

City of Placerville Traffic Calming Policy and Resource Manual



City of Placerville
3101 Center Street
Placerville, California 95667

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INTRODUCTION

The purpose of this Traffic Calming Policy and Resource Manual is to assist community leaders, City staff and residents with an understanding of the City of Placerville's Traffic Calming Program. One of the most persistent and emotional complaints that the City receives is speeding on residential streets. Traffic Calming is the management of traffic so that its negative impacts on residents, pedestrians and schools are minimized. Traffic Calming elements are those traffic control devices and programs that regulate, warn, guide, inform, enforce and educate motorists, bicyclists and pedestrians. These elements include signing and striping applications, minor roadway design/construction to improve visibility and safety, enforcement by police services, public outreach and safety education. These elements promote safe and pleasant conditions for residents, pedestrians, bicyclists, and motorists on neighborhood streets. They assist in reducing vehicular traffic on local neighborhood streets, reduce the average speed of traffic on local neighborhood streets, and preserve and enhance pedestrian and bicycle access to neighborhood destinations.

The mission of a Traffic Calming Program is to improve community safety, preserve community character and enhance the local neighborhoods by working with the residents to implement solutions to concerns created by automobile traffic on neighborhood streets. Neighborhood traffic management programs are becoming standard practice for many cities around the world that are taking an active role in managing growth and making sure their roadways are safe, attractive, and convenient for all users. Citizens play an integral role in developing successful traffic management programs for their streets by working with City staff and utilizing street design tools, education, and enforcement to determine ways to attempt to manage and calm traffic. The goal of the Traffic Calming Policy and Resource Manual will be to develop a process to assess various city streets and address problems such as speeding traffic, increased traffic volumes, and safety and provide those tools available to address and mitigate the problems.

This manual provides the necessary tools for the City of Placerville to successfully implement Traffic Calming Programs on public streets. It provides a course to follow that will guide the users through a comprehensive process to determine the most practicable and effective mitigation for a specific problem. It provides a "tool box" of different techniques that can be used alone or in combinations with other tools to manage neighborhood traffic. Included is a summary chart, which is a useful means in selecting treatments to consider in the development stage of the process. Each tool's description provides the user with the advantages and disadvantages of each technique and the level of effectiveness. It also lists those characteristics that it specifically addresses such as speed reduction. Although intended for use on the City's public streets, it can be used by communities with private streets.

ROADWAY DESIGNATIONS

From the City's General Plan Circulation Element, the roadway system in Placerville is defined using a classification system that describes a hierarchy of facility types. The categories of roadways included in this classification system differentiate the size,

function and capacity of the roadway links for each type of roadway. There are six basic categories in the hierarchy, ranging from "freeway" with the highest capacity to "local" streets with the lowest capacity and can be summarized as follows:

Freeway - A six- to ten-lane divided arterial roadway with full access control, grade separations at all intersections and a typical right-of-way width in excess of 150 feet, designed and maintained by the State Department of Transportation.

Major - A six-lane divided roadway with a typical right-of-way width of 120 feet and a curb-to-curb pavement width of approximately 100 feet. This classification accommodates 30,000 to 45,000 ADT (Average Daily Traffic).

Primary - A four-lane divided roadway with a typical right-of-way width of 100 feet and curb-to-curb pavement width of approximately 84 feet. This classification accommodates 20,000 to 30,000 ADT.

Secondary - A four-lane undivided roadway, with a typical right-of-way width of 80 feet and a curb-to-curb pavement width of approximately 64 feet. This classification accommodates 10,000 to 20,000 ADT.

Local Collector - A two-lane undivided roadway with a typical right-of-way width of 60 feet and a pavement width of approximately 40 feet. This category of roadway is designed to provide access to individual parcels in the City. This classification accommodates 7,500 to 10,000 ADT.

Although not specifically discussed in the Circulation Element, there is also the residential or local street designation.

Local/Residential - Two-lane streets with a typical right of way width of 40-60 feet and a pavement width of 24-40 feet. This type of roadway typically accesses residential parcels and accommodates less than 7,500 ADT.

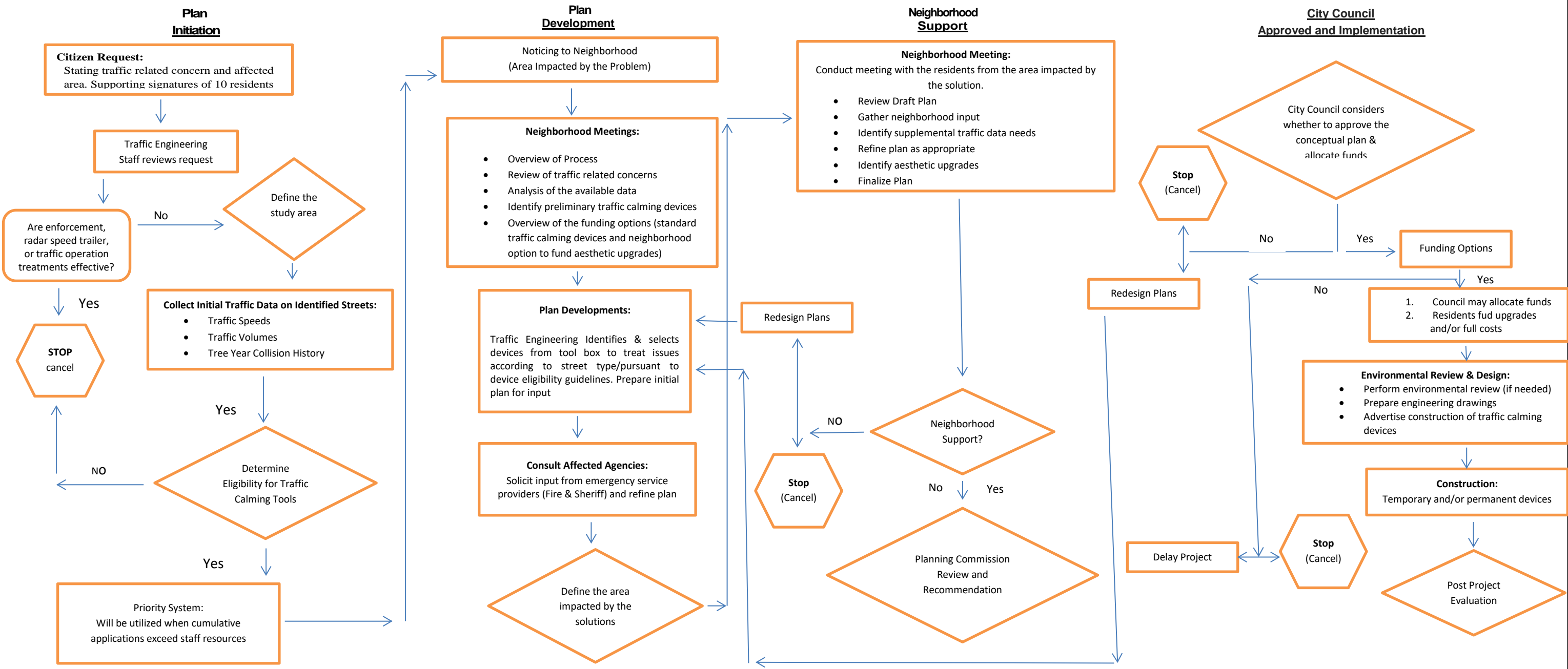
City Of Placerville TRAFFIC CALMING PROCESS

The following is a brief outline of the process to achieve the goals of the Placerville Traffic Calming Policy and Resource Manual. Figure 1 provides a flow chart that provides the steps that the City will follow when considering traffic calming measures. Four major steps are shown. Depending on the particular issues, not all of the major steps may be necessary. The four major steps are:

1. Plan Initiation
2. Plan Development
3. Neighborhood Support
4. City Council Approval and Implementation

City of Placerville Traffic Calming Process

Figure 1 – City of Placerville Traffic Calming Process



1. Plan Initiation

Citizen Request

The first component of the process is the initial request. The process would begin when a resident or group contacts City staff by telephone, letter or e-mail to discuss and make them aware of a potential neighborhood traffic problem. A resident or group may also address the City Council or Planning Commission. Problems typically would be regarding speeding, traffic volumes or traffic-related safety issues within their neighborhood. The request should describe the problem and affected area. The residents may also provide any supporting data that may have been gathered that they feel will further assist City staff with their request. The request should have the signatures of ten supporting residents in the affected area.

Traffic Engineering Staff Review

City staff reviews problem and visits the site. Staff will determine if enhanced enforcement by the Police Department or a radar speed trailer will mitigate the situation. If it is determined that this is the most effective mitigation, staff will work with the Police Department to implement and the request will be addressed with no further action. If these measures do not effectively mitigate the problems, staff will further define the area impacted by the problem.

Define Study Area

The area affected by the problem will be defined by City staff according to the petition and later refined with residents and staff's knowledge of where the traffic-related concerns occur. Staff may contact the initiators of the petition to gain a better understanding of the neighborhood concerns. Staff will also determine whether the traffic-related issue affects multiple streets or a single street. Determining the area affected by the problem is necessary to understand where initial traffic data should be collected or if development of a plan would potentially affect other nearby streets.

Collect Initial Traffic Data

Staff will perform a more detailed field review of the area defined by the problem and collect preliminary traffic data. Traffic data collection may include the following:

- Traffic speeds
- Traffic volumes
- Three-year collision history

Traffic volumes will be collected for a minimum of 24 hours using a pneumatic hose count machine at the locations identified in the petition. The City may also conduct a radar speed survey with an unmarked vehicle so that vehicles do not slow down as soon as they see the "typical" radar trailer or an officer from the Police department in a marked car. The three-year collision history may be collected to determine the type and severity of collisions in the neighborhood. This information will be used to rank the magnitude of traffic issues. Staff will also identify parks, school, bus routes, and/or other significant characteristics of the affected area.

Once the initial data has been collected, analyzed and interpreted for the affected neighborhood, staff will notify and work with the residents in the area. The impacted area may encompass a single street or multiple streets. Historically, the traffic-related issues on a single street are much simpler to address and typically involve fewer neighborhood traffic management devices. Multiple street plans include more than one affected street and will consequently require greater resources to implement and have the potential to affect a greater number of residents.

Determine Eligibility for Traffic Calming Tools

Staff will utilize a point system to determine if the residential neighborhood qualifies for traffic calming treatments. The table below shows how a value is assigned to each data element. When data such as speed and volume is gathered at more than one location within the neighborhood, points will be assigned for each location and then averaged to ensure equitable comparisons.

Data Element	Points	Basis for Points
Speed	0 to 30	Extent that 85th percentile* speeds exceed speed limit; 2 points assigned for every 1 mph over speed limit
ADT Volume	0 to 25	1 point for every 25 vehicles over 500 ADT for local residential streets or 1 point for every 100 vehicles over 1500 ADT for collector residential streets.
Crashes	0 to 15	1 point for every nonfatal crash and 5 points for every fatal crash recorded by the Poice Department in the last 3 years
Pedestrian Generators	0 to 20	5 points for every school, park, beach, bus stop, community center, library, or other public facility within the impact area
Sidewalks or pathways	0 to 10	5 points if there are not continuous sidewalks or pathways on one side of all local residential streets or both sides of all collectors; 10 points if there are no sidewalks
Discretionary Factors	0 to 10	Up to 10 points may be awarded by the City Manager for additional data provided by residents, percentage of residents in support, and other factors.
Total Points Possible	100	

**The 85th percentile speed is the speed at or below which 85 percent of the vehicles travel.*

A minimum total score of 51 points is required for the residential neighborhood to qualify for traffic calming treatments. If it is not eligible or it is determined that there are no tools available to address the problem, no further action will be taken.

For arterial streets, the following minimum eligibility guidelines must be satisfied in order to proceed further with the process:

1. The 85th percentile speed is at least 9 mph above the prima-facie speed limit
2. Peak hour traffic volume is between 1000 and 2000 vehicles
3. Roadway has a minimum length of one-half mile

Priority System

If the eligibility guidelines are met, the City will rank the various petitions when cumulative applications exceed current staff resources. The highest ranked applications may then move to the next step in the process with current staff or outside consultants.

2. Plan Development

Notifying the Neighborhood

At this time, staff has determined that traffic calming measures may be warranted. The residents/property owners in the neighborhood impacted by the problem will be notified that the City is investigating and considering implementing one or more traffic calming measures in their neighborhood that may directly or indirectly affect them. This notification may be either by direct mail or hand delivered notices to all impacted stakeholders in the neighborhood.

Neighborhood Meeting

City staff will schedule a neighborhood meeting with those residents and stakeholders impacted by the problem. At this meeting, staff will present the attendees with an overview of the City's Traffic Calming program process. The traffic-related concerns will be presented and discussed to define the objectives. A map of the affected area will be presented and potential types of various traffic calming devices will be discussed. Staff will review the analysis of the available data and may present an initial plan to mitigate the traffic concerns raised by the residents in the petition. Any other supplemental traffic data needs required for the process will be identified and the course of action necessary to procure such data will be defined.

Staff will provide information to the neighborhood residents about the various possible funding options for traffic calming in the City. It may be necessary to schedule more than one meeting to meet the objectives outlined in the City's Plan Development phase of the traffic calming process.

Plan Development

City staff will further review the data previously collected and any new data obtained as a result of the neighborhood meeting(s). Staff will revisit their initial recommendations and formulate any new or additional recommendations to mitigate the traffic problem in the impacted area. Neighborhood input will be taken into consideration during this step of the process.

City staff will then identify and select from the toolbox those devices that treat the issues surrounding the particular traffic problem in accordance with the eligibility guidelines.

Consult Affected Agencies

Once engineering staff has determined that the program meets the eligibility requirements and has developed a plan they feel appropriately addresses the traffic-related issues, feedback will

be solicited from other agencies that may be potentially affected by the plan. The intent of this process is to identify concerns and potential modifications to the plan. Agencies to be contacted may include:

- El Dorado County Fire Authority
- El Dorado County Sheriff's Department
- El Dorado Transit Authority (EDT)
- Placerville Union School District
- El Dorado Union High School District

Define the Area Impacted by the Solution

Once staff has identified the problem, determined the area impacted by the problem, identified the traffic calming program to address the problem, met and received input from affected residents and stakeholders, staff will determine the areas impacted by the solution. This will include the area impacted by the problem in addition to those areas that may be impacted by the solution. History has shown that solving a traffic problem in one neighborhood may cause the problem to relocate to another area in close proximity. Not all traffic calming devices have this potential, but some do. Staff will determine if the proposed traffic calming devices may have an impact on surrounding areas not defined in the area impacted by the problem. This step is critical in gathering support from all of those affected by not only the problem, but also the solution.

3. Neighborhood Support

Neighborhood Meeting

Staff will schedule a meeting with those impacted by the problem and those impacted by the solution. At this point, staff has already met with those impacted by the problem and received their comments and concerns. In addition, traffic engineering staff have reviewed additional information as well as received responses from the affected agencies. This information is used to either solidify the proposed traffic calming program or require refinements to what was previously envisioned as a viable solution.

Staff will review the draft plan with those in attendance at the meeting. Further input from the affected neighborhood residents and stakeholders will be requested. Again, residents will be asked to provide input on any aesthetic enhancements as part of the traffic calming devices that they feel would be beneficial to the neighborhood.

Staff may revise the traffic calming plan based upon feedback from the neighborhood. If it was determined that there is not consensus, traffic engineering staff may stop any further action, proceed back to the Plan Development stage or proceed to the Planning Commission.

Staff will provide the estimated cost of the proposed plan and discuss the funding options to implement the plan. The neighborhood residents can also determine what type if any aesthetic improvements they desire and are willing to fund as part of the implementation of the traffic calming plan.

Planning Commission

City staff will present the proposed traffic calming plan to the Planning Commission for review, comment and recommendation to the City Council.

4. City Council Approvals and Implementation

After the Planning Commission has been presented with the proposed traffic calming plan, staff will present it to the City Council for recommendation and approval. The staff report will provide the steps taken to establish the proposed plan, provide expected results and discuss neighborhood support, affected agency feedback and the estimated cost to implement the plan. In addition, any outside funding sources will be identified along with the process through which to procure these funds and the estimated time frame to do so.

The City Council will then make its decision based on the staff report and any feedback that may be received during the public hearing at the City Council meeting.

If the City Council does not approve the proposed traffic calming plan, a decision will be made to either stop the process or go back to the Plan Development step and reconsider alternative traffic calming devices and redefine the proposed plan. If the City Council approves the proposed plan, as presented or with modifications, funding options will be considered.

Funding Options

The City Council may direct staff to proceed with implementing the proposed program with existing City funds. It may also choose this option with the understanding that the neighborhoods affected by the proposed plan will provide additional funds to further aesthetically enhance the proposed traffic calming devices. In addition, it may be determined in the Neighborhood Meetings that the affected neighborhoods have volunteered to fund the entire program implementation.

The City Council may also choose to approve the proposed traffic calming program, but delay its implementation until funds are available. This may involve approval of the program with direction to City staff to incorporate the respected program improvement into the City's Capital Improvement Program (CIP). When the funds are programmed for this project, staff will proceed with project implementation.

Environmental Review & Design

The first step in implementing the approved traffic calming program will be to determine if any environmental documentation is necessary in accordance with the California Environmental Quality Act (CEQA) and/or the National Environmental Policy Act (NEPA). CEQA is the state mandated environmental program and NEPA is the federal mandated environmental program. If deemed necessary, City staff will prepare the necessary documents to meet the guidelines established through either or both CEQA/NEPA.

Staff will then begin the design stage of the implementation process by preparing plans specifications and estimates (PS&E). These are the construction documents necessary for a contractor to construct the improvements determined for a particular traffic calming program. Once the City Engineer has approved the PS&E, staff will advertise and solicit bids from qualified contractors to construct the respective traffic calming devices.

Construction

The contractor will construct the devices identified in the PS&E package in accordance with all applicable standards, specifications and requirements. These devices may be temporary or permanent installations depending on what was defined in the proposed traffic calming program and the scope of the PS&E.

Post Project Evaluation

After construction of the approved traffic management plan improvements, traffic engineering staff will rely on the community members, the Police department and field observations for feedback on the constructed devices. Based on this feedback, the City will determine the next steps, if any. For example, the approved plan may have produced reasonable and satisfactory results and therefore there is nothing further for the City to do. This evaluation will also assist staff in addressing future traffic problems in other areas. It will serve as a “lesson learned” synopsis.

If the approved plan has not produced reasonable and satisfactory results, the following options are available:

- Take no further action
- Collect additional traffic data
- Modify constructed devices
- Implement additional traffic calming measures

The following table provides a list of the devices presented in the Tool Box (Appendix A). It identifies the device, the direct and indirect issue it addresses, and provides a range of expected costs to implement. These costs are based on the typical application and will vary depending on such factors as street width, length, environmental issues, aesthetic enhancements and if right-of-way acquisition is necessary. They are provided only as a guideline and as discussed in the process, more detailed cost estimates will be prepared for each proposed traffic calming program.

Toolbox Item		Speed Reduction	Volume Reduction	Improves Safety	Increase in Noise and Pollution	Local Streets (Residential)	Collector/Secondary Streets	Arterial Streets	Estimated Construction Cost
1	Enforcement (Visible & Active Police Presence)	X	I	X		X	X	X	
2	Speed Feedback Sign	X	I	X		X	X	X	
3	Neighborhood Traffic Safety Campaign (Education)	X	O	X		X	X		
4	Radar Trailer	X	I	X		X	X	X	
5	Lane Narrowing	X	I	O		X	X	X	
6	Edge Line	X	I	O		X	X	X	
7	Chicane/Deviation	X	O			X	X		
8	Angled Slow Points	X	O			X	O		
9	Forced Turn Islands, Barriers, Channelization	I	X	X			X		
10	Gateway Treatment	X	I			X	X	O	
11	Mid-Block Median	X	O			X	X	X	
12	Modified Intersection	X	I			X	X	X	
13	Landscaping	X	I			X	X	X	
14	Neck downs/Chokers	X	O			X	X		
15	One-way Streets		I	X		X	X		
16	Roundabouts (single-lane)	X	O				X	O	
17	Traffic Circle	X	O			X	X	O	
18	Raised Crosswalk	X	O		X	Mid-block			
19	Speed Humps	X	X		X	Mid-block	Mid-block		
20	Raised Intersections	X	O		X	X			
21	Partial Street Closure		X	X		X	X		
22	Full/Diagonal Diverters	X	X	X		X			
23	Traversable Barriers		X			X			
24	Full Closures, Cul-de Sacs	X	X			X			
25	Turn Restriction Signs	I	X	X		X	O	O	

X Appropriate

O Moderately Appropriate

I Indifferent

APPENDIX A

Traffic Calming Tool Box

1. Traditional Enforcement



This is the periodic monitoring of speed and other violations by the police department in a highly visible way to deter and prevent unacceptable driver activity. This is a medium to high cost tool.

Advantages:

- Good temporary public relations tool
- Serves to inform the public that speeding is undesirable behavior for which there are consequences.
- Quick Implementation

Disadvantages:

- Effects are not permanent
- Enforcement is an expensive tool

Criteria:

- Local, collector and arterial street

Level of Effectiveness

Safety	Speed Reduction	Volume Reduction	Local or Collector	Pollution	Cost	Emergency Service
Possible Improvement	Temporary	No	Both	N/A		N/A

2. Speed Feedback Sign



Speed feedback signs perform the same functions as radar trailers but are permanent. Real-time speeds are relayed to drivers and flash when speeds exceed the limit. Speed feedback signs are typically mounted on or near speed limit signs and can be mobile units.

Advantages:

- Real-time speed feedback
- Does not physically slow emergency vehicles or buses
- Permanent Installation

Disadvantages:

- May require a power source
- Only effective for one direction of travel
- Long-term effectiveness uncertain

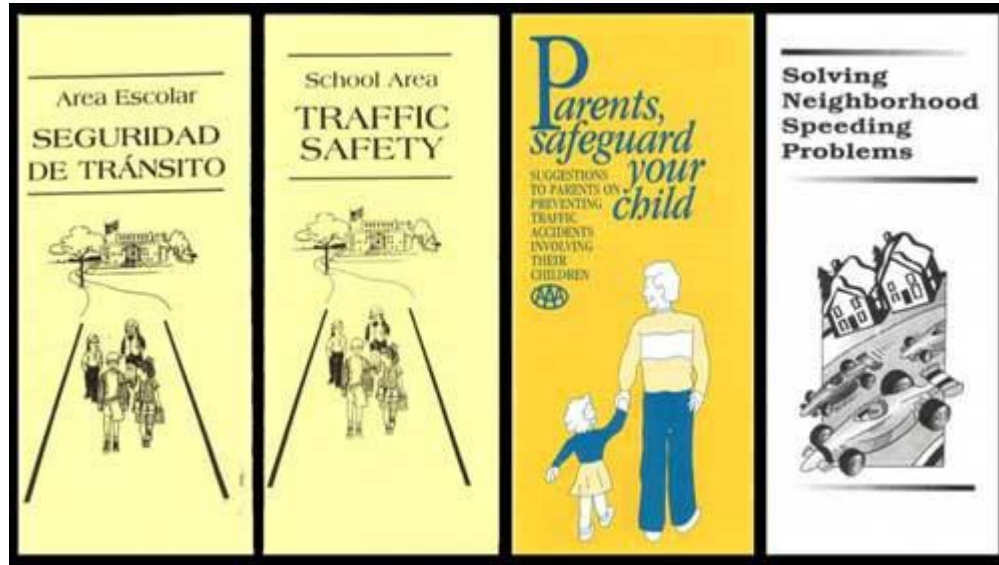
Criteria:

- Two lane, two-way roadway or single lane one-way roadway

Level of Effectiveness

Safety	Speed Reduction	Volume Reduction	Local or Collector	Pollution	Cost	Emergency Service
Possible Improvement	Yes	No	Both	Small Decrease		No Impact

3. Education



Traffic safety campaigns for a particular neighborhood usually consist of informational leaflets, fliers or letters sent out to residents and schools.

These may show information on current travel speeds within the area with a request that neighbors adhere to posted speed limits and other traffic laws such as stopping at stop signs etc. It is not clear whether these measures actually result in safer driving conditions or whether they are effective in the reduction of traffic speeds. They target neighborhood residents so speeding resulting from non-local cut-through traffic is not affected.

Advantages:

- Helps to make residents aware of problems
- May offset some complaints from some residents
- Signs may enhance the residential nature of an area if used with other measures.
- May make residents aware of a potential safety problem

Disadvantages:

- Effectiveness of these measures has not been verified
- There may be other more effective measures to use

Criteria:

- None

Level of Effectiveness

Safety	Speed Reduction	Volume Reduction	Local or Collector	Pollution	Cost	Emergency Service
Possible Improvement	Possible	N/A	N/A	N/A		No Effect

4. Radar Speed Trailer



This is a mobile trailer-mounted radar display that measures each approaching vehicle's speed and displays it next to the legal speed limit in clear view of the driver. This element is applicable on any street where speeding is a problem and can be moved from location to location easily.

Advantages:

- Educational tool
- Good public relations for neighborhoods
- Portable
- Effective for temporary speed reduction needs
- Quick implementation

Disadvantages:

- Not self-enforcing
- Duration of effectiveness is limited
- May require temporary lane closures
- Subject to vandalism

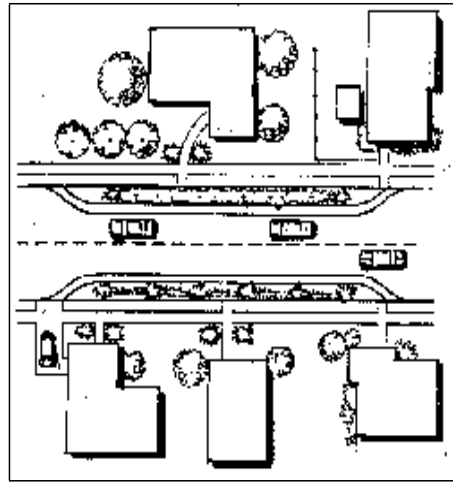
Criteria:

- Two to four lane, two-way roadway or single lane one-way roadway
- Local, Secondary and arterials

Level of Effectiveness

Safety	Speed Reduction	Volume Reduction	Local or Collector	Pollution	Cost	Emergency Service
Possible Improvement	Yes	No	Both	N/A		No Effect

5. Lane Narrowing



Curb extensions at midblock or intersection corners that narrow a street by extending the sidewalk or widening the planting strip

Advantages:

- Minor inconveniences to drivers
- Minimal inconvenience to local traffic
- Good for pedestrians due to shorter crossing distance
- Slows traffic without seriously affecting emergency response time
- Reduces pedestrian crossing width and increases visibility of pedestrian
- Single lane narrowing reduces vehicle speed and through traffic

Disadvantages:

- May impact parking and driveway access
- Unfriendly to cyclists unless designed to accommodate them
- Conflict between opposing drivers arriving simultaneously could create problems.

Criteria:

- Local and collector streets over 32 feet wide with less than 7,500 vehicles per day
- Street must have a speed limit of 30 mph or less

Level of Effectiveness

Safety	Speed Reduction	Volume Reduction	Local or Collector	Pollution	Cost	Emergency Service
Possible Improvement	Yes	Possible	Local	Small Increase		No Effect

6. Edge Line



Lane striping can be used to create formal bicycle lanes, parking lanes, or edge lines. As a neighborhood traffic management measure, they are used to narrow the travel lanes for vehicles, thereby inducing drivers to lower their speeds.

Advantages:

- Inexpensive
- May reduce speed
- May increase safety for pedestrians and cyclists
- Low maintenance
- Does not slow emergency vehicles

Disadvantages:

- May not be as effective as other more structured techniques
- Requires regular maintenance

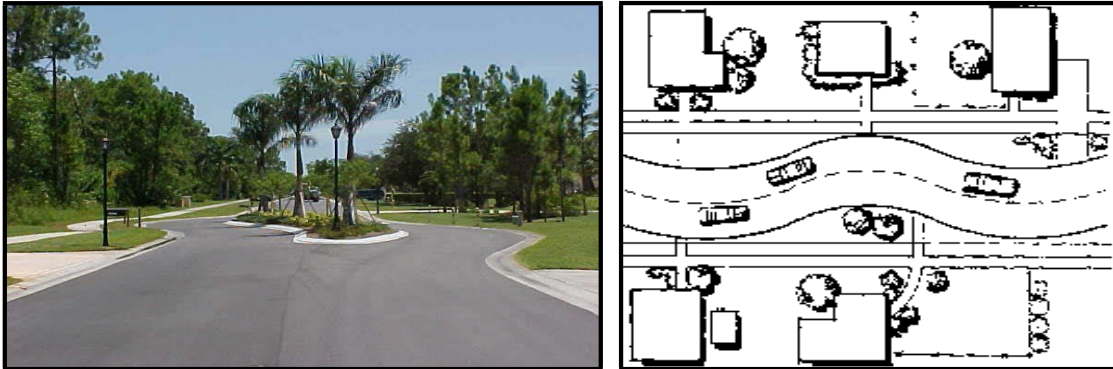
Criteria:

- Local and collector streets with a minimum width of 32 feet and less than 10,000 vehicles per day
- With and without parking
- Street must have a speed limit of 35 mph or less

Level of Effectiveness

Safety	Speed Reduction	Volume Reduction	Local or Collector	Pollution	Cost	Emergency Service
Possible Improvement	Possible	No	Both	No Effect		No Effect

7. Chicane/ Deviation



Chicanes are sometimes called deviations, serpentes, reversing curves and twists. Chicanes are curb extensions that alternate from one side of the street to the other, forming S-shaped curves. Chicanes can also be created by alternating on-street parking, either diagonal or parallel, between one side of the street and the other. Each parking bay can be created either by restriping the roadway or by installing raised, landscaping islands at the ends of each parking bay.

Good for locations where speeds are a problem but noise associated with Speed Humps and related measures would be unacceptable.

Advantages:

- Provides a greater visual obstruction
- Pedestrians have a reduced crossing distance
- Imposes minimal inconveniences to local traffic
- Cost is dependent on length
- Are easily negotiable by large vehicles (such as fire trucks) except under heavy traffic conditions

Disadvantages:

- Curb realignment and landscaping can be costly, especially if there are drainage issues
- Must be designed carefully to discourage drivers from deviating out of the appropriate lane
- May require the elimination of some on-street parking

Criteria:

- Local streets over 32 feet wide with less than 7,500 vehicles per day
- Two lane, two-way streets or one lane one-way streets
- Not on regularly used by emergency vehicles or a bus route
- Street must have a speed limit of 30 mph or less

Level of Effectiveness:

Safety	Speed Reduction	Volume Reduction	Local or Collector	Pollution	Cost	Emergency Service
Possible Improvement	Yes	Possible	Local Collector (Possibly)	Small Increase		Possible Problems

8. Angled Slow Points



An Angled slow point is a variant of a chicane or one-lane choker. An angled deviation to deter the path of travel so that the street is not a straight line (by the installation of offset curb extensions).

Advantages:

- Reduces vehicle speed
- More effective when used in a series
- Imposes minimal inconveniences to local traffic
- Provides space for landscaping
- Provides a visual obstruction

Disadvantages:

- Landscaping needs to be controlled to ensure visibility is not reduced
- Contrary to driver expectation of unobstructed flow
- Can be hazardous for drivers and cyclists if not designed and maintained properly
- Confrontation between opposing drivers arriving simultaneously may create problems
- Double lane application is less effective in controlling speeds than single lane because drivers can create a straighter through movement by driving over centerline
- Increases area of landscaping to be maintained by residents

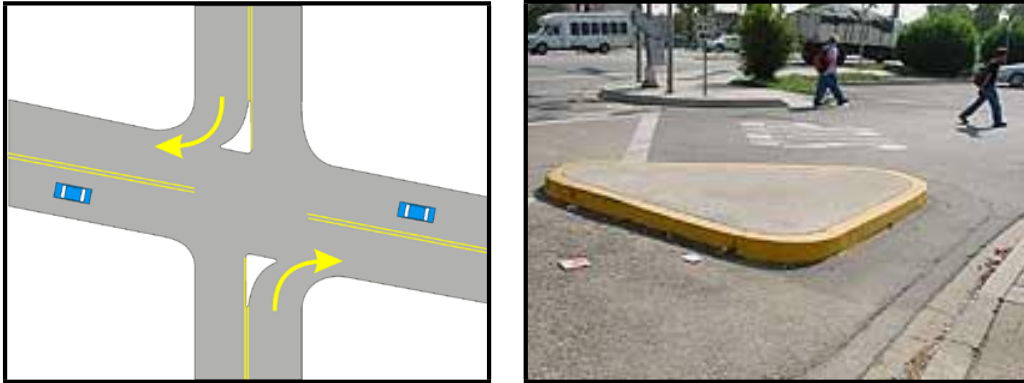
Criteria:

- Local and collector streets over 26 feet wide with less than 3000 vehicles per day
- Two lane two-way roadways
- Not on routes regularly used by emergency vehicles or on bus routes
- Street must have a speed limit of 30 mph or less

Level of Effectiveness:

Safety	Speed Reduction	Volume Reduction	Local or Collector	Pollution	Cost	Emergency Service
Possible Improvement	Yes	Possible	Local	Small Increase		Possible Problem

9. Forced Turn Barriers



These are traffic islands or curbs specifically designed to prevent traffic from making certain movements at an intersection or to force the traffic into specific patterns. They are sometimes referred to as "Pork Chops" or right-turn islands.

Care should be taken to evaluate the effects of diverted traffic on adjacent streets. Problems could be simply transferred from one location to another.

Advantages:

- Potential to reduce traffic speed
- Reduces traffic volumes
- Can be used to reduce cut-through traffic
- Self-enforcing
- Landscaping possible

Disadvantages:

- May reduce access for emergency vehicles
- Diversion to longer routes may cause inconvenience to and be opposed by affected residents
- Care needed if placed on transit routes
- Access to residences may also be adversely affected
- May transfer problems elsewhere
- Need to allow bicycle access

Criteria:

- Local and collector streets
- Two lane, two-way streets or single lane one-way street
- Intersection leg with diverter must be stop controlled
- Not on routes regularly used by emergency vehicles or a bus route

Level of Effectiveness:

Safety	Speed Reduction	Volume Reduction	Local or Collector	Pollution	Cost	Emergency Service
Possible Improvement	Possible	Yes	Both	Small Increase		Possible Problem

10. Gateway Treatment



A gateway is a special entrance that reduces the width of a travel way, often implementing the use of islands. It is usually placed in a roadway to define the entry to a residential area and/or to narrow each direction of travel and interrupt the view path along the center of the roadway.

Advantages:

- High visibility to motorists to notify change in roadway nature
- May discourage cut-through traffic
- Helps slow traffic

Disadvantages:

- Will increase need for maintenance
- May necessitate removal of parking

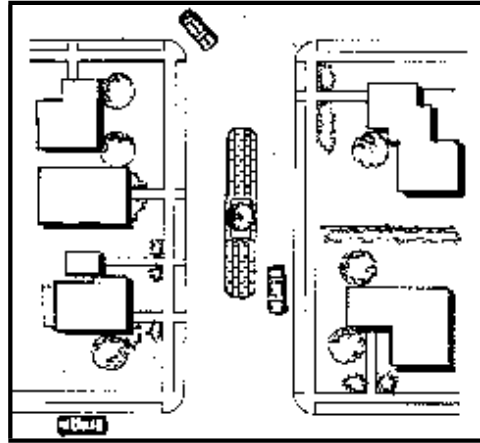
Criteria:

- Local and collector streets over 26 feet wide
- Significant entrances to neighborhood or commercial area

Level of Effectiveness

Safety	Speed Reduction	Volume Reduction	Local or Collector	Pollution	Cost	Emergency Service
Possible Improvement	Unlikely	Mixed Results	Both	No Effect		Possible Problems

11. Mid-block Median



Mid-block medians are sometimes referred to as center island narrowing, median slow points, or median chokers. Raised islands located along the centerline of a street that narrow the travel lanes at that location

Advantages:

- Are often nicely landscaped to provide visual amenity and neighborhood identity
- Provides a mid-point refuge for pedestrian crossings
- Sometimes used on wide streets to narrow travel lanes
- Provides a barrier between lanes of traffic
- Works well when combined with crosswalks

Disadvantages:

- May reduce parking and driveway access
- May also limit line of sight (visibility)
- Increased maintenance

Criteria:

- Local and collector streets over 32 feet wide with less than 10,000 vehicles per day
- Two lane, two-way streets
- Street must have a speed limit of 30 mph or less

Level of Effectiveness:

Safety	Speed Reduction	Volume Reduction	Local or Collector	Pollution	Cost	Emergency Service
Possible Improvement	No	Possible	Both	No Effect		Possible Problems

12. Modified Intersection



Median devices that force turns by motorists

Advantages:

- Reduces vehicle speed
- Changes driving patterns
- Necessary to enforce changes in priority from one street to another
- Reduces through traffic
- May provide space for landscaping

Disadvantages:

- May increase response times for emergency vehicles
- Reduces access to properties for residents
- May increase trip length for some residents
- Can be aesthetically unattractive if not landscaped

Criteria:

- Local and collector streets forming a T-intersection and not on a primary street
- Street width greater than 26 feet
- Street must have 5000 vehicles per day or less
- Street must have a speed of 35 miles per hour or less

Level of Effectiveness:

Safety	Speed Reduction	Volume Reduction	Local or Collector	Pollution	Cost	Emergency Service
Possible Improvement	Yes	Possible	Both	Small Increase		Possible Effects

13. Landscaping



Treatment to a streetscape that focuses on visual aspects, landscaping and dimensional changes to communicate a sense of neighborhood and helps make motorist aware of a change in driving environment.

Advantages:

- Positive indication of a change in environment from arterial road to residential street
- Reduces entry speed
- May reduce pedestrian crossing distances
- Helps give neighborhood a sense of identity
- Allows neighborhood's creativity and participation in design

Disadvantages:

- May increase maintenance responsibility. This can be eliminated if the community is responsible to maintaining the landscaping.

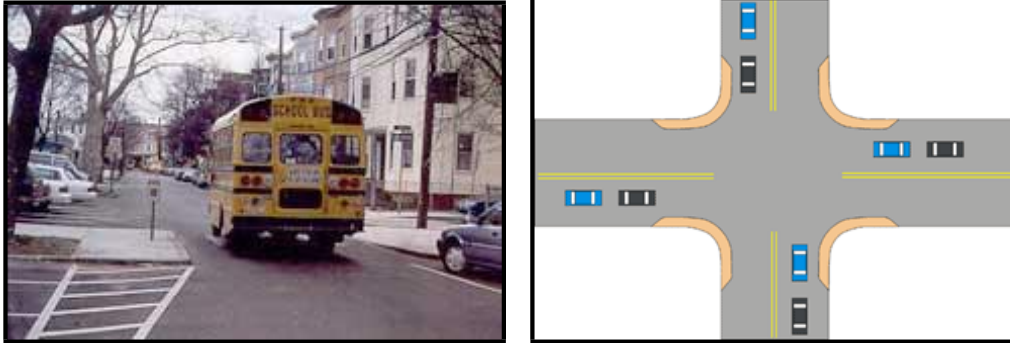
Criteria:

- Local, collector and arterial streets
- Existing median or a minimum street width of 32 feet
- Landscaping cannot impeded sight distance

Level of Effectiveness:

Safety	Speed Reduction	Volume Reduction	Local or Collector	Pollution	Cost	Emergency Service
Possible Improvement	Possible	No	Both	No Effects		No Effect

14. Neck Downs/Chokers



Neck downs, also known as nubs, bulbouts, knuckles, intersection narrowings, corner bulges, and safe crosses. Neck downs are curb extensions at intersections that reduce the roadway width from curb to curb. They "pedestrianize" intersections by shortening crossing distances for pedestrians and drawing attention to pedestrians via raised peninsulas. They also tighten the curb radii at the corners, reducing the speeds of turning vehicles.

They are good for intersections with substantial pedestrian activity and areas where vertical traffic calming measures would be unacceptable because of noise considerations.

Advantages:

- Improve pedestrian circulation and space
- Through and left-turn movements are easily negotiable by large vehicles
- Create protected on-street parking bays
- Reduce speeds, especially for right-turning vehicles
- Shorter crossing distance for pedestrians

Disadvantages:

- Effectiveness is limited by the absence of vertical or horizontal deflection
- May slow right-turning emergency vehicles
- May require bicyclists to merge with vehicular traffic
- They may require the elimination of some on-street parking near the intersection

Criteria:

- Streets wider than 26 feet with or without parking or wide curb lanes with 20,000 vehicles or less per day
- Intersections where there is low truck volume and other large vehicles
- Near schools or other areas of high pedestrian volumes
- Street must have a speed limit of 35 mph or less

Level of Effectiveness:

Safety	Speed Reduction	Volume Reduction	Local or Collector	Pollution	Cost	Emergency Service
Possible Improvement	Yes	Possible	Both	Small Increase		No Effect

15. One-way Streets



One-way Streets and associated signs are used to restrict all through traffic in a given direction on particular streets. When used on a series of streets they can be effectively used to prevent cut-through traffic.

One-way couplets or pairs of one-way streets going in two directions are not usually used for traffic calming because they often cause an increase in traffic speed. All one-way streets have the potential to increase travel speed and they may need to be used in conjunction with other speed control devices to offset this. It is important to obtain resident input in any plan to implement one-way streets because access routes to properties on or near the streets can be affected.

Advantages:

- Simplify crossing for pedestrians
- Can be used to prevent cut-through traffic
- May provide room for a bike lane
- May allow more on-street parking to be added

Disadvantages

- May increase travel speeds
- May cause inconvenience for residents and emergency response
- Best used with other speed reduction measures
- May affect adjacent streets and intersections

Criteria:

- Local, collector and arterial streets
- Preferably two parallel one-way streets

Levels of Effectiveness:

Safety	Speed Reduction	Volume Reduction	Local or Collector	Pollution	Cost	Emergency Service
Possible Improvement	No	Possible	Both	No Effect		No Effect

16. Roundabouts



Roundabouts require traffic to circulate counterclockwise around a center island. Unlike traffic circles, roundabouts are used on higher volume streets to allocate right-of-way between competing movements. Vehicles in the circle have the right-of-way and those entering must yield.

Advantages:

- Can moderate traffic speeds on an arterial
- Are generally aesthetically pleasing if well landscaped
- Enhanced safety compared to traffic signals, 2-way and 4-way stops
- Can minimize queuing at the approaches to the intersection
- Are less expensive to operate than traffic signals

Disadvantages:

- May be difficult for large vehicles (such as fire trucks) to circumnavigate
- Must be designed so that the circulating lane does not encroach on the crosswalks
- May require the elimination of some on-street parking
- Landscaping must be maintained, either by the residents or by the municipality

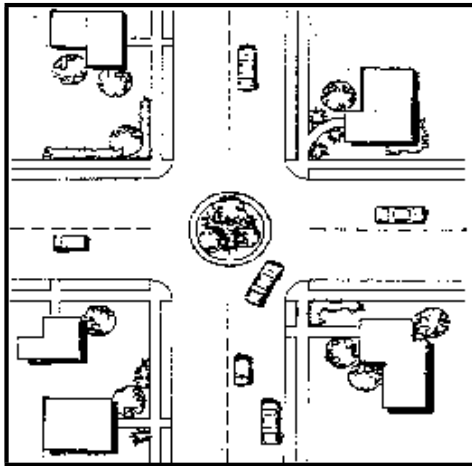
Criteria:

- Use on streets over 26 feet wide with 16,000 vehicles per day or less
- Local, collector and arterial streets
- Intersections with 3 to 8 legs and adequate right of way
- Locate at intersection before or after the one where large vehicles have to turn
- Streets must have a speed limit of 45 mph or less

Levels of Effectiveness:

Safety	Speed Reduction	Volume Reduction	Local or Collector	Pollution	Cost	Emergency Service
Improved	Yes at Intersection	Possible	Both	Slight Increase		Possible Problems

17. Traffic Circles



Traffic circles are a raised island located in the center of an unsignalized intersection. Drivers must maneuver around the central island rather than proceeding straight. Traffic circles replace two and four way stop controls on local streets.

Advantages:

- Reduce vehicle crashes compared to stop signs
- Are generally aesthetically pleasing if well landscaped
- Enhanced safety compared to traffic signals, 2-way and 4-way stops

Disadvantages:

- May be difficult for large vehicles
- Wrong way left turns could be problematic on busy residential or collector roads
- Landscaping must be maintained, either by the residents or by the municipality

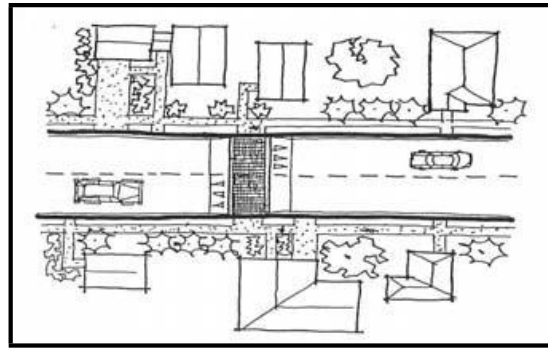
Criteria:

- Local streets over 26 feet wide with less than 10,000 vehicles per day
- Intersections with 4 legs that intersect at 90 degree angles
- Street must have a speed limit of 35 mph or less

Levels of Effectiveness:

Safety	Speed Reduction	Volume Reduction	Local or Collector	Pollution	Cost	Emergency Service
Improved	Yes at Intersection	Possible	Both	Slight Increase		Possible Problems

18. Raised Crosswalks



Raised crosswalks are Speed Tables outfitted with crosswalk markings and signage to channelize pedestrian crossings, providing pedestrians with a level street crossing. Also, by raising the level of the crossing, pedestrians are more visible to approaching motorists.

Raised crosswalks are good for locations where pedestrian crossings occur at haphazard locations and vehicle speeds are excessive.

Advantages:

- Improve safety for both pedestrians and vehicles
- Can have positive aesthetic value if well designed
- Are effective in reducing speeds, though not to the extent of speed humps

Disadvantages:

- Textured materials, if used, can be expensive
- Impacts on drainage needs to be considered
- May increase noise and air pollution

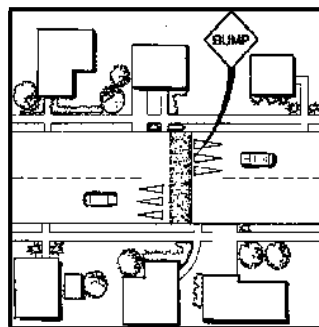
Criteria:

- Local or collector street with 7,500 vehicles per day or less
- Marked, unsignalized pedestrian crossings only
- Street must have a speed limit of 35 miles per hour or less

Levels of Effectiveness:

Safety	Speed Reduction	Volume Reduction	Local or Collector	Pollution	Cost	Emergency Service
Increase for Pedestrians	Yes	Possible	Both	Slight Increase		Possible Effect

19. Speed Humps



Speed humps are rounded raised areas placed across the roadway. They are generally 10 to 14 feet long (in the direction of travel), making them distinct from the shorter “speed bumps” found in many parking lots, and are 3 to 4 inches high. The profile of a speed hump can be circular, parabolic, or sinusoidal. They are often tapered as they reach the curb on each end to allow unimpeded drainage.

Advantages:

- Relatively inexpensive
- Relatively easy for bicycles to cross if designed appropriately
- Very effective in slowing travel speeds
- Good for locations where very low speeds are desired and reasonable Noise and fumes are not a major concern

Disadvantages:

- Cause a “rough ride” for all drivers
- Force large vehicles, such as emergency vehicles and those with rigid suspensions, to travel at slower speeds
- May increase noise and air pollution
- Have questionable aesthetics

Criteria:

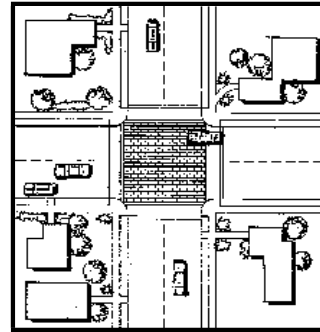
- Local streets not on Circulation Element of the General Plan
- Street shall be at least 1200 feet long
- Street shall not be a truck route
- Street shall have a maximum Average Daily Traffic (ADT) of 3000 vehicles per day
- Street must have a longitudinal grade of 5% or less within 250 feet of proposed hump
- Street must have a paved width of 40 feet or less
- Street must have a maximum speed limit of 25 mph
- Street shall have 15 or more buildings fronting on one side or a total of 20 or more fronting both sides of the street

Speed Humps – Cont.

Level of Effectiveness:

Safety	Speed Reduction	Volume Reduction	Local or Collector	Pollution	Cost	Emergency Service
Possible Improvement	Yes	Possible	Both	Small Increase		Possible Problems

20. Raised Intersections



These are raised areas, which cover the entire intersection. They have ramped edges on all approaches and exits and can incorporate textured paving materials on the flat section.

The raised section is usually at sidewalk height or may be slightly below to provide a ridge for the visually disabled pedestrian. They make the entire intersection area a pedestrian oriented zone and are benefit from not impacting parking. They are a moderately expensive measure.

Raised intersections, sometimes called raised junctions, intersection bumps or plateaus.

Advantages:

- Improve safety for both pedestrians and vehicles
- Can have positive aesthetic value if well designed
- Can calm two streets at once
- Good for intersections with substantial pedestrian activity
- Good for areas where other traffic calming measures would be unacceptable because they take away scarce parking spaces

Disadvantages:

- Tend to be expensive, varying by materials used
- Impact to drainage needs to be considered
- Less effective in reducing speeds than Speed Humps, Speed Tables, or Raised Crosswalks

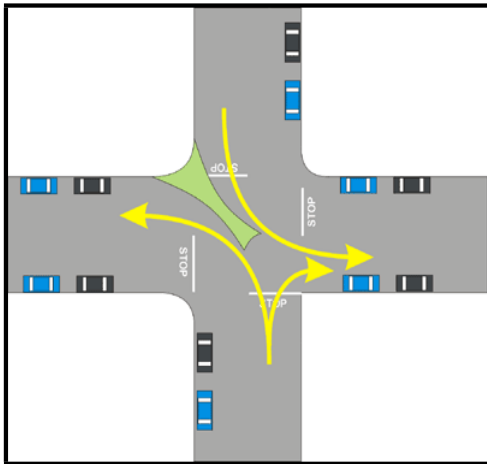
Criteria:

- Local and collector streets of any width with 10,000 vehicles per day or less
- Streets must have a speed limit of 35 mph or less
- Not on routes regularly used by emergency vehicles and on bus routes

Levels of Effectiveness:

Safety	Speed Reduction	Volume Reduction	Local or Collector	Pollution	Cost	Emergency Service
Possible	Yes	Possible	Both	Small Increase		Possible Problems

21. Partial Street Closure



Semi-diverters are extensions from the curb or islands - usually extending from a corner of an intersection that block one directional lane of the street.

They are used to prevent drivers from making certain turn movements at an intersection. Semi-diverters can effectively reduce traffic volumes on a street although the diverted traffic may impact adjacent streets. Semi-diverters are very effective in reducing volumes at specific locations. Semi-diverters affect all drivers, including local residents. Thus, care must be taken to consider the impacts on alternative routes as well as neighborhood access routes.

Advantages:

- Reduces traffic volume
- Maintains access for residents
- Reduces cut-through traffic
- Reduces crossing distance for pedestrians
- Landscaping possible
- OK for emergency vehicles

Disadvantages:

- May divert traffic to parallel streets
- May increase trip length for some residents
- 1-2 curbside parking spaces lost

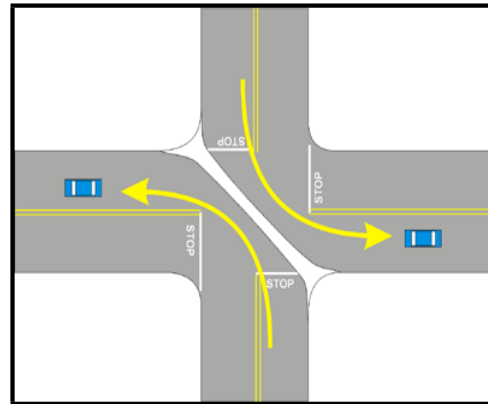
Criteria:

- Local and collector streets of any width with 5,000 vehicles per day or less
- Not on routes regularly used by emergency vehicles and on bus routes
- Streets must have a speed limit of 35 mph or less

Levels of Effectiveness:

Safety	Speed Reduction	Volume Reduction	Local or Collector	Pollution	Cost	Emergency Service
Possible	Possible	Possible	Both	Slight Increase		Possible Problems

22. Diagonal Diverters



Diagonal road closures are closed to motor vehicles but traversable by pedestrians and bicyclists. A barrier placed diagonally across a four-legged intersection, interrupting traffic flow across the intersection.

Advantages:

- Reduces traffic speed
- Reduces traffic volumes
- Reduces cut-through traffic
- Self-enforcing
- Enhanced landscaping opportunities possible

Disadvantages:

- May reduce access for emergency vehicles
- Diversion to longer routes may cause inconvenience to and be opposed by affected residents
- Not suitable on transit routes
- Landscape Maintenance costs

Criteria:

- Local streets of any width with 5,000 vehicles per day or less
- Not on routes used regularly by emergency vehicles or on bus routes
- Streets must have a speed limit of 35 mph or less

Levels of Effectiveness:

Safety	Speed Reduction	Volume Reduction	Local or Collector	Pollution	Cost	Emergency Service
Possible Improvements	Yes	Yes	Both	Small Increase		Possible Problems

23. Traversable Barriers



A Traversable Barrier is closed to motor vehicles but traversable by emergency vehicles. A barrier placed across any portion of a street that is traversable by bikes, pedestrians, in-line skaters, and emergency vehicles, but not by motor vehicles.

Advantages:

- Reduces traffic volumes
- Allows two-way traffic in the remainder of the street
- Provides space for landscaping
- Improves safety for all the street users
- Maintains pedestrian and bike access

Disadvantages:

- Reduces emergency vehicle access as they have to drive around barrier with care
- Compliance with semi-diverters is not 100%
- Reduces access to properties for residents
- May increase trip length for some residents
- May be perceived as an inconvenience by some neighbors and an unwarranted restriction by the general public
- May increase traffic volumes on other streets

Criteria:

- Local street of any width with 5,000 vehicles per day or less
- Street must have a speed limit of 30 mph or less
- Not on routes regularly used by emergency vehicles or on bus routes

Levels of Effectiveness:

Safety	Speed Reduction	Volume Reduction	Local or Collector	Pollution	Cost	Emergency Service
Improvement	Yes	Yes	Local & Possible Collector	Small Increase		No Effect

24. Street Closure or Cul-de-sac



Full street closures are barriers placed across street to completely close the street to through-traffic, usually leaving only sidewalks open.

Advantages:

- Reduces traffic volumes
- Eliminates through traffic
- Reduces speed of the remaining vehicle
- Improves safety for all the street users
- Pedestrian and bike access maintained

Disadvantages:

- Requires legal procedures for closure
- Reduces emergency vehicle access
- Reduces access to properties for residents
- May be perceived as an inconvenience by some neighbors and an unwarranted restriction by the general public
- May increase traffic volumes on other streets

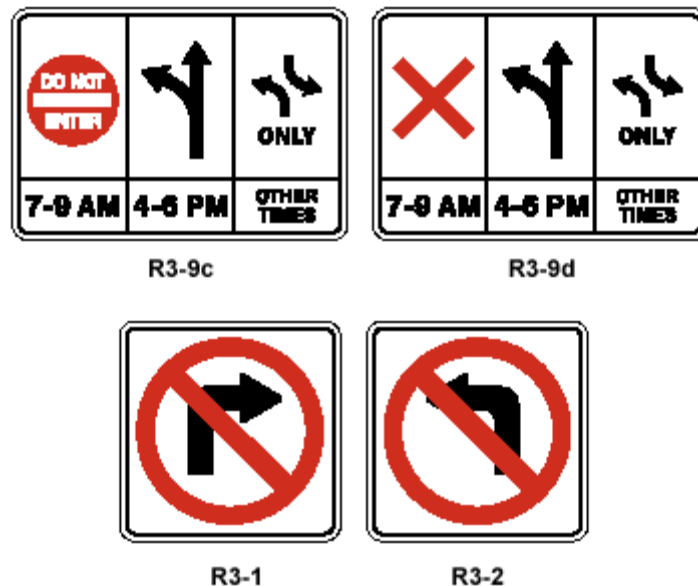
Criteria:

- Local streets of any width with 5,000 vehicles per day or less
- Streets where few properties are accessed from the street

Level of Effectiveness:

Safety	Speed Reduction	Volume Reduction	Local or Collector	Pollution	Cost	Emergency Service
Possible Improvement	Yes	Yes	Both	No Effect		Possible Problems

25. Turn Restriction/Prohibition Signs



Turn restrictions prohibit movements at designated intersections - often during specified peak hours. Full-time turn restrictions are not as effective. Compliance is a problem with un-enforced turn-restrictions with about 50% violation. Enforced restrictions have about 20% violations rates.

Like one-way streets, turn restrictions can result in inconvenience to residents by making access to some properties indirect, and they may affect emergency response times. However, they can be used effectively to control cut-through traffic.

Advantages:

- Can be used to prevent cut-through traffic
- Most effective if limited to peak hours
- Relatively low cost option

Disadvantages:

- May have enforcement problems
- May affect adjacent street intersections
- May cause inconvenience for residents and emergency response
- More effective with active enforcement

Criteria:

- Local, collector and arterial streets

Levels of Effectiveness:

Safety	Speed Reduction	Volume Reduction	Local or Collector	Pollution	Cost	Emergency Service
Unknown	No	Yes	Both	None		Yes

