



ASSET MANAGEMENT INVESTMENT FOLIO

Bridge Condition

Bridge Condition is one of the ten investment categories in MnSHIP. MnSHIP is a fiscally constrained plan, meaning that it must balance the needs and risks of this category against those of the other investment categories. Each investment category has its own folio describing the trade-offs of different investment levels. Please see page 4 for a list of additional folios.

Why is Bridge Condition important?

There are approximately 20,000 bridges in the state of Minnesota. Over 4,500 of these bridges serve the state highway system and are therefore under MnDOT jurisdiction. Most bridges last 70 to 80 years before needing replacement, if maintained at optimal points. Proactive, preventive maintenance helps MnDOT maximize the service life of bridges, while delaying repairs can lead to higher maintenance and life-cycle costs.

How does maintaining a high-quality bridge network support the Minnesota GO Vision and the Statewide Multimodal Transportation Plan?

Investing in bridges supports the guiding principles laid out in the 50-year vision for the state's transportation system, Minnesota GO. Among those are:

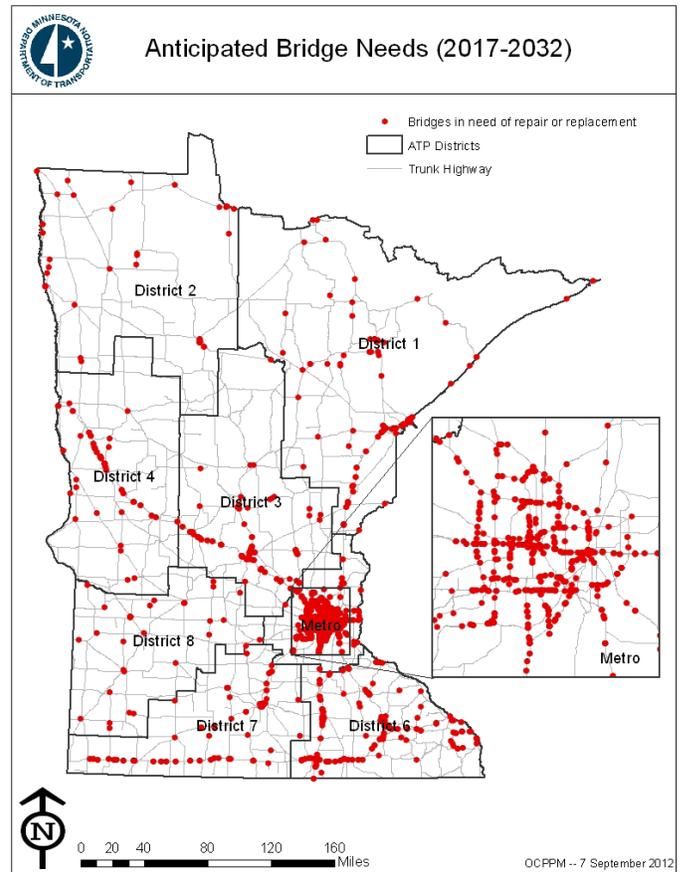
- Providing safe, convenient, efficient, and effective movement of people and goods;
- Strategically fixing the system; and
- Systematically improving safety for all forms of transportation.

Building upon these principles, investment in Bridge Condition strengthens multiple strategies identified in the Statewide Multimodal Transportation Plan (SMTP), notably:

- Prioritize maintaining and operating assets on identified priority networks;
- Keep Minnesota's transportation system on a sustainable track for the future; and
- Ensure that safety, operations, and maintenance needs are considered and addressed in transportation planning and programming.

How is MnDOT performing with respect to Bridge Condition?

MnDOT conducts regular inspections on the state's 4,500 bridges to assess the condition of their decks, superstructures, substructures, and culverts (see page 4). Each bridge is rated as having Good, Satisfactory, Fair, or Poor structural condition. Good and Satisfactory bridges require maintenance, while Fair and Poor



The above map shows the anticipated bridge needs after the STIP programmed projects are completed or under construction by the end of 2016. Approximately 8% of Minnesota's will be in Poor condition by the end of 2032 under current investment levels.

bridges may need major capital investment.

MnDOT's targets for bridges are as follows:

Principal Arterials	Non-Principal Arterials
• Good: 55% or greater	• Good: 50% or greater
• Good or Satisfactory: at least 84%	• Good or Satisfactory: at least 80%
• Fair or Poor: fewer than 16%	• Fair or Poor: fewer than 20%
• Poor: fewer than 2%	• Poor: 8% or fewer

MnDOT anticipates that it will meet its targets for Principal Arterial bridges by the end of 2016 given current programming and funding levels. **89%** will be rated as Good or Satisfactory and **11%** will be Fair or Poor, of which **2%** will be rated Poor.

What bridge programs have already been funded?

The 2008 Minnesota Legislature passed legislation known as Chapter 152, which provided MnDOT with \$2.1 billion to repair or replace 120 high-priority bridges by 2018. The 2009 American Recovery and Reinvestment Act (ARRA) gave an additional \$30.3 million to bridge projects. These two acts gave a sizable boost to the bridge investment over the past four years. However, the

majority of this work has been completed and Chapter 152 funding will end in 2018.

Where are we headed?

Under current funding levels, MnDOT is projected to spend an average of \$190 million annually on Bridge Condition for the next 20 years. This corresponds to **Performance Level 3** in the Performance Level Option table (below).

Tips for Using This Table

Performance Levels

- **Performance Level 0 (or PL 0)** represents a strategy in which Bridge Condition would receive less than current funding. PL 0 corresponds to the most extreme risk level MnDOT would potentially consider.
- MnDOT's current spending in Bridge Condition corresponds to approximately the amounts listed in **PL 3**.
- PLs for Bridge Condition are independent of other investment categories.

Investment Levels

- The **pie charts** represent the distribution of MnSHIP's total planned investment (\$14.3 billion) at each PL.
- **Other Br** refers to bridges which would not be funded through Chapter 152 funds.
- **Minimum Category Investment** is the amount required to invest at PL 0 in every other category.
- **Discretionary Category Investment** is the remaining revenue available for additional investment beyond the Minimum Category Investment for all categories in MnSHIP.

Outcomes

- Outcomes represent the proportion of bridge deck area in Good + Satisfactory condition (**green**) and deck area in Poor condition (**red**). **Deck area** refers to the total surface area of a bridge.
- Principal Arterials (PAs) are reported separately from bridges on Non-Principal Arterials (NPAs).

PERFORMANCE LEVEL OPTIONS		
Bridge Condition		
Overarching Goal: Maintain a safe and sustainable system of Minnesota highway bridges for passenger vehicles, freight, transit, and bicycle users.		
	Performance Level 0 <i>Lowest cost, greatest risk</i>	Performance Level 1 <i>Lower cost, greater risk</i>
Investment Approach <i>(Scenario Planning Folio)</i>	PL does not correspond with an Investment Approach	PL does not correspond with an Investment Approach
Investment Level <i>Total</i> <i>CH 152 - Yrs 5-10 (2017-2022)</i> \$1.47 B <i>Other Br - Yrs 5-10 (2017-2022)</i> \$77 M/yr <i>Other Br - Yrs 11-20 (2023-2032)</i> \$63 M/yr	<p>Bridge Condition</p> <p>\$1.47 B \$77 M/yr \$63 M/yr</p>	<p>Bridge Condition</p> <p>\$2.03 B \$77 M/yr \$93 M/yr</p>
Investment Description	<ul style="list-style-type: none"> • Complete Chapter 152 fixes • Invest in highest priority Other Bridges 	<ul style="list-style-type: none"> • Complete Chapter 152 fixes • Invest in high priority Other Bridges
Outcomes <i>How would each investment strategy contribute to Good + Satisfactory or Poor system conditions? (Does not include bridges in Fair condition)</i>	<p>69% 71% 20% 21%</p> <p>PAs NPAs</p>	<p>74% 75% 15% 17%</p> <p>PAs NPAs</p>
Risks <i>H = High Risk</i> <i>M = Medium Risk</i> <i>L = Low Risk</i>	<p>(M) Hazardous conditions (H) Deferring investment leads to unmanageable needs (H) Higher life-cycle costs (H) Service interruptions and weight restrictions leads to inefficient freight movement and lower quality of life</p> <p>MR * RR</p>	<p>(L) Hazardous conditions (H) Deferring investment leads to unmanageable needs (H) Higher life-cycle costs (H) Service interruptions and weight restrictions leads to inefficient freight movement and lower quality of life</p> <p>MR * RR</p>
Risk Management Strategies <i>What strategies would MnDOT use to manage risk?</i>	<ul style="list-style-type: none"> • Increased focus on maintenance activities to avoid hazardous conditions • Defer most non-critical fixes • Close some bridges; impose weight restrictions on many others to avoid hazardous conditions 	<ul style="list-style-type: none"> • Maintenance activities focus on avoiding hazardous conditions • Defer many long-term fixes • Close bridges as needed; impose weight restrictions on some others to avoid hazardous conditions

What are the risks to be addressed in the Bridge Condition investment?

Generally, the more MnDOT invests in Bridge Condition, the more we are able to reduce these key risks:

- Bridge conditions become potentially hazardous (such as deteriorated railings or concrete) and require significant repairs;
- Deferring long-term investments leads to unmanageable needs

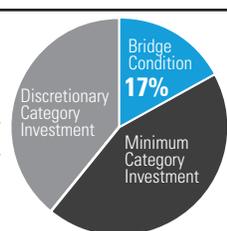
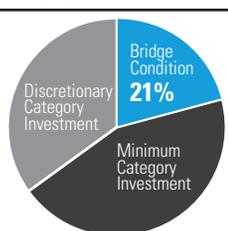
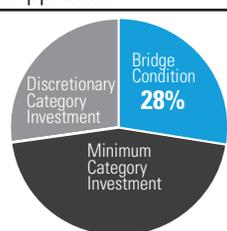
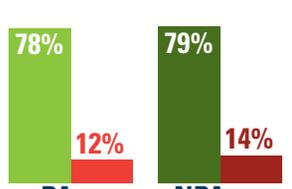
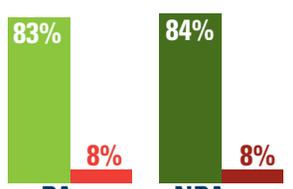
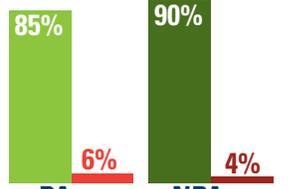
and a financially unsustainable bridge system;

- Inability to make timely and appropriate investments results in reduced bridge service life, higher life-cycle costs, and inefficient spending; and
- More frequent service interruptions and bridge weight restrictions compromise the efficiency of the system, impacting mobility, economic viability, and quality of life.

PERFORMANCE LEVEL OPTIONS

Bridge Condition

Performance Objectives: System safety, optimizing investments, sustainable system of bridges, public confidence in infrastructure, efficient transportation system, timely and appropriate investments in preservation and safety.

	Performance Level 2 <i>Moderate cost, moderate risk</i>	Performance Level 3 <i>Greater cost, lower risk</i>	Performance Level 4 <i>Greatest cost, lowest risk</i>
Investment Approach <i>(Scenario Planning Folio)</i>	Approach C	Approach A Approach B (approximate)	PL does not correspond with an Investment Approach
Investment Level <i>Total</i> <i>CH 152 - Yrs 5-10 (2017-2022)</i> <i>Other Br - Yrs 5-10 (2017-2022)</i> <i>Other Br - Yrs 11-20 (2023-2032)</i>	\$2.50 B \$77 M/yr \$107 M/yr \$140 M/yr 	\$3.05 B \$77 M/yr \$121 M/yr \$186 M/yr 	\$3.95 B \$77 M/yr \$102 M/yr \$289 M/yr 
Investment Description	<ul style="list-style-type: none"> • Complete Chapter 152 fixes • Invest in medium and high priority Other Bridges 	<ul style="list-style-type: none"> • Complete Chapter 152 fixes • Invest in wide range of Other Bridges 	<ul style="list-style-type: none"> • Invest at optimal points in bridge life cycle • Meet 100% of performance-based bridge needs
Outcomes <i>How would each investment strategy contribute to Good + Satisfactory or Poor system conditions? (Does not include bridges in Fair condition)</i>			
Risks <i>H = High Risk</i> <i>M = Medium Risk</i> <i>L = Low Risk</i> <i>MR = Managed Risk</i> <i>RR = Remaining Risk</i>	<ul style="list-style-type: none"> (L) Hazardous conditions (M) Deferring investment leads to unmanageable needs (M) Higher life-cycle costs (M) Service interruptions and weight restrictions leads to inefficient freight movement and lower quality of life 	<ul style="list-style-type: none"> (L) Hazardous conditions (L) Deferring investment leads to unmanageable needs (L) Higher life-cycle costs (M) Service interruptions and weight restrictions leads to inefficient freight movement and lower quality of life 	<ul style="list-style-type: none"> (L) Hazardous conditions (L) Deferring investment leads to unmanageable needs (L) Higher life-cycle costs (L) Service interruptions and weight restrictions leads to inefficient freight movement and lower quality of life 
Risk Management Strategies <i>What strategies would MnDOT use to manage risk?</i>	<ul style="list-style-type: none"> • Maintenance activities able to include some preventive repairs • Defer some long-term fixes • Impose occasional weight restrictions to avoid hazardous conditions 	<ul style="list-style-type: none"> • Maintenance activities focus on preventive repairs • Defer few long-term fixes 	<ul style="list-style-type: none"> • Implement cost-effective preventive maintenance program



Investment in Bridge Condition has dramatically increased over the last four years due to Chapter 152. MnDOT will need to allocate additional regular program funding to maintain this level of spending after the Chapter 152 program ends in 2018.

How are we optimizing resources?

MnDOT manages its bridges with the goal of minimizing the life-cycle costs of bridges and maximizing the dollars spent on maintenance and improvements. MnDOT prioritizes the following strategies to optimize bridge investments:

- **Bridge inspections**—Frequent, thorough inspections lead to timely maintenance activities and capital investments. MnDOT expects to complete all bridge safety inspections on time every year. Occasionally, there are delays due to weather or conflicting construction activities. In 2011, 96.2% of bridge safety inspections were completed on time.
- **Bridge preservation**—MnDOT invests in preventive maintenance to ensure the safety and structural conditions of its bridges.
- **Bridge improvement**—Investing in rehabilitation projects at appropriate times during the bridges’ 80-year life-cycle helps MnDOT get full use of its bridge infrastructure before needing to replace it.

These cost-effective approaches to bridge management assist MnDOT in providing a safe and reliable system for travelers while maximizing the life-cycle of the infrastructure.

Look for these additional folios!

Overview + Background

- What is MnSHIP?

Investment Category Folios

- Pavement Condition
- Roadside Infrastructure Condition
- Traveler Safety
- Twin Cities Mobility
- Interregional Corridor Mobility
- Bicycle Infrastructure
- Accessible Pedestrian Infrastructure
- Regional + Community Improvement Priorities
- Project Support

Scenario Planning

- MnSHIP Investment Approaches

How do we decide when to invest in bridges?

Each bridge has its own investment plan. For **Chapter 152** bridges, MnDOT follows legislative criteria to classify its bridge needs into three tiers. Bridges in Tier 1 are the highest-priority bridges. Whenever possible, bridges in a higher tier must be programmed repaired before starting repairs to bridges in the next tier.

For **Other Bridges**, MnDOT has developed the **Bridge Replacement and Improvement Management (BRIM)** to enhance its process of using input from District bridge engineers and planners, risk assessments, and traditional structural ratings to decide which bridges need to receive future investment.

How does recent federal legislation affect bridges in Minnesota?

The Moving Ahead for Progress in the 21st Century Act (MAP-21) is a federal transportation funding bill that was signed in July 2012. As part of the bill’s requirements, MnDOT and other state transportation agencies must report on the condition of bridges on the National Highway System (NHS).



Conducting inspections and investing in timely maintenance and improvement activities help MnDOT provide safe, reliable bridge infrastructure.

For more information, contact:

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