



# Neighborhood Traffic Calming Handbook



Sunnyvale



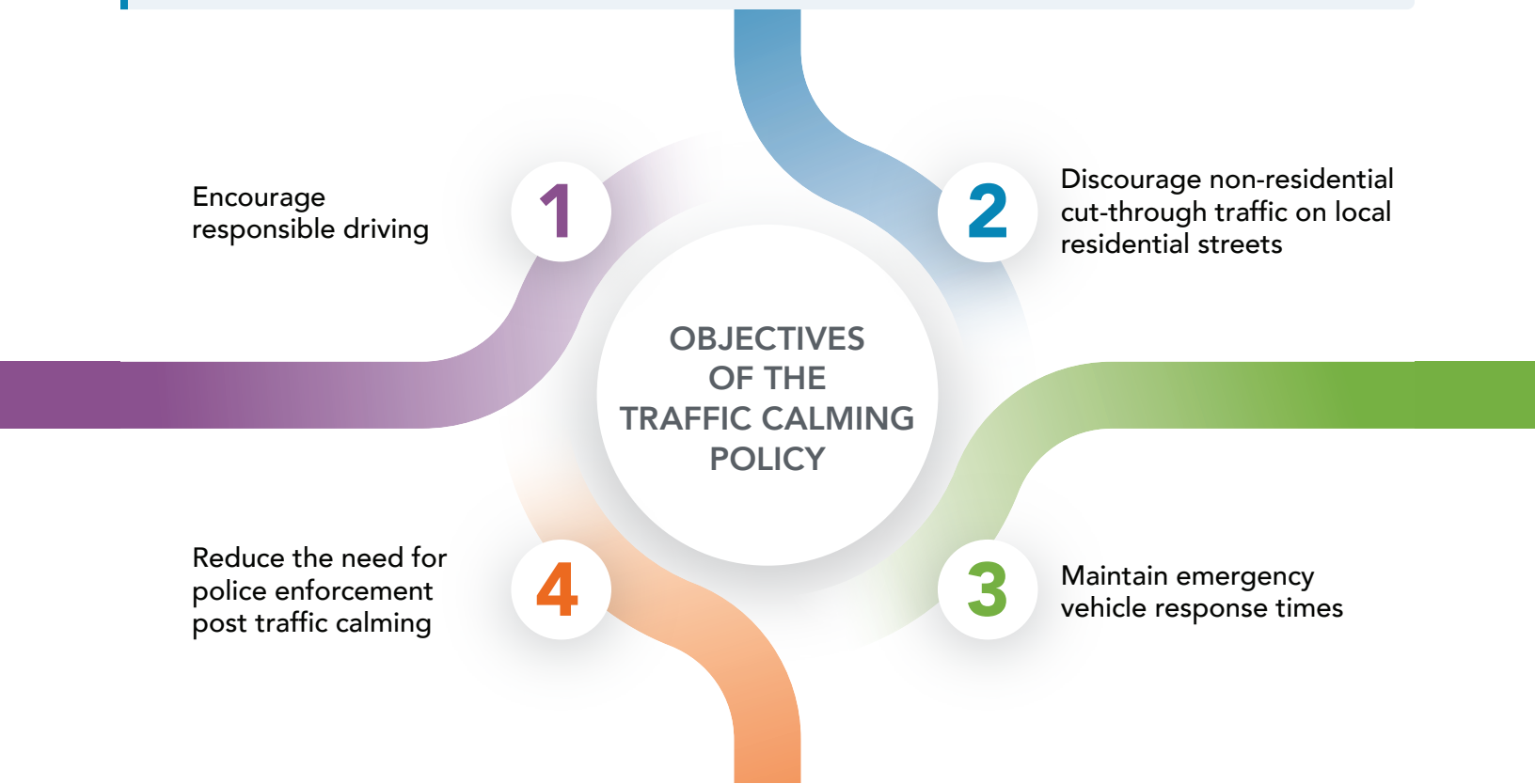
# Table of Contents

What is Traffic Calming? .....	1	Step 3: Data Collection .....	3
What are Traffic Calming Measures? .....	1	Step 4: Stage 1 Traffic Calming Measures ..	4
The Neighborhood Traffic Calming Process...	2	Step 5: Follow-up Data Collection .....	5
Step 1: Report the problem .....	2	Step 6: Stage 2 Traffic Calming Study .....	5
Step 2: Neighborhood Consensus .....	3	Step 7: City Council Approval .....	9

# What is Traffic Calming?

Sunnyvale residents have expressed concern about speeding and cut-through traffic in residential neighborhoods. In response to public interest, the City has developed a Neighborhood Traffic Calming Policy.

Traffic calming employs a combination of physical, visual, and social measures to reduce cut-through traffic and speeding in residential neighborhoods, promote quality of life for residents, improve comfort for non-vehicular road users, and enhance safety for all.



## What are Traffic Calming Measures?

Neighborhood traffic calming measures are an attempt to enhance traffic and pedestrian safety and preserve neighborhood character and livability. There are a number of traffic calming devices that are available to achieve this effect. The specific measures are described in more detail below, but can generally be used to address problems with speeding, cut-through traffic, increased volume, and to improve safety. When a traffic calming measure is implemented successfully, it is effective and self-enforcing.

# The Neighborhood Traffic Calming Process

This section describes the process, regulations, and requirements of the Sunnyvale Neighborhood Traffic Calming Program.

## STEP 1

### REPORT THE PROBLEM

---

If you feel as though you have a **speeding or traffic problem on your residential street**, the first step is to report the problem to City of Sunnyvale Public Works staff at **408-730-7415** or [pubworks@sunnyvale.ca.gov](mailto:pubworks@sunnyvale.ca.gov).

City staff will note your concern and provide a Traffic Calming Request Application.

After the Application is submitted, City staff will evaluate the request to determine the nature of the problem, and make sure that the location meets the first traffic calming criteria:

#### **The street must be classified as “Residential”**

The City will only implement traffic calming measures or conduct traffic calming studies on streets classified as “Local Residential” or “Residential Collector”. Staff can work with you to identify other actions if your street does not meet this basic criterion.

For cut-through traffic concerns, the traffic calming program will only respond to those reported on “Local Residential” streets.

#### **Staff will define the study area**

Sometimes, traffic calming solutions on a street would “shifts” the problem to a nearby street. Upon receiving the request, City staff will identify a study area for the traffic calming study.

## STEP 2

# NEIGHBORHOOD CONSENSUS

---

After receiving the Traffic Calming Request Application, City staff will request a petition from a representative number of residents in the neighborhood to verify that there is a widespread concern for the speeding or cut-through traffic issue. Only one signature can be submitted per address.

Representative number of residents = 50% or more of residential properties along the roadway segment requesting traffic calming. Multi-family residential (i.e., condos, apartments) are exempted from the petition process.

## STEP 3

# DATA COLLECTION

---

When it is determined that a representative number of residents perceive the problem, City staff will collect traffic volume and speed data for the streets within the study area and observe traffic patterns.

### **Speeding Problem Thresholds:**

- For Local Residential Streets: 85th percentile speed > posted speed limit + 5 miles per hour.
- For Residential Collector Streets: 85th percentile speed > posted speed limit + 5 miles per hour.

### **Cut-through Problem Threshold:**

- For Local Residential Streets: Average Daily Traffic > 1,000 vehicles per day.

### **Other Issues:**

- Some traffic problems do not fit neatly into the speeding or cut-through “boxes”. City staff will evaluate on a case-by-case basis if a unique issue warrants traffic calming.

## STEP 4

# STAGE 1 TRAFFIC CALMING MEASURES

For roadways that meet the identified thresholds, City staff will first suggest possible solutions that do not involve the use of physical controls or impediments on the roadway system. These are called Stage 1 Traffic Calming Measures that include, and are not limited to:



**RADAR SPEED TRAILER DEPLOYMENT** — This is a temporary device that is primarily used to educate motorists regarding the fact that they may be significantly exceeding the posted speed limit. Permanent radar speed feedback signs can also be considered.



**TRAFFIC ENFORCEMENT ACTIONS** — This is traditional enforcement activity on the part of Public Safety's traffic enforcement officers. The intent is to modify behavior to result in a safer situation for all drivers and neighbors.



**TRAFFIC SIGNING AND PAVEMENT MARKERS** — Public Works staff will review all of the traffic signing and pavement markings in the area. If necessary, staff will install additional signing or striping. When appropriate, changes and additions will be reviewed with interested neighbors.



**COMMUNITY OUTREACH** — Public Works staff will conduct neighborhood outreach to educate the community on safe driving behaviors. Sometimes, the drivers speeding on a local roadway are residents in the community.

## STEP 5

### FOLLOW-UP DATA COLLECTION

---

City staff will conduct another speed and/or volume data collection six months after the implementation of Stage 1 Traffic Calming measures. The data will then be analyzed to determine if the Stage 1 Traffic Calming measure was successful. If the measure was successful, and the thresholds identified in Step 3 are no longer met, then the traffic calming process will end at this point.

If the location continues to exceed the thresholds for speed and/or volume on a residential street, City staff will move on to analyze possible Stage 2 Traffic Calming measures.

## STEP 6

### STAGE 2 TRAFFIC CALMING STUDY

---

Stage 2 traffic calming study will be initiated only if Stage 1 measure were determined unsuccessful by City staff (after Step 5).

Stage 2 traffic calming study is intended to identify physical devices to be installed in the roadway. These devices will be experienced by the community on a daily basis. Therefore, it requires a more robust study process.

They are generally categorized into the following categories:

- Vertical Deflection
- Horizontal Deflection
- Travel Lane Width Reduction
- Routing Restriction

Since Woonerf Residential Collector streets have a higher intended roadway function than Local streets, Stage 2 study on a Residential Collector would consider measures only from the following categories of devices that do not impede the speed of emergency vehicles:

- Horizontal Deflection
- Travel Lane Width Reduction
- Other Devices that do not impede the speed of emergency vehicles

Example measures within each category are shown below.

## Possible Stage 2 Measures include:

### VERTICAL DEFLECTION (Applies to Local Residential Streets Only)



**Figure 1. Speed Humps**

Speed humps are approximately 12 feet in width and vary from 2.5 to 4 inches in height. This raised pavement serves to physically force motorists to reduce their speed. In order to be effective, speed humps should be placed no further than 300 feet apart.



**Figure 2. Speed Tables**

These are speed humps with a long flat section that is generally used at crosswalk locations. Both speed humps and speed tables require signing and roadway markings to make their presence known to motorists and other roadway users.



**Figure 3. Speed Cushions**

Speed cushions differ from speed humps and speed tables by having wheel cut-outs that allow emergency vehicles to proceed unimpeded. Passenger cars generally have narrower wheel bases and would not be able to pass unimpeded.



**Figure 4. Raised Intersection**

A raised intersection is a flat, raised area covering an entire intersection with ramps on all approaches. It is essentially a speed table that covers an entire intersection, including the sidewalks.

## HORIZONTAL DEFLECTION: (Applies to both Local Residential and Residential Collector Streets)



**Figure 5. Traffic Circles**

This device is a raised circular island in the middle of a residential neighborhood intersection. Direct through movements are obstructed by the raised island, requiring traffic to move to the right and around the circle. The intersection approaches are normally controlled by yield signs that serve to alert motorists to the need to slow their speed entering the intersection.



**Figure 6. Curb Extensions, Chokers, Chicanes**

These are various methods of narrowing the roadway by extending raised curbs into the street. These can be done at street entries and exits as well as mid-block locations. The narrower street generally results in reduced traffic speeds and provides pedestrians with shorter crossing distances.

## ROUTING RESTRICTION: (Applies to Local Residential Streets Only)



**Figure 7. Median Barriers**

These can be a barrier or raised island along the center of a roadway to prohibit left turns or crossing traffic.



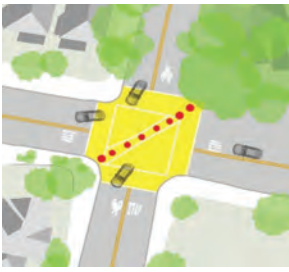
**Figure 8. Raised Medians**

This is a median placed in the center of a roadway to create a narrower travel way and also reduce pedestrian crossing distances.



**Figure 9. Forced Turn Islands, Barriers, Channelization**

These are traffic islands or curbs specifically designed to prevent traffic from making specific movements at an intersection.



**Figure 10. Diagonal Diverters**

These are barriers placed diagonally across an intersection to force drivers to make a particular turn but not allow other movements.



**Figure 11. One-Way Streets**

This is when traffic on a street is regulated to only allow traffic to flow in one direction. Usually this is accomplished through sign placement.



**Figure 12. One-Way Chokers, Half-Closures or Semi-Diverters**

These are barriers to traffic in one direction that permit traffic in the opposite direction to proceed.



**Figure 13. Street Closures and Cul-de-sacs**

This is the complete barricade or termination of a street.



**Figure 14. Woonerf**

This is a design that makes residential streets an extension of the front yards. Essentially there is no identified street with curbs and gutters. Parked cars, landscaping, etc. intrude upon portions of the streetway while still allowing for vehicular travel. They are typically narrow streets without curbs and sidewalks, and vehicles are slowed by placing trees, planters, parking areas, and other obstacles in the street. Motorists become the intruders and must travel at very low speeds below 10 miles per hour. This makes a street available for public use that is essentially only intended for local residents.

**The following general criteria must be met to consider the installation of any Stage 2 traffic calming measure:**

1. Installation must not result in traffic diversion to other neighborhood streets within the study area.
2. Greater than 50% of the households within the study area shall support the installation.
3. Devices shall be located a minimum of 25 feet from driveways, manholes, drain inlets, water valves, street monuments, and other appurtenance.
4. Devices shall be located a minimum of 25 feet from fire hydrants.
5. Devices shall be installed only where a minimum safe stopping distance can be provided.
6. Sunnyvale Department of Public Safety must approve the plan to assure that emergency response times or access are not negatively effected.

**STEP 7**

## **CITY COUNCIL APPROVAL**

---

Once City staff and the neighborhood agree on an appropriate Traffic Calming solution, the proposal will be brought to the City Council for final approval and funding allocation.

### **Prioritization**

Staff will complete Traffic Calming Studies on a “first come -first serve” basis.

# Appendix

## Pros and Cons of Stage 2 Traffic Calming

Before the City decides to consider pursuing Stage 2 traffic calming actions, it is important that the benefits and disadvantages be carefully considered. While Stage 2 actions can be successful, they can also result in problems more significant than the original concern.

This section will describe the pros and cons of the Stage 2 traffic calming tools described previously. In most cases, the benefits are predictable, while the disadvantages can be much more unexpected. Consequently, a greater emphasis has been placed on the potential problems so that decisions can be made in a fully informed manner.

### Pros

#### **Traffic Calming Measures Often Achieve the Desired Result**

Physical actions such as the installation of speed humps, traffic circles, street closures, etc., are almost always successful in forcing traffic to behave in an intended fashion. In certain situations, they can achieve the desired result by utilizing a one time capital expenditure and generally low ongoing maintenance costs.

#### **Permanence**

Stage 2 traffic calming actions are generally viewed as much more permanent solutions than Stage 1 actions. In most instances the alternative approach to the desired result involves repetitive and costly ongoing Stage 1 traffic calming actions. There are significant potential benefits to utilizing Stage 2 traffic calming actions which is why some communities have implemented Stage 2 actions and many other communities are exploring their possible use.

#### **Collision Reduction**

One of the most important impacts of traffic calming is the potential reduction in the severity and number of crashes on traffic-calmed streets. Safety is enhanced through increased driver awareness of other street users and reductions in volumes, speeds and conflicts. In the United States, reduction of crashes due to traffic calming measures has been reported to be an overall average of 50 percent. Traffic circles appear to offer the greatest reduction in collisions. Speed reduction is especially important for pedestrian safety, as the severity of injury to a pedestrian when hit by an automobile is dramatically reduced by lowering vehicle speeds from 35 mph (usually fatal) to fewer than 20 mph (usually just minor injuries).

## Cons

### **Delays in Emergency Response Vehicles**

This is especially true for fire apparatus and ambulance. Because of the heavy weight of fire engines, and delicate instruments and patients within ambulances, these vehicles must almost come to a complete stop when they encounter a bump, dip or sharp curve. Creating bumps, dips, and sharp curves is often precisely the result of many of the traffic calming tools. While these maneuvers will cause moderate discomfort and delay for normal passenger vehicles, they cause a much greater problem for emergency vehicles. The time required to respond to medical emergencies or building fires by emergency personnel and apparatus has a significant influence on the outcome of the event. In cardiac arrest cases, literally seconds count in the patient's chance of survival. From the moment of collapse, the likelihood for recovery diminishes by 10% for each minute which passes. Likewise, in their early stages, fires grow at a geometric rate. Minutes could mean the difference between a small fire easily contained and a fire causing major property loss and possible injury or death. For these reasons, the City's Fire Services Division is concerned with any physical action which would force delay upon responding emergency vehicles.

### **Diverting the "Problem" Traffic to Another Neighborhood Street**

Another concern has been the realization that in many instances implementing traffic calming tools would be likely to move the problem rather than solve the problem. In virtually all instances, the traffic being controlled by physical traffic calming tools will not disappear or make major changes in its travel patterns. In most instances the placing of impediments on a particular neighborhood street will merely divert some or all of that traffic to other neighborhood streets.

### **Everyone is Inconvenienced**

Enforcement and education efforts aimed at controlling speeds or influencing driver behavior impact primarily the irresponsible drivers - usually a relatively small percentage of the driving population. On the other hand, physical traffic calming measures create delay and inconvenience for all drivers using the particular street.

## **Benefits Sometimes Very Localized**

While speed humps are generally very effective in reducing speed in the immediate vicinity of the humps, they often result in higher speeds between the humps as drivers try to “make up” for the delay at the humps. Consequently, while using the speed humps to lower the average speed, it is likely that the top speeds on the street will increase. This result has been clearly documented in many studies regarding the use of speed humps or non-warranted stop signs for speed control. Other Stage 2 traffic calming actions can also result in benefits near the installation but disadvantages elsewhere within a neighborhood. In the case of neighborhood intersection traffic circles, the results are often similar to speed humps with drivers traveling at higher velocity between the circles to “make up” the lost time. Actions such as diverters, barriers, and medians can often improve the situation where the traffic movement has been prohibited but can significantly worsen the problems to the streets where the traffic has been diverted.

## **Actions can be Significant for Certain Types of Vehicles**

Speed humps can significantly increase the cost of maintaining heavy vehicles. While not readily quantifiable, this is an important consideration related to the maintenance cost for fire engines, refuse trucks, etc. This is an especially serious concern for vehicles which will confront the traffic calming actions on a continual or repeated basis.

## **Impacts on Parking and Other Road Users**

Bicyclists, pedestrians and any other road user can encounter problems with physical traffic calming measures. All measures are designed to be acceptably safe for all users, assuming that these users are attentive as they proceed down the street. Speed humps and traffic circles, for example, are two of the most popular traffic calming measures. Bicyclists can traverse speed humps at typical cycling speeds without slowing down. However, if the bicyclist is careless (e.g., riding with no hands, not watching the road, no lights at night, etc.), the bicyclist might unexpectedly encounter a hump and be caught off balance. Where lanes are narrowed, bicyclists and drivers usually must share the lane, possibly becoming a problem if traffic volumes are moderate to high. Traffic circles force drivers to the right at intersections, toward (but not into) the crosswalks, and pedestrians sometimes feel that their safety is being compromised. Residents who are used to parking in front of their homes on the street may also be impacted, as some measures require the prohibition of on-street parking. These disadvantages for various user groups need to be considered along with the recognized benefits of overall traffic speed and volume reduction that result from a traffic calming project.

## Visual Impacts, Noise Impacts and Aesthetic Concerns

While some traffic calming devices can have favorable aesthetic impacts, others can be, by their nature, unsightly. Actions such as speed humps and diverters most often pose no opportunity for the incorporation of aesthetics and can certainly have negative visual impacts. Additionally, virtually all Stage 2 traffic calming devices require reflective devices, signs and striping which negatively effect the aesthetics of a neighborhood.

Since these devices are intended to pose obstacles to cars, they must be very well signed, marked and lit in order to minimize potential safety problems and potential liability exposure. While the signing, marking and lighting are clearly justified for those reasons, they certainly negatively impact neighborhood aesthetics.

Noise in the area of traffic calming devices, such as speed humps, can increase due to the deceleration and acceleration of vehicles. There is also usually noise created by the vehicle traversing a speed hump.

The City considers the balance of the Traffic Calming pros and cons and recognizes that there are situations where the benefits of traffic calming outweigh the disadvantages. With each individual Neighborhood Traffic Calming Study that is conducted, City staff and residents must carefully weigh these advantages and disadvantages of each Traffic Calming action.

