

Research at a Glance

Technical Brief

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Evaluation of NJDOT Hardened Traffic Paint Markings and Stripes Performance

Pavement markings are essential for roadway safety, providing critical guidance to drivers and supporting ADAS technologies that depend on clear, visible lanes. While retroreflectivity is commonly used to assess nighttime visibility, other factors such as pavement color, width, surface texture, and environmental conditions also influence performance, making consistent markings vital.

Research Problem Statement

Pavement markings are critical for roadway safety and machine-vision systems in ADAS and autonomous vehicles, yet their visibility deteriorates quickly due to traffic, weather, and poor application practices. Traditional retroreflectivity measurements alone cannot capture the full range of performance factors, leaving gaps in ensuring long-term durability and reliability. Additionally, supply chain disruptions and inconsistent quality assurance practices hinder timely maintenance and material availability. These challenges highlight the urgent need for performance-based specifications, resilient procurement strategies, and marking standards compatible with emerging automated driving technologies.

Research Objectives

The objective of this research is to identify pavement marking products capable of withstanding New Jersey's weather and traffic conditions while ensuring long-term durability and cost-effectiveness. The study seeks to guide for improvement of installation specifications, maintenance practices, and testing protocols by evaluating factors such as drying time, durability, temporary marking needs, and cost benefits. It also aims to develop alternative specifications that enable quick application during supply chain disruptions. Finally, the research emphasizes ensuring pavement markings are compatible with autonomous vehicle sensing systems, supporting safe and reliable operations in the evolving transportation environment.

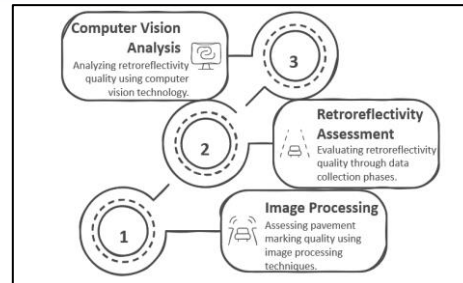
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Methodology

The study used technical data collection, field investigations, and stakeholder interviews to evaluate pavement marking performance across New Jersey. A three-year study (2023–2025) used video-based technologies and computational methods to assess durability, drying times, cost-effectiveness, and AV sensor compatibility, while also reviewing specifications, testing protocols, and supply chain considerations for future-ready improvements.



Data Analysis Framework

Results

- Field data from NJ routes showed Coefficient of retroreflected luminance (R_L) dropped within 7–8 months, often below 150 mcd/m²/lux. Visual inspections overstated quality, underscoring the need for objective R_L testing with handheld or mobile retroreflectometers.
- Thermoplastic showed the best R_L and durability for high-volume or snowplow corridors; 6-inch lines outperformed narrow ones, while epoxy degraded faster, and waterborne paints suited temporary use.
- COVID-19 disruptions emphasized the importance of bulk purchasing, diversified vendors, and approval of alternative products (e.g., high-build paints) to ensure continuity.
- Agencies should adopt measurable minimum maintained R_L thresholds (≥ 150 white, ≥ 100 yellow mcd/m²/lux) to refresh markings before reaching MUTCD minimums, with post-installation and periodic testing to guide maintenance and service life planning.
- High-contrast, wider, markings improve visibility for ADAS/AV sensors, supporting safer automated mobility.



Mobile Pavement Marking Retroreflectometer and Camera System

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