



FCITE CHAPTER



in-road lighting safety solution

FHWA / NHTSA

Half+ of fatalities are at night

More than half of traffic fatalities occur at night, although only about one-quarter of travel occurs after dark.



When the clocks change, remember to stay alert while driving, **especially** at night!

VEHICLE-MILES TRAVELED

Night: 27%

Day: 73%

FATALITIES

Night: 52%

Day: 48%

Note: NHTSA defines daytime as 6AM to 6PM and nighttime as 6PM to 6AM.

Sources: 2018 NHTSA Fatality Analysis Reporting System (FARS)
FHWA Traffic Monitoring Analysis System (TMAS)

FDOT: STATE SAFETY PLAN

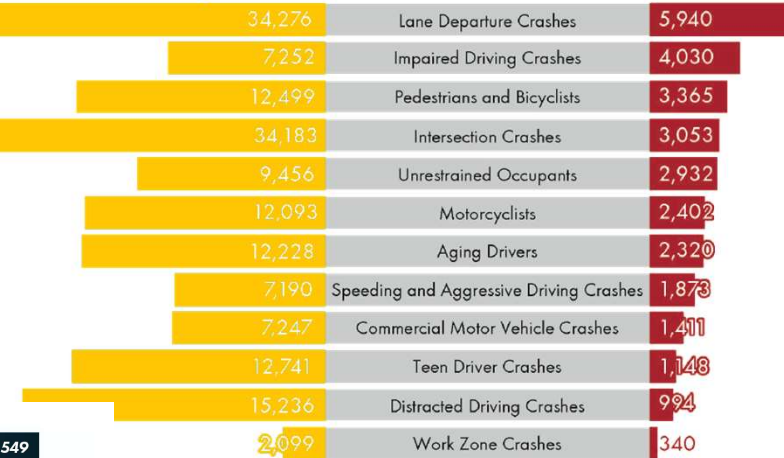
FIP update process.



Serious Injuries

5-Year Period of
2011-2015

Fatalities



Note: Multiple factors are involved in almost every crash.

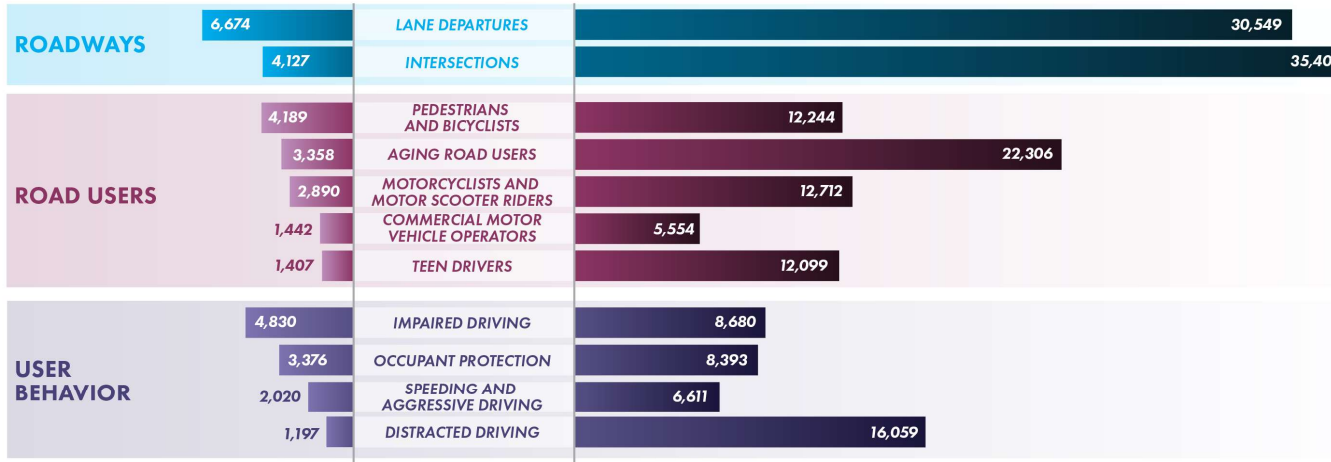
Source: Department of Highway Safety and Motor Vehicles (2016).

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FATALITIES

2015-2019

SERIOUS INJURIES



TRAFFIC RECORDS AND INFORMATION SYSTEMS

THE FOUNDATION FOR DATA-DRIVEN DECISIONS

Local Municipalities: PEDESTRIAN SAFETY

Orlando is America's Most Dangerous Place for Pedestrians: Study



LONGFORM

Orlando, the nation's deadliest city for pedestrians, has a plan for safer streets

At ground zero of the pedestrian safety crisis, a mayor's traffic reform goals are put to the test



Distracted driving



Inclement Weather

Lux Mission

A simple business approach with the sole purpose to provide **safety** through **innovation** to our roadways.

Lux Vision

To **save human lives**, reduce the earth's carbon footprint with a sustainable product line utilizing renewable energy.



Annual USA Crash Statistics

38,000 Fatalities

4.4 Million Injuries

\$871 Billion (Economic Impact)

\$380 Million (Medical Costs)

#1 Leading Death (Ages 1-54)



in-road lighting safety solution



**Pedestrians
and Bicyclists**



**Lane
Departures**



Intersections



**Speeding and
Aggressive
Driving**



**Impaired
Driving**

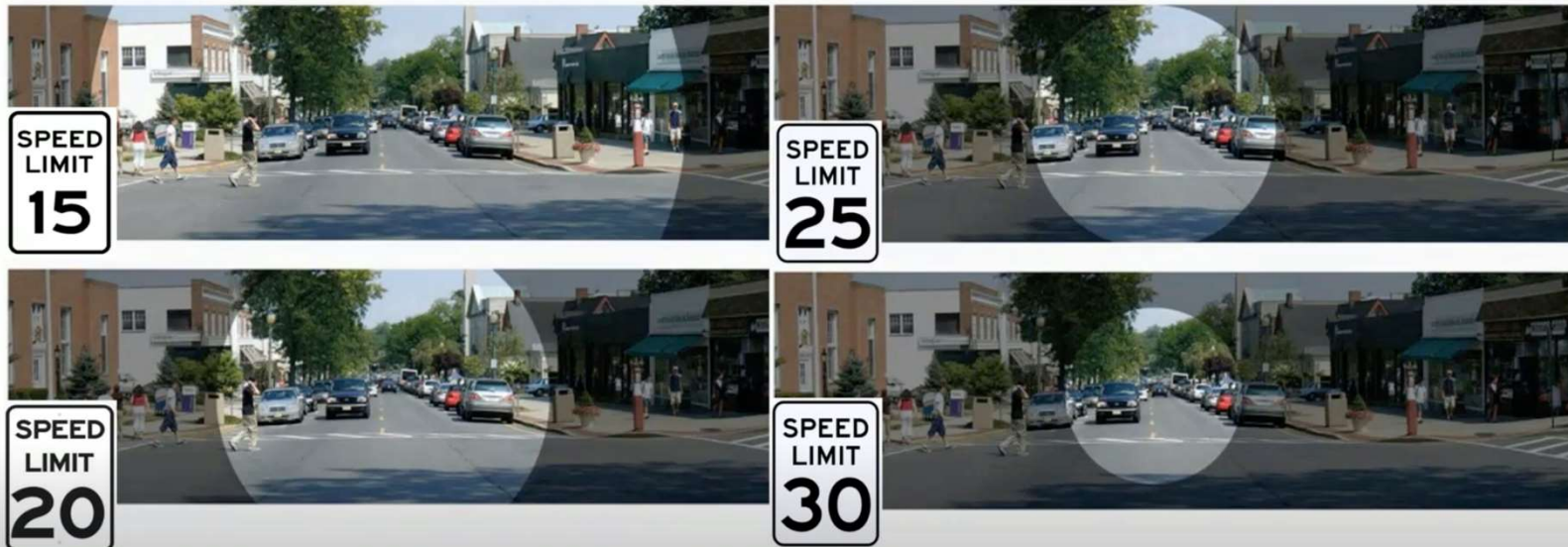


**Aging Road
Users**



**Distracted
Driving**

Speed From the Driver's Perspective






Stopping Sight Distance = perception + reaction + deceleration

Comparison of 35 mph to 45 mph



At 45 MPH, the driver will travel an
additional 110 feet in only 0.5 seconds!



**Conventional
tools aren't moving
the needle fast
enough**

Let's explore new ways
to save lives.





in-road lighting safety solution



MADE IN THE USA



- Innovative Technology (Visibility)
- MUTCD Compliant
- FDOT Approved
- Cost Effective (B/C)
- Reliability
- Ease of Installation
- Low maintenance
- Sustainable
- Made in USA
- Self Educated

Crosswalk Visibility from Driver's Perspective

❖ At 35 MPH, Driver needs 250 feet to stop ❖



in-road lighting safety solution

www.iiRPM.com

Making the world safer...one light at a time

For safer crosswalks



Mid Block



Pedestrian Activated System
with In-Road warning Lights
(Wired AC/DC System) (Day/Night)



MUTCD Compliant
FDOT Approved

Signalized / STOP

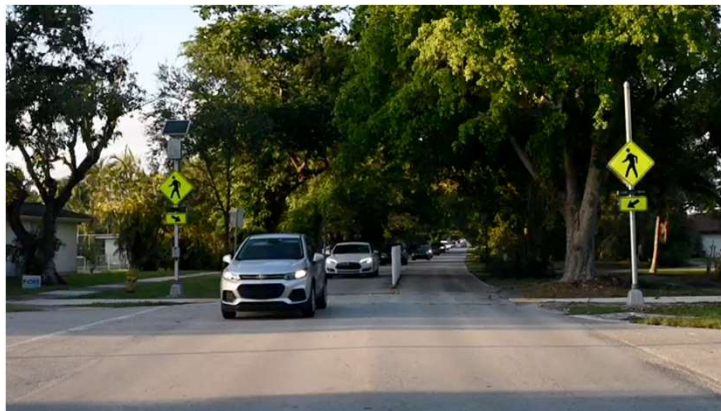


Highlighted crosswalks
with In-road lights delineation
(Wireless / Solar) (Nighttime Only)

For safer crosswalks



Pedestrian Activated Wired System (Day & Night)



- Earlier warning for drivers within line of sight
- Works with existing poles/cabinets

MUTCD Compliant

FDOT Approved

For safer crosswalks



Earlier warning for drivers within line of sight



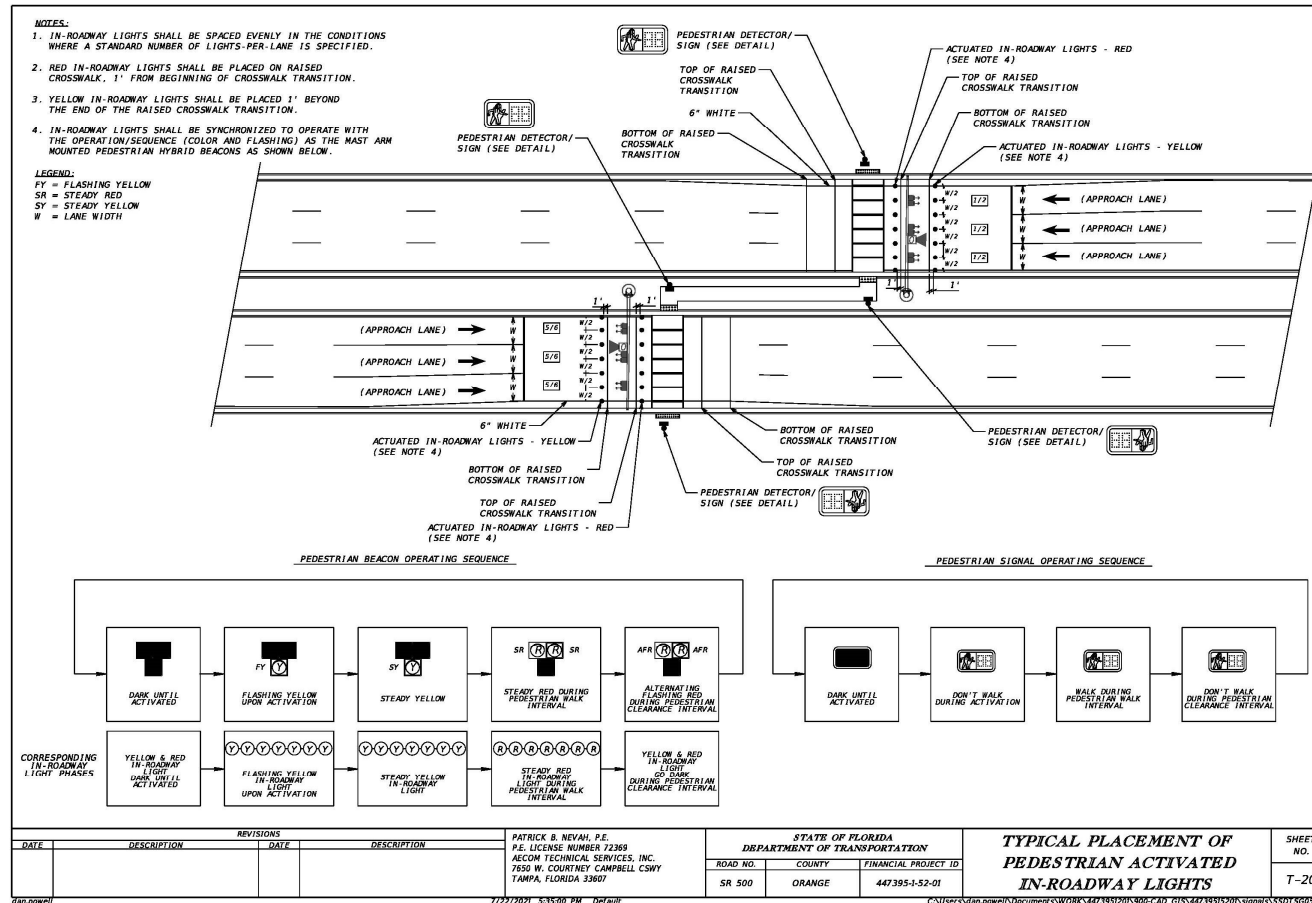
For safer crosswalks

Highlighted Crosswalk (Signalized Intersections) (Nighttime only)



Crosswalk Visibility

For safer crosswalks (In-Road & HAWK System)



For safer crosswalks



Installations

Village of Palmetto Bay	148 Dr & 82 Ave (1 Location)	Complete mid-block system with RRFBs	Solar System (4 Years +) Zero Maintenance
City of Miami Lakes	Fairway & Montrose (2 locations)	Complete mid-block system with RRFBs	AC system
City of Aventura	6 locations	Complete mid-block system with RRFBs	Solar System with Refuge Island (4 Lanes) (3 Years)
Escambia County	Perdido Key Drive (SR 292) (5 locations)	Complete mid-block system with LED Highlighted Signs	Retrofit existing RRFB systems with Solar In-Road /LED highlighted signs (Using Existing poles)
City of Deltona	14 Locations (240 in-road lights)	Complete mid-block system with RRFB	Solar Systems (2 -4 Lanes)
Brevard County (FDOT D5)	SR A1A (16 Locations)	Complete mid-block system with RRFBs	Retrofit existing RRFB systems with Solar In-Road /LED highlighted signs (Using Existing poles)



in-road lighting safety solution

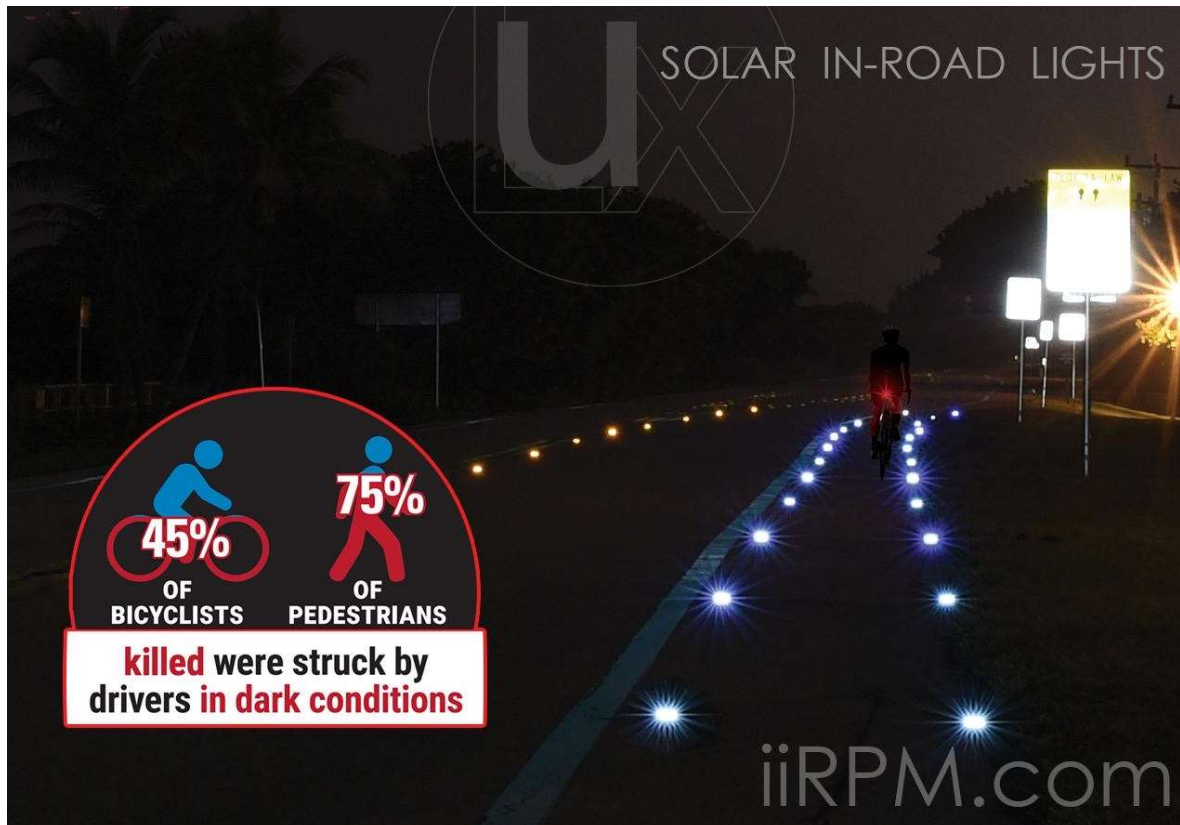
Comparisons in Delivery Time & Costs

Mid-Block Crosswalk Solution for 2-Lane Roadways	Bid to Design to Install Time	Avg. Cost Range
HAWK Hybrid System	1-2 years	\$250,000 - \$300,000
RRFBs	8-10 weeks	\$25,000
Raised, painted crosswalks	3-6 months	\$20,000+
LUX new hybrid RRFB + in-road lighting	8-10 weeks	\$42,000 (B/C = 20/1)
LUX in existing hybrid RRFB + in-road lighting	8-10 weeks	\$30,000 (B/C = 27/1)
LUX highlighted crosswalks (nighttime only)	2 weeks	\$7,000 (B/C = 117/1)

For safer bicyclists



Highlighted Bike lanes with In-Road iiRPMs

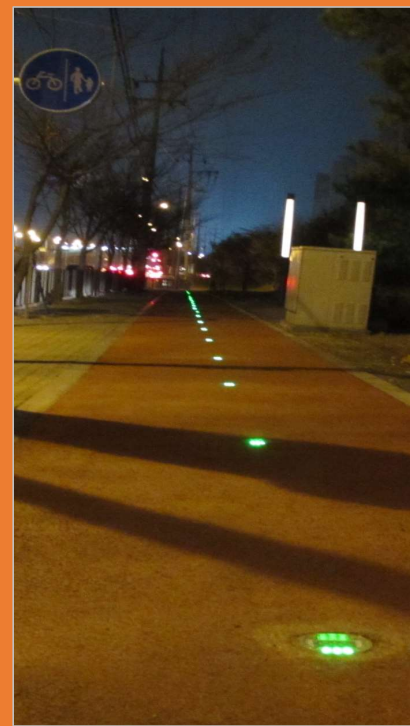


- Earlier warning for drivers within line of sight
- Emphasizes bike lanes at nighttime
- Improve nighttime visibility for bicyclists
- Flush to pavement (safe for bicyclists)
- Quickly installed
- Traffic calming tool
- No maintenance required

MUTCD Compliant (Section 3B.11)
FDOT Approved

For safer bicyclists

Highlighted Bike Lanes & Trails



For safer roadways



iiRPMs Road Delineation Applications



- Warns motorists of roadway changes ahead
- Allows for extended reaction time with advanced line of sight guidance
- No utilities needed/quick installation
- Varied light color and flash options to suit each environment
- Less than 15% of cost of streetlights (rural roadways illumination)
- High benefit to cost ratio
- Traffic calming application

MUTCD Compliant (Section 3B.11)
FDOT Approved

For safer roadways

Road Delineation



Florida Turnpike One Mile Installation at MM166



- Warns motorists of roadway changes ahead without need for streetlights
- Allows for extended reaction time
- No utilities needed/quick installation
- Less than 15% of cost of streetlights
 - High benefit to cost ratio
- Varied light color and flash options to suit each environment
- Traffic calming benefits

MUTCD Compliant (Section 3B.11)

FDOT Approved

For safer roadways



Wrong Way Driver Warning

- Provides drivers clear warning message within the line-of-sight
- Visually warns distracted, aging, impaired drivers
- Allows for continuous in-road lighting
- Installs quickly
- Light colors and actions adaptable to settings (Steady Red or Flashing Red)
- FHWA Approved via a Request to Experiment

MUTCD Compliant (Section 3B.11)
FDOT Approved



For safer roadways

Reversible Express Lanes (Gates) Wrong Way Driver Warning

- Provides drivers clear warning message within the line-of-sight
- Visually warns distracted, aging, impaired drivers
- Allows for continuous in-road lighting
- Installs quickly
- Light colors and actions adaptable to settings (Steady Red or Flashing Red)



Benefit / Cost

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iiRPMs Wrong Way		
Item	One Lane Ramp	Two Lane Ramp
Total Cost	\$6,200 (132 Ramps) B/C = 132/1	\$9,900 (83 Ramps) B/C = 83/1

FDOT Average Crash Costs (Severity)
Severe Injury = \$ 818,636 ❖ Fatality = \$ 10,100,000

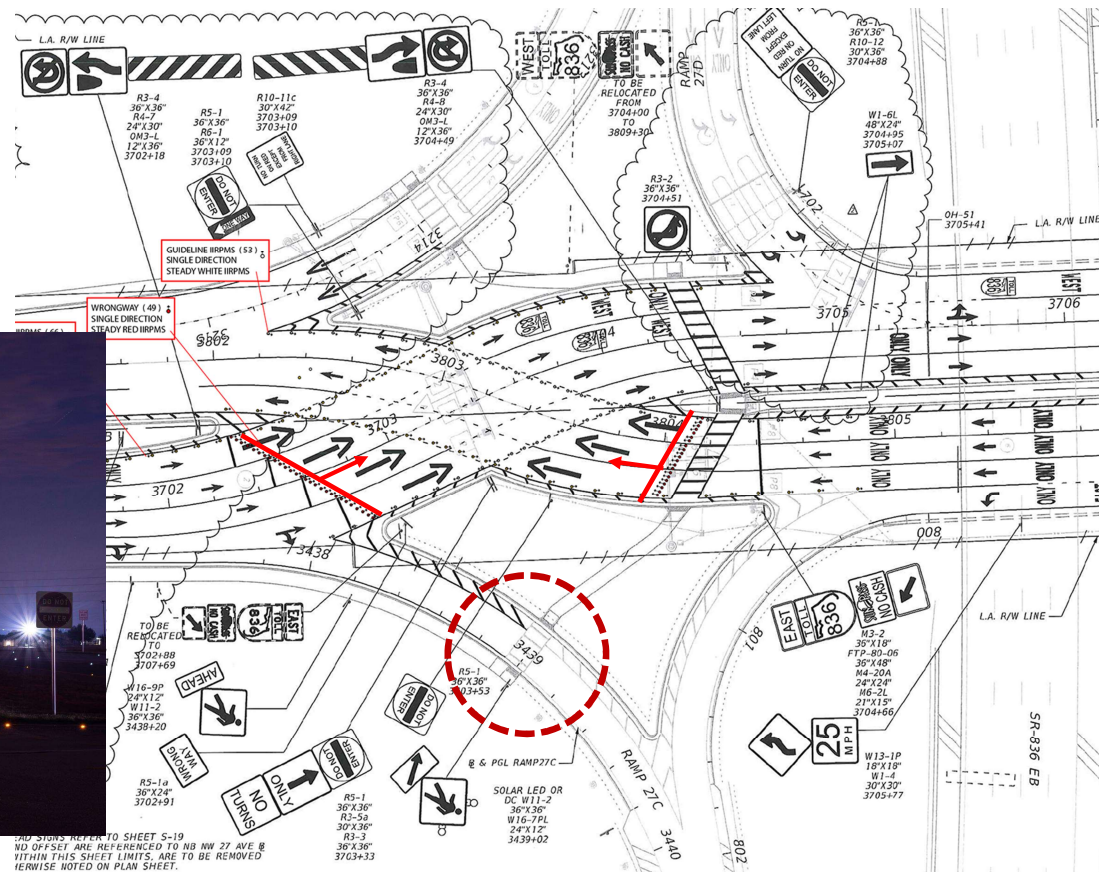
For safer roundabouts



For safer intersections & interchanges



Diverging Diamond Interchanges (DDIs)



AND SIGNS REFER TO SHEET S-19
AND OFFSET ARE REFERENCED TO NB NW 27 AVE &
WITHIN THIS SHEET LIMITS. ARE TO BE REMOVED
UNLESS NOTED ON PLAN SHEET.

For safer STOP Signs

- Provides drivers clear warning message within the line-of-sight
- Visually warns distracted, aging, impaired drivers
- Allows for continuous in-road lighting
- Installs quickly
- Same as Flashing Beacon



For safer medians & traffic separators



Other Applications



Where lane delineation and warning is needed

- ✓ Roundabouts
- ✓ Speed Humps/Bumps/Tables
- ✓ Traffic Calming
- ✓ Speed Calming
- ✓ Stop Sign Warning
- ✓ Islands & Traffic Separators
- ✓ Dead End intersections (Guardrails/Canals)
- ✓ Railroad Crossings
- ✓ Fire Hydrants Warning
- ✓ Incident Management
- ✓ Express Lanes

Benefits/Features

- Allows for continuous lighting
- Installs quickly
- Adapts to time of day and settings with variable light colors and actions



Proven, approved, no maintenance



- FDOT & FHWA Approved, MUTCD Compliant
- 6-years of testing
- Solar (Hybrid Capacitors)
- No maintenance
 - Holds up to all weather conditions
- Embeds in pavement less than 6 mm above road surface and at depth of 1.5 inches
- Patent core components are field-replaceable
- Housed inside patent composite cup (milling & resurfacing)
- Recyclable components
- 2- and 5-year warranties





Previous Studies & Evaluations

- Florida's Turnpike one-mile curve delineation
(reduced speeds +70mph 38-58%)
- FDOT D2 reverse curve delineation
(56 crashes ➡ 1 crash)





References

&

Recommendations

- FDOT D2 reverse curve delineation
- City of Miami Gardens roundabouts
- Village of Palmetto Bay crosswalk
- Malibu Bay private residential development (Homestead)
- Bicycle associations' letters of support



Quick installation with purchasing options

In-Road Solar Markers (iiRPMs) (FDOT APL 706)

- **Average install within 2 weeks of order**
- No utilities needed
- FDOT APL statewide contract
- City of Aventura (Demand Star) piggyback sole source contract



In-Road Mid-Block Crosswalk System (FDOT APL 654)

- **Average install within 8 weeks of order**
- Can retrofit existing RRFB system
- FDOT APL statewide contract
- City of Aventura (Demand Star) piggyback sole source contract



Installation

- For road delineation
- 1 mile
- 4 lanes
- Installed 10am – 5pm



Installation

- Proven Epoxy
- 10 Minutes



Maintenance

- Easy replacement
- No heavy equipment needed



Let's make a
difference together

It's
TIME



in-road lighting safety solution

ROAD TO
ZERO

- Crosswalk warning
- Bike lane delineation
- STOP Signs
- Curve delineation
- Wrong way prevention
- Railroad crossings
- Roadway delineation
- Incident management
- Traffic signal augmentation



Questions?

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