

# Pavement Condition

## A SYSTEM STEWARDSHIP INVESTMENT

**Pavement Condition** is one of the 14 investment categories of MnSHIP, a fiscally constrained plan MnDOT uses to balance the needs and risks of Minnesota's state highway network. Folios for each investment category describe potential levels of investment and associated outcomes. Through MnSHIP, MnDOT will create an investment direction that guides state highway capital investments for the next 20 years.

### INVESTMENT CATEGORY DETAILS

#### What is Pavement Condition?

One of MnDOT's largest assets is its pavements. Pavements are a critical part of MnDOT's transportation network, providing mobility and access to a wide range of users. MnDOT maintains over 12,000 miles of state highways that serve vehicles, freight, transit, bicycle users, and pedestrians. The state system consists of Interstates (e.g. I-94, I-35), non-Interstate NHS (e.g. US14, US 169), and non-NHS highways (e.g. MN 75, MN 218). On an average day, there are over 90 million vehicle miles traveled on Minnesota highways.

#### Why is Pavement Condition important?

Pavement deterioration is a serious risk that MnDOT is facing. Most pavements last approximately 20 years before deteriorating to a level that requires major rehabilitation. Performing minor repairs on regular intervals can prolong pavement life and reduce total life-cycle costs. MnDOT is better able to fulfill its responsibilities as stewards of the highway system by limiting the proportion of pavements needing major repairs.

#### How does investing in Pavement Condition support the Minnesota GO Vision and the Statewide Multimodal Transportation Plan?

Investing in Pavement Condition supports the guiding principles laid out in the 50-year vision for the state's transportation system, Minnesota GO. These include:

- Leveraging public investments to achieve multiple purposes;
- Strategically fixing the system; and
- Ensuring regional connections.

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

- Prioritize maintaining and operating assets on identified priority networks;
- Work together to improve accessibility and safety for everyone traveling on, along, and across roads; and
- Ensure that transportation facilities are planned, engineered, operated, and maintained with consideration for the safety of all users.



*Pavement preservation projects ensure a smooth ride for the user. MnDOT maintains over 12,000 miles of state highways that serve vehicles, freight, transit, bicycle users, and pedestrians.*

#### How has the planning context for Pavement Condition changed since 2013 MnSHIP?

MnDOT undertook the Transportation Asset Management Plan (TAMP) in 2014, which included pavements. Interstate and non-Interstate NHS poor pavement targets of 2% and 4% were identified during the last MnSHIP. Through TAMP, a non-NHS poor pavement condition target of 10% was recommended. The current MnSHIP update included this target when developing performance levels.

#### How does MnDOT measure performance in Pavement Condition?

Each year, MnDOT travels the state highway system with a special van that evaluates the degree of cracking and the smoothness of the ride to determine the Ride Quality Index (RQI) rating for each section of roadway. MnDOT looks at the percentage of pavements in good or poor condition to determine its future pavement preservation needs.

#### How does MnDOT typically invest in Pavement Condition?

Based on the 2013 MnSHIP investment direction, MnDOT is projected to spend an average of \$289 million annually on pavement until 2023. In 2024, due to increasing deterioration of state highway pavements and the decreased buying power due

to the cost of inflation, MnDOT shifts additional investments into pavement condition. From 2024 through 2033, the 2013 Investment Direction dictates an average \$541 million annually for pavements.

How does MnDOT create investment options?

The table below presents four funding alternatives, called

Tips for using this table

Performance Levels

- **Performance Level 0 (PL 0)** represents a strategy which corresponds to the most extreme risk level MnDOT would consider for investing in Pavement Condition.
- MnDOT’s current spending in Pavement Condition approximately corresponds to **PL 0**.
- Cost + benefit increase and risks decrease from left to right.
- PLs for Pavement Condition are independent of other performance categories.

Investment Approach

- See **MnSHIP Investment Approaches** folio

Investment Levels

- The **pie charts** represent MnSHIP’s total planning investment for years 2022-2037 (\$17.1 billion) and the portion of it which will be dedicated to Pavement Condition investment at each PL.
- **Base investment for other categories** is the amount required to invest at PL 0 in every other category.
- **Remaining revenue available** is the additional investment beyond the base investment for all categories in MnSHIP.

Outcomes

- Highlights key outcomes associated with each PL. For Pavement Condition, outcomes correspond with key performance measures.

Risks

- Identified as **high**, **medium**, or **low** in each PL; each risk decreases in severity from left to right.

System Investment Strategies

- Details the steps MnDOT would make to mitigate risk at each PL.

Performance Levels (PL), for guiding Pavement Condition investment between 2022 and 2037. PL 0 through 4 represent a range of options to help stakeholders and decision-makers understand outcomes, risks, and system investment strategies for Pavement Condition. PLs provide the information to develop capital investment scenarios.

Pavement Condition

| Overarching Goal: Preserve the structural integrity of MnDOT’s pavements to provide a safe and reliable surface for passenger vehicles, freight, transit and non-motorized users. |   |   |
|---|---|---|
|   | Performance Level 0<br><i>Lowest cost, greatest risk</i>  | Performance Level 1<br><i>Lower cost, higher risk</i>   |
| Investment Approach<br><i>(See Approach Folio)</i>  | <b>Approach C</b><br>Corresponds with current investment  | <b>Approach A, B</b>  |
| Investment Level<br><i>Total</i>  | <b>\$8,447 M</b><br><br>Years 5-10 (2022-2027)<br>Years 11-20 (2028-2037)<br><br>\$527.9 M/yr<br>\$527.9 M/yr<br><br>   | <b>\$9,242 M</b><br><br>\$577.6 M/yr<br>\$577.6 M/yr<br><br>  |
| Investment Description  | Maintain current investment direction based on 2013 MnSHIP investment direction   | Maintain our Interstate at a level compliant with MAP-21. Maintain GASB 34 threshold on the NHS and Non-NHS system.   |
| Outcomes<br><i>To what extent would MnDOT meet performance targets for Pavement Condition?</i>  |   |   |
| Risks   | <b>High</b> <ul style="list-style-type: none"><li>• Inability to meet GASB and MAP-21 thresholds through 2037</li></ul>   | <b>Medium</b> <ul style="list-style-type: none"><li>• Inability to meet GASB and MAP-21 thresholds through 2037</li><li>• Slower travel, higher fuel costs, vehicle wear and tear, increased freight costs</li><li>• Shortened pavement life</li><li>• Increased maint. costs</li></ul>   |
|   | <b>Medium</b> <ul style="list-style-type: none"><li>• Slower travel, higher fuel costs, vehicle wear and tear, increased freight costs</li><li>• Shortened pavement life</li><li>• Increased maint. costs</li></ul>   | <b>Low</b> <ul style="list-style-type: none"><li>• Greater likelihood of injuries and crashes from more work zones</li></ul>  |
|   | <b>Low</b> <ul style="list-style-type: none"><li>• Greater likelihood of injuries and crashes from more work zones</li></ul>  |   |
| System Investment Strategies<br><i>What strategies would MnDOT use to manage risk?</i>  | <ul style="list-style-type: none"><li>• Increased focus of reactive maintenance activities on avoiding hazardous conditions.</li><li>• Increased use of operational budget for maintenance of pavements</li><li>• Increase use of short-term fixes increases the frequency of disruptions to the public</li><li>• Increased use of load postings on highway</li></ul> | <ul style="list-style-type: none"><li>• Increased focus of reactive maintenance activities on avoiding hazardous conditions.</li><li>• Increased use of operational budget for maintenance of pavements</li><li>• Increased use of short-term fixes increases the frequency of disruptions to the public</li><li>• Increased use of load postings on highways</li></ul> |

How will we decide where to invest in Pavement Condition in Minnesota?

The Moving Ahead for Progress in the 21st Century Act (MAP-21) is a federal transportation funding bill that was signed into law in July 2012. As part of the bill’s requirements, MnDOT and other state transportation agencies must meet performance targets for

pavement condition and other highway assets. MnSHIP will direct capital improvements on the state highway system to reflect these priorities.

Where is MnDOT headed?

As of 2014, MnDOT was meeting its poor pavement targets on the Interstate, remaining NHS, and non NHS state highways.

| Performance Objectives: Maintain pavements in good condition and minimize the share in poor condition; use cost-effective treatments for preventive maintenance, repair, rehabilitation and replacement; minimize reactive maintenance; and apply short- and long-term fixes at optimum points in the deterioration curves.   |  |  |
|---|--|--|
| Performance Level 2<br><i>Greater cost, lower risk</i>  | Performance Level 3<br><i>Greater cost, lower risk</i>   | Performance Level 4<br><i>Greatest cost, lowest risk</i>   |
| PL does not correspond with an Investment Approach  | PL does not correspond with an Investment Approach   | PL does not correspond with an Investment Approach   |
| <b>\$11,225 M</b><br><br>\$701.6 M/yr<br>\$701.6 M/yr<br><br>   | <b>\$12,298 M</b><br><br>\$768.6 M/yr<br>\$768.6 M/yr<br><br>  | <b>\$15,108 M</b><br><br>\$944.3 M/yr<br>\$944.3 M/yr<br><br>  |
| Meet our performance targets on the Interstate and Non-Interstate NHS systems by 2037. Maintain GASB 34 threshold on Non-NHS system through 2037.   | Meet our performance targets on all three systems by 2027 and maintain through the end of 2037.  | Maintain current pavement conditions.  |
|   |  |  |
| <b>Medium</b> <ul style="list-style-type: none"><li>• Increased maint. costs</li></ul> <b>Low</b> <ul style="list-style-type: none"><li>• Inability to meet GASB and MAP-21 thresholds through 2037</li><li>• Slower travel, higher fuel costs, vehicle wear and tear, increased freight costs</li><li>• Shortened pavement life</li><li>• Increased maint. costs</li><li>• Greater likelihood of injuries and crashes from more work zones</li></ul> | <b>Low</b> <ul style="list-style-type: none"><li>• Inability to meet GASB and MAP-21 thresholds through 2037</li><li>• Slower travel, higher fuel costs, vehicle wear and tear, increased freight costs</li><li>• Shortened pavement life</li><li>• Increased maint. costs</li><li>• Greater likelihood of injuries and crashes from more work zones</li></ul> | <b>Low</b> <ul style="list-style-type: none"><li>• Inability to meet GASB and MAP-21 thresholds through 2037</li><li>• Slower travel, higher fuel costs, vehicle wear and tear, increased freight costs</li><li>• Shortened pavement life</li><li>• Increased maint. costs</li><li>• Greater likelihood of injuries and crashes from more work zones</li></ul> |
| <ul style="list-style-type: none"><li>• Focus of reactive maintenance activities on avoiding hazardous conditions on non-NHS System.</li><li>• Some use of operational budget for maintenance of pavements specifically on non-NHS System</li><li>• Some use of short-term fixes most notably on the non-NHS System increase the frequency of disruptions to the public</li><li>• Some use of load postings on non-NHS System</li></ul>               | <ul style="list-style-type: none"><li>• Focus of reactive maintenance activities on avoiding hazardous conditions on non-NHS System.</li><li>• Some use of operational budget for maintenance of pavements</li><li>• Some use of short-term fixes most notably on the non-NHS System increase the frequency of disruptions to the public</li></ul>             | <ul style="list-style-type: none"><li>• Long-term fixes complete as need on the system</li><li>• Focus on preventative maintenance instead of reactive maintenance on the system</li><li>• Maintaining current pavement conditions on the system is made through capital investments to reduce strain on operations budget</li></ul>                           |

If MnDOT continues the 2013 MnSHIP investment direction, Interstate pavement would return to current conditions by 2037. However, by 2037, 17.5% of the remaining NHS and 24.3% of non-NHS highways will be in poor condition. If MnDOT continues its current investment, Minnesota would pass the GASB 34 threshold around 2033. Below is a table outlining pavement condition as of 2014 and projected conditions at the end of the 4-year Statewide Transportation Improvement Program (2019), the 10-year Capital Highway Investment Plan (2025), and the MnSHIP 2037 update.

| System        | 2014 | 2019  | 2025  | 2037  |
|---------------|------|-------|-------|-------|
| Interstate    | 1.9% | 4.5%  | 2.8%  | 1.7%  |
| Remaining NHS | 3.0% | 3.3%  | 10.1% | 17.5% |
| Non NHS       | 3.5% | 10.2% | 10.9% | 24.3% |

### What are the risks to be addressed in the Pavement Condition investment?

Generally, the more MnDOT invests in Pavement Condition, the more MnDOT is able to reduce these key risks:

- Poor pavement condition results in more frequent work zones and increased exposure of more workers and the traveling public to greater likelihood of injuries and crashes.
- Inability to meet federal GASB 34 requirement and MAP-21 decreases MnDOT's spending flexibility and lower the state's bond rating.
- Poor pavement quality results in increased costs to users, including loss of efficiency (higher fuel costs), slower travel times (lost time or wages), greater wear and tear on vehicles and damage to freight. Poor roads will likely have to be posted to less than 10 tons, resulting in increased freight cost.
- Less capital investment coupled with inflation stretches resources, causing greater use of low-cost, less effective, short-term fixes thereby increasing replacement costs as deterioration quickens and reducing overall remaining pavement service life.
- Less capital investment increases pressure on operations budget as greater maintenance activities are necessary to sustain a base level of safety and smoothness.

### How is MnDOT enhancing financial effectiveness through Pavement Condition?

#### Find more information with these additional folios!

##### System Stewardship

- Bridge Condition
- Roadside Infrastructure Condition
- Jurisdictional Transfer
- Facilities

##### Transportation Safety

- Traveler Safety

##### Critical Connections

- Twin Cities Mobility
- Greater Minnesota Mobility
- Bicycle Infrastructure

- Accessible Pedestrian Infrastructure

##### Health Communities

- Regional + Community Improvement Priorities

##### Other Investments

- Project Delivery
- Small Programs



Example of a road in poor condition. This pavement would receive a low RQI based on its degree of cracking and smoothness of ride.

MnDOT uses the following cost-effective approaches for pavement preservation to provide a safe and reliable riding surface for travelers while minimizing its roadways' life-cycle costs:

- **Low-cost maintenance and repairs**—using recycled materials, innovative pavement design, and preventive maintenance treatments;
- **Performance-based design**—focusing on projects that cost-effectively meet pavement and safety performance needs;
- **Alternate bidding**—planning for two comparable repair strategies (concrete versus bituminous) in the construction plan so that contractors can bid the most cost-effective solution; and
- **Research**—testing innovative materials and construction techniques at MnROAD, a world-class research facility in Albertville.

When repaving or reconstructing roads, MnDOT often makes improvements related to roadside infrastructure, safety features, and bicycle and pedestrian infrastructure. This approach helps MnDOT to more effectively use resources and minimize disruptions to the traveling public. It is often the most cost-effective strategy to include these improvements within pavement projects rather than completing them as stand alone projects.

#### For more information, contact:

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