



11. TRAFFIC CALMING

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(Credit: Broward County Traffic Engineering Division)



DEFINITION

During the public outreach period for the *Broward Complete Streets Guidelines*, a common theme heard was a strong desire to slow down traffic speeds. While traffic calming takes various approaches, the outcome is usually the same: reduced traffic speeds.

Traffic calming is the combination of mainly physical measures that (i) reduce the negative effects of motor vehicle use, (ii) alter driver behavior, and (iii) improve conditions for non-motorized street users.



Traffic calmed street (Credit: Dan Burden)

The phrase, “the combination of mainly physical measures,” means physical measures plus a supportive policy environment such that traffic calming is permitted and encouraged.

“Reduce the negative effects of motor vehicle use” means changing the role and design of streets to accommodate motorists in ways that reduce the negative social and environmental effects on individuals, neighborhoods, districts, retail areas, corridors, downtowns, and society in general (e.g., reduced speeds, reduced sense of intrusion/dominance, reduced energy consumption and pollution, reduced sprawl, and reduced automobile dependence).

“Alter driver behavior” means that the street design helps drivers self-enforce lower speeds, resulting in less aggressive driving and increased respect for non-motorized users of the streets. “Improve conditions for non-motorized street users” means promoting walking and cycling, changing expectations of all street users to support equitable use of the street, increasing



safety and comfort (i.e., the feeling of safety), improving the aesthetics of the street, and supporting the context of the street.

The definition of traffic calming is broad enough to apply to a myriad of contexts and situations but specific enough to have independent meaning so that it is not confused with other street design elements and design approaches.

Through design, traffic calming aims to slow the speeds of motorists to the “desired speed” (usually 20 mph or less for residential streets and 25 to 35 mph for boulevards and avenues) in a context-sensitive manner by working with the stakeholders (i.e., residents, business owners, and agencies). Traffic calming is acceptable on all street types where pedestrians are allowed. One exception is Broward County Transit’s (BCT’s) stated desire to not have vertical speed deflections (such as speed tables and speed cushions) on streets that BCT buses utilize.

“It’s more dangerous to walk than travel by car, because of speed, it does not matter where you live, people are always in a hurry.”

- (Broward Complete Streets survey respondent)

Traffic calming typically connotes a street or group of streets that employ traffic calming measures with a “self-enforcing” quality that physically encourages motorists to drive at the desired speed. When a group of streets are involved, it is normally referred to as “area-wide calming.”

Traffic calming measures can also be designed to treat and manage streetwater.

CATEGORIES

From a policy and design perspective, traffic calming measures fall into two broad categories: those that are appropriate for “framework” streets and those that are appropriate for both framework streets and “non-framework” streets. Framework streets are streets that (i) connect places, neighborhoods, and districts (usually most boulevards and avenues) and/or (ii) serve as emergency vehicle routes. The sorts of traffic calming measures that are appropriate on framework streets include “cross-section measures”



*Median traffic calming measure: Plantation
(Credit: Kimley-Horn and Associates, Inc.)*



because emergency response times are generally unaffected by cross-section changes. Non-framework streets are all the other streets in the street network. The majority of streets in local jurisdictions are non-framework streets. Non-framework streets provide access to houses, businesses, offices, and parks, and are rarely used by emergency vehicles except for local calls. The sorts of traffic calming measures that are appropriate for non-framework streets include cross-section measures and “periodic measures.” Periodic measures are spaced intermittently, rather than continuously. They are very popular on non-framework streets because they are inexpensive when compared to cross-section measures, which typically require construction along the entire length of the street. Examples of both types of measures and guidance for their use are shown above and below.

The correct terminology for traffic calming is “measures” not “devices.” “Devices” implies a degree of portability that does not apply to most traffic calming measures. The use of “devices” also causes confusion with the contents of the Manual on Uniform Traffic Control Devices (MUTCD). Adding street trees and changing the paving material to provide texture or contrast, for example, are measures to alter behavior and perceptions but they are clearly not “devices.”



Periodic traffic calming measure: Raised crosswalk in Seattle, WA (Credit: Ryan Snyder)



Partial closure: Riverside, CA (Credit: Ryan Snyder)

“Route modifications measures” are not true traffic calming measures. Examples of route modifications measures include street closures, partial closures, turn prohibitions, diverters, and one-way streets. Route modifications effectively remove parts of the network. Route modifications result in circuitous and out-of-direction routing. The resulting trips are longer and burn more fuel; thus, circuitous routing can increase driver frustration and result in higher speeds. Route modification should be used sparingly and generally where traffic is diverted to boulevards to reduce cut-through traffic, or on bike boulevards to reduce their use by through motor vehicle traffic.

Lastly, signs, pavement markings, and on street parking are often used in conjunction with traffic calming measures, but they are traffic control devices, not traffic calming measures.



SAFETY

The greatest benefit of traffic calming is increased safety. Compared with conventionally designed streets, traffic calmed streets typically have fewer collisions and even higher reductions in injuries and fatalities. These dramatic safety benefits are mostly the result of slower speeds for motorists that result in greater driver awareness, wider fields of vision, shorter stopping distances, and less kinetic energy during a collision. At 20 mph or less, chances are high that a motorist will not kill or severely injure a pedestrian in a collision. Other contributing factors to these superior safety results include a more legible street environment and design advantages for pedestrians and cyclists. Bulb-outs on corners of intersections, for example, allow pedestrians to see past parked cars prior to crossing the street.



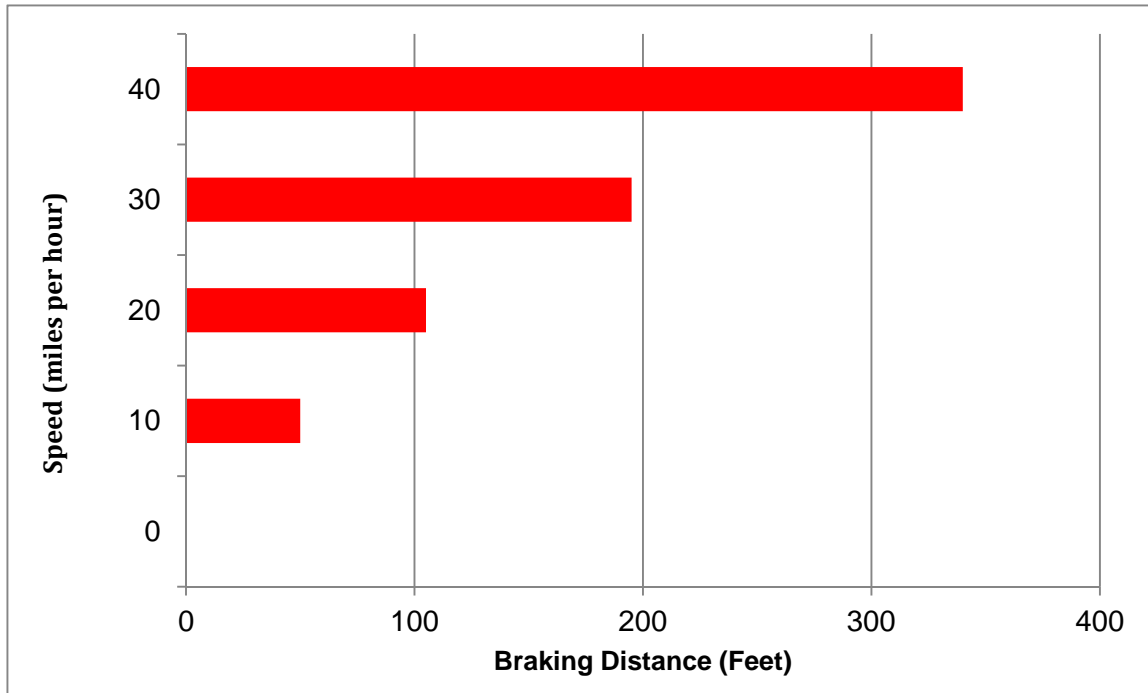
Peripheral vision at 15 mph



Peripheral vision at 30 mph

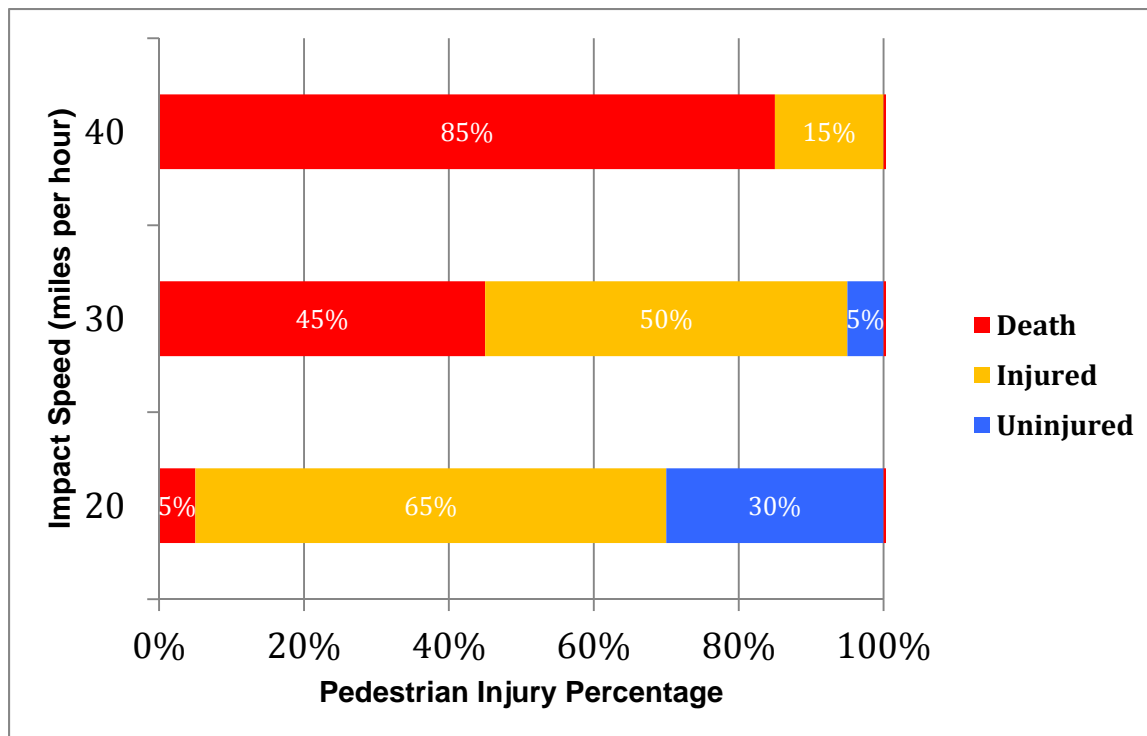
Peripheral vision decreases at higher speeds. (Credit: Michele Weisbart)

The accommodation and comfort of pedestrians increases greatly as speeds lower. For example, acceptable gaps (i.e., the space between moving vehicles) are better judged at slower speeds. Also, at 25 mph or less drivers are much more likely to yield to pedestrians and let them cross the street than at over 25 mph. The chart on the next page shows that it takes a longer distance to brake and come to a full stop as speeds increase.



Source: (Federal Highway Administration, *Pedestrian Safety Design Course*)

The chart below illustrates that crashes become more severe with speed.



Source: *Killing Speed and Saving Lives*, UK Department of Transportation.



EMERGENCY RESPONSE AND NUMBER OF PERIODIC MEASURES



Designing traffic calming to accommodate emergency response. (Credit: Dan Burden)

It is important to have a network of framework streets so that emergency personnel can get to, or reasonably close to, calls without encountering too many periodic measures. In this way, all or most of the length of the responders' trips are on framework streets and, if any periodic measures are encountered, then they are encountered only towards the end of the trip. From an emergency perspective and a public acceptability perspective, it is important to limit the number of periodic measures in a row on non-framework streets. The rule of thumb is, on the routes between two framework streets there should be no more than 8 to 12 periodic measures. If more than 8 to 12 periodic

measures are used in a row, motorists who use the streets will become highly irritated with the measures and will have them removed. This rule of thumb effectively limits the length of single-street traffic calming projects. It also limits the size of the area for area-wide calming (i.e., the maximum limit is 8 to 12 multiplied by the spacing between the measures).

To achieve a desired speed of 20 mph using periodic measures, the spacing between the measures should be about 250 to 300 feet. Typically, measures are constructed at the obvious locations (i.e., pedestrian crossings, intersections, and curves) and then subsequent measures are filled in to attain the correct spacing. In this way, a slow and steady speed profile is achieved; there is little opportunity or utility for motorists to speed up between the measures.

EXCEPTIONS

There are two general exceptions to the above recommendations:

- Some local streets should be classified as framework streets due to their long lengths and inability to be effectively calmed with no more than 8 to 12 periodic measures at the correct spacing.
- Periodic measures are appropriate on framework streets in some situations. Examples include locations with heavy pedestrian generators (e.g., at elementary schools, community centers, entertainment venues, and key intersections along a main street or in a downtown).



DESIGN VEHICLE

In general, all public streets and traffic calming measures should be designed to accommodate a WB-40 design vehicle (i.e., a tractor trailer with a 40-foot wheel base). The WB-40 design vehicle uses more space to turn than fire trucks, school buses, garbage trucks, and most service trucks. Therefore, if the WB-40 fits, all the rest fit. On streets where larger design vehicles are permitted and are expected to use the streets regularly, then the design vehicle should be changed accordingly. While all streets should be designed to accommodate WB-40 vehicles, they should not be the primary design vehicle on non-framework streets. And this does not mean that every radius must be large enough to accommodate them as large trucks may use the full width of the street they are turning into. These streets should be narrow and require reduced speeds to turn at intersections, especially for large vehicles.

GENERAL POLICY GUIDANCE

For local jurisdictions initiating a traffic calming policy, the most important items to include are the following:

- The correct definition of traffic calming
- General statements of support for traffic calming throughout the city and experimentation with traffic calming for a variety of rationales
- A chart of examples of acceptable measures on different categories of streets
- A reference to traffic calming practices and procedures that will be maintained at the staff level

The last item is important because local jurisdictions need the flexibility to adapt their programs, include updated practices and measures as they are developed or discovered, and react to changing circumstances. **If practices and procedures are adopted by ordinance or resolution, then the traffic calming policy will be out-of-date quickly or will hamper local jurisdictions' ability to address unique contexts.**

TORT LIABILITY

The low speed environment of a traffic calmed street is a difficult place for someone to be “victimized” by a fault in the road design. Consequently, there are very few tort actions associated with traffic calming. Furthermore, there are fewer collisions and far fewer injuries and deaths on traffic calmed streets than streets with higher speeds. It is recommended that some simple and routine actions are followed:

- In local jurisdictions' statements for supporting traffic calming, some broad rationale should be listed so that traffic calming cannot be considered “capricious.” Examples should include to increase safety, increase walkability, increase community cohesion,



and increase business viability; historic preservation and environmental protection; and to further the goals and objectives of the community and city in a variety of contexts.

- Local jurisdictions should conduct normal monitoring for maintenance, complaints, incidents, and collisions. This need not be anything more than the normal reporting systems but with some additional attention paid to streets with new modifications.

TRAFFIC CALMING CONTEXTS

Early traffic calming efforts in North America started as “programs” and often used a variety of warrants and petitions. However, traffic calming has evolved and there are many reasons to calm traffic; a city doesn’t need special permission or warrants to increase the safety and comfort of its streets. In many ways, traffic calming is synonymous with other terms that are used to encourage better street designs. Depending on the term, the emphasis differs, but in all cases traffic calming measures play a role.

Context-Sensitive Design (CSD)

CSD implies that the context (i.e., the social, historical, physical, fiscal, political, environmental, and policy contexts) drive the design as opposed to the conventional street hierarchy. Typically, conventional practices use general design guidelines that are indifferent to the context. Frequently, contexts along conventional streets in local jurisdictions suffer from some combination of negative effects of motor vehicle use, poor driver behavior, and poor conditions for non-motorized street users. Consequently, CSD often employs traffic calming measures to respect the context of the street and neighborhood.

Smart Transportation

This term describes the transportation aspects of smart growth. The idea is to consider “transportation planning and design” as integral with “land use planning and design,” as opposed to separate ideas. Too often, the two are done by separate specialists and for independent reasons. Traffic calming measures play an important role in the design of all scales of streets in local jurisdictions when integration with the adjacent land use is desired. Through the TOUCH Grant, the Broward Regional Health Planning Council has married the two programs together and is working to ensure seamless coordination between complete streets and Smart Growth policies.

Safe Routes to School

Safe Routes to School (SRTS) includes a series of operational and physical changes that help students walk and cycle to and from schools. Traffic calming measures are routinely employed with other strategies and changes to create safer walking and bicycling routes to school by slowing traffic.



Neighborhood Traffic Management

This term describes the combination of the following techniques.

- Route modifications (e.g., turn prohibitions, closures, partial closures, diverters, and one-way streets) to remove parts of the street network, sever linkages, create mazes, or reduce connectivity.
- Speed control measures to delay motorists who cut through neighborhoods.
- Traffic calming to reduce poor driver behavior (e.g., speeding and aggressive driving).

Please note that in most situations, diminishing the street network is not considered good practice. Bicycle boulevards are a primary exception to this rule; traffic control devices are desirable on bicycle boulevards to discourage through motor vehicle traffic. Route modification may also be used to reduce cut-through traffic where the traffic will be diverted to a boulevard.

Shared Space

Shared space uses the design of the public realm (i.e., the space between the buildings) to cause all of the street users to communicate, interact, and behave safely without (i) the reliance on conventional traffic control devices doing the communicating for them, and (ii) the conventional allocation of separate lanes/spaces that accompany the conventional and often less safe “safety-through-separation” theories. Many traffic calming measures, such as texture, paving color changes, lateral shifts, and enclosure, are employed in shared spaces.



*Shared space: Groningen, Holland
(Credit: Ryan Snyder)*

Road Diet

This term describes the narrowing and/or removal of motor vehicle lanes from the cross-section. Both of these changes are traffic calming measures. Typically, the reclaimed space is used for other purposes such as wider sidewalks, landscaped spaces, bicycle lanes, linear parks, and/or on-street parking. Often, road diet projects employ other traffic calming measures as well. Roundabouts often enable implementation of road diets, especially on busier boulevards since they have greater capacity to handle traffic at intersections with fewer lanes than other controls.

Competent Street Design

Competent street design combines all of the above. There is little excuse any more to ignore the context or to build incomplete, dangerous, or poorly integrated streets. The issue for traffic calming is not justification but prioritization. If there are problems with a conventionally



designed street, then traffic calming is warranted. The questions are how to calm, when to calm, and how the project compares to other priorities in the city.

Obviously, an early priority for any city is to incorporate traffic calming measures into normal street design practices and procedures to help any new/future streets avoid the deficiencies of conventionally designed streets. The harder part is prioritizing the rebuilding or retrofitting of the myriad of already built conventionally design streets. Rebuilding or retrofitting these streets should be prioritized based on the context, in the broadest sense. Candidates for calming might include the following:



*Curb extensions enhance retail districts:
 Asheville, North Carolina (Credit: Ryan Snyder)*

- Key shopping streets in the downtown area
- Waterfront streets, which commonly attract pedestrians who would benefit if the streets were calmed
- Neighborhood streets
- Large arterials (boulevards) that create barriers in the city

Consequently, allocating street redesign money based on warrants or numerical scores is not recommended because the contexts and scope vary too much. In the early days of North American traffic calming, special traffic calming programs were established with warrants that focused primarily on motor vehicle speeds, volumes, and collisions on residential streets. Warrants were popular in the early traffic calming programs because, at the time, traffic calming was new and unfamiliar. Traffic calming was thought of as an independent program for residential streets only.

Scoring schemes are problematic. For example, if a threshold score is exceeded on one block or at one intersection but nowhere else on the street, traffic calming the one location does not make sense. A single periodic measure used alone that does not result in a slow and steady speed profile is known as an “orphan.” Periodic traffic calming measures rely on other measures along the street at the correct spacing to be most effective. Furthermore, the individual score or warrant cannot anticipate shifting a problem to a parallel street. In other words, the scoring systems cannot anticipate transfer effects. Area-wide calming requires judgment.

Numerical scores leave out key contextual considerations (i.e., school area, retail area, parks, presence of sidewalks, right-of-way widths, and building setbacks) and thus are incomplete. Many scoring schemes rank projects on auto-related criteria such as volume, speed, crashes, etc. This method ignores other street users such as pedestrians and cyclists. The scores require



a lot of effort to gather, analyze, and compare. They also provide a false sense of objectivity because the fundamental choice of what to measure is subjective as is the weighting of the measures. It is difficult to correlate the scoring with a city's, district's, downtown's, corridor's, or neighborhood's vision, goals, objectives, and broader priorities. These priorities may include revitalization, community cohesion, housing, or others.

Instead, traffic calming should be a normal part of a city's, district's, downtown's, corridor's, or neighborhood's plans and a normal part of the budgeting process. It should be incorporated into resurfacing, utility replacement, and other programs. Every time a conventional street gets attention, the replacement design should include traffic calming as normal practice. Traffic calming should be the rule, not the exception, and special permission to not calm should be sought in those instances. Competing areas, neighborhoods, and districts that want traffic calming need to express their desires through the normal planning and capital works programs.

Requiring petitions is not recommended either, as they can be expensive, distracting, and divisive. Outcomes can vary depending on the wording of the petition; the business people's, property owners', and residents' understanding of the related issues; and the people who are collecting the signatures. Petitions can make the task of designing a context-sensitive, traffic calmed street very difficult.

Traffic Calming and Streetwater Management

Traffic calming measures, such as bulb-outs, roundabouts, traffic circles, chicanes, lane narrowing, and others, can be used as streetwater management tools. Some of these can create space for bioretention, detention, and pervious pavement.

PLANNING AND DESIGN PROCESSES

Traffic calming redevelopment should be a normal part of any city's planning and design processes, as well as ADD-budgeted processes. The processes will vary dramatically depending on the context. For example, implementing a road diet in conjunction with a transit facility along a five-mile boulevard would require a different process than reverting one-way streets back to two-way operation in a downtown. Similarly, a neighborhood traffic calming plan would require a different process than designing a people-friendly Main Street. Also, identifying boulevard streets that are barriers in a city during comprehensive planning would require a different process than altering streets on a college campus or hospital campus.

The common threads that link all of the processes include the following:

- Gaining a good understanding of the context
- Involving the stakeholders in the definition of the problems to be solved and aspirations to be fulfilled
- Educating the stakeholders such that they can have meaningful involvement



- Aligning the project with a broader vision for the area
- Achieving an informed consent regarding the plan

Traffic calming is best done in conjunction with a development, revitalization, utility, or maintenance project; a downtown, corridor, or transit plan; a new street design; or other project. Then the traffic calming layer is simply incorporated into the larger project's processes.

Table 11.1 illustrates acceptable traffic calming measures on various types of streets.

Table 11.1: Representative Examples of Traffic Calming Measures and their Appropriateness on Various Street Categories

Traffic Calming Classification		Framework Street			Framework Street or Non-Framework Street		Non-Framework Street	
		Boulevards in Transition (partially calmed)	Regional Boulevard	Community Boulevard	Community Avenue	Neighborhood Avenue	Local Street	
Conventional Street Classification								
Posted / Design / Target / Operating Speed (mph)		35 mph +	25 to 30 mph	20 to 30 mph	20 to 30 mph	20 to 25 mph	20 mph or below	
Transition Zone from / to higher speed environment		Yellow	Green	Green	Red	Red	Red	
Entrance Features (architecture / landscaping / monument)		Green	Green	Green	Green	Green	Green	
Cross-Section Measures	Reduction in number of lanes	Green	Green	Green	Green	Green	Green	
	Reduction in width of lanes	Green	Green	Green	Green	Green	Green	
	Long Median / Continuous Median	Green	Green	Green	Green	Green	Green	
	Short Median / Refuge	Green	Green	Green	Green	Green	Green	
	Short Medians on Curves	Green	Green	Green	Green	Green	Green	
	Bulb-outs	Green	Green	Green	Green	Green	Green	
	Curb and Gutter	Green	Green	Green	Green	Green	Green	
	Curbless / Flush Streets	Red	Green	Green	Green	Green	Green	
	Flush Medians	Green	Green	Green	Green	Green	Green	
	Pedestrian Scale Lighting	Green	Green	Green	Green	Green	Green	
	Street Trees	Green	Green	Green	Green	Green	Green	
	Building up to the right-of-way	Green	Green	Green	Green	Green	Green	
	Lateral Shifts	Red	Green	Green	Green	Green	Green	
	Shared Spaces	Red	Green	Green	Green	Green	Green	
	Bike Lanes / Protected Bike Lanes / Cycle Tracks	Green	Green	Green	Yellow	Yellow	Yellow	
	Textured and/or Colored Paving Materials (parking, lanes, bike lanes, crossings, intersections, general purpose lanes, turn lanes, medians)		Green	Green	Green	Green	Green	Green
	On-street Parking	Parallel	Yellow	Green	Green	Green	Green	Green
		Back-in-angled	Yellow	Green	Green	Green	Green	Green
Front-in-angled		Red	Red	Red	Red	Red	Green	
Right-angle		Red	Red	Red	Red	Red	Green	
Valley gutters used in conjunction with parking		Green	Green	Green	Green	Green	Green	



Traffic Calming Classification			Framework Street			Framework Street or Non-Framework Street			Non-Framework Street			
Periodic Measures	Horizontal Measures	Roundabouts	Appropriate	Appropriate	Appropriate	Appropriate	Appropriate	Appropriate	Appropriate	Appropriate	Appropriate	
		Mini Roundabouts	Not Appropriate	Appropriate	Appropriate	Appropriate	Appropriate	Appropriate	Appropriate	Appropriate	Not Appropriate	
		Mini Traffic Circles	Not Appropriate	Not Appropriate	Not Appropriate	Appropriate	Appropriate	Appropriate	Appropriate	Appropriate	Appropriate	
		Impellers (T-intersections)	Not Appropriate	Not Appropriate	Not Appropriate	Appropriate	Appropriate	Appropriate	Appropriate	Appropriate	Appropriate	
		Two-lane chicanes	Not Appropriate	Not Appropriate	Not Appropriate	Appropriate	Appropriate	Appropriate	Appropriate	Appropriate	Appropriate	
		One-lane chicanes (yield condition)	Not Appropriate	Not Appropriate	Not Appropriate	Appropriate	Appropriate	Appropriate	< 3,000 ADT	< 3,000 ADT	< 3,000 ADT	Appropriate
		Short medians	Not Appropriate	Not Appropriate	Not Appropriate	Appropriate	Appropriate	Appropriate	Appropriate	Appropriate	Appropriate	Appropriate
		Medians on curves	Not Appropriate	Not Appropriate	Not Appropriate	Appropriate	Appropriate	Appropriate	Appropriate	Appropriate	Appropriate	Appropriate
	Narrowings	Yield Streets	Not Appropriate	Not Appropriate	Not Appropriate	Appropriate	Appropriate	Appropriate	< 1,500 ADT	< 1,500 ADT	< 1,500 ADT	Appropriate
		Pinch Points	Not Appropriate	Not Appropriate	Not Appropriate	Appropriate	Appropriate	Appropriate	< 3,000 ADT	< 3,000 ADT	< 3,000 ADT	Appropriate
		Bulb-outs	Appropriate	Appropriate	Appropriate	Appropriate	Appropriate	Appropriate	Appropriate	Appropriate	Appropriate	Appropriate
	Vertical Measures	Raised Intersections	Appropriate in Specific Circumstances	Appropriate in Specific Circumstances	Appropriate in Specific Circumstances	Appropriate	Appropriate	Appropriate	Appropriate	Appropriate	Appropriate	Appropriate
		Raised Crosswalks	Appropriate in Specific Circumstances	Appropriate in Specific Circumstances	Appropriate in Specific Circumstances	Appropriate	Appropriate	Appropriate	Appropriate	Appropriate	Appropriate	Appropriate
		Flat-top Speed Humps (speed tables)	Not Appropriate	Not Appropriate	Not Appropriate	Appropriate	Appropriate	Appropriate	Appropriate	Appropriate	Appropriate	Appropriate
		Speed Cushions	Not Appropriate	Not Appropriate	Not Appropriate	Appropriate	Appropriate	Appropriate	Appropriate	Appropriate	Appropriate	Appropriate
Speed Humps		Not Appropriate	Not Appropriate	Not Appropriate	Appropriate	Appropriate	Appropriate	Appropriate	Appropriate	Appropriate	Appropriate	
Not Traffic Calming Measures	Vertical Changes	Rumble Strips (for warning purposes)	In rural areas only	Not Appropriate	Not Appropriate	Not Appropriate	Not Appropriate	Not Appropriate	Not Appropriate	Not Appropriate	Not Appropriate	
		Speed Bumps	Not Appropriate	Not Appropriate	Not Appropriate	Not Appropriate	Not Appropriate	Not Appropriate	Not Appropriate	Not Appropriate	Not Appropriate	

Note: Many of these measures can be combined in a variety of ways that are too numerous to list in this chart.

Legend:

Appropriate
Appropriate in Specific Circumstances
Not Appropriate

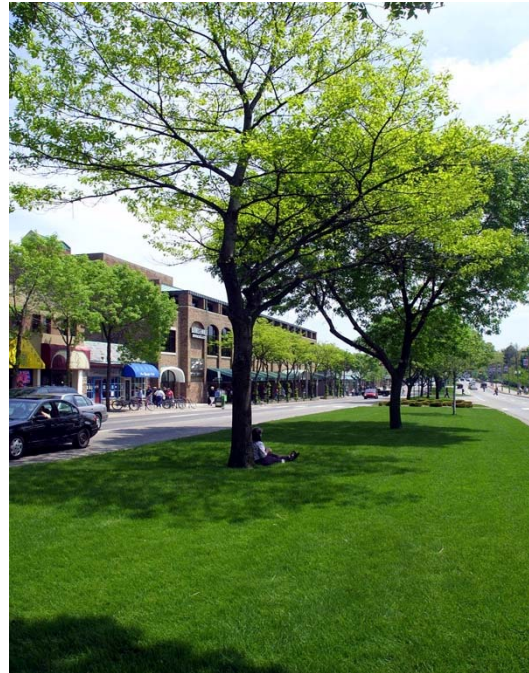
The following photos illustrate some of these measures.



IMAGE GALLERY



Reduction in widths (Credit: Ian Lockwood)



*Long, continuous median
(Credit: Ian Lockwood)*



*Short median with refuge (Credit: Kimley-Horn and
Associates, Inc.)*



Short median on curve (Credit: Michael Wallwork)



Rubber speed cushions (Credit: Unknown)



Curbless median (Credit: Ian Lockwood)



*Speed table and lane narrowing with warning sign
(Credit: Kimley-Horn and Associates, Inc.)*



Lateral shifts (Credit: Ian Lockwood)



Textured pavement (Credit: Ian Lockwood)



Valley gutter (Credit: Ian Lockwood)



Short median adjacent to uncontrolled intersection (Credit: Kimley-Horn and Associates, Inc.)



Roundabout with splitter islands for pedestrian crossings (Credit: Kimley-Horn and Associates, Inc.)



Mini-roundabout (Credit: Ian Lockwood)



Impeller T-intersection (Credit: Ian Lockwood)



Two-lane chicane (Credit: Michael Wallwork)



Textured pavement (Credit: Kimley-Horn and Associates, Inc.)



One-lane chicane (Credit: Ian Lockwood)



Short median (Credit: Ian Lockwood)



Neighborhood traffic circle (Credit: Unknown)



Raised crosswalk (Credit: Ian Lockwood)



Speed cushion (Credit: Ian Lockwood)



Oval median (Credit: Michael Wallwork)



Mid-block curb extension with bioswale (Credit: Brad Lancaster)