Implementation of a Pavement Marking Management Program in Florida

NESMEA 2013
Presentation Outline

- Pavement Marking Information
- Current Re-Striping Determinations
- Mobile Retroreflectivity Unit (MRU)
- MRU Program Background
- Pavement Marking Management Program
  - Implementation Plan
  - Data Quality of MRU Testing
  - Database
Pavement Marking Information

- Driver’s need for light doubles every 13 years
- Slower response time with age
- 12% of the country’s drivers are over the age of 65
- 17% of Florida’s drivers are over the age of 65
- Fatalities are 3 times more likely at night
Night Time Marking Visibility

How do you think these traffic signs and pavement markings perform at night?
## Factors that Influence Retroreflectivity

<table>
<thead>
<tr>
<th>Climate Conditions</th>
<th>Glass Spheres</th>
<th>Marking Material</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rain</td>
<td>Dispersion</td>
<td>Construction</td>
<td>Roadway debris</td>
</tr>
<tr>
<td>Fog</td>
<td>Embedment depth</td>
<td>Type</td>
<td>Abrasion by traffic</td>
</tr>
<tr>
<td>Snow</td>
<td>Clarity</td>
<td>Color</td>
<td>Dirt &amp; sand</td>
</tr>
<tr>
<td>Ultraviolet light &amp; heat</td>
<td>Refractive Index</td>
<td>Thickness</td>
<td>Pavement Texture</td>
</tr>
</tbody>
</table>

- It is difficult to precisely determine when it is the best time to replace pavement markings
  - Too late compromises safety,
  - Too soon increases maintenance cost!
Current Re-Striping Determinations

- Visual Inspection
  - Windshield Survey
  - Subjective (pass/fail)

- Handheld Retroreflectivity
  - Site Specific
  - Requires M.O.T.

- Prescriptive Method
  - Re-striping cycles
  - Inefficient
Mobile Retroreflectivity Unit (MRU)
Mobile Retroreflectivity Unit (MRU)

- Follows Same Method as Handheld Unit but on a Mobile Platform
- Laser Scans the Road 1 Meter Wide
- No Maintenance of Traffic Required
- Highway Speed Testing
- Continuous Data Collection
- Can be used Day or Night

1/3rd scale of 30 meter geometry (Used in FDOT unit)

Observation Angle = 1.05°

Co-entrance Angle = 1.24°
MRU Program Background

- Collaboration of FDOT and UNF (Since 2005)
- Mitigation Strategies to Improve MRU Test Results
- Collaboration with MRU Manufacturer
- FDOT Operational Manual for MRU
- Development of an Implementation Plan
**PMM Implementation Plan**

- 3 Year Initial, 25,000 Line Miles of Markings per Year.
  - 100% of the Yellow Center-line Markings (Approx. 12,000 Miles)
  - Sampling of the White Line Markings (Skip and Edge-line, Approx. 8,000 Miles)
  - Identification of 35 New Construction/Overlay Projects for Determining Pavement Marking Degradation Rates (Approx. 4,000 Miles)
    - 5 per District, Not to Exceed 700 Lane-mile Total

- Network Level Assessments for Pavement Marking Retroreflectivity
- Efficient Means to Measuring Retroreflectivity
- Improve Safety for Roadway Users and Field Personnel
- More Objective Assessments
The results of two properly conducted retroreflectivity tests using different MRUs on the same pavement marking test section should not differ by more than 13.3% (53.0 mcd/m$^2$/lux for the ten sites tested for this study) at a 95 percent confidence level for retroreflectivity values ranging between 200 and 800 mcd/m$^2$/lux.

*6 MRU and 3 handheld values at each 0.1 mile segment*
Florida Test Method

- A Florida Test Method for Measuring Retroreflectivity of Pavement Markings Using a Mobile Retroreflectivity Unit has been created...

- FM 5-600
# MRU Worksheet

- **FDOT MRU Worksheet** *(Form #675-060-15)*

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**INSTRUCTIONS**

Yellow Highlight Areas are Optional input into the MRU database.

Red Highlight Areas are Required input into the MRU database.

1. The file name is needed for a reference.
2. The data analysis software and version being used. Ex. (Excel 2016, #1.4)
3. The company performing the data collection. Ex. FloridaDOT
4. The reflectometer serial number. Ex. Laserdot 402 or LL 409
5. Operator's name specific to the test.
6. The MRU unit, vehicle or equipment ID. Ex. APRIL 2 or unit #2
7. Identification description. Ex. Road #01 or reflector #47

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Traffic Marking Certification Worksheet

- FDOT Traffic Marking Certification Worksheet (Form# 700-050-70)

<table>
<thead>
<tr>
<th>Date</th>
<th>Financial Projected</th>
<th>Contracting Feds/State (Form #)</th>
<th>Financial Reporting Period</th>
<th>Certification Period</th>
<th>Certification Authority</th>
<th>Certification Authority Signature</th>
<th>Certification Authority Title</th>
</tr>
</thead>
<tbody>
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</tbody>
</table>

Note: This worksheet is for use by certified traffic marking contractors to record and report the completion of marking projects. It includes fields for project details, certification information, and authority signatures. The form is designed to ensure compliance with traffic marking standards and regulations.
Quality Assurance

- A **Quality Assurance for Mobile Retroreflectivity Units** document has been developed to ensure:

  - The equipment and operators can adequately meet the performance requirements such as:
    - Equipment sensitivity
    - Calibration procedures
    - Software
    - Known Retro Values
    - Field Verification
    - Data Validation
Statewide MRU Testing

- Contract with MRU Consultant
  - Contract Start Date: April 22, 2013
    - Performed and Passed Quality Assurance Testing
  - Statewide Testing Start Date: April 29, 2013
  - Current Status: On Schedule
    - Over 10,000 of 25,000 Line Miles Collected
    - 40% Complete

- Quality Control
  - FDOT Collecting 30% of Statewide Data
Pavement Marking Management Program Database Development

- Current Status
  - System Design Phase Completed
  - PMM System Construction and Testing Start Date: August 2013
- Proposed Completion Date: January 2014
- Features
  - Graphs
  - Tables
  - Query Tools
  - Video log
  - GIS Mapping
Pavement Marking Management Program Selection Filter/Query Tools
Pavement Marking Management Program Graph and Table Reporting

Florida Department of Transportation
State Materials Office
Pavement Materials Section
Pavement Marking Management System Summary
District 2 - Madison County - SR53
County Section: 35060000
BMP: 0.000 EMP: 20.222
Pavement Marking Management Program
GIS Mapping and Video Log Tools
Questions/Comments