

## Audible & Vibratory Pavement Marking



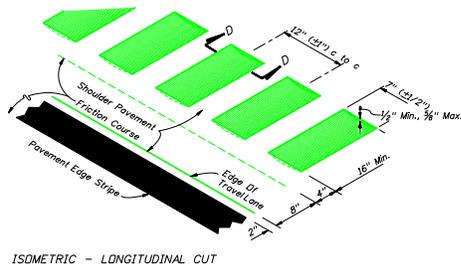
## Purpose of Markings

Alert motorists when the vehicle leaves the travel lane.

## Types of Audible & Vibratory Warnings

- Ground-in Rumble Strips
- Raised Audible Pavement Markings
- Rumble Stripe

## Ground-in Rumble Strip

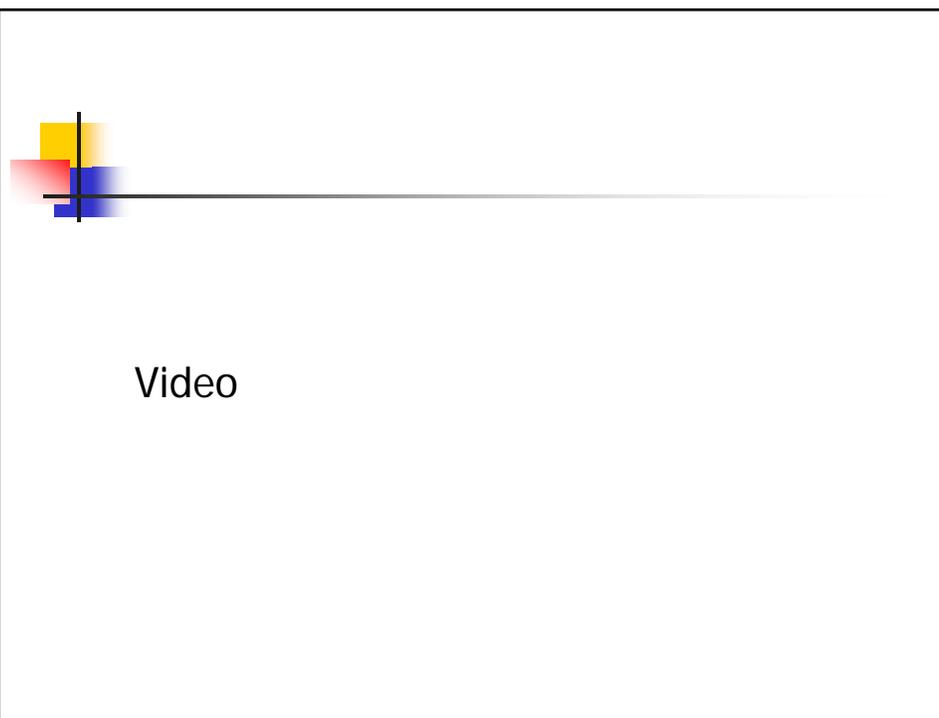


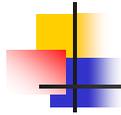
## Raised Audible Pavement Marking



## Raised Audible Pavement Marking







## Current Policy for Rumble Strips

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### 2.3.2 Shoulder Warning Devices (Rumble Strips)

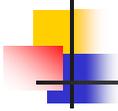
The safety of freeways and other limited access facilities on the State highway system is to be enhanced by the installation of shoulder warning devices in the form of rumble strips. **Projects on limited access facilities shall include the construction of ground-in rumble strips.** Several types of applications have been tested. The ground-in strips provide the desired warning to the driver and consistency in application has been possible using this construction process.



## Strategic Highway Safety Plan

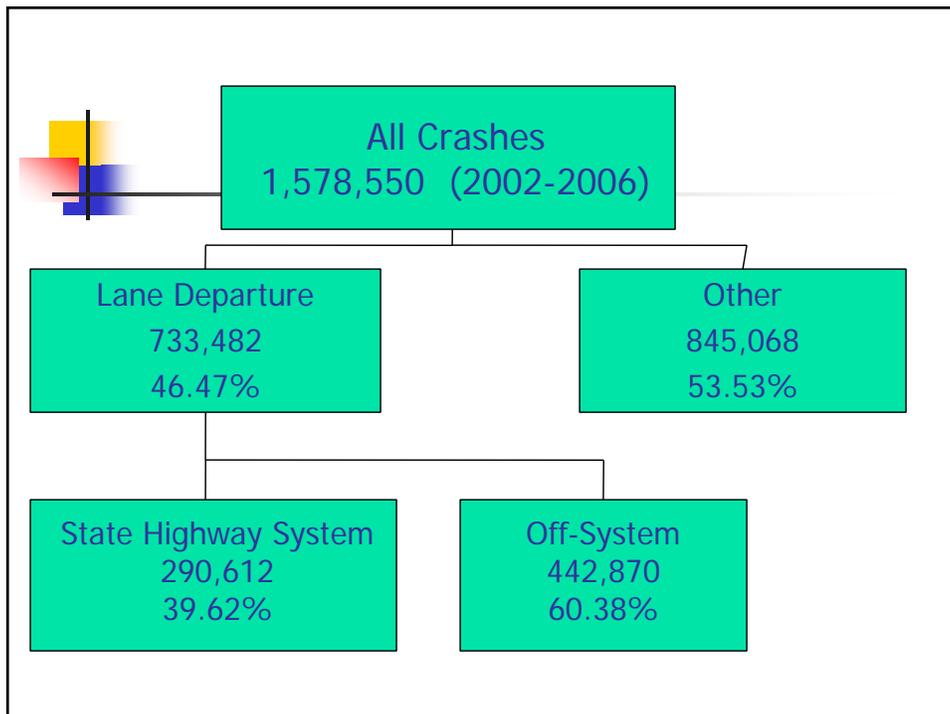
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One of the four emphasis areas of the Strategic Highway Safety Plan is to reduce lane departure crashes on limited access and rural two-lane roadways



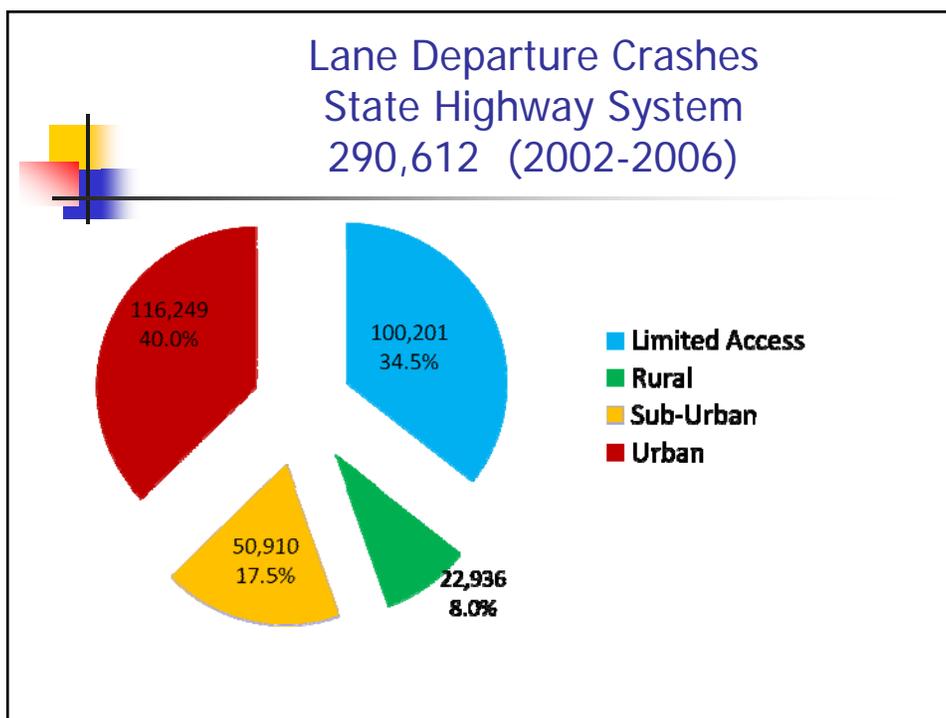
## Strategies in Lane Departure Emphasis Area

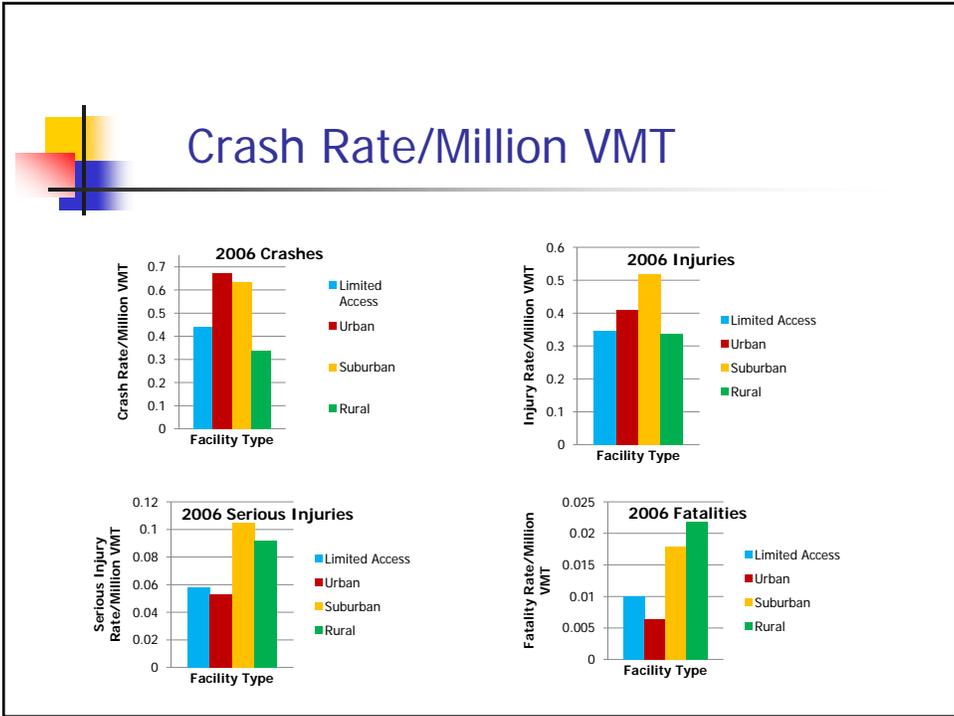
Beginning with an initial focus on rural, two-lane roadways, increase audibility and visibility of lane delineation in all weather conditions in conjunction with routine maintenance and other roadway repair and/or enhancement projects.



## Fatality Statistics

Year	Total Fatalities	SHS Lane Departure Fatalities
2002	3,142	1,220
2003	3,185	1,224
2004	3,260	1,262
2005	3,533	1,378
2006	3,365	1,282





### 5 Yr. Resurfacing Mileage Versus State Highway Mileage

	Resurfacing Program		Highway System	
	<u>2-3 Lane</u>	<u>Multi-Lane</u>	<u>2-3 Lane</u>	<u>Multi-Lane</u>
Rural	1,099	303	4,245	902
Urban 2 & 3	<u>198</u>	<u>265</u>	<u>1,469</u>	<u>1,250</u>
Total	1,297	568	5,714	2,152



## Resurfacing Program Impacts

Year	Additional Cost for Audible & Vibratory Marking	Budgeted Cost	Cost Increase
2008	\$ 2,381,350	\$ 215,941,398	1.10%
2009	\$ 3,016,021	\$ 349,653,112	0.86%
2010	\$ 3,081,213	\$ 349,977,071	0.88%
2011	\$ 1,964,508	\$ 257,877,716	0.76%



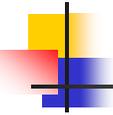
## Crash Reduction Factors

### Crash Reduction Factor: Shoulder Rumble Strips<sup>1</sup>

Rural (Two Lane) > 4000 AADT	= 13%
Rural (All)	= 34%
Rural (Three Lane)	= 36%
Rural (Two Lane)	= 32%

<sup>1</sup>Crash Reduction Factors (FHWA-SA-07-015), FHWA, 2007

<sup>2</sup> Highway Safety Improvement Guideline (HSIPG), FDOT Plans Preparation Manual

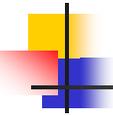


## Crash Reduction Factors

Crash Reduction Factor: Shoulder Rumble Strips<sup>1</sup>

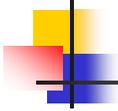
Rural Multilane Divided	= 16%
Rural Multilane Divided	= 10%
Rural Arterial	= 16%
Rural Multilane Divided	= 22%

<sup>1</sup>Crash Reduction Factors (FHWA-SA-07-015), FHWA, 2007



## Cost of Audible & Vibratory Markings

- Cost Per of 6" Solid Thermoplastic  
\$ 3,500 per Net Mile
- Cost of Audible & Vibratory Marking  
\$ 6,500 per Net Mile



## New Policy for Audible & Vibratory Pavement Markings

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*Florida Department of Transportation*

CHARLIE CRIST  
GOVERNOR

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Tallahassee, FL 32399-0450

STEPHANIE C. KOPELOUSOS  
SECRETARY

ROADWAY DESIGN BULLETIN 08-07  
ESTIMATES BULLETIN 08-05

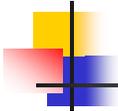
DATE: May 9, 2008

TO: District Design Engineers, District Traffic Operations Engineers, District Maintenance Engineers, District Estimates Coordinators, District Safety Engineers

FROM: Phillip "Greg" Davis, P.E., State Estimates Engineer  
David C. O'Hagan, P.E., State Roadway Design Engineer

COPIES TO: Ananth Prasad, Lora Hollingsworth, Brian Blanchard, Duane Brautigam

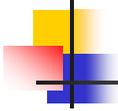
SUBJECT: Audible and Vibratory Pavement Markings



## New Policy for Audible & Vibratory Pavement Markings

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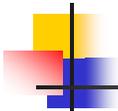
Effective with the January 2009 letting, audible and vibratory pavement markings shall be installed on all rural projects excluding limited access facilities. The markings should also be considered for Urban 2 & 3 areas with flush shoulders.



## New Policy for Audible & Vibratory Pavement Markings

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- Edge lines on two-lane and multi-lane rural undivided roads.
- Inside and outside edge lines on two-lane and multi-lane rural divided roads.
- Only on centerlines of two-lane rural roads with history of centerline cross over crashes.



## Audible & Vibratory Markings Pay Items

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### 701- 1A-BCD

A= Class\*

1 (Standard)

C= Type of Marking

1 (Solid) NM

2 (Skip) GM

B= Color

1 (White)

2 (Yellow)

D= Width

1 (6")

## Wet Weather Pavement Marking

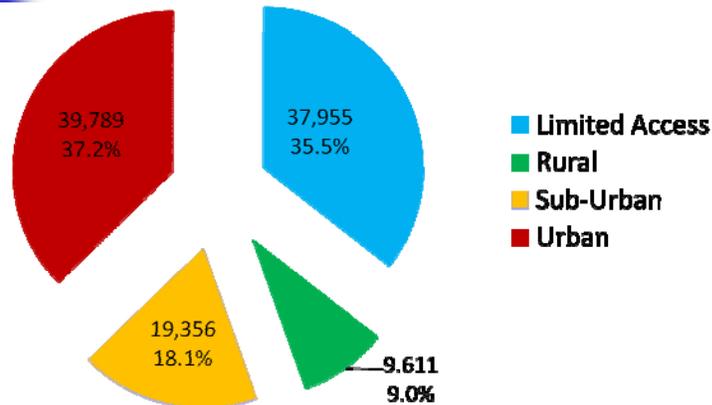


All Lane Departure Crashes  
State Highway System  
290,612 (2002-2006)

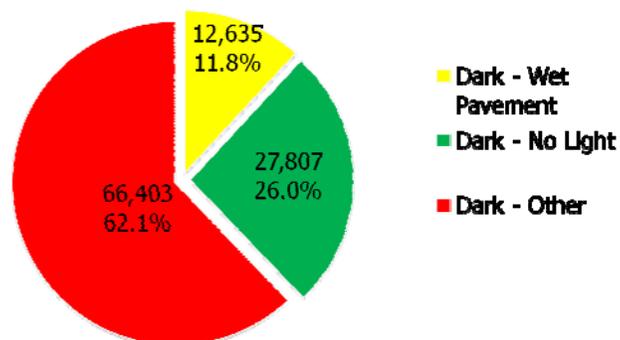
Daytime Crashes  
183,767  
63.23%

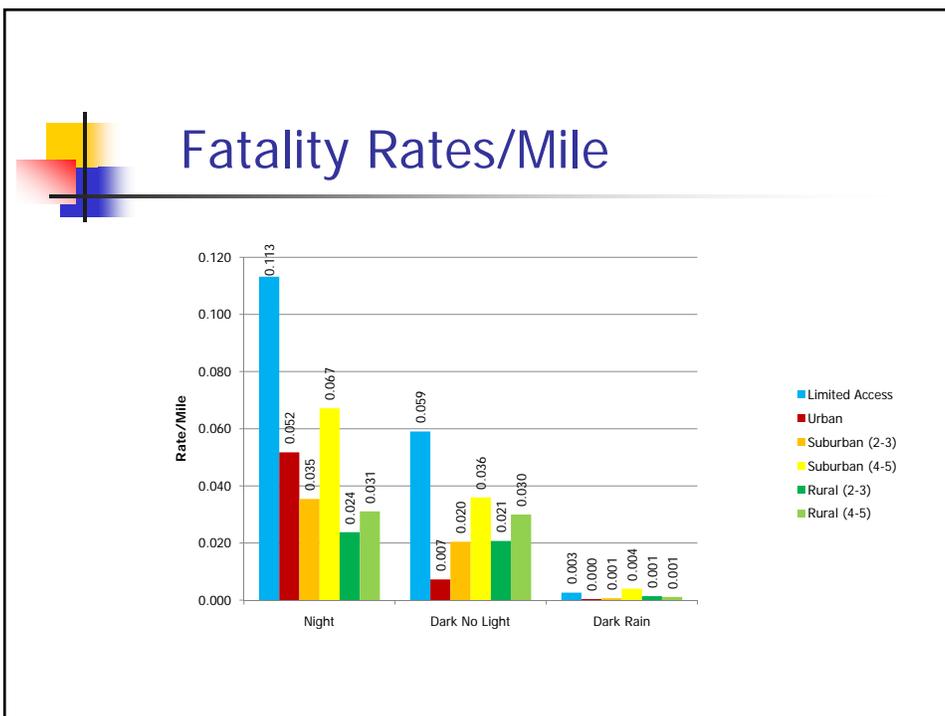
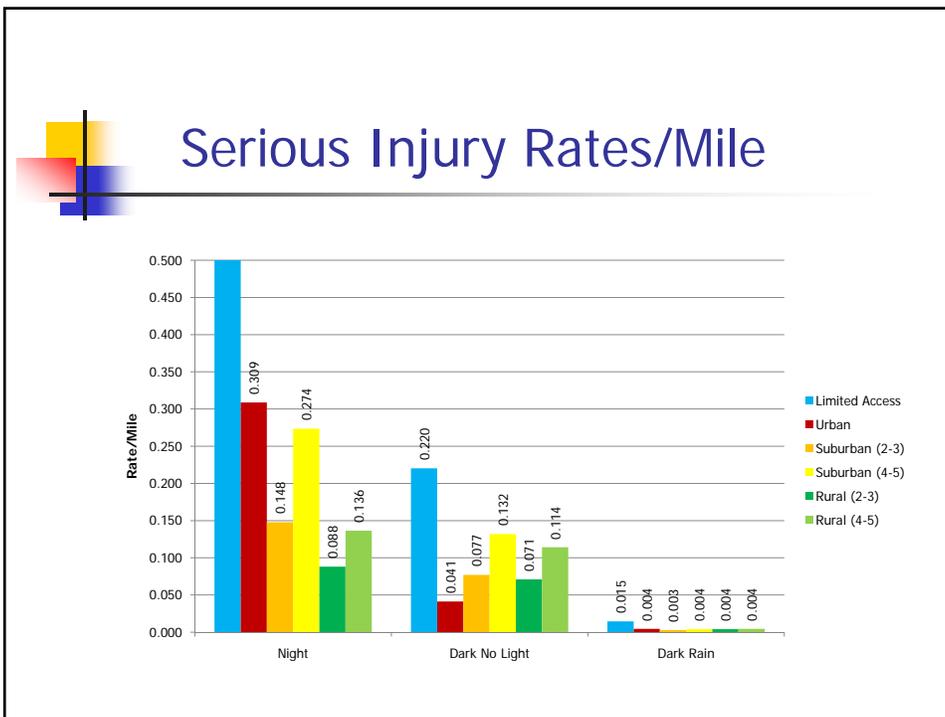
Night Time Crashes  
106,845  
36.77%

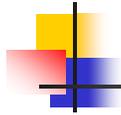
### Night Time Lane Departure Crashes State Highway System 106,845 (2002-2006)



### Night Time Departure Crashes State Highway System 106,845 (2002-2006)







## Wet Weather Policy

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- No specific policy at this time.
- Districts can use wet weather pavement markings for specific areas with history of wet weather crashes.



## Wet Weather Audible Markings

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- No specific policy at this time.
- Districts can use wet weather audible pavement markings for specific areas with history of lane departures during rain events.

