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## Best Practice Improvements/Actions for Pedestrian and Bicycle Safety and Comfort



## *Resources*

<https://www.pps.org/article/livememtraffic>

<http://viriniadot.org/programs/resources/Traffic-Calming-Guide-For-Neighborhood-Streets.pdf>

[https://safety.fhwa.dot.gov/speedmgt/ePrimer\\_modules/module3pt2.cfm](https://safety.fhwa.dot.gov/speedmgt/ePrimer_modules/module3pt2.cfm)

Expanding and improving the pedestrian and bicycle infrastructure means adding elements that may be new to a particular community. This Best Practice Compendium, although not exhaustive, details an array of well-established techniques from traffic calming to crossing treatments that can be used to slow traffic, improve comfort and safety and create awareness of pedestrians and bicyclists. In particular these may be applied on streets that are too narrow for any designated pedestrian or bicycle space, but which are likely to carry pedestrians and bicyclists. Many of these tools are part of a system of “calming” or slowing traffic in places where there are expected to be higher numbers of pedestrians and bicyclists or where you would like to encourage them to go. Used together they can create low-stress routes also referred to as bicycle boulevards, greenways and bikeways.

Following are more detailed descriptions of the various types of improvements and actions that may be used to create facilities that are comfortable for users of all abilities. The simpler improvements are typically easier and less expensive ways to create safety and ensure that walking and bicycling are viable modes of travel. Other improvements listed here may be considered over the long term as use grows and funds become available. It's often helpful to test new designs through temporary demonstrations where you can measure what works or not; examples are included below.

#### Temporary Demonstration Projects

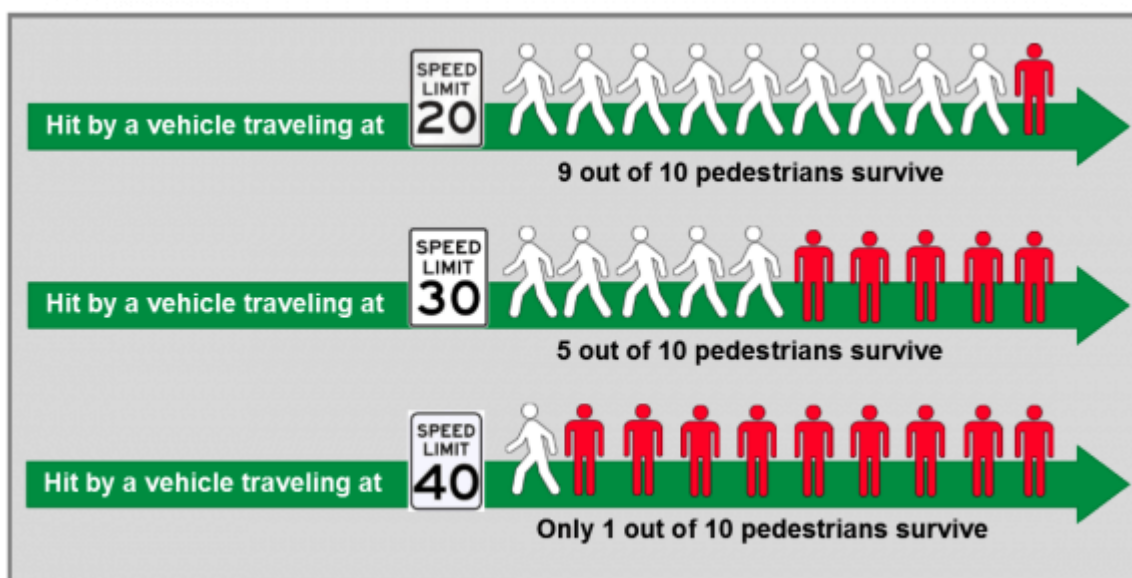
Test ideas, gather community feedback and collect before and after evidence on new facilities by conducting demonstrations.



#### Traffic Calming

The more general techniques listed in this section are used to reduce traffic speeds and create safer conditions for pedestrians and bicyclists. They can also discourage cut-through vehicle traffic making the street more livable for adjacent residents. Traffic calming is intended to prompt drivers to not travel over the speed limit through designs that make speeding uncomfortable for the driver. This improves street safety and livability for all users.

#### Likely pedestrian deaths based on speed of vehicles



**Edge friction** is a combination of vertical elements such as on-street parking, bulb-outs, street trees, shrubs and site furnishings that narrow the perceived street width and have been shown to reduce motor vehicle speeds. Some are described in more detail below.



**Narrow lanes** can reduce motor vehicle speed. Paint is a simple, low cost and easy way to narrow travel lanes and can be used to stripe shoulders (see paved shoulder facilities).

Guidance on traffic lane widths show they can be as narrow as nine feet in appropriate locations.

**Curb extensions** extend the curb outward to reduce the width of a crossing (below left). They slow vehicles with edge friction, narrow the travel lane and improve sight lines. This makes pedestrians more noticeable by moving them closer to the travel lane. It shortens the crossing distance decreasing pedestrian risk. And it can reduce vehicle delay due to shortened time required for pedestrian crossing.



### Curb Extension Demonstration

Build a temporary curb extension as part of a pop-up traffic calming demonstration using straw wattles to create the extended curb area and cones to make them visible.



A **traffic circle or mini-circle** can be used at intersections on low volume, local roads.

Without realigning the roadway, adding a small island and vertical element in the center of the intersection (right) causes traffic to slow to maneuver around it, increases driver attentiveness and improves safety. Circles slow vehicles but allow them to proceed after yielding to any vehicle on their left. This reduces the “Whose turn is it to go?” confusion that often occurs at a four-way stops vehicle-to-vehicle and vehicle-to-bicyclists. Circles can decrease the total time it takes to travel a roadway even though it reduces the peak speed due to fewer start/stop delays at intersections.



### Intersection Traffic Calming Demonstration

You can create a mini-circle as part of a traffic calming demonstration using hay bales for instance to create a short term pop-up demonstration.



Hay Bales

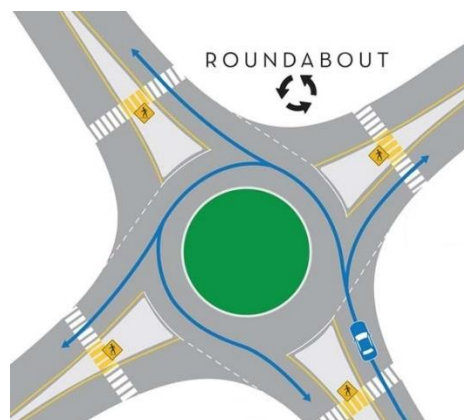


**Intersection painting** with large murals across full intersections are not just about traffic calming but building a sense of community. Painting can be done **as a demonstration** or permanently. The colorful street art gets drivers’ attention and alerts them to the landscape around them. Especially near schools, parks and in residential neighborhoods they can effectively slow traffic.



**Textured median island** is a very simple traffic calming technique in the center of the street, particularly as a treatment entering a neighborhood or district. This can slow traffic and divide the crossing task for pedestrians by providing an informal mid-street crossing refuge (only on low-speed low-volume streets). This textured surface (at left), is well suited to streets which are low volume or too narrow for a raised island; the roughened texture itself tends to slow drivers somewhat.

A **roundabout** is a circular intersection with entry deflection and yield control upon entering the circle that allows a driver to proceed at controlled speeds in a counterclockwise direction around a central island. Well-designed roundabouts maximize motorized and nonmotorized traffic flow and movement while reducing vehicle speed through design features such as entry deflection, yield to traffic on the left (rather than stop), reconfigured sidewalks, bikeway bypasses, high-visibility crosswalks and other traffic measures. Roundabouts may require additional right-of-way.



**Research has established the following roundabout benefits:**

- Dramatic reductions in severe motor vehicle collisions, injuries, and fatalities (roughly 70%-80%).
- Reductions in pedestrian and bicycle crashes and injuries.
- Typically reduced vehicle delays at peak traffic volumes, and much smoother motor vehicle flows at off-peak hours. (This benefit is particularly relevant at Alderson/US-95)
- Lower long-term maintenance costs than comparable signal light infrastructure (no hardware, lights, electricity), yet initial installation costs that are comparable to signal lights.
- Continued normal and safe operation even during power outages.
  - *Roundabouts can be difficult or dangerous for pedestrians with disabilities and require careful attention to detail.*



## Pedestrian infrastructure

**Pedestrian lanes** are space designated on the roadway with striping and pavement markings for exclusive use of pedestrians. The lane may be on one or both sides of the roadway and can fill gaps between important destinations in a community. They may be appropriate on roads with low to moderate speeds and volumes and may be improved over time with more permanent facilities as demand dictates.



**Sidewalks** provide dedicated space for pedestrians along a roadway and are physically separated from the roadway by a curb or unpaved buffer space. They should be of a solid material that is smooth and accessible to all abilities and users, i.e. wheelchairs and strollers.

**Pedestrian lighting** should uniformly light the pedestrian way along the route at pedestrian height and illuminate the pedestrian at crosswalks while reducing glare to motorists.





**Raised pedestrian crosswalks** (left) or speed-tables where a crosswalk or entire intersection is raised such as this one in downtown Bonners Ferry (right). These make



pedestrians more visible to approaching motorists, raising the pedestrian to driver eye level. They improve accessibility by allowing pedestrians to cross a road at nearly a constant grade without the need for a curb ramp. They slow motorists and advance yield pavement markings, and crosswalk markings improve the visibility of the crossing. Speed tables are generally used on local streets or entrances such as at schools or in high- activity locations such as downtowns.



### Bicycle facilities

**Bike lanes** designate exclusive roadway space for bicyclists with striping, pavement markings and optional signs. A bike lane is located directly adjacent to motor vehicle travel lanes in the same direction as motor vehicle traffic. If adjacent to curbside parking allow enough width to avoid car doors opening. Simple bike lanes are appropriate on streets with low to moderate vehicle volumes and speed. (See examples above right.)



### Bike Lane Demonstration

Use chalk paint to create temporary bike lanes. Use cones to protect the workers or volunteers painting the bike lanes.



A **buffered bike lane** is a bike lane that in addition to the bike lane characteristics listed above is further separated from motor vehicle traffic with a painted buffer 1-3 feet wide (see demonstration project above).

A **separated or protected bike lane** is a bike lane that in addition to the bike lane characteristics listed above is physically separated from motor vehicle traffic with a physical buffer (such as a curb) and/or a permanent vertical element. (See example at left.)

**Sharrows** The use of “sharrows” can heighten driver awareness, encourage bicyclists and cue bicyclists where to ride by aligning outside the door area of on-street parking in the preferred path for bikes. Shared lane arrows provide wayfinding for bicyclists and announce to drivers to expect bicyclists.



A **bicycle boulevard** is a low-stress connected route designed to prioritize bicyclists. They operate within a roadway shared with motor vehicle traffic and are designated with street signs, directional signage and pavement markings. These are appropriate on low-volume low-speed local roads; through vehicle traffic is slowed. Speed and volume management may be required through traffic calming and other techniques to create low-stress conditions throughout the corridor. Connections may be needed between streets or sections and should be well marked and designed for low stress. Benefits of bicycle boulevards include safety and access for bicyclists and pedestrians by slowing traffic speeds and encouraging through traffic to use another route.



### Bicycle parking and storage

A location for **short-term bike parking** should be visible from and close to the entrance it serves—50' or less is a good benchmark. Weather-protected parking makes bicycle transportation more viable for daily and year-round use. Area lighting is important for any location likely to see use after dark.

Effective **bike parking for short-term users** depends on two main factors: 1) proximity to the destination and 2) ease of use. Short-term parking is designed to meet the needs of people visiting businesses, institutions and others—typically lasting up to two hours. Short-term users may be infrequent visitors to a location, so the parking installation needs to be readily visible and self-explanatory.

**Bike rack styles** should be designed for ease of use.

- Rack use is intuitive and is placed parallel or diagonally to the road
- Accommodates a variety of bicycles and attachments
- Is placed so that bikes do not impede clear area on sidewalk
- Allows locking of frame and at least one wheel with a U-lock
- Supports bike upright with 2 points of contact without putting stress on wheels
- Provides security and longevity features appropriate for the intended location

These rack styles fit the criteria at left

Inverted-U



**Bike corrals** can be used where there is limited sidewalk space and strong bicycle activity. On-street bike corrals can be located in the street area adjacent to the curb and can sometimes make use of on-street areas that are unsuitable for auto parking. When replacing a single auto parking space, a corral can generally fit 8 to 12 bicycles.



**Long-term bike parking** should be secure and have weather protection and can serve employees, residents and public transit users when at home or at a routine destination. Bicycles can safely be left unmonitored for a period of several hours or longer. They can be a room within a residential building or workplace, a secure enclosure within a parking garage or a cluster of bike lockers at a transit center or other indoor facility.



**For more information see Association of Pedestrian and Bicyclists Professionals Guidelines:**

[https://cdn.ymaws.com/www.apbp.org/resource/resmgr/Bicycle\\_Parking/EssentialsofBikeParking\\_FINA.pdf](https://cdn.ymaws.com/www.apbp.org/resource/resmgr/Bicycle_Parking/EssentialsofBikeParking_FINA.pdf)

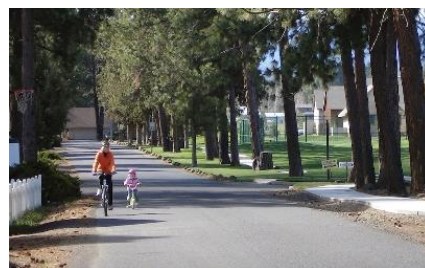






### Shared facilities

A **yield roadway** serves pedestrians, bicyclists and two-way motor vehicle traffic in the same slow-speed travel area without lane markings in the roadway (right). The narrow width of yield roadways require motor vehicle traffic to yield to oncoming vehicles in order to pass when other uses are present such as pedestrians, bicyclists or parked cars. Appropriate on low-volume and low-speed roadways with little through traffic. Share the Road signage can raise awareness of all users.

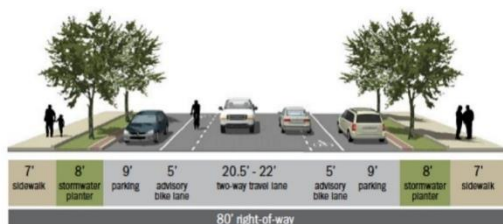


**Paved shoulder facilities** striped on the edge of roadways can serve as a functional space for bicyclists and pedestrians to travel in the absence of other facilities with more separation. Another alternative for smaller streets is to create a marked shared path on one side of the road. On roads with moderate to high volumes and speeds with truck traffic they can serve longer distance or regional connections, but they fail to provide a low-stress experience in this condition.

A **shoulder sidepath** is a two-way shared-use path located on the roadway shoulder where there is no ability to obtain right-of-way to have a separated facility. Shoulder sidepaths are generally an extension of existing pavement and can offer a lower stress experience for users by using paint or other strategies to increase visibility such as a painted buffer, use of color at higher stress area and vertical delineators to provide physical separation between the travel lane and the marked pedestrian/bicycle lane. Such a path can be five to eight feet wide, with a marked line or buffering stripe (e.g. 12-inch striping).



**Advisory lanes or advisory shoulders** create usable shoulders on low-volume roadways otherwise too narrow to accommodate a bike lane or shared path. The lane is suggested by marking four to six foot shoulders with dashed lines and colored sections where needed to highlight conflict areas. This cues drivers they are to travel toward the center of the road, leaving the shoulders for pedestrians and bikes, except when passing a vehicle in the opposite direction. Advisory shoulders can offer solutions for constrained conditions on roads with low to moderate vehicle volumes and speeds while still are under assessment (see below). *Note: Advisory shoulders are a new treatment type in the United States. In order to install advisory shoulders, an approved Request to Experiment is required as detailed in Section 1A.10 of the MUTCD. FHWA is also accepting requests for experimentation with a similar treatment called "dashed bicycle lanes."*







### Separated facilities

A **sidepath** is a walking and biking two-way shared-use path located parallel to a roadway with some separation from the road using a barrier or unpaved buffer space. Sidepaths should be of smooth material accessible to all abilities and can offer a low-stress experience for users of all ages and abilities near heavy traffic while maintaining rural and small town community character.

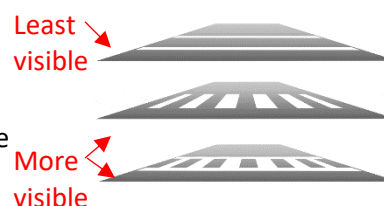


**Trails or shared use paths** provide for two-way travel on routes separate from the road network and may function as a network alternative to a roadway connection for bicyclists, pedestrians, skaters, wheelchair users, joggers and other users. These should be a minimum of 10' wide. A 12' wide facility will provide a better low-stress experience for a variety of users for transportation and recreation. They are generally made of smooth material accessible to all abilities, but may be compacted gravel or a rock-fine surface.



### Crossings

**Enhanced crosswalk markings** are typically wide stripes marking a crosswalk that are perpendicular to the crossing direction to increase visibility of the crossing for drivers and better guide pedestrians.



**Curb ramps** are required for ADA compliance at intersections, crossings and other locations where wheelchairs need access. They provide access for wheelchair users, strollers and other wheels otherwise excluded from the sidewalk because of the barrier created by the curb. Design appropriately so they do not confuse those with vision impairments who rely on the curb to find the transition between the sidewalk and the street. Dual ramps perpendicular to and aligned at the crossings are safer than one diagonal ramp at the middle of the curb radius and are recommended. For design strategies to enhance the benefits of curb ramps while minimizing the drawbacks see:

[https://www.fhwa.dot.gov/environment/bicycle\\_pedestrian/publications/sidewalk2/sidewalks207.cfm](https://www.fhwa.dot.gov/environment/bicycle_pedestrian/publications/sidewalk2/sidewalks207.cfm)



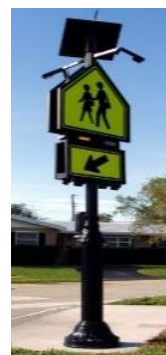
**Refuge islands** are islands in the roadway to provide pedestrians and bicyclists a safer place to wait if they are unable to complete their crossing in one movement (see right). When used at intersections they should be designed with a small "nose" to protect a pedestrian who is stopped midcrossing.



**Midblock crossings** can provide safe frequent crossings for pedestrians and bicyclists on roadways with high-speed or high-volume traffic. They may be located midblock to avoid vehicle turning movements or to provide crossings in areas where infrequent intersections create substantial out-of-direction pedestrian or bike travel. Midblock crossings should be paired with traffic-control devices such as RRFBs, lighted flashing signs and refuge islands.



**Pedestrian Hybrid Beacons (PHBs)** and **Rectangular Rapid Flashing Beacons (RRFBs)** are signals activated by pedestrians and bicyclists to increase crossing safety by warning and controlling traffic at higher volume locations with marked crosswalks and no traffic signals. Typical locations have high pedestrian demand and/or connect to important destinations such as schools, parks and retail. They should be paired with additional improvements such as curb extensions, enhanced crosswalk marking, lighting, median refuge islands and corresponding signage.



### Other Actions

**Street trees, shelter, other furnishings** – The inclusion of human scale **placemaking and comfort making** amenities announce to drivers to expect pedestrians and to people on foot that the street/place is safe and



comfortable. They provide visual detail and interest. These conveniences include: street trees which provide shade and some protection from the elements; street furnishings such as trash receptacles; seating especially near gathering areas, food, transit stops and on long routes used by children and older adults; bicycle parking; and public art which can provide function and beauty. All can transform downtowns and other active locations into walkable/bikeable destinations. Street trees are important on all routes used by pedestrians



**Safe Routes to School (SRTS)** programs use education, engineering and enforcement strategies that help make routes safer for children to walk and bike to school, as well as encouragement strategies to attract more children to walk and bike. Through SRTS, cities, school districts, schools, families and students work together to encourage more walking and biking to school, helping increased school performance, better health and more physical activity for students.



**High-visibility signage** – These yellow green fluorescent signs offer superior visibility, especially when approached from an angle. They are recommended near schools.



**Other techniques** consist of operational measures such as police enforcement and speed displays.