223 Bicycle Facilities

223.1 General

This chapter provides the minimum criteria to be used for the design of bicycle facilities on the State Highway System (SHS).

Provide a bicycle facility on all roadways on the SHS, except where its establishment would be contrary to public safety; e.g., limited access facilities as defined by ***FDM 211***. The various methods of providing bicycle facilities are discussed in ***FDM 223.2.***

Process a Design Variation when a bicycle facility cannot be provided or when criteria contained within this chapter are not met.

223.2 Bicycle Facilities

A bicycle facility is an improvement or provision made to the roadway to accommodate bicycle travel. Bicycle facilities play an important role in supporting safe bicycle travel. Bicycle facilities include the following:

- Bicycle lanes
- Paved shoulders
- Wide curb lanes
- Shared use paths
- Keyhole lanes
- Separated bicycle lanes

Bicycle safety can be enhanced through the following measures:

(1) Maintaining a smooth, clean riding surface, free of obstructions. This includes ensuring drainage inlets and utility covers that cannot be moved out of the travel way are flush with grade, well seated, and use bicycle-compatible inlets, grates and covers.

(2) Responsive and appropriate traffic control devices, consistent with guidance in the ***Manual on Uniform Traffic Control Devices*** (***MUTCD***), including providing bicycle oriented directional signage.

(3) Providing adequate lighting.

223.2.1 Bicycle Lanes

Bicycle lanes are a portion of a curbed roadway designated for the exclusive use of bicyclists. Bike lanes are designated by a bicycle symbol pavement marking in accordance with ***Standard Plans, Index 711-002*** and the ***MUTCD***, and illustrated in ***Exhibits 223-1*** through ***223-3***. Bike lane signs and plaques may be used in accordance with the ***MUTCD*** when high levels of bicycle traffic exist or are anticipated.

Bicycle lanes are the preferred bicycle facility type on curbed roadways with a design speed ≤ 45 mph.

Bicycle lanes are one-way facilities and carry bicycle traffic in the same direction as adjacent motor vehicle traffic. On one-way streets, bicycle lanes should typically be placed on the right side of the street. A bicycle lane on the left side of the street can be considered if it will substantially reduce the number of potential conflicts, such as those caused by frequent bus traffic, heavy right-turn movements, high-turnover parking lanes, or if there is a significant number of left-turning bicyclists.

223.2.1.1 Bicycle Lane Width

The width of the bicycle lane is measured from the edge of travel lane to the edge of pavement. For new construction projects, a 7-foot buffered bicycle lane is the standard. A buffered bicycle lane has a double-6-inch white edge line separating the bike lane and the adjacent travel lane.

Buffered bicycle lanes are depicted in ***Exhibit 223-1***. A buffered bicycle lane should not exceed 7 feet in width (including the buffer). Any additional pavement width that results from restricting the buffered bicycle lane to 7 feet should be applied to the outside travel lane.

For projects where a bike lane is needed and it is not practical to move the existing curb (e.g., RRR), the width of the bicycle lane depends on the width of the available roadway pavement. For these types of projects, the options in the order of priority are:

(1) 7-foot buffered bicycle lane

(2) 6-foot buffered bicycle lane

(3) 5-foot bicycle lane

(4) 4-foot bicycle lane

Do not provide a bike lane when available roadway pavement is less than 4 feet.

When roadway pavement is continuous to the face of guardrail or barrier, the minimum bicycle lane width is 5 feet. See ***FDM 223.2.1.3*** when the bicycle lane is adjacent to a right-turn lane or bus bay.

223.2.1.2 Pavement Markings and Signage

Bicycle lane pavement marking symbols are illustrated in ***Exhibit 223-1***. Use the following guidance in determining the appropriate placement of bicycle lane markings:

(1) At an intersection approach, transition the buffer lane striping to a double 6-inch wide stripe using a 2'- 4' dotted pattern 150 feet in advance of the intersection to provide sufficient distance for an automobile or truck to merge into the bicycle lane before turning right.

(2) Provide continuous lane striping past low-volume and residential driveways.

(3) Place a Helmeted Bicyclist Symbol and Bicycle Lane Arrow (per ***Standard Plans, Index 711-002***) in the following locations:

  (a) The beginning of a bicycle lane

  (b) The far side of major intersections

  (c) Prior to and within the keyhole lane

(4) The maximum spacing of the Helmeted Bicyclist Symbol and Bicycle Lane Arrow is 1,320 feet.

Provide "Bike Lane Ahead" and "Bike Lane End" signage in accordance with the ***MUTCD***.

See ***FDM 230.3.1.3*** for information on placing markings on concrete surfaces.

223.2.1.3 Keyhole Lanes

A keyhole lane is a bicycle lane that is placed between a through lane and the adjacent right turn lane, bus bay, or parking lane. Provide a keyhole lane on curbed roadways that have a bicycle lane approaching the intersection, bus bay, or parking lane. On curbed roadways that do not have a bicycle lane approaching the intersection, consider providing a 17-foot right-turn lane for development of future bicycle facilities.

A keyhole lane should be provided on flush shoulder roadways that have marked shoulders (per ***FDM 223.2.2.1***) on the approaching paved shoulders. Consider providing a keyhole lane on flush shoulder roadways where the approach shoulder is not marked and high levels of bicycle traffic exist or are anticipated.

Provide a 7-foot buffered keyhole lane on curbed roadways; however, when 7 feet is not obtainable, provide the greatest keyhole lane width possible, but not less than 5 feet. The keyhole lane should match the width of the shoulder on flush shoulder and high speed curbed roadways, but not less than 5 feet.

Include Helmeted Bicyclist Symbol and Bicycle Lane Arrow pavement markings in the keyhole lane. Keyhole lanes are illustrated in ***Exhibit 223-2***.

The addition of a keyhole lane is not required on RRR projects that have inadequate R/W or utility conflicts.

223.2.1.4 Green-Colored Bicycle Lanes

The Federal Highway Administration (FHWA) has issued an Interim Approval (IA.14), dated April 15, 2011, for the use of green-colored pavement in marked bicycle lanes and in extensions of bicycle lanes through intersections and other traffic conflict areas. FDOT has received permission from FHWA for use of green-colored pavement markings on the SHS. The Interim Approval may be found at the following website:

http://mutcd.fhwa.dot.gov/resources/interim_approval/ia14/index.htm

Green-colored bicycle lanes may be used when the need to enhance the conspicuity of bicycle-vehicular conflict areas is demonstrated. Bicycle-vehicular conflict areas are illustrated in ***Exhibit 223-3***; and include:

(1) Bicycle lane crosses a vehicular right turn lane
   (a) Separate right-turn lane (image A)
   (b) Dropped lane transitioning into a right-turn lane (image B)
   (c) Free-flow channelized right-turn lane, such as at an interchange: lane addition (image D) or merge lane (image E)

(2) Bicycle lane adjacent to a dedicated bus bay (image C)

Green-colored pavement supplements the required bicycle lane pavement markings and is not to be used as a substitute for such markings.

The use of green-colored bicycle lanes require the approval of the District Design Engineer with a copy of the approval submitted to the State Bicycle and Pedestrian Coordinator. The addition of green-colored pavement to bicycle lanes per these criteria does not require a local agency maintenance agreement.

Modification for Non-Conventional Projects:
Delete the above paragraph and see RFP for requirements.

Use the following guidance in the placement of green-colored pavement:

(1) When it is used in conjunction with white dotted lines, such as when extending a bike lane across a right turn lane or access to a bus bay, the transverse colored marking must match the 2'- 4' white dotted line pattern of the bike lane extension.

(2) Start the green colored pavement as a solid pattern 50 feet in advance of the dotted striping, match the 2'- 4' dotted through the conflict area, and then resume the solid color for 50 feet after the conflict area, unless such an extent is interrupted by a stop bar, an intersection curb radius or bike lane marking.

(3) Materials used to color the bicycle lane green must be non-reflective and in compliance with:

(a) ***FDOT Specification 523, Patterned Pavement***, and

(b) ***FHWA* Interim Approval letter (IA.14)**.

Include quantities as Patterned Pavement in the Summary of Pavement box in accordance with the ***Basis of Estimates Manual***. Load these planned quantities into AASHTOWare Project™ Preconstruction or Designer Interface in the Roadway Category.

223.2.1.5 Green-Colored Intersection Bicycle Box and Two-Stage Queue Box

The Federal Highway Administration (FHWA) has issued Interim Approvals (IA), for the use of intersection bicycle boxes and two-stage bicycle queue boxes. FDOT has received permission from FHWA for use of these markings on the SHS.

The use of bicycle boxes or two-stage queue boxes may be considered only at signalized intersections. Should it be determined there are safety concerns with the IA's device or application and the IA is terminated, the device must be removed and the site restored to its previous condition.

The IAs may be found at the following websites:

- IA.18: Intersection Bicycle Box: https://mutcd.fhwa.dot.gov/resources/interim_approval/ia18/ia18.pdf
- IA.20: Two-Stage Queue Box: https://mutcd.fhwa.dot.gov/resources/interim_approval/ia20/ia20.pdf

Materials used for the bicycle boxes and two-stage bicycle queue boxes must be in compliance with ***Standard Specification*** 523, Patterned Pavement. The color green must be in compliance with ***IA.14***: Optional Use of Green Colored Pavement for Bike Lanes.

The use of intersection bicycle boxes are to meet the requirements in ***IA.18*** and comply with all of the following conditions:

- 'Right turn on red' is prohibited and the left turn signal is protective
- All approaches to the intersection have a posted speed no greater than 35 mph
- Bicycle detection is provided if detection is required to actuate the signal
- There is a bicycle lane or bicycle keyhole preceding the bicycle box
- There is no more than one through lane on the approach to the bicycle box
- There is a receiving bicycle facility (bicycle lane or paved shoulder) on the opposite side of the intersection

The use of intersection two-stage queue boxes are to meet the requirements in ***IA.20*** and comply with all of the following conditions:

- 'Right turn on red' is prohibited
- All approaches to the intersection have a posted speed no greater than 45 mph
- Bicycle detection is provided if detection is required to actuate the signal

It is recommended that an educational program be developed to accompany the installation of bicycle boxes or two-stage bicycle queue boxes.

The use of green-colored intersection bicycle boxes or two-stage queue boxes require the approval of the State Roadway Design Engineer. The addition of green-colored pavement per these criteria does not require a local agency maintenance agreement.

Modification for Non-Conventional Projects:
Delete the above paragraph and see RFP for requirements.

223.2.2 Paved Shoulders

A paved shoulder is the portion of the roadway contiguous with the traveled way for accommodation of errant vehicles, stopped vehicles, bicycle traffic, and emergency use. A paved shoulder must be a minimum width of 4 feet to serve as a bicycle facility.

See ***FDM 210.4*** for additional information on paved shoulder requirements.

When audible and vibratory treatment is used adjacent to a paved shoulder that serves as a bicycle facility, see ***FDM 210.4.6***.

223.2.2.1 Marked Shoulders

A paved shoulder that has the Helmeted Bicyclist Symbol and Bicycle Lane Arrow pavement markings (see ***FDM 223.2.1.2***) are referred to as “marked shoulders”. Do not use bike lane signs on flush shoulder roadways.

Paved shoulders should be marked only when all the following are met:

(1) Design speed ≤ 45 mph,

(2) Shoulder width ≥ 5-foot,

(3) Within C4, C5 or C6 context classification; or within C3R when demand is demonstrated, and

(4) Shared use path is not present along corridor.

223.2.3 Wide Curb Lanes

A 14-foot outside travel lane on a curbed roadway is known as a wide curb lane. The 14-foot width allows most motor vehicles to safely pass a bicycle within the travel lane. Wide curb lanes are not to be used as a method of providing bicycle facilities on new construction projects. They may be used on RRR projects when they are the only practical option for a bicycle facility.

223.2.4 Shared Use Paths

See ***FDM 224*** for additional information on shared use paths.

Shared use paths are not replacements for on-street bicycle lanes. Within a roadway R/W, bicycle lanes are typically safer and more efficient for bicyclists.

When paths are located immediately adjacent to roadways, some operational problems are likely to occur:

(1) Paths require one direction of bicycle traffic to ride against motor vehicle traffic, which is contrary to the normal Rules of the Road. Motorists are not in the habit of scanning for traffic from that direction.

(2) At path ends, bicyclists riding against traffic will tend to continue to travel on the wrong side of the street, as do bicyclists getting on to a path. Wrong-way travel by bicyclists is a major cause of bicycle-automobile crashes and should be discouraged.

(3) Some bicyclists may use the roadway instead of the path because they have found the roadway to be safer, less congested, more convenient, or better maintained.

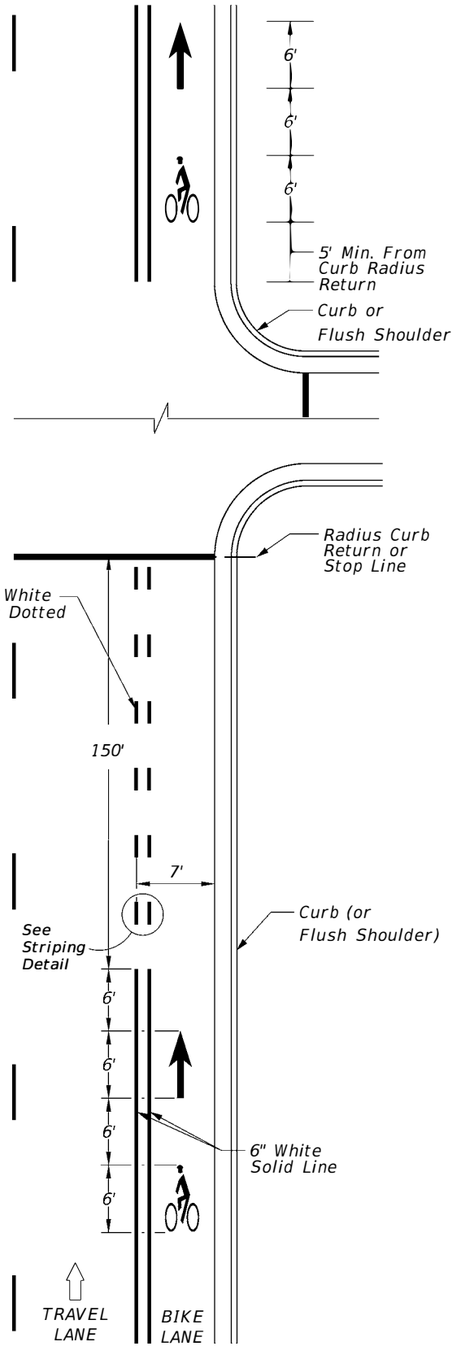
223.2.5 Separated Bicycle Lanes

Separated bicycle facilities are one-way or two-way bicycle lanes that are adjacent to and physically-separated from the vehicular travel lane. Bicyclists in these facilities are separated from vehicular traffic and special attention must be paid to facility connections at intersections. Examples of treatment options include:

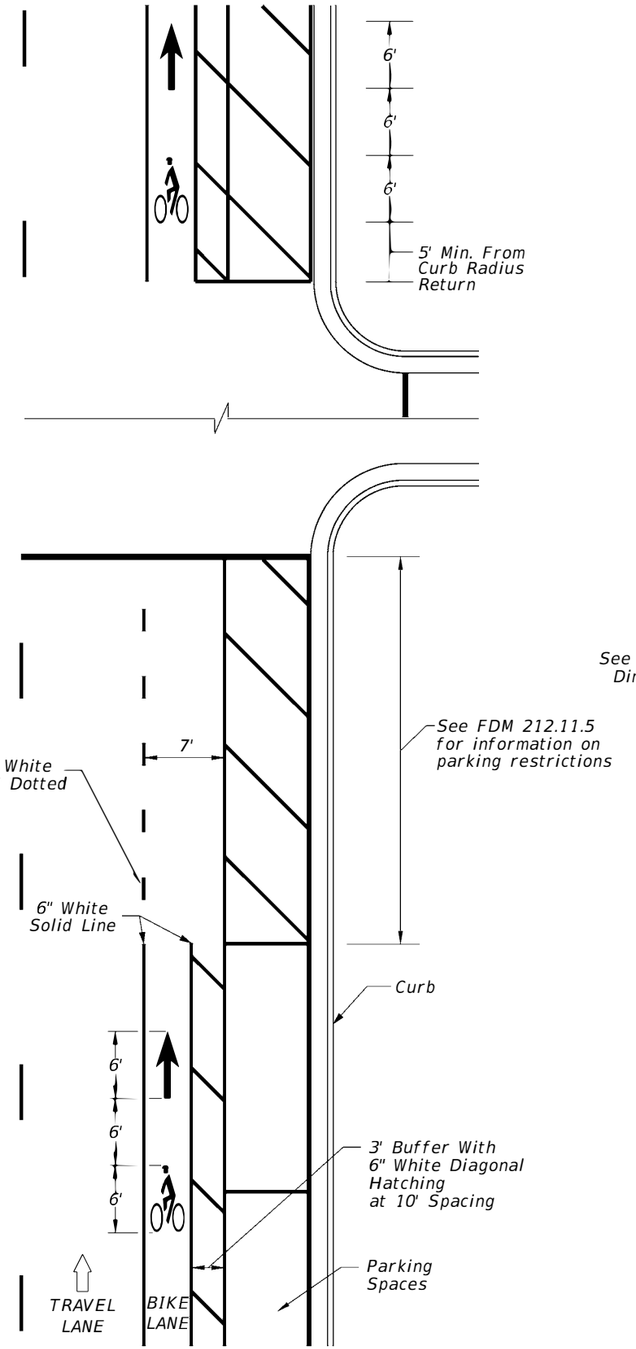
- Protected intersections
- Transitioning to shared lanes near the intersection
- Bicycle signalization

For design criteria and more information on separated bicycle facilities, see the ***FHWA Separated Bike Lane Planning and Design Guide***.

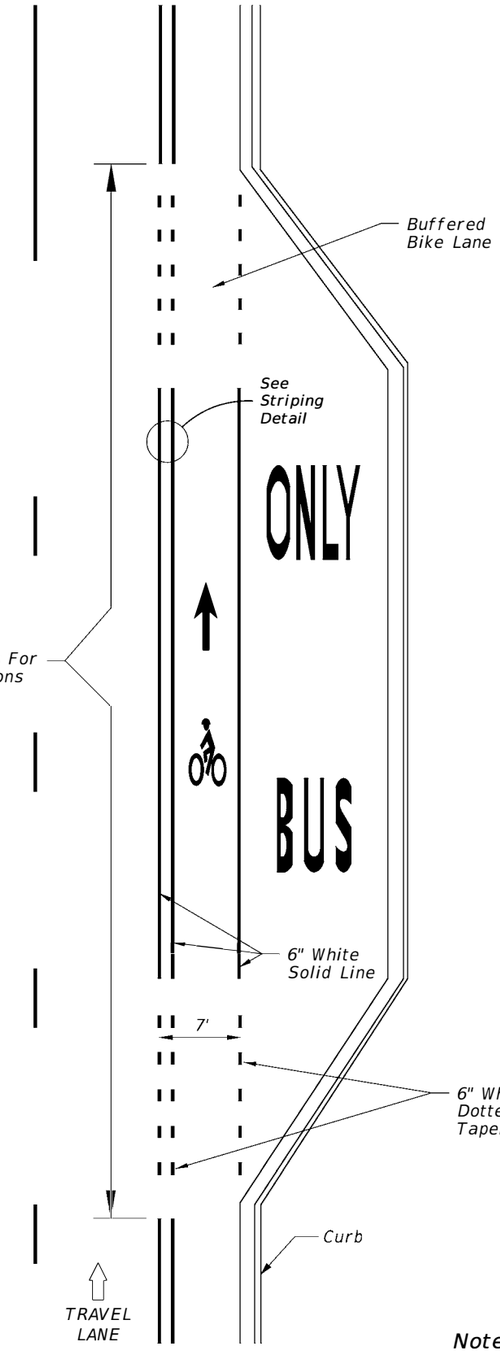
BIKE LANE TYPICAL PAVEMENT MARKINGS



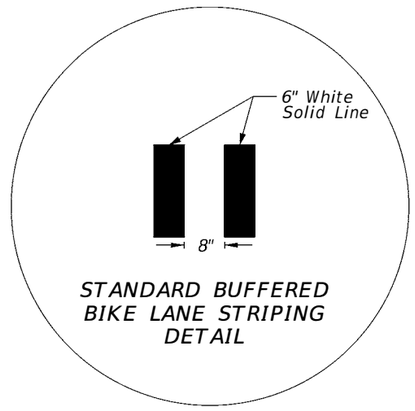
BIKE LANE INTERSECTION APPROACH DETAILS



BIKE LANE ADJACENT TO ON-STREET PARKING



BIKE LANE ADJACENT TO BUS BAY



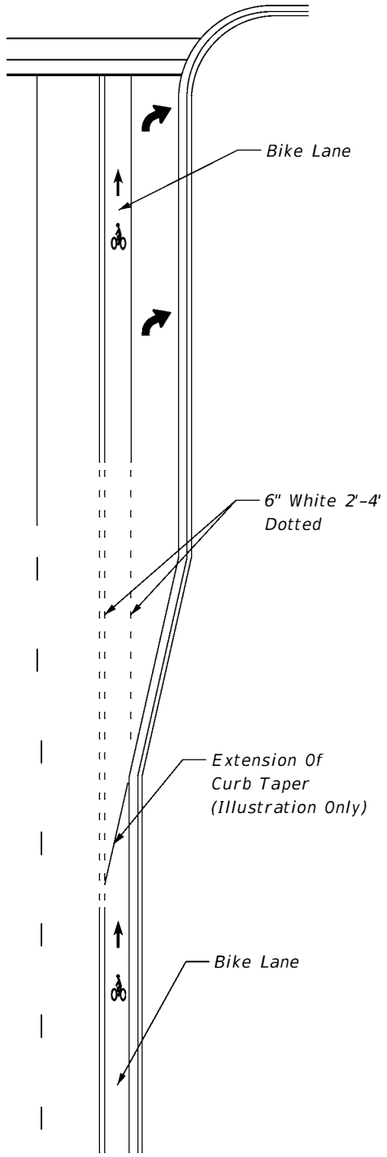
STANDARD BUFFERED BIKE LANE STRIPING DETAIL

Note:
See Exhibit 230-1 in FDM 230 for bike lane and midblock crossings pavement markings.

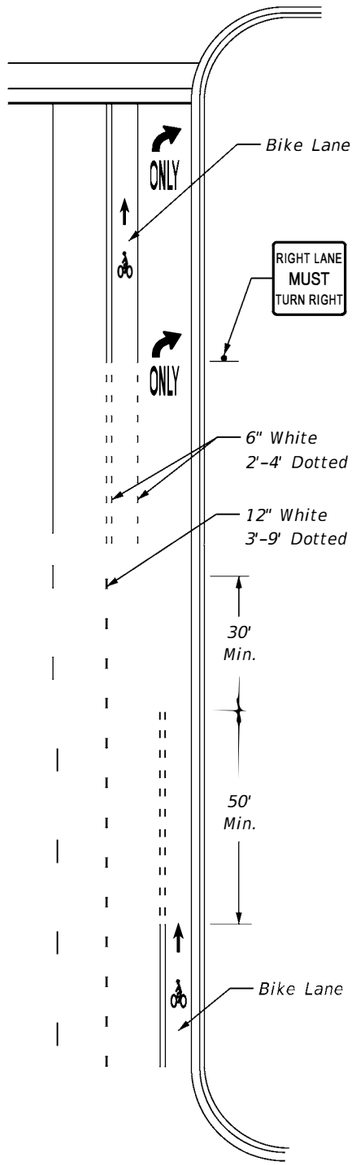
NOT TO SCALE

EXHIBIT 223-1
05/14/2019

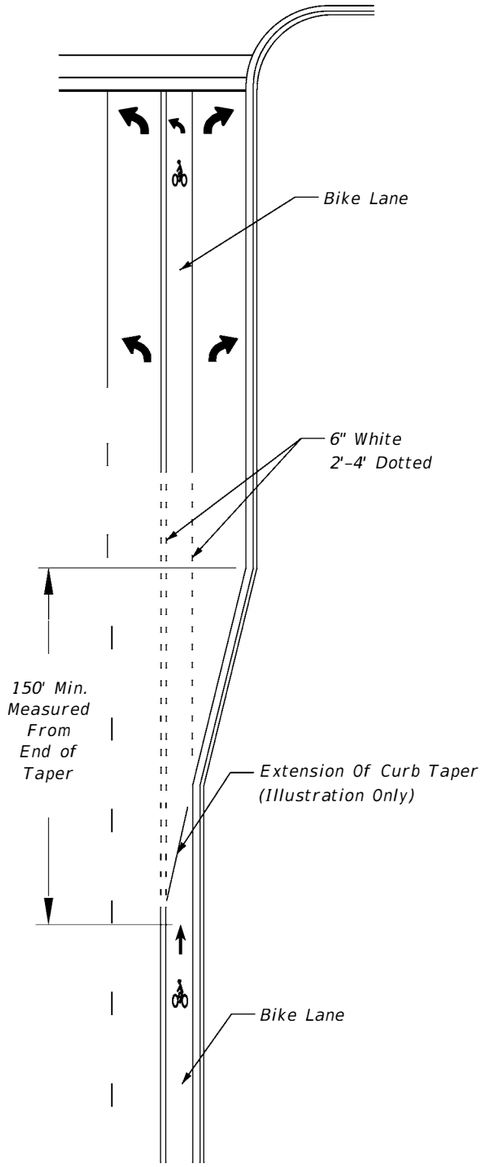
TYPICAL KEYHOLE LANES



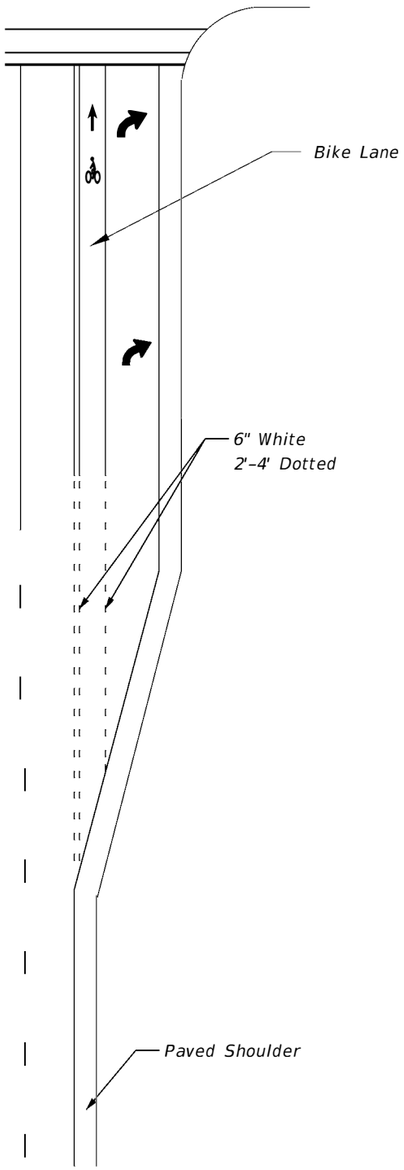
CURBED ROADWAY INTERSECTION WITH SEPARATE RIGHT TURN LANE



CURBED ROADWAY INTERSECTION WITH RIGHT TURN DROP LANE



CURBED ROADWAY "TEE" INTERSECTION WITH SEPARATE RIGHT-TURN LANE

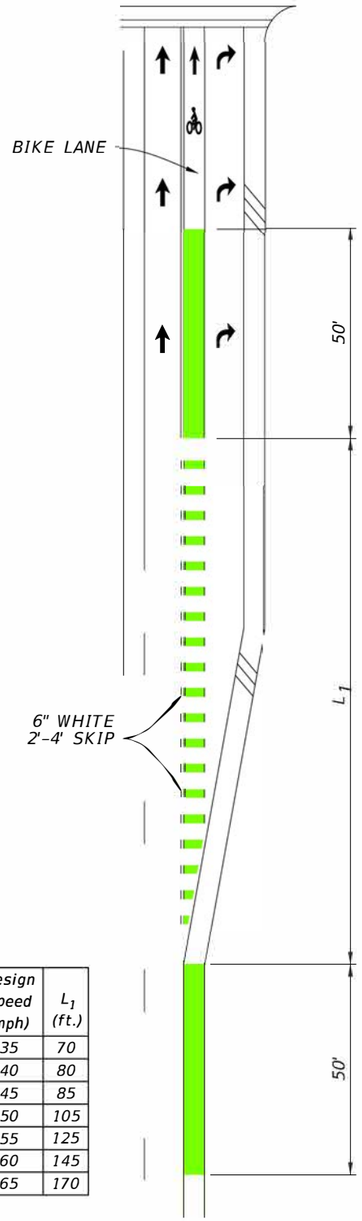


FLUSH SHOULDER ROADWAY INTERSECTION WITH SEPARATE RIGHT-TURN LANE

NOT TO SCALE

EXHIBIT 223-2
01/01/2018

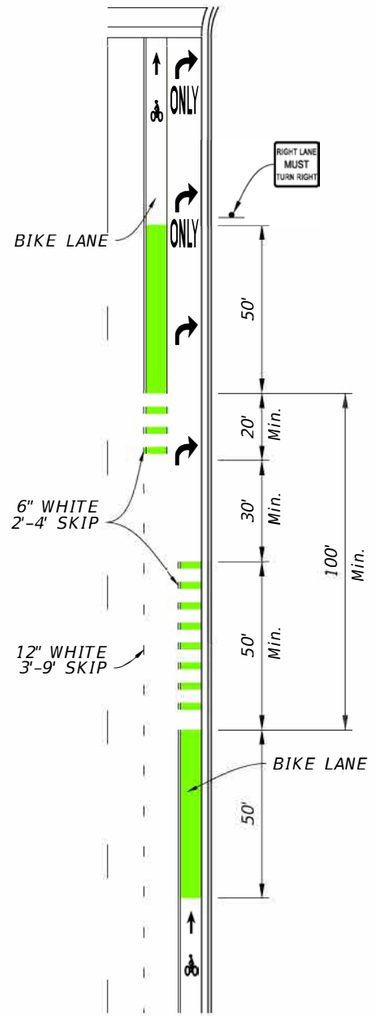
GREEN-COLORED BIKE LANES



Design Speed (mph)	L_1 (ft.)
35	70
40	80
45	85
50	105
55	125
60	145
65	170

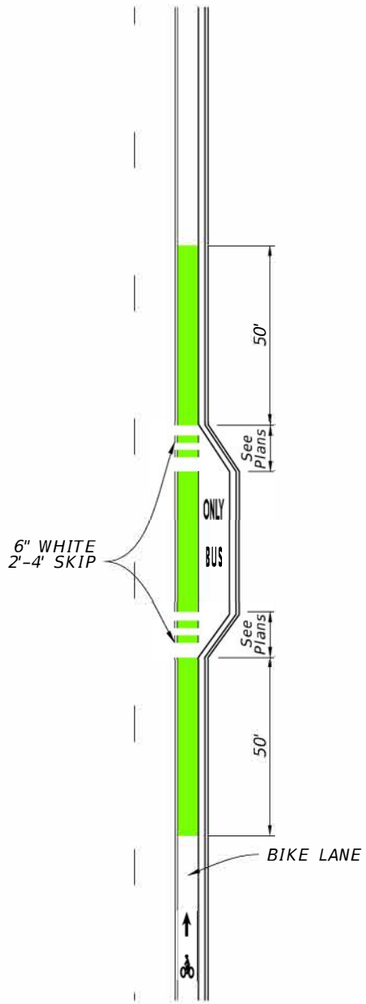
A

FLUSH SHOULDER ROADWAY
BIKE LANE WITH
SEPARATE RIGHT-TURN LANE



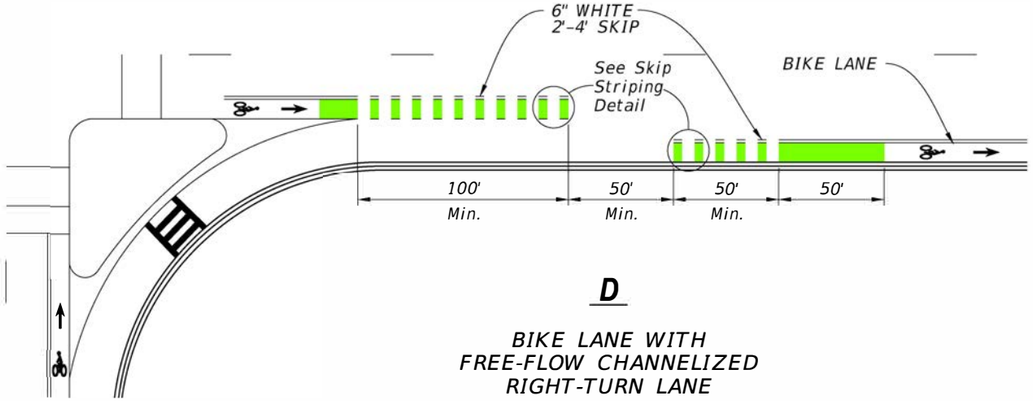
B

CURBED ROADWAY
BIKE LANE WITH
RIGHT-TURN DROP LANE



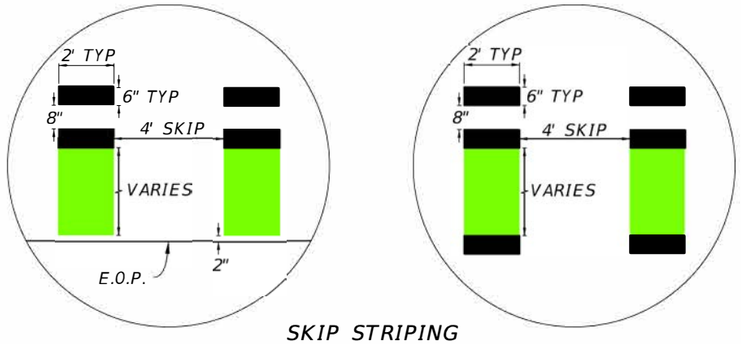
C

CURBED ROADWAY
BIKE LANE ALONG
BUS BAY

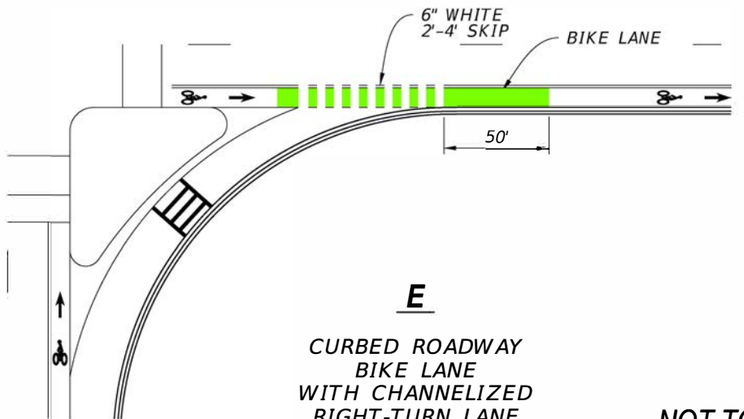


D

BIKE LANE WITH
FREE-FLOW CHANNELIZED
RIGHT-TURN LANE



SKIP STRIPING
DETAILS



E

CURBED ROADWAY
BIKE LANE
WITH CHANNELIZED
RIGHT-TURN LANE

NOT TO SCALE

Legend
Green Colored Pavement

EXHIBIT 223-3
01/01/2019

223.3 Shared Lane Markings (Sharrows)

Shared lane markings, or "Sharrows" are optional pavement markings used to indicate a shared environment for bicycles and motor vehicles. Sharrows are used where it is not practical to provide a bicycle facility, and any of the following conditions exist:

(1) The travel lane is too narrow for bicycles and motor vehicles to safely travel side-by-side.

(2) With on-street parallel parking in order to reduce the chance of a bicyclist's impacting the open door of a parked vehicle.

(3) To fill a gap in an otherwise continuous bicycle facility, generally for a short distance.

(4) As part of an approved temporary traffic control plan, see ***FDM 240***.

Streets with low traffic volumes and low traffic speeds are better suited to a travel environment where bicycle and motor vehicle traffic are mixed. Do not use Sharrows in the following conditions:

- Roadways with a posted speed greater than 35 mph
- On shared use paths
- Within a right turn lane

Place Sharrows in the center of the travel lane. This placement provides guidance to bicyclists to "command the lane" which discourages motorists from passing too closely. This placement also informs drivers that cyclists are entitled to ride in the center of the lane for their safety. To effectively convey this message, place Sharrows immediately after intersections and at a maximum spacing of 250 feet.

223.4 On-Street Parking

Roadways with on-street parking must provide room to cyclists to minimize impacts related to close proximity of parked vehicles (e.g., door zone avoidance). The following treatments are required for roadways with on-street parking:

- Parallel Parking:
    - Provide a 4-foot bicycle lane adjacent to the travel lane with a 3-foot buffer between the parallel parking lane and bike lane, per ***Exhibit 223-1***.

  - Provide a shared lane marking in place of a bicycle facility when there is less than 7 feet available for the bicycle lane and buffer.

- Angle Parking:
  - Use a shared lane marking in place of a bicycle facility.

223.5 Bicycle Parking Amenities

Appropriately-placed bicycle parking supports those who choose to use the bicycle as their mode of transportation. Bicycle parking facilities, installed and maintained by local agencies, on FDOT R/W require the approval of the District Design Engineer.

Consider the following for the placement of bicycle parking facilities:

- Facilities do not interfere with pedestrian facilities and meet lateral offset requirements
- Racks support the bicycle from two locations to prevent it from falling over
- Bicycle shelters are desirable for long-term bicycle parking and for shielding bicycles from inclement weather conditions
- Bicycle lockers can provide a secure place to store a bicycle by preventing access when closed

See ***AASHTO's 2012 Guide for the Development of Bicycle Facilities*, *Section 6.3.1*** for site-specific guidance for bicycle racks.

223.6 Bicycle Route System

Bicycle routes include roadways or shared use paths designated through signage, pavement markings or mapping. They provide directional and distance information, and aid bicyclists in wayfinding, especially in complex urban locations or along established long distance bicycle routes.

Follow the signing guidance in the ***MUTCD*, *Part 9*** when including information directing bicyclists around temporary interruptions in a route. Do not terminate bicycle routes at a barrier.

The decision whether to provide a bicycle route system should be based on the suitability of the particular roadway or shared use path for bicycle travel and the need for wayfinding

information. Evaluations of suitability should include roadway width, volume, speed, and types of traffic, parking conditions, grade, sight distance, and connectivity to services, significant destinations, and local transit or regional transportation hubs. Other considerations include location and condition of drainage grates, railroad crossings, pavement surface, signals responsive to bicycles, and maintenance schedules.

223.6.1 U.S. Bicycle Route System

The U.S. Bicycle Route (USBR) System is a network of bicycle routes that span multiple states and are of national or regional significance. These routes are nominated for national designation by State Departments of Transportation (DOTs), and designated and catalogued by the ***American Association of State Highway and Transportation Officials (AASHTO).***

The National Corridor Plan shows existing and proposed U.S. Bicycle Routes within the United States. Florida has three U.S. Bicycle Routes:

- U.S. Bicycle Route 1
- U.S. Bicycle Route 90
- U.S. Bicycle Route 15

Florida has adopted a policy entitled *U.S. Numbered Bicycle Routes, Topic No. 000-525-060-a* in support of the national route system.

See Office of Policy Planning web page for additional information on U.S. Numbered Bicycle Routes in Florida: http://www.fdot.gov/planning/policy/usbr/

223.6.1.1 Determining a U.S. Bicycle Route

The District Bicycle Pedestrian Coordinator(s), with assistance from the State Bicycle Pedestrian Coordinator, will conduct the following:

- Assess and evaluate possible routes and select the most appropriate alternative.
- Acquire written support from federal, state or local agencies that have jurisdiction over the route or surrounding area, including the following:
    - Road authorities
    - Municipal governments

- Departments of natural resources
- Tribes
- Parks and recreation
- Federal land agencies; e.g., U.S. Forest Service, Bureau of Land Management, National Park Service

- Secure letter of concurrence from adjacent state (Alabama or Georgia). When these states ask Florida for concurrence of a proposed route, the letter will be signed by the appropriate District Secretary.
- Prepare and submit the AASHTO application. Provide turn-by-turn instructions, map, state letter of concurrence, and written support from road owners. Also include discussion of economic benefits, liability and signage for the route. The application is to be signed by FDOT Secretary.

Table 223.6.1 provides criteria that can be used to evaluate route options. Route options are scored on a scale from 3 (fulfills selection criteria) to 0 (does not contribute to meeting selection criteria). "N/A" may be used when the criteria does not apply.

Table 223.6.1 U. S. Bicycle Route Criteria

Macro Criteria	3	2	1	0	NA
Within USBR corridor, with an emphasis on intrinsic scenic and cultural qualities of the corridor itself.					
Access to scenic, cultural, historical and recreational destinations. (May not be directly on route but are nearby.)					
Links major metropolitan areas to connect bicyclists to transportation hubs or major attractions.					
Reasonable direct route in connecting cities or attractions along the corridor.					
Supports natural connections between adjoining states.					
Includes or intersects existing or planned bicycle routes that are suitable for travel by touring bicycles.					
Micro Criteria	**3**	**2**	**1**	**0**	**NA**
Meets acceptable design criteria for on-road facilities and shared use paths.					
Utilizes already established and successful routes or paths					
Easy to follow with limited turns; is well marked or has easily identified permanent landmarks to enable navigation.					
Connects to at least one neighboring state's USBR, suitable roadway, bicycle route, or trail system.					
Access to food, water and overnight accommodations (including camping) at appropriate intervals (40-60 miles).					
Access to restaurants, libraries, retail shops and bicycle shops (parts and repair).					
Regularly scheduled ferry service for crossing water bodies. An alternate route should be identified when service may not be available.					
Topography is relatively easy for bicyclists; i.e., avoids extreme climbs.					
Total					