CITY OF LIVERMORE

NEIGHBORHOOD TRAFFIC CALMING PROGRAM

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CITY OF LIVERMORE
NEIGHBORHOOD TRAFFIC CALMING PROGRAM

INTRODUCTION

Some experts claim that speeding traffic is a social issue and behavioral problem that cannot be addressed through engineering or enforcement. These experts point out the paradox of human behavior in which a resident wants drivers to drive slowly on their street, however that same resident will speed in other residential areas. They believe that until this issue of human behavior is addressed, speeding problems will persist. Although this may be true to a certain degree, many local governments around the world have experienced some success with traditional traffic calming programs.

BACKGROUND

The City receives numerous requests, complaints and suggestions from residents about traffic related issues. In 1999, the City Council inquired about the use of speed humps and other traffic calming measures to address excessive speeding vehicles and cut-through traffic in residential neighborhoods. From this inquiry, the Council initiated the Traffic Education, Engineering, and Enforcement program in June 1999. The Traffic Education, Engineering and Enforcement program employs a traffic management team comprised of Police Department and Engineering Division experts who emphasize education, engineering and enforcement to improve traffic safety. In October 2000, a motorcycle team of four officers with highly specialized training in enforcement was deployed. In many cases, this program has been extremely effective and continues to be a success. However, there is a high demand for enforcement all over the City and it is not very efficient to conduct enforcement on low volume residential streets. Sometimes enforcement works only on a temporary basis and there is a need for more permanent measures to reduce the speed of vehicles and discourage cut-through traffic on low volume residential streets.

The idea of utilizing traffic calming devices was raised again by the City Council in 2001 when concerns were raised that traffic from the new developments in the TDR area near Holmes Street and Alden Lane would dramatically increase the traffic volume on Wood Hollow Drive. At the January 22, 2001 Council meeting, Council decided not to use road closures to divert the traffic and instead directed staff to work with residents of the Wood Hollow neighborhood to develop acceptable traffic calming measures. The Council also directed staff to develop a Neighborhood Traffic Calming Program that could be applied to residential neighborhoods citywide.

This program is the product of Council's direction. The implementation measures in the Traffic Education, Engineering and Enforcement program are considered Tier 1 traffic calming measures and do not include the more aggressive Tier 2 traffic calming measures which include physical modifications to the roadway. The aim of the Neighborhood Traffic Calming Program is to strengthen the Traffic Education, Engineering and Enforcement program by adding a Tier 2 component and providing one comprehensive program that guides the use of additional engineering tools, commonly known as traffic calming devices, in responding to neighborhood traffic issues.

INTRODUCTION TO TRAFFIC CALMING DEVICES

The Institute of Transportation Engineers defines traffic calming as follows: "Traffic calming is the combination of mainly physical measures that reduce the negative effects of motor vehicle use, alter driver behavior and improve conditions for non-motorized street users". Traffic calming devices can generally be divided into 4 categories: 1) Vertical deflection, 2) Horizontal shifts, 3) Constrictions and 4) Diverters & Closures. Examples of each of these devices are shown in Appendix B, "Traffic Calming Toolbox".

Vertical deflection devices deflect the path of a vehicle in a vertical direction. These measures require motorists to slow considerably to minimize the impact when the vehicle passes over the device. Vertical deflection devices include speed humps, raised crosswalks and raised intersections.

Horizontal shift devices shift the path of a vehicle in a horizontal direction, forcing motorists to slow to maneuver around the devices. Horizontal shifts have a secondary effect in that they tend to break up the straight sight lines of a roadway, which in turn slows motorists by reducing the comfortable speed of travel. Examples include traffic circles, chicanes, and medians.

Constriction devices narrow the roadway and slow motorists by reducing the comfortable speed of travel. Constrictions include curb extensions, neckdowns and chokers. Other types of more passive constrictions are on-street parking, narrowed lanes and the addition of bicycle lanes.

Traffic diverters, street closures, and turn restrictions are another type of traffic calming measure. These are generally measures that alter the transportation circulation system by prohibiting access to existing streets.

Some agencies have had traffic calming programs for several decades now. Many of these programs have been successful. However, some agencies have since set up traffic calming removal programs and set moratoriums on implementing new devices. This movement is largely contributed to the proliferation of extremely restrictive traffic calming devices across an agency without due regard for the movement of traffic and the cumulative impacts. Therefore, it is particularly important to determine the need and appropriateness of devices as part of the traffic calming program in order to reduce the likelihood of later implementing a traffic calming removal program.

PURPOSE STATEMENT

The purpose of the Neighborhood Traffic Calming Program is to improve livability and quality of life within residential neighborhoods through the deployment of traffic calming devices. This is accomplished by the following program steps:

- Define a process to evaluate neighborhood concerns.
- Identify criteria to implement various methods to calm traffic.
- Establish the means to pay for and maintain the devices.
- Prioritize the deployment of traffic calming devices.
- Implement the program through the Capital Improvement Program.

GOALS AND OBJECTIVES

The City of Livermore continually strives to ensure overall safety, protect its neighborhoods and improve the quality of life for its residents. Traffic conditions on residential streets certainly affect neighborhood livability and one's sense of community. Traffic that is traveling at inappropriate speeds and commuter traffic that is inappropriately using residential roadways can adversely affect a resident's quality of life.

However, implementing traffic calming measures is not a solution for all speeding and cut-through traffic woes. Each neighborhood may have its own unique set of problems that must be analyzed to identify solutions. This program was developed to guide City staff and inform residents about the processes and procedures for implementing traffic calming measures on residential streets. Under this policy, staff will work with residents to identify traffic issues in their neighborhoods and seek appropriate solutions.

The goal of the Neighborhood Traffic Calming Program is to implement measures identified by a consensus of the neighborhood to affect driver behavior in such a way that improves safety and the quality of life for residents, pedestrians, bicyclists and motorists. This goal is to be balanced with the City's goal to provide quick emergency response times for emergency vehicles including fire trucks, police and ambulances.

The objectives are as follows:

- Reduce vehicle speeds on residential streets.
- Discourage cut-through traffic.
- Promote conditions that encourage bicycle and pedestrian travel.
- Create attractive streetscapes in neighborhoods.
- Provide clear guidelines of the process to evaluate traffic calming measures.
- Encourage citizen involvement in all phases of neighborhood traffic calming activities.
- Make efficient use of City resources by prioritizing traffic calming requests.

COMPATIBILITY WITH GENERAL PLAN

This program is consistent with and assists in achieving the goals and policies identified in the Circulation Element of the City's General Plan revised by the City Council in December 1998. The goals, policies and programs identified in the Circulation Element include:

- Emphasize in local circulation planning the need to minimize adverse environmental impacts and protect neighborhood quality. (Circulation System Goal #6)
- Provide a street system which minimizes traffic on local, minor (non-collector) streets in order to create and preserve a high quality residential environment. (Roadway Improvement Policy #10)
- Incorporate roadway improvement design measures which divert through traffic from, and minimize local traffic on, local residential streets in order to protect the quality and livability of Livermore neighborhoods. (Roadway Improvement Program #11 – Neighborhood Protection)

The Circulation Element defines the City's existing and future roadway system, including the classification of each roadway. The Circulation Element will be referenced in order to determine the classification of the roadways. In general, the Circulation Element defines local and collector streets as follows:

Local Street: Local streets are low-speed, low-capacity minor streets that provide for circulation within neighborhoods, with direct access to abutting land uses. Street design standards and layouts are typically used to discourage through traffic movements, avoid high travel speeds and volumes, and minimize neighborhood noise and safety impacts. Curbside parking is usually permitted. Local streets are typically two-lane facilities.

Collector: Collector streets are relatively low-speed, medium capacity streets that collect and distribute local traffic moving between local and major streets. Collector routes provide for circulation between neighborhoods, and divert through traffic from local streets. Direct access to abutting properties (driveway spacing) shall be stringently limited. Prohibitions on curbside parking may vary with road widths and traffic conditions. Collector streets are typically two to four-lane facilities.

The circulation element currently does not differentiate between collector streets that may be primarily residential in nature and collector streets that may serve commercial and industrial areas. These types of collector streets have a distinctly different function where it can be generally stated that a collector serving a commercial or industrial area will have higher traffic volumes and speeds than a collector with residential frontage. In this respect, collector streets that have residential frontage are similar to local streets in that they should include goals to minimize adverse environmental impacts, protect neighborhood quality and preserve a high quality residential environment. Therefore, for the purposes of this program, two-lane collectors that are residential in nature are considered for inclusion in the above listed goals and objectives.

Additionally, there are two different types of residential collector streets, major and minor collector streets. Major collector streets may include one or more of the following characteristics: 1) connects to two parallel major streets, 2) connects two or more collectors or major streets, 3) is usually fairly long (greater than 1 mile), 4) may be used to get from one part of town to the other, 5) connects several neighborhoods, 6) generally serves as access to approximately 500 or more residences, and 7) wider than 40'. Appendix A presents the designation of major and minor residential collector streets for use within this program.

It should be noted that it is not the intent of this program to change the classification of roadways. Residential collector streets are designed to carry more traffic than local residential streets and are typically streets that provide access between local streets and arterial streets. It must be recognized that not all residential streets can mimic the traffic conditions of a cul-de-sac and it is not the goal of this program to achieve those conditions.

POLICY STATEMENTS

1. Emergency Response

A critical concern about the use of traffic calming devices is the delay they may create for emergency response vehicles, including fire engines, ambulances and law enforcement vehicles. It is important to be aware of the trade-offs when making decisions about the use of traffic calming devices. The more aggressive devices for slowing traffic will slow emergency vehicle response as well, and in some cases may cause safety concerns.

The City's policy for fire services is to respond to medical and structure fire incidents within 7 minutes, 90% of the time, as measured from receipt of the 911 call, to the fire unit arrival at the incident. The City currently meets this goal. It is important to point out that fire trucks respond to many life threatening medical emergencies, such as heart attack victims, in addition to fire emergencies. Often, a fire truck is the first to respond to a medical emergency, since there are fire stations located throughout the City. Fire stations have been spaced as far apart as is practical, while still meeting the response time goal, so as to avoid having too many fire stations. Thus, to areas at the limits of current response times, any significant traffic calming devices will cause response time failures.

Recognizing the importance of achieving this emergency response time goal as a necessary service to the public, all traffic calming devices will be designed to accommodate all emergency vehicles and to minimize its impacts on emergency vehicle response times. Most arterial and collector streets are considered primary emergency vehicle response routes and are used to access various parts of the city from the fire stations. In order to minimize impacts to emergency vehicle response times, particular attention should be paid to the types of devices used on collector streets. Devices that considerably limit or restrict emergency vehicle access on collector streets will not be allowed.

Emergency Response Policies:

- Traffic calming measures shall be designed to accommodate all emergency vehicles and to minimize their impacts on emergency vehicle response times. (Policy 1)
- Traffic calming measures shall be limited on primary response routes. (Policy 2)
- The Fire Department and the Police Department should be involved in the development of the traffic calming measures in neighborhoods and should approve all proposed plans. (Policy 3)

2. Traffic Calming Devices

There are a few basic types of traffic calming devices that have different effects on the motoring public. It is important to understand how each type of device works and its impacts on motorists and emergency vehicles. The following discussion is divided to explain each type of device and the associated policies.

Horizontal shift devices include traffic circles, chicanes, and medians. ***Constriction devices*** include curb extensions, neckdowns and chokers. Both horizontal shift and constriction devices

slow traffic by physically forcing motorists to maneuver around the devices. The use of landscaping within these devices not only enhances the aesthetics of the streetscape but also increases their effectiveness by breaking up the motorist's line of sight, which reduces the comfortable speed of travel. Therefore, these devices, when used in conjunction with one another, are effective for a longer stretch of roadway rather than just in the immediate vicinity of the device. These devices also tend to have relatively lower impacts on emergency response times in that the vehicles can continue to move around the devices without stopping. However, use of these devices usually requires prohibition of on-street parking adjacent to the device.

Policies on Horizontal Shift and Constriction Devices:

- Horizontal shift and constriction devices such as medians, traffic circles, chokers and chicanes are acceptable traffic calming devices. (Policy 4)
- Residents fronting the proposed devices must approve any required parking restrictions. (Policy 5)

Vertical deflection devices include speed lumps, speed humps, speed tables, and raised crosswalks and intersections. The only vertical deflection device that is included in this program is the speed lump. Speed lumps are similar to speed humps, except they are divided into three lumps with one foot of space between each lump. The space between the lumps is specifically designed to accommodate the axle width of fire trucks. All other vehicles with smaller axle widths have to go over the humps from at least one side of the vehicle. Speed lumps are typically 12 to 14 feet long and 3 inches high.

One of the concerns associated with speed lumps is the potential increased noise in the immediate area where the speed lumps are installed because of braking and accelerating vehicles. It is important that residents immediately adjacent to the speed lumps concur to their installation.

Policies on Vertical Deflection Devices:

- Speed lump is the only approved vertical deflection device. (Policy 6)
- Residents fronting the proposed speed lump must approve the installation. (Policy 7)

Diverters, street closures, and turn restrictions are measures that alter the existing transportation circulation system. In developing a solution it is important not to shift the problem to another neighborhood. Turn restrictions and street closures can cause a tremendous amount of traffic diversion over a wide area. These types of measures have impacts that would need to be evaluated in a greater scope than just within a particular neighborhood. The impacts would include the environmental impacts due to changing the transportation circulation system. Many other cities have policies that ban or discourage street closures. For these reasons, diverters, closures and turn restrictions are not to be used as traffic calming measures. However, the use of diverters, street closures and turn restrictions may be used outside of this program and should be evaluated as part of a larger area-wide study if their use is to be considered.

Policy on Diverters and Closures:

- Diverters, street closures, and turn restrictions shall not be used as part of this program. (Policy 8)

Stop signs are not traffic calming devices. Residents, however, often request stop signs in an effort to calm traffic. Although residents believe that stop signs will reduce vehicle speeds, studies have shown that vehicle speeds after the vehicle has passed through the stop controlled intersection are as high, and occasionally higher, than without a stop sign, as motorists try to "make up" time lost at the stop sign. The acceleration and deceleration near stop signs generates noise and adversely affects air quality.

Inappropriate use of stop signs also creates significant adverse impact to emergency vehicles. Emergency vehicles are required to verify that a stop controlled intersection is clear of vehicles prior to entering. Many times this means that the emergency vehicle must nearly come to a stop. The delay to an emergency vehicle at a stop sign is similar to that caused by a vertical deflection device.

Stop signs are traffic control devices that should be used when appropriate to assign right-of-way to conflicting traffic movements, not to calm traffic. Stop signs should be installed only at locations where conditions meet established criteria, which has been the past practice of the City. Studies have shown that stop signs that do not meet established criteria (known as unwarranted stop signs) have a higher violation rate. Unwarranted stop signs also create disrespect of traffic control devices in general and affects behavior at other stop controlled intersections. It is for these many reasons that unwarranted stop signs are not to be used in this program.

Policy on Stop Signs:

- Unwarranted stop signs shall not be used as a part of this program. (Policy 9)

3. Maintenance

Many traffic calming devices alter the geometry of the roadway. Poorly designed traffic calming devices could interfere with street sweeping and other existing maintenance activities. This could have a negative effect on the appearance of the neighborhood and the residents' quality of life.

Maintenance Policies:

- Traffic calming devices shall be designed to minimize adverse impacts to street sweeping and other maintenance activities. (Policy 10)
- The development of traffic calming devices should be coordinated with the Maintenance Department. (Policy 11)

4. Residential Focus

This program is focused on residential areas since the purpose of the program is to improve quality of life of residents. Only local residential and residential 2-lane collector streets will be

considered in this program. Arterial streets are specifically excluded from this program because the nature of arterial streets is to move large numbers of vehicles in a relatively free-flowing manner. Actually, non-neighborhood traffic is encouraged to use arterial streets in order to reduce cut-through traffic in the neighborhoods.

Diverted traffic must also be considered when evaluating traffic calming measures. In developing a solution for one traffic problem, it is important not to shift the problem to another neighborhood or other residential streets within the neighborhood. Therefore, it is necessary to identify a neighborhood boundary to study the effects of proposed traffic calming devices.

Neighborhood participation is important in order to develop a consensus of the issues that adversely affect the neighborhood, evaluate the pros and cons of the various traffic calming measures and ensure that the issues are adequately addressed. It is essential to consider a wide range of perspectives and observations in addition to engineering data. The program is designed so that residents can become actively involved in defining the problem(s) and in the decision-making process in order to have a sense of ownership of the outcome.

In addition to neighborhood participation, it is important that the process reflects the opinions of a majority of the residents and not just a few vocal residents. This is implemented through the use of a petition that must be signed by at least 60% of the households within the neighborhood to initiate the traffic calming process. A preliminary neighborhood meeting will be held to discuss the traffic calming program prior to requiring the 60% petition. Another petition is required to implement the proposed traffic calming devices. This second petition is needed in order to be sure there is enough support for approval of an assessment district. This is discussed in more detail under funding.

Residential Focus Policies:

- Traffic calming measures will only be considered on local residential and residential 2-lane collector streets. (Policy 12)
- Traffic calming measures shall not be used on arterial streets or non-residential streets. (Policy 13)
- Minimize diverted traffic to other local or residential collector streets. (Policy 14)
- City staff will identify neighborhood study areas in order to evaluate the potential of diverted traffic. (Policy 15)
- Maintain or improve the aesthetics of the streetscape through landscaping and hardscaping treatments. (Policy 16)
- Residents within the neighborhood should be encouraged to participate in the identification of the issues as well as the development of the solution. (Policy 17)
- Require a positive response from at least 60% of the households within the identified neighborhood boundary to initiate the traffic calming process and also to approve the permanent installation of traffic calming devices. (Policy 18)

5. Minimum Criteria and Prioritization Criteria

The need to prioritize projects arises when the demand for traffic calming exceeds City resources. This includes staff time to work on the project as well as construction funding. A common

approach used by most other cities to efficiently utilize city resources is to prioritize projects so that the neighborhoods with the greater problems are addressed first. Since most neighborhood traffic problems involve speeding vehicles or a high volume of vehicles relative to the street type, these criteria are weighted heavier in the ranking. Another factor that is considered in defining the extent of the problem is the average annual reported accidents. Also, the impact traffic will have on a neighborhood depends upon the character of the street in the neighborhood and the amount of pedestrian activity within the neighborhood. Streets that have a greater percentage of fronting homes, schools, parks or other public facilities are impacted more than streets that are lined with backing lot treatments. Neighborhoods that have a higher number of pedestrian generators, such as parks, schools and other public facilities, will be impacted greater than those neighborhoods without pedestrian generators. Due to the high concentration of school-aged pedestrians and localized traffic congestion associated with elementary, middle and high schools, these pedestrian generators are weighted double that of other non-school pedestrian generators. The prioritization criteria are also used to determine how the project should be funded. This is discussed in more detail under funding.

In addition to prioritizing projects, it is necessary to provide some minimum criteria that must be met in order for a neighborhood to qualify for traffic calming measures. These minimum criteria ensure that City staff and financial resources are used efficiently by not spending resources on streets that do not have a significant traffic problem and to avoid creating unmet expectations by having a long list of projects that may never get built. These minimum criteria are based on vehicle speeds and volumes.

For the purposes of the minimum and prioritization criteria, the data collected will be rounded up to the nearest whole number.

Minimum Criteria and Prioritization Criteria Policies:

- The minimum criteria to be used to determine if a street is eligible for traffic calming devices is as follows (Policy 19):

  Speed – 85th percentile speed (critical speed) is at least 33 mph

  Volume – Average daily traffic is at least 1000 vehicles

- The prioritization scoring criteria allows 35 maximum points and is as follows (Policy 20):

Speed

85^{th} percentile speed (critical speed)	**Points**
34 mph	2
35 mph	4
36 mph	6
37 mph	8
38 mph or more	10 maximum

Volume (Average Daily Traffic)

Local Street	Minor Collector Street	Major Collector Street	Points
1000 – 1100	2000 – 2200	3000 – 3400	1
1101 – 1200	2201 – 2400	3401 – 3800	2
1201 – 1300	2401 – 2600	3801 – 4200	3
1301 – 1400	2601 – 2800	4201 – 4600	4
1401 – 1500	2801 – 3000	4601 – 5000	5
1501 – 1600	3001 – 3200	5001 – 5400	6
1601 – 1700	3201 – 3400	5401 – 5800	7
1701 – 1800	3401 – 3600	5801 – 6200	8
1801 – 1900	3601 – 3800	6201 – 6600	9
1901 and above	3801 and above	6601 and above	10 maximum

Accident History - One point per accident susceptible to correction by traffic calming device, using the average annual accidents over past 3 years (5 points maximum)

Fronting Uses (including homes, schools, parks & public facilities)

Percentage of the street that has fronting uses	Points
10% or less	1
11 – 25 %	2
26 – 50%	3
51 – 75%	4
75 – 100%	5 maximum

Pedestrian Generators (such as parks, schools, public facilities, not including homes)*

Number of pedestrian generators within neighborhood boundary	Points
1	1
2	2
3	3
4	4
5 or more	5 maximum

* Elementary, middle and high schools will be weighted double points in this category.

6. Funding

Administration Costs - Administration costs include staff time to collect and analyze data, prioritize requests, conduct neighborhood meetings and design the traffic calming devices. These costs would be covered under normal operating budgets using existing staff.

Capital Financing – The construction costs of traffic calming devices will be shared between the residents and the City of Livermore. The cost sharing concept has several advantages. It ensures that residents have buy-in and a sense of ownership in the project, and traffic calming devices are

less likely to be removed in the future. The issue of traffic calming removal should not be dismissed as minor. Some agencies that have had traffic calming programs for several decades have now implemented traffic calming removal programs. The shared funding concept helps to avoid this situation by ensuring that the traffic calming devices are really necessary. Another advantage of the shared funding approach is that the residents will be fiscally responsible in the development of the traffic calming plan. The City can stretch its budget to cover more projects to more neighborhoods.

The residential share of the cost is dependent upon the nature of the traffic conditions in the neighborhood. The more severe traffic problems should receive a greater share of City funds. Since the prioritization criteria quantifies the magnitude of the traffic problem, the higher the prioritization score, the greater the percentage of the project that will be paid by the City. If a project scores 21 or more points, the City would fund 100% of the construction costs.

The resident share of the traffic calming project would be collected through a Lighting and Landscaping Assessment District. This requires setting up an assessment district to levy fees to be added to the property owners' property tax bill. Some neighborhoods (about 15% of residential areas in the City) already have Lighting and Landscaping Assessment Districts that could be used to assess the cost of constructing and maintaining traffic calming devices if the neighborhood boundary coincides with assessment district boundary. If the boundaries do not coincide, then a new Lighting and Landscaping Assessment District would be formed. The main advantage of this method is that the cost of the project can be spread over several years (up to 5 years) to minimize the annual fiscal impact to each homeowner. The homeowners within the neighborhood boundary will be billed an equal share of the project. In order to impose this fee, a 51% majority vote of the voting homeowners is required. Approximately $5,000 to $10,000 would be spent by the City in "soft costs" such as administration and legal expenses to prepare the engineers report, and to put the assessment to a vote. If the assessment district vote fails, these soft costs would be taken out of the annual traffic calming budget. If the assessment district passes, these costs would be incorporated into the assessment.

Operations and Maintenance Financing - Residents are required to pay for the cost of maintaining traffic calming devices, usually consisting of landscaping maintenance and irrigation costs, regardless of the percentage of the construction cost paid by the City. Some neighborhoods already pay for maintenance of common areas through Lighting and Landscape Assessment Districts. The maintenance costs for traffic calming devices will be collected from the residents through Landscape and Lighting Assessment Districts. An increase in assessments would require a 51% majority vote of the voting homeowners. The installation of traffic calming devices is predicated on voter approval of an assessment district to pay for maintenance of the devices.

Funding Policies:

- The shared funding concept is implemented to share the construction costs between the City and the residents, with a greater City share being contributed to address the more severe traffic problems. (Policy 21)
- The City will not directly collect funds from the residents for the neighborhood share. (Policy 22)

- The residents shall be responsible for all associated maintenance costs through existing or new assessment districts. (Policy 23)
- The Funding Criteria is based on the Prioritization Score. The higher the score the more the City will contribute to funding. The Funding Criteria is as follows (Policy 24):

Points	**Proportion of City Funding**
0 – 5	0%
6 – 10	25%
11 – 15	50%
16 – 20	75%
21 and above	100%

7. Traffic Calming Device Removal

Although there are many policies and steps incorporated in the program to avoid the scenario whereby a neighborhood requests to have traffic calming devices removed, it is acknowledged that this may occur. In order for traffic calming devices to be removed from a neighborhood, the same process of neighborhood meetings and consensus requirements should be met. A neighborhood meeting would be held to discuss the issues and the impacts of traffic calming removal. A petition to garner 60% approval would need to be circulated within the original neighborhood boundary that installed the traffic calming device initially. The costs of removing traffic calming devices would be paid 100% by the residents. Therefore, it would require a 51% approval of the property owners to pass an assessment district vote to fund the removal costs.

Removal Policies:

- Require a positive response from at least 60% of the households within the original neighborhood boundary to remove traffic calming device. (Policy 25)
- Residents shall pay for 100% of the costs to remove traffic calming devices. (Policy 26)

NEIGHBORHOOD TRAFFIC CALMING PROCESS

The process begins once the City receives a request from a resident to initiate a traffic study in a residential neighborhood due to concerns about traffic. The process is divided into two distinct tiers, with Tier 1 being the existing Traffic Education, Enforcement and Engineering Program and Tier 2 being the Neighborhood Traffic Calming Program.

First, staff will conduct a Tier 1 analysis. This may include data collection including traffic counts, speed surveys, collision history and pedestrian observations. Staff may recommend that the identified problem may be easily reduced or alleviated with Tier 1 implementation measures. Tier 1 implementation measures are usually low cost tools, primarily consisting of education, enforcement and some engineering. Tier 1 implementation measures include:

- targeted enforcement
- improving sight distance by trimming landscaping
- appropriate additional signing, striping or pavement markings
- educational outreach
- placement of the radar speed trailer

If Tier 1 measures do not have a positive affect on traffic and the resident still has a concern, the resident can request to move the request forward to Tier 2. If staff does not recommend the use of Tier 1 measures or the Tier 1 measures have already been implemented without the desired effect, the request may move directly to Tier 2.

In order for a request to be considered for Tier 2, the existing traffic conditions must meet the following minimum criteria as stated in Policy 18. If these minimum criteria are not met, the request may not proceed for Tier 2 analysis.

The request is then prioritized for study among other requests utilizing the prioritization criteria as stated in Policy 19. Prioritizing requests provides clear guidelines to staff on how to manage the limited resources effectively by dealing with neighborhoods that have the most pressing issues first.

At the beginning of each fiscal year, the top projects on the priority list will be selected for study during that year, depending upon the availability of funding. Once the project is selected for study, staff determines a neighborhood boundary to identify the limits of the analysis.

A preliminary neighborhood meeting will be held and all of the residents within the boundary will be notified. The purpose of this first meeting is to listen to the concerns of the residents, discuss the traffic calming program and process, the use of traffic calming devices and the potential fiscal impacts. This will mostly be an educational meeting, both for staff to learn the concerns of the residents and for the residents to learn of the traffic calming process and its implications. This meeting is purposely held prior to the circulation of the initial petition so that the residents are more educated about the process that they are being asked to support. At this meeting, it is required that a neighborhood captain or neighborhood working group be identified in order to coordinate the future outreach efforts within the neighborhood.

Since traffic calming measures impact many people in the neighborhood and the measures tend to be costly, it is necessary to determine if there is adequate support for the process before continuing. Therefore, a petition requesting initiation of the Tier 2 process must be signed by at least 60% of the households within the neighborhood boundary. The neighborhood captain or the neighborhood working group will need to coordinate this effort. If at least 60% of the households do not sign the petition, the request may not proceed. For the purposes of this program, a household is defined as any owned or rented living unit with its own street address, regardless of how many people live in each unit. Each household is represented by one signature.

Based on information gathered from the preliminary neighborhood meeting, staff will develop alternatives for implementation of traffic calming devices and their fiscal impacts. Then a second neighborhood meeting will be held to discuss study results and the alternatives to identify the

neighborhood's preferred alternative.

Once the neighborhood's preferred alternative is identified, Staff will develop a trial project to be conducted for a specific time period. Staff will implement the trial project and evaluate its effectiveness. It is important to note that trial projects tend to not be as effective as permanent installations. Trial projects are much less attractive because they usually consist of pavement markings, cones or concrete in the roadway to mimic the shape of the traffic calming device. There is no new landscaping associated with trial projects, therefore there is no benefit of sight line breaks. It is important to communicate this to the neighborhood during the second neighborhood meeting.

After the trial period, a third neighborhood meeting will be held to discuss the effects of the trial project, implementation of permanent measures, neighborhood approval requirements and funding scenarios. Once the permanent project is finalized, a neighborhood vote is required to approve the traffic calming project. This vote requires a positive response from at least 60% of the households.

Then funding for the construction and maintenance of the project must be approved by the property owners through a Lighting and Landscaping Assessment District. If the project is 100% funded by the City, only the maintenance portion of the project would need to be approved in the assessment district vote.

Once funding measures are in place, the City Council would review the neighborhood approved plan, approve permanent installation of the devices and allocate City funding. After funding is allocated, the CEQA process and environmental review of the project will be conducted. Plans and specifications will be prepared. Then the project will be advertised for construction. It is expected that construction would be completed within 12 months of City Council approval.

APPENDIX B

Traffic Calming Toolbox
For use in the Neighborhood Traffic Calming Program

Purpose:
This toolbox was developed to provide guidance on the use of various traffic calming devices for use in the City of Livermore. It is intended to be used in conjunction with the overall Neighborhood Traffic Calming Program that outlines the goals, objectives, policies and procedures for addressing neighborhood traffic concerns in Livermore. Each page provides the following information for different traffic calming devices:

Description:
An illustration and written description is provided for each device.

Application:
Each traffic calming device or tool is designed to address specific traffic calming issues. The application section outlines the common uses for each device.

Advantages:
Each tool included in the toolbox provides some advantages to traffic calming and to the quality of life in the neighborhood. The advantages sections outlines the positive impacts associated with each traffic calming measure.

Disadvantages:
Although each device included in the toolbox provides some positive aspects to traffic calming, each has negative impacts as well. The disadvantages are outlined so that tools can be evaluated for both their positive and negative effects.

Variations:
There are often several variations of specific traffic calming devices. Several of these are provided where they are appropriate.

Considerations:
This section offers a variety of issues that should be considered for each traffic calming measure. Emergency response and operational concerns are flagged in this section.

Cost:
The cost section is intended as a general guide to costs, using high, moderate and low designations for the different devices.

Traffic Calming Tools Recommended in the Program

Enforcement and Monitoring
- Targeted Speed Enforcement
- Speed Monitoring Radar Trailer

Constrictions and Narrowing
- Median
- Entry Island
- Choker
- Neckdown

Horizontal Alignment Changes
- Traffic Circle
- Chicane

Signing and Striping
- Speed Limit Sign
- Neighborhood Speed Watch Signs
- Roadway Striping

Pavement Texture and Color
- Textured crosswalks or intersections
- Colored pavement in crosswalks or bike lanes

Vertical Deflection
- Speed Lumps

Traffic Calming Tools Not Recommended for use in the Program

There are a few traffic calming tools that are not recommended to be included in this toolbox. They are discussed more extensively in the staff report. Generally, the tools that are in the toolbox offer more effective results in addressing the desired outcomes and have fewer negative impacts.

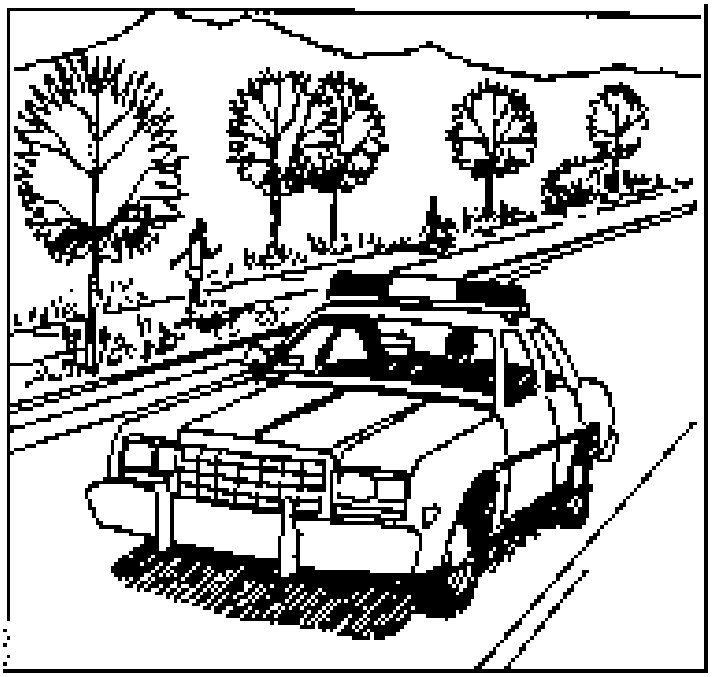
- **Rumble strips** are series of pavement bumps that create a "rumble" effect as cars drive over them. They are often used to alert drivers as they approach tolls on toll-ways or stop signs on highways in isolated areas. Rumble strips are not effective as speed control devices and do little or nothing to discourage cut-through traffic. In addition, due to the noise they generate, they would be inappropriate to use within neighborhoods.

- **Children at Play Signs** are commonly requested in neighborhoods, however, they are not standard traffic control devices and have not been found to be effective in improving the safety of children. Residential areas commonly have children and the presence of signs does not change driving behavior in the neighborhood. One of the disadvantages of the Children at Play sign is that they can create false sense of security, which can increase the potential for accidents and injuries. If the safety of children is the major concern in a neighborhood or at a specific location, there are more effective tools that can be used to improve safety.

- **Stop signs** are not traffic calming devices. Studies have shown that stop signs that do not meet established criteria have a higher violation rate. Studies also show that vehicle speeds after the vehicle has passed through an unwarranted stop controlled intersection are as high, and occasionally higher, than without a stop sign, as motorists try to "make up" time lost at the stop sign. The acceleration and deceleration near stop signs generates noise and adversely affect air quality. Inappropriate use of stop signs also creates significant delay to emergency vehicles since they are required to nearly come to a stop to verify that the intersection is clear of vehicles prior to entering.

- **Diverters, street closures, and turn restrictions** are measures that alter the existing transportation circulation system. In developing a solution it is important not to shift the problem to another neighborhood. Turn restrictions and street closures can cause a tremendous amount of traffic diversion over a wide area. These types of measures have impacts that would need to be evaluated in a greater scope than just within a particular neighborhood. The impacts would include the environmental impacts due to changing the transportation circulation system. Many other cities have policies that ban or discourage street closures. For these reasons, diverters, closures and turn restrictions are not recommended for use as traffic calming measures, but rather should be evaluated as part of a larger area-wide study if their use is to be considered.

TARGETED SPEED ENFORCEMENT



Description: Police presence to monitor speeds and issue formal or courtesy citations.

Application:

- Streets with documented speeding problem and need for quick mitigation
- Locations where restrictions are being violated
- Higher volume streets such as major and collector streets

Advantages:

- Effective while officer actually monitoring traffic
- Flexible measure that can be implemented in almost any location at short notice
- Personal contact with educational opportunity
- Visibility of marked patrol car or motorcycle encourages compliance

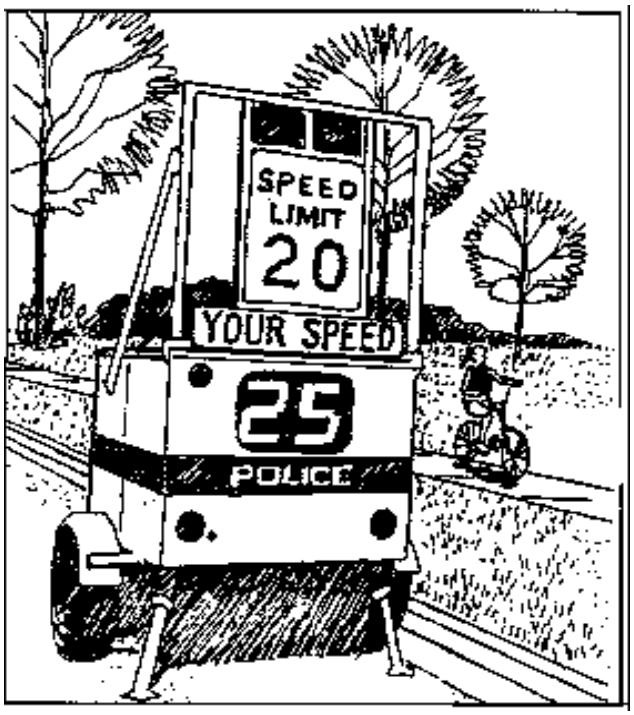
Disadvantages:

- Fines do not typically cover cost of enforcement
- Disrupts efficient traffic flow on high volume streets
- Short "memory effect" on motorists when enforcement officers no longer present

Special Considerations:

- Often helpful in school zones
- May be used during "learning period" when new devices or restrictions first implemented
- Demand for enforcement is greater than available resources

Cost: High cost primarily due to the staffing requirements.



SPEED MONITORING RADAR TRAILER

Description: Mobile trailer mounted radar display that informs drivers of their speed.

Application:
- Any street where speeding is a problem

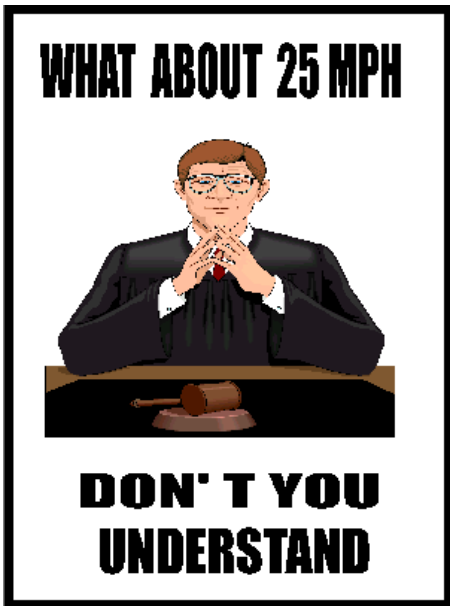
Advantages:
- Educational tool
- Good public relations
- Effective for temporary speed reduction needs

Disadvantages:
- Duration of effectiveness may be limited
- Not self enforcing

Special Considerations:
- Should not be used in remote areas

Cost:
- Moderate cost to use due to staffing requirements
- Expensive to enforce

NEIGHBORHOOD SPEED WATCH



Description:
The purpose of the program is to increase motorist awareness of the 25 MPH speed limit on local streets and reduce speeds in our neighborhoods. The program includes:

- Neighborhood Informational Canvass
- Fliers with accident and speed data and information on targeted enforcement
- Neighborhood Speed Awareness Signs
- Unique messages and graphics mounted on garbage cans by residents
- Targeted Police Enforcement
- Police enforce and issue citations during identified problem times

Application:
- Any residential street where speeding is a problem

Advantages:
- Educational tool
- Directly involves residents in the solution
- Effective for temporary speed reduction needs

Disadvantages:
- Duration of effectiveness may be limited

Cost:
- Expensive to enforce

SPEED LIMIT SIGN



Description:
Signs that define the legal driving speed under normal conditions

Application:
- Streets where speeding is a problem

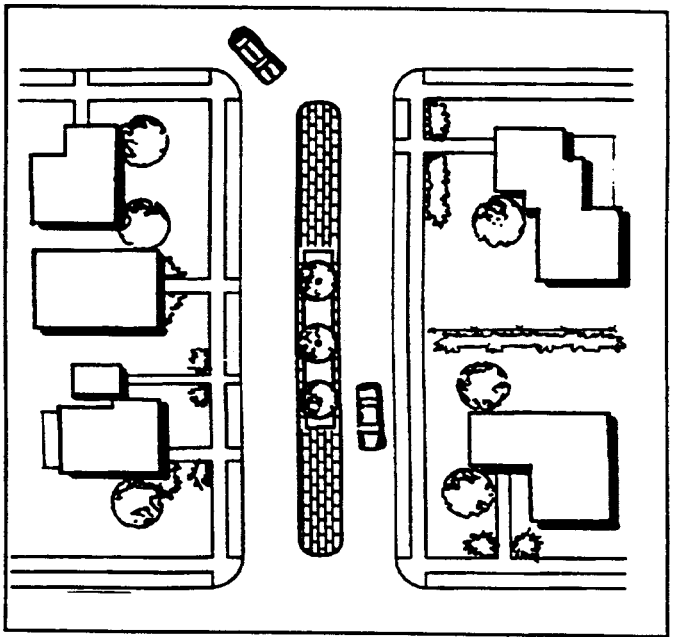
Advantages:
- Provides clear definition of legal speed limit
- Provides context for enforcement efforts
- Provides goal for traffic calming efforts

Disadvantages:
- Typically not effective in and of themselves
- Not self enforcing
- Requires on-going police enforcement
- Unrealistically low speed limits are difficult to enforce and tend to be disregarded
- More visual pollution from signs in the neighborhood

Special Considerations:
- Speed limits set by an engineering analysis tend to be higher than limits set by political pressures

Cost:
- Low; inexpensive to install
- High; expensive to enforce

MEDIAN



Description:

Raised island in the center of the roadway with one-way traffic on each side

Application:

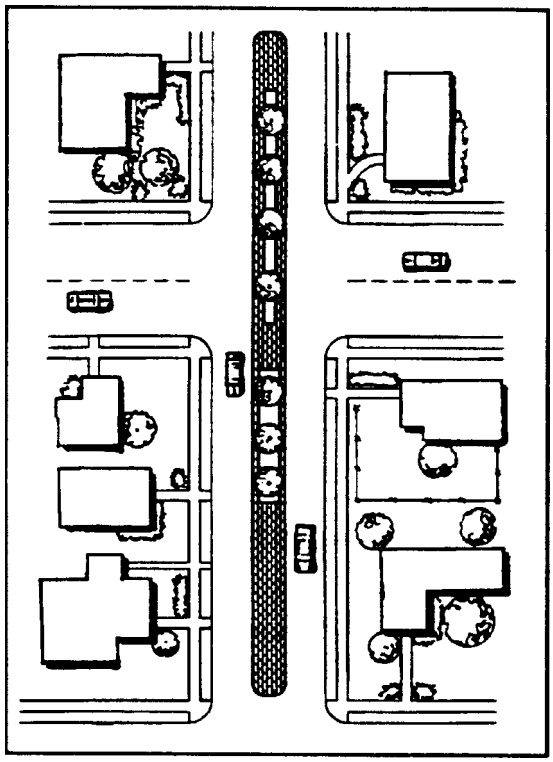
- Used on wide streets to narrow each direction of travel and to interrupt sight distances down the center of the roadway

Advantages:

- Narrowed travel lanes provide 'friction" and can slow vehicle speeds
- Significant opportunity for landscaping and visual enhancement of the neighborhood
- Can utilize space which otherwise would be "unused" pavement
- Can be used to control traffic access to adjacent properties if desired

Disadvantages:

- Long medians may impact emergency access potential
- May interrupt driveway access and result in U -turns
- Will require removal of parking if lane is less than 18 feet
- May require circuitous access to driveways by residents
- Creates a physical obstruction in the travel-way



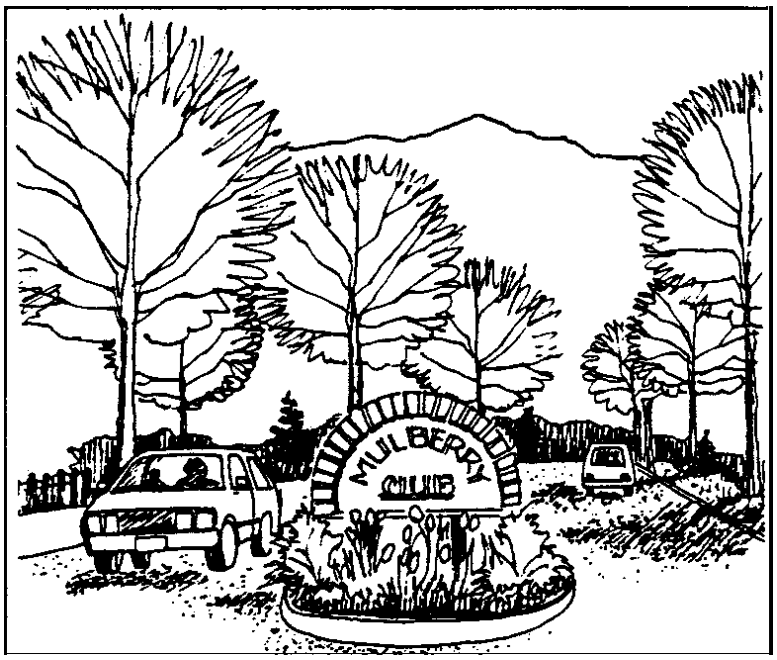
Variations:

- Medians of various lengths can be constructed
- Can be constructed mid-block only to allow all turning movements at intersection
- Can be extended through intersections to preclude left turning access, or side street through movement, if desired

Special Considerations:

- Vegetation should 'be carefully designed not to obscure visibility between motorists, bicyclists and pedestrians at intersection and pedestrian crossing areas
- Maintain 12 foot wide lane minimum on each side
- Maximum length between access points should be 200' to accommodate emergency response -turning radius for a fire truck should be maintained at these breaks
- May impact bicycle safety

Cost: High cost to construct, landscape and maintain



ENTRY ISLAND (NEIGHBORHOOD IDENTIFICATION ISLAND)

Description:
A raised island in the center of a two-way street adjacent to an intersection at the perimeter of a neighborhood that identifies the entrance.

Application:

- Placed in a roadway to define the entry to a residential area and/or to narrow each direction of travel and interrupt sight distance along the center of the roadway

Advantages:

- Notifies motorists of change in roadway character
- Helps slow traffic
- Opportunity for landscaping and/or monumentation for aesthetic improvements
- May discourage cut -through traffic

Disadvantages:

- Need for maintenance (and irrigation)
- May necessitate removal of parking
- Creates physical obstruction in the travel-way

Variations:

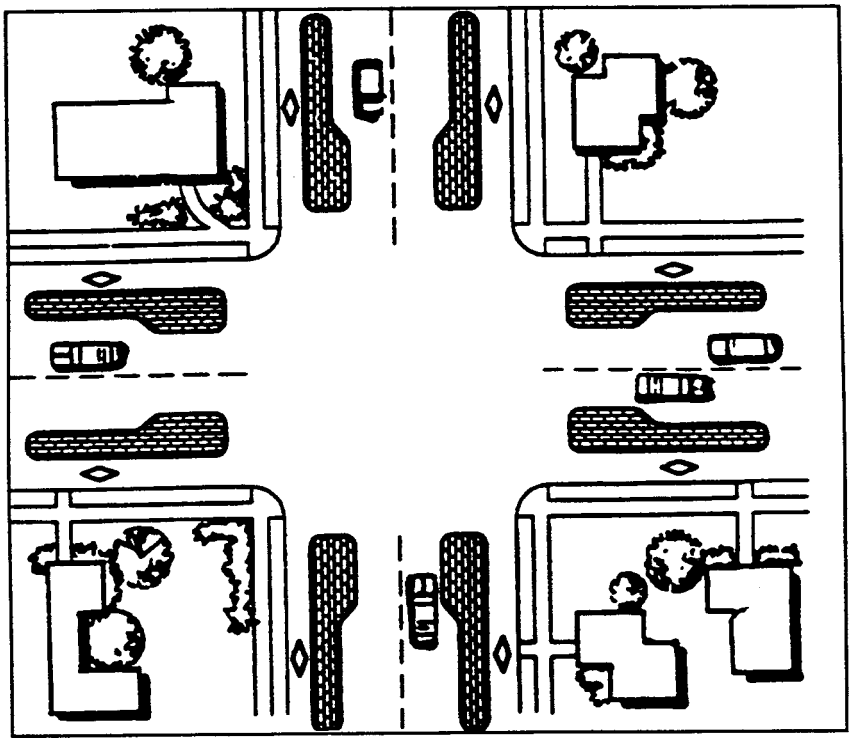
- Can incorporate neighborhood identification signing and monumentation

Special Considerations:

- Care should be taken not to restrict pedestrian visibility at adjacent crosswalk

Cost:

- Low to medium cost to install, landscape and maintain



CHOKERS

Description :
Raised islands built to narrow the roadway. The islands are detached from the curb line, allowing bike lanes to continue behind the choker.

Application:
- Typically used adjacent to intersections where parking is restricted
- Can be used to narrow roadway and shorten pedestrian crossings

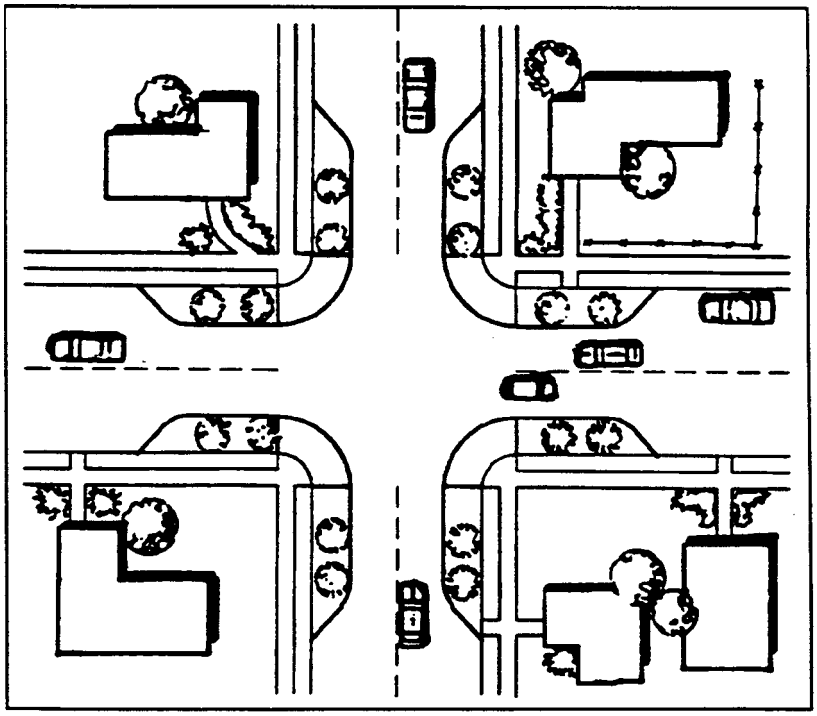
Advantages:
- Pedestrian crossing distance reduced
- Narrowed roadway section may contribute to vehicular speed reduction
- Breaks up drivers' line-of-sight

Disadvantages:
- May create hazard for bicyclists who are less visible to cross street and turning traffic
- Creates physical obstruction in the travel way
- Will require the removal of parking

Special Considerations:
- Significant problems with maintenance
- Debris builds in bike lane between the choker and the curb line, creating hazard for bicylists

Cost:
- Moderate

NECKDOWN OR CURB EXTENSION



Description:
Segments of roadway narrowing where roadway edges or curbs are extended toward the center of the roadway

Application:

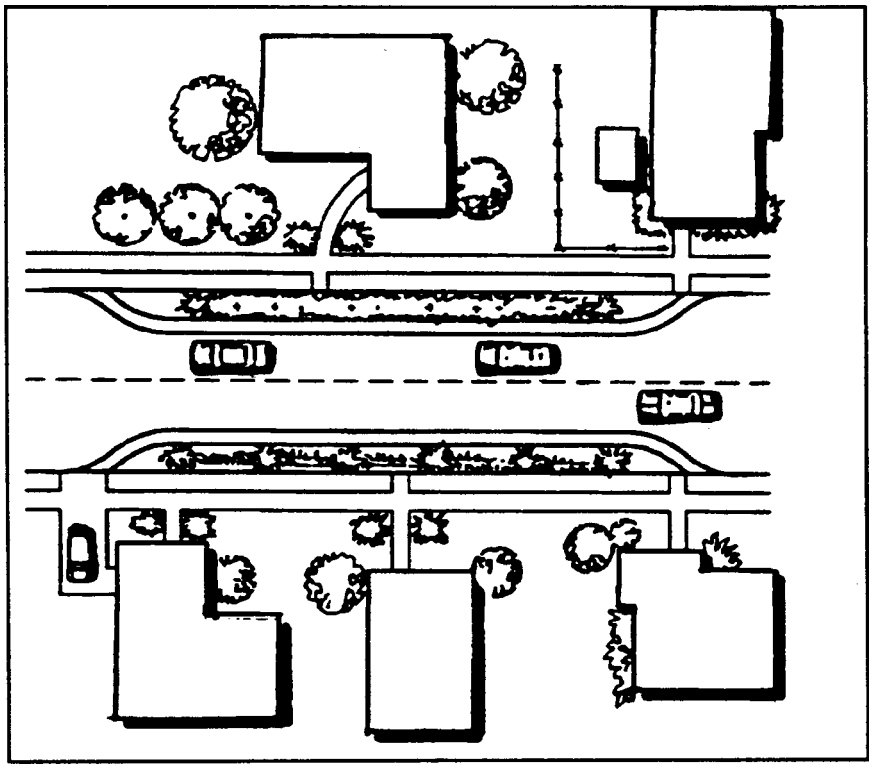
- Typically used adjacent to intersections where parking is restricted
- Can be used to narrow roadway and shorten pedestrian crossings

Advantages:

- Pedestrian visibility increased and crossing distance reduced
- Narrowed roadway section may contribute to vehicular speed reduction
- Can "reclaim" pavement for pedestrian and streetscape amenities
- Breaks up drivers' line-of-sight

Disadvantages:

- Creates drainage issues where curb and gutter exist
- Creates physical obstruction in the travel way
- May create hazard for bicyclists
- Will require removal of parking



Variations:

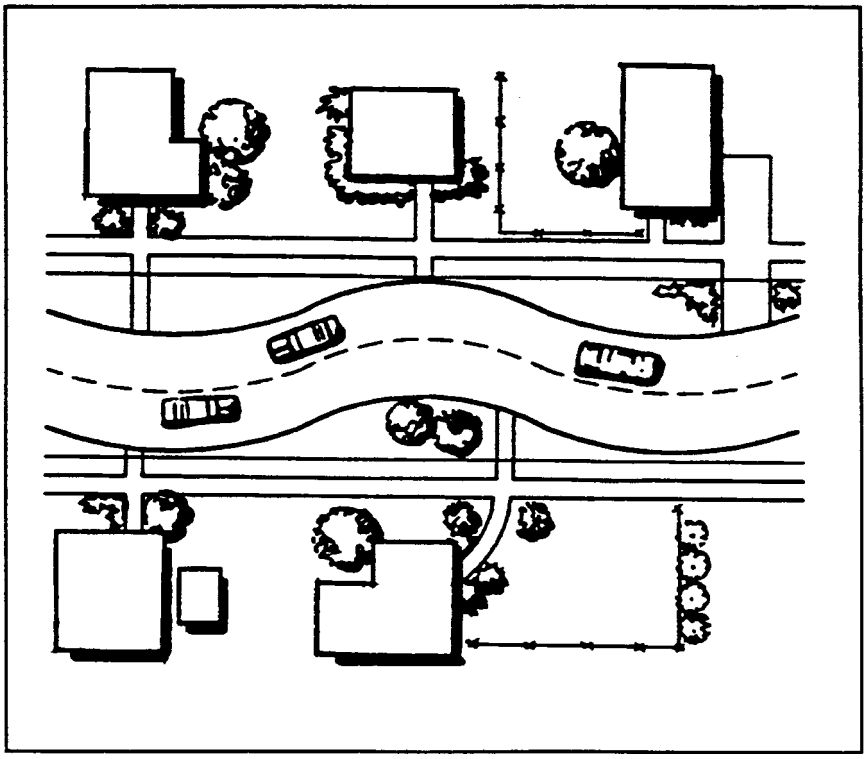
- Mid-block neckdowns often used in conjunction with pedestrian crossing treatments

Special Considerations:

- Curb extensions should not extend into bicycle lanes where present

Cost:

- Medium to high cost depending on landscaping, pavement treatments and storm drainage considerations



CHICANE

Description:

A curved street alignment can be designed into new developments or retrofitted in existing rights-of-way. The curvilinear alignment requires additional maneuvering and reduces drivers' line-of-sight.

Application:

- Any street where speed control is desired
- Any street where reduced line-of-sight is desired

Advantages:

- Aesthetically pleasing
- Provides landscaping opportunities
- Minimal impact on emergency response

Disadvantages:

- Expensive
- May have little or no impact on cut-through traffic
- Needs to be combined with narrowing or other traffic calming tools to have significant impact on speeds
- May require additional R.O.W. to be effective

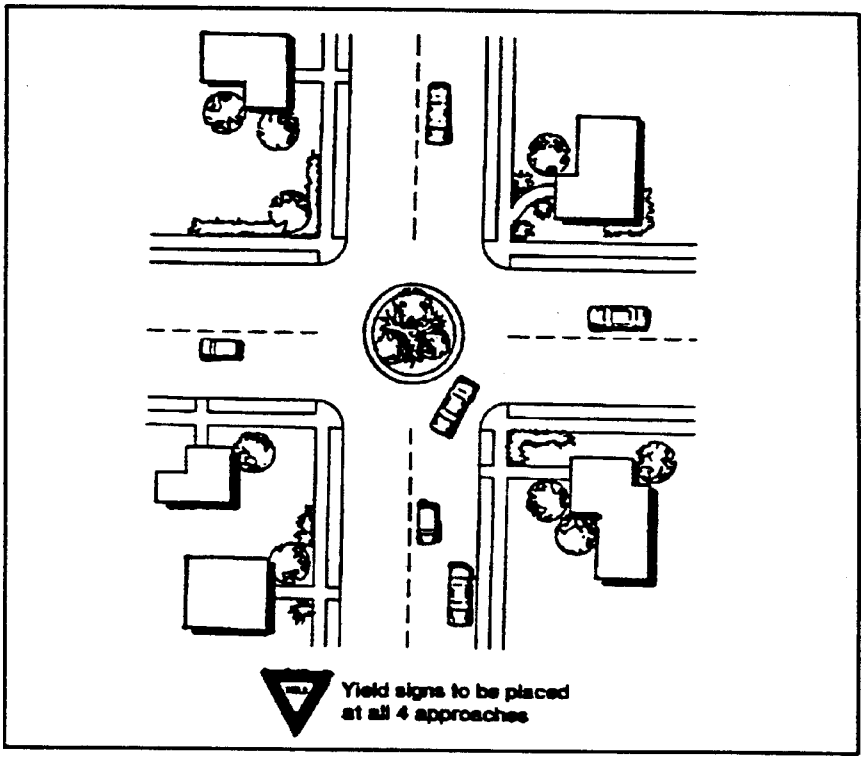
Special Considerations:

- Cannot be used where right-of-way is limited
- May require removal of on-street parking

Cost:

- High

TRAFFIC CIRCLE



Description: Traffic circles are raised circular medians in an intersection with counterclockwise traffic flow. Vehicles must change their travel path to maneuver around the circle and are typically controlled by "Yield on Entry" on all approaches.

Application:

- Streets where speed contro1 is desired
- Intersections where improved side-street access is desired

Advantages:

- Provides increased access to street from side street
- Slows traffic as it drives around median
- Breaks up sight -lines on straight streets
- Opportunity for landscaping in the intersection

Disadvantages:

- Definition of right-of-way is contrary to the "'yield to the vehicle on the right" rule
- May impede emergency response and ambulance transport
- Relatively expensive if curb extensions are required
- May impede left turns by large vehicles
- On streets with bicycle facilities, bikes must merge with traffic around circle
- Creates physical obstruction in the travel way

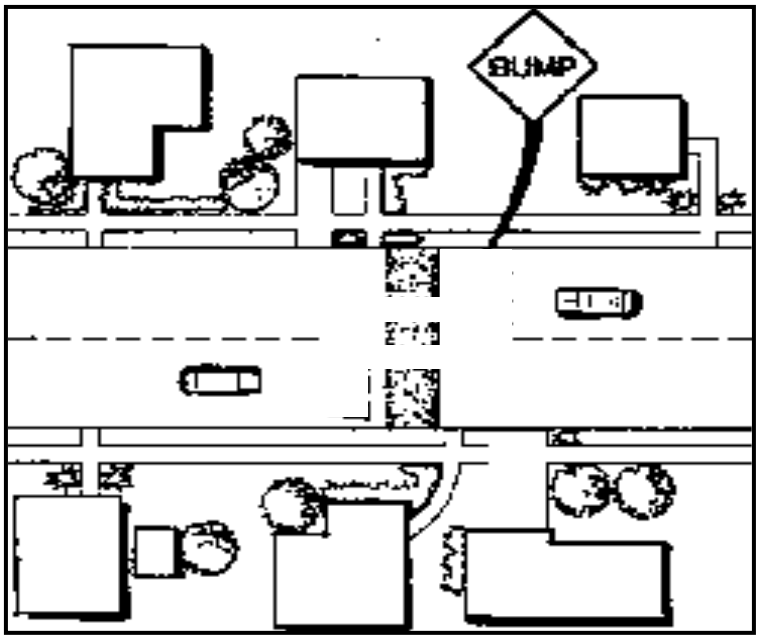
Variations:

- With or without neckdowns
- With or without diverter islands

Special Considerations:

- Need to be used in series or in conjunction with other traffic calming devices
- Requires special approval by the Fire Department for use on critical emergency response routes
- May require extensive signing
- Minimum 20' clearance is required around circle
- May require educational campaign and learning period
- Should be constructed with mountable curb face to accommodate emergency and large vehicles

Cost: High



SPEED LUMPS

Description:

Speed lumps are similar to speed humps, except they are divided into three lumps with one foot of space between each lump. The space between the lumps is specifically designed to accommodate the axle width of fire vehicles. All other vehicles with smaller axle widths have to go over the humps from at least one side of the vehicle. Speed lumps are typically 12 to 14 feet long and 3 inches high.

Application:

- Any two-lane residential street where speed control is desired.
- The street segment shall be improved with curb and gutter and at least 750 feet long
- Shall not be installed within at least 150 feet of the beginning or ending of a curve.
- Shall be spaced at a minimum of 100 feet from an intersection.
- Usually spaced 300 to 600 feet apart
- Could be used in conjunction with other approved traffic calming devices.
- The roadway longitudinal grade is 5% or less

Advantages:

- Effective in reducing speed
- Does not require parking removal
- Can reduce vehicular volume
- Inexpensive compared to chicanes, traffic circles, and median islands

Disadvantages:

- Increases noise and air pollution near lumps
- May cause slight delay on emergency response vehicles other than fire trucks
- Not aesthetically pleasing
- May divert traffic to parallel streets
- May cause discomfort to motorists/passengers with spinal injuries

Special Considerations:

- Require advance warning signs and object markers at lumps
- Should be located adjacent to existing street lights
- Difficult to construct precisely.

Cost:

- Low to medium cost to install