



City of Nashua Guide to Traffic Calming



Prepared with assistance from the Nashua Regional Planning Commission



iTRaC Program
March 2008



TABLE OF CONTENTS

1.0	TRAFFIC CALMING MEASURES	1
1.1	BULBOUT AND CURB EXTENSIONS	4
1.2	CHICANES	5
1.3	CHOKERS/NECKDOWNS	6
1.4	GATEWAYS	7
1.5	LANDSCAPING	8
1.6	MEDIANS	9
1.7	MODIFIED T-INTERSECTIONS.....	10
1.8	PARTIAL STREET CLOSURE/ENTRANCE BARRIERS	11
1.9	PAVEMENT TREATMENTS	12
1.10	PEDESTRIAN REFUGE ISLAND /CROSSING ISLANDS	13
1.11	SPEED HUMPS AND SPEED TABLES.....	14
1.12	RAISED INTERSECTIONS	15
1.13	RAISED CROSSWALKS.....	16
1.14	REDUCING THE NUMBER OF LANES	17
1.15	ROADWAY OR LANE NARROWING.....	18
1.16	ROUNDBOUTS	19
1.17	MINI-CIRCLES	21
1.18	STREETSCAPING	22
1.19	WOONERFS.....	23

LIST OF TABLES

TABLE 1:	TRAFFIC CALMING TECHNIQUES.....	2
----------	---------------------------------	---

1.0 TRAFFIC CALMING MEASURES

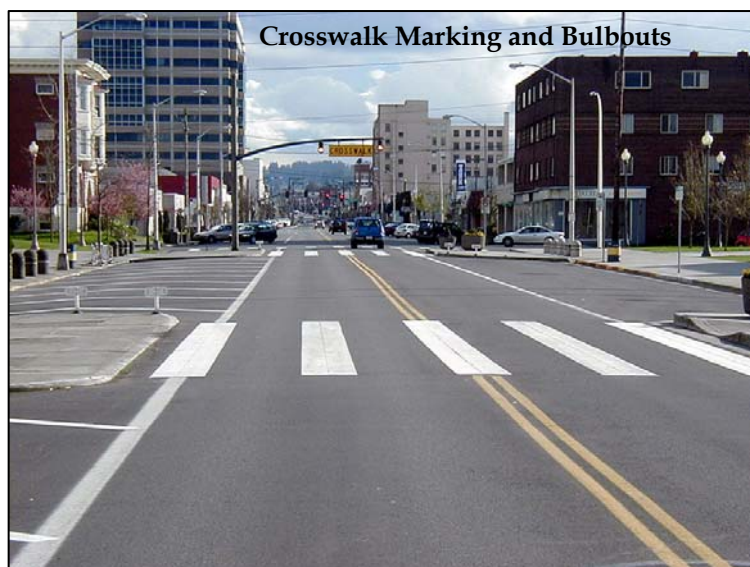
Initial traffic calming efforts began in Europe in the late 1960's and increased in popularity throughout the 1970's and 1980's with efforts in Israel, Japan and Australia. The Netherlands first began focusing on methods to address undesirable cut-through traffic on residential streets. Coined 'Woonerven', this technique focused on creating shared streets that provided pedestrian amenities as well as motor vehicle access. This technique proved to be extremely costly due to the focus on street furniture. The Netherlands eventually focused on traffic calming techniques, due to its cost effectiveness.

In the 1980's, Denmark and Germany completed a number of demonstration projects to determine the effects of traffic calming techniques. In general terms, some of the benefits included reduced traffic speeds, air pollution and severity of accidents. The German demonstration projects found that traffic calming efforts were more successful when implemented in a widespread fashion over large areas, rather than sporadically on isolated streets. These successes lead to widespread usage throughout Europe and beyond.

In the United States, initial traffic calming efforts can be traced back to the 1970's in Berkeley, CA, and Seattle, WA. Seattle implemented a successful demonstration project in the Stevens Neighborhood in 1971. A combination of diverters, roundabouts and partial street closures significantly reduced undesirable cut-through traffic. Seattle has continued to embrace traffic calming techniques throughout the city with chicanes, bulbouts, neckdowns, and speed humps. Similar efforts can be seen throughout the country in Austin, TX; Charlotte, NC; Eugene and Portland, OR; and Gainesville, FL.

Source: [Traffic Calming: State of the Practice, Reid Ewing: ITE/FHWA, August 1999.](#)

Traffic calming techniques are designed to reduce vehicle speeds, increase space for pedestrians and bicyclists on the roadway, create a sense of community and improve the local environment. This is accomplished by creating physical structures and visual cues that induce drivers to slow down. Communities that implement traffic calming measures also see a reduction in both the number and severity of vehicular accidents. As more vehicles take to the road in this region, traffic calming techniques also play an important role in enhancing the livability of our cities and towns. When properly implemented, these measures decrease noise and air pollution and allow pedestrians and bicyclists to more safely and comfortably take to the streets. Best of all, traffic calming techniques can be customized to fit the needs of any community. For additional information please reference *Draft of Nashua Code of Ordinances, Chapter 320 Vehicles and Traffic, Article III Section 320-10, Traffic calming and Section 320-11 Streets with traffic calming measures.*



Courtesy of Dan Burden, Glattig Jackson Kercher Anglin, Inc., and Walkable Communities.

Traffic calming experts like Dan Burden¹ believe that there are **four critical steps** involved with deciding when, where and how to apply traffic calming measures in a community. The **first step** is to decide what the problem is. For example, a community may want to use a gateway to send a message to motorists that they are transitioning from a highway to a lower speed residential area. In other situations, a community may want to calm traffic through the use of pavement markings that clearly define where motor vehicles, pedestrians and bicycles should be operating.

The **second step** is to determine the type of location that the traffic calming technique is going to be applied to. This is important, for example, because some techniques are appropriate at intersections but not at specific non-intersection locations. There are generally four types of locations:

- A **spot location** is a specific location on a roadway that is not an intersection. One example of a spot location is a mid-block crosswalk.
- The **intersection** is a point at which two or more streets intersect.
- **Roadway** refers to improvements that would be applied along a segment of roadway.
- **City-wide** means that the tool could be applied in any area of the City of Nashua.

The **third step** is to select the appropriate traffic calming technique for the type of location. The following table provides guidance for matching the type of situation/location with a specific traffic calming tool:

TABLE 1: TRAFFIC CALMING TECHNIQUES

TOOL	PAGE	MATCH THE TECHNIQUE WITH THE TYPE OF SITUATION/LOCATION			
		SPOT LOCATION	INTERSECTION	ROADWAY	CITYWIDE
BULBOUT & CURB EXTENSIONS	4	●	●	●	●
CHICANES	5			●	●
CHOKERS/NECKDOWNS	6	●	●	●	●
GATEWAYS	7	●	●	●	●
LANDSCAPING	8	●	●	●	●
MEDIANS	9			●	●
MODIFIED T- INTERSECTIONS	10		●		●
PARTIAL STREET CLOSURE/STREET CLOSINGS	11		●	●	●
PAVEMENT TREATMENTS	12	●	●	●	●
PEDESTRIAN REFUGE ISLAND/CROSSING ISLANDS	13	●	●	●	●
SPEED BUMPS & SPEED TABLES	14	●	●		●

¹ Streets and Sidewalks, People and Cars. The Citizens' Guide to Traffic Calming by Dan Burden.

Guide to Traffic Calming
March 2008

TOOL	PAGE	MATCH THE TECHNIQUE WITH THE TYPE OF SITUATION/LOCATION			
		SPOT LOCATION	INTERSECTION	ROADWAY	CITYWIDE
RAISED INTERSECTIONS	15		●		●
RAISED CROSSWALKS	16		●		●
REDUCING # OF LANES	17			●	●
ROADWAY OR LANE NARROWING	18			●	●
ROUNDBABOUTS	19		●		●
MINI-CIRCLES	21		●		●
STREETSCAPING	22	●	●	●	●
WOONERFS	23			●	●

The **fourth step** is to review the various traffic calming techniques that are described in the following pages and decide which are the most appropriate for the community.

1.1 BULBOUT AND CURB EXTENSIONS

Bulbouts, also known as bump-outs, and curb extensions narrow the existing roadway by extending the curb and or sidewalk into the street in a rounded fashion. This improves pedestrian site distance while



[www.pedbikeimages.org/Dan Burden](http://www.pedbikeimages.org/Dan_Burden)

reducing the crossing distance between sidewalks. Traffic speed is often reduced as a by-product of the narrower street width. Bulbouts can be used solely at intersections or combined with mid-block locations for a series, slowing traffic over a greater distance. Bulbouts and extensions improve safety for pedestrians crossing at intersections, they increase visibility and reduce the speed of turning vehicles. They work effectively combined with on-street parking (like on Main Street) and add aesthetic benefits when combined with street furniture and landscaping.

Application

- Residential areas/neighborhoods, and urban pedestrian crossings
- To reduce pedestrian crossing distance at intersection and mid-block crosswalks

Pros

- Reduce pedestrian crossing distance/time
- Encourage pedestrians to cross at designated locations
- Increase visibility at crossings
- Attract vehicle driver's attention
- Tendency to slow vehicles
- Discourage parking/blocking crosswalks
- Potential for landscaping
- Improved access for emergency and large vehicles at intersections

Cons

- Possible loss of parking spaces
- Potential stormwater drainage issues/modifications
- Can make snow removal difficult
- May increase maintenance costs

Special Considerations

- Best when used on streets with on-street parking
- If landscaped, maintenance may be required
- Where bike lanes are included, extension lane widths require adaptation
- Should be marked with bollards, delineators or signs

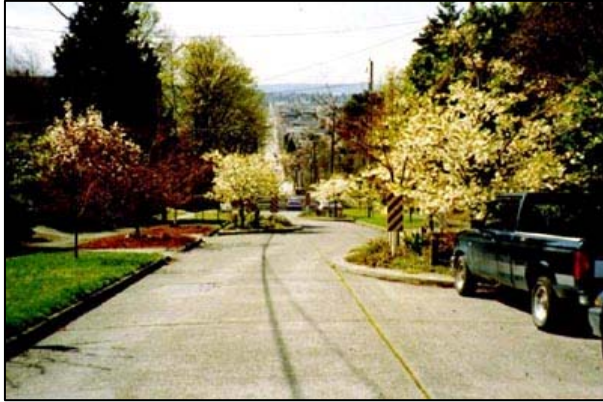


[www.pedbikeimages.org/Dan Burden](http://www.pedbikeimages.org/Dan_Burden)



NRPC Staff

1.2 CHICANES



www.pedbikeimages.org/Portland Office of Transportation

Chicanes are intended for low volume streets (less than 1500 vehicles per day). They are formed by a series of bulbouts that combine to reduce street width to a single lane at specific locations. This narrowing forces vehicles to slow down considerably. They also provide visual cues for traffic to reduce speed.

Application

- Residential areas/neighborhoods
- To reduce speeds on long blocks or at intersections

Pros

- Effectively reduce vehicle speeds without restricting access
- Provide location for pedestrian crossing
- Opportunity for landscaping
- Attract vehicle driver's attention

Cons

- Acquiring additional right-of-way may be necessary
- Potential loss of parking spaces
- Slows emergency vehicles
- More costly than bulb-outs/curb extensions
- Can make snow removal difficult.
- May increase maintenance costs.

Special Considerations

- Best used on streets with on-street parking
- If landscaped, maintenance may be required
- Harder for snow removal equipment to navigate
- Most effective where two-way traffic flow is balanced



www.pedbikeimages.org/unknown



www.pedbikeimages.org/Dan Burden

1.3 CHOKERS/NECKDOWNS



www.pedbikeimages.org/unknown

Implement curb bulbouts at intersections and mid-block locations, narrowing the road to one lane. This greatly reduces vehicle speed. Chokers are best placed in locations with 600 to 2000 vehicles per day.

Application

- Residential areas/neighborhoods, downtown cross-streets
- To slow traffic at mid-block or entry point of streets

Pros

- Effectively reduce vehicle speeds
- Reduce pedestrian crossing distance/time
- Encourage pedestrians to cross at designated locations
- Increase visibility at crossings
- Attract vehicle driver's attention
- Tendency to slow vehicles
- Potential for landscaping

Cons

- Potential loss of parking spaces
- May create drainage issues
- Emergency and large vehicle access may be impeded
- Potential hazard to bikers

Special Considerations

- Insufficient narrowing of street will allow vehicles to pass, reducing effectiveness.



[www.pedbikeimages.org/Dan Burden](http://www.pedbikeimages.org/Dan_Burden)



[www.pedbikeimages.org/Dan Burden](http://www.pedbikeimages.org/Dan_Burden)

1.4 GATEWAYS



[www.pedbikeimages.org/Dan Burden](http://www.pedbikeimages.org/Dan%20Burden)

Gateways can be located at town lines, or entrances to specific districts or neighborhoods. They provide visual cues that the roadway is changing and traffic volumes should be reduced. Elements of landscaping, signage, lighting and public art can be effectively combined to create a pleasing gateway.

Application

- Slow traffic and increase attentiveness of driver
- To define the transition into a different land use
- May be used in conjunction with other calming measures

Pros

- Tendency to reduce vehicle speeds
- Create a unique identity to an area
- Landscaping opportunities

Cons

- Limited traffic calming when used alone
- Create a physical obstruction that may slow emergency and large vehicles
- May increase maintenance costs

Special Considerations

- Strong visual effects are essential
- Be careful not to reduce pedestrian visibility
- Maintenance of signs and landscaping required
- Use of textured pavements may increase noise



[www.pedbikeimages.org/Dan Burden](http://www.pedbikeimages.org/Dan%20Burden)



NRPC Staff

1.5 LANDSCAPING



[www.pedbikeimages.org/Dan Burden](http://www.pedbikeimages.org/Dan_Burden)

Landscaping can be a means of improving aesthetics, providing shade and buffers between different uses. Landscaping of shoulders and medians can influence driver behavior. Properly planted roads result in the perception of a reduced travel lane width and lower travel speed. Care must be taken to ensure that the proper plants are selected for the location and that the existing conditions will support the landscaping in the long-term.

Application

- Enhances the street environment and provides separation between vehicles and pedestrians
- Visually reduces streets effective width, slowing traffic

Pros

- Tendency to slow traffic
- Enhances appearance of other traffic calming measures
- Reduces stormwater runoff
- Trees may reduce energy costs by providing shade/cooling
- Effectiveness enhanced when used with other traffic calming techniques



[www.pedbikeimages.org/Dan Burden](http://www.pedbikeimages.org/Dan_Burden)

Cons

- Requires coordination and agreement among neighbors and municipality
- May increase maintenance costs
- May slow emergency vehicles

Special Considerations

- Choose appropriate species to insure long term health and growth patterns that will minimize maintenance and preserve sight distances.
- Municipality usually will buy and maintain trees, but the neighborhood may be responsible for maintenance of smaller plantings.
- The Nashua Shade Tree Program enables property owners to purchase low cost trees from the city. Trees must be planted in close proximity to the street and be maintained by the property owner. The Nashua Parks Department should be contacted for additional information.



NRPC Staff

1.6 MEDIANS



[www.pedbikeimages.org/Dan Burden](http://www.pedbikeimages.org/Dan%20Burden)

Medians are long raised islands built in the center of a street. Medians can slow traffic, decrease accidents and function as a pedestrian refuge. By providing areas for planting street trees and ground cover, medians can make the street more attractive and pleasant. Building a median may require narrowing lane widths, reducing the number of travel lanes or removing on-street parking. Temporary medians can also be built to address seasonal traffic issues and can be beautified with planted barrels.

Application

- Used to narrow lanes to slow traffic
- Restrict traffic from crossing busy neighborhood intersections
- Provide left turning pockets to improve safety
- Provide refuge at the mid-point of pedestrian/bike crossings
- Create a barrier and prohibit or limit left turning movements

Pros

- Reduce vehicle speeds
- Reduce head-on accidents
- Improve safety of pedestrian crossings by reducing exposure and distance
- Provide landscaping opportunities



[www.pedbikeimages.org/Dan Burden](http://www.pedbikeimages.org/Dan%20Burden)

Cons

- Reduced lane width may affect large vehicle access
- May limit driveway access
- Loss of on-street parking on narrower streets
- Lane narrowing may limit bicycle accessibility
- May divert traffic to more accessible streets, shifting the problem elsewhere
- Can be difficult to maintain planted medians on busy streets
- May slow emergency vehicles

Special Considerations

- Most useful on higher speed collectors and arterials
- Residents and businesses need to be made aware of pros and cons
- Medians often enhance a street and positively affect property values
- Emergency services input on accessibility is necessary



[www.pedbikeimages.org/Dan Burden](http://www.pedbikeimages.org/Dan%20Burden)

1.7 MODIFIED T-INTERSECTIONS



[www.pedbikeimages.org/Dan Burden](http://www.pedbikeimages.org/Dan_Burden)

This technique can be used at some T-intersections to slow traffic speeds in residential areas. A bulbout is placed at the top of the T-intersection, forcing vehicles to slow down and curve around the bulbout to travel through the intersection. This modification may not be appropriate for all T-intersections and must be designed to slow traffic, while minimizing confusion about how to travel through the intersection.

Application

- Residential areas/neighborhoods
- Reducing vehicle speeds
- Low to moderate vehicle volumes

Pros

- Discourage unwanted cut-through traffic in residential areas

Cons

- Such configurations can be confusing to drivers and care must be taken to ensure that they are properly designed and facilitate movement
- May slow emergency vehicles
- May increase maintenance costs
- May affect snow removal

Special Considerations

- May want to consider options such as a mini-circle



[www.pedbikeimages.org/Portland Office of Transportation](http://www.pedbikeimages.org/Portland_Office_of_Transportation)

1.8 PARTIAL STREET CLOSURE/ENTRANCE BARRIERS



[www.pedbikeimages.org/Portland Office of Transportation](http://www.pedbikeimages.org/Portland%20Office%20of%20Transportation)

Such closures prevent one direction of traffic from entering or exiting a particular street by adding a curb bulout at the mouth of the street. The curb bulout extends from one side to the center of the street. Travel will be one way at the intersection but the remainder of the street can support either one-way or two-way traffic. Particular attention must be paid to impacts on adjacent streets. This configuration limits cut-through traffic and reduces traffic volumes.

Application

- Used to prevent traffic from entering or exiting a residential area
- Discourage unwanted cut-through traffic in residential areas
- Reduce traffic volume
- Limit access while still maintaining two-way travel
- Could provide an opportunity to improve landscaping and beautify a neighborhood at the bulbout

Pros

- Discourage unwanted cut-through traffic in residential areas
- May reduce traffic volumes
- Facilitate pedestrian crossings
- Can still provide two-way access for bicycle, pedestrian and emergency access

Cons

- Can adversely impact adjacent streets and neighborhoods
- May increase travel time and distances for local travel
- May remove existing parking
- May slow emergency vehicles
- May increase maintenance costs

Special Considerations

- May want to consider whether other less restrictive options might solve the problem as well



[www.pedbikeimages.org/Portland Office of Transportation](http://www.pedbikeimages.org/Portland%20Office%20of%20Transportation)



[www.pedbikeimages.org/Michael King](http://www.pedbikeimages.org/Michael%20King)

1.9 PAVEMENT TREATMENTS



Textured or colored pavement can be used to emphasize pedestrian crossings, intersections or blocks. A variety of materials, including brick, cobblestone, as well as textured and pigmented concrete or asphalt, can be used. Such treatments can reduce vehicle speed, improve aesthetics, alert drivers and highlight crosswalks, increasing overall safety.

NRPC Staff

Application

- Textured and colored pavement can increase visibility and aesthetic appeal
- Ideal near schools, recreational sites and bike crossings

Pros

- Can improve the overall aesthetic value of an area with defined and textured sidewalks and crosswalks
- Reduce vehicle speed over crosswalks
- Increase sidewalk visibility and safety for pedestrians
- Pigmented concrete or bricks can reduce long term maintenance costs



NRPC Staff

Cons

- Texture can wear down over time
- Painted surfaces can wear off over time
- Potential for higher initial and long term costs
- May increase maintenance costs

Special Considerations

- Pigmented concrete has higher initial costs, but has less maintenance in the long run
- Cold weather considerations for installations



NRPC Staff

1.10 PEDESTRIAN REFUGE ISLAND/CROSSING ISLANDS



www.pedbikeimages.org/ITE Pedestrian Bicycle Council

Also known as center islands, these raised islands in the middle of the street allow pedestrians to cross half of the street, stop and wait safely before crossing the other half. Such crossings improve pedestrian safety, improve visibility of crosswalks, and reduce vehicle speeds. These islands must be handicapped-accessible and not reduce bike mobility.

Application

- Provide a median island that serves as a refuge area for pedestrian and bicycle crossings
- Intended for use at crossing points with high volumes and high travel speeds

Pros

- Facilitate pedestrian and bicycle crossings
- Increase pedestrian safety
- Can improve crosswalk visibility
- Reduce crossing distance
- Can provide an opportunity for landscaping

Cons

- Can impede left turns and driveway access
- Some parking may be lost
- Traffic may increase on adjacent streets
- May slow emergency vehicles
- May increase maintenance costs

Special Considerations

- Ideally suited for unsignalized crosswalks
- Generally designed between 4 and 8 feet in width
- Ensure island is highly visible for drivers



www.pedbikeimages.org/Dan Burden



www.pedbikeimages.org/Dan Burden

1.11 SPEED HUMPS AND SPEED TABLES



www.pedbikeimages.org/Michael King

Speed humps are asphalt mounds typically 3-6 inches high and spaced between 400 to 600 feet apart on residential streets. They force vehicles to reduce speeds to safely travel over them. Speed tables serve the same function as speed humps. They are designed with a flat top, rather than a rounded top of speed humps. Speed humps are often located at crosswalks, trail crossings and parking lots. To increase visibility and attractiveness, they can be striped or made of pavers.

Application

- Slow the speed of vehicles in neighborhoods where intersections are far apart

Pros

- Reduce vehicle speeds
- May reduce traffic volumes by shifting vehicles to adjacent routes
- Ideal solution for a targeted problem

Cons

- Can increase traffic on adjacent streets
- Emergency response times can be reduced
- Can be unattractive
- Can increase noise due to cars accelerating and decelerating
- Require adequate signage notifying drivers
- May affect snow removal



NRPC Staff

Special Considerations

- Limited effects on trucks and sport utility vehicles
- Can be difficult to accurately construct on site
- Multiple speed humps and tables should not be use on emergency routes and bus routes
- Available in rubberized and other specialized materials



www.pedbikeimages.org/Dan Burden

1.12 RAISED INTERSECTIONS



www.pedbikeimages.org/ITE Pedestrian Bicycle Council

A raised intersection involves elevating an entire intersection and crosswalks to develop a flat area raised about 3-6 inches higher than the surrounding roads. Ramps are provided on all the approaches behind the crosswalks, and provide a gradual incline from the lower roadway to the raised intersection. The raised intersection and crosswalks can be built or covered with bricks, pavers or textured or tinted concrete.

Application

- Used to slow traffic in an intersection and provide a safer crossing area for pedestrians

Pros

- Reduce vehicle speeds
- Improve pedestrian and bicycle safety
- Can improve overall aesthetics

Cons

- Impede emergency vehicle access and increases response time
- More expensive than a traditional intersection
- May require drainage modifications
- Difficult for buses to traverse
- May affect snow removal

Special Considerations

- Can be implemented only in flat locations
- The needs of transit providers and emergency vehicles must be considered
- A speed table may be a less expensive option



www.pedbikeimages.org/ITE Pedestrian Bicycle Council



www.pedbikeimages.org/ITE Pedestrian Bicycle Council

1.13 RAISED CROSSWALKS



Similar to a raised intersection, raised crosswalks are raised about 3 to 4 inches above the existing street elevation. They span the width of the street and, if necessary, ramps where they connect to the sidewalk or the roadway. To improve aesthetics, bricks, pavers or textured or tinted concrete can be used in the flat portion of the crosswalk.

Approaches to the raised crosswalk may be highlighted with pavement markings and noted with signage to raise driver awareness about the crosswalk.

NRPC Staff

Application

- Ideally located in locations with high pedestrian traffic, raised crosswalks slow traffic and increase pedestrian safety

Pros

- Reduce vehicle speed
- Can be attractive and aesthetically appealing
- Increase pedestrian safety

Cons

- Increased noise may occur
- Increased delay for emergency vehicles
- Can affect drainage
- May affect snow removal
- May increase maintenance costs

Special Considerations

- Must be designed so the visually impaired recognize that it is a crosswalk
- Need to make adequate provisions for bicycles
- Work well in conjunction with bulbouts
- Can also be illuminated with lights embedded in pavement



NRPC Staff



NRPC Staff

1.14 REDUCING THE NUMBER OF LANES



[www.pedbikeimages.org/Dan Burden](http://www.pedbikeimages.org/Dan%20Burden)

Where capacity constraints are not an issue, reducing the number of lanes on a road or segment of roadway is an effective solution to excessive speed and safety concerns of residents.

Application

- Lane reduction can be applied to local and regional roads where traffic volumes can be accommodated with the reduced roadway capacity. Lane reductions are intended to reduce vehicle speeds and minimize vehicle interactions.

Pros

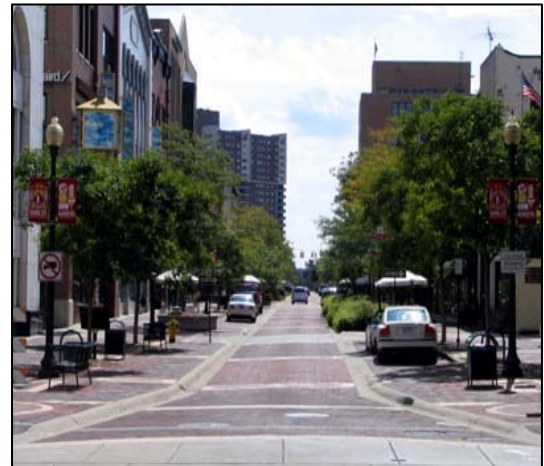
- Generally result in reduced speeds
- Reduce severity and frequency of collisions
- Result in shorter pedestrian crossings and may allow for pedestrian refuge (See bulbout)
- May increase on-street parking
- Can allow for bike lane

Cons

- May result in traffic diversion to other streets
- May increase the percentage of angle collisions
- Speed reductions may not be as effective as other more restrictive measures

Special Considerations

- Could allow for a center turning lane or turn pockets, resulting in better access management, improved safety and reduced congestion



[www.pedbikeimages.org/Dan Burden](http://www.pedbikeimages.org/Dan%20Burden)



[www.pedbikeimages.org/Dan Burden](http://www.pedbikeimages.org/Dan%20Burden)

1.15 ROADWAY OR LANE NARROWING



[www.pedbikeimages.org/Dan Burden](http://www.pedbikeimages.org/Dan_Burden)

The roadway can be striped to create narrow travel lanes, usually 10 to 11 feet wide. This technique changes the driving environment and driver experience, resulting in reduced speed. In addition, the pavement to the right of the fog line can be used for bicycle and pedestrian travel.

Reducing the physical width of pavement and providing landscaping along the sides of the road will have a more dramatic effect on the driver experience and likely have a greater impact on driver behavior.

Application

- Lane narrowing through re-striping can be quickly applied to local roads and regional throughways.
- Physical narrowing of lanes through the addition of pedestrian facilities or green strips may be considered where budgetary constraints allow.

Pros

- The primary benefit of narrowing lanes through striping is to slow vehicle speeds
- Narrow travel lanes can provide additional travel space for bicycles and pedestrians.
- Improve safety
- Can be implemented and modified quickly
- Increase the separation between vehicles and pedestrians
- Increase sight distance on driveways

Cons

- Increases maintenance requirements
- Requires centerline striping on local neighborhood streets
- May bring an “urban feel” to local neighborhood
- Not always perceived as an effective tool

Special Considerations

- Can be quickly implemented and easily reversed
- May help improve safety on sharp curves by guiding drivers to stay between the lines
- Consider implementation of routes used by bicycles



[www.pedbikeimages.org/Dan Burden](http://www.pedbikeimages.org/Dan_Burden)



[www.pedbikeimages.org/Dan Burden](http://www.pedbikeimages.org/Dan_Burden)

1.16 ROUNDABOUTS



www.pedbikeimages.org/Portland Office of Transportation

Roundabouts are raised circular islands in an intersection. 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.

The primary benefit of a roundabout is to reduce speeds approaching the intersection and a reduction in angle and turning collisions. Accidents within roundabouts tend to be less severe and result in less property damage and fewer injuries

The inner lane may be elevated or textured to deter small vehicles from short-circuiting, while allowing the turning of larger vehicles.

Application

- Roundabouts should be considered where there is a need to reduce speeds approaching an intersection, effectively process high volumes of traffic and reduce angle and turning collisions.

Pros

- Effectively reduce vehicle speeds
- Reduce collision potential and minimizes severity of collisions
- Provide better side-street access
- Allow an opportunity for landscaping and gateway treatment
- Total cost for building and operating is typically less than for traffic signals
- Minimize or eliminate queuing at the approach to an intersection
- Reduce total vehicle delay
- Pedestrians crossing may have little impact to level of service
- Can be designed to maintain neighborhood character

Cons

- Implementation of multi-lane roundabouts often requires additional right of way
- Parking removal may be required
- May slow emergency vehicles



NRPC Staff



NRPC Staff

Special Considerations

- Careful planning for pedestrians and bicycles should be included in roundabout design
- Allows for community involvement through landscaping projects
- Bus service and fire officials should be consulted regarding turning radius and response time
- Additional signage may be necessary
- Level of service depends on traffic distribution
- Requires proper design on illumination
- The need for public education on the proper and efficient use of roundabouts

1.17 MINI-CIRCLES



[www.pedbikeimages.org/Dan Burden](http://www.pedbikeimages.org/Dan_Burden)

Similar to roundabouts, mini-circles require drivers to reduce speed in order to comfortably maneuver around the circle in a counterclockwise direction. Mini-circles are most effective in low-volume, environments where space is limited. They also provide opportunity for landscape treatments and can serve as a Gateway treatment to a neighborhood.

Application

- Mini-circles may be considered lower volume applications with speed control and reduction in angle and turning collisions. They may be considered in lieu of four-way stops.

Pros

- Effectively reduces vehicle speeds
- Reduce collision potential
- Provide better side-street access
- Opportunity for landscaping
- Replace stop sign control at similar intersection
- Maintain neighborhood character
- Pedestrian crossing may have little impact to level of service
- Total cost of building and operating is typically less than for traffic signals

Cons

- Mini-circle implementation often requires additional right of way
- Can impede emergency vehicles and turning of large vehicles
- Additional signage may be necessary
- Cannot be used for large vehicle volumes

Special Considerations

- Careful planning for pedestrians and bicycles should be included in the design of the mini-circle
- Allows for community involvement through landscaping projects
- Transit and Fire officials should be consulted to address turning radius and response time considerations



[www.pedbikeimages.org/Dan Burden](http://www.pedbikeimages.org/Dan_Burden)

1.18 STREETSCAPING



www.pedbikeimages.org/Dan Burden

Streetscaping calms traffic by providing visual cues and opportunities for pedestrian activity. Streetscaping shapes the character of the street and can create an inviting place for pedestrians and bicyclists alike. Street furniture such as benches, trash receptacles, and bicycle racks create a welcome place to spend time outside along the street. Aesthetic elements, such as hanging flower baskets, planters, banners and flags, period lighting and textured pavements, create a sense of place and attractive locations.

Application

- Streetscaping treatments should be considered in areas where pedestrian activity takes priority over through traffic movements. Effective applications include downtown areas, Main Streets and parkland or open space areas.

Pros

- Create a sense of place when implemented
- Potential positive impact on local economy
- Reduced vehicle speed

Cons

- May result in more conflict between pedestrians and vehicles
- May increase traffic volume
- May increase maintenance costs

Special Considerations

- May require additional pedestrian treatments such as crosswalks to accommodate increase in use



NRPC Staff



NRPC Staff

1.19 WOONERFS



www.pedbikeimages.org/Annie Lux

Traffic calming techniques trace their origins to the Dutch “Woonerf” plans of the 1970s, which introduced the concept of space shared between vehicles and pedestrians. Woonerf, meaning “street for living,” incorporates narrow roadways without curbs or sidewalks. Cars are slowed by placing trees, planters and parking areas in the street. In addition to being pedestrian friendly, woonerfs are ideal for creating public spaces.

Application

- Woonerf techniques can be effectively applied in downtown shopping and historic areas where pedestrian traffic is desirable.
- Woonerf implements multiple traffic calming measures to achieve an environment where motorized and non-motorized modes of transportation co-exist.

Pros

- Create a sense of place when implemented
- Potential positive impact on local economy
- Reduced vehicle speed
- Potential air quality benefit

Cons

- May result in more conflict between pedestrians and vehicles
- Full implementation can be expensive
- Could result in traffic diversion
- Impacts deliveries and wider vehicles

Special Considerations

- May require additional pedestrian treatments such as crosswalks to accommodate increase in use



www.pedbikeimages.org/Dan Burden

Sources:

Streets and Sidewalks, People and Cars - the Citizen’s Guide to Traffic Calming
Dan Burden, Local Government Commission, Center for Livable Communities, April 2000.
City of Concord Traffic Management Policy, September 2005
Making Streets that Work, City of Seattle Neighborhood Planning Tool, May 1996