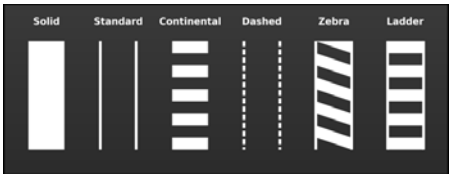
Pershing Boulevard Complete Streets Plan

Pedestrian Safety Toolbox

TOOL	DESCRIPTION	BENEFITS	APPLICATION/ CONSIDERATION	COST
Marked Crosswalk  *Image source: www.walkinginfo.org/pedsafe/*	Provide designated pedestrian crossings at: • Pedestrian generators • Crossings with significant pedestrian volumes (at least 15 per hour) • Crossings with high vehicle-pedestrian collisions	Signal a clear "channel" for pedestrian pathways to both pedestrians and vehicles	Marked crosswalks alone should not be installed on multi-lane roads with more than about 10,000 vehicles/ day.	$
High-Visibility Signs and Markings  *Image source: http://mutcd.fhwa.dot.gov*	Includes a family of crosswalk striping styles such as the "ladder" and the "continental" High-visibility colored signs are posted at crossings to increase driver awareness of the pedestrian crossing	Increase driver awareness of unexpected condition or location where drivers need to exercise a higher level of caution based on potential conflicts with more vulnerable road users	Beneficial in areas where drivers might not expect a pedestrian crossing or where a higher level of driver attention is required due to potential pedestrian and bicycle conflicts	$
Advanced Yield Lines  *Image source: www.saferoutesinfo.org*	Standard white yield limit lines are placed in advance of marked, uncontrolled crosswalks.	Increases the pedestrian's visibility to motorists Reduces the number of vehicles encroaching on the crosswalk Indicates to drivers where to stop	Useful in areas where pedestrian visibility is low and in areas with aggressive drivers Addresses the multiple-threat collision on multi-lane roads.	$

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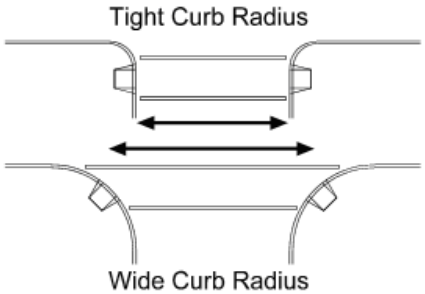
In-Street Pedestrian Crossing Signs  *Image source: http://mutcd.fhwa.dot.gov*	Regulatory pedestrian signage posted on lane edge lines and road centerlines May be used to remind road users of laws regarding right of way at an unsignalized pedestrian crossing	Highly visible to motorists and has a positive impact on pedestrian safety at crosswalks Good driver compliance with yielding to pedestrians though compliance decreases on multi-lane roadways	Mid-block crosswalks Unsignalized intersections Low-speed areas Two-lane roadways May need to be removed in winter in snowy climates	$
Curb Extension/ Bulb Outs 	Traffic-calming measure meant to slow traffic and increase driver awareness Consists of an extension of the curb into the street, making the pedestrian space (sidewalk) wider	Narrows the distance that a pedestrian has to cross and decreases pedestrian exposure time Increases the sidewalk space on the corners. Improves pedestrian visibility Lowers vehicle turning speeds	Suitable along most roadways and intersections so long as a parking lane shadows the curb extension Need to consider impact on transit service and could provide extended curb extension that extends length of bus stop so long as there is another travel lane to bypass the stopped bus Need to consider larger vehicle turning paths	$$
Reduced Curb Radii  *Image Source: www.ci.austin.tx.us*	The radius of a curb is reduced requiring motorists to make a tighter turn	Narrow the distance pedestrians have to cross Reduce traffic speeds and increase driver awareness (like curb extensions)	Beneficial on streets with high pedestrian activity, on-street parking, and no curb-edge transit service More suitable for wider roadways and roadways with low volumes of heavy truck traffic	$$$

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Raised Crosswalks 	Marked crosswalks that are raised to act simultaneously as a traffic calming device	Provide superior safety advantage to pedestrians with demonstrated increased yielding by drivers	Appropriate on streets with moderate traffic Particularly effective where heavily used trails cross a road	$$
Median Pedestrian Island  *Image source: http://thegoodcity.wordpress.com/category/transportation/*	Raised islands are placed in the center of a roadway, separating opposing lanes of traffic with cutouts for accessibility along the pedestrian path, providing a refuge for people crossing	This measure allows pedestrians to focus on each direction of traffic separately, and the refuge provides pedestrians with a better view of oncoming traffic as well as allowing drivers to see pedestrians more easily. It can also split up a multi-lane road and act as a supplement to additional pedestrian tools.	Recommended for multi-lane roads wide enough to accommodate an ADA-accessible median	$$$
Staggered Median Pedestrian Island 	Crosswalks in the roadway are staggered such that a pedestrian crosses half the street and then must walk *towards* traffic to reach the second half of the crosswalk Must be designed for accessibility by including rails and truncated domes to direct sight-impaired pedestrians along the path of travel.	Increase in the concentration of pedestrians at a crossing and the provision of better traffic views for pedestrians Motorists are better able to see pedestrians as they walk through the staggered refuge.	Best used on multi-lane roads with obstructed pedestrian visibility or with off-set intersections Must be designed for accessibility by including rails and truncated domes to direct sight-impaired pedestrians along the path of travel	$$$

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In-Roadway Warning Lights  *Image Source: www.tfhrc.gov/*	Both sides of a crosswalk are lined with pavement markers, often containing an amber LED strobe light Lights may be push-button activated or activated through passive pedestrian detection	Provides a dynamic visual cue Increase effectiveness in low light conditions	Best in locations with low bicycle ridership, as the raised markers present a hazard to bicyclists May not be appropriate in areas with accumulating snow due to decreased visibility of lights Not as effective in locations with bright sunlight	**$$$**
Overhead Flashing Beacons  *Image source: tti.tamu.edu*	Flashing amber lights installed on overhead signs in advance of the crosswalk or at the crosswalk	Blinking lights during pedestrian crossing times increase the number of drivers yielding for pedestrians and reduce pedestrian-vehicle conflicts May also improve conditions on multi-lane roadways.	Best used in places where motorists cannot see a traditional sign due to topography or other barriers	**$$$**
Rapid Flash Beacons  *Image source: mutcd.fhwa.dot.gov*	Replace the traditional slow flashing incandescent lamps with rapid flashing LED lamps The beacons may be push-button activated or activated with pedestrian detection	Very effective as measured by increased driver yielding compliance (65-80% compliance) Solar panels reduce energy costs associated with the device Wireless capabilities reduces installation cost	Appropriate for single and multi-lane roadways Effectiveness decreases as the number of travel lanes increases	**$$**

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Pedestrian Hybrid Beacon  *Image Source: www.tfhrc.gov/*	Pedestrian-actuated beacon that is a combination of a beacon flasher and a traffic control signal When actuated, the beacon displays a yellow (warning) indication followed by a solid red light During pedestrian clearance, the driver sees a flashing red "wig-wag" pattern until the clearance interval has ended and the signal goes dark	Reduces pedestrian-vehicle conflicts and increases driver compliance with yielding to pedestrians (80-90% compliance) Reduces vehicle delay when compared to standard pedestrian traffic signal	Useful in areas where it is difficult for pedestrians to find gaps in automobile traffic to cross safely, but where normal signal warrants are not satisfied Based on higher cost, most appropriate for higher speed multi-lane roadways.	$$$ $
Pedestrian Countdown Signs  *Image source: www.livablestreets.com*	Pedestrian signal head that displays the amount of time remaining during the pedestrian clearance interval	Reduces pedestrian-vehicle conflicts and slows traffic speeds Studies have shown it reduces pedestrian versus vehicular crashes by 25%	Required by the MUTCD for all signalized intersections With pedestrian signal heads	$$
Pedestrian Overpass/ Underpass  *Image source: omahamidcenturymodern.blogsome.com*	Pedestrian-only overpass or underpass over a roadway Provides complete separation of pedestrians from motor vehicle traffic, normally where no other pedestrian facility is available Connects off-road trails and paths across major barriers	Allow for the uninterrupted flow of pedestrian movement separate from the vehicle traffic	Most feasible and appropriate in extreme cases where pedestrians must cross roadways such as freeways and high-speed, high-volume arterials This measure should be considered only with further study	$$ $$$

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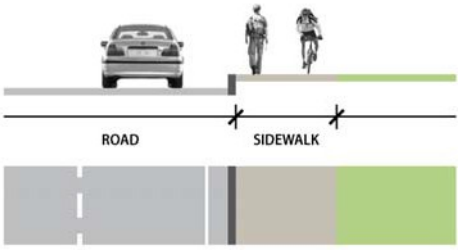
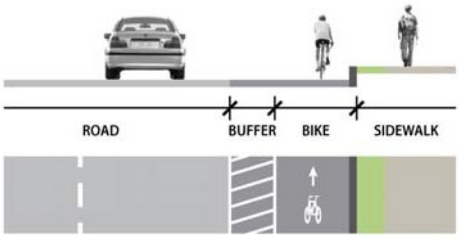
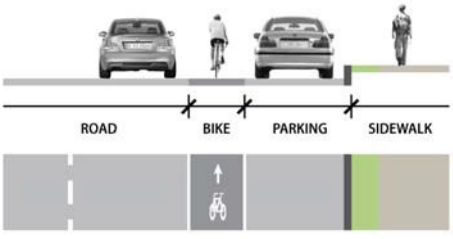
Bicycle Safety Toolbox

TOOL	DESCRIPTION	BENEFITS	APPLICATION/ CONSIDERATION	COST
Sidewalk Bikes Permitted 	Designed for bicycle usage to avoid conflicts between single direction motor vehicle traffic	Sidewalks will include additional signage, ground markings, and special curb cuts to facilitate bicycle travel Physical separation between wheeled and non-wheeled users is recommended to minimize potential conflicts between users	Interim solutions that connect two green facilities together Should be used only when there is no immediate solution to resolve a connection between two green facilities	$$$
Buffered or Protected Bike Lane 	Created by painting a flush buffer zone between a bike lane and the adjacent travel lane Buffers may also be provided between bike lanes and parking lanes to demarcate the door zone and discourage bicyclists from riding closely next to parked vehicles	Provides a warning for motorists and bicyclists that the street is multi-purpose Buffered bike lanes increase the riding comfort for bicyclists as they increase separation from vehicular traffic and/or parked vehicles	Should be considered at locations where there is excess pavement width or where increased separation is desired	$$
Bicycle Lane 	Portion of the roadway designated for preferential use by bicyclists One-way facilities that typically carry bicycle traffic in the same direction as adjacent motor vehicle traffic on the right side of the roadway	Provide dedicated space from vehicular traffic Reduce stress caused by acceleration and operating speed differentials between bicyclists and motorists	Desirable on collectors and some arterials where traffic volumes and speeds are higher Typically installed by reallocating existing street space by narrowing existing lanes, removing travel lanes or parking lanes, and/or reconfiguring parking lanes	$$

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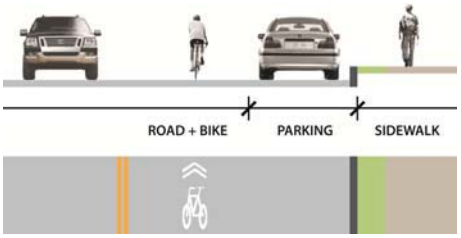
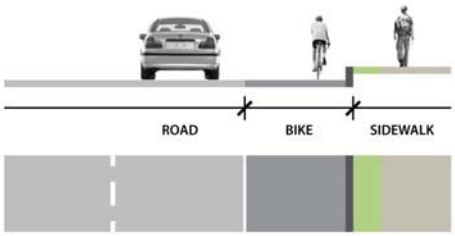
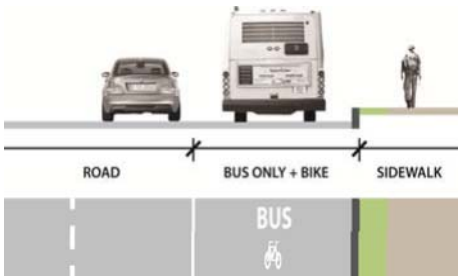
Bicycle Safety Toolbox

TOOL	DESCRIPTION	BENEFITS	APPLICATION/ CONSIDERATION	COST
Marked Shared Lane (Sharrow) 	Marking alerts road users to the lateral position bicyclists are likely to occupy within the traveled way to be most visible to drivers and to help avoid conflicts with parked cars	Provide guidance to bicyclists and motorists in situations where separate bicycle facilities are not provided Encourage safer passing practices (including changing lanes, if necessary)	Installed where there is insufficient space to allocate to a dedicated bicycle facility in the right most through travel lane Generally used on collector streets where a more comfortable bicycle facility cannot be provided due to right-of-way constraints	$
Paved Shoulder 	Hybrid bicycle facilities on roadways where there is additional space between the outer travel lanes and the edge of the right of way Paved shoulders are marked with a solid white line	Increase the riding comfort for bicyclists as they increase separation from vehicular traffic Do not have ground markings at the intersections to resolve turning conflicts between bicyclists and motorists	Should be considered at locations where there is excess pavement width or where increased separation is desired Signage should be installed to warn motorists and bicyclists that the street is multipurpose	$
Bike/Bus Lane 	Marking is intended to alert bicyclists and bus drivers that both uses occupy the traveled way Special ground markings warn motorists of their presence Include special stop designs to allow passing when buses are stopped	Encourage safer passing practices (including changing lanes, if necessary)	Located in arterial corridors where there are bus routes and the need for on-street bicycle connections between destinations	$
Bicycle Detection Loop 	Embedded loop detector in roadway surface detects a bicycle	Decreases delay for cyclists at signalized intersection Encourages cyclists to wait for signal indication	Should be considered in locations where there is a high number of cyclists or low number of vehicles that would activate the signal	$$

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Consider for all signalized Intersections

TOOL	DESCRIPTION	BENEFITS	APPLICATION/ CONSIDERATION	COST
Leading Pedestrian Intervals 	Traffic signal timing that provides pedestrians with a few second head start prior to motor vehicles on the parallel roadway being given the green light	Increases pedestrian visibility for turning vehicles and driver yielding compliance for pedestrians Helps reduce conflicts between turning vehicles and pedestrians	Can be applied at most signalized intersections especially where there is a high number of turning vehicles and pedestrians conflicts	$
Protected Left Turn Phasing 	Traffic signal phasing that only allows left turning vehicles to enter the intersection	Eliminates conflicts between left turning vehicles and pedestrians which is one of the most common type of crash involving a pedestrian and vehicle	Used primarily on higher volume roadways where the left turning vehicle must cross multiple approach lanes and there is no left turn storage issues	$$$
No Turn on Red (signs) 	Posting regulatory signs that restrict vehicles from turning on red signal indications	Eliminates potential conflicts between turning vehicles and pedestrians or bicyclists that might be crossing during the conflicting traffic signal phase.	Should be considered in most urban locations where there are a high number of pedestrians Turn restriction can be limited to certain hours when pedestrians are most likely to be present at the intersection	$
Way-finding signs 	Posting a series of pedestrian and bicycle way-finding signs that orient pedestrians to walking and biking destinations along a corridor	Encourages more walking and bike trips by providing people with a reference point to a destination	Applied in locations where there are pedestrian and bicycle destination or attractors Should be located in areas where will not obstruct the pedestrian walkway or create sign clutter Should be scaled to be legible for appropriate user Should not be used to promote private businesses	$

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Consider for all signalized Intersections

TOOL	DESCRIPTION	BENEFITS	APPLICATION/ CONSIDERATION	COST
Signal Coordination (bicycle progression) 	Developing a traffic signal coordination plan that is based around a slower travel speed usually between 12-18mph	Reduces start and stop delay for cyclists Promotes a more uniform travel speed for all road users Makes for a more comfortable roadway to bike on	Most appropriate on lower volume collector type streets where there are high number of bicyclists	$$
Lagging Left Turns 	Changes the sequence of the protected left turn phasing so that the left turn phase occurs after the adjacent through phase is completed instead of before	Reduces delay for pedestrians by providing them the walk phase prior to the left turning phase	Should be considered where there is adequate left turn vehicle storage and will meet driver expectancy.	$
Retiming Clearance Intervals 	Modifying the pedestrian clearance intervals at signalized intersections to provide adequate time for a pedestrian to cross the intersection at a slower walking speed that 3.5 ft/s	Increases the comfort level for all pedestrians and reduces the need to rush to cross the street	Should be considered around schools and senior centers where pedestrians with slower walking speeds are anticipated	$

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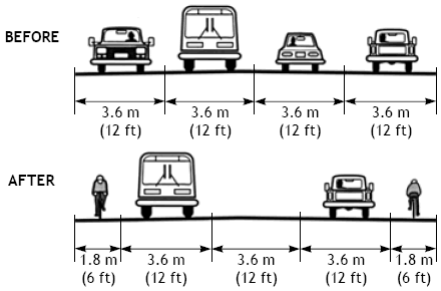
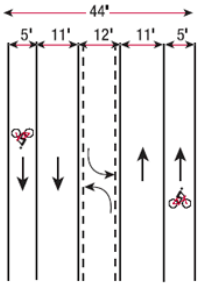
Corridor Treatments

TOOL	DESCRIPTION	BENEFITS	APPLICATION/ CONSIDERATION	COST
Pedestrian Safety Blitzes 	Education/enforcement campaign to remind pedestrians and motorists to look out for each other on roadways Local police target drivers who fail to yield to pedestrians in crosswalks	Increase driver compliance with yield to pedestrian laws Raise the awareness of pedestrian safety issues	Blitzes should occur at or near marked intersections and police should cite drivers if a pedestrian has completely entered the crosswalk Initially, warnings should be issued as part of awareness campaign	$$
Road Diet (aka Lane Reduction) 	The number of lanes of travel is reduced by widening sidewalks, adding bicycle and parking lanes, and converting parallel parking to angled or perpendicular parking	Good traffic calming and pedestrian safety tool, particularly in areas that would benefit from curb extensions but have infrastructure in the way Improves pedestrian conditions on multi-lane roadways.	Roadways with surplus roadway capacity Roadways that would benefit from traffic calming measures	$$$
Lane diets 	Reducing the width of existing wider travel lanes down to 10-11 feet	Encourages slower travel speeds and allows for the installation of medians, bicycle facilities, and other traffic calming elements	Most appropriate on collector/arterial type streets with identified speeding concerns or a desire to provide bicycle facilities	$$

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Consider for all signalized Intersections

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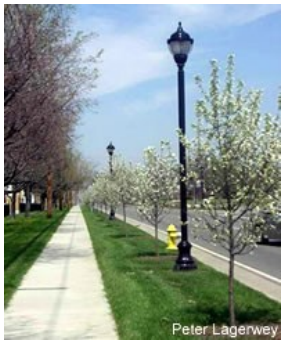
Sidewalks 	All-weather walking surface outside the travel way	Provides pedestrians a safer and more enjoyable location to walk along a roadway	Should be consider along all corridors	$$
Corridor Lighting 	Roadway and pedestrian sidewalk lighting to improve driver visibility of pedestrians during low light conditions	Improves driver visibility of pedestrians and provides them more time to react to a potential conflict	Should be considered along all corridors	$$$ $
Landscape Buffer 	Providing a 5-8' landscaping strip between the edge of roadway and the pedestrian path	Improves pedestrian walking environment by providing buffer between moving traffic and sidewalk Provides area to install street furniture and utilities to help maintain a clear pedestrian walkway Provides a good location to store snow in colder climates	Should be considered on most corridors where right-of-way width permits	$$$