

Project Capsule



April 2026

Pavement Markings Retroreflectivity: Enhancing Traffic Safety

PROBLEM

Pavement markings are a critical component of roadway safety, providing lane delineation and alignment guidance for drivers, particularly during nighttime and low-visibility conditions. To remain effective for both human and machine vision, pavement markings must maintain adequate visibility and durability throughout their service life. In Louisiana, the Department of Transportation and Development (DOTD) requires recurring nighttime inspections of existing pavement markings to determine whether retroreflectivity levels meet minimum thresholds and whether replacement is necessary. Additionally, the Federal Highway Administration (FHWA) published a final rule in 2022 updating the Manual on Uniform Traffic Control Devices (MUTCD), which establishes minimum retroreflectivity standards and guidance for longitudinal pavement markings and requires agencies to implement a formal method to ensure compliance within a four-year timeframe.

Pavement marking performance is influenced by several factors, including traffic wear, environmental exposure, and routine maintenance activities, which can vary significantly across roadway types and conditions in Louisiana. Applied Research Associates (ARA), Inc., understands that the Louisiana Transportation Research Center (LTRC) is seeking research-based insights to better understand the factors influencing pavement marking retroreflectivity and to identify effective maintenance methods that support sustained compliance with FHWA standards. In addition, LTRC desires to assess the safety benefits associated with improved pavement marking visibility, particularly related to nighttime roadway and lane departure crashes, to ensure that transportation funds are used efficiently and effectively.

OBJECTIVE

The objectives of the project are to:

1. Develop cost-efficient recommendations for maintaining marking retroreflectivity at or above minimum levels on Louisiana state highways;
2. Improve understanding of pavement striping practices and material performance factors that influence the durability and long-term retroreflectivity of pavement markings; and
3. Evaluate the safety impacts of pavement marking retroreflectivity, with an emphasis on nighttime roadway and lane departure crashes.



Figure 1. ARA MRU Truck

Start Date

April 13, 2026

Duration

21 months

Funding

SPR: TT-Fed/TT-Reg - 5

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METHODOLOGY

This plan is broken down into twelve (12) individual tasks to ensure systematic execution of the research in accordance with LTRC requirements:

1. **Kickoff Meeting:** Prior to the start of the project, ARA will coordinate with the Project Manager and attend the kickoff meeting in person to formally introduce the ARA project team, review key proposal elements, and address any questions or recommendations from the Project Review Committee (PRC).
2. **Literature Review:**
 - Review FHWA identified acceptable methods designed to maintain pavement marking retroreflectivity at or above the specified minimum levels.
 - Review the substantial body of literature which has examined pavement marking practices, material performance, and maintenance strategies employed by state DOTs, beyond FHWA.
 - Review results from recent relevant studies addressing pavement marking performance, degradation behavior, and safety impacts.
3. **Survey:** To understand how practices vary across the state, ARA will distribute a survey to DOTD Districts and Headquarters traffic engineers.
4. **Field Data Collection:** ARA will select test locations representing a range of pavement marking materials, pavement surface types, and other factors of interest.
5. **Performance Data Analysis:** ARA will perform comparative evaluations of pavement marking performance across the selected test locations.
6. **Traffic Safety Analysis:** ARA will request crash data from LTRC or DOTD for locations where pavement marking retroreflectivity has been improved through documented treatment. The data will be used to examine whether observed changes in safety can be associated with marking treatments and the timing of those treatments.
7. **Interim Presentation:** ARA will prepare and deliver an interim technical presentation to the PRC summarizing project progress, completed tasks, preliminary findings, and any emerging issues or observations.

8. **Biannual Reports:** ARA will prepare and submit three biannual written progress reports in accordance with LTRC requirements.
9. **Draft Final Report:** ARA will prepare a draft final report presenting the complete research methodology, data collection activities, analyses findings, conclusions, and preliminary recommendations.
10. **Final Report and Technical Summary:** ARA will submit a final report that incorporates PRC feedback and is suitable for publication.
11. **Final Presentation:** ARA will deliver a final close-out presentation to the PRC summarizing the completed research, key findings, conclusions, and recommended implementation stages.
12. **Presentation to DOTD Officials:** ARA will present the study results to DOTD officials at DOTD Headquarters in Baton Rouge, Louisiana.

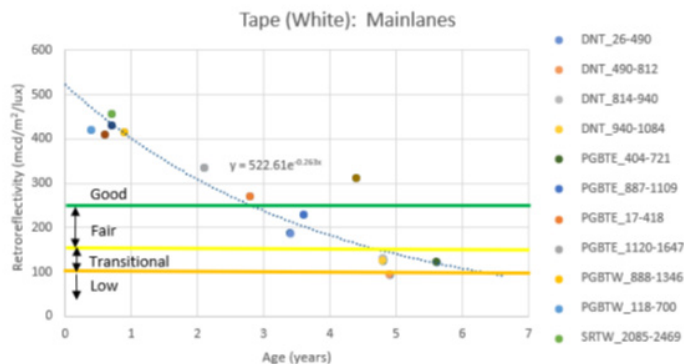


Figure 2. Pavement Marking Performance Curves

IMPLEMENTATION POTENTIAL

The findings from this research will support DOTD's implementation of a method for maintaining minimum pavement marking retroreflectivity and provide data-driven input for pavement marking maintenance and safety decision making. Potential applications include pavement marking material selection, maintenance planning, retroreflectivity monitoring strategies, and prioritization of locations where improved visibility offers greater safety benefits.