Florida Department of Transportation Research

# Raised Pavement Markers (RPMs) Assessment Using Highway Speed Mobile Retroreflectivity Technology

*May 2022*


**Project Number**
BE715

**Project Managers**
Charles Holzschuher
*FDOT Materials Office*

**Principal Investigator**
James Fletcher
*University of North Florida*


## Current Situation

Raised pavement markers (RPMs) are common on Florida roadways. They improve the visibility of driving lanes under wet or nighttime conditions, especially on rural roads where illumination may be lacking. The effectiveness of RPMs is due to their retroreflectivity, which is the ability to reflect light back toward its source (for example, a driver's vehicle) regardless of the angle between the light source and the RPM. However, because RPMs are exposed to continuous wear, the elements, and other sources of damage, they may cease to be useful if they are cracked, fragmented, or dislodged. Therefore, RPMs must be inspected, requiring visual inspection along thousands of miles of Florida roadways. Similar inspections are conducted for pavement striping, but these inspections are performed using a mobile reflectivity unit (MRU) that automates the process. It would be useful if the MRU could also be adapted for effective inspection of RPMs.

*Florida's roadways are lined with millions of raised pavement markers that help drivers follow traffic lanes, especially at night.*

## Research Objectives

University of North Florida researchers investigated the use of a mobile retroreflectivity unit to accurately and repeatably detect and measure the retroreflectivity of in-service raised pavement markers.

## Project Activities

In a previous project (BDV34-977-03), the research team developed the methodology to measure retroreflectivity of lane striping, to process the data, and deliver the data to Florida Department of Transportation (FDOT) data management applications. Using those procedures, the FDOT State Materials Office now collects 25,000 lane miles of line-stripe retroreflectivity data each year in units of retroreflected luminance (RL). A primary objective of this project was to use these RL values to calculate a different measure of retroreflectivity, luminous intensity (RI), which is the industry standard for such measurements. This was one of several adjustments that were required to adapt the MRU for RPM assessment.

The researchers developed custom software to control the MRU through a simplified interface and thus facilitate the many adjustments and measurements the research required. An RPM handheld retroreflectometer was used to verify MRU measurements.

In a lengthy series of laboratory studies, the MRU was modified to detect and measure RPM retroreflectivity in terms of RL. RPMs on several roadways throughout Northeast and Central Florida were examined using both the handheld retroreflectometer and the MRU. The results showed that the modified MRU effectively assessed RPM retroreflectivity on tenth-mile intervals in a highly repeatable manner with an average error in estimated RI of ±16%.

Software was designed to summarize information from the MRU-produced data. The output of this software includes estimated RI values, counting RPMs, and classifications of RPM retroreflectivity for each tenth-mile reading as "LOW", "MID", or "HIGH."

## Project Benefits

The modified MRU developed in this project for statewide RPM assessments is a significant improvement over the current visual assessments and allows maintenance personnel to quantify RPM quality on a network level.

*For more information, please see www.fdot.gov/research/.*