

Resource Guide for Bicycle Facilities

BICYCLE FACILITY TYPE		Definition	Recommended Volume Limits*	Recommended Posted Speed Limits*	Bicyclist Comfort Rating	Implementation Elements
Shared Use Paths†		Shared Use Paths are for the exclusive use of pedestrians, bicyclists and other active transportation users. They are separated from motorized vehicular traffic by an open space, barrier, curb, or exist in an independent corridor.	recommend to separate pedestrians and cyclists from high speed and/ or high density areas (not to preclude other opportunities such as rails to trails and/or where opportunities exist off-road)		☆☆☆	<ul style="list-style-type: none"> • Width is the primary design consideration and should be based on context, volume, and mix of users. Typical widths range from 10 to 14 feet. <ul style="list-style-type: none"> o Commonly designed for two-way cyclist and pedestrian travel. o Separation of pedestrians and bicyclists is appropriate in high volume areas. • Typically within own right-of-way • In constrained conditions, sidepaths adjacent to roadway can function for short segments or longer segments if there are limited driveways and street-crossings but not recommended as two-way sidepaths have operational challenges. <ul style="list-style-type: none"> o Sidewalks are not considered sidepaths and are undesirable as shared use paths • Must meet all ADA guidelines. • Bridges or underpasses may be needed to provide continuity • Intersection treatments should address both cross-traffic movements and turning movements of people entering and exiting the path • Lighting and signage strongly recommended
Protected Bike Lanes (one way, two-way, raised)*		Protected Bike Lanes are an exclusive bicycle facility within or adjacent to the roadway but separated from motor vehicle traffic by a physical barrier or change in elevation. Also known as "Cycle Tracks".	recommend protected lane when volume exceeds 35,000 vehicles per day	Appropriate on most facilities. Higher speed roadways should include more durable separation such as a landscape buffer, parking or raised median/ raised cycle track.	☆☆☆	<ul style="list-style-type: none"> • A Protected Bike Lane (also referred to as a cycle track) is physically separated from motor traffic and distinct from the sidewalk <ul style="list-style-type: none"> o Physical separation from vehicles is required, which can be accomplished via flex-posts, plantings, curb, parking etc. o If parking is used as the physical separation then a 3ft buffer must be placed between the bicycle way and the on street parking • Width: The minimum width of cycle track is 5ft with greater widths desired, particularly uphill <ul style="list-style-type: none"> o one-way – minimum width is 5 feet, desirable width is 7ft to allow passing o two-way – minimum width is 8ft, desirable width is 12ft • Pavement markings span at frequent intervals such as a bike symbol • Intersection Treatments: Additional treatments at intersections and driveways are important considerations which can be addressed via bicycle signals, intersection crossing markings, conventional bike lane through the intersection, bike box, combined bike lane/turn lane that indicates the pathway through the shared left turn lane, sight distance considerations and signage. • Two-way cycle tracks are often used on streets where there is not enough room for a one-way cycle track on both sides of the street • Other important comfort and safety considerations include using a colored lane or a raised cycle track, wrapping the lane behind transit stop zones where appropriate.
Neighborhood Greenways*		Neighborhood Greenways are low speed, low volume local streets that prioritize pedestrian and bicycle travel with traffic calming treatments and improving arterial crossings. These often parallel nearby arterials and typically include a combination of treatments and aesthetics. Neighborhood Greenways are also known as Bike Boulevards.	recommended on roadways with less than 1,500 vehicles per day, up to 3,000 allowed	85th percentile speeds at 25mph or less (20mph preferred)	☆☆☆	<ul style="list-style-type: none"> • Low volume streets: Neighborhood Greenways are on non-arterial neighborhood streets and/ or local roads with preferred speeds less than 25mph • Clear route planning that takes into consideration destinations being served, other connected bicycle facilities and where safe crossings of arterials can be implemented. • Signs and Pavement Markings should be easy to follow and large enough to be visible by all road users. Wayfinding should also be considered that includes direction arrows and destinations. • Speed and Volume Reduction can be accomplished via posted reduced speed limits, speed humps or cushions, curb extensions or bulb-outs, traffic circles, etc. as well as restricting turn movements for automobiles and turning stop-signs to intersecting roadways. • Green Infrastructure includes storm-water treatment such as bioswales or raingardens, community gardening, landscaping and additional trees. • Intersection Treatments are a key component of neighborhood greenways. They include traffic control and/or geometric design elements at all intersections to reduce conflicts such as: <ul style="list-style-type: none"> o Minor street crossings: reorient stop signs towards intersecting local streets (goal: unimpeded travel along the neighborhood greenway) or roundabouts with pavement markings for cyclists to reduce conflicts. o Unsignalized crossing of major streets: improve visibility and reduce delay for bicyclists and pedestrians via enhanced crosswalks, advanced warning, median refuge islands and curb extensions, warning signs/markings/beacons, actuated warning beacons o Major/ Signalized intersections: separate bicycle signal, prohibiting through movements for volume management, bike lane type markings through the intersection, bike boxes
Bike Lanes*		Bike Lanes are a portion of the roadway designated for preferential use by bicyclists. Bike lanes include pavement markings indicating one-way bike use.	recommended where volumes meet or exceed 3,000 vehicles per day	Recommended at speeds less than 35mph	☆☆	<ul style="list-style-type: none"> • Bike lanes are facilities within the roadway for the exclusive use of bicyclists. They are set between a solid line or buffered by hatched lines and a curb, parking lane or landscaping. This category includes a variety of implementation strategies such as buffered bike lanes, contra-flow bike lanes, colored bike lanes and bike passing lanes. • Pavement Markings must be included periodically along each segment to differentiate a bike lane from a paved shoulder • Intersection treatments are a primary consideration both at turn lanes and through intersections. Projects that do not implement intersection treatments should get a low score for safety. • Bike lanes should also have wider than minimum widths wherever possible <ul style="list-style-type: none"> o conventional bike lanes: minimum widths are 3ft, desirable widths are 5-6ft with a solid white line of 4 inches o buffered bike lanes: buffer shall be marked with 2 solid white lines 18inches – 3ft. A lane can be narrower if buffered - a 3 foot buffer and 4 foot bike lane next to a curb can be considered a 7 foot bike lane. o 5 ft minimum width is recommended next to a parking lane to reduce door conflicts • Buffered bike lanes on streets with high travel speeds/ volumes (above 30mph) are preferred • Gutter seams, drainage inlets, and utility covers should be flush with the ground • Additional information for contra-flow and left-side bike lanes as well as buffered and conventional can be found using the NACTO Urban Bikeway Design Guide.
Shared Lane Markings*		Shared Lane Markings are pavement markings, or "sharrows," which are used to indicate roadways that have a shared lane environment for bicycles and automobiles. SLMs reinforce the legitimacy of bicycle traffic on the street and recommend proper bicyclist positioning.	recommended where volumes do not exceed 3,000 vehicles per day	Not appropriate on streets with speed limit above 30mph	☆	<p>The shared lane marking is not a facility type and should not be considered a substitute for bike lanes, cycle tracks, or other separation treatments where these types of facilities are otherwise warranted or space permits. Shared lane markings reinforce the legitimacy of bicycle traffic on the street, recommend proper bicyclist positioning, and may be configured to offer directional and wayfinding guidance.</p> <p>Typical Applications:</p> <ul style="list-style-type: none"> o Used to indicate a proper path for bicyclists through difficult or hazardous situations (such as railroad crossings) o Along Neighborhood Greenways o On a downhill slope, preferably paired with an uphill bike lane o On streets where the traffic signals are timed for a bicycling travel speed of 12 to 15 miles per hour o Within single or multi-lane roundabouts o Along front-in angled parking, where a bike lane is undesirable o To direct bicyclists along circuitous routes o In the street alongside separated bikeway facilities such as cycle tracks, to permit continued use of the street by bicyclists who prefer to ride in the street

*minimum and recommended strategies from NACTO Urban Bike Guide - <http://nacto.org/publication/urban-bikeway-design-guide/>

†minimum and recommended strategies from AASHTO Guide for the Development of Bicycle Facilities. No online link, book must be purchased. A copy is available in the PSRC library for use in-house.

Resource Guide for Pedestrian Facilities

Pedestrian Facilities	Defintion	Pedestrian Comfort Rating	Implementation Elements
	<p>Pedestrian Corridors are places separate from motor vehicle traffic that allow people safe and comfortable access to destinations where they can move with ease and without obstruction along corridors and across roadways.</p>	<p>A sidewalk adjacent to a roadway is a less comfortable facility without enhancements in the curb zone.</p>	<p>There are four main elements to the pedestrian corridor – the Frontage Zone, Pedestrian Through Zone, Street Furniture/ Curb Zone and the Enhancement/ Buffer Zone:</p> <ol style="list-style-type: none"> 1. Frontage Zone: The section of the sidewalk that functions as access to buildings and businesses, whether through entryways and doors or sidewalk cafes. The frontage zone consists of both the structure and the facade of the building fronting the street, as well as the space immediately adjacent to the building. 2. Pedestrian Through Zone is the primary, accessible pathway that ensures that pedestrians have a safe and adequate place to walk parallel to the street. This zone should be 5–7 feet wide in residential settings and 8–12 feet wide in downtown or commercial areas. 3. Street Furniture/Curb Zone is defined as the section of the sidewalk between the curb and the through zone in which street furniture and amenities such as lighting, benches, newspaper kiosks, utility poles, tree pits and bicycle parking are provided. The street furniture zone may also consist of green infrastructure elements, such as rain gardens or flow-through planters. 4. The Enhancement/Buffer Zone is the space immediately next to the sidewalk that may consist of a variety of different elements such as curb extensions, parklets, stormwater management features, parking, bike racks, bike share stations and curbside bike lanes or cycle tracks.
	<p>A Leading Pedestrian Interval (LPI) typically gives pedestrians a head start when entering an intersection with a corresponding green signal in the same direction of travel.</p>	<p>Increases safety and comfort at intersections</p>	<p>Leading Pedestrian Intervals are critical at intersections where heavy right or left turning volumes create consistent conflicts and safety concerns between vehicles and pedestrians. They enhance the visibility of pedestrians in the intersection and reinforce their pathway over turning vehicles, especially in locations with a history of conflict.</p> <p>LPIs should give pedestrians a minimum head start of 3–7 seconds, depending on the overall crossing distance. Intervals of up to 10 seconds may be appropriate where pedestrian volumes are high or the crossing distance is long.</p> <p>To increase the effectiveness of a LPI and improve visibility of pedestrians at high-conflict intersections, install a curb extension at the intersection.</p>
	<p>Pedestrian activated lights and signs alert drivers and improve pedestrian crossings. They can be activated by pedestrians manually by a push button or passively by a pedestrian detection system, and should be unlit when not activated.</p>	<p>These crossing treatments increase safety and comfort at intersections.</p>	<p>Rectangular Rapid Flash Beacons (RRFB) and other lighted crossings can enhance safety by reducing crashes between vehicles and pedestrians at unsignalized intersections and mid-block pedestrian crossings by increasing driver awareness of potential pedestrian conflicts.</p> <p>RRFBs use an irregular flash pattern that is similar to emergency flashers on police vehicles and can be installed on either two-lane or multi-lane roadways.</p> <p>Pedestrian Actuated Crossing Treatments typically receive power by standalone solar panel units, but may also be wired to a traditional power source.</p>
	<p>Curb Extensions are the horizontal extension of the sidewalk into the street which visually and physically narrow the roadway creating safer and shorter crossings for pedestrians while increasing the available space for street furniture, benches, plantings and street trees.</p>	<p>Increases safety and comfort at intersections</p>	<p>Narrowing the street through curb extensions create more time for preferential treatments such as leading pedestrian interval and transit signal priority, tighten intersection curb radii and encourage slower turning speeds. Curb extensions can be implemented using low-cost, interim materials. In such cases, curb extensions should be demarcated from the existing road- bed using temporary curbs, bollards, planters, or striping.</p> <p>Curb extension is an umbrella term that encompasses several different treatments and applications and may be segmented into various sub-categories:</p> <ul style="list-style-type: none"> • Midblock curb extensions, known as pinchpoints or chokers, which may include cut-throughs for bicyclists. • Curb extensions used as gateways to minor streets known as neckdowns. • Offset curb extensions that force vehicles to move laterally, known as chicanes. • Curb extensions at bus (or transit) stops, also known as bus bulbs. Used as a bus bulb, curb extensions may improve bus travel times by reducing the amount of time a bus takes to merge with traffic after boarding. Bus bulbs also help to prevent motorists from double parking in the bus stop. • Conventional curb extensions are a recommended feature where there is on-street parking.
	<p>A pedestrian safety island (also referred to as a “refuge island”) reduces the exposure time experienced by a pedestrian in the intersection by allowing pedestrians an opportunity to cross one half of the roadway, with a safe place to stop before crossing the second half of the roadway. This increases safety while reducing the time a pedestrian must wait for an adequate gap in the traffic stream if at an unsignalized crossing.</p>	<p>Increases safety and comfort at intersections</p>	<ul style="list-style-type: none"> • Generally applied at locations where speeds and volumes make crossings prohibitive, or where three or more lanes of traffic make pedestrians feel exposed or unsafe in the intersection. • They are typically constructed at marked crosswalks either at a midblock location or at an intersection. • Pedestrian safety islands should be at least 6 feet wide, but have a preferred width of 8–10 feet. Where a 6–foot wide median cannot be attained, a narrower raised median is still preferable to nothing. The minimum protected width is 6 feet, based on the length of a bicycle or a person pushing a stroller. The refuge is ideally 40 feet long. • The cut-through or ramp width should equal the width of the crosswalk. Where this cannot be achieved, cross-walks should be striped wider than the cut-through area. • All medians at intersections should have a “nose” which extends past the crosswalk. The nose protects people waiting on the median and slows turning drivers. • Safety islands should include curbs, bollards, or other features to protect people waiting. • It is preferable to have the crosswalk “cut-through” the median. Where the median is wider than 17 feet, ramps are preferred. This dimension is based on a 6–inch- high curb, two 1:12 ramps, and a 5–foot–wide level landing in the center.
	<p>Midblock crosswalks facilitate crossings that are not well served by the existing traffic network that make for unsafe situations for both pedestrians and vehicles.. These pedestrian crossings are most commonly needed at schools, parks, civic centers and other destinations with high rates of activity and fairly long distances between controlled intersections.</p>	<p>Increases safety and comfort at intersections</p>	<p>Midblock Crosswalks:</p> <ul style="list-style-type: none"> • Vertical elements such as trees, land- scaping, and overhead signage help to identify crosswalks and islands to drivers. • Daylighting in advance of a crosswalk makes pedestrians more visible to motorists and cars more visible to pedestrians. This may be accomplished by restricting parking and/or installing a curb extension. • Stop lines at midblock crossings should be set back 20–50 feet. This ensures that a person crossing the street is visible to the second driver when the first driver is stopped at the stop line. • Stripe the crosswalk, regardless of the paving pattern or material. Otherwise, drivers are not likely to see it, especially at night. • Medians or safety islands create a 2-stage crossing for pedestrians, which is easier and safer. • At key access points to parks, schools, and waterfronts, and at intersections with local streets, raised crossings increase visibility, yielding behavior, and create a safer pedestrian crossing environment. • Where an unsignalized crossing exists at a transit stop, enhanced crossing treatments or actuated signals should be added. Transit stops should ideally be located so that pedestrians cross behind the bus or transit vehicle. <p>Shortcuts paths and 'cut-thoughts' can provide an alternate to the street network and can help people overcome barriers to walking by facilitating neighborhood connections that are both safe and pleasant when properly lighted and maintained. They can be particularly useful in cul-de-sac neighborhoods or with large block sizes where walking distances along the roadway network are long. These are particularly useful when connecting schools, parks and food access to neighborhoods.</p>

^ominimum and recommended strategies from NACTO Urban Street Design Guide - <http://nacto.org/publication/urban-street-design-guide/>