

Roadside Infrastructure

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 Roadside Infrastructure investment strategies, funding levels, and outcomes for the estimated \$7-9 billion of remaining investment.

1 | WHAT IS ROADSIDE INFRASTRUCTURE?

Roadside Infrastructure represents an array of non-pavement and non-bridge assets found on Minnesota's state highway system that support the safe, reliable, and efficient movement of people and goods throughout the state.

GOAL AND OBJECTIVES OF INVESTMENT

The goal of Roadside Infrastructure investment is to manage roadside infrastructure beyond pavement surfaces and bridges effectively and efficiently to support a safe, accessible, and reliable roadway system. To accomplish this goal, MnDOT invests in installing, maintaining, replacing and upgrading critical infrastructure elements at optimal times to manage performance and condition using the best available information, tools and life-cycle planning to improve efficiency and reduce risks to the public.

TYPES OF IMPROVEMENTS

Roadside Infrastructure includes:

- Culverts, deep stormwater tunnels, storm sewer systems, stormwater management, and other drainage,
- Traffic signals, lighting, and Intelligent Transportation Systems (ITS)
- Highway signs and sign structures including traffic and directional signs
- Noise walls
- Pavement markings

- Guardrail and concrete barriers, including cable-median barriers

Roadside Infrastructure investment focuses on the repair, rehabilitation or replacement of existing infrastructure. Investments to upgrade or add new infrastructure is not included in Roadside Infrastructure. New improvements such as new lighting at rural intersections, new dynamic messaging signs or new guardrail are included in other investments categories such as Transportation Safety, Highway Mobility, and Advancing Technology based on the purpose for the expansion.

HOW DOES MNDOT CURRENTLY SELECT ROADSIDE INFRASTRUCTURE IMPROVEMENTS?

MnDOT often repairs, replaces, or rehabilitates roadside infrastructure as a part of a larger pavement, bridge, or intersection project. An example of this is striping of roadways as a part of a paving project. On a typical pavement project, approximately 12% is spent on roadside infrastructure elements.

Sometimes, MnDOT carries out corridor-wide standalone roadside infrastructure projects for assets such as culverts, signs, or lights. Roadside infrastructure features damaged from weather or vehicle impacts are usually repaired as part of routine maintenance and funded through the operations and maintenance budget.





2 | WHY IS INVESTING IN ROADSIDE INFRASTRUCTURE IMPORTANT?

Roadside Infrastructure investments promote safe and informed driving. Center and edge line striping, and rumble strips help drivers stay within their travel lane. Guardrails and cable-median barriers deflect vehicles if they leave the paved surface. Culverts and drainage systems prevent flooding on the roadways during heavy rains and settle out pollutants that could damage rivers, creeks, and wetlands. Lighting, signs, signals, and ITS help drivers safely find their way to destinations while noise walls provide barriers to help reduce traffic noise from reaching nearby homes.

HOW DOES MNDOT MEASURE PERFORMANCE, CONDITION, OR OUTCOMES?

As a part of Transportation Asset Management Plan, MnDOT compiled inventories, collected inspection data, and set condition performance measures and targets for several different types of roadside infrastructure. Below is a table including the performance measure, targets, and current condition for roadside infrastructure.

INFRASTRUCTURE TYPE	PERFORMANCE MEASURE	PERFORMANCE TARGET	CURRENT CONDITIONS (2021)
Highway culverts	Share of culverts in poor condition	10% poor	18% poor
Deep Stormwater Tunnels	Share of tunnels in poor condition	10% poor	0% poor
Lighting	Share of lighting in beyond useful life	2% beyond useful life	12% beyond useful life
High-Mast Light Towers	Share of towers in poor condition	6% poor	8% poor
Traffic Signals	Share of signals in beyond useful life	2% beyond useful life	9% beyond useful life
Intelligent Transportation Systems (Example: Traffic Cameras)	Share of ITS asset beyond useful life	Various (Example: 5% approaching or beyond useful life)	Various (Example: ≤4% approaching or beyond useful life)
Overhead Sign Structure	Share of structures in poor condition	6% poor	14% poor
Noise Walls	Share of noise walls in poor condition	8% poor	6% poor

3 | OPTIONS FOR INVESTING OVER THE NEXT 20 YEARS

Roadside Infrastructure Strategies

A **minimum level** of investment of **\$2.0 billion** represents a roughly 20% reduction from the current rate of investment over the next 20 years. At this level of investment, roadside infrastructure would deteriorate at a quicker rate. For example, highway culverts would deteriorate from 18% poor to 41% poor, noise walls from 6% to 25% poor, and traffic signals would deteriorate considerably from 9% beyond service life to 61% beyond useful service life. Increasing levels of investment help MnDOT replace and repair more culverts, lights, signs, or signals and keep roadside infrastructure in better condition. Below are four levels of additional investment above the minimum of \$2.0 billion and their associated outcomes.



\$X.X Total cost of investment level

- Portion of remaining \$7-9 billion investment for level
- Remaining investment available for other priorities

4 | ROADSIDE INFRASTRUCTURE 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 Roadside Infrastructure. The risks and their impacts are identified below.

HIGH RISKS

Risk: Equipment/systems exceeds service life or are damaged and are no longer functional

Impact: Likely to impact safety to the public (from potential injury to loss of life), cause greater service interruptions, loss of service, and exposure of MnDOT workers

MEDIUM RISKS

Risk: Reduction in replacement and repair

Impact: Likely to shift responsibility of replacement and repair to operations and maintenance resources and staff or result in an inability to meet asset standards

Risk: Delayed replacement and repair cycles not aligned with optimal life-cycle

Impact: Likely to result in more reactive, less cost-effective strategies and reduced ability to replace or upgrade assets beyond service life.

Risk: Inability to adapt to climate change and extreme weather events

Impact: Likely to reduce the resilience of infrastructure, increase the deterioration, increase potential for asset failure, and accelerate the life-cycle replacement

Risk: Risk of technology, material, and installation obsolescence and inability to modernize the system

Impact: Likely to lose functionality before end of service life and inability to integrate new assets into existing systems

WHAT LEVELS OF INVESTMENT REDUCE THE LIKELIHOOD OF THE RISK OCCURRING OVER THE NEXT 20 YEARS?

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

RISK STATEMENT	SHIFTS FROM HIGH TO MEDIUM RISK	SHIFTS FROM MEDIUM TO LOW RISK
Equipment/systems exceeds service life or are damaged and are no longer functional	Investment Level 2	Investment Level 4
Reduction in replacement and repair	Already a Medium risk level	Investment Level 3
Delayed replacement and repair cycles not aligned with optimal life-cycle	Already a Medium risk level	Investment Level 4
Inability to adapt to climate change and extreme weather events	Already a Medium risk level	Investment Level 4
Risk of technology, material, and installation obsolescence and inability to modernize the system	Already a Medium risk level	Investment Level 3

To find out more details about Roadside Infrastructure planning and projects, go to:

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

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

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