



TECHNICAL SUMMARY

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LRRB PROJECT COST:

\$65,000



After only two years of service, this pavement marking has significantly deteriorated, demonstrating the importance of using products with longer service lives.



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Using a National Database to Develop Performance Metrics for Local Pavement Markings

What Was the Need?

Pavement markings play an important role in road safety, preventing crashes and helping drivers navigate the road. The effectiveness of pavement markings can vary depending upon the type of materials used, such as latex, epoxy, tape and thermoplastic.

To maximize the cost-effectiveness of markings, local agencies must select materials based on road surface type, traffic volume and purpose. MnDOT continually tests various types of pavement marking materials for their effectiveness, retroreflectivity and durability. To allow other agencies to reap the benefits of these efforts, MnDOT shares its pavement marking test data via the AASHTO National Transportation Product Evaluation Program (NTPEP) database. NTPEP enables cost-effective product evaluations for state DOTs by eliminating duplicate testing and tracking.

Product performance metrics from this study will help Minnesota local agencies save time and money by choosing longer-lasting pavement marking products.

What Was Our Goal?

The goal of this research was to develop pavement marking performance metrics for Minnesota local agencies to use as a guide when choosing the most durable and cost-effective products. Researchers developed the pavement marking performance metrics, specifically for retroreflectivity and service life, by analyzing existing MnDOT data mined from NTPEP. They also used the findings to make recommendations for future pavement marking research to support local agency needs.

What Did We Do?

Researchers designed and conducted a survey to assess pavement marking products used by local agencies in the state. Then they extracted 2010 and 2013 MnDOT pavement marking data from NTPEP to analyze the performance of products that survey respondents identified as commonly used.

NTPEP data included products tested at two different sites and applied on different road surfaces. Researchers analyzed performance with regard to retroreflectivity and deterioration or longevity of the materials under various conditions, such as road surface type, year of application, traffic volume and type of pavement marking. Based on results from the analysis, researchers developed performance metrics for Minnesota local agencies to use as a guide for choosing particular pavement marking product types.

What Did We Learn?

From the survey results, researchers learned that the majority of Minnesota local agencies use either latex or epoxy as their primary pavement marking material. However, epoxy and tape outperformed latex at all levels of conditions and provided a service life of three years or more.

A few survey respondents also reported grooving as a method that seemed to extend the service life of latex paint markings. Researchers were unable to investigate the impact of grooving, however, since the NTPEP database does not include MnDOT grooving data.

“There would be great potential savings in using pavement marking products with a longer service life. Mining NTPEP data to analyze product performance has not been done before and should contribute substantially to this goal.”

—Omar Smadi,
Director, Iowa State
University Center for
Transportation Research
and Education

“The findings from this research will be beneficial for Minnesota local agencies in determining which pavement marking materials are most effective.”

—Kate Miner,
Traffic Manager, Scott
County

Produced by CTC & Associates for:

Minnesota Department
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Grooving may extend the service life of pavement marking materials.

From the NTPEP data analysis, researchers concluded the following:

- White markings had significantly higher initial retroreflectivity and slower deterioration than yellow markings.
- Road surface type does not significantly impact retroreflectivity throughout its service life.
- Epoxy has higher retroreflectivity than latex materials.
- As expected, markings on wheel zones deteriorated faster, reducing retroreflectivity over time.
- Deterioration values of markings varied among different test sites, which may be attributed to differences in average annual daily traffic (AADT) values (10,000 in 2010 versus 37,000 in 2013) or installation practices.

What's Next?

Although the product performance metrics data will help Minnesota local agencies make better pavement marking product decisions in less time, researchers recommend developing a guidebook to make the information more usable. Adding grooving data to the guidebook would also be beneficial to investigate the potential impact grooving provides in extending the service life of pavement markings.

Researchers also recommend testing the same products evaluated in this research on low-volume local roads and on challenging surface types. MnDOT NTPEP data only included products that were tested on high-volume freeways.

This Technical Summary pertains to the LRRB-produced Report 2017-43, “Minnesota Local Agency Pavement Marking: Mining Existing Data,” published November 2017. The full report can be accessed at mndot.gov/research/reports/2017/201743.pdf.