DISCLAIMER

The following document is an internal guide for the use of the employees of the City of Springfield, Missouri in applying "bicycle friendly" policies. This document has not been passed or approved by the City Council as ordinance. This guide is not authoritative, nor does it claim to be a legal standard to be followed. This document is only a guide and is not intended to be used by third parties, except only as examples of possible solutions to roadway design by the City of Springfield. All third parties should consult with their staff, qualified professionals, and/or necessary design standards in the design of any bicycle facilities to assure proper applications of roadway design.

Bikeway Signing & Marking Guide

Revised July 2019

City of Springfield – Public Works
Traffic Operations Division
840 Boonville Avenue,
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2. OVERVIEW

Biking is an important mode of transportation within the city of Springfield. Therefore, it is important for bicycle facilities to be implemented on City streets. However, Springfield has many different classifications of streets, so it is important to understand which types of facilities are applicable, and where.

The purpose of this *Bikeway Signing & Marking Guide* is to help guide City staff in the design of on-street and off-street bicycle facilities within the city of Springfield.

3. GENERAL BIKEWAY SIGNING & MARKING

Signs and markings for bicycle facilities are included in the Manual on Uniform Traffic Control Devices for Streets and Highways (MUTCD) – Part 9. Design guidance is provided in the Urban Bikeway Design Guide – National Association of City Transportation Officials (NACTO) and the Guide for the Development of Bicycle Facilities – American Association of State Highway and Transportation Officials (AASHTO). Additional guidance is provided herein.

In general, shared lane bikeways may be provided on low-volume, low speed streets and bike lanes may be provided on streets with higher volumes and higher speeds. Table 1 below provides specific bicycle facilities that are applicable to streets based on their respective volumes and speeds.

Table 1: Street Suitability for Bicycle Facility

Road Volume	**Speed (MPH)**			
(Vehicles Per Day)	**< 30**	**30**	**35**	**> 35**
0 - 2,000	1	2	2	4
2,001 - 6,000	2	2	3	4
> 6,000	3	3	3	4

1. Suitable for all types of bicycle facilities and for bicycling without signs and markings
2. Suitable for all types of bicycle facilities
3. Suitable for bike lanes; shared lane bike routes may be used with engineering judgement
4. Suitable for bike lanes; not suitable for shared lane bike routes; may sign with BICYCLE SHARE THE ROAD warning signs when needed to connect other bicycle facilities and when frequently used by bicyclists if deemed appropriate after speed, volume, and distance analysis

4. SHARED LANE SIGNING & MARKING

Shared lane markings, as described in the MUTCD, may be used in addition to the signs to provide additional information to all roadway users that the street is a designated bikeway. While the MUTCD states that, if used, the shared lane marking should be place immediately after an intersection and spaced at

intervals of not greater than 250 feet, the City of Springfield has established a more generous spacing. Shared lane markings should be applied near the center of the driving lane and near street lights, when practical. Marking may be applied at approximate spacing as set forth in Table 2 below. Table 2 sets forth more specific suggestions based on whether there is an adjacent two-way left turn lane (TWLTL). It also addresses lane volumes, which may be applicable for four or five lane roadways with less than 3,000 vehicles per day, per lane.

Table 2: Bicycle/Motor Vehicle Shared Lane Marking - Spacing

Lane Volume	Lane Adjacent to Two-Way Left Turn Lane	Lane Width	Speed (MPH)		
			< 30	30	35
			Min./Max.	Min./Max.	Min./Max.
0 - 1,000	Yes	12 - 15	440'/550'	440'/550'	440'/550'
		< 12	440'/550'	440'/550'	440'/550'
	No	12 - 15	440'/550'	440'/550'	330'/440'
		< 12	440'/550'	440'/550'	330'/440'
1,001 - 2,000	Yes	12 - 15	440'/550'	440'/550'	330'/440'
		< 12	440'/550'	440'/550'	330'/440'
	No	12 - 15	440'/550'	330'/440'	220'/250'
		< 12	440'/550'	330'/440'	220'/250'
2,001 - 3,000	Yes	12 - 15	330'/440'	330'/440'	330'/440'
		< 12	330'/440'	330'/440'	330'/440'
	No	12 - 15	330'/440'	220'/250'	Do Not Use
		< 12	330'/440'	220'/250'	Do Not Use
> 3,000	Yes	12 - 15	330'/440'	220'/250'	220'/250'
		< 12	330'/440'	220'/250'	Do Not Use
	No	12 - 15	220'/250'	220'/250'	Do Not Use
		< 12	220'/250'	Do Not Use	Do Not Use

* Engineering judgement should be used for streets with volumes greater than 4,000 vehicles per day and speed limits greater than 35 MPH

Shared Lane Signing Guide:

- Place W11-1 BICYCLE WARNING sign in advance of the beginning of a bike route on a street
- Place R4-11 BICYCLE MAY USE FULL LANE sign for first sign on route, first sign after a major street, at the end of a bike lane, or at least one per mile
- Place D11-1 BIKE ROUTE signs along shared lane roadways between R4-11 signs at approximate spacing of 880 feet
- Place D11-1 BIKE ROUTE signs with directional arrows at intersections of other bike routes and at turns in bike route being signed

Shared Lane Symbols & Arrows Guide:

- Approximate spacing for shared lane markings is 440 feet (maximum spacing of 550 feet) for streets with lane volumes less than 1,000 vehicles per day and a speed limit of 30 MPH or less
- Spacing for shared land markings is decreased as speed and volume increases and/or available street width decreases, as shown in Table 2
- Place markings near street lights and away from areas that pond water
- Place markings centered five feet to six feet from the center of the roadway
- Place first marking from cross street where wheel tracking from turns becomes consistent along tangent section of roadway, typically about 20 feet from where the corner radius meets the tangent curb
- Place markings where they are clearly visible from 100 feet to 200 feet away. Avoid placement in shadowed area of otherwise sunlit roadway and on a crest vertical curve
- Shared lane marking is not recommended on street with speed limits higher than 35 MPH and traffic volumes higher than 3,000 vehicles per lane, per day

Exhibit 1 on the following page depicts typical signing and marking for streets with lanes shared among bicycle and motor vehicles.

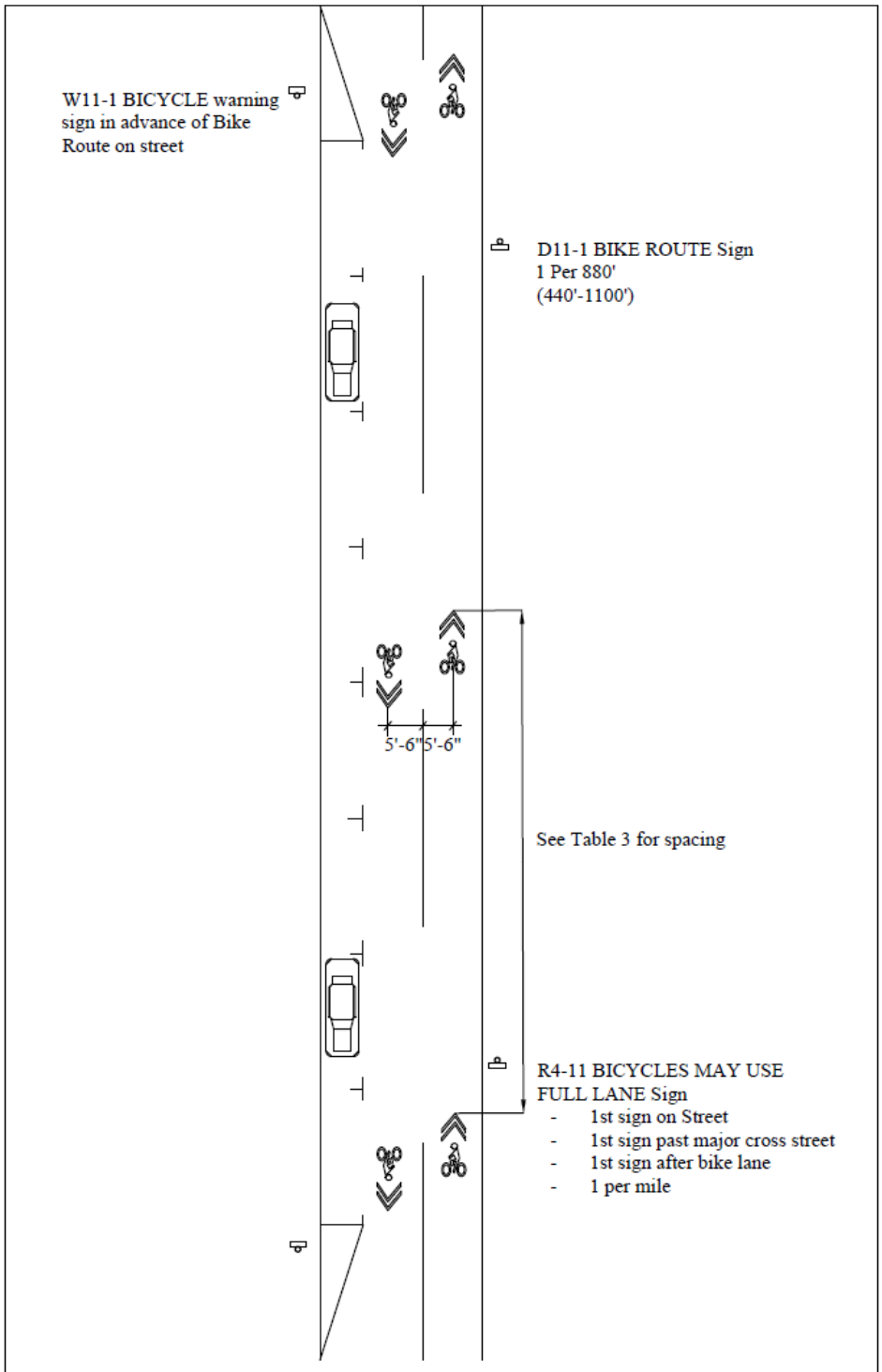

EXHIBIT 1:
Shared Lane Signing and Marking Guide

Shared Bikeways at Major Intersections:

On many of Springfield's two-lane collector roadways, a left turn lane is added at signalized intersection and some other intersections with major streets. In these cases, the bike lane is dropped where the median begins, to expand for the left turn lane. The through lanes are marked with a shared lane marking near the beginning of the left turn lane. Exhibit 2 on the following page shows typical signing and marking for shared lanes through a signalized intersection, including the transition from bike lane to shared lane.

Markings for Shared Bikeways at Major Intersections:

- Place bicycle detector symbol over center of loop where best detection occurs – approximately one foot in advance of the stop bar

  Bicycle detector markings are used to show where a bicycle can be stopped to be detected by a traffic signal controller. Where traffic signal loops are present, the decal should be located on the center saw cut or loop wire run near the intersection end of the saw cut, or about 12 inches from the stop bar, as shown in Exhibit 3 on the following page. Where a square loop is used, the detector should be placed on the side near the curb at the intersection end of the side parallel to the curb, also shown in Exhibit 3 on pg. 9. Where there is no pavement evidence of loop location, the Traffic Signal Shop should mark the loop location. The Traffic Signal Shop should watch the controller for actuation by a bicycle to assure that the controller is appropriately detecting bicycles.
- Place BIKE ROUTE directional symbol in center of lane at signal seven to twenty feet in advance of stop bar.
- Place BIKE ROUTE direction symbols in center of lane at intersection of other bicycle facilities and where bike route changes direction – within 20 feet of cross-street, crosswalk, or stop bar; 100 feet in advance of right or left turn lane lines for effective lane change movement; intermediate location between intersections and advance symbols where distance is more than 250 feet.

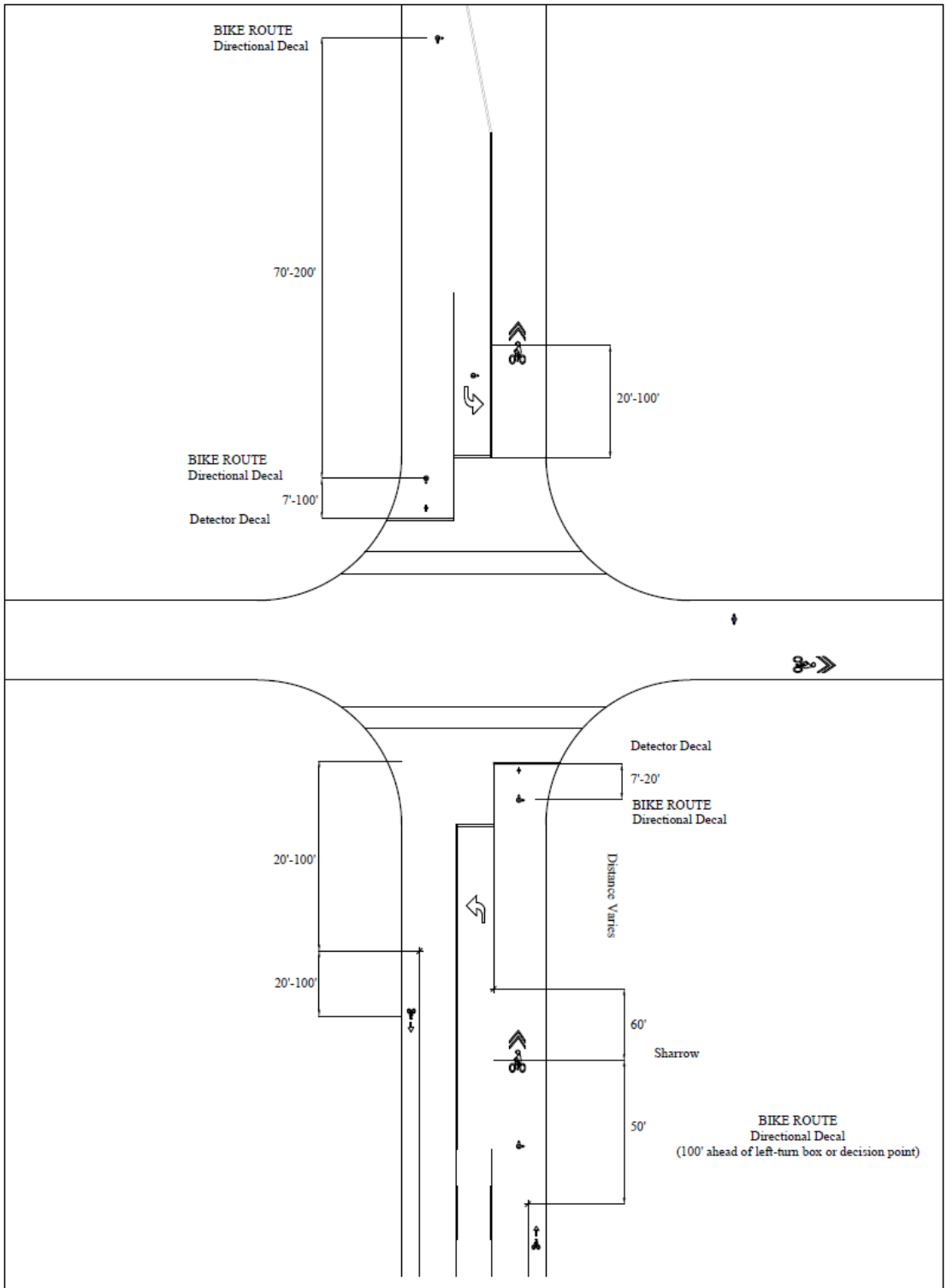

EXHIBIT 2:
Shared Lane Signing & Marking Through Signalized Intersection
Bike Lane to Shared Lane Transition

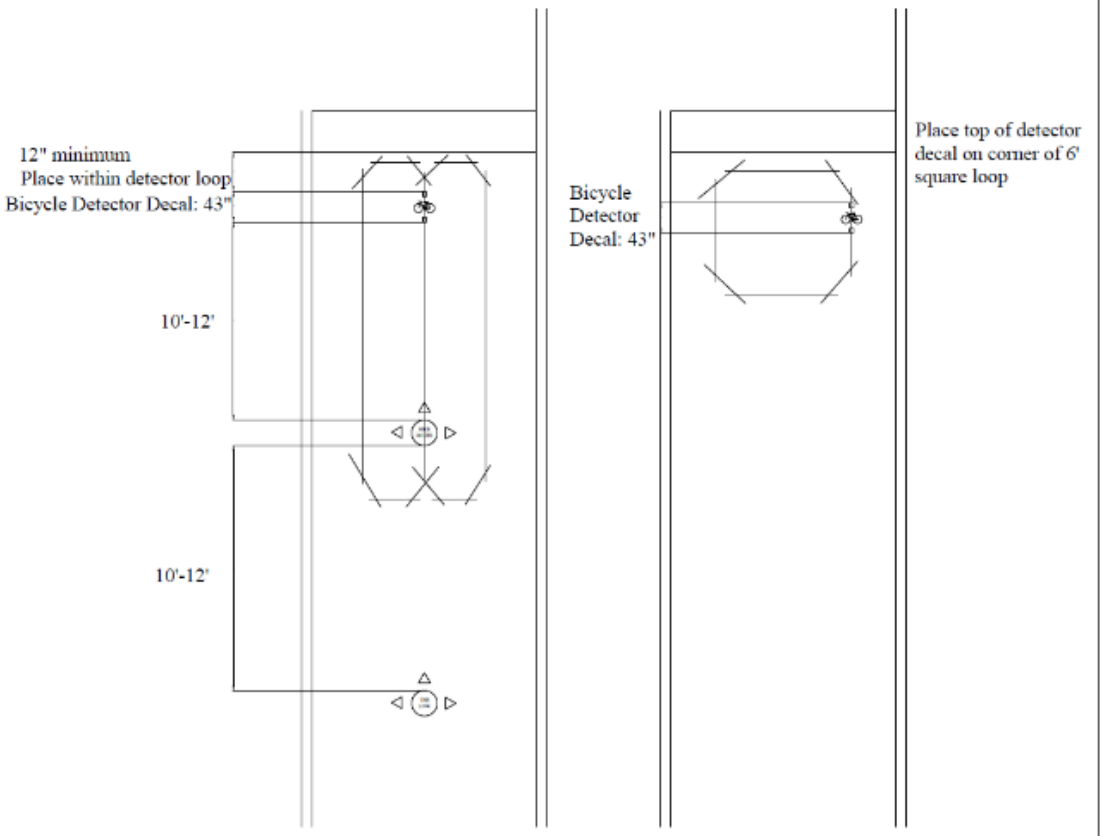

EXHIBIT 3:
Intersection Approach Bicycle Markings Including
Traffic Signal Loop Detector Placement

5. BIKE LANE SIGNING & MARKING

Bike lanes are designated by a solid six-inch white line between the edge of the roadway and the space designated for motor vehicles operation. Bike lanes are for the operation of bicycles, but may be used by motor vehicles making right turns.

A dashed bike lane (two-foot stripes with six-foot gaps) indicates that the bike lane may be shared with motor vehicles. The dashed bike lane should be marked on each side of the bike lane across public street intersections and all legs (public or private) of signalized intersections.

The dashed bike lane should be used in advance of intersections where a substantial number of right turn movements are made across the bike lane, such as signalized intersection approaches and intersecting collector streets where more than 400 right turns from bikeway street to intersecting street or driveway occur each day. Dashed line marking should begin 100 feet in advance of the intersecting street or driveway where parking is not permitted. Where parking is permitted, dashed line should begin at the end of the nearest parking space.

A dashed bike lane should be used adjacent to bus stops. The line should be dashed 40 feet in advance of bus stops and 20 feet downstream of bus stops. The line should be dashed across entrance and exit for turnouts and may be solid adjacent to the bus stopping area.

Where a bike lane is marked adjacent to a parking lane, the desirable combined width is 15 feet and the minimum combined with is 13 feet. The minimum bike lane width adjacent to parked vehicles is six feet and the minimum parking lane width is seven feet. A three-foot door zone may be marked between the parking lane and the bike lane. The minimum width of the bike lane adjacent to a door zone is four feet. Less bicycle lane width may be considered when the occupancy of an adjacent parking lane is less than 30 percent and when parking turnover is low. Less bicycle lane width may also be used for short distances such as through intersections where approximate lane width criteria is met.

Bicycle lanes should be wider on streets with higher speeds and larger vehicles. Table 3 below shows bicycle lane widths relative to speed limits. Greater width should also be considered when traffic volumes exceed 4,000 vehicles per lane, per day and when the proportion of trucks and large vehicles is high.

Where speed limit is 40 MPH or more, a 24-inch to 36-inch buffer between the bicycle lane and motor vehicle traffic lanes should be considered by reducing the bicycle lane to five feet. A 24-inch to 36-inch door zone buffer may be provided between a parking lane and a bicycle lane. The width of a bicycle lane between buffers and other barriers should not be less than five feet.

Table 3: Bicycle Lane Width Relative to Speed

Speed Limit (MPH)	**Bicycle Lane Target Width (ft)**				**Motor Traffic Lane Target Width (ft)**	
	Lane Adjacent to Moving Traffic		**Lane Adjacent to Two-Way Left Turn Lane**			
	No Parking	**Parking**	**No Parking**	**Parking**	**No Parking**	**Parking**
≤ 30	5	7.5	5	7.5	10.5	11
35	6	7.5	5	7.5	11	11
40	7	8	6	7.5	11.5	12
≥45	8	9	7	8	12	12

Bike Lane Signing Guide:

- Place R3-17 BIKE LANE sign at beginning of bike lane and at approximate spacing of 880 feet
- Place D11-1 BIKE ROUTE signs with directional arrows at intersections of other bike routes and at turns in bike route being signed
- Place W11-1 BICYCLE WARNING sign in advance of the beginning of a bike route on a street

Bike Lane Symbols & Arrows Guide:

- Begin bike lane where wheel tracks from turning vehicles become parallel to tangent curb, typically about 20 feet from where corner radius meets tangent curb

- Place bike lane symbol and arrow at approximate distance of 10 feet to 100 feet from beginning of bike lane
- Place bike lane symbol along bike lane at an approximate spacing of 220 feet to 550 feet centered 24 inches right of left bike lane line
- Place markings near street lights and away from areas that pond water
- Place markings where they are clearly visible from 100 feet to 200 feet away. Avoid placement in a shadowed area of otherwise sunlit roadway and on a crest vertical curve
- Place bike lane symbol near end of solid bike lane lines prior to transition to dashed bike lane lines and near beginning of solid bike lane lines downstream of transition from dashed bike lane lines
- When a bike lane is between two moving traffic lines, place bike lane symbols at an approximate spacing of 110 feet to 250 feet centered in bike lane
- When a dashed bike lane length is more than 250 feet, place shared lane symbols within the dashed bike lane at an approximate spacing of 110 feet to 250 feet centered 24 inches right of left bike lane line

Exhibit 4 below shows signing and marking for a typical street/intersection

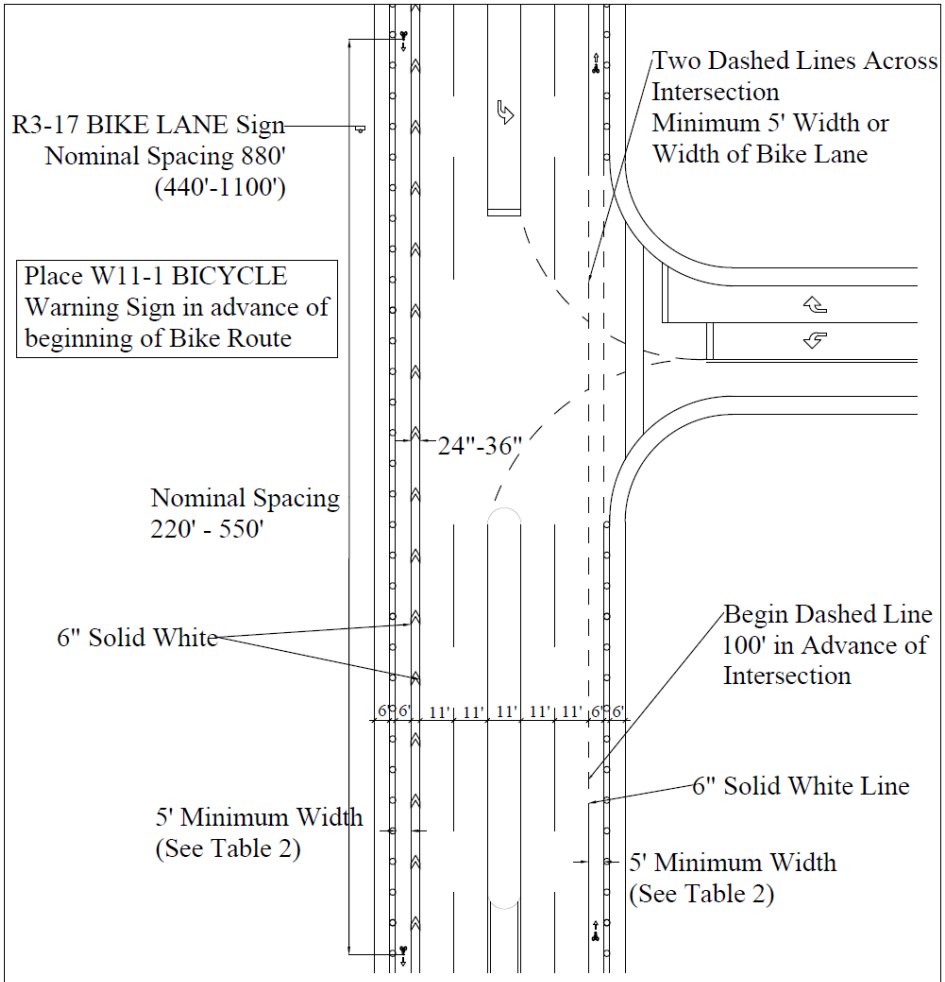

EXHIBIT 4:
Bike Lane Signing and Marking Guide

Where street width is available on signalized intersection approaches, a bike lane may be marked adjacent to the motor vehicle lane and across the intersection. The lane marking should change from a solid line to a dashed line where motor vehicles turning right would occupy the same space as bicycles going through or right. The City of Springfield's policy for length of the dashed bike lane for right turns is $\frac{\sqrt{speed\ limit}}{8}$, as shown in Table 4, below:

Table 4: Length of Dashed Line for Right Turn Encroachment

Speed Limit (MPH)	**Length of Dotted Line (ft)**
25	80
30	110
35	150
40	200
45	250
50	310

Where there is width for a right turn lane and a bike lane, the bike lane is marked with solid six-inch white spaced a minimum of five feet apart between the through lane and the right turn lane. The bike lane shall be marked with dashed lines between the beginning of the taper of the right turn lane and the sloid right turn lane. The bike lane should be marked across the intersection with dashed lines a minimum of six feet apart. The bike lane pavement marking symbol will be located near the beginning of solid lines and near the end of solid lines in advance of dashed lines. Exhibit 5 on the following page depicts typical bike lane markings through an intersection.

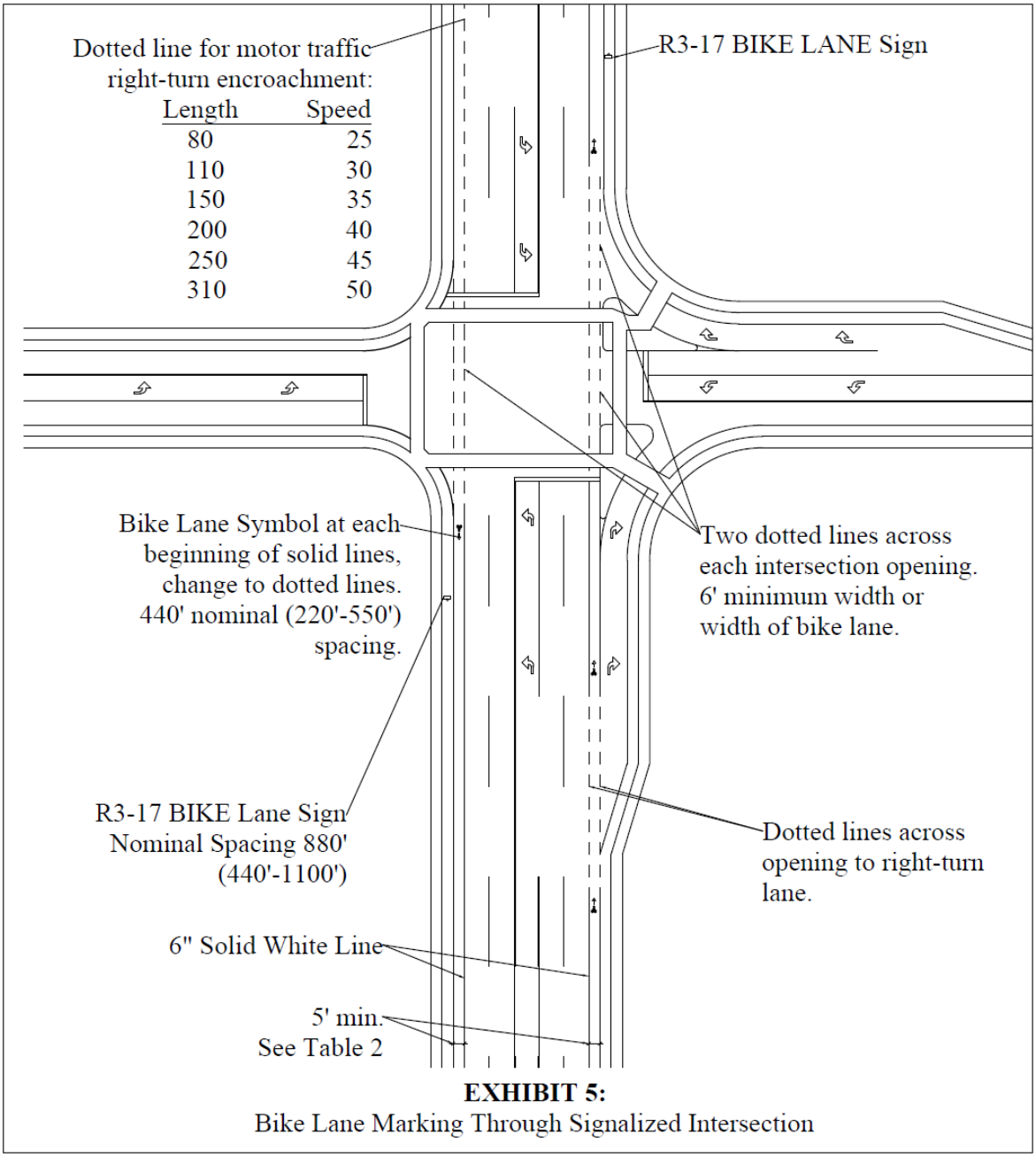

EXHIBIT 5:
Bike Lane Marking Through Signalized Intersection

Where 10 to 15 feet of width is available for a right turn lane, the bike lane may merge into a shared lane for through and right bicycle movements and right turn motor vehicle movements. The designation of a bike lane across an intersection should be with a set of dashed lines spaced six feet apart. Exhibit 6 on the following page shows the typical treatment of a two-lane street with bike lanes between parking lanes and motor vehicle traffic lanes.

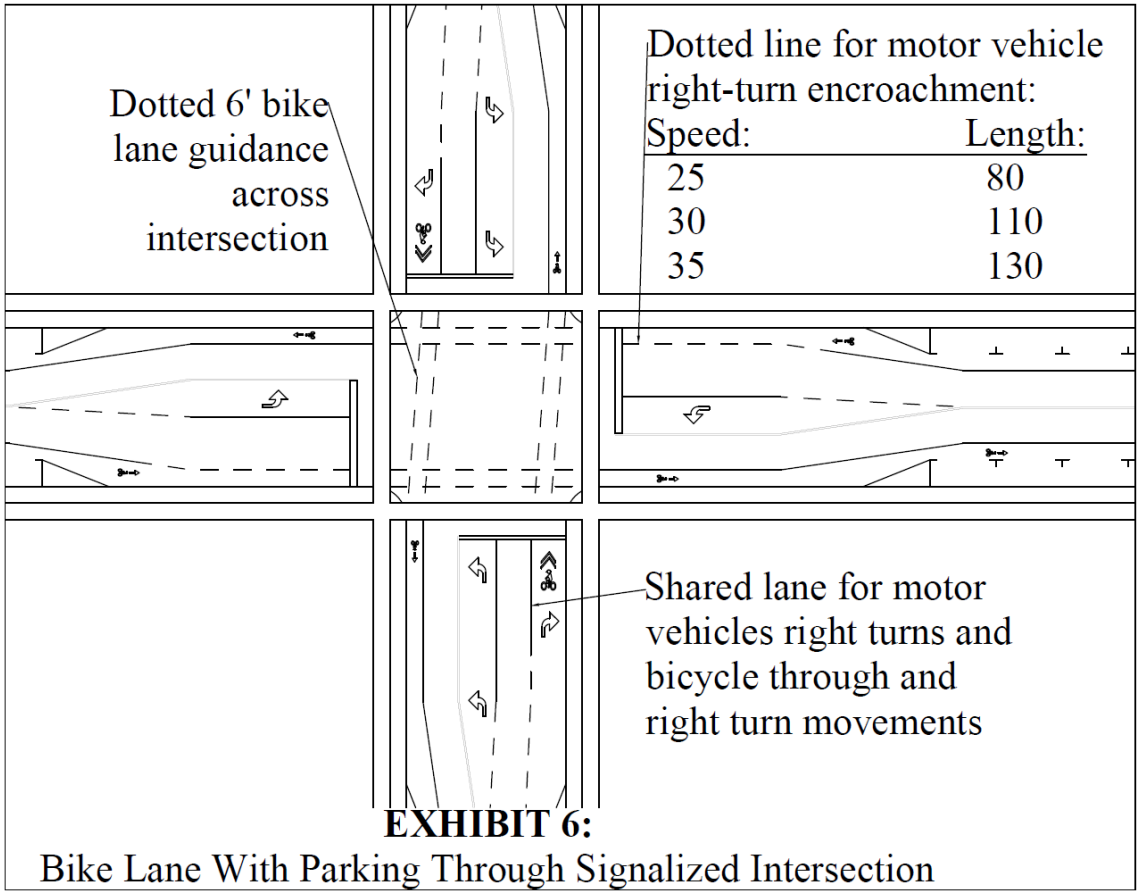

EXHIBIT 6:
Bike Lane With Parking Through Signalized Intersection

The minimum width of the parking lane is seven feet. A two-foot to three-foot buffer may be striped between the parking lane and bike lane as a "door zone". When a buffer is available, the bike lane should not be less than five feet. Where a left turn lane is added, and parking is prohibited near major intersections, the length of dashed lines for motor vehicle right turn encroachment should be similar to that shown in Table 4, but can be adjusted to conform to the end of the parking lane and length of the left turn lane. Exhibit 7 on the following page shows a typical layout for a bikeway with lanes shared among motor vehicles and bicycles and for a street with bike lanes passing through a multi-way stop intersections. Refer to Exhibit 3 for bicycle detector marking details for shared bikeways at major intersections.

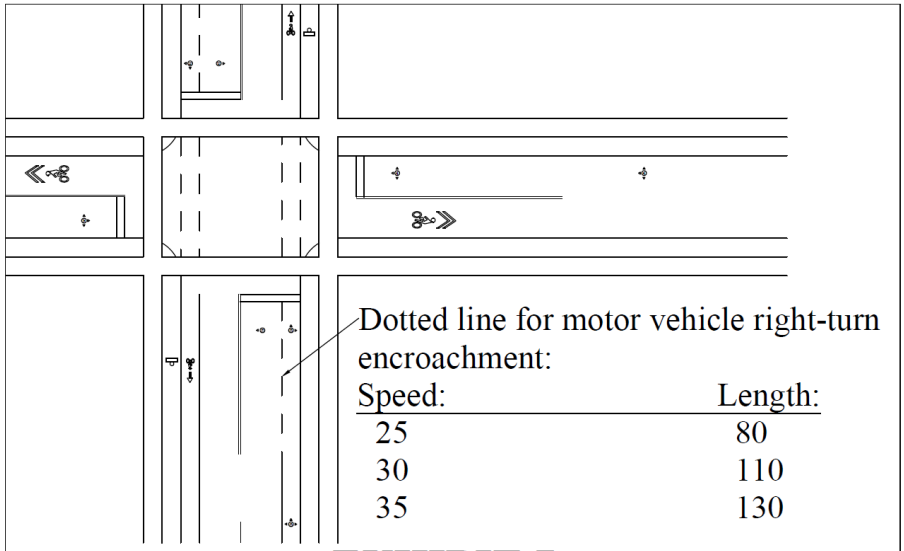

EXHIBIT 7:
Bike Lane & Shared Lane Through Intersection with Multi-Way Stop

6. SIDEPATHS, SIDEWALKS, & OTHER ON/OFF-STREET BICYCLING FACILITIES

Sidewalks:

Bicycling is permitted by state code on sidewalks, except within business districts. Bicycling is not appropriate on sidewalks with heavy pedestrian use and those with building access and pedestrian activity areas within ten feet of the sidewalk (such as downtown districts). There are many dangers to bicycling on sidewalk that may not be immediately evident.

Motorists, when preparing to enter a street, look for vehicles on the street on the near side of the roadway to their left and the far side of the roadway to their right. Motorists frequently will not perceive a person walking or bicycling, even though they look at them (because they do not identify them as creating a need to take an action), especially when they are outside of their normal cone of vision when looking for motor vehicles.

Persons riding bicycles on sidewalk are not perceived by motorists preparing to cross their paths at street and driveway intersections. Persons riding bicycles on sidewalks must consider every street and driveway intersection a potential hazard and enter at a speed such that they can stop before encountering a motorist that did not see them. Further, persons riding bicycles on sidewalks must be prepared to stop and avoid pedestrians on the sidewalk and objects within sidewalk – such as garbage cans, pavement irregularities, unrepaired utility cuts, and vertical pavement separations.

Side Paths:

Side paths and two-lane separated bicycle paths may be constructed adjacent to streets where on-street bicycle facilities are not appropriate with the understanding that every intersection is a hazard that requires extra signing and marking. Motorists can identify bicyclists approaching from

both directions better at a mid-block crosswalk than at an intersection. Consideration should be given to placing the crossing of two-way parallel bicycle paths at least 25 feet from the face of curb so that there is room for an automobile to stop before the crosswalk – yet clear of the intersecting street.

Signs warning of a two-way bicycle path should be visible for traffic turn right, left, and opposite the intersection adjacent to the crossing. Vertical deflection at or in advance of the crossing, such as a speed table or rumble strips would add additional attention that the crossing is present. The design of the approach of the bikeway should provide maximum visibility of the bicyclists and maximum view for the bicyclist to see motor vehicles. A typical design for a side path or two-way bike lane crossing a street is shown below in Exhibit 8:

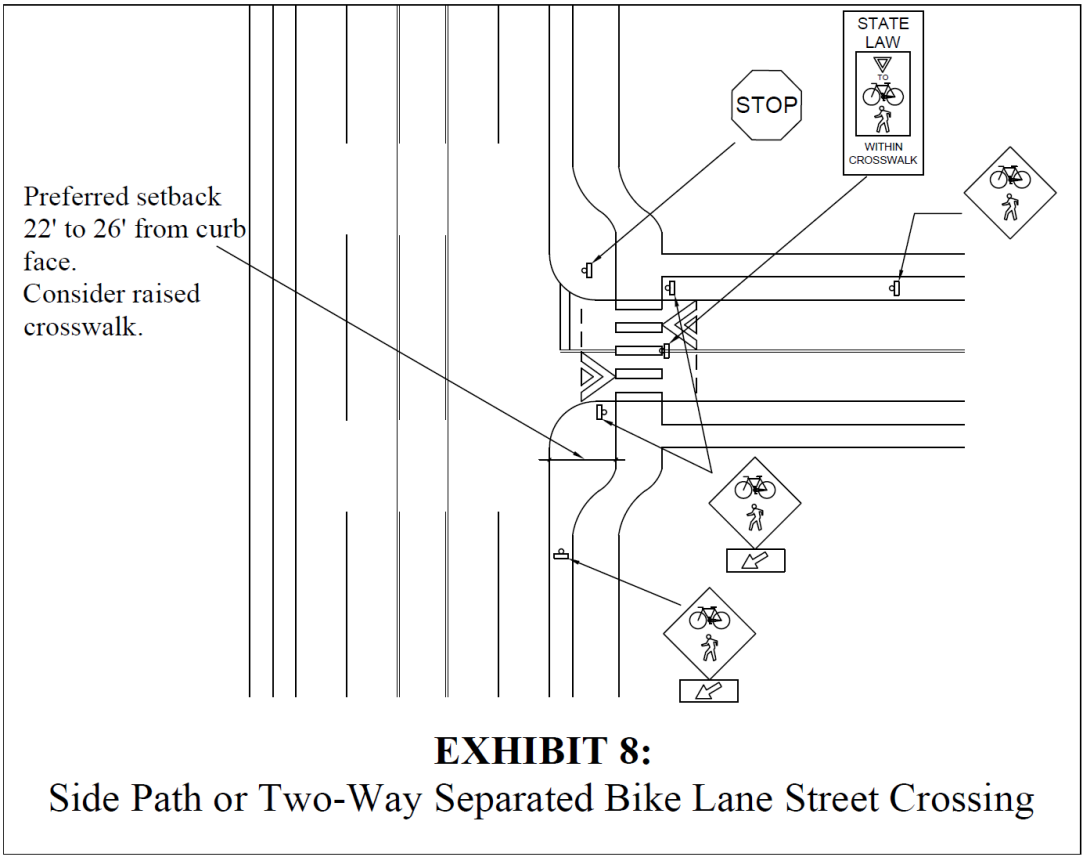

EXHIBIT 8:
Side Path or Two-Way Separated Bike Lane Street Crossing

Separated Bikeways:

A separated bikeway is a lane or path exclusively for bicycles that is separated by horizontal and vertical elements from roadway space allocated to motor vehicles and pedestrians. The separated bikeway may be at roadway level, sidewalk level, or between the two. The separated bikeway may be separated by motor traffic by a parking lane, by planters/bollards, or by curbing. Separation between a bikeway and sidewalk often includes tree wells, landscape wells, or space occupied by street furniture. Separated bike lanes operate similar to on-street bike lanes, but are

less visible to other traffic because they are further from the edge of the motorway. Separated two-way bikeways operate like side paths.

High-Volume & High-Speed Roadways:

Roads and highways typically have posted speed limits greater than 35 MPH. Roads and highways that are frequented by bicyclists may be signed as bike routes with a W11-1 BICYCLE WARNING sign combined with a W16-1P SHARE THE ROAD sign. This signage may also be used on streets needed as a connection between designated bike routes that have traffic volumes or posted speed limits greater than desirable for designating the street as a bike route. In either case, an engineering analysis is needed to balance the roadway conditions with the suggestion that bicyclists may use the roadway.

The LINK:

The LINK is a designation on low-volume, slow speed streets that provide a link among the Greenway Trail system and activity centers. This includes an experience for walkers and bicyclists similar to a Greenway Trail. The LINK provides continuation and connection among the walkable features of main street, downtown streets, campuses, and the Greenway trail system. Streets with The LINK designation is low-volume, slow speed streets or provide some separation of bicyclists and motor vehicles and have continuous accessible sidewalk along at least one side. A goal of The LINK is to provide traffic control and traffic calming that discourages use by motor vehicles and encourages use by bicyclists and pedestrians. The LINK is designated by signs that supplement other bikeway signing along the street - and by signs and pavement markings along the streets/sidewalks to provide guidance along The LINK. Exhibit 3 below shows the use of a LINK decal on a street at an intersection approach and Exhibit 9 below shows use of sidewalk LINK decals on a street corner.

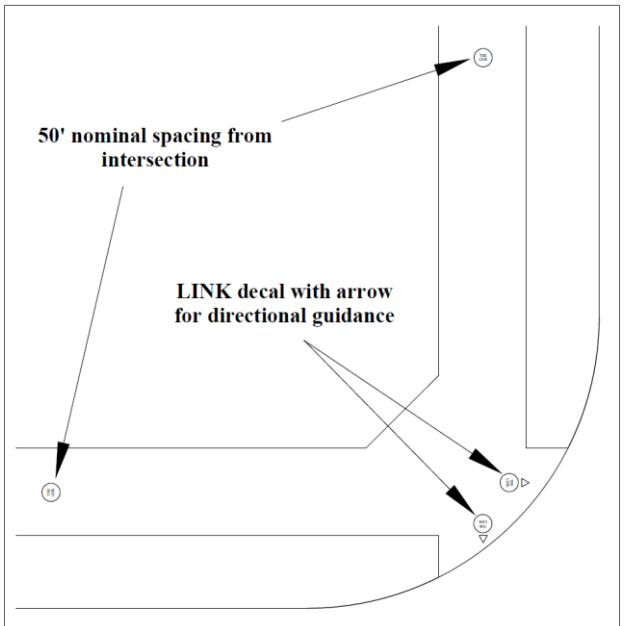

EXHIBIT 9:
LINK Decal Placement on Sidewalk Intersections

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