City Of Concord

TRAFFIC MANAGEMENT POLICY

Prepared by Traffic Calming Committee
September 2005

Policy Outline

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Other literature that we found valuable was The Institute of Transportation Engineers and the Federal Highway Administration's *Traffic Calming, State of the Practice*, 1999.

1. Introduction

What Is Traffic Calming?

The City of Concord frequently receives requests from its residents about speeding and cut-through traffic in our neighborhoods. Pedestrian safety has become a major concern of area residents and grass root efforts have taken place in the city to promote pedestrian visibility and reduce speeding traffic. As the City and the surrounding communities continue to grow more traffic on our city streets can be expected, without proper treatment, neighborhood livability will become more adversely affected. For these reasons the City of Concord needs a comprehensive Traffic Management Program.

The term "traffic calming" is defined differently throughout the United States and the world. The Institute of Transportation Engineers, an international educational and scientific association of transportation professionals, defines traffic calming as follows:

> *"Traffic calming is the combination of mainly physical measures that reduce the negative effects of motor vehicle use, alter driver behavior and improve conditions for non-motorized street users."*[1]

The City of Concord expands this definition to also include consideration of non-physical measures, such as enhanced enforcement. The City has decided to utilize traditional methods that may not be considered as a calming tool but more of a traffic management tool, such as intersection signalization or the use of signage. Thus, this document uses the term traffic calming and management interchangeably.

Multiple Purposes of Traffic Calming

The immediate purpose of traffic calming is to reduce the speed and volume of traffic to acceptable levels. Reductions in traffic speed and volume, however, are just means to other ends such as traffic safety and active street life.[2] Traffic calming is undertaken for many different reasons, including:

- Reducing through traffic
- Reducing truck traffic
- Reducing the occurrence of speeding
- Reducing noise, vibration and air pollution
- Reducing accidents
- Providing safer environment for pedestrians and children
- Improving livability and aesthetics
- Reducing crime
- Supporting redevelopment

As discussed later, many different traffic calming/management tools are available to achieve the above goals.

[1] **"ITE Traffic Calming Definition," ITE Journal, Vol. 67, July 1997.**
[2] **"Traffic Calming, State of the Practice," ITE, August 1999.**

An Integrated Approach to Traffic Management

The City of Concord's Traffic Management Program addresses the "too many cars, going too fast by my house" syndrome by working closely with residents to identify existing problems, define neighborhood goals, and garner community support. The program relies heavily on community participation and action.

Once a request or complaint regarding a traffic/pedestrian concern is received from a resident, the city's traffic operations committee will evaluate the problem and determine whether the concern meets the criteria for taking further action. If it is determined that action is needed, routine solutions or Level 1 actions are considered first (see chart 4.1). Routine measures consist of low-cost, non-regulatory changes that are often less controversial. These tools include radar speed display units, targeted police enforcement, sign installation, and pavement marking changes.

After reviewing the effectiveness of routine solutions, it may be determined that more assertive measures need to be implemented that include physical alterations. These alterations change the configuration of neighborhood streets, often require engineering design, are higher-cost, and require community acceptance prior to installation. These physical alteration measures consist of physical devices such as speed tables, roundabouts, curb extensions, median islands, and a host of other measures described within this report.

The City's policy for traffic calming includes opportunity for community involvement. Residents, businesses and property owners will be expected and asked to comment on solutions and alternative concepts as they are presented to the community.

Future Program Updates

The City of Concord's Traffic Management Policy is considered a "living document," that is, it will be updated from time to time as new traffic calming techniques are developed and tested. As the City's neighborhoods gain more experience with traffic calming, procedures may be revised. In addition, traffic calming/management device installation guidelines will be added as they are developed.

What's Included in this Report?

The City of Concord's Neighborhood Traffic Management Program report is divided into the following four chapters:

- *Chapter 1. Introduction*: This chapter, provides an overview of the City of Concord's Traffic Management Program.
- *Chapter 2. Traffic Management Toolbox*: Presents descriptions of various Level 1 and Level 2 traffic calming tools.
- *Chapter 3. Traffic Calming Impacts*: Provides discussion of travel speed and volume, collision potential, and emergency response impacts.
- *Chapter 4. Implementation Process*: Discusses the City of Concord's integrated and community-driven traffic management approach.

2. Traffic Management Toolbox

Application of Tools

The traffic management toolbox includes a variety of measures that range from a simple solution to a significant change in the physical environment. Each situation is different and selected measures must be appropriate for that specific location. This toolbox displays the different types of traffic management devices and their appropriate uses, the limitations, advantages, disadvantages, and the associated costs.

Before committing to any type of measure in response to a resident or neighborhood request, it is important to carefully research the issue and determine if the problem is perceived, or real, through data collection and observation. All factors and conditions that may be contributing to the problem need to be reviewed and evaluated before any type of measure can be recommended. For example, to reduce speeds in a neighborhood, residents may want to consider a speed hump or speed table to slow down traffic if increased police enforcement or speed regulation signage is proven not to be effective. The installation of a vertical deflection element can be very effective in reducing speed on a residential street but is not a realistic option if the street is classified as an emergency response route. It is important to understand all of the issues associated with each tool and to identify the most appropriate one for a specific circumstance.

It is also important to recognize that certain sets of measures are more effective for problems associated with cut-through traffic than speeding, or pedestrian safety. The measures in the toolbox should be adhered to and used for the purposes recommended.

Table 2.1 provides a general assessment and application criteria for traffic management measures. Chapter 3 provides more specific detail on each measures' effects on traffic speeds, volumes, vehicle collisions, and other quality of life measures.

Level 1 Traffic Management Tools

Level 1 measures consist of easily implementable and low-cost tools, such as neighborhood traffic safety campaigns, radar speed display units, targeted police enforcement, sign installation, and pavement marking changes. Level 1 measures, as discussed in Chapter 3, will always be implemented and tested prior to consideration of more restrictive measures. Level 1 actions primarily consist of education and enforcement tools.

The following pages provide a gallery of potential Level 1 traffic management measures.

Table 2.1 Generalized Assessment of Traffic Management Measures

Revised: 12/6/2005

	Solves Following Issues				Street Type Suitability**				Impact of Measures						
Measure	**Reduces Speed**	**Reduces Traffic**	**Pedestrian Safety**	**Vehicular Safety**	**A**	**ER**	**C**	**L**	**Loss of Parking**	**Restrict Access**	**Emrgny. Resp.Impac**	**Noise**	**Capital Maintenance**	**Snow-Plow Impacts**	**Approx. Cost**
Level 1 Measures:															
Traffic Educ. Campaign	Maybe	Maybe	Maybe	Maybe	*	*	*	*	None	None	None	No change	No	None	Varies
Speed Display	Yes	No	Maybe	Maybe	*	*	*	*	None	None	None	No change	No	None	$250/day
Neighborhood Sign	Maybe	Minimal			*	*	*	*	None	None	None	No change	No		$200/sign
High Visibility Crosswalks	Maybe	No	Yes	No	*	*	*	*	None	None	None	No change	Yes	None	$1K-$5K
Police Enforcement	Yes	Maybe	Some	Some	*	*	*	*	None	None	None	No change	No	None	$75/hour
Narrowing Lanes	Yes	Maybe	Some	Some	*	*	*	*	None	None	None	No change	Yes	None	$1K-$3K
Speed Limit Signing	Maybe	No	Maybe	Maybe	*	*	*	*	None	None	None	No change	No	None	$200/sign
Speed Reduction	Maybe	No	Maybe	Maybe	*	*	*	*	None	None	None	No change	No	None	Signs
Stop Signs	Maybe	No	Some	Some	*	*	*	*	None	None	Some	Increase	No	None	$200/sign
Signing Restrictions	No	Yes	No	No	*	*	*	*	None	Yes	Maybe	No change	No	Maybe	$200/sign
Level 2 Measures:															
Median Island	Maybe	Yes	Yes	Yes	*	*	*	*	Maybe	Yes	Yes	Decrease	No	Maybe	$10K-$75K
Gateway	Yes	Yes	Yes	Maybe	*	*	*	*	Maybe	Yes	None	Decrease	No	Maybe	$10K-$20K
Curb Extension/Bump-out	Maybe	No	Yes	Maybe	*	*	*	*	Yes	None	Some	No change	Yes	Maybe	$10K-$20K
Choker	Yes	Maybe	Yes	Maybe				*	Yes	None	Some	No change	No	Yes	$15K
Speed Hump	Yes	Maybe	Maybe	Yes				*	Maybe	None	Some	Increase	Yes*	Some	$5K
Raised Crosswalk	Yes	Maybe	Yes	Yes				*	Yes	None	Some	Increase	Yes*	Some	$5-$10K
Raised Intersection Speed Table	Yes	No	Yes	Yes				*	Yes	None	Some	Increase	Yes	Some	$25K-$50K
Mini-Roundabout	Yes	Maybe	Maybe	Yes		*	*	*	Yes	None	Some	No change	Yes	Some	$15-$25K
Roundabout	Yes	Maybe	Yes	Yes	*	*	*	*	Maybe	None	Some	No change	Maybe	Some	?
Traffic Signal	Yes	No	Yes	Some	*	*	*	*	None	None	Some	Maybe	Yes	No	$150,000+
Intersection Channelizing	Yes	Maybe	Maybe	Yes	*	*	*	*	Yes	None	None	No change	Maybe	Some	$15-$20K
Chicane	Yes	Maybe	Maybe	Yes				*	Yes	None	Yes	Maybe	Maybe	Yes	$20K-$40K
Movement Barrier	Maybe	Yes	No	Yes	*	*	*	*	None	Yes	Yes	Decrease	Yes	Some	$5K
Entrance Barrier	Maybe	Yes	Yes	Yes	*	*	*	*	Maybe	Yes	Maybe	No change	No	Yes	$15-$20K
One-way Streets	No	Yes	No	Yes	*	*	*	*	None	Yes	Yes	No change	No	No	$5K
Diagonal Diverter	Yes	Yes	No	Yes			*	*	Maybe	Yes	Maybe	Decrease	No	Some	$15-$35K
Street Closure	Yes	Yes	Some	Some			*	*	Yes	Total	Yes	Decrease	No	Yes	$20-$35K
Lane Reduction	Yes	Maybe	Yes	Yes	*	*	*	*	None	None	Maybe	No change	No	No	Varies
Lane Additions	No	No	No	Maybe	*	*	*	*	Maybe	None	None	Increase	Yes	Yes	Varies

* Speed humps and raised crosswalks must be reinstalled each time a street is resurfaced.
Sources: "Neighborhood Traffic Management & Calming Program," City of San Buenaventura, CA, 1997 and Parisi Associates.
Street Type Suitability** A=Arterial; ER = Emergency Response; C = Collector; L = Local

Neighborhood Traffic Education Campaign

Level 1

Description: Neighborhood traffic safety campaigns include: personalized letters, neighborhood flyers, meetings, workshops, specific school programs, and neighborhood speed awareness signs or banners.

Application: The intended benefit of conducting neighborhood traffic safety campaigns is usually to increase awareness of local speed limits and other traffic and safety concerns.

Advantages:

+ Allows residents to discuss views.
+ Identifies issues of concern.
+ Enables staff to see concerns.
+ Reduces speeds temporarily.

Disadvantages:

- Effectiveness may be limited.
- Meetings need to stay focused.
- Potentially time consuming.
- Enforcement still likely required.

Special Considerations:

• Neighborhood traffic safety campaigns can consist of letters and/or flyers.
• Often, neighborhood meetings or workshops are conducted.
• Any meetings or workshops need to stay focused on specific traffic issues.
• Neighborhood speed awareness signs or banners are sometimes used.
• Usually only effective over a short duration.

Cost:

• Varies.

Speed Display Unit

Level 1

Description: The most common form of radar speed display unit is a portable trailer equipped with a radar unit that detects the speed of passing vehicles and displays it on a reader board, often with a speed limit sign next to the display.

Application: The primary benefit of speed display units is to discourage speeding along neighborhood streets.

Advantages:

+ Effective educational tool.
+ Good public relations tool.
+ Encourages speed compliance.
+ Can reduce speeds temporarily**.**

Disadvantages:

- Not an enforcement tool.
- Ineffective on multi-lane roadways.
- Less effective on high volume streets.
- Subject to vandalism.

Limited use in winter months

Special Considerations:

• Used throughout the city on an ongoing basis.
• The purpose of the units is to remind drivers that they are speeding.
• Encourage compliance with the posted speed limit.
• Usually only effective in reducing speeds when actually being used.
• In longer term (30 days), speeds can decrease by 6% on low volume roads.
• Effect usually negligible on higher volumes streets serving through traffic.
• Some motorists may speed up to try to register a high speed.
• Should not be used in remote areas.

Approximate Cost:

• $250 **per day.**

Higher Visibility Crosswalks

Level 1

Description: Higher visibility crosswalks can be created by using paving blocks or contrasting color concrete, or painting "zebra" stripes in lieu of or between the crosswalk's outer boundary stripes.

Application: The primary benefit of higher visibility crosswalks is to increase crosswalk visibility to drivers.

Advantages:

+ More visible than traditional x-walks.
+ Indicates preferred crossing location.
+ Can slow travel speeds.
+ Can be aesthetically pleasing.

Disadvantages:

- Provides a false sense of security for pedestrians.

- Usually a higher capital cost and may require more maintenance than traditional crosswalks.

Special Considerations:

• Higher visibility crosswalks indicate preferred crossing location to pedestrians.
• Pedestrians may place too high a reliance on ability to control driver behavior.
• Specially paved types require more maintenance than traditional crosswalks.
• Should only be used at uncontrolled crosswalks.
• Less expensive, but not as effective as raised crosswalks (Level 2).

Approximate Cost:

• $1,000 to $5,000 each.

Targeted Police Enforcement

Level 1

Description: The Police Department deploys motorcycle or automobile officers to perform targeted enforcement on residential streets for at least an hour a day.

Application: The intended benefit of targeted police enforcement is to make drivers aware of local speed limits and to reduce speeds.

Advantages:

+ Visible enforcement very effective.
+ Driver awareness increased.
+ Can be used on short notice.
+ Can reduce speeds temporarily.

Disadvantages:

- Temporary measure.
- Requires long-term use to be effective.
- Fines lower than enforcement cost.
- Disrupts traffic on high volume streets.

Special Considerations:

• Police enforcement is continually in effect throughout the city.
• Usually used only on neighborhood streets with documented speeding problems.
• Typically only effective while officer is actually monitoring speeds.
• Often helpful in school zones.
• May be used during "learning period" when new devices first implemented.
• Long-term benefits unsubstantiated without regular periodic enforcement.
• Expensive.

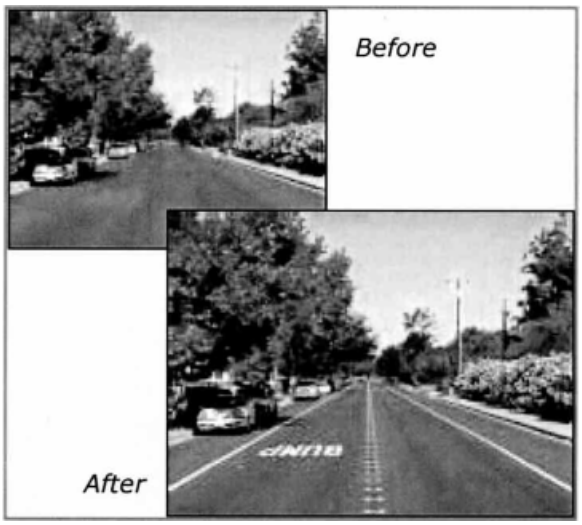
Approximate Cost:

• About $75 per hour for officer and equipment.

Narrowing Lanes

Level 1

Description: On this Level 1 type of measure, striping is usually used to create narrow lanes --often about 10 feet wide. The "unused" pavement can be used to stripe bicycle and/or parking lanes.



Application: The primary benefit of narrowing lanes through striping is to slow vehicle speeds.

Advantages:

+ Can be quickly implemented.
+ Slows travel speeds.
+ Improves safety.
+ Can be easily modified.

Disadvantages:

-Minor Increase in regular maintenance.
- Not always perceived as effective tool.
- Adds striping to neighborhood streets.
-

Special Considerations:

• Narrowed travel lanes provide "friction" and can slow vehicle speeds.
• Can be installed quickly and easily revised over time.
• Designated bicycle lanes and/or parking lanes can be created.
• Adds centerline and edgeline striping to neighborhood streets.
• Can be used around curves to "force" vehicles to stay within lanes.
• On curves, reflective lane delineators are usually most effective in centerline.

Approximate Cost:

• $1,000 to $3,000 each.

Speed Limit Signage and Reduction

Level 1

Description: 30 or 25 mile per hour speed limit signs are installed along neighborhood streets.

Application: The primary benefit of installing speed limit signing is to encourage slower vehicle speeds along residential streets. Signs are only installed along streets where speeding is a problem.

Advantages:

+ Clearly defines legal speed limit.
+ Can reduce speeds if enforced.
+ Usually popular with neighborhood.
+ Low cost installation.

Disadvantages:

- Requires on-going police enforcement.
- Not effective solely by themselves.
- Adds additional signs in neighborhood.

Special Considerations:

• Should only be used on streets where speeding is a documented problem.
• Requires police enforcement to remain effective.
• Speed limits lower than 25 mph can only be set by engineering analysis.
• Unrealistically low speed limits tend to be disregarded.
• Increases cost of sign maintenance.

Approximate Cost:

• $200 per sign.

Stop Signs

Level 1

Description: Stop signs are either installed on the "side street" where no signs currently exist -- or on the "main street" at an intersection where the "side street" already has stop signs.

Application: Stop signs should only be considered when warranted based on established criteria.

Advantages:

+ Requires traffic to stop.
+ Assists pedestrian crossings.
+ May slightly reduce cut-thru traffic.
+ Lowers speeds at stop sign.

Disadvantages:

- May lead to increased mid-block speeds.
- Increases noise and air pollution.
- Can create problems if unwarranted.
- May increase emergency response time.

Special Considerations:

• Stop signs should only be installed if warranted based on established criteria.
• Drivers may not comply with stop signs if installation is unwarranted.
• Mid-block speeds can increase to make up for "lost" time.
• At low volume, unwarranted locations, many drivers will "roll" through.
• Can create safety problems for pedestrians when compliance is poor.
• Stop signs may increase certain types of collisions, e.g., rear-ends.
• Stop signs may reduce other types of collisions, e.g., broad-sides.
• May increase emergency response times.
• Increases noise near intersection due to vehicle deceleration and acceleration.

Approximate Cost: $200 per sign

Restricted Movement Signing

Level 1

Description: Turn prohibition signs involve the use of standard "No Left Turn", "No Right Turn", or "Do Not Enter" signs to prevent undesired turning movements onto residential streets. They may include peak period limitations.

Application: The primary benefit of restricted movement signing is to reduce cut-through traffic volumes along residential streets.

Advantages:

+ Redirects traffic to main streets.
+ Reduces cut-through traffic.
+ Can address time-of-day problems.
+ Low cost.
+Turn prohibitions can be used on a trial basis.

Disadvantages:

- May divert traffic to other residential streets.
- Requires enforcement to be effective.
- Adds more signs to neighborhood.

Special Considerations:

• Restricted movement signing is best used on major or collector streets.
• Most effective at periphery of a neighborhood to prevent entering traffic.
• Has little or no effect on speeds for through vehicles.
•
• With active enforcement, violation rates are reduced to about 20%.
• Turn restrictions are most effective when limited to peak hours.
• Less effective when applied around-the-clock.

Approximate Cost:

• $200 per sign.

Level 2 Traffic Management Tools

Level 2 or Physical Alterations of neighborhood streets, often require engineering, are higher-cost, and require community acceptance prior to installation. Level 2 measures are only used after standard solutions or Level 1 measures have been implemented and proven ineffective in addressing particular neighborhood traffic management needs. Before Level 2 traffic management actions are constructed, the neighborhood and City staff must carefully evaluate the benefits and disadvantages of each action as compared to a no build alternative.

The following pages provide a gallery of potential Level 2 traffic management measures. It is often possible to combine elements of various Level 2 actions or to slightly modify treatments.

Combining Traffic Management Measures

Often, the most effective traffic management programs use a variety of traffic management tools. Combinations of traffic management measures can be used, and are often encouraged, in different neighborhoods and even along the same street. As shown in the toolbox of Level 1 and Level 2 applications, many of the measures complement each other. For instance, speed humps and chokers can be used effectively together, as can roundabouts and curb extensions. Center median islands and chokers are often installed as a set. Raised crosswalks and curb extensions work well together. Many other combinations of traffic management tools can be effective.

Use of Temporary Measures

Whenever feasible, the City of Concord will install temporary Level 2 traffic management devices subject to an assessment of impacts and support of the residents. It should be noted that while the use of temporary devices can help determine the resulting travel speed and traffic volume changes, temporary devices are usually not aesthetic. Because of this, there is always the risk that residents will criticize the device's appearance instead of its effectiveness in traffic management. However, the use of attractive materials, colors and composition can create acceptable temporary devices. For example, planters, which provide greenery as well as access control, can be used as temporary street closures. Temporary measures should plan to be installed for a 4-6 week period.

Median Island

Level 2

Description: Median islands are raised islands in the center of a street that can be used to narrow lanes for speed control and/or to create a barrier to prohibit left-turns into or from a side street. They can also be used for pedestrian refuges in the middle of a crosswalk.

Application: Median islands are used on wide streets to lower travel speeds and/or to prohibit left-turning movements. They are also often used to provide a mid-point refuge area for crossing pedestrians.

Advantages:

+ Effectively reduces vehicle speeds.
+ Can reduce head-on collision potential.
+ Reduces pedestrian crossing distance.
+ Opportunity for landscaping.

Disadvantages:

- May require removal of parking if roadway narrows significantly.
- May reduce driveway access.
- Could impact emergency vehicle access.
- May divert traffic volumes to other streets due to accessibility.

Special Considerations:

• Median islands, when used to block side street access, may divert traffic.
• In this condition, they may impact emergency response times.
• Median islands may visually enhance the street through landscaping.
• • Fire departments usually prefer mountable median islands to some other measures.
• Bicyclists prefer not to have travel way narrowed.

Approximate Cost:

• $10,000 to $75,000 each (depending on size).

Gateway

Level 2

Description: Gateway entrance treatments consist of physical and textural changes to streets and are located at key entry ways into a neighborhood. They often consist of features, like chokers, that narrow a street in order to reduce the width of the street's travel way.

Application: The primary benefit of gateway treatments is speed reduction. They provide visual cues that tell drivers they are entering a local residential area or that the surrounding land uses are changing.

Advantages:

+ Can reduce vehicle speeds.
+ Creates identity for neighborhood.
+
+ Opportunity for landscaping.

Disadvantages:

- Maintenance and irrigation needs.
- May require removal of parking.
- Can impede fire apparatus movements
- Creates physical obstruction.

Limited traffic calming and cost effectiveness.

Special Considerations:

• Gateway treatments make drivers more aware of neighborhood environment.
• Can incorporate neighborhood identification signing and monumentation.
• Care should be taken not to restrict pedestrian visibility at adjacent crosswalk.
• Textured pavements could introduce some new noise.

Approximate Cost:

• $10,000 to $20,000 each.

Curb Extension/Bump-Out

Level 2

Description: Curb extensions narrow the street by extending the curbs toward the center of the roadway or by building detached raised islands to allow for drainage and bike lanes passage.

Application: Curb extensions are used to narrow the roadway and to create shorter pedestrian crossings. They also improve sight distance and influence driver behavior by changing the appearance of the street.

Advantages:

+ Better pedestrian visibility.
+ Shorter pedestrian crossing.
+ Can decrease vehicle speeds.
+ Opportunity for landscaping.

Disadvantages:

- Can require removal of parking.
-
- Can create drainage issues.

Special Considerations:

• Curb extensions can be installed at intersections or mid-block (see chokers).
• Mid-block checkers are often used with pedestrian crossing treatments.
• Curb extensions must provide space for bicycle lanes where present.
• Curb extensions at transit stops enhance service.
• No noise or emergency service impacts.
• May require landscape maintenance to preserve sight distances.

Approximate Cost:

• $10,000 to $20,000 each.

Choker

Level 2

Description: Chokers are midblock curb extensions that narrow a street by extending the sidewalk or widening the planting strip. The remaining cross-section can consist of one lane or two narrow lanes.

Application: Chokers are intended to reduce traffic volumes by making the roadway narrow so that only one car at a time can pass through it, or two cars can pass very slowly in opposite directions.

Advantages:

+ Effectively reduces vehicle speeds.
+ Shorter pedestrian crossing.
+ Provides improved sight distance.
+ Opportunity for landscaping.

Disadvantages:

- Can require removal of parking.
- May create hazard for bicyclists.
- Can create drainage issues.
- May impede truck movements.

Special Considerations:

• Chokers can be designed with protected bike lane next to original curb.
• Chokers with exclusive bike lanes can collect debris in bike lane.
• Can impact driveway access.
• Also reduce travel speeds when cross-section reduced substantially.
• Preferred by many emergency response agencies to other measures.
• Provide excellent opportunities for landscaping.

Approximate Cost:

• $10,000 each.

Speed Hump

Level 2

Description: Speed humps are asphalt mounds constructed on residential streets. They are usually placed in a series and spaced 300 to 600 feet apart. Speed humps are typically 14 feet long and 3 inches high. Their vertical deflection encourages motorists to reduce speed.

Application: The primary benefit of speed humps is speed control. They work well in conjunction with curb extensions.

Advantages:

+ Effectively reduces vehicle speeds.

May divert traffic to parallel arterial street.

+ Does not require parking removal.
+ Can reduce vehicular volumes.
+ Easily tested on temporary basis.

Disadvantages:

- Slows emergency vehicles.
- Increases noise near speed humps.
- May divert traffic to parallel neighborhood streets.
- Not aesthetically pleasing.

Special Considerations:

• Vehicle speeds between humps have been shown to decrease by up to 25%.
• Volumes may decrease if parallel route, without measures, is available.
• Possible increase in traffic noise from braking and accelerating.
• Highest noise increase from buses and trucks.
• Speed humps reduce emergency vehicle response times.
• 3-5 second delay per hump for fire trucks, 10 seconds for ambulances.
• Speed humps require advance warning signs and object marker at hump.
• Difficult to construct precisely, unless pre-fabricated.

Approximate Cost:

• $5,000 each.

Raised Crosswalk

Level 2

Description: Raised crosswalks are crosswalks constructed 3 to 4 inches above the elevation of the street. They are usually about 22 feet long, with a flat section in the middle and ramps on the ends. Sometimes the flat portion is constructed with brick or other textured materials.

Application: Raised crosswalks are intended to reduce vehicle speeds specifically where a high amount of pedestrians cross the street.

Advantages:

+ Effectively reduces vehicle speeds.
+ Good pedestrian safety treatment.
+ Does not affect access.
+ Flat portion can be textured.

Disadvantages:

- May generate increased noise.
- Can require drainage modifications.
- Only 3 seconds delay for fire trucks.
- Often require signage and markings.

Special Considerations:

• Raised crosswalks are usually 22 feet long, with a 10 foot wide flat section.
• Lower elevation than sidewalk to alert visually impaired it's a crosswalk.
• Careful design is needed due to potential drainage issues.
• Usually preferred by Fire Departments over standard speed hump.
• Work well in combination with curb extensions and curb radius reductions.
• Do not affect access.
• Increases pedestrian visibility and likelihood that driver yields to pedestrian.
• Often referred to as speed tables or speed platforms.

Approximate Cost:

• $5,000 to $10,000 each.

Raised Intersection/Speed Table

Level 2

Description: A raised intersection is a flat, raised area covering an entire intersection. There are ramps on all approaches. The plateau is usually about 4" high. Usually, the raised intersection is finished in brick or other textured materials.

Application: Raised intersections are used to reduce through movement speeds and provide safer street crossings for pedestrians.

Advantages:

+ Effectively reduces vehicle speeds.
+ Good pedestrian safety treatment.
+ Can be aesthetically pleasing.
+ Does not affect access.

Disadvantages:

- Expensive to construct and maintain.
- Requires drainage modifications.
- Affects emergency vehicle response.
- May require bollards to define corners.

Special Considerations:

• Raised intersections usually used in urban areas.
• Make entire intersections more pedestrian-friendly.
• Work well with curb extensions and textured crosswalks.
• Often part of an area wide traffic calming scheme involving both streets.
• Expensive.

Should not be used in conjunction with a four way stop.

• Special signing often required.

Approximate Cost:

• $25,000 to $50,000 each.

Mini-Roundabout

Level 2

Description: Mini-roundabouts are raised circular islands in an intersection. They are typically landscaped with ground cover and/or street trees. Mini-roundabouts require drivers to slow down to a speed that allows them to comfortably maneuver around the circle in a counterclockwise direction. Used at low-volume, low-speed intersections or where space is limited.

Application: The primary benefit of a mini-roundabout is speed control and reduction in angle and turning collisions. Can be used in lieu of four way stop or traffic signal.

Advantages:

+ Effectively reduces vehicle speeds.
+ Reduces collision potential.
+ Provides better side-street access.
+ Opportunity for landscaping.
+ Improves air quality and reduces noise pollution.

Disadvantages:

- Parking removal may be required.
-
- Can impede emergency vehicles.
-

Special Considerations:

• • About 30 feet of curbside parking must be prohibited in advance of roundabout.
• Buses can maneuver around roundabouts at slow speeds.
• Noise impacts are minimal.
• If well-maintained, traffic circles can be attractive.
• However, there are also a lot of signs and pavement markings required.
• May require utility relocation and right-of-way access.
• Mini-roundabouts are less effective at T-intersections and offset intersections.

Approximate Cost:

• $15,000 to $25,000 each.

Roundabout

Level 2

Description: Roundabouts are raised circular islands in an intersection. They are typically landscaped with ground cover and/or street trees. Roundabouts require drivers to slow down to a speed that allows them to comfortably maneuver around the circle in a counterclockwise direction. Roundabouts are used to control major intersections with relatively high volumes and speeds.

Application: The primary benefit of a roundabout is to reduce speeds approaching the intersection and a reduction in angle and turning collisions.

Advantages:

+ Effectively reduces vehicle speeds.
+ Reduces collision potential.
+ Provides better side-street access.
+ Opportunity for landscaping.
+ Typically less expensive to build and operate than a Traffic signal
+ Minimize or eliminates queuing at the approach to an intersection.
+ Reduces total vehicle delay.

Disadvantages:

- Parking removal may be required.
- Often requires additional right of way
- Can impede emergency vehicles.

Special Considerations:

• • Curbside parking must be prohibited in advance of roundabout.
• Buses can maneuver around roundabouts at slow speeds.
• Noise impacts are minimal.
• If well-maintained, roundabouts can be attractive.
• However, there are also a lot of signs and pavement markings required.
• May require utility relocation and right-of-way access.

Approximate Cost:

- $100,000-300,000 each

Traffic Signal

Level 2

Description: Signalization of major intersections will regulate traffic through busy intersections and directly impact traffic flow and speeds.

Application: The primary benefit is to reduce the number and severity of collisions at high traffic volume intersections on arterials and collectors.

Advantages:

+ Effectively reduces vehicle speeds.
+ Low impact to emergency services.
+ Can discourage through traffic.
+ Can reduce severity of collisions

Disadvantages:

- Parking removal may be required.
- May direct traffic to other street(s).
- Maintenance responsibility.
- May intensify queuing at the approach to an intersection
- Fairly expensive.
- Can increase rear end collisions
- Turn lane requires right-of-way
- Increases vehicle delay and emissions.
- Increase vehicle speeds during green phase.

Special Considerations:

• Improvement may also discourage some cut-through traffic.
Needs to warrant state improvement.
• No significant impedance to fire and transit service.
• May require road re-alignment for turning lanes.
• Possible to vary traffic control with timed signalization.

Approximate Cost:

• $150,000 to $1,000,000 each.

Intersection Channelization

Level 2

Description: Providing channelization at three-legged intersections forces previous straight-through movements to make slower turning maneuvers. Channelization is usually raised.

Application: The primary benefit of realigning intersections is to slow traffic down. Can also be used to redirect traffic to another facility or to provide neighborhood gateway.

Advantages:

+ Effectively reduces vehicle speeds.
+ Low impact to emergency services.
+ Can discourage through traffic.
+ Opportunity for landscaping.

Disadvantages:

- Parking removal required.
- May direct traffic to other street(s).
- Maintenance responsibility.
- Fairly expensive.

Special Considerations:

• Intersection channelization slows traffic down near the intersection.
• Improvement may also discourage some cut-through traffic..
• No significant impedance to fire and transit service.
• Provide landscaping opportunities and potential gateway treatments.
• Can require drainage modifications.
• Possible to vary traffic control with stop signs on one or all three legs.

Approximate Cost:

• $15,000 to $20,000 each.

Chicane

Level 2

Description: A chicane is a series of two or more staggered curb extensions on alternating sides of a roadway. Horizontal deflection influences motorists to reduce speed through the serpentine roadway.

Application: The primary benefit of chicanes is speed control either in mid-block conditions or intersections.

Advantages:

+ Effectively reduces vehicle speeds.

+ Does not restrict resident access.

+ Opportunity for landscaping.

Disadvantages:

- Significant parking loss.
- Increased maintenance.
- May require right-of-way.
- Expensive.

Increases Emergency Vehicle response times.

Special Considerations:

• Chicanes cannot usually be used where right-of-way is limited.
• May require removal of substantial amounts of on-street parking.
• Alternatively, on-street parking can be used to create a chicane.
• Most effective with equivalent traffic volumes along both approaches.
• May increase conflicts with pedestrians and bicyclists.
• Chicanes provide landscaping opportunities.
• Most residents would have their driveways affected by type of installation.
• No expected noise impacts.

Approximate Cost:

• $20,000 to $40,000 each.

Restricted Movement Barrier

Level 2

Description: Restricted movement barriers are raised islands that prevent certain movements at an intersection. They are often landscaped.

Application: The primary benefit of restricted movement barriers is to reduce cut-through traffic levels. They also provide pedestrian refuge areas for street crossings.

Advantages:

+ Redirects traffic to other streets.
+ Reduces cut-through traffic.
+ Provides pedestrian refuge area.
+ Opportunity for landscaping.

Disadvantages:

- May redirect traffic to residential streets.
- Will increase trip lengths.
- May impact emergency response times.

Special Considerations:

• Barriers have little or no affect on speeds for through vehicles.
• Should not be used on critical emergency response routes.
• Reduces number of potential conflict points for turning vehicles.
• Possibility for landscaping.
• Many variations are possible, including prohibiting turns to/from main street.
• Design needs to consider drainage needs.
• Usually require signing.

Approximate Cost:

• $5,000 each.

Entrance Barrier

Level 2

Description: Entrance barriers are curb extensions or barriers that restrict movements into a street. They are constructed to approximately the center of the street, effectively obstructing one direction of traffic. Entrance barriers create a one-way segment at the intersection, while maintaining two-way traffic for the rest of the block.

Application: The primary benefit of entrance barriers is traffic volume reduction.

Advantages:

+ Reduces cut-through traffic.
+ More self-enforcing than signs.
+ Shorter pedestrian crossings.
+ Opportunity for landscaping.

Disadvantages:

- May divert traffic to other streets.
- Can increase trip lengths.
- Potential parking removal.
- Maintenance responsibility.

Special Considerations:

• Restrict movements into street while allowing resident access within block.
• Potential use must consider how residents will gain access.
• In emergency situations, emergency vehicles can gain access.
• Required maneuver may increase emergency response times.
• Can be provided on opposite intersection corners.
• Bicycles can be permitted to travel through in both directions.
• Entrance barriers can be nicely landscaped.
• In effect at all times, even when cut-through volumes may be low.

Approximate Cost:

• $15,000 to $20,000 each.

One-way Streets

Level 2

Description: This measure converts a segment of a two-way street to one-way operations.

Application: The primary benefit of two-way to one-way street conversions is reduction in cut-through traffic in one direction.

Advantages:

+ Redirects traffic to other streets.
+ Reduces cut-through traffic in one direction.
+ Improved safety with one-way.
+ Emergency services can bypass.

Disadvantages:

- Can encourage increased speeds.
- Redirects traffic to other streets.
- Will increase trip lengths.
- Requires signage.

Special Considerations:

• Restrict movements into street while allowing resident access within block.
• Potential use must consider how residents will gain access.
• Bicycles are typically permitted to travel through in both directions.
• In effect at all times, even when cut-through volumes may be low.
• Can be accomplished with just signing and pavement markings.
• Possible to landscape channelizing islands, but maintenance required.
• Often used in combination with other one-way street conversions.
• Must be considered as part of neighborhood wide traffic management plan.

Approximate Cost:

• $200 per sign.

Diagonal Diverter

Level 2

Description: Diagonal diverters are raised areas placed diagonally across a four-legged intersection. They prohibit through movements by creating two "L" shaped intersections.

Application: The primary benefit of diagonal diverters is reduction in through traffic volumes. These type of diverters also minimally decrease speeds near the intersection**.**

Advantages:

+ Reduces cut-through traffic.
+ Self-enforcing.
+ Reduces collision potential.
+ Opportunity for landscaping.

Disadvantages:

- Redirects traffic to other streets.
- May increase trip lengths.
- Can impede emergency vehicles.
- Always in effect.

Special Considerations:

• Diagonal diverters can be designed to allow emergency vehicle access.
• Can be designed to allow pedestrian and bicycle access.
• They may shift problems elsewhere unless strategic program developed.
• Provide advantage over complete street closure as circulation less impacted.
• Can be attractively landscaped.
• Has little or no effect on speeds for local traffic.

Approximate Cost:

• $15,000 to $35,000 each.

Street Closure

Level 2

Description: 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.

Application: Cul-de-sacs and street closures are intended to change traffic patterns. They are very effective at reducing cut-through and general traffic volumes.

Advantages:

+ Eliminates cut-through traffic.
+ Reduces speeding near device.
+ Self-enforcing.
+ Opportunity for landscaping.

Disadvantages:

- Directs traffic to other streets.
- Increases trip lengths.
- Affects emergency response time.
- May lose some on-street parking.

Special Considerations:

• Cul-de-sacs/street closures typically used after other measures have failed.
• Often used in sets to make travel circuitous — typically staggered.
• Require strategic pattern of devices to not shift problem elsewhere.
• Can be placed at an intersection or mid-block.
• Not used on major emergency response routes or transit routes.
• May be designed to allow emergency vehicle access.
• Usually designed with small opening to allow bicyclists and pedestrians.
• Often consist of landscaping.

Approximate Cost:

• $20,000 to $35,000 each.

Lane Reduction

Level 2

Description: Lane reductions (Road Diets) are often conversions of four-lane undivided roads into three lanes (two through lanes and a center turn lane). The fourth lane may be converted to bicycle lanes, sidewalks, and/or on-street parking.

Application: Lane reductions are intended to reduce vehicle speeds and vehicle interactions during lane changes by allowing only two travel lanes and a center turn lane.

Advantages:

+ Reduces speeds.
+ Reduces severity of collisions.
+ Shorter pedestrian crossing.
+ May increase on street parking
+ Can allow for bike lane

Disadvantages:

- May Divert traffic to other streets.
- May increase the percentage of angle collisions
- speed reductions not as effective as other more restrictive measures

Special Considerations:

• Fourth lane can be used for on street parking, bike lanes, or pedestrian access
• Lane reductions have a higher percentage of angle crashes.
• Costs can be low to moderate.

Approximate Cost:

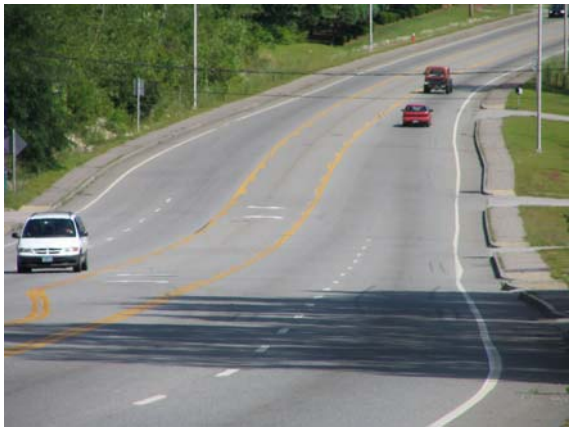
• Varies

Lane Additions

Level 2

Description: Lane additions are often conversions of two-lane undivided roads into three lanes or more lanes. Designed with the movement of traffic as the highest priority.

Application: Lane Additions are intended to alleviate traffic congestion by allowing by allowing turn lanes or additional travel lanes.



Advantages:

+ Reduces traffic congestion
+ May reduce the number of vehicular crashes
+ Diverts traffic from residential to arterial streets.

Disadvantages:

- May increase the amount of traffic volumes
- May reduce on street parking
- May impede vehicle turning movements
- Less pedestrian friendly at crossings

Special Considerations:

• Although it may reduce traffic congestion, traffic volumes will be expected to increase over time as traffic circulation deviates from surrounding streets that were once used for cut through traffic.
• Turning lanes may reduce the number of collisions.
• May be costly if drainage improvements, utility relocation and right-of-way access is required.
• Not pedestrian friendly, as street becomes longer to cross.
• Traffic moving at a faster rate may increase the number of collisions

Approximate Cost:

• Varies

3. Traffic Management Impacts

This chapter describes impacts of different types of traffic management measures. Using qualitative and quantitative data available from before-and-after studies, the ability of various Level 2 or physical alteration devices to reduce travel speeds, cut-through traffic volumes, and collision potential are discussed. In addition, traffic management measures' impact on emergency responsiveness is presented. Level 1 or standard solution impacts are not discussed since very few before-and-after studies have been conducted on these type of traffic management improvements.

Travel Speeds

One of the primary goals of traffic calming is to reduce travel speeds on residential streets. In traffic engineering, speed distributions are typically represented by 85th percentile speeds since it is generally felt that at least 85 percent of the drivers operate at speeds which are reasonable and prudent for the conditions pertaining in each situation. Most of the speed data available from before-and-after studies of traffic calming are 85th percentile speeds.

Table 3.1 summarizes the speed impacts of various traffic management measures. The data shown in the table is based on the results of hundreds of before-and-after studies.

Table 3.1 Speed Impacts Downstream of Traffic Calming Measures

Sample Measure	Sample Size	85th Percentile Speed (mph)*			Percentage Change*
		Avg. Before Calming	Avg. After Calming	Change After Calming	
Speed hump	179	35.0	27.4 (4.0)	-7.6 (3.5)	-22 (9)
Raised crosswalk	58	36.7	30.1 (2.7)	-6.6 (3.2)	-18 (8)
Raised intersection	3	34.6	34.3 (6.0)	-0.3 (3.8)	-1 (10)
Roundabouts	45	34.2	30.3 (4.4)	-3.9 (3.2)	-11 (10)
Narrowing	7	34.9	32.3 (2.8)	-2.6 (5.5)	-4 (22)
Entrance barrier	16	32.3	26.3 (5.2)	-6.0 (5.2)	-19 (11)
Diagonal diverter	7	29.3	27.9 (5.2)	-1.4 (4.7)	-4 (17)

* Measures within parentheses represent the standard deviation from the average.
Source: "Traffic Calming, State of the Practice," ITE, August 1999.

As shown in Table 3.1, speed humps have the greatest impact on 85th percentile speeds, reducing them by an average of more than seven miles per hour (mph), or 20 percent. Raised intersections and roundabouts have the least impact.

It should be noted that the speed impacts of traffic management measures rely not only on the geometries of the device, but the spacing between successive devices. Previous studies indicate that speeds increase about 0.5 to 1.0 mph for every 100 feet of separation for speed hump spacing up to 1,000 feet.

Traffic Volumes

Another primary goal of traffic calming is to reduce cut-through volumes on residential streets. Traffic volume impacts are much more complex and site-specific as compared to speed impacts because of the availability of alternative routes and the split of traffic between localized trips (that need to travel along the traffic calmed location) and through traffic (which can often take another route).

Although traffic volume changes are difficult to assess, based on previous studies, two measures of impact are summarized in Table 3.2. The table provides information on average percentage change in daily traffic after treatment. The results shown in Table 3.2 should be viewed as representative only.

Table 3.2 Volume Impacts of Traffic Management Measures

Sample Measure	Sample Size	Average Percent Change in Volume* (vehicles per day)
Speed hump	143	-18 (24)
Raised crosswalk	46	-12 (20)
Roundabout	49	-5 (46)
Narrowing	11	-10 (51)
Entrance barrier	53	-42 (41)
Diagonal diverter	27	-35 (46)
Full closure	19	-44 (36)

* Measures within parentheses represent the standard deviation from the average. Source: "Traffic Calming, State of the Practice," ITE, August 1999.

Traffic volume changes are usually the greatest when roadway closure devices are used, such as entrance barriers, diagonal diverters and cul-de-sacs. Of Level 2 measures, roundabouts typically have the least effect in reducing traffic volumes.

It should also be pointed out that while implementation of certain traffic management devices can reduce traffic volumes along the intended route, they may also increase traffic volumes along nearby residential streets. This potential impact should be considered before deciding on which traffic calming tools are to be implemented.

Collisions

By slowing traffic, eliminating conflicting movements, and increasing drivers' attention, traffic calming can result in fewer collisions. And, due to lower speeds, they are often less serious when collisions do occur.

Table 3.3 compares before-and-after collision frequencies for various Level 2 traffic management measures. As shown, several traffic calming devices reduce the potential for collisions. Roundabouts are very effective as they lower the number of potential vehicle conflict points (since no left-turn or straight-through movements are allowed).

Table 3.3 Average Annual Collision Frequencies Before and After Traffic Calming

Sample Measure	Sample Size	Average Annual Collisions		
		Before Calming	After Calming	Percentage Change
Speed hump	50	2.62	2.29	-13
Raised crosswalk	8	6.71	3.66	-45
Roundabouts	130	2.19	0.64	-71

Source: Unpublished documents supplied by traffic calming programs.

Many traffic management measures not only reduce the potential for collisions between two or more vehicles, but also between vehicles and pedestrians or between vehicles and bicyclists. Several treatments improve the sight distance between these modes, and/or provide safe refuge areas for crossing non-motorized users. On the other hand, some measures that reduce travel lane widths could increase the potential for conflicts between vehicles and bicyclists.

Emergency Responsiveness

Any traffic management tools that are effective due to their ability to physically control traffic could also negatively impact several classes of emergency vehicles. The City of Concord and its residents place a very high priority on minimizing emergency response times.

Several localities have performed controlled tests of speed humps, raised crosswalks, and roundabouts to see how much delay they produce. Table 3.4 presents the test results.

Table 3.4 Emergency Response Time Study Results

Community	Measure	Delay at Slow Point (seconds)
Austin, TX	12 -foot speed hump	2.8 (fire engine) 3.0 (ladder truck) 2.3 (ambulance w/out patient) 9.7 (ambulance with patient)
Berkeley, CA	12-foot speed hump 22-foot raised crosswalk	10.7 (fire engine) 9.2 (ladder truck) 3.0 (fire engine) 13.5 (ladder truck)
Boulder, CO	12-foot speed hump 25-foot roundabout	2.8 (fire engine) 7.5 (fire engine)
Montgomery Co., MD	12-foot speed hump 18-foot roundabout	2.8 (ladder truck) 3.8 (ambulance) 4.2 (fire truck) 7.3 (pumper truck) 5.4 (ladder truck) 3.2 (ambulance) 5.0 (fire truck) 7.0 (pumper truck)
Portland, OR*	14-foot speed hump 22-foot raised crosswalk 16 to 24-foot roundabout	5.2 (fire engine) 2.9 (custom rescue vehicle) 6.6 (ladder truck) 3.0 (fire truck) 0.3 (custom rescue vehicle) 3.0 (ladder truck) 6.1 (fire engine) 3.1 (custom rescue vehicle) 8.4 (ladder truck)
Sarasota, FL	12 -foot speed hump	9.5 (ambulance)

* Assumes a 35-mph response cruising speed.
Source: "Traffic Calming, State of the Practice," ITE, August 1999.

As shown in Table 3.4, regardless of the traffic management measure or fire-rescue vehicle, the delay per traffic management measure is nearly always under 10 seconds. Roundabouts appear to create longer delays than speed humps, but speed humps have a greater probability of damage to fire-rescue vehicles and injury to patients in ambulances. Finally, speed tables, because they are longer, create shorter delays than speed humps.

Consideration of traffic management devices will always include a review of possible negative impacts, including emergency response times.

4. Implementation Process

The City of Concord's Neighborhood Traffic Management Program is based on substantial community participation. Because residents are expected to be the primary initiators of traffic calming requests and must live day-to-day with the resulting actions, the City includes neighborhood participation throughout the process. Development of successful traffic management programs depends on strong interaction between the community and City staff.

One of the intents of the program is to provide a clear structure for addressing traffic concerns in the City's neighborhoods. Traffic concerns may exist throughout an entire neighborhood, or may be specific to a particular street, segment of roadway, or at a spot location. The City's implementation process of traffic calming solutions will require community support to be successful. The process allows implementation of traffic management tools in a timely manner in conditions where problems could be addressed with fairly routine solutions. The six step process, as shown in Figure 4.1, outlined by the City allows for the opportunity to seek routine solutions to problems identified with minimum fanfare as well as more costly solutions including regulatory changes and physical characteristics changes that will require public input and one or more votes by the City Council.

Community Identification of the Problem and Step 1 and 2

The traffic management process begins once a traffic request or complaint has been submitted to City Council. The City Engineer and/or Traffic Operation Committee will evaluate the situation. The City's Engineer or Traffic Operations Committee will document the neighborhood concern, conduct a field investigation, and collect data, as appropriate (e.g., traffic volumes, collision data, travel speeds, etc.). If no problem has been identified City Staff will submit a report to Council and/or complainant. If City staff determines that the neighborhood's identified problem can be easily reduced or alleviated with a routine solution (level 1: e.g., easily implementable and low cost tools, non-regulatory changes), the City will program implementation of the most appropriate improvement(s). Once these changes have been implemented results will be monitored.

Step 3 or Standard Solution Implementation Process

If it is determined that routine solutions will not work for the problem identified then a level 1 - Standard Solution may be recommended. These solutions may include a stop sign, traffic signal, speed limit change, a change in on street parking, increased visibility of crosswalks, etc. A neighborhood informational meeting will be held to present the alternatives suggested to rectify the traffic problem and draw support for a corrective action. A public hearing and vote by City Council will be recommended in support of the action. Once the action is approved, the City will undertake the design either with City staff or a consultant. Another neighborhood meeting will be held to review final design. Action will be implemented and results will be monitored for effectiveness.

Step 4 or Traffic Management Solution Implementation Process for Minor and Neighborhood Streets

In certain instances routine and standard solutions may be proven to be ineffective and may not be the most practical. City staff may recommend traffic calming level 2 measures that may include curb extensions, speed tables, roundabouts, refuge islands, etc. City Staff will hold a neighborhood meeting to present alternative concepts and then report to a Traffic Management Committee. The Traffic Management Committees role will be to review the neighborhood to be impacted and on a case by case basis define the affected area from which project support must be received. A petition from the affected area must have 60% support of business owners and residents for the project to proceed. Only one petition signature will be granted per business or household.

Once a 60% supportive petition is received by the City a public hearing will be scheduled and the City Council will be asked for approval to proceed with project. If City Council grants approval, a design will be developed by staff or a consultant. A preliminary design will be developed and a trial installation of the measure will be undertaken to determine its effectiveness. A letter and ballot will then be sent to residents, businesses, and property owners. To determine if the project should proceed, a one-third response rate must be received by the city for the ballot to be considered valid and a 60% positive vote of the ballots received is required for the project to move forward. If the ballot yields positive results then a final public hearing will be held, followed by a City Council decision and funding appropriation.

Once the project has final approval and the project funding is in place, the final design work can be completed. The final design will be presented at a neighborhood meeting before construction begins. After a traffic management measure is constructed, it will be monitored closely to ensure that the measure is effective.

Step 5 or Traffic Management Solution Implementation Process for Arterial and Collector Streets

Arterial and collector streets have a greater impact on the general public as they help to move high volumes of traffic throughout the City. Traffic management measures along these major routes need to have the support of the entire community and not just the property owners and residents adjacent to the street since it can greatly disrupt traffic patterns throughout the City. Due to the potential for differing objectives between abutters and through travelers it would not be possible to define the impacted area to petition or ballot so the process is somewhat different from the Step 4 process.

City Staff will hold a neighborhood meeting to present alternative concepts and make recommendations to City Council. A public hearing will be scheduled and a recommendation forwarded to the City Council for their review and decision. If City Council grants approval and necessary funding then the project design will be completed. Staff will then review the final design with direct abutters. A final public hearing will be held by the City Council prior to bidding and construction of the project. After completion the project will be monitored for its effectiveness.

Step 6 or Public Safety Override and New Development Process

Under certain situations, City Administration will initiate a safety or operational investigation that may require action. This might occur where a series of accidents have taken place at a busy intersection or a significant increase in traffic volumes or speeding has occurred. City staff will examine toolbox solutions and will make appropriate recommendations. A neighborhood informational meeting will be held to present alternative concepts developed by staff. A public hearing will be scheduled by the City Council and a final decision made as to whether the project should proceed. If City Council grants approval then a final design will be developed and a neighborhood meeting will be held to review the design before the measure is constructed.

Funding Considerations

Funding for the implementation of a traffic management plan should be considered throughout the plan development process. The level of funding available may limit the traffic management measures that can be considered. It must be reiterated that traffic management devices can be costly. If the City intends to proceed with a traffic management program, serious consideration needs to be given to providing capital budget funds for design and construction. If the recommendations included in this policy report are adopted by the City Council, it needs to be recognized that significant staff resources will be required to manage and implement the design and community participation aspects of the process. If a neighborhood wants to implement a more extensive plan than what City staff and Council believe are appropriate to resolve the identified problem(s), then the City Council may need to approve the plan and either appropriate additional funds and/or seek financial participation by the neighborhood making the request.

Removal Costs and Procedure:

In certain cases the neighborhood may request that traffic management measures be removed. If the request for the removal of the measure happened within the first five years of installation then the neighborhood will be expected to take primary responsibility in the cost of removal as may be determined by City Council. The process for the request must include a petition from the affected area and must have 60% support of business owners and residents for the request to proceed. Once a 60% supportive petition is received by the City a public hearing will be scheduled and the City Council will be asked for approval to proceed with funding and removal. If City Council grants approval, a letter and ballot will then be sent to residents, businesses, and property owners. To determine if the removal process should proceed, a one-third response rate must be received by the city for the ballot to be considered valid and a 60% positive vote of the ballots received is required for the project to move forward. If the ballot yields positive results then a final public hearing will be held, followed by a City Council decision and responsibility of payment of costs for removal.

If the installation has been installed for over 5 years then the neighborhood will not be expected to share in the costs of removal. However, the steps for removal will be the same as listed above.

City of Concord
Traffic Management Program (TMP)

February 14, 2006

Traffic Request or Complaint Received by City Council

City Engineer and/or Traffic Operations Committee evaluate

Problem Identified

TOC Street Classification Determination:
* Minor/Neighborhood Street, or
* Arterial/Collector Street

EXAMINE TOOLBOX
Review list of potential traffic management options [including traffic calming] along with the locations and conditions under which they might be utilized. Make Recommendations

Nature of Changes

1 No Problem Identified → Report back to complainant and/or Council

2 ROUTINE SOLUTION: Low cost, non-regulatory changes. e.g. Warning Signs, Pavement Markings, Enforcement, etc. → **Implement and monitor results**

3 STANDARD SOLUTIONS: e.g. Traffic Signal, Stop Sign, Speed Limit Change, Parking, Bike Lane, Crosswalk, etc.
→ Hold Neighborhood Info Meeting to present alternative concepts → Public Hearing & Vote by City Council → Hire Consultant or design in-house → Neighborhood Meeting to review final design → **Implement and monitor results**

4 **MINOR/ NEIGHBORHOOD STREET** TRAFFIC CALMING SOLUTIONS: e.g. Curb extension, roundabout, speed table, refuge island, etc.
→ Hold Neighborhood Info Meeting to present alternative concepts → Petition in support of an Option to affected residents/businesses & owners. 2/3 positive vote by direct abutters and 60% of neighborhood as determined by Traffic Calming Committee. → Public Hearing and Vote by City Council → Hire Consultant or design in-house → Preliminary Design & Temporary Measures installed → Letter & Ballot to affected residents/businesses/owners. 2/3 positive vote by direct abutters and 60% of neighborhood as defined by Traffic Calming Committee. A minimal of 1/3 response rate of ballots received. → Public Hearing and Vote by City Council

Traffic Calming Comm. decision on balloting process

Budget design and construction → Final Design → Neighborhood Meeting to review final design → **Implement and monitor results**

5 **ARTERIAL or COLLECTOR STREET** TRAFFIC CALMING SOLUTIONS: e.g. Curb extension, roundabout, refuge island, etc.
→ Hold Neighborhood Info Meeting to present alternative concepts → Staff recommendation to City Council → Public Hearing & Vote by City Council → Hire Consultant or design in-house → Design → Review design with Direct Abutters → Public Hearing and Vote by City Council → **Implement and monitor results**

Public Safety Override & New Development

6 City Administration Initiates Safety or Operational Investigation
→ Possible Toolbox Solutions examined by TOC → Hold Neighborhood Info Meeting to present alternative concepts → Public Hearing and Vote by City Council → Final Design → Neighborhood Meeting to review final design → **Implement and monitor results**