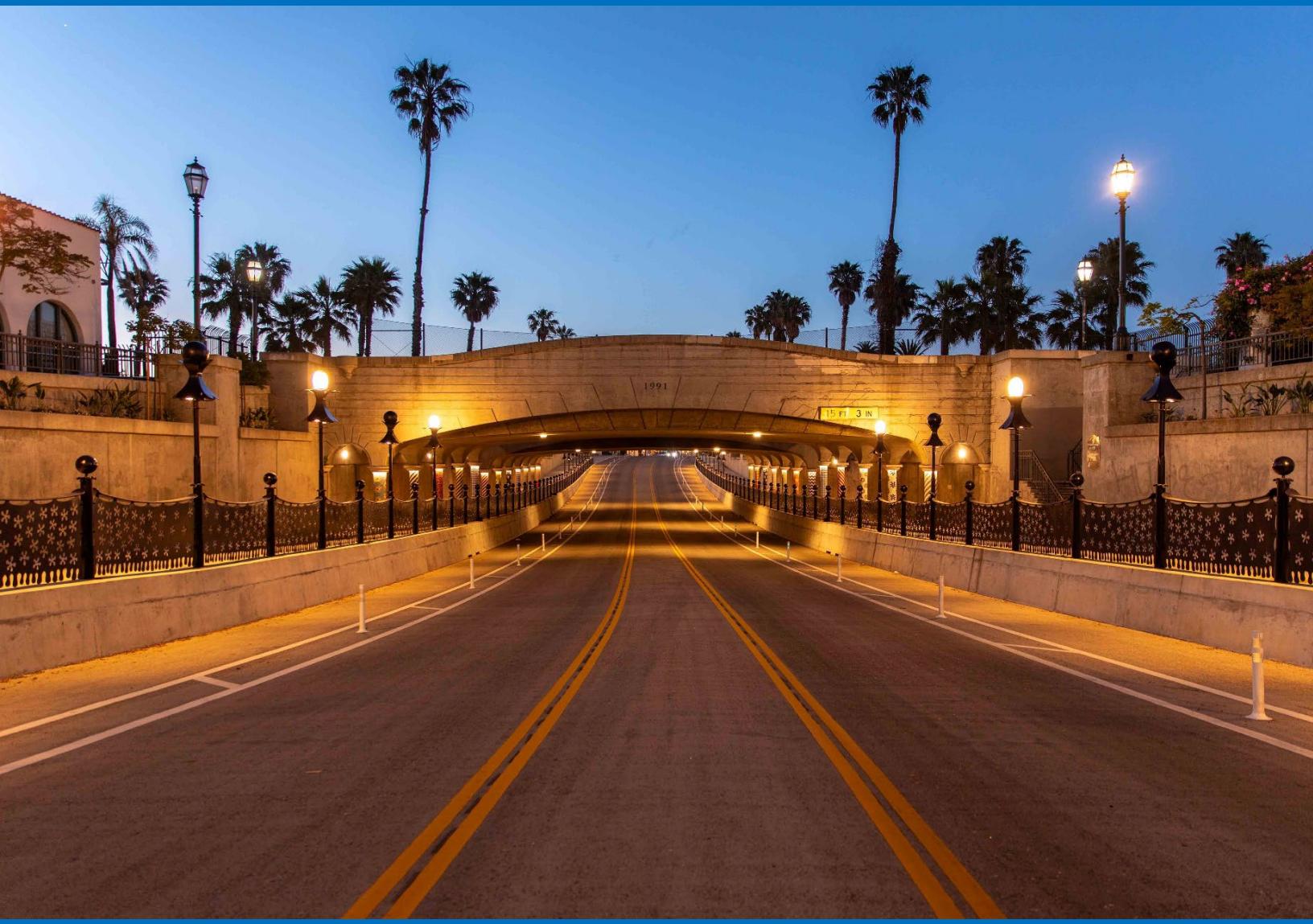

APPENDIX E

Traffic Safety Countermeasures

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Traffic Safety Counter Measures Against Collision-Types

Intersection improvements

INFRASTRUCTURE TITLE	PRIORITY TO IMPLEMENT	MAJOR STREETS	RESIDENTIAL STREETS	PRIMARY CRASH-TYPES ADDRESSED
Driver Alertness				
Curb Extensions	x			Turn-related, Pedestrian, Bicycle
Intersection Daylighting	x			All
Intersection Lighting	x			Night
Pavement Markings through Intersection				Turn-related, maintain lane
Retroreflective Backplates	x			All
Separate Users in Space				
Access Ramps	x			Turn-related, Pedestrian
Bike Box				Bicycle
Bus Boarding Island				Bicycle
Close Slip Lane				Turn-related, Pedestrian, Bicycle
Diagonal Diverters				All
Green Conflict Striping	x			Bicycle
Pedestrian Refuge Island				Pedestrian
Protected Intersection				All
Remove Bicycle Mixing Zones				Bicycle
Two-Stage Turn Queue Bike Box				Bicycle
Separate Users in Time				
All-Way Stop Control	x			All
Bicycle Signal/Exclusive Bike Phase				Bicycle
Bike Detection	x			Bicycle
Exclusive Pedestrian Phase				Pedestrian
Improve Signal Timing	x			Red-light running, Pedestrian, Bicycle
Leading Pedestrian Interval	x			Pedestrian, Bicycle
Pedestrian Recall	x			Pedestrian
Prohibit Right-Turn-on-Red				Turn-related, Pedestrian, Bicycle
Protected Left Turns	x			Turn-related, Pedestrian, Bicycle
Rest-in-Red Signal				Unsafe speeds
Separate Right-Turn Phasing				Turn-related, Pedestrian, Bicycle
Traffic Signal	x			All
Speed Management				
Left Turn Calming				Turn-related, Pedestrian, Bicycle
Neighborhood Traffic Circle				All
Roundabout				All

Signage Noting that Signals Coordinate to Posted Speeds				Unsafe speed
Skewed Intersection Redesign				All

Intersection / Mid-Block Improvements

INFRASTRUCTURE TITLE	PRIORITY TO IMPLEMENT	MAJOR STREET	RESIDENTIAL STREET	PRIMARY CRASH-TYPES ADDRESSED
Driver Alertness				
Delineators, Reflectors, and/or Object Markers	x			Hit object
High-Visibility Crosswalk	x			Pedestrian
Pedestrian Activated Rectangle Rapid Flashing Beacons	x			Pedestrian
Separate Users in Space				
Access Management	x			Turn-related, Pedestrian, Bicycle
Full Road Closures				All
New and Widened Sidewalks	x			Pedestrian
Partial Road Closures				All
Separate Users in Time				
Pedestrian Hybrid Beacon				Pedestrian
Speed Management				
Raised Crosswalk				Pedestrian
Raised Intersection				Pedestrian

Mid-Block Improvements

INFRASTRUCTURE TITLE	PRIORITY TO IMPLEMENT	MAJOR STREET	RESIDENTIAL STREET	PRIMARY CRASH-TYPES ADDRESSED
Driver Alertness				
Bicycle Boulevard				All
Curve Warning Signage	x			Run off road, Hit object
Edge Line				Run off road, Hit object
Lane Narrowing	x			Unsafe speeds
Raised Pavement Markers				Lane departure, hit Object
Segment Lighting	x			Night
Speed Feedback Sign				Unsafe speeds
Speed limit Signs	x			Unsafe speeds
Separate Users in Space				
Angled Parking/Parking Configuration				Bicycle, parking maneuvers
Bike Lanes	x			Bicycle
Bike Path	x			Bicycle, Pedestrian

Close bike lane gaps	x			Bicycle
Curbside Management	x			All
Roadway Reconfiguration / road diet				All
Separated Bikeway (Class IV)	x			Bicycle
Sidewalk Infill	x			Pedestrian
Speed Management				
Chicanes (lateral shifts)				All
Speed Hump				All
Lane Narrowing	x			Unsafe speeds
Speed Limit Reduction	x			All
Striping (lateral shifts)				All

Programs

INFRASTRUCTURE TITLE	PRIORITY TO IMPLEMENT	MAJOR STREET	RESIDENTIAL STREET	PRIMARY CRASH-TYPES ADDRESSED
Safe Routes to School	x			All
Focused Enforcement and Deterrence	x			All

INTERSECTION IMPROVEMENTS | Driver Alertness

Curb Extensions

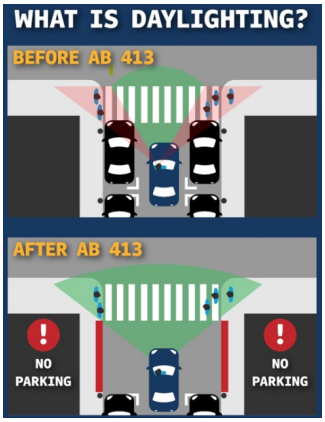
Priority Improvement | **Major & Residential Streets**

A curb extension is a traffic calming measure that widens the sidewalk for a short distance to enhance the pedestrian crossing and reduce turning vehicle speeds. For the pedestrian, this reduces the crossing distance and improves pedestrian visibility. For the vehicle, this visual narrowing encourages drivers to reduce speed when approaching the intersection and modifies the turning movement geometry to encourage sharper, slower turns.

Curb radii and truck aprons can be used to be outside emergency service vehicles' effective turn radius.

PRIMARY CRASH TYPES ADDRESSED: Turn-related, Pedestrian, Bicycle

Intersection Daylighting



Priority Improvement | **Major & Residential Streets**

Remove objects that may prevent drivers and pedestrians from having a clear sightline. This may include installing red curb at intersection approaches to remove parked vehicles (also called "daylighting"), trimming or removing landscaping, or removing or relocating large signs. This countermeasure supports compliance with AB 413, California's daylighting law that prohibits the stopping, standing, or parking of a vehicle within 20 feet of the vehicle approach side of any unmarked or marked crosswalk (Image credit: City of Pasedena)

PRIMARY CRASH TYPES ADDRESSED: All

Intersection Lighting

Priority Improvement | **Major & Residential Streets**

Adding intersection and/or pedestrian scale lighting at intersections improves safety by increasing visibility of all road users. This countermeasure improves safety for all users by increasing the visibility of pedestrians at intersections at night

PRIMARY CRASH TYPES ADDRESSED: Night

INTERSECTION IMPROVEMENTS | Driver Alertness (Continued)

Pavement Markings through Intersection

Long-Term Improvement | **Major Streets**

Adding clear pavement markings, also known as "cat tracks," can guide motorists through complex intersections. Intersections where the lane designations are not clearly visible to approaching motorists and/or intersections noted as being complex and experiencing crashes that could be attributed to a driver's unsuccessful attempt to navigate the intersection can benefit from this treatment.

PRIMARY CRASH TYPES ADDRESSED: Turn-related, maintain lane

Retroreflective Backplates

Priority Improvement | **Major Streets**

Retroreflective signal borders enhance the visibility of traffic signals for aging and color-vision-impaired drivers, enabling them to understand which signal indication is illuminated. Retroreflective borders may also alert drivers to signalized intersections during periods of power outages when the signals would otherwise be dark and non–reflective signal heads and backplates would not be visible

PRIMARY CRASH TYPES ADDRESSED: All

INTERSECTION IMPROVEMENTS | Separate Users in Space

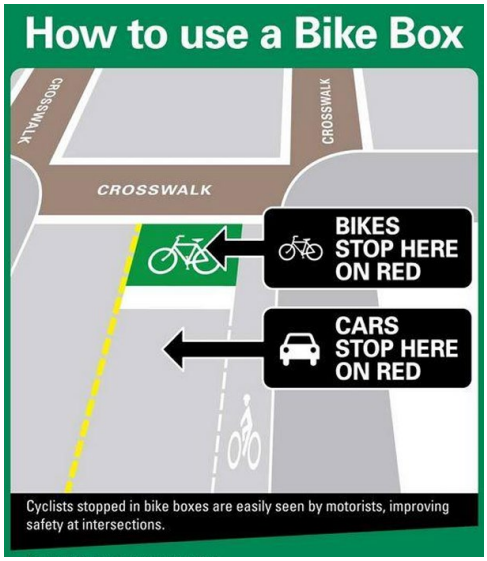
Access Ramps

Priority Improvement | **Major & Residential Streets**

Access ramps provide an accessible path of travel for people with mobility challenges. Well placed access ramps allow people with mobility challenges to enter or cross the street at a predictable location .

PRIMARY CRASH TYPES ADDRESSED: Turn-related, Pedestrian

Bike Box

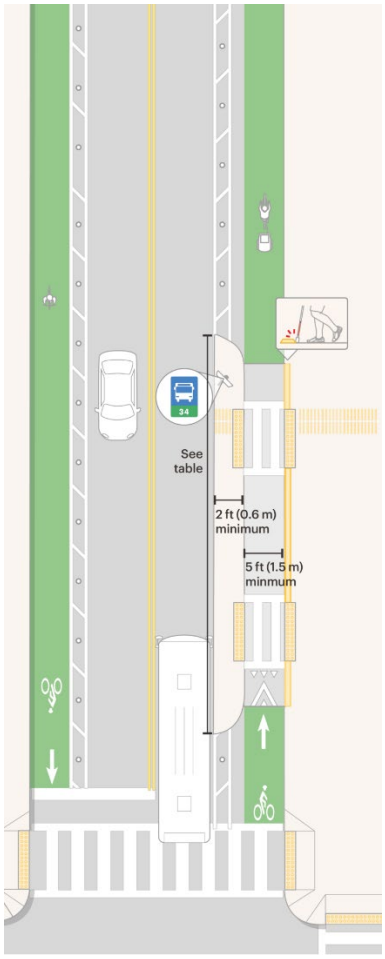


Long-Term Improvement | **Major & Residential Streets**

A bike box is a designated area between the stop bar and intersection that provides bicyclists with a safe and visible way to get ahead of queuing traffic during the red signal phase. They are most effective on side streets or approaches that don't typically have the green, as it gives bicyclists an opportunity to position themselves appropriately. (Image credit: NACTCO.org and SFMTA.org)

PRIMARY CRASH TYPES ADDRESSED: Bicycle

Bus Boarding Island



Long-Term Improvement		Major Streets

Transit boarding islands allow for bicycles to bypass the bus stop in a separated space, provide transit speed and reliability improvements by allowing for in-lane stopping, and can double as a pedestrian refuge island. (Image credit: NACTO.org)

PRIMARY CRASH TYPES ADDRESSED: Bicycle

INTERSECTION IMPROVEMENTS | Separate Users in Space (Continued)

Close Slip Lane

Long-Term Improvement | **Major & Residential Streets**

Closing a high speed slip lane modifies the corner of an intersection to remove the sweeping right-turn lane for vehicles. It results in shorter crossings for pedestrians, reduced speed for turning vehicles, better sight lines, and space for landscaping and other amenities. An alternative to closing a slip lane is modifying the shape to reducing turning speeds.

PRIMARY CRASH TYPES ADDRESSED: Turn-related, Pedestrian, Bicycle

Diagonal Diverters

A diagonal diverter is a traffic calming device forcing vehicles to make turns instead of continuing through, lowering traffic volumes and reducing conflicts. (Image credit: NACTO. org)

PRIMARY CRASH TYPES ADDRESSED: All

Green Conflict Striping

Priority Improvement | **Major & Residential Streets**

Green conflict striping are dashed-green markings in bike lanes and are placed in conflict areas such as at turn pockets, driveways, and intersections. They signal drivers and cyclists to take caution.

PRIMARY CRASH TYPES ADDRESSED: Bicycle

INTERSECTION IMPROVEMENTS | Separate Users in Space (Continued)

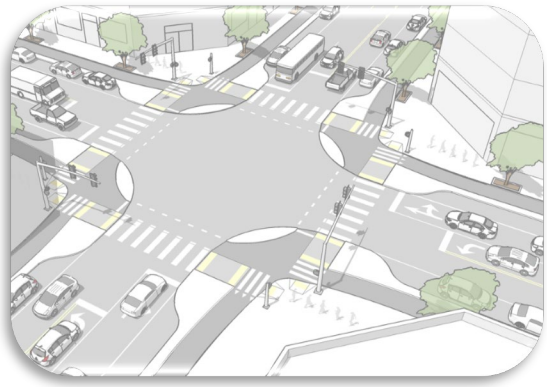
Pedestrian Refuge Island

Long-Term Improvement | **Major & Residential Streets**

A pedestrian refuge island is a raised barrier in the center of the roadway providing a place for pedestrians and cyclists to wait if they are unable to finish crossing the intersection. It improves safety by reducing the exposure time for pedestrians crossing the intersection and reducing left-turning vehicle speeds.

PRIMARY CRASH TYPES ADDRESSED: Pedestrian

Protected Intersection



Long-Term Improvement | **Major Streets**

Protected intersections use corner islands, curb extensions, and colored paint to delineate bicycle and pedestrian movements across an intersection. Slower driving speeds and shorter crossing distance increase safety for pedestrians.

Corners can be designed to be mountable for emergency and service vehicle maneuverability. (Image credit: NACTO.org)

PRIMARY CRASH TYPES ADDRESSED: All

Remove Bicycle Mixing Zones

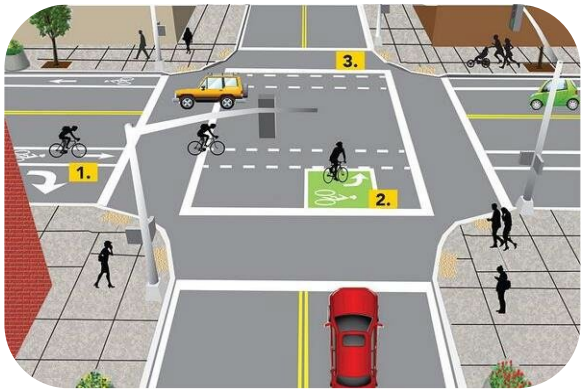
Long-Term Improvement | **Major & Residential Streets**

A mixing zone is where right turning vehicles merge with cyclists. Alternatives include protected intersections and separate traffic signal phasing to separate users in space and time.

PRIMARY CRASH TYPES ADDRESSED: Bicycle

INTERSECTION IMPROVEMENTS | Separate Users in Space (Continued)

Two-Stage Turn Queue Bike Box



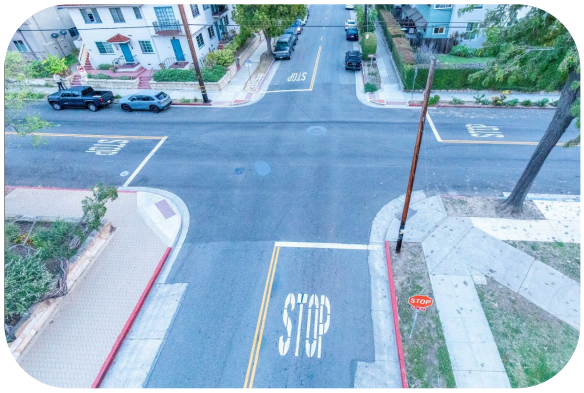
Long-Term Improvement **Major & Residential Streets**

This box gives cyclists a way to turn left while on a bike lane or separated bikeway on the right-side of a roadway at a multi-lane signalized intersection. Cyclists are separated from the flow of traffic while waiting to turn. (Image credit: ResearchGate)

PRIMARY CRASH TYPES ADDRESSED: Bicycle

INTERSECTION IMPROVEMENTS | Separate Users in Time

All-Way Stop Control



Priority Improvement | **Residential Streets**

An all-way stop-controlled intersection is a traffic management system requiring all vehicles to stop before crossing the intersection. It improves safety by removing the need for motorists, bicyclists, and pedestrians on a side-street or stop-controlled intersection to cross free-flowing lanes of traffic reducing the risk of collision.

Installation should be justified by an engineering study based on the California Manual on Uniform Traffic Control Devices (CA MUTCD.)

PRIMARY CRASH TYPES ADDRESSED: All

Bicycle Signal/Exclusive Bike Phase

Long-Term Improvement | **Major Streets**

A bicycle signal is specifically designed to control the movement of cyclists at intersections, operating either independently or in coordination with a traffic signal. It separates cyclists from motor vehicles or pedestrian movements, enhancing their safety and visibility in an intersection.

PRIMARY CRASH TYPES ADDRESSED: Bicycle

Bike Detection

Priority Improvement | **Major & Residential Streets**

Bike detection is a technology used to identify the presence of a bicycle at signalized intersections or roadways, either through a push-button, or a detection system, to call a green light for bicyclists and reduce delay for bicycle travel. This can discourage red light running and other unpredictable movements, which increases convenience and safety. An alternative to bike detection is to recall movements automatically through the traffic signal controller.

PRIMARY CRASH TYPES ADDRESSED: Bicycle

INTERSECTION IMPROVEMENTS | Separate Users in Time (Continued)

Exclusive Pedestrian Phase

Long-Term Improvement | **Major Streets**

An exclusive pedestrian phase is a form of pedestrian "WALK" phase at a signalized intersection in which all vehicular traffic is required to stop, allowing pedestrians to cross through the intersection in any direction, sometimes diagonally. This phase significantly reduces conflicts between vehicles and pedestrians at intersections and provides maximum pedestrian visibility. (Image credit: Maryland.gov)

PRIMARY CRASH TYPES ADDRESSED: Pedestrian

Improve Signal Timing

Priority Improvement | **Major & Residential Streets**

Traffic signal cycles have a significant impact on opportunities for all road users to operate safely along a road. Signal timing improvements can include coordinating multiple locations, changing the traffic signal sequence and clearance intervals, and eliminating or restricting higher risk movements. These changes can decrease exposure to conflicts and reduce wait times.

PRIMARY CRASH TYPES ADDRESSED: Red-light running, Pedestrian, Bicycle

Leading Pedestrian Interval

Priority Improvement | **Major & Residential Streets**

A leading pedestrian interval gives pedestrians the opportunity to enter an intersection three to seven seconds before vehicles are given a green indication. With this head start, pedestrians are more visible and can better establish their presence in the crosswalk before vehicles have priority to turn left or right. Cyclists may use the leading pedestrian interval in California (AB 1909).

PRIMARY CRASH TYPES ADDRESSED: Pedestrian, Bicycle

Pedestrian Recall

Priority Improvement | **Major & Residential Streets**

Pedestrian recall is a traffic signal timing function that causes a pedestrian walk phase to activate automatically every traffic signal cycle. Pedestrian recall can benefit pedestrians by reducing pedestrian delays and reduce unsafe crossing behavior. Pedestrian recall can be used as an alternative to bicycle detection, as cyclists can follow pedestrian signals in California (AB 1909).

PRIMARY CRASH TYPES ADDRESSED: Pedestrian

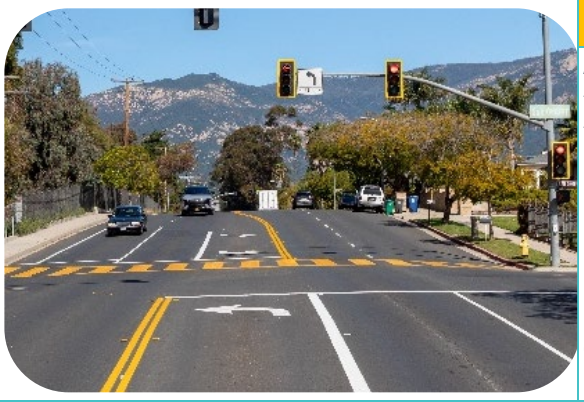
Prohibit Right-Turn-on-Red

Long-Term Improvement | **Major & Residential Streets**

Prohibiting right-turn-on-red movements can help prevent conflicts with vehicles turning right on red from one street with thru-vehicles on the cross street or pedestrians.

PRIMARY CRASH TYPES ADDRESSED: Turn-related, Pedestrian, Bicycle

Protected Left Turns



Priority Improvement | **Major & Residential Streets**

A protected left turn is a traffic signal configuration that provides dedicated time for vehicles to make left turns, minimizing conflicts with oncoming traffic, bicyclists, and pedestrians. Left turns are widely recognized as the highest-risk movement at signalized intersections since driver's must make multiple judgement calls at once (identify appropriate gap in traffic, presence of bicyclists/pedestrians, and speed to turn).

Protected left turns can be installed at locations with left turn pockets, a mast arm that can support an additional signal head, and appropriate detection for the left turn pocket. An engineering study is needed to justify installation.

PRIMARY CRASH TYPES ADDRESSED: Turn-related, Pedestrian, Bicycle

INTERSECTION IMPROVEMENTS | Separate Users in Time (Continued)

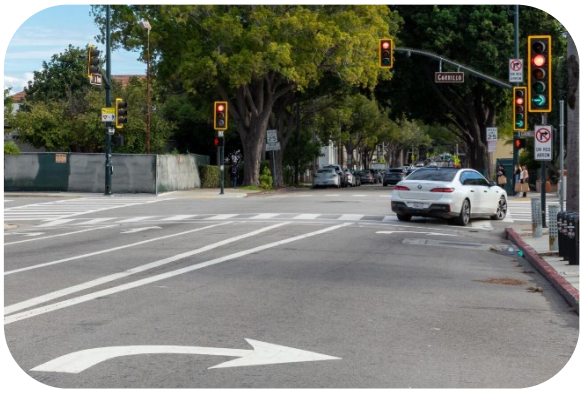
Rest-in-Red Signal

Long-Term Improvement | **Major & Residential Streets**

At certain hours (e.g. late night) a traffic signal remains red for all intersection approaches until a user arrives. This can reduce or eliminate waiting for side street traffic or pedestrians, and encourage main street traffic to reduce travel speeds.

PRIMARY CRASH TYPES ADDRESSED: Unsafe speeds

Separate Right-Turn Phasing



Long-Term Improvement | **Major & Residential Streets**

A separate right-turn phase provides a green arrow phase for right-turning vehicles. It helps mitigate conflicts between right-turning traffic and bicyclists or pedestrians crossing the intersection on their right.

PRIMARY CRASH TYPES ADDRESSED: Turn-related, Pedestrian, Bicycle

Traffic Signal

Priority Improvement | **Major Streets**

Traffic signals adds and expands existing traffic control at an intersection. They can break up long roadways to manage vehicle speeds, provide pedestrian crossing opportunities, and improve side-street access when justified by an engineering study.

PRIMARY CRASH TYPES ADDRESSED: All

Curb Extensions

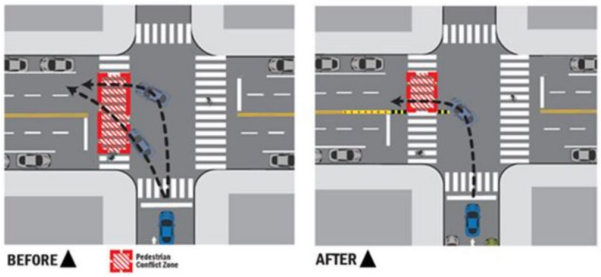
Priority Improvement | **Major & Residential Streets**

A curb extension is a traffic calming measure that widens the sidewalk for a short distance to enhance the pedestrian crossing and reduce turning vehicle speeds. For the pedestrian, this reduces the crossing distance and improves pedestrian visibility. For the vehicle, this visual narrowing encourages drivers to reduce speed when approaching the intersection and modifies the turning movement geometry to encourage sharper, slower turns.

Curb radii and truck aprons can be used to be outside emergency service vehicles' effective turn radius.

PRIMARY CRASH TYPES ADDRESSED: Turn-related, Pedestrian, Bicycle

Left Turn Calming



Long-Term Improvement | **Major & Residential Streets**

Use of paint, bollards, or raised median to extend the centerline and slow left turns at intersections. Widening the turning radii of left-turning vehicles expands the field of vision for drivers and increases the visibility of pedestrians.

Materials used can be designed to be fully mountable to limit the effects on emergency service vehicles and larger delivery vehicles. (Image credit: Chicago.gov)

PRIMARY CRASH TYPES ADDRESSED: Turn-related, Pedestrian, Bicycle

Neighborhood Traffic Circle

Long-Term Improvement | **Residential Streets**

Traffic circles, also referred to as mini roundabouts, are a type of roundabout typically small in diameter and located on residential streets. Traffic circles decrease vehicle speeds and severity of collisions while reducing congestion and improving traffic flow

PRIMARY CRASH TYPES ADDRESSED: All

INTERSECTION IMPROVEMENTS | Speed Management

Roundabout

Long-Term Improvement | **Major Streets**

A roundabout is a type of circular intersection in which traffic is permitted to flow in one direction around a central island, and priority is typically given to traffic already in the junction. Left-turn conflicts are not present in a roundabout and the geometry of a roundabout encourages drivers to reduce speeds as they proceed through the intersection, reducing the severity of crashes when they do occur. Pedestrians only have to cross one direction of traffic at a time at roundabouts, thus reducing the potential for vehicle/pedestrian conflicts as well.

PRIMARY CRASH TYPES ADDRESSED: All

Signage Noting that Signals Coordinate to Posted Speeds

Long-Term Improvement | **Major & Residential Streets**

Coordinate signals on major roadways to match posted speeds. Reinforce safe driving behavior by providing drivers traveling at the posted speed a “green wave,” limiting their need to stop at signals and improving their travel time. Signage can be used to supplement signal coordination to alert drivers of this benefit.

PRIMARY CRASH TYPES ADDRESSED: Unsafe speed

Skewed Intersection Redesign

Long-Term Improvement | **Major & Residential Streets**

“Square up” skewed intersections to reduce large curb radii that allow for higher turn speeds by restriping approaches. A squared up intersection provides better visibility for all road users, reduces turning speeds, and reduces pedestrian crossing lengths.

PRIMARY CRASH TYPES ADDRESSED: All

INTERSECTION/MIDBLOCK IMPROVEMENTS | Driver Alertness

Delineators, Reflectors, and/or Object Markers

Priority Improvement | **Major & Residential Streets**

Delineators, reflectors, and/or object markers are intended to warn drivers of an approaching curve or fixed object that cannot easily be removed.

PRIMARY CRASH TYPES ADDRESSED: Hit object

High-Visibility Crosswalk

Priority Improvement | **Major & Residential Streets**

A high-visibility crosswalk has a striped pattern with ladder markings made of high-visibility material, such as thermoplastic tape, instead of paint. A high-visibility crosswalk improves safety by increasing the visibility of marked crosswalks and provides motorists a cue to slow down and yield to pedestrians

PRIMARY CRASH TYPES ADDRESSED: Pedestrian

Pedestrian Activated Rectangle Rapid Flashing Beacons

Priority Improvement | **Major & Residential Streets**

Rectangular Rapid Flashing Beacons (RRFBs) are pedestrian safety devices installed at crosswalks to enhance visibility and alert drivers to the presence of pedestrians. Activated by pedestrians, these beacons emit a rapid, alternating flash pattern, capturing drivers' attention and prompting them to yield. RRFBs improve crosswalk visibility, increase driver compliance with yielding to pedestrians, and thereby enhance pedestrian safety.

PRIMARY CRASH TYPES ADDRESSED: Pedestrian

INTERSECTION/MIDBLOCK IMPROVEMENTS | Separate Users in Space

Access Management

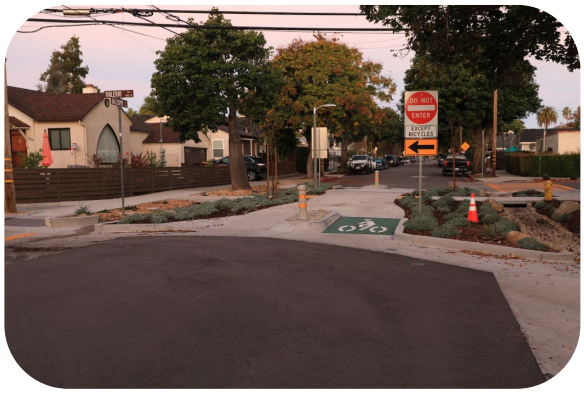
Priority Improvement | **Major Streets**

Common forms of access management include restricting left turns into/out of driveways and side streets, particularly those within 250 feet of intersections; restricting left turns at major intersections where sight distance needs cannot be accomodated; aligning driveways to prevent interlocking left turns; and closing legs of complex intersections.

The most effective form of access management includes hardening the centerline through raised curb or more temporary materials. Mountable curb can be used to maintain emergency service access at these locations.The most effective form of access management includes hardening the centerline through raised curb or more temporary materials. Mountable curb can be used to maintain emergency service access at these locations.

PRIMARY CRASH TYPES ADDRESSED: Turn-related, Pedestrian, Bicycle

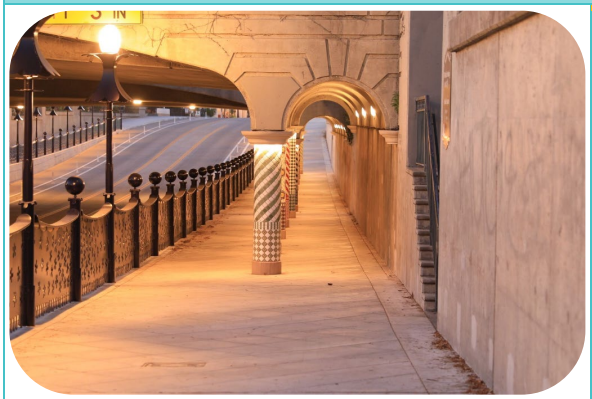
Full Road Closures



Full road closures prevent through traffic, which lowers traffic volumes and reduces conflicts.

PRIMARY CRASH TYPES ADDRESSED: All

New and Widened Sidewalks



Priority Improvement | **Major & Residential Streets**

New and widened sidewalks provide a more comfortable space for pedestrians, particularly in locations with high volumes of pedestrians, and provides space to accommodate people in wheelchairs. New and widened sidewalks improve safety by minimizing collisions with pedestrians walking in the road.

PRIMARY CRASH TYPES ADDRESSED: Pedestrian

Partial Road Closures

Partial road closures force vehicles to turn, eliminating through movements. Traffic volumes are reduced, which in turn reduces conflicts.

PRIMARY CRASH TYPES ADDRESSED: All

INTERSECTION/MIDBLOCK IMPROVEMENTS | Separate Users in Time

Pedestrian Hybrid Beacon

Long-Term Improvement | **Major Streets**

A pedestrian hybrid beacon (PHB) is used at unsignalized intersections or mid-block crosswalks to notify oncoming motorists to stop with a series of red and yellow lights. Unlike a traffic signal, the PHB rests in dark until a pedestrian activates it via pushbutton or other form of detection providing enhanced pedestrian visibility.

PRIMARY CRASH TYPES ADDRESSED: Pedestrian

INTERSECTION/MIDBLOCK IMPROVEMENTS | Speed Management

Raised Crosswalk

Long-Term Improvement | **Residential Streets**

A raised crosswalk is a pedestrian crosswalk that is typically elevated 3-6 inches above the road or at sidewalk level. A raised crosswalk improves safety by increasing crosswalk and pedestrian visibility and slowing down motorists.

It should be considered in combination with other appropriate traffic control devices at mid-block crossings.It should be considered in combination with other appropriate traffic control devices at mid-block crossings.

PRIMARY CRASH TYPES ADDRESSED: Pedestrian

Raised Intersection

Long-Term Improvement | **Residential Streets**

A raised intersection is 3” to 6” above the approaching streets. The vertical deflection improves visibility of pedestrians and reduces approach speeds. (Image credit: NACTO.org)

PRIMARY CRASH TYPES ADDRESSED: Pedestrian

MIDBLOCK IMPROVEMENTS | Driver Alertness

Bicycle Boulevard

Long-Term Improvement | **Residential Streets**

A bicycle boulevard is a street with low vehicle traffic volumes and speeds, designated to give bicyclists travel priority and create a low-stress cycling experience. Bike boulevards typically feature various traffic calming measures to reduce vehicle speeds and prioritize bicycles, such as branded wayfinding, pavement markings, traffic diverters, and landscaping. Sharrows are the most common pavement markers used on bike boulevards.

PRIMARY CRASH TYPES ADDRESSED: All

Curve Warning Signage

Priority Improvement | **Major Streets**

Curve warning signs, turn warning signs, and chevrons warn drivers of an approaching curve and provide tracking information and guidance to the drivers.

PRIMARY CRASH TYPES ADDRESSED: Run off road, Hit object

Edge Line

Long-Term Improvement | **Major & Residential Streets**

Edge lines are striping between the travel lane and the parking lane. Edge lines can be used where there is a history of driver depature from lane collisions.

PRIMARY CRASH TYPES ADDRESSED: Run off road, hit object

MIDBLOCK IMPROVEMENTS | Driver Alertness (Continued)

Lane Narrowing

Priority Improvement | **Major Streets**

Lane narrowing reduces lane widths to encourage motorists to travel at slower speeds.

PRIMARY CRASH TYPES ADDRESSED: Unsafe speeds

Raised Pavement Markers

Long-Term Improvements | **Major Streets**

Raised pavement markers provide an audible and tactile warning to drivers when they depart from their lane, and when equipped with reflectors, improve visibility of lane markings.

PRIMARY CRASH TYPES ADDRESSED: Lane departure, hit object

Segment Lighting

Priority Improvement | **Major & Residential Streets**

Providing roadway lighting improves safety during nighttime conditions by increasing driver awareness, increasing sight distance, and improving visibility of pedestrians and bicyclists.

PRIMARY CRASH TYPES ADDRESSED: Night

MIDBLOCK IMPROVEMENTS | Driver Alertness (Continued)

Speed Feedback Sign

Long-Term Improvement | **Major & Residential Streets**

A speed feedback sign notifies drivers of their current speed, usually followed by a reminder of the posted speed limit. A speed feedback sign iprovides a cue for drivers to check their speed and slow down, if necessary

PRIMARY CRASH TYPES ADDRESSED: Unsafe speeds

Speed limit Signs

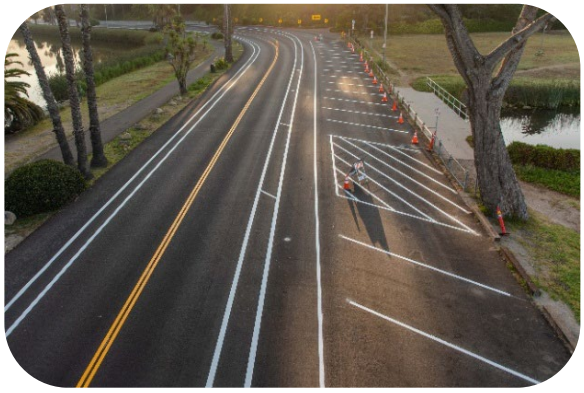
Long-Term Improvement | **Major & Residential Streets**

Speed limit signs are used to communicate the legal speed limit and support enforcement efforts.

PRIMARY CRASH TYPES ADDRESSED: Unsafe speeds

MIDBLOCK IMPROVEMENTS | Separate Users in Space

Angled Parking/Parking Configuration

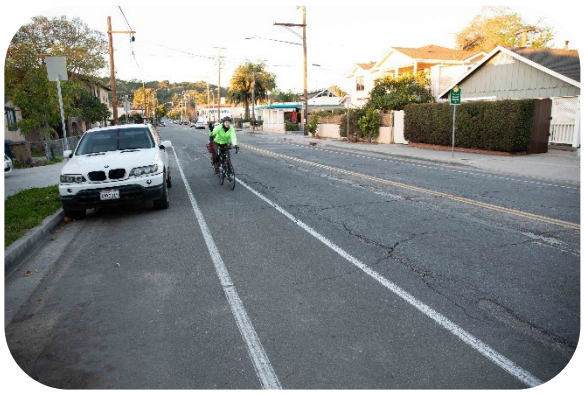


Long-Term Improvement | **Major & Residential Streets**

Angled parking increases safety by improving driver visibility when pulling out of parking spaces. Drivers pull out of parking spaces in the forward direction instead of a reverse direction.

PRIMARY CRASH TYPES ADDRESSED: Bicycle, parking maneuvers

Bike Lanes



Priority Improvement | **Residential Streets**

A bike lane provides dedicated street space, typically adjacent to outer vehicle travel lanes, with designated lane markings, pavement legends, and signage. Bike lanes improve safety by reducing conflicts between bicycles and vehicles on the road and by creating a road-narrowing effect with buffers or vertical barriers, which may reduce vehicle speeds. They can be paired with buffers to provide extra width between moving vehicles, people exiting parked vehicles, and bicyclists.

PRIMARY CRASH TYPES ADDRESSED: Bicycle

Bike Path

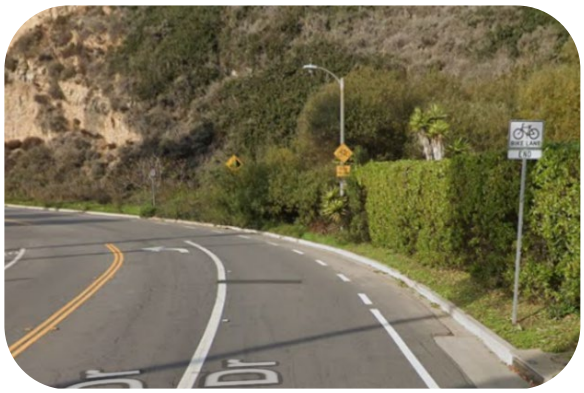
Priority Improvement | **Major Streets**

A bike path or multi use path provides a completely separate right of way that is designated for the exclusive use of people riding bicycles and people walking with minimal cross-flow traffic.

PRIMARY CRASH TYPES ADDRESSED: Bicycle, Pedestrian

MIDBLOCK IMPROVEMENTS | Separate Users in Space (Continued)

Close bike lane gaps



Priority Improvement | **Residential Streets**

Prioritize closing small gaps in bike lanes to ensure continuous bike lanes. A bike lane provides dedicated street space, typically adjacent to outer vehicle travel lanes, with designated lane markings, pavement legends, and signage. Bike lanes improve safety by reducing conflicts between bicycles and vehicles on the road and by creating a road-narrowing effect with buffers or vertical barriers, which may reduce vehicle speeds. They can be paired with buffers to provide extra width between moving vehicles, people exiting parked vehicles, and bicyclists.

PRIMARY CRASH TYPES ADDRESSED: Bicycle

Curbside Management

Priority Improvement | **Major Streets**

Curbside management can better prioritize reliable transit, safe bicycling infrastructure, freight deliveries, passenger pick-ups/drop-offs, green stormwater infrastructure, public spaces, and parking management

PRIMARY CRASH TYPES ADDRESSED: All

Roadway Reconfiguration/road diet

Long-Term Improvement | **Major Streets**

A roadway reconfiguration reduces roadway space dedicated to vehicle travel lanes to create room for bicycle facilities, wider sidewalks, center turn lanes, pedestrian refuge islands, or parking. A roadway reconfiguration improves safety by reducing vehicle speeds and creating designated space for all road users.

PRIMARY CRASH TYPES ADDRESSED: All

MIDBLOCK IMPROVEMENTS | Separate Users in Space (Continued)

Separated Bikeway (Class IV)

Priority Improvement	Major Streets

A separated bikeway provides dedicated street space, typically adjacent to outer vehicle travel lanes, with physical separation from vehicle traffic, designated lane markings, pavement legends, and signage. Physical separation may consist of plastic posts, parked vehicles, or a curb. Separated bikeways improve safety by reducing conflicts between bicycles and vehicles on the road and by creating a road narrowing effect with buffers or vertical barriers, which may reduce vehicle speeds.

PRIMARY CRASH TYPES ADDRESSED: Bicycle

Sidewalk Infill

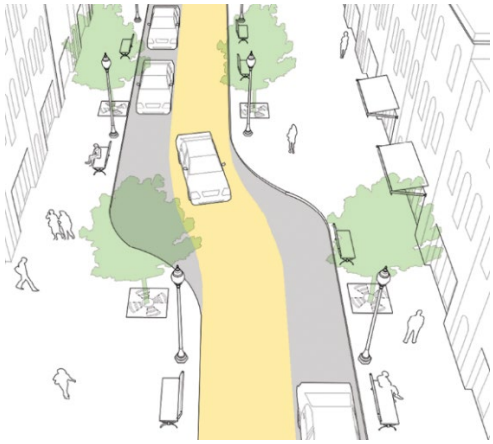
Priority Improvement	Major & Residential Streets

Sidewalk infill closes gaps in the sidewalk network, eliminating the need for pedestrians to walk in the street or make less predictable movements.

PRIMARY CRASH TYPES ADDRESSED: Pedestrian

MIDBLOCK IMPROVEMENTS | Speed Management

Chicanes (lateral shifts)



Long-Term Improvement | **Residential Streets**

Chicanes create horizontal defection, which reduces traffic speeds. Chicanes can be created by raised features such are island, or by roadway markings. (Image credit: NATCO.org)

PRIMARY CRASH TYPES ADDRESSED: All

Speed Hump

Long-Term Improvement | **Residential Streets**

A speed hump is a parabolic traffic calming device that uses vertical defection to raise the entire wheelbase of a vehicle and encourage motorists to travel at slower speeds to avoid damage to the undercarriage of an automobile. Speed humps span the full width of the street and are typically used to slow speeds on low volume, low speed roads. They should be spaced every 250 to 500 feet for maximium efficacy.

PRIMARY CRASH TYPES ADDRESSED: All

Speed Limit Reduction

Priority Improvement | **Major & Residential Streets**

Set speed limits to reflect the surrounding land use context of the roadway. Lower opearating speeds have shorter stopping distances, reduce the likelihood of collisions, decrease the severity of crashes, and enhance the overall experience all users. Thorogh enforcement increases compliance with speed limit.

PRIMARY CRASH TYPES ADDRESSED: All

MIDBLOCK IMPROVEMENTS | Speed Management (Continued)

Striping (lateral shifts)

Long-Term Improvement	Major Streets

Similar to chicanes, lateral shifts using pavement markings creates horizontal defection which can lower operating speeds. (Image credits: Caltrans.gov and NACTO.org)

PRIMARY CRASH TYPES ADDRESSED: All

PROGRAMMATIC IMPROVEMENTS | Local Program

Safe Routes to School

Priority Improvement | **Major & Residential Streets**

The City has a Safes Routes to School Program. One component of the program involves implementing traffic safety countermeasures along routes to school.

PRIMARY CRASH TYPES ADDRESSED: All

Focused Enforcement and Deterrence

Priority Improvement | **Major & Residential Streets**

Focused traffic safety enforcement directs police resources to high-risk behaviors like speeding and DUIs, using visible enforcement to increase deterrence and encourage safer behavior among all road users. The City's Youth Division Program also promotes bicycle and e-conveyance safety for minors; failure to participate can result in an administrative fine, and parents or guardians may be held financially responsible for property damage caused by unsafe riding.

PRIMARY CRASH TYPES ADDRESSED: All