

Implementation of a Pavement Marking Management Program in Florida



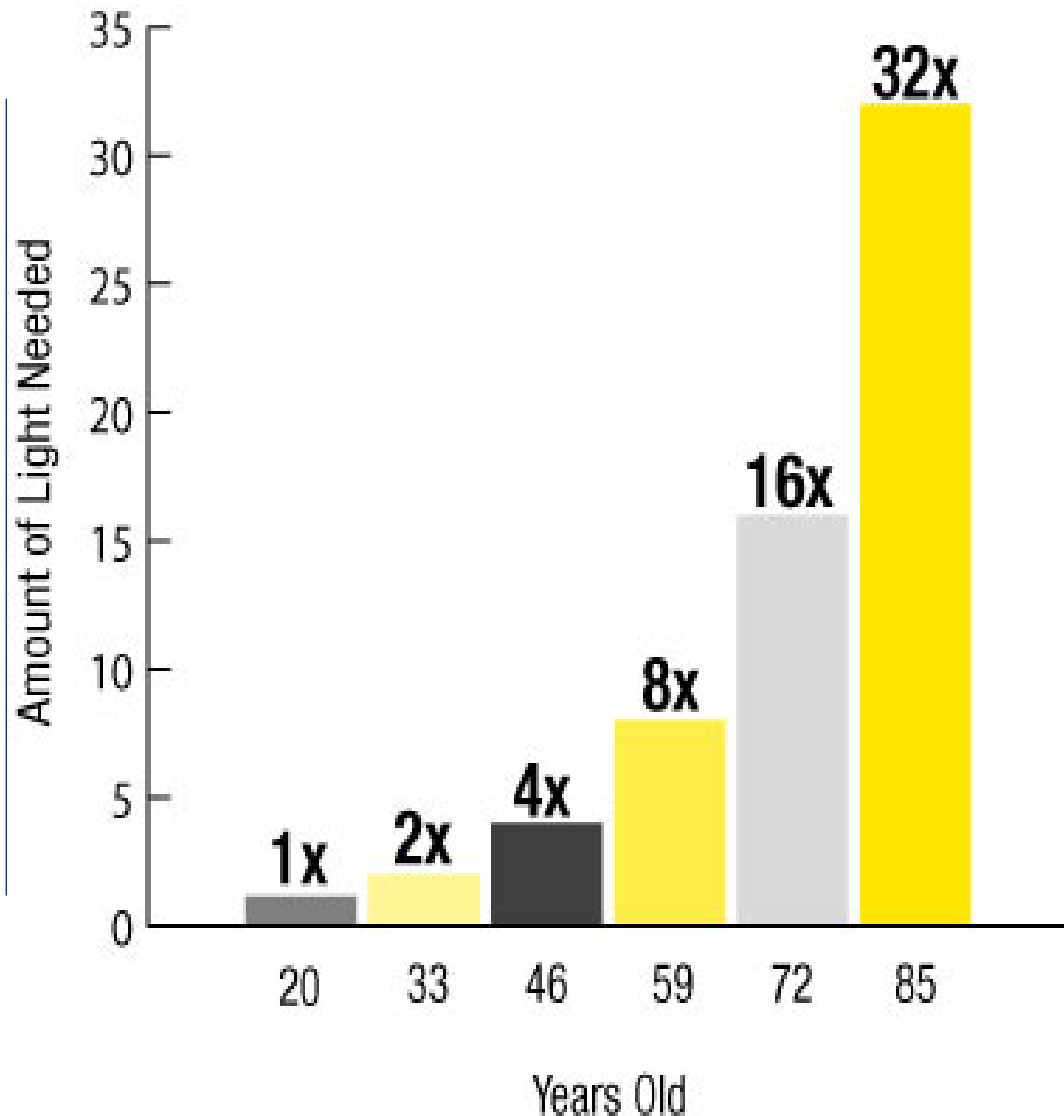
NESMEA 2013

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

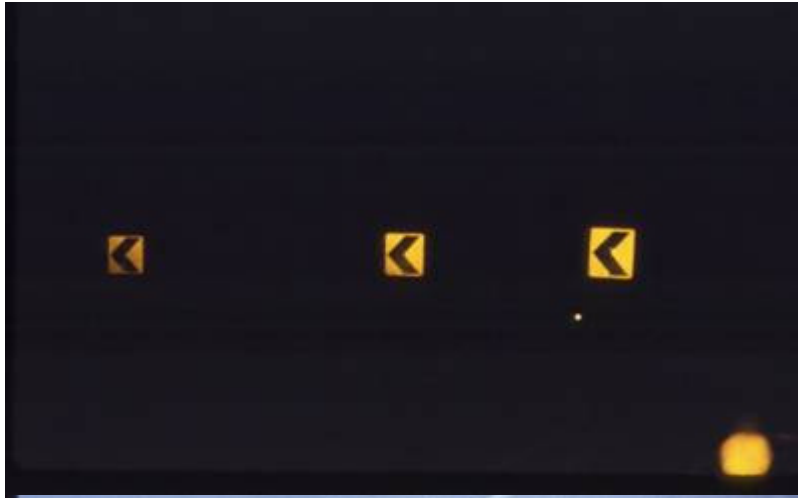


Pavement Marking Information



- ◆ 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

Climate Conditions
Rain
Fog
Snow
Ultraviolet light & heat

Glass Spheres
Dispersion
Embedment depth
Clarity
Refractive Index

Marking Material
Construction
Type
Color
Thickness

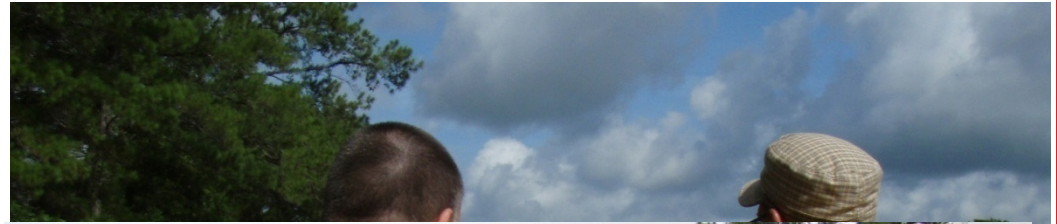
Other
Roadway debris
Abrasion by traffic
Dirt & sand
Pavement Texture

- ◆ 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

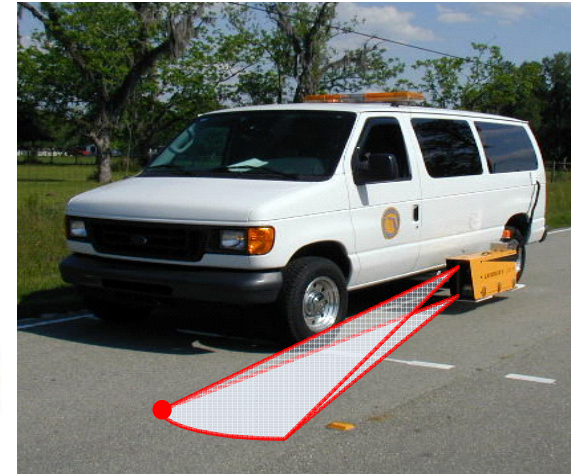


Mobile Retroreflectivity Unit (MRU)

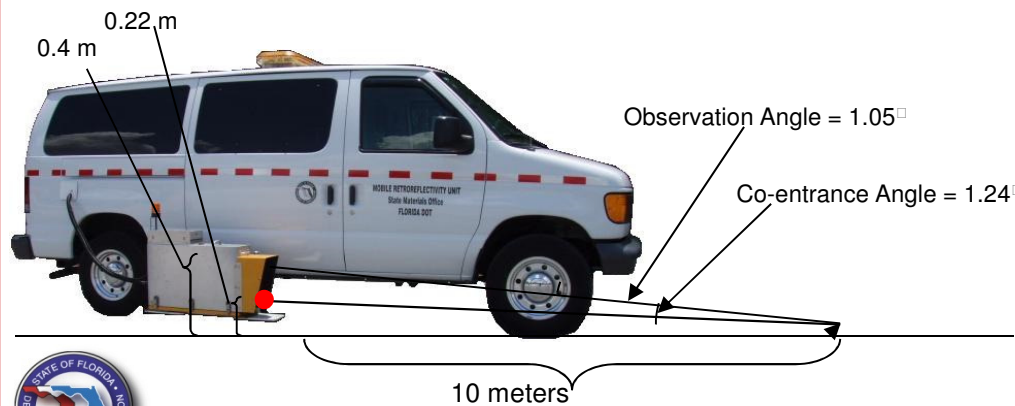


Mobile Retroreflectivity Unit (MRU)

- ◆ 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)



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



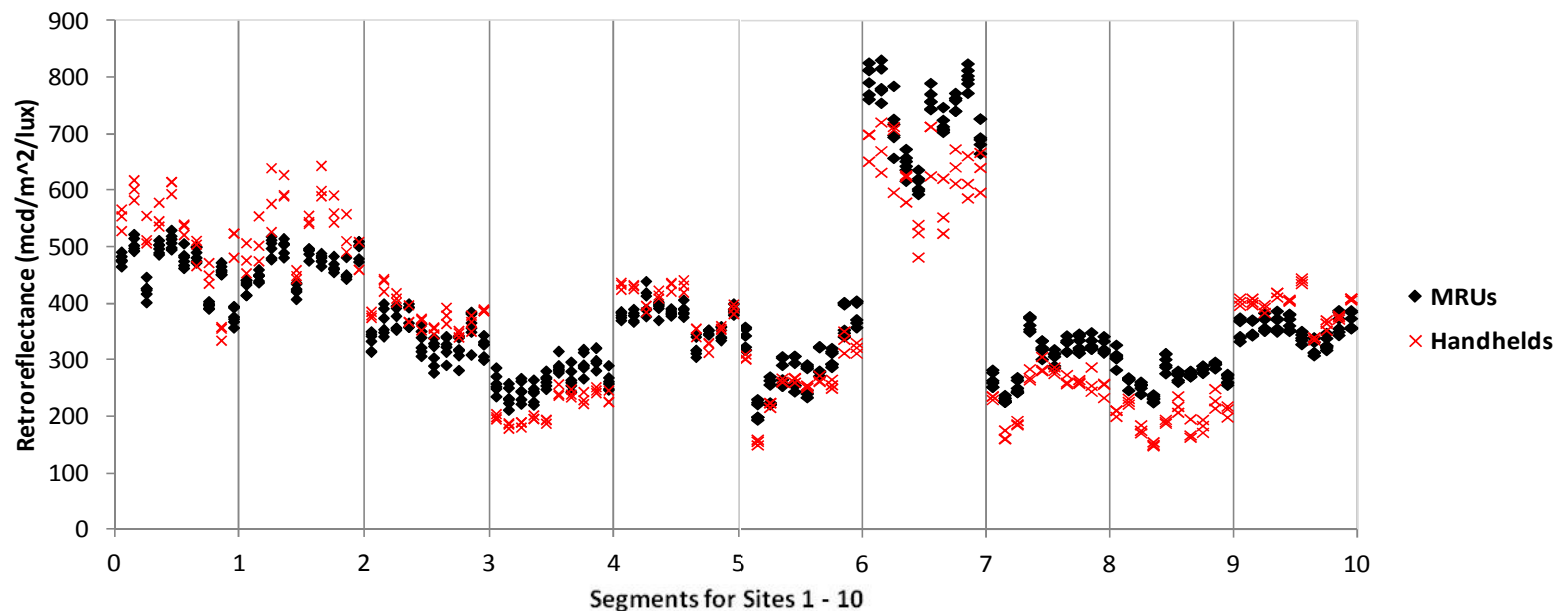
PMM Implementation Plan

- ◆ 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-miles Total
- ◆ Network Level Assessments for Pavement Marking Retroreflectivity
- ◆ Efficient Means to Measuring Retroreflectivity
- ◆ Improve Safety for Roadway Users and Field Personnel
- ◆ More Objective Assessments



Precision of MRU

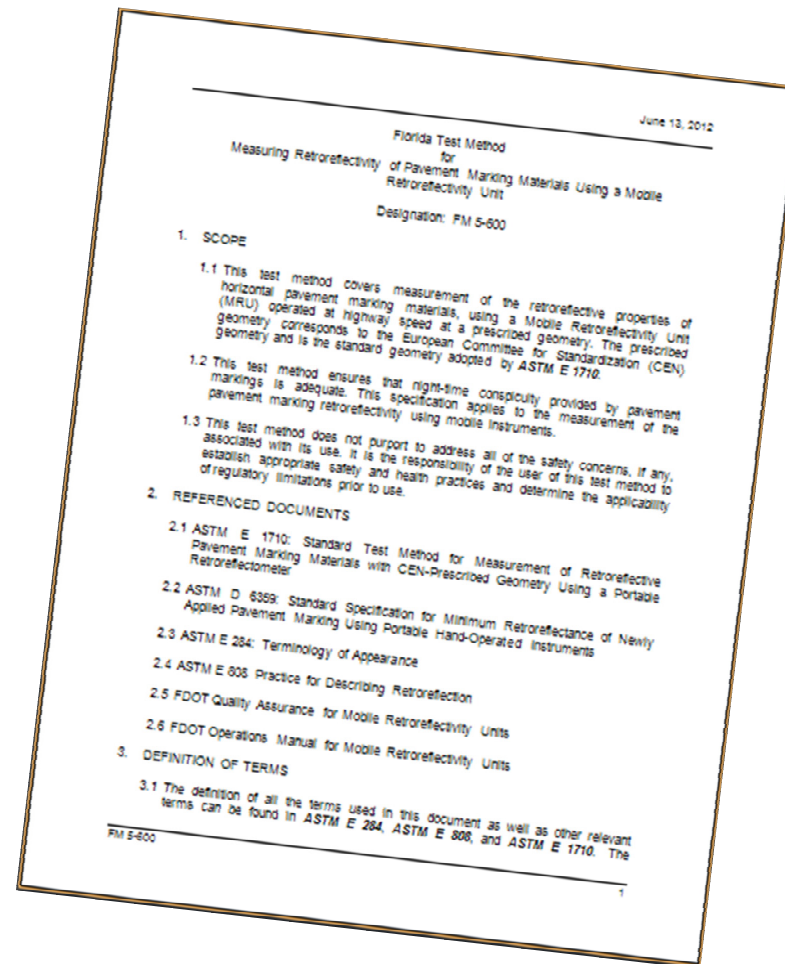
- ◆ MRU Repeatability and Reproducibility
 - ✓ The results of two properly conducted retroreflectivity tests using different MRUs on the same pavement marking test section should not differ by more than 13.3% (53.0 mcd/m²/lux for the ten sites tested for this study) at a 95 percent confidence level for retroreflectivity values ranging between 200 and 800 mcd/m²/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](#))

Q11		fx												
Florida Dept. of Transportation	3	(LL 143)	4											
Description			5											
Hardware ID		MRU 2	6											
Imperial Units & Acq Freq (miles)	7	8	0.1											
White Stripe Calibration Factor & Cal Date	9	1.0332	5-23-2012/21:00:44											
Yellow Stripe Calibration Factor & Cal Date	13	1.0033	5-23-2012/21:09:11											
Detector Compensation Applied		Yes	21											
Stripe Width Compensation Applied		No	22											
Measurement Date	23	4/10/2012												
Acquisition Window Start	24		1											
Acquisition Window End	25		200											
District	26		2											
System	27		1											
County	28		26											
Section	29		005											
Subsection	30		000											
ST	31		SR											
Road	32		222											
Direction	33		E											
Lane	34		REL											
Weather	35		Overcast											
Temperature	36		80											
Operator(s)	37		JTS											
Test Type	38		2											
Material	39		Thermo											
Chainage	0	Manual												
	40	0.104	0											
	40	0.207	0											
		0.311	0											
		0.415	0											
		0.518	0											
		0.622	0											
		0.725	0											
		0.829	0											
		0.932	0											
		1.001	0											
Stripe Type	Start	Left Point	Left Peak Maximum	Left Peak Minimum	Left Peak Average	Left Peak Standard Deviation	Left Contrast	Right Point						
41	42	147	43	349.16	44	170.83	45	242.85	46	31.98	47	0.53	48	0
		147		307.52		168.41		220.85		25.19		0.54		0
		147		291.52		176.22		230.71		25.81		0.56		0
		147		235.28		187.44		229.94		21.04		0.57		0
		146		332.1		184.71		256.13		26.05		0.63		0
		147		334.27		161.65		274.73		26.83		0.65		0
		147		323.59		189.02		250.04		27.96		0.53		0
		147		347.3		224.92		277.15		23.24		0.65		0
		147		351.68		195.1		283.72		33.21		0.64		0
		104		321.04		199.72		254.06		26.72		0.53		0

INSTRUCTIONS

Yellow Highlight Areas are Optional Input into the MRU database.
 Blue Highlight Areas are Required Input into the MRU Database

- The file name is needed for a reference
- The data analysis software and version being used. Ex. (Road Vista 2.3)
- The company performing the data collection. Ex. FloridaDOT
- The retroreflector serial number. Ex. Laserlu 149 or LL 149
- Operator's notes specific to the test
- The MRU unit, vehicle or equipment ID. Ex. MRU2 or Unit 2
- Including units description. Ex. feet (ft) or miles (mi)

Form # 675-060-15 Instructions



Traffic Marking Certification Worksheet

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

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
TRAFFIC MARKING CERTIFICATION
(WORKSHEET)

VERSION
1.0 (07/10/10)

CONTRACTOR: FINANCIAL PROJECT ID: DATE:

CONTRACT NO.: FEDERAL AID NO.: STATE ROAD NO.:

YOUR NAME: PERIOD REPRESENTED BY CERTIFICATION From: To:

Dist. Mile Marker Number	Mile Marker Number	Dist. Mile Marker Number (1.5 MI.)	Location (Address No., Mile Marker Mile Post & Lane Designation)	Initial Release Facility (Dist. Mile Marker)			Dist. Mile Marker	Traction (Dist. Mile Marker)					Dist. Mile Marker	Initial Release Facility (Dist. Mile Marker)			Dist. Mile Marker	Type or Reference Description
				1	2	3		1	2	3	4	5		6	7	8		

I certify that, based on my personal knowledge and well-founded belief following my own reasonable investigation, the above counts, measurements, readings and quality of products are correct and accurate.

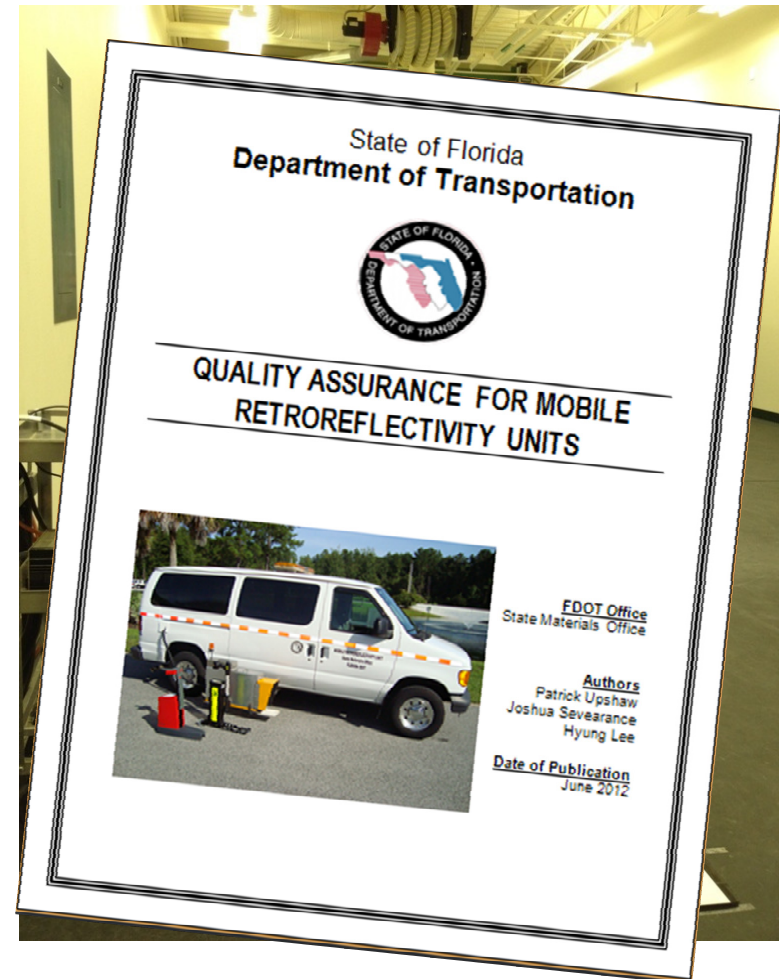
Contractor's Authorized Agent (Signature): Prime Contractor's Work Site Traffic Supervisor (Signature):

Contractor's Authorized Agent (Print Name & Company): Prime Contractor's Work Site Traffic Supervisor (Print Name):



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

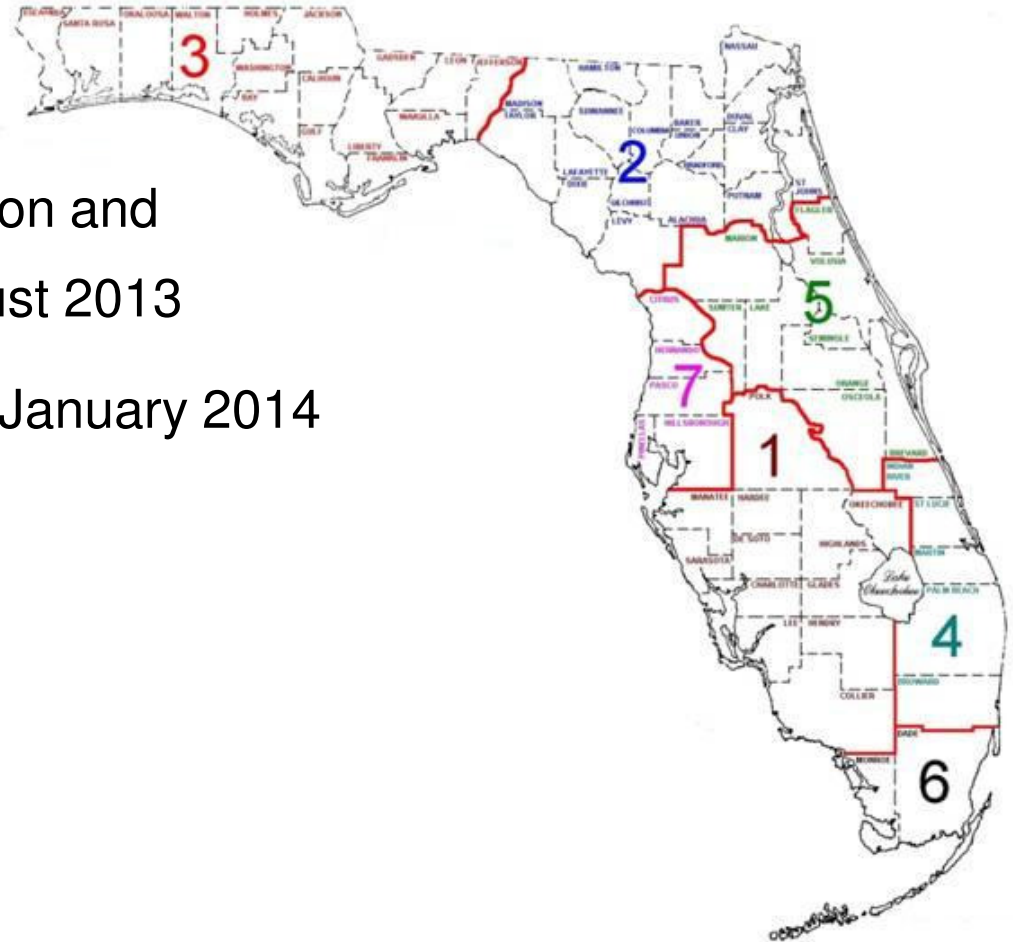
- ◆ Contract with MRU Consultant
 - ✓ Contract Start Date: April 22, 2013
 - Performed and Passed Quality Assurance Testing
 - ✓ Statewide Testing Start Date: April 29, 2013
 - ✓ Current Status: On Schedule
 - Over 10,000 of 25,000 Line Miles Collected
 - 40% Complete

- ◆ 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



MRU Upload

Search Again

	Dist	County
<input type="checkbox"/>	5	LAKE
<input type="checkbox"/>	5	LAKE
<input type="checkbox"/>	5	LAKE
<input type="checkbox"/>	5	LAKE

Reset

Details of Selected GIS View

Average Retroreflectivity values listed

Pavement Marking Selection Filter

Roadway ID
 2 thru 8 characters

District
 D1 D2 D3 D4 D5 D6 D7

County
 26 - ALACHUA
 27 - BAKER
 46 - BAY
 28 - BRADFORD
 70 - BREVARD
 86 - BROWARD multiple selection

Road
 SR-2
 SR-3
 SR-4
 SR-5
 SR-5A
 SR-6 multiple selection

Group
 ALACHUA 2010/8
 ALACHUA 2011/7
 ALACHUA 2012/10
 BAKER 2010/8
 BAKER 2011/7
 CLAY 2012/11 multiple selection

Project
 Item Seg? 7 characters

Roadway System
 Interstate Turnpike Primary Int./Art

Status
 Active Inactive

Test Date
 From: 01/01/2009 To: Current Date

Test Type
 MRU Traffic Marking Certification Handheld

Stripe Type
 Right Center line
 Left Center Line
 Right Edge Line
 Left Edge Line
 Right Skip Line 1 multiple selection

Retro Reflectivity Value
 From: 0 To: 1500

AADT
 From: To: **Min and Max AADT/Speed from 'Correlated Milepost Bin Table'**

Speed Limit
 From: To:

Roadway Surface Type
 FC-5
 FC-125
 Etc... multiple selection

Manufacturer
 ACME
 DUPONT multiple selection

Material
 QPL 1
 QPL 2 multiple selection

Operator ID
 HL
 JW multiple selection

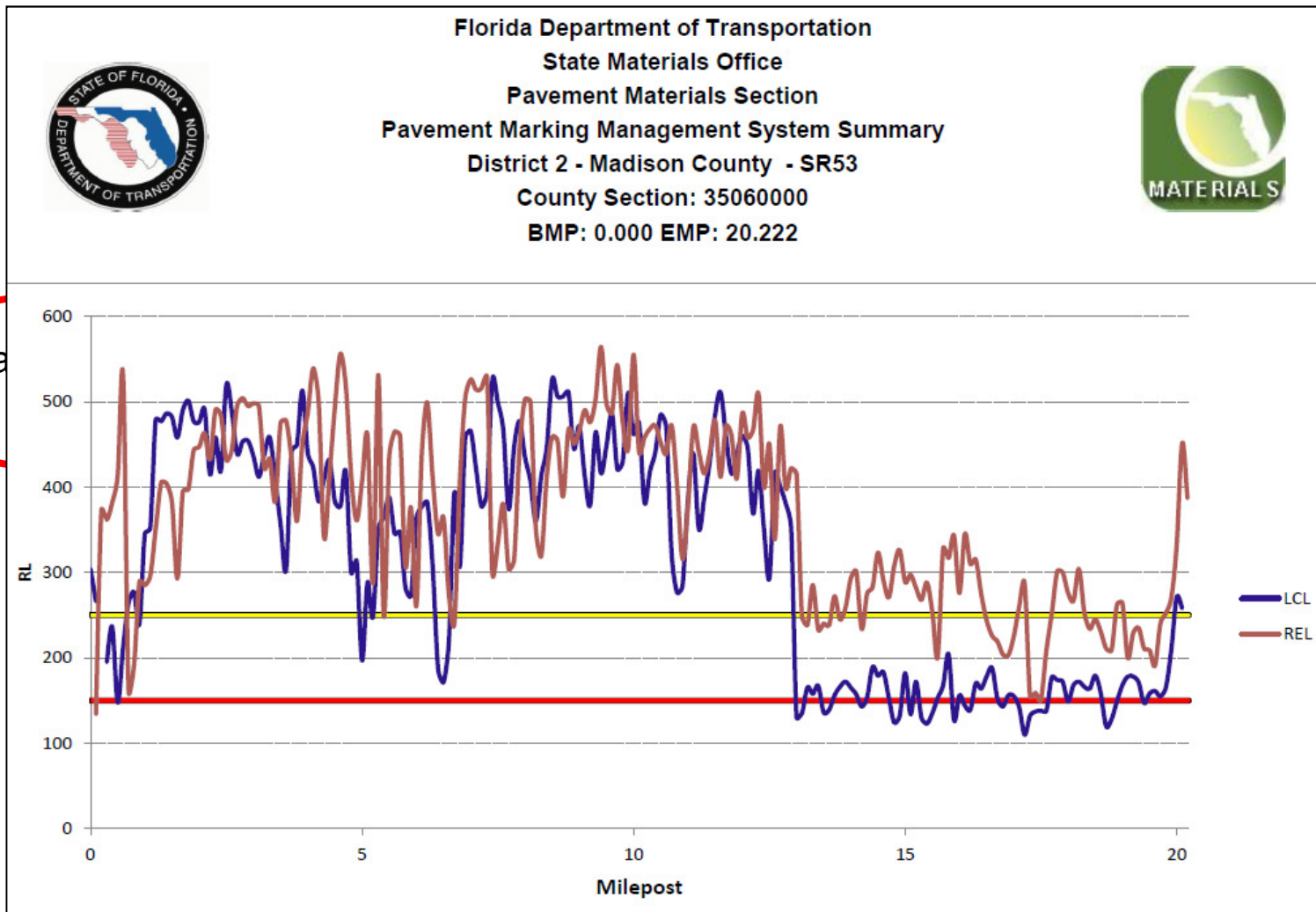
State Materials Office
 5007 NE 39th Avenue
 Gainesville, FL 32609
 352-955-6600
 materials@dot.state.fl.us

Admin

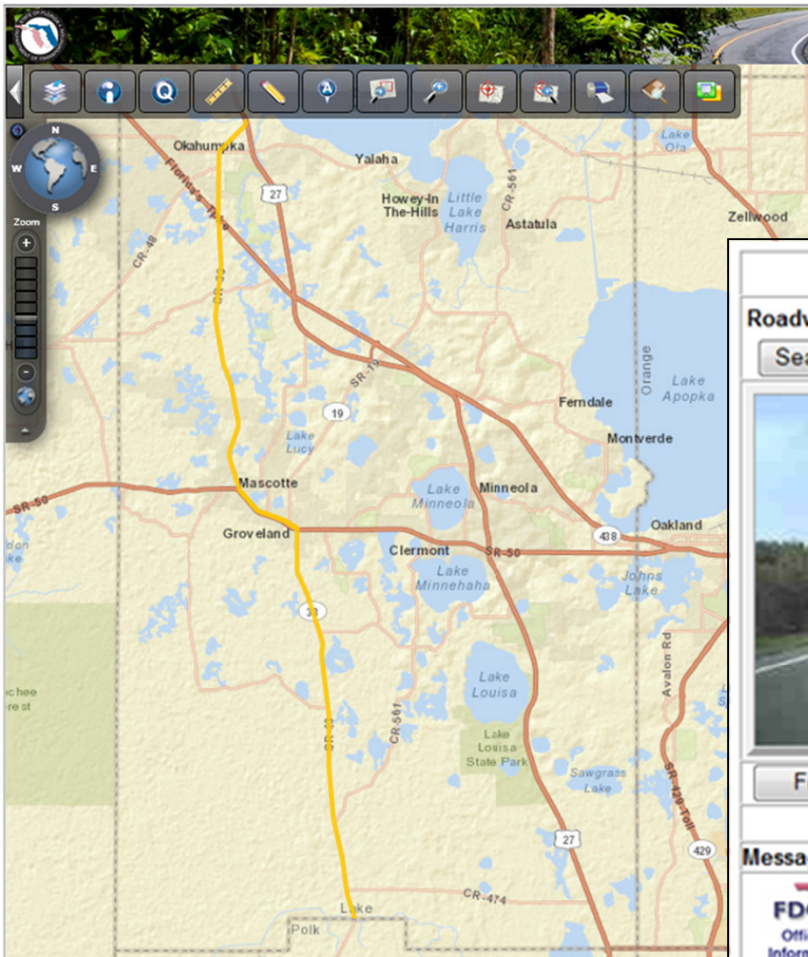
Weather	Unit	Status
Sunny	LL 149	Active
Sunny	LL 149	Active
	Delta01	Active
		Active



Pavement Marking Management Program Graph and Table Reporting




Pavement Marking Management Program GIS Mapping and Video Log Tools




Video Log Viewer Application [Help](#)

Roadway ID: 11020000 Dir: North Mile Pt: 2.660 View: Front CD Drive: No

 Roadway Name: SR 33 / CR 33
Frame Date: 03/23/2011
Frame: 553

Play Speed: 1 fps 2 fps 3 fps 4 fps

Message: Roadway Segment

 Questions about data or images - [Doug Barch](#).
Questions about a malfunction of the site - FDOT.ServiceDesk@dot.state.fl.us.

Disclaimer: This product is intended for general informational uses only and may not be suitable for legal, engineering, or surveying purposes. This information or data is provided with the understanding that conclusions drawn from such information are the responsibility of the user. The video log information is provided "as is" without warranty of any kind, either expressed or implied. Changes to these images may be made periodically without notice.



Questions/Comments

