

City of Bellflower Traffic Calming Program

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Manoochehr Adhami, P.E., T.E.
Traffic Engineer

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Appendix A- Traffic Calming Device Summary Table

1. Introduction

The City of Bellflower has developed a Traffic Calming Toolbox to be used as a guideline to implement proper and effective traffic calming solutions addressing traffic concerns throughout the City. These guidelines identify the policies and procedures to implement traffic calming solutions. The purpose of the Traffic Calming Toolbox is to provide information on the City of Bellflower's Traffic Calming Policy as indicated in this document. This Policy is designed to be a framework for potential selection, funding, design, and implementation of the most appropriate traffic calming solution for the traffic concern.

Definition of Traffic Calming

According to the Institute of Transportation Engineers (ITE) and transportation engineering professionals, traffic calming is defined as the combination of physical and/or regulatory measures that can be applied to neighborhood blocks and roadways to improve pedestrian safety, reduce negative effects of automobile use, alter driver behavior, and improve conditions for non-motorized street users.

The Traffic Calming Toolbox identifies traffic calming measures that can be implemented to address specific traffic conditions including the following:

- Speeding
- Traffic volumes
- Driver safety
- Pedestrian safety
- Bicycle safety

However, the implementation of traffic calming measures may also have some disadvantages including the following:

- Increased traffic noise
- Increased pollution
- Loss of parking
- Restricted access
- Increased emergency vehicle response times
- Increased maintenance
- Increased delay

2. General Information

Any request for a traffic calming measure must be made in writing to the City of Bellflower Public Works Department. Any application will be considered in accordance with a separately adopted City Council resolution.

Eligibility Requirements

Roadways must have appropriate operational and geometric characteristics for the proposed traffic calming measure identified in the Traffic Calming Toolbox in order to proceed with a feasibility study for installation. Each traffic calming measure has different operational and geometric requirements in order to have a proper and effective traffic calming result. Eligible characteristics are identified in each type of traffic calming measure section in this report.

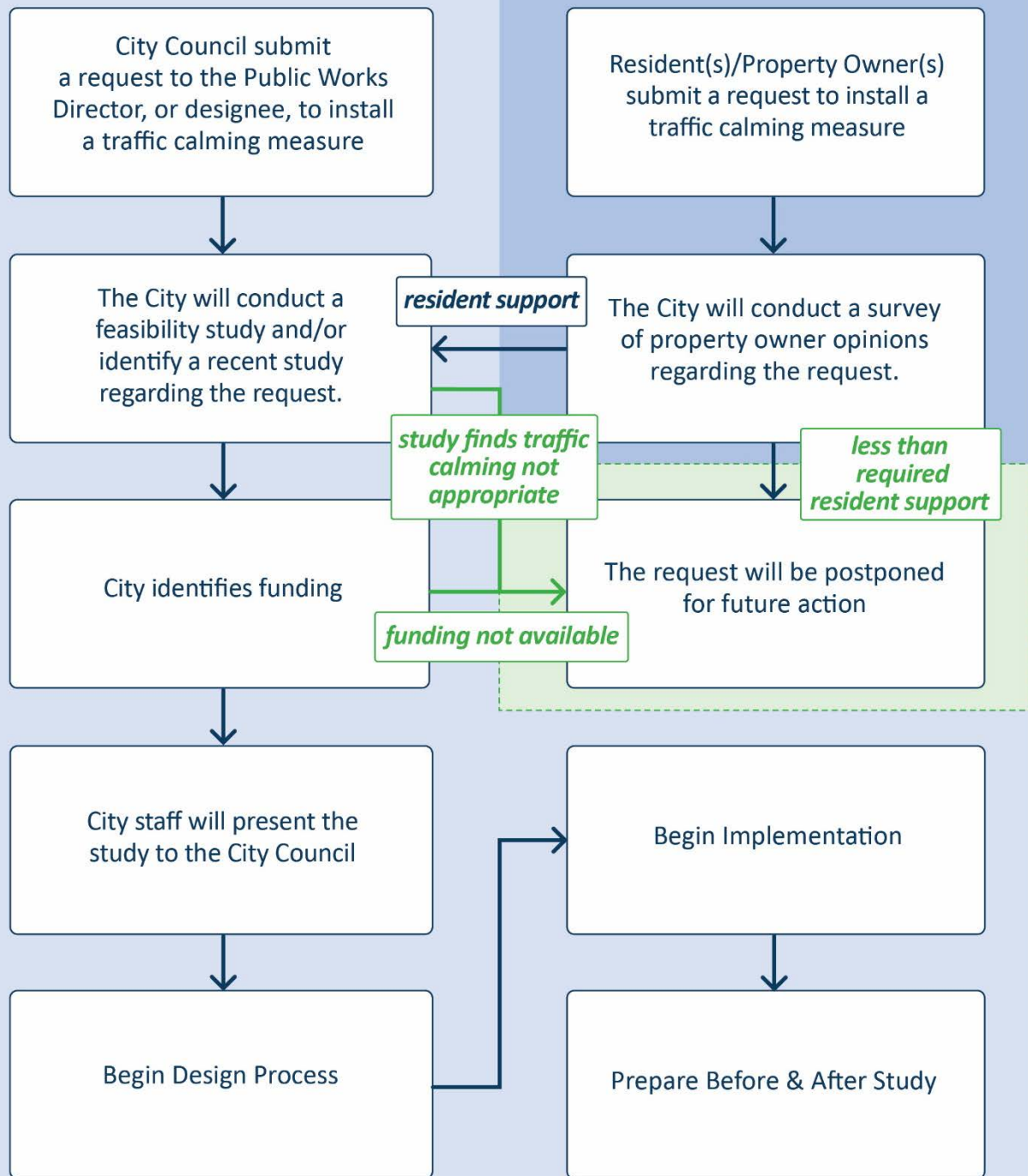
Location of Traffic Calming Measure

Many factors must be considered for the location of traffic calming measures for optimal effectiveness. If not correctly placed, localized reductions in speed or volume may occur instead of overall speed or volume reductions along the entire block or roadway. Specific site details and conditions will be the primary consideration in determining the location for each traffic calming measure. Successful deployment of traffic calming measures on streets within residential neighborhoods should employ all necessary steps to minimize any traffic related impacts on adjacent roadways.

3. Procedures for Requesting and Installing a Traffic Calming Measure

Procedures for considering Traffic Calming Measures will be established by City Council resolution. A sample method for implementing Traffic Calming Measures is graphically depicted on the next page.

Procedure to Request Traffic Calming Measures



4. Types of Traffic Calming Measures

The four most important components of an effective traffic calming measure are Engineering, Enforcement, Education, and Emergency Response, also known as the 4 E's. Engineering can propose infrastructure improvements in the roadway to install other physical traffic calming measures. Without enforcement, most traffic calming measures will not produce a desired outcome. Education and community involvement have proven to be very effective in achieving successful traffic calming measures. The inclusion of emergency response services in developing traffic calming measures will ensure that emergency response times are not negatively impacted by traffic calming measures.

The most effective traffic calming measure identified in the toolbox is an increase in traffic enforcement. Before any other traffic calming measures are implemented, an increase in enforcement by the Sheriff's Department should be the first step. The increased traffic enforcement presence should be evaluated to determine its effectiveness in addressing the perceived traffic problem or if additional traffic calming measures are needed. Even when a traffic calming measure is implemented, enforcement should maintain its presence to further enhance the desired traffic calming impact.

Traffic Calming Measures for Speeding

The following traffic calming measures are used to mitigate speeding complaints. Perceived speeding issues are good candidates for traffic calming if drivers are driving 10 mph over the speed limit. The list is prioritized based on effectiveness and cost. Traffic calming measures at the top of the list should be considered before measures at the bottom. Speed related traffic calming measures have different effects on arterial streets and residential streets. The list below identifies the best traffic calming measures for each roadway type.

Arterial Street	Residential and Collector Streets
• Police Enforcement • Safety Education • Radar Trailer • Speed Feedback Signs • Lane Reduction • Medians • Bulb-Outs • Chokers • Alter Traffic Signal Operation	• Police Enforcement • Safety Education • On Street Parking Edgeline and Narrowing Lanes • Enhanced Crosswalks • Flashing Beacons • Bulb-Outs • Chokers • Speed Humps

Traffic Calming Measures for Traffic Volumes

The following traffic calming measures are used to mitigate high traffic volumes and cut through traffic complaints. These traffic calming measures are typically only applied to residential and collector type streets to reduce cut through traffic. Neighborhood traffic management measures must also consider the entire neighborhood area in the traffic study in order to adequately address the cut through traffic problem instead of shifting it to an adjacent street. The list is prioritized based on effectiveness and cost. Measures at the top of the list should be considered before measures at the bottom.

- Lane Reduction
- Turn Restriction
- Diverters
- Partial Closure
- Full Closure
- Speed Reduction

Other Traffic Calming Measures

These following traffic calming measures are tools used to mitigate all other traffic conditions. The list is prioritized based on effectiveness and cost. Traffic calming measures at the top of the list should be considered before measures at the bottom.

- Add /Change Striping
- Add / Change Signage
- Curb Markings
- High Visibility Signs

The following traffic calming measures are used to assign right-of-way at intersections.

- Stop Signs
- Traffic Circle
- Traffic Signal

If the City determines through an engineering study that traffic calming measures are recommended for installation, the project should be implemented in two parts:

1. **Demonstration Project** – A low cost demonstration project that temporarily implements the traffic calming measure with temporary fixtures including traffic cones and temporary signage. A before and after traffic study should be conducted during the demonstration project to identify the effectiveness of the traffic calming measure on mitigating the traffic issue.

- 2. Permanent Project** – If the demonstration project produces a positive impact, a permanent traffic calming measure will be implemented using permanent materials including concrete and landscaping.

The Traffic Calming Toolbox identifies the advantages and disadvantages of each traffic calming measure and the geometric and operational requirements for implementation. The following section provides a detailed description of each traffic calming measure in the City of Bellflower Traffic Calming Toolbox.

Sheriff's Enforcement

An increase in enforcement presence to issue traffic citations will result in greater driver compliance with traffic laws. The increased presence of the Sheriff's Department can be used to help resolve speeding, illegal parking, and improve safety for drivers and pedestrians.



Eligibility Criteria: This traffic calming measure is suitable as a preliminary course of action and is complimentary to other traffic calming measures. However, increasing enforcement is subject to resources and availability within the local Sheriff's Department.

Cost: Subject to Resources

Advantages	Disadvantages
• Reduce Speed • Increase Driver Safety • Increase Pedestrian Safety • Increase Bicyclist Safety • Enforces Parking Violations • Reduce Other Violations • Increase Compliance with Traffic Laws	• Cost and Availability of Enforcement Staff

Safety Education and Community Involvement



This traffic calming measure requires neighborhood involvement, outreach, and participation for safety programs that present safe practices to residents and school children. Safety education programs focus on approaches to encourage compliance with impaired driving, speed limits, red light running, and other traffic laws. Safety programs also include student safety assemblies and programs to educate students on safe walking and bicycling to school.

Including neighborhood communities in the decision-making process for design and implementation of traffic calming measures has proven to be a major contributor in achieving a positive outcome in the traffic calming process.

Eligibility Criteria: This traffic calming measure is suitable as a preliminary course of action but is subject to available resources.

Cost: Subject to Resources

Advantages	Disadvantages
• Reduce speed • Increase Driver Safety • Increase Pedestrian Safety • Increase Bicyclist Safety	• Requires Time and Attention from Residents

Radar Speed Trailer

Radar speed trailers are an effective temporary traffic calming measure which affects drivers speed by alerting them of both their speed and the posted speed limit. Drivers being alerted of driving faster than the speed limit have an opportunity to lower their speed to the posted speed limit. Radar speed trailers lose their effectiveness if they are not supplemented with Sheriff's enforcement.



Eligibility Criteria:

This traffic calming measure is suitable for:

- Wide roadways with availability in the shoulder or parking lane to set up a radar trailer
- School zones
- Locations with speeding concerns
- High-pedestrian activity areas

And not suitable for:

- Intersections
- Significant roadway curvature

Cost: Subject to resources, the Sheriff's Department has a radar trailer, but it may or may not be in use at the time of the traffic calming request.

Advantages	Disadvantages
• Increase Driver Safety • Increase Pedestrian Safety • Increase Bicyclist Safety	• Requires Frequent Maintenance • Affect Parking in Business Districts • Loss of Effectiveness if Not Supplemented by Enforcement • Can Cause Visibility Problems if Not Properly Placed

Add / Change Signage

Adding or changing signage is a tool that can be used for other traffic calming measures.

Eligibility Criteria: Signs must be installed or changed to the latest requirements of the California Manual on Uniform Traffic Control Devices (CA MUTCD). Signs should be added or changed based on Engineering study recommendations and space availability.

Cost: Relatively inexpensive

Advantages	Disadvantages
• Increase Driver Safety • Increase Pedestrian Safety • Increase Bicyclist Safety • May Reduce Speed • May Reduce Volume	• May Increase Maintenance • May Restrict Access

Curb Markings



Curb markings reinforce parking regulations. Red paint on the curb is used to restrict parking and green paint on the curb is to implement time limited parking. Curb markings are a tool used for other traffic calming measures and is not a full measure on its own.

Eligibility Criteria: Red curb markings should be installed where required by the MUTCD or where parking is detrimental to traffic operation.

Cost: Inexpensive

Advantages	Disadvantages
• Increase Driver Safety • Increase Pedestrian Safety • Increase Bicyclist Safety	• Loss of parking • Increase Maintenance

High Visibility Signs

High visibility signs warn drivers with advance notice of an upcoming traffic obstacle. High visibility signs are made of a reflective material and have flashing lights around the edges which makes the sign more visible at night. Adding or changing signs to be high visibility is a tool that can be used for several of the previously mentioned traffic calming measures.



Eligibility Criteria: Where the existing roadside sign is ineffective or not visible to drivers at night.

Cost: \$5,000-\$15,000

Advantages	Disadvantages
• Increase Driver Safety • Increase Pedestrian Safety • Increase Bicyclist Safety • May Reduce Speed • May Reduce Volume	• May Increase Maintenance • May Restrict Access

Add / Change Striping



Adding or changing striping is a tool that can be used for other traffic calming measures.

Eligibility Criteria: Where required by the MUTCD or engineering study. The roadway must have adequate roadway width to comply with MUTCD lane widths.

Cost: Relatively inexpensive

Advantages	Disadvantages
• Increase Driver Safety • Increase Pedestrian Safety • Increase Bicyclist Safety • May Reduce Speed • May Reduce Volume	• May Increase Maintenance • May Restrict Access

Radar Speed Feedback Signs

Speed feedback signs are permanent fixtures to alert drivers of their driving speeds compared to the posted speed limits. The signs can be operated on solar power. Drivers being alerted of driving faster than the speed limit have an opportunity to lower their speed to the posted speed limit. Radar speed feedback signs lose their effectiveness if they are not supplemented with Sheriff's enforcement.



Eligibility Criteria: Where vehicles are not adhering to the street posted speed limit.

This traffic calming measure is suitable for:

- School zones
- Collector streets
- Arterial Streets
- Locations with speeding concerns
- High-pedestrian activity areas

This traffic calming measure is not suitable for:

- Intersections
- Roadways with significant curvature

Cost: \$10,000-\$15,000 per unit

Advantages	Disadvantages
• Speed Reduction	• Increase Maintenance

On Street Parking Edgeline

Painting an edgeline on the roadway to allocate parking spaces result in narrowing roadway travel lanes and increases side friction to traffic flow. Spaces can be either parallel or angled.



On-street parking is already prevalent in the City of Bellflower but striping an edgeline to identify lane usage will influence the perception of the roadway width to drivers and will slow vehicles down. Striping an edgeline for parking will also assign vehicular right-of-way by keeping parked cars in the parking lane and vehicles in the through lane.

Eligibility Criteria: Where high demand for parking is present. Only suitable for 2 lane streets.

Cost: greater or less than \$6,000 depending on length

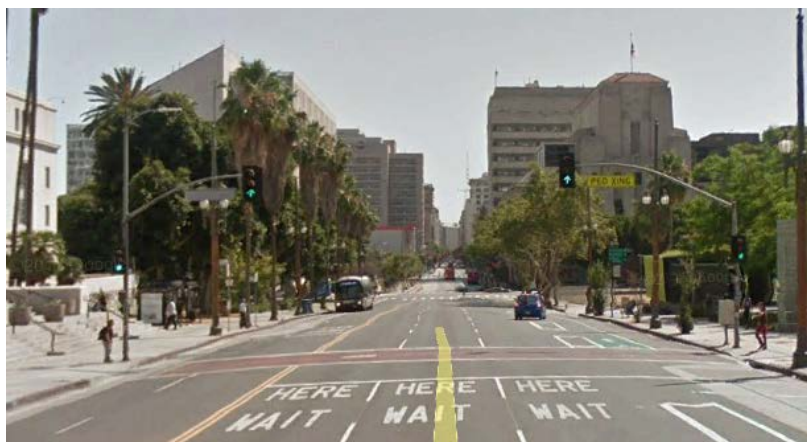
Advantages	Disadvantages
• Speed Reduction • Increase in Parking Availability	• May Affect Bicycle Safety • May Affect Regular Street Cleaning • May Affect Pedestrian Safety

Enhanced Crosswalks at Existing Uncontrolled Crosswalks



Enhanced crosswalks are designed for existing marked and uncontrolled crosswalk locations to maximize their visibility using supplemental devices. Noticeable pavement markings, flashing beacons, and advance warning signs warn motorists of marked crosswalks. These include features such as high-visibility crosswalk paint, flashing beacons, in-roadway warning lights, advance yield lines, advance signage, and/or advance pavement markings. Enhanced crosswalks give motorists advance notice that there are pedestrians in the vicinity and causes drivers to lower their speed around crosswalks to check for pedestrians crossing or waiting to cross. Enhanced crosswalks may affect pedestrian safety if they are not properly supplemented by other devices. An engineering study may recommend a pedestrian traffic signal (bottom left image) or High-Intensity Activated Crosswalk (HAWK) beacon signal (bottom right image) to supplement enhanced crosswalk features.

Enhanced crosswalks give motorists advance notice that there are pedestrians in the vicinity and causes drivers to lower their speed around crosswalks to check for pedestrians crossing or waiting to cross. Enhanced crosswalks may affect pedestrian safety if they are not properly supplemented by other devices. An engineering study may recommend a pedestrian traffic signal (bottom left image) or High-Intensity Activated Crosswalk (HAWK) beacon signal (bottom right image) to supplement enhanced crosswalk features.



Eligibility Criteria: Where drivers fail to yield to pedestrians at existing marked crosswalk locations. Uncontrolled crosswalk location enhancements should heavily consider flashing beacons at the crosswalk as a high-visibility feature. When used, all signs, pavement markings, and traffic control features must meet CA MUTCD guidelines. Enhanced crosswalk features are not suitable for low pedestrian volume crossing locations. An engineering study must be conducted to identify the need to install enhanced crosswalks.

Cost: \$20,000-\$40,000

Advantages	Disadvantages
• Increase Pedestrian Safety if Properly Suppleimented with Other Devices • Increase Bicyclist Safety • Increase Driver Safety	• Increase Maintenance • May Affect Pedestrian Safety if Not Properly Suppleimented by Other Devices • May Give Pedestrains a False Sense of Safety

Stop Signs



This device can be applied for either two-way or all way stops at intersections. Stop signs help assign right-of-way to drivers. Stop signs are not a traffic calming measure and should not be installed solely for the purpose of traffic calming.

Eligibility Criteria: Must meet latest CA MUTCD warrant guidelines

Cost: Engineering Study Cost & sign cost

Advantages	Disadvantages
• Increase Driver Safety • Increase Pedestrian Safety • Increase Bicyclist Safety • May Reduce Volume	• Increase Noise • Increase Pollution • Possible Loss of Parking • Increase Maintenance

Flashing Beacons

Flashing beacons are installed to supplement regulatory or warning signs. The most common application of flashing beacons are installed along the side of the road or over the roadway to warn motorists of the presence of pedestrians attempting to cross the roadway at a marked crosswalk. Flashing beacons can be used as traffic calming measures to slow vehicles down by notifying motorists that pedestrians are in the roadway.



Eligibility Criteria: Near schools, in mixed-use areas, residential streets and collector streets. Flashing Beacons can be posted at crosswalks if the number of pedestrians crossing justifies the need for flashing beacons. Flashing beacons should be installed above stop signs, school zone signs, and school speed signs if the existing sign has a history of not being noticed or ignored.

Cost: \$15,000-\$100,000

Advantages	Disadvantages
• Increase Pedestrian Safety • Increase Bicyclist Safety • Increase Driver Safety	• Increase Maintenance

Lane Reduction

A Roadway lane reduction is the revision of the street's lane use or width to reduce the travel lane(s) in one or both directions in order to slow motorists. Typically, one travel lane per direction with minimum width, with a goal of reducing the roadway width for vehicular use is recommended. Common applications involve conversion of four-lane, two-way roads to three-lane roads with two through lanes and a center two-way left turn lane. A lane reduction can also involve narrowing existing travel lanes. Alternate cross-section uses can include dedicated bicycle facilities, left turn lanes, on-street parking, raised medians, pedestrian refuge islands, sidewalks, etc. Lane reductions turn a wide street into a narrower roadway where drivers feel the need to slow down to stay in their lane around parking stalls, bike lanes, medians, etc.



Eligibility Criteria: Where volume and speed reduction desired also helps to allow space for bike lanes.

Cost: \$20,000- \$30,000 per mile

<u>Advantages</u>	<u>Disadvantages</u>
• Reduce Speed • May Reduce Volume • May Increase Bicyclist Safety	• Increase Maintenance • May Restrict Access • Increase Delay

Speed Humps

Speed humps are rounded raised areas of pavement typically 12 to 14 feet in length often placed in a series typically spaced 260 to 500 feet apart. Speed humps are a traffic calming measure for speeding and volume which reduces motorists' speeds and/or encourages motorists to seek alternative travel routes. Speed reduction commonly occurs at and around the speed hump to a slow crawl to safely drive over the bump. When drivers proceed over a speed hump at higher speeds, the bottom of lower vehicles scrape on the pavement and often cause noise and can damage a vehicle. Speed humps are only effective when installed in a series of several speed humps near each other on a roadway.



Eligibility Criteria: There are very few areas where speed humps are good candidates for traffic calming. All of the following requirements must be met for the roadway in question to be eligible:

- The roadway requires an uninterrupted roadway length of more than 1,000 feet with minimal number of driveways.
- Cannot be utilized on roadways with sharp curvatures and slopes.
- There must be more than 1 speed hump on the street to be effective.
- There must not be a driveway where the speed hump is being placed.
- Cannot be used on arterial or collector roadway

Cost: \$2,000-\$4,000 per speed hump

Advantages	Disadvantages
• Reduce Speed • Reduce Volume • Increase Pedestrian Safety	• Increase Noise • Loss of Parking • Emergency Vehicle Impacts • Increase Maintenance • May Affect Drainage • Residents Do Not Want the Speed Hump in Front of Their House • Some Motorists and Cyclists Choose to Travel over Speed Humps at High Speeds for Fun

Chokers

Chokers are a curb extension of the sidewalk into the street, resulting in a narrower roadway section. Chokers are similar to bulb-outs but are installed at mid-block locations. Chokers can be used as a traffic calming measure for speeding by narrowing the roadway at midblock sections which forces drivers to slow down to safely maneuver through the roadway.



Eligibility Criteria: Where defining pedestrian crossing is desired and visual cue is determined to be effective in reducing speed. Not suitable for high demand on-street parking locations or for streets with high bicycle volumes.

Cost: \$20,000- \$40,000

Advantages	Disadvantages
• Reduce Speed • May Reduce Volume • Increase Pedestrian Safety • Improve Aesthetic	• Loss of Parking • Emergency Vehicle Impacts • Increase Maintenance • Requires Measures to Improve Visibility

Bulb-Outs

Bulb-outs or curb extensions are an extension of the sidewalk into the street, resulting in a narrower roadway section at the intersection. Bulb-outs provide a shorter crosswalk length for pedestrians to cross at an intersection and they slow vehicles speeds with the perception of a narrowed roadway. Bulb-outs can be used as a traffic calming measure for speeding by narrowing the roadway at intersections which forces drivers to slow down to safely maneuver through the intersection.

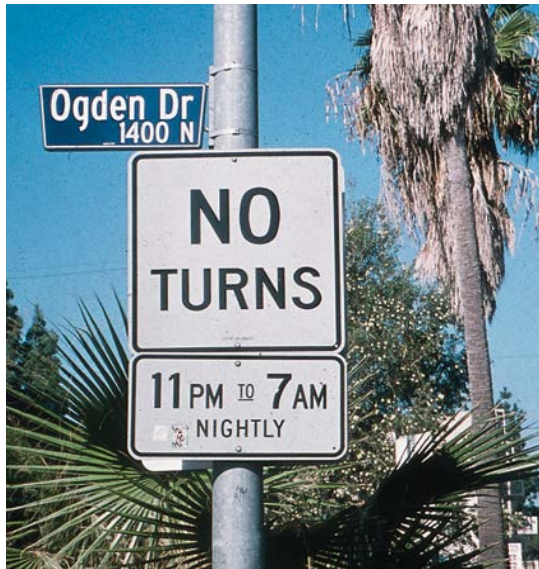


Eligibility Criteria: Where crossing/street width is excessive. Not suitable for low pedestrian activity areas, or for streets with high truck volumes.

Cost: \$20,000-\$80,000

Advantages	Disadvantages
• Reduce Speed • May Reduce Volume • Increase Pedestrian Safety • Increase Aesthetics • Shield Parked Vehicles	• Loss of Parking • Emergency Vehicle Impacts • Increase Maintenance • May Affect Line of Sight if the Location is Inappropriate • May Affect Drainage

Turn Restriction



Turn restrictions restrict the use of turning movements at an intersection to halt cut through traffic during peak periods.

Eligibility Criteria: Not suitable for high-volume turns. This measure will redirect traffic to take longer routes and may force drivers to make U-turns at nearby intersections.

Cost: Cost to install the signs are relatively inexpensive. However, more permanent turn restrictions involve installing concrete barriers.

Advantages	Disadvantages
• Reduce Volume • Improve Safety	• Increase Pollution • May Increase Maintenance

Medians

Medians are raised concrete median islands located along the street centerline that narrows the travel lanes at that location. Medians can be used as traffic calming devices for both speeding and reducing turning movements. Medians can be used to reduce speeds when the median narrows the roadway forcing drivers to slow down to safely proceed through. Medians also restrict left turns into and out of driveways which lower broadside and head-on collisions.



Eligibility Criteria: Normally for major and secondary roadways. Not suitable for narrow roadways.

Cost: \$5,000 - \$10,000 per linear foot to construct and will also have an annual landscape maintenance cost.

Advantages	Disadvantages
• Reduce Speed • May Reduce Volume • May Increase Driver Safety • Increase Aesthetics • Long medians Improve Safety by Preventing Left Turns from Side Streets	• Loss of Parking • Emergency Vehicle Impacts • Increase Maintenance • Restricts Access

Diverter

Diverter are barriers placed in intersections blocking turn movements or through movements. Diverter reduce cut through traffic through neighborhoods by permanently detouring certain routes.



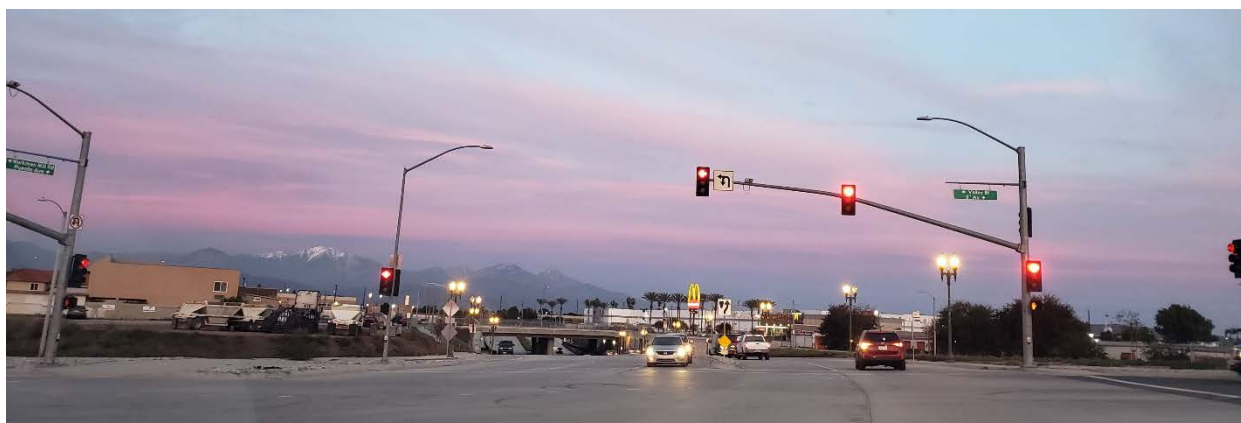
Eligibility Criteria: Reduction in unwanted traffic is desired. Suitable for collector streets or local roadways. Diverter are not suitable for high-volume movements unless designed to accommodate specific turns. This measure will redirect traffic to take longer routes and may force drivers to make U-turns at nearby intersections.

Cost: \$30,000- \$100,000

Advantages	Disadvantages
• Reduce Volume • Increase Aesthetics	• May Increase Pollution • May Result in Loss of Parking • Emergency Vehicle Impacts • Increase Maintenance • Restricts Access

Traffic Signals

A traffic signal is an intersection traffic control device that is used to assign right-of-way to motorists, pedestrians, and bicyclists to safely proceed through the intersection. Traffic signals are not a traffic calming device as they must meet California MUTCD warrant guidelines to be installed and are not influenced by reducing speeding or cut through traffic. Traffic signals must only be installed if there is excessive delay at an intersection, pedestrian needs for a signal, or a clear history of crashes at the intersection that are correctable by a traffic signal.



Eligibility Criteria: Must meet latest CA MUTCD warrant guidelines

Cost: \$200,000 - \$400,000

Advantages	Disadvantages
• Increase Driver Safety • Increase Pedestrian Safety • Assigns Appropriate Right-of-way	• Loss of Parking • Increase Maintenance • High Cost • Can Only Be Installed if Warranted • May Increase Rear-End and Left Turn Crashes if Not Properly Designed

Traffic Circles



Traffic circles are raised islands placed in unsignalized intersections where traffic circulates around the intersection. Approaching motorists yield to motorists already in the intersection. Requires drivers to slow to a speed that allows them to comfortably maneuver around the raised traffic circle in the middle of the intersection. A traffic circle is much smaller than a roundabout and can typically be placed on smaller two-lane roadways. Traffic circles can be used as

a traffic calming device to force vehicles to yield at intersections and slow vehicles to safely maneuver around the circle.

Eligibility Criteria: Not suitable for intersections with horizontal or vertical curvature.

Cost: \$50,000- \$100,000

Advantages	Disadvantages
• Reduce Speed • May Reduce Volume • Increase Aesthetics • Reduces Air and Noise Pollution	• Loss of Parking • Emergency Vehicle Impacts • Increase Maintenance • May Restrict Access for Large Emergency Vehicles and Moving Trucks • May Affect Drainage if Not Properly Designed

Partial Closure

Partial closures are barriers that block travel in one direction (creates a one-way street) for a short distance on otherwise two-way streets. Partial closures reduce cut through traffic and the roadway traffic by removing one direction of roadway travel. This traffic calming measure may make resident's routes longer to and from their homes but is effective in removing unwanted traffic through their streets.



Eligibility Criteria: Reduction in unwanted traffic is desired. Suitable only for residential streets or local roadways.

Cost: \$30,000 - \$60,000 per location

Advantages	Disadvantages
• Reduce Speed • Reduce Volume • Increase Pedestrian Safety • May Increase Aesthetics	• Emergency Vehicle Impacts • Increase Maintenance • Restricts Accesss • May Increase Pollution • May Result in Loss of Parking

Full Closure / Cul- De Sac

Full closures include barriers placed across a street to completely close the street to through traffic, usually leaving open space for pedestrians and bicyclists. The barriers turn a through street into a cul-de-sac. This is an effective traffic calming measure for reducing traffic volume through a residential street. This traffic calming measure will result in longer routes for residents to and from their homes but is effective in removing unwanted traffic through their streets.



Eligibility Criteria: Reduction in unwanted traffic is desired. Suitable only for residential streets or local roadways.

Cost: \$50,000- \$100,000 per location

Advantages	Disadvantages
• Reduce Speed • Reduce Volume Significantly • Increase Pedestrian Safety • May Increase Aesthetics	• Emergency Vehicle Impacts • Increase Maintenance Restricts Accesss • May Increase Pollution • May Result in Loss of Parking

APPENDIX A

Traffic Calming Device Summary Table

Page No.	Measure	Description	Traffic Calming Types	Pros						Cons						Construction Cost		
				Reduce Speed	Reduce Volume	Increase Driver Safety	Increase Pedestrian Safety	Increase Bicycle Safety	Increase Aesthetics	Noise Increase	Pollution Increase	Loss of Parking	Restricts Access	Emergency Impacts	Increase Maintenance		Operational Characteristics	Geometric Characteristics
6	Sheriff's Enforcement	Change in enforcement presence/increase	Speeding	Yes	No	Yes	Yes	Yes	No	No	No	No	No	No	No	Subject to resources	Subject to resources and availability among the local Sheriff's department	
7	Safety Education	Will involve neighborhood involvement for safety programs that present safe practices to residents and school children.	Speeding, Pedestrian Safety, Bicycle Safety	Yes	No	Yes	Yes	Yes	No	No	No	No	No	No	No	Subject to resources	Subject to resources and availability among the Traffic Commission and City Council	
8	Radar Trailer	A temporary solution to a speeding problem	Speeding	Yes	No	Yes	Yes	Yes	No	No	No	No	No	No	No	Subject to resources	school zones, high pedestrian activity areas, local and collector streets	Wide roadway with shoulder availability for a radar trailer
9	Add/Change Signage	Add new signs or change the signage	Could be use as supplemental measure	Yes	No	Possible	Yes	Yes	No	No	No	No	No	No	No	Relatively inexpensive	Required by MUTCD, Engineering studies	Where there is space availability for signage without clutter
9	Curb Markings	Red paint on the curb to restrict parking or green paint on the curb to implement time limited parking	Parking	No	No	Yes	Yes	Yes	No	No	No	Yes	No	No	Yes	Inexpensive	Where required by MUTCD or where parking is detrimental to traffic operation	Where roadway has curb
10	High Visibility Signs	High visibility signs provide drivers with advance notice, increasing nighttime visibility	Could be use as supplemental measure	Yes	No	Yes	Yes	Possible	No	No	No	No	No	No	Yes	\$5,000-\$15,000	Where roadside sign is ineffective or not visible to drivers at night	
11	Add/Change Striping	Add new or change the existing striping	One of the available tool for traffic calming	Possible	Possible	Yes	Yes	Yes	No	No	No	Possible	Possible	No	No	Relatively inexpensive	Where required by MUTCD or Engineering study	Must have adequate roadway width
12	Radar Speed Feedback Signs	Sign shows drivers their speeds next to the posted speed limit. The sign works with radar, AC or solar powered.	Speeding	Yes	No	Yes	Yes	Yes	No	No	No	No	No	No	Yes	\$10,000-\$15,000 per unit	Where vehicles are not adhering to the posted speed limit	

Page No.	Measure	Description	Traffic Calming Types	Pros						Cons						Construction Cost		
				Reduce Speed	Reduce Volume	Increase Driver Safety	Increase Pedestrian Safety	Increase Bicycle Safety	Increase Aesthetics	Noise Increase	Pollution Increase	Loss of Parking	Restricts Access	Emergency Impacts	Increase Maintenance		Operational Characteristics	Geometric Characteristics
13	On Street Parking Edgeline	Allocation of parking spaces, resulting in narrowing road travel lanes and increasing side friction to traffic flow.	Speeding	Yes	No	No	No	No	Possible	No	No	No	No	No	No	\$6,000 or less	Where high demand for parking is present	Must have adequate roadway width to hold both parking and travel lanes
14	Enhanced Crosswalks (Flashing Beacons)	Installed to warn motorists of the existing marked uncontrolled crosswalks	Pedestrian Safety	Yes	No	Yes	Yes	Yes	No	No	No	No	No	No	Yes	\$20,000-\$40,000	Where drivers fail to yield to pedestrians	Must already be an existing marked uncontrolled crosswalk
15	Stop Signs	Either two-way or all way stops at intersections	Intersection Delay	No	Possible	Yes	Yes	Yes	No	Yes	Yes	Possible	No	No	Yes	Engineering Study Cost	Must meet the latest CA MUTCD warrant guidelines	
16	Flashing Beacons	Flashing beacon on traffic signal poles to warn motorists of school children or pedestrian presence/crossing.	Pedestrian Safety	Yes	No	Yes	Yes	Yes	No	No	No	No	No	No	Yes	\$15,000-\$100,000 per unit	Near Schools, mixed use areas, residential streets, and collector streets	
17	Lane Reduction	Common application involves conversion of four-lane road to two-lane road and center two-way left turn lane. Can also involve narrowing existing travel lanes. Alternate cross-section uses can include dedicated bicycle facilities, left turn lanes, on-street parking, raised medians, pedestrian refuge islands, sidewalks, etc.	Speeding, Bicycle Safety, Pedestrian Safety	Yes	Possible	Yes	Yes	Yes	Yes	No	No	No	Possible	No	Yes	\$20,000-\$30,000 per mile	Where volume and speed reduction are desired.	
18	Speed Humps	Rounded raised areas of pavement typically 12 to 14 feet in length often placed in a series (typically spaced 260 to 500 feet apart)	Speeding	Yes	Possible	No	Yes	No	No	Yes	Possible	Possible	No	Yes	Yes	\$2,000-\$4,000 per speed hump		Where conflicting driveways, roadway curvature and steep slope are not present

Page No.	Measure	Description	Traffic Calming Types	Pros						Cons						Construction Cost		
				Reduce Speed	Reduce Volume	Increase Driver Safety	Increase Pedestrian Safety	Increase Bicycle Safety	Increase Aesthetics	Noise Increase	Pollution Increase	Loss of Parking	Restricts Access	Emergency Impacts	Increase Maintenance		Operational Characteristics	Geometric Characteristics
19	Chokers	Midblock curb extension is a lateral horizontal extension of the sidewalk into the street, resulting in a narrower roadway section.	Speeding	Yes	Possible	No	No	No	Yes	No	No	Yes	No	Yes	Yes	\$20,000-\$40,000	Not suitable for low pedestrian activity areas or streets with high truck volumes	Where crosswalk length or street width is excessive, where there is on-street parking
20	Bulb-Outs	Intersection curb extension is a lateral horizontal extension of the sidewalk into the street, resulting in a narrower roadway section at the intersection.	Pedestrian Safety, Speeding	Yes	Possible	No	Yes	No	Possible	No	No	Yes	No	Yes	Yes	\$20,000 - \$80,000	Not suitable for low pedestrian activity areas or streets with high truck volumes	Where crosswalk length or street width is excessive, where there is on-street parking
21	Turn Restriction	Restrict the use of turning movements at an intersection to halt cut through traffic during peak periods	Volume	No	Yes	Yes	Possible	Possible	No	No	No	No	Yes	Yes	Yes	Relatively inexpensive	Not suitable for high-volume turns	
22	Medians	Raised Island located along the street centerline that narrows the travel lanes at that location	Speeding, Unsafe Left Turns	Yes	Possible	Possible	No	No	Yes	No	No	Yes	Possible	Yes	Yes	\$ 5,000-\$10,000 per linear foot	Normally for major and secondary roadways	Not suitable for narrow roadways
23	Diverter	Barriers placed in intersections blocking turn movements or through movements.	Pedestrian Safety, Bicycle Safety, Volume	Possible	Yes	No	No	No	Possible	No	Possible	Possible	Yes	Yes	Yes	\$30,000-\$100,000	Reduction in unwanted traffic is desired, suitable for collector streets and local roadways	
24	Traffic Signal	Intersection traffic control device that is used to assign right-of-way to motorists, pedestrians, and bicyclists.	Intersection Delay	No	No	Yes	Yes	No	No	No	No	Yes	No	No	Yes	\$200,00-\$400,000	Must meet latest CA MUTCD warrant guidelines	
25	Traffic Circles	Raised islands placed in unsignalized intersections around which traffic circulates.	Speeding, Intersection Delay	Yes	Possible	No	No	No	Yes	No	No	Yes	Possible	Yes	Yes	\$50,000-\$100,000	Where stop signs are to be replaced by a device with Aesthetic improving quality	Not suitable for intersections with horizontal or vertical curvature

Page No.	Measure	Description	Traffic Calming Types	Pros						Cons						Construction Cost		
				Reduce Speed	Reduce Volume	Increase Driver Safety	Increase Pedestrian Safety	Increase Bicycle Safety	Increase Aesthetics	Noise Increase	Pollution Increase	Loss of Parking	Restricts Access	Emergency Impacts	Increase Maintenance		Operational Characteristics	Geometric Characteristics
26	Partial Closure	Barriers that block travel in one direction (creates a one-way street) for a short distance on otherwise two-way streets	Cut Through Traffic	Possible	Yes	No	Yes	No	Possible	No	Possible	Possible	Yes	Yes	Yes	\$30,000-\$60,000	Where reduction in unwanted traffic is desired. Suitable only for residential streets or local roadways	
27	Full Closure/Cul-De Sac	Barriers placed across a street to completely close the street to through traffic, usually leaving open space for pedestrians and bicyclists	Pedestrian Safety, Bicycle Safety	Possible	Yes	No	Yes	No	Possible	No	Possible	Possible	Yes	Yes	Yes	\$50,000-\$100,000	Where reduction in unwanted traffic is desired. Suitable only for residential streets or local roadways	