

DRAFT City of Seattle Bicycle Master Plan
Bicycle Facility Descriptions—November 2006

Types of Facilities for Network Segments

The Bicycle Facility Network includes a variety of on- and off-road bicycle facilities. On-road bicycle facilities serve several purposes, including designating roadway space for bicyclists, channelizing motor vehicles and bicyclists, making bicyclist movements more predictable, indicating the proper direction for bicyclists to travel on the roadway, and indicating the optimal location on the street for riding at mid-block locations and when approaching intersections. Off-road bicycle facilities, including multi-use trails and sidepaths, provide a space for bicyclists physical barrier from roadway traffic. The specific types of facilities that are recommended on each segment of the network depend on a wide range of factors, including:

- Surrounding land uses and connectivity to destinations
- Existing right-of-way space
- Travel lane width
- Traffic volume
- Traffic speed
- Traffic composition (presence of buses and large trucks)
- Presence of on-street parking
- Pedestrian activity

Bicycle facilities are recommended for segments in the Network are described below. Additional detail is provided in the [Appendix B/Bicycle Design Guidelines Document].

Bicycle Lanes

A bicycle lane is a portion of the roadway that has been designated by striping, signing, and pavement markings for the preferential use of bicyclists. The minimum width for a bicycle lane is five feet. Bicycle lanes include a bicycle pavement marking with an arrow to indicate that bicyclists should ride in the same direction as adjacent motor vehicle traffic. These facilities are recommended for arterial roadways in Seattle. Bicycle lanes provide the following benefits:

- Increase the comfort of bicyclists on roadways
- Increase the amount of lateral separation between motor vehicles and bicycles
- Indicate the most appropriate location to ride on the roadway with respect to moving traffic and parked cars, both at mid-block and approaching intersections
- Increase the capacity of roadways that carry mixed bicycle and motor vehicle traffic
- Make bicyclist and motorist movements more predictable
- Make drivers more aware of bicyclists while driving and when opening doors from an on-street parking space



When on-street parking exists, bicycle lanes should be designed so that bicyclists are encouraged to ride far enough away from parked cars so that they are not at risk of being struck by opening doors. Further, bicycle lanes should not be placed between parked cars and the curb, for the following reasons:

- Motor vehicle drivers pull out across the bicycle lane from intersecting streets to look for traffic around the parked cars
- Passengers of parking cars do not expect fast-moving vehicles to be on that side of the car, so they open doors into the bicycle lane or cross the bicycle lane without looking
- Bicyclists who need to make a left turn at an upcoming intersection must move out from behind parked cars to enter the travel lanes with motor vehicles



Shared Lane Pavement Markings

Shared lane pavement markings (or “sharrows”) are bicycle symbols that are placed in the roadway lane. Unlike bicycle lanes, they do not designate a particular part of the roadway for the use of bicyclists. The bicycle symbols used in shared lane pavement markings include chevrons pointing in the direction motor vehicle traffic to indicate that bicyclists should also ride in this direction. Shared lane pavement markings have the following benefits:

- Provide a visible cue to bicyclists and motorists that bicycles are to be expected and welcomed on the roadway
- Indicate the most appropriate location to ride on the roadway with respect to moving traffic and parked cars
- Can be used on roadways where there is not enough space for standard five-foot-wide bicycle lanes
- Connect gaps between other bicycle facilities, such as a narrow section of roadway between bicycle lanes



Climbing Lanes

Climbing lanes are a hybrid bicycle facility that include a five-foot bicycle on one side of the roadway (typically in the uphill direction) and a shared lane pavement marking on the other side of the roadway. This allows slower-moving, uphill bicyclists to have a designated bicycle lane space and allows motor vehicles to pass more easily. It also allows faster-moving, downhill bicyclists to have a shared-lane pavement marking, which helps make motorists be aware that the faster-moving bicyclists are more likely to move away from parked cars and merge into the travel lane. The bicycle lane and shared lane pavement markings also indicate the proper direction for bicyclists to travel on either side of the street. This type of facility is particularly useful in Seattle because of its topography and because it can be used on streets where there is not enough space for standard five-foot-wide bicycle lanes on both sides.



Bicycle Boulevards

Bicycle boulevards are non-arterial streets that are designed to allow bicyclists to travel at a consistent, comfortable speed along non-arterial roadways and to cross arterials conveniently and safely. This is achieved by switching stop or yield signs so that bicyclists can travel along the bicycle boulevard without stopping. Traffic calming and traffic management treatments such as traffic circles, chicanes, and diverters are used to prevent motor vehicles from speeding and using the bicycle boulevard as a cut-through. Quick-response traffic signals, median islands, or other crossing treatments are provided to facilitate bicycle crossings of arterial roadways. Bicycle boulevards are marked with a bicycle pavement symbol and the words “BIKE BLVD”.

SIDEBAR: “Streets with a series of traffic calming features work well as bike routes. Cars have to slow down to bicycle speed.”



Multi-Use Trails

Multi-use trails (also referred to as shared-use paths) are an important component of Seattle’s bicycle transportation system. These facilities can provide a high-quality bicycling experience because they are separated from motor vehicle traffic. Multi-use trails can be paved and should be a minimum of ten feet wide. Minimum width may be reduced to eight feet where physical or right-of-way constraints pose obstacles. Trail widths of 12-, 14-, and even 16-feet are appropriate in high-use urban situations.



Shared Roadways

Shared roadways are regular streets without any designated bicycle facilities. The most common type of shared roadways used by bicyclists in Seattle are non-arterial roadways with low traffic volumes and low speeds. Because these are quiet streets, bicycle facilities do not need to be provided to make them comfortable for most bicyclists to use.



Other Bicycle Facilities

Other bicycle facilities recommended for the Bicycle Facility Network include paved shoulders, wide outside lanes, shared bus/bike lanes, and bus/bike-only roadways.

Paved shoulders provide space on the outside of the roadway for bicycle and pedestrian use. There is no minimum width for paved shoulders, however a width of at least 4 feet is preferred. On some undeveloped roadways (many of which are in the far northern and southern parts of Seattle), paved shoulders can be provided to make important bicycle connections. In some locations, reconstructing the roadway with shoulders can also include pavement for an on-street parking lane or parking pockets. Paved shoulders also improve safety for motor vehicles and prevent pavement damage to the travel lanes.



Wide outside travel lanes are typically designed to be 13- to 15-foot wide. This width allows more separation between bicyclists and motor vehicles than more typical 10- to 12-foot wide travel lanes. However, these travel lanes do not provide the benefit of having a striped area that is exclusively for the use of bicyclists, a feature that bicyclists with all levels of riding experience have reported as desirable. Wide outside lanes also do not have markings to indicate where bicyclists should be positioned when passing through an intersection with a right-turn lane.



- Bus/Bike Only Roadways
- Shared Bus/Bike Lanes



Due to limited opportunities and other considerations, this Plan recommends considering use of sidewalk and sidepath facilities for bicycling in a number of locations. Special attention will be required in the design process to ensure user safety on sidewalks and sidepaths.

Sidewalks may be useful for bicycling for a number of reasons:

- Bicycle access is needed but bicycle volumes and/or pedestrian volumes are expected to be low.
- Right-of-way or traffic safety (high speeds, high volumes, lots of trucks) issues suggest that sidewalk use may be the only option or even preferred.
- They can be designed to accommodate separated, one-way bicycling on each side of the road so that bicyclists can safely and easily transition to and from the road at each end of the segment. Sidewalk bike routes should not result in bicyclists riding opposed to motor vehicle traffic when they re-enter the street.



Sidepaths are essentially trails that are located on the side of a roadway. However, sidepaths are often located only on one side of a road and are intended to provide two-way bicycle and pedestrian travel. While this type of facility is not ideal, sometimes it is the only option or even the safest option, for similar reasons as noted above. Sidepaths can function well if some of the following key design features can be achieved:

- The roadway is an expressway, or limited access in nature and the path can be located in an area where there are no, or only a few conflicts with crossing roadways, which may be signalized.
- Crossings of free flow ramps can be avoided, minimized or made sufficiently safe.
- Sufficient width is available to build a facility with a buffer from traffic and path surface wide enough to safely serve the expected volume of bicycle and pedestrian traffic.



Further Study Required

There are a number of high-speed, high-volume roadways that have poor conditions for bicycling, but do not have straightforward opportunities to stripe narrower lanes, remove lanes, add shoulders, or make other physical improvements due to right-of-way constraints and traffic volumes. Several of these roadways represent critical connections between major destinations in the Bicycle Facility Network. In order to improve bicycling conditions, the City should conduct detailed bicycle facility design studies and to recommend appropriate bicycle facilities for these connections in the short term. Other roadways should also be improved for bicycling in the future, but are not as critical to providing connectivity in the Bicycle Facility Network. These other roadways should undergo further study in the future.

Transitions Between Different Bicycle Facility Types

Due to existing roadway conditions, surrounding land uses, available right-of-way, and other characteristics, it is necessary to use different bicycle facilities to provide bicycle access within the same bikeway corridor. It is important for the City of Seattle to provide safe transitions between different facilities (such as adding shared lane pavement markings and “SHARE THE ROAD WITH BICYCLES” signs when transitioning from a bicycle lane to a shared roadway). These transitions can be made safer and more understandable for bicyclists and motorists with appropriate treatments, such as warning signs, pavement markings, curb cuts, etc. Transitions should be provided as a part of the bicycle facility design process.

Types of Facilities for Network Roadway Crossings

Roadway crossings are critical to the safety and convenience of the Bicycle Facility Network. Seattle has a number of multi-lane streets that carry high-speed, high-volume traffic, such as Aurora Avenue N and Rainier Avenue S. Many other arterial streets are also challenging to cross, particularly during peak travel periods. In order to make it possible for bicyclists to travel throughout the City, there must be safe places to cross these major streets. The section below describes the types of treatments that are recommended to help bicyclists cross these roadways. Selection of the appropriate roadway crossing treatment depends on a number of factors:

- Roadway width
- Traffic volume
- Sight-distance
- On-street parking
- Presence of traffic signals at the intersection or at nearby intersections
- Location on a signed bicycle route

Roadway crossing facilities recommended for the Network are described below. Additional detail is provided in [Appendix C/Design Guidelines Document].

An appropriate combination of physical improvements is recommended for each crossing location. The types of physical improvements that are recommended are described below. There are three general categories of improvements:

- 1) Traffic signals
- 2) Geometric improvements
- 3) Signs

Full Traffic Signals

Full traffic signals allow bicyclists to cross arterial streets without needing to select an appropriate gap in moving traffic. Traffic signals make it easier to cross the street, though it is important to make bicyclists aware of potential conflicts with turning vehicles and make improvements to reduce these conflicts.



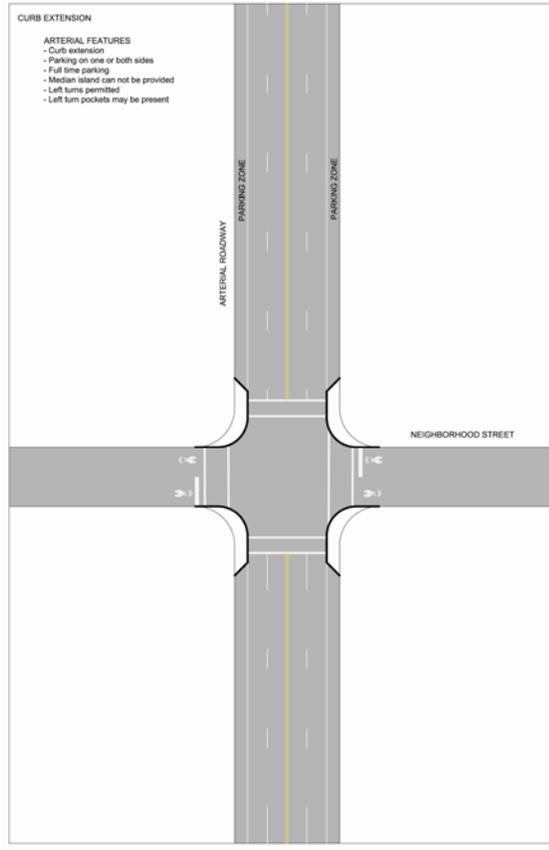
Pedestrian Crossing Signals

Pedestrian crossing signals to allow pedestrians to stop traffic to cross at key locations on arterial streets. These signals are beneficial for bicycle crossings. However, because they are oriented for pedestrians, the signals are provided on only one side of the non-arterial roadway, and the push-buttons for actuating the signal are adjacent to the sidewalk, out of reach of bicyclists in the roadway (see section below for recommended improvements to these signals).



Curb Extensions

Curb extensions shorten bicycle and pedestrians crossing distance and increase the visibility of non-motorized users at roadway crossings. By narrowing the curb-to-curb width of a roadway, curb extensions may also help reduce motor vehicle speeds and improve bicyclist and pedestrian safety. Curb extensions are appropriate for locations that have on-street parking.

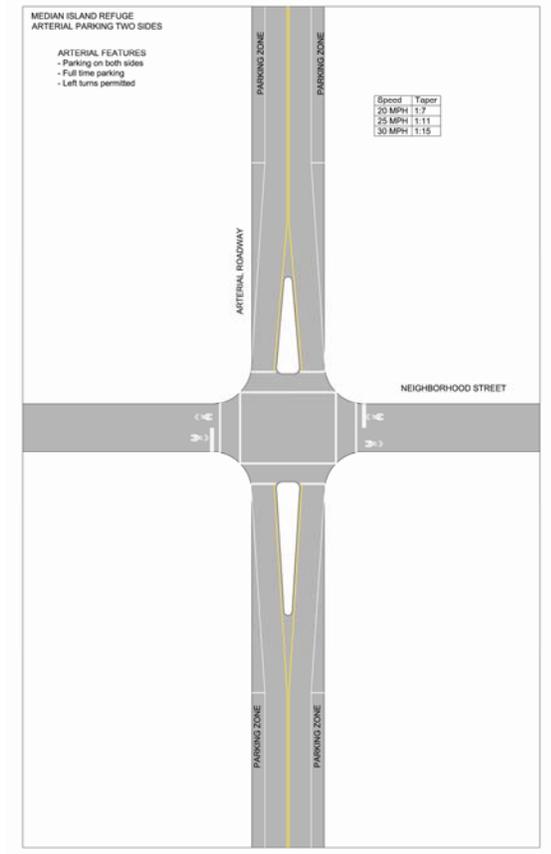


Curb radius reduction

Wide curb radii allow motorists to make high-speed turning movements. Reducing the curb radii at the corners of an intersection helps to slow turning vehicles, improves sight distance between bicyclists and motorists, and shortens the crossing distance for bicyclists and pedestrians. Surrounding land uses and the traffic composition on the roadway are important to evaluate when considering this treatment. If a curb radius is too small, trucks and buses may drive over the curb and endanger bicyclists and pedestrians. In Seattle, curb radii should be evaluated at the same time as other geometric improvements at an intersection.

Median Islands

Median islands (or crossing islands) allow bicyclists and pedestrians to cross one direction of motor vehicle traffic at a time. Arterial roadway intersections that have low demand for left-turn movements can be potential candidates for adding median islands. Median islands can be constructed on these roadways by using the available center turn lane area or by removing parking from one side of the street and shifting the travel lanes. Median islands are likely to be a long-term improvement on roadways where significant geometric changes are needed to provide enough space for the median island.



Overpasses and Underpasses

Overpasses and underpasses separate bicycle and pedestrian traffic from vehicular traffic, allowing bicyclists and pedestrians to cross busy streets without potential conflicts. Because they are expensive to construct, they should be reserved for locations where there is a high demand for bicycle and pedestrian crossings and the danger of crossing the roadway is high. Ideally, overpasses and underpasses should take advantage of the topography at a site—grade separations are less expensive to construct and more likely to be used if they can help bicyclists and pedestrians avoid going up and down slopes, ramps, and steps. Adequate width (for users to pass each other comfortably), lighting, and surveillance should also be provided to increase security of these crossings.

Bike Box at Intersection

Bike boxes are installed to allow bicyclists to move in front of cars waiting at an intersection to increase their visibility and reduce conflicts with turning vehicles. They are typically used at intersections where bicyclists need to turn left and/or many vehicles turn right. During a red signal phase, bicyclists are able to better position themselves for a left turn by moving left across the bike box.



High-visibility pedestrian/bicycle crossing warning signs

High-visibility pedestrian and bicycle pedestrian warning signs are recommended at trail crossings in Seattle. These signs can increase driver awareness of pedestrians and bicyclists, especially at mid-block locations where pedestrians and bicyclists may not be expected. These signs will be most effective when combined with other treatments, such as marked crosswalks, curb extensions, median islands, etc. Signs should be used judiciously—too many signs can cause visual clutter and lead to non-compliance.



Sight-distance improvements

Sight-distance obstructions can increase the risk of bicyclist being struck by vehicles at roadway crossings. Several of the locations recommended for bicycle crossing improvements in Seattle have on-street parking, landscaping, light poles, bus stop shelters, and other features obstructing the line of sight between drivers and bicyclists. While these features can make a street more attractive and serve other valuable functions, they should be placed in locations that do not obscure drivers' views of bicyclists. The City should continue to make sight distance improvements through its Spot Maintenance Program.