

# 2018 Florida Greenbook



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June 2019

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## Purpose of Florida Greenbook

- Section 334.044, F.S. Florida Statutes
  - Provide uniform minimum standards and criteria
  - Covers design, construction, and maintenance
  - Applies to all streets, roads, highways, bridges, sidewalks, curbs and curb ramps, crosswalks, bicycle facilities, underpasses and overpasses traveled by the public



56<sup>th</sup> Street, Temple Terrace

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# Florida Greenbook Advisory Committee

- 4 members per FDOT District (28 total)
  - Professional engineers representing rural and urban local governments
  - Professional engineer not employed by a government agency
  - FDOT's District Design Engineer



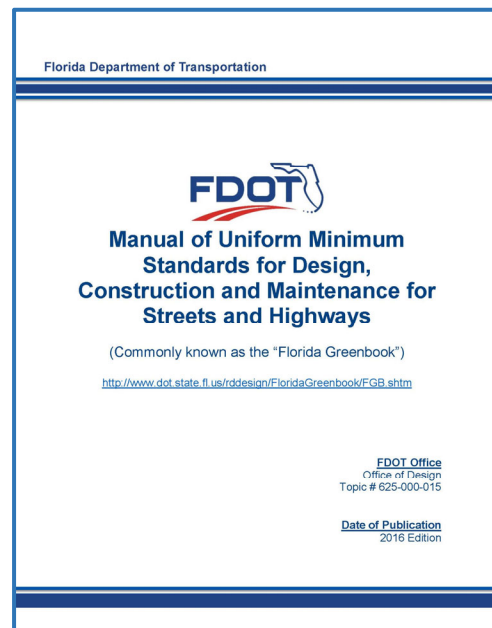
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# Florida Greenbook

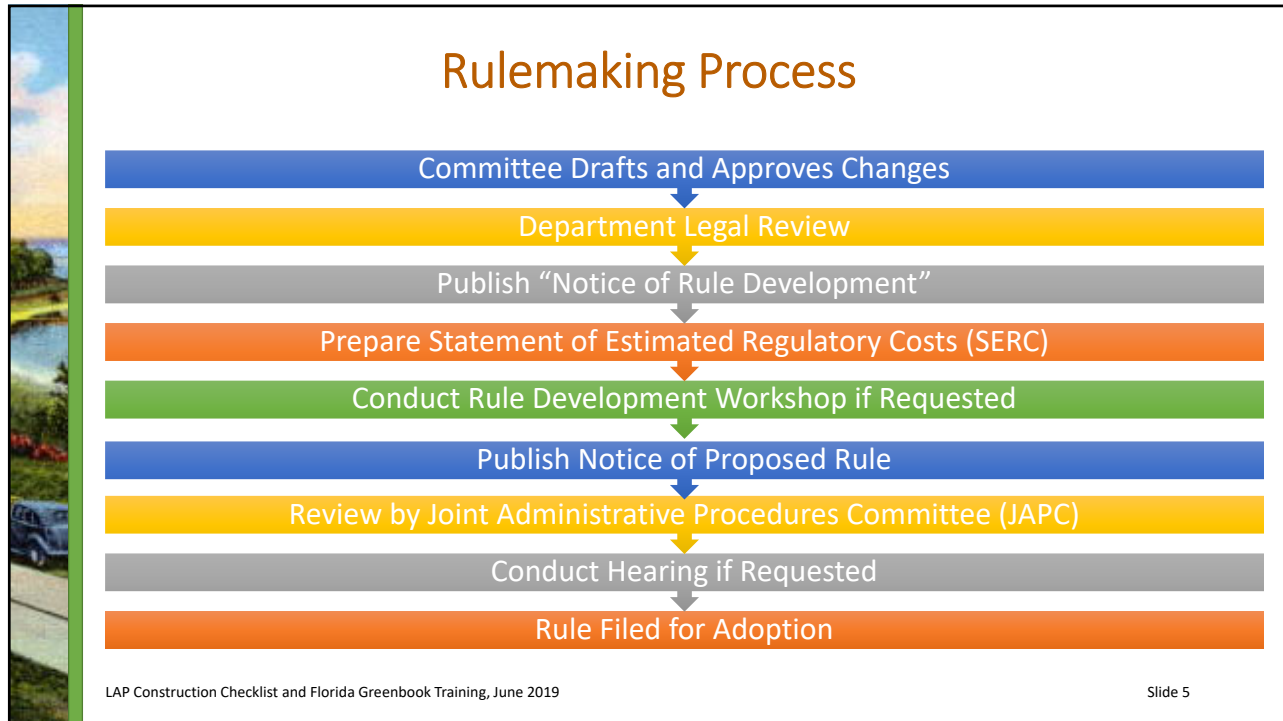
- 2016 Florida Greenbook is the current edition
  - Was effective **June 19, 2017**
- 2018 Florida Greenbook is drafted and has begun rulemaking
  - Expect to be adopted late 2018
- Draft 2018 Florida Greenbook posted on FDOT's web page:
  - ✓ <http://www.fdot.gov/roadway/>



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## Contact Mailer

- How can I find out when its effective?
- "Self Service" web page where you can register to receive information from FDOT
- Options include information on design criteria and standard changes, specifications and estimates updates, training opportunities, and **Greenbook!**
- <http://www.dot.state.fl.us/projectmanagementoffice/ContactDatabase.shtm>

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# Draft 2018 Florida Greenbook

- <https://www.fdot.gov/roadway/floridagreenbook/fgb.shtm>

Roadway Design / Roadway Criteria / Florida Greenbook

## Florida Greenbook

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**Current Florida Greenbook**

- 2016 Florida Greenbook Effective June 19, 2017 Summary of Major Changes
- DRAFT Florida Greenbook**
- 2018 Florida Greenbook DRAFT Proposed for 2019 Effective Date Summary of Major Changes Design Exception and Variation Sample Letter

**Archived Florida Greenbook**

2013	1997
2011	1989
2007	1986
2005	1984
2002	1981
2001	1976
1994-Revision	

**Committee Meetings**

**FLORIDA GREENBOOK ADVISORY COMMITTEE MEETING**

Agenda and Meeting Package  
Thursday, March 28, 2019, 8:00 AM – 5:00 PM  
Friday, March 29, 2019, 8:00 AM - 12:00 PM

**PLEASE NOTE:**

The *Manual of Uniform Minimum Standards for Design, Construction and Maintenance (Florida Greenbook)* provides criteria for public streets, roads, highways, bridges, sidewalks, curbs and curb ramps, crosswalks, bicycle facilities, underpasses, and overpasses used by the public for vehicular and pedestrian travel.

Authority for the *Florida Greenbook* is established by Chapters 20.23(3)(a), 334.044(10)(a), and 336.045, Florida Statutes, and Rule 14-15.002, Florida Administrative Code. This manual is intended for all projects not on the state and national highway systems.

This site contains the current and past editions, meeting information, and committee membership for the *Florida Greenbook* in \* PDF format.

To receive notices of updates to the *Florida Greenbook*, users should register their preferences and e-mail addresses in the Department's Contact Management database. Users can register at the following link:

<http://www.fdot.gov/designsupport/ContactDatabase.shtm>

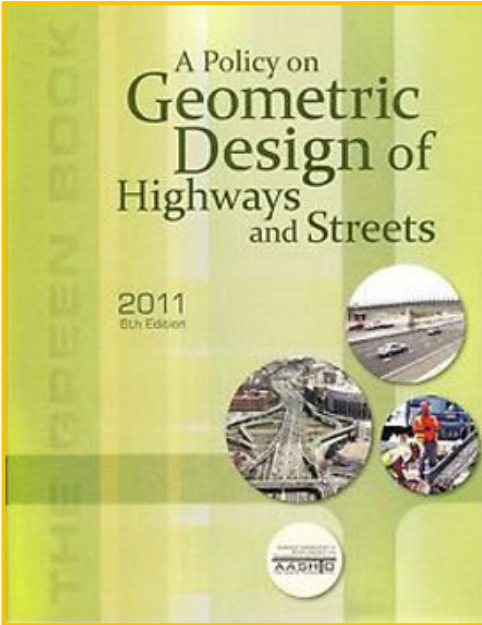
If you have any questions, comments or suggestions regarding the Florida Greenbook, please contact **Mary Anne Koos, Special Projects Coordinator**

Email: [maryanne.koos@dot.state.fl.us](mailto:maryanne.koos@dot.state.fl.us)  
Phone: (850) 414-4321

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## 2011 AASHTO Greenbook

- Effective November 12, 2015
- FHWA published the Final Rule to Title 23, Code of Federal Regulations Part 625
- The rule modifies regulations governing new construction, reconstruction, resurfacing (except for maintenance resurfacing), restoration, and rehabilitation projects on the NHS



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## 2018 AASHTO Greenbook?

- 2011 AASHTO Greenbook is still the incorporated reference based upon FHWA's published Final Rule to Title 23, Code of Federal Regulations Part 625
  - FHWA reviewed the 2018 Green Book and found the updates meet or improve upon the criteria of the 2011 Green Book
  - State DOTs may adopt the 2018 Green Book for use *on* NHS projects
  - Until 23 CFR part 625 is updated through rulemaking, the 2018 AASHTO Green Book should be considered guidance only
  - <https://www.fhwa.dot.gov/design/standards/190510.pdf>
  - [http://downloads.transportation.org/publications/GDHS-7\\_SummaryOfChanges.pdf](http://downloads.transportation.org/publications/GDHS-7_SummaryOfChanges.pdf)

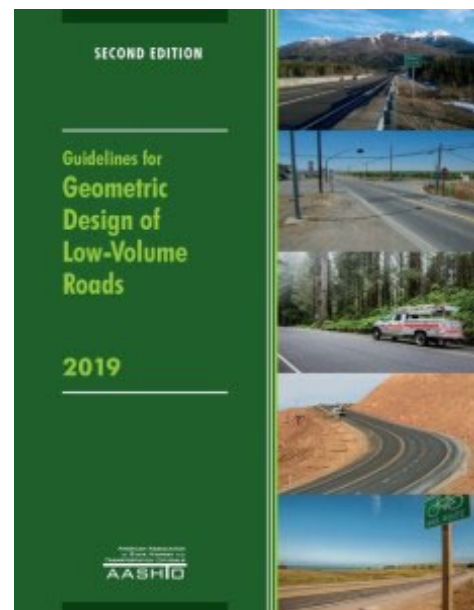
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## 2019 AASHTO Geometric Design of Low Volume Roads

- Local roads and minor collectors with ADT of  $\leq 2000$  vehicles per day



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## Major Changes in 2018 Greenbook

- Introduction and Definition of Terms
- Chapter 1 – Planning
- Chapter 3 – Geometric Design
- Chapter 4 – Roadside Design
- Chapter 6 - Lighting
- Chapter 8 – Pedestrian Facilities
- Chapter 9 – Bicycle Facilities
- Chapter 11 – Work Zone Safety
- Chapter 14 – Design Exceptions and Variations
- Chapter 17 – Bridges and Other Structures
- Chapter 18 – Signing and Marking

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## On or Off the State Highway System (SHS)?

- Intended for use on all streets and highways OFF the SHS
- Unless using federal funds and project is:
  - On the National Highway System (NHS),
  - Has a construction value  $\geq$  \$10 million, or
  - Includes a vehicular bridge, pedestrian bridge over a roadway, certain box culverts.
- Then use FDOT's Design Manual (FDM) and Standard Plans



Fort George/Talbot Island Bridge, FL

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## What Criteria To Use?

✓ Check Table 1: Project Classifications in Chapter 19 of Local Agency Program(LAP) Manual  
[http://www.fdot.gov/programmanagement/LAP/LAP\\_TOC.shtm](http://www.fdot.gov/programmanagement/LAP/LAP_TOC.shtm)

Project Classifications	Design Criteria and Standards,*	Specifications*	Materials Testing*	Qualifications
<b>Class A</b> On the State or National Highway Systems	<a href="#">FDOT Design Manual</a> and <a href="#">FDOT Standard Plans</a>	<a href="#">FDOT Standard Specifications for Road &amp; Bridge Construction</a>	<a href="#">Samples Testing and Reporting Guide</a> and <a href="#">FDOT Materials Manual</a>	FDOT Prequalified <a href="#">Consultants</a> and <a href="#">Contractors</a>
<b>Class B</b> Off the State and National Highway Systems with an estimated construction value of \$10 million or greater.	<a href="#">FDOT Design Manual</a> and <a href="#">FDOT Standard Plans</a>	<a href="#">FDOT Standard Specifications for Road &amp; Bridge Construction</a>	<a href="#">Samples Testing and Reporting Guide</a> and <a href="#">FDOT Materials Manual</a>	FDOT Prequalified <a href="#">Consultants</a> and <a href="#">Contractors</a>
<b>Class C</b> Off the State and National Highway Systems and includes structural components: <ul style="list-style-type: none"> <li>a vehicular bridge</li> <li>pedestrian bridge over a roadway</li> <li>box culvert meeting the definition of a bridge as stated in <a href="#">23 CFR 305</a></li> </ul>	1) For structures components, use the <a href="#">FDOT Design Manual</a> and <a href="#">FDOT Standard Plans</a> 2) For all other components, use the <a href="#">Florida Greenbook</a>	1) For the structures components, <a href="#">FDOT Standard Specifications</a> 2) For all other components, <a href="#">LAP Big 4 or approved Local Agency Specs</a>	1) For structures components, use the <a href="#">Samples Testing and Reporting Guide</a> and <a href="#">FDOT Materials Manual</a> 2) For all other components, use Local Agency materials testing process	FDOT Prequalified <a href="#">Consultants</a> and <a href="#">Contractors</a>
<b>Class D</b> Off the State and National Highway Systems, may include structural components: <ul style="list-style-type: none"> <li>pedestrian bridges not over a roadway</li> <li>bridges on shared use path not over a roadway</li> <li>box culverts that do not meet the definition of a bridge as stated in <a href="#">FDOT Symposium Sidewalks and Shared Use Paths 2019</a></li> </ul>	<a href="#">Florida Greenbook</a> -Or- Approved Minimum Design Standards chosen by local agency which conform to the minimum criteria provided in <a href="#">Florida Greenbook</a>	<a href="#">LAP Big 4 or approved Local Agency Specs</a>	Local Agency materials testing process	Local Agency qualified consultants and contractors

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## State-maintained and Locally-maintained

### Vehicle-miles Traveled 2011-2015

Local  
46%

State  
54%

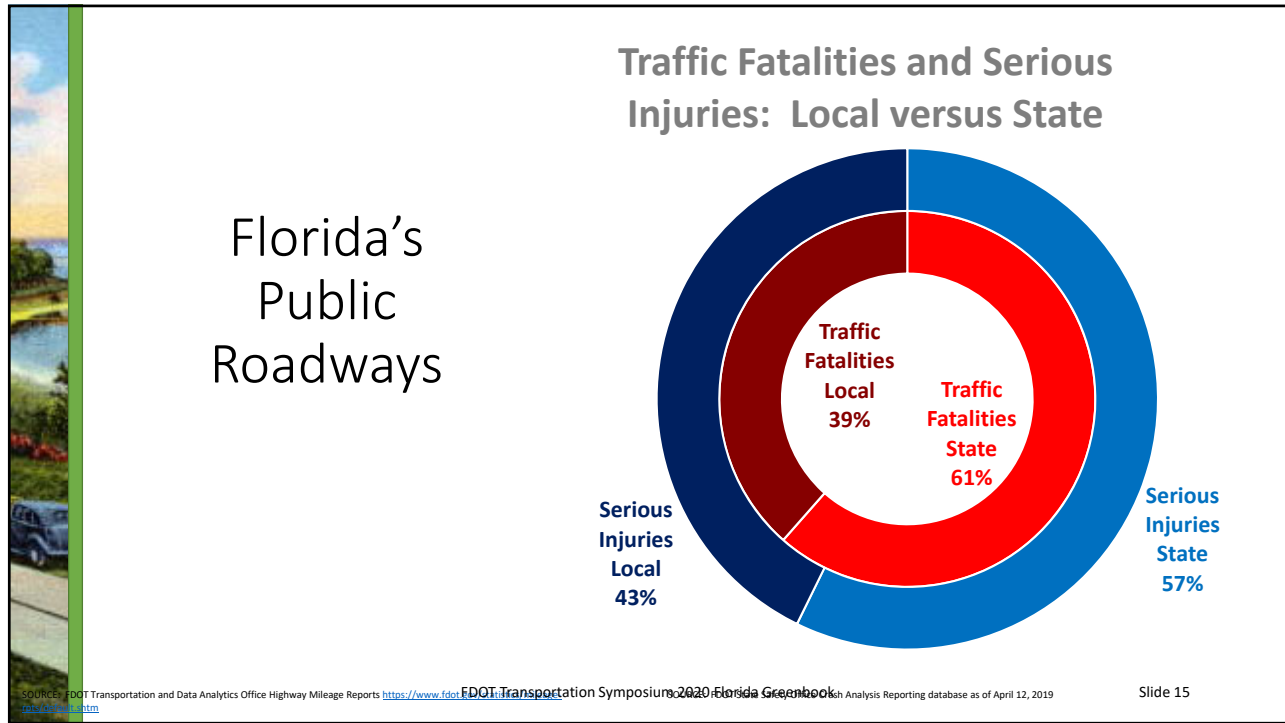
Centerline Miles 2015  
State  
10%

Centerline Miles 2015  
Local  
90%

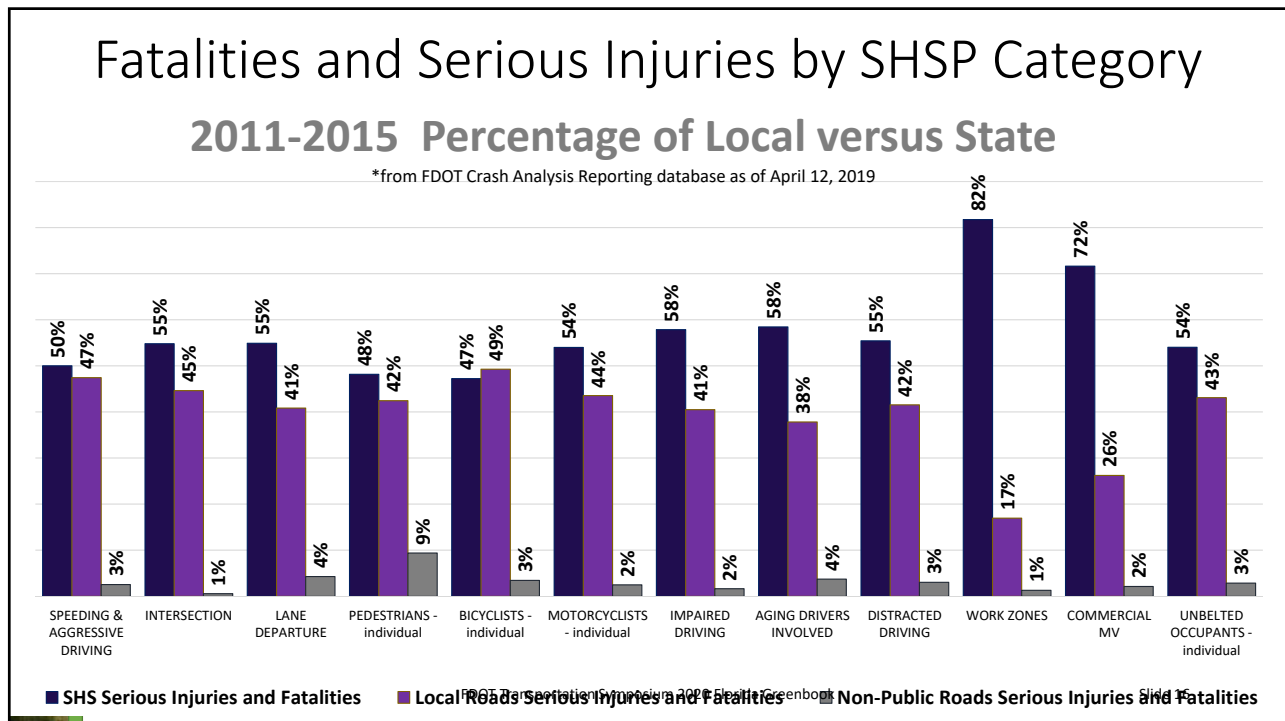
## Florida's Public Roadways

SOURCE: FDOT Transportation and Data Analytics Office Highway Mileage Reports <https://www.fdot.com/transportation-and-data-analytics-office-highway-mileage-reports> FDOT Transportation Symposium 2020 Florida Greenbook Analysis Reporting database as of April 12, 2019

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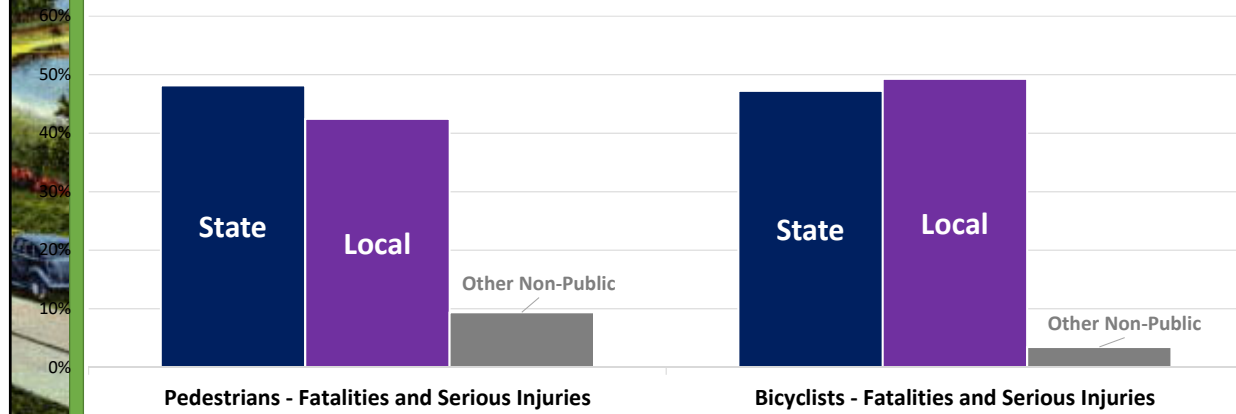


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# Florida Pedestrian and Bicyclist Fatalities and Serious Injuries

## Florida Pedestrian and Bicyclist Fatalities and Serious Injuries 2011-15, by Roadway System



SOURCE: FDOT State Safety Office Crash Analysis Reporting database as of April 12, 2019

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## Flexibility in Highway Design, FHWA

- National Highway System Act, 1995
- Congress emphasized “A design for new construction, reconstruction, or rehabilitation of a highway on the National Highway System... may take into account...
  - Constructed and natural environment of the area
  - Environmental, scenic, aesthetic, historic, community, and preservation impacts of the activity
  - Access for other modes of transportation”
  - <https://www.fhwa.dot.gov/environment/publications/flexibility/flexibility.pdf>



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## New Construction or RRR?

- New construction and reconstruction projects
  - Geometric Design, Roadside Design, Lighting, Rail Highway Crossings, Pedestrian and Bicycle Facilities, Transit, Drainage
- Maintenance and resurfacing projects
  - Maintenance and Resurfacing, Pedestrian and Bicycle Facilities
- All projects
  - Design Exceptions...and Variations



Coastal Highway/US 98, Apalachicola, FL

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## Introduction

- Provides information on –
  - Statutory Authority
  - Intended Use (new, reconstruction, resurfacing, maintenance)
  - Adoption of 2009 MUTCD and Revisions 1 and 2
  - When exceptions and variations are required



SR 100, Putnam County

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# Introduction - Definitions

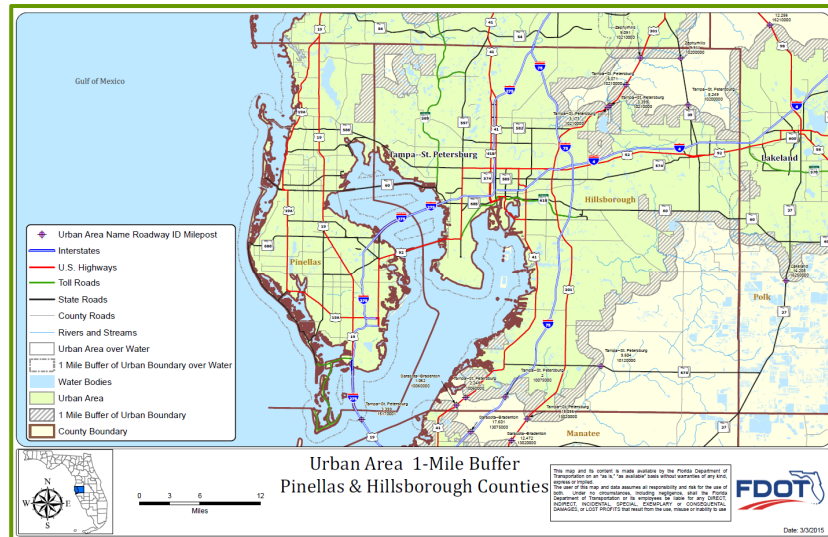
- New definitions for –
  - Border Area
  - Clear Zone
  - Lateral Offset
  - Low Speed
  - Reconstruction
  - Shared Street
  - Shared Use Path/Multi-Use Trail



SR 24, Waldo Road, Waldo, FL

# Chapter 1 – Planning

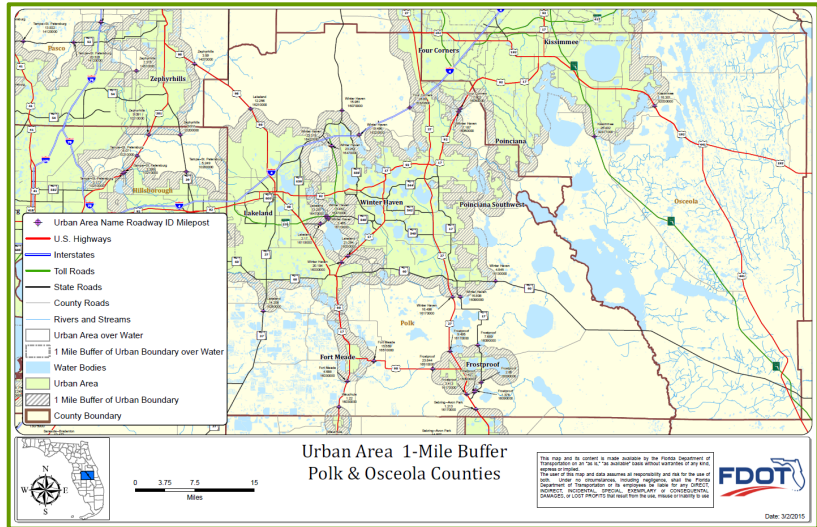
- Design should be based upon existing and proposed land uses and development patterns
- Terms rural and urban are based upon population density
- Urban Area 1-Mile Buffer Maps
  - <http://www.fdot.gov/roadway/BufferMaps/Default.shtm>



# Chapter 1 – Planning

- Design should be based upon existing and proposed land uses and development patterns
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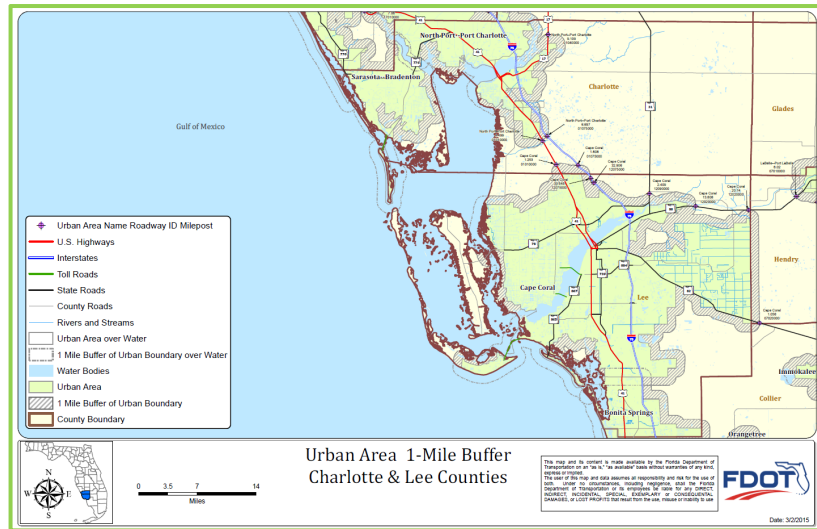
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# Chapter 1 – Planning

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- Urban Area 1-Mile Buffer Maps

- <http://www.fdot.gov/roadway/BufferMaps/Default.shtm>



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## Chapter 2 – Land Development

- Defines road users as pedestrians, bicyclists, transit and motor vehicle operators and passengers
- Provide desirable geometry that supports appropriate cross sections and sight distance
- Provide sufficient right of way for stormwater, utilities, pedestrian features
- Design for target speed



Lakeland, Florida

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## Chapter 3 – Geometric Design

- Revised table for stopping sight distance to include grades
- New tables for:
  - Decision sight distance
  - Deflections thru intersections
  - Min. length of horizontal curves
  - Length of compound curves in turning roadways
- Superelevation criteria revised
  - Two types – a) rural highways, urban freeways, and high speed urban highways  
b) low speed urban arterials and collectors
  - New tables for superelevation rates, minimum radii, and transition slope rates
- Values for traveled way widening revised to reflect a WB-62 as base vehicle.

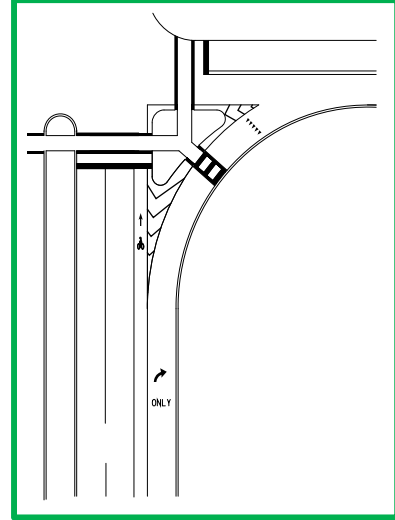
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## Chapter 3 – Geometric Design (con.)

- Revised notes for maximum grade table
- Revised notes in lane widths table to allow 11-14' lanes on 3- and 5-lane typical sections
- Reduced the min. shoulder widths for multi-lane divided highways
- New table for median widths which allows for narrower medians in constrained sections
- New section for islands for channelization, division, and refuge (painted and raised)
- Roadside slopes, clear zone, and lateral offset moved to Chapter 4



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## Chapter 3 – Geometric Design (con.)

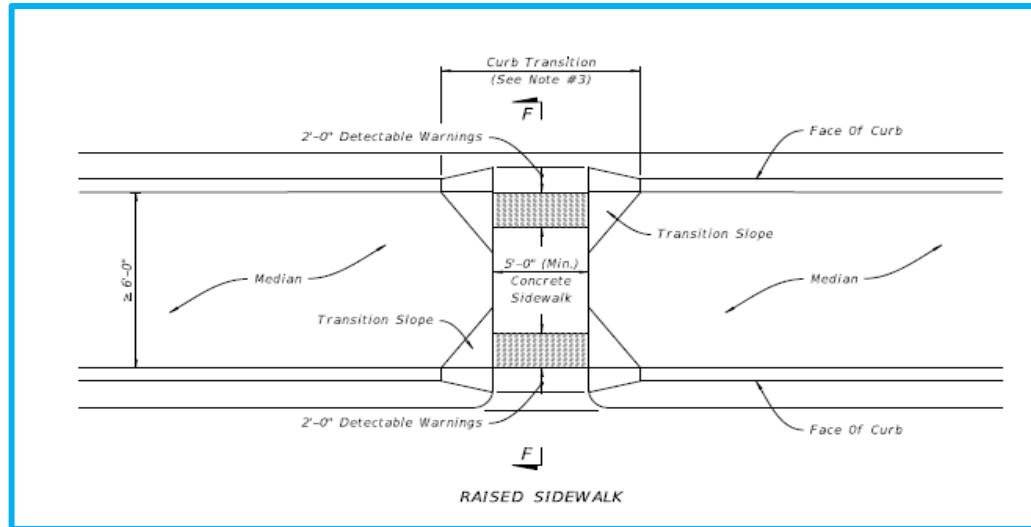


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## Chapter 3 – Geometric Design (con.)



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## Chapter 3 – Geometric Design (con.)

- Revised section for auxiliary lanes at intersections (turn lanes)
- New table for pavement widths for turning roadways
- Clarified that accessibility requirements apply to sidewalks, shared use paths, transit boarding and alighting areas



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Union Station, Denver, CO

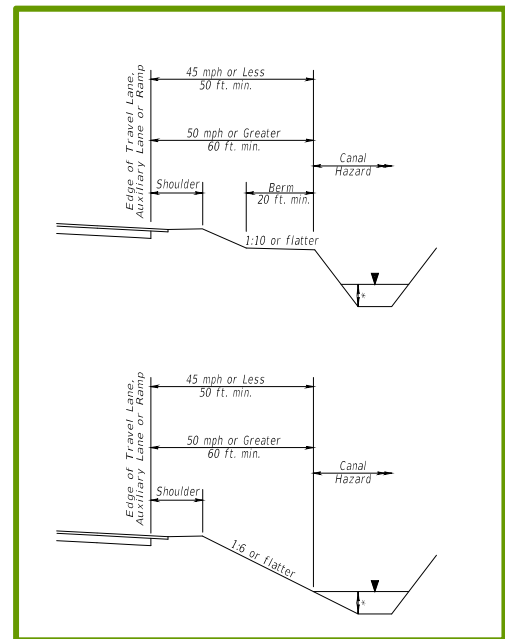
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## Chapter 4 – Roadside Design

- New chapter - 33% of all crashes are lane departures, but 50% of fatalities
- Added definitions for recoverable, non-recoverable and traversable slopes
- New table for clear zone widths
  - Considers cost, terrain, right-of-way, social and environmental impacts
- New section for lateral offset, requirements for above ground objects, drop offs, drainage features
- New section for barriers, crash test criteria, safety hardware upgrades

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## Chapter 4 – Roadside Design (con.)

- New section for offset requirements for signs, signals, lighting supports, utility poles, trees and similar features
  - Performance requirements for breakaway devices
  - Miscellaneous section for fire hydrants, railroad warning devices, mailbox supports, bus benches and shelters
- New section for barriers, end treatments and crash cushions
  - Performance requirements
  - Warrants (including median barriers)
  - Work Zones

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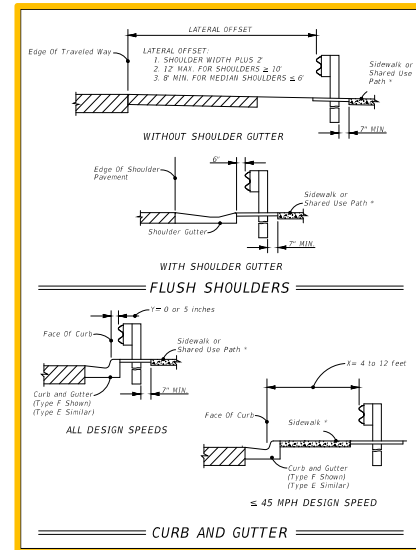
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## Chapter 4 – Roadside Design (con.)

- Barrier Types (guardrail, concrete barrier, high tension cable barrier, and temporary barrier)
  - Selection guidelines
  - Placement
  - Location relevant to other features (e.g. shared use paths and guardrails)
  - Deflection space and zone of intrusion
  - Grading
  - Curbs
  - Flare rate
  - Length of need
- End treatments and crash cushions
- Bridge Rails



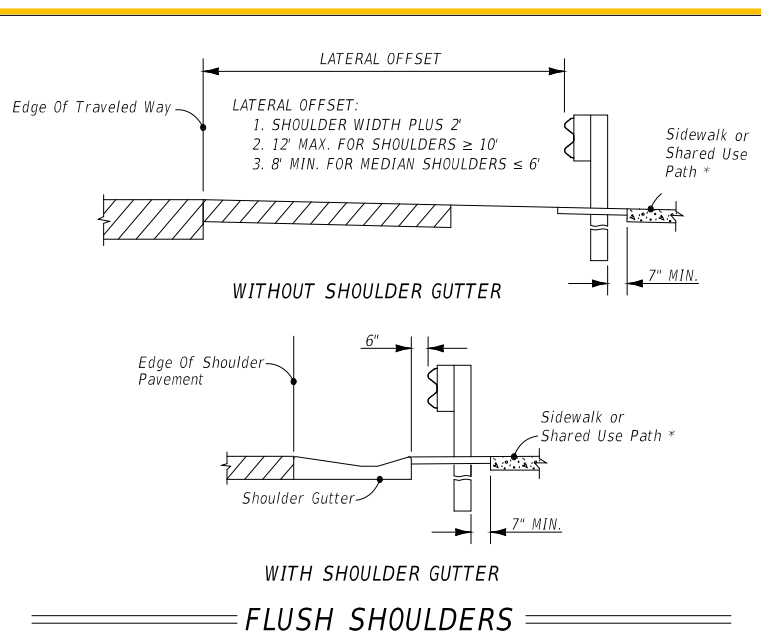
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## Chapter 4 – Guardrail on Flush Shoulder Roadways

- Consider location of guardrail relative to existing or future sidewalks or shared use paths

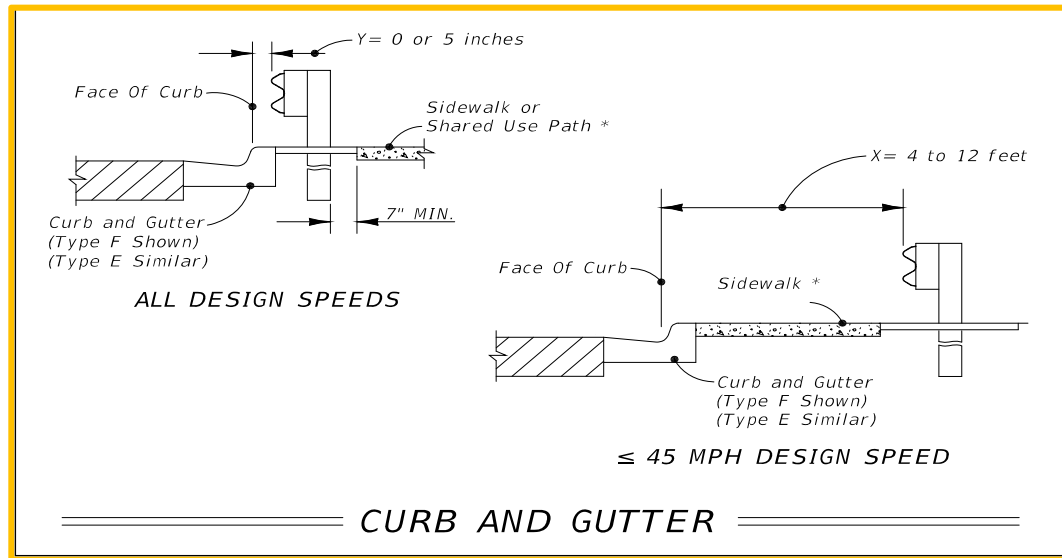


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## Chapter 4 – Guardrail on Curbed Roadways



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## Chapter 6 – Lighting

- New definitions for LED, HPS, and MH luminaires
- Explanation of the lighting methods
  - Luminance – straight roadways, based upon surface type
  - Horizontal and vertical illuminance – pedestrian areas
  - Horizontal illuminance – intersections and interchanges, includes variable for surface type
- New requirements for underpasses
  - Use wall mounted luminaire attached to pier, pier cap or wall copings
  - Daytime and nighttime requirements
- Requirements for decorative and architectural lighting



Pinellas County, FL

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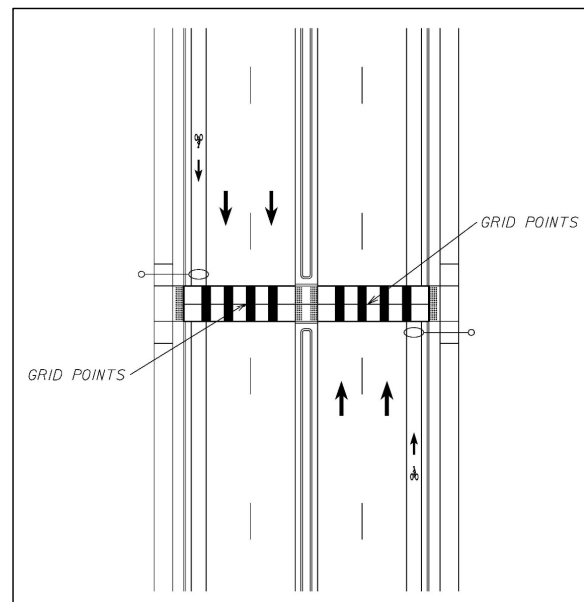
### Table 6 -2 Illuminance and Luminance Design Values

Roadway and Walkway Classification	Off-Roadway Light Sources	Illuminance Method					Luminance Method			Additional Values (both Methods)
		Average Maintained Illuminance (Horizontal)				Illuminance Uniformity Ratio	Average Maintained Luminance			Veiling Luminance Ratio
		R1	R2	R3	R4		Lavg	Uniformity		
General Land Use	(foot-candles) (min)	(foot-candles) (min)	(foot-candles) (min)	(foot-candles) (min)	avg/min (max) (6)	cd/m2 (min)	Lavg/Lmin (max)	Lmax/Lmin (max)	Lv(max)/Lavg (max) <sup>(3)</sup>	
Sidewalks	Commercial	0.9	1.3	1.3	1.2	3:1	Use illuminance requirements			
	Intermediate	0.6	0.8	0.8	0.8	4:1				
	Residential	0.3	0.4	0.4	0.4	6:1				
Pedestrian Ways and Bicycle Ways <sup>(2)</sup>	All	1.4	2.0	2.0	1.8	3:1				
Notes	1. Meet either the Illuminance design method requirements or the Luminance design method requirements and meet veiling luminance requirements for both illuminance and Luminance design methods.									
	2. Assumes a separate facility. For Pedestrian Ways and Bicycle Ways adjacent to roadway, use roadway design values. Use R3 requirements for walkway/bikeway surface materials other than the pavement types shown.									

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## Chapter 6 – Lighting

- Midblock Crosswalks
  - Provide 2.0 foot candles of maintained vertical illumination
  - Measured at 5 feet from the road surface
  - Calculate the vertical illuminance on each near side approach.



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# Chapter 7 – Rail-Highway Crossings

- Requires sidewalks and shared use paths be continued through at grade street crossings



Jacksonville – Baldwin Trail



Myers Park Drive, Tallahassee

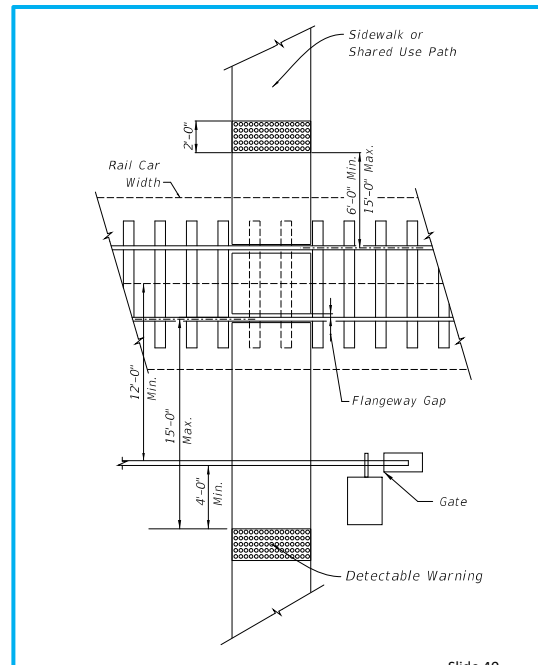
FDOT Symposium Sidewalks and Shared Use Paths 2019

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# Chapter 7 – Rail-Highway Crossings

- Figure 7 – 3 Pedestrian Crossings



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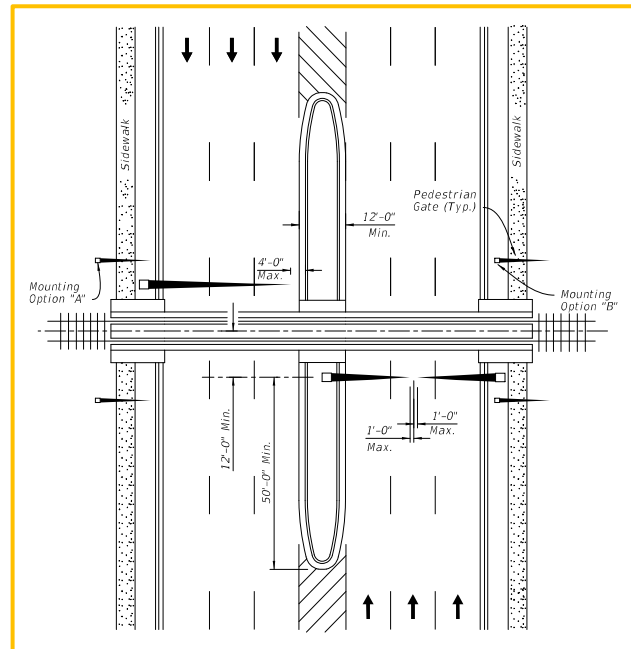
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## Chapter 7 – Rail - Highway Crossings



Sun Rail Crossing, Winter Park, FL

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## Chapter 8 – Pedestrian Facilities

- Sidewalks have a min. width of 5' (6' back of curb)
- Graded area  $\geq 1$  foot with 1:6 cross slope, flush with the sidewalk
- Buffer strips  $\geq 2$  feet if sidewalk separated from curb
- Cross slope  $\leq 2\%$
- Include an evaluation of existing driveways for accessibility



Historic Downtown Ft. Myers, FL

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## Chapter 8 – Pedestrian Facilities

- Grades  $\leq 5\%$ , unless accessible ramps and landings provided
  - In a right of way, grades are allowed to equal the general grade of the roadway
- Requires at least a 5' wide connection between an accessible transit stop and the sidewalk
- New sidewalks need to connect to existing sidewalks, shared use paths and crosswalks on the adjoining project



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Centerville Road, Tallahassee, FL

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## Chapter 8 – Pedestrian Facilities

- Guidance for evaluation of existing driveways for accessibility and placement of new utility poles
- Revised section for curb ramps and blended transitions
- Clarifications of when to place detectable warnings



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US 1, Marathon, Florida

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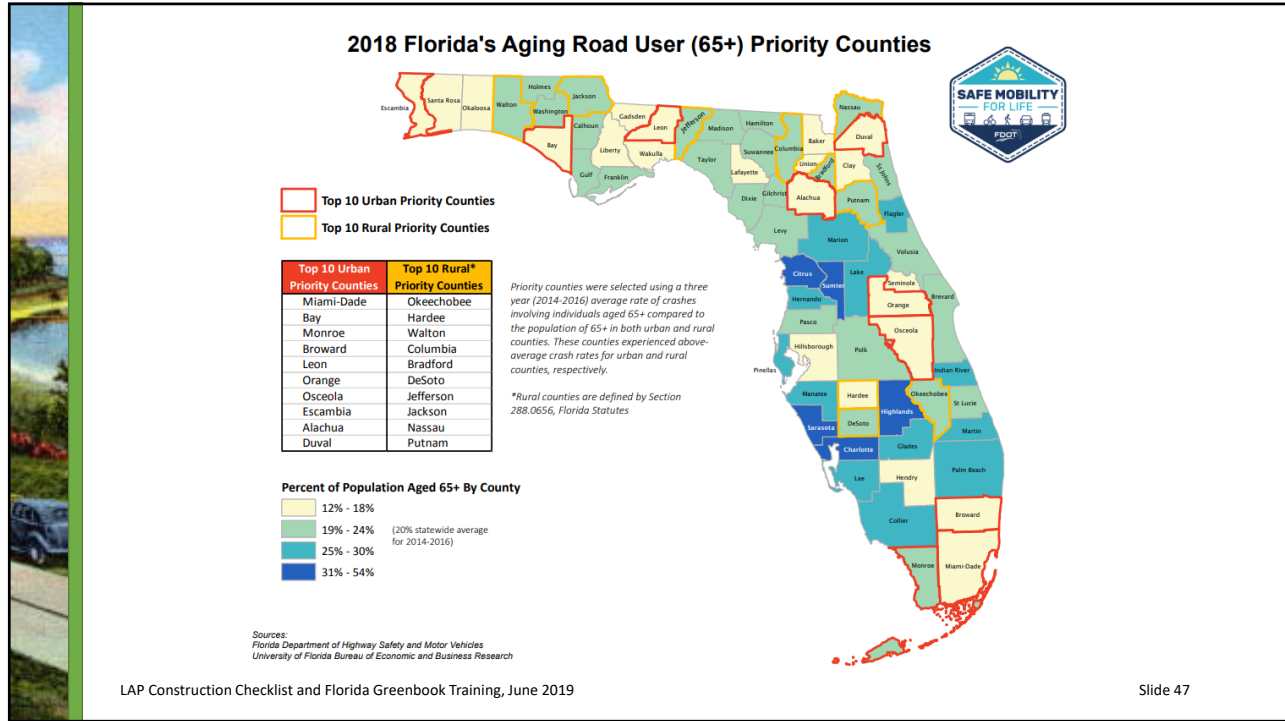
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# Accessibility

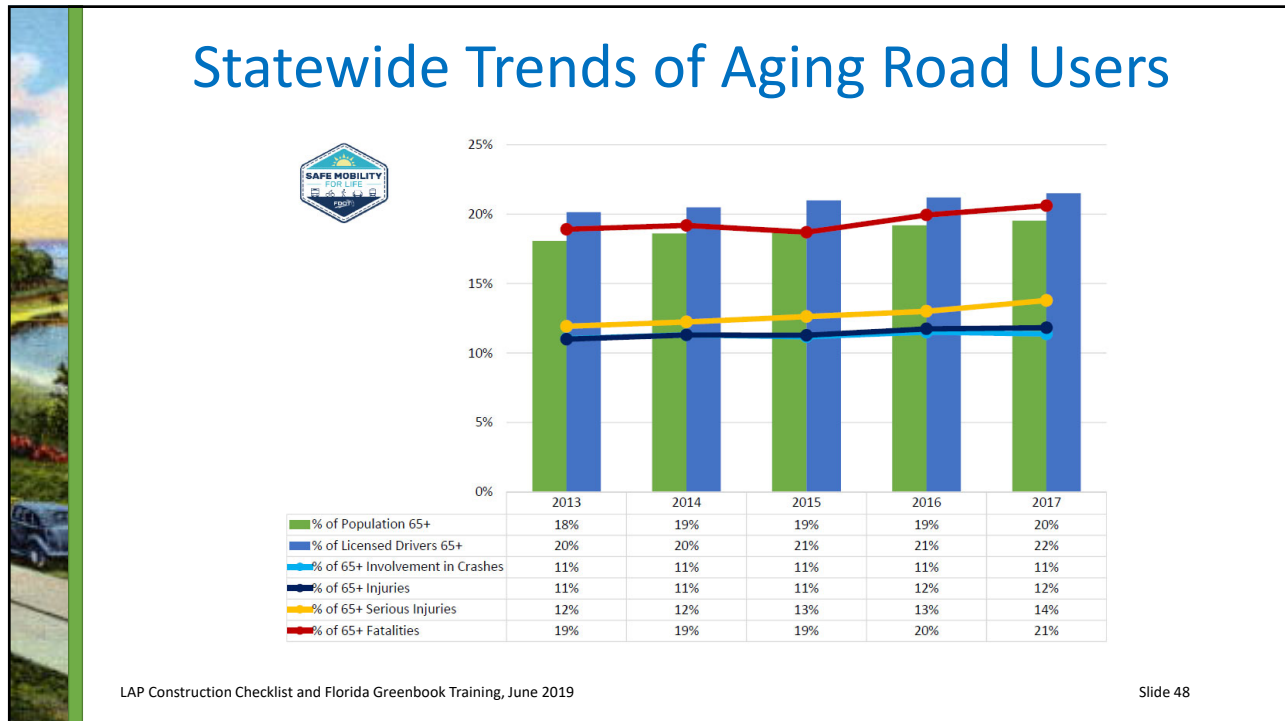
- United States Access Board
  - Public Rights of Way
  - Shared Use Paths
  - <https://www.access-board.gov/guidelines-and-standards/streets-sidewalks>



- <https://www.access-board.gov/guidelines-and-standards/streets-sidewalks>



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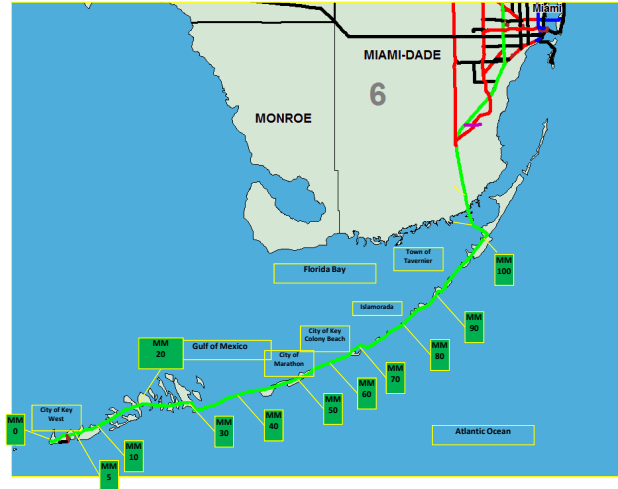


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## Aging Road User Roadway Safety Audit: Monroe County

- Compare crash data for all ages versus 65+ to find high crash locations
- Used years 2012 to 2016
- Data Sources:
  - FDOT State Safety Office
  - Signal 4
- Used District road safety audit process
- Included drivers, bicyclists, and pedestrians
- Reviewed crash reports for more information



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## US 1 at Sombrero Beach Road, Marathon

- Angle crashes are dominant:
  - 50% of 65+
  - 37% of all ages
- Left turn 2nd leading crash type
  - 18% of 65+
  - 13% of all ages
- Crashes are an indicator that older drivers experience difficulties entering and exiting US 1



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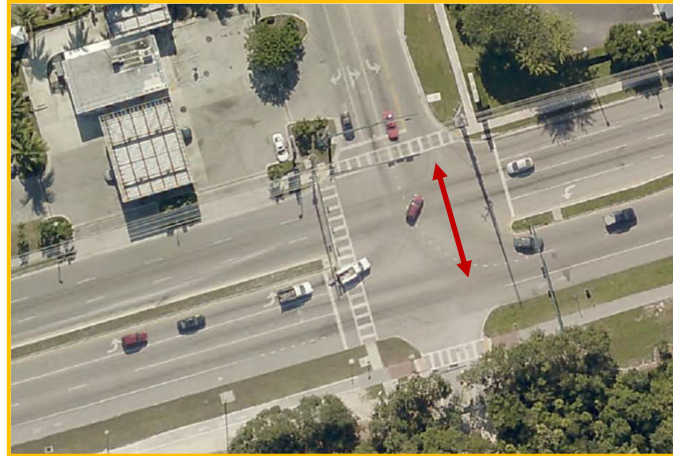
## US 1 at Sombrero Beach Road

### Safety Issue:

- Missing crosswalk on south leg of US 1.

### Suggestion:

- Install high emphasis crosswalk on south leg of intersection.



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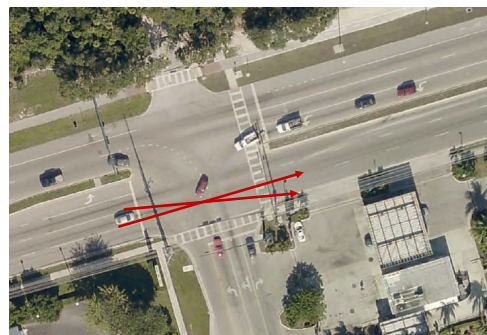
## US 1 at Sombrero Beach Road

### Safety Issue:

- Existing shared right and through lane are source of conflict at gas station driveway

### Suggestions:

- Perform intersection analysis to evaluate an exclusive right turn lane
- If exclusive right turn is justified some suggestions include:
  - Install Right Turn Arrow pavement marking.
  - Install delineators to restrict northbound through movement.

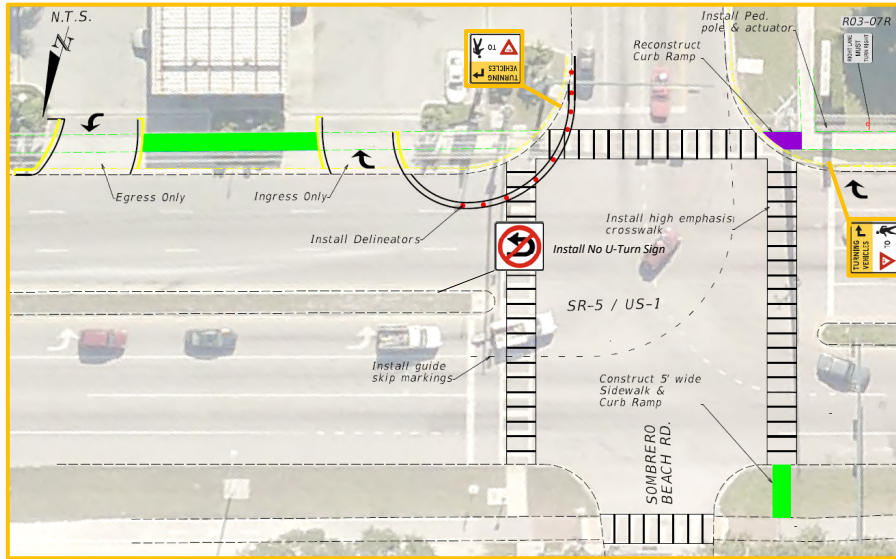


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## US 1 at Sombrero Beach Road – Suggested Improvements



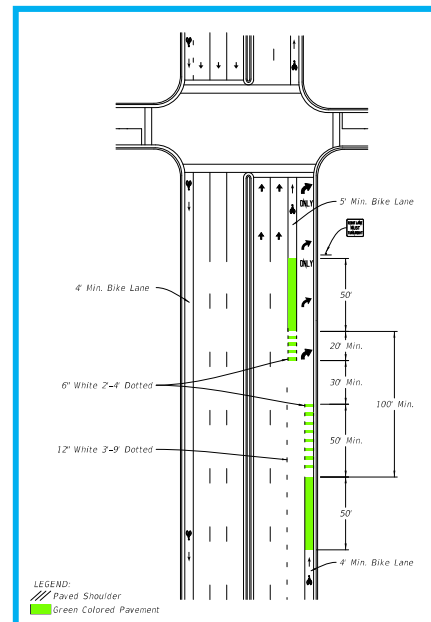
LAP Construction Checklist and Florida Greenbook Training, June 2019

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## Chapter 9 – Bicycle Facilities

- Updated placement of bicycle lane markings and figures
- Added example of obstruction pavement marking
- Added requirement to redistribute pavement width to provide bicycle facilities with new table for lane widths
- New section on buffered bike lanes and green bike lanes
- Revised shared lane marking section to place in middle of lane



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## Chapter 9 – Shared Use Paths



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False Creek Seawall, Vancouver

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## Chapter 9 – Shared Use Paths

- Minimum standard width for a two-way path is 10 feet
- Can be 10 - 14 feet (wider trails with high use, variety of users, steep grades, SUN Trail)
- Rarely, 8 feet if:
  - Bicycle traffic is low, even on peak days or hours
  - Only occasional pedestrians expected
  - Frequent passing and resting opportunities
  - Infrequent maintenance vehicle loading
  - Available on-street facility such as bike lanes
  - Short distance due to a physical constraint (environmental feature, bridge abutment, utility structure, or fence)



Goose Pond Trail, Tallahassee

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## Chapter 9 - Shared Use Paths

- Require a separation from the roadway (horizontal space of at least 5' or barrier)
- Fixed objects should not be permitted to protrude within the vertical or horizontal clearance
- Running grade, cross slope and curb ramp requirements same as sidewalks
- Include an evaluation of existing driveways for accessibility



Courtney Campbell Trail, Pinellas County

FDOT Symposium Sidewalks and Shared Use Paths 2019

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## Chapter 9 – Shared Use Paths

- Graded shoulder  $\geq 2$  feet with 1:6 slope
  - 3 feet or more desirable (clearance from trees, poles, walls, fences, guardrails, etc.)
  - Adjacent to canals, ditches, or slopes steeper than 1:3, a wider separation recommended
- Separation from edge of path to top of slope  $\geq 5$  feet
  - Depending on height of embankment and condition at the bottom, a barrier may be needed
- Vertical clearance of 8 feet
  - 10 feet is desirable, especially if emergency vehicles need to pass through
- Clear width on structures should be the same as the approach path, plus  $\leq 2$  foot wide clear areas.



Legacy Trail, Sarasota

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## Chapter 9 – Shared Use Paths

- For paths in relatively flat areas (grades  $\leq 4\%$ ), use design speed of 18 mph
- For sustained downgrades greater than 4% exists, refer to the [AASHTO Guide for the Development of Bicycle Facilities \(2012, 4th Edition\)](#) for further guidance



Legacy Trail, Sarasota

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FDOT Symposium Sidewalks and Shared Use Paths 2019

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## Chapter 9 – Shared Use Paths

- Permission for grade to match slope of roadway in constrained rights of way extended to shared use paths
  - US Access Board Guidelines and Standards for Shared Use Paths
  - <https://www.access-board.gov/guidelines-and-standards/streets-sidewalks>



Camp Helen State Park, Bay County

Slide 62

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## Accessibility

- Curb ramps should be parallel to and the full width of the path
- Pull boxes, manholes, etc. in the curb ramp or detectable warning should be relocated when feasible
- Specify an appropriate detectable warning system compatible with path surface
- Push buttons within reach range (10") of sidewalk and 42" high



Welaunee Blvd., Tallahassee

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FDOT Symposium Sidewalks and Shared Use Paths 2019

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## Chapter 9 – Shared Use Paths

- Use the *AASHTO Guide for the Development of Bicycle Facilities (2012, 4th Edition)* to determine the minimum radius of curves
- Transition towards the roadway at intersections to provide a more functional crossing location



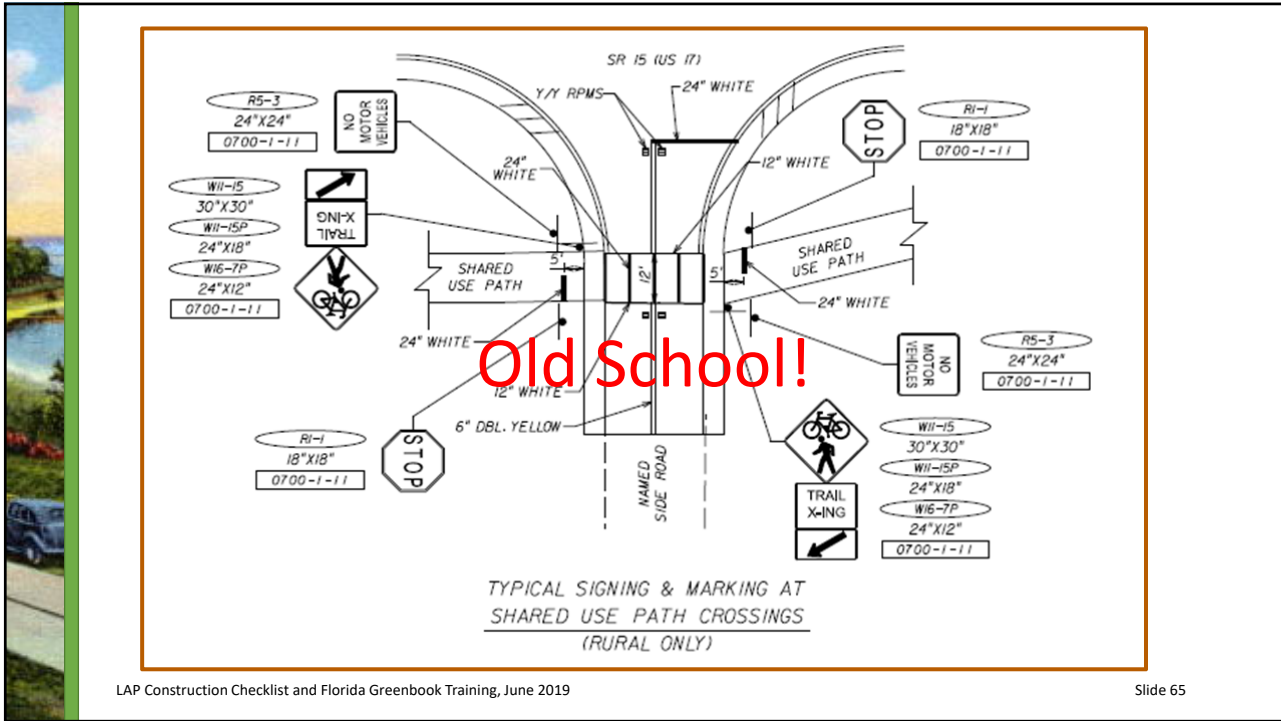
US 41, Lecanto

Slide 64

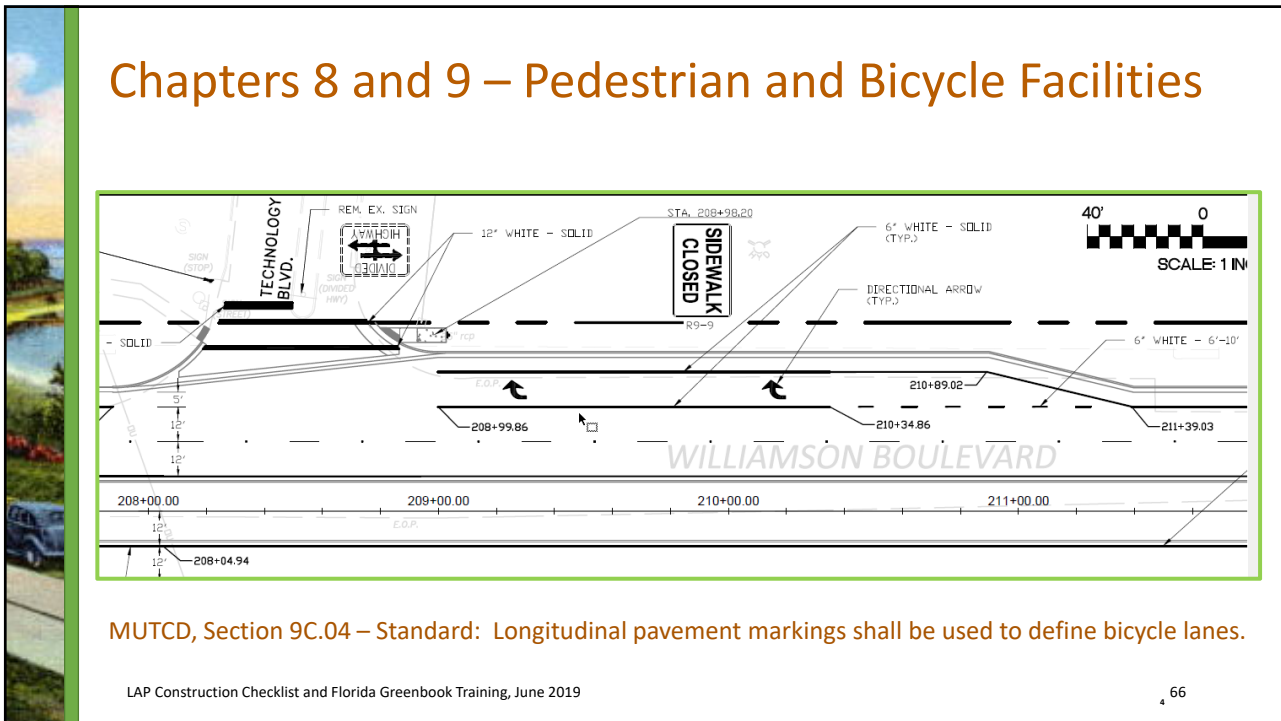
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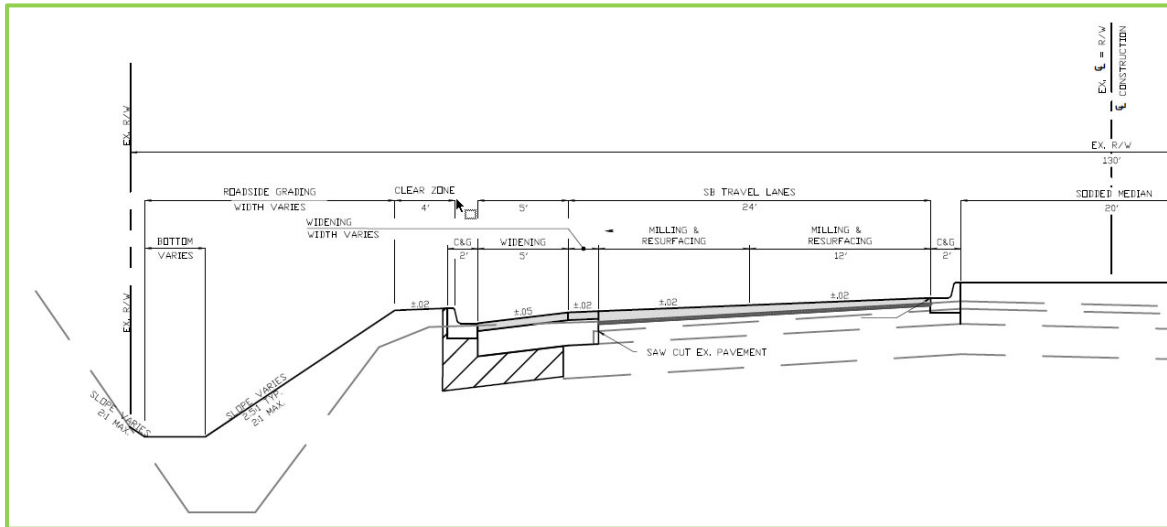


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## Chapters 8 and 9 – Pedestrian and Bicycle Facilities



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## Chapter 11 – Work Zone Safety

- Added requirements for clear zone in traffic control plans
- Guidance for the use of transverse rumble strips
- Requirements for barrier selection and placement



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## Chapter 11 – Work Zone Safety

- Applies to any activity within the right of way
- Temporary Traffic Control Plan (TTC) must address all road users (pedestrians, cyclists, drivers, transit, trucks)
- Follow Part 6 D of the MUTCD



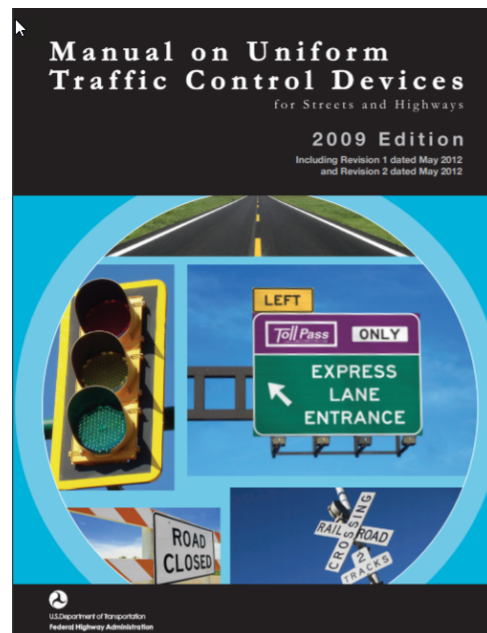
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## MUTCD

- Manual on Uniform Traffic Control Devices
  - Part 6 – Temporary Traffic Control
  - Interim Approvals
  - [https://mutcd.fhwa.dot.gov/pdfs/2009r1r2/pdf\\_index.htm](https://mutcd.fhwa.dot.gov/pdfs/2009r1r2/pdf_index.htm)



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## Chapter 11 – Work Zone Safety

- Provide safe passageways for pedestrians through, in, and/or around construction or maintenance work zones, including persons with disabilities in compliance with the:
  - [2006 Americans with Disabilities Act Standards for Transportation Facilities](#) as required by [49 C.F.R 37.41 – Construction of Transportation Facilities by Public Entities](#), or
  - [37.43 - Alteration of Transportation Facilities by Public Entities](#), and
  - [2017 Florida Accessibility Code](#) as required by [61G20-4.002](#).



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## Chapter 11 – Pinellas Trail

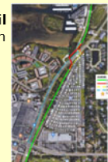


Guide to the  
**Pinellas Trail**

**Parks & Conservation Resources**  
PCR Administrative Office  
12520 Ulmerton Road  
Largo, FL 33774  
(727) 582-2100 - select option #2

### Alternate 19/Orange Street pedestrian bridge closure

**A segment of the Pinellas Trail will be closed until further notice:** Alternate 19/Orange Street pedestrian bridge between Curlew and Tampa roads. The trail segment will be inaccessible to cyclists, runners, and pedestrians. Trail users are advised to follow one of two detours that will allow continued trail use.



#### Alternate 1 Detour

**Coming from the south:** When approaching the southern end of the closed bridge, Trail users should use the sidewalk to the east of the bridge that connects to the sidewalk on the east side of Alt. 19. There is a new mid-block crosswalk across Alt. 19 at Orange Street with pedestrian activated flashing beacons on both sides of the crosswalk to alert motorists of the crosswalk user. Reconnect with the trail using the new sidewalk connection at Alt. 19 and Orange Street.

**Coming from the north:** Trail users should use the new sidewalk connection at Orange Street to connect to the new mid-block crosswalk across Alt. 19. There are pedestrian activated flashing beacons on both sides of the crosswalk to alert motorists of the crosswalk user. Continue south on the sidewalk on the east side of Alt. 19 to reconnect to the trail on the southern end of the closed bridge.

#### Alternate 2 Detour

**Coming from the south:** Trail users should cross Curlew Road, then Alt. 19 and use a sidewalk along the west side of Alternate 19 to reconnect with the trail using the new sidewalk connection at Alt. 19 and Orange Street.

**Coming from the north:** Trail users should use the new sidewalk connection at Orange Street to connect to the sidewalk along the west side of Alt. 19. Continue south to reconnect to the trail at the Curlew Road intersection.

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# Pinellas Trail Pedestrian Bridge Replacement

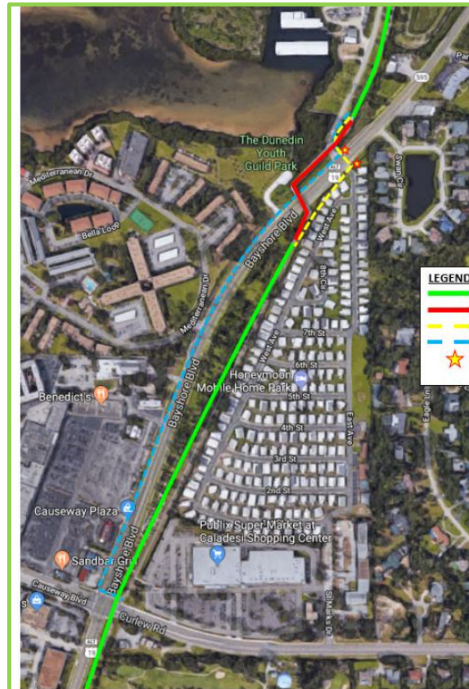


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# Chapter 11 – Pinellas Trail



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# Pinellas Trail Pedestrian Bridge Replacement



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# Pinellas Trail Pedestrian Bridge Replacement



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## Pinellas Trail Pedestrian Bridge Replacement



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## Chapter 14 – Design Exceptions & Variations

- Revised controlling criteria to be consistent with FHWA (published May 2016)
- Required when not possible to meet the min. standards
- Recommended by PE, signed by maintaining authority's PE or designee
- If project is on SHS or NHS, follows process in FDM, signed by DDE



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Naples, Florida

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## Shalls vs. Shoulds?

- **Shall**

- Over 250 shall conditions
- Shall or Must - a mandatory condition

- **Should**

- An advisory condition, considered to denote advisable usage, recommended but not mandatory



Centerville Road, Tallahassee, FL

LAP Construction Checklist and Florida Greenbook Training, June 2019

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## Shalls

- **Examples of shall conditions**

- Design speed
- Stopping and passing sight distance
- Lane widths
- Cross slope
- Shoulders
- Medians
- Shielding
- Rail crossings
- Sidewalks, bike lanes, shared use paths
- Design exceptions



Centerville Road, Tallahassee, FL

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## Design Exceptions

- Historically based on 13 controlling elements
- FHWA published a notice of revisions for criteria May 2016
- Established 2 categories based upon design speed
- High Speed is  $\geq 50$  mph and has 10 Controlling Criteria
- Low Speed is  $\leq 45$  mph and has 2 Controlling Criteria



A1A, Volusia County, FL

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LAP Construction Checklist and Florida Greenbook Training, June 2019

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## High Speed ( $\geq 50$ mph)

- 10 Controlling Criteria
  - Design Speed
  - Lane Width
  - Shoulder Width
  - Horizontal Curve Length
  - Superelevation Rate
  - Stopping Sight Distance (SSD)
  - Maximum Grade
  - Cross Slope
  - Vertical Clearance
  - Design Loading Structural Capacity



US 41, Dunnellon, FL

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## Low Speed ( $\leq 45$ mph)

- 2 Controlling Criteria
  - Design Speed
  - Design Loading Structural Capacity



FAMU Way Connector, Tallahassee, FL

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## Changes in Controlling Criteria

- The Silent 3 Controlling Criteria
  - Vertical Alignment
    - Associated with Stopping Sight Distance
  - Horizontal Clearance
    - Addressed in Shoulder Width, Lateral Offset and Clear Zone Requirements
  - Bridge Width
    - Addressed in Lane and Shoulder Width Requirements



US 98, Carrabelle, FL

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## Design Speed

- Consider the anticipated operating speed, topography, land use, bicycle and pedestrian traffic, and functional classification
  - Shall not be less than the posted speed
  - Compatible with terrain, local development, safety and funding
  - Consistent over a given section of street or highway
  - Values in Chapter 3, Table 3 – 1 Minimum and Maximum Design Speed



Coastal Highway (US 98), Apalachicola, FL

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## Pavement (Lane) Width

- Minimum lane widths for travel, speed change, turn and passing lanes provided in Chapter 3, Table 3 – 18 Minimum Lane Widths
- On multilane urban streets where there is insufficient space for bike lanes, consider unequal lane widths



Thomasville Road, Tallahassee, FL

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## Shoulder Width

- Width of outside and median shoulders for two-lane, two-way roadways shall not be less than the values in Chapter 3, Table 3 – 18 Minimum Shoulder Widths for Flush Shoulder Highways
  - Two lane roadways - dependent on volume
  - Multilane divided roadways – dependent on # of lanes (decreased from 2016 to 2018)
- Paved outside shoulders required for rural, high speed, multilane highways



SR 145, Pinetta, FL

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## Horizontal Curve Length

- The minimum lengths that should be used in establishing horizontal alignment are shown in Table 3 – 7 Minimum Lengths of Horizontal Curves
  - Based upon design speed and deflection angle
  - Should be the greater of the lengths (design speed and deflection angle)
  - If curve lengths cannot be attained, provide greatest length possible but not less than 400'



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# Superelevation Rates

- Values for two types of roadways:
  - Rural highways, urban freeways and high speed urban freeways are found in Table 3 – 9 Superelevation Rates for Rural Highways, Urban Freeways, and High Speed Urban Highways (e max = 0.10)
  - Low speed urban freeways are found in Table 3 – 10 Superelevation Rates for Low Speed Arterials and Collectors (emax = 0.05)
  - Terms rural and urban reflect the location of the roadway

**Table 3 – 10 Superelevation Rates for Low Speed Arterials and Collectors (e<sub>max</sub> = 0.05)**

Degree of Curve <i>D</i>	Radius <i>R</i> (ft.)	Tabulated Values			
		Design Speed (mph)			
		30	35	40	45
2° 00'	2,895	NC	NC	NC	NC
2° 15'	2,548				
2° 45'	2,083				NC
3° 00'	1,910				RC
3° 45'	1,628			NC	
4° 00'	1,432			RC	
4° 45'	1,229				
5° 00'	1,148		NC		
5° 15'	1,091		RC		
5° 30'	1,042				
5° 45'	993				
6° 00'	955				RC
6° 15'	917				0.022
6° 30'	881				0.024
6° 45'	849				0.027
7° 00'	819	NC			0.030
7° 15'	790	RC			0.033
7° 30'	764				0.037
7° 45'	739				0.041
8° 00'	715			RC	0.045
8° 15'	694			0.022	0.050
8° 30'	674			0.025	D <sub>max</sub> = 8° 15'
8° 45'	655			0.027	
9° 00'	637			0.030	
9° 30'	603			0.034	
10° 00'	573			0.040	
10° 30'	546		RC	0.047	
11° 00'	521		0.023		D <sub>max</sub> = 10° 45'
11° 30'	498		0.028		
12° 00'	477		0.030		
13° 00'	441		0.038		
14° 00'	409	RC	0.048		
15° 00'	382	0.023		D <sub>max</sub> = 14° 15'	
16° 00'	358	0.027			
17° 00'	337	0.032			
18° 00'	318	0.038			
19° 00'	302	0.043			
20° 00'	289	0.050			
		D <sub>max</sub> = 20° 00'			

NC = Normal Crown (-0.02)      RC = Reverse Crown (+0.02)

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# Stopping Sight Distance

- Safe stopping and passing sight distance shall be provided
- Distances determined by:
  - Vehicle speed
  - Driver's total reaction time
  - Characteristics and condition of the vehicle
  - Friction capabilities
  - Vertical and horizontal alignment
- Minimum values in Chapter 3, Table 3 – 3 Minimum Stopping Sight Distance



St. Armand's Circle, Sarasota, FL

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## Maximum Grade

- Should be as flat as practical and not greater than the values in Chapter 3, Table 3 – 15 Maximum Grades
- Notes:
  - Grades 1% steeper may be provided in urban areas
  - Short lengths of grade, one-way downgrades, and grades on low-volume collectors may be 2% steeper
  - Residential street grades should be < 15%, commercial and industrial areas < 8%



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Iceland

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## Traveled Way Cross Slope

- Cross slope of the traveled way should be a compromise between meeting drainage requirements and smooth vehicle operation
  - Recommended slope is 0.02 feet per foot
  - The outside lane in a 3 lane section should be 0.03 feet per foot
  - Shall not be less than 0.015 feet or greater than 0.04 feet per foot
  - Found in Section C.7.b.2 Traveled Way Cross Slope



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US 41, White Springs, FL

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## Shoulder Cross Slope

- The cross slope of shoulders should be within the range given in Chapter 3, Table 3 – 20 Shoulder Cross Slopes
  - Paved – 2 to 6%
  - Gravel/Crushed Rock – 4 to 6%
  - Turf – 6 – 8%
  - Existing shoulder cross slopes (paved and unpaved)  $\leq$  12% may remain



SR 145 Pinetta, FL

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## Roadside Slopes

- Side slope adjacent to the shoulder of the roadway
- Shall not be steeper than 1:3
  - Should be 1:4
  - Should be flatter on the outside of horizontal curves
- Backslopes on ditches or cuts should not exceed 1:3 if within the clear zone
  - Should be 1:4



US 17, Doctor's Inlet, FL

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## Vertical Clearance

- Freeways and arterials shall have a vertical clearance of at least 16 and ½ feet
- Other streets and highways should have a clearance of 16 feet
- Pedestrian or shared use path bridges require at least 17 feet clearance
- Bridges over railroads require at least 23 feet
- Found in Chapter 3, Section C.7.j.4(b) Vertical Clearance



I-10 at Greensboro

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## Design Loading Structural Capacity

- Design in accordance with AASHTO Load and Resistance Factor Design (LRFD) Bridge Design Specifications, 8th Edition (2017)
  - Uses notional (HL – 93) design load
- Bridges also require a FL 120 permit load rating greater than 1 as defined in the Department's Structures Manual, Volume 1 – Structures Design Guidelines, 2018 (SDG)
  - Allows for a more consistent load rating comparison



Cross Seminole Trail, Red Bug Lake Road, Seminole County, FL

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# Design Exceptions and Variations

- Design Exceptions
  - Required when proposed controlling design elements are below both AASHTO's new construction criteria and the criteria in Florida Greenbook
- Design Variations
  - Required when proposed features other than controlling design elements do not meet Florida Greenbook criteria
- Can use Exhibit 14-A to submit request

**Exhibit 14-A Sample Request Letter for Design Exception or Variation**

TO: \_\_\_\_\_ DATE: \_\_\_\_\_

SUBJECT:  DESIGN EXCEPTION or  DESIGN VARIATION

Local road number or street name: \_\_\_\_\_  
 Project description (limits): \_\_\_\_\_  
 Type construction (new, rehabilitation, adding lanes, resurfacing, etc.): \_\_\_\_\_  
 Design Speed: \_\_\_\_\_  
 State and/or Federal road number (if applicable): \_\_\_\_\_  
 FDOT Financial Project ID No. (if applicable): \_\_\_\_\_

DESIGN EXCEPTION OR VARIATION FOR THE FOLLOWING ELEMENT:

<input type="checkbox"/> Design speed	<input type="checkbox"/> Stopping Sight Distance	<input type="checkbox"/> Other (explain): _____
<input type="checkbox"/> Lane Width	<input type="checkbox"/> Maximum Grade	
<input type="checkbox"/> Shoulder Width	<input type="checkbox"/> Cross Slope	
<input type="checkbox"/> Horizontal Curve Radius	<input type="checkbox"/> Vertical Clearance	
<input type="checkbox"/> Superlevation Rate	<input type="checkbox"/> Design Loading Structural Capacity	

Include a brief statement concerning the project and items of concern.  
 Attach all supporting documentation to this exhibit in accordance with Chapter 14.

Recommended by: \_\_\_\_\_  
 (Responsible Professional Engineer)

Approval: \_\_\_\_\_  
 (Maintaining authority's designated Professional Engineer)

Concurrence: \_\_\_\_\_  
 FDOT (if applicable)

Concurrence: \_\_\_\_\_  
 FHWA (if applicable)

# Signal 4 Analytics

<https://s4.geoplan.ufl.edu/>

**Home**  
 • Capabilities  
 • About Us  
 • For the Press

Request Access Log In

**About Signal Four Analytics**

Florida *Signal Four Analytics* is an interactive, web-based system designed to support the crash mapping and analysis needs of law enforcement, traffic engineering, transportation planning agencies, and research institutions in the state of Florida.

This system is developed by the **GeoPlan Center** at the **University of Florida**, and funded by the state of Florida through the **Traffic Records Coordinating Committee (TRCC)**. Following a preliminary pilot, the system will become available for use via the internet to any interested public agency or organization in Florida.

Traffic crash data is available now in greater detail than ever, but making sense of this data remains a challenge to law enforcement, transportation planners, and traffic engineers. These professionals need powerful, accessible, and affordable tools to explore the spatial and logical relationships that drive decisions on resource allocation and project prioritization.

*Signal Four Analytics* aims to address these needs by providing **current crash and streets data** paired with **interactive analysis and visualization tools**, accessible via **any modern web browser**. If your agency or organization could benefit, we would love to hear from you.

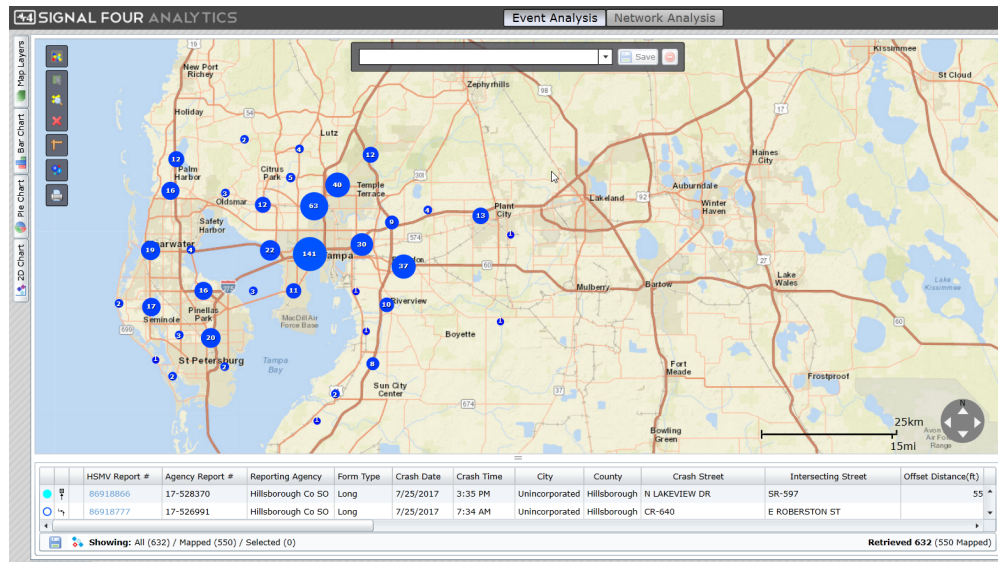
For questions, or to learn more about Florida *Signal Four Analytics*, contact project director Dr. Ilir Bejleri by email at [ilir@ufl.edu](mailto:ilir@ufl.edu) or by phone at 954-214-7885.

**Live Statistics**

As of **January 30, 2017**, the database contains:

<b>Crash reports</b>	<b>5,180,766</b>
Fatal crashes	30,649
Injury crashes	1,524,795
Prop. damage crashes	3,625,322
Fatalities	32,850
Injuries	2,348,367
Property damages	\$ 1.2b
Violations	3,713,862
Vehicles	9,860,529
Drivers	9,302,695
Passengers	3,593,517
Non-motorists	202,178
Pedestrians	106,722
Cyclists	72,177
All other	23,200

## Signal Four Analytics



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## Chapter 17 – Bridges and Other Structures

- Updated references to AASHTO Manuals
  - [Load and Resistance Factor Design \(LRFD\) Bridge Design Specifications, 8th Edition \(2017\)](#)
  - [LRFD Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals, 1st Edition, 2018 Interim Revisions](#)
  - [Structures Manual, Volume 1 – Structures Design Guidelines, 2018 \(SDG\)](#)
- Edited sections for:
  - Navigational aids and vessel collisions
  - Routine maintenance and inspection



17<sup>th</sup> Street

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## Chapter 18 – Signing and Marking

- Added reference to the Manual on Speed Zoning for Highways, Roads, and Streets in Florida
  - [http://www.fdot.gov/traffic/speedzone/Speed\\_Zone\\_Manual.shtm](http://www.fdot.gov/traffic/speedzone/Speed_Zone_Manual.shtm)
- Established minimum levels of maintained reflectivity for overhead street name signs
- Expanded guidance on audible and vibratory markings to improve effectiveness
- Added guidance on transverse rumble strips (crash history, roadway geometry, land use)



US 1, Marathon, Florida Keys

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## 2020 Florida Greenbook?

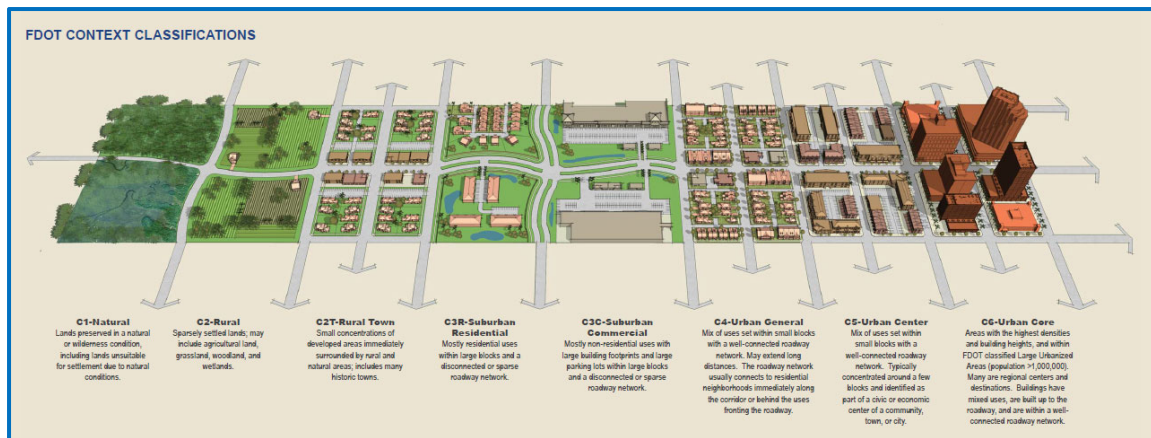


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June 2019

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# Context Based Design



FDOT Transportation Symposium 2020 Florida Greenbook

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## Major Changes in 2020 Greenbook - Drafted

- Introduction and Definition of Terms
- Chapter 1 – Planning
- Chapter 3 – Geometric Design
- Chapter 5 – Pavement Design and Construction
- Chapter 10 – Maintenance and Resurfacing
- Chapter 20 – Drainage

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## Chapter 10 – Maintenance and Resurfacing

- Safety Edge should be provided adjacent to the travel lane on roadways:
- without curb or paved shoulders,
- with a posted speed of 45 mph or greater, and
- a history of lane departure crashes.



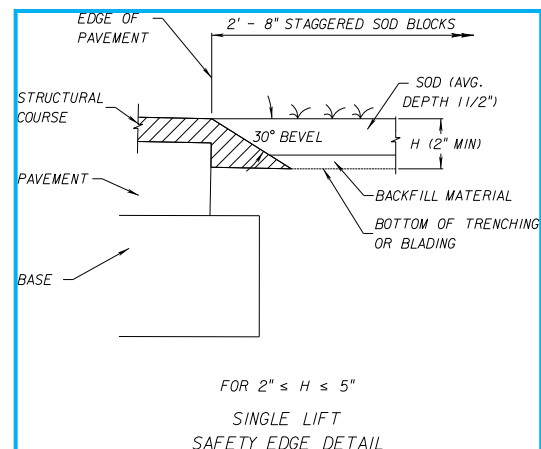
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## Chapter 10 – Maintenance and Resurfacing

- [FHWA's Office of Safety – Safety Edge](#), Design and Construction Guide, Guide Specification, Safety Evaluation Tech Brief and Case Studies
- [FHWA's Crash Modification Factors Clearinghouse](#) also provides information on the performance of safety edge.
- [Developmental Specification for Safety Edge – Dev330SE](#) on the Department's web site which may be used if approved by the agency having jurisdiction.



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## Major Changes in 2020 Greenbook – Future Work

- Chapter 1 – Planning (road diets/repurposing pavement)
- Chapter 2 – Land Development (TND area planning, mixed use and high density development)
- Chapter 3 – Geometric Design (organize to be similar to 2018 AASHTO Greenbook, reflect context classifications, controlling criteria, and parking)



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## Major Changes in 2020 Greenbook – Future Work

- Chapter 9 – Bicycle Facilities (separated bike lanes)
- Chapter 11 – Work Zone Safety (pedestrian and bicycle facilities)
- Chapter 15 – Traffic Calming (speed management)
- Chapter 19 – TND (delete)
- Chapter 20 – Drainage (sustainable stormwater, bio swales, permeable pavements)

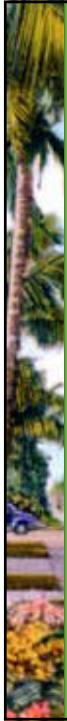


Leiden, Netherlands

FDOT Transportation Symposium 2020 Florida Greenbook

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## Questions?

Mary Anne Koos, CPM  
Special Projects Coordinator  
Office of Design, FDOT

[MaryAnne.Koos@dot.state.fl.us](mailto:MaryAnne.Koos@dot.state.fl.us)

850-414-4321