Virginia Transportation Research Council
Research Needs Statement

RNS 26-5: Performance Assessment and Implementation Strategy for Grooved Pavement Markings

Proposers should define a budget and timeline necessary to accomplish the research objectives laid out in this Research Need Statement.

Please contact Michael Fontaine at Michael.Fontaine@VDOT.Virginia.Gov or Justice Appiah at Justice.Appiah@VDOT.Virginia.Gov with any questions.

E-mail reply to this solicitation to: Michael.Fontaine@VDOT.Virginia.Gov by 12:00 Midnight on September 19, 2026

Background

VDOT has implemented recessed (grooved) pavement markings using various materials, including high-build paint, thermoplastic, polyurea, and tape, on several roadways throughout the state. This initiative aims to reduce snowplow-related damage and extend the service life of pavement markings, particularly on roadways exposed to frequent snowplow operations and heavy traffic. As recessed markings are considered for broader implementation, there is a need to evaluate their long-term performance and cost-effectiveness relative to traditional surface applied markings.

A key performance metric under evaluation is the retroreflectivity of the recessed markings in dry conditions. This study should (1) conduct annual post-winter assessment of the retroreflectivity and durability of recessed pavement markings at multiple pilot locations using Mobile Retroreflectivity Units (MRUs) or other methods and (2) compare the retroreflectivity with the performance of the same types of surface-applied pavement markings at other locations. Additionally, the evaluation should consider other factors influencing marking performance, such as traffic volume, weather conditions, and roadway geometry.

Project Objectives

The primary objectives of this research are to (1) evaluate the lifecycle performance of recessed pavement markings across various materials and environmental conditions and (2) develop recommendations for where VDOT should install recessed markings. Specifically, the research should:

- Regularly assess the retroreflectivity and durability of recessed pavement markings annually for at least 2 years at a set of pilot locations. Depending on the results of that analysis, a follow-on study of up to 2 additional years may be awarded at the discretion of VTRC and the Technical Review Panel. Universities should only outline their scope for the first 2 years in their expression of interest (EOI), however.
- Compare the performance of recessed markings to a set of similar sites with conventional surface-applied markings.

- Analyze factors that influence performance, such as traffic volumes, weather patterns, and roadway geometry.
- Evaluate lifecycle costs, constructability, and maintenance requirements.
- Develop strategic recommendations for prioritizing roadway segments and locations best suited for recessed markings to enhance roadway safety and maximize cost-benefit.

Potential Tasks

Each research team should develop a methodology that best satisfies the project objectives. Researchers should include task descriptions that cover the following items at a minimum:

- A review of recent research related to retroreflectivity and life cycle of recessed markings
- A review of state DOT best practices for installation, maintenance, and life cycle costs of recessed markings
- A detailed data collection and sampling plan, including a description of methods used to collect and analyze retroreflectivity data.

An implementation plan should be provided in the response to this RNS. The implementation plan should discuss how the results could support the development of statewide pavement marking policies and implementation strategies, including recommendations for potential broader deployment of recessed markings. Based on the research findings, a decision-making framework or prioritization tool should be developed to assist VDOT and its district offices in identifying roadway segments most suitable for recessed markings. This tool may incorporate factors such as crash history, retroreflectivity performance data, roadway classification, and regional weather conditions to help map and prioritize high-risk corridors.

Special Notes

1. In preparing the EOI, each responding university should be sure to indicate the number of hours spent by key personnel on the project by task in their budget submission.
2. The EOI should include virtual meeting updates with the Technical Review Panel on at least a quarterly basis.
3. If the researchers expect VDOT to provide any data, materials, or services (such as traffic control), that should be explicitly indicated in the EOI.