

# 5 FACILITY TYPES

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## 5.1 FACILITY TYPES & PREFERENCES

### 5.1.1 BIKEWAY TYPES

This plan recommends a mixture of on-street bikeways and off-street trails to foster a cohesive bicycle network that links all parks, major destinations, and areas in the City of Urbana. Facility types are organized in [Figure 22](#).

According to the *AASHTO Bike Guide 2012*, “the urban centers in the United States that have seen the highest levels of bicycle use are those that have built a network of bike lanes and shared-use paths as the backbone of their system. A very effective tool for encouraging bicycling is to provide a visible network of bikeways.”

#### DEFINITION: BIKEWAY

A generic term for any road, street, path, or way which in some manner is specifically designated for bicycle travel, regardless of whether such facilities are designated for the exclusive use of bicycles or are to be shared with other transportation modes.

Source: *AASHTO Bike Guide 2012*

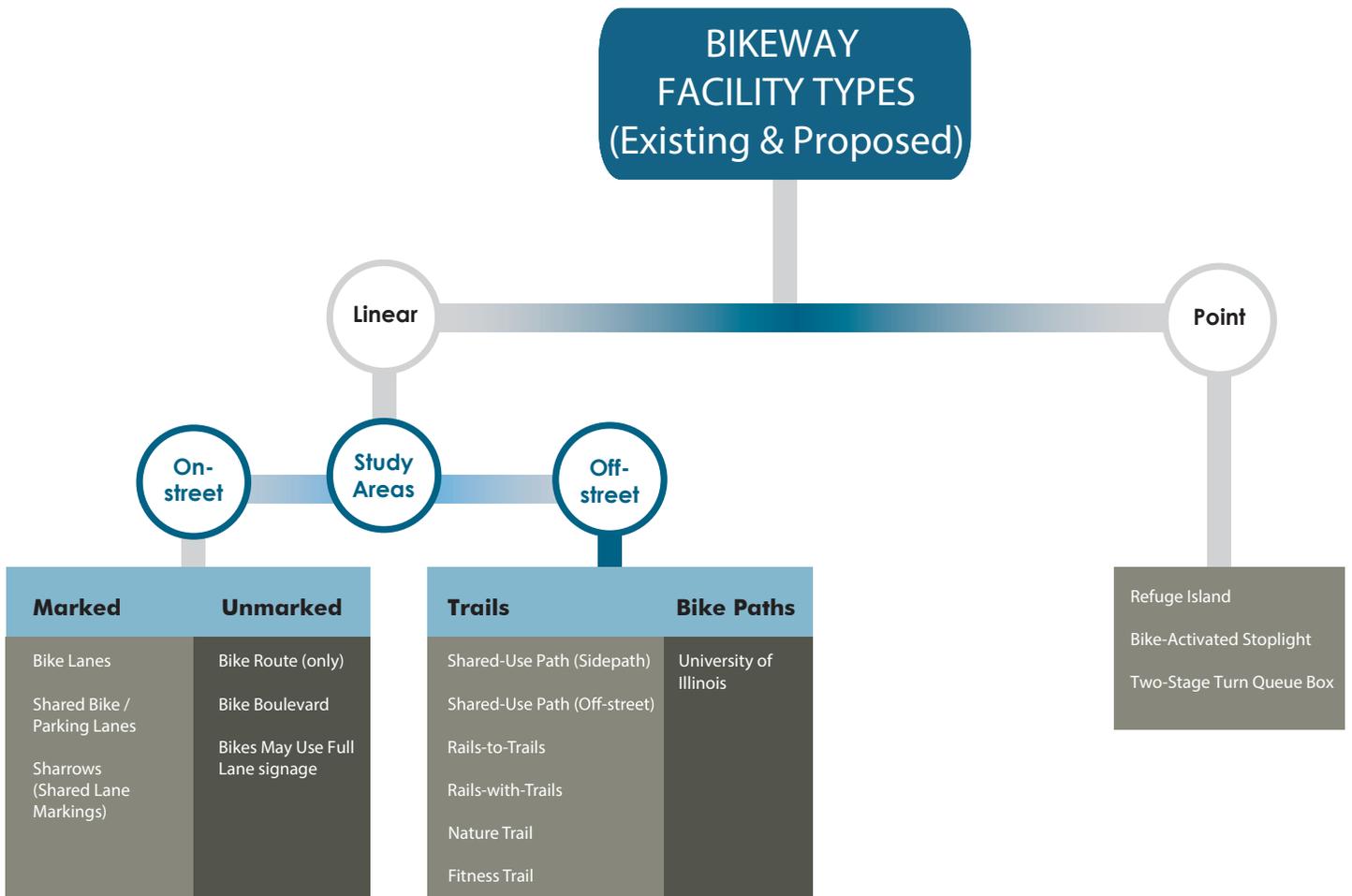


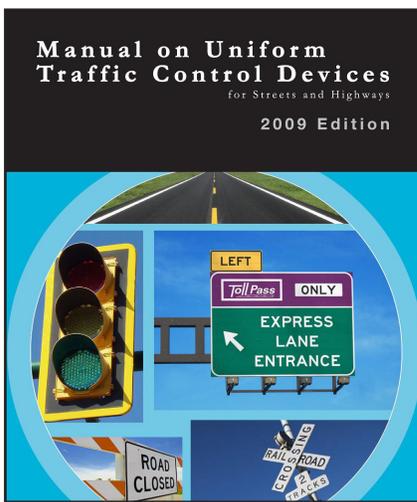
Figure 22 Recommended bike and trail facility types

At a minimum, all bikeways installed in the City of Urbana **shall** follow the *Manual on Uniform Traffic Control Devices (MUTCD)*, with additional guidance on bikeway design and installation provided by the following documents:

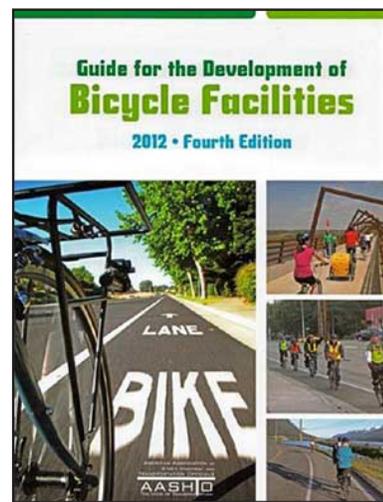
- *American Association of State Highway and Transportation Officials Guide for the Development of Bicycle Facilities (AASHTO Bike Guide 2012)*
- *National Association of City Transportation Officials (NACTO) Urban Bikeway Design Guide*
- *Federal Highway Administration (FHWA) Separated Bike Lane Planning and Design Guide*

The Association of Pedestrian and Bicycle Professionals (APBP) provides comprehensive information on bike parking in the 2nd Edition of its *Bicycle Parking Guidelines*, published in 2010.

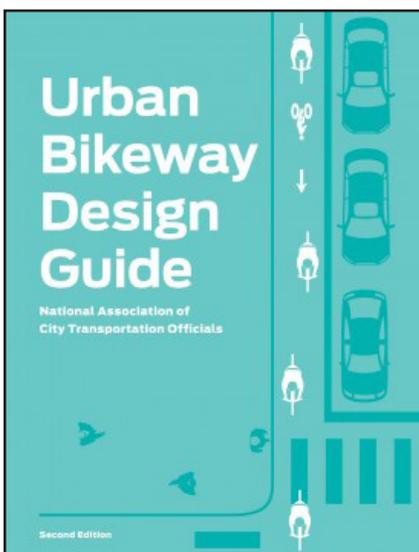
Bikeway design and signage should also follow the *2014 Champaign County Greenways & Trails Design Guidelines* to provide consistency along facilities across jurisdictions and geographies in Champaign County (see [Section 3.2.4](#)).



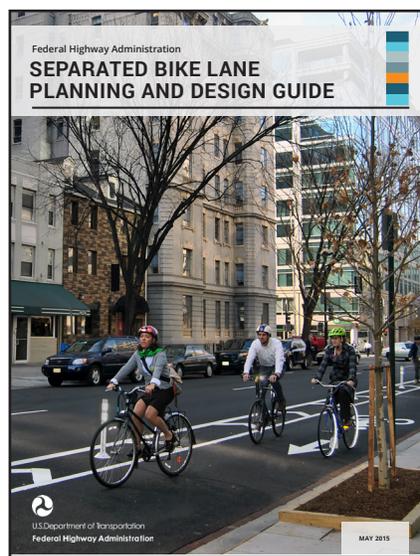
**Figure 23** Manual on Uniform Traffic Control Devices (MUTCD) 2009 Edition



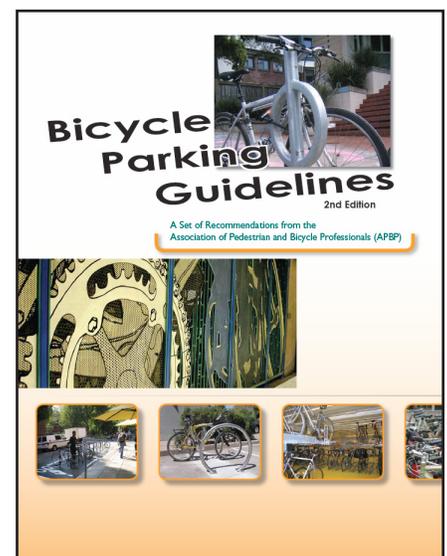
**Figure 24** AASHTO Bike Guide 2012



**Figure 25** NACTO Urban Bikeway Design Guide



**Figure 26** FHWA Separated Bike Lane Planning and Design Guide



**Figure 27** APBP Bicycle Parking Guidelines, 2nd Edition

These nationally and regionally accepted documents allow for a variety of signs and markings to be installed on bikeways. **Table 23** lists the signs and/or markings that the City of Urbana should install for each bikeway type.

City of Urbana Bikeway Markings & Signage Installation Table									
Facility	Markings				Signage				
	Bike Lanes	Centerline	Parking Lanes	Sharrows	Bike Lanes	Bike Route	Bikes May Use Full Lane	Trail	Wayfinding (Destination, Distance and/or Time, Direction)
<b>On-Street Facilities</b>									
Bike Boulevard		Rarely		X		X			X
Bike Lanes	X	X			X				X
Bike Route		Optional				X	Optional		X
Bike Route + Sharrows		X		X		X	Optional		X
Shared Bike/ Parking Lanes		X	X			X			X
Sharrows		X		X			Optional		
<b>Off-Street Facilities</b>									
Shared-Use Path		Optional						X	X
University Bike Path		X						X	

**Table 23** City of Urbana Bikeway Markings & Signage Installation Table

The Montgomery County, MD Bicycle Planning Guidance illustrates selected bicycle facilities by level of separation from motor vehicles (see Figure 28). Section 5.2 has more information on the full spectrum of on-street marked bikeways.

**Least Separation**

**Most Separation**



**Figure 28** Selected bicycle facility types by separation from motor vehicles (Credit: Montgomery County, MD Bicycle Planning Guidance)

Creating Walkable + Bikeable Communities provides a fairly comprehensive list of bicycle infrastructure in Figure 29. Many of these treatments will be discussed in this plan. However, some of these treatments may not be physically or financially feasible to install in the City of Urbana at this time.

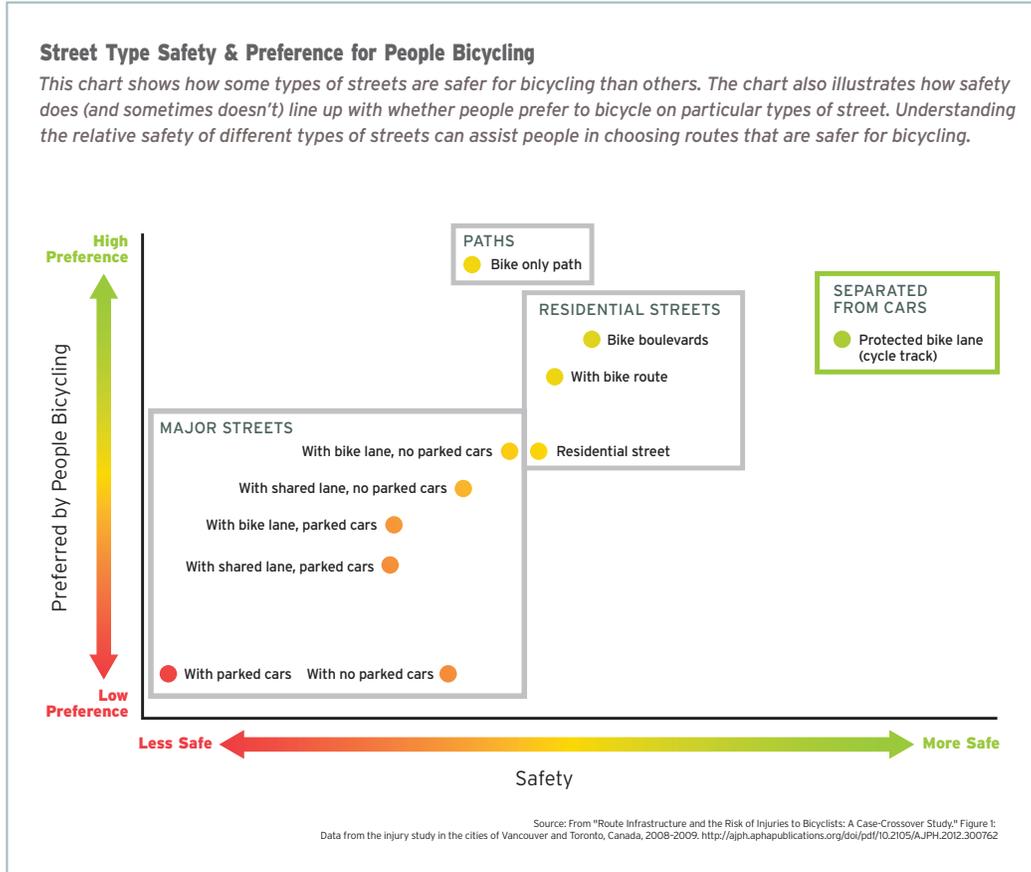
Information on facility cost estimates can be found in Chapter 12.



**Figure 29** Bicycle infrastructure treatments (Credit: Creating Walkable + Bikeable Communities)

### 5.1.2 USER PREFERENCES & SAFETY

Getting the Wheels Rolling provides a chart showing the safety and user preference of particular bicycle facilities (see Figure 28). The safest and most preferred facilities are protected bike lanes (cycle track), bike boulevards, bike routes on residential streets, bike lanes with no parked cars, and bike paths.



**Figure 30** Street Type Safety & Preference for People Bicycling (Credit: ChangeLab Solutions)

NCHRP Report 766 released in 2014 also notes that motorists behave in a manner less threatening to bicyclists when bike lanes exist versus a wide curb lane (see Table 24).

Behavior	Findings	Safer Facility	Supporting Studies
Separation between bikes and motor vehicles	Bike lanes and wide curb lanes produce similar results.	—	Harkey, Stewart, and Rodgman (1996) Kroll and Ramey (1977)
Bike distance from edge of roadway	Compared to wide curb lanes, bike lanes provide greater distance between cyclist and curb.	Bike lane	Harkey, Stewart, and Rodgman (1996)
Vehicle encroachment into adjacent lane when passing	Compared to wide curb lanes, bike lanes result in less encroachment into adjacent lanes.	Bike lane	Harkey, Stewart, and Rodgman (1996) Hunter, Stewart, and Stutts (1999) Hunter and Feaganes (2003)
Driver variability	Compared to wide curb lanes, bike lanes result in less driver variability.	Bike lane	Kroll and Ramey (1977) Torrence et al. (2009)
Bikes in door zone	Compared to wide curb lanes, bike lanes result in fewer cyclists riding in the door zone.	Bike lane	Duthie et al. (2010) Torrence et al. (2009)

**Table 24** Behavioral impact of bike lanes and wide curb lanes (Credit: NCHRP Report 766)

### 5.1.3 DESIGN CONSIDERATIONS

The *Montgomery County, MD Bicycle Planning Guidance* provides additional design considerations for bicycle facility selection (see [Section 4.5](#)). This can be especially helpful for accommodating the target audience of this plan (see [Section 4.1.4](#)).

## DESIGN CONSIDERATIONS

Additional considerations and mitigations for design are listed in the table below

CONSIDERATION	MITIGATION
Bus stops along bike route	Bike lanes: Minimize and clearly mark conflict areas to alert bicyclists and buses Physically separated facilities: Provide pedestrian queuing, landing, and shelter (if present) between bike facility and roadway, if feasible.
Bikeway adjacent to on-street parking with low occupancy	Consider removal or consolidation of parking
Bikeway adjacent to on-street parking with high turnover	Wide or buffered bike lanes preferred to reduce risk from opening car doors
Front-in perpendicular or angled parking	The use of back-in angled parking preferred
Bikeways along streets with numerous commercial driveways and/or unsignalized intersections	Clearly sign and mark conflict areas with colored pavement to warn motorists and bicyclists. Design high-volume driveways as intersections
Bikeways crossing a major signalized intersection	Consider bike boxes, turn-queue boxes, warning signs and markings, bicycle signals (especially at separated bicycle facility)
New bicycle route connecting existing facilities	Provide continuity with adjacent facilities, where possible. Provide bicycle facility at same or higher level of protection compared to adjacent facilities.
Bikeway on a truck route or road with greater than 10% heavy vehicles	Step up to next level of protection recommended by the chart (i.e. from mixed traffic to bike lanes, from buffered bike lanes to separated bicycle facility). Generally, separated bicycle facilities preferred, bike lane with buffer optional, depending on speed & volume characteristics of the roadway.

When an alternative route is needed, the following considerations are appropriate:

- The “interested but concerned” population may be willing to divert to a lower stress facility if the increase in trip length is less than 30%.<sup>1</sup> Even with the designation of a lower stress parallel route, “enthused and confident” cyclists will likely still prefer the primary route; thus, the primary route should still be designed for confident cyclists.
- Provide a high-quality, functional design for parallel route. For example, if mixed traffic is appropriate for the “interested but concerned” population on a parallel route, consider providing a bicycle boulevard to minimize bicycle delay, reduce traffic speeds, and brand the route to increase awareness and visibility.
- Include wayfinding to direct bicyclists to the alternative parallel route. Wayfinding should provide information about the facility on the parallel route, such as the destination and distance to the destination (e.g., “Downtown Silver Spring via Fenton Cycle Track” or “Glenmont Metro via Grandview Bike Blvd”).

**Figure 31** Design Considerations (Credit: Montgomery County, MD Bicycle Planning Guidance)

### 5.1.4 EMERGING AND FUTURE BIKEWAY TYPES

As bicycle planning grows in the United States, the effectiveness and specifications of existing bikeway treatments continue to be analyzed and revised, and new bikeway treatments continue to be developed. Research and pilot projects on new bikeway technology around the world are ongoing. While all of this cannot be captured in this plan, the City of Urbana and the UBMP steering committee should stay abreast of new bikeway treatments and their effectiveness before this plan is updated again in 2020.

## 5.2 ON-STREET FACILITIES

Bicyclists have the right to ride on roads. Traffic laws apply to persons riding bicycles. Bicyclists riding on a highway are granted all of the rights and are subject to all of the duties applicable to the driver of a vehicle, with certain exceptions.<sup>6</sup>

On-street bicycle facilities are becoming more popular among the public, and are being installed in more places around the United States. Using the road often improves safety by increasing cyclist visibility, especially at intersections, where most crashes occur. On-street bikeways are especially appropriate on moderate to lower speed roads with more than a few intersections, driveways, and entrances. They also eliminate bicycle-pedestrian conflicts because they keep bicycles off of sidewalks, which are too narrow to safely accommodate both modes.

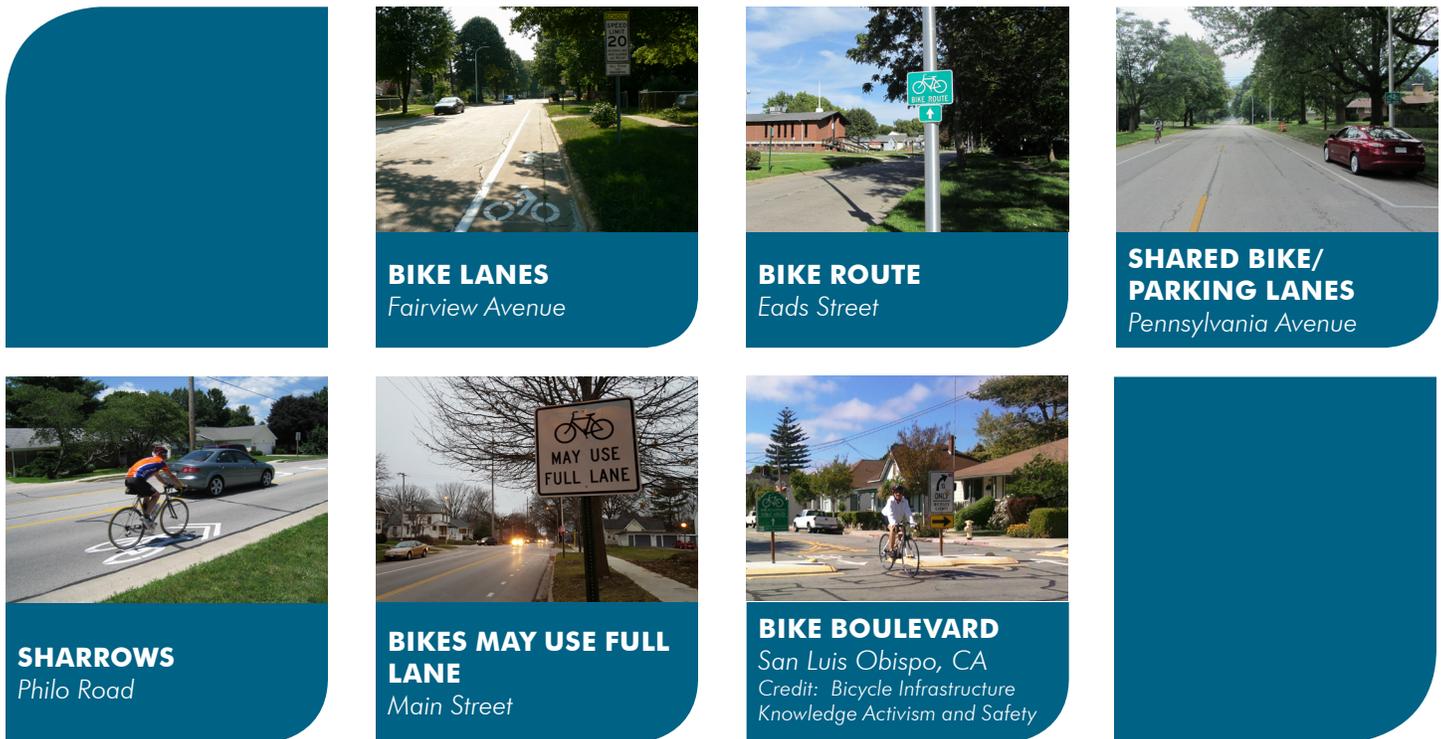
On-street facilities, especially bike routes, should include sidewalks on at least one side of the street to serve the same users that off-street trails do.

For a full list of regulatory signs and plaques for bicycle facilities, please refer to MUTCD Figure 9B-2.

For a full list of warning signs and plaques and object markers for bicycle facilities, please refer to MUTCD Figure 9B-3.

For guidance on bicycle sign information beyond what is provided in this section, please refer to the *NACTO Urban Bikeway Design Guide* bike boulevard section, which includes sign and pavement marking information that could be applied to other on-street facilities. NACTO recommends using the “Clearview Hwy” font on wayfinding signage, as it is commonly used for guide signs in the United States for its legibility.

The on-street bicycle facility types existing and proposed in Urbana are listed below:



6. State of Illinois Vehicle Code 625 ILCS, 5/11-1502

Creating Walkable + Bikeable Communities illustrates the continuum of on-street marked bikeways in Figure 32. Treatments from least to most protected from motor vehicles are: shared lane markings (sharrows), shoulder bikeway, bike lane, buffered bike lane, cycle track (one- or two-way, at-grade, protected with parking), cycle track (one- or two-way, raised and curb separated), and cycle track (one- or two-way, protected with barrier). Shared lane markings and bike lanes are recommended in this plan. Buffered bike lanes can be considered on Urbana streets that are recommended for bike lanes where there is sufficient street width. Buffered bike lanes can be considered on Urbana streets that are recommended for bike lanes where there is sufficient street width.

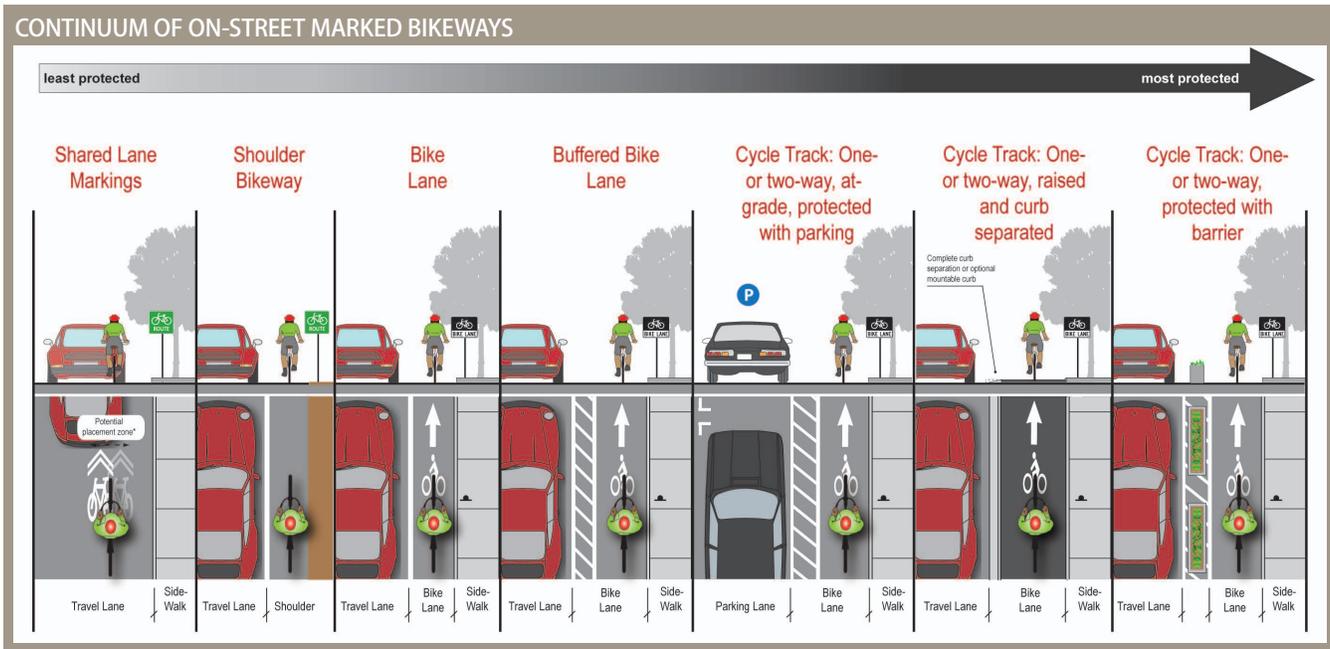


Figure 32 Continuum of On-Street Marked Bikeways (Credit: Creating Walkable + Bikeable Communities)

The Federal Highway Administration (FHWA) released the Separated Bike Lane Planning and Design Guide in May 2015. Separated bike lanes include buffered bike lanes and cycle tracks. Table 25 lists the preferred minimum distance between the travel lane and a separated bike lane, based on the form of separation.

Form of Separation	Preferred Minimum Buffer Distance
Delineator Posts	3'
Bollards	1.5-3'
Concrete Barrier	3'
Raised Median	16"
Raised Lane	2'
Planters	3'
Parking Stops	1-2'
Parked Cars	3'

Table 25 Preferred Minimum Buffer Distance for Separated Bike Lanes

## 5.2.1 BIKE LANES



**Figure 33** Goodwin Avenue

Bike lanes are portions of the roadway designated for use by bicyclists. Bike lanes are at least 5' wide on each side of the road (including gutter pans), and include stripes, signs, and pavement markings. They give bicyclists dedicated road space that is adjacent to, but separated from, other travel lanes.

Cyclists in each bike lane travel one-way with the flow of traffic. Parking is not permitted in bike lanes. On streets with bike lanes and adjacent parking, the bike lanes should be striped between the parking spaces and the travel lanes.

Where they can be safely installed, bike lanes are recommended on urban collectors, arterials, and certain other roads in high-use bicycling areas.

Some of the benefits of bike lanes include:

- More predictable movements by both people in cars and on bikes
- A decrease in bad cycling, with better cyclist adherence to laws about riding on the right side of the road
- Higher bike usage
- Passive traffic calming effects from narrower lanes
- Add visual definition and clarity to the roadway, making it easier for motorists and cyclists to share the road

Following are the City of Urbana design standards for bike lanes, which incorporate the *Champaign County Greenways & Trails (GT) Plan's* bike lane design standards:

**DIMENSIONS**

**WIDTH**

*Varies based on roadway cross-section:*

- For roadways with no curb and gutter, the desirable width of a bike lane is 5'; the minimum width is 4'. See [Figure 34](#).
- For roadways with curb and gutter where parking is permitted, the desirable width of a bike lane is 6' from the edge of the parking lane; the minimum width is 5'. See [Figure 35](#).
- For roadways with curb and gutter where parking is prohibited, the desirable width of a bike lane is 6' from the face of the curb; the minimum width is 5'. See [Figure 36](#).

**SLOPE/DRAINAGE**

- Follow the most recent adopted edition of the Illinois Department of Transportation (IDOT)'s *Bureau of Local Streets & Roads Manual* (Chapter 42 - Bicycle Facilities) for road engineering standards.
- Drainage grates and utility covers should be adjusted flush with the road surface and be bike-proof.
- Curb inlets should be used to eliminate exposure of bicyclists to grates when possible.

**SUB-GRADE, SUB-BASE, AND ROADWAY SURFACE**

- Follow the most recent adopted edition of the Illinois Department of Transportation (IDOT)'s *Bureau of Local Streets & Roads Manual* (Chapter 42 - Bicycle Facilities) for road engineering standards.
- Paved shoulders marked as bike lanes should be smooth and maintained to provide a desirable riding surface.

**MARKINGS**

- All bike lane surface markings should be retroreflectorized and be made of skid-resistant material for safety.
- A bike lane should be delineated from the motor vehicle lanes with a 6" minimum solid white line. See [Figure 37](#).
- A bike lane should be delineated from the parking lanes with a 4" minimum solid white line. A 6" solid white line may be used to further emphasize adjacent parking. Parking lanes in Urbana are typically 8' wide (including gutter pans). See [Figure 37](#).
- Tick marks to delineate parking spaces should be a 4" solid white line which extends 2' into the bike lane and 2' into the parking lane. See [Figure 37](#).

- At intersections with a bus stop or right-turning motor vehicles, the solid white bicycle lane shall be replaced with a broken line for a distance of 100' – 200'. See [Figure 40](#).
- At other designated bus stops (including far-side intersection stops), the solid white line shall be replaced with a broken line for a distance of at least 80'. See [Figure 40](#).
- A broken line shall consist of 2' dashes with 6' spaces. See [Figure 40](#).
- A bike lane should be painted with standard pavement symbols to inform bicyclists and motorists of the presence of the bike lane. See [Figures 38 & 39](#).
- Bike lane symbols shall be white.
- Bike lane symbols shall be placed immediately after an intersection and at other locations as needed.
- When bike lane symbols are used, the bike lane signs in [Table 26](#) (MUTCD Signs R13-17, R13-17aP, R13-17bP) shall also be used.

**INTERSECTION APPROACHES WITH BIKE LANES**

- A through bike lane shall not be positioned to the right of a right turn only lane. See [Figures 41-43](#).
- When the right through lane is dropped to become a right turn only lane, the bike lane markings should stop at least 100 feet before the beginning of the right turn lane. Through bike lanes should resume to the left of the right turn only lane.
- No markings should be painted across pedestrian crosswalks.
- The bike lane symbol marking should be placed immediately after intersections and as appropriate.
- Follow the NACTO *Urban Bikeway Design Guide* Intersection Treatments section for information on bike boxes, intersection crossing markings, two-stage turn queue boxes, through bike lanes, combined bike lane/turn lane, and cycle track intersection approaches.

FIGURE 34

(4) Typical Roadway in Outlying Areas Parking Protected

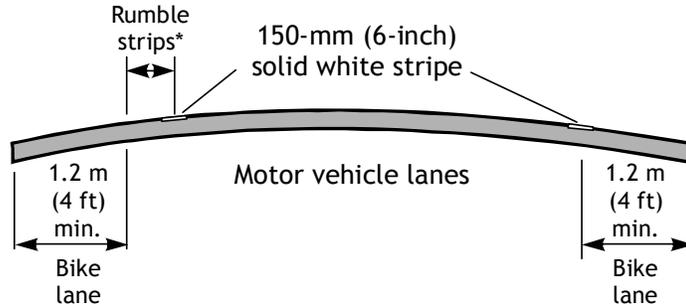
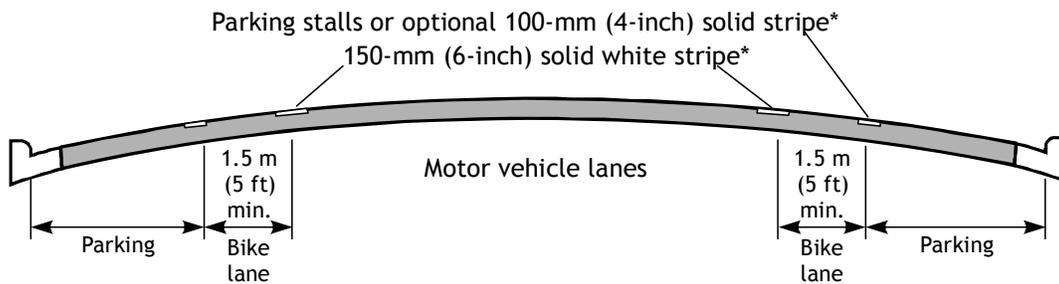


Figure 34 Street cross-section with Bike Lanes but no curb and gutter (Source: AASHTO, [http://safety.transportation.org/htmlguides/bicycles/description\\_of\\_strat.htm](http://safety.transportation.org/htmlguides/bicycles/description_of_strat.htm))

FIGURE 35

(1) On-Street Parking



\* The optional solid stripe may be advisable where stalls are unnecessary (because parking is light) but there is concern that motorist may misconstrue the bike lane to be a traffic lane.

Figure 35 Street cross-section with Bike Lanes and On-Street Parking (Source: AASHTO, [http://safety.transportation.org/htmlguides/bicycles/description\\_of\\_strat.htm](http://safety.transportation.org/htmlguides/bicycles/description_of_strat.htm))

FIGURE 36

(3) Parking Prohibited

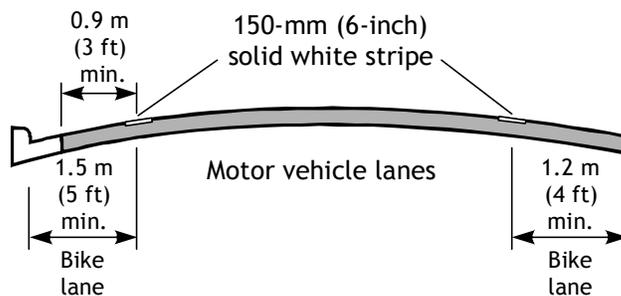
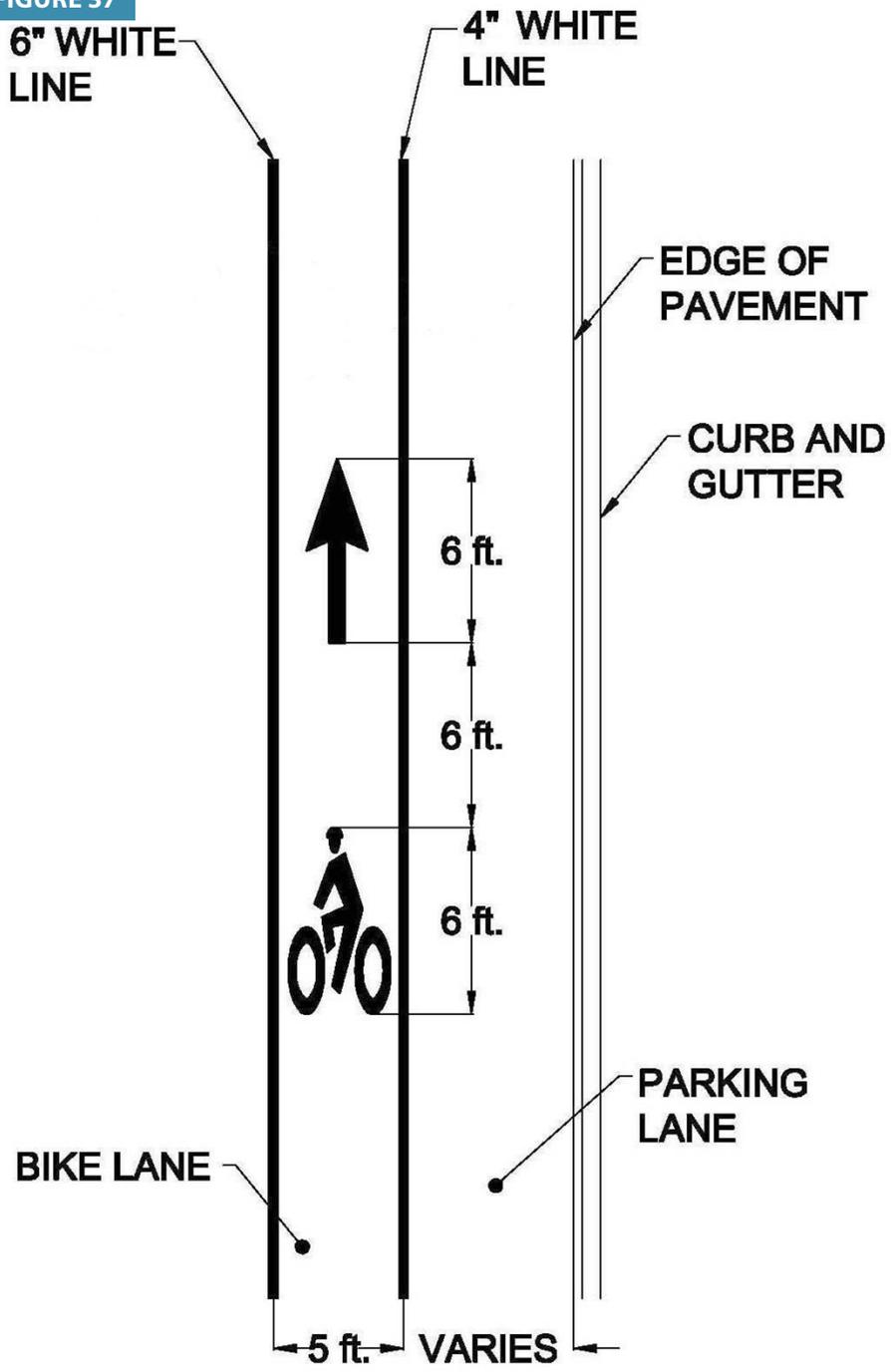
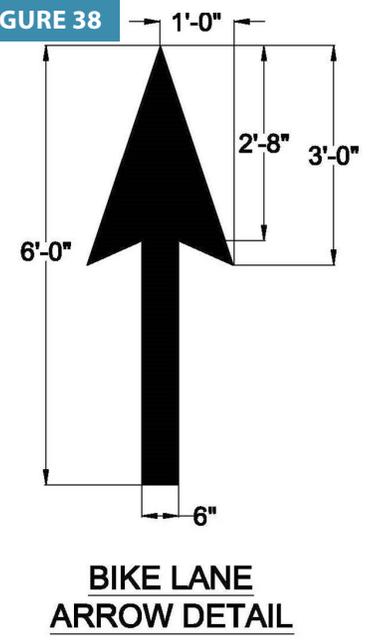


Figure 36 Street cross-section with Bike Lanes but no parking (Source: AASHTO, [http://safety.transportation.org/htmlguides/bicycles/description\\_of\\_strat.htm](http://safety.transportation.org/htmlguides/bicycles/description_of_strat.htm))

**FIGURE 37**

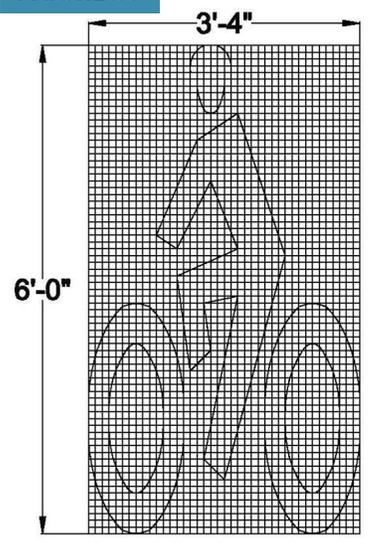


**FIGURE 38**



**BIKE LANE ARROW DETAIL**

**FIGURE 39**

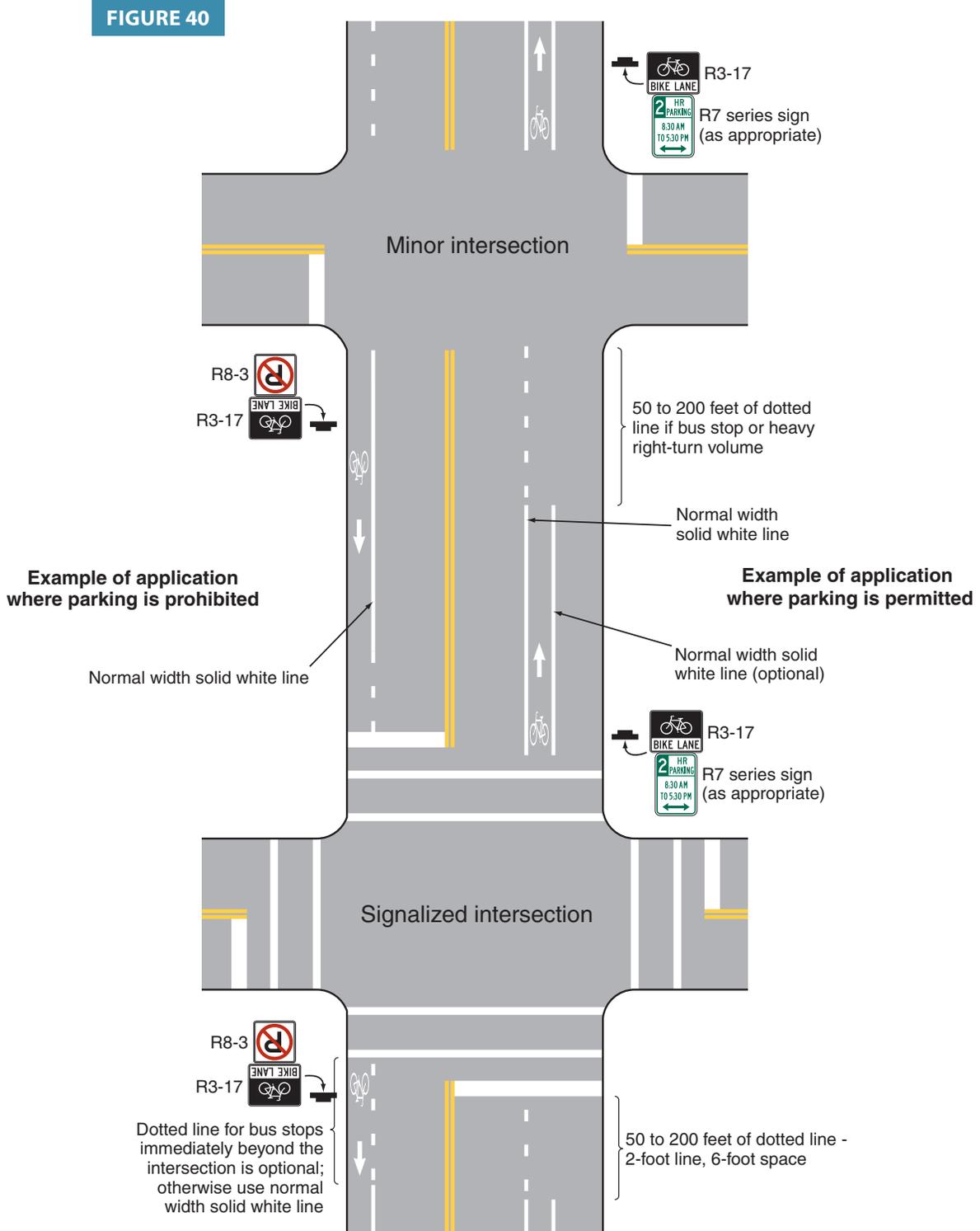


**BIKE RIDER SYMBOL DETAIL**

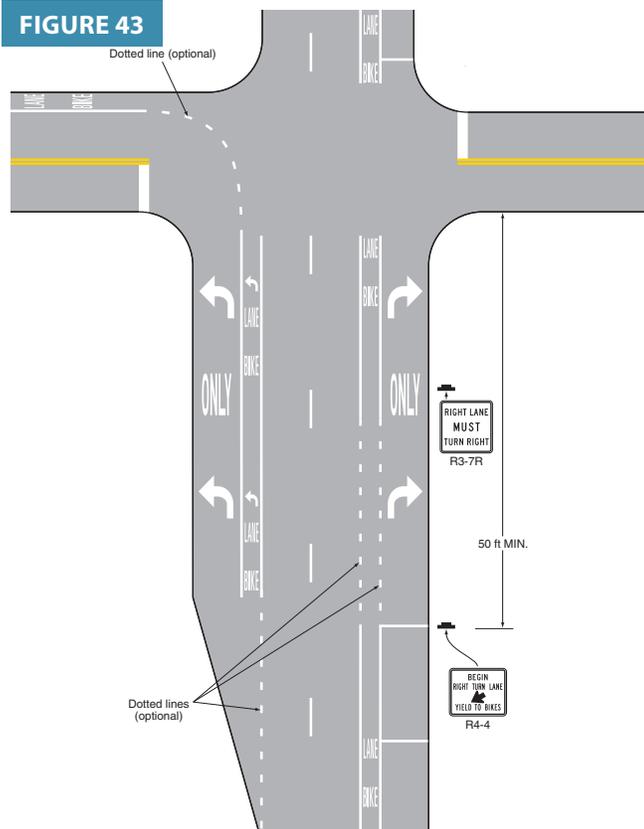
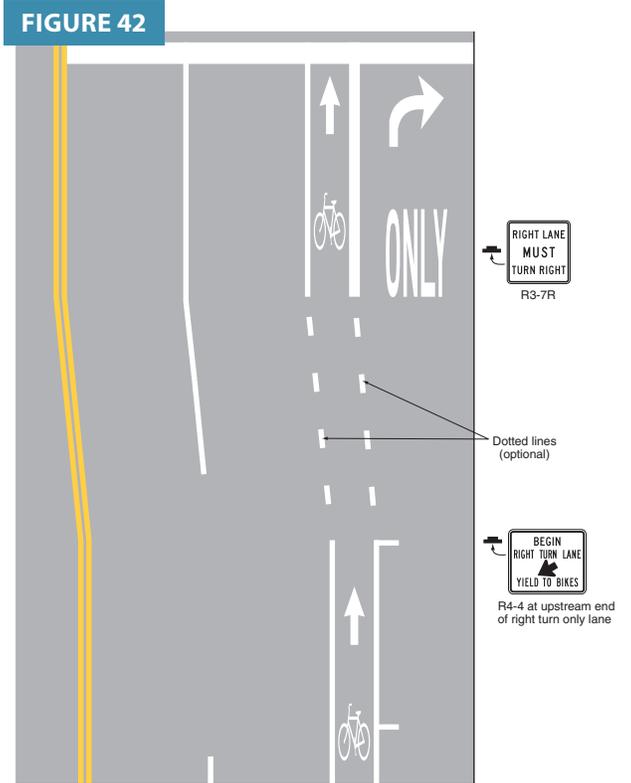
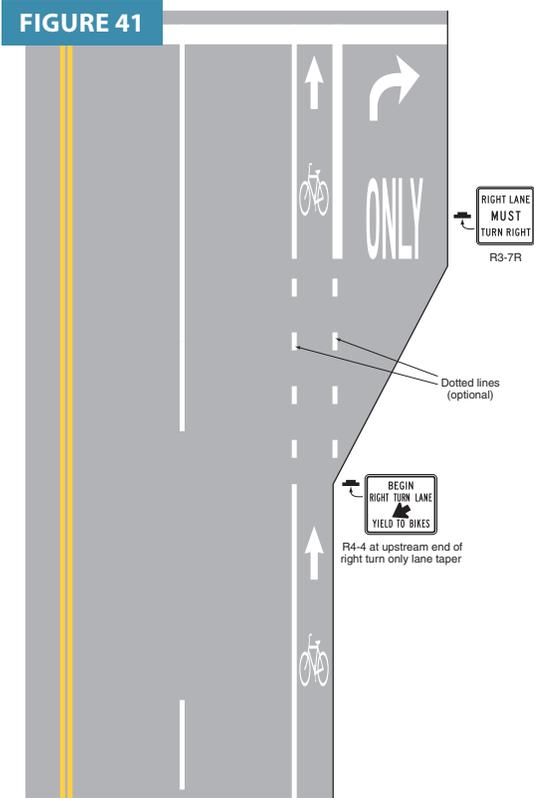
**Figure 37** Bike Lane symbol layout

**Figure 38** Bike Lane Pavement Marking - Arrow

**Figure 39** Bike Lane Pavement Marking - Bike Rider Symbol



**Figure 40** Typical pavement marking for Bike Lanes on a two-way street (Source: MUTCD Figure 9C-6, [http://mutcd.fhwa.dot.gov/htm/2009/part9/fig9c\\_06\\_longdesc.htm](http://mutcd.fhwa.dot.gov/htm/2009/part9/fig9c_06_longdesc.htm))



**Figure 41** Example of bike lane treatment at a right-turn only lane (Source: MUTCD Figure 9C-4, [http://mutcd.fhwa.dot.gov/htm/2009/part9/fig9c\\_04\\_longdesc.htm](http://mutcd.fhwa.dot.gov/htm/2009/part9/fig9c_04_longdesc.htm))

**Figure 42** Example of bike lane treatment at parking lane into a right-turn only lane (Source: MUTCD Figure 9C-5, [http://mutcd.fhwa.dot.gov/htm/2009/part9/fig9c\\_05\\_longdesc.htm](http://mutcd.fhwa.dot.gov/htm/2009/part9/fig9c_05_longdesc.htm))

**Figure 43** Example of intersection pavement markings - designated bike lane with left-turn area, heavy turn volumes, parking, one-way traffic, or divided highway (Source: MUTCD Figure 9C-1, [http://mutcd.fhwa.dot.gov/htm/2009/part9/fig9c\\_01\\_longdesc.htm](http://mutcd.fhwa.dot.gov/htm/2009/part9/fig9c_01_longdesc.htm))

## SIGNS

Signs along bike lanes are intended to inform both bicyclists and motorists of the rules associated with roads with bike lanes. All signage should follow the U.S. Department of Transportation (US DOT) Federal Highway Administration (FHWA) *Manual on Uniform Traffic Control Devices (MUTCD)*.

- **MUTCD Sign R3-17** shall be used in conjunction with marked bike lanes and be placed at periodic intervals along the marked bike lane. Spacing of the sign should be determined by engineering judgment based on the prevailing speed of bicycle and other traffic, block length, distances from adjacent intersections, and other considerations.
- **MUTCD Sign R3-17aP** should be mounted directly below **MUTCD Sign R3-17** in advance of the beginning of a marked bike lane.
- **MUTCD Sign R3-17bP** should be mounted directly below **MUTCD Sign R3-17** at the end of a marked bike lane, but should not be installed at temporary interruptions in a bike lane.
- **MUTCD Sign R4-4** may be used when motor vehicles must cross a bike lane to enter an exclusive right-turn lane.
- **MUTCD Sign R7-9a** should be installed if it is necessary to restrict parking, standing or stopping in a bike lane.
- **MUTCD Sign R9-3cP** should be used only in conjunction with **MUTCD Sign R5-1b**, and shall be mounted directly below **MUTCD Sign R5-1b**.

Sign Dimensions: Bike Lanes			
Signs	Sign Name & Dimensions	Signs	Sign Name & Dimensions
	MUTCD Sign R3-17 Bike Lane 30" x 24"		MUTCD Sign R7-9a No Parking Bike Lane 12" x 18"
	MUTCD Sign R3-17aP Bike Lane (plaque) 30" x 12"		MUTCD Sign R5-1b Bicycle Wrong Way 12" x 18"
	MUTCD Sign R3-17bP Bike Lane (plaque) 30" x 12"		MUTCD Sign R9-3cP Ride With Traffic (plaque) 12" x 12"
	MUTCD Sign R4-4 Begin Right Turn Lane Yield to Bikes 36" x 30"		

**Table 26** Bike lane sign dimensions (Source: MUTCD Figure 9B-2, [http://mutcd.fhwa.dot.gov/hdm/2009/part9/fig9b\\_02\\_longdesc.htm](http://mutcd.fhwa.dot.gov/hdm/2009/part9/fig9b_02_longdesc.htm))

WAYFINDING SIGNS ON STREETS WITH BIKE LANES

The AASHTO Bike Guide no longer recommends that Bike Route signs be used on streets with bike lanes.

Therefore, the following MUTCD Bike Route signs should **not** be used on streets with bike lanes:

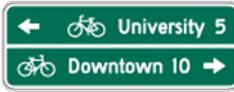
- D11-1 (Bike Route)
- M5 series (Bicycle Route Arrow)
- M6 series (Bicycle Route Arrow)

Instead, the signs in Table 27 can be used on streets with bike lanes at the following locations:

- Intersecting bikeways
- Where bike lanes transition to a Bike Route
- Where bike lanes transition to Shared Bike/Parking Lanes
- Where bike lanes transition to a Bike Boulevard
- Where bike lanes transition to a Shared-Use Path

D1-1b signs should only be used for turns in the Urbana Green Loop (see Chapter 11). D1-1c, D1-2c, and D1-3c signs should be used to list all other destinations on bike lanes.

The use of these particular signs with the bicycle symbol will remind bicyclists and motorists that they are on a bicycle facility, while also providing destination, distance (in miles) and/or time (in minutes), and direction information. The City of Chicago also uses these wayfinding signs on its bike lanes.

Sign Dimensions: Bike Lane Wayfinding	
Signs	Name & Dimensions
	MUTCD Sign D1-1b Bicycle Destination (1 line) Varies x 6"
	MUTCD Sign D1-1c Bicycle Destination (1 line) Varies x 6"
	MUTCD Sign D1-2c Bicycle Destination (2 lines) Varies x 12"
	MUTCD Sign D1-3c Bicycle Destination (3 lines) Varies x 18"

**Table 27** Bike lane wayfinding sign dimensions  
(Source: MUTCD Figure 9B-4)

## 5.2.2 BIKE ROUTE



**Figure 44** Pennsylvania Avenue east of Race Street

Bike routes are specially designated shared roadways that are preferred for bicycle travel for certain recreation or transportation purposes. These “signed shared roadways” may be appropriate where there is not enough room or less of a need for dedicated bike lanes.

The 2012 AASHTO *Guide for the Development of Bicycle Facilities* lists the following uses for bicycle route and guide signs:

- Designate a system of routes in a city, county, region, or state that is likely to generate bicycle trips, because it connects important origins and destinations.
- Designate a continuous route that may be composed of a variety of facility types and settings, or located wholly on local neighborhood streets.
- Provide wayfinding guidance and connectivity between two or more major bicycle facilities, such as a street with bike lanes and a shared use path.
- Provide guidance and continuity in a gap between existing sections of a bikeway, such as a bike lane or shared use path.
- Provide location-specific guidance for bicyclists such as:
  - How to access and cross a bridge.
  - How to navigate through an area with a complex street layout.
  - Where the route diverges from a way motorists use.
  - How bicyclists can navigate through a neighborhood to an internal destination, or to a through route that would otherwise be difficult to find.

The 1999 AASHTO *Guide for the Development of Bicycle Facilities* lists the following reasons for designating signed bike routes:

- The road is a common route for bicyclists through a high-demand corridor.
- The route extends along local neighborhood streets and collectors that lead to internal neighborhood destinations, such as a park, school, or commercial district.

A road does not require a specific geometry to be signed as a Bike Route. Generally, a road’s Bicycle Level of Service (BLOS) grade should be High C or better in order to be designated a Bike Route.



**Figure 45** Bike Route sign with wayfinding signage that consists of destination, distance (in miles), and direction

**SIGNS**

When the City of Urbana installs Bike Route signs, supplemental destination, distance (in miles) and/or time (in minutes), and direction sign plates should be placed beneath them.

The signs in Table 28 should **only** be used on streets designated as Bike Routes.

D11-1 signs should **only** be placed on streets that are designated Bike Routes.

D1-1 signs should only be used for turns in the Urbana Green Loop (see Chapter 11).

D1-1a, D1-2a, and D1-3a signs should be used to list all destinations on Bike Routes, and their corresponding distance (and/or time) and direction from the sign location.

Directional arrows will typically be horizontal or vertical; however, a sloping arrow may be used if it conveys a clearer indication of the direction bicyclists should travel.<sup>7</sup>

**SIGN BENEFITS**

Following are several benefits of installing Bike Route wayfinding signage based on the *NACTO Urban Bikeway Design Guide*, especially to Interested but Concerned bicyclists:

- Identifies lower traffic routes to destinations
- Overcomes a “barrier to entry” for infrequent bicyclists
- Signage that includes mileage and travel time to destinations may help minimize the tendency to overestimate the amount of time it takes to travel by bicycle
- Visually indicates to motorists that they are driving along a Bike Route and should use caution
- Passively markets the bicycle network by providing unique and consistent imagery throughout the City of Urbana

Signage Dimensions: Bike Route Wayfinding	
Signs	Name & Dimensions
	MUTCD Sign D11-1 Bike Route 24" x 18"
	MUTCD Sign D1-1 Destination (1 line) Varies x 18"
	MUTCD Sign D1-1a Destination (1 line) Varies x 18"
	MUTCD Sign D1-2a Destination (2 lines) Varies x 30"
	MUTCD Sign D1-3a Destination (3 lines) Varies x 42"

**Table 28** Bike Route wayfinding sign dimensions (Source: MUTCD Figure 9B-4)

7. AASHTO. *Guide for the Development of Bicycle Facilities*. American Association of State Highway and Transportation Officials, Washington, DC, 2012.

## SIGN PLACEMENT & CATEGORIES

Bicycle guide signs should be visible to bicyclists and oriented so bicyclists have sufficient time to comprehend the sign and change their course, when needed.<sup>7</sup> Consideration should be made to prevent signage from being blocked by vegetation and parked cars.

**MUTCD** standards shall be followed for sign installation, notably Section 9B.01 Application and Placement of Signs, and Section 9B.20 Bicycle Guide Signs. Section 9B.01 provides guidance on mounting height and lateral placement from the edge of the roadway. Information from Section 9B.20 has been incorporated into [Tables 26 and 27](#).

Based on guidance from the **AASHTO Bike Guide**, Bike Route signs should be placed at the following locations:

- Where a Bike Route turns at an intersection
- Where a Bike Route crosses another Bike Route or bikeway
- Where a Bike Route crosses major roadways, especially at signalized intersections
  - It may be appropriate to place signs at both the near and far side, or at multiple locations
- At least every 1/4 mile

Adherence to a spacing standard helps create a legible network and a degree of predictability for bicyclists.

The **NACTO Urban Bikeway Design Guide** lists three types of Bike Route signs: Confirmation, Decision, and Turn.

Confirmation signs in Urbana should at minimum consist of the MUTCD D11-1 Bike Route sign, and can also include destination and distance/time information. NACTO recommends installing Confirmation signs along Bike Routes at the following locations:

- Every 2 to 3 blocks
- On the far side of major street intersections
- Within 150 feet of a Decision or Turn sign
- After turns, to confirm destinations

Decision signs (see [Figure 46](#)) in Urbana should include the MUTCD D11-1 Bike Route sign and MUTCD D1-1, D1-1a, D1-2a, or D1-3a supplemental signs, and be installed at decision points along the Bike Route.

Decision signs should be placed on the near side of intersections in advance of a junction with another bikeway, and along a route to indicate a nearby destination. Decision signs should include destinations, directional arrows, and distance and/or time, and should therefore be the most frequent Bike Route sign type used in Urbana.



**Figure 46**

Bike Route Decision sign

(Credit: NACTO Urban Bikeway Design Guide, <http://nacto.org/publication/urban-bikeway-design-guide/bicycle-boulevards/signs-and-pavement-markings/>)

Turn signs are placed on the near side of intersections where bike routes turn. However, it is recommended to install Decision signs at Bike Route turns in Urbana instead of Turn signs.

For consistency, and to fully realize the benefits of Bike Route signs previously stated, it is recommended to always install MUTCD D1-1, D1-1a, D1-2a, or D1-3a signs beneath every D11-1 sign installed in Urbana.

WAYFINDING SIGN ASSEMBLY

Key destinations or the cross street at the end of the Bike Route designation are suggested for wayfinding signage. Based on guidance from NACTO, the following types of destinations can be included on wayfinding signage. They are generally ranked to assist the City of Urbana with choosing destinations when assembling signs. See Chapter 11 for more information on what specific destinations should be listed on specific existing and proposed Bike Routes.

1. Urbana Green Loop (MUTCD D1-1 sign)
2. Schools / University of Illinois campus
3. Local or regional parks and trails
4. Bikeways
5. Commercial centers
6. Civic/community destinations
7. Hospitals

Based on guidance from NACTO (see Figure 45), the City of Urbana should follow these guidelines for assembling Bike Route wayfinding signage:

- Place the closest destination in the top slot.
- Destinations that are further away can be placed in slots two and three. This allows the nearest destination to “fall off” the sign and subsequent destinations to move up the sign as the bicyclist approaches.
- Rank destinations using the list above to determine which should be listed on a sign where more than three destinations are nearby.
- For longer routes, show immediate destinations rather than include all destinations on a single sign.
- Stack or abbreviate destination names to accommodate longer destination names before reducing text size.
- At greater distances, list area destinations (e.g. downtown, neighborhoods) as a general location.
- Consider reserving space for future destinations or bikeways. This can be done by always installing MUTCD D1-3a signs.
- If bicycling time is included, it should assume a typical speed of 10 MPH.

WAYFINDING SIGNAGE ON NON-BIKE ROUTES

For guidance on placement of bicycle wayfinding signage on streets with bike lanes, see Section 5.2.1.

For guidance on placement of wayfinding signage on shared-use paths, see Section 5.3.1.

Although the MUTCD allows for Bike Route (D11-1) signs to be installed on any type of bikeway (on-street and off-street), it is not recommended to install these signs on shared-use paths. Bike Route signs along sidepaths also face vehicular traffic, and signs can confuse motorists, especially if the sign is on the opposite side of the road. These signs can also confuse bicyclists, who may not be sure if the sidepath or road is the designated bicycle facility.

Trail signage for shared-use paths were developed as part of the *Champaign County Greenways & Trails Plan*, and should be installed along all off-street bikeways in Urbana. Supplemental distance/time, destination, and directional signage that match these trail signs should also be installed.

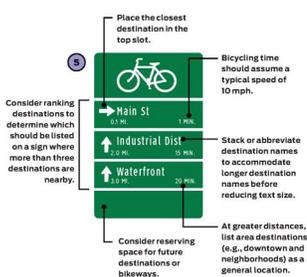
SIGN CONSOLIDATION

The *AASHTO Bike Guide 2012* states “when appropriate, bicycle guide signs may be placed on existing posts and light poles to reduce sign and post clutter. However, the MUTCD prohibits displaying certain types of signs on the same post and should therefore be consulted.”

This plan recommends wayfinding signs that list destinations, distances/times, and directions on one sign to reduce the burden of sign maintenance on the City of Urbana.

PEDESTRIAN FACILITIES

All on-street Bike Routes should have an adjacent pedestrian path (e.g. sidewalk) constructed or already existing. This would serve the same users that shared-use paths accommodate. Wayfinding signage can also serve pedestrians, although they may not walk as far as bicyclists will bike.



**Figure 47**  
Bike Route wayfinding sign assembly guidance

(Credit: NACTO Urban Bikeway Design Guide, <http://nacto.org/publication/urban-bikeway-design-guide/bicycle-boulevards/signs-and-pavement-markings/>)



**Figure 48** Pennsylvania Avenue east of Vine Street

Bike/parking lanes are recommended on streets with low parking occupancy. They are designated with Bike Route signage (see [Section 5.2.2](#)) and a continuous white line to separate the parking lane from travel lanes. Shared bike/parking lanes should be used for each direction of travel, with each lane typically 8’ wide (including gutter pans).

Roads are signed with Bike Route signs, but do not include any bike lane signage nor bike lane pavement markings. Parking lanes are striped to indicate the shared bike/parking lane. Cyclists in this space would pass parked cars just as they do on road shoulders and unstriped roads. The benefits include:

- An increased perception of comfort by the cyclist.
- Lower likelihood of the occasional parked car being hit by another car.
- Traffic calming from narrower lanes.



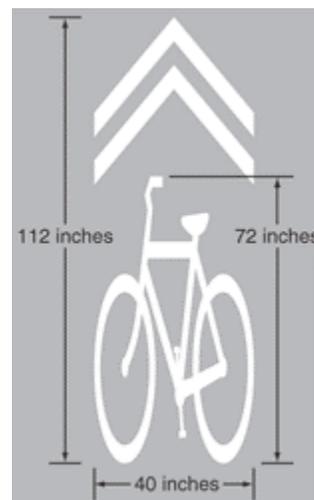
**Figure 49** Philo Road

Bicycle positioning on the roadway is key to avoiding crashes with cars turning at intersections. Shared lane markings, also known as “sharrows” (see [Figure 50](#)), are included in the 2009 version of the Federal Highway Administration’s *Manual on Uniform Traffic Control Devices (MUTCD)*.

Shared lane markings are used to indicate correct straight-ahead bicycle position at intersections with turn lanes, and at intersections where bike lanes are temporarily discontinued due to turn lanes or other factors. Shared lane markings will be installed where needed to provide connections to bicycle facilities and/or to complete a network. The following is information regarding shared lane markings from the 2009 MUTCD.

The Shared Lane Marking may be used to:

- Help bicyclists position themselves in a shared lane with on-street parallel parking. This reduces the chance of a bicyclist hitting the open door of a parked vehicle.
- Help bicyclists position themselves in lanes that are too narrow for a motor vehicle and a bicycle to travel side by side within the same traffic lane.
- Alert road users to the space bicyclists are likely to occupy within the traveled way.
- Encourage motorists to safely pass bicyclists.
- Reduce the incidence of wrong-way bicycling.



**Figure 50** Shared Lane Marking road pavement symbol (Source: MUTCD)

**DIMENSIONS**

The shared lane marking consists of two chevron markings above a bicycle symbol. The entire marking is 40 inches wide and 112 inches tall. The bicycle symbol is 72 inches high, from the top of the handlebars to the bottom of the tires.

## MARKINGS

- Shared lane markings should not be placed on roads that have speed limits above 35 mph. If sharrows are desired on such roads, the speed limit should be reduced to 35 mph or less.
- Shared lane markings shall not be used on shoulders or in designated bicycle lanes.
- On shared lanes with on-street parallel parking, shared lane markings should be placed in the center of the lane. The centers of the markings should be at least 11 feet from the edge of the pavement.
- On a street without on-street parking with an outside travel lane less than 14 feet wide, the centers of the shared lane markings should be at least 4 feet from the edge of the pavement.
- On a street without on-street parking, shared lane markings should be placed far enough from the curb to direct bicyclists away from gutters, seams, and other obstacles.
- On streets with posted 25 MPH speeds or slower, the **preferred** placement of shared lane markings is in the center of the travel lane to minimize wear and encourage bicyclists to occupy the full travel lane.
- On a street with a center turn lane, shared lane markings should be placed closer to the curb.
- On a two-lane street, shared lane markings should be placed in the center of the lane.
- Shared lane markings should be placed immediately after an intersection and spaced at intervals not greater than 250 feet thereafter.
- The number of shared lane markings along a street should correspond to the difficulty bicyclists experience taking the proper travel path or position. Shared lane markings used to bridge discontinuous bicycle facilities or along busier streets should be placed more frequently (50 to 100 feet) than along low traffic bicycle routes (up to 250 feet).

## SIGNS

A *Bicycles May Use Full Lane* sign (see [Table 29](#)) may be used in addition to or instead of the shared lane marking to inform road users that bicyclists may occupy the full travel lane. See [Section 5.2.5](#) for more information.

## 5.2.5 BIKES MAY USE FULL LANE



**Figure 51** Main Street at Cottage Grove Avenue

A *Bicycles May Use Full Lane* sign (see [Table 29](#)) may be used to inform road users that bicyclists may occupy the full travel lane. This sign may be used on roadways where no bike lanes or adjacent shoulders usable by bicyclists are present, and where travel lanes are too narrow for bicyclists and motor vehicles to operate side by side.

Bikes May Use Full Lane signage is recommended under any of the following conditions:

- Where traffic volumes and speeds are low.
- At intersections where bike lanes do not continue on the other side of the intersection (see [Figure 51](#)).
- On roads popular with more advanced cyclists, but have insufficient width to install bike lanes or shoulders. These roads have Bicycle Level of Service (BLOS) grades of Low C or High D.

Installation of the sign in [Table 29](#) should be no less than every 1/2 mile on urban streets. On rural roads, signs should be installed every 1/4 to 1/2 mile.

Sign Dimensions: Bicycles May Use Full Lane	
Signs	Name & Dimensions
	MUTCD Sign R4-11 Bicycles May Use Full Lane 30" x 30"

**Table 29** Bicycles May Use Full Lane sign dimensions (Source: MUTCD Figure 9B-2)

**SAFER ROAD SIGNS – EMERGING RESEARCH**

In November 2015, Ride Illinois prepared a technical brief addressing what signage is best to install in place of Share the Road signs. Recent behavioral studies show that Share the Road signs may be interpreted in opposite ways by some cyclists and motorists, reducing their effectiveness in alerting and educating motorists about sharing the road with bicycles properly. Note that as of 2016, no Share the Road signs have been installed in Urbana.

Bikes May Use Full Lane signs send the message to bicyclists that they should use the center of the lane; however, this is not always the intent when installing more effective signage than Share the Road signs. The brief recommends installing signage that alerts motorists that they should give a minimum of 3 feet when passing bicyclists.<sup>6</sup>

Based on this brief, the most appropriate sign to install on roads recommended for “Bikes May Use Full Lane” sign installation in this plan is actually the “State Law 3 Feet Minimum to Pass Bicycles” sign (see Figure 52). Unfortunately, as of 2016, the MUTCD does not have an approved 3-foot law sign with graphics, but the issue is currently being studied for a future version.<sup>8</sup> A new sign type could be approved before this plan is updated in 2021. **Therefore, the City of Urbana and Urbana Township should work with Ride Illinois and any other appropriate entities to install the most appropriate signage upon implementation of this facility type.** Ride Illinois is planning to work with local areas on identifying and fundraising for new sign installation as early as 2016.



**Figure 52** State Law - 3 Feet Minimum to Pass Bicycles sign

8. Ride Illinois. *Working for Safer Road Signage*. 2015. <http://rideillinois.org/working-for-safer-road-signage/>

# 5.2.6 BIKE BOULEVARD



**Figure 53** Bike Boulevard, San Luis Obispo, CA  
 (Credit: Bicycle Infrastructure Knowledge Activism and Safety (B.I.K.A.S.))

A bike boulevard is a local street or series of connected street segments that have been modified to function as a through street for bicyclists, while discouraging through automobile travel. Local access is maintained.<sup>7</sup>

Signs and pavement markings create the basic elements of a bike boulevard. They indicate that a roadway is intended as a shared, slow speed street, and reinforce the intention of priority for bicyclists along a given route.<sup>9</sup>

Bike boulevards incorporate elements from many other on-street facilities (e.g. wayfinding signage, sharrows), but the main difference is that bike boulevards prioritize bicycle travel and minimize non-local automobile traffic. They also realize similar, if not more, benefits to those of Bike Routes.

Bike boulevards also have several other names, such as Neighborhood Greenways (Portland, OR; Seattle, WA), Local Street Bikeways (Vancouver, BC), Bike/Walk Streets (Minneapolis), and bicycle priority streets.

Bike boulevards are essentially enhanced Bike Routes.

The primary characteristics of a bike boulevard are<sup>10</sup>:

- Low motor vehicle volumes
- Low motor vehicle speeds
- Logical, direct, and continuous routes that are well marked and signed
- Provide convenient access to desired destinations
- Minimal bicyclist delay
- Comfortable and safe crossings for cyclists at intersections

9. NACTO. *Urban Bikeway Design Guide*. National Association of City Transportation Officials. <http://nacto.org/cities-for-cycling/design-guide/>.

10. IBPI. *Fundamentals of Bicycle Boulevard Planning & Design*. Initiative for Bicycle and Pedestrian Innovation, Portland, OR, 2009.

## DESIGN

A bike boulevard does not have one standard cross-section, but is made up of a collection of elements that may be employed in various situations.<sup>11</sup>

According to NACTO, the three required elements of a bike boulevard (see Figure 52) are:

- Wayfinding signage
- Pavement markings, particularly sharrows
- Limited or no use of centerlines

NACTO recommends limiting centerlines to short sections at intersection approaches or traffic circles, as drivers have an easier time passing bicyclists on roads without centerlines. The MUTCD only recommends centerlines on streets with 4,000 vehicles per day or greater (MUTCD Section 3B.01), making low-traffic streets the main candidates for bike boulevards.



**Figure 54** Bike Boulevard signs and pavement markings  
(Credit: NACTO Urban Bikeway Design Guide)

The AASHTO Bike Guide lists several design elements of bike boulevards to accommodate bicyclists. However, not all bike boulevards will need all of these elements.

- Traffic diverters at key intersections to reduce through motor vehicle traffic while permitting passage for through bicyclists.
- At two-way, stop-controlled intersections, priority assignment that favors the bike boulevard, so bicyclists can ride with few interruptions.
- Neighborhood traffic circles and mini-roundabouts at minor intersections that slow motor vehicle traffic but allow bicyclists to maintain momentum.
- Other traffic-calming features to lower motor vehicle speeds where deemed appropriate.
- Wayfinding signs to guide bicyclists along the way and to key destinations.
- Sharrows where appropriate to alert drivers to the path bicyclists need to take on a shared roadway.

- Crossing improvements where the bike boulevard crosses major streets. Techniques for this purpose include, but are not limited to:
  - o A traffic signal, where warranted, or a crossing beacon. To enable bicyclists to activate the signal, bicycle-sensitive loop detectors (with detector pavement markings), or push-buttons that do not require bicyclists to dismount are appropriate.
  - o Median refuges wide enough to provide a refuge for bicyclists (i.e. 6' minimum median length) and with an opening wide enough to allow them to pass through (i.e. 6' minimum median width). See Section 5.4.1 for more information on median refuge islands.
  - o Curb extensions on a crossed thoroughfare with on-street parking, to allow approaching bicyclists an opportunity to pull past parked cars to get a better view of approaching traffic.

City of Urbana staff may pick and choose the appropriate mix of design elements needed for bike boulevard development along a particular corridor<sup>10</sup>:

- Intersection treatment
- Prioritize travel on bike boulevard
- Signage
- Traffic calming
- Traffic reduction

Most design treatments used on bike boulevards do not impact on-street parking.<sup>10</sup>

The *Fundamentals of Bicycle Boulevard Planning & Design* provides a bicycle boulevard audit to assess a roadway for bike boulevard development (see Appendix 3).

## SIGNS

Follow the recommendations in Section 5.2.2 (Bike Route).

11. IBPI. *Creating Walkable+Bikeable Communities*. Initiative for Bicycle and Pedestrian Innovation, Portland, OR, 2012.

## 5.3 OFF-STREET FACILITIES

Trails and dedicated bike paths are also available to bicyclists, which offer significant separation from motorized vehicle traffic.

The off-street bicycle facility types existing and proposed in Urbana are listed below:



**SHARED-USE PATH  
(OFF-STREET TRAIL)**  
*Meadowbrook Park*



**SHARED-USE PATH  
(SIDEPATH)**  
*Philo Road*



**RAILS-TO-TRAILS**  
*Normal, IL*



**RAIL-WITH-TRAIL**  
*Belleville, IL*  
*Credit: Harry Sanders*



**UNIVERSITY BIKE PATH**  
*South of Nevada Street*

The path types in [Sections 5.3.1 through 5.3.4](#) are for shared-use between bicyclists and other non-vehicle modes.

## 5.3.1 SHARED-USE PATH (OFF-STREET TRAIL)



**Figure 55** King Park Trail

Shared-use paths, or trails, are physically separated from motor vehicle traffic, except at road crossings. Trails accommodate a variety of users, including pedestrians, bicyclists, rollerbladers, people with baby strollers, skateboarders, and others, for both recreation and transportation purposes. Trails away from roads, on easements or their own rights-of-way, tend to be more pleasant and popular.

The sidepath (see [Section 5.3.2](#)) and Rail-Trail (see [Sections 5.3.3 and 5.3.4](#)) are both a type of shared-use path, with more specification regarding the location of the path. The other shared-use paths in this plan are off-street paths through parks, green space, and neighborhoods. **The desired width for all shared-use paths is at least 10', with a minimum recommended width of 8'**, in order to facilitate bi-directional and multi-modal traffic. Striping is not necessary on shared-use paths.

Following are the City of Urbana design standards for shared-use paths, which incorporate the Champaign County Greenways & Trails shared-use path design standards:

## DIMENSIONS

### WIDTH

- **The desired surface width of a shared-use path is at least 10'.**
- **The minimum surface width of a shared-use path should not be less than 8'.**
- Transitions between existing narrower trails and the 10' wide shared-use path should be created using tapers.

### CLEAR ZONE

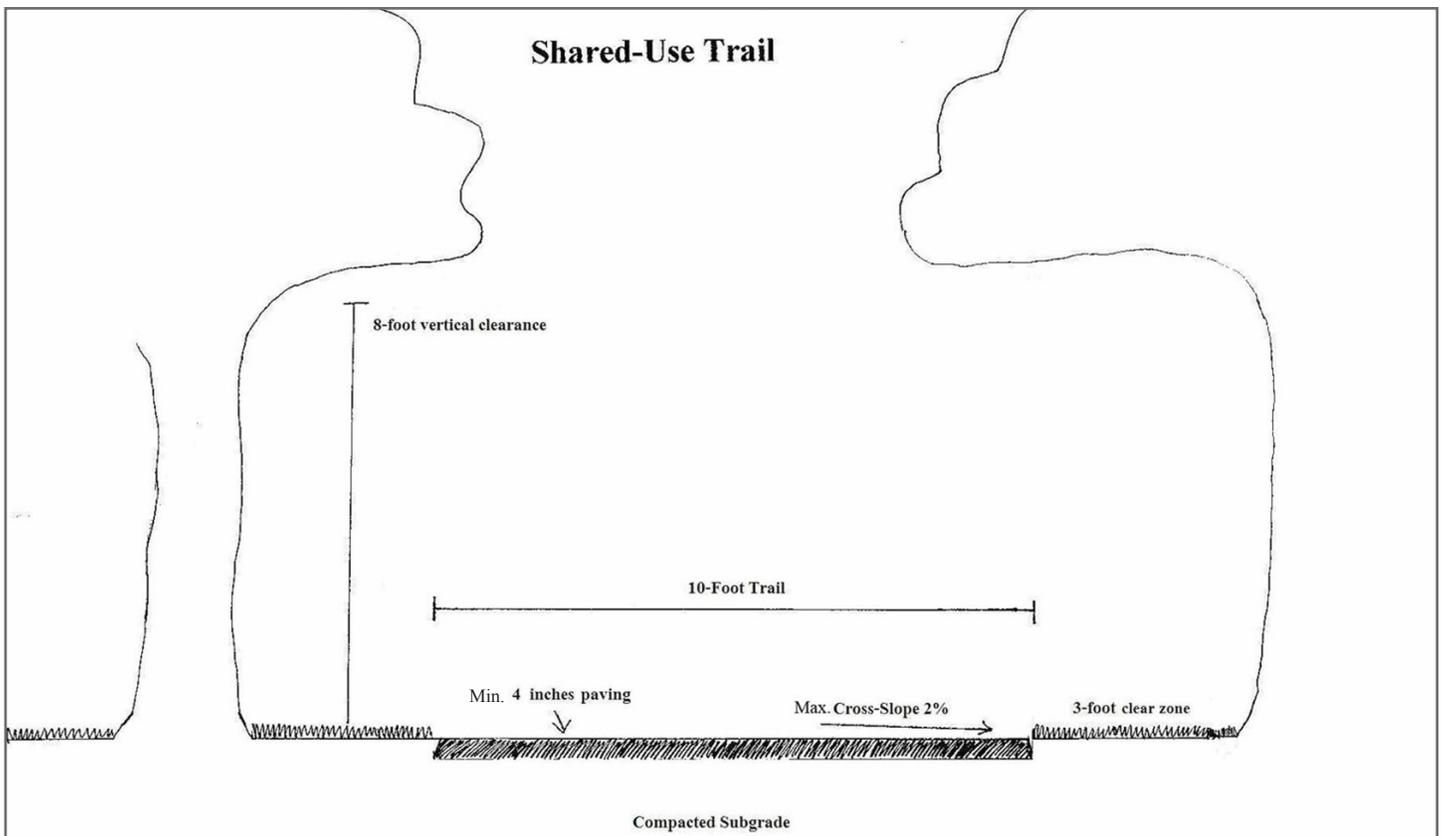
- A clear zone should be maintained adjacent to both sides of all shared-use paths for the use of joggers and to keep vegetation from erupting through the trail surface. **The desired clear zone width is 3', and the minimum clear zone width should not be less than 2'. Therefore, a 16' right-of-way (ROW) is recommended for shared-use paths, with a minimum recommended ROW of 12'.**
- Where a roadway runs adjacent to or near a shared-use path, the roadway should be separated from the shared-use path with a 5' wide clear zone. **Therefore, 15' is recommended between the far side of the shared-use path and the**

**road or rail edge, and a minimum of 13' is recommended between the two locations.**

- When separation of 5' cannot be achieved, a physical barrier of at least 4.5' high between the trail and the roadway is recommended.
  - Smooth rub rails should be attached to the barriers at handlebar height of 3.5'.
- The vegetative distance between the trail edge and any water body (stream, wetland, or lake) is recommended to be a minimum of 10' to reduce water pollution potential from runoff and chemicals associated with paved surfaces.

### VERTICAL CLEARANCE

- The vertical clearance should be a minimum of 8' high (or higher to accommodate maintenance vehicles).
- Tunnels and other undercrossings should have a vertical clearance of at least 10'.



**Figure 56** Shared-Use Path Dimensions Diagram

## SUB-GRADE AND TRAIL SURFACE

### SUB-GRADE

- The trail and shoulders should be cleared of organic materials. Soil sterilants should be used where necessary to prevent vegetation from erupting through the pavement.

### TRAIL SURFACE

- The following are acceptable surface types for shared-use paths:
  - Asphalt
  - Concrete
  - Compacted crushed rock
- The paved surface should be a minimum of 6" thick.
- All joints in concrete paths should be cut with a saw, and tooled joints should not be used. The spacing of transverse joints is desirably equal to the width of the path.
- Shared-use paths should be designed to sustain without damage wheel loads of occasional emergency, patrol, maintenance, and other motor vehicles that are expected to use or cross the path.
- Edge support to accommodate vehicles can be in the form of stabilized shoulders or in additional pavement width.
- Shared-use paths should be machine laid, using the appropriate machines and tools to smooth and compact the trail surface.

## ENGINEERING

- Refer to the most recent adopted edition of the *AASHTO Guide for the Development of Bicycle Facilities* and the Illinois Department of Transportation (IDOT)'s *Bureau of Local Streets & Roads Manual* (Chapter 42 - Bicycle Facilities) for engineering specifications, including design speed, sight distances, horizontal alignment and superelevation.

## MARKINGS

All surface markings on shared-use paths should be retroreflectorized and be made of skid-resistant material for safety. Obstructions in the traveled way of a shared-use path should be marked with retroreflectorized material. Striping should not be used on shared-use paths to separate directions; yield signage (MUTCD Sign R9-6 in [Table 30](#)) should be used instead. Where there are curves with restricted sight distance, a 4" wide yellow centerline stripe may be used to separate opposite directions of travel.

**SIGNS**

Shared-use path signs, especially MUTCD Signs R1-1 and R1-2 in [Table 30](#), should be shielded so they are not visible by road users. Sign R5-3 should be installed at the entrance to a shared-use path. The trail should be signed at cross streets and vice versa so trail users know where they are and motorists recognize that they are crossing a trail. Stop signs should not be used where Yield signs would be acceptable.

MUTCD Sign W11-15 in [Table 31](#) should be used on roads where they cross shared-use paths. Sign W11-15P should be mounted below the W11-15 sign ahead of the crossing. Sign W16-9P can also be mounted below the two aforementioned signs ahead of the crossing. Sign W16-7P should be mounted below Sign W11-15 at the trail crossing.

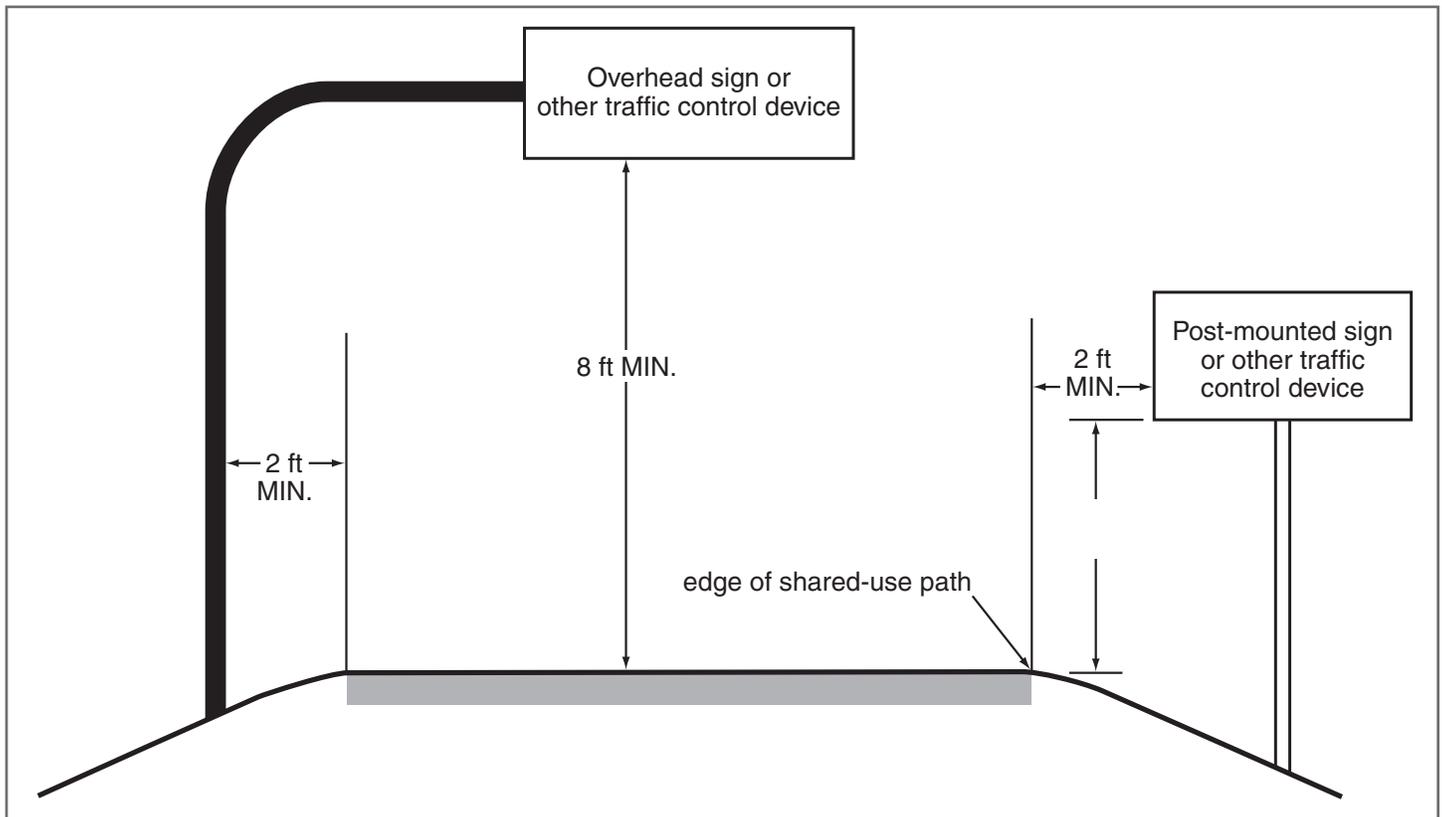
Sign Dimensions: Shared-Use Paths			
Signs	Name and Dimensions	Signs	Name and Dimensions
	MUTCD Sign R1-1 Stop 18" x 18"		MUTCD Sign R15-1 Grade Crossing (Crossbuck) 24" x 4.5"
	MUTCD Sign R1-2 Yield 18" x 18" x 18"		MUTCD Sign W3-1 Stop Ahead 18" x 18"
	MUTCD Sign R4-3 Movement Restriction 12" x 18"		MUTCD Sign W3-2 Yield Ahead 18" x 18"
	MUTCD Sign R9-6 Bicycle Regulatory 12" x 18"		MUTCD Sign W3-3 Signal Ahead 18" x 18"
	MUTCD Sign R5-3 No Motor Vehicles 24" x 24"		MUTCD Sign W10-1 Grade Crossing Advance Warning 24" diameter

**Table 30** Shared-Use Path sign dimensions (Source: MUTCD Figures 9B-2 and 9B-3)

Sign Dimensions: Shared-Use Path Crossing			
Signs	Name & Dimensions	Signs	Name & Dimensions
	MUTCD Sign W11-15 Combination Bike and Pedestrian Crossing 30" x 30"		MUTCD Sign W16-7P Diagonal Arrow (plaque) 24" x 12"
	MUTCD Sign W11-15P Trail Crossing (plaque) 24" x 18"		MUTCD Sign W16-9P Ahead (plaque) 24" x 12"

**Table 31** Shared-Use Path Crossing sign dimensions  
(Source: MUTCD Figure 9B-3)

Lateral sign clearance should be a minimum of 2' from the near edge of the sign to the near edge of the path. The mounting height for ground-mounted signs should be a minimum of 4', measured from the bottom edge of the sign to the near edge of the path surface. Overhead signs should have a clearance of 8' from the bottom edge of the sign to the path surface directly under the sign (or higher to accommodate maintenance vehicles). See Figure 57.



**Figure 57** Sign Placement Diagram on Shared-Use Paths (Source: MUTCD Figure 9B-1, [http://mutcd.fhwa.dot.gov/hm/2009/part9/fig9b\\_01\\_longdesc.htm](http://mutcd.fhwa.dot.gov/hm/2009/part9/fig9b_01_longdesc.htm))

Although the MUTCD allows for Bike Route (D11-1) signs to be installed on any type of bikeway (on-street and off-street), it is not recommended to install these signs on shared-use paths. Bike Route signs along sidepaths also face vehicular traffic, and signs can confuse motorists, especially if the sign is on the opposite side of the road. These signs can also confuse bicyclists, who may not be sure if the sidepath or road is the designated bicycle facility.

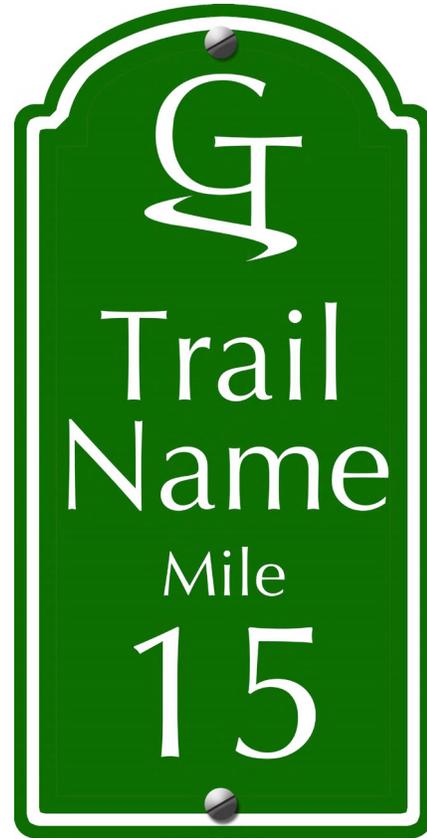
Trail signage for shared-use paths were developed as part of the *Champaign County Greenways & Trails Plan*, and should be installed along all off-street bikeways in Urbana. Installing these signs will also create consistency along trails between the City of Urbana, Urbana Park District, City of Champaign, University of Illinois, Champaign County Forest Preserve District, and other participating jurisdictions.

The most appropriate sign to install along shared-use paths is the Trail Mile Marker Sign (see [Figure 58](#)):

- The sign should be 18” in height and 9” wide.
- Unnamed linear and loop shared-use paths should be named after one of the following places that are adjacent to the trail or where the trail leads:
  - Adjacent street name (especially for sidepaths, e.g. Main Street Trail)
  - Streets that the trail connects (e.g. Lanore-Adams-Fairlawn Trail)
  - Where a street ends and continues as a trail
  - Neighborhoods (e.g. Lierman Neighborhood Trail)
  - Areas of Urbana (e.g. East Urbana Parks Loop Trail)
  - Parks
  - Railroads
  - Water body (e.g. Saline Branch Trail)
  - Other destinations
- Urbana Green Loop segments should be signed as the “Urbana Green Loop Trail” every mile, with the origin being King Park (the most northwest park in Urbana). The City of Urbana should coordinate with the Urbana Park District when assembling these signs.
- Supplemental distance/time (in miles/minutes), destination, and directional signage that match these trail signs should also be installed (see [Figure 59](#)).

Other Champaign County Greenways & Trails sign types that can be installed along Urbana shared-use paths are:

- Oval sign
- Point of Interest sign
- Arrow sign
- Map sign (includes removable map concept to display updated maps)



**Figure 58** Trail Mile Marker Sign, 18” x 9”  
(Source: *Champaign County Greenways & Trails Design Guidelines*)



**Figure 59** Trail Destination, Distance, and Direction Sign

### TRAILHEAD & REST AREA FACILITIES

Please refer to the *Champaign County Greenways & Trails Design Guidelines* for more information on the following features that could be installed along trails:

- Accessible bathrooms
- Benches
- Bollards
- Drinking fountains
- Information kiosks
- Landscaping
- Lighting
- Motorized vehicle parking
- Trash receptacles
- Trail art

## 5.3.2 SHARED-USE PATH (SIDE PATH)



Figure 60 Orchard Street north of Church Street

Sidepaths are shared-use paths running immediately parallel to a roadway, similar to, but wider than a sidewalk. In general, sidepaths may be better choices than on-road bikeways for faster, busier roads with few access points and with well-designed intersections.

Sidepath conflicts can be reduced by:

- Bringing the sidepath closer to the road at intersections, for better visibility during all turning motions and better stop line adherence for right turners, as shown in Figure 61.
- Using corner and/or median refuge islands (see Section 5.4.1) to break up major crossings and right-in-right-out entrances.
- Using high visibility crosswalks or color differences, including at commercial entrances.

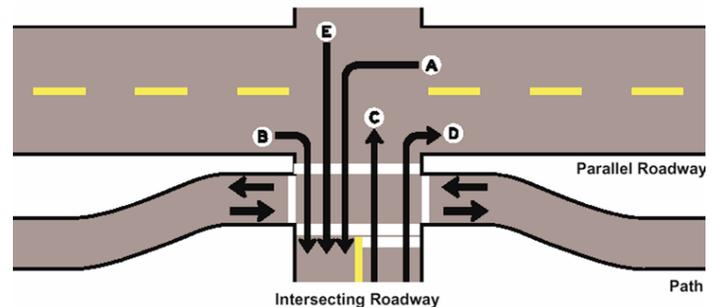


Figure 61 Example of a Sidepath/Roadway Intersection  
(Source: AASHTO)

### DIMENSIONS

Follow the recommendations in Section 5.3.1.

### SUB-GRADE AND TRAIL SURFACE

Follow the recommendations in Section 5.3.1.

### ENGINEERING

Follow the recommendations in Section 5.3.1.

### MARKINGS

Follow the recommendations in Section 5.3.1.

### SIGNS

Follow the recommendations in Section 5.3.1.



## 5.3.3 RAILS-TO-TRAILS

**Figure 62** Constitution Trail, a rail-to-trail shared-use path, Normal, IL

A “rail-to-trail” is a shared-use path, either paved or unpaved, built within the right-of-way of a former railroad,<sup>6</sup> perhaps under federal railbanking law.

### DIMENSIONS

Follow the recommendations in [Section 5.3.1](#).

### SUB-GRADE AND TRAIL SURFACE

Follow the recommendations in [Section 5.3.1](#).

### ENGINEERING

Follow the recommendations in [Section 5.3.1](#).

### MARKINGS

Follow the recommendations in [Section 5.3.1](#).

### SIGNS

Follow the recommendations in [Section 5.3.1](#). The sign recommendations based on the Champaign County Greenways & Trails Design Guidelines should be applied to the Kickapoo Rail-Trail in Urbana, St. Joseph, Ogden, and points in between.

## 5.3.4 RAILS-WITH-TRAILS



**Figure 63** MetroBikeLink Trail, a rail-with-trail shared-use path, Belleville, IL (Credit: Harry Sanders)<sup>12</sup>

A “rail-with-trail” is a shared-use path that parallels an active rail track, sometimes as an easement on railroad right-of-way. The Federal Highway Administration’s *Rails with Trails: Lessons Learned* provides best practices information on rails-with-trails.

### DIMENSIONS

Follow the recommendations in [Section 5.3.1](#).

### SUB-GRADE AND TRAIL SURFACE

Follow the recommendations in [Section 5.3.1](#).

### ENGINEERING

Follow the recommendations in [Section 5.3.1](#).

### MARKINGS

Follow the recommendations in [Section 5.3.1](#).

### SIGNS

Follow the recommendations in [Section 5.3.1](#).

12. Sanders, Harry. Rails-with-Trails. <https://werunandride.files.wordpress.com/2014/04/st-louise-metrobikelink.jpg>.



# 5.3.5 UNIVERSITY BIKE PATH



**Figure 64** Iowa Bike Path, along the Iowa Street corridor

*This path type is for the exclusive use of bicyclists.*

A University bike path is an off-street path for exclusive bicycle use on the University of Illinois campus. It has a striped dashed centerline to facilitate bi-directional travel. University bike paths vary in width from 6'-8'. All extensions or reconstructions should follow the latest AASHTO guidelines.

The University of Illinois 2014 Campus Bike Plan was adopted in 2015. That document can be accessed via the University's Illinois Climate Action Plan (iCAP) Portal at <http://icap.sustainability.illinois.edu/>.

The University of Illinois is responsible for implementing bicycle improvements on the streets and paths that it owns. [Appendix 4](#) outlines the street ownership in the University District and the responsibilities of the University of Illinois and the City of Urbana.

The City of Urbana should coordinate with the University of Illinois to facilitate smooth transitions between City and University paths.

## 5.4 POINT FACILITIES

Safe bikeway and trail crossings of roads are important to creating a safe and attractive bicycle network.

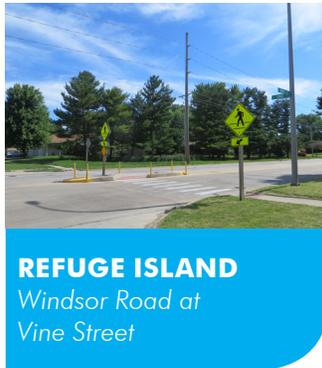
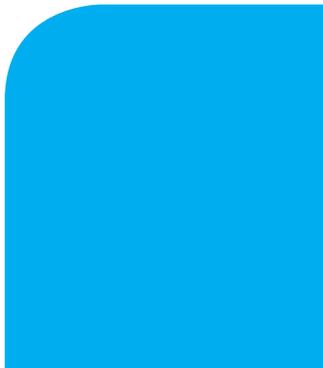
Convenient and accessible bike parking is also important to ensure bicyclists have a secure, attractive place to store their bike at the end of each trip.

Safety, convenience, and access are three of the four requirements people need to choose to make a trip by bike (see [Section 4.1.1](#)).

Guidance on trail crossing signage can be found in [Section 5.3.1](#).

Further guidance on shared-use path crossings can be found in MUTCD Figure 9B-7 and AASHTO Bike Guide Figures 5-17 through 5-20.

The point bicycle facility types existing and proposed in Urbana are listed below:





## 5.4.1 REFUGE ISLAND

**Figure 65** Refuge island and crosswalk across Windsor Road from Meadowbrook Park to Vine Street

A refuge island is a concrete island in the middle of a roadway that allows bicyclists and pedestrians to cross one direction of traffic at a time. The benefit of a refuge island is that it allows bicyclists and pedestrians to cross one direction of traffic at a time on roads where cross-traffic does not stop.

Typically, refuge islands include marked crossings on either side of the island, and are oriented at an angle so that the person(s) crossing must look at the approaching traffic before crossing. **The minimum width of a refuge island should not be less than 6’,** according to the Federal Highway Administration Report No. FHWA-SA-05-12.<sup>13</sup>

### DIMENSIONS

- **The desired width of a refuge island is 10’, in order to accommodate a bicycle with a trailer.<sup>7</sup>**
- **The minimum width of a refuge island should not be less than 6’.**
- The refuge island should be wide enough to accommodate two-way bicycle traffic.<sup>9</sup>
- Detectable warning surfaces should be installed at the edges of the sidewalks and the refuge island.

### ENGINEERING

- Refuge islands should be designed in accordance with the *Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities (ADAAG)* and the proposed *Public Rights-of-Way Accessibility Guidelines (PROWAG)*.

### MARKINGS

- High visibility crosswalk markings should be installed on both sides of the refuge island.
- Advance stop lines may be appropriate to install on the cross street ahead of the refuge island where the users crossing are given priority.<sup>7</sup>

### SIGNS

Follow the recommendations in [Section 5.3.1](#) and [Table 31](#).

13. FHWA. *How to Develop a Pedestrian Safety Action Plan*, Report No. FHWA-05-12. Federal Highway Administration, McLean, VA, 2006.



## 5.4.2 BIKE-ACTIVATED STOPLIGHT

There are two types of traffic signals in the City of Urbana: fixed-time and demand-actuated.

Fixed-time signals change at pre-set intervals. These signals do not have loop detectors. Therefore, if a car, bicycle, or pedestrian wants to cross the street, they must wait for the signal to change at the pre-set interval.

Demand-actuated signals consist of detector loops embedded in the pavement. The detector loops detect the presence of vehicles over them. Other demand-actuated signal detection methods include video, thermal imaging, and radar. Demand-actuated signals typically give a green light to the busier street until a car, bicycle, or pedestrian on the minor street wants to cross the busier street.

Both bicycles and motorcycles often have difficulty activating demand-actuated traffic signals. Cars may not be present to trip the signal, or cars may be stopped too far behind a bike. Pedestrian push-button actuation, if present, is often inconveniently located for on-road bikes.

The MUTCD Bicycle Detector Pavement Marking in Figure 64 (see MUTCD Figure 9C-7 for dimensions), together with the R10-22 Bicycle Signal Actuation Sign in Table 32, can indicate the detector trigger point for actuating the signal. This is typically on the perimeter of the detector. The Bicycle Detector Pavement Marking can have the auxiliary benefit of indicating proper bicycle positioning at an intersection, such as the straight-ahead lane where a right-turn lane is present.

**Figure 66** Goodwin Avenue at Green Street

Correct tuning of the detector is needed for sufficient sensitivity without false triggers from “crosstalk.” Other options are available. Quadrupole loop detectors are more sensitive to bikes and motorcycles, especially diagonal quadrupole inductive loops. The City of Urbana has also begun employing the use of thermal imaging cameras that sense bicyclists without the need for detector loops or push buttons.

Pedestrian push buttons on poles for bicyclists should only be used in locations where it is not possible to reliably detect the presence of bicycle traffic, or as an interim measure to ensure safe passage of bicycles until adequate detection systems can be installed. The placement of the push button detectors must be convenient to the bicyclist.

The Illinois Department of Transportation (IDOT) is responsible for installing and maintaining bike-activated stoplights at intersections along University and Cunningham Avenues since those streets are state or United States routes.

Signage Dimensions: Bike-Activated Stoplight	
Signs	Name & Dimensions
	<p>MUTCD Sign R10-22 To Request Green Wait on Symbol 12" x 18"</p>

**Table 32** Bike-Activated Stoplight sign dimensions (Source: MUTCD Figure 9B-2)



**Figure 67** Inverted U bike racks at Brookens Gym

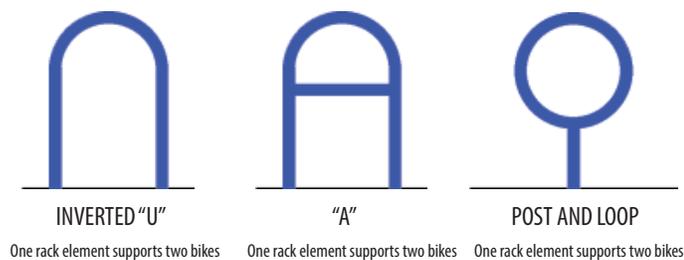
Providing secure bicycle parking is a necessary part of a bikeway network, allowing people to use their bikes for transportation and reducing parking in undesirable places. Successful bicycle parking requires a good bike rack in a good location within 50 feet of an entrance.

Bike parking should be located at trailheads and destinations along trails and bikeways, employment centers, schools, and public buildings (e.g. libraries, post offices, and shops). Bicycle storage facilities may be used in high traffic areas where users will be away from their bicycles for long time periods (e.g. employment centers, shopping malls, and schools) to protect bicycles from weather.

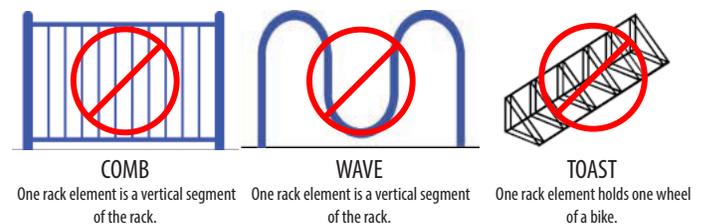
**TYPES**

A good bicycle rack provides support for the bike frame and allows both the frame and wheels to be secured with one lock. The most common styles include the “inverted-U” and the “post and loop” (accommodates two bikes each; see [Figure 68](#)).

Old-fashioned “school racks,” which secure only one wheel, are a poor choice for today’s bicycles (see [Figure 69](#)).



**Figure 68** Recommended bike racks  
(Source: APBP Bike Parking Guidelines)



**Figure 69** Not recommended bike racks  
(Source: APBP Bike Parking Guidelines)

The Association of Pedestrian and Bicycle Professionals (APBP) provides comprehensive information on bike parking in the 2nd Edition of its *Bicycle Parking Guidelines*, published in 2010. This document further categorizes acceptable and non-acceptable bike parking types:

Recommended bike parking types (see Figure 68):

- Inverted U (“A” rack when it includes a crossbar)
- Post and Ring (i.e. Post and Loop)
- Inverted U Series

Acceptable bike parking types:

- Wall-Mounted Racks
- Wheelwell - Secured (see Figure 70)
- Tree Guard Bicycle Racks
- Modified Coathanger
- Two-Tier or Double Decker

Unacceptable bike parking types (see Figure 69):

- Undulating (i.e. Wave)
- Schoolyard (i.e. Grid, Comb)
- Sprial
- Wheelwell
- Coathanger
- Swing Arm Secured

The unacceptable bike parking types do not meet some of the critical design criteria in the APBP *Bicycle Parking Guidelines* 2nd Edition. Incentives should be developed to replace unacceptable bike parking where it currently exists.

Other considerations for bicycle parking include:

- Sheltered bike parking (i.e. Covered bike parking)
- In-street bike parking facilities (i.e. Bike Corrals)
- Bike parking in public right-of-way (e.g. sidewalks)
- Event bike parking
- Bike transit centers

Dero and Park-A-Bike (especially the Varsity Bike Dock) are two companies whose bike parking types have been installed in Urbana and on the University of Illinois campus. The Varsity Bike Dock is a secured wheelwell, an acceptable bike parking type (see Figure 70).



Figure 70 Varsity Bike Docks (Credit: Park-A-Bike)

**LENGTH OF STAY**

All bike parking facilities fall into two categories: short-term (two hours or less) and long-term (more than two hours). Short-term bike parking accommodates convenience and ease of use, while long-term bike parking provides security and weather protection.<sup>12</sup> The San Francisco Municipal Transportation Agency (SFMTA) lists various short-term and long-term bike parking types in its *Bicycle Parking Standards, Guidelines, and Recommendations* document (see Figure 71).

12. APBP. *Bicycle Parking Guidelines*, 2nd Edition. Association of Pedestrian and Bicycle Professionals, Cedarburg, WI, 2012.

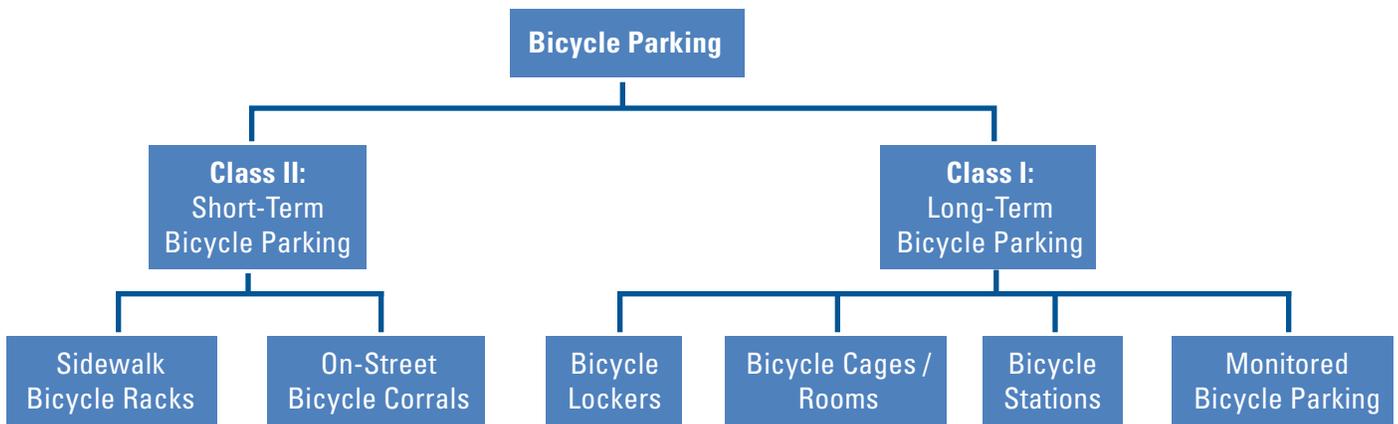


Figure 71 Bicycle Parking Typology Diagram (Credit: San Francisco Municipal Transportation Agency)

## DIMENSIONS

According to the AASHTO Bike Guide, bicyclists will seek to park as close as practical to their final destination. Therefore, bike parking should be conveniently placed in a highly visible location within 50 feet or as close to the building entrance as practical. Bike parking should also be placed at both the trip origin and destination.

Following are the City of Urbana design standards for bike parking, which incorporate the *Champaign County Greenways & Trails (GT) Plan's* bike parking design standards:

- Located no more than 50 feet from the building entrance or trail entrance.
- A minimum of 24 inches from a parallel wall and 30 inches from a perpendicular wall.
- A minimum of 4 feet from curb ramps, fire hydrants, building entrances, etc.
- Facilities should not interfere with pedestrian flow. If located on sidewalks, racks and the bicycles linked to them should provide sufficient clearance around them for all types of pedestrians, including wheelchair users.
- Bicycle racks should be mounted on a 6-inch thick concrete slab.
- Bike racks should support both wheels to prevent bent rims.
- Bike racks should be fabricated of pipe or other durable material.

## SIGNS

MUTCD Sign D4-3 (see [Table 33](#)) can be installed to direct people to designated bicycle parking areas, from either an on-street or off-street bikeway.

Sign Dimensions: Bike Parking	
Signs	Name & Dimensions
	<p>MUTCD Sign D4-3 Bicycle Parking Area 12" x 18"</p>

**Table 33** Bike Parking sign dimensions  
(Source: MUTCD Figure 9B-4)



## 5.4.4 TWO-STAGE TURN QUEUE BOXES

**Figure 72** Two-stage turn queue box, Portland, OR  
(Credit: NACTO Urban Bikeway Design Guide)

The NACTO *Urban Bikeway Design Guide* introduces a new intersection treatment for bicyclists. Two-stage turn queue boxes offer bicyclists a safe way to make left turns from a right side bike lane or cycle track. Two-stage turn queue boxes may also be used at unsignalized intersections to simplify turns from a bike lane or cycle track. Multiple positions are available for queuing boxes, depending on intersection configuration.

Locations exist in Urbana where cyclists must transition between bike lanes or sharrows on one side of the road and a sidepath on the other side of the road in order to stay on a bicycle facility. This makes the provision of two-stage turns critical for basic transportation function.

The FHWA *Separated Bike Lane Planning and Design Guide* recommends that when a bike lane terminates at an off-street trail or sidepath, designers should place markings and signage to emphasize the connection and enforce space designations for different user groups (generally differentiating space for cyclists from space for pedestrians or joggers). Green paint can be used at the junction of these facilities in order to alert different path users to the presence of cyclists entering and exiting the trail to and from the bike lane. Depending on the nature of the off-street trail, bicycle-specific wayfinding signage should be installed near the end of the bike lane to encourage the off-street trail's use (see [Section 5.2.1](#)).

The two-stage turn queue box is experimental in accordance with the MUTCD. The two-stage turn queue box should be designed in accordance with the MUTCD experimental approval. It should be located out of the way of through bicyclists, usually between the bike lane and crosswalk.

## DIMENSIONS

The *FHWA Separated Bike Lane Planning and Design Guide* recommends that two-stage turn queue box dimensions be about the same size or larger than the dimensions of four (4) cyclists standing side by side (i.e. 10 feet wide by 6.5 feet deep).

## MARKINGS

Following are the required features of a two-stage turn queue box based on the *NACTO Urban Bikeway Design Guide*:

- An area shall be designated to hold queuing bicyclists and formalize two-stage turn maneuvers.
- Pavement markings shall include a bicycle stencil and a turn arrow to clearly indicate proper bicycle direction and positioning.
- The queue box shall be placed in a protected area. Typically this is within an on-street parking lane or between the bike lane and the pedestrian crossing.
- At intersections that permit right turns on red signal indications, a “No Turn on Red” sign shall be installed overhead to prevent vehicles from entering the queuing area.

Following are recommended features of a two-stage turn queue box based on the *NACTO Urban Bikeway Design Guide*:

- The queue box should be positioned laterally in the cross-street, to promote visibility of bicyclists.
- Colored paving inside of the queuing area should be used to further define the bicycle space. It should be noted that snow and ice will make colored pavement a challenge to maintain.
- Markings across intersections should be used to define through bicyclist positioning.
- Signage may be used to define proper positioning and improve visibility of the queue box.
- Guide lines, pavement symbols, and/or colored pavement may be used to lead bicyclists into the queue box.

## MARKING BENEFITS

Following are several benefits of installing two-stage turn queue boxes based on the *NACTO Urban Bikeway Design Guide*:

- Improves bicyclist ability to safely and comfortably make left turns
- Provides a formal queuing space for bicyclists making a two-stage turn
- Reduces turning conflicts between bicyclists and motor vehicles
- Prevents conflicts arising from bicyclists queuing in a bike lane or crosswalk
- Separates turning bicyclists from through bicyclists



**Figure 73** Two-Stage Turn Queue Box  
(Credit: *NACTO Urban Bikeway Design Guide*)