



INVESTMENT NEEDS

Substantial capital investments are needed to keep Minnesota’s almost 12,000-mile state highway system in a condition that supports a strong economy and a high quality of life for Minnesotans. Chapter 4 provides a cost analysis of the investments needed on the state highway system through the year 2042 in six investment areas: System Stewardship, Climate Action, Transportation Safety, Critical Connections, Healthy Equitable Communities and Other. The rest of this chapter contains a breakdown of the investment need by MnSHIP investment category and explains how MnDOT developed its needs and assumptions.

Definition of Needs in MnSHIP

MnDOT defines needs 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 16 legislative goals for transportation and the objectives outlined in the Minnesota GO Vision and the Statewide Multimodal Transportation Plan and 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 for each investment category typically corresponds to the total need described in this chapter. The total need for the state highway system is estimated to be up to \$57 billion over 20 years, compared to \$37 billion in available revenue.

In addition to the MnDOT identified need process, MnDOT conducted engagement with city and county engineers regarding local improvement priorities on the state highway system. These stakeholders identified an additional \$5 billion in state highway needs beyond the MnSHIP identified needs.

[Investment Category Folios](#) provide more detail regarding the performance levels for each category.

NEEDS ASSOCIATED WITH ACHIEVING PERFORMANCE TARGETS

As described in Chapter 1: Plan Overview, 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.

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. Current performance condition and

adopted performance measures and targets are at minnesotago.org.

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
- Rest Areas
- Freight
- Traveler Safety
- Highway Mobility
- Pedestrian



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. The categories listed below do not currently have established performance measures or targets or MnDOT does not have a method to estimate the impact of investment on a related performance measure. Nevertheless, they are critical in helping MnDOT to make progress toward the Minnesota GO Vision and Legislative Goals:

- Climate Resilience
- Advancing Technology
- Bicycle
- Local Partnerships

- Main Streets/Urban Pavements
- Project Delivery
- Small Programs

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

- The cost to implement statewide and district modal plans. The investment needs for bicycle infrastructure are based on completing improvements identified in the district bicycle plans and a portion of the needs for pedestrian improvements—those unrelated to 1990 Americans with Disabilities Act compliance—are based on implementing needs identified in the Statewide Pedestrian System Plan.



CHAPTER 4

- The cost to address emerging needs. This plan includes multiple new investment areas that are emerging need areas for transportation: climate resilience, advancing technology and livability. Needs in these areas were calculated to manage the greatest risks and meet the goals identified in the Minnesota GO Vision and the SMTP.
- The cost to manage greatest risks. MnDOT calculated needs for the Local Partnerships and Main Streets/ Urban Pavements categories 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 are the costs necessary to bring all identified needs in other categories from conception to completion based on historical expenditures in this area.
- The cost to implement programs. Investment need for specific programs within each category are the costs to implement those programs. This includes federal programs with set funding such as the Highway Safety Improvement Program and National Highway Freight Program as well as MnDOT led programs such as Small Programs.

Summary of Needs

In developing its assumptions for MnSHIP, MnDOT projected the investments necessary to meet state highway transportation needs through 2042. The total need for the Minnesota state highway system is calculated to be up to \$57 billion over 20 years. Figure 4-1 shows a comparison between available revenue and total need. Figure 4-2 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 4-3 summarizes what MnDOT would be able to accomplish in each investment category under a program with no fiscal constraints. Please note: Needs below are listed by objective category. The order does not reflect priority.

In addition to the MnDOT identified need process, MnDOT conducted engagement with city and county engineers regarding local improvement priorities on the state highway system. These stakeholders identified an additional \$5 billion in state highway needs beyond the MnSHIP identified needs.



Figure 4-1: Comparison of Investment Need and Available Revenue

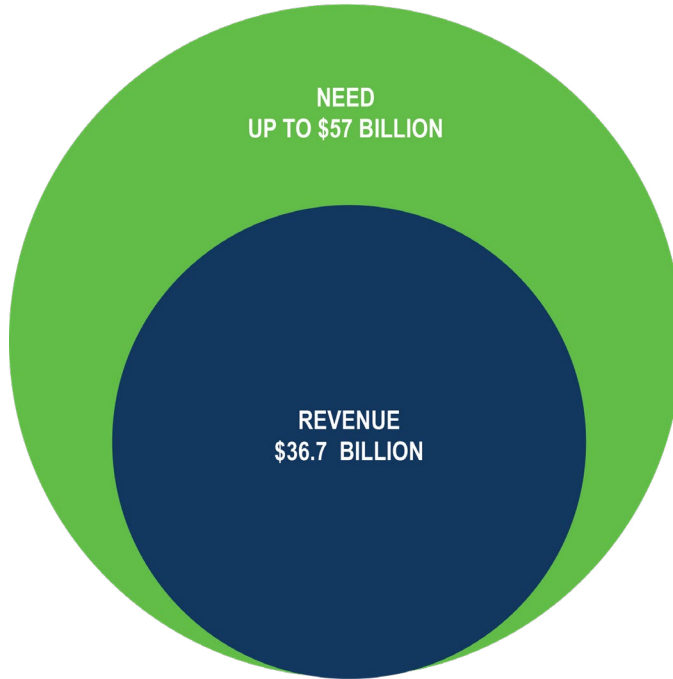
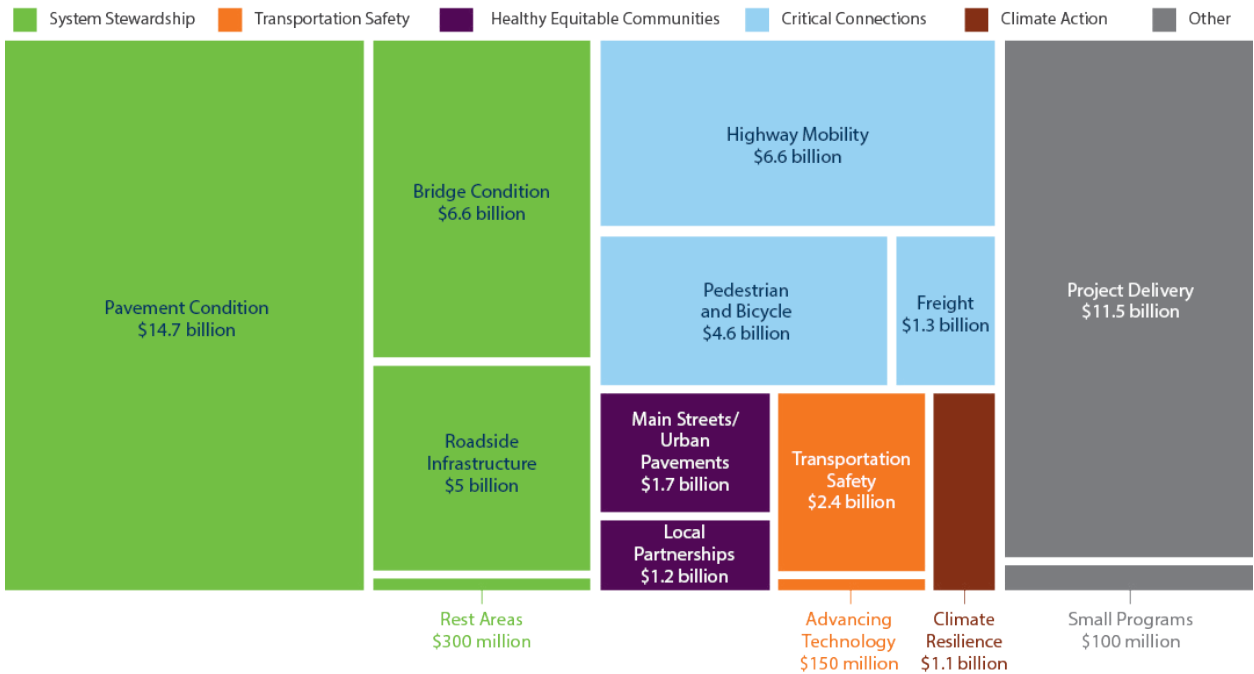


Figure 4-2: 20-Year Capital Highway Transportation Needs (by Investment Category)



CHAPTER 4

Figure 4-3: 20-Year Capital Highway Transportation Needs and Projected Outcomes (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% poor and 70% good condition on Interstates, 4% percent poor and 65% good condition on non-Interstate NHS, 8% poor and 60% good condition on non-NHS.	\$14.7 billion	25.6%
Bridge Condition	System Stewardship	Meet bridge performance target of 5% poor and 55% good condition on NHS bridges, 8% poor and 50% good condition on non-NHS bridges.	\$6.6 billion	11.5%
Roadside Infrastructure	System Stewardship	Meet performance targets listed in the Transportation Asset Management Plan for the condition of roadside infrastructure assets such as culverts, lighting, traffic signals, overhead signs and noise walls.	\$5.1 billion	8.9%
Rest Areas	System Stewardship	Meet performance target of 4% of rest area buildings in poor condition and resurface a rest area pavement every 1-2 years.	\$300 million	0.5%
Climate Resilience	Climate Action	Invest in program to address infrastructure needs related to extreme weather events and implement the Minnesota Statewide Pedestrian System Plan climate change mitigation strategy to add/improve green infrastructure along state highways.	\$1.2 billion	2.1%
Transportation Safety	Transportation Safety	Continue delivering the Federal Highway Safety Improvement Program and address locations that have a fatal/serious injury crash rate in the top 10%.	\$2.4 billion	4.2%
Advancing Technology	Transportation Safety	Increase Intelligent Transportation Systems (ITS) solicitation to fund the Transportation System Management and Operations Business Plan, invest in immediate and medium fiber network needs, pilot programs to invest in roadway improvements to integrate with changing vehicle technology.	\$150 million	0.3%
Freight	Critical Connections	Address major freight bottlenecks. Maintain weigh stations and highway rail crossing equipment. Expand truck parking at MnDOT owned locations.	\$1.3 billion	2.3%
Highway Mobility	Critical Connections	In the Twin Cities Metro, invest to meet delay target of 9 minutes per workday per person. In Greater Minnesota, invest in spot mobility improvements at locations identified in the Greater MN Mobility study.	\$6.6 million	11.5%
Pedestrian and Bicycle	Critical Connections	Bring all sidewalks, curb ramps and signalized intersections to total ADA-compliance by 2037, address pedestrian network gaps, add new pedestrian bridges and implement the District Bicycle Plans.	\$4.6 billion	8.0%

INVESTMENT CATEGORY	OBJECTIVE AREA	20-YEAR OUTCOMES BASED ON PERFORMANCE TARGETS OR OTHER KEY SYSTEM GOALS	ESTIMATED 20-YEAR NEED	TOTAL (%) OF NEED
Local Partnerships	Healthy Equitable Communities	Expand partnerships with stakeholders, increased landscaping, implement the 2014 Jurisdictional Realignment Project Report and pilot program for livability improvements.	\$1.2 billion	2.1%
Main Streets/ Urban Pavements	Healthy Equitable Communities	Provide funding on urban pavement projects to address ADA compliance, complete streets and local priorities.	\$1.7 billion	3.0%
Project Delivery	Other	Efficiently deliver projects through adequate consultant services, supplemental agreements, construction incentives and right of way acquisition.	\$11.5 billion	20.0%
Small Programs	Other	Continue to fund unforeseen issues and historic property improvements.	\$100 million	0.2%
TOTAL			\$57 BILLION	100%

SYSTEM STEWARDSHIP NEEDS

MnDOT estimates that it would cost \$27.8 billion to meet performance targets and other key objectives for System Stewardship through 2042.

Figure 4-4: System Stewardship Investment Needs

SYSTEM STEWARDSHIP	INVESTMENT NEED
Pavement Condition	\$14.7 billion
Bridge Condition	\$6.6 billion
Roadside Infrastructure	\$5.1 billion
Rest Areas	\$300 million
TOTAL	\$27.8 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% in poor condition and 70% in good condition
- Other NHS pavements: 4% in poor condition and 65% in good condition
- Non-NHS pavements: 8% in poor condition and 60% in good condition

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

CHAPTER 4

Pavement Condition need is estimated to be \$14.7 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 2042

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: 5% in poor condition and 55% in good condition (by deck area)
- Non-NHS bridges: 8% in poor condition and 50% in good condition (by deck area)

MnDOT uses the Bridge Office Replacement and Improvement System (BORIS) 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. BORIS 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 \$6.6 billion. At this level of investment in Bridge Condition, MnDOT would be able to:

- Meet all performance-based bridge needs

ROADSIDE INFRASTRUCTURE NEEDS

MnDOT measures its Roadside Infrastructure performance based on structural condition and asset service life, depending on the asset. As part of the Transportation Asset Management Plan (TAMP) process, MnDOT set performance targets for 12 roadside assets. MnDOT used the following targets for estimating need:

- Culverts and Deep Stormwater Tunnels: 10% in poor condition
- High-Mast Light Towers: 6% in poor condition
- Intelligent Transportation Systems infrastructure: Various targets depending on the asset
- Noise Walls: 8% in poor condition
- Overhead sign structures: 6% in poor condition
- Traffic signals and lighting: 2% beyond useful life

Roadside Infrastructure need is estimated to be \$5.1 billion. At this level of investment in Roadside Infrastructure, MnDOT would be able to:

- Meet performance targets (for those assets with adopted targets)
- Upgrade all pavement markings and traffic barriers to new standards

MnDOT will continue to refine its approach to estimating needs in this category through its asset management planning process.



REST AREA NEEDS

MnDOT measures rest area building condition through periodic assessments. As part of the 2022 TAMP, MnDOT set a target for rest area building condition of no more than 4% of buildings in poor condition. That would equate to 2 buildings on the system in poor condition at any time. MnDOT also began assessing parking lot pavement condition in terms of percent of parking lots in poor condition. There is no set condition target for parking lot pavement currently. Rest Area need is estimated to be \$300 million. At this level of investment in Rest Areas, MnDOT would be able to:

- Meet performance target of 4% of rest area buildings in poor condition
- Resurface a rest area pavement every 1-2 years

CLIMATE ACTION NEEDS

MnDOT estimates that it would cost approximately \$1.2 billion to meet its Climate Action needs through 2042. This is a new objective area in the SMTP. The Climate Resilience investment category is the only category under the Climate Action objective area. Investments in this category improve state highway infrastructure to withstand increasingly extreme weather events. Types of investments include addressing locations with recurring flooding issues and making proactive resilience improvements to limit weather impacts on the state highway system before they occur.

Climate Resilience need is estimated to be \$1.2 billion. At this level of investment, MnDOT would be able to:

- Address 20-25 locations with flooding problems or locations that develop flooding issues in the future
- Fund 10-20 projects per year to proactively address infrastructure needs related to extreme weather events such as addressing vulnerable culverts
- Address all high return on investment snow trap sites
- Implement Minnesota State Pedestrian Plan climate change mitigation strategy to add/improve green infrastructure along 475 miles of state highways



TRANSPORTATION SAFETY NEEDS

MnDOT estimates that it would cost approximately \$2.5 billion to meet its Transportation Safety needs through 2042.

Figure 4-5: Transportation Safety Investment Needs

TRANSPORTATION SAFETY	INVESTMENT NEED
Transportation Safety	\$2.4 billion
Advancing Technology	\$150 million
TOTAL	\$2.5 BILLION

TRANSPORTATION SAFETY NEEDS

MnDOT estimated needs in Transportation Safety over the next 20 years by calculating the cost of implementing projects at locations with a high fatal or serious injury crash 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 \$2.4 billion. At this level of investment, MnDOT would be able to:

- Continue delivering the Federal Highway Safety Improvement Program
- Address intersections and segments that have a fatal/serious injury crash rate in the top 10% with additional safety investments



ADVANCING TECHNOLOGY

MnDOT estimated needs in Advancing Technology over the next 20 years by calculating the cost to implement the Transportation System Management and Operations Business Plan, invest in priority corridors for fiber network expansion and roadway improvements to integrate with changing vehicle technology.

Advancing Technology need is estimated to be \$150 million. At this level of investment, MnDOT would be able to:

- Increase Intelligent Transportation Systems (ITS) solicitation to fund the Transportation System Management and Operations Business Plan
- Invest in immediate and medium fiber network needs
- Pilot programs to invest in roadway improvements to integrate with changing vehicle technology



CRITICAL CONNECTIONS NEEDS

MnDOT estimates that it would cost approximately \$12.5 billion to meet its targets and key objectives for Critical Connections through 2042.

Figure 4-6: Critical Connections Investment Needs

CRITICAL CONNECTIONS	INVESTMENT NEED
Highway Mobility	\$6.6 billion
Freight	\$1.3 billion
Pedestrian and Bicycle	\$4.6 billion
TOTAL	\$12.5 BILLION

HIGHWAY MOBILITY NEEDS

MnDOT calculated its 20-year needs for Highway Mobility in the Twin Cities region by projecting the costs needed to meet the regional delay target of 9 minutes per workday per person. In doing so, MnDOT would increase investment in Active Traffic Management, transit-supportive improvements, spot mobility improvements, build out a majority of planned E-ZPass express lanes and fund strategic capacity expansion projects.

As part of the SMTP, MnDOT adopted a target to reduce per capita vehicle miles travelled 14% by 2040. Meeting that vehicle miles traveled reduction target would reduce highway mobility need in the Twin Cities area by \$5 billion.



For Greater Minnesota, MnDOT identified its 20-year needs for Highway Mobility as the cost to implement spot mobility improvements at locations identified in the Greater Minnesota Mobility Study.

Highway Mobility need is estimated to be \$6.6 billion. At this level of investment in Highway Mobility, MnDOT would be able to:

- Build out the traffic management system regionwide
- Support up to 10 arterial Bus Rapid Transit projects on or across state highways
- Fund over 200 spot mobility improvements in the Twin Cities region
- Build out the planned E-ZPass express lane system
- Increase investment in strategic capacity projects such as interchanges or auxiliary lanes
- Implement spot mobility improvements at 75-100 locations on the NHS in Greater Minnesota
- Fund top 8-10 larger expansion priorities or 15-20 smaller capacity expansion projects in Greater Minnesota

FREIGHT NEEDS

The Freight investment category includes needs for multiple areas including freight mobility and safety, weigh stations, state highway rail crossings and truck parking. Needs were based on statewide planning efforts for most areas including weigh stations, truck parking and freight bottlenecks.

Freight need is estimated to be \$1.3 billion. At this level of investment, MnDOT would be able to:

- Continue the National Highway Freight Program and increase investment to address 6 major freight bottlenecks and safety improvements
- Maintain existing weigh stations and construct 3-7 new weigh stations in the state
- Replace all equipment at state highway rail crossings on a 20-year cycle and convert one passive crossing to active per year
- Expand truck parking at existing MnDOT owned locations and add 3 new locations in the state



CHAPTER 4

PEDESTRIAN AND BICYCLE NEEDS

Pedestrian and bicycle investment and needs have been combined into one category for this plan. However, the needs were identified separately.

MnDOT calculated its 20-year needs for bicycle infrastructure as the costs required to implement the District Bicycle Plans and maintain existing and new separated bicycle facilities. MnDOT calculated its 20-year needs for pedestrian infrastructure as the costs needed to comply with the Americans with Disability Act (ADA), implement the Statewide Pedestrian System Plan investment strategies and improve pedestrian crossings over state highways.

Pedestrian and Bicycle need is estimated to be \$4.6 billion. At this level of investment in Pedestrian and Bicycle, MnDOT would be able to:

- Be 100% ADA compliant by 2037 across all asset types
- Address network gaps in all areas of top 6.5% pedestrian needs on the state highway system (400-500 miles of roadway with improved pedestrian facilities)
- Add 10-15 pedestrian bridges
- Implement the District Bicycle Plans
- Maintain existing and new separated bicycle facilities to maintain a smooth ride

HEALTHY EQUITABLE COMMUNITIES

MnDOT estimates that it would cost approximately \$2.9 billion to meet its key objectives for Healthy Equitable Communities through 2042.

Figure 4-7: Healthy Equitable Communities Investment Needs

HEALTHY EQUITABLE COMMUNITIES	INVESTMENT NEED
Local Partnerships	\$1.2 billion
Main Streets/Urban Pavements	\$1.7 billion
TOTAL	\$2.9 BILLION

LOCAL PARTNERSHIP NEEDS

The Local Partnerships investment category includes needs for multiple areas including jurisdictional transfer, livability improvements and landscaping and municipal agreements. Jurisdictional Transfer needs are based on implementing the recommendations from the Jurisdictional Realignment Project Report.

Local Partnerships need is estimated to be

\$1.2 billion. At this level of investment in Local Partnerships, MnDOT would be able to:

- Transfer over 600 miles of highways
- Add 155 miles of shade trees, planters and pervious surface on state highway right-of-way
- Pilot livable communities program

MAIN STREETS/URBAN PAVEMENT NEEDS

Main Streets/Urban Pavement is a new investment category for this plan. Needs were identified in this category as urban pavement locations with ADA or local community needs that are not planned for a pavement reconstruction project.

Main Streets/Urban Pavements need is estimated to be \$1.7 billion. At this level of investment in Main Streets/Urban Pavements, MnDOT would be able to:

- Address 225-250 urban pavement candidate locations to address ADA compliance and other local priorities

OTHER NEEDS

MnDOT estimates that it would cost approximately \$11.6 billion for Project Delivery and Small Programs through 2042.

Figure 4-8: Other Investment Needs

OTHER	INVESTMENT NEED
Small Programs	\$100 million
Project Delivery	\$11.5 billion
TOTAL	\$11.6 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. This plan assumes \$5 million per year or less than 1% of its total projected revenue to cover investments in Small Programs. Investments in Small Programs include historic properties, flood and slide repair and cleaning up contaminated materials.

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, Climate Resilience, Transportation Safety, Critical Connections and Healthy Equitable Communities would require approximately \$11.5 billion in Project Delivery through 2042.

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 over the next 20 years. Approximately 20% of MnDOT's annual capital investment typically goes to supporting the delivery of projects. Project Delivery includes consultant services, construction incentives and supplemental agreements and right of way. The percentage of spending in project delivery has increased since 2017 MnSHIP as a result of more thorough analysis of actual expenditures and increased requirements for MnDOT projects.

