223 Bicycle Facilities

223.1 General

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

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

For RRR projects coordinate with the District Pedestrian/Bicycle Coordinator, the District Modal Development Office, and, as needed, the District Safety Engineer and/or District Safety Administrator when deficiencies in bicycle facilities are identified during the field review or project development.

223.1.1 Statutory Requirements

Section 335.065, F.S. (Bicycle and pedestrian ways along state roads and transportation facilities) establishes the following requirements for providing a bicycle way:

"(1) (a) *Bicycle and pedestrian ways shall be given full consideration in the planning and development of transportation facilities, including the incorporation of such ways into state, regional, and local transportation plans and programs. Bicycle and pedestrian ways shall be established in conjunction with the construction, reconstruction, or other change of any state transportation facility, and special emphasis shall be given to projects in or within 1 mile of an urban area.*

(b) *Notwithstanding the provisions of paragraph (a), bicycle and pedestrian ways are not required to be established:*

i. *Where their establishment would be contrary to public safety;*

ii. *When the cost would be excessively disproportionate to the need or probable use;*

iii. *Where other available means or factors indicate an absence of need.*"

When considering "*other available means*" in accordance with ***Section 335.065 (1)(b)(3), F.S.***, an alternate route or facility to serve cyclists should:

- Meet the design criteria for bicycle and pedestrian facilities on state roadways.

- Provide access to the same services, origination and destination sites, and transit connections as the project corridor.
- Avoid creating a significant increase in:
    - Travel time,
    - Trip length,
    - Exposure to motorized vehicular traffic, or
    - Substantial elevation changes.
- Provide appropriate locations to cross limited access, arterial or collector roadways, or rail corridors. A bicyclist should experience similar control types and delay as would be experienced if the bicycle facility was on the state roadway.

Bicycle facilities that meet ***Section 335.065, F.S.*** are shown in ***Table 223.1.1*****.**

Table 223.1.1 Bicycle Facility Assignment to Meet 335.065 F.S.

Context Classification	Design Speed (mph)	Bicycle Facility					
		Paved Shoulder[2]	Bike Lane[2]	Separated Bike Lane[2]	*SLS Bike Lane[2]	Shared Use Path[3]	Urban Side Path[3]
C6, C5, C4	25-35	X	X	X[1]	X	X[1]	X
C4	40-45	X	X	X[1]	X	X[1]	
C3C, C3R	35	X	X	X[1]		X[1]	
	40-45	X	X	X[1]		X[1]	
	50-55	X				X	
C2T	35	X	X	X	X		X
	40-45	X	X	X	X	X	
C1, C2	55-70	X				X	

Notes:

(1) For new and reconstruction projects with a design speed of 35 MPH or greater and C3C or C4 context classification provide a shared use path or separated bicycle lane on multilane or two-way left turn lane roadways.

(2) See ***FDM 223.2*** for requirements.

(3) See ***FDM 224*** for requirements.

*SLS Bike Lane = Sidewalk Level Separated Bicycle Lane

223.1.2 General Considerations for Bicycle Facility Design

Bicycle facility safety can be optimized through the following guidance:

(1) Maintaining a smooth, clean riding surface, free of obstructions.

(a) This includes ensuring drainage inlets and utility covers that cannot be moved out of the bicycle traveled way are flush with grade, well seated, and use bicycle-compatible inlets, grates and covers. See ***Standard Plans Index*** and the ***Drainage Manual*** for drainage inlet and utility covers to ensure compatibility with bicycles.

(b) Consider working with the Maintenance Office to ensure capabilities exist for sweeping the bicycle facility and that sweeping occurs at an appropriate interval.

(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. See ***FDM 231*** for lighting criteria.

(4) Developing and maintaining a district bicycle facility plan to assign proposed bicycle facility types through a consistent and efficient process and ensure the following:

(a) Integration of FDOT bicycle facilities with local and regional bicycle transportation systems.

(b) The installation of more complex facility types in a cost-effective and efficient manner.

(5) For more design guidance regarding bicycle facilities on arterials and collectors, refer to the ***FHWA Separated Bike Lane Planning and Design Guide*** and the ***AASHTO Guide for the Development of Bicycle Facilities (AASHTO Bike Guide)***.

223.1.3 Project Controls for Bicycle Facilities

FDM 110.4 Project Design Controls and Standards requires selection of appropriate project design controls and standards, including design vehicle and design speed, among others. Bicycle facility projects have corollary controls and standards that should be considered when selecting and designing a bicycle facility type, which include:

- Design User
- Design Speed

223.1.3.1 Design User

The ***AASHTO Bike Guide*** identifies four design user profiles based on the confidence and ability of the cyclist. The Design User Types and their general characteristics are as follows:

Type 1 - Non-Bicyclist: This Design User has no interest in cycling or is physically unable to bicycle. May include other Design User Types who are choosing not to bicycle.

Type 2 - Interested but Concerned: Able to ride and will use separated facilities. Uncomfortable with bicycle lanes and will not ride in traffic or mixed lanes. Likely to ride on the sidewalk, even if a bicycle lane is provided. Represents an estimated 51-56% of the population, including most children. May include Type 3 or Type 4 Design Users who have chosen not to ride in traffic for various reasons (common reasons include carrying children, hauling groceries or cargo, or feeling unsafe with traffic volumes or speeds.)

Type 3 - Somewhat Confident: Prefers separated facilities, but will use bicycle lanes or paved shoulders on Low and Very Low Speed roadways. Represents an estimated 5-9% of the population, but may represent a much larger proportion of bicyclists, including many commuters and people who bicycle for primary transportation.

Type 4 - Highly Confident: Comfortable riding in traffic, bicycle lanes, or on paved shoulders, regardless of traffic speed. Will control and ride in travel lane if a bicycle facility is not provided. May avoid separated facilities if poorly designed, poorly maintained, or too crowded to allow sufficient bicycle speed. Represents an estimated 4-7% of the population but may represent a larger percentage of cyclists.

The Design User may be provided as part of project scoping or through a bicycle facilities plan or can be assigned based on context classification as shown in ***Table 223.1.2***. Design the bicycle facility to be consistent with the Design User, recognizing the Design User may be different in different parts of a project, particularly where the context classification changes. Include documentation in the project file when a Design User different from ***Table 223.1.2*** is selected.

Table 223.1.2 Default Assignment of Design Users

Context Classification	Design User Type
C6, C5, C4, C2T	Type 2, Type 3
C3C and C3R	Type 3, Type 4
C1 and C2	Type 4

223.1.3.2 Design Speed

Select the design speed appropriate to the type of bicycle facility.

On-Street Bicycle Facilities - Buffered Bicycle Lanes, Bicycle Lanes, and Paved Shoulders: The design speed is the design speed of the roadway.

Separated Bicycle Facilities - Separated Bicycle Lanes and Sidewalk Level Separated Bicycle Lanes: The design speed is 10 mph. Avoid designing facilities to support or encourage higher speeds, when possible, to manage the speed differential with pedestrians and account for the reduced operating space, frequent stops, and heightened vigilance required on these types of facilities.

Design speeds for Shared Use Paths and Urban Shared Use Paths are found in ***FDM 224***.

Sidewalks do not have a design speed and therefore are not considered bicycle facilities.

223.2 Longitudinal Bicycle Facilities

A longitudinal bicycle facility accommodates bicycle travel along a roadway facility. Bicycle facilities play an important role in supporting bicycle travel.

Longitudinal bicycle facilities include the following:

- Paved shoulders
- Bicycle lanes
- Separated bicycle lanes
- Sidewalk level separated bicycle lanes
- Shared use paths/urban side paths
- Shared lane markings (Sharrow)

223.2.1 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 differs from a bicycle lane as it lacks pavement markings designating the space for exclusive use by bicycles.

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. See ***FDM 223.2.2*** for bicycle lane criteria on flush shoulder roadways.

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 Bicycle Lanes

When bicycle lanes are selected as the longitudinal bicycle facility use the design criteria in this section.

Bicycle lanes are a portion of a roadway designated for the exclusive use of bicyclists. Bicycle lanes give bicyclists exclusive use of that lane, encourages regular maintenance, and encourages driver awareness of bicyclist in the roadway. Bicycle lanes are designated by bicycle symbol and bicycle lane arrow pavement markings in accordance with ***Standard Plans, Index 711-002*** and the ***MUTCD***, and illustrated in ***Exhibits 223-1*** through ***223-3***. See ***FDM 223.5*** for bicycle lane pavement markings and signage.

Bicycle lanes are one-way facilities that carry bicycle traffic in the same direction as the adjacent motor vehicle traffic. Bicycle lanes that carry bicycle traffic in the opposite direction as the adjacent motor vehicle traffic (contra-flow bicycle lanes) may be used with coordination of the State Bicycle Pedestrian Coordinator.

For design speeds > 30 mph, it is best practice to consider separation of bicyclists from motor vehicles, e.g. separated bicycle lane, sidewalk level separated bicycle lanes, urban side paths, or shared use paths.

On one-way streets, bicycle lanes should typically be placed on the right side of the street. Bicycle lanes on the left side of the street may be considered to reduce conflicts with frequent bus traffic, heavy right-turn movements, high-turnover parking lanes, or if there are a significant number of left-turning bicyclists.

Bicycle lanes may be provided on curb and gutter roadways when all of the following criteria are met:

(1) Design speeds ≤ 45 mph.

(2) A shared use path, urban side path, or separated bicycle lanes are not present along the corridor.

Bicycle lanes may be provided on flush shoulder roadways when all the following are met:

(1) Design speed ≤ 45 mph,

(2) Shoulder width ≥ 5 feet (≥ 4 feet on RRR projects),

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

(4) Shared use paths or separated bicycle lanes are not present along the corridor.

223.2.2.1 Bicycle Lane Width

The width of the bicycle lane is measured from the edge of travel lane to the edge of pavement.

A buffered bicycle lane has a double 6-in white edge line or “buffer” separating the bicycle lane and the adjacent travel lane. When adjacent to a parallel parking lane, use a single 6-in white line between the bicycle lane and adjacent travel lane, and make the buffer 3 feet wide between the bicycle lane and the parking lane.

Buffered bicycle lanes are depicted in ***Exhibit 223-1***.

For new construction projects when a bicycle lane has been selected as the bicycle facility provide a 7-ft buffered bicycle lane.

For retrofit projects where a bicycle lane has been selected as the bicycle facility the width of the bicycle lane depends on the width of the available roadway pavement. The options in the order of priority are:

(1) 7-ft buffered bicycle lane

(2) 6-ft buffered bicycle lane

(3) 5-ft bicycle lane

(4) 4-ft bicycle lane

FDM 210 provides a range of travel lane widths to minimize the impact on right of way demand and accommodate a buffered bicycle lane or bicycle lane. If additional width is available beyond what is required for the 7-ft buffered bicycle lane, consider using a separated bicycle lane instead. Otherwise, apply the additional width to the outside travel lane.

Bicycle lanes adjacent to 10-ft travel lanes must be at least 5 feet in width.

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.

223.2.3 Separated Bicycle Lanes (SBL)

Separated bicycle lanes are one-way or two-way bicycle lanes that are adjacent to and physically separated from the vehicular travel lane with a vertical design element. Bicyclists in these facilities are separated from vehicular traffic.

When separated bicycle lanes have been selected as the longitudinal bicycle facility, use the design criteria in this section.

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 driveways and side street crossings.

See bicycle ramp criteria in ***FDM 223.3.1*** for criteria for transitioning between elevations and ***FDM 211.18*** for ramp crossing criteria.

Use the criteria contained in ***FDM 223.2.4*** in conjunction with guidance from the ***FHWA Separated Bike Lane Planning and Design Guide*** to plan and design separated bicycle lanes on the State Highway System.

223.2.3.1 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 in ***Table 223.2.1***.

Table 223.2.1 Types of Separation by Design Speed

Separation Type	Design Speed: ≤35 MPH	Design Speed: 40-45 MPH
Tubular Markers	✓	
Islands	✓	✓
Traffic Separators	✓	✓
On-Street Parking	✓	
Rigid Barriers	✓	✓
Raised Buffer	✓	

Parking separation should be combined with another separator, such as islands or tubular markers, to prevent vehicles from parking within the bicycle lane.

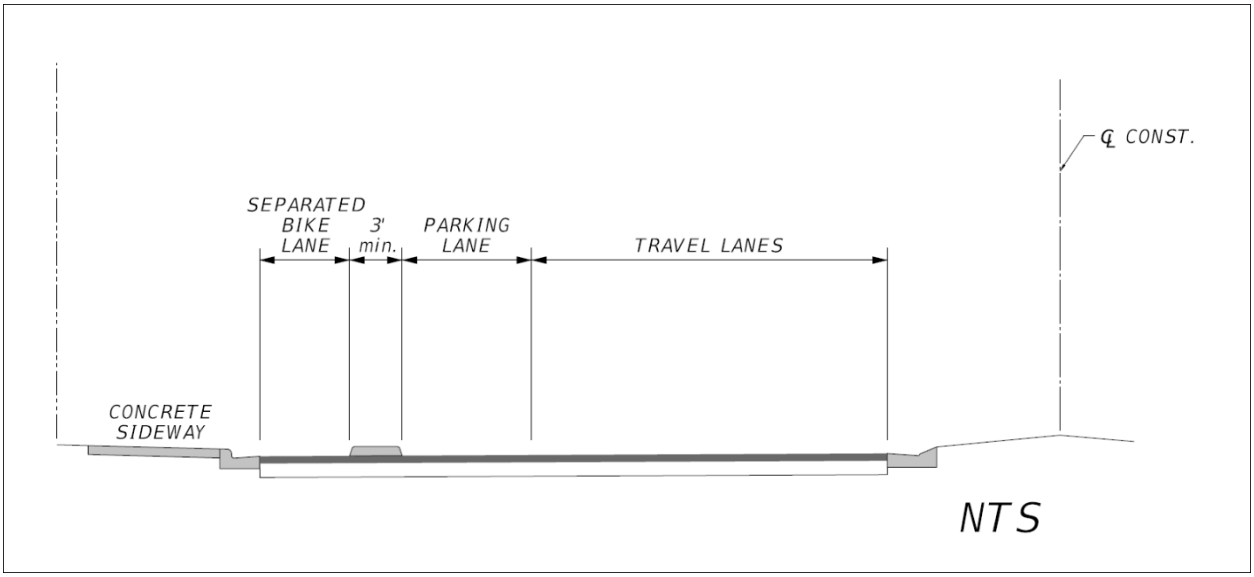
Use curb types for separated bicycle lanes as shown in ***Figure 223.2.2***. Other forms of separation require approval from the State Roadway Design Engineer.

223.2.3.2 Separated Bicycle Lane Width of Separation

The widths of separation are as follows:

- 3 feet minimum if adjacent to on-street parking. See ***Figure 223.2.3*** for more information.
- If adjacent to travel lanes:
  - 35 mph or less: 6 feet preferred, 3 feet minimum (unless using tubular markers or islands, then 2 feet minimum).
  - 40 to 45 mph: 8 feet preferred, 3 feet minimum.

Figure 223.2.1 On-Street Parking Minimal Separation



223.2.3.3 Separated Bicycle Lane Widths

Use wider lanes where higher volumes are expected.

The preferred lane width for one-way separated bicycle facilities is 7 feet. For two-way facilities, the preferred lane width is 12 feet.

Use the following minimum separated bicycle lane widths in ***Table 223.2.2*** along one-way and two-way separated bicycle lane facilities under constrained conditions:

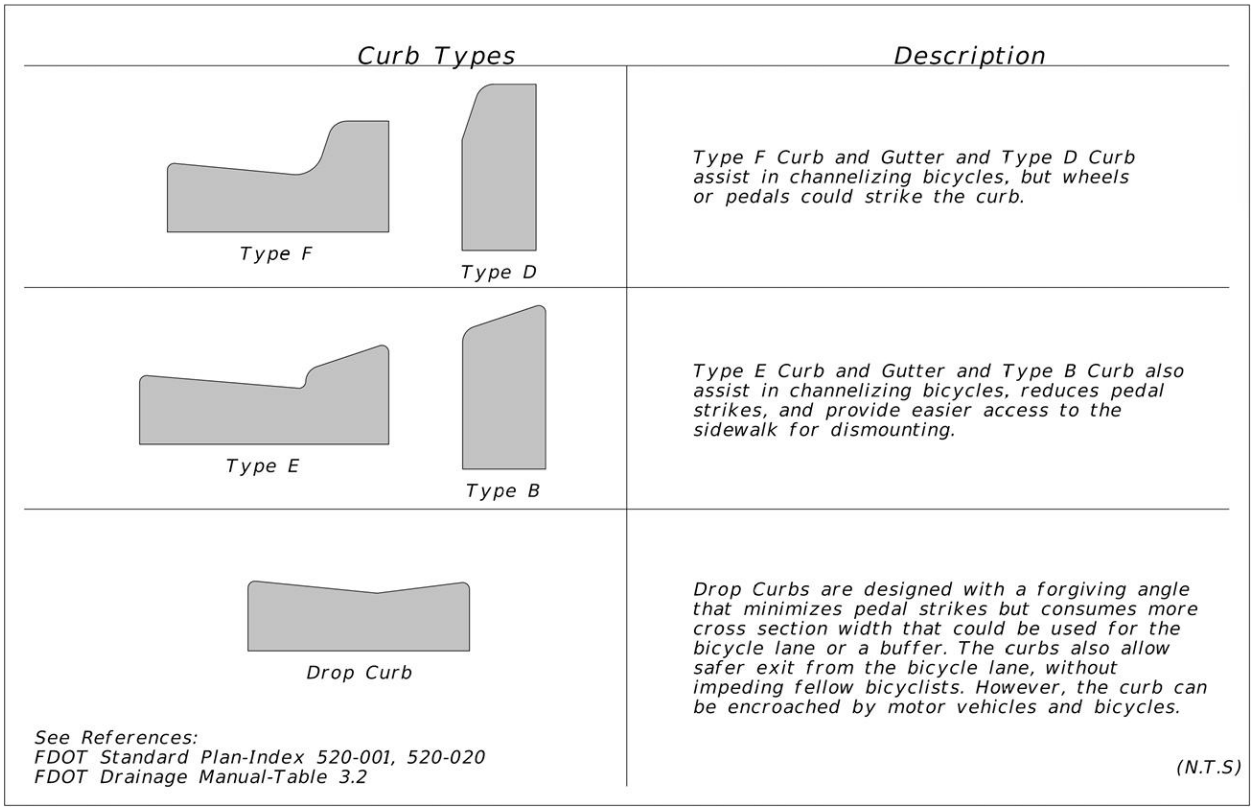
Table 223.2.2 Minimum Separated Bicycle Lane Widths

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.	

223.2.3.4 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 223.2.2*** illustrates and describes curb types used for separated bicycle lanes.

Figure 223.2.2 SBL Curb Types



223.2.3.5 Intersections and Driveways

Maintain separation between bicycles and motorized vehicular traffic through intersections (e.g., do not use mixing zones and keyhole lanes).

Minimize turning conflicts through access management. Cyclists should have priority at the driveway and side street crossings that remain.

Guidance contained in Chapter 5 of the ***FHWA Separated Bike Lane Planning and Design Guide*** includes typical designs to address the following:

- Facility connections at intersections,
- Side streets and driveways, and
- Traffic operation tools such as bicycle signal faces and signal phasing.

223.2.4 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 adjacent to the roadway.

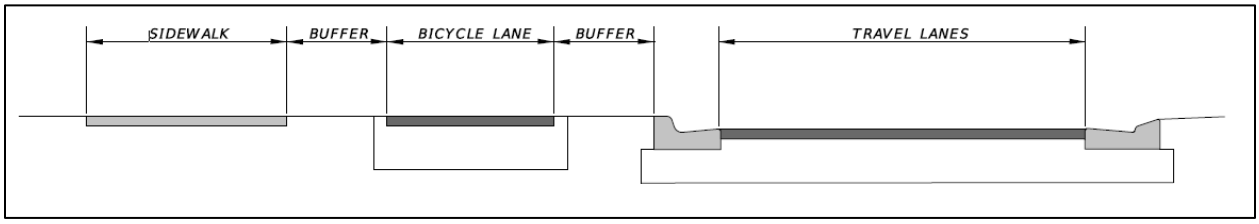
When sidewalk level separated bicycle lanes have been selected as the longitudinal bicycle facility, use the design criteria in this section.

Use the following criteria when designing sidewalk level SBLs:

- In C2T, C4, C5, or C6 context classifications where the design speed is 35 mph or less, use urban side path criteria per FDM 224 for the following elements. In C3C, C3R, and C4 context classifications where design speed is 40 mph or greater, use shared use path criteria for these elements.
    - Horizontal Clearance
    - Vertical Clearance
    - Design Speed
    - Horizontal Alignment
    - Separation from Roadway
    - Longitudinal Grades
    - Cross Slopes
- Width
    - A One-Way facility should have a minimum width of 5 feet. The preferred width is 7 feet.
    - A Two-Way facility should have a minimum width of 8 feet. The preferred width is 12 feet.
    - Wider separated facilities are allowable and improve passing, side-by-side riding, and cargo bike accessibility.
- When adjacent to a sidewalk, provide a 2-ft detectable buffer (e.g. grass strip or textured pavement) between the sidewalk and separated bicycle lane. A 1-ft detectable buffer may be used in constrained conditions. The detectable buffer should be designed to be detectable by a cane or under foot and distinct from truncated domes (e.g. grass strip, textured pavement, raised delineator, or tactile strip).

A sidewalk level bicycle lane does not substitute for a sidewalk where a sidewalk is required. See ***Figure 223.2.3*** for an example of a sidewalk level bicycle lane.

Figure 223.2.3 Example of Sidewalk Level Bicycle Lane



223.2.5 Shared Use Paths and Urban Side Paths

When a shared use path or urban side path has been selected as a longitudinal bicycle facility, use the design criteria in this section and ***FDM 224***.

A shared use path or urban side path may substitute for a bicycle lane and serve as the bicycle facility.

A shared use path may serve as a two-way bicycle facility when all the following conditions are met:

- Roadway design speed is ≥ 35 mph,
- Context classification of C1, C2, C3, or C4,
- Separation can be maintained between bicycle and motorized vehicular traffic through intersections, and
- Conflict points are minimal and mitigated.

An urban side path, which is a category of shared used path, may serve as a two-way bicycle facility when all the following conditions are met:

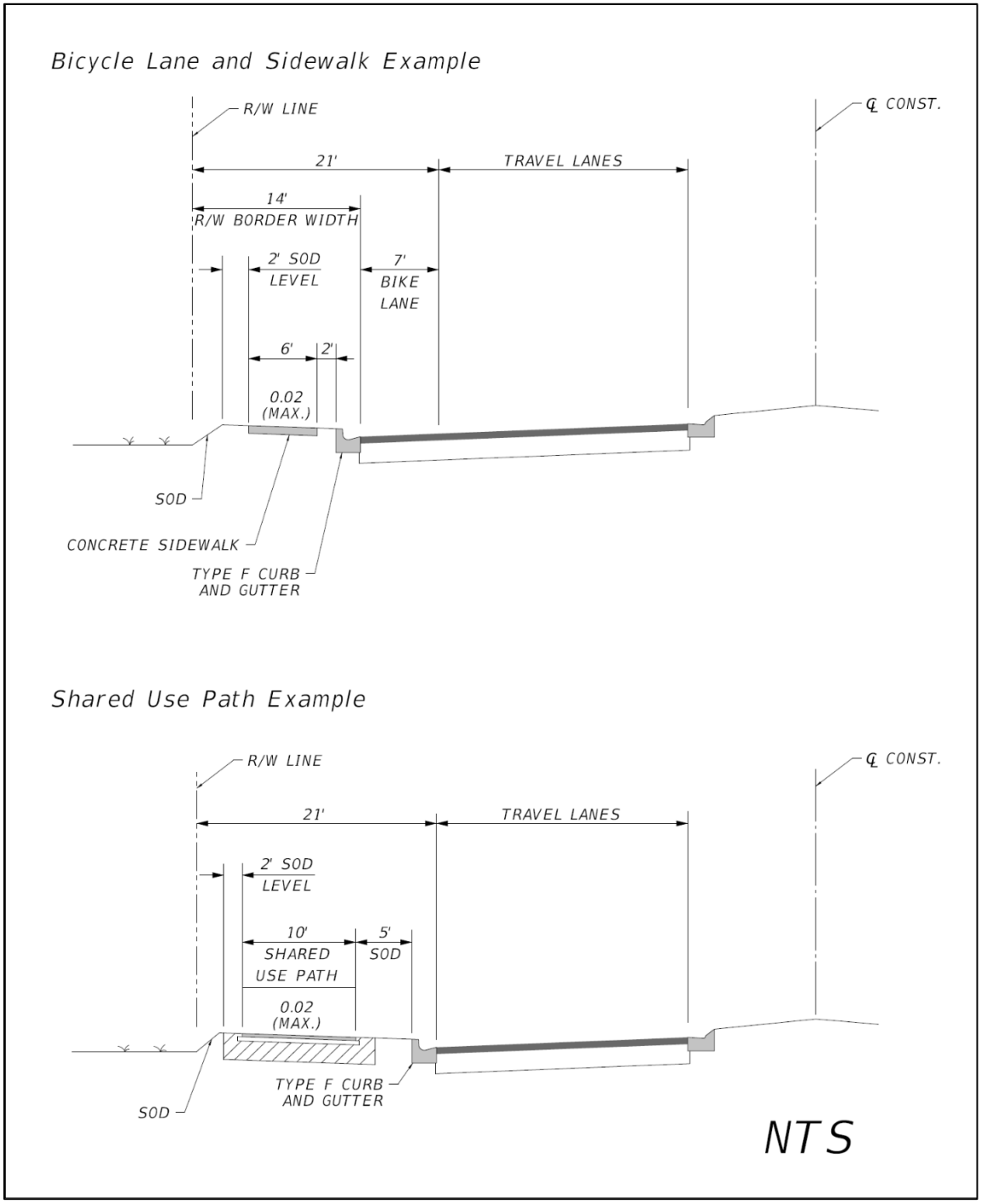
- Roadway design speed is ≤ 35 mph,
- Context Classification of C2T, C4, C5, and C6, and
- The adjacent roadway is curbed.

Process a Design Variation for signs placed within the path horizontal and vertical clearance envelope (see ***FDM 224.7*** and ***FDM 224.8***) or roadway lateral offset (see ***FDM 215*** and ***Standard Plans***).

As shown in ***Figure 223.2.4***, in some cases it may be possible to fit a shared use path into the same space required for a sidewalk and buffered bicycle lane. In other cases, additional width may be required. It is preferable to plan for shared use paths and separated bicycle lanes ahead of time by reflecting them in a district bicycle facility plan.

See ***FDM 224*** for shared use path design criteria.

Figure 223.2.4 Bicycle Lane and Shared Use Path Examples



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

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

(3) 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 support mixed bicycle and motor vehicle traffic. Sharrows may be used in the above conditions if all the following criteria are met:

- Roadway posted speed is ≤ 35 mph
- Roadway Annual Average Daily Traffic (AADT) is below 6,000.

Consider alternative bicycle routes or alternative bicycle facility types before placing shared lane markings. Design Variations require the approval of the State Bicycle and Pedestrian Coordinator.

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. Refer to ***MUTCD Section 9E.09*** when considering the use of sharrows within a right-turn lane.

223.3 Intersection and Transitional Bicycle Facilities

When designing a bicycle facility, access through an intersection and between facilities must be provided. Follow the guidance in this section for design criteria for intersections and transitional facilities.

223.3.1 Bicycle Ramps

Use bicycle ramps when connecting on-street bicycle facilities to sidewalk level SBLs or shared use paths on curbed roadways.

Figure 223.3.1 depicts 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 (not to exceed 35 degrees).

Figure 223.3.2 depicts the geometrics for a bicycle ramp when the sidewalk on the approach leg is adjacent to or near the back of curb.

See ***FDM 211*** for placing bicycle ramps at interchanges.

See ***FDM 213*** for placing bicycle ramps at roundabouts.

Place a 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 or shared use path. 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. Do not include a Directional Indicator when connecting an on-street bicycle facility to a sidewalk level SBL.

Figure 223.3.1 Angled Bicycle Ramp

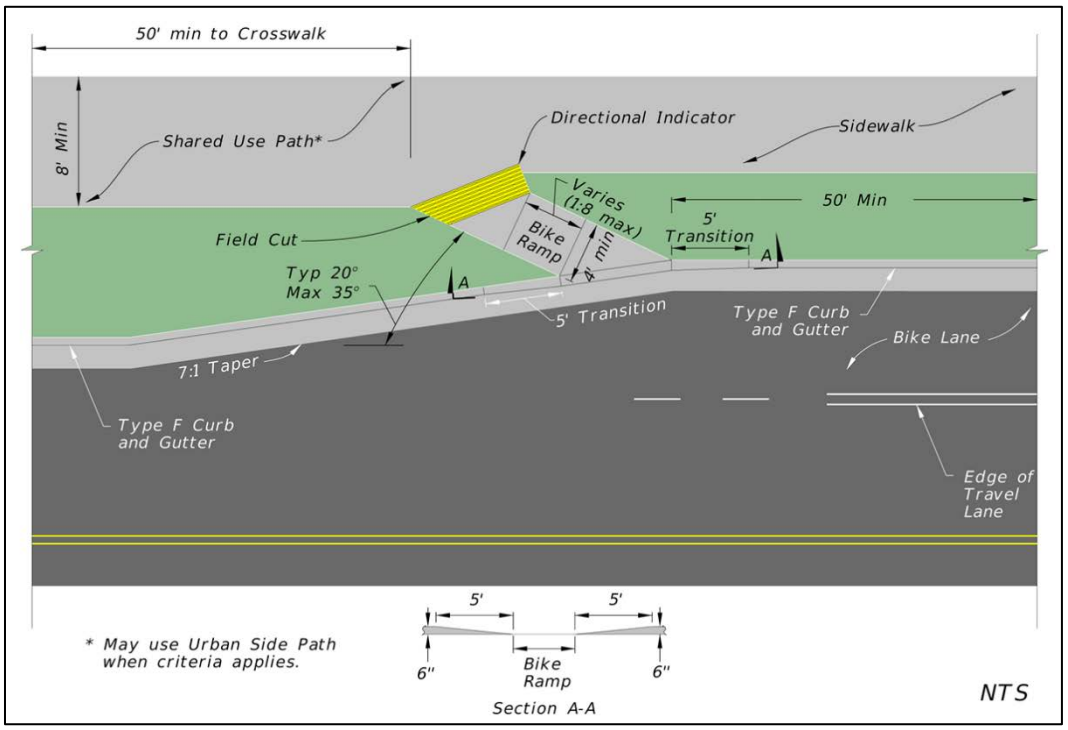
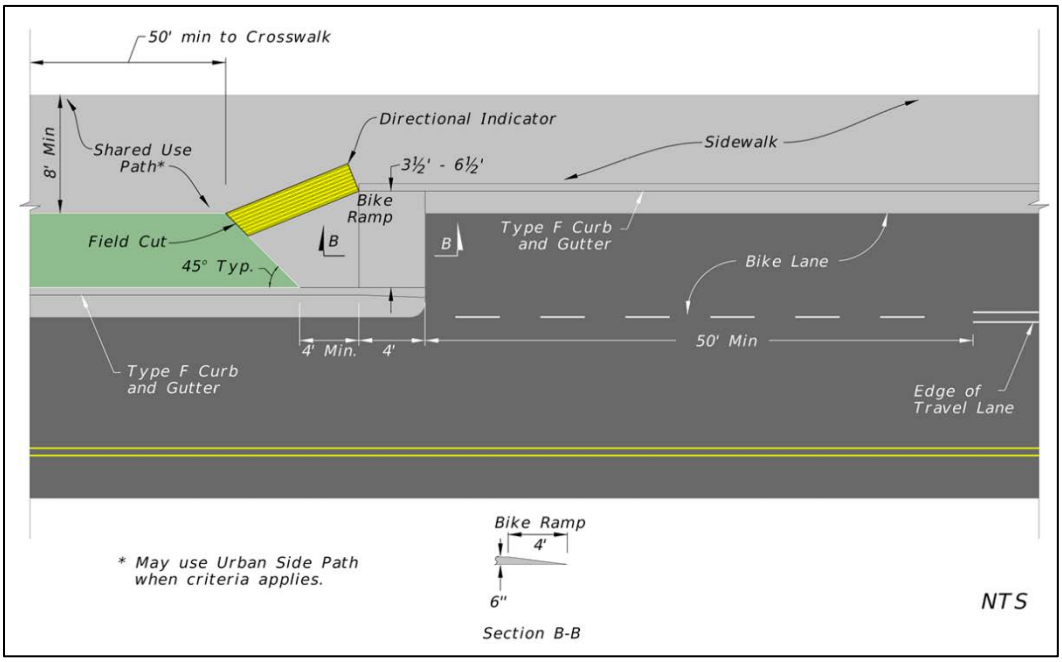


Figure 223.3.2 Straight Bicycle Ramp



223.3.2 Keyhole Lanes

A keyhole lane is a bicycle lane that is placed between a through lane and the adjacent right-turn lane, merge lane, or bus bay to manage conflicts with turning vehicles, position cyclists correctly for movement through the intersection, and limit the potential for cyclists to delay vehicular traffic by blocking through or turn lanes.

To reduce conflicts between motorists and bicyclists, consider transitioning a bicycle lane to an adjacent separated bicycle lane, sidewalk level 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.

The standard width of a keyhole lane is 7 feet, buffered; however, when 7 feet is not obtainable, provide the greatest keyhole lane width possible, but not less than 5 feet unbuffered.

In C6, C5, C4, C3, and C2T, provide a keyhole lane at intersections where a right turn only lane is also provided. Provide a keyhole lane on curbed roadways that have a bicycle lane approaching a merge lane, bus bay, or parking lane. Keyhole lanes are not required in C1 and C2.

Consider providing the following keyhole lane configuration for dedicated right turn lanes that exceed 500 feet (measured from the radial return of the intersection) with no driveway or parcel access:

(1) Keep bicycle lane to the right of the right-turn lane up to 200 feet from the intersection, and then

(2) Transition to a keyhole lane 200 feet from the radial return of the intersection.

On curbed roadways that do not have a bicycle lane approaching an intersection with a right-turn lane, consider providing a 17-ft right-turn lane for development of future bicycle facilities.

See ***FDM 223.4*** for bicycle lane design criteria when adjacent to on-street parking.

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

For RRR projects, a keyhole lane should be provided, except on projects that have inadequate R/W and/or utility conflicts.

223.3.3 Intersection Bicycle Box and Two-Stage Bicycle Turn Box

Intersection bicycle boxes and two-stage bicycle turn boxes are not required. When they have been selected as an intersection treatment, use the criteria in this section.

Intersection bicycle boxes increase the visibility of stopped bicycle traffic at an intersection and help group together bicyclists to clear intersections more quickly. Two-stage bicycle turn boxes provide another option for bicyclists to make a left-turn at an intersection.

The use of intersection bicycle boxes or two-stage bicycle turn boxes may be considered only at signalized intersections. Intersection bicycle boxes are to meet the requirements in the ***MUTCD*** and comply with all of the following conditions:

- 'Right-turn on red' is prohibited
- 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 or the signals are not timed
- 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

Two-stage bicycle turn boxes are used only in conjunction with bicycle lanes. They must meet the requirements in the ***MUTCD*** 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 or the signals are not timed

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

The use of intersection bicycle boxes or two-stage bicycle turn boxes require the approval of the State Roadway Design Engineer.

223.4 On-Street Parking

Roadways with on-street parking must provide room to cyclists to minimize impacts related to the close proximity of parked vehicles (e.g., door zone avoidance).

When separated bicycle facilities are not used, the following treatments are required for roadways with on-street parking:

- Parallel Parking:
  - Provide a 4-ft bicycle lane adjacent to the travel lane with a 3-ft buffer between the parallel parking lane and the bicycle 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 Pavement Markings and Signage

Pavement markings used for bicycle facilities must conform to the ***MUTCD***, ***Traffic Engineering Manual (TEM)***, or ***FDM 230***. Markings that do not conform to any of these manuals require approval by the State Roadway Design Engineer and State Traffic Operations Engineer.

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

See ***FDM 127.2 (15)*** for limitations on aesthetic applications on bicycle facilities.

Bicycle lane signs and plaques may be used in accordance with the ***MUTCD*** when high levels of bicycle traffic exist or are anticipated. Provide “Bike Lane Ahead” and “Bike Lane End” signage in accordance with the ***MUTCD***.

223.5.1 Bicycle Symbol and Bicycle Lane Arrow

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

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

Place a Bicycle Symbol and Bicycle Lane Arrow (per ***Standard Plans, Index 711-002***) within bicycle lanes and separated bicycle lanes 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

The maximum spacing of the Bicycle Symbol and Bicycle Lane Arrow is 1,320 feet.

Bicycle lane pavement marking symbols are illustrated in ***Exhibit 223-1***.

223.5.2 Bicycle Lane Pavement Markings

Place bicycle lane pavement markings using the following criteria:

At an intersection approach, transition the buffer lane striping to a double 6-in-wide stripe using a 2-ft to 4-ft 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.

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

Consider extending bicycle lane markings though the intersection in conditions where additional guidance through the intersection is appropriate e.g. complex multilane intersections or alternative intersections.

223.5.3 Green-Colored Pavement Markings

Green-colored pavement markings are not required but may be used to enhance the conspicuity of the following bicycle-vehicular conflict areas:

(1) Bicycle lane crosses a vehicular right-turn lane

(a) Separate right-turn lane

(b) Dropped lane transitioning into a right-turn lane

(c) Free-flow channelized right-turn lane, such as at an interchange: lane addition or merge lane

(2) Bicycle lane adjacent to a dedicated bus bay

(3) Extensions of separated bicycle lanes through intersections

(4) Intersection bicycle boxes, see ***FDM 223.3.3***

(5) Two-stage bicycle turn boxes, see ***FDM 223.3.3***

Bicycle-vehicular conflict areas are illustrated in ***Exhibit 223-3.***

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

The use of green-colored pavement markings requires the approval of the District Design Engineer through Project Suite's Design Approval Request Process. The approval must be obtained during Phase I of design. The addition of green-colored pavement markings to bicycle lanes per these criteria does not require a local agency maintenance agreement. For placement on existing pavement, contact the State Materials Office for additional placement requirements.

Use the following criteria in the placement of green-colored pavement markings for bicycle lanes:

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

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

Include quantities in accordance with the ***BOE Manual***. Load these quantities into the Designer Interface in the Signing and Pavement Marking Category.

Additional details on tracking can be found in the ***CADD Manual*** and at the following website: ***https://www.fdot.gov/gis/bim/green-pavement***.

Exhibit 223-1: Bicycle Lane Typical Pavement Marking

Exhibit 223-2: Typical Keyhole Lanes

Exhibit 223-3: Green-Colored Bicycle Lanes

223.6 Bicycle Parking

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 require approval of the District Design Engineer when on FDOT R/W. Locate and design bicycle and micromobility device parking facilities so that:

- Sidewalk-level facilities meet the following lateral offset requirements based on roadway design speed:
  - o $\leq$ 35 mph: 1.5 feet
  - o $\geq$ 40 mph: 4 feet
- On-street facilities are no closer than 1.5 feet to the traveled way
- When parked, the device fits completely within the parking area (i.e. does not extend into the travel lane) and does not interfere with pedestrian facilities
- Racks provide two points of support to the device

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 223.6.1*** and ***Figure 223.6.2:***

- 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 223.6.1 illustrates on-street bicycle parking at midblock and ***Figure 223.6.2*** illustrates on-street bicycle parking at an intersection.

Figure 223.6.1 On-Street Bicycle Parking (Midblock)

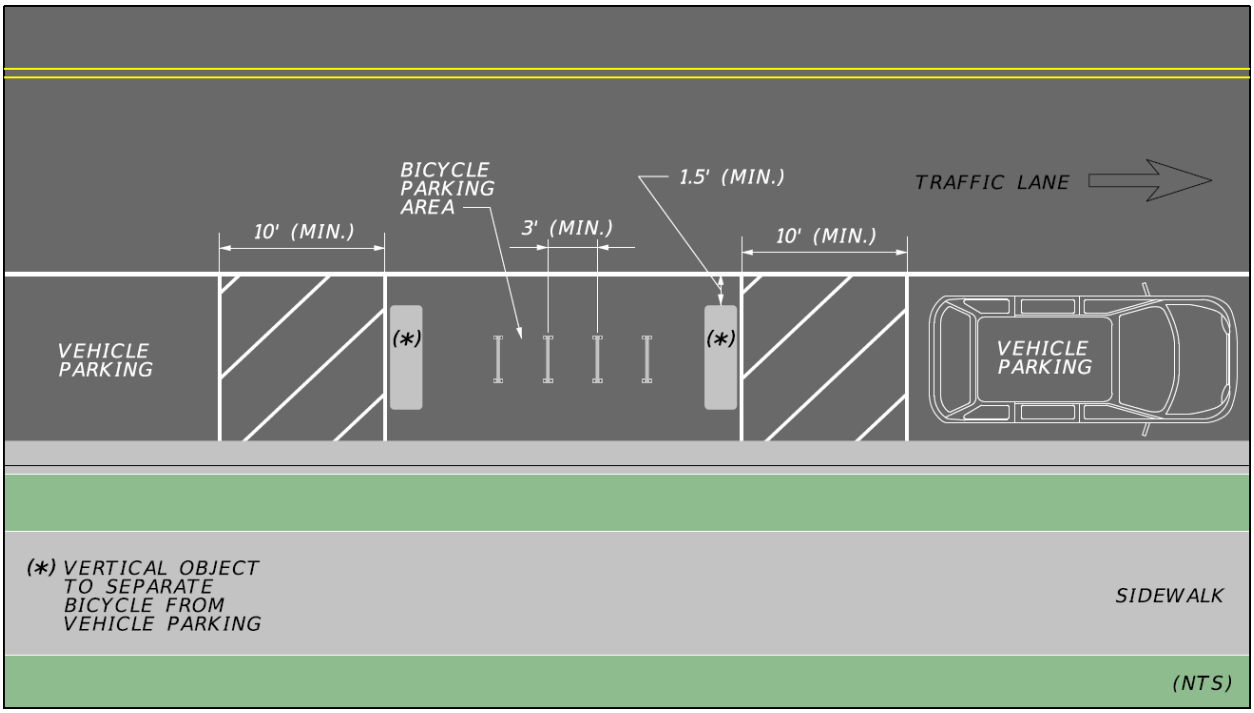
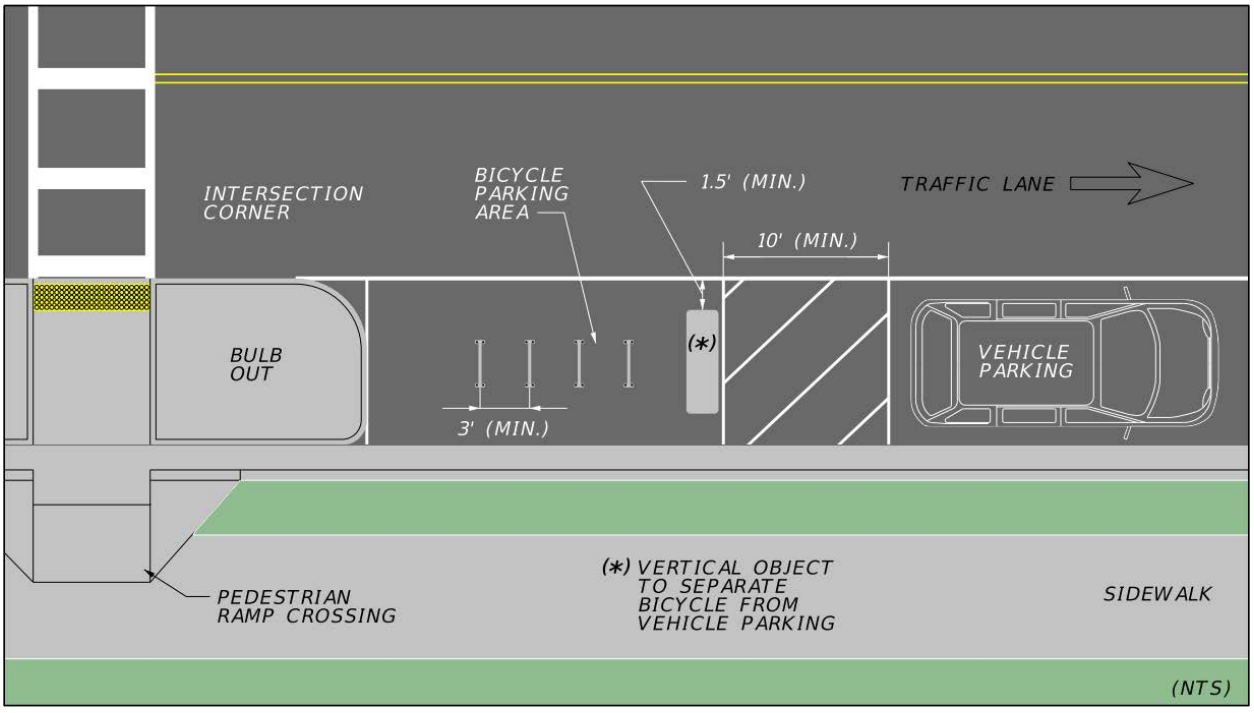


Figure 223.6.2 On-Street Bicycle Parking (Intersection)



See the ***AASHTO Bike Guide*** for site-specific guidance for bicycle racks.

223.7 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 ***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 surfaces, signals responsive to bicycles, and maintenance schedules.

223.7.1 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 are 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.

223.7.1.1 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 a letter of concurrence from the 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 the FDOT Secretary.

Table 223.7.1 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 223.7.1 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					