

HIGHWAY DESIGN MANUAL

Chapter 25 - Traffic Calming

Revision 36

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**CHAPTER 25
TRAFFIC CALMING**

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25.1 INTRODUCTION

Traffic calming measures have been used successfully in Europe for many years. The number of successful traffic calming programs in the United States is increasing, and reports of these successes are generating strong interest in New York State. Traffic calming techniques were first used to stem the rise of speeds and accidents, and to improve the environment in residential settings. Since then, they have been used in other situations with some success.

Practitioners have found that increased public awareness of traffic calming is resulting in a call to use it to resolve many traffic problems. However, traffic calming cannot solve all traffic problems. The Region, in cooperation with the local community, should examine the project circumstances, establish the project objectives, and consider if traffic calming should be an alternative or an element of the design.

A Department task force developed a policy statement and guidance on traffic calming to assist Regions through the process. Section 25.2 contains the policy statement, policy scope, and the definition and background of traffic calming. Section 25.3 contains general guidance and requirements, including general considerations. Section 25.4 provides some examples of objectives that could be achieved by traffic calming. Section 25.5 lists example "test questions" to help determine if traffic calming is viable. Section 25.6 explains the applicability of traffic calming techniques, and describes the speed categories established specifically for traffic calming measures. Section 25.7 outlines the importance of community involvement and the process that should be followed. Section 25.8 covers project monitoring and its importance in evaluating the effectiveness of the project. Appendices A, B, and C are excerpts from guidelines developed for the Washington State Department of Transportation, the Florida Department of Transportation, and the City of San Buenaventura, CA, respectively. They are provided for guidance until such time as formal guidelines or standards are adopted by the Department.

25.2 TRAFFIC CALMING POLICY

25.2.1 Policy Statement

The Department's policy is to consider the application of traffic calming, as appropriate, on State highways and Department administered or financed projects, in accordance with the guidelines and requirements contained in this chapter.

25.2.2 Scope

The policy provides requirements and guidance for the Department's planners, scopers, designers, and traffic engineers; formally states positions on application of traffic calming measures; and indicates the process to be used to consider them.

25.2.3 Definition

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 nonmotorized street users.

NOTE: The Department is adopting the above proposed Institute of Transportation Engineers (ITE) definition of traffic calming due to the desirability of having a consistent definition and because it is sufficiently broad to allow for the concept that the needs of the motorist and nonmotorist must be balanced, appropriate to the intended function of a given facility or area.

NOTE: The ITE describes the meaning of the phrases in the definition as follows: 1) reduce negative effects of motor vehicle use means changing the design and the role of the street to reduce the negative social and environmental effects of motor vehicles on individuals (e.g., speed, intrusion, etc.), and on society in general (e.g., pollution, urban sprawl, etc.); 2) altering driver behavior addresses the self enforcement aspect of traffic calming; the lowering of speeds, the reduction of aggressive driving, and the increase in respect for nonmotorized street users; 3) improve conditions for nonmotorized street users means to promote walking and cycling, increase safety, create a feeling of safety, and improve aesthetics, etc.

25.2.4 Background

Individual traffic calming techniques are not, for the most part, new. Some, such as pedestrian refuge islands and traffic circles, have been used since the days of horse drawn carriages. Most techniques are used in one form or another with varying frequency on highways, streets, or private property. What is new is the interest in applying these techniques in combination, and improving the compatibility among all highway users. Combining techniques is especially effective in neighborhood traffic calming, which applies to residential neighborhoods, and on shopping or entertainment oriented streets, and in some cases main streets of cities, villages, and hamlets, and school zones.

25.3 GENERAL GUIDANCE AND REQUIREMENTS

The policy and guidance in this chapter create a hierarchy for the application of traffic calming techniques which strives to consider and balance the many conflicting needs between the highway users (motorists, pedestrians, bicyclists) and adjacent land owners, with safety being of paramount concern. Wherever possible, existing standards, basic design principles, ongoing research, and past experiences have been used to develop the policy and guidance. Often both the State and local highway systems will be affected and coordination is needed during scoping and early design phases. It is essential to determine, during scoping, if traffic calming measures are warranted and implementable, or if traditional approaches or strategies are more appropriate. Refer to Section 25.5 for guidance in when traffic calming should be considered.

Whenever possible, traffic calming measures shall be designed in accordance with all applicable standards, criteria, and guidelines. When a design speed is selected that is less than the value obtained using the methodology in Chapters 2 and 4 of this manual, it shall be considered a traffic calming effort and the requirements or guidance in this chapter will apply. However, each situation is unique and professional judgement must be exercised. Refer to Chapter 1, Chapter 2, Section 2.8, and Chapter 5, Section 5.1 of this Manual, and Sections 25.5 and 25.6.3 in this chapter for further guidance on how to deal with variations from this Manual and design exceptions.

A caution: in some localities across the country, traffic calming is being embraced as a cure-all. Some of the techniques suggested in the literature were tried and discarded (some in the 1940's or 1950's). Other techniques have been developed in other countries with different cultural attitudes and often lower vehicle volumes on even the most heavily traveled roads. These reasons, in combination with different laws and penalties, may have significant effect on the success of a particular technique.

While a fresh look at some techniques is appropriate, effort should not be wasted reinventing the wheel. It is costly monetarily, and sometimes from a safety point of view, to experiment. Consequently, it is well worth the extra effort to search old literature and old department records, and to talk to experienced department staff, to determine why a particular technique is no longer used and what was wrong with particular aspects of it, either in design or application. Also, it may be possible to observe a similar installation or to find a before and after study of a recent installation.

Caution should be exercised in reintroducing any technique that has a proven negative safety record. For example, the once popular traffic circles (rotaries) were dropped from AASHTO's *A Policy on Geometric Design of Highways and Streets*, 1984 for reasons of safety, capacity, and driver confusion. Many have been removed or are now controlled by signals. Now, there is renewed interest in the new version called the modern roundabout, which has some design changes from the old traffic circle. However, these changes may not address some of the inherent problems with traffic circles, such as those related to use by large trucks or recreational vehicles, or driver confusion on multilane circles. There are also mixed opinions on safety and capacity issues which need to be investigated further before any policy on the use of modern roundabouts is issued.

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Experience in other localities indicate successes, especially for low speed, local street situations where a single lane modern roundabout is adequate for the traffic volumes. With respect to multilane roundabouts, the prudent course of action would be to modify existing traffic circles with known operational problems to the modern roundabout design in order to determine if the new designs are in fact as effective as claimed. Considering the negative operational history with multilane traffic circles, new versions should not be built if the techniques will not remedy the problems on existing ones. In the interim, until a policy is developed, any proposal for a roundabout should be developed on a case-by-case basis with input from the Main Office. This will help in the formulation of a policy and enable the dissemination of the latest information on techniques and experiences of other Regions.

Traffic calming techniques, when appropriately installed, can supplement law enforcement activities. However, they cannot replace the need for, or the obligation to provide normal law enforcement.

In general, the Department, in collaboration with the affected locality and within the framework of this policy, will consider traffic calming measures as a tool to address congestion, safety, and quality of life issues in response to one or more of the following:

1. A community, corridor or area where a traffic calming plan has been completed, or agreed upon, by a neighborhood group, the municipality, the county.
2. A project is scheduled for a village/main street, school zone or other subarea and scoping indicates that inclusion of traffic calming would satisfy identified subarea needs such as a significant existing accident problem whose severity could reasonably be expected to be reduced by the application of traffic calming.
3. Community requests for speed limit modifications, traffic control devices, safety improvements or other concerns are not satisfied by more traditional measures and/or enforcement. The community must, however, be aware that traffic calming does not replace their obligation to provide normal law enforcement.

For additional guidance in when traffic calming can be considered, refer to Section 25.5.

Drivers should be warned before they enter, and when they drive through, a traffic-calmed area. Isolated and unanticipated street narrowing, tight curves or reduced sight distances could be potential hazards if encountered without warning.

In addition to concerns for motorists' safety, public safety concerns must be addressed. The most obvious of these are access for fire vehicles and response times for fire, ambulance and police traffic. The main concern is how traffic calming may affect them.

When the implementation of traffic calming causes drivers to divert to use alternate routes, it will likely lead to increased volumes (and perhaps speeds) on those routes. Projects that will result in significant diversions of traffic to alternate routes should be developed in accordance with the following:

1. Traffic calming plans shall not be developed without the opportunity for input from people who live or work along the alternate routes to which traffic will be diverted. Refer to Section 25.7.1.2.
2. Traffic calming techniques that are likely to reduce capacity should only be used on local streets or neighborhood streets to avoid serious congestion. Capacity reducing techniques should not be used for other highway types unless a reasonable, logical alternative route is readily available or is provided before the project or as part of it. If there is clearly excess capacity so that capacity reduction will not be a problem, such techniques may be considered. In some situations, the alternate route should be clearly signed.
3. Area-wide traffic management/calming plans to ameliorate the potential impact of any traffic diversion as a consequence of the traffic calming activities should be considered, particularly in urban settings.
4. Traffic calming should only be employed over limited lengths of a given collector or arterial that meet all other requirements for treatment. For local roads, it should only be used where it is important to give priority to residential area character or to nonmotorized users of the roadway.

Consider installing temporary, more forgiving traffic calming measures such as pavement markings, temporary delineators or channelizing devices on a trial basis, when appropriate, before installing the permanent measures, particularly in those situations where traffic calming may require significant driving adjustments. Temporary deployment will provide a transition to the permanent measures proposed, an insight into the effectiveness of the proposed calming measures, and the opportunity to make modifications before installing a permanent device.

It is desirable to use forgiving, frangible, or crashworthy traffic control devices, plantings, etc., for permanent traffic calming measures. Design speed, traffic, pedestrian and bicycle volumes, project geometrics, and aesthetics are factors to be considered in determining the treatment to be used.

The trial period should be developed and implemented with the concurrence of, and in coordination with, the locality. The trial measures should encompass all the affected highway and mainline and side street approaches as deemed appropriate by agreement between the Department and the locality. The trial period should be long enough to evaluate the effectiveness of the measures and acclimate highway users through the full range of traffic (commuter, tourism, commercial) and environmental (snow and ice control) conditions expected. Refer to Appendix A, p. 40 for additional guidance on temporary installations.

Finally, traffic calming plans, especially those that involve neighborhood traffic calming, require the complete cooperation and support by the affected local citizens if the plans are to be successful.

25.4 TRAFFIC CALMING PROJECT OBJECTIVES

A project's needs determine what objectives should be achieved by alternatives. Examples of objectives that may be achieved by traffic calming measures include:

- ! Improve driver behavior to be more considerate of other users of the street or road,
- ! Increase the level of respect for nonmotorized street users,
- ! Create a feeling of safety for all street users,
- ! Improve safety and convenience for road users, including residents, motorists, bicyclists, pedestrians, transit riders, and people with disabilities.
- ! Reduce number and/or severity of accidents.
- ! Reduce noise and air pollution (see NOTE below).
- ! Provide space for non-traffic activities (e.g., shopping, rest, and play).
- ! Enhance street appearance and reduce, where possible, the number of traffic signs. (Traffic control measures require signing and may increase the number of signs.)
- ! Achieve an overall improvement in the environment.
- ! Reduce speeds of motor vehicles where incompatible with adjacent land use.
- ! Reduce need for police enforcement.
- ! Reduce short-cut motor vehicle traffic.
- ! Mitigate the impact of vehicular traffic on residential neighborhoods.
- ! Promote and support the use of transportation alternatives to the single occupant vehicle.
- ! Achieve an overall improvement of the community's quality of life.

NOTE: Some traffic calming measures may not reduce air pollution. If the objective of a project is reduced air pollution, the appropriate analysis should be conducted to prevent unintended consequences.

25.5 WHEN TRAFFIC CALMING SHOULD BE CONSIDERED AS AN ALTERNATIVE

Traffic calming is not applicable to every project. Projects should be assessed to determine if traffic calming is a feasible alternative. The following are examples of “test questions” to assist the designer or scoper in this determination. All questions are not necessarily applicable to all projects. Only those that do apply should be selected. If a majority of the responses are affirmative, traffic calming should probably be considered as an alternative. The questions are categorized according to whether they involve local community support, traffic conditions or diversions, mobility or safety issues, design measures, or other conditions.

Local Community Support

- # Requested by Local Community
 - ! Has traffic calming been requested by users, residents, or other affected local citizens?
 - ! Has the locality requested or initiated a traffic calming study or prepared a plan to improve circulation, safety, etc., in a congested area, or on the whole network?
 - ! Is there a local desire to create a more livable community by improving the urban environment through motor vehicle speed and/or volume control?
 - ! Is there a local desire to develop, improve, or enable diversified travel mode choices for travelers?
 - ! Are there continuous requests from local residents for speed limit reductions?

- # Support of Local Community, Agencies, Services
 - ! Will emergency services approve the use of traffic calming on other than principal evacuation, fire, and ambulance routes?
 - ! Does traffic calming have the approval of local business and transit operators?
 - ! Is there a joint NYSDOT/local agreement on what the problems are and that there is need to address them with traffic calming measures?
 - ! Is there is broad-based community and local government support for traffic calming?
 - ! Have the local citizens been given every opportunity for involvement in solving the problem?

- # Comply With Master Plan and Zoning Ordinance
 - ! Is the solution part of, and in accordance with the local master plan?
 - ! Are the appropriate land use and zoning ordinances in effect in the local community?
 - ! Does the local government have a comprehensive plan to address the direct and indirect effects of implementing traffic calming on a particular facility, i.e., the effects of traffic diversion, the effects on emergency vehicle routes, congestion, etc.?

Traffic Conditions/Mobility/Safety

- # Traffic Operations/Conditions
 - ! Are there significant pedestrian/bicycle traffic generators (schools, community or recreational facilities) located on the street?
 - ! Is there widespread non-compliance with existing speed limits?
 - ! Is there excessive through traffic on local and collector roads?
 - ! Would known circulation problems in and around the right of way, or in the corridor of a project on a "Main Street" require an area wide solution?

- # Mobility
 - ! What is the roadway's relationship or importance to an area and can NYSDOT accept the potential loss of service quality associated with traffic calming?
 - ! Would the use of traffic calming complement the intended function of the route?

- # Safety
 - ! Are there concerns for speeding, pedestrian safety, or other issues at locations where warrants for traffic signals or stop signs are not met?
 - ! Would the use of traffic calming be detrimental to safety?
 - ! Are there accidents between autos, bicycles, and pedestrians?
 - ! Are there parking and deparking accidents?
 - ! Would known safety problems in and around the right of way, or in the corridor of a project on a "Main Street" require an area wide solution?

- # Diversion
 - ! Can diversions be accommodated?
 - ! Are diversions appropriate?
 - ! Are adequate alternate routes available?
 - ! Are alternate routes consistent with the comprehensive plan for managing traffic through the community?
 - ! Will the introduction of traffic calming measures on a roadway adversely affect adjoining roadways?

Design Measures

- # Standards
 - ! Would the use of traffic calming violate standards, policies, rules, or regulations?
 - ! Can its use be justified by the exception process? (See Chapter 2, Section 2.8 and Chapter 5, Section 5.1 of this Manual.)
 - ! Will the traffic calming measures conform to the Americans with Disabilities Act Accessibility Guidelines (ADAAG)?

- # Traditional Alternatives
 - ! Will traditional design approaches achieve the identified project objectives?

Other Conditions

- ! Will school districts be negatively affected?
- ! Will traffic calming be detrimental to economic growth?
- ! Will the proposed traffic calming measures undergo a trial period?
- ! Is there a decline in quality of life due to perceived imbalance in travel modes?
- ! Are alternate modes of travel available?
- ! Is there a local access management policy and/or a local land use policy that will complement traffic calming?
- ! Does a State arterial function as the "Main Street" of a local community?
- ! Are there multi-modal circulation problems over a subarea or a network that could be resolved by traffic calming?
- ! Are problems in the project area directly related to inappropriate driver behavior?

25.6 APPLICABILITY OF TRAFFIC CALMING TECHNIQUES

Traffic calming measures can be divided between those that 1) use physical restrictions to lower the speed at which a reasonable and prudent driver feels safe and comfortable, and those that 2) convey the message that priority is given to creating a pedestrian and resident-friendly setting, possibly with special accommodations for bicyclists. Measures in the former group include speed humps and tables, lane constrictions (including neck-downs to a single lane), chicanes, tight curves, turning radius reductions, and sight distance limitations. Measures in the latter group (message or ambiance techniques) include aesthetic treatments such as landscaping with trees and other plants; use of special paving and/or markings; decorative benches, light poles, fountains, and sculptures and/or kiosks; accommodations such as sidewalks, pedestrian bulb-outs, mid-block crosswalks, and bicycle lane markings; and distinctive entrances (gateways) as demarcation for the traffic-calmed area.

For the purpose of application of this policy and guidance, the highway system is divided into four general speed categories, Category I through Category IV, as described below. Category II is subdivided into "Local Streets and Roads", as defined in Chapter 2 of this Manual, and "All Other Streets and Roads", for one of the higher functional classifications. Roads on the New York State highway system are generally covered by Category II, Subcategory "All Other Streets and Roads", Category III, and Category IV. All speed categories are applicable to streets and roads not on the New York State highway system. The suitabilities of the techniques for each of the categories are shown in Table 25-1.

Illustrations and descriptions of many of the traffic calming measures in Table 25-1 can be found in the appendices.

25.6.1 Category I Facilities

Intended or desired vehicle operating speed is in the range of 25 km/h (15 mph) to less than 40 km/h (25 mph).

Preservation or enhancements of neighborhood or area character and/or accommodation of bicyclists and pedestrians are the primary functions of such streets or roads. Examples include neighborhood streets, and areas intended for shopping, recreation, or entertainment activities where the intended or preferred transportation modes are walking or bicycling. These are the types of facilities where traffic calming techniques have the greatest applicability and will receive the greatest support from the community as a whole.

Since it is not legal or practical to create a speed limit less than 40 km/h (25 mph), except for school speed limits, speed control and eliminating or discouraging through traffic is achieved by physical means in combination with appropriate warning signs (refer to Category III, *Reduced Operating Speeds*). Design speed measurements using the methodology in Chapter 2 of this Manual would not normally find speeds that fall within the range of this category. They are achievable only after the implementation of certain traffic calming techniques.

Many techniques can be used where there is a demonstrated problem and normal enforcement has been unsuccessful. These include such features as vertical and lateral shifts, street narrowing, medians, one-way restrictions, and reduced corner radii. See Table 25-1 and related information for suitability of various traffic calming techniques.

Where the intent is to significantly reduce through vehicle trips, suitable alternative routes must exist or they must be constructed and opened before implementation of the traffic control measures.

25.6.2 **Category II Facilities**

Design speed ranges from 40 km/h (25 mph) to less than 60 km/h (35 mph) as determined in accordance with Chapter 2 in this Manual, or as established for Local Streets and Roads (refer to Category III, *Reduced Operating Speeds*).

Included in this grouping are most through streets in urban or suburban areas, villages, hamlets, and main roadways in developments. This category is subdivided into "Local Streets and Roads", as defined in Chapter 2 of this Manual, and "All Other Streets and Roads" which includes all other classifications, and generally applies to the roads on the New York State highway system.

Speed control and safety is normally accomplished by routine enforcement. Where data shows this effort is not effective, enforcement can be supplemented by speed-timed progressive signal systems, chicanes (designed for local streets # 50 km/h [30 mph]), pedestrian refuge islands, walk phases on signals, gateways, sidewalk extensions at intersections, patterned and/or colored crosswalks, and other street ambiance enhancing features. See Table 25-1 for suitability of various traffic calming techniques. Refer to Chapter 5, Section 5.10.4.3 of this Manual for the design requirements for pedestrian refuge islands.

25.6.3 **Category III Facilities**

Design speed is 60 km/h (35 mph) to less than 80 km/h (50 mph) as determined in accordance with Chapter 2 of this Manual.

This is undoubtedly the most varied of groupings with respect to mix of vehicles, pedestrians, and bicyclists, with most types of roads being represented. This group includes, but is not limited to:

1. Some parkways,
2. Urban or suburban arterials and collectors,
3. Most state highways, county or town roads as they pass through small suburban or rural communities, and
4. Some higher speed urban streets whose primary function is to move large volumes of vehicular traffic at higher speeds.

The number of bicyclists or pedestrians will vary widely (including seasonal variations). Some of the techniques that will achieve speed reduction or improve safety would include, where applicable, progressive traffic signal systems, pedestrian refuge islands, walk phases on signals, gateways, patterned and/or colored crosswalks, and other street ambiance enhancing features. See Table 25-1 and related information for suitability of various traffic calming techniques. Refer to Chapter 5, Section 5.10.4.3 of this Manual for the design requirements for pedestrian refuge islands.

Attempts at creating speed limits which are inconsistent with driver expectations and habits are ineffective, inappropriate, and potentially unsafe because they create a wide variance in operating speeds and are generally ignored. Speed limits inconsistent with anticipated operating speeds (85th percentile) will be unsuccessful unless there is heavy, continued enforcement.

Reduced Operating Speeds

It may be possible to reduce operating speeds for some projects as part of a traffic calming effort. A local road or street, and in some instances a state highway, may have an existing operating speed far in excess of the speed limit or the desired operating speed. Application of the methodology in Chapter 2 of the HDM would produce a design speed comparable to the existing speeds. However, consistent with the spirit and intent of the design speed discussion in the 1994 AASHTO "A Policy on Geometric Design of Highways and Streets", page 62, it may be acceptable and consistent with good engineering practice to progress, as exceptions to design standards, a design which will lower the anticipated operating speed. The design speed could then be based on the lower anticipated operating speed.

To progress the design as an exception to the normal process for establishing anticipated operating speed, the designer must clearly demonstrate and document the following as appropriate:

1. That the existing operating speeds and/or volumes are clearly inconsistent with the intended use and function of the road, e.g., a residential street that is being used as a short cut between arterial and/or collector highways, while similar adjacent streets function as intended.
2. That there is an existing accident problem, or that the number of pedestrians and/or bicyclists that currently use or would use the facility are significant and there is a potential for safety problems.
3. That the proposed design will clearly affect the existing operating speeds and the Regional Traffic Engineer (RTE) supports the design and agrees reductions in operating speed will occur. The burden is on the designer to provide an engineering analysis to demonstrate that the elements of the proposed design will reduce the operating speeds. The devices that may be used include geometric alternatives such as the introduction of a series of horizontal curves, installation of signing, use of traffic calming devices consistent with the new anticipated operating speed, and any other recognized and accepted technique with a proven track record in reducing speeds without compromising safety.

From another perspective, traffic calming features that restrict travel on Category III facilities would essentially build potential problem areas into a road. Great care must be exercised to ensure that attempts at speed reduction do not simply make the road less safe without actually reducing operating speeds to levels consistent with the safe operating speed for the design. This applies to a lesser degree to Categories I and II, and to a greater degree to Category IV.

Where it is determined that speed reducing efforts will not be appropriate, the designer should consider traffic calming techniques that are intended to improve conditions for nonmotorized users and residents without directly impacting vehicle operation.

4. That the gradual transition of roadside treatments to this area from a Category IV area can be accomplished safely, consistent with currently accepted practice, e.g.,:
 - ! through the use of gradual reductions in clear area;
 - ! by the introduction of traversable curb at the back of shoulder, to loss of shoulder, to change to barrier curb;
 - ! by the introduction of transitional horizontal curves that step speeds down;
 - ! with the use of speed x width (S x W) tapers for lane width reductions.
5. That appropriate regulatory and warning signs will be installed as necessary.
6. That the project will be monitored by the Region or the locality after construction. (See Section 25.8.)
7. That all applicable standards, policies, rules and regulations will be followed.

25.6.4 Category IV Facilities

Design speed is 80 km/h (50 mph) or greater as determined in accordance with Chapter 2 of this Manual.

Included are interstates, freeways, high speed parkways, arterials, expressways and all other high speed roads where priority is given to motorized vehicles either by prohibiting nonmotorized access, by providing shoulders that bicyclists or pedestrians may use, or by providing separate facilities.

The selection of traffic calming measures, where bicycles or pedestrians are allowed, is limited and consists primarily of warning or regulatory signs to alert the motorist of designated bike routes or crossing points for pedestrians or bicycles. Roadside development, such as businesses or recreational areas, may also serve to alert motorists of the possibility of the presence of bicyclists or pedestrians. Some of the suitable techniques include pedestrian refuge islands, certain streetscaping devices, some route modifications, and traffic control devices. See Table 25-1 and related information for suitability of various traffic calming techniques. Refer to Chapter 5, Section 5.10.4.3 of this Manual for the design requirements for pedestrian refuge islands.

Consideration should be given to providing adequate shoulder width for bicycles and pedestrians to use, as appropriate.

Attempts at creating speed limits inconsistent with driver expectations and habits are ineffective, inappropriate, and potentially unsafe because they create a wide variance in operating speeds. Speed limits inconsistent with anticipated operating speeds (85th percentile) will be unsuccessful unless there is heavy, continued enforcement.

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Table 25-1 Suitability of Traffic Calming Features for Speed Categories

TRAFFIC CALMING FEATURES	CATEGORY I (NEIGHBORHOOD) (25-39 km/h)	CATEGORY II (40-59 km/h)		CATEGORY III (60-79 km/h)	CATEGORY IV (80 km/h)	SPEED REDUCTION ¹	VOLUME REDUCTION ¹
		LOCAL ² STREETS OR ROADS	ALL OTHER STREETS OR ROADS				
VERTICAL SHIFTS ³							
Raised Crosswalks	SUITABLE	SUITABLE #50 km/h NOT RECOMMENDED >50 km/h	NOT RECOMMENDED	NOT PERMITTED	YES	POSSIBLE	
Raised Intersections						NO	
Speed Cushions						NO INFORMATION	
Speed Humps ⁴						POSSIBLE	
Speed Tables							
LATERAL SHIFTS							
Alternate Side Parking	SUITABLE	SUITABLE		NOT PERMITTED		LIKELY	POSSIBLE
Chicanes/Serpentine		SUITABLE #50 km/h NOT RECOMMENDED >50 km/h	NOT RECOMMENDED			YES	

See General Notes and Endnotes following this table.

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Table 25-1 Suitability of Traffic Calming Features for Speed Categories (continued)

TRAFFIC CALMING FEATURES	CATEGORY I (NEIGHBORHOOD) (25-39 km/h)	CATEGORY II (40-59 km/h)		CATEGORY III (60-79 km/h)	CATEGORY IV (≥80 km/h)	SPEED REDUCTION ¹	VOLUME REDUCTION ¹	
		LOCAL ² STREETS OR ROADS	ALL OTHER STREETS OR ROADS					
CONSTRICIONS								
Neckdowns, Chokers ⁵	SUITABLE		NOT RECOMMENDED	NOT PERMITTED		SLIGHT	NO	
1-Way Entry/Exit Choker, Half Closure, Semi-Diverter						YES	YES	
Curb Extensions at Intersections			SUITABLE (SLIGHT	NO
Pedestrian Refuge/Midblock Islands			SUITABLE					
Driveway Link	SUITABLE		NOT PERMITTED		YES	YES		
Single Lane Slow Point								
Single Lane Angled Slow Point								
Two-Lane Slow Point								
Two-Lane Angled Slow Point		NOT RECOMMENDED						
NARROW PAVEMENT WIDTHS								
Pavement Narrowing	SUITABLE		NOT RECOMMENDED	NOT PERMITTED		POSSIBLE	POSSIBLE	
ENTRANCE FEATURES								
Gateways	SUITABLE				NOT PERMITTED	YES	YES	

(Suitable only with upstream parking.
See General Notes and Endnotes following this table.)

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Table 25-1 Suitability of Traffic Calming Features for Speed Categories (continued)

TRAFFIC CALMING FEATURES	CATEGORY I (NEIGHBORHOOD) (25-39 km/h)	CATEGORY II (40-59 km/h)		CATEGORY III (60-79 km/h)	CATEGORY IV (80 km/h)	SPEED REDUCTION ¹	VOLUME REDUCTION ¹			
		LOCAL ² STREETS OR ROADS	ALL OTHER STREETS OR ROADS							
RELATED STREETSCAPING										
Color Contrast or Patterns/Markings	SUITABLE					POSSIBLE	NOT LIKELY			
Landscape Development							NO			
Sidewalks, Shoulders						NO INFORMATION				
Street Furniture and Lighting						NOT RECOMMENDED		NOT PERMITTED	POSSIBLE	NOT LIKELY
Surface Textures										NO INFORMATION
Shared Zones						NOT RECOMMENDED		NOT PERMITTED		NO INFORMATION
UNCATEGORIZED MEASURES										
Supplementary Pedestrian Crossing Channelization Devices ⁶	SUITABLE	SUITABLE (40-49km/h) NOT PERMITTED (50-59km/h)		NOT PERMITTED		NO INFORMATION				
Back-in Diagonal Parking ⁷		NOT RECOMMENDED								
Reduced Intersection Radii		((((((YES	NOT LIKELY			
Single-Lane Roundabouts	((NO INFORMATION				
Multiple-Lane Roundabouts	((((NO INFORMATION					

((Any proposal for a roundabout should be developed on a case-by-case basis with input from the Design Quality Assurance Bureau.
See General Notes and Endnotes following this table.

TRAFFIC CALMING

25-17

Table 25-1 Suitability of Traffic Calming Features for Speed Categories (continued)

TRAFFIC CALMING FEATURES	CATEGORY I (NEIGHBORHOOD) (25-39 km/h)	CATEGORY II (40-59 km/h)		CATEGORY III (60-79 km/h)	CATEGORY IV (\$80 km/h)	SPEED REDUCTION ¹	VOLUME REDUCTION ¹				
		LOCAL ² STREETS OR ROADS	ALL OTHER STREETS OR ROADS								
ROUTE MODIFICATIONS											
Arterial Improvements	SUITABLE					NO INFORMATION					
Bike Facilities						POSSIBLE					
Median Treatments						LIKELY		YES			
Modified Intersection, Channelization						NO INFORMATION					
One-Way Operation						NO		MINOR			
Truck Prohibitions						YES		YES			
Cul-de-sacs, Full Closures						NOT RECOMMENDED	NOT PERMITTED		LIKELY		YES
Diverter						LIKELY		YES			
TRAFFIC CONTROL DEVICES											
Higher Visibility Crosswalks ⁸	SUITABLE					POSSIBLE					
Signing						POSSIBLE					
Progressive Traffic Signal Systems						POSSIBLE		NO			
Walk Phase on Signals						NO					
Regulations/Enforcement						LIKELY					

See General Notes and Endnotes following this table.

General Notes to Table 25-1

- C Those measures shown as “NOT RECOMMENDED” may be considered in case-specific projects.
- C Generally, traffic calming measures should not be used on principal emergency response routes. Their proposed use should be coordinated with and approved by the local police/fire/emergency medical services.
- C Slow point constrictions may include one or more traffic calming measures.
- C Gateways are generally a combination of traffic calming measures.

Endnotes to Table 25-1

1. This information is based on the experience of others who have implemented traffic calming and have monitored the results. Individual results may be influenced by the combination of traffic calming measures used, the frequency of their use, the speed category and the intended function of the facility or area, and other factors. Taken from *A Guidebook for Residential Traffic Management* and also *Neighborhood Traffic Management and Calming Program*.
2. As defined in Chapter 2 of this Manual.
3. Speed humps/bumps are not used on New York State highways to control speed (D.J. Russo, Operations Bureau letter to M. Weithorn, August 6, 1995). These guidelines extend this restriction to include all vertical shift measures. Use of vertical shifts on local roads is subject to the approval of the local authority having jurisdiction.
4. Refer to *Guidelines for the Design and Application of Speed Humps*.
5. In locations where no parking is provided, lane drop tapers should precede neckdowns or chokers.
6. Refer to NYSDOT's guidance on Supplementary Pedestrian Crossing Channelization Devices (T.C. Werner memo to Regional Traffic Engineers, July 15, 1997).
7. The following dimensions were adapted from the *Traffic Engineering Handbook*, 1992, Figure 7-1 and Table 7-5 for 3.0 m wide parking spaces and 60° angle parking:
 - a. 2 lanes, 2-way, angle parking both sides, minimum pavement width 19.0 m curb-to-curb.
 - b. 2 lanes, 2-way, angle parking one side, minimum pavement width 13.5 m curb-to-curb.
 - c. 1 lane, 1-way, angle parking one side, minimum pavement width 9.5 m curb-to-curb.
8. Crosswalk markings must be white, in accordance with the *NYS Manual of Uniform Traffic Control Devices*.

25.7 COMMUNITY INVOLVEMENT

In those communities that have them, traffic calming programs are conducted to respond to complaints and requests from local residents concerned about the safety, noise, pollution, and visual impacts of cars, trucks, and buses on their street. Most traffic calming programs are geared for residential areas on residential streets, or shopping or entertainment oriented streets where, in the perception of the residents or users, those impacts are affecting their quality of life.

Community involvement may be the most important element in a successful traffic calming project. Close community involvement enables planners/designers to see the problem from the local perspective. It also helps the community understand the impacts of traffic calming measures and the constraints within which the project must be developed. Several meetings should be held with the affected residents, from the time a problem is recognized and identified until the completed project has been evaluated. Without community involvement, the solution to a problem may not satisfy the needs of the community or the project, and result in failure.

25.7.1 The Process

A project is initiated when the scoping process begins for a project on the Region's program, or when local residents request traffic calming be considered an alternative solution to traffic problems on their street or road. Projects should be assessed early in the scoping phase to determine if traffic calming should be considered. Not all projects are candidates for traffic calming. Refer to Section 25.5 for examples of "test questions" to assist in determining if traffic calming should be considered as a project alternative. Examples of traffic calming objectives can be found in Section 25.4.

Input should be solicited from the potentially affected parties during the planning and design of traffic-calmed facilities. The following list of potential parties is not limiting, nor is contact necessarily appropriate or required for all parties.

1. Residents, owners, and store operators (local populace) on the street.
2. Local populace on the street(s) to which traffic may be diverted.
3. Police, fire, ambulance and sanitation officials.
4. Transit authorities.
5. Local truck delivery companies.
6. Municipal planning organizations.
7. The organization with final maintenance jurisdiction.
8. Utility companies.

The activities described below are suggested guidelines for community involvement when considering traffic calming for projects. It is intended that they be coordinated with, but not replace, the normal scoping phase and Design Phases I-IV public involvement activities, as described in the Scoping Procedure Manual and the Design Procedure Manual.

25.7.1.1 Scoping Phase

When the Region initiates a project and traffic calming has not been requested by local representatives/residents prior to the start of the scoping phase, the Region should inform them that a project is to be undertaken, and solicit their input regarding traffic problems, issues, and project needs, for consideration in the development of the project scope.

When traffic calming has been requested by local representatives/residents prior to the start of, or during the scoping phase, the Region should solicit local input regarding traffic problems, issues, and project needs, for consideration in the development of the project scope.

The Region should hold a meeting with the local representatives/residents of the street to introduce the traffic calming policy and assess the need and support for traffic calming on the project. The first meeting should include only those who occupy property along the street within the project area. The Region should request that the locality provide a person or persons to serve as liasons for the local residents within the project area who will be affected by the project, and to communicate information to the public regarding project meeting schedules, etc.

If it is determined at the first meeting that there is a need for traffic calming, and there is local support, a subsequent meeting should be held to review the data collected during the scoping phase and to brainstorm ideas that residents might like the Region to pursue. Notification of the second meeting should go to local government representatives, to residents on the project street and cross-streets, and any affected agencies or organizations.

25.7.1.2 Design Phase I

The Region should develop alternatives after considering the ideas raised at the previous meeting and present them to those invited to the previous meeting. This will enable residents to participate in the development of the alternatives. It is also an opportunity to get ideas from them that may have been overlooked. Provision should also be made to obtain the comments of those who are unable to attend the meeting. When traffic will be diverted as a result of the project, residents and property owners along the streets to be used as alternate routes should be notified of the meeting and the potential impacts to their streets.

The Region should refine the alternatives based on the input/feedback provided by the local citizens and present the refined alternative(s) for consideration and prioritization by the local residents at a follow-up meeting. If necessary, a third Phase I meeting may be held to determine the final traffic management plan to be carried forward.

25.7.1.3 Design Phases II-IV

Development of the traffic calming alternative(s) should be carried out along with the development of other alternatives. Refer to the Design Procedure Manual for a detailed description of the project process.

25.7.2 **Project Approval**

The normal NYSDOT project approval process should be followed. Refer to the Design Procedure Manual.

25.8 MONITORING

All traffic calming projects should be monitored. Studies should be conducted by the Region or the locality both before and after traffic calming measures are implemented. Monitoring is a means of measuring the safety and effectiveness of traffic calming measures in achieving the project objectives, as well as determining the appropriate modifications to be made, if necessary. It will also help improve designs for future projects and determine if corrective treatments are needed. Systematic 'before and after' monitoring is also necessary to evaluate whether the money is well spent.

The safety and effectiveness of traffic calming measures should be evaluated consistent with the traditional techniques used in transportation engineering. A key benefit of monitoring is to provide information which increases the Department's knowledge of good and bad practice in the design and implementation of traffic calming measures. The information can be used to plan and design future traffic calming projects as well as to remove ineffective measures from future consideration. This is especially important due to lack of experience with traffic calming measures in New York State. Collecting the 'before and after' information and sharing it with the Regions will build confidence in the role and performance of traffic calming.

Project monitoring should begin as soon as it is determined, during the project scoping phase, that traffic calming will be considered. Project monitoring should involve gathering 'before' data that supports or negates the concerns of the Department and locality.

When the project is completed and put into operation, the collection of 'after' data should begin. The collection of data should include follow-up meetings with the local residents affected by the project to determine how well the project has responded to their concerns. Photographs of before-and-after geometrics and of the completed features should be included, and used at the meetings. This information is compared to the 'before' data to determine how effective traffic calming is and if it satisfies the project objectives. If any unacceptable impacts are identified, they should be corrected.

The type and extent of monitoring is project specific, however, the following matters should be considered:

- ! the number and location of monitoring sites (e.g., to detect any diversion of traffic, if one of the project objectives or possible outcomes is a significant reduction in traffic volume),
- ! the need for a control site (e.g., in relation to overall accident trends),
- ! whether spot speeds or average speeds through a scheme should be measured,
- ! the short term and long term effects (does the impact wear off over time?), and
- ! the number of measurements needed for statistical reliability.

Public reaction to the effectiveness of the installed measures is also a key factor. Monitored results may diverge from the expected effects that were highlighted during project development. Establishing what the public's expectations and perceptions were, and to what extent they have or have not been realized, will be helpful for future schemes. Refer to Section 25.7 for guidance in public involvement activities.

The results of the monitoring should be reported to the Design Quality Assurance Bureau, after which it will be distributed to all Regions for guidance in selecting future traffic calming measures.

The factors monitored should reflect the objectives of the project and be used to assess priorities for funding. They may include accidents and traffic speeds, or traffic flow and diversion to other routes, depending on the particular situation. The guidelines below should assist in determining which parameters can be reasonably measured, and whose measurements can be interpreted to have some direct relationship to the actual traffic calming project.

- ! 'Before-and-After' Accident Studies to determine annual rates of accidents per million vehicle miles (Acc/MVM) and injuries/MVM) for:
 - # all accidents,
 - # motor vehicle/bicycle accidents,
 - # motor vehicle/pedestrian accidents,
 - # transit accidents.

Perform accident studies to determine how accident trends in the project area have been affected. The length of time of the studies should be sufficient to determine the long-term effects.

- ! 'Before-and-After' Speed Studies to determine
 - # the 85th percentile speed,
 - # the 15 km/h (10 mph) pace and per cent of vehicles within it,
 - # numbers of priority investigation locations (PILs) and high accident locations (HALs) eliminated.

The speed studies should be performed upstream of, at, and downstream of the traffic calming feature, to learn its effect on vehicle speeds.

- ! For urban streets, the percent of vehicles using the facility that attain the speed range for the facility speed category. (See §25.6.1-25.6.4)

- ! 'Before-and-After' User Volumes to determine
 - # the average daily traffic (ADT), vehicles/day,
 - # the average annual daily traffic (AADT), vehicles/day,
 - # the design hourly volume (DHV), vehicles/hour,
 - # the directional design hourly volume (DDHV), vehicles/hour.

Traffic counts should be made on the street where traffic calming will be installed and on the streets to which traffic is expected to divert. The 'after' counts should be made when traffic patterns have stabilized.

- ! Parking occupancy
- ! Level of community satisfaction.

25.9 REFERENCES

The following is a list of the publications that were used in the preparation of this chapter.

1. *A Guidebook for Residential Traffic Management*, WA-RD 368.1, Final Report, December 1994, Savage, J.P. Jr., R.D. MacDonald, J.Ewell. Washington State Department of Transportation, Engineering Publications Room SD3, PO Box 47300, Olympia, WA 98504-7300.
2. *Florida Pedestrian Planning and Design Handbook*, May 1996, University of North Carolina, Highway Safety Research Center. Florida Department of Transportation, Safety Office, 605 Suwannee Street, Mail Station 82, Tallahassee, FL 32399-0450.
3. *Highway Design Manual*. Plan Sales Unit, Support Services Bureau, New York State Department of Transportation, 1220 Washington Avenue, Albany, NY, 12232-0204.
4. ITE Traffic Calming Definition, Lockwood, I.M. In *ITE Journal*, Volume 67, Number 7, July 1997. Institute of Transportation Engineers, 525 School Street, SW, Suite 410, Washington, DC, 20024-2729.
5. *Neighborhood Traffic Management and Calming Program*, City of San Buenaventura, Department of Community Services, Engineering Division, 501 Poli Street, Ventura, CA, 93001.
6. Supplementary Pedestrian Crossing Channelization Devices, T.C. Werner memo to Regional Traffic Engineers, July 15, 1997. Transportation Planning, Highway Safety and Traffic Engineering Division, NYS Department of Transportation, 1220 Washington Avenue, Albany, NY, 12232.
7. *Traffic Calming*, July 1995, Hoyle, C.L., Planning Advisory Service Report Number 456. American Planning Association, Publications Office, 122 S. Michigan Avenue, Suite 1600, Chicago, IL, 60603.
8. *Traffic Calming Guidelines*, 1992. Devon County Council, Engineering and Planning Department, Devon County, Great Britain.
9. *The Traffic Calming Program: Simplification and Enhancement of the Neighborhood Traffic Management and Arterial Traffic Calming Programs*, September 30, 1994. City of Portland, Office of Transportation, Bureau of Traffic Management, Neighborhood Traffic Management, 1120 S.W. 5th Avenue, Room 730, Portland, OR, 97204-1914.

25.10 OTHER SOURCES

The publications listed below are additional sources of information related to topics presented in this chapter. Search the Internet Web for up-to-date resources using “traffic + calming” as key words.

1. *Code of Practice for the Installation of Traffic Control Devices in South Australia*, July 1996. Traffic and Operational Standards Section, Department of Transport, P.O. Box 1, Walkerville, South Australia, 5081.
2. *The Florida Roundabout Guide*. Florida Department of Transportation, Maps & Publications Sales, Mail Station 12, 605 Suwannee Street, Tallahassee, Florida, 32399-0450.
3. *Guidelines for the Design and Application of Speed Humps -A Recommended Practice of the Institute of Transportation Engineers*, 1997. Institute of Transportation Engineers, 525 School Street, SW, Suite 410, Washington, DC, 20024-2729.
4. *Manual of Uniform Traffic Control Devices*, 1983. Transportation Planning, Highway Safety, and Traffic Engineering Division, New York State Department of Transportation, 1220 Washington Avenue, Albany, NY, 12232-0204
5. *Modern Roundabout Practice in the United States*, National Cooperative Highway Research Program Synthesis of Highway Practice 264, 1998, Jacquemart, G. Transportation Research Board, National Research Council, 2101 Constitution Avenue, NW, Washington, DC, 20418.
6. *New York State Vehicle & Traffic Law*, (latest edition). New York State Department of Motor Vehicles, Swan Street Building, Empire State Plaza, Albany, NY, 12228.
7. *Roundabout Design Guidelines*. Maryland Department of Transportation, State Highway Administration, P.O. Box 717, Baltimore, MD, 21203-0717.
8. *Traffic Control Systems Handbook*, FHWA-SA-95-032, 1996, Gordon, R.L., R.A. Reiss, H. Haenel, E.R. French, A. Mohaddes, R. Wolcott. Federal Highway Administration, Office of Technology Applications, 400 Seventh Street, SW, Washington, DC, 20590.
9. *Traffic Control Systems Handbook*, Revised Edition, 1985, FHWA-IP-85-11, Wilshire, R., R. Black, R. Grachoske, J. Higanbotham. Federal Highway Administration, Office of Implementation, 400 Seventh Street, SW, Washington, DC, 20590.

GENERAL

The guidelines for traffic calming measures included in the appendices are taken from guidelines developed for Washington State Department of Transportation, Florida Department of Transportation, and the City of San Buenaventura, CA. Excerpts from those guidelines are Appendices A, B, and C respectively. They should be used for guidance only until such time as formal guidelines or standards are adopted by the Department.

There has been considerable research and publication of traffic calming materials since the guidelines were published. Interested parties should search the Internet Web for up-to-date resources using “traffic+calming” as keywords.

Refer to Sections 25.9 and 25.10 for bibliographic information on the guideline references and on other sources of traffic calming information.