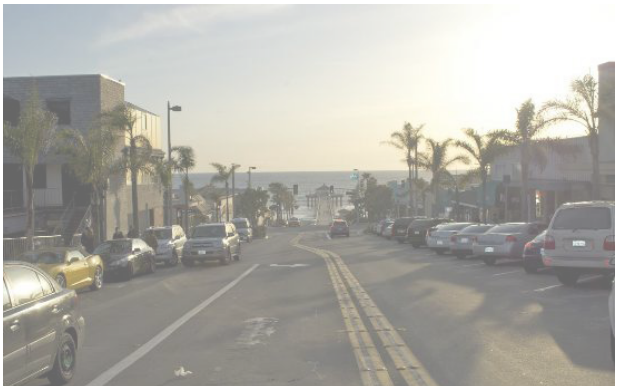
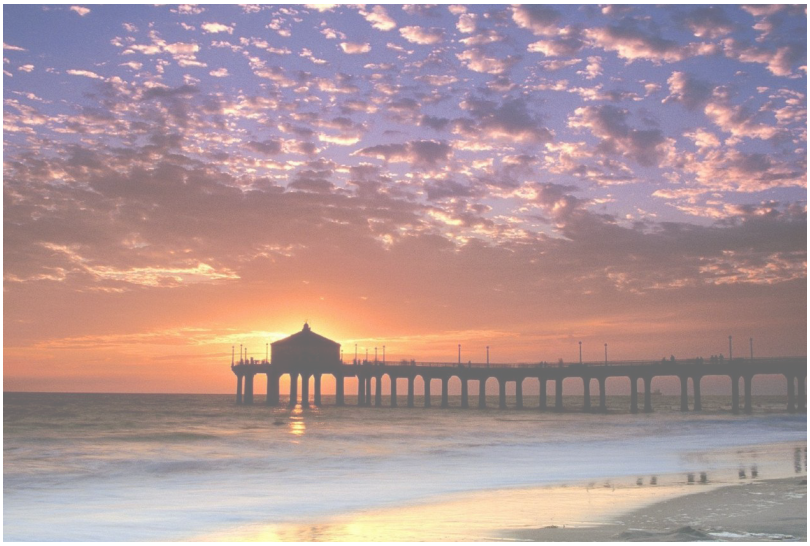
DRAFT

Manhattan Beach Mobility Plan
Pedestrian Crossing Enhancements Policy





Prepared by:

ITERIS Innovation for better mobility

FEHR PEERS

March 2014

TABLE A \\ UNCONTROLLED CROSSING TREATMENT TOOLBOX

POTENTIAL STRIPING ENHANCEMENTS

TREATMENT	IMPLEMENTATION GUIDANCE
HIGH-VISIBILITY MARKED CROSSWALK/TEXTURED CROSSWALK **[Striping]** High-visibility markings include a family of crosswalk striping styles such as the "ladder" and the "triple-four," as well as decorative or textured crosswalk markings. These marking provide greater crosswalk visibility to motorists.  	Implemented together as package of improvements at all locations that meet the flow chart test justifying a marked crossing. Additional enhancements to this package may be needed depending upon width of street, posted speed limit, sight distance and average daily traffic volumes. See guidance under which conditions additional enhancements are needed.
ADVANCE YIELD LIMIT LINE (MULTI-LANE ROADWAYS) **[Striping]** Yield limit lines (also referred to as "sharks' teeth") are placed in advance of marked, uncontrolled crosswalks to indicate to motorists where they should stop when a pedestrian is in a crosswalk.  *City of Pasadena*	
ADVANCE WARNING SIGNS/CROSSWALK SIGN ASSEMBLY **[Signage]** High-visibility fluorescent yellow green signs posted in advance of and at crossings increase the visibility of a pedestrian crossing. Requirements for the design and placement of these signs may be found in the California Manual on Uniform Traffic Control Devices (MUTCD). Additionally, in street pedestrian signs may be added.  *pedbikeimages.org* 	

TABLE A \\ UNCONTROLLED CROSSING TREATMENT TOOLBOX, CONT'D

POTENTIAL GEOMETRIC ENHANCEMENTS

TREATMENT	IMPLEMENTATION GUIDANCE		
	SPEED LIMIT		
	30MPH OR LOWER	35 MPH	40 MPH+
CURB EXTENSIONS **[Geometrics]** Also known as a pedestrian bulb-out, this traffic-calming measure is meant to slow traffic and increase driver awareness of pedestrians. It consists of an extension of the curb into the street, making the pedestrian space (sidewalk) wider and the crosswalk narrower. It improves driver visibility of pedestrians waiting to enter the crosswalk 	One geometric enhancement is recommended under the following conditions: • 3 lane street with ADT of 12,000+ • 4+ lane street (no raised median) with ADT of 9,000+ • 4+ lane street (with raised median) with ADT of 12,000+ Locations where pedestrian actuated signals are installed may not require these enhancements	One geometric enhancement is recommended under the following conditions: • 2 lane street with ADT of 15,000+ • 3 lane street with ADT of 9,000 • 4+ lane street (no raised median) with ADT of 9,000 or less • 4+ lane street (with raised median) with ADT of 12,000+ Locations where pedestrian actuated signals are installed may not require these enhancements	One geometric enhancement is recommended at all crossings with a speed limit of 40 mph or greater regardless of lane width and ADT. Locations where pedestrian actuated signals are installed may not require these additional enhancements
REFUGE ISLANDS **[Geometrics]** Raised islands are placed in the center of the roadway, separating opposing lanes of traffic with cutouts or ramps for accessibility along the pedestrian path. Median refuge islands are recommended where right-of-way allows and conditions warrant. Refuge medians can also be designed as a split pedestrian crossover where crosswalks in the roadway are staggered such that a pedestrian crosses half the street and then walks toward traffic to reach the second half of the crosswalk. This measure must be designed for accessibility to direct sight-impaired pedestrians along the path of travel.  *tfhrc.gov*			
RAISED CROSSWALK **[Geometrics]** This traffic calming measure provides a crosswalk with a surface elevated above the travel lanes (typically at curb height), attracting drivers' attention, encouraging lower speeds at the pedestrian crossing point, and improving the visibility of pedestrians in the crosswalk.  *saferoutesinfo.org*			

TABLE A \\ UNCONTROLLED CROSSING TREATMENT TOOLBOX, CONT'D

POTENTIAL SIGNAL ENHANCEMENTS

TREATMENT	IMPLEMENTATION GUIDANCE		
	SPEED LIMIT		
	30MPH OR LOWER	35 MPH	40 MPH+
OVERHEAD FLASHING BEACON **[Signal Treatment]** Flashing amber lights are installed on overhead signal arms in advance of the crosswalk or at the entrance to the crosswalk. Typically overhead beacons are pedestrian push button actuated and are most appropriate on multi-lane, signalized streets.  tti.tamu.edu	Instead of, or in addition to a geometric enhancement, install an overhead beacon or RRFB under the following conditions: • 3+ lane street with ADT of 12,000+ Beacons should not be installed at locations of pedestrian actuated signals.	Instead of, or in addition to a geometric enhancement, install an overhead beacon or RRFB under the following conditions: • 2 lane street with ADT of 15,000+ • 3+ lane street with ADT of 9,000+ Beacons should not be installed at locations of pedestrian actuated signals.	A geometric and/or an overhead beacon or RRFB is recommended at all crossings with a speed limit of 40 mph or greater regardless of lane width and ADT. Beacons should not be installed at locations of pedestrian actuated signals.
RECTANGULAR RAPID FLASHING BEACON (RRFB) **[Signal Treatment]** RRFB is a flashing beacon that is enhanced by replacing the traditional slow flashing incandescent lamps with rapid flashing LED lamps. The beacons may be push-button activated or activated with pedestrian detection. Research indicated the greatest response from RRFBs.  mutcd.fhwa.dot.gov			
PEDESTRIAN ACTUATED SIGNAL **[Signal Treatment]** This is a conventional traffic control device with warrants for use based on the MUTCD. Signal remains on green until a pedestrian push button activation. Signal operates with a flashing red until completion of pedestrian phase.  City of Pasadena	Recommended on 4+ lane streets with ADT of15,000+. If pedestrian actuated signal is installed, geometric enhancements may not be necessary.	Recommended on 3+ lane street with ADT of 15,000+ If pedestrian actuated signal is installed, geometric enhancements may not be necessary.	Recommend on 2 lane street with ADT of 15,000 + or 3+ lane street with ADT of 9,000+ If pedestrian actuated signal is installed, geometric enhancements may not be necessary.

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The following is a list of potential enhancements options for intersections in pedestrian priority areas (such as around schools, parks, Downtown, etc.):

TABLE B \\ STOP-CONTROLLED LOCATION TOOLBOX

City of Pasadena

REFUGE ISLAND

[Geometrics]

Raised islands are placed in the center of the roadway, separating opposing lanes of traffic with cutouts or ramps for accessibility along the pedestrian path.

CURB EXTENSION/BUS BULBS/SHORT RIGHT-TURN LANE ELIMINATION

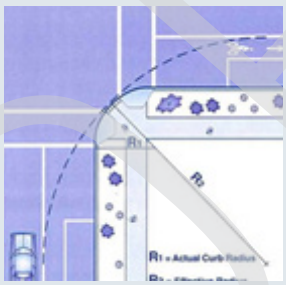
[Geometrics]

Also known as a pedestrian bulb-out, this traffic-calming measure is meant to slow traffic and increase driver awareness of pedestrians. It consists of an extension of the curb into the street, making the pedestrian space (sidewalk) wider.

IMPROVED RIGHT-TURN SLIP-LANE DESIGN/PORK CHOP REDESIGN

[Geometrics]

Right-turn slip lanes (aka channelized right-turn lanes) are separated from the rest of the travel lanes by a pork chop-shaped striped or raised median area. This measure separates right-turning traffic and streamlines right turning movements. Improved right-turn slip lanes provide pedestrian crossing islands within the intersection and are designed to optimize the right-turning motorist's view of the pedestrian and of vehicles to his or her left.



saferoutesinfo.org

REDUCED TURNING RADIUS AS DETERMINED BY DESIGN VEHICLE

[Geometrics]

The size of the curb radius determines the speed at which approaching vehicles can navigate a turn. Reduced turn radii force approaching vehicles to slow down when turning, while still efficiently accommodating the largest vehicle commonly expected at the intersection.

www.ci.mil.wi.us

PEDESTRIAN-SCALE LIGHTING

[Streetscape]

Pedestrian-scale lighting improves motorist sight of pedestrians.

TABLE B \\ STOP-CONTROLLED LOCATION TOOLBOX, CONT'D

walkinginfo.org/pedsafe/

STANDARD CROSSWALK FOR STOP-CONTROLLED APPROACHES, LADDER OR TRIPLE FOUR AT UNCONTROLLED APPROACHES

[Striping]

High-visibility markings include a family of crosswalk striping styles such as the "ladder" and the "triple-four." Stop bars should be striped in advance of the crosswalk on approaches controlled by a stop sign.

City of Pasadena

DIRECTIONAL CURB RAMP WITH TRUNCATED DOMES

[Geometrics/ADA Treatments]

Where right-of-way is available, directional curb ramps are installed at two per corner and guide pedestrians in to the crosswalk they would utilize to cross the street. Truncated domes provide a tactile signal to the visually impaired that they are leaving the sidewalk area. Exceptions for directional curb ramps may be allowed when physical considerations such as existing drainage or required turn radius deem infeasible. Selecting directional curb ramps as a preferred treatment does not call for retrofit of existing curb ramps, rather installation will be done oppurtunistically in scenarios such as grant funding, development review, new construction, and

Nazir Lalani

REMOVAL OF SIGHT DISTANCE OBSTRUCTIONS

[Geometrics]

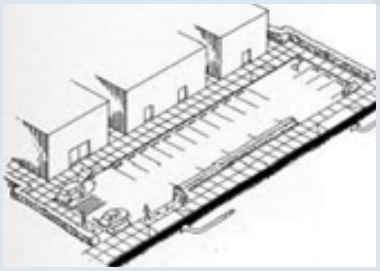
If objects impede sight distance, it may result in an unsafe condition when motorists and pedestrians are unable to see each other. Items such as parked cars, signage, landscaping, fencing, and street furniture should be placed in a location that will not obstruct sight distance.

danpink.com

LIMITED SIGNAGE/SIGN CLUTTER EVALUATION

[Signage]

Road signs and street signs at intersections may distract motorists from the road. Unnecessary signage should be removed and relocated to present motorists only with signage relevant to the operation of the intersection.



mrsc.org

DRIVEWAY ACCESS MANAGEMENT

[Geometrics]

Access management strategies can reduce the number of driveway crossings pedestrians encounter and result in a wider sidewalk through more efficient allocation of space.

The following is a list of potential enhancements options for intersections in pedestrian priority areas (such as around schools, parks, Downtown, etc.):

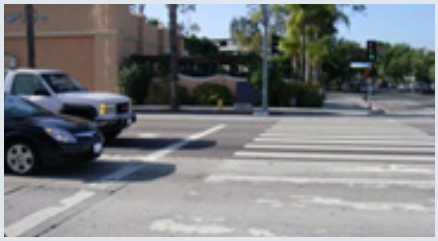
TABLE C \\ SIGNAL-CONTROLLED LOCATION TOOLBOX

walkinginfo.org/pedsafe/

MARKED CROSSWALK

[Striping]

Marked crosswalks should be installed to provide designated pedestrian crossings at signalized locations, on all feasible approaches. Exceptions for striping crosswalks on all four legs of a signalized intersection may be allowed due to operational and physical considerations



ADVANCE LIMIT LINE

[Striping]

Standard advance limit (white stop) lines are placed four feet in advance of marked crosswalks

www.saferoutesinfo.org

COUNTDOWN SIGNAL

[Signal Treatment]

Displays a "countdown" of the number of seconds remaining for the pedestrian crossing interval.

www.livablestreets.com

SLOWER WALKING SPEED

[Signal Treatment]

The California MUTCD requires that signal timings be changed to reflect 3.5 feet per second walk times rather than 4.0 feet per second. In locations adjacent to schools, senior centers, etc., a slower walk speed should be considered in signal timings.

www.saferoutesinfo.org

PEDESTRIAN RECALL IN HIGH ACTIVITY PEDESTRIAN AREAS

[Signal Treatment]

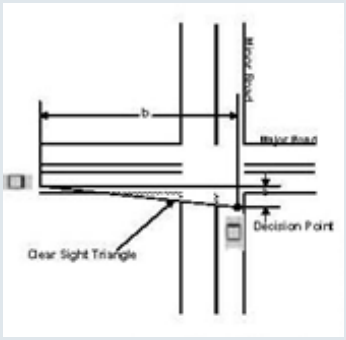
Pedestrian Recall provides a guaranteed walk phase for each crossing at the signal during periods of peak pedestrian activity regardless of whether the pedestrian push button has been activated. This ensures ample time is provided for pedestrian crossings when pedestrians are typically present (even if a pedestrian fails to push the button).

City of Pasadena

DIRECTIONAL CURB RAMP WITH TRUNCATED DOMES & SEPARATED PEDESTRIAN PUSH BUTTONS (PPB)

[Geometrics/ADA Treatments]

When right-of-way is available, directional curb ramps are installed two per corner and guide pedestrians into the crosswalk. Truncated domes provide a tactile signal to the visually impaired that they are leaving the sidewalk area. Separated push buttons are placed within five feet of each curb ramp, one per crosswalk. Exceptions for directional curb ramps may be allowed when physical considerations such as existing drainage or required turn radius deem infeasible.



Nazir Lalani

REMOVAL OF SIGHT DISTANCE OBSTRUCTIONS

[Geometrics]

If objects impede sight distance, this may result in an unsafe condition where motorists and pedestrians are unable to see each other. Items such as parked cars, signage, landscaping, fencing, and street furniture should be placed in a location that will not obstruct sight distance.

www.ci.mil.wi.us

PEDESTRIAN-SCALE LIGHTING

[Streetscape]

Pedestrian-scale lighting improves motorists' visibility of pedestrians.

TABLE C \\ SIGNAL-CONTROLLED LOCATION TOOLBOX, CONT'D

walkinginfo.org/pedsafe/

HIGH-VISIBILITY CROSSWALK

[Striping]

High-visibility markings include a family of crosswalk striping styles such as the "ladder" and the "continental." High-visibility striping should be provided for crosswalks with heavy pedestrian volumes, with frequent pedestrian-vehicle conflicts (such as with permissive left turns), or at skewed intersections. One style of high-visibility striping should be selected as the City's preferred style.

polara.com

ACCESSIBLE PEDESTRIAN SIGNALS

[ADA Treatments]

Accessible pedestrian signals communicate information about pedestrian crossings in non-visual format such as audible tones, verbal messages, and/or vibrating surfaces, providing access to the pedestrian signals for the visually impaired. Locations for accessible pedestrian signals are coordinated with the Accessibility Disability Commission.

freefoto.com

ALL RED CLEARANCE

[Signal Treatment]

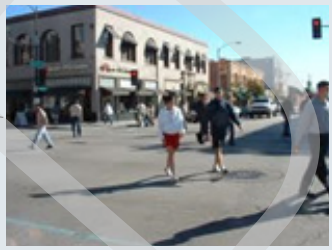
Provides a phase (1-2 seconds) where all vehicle indicators hold the red at an intersection.

walkinginfo.org

LEADING PEDESTRIAN INTERVAL (LPI)

[Signal Treatment]

Provides pedestrians with a walk indicator while all vehicle indicators hold the red ball. This allows pedestrians to get a head start crossing the street before vehicles get the green indication.



streetswiki.wikispaces.com

SCRAMBLE PHASE

[Signal Treatment]

Provides an all-red phase for vehicles while providing pedestrians with a walk indication. Pedestrians may cross the street orthogonally or diagonally.

safety.fhwa.dot.gov

PROTECTED LEFTS

[Signal Treatment]

Protected left turns give vehicles that are turning left an exclusive phase that does not coincide with the pedestrian walk phase. This eliminates the pedestrian-vehicle conflict between permissive lefts and pedestrians in a crosswalk.

TABLE C \\ SIGNAL-CONTROLLED LOCATION TOOLBOX, CONT'D

lincoln.ne.gob

FULL-TIME RECALL/FIXED TIME PEDESTRIAN INTERVALS

[Signal Treatment]

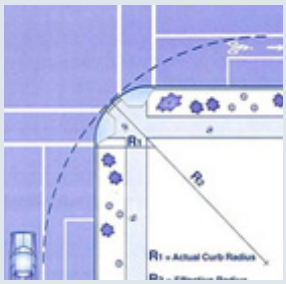
Pre-timed signals give pedestrians the walk signal without requiring push button actuation.

luni.net

PROHIBITED RIGHT TURN ON RED

[Signal Treatment]

Prohibits vehicles from turning right when the signal has a red indication.

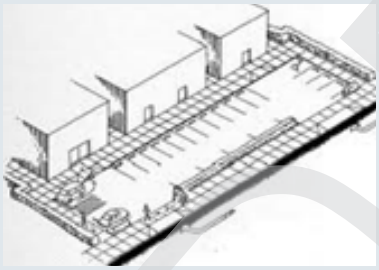


saferoutesinfo.org

REDUCED TURNING RADIUS AS DETERMINED BY DESIGN VEHICLE

[Geometries]

The size of the curb radius determines the speed at which approaching vehicles can navigate a turn. Reduced turn radii force approaching vehicles to slow down when turning, while still accommodating emergency vehicles and the largest vehicle expected to typically navigate the intersection (i.e., the design vehicle).



DRIVEWAY ACCESS MANAGEMENT

[Geometries]

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City of Pasadena

REFUGE ISLAND

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CURB EXTENSION/BUS BULBS/SHORT RIGHT-TURN LANE ELIMINATION

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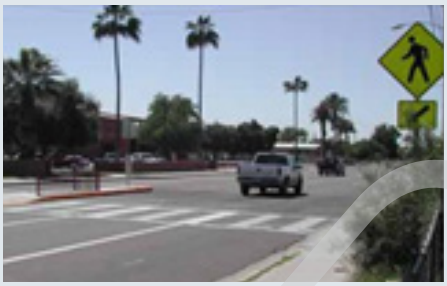

tfhrc.gov

TWO-STAGE CROSSING

[Geometrics]

This measure is similar to traditional median refuge islands except that the crosswalk is staggered such that a pedestrian crosses half the street and then must walk towards traffic to reach the second half of the crosswalk. This measure must be designed for accessibility by including rails and truncated domes to direct sight-impaired pedestrians along the path of travel.