# Section 10
# Bicycle Facility Standards

The purpose of this section is to present recommended standards for on-street and off-street bicycle facilities within the Rockford Area Transportation Study (RATS) Metropolitan Planning Area (MPA). Complete reviews of existing standards provided by the American Association of State Highway and Transportation Officials (AASHTO), the Illinois Department of Transportation (IDOT), and the Manual on Uniform Traffic Control Devices (MUTCD) were conducted in order to provide a summary and description of accepted standards and tools to be used for implementing this bicycle plan.

In general, bicycle facilities should be incorporated into new and existing development within the MPA. These facilities include shared use paths, marked bike lanes, and shared lane signed bike routes. In addition, in order to create a complete bicycle facility network, standards for bicycle storage facilities are provided.

## 10. 1 Shared Use Paths

"Shared use path" is the term adopted by AASHTO to refer to a bikeway physically separated from motorized vehicular traffic by an open space or barrier. These paths are used by bicyclists, pedestrians, skaters, wheelchair users, joggers, and other non-motorists. The term "bike path" is not used because of the current multi-use nature of most trails. Shared use paths should adhere to minimum design criteria when they are designated as bicycle facilities.

Shared use paths should be used to serve corridors not well served by streets and highways. Shared use paths are not a substitute for on-road facilities. Instead, they should complement the system of on-road facilities.

Separating Shared Use Paths and Roadways

The Federal Highway Administration (FHWA) recommends that all shared use paths located within the roadway right of way (also called sidepaths) be physically separated from motor vehicle traffic with either a barrier or plantings, while AASHTO suggests that a minimum distance of 5 feet be maintained between a shared use path and roadway wherever possible. If this separation is not possible, a suitable physical barrier (i.e. guard rails, pedestrian fences, or low bushes) is recommended. Where right-of-way is constrained, an exception to the separation barrier guidance is possible.

Restricting Motor Vehicle Traffic at Roadway Intersections

Intersections between shared use paths and roadways are one of the most critical design issues. According to the AASHTO Bicycle Guide (1999), shared use paths should be designed individually in accordance with each specific intersection situation. For instance, at an adjacent path crossing, such as that shown in **Figure 10-1, Side**

**Path/Roadway Intersection**, the path user faces motor vehicles turning left (A) and right from the parallel roadway (B), and on the crossed roadway (C, D, and E).[1]

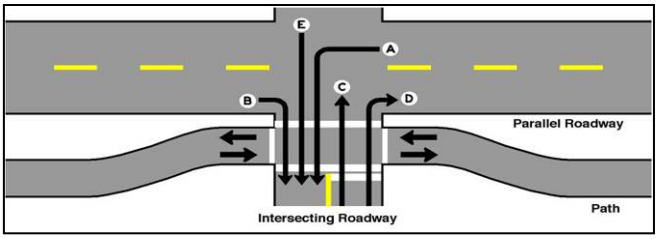


**Figure 10-1 Side Path/Roadway Intersection (Source: AASHTO)**

Width and Clearance

Under most conditions, the recommended paved width for a two-directional shared use path is 10 feet. Under certain conditions it may be necessary or desirable to increase the width of a shared use path to 12 feet, or even 14 feet, where there may be substantial shared use by bicycles, joggers, skaters and pedestrians. IDOT recommends a width of 10 feet for shared use paths adjacent to highways (also called sidepaths) when the path is designed for two-way access with 100-300 users per peak hour, and only 8 feet if the combined traffic is less than 100 peak users per hour. AASHTO recommends that a minimum width of 6 feet could be used only if the path is intended for one-way use.[2]

According to AASHTO and IDOT standards, a minimum 2-foot wide graded area (grass or limestone fines) with a maximum 1:6 slope should be maintained adjacent to both sides of the path. A 3-foot or wider setback is desirable to provide lateral clearance from trees, poles, walls, fences, guardrails or other lateral obstructions.

The minimum vertical clearance to obstructions should be 8 feet. A vertical clearance of 10 feet for tunnels is desirable.[3]

Design Speed

Shared use paths typically should be designed for a selected speed that is at least as high as the preferred speed of faster bicyclists. AASHTO guidelines suggests that 20 mph should be the minimum design speed used to design a trail, 30 mph for areas where downgrades exceed 4 percent, and 15 mph when the path is unpaved. Pathways with horizontal curve radii less than 100 feet should be signed with curve warning signs.

[1] American Association of State Highway and Transportation Officials. Guide for the Development of Bicycle Facilities. American Association of State Highway and Transportation Officials. Washington, D.C.: AASHTO, 1999.
[2] AASHTO Bike Guide. 1999.
[3] AASHTO Bike Guide. 1999.

Signing and Marking Shared Use Paths

Adequate signing and markings are recommended for shared use paths, especially signage that provides direction and/or warnings to users. These types of signs can include warning for design elements that are less than the minimum criteria, such as vertical clearances or minimum curve radii.[4] General guidance for signing and marking is best provided in the current edition of the MUTCD.

Traditional signage and marking includes bicycle crossing signs, pedestrian/bicycle crossing signs, pedestrian crosswalk lines, and flashing yellow lights (See **Figure 10-2, Curve Warning, Bicycle Crossing Signs, and Directional Signage**). Most pathway warning signs can be smaller than highway signs (usually 18 inches by 18 inches). Other signage can include directional information that informs bicyclists of attractions and locations (See **Figure 10-1**).

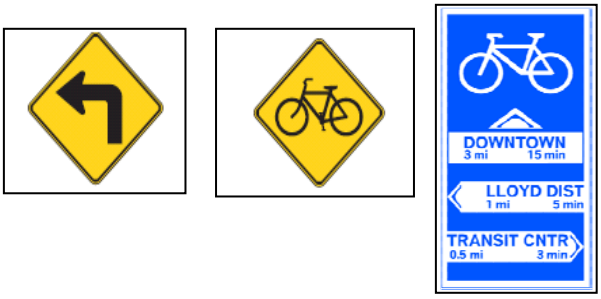


**Figure 10-2 Curve Warning (left), Bicycle Crossing (center), and Directional Signage (Source: MUTCD and www.portlandonline.com)**

Pavement Structure

The design and selection of pavement sections for shared use paths are similar to the procedure used for highway pavement sections. Prior to installation of paths, a soils investigation may be needed to determine the load carrying capabilities of the native soil and any special provisions. While loads on bicycle path substantially are less than on highways, bicycle paths should be designed to sustain, without damage, the wheel loads of occasional emergency, patrol, maintenance, or other vehicles that may need to use the paths.[5]

The quality of the roadway surface is of great importance to bicyclists; smooth pavements are more comfortable and desirable for cycling. The quality of the pavement can be dependent upon weather conditions and climate.

Bituminous or asphalt surfaces are preferred for shared use paths over aggregate because they provide a higher level of service and require less maintenance over the life of a project. Concrete, on the other hand may offer advantages in wet soil conditions or in areas that typically flood (See **Table 10-1, Advantages and Disadvantages of Surface Materials**).

[4] Illinois Department of Transportation (IDOT). Bureau of Design and Environment Manual. Illinois: IDOT, 2002a.
[5] IDOT. 2002a.

**Table 10-1**
**Advantages and Disadvantages of Surface Materials**

| Surface Material | Advantages | Disadvantages |
|---|---|---|
| Crushed Aggregate | Soft but firm surface; natural material; moderate cost; rough surface; accommodate multi-use | Surface can rot or erode from heavy rainfall; surface softens when wet-bike tires and horses will damage surface; regular maintenance to keep consistent surface; replenishing aggregate may be a long-term expense; not for slopes >3% |
| Bituminous Surface Treatment (also called Oil & Chip, Chip Seal) | Inexpensive to apply; more stable surface, durable | Potential for oil bleeding to surface in hot weather; application methods important to minimize loose gravel |
| Asphalt | Hard surface; supports most types of use; all weather; does not erode; accommodates most users simultaneously; low maintenance | Higher installation costs; more costly to repair; not a natural surface; freeze/thaw can crack surface; heavy construction vehicles need access |
| Concrete | Hardest surface; easy to form to site conditions; supports multiple users; lowest maintenance; resists freeze/thaw; best cold weather surface; best for wet conditions | High installation cost; costly to repair; not a natural looking surface; construction vehicles will need access to the trail corridor |

Source: Illinois Department of Transportation. Bureau of Design and Environment Manual: Chapter 17 Bicycle and Pedestrian Accommodations. December 2002.

## 10.2 Bicycle Lanes

Bicycle lanes are designated portions of a roadway available for the preferential use of by bicyclists. These facilities usually are marked by signage and pavement striping. Bike lanes should be one-way facilities that carry traffic in the same direction of travel as the adjacent motor vehicle traffic. Two-way bike lanes are not recommended when they result in bicycles riding against the flow of motor vehicle traffic. This type of riding is a major cause of bicycle crashes and violates the rules of the roads as stated in the Uniform Vehicle Code.[6] Signage may be used to discourage this type of wrong-way riding. Special situations may exist where a two-way bike lane for a short distance is present, such that the bike lane could eliminate the need for a bicyclist to make a double crossing of a busy street or to travel on a sidewalk. Motorists are prohibited from using bike lanes for driving and parking, but may use them for emergency avoidance maneuvers or breakdowns. Bike lanes are most useful when provided on urban arterial and collector streets.

Bike lanes have proven their value to all highway users. Among their benefits in creating a smooth, efficient and safe sharing of the highway are the following:

[6] AASHTO Bike Guide. 1999.

- Establishing the correct riding location within the roadway for bicyclists
- Informing the motorists that bicyclists have a right to use the roadway
- Reducing motorist and bicyclist sudden swerving or lane changing
- Guiding bicyclists through intersections on the safest, most predictable course
- Permitting bicyclists to pass stopped motorists and queue properly at traffic signals
- Permitting motorists to pass bicyclists on two-lane roadways

Placement and Width

Bike lanes should be provided on both sides of a two-way street. On one-way streets, bike lanes should generally be placed on the right side of the street. Bike lanes on the left side are unfamiliar and unexpected for most motorists.

**Table 10-2**
**IDOT Bike Lane Widths**

| Roadway | Minimum Width | Recommended |
|---|---|---|
| Without parking | 4’ | 5’ |
| With parking | 5’ | 6’ (if turnover is high) |
| With high truck volumes* | 5’ | 6’ |
| With vehicle speeds >50 mph | 5’ | 6’ |

*High truck volumes are defined as a Directional Design Hour Volume (DDHV) of over 250 vehicles per hour.

On urban roadways, IDOT recommends that bicycle lanes are appropriate if a combination of lower speeds (i.e. posted 45 mph or less) and high vehicular traffic volumes exist. On curbed streets without parking, bicycle lanes should be placed next to the gutter with a 4-foot minimum width. If parking is present, the lane width should be increased to 5 feet (see **Table 10-2, IDOT Bike Lane Widths** and **Figures 10-3, Bike Lanes on a Narrow Two-Way Street with No Parking on Both Sides** and **10-4, Bike Lanes on a 44-foot Wide Street With Parking on Both Sides**).

AASHTO recommendations differ slightly from that suggested by IDOT. AASHTO recommends that for roadways without curb and gutter or parking, the minimum width of a bike lane should be 4 feet. The recommended width of a bike lane is 5 feet from the face of a curb or guardrail when parking is not permitted. The minimum width of a bike lane next to a parking lane also is 5 feet. Extra width, approximately one to two feet, is desirable if parking turnover is high, where most parked vehicles are commercial vehicles, or if traffic speeds exceed 50 mph.[7]

[7] AASHTO Bike Guide. 1999. and IDOT. 2002a.

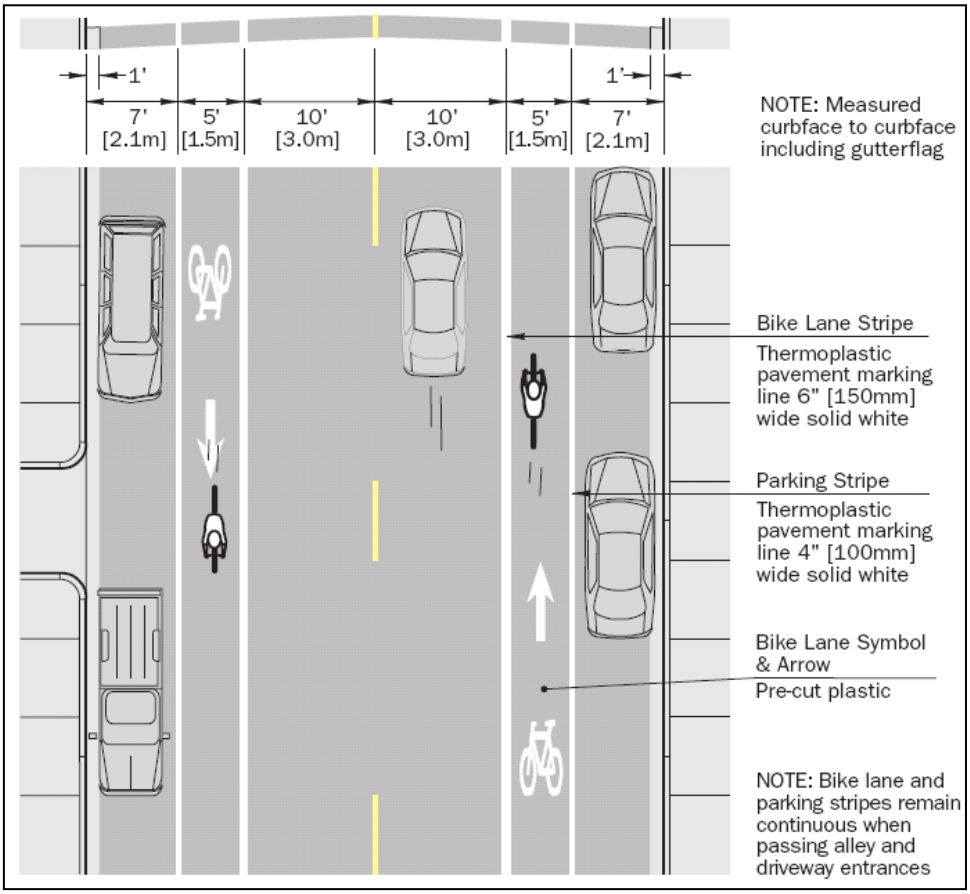


**Figure 10-3 Bike Lanes on a Narrow Two-Way Street with No Parking on Both Sides (Source: City of Chicago, Bike Lane Design Guide)**

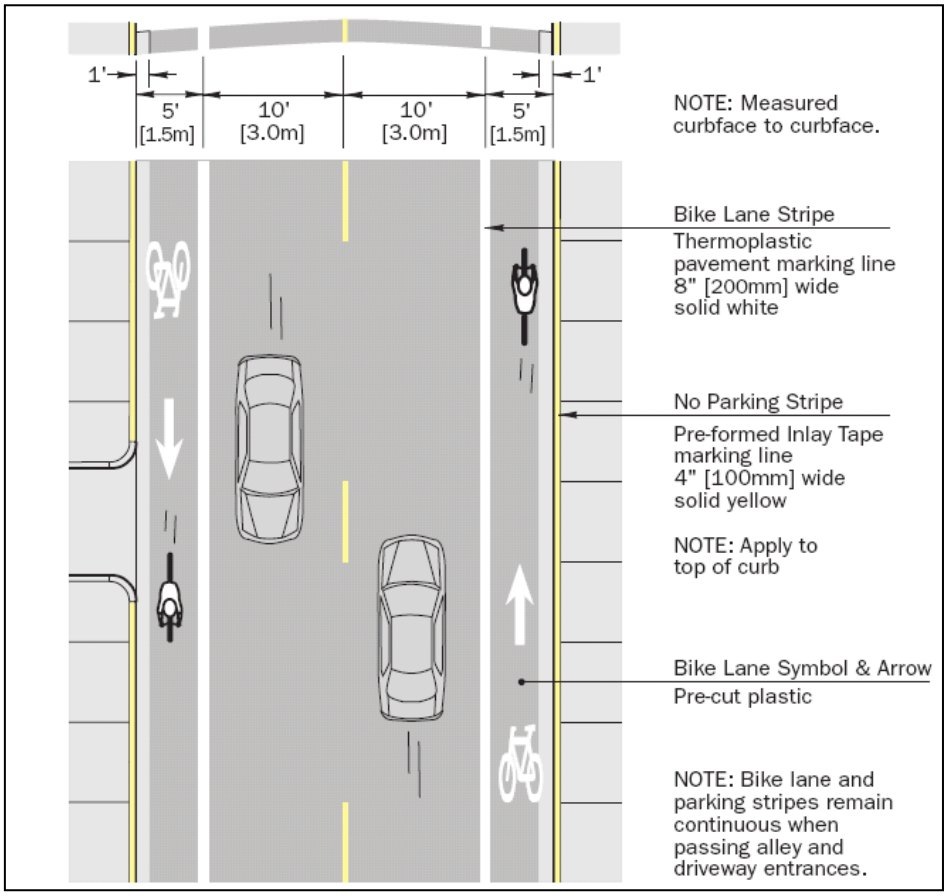


**Figure 10-4 Bike Lanes on a 44-foot Wide Street with Parking on Both Sides (Source: City of Chicago, Bike Lane Design Guide)**

Signing and Marking

Bike lanes are designated by lane striping, regulatory signs, and pavement symbol markings.

Bike lanes should be painted with standard pavement symbols to inform bicyclists and motorists of the presence of the bike lane. The standard pavement symbols are one of two bicycle symbols with a directional arrow (See **Figure 10-5, Optional Symbol Pavement Markings for Bike Lanes**). These symbols are to be painted on the far side of each intersection in white, reflectorized paint.[8]

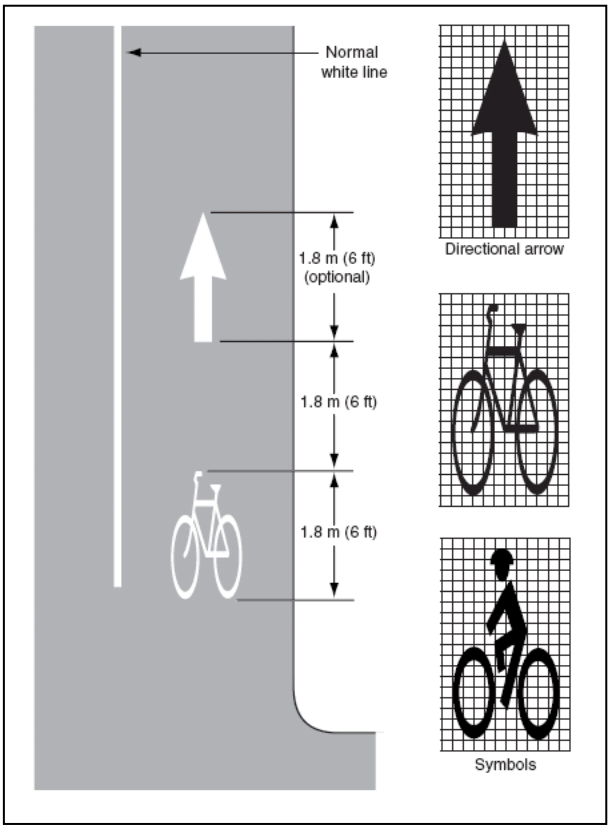


**Figure 10-5 Optional Symbol Pavement Markings for Bike Lanes (Source: MUTCD 2003)**

A bike lane should be delineated from the motor vehicle travel lanes with a 6-inch solid white line.[9] An additional 4-inch solid white line can be placed between the parking lane and the bike lane. This second line will encourage parking closer to the curb, providing added separation from motor vehicles. Where parking is light, the second line will discourage motorists from using the bike lane as a through travel lane.

Bike lanes sometimes are designated with paint, especially where the roadway is scheduled for resurfacing in the near future or where a community would like to test the effectiveness of the bike lane. The painted lanes can be added after the resurfacing as part of the overall project. However, thermoplastic pavement markings last longer and are recommended for final installations. Additional grit in the thermoplastic mix can be used for better bicycle wheel traction.

Signage may be used in conjunction with the bicycle lanes in order to indicate where the lane begins and ends. Additional signage can be installed to inform users of changing conditions along the roadway, including grade and crossings.

[8] Federal Highway Administration. Manual of Uniform Traffic Control Devices (MUTCD). 2003 ed. Washington, D.C.: Federal Highway Administration, 2004.
[9] AASHTO Bike Guide. 1999.

Bike Lanes at Intersections

Alignment of on-road bicycle movements through intersections should be an integral part of the overall design of bicycle lanes. The following factors complicate bike lane intersection design:

- Motorists turning right must cross paths with bicyclists proceeding straight through.
- Bicyclists turning left must merge across traffic or must make a two-stage pedestrian-like crossing.
- Bicyclists and motorists often are moving at very different speeds when merging and turning movements must occur.
- Intersection design often eliminates the space for the bicyclist when turning lanes are added.

Bike lane striping should stop at pedestrian crosswalks. In most cases, the striping should not continue through street intersections.[10] If a bus stop or a high right-turn volume is present, the 6-inch solid line should be replaced with a broken line with 2-foot dots and 6-foot spaces.[11]

The broken line should continue for the length of the bus stop. If there is a high right-turn volume, striping and signing configurations should encourage crossing in advance of the intersection, in a merging fashion, rather than in the immediate vicinity of the intersection. In these cases, AASHTO (Bike Guide 1999) recommends that the broken line should extend 50 to 200 feet from the intersection crosswalk. A shorter dashed line would be appropriate on shorter blocks and for slower traffic conditions. At non-signalized minor intersections with no stop controls, solid bike lane striping can continue all the way to the crosswalk on the near side of the intersection. The bike lane striping should resume at the outside line of the crosswalk on the far side of the intersection.

General guidance for pavement marking of bike lanes at intersections is contained in the MUTCD (See **Figure 10-6, Example of Pavement Markings for Bicycle Lanes on a Two-Way Street**).

[10] MUTCD. 2003.
[11] AASHTO Bike Guide. 1999.

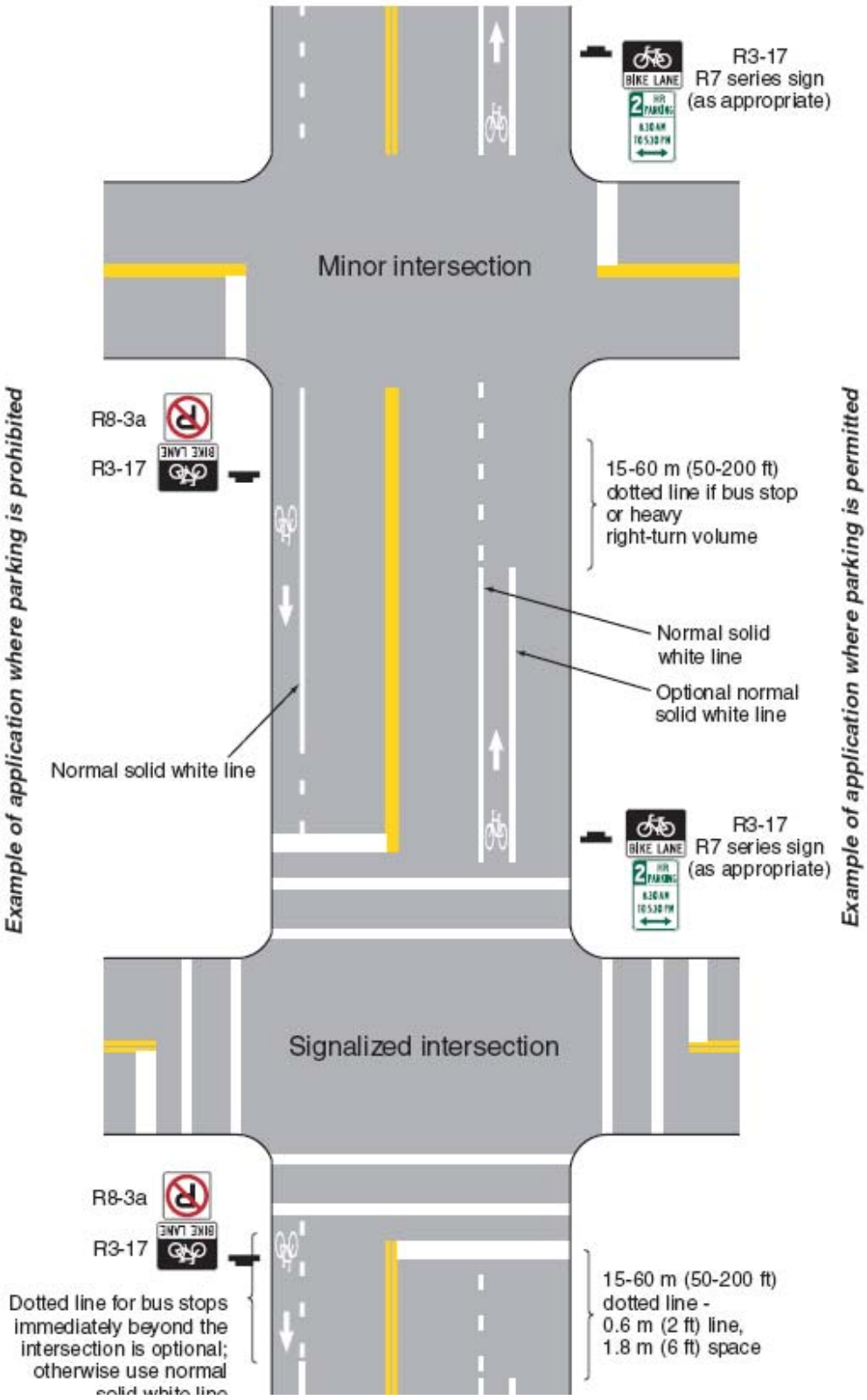


**Figure 10-6 Example of Pavement Markings for Bicycle Lanes on a Two-Way Street**
**(Source: MUTCD 2003)**

Right Turning Vehicles

Bicyclists traveling straight through an intersection and right turning motor vehicles must merge before the intersection. Separate right turn lanes further complicate the situation for bicyclists. Signing should include replacing the standard "RIGHT TURN LANE" sign with "BEGIN RIGHT TURN LANE YIELD TO BIKES" (See **Figure 10-7, Bicycle Lane Treatment at Right Turn Only Lane**).[12]

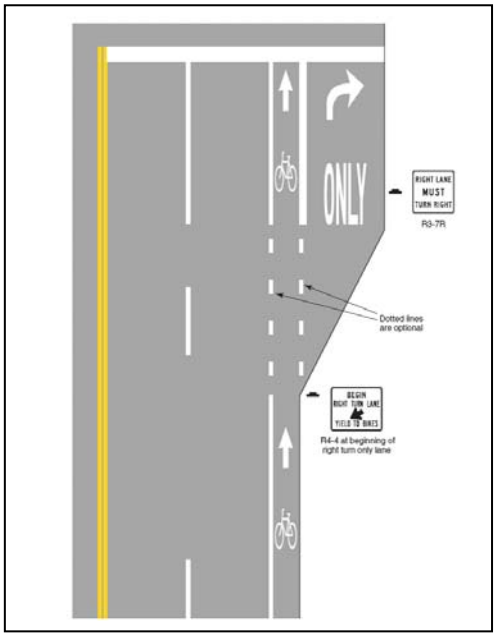


**Figure 10-7 Bicycle Lane Treatment at Right Turn Only Lane (Source: MUTCD 2003)**

In those cases where the addition of turning lanes has reduced the available pavement width below the minimum requirements for bike lane operation, and the possibility to narrow lane widths or widen the pavement is not present, the bike lane striping should be discontinued. Bicyclists proceeding straight through the intersection should be directed to merge with motor vehicle traffic in order to cross the intersection (See **Figure 10-8, Signing of Shared Lanes**).

AASHTO recommends that motor vehicle speeds should be slowed at intersections with bicycle facilities. Available design options include:

- Reduced turning radii
- Elimination of free-flow right turn bays
- Elimination of right turn on red

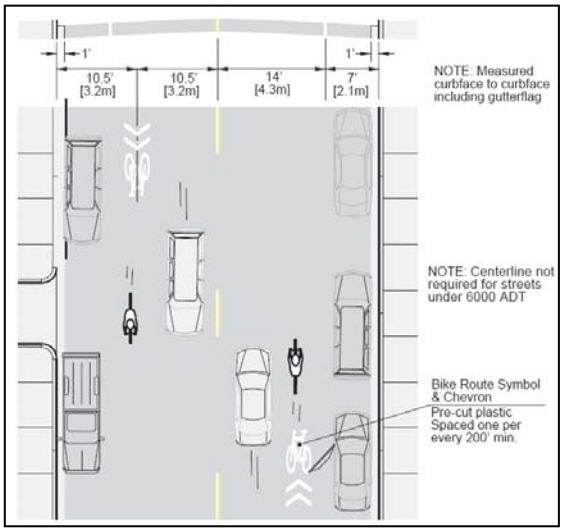


**Figure 10-8 Signing of Shared Lanes (Source: MUTCD)**

Left Turning Bicyclists

The Illinois Vehicle Code allows the bicyclist the option of making either a "vehicular style" left turn (where the bicyclist merges leftward to the same lane used for motor vehicle left turns) or a "pedestrian style" left turn (where the bicyclist proceeds straight through the intersection, turns left at the far side, then proceeds across the intersection again on the cross street).

[12] AASHTO Bike Guide. 1999.

Where numerous left-turning bicyclists are present, a separate bicycle turning lane also can be considered, similar to the right only treatment depicted in **Figure 10-7**.

Surface Conditions

A smooth riding surface should be provided for bicycle lanes, and utility covers should be adjusted flush with the surface to prevent riders from catching their tires. Drainage grates should be bicycle-safe, as well. Grate openings should be cross hatched or perpendicular to the curb. Parallel slat grate openings can catch bicycle wheels if the openings are wider than a bicycle tire (see **Figure 10-9, Sewer Grates**).

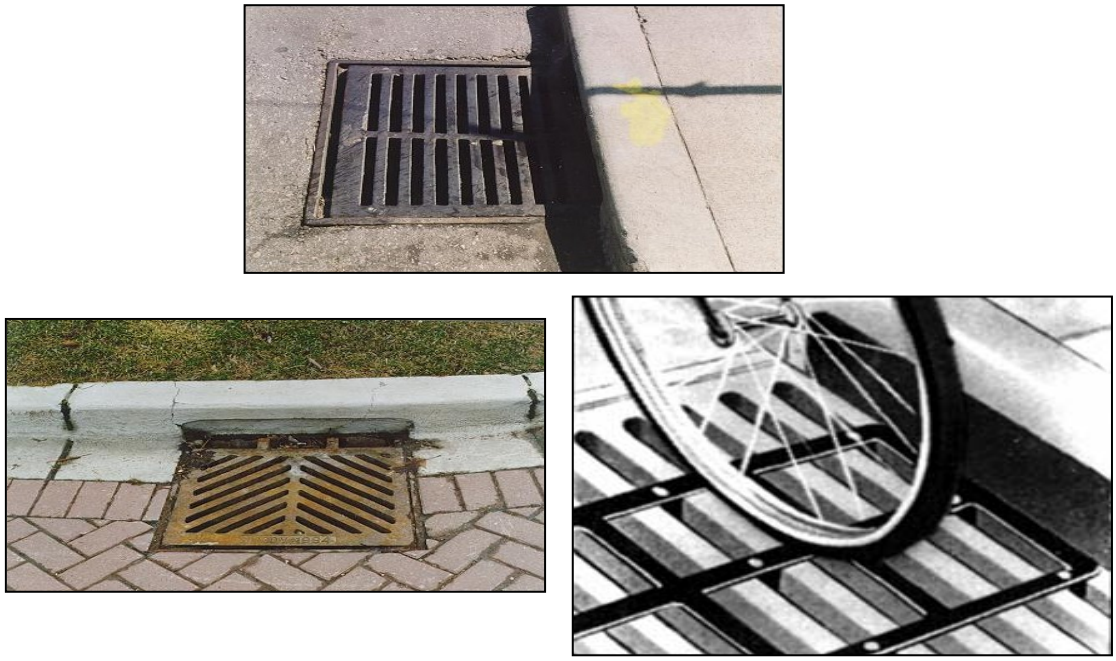

**Figure 10-9 Sewer Grates**
The top sewer grate has parallel slats, which are unsafe for bicyclists, whereas the bottom two have cross slats, which prevent tires from getting caught.
**(Source: www.goforgreen.ca and www.transalt.org)**

Several types of grates are considered to be bicycle safe. The Illinois Department of Transportation standards suggest that Types 3, 3V, 4, 9, 10, 11, 11V, 23, and 24 are suitable for bicycle travel. Types 20, 21, and 22 are conditionally acceptable if the vane length is perpendicular to bicycle travel. Other grates are acceptable if the opening slots do not exceed 6¼ inches in length by 1½ inches in width. Grates and utility covers should be placed so as to be flush with the pavement.

For bike lanes placed directly next to a curb, the pavement surface should be smooth and free of structures and obstacles in the critical riding area, which is 32 to 40 inches from the curb face. A policy to provide priority to pavement conditions on those streets that are part of the bicycle facility network would enhance bicycle safety.

Finding Space for Bike Lanes

On arterial and collector roadways, bicycle use can be accommodated and encouraged by the addition of bike lanes. Bicycle lanes require 8–10 feet of additional pavement, which amounts to 4 to 5 feet on either side of the roadway. Bike lanes can be accommodated by marking or re-marking the pavement to increase the width of the curb lane or to add bike lanes. Several options exist to create this needed space. They include the following, but are not limited to these methods:

1) Reducing Travel Lane Widths- The width of inside traffic lanes can be reduced in accordance with IDOT and AASHTO criteria. The narrow lanes, especially in combination with bike lanes, have a traffic calming impact that also is a benefit in urbanized areas.

2) Reducing the Number of Travel Lanes- On two-way roadways with four travel lanes and significant left-turning movements, re-striping for a center turn lane, two travel lanes and two bike lanes can encourage bicycle travel without negatively impacting traffic flow. The reduction of travel lanes also is known as a road diet. On roadway segments between intersections the middle space can provide a refuge for pedestrians as a median, either landscaped or not (See **Figure 10-10, Reducing the Number of Vehicular Travel Lanes**).

3) Reduce, Re-configure, or Remove Parking- Parking can be limited to one side of the street if demand is not high, or parking spots can be removed to off-street locations if available. Space also can be created by changing the style of parking and reducing the width of parking spaces. The combined bike lane and parking lane should be at minimum 12 feet (see **Figure 10-11, Removed Parking**).

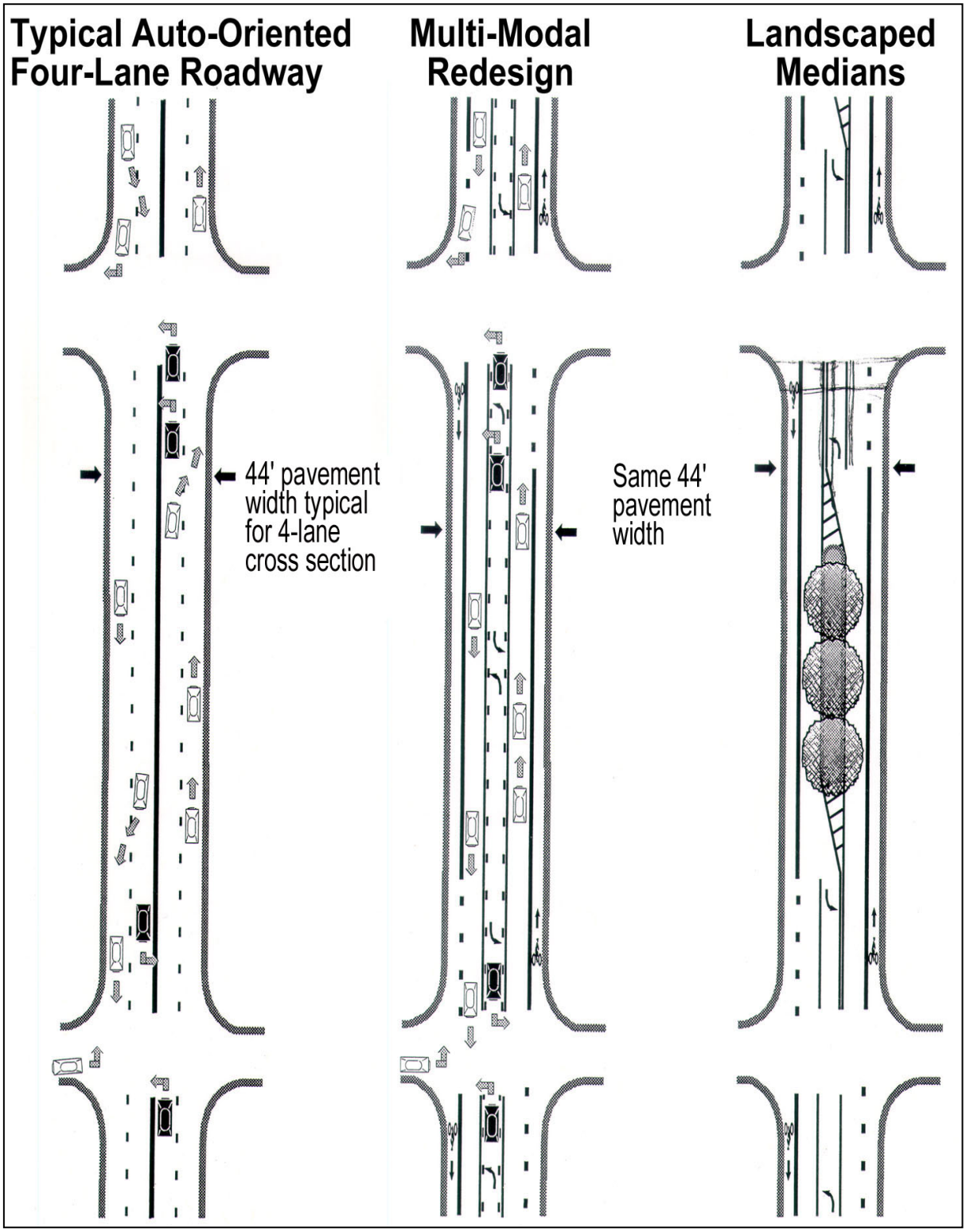


**Figure 10-10 Reducing the Number of Vehicular Travel Lanes**
**(Source: Kalamazoo Non-motorized Transportation Plan)**

## 10.3 Shared Roadways and Bike Routes

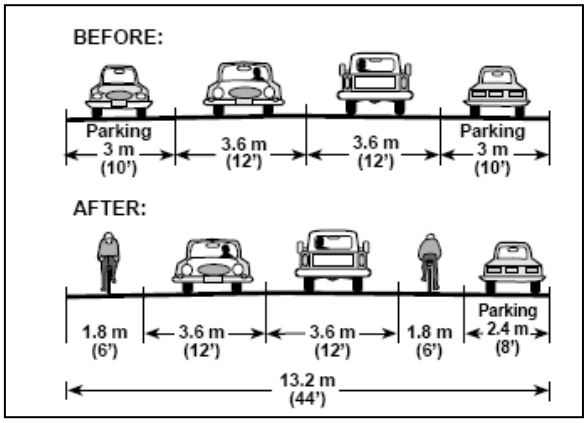


**Figure 10-11 Removed Parking**
**(Source: 1995 Oregon Bicycle and Pedestrian Plan)**

According to AASHTO, to some extent, bicycles will be used on all highways where they are permitted regardless of the presence of a bicycle lane. Width is the most critical factor affecting the ability of a roadway to accommodate bicycle traffic.

Shared roadways, therefore, also can be identified as preferred bike routes (See **Figure 10-12, Typical Bike Route Signing**). Signed shared roadways can identify to users what routes have smooth surfaces, proper maintenance to prevent accumulation of debris, wider curb lanes, connections between paths, and direct travel corridors.[13] Bicycle route signing generally is recommended for relatively low volume, low speed streets that form part of the overall bicycle facility network.

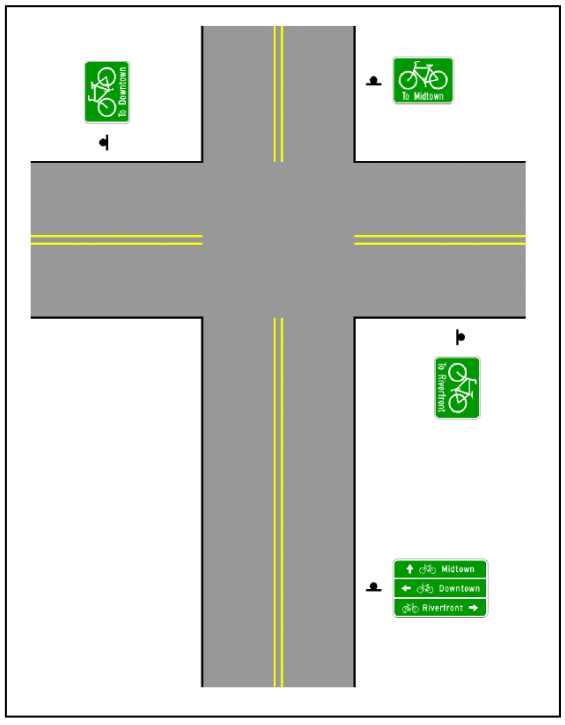


**Figure 10-12, Typical Bike Route Signing**
**(Source: MUTCD 2003)**

Three ways to improve conditions for bicycling on roadways are to add or improve paved shoulders, provide a wider than usual outside travel lane, or provide a wide parking lane. Although not the optimal bicycle accommodation, shared roadways always will be present.

1) Add or Improve Paved Shoulders- Adding or improving paved shoulders is a highly recommended solution for rural areas in particular. Paved shoulders provide an area in which bicyclists can maneuver without interfering with the motorized traffic. They also can serve motorists by providing a break down area for cars and helping to extend the life of the roadway by reducing deterioration at the edge of a road. Paved shoulders should be a minimum of 4 feet wide to

[13] AASHTO Bike Guide. 1999.

accommodate bicycle travel, not including the gutter pan. If no gutter is present, IDOT (2002) recommends that the shoulder be expanded to 6 feet in width, especially where posted speeds exceed 55 mph or greater or where posted speeds equal or exceed 45 mph, but have high truck, recreational vehicle, or bus traffic. Rumble strips and other raised pavement features typically found on the shoulder should be avoided. If rumble strips are necessary, at least 3 feet of smooth pavement should be located to the outside of the rumble strip.

2) Widened Outside Lanes- Widened curb lanes for bicycle use usually are preferred where shoulders are not present. According to AASHTO, 14 feet of usable lane width is recommended for shared use in a wide curb lane, although lanes greater than 12 feet on highway sections can accommodate both motor vehicles and bicycles (See **Figure 10-13, Widened Outside Lanes**). Usable width refers to the area from the edge stripe to lane stripe or from the longitudinal joint of the gutter pan to the lane stripe.[14] Wide outside travel lanes do not interfere with motor vehicle capacity, and instead, increase the roadway capacity through the addition of bicycles. These lanes also minimize the real and perceived operating conflicts that exist between bicycles and motor vehicles.

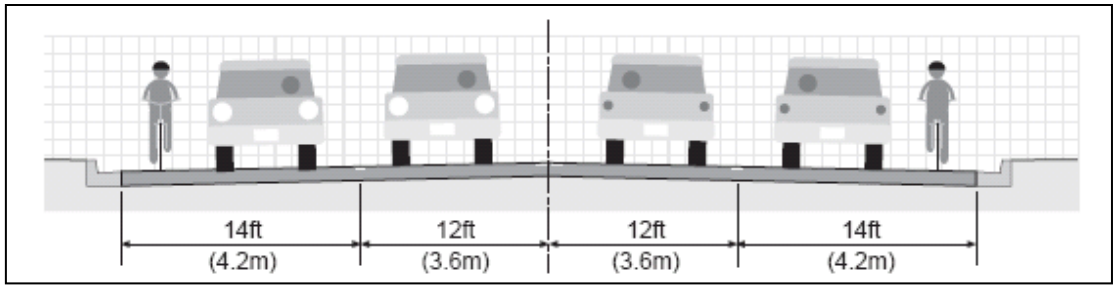


**Figure 10-13 Widened Outside Lanes**
**(Source: Wisconsin Bicycle Facility Design Handbook)**

3) Widened Parking Lanes - A third strategy for roadways with parking lanes is to narrow the motor vehicle travel lane to 10 feet or 11 feet and add the remaining space to the parking lane. While this shared space should not be marked as a bike lane if it is less than 12 feet in width, it can provide a measure of separation from motor vehicle travel. This is another location where shared lane markings would be appropriate.

## 10.4 Signal Actuation and Timing

Ideally, all actuated traffic signals within the MPA should provide convenient actuation for bicyclists and pedestrians. In mixed traffic flow, the bicyclist normally can cross the intersection under the same signal phase as motor vehicles. However, the greatest risk to bicyclists is during the clearance interval (a brief period where the lights in all directions are red) and during actuated phases (timer or sensor controlled) during periods of low traffic flow.

[14] AASHTO Bike Guide. 1999.

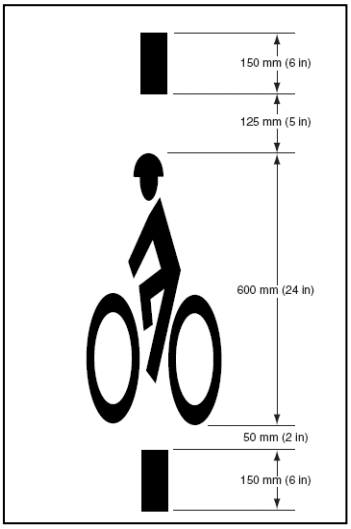


**Figure 10-14 Bicycle Detector Pavement Marking (Source: MUTCD 2003)**

Several types of detectors can indicate the presence of bicycles. These include the quadropole and diagonal type loop detectors, which are both examples of induction loops. The former detector works best in a bicycle path or lane situation, while the latter works best in shared roadway situations.[15] Dipole and rectangular loops also can detect bicycles if the detector sensitivity is adjusted.[16] Detection devices should be located in the bicyclist's expected path, including left turn lanes if necessary.[17] Pavement markings and signs can indicate where a bicyclist needs to be positioned in order to activate the signals (See **Figure 10-14, Bicycle Detector Pavement Marking**).[18]

Alternatives to loops and push buttons include the use of video cameras or the use of microwave sensors to detect bicycle and other traffic. Video systems use cameras mounted on signal arms and "virtual loops" drawn on a computer screen. The system is capable of sensing up to 60 different detection zones in a single intersection which are comparable to loop detectors buried within the pavement. Microwave systems are reliable for remote traffic sensing and bicycle detection.

Fine tuning existing traffic signals also may improve bicycling conditions. Signal timing should include an adequate minimum green time and a yellow/red time that provides a safe bicycle clearance interval. Research indicates that two to three seconds added to the minimum automobile green time at actuated signals is appropriate, and a yellow interval of 3.0 seconds offers sufficient time for a cyclist to come to a complete stop or to enter the intersection legally; but an all red clearance interval greater than 2.0 seconds is needed to clear bicycles from most intersections.[19]

## 10.5 Bicycle Parking Specifications and Placement Guidelines

Bicycle parking and storage are essential components of a bicycle facility network.

Short term facilities can include racks where cyclists can lock their bikes quickly and easily. Racks that are complicated to use or racks that only hold one wheel of the bicycle should be avoided. Bike racks should have no obtrusive or sharp edges and be accessible to various users. Recommended short term bicycle parking racks should meet the following criteria:

- Supports the bicycle in two places
- Prevent the wheels from tipping over

[15] IDOT. 2002a.
[16] AASHTO Bike Guide. 1999.
[17] IDOT. 2002a.
[18] MUTCD. 2003.
[19] AASHTO Bike Guide. 1999.

- Enable the frame and one or both wheels to be secured
- Simple design to limit need for explanation for use
- Clearly designated space for each bicycle
- Allow front-in and back-in parking

Typical space allocations for bicycle spaces are 2.5 feet wide by 6 feet long per bicycle. An example of short-term bicycle parking racks is depicted in **Figure 10-15, Inverted "U" Rack**.

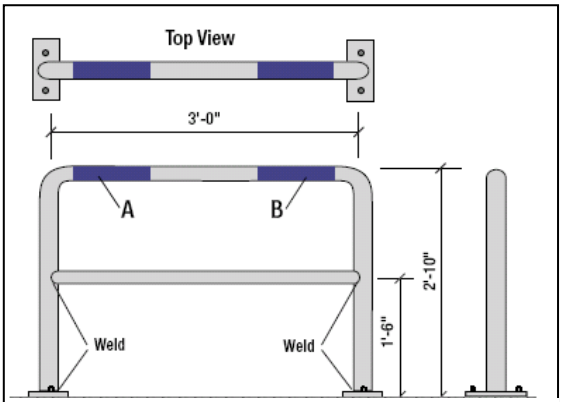


**Figure 10-15 Inverted "U" Bicycle Rack**
**(Source: www.bicyclinginfo.org)**

Short term bicycle racks should be installed in a location that is visible and protected. Racks should be placed so as to avoid conflicts with pedestrians and automobiles away from curbs and entrances to buildings and/or crosswalks. Often, racks can be placed on sidewalks as long as five or more feet of sidewalk space is kept clear for other uses. Bicycle racks typically are installed in concrete, as they cannot be properly anchored in asphalt. The racks must be installed at least 4 feet from fire hydrants, curb ramps, and building entrances.[20]

The location of these racks should be based upon visual inspections, user input, land use criteria, public-private partnerships, and building codes (See **Figure 10-16, Recommended Dimensions for Bicycle Rack Parking**). Visual inspections will help to identify places where bicycles currently are parked illegally due to the lack of regulated parking spaces. A list of needed bicycle spaces can be created by local advocacy groups. Specific areas can be targeted based upon user groups or service needs. For instance, locations that target teenage audiences, such as coffee shops, bookstores, video arcades, and clothing stores may be possible locations. Grocery stores and other small commercial properties also may be desirable places for bicycle racks. A private-public partnership can be forged, as well, in which a business can request bicycle parking for customers and employees. The businesses would pay for the installation, but the racks could be paid for by a grant.

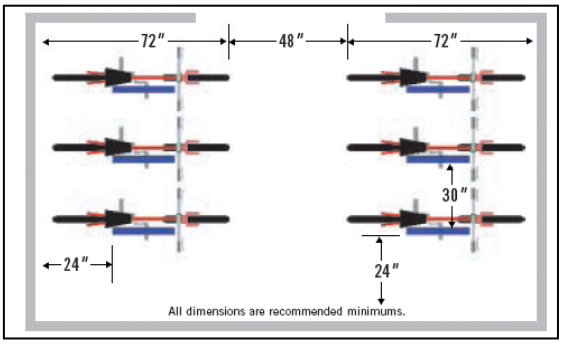


**Figure 10-16 Recommended Dimensions for Bicycle Rack Parking**
**(Source: www.bicyclinginfo.org)**

Long term bicycle parking should be installed where employees, commuters, students or residents will park for more than two hours. Long term bicycle parking can be created by

[20] BicyclingInfo.org. "Bicycle Parking: The Basics." www.bicyclinginfo.org/de/park_basics.cfm

providing protected bicycle parking facilities, such as bicycle lockers or in locations such as designated storage rooms, cages (fenced, locked areas) or inside a parking garage or transit station. Protection from the weather is highly desirable (see **Figure 10-17, Bicycle Lockers**).

**Figure 10-17 Bicycle Lockers**
**(Source: www.communications.uwo.ca/western)**

Recommended long term bicycle parking facilities should provide: A rack that can secure the frame and both wheels, provide protection from the weather, or be enclosed fully by a locker or locked storage area.

Proposed Parking Ordinance Revision

Both short-term and long-term bicycle parking should be provided as a regulation contained within municipal ordinances. All new developments or changes within businesses may require the installation of bicycle parking proportionate to car parking requirements.[21] Bicycle parking requirements should consist of the following: specific requirements for facility access, facility types, signage, and number of spaces to be provided per building square footage and/or per number of employees. Bicycle parking should be appropriate for the type of setting, urban, suburban, or rural. The following examples provide information regarding requirements based upon automobile parking, the number of employees, and land use.

Two examples from the *San Francisco Bicycle Plan: Policy Framework* demonstrate methods of determining bicycle parking requirements within an urban setting. [22]

**Table 10-3, Municipal Garage Bicycle Parking** identifies bicycle parking needs that are appropriate for public garages, but also can be adapted to suit suburban surface parking lots. The intent of this regulation is to define bicycle parking in relation to the number of automobile spaces provided.

**Table 10-3**
**Municipal Garage Bicycle Parking**

| Number of Auto Parking Spaces | Number of Bicycle Spaces |
|---|---|
| < 120 | 6 |
| 120-500 | 1 per every 20 auto spaces |
| 500+ | 25+ 1 per every 40 auto spaces, up to max. 50 bicycle spaces |

[21] International Bicycle Fund. "Bicycle Parking Criteria, Bike Rack, Bicycle Locker, Cycle Stands, & Bike Storage Systems." www.ibike.org/engineering/parking.htm.
[22] *San Francisco Bicycle Plan*. www.sfgov.org.

**Table 10-4, Class 1 Bicycle Parking** depicts the requirements for longer term bicycle parking, which refers to facilities that protect the entire bicycle, its components and accessories from theft and inclement weather. This type of bicycle parking typically is used for 2 hours or more.[23] Requirements are based upon the number of employees within a building that is owned by the city or leased buildings. This type of requirement is appropriate for urban settings, where people have a variety of transportation options other than the automobile, and can be applied to all types of commercial buildings.

Class 2 bicycle parking, on the other hand, is that which allows the locking of the bicycle frame and one wheel to a rack and will support the bicycle. San Francisco does not provide as specific regulations governing Class 2 bicycle parking, which may be provided in garages or outdoor settings, as those provided for Class 1 bicycle parking. Instead, Class 2 bicycle parking is to be located in highly visible areas and can be placed in combination with Class 1 parking facilities.

**Table 10-4**
**Class 1 Bicycle Parking**

| Number of Employees | Number of Bicycle Spaces |
|---|---|
| 1-20 | 2 |
| 21-50 | 4 |
| 51-300 | At least 5% of the number of employees at the building, but not less than 5 |
| > 300 | At least 3% of the number of employees at the building, but not less than 16 |

The San Francisco ordinance requires additional bicycle parking regulations for city owned buildings, new and renovated commercial buildings, and city-owned and leased buildings.[24]

The City of Madison, Wisconsin bases parking requirements on land use. Dependent upon the land use, the parking spaces may be allotted based on employees, automobile spaces, or the capacity of the buildings. The land use requirements can be adapted to the land uses present within the RATS MPA.

The requirements are listed in **Table 10-5, Off-Street Bicycle Parking**.

**Table 10-5**
**Off-Street Bicycle Parking**

| Land Use | Number of Bicycle Spaces |
|---|---|
| Dwellings/Lodging Rooms | 1 per dwelling or 3 lodging rooms |
| Clubs/lodges | 1 per lodging room plus 3% of person capacity |
| Fraternities/sororities | 1 per 3 rooms |
| Hotels/lodging houses | 1 per 20 employees |
| Galleries/museums/libraries | 1 per 10 auto spaces |

[23] Bicycle Technical Guidelines: A Guide for Local Agencies in Santa Clara County. 1999. Santa Clara Valley Transportation Authority.

[24] San Francisco Planning Code. Bicycle Parking Ordinances. Section 155.

| Table 10-5<br>Off-Street Bicycle Parking | |
|---|---|
| **Land Use** | **Number of Bicycle Spaces** |
| Colleges/universities/junior and high schools | 1 per 4 employees plus 1 per 4 students |
| Nursery/elementary schools | 1 per 10 employees plus students above second grade |
| Convalescent and nursing homes/institutions | 1 per 20 employees |
| Hospitals | 1 per 20 employees |
| Places of assembly, recreation, entertainment, and amusement | 1 per 10 auto spaces |
| Commercial/manufacturing | 1 per 10 auto spaces |
| Miscellaneous/other | To be determined by the Zoning Administrator based on the guidelines for the most similar use listed above |

Within Illinois, some municipalities require bicycle parking. For instance, the Village of Schaumburg has adopted bicycle parking as part of their zoning ordinance (Title 15, Chapter 154, Section 125). The required number of spaces is based upon land use similar to those adopted by the City of Madison. Schaumburg, however, determines the required bicycle parking spaces for office and professional uses based on gross floor area measured in square feet. Either model is suitable for the MPA, as each accounts for different land uses within both urban and suburban environments.

Bicycle parking regulations should be included in zoning regulations to ensure that it is provided in all new developments. The regulations should be included as part of the process of obtaining a building permit.[25] The examples and recommendations provided within this section should be used to assist in the development of a flexible regulation to accommodate bicycle parking throughout the Metropolitan Planning Area.

[25] Federal Highway Administration. "Bicycle Parking and Storage." http://safety.fhwa.dot.gov/ped_bike/univcourse/swless22.htm.