4. TRAFFIC CALMING

4.1 What Is Traffic Calming?

Agreement about what constitutes traffic calming was an important first step in the process of developing a traffic calming plan for Downtown Brooklyn. Perceptions of what the term encompasses vary not only within the broad community but also within the traffic engineering profession. It became apparent in the course of the study that the perception of the meaning of traffic calming has a clear and important impact on expectations of what can be achieved by a traffic calming plan.

At its most general, the term "traffic calming" describes actions to reduce vehicular traffic's intrusion into and its effects on urban life. One means of achieving this is a citywide reduction in traffic levels through such policies as land use control, road pricing, improving public transport and restricting road travel by limiting road or parking supply. Various suggestions made by the community in the course of the Downtown Brooklyn Traffic Calming project reflected a desire for use of such measures. These are addressed in Appendix H of this report. While such measures can play an important role in urban policy and could well be important tools in limiting the amount of traffic in Downtown Brooklyn, they are not included as key elements of the Downtown Brooklyn Traffic Calming Strategy, as their implementation would require a coordinated city agency effort that would entail significant political, administrative, and community changes that fall outside the scope of this study.

Traffic calming practice typically consists of various forms of physical management of vehicles implemented at a street or neighborhood level. Although the most familiar forms of traffic calming action worldwide involve the use of physical treatments at the local street level, international traffic calming practice is not limited to low-volume neighborhood streets. Traffic calming may also describe traffic management in busier streets and corridors. Indeed, in an area such as Downtown Brooklyn in which the adverse effects of traffic are felt on all streets, it is critical that the traffic calming strategy extends beyond the confines of the local neighborhood, and that it is integrated within some form of traffic management framework.

The range of traffic calming actions is wide. Ewing (1999) distinguishes between traffic control devices, such as “Stop” signs and speed limit signs that require enforcement and traffic calming measures that are *self-enforcing*. Ewing contends that this distinction implies that effective traffic calming actions “rely on the laws of physics rather than human psychology to slow down traffic.” While the strategy has been developed with the idea of self-enforcement firmly in mind, it does not exclude any means of improving the street environment that can be effective. Brindle and O’Brien (1999) contend that traffic calming is the end rather than the means. In this context, arguments about what should and should not be considered traffic calming actions are unimportant. The critical motivator of traffic calming is the underlying desire to improve the street environment. This moves the discussion from the kinds of *actions* that can legitimately be grouped under the traffic calming banner to the kinds of *outcomes* being sought.

In an environment such as Downtown Brooklyn, in which the effects of vehicular traffic dominate public space, the obvious and simple response is try to rationalize or balance the motorized traffic. Implementing such a strategy may well create a pleasant environment, but by no mean guarantees that other objectives for the use of public space implicit in eliminating traffic will be met.

Traffic calming, as it relates to this project, revolves around the idea of better use of public space. This may be manifested in various ways: it may involve de-emphasizing vehicular traffic in favor of pedestrians and other street users. This type of approach might be appropriate for residential streets. It might also involve ensuring motorized traffic takes its place in the life of a commercial

street without dominating it. After all, many successful and vibrant commercial streets accommodate traffic as an important part of their makeup; the key in such situations is that the traffic does not exclude other users of the space. Traffic calming may also involve optimizing the operations of a major road, such that traffic capacity is maintained or enhanced, without precluding effective use of the space by other users.

Brindle and O'Brien (1999) have defined three levels of traffic calming:

- *Level I traffic calming*: results of actions to restrain traffic speed and lessen traffic impacts at a local level, where traffic volumes, levels of service, and network capacity are *not* an issue.
- *Level II traffic calming*: results of actions to restrain traffic speed and lessen traffic impacts on corridors and traffic routes (district or sub-arterial roads), where traffic volumes, levels of service, and network capacity are or may become an issue.
- *Level III traffic calming:* results of actions on a broader scale, to lessen traffic levels and impacts citywide. This brings traffic calming into the area of urban transport policy and away from its original singular focus on traffic management.

Level III traffic calming differs from Levels I and II not just in the matter of scale. At the citywide scale, a different kind of outcome is implied – not just *calming* but rather a *change in travel behavior*. While each of the levels can legitimately lay claim to the term traffic calming, the approach adopted for this study is confined to Levels I and II, as defined above. This has been done not through any assessment of the value of changes in the life of New York implied by strategies designed to achieve Level III traffic calming, but through a desire to confine the study's focus to strategies and underlying actions that can be implemented in a reasonable time within budgets and levels of support likely to be available. This conforms to the mainstream idea around the world of what constitutes practical traffic calming.

Brindle and O'Brien distinguish between those actions that concern engineering techniques and the physical environment from those that imply social and cultural change. They have used a classification matrix they call the "Darwin Matrix" (*Table 4.1*) consisting of three rows for the three levels described above and two columns. The first column covers measures instituted. The second column reflects social or attitudinal changes that may occur over a period, either spontaneously or by intervention, at the local or broader scale.

Table 4.1 Brindle and O'Brien's classification matrix

	Type of Measure	
Scope of measure	Physical/Environmental ('Techniques')	Social/Cultural/Attitudinal ('Ethos')
Local (street or neighborhood)	Level I traffic calming techniques: Speed and accident physical countermeasures; local area/neighborhood traffic management; Low-speed street design	Level I social change: neighborhood speed watch; community action; attitudinal change
Intermediate (zone, traffic corridor regional road)	Level II traffic calming techniques: environmentally-adapted through roads (Denmark); shared zones, lower-speed zones; pedestrianized retail precincts; bike lanes; transit lanes; corridors; precinct road pricing; parking policies	Level II social change: voluntary behavior change: mode choice, speed; acceptance of provisions for cyclists.
City-wide	Level III traffic calming techniques: travel demand management; transport system management; total system measures (fares policy, city-wide road pricing, bike systems, etc); manipulation of urban form and structure; parking policies	Level III social change: cultural change; cycling culture; loss of choice (e.g., energy constraints, significant drop in living standard); population decline; alternative futures

Source: Brindle and O'Brien (1999)

The second key element of traffic calming is the need to adopt an area-wide approach. This is informed by two issues:

- the need to see neighborhoods as systems; and
- the resulting need to follow a systematic planning approach when managing an area.

An area-wide plan for local area traffic management requires more than a catalog of traffic measures; an effective area-wide plan must be designed in a coordinated way. The adaptability of networks is well known to traffic engineers. It is no coincidence that average travel times from Hamilton Avenue (in the south of the study area) to the Brooklyn Bridge approaches (in the north) during the morning commuter peak are approximately the same by all routes. This phenomenon is demonstrated in *Figure 3.2*, which shows observed peak hour travel times. Drivers learn how to travel through an area as quickly as possible and experienced drivers quickly exploit a perceived shortcut so that an area's traffic demand is typically in equilibrium. Any change to traffic conditions modifies this equilibrium point, but not the certainty that equilibrium will occur. Accordingly, implementation of an isolated traffic calming treatment will act to alter traffic patterns; traffic volumes may diminish in the vicinity of the treatment, but only at the expense of streets that provide alternative routes.

In developing a traffic management scheme such as the Downtown Brooklyn Traffic Calming Project it is therefore critical to take account of the effects of physical treatments on travel decisions and driver route choice.

Regardless of the many benefits engineering-based traffic calming techniques can bring, sustainable cities will not be created through such techniques alone. The achievement of traffic calming at a citywide level requires widespread and fundamental changes in the community's attitudes to urban development, travel mode, and driver behavior. Traffic management at a significant level cannot lead social attitudes. Cultural change cannot be completed through traffic engineering alone.

A comprehensive planning approach may well lead to the conclusion that the proper solution to future traffic problems does not lie in engineering treatments, but rather in holistic planning and design. Traffic and roads are only one part of the urban system. At the very least, an attempt should be made to see problems and solutions in the context of the neighborhood as a functioning unit, not just as a site-specific traffic problem.

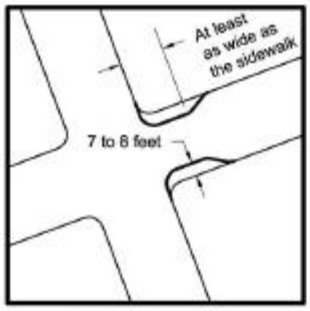
4.2 Integrated Traffic Management

Transportation planners and engineers have a range of tools available to them. Typical traffic calming tools are shown in *Figure 4.1*. Used properly, these and other tools may be integrated to yield an effective means of building and maintaining an efficient and effective transport system.

As in any toolbox, different tools serve different purposes. It is important that appropriate tools are used to address each transport management issue. A traffic calming tool can be used to address a number of the pressing transport issues confronting Downtown Brooklyn, but it is not appropriate for all issues. A number of legitimate transport-related issues were raised in the course of this study for which traffic calming is not the most appropriate tool. These are discussed, together with suggestions regarding appropriate means of addressing them, in *Appendix E* of this report.

However, a traffic calming plan and the integrated traffic management approach that such a plan implies can significantly improve the street environment and the travel experience for people in Downtown Brooklyn. Such a plan and approach are the focus of this study.

Figure 4.1 Typical traffic calming devices

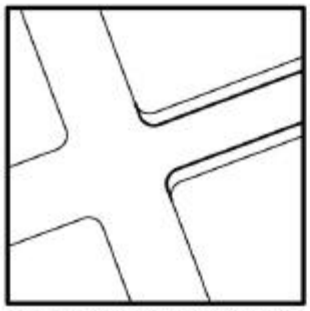


NECKDOWNS

A neckdown (also known as a curb extension) consists of a localized narrowing of the street achieved by widening the sidewalk. They may occur either at intersections or mid-block, and may include landscaping.

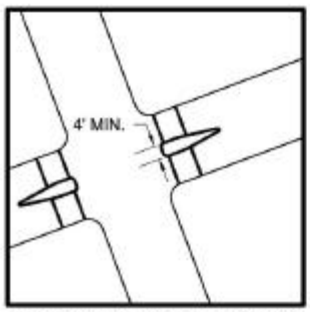
BUS BULB

A bus bulb consists of widening the sidewalk at a bus stop location so that buses remain in the travel lane when stopped at that bus stop.



ROADWAY NARROWING

Roadway narrowing involves the reduction of typical pavement width along a roadway. The narrowing can be achieved by removing a portion of the pavement width (typically by widening the sidewalk), or by using pavement markings to indicate narrow travel lanes.

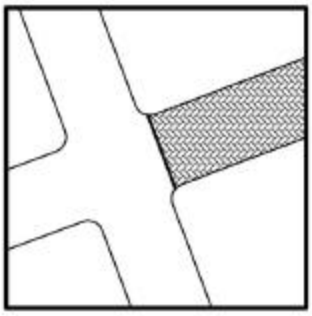


PEDESTRIAN REFUGES

Pedestrian refuges are small islands placed in the center of a two-way street. These islands separate opposing streams of traffic and allow pedestrians to cross the street in stages. They can also be used to narrow the travel lanes at the crossing location.

BIKE LANES

A designated on-street right-of-way that is delineated by pavement markings and signs. For bicycle lanes (Class II Bikeways) the Federal Highway Administration permits a minimum width of five feet when located adjacent to a curb or parking. In New York City, on-street lanes may be supplemented with an adjacent buffer zone to further define the separation of roadway use.

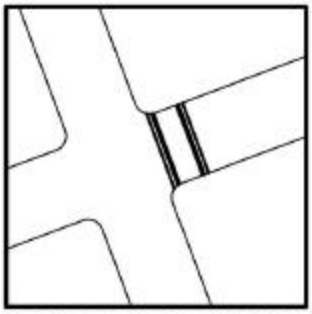


ROADWAY COLOR AND TEXTURE

Construction of roadway surfaces with materials that introduce surface texture to the roadway, such as paver stones, bricks, surface concrete patterns or stamped asphalt. Surface texture can create visual, vibratory and auditory effects. Texture can be utilized in a variety of applications, from treating entire streets, sidewalks or intersections to accenting and defining pedestrian crossing locations.

SPEED HUMP

A speed hump is a raised area in the roadway pavement extending across the road. Speed humps generally have a maximum height of 3 or 4 inches, with a travel length of 12 to 22 feet. The profile can be circular, parabolic or flat topped with sloping approaches. Longer, flat-topped speed humps are also known as speed tables, and may be combined with raised crosswalks

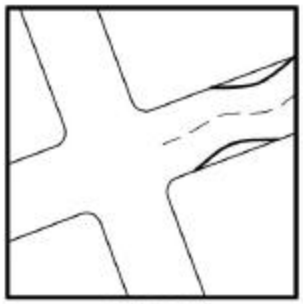


RAISED CROSSWALK

Raised crosswalks are constructed 2-4 inches above the normal roadway surface. Raised crosswalks are essentially flat-topped speed humps (speed tables). They are often constructed with concrete ramps and may also incorporate textured pavements in the crosswalk. Raised crosswalks can be placed mid-block or at intersections.

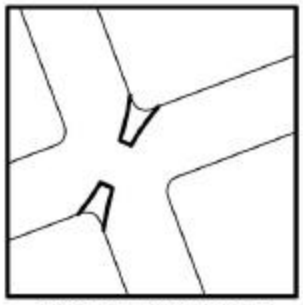
ROADWAY MEDIANS

A roadway median is defined as a raised island on the centerline of the street. A roadway median can include landscaping, space for pedestrian refuges and storage lanes for left turning vehicles.



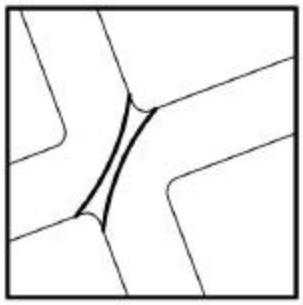
CHICANE

Chicanes introduce horizontal deflection by building out curb lines on alternating sides of the roadway. These built-out areas may be landscaped. A chicane-like effect can also be achieved by alternating on-street parking from one side of the street to another.



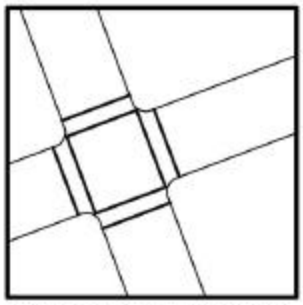
PARTIAL DIVERTER

A partial diverter consists of a curb extension or island that blocks one direction of travel at an intersection. It often includes landscaping and can be designed to retain bicycle access in both directions. Typically used on minor two-way streets.



DIAGONAL DIVERTER

Diagonal diverters consist of a physical barrier placed diagonally across an intersection, forcing all traffic to turn.

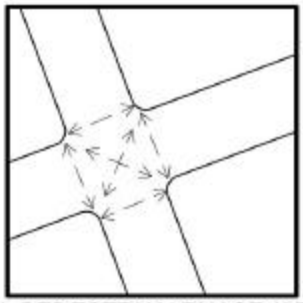


RAISED INTERSECTION

Raised intersections are flat raised areas covering entire intersections with ramps on all approaches. They typically rise to the sidewalk level or just below. Raised intersections are often constructed with textured pavement materials on the flat portion.

GATEWAY TREATMENT

Gateway treatments consist of a combination of physical traffic calming measures (such as curb extensions, raised crosswalks and textured surfaces) to create a threshold effect at entrances to streets and neighborhoods.



ALL PEDESTRIAN PHASE (APP)

An all-pedestrian phase (also known as Barnes Dance) is a signal phase that gives all vehicles a red indication, but gives all pedestrians a green "WALK" indication. It is used at intersections with heavy traffic in all directions to increase pedestrian visibility and confidence.

LEADING PEDESTRIAN INTERVAL (LPI)

A leading pedestrian interval is a signal phase that holds all vehicles at a red indication while giving pedestrians on at least one approach a green "WALK" indication. The vehicles are typically held for 5-10 seconds - just long enough for pedestrians to enter the crosswalk ahead of turning vehicles. Once pedestrians have begun crossing, vehicles on the parallel legs are given a green indication. LPIs are used at intersections with heavy traffic in at least one direction to increase pedestrian visibility and confidence.

Table 4.2 summarizes the traffic calming measures described in this report. It includes the primary objective of each measure, as well as a general assessment of suitability for use in the study area. More detailed descriptions of each measure are provided in the previous sections.

Table 4.2 Traffic calming measures and their suitability for Downtown Brooklyn

Traffic Calming Measure	***Primary Desired Impact***			***Generally Suitable for Downtown Brooklyn?***
	Lower Traffic Speed	*Lower Traffic Volume*	*Other (Pedestrian Safety, Street Environment, etc)*	
Physical Measures				
Speed Humps	X			X
Rumble Strips	X			
Speed Cushions	X			
Surface Texture	X			X
Raised Crosswalks	X		X	X
Traffic Circles	X			
Chicanes	X			
Street Narrowing	X		X	X
Curb Extensions (Neckdowns)			X	X
Gateway Treatments	X	X	X	X
Partial Diverters		X		
Diagonal Diverters		X		
Street Closures		X		
Median Barriers		X	X	
Roadway Medians			X	X
Pedestrian Refuges			X	X
Bicycle Lanes			X	X
Raised Intersections	X		X	X
Management Measures				
Signing and Striping	X	X	X	X
Traffic Signal Timing	X	X	X	X
Speed Enforcement	X			X
Safety Zones	X			X
Truck Restrictions		X		X
Street Direction		X		X
Educational Measures				
MUTCD-compliant Warning Signs	X			X
Road Safety Programs	X		X	X
Speed Watch Programs	X			X
School Safety Programs	X		X	X