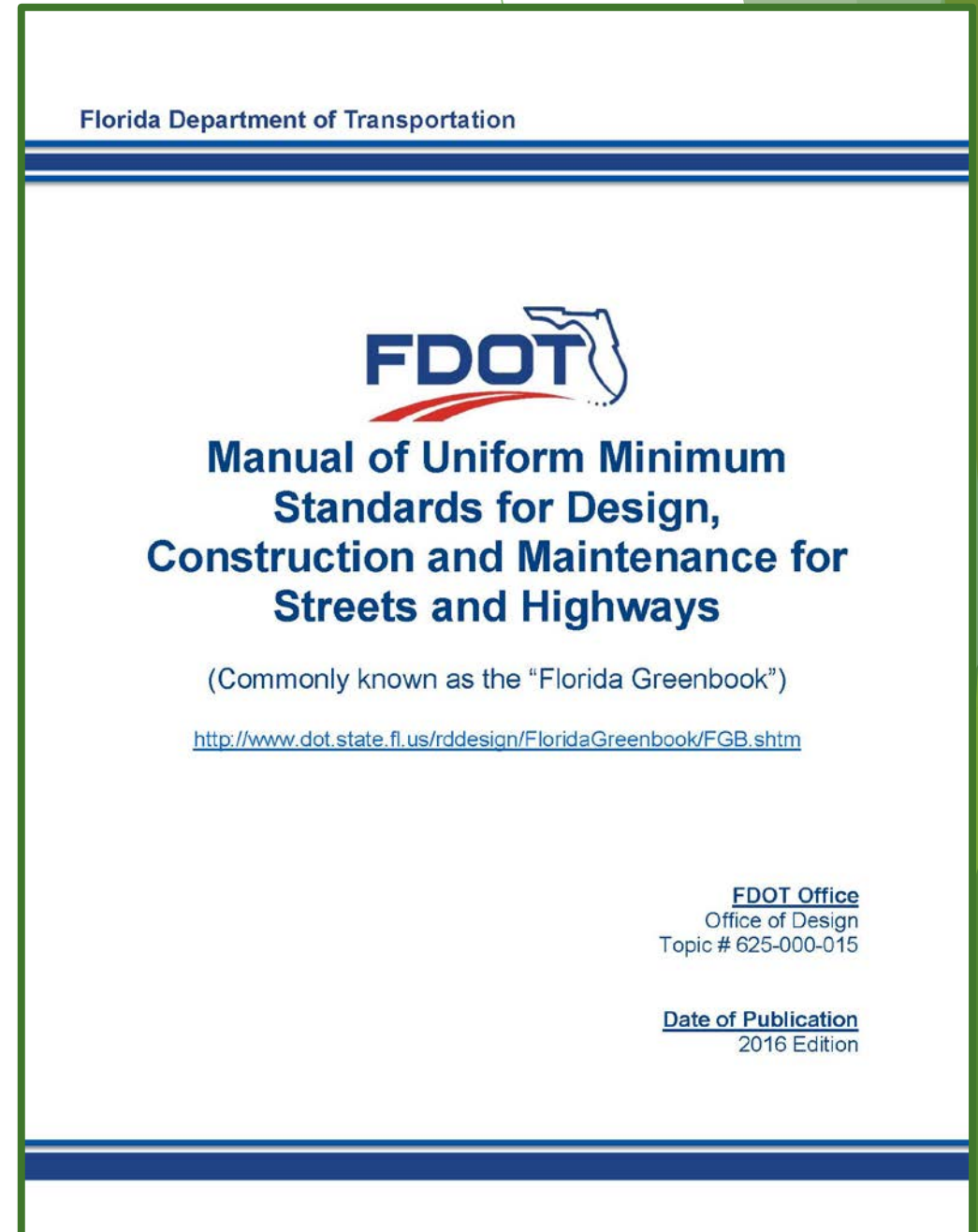


Summary of Changes 2016 Florida Greenbook

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Florida Greenbook

- ▶ 2016 Florida Greenbook is the current edition
 - ▶ Effective date of June 19, 2017
- ▶ Posted on FDOT's Florida Greenbook web page
 - ✓ <http://www.fdot.gov/roadway/>



Purpose of 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



56th Street, Temple Terrace

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



Major Changes in 2016 Greenbook

- ▶ Introduction and Definition of Terms
- ▶ Chapter 1 - Planning
- ▶ Chapter 3 - Geometric Design
- ▶ Chapter 4 - Roadside Design
- ▶ Chapter 6 - Lighting
- ▶ Chapter 7 - Rail-Highway Crossings
- ▶ Chapter 8 - Pedestrian Facilities
- ▶ Chapter 9 - Bicycle Facilities
- ▶ Chapter 11 - Work Zone Safety
- ▶ Chapter 13 - Public Transit
- ▶ Chapter 15 - Traffic Calming
- ▶ Chapter 16 - Residential Street Design
- ▶ Chapter 17 - Bridges and Other Structures
- ▶ Chapter 18 - Signing and Marking

2016 Greenbook - Definition of Terms

- ▶ New definitions for alley, corridor, design vehicle, driveway, federal aid highway, high-speed rail, paratransit, pedestrian access route, public way, ramp, shared roadway, vertical clearance, very low-volume road
- ▶ Revised definitions for recovery area, rural areas, shared street, slopes, wide outside lane



Estero Blvd., Ft. Myers Beach

Chapter 1 - Planning

- ▶ Reorganized to address volume, speed, traveler and trip characteristics, safety, access and level of service
- ▶ Basic classifications are:
 - ▶ Local Road
 - ▶ Collector Road
 - ▶ Arterial Road
- ▶ Expanded list of potential environmental impacts
- ▶ To minimize social and community impacts, address:
 - ▶ Corridor Preservation
 - ▶ Historical and Archaeological Preservation
 - ▶ Scenic Byways
 - ▶ Visual Impacts
 - ▶ Section 4(f) and 5(f) if federally funded



Historic Downtown Ft. Myers, FL

Chapter 3 - Geometric Design

- ▶ Greater range of design speeds and lane widths
- ▶ Updated for Florida specific design vehicles
- ▶ Stopping sight distance and rounded "K" values now based upon 2' object height
- ▶ Passing sight distance consistent with MUTCD method of calculation and 2011 AASHTO Greenbook
- ▶ Shoulder widths on flush shoulder highways based upon traffic volume and # of lanes
- ▶ Criteria for shoulder cross slopes based upon surface (paved, gravel, grass)



Franklin Blvd, Tallahassee, FL

Table 3 – 1 Recommended Design Speed (mph)

Facility ¹		AADT (vpd)	Terrain	Design Speed (mph)
Freeways	Rural	All	Level and Rolling	70
	Urban	All	Level and Rolling	50 – 70 ²
Arterials	Rural	All	Level	60 – 70
			Rolling	50 – 70
	Urban	All	All	30 – 60 ³
Collectors	Rural	≥ 400	Level	60 – 65 (50 mph min for AADT 400 to 2000)
			Rolling	50 – 65 (40 mph min for AADT 400 to 2000)
	< 400	Level	40 – 60	
		Rolling	30 – 60	
	Urban	All	All	30 – 50 ³
Local	Rural	≥ 400	Level	50 – 60
			Rolling	40 – 60
	< 400	Level	40 – 60 (30 mph min for AADT < 250)	
		Rolling	30 – 60 (20 mph min for AADT < 50)	
	Urban	All	All	20 – 30 ⁴

Chapter 3 – Geometric Design

Chapter 3 – Geometric Design

Table 3 – 3 Stopping Sight Distances

For application of stopping sight distance, use an eye height of 3.50 feet and an object height of 2 feet above the road surface											
Design Speed (mph)	20	25	30	35	40	45	50	55	60	65	70
Stopping Sight Distance (feet)	115	155	200	250	305	360	425	495	570	645	730

Source 2011 ASSHTO Greenbook, Table3-1

Chapter 3 - Geometric Design

Table 3 – 4 Passing Sight Distances

For application of passing sight distance, use an eye height of 3.50 feet and an object height of 3.50 feet above the road surface.											
Design Speed (mph)	20	25	30	35	40	45	50	55	60	65	70
Minimum Passing Sight Distance (feet)	400	450	500	550	600	700	800	900	1000	1100	1200

Source: 2011 AASHTO Greenbook, Table 3-4.

Chapter 3 - Geometric Design

Table 3 – 10 Minimum Lane Widths

Facility		ADT (vpd)	Design Speed (mph)	Divided/ Undivided	Lane Width - FT			
					Travel Lanes ¹	Speed Change Lanes	Turn Lanes ⁵ (LT/RT/MD)	Passing Lanes
Freeway	Rural	All	All	All	12	12	--	--
	Urban	All	All	All	12	12	--	--
Arterial	Rural	All	All	All	12 ⁸	12 ⁸	12 ⁸	12 ⁸
	Urban	All	> 45	All	12	12	12	12
		All	≤ 45	Undivided	11 ³	11 ³	11 ^{3,6}	11 ³
				Divided	11 ³	11 ³	11 ^{3,6}	11 ³
Collector	Rural	> 1500	All	All	12 ⁸	12 ⁸	12 ⁸	12 ⁸
		400 to 1500	All	All	11 ³	11 ³	11 ³	--
		< 400	> 45	All	11	11	11 ⁶	--
	≤ 45		All	10	10	10	--	
	Urban	All	All	All	11 ^{2,3}	11 ^{2,3}	11 ^{2,6}	--
Local	Rural	> 1500	All	All	12 ⁸	12 ⁸	12 ⁸	12 ⁸
		400 to 1500	All	All	11 ³	--	11 ³	--
		< 400	> 50	All	11 ³	--	11 ³	--
			45 to 50	All	10	--	10	--
			< 45	All	9	--	9	--
	Urban	All	All	All	10 ^{2,4}	--	10 ⁷	--

Chapter 3 - Geometric Design

Table 3-10 - Minimum Lane Widths (con.)

Footnotes

1. A minimum traveled way width equal to the width of two adjacent travel lanes (one way or two way) shall be provided on all rural facilities.
2. In industrial areas and where truck volumes are significant, 12' lanes should be provided, but may be reduced to 11' where right of way severely limited.
3. In constrained areas where truck and bus volumes are low and speeds are less than 35 mph, 10; lanes may be used.
4. In residential areas where right of way is severely limited, 9' may be used.
5. Median turn lane widths shall not exceed 15'.
6. Turn Lane width should be same as Travel Lane width. May be reduced to 10' where right of way is constrained.
7. Turn Lane width should be same as Travel Lane width. May be reduced to 9' where truck volumes are low.
8. For design speeds below 50 mph, lane widths of 11 feet are acceptable.

Chapter 4 – Roadside Design

- ▶ Hazards should be removed, relocated, made traversable, or shielded
- ▶ Canals defined and criteria for location and shielding included
 - ▶ Open ditch parallel to the roadway for a min. distance of 1000 feet with depth of 3 feet
 - ▶ For design speeds ≥ 50 mph, min. distance from travel lane to top of canal slope is 60 feet
 - ▶ For design speeds < 50 mph, min. distance from travel lane to top of canal slope is 50 feet for flush shoulders, 40 feet with curb and gutter



SR 309, St. George Island Bridge, FL

Chapter 6 - Lighting

- ▶ Areas that warrant lighting include roundabouts, urban streets, pedestrian and bicyclist crossings, schools, places of assembly, transit stops, junctions of major highways in rural areas, rest areas, trailheads
- ▶ New tables for:
 - ▶ required level of illumination for streets and highways based upon facility, road surface
 - ▶ overhead sign lighting
- ▶ Mid-block pedestrian crosswalks require vertical illumination of 2.0 foot candles if night time activity expected



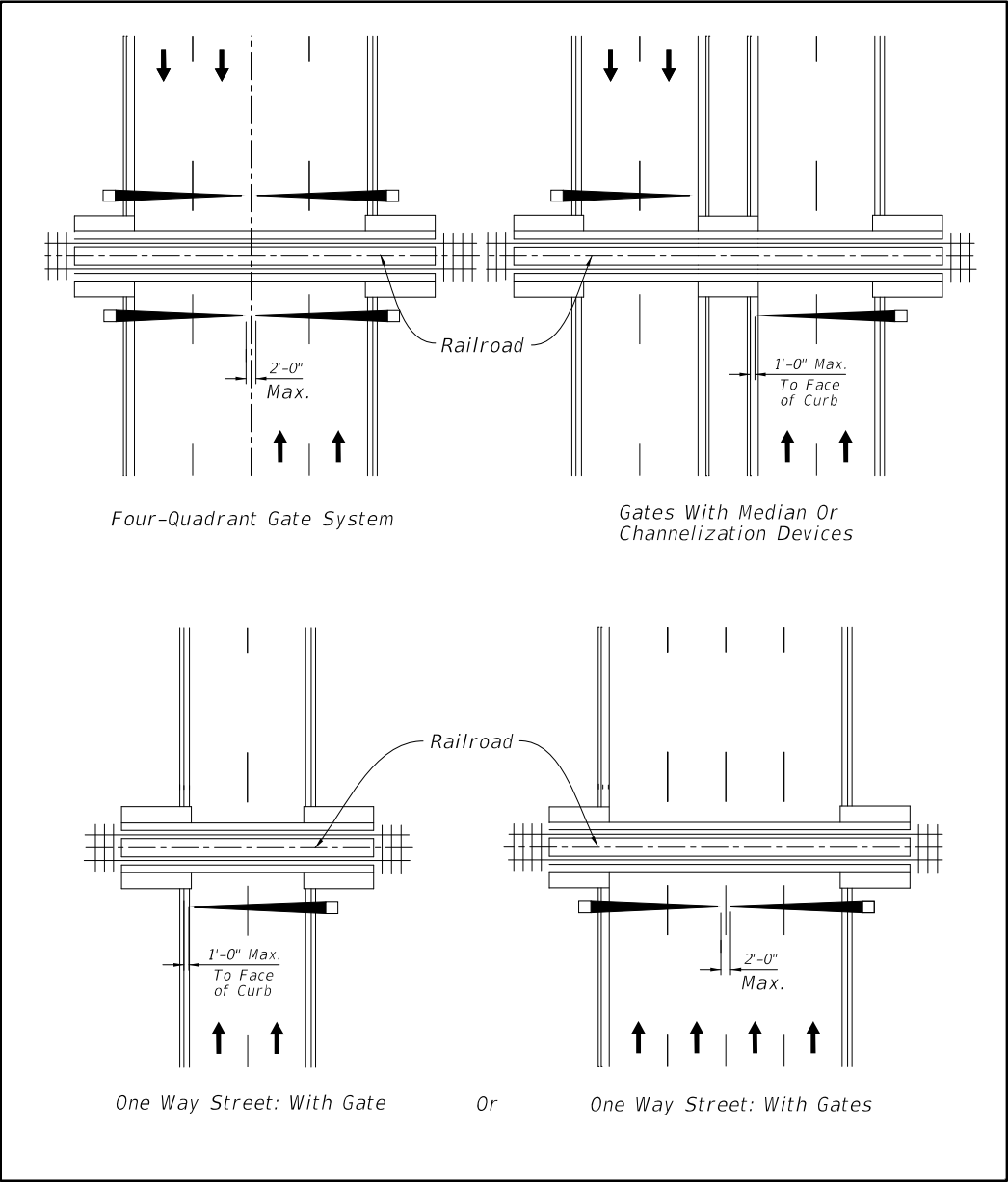
Chapter 7 - Rail-Highway Crossings



4 Quadrant Gate System

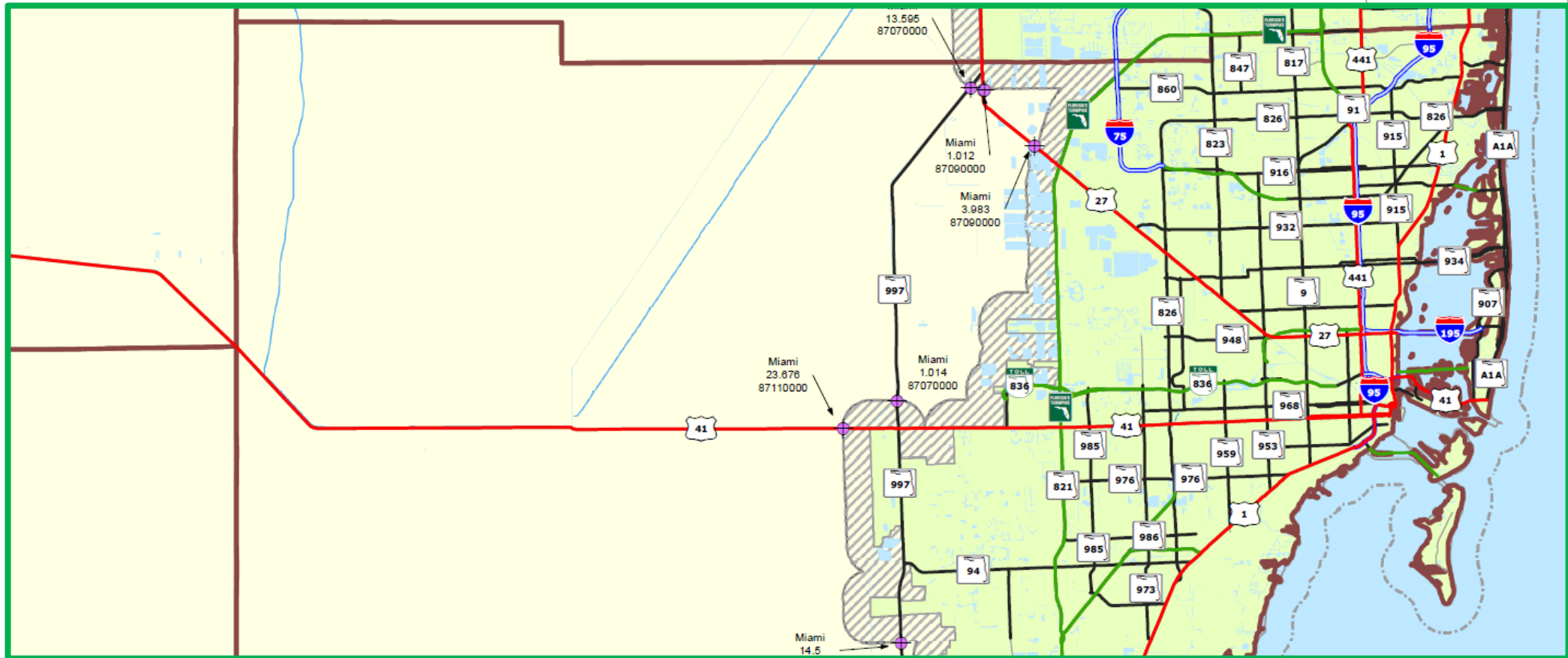
- ▶ New criteria for vertical and horizontal clearance at crossings
- ▶ Requires sidewalks and shared use paths be continued through grade crossings
- ▶ Added requirements for “Quiet Zones”
- ▶ Updated passive and active crossing configurations to be consistent with MUTCD
- ▶ Categorizes high speed rail by speed

Figure 7 - 8 Gate Configuration for Quiet Zones



Chapter 8 - Pedestrian Facilities

- Provide sidewalks on both sides of a roadway in or within 1 mile of an urban area, <http://www.fdot.gov/roadway/BufferMaps/Default.shtm>



Chapter 8 - Pedestrian Facilities

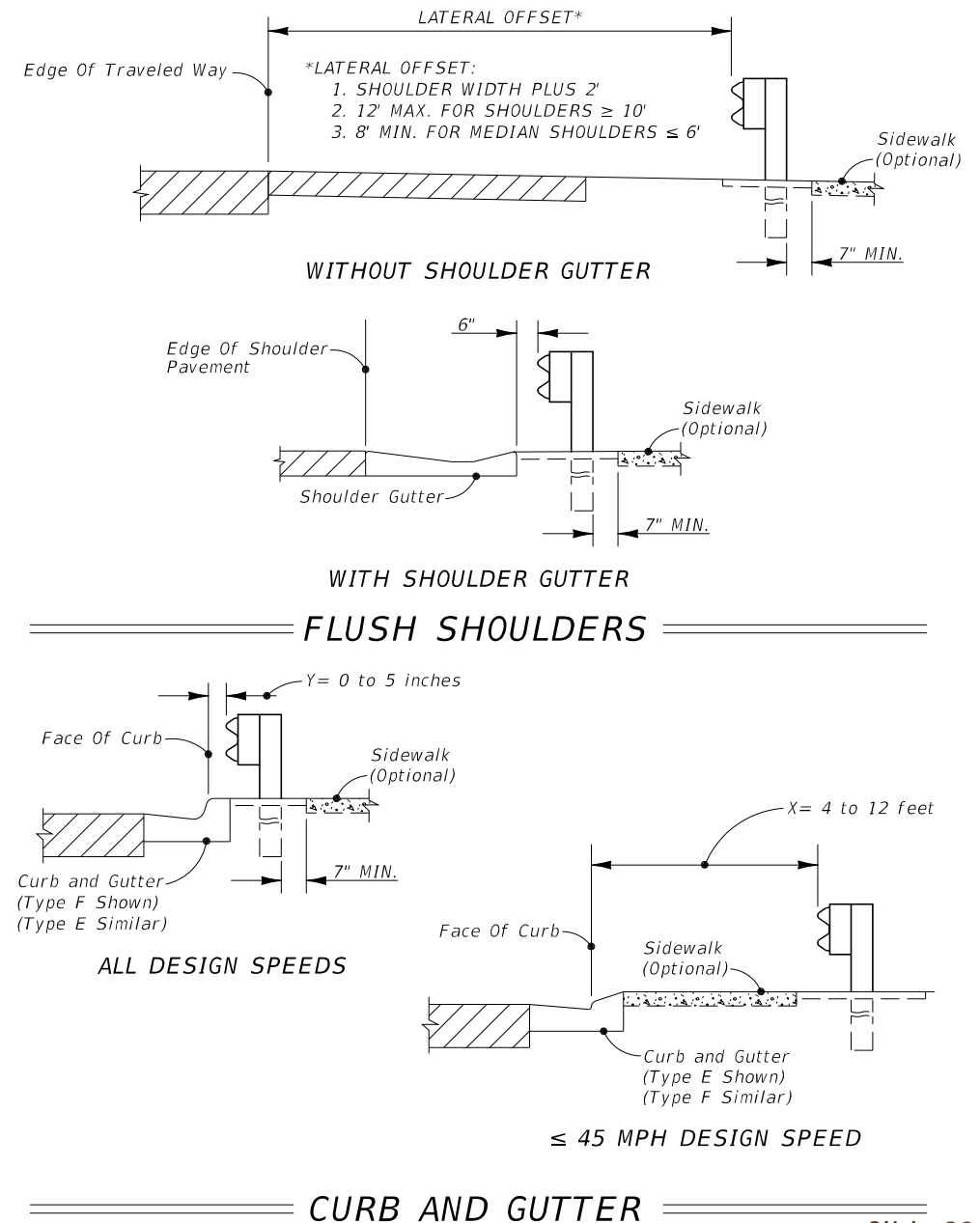
- ▶ Establishes 5' (6' back of curb) as the min. width for sidewalks
- ▶ Defines drop off hazards and when shielding needed
- ▶ New guidance for mid-block crossings, median refuge, and pedestrian hybrid beacons
- ▶ New criteria for horizontal separation of sidewalk from roadway



4th Street North, St. Petersburg

Figure 8-2 Sidewalk with Guardrail

- ▶ On curb gutter, guardrail is at face of curb or 4-12 feet behind curb
- ▶ On flush shoulder, based upon lateral offset from edge of traveled way
 - ▶ Shoulder width plus 2 feet
 - ▶ 12 ft. max. for shoulders ≥ 10 ft.
 - ▶ Min. of 7" offset of sidewalk behind guardrail



Chapter 9 – Bicycle Facilities

- ▶ More bike lane types - standard, buffered and green
- ▶ Ability to adjust lane widths to provide bicycle facilities
- ▶ Table 9-1 Lane Widths for Existing Urban Multilane or Two-Lane with Curb and Gutter

Design Year AADT	Design Speed (mph)	Minimum Thru Lane (ft.)	Minimum Turn Lane (ft.)	Minimum Parking Lane (ft.)
ALL	ALL	10 ₁	9 ₂	7 ₃

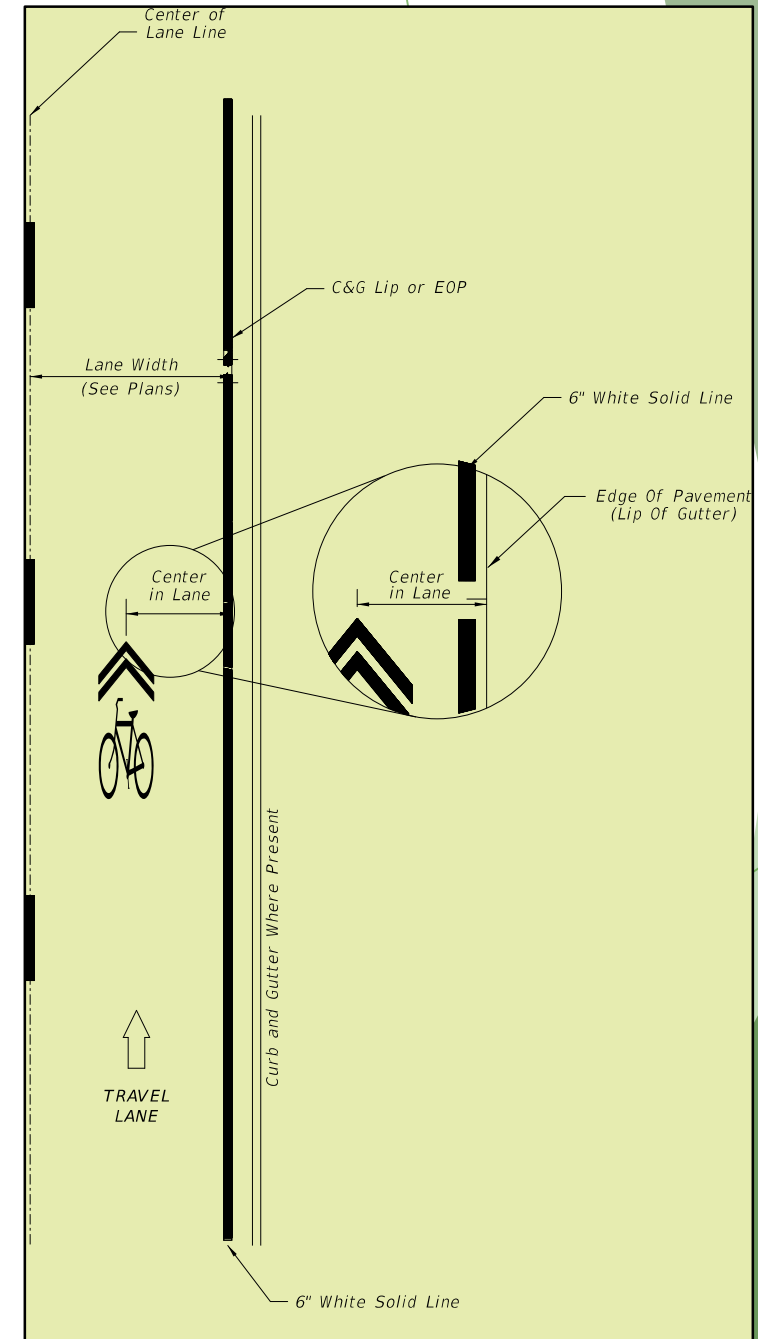
1. 11' where trucks are >10% of Design Year Traffic or Design Speed is 40 mph or greater
2. 10 ft. for 2 Way Left Turn Lanes
3. Min. width of 7 feet measured from face of curb may be left in place, otherwise 8 feet

Chapter 9 - Bicycle Facilities

- ▶ Shared lane marking to be centered in lane, not along curb.



56th Street , Temple Terrace



Chapter 9 - Shared Use Paths

- ▶ Complete update of shared use path section
- ▶ Criteria established for type, size and location of signs on shared use paths
- ▶ Permission for grade to match slope of roadway in constrained rights of way extended to shared use paths
- ▶ Bicycle's operating characteristics govern the design, 18 mph design speed



Camp Helen State Park, Bay County

Chapter 9 - Shared Use Paths

- ▶ Minimum standard width for a two-way path is 10 feet
- ▶ Range from 10 - 14 feet (wider trails with high use, variety of users, steep grades)
- ▶ 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
 - ▶ Short distance due to a physical constraint (environmental feature, bridge abutment, utility structure, or fence)



Goose Pond Trail, Tallahassee
Slide 24

Chapter 9 - Shared Use Paths



Legacy Trail, Sarasota

- ▶ Graded shoulder ≥ 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 ≥ 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

Chapter 9 – Shared Use Paths

- ▶ For paths in relatively flat areas (grades less than or equal to 4%), design speed of 18 mph shall be used
- ▶ When a sustained downgrade greater than 4% exists, refer to the [*AASHTO Guide for the Development of Bicycle Facilities \(2012, 4th Edition\)*](#) for further guidance



Chapter 9 – Shared Use Paths

- ▶ Refer to 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



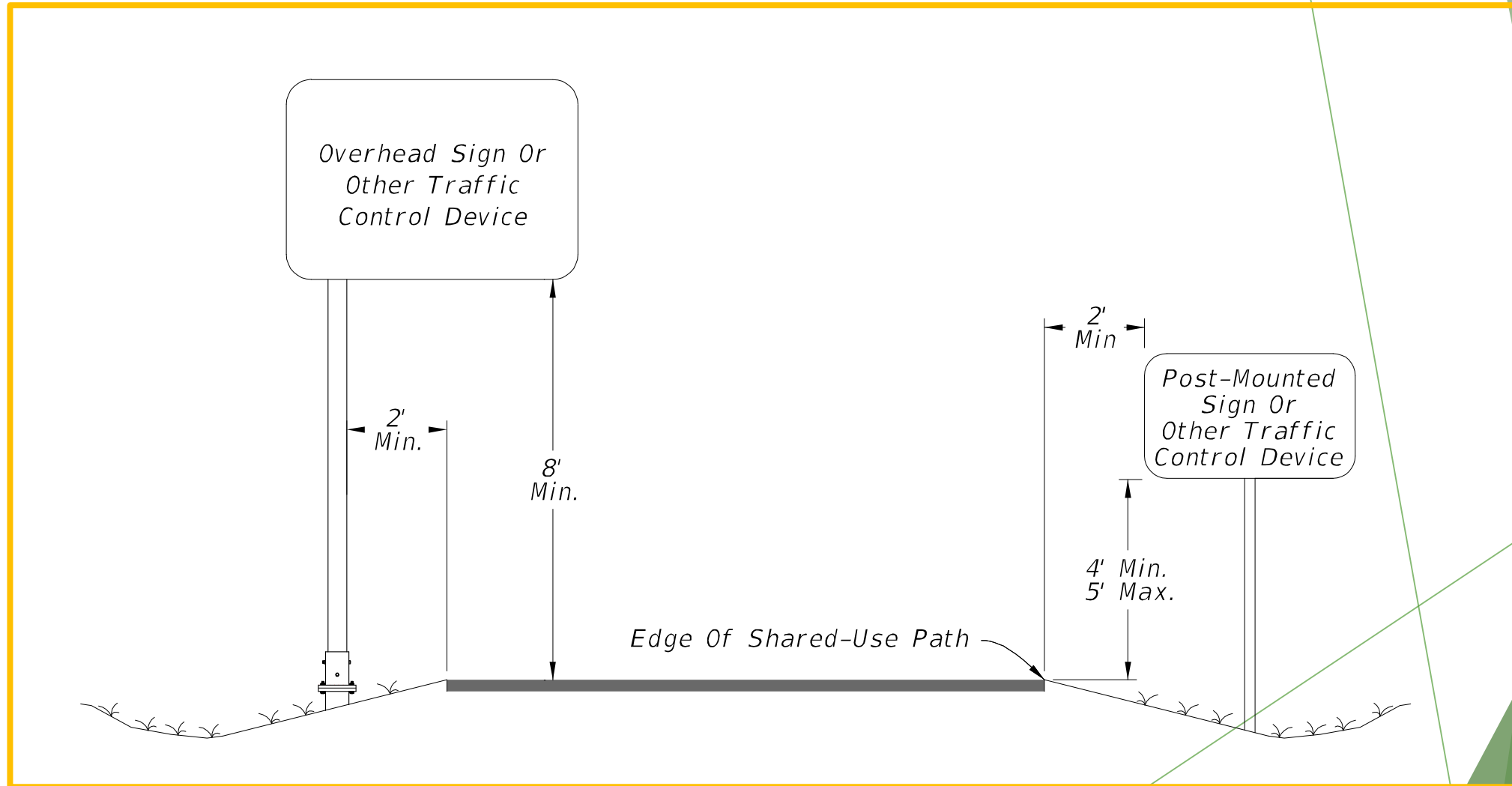
US 41, Lecanto, FL

Chapter 9 - Shared Use Paths

- ▶ MUTCD regulates the design and use of all traffic control devices on shared use paths
- ▶ Sign Placement on Shared Use Paths shown in Figure 9-27
 - ▶ Maximum height from the outside edge of the path to the bottom elevation of a sign is 5'
 - ▶ Sign dimensions provided in MUTCD, Table 9B-1 Bicycle Sign and Plaque Sizes
 - ▶ Placement of stop or yield lines and crosswalks provided in the MUTCD, Part 3



Figure 9-27 Sign Placement on Shared Use Paths



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)

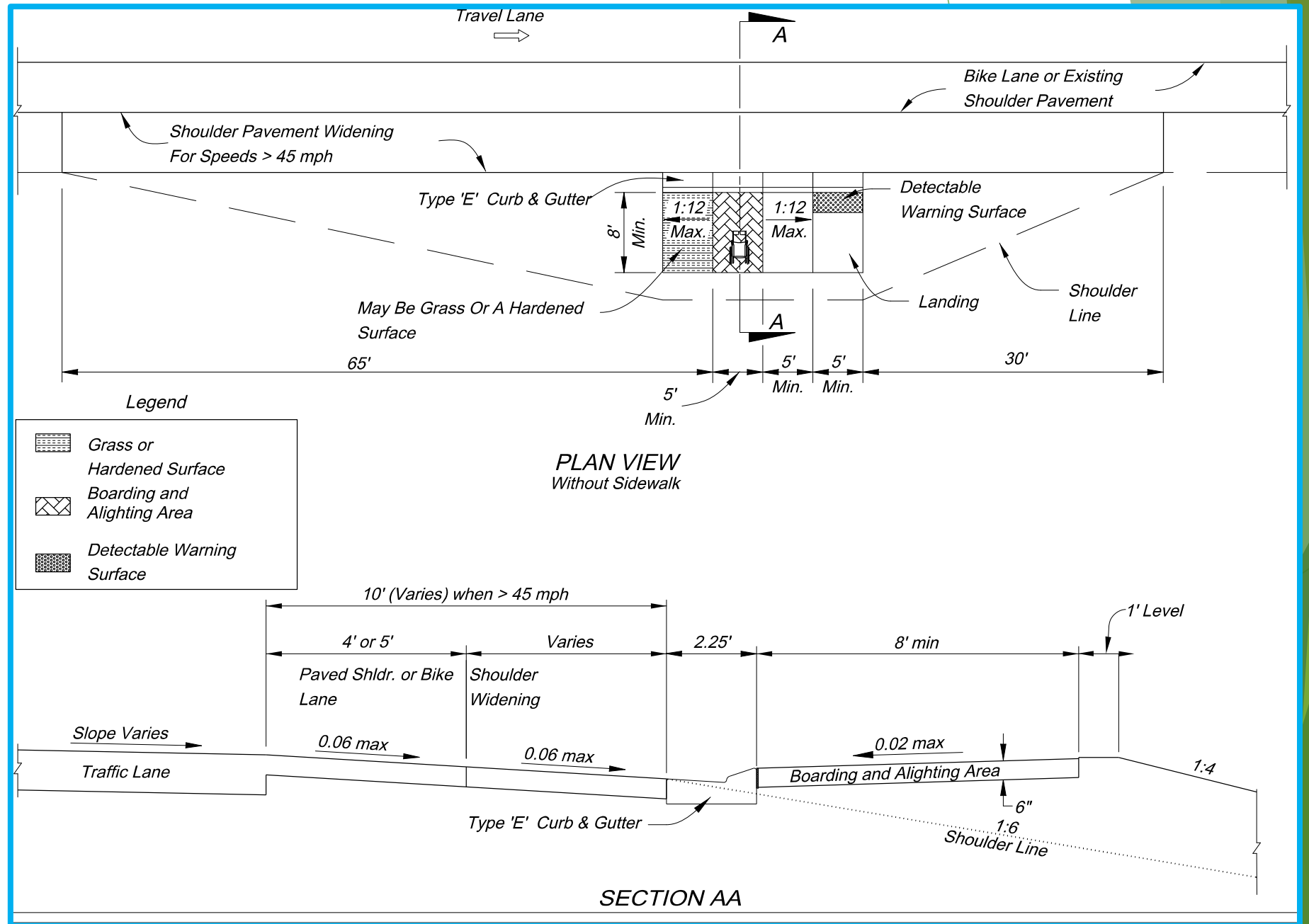


Chapter 13 - Transit

- ▶ New criteria for boarding and alighting areas, including details for design
- ▶ Description for boarding and alighting areas (B&A)
- ▶ When projects include a new bus stop or impact existing bus stops they should comply with FAC 14-20

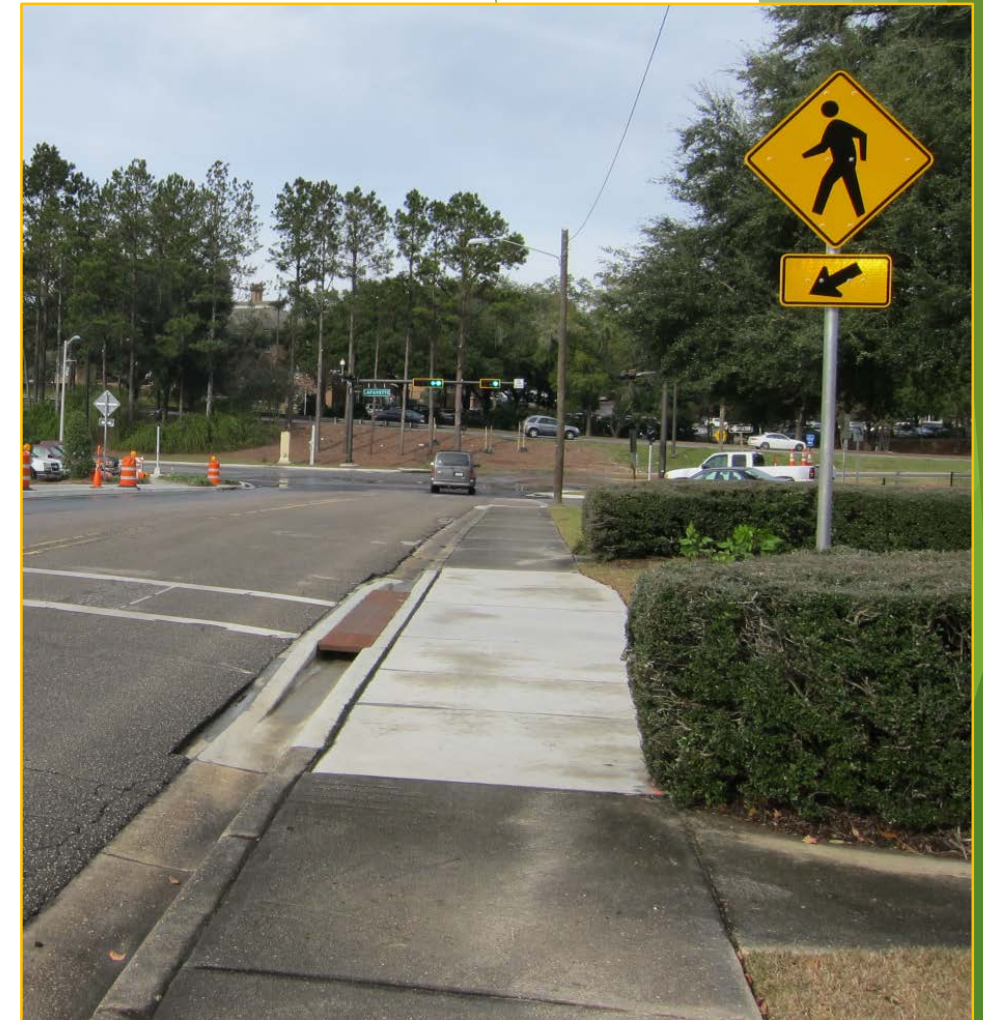


Figure 13 - 1
 B & A Area for
 Flush Shoulder
 Roadways
 with
 Connection to
 Roadway



Chapter 15 - Traffic Calming

- ▶ Added information for curb extensions, speed cushions/pillows, chicanes, raised crosswalks, roundabouts



Chapter 16 - Residential Street Design

- ▶ Increased corner sight distance min. to 300' if no traffic control used
- ▶ Established a 20' min. width for two-way residential roads
 - ▶ Allows 9' or narrower lanes in constrained or rural conditions
- ▶ Expanded criteria for when sidewalks, bicycle facilities, or shared use paths should be provided and requires connectivity between facilities



Estero Blvd, Ft. Myers Beach, FL

Chapter 17 – Bridges and Other Structures

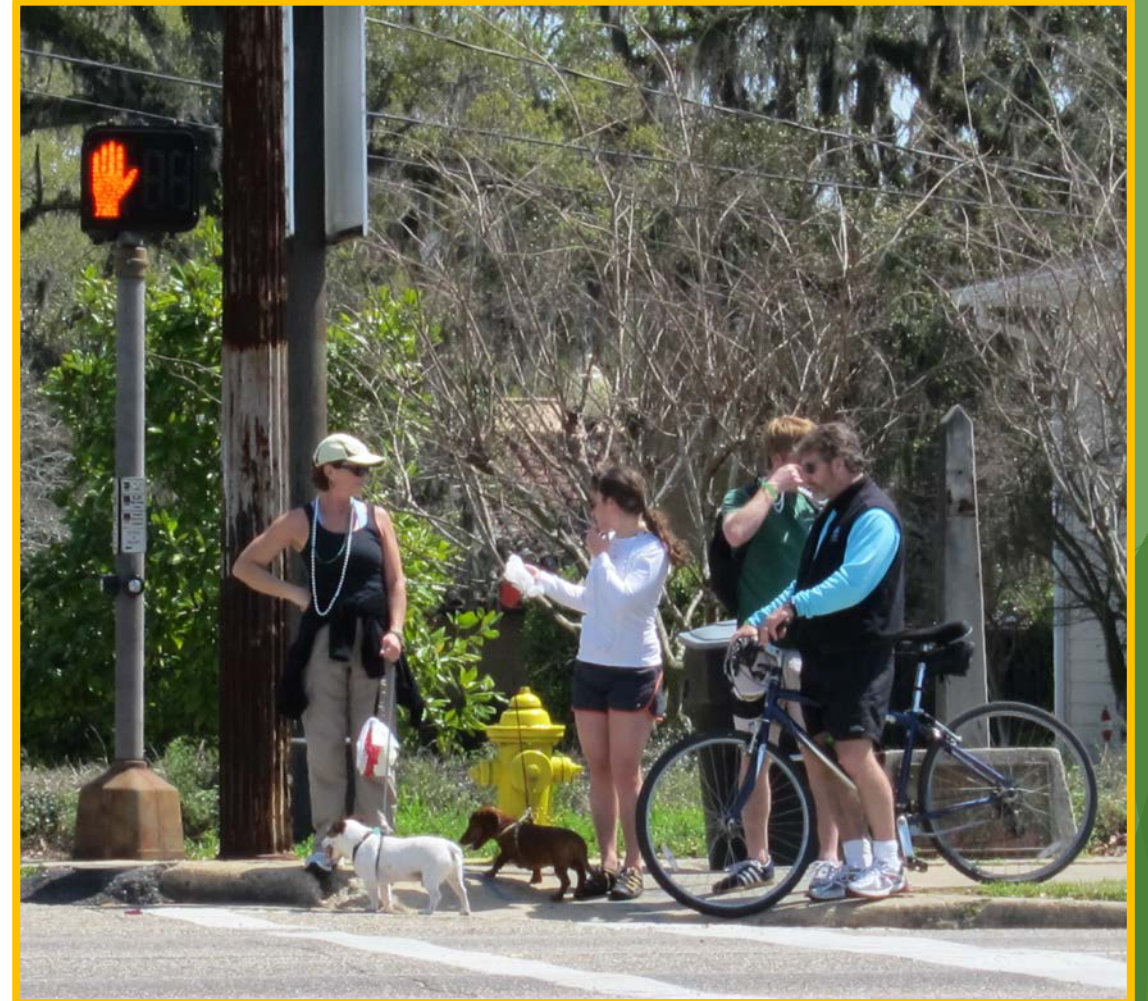
- ▶ Sign, lighting and traffic supports required to meet AASHTO and FDOT criteria
- ▶ Requires noise walls to meet FDOT's Structures Design Guidelines (SDG)
- ▶ Bridge Load Rating and Posting
 - ▶ Inspections required at regular intervals
 - ▶ New fillable form called Exhibit A Bridge Load Rating Summary Table
 - ▶ <http://www.fdot.gov/maintenance/LoadRating.shtm>



San Carlos Blvd., Ft. Myers Beach, FL

Chapter 18 - Signing and Marking

- ▶ Overhead street name signs should be installed on mast arm or strain pole, not span wires
- ▶ Increased max. length of internally illuminated overhead signs to 108" (9 feet)
- ▶ Added requirements for community wayfinding signs to follow Rule 14-51.030, F.A.C., no advertising of destinations



North Monroe Street, Tallahassee, FL

Questions?



SW 2nd Avenue, Gainesville, FL

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