CITY OF CONCORD
TRAFFIC CALMING POLICY

PURPOSE

The City of Concord's Traffic Calming Policy was developed to guide city staff and to inform residents on the process for implementing traffic calming in residential areas. The policy is intended to address traffic issues not commonly addressed in the Manual on Uniform Traffic Control Devices (MUTCD), although the MUTCD will be used for traffic engineering reference.

Traffic calming means many things to different people. To some, traffic calming is defined by speed limit reductions, to some it is the installation of traffic control devices, and to others traffic calming is an attempt to reduce traffic volume and the negative effects that large volumes of traffic can have on residential neighborhoods. Each of the perspectives may correctly define traffic calming. In the most basic terms, traffic calming is a programmatic response to inappropriate speeds or volumes on residential streets.

To aid in prompt responses to traffic related concerns of the citizens of Concord, the City Manager has directed the Transportation Director, the Chief of Police, the Chief of the Department of Fire and Life Safety, and the Emergency Management Coordinator and their designated staff to sit as a Traffic Safety Advisory Committee (TSAC) to evaluate, work with residents, provide sensible and programmatic responses to each request, and recommend certain actions to City Council for consideration of implementation.

Streets that are maintained by the City of Concord and are considered to be a local / residential, minor or major collector will be addressed under this policy. They serve as local circulation for automobiles, bicycles, and pedestrians and do not carry significant volumes of through traffic. These streets also tend to be adjacent to residential areas. **Streets identified as an expressway, major thoroughfare or minor thoroughfare or city streets carrying more than 4,000 vehicles per day are not eligible for the Traffic Calming Program.**

EVALUATION PROCESS

Citizens or neighborhood associations' may contact City of Concord Transportation Department staff with a concern for need of traffic calming or speed limit reduction in their area.

1. Determination of Existing Conditions

Before the initiation of a traffic calming study, the Transportation Department will conduct field observations/site visits, determine the established speed limit utilizing the City Ordinance, collect traffic volumes, and speed data. Once the following information is collected, an initial response method to the concern will be determined by the Traffic Safety Advisory Committee:

- Traffic volume data and verification of street classification
- Speed data to determine speeding violations exists and determination of the 85th percentile speed through the Concord Police Department
- Accident data through Concord Police Department Records
- Emergency Services Service Routes and Response Times
- Housing density and development in the area
- Pedestrian and bicycle activity
- Vehicle classification data will be collected if deemed necessary
- Geometric features of the roadway (lane width, shoulder width, sight distance, alignment, and sidewalks)

2. Guidelines and Recommendations

The Traffic Safety Advisory Committee will make programmatic responses and recommendations in cases where the 85th percentile speed is 5 MPH higher than the posted speed limit; where there is a geometric deficiency, and / or a history of accidents. Research will be conducted into state and national traffic calming examples/trends, as well as the Institute of Transportation Engineers (ITE) traffic calming recommendations and procedures. The ordered responses that will be evaluated and considered **before** in-street structural traffic calming measures are recommended to City Council are as follows:

Step 1. Police enforcement and citizen education – as associated with the Speed Watch and Speed Limit Reduction Policy programs

Step 2. Signage and warning devices

Step 3. Low cost traffic improvements (striping, parking changes, etc.)

Step 4. Traffic calming measures

Step 5. In-street structural devices

3. Traffic Calming Studies

Qualifying Criteria for Traffic Calming Studies

If a traffic calming response, outside of speed limit reduction and low cost traffic improvements, is determined to be appropriate by the Traffic Safety Advisory Committee, a Traffic Calming Study Request Form will be sent to the applicant. The submitted request should specifically explain and identify the need for a traffic calming measure or device. Upon submittal of the completed form to the City, committee staff will proceed with the evaluation of a formal study using the eight qualifying criteria listed below:

QC-1. The proposed street must be classified as a two-lane (one or two-way traffic) local, residential or collector street as identified in the City of Concord's Unified Development Ordinance (UDO).

QC-2. The street pavement must be less than 40 feet in width.

QC-3. The average daily traffic should be at least 700 vehicles per day and not more than 4,000 vehicles per day.

QC-4. The Traffic Calming Study area should include a minimum of 1,000 feet of street.

QC-5. 15% of the traffic on the street exceeds the posted speed limit by 5 mph or more.

QC-6. At least 75% of the residences of the street, or in the event of a rental the owner of the property on which the rental is located, shall sign a petition supporting the Traffic Calming Request and subsequent device or measure.

QC-7. The street's speed limit must be posted at 25 mph if a local / residential street and 35 mph if a collector.

QC-8. The street should not be a primary emergency services route as designated on the latest revision of the City of Concord Primary Emergency Response Map kept on file in the Transportation Department and in the office of Emergency Management.

Upon receipt, Transportation Department staff will determine if the request conforms to the Qualifying Criteria noted above. Applications that do **not** meet the above noted qualifying criteria will **not** be considered for formal study or implementation of in-street structural traffic calming measures as shown in Appendix A of this Policy.

Prioritization Criteria

Upon qualification, city staff will conduct additional reviews to determine the priority of need of the request. The priority review will be conducted by the Traffic Safety Advisory Committee and will be based on the following prioritization criteria:

PRIORITIZATION CRITERIA			
Criteria	**Points Allowed**	**Points Awarded**	**Notes**
Traffic Volume	1		For each 200 vehicles per day over 1500.
Speeding	2		For each mph the 85th percentile speed is over the posted speed limit.

PRIORITIZATION CRITERIA			
Criteria	**Points Allowed**	**Points Awarded**	**Notes**
Schools, Daycare, etc.	5		If within 1,200 feet of facility
Sidewalks	9		No sidewalks on either side of the road.
Sidewalks	4		Sidewalk on one side of the road.
School crossing	7		If there is an official school crossing on the street.
Pedestrian generator	5		If there is an activity within 1,200' that generates high numbers of pedestrians.
Accidents	5		For each accident on the street over a 3 year period.
Residential density	1		Times the R Zoning District.
Waiting list	1		For each month on the list (if applicable)
Total Points Awarded			

The highest ranked requests would be submitted for City Council for construction approval and funding authorization. (See Part 6. Public Hearings, below) . City Council would approve the proposed construction list annually as part of the budget process. Those not funded would be rolled over to the following year. The Prioritization Criteria noted above provides a point for each month that a petition is on the waiting list.

Placement Guidelines

The Traffic Safety Advisory Committee staff shall determine the type and location of all traffic calming measures and devices according to the placement criteria listed below. The Chief of Police also may deem certain traffic safety measures and devices necessary that will be implemented based on protection of the public. Placement of such will be based on engineering judgment and in a manner not to pose a problem to the street as follows:

- Positioned to meet recommended Federal or NCDOT guidelines or
- Positioned a minimum of 200 feet apart.
- Provide a stopping sight distance of 200 feet or more at 25 mph.
- Be located a minimum of 200 feet from an intersection.
- Primarily located at or near a property line

- At or near a street light (if applicable).
- Be located a minimum of 10 feet from a driveway
- Plantings must be issued an encroachment and maintained by property owner or homeowners association.

Notice Regarding Emergency Vehicles and Public Safety Response

Emergency Services, Transit Buses and School Buses will be affected by the installation of in-street structural traffic calming measures. These vehicles must travel at lower speeds due to the type of equipment and service they provide. According to the recent data, fire trucks typically slow to 5-7 mph when encountering a positive measure traffic calming device. This will increase emergency vehicle response time by 5-9 seconds per device. As part of the petition process, neighborhoods should be clearly advised of the reduction in response time that is attributed to in-street traffic calming devices.

Liability Concerns

There is limited documentation that specifically indicates that traffic calming devices and measures create direct traffic hazards. However, the installation of in-street traffic calming devices and measures onto the City's streets may create additional liability to the City. This liability must be balanced against the increased safety that results from lower speeds or limited access on City streets.

4. Technical Memorandums

A technical memorandum for the initial study will be prepared documenting the existing conditions, site evaluation, mitigation recommendations, and safety and emergency response issues. Maps, charts, and photos will be used in the technical memorandum to present the data in an easy to read format.

5. Local Neighborhood Meetings and Hearings

Neighborhood Input and Hearing Session(s) will be advertised and held in the affected neighborhood once the technical memorandum and information has been finalized. A staff representative of the Community and Business Assistance Department, acting in coordination with the Traffic Safety Advisory Committee, will attempt to notify all affected property owners, civic associations, neighborhood associations, abutting residents, etc. to inform them of the meeting. Traffic Safety Advisory Committee staff will attend (as requested) meetings to discuss the results of the technical memorandum and any other neighborhood traffic issues that develop as part of the process. These input sessions will be held and considered before any further action is brought to City Council by the Traffic Safety Advisory Committee.

IMPLEMENTATION PROCESS

1. Public Hearings

Public Hearing will be held before City Council before any in-street structural traffic calming measures are implemented for traffic calming projects. If needed at that time, City Council will be

provided with a list of those projects that had previously qualified for future cycles but to date have not been approved. The City Council has the final authority for approving and authorizing any projects.

2. Construction

The City of Concord will be responsible for implementing recommendations made by City Council. If a particular project is approved by but not funded by City Council, Neighborhoods that have raised funds to cover the full cost of the Traffic Safety Advisory Committee's recommended traffic calming method may chose to pay the City for implementation at that time. Council will consider whether to accept or reject an offer of private funding for the measure(s).

Construction will be performed by City of Concord forces or by parties contracted for the work by the City. Contract construction by private associations or citizens will not be allowed.

Examples of various Neighborhood Traffic Calming devices are contained in the latest revision of Appendix A - Traffic Calming Reference Guide. The Traffic Safety Advisory Committee may periodically update Appendix A to include of the latest technology with regards to traffic calming measures and devices and incorporate recommendations in their use by federal, state and local agencies.

3. Re-evaluation and Monitoring

The Traffic Safety Advisory Committee will review each improvement measure three (3) months after they have been implemented. This will allow staff to measure how effective the improvements were in calming traffic. Should traffic conditions change or other reasons arise, the City Transportation Director shall have the authority to remove any or all traffic calming measures or devices. Should changes be made, the affected property owners will be notified of the change.

APPENDIX A

TRAFFIC CALMING REFERENCE GUIDE

Traffic Calming Measures - Speed Table

Description:

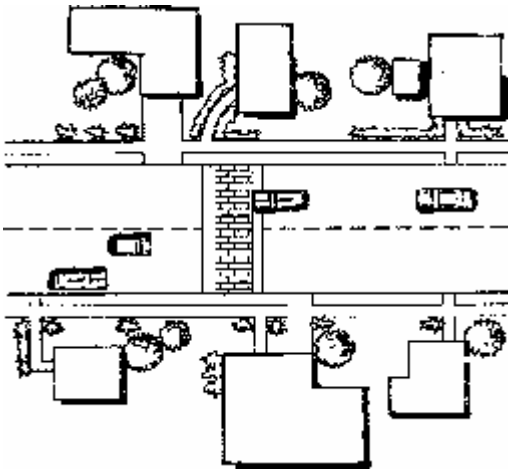
- Long raised speed humps with a flat section in the middle and ramps on the ends; sometimes constructed with brick or other textured materials on the flat section
- Often called flat top speed humps, speed platforms, raised crosswalks, or raised crossings

Applications:

- Local and collector streets
- Main roads through small communities
- Typically long enough for the entire wheelbase of a passenger car to rest on top
- Work well in combination with textured crosswalks, curb extensions, and curb radius reductions
- Can include a crosswalk

Design/Installation Issues:

- Typically 22 feet in the direction of travel with 6 foot ramps on each end and a 10 foot flat section in the middle; other lengths (32 and 48 feet) reported in U.S. practice
- Most common height is between 3 and 4 inches (and reported as high as 6 inches)
- Ramps are typically 6 feet long (reported up to 10 feet long) and are either parabolic or linear
- Careful design is needed for drainage



Potential Impacts:

- Little effect on access
- Speeds are reduced, but usually to a higher crossing speed than at speed humps (typically between 25 and 27 miles per hour)
- Traffic volumes have been reduced on average by 12 percent depending on alternative routes available
- Collisions have been reduced on average by 45 percent on treated streets (not adjusted for traffic diversion)
- Reported to increase pedestrian visibility and likelihood that driver yields to pedestrian

Emergency Response Issues:

- Typically preferred by fire departments over 12 to 14-foot speed humps
- Generally less than 3 seconds of delay per hump for fire trucks

Typical Cost:

- Approximately $2,800 (in 2000 dollars) for asphalt tables; higher for brickwork, stamped asphalt, concrete ramps and other enhancements sometimes used at pedestrian crossings

Traffic Calming Measure - Raised Intersection

Description:

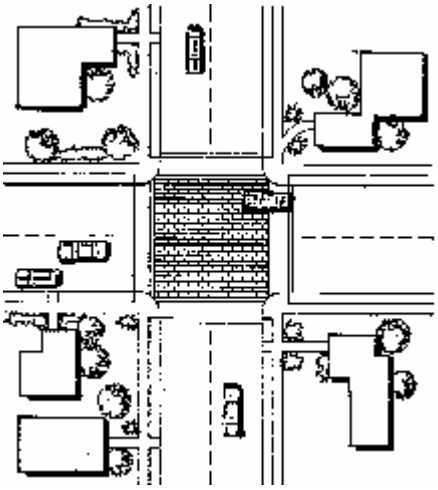
- Flat raised areas covering entire intersections, with ramps on all approaches and often with brick or other textured materials on the flat section and ramps
- Often called raised junctions, intersection humps, or plateaus

Applications:

- Work well with curb extensions and textured crosswalks
- Often part of an area wide traffic calming scheme involving both intersecting streets
- Located in densely developed urban areas where loss of parking would be unacceptable

Design/Installation Issues:

- Typically rise to sidewalk level
- May require bollards to define edge of roadway
- storm drainage modifications are necessary



Potential Impacts:

- Reduction in through movement speeds at intersection
- Reduction in midblock speeds typically less than 10 percent
- No effect on access
- Make entire intersections more pedestrian-friendly

Emergency Response Issues:

- Slows emergency vehicles to approximately 15 miles per hour

Typical Cost:

- Reported costs range between $20,000 and $60,000 (in 2000 dollars)

Traffic Calming Measure - Speed Hump

Description:

- Rounded raised areas of pavement typically 12 to 14 feet in length
- Placed in a series (typically spaced 300 to 600 feet apart)

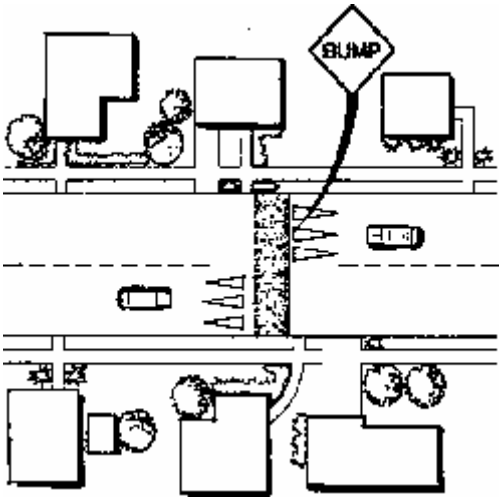
Applications:

- Residential streets
- Not typically used on major roads, bus routes, or primary emergency response routes
- Midblock placement, not at an intersection
- Not on grades greater than 8 percent
- Work well with curb extensions

Design/Installation Issues:

- Typically 12 to 14 feet in length; other lengths (10, 22, and 30 feet) reported in practice in U.S.
- Speed hump shapes include parabolic, circular, and sinusoidal
- Hump heights range between 3 and 4 inches with trend toward 3 - 3 ½ inches maximum
- Difficult to construct precisely; may need to specify a construction tolerance (e.g. ± 1/8 inch) on height

- Have signage (advance warning sign before first hump in series and warning sign or object marker at hump)
- Typically have pavement marking (zigzag, shark's tooth, chevron, zebra)
- Taper edge near curb to allow gap for drainage
- Bicyclists prefer that it not cover or cross a bike lane



Potential Impacts:

- No effect on non-emergency access
- Speeds determined by height and spacing; speeds between humps have been observed to be reduced between 20 and 25 percent on average
- Based on a limited sample of sites, typical crossing speeds (85th percentile) of 19 mph have been measured for 3½ inch high, 12 foot humps and of 21 mph for 3 inch high, 14 foot humps; speeds have been observed to rise to 27 mph within 200 feet downstream
- Speeds typically increase approximately 0.5 mph midway between humps for each 100 feet of separation
- Studies indicate that traffic volumes have been reduced on average by 18 percent depending on alternative routes available
- Studies indicate that collisions have been reduced on average by 13 percent on treated streets (not adjusted for traffic diversion)
- Most communities limit height to 3-3½ inches, partly because of harsh ride over 4-inch high humps
- Increase in traffic noise from braking and acceleration of vehicles, particularly buses and trucks

Emergency Response Issues:

- Concern over jarring of emergency rescue vehicles
- Approximate delay of between 3 and 5 seconds per hump for fire trucks and up to 10 seconds for ambulance with patient

Typical Cost:

Approximately $2,300 (in 2000 dollars)

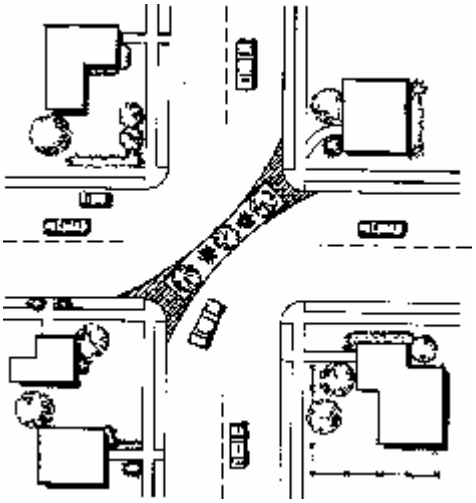
Traffic Calming Measures - Closure

Applications:

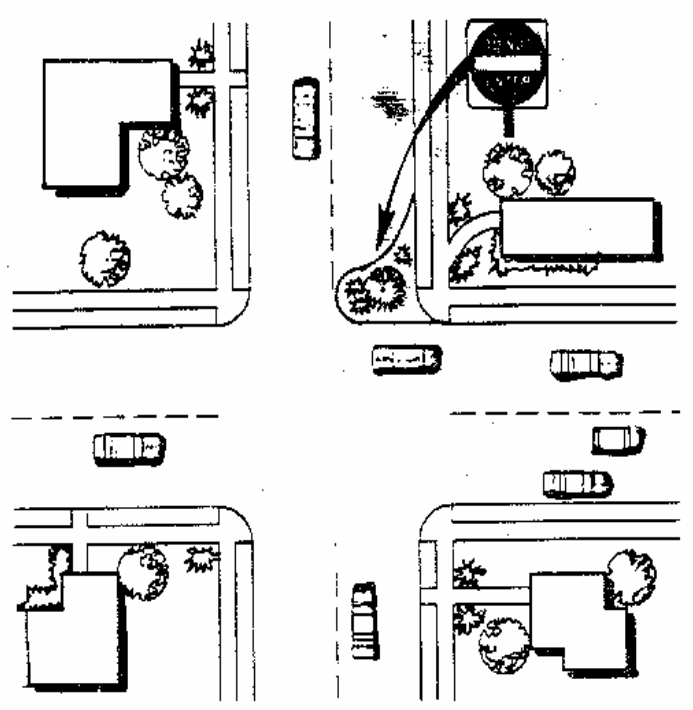
- Closures are typically applied only after other measures have failed or been determined to be inappropriate
- For all types of closures, provisions are available to make diverters passable for pedestrians and bicyclists
- Often used in sets to make travel through neighborhoods more circuitous - typically staggered internally in a neighborhood, which leaves through movement possible but less attractive than alternative (external) routes
- Closures have been used as a crime prevention tool

Descriptions:

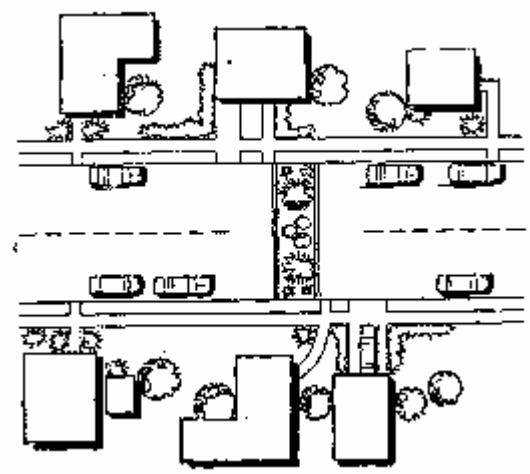
Diagonal diverters are barriers placed diagonally across an intersection, blocking through movement; they are sometimes called full diverters or diagonal road closures.



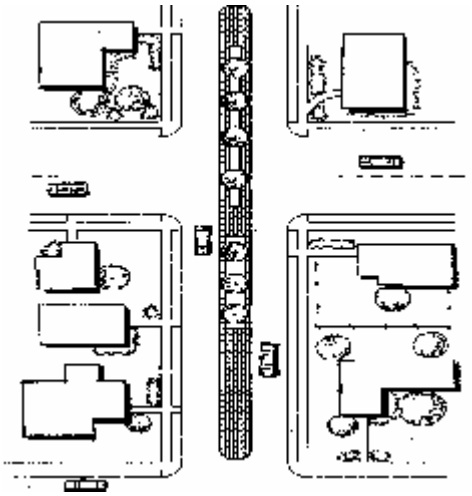
Half closures are barriers that block travel in one direction for a short distance on otherwise two-way streets; they are sometimes called partial closures, entrance barriers, or one-way closures (when two half-closures are placed across from one another at an intersection, the result is a semi-diverter).



Full-street closures are barriers placed across a street to completely close the street to through-traffic, usually leaving only sidewalks open; they are sometimes called cul-de-sacs or dead-ends.



Median barriers are raised islands in the centerline of a street and continuing through an intersection that block the left turn movement from all intersection approaches and the through movement at the cross street.



Design/Installation Issues:

- Issues associated with closing a public street
- Can be placed at an intersection or midblock
- Barriers may consist of landscaped islands, walls, gates, side-by-side bollards, or any other obstruction that leave an opening smaller than the width of a passenger car

Potential Impacts:

- Concern over effects on emergency response, street network connectivity and capacity, and parallel local streets that carry diverted traffic
- May divert significant traffic volumes
- No significant effect on vehicle speeds beyond the closed block

Emergency Response Issues:

- Half closures allow a higher degree of emergency vehicle access than full closures or diagonal diverters
- All three types of closures can be designed to allow emergency vehicle access

Typical Cost:

- Costs range between $2,400 for a simple half-closure and $45,000 for highly landscaped diagonal diverter. (in 2000 dollars)

Traffic Calming Measures - Neighborhood Traffic Circle

Description:

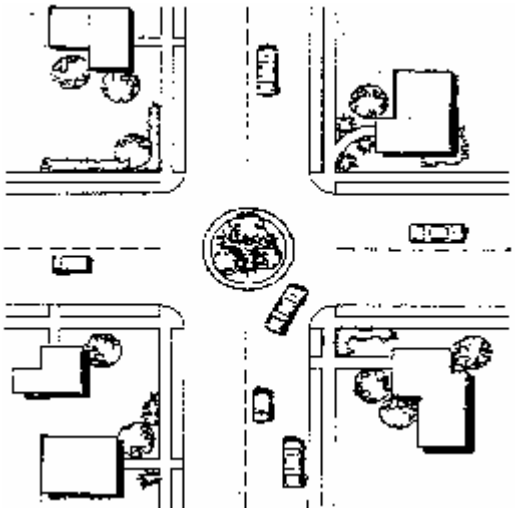
- Raised islands, placed in intersections, around which traffic circulates
- Motorists yield to motorists already in the intersection
- Require drivers to slow to a speed that allows them to comfortably maneuver around them
- Different from roundabouts

Applications:

- Intersections of local or collector streets
- One lane each direction entering intersection
- Not typically used at intersections with high volume of large trucks and buses turning left

Design/Installation Issues:

- Typically circular in shape, though not always
- Usually landscaped in their center islands, though not always
- Controlled by YIELD signs on all approaches, but many different signage approaches have been used
- Key design features are the offset distance (distance between projection of street curb and center island), lane width for circling the circle, the circle diameter, and height of mountable outer ring for large vehicles such as school buses and trash trucks



Potential Impacts:

- Minimal effect on access
- Reduction in midblock speed of about 10 percent; area of influence tends to be a couple hundred feet upstream and downstream of intersection
- Minimal diversion of traffic
- Intersection collisions have been reduced on average by 70 percent and overall collisions by 28 percent
- Can result in bicycle/auto conflicts at intersections because of narrowed travel lane

Emergency Response Issues:

- Emergency vehicles typically slow to approximately 13 mph; approximate delay of between 5 and 8 seconds per circle for fire trucks
- Fire trucks can maneuver around traffic circles at slow speeds provided vehicles are not parked near the circle

Other/Special Considerations:

- Large vehicles may need to turn left in front of the circle (which could be unsafe at higher volumes); legislation may be required to legally permit this movement
- Quality of landscaping and its maintenance are key issues
- Landscaping needs to be designed to allow adequate sight distance
- Care must be taken to avoid routing vehicles through unmarked crosswalks on side-street approach

Typical Cost:

- Approximately $4,000 to $25,000 (in 2000 dollars)

Traffic Calming Measure - Chicane

Description:

- A series of narrowing or curb extensions that alternate from one side of the street to the other forming S-shaped curves
- Often called deviations, reverse curves, twists, and staggering

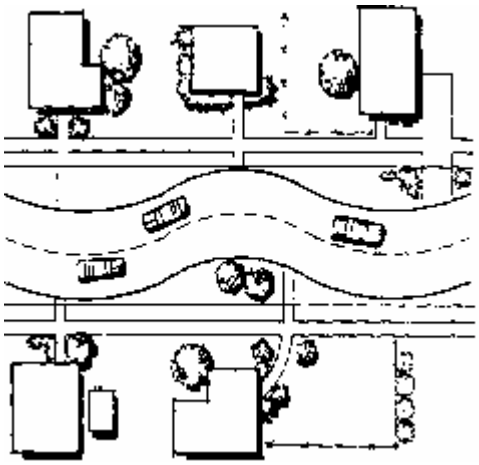
Applications:

- Appropriate for midblock locations only
- Most effective with equivalent volumes on both approaches
- Typically, is a series of at least three curb extensions
- Can use on-street parking to create chicane

Design/Installation Issues:

- Unless well-designed, chicanes may still permit speeding by drivers cutting straight paths across the center line

- Recommend traffic shifts in alignment of at least one lane width, deflection angles of at least 45 degrees, and center islands to prevent drivers from taking a straight "racing line" through the feature



Potential Impacts:

- No effect on access
- Street sweeping may need to be done manually
- Can impact parking and driveway access
- Provides opportunity for landscaping

Emergency Response Issues:

- Limited data available on their effect on delay to emergency response
- Emergency response typically prefer two-lane chicanes to speed humps

Typical Cost:

- Reported costs range between $5,800 and $21,000 (in 2000 dollars)

Traffic Calming Measures - Choker

Description:

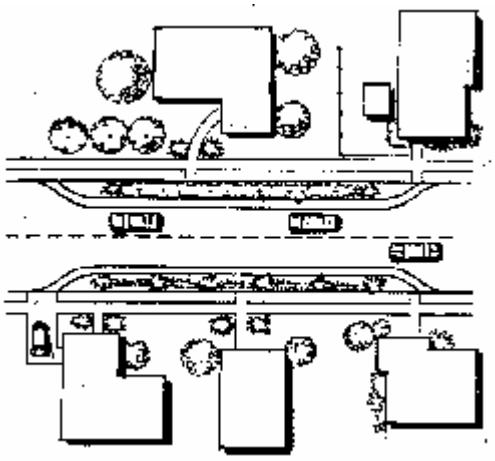
- Curb extensions at midblock or intersection corners that narrow a street by extending the sidewalk or widening the planting strip
- Can leave the cross section with two narrow lanes or with a single lane
- At midblock, sometimes called parallel chokers, angled chokers, twisted chokers, angle points, pinch points, or midblock narrowing
- At intersections, sometimes called neckdowns, bulbouts, knuckles, or corner bulges
- If marked as a crosswalk, they are also called safe crosses

Applications:

- Local and collector streets
- Pedestrian crossings
- Main roads through small communities
- Work well with speed humps, speed tables, raised intersections, textured crosswalks, curb radius reductions, and raised median islands

Design/Installation Issues:

- Some applications use an island which allows drainage and bicyclists to continue between the choker and the original curb line
- Typically designed to narrow road to 20 feet for two-way traffic; typically avoid the use of widths between 13 and 17 feet
- Adequate drainage is a key consideration
- Provides opportunity for landscaping
- Vertical delineators, bollards or object markers are often used to make visible to snowplow operators



Potential Impacts:

- Can impact parking and driveway access
- Reduces pedestrian crossing width and increases visibility of pedestrian
- Speeds have typically been reduced on average by 4 percent for two-lane chokers and 14 percent for one lane chokers
- Minor decrease in traffic for two-lane and 20 percent reduction for one-lane chokers
- Bicyclists prefer not to have the lane narrowed into path of motor vehicles

Emergency Response Issues:

- Preferred by many fire department/emergency response agencies to most other traffic calming measures

Other/Special Considerations:

- One-lane chokers rely on regulatory signs and driver courtesy to work

Typical Cost:

- Approximately $7,800 to $12,000 (in 2000 dollars)

Traffic Calming Measures - Center Island Narrowing

Description:

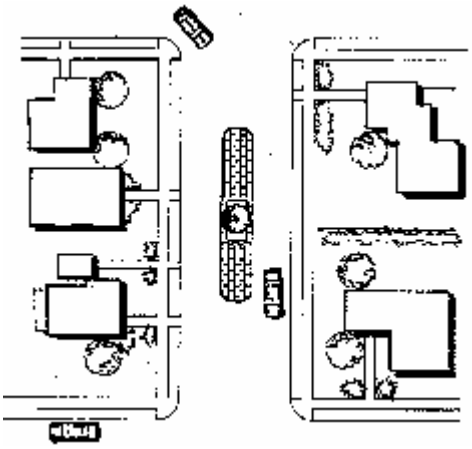
- Raised islands located along the centerline of a street that narrow the travel lanes at that location
- Often called midblock medians, median slow points, or median chokers

Applications:

- Often nicely landscaped to provide visual amenity and neighborhood identity
- Can help create pedestrian friendly streets by providing a mid-point refuge for pedestrians crossings
- Sometimes used on wide streets to narrow travel lanes
- Work well when combined with crosswalks

Potential Impacts:

- May reduce parking and driveway access
- Reduces pedestrian crossing width
- May visually enhance the street through landscaping but may also limit visibility of pedestrian crossings
- Bicyclists prefer not to have the travel way narrowed into path of motor vehicles



Emergency Response Issues:

- Preferred by fire department/emergency response agencies to most other traffic calming measures

Typical Cost:

- Reported costs range between $6,000 and $20,000 (in 2000 dollars)

The information provided on these fact sheets has been obtained from the research and experience of transportation engineering and planning professionals. The information is intended for informational and example purposes only and does not include ITE or FHWA recommendations on the best course of action.