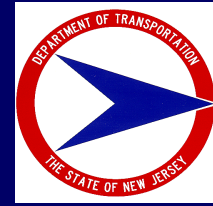


New Jersey Department of Transportation  
Bureau of Research

## Technical Brief



### Evaluation of Raised Pavement Markers

This project developed a methodological framework for quantifying the safety effectiveness and implementation costs of raised pavement markers (RPMs) and relevant alternatives. It proposed guidelines for the use of these safety devices under different conditions after reviewing relevant literature and current installation practices in various states. Finally, a computer-aided decision support tool was provided to support making the optimal decision.

### Background

RPMs are delineation devices used to improve preview distances and provide guidance for drivers in inclement weather and low-light conditions. Different states have particular asset management strategies in terms of installation, monitoring, inspection and maintenance of RPMs. Most states install RPMs selectively based on certain locational characteristics of the roadways, while in the State of New Jersey, RPMs are used along all centerlines and skip lines, regardless of traffic volume, roadway geometry, or roadway classification. The main purpose of this study is to conduct a comprehensive evaluation for RPMs and relevant alternatives to attain cost-effective safety improvements.

### Research Objectives and Approach

This research aimed to better understand 1) whether the significant investment of RPMs in New Jersey generates varying safety benefits at different locations; 2) whether there are alternatives or modifications to the existing RPMs; and 3) how to optimize the installation, monitoring, and maintenance of RPMs and their promising alternatives.

This research reviewed previous studies and developed a methodological framework for quantifying the cost-effectiveness of RPMs and their alternatives. In addition to a preliminary statistical data analysis of the cost and potential safety benefit, the study also summarized a simple luminance measurement method for RPMs and other forms of pavement marking and delineation systems. Laboratory testing results and visual performance analyses are also presented in the study.

## Findings

- There is no consensus in the literature regarding whether and how RPMs affect roadway crash rate. The effects of RPM on roadway safety were found to vary with traffic, environmental factors, and roadway characteristics.
- The laboratory testing shows that the new RPM samples provide high levels of visibility.
- Used RPMs measured in this study had luminances 20% to 30% lower than new RPMs; however, such reductions were of little consequence to visual performance.
- In general, RPMs tend to have visibility distances between 300 and 400 meters before they reach the visibility threshold defined by a Relative Visual Performance (RVP) value of zero. While greater threshold distances would give drivers more time and distance to respond to these devices, further study is needed to assess whether they would reduce nighttime crashes.
- There are diverse practices and guidelines for implementing RPMs and alternatives (e.g. rumble stripes, traffic tapes, delineators) among different states.
- One factor that needs further research is the spacing or degree of continuous delineation that drivers need for safety.
- A decision support tool has been developed to evaluate and compare the life-cycle-cost (LCC) of RPMs and alternatives. The tool accounts for installation cost, traffic control cost, traffic delay cost, inspection cost, maintenance and repair cost, as well as the liability cost associated with incidents due to damaged RPMs or alternatives.

For More Information Contact:

NJDOT Project Manager:	Pragna Shah
	609-530-8025
	<a href="mailto:Pragna.Shah@dot.nj.gov">Pragna.Shah@dot.nj.gov</a>
Principal Investigator:	Xiang Liu
	Assistant Professor, Civil and Environmental Engineering
	217-721-0392
	<a href="mailto:Xiang.liu@rutgers.edu">Xiang.liu@rutgers.edu</a>

A final report is available online at: <http://www.state.nj.us/transportation/refdata/research/>.  
If you would like a copy of the full report, send an e-mail to: [Research.Bureau@dot.state.nj.us](mailto:Research.Bureau@dot.state.nj.us).

**Evaluation of Raised Pavement Markers**  
**NJDOT Research Report No: FHWA-NJ-2018-004**