City of Newton

Pedestrian Street Standards and Walkable Environments

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Comprehensive Planning Advisory Committee

Pedestrian Street Standards and Walkable Environments for the City of Newton

Walkable environments are an integral component of healthy neighborhoods and commercial areas. It is the intent of the CPAC planning process to promote pedestrian-friendly street environments, maintain safety standards, allow appropriate access for bicyclists, and facilitate a program of multi-modal transportation. To this effect, the Pedestrian Plan for Newton will work to enhance and preserve the City's neighborhoods while improving and diversifying the transportation system. By promoting pedestrian street standards, it is anticipated that more people will use transit or walking as their mode of transportation, thus reducing automobile use and vehicle miles traveled.

As part of the overall initiative to enhance its multimodal transportation system, the City of Newton will work to implement pedestrian street standards. The primary purpose of these standards is to foster a safe and pleasant environment for residents and pedestrians as well as to facilitate mobility for all transportation modes. By balancing the transportation system and encouraging pedestrian activity, pedestrian, bicyclist, and motor vehicle safety will be improved and residential and village areas will be beautified. The overall function, comfort, and safety of a multi-purpose pedestrian friendly street are more important than its vehicular efficiency alone. Pedestrian friendly streets can help reduce the amount of through traffic on Newton's streets by both slowing and dispersing vehicular traffic. By providing superior pedestrian-friendly access to commercial and recreational destinations, it is anticipated that this plan can help reduce the amount of vehicle miles and overall vehicle trips traveled by 15%.

Overview

Concepts of Pedestrian-Oriented Street Design

- Enhance pedestrian accommodations
- Reduce cut-through traffic on residential streets
- Develop traffic calming options
- Improve options for walking to school
- Limit expansion of existing roads and turning lanes
- Make permit approval subject to streetscape principles

The City of Newton recognizes that streets are not just channels for vehicular movement, but that they are among the most prevalent of public spaces. In advocating for good street design, it is the intention of the City to consider its streets as "places," recognizing that streets are among our most vital public commodities. In the last half of the 20th century, street design standards have emphasized automobiles. In its Comprehensive Plan, the City will endorse measures that introduce human-scale design in its streets and provide a variety of transportation choices. Street design standards will emphasize the role of pedestrians and other non-motorized uses on streets, in addition to vehicular traffic. It is recognized that a comfortable, convenient, and safe street environment is necessary to

encourage non-motorized travel on our streets, and efforts must be undertaken to make walking safer and more convenient.

In many communities, existing street standards are based on provisions of state highway manuals. These highway provisions, when applied to neighborhoods and historic villages, can result in an increase in traffic and an increase in automobile speeds, both of which have been shown to result in adverse safety consequences. In addition, streets that are unnecessarily wide represent a wasteful use of land. The City of Newton supports street standards that are adapted to the local context in which they are applied in Newton's villages and neighborhoods. A specific goal of the Comprehensive Plan is to maintain the City's roadways within the character of Newton's neighborhoods while taking measures to reduce inappropriate and unsafe behaviors such as speeding. It is important that streets in Newton meet the needs of all parties, including residential abutters and commercial interests in village centers, while fulfilling multimodal transportation needs, including those of automobile drivers, bicyclists, and pedestrians.

Goals of Pedestrian Street Standards

The following is a list of the major goals that are intended as part of the Pedestrian Street Standards and Walkable Environments plan.

- Enhance and improve pedestrian safety and comfort
- Promote pedestrian and other non-auto modes of travel
- Balance street design to de-emphasize vehicular travel
- Encourage vehicle speeds and volumes appropriate for context sensitive design
- Preserve density and streetscapes of village centers and commercial corridors
- Encourage on-street parking and enhance its supply
- Beautify neighborhoods and village centers with street trees and landscaping
- Increase desirability of neighborhoods by reducing traffic speeds and volumes
- Improve streetscapes to foster opportunities for social and civic interaction

It is the intention of the pedestrian street standards to lead to improved civic life, community vitality, and personal interaction on Newton's diverse roadways. In residential areas, design speeds of roadways should be under 25 mph and residential streets should encourage only neighborhood traffic. The reduced scope of roadway design will not affect housing density or adversely affect access to commercial zones. By improving the City's streetscape, economic activity and vitality will increase. Traffic calming measures and the provision of additional on-street parking will enhance the attractiveness of Newton's villages for shopping and mingling, which will lead to direct gains for business owners. These pedestrian standards are entirely compatible with appropriate possible future development and increased residential density in our village centers. A pedestrian-oriented street system can provide the foundation for future mobility, commerce, community, and recreation.

The process of implementing pedestrian street standards should be accomplished in a cost-effective manner, such that existing businesses and residential neighborhoods are not

adversely affected. By articulating a set of city-wide pedestrian street standards, the City of Newton intends to outline a set of principles that will reduce any undue delay for potential developers. For developers who are in compliance with the standards, the project review process will be simplified and design costs will be reduced. Traffic management in areas where pedestrian standards are implemented will be self-enforcing, as there will be geometric and visual cues that will enable drivers to follow recommended speeds and roadway rules. These standards are intended to be compatible with the overall land use goals of the City and with both residential and commercial property owners.

Basic Definitions:

American with Disabilities Act (ADA): The City will rigorously pursue measures to meet the requirements for accessibility for disabled persons, as per the Federal legislation passed in 1990.

Arterial Street: Newton's system of primary arterials (designed to carry traffic between destinations) and secondary arterials (designed to carry traffic to local destinations) should have continuous pedestrian amenities. This includes roadways that are considered "Main Streets," because they pass through village centers.

Boulevards: These are considered as multi-lane roads, with travel lanes often separated by a center island. Pedestrian sidewalks should be provided on all boulevards.

Crosswalks: In areas of significant pedestrian traffic, a portion of the roadway should be marked for pedestrian crossing. Crosswalks should be a natural extension of the sidewalk or curb line.

Curb radius: The curved edge joining intersecting street curbs at a street corner is known as the curb radius. Whenever possible, the curb radius should be kept low so as to slow and calm traffic.

Local streets: These are primarily in residential neighborhoods and are designed for local access to residential property. Continuous sidewalks may not be necessary on this type of roadway, as traffic volumes and speeds are often low.

Street Standards and Roadway Typology

Generally, pedestrian comfort will be greater on streets that are relatively narrow and in neighborhoods where traffic moves slowly. In village centers, wide sidewalks which are separated from the flow of moving traffic by a row of trees or by parked cars can lead to a sense of enhanced pedestrian security. A further sense of comfort and enclosure is provided by buildings with permeable entrances and windows that front the sidewalk, with no separation between the building's façade and the sidewalk.

Alleys and Private Roads (including roads within new developments)

Based on fire codes, the minimum width of a two-way street should be 20 feet, even though the Urban Land Institute (2002) suggests that an 18-foot wide pavement is adequate for low-volume streets where no parking is expected. The widest fire truck is approximately 10 feet wide (including side mirrors). Therefore, a one-way alley with no parking should have a minimum width of 12 feet, with a shoulder 3 feet wide. If parking is to be included, the minimum width of a travel lane of (9 feet) can be added to the width of the parking lane (7 feet) and a shoulder on the alternate side of the road (4 feet), for a total width of 20 feet. To encourage pedestrian use and safety, the maximum width of such routes should be maintained such that it is no greater than the standards noted above. Design speeds should be no more than 10 mph.

On alleys and private roads, because of their low traffic volume and reduced right-of-way, sidewalks may not be necessary. However, in some cases, a sidewalk on one side may be sufficient. A minimum sidewalk width of 5 feet with a planting strip of 6 feet between the sidewalk and the street is encouraged. Generally, a 6 feet wide planting strip is recommended to provide adequate space for trees, although a berm as little as a 2 feet wide may be adequate room between the sidewalk and the curb. Curbs are rarely needed on alleys or private roads. These types of standards, along with minimal front setbacks to houses, will encourage neighborhoods and new developments to be both more affordable and pedestrian friendly.

Local Streets (Residential Streets)

In most cases, local streets are primarily those intended to serve residential neighborhoods and have traffic counts less than 750 ADT. Design speeds on residential streets should be no more than 15 mph. On any routes that are designated as "Safe Routes to School" or access routes to transit nodes or villages, sidewalks are recommended on both sides of the street. (Refer to **Primary Pedestrian Routes** map). Otherwise, sidewalks on one side may be sufficient, especially on low-volume, low-density residential streets. A pedestrian-friendly street will have travel lanes no more than 10 feet wide. If a high volume of on-street parking is expected, parking lanes of 7 feet each may be included. Travel lanes that are 8 feet wide, with parking lanes that are 6 feet wide are acceptable on low volume streets. On streets where there is intermittent on-street parking, or where the maintenance of on-street parking is vital (such as near village centers), a roadway width of 24-26 feet is acceptable, which includes parking on both sides.

On short residential streets, a "yield-flow" traffic operation may be permitted, such that there is one lane of travel with two sides of parking possible at any given time. In these cases, a travel lane as narrow as 12 feet with two parking lanes of 7 feet each may suffice, even though the street is intended to allow two-way travel. A minimum sidewalk width of 5 feet is desired. In cases where the right-of-way allows it, a planting strip for trees that is 3-6 feet wide should be considered as a component. Trees should be planted in continuous areas, with the planter width and tree spacing determined by the canopy

requirements of the tree species, and depending on the character of the residential neighborhood.

In general, pedestrian-friendly streets are those that connect between neighborhoods and with other streets. Dead-end streets are not encouraged. A good street network should provide at lest two directional routes of access to any property. However, some local streets may end in cul-de-sacs or turnarounds. In these cases, it is important to maintain an adequate pavement width to allow emergency vehicles and others enough room to turn around. It is equally important to keep the pavement width at a minimum, so as to increase pedestrian safety and the local ambiance of these neighborhoods. Therefore, it is recommended that a turning radius of 30 feet be employed in cul-de-sacs without a center island. With that type of radius, some backing-up may be required by drivers of large SUVs (sports utility vehicles). If regular use of the cul-de-sac by school buses or service vehicles is anticipated, a 42-foot radius may be necessary. In cases where there is a center island, a turning radius of 45 feet is preferable, with 20 feet wide travel lanes that bulge to 24 feet wide at the end of the circle. Another alternative for a dead-end street is the T or Y-shaped ending. These types of endings have lower construction costs and result in a paved area only 43% of that of the smallest 30-foot radius cul-de-sac, but they require backing-up movements by drivers.

Primary and Secondary Arterials, including Village "Main Streets"

Arterial streets are often the primary routes between villages and also between residential neighborhoods and village centers and transit nodes. Primary arterials often carry more than 10,000 vehicles per day, whereas secondary arterials usually carry between 4000 and 10,000 vehicles per day. In village centers, these routes take on a "Main Streets" design, and service commercial and mixed-use buildings. Design speeds should be no more than 20 mph in village corridors and 25 mph in residential zones. When related to stopping sight distances on wet pavement, a 20 mph design speed correlates to a distance of 125 feet, and a 25 mph design speed correlates to a distance of 150 feet.

In village centers, arterial streets are intended for slow-moving traffic and they provide frontage for moderate density buildings. Small-scale commercial uses are mixed with moderate density buildings that may include residential and office space. As such, it is vital that Newton's primary and secondary arterials are pedestrian-friendly and promote a safe and comfortable environment for walking. In villages, traffic calming measures (such as "bulb-outs" and raised crosswalks at intersections) should be considered, and on-street parking becomes an important parameter. Because of the multiple needs of the roadway, including those of wide sidewalks for pedestrians and on-street parking for commercial interests, bicycle accommodations may often be provided as part of a "Share the Road" policy, with safe and prominent storage facilities located in villages and near key transit nodes.

Arterial streets should have a travel lane width of 11 feet – 12 feet. In areas where on-street parking is anticipated, a parking lane that is 7 feet wide should be planned. Therefore, in village centers, an ideal width for an arterial route would be 36-38 feet. This

would include travel lanes that are 10-feet wide and two parallel parking lanes that are 8 feet wide. However, in some village corridors, streets as narrow as 32 feet can accommodate cars in two 9-foot travel lanes and parking on both sides in two 7-foot lanes. Another possible configuration is a street that has two 11 foot travel lanes with two 6 foot parking lanes, for a total of 34 feet curb-to-curb. These narrower streets will be marked by slow vehicle movement, a design speed of 20 mph, and in most cases are not expected to carry more than 1500 ADT per day. On such a narrower street, it may be perfectly acceptable for an oversized vehicle to cross the centerline of a street when making a right turn.

Sidewalks and on-street parking should be found on both sides of the street in village centers. In addition, a minimum sidewalk width of 5 feet should be included in residential areas. A planting strip for trees should be planned for between the curb and the sidewalk. This may range in width from 3 feet to 6 feet. Where sidewalks enter the village center, and where they front higher-density mixed-use buildings or important civic spaces, a minimum sidewalk width of 10-12 feet is desired, which may include grates for street trees. Street trees may be planted in 3 feet by 3 feet grates. Usually, a single species of tree is planted in a continuous alignment and trees may be confined in individual planters so as to create a sidewalk of maximum width. Trees should have clear trunks and high canopies so that their leaves and branches avoid shopfronts, signage, and awnings, with a clear area up to about 8 feet above the ground. Near an intersection, it is appropriate to position trees about 10-15 feet away, such that the minimum intersection sight triangle is 10 feet.

Boulevards

A boulevard is considered a special street that often includes a center-island median. In Newton, the primary boulevard is Commonwealth Avenue. In addition to the center island, which should be a minimum of 12 feet wide, a boulevard will include travel lanes that are 10-15 feet wide. If parking is included, a parking lane that is 7-8 feet wide is desired. Because these streets are often considered medium-distance roads with free traffic flow, the average design speed is 30 mph. This correlates to a stopping sight distance of 200 feet on wet pavement. Boulevards should include sidewalks that are 5-6 feet wide, as well as a planting strip that is 3-6 feet wide. Street trees should be planted in continuous planting strips, with spacing determined by the canopies of the particular species. On Commonwealth Avenue, bicycle accommodations are included on both sides, with the eastbound bicycle lane located in the shoulder of the travel lane, and the westbound bicycle lane located in the Carriage lane.

Primary Pedestrian Routes and “Safe Routes to School”

Pedestrians should expect to have a safe and well-maintained streetscape at and between all key locations in the City of Newton. These key locations include major employment centers, villages, transit nodes, public buildings, and schools. Although it is the goal of the pedestrian access plan to promote and maintain unobstructed sidewalks throughout all of Newton’s residential neighborhoods, the City will prioritize maintenance and upkeep of certain strategic routes that are considered the most essential. A map

attached at the end of this summary shows these routes (refer to ***Primary Pedestrian Routes*** map). These routes will be the first to be cleaned in the winter after snowstorms, and there will be no obstructions allowed that may impede pedestrian flow. In addition to cleaning and shoveling snow on Primary Pedestrian Routes during the winter, Newton's maintenance vehicles will insure that ramps for wheelchairs and strollers are unobstructed at intersections along these routes.

The intention of having a "Primary Pedestrian Routes" plan is to improve the pedestrian environment so that Newton's neighborhoods, villages, and other centers of activity are made more walkable. As such, a pedestrian system of routes should consist of an interconnected and continuous assembly of sidewalks connecting nodes of activity. It is especially important that any new development is integrated into existing neighborhoods with pedestrian connections. Also, direct pedestrian access to transit should be provided so that both new and existing neighborhoods have the most efficient access to transit stations and routes. Finally, on all of Newton's streets and in all of the City's neighborhoods, an aggressive program to improve access for persons with disabilities must be implemented, in accordance with the Americans with Disabilities Act (ADA).

As part of its "Primary Pedestrian Routes" plan, Newton will endorse a "Safe Routes to School" system of pedestrian access for students, parents, and staff. The goal is to improve safety and reduce traffic congestion related to Newton's schools. This will be accomplished by creating a more efficient school transportation system that includes walking and bicycle use as alternatives to car use. The "Safe Routes to School" concept includes a complete system of sidewalk connections around schools in a 1/2 mile radius, so as to facilitate safe travel by foot and to reduce the number of automobile drop-offs. Within this 1/2 mile radius, traffic calming measures may also be implemented where there is a need, which will reduce the speed of traffic and increase safety for pedestrians. In addition to pedestrian improvements, designated school bus stops will be identified and marked with clear signage, and consideration will be given to increasing the number of stops and expanding service with more routes through neighborhoods. The "Safe Routes to School" program also endorses the concept of shared walking responsibilities for parents with younger children, which will decrease rides to school and improve safety along these routes. The "Safe Routes to School" are identified on the map of "Primary Pedestrian Routes."

Street Design Measures that Enhance Pedestrian Accommodation

The geometry of roadways can determine whether a street encourages pedestrian activity. Streets that are more pedestrian-friendly are those with lower curb radii at intersections and those which de-emphasize turning lanes. Intersections can be designed to improve pedestrian comfort, and wide sidewalks and direct pedestrian connections can make walking a more safe, efficient, and pleasant activity.

Newton has many older streets that would be considered "narrow" by late 20-th century highway standards. However, these streets are often considered charming and historic, adding to the ambiance of Newton's landscape. The City of Newton supports efforts to preserve the character of its streets in its villages and residential neighborhoods. Also, to improve safety and reduce excess traffic volumes and speeds, the City of Newton supports the concept of traffic calming as a way to achieve these goals.

Curb radius

An adequate curb-radius is important so that vehicles can negotiate intersections and turning movements without bumping into the curb. However, as the curb radius increases, higher vehicle speeds are encouraged and the distance a pedestrian has to cross the intersection increases. When the curb radius is excessive, drivers can make turns at excessive and unsafe speeds. At intersections where a curb radius is 30 feet or more, the likelihood of a vehicle stopping decreases, and the vehicle has a "free right turn," or continuous turning movement.

Regardless of the type of street, it is important to maintain pedestrian-friendly curb radii in order to make the environment as conducive to walking as possible. As part of this effort, the City of Newton will encourage the lowest possible curb radii on its streets. The goal of having reduced curb radii is to exert a calming effect on traffic speeds, especially when cars negotiate intersections, while maintaining adequate access and capacity at key intersections. In cases where there is a known predominance of commercial traffic, such as on streets that provide access to industrial land uses, the City Engineer may deem that a larger curb radius is necessary. However, in most cases, a curb radius on local streets should not exceed 15 feet. On most residential streets, a curb radius of 5 feet is entirely acceptable. On arterial streets, the curb radius should not exceed 25 feet. Curb radii exceeding 30 feet should only be required where there is frequent truck turning, such as at industrial facilities.

Turning lanes

In general, turning lanes of excessive length will degrade the pedestrian environment. By increasing automobile capacity, turning lanes can potentially induce further traffic and thereby lead to worsening traffic congestion and air pollution. When turning lanes are combined with excessively large curb radii, unsafe vehicle speeds can result, which can degrade pedestrian safety. Having turning lanes will increase curb to curb crosswalk distances and make intersections more inhospitable for pedestrians, wheelchairs and carriages, and bicyclists.

The City of Newton supports measures to limit turning lanes. Where turning lanes are deemed necessary to preserve traffic flow and present-day vehicle capacity, they should be no longer than about 4 car lengths (about 80 feet). In village centers, consideration should be given to eliminating turning lanes and building bulb-outs, raised sidewalks, and other traffic calming measures. In contrast to turning lanes, bulb-outs and raised

crosswalks extend the pedestrian realm into the intersection and reduce the distance to cross the road, thereby improving pedestrian safety.

Sidewalks and Pedestrian Connections

As indicated above, sidewalks are necessary on all arterial streets, as they traverse residential and village areas. Sidewalks are also necessary on all residential streets that provide direct access between village centers, provide connections to transit, or are designated as "safe routes to school." On low-density residential streets, sidewalks may be on located on just one side of the street, and short and narrow private rights-of-way (alleys and internal private roads within developments) may not require sidewalks. Any new property that is adjacent to a public street must include pedestrian access in the form of public sidewalks. Private complexes that incorporate multiple dwellings must also include an internal sidewalk system for pedestrian access. Since pedestrians like to follow the shortest path possible, developments must provide pedestrian connections from several ends of the development to the public sidewalk system, and not just from one egress point. Sidewalk systems must be constructed in accordance with requirements of the Americans with Disabilities Act (ADA).

Pedestrian Standards and Street Widths (The Issue of Historic, Narrow Streets)

Pedestrian standards and street width parameters must take into account the safety, function, and performance of the roadway. In many cases, wide automobile pavement widths and excessively large turning radii at intersections are not necessary and may instead reduce safety to pedestrians. It is important to recognize that the width of an average car, van, or SUV (sports utility vehicle) is only about 5 1/2 to 61/2 feet wide. Even garbage trucks and school buses are rarely more than 7 feet wide. A standard fire truck is 8 feet wide, which is increased to 10 feet wide when its mirrors are included. These measures are important to consider in situations where a historic roadway is being reconstructed and where the goal is to foster a safe and pleasant pedestrian environment.

Many of Newton's residential streets, as well as some streets which are adjacent to village centers and commercial areas, are 24 feet – 26 feet in width. These are streets that have historically fostered safe and pleasant walkable environments, and have maintained our villages as centers of pedestrian activity. They have served multiple uses, including the obvious provision of automobile access to neighborhoods and villages, as well as allowing on-street parking. It is the intention of the City of Newton to maintain these roadways in their historical configuration as much as possible, encouraging pedestrian use, maintaining safety, and promoting quality of place.

The design and current use of these streets is entirely consistent with current concepts of context-sensitive transportation engineering and design. In the American Association of State Highway Engineer's manual, "A Policy on Geometric Design of Highways and Streets," it is written that in certain residential neighborhoods, it is acceptable and safe to have streets that, at times, provide only one unobstructed lane of traffic. "On residential streets in areas where the primary function is to provide land service and foster a safe and

pleasing environment, at least one unobstructed moving lane must be ensured even where parking occurs on both sides. The level of [automobile] user inconvenience occasioned by the lack of two moving lanes is remarkably low in areas where single-family units prevail" (AASHTO Green Book, p. 431, 1994). The Institute of Transportation Engineers also supports the concept of narrow streets with a pedestrian oriented and context sensitive design. "On [narrow] streets, with intermittent on-street parking, the street's width may occasionally require one driver to slow down or pull over to let an oncoming vehicle pass before proceeding, particularly if one of the vehicles is a truck or other large vehicle. From the designer's perspective, where volumes are low and large vehicles are few, one may actually only need a single, relative clear or through lane" (Institute of Traffic Engineers, 1999).

Several studies support the safety of streets that are relatively narrow, similar to those that are found throughout Newton. A study of fire trucks and suitability of access of residential streets in Winter Park, Florida confirmed the safety of relatively narrow streets for emergency vehicles. Winter Park Fire Department trucks are 9.5 feet wide (from mirror to mirror). In the study, fire fighters were asked to consider twenty of Winter Park's narrowest streets, which included streets as narrow as 16 feet wide with parking on one side. Other streets with parking on both sides had street widths of 22-24 feet. The Winter Park Fire Department officials assured the study sponsors that they could navigate any street in the city" (Burden et al, 2002). Work done by the Urban Land Institute confirms these observations. "The most confining street situation for emergency vehicles is the local street with cars parked on both sides. The parked cars occupy 13 to 14 feet of the roadway, leaving 10 to 13 feet for the passage of emergency vehicles, even on a minimal 24 to 26 feet wide street. The maximum width of a standard fire truck is 8 feet, excluding mirrors. Thus, even with parked vehicles present on both sides of a local street, a standard fire truck can freely negotiate the street (Urban Land Institute, 2001).

Traffic calming measures

According to the Institute of Traffic Engineers, traffic calming involves changes in the geometry of roadways to reduce vehicle speeds, decrease cut-through volumes, and improve safety and livability in neighborhoods. Because traffic calming can enhance the quality of life for Newton's residents and in village centers, the City of Newton endorses the concept of traffic calming where it is appropriate. Traffic calming can reduce the negative effects of motor vehicle use and improve the pedestrian environment. As a result, traffic calming may yield both safety benefits and improve the economic vitality of our villages.

Traffic calming measures serve a dual purpose by increasing the safety of our roadways for motorists and non-motorists, while creating an environment more conducive and comfortable for walking and bicycle riding. In general, traffic calming measures include those that either slow down the speed of traffic or those which divert traffic away from areas where heavy volume is undesired. The anticipated result of traffic calming is a decrease in driving speeds and an increase in attention on the part of drivers. This leads to lower instances of speeding, decreased traffic volumes, reduced severity of collisions, a

reduced need for law enforcement, improved safety for pedestrians and bicycles, and improved access for all modes of travel. Examples of areas where traffic calming may provide the greatest benefits include:

- Village centers, where pedestrians need to have priority at crosswalks
- Residential neighborhoods, where speeding cars cause safety hazards
- Major intersections, where automobile-pedestrian conflicts can occur
- Local streets, where cut-through traffic can degrade the quality of life
- Poorly defined roadways, where better definition can improve safety

Many different types of traffic calming measures exist, each of which could be appropriate depending on the environment and the impact desired. A short list of definitions is included in Appendix A.

General Pedestrian and Streetscape Principles

By following a well-delineated outline of simple principles, Newton's streets can be made more pedestrian friendly and fulfill the goal that streets can be made into great public spaces. The City of Newton endorses street design that allows for more multimodal use and enhanced safety for pedestrians, transit users, and bicyclists. In addition, the City of Newton supports efforts to improve the aesthetics of our streetscapes. The following general principles are encouraged in street design:

1) Streets should be no wider than the minimum width needed to accommodate the typical vehicular mix the street will serve. Where possible, travel lane widths of residential and arterials roads should be reduced.
2) Streetscapes should be designed for multimodal use, and encourage use by people who are biking, walking, or using transit.
3) In new developments, cul-de-sacs and dead end streets should be discouraged, as they hinder connectivity. In cases where automobile cut-through is undesirable, pedestrian connections should be maintained.
4) All streets should have vertical curbs, except those adjacent to certain natural or historic settings. Curbs promote safety and comfort of pedestrians by distinguishing the space for automobiles from that of those walking on sidewalks.
5) On most streets, a separated sidewalk should exist. Rolled curbs should be eliminated. Sidewalks should be at least 5 feet wide in residential areas and 10 feet wide in commercial or mixed-use zones.
6) All overhead wires and clutter from utilities should be removed from streets when reconstruction occurs as part of the natural life cycle of the roadway. Utilities that are within the right of way may cross under the pavement, but may only run longitudinally under the pavement provided that future utility stub-outs are installed prior to paving.
7) In general, more frequent lighting that is shorter in height is preferable to taller, high-intensity lighting that is spaced further apart. The scale of the lighting fixtures and the illumination provided must be appropriate for both pedestrian and vehicular movements.

8) Street trees should be planted and maintained as part of every street improvement project. Trees are recognized for their traffic calming effects, as well as for their aesthetic and environmental benefits.

By following these simple principles, the City of Newton can achieve the goal of improving pedestrian accommodations and fostering a safe and pleasant environment on its streets. Along with the other recommendations in this plan, it is hoped that the City's pedestrian friendly efforts will result in an increased number of people walking and an overall reduction in the amount of vehicle trips made by residents and visitors to the City.

The City of Newton recognizes that creating and maintaining pedestrian friendly streets is a long-term process. Opportunities for streetscape improvement occur infrequently, and usually only when a major roadway reconstruction project is programmed to happen. It will also be important to encourage and require that new developments include major streetscape improvements that concur with the City's pedestrian plan. In order to maintain and enhance the walkable environments that Newton values, it will be especially important to implement pedestrian friendly design as our villages and major corridors change and develop over time. As such, a further description of desired streetscapes for Newton's villages and the Needham Street corridor is included in Appendix B.

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Appendix A

Traffic Calming Measures

Traffic calming involves slowing or reducing automobile traffic to improve safety and to enhance the livability of the environment adjacent to a roadway. By compelling drivers to slow down, the negative effects of motor vehicle use can be reduced and conditions can be improved for pedestrians and bicyclists. Two primary techniques are used in traffic calming: those that primarily reduce speed and those that primarily divert or reduce traffic volumes.

Speed control techniques can be used to decrease vehicle speeds and volume reduction techniques are designed to reduce cut-through traffic. However, there is often an overlap in the results of both measures, because they can both simultaneously slow traffic and reduce volumes. As a result, roadway safety improves and the number of collisions will decrease. In most cases, traffic calming involves changes in the roadway geometry or street alignment, as outlined below.

Techniques that primarily reduce speed (speed control measures):

1) Speed humps: Speed humps are rounded and raised areas placed across a roadway. They are usually 3"-4" high, and are tapered at the curb to allow drainage. Speed humps are designed to reduce speeds, are compatible with bicycle use, and are inexpensive. However, they can cause jarring for automobile drivers and can slow large vehicles and trucks. Also, they may cause increased noise and air pollution.

   Results: About a 20% decrease in speed (from 35 mph to 27 mph) and about an 11% decrease in accidents (from 2.7 to 2.4 accidents per year). These figures are for a 12-foot long speed hump.

2) Speed tables: Speed tables are flat-topped speed humps that are often constructed of brick or other textured materials on their flat section. On a speed table, the ramps are often more gently sloped than on a speed hump, and the entire wheel-base of the vehicle can rest on the flat section. They are smoother to drive over than speed humps and can reduce speeds, although not as much as speed humps. They are often more expensive than speed humps, and may increase noise and pollution by causing vehicles to slow down and then accelerate.

   Results: About an 18% decrease in speeds (from 36.7 mph to 30.1 mph), and a 45% decrease in accidents (6.7 to 3.7 per year). These figures are for a 22-foot long speed table.

3) Raised crosswalks: These are basically speed tables which serve as crosswalks at pedestrian crossings. By raising the level of the crossing, the crosswalk is more

apparent to motorists, causing cars to slow down. Therefore, raised crosswalks improve safety for both pedestrians and vehicles. In addition, raised crosswalks can enhance aesthetics at an intersection. They may also increase noise and pollution. For visually impaired individuals, it is recommended that a small lip or curb be placed on entry to the raised crosswalk, so as to define the street edges for the individual.

Results: The same as for speed tables – an 18% decrease in speeds (36.7 mph to 30.1 mph) and a 45% decrease in accidents (6.7 to 3.7 per year). Again, this is for a 22-foot speed table, which is similar to a raised crosswalk.

4) Raised intersections: A raised intersections consists of a flat raised area which covers an entire intersection. A sloped incline exists on all sides, usually raising the roadway to the level of the sidewalk. Textured material is often utilized. These are implemented in areas of substantial pedestrian activity. They can improve safety for both pedestrians and vehicles, will slow traffic on two streets at once, and may improve aesthetics.

   Results: Speeds are reduced slightly, averaging about 1% (from 34.6 to 34.3 mph). Impacts on drainage need to be considered, and a small lip needs to be created to distinguish the intersection from the sidewalk for the visually impaired.

5) Textured pavements: Types of textured pavements include those made of brick, paving stones, and cobblestones. They create an uneven surface for vehicles, causing them to slow down. However, depending on the material, their uneven surface may also make them difficult for bicycles, carriages, wheelchairs, and even pedestrians to utilize. They can also be noisy.

   Results: Textured pavements can reduce speed and can add visual diversity which improves aesthetics. However, they can be difficult for wheelchair users and other impaired individuals.

6) Traffic circles: Traffic circles are raised islands in intersections which force traffic to circulate around them. They can slow traffic and reduce traffic volume while improving safety in areas where large traffic volumes are not expected. However, they can be difficult for large vehicles to navigate and may require additional maintenance, such as landscaping. Also, they may cause cars to encroach on the adjacent sidewalk at intersections and may result in a loss of on-street parking.

   Results: Traffic circles lead to an 11% decrease in vehicle speeds (34.1 to 30.2 mph) and a significant 27% decrease in accidents (5.9 to 4.2 accidents per year).

7) Roundabouts: Often called rotaries, these are much larger than traffic circles and require the entire flow of traffic to circulate counterclockwise around a center island. These are used at high-volume intersections. They can moderate traffic

speeds at an intersection and have been shown to be safer than traffic signals. At moderate traffic volumes, they can minimize vehicle delays at intersections and are less expensive than signals. However, they may by difficult for larger vehicles to navigate and they may cause the removal of on-street parking and an encroachment of the roadway into sidewalk areas.

Results: Roundabouts lead to a 29% reduction in accidents (9.3 to 5.9 accidents per year). However, they may lead to higher vehicle speeds and decrease pedestrian safety if poorly designed.

8) Chicanes: This type of traffic calming involves converting a straight-away road into a curved S-shaped roadway by causing traffic to twist around an extended curb. Chicanes can also be created by alternating on-street parking from one side of the road to another. By causing traffic to deviate on the otherwise straight roadway, chicanes reduce vehicular speeds. In contrast to speed humps, they do not cause increased noise and are relatively easy to maneuver by trucks. However, they must be designed so that drivers do not cross the center-line, and curb realignment can be costly. A loss of on-street parking may also result.

   Results: No data has been compiled on the effects of chicanes on traffic.

9) Realigned intersections: This involves turning an intersection to create a curve so that traffic slows down as it either approaches or as it negotiates the turn. These can be used in T-intersections and can be effective in reducing speeds and improving safety. However, they may require loss of part of an adjacent sidewalk or property, in order to achieve the desired deflection in the road.

   Results: No data has been compiled on the effects of realigned T intersections on traffic.

10) Neckdowns: These are also called bulb-outs or “intersection narrowings.” Neckdowns involve reducing roadway width from curb to curb, shortening pedestrian crosswalks and reducing curb radii at the corners of intersections. They are effective in reducing speeds at intersections with substantial pedestrian activity and improve the realm of the pedestrian. They reduce speeds for right-turning vehicles while allowing unimpeded left turning movements. They can also be used to delineate on-street parking spaces, but may result in the loss of the parking space adjacent to the intersection. Also, they may force bicyclists to merge into the traffic lane at an intersection.

    Results: Neckdowns lead to a 4% decrease in traffic speeds (34.9 mph to 32.3 mph).

11) Medians and Center Island Narrowings: Medians can be placed to narrow a wide roadway, thereby reducing speeds and improving pedestrian safety. Also, they can be landscaped to provide green space in the roadway. When a crosswalk is

delineated in a center island or median, it can serve as a place of pedestrian refuge. Strategically placed medians can result in reduced traffic volumes. However, medians can lead to a loss of on-street parking.

Results: The figures for neckdowns apply – an average 4% decrease in speeds (from 34.9 mph to 32.3 mph).

12) Chokers and Mid-block Narrowings: A choker is a curb extension in a mid-block location that narrows the road while maintaining the straight-away. They result in a loss of on-street parking, but can reduce vehicle speeds and lead to lower traffic volumes. Chokers can be easily negotiated by large vehicles and trucks, since the travel lane is not reduced in width. However, a choker may force bicyclists to merge into traffic.

Results: The figures for neckdowns apply – an average 4% decrease in speeds (from 34.9 mph to 32.3 mph).

13) Other speed control measures: Intersection jiggle bumps, hammerhead islands, and angle point chicanes are alternative methods to slow traffic, narrow a roadway, or to divert fast-flowing traffic. Other examples of speed reduction devices include the "Lateral Shift," which is a chicane that deviates once and does not return to the original centerline, the "Split Median," which creates a median just at an intersection, the "Median Choker," which puts a median and an extended curb at an intersection, and the "Half Circle," which deviates traffic on only one side of a roadway at an intersection.

Techniques that primarily divert traffic (volume control measures)

1) Full closures: This involves closing a street to vehicular traffic while maintaining a pedestrian and bicycle connection. Often, barriers are placed in the middle of the roadway. This is an extreme measure that requires legal action and that may cause circuitous traffic patterns in neighborhoods. However, closures can result in a major decrease in traffic volumes.

Results: There is an average 44% decrease in traffic volumes resulting from a street closure.

2) Median barriers: These are islands in the middle of a street than continue through an intersection, preventing through movement of vehicles that would otherwise cross the road. They can improve safety by preventing dangerous turning movements and reduce cut-through traffic where it is desired. However, they also limit access for local residents and for emergency vehicles.

Results: Median barriers result in an average 31% decrease in traffic volumes.

3) Half closures: These are barriers that block travel in one direction on an otherwise two-way street, while allowing pedestrian and bicycle access. However, they may pose an impediment to emergency vehicles and they can result in circuitous routes for local residents. Also, drivers can illegally circumvent the barrier.

   Results: Half closures have been associated with a 42% decrease in traffic volumes.

4) Forced Turn Islands: These are small raised islands at intersections that divert traffic to one side and that block certain movements. Because of their shape, they are also known as "pork chops." They can be used to block left turns at intersections where a left turn would be undesirable or unsafe. By prohibiting dangerous turning movements, Forced Turn Islands can improve safety. They can also reduce traffic volumes. In some cases, however, a driver can illegally circumvent this barrier.

   Results: There is an average 31% decrease in traffic volumes.

5) Diagonal Diverters: These are placed diagonally across an intersection, blocking through movements and creating two L-shaped streets. They can have a dual effect of diverting traffic and forcing it to seek an alternate route through the neighborhood, but also discourage non-local traffic from using the street. Full pedestrian and bicycle access can be maintained. Diverters can reduce traffic, but they may also require reconstruction of corner curbs and may impede emergency vehicles.

   Results: Diverters result in an average 35% decrease in traffic volumes.

6) Other volume control measures: These include "Star Diverters," which are similar to Diagonal Diverters in that only right turns are permitted at intersections, "One Way – Two Way Islands," which are forced turn islands that convert a street form one way to two way, "Truncated Diagonal Diverters," which leave a gap on one side of the diverter to allow an additional right turn, and "Diverter Closures," where a diverter effectively closes the road past an intersection.

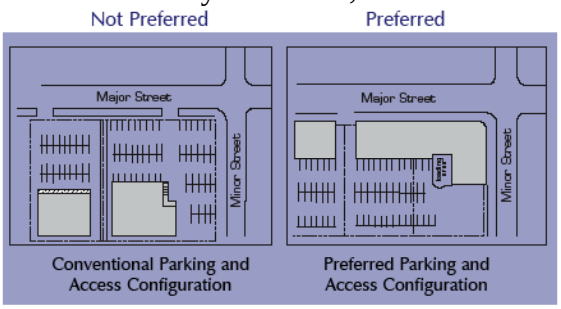
Although some of these forms of traffic calming may be more appropriate in one location over another, the City of Newton will consider traffic calming techniques in areas where their implementation will result in safety, pedestrian, and traffic improvements.

APPENDIX B:

Design Guidelines for Future Development of Newton's Village Centers and The Needham Street Corridor

1) A village center should have a walkable scale, which in most cases is considered to be a 5 to 10 minute walk from its core to its edge, or about a 1/2 mile maximum distance. Therefore, each village node may be up to 1 mile in diameter. Most village centers will occupy an area of about 40 to 100 acres.
2) A village center will have a discernable core area or civic space. There should be a mixture of residential and non-residential uses, with a minimum of 15% of floor space devoted to commercial uses. Public structures (such as civic spaces) and public open spaces, such as squares, parks, and playgrounds should be integrated into the village center. There should be a diversity of housing types, commercial, and civic uses. Small-scale commercial uses should be integrated into mixed-use retail and residential areas.
3) Higher residential densities and smaller lot sizes, usually including multi-family dwellings, are generally located in the core area, with lower densities located towards the edges. Commercial densities should be sufficient to promote pedestrian access. Building should emphasize street frontages, and be oriented to sidewalks and transit access.
4) Streets should be interconnected so as to diffuse traffic and to shorten walking distances. Streets should be relatively narrow and landscaped with rows of trees. Block lengths should be between 250 and 500 feet.
5) Streets should provide a sense of enclosure, enhance neighborhood character, visually terminate in specific locations, and provide physical and visual access to public places.
6) Streets should be bounded by buildings of an appropriate height based on the width of the street. Pedestrian comfort is best attained when buildings are not overly tall, which can create unpleasant shadows, wind tunnels, and a corridor effect. Similarly, buildings that are too short and next to a wide street make the streetscape appear unfinished, forlorn, and barren. The world's most pleasant streets generally have a ratio between building height and street width of 1:1 to 1:2. In other words, a street and sidewalk corridor that is 60 feet wide feels most comfortable to pedestrians if the buildings along it are 30 to 60 feet tall (two to five stories).
7) Buildings should be oriented towards the street and placed close to the street. Pedestrian access to buildings from the sidewalk should be direct, and parking lots and garage structures should not face the street. Off-street parking should be located behind buildings, and not in the front, so as to not interfere with pedestrian access.
8) Drive-through services as part of development should be avoided in order to decrease emissions from idling engines and to reduce traffic and pedestrian-vehicle conflicts.

9) Sidewalks should be a minimum of 5 feet wide when fronting residential uses, but at least 10 feet wide in commercial zones. Sidewalks should directly abut stores in commercial areas. There should be sidewalks on both sides of the street and there should be a continuous pedestrian network. Curb cuts should be minimized to reduce conflicts between cars and pedestrians and also to reduce interruptions to traffic flow.
10) Pedestrian street crossings should be no longer than necessary, since the needs of pedestrians should be balanced with those of vehicular traffic. Where it is appropriate, mid block crossings, bulb-outs, raised crosswalks, and other traffic calming measures should be undertaken to improve the pedestrian environment.
11) On-street parking is encouraged in pedestrian zones. It slows traffic and provides a buffer for pedestrians between the street and the sidewalk. On-street parking is a valuable public resource that benefits the small businesses in our village centers.
12) The streetscape should be made more appealing with the addition of trees, wide sidewalks, and other pedestrian amenities such as street furniture. Building facades should stimulate visual interest and harmony with adjacent structures. Building design may be more important than building use in a pedestrian zone. Streets are more interesting when they are bordered by buildings with porches, plazas, patios, and shopfronts. There should be easy views into and out of commercial buildings, with permeable glass facades fronting the sidewalk. Multi-story construction is characterized by first floor uses for retail or office space, with the possibility of residential housing above.
13) Buildings in pedestrian zones will be considered for transportation credits (either in the form of reduced fees charged to the developer or increased allowances for usable floor area) when they conform to pedestrian-oriented design features. Credits for parking requirements will be granted for mixed-use buildings or for buildings with good transit access. Increased density and reduced parking will be allowed for buildings that conform to the standards.
14) The administrative review and approval process will be simplified and accelerated for buildings and developers who follow village design parameters as outlined in this plan, thereby reducing the overall cost of the project for the developer.
15) Creative parking strategies and lower parking requirements should be implemented. In most cases, a limit on the maximum of allowed parking spaces should be enforced. Developers should be permitted to use on-street parking spaces (within 600 feet) when calculating off-street parking requirements. Innovative strategies should be implemented to allow shared parking spaces between businesses. Parking may also be located in underground buildings or in multistory structures, as long as there is ground-floor retail facing the street.
16) Parking lots must not face the street and they must not be placed between the sidewalk and the front of a building. Instead, parking should be located in shared structures or lots behind buildings, or in the form of on-street parking. On-street parking slows traffic, protects pedestrians on the sidewalk from moving cars, and reduces the need for costly off-street parking.



APPENDIX C:

Design Checklist for Village Centers and The Needham Street Corridor

Village Center and Transit Oriented Development Design Guidelines:

- Encourage minimal setbacks: less than 6 feet from the property line
- Minimum building frontage as percent of lot frontage = 75%
- Buildings to include clear windows for at least 50% of façade facing the street
- No more than 30% blank walls facing the street
- Building entrances should be oriented to the street
- Buildings should provide structured shading, such as awnings and arcades
- Building height to street width ratios should be 1:2 (preferable) to 1:1 (at most)
- Linear retail should front the street in any large developments
- At least 15% of building area and 85% of ground floor frontage should be for commercial and retail use, preferably on ground floor
- Parking should be located in the rear and not fronting the street
- Sidewalks must have a minimum width of at least 10 feet (12 feet preferable)
- Sidewalks may be used for seating, display, dining, etc with permit
- Signs must be pedestrian scale, no more than one square foot per one foot of elevation (maximum 100 square feet)
- For structured parking, non-parking uses must occupy at least 50% of ground level
- Structured parking should not face the main road at ground level
- Loading access should be from non-pedestrian streets
- Mixed-use development is encouraged, with retail on ground floor
- Encourage design-based zoning approval, rather than by type of use

References:

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