2024 FDOT Design Manual

FDM 2024
Ped/Bike Updates

Presented by:
Tanya Merkle

Lee County Bicycle and Pedestrian Advisory Committee
April 17, 2024

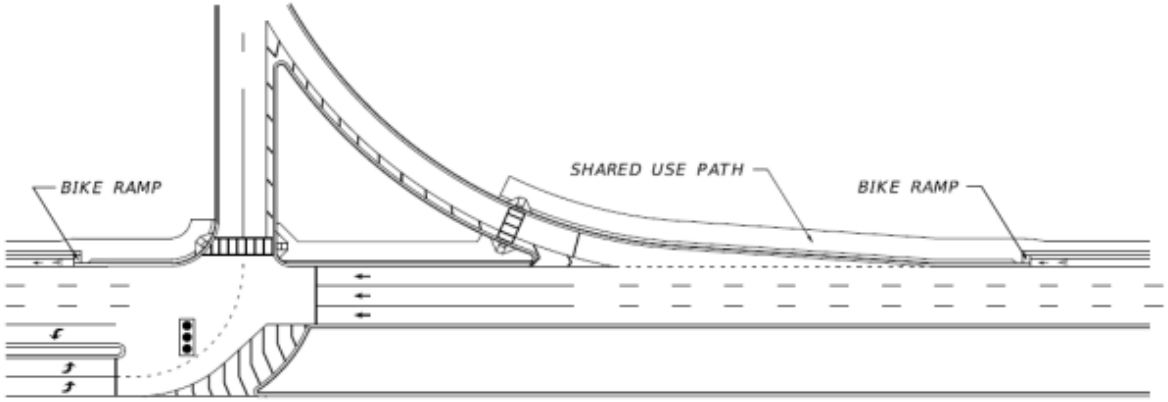
Major Changes to FDM 211 Limited Access Facilities

- **FDM 211.18 Interchange Areas Bicycle and Pedestrian Facilities**

FDM 211.18 Interchange Areas Bicycle and Pedestrian Facilities

- New Section for Bicycle and Pedestrian Facilities
- Shared Use Paths
  - Based on Research
  - New Interchanges
  - Not Required on RRR or Existing Interchanges

Figure 211.18.1 Conceptual Layout of Bicycle Ramps at Interchange Areas



Major Changes to FDM 213 Modern Roundabouts

- FDM 213.8.2 Bicycle Facilities
- FDM 213.8.3 Pedestrian Crossings
- FDM 213.10 Signing and Pavement Markings

FDM 213.8.2 Bicycle Facilities

- Relocation of Figures 213.8.1 and 213.8.2 from FDM 213 to FDM 223
- Complete Overhaul of Original Text
  - Included Text for On-Road Bicycle Facilities
  - Included Text for Physically Separated Bicycle Facilities

213.8.2 Bicycle Facilities

~~Do not carry bicycle lanes through the roundabout.~~

~~Inclusion of bicycle ramps is required for multi-lane roundabouts and is optional for single-lane roundabouts. Terminate bicycle lanes or shoulders as illustrated in ***Exhibit 213-1***.~~

~~***Figure 213.8.1*** illustrates the geometrics for a bicycle ramp when a utility strip of at least 5-feet is present. The desired angle between the ramp and the roadway ranges from 20 to 25 degrees; however, angle is not to exceed 35 degrees.~~

~~***Figure 213.8.2*** illustrates the geometrics for a bicycle ramp when sidewalk on the approach leg is adjacent to, or near the back of curb.~~

~~Place Directional Tactile Walking Surface Indicator (a.k.a., Directional Indicator) at the top of the bicycle ramp to provide a tactile cue for visually impaired pedestrians to continue down the sidewalk. Do not place detectable warning surfaces on the bicycle ramp. See Developmental Specification ***Dev528*** and Developmental Standard Plans (DSP) ***Index D528-001*** for additional requirements.~~

There are several types of on-road and physically separated bicycle facilities available to accommodate bicycle travel as discussed in ***FDM 223***. The following paragraphs outline the requirements for bicycle facilities at roundabouts.

On-road bicycle facilities: On-road bicycle facilities include bicycle lanes and paved shoulders. Terminate on-road bicycle facilities at the upstream end of the roundabout and resume them at the downstream end as shown in ***Figure 213.10.1***. Locate termination points close to the roundabout where vehicular speeds are slow. Provide physically separated bicycle facilities with bike ramps at multi-lane roundabouts. This allows cyclists the option to either use the physically separated facility to cross the intersection or enter the travel lane and use the circulatory roadway to cross. Physically separated bike facilities with bike ramps are optional for single lane roundabouts.

Physically separated bicycle facilities: Physically separated bicycle facilities include separated bike lanes, sidewalk level separated bike lanes, and shared use paths. Physically separated facilities should be continuous around the intersection, parallel to the curb line and follow the contours of the circular intersection. ***Figure 213.10.1*** shows a typical design for a separated bike lane. Details for sidewalk level separated bike lanes and shared use paths are similar.

Separation techniques for physically separated bicycle facilities are covered in ***FDM 223***.

Provide bike ramps at multi-lane roundabouts to allow cyclists on the roadway the option to use the physically separated bike facility to cross the intersection or to stay on the roadway and use the circulatory roadway to cross. Bike ramps are optional for single lane roundabouts.

Design bike ramps in accordance with ***FDM 223.2.5***.

FDM 213.8.3 Pedestrian Crossings

- Added New Subsection 213.8.3
  - Angled Crossings
  - Straight Crossings
  - Offset Crossings

213.8.3 Pedestrian Crossings

- Angled Crossings - Angled crossings are the preferred configuration because they minimize pedestrian crossing distance. When developing Angled Crossings, place each leg of the crosswalk perpendicular to the outside curb of the entry and exit lanes and locate the angle point near the center of the splitter island. (See ***Figure 213.8.1*** for angled crossings)
- Straight Crossings – Straight crossings are used when providing continuity of a major multi-use path. For Straight Crossings, place the entire crosswalk perpendicular to the centerline of the approach roadway. *(See **Figure 213.8.1*** for straight crossings)

- Offset Crossings - Offset crossings ***(Figure 213.8.2)*** are used at multi-lane roundabouts where supplemental crossing treatments such as Pedestrian Hybrid Beacons or Rectangular Rapid Flashing Beacons are proposed. When developing offset crossings, locate the approach lane crosswalk 20 feet from the outside of the ICD and the exiting lane crosswalk 50 feet from the outside of the ICD. This design is intentionally opposite the similar "Z-Crossing" found at midblock locations. The longer distance at the exit allows for a 2-car queue between the crosswalk and roundabout.

FDM 213.8.3 Pedestrian Crossings

- Added New Figures for Subsection 213.8.3
  - Figure 213.8.1 Angled and Straight Crossings
  - Figure 213.8.1 Offset Crossings

Figure 213.8.1 Angled and Straight Crossings

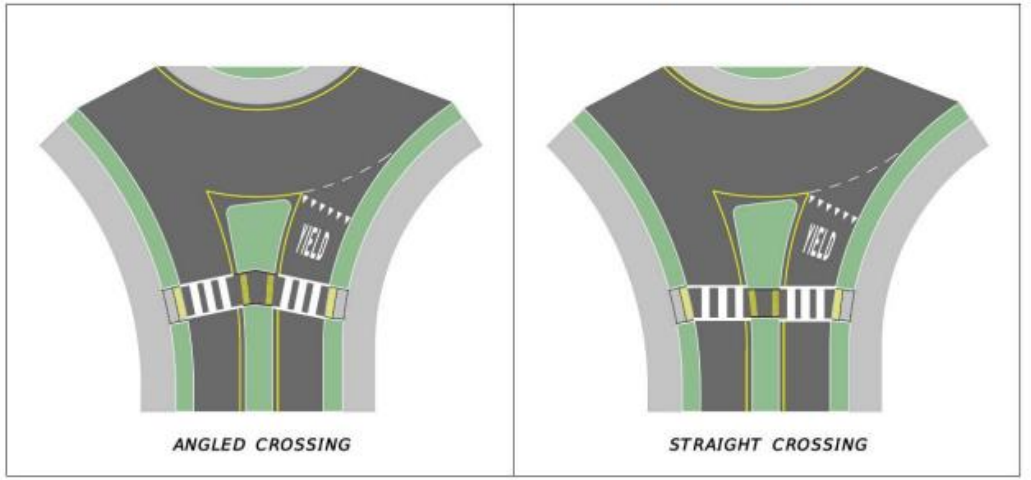
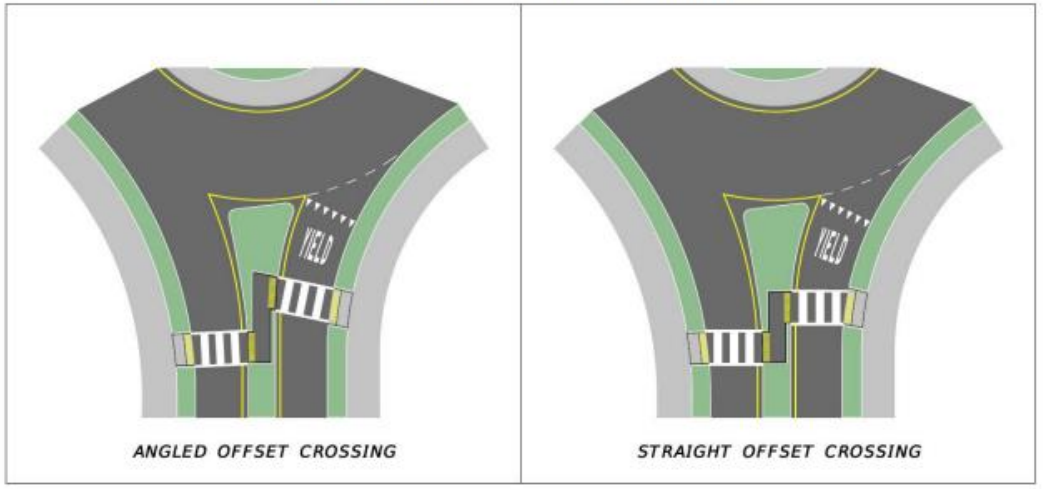


Figure 213.8.2 Offset Crossings



FDM 213.10 Signing and Pavement Markings

- **Modified Text for 213.10**
  - **Change Location of Some Text Within the Section**
  - **Text Regarding New Figure**
  - **Guidance on the Use of Green-Colored Pavement**

213.10 Signing and Pavement Markings

Well-designed signing and pavement markings will enhance safety and traffic operations by clarifying the rules of the road and proper lane assignments to drivers as they navigate through the roundabout.

Use the standard left-turn arrow with a circular dot on the left-most lane of the approach to multi-lane roundabouts as shown in ***Standard Plans, Index 711-001***. Use standard arrows within the circulatory roadway.

Follow the details presented in ***Exhibits 213-3, 213-4, 213-5, and Figure 213.10.1*** when developing roundabout signing and pavement marking plans to promote consistency throughout the state.

~~Use the standard left-turn arrow with a circular dot on the left-most lane of the approach to multi-lane roundabouts as shown in ***Standard Plans, Index 711-001***. Use standard arrows within the circulatory roadway.~~

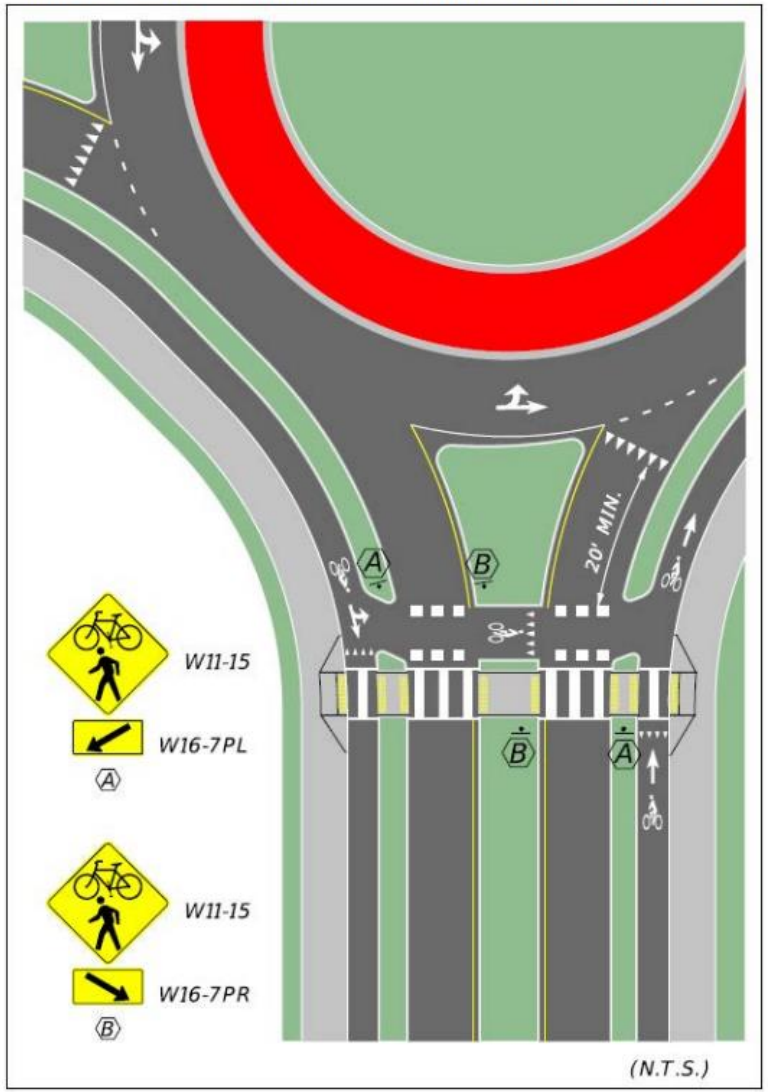
Figure 213.10.1 shows roundabout signs and pavement markings with the bicycle lane. There are options for green or no green color pavement markings depending on the location and conditions. Green-colored pavement is permitted for use with Interim Approval from FHWA. This figure also identifies features that should be included in the design of street crossings.

Additional measures may be needed to induce yielding to bicyclists and pedestrians at crossing locations of multilane roundabouts or roundabouts where exit geometry may prompt faster exiting speeds and reduced chances of yielding by motorists. Consider devices such as a Rapid Flashing Beacon or a Pedestrian Hybrid Beacon.

FDM Signing and Pavement Markings

- **Added Figure 213.10.1 Roundabout S&PM with Separated Bicycle Lane**

Figure 213.10.1 Roundabout S&PM with Separated Bicycle Lane



Major Changes to FDM 222 Pedestrian Facilities

- **FDM 222.2.1 Sidewalk**

FDM 222.2.1 Sidewalk

- **Requirement for Sidewalk in C3C Context**

Provide sidewalk on high speed curbed and flush shoulder roadways within C2T, C3C, C4, C5 or C6 context classification; and within C1, C2 or C3R where the demand for use is demonstrated.

Major Changes to FDM 223 Bicycle Facilities

- FDM 223.2 Bicycle Facilities
- FDM 223.2.1 Bicycle Lanes
- FDM 223.2.1.1 Bicycle Lane Width
- FDM 223.2.1.3 Keyhole Lanes
- FDM 223.2.4 Separated Bike Lanes
- FDM 223.2.4.1 Type of Separation
- FDM 223.2.4.2 Sidewalk Level Separated Bike Lane
- FDM 223.2.4.4 Separated Bicycle Lane Widths
- FDM 223.2.5 SBL Curb Types
- FDM 223.2.6 Bicycle Ramps
- FDM 223.5 Bicycle Parking Amenities

FDM 223.2 Bicycle Facilities

- **Added Bicycle Ramps as a Bicycle Facility**

223.2 Bicycle Facilities

A bicycle facility accommodates bicycle travel. Bicycle facilities play an important role in supporting bicycle travel.

Bicycle facilities include the following:

- Bicycle lanes
- Keyhole lanes
- Intersection Bicycle Box and Two-Stage Bicycle Turn Box
- Paved shoulders
- Shared use paths
- Separated bicycle lanes
- Bicycle ramps

FDM 223.2.1 Bicycle Lanes

- **Moved 223.2.21 Marked Shoulder Subsection to the 223.2.1 Bicycle Lanes Subsection**
  - **Modified Context Classification Allowance for Marking Paved Shoulders as Bicycle Lanes**
  - **Modified Condition 4 to Include Separated Bicycle Lanes as not being present along Corridor**

Bicycle lanes can be used on ~~curbed~~ roadways with a design speed ≤ 45 mph. However, it is best practice to consider other types of facilities for design speeds greater than 30 mph, such as a separated bicycle lane or shared use path.

Mark paved shoulders as bicycle lanes when all the following are met:

(1) Design speed ≤ 45 mph,

(2) Shoulder width ≥ 5-foot,

(3) Within C2T, C4, C5, C6, C3C context classification, or within C3R when demand is demonstrated, and

~~(1)~~(4) Shared use path or separated bicycle lanes are not present along corridor.

~~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*) is referred to as a "marked shoulder".~~

FDM 223.2.1.1 Bicycle Lane Width

- **Modified Criteria Regarding the Placement of a Bicycle Lane Adjacent to a 10 Foot Travel Lane**

For projects where a bicycle 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

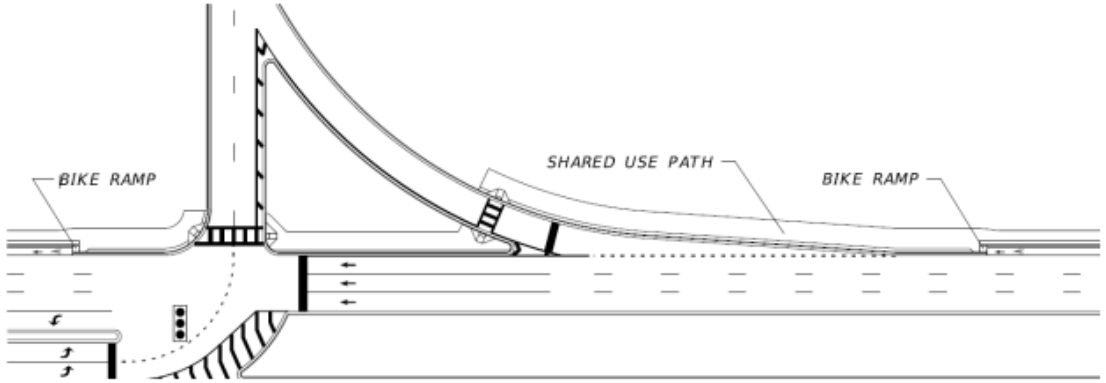
(4) 4-foot bicycle lane

Do not place a ~~4-foot~~ bicycle lane with less than 5 feet of width adjacent to a 10-foot traffic lane.

FDM 223.2.1.3 Keyhole Lanes

- **Modified Keyhole Lane Criteria**

Figure 211.18.1 Conceptual Layout of Bicycle Ramps at Interchange Areas



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, merge lane, bus bay, or parking lane.

To reduce conflicts between motorists and bicyclists, consider transitioning a bicycle lane to an adjacent separated bicycle lane, shared use path, or urban side path prior to and through the conflict area. Keyhole lanes are not required where a separated bicycle lane is provided.

Provide a keyhole lane on curbed roadways that have a bicycle lane approaching ~~the intersection~~a right-turn lane, merge lane, bus bay, or parking lane. On curbed roadways that do not have a bicycle lane approaching ~~the~~an intersection with a right-turn lane, consider providing a 17-foot right-turn lane for development of future bicycle facilities.

Provide a keyhole lane on flush shoulder roadways of any design speed where the approaching or departing paved shoulder is of at least 4 feet in width.

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.

FDM 223.2.4 Separated Bike Lanes

- **Added language to support separated bicycle lanes in advance of interchange ramps as well as other intersections and roundabouts**

223.2.4 Separated Bicycle Lanes (SBL)

Separated bicycle ~~facilities~~ lanes 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.

A separated bicycle lane may be used when all the following conditions are met:

- Minimum required combined width of the separator and separated bicycle lane can be obtained,
- Separation can be maintained between bicycle and motorized traffic through intersections, and
- Conflict points are minimal and mitigated. Cyclists should be given priority at the driveway and side street crossings.

A separated bicycle lane should be considered when street level bicycle facility transitions are needed for interchange ramp and intersection approaches. See ***FDM 223.2.6*** for criteria for transitioning between elevations and ***FDM 211.18*** for ramp crossing criteria.

FDM 223.2.4.1 Type of Separation

- **Modified language for clarification**
- **Point to the new section on curb types**

223.2.4.1 Type of Separation

Tubular markers, islands, on-street parking, and rigid barriers may be used as forms of separation for the appropriate design speeds as follows:

- 35 mph or less: Tubular markers, traffic separators, islands, rigid barriers, or on-street parking. For separated bicycle lanes adjacent to on-street parking, use an island (see ***Figure 223.2.2***).
- 40-45 mph: ~~Medianst~~Traffic separator, islands, or rigid barriers

Use curb types for separated bicycle lanes as shown in ***FDM 223.2.5***. Other forms of separation require approval from the State Roadway Design Engineer.

FDM 223.2.4.2 Sidewalk Level Separated Bike Lane

- Added Sidewalk Level Separated Bicycle Lanes as an option
- Design Criteria for widths and other design criteria including buffer between sidewalk and SBL

223.2.4.2 Sidewalk Level Separated Bicycle Lanes

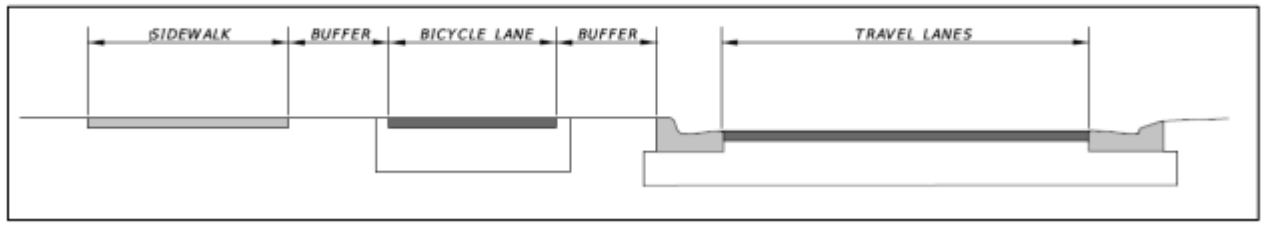
Sidewalk level separated bicycle lanes (sidewalk level SBLs), also known as raised bicycle lanes, are exclusive bicycle facilities located at sidewalk level directly adjacent to the roadway.

Use the following criteria when designing sidewalk level SBLs:

- In C2T, C4, C5, or C6 where design speed is 35 mph or less, use urban side path criteria per FDM 224 for the following elements. In other conditions, use Shared Use Path criteria for these elements.
  - Horizontal Clearance
  - Vertical Clearance
  - Design Speed
  - Horizontal Alignment
  - Separation from Roadway
  - Longitudinal Grades
  - Cross Slopes
- Follow the width criteria in ***Table 223.2.1***
- When adjacent to a sidewalk, provide a 2-foot detectable buffer (e.g. grass strip or textured pavement) between the sidewalk and separated bicycle lane. A 1-foot detectable buffer may be used in constrained conditions.

A sidewalk level bike lane does not substitute for a sidewalk, where a sidewalk is required. See ***Figure 223.2.2*** for example of a sidewalk level bike lane.

Figure 223.2.2 Example of Sidewalk Level Bicycle Lane



FDM 223.2.4.4 Separated Bicycle Lane Widths

- More Flexibility in Minimum Lane Widths of SBLs
- Accounting for curbs

Table 223.2.1 Minimum Separated Bicycle Lane Widths

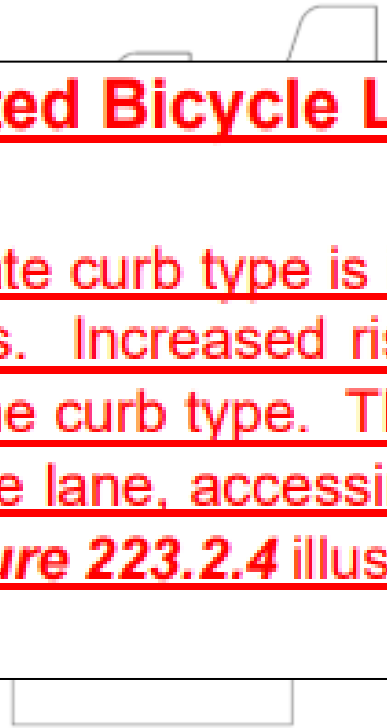
One-Way Facility	Width (feet)
Between drop curbs, types E or B curbs, at sidewalk level, or adjacent to one type F or D curb	5
Between two type F or D curbs	6
Two-Way Facility	**Width (feet)**
Between drop curbs, types E or B curbs, or at sidewalk level	8
Adjacent to one type F or D curb	9
Between two type F or D curbs	10

Notes:

(1) A continuous barrier is treated the same as a type F or D curb.

FDM 223.2.5 SBL Curb Types

Figure 223.2.4 SBL Curb Types

Curb Types	Description
 Drop Curb	cross section width that could be used for the bicycle lane or a buffer. The curbs also allow safer exit from the bicycle lane, without impeding fellow bicyclists. However, the curb can be encroached by motor vehicles and bicycles. (N.T.S)
See References: FDOT Standard Plan-Index 520-001, 520-002 FDOT Drainage Manual-Table 3.2	

223.2.5 Separated Bicycle Lane (SBL) Curb Types

Selecting the appropriate curb type is important when designing separated bicycle lanes and street buffer zones. Increased risks of bicycle wheel or pedal strikes and crashes can be influenced by the curb type. The curb angle and curb height can have an impact when exiting the bicycle lane, accessing parking, and determining risk of encroachment by motor vehicles. ***Figure 223.2.4*** illustrates and describes curb types used for separated bicycle lanes.

FDM 223.2.6 Bicycle Ramps

Figure 223.2.6 Straight Bicycle Ramp

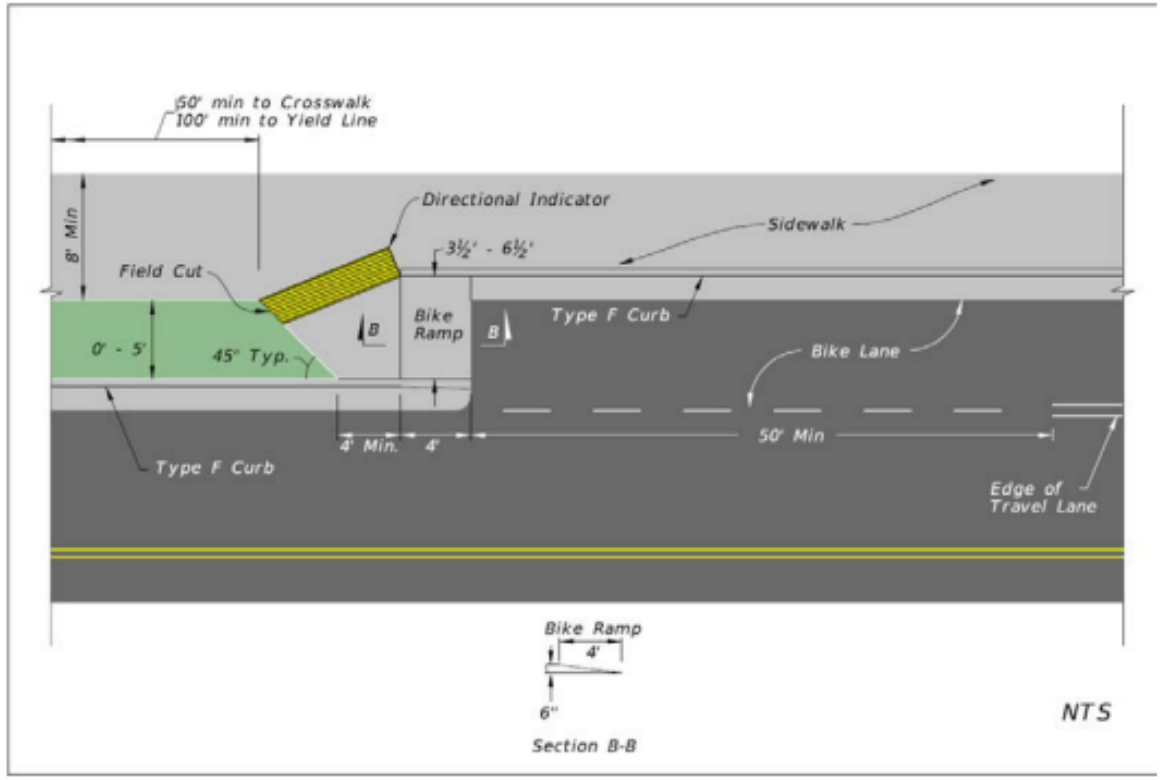
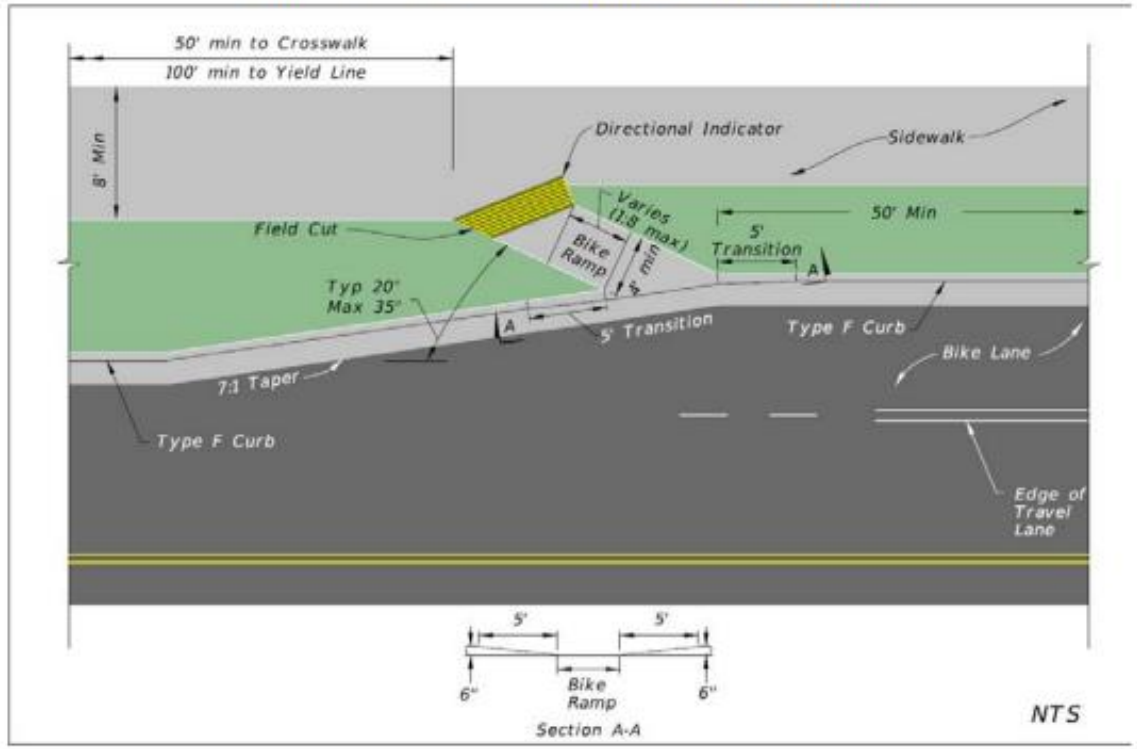


Figure 223.2.5 Angled Bicycle Ramp



not include a Directional Indicator when connecting an on-street bicycle facility to a sidewalk level SBL.

FDM 223.5 Bicycle Parking Amenities

- **Adding "Micromobility" Given the Challenges of Scooter Clutter on**

Micromobility Device

A range of small, lightweight vehicles (typically less than 36" wide and 50 lbs.) operated by users personally at speeds between 15 mph and 28 mph. Micromobility devices include, but are not limited to, electric scooters, electric skateboards, and electric pedal assisted (pedelec) bicycles.

- **Clarified lateral offset requirements**

223.5 Bicycle Parking Amenities

Appropriately placed bicycle and micromobility parking supports those who choose to use the bicycle or micromobility devices (devices) as their mode of transportation. Bicycle and micromobility parking facilities are installed and maintained by local agencies and

Consider the following:

- Shelters are desirable for long-term device parking and for shielding devices from inclement weather conditions
- Lockers can provide a secure place to store and prevent access when closed

When on-street parking is being used to create bicycle and micromobility device parking as seen in ***Figure 223.5.1*** and ***Figure 223.5.2:***

- Use only where vehicular on-street parking is also allowed per ***FDM 210.2.3***
- Parking should be flush with the bicycle lane or accessible by a mountable curb
- Vertical ground-mounted objects (i.e. tubular markers) may also be used for motor vehicle and bicycle parking separation

Figure 223.5.1 illustrates on-street bicycle parking at midblock and ***Figure 223.5.2*** illustrates on-street bicycle parking at an intersection.

FDM 223.5 Bicycle Parking Amenities

- Offset Requirement
- Spacing Between Racks
- Midblock and Intersection

- Spacing Adjacent to Cars to Allow for Entering & Exiting
- Separation from Parked Cars
- Parking Accessible to Bike Facility

Figure 223.5.2 On-Street Bicycle Parking (Intersection)

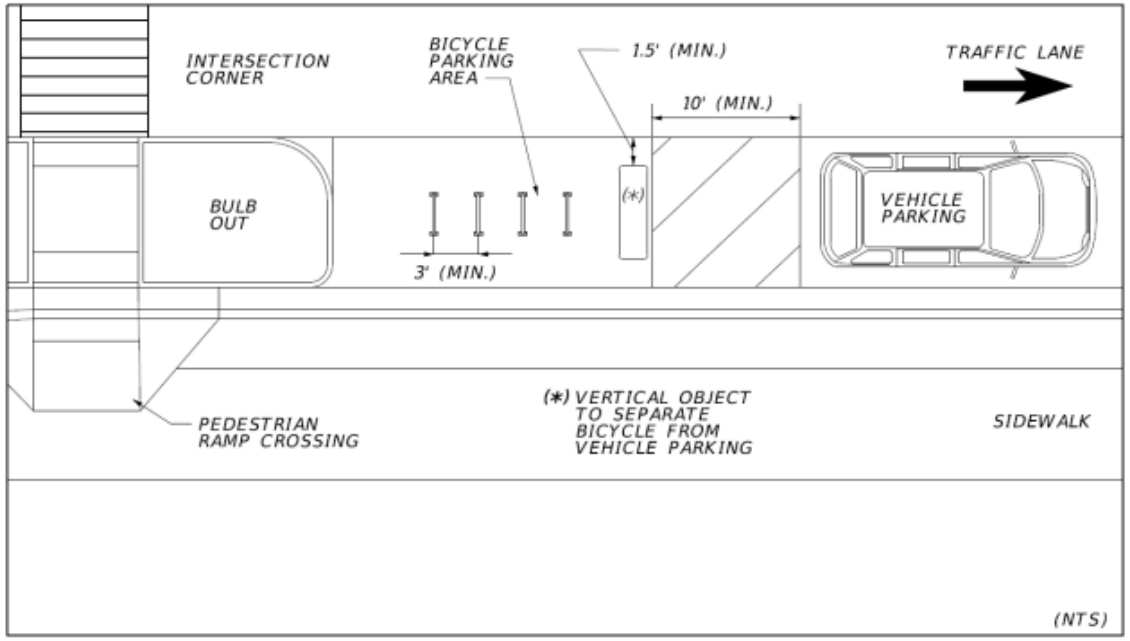
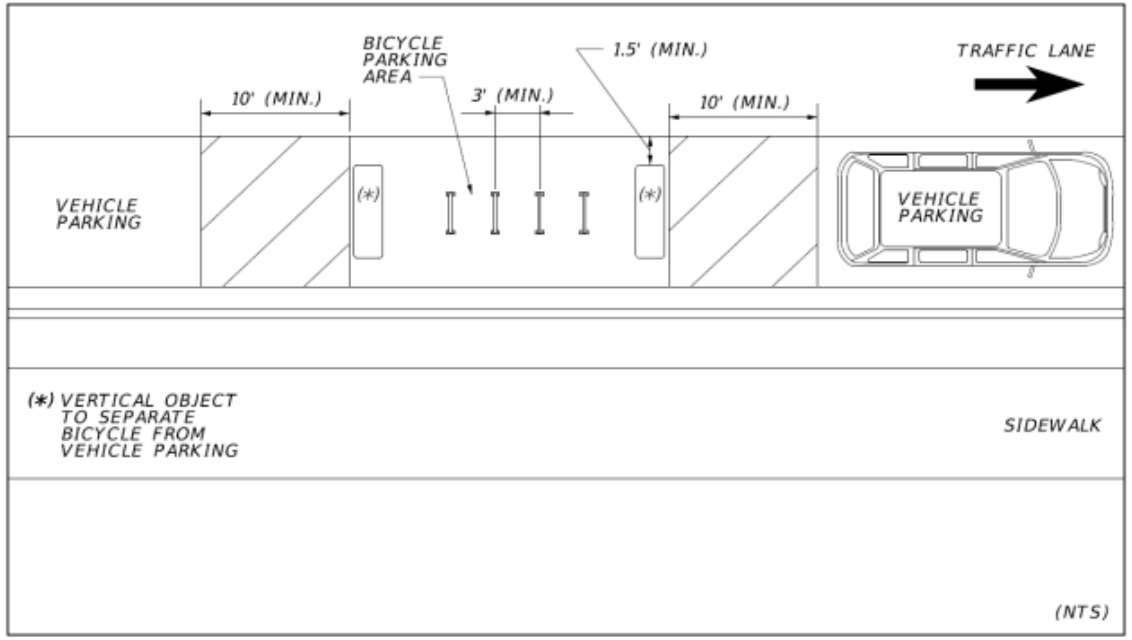


Figure 223.5.1 On-Street Bicycle Parking (Midblock)



Major Changes to FDM 224 Shared Use Paths

- FDM 224.4.1 Tunnel and Bridge Width
- FDM 224.7 Horizontal Clearance

FDM 224.4.1 Tunnel and Bridge Width

- **Added Needed Clarification of Criteria on Vehicular Bridges**

224.4.1 Tunnel and Bridge Widths

Clear width for tunnels is the width of the shared use path plus four feet. The geometrics and lighting requirements should be discussed with the Department Project Manager and the District Pedestrian/Bicycle Coordinator.

Clear width for standalone pedestrian & bicycle Bridges can be found in ***FDM 266.3***.

Clear width for shared use paths on vehicular bridges is the width of the approach facility plus four feet (2-foot wide on each side). The minimum clear width is 12 feet under constrained conditions.

FDM 224.7 Horizontal Clearance

- **Language supports the changes in FDM 224. 4.1**

224.7 Horizontal Clearance

Provide a 4-foot clear area adjacent to both sides of the path, including placement of signs. Maintain a 2-foot-wide graded area with a maximum 1:6 slope adjacent to both sides of the path. For restricted conditions, bridge abutments, sign columns, fencing and railing may be located within 4 feet of the edge of pavement.

For Urban Side Paths, the following criteria reflect the lower design speed. Provide a minimum 2-foot buffer area adjacent to both sides of the path, including placement of signs. Signs, plantings, or other items must be located outside of the 2-foot buffer. Maintain a graded area with a maximum 1:6 slope adjacent to both sides of the path within the 2-foot minimum buffer area.

Horizontal clearance on standalone pedestrian & bicycle bridges, shared use paths alongside or on vehicular bridges, and tunnels is accounted for in the required clear widths as described in ***FDM 224.4.1***.

FDOT

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