TOWN OF WINDSOR

Neighborhood Traffic Management and Calming Program

April 2013



NEIGHBORHOOD TRAFFIC MANAGEMENT AND CALMING PROGRAM

PREPARED for:

TOWN OF WINDSOR
DEPARTMENT OF PUBLIC WORKS

April, 2013

TABLE OF CONTENTS

	SECTION	PAGE
1.	BACKGROUND	1
1.1	Traffic Calming for Livable Neighborhoods	1
1.2	Neighborhood Traffic Management Options	2
1.3	Current Town Practices	2
1.4	Proposed Neighborhood Traffic Management Process	3
2.	IMPACTS OF TRAFFIC CALMING DEVICES	3
2.1	Effectiveness of Traffic Calming Devices	3
2.2	Effect on emergency Vehicles Response Time	3
2.3	Traffic Diversion	4
2.4	Impacts to Transit and Utility Vehicles	4
2.5	Consideration for Other Roadway Uses	4
2.6	Noise Impacts	4
2.7	Loss of Parking	4
2.8	Liability Exposure Implications	5
2.9	Visual Impacts and Aesthetic Concerns	5
2.10	Increased Maintenance Costs	5

LIST OF ATTACHMENTS

TITLE **NUMBER**

SUMMARY OF NEIGHBORHOOD TRAFFIC MANAGEMENT
AND CALMING OPTIONS 1

DESCRIPTION OF NEIGHBORHOOD TRAFFIC MANAGEMENT
AND CALMING OPTIONS 2

1. BACKGROUND

One of the most persistent and emotional complaints that the Town receives is speeding on residential streets. Each year, more than a dozen requests are received by various Town departments to study streets where residents have concerns about excessive traffic speeds, noise and/or volumes. Proper street design is essential in encouraging lower speeds and maintain the integrity of residential neighborhoods. New streets are designed to minimize through traffic in a neighborhood. New developments are now designed to avoid long straight stretches of streets in new residential areas. Long stretches of streets encourage higher speeds. Existing residential streets with long stretches of more than 1,000 feet are often concerned with higher speeds and noise. Residential streets carrying volumes of more than 1,000 vehicles per day are generally considered undesirable to adjacent residents.

Effective traffic calming employs the 3 E's: Education, Enforcement and Engineering. This report presents a four tiered Neighborhood Traffic Management and Calming Program aimed at making existing residential streets more livable by reducing traffic speeds and volumes. This Neighborhood Traffic Management and Calming Program is designed to provide community leaders with a model to guide residents toward a better understanding of the available tools and the necessary steps to achieve basic and comprehensive traffic calming.

1.1 Traffic Calming for Livable Neighborhoods

Traffic calming is the combination of both policies and measures that help decrease the negative impacts to local streets and neighborhoods caused by motor vehicles. Although traffic calming techniques did not begin to be readily implemented in the United States until the 1980's, there are many examples that already exist. Many of the successful techniques used there are into their second and third generation. Their effectiveness has been proven and many appear to be part of the original street design rather than as an afterthought.

Traffic calming techniques were developed to reduce speeding problems and heavy traffic flow on residential streets. By making some residential streets more "calm" it makes the neighborhood more livable. Although "livable" in terms of a neighborhood does not have a precise definition, a livable neighborhood can be described as having the following characteristics:

- Ability to feel safe and secure,
- Opportunity to interact with neighbors,

- Ability to experience a sense of home and privacy, and
- A sense of community identification.

In essence, when a citizen calls to request a stop sign to slow traffic on their street, they are requesting the Town make their street more livable. Because no single answer for the problem of speeding vehicles on residential streets exists, many different traffic calming techniques have been developed. These techniques range from the traditional, such as radar display boards and selective police enforcement to non-traditional such as street chokers and roundabouts. A discussion of all the techniques is found on the following pages. A major component of introducing traffic calming techniques is a comprehensive citizen education/participation campaign. A citizen education/participation campaign encourages the neighborhood to take responsibility for the solution too. Experience has shown that a majority of the speeding violations in the residential area are from residents who live in the neighborhood.

1.2 Neighborhood Traffic Management Options

A summary of available neighborhood traffic management options is provided in Attachment 1. The information in Attachment 2 provides a brief description of the positive and negative effects of implementing each option. The options presented have been chosen for their impact on speeds and volumes on residential streets. Although some of the options can be used on non-residential streets, the focus of the traffic calming program is on local residential streets. The options have been structured into four levels. Level 1 and 2 options are the least restrictive and lower cost and can be handled at the staff level by Public Works and Police Departments. Level 3 and 4 options are the most restrictive and have the highest costs and require Council actions. The overall objectives for the Neighborhood Traffic Management program are:

1 Improving neighborhood livability by mitigating the impact of vehicular traffic on residential neighborhoods.

2. Promotion of safe and pleasant conditions for motorists, bicyclists, pedestrians and residents on neighborhood streets;

3. Encouraging citizen involvement and effort in neighborhood traffic management activities;

4. Making efficient use of Town resources by prioritizing traffic management requests; and

5. Supporting the Comprehensive Plan policy that livability and safety of established residential neighborhoods be protected in transportation operations.

1.3 Current Town Practices

The Town currently undertakes most of the techniques described as Levels 1 and 2 actions. Neighborhood meetings, speed studies, volume studies, other traffic observations and provides enforcement are provided as appropriate. Additionally, all roadway signing and striping are reviewed and modifications or additions made as necessary. The Engineering Division routinely utilizes its radar speed trailer on streets where vehicle speeds have been reported as a problem. In some instances the trailer does not appear particularly effective in reducing driver's speeds. However, in other instances speed reductions are clearly noted. In almost all instances the speed trailer deployment is supported by the concerned residents because of a real or perceived decrease in speeds or by educating the residents to the fact that speeds are not as high as had been perceived. Overall, the Town's current Levels 1 and 2 efforts are comparable to what is found in most similar communities.

1.4 Proposed Neighborhood Traffic Management Process

Traffic calming techniques work best when incorporated into a "traffic calming" or "neighborhood traffic management program." Successful programs include the planning process, overall community participation and local authority support. Because residents are the main initiators of traffic calming requests, they need to be part of the process as much as possible. By developing a program early on that addresses neighborhood traffic safety concerns on an area wide basis, it encourages citizens to become actively involved in the improvement process. In this way, the Town and the neighborhood can work together to create more livable neighborhoods. Town staff currently uses the Neighborhood Traffic Management and Calming Process proposed in Attachment 1 to address citizens concerns.

2. IMPACTS OF TRAFFIC CALMING DEVICES

Before the Town decides to pursue Levels 3 and 4 traffic calming options, it is important that the impacts be carefully considered. While Levels 3 and 4 options can be successful, they can also result in problems more significant than the original concern. This section of the report will describe the possible impacts of Levels 3 and 4 traffic calming tools. In most instances, the benefits are quite obvious and predictable while the disadvantages can be much more unexpected. Consequently, a greater emphasis has been placed on the potential problems so that decisions can be made in a more fully informed manner.

2.1 Effectiveness of Traffic Calming Devices

Physical actions such as the installation of speed humps, traffic circles, street closures, etc. are almost always successful in forcing traffic to behave in an intended fashion. In certain situations, they can achieve the desired result by utilizing a one-time capital expenditure and generally low ongoing maintenance costs. Levels 3 and 4 traffic calming actions are generally viewed as much more "permanent" solutions than Levels 1 and 2 actions. In most instances the alternative approach to the desired result involves repetitive and costly ongoing Levels 1 and 2 traffic calming actions. There are significant potential benefits to utilizing Levels 3 and 4 traffic calming actions which is why some communities have implemented Levels 3 and 4 actions and many other communities are exploring their possible use.

2.2 Effect on Emergency Vehicles Response Times

Any traffic calming tool that might be effective because it physically controls traffic generally has a much more negative impact on several classes of emergency vehicles. The Town, as well as its residents and businesses, place a very high priority on minimizing emergency response times. Installation of most physical traffic calming tools can significantly worsen emergency response time. This is especially true for fire apparatus and ambulances. Because of the heavy weight of fire engines and the delicate instruments and patients within ambulances, these vehicles must almost come to a complete stop when they encounter a bump, dip or sharp curve. Creating bumps, dips and sharp curves is often precisely the objective being sought by many of the traffic calming tools. While these maneuvers will cause moderate discomfort and delay for normal passenger vehicles, they cause a much greater problem for emergency response vehicles.

These studies show the following average delays to emergency vehicles for certain types of devices:

TYPE OF DEVICE	AMBULANCES	FIRE TRUCKS
Each Speed Hump	2.3-9.7 seconds	3-5 seconds
Each Traffic Circle	Not Available	1.3-10.7 seconds

The Town's Fire District is concerned about the affect these devices have on response times and has requested initial review of all proposed changes involving Level 3 and 4 options with the ability to veto any changes affecting critical access streets. This impact will

have to be addressed for each area for which Level 3 and 4 traffic calming options are requested.

2.3 Traffic Diversion

Another concern is that in many instances implementing traffic calming devices would be likely to move the problem rather than solve the problem. In most instances the placing of impediments on a particular neighborhood street may merely divert some of all of that traffic to other neighborhood streets.

2.4 Impacts to Transit and Utility Vehicles

Some of the traffic calming options in Levels 3 and 4 could potentially have severe impacts on school and transit bus routes and utility vehicles such as trash trucks. Providers of these services will have to be consulted whenever Level 3 and 4 options are considered.

2.5 Considerations for Other Roadway Users

In addition to the safety concerns already discussed in this report, Levels 3 and 4 traffic calming actions can often have unintended negative safety impacts on certain roadway users. They can result in worsening the situation for a range of roadway users such as bicyclists, roller skaters, skate boarders, joggers, pedestrians and parked cars.

2.6 Noise Impacts

The noise impact to adjacent residents resulting from vehicles braking, going over and around traffic calming devices can have a major impact on the acceptability of these devices by residents living closest to them. The unanimous support of residents living immediately adjacent to locations where physical changes are proposed will be essential to the success of any project.

2.7 Loss of Parking

It is often necessary to prohibit on-street parking in the immediate vicinity of the intersection in order to accommodate the realigned vehicle path. There are also significant on street parking impacts from several options in Levels 3 and 4.

2.8 Liability Exposure Implications

Many Level 3 and 4 traffic calming actions can also result in varying degrees of liability exposure to the Town. The most likely source of increased liability exposure would be that resulting from Town implementation of traffic calming action. This exposure would probably stem from two general categories of negative impacts. The first would be liability which might arise from the negative impact to emergency vehicle response times. Delay of emergency response could result in a civil action by an injured party from allegations that the emergency vehicle response was delayed by traffic calming devices.

It is also possible that traffic calming devices themselves might result in damage or injury. Certainly if a traffic calming device were not properly designed with all appropriate lighting, signing and pavement markings, liability exposure could result. But there is also potential liability from properly designed and installed traffic calming actions. If the device itself causes driver behavior which results in damage to property or injury, the Town could potentially be held liable. For instance, if a driver maneuvered in order to avoid a traffic calming device and as a result struck a parked car, pedestrian, cyclist, etc., there is the potential for Town liability exposure. Agencies have been held liable for not maintaining warning signs and markings in excellent condition. These are just a few examples of the potential, unintended, but known negative impacts of traffic calming devices.

2.9 Visual Impacts and Aesthetic Concerns

While some traffic calming devices can have favorable aesthetic impacts, others can be, by their nature, unsightly. Devices such as speed humps and diverters most often pose no opportunity for the incorporation of aesthetics and can have negative visual impacts. Virtually all Level 3 and 4 traffic calming actions require reflective devices, signs and striping which may negatively affect the aesthetics of a neighborhood.

2.10 Increased Maintenance Costs

Street maintenance costs will increase in two areas. Landscaping associated with such devices as traffic circles, chokers and slow points will require regular maintenance. Devices such as speed humps will have to be reinstalled each time a residential street is overlayed which will increase costs by $20,000 per mile.

C|\AAA\SOX\WIN\WIN918\Staff Issues\Traffic Calming

ATTACHMENT I

SUMMARY OF NEIGHBORHOOD TRAFFIC MANAGEMENT AND CALMING OPTIONS

NEIGHBORHOOD TRAFFIC MANAGEMENT AND CALMING OPTIONS

(Not in priority order)

LEVEL	TRAFFIC MANAGEMENT OPTION	SPEED REDUCTION	VOLUME REDUCTION/ TRAFFIC DIVERSION	NOISE POLLUTION	LOSS OF ON STREET PARKING	ACCESS RESTRIC-TION	BUS ROUTE AND EMERGENCY VEHICLE RESPONSE IMPACTS	INCREASE IN STREET MAINTEN-ANCE	INSTALLATION COST
1	Higher Visibility Crosswalks	Possible	No	No Change	None	None	None	Yes	$1,000 -5,000
1	Neighborhood Meeting	Possible	Possible	No Change	None	None	None	No	-
1	Police Enforcement	Yes	Possible	No Change	None	None	None	No	$90,000[2]
1	Police Presence	Possible	No	No Change	None	None	None	No	-
1	Posting 25 MPH Speed Limits/ radar warning signs	Possible	No	No Change	None	None	None	No	$200 per sign
1	Radar Trailer	Yes	No	No Change	None	None	None	No	-
2	Striping Narrower Lanes	Yes	Possible	No Change	None	None	None	Yes	$1,000 -3,000
2	Commercial Vehicle Restrictions	Possible	Yes	Yes	None	Yes	None	No	$ 1,000

LEVEL	TRAFFIC MANAGEMENT OPTION	SPEED REDUCTION	VOLUME REDUCTION/ TRAFFIC DIVERSION	NOISE POLLUTION	LOSS OF ON STREET PARKING	ACCESS RESTRIC-TION	BUS ROUTE AND EMERGENCY VEHICLE RESPONSE IMPACTS	INCREASE IN STREET MAINTEN-ANCE	INSTALLATION COST
2	Neighborhood Monitoring Program	Yes	No	No Change	None	None	None	No	-
2	Stop Sign Reversal	Possible	No	Increase	None	None	None	No	$ 500
3	Chokers	Yes	Possible	No Change	Yes	None	Yes	No	$5,000 -$15,000
3	Gateways	Yes	Yes	Decrease	None	Yes	None	No	$5,000 -$15,000
3	Intersection Channelization	Yes	Possible	No	Yes	None	No	Possible	$30,000
3	Median Barrier	Possible	Yes	Decrease	None	Right Turn Only	Yes	No	$20,000 -$10,000
3	Neckdowns	Possible	Possible	No	Yes	None	Some Constraint	Yes	$10,000 -$20,000
3	One Way Streets	No	Yes	No Change	None	Yes	Yes	No	$ 1,000 -$5,000
3	Raised Intersections	Yes	No	Yes	Yes	None	Yes	Yes	$50,000 -$100,000
3	Roundabouts	Yes	Possible	No Change	Yes	None	Some Constraint	Yes	$50,000 -$150,000

LEVEL	TRAFFIC MANAGEMENT OPTION	SPEED REDUCTION	VOLUME REDUCTION/ TRAFFIC DIVERSION	NOISE POLLUTION	LOSS OF ON STREET PARKING	ACCESS RESTRIC-TION	BUS ROUTE AND EMERGENCY VEHICLE RESPONSE IMPACTS	INCREASE IN STREET MAINTEN-ANCE	INSTALLATION COST
3	Serpentine	Yes	Possible	Possible	Yes	None	Yes	Possible	$50,000
3	Single Lane Slow Point	Yes	Possible	Unknown	Yes	None	Yes	Yes	$5,000 -$15,000
3	Speed Humps	Yes	Yes	Increase	Yes	None	Yes	Yes[3]	$3,000 per hump
3	Turning Restrictions Using Delineators	Possible	Yes	Decrease	None	Yes	Yes	Yes	$1,000
3	Two Lane Slow Point	Yes	Possible	Increase Possible	Yes	None	Some Problems	Possible	$40,000
4	Cul-De-Sac	Yes	Yes	Decrease	Yes	Total	Yes	No	$50,000
4	Diagonal Diverter	Yes	Yes	Decrease	Possible	Left or Right Turn Only	Yes	No	$15,000
4	Half Closures	Possible	Yes	No Change	Yes	Yes	Yes	No	$15,000
4	Mid Block Street Closures	Yes	Yes	Decrease	Yes	Yes	Yes	Yes	$50,000
4	Photo Enforcement	Yes	No	No	No	None	None	No	$165,000

ATTACHMENT 2
DETAILED DESCRIPTIONS OF NEIGHBORHOOD TRAFFIC MANAGEMENT AND CALMING OPTIONS

Neighborhood Meeting

Description: Hold a neighborhood meeting at a time and location convenient for residents to attend and express their concerns. The meeting would be used to clearly identify the issues of concern.

Positive Aspects:

- Clearly identifies issues of concern.
- Allows all residents to air their views.
- Establishes clear lines of communication between Town staff and residents.

Negative Aspects:

- Meetings have to be focused on specific issues and not allowed to become a forum to address all the Town's problems.
- Potentially time consuming if meetings are repetitious.

Radar Trailer

Description: A portable radar speed meter capable of measuring vehicle speed graphically and displaying the speed of the motorist.

Positive Aspects:

- Speeds may be reduced during short intervals where the radar trailer is located.
- An effective public relations and educational tool.

Negative Aspects:

- Not an enforcement tool.
- Not effective on multi-lane roadways that have significant traffic volumes. In these cases there is limited ability to differentiate between more than one approaching vehicle.



Higher Visibility Crosswalks

Description: The crosswalk is designed to increase driver recognition by using one of the following techniques: raising the crosswalk to a grade higher than the roadway, designing the crosswalks with paving blocks or contrasting color concrete or painting the crosswalks with "zebra" stripes between the outer boundary stripes. Higher visibility crosswalks would only be used at uncontrolled crosswalks. Some cities have tried using large "dot" markers (similar to the ones found on the internal crosswalks at the Factory Stores) or reflectorized pavement markers. At this time staff is not recommending either technique be used on residential streets.

Positive Aspects:

- Indicates to pedestrians an acceptable or preferred crossing location.
- More visible to drivers then traditional crosswalks.

Negative Aspects:

- Pedestrians may place too high a level of reliance on the ability of a crosswalk to control driver behavior.
- More maintenance required than with traditional crosswalks.



Narrowing Lanes

Description: Striping is used to create narrow 10 feet wide lanes. This gives drivers the feel of a narrow street that does not lend itself to high speeds. The cost can vary depending on the length of street, but are not anticipated to exceed $5,000 per mile.

Positive Aspects:

- Changes can be quickly implemented.
- The striping can be easily modified if paint is used.
- Speed may decrease and safety is improved through the provision of positive guidance to drivers.

Negative Aspects:

- Would increase regular maintenance.
- Residents do not always perceive striping is an effective tool for speed reduction.
- Cost of resurfacing residential streets will increase.



Posting 25 mph Speed Limits/Radar Warnings

Description: This option involves posting 25 mph speed limit or radar warning signs on the street to regulate the speed of traffic. Costs are typically $300 per sign installation if a pole has to be erected.

Positive Aspects:

- Low cost installations that are popular with residents.
- Reduces traffic speeds if backed up with regular enforcement.

Negative Aspects:

- High potential for violation when not enforced.
- Increases cost of sign maintenance.



Police Presence

Description: Position a police vehicle on the street as a visible aspect of enforcement to discourage speeding.

Positive Aspects:

- Shows an enforcement presence.
- May help to show vehicle speeds.

Negative Aspects:

- Residents may quickly realize that the presence of the vehicle does not result in speeding citations.
- Police Department resources will be needed to deploy vehicles.

Police Enforcement

Description: The Police Department deploys traffic motorcycle officers to perform radar enforcement on residential streets for at least two hours a day. A priority list would be provided to the Police Department each week based on citizen requests.

Positive Aspects:

- Visible enforcement would reduce speed.
- Driver awareness about speeding on residential streets and safety is increased.
- Program is flexible and can be tailored to suit the citizens' needs.
- Response can be quick and effective

Negative Aspects:

- Long-term benefits of speed reduction are unsubstantiated without regular periodic enforcement.



Radar Feedback Signs

Radar speed display signs are a permanent version of the radar trailer, where drivers are informed of their speeds. These signs are intended for multi-lane streets with higher speed limits and moderate volumes.

Positive Aspects

- Increases driver awareness of reduced speed limit
- Can be activated only during school pick-up and drop-off times
- Educational tool

Negative Aspects

- Added cost to install and maintain
- Long-term effectiveness may be limited for everyday drivers



Stop Sign Reversal

Description: Two stop signs are placed at all four legged intersections in the Town. The signs are placed on the lower volume approaches. If the volumes are balanced, the stop sign locations could be switched to stop the other street. The cost for switching stop signs would be less than $1,000.

Positive Aspects:

- Change can be easily made.
- Traffic speed may be reduced in the vicinity of the stopped approaches.

Negative Aspects:

- The speeds may increase on the unstopped approaches.
- There is high potential for violation of stops unless enforced periodically.
- Not always favorable to residents immediately adjacent to new stop sign locations.
- Potential for rear end accidents is increased in the short term.

Turn Restriction Using Delineators

Description: Delineators glued to the pavement surface are used to create a barrier to prevent vehicles from making certain movement in and out of a local street. The delineators are typically placed along the centerline of the major collector street. Cost would average $600-$1,000 depending on the number of delineators used.

Positive Aspects:

- Reduces through volume of traffic.
- Reduces rear-end and left-turn accidents at major or collector street intersection with local streets.
- Low cost installation that can be easily removed or changed.

Negative Aspects:

- Little reduction in traffic speeds.
- Could potentially make it more circuitous for residents to reach their destinations.
- May divert traffic onto adjacent streets.



Commercial Vehicle Restrictions

Description: After the adoption of appropriate resolution by the Town Council, post commercial vehicle restrictions on signs and enforce the restrictions.

Positive Aspects:

- Restricts commercial vehicles using the street as a cut through.
- Reduces traffic noise, speed and volumes.

Negative Aspects:

- Requires additional maintenance of signs
- Requires enforcement to be effective.



One-Way Street(s)

Description: One or more streets designated as "one-way."

Positive Aspects:

- May reduce total volume on subject street
- Adds vehicle capacity to a street.
- Safety is inherently greater on one-way segments, but care must be taken to handle intersection treatments properly.

Negative Aspects:

- Can encourage increased speeds
- Adverse travel distance results for local residents.
- May shift diverted traffic to another local street.



Median Barrier

Description: A physical barrier on a non-local street which can effectively eliminate left turns from that non-local street onto a local street, and eliminate local street straight-through and left turn traffic across the non-local street. A median barrier can take many forms, ranging from a closely-spaced row of flexible delineator posts to a series of pre-cast curb sections affixed to the pavement to a temporarily-placed but immovable 3' high concrete barrier (K-Rail) to an asphalt/concrete curbed island with or without a decorative landscaping and surface treatment. Costs vary widely among those options. This device is also known as a "worm."

A full median with no breaks can also be used to prohibit all left turns.

Positive Aspects:

- Makes the intersection safer by reducing the number of conflicting movements.
- Reduces local street volumes.
- Negates the possible need for future expensive traffic signal

Negative Aspects:

- The physical barrier may shift traffic to other locations where left-turn opportunities exist.
- This tool may inconvenience local residents who will be forced to drive longer more circuitous paths to reach their destination.



Gateways

Description: A special entrance feature, similar to a choker, that narrows a street at the intersection in order to reduce width of the traveled-way. This is not a gate. Chokers are usually located within the block or at intersections. Gateways are considered more dramatic and provide identity to a neighborhood. The exact configuration of the gateway treatment will depend upon the location of the gateway, i.e., conflicts with driveways. Medians can also be added to street to slow turning movements and enhance the street.

Positive Aspects:

- Creates an identity to a neighborhood.
- Creates added streetscape area for landscaping or monuments.
- Can discourage truck entry.
- Allows signs to be placed closer to driver's cone of vision.

Negative Aspects:

- Can impede legitimate truck movements.
- Increased maintenance costs.



Chokers

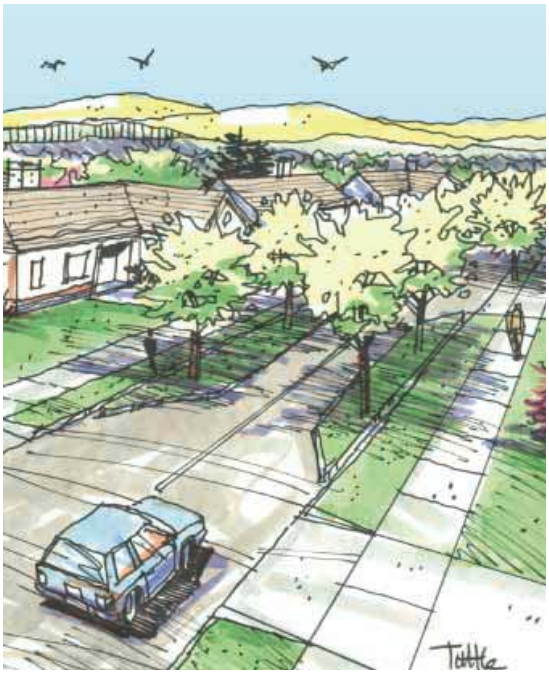
Description: Narrowing of a street at an intersection, mid-block or a segment of a street in order to reduce width of the traveled-way by construction of a wider sidewalk or landscape strip.

Positive Aspects:

- Slight slowing is normally the result.
- Shorter pedestrian crossing distances and better motorist-pedestrian visibility of each other.
- Creates added streetscape area for pedestrians and/or landscaping
- Can discourage truck entry.
- Allows signs to be placed closer to driver's cone of vision.

Negative Aspects:

- Potential obstacle for motorist to run into.
- May impede bicycle mobility and safety.
- May result in loss of curbside parking.
- Can impede legitimate truck movements.
- May require reworking of surface drainage.



Neighborhood Traffic Circles

Description: A small circular island placed in the center of an existing local street intersection, thus creating a small "roundabout." Some may also refer to this device as a traffic circle.

Positive Aspects:

- A noticeable reduction in speeds.
- Reduces accident potential.
- Under certain conditions capacity can be increased.
- Can be used instead of stop signs.

Negative Aspects:

- Required safety signing may detract from its aesthetic quality.
- Pedestrians and bicyclist must adjust to less traditional crossing patterns.
- Some parking may be lost on approaches to accommodate vehicles' deflected paths.
- May increase accidents until drivers become accustomed to change.
- Poor designs may create unintended consequences, such as wrong-way driving or driving in parking lanes.



Raised Intersections

Description: A raised plateau of roadway where roads intersect. The plateau is generally about 4" higher than the surrounding streets. This application is best for locations with high pedestrian volumes with significant safety concerns related to traffic speeds.

Positive Aspects:

- Effective speed reduction.
- Aesthetically pleasing if well designed.
- Good pedestrian safety treatment.
- Can be used on higher or lower volume streets.

Negative Aspects:

- Expensive to construct and maintain.
- Affects emergency vehicle response time.



Single Lane Slow Points

Description: A single lane slow point is created by constructing a landscaped island on side of the street. Vehicles have to slow down to go through the narrow area and to yield to oncoming traffic.

Positive Aspects:

- Reduces vehicular speeds.
- No significant impedance to fire and transit services.

Negative Aspects:

- Loss of on-street parking.
- Landscaping will have to be maintained.
- Potential for head-on collisions.



Neckdowns-Bulbouts

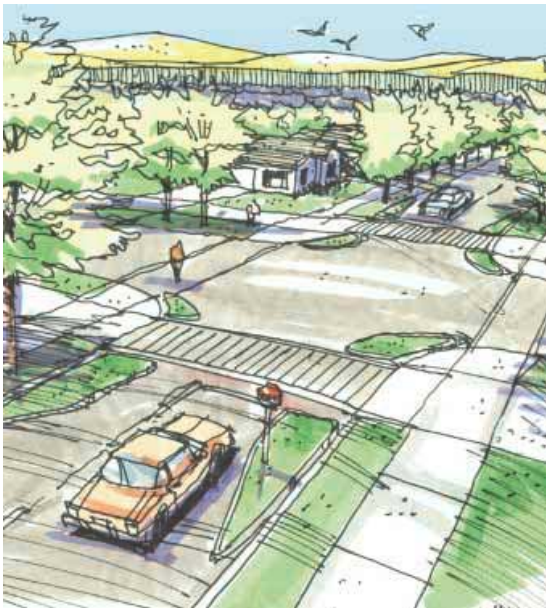
Description: Physical curb reduction of road width at intersections by widening of street corner to discourage cut through traffic and to help define neighborhoods.

Positive Aspects:

- May be aesthetically pleasing, if landscaped.
- Good for pedestrians due to shorter crossing.
- Can be used in multiple application.

Negative Aspects:

- Increased landscaping maintenance.
- Landscaping may cause right distance problems.
- May impede bicycle mobility and safety.



Two Lane Angled Slow Point

Description: Three islands are used to create an angled path of travel for vehicles. The effect of angling the travel path slows vehicles down. The volume of traffic may well be unaffected. The islands adjacent to the curb are typically landscaped.

Positive Aspects:

- Slows vehicle speeds.
- Fire and transit vehicles are not impeded significantly.

Negative Aspects:

- Loss of on-street parking
- Landscaping and signing/striping has to be regularly maintained.



Serpentine

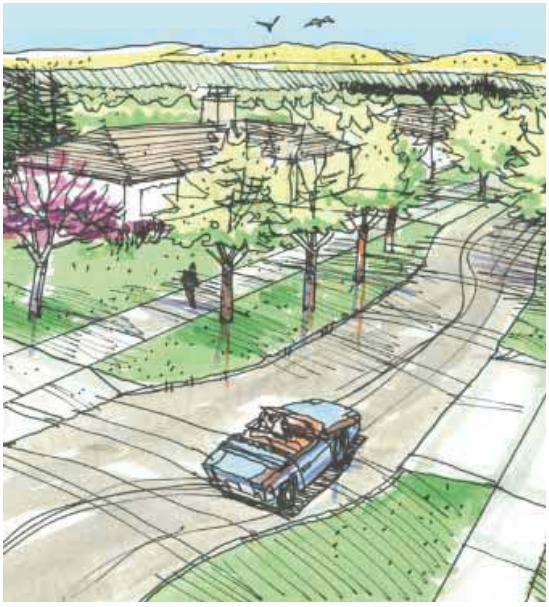
Description: A narrow serpentine road is created for several hundred feet using curbs and landscaping.

Positive Aspects:

- Reduces vehicle speeds.
- May reduce through traffic volumes.

Negative Aspects:

- Increased maintenance for landscaping and pavement
- Significant loss of on-street parking.
- Most residents would have driveway affected by the type of installation.
- Fire and transit services would be affected.



Speed Humps

Description: Mounds of paving material placed across a roadway for the purpose of causing motorists to reduce their operating speed while driving on the roadway.

Positive Aspects:

- Reduces speed.
- Can cause traffic to shift to arterial system and no longer cut through the neighborhood.

Negative Aspects:

- Can cause traffic to shift to parallel residential streets.
- Affects emergency response times
- Contents of vehicles can be jarred.
- Increase in noise adjacent to hump.
- 

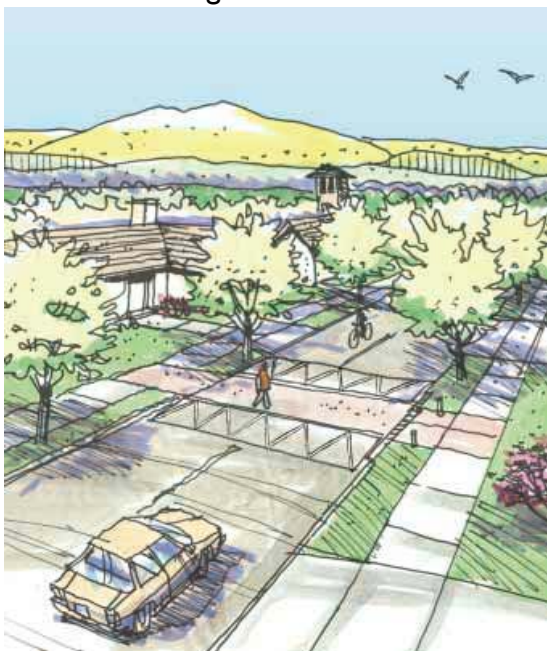
Raised Crosswalks

Description: A combination of a crosswalk and a speed hump across a roadway for the purpose of causing motorists to reduce their operating speed while driving on the roadway.

Positive Aspects:

- Reduces speed.
- Can cause traffic to shift to arterial system and no longer cut through the neighborhood.
- Easier for persons with disabilities to cross

Negative Aspects:

- Can cause traffic to shift to parallel residential streets.
- Affects emergency response times
- Contents of vehicles can be jarred.
- Increase in noise adjacent to hump.
- Potential drainage issues.
- 

Intersection Channelization

Description: T-intersections are channelized so that vehicles are not traveling in a straight path. This has the effect of slowing vehicles down.

Positive Aspects:

- Slows vehicle speeds.
- No significant impedance of fire and transit service.

Negative Aspects:

- Landscaping and signing/striping maintenance will be required.
- Loss of on-street parking will occur.

Photo Enforcement

Description: There are two uses for photo enforcement. One use is to have a camera mounted at intersections that records the license plates of cars that run red lights. The other is a camera and radar unit located in a portable trailer installed on a public street. The radar unit determines if a car is exceeding the speed limit and the camera takes a picture of their license plate after they have passed. In both cases, through tracing the license plate number, a ticket is mailed to the vehicle owner.

Positive Aspects:

- Once the public is aware of the photo enforcement, it is a very effective tool at eliminating red light runners and speeding traffic on the block.
- Cost effective, private companies will install and maintain the equipment in exchange for keeping the revenues generated by speeding tickets.

Negative aspects:

- Residents may not like the "Big Brother is watching you" feeling.



Cul-de-sac

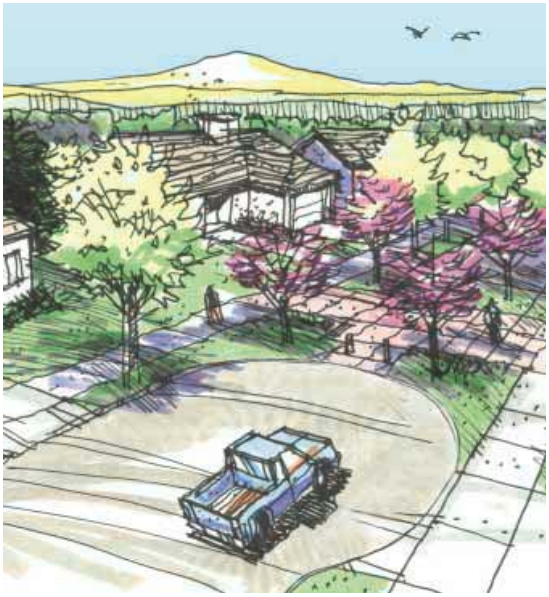
Description: Complete closure of a street either at an intersection or at a mid-block location.

Positive Aspects:

- Very effective at eliminating most of the previously speeding traffic on the block.
- Very effective at reducing volumes.
- Can be landscaped for an attractive effect to convey street discontinuity.
- Mid-block type can be effectively used where abutting land uses change.
- Improved traffic safety.

Negative Aspects:

- Can negatively affect response times for emergency service.
- In large neighborhoods, can shift a problem elsewhere unless a strategic pattern of cul-de-sacs are used.
- Can generate confusion on the part of users unless signed carefully.
- May inconvenience local residents.



Diagonal Diverter

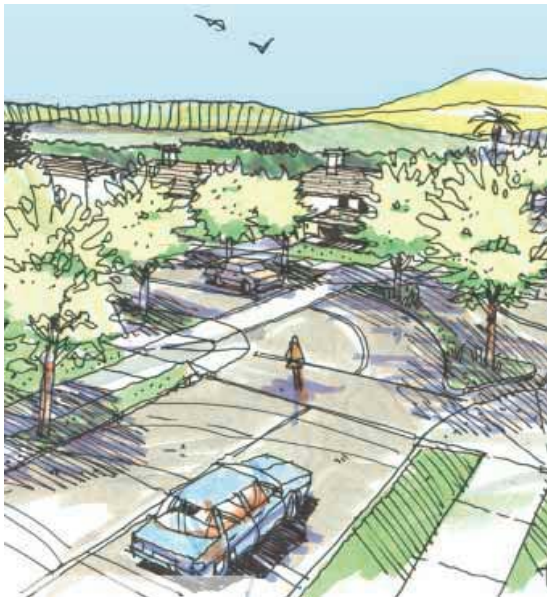
Description: Barriers between diagonally opposite corners of a 4-legged intersection, thus creating two unconnected L-shaped intersections.

Positive Aspects:

- Reduces speed.
- Can achieve a 20%-70% reduction in volumes.
- Reduces accident potential by eliminating conflicting traffic movements.
- Advantage over complete street closure (cul-de-sac) in that it has a lesser impact on circulation, as it actually creates no dead-end streets. Local residents and service vehicles may view this as a benefit in that their routes can be more direct.
- Can be attractively landscaped.

Negative Aspects:

- In a large neighborhood, can shift problems elsewhere unless a strategic pattern of diverters is used.
- May inconvenience local residents who are forced to drive longer more circuitous paths to/from their homes.



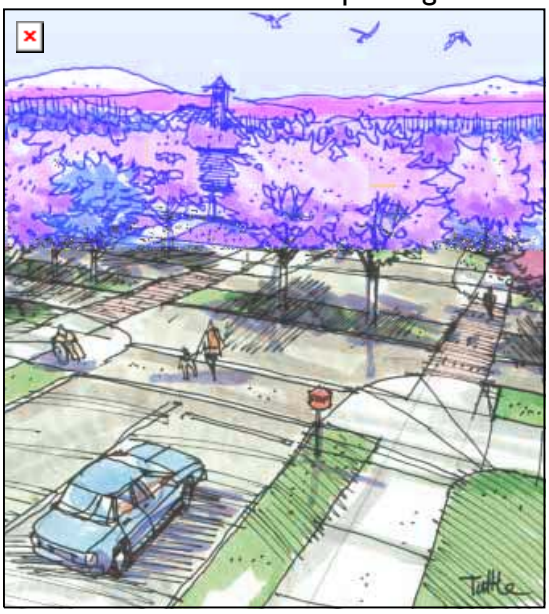
Mid-Block and Intersection Road Closure

Description: Cul-de-sacs are created by closing the street mid-block using a landscaped island. Pedestrian access is provided across the island. The closure must be located between driveways serving adjacent residences. Intersection road closures can be achieved with medians that prevent through traffic on one of the intersecting streets.

Positive Aspects:

- Reduces through traffic volumes.
- Reduces speeds in the vicinity of the closure

Negative Aspects:

- Traffic may be diverted onto adjacent parallel streets.
- Maintenance of the landscaped areas will have to be provided for.
- Emergency access will be impeded.
- Local residents may be forced to drive more circuitous routes.
- There is loss of on-street parking.
- 

Half Closures

Description: The street is partially closed to traffic by the construction of a physical barrier at the entrance to the neighborhood to reduce cut through traffic.

Positive Aspects:

- Reduces cut through traffic.
- May reduce traffic speeds.

Negative Aspects:

- May require additional maintenance.
- Could be violated, especially in the late evening.

