

Bridge Condition

MnDOT estimates \$30-33 billion in available funding for the state highway system over the next 20 years. A minimum of \$23.5 billion is needed to manage highest risks and meet legal requirements. This folio provides information on potential Bridge Condition investment strategies, funding levels, and outcomes for the estimated \$7-9 billion of remaining investment.

1 | WHAT IS BRIDGE CONDITION?

Investments in Bridge Condition include repairs and replacement of existing bridge structures. This investment category includes five types of state-owned bridge structures: vehicle bridges, railroad bridges, tunnels, and culverts longer than ten feet. Investment prioritizes bridges on the National Highway System including bridges over Interstate and other NHS routes.

GOAL AND OBJECTIVES OF INVESTMENT

The goal of Bridge Condition investment is to maintain a safe and sustainable system of Minnesota highway bridges for passenger vehicles, freight, transit, pedestrian, and bicycle users. To reach this goal, MnDOT prioritizes system safety while optimizing investments that maintain a sustainable system of bridges, continue to ensure public confidence in infrastructure, provide an efficient transportation system and implement timely and appropriate investments in preservation and safety.

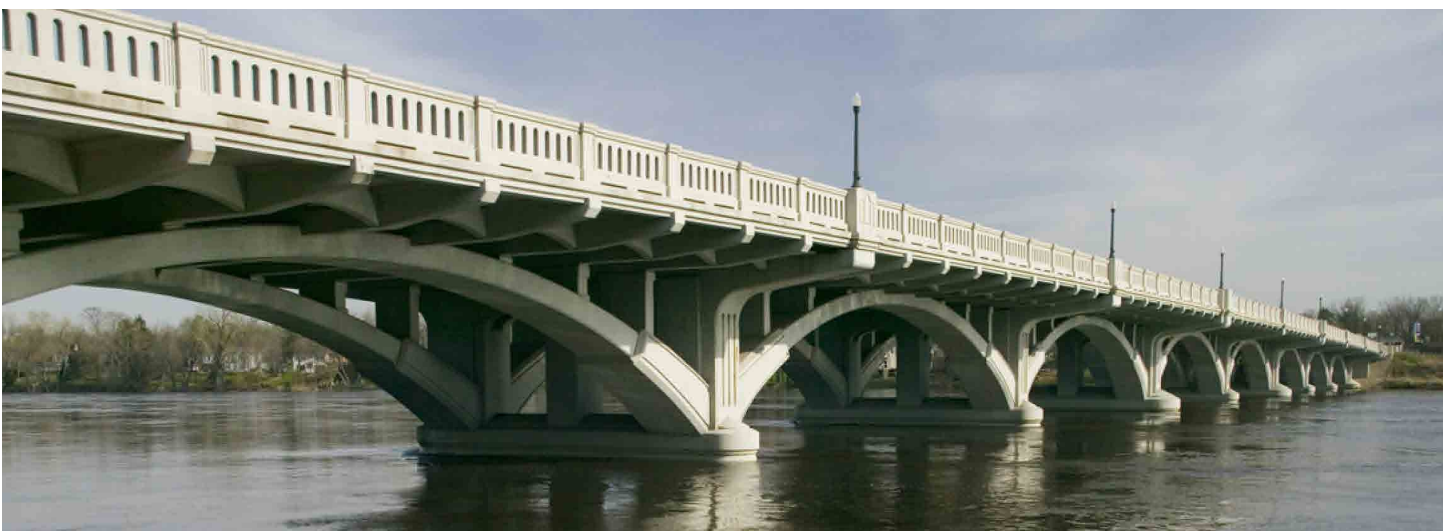
TYPES OF IMPROVEMENTS

MnDOT uses different types of improvements at different times over the life of a bridge to preserve and lengthen the time before a full replacement is needed. Age, traffic and chemicals is constantly at work deteriorating the condition

of bridges. Preventive maintenance activities, such as deck flushing, crack sealing, or other minor repairs, help to slow the rate of deterioration. If timely repairs are made, conditions can be improved, thus extending the service life. Preservation improvements including bridge painting, deck resurfacing, and bridge substructure repairs help to lengthen the life of bridges. Eventually, age causes a bridge to slip into a poor condition where only expensive rehabilitation or full replacement can restore the needed level of performance. Rehabilitation work includes activities such replacing a component of the bridge like the deck or super structure but not the entire bridge.

HOW DOES MNDOT CURRENTLY SELECT BRIDGE CONDITION IMPROVEMENTS?

MnDOT determines which bridges to invest in based on the Bridge Replacement and Improvement Management (BRIM) analysis tool which assesses bridge condition, traffic demand, and other structural ratings to determine bridges in greater need of investment. Experts from the Bridge Office, District bridge engineers, and District planners then decide which bridges need to receive future investment and when to program those investments.





2 | WHY IS INVESTING IN BRIDGE CONDITION IMPORTANT?

Investment in Bridge Condition supports the state transportation goal to provide for and prioritize funding of transportation investments that ensures that the state’s transportation infrastructure is maintained in a state of good repair. Bridges are one of the most important types of infrastructure on the state highway system. They provide connections over barriers such as other roadway, railroads, or rivers. 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 appropriately. Proactive, preventive maintenance helps MnDOT maximize the service life of bridges, while delaying repairs can lead to higher maintenance and shorter service life.

Over the next 20 years, there will be a large number or “bubble” of bridges built during the Interstate construction era which will need major rehabilitation or replacement. A sizable investment is needed to maintain these bridges in good and safe conditions. If not, some bridges may need to be closed or load posted causing potential detours and delays negatively impact mobility, economic viability and quality of life.

The recently passed federal transportation infrastructure bill, Infrastructure Investment and Jobs Act (IIJA) also shows this is a national concern, not just a Minnesota concern. The new bill created a new Bridge Program which will provide an additional \$50 million per year from 2022-2026 towards state highway bridges. This funding has been incorporated into the minimum levels for Bridge Condition.

HOW DOES BRIDGE CONDITION SUPPORT EQUITABLE OUTCOMES?

Bridge Condition investment provides opportunities for more replacement and redesign of bridges. Redesigns can

incorporate new or improved connections for pedestrians and bicyclist which may not have been included in the original bridge. These improvements would provide benefits for those who don’t drive, either by choice or by circumstance through added connections and improved safety.

HOW DOES MNDOT MEASURE PERFORMANCE, CONDITION, OR OUTCOMES?

MnDOT conducts regular inspections on the 4,500 state-owned bridges to assess the condition of their decks, superstructures and substructures, as well as culverts greater than ten feet. Each bridge is rated as having good, satisfactory, fair, or poor structural condition. The condition at each level is shown as a percentage of the total deck area on state owned bridges.

MnDOT’s targets for bridges are as follows:

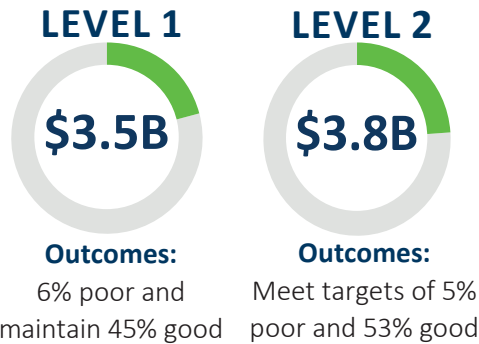
NHS BRIDGES	NON-NHS BRIDGES
Good: 55% or greater	Good: 50% or greater
Poor: 5% or fewer (recommended change from 2% poor)	Poor: 8% or fewer

For reference, NHS bridges current conditions are approximately 5% poor and 33% good. Non-NHS bridges are in slightly better condition with approximately in 4% poor and in 33% good. Overall MnDOT has increased the accuracy of bridge inspection data over the past 4-5 years through rigorous training, review and quality control of bridge inspections. This led to a drop in percent good from a long-term average of 50% good to 33% good (from 2017 to now).

3 | OPTIONS FOR INVESTING OVER THE NEXT 20 YEARS

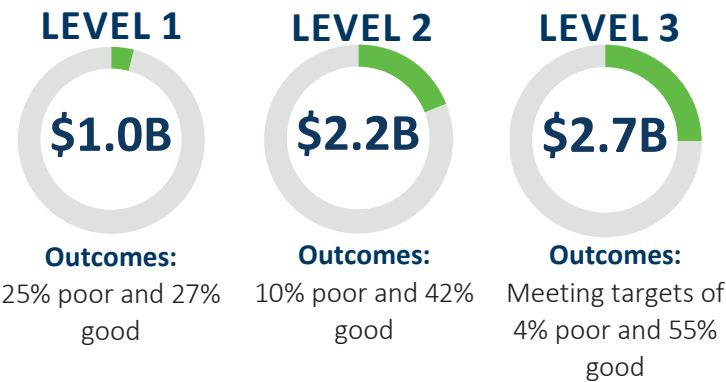
NHS Bridges

The **minimum level** MnDOT would invest in NHS bridges is **\$1.9 billion**. This represents the current rate of investment continued through 2042. Current investment would require MnDOT to focus on minimizing the number of bridges in poor condition. This would not allow MnDOT to use best asset management practices to preserve bridges in good and fair condition. With the current rate of investment, NHS bridges would **deteriorate from 5% to 14% poor and from 33% good to 29% good**.



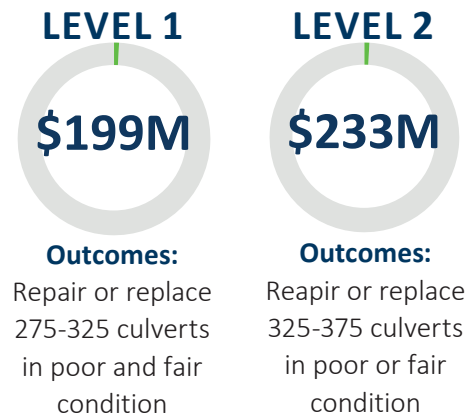
Non-NHS Bridges

The minimum level MnDOT would invest in non-NHS bridges is **\$723 million**. This represents the current rate of investment continued through 2042. Current investment would require MnDOT to focus on minimizing the number of bridges in poor condition. This would not allow MnDOT to use best asset management practices to preserve bridges in good and fair condition. With the current rate of investment, non-NHS bridges would **deteriorate from 4% to 27% poor and from 33% good to 22% good**.





Bridge Culverts

A minimum level of investment of **\$155 million** represents the current level of investment continued through 2042. At this level of investment, MnDOT would be able to **repair or replace 200-250 culverts through pavement projects or standalone projects**.



\$X.X Total cost of investment level

 Portion of remaining \$7-9 billion investment for level

 Remaining investment available for other priorities

4 | BRIDGE CONDITION RISKS

WHAT ARE THE RISKS OF UNDERINVESTING?

As a part of developing performance levels for various programs and strategies, MnDOT also identified the risk of underinvesting. Five risks were rated as low to high risks based on investment at the minimum investment level for Bridge Condition. The risks and their impacts are identified below.

HIGH RISKS

Risk: Increased number of bridges deteriorate into poor condition

Impact: Could require significant service interruptions and load postings that negatively impact mobility, economic viability and quality of life. Could also lead to reactive repairs to minimize public exposure to hazardous conditions such as deteriorated railings and delaminated concrete

Risk: Bridge investment needs are continually deferred
Impact: Could result in an unmanageable growth in bridge needs and an inability to manage system through annual state road construction program

MEDIUM RISKS

Risk: Unable to make timely and appropriate fixes during a bridge’s lifespan

Impact: Could require larger, more expensive fixes sooner and increase costs to manage the bridge system

Risk: Inability to meet performance thresholds outlined in federal legislation

Impact: Could incur federal penalties which decreases our spending flexibility

Risk: Additional non-bridge needs driving the replacement of a bridge sooner than the end of the bridge’s life

Impact: Could cause loss of service life and bridge value

WHAT LEVELS OF INVESTMENT REDUCES THE RISKS’ SEVERITY?

The table below provides a summary of how risk levels changed with increased investment in Bridge Condition.

RISK STATEMENT	SHIFTS FROM HIGH TO MEDIUM RISK	SHIFTS FROM MEDIUM TO LOW RISK
Increased number of bridges deteriorate into poor condition	Investment Level 1	Investment Level 2
Bridge investment needs are continually deferred	Investment Level 1	Investment Level 2
Unable to make timely and appropriate fixes during a bridge’s lifespan	Already at Medium risk level	Investment Level 3
Inability to meet performance thresholds outlined in federal legislation	Already at Medium risk level	Investment Level 2
Additional non-bridge needs driving the replacement of a bridge sooner than the end of the bridge’s life	Already at Medium risk level	Investment Level 2

To find out more details about Bridge Condition planning and projects, go to:

Project Selection: www.dot.state.mn.us/projectselection/

Transportation Asset Management Plan:
www.dot.state.mn.us/assetmanagement/tamp.html

Bridge Management:
www.dot.state.mn.us/bridge/index.html

For more information, contact:

Josh Pearson, AICP
Project Manager, 20-year State Highway Investment Plan
Minnesota Department of Transportation
395 John Ireland Boulevard, MS 440
St. Paul, MN 55155-1899
651.366.3773
joshua.pearson@state.mn.us

