

# **ALAMEDA COUNTY NEIGHBORHOOD TRAFFIC CALMING PROGRAM**

ADOPTED BY THE ALAMEDA COUNTY BOARD OF SUPERVISORS  
July 2001 - June 2004

**ALAMEDA COUNTY  
NEIGHBORHOOD TRAFFIC CALMING PROGRAM**

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## I. Introduction

*The Alameda County Neighborhood Traffic Calming Program*, a set of traffic calming guidelines for local and collector roadways, employs traffic engineering practices, neighborhood involvement, education, and physical measures to help relieve the negative impact of vehicles on residential neighborhoods. This program attempts to address residential neighborhood impacts such as motorists driving above the posted speed limit or using residential roadways as a bypass to more congested major routes.

Alameda County frequently receives requests from residents to address traffic issues related to excessive speed, bypass traffic and other safety concerns on their residential roadways. In response to these requests, Public Works Traffic Engineering staff conducts traffic studies and makes recommendations for measures to address these traffic concerns. Depending on the roadway conditions and traffic characteristics, either the installation of a traffic control device or increased enforcement of existing laws will often mitigate the traffic safety concern.

When residents feel that the recommended traffic control devices or the level of enforcement are not adequate to address their traffic concerns, other measures may be requested to reduce motorist speeds or vehicle volumes in their neighborhoods. These requests typically include all-way STOP controls or speed bumps. Neither all-way STOP controls nor speed bumps are well suited for addressing many typical residential traffic concerns; STOP controls because they are ineffective for speed or volume control, speed bumps because they create safety concerns and potential damage to vehicles at desirable roadway speeds.

The purpose of STOP control is for assignment of right-of-way; the process for the appropriate installation of intersection STOP control is by a Traffic Engineering assessment for safety and operations. Residents may request the County to evaluate the need for STOP control or other traffic control devices, such as YIELD, traffic signals, and turning movement restrictions. (See page 39 for a listing of traffic control devices) The County will provide an evaluation and recommend appropriate actions needed at the intersection.

As an alternative to all-way STOP controls and speed bumps, alternatives have been utilized to address residential roadway traffic issues. These alternatives are commonly referred to as traffic calming measures. Their application and implementation on Alameda County roadways is consistently evaluated by the Public Work Agency's Traffic Engineering Section as part of the *Alameda County Neighborhood Traffic Calming Program*.

Traffic calming, as implemented in this program, is not intended for arterial or major collector roadways, even though these roadways may be within residential areas. Among the reasons for not including roadways of these classifications are the necessity for mobility on these roadways, the impacts to emergency response times, and maintenance of the community roadway network and the negative impacts of transferring bypass traffic and commercial vehicles onto other local residential roadways.

Public safety must be the priority before any traffic calming measure can be considered for implementation. The implementation of traffic calming measures is divided into four "levels." The levels start with passive measures and gradually increase to more physically restrictive vehicle control measures. The level of traffic calming measures depends on roadway conditions, traffic characteristics, impacts to the surrounding neighborhood, emergency service impacts, and the degree of effectiveness.

## II. Objectives

The program described herein applies only to local and minor collector residential roadways. This is because the sensitivity to maintain the character of these roadways, and because the primary function of these types of roadways is for property access rather than to accommodate larger volumes of through (bypass) traffic in a free-flowing manner.

The following objectives for residential roadways have been identified for *the Alameda County Neighborhood Traffic Calming Program*:

1. Increase motorist awareness of the residential character of the neighborhood
2. Reduce motorist speed
3. Discourage bypass traffic on local and minor collector roadways
4. Reduce traffic collisions
5. Promote a pleasant environment for pedestrians, bicyclists, and non-motorized roadway users
6. Improve community awareness in residential neighborhoods
7. Maintain Emergency Service response time

In addition, the following are auxiliary objectives of the program:

1. Involve local residents in developing the traffic calming program for their neighborhood
2. Provide a step process, which is streamlined and well-defined, to address residents' requests for traffic calming measures.
3. Establish consistent screening criteria for implementing traffic calming measures where applicable.
4. Establish design guidelines for installing traffic calming measures.
5. Provide for prioritized, cost effective implementation of traffic calming devices.

### III. Step Process

The process for developing and implementing traffic calming measures in a neighborhood involves the participation of the community and governmental entities including Public Works Agency, Community Development Agency, CHP, and the Sheriffs and Fire Departments. The following steps are included in the process for implementing traffic calming measures (the responsible party for each step is identified by *italics*):

1. Define the neighborhood in terms of surrounding roadway network, circulation boundaries, and connections to arterial and collector roadways. (*Public Works and the neighborhood*)
2. Determine the level of community support for the Neighborhood Traffic Calming Program (generally in the form of a petition letter from residents and property owners representing 2/3 of the neighborhood's properties). (*Public Works and the neighborhood*)
3. Discuss the Neighborhood Traffic Calming Program with residents and/or property owners to identify traffic issues and determine objectives for the neighborhood. (*Public Works and the neighborhood*)
4. Study traffic conditions (traffic volumes, motorist speed, on-street parking demands, typical travel routes, emergency service, etc.) and identify types of measures that may be applicable and effective in achieving neighborhood objectives. (*Public Works*)
5. Develop a preliminary implementation plan of traffic calming measures and alternatives and present to the neighborhood. (*Public Works*)
6. Negotiate an implementation plan with neighborhood residents and specific affected property owners. (*Public Works and the neighborhood*)
7. Revise implementation plan to assimilate comments from the neighborhood and commitments obtained from affected property owners and/or residents, if necessary. (*Public Works*)
8. Negotiate appropriate financial participation from the neighborhood, if necessary. (*Public Works and the neighborhood*)
9. Implement traffic calming measures including any necessary design and construction. (*Public Works*)
10. Perform follow-up evaluation of whether neighborhood objectives were met. (*Public Works*)
11. Repeat steps 5 through 10 if necessary.

When a physical traffic calming measure is approved, installation of the device will be installed after all appropriate steps are completed (environmental review, preparation of plans and specifications, construction, and inspection).

#### **IV. Guidelines for Construction**

As part of the process in developing the design guidelines for *the Neighborhood Traffic Calming Program*, applicable roadway safety criteria from the following design manuals were considered:

- AASHTO (American Association of State Highway and Transportation Officials) - **A Policy on Geometric Design of Highways and Streets**
- Caltrans - **Highway Design & Traffic Manuals**
- FHWA (Federal Highways Administration) - **Manual on Uniform Traffic Control Devices**
- ITE (Institute of Transportation Engineers) Design Criteria
- ACPWA (Alameda County Public Works Agency) Design Guidelines

The following are construction guidelines for the program:

1. A step process will be used to apply traffic calming measures in communities.
2. The device must be located on relatively straight, level roadway sections (i.e. tangents to horizontal and vertical curves)
3. Proximity to intersections
4. For speed humps, the roadway must have a gradient of less than five percent (5%) for a minimum of 230 m (750 feet) between intersections in the traffic calming area. Road humps may be used on roadways up to eight percent (8%). The minimum roadway section length may be increased for vehicle control considerations for steep grades adjacent to the roadway section under consideration. The roadway should have a minimum curb to curb or pavement width (unimproved shoulder) of 7.3 m (24 feet) or a maximum of 12.2 m (40 feet).
5. Roadway illumination is required at the traffic calming device
6. Devices, must be installed entirely within the County's right-of-way
7. Devices must avoid conflicts with existing infrastructure: utilities, storm-drain facilities including gutter flow, landscaping and driveways
8. Landscaping ownership and associated maintenance responsibilities must be agreed to by the adjacent property owners
9. Community financial participation may be required for:
  - right-of-way dedication (if necessary for the traffic calming device)
  - sidewalk, curb, and gutter installation and replacement (if necessary)
  - storm drain/utility relocation landscaping installation and maintenance

**V. Prioritization (Screening) Criteria**

The eligibility of residential roadways for the traffic calming pilot program will be determined by the following criteria:

1. Roadway should have a functional classification of a local or minor collector roadway. Classifications have been established with Caltrans and FHWA.
2. ADT (Average Daily Traffic)  
maximum volumes on local roadways: < 1,500 vehicles per day (vpd). maximum volumes on collector roadways: < 3,000 vpd.
3. The posted speed limit must be not more than 30mph.
4. The Critical (85' percentile) Speed must be a minimum of 10 miles per hour (mph) above the posted speed limit (typically 25 mph) for speed humps.
5. Collision rates on the roadway should exceed Caltrans (District 4, Statewide, and countywide) figures.
6. Lack of adequate vehicle gaps for pedestrian crossing.
7. Roadways must have adequate width or shoulder area.
8. An assessment of existing roadway facilities will be conducted, and additional consideration will be given to those roadways which have Portland Cement Concrete (PCC) curb, gutter and sidewalk. Existing roadway facilities that are on designated suggested routes to school, or are near parks, community centers, senior housing, retail establishments or other pedestrian generators will also be given special consideration even if PCC curb, gutter, and/or sidewalk improvements do not exist.

Roadways should be of residential character.

**VI. Constraints, Guidelines, and Factors Affecting Design**

1. Enforcement efforts and traditional traffic engineering practices alone do not effectively modify motorist driving behavior
2. Bypass traffic avoiding designated collector or arterial roadways by using local roadways
3. Access for pedestrians, bicyclists, and other non-motorized users
4. Preserving emergency vehicle access
5. Access for buses (AC Transit, Paratransit), trash collection, moving vans, and construction (private and public) equipment
6. The effect of the device upon street sweeping operations
7. Potential loss of on-street parking
8. Diversion of traffic to other nearby residential local and collector roadways
9. Increase in or concentration of noise levels due to the traffic calming device
10. Potential changes to community character (street lighting, loss of on-street parking, signage, and roadway surface and alignment)
11. Sight distance obstructions related to landscaping, fences, roadway alignment, etc. Appropriate recovery-area spacing between devices
12. The proximity to other calmed areas and intersections
13. Acceptance of property owners on adjoining and parallel roadways
14. Availability of funding for the installation of traffic calming measures

Timing of proposed improvements with respect to the on-going resurfacing program



## **VII. TYPICAL TRAFFIC CALMING MEASURES**

The following traffic calming measures outline the different levels of traffic calming and the required approval process for each designated level. These traffic calming measures can be implemented individually or in combination. However, not all measures will be feasible or acceptable in all locations.

This section defines each level in the order of implementation of traffic calming measures. It also serves as a guide in the decision-making process for determining the best possible treatment for specific traffic issues within a community.

### **Level 1 Traffic Calming:**

Requires no physical roadway modifications.

Approval authority: Traffic Engineering

- Roadway Centerline
- Speed Enforcement
- Neighborhood Speed Watch Program
- Residential Neighborhood Gateway
- Street Trees

### **Level 2 Traffic Calming:**

Requires minor physical roadway modifications (e.g., raised ceramic tiles, painted legends, striping).

Approval authority: Traffic Engineering with District Supervisor's Chief of Staff

- Rumble Strips
- Highlighted Pedestrian Crossings

### **Level 3 Traffic Calming:**

Requires major physical roadway modifications (e.g., extension of curb lane into roadway, uneven roadway surface).

Approval authority: Director of Public Works and District Supervisor

- Bulb-outs
- Chicanes
- Single-lane Slow Points
- Road Humps
- Speed Humps
- Raised Crosswalks
- Roundabouts

### **Level 4 Traffic Calming:**

Measures physically prohibit vehicular travel to a certain degree (e.g., detours to parallel routes). These are not applicable on collector roadways.

Approval authority: Board of Supervisors Resolution

- Diverters/Forced Turn Channelization
- Half (one-way) Roadway Closure
- Full Roadway Closure

# LEVEL 1 TRAFFIC CALMING

Approval Authority: County Engineer/Traffic Engineering

## **ROADWAY CENTERLINE**

(Level 1 *Traffic Calming*)

### **DESCRIPTION**

Removing the roadway centerline striping "softens" the appearance of a roadway, altering motorist perception, and creating a more residential and local visual character for the roadway. With the elimination of centerline delineation, motorists tend to drive closer to the center of the roadway, sharing lanes with opposing traffic and creating roadside area for pedestrians and on-street parking.

Typically, centerline striping is installed on roadways with horizontal and vertical curves in order to separate motorists to improve traffic safety. Unfortunately, striping provides motorists with a sense of security of the travel lane, as well as, delineates major travel thoroughfares for those looking for "shortcuts."

By removing centerlines where not needed for safety, several neighborhood benefits may be achieved:

- Eliminates roadway visual identification as a bypass routes
- Creates the appearance of a minor residential roadway
- Allows motorists to drive towards the center of the roadway
- Reduces the potential for hit-parked-vehicle type collisions thereby encouraging residents to park on the roadway and not on the sidewalk area providing improved access and safety for pedestrians
- Typically reduces motorist speeds by eliminating clearly defined travel lanes, creating a shared roadway

Centerlines will remain where necessary to guide motorists around horizontal or vertical curves. While this traffic calming measure may lose its effectiveness to everyday users over time, its impact should be effective on occasional users.

### **IMPLEMENTATION GUIDELINES**

The County is currently implementing this measure as a part of the on-going pavement maintenance program (slurry seal, chip seal, overlay, and reconstruction projects.) Rather than removing striping for specific roadways, it may be better to wait for a pavement rehab project or reschedule pavement rehab to include the subject roadway.

## **SPEED ENFORCEMENT**

*(Level 1 Traffic Calming)*

### **DESCRIPTION**

Enforcement is tool that deters motorist from driving behavior that violates existing regulations for parking, driving maneuvers, and excessive speed. Enforcement of posted speed limits may be done by "selective enforcement" by the California Highway Patrol (CHP). Speed enforcement includes passive methods such as the use of a trailer that measures and displays the speed of motorists, but also includes the visual presence of CHP patrol and radar speed enforcement. Selective enforcement is most effective when done in conjunction with the neighborhood speed watch program.

Speed enforcement is effective in creating a heightened visual awareness of motorist speed in neighborhood areas. An additional impact of enforcement is the imposition of penalties upon driving behavior that may create unsafe roadway conditions. Radar enforcement requires compliance with the requirements of the California Vehicle Code and approval and support of the Board of Supervisors and the CHP.

### **IMPLEMENTATION GUIDELINES**

Selective enforcement is implemented with the cooperation of the CHP as the enforcement agency: radar speed enforcement can only be implemented where concurrence and commitment from the CHP can be obtained.

## **NEIGHBORHOOD SPEED WATCH PROGRAM**

*(Level 1 Traffic Calming)*

### **DESCRIPTION**

The speed watch is an educational program which requires the involvement and commitment from the neighborhood. Our experience indicates that the majority of motorists who drive above the posted speed limit live in the area. As part of the Speed watch program, neighborhood residents will receive a "Drive 25" flyer informing them about traffic issues in their community and the need for their participation to relieve the concerns. Thus, this approach targets the primary offenders.

Neighborhood participation includes the following:

- Identify motorists who drive at excessive speeds - vehicle type, color, license plate, time of day, etc. This information will be forwarded to the CHP for follow-up which may include selective enforcement at the specified times or a visit to the residence of the owner of the identified vehicle.
- Observe Public Works staff collecting speed data using radar equipment. Radar equipment may be loaned to residents to assist in speeding motorist identification.
- Promotes neighborhood involvement to address traffic issues (excessive speed as well as other community concerns)

This program can be very effective and efficient since it heightens motorist awareness of driving behavior and its impact on the residents; it also provides the CHP with specific times for selective enforcement, and requires a joint effort from the community to regain control of its roadways.

### **IMPLEMENTATION**

This is a **mandatory** level one measure for the Neighborhood Traffic Calming program. An example of the flyer is shown on the next page. Public Works will collect data, prepare the flyer, and send it out to the identified "neighborhood." This will be one opportunity to have the block captains or neighborhood leaders observe in the field data collection and the use of radar equipment.

## **RESIDENTIAL NEIGHBORHOOD GATEWAY** (Level 1 *Traffic Calming*)

### **DESCRIPTION**

Converting the entrance of a residential area into a neighborhood gateway. This can be done by means of an entry structure or signing in conjunction with other aesthetic features to emphasize the residential neighborhood. Gateways are typically constructed by newer large residential development projects to identify the development community.

Typically, motorists frustrated by congestion on major arterial and collector roadways will seek shortcuts or less congested routes. By providing high quality gateway features at the entrance to a residential neighborhood, some bypass traffic may be discouraged. In addition, gateways may improve the identity of the neighborhood generating more community involvement to preserve neighborhood character.

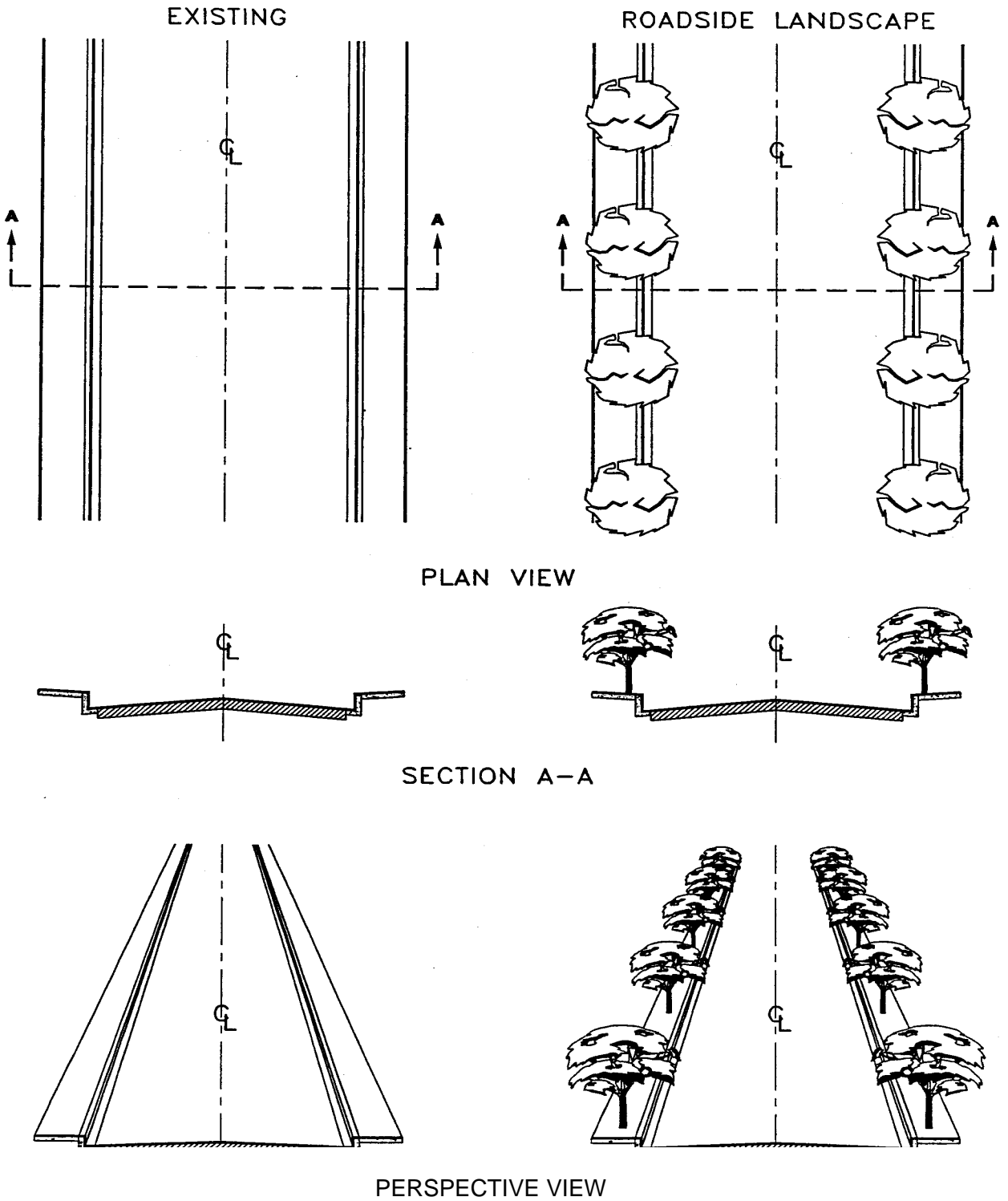
Some of the negative effects of this traffic calming measure may include the potential for vandalism and the cost to provide a high quality entry feature. Typically, entry structures would be installed on private property.

### **IMPLEMENTATION**

Gateways would be installed at a natural entry to a residential neighborhood, especially where the neighborhood boundary changes in character (i.e. from a rural or commercial area to a residential area). The design of the gateway should be a high-quality design that reflects the character of the residential neighborhood.

Implementation will typically require the use of private property; the cooperation and concurrence of the property owner will be required and cannot be assured. Maintenance of the gateway would be the responsibility of the neighborhood.

# STREET TREES



## **STREET TREES** (Level 1 *Traffic Calming*)

### **DESCRIPTION**

Install street trees behind the sidewalk or pedestrian pathway along the length of the roadway. This traffic calming measure attempts to narrow the visual corridor of the roadway. Narrowing the visual corridor may influence motorists to drive more cautiously (hopefully slower) because of the apparent reduction of the "shy" distance along the roadway. Without street trees, the visual corridor may be defined in part by the front of houses. By adding street trees, the visual corridor becomes defined by the tree canopies which are closer to the roadway.

Street trees provide several community advantages as well as inconveniences:

- Narrows the visual corridor along the roadway influencing motorists to drive more cautiously.
- Improves the aesthetic character of the community.
- Provides a buffer between the roadway and residences.
- Trees may take time to mature in order to provide the desired effect.
- There is a maintenance responsibility for the tree assumed by the property owners.
- The potential for uplifting of the sidewalk is increased.
- There is a potential for an increase of safety and liability issues

### **IMPLEMENTATION**

Implementation of this traffic calming measure requires the cooperation and support of the property owners along the roadway since street trees will be the responsibility of the property owner. However, street trees will not be needed at every property to get the desired effect of narrowing the visual corridor - however, more street trees improve the residential character of the neighborhood.

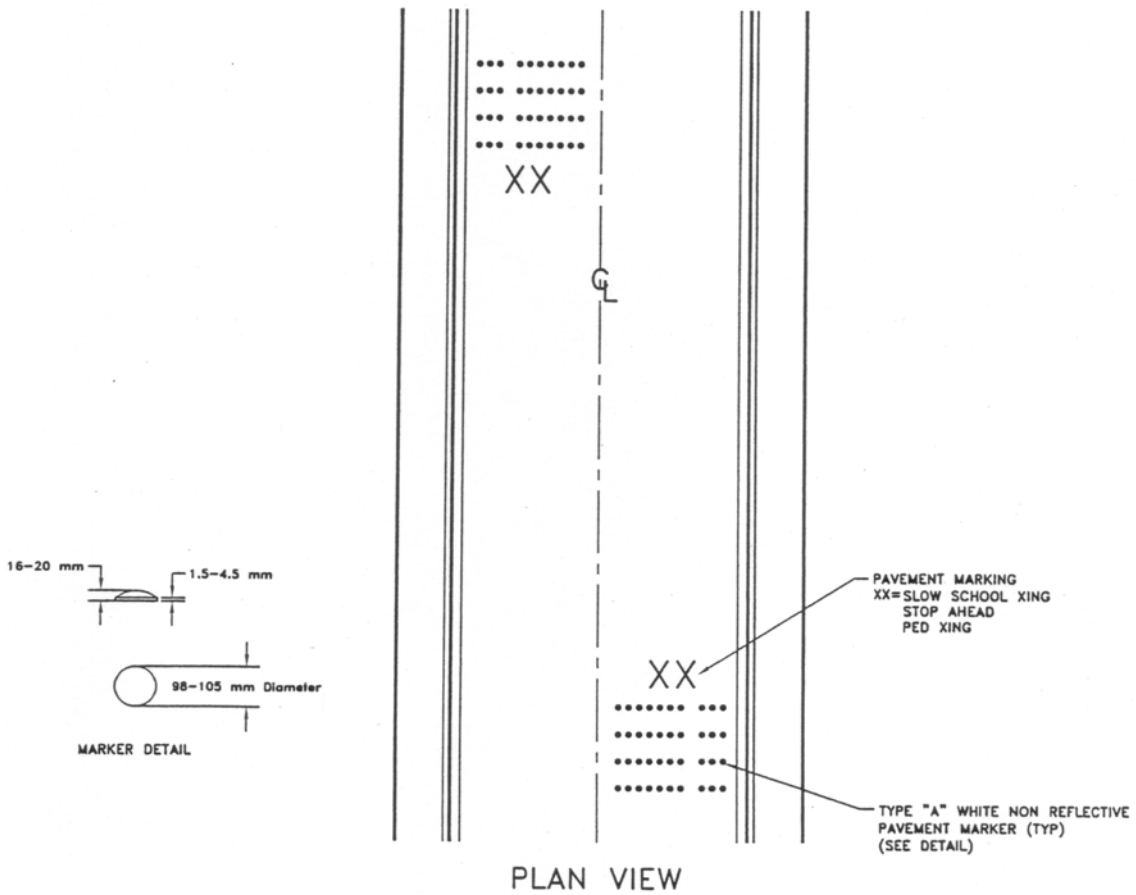
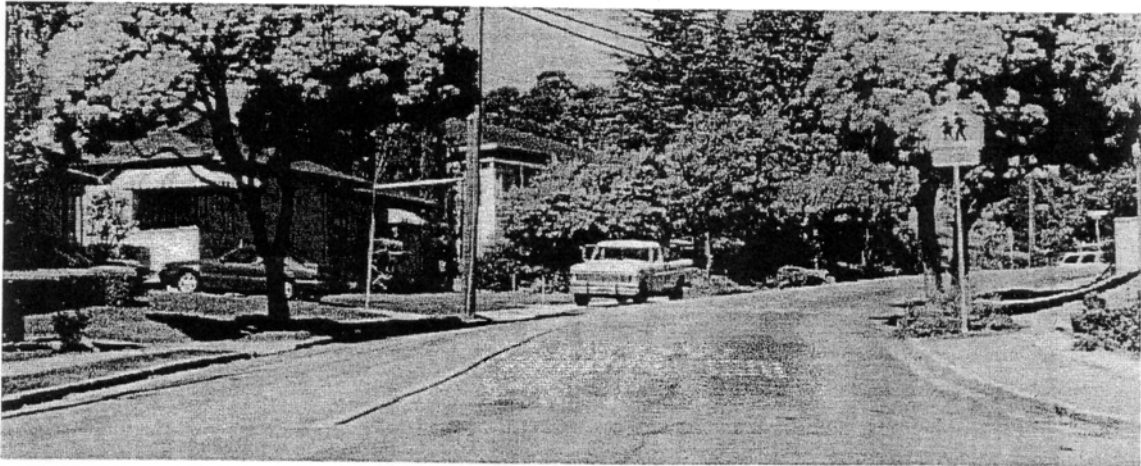
The County occasionally receives grants for street trees. However, if trees are not available from the County, other sources of street trees will need to be identified.



# LEVEL 2 *TRAFFIC CALMING*

Approval Authority:  
County Engineer or Traffic Engineer with District Supervisor's Chief of Staff

# RUMBLE STRIP



## **RUMBLE STRIPS** (Level 2 *Traffic Calming*)

### **DESCRIPTION**

Rumble strips consist of a pattern of raised ceramic pavement markers applied to the pavement to alert motorists of a change in roadway conditions ahead. They transmit vibration and sound to the motorists which refocuses attention back to the roadway.

There are two primary uses of rumble strips as a traffic calming measure:

1. Rumble strips can provide advance warning of a change in neighborhood characteristics ahead. For instance, it can be used in conjunction with gateway treatments, centerline changes, street tree treatments, [etc. to](#) alert motorists that they are entering an area where they should drive with caution.
2. Rumble strips can also. create an area with an uncomfortable roadway surface which may influence motorists to drive slower.

Some of the issues regarding rumble strips include the following:

- The noise and vibration created by the rumble strips affects the adjacent residences.
- Bicyclists and motorcyclists may have experience difficulty riding over the ceramic markers.
- Motorists tend to swerve to avoid driving over the rumble strips.
- Influence on motorists speed may be minimal or site specific.

### **IMPLEMENTATION**

Rumble strips can be installed to emphasize traffic calming measures or other unexpected roadway conditions. However, due to the noise and vibration created by rumble strips, written concurrence from the adjacent property owner will be required prior to installing rumble strips.

## **HIGHLIGHTED PEDESTRIAN CROSSINGS**

*(Level 2 Traffic Calming)*

### **DESCRIPTION**

The primary function of pedestrian crosswalks is to concentrate pedestrians at a single crossing location, most desirably at intersections. Pedestrian crossings can be highlighted in order to accentuate the visibility of the crossing to motorists. Measures to incorporate this include using materials other than standard asphalt concrete (AC) such as textured concrete, raising the crossing above the roadway grade, or adding additional pavement markings (paint) within the existing crossing (additional pavement markings could be considered a Level 1 traffic calming measure.)

As a part of the annual pavement rehab program (slurry seal, chip seal, etc.) throughout the County, crosswalks that do not congregate pedestrians to a centralized crossing will be recommended for removal. Typically, pedestrians develop a false sense of security at crosswalks and tend to enter the roadway without looking for approaching vehicles. However, where crosswalks are appropriate, measures can be taken to emphasize the crossings.

A textured surface project would be a Level 2 traffic calming measure. The type of material selected would determine the effectiveness of this measure. Care must be taken to select a design that increases visibility and does not create tripping conditions such as cracks or raised asphalt "lips." Although the expected effect of highlighted crossings on motorist speed is minimal, it may increase motorists awareness of pedestrian activity in an area.

A raised crosswalk would be similar to a speed hump or other physical device and thus will be discussed with the Level 3 traffic calming measures.

### **IMPLEMENTATION**

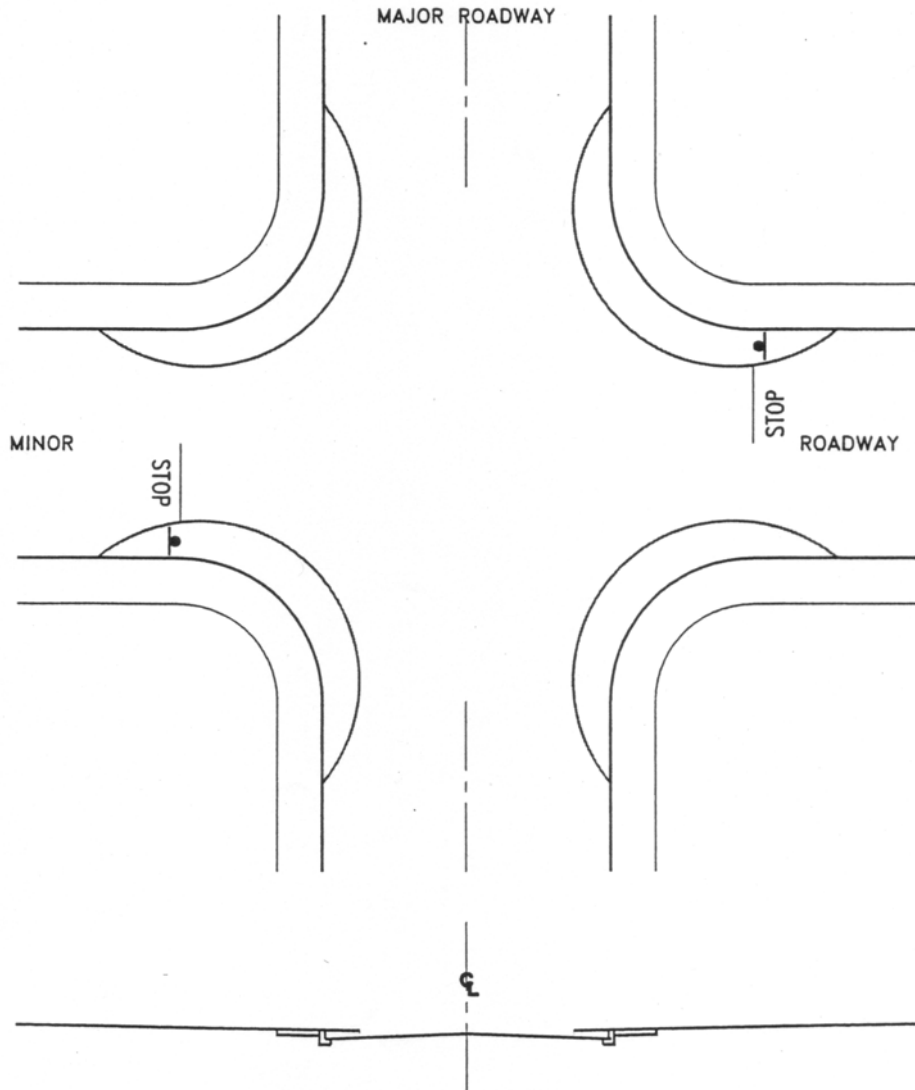
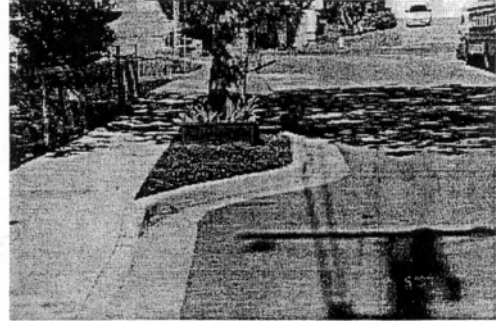
Prior to the highlighting of any crossing, the crossing must be determined to be necessary (i.e. on a safe-route-to-school, adjacent to major pedestrian generators such as commercial areas, or at locations with demonstrated conflicts between pedestrians and vehicles). Once this is determined, the type of crossing highlighting, if any, should be decided. There is a cost associated with the textured crossing along with potential noise; the additional markings may be more slippery when wet.

Highlighted crossings may also be used in conjunction with Level 3 traffic calming measures.

# LEVEL 3 *TRAFFIC CALMING*

Approval Authority:  
Director of Public Works and District Supervisor

# BULB OUT



## **BULB-OUTS**

(Level 3 *Traffic Calming*)

### **DESCRIPTION**

Bulb-outs narrow the roadway width at an intersection by modifying the curb return providing a physical constraint at an intersection which forces motorists to "slow down" in order to pass through the narrower roadway section. This measure is typically constructed at intersections, but mid-block locations may be considered.

This type of measure introduces two traffic calming concepts: physical constraints and visual traffic calming. Level 3 traffic calming involves physical constraints which produces a point speed reduction and pedestrian-friendly crossings. Point speed reductions may occur at bulb-outs, but motorist speed beyond the bulb-outs are typically either unaffected or higher than before installation. Visual traffic calming involves installing features which provide visual breaks along long sections of roadway to make the roadway appear either shorter or as a not a through route.

Bulb-outs offer several benefits to a neighborhood. These include the following:

- Visual traffic calming effect and possible point speed reduction
- Highlights intersections for motorists
- Reduces length of crossings for pedestrians
- Provides opportunities for landscaping
- No adverse effect on emergency vehicle access

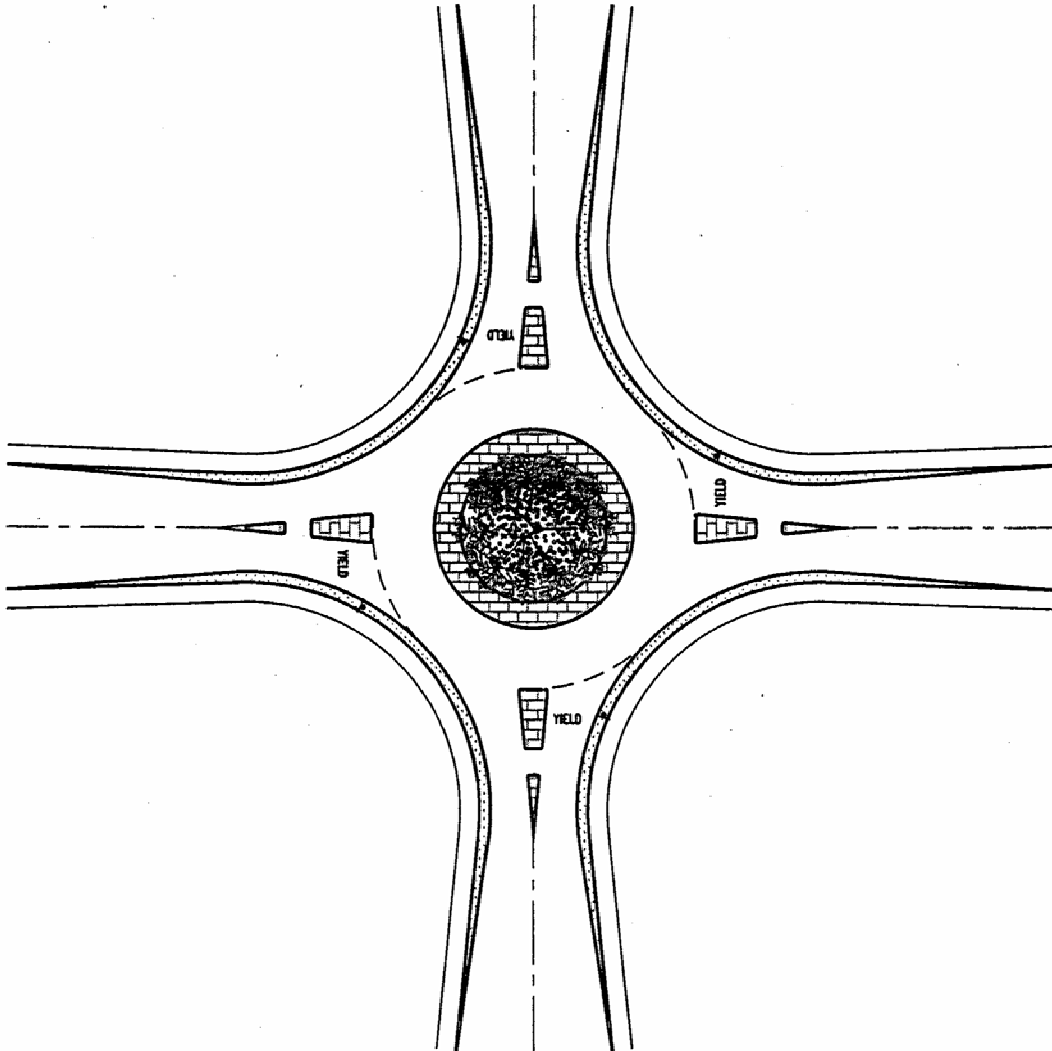
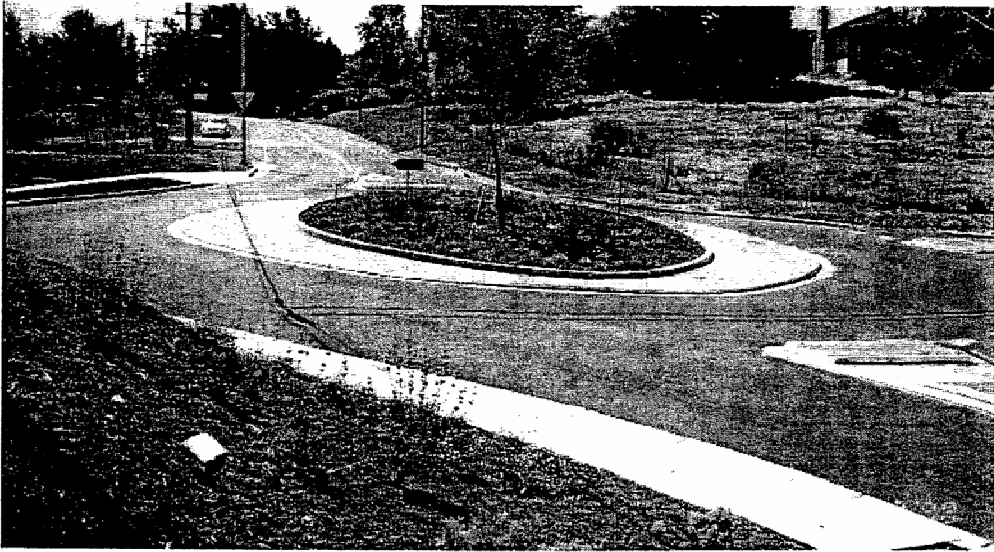
There are some design obstacles and with bulb-outs. These include the following:

- Storm drain, street lighting, sewer, and other utilities may be affected and require relocation
- Reduces available on-street parking spaces
- Forces bicyclists into the travel lane with motorized vehicles

### **IMPLEMENTATION**

Beneficial on long, straight, and flat roadway sections where visual traffic calming effects apply. Due to pedestrian benefits, consideration should be given to high pedestrian use intersections (adjacent to schools, commercial centers, etc.). Design considerations include accommodating large vehicles (fire trucks, garbage trucks, moving vans, etc.), street lighting, maintaining drainage system, allowing bicycle access, and landscaping and the associated maintenance and sight distance issue

# ROUNDAABOUT





## **ROUNDBABOUTS** (Level 3 *Traffic Calming*)

### **DESCRIPTION**

A roundabout is a landscaped circular island located in the center of a residential intersection. Traffic drives to the right of the roundabout in a counterclockwise direction for all movements (left-turn, straight, and right-turn) Right-of-way assignment with a roundabout is given to those within the circle whereas those entering the roundabout must yield.

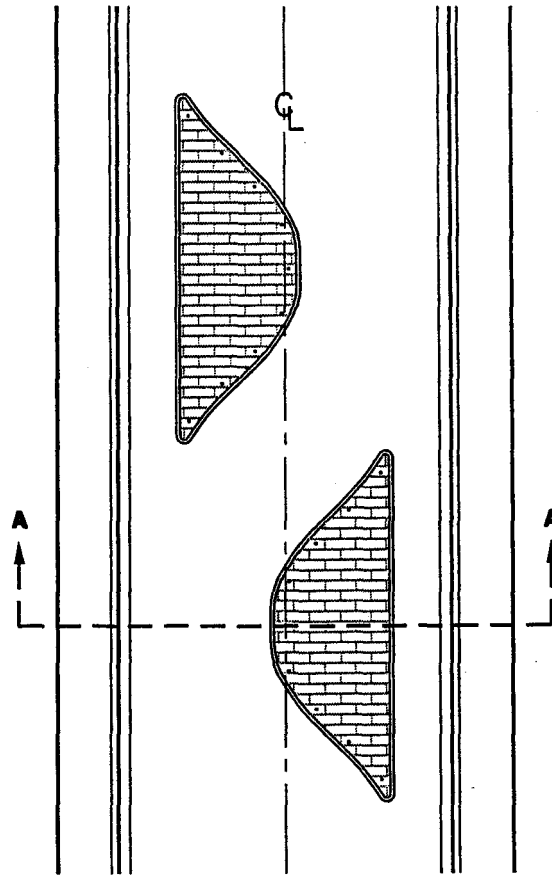
This type of measure introduces two traffic calming concepts: physical constraints and visual traffic calming. Level 3 traffic calming involves physical constraints which produces a point vehicle speed reduction. Point speed reductions may occur at the roundabout. But motorists speed beyond the roundabout are typically either unaffected or higher than before unless applied as a system of devices. Visual traffic calming involves installing features which provide visual breaks along long sections of roadway to make the roadway appear either shorter or as a not a through route. Roundabouts may also serve as gateways (see Level 1) to a community or to a system of traffic calming measures.

Roundabouts function somewhat similarly to bulb-outs except that vehicles must deviate from their path to drive past this traffic calming measure, thus impacting motorists speed more than bulb-outs. Visual traffic calming effects are greater with roundabouts than with bulb-outs. However, pedestrian accessibility with roundabouts is much more difficult and addressing vehicle access (turning radii) becomes more of an issue. Advance signing and pavement markings are usually installed for roundabouts to minimize collision potential.

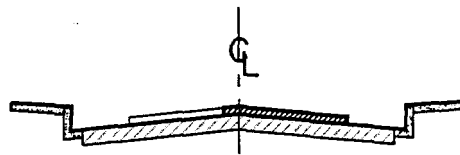
### **IMPLEMENTATION**

Roundabouts are beneficial on long, straight, and flat roadway sections where visual traffic calming effects or gateway features may apply. This traffic calming measure is not recommended along major collector roadways, at intersections with significant pedestrian activity, nor at intersections with levels-of-service C or worse due to the potential for motorists confusion. (level of service (LOS) is a measure of efficiency from a user perspective (LOS A being very efficient through LOS F, which is gridlock)). Design considerations include accommodating larger vehicles (particularly fire trucks), street lighting, landscaping, and the associated maintenance and sight distance issues.

# CHICANE



PLAN VIEW



SECTION A-A

## **CHICANES** (Level 3 *Traffic Calming*)

### **DESCRIPTION**

A chicane (shi-ka) is a two or three section curb protuberance that forces motorists to maneuver through a narrow, single or two lane angled roadway section at a midblock location. Single lane chicanes restrict two-way traffic, requiring motorists to alternate traversing the narrow one lane roadway section. Two lane chicanes (also called "tadpoles") accommodate two directional flow simultaneously.

On single lane chicanes, if one does not encounter opposing traffic, the chicane forces one to drive slowly through the traffic calming device resulting in a point reduction in speed. Motorists encountering opposing traffic may have to yield for opposing vehicles to pass before proceeding. A "tadpole" chicane would function similarly to a mid-block traffic circle.

Chicanes introduce two traffic calming concepts: physical constraints and visual traffic calming. Level 3 traffic calming involves physical constraints which produces a point speed reduction. Point speed reductions may occur at a chicane, but motorist speed beyond the chicane are typically either unaffected or higher than before installation, unless used within a -system of traffic calming measures. Visual traffic calming involves installing features which provide visual breaks along long sections of roadway to make the roadway appear either shorter or as a not a through route.

Chicanes offer several benefits to the neighborhood. These include the following:

- Visual traffic calming effect and point speed reduction
- Opportunities for landscaping
- Minimal impact to emergency vehicle access.

Design considerations and negative impacts include the following:

- Possible increase in speeds beyond the chicane
- Increased noise at the chicane
- Removal of on-street parking
- May divert traffic to other adjacent roadways
- Increased potential for motorists hitting the curb

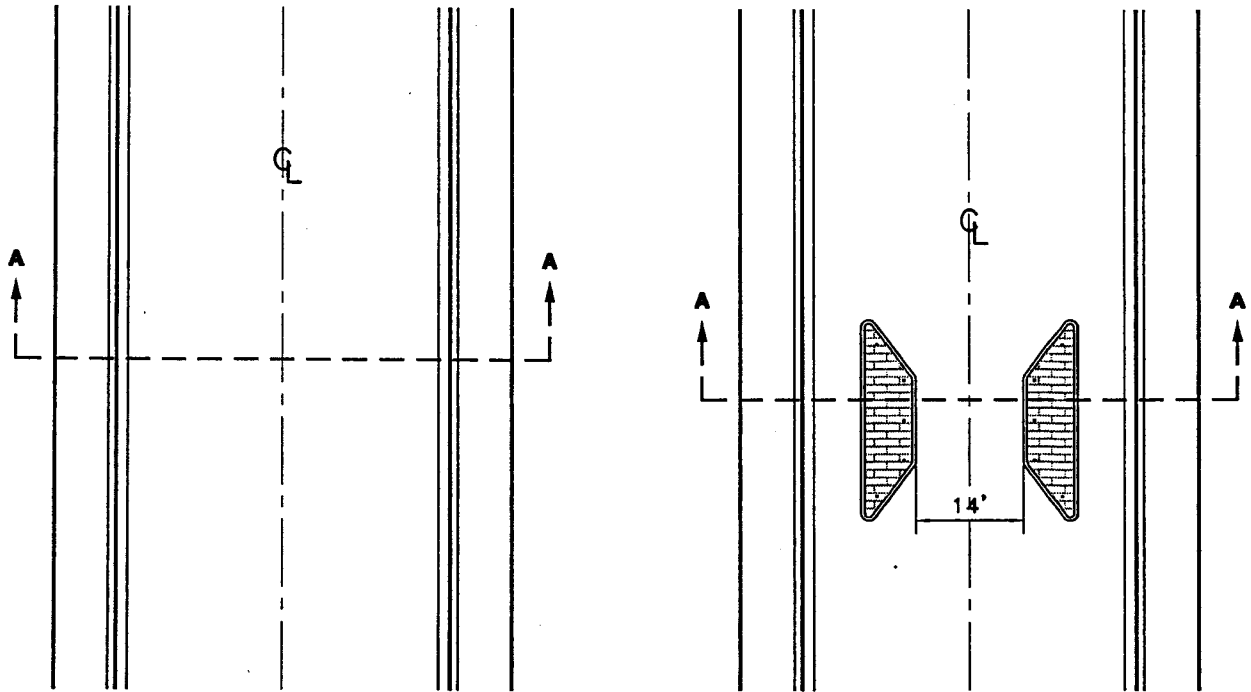
### **IMPLEMENTATION**

Beneficial on long, straight, flat roadway sections where visual traffic calming effects apply. Design considerations should include street lighting, accommodating large vehicles (fire trucks, garbage trucks, moving vans, etc.), advance signing, maintaining adequate drainage, bicycle access, landscaping, and the associated maintenance and sight distance issues.

# SINGLE LANE SLOW POINT

EXISTING

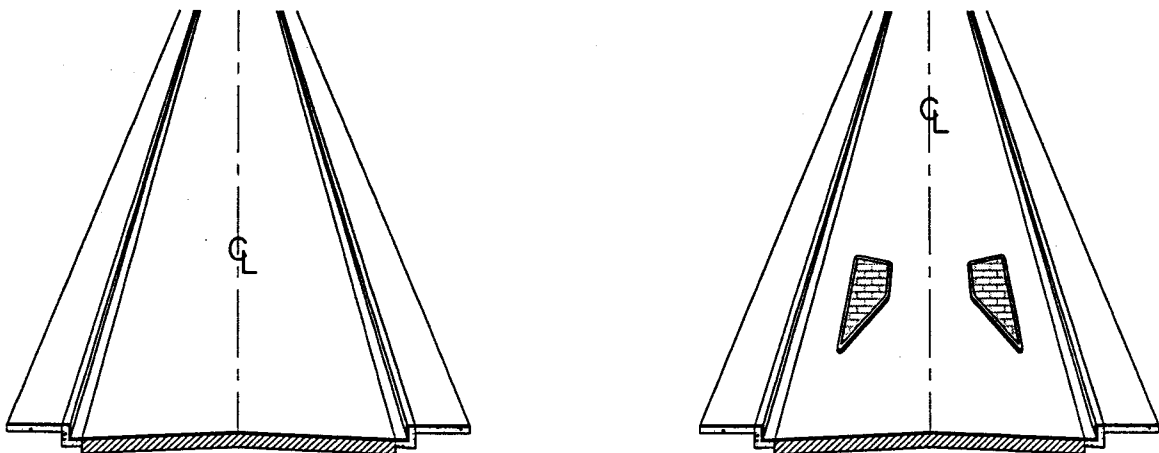
PROPOSED IMPROVEMENT



PLAN VIEW



SECTION A-A



## **SINGLE-LANE SLOW POINTS** (Level 3 *Traffic Calming*)

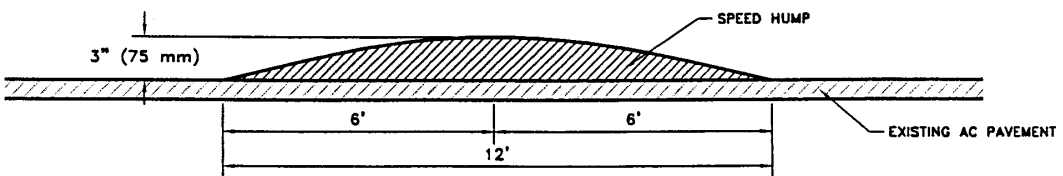
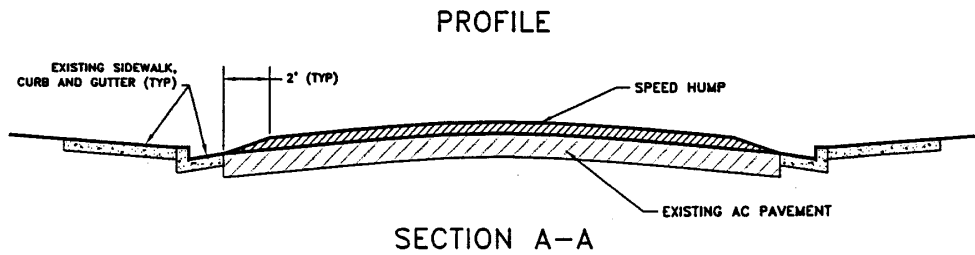
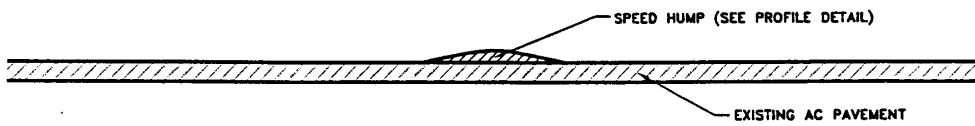
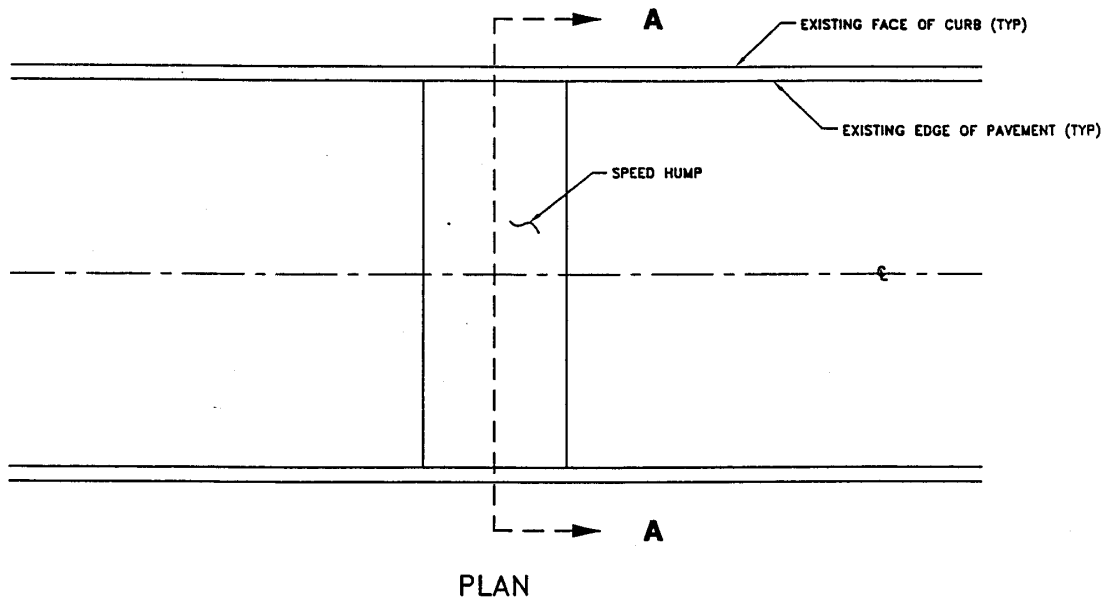
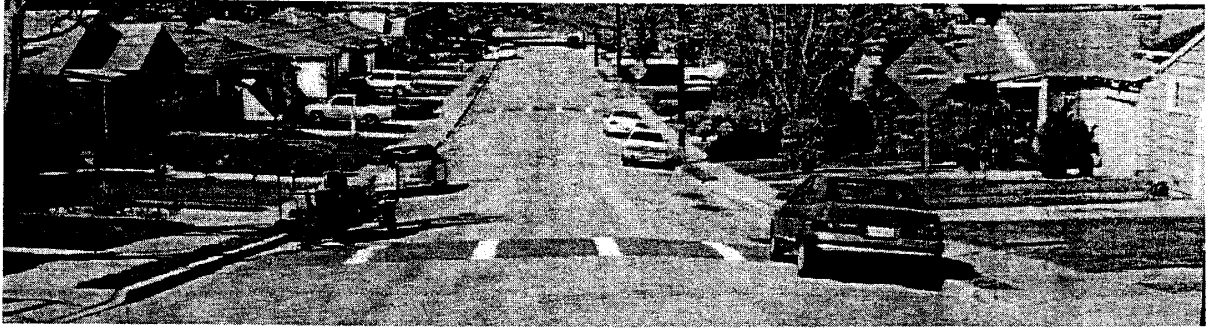
### **DESCRIPTION**

A single-lane slow point is similar to a chicane except that there is no skew or angle in the roadway reduction. It provides a narrow roadway section along the roadway centerline which allows only one vehicle to pass at any time.

### **IMPLEMENTATION**

See *Chicanes*.

# SPEED HUMP



ATHENA/TRAFFIC/TRAFFIC CALMING MANUAL/PLANS.DWG

## **SPEED HUMPS** (Level 3 *Traffic Calming*)

### **DESCRIPTION**

A speed hump is a raised pavement section which requires motorists to drive at a reduced speed over an undulation. Speed humps differ from speed bumps (typically used in parking lots) in that humps are typically 3.7 m (12 feet) long as opposed to 0.6 m (2 feet) for speed bumps. The longer length of the speed hump increases the impact to vehicles at higher speeds and is more comfortable at lower speeds. The typical height of speed humps is 75 mm (approximately 3 inches.)

Speed humps, unlike the other Level 3 traffic calming measures, provide only a physical constraint to produce a point speed reduction. While speeds will be reduced at the speed hump, motorists speed beyond the speed hump will be typically found to be unaffected or higher than before. No visual *traffic calming* benefits are achieved with speed humps.

Due to the jolt created by driving over the speed hump, traffic will be diverted to other adjacent roadways. While this diversion may benefit the roadway with the speed hump, the impact of the diversion to the entire identified neighborhood must be considered. Speed humps installed in areas without curb and gutter improvements may result in motorists driving on private property to avoid the speed hump. Fire trucks and other heavy vehicles are also affected due to the weight of the trucks. In addition, long term, everyday use of the speed hump can cause motorist frustration.

If applied correctly, speed humps can benefit a roadway:

- Reduces motorist speeds at and between speed humps if properly spaced
- Discourages bypass traffic
- Least expensive Level 3 traffic calming measure

Speed humps have several negative impacts. These include the following:

- Unfamiliar or inattentive motorists may lose control of their vehicles
- Increases emergency response times and impacts emergency vehicle equipment
- Undesired diversion of traffic to adjacent residential roadways
- No visual traffic calming effects
- Point speed reduction may have minimal impact beyond the speed hump
- Increased vehicle noise at the speed hump due to braking and acceleration
- Neighborhood aesthetics are affected by speed humps and the associated signing and pavement markings

## **SPEED HUMPS (contd.)** (Level 3 *Traffic Calming*)

### **IMPLEMENTATION**

- Impacts motorcyclists and bicyclists
- Define the "neighborhood" to identify potential affected residential roadways. If other roadways will be impacted, concurrence for the installation of the speed hump on the study roadway must be received from two-thirds of the property owners on those impacted roadways.
- Identify primary emergency response routes
- Identify AC Transit service routes
- Roadway section must be straight and flat. In flat areas with adjacent hills, primary consideration must be given to maintaining traffic safety
- Meet warrants for speed hump installation
- Provide street light at each speed hump
- Use the following guidelines for installation of speed humps vs. road humps

Residential roadways with feasible alternative routes and grades less than or equal to five percent (5%)      Install Speed Humps

Residential roadways with no feasible alternative routes and grades less than or equal to eight percent (8%)      Install Road Humps

Minor collector roadways with feasible alternative routes and grades less than or equal to five percent (5%)      Install Speed Humps

Minor collector roadways with no feasible alternative routes and grades less than or equal to eight percent (8%)      Install Road Humps



## **ROAD HUMPS** (Level 3 Traffic Calming)

### **DESCRIPTION**

Road humps are a smaller version (50 mm (2 inches) high as opposed to 75 mm (3 inches) high) of speed humps. The purpose of road humps is to alert motorists to the residential area and their driving characteristics rather than as a speed attenuator or bypass traffic deterrent.

A road hump does not provide a significant jarring sensation to a motorist. Rather, it provides a subtle disruption which may make motorists more aware of their surroundings - similar to rumble strips.

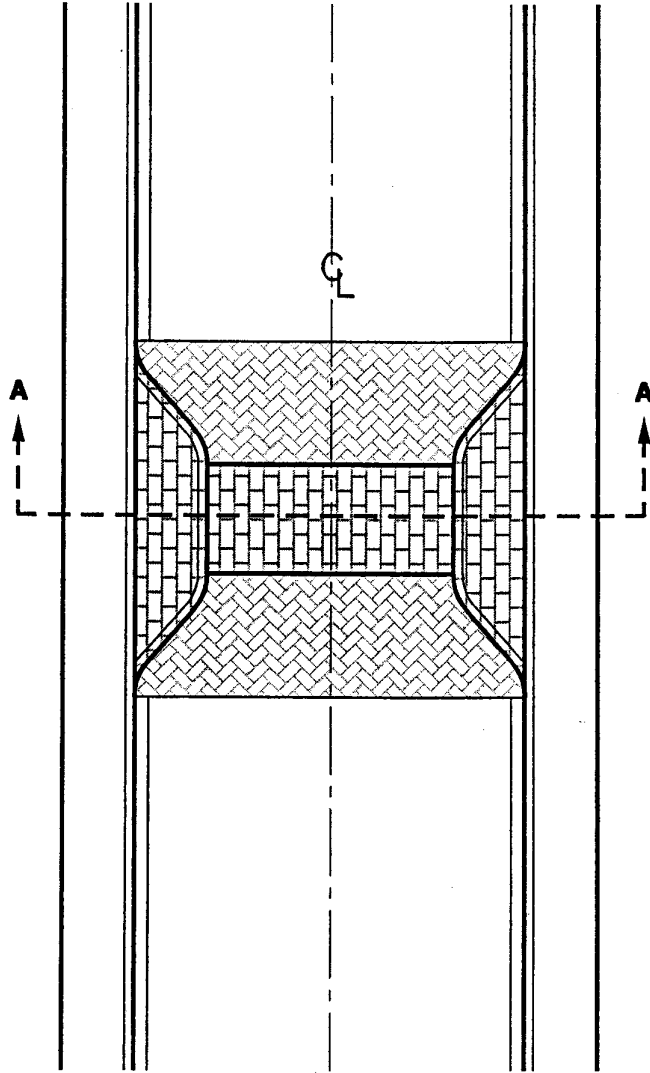
The application of road humps is similar but less restrictive than the speed hump. The applicable grades are up to eight percent (8%) and the warrant criteria requirements are not as restrictive.

### **IMPLEMENTATION**

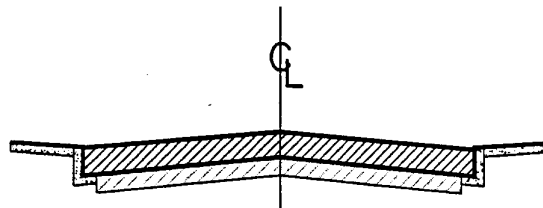
- May be applicable on roadways up to eight percent (8%) grade with less restrictive application of warrant criteria. Impact to speeds and as a bypass deterrent is minimal. However, impacts to motorist awareness may be increased
- Use the following guidelines for installation of speed humps vs. road humps

Residential roadways with feasible alternative routes and grades less than or equal to five percent (5%)	Install Speed Humps
Residential roadways with no feasible alternative routes and grades less than or equal to eight percent (8%)	Install Road Humps
Minor collector roadways with feasible alternative routes and grades less than or equal to five percent (5%)	Install Speed Humps
Minor collector roadways with no feasible alternative routes and grades less than or equal to eight percent (8%)	Install Road Humps

# RAISED CROSSWALK



PLAN VIEW



SECTION A - A

## **RAISED CROSSWALKS** (Level 3 *Traffic Calming*)

### **DESCRIPTION**

Raised crosswalks are similar to speed humps except that these are installed at intersections to elevate crosswalks. This type of traffic calming measure can be expanded to include the entire intersection (raised intersection).

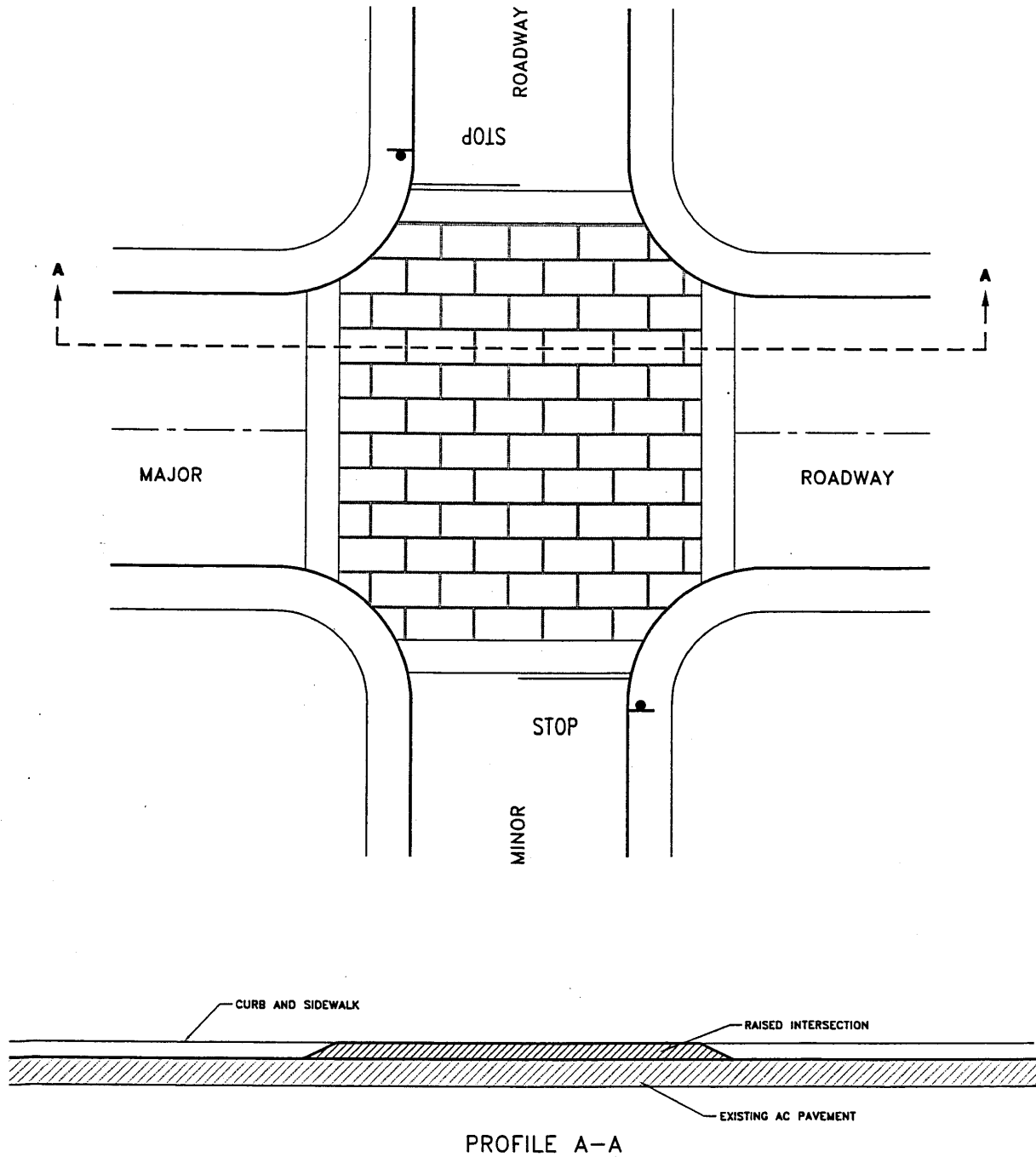
Raised Crosswalks and Intersections, due to similar vehicle and neighborhood impacts, must meet the same criteria as *Speed Humps* as well as *Highlighted Crossings*. Raised crosswalks do provide benefits to pedestrians which are not provided by the speed hump.

Raised crosswalks and intersections may be difficult and expensive to install due to drainage requirements. In addition, raised crosswalks and intersections create turning maneuver problems at intersections.

### **IMPLEMENTATION**

Must satisfy the criteria of both *Highlighted Crossings* and *Speed Humps*.

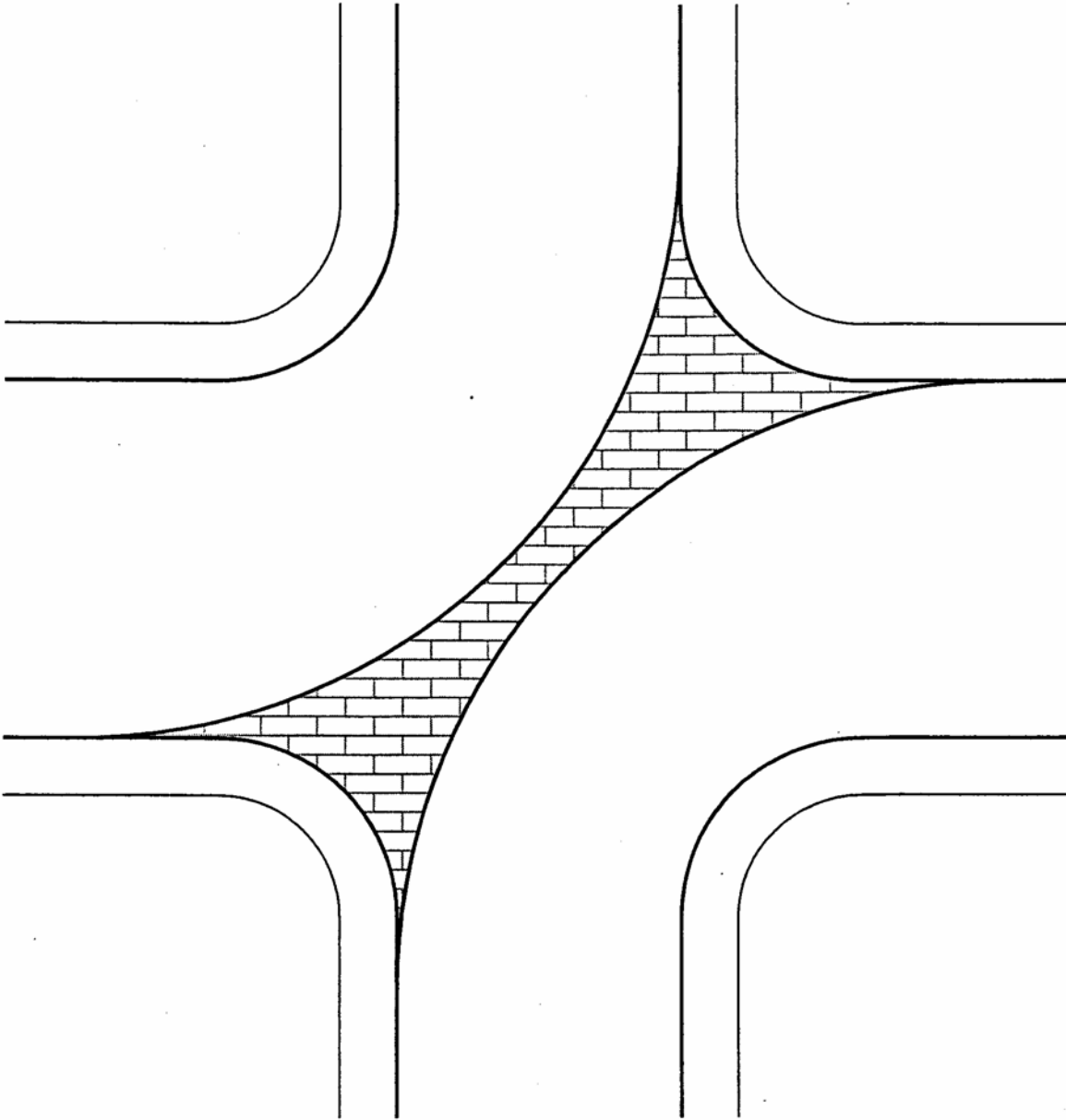
# RAISED INTERSECTION



# LEVEL 4 *TRAFFIC CALMING*

Approval Authority:  
Board of Supervisors Resolution

# DIAGONAL DIVERTER



## **DIVERTERS/FORCED TURN CHANNELIZATION**

(Level 4 *Traffic Calming*)

### **DESCRIPTION**

A diverter is a physical measure constructed diagonally across an intersection which forces traffic to turn right or left. Diverters eliminate through traffic and forces traffic onto sidestreets.

Diverters effectively reduce bypass traffic, however their effect on motorist speed depends on the length of the block. Other benefits are the improved pedestrian and motorist safety at the intersection by eliminating conflicts, areas provided for landscaping, and the maintained through access for bicycles.

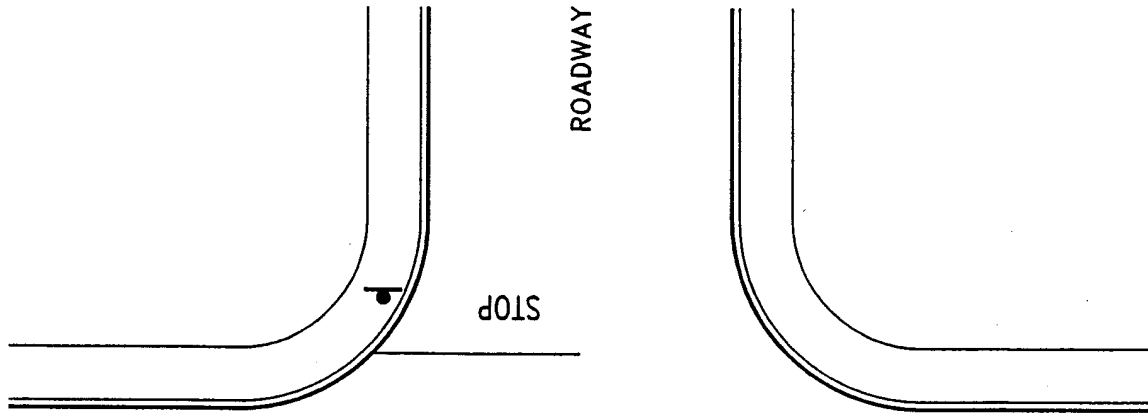
The negative aspects .of diverters are that traffic *is* diverted to other roadways and thus, creates traffic issues on other roadways. Emergency vehicle access may also be diverted, increasing emergency response. The diversion may also prove to be a great inconvenience to some residents gaining access to their property. Additionally, the installation of diverters may require the reconstruction of the entire intersection and the acquisition of right-of-way from adjacent property owners.

While diverters offer tremendous traffic calming and aesthetic benefits to a roadway, the entire neighborhood is affected by this type of traffic calming measure.

### **IMPLEMENTATION**

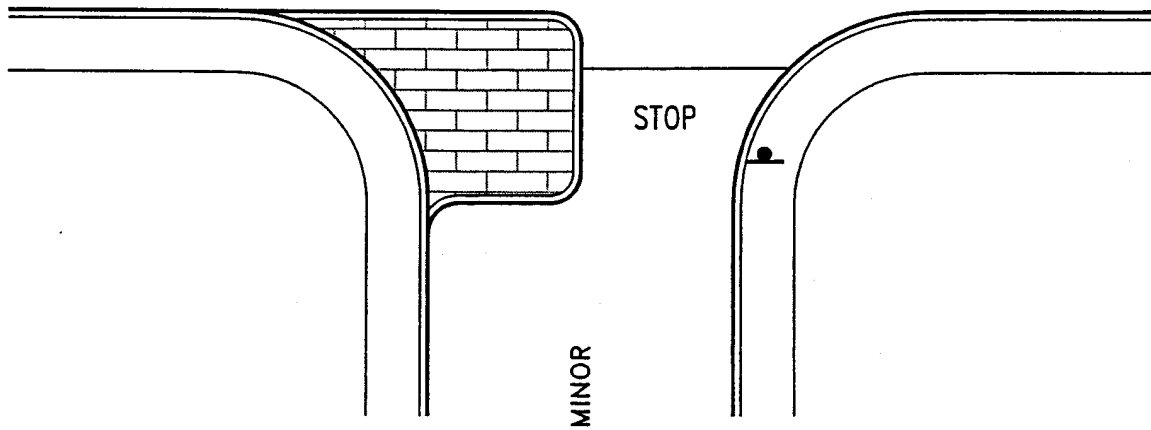
- Define the "neighborhood" to identify potential affected residential roadways. If other roadways will be severely impacted, 90% concurrence from property owners on those impacted roadways must be received for the installation of the diverter at the study intersection.
- Identify primary emergency response routes
- Identify AC Transit service routes
- Design must accommodate turning of large vehicles
- Landscaping should consider maintenance and sight distance issues
- Requires Board of Supervisors Resolution

# HALF ROADWAY CLOSURE



MAJOR

ROADWAY



STOP



## **HALF (ONE-WAY) ROADWAY CLOSURE**

*(Level 4 Traffic Calming)*

### **DESCRIPTION**

A half (one-way) roadway closure is a physical measure constructed to allow one-way traffic only at an intersection. This is similar to the chicane described in the level 3 traffic calming measures except that this device allows only one way traffic.

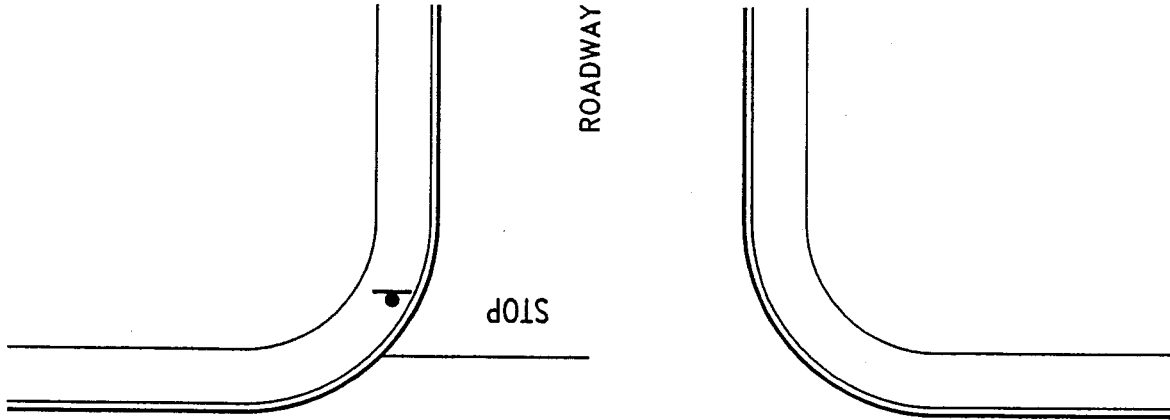
Half closures (which may also provide potential areas for landscaping) effectively reduce bypass traffic in one direction. Motorist speeds in the direction of unrestricted traffic may be unaffected. However, since this is used at an intersection, STOP controls may apply.

Disadvantages to half closures include the diversion of traffic to other roadways, partial emergency vehicle impediment, and the inconvenience to residents.

### **IMPLEMENTATION**

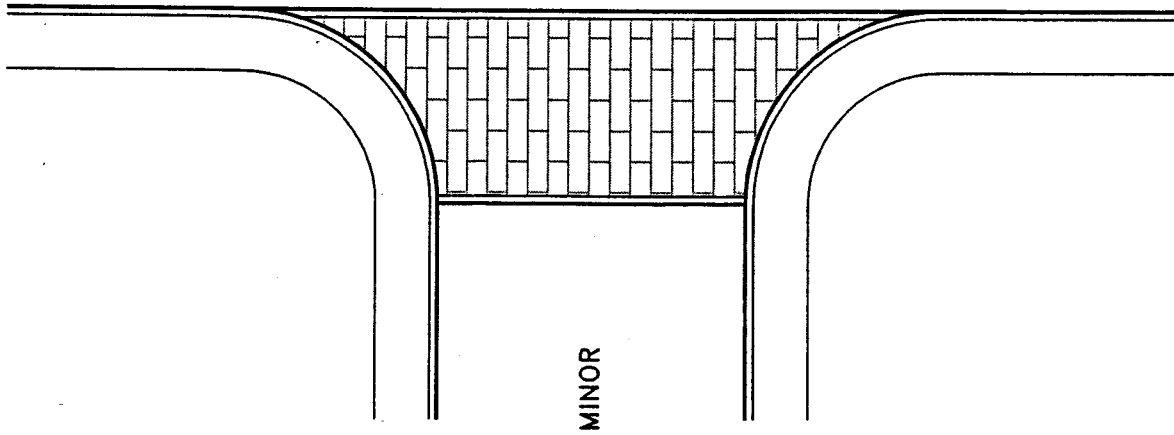
- Define the "neighborhood", to identify potential affected residential roadways. If other roadways will be severely impacted, 90% concurrence from property owners on those impacted roadways must be received for the installation of the half (one-way) roadway closure at the study intersection.
- Identify primary emergency response routes
- Identify AC Transit service routes
- Design must accommodate turning of large vehicles
- Landscaping should consider maintenance and sight distance issues
- Requires Board of Supervisors Resolution

# FULL ROADWAY CLOSURE



MAJOR

ROADWAY



## **FULL ROADWAY CLOSURE**

(Level 4 *Traffic Calming*)

### **DESCRIPTION**

A full roadway closure is a physical measure constructed to essentially cul-de-sac a roadway at an intersection.

Full closures (which may also provide potential areas for landscaping) effectively reduce bypass traffic. Motorist speeds would be similar to cul-de-sac roadways with the same roadway geometry.

Disadvantages to full closures include the diversion of traffic to other roadways, increase of emergency response times, and the inconvenience to residents.

### **IMPLEMENTATION**

- Define the "neighborhood" to identify potential affected residential roadways. If other roadways will be severely impacted, 90% concurrence from property owners on those impacted roadways must be received for the installation of the full roadway closure at the study intersection.
- Identify primary emergency response routes
- Identify AC Transit service routes
- Design must accommodate turning of large vehicles
- Landscaping should consider maintenance and sight distance issues
- Requires Board of Supervisors Resolution

ALAMEDA COUNTY  
*TRAFFIC CALMING*  
SAMPLE FORMS

**ALAMEDA COUNTY  
WARRANT FOR SPEED HUMP INSTALLATIONS**

ROADWAY \_\_\_\_\_  
LIMITS \_\_\_\_\_

ALL OF THE FOLLOWING CRITERIA SHALL BE MET FOR A ROADWAY TO BE CONSIDERED FOR SPEED HUMP INSTALLATION:

	WARRANT SATISFIED	
	YES	NO
1. The roadway is a two-lane roadway in a residential area	_____	_____
2. Roadway segment is at least 230 m (750 feet) in length*	_____	_____
3. The roadway width is :		
a) 12.2 m (40 feet) or less curb to curb or		
b) a minimum of 7.32 m (24 feet) designated roadway surface area		
4. The roadway longitudinal grade is 5% or less	_____	_____
5. The centerline radius is 91.5 m (300 feet) or more	_____	_____
6. The posted speed limit is 25 mph	_____	_____
7. The critical speed (85 <sup>th</sup> percentile) is a minimum of 10 mph above the posted speed limit	_____	_____
8. Maximum volume on local roadways is less than 1500 vehicles per day (vpd) or less than 3000 vpd on collector roadways	_____	_____
9. At least 2/3 of residents and property owners sign the petition	_____	_____
10. Inform residents and property owners contiguous to the speed humps	_____	_____

ALL WARRANTS SATISFIED? \_\_\_\_\_

\* Longer minimum roadway segment lengths will be required for roadways with adjacent grades greater than the 5% maximum in order to address motorist control of their vehicles prior to approaching a *traffic calming* device.

Note: All requirements must be satisfied in order for speed humps to be considered.

ALAMEDA COUNTY  
TRAFFIC CALMING PETITION

DATE: \_\_\_\_\_  
TO: Director of Public Works  
FROM: The residents of \_\_\_\_\_  
SUBJECT: *Traffic Calming* - \_\_\_\_\_

The traffic conditions (motorist speed and bypass traffic) on \_\_\_\_\_ are a concern to our neighborhood. Consequently, we are requesting, via this petition, that the Alameda County Public Works Agency perform appropriate traffic studies and investigate the implementation of traffic calming measures to mitigate traffic concerns on our roadway.

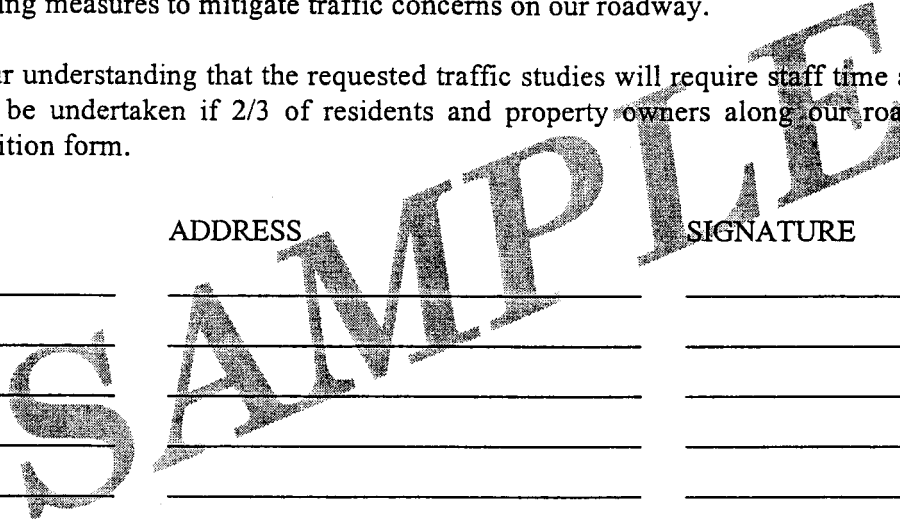
It is our understanding that the requested traffic studies will require staff time and budgeting and will only be undertaken if 2/3 of residents and property owners along our roadway(s) have signed this petition form.

PRINT NAME

ADDRESS

SIGNATURE

PRINT NAME	ADDRESS	SIGNATURE
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# ACKNOWLEDGMENTS

## ACKNOWLEDGMENTS

Preparation of these guidelines for the *Alameda County Neighborhood Traffic Calming Program* was guided by the review and comments of the following:

<b><u>ENFORCEMENT:</u></b>	
	California Highway Patrol - Hayward Area California Highway Patrol - Dublin Area Alameda County Sheriffs Department
<b><u>ENGINEERING:</u></b>	
Donald J. LaBelle	Director of Public Works (PWA)
Daniel Woldesenbet	County Engineer (PWA) - CE # 60306
Arthur G: Carrera	Road Program Manager (PWA) - CE # 45543, TE # 1567
Robert N. Preston	Traffic Engineer (PWA) - CE # 37048, TE # 1392, PTOE # 204
John P. Bates	Associate Engineer (PWA) - CE # 48791; TE #2044, PTOE # 521
Tam Nguyen	Assistant Engineer (PWA)
P.E. Baker	Supervising Engineering Scientist - Environmental Services (PWA) - REA # 05396, CEP # 87032304

<b><u>PLANNING:</u></b>	
James Sorensen	Director, Community Development Agency


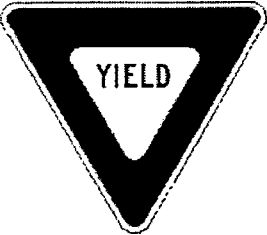


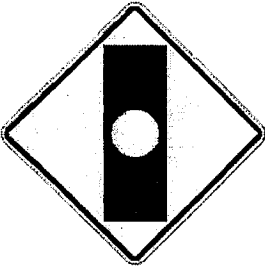

## REFERENCES

1. City of Fremont's Speed Hump Policy
2. Traffic Calming, A Guide to Street Sharing, Michael J. Wallwork, P.E. 1993. City of Palo Alto Local and Collector Street Traffic Calming Program
3. Guidelines for the Design and Application of Speed Humps, ITE, March 1993. APWA Reporter "Speed Humps", Marshall Elizer, Jr., P.E.
6. Neighborhood Automated Speed Compliance Program
7. Traffic Calming Toolbox, DKS Associates, 1996
8. Federal Office of Road Safety (Australia Department of Transport) Towards Traffic Calming: A Practitioner's Manual of Implemented Local Area Traffic Management and Blackspot Devices
9. Traffic Calming: Techniques and Management, April 18-19, 1996, Seattle, Washington
10. City of Santa Barbara's Speed Hump and Roundabout Guidelines and Policy

## Traffic Control Devices (not included in Traffic Calming program)

The following are some common traffic control devices that are defined in the Manual of Uniform Traffic Control Devices (MUTCD). The application of these traffic controls are also referenced in the California Department of Transportation Traffic Manual.

	<ul style="list-style-type: none"><li>• The purpose of STOP control is the assignment of right-of-way.</li><li>• STOP control will be installed only after an evaluation of intersection and a determination that the STOP control is warranted.</li><li>• STOP control is effective in the assignment of right-of-way and reducing potential broadside type collisions.</li><li>• STOP control is not effective for speed control nor for reducing the volume of traffic.</li></ul>
	<ul style="list-style-type: none"><li>• The purpose of YIELD control is the assignment of right-of-way where a full stop is not necessary at all times.</li><li>• YIELD control will be installed only after an evaluation of intersection and a determination that the YIELD control is warranted.</li><li>• YIELD control is effective in the assignment of right-of-way and reducing potential collisions resulting from confusion of right-of-way.</li><li>• YIELD control is not effective for speed control nor for reducing the volume of traffic.</li></ul>

	<ul style="list-style-type: none"><li>• The purpose of traffic signal control is the assignment of right-of-way and to improve intersection operations.</li><li>• Traffic signal control will be installed only after an evaluation of intersection and a determination that the traffic signal is warranted and would provide improved intersection safety or operations.</li><li>• Traffic signal control is effective in the assignment of right-of-way and improving intersection efficiency where there are higher volumes of conflicting traffic movement.</li><li>• Traffic signal control is not effective for reducing traffic volumes nor for speed control, except for metering large volumes of vehicles with a series of traffic signals.</li><li>• Traffic signal control is generally not appropriate in residential areas due to lower traffic volumes.</li></ul>
	<ul style="list-style-type: none"><li>• The purpose of turn restrictions is the elimination of a conflicting or undesired vehicle movement and to improve intersection operational efficiency.</li><li>• Turn restrictions will be installed only after an evaluation of the intersection and the neighboring roadway network and a determination that the restrictions will not create adverse impacts.</li><li>• Turn restrictions are effective in reducing vehicle volumes generated by a specific vehicle movement, but require motorist compliance and enforcement.</li><li>• Turn restrictions reduce access and circulation and may impact neighboring roadways.</li></ul>