmed in years 2018 through 2021. The priorities identified in this plan will be reflected in investments and projects starting in 2022. Figure 5-1 shows the distribution of expenditures through all years of the plan.

Figure 5-2 on the following page summarizes the total amount of investment for MnSHIP. It also includes current conditions and associated outcomes for each of the 14 investment categories.

Figure 5-1: 20-Year Capital Highway Investment Direction

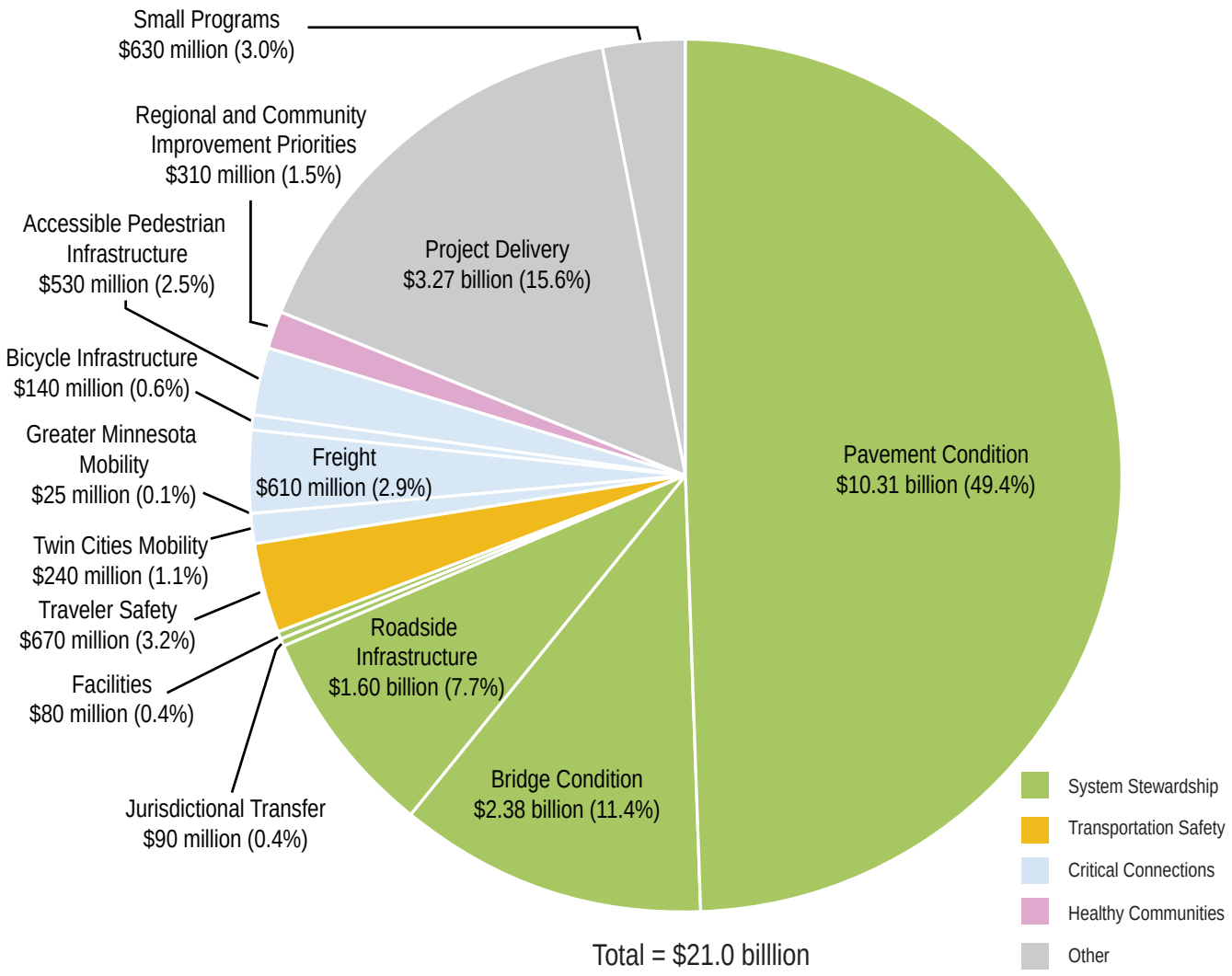


Figure 5-2: Total Investments, Outcomes and Current Condition

INVESTMENT CATEGORY	OBJECTIVE AREA	CURRENT CONDITIONS (2017)	PROJECTED OUTCOME(S) IN 2037	TOTAL INVESTMENT (2018-2037)
Pavement Condition	System Stewardship	Meet MnDOT targets and Governmental Accounting Standards Board 34 thresholds for NHS and Non-NHS pavement condition. • Interstate: 1.9% poor • NHS: 3.0% poor • Non-NHS: 4.0% poor	NHS and Non-NHS pavement condition worsen. Interstate condition worsens but meets federal minimum thresholds. Maintain GASB 34 threshold on the NHS. • Interstate: 4.0% poor • NHS: 8.0% poor • Non-NHS: 18.0% poor	$10.31 billion
Bridge Condition	System Stewardship	Meet GASB 34 thresholds for NHS and Non-NHS for bridge condition. Only Non-NHS meets MnDOT targets for bridge condition. • NHS: 4.5% poor • Non-NHS: 1.3% poor	Non-NHS bridge conditions worsen, while NHS bridge condition is maintained. GASB 34 thresholds are met but NHS thresholds are not. • NHS: 5.0% poor • Non-NHS: 7.0-8.0% poor	$2.38 billion
Roadside Infrastructure Condition	System Stewardship	Roadside infrastructure condition does not meet targets. • Culverts: 13.0% poor • Deep Storm Water Tunnels: 24.0% poor • Overhead Sign Structures: 30.0% poor	The condition of all roadside infrastructure assets will be maintained. Condition targets for culverts, deep storm water tunnels and overhead sign structures will not be met. • Culverts: 14.0-15.0% poor • Deep Storm Water Tunnels: 23.0-24.0% poor • Overhead Sign Structures: 25.0% poor	$1.60 billion
Jurisdictional Transfer	System Stewardship	2,653 miles of misaligned roads. Transfer of misaligned roads will continue.	MnDOT will transfer over 900 miles of roadway between the state and local agencies.	$90 million
Facilities	System Stewardship	6.0% of rest areas in good condition and nearly half in poor condition. Repair or replacement of weigh scales is not keeping pace with need.	6.0% of rest areas will remain in good condition. Weigh scale and weigh station replacement will not keep pace resulting in outdated or inoperable sites.	$80 million
Traveler Safety	Transportation Safety	Safety improvements are made proactively with low cost/high benefit projects. Total fatalities and serious injuries have plateaued after decade-long decline.	Safety improvements made at a reduced rate. There is limited ability to address locations with high sustained crash rates. Total fatalities and serious injures may see an increase.	$670 million
			TOTAL	$21.0 BILLION

INVESTMENT CATEGORY	OBJECTIVE AREA	CURRENT CONDITIONS (2017)	PROJECTED OUTCOME(S) IN 2037	TOTAL INVESTMENT (2018-2037)
Twin Cities Mobility	Critical Connections	Congestion remains relatively flat. MnPASS express lanes and spot mobility improvements are completed where needed.	Travel time reliability likely to decrease. Investments made in two MnPASS corridors and six spot mobility improvements between 2018 and 2023.	$240 million
Greater Minnesota Mobility	Critical Connections	A few corridors of mostly urban highways have decreased reliability during peak travel times.	Corridors likely to see decreased travel time reliability. 6-10 low-cost capital improvements are completed.	$25 million
Freights	Critical Connections	-	-	$610 million
Bicycle Infrastructure	Critical Connections	The condition of the state bicycle network is maintained and new bicycle improvements are being made where needed.	Reduced investment in new improvements and maintenance of existing bicycle infrastructure leads to deterioration of bicycle network.	$140 million
Accessible Pedestrian Infrastructure	Critical Connections	Progress is being made towards ADA-compliant pedestrian infrastructure. Non-ADA pedestrian improvements are limited. • Sidewalks not ADA compliant: 54.0%	Infrastructure on the pedestrian network will be substantially compliant with standards. Some non-ADA projects will increase pedestrian access.	$530 million
Regional and Community Improvement Priorities	Healthy Communities	Economic development and quality of life improvements are being made through partnerships and project upgrades.	MnDOT will respond to 2-5 economic development opportunities per year through the TED program.	$310 million
Project Delivery	Other	Invest the amount necessary to deliver projects in the other categories.	Invest the amount necessary to deliver projects in the other categories.	$3.27 billion
Small Programs	Other	-	Continue to invest in small programs such as off-system bridges and historic properties.	$630 million
			TOTAL	$21.0 BILLION

Figure 5-3: Investment Direction by Time Periods

INVESTMENT CATEGORIES	FY2018-2021	FY2022-2023	FY2024-2037
Pavement Condition	33.5%	47.3%	52.9%
Bridge Condition	15.6%	8.2%	9.7%
Roadside Infrastructure	8.7%	6.9%	7.7%
Jurisdictional Transfer	0.0%	0.5%	0.5%
Facilities	0.0%	0.4%	0.5%
Traveler Safety	4.2%	3.1%	3.1%
Twin Cities Mobility	5.7%	6.8%	0.0%
Greater Minnesota Mobility	0.0%	1.4%	0.0%
Freight	2.8%	2.7%	3.0%
Bicycle Infrastructure	0.8%	0.5%	0.6%
Accessible Pedestrian Infrastructure	1.8%	2.4%	2.7%
RCIP	3.3%	1.2%	1.0%
Project Delivery	14.3%	15.7%	16.0%
Small Programs	6.1%	2.8%	2.3%

Distribution of investments over the 20 year is not uniform. The investment direction has three phases as it transitions from the previous 2013 investment direction to the update investment direction in this MnSHIP. Figure 5-3 shows the difference in investment breakdown over the 20 year time frame.

The first four years (2018-2021) of the MnSHIP investment direction represents the current projects which are being programmed in the STIP. Projects were selected based on 2013 investment direction guidance.

The next two years (2022-2023) of the investment direction reflects a transition between the 2013 MnSHIP investment direction and the updated investment direction in this plan. While the investment direction in these two years begins to shift towards an increased focus on maintaining the existing system over expanding the system there is continued investment in mobility projects. This represents the continued commitment to invest in mobility projects through 2023 identified in the 2013 plan and continued in this update.

After 2023, the investment direction reflects the priority to maintain the existing highway system. With no investment in mobility projects after 2023, investments in pavement condition, bridge condition, and roadside infrastructure increase.

BIGGEST STRENGTHS

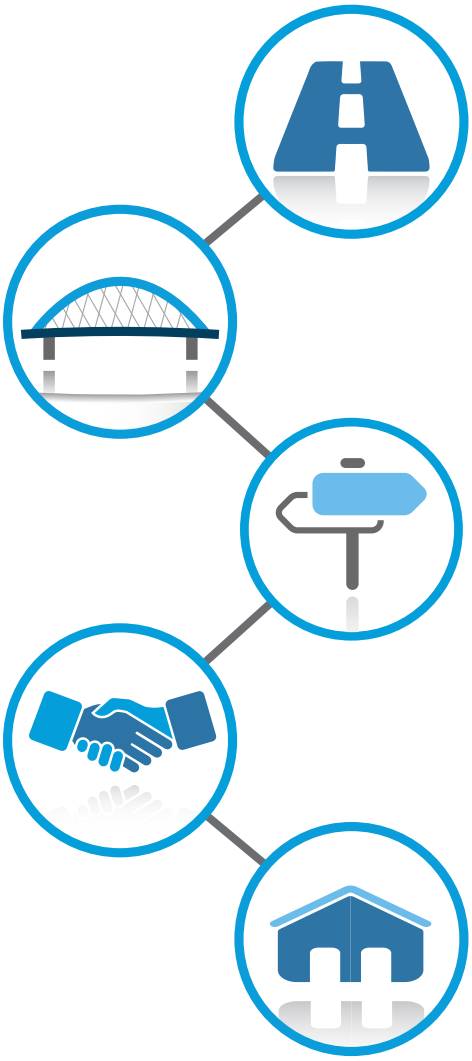
The investment direction makes progress toward goals in all four investment objective areas. MnDOT's priorities reflect the public's input that calls for a diversified approach, and one that prioritizes maintenance of the transportation system. Outcomes for each investment area include:

- System Stewardship: MnDOT focuses a majority of investment on maintaining the condition of roads, bridges and roadside infrastructure. Federal pavement and bridge condition minimum thresholds are likely to be met.
- Transportation Safety: MnDOT will continue to focus on lower cost, proactive treatments aimed at preventing fatalities and serious injuries.
- Critical Connections: MnDOT commits to achieving substantial compliance with the Americans with Disabilities Act no later than 2037. MnDOT also commits to planned mobility investments in the Twin Cities metro area through 2023.
- Healthy Communities: Through the Transportation and Economic Development program, investments will be made to address local concerns through partnerships, design add-ons and a few stand-alone projects to support economic competitiveness and quality of life.

BIGGEST DRAWBACKS

The investment approach offers a limited response to increasing infrastructure and multimodal needs. Several challenges remain, including:

- System Stewardship: Conditions of roads, bridges and roadside infrastructure decline on NHS and non-NHS routes.
- Transportation Safety: Only a limited number of locations with a sustained crash history will be addressed.
- Critical Connections: The number and scope of mobility improvements decreases substantially, potentially reducing the ability to maintain reliable travel times in the Twin Cities area and Greater Minnesota. Resources are not available to address growing areas of the state.
- Healthy Communities: The investment direction limits MnDOT's ability to address local concerns.



System Stewardship

The MnSHIP investment direction aligns with the System Stewardship objective and strategies in the Statewide Multimodal Transportation Plan. This objective emphasizes maintaining the state's existing NHS highways, keeping the transportation system on a sustainable track for the future, considering multiple needs in programming and collaborating with partners.

MnDOT will not be able to invest in all assets at optimal points in their life-cycles due to funding limitations. Throughout the 20-year plan, MnDOT will prioritize infrastructure improvements on NHS routes and hold these roads to a higher performance standard than non-NHS routes. This approach allows MnDOT to comply with federal law and manage risks related to statewide travel.

While MnSHIP's emphasis is on maintaining the existing system, MnDOT strives to achieve multiple objectives through coordinated investments. For example, drainage infrastructure (Roadside Infrastructure Condition) helps pavements last longer. Funding Bridge Condition at a high level of performance for all years of the plan supports traveler safety. Investing in Pavement Condition can enhance the bicycle and pedestrian network.

MnDOT will ensure that the dollars spent in System Stewardship achieve optimal outcomes through:

- Innovation: Developing new materials, design standards, and procedures
- Low-cost maintenance and repairs: Using recycled materials, innovative design, and preventive maintenance treatments to extend the useful life of infrastructure without increasing costs
- Alternate bidding: Planning for two comparable repair strategies (concrete versus bituminous) for some projects so contractors can bid the most cost-effective solution

In addition to MnSHIP, MnDOT will continue to use planning and research to guide its stewardship of state highway assets. MnDOT completed its first risk-based asset management plan, the Transportation Asset Management Plan, in 2013. The plan helps MnDOT coordinate pavement, bridge and roadside infrastructure investments to make the most effective use of limited dollars. It will be updated to include additional assets such as MnDOT buildings along the state highway, noise walls, pedestrian infrastructure (e.g. sidewalks and curb ramps, traffic signals and lighting) and intelligent transportation systems.

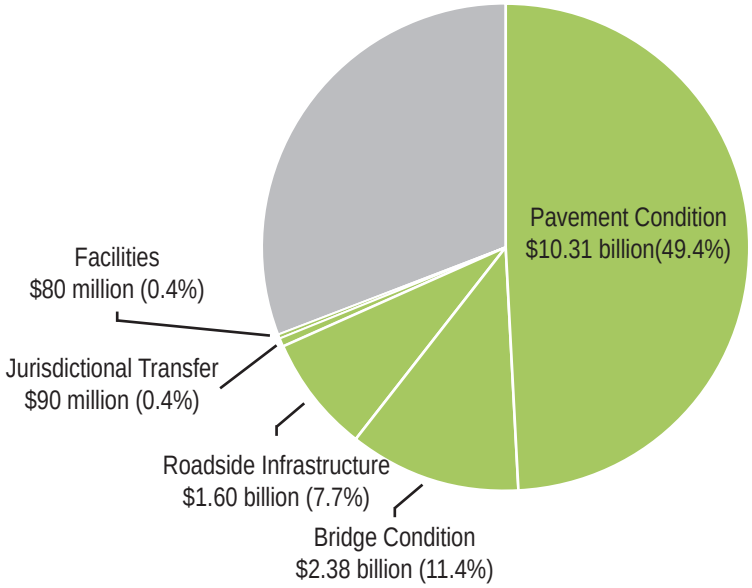
INVESTMENT PRIORITIES

Figure 5-4 shows that system stewardship is expected to constitute approximately 69 percent ($14.6 billion) of MnDOT's overall program for the 20-year planning period of MnSHIP.

PAVEMENT CONDITION

Projects that qualify as Pavement Condition investments include overlays, mill and overlays and reconstruction of existing roads.

Figure 5-4: System Stewardship Investments in MnSHIP



Project Selection

MnDOT uses its Pavement Management System to predict future pavement conditions and develop a list of suggested fixes on NHS and non-NHS routes. The system uses funding assumptions based on statewide investment goals established in MnSHIP. The management system creates a preliminary 10-year list of potential projects. Projects on the NHS are selected through the Statewide Performance Program to achieve statewide outcomes on the NHS system. MnDOT districts then modify the list based on a number of considerations such as local knowledge of conditions, input from stakeholders and timing of other projects in the area. The result is a list of projects that are included in the CHIP.

Districts also plan pavement improvements on non-NHS routes through the District Risk Management Program. In this program, the districts have more flexibility to set priorities for non-NHS pavement projects provided that the projects collectively meet the MnSHIP investment guidance.

More information on the SPP and DRMP programs can be found in Appendix E: MnSHIP Financial Summary.





Outcomes

Overall, MnDOT expects that the miles of pavement in poor condition will increase significantly by the end of the 20-year planning period. No MnDOT performance targets will be met. However, interstate pavements are expected to meet federal minimum thresholds. Pavement condition is expected to decline due to two key factors: 1) limited funding and 2) the age of Minnesota's roadways, many of which were constructed over 40 years ago and require more expensive fixes. Conditions on the NHS and non-NHS are projected to decline most significantly.

At the end of the MnSHIP plan horizon (2037), the percentage of pavement in poor condition is expected to be:

- Interstate pavements: 4.0 percent (40 miles)
  - Will not meet MnDOT target (2.0 percent or less poor)
  - Is expected to meet federal minimum thresholds through 2037
- Other NHS pavements: 8.0 percent (230 miles)
  - Will not meet MnDOT target (4 percent or less poor)
- Non-NHS pavements: 18.0 percent (795 miles)
  - Will not meet MnDOT target (10.0 percent or less poor)
  - Will not meet GASB 34 threshold (~15 percent or less poor)

System Investment Strategies

MnDOT may implement any of the following strategies to address the risks that remain with the level of investment in Pavement Condition:

- Focus on reactive maintenance activities (e.g. pothole patching) to avoid hazardous conditions
- Use of operational budget for maintenance of pavements
- Short-term fixes to address immediate needs
- Load posting, or restricting heavy vehicles, on select roadways

BRIDGE CONDITION

Bridge Condition includes the replacement, repair and painting of bridges.

Project Selection

As is the case with Pavement Condition, MnDOT prioritizes more investments in Bridge Condition on NHS roads than on non-NHS state highways.

MnDOT's Bridge Office uses the Bridge Replacement and Improvement Management process and statewide goals to recommend bridge projects based on condition and risk factors. Risk factors can include the length of a potential detour and traffic volumes on the bridge. The bridge office and district offices generate a list of bridge projects for NHS (through the SPP) and non-NHS bridges (through the DRMP) based on the results of the BRIM process. In modifying the BRIM results, districts consider stakeholder input and local expertise to coordinate timing with other planned projects in the region.

Districts primarily choose projects with long-term fixes for NHS bridges and focus investment on non-NHS bridges in the greatest need of repair.

Outcomes

Bridge conditions on the NHS and non-NHS will worsen overall. However, the projected condition of NHS and non-NHS bridges is expected to meet the federal minimum thresholds and the GASB 34 minimum conditions thresholds. Only non-NHS bridges will meet all MnDOT targets.

The percentage of bridge deck area in poor condition is expected to be as follows in 2037:

- NHS Bridges: 6.0 percent
    - Will not meet MnDOT target (2.0 percent or less poor)
    - Will likely meet the federal minimum threshold (10.0 percent or less poor)
    - Meets GASB threshold (8.0 percent or less poor)
- Non-NHS bridges: 7.0 - 8.0 percent
    - Will likely meet MnDOT target (8.0 percent or less poor)
    - Meets GASB threshold (20.0 percent or less poor)

System Investment Strategies

MnDOT may implement any of the following strategies to address the risks that remain with the level of investment in Bridge Condition:

- Maintenance activities focused on preventive repairs
- Deferment of long-term fixes



ROADSIDE INFRASTRUCTURE CONDITION

Roadside Infrastructure Condition elements include culverts, traffic signals, signs, lighting, retaining walls, fencing, noise walls, guardrails, overhead structures, Intelligent Transportation Systems, and pavement markings.



Project Selection

MnDOT often repairs or replaces roadside infrastructure as part of a larger pavement and bridge project. Sometimes, MnDOT carries out corridor-wide, stand-alone roadside infrastructure projects for assets such as culverts, signage, or lighting. Roadside infrastructure damaged from weather or crashes are usually repaired as part of routine maintenance and funded through the operations and maintenance budget.

Outcomes

In general, by 2037, the condition of the system's roadside infrastructure elements is expected to remain relatively stable. However, NHS routes will receive more frequent upgrades to roadside infrastructure elements compared to non-NHS routes due to the relative frequency of pavement and bridge projects.

The percentage of roadside infrastructure in poor condition is expected to be as follows in 2037:

- Culverts: 14.0-15.0 percent
    - Will not meet target (10.0 percent or less poor)
- Deep Storm Water Tunnels: 23.0-24.0 percent
    - Will not meet target (10.0 percent or less poor)
- Overhead Signs (structure only): 25.0 percent
    - Will not meet target (6.0 percent or less poor)

System Investment Strategies

MnDOT may implement any of the following strategies to address the risks that remain with the level of investment in Roadside Infrastructure Condition:

- Repair and replace infrastructure in poor condition or infrastructure beyond its service life
- Replace infrastructure with greatest exposure to the traveling public, mostly through pavement/bridge projects

JURISDICTIONAL TRANSFER

Jurisdictional Transfer investments are needed capital investments to improve highways so they can be transferred from MnDOT to county or local governments or vice versa over the next 20 years.

Project Selection

Typically, a planned project is modified to include longer-term improvements

and/or additional enhancements with agreement that a local agency would take ownership of the road. Transferring a road requires the agreement of MnDOT and the local agency.

Outcomes

In combination with the $50 million already allocated to jurisdictional transfers, this additional level of investment would allow MnDOT to repair and transfer more than 900 miles of roads.

System Investment Strategies

MnDOT may draw from the following strategies, when necessary, to prioritize projects and address risks that are associated with lower performance or investment in Jurisdictional Transfer:

- Leverage other dedicated funding
- Commit to correcting roads with highest degree of mismatched ownership (i.e. those identified in Track 0 of the 2014 Minnesota Jurisdictional Realignment Project report)
- Balance investment between the Twin Cities area and Greater Minnesota
- Identify projects in the CHIP where investments could facilitate the transfer of ownership



FACILITIES

The Facilities investment category includes investments made to MnDOT buildings along state highways. These assets include rest areas, weight enforcement buildings and weigh scales. Facilities investments were previously made through either Roadside Infrastructure Condition or special capital programs.

Project Selection

New or renovated buildings are completed as stand-alone projects while pavement work on exit ramps or parking lots are typically completed in conjunction with another project on the adjacent highway.

Outcomes

At the level of investment included in MnSHIP, MnDOT expects the percentage of facilities needing significant renovation or replacement to increase. Investments in rest areas and weigh stations will be reactive, increasing maintenance costs and limiting MnDOT's ability to keep many facilities in a state of good repair.

System Investment Strategies

MnDOT may draw from the following strategies, when necessary, to prioritize projects and address risks that are associated with lower performance or

investment in Facilities:

- Prioritize health and safety-related repairs to rest areas unless replacement is warranted
- Focus investments on weigh scale mechanics and existing weigh station buildings

SYSTEM STEWARDSHIP OVERALL OUTCOMES

Pavement, NHS bridges and roadside infrastructure assets will continue to deteriorate over the next 20 years and as a result, MnDOT will:

- Not meet MnDOT targets for any pavement system.
- Meet state and federal minimum thresholds for bridge condition with a decrease in overall bridge system condition.

These targets represent desired performance levels, typically based on lowest life-cycle costs, customer expectations, or policy priorities. MnDOT used these targets to calculate its estimated 20-year needs in these categories, as described in Chapter 3, "Investment Needs."

It should be noted that some roadside infrastructure assets, the Jurisdictional Transfer and Facilities categories do not have performance targets. In these cases, investments will be guided based on the goals MnDOT wants to achieve in each investment category.

Figure 5-5: System Stewardship Performance Targets and Outcomes

INVESTMENT CATEGORY	SYSTEM	TARGET	GASB 34 MINIMUM CONDITION THRESHOLD	PROJECTED OUTCOMES (2037)
Pavement Condition	Interstate	2.0% poor (or less)	10.0% poor (or less) (all NHS)	4.0% poor
Pavement Condition	Other NHS	4.0% poor (or less)	10.0% poor (or less) (all NHS)	8.0% poor
Pavement Condition	Non-NHS	10.0% poor (or less)	13.0% poor (or less)	18.0% poor
Bridge Condition	NHS	2.0% poor (or less)	8.0% poor (or less)	5.0% poor
Bridge Condition	Non-NHS	8.0% poor (or less)	20.0% poor (or less)	7.0-8.0% poor
Roadside Infrastructure Condition	Culverts	10.0% poor (or less)	N/A	14.0-15.0% poor
Roadside Infrastructure Condition	Deep Storm Water Tunnels	10.0% poor (or less)	N/A	23.0-24.0% poor
Roadside Infrastructure Condition	Overhead Sign Structures	6.0% poor (or less)	N/A	25.0% poor

Figure 5-5 shows MnDOT's performance goals for Pavement Condition, Bridge Condition and certain Roadside Infrastructure assets when performance targets have been adopted. The anticipated pavement condition, bridge

conditions and roadside infrastructure on the state highway system are shown in the column on the far right. These outcomes meet the minimum thresholds established for GASB 34 and federal performance measures. However, many outcomes do not meet MnDOT targets.

Figure 5-6 summarizes the expected condition of all System Stewardship investment categories based on MnDOT's investment priorities for MnSHIP and compares them to the previous set of priorities established in the 2013 plan.

Figure 5-6: System Stewardship Outcomes and Total Investment

INVESTMENT CATEGORY	OBJECTIVE AREA	CURRENT CONDITIONS (2017)	PROJECTED OUTCOME(S) IN 2037	TOTAL INVESTMENT (2018-2037)
Pavement Condition	System Stewardship	Meet MnDOT targets and GASB 34 thresholds for NHS and Non-NHS pavement condition. • Interstate: 1.9% poor • NHS: 3.0% poor • Non-NHS: 4.0% poor	NHS and Non-NHS pavement condition worsen. Interstate condition worsens but meets federal minimum threshold. Maintain GASB 34 threshold on the NHS. • Interstate: 4.0% poor • NHS: 8.0% poor • Non-NHS: 18.0% poor	$10.31 billion
Bridge Condition	System Stewardship	Meet GASB 34 thresholds for both NHS and Non-NHS for bridge condition. Only Non-NHS meets MnDOT targets for bridge condition. • NHS: 4.5% poor • Non-NHS: 1.3% poor	Non-NHS bridge conditions worsen, while NHS bridge condition is maintained. GASB 34 thresholds are met but NHS thresholds are not. • NHS: 5.0% poor • Non-NHS: 7.0-8.0% poor	$2.38 billion
Roadside Infrastructure Condition	System Stewardship	Roadside infrastructure condition is not meeting targets. • Culverts: 13.0% poor • Deep Storm Water Tunnels: 24.0% poor • Overhead Sign Structures: 30.0% poor	The condition of all roadside infrastructure assets will be maintained. Condition targets for culverts, deep storm water tunnels and overhead sign structures will not be met. • Culverts: 14.0-15.0% poor • Deep Storm Water Tunnels: 23.0-24.0% poor • Overhead Sign Structures: 25.0% poor	$1.60 billion
Jurisdictional Transfer	System Stewardship	2,653 miles of misaligned roads. Transfer of misaligned roads will continue.	MnDOT will transfer more miles of roadway between the state and local agencies.	$90 million
Facilities	System Stewardship	6.0% of rest areas in good condition and nearly half in poor condition. Repair or replacement of weigh scales is not keeping pace with need.	6.0% of rest areas will remain in good condition. Weigh scale and weigh station replacement will not keep pace resulting in outdated or inoperable sites.	$80 million
			TOTAL	$14.46 B

Transportation Safety

TRAVELER SAFETY

Funding for traveler safety in MnSHIP will allow MnDOT to continue its comprehensive approach to improving traveler safety on state highways. As described in Chapter 1. Plan Overview, MnDOT currently uses a combination of three types of safety investments in its effort to improve safety and reduce the number of fatalities and serious injuries on Minnesota roads:

- Proactive lower cost, high-benefit safety features
- Sustained crash locations treatments
- Investments identified as part of the Highway Safety Improvement Program

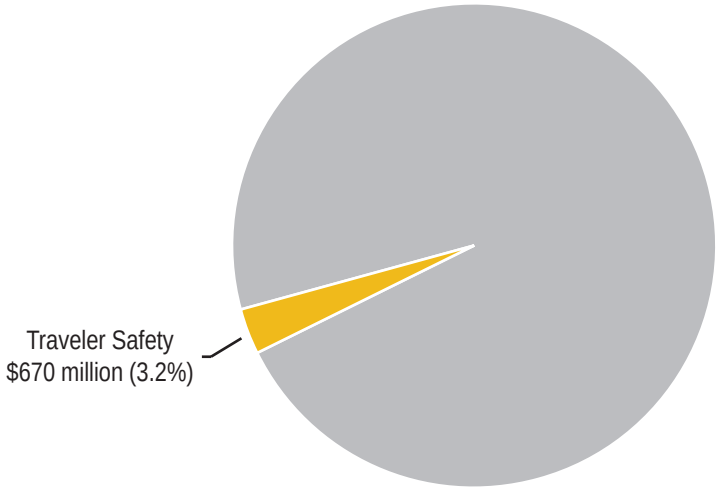
The Highway Safety Improvement Program is a federal program that emphasizes data-driven, strategic approaches to improving highway safety. HSIP projects correct a hazardous road location or address a highway safety problem.

The level of investment provides MnDOT limited ability to address locations with a sustained crash history. Due to changes in federal requirements, MnDOT will no longer provide capital funding for the Toward Zero Deaths initiative goals to promote enforcement and education efforts with its partners.

Investment Priorities

As shown in Figure 5-7, MnDOT anticipates spending approximately 3.2 percent of its program on Traveler Safety for the 20-year planning period of MnSHIP.

Figure 5-7: Traveler Safety Investment in MnSHIP



Project Selection

MnDOT selects safety projects on the NHS in coordination with its districts and the Office of Traffic, Safety and Technology. The mix of project types varies by district. Districts draw from two main sources to select projects:

- District Safety Plans: Each district uses its DSP to prioritize safety infrastructure projects and determine which strategic improvements to implement. In addition, the 10-Year Capital Highway Investment Plan includes Highway Safety Improvement Program investments.
- Sustained crash locations list: MnDOT's Office of Traffic, Safety and Technology identifies areas throughout the state that experience a high crash rate over a five-year period. Districts include high-priority projects at some of these locations.

The districts also estimate the costs associated with installing roadway safety infrastructure as part of other projects, namely pavement improvements.

Outcomes

MnDOT districts will continue installing safety features as part of pavement projects; however, the rate of implementing DSPs will be cut by one third. Lower cost, high-benefit safety infrastructure will be constructed at priority locations throughout the state highway system and select moderate to high-cost projects will be funded to address sustained crash locations. MnDOT will continue to participate in the TZD program.

Fatalities have been reduced substantially over the past 10 years. While MnDOT will continue to make investments in Traveler Safety, the goal of TZD cannot be achieved through infrastructure improvement alone. Even full implementation of all identified safety projects may do little to prevent fatalities and serious injuries resulting from driver behavior such as distracted or impaired driving.

System Investment Strategies

MnDOT may draw from the following strategies, when necessary, to prioritize projects and address risks that are associated with lower performance or investment in Traveler Safety:

- Invest in high priority, lower cost proactive projects
- Reactively install lighting at sustained crash locations

Figure 5-8 summarizes expected Traveler Safety outcomes based on MnDOT's investment priorities for MnSHIP and compares them to current conditions.

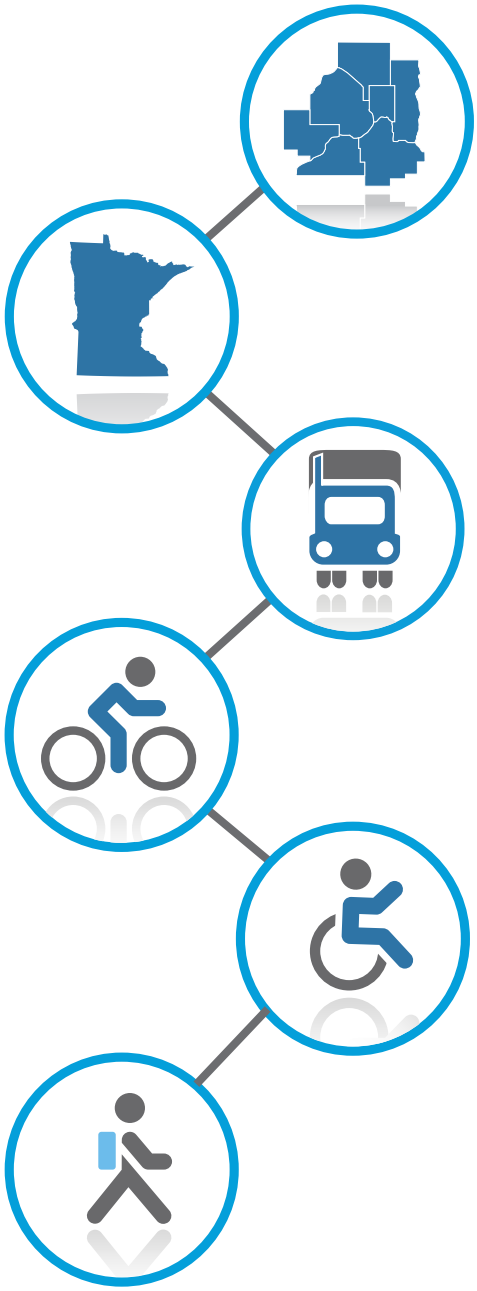
Figure 5-8: Transportation Safety Outcomes and Total Investment

INVESTMENT CATEGORY	OBJECTIVE AREA	CURRENT CONDITIONS (2017)	PROJECTED OUTCOME(S) IN 2037	TOTAL INVESTMENT (2018-2037)
Traveler Safety	Transportation Safety	Safety improvements are made proactively with low cost/high benefit projects. Total fatalities and serious injuries have plateaued after decade-long decline.	Safety improvements made at a reduced rate. There is limited ability to address locations with high sustained crash rates. Total fatalities and serious injures may see an increase.	$670 million
			TOTAL	$670 M



Critical Connections

Critical Connections includes mobility investments for many types of highway users, including those driving automobiles, freight carriers, bicyclists and pedestrians. MnSHIP's investment categories within Critical Connections recognize the importance of the multimodal connections detailed in the Statewide Multimodal Transportation Plan. The categories of Twin Cities Mobility and Greater Minnesota Mobility reflect that the state's mobility needs vary by geographical region, road volume and usage. Bicycle Infrastructure and Accessible Pedestrian Infrastructure help MnDOT better track its progress toward multimodal objectives on the state highway system, recognizing the need for building a safe transportation network that serves all Minnesotans. MnDOT also added one new investment category, Freight, for MnSHIP. The Freight investment category includes new federal funding that the upcoming Freight Investment Plan will determine how to invest.



INVESTMENT PRIORITIES

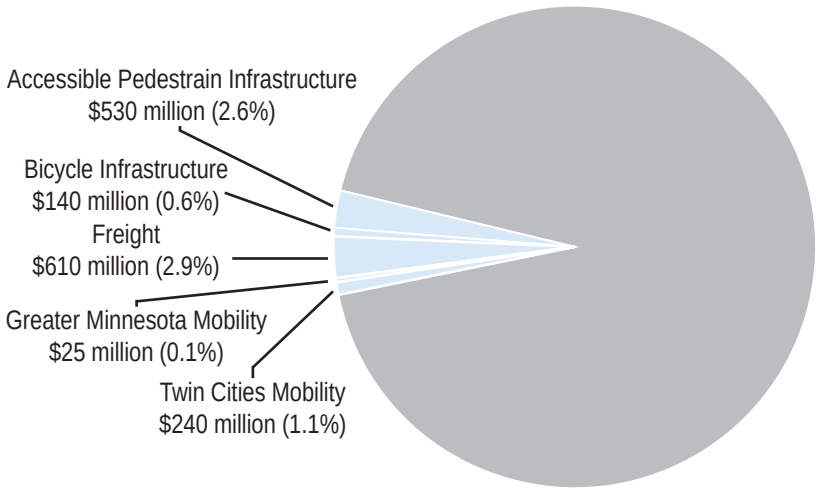
Critical Connections is expected to constitute 7.3 percent of MnDOT's investment through all years of the plan (Figure 5-9).

TWIN CITIES MOBILITY

The goal of the Twin Cities Mobility investment category is to enhance the movement of people, freight and transit on highways in the Twin Cities area. The Twin Cities Mobility investment category focuses on this by improving travel time reliability.

MnDOT's strategy for maintaining travel reliability in the Twin Cities metropolitan area has moved away from traditional highway expansion. Twin Cities mobility projects follow the strategies laid out by the Metropolitan Council, the regional Metropolitan Planning Organization, in its 2040

Figure 5-9: Critical Connections in MnSHIP



Transportation Policy Plan. The strategies include four types of highway mobility improvements:

- **Active traffic management**
- Spot mobility improvements
- MnPASS express lanes
- Major capacity investments

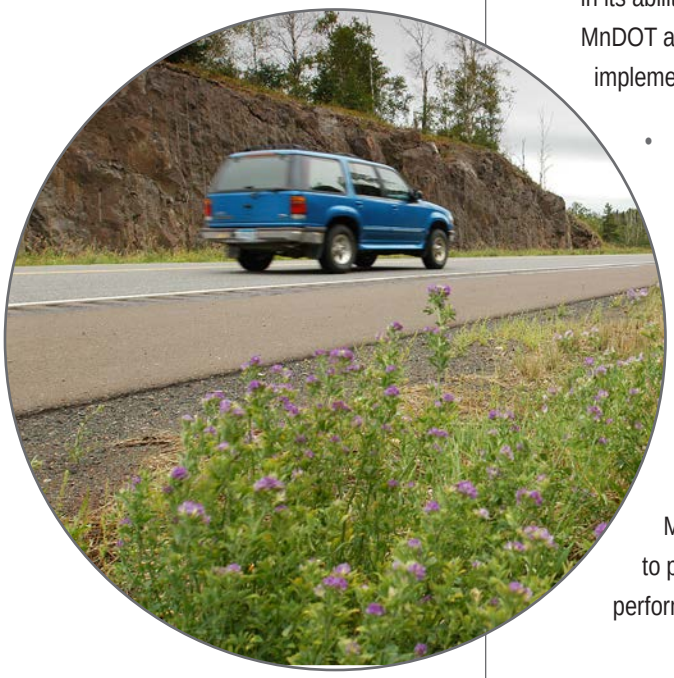
Project Selection

MnDOT's Metro District works in collaboration with the Metropolitan Council to develop a list of Twin Cities mobility projects that best align statewide goals within MnSHIP and the Council's Transportation Policy Plan. This approach addresses federal and state performance measures while also coordinating investments in other strategies that improve mobility on Twin Cities area highways through innovation, technology and multimodal options.

Many identified projects in Metro District's 10-Year Capital Highway Investment Plan originated in previous planning efforts, such as the Metropolitan Council's 2040 TPP, MnDOT's Congestion Management Safety Plan (for potential spot mobility projects) and MnPASS and other system studies completed in partnership with the Metropolitan Council. Twin Cities Mobility projects are often coordinated with bridge and pavement replacement projects to minimize travel disruptions and project costs.

Outcomes

Based on the investment direction in MnSHIP, MnDOT will be extremely limited in its ability to invest in Twin Cities Mobility. Over the 20-year plan period, MnDOT and the Metropolitan Council will invest in Twin Cities Mobility to implement the following:



- Approximately six spot mobility improvements
- Completion of MnPASS express lanes along two corridors

These projects will help improve travel reliability, but it is still anticipated to worsen through 2037 relative to today due to expected regional growth and the related increase in mobility needs across the system.

System Investment Strategies

MnDOT may draw from the following strategies, when necessary, to prioritize projects and address risks that are associated with lower performance or investment in Twin Cities Mobility:

- Focus on investments that provide reliable congestion-free options on Twin Cities metro area corridors
- Focus on low cost spot mobility projects that provide safety benefits and reduce delays



GREATER MINNESOTA MOBILITY

The goal of Greater Minnesota Mobility investments is to enhance the movement of people and freight in Greater Minnesota. It focuses on improving travel time reliability on the NHS through operational and low-cost capital improvements.

Project Selection

MnDOT prioritizes Greater Minnesota Mobility investments by considering the reliability of traffic flow on the NHS. Once the Federal Highway Administration finalizes the mobility performance measures for the NHS, MnDOT will set targets for those measures. These targets will inform where investments are necessary to meet the reliability and mobility goals for the NHS. MnDOT has not selected projects to be funded through Greater Minnesota Mobility for Years 1-4, as the category (formerly IRC Mobility) was not funded through MnSHIP 2013. MnDOT will re-evaluate the extent and location of performance-based needs on the NHS once performance measures are determined.

In addition to the investment in Greater Minnesota Mobility, there are projects listed in the 10-Year Capital Highway Investment Plans that will improve safety and mobility on the NHS in Greater Minnesota. These projects are currently categorized under other investment categories because they do not yet address a performance-based need.

Outcomes

Before specific projects are selected, MnDOT will need to establish performance targets for federal NHS mobility performance measures. The federal performance measures for mobility are not yet finalized. However, the investment in Greater Minnesota Mobility in MnSHIP could complete six to 10 operational and low-cost capital improvements on the NHS.

System Investment Strategies

MnDOT may draw from the following strategies, when necessary, to prioritize projects and address risks that are associated with lower performance or investment in Greater Minnesota Mobility:

- Focus investment to improve travel time reliability through operational improvements such as upgraded traffic signals, ITS, turn lanes and passing lanes

FREIGHT

The goal of the Freight investment category is to improve the efficient movement of freight. The investment in the Freight category identified in MnSHIP reflects the amount provided for the National Highway Freight Program as part of the federal transportation legislation, Fixing America's Surface Transportation Act. Freight improvements on the highway system will be identified in the Minnesota Freight Investment Plan.

Project Selection

MnDOT has selected projects in Years 1-4 using funding from the National Highway Freight Program. Additional projects will be selected using criteria from the Freight Investment Plan being led by MnDOT. MnDOT will work to develop a project selection process to identify projects in Years 5-10 of the CHIP once the investment plan has been completed.

Outcomes

MnDOT will project investment outcomes as part of the upcoming Freight Investment Plan. At this time, MnSHIP does not project outcomes for the Freight investment category.

System Investment Strategies

System investment strategies for the Freight investment category will be explored in the upcoming Freight Investment Plan.

BICYCLE INFRASTRUCTURE

MnDOT typically constructs bicycle improvements at the same time as pavement and bridge projects, but also implements some stand-alone projects in urban areas or areas with high volumes of bicycle traffic.

Project Selection

MnDOT districts identify their investments in Bicycle Infrastructure for Years 1-10 based on their highest risks and planned bridge and pavement projects for these years. Investments are generally made in conjunction with bridge or pavement projects. Bicycle improvements are occasionally made as a part of stand-alone bicycle projects.

The *Statewide Bicycle System Plan* completed in 2016, identifies priorities for the type of facility (seperated bike lanes) and general locations for investment, such as in urban areas. Eventually bicycle and pedestrian planners, working with districts, will identify a priority bikeway network, which will include state highways and local roads. This effort will help MnDOT districts identify where bicycle facilities projects on state highways should be a priority.

Outcomes

MnDOT will invest in Bicycle Infrastructure at 75 percent of the current rate of investment. This will result in limited ability to make new improvements for bicycling and to maintain existing bicycle infrastructure as a part of pavement and bridge projects. Existing bicycle infrastructure will deteriorate and negatively affect the goal of promoting and increasing bicycling in Minnesota.

System Investment Strategies

MnDOT may draw from the following strategies, when necessary, to prioritize projects and address risks that are associated with lower performance or investment in Bicycle Infrastructure:

- Focus 70 percent of bicycle investments in urban areas and 30 percent of investments in rural areas
- Add to existing bridge and pavement projects to improve safety and connectivity of the state bikeway system

ACCESSIBLE PEDESTRIAN INFRASTRUCTURE

Improvements made to pedestrian infrastructure, whether as a result of ADA requirements or not, are typically implemented as part of pavement or bridge projects. However, stand-alone projects are also implemented where needed.

Project Selection

Each district has varying pedestrian and ADA infrastructure needs. The districts select their 10-year investments in this category based on planned bridge and pavement projects, ADA needs identified via MnDOT's ADA Transition Plan, and inventory and highest-risk pedestrian areas. Through collaboration between MnDOT districts and MnDOT's ADA Office, MnDOT identifies existing non-compliant sidewalks along any scheduled pavement or bridge project. MnDOT takes the opportunity to repair the sidewalk to bring it into compliance. Some additions of ADA-compliant facilities and elimination of pedestrian "gaps" are also completed where needed. Some stand-alone ADA projects can also be selected to repair non-compliant sidewalks in locations where there is not an upcoming pavement or bridge project identified.



Outcomes

MnDOT is committed to achieving substantial ADA compliance of the state pedestrian network by 2037. Districts will fund a range of pedestrian and ADA projects based on their needs. Investments will be primarily curb ramps, sidewalks and Accessible Pedestrian Signals at intersections, implemented concurrently with pavement and

bridge projects. MnDOT will be able to complete some stand-alone ADA improvements, focusing on complete streets and filling gaps in the sidewalk network.

System Investment Strategies

MnDOT may draw from the following strategies, when necessary, to prioritize projects and address risks that are associated with lower performance or investment in Accessible Pedestrian Infrastructure:

- Focus more investment in sidewalks, curb ramps and APS projects
- Make other pedestrian improvements via complete streets and complete gaps in the network

Figure 5-10 summarizes expected Critical Connections outcomes based on MnDOT's investment priorities for MnSHIP and compares them to current conditions.

Figure 5-10: Critical Connections Outcomes and Total Investment

INVESTMENT CATEGORY	OBJECTIVE AREA	CURRENT CONDITIONS (2017)	PROJECTED OUTCOME(S) IN 2037	TOTAL INVESTMENT (2018-2037)
Twin Cities Mobility	Critical Connections	Congestion remains relatively flat. MnPASS express lanes and spot mobility improvements are completed where needed.	Travel time reliability likely to decrease. Investments made in two MnPASS corridors and six spot mobility improvements between 2018 and 2023.	$240 million
Greater Minnesota Mobility	Critical Connections	A few corridors of mostly urban highways have decreased reliability during peak travel times.	Corridors likely to see decreased travel time reliability. six to 10 operational and low-cost capital improvements are completed	$25 million
Freight	Critical Connections	-	-	$610 million
Bicycle Infrastructure	Critical Connections	The condition of the state bicycle network is maintained and new bicycle improvements are being made where needed.	Reduced investment in new improvements and maintenance of existing bicycle infrastructure leads to deterioration of bicycle network.	$140 million
Accessible Pedestrian Infrastructure	Critical Connections	Progress is being made towards ADA-compliant pedestrian infrastructure. Non-ADA pedestrian improvements are limited. • Sidewalks not ADA compliant: 54.0%	Infrastructure on the pedestrian network will be substantially compliant with standards. Some non-ADA projects will increase pedestrian access.	$530 million
			TOTAL	$1.50 B

Healthy Communities

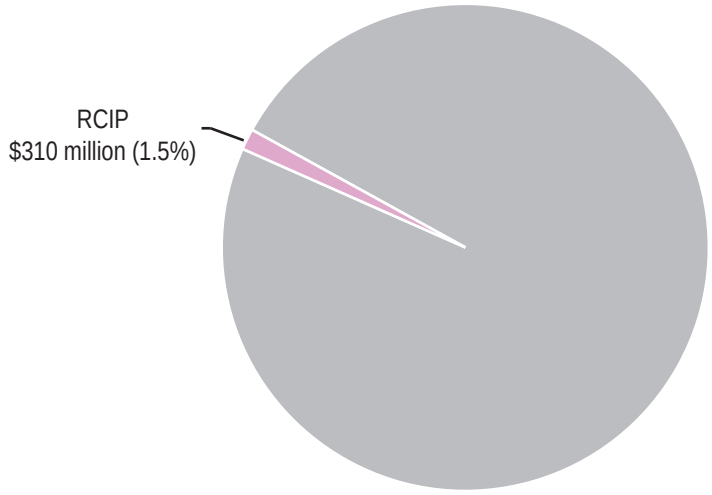
REGIONAL AND COMMUNITY IMPROVEMENT PRIORITIES

The Minnesota GO Vision and Statewide Multimodal Transportation Plan emphasize the importance of accountability, transparency and communication. Although MnDOT pursues these objectives in all investment areas, Regional and Community Improvement Priorities or RCIPs are the primary outlet for collaboration with local agencies. RCIPs help MnDOT to complete projects that enhance accessibility, increase communication with stakeholders and deliver transportation projects that maximize benefits to the community. Implementing RCIP projects allows MnDOT to partner with local agencies and leverage state resources to achieve multiple purposes.

Investment Priorities

MnDOT anticipates spending approximately 1.5 percent of its program on RCIPs in all years of the plan (Figure 5-11).

Figure 5-11: Healthy Communities in MnSHIP



Project Selection

MnDOT selects projects through statewide solicitations to partner with stakeholders and local jurisdictions to address non-performance-based needs. These statewide solicitations fund projects that leverage local funds to provide economic, quality of life and transportation benefits. An example of a statewide solicitation is the TED program.

Additional RCIP investment gives MnDOT districts flexibility to address non-performance based needs that are important to local transportation partners. These RCIP investments are often tied to pavement and bridge projects.

Outcomes

MnSHIP will invest $310 million in RCIPs through 2037. Most investments will be completed through partnerships and design add-ons to existing projects. Stand-alone RCIP projects will be limited. The vast majority of improvements will be made through the Transportation Economic Development or TED program.

System Investment Strategies

MnDOT may draw from the following strategies, when necessary, to prioritize projects and address risks that are associated with lower performance or investment in RCIPs:

- Maintain the TED program
- Expand partnerships with local agencies/communities that leverage funds to complete larger projects

Figure 5-12 summarizes the outcomes related to Healthy Communities improvements on the state highway system based on MnDOT's investment priorities for MnSHIP and compares them to existing priorities.

Figure 5-12: Healthy Communities Outcomes and Total Investment

INVESTMENT CATEGORTY	OBJECTIVE AREA	CURRENT CONDITIONS (2017)	PROJECTED OUTCOME(S) IN 2037	TOTAL INVESTMENT (2018-2037)
Regional and Community Improvement Priorities	Healthy Communities	Economic development and quality-of-life improvements are being made through partnerships and project upgrades.	MnDOT will respond to two to five economic development opportunities per year through the TED program.	$310 million
			TOTAL	$310 M

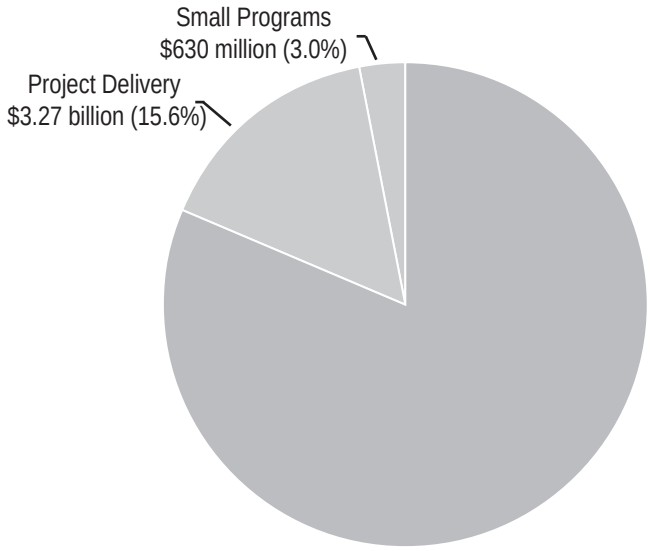


Other

INVESTMENT PRIORITIES

MnDOT anticipates spending approximately 18.6 percent of its program on Small Programs and Project Delivery in all years of the plan (Figure 5-13).

Figure 5-13: Other Investment in MnSHIP



SMALL PROGRAMS

Small Programs is used to fund short-term, unforeseen issues and one-time priorities needs as they arise. Some programs do not easily fit into a MnSHIP investment category. If funding is required beyond the short-term, an effort is made to incorporate the program into a MnSHIP investment category during the next MnSHIP update.

Components of Small Programs in MnSHIP include centrally managed programs and historic property investments.

Project Selection

The project selection process for Small Programs varies depending on the program. However, projects are typically prioritized and selected centrally instead of at the district level.

Outcomes

MnDOT will invest $630 million in Small Programs through 2037.

PROJECT DELIVERY

Project Delivery includes critical components of projects that ensure the timely and efficient completion of highway projects. These components include right-

of-way costs, consultant services, supplemental agreements and construction incentives (see Chapter 1. Plan Overview for more detail on the components of Project Delivery). Historically, MnDOT has spent an average of 16 percent of total capital revenues on Project Delivery.

Project Selection

Investments in project delivery are the costs associated with delivering projects for the rest of the program. This category does not fund stand-alone projects.

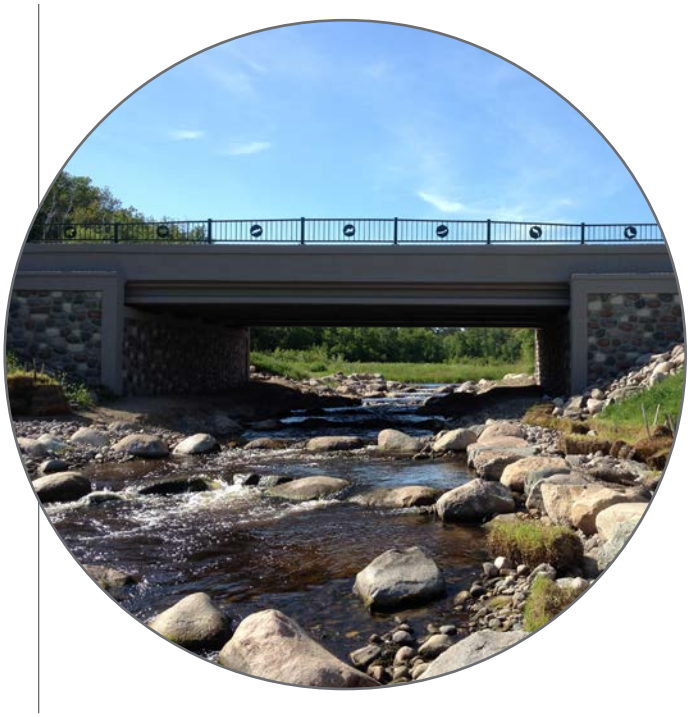
Outcomes

MnDOT assumes that it will continue to spend approximately 16 percent of its funds in this category. This is consistent with recent averages due to the similarity in improvement types scheduled through 2037.

Figure 5-14 summarizes the outcomes related to Other improvements on the state highway system or as part of project delivery based on MnDOT's investment priorities for MnSHIP and compares them to existing priorities.

Figure 5-14: Other Outcomes and Total Investment

INVESTMENT CATEGORY	OBJECTIVE AREA	CURRENT CONDITIONS (2017)	PROJECTED OUTCOME(S) IN 2037	TOTAL INVESTMENT (2018-2037)
Project Delivery	Other	Invest the amount necessary to deliver projects in the other categories.	Invest the amount necessary to deliver projects in the other categories.	$3.27 billion
Small Programs	Other	-	Continue to invest in small programs such as Off-System bridges and historic properties.	$630 million
			TOTAL	$3.9 B





Chapter 6

PRIORITIES FOR ADDITIONAL REVENUE

This page intentionally left blank.

PRIORITIES FOR ADDITIONAL REVENUE

Over the next 20 years, MnDOT estimates there will be $21 billion in available revenues to address $39 billion in identified transportation needs, resulting in a funding gap of approximately $18 billion. Roughly one-quarter of this gap, or $4 billion can be attributed to a reduction in buying power. Over the planning period, revenues are not expected to keep pace with forecasted inflation for the construction-related sector. The remainder of the gap represents unfunded capital improvements needed to maintain aging infrastructure and meet Minnesotans' growing transportation needs. Given this gap, there will be many unmet needs and priorities within MnSHIP's 20-year horizon.

This chapter includes a description of the remaining risks for each investment category and the feedback from public outreach and internal discussions which outline the investments that the agency would prioritize if any additional funding became available.

The key messages of Chapter 6 are:

- The funding gap in MnSHIP will result in significant unmet needs across all the investment categories which will affect both system conditions and the experience for the traveling public
- If additional resources become available, investment priorities will reflect the principles, policy objectives, and strategies put forth in the "family of plans" and the input received from the public and stakeholders in the development of this plan

UNMET NEEDS

The unmet needs presented in this chapter refer to the same set of needs presented in Chapter 3, "Investment Needs." Due to the substantial differences between investment needs and available revenues, MnDOT does not expect to fund any investment category to its full needs amount through 2037. Therefore, MnDOT does not expect to be able to deliver a program of capital improvements that wholly meets the expectations of stakeholders and the travelling public.

For the state highway system, the difference between the 20-year needs and the amount MnDOT plans to spend in each investment category over this timeframe is shown in Figure 6-1. MnDOT estimates there will be a funding gap of approximately $18 billion over the next 20 years. Both immediate investment needs and those expected to arise over the next 20 years will not be fully addressed. As a result, the state will not be making significant progress toward realizing the Minnesota GO Vision and MnDOT will fall short of meeting its performance-based goals.



Figure 6-1: Summary of Unmet Needs

INVESTMENT CATEGORY	20-YEAR NEEDS	20-YEAR EXPENDITURES	UNMET NEEDS	UNDER-FUNDED IMPROVEMENTS
Pavement Condition	$13.44 billion	$10.31 billion	$3.13 billion	Non-Interstate, NHS and Non-NHS pavement condition
Bridge Condition	$2.65 billion	$2.38 billion	$270 million	NHS bridge condition
Roadside Infrastructure Condition	$3.35 billion	$1.60 billion	$1.75 billion	All elements such as culverts, signage, lighting
Jurisdictional Transfer	$1.14 billion	$90 million	$1.05 billion	Transfer of optimal roadway miles
Facilities	$390 million	$80 million	$310 million	Rest areas and weigh stations
Traveler Safety	$1.37 billion	$670 million	$700 million	Sustained crash locations, proactive treatments
Twin Cities Mobility	$4.58 billion	$240 million	$4.34 billion	MnPASS express lanes, major capacity and spot mobility improvements
Greater Minnesota Mobility	$1.39 billion	$25 million	$1.36 billion	Low cost and high cost capital improvements to improve travel time delay
Freight	Not applicable	$610 million	-	Freight needs are identified in other categories
Bicycle Infrastructure	$580 million	$140 million	$440 million	Stand-alone bike projects, statewide bikeway projects
Accessible Pedestrian Infrastructure	$680 million	$530 million	$150 million	Other pedestrian improvements not related to ADA compliance of existing infrastructure
Regional and Community Improvement Priorities	$2.62 billion	$310 million	$2.31 billion	Significant investments to address local or regional quality of life and economic competitiveness. Flood mitigation
Small Programs	$630 million	$630 million	-	Not applicable
Investment Category Total	$33 billion	$18 billion	$15 billion	-
Project Delivery costs	$6.18 billion	$3.27 billion	$2.91 billion	Cost to deliver capital projects based on analysis of historic expenditure patterns
Investment Category Total Plus Project Delivery Costs	TOTAL=$39 billion	TOTAL=$21 billion	TOTAL=$18 billion	

SYSTEM STEWARDSHIP: UNMET NEEDS

Pavement Condition

Based on the spending strategies outlined in Chapter 5, "Investment Direction" interstates will have twice as many miles in poor condition while all non-Interstates will have three to four times as many miles in poor condition at the end of the plan period. Pavements on any state system are not expected to meet their respective MnDOT statewide condition performance targets. Worsened road conditions will negatively affect the movement of vehicles, freight, and bicycles. These impacts will lead to an increase in maintenance costs and overall shortened life span of state highways.

Bridge Condition

The amount of National Highway System bridges in poor condition will increase slightly compared to today while non-NHS bridges in poor condition will increase threefold. This will potentially result in the need for weight restrictions on some bridges and more frequent service interruptions on the system, resulting in longer trips for carriers of critical goods and services. Total life cycle costs to maintain bridges will also increase.

Roadside Infrastructure Condition

Delaying the response to growing culvert and underground drainage needs is a high risk. In addition, delaying the response shifts the burden to replace or repair many roadside infrastructure elements from capital to operations and maintenance budgets. Delaying repairs does not align with optimal life cycle investments or public expectations and standards that could result in non-compliance with safety and accessibility standards.



Facilities

The condition of rest areas and weigh stations will continue to deteriorate. Weigh scales at weigh stations will become outdated and enforcing weight restrictions becomes ineffective and increasingly difficult. Rest areas will not make progress towards compliance with the 1990 Americans with Disabilities Act standards, and a few rest areas may close as a result of delayed maintenance and repairs.

Jurisdictional Transfer

MnDOT has limited ability to find opportunities to realign roadways under the correct agency. Roadways that are currently owned by MnDOT but would better serve the traveling public if owned by a local agency will not be repaired or transferred. This results in potentially foregone savings from future maintenance and capital costs.

TRANSPORTATION SAFETY: UNMET NEEDS

Traveler Safety



Outcomes for Traveler Safety are difficult to project. Recent years saw a substantial decline in the annual number of fatalities and serious injuries on Minnesota roads due to a robust program of safety improvements and Toward Zero Deaths strategies. However, MnDOT's reduced investment in Traveler Safety over the next 20 years may cause this trend to slow or even reverse. Sustained crash locations will be left unaddressed. There are fewer opportunities to invest in new safety treatments and some existing safety features will deteriorate. The low fatality and serious injury rate goals set by the TZD program may be difficult to achieve without continued investment to support safety improvements. Other program resources – safety education, enforcement, and emergency services – will become even more important in keeping fatal and serious injury rates low but new federal law restricts MnDOT's continued funding participation in these areas.

CRITICAL CONNECTIONS - UNMET NEEDS

Twin Cities Mobility

MnDOT will fund Twin Cities Mobility through the first six years of the plan (years 2018-2023), leaving many anticipated needs unaddressed. Congestion in the metropolitan area will lead to greater freight costs, decreased quality of life, and lost productivity for metro area residents. MnDOT will not be well-positioned to address expected regional growth and anticipated increasing congestion and reliability issues, resulting in unpredictable travel times and potentially negative impacts to the state and regional economy. In the absence of any additional revenue, Twin Cities Mobility remains a high risk at the end of the planning period.

Greater Minnesota Mobility

In the absence of major investments to improve mobility needs in Greater Minnesota over the next 20 years, the NHS will be subject to less predictable travel times and unstable flow. As a result, MnDOT will be unable to make progress towards a number of objectives in communities across Minnesota, including improving multimodal connections, community livability, economic competitiveness, environmental health, and quality of life.

Freight

At this time, MnDOT has not estimated its 20-year needs for freight on the state highway system. The investment in the Freight category identified in MnSHIP reflects the amount provided for the National Highway Freight Program as

part of the FAST Act. Needs related to freight movement are identified in other investment categories so there is no separate need category for freight in this MnSHIP update. The upcoming Minnesota Freight Investment Plan will identify priorities to spend money for freight improvements.

Bicycle Infrastructure

Stand-alone bicycle improvements and priority state bikeways will not be funded during this period despite increasing demand for non-motorized transportation options. Bicycle facilities, including shoulders, will not be maintained well enough to ensure safe, easy access to bikeways. State highways may continue to be barriers to bicycle movement in many locations, although they will continue to allow bicycle movement along them.

Accessible Pedestrian Infrastructure

MnDOT plans to invest in pedestrian facilities and infrastructure to become substantially compliant with the ADA standards by the end of the 20-year period. This includes investments that are made concurrently with pavement and bridge projects, and stand alone improvement projects.

HEALTHY COMMUNITIES: UNMET NEEDS

Regional and Community Improvement Priorities

MnDOT does not plan to fund urban reconstruction projects in the RCIP category due to limited funds. These projects also accommodate improvements to local facilities. High priority roadways that are prone to flooding would remain at risk. At this funding level, there would be no opportunities for locally driven priorities such as capacity improvements without additional revenue.

OTHER: UNMET NEEDS

Small Programs

MnSHIP assumes MnDOT will continue to need a fixed amount of funds throughout the 20-year timeframe to respond to short-term, unforeseen issues and continuing commitments. MnDOT currently plans $32 million per year or 0.3 percent of its total projected revenue to cover investments in Small Programs.

Assuming that the current investment level is held constant throughout the next 20 years, approximately $630 million is needed to fund small programs. This MnSHIP update has reduced the size of Small Programs such as rest area, weigh station, and economic development investments, which have been incorporated into other MnSHIP investment categories.

If MnDOT does not fully spend its annual allocation for small programs in a given year, it directs the funds toward its highest unaddressed risks in the capital program.

Project Delivery

MnDOT estimates that achieving its targets and key objectives in the areas of System Stewardship, Transportation Safety, Critical Connections, and Healthy Communities would require approximately $6.18 billion in Project Delivery through 2037. The MnSHIP investment direction includes $3.27 billion for Project Delivery. An additional $2.9 billion would be required for Project Delivery if MnDOT were to deliver a program that meets the needs in all of the MnSHIP investment categories.

MnDOT estimated the amount historically spent in this category to establish the proportion of the overall investment that would be required to design, engineer, and construct projects over the next 20 years. Approximately 16 percent of MnDOT's annual capital investment typically goes to supporting the delivery of projects. The percentage of spending in project delivery has changed significantly since 2013 MnSHIP as a result of more thorough analysis of actual expenditures and increased requirements for MnDOT projects.



RISK MANAGEMENT RESULTS

During the MnSHIP process, MnDOT identified 11 key risks related to implementing MnSHIP's capital investment priorities. The following section evaluates the effectiveness of MnSHIP's investment direction in managing these risks. The risks are grouped into the five Statewide Multimodal Transportation Plan objective areas. The risks and objective areas are displayed below.

SYSTEM STEWARDSHIP

What Success Looks Like: The useful life of transportation assets and system performance are maximized while placing an emphasis on the priority highway network resulting in minimized costs and impact to the state's economy, environment and quality of life.

Key Investment Risks:

- Federal Performance Requirements: Failure to achieve federal performance requirements on Interstate pavements and NHS bridges reduces flexibility to spend future revenue on other state priorities
- Remaining Service Life: The investment direction limits MnDOT's ability to perform the right fix at the right time, which leads to a decreased useful lifespan of the asset and more expensive fixes later
- Operations Budget: Maintenance costs rise, which places undue pressure on the operations budget and adds travel disruptions
- Increased costs to users: Poor asset management ultimately leads

to increased costs to users of the system and Minnesota's economy by placing weight limitations on bridges

TRANSPORTATION SAFETY

What Success Looks Like: Travelers of all modes and the communities the transportation system travels through are safeguarded. The state is able to plan, design, build, operate and maintain critical safety infrastructure and facilities to improve the safety of users across the system.

Key Investment Risks:

- Safety Infrastructure: Critical traveler safety features begin to deteriorate, limiting their effectiveness

CRITICAL CONNECTIONS

What Success Looks Like: Multimodal transportation connections and networks are maintained and expanded. Building the connections between workers and jobs, cities and regions, and between different modes maximizes social, economic and environmental benefits. Equitable access to goods, services and opportunities are provided.

Key Investment Risks:

- Multimodal Priorities: Reduced investment in critical connections limits MnDOT's ability to advance modal priorities
- Mobility: Limited investment impacts mobility of people and goods which negatively impacts economic health

HEALTHY COMMUNITY OBJECTIVE

What Success Looks Like: Higher priority is given to improvements which consider complementary land uses and the surrounding context that maximizes community benefits, limits long-term costs, and creates infrastructure that is reflective of the surrounding environment.

Key Investment Risks:

- Urban Reconstruction: A focus on statewide performance measures and asset management results in lack of investment in urban reconstruction projects
- Responsiveness: Limited investment reduces MnDOT's ability to support local economic development and quality of life opportunities

What Success Looks like: Supporting and implementing investments that preserve natural resources and prevent natural resources and natural events from causing damage to the transportation system.

Key Investment Risks:

- Climate Change: Inadequately addressing the effects of climate change and flooding leads to unplanned road closures and increased maintenance costs

OPEN DECISION MAKING

What Success Looks like: Make transportation system decisions through processes that are inclusive, engaging, and supported by data and analysis. Engage the public and stakeholders to understand their priorities and to also educate them on system wide goals along with project specific information.

Key Investment Risks:

- Legislative Action: Misalignment between MnSHIP investment direction and legislative priorities results in legislation that redirects financial resources and compromises plan outcomes

Figure 6-2 broadly illustrates the key investment risks posed by the investment direction, the likelihood that the risk will occur and the reason why MnDOT feels the risk is unlikely or highly likely to occur. The 11 risks vary in terms of their impact and require different amounts of resources to be partially or adequately mitigated. As discussed previously in this chapter, the risks associated with asset management are significant, more likely to occur, and the most costly to address.



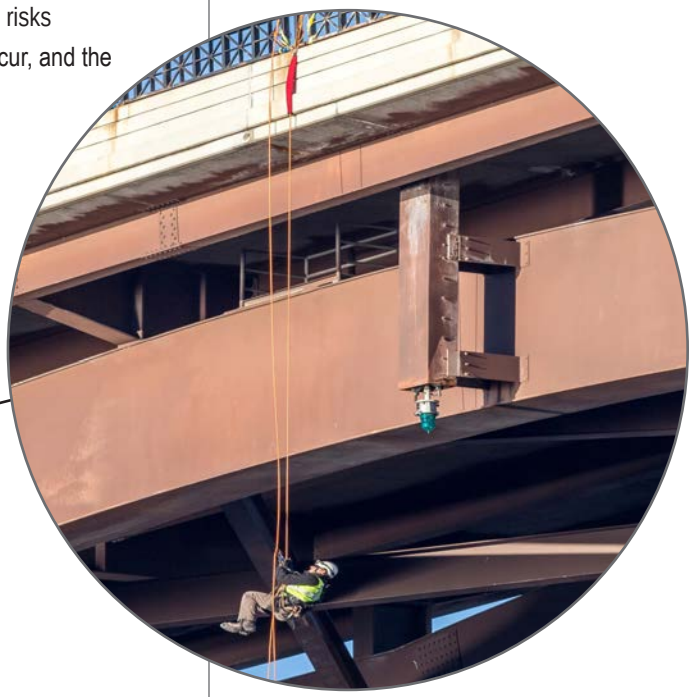


Figure 6-2: Key Investment Risks

KEY INVESTMENT RISK	CURRENT	FUTURE (2037)	REASONING
Federal Performance Requirements: Failure to achieve federal performance requirements on Interstate pavements and NHS bridges reduces flexibility to spend future revenue on other state priorities.	Low	Low	Interstate pavements and NHS bridge conditions are projected to meet federal requirements through 2037
Remaining Service Life: The investment direction limits MnDOT's ability to perform the right fix at the right time, which leads to a decreased lifespan of the asset and more expensive fixes later.	Medium	High	Limited investment in bridges and pavements may increase the use of reactive, short term fixes to avoid hazardous conditions especially on non-NHS pavements
Operations Budget: Maintenance costs rise, which places undue pressure on the operations budget and adds travel disruptions.	Medium	High	Limited investment in bridges and pavements may increase use of operational budget for maintenance of pavements especially on the non-NHS
Increased costs to users: Poor asset management ultimately leads to increased costs to users of the system and Minnesota's economy by placing weight limitations on bridges.	Low	Medium	Identified investment to maintain the condition of bridges should limit the risk of requiring weight limits on bridges
Safety Infrastructure: Critical traveler safety features begin to deteriorate, limiting their effectiveness.	Low	Low	Safety infrastructure maintained through investment in roadside infrastructure at current investment levels. MnDOT will continue to make new safety improvements on the system
Multimodal Priorities: Reduced investment in critical connections limits MnDOT's ability to advance modal priorities.	Medium	Medium	MnDOT commits to reaching substantial ADA compliance with existing pedestrian infrastructure; however, investment in new pedestrian and bicycle connections is limited
Mobility: Limited investment impacts mobility of people and goods which negatively impacts economic health.	Low	High	No investment in mobility after 2023, although the Transportation Economic Development program continues to fund small economic development projects. Congestion is likely to increase due to projected population growth
Urban Reconstruction: A focus on statewide performance measures and asset management results in lack of investment in urban reconstruction projects.	Medium	High	Investment direction limits MnDOT's ability to address urban reconstruction needs
Responsiveness: Limited investment reduces MnDOT's ability to support local economic development and quality of life opportunities.	Medium	High	Economic development projects continue through investment in the Transportation Economic Development program. Other investment in local/ regional priorities is very limited
Climate Change: Inadequately addressing the effects of climate change and flooding leads to unplanned road closures and increased maintenance costs	High	High	No investment identified to proactively address potential vulnerabilities to flooding
Legislative Action: Misalignment between MnSHIP investment direction and legislative priorities results in legislation that redirects financial resources and compromises plan outcomes.	Medium	High	No investment in mobility after 2023. Legislature may re-direct resources to address mobility needs which could negatively impact plan outcomes

INCREASED REVENUE PRIORITIES

MnDOT estimates that it will have $21 billion to spend on highway capital projects over the next 20 years. This amount is based on an analysis of MnDOT's projected revenue sources and the assumption that key revenue sources are expected to grow slightly each year during the plan. The revenue projection also assumes that there will be no additional temporary or permanent funding sources available. However, periodically MnDOT does receive new funding. For example, new revenue could come from:

- One-time sources, such as a solicitation from the Federal Highway Administration for projects that meet certain criteria
- Temporary revenue increases, such as the issuance of bonds. However, it should be noted that bonds require repayment with interest
- Permanent revenue sources, such as legislative action that increases the state motor vehicle fuel tax rate or that establishes alternate funding sources

PRIORITIES FOR ADDITIONAL FUNDING

During the second round of the public outreach process, MnDOT asked stakeholders what their priorities would be should MnDOT receive any additional funding through one of the sources mentioned above. The public was asked to prioritize which categories they would like to see MnDOT invest in, beyond what is being invested through the proposed investment direction. MnDOT senior leadership and key staff were also asked their preference for investing additional revenue. Figure 6-3 below shows the ranking of stakeholder and MnDOT priorities for additional funding. Stakeholders and the public generally agreed that any extra funding MnDOT receives for capital improvements on the state highway network should be spent maintaining and repairing MnDOT's existing assets. For the public, poorly maintained pavements and bridges were seen as a safety issue. Both groups believed investment in capacity or mobility improvements are priorities but disagreed on the preferred investment category. There was also agreement that main street improvements are important.

Based on input from the public and transportation stakeholders and MnDOT's own internal priorities, MnDOT would prioritize spending additional funding on:

- Maintaining and repairing existing assets on the state highway system
- Strategically improving mobility and reliability at high priority locations on the NHS
- Reconstructing Main Streets

Figure 6-3: Priorities for Additional Funding



Such activities would allow MnDOT to limit the number of bridges and miles of pavement in poor condition, bringing the highway system closer to Interstate and NHS performance targets. Additional funding would increase MnDOT's ability to address deteriorating culverts, signage and other supporting infrastructure. MnDOT would also be able to address more urban reconstruction, or Main Street, projects. These projects allow local governments to improve amenities and facilities along the state highway. Mobility improvements in the Twin Cities area would be consistent with the Met Council's Transportation Policy Plan, such as constructing MnPASS lanes, and follow the strategies for Twin Cities Mobility listed in MnSHIP. Mobility improvements in Greater Minnesota would be focused on the locations with the greatest performance issues and focus on low-cost/high benefit improvements. Completing these additional priority projects would allow MnDOT to cost-effectively meet long term performance targets and further advance the Minnesota GO Vision for transportation.

CRITERIA FOR PRIORITIZATION OF EXPANSION PROJECTS WITH ADDITIONAL FUNDING

In recent years, the Minnesota Legislature has created funding programs to address needs of the state highway system, including mobility on the NHS and major bridge replacement. However, MnDOT has not created a planning and prioritization process to address project selection for these types of funding programs. The investment direction in MnSHIP focuses on bridge and pavement improvements. As noted above, with additional funding MnDOT would continue to invest in its bridges and pavements while also investing in other needs such as mobility. The prioritization process for bridge and pavement projects is well-established but prioritization of expansion projects

has not. Many expansion projects were funded through specific programs such as the Transportation Economic Development program or Corridors of Commerce program which included their own criteria for prioritizing projects.

To provide guidance on expansion project priorities, MnSHIP includes a work plan item in Chapter 7, "Moving Forward," to establish criteria to evaluate expansion projects if additional money is provided by the legislature. In the meantime, MnDOT will consider the following criteria based on public outreach results and MnDOT priorities:

- Safety
- Mobility/reliability
- Freight benefits
- Multimodal benefits

Any projects funded and constructed on the state highway system should follow the guiding principles of the Minnesota GO Vision. In addition, projects should be consistent with the investment strategies in MnSHIP and the strategies and objectives in the Statewide Multimodal Transportation Plan. If projects are located within the boundaries of a Metropolitan Planning Organization, they should be consistent with the respective MPO long-range transportation plan.



This page intentionally left blank.



Minnesota GO
A Collaborative Vision for Transportation

20-Year State Highway Investment Plan

Chapter 7

MOVING FORWARD

This page intentionally left blank.

MOVING FORWARD

As the gap between available revenue and total transportation needs continues to widen, MnDOT will use strategies and process improvements to ensure that the state achieves the maximum positive impact from all of the investments on state highways. These strategies will help close the gap between desired outcomes and the projected outcomes in MnSHIP. Several new planning processes are also underway and will be completed between now and the next MnSHIP update, including completing phase two of the Transportation Asset Management Plan, the Freight Investment Plan, and the Statewide Pedestrian System Plan. MnDOT also plans to make process improvements that will help the agency and stakeholders make more informed decisions on projects and investments.

Key messages of Chapter 7 are:

- MnDOT has identified several internal and external policy-oriented strategies to make the greatest impact with available revenue
- Between now and the next MnSHIP update, MnDOT will complete several new plans for different modes and assets to help better identify conditions, needs, targets and investments in those areas
- MnDOT will implement new process improvements to more accurately measure the impact of investment dollars to projects and maintenance costs

Strategies to Stretch Projected Revenue

MnDOT will pursue a mix of internally and externally oriented strategies that will stretch existing revenue to accomplish additional priorities beyond those identified in MnSHIP. In some cases, these strategies will require further study prior to implementation and support from MnDOT's transportation stakeholders. Whether these strategies are internal to MnDOT or rely on external decision-making, they can be a means for achieving more desirable outcomes on the state highway system.

INTERNAL STRATEGIES

Adjust performance expectations, where possible, to better match customer expectations with system performance. MnDOT sets its targets, in part, based on public expectations for the state highway system. This strategy would reevaluate targets given emerging risks, aligning them with realistic expectations for system performance. Although this strategy does not address investment needs on the system directly, it would allow MnDOT to ensure its performance-based management efforts are concerted, efficient, and supported by realistic public expectations.

Continue to educate and train key MnDOT staff on the total life cycle costs associated with proposed investments and the revenue forecasts. By effectively educating and training staff on the issue of a widening gap between revenues and public expectations, MnDOT will be better positioned to discuss what it can achieve with the revenues it has and what it could achieve if additional revenues become available.

Pursue research and innovation to improve efficiency and minimize impacts to the traveling public. With all the challenges facing Minnesota's transportation system, innovation is a key strategy. Creativity and innovation need to permeate every aspect of transportation service delivery, from how revenues are generated to how projects are constructed. An example of recent MnDOT innovation was the use of a Self-Propelled Modular Transporter in 2012 to move a bridge constructed off-site into place over interstate-35E in Saint Paul. This innovative construction method minimized roadway closures during construction.

Continue to employ high return-on-investment strategies that deliver the majority of benefits at a reduced cost. MnDOT has increased its use of performance-based designs throughout the agency. These designs help ensure MnDOT does not deliver projects beyond what is needed to meet agency performance targets or other key agency objectives. By continuing to expand the use of this design flexibility, MnDOT will increase its ability to help manage project costs and ensure that the most efficient investment is made to try to meet performance based designs.

Evaluate the capital and operations revenue split to best use revenues in keeping state highways safe and operable. If decreased investments are made in capital infrastructure, operations and maintenance costs typically increase. Determining the appropriate balance between how much is invested in capital infrastructure versus how much will be deferred and used for operations and maintenance is an important consideration moving forward.

Manage investments to achieve multiple objectives such as improving economic competitiveness, public health, and energy independence. Early coordination and participation in the planning process helps MnDOT combine resources and leverage investments to achieve improved outcomes. For example, in most cases, it is far more cost-effective to include a bicycle element or a freight accommodation during construction of a larger bridge or highway project than as an independent project.

Increase attention given to analyzing and accurately tracking investments and performance measures in several investment categories. In particular, there is room to improve performance tracking for Roadside Infrastructure Condition, Bicycle Infrastructure, and the non-ADA components of Accessible Pedestrian Infrastructure.

EXTERNAL STRATEGIES

MnDOT cannot or would not employ a strategy without significant collaboration with the Federal Highway Administration and other transportation stakeholders, such as other state agencies, local area transportation partnerships, and local units of government.

Continue evaluating the jurisdictional alignment of the state highway system to ensure transportation decisions occur at the right level of government. MnDOT, in conjunction with local governments across the state, completed a study that explored potential roadways for jurisdictional transfer. An additional assessment of state law and other policy considerations are necessary to determine how this type of system refinement will increase long-term system sustainability and place transportation decisions at the right level of government.

Coordinate with local units of government and other state agencies to achieve better transportation outcomes for the public, transportation stakeholders, and partners. By improving local participation, MnDOT will be better positioned to engage in collaborative planning efforts with stakeholders and to pursue outcomes that achieve multiple purposes. Successful examples of this include MnDOT's collaboration with the Minnesota Department of Health to develop Minnesota Walks a guide to make walking safe, convenient and desirable.



Advocate for flexible design standards and specifications. Flexible design allows greater sensitivity to local needs and demands of the surrounding environment without prescribing unnecessary or burdensome improvements. By decreasing road width, for example, MnDOT also decreases the initial cost of the project and the amount of pavement that it will need to maintain.

Broaden the education of stakeholders and policymakers on the total life cycle costs associated with proposed investments and the revenue forecasts. By effectively engaging stakeholders and policymakers on the issue of a widening gap between revenues and public expectations, MnDOT will be better positioned to discuss what it can achieve with the revenues it has and what it could achieve if additional revenues become available.

Work Plan



MnSHIP covers the 20-year period between 2018 and 2037. It is updated every four years to reflect changes in federal and state policy, system conditions, and revenue projections. The current MnSHIP update refined MnDOT's planning and programming process to address these changes. Between now and the next MnSHIP update, MnDOT will continue to update and improve this process and adjust investment priorities as conditions evolve. MnDOT has been implementing and will continue to work on the following efforts over the coming years:

NEW PLANNNING ACTIVITIES

- Complete phase two of the Transportation Asset Management Plan. MnDOT completed phase one of the Transportation Asset Management Plan after being selected as one of three states to participate in a pilot program by the FHWA. The second phase of the plan expands the number of assets analyzed which will help MnDOT report on life-cycle costs, condition, and inform investment decisions in the next MnSHIP update.

Related Objectives: System Stewardship, Transportation Safety

- Complete the Freight Investment Plan. Minnesota's Freight Investment Plan, currently under development, will provide a fiscally constrained list of priority projects important to freight, and describe how federal formula funds would be invested and matched. The plan will help identify how the FAST Act freight program funds get invested on the new National Highway Freight Network created by the freight program. Developed cooperatively with private and other public entities, the plan will also provide guidelines in project development and operational decisions, all in accordance with the FAST Act.

Related Objectives: System Stewardship, Critical Connections

- Complete the Statewide Pedestrian System Plan. The Statewide Pedestrian System Plan will identify a pedestrian priority network for pedestrian improvements. An established pedestrian priority network would help guide general pedestrian improvements and communicate opportunities for investment to MnDOT districts and local partners.The plan will be guided by *MInnesota Walks*, a collaborative effort between MnDOT and the Minnesota Department of Health designed to be a shared roadmap for how all Minnesotans can have safe, desirable, and convenient places to walk and roll.

Related Objectives: Critical Connections

PROCESS IMPROVEMENTS

- Improve the transparency and consistency of MnDOT's project selection process. There are several actions MnDOT will undertake to improve transparency. These actions include implementing best practices to improve transparency of the project selection process and local agency involvement and establishing a method to track spending of local dollars on the state highway system.

Related Objectives: Open Decision Making

- Establish criteria for prioritization of expansion projects with additional funding. The prioritization process for bridge and pavement projects is well-established but expansion projects have been funded through criteria specific to programs that have changed over the years. This effort will allow MnDOT to be prepared to prioritize and deliver new projects should additional revenue become available.

Related Objectives: Open Decision Making, Critical Connections

- Establish mobility targets: Once the FHWA publishes final rules for system performance measures, MnDOT will have one year to establish mobility targets for the Twin Cities and the state. These measures and targets will influence future mobility investment decisions.

Related Objectives: Critical Connections

- Improve bicycle investment reporting and project scoping: The Statewide Bicycle System Plan was completed in 2016. Accurate tracking of progress toward meeting bicycle investment objectives will require better data on the type and location of bicycle infrastructure improvements. Improving the cost estimates for different types of bicycle facilities will also help districts better account for investments made and documented through the annual 10-Year Capital Highway Improvement Plan process.



Related Objectives: Critical Connections

- Quantify the impact capital investments have on maintenance and operations needs and expenditures: Reduced capital investment can often result in increased operations and maintenance needs. MnDOT will examine the relationship between capital investments and operations and maintenance since preventive maintenance is often seen as helping to extend the life of the facility or asset.

Related Objectives: System Stewardship, Open Decision-Making

- **Refine and expand the components that are incorporated into the bridge tracking model:** Refinement of associated bridge elements (e.g. approach work, bicycle and pedestrian elements) would provide more accurate project costs. Reaching consensus with the bridge office and districts as to what should be included would help districts manage their budgets. Incorporating culverts, railroad bridges, tunnels and pedestrian bridges would allow MnDOT to better prioritize bridge needs and plan for repairs and maintenance.

Related Objectives: System Stewardship

- Implement standard inspection protocols for pedestrian improvements: In recent years, MnDOT has completed a sidewalk inventory on the state highway system. As a follow-up, MnDOT would standardize data collection of system condition and ADA compliance by establishing inspection intervals and processes.

Related Objectives: Critical Connections

- Better inclusion of ancillary pavements into total pavement needs and assets, such as signage and lighting at rest areas and weigh stations, into roadside infrastructure needs: This effort will help to clearly communicate rest area and weigh station needs to MnDOT districts.

Related Objectives: System Stewardship

- Continue coordination of planned projects with partners: Stakeholder engagement efforts will continue to ensure strong connections between the Minnesota GO Vision and project selection. Projects in Years 5-10 of the CHIP will be the subject of additional project development conversations between MnDOT and its partners to ensure that funds leverage the highest possible outcomes.

Related Objectives: Healthy Communities, Open Decision Making

- **Quantify the benefits of jurisdictional transfer:** Outcomes include maintenance and operations benefits and long and short-term capital

savings as a result of a transfer. This analysis should be expanded to specific segments.

Related Objectives: System Stewardship, Open Decision Making

This page intentionally left blank.



Minnesota GO
A Collaborative Vision for Transportation

20-Year State Highway Investment Plan

Appendices

ADDITIONAL ONLINE RESOURCES

Available at http://minnesotago.org/