

BIKE FACILITIES AND PARKING

A 2017 study¹ out of the University of Glasgow looked at the connection between active commuting and health and found that when commuting by bike, the risk of cardiovascular disease, cancer, and other causes of death were reduced by nearly half. However, just simply encouraging people to bike is not enough. Streets must be designed to include bike infrastructure that will support long-term behavior change for bicycling.

Streets with high speeds and high traffic volumes are often located in communities that are most impacted by poor health outcomes and are in the most need for low-cost transportation options. These streets often have minimal to no bike facilities or low-stress bike route alternatives options for bicyclists. In Sacramento County, parks and healthy retail destinations are primarily located along high speed and high volume arterials and trucking routes, discouraging active travel due to unsafe roadway conditions and thereby limiting opportunities to improve health.

Different bike facility treatments can affect the level of stress and comfort level of a rider, which ultimately influences the likelihood a rider is to ride. There are four types of bicyclists²:

1. **Strong and Fearless:** People willing to bicycle with limited or no bicycle-specific infrastructure
2. **Enthusied and Confident:** People willing to bicycle if some bicycle-specific infrastructure is in place
3. **Interested but Concerned:** People willing to bicycle if high-quality bicycle infrastructure is in place
4. **No Way, No How:** People unwilling to bicycle even if high-quality bicycle infrastructure is in place

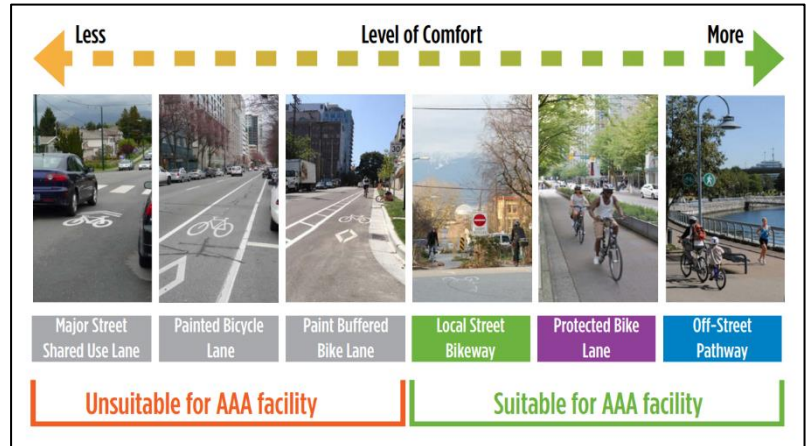
Bike facility designs should aim to increase comfortability for Bicycle Type #3 – Interested by Concerned. This group has the most opportunity to convert to using bicycling as a transportation mode if infrastructure is improved and thereby improving their personal health, as well as many other benefits.

HEALTH BENEFITS OF BIKE FACILITIES

Bike facilities can provide a multitude of health benefits including:

- Encourages active travel by creating a safe and comfortable bicycle environment
- Reduces vehicle traffic volumes as more residents switch to bicycling, leading to a reduction in vehicle emissions and improved air quality
- Provides mental health benefits through reduced traffic noise and improved streetscape aesthetics
- Increases opportunities for neighborhood interaction and economic development
- Can be used as a traffic calming strategy

City of Vancouver Transportation Design Guidelines: All Ages and Abilities (AAA) Cycling Routes



Source: City of Vancouver

¹Celis-Morales Carlos A, Lyall Donald M, Welsh Paul, Anderson Jana, Steell Lewis, Guo Yibing et al. Association between active commuting and incident cardiovascular disease, cancer, and mortality: prospective cohort study BMJ 2017; 357 :j1456

² Understanding the "Four Types of Cyclists", Alta Planning and Design, <https://blog.altaplanning.com/understanding-the-four-types-of-cyclists-112e1d2e9a1b>, Accessed August 2019

HOW TO USE THIS GUIDE

The following strategies are examples of bike facilities and bike parking that can be implemented to achieve lower-stress, safer bike networks on streets.

Note that the appropriate bike facility treatment depends on the context of the street and the neighborhood, which requires community partnership and consultation in order to ensure successful and equitable outcomes. This toolkit is intended to be referenced after a walk audit or bike audit has been conducted where traffic calming has been identified as a priority.

Each bike facility treatment includes a description of what the treatment is, estimated costs, and the type of rider the treatment is deal for.

ADDITIONAL RESOURCES

- Public Engagement Best Practices
- Walk Audit Toolkit

COSTS

Costs are estimated on a scale of low, medium, and high. Some bike facility treatments require a larger investment of time and resources, however many can also be relatively inexpensive to implement using paint, planters, bollards, and other materials. Temporary materials can also be used to test how a bike facility works and helps create community buy-in before permanent implementation.

Low Cost



Medium Cost



High Cost



BIKE FACILITY TREATMENTS

No one bike facility treatment is perfect for every type of road. Depending on the road type, number of lanes, traffic volume, and surrounding land uses, the correct bike facility treatment will change. It is important to remember context is key when considering which type of treatment is correct for which type of road:

1. **Arterial** – Arterial roads are high capacity urban roads that are designed to move high volumes of traffic. Often times these roads also serve as a main access point for surrounding neighborhoods and can pose a barrier for pedestrians and bicyclists.
2. **Collector** – Collector streets serve as an intermediary between neighborhood streets and arterial streets.
3. **Residential** – Residential streets are low-volume streets in highly residential areas. These streets are often one lane in either direction and have the lowest traffic volumes.

Arterial



Collector



Residential



The following strategies indicate which bike facility treatments work best for each type of street with the goal of decreasing level of stress and increasing level of comfort while biking.

Bike Facilities and Parking

BIKE INFRASTRUCTURE

There are four distinct types of bike facilities to accommodate bicycles on the roadways. Each facility offers varying levels of protection from cars and can increase or decrease the comfort level of a rider. Studies show that the more separation bicyclists have from vehicles, the more comfortable bicyclists of all ages and abilities will feel. The following strategies are organized from the least amount of separation to the most separation.

Class III – Bike Route

A Class III bike route is a street designated for bicycle travel and where bicycles share a travel lane with vehicles. Identification of routes are often signaled by “sharrow” pavement markings or a bike route wayfinding sign. Shared traffic lanes are best used on low-volume streets.

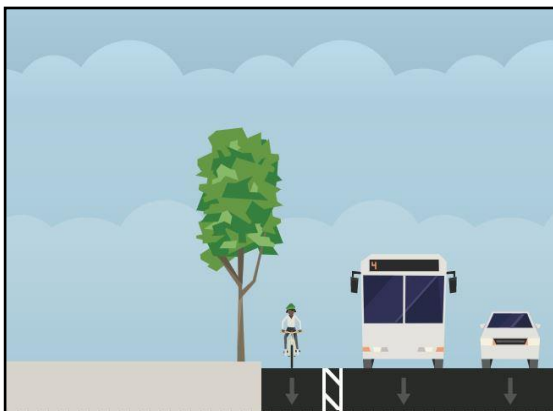
COST



TYPE OF ROAD



Class II – Bike Lane



A Class II bike lane provides a dedicated space to the rider but generally no additional separation from moving vehicles or parked cars. Class II bike lanes are indicated by a painted line and are approximately 5-6' wide. Occasionally, Class II bike lanes may have a striped 2-4' painted buffer providing greater separation between a lane of traffic and the bicyclist. Class II bike lanes are best suited for low speed, low volume streets.

COST



TYPE OF ROAD



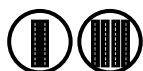
Class IV – Protected Bike Lanes

Class IV protected bike lanes adds vertical features to further separate the bicyclist from traffic. Vertical barriers include raised medians, planter boxes, parking spaces, or bollards. Class IV protected bike lanes are ideal for higher volume streets and can help encourage more people to try riding on busier streets.

COST



TYPE OF ROAD



Class I – Off-Street Bike Path



Class I off-street bike paths are completely separate from the road. These paths are great for rural areas or rails to trails projects. Class I bike paths are expensive and require a lot of space but are an excellent way to encourage physical activity and riders of all ages and abilities.

COST



TYPE OF ROAD



Bike Facilities and Parking

ADDITIONAL BIKE FACILITY ELEMENTS

In addition to bicycle lanes, there are additional elements that can be added to help reinforce the level of safety, comfort and functionality of bike networks.

Green Paint

Green paint can increase visibility of bicyclists, especially at areas of turning conflicts. The green paint signals to all mode users where to expect bicyclists. Green paint most effective at intersections to signal turning conflicts or to give priority placement to bicyclists.

COST



Maintenance



Maintenance of bike lanes and bike parking is important to ensure safety of riders and regular use. Maintenance can include cleaning of lanes, lighting needs, restriping of paint, or regular trimming of landscaping. When working to design new bike lanes or determining placement of bike racks, create a maintenance plan with distribution of responsibilities to support long-term success.

COST



Wayfinding

Wayfinding is a low-cost way to direct bicyclists to nearby destinations and to low-stress bicycle networks. Wayfinding signs should be simple and easy to read with universal visuals.

COST



Bike Parking Placement & Maintenance

Placement of bike racks is critical to the use and security of racks. Racks should be in highly visible, well lit, locations that are easy to access and do not block the pedestrian right of way.

When placing racks, ensure a maintenance plan is in place to ensure upkeep is regularly maintained. The racks in the photo on the right are poorly placed and have overgrown foliage, discouraging rack use.

COST



Bike Facilities and Parking

BIKE PARKING

In order for residents to choose bicycle riding for everyday activities such as errands or commuting to work, adequate and secure bike parking is essential for residents to be able to park their bikes easily and securely. The type of bike parking chosen depends on many factors including use, short-term or long-term parking, and space available.

In addition to selecting the right type of bike parking, placement and security is essential to ensure bicyclists feel comfortable parking their bike at a rack. The City of Sacramento has created bike parking selection criteria in their Bike Rack Design and Placement Design Standards³.

Table 1: Bike Rack Design and Placement Design Standards, City of Sacramento. Bike Rack Design Criteria

Criteria	Description
Supports the bike upright without putting stress on wheels	The rack should provide two points of contact with the frame. The rack's high point should be at least 32" high.
Accommodates a variety of bicycles and attachments	The racks recommended on page 3 serve nearly all common types of bicycle styles and attachments (baskets, racks, etc.) – if installed with proper clearances.
Allows locking of frame and at least one wheel with a u-lock	A closed loop of the rack should allow a single u-lock to capture one wheel and one closed section of the bike frame. Rack tubes with a cross section larger than 2" can complicate the use of smaller u-locks.
Provides security and longevity features appropriate for the intended location	Steel and stainless steel are common and appropriate materials for most general-use racks. Use tamper-resistant mounting hardware.
Rack use is intuitive	First-time users should recognize the rack as bicycle parking and should be able to use it without the need for written instructions.
Ensure each short-term space is accessible	The short-term rack should not require the user to lift the bicycle or move another bicycle.

³ City of Sacramento Bike Rack Design and Placement Design Standards, Adopted by City Council April 25, 2017, Accessed August 2019

Short-Term Bike Parking

Short-term bike parking is ideal for locations where people need to leave their bikes for day-use destinations. Bike racks should be placed in convenient and highly visible areas. Racks must also allow people to easily lock a chain or u-lock to the rack to further secure their bicycle.

Bike parking can be customized to mark a sense of place, highlight local artists, or carry out other themes in a neighborhood. However, rack security and ability for riders to easily lock their bikes to the racks should never be compromised for visual appeal.

COST



Inverted U Racks



Bike Hitch



Wheel Well Secure



Long-Term Bike Parking

Long-term bike parking is ideal for situations where bicycles may need to be left and stored for longer periods of time and where increased security measures are desired. Transit hubs, residential areas, and business centers are ideal places to consider long-term bike parking.

COST



Vertical Parking



Source: Dero Bikes

Two-Tier Parking



Source: Waverly Station, M J Richardson

Bike Lockers



Source: An Errant Knight, Creative Commons

Secure Parking Areas



Source: Freiburg Bike Mobility Centre, Paul Krueger

PEDESTRIAN FACILITIES

People walk for many reasons: to go to a neighbor's house, to run errands, for school, or to get to a business meeting. People also walk for recreation and health benefits or for the enjoyment of being outside. Some pedestrians must walk to transit or other destinations. Regardless, everyone is a pedestrian at some point, whether walking from the car to the store or walking as the primary method of transportation.

Well designed and maintained pedestrian facilities encourage walking, which leads to greater physical activity and improved health. The importance of good pedestrian design not only applies to development of new facilities, but also to the improvement and retrofit of existing facilities. When pedestrian access is expanded and existing conditions for pedestrians are improved, higher numbers of pedestrians can be expected to use the system. Pedestrian facilities must be safe, attractive, convenient, and easy to use.



In Sacramento County, there have been over 360 collisions involving motorists and non-motorists over a 5-year span in North Sacramento and South Sacramento communities where residents are already disproportionately impacted by and vulnerable to poor health outcomes. Far distances between crosswalks, wide intersections, noncontiguous sidewalks, and prevalence of unmarked crossings are some of the contributing factors to these collisions. Therefore, poor design of pedestrian facilities can lead to perpetual problems and can actually discourage use if pedestrians are made to feel unsafe, unprotected, or uncomfortable.

HEALTH BENEFITS OF PEDESTRIAN FACILITIES

Pedestrian facilities can provide a multitude of health benefits including:

- Encourages active travel by creating a safe and comfortable pedestrian environment
- May reduce vehicle traffic volumes as more residents switch to walking, leading to a reduction in vehicle emissions and improved air quality
- Provides mental health benefits through reduced traffic noise and improved streetscape aesthetics
- Increases opportunities for neighborhood interaction and economic development
- Can be used as a traffic calming strategy

HOW TO USE THIS GUIDE

The following strategies provide basic design guidance for improving overall conditions for pedestrians, thereby encouraging pedestrian travel as an alternative to driving and enhancing health and quality of life.

Note that the appropriate pedestrian facility treatment depends on the context of the street and the neighborhood, which requires community partnership and consultation in order to ensure successful and equitable outcomes. This toolkit is intended to be referenced after a walk audit has been conducted where pedestrian enhancements have been identified as a priority.

Each pedestrian facility treatment includes a description of what the treatment is, estimated costs, and co-benefits.

ADDITIONAL RESOURCES

- Public Engagement Best Practices
- Walk Audit Toolkit

COSTS

Costs are estimated on a scale of low, medium, and high. Some pedestrian facility treatments require a larger investment of time and resources, however many can also be relatively inexpensive to implement using paint, planters, bollards, and other materials. Temporary materials can also be used to test how a pedestrian facility works and helps create community buy-in before permanent implementation.

Low Cost



Medium Cost



High Cost



PEDESTRIAN FACILITY TREATMENTS

No one pedestrian facility treatment is perfect for every type of road. Depending on the road type, number of lanes, traffic volume, and surrounding land uses, the correct pedestrian facility treatment will change. It is important to remember context is key when considering which type of treatment is correct for which type of road:

1. **Arterial** – Arterial roads are high capacity urban roads that are designed to move high volumes of traffic. Often times these roads also serve as a main access point for surrounding neighborhoods and can pose a barrier for pedestrians and bicyclist.
2. **Collector** – Collector streets serve as an intermediary between neighborhood streets and arterial streets.
3. **Residential** – Residential streets are low-volume streets in highly residential areas. These streets are often one lane in either direction and have the lowest traffic volumes.

Arterial



Collector



Residential



The following strategies indicate which pedestrian facility treatments work best for each type of street with the goal of decreasing level of stress and increasing level of comfort while walking.

Pedestrian Facilities

SIDEWALKS AND WALKWAYS

Sidewalks are “pedestrian lanes” that provide people with the space to travel within the public right-of-way that is separated from roadway vehicles and on-road bicycles. Sidewalks should be safe, accessible, and visually appealing. Well-designed and maintained sidewalks improve mobility for all pedestrians and in particular for those with disabilities. They also provide access to schools, work, parks, shopping areas, and other destinations.

Attached Sidewalks



Sidewalks that are adjacent to the street are called attached sidewalks. These sidewalks typically do not provide a “buffer zone”; space between pedestrian and vehicles, which place pedestrians closer to high-speed traffic. It is recommended that 2 feet should be added to the absolute minimum clear path width between pedestrians and vehicles. Sidewalks of minimum dimensions directly adjacent to the traveled way should be avoided.

COST



TYPE OF ROAD



Detached Sidewalks

Sidewalks that are separated from the roadway by strips of grass, dirt, rocks, or trees are called detached sidewalks. These sidewalks typically provide a “buffer zone”, which provides space between pedestrian and vehicles.

COST



TYPE OF ROAD



Sidewalk Width



Source: Model Design Manual for Living Streets

Sidewalks have a desired minimum through zone of 6 feet and an absolute minimum of 5 feet. When an attached sidewalk is placed especially along an arterial street or near schools, parks, retail or where large numbers of pedestrians are expected, a width of 8 to 10 feet is recommended. This will allow for pedestrians to walk side-by-side, pass each other, or allow for street furniture or amenities.

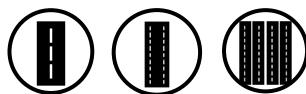
Curb Ramps

Curb ramps provide access between the sidewalk and roadway for people using wheelchairs, strollers, walkers, crutches, handcarts, bicycles, or who have mobility restrictions that make it difficult to step up and down high curbs. Curb ramps must be installed at all intersections and midblock locations where there are pedestrian crossings and follow the ADA design guidelines, as mandated by federal legislation (1973 Rehabilitation Act and American with Disabilities Act 1990).

COST



TYPE OF ROAD



Pedestrian Overpass/Underpass



Source: Skyrise Cities

Pedestrian overpasses and underpasses allow for the uninterrupted flow of pedestrian movement separate from vehicle traffic. However, they should be a measure of last resort, and it is usually more appropriate to use traffic-calming measures or install a pedestrian-activated signal that is accessible to all pedestrians because overpasses and underpasses are costly, visually intrusive, and poorly utilized when a more direct at-grade crossing is possible.

COST



TYPE OF ROAD



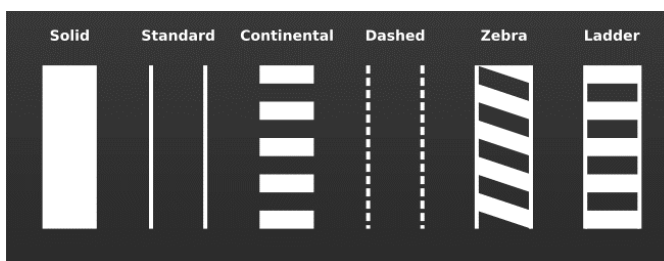
Pedestrian Facilities

CROSSINGS AND INTERSECTIONS

Crossings are important pedestrian facilities that indicate where it is safe to cross and alerts drivers to the presence of pedestrians. In California, unmarked crosswalks at intersections are still legal crossings. However, the presence of marked crosswalks improves pedestrian safety by making pedestrians more visible to drivers. Various additional elements can help improve the safety and functionality of crosswalks and intersections.

Marked Crosswalks

Marked crosswalks are painted pedestrian crossings which indicate optimal or preferred locations for pedestrians to cross and help designate right-of-way for motorists to yield to pedestrians. It is recommended that crossings are kept as compact as possible, facilitating eye contact by moving pedestrians directly into the driver's field of vision. Additionally, marked crosswalks can be placed between intersections or midblock.

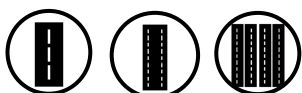


Source: SF Better Streets

COST



TYPE OF ROAD



Pedestrian Safety Islands

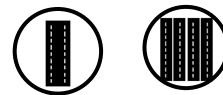


Pedestrian safety islands minimize the exposure time of people crossing streets and provide a safe refuge for pedestrians crossing two-way traffic. Typically, islands are placed in locations where speeds and volume make crossing difficult, or where there are 3 or more lanes of traffic that make pedestrians feel unsafe.

COST



TYPE OF ROAD



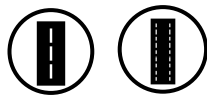
Pedestrian Pushbuttons

Pedestrian pushbuttons are electronic buttons used by pedestrians to change traffic signal timing to accommodate pedestrian crossings. When used pushbuttons should be timed to be as responsive to activation as possible, with delay kept at a minimum. Pushbuttons require to be programmed to minimize delays and require a lot of upkeep of the detection on the street, so they are less preferred and recommended to be used less. Signals can be put in pedestrian “recall” for key time periods of day such as school crossing times.

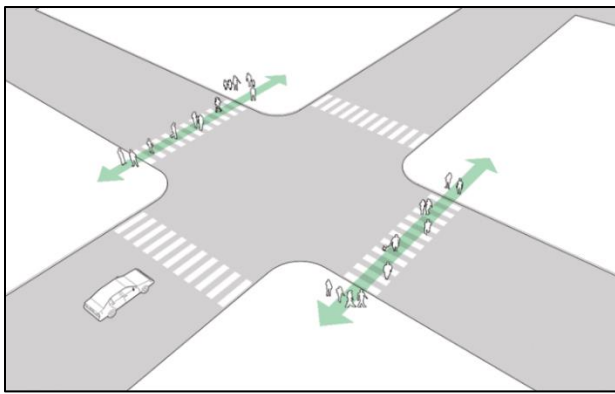
COST



TYPE OF ROAD



Leading Pedestrian Intervals



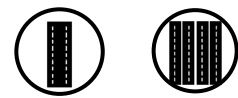
Source: NACTO

Leading pedestrian intervals typically gives pedestrians a head start of 3-7 seconds when entering an intersection with a corresponding green signal in the same direction of travel. Leading pedestrian intervals enhance the visibility of pedestrian in the intersection and reinforce their right-of-way over turning vehicles, especially in locations with a history of conflict.

COST



TYPE OF ROAD



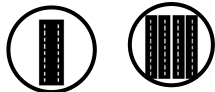
Pedestrian Countdown

Countdown signals help by giving pedestrians information about how much crossing time remains. Adequate countdown signals take into consideration the time and speeds of children, elders, and people with disabilities, who tend to walk slower to help them cross the street safely.

COST



TYPE OF ROAD



Source: SF Curbed

Rectangular Rapid Flashing Beacons (RRFB)



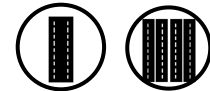
Source: Goffstown Rail Trail

RRFB's are used in combination with pedestrian, school, or trail crossing warning sign to enhance the safety and visibility of pedestrians at uncontrolled, marked crosswalks. RRFB's are a treatment option that is most particularly effective at multilane crossings with speed limits less than 40 mph.

COST



TYPE OF ROAD



Hawk Signal

Hawk signals provide pedestrians a safer crossing alternative than traditional crosswalks, especially in mid-block locations that are heavily travelled by pedestrians. Like conventional traffic signals, the hawk signal provides a pedestrian with an indication notifying them when to cross the street. Unlike conventional traffic signals, the hawk signal is only operational when activated by a pedestrian.

COST



TYPE OF ROAD



Source: City of San Rafael, CA

Pedestrian Facilities

AMENITIES

In addition to the various pedestrian facilities, there are additional elements and amenities that can be added to help reinforce the level of safety, comfort and functionality of pedestrian facilities.

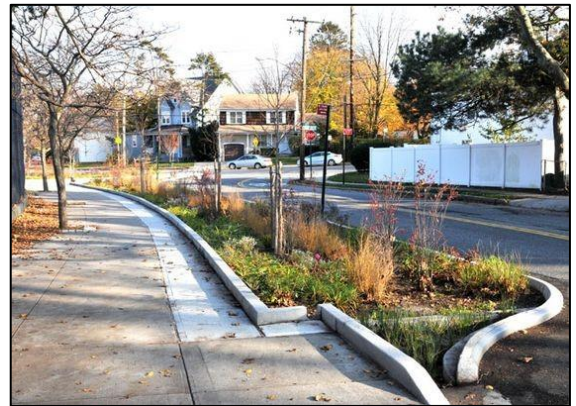
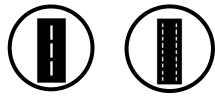
Flow-Through Planters

Flow-through planters are hard-edged storm water management facilities with an impermeable base. Appropriate for infiltration preclusive or high density urban areas, flow-through planter treat water by allowing runoff to soak through its soil matrix and filter into tan underdrain system.

COST



TYPE OF ROAD



Source: City of Kelso, WA

Lighting



Source: City of Cheyenne, WY

Good quality and placement of lighting can enhance the environment and safety of all roadway users, in particular pedestrians. Lighting can also strengthen retail areas with more foot traffic and visibility to business and of pedestrians by motorist. Proper lighting can also improve nighttime security, should be placed on both sides of the street and should illuminate pedestrian crosswalks, and curb ramps.

COST



TYPE OF ROAD



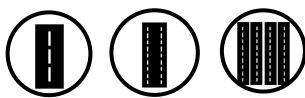
Tree Canopy

Tree canopy refers to the part of a city or community that is covered by the shade of trees. Tree canopy provide community benefits as follows, Air quality – reducing dust particles, absorbing pollutants, increasing oxygen levels. They also support with increasing soil capacity, reducing soil erosion, and help conserve energy by helping absorb heat and reducing temperature. Lastly, tree canopy support with recreational opportunities, shade, beauty, wildlife habitats and overall healthier lives.

COST



TYPE OF ROAD



Source: The California Sun

Street Furniture



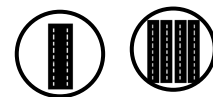
Source: Transportation Planning Blog

Providing street amenities such as benches, trashcans, and newspaper kiosk to name a few are great to support a variety of activities that can help build a stronger sense of community life. Providing these amenities can help reduce litter, give options for people to sit, network or rest throughout their travels. Yet, these amenities need to be placed in areas that do not block pedestrian walkway or curb ramps and create a sightline problem for motorist and pedestrians.

COST



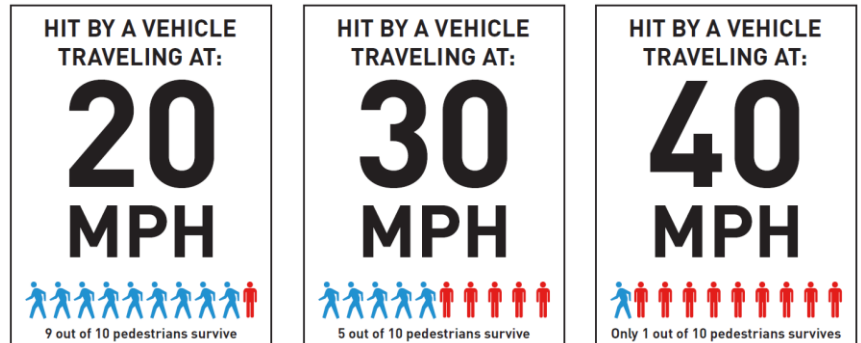
TYPE OF ROAD



TRAFFIC CALMING

Traffic calming refers to street design measures that have a goal of reducing vehicle speeds. Reduced vehicle speeds creates a safer and more comfortable environment for active travel, thereby encouraging people to walk or bike to destinations and reducing risk of fatal or serious injuries from collisions. The higher the speed of a collision with a pedestrian or a bicyclist, the higher the likelihood of the collision resulting in a fatal or serious injury. Other factors such as age and disability further increase the likelihood of fatal or serious injury.

Vehicle Speed and Likelihood of Pedestrian Fatality



Source: Seattle DOT

Streets with high speeds and high traffic volumes are often located in communities that are most impacted by poor health outcomes. In Sacramento County, parks and healthy retail destinations in the Department of Health and Human Services' priority health intervention communities are primarily located along high speed and high volume arterials and trucking routes, discouraging active travel due to unsafe roadway conditions and thereby limiting opportunities to improve health. Additionally, cut-through traffic on neighborhood streets results in speeding near neighborhood destinations such as parks and schools, creating greater stress on people (and particularly youth) who access these locations on foot or other active modes.

Three traffic calming principles – narrowing the road, creating obstacles, and creating visual interest – work to lower traffic speeds based on the concept that motorists slow down when they are forced to pay attention to their surroundings. By using human behavior to self-enforce lower speeds, physical design changes can be more effective than signage and more efficient than law enforcement.

HEALTH BENEFITS OF TRAFFIC CALMING

Traffic calming can provide a multitude of health benefits. General health benefits resulting from lower traffic speeds include:

- Encourages active travel by creating a safe and comfortable pedestrian and bicycle environment
- Creates a lower risk of fatal or serious injuries while walking and biking
- May reduce traffic volumes, leading to a reduction in vehicle emissions and improved air quality
- Provides mental health benefits through reduced traffic noise and improved streetscape aesthetics
- Increases opportunities for neighborhood interaction and reduces risk of crime

HOW TO USE THIS GUIDE

The following strategies are examples of traffic calming treatments that can be implemented individually or in combination in order to achieve slower, safer streets. Strategies are organized based on the traffic calming principles of narrowing the road, creating obstacles, and creating visual interest.

Note that the appropriate traffic calming treatment depends on the context of the street and the neighborhood, which requires community partnership and consultation in order to ensure successful and equitable outcomes. This toolkit is intended to be referenced after a walk audit has been conducted around a park or retail store where traffic calming has been identified as a priority.

ADDITIONAL RESOURCES

- Public Engagement Best Practices
- Walk Audit Toolkit

Each traffic calming treatment includes a description of what the treatment is, estimated costs, and co-benefits.

COSTS

Costs are estimated on a scale of low, medium, and high. Some traffic calming treatments require a larger investment of time and resources, however many can also be relatively inexpensive to implement using paint, colors and patterns, planters, bollards, and other materials. Temporary materials can also be used to test how the treatment works before permanent implementation.

Low Cost



Medium Cost



High Cost



CO-BENEFITS

Co-benefits of a traffic calming treatment include any benefit beyond the general health benefits of traffic calming.



Creates space for improved pedestrian facilities



Creates space for improved bicycle facilities



Reduces pedestrian crossing distances



Creates space for landscaping



Creates space for amenities (benches, bike parking, etc)

Traffic Calming

NARROW THE ROAD

Narrowing the roadway reduces vehicle speeds by physically and visually creating a “crowded” environment, making it more uncomfortable for drivers to travel through the corridor at higher speeds. Road narrowing also provides an opportunity to reallocate road space for active travel modes and create a more balanced street. Streets with wide vehicle travel lanes, multiple vehicle travel lanes, and far crossing distances may be candidates for road narrowing strategies.

Lane Narrowing

Narrower vehicle travel lanes (between 9-11 feet wide) are correlated with lower vehicle speeds because drivers have less buffer space from adjacent vehicles and feel less comfortable driving fast. Lane narrowing also creates an opportunity to reconfigure road space for bike lanes and wider sidewalks, which creates a safer and more comfortable walking and biking environment.

COST

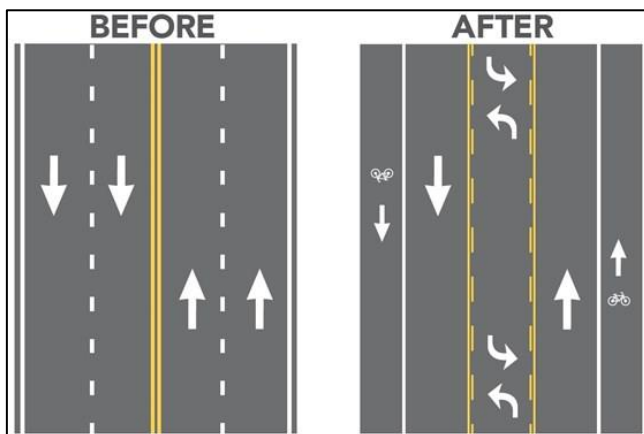


CO-BENEFITS



Source: Sacramento Area Bicycle Advocates

Road Diet



Source: FHWA

Oftentimes, streets are underutilized and can accommodate the same volume of vehicles with fewer travel lanes. A road diet reconfigures a roadway to improve mobility for multiple modes, rather than just for vehicles. Road diets generally remove one or more vehicle travel lanes in order to add or improve pedestrian and bicycle facilities.

Road diets are most effective on streets with four or more travel lanes. Temporary pilot projects and in-depth traffic analyses can help determine whether a road diet is feasible.

COST



CO-BENEFITS



Bulb-Outs

Bulb-outs are an extension of a crosswalk that create a narrower roadway and slow vehicles approaching the crosswalk. Bulb-outs can be placed at intersection corners or at mid-block crossing locations. When used at corners, bulb-outs also help reduce vehicle turning speeds by creating a tighter turn radius for vehicles to navigate.



Source: City of Olympia, WA

COST



CO-BENEFITS



Chokers and Pinchpoints



Source: City of Watsonville, CA

Chokers, also called pinchpoints, are midblock curb extensions that create a narrower roadway and cause cars to slow down. Chokers are best used on low-volume streets and in conjunction with marked crossings.

COST



CO-BENEFITS



Raised Median Islands

Raised median islands are located in the middle of the roadway and briefly narrow a portion of the road. Median islands are often used to create gateways at the entrances of neighborhood streets but can also be used at mid-block locations.

COST



CO-BENEFITS



Source: Sprout Landscape LLC

Traffic Calming

CREATE OBSTACLES

Drivers naturally slow down when traversing curves or bumps and dips in the roadway. Adding elements to the street that drivers must navigate helps reduce speeds, especially when used throughout a corridor. Neighborhood streets or streets with lower volumes of vehicle traffic may be candidates for traffic calming strategies that create obstacles.

Traffic Circles



Source: NACTO

Traffic circles are raised islands in the center of an intersection that slow vehicles by altering the path of travel. Traffic circles work best at intersections along neighborhood streets, and may be used in place of stop signs to facilitate slower traffic flow.

COST



CO-BENEFITS



Chicanes

A chicane creates a curved roadway using sets of offset curb extensions. Vehicles traveling through chicanes must slow down to traverse the curves.

COST



CO-BENEFITS



Source: FHWA

Vertical Raised Devices

Vertical raised devices include speed humps, lumps, tables, and rumble strips. These devices force vehicles to slow down in order to comfortably move over the device.

Vertical raised devices are best used on neighborhood streets with low volumes of vehicle traffic. Transit and emergency vehicle routes should be considered before installing vertical raised devices. In the City of Sacramento and unincorporated County, vertical raised devices are typically initiated through resident petitions.

COST



Speed Humps



Source: NACTO

Speed Lumps



Source: City of Sacramento, CA

Speed Tables



Source: FHWA

Rumble Strips



Source: Walkable Princeton

Traffic Calming

CREATE VISUAL INTEREST

Visually interesting aspects along a street create an element of surprise that keeps drivers aware of their surroundings and reduces speeds. A visually interesting streetscape can also create the perception of a narrower roadway that causes drivers to slow down. When used to highlight the presence of pedestrian and bicycle facilities such as crosswalks and bike lanes, visual interest can help improve safety by drawing attention to other street users. Neighborhood streets and commercial corridors often benefit from visually interesting streetscape elements.

Trees

Trees in medians and along sidewalks reduce vehicle speeds by creating a visually narrow roadway. While the street itself may remain unchanged, the presence of trees creates visual interest, constrains sightlines, and impacts driver perception of street width, leading to slower speeds.

COST



Source: Strong Towns

Art and Amenities



Source: Visit California

Art and amenities along sidewalks or on private properties can increase pedestrian activity and generate visual interest that slows vehicle speeds. Art may include sculptures, murals, and yard décor, and amenities may include benches, lighting, and mini libraries. Art and amenities can be incorporated on public or private properties in neighborhoods or commercial corridors.

COST



Pavement Materials

Different colors and types of pavement materials can highlight sidewalks, crosswalks, and intersections and draw attention to pedestrians. Varying the texture of pavement materials can also help slow down vehicles by having a similar effect as rumble strips.

COST



Source: Capital Public Radio