# 2012 Design Update – PPM and Design Standards

## Florida Dept. of Transportation

# Bicycle, Pedestrian and Transit Facilities

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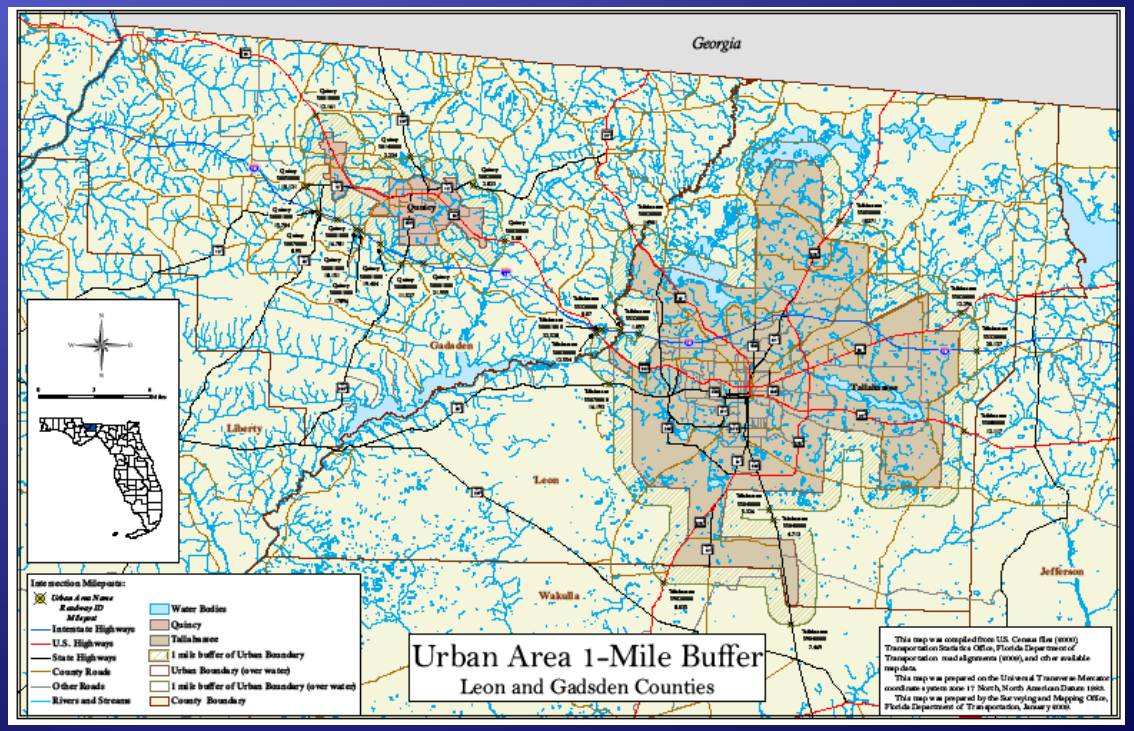
# Key Topics for 2012

- Urban Area Maps
- Sidewalk Location
- Pedestrian Crossings
- Bicycle Lanes
- Shared Lane Markings
- Bicycle Routes
- Drainage Inlets, Grates
- Shared Use Paths
- Prefabricated Pedestrian Bridges
- Temporary Bus Stops

# Urban Area Buffer Maps

- Priority maps for bike lanes and sidewalks
- Posted in conjunction with the PPM on Roadway Design's web page
- http://www.dot.state.fl.us/rddesign/PPMManual/BM/BufferMaps.shtm



# Sidewalk Location (Section 8.3)

- Sequence of desirability for new sidewalks
  - As near the right of way line as possible
  - Outside of the clear zone
  - 5’ from the shoulder point
  - At the shoulder point
- Sidewalks shall not be contiguous to the roadway pavement
- Transition to provide functional crossing locations that meet driver expectation at intersections

# Sidewalk Location

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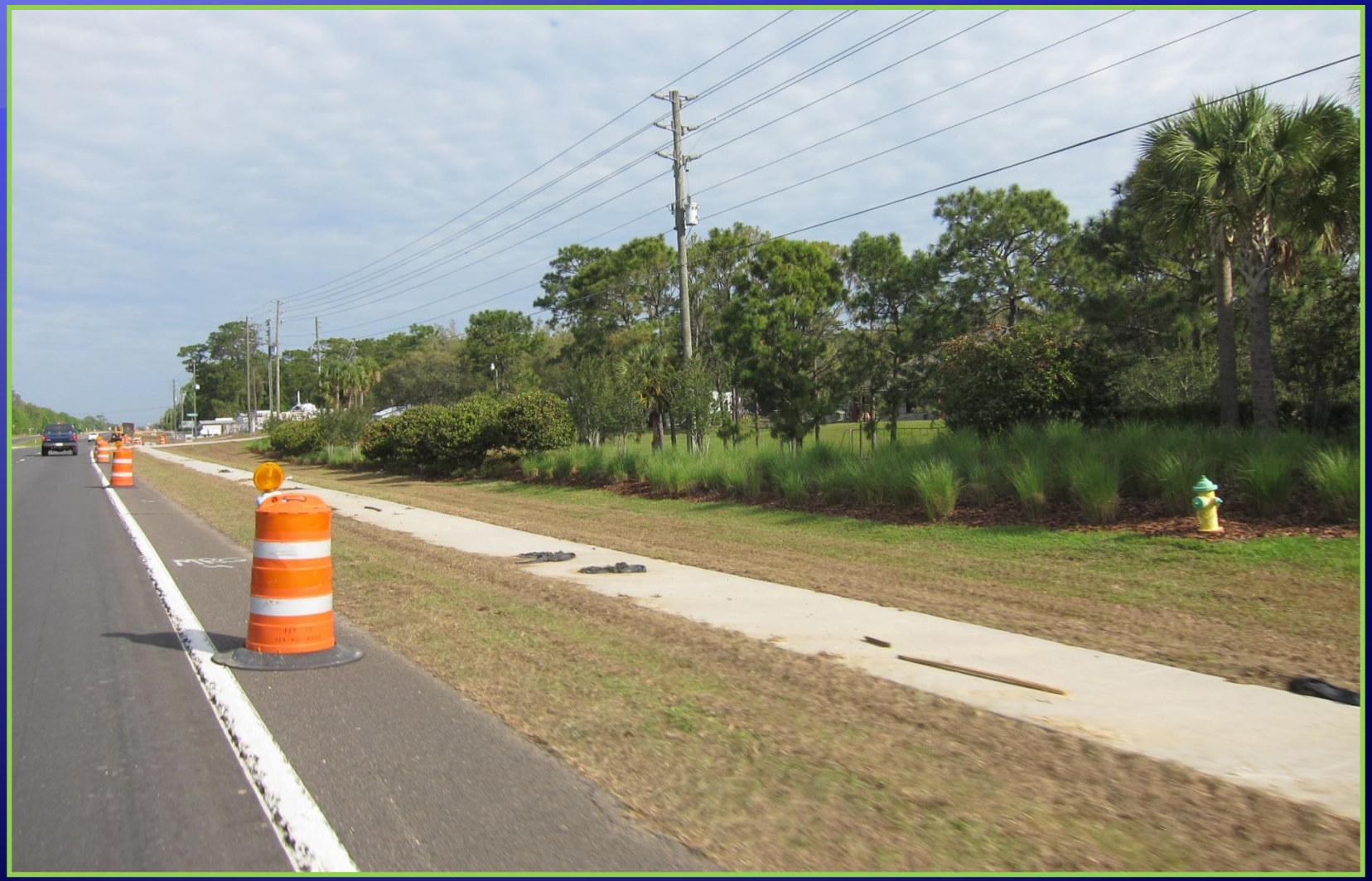
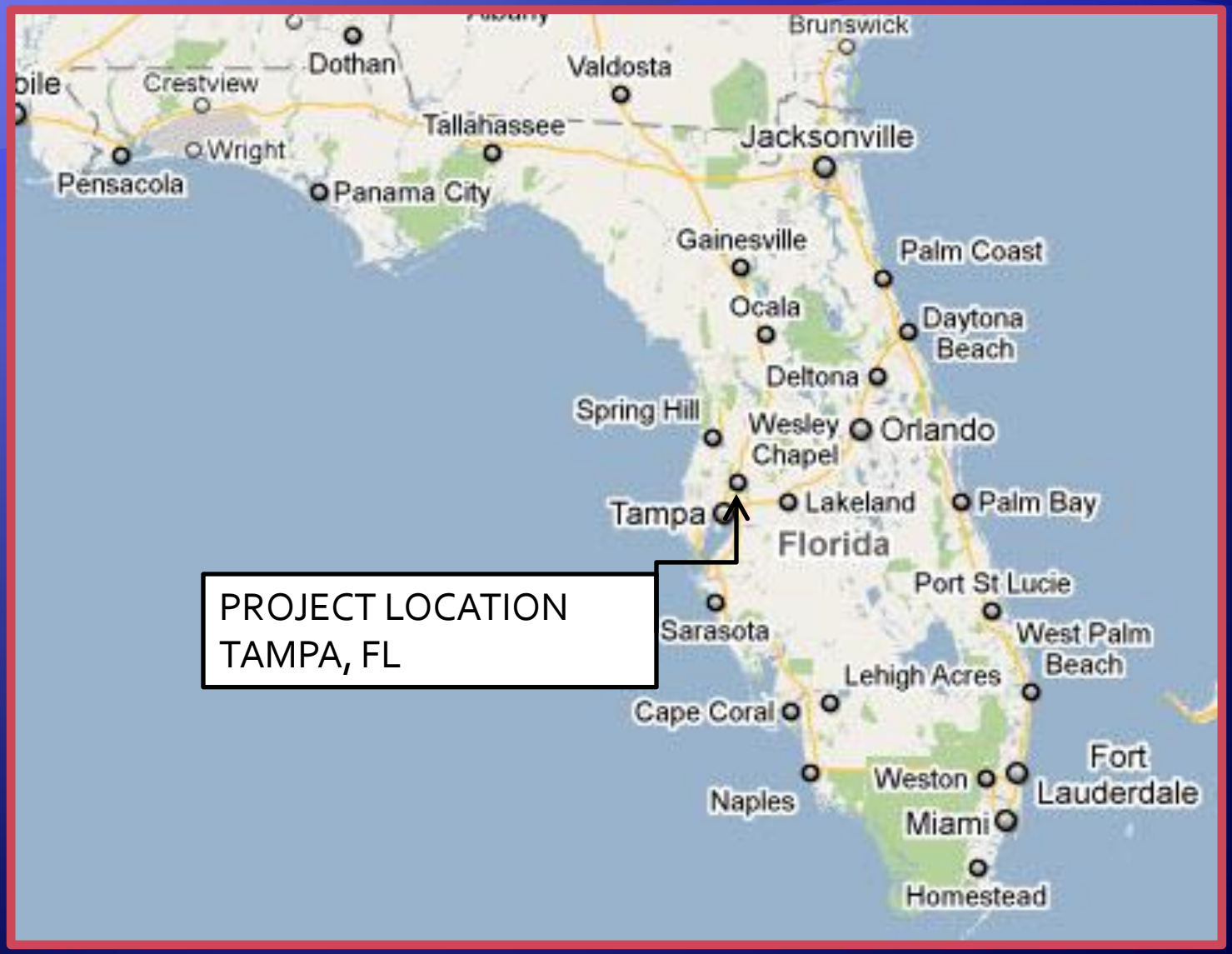


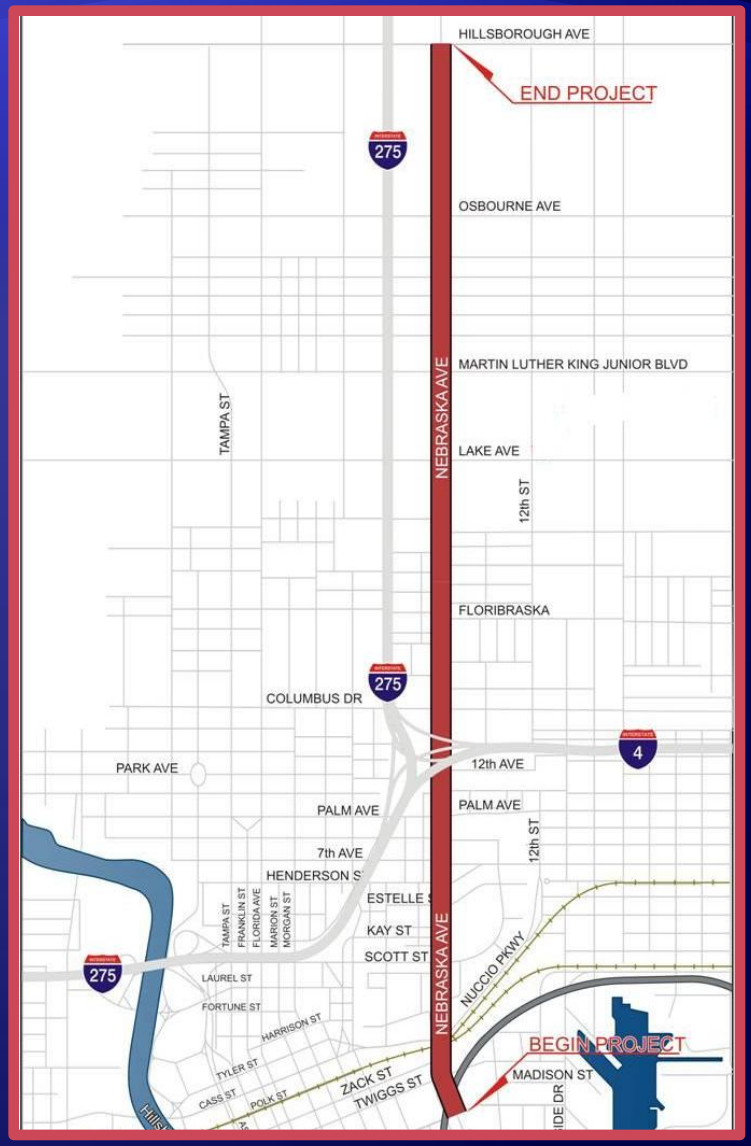
# Sidewalk Location (Section 8.3)

# Nebraska Ave Road Diet

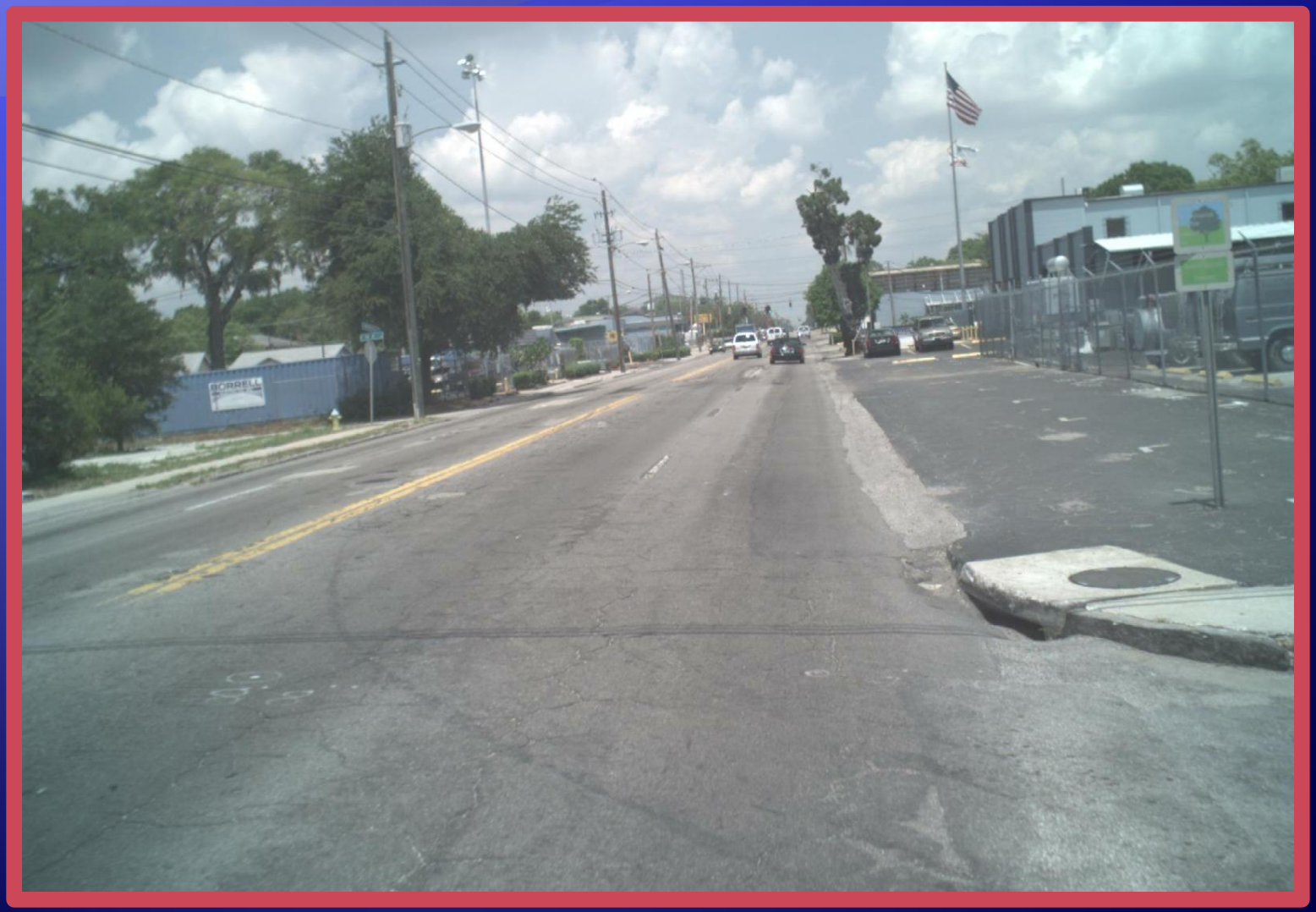


# General Information

- Urban Minor Arterial
- Highly urbanized area of Tampa with residential and commercial development
- Nebraska Avenue was among the highest bicycle and pedestrian crash frequency corridors in FDOT District 7



# Before Conditions: 4 Lanes



# After Conditions: 2 Lane Divided

# After Condition: Signal Upgrades

# After Condition: Midblock Crosswalk

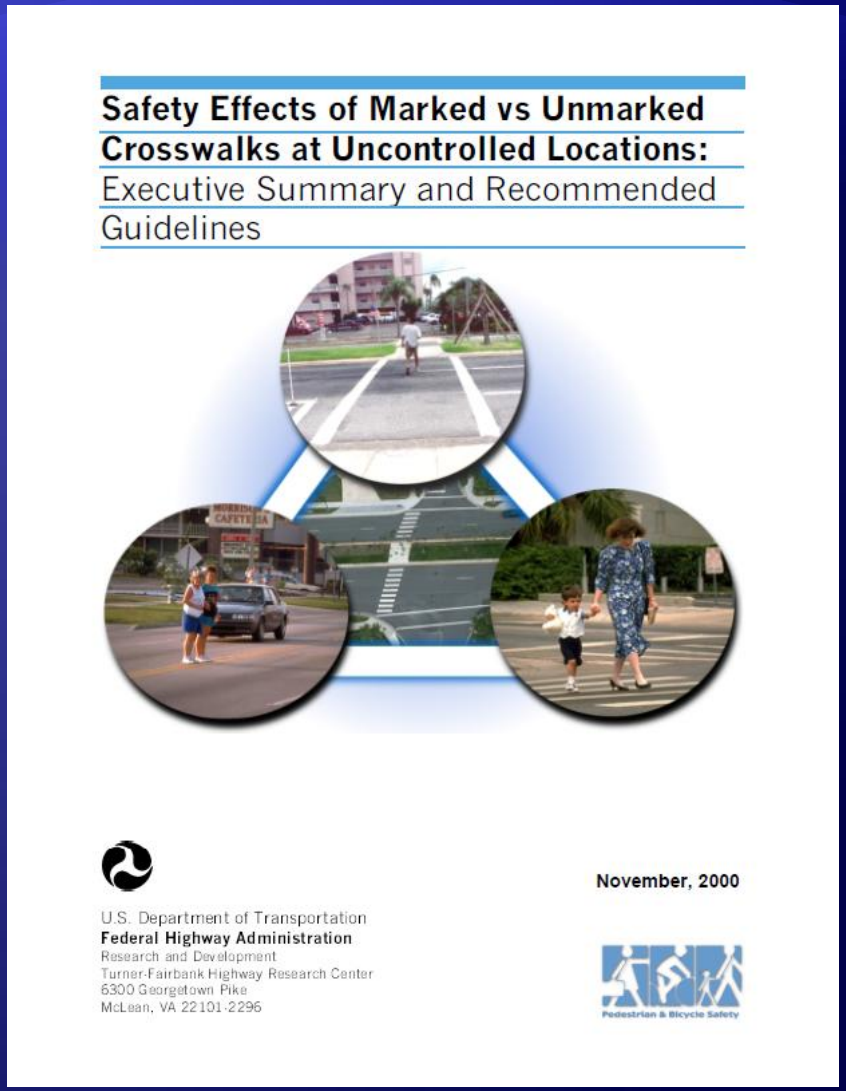
# Crash Reductions

- Pedestrian crashes reduced from 7 to 2.5 crashes per year.
- Bicycle crashes reduced from 5.0 to 1.7 per year.
- Sideswipe crash rate reduced from 0.76 to .15 crashes per million vehicle miles traveled (MVMT).
- Rear end crash rate has reduced from 1.18 to .82 crashes per MVMT.
- Sidewalks, crosswalks, bicycle lanes, bus bays and a two way left turn lane were included in the project.

# Crosswalks (Section 8.3)

- *FHWA's Safety Effects of Marked vs. Unmarked Crosswalks at Uncontrolled Locations: Executive Summary and Recommended Guidelines*

- http://safety.fhwa.dot.gov/ped_bike/docs/cros.pdf



# Bicycle Lanes (Section 8.4.1)

- A min. of 4’ wide , measured from lip of gutter or edge of pavement
- A min. of 5’ wide when a guardrail or other barrier exits and the roadway pavement is continuous to barrier
- A min. of 6.5’ wide on new “high speed urban and suburban” arterials with curb and gutter
- Follow Index 17347

# Bicycle Lanes

# Bicycle Lanes (Section 8.4.1)

# Green Color Bicycle Lanes (Section 8.4.2)

- FDOT has received Interim Approval from FHWA for locations on the SHS only
- Considered a traffic control device whose need must be demonstrated and installations evaluated
- Purpose is to highlight the conflict area of the bike lane – point at which driver's and cyclists are likely to cross paths

# Green Colored Bike Lanes

# Green Color Permitted When:

- A traffic conflict area ("keyhole") exists at one of the following locations:
  - The bike lane crosses a right turn lane,
  - Traffic in a channelized right turn lane crosses a bike lane, or
  - The bike lane is adjacent to a dedicated bus bay.
- And .....

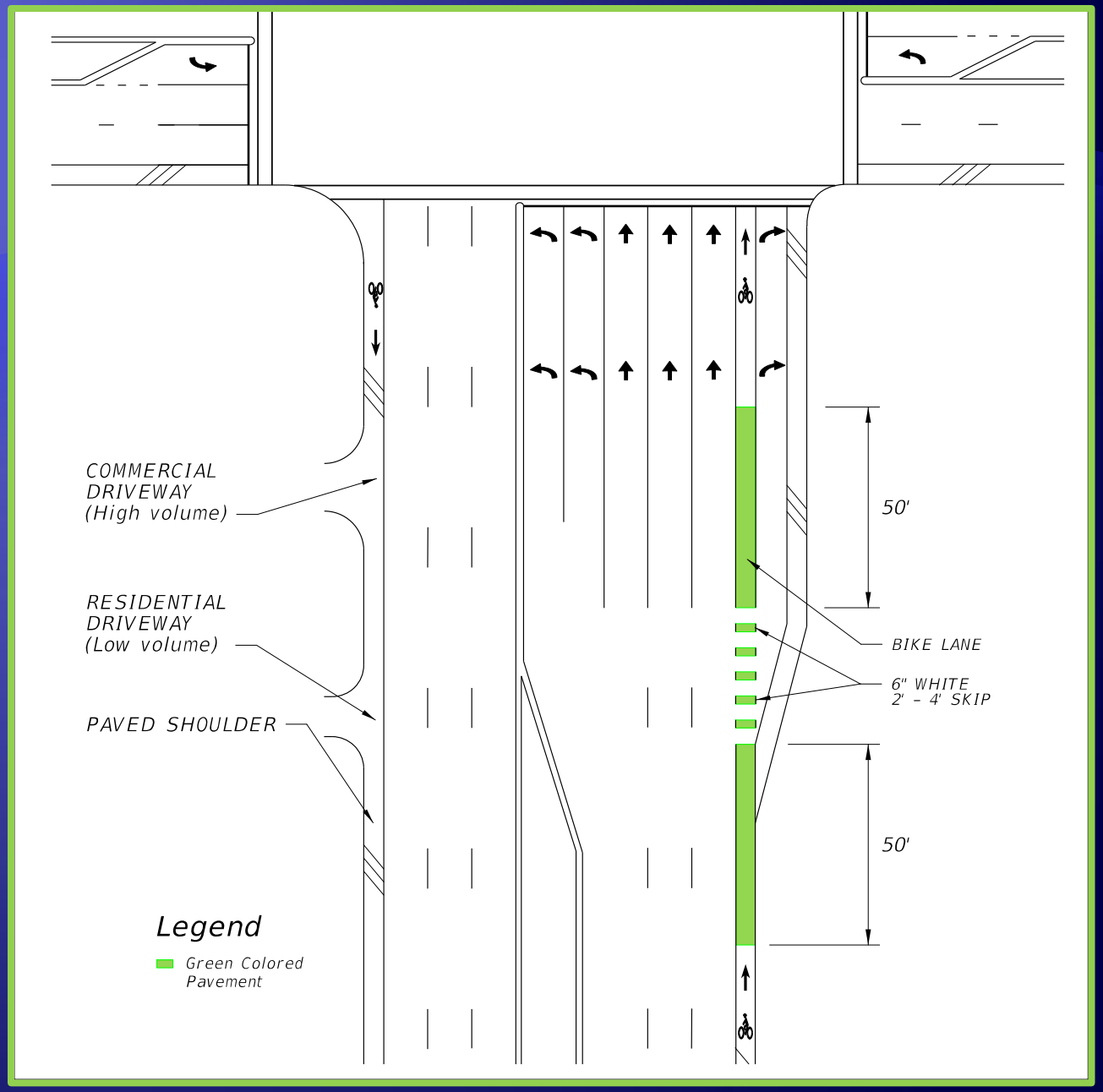
# Green Color Permitted When:

- Need for treatment is demonstrated by:
  - 3 or more motor vehicle-bicycle crashes at the traffic conflict area over the most recent three-year period, or
  - Government agency has observed and documented conflicts between cyclists and motor vehicles at an average rate of 2/peak hour
- Approved by District Design Engineer
- Performance reviewed on an annual basis
- No local agency maintenance agreement required

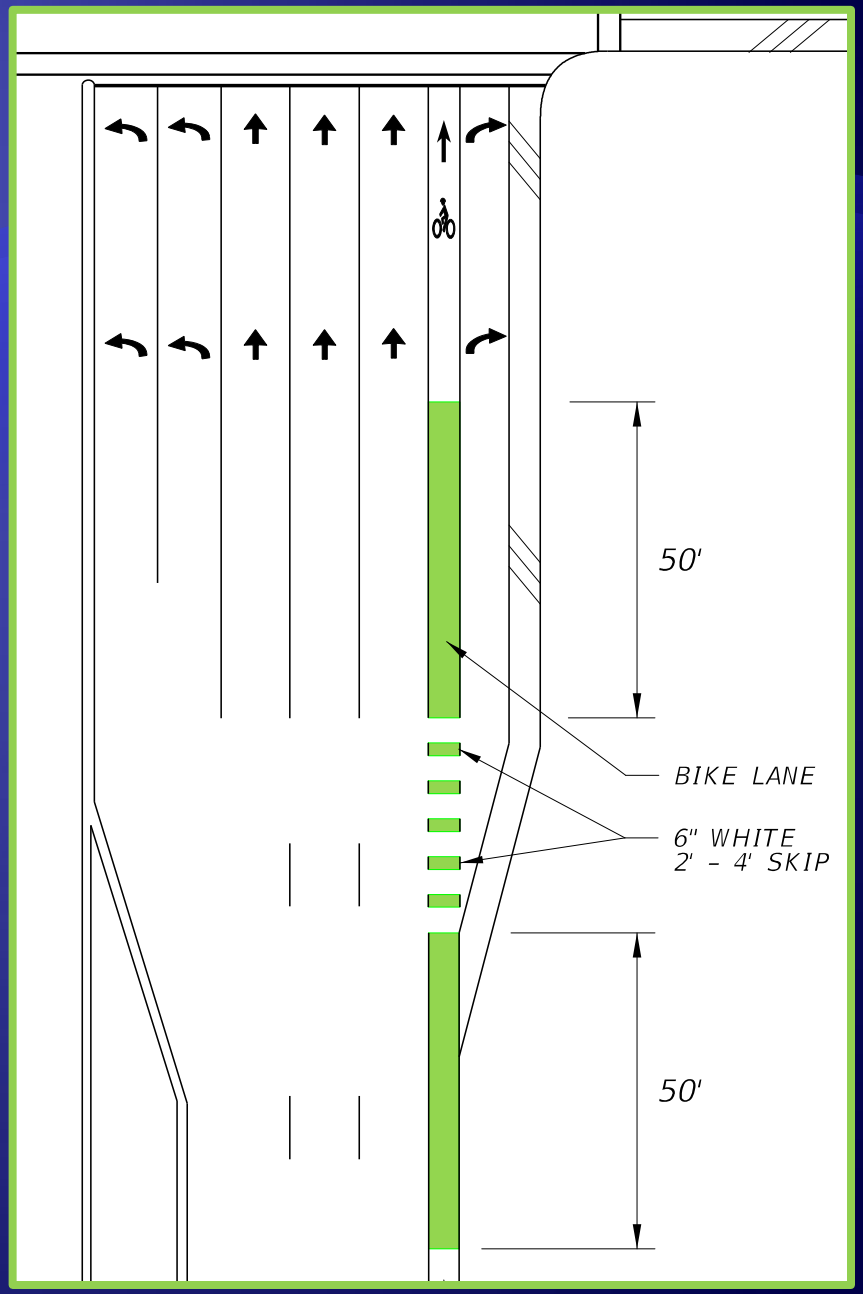
# Observation of Conflicts

- Minimum of two separate data collection periods
- Different days in a one month period
- At least one weekday and one weekend count
- During peak bicycle travel times
- At least 2 hours in duration
- Peak times are typically:
  - Weekday, 11:00 AM to 1:00 PM
  - Weekday, 5:00 PM to 7:00 PM
  - Saturday, 8:00 AM to 2:00 PM

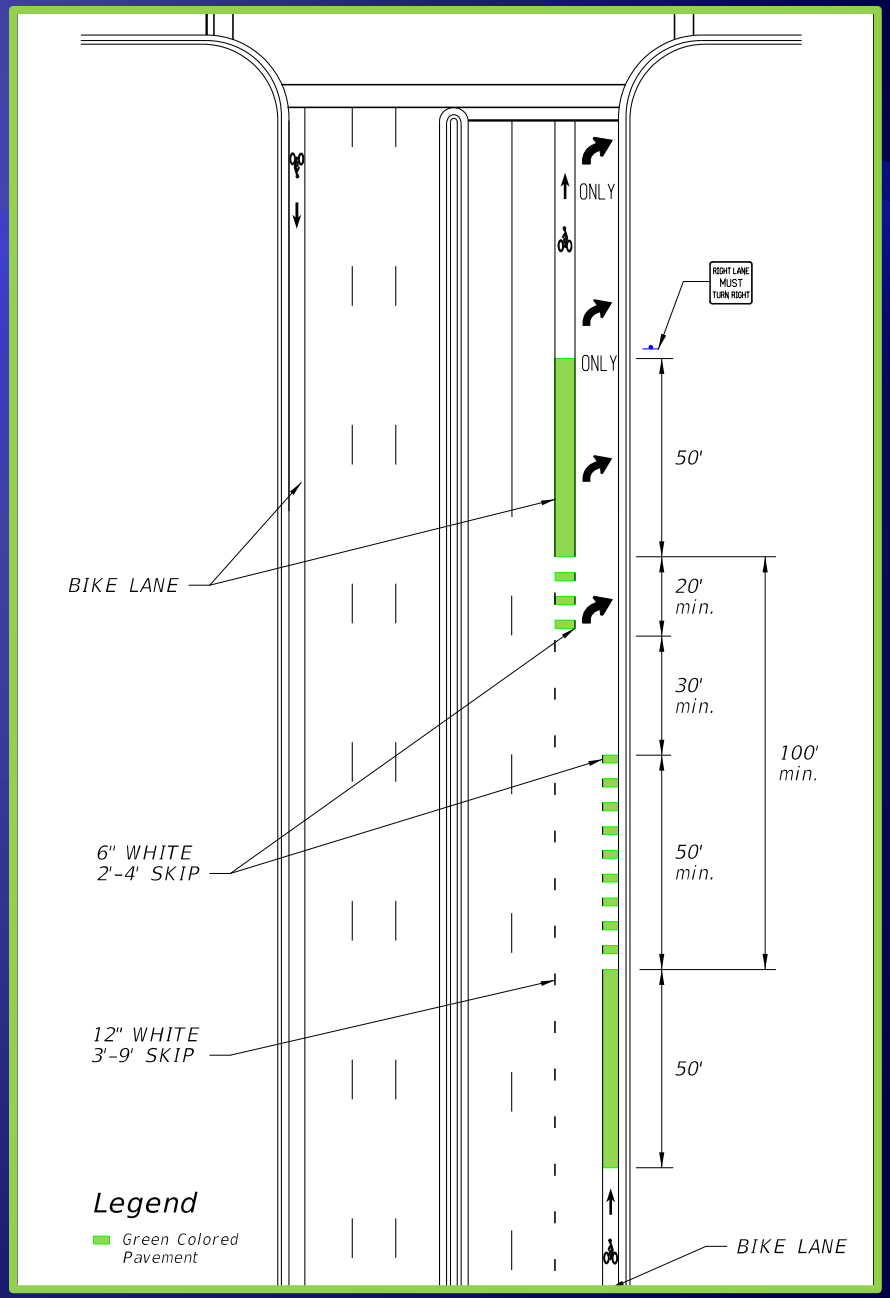
# Green Bicycle Lanes – Right Turn Lane



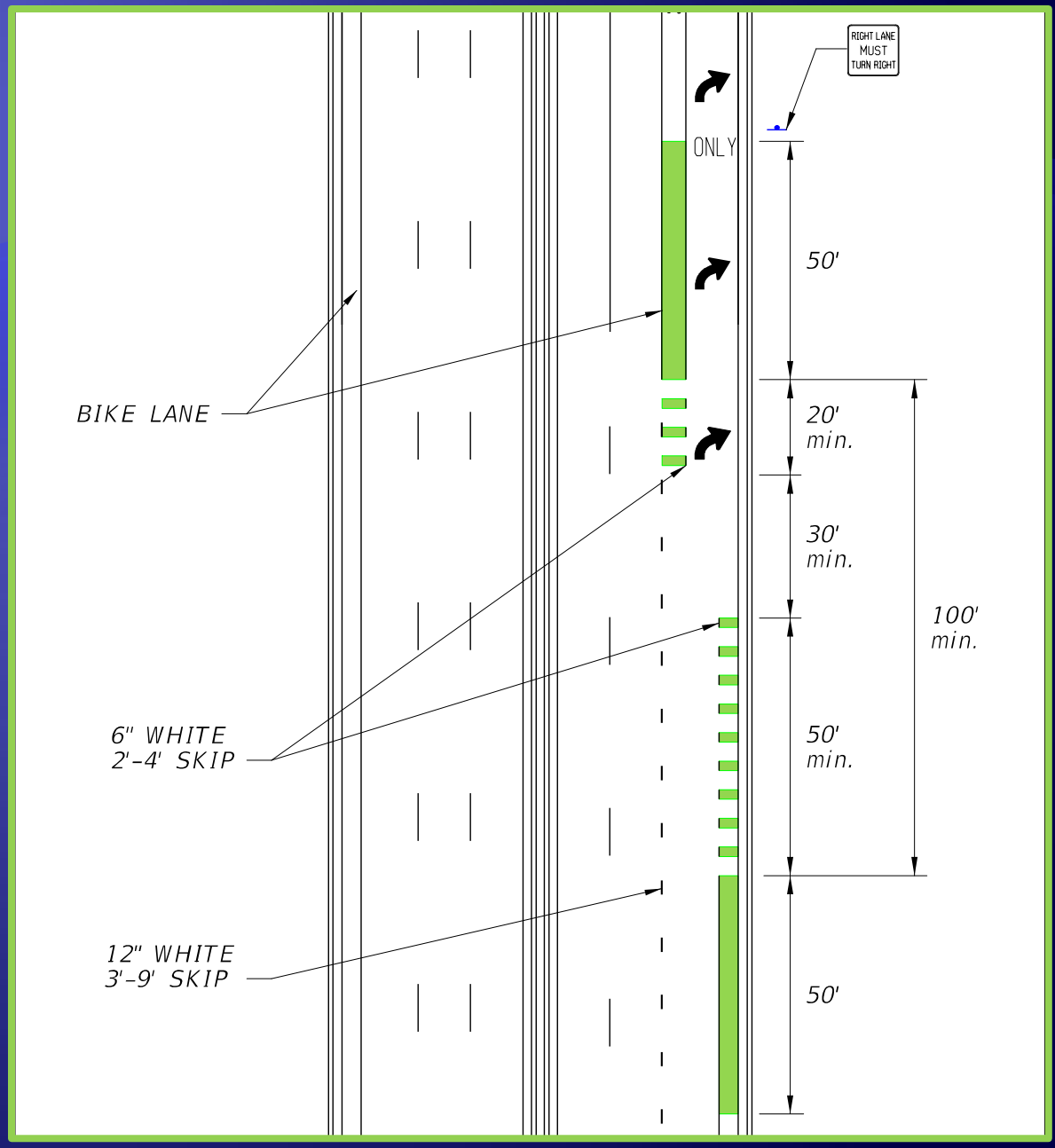
# Green Bicycle Lanes – 2′ – 4′ Skip Pattern



# Green Bicycle Lanes – Right Turn Drop Lane



# Green Bicycle Lanes – Right Turn Drop Lane 2′- 4′ and 3′- 9′ skip patterns?



# Colored Pavement

- Shall supplement, not be in lieu of, bike lane markings
- Shall match either the solid or 2'-4' white skip line pattern
  - Begin as a solid pattern 50' in advance of conflict area
  - Match the 2'-4' pattern through conflict area
  - Resume solid pattern for 50', unless interrupted by stop bar, intersection curb radius, or bike lane marking
- Illustrated in Figures 8.4.1 – 8.4.5 of PPM

# Colored Pavement Materials

- Must be non-reflective
- Fall within the color parameters defined by FHWA
- Meet FDOT Specification 523, Patterned Pavement
  - ftp://ftp.dot.state.fl.us/LTS/CO/Specifications/WorkBook/Jan2012/SS523000.pdf

# Paved Shoulders (Section 8.4.3)

# Paved Shoulders

- Delineated by edge line striping
- May include bicycle lane pavement markings or signing
- In or within 1 mile of an urban area, the paved shoulder shall be marked as a bicycle lane.

# Shared Lane Markings (Section 8.4.5)

- "Sharrows"
- Optional pavement marking for shared lane roadways.
- Priorities for use:
  - With on-street parking
  - Gaps in facilities
  - Identify alternate route as part of MOT
  - Crash history of 3+/mile, over 3 years
- Research underway to develop criteria for use on roadways w/ posted speeds > 35 mph

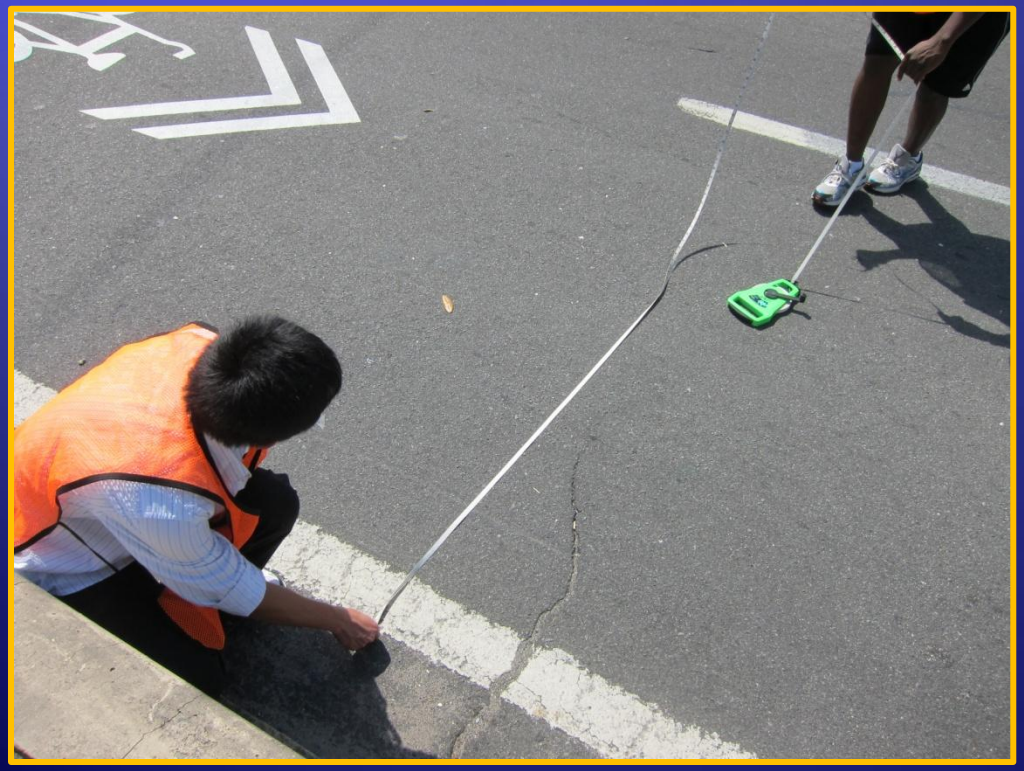
# Bridge of Lions

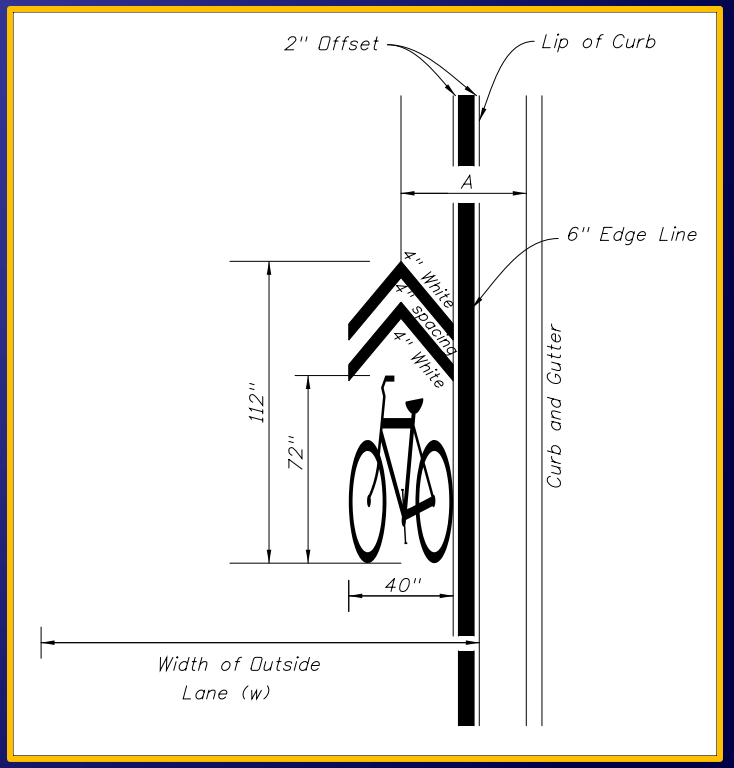
# Bridge Leaf Joint

# Shared Lane Marking

- Index 17347 – Added shared lane markings and details on where they should be placed in the travel lane, with/without parking

| Lane Width (w) | Sharrow ℄ (A) |
|---|---|
| 13' or Greater | 4' |
| Less Than 13' | 5 1/2' |





# FDOT Bicycle Research Team

# Bicycle Routes

- Roadways or shared use paths designated through signage, pavement markings or mapping
- Provide directional and distance information
- Should not end at a barrier
- Based on the suitability of the particular roadway or shared use path for bicycle travel and the need for wayfinding information
- Evaluations of suitability include:
  - roadway width, volume, speed, and types of traffic
  - grade and sight distance,
  - connectivity to services, destinations, and transportation hubs
- Further guidance on signing bicycle route systems is provided in the ***MUTCD, Part 9***


# U.S. Bicycle Route System

# US Bicycle Route System

- Network of bicycle routes that span multiple states and are of national or regional significance
- Nominated for national designation by State DOTs, and designated and catalogued by the ***American Association of State Highway and Transportation Officials (AASHTO)***
- Florida has adopted a policy entitled ***U.S. Numbered Bicycle Routes, Topic No. 000-525-060-a*** in support of the national route system


CORRIDOR PLAN
MARCH 2011
THE GOAL OF THE UNITED STATES BICYCLE ROUTE SYSTEM IS TO CONNECT AMERICA THROUGH A NETWORK OF NUMBERED INTERSTATE BICYCLE ROUTES.
THE UNITED STATES BICYCLE ROUTE SYSTEM
Adventure Cycling Association
America's bicycle travel experts
AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS
AASHTO
THE VOICE OF TRANSPORTATION
Seattle
Spokane
Portland
Missoula
Helena
Solem
Eugene
Billings
Bismarck
Fargo
Boise
Idaho Falls
Pierre
Minneapolis
Sioux Falls
Casper
Santa Rosa
Reno
Salt Lake City
Cheyenne
Fort Collins
Lincoln
Omaha
Des Moines
Provo
Sacramento
Denver
San Francisco
San Jose
Fresno
Colorado Springs
Topeka
Kansas City
St. Louis
Bakersfield
Las Vegas
Wichita
Springfield
Santa Fe
Tulsa
Los Angeles
Riverside
Albuquerque
Oklahoma City
Memphis
Little Rock
San Diego
Phoenix
Tucson
Lubbock
Fort Worth
Dallas
Shreveport
El Paso
Jackson
Deadhorse
Austin
Houston
Baton Rouge
New Orleans
San Antonio
Fairbanks
Corpus Christi
Anchorage
Haines
Skagway
Juneau
Homer
McAllen
Honolulu
Hilo
Sault Ste Marie
Burlington
Portland
Albany
Manchester
Boston
Rochester
Syracuse
Providence
Buffalo
Hartford
New Haven
Scranton
G. Rapids
Lansing
Milwaukee
Detroit
New York
Davenport
Chicago
Toledo
Cleveland
Philadelphia
Canton
Pittsburgh
Wilmington
Ft. Wayne
Columbus
Baltimore
Dayton
Indianapolis
Washington D.C.
Cincinnati
Charleston
Richmond
Lexington
Louisville
Virginia Beach
Raleigh
Nashville
Knoxville
Asheville
Charlotte
Fayetteville
Chattanooga
Columbia
Atlanta
Augusta
Birmingham
Charleston
Savannah
Montgomery
Jacksonville
Mobile
Tallahassee
Gulfport
Pensacola
Daytona Beach
Orlando
Melbourne
Tampa
Sarasota
W. Palm Beach
Fort Lauderdale
Miami
Key West
PRIORITIZED CORRIDORS ARE NOT routes, but 50-mile wide areas where a route may be developed. These corridors have been assigned route numbers.
ALTERNATE CORRIDORS provide additional consideration for interstate routing. These corridors have not been assigned route numbers but may be prioritized. Corridors may be added or existing corridors shifted as needed.
THE TWO ESTABLISHED ROUTES, US Bicycle Route 1 in Virginia & North Carolina, and US Bicycle Route 76 in Virginia, Kentucky, & Illinois, were designated through AASHTO in the 1980's.
PRIORITIZED CORRIDOR
ALTERNATE CORRIDOR
Connecting People, Communities, and the Nation
PRIVATE OR PUBLIC FERRY
UNITED STATES BICYCLE ROUTE

# U.S. Numbered Bicycle Routes

- The initial 50-mile wide corridors that will be established are:
  - US BR 90 which follows US 90 from Pensacola to St. Augustine
  - US BR 1 which follows US 1 from Nassau County to Key West
  - US BR 15 which follows Florida's Gulf Coast from Madison County to Miami
  - Alternate US BR CFG which follows the route of the Marjorie Harris Carr Cross Florida Greenway, from Daytona Beach to Tampa Bay
- Criteria for evaluation of potential routes provided in Table 8.4.1 of the PPM
  - Identifies criteria to use when selecting a route within a USBR corridor

# U.S. Numbered Bicycle Routes

## Criteria - Macro

# U.S. Numbered Bicycle Routes

- Within USBR corridor
- Supports natural connections between adjoining states
- Includes or intersects existing and planned bicycle routes
- Access to scenic, cultural, historical and recreational destinations
- Links metropolitan areas, transportation hubs or major attractions
- Reasonably direct route

## Criteria - Micro

# U.S. Numbered Bicycle Routes

- Meets Florida design criteria for bicycle facilities
- Connects to a neighboring state's USBR
- Utilizes already successful routes
- Provides access to services and amenities - food, water and overnight accommodations, restaurants, libraries, and bicycle shops
- Has regular ferry or shuttle crossings of water bodies or other barriers
- Avoids unnecessary extreme climbs and hills
- Easy to follow

# Drainage Inlets, Grates (Section 8.5)

- Review of drainage structures and how they affect cyclists and pedestrians
  - Opening dimensions
  - Grate types
  - Grate cross slopes

# Storm Drain Handbook

- 2012 Drainage Handbook: Storm Drains
  - Refer to *Figure 3-11, Curb Inlet and Gutter Inlet Application Guidelines*, and *Figure 3-12, Ditch Bottom and Median Inlet Application Guidelines*
  - http://www.dot.state.fl.us/rddesign/dr/files/StormDrainHB.pdf

# Storm Drain Handbook: Curb and Gutter Inlets



CURB INLET and GUTTER INLET APPLICATION GUIDELINES

| INDEX NO | INLET TYPE | TYPE CURB/GUTTER | GRADE CONSIDERATION | BICYCLE COMPATIBLE | ACCEPTABLE IN PEDESTRIAN WAY | ACCEPTABLE IN AREAS OF OCCASIONAL PEDESTRIAN TRAFFIC | Notes | UTILITY LOCATION FROM CURB |
|---|---|---|---|---|---|---|---|---|
| 210 | 1 | E & F | Continuous | Yes | No | Yes | | Inside |
| | 2 [1] | E & F | Sag | Yes | No | Yes | | Inside |
| | 3 | E & F | Continuous | Yes | No | Yes | | Inside |
| | 4 [1] | E & F | Sag | Yes | No | Yes | | Inside |
| 211 | 5 | E & F | Continuous | Yes | No | Yes | | Outside |
| | 6 [1] | E & F | Sag | Yes | No | Yes | | Outside |
| 212 | 7 | Separator I & II | Continuous or Sag | Yes | No | Yes | | Inside |
| 213 | 8 | Separator IV & V | Continuous or Sag | Yes | No | Yes | | Inside |
| 214 | 9 [2] | D & F | Continuous or Sag | Yes | No | Yes | | Outside |
| 215 | 10 [2] | D & F | Continuous or Sag | Yes | No | Yes | | Outside |
| 217 | 1 | Median Barrier Wall | Continuous | No | No | Yes [4] | | N/A |
| | 2 [1] | Median Barrier Wall | Sag | No | No | Yes [4] | | N/A |
| | 3 | Median Barrier Wall [3] | Continuous | No | No | Yes [4] | | N/A |
| | 4 [1] | Median Barrier Wall [3] | Sag | No | No | Yes [4] | | N/A |
| | 5 [1] | Median Barrier Wall [3] | Continuous & Sag | No | No | Yes [4] | | N/A |
| 218 | - | Barrier Wall | Continuous or Sag | No [5] | No | Yes | See Index 218 Inset B | N/A |
| 219 | - | Barrier Wall (Rigid, C & G) | Continuous or Sag | No [5] | No | Yes | See Index 219 Inset B & C | N/A |
| 220 | S | Shoulder | Continuous | No [5] | No | Yes | See Index 220 Bar Stub Detail | N/A |
| 221 | V | Valley | Continuous or Sag | No [5] | No | Yes | | N/A |

[1] Double throated inlets are usually not warranted unless the minor gutter flow exceeds 50 feet in length or 0.5 CFS.
[2] Curb Inlets 9 and 10 are to be used only where flows are light and right of way does not permit the use of throated curb inlets.
[3] These are double inlets; one on each side of the barrier wall.
[4] May be used by specifying the reticuline grate.
[5] Bicycle compatible provided a minimum 4ft riding surface is provided around the inlet, with a preferred 1 ft offset from the inlet. Consider use of pavement markings shown in the 2009 MUTCD to alert cyclist to the inlet in the bicycle lane or shoulder pavement.

**Figure 3-11**
36

# Storm Drain HB: Ditch Bottom and Median Inlets



DITCH BOTTOM AND MEDIAN INLET APPLICATION GUIDELINES

| Index No. | Inlet Type | Location | Traffic | Bicycle Compatible | Acceptable in Pedestrian Way | Acceptable in Areas of Occasional Pedestrian Traffic [5] |
|---|---|---|---|---|---|---|
| 230 | A | Limited Access Facilities | Heavy Wheel Loads | No | No | No |
| 231 | B | Inside Clear Zone | Heavy Wheel Loads | No | No | Yes |
| 232 | C [3] | Outside Clear Zone [4] | Infrequent Traffic | Yes [6] | No | Yes [4] |
| | D | Outside Clear Zone [4] | Infrequent Traffic | Yes [6] | No | Yes [4] |
| | E | Outside Clear Zone [4] | Infrequent Traffic | Yes [6] | No | Yes [4] |
| | H | Outside Clear Zone | Infrequent Traffic | Yes | No | Yes |
| 233 | F | Inside Clear Zone | Heavy Wheel Loads | Yes | No | Yes |
| | G | Inside Clear Zone | Heavy Wheel Loads | Yes | No | Yes |
| 234 | J | Inside Clear Zone | Heavy Wheel Loads | No | No | Yes |
| 235 | K | Outside Clear Zone | N/A | N/A | No | N/A |

[1] Alternate G grates should be specified when in salt-water environment.
[2] Inlets with slots are more debris tolerant than inlets without slots. Debris may buildup on Type B fence of Type K Inlet.
[3] For Back of Sidewalk Location See Index No. 282.
[4] Type C, D, & E Inlets without slots or inlets with traversable slots may be located within the Clear Zone. Slotted inlets located within the Clear Zone or in areas accessible to pedestrians shall have traversable slots.
[5] Areas subject to occasional pedestrian traffic are pavement, grassed, or landscaped areas where pedestrians are not directed over the inlet and can walk around the inlet.
[6] Inlets with traversable slots shall not be used in areas subject to bicycle traffic.

**Figure 3-12**

# Shared Use Paths (Section 8.6)

- Paved facilities separated from motorized traffic by an open space or barrier and either within the highway right of way or an independent right of way.
- Used by bicyclists, pedestrians, skaters, runners and others.

# Shared use Path Widths

- Appropriate width is dependent upon context, volume and mix of users
  - Range from 10-14 feet, wider values in areas with high use or a broader variety of users (bicyclists, pedestrians, joggers, and skaters)
  - Need to provide for larger emergency or maintenance vehicles or manage steep grades can also affect appropriate width.
  - The minimum width for a two-directional shared use path is 10 feet.
  - ***FHWA's Shared Use Path Level of Service Calculator***

# Shared Use Paths

# Pedestrian Bridges (Section 8.7.2)

- Updated guidance on the use of steel truss bridges for pedestrian crossings.
  - Stand-alone structures or hybrid structure with adjoining spans of other types (FIB, deck slab, steel I-girder, etc.)

# Pedestrian Bridges (Section 8.7.2)

- Updated guidance on the use of steel truss bridges for pedestrian crossings.
  - Stand-alone structures or hybrid structure with adjoining spans of other types (FIB, deck slab, steel I-girder, etc.)
- Following conditions need to be met:
  - Steel truss span lies within a tangent horizontal alignment
  - Maximum length of the steel truss span does not exceed 200 feet
  - Width of the steel truss span is constant
  - Steel truss span supports have a skew angle not to exceed 20°
- When these criteria are not met provide a complete set of bridge details in the plans.

# Temporary Bus Stops

# Temporary Bus Stops

# *Questions?*

## Bicycle, Pedestrian and Transit Facilities Update

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