City of Nashua
Guide to Transportation Planning

Prepared with assistance from the Nashua Regional Planning Commission

iTRaC Program
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Photos: Nashua Regional Planning Commission Staff

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1.0 INTRODUCTION

Nashua has been recognized nationally as the best place to live in America on multiple occasions in the past two decades. An important aspect of that distinction is the livable nature of the city's many diverse neighborhoods and downtown. It is important to recognize that our streets have an important role in the livability, vitality and character of our city.

As Nashua continues to grow, we must take a multi-disciplinary approach to preserve and enhance our city's neighborhoods and downtown for future generations to enjoy. Understanding the reciprocal relationship between the way we develop our land and the impact that development has on transportation and our streets is a critical first step towards ensuring a bright future for Nashua. The decisions we make in developing new neighborhoods, redeveloping our downtown or expanding our economic base have a direct and tangible impact on our transportation system and the livability, vitality and character of Nashua.

Nashua's streets provide the necessary link between neighborhoods and also contribute to the character and quality of life in every community. Our streets are intended for all modes of transportation from pedestrian and bicyclist to public transit. There are many planning tools and strategies that may be implemented to maintain and enhance the livability and character of our neighborhoods.

This guide is part of a comprehensive planning approach intended to help city officials and residents better understand local traffic impacts and identify possible transportation planning strategies that will have a positive impact on the city. The intention is to have residents and city decision makers use this document in a cooperative manner and partner on solutions that will keep Nashua amongst the most desirable cities in the country.

This guide has been organized to provide background information on the reciprocal relationship between transportation and land use, the information contained in traffic studies, and a variety of roadway design elements. You will find a wide array of information, including photos and examples, to help you better understand a variety of transportation topics. This guide is intended to provide a greater level of detail to decision makers and the general public but is not intended to replace the sound advice and technical recommendations of City of Nashua staff and professionals in the field.

www.pedbikeimages.org/Dan Burden

2.0 LAND USE AND TRANSPORTATION

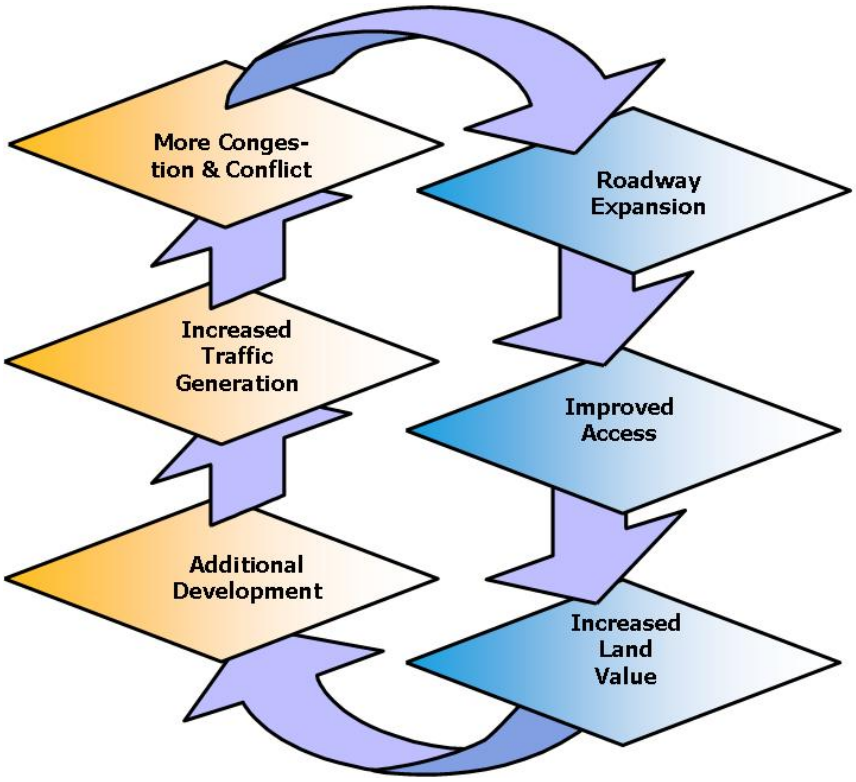
As the population of southern New Hampshire continues to increase greater demands will be placed upon the existing infrastructure and roadway system. This requires maintaining a delicate balance between constructing new infrastructure and changing existing behavior patterns. The expansion of existing roads and the creation of new roadways often improve traffic conditions in the short term. However a widened or new road may result in increased traffic over time as commuters who took alternate routes will now take advantage of a widened or improved roadway. Improved and newly developed roads often attract new development making a full circle back to increased traffic and congestion. The good news is there are methods to address and potentially improve this situation.

Communities can develop regulations to accomplish the following:

- Consolidate Development
- Encourage Mixed-Use Development
- Limit Access to Regional Roadways

Such regulations have been addressed in the Master Plan, Capital Improvement Plan and the Zoning Code. Reference the *Nashua Revised Ordinances, Chapter 16, Land Use Code, Article III. Zoning and Supplemental Use Regulations* and the *Master Plan of the City of Nashua*, adopted by the Planning Board on November 15, 2001 and approved by resolution of the Board of Aldermen on December 16, 2001, for further details. In addition, there are a number of other land use techniques that can be used to strengthen the land use and transportation connection. They are discussed below.

Land Use Transportation Cycle



Source: Rockingham Regional Planning Commission Route 16 Land Use Transportation Report

2.1 Land Use and Transportation Techniques

Nodal Development

Nodes are centers or clusters of development and may include a mix of residential, commercial, retail and recreational uses. Nodal development is generally found in more suburban/urban locations and provides a mix of residential, commercial and service opportunities in a compact walkable area. Nodes are often located at existing intersections or community centers. The land between the nodes often remains relatively rural with limited commercial sites and access points.

One of the key benefits is reducing overall automobile trips by providing bicycle and pedestrian amenities such as sidewalks, visible crosswalks, streetscape improvements, and street furniture. Such development can also enhance community character and a sense of place and, at the same time, minimize the spread of generic sprawl across major corridors. Safety can also be increased by concentrating access points within the nodes and limiting them along major corridors, minimizing potential conflict points.

Within the City of Nashua, the Maplewood development is an example of a nodal development. The commercial sites along Merit Parkway provide an opportunity for residents to walk or bicycle to a variety of uses including a preschool, dry cleaners and restaurants. These uses could even be expanded to include a smaller grocery store and pharmacy. The access points for the commercial sites are located off of Merit Parkway, paralleling 111A. This design minimizes access points of the major corridor, 111A, which decreases potential conflict points.

Maplewood – Meandering Sidewalks

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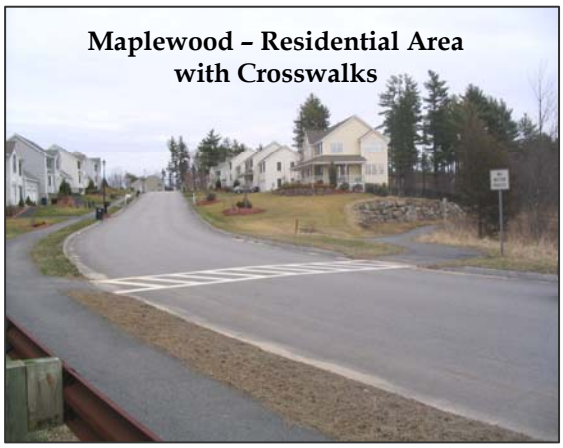
Maplewood – Residential Area with Crosswalks



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Maplewood – Commercial Space

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Village Plan Alternative (VPA)
The VPA is very similar to Nodal Development and is a planning tool that promotes compact development with a mix of land uses, including residential, small scale commercial, recreation and conservation, and is often located in suburban and rural areas. These mixed uses are in close proximity to one another within a neighborhood. The Village Plan Alternative addresses economic, environmental, and social concerns by promoting the smart growth principles of compact, mixed-use development, preserving the working landscape and protecting environmental resources.

The Village Plan Alternative is designed to implement the specific provisions of RSA 674:21.VI (a) to allow for the creation of new villages with mixed-use development scaled to New Hampshire's smaller populations and lower densities. The following graphic is an example of how buildings shall relate to scale and design of surrounding buildings and environment.

Source: *Village Design Model Ordinance*, Rockingham Planning Commission

Transit Oriented Development (TOD)
Transit Oriented Development creates mixed-use, dense, walkable communities that encourage citizens to live, work and shop near transit and decrease their dependence on cars.

Key Components
- Walkable layout with pedestrians as the highest priority
- Inclusive design for non-motorized transportation (ex. bikes, scooters, rollerblades)
- Public transit station as prominent feature of town center
- Collector support transit systems, including trolley, streetcars, light rail, buses
- Reduced and managed parking within close proximity to town center

Benefits
- Reduced need for driving and burning of fossil fuels
- Higher quality of life, better places to live, work, and play
- Greater mobility and increased transportation options
- Reduced traffic congestion
- Improved public health by promoting walking, better air quality
- Increased economic vitality, higher property values

Multi-Modal Amenities
"If you build it, they will come" has a ring of truth in relation to transit and bicycle and pedestrian amenities. Implementing transit and bicycle and pedestrian amenities is a balancing act. It can be hard to raise support for such amenities if there is not a perceived need. However, once amenities such as sidewalks, street furniture and safe crosswalks are implemented, more bicyclists and pedestrians will likely take advantage of them. If density is sufficient to support transit, then providing safe connections to access transit sites tightens the land use transportation connection.

Infill and Revitalization
Infill is the development of existing vacant parcels and revitalization is the rehabilitation of existing buildings and sites to create more attractive or more usable spaces. Both of these techniques produce usable spaces with minimal impacts to the existing transportation network. It is important to maintain and enhance the existing sense of place and character of the area in which infill or revitalization occurs. For instance, it would be out of character to build a three-story multi-family structure in an existing neighborhood with single story ranches. However, this would probably work quite well in an older neighborhood with a mix of single or multi-family large scale homes.

A different example is the Jackson Falls Condominiums in downtown Nashua. These condo units have been built along the Nashua River on a constrained site that is narrow and long. To address limited surface area, parking has been accommodated beneath the living space and the building is four stories high.

Access Management
Access management is the practice of coordinating the location, number, spacing and design of access points to minimize the traffic capacity of a roadway. Uncoordinated growth along some of the region's major travel corridors has resulted in strip development and a proliferation of access points. In most instances, each individual development along the corridor has its own access driveway. Numerous access points along the corridor create conflicts between turning and through traffic which cause delays and accidents.

Benefits
- Improving overall roadway safety
- Reducing the total number of vehicle trips
- Decreasing interruptions in traffic flow
- Minimizing traffic delays and congestion
- Maintaining roadway capacity
- Avoiding costly highway projects
- Improving air quality
- Encouraging compact development patterns
- Improving access to adjacent land uses

Along Daniel Webster Highway in south Nashua, there are a number of successful examples of access management. Cross connections have been made between Webster Square Plaza (DSW Shoes and Toys 'R' Us) to the Home Depot Shopping Area and the Pheasant Lane Mall. Each of these three distinct shopping areas has direct access onto Daniel Webster Highway in addition to the cross connections. These cross connections are vital in this busy shopping area as they provide an alternative means to travel between stores without accessing Daniel Webster Highway. Likewise, Barnes and Noble, the Pier 1 shopping area and the Royal Ridge Center all have their own access points onto Daniel Webster Highway, Spit Brook Road or both; however, they all connect to a common driveway. This driveway also connects all three areas, facilitating movement between the three without needing to access the main roadways. Circuit City and Best Buy also have a driveway that connects the two sites allowing customers to travel between the two without accessing Daniel Webster Highway.

Throat storage is a valuable access management tool that provides a designated area for cars to queue while waiting to exit the plaza. A prime example of this is the newly configured entrance/exit at the Tulley car dealership and the new Lowe's and BJ's located at the north end of Daniel Webster Highway.

Summary
Many different techniques can be implemented to enhance the connection between land use and transportation. The City of Nashua has the advantage of having a dense urban core surrounded by a

number of dense residential neighborhoods, which support transit and mixed use development; whereas the southwest corner of the city is more suburban in nature and is more suited to nodal development. As noted above, different techniques can be employed in locations throughout the city, because they all work toward enhancing the land use and transportation balance.

Source: Strafford Regional Planning Commission – How to Link Land Use and Transportation Planning

3.0 CONTEXT SENSITIVE SOLUTIONS AND PLACE MAKING

3.1 CONTEXT SENSITIVE SOLUTIONS

Context Sensitive Solutions (CSS) is a process in which communities take a central role in shaping transportation projects. Community stakeholders help to define problems, create vision statements and provide input into the ultimate solution for their community. The New Hampshire Department of Transportation's (NHDOT) official definition of CSS is

> *"a collaborative interdisciplinary approach that involves all stakeholders to develop a transportation facility that fits its physical setting and preserves scenic, aesthetic, historic and environmental resources, while maintaining safety and mobility."*

The Project for Public Spaces (PPS) and Tom Warne & Associates are assisting the State of New Hampshire Department of Transportation in implementing this new planning technique. PPS defines CSS by the following:

> *"The central tenet of CSS is that communities should not be molded to the requirements of motor vehicle traffic alone--transportation should preserve the scenic, historic, and environmental resources of the places it serves."*
>
> Source: NRPC

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3.2 PLACE MAKING

Place Making is often the first step in the CSS planning process and NHDOT is currently implementing this process in transportation planning projects. Place Making is an exercise that is used to help a community to define the character, problems and opportunities of a particular location. Exercises typically involve a group working together on site, either along a stretch of roadway, downtown or intersection to answer a series of questions about what works well and what doesn't in this area. It is an easy way to receive and synthesize input from a large group of community stakeholders -- from public officials to residents, businesses, schools and other relevant groups. Place Making can help communities clarify problems and visions for specific locations within the community. Communities can identify ideas for projects and discover new opportunities for collaboration and problem-solving.

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4.0 UNDERSTANDING TRAFFIC STUDIES

Traffic studies provide insight regarding the potential traffic implications associated with various types of development projects. The City of Nashua requirements for traffic studies are described in detail in Guidelines for the Preparation of Traffic Impact Reports and Traffic Management Plans (http://www.gonashua.com/filestorage/51/100/363/TrafficImpactsRpt.pdf). This document contains information detailing the criteria that trigger the requirement for a study, identifies the extent of the study area and discusses the design year requirements. In addition, it describes the requirements for trip generation and distribution analyses.

In addition, ITE's *Recommended Practice* states that "in lieu of other locally preferred thresholds, it is suggested that a traffic impact study be conducted whenever a proposed development will generate 100 or more added (new) trips during the adjacent roadways' peak hour or the development's peak hour." A thorough traffic study typically includes a project description, existing traffic conditions, future conditions, traffic operations analysis and traffic mitigation. Existing conditions typically include data on:

- Existing roadways
- Intersections
- Traffic volumes
- Peak hour traffic volumes
- Turning movement counts
- Accident data

Future conditions typically include planned roadway improvements, anticipated traffic growth, build and no build traffic volumes, trip distribution for the proposed site and vehicle trip generation. The traffic operation analysis should include an intersection capacity analysis that will generate existing and future level of service (LOS) data for each intersection in the study area. LOS should include movement-specific delay for each intersection in the study area. Traffic mitigation should address off-site traffic impacts of the project as well as access into and out of the site. The traffic study should also review internal circulation on the site to ensure that traffic queues do not hinder site ingress and egress. Transit, bicycle and pedestrian issues should also be addressed. Some of the terminology typically included in traffic studies is identified below.

4.1 CALCULATION OF TRAFFIC MITIGATION FEES

Traffic mitigation fees are used to assess on a project by project basis, a fair share portion of the cost for roadway improvements in the region. A typical example of a traffic mitigation fee calculation is to multiply the average daily traffic by an applicable trip fee. So if a proposed development in the region produced an ADT of 100 trips and the trip fee was set to $50.00, the traffic mitigation fee for that development would be $5000.00.

4.2 PEAK HOUR

The peak traffic "hour" is the period of time in which highest traffic volumes are observed on a specific road segment or at a specific intersection. Peak period is also used, since the peak traffic conditions can sometimes exist longer than one hour.

4.3 SOURCES FOR ACCIDENT DATA

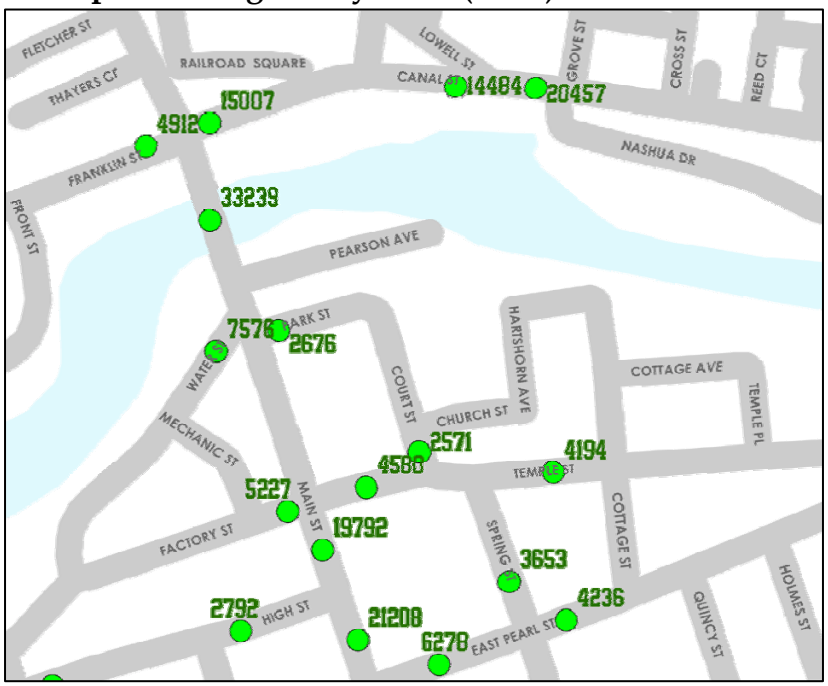
Accident data is available in a Geographic Information Systems format through the New Hampshire Department of Transportation. Local police departments are also good source of accident data. Efforts are underway to develop a statewide uniform accident reporting system that will improve the availability

and consistency of the accident data. More information on accident data for the Nashua region is available in the Transportation Safety Plan for the Nashua Region.

4.4 AVERAGE DAILY TRAFFIC/VOLUME

Average Daily Traffic (ADT) is the average number of vehicles that travel on a road during a 24-hour period. To calculate the ADT, planners take the total traffic volume during a given time period in whole days (24-hour periods) and divide it by the number of days in that time period. This enables traffic planners to prioritize projects by comparing traffic counts to determine relative need. The following map shows ADT based on the recent traffic count data in Nashua. ADT numbers in the Nashua Region can be found on the NRPC website at http://www.nashuarpc.org/trafficcount.

Map 1: Average Daily Total (ADT) Traffic Counts



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4.5 CAPACITY

The term capacity is used to express the maximum hourly rate at which persons or vehicles can reasonably be expected to traverse a point during a given time period under typical roadway and traffic conditions. Capacity for various types of roads is typically expressed in vehicles per day (VPD). For example, the capacity of a rural, two-lane, access-controlled highway with no median is estimated by traffic engineers to be 17,400 VPD.

Highway capacity analysis is used in transportation planning studies to assess the adequacy of existing highway networks to service current traffic. Capacity is also used to estimate a time in the future when traffic growth may overtake the capacity of a highway or perhaps reach an undesirable level of congestion. For example, if it is estimated that the segment of road from the above example will be greater than 17,400 VPD in the future, it means the roadway will be over capacity.

4.6 VOLUME TO CAPACITY

The Volume-to-Capacity ratio (V/C) measures the level of congestion on a roadway. It is measured simply by dividing the volume (VPD) of traffic (existing or future) by the capacity of the roadway. For

example, if the volume of traffic on the segment of roadway from the above example were 10,000 VPD, then the V/C ratio for that segment would be 10,000/17,400 = .57. A V/C ratio of greater than one means that a segment of road is "over capacity".

The V/C ratio makes it possible to estimate the relative level of congestion on a segment of roadway. Traffic engineers have developed the following categories:

- V/C ratio > 1 = Severe congestion
- V/C ratio 0.75 to 1.0 = Heavy congestion
- V/C ratio 0.5 to 0.74 = Moderate congestion
- V/C ratio < 0.5 = Low or no congestion

4.7 LEVEL OF SERVICE

Level of Service (LOS) is a measure by which transportation planners estimate the quality of operations at specific transportation facilities such as roads, lanes, intersections and intersection approaches during the "peak hour "of traffic. LOS characterizes the operating conditions on the facility in terms of speed, travel time, freedom to maneuver, traffic interruptions, comfort and convenience. The levels of service range from LOS A (least congested) to LOS F (most congested). The distinction between levels-of-service A through F are subjective. The general definitions of levels of service are shown in Table 1. Some examples of AM and PM LOS are shown in Map 2 below. The LOS is based on 2007 traffic count data.

TABLE 1: LEVEL OF SERVICE DEFINITIONS

Level of Service	General Operating Conditions
A	Free flow (traffic flows at or above speed limit and motorists have complete mobility between lanes)
B	Reasonably free flow (slightly more congested, with some impingement of maneuverability)
C	Stable flow (more congested than B, ability to pass or change lanes is not always assured. Experienced motorists are comfortable, roads are below but **close** to capacity, and posted speed is maintained)
D	Approaching unstable flow (speeds are somewhat reduced, motorists are hemmed in by other vehicles. Example: busy shopping corridor during middle of a weekday, or a functional urban highway during rush hour)
E	Unstable flow (flow becomes irregular, speed varies widely and rarely reaches speed limit. This is consistent with a road over its capacity)
F	Forced or breakdown flow (a constant traffic jam)

Source: "A Policy on Geometric Design of Highways and Streets", AASHTO

Map 2: AM and PM Level of Service at 3 Intersections in Nashua

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4.8 INTERSECTION DELAY

Intersection level-of-service analysis for signalized and non-signalized intersections is closely associated with intersection delay. Transportation planners use various inputs to determine how long motorists have to wait before they can move through an intersection. The amount of time the motorists must wait determines the level-of-service for that intersection. The following tables show the delay and associated level of service for signalized and non-signalized intersections.

TABLE 2: LEVEL OF SERVICE CRITERIA - SIGNALIZED INTERSECTIONS

Level of Service	Control Delay per Vehicle (sec./veh.) Amount of Time to Travel through an Intersection
A	≤ 10
B	> 10-20
C	> 20-35
D	> 35-55
E	> 55-80
F	> 80

Source: "Highway Capacity Manual 2000", TRB

TABLE 3: LEVEL OF SERVICE CRITERIA - NON-SIGNALIZED INTERSECTIONS

Level of Service	Control Delay per Vehicle (sec./veh.)
A	0 – 10
B	10 – 15
C	15 – 25
D	25 – 35
E	35 – 50
F	> 50

Source: "Highway Capacity Manual 2000", TRB

4.9 TRIP GENERATION

Trip generation is the number of vehicle trips that result from a specific site development. The Institute for Traffic Engineers Trip Generation Manual provides an industry standard of the anticipated number of trips for a wide range of specific land uses. Planners and traffic engineers can use this information to model the travel demand on local and regional roads that will result from the type of development at a specific location. The following table provides you with an estimate of the number of vehicle trips per day that a specific land use will likely produce.

TABLE 4: TRIP GENERATION INDUSTRY STANDARDS

Land Use	Vehicle Trips Per Day
Single Family Housing	10 Trips/Home/Day
Fast Food W/Drive Through	496 Trips /1000 sq ft/Day
Home Improvement Super Store	30 Trips/1000 sq ft/Day
Pharmacy W/ Drive Through	88 Trips/1000 sq ft/Day

Source: "Trip Generation", Institute of Transportation Engineering, 6th edition, vol. 2

4.10 SPEED LIMITS

State and Local Regulations for Speed Limits –Process for adjusting

New Hampshire state law allows local authorities to determine reasonable speed limits within their jurisdiction based upon sound engineering or traffic studies.

Local authorities may also adjust speed limits based on sound engineering or traffic studies to a speed that is deemed safe and reasonable for a specific road segment. This action could include:

- Decreases the limit at intersections
- Increases the limit within an urban district but not to more than 60 miles per hour
- Decreases the limit outside an urban district but not to less than 25 miles per hour
- Decreases the limit within any business or urban residence district but not to less than 25 miles per hour

When No Speed Limit is Posted

Within the City of Nashua, any road without a posted speed limit permits a maximum speed of 30 mph. The City of Nashua Police Department is equipped with speed monitoring equipment.

Speed limits in school zones and construction zones

In school zones, state law requires a posted speed of 10 miles per hour below the usual posted limit from 45 minutes prior to each school opening until each school opening and from each school closing until 45 minutes after each school closing.

In work zones, posted speed must be 10 miles per hour below the usual posted limit, but in no case greater than 45 miles per hour.

4.11 85TH PERCENTILE RULE FOR SPEED LIMITS

Speed Limits

Most states including New Hampshire have a basic speed law which recognizes that driving conditions and speeds may vary widely from time to time. No posted speed limit can adequately serve all driving conditions. In Nashua, a roadway without a posted speed limit permits a maximum speed of 30 mph. Motorists must constantly adjust their driving behavior to fit the conditions they meet. Speed limits encourage consistent travel speeds, fostering safety for the traveling public by reducing the speed differentials between motor vehicles.

According to the Federal Highway Administration, all states and most of the local agencies use the 85th percentile speed (the speed that 85 out of 100 vehicles travel at or below) of free-flowing traffic as the basic factor. Speed limits reflecting the speed most motorists naturally drive are selected in part by determining the "85th percentile speed". However, it is fairly common to reduce the speed limit based on a subjective consideration dependent upon other factors. This method is based on the principle that reasonable drivers will consider roadway and roadside conditions when selecting travel speeds.

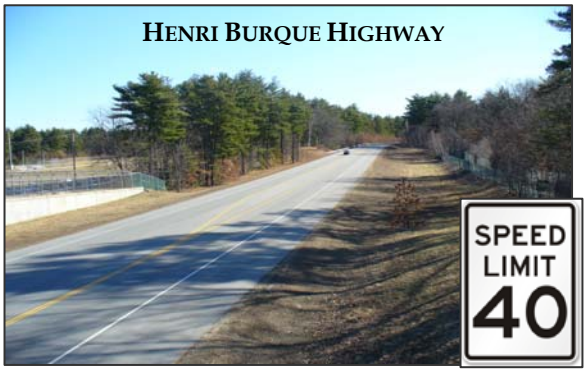
When setting speed limits, engineers also consider other factors like:

- Roadway characteristics, shoulder condition, grade, alignment and sight distance
- Roadside development and lighting
- Parking practices, e.g., angled parking, and pedestrian and bicycle activity
- Collision rates and traffic volume trends
- Right lane/entering traffic conflicts (for freeways)

The range of travel speeds is reduced when speed limits are set near the 85th percentile speed and adjusted for the other influencing factors.

Sources: Washington State DOT and Federal Highway Administration

DUBLIN AVENUE



HENRI BURQUE HIGHWAY

EVERETT TURNPIKE

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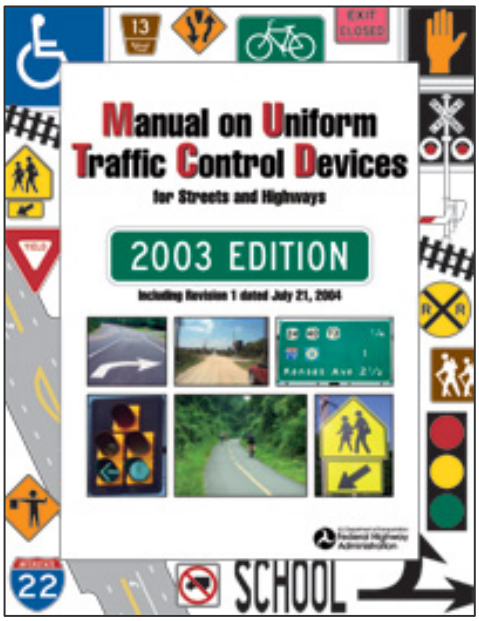
5.0 TRAFFIC CONTROL DEVICES



Traffic control devices are signs, signals, pavement markings and devices used for the purpose of regulating, warning, or guiding traffic. Traffic control devices are placed by authority of a public body or official having jurisdiction to regulate, warn or guide traffic. The Federal Highway Administration recognized the need to develop a uniform standard for traffic control devices. The Manual on Uniform Traffic Control Devices (MUTCD) is a document issued by the Federal Highway Administration (FHWA) to specify the standards by which traffic signs, road markings, and traffic signals are designed, installed and used.

Equally as important is the responsibility of state and local officials to develop procedures for the effective implementation of traffic control devices. The requirements that Nashua has developed to implement traffic control devices can be found in the Draft Nashua Code of Ordinances, Chapter 320 Vehicles and Traffic. The following section provides basic information necessary to understand effective implementation of traffic control devices.

5.1 MUTCD

The MUTCD is intended to specify the standards by which traffic control devices such as traffic signs, road markings, and traffic signals are designed, installed and used. These specifications include the shapes, colors, and fonts used in traffic control devices. All traffic control devices must generally conform to these standards. Private construction firms and state agencies use the manual to ensure that the traffic control devices they use conform to the national standard.

5.2 SIGNAGE

Traffic signs are a type of traffic control device installed along a traveled way, to provide a wide variety of information to all modes of transportation. Traffic signs are used to provide regulatory and directional information to the traveler as well as warn of potential hazards. They should be placed only where supported by data and engineering studies. Unwarranted installation of signs may distract travelers from more important traffic control devices. The Manual on Uniform Traffic Control Devices (MUTCD) is the standard used throughout the country for traffic signage. The MUTCD states that signs should meet five basic requirements to be effective:

- Fulfill a need
- Command attention
- Convey a clear, simple meaning
- Command respect from road users
- Give adequate time for proper response

Source: MUTCD

5.3 DIFFERENTIATING BETWEEN REGULATORY, DIRECTIONAL, AND WARNING SIGNS

Warning signs are typically yellow and diamond shaped. Examples include warning the driver of curves in the road or signals ahead.

Directional or informational signs are typically rectangular and vary in color. Recreational signs are usually brown and rectangular and provide information on cultural and recreation facilities in the area. Hospital signs are blue and rectangular in shape.

Regulatory signs instruct a driver to take or not to take specific actions. Regulatory signs also vary in shape and color. Unlike warning and directional signs there are exclusive shape and color patterns designated to specific regulatory signs such as the Stop sign and Yield sign. Most regulatory signs are rectangular in shape and contain red or black instructional text or symbols.

5.4 STOP SIGN WARRANTS

According to the MUTCD, STOP signs should be used if engineering judgment indicates that one or more of the following conditions exist:

- Intersection of a less important road with a main road where application of the normal right-of-way rule would not be expected to provide reasonable compliance with the law
- Street entering a through highway or street
- Unsignalized intersection in a signalized area
- High speeds, restricted view, or crash records indicate a need for control by the STOP sign

5.5 PAVEMENT MARKINGS

Motorists, pedestrians and bicyclists benefit from pavement markings that clearly define travel lanes, crosswalks, shoulder and other roadway characteristics. When a travel corridor is well defined with the proper pavement markings, the users of that corridor have a clear understanding of what their responsibilities are. Depending on the project and its location, pavement markings can be either retroflective paint or thermoplastic. Thermoplastic is recommended for roads with high volumes due to its longevity.

SOLID LINES

- A SOLID line usually indicates that crossing the line is discouraged.

- A DOUBLE SOLID WHITE line indicates that lane changing (among lanes going in the same direction) is prohibited.

- In the case of lines used to designate no-passing zones, a SOLID YELLOW line immediately to the left of your lane indicates that crossing the centerline to overtake and pass another vehicle is prohibited.

- A DOUBLE SOLID YELLOW line indicates that passing is prohibited in both directions on an undivided road or highway.

Source: http://mutcd.fhwa.dot.gov/PavMkgs/Tutorial/

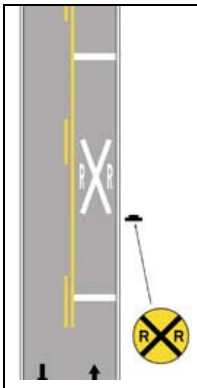
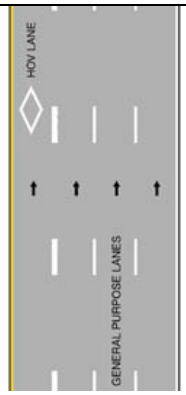
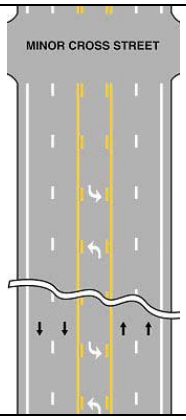
DASHED CENTER LINES

- A BROKEN (dashed) WHITE line indicates that it is permissible to cross the line to change lanes to move into an adjacent lane moving in the same direction.

- A BROKEN (dashed) YELLOW line is a roadway centerline indicating that crossing over into the oncoming traffic lane for the purposes of overtaking and passing another vehicle is permitted if it is safe to do so.

FOG LINE

- White edge lines (also referred to as Fog Lines) mark the right edge of pavement or boundary between a travel lane and an adjacent shoulder along the outer edge of a roadway.

		
Rail Road	HOV	Center Turn Lane

Source: http://mutcd.fhwa.dot.gov/PavMkgs/Tutorial/

5.6 TRAFFIC SIGNALS

When two roads intersect each other, a traffic signal is sometimes necessary to control traffic and prevent collisions between motor vehicles, pedestrians and bicyclists. Traffic signals can be programmed to process traffic through one intersection or simultaneously through several intersections. While installation of traffic signals may improve the safety and functionality of a specific intersection, the signal may impact traffic flow beyond the limits of the intersection. Therefore, it is important to fully study the traffic pattern of the area and complete a *Signal Warrant Analysis* before considering the installation of a signal. The City of Nashua currently uses the MIST signal control system. The City is installing NASTEC controllers on Daniel Webster Highway and Spit Brook Road. These controllers will work with ITMSNOW software. This will give us corridor-wide traffic management capabilities.

5.7 SIGNAL WARRANT ANALYSIS

Traffic signals control vehicle and pedestrian traffic by assigning the right-of-way to the various traffic movements which means that traffic signals have a profound effect on traffic flow. Properly located and operated control signals increase the traffic-handling capacity of an intersection, provide safe pedestrian crossing and reduce the frequency of certain types of accidents. The MUTCD establishes standards that justify the installation of traffic signals. **The manual states that the satisfaction of a warrant in itself does not justify the installation of a signal**. A study should indicate that a signal would improve the overall traffic operations and safety of an intersection. The Federal Highway Administration developed the eight traffic signal warrants contained within the MUTCD.

The eight warrants define minimum conditions under which traffic signal installations may be justified. Warrant guidelines must be supplemented by investigating the effects of specific site conditions and the application of good engineering judgment. The decision to install a traffic signal should improve the overall safety and/or operation of an intersection and should be considered only when deemed necessary by careful traffic analysis and after less restrictive solutions have been attempted.

- Warrant 1 – Eight-hour vehicular volume - This warrant has two conditions. The Minimum Vehicular Volume, Condition A, is intended for application where a large volume of intersecting traffic is the principal reason to consider installing a traffic signal. The Interruption of Continuous

Traffic, Condition B, is intended for application where the traffic volume of a major street is so heavy that traffic on a minor intersecting street suffers excessive delay or conflict in entering or crossing the major street.

- Warrant 2 – Four-hour vehicular volume – This warrant is intended to be applied where the volume of intersecting traffic is the principal reason to consider installing a traffic control signal.

- Warrant 3 – Peak Hour – This warrant is intended for use at a location where traffic conditions are such that for a minimum of one hour on an average day, the minor street suffers undue delay when entering or crossing the major street.

- Warrant 4 – Pedestrian Volume - This warrant is intended for application where the traffic volume on a major street is so heavy that pedestrians experience excessive delay in crossing the major street.

- Warrant 5 – School Crossing - This warrant is intended for application where the fact that school children cross the major street is the principal reason to consider installing a traffic control signal.

- Warrant 6 – Coordinated Signal System – This warrant is used when progressive movement of traffic in a coordinated signal system sometimes necessitates installing traffic control signals at intersections where they would not otherwise be needed in order to maintain proper platooning of vehicles.

- Warrant 7 – Accident Experience - This warrant is intended for application where the severity and frequency of crashes are the principal reason to consider installing a traffic control signal.

- Warrant 8 – Roadway Network - This warrant is used at the intersection of two major routes where installing a traffic signal might encourage concentration and organization of traffic flow on a roadway network.

Source MUTCD Millennium Edition

5.8 SYNCHRONIZATION OF TRAFFIC SIGNALS

Traffic signals must be programmed regarding when to change phases. They can also be coordinated so that the phase changes called for occur in some relationship with nearby signals. The three basic signal phases are based on one of three systems: pre-timed, semi-actuated and fully-actuated.

Pre-timed Signal: The use of a timer is the simplest way to control the phase of a traffic signal. A pre-timed signal runs a set timing plan independent of the existing traffic. It also has the capability of running different cycle lengths depending on the time of day. In this scenario, each phase of the signal lasts for a specific duration before the next phase occurs. This pattern repeats itself regardless of traffic.

Semi-actuated Signal: A semi-actuated signal includes a magnetic loop buried in the pavement or a video camera that can detect the presence of traffic waiting at the light installed on the minor road that detects when traffic is present. This detection switches the green phase to the minor road to allow traffic to clear.

Fully-actuated Signal: A fully-actuated signal includes mechanisms installed on both the major and minor roads, such as video detection, that detect the volume of traffic present. Based on the amount of traffic, the signal provides enough time to accommodate all of the vehicles.

It is also possible to coordinate traffic signals so that drivers encounter long strings of green lights. These "coordinated" systems are controlled from a master controller and are set up so lights "cascade" in sequence so platoons of vehicles can proceed through a continuous series of green lights. In modern coordinated systems, it is possible for drivers to go many miles without encountering a red light.

Sometimes the phase of the traffic signal is based on the time of day and the day of the week, or for special circumstances (such as a major event causing unusual demand at an intersection).

5.9 RIGHT TURNS ON RED

Depending on the municipality, traffic may turn right after stopping at a red, provided it yields to pedestrians and other vehicles. In some cases a right turn on red may be forbidden because of circumstances at a specific intersection. This would be indicated by a "no turn on red" sign.

5.10 TRAFFIC CALMING

Traffic calming techniques are designed to reduce vehicle speeds, increase space for pedestrians and bicyclists, 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. Traffic calming techniques include bulbouts, chokers, center islands, chicanes, closures, curb extensions, diverters, median barriers, neckdowns, roundabouts, speed humps, and pavement treatments. Additional information on traffic calming can be found in the "City of Nashua Guide to Traffic Calming".

BULBOUTS

www.pedbikeimages.org/Dan Burden

CHICANES

www.pedbikeimages.org/unknown

6.0 ROADS

6.1 ROADWAY HIERARCHY

- Interstate Highways: Interstate highways are at the top of the hierarchy. They are *limited access*, provide largely uninterrupted travel over long distances and are designed for high speeds. An example of an interstate highway is I-93.
- Arterial Roads: Arterial roads are the next level of roadways. They serve to move large volumes of traffic through a town or to connect one section of town with another section. An example of an arterial is Amherst Street (NH 101 A).
- Collector Roads: Collector roads act to feed traffic to or from local roads and arterials. Collector roads provide direct access to abutting properties and distribute it to or from arterials. Traffic using a collector is usually going to or coming from somewhere nearby. An example of collector roads is Henri Burque Highway.
- Local Roads: Local roads provide for internal movement within residential areas and for direct access to abutting property. An example of a local road is East Stark Street.

TABLE 5: LOCAL EXAMPLES OF ROADWAY HIERARCHY

Name of Road and Type	Traffic Volume (ADT)	Year
Everett Turnpike – Limited Access Highway	126,336	2004
NH 101A – Arterial	45,985	2002
Henri Burque Highway – Collector Road	16,126	2004
East Stark Street	1,074	2006


Everett Turnpike

Henry Burque Highway


NH 101A

NRPC Staff

6.2 STANDARD ROAD WIDTHS

The following table of standard roadway widths is from *A Policy on Geometric Design of Highways and Streets 2001*; AASHTO.

TABLE 6: STANDARD ROADWAY WIDTHS (INCLUDES 2 LANES WIDE)

Design Speed (mph)	Minimum width of traveled way (ft) for specified design volume (veh/day)			
	Under 400 vpd	400 to 1,500 vpd	1,501 to 2,000 vpd	2,000+ vpd
15	18	20	20	22
20	18	20	22	24
25	18	20	22	24
30	18	20	22	24
40	18	20	22	24
45	20	22	22	24
50	20	22	22	24
55	22	22	24	24
60	22	22	24	24
	Width of graded shoulder on each side of road (ft)			
All speeds	2	5	6	8

Source: A Policy on Geometric Design of Highways and Streets 2001; AASHTO.

7.0 STREET CLASSIFICATION

The New Hampshire highway classifications are derived from RSA 229:5, Classifications. The highway system is divided into seven classes.

7.1 CLASS I

All existing or proposed highways on the primary state highway system and portions of turnpikes and interstate highways within the compact (urban compact as defined in Section 7.5) sections of cities and towns, listed in RSA 229:5, V. Class I highways include both state and federal route numbers. The F.E. Everett Turnpike is an example of a Class I Road.

The state has full control of Class I highways and bears the cost of maintenance and new construction, including bridges.

7.2 CLASS II

All existing or proposed highways on the secondary state highway system, except those portions within the compact sections of the cities and towns listed in RSA 229:5, V. Henri Burque and Concord Street are examples of Class II Roads.

The state bears the cost of maintenance and reconstruction of Class II highways that satisfy the NHDOT commissioner under RSA 230:3. Class II highways that do not meet NHDOT standards are maintained by the cities or towns, but may be improved to NHDOT standards using available state funds as provided in RSA 230:4.

7.3 CLASS III

All recreational roads leading to, and within, state reservations (e.g., state parks, camp grounds) designated by the legislature under RSA 229:5, III.

Public roads primarily leading to a private recreation area, when authorized by the legislature, and approved by the governor and council have a Class III designation. The NHDOT has responsibility for maintaining and reconstructing recreational roads, under RSA 233:8, Class III Recreational Roads, after they have been designated by the NH Department of Resources and Economic Development (DRED), and the NHDOT commissioner. Class III public roads leading primarily to private recreation facilities are maintained by the owner/operator to the satisfaction of NHDOT, unless other arrangements are made under RSA 233:9. Class III highways may be regulated by the commissioner of DRED under RSA 233:8.

7.4 CLASS III-A

New boating access highways from any existing highway to any public water in this state. All class III-a highways are limited access highways as defined in RSA 230:44. Layout, design, construction, and maintenance of Class III-a highways are subject to the provisions of RSA 230:45-47 and all other provisions relative to limited access facilities, except that NH Fish and Game department has the same authority for class III-a highways as the NHDOT has for limited access facilities. A class III-a highway may be laid out subject to the following conditions: it shall not be maintained during the winter months; it must have gates and bars; it is restricted to the accommodation of persons on foot, certain vehicles, or both, if federal funds are not used. The executive director of fish and game may petition the governor and council to discontinue any class III-a highway.

Prior to 1992, RSA 230:63 through 71 (Repealed in 1992) permitted the governor and council to purchase and lay out "highways to public waters." These became Class V highways maintained by the town. The current Class III-a statute replaced this, but the road still has the Class V designation. Unless NH Fish and Game has converted these roads to Class III-a, they should be treated as they were, pre-1992.

7.5 CLASS IV

All highways located within the compact sections of cities and towns listed in RSA 229:5, V. The compact section is defined as the portion of land within a city or town that has frontage on any highway and, in the opinion of the NHDOT Commissioner, is primarily occupied by dwellings or buildings in which people live or business is conducted year round (not for a season only).

The NHDOT commissioner may reclassify a section of a Class I or Class II highway as a Class IV highway, after preparation of a statement of rehabilitation work that shall be performed by the state in connection with the reclassification (turnback). Required rehabilitation work shall be completed by the state during the calendar year preceding the effective date of the reclassification. A copy of the commissioner's statement of work to be performed by the state shall be attached to the notification of reclassification to Class IV, and receipt of said statement shall be acknowledged, in writing, by the selectmen of the town, or the mayor of the city, affected by the reclassification.

7.6 CLASS V

All traveled highways (other than Class IV), which the town has the duty to maintain regularly and referred to as town roads. Any public highway that has lapsed to Class VI status due to five-years' non-maintenance, as set forth in RSA 229:5, VII, but which subsequently has been regularly maintained and repaired by the town year round and in suitable condition for year-round travel for at least five successive years without being declared an emergency lane pursuant to RSA 231:59-a, is a Class V highway. Dublin Avenue is an example of a Class V road.

> *Class V has nothing to do with construction standards. This designation applies to multi-lane town roads as well as single-lane dirt roads. Case law has found that a Class V highway must be maintained as well as traveled [Glick v. Ossippe, 130 N.H. 634 (1988)]*

7.7 CLASS VI

All other existing public ways, and shall include all highways discontinued as open highways and made subject to gates and bars, except as provided in paragraph 7.4 Class III-a and all highways which have not been maintained and repaired by the town in suitable condition for travel thereon for five successive years or more except as restricted by RSA 231:3, II.

> *Class VI roads are public highways in all respects except maintenance and towns have full regulatory authority. Class VI highways are "subject to gates and bars"; however, gates and bars erected by land owners must be capable of being opened and closed by users of the road.*

Source: http://www.gencourt.state.nh.us/rsa/html/XX/229/229-5.htm
and "A Hard Road to Travel", Local Government Center, 2004 edition

8.0 CIRCULAR INTERSECTIONS

8.1 HISTORY

South Main Street - City of Nashua

City of Nashua Department of Public Works

Circular intersections were redeveloped by the British into roundabouts and have become hugely popular throughout Europe and Australia. The United States began implementing a reengineered and much smaller roundabout during the 1990's. Today they are widely used in many parts of the country, especially in Colorado, Washington, Maryland and Utah.

8.2 TRAFFIC CIRCLES OR ROTARIES

Traffic circles and rotaries are large circular intersections often located at the confluence of numerous high speed roadways. They allow traffic to enter and travel at high speeds around a large center island. Some traffic circles give the right of way to entering traffic, forcing the traffic in the circle to yield or stop.

- Generally constructed before 1950
- Large diameters generally 200' – 400' wide or larger
- Straight entrances enable vehicles to enter at high travel speeds
- High travel speeds to enter and travel
- Traveling traffic must yield to entering traffic
- Large spaces in traffic are required to enter the traffic flow
- Can experience congestion with high traffic volumes

8.3 ROUNDABOUTS

Roundabouts are located where a number of streets converge and are designed to increase safety and traffic flow. They are circular intersections where traffic enters and travels in a counter-clockwise direction. Nashua has two 1-lane roundabouts, Goffstown has one 1-lane roundabout; and 2-lane roundabouts are located in Keene and Brattleboro, VT.

Entering traffic must yield to on-coming vehicles and travel around a sharp curve, forcing the driver to reduce travel speeds. As the diameter of a roundabout is relatively small, cars must maintain a slow speed while traveling in the

South Main Street - City of Nashua

City of Nashua Department of Public Works

circle. Truck aprons, generally designed in a different material, such as brick, are located adjacent to the center island and intended only for use by trucks when extra turning radius is required.

- Generally constructed after 1990
- Small diameter generally 100'-200' wide
- Curved entrances force entering vehicle to reduce travel speeds
- Low travel speeds to enter and travel
- Ideal travel speed is < 30 mph
- Traffic must yield to enter the circle
- Reduction in intersection accidents

8.4 SAFETY

- Roundabouts are found to improve safety compared with traditional signalized intersections. A 2001 Insurance Institute for Highway Safety study found that roundabouts led to:
  - An 80% decrease in injury accidents
  - A 40% decrease in overall accidents

- Many types of crashes are eliminated as all traffic travels in the same direction. Accidents occurring at roundabouts are generally between low speed vehicles, reducing the severity of the accident.
- Additional information on roundabouts can be found in the *City of Nashua Guide to Traffic Calming*.

Sources:
New York State Department of Transportation, www.nysdot.gov
NY State Department of Transportation "A Citizen's Guide to Roundabouts", PUB 4 (3/04) Revised 1/05
Insurance Institute for Highway Safety, http://www.iihs.org/research/qanda/roundabouts.html

NH130 Roundabout – City of Nashua

City of Nashua Department of Public Works

9.0 BICYCLE AND PEDESTRIAN

Sound planning should include policies that support alternative modes of transportation, including bicycle and pedestrian uses. While additional work is required to create transportation routes that allow bicyclists, pedestrians, and motorists to travel safely together, the benefits certainly outweigh the costs. Providing for bicyclists and pedestrians can lead to higher levels of public health, decreased traffic congestion, strong economies and a better quality of life.

9.1 CROSSWALKS – RAISED VS. MARKED

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Marked crosswalks indicate optimal or preferred locations for pedestrians to cross and help designate right-of way for motorists to yield to pedestrians. A crosswalk may be marked with special paint thermoplastic materials, retro reflective paint, plastic tape and other materials. Crosswalks in Nashua are marked with white traffic paint, thermoplastic and red paint in school zones.

Crosswalks are often installed at signalized intersections and other selected locations. Marked crosswalks are also desirable at some high pedestrian locations to guide pedestrians along a preferred walking path.

A raised pedestrian crosswalk is essentially a speed table with a flat portion the width of a crosswalk (10 to 15 feet) on top of the raised section. Raised crosswalks encourage motorists to yield to pedestrians. The purpose of a raised crosswalk is to reduce vehicle speeds and enhance the pedestrian environment.

9.2 ADA-COMPLIANT DESIGN

The Americans with Disabilities Act (ADA) was passed to ensure that all people, including those with disabilities, have equal access to transportation. People with disabilities may have limited visual and cognitive ability, or a combination of disabilities, which is more common as a person grows older. New or altered facilities must provide access for all pedestrians. While improvements for persons with disabilities were mandated by the Federal Government to ensure access and mobility for physically challenged pedestrians, most of these improvements benefit all pedestrians.

All new construction and retrofit projects must include curb ramps that meet ADA requirements. Other barriers should be identified also. Examples of barriers that are often overlooked include poles and signs in the middle of the sidewalk, steeply sloped driveways, and interruptions such as broken or missing sidewalk sections. While all streets should be upgraded to be accessible, public agencies should set priorities for high-use areas, such as commercial districts, schools, parks, transit facilities, etc. and retrofit as rapidly as possible

Source: Pedestrian Facilities Users Guide: Providing Safety and Mobility FHWA-RD-01-102

9.3 BICYCLE LANES

Bicycle lanes are established with appropriate pavement markings and signing along streets in corridors where there is significant demand and where there are distinct needs that can be served by them. The purpose should be to improve conditions for bicyclists on the streets. Bike lanes are intended to delineate the right of way assigned to bicyclists and motorists and to provide for more predictable movements by

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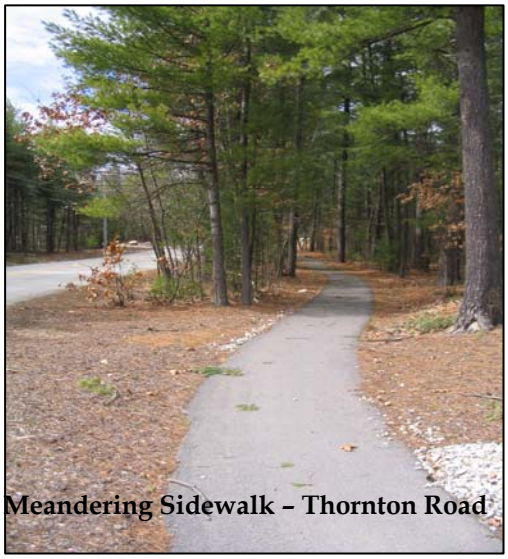
each. The desired minimum bike lane width is 4' without a curb and 5' with a curb. Motor vehicles are not allowed to drive, park or stand in a bike lane, but right turning vehicles can enter the lane at intersections to complete their turn.



Meandering Sidewalk – Thornton Road

NRPC Staff

9.4 SHARED BICYCLE AND PEDESTRIAN PATHS

Shared bicycle and pedestrian paths provide an excellent opportunity for recreational and alternative transportation access. Such paths are often located on old railroad beds, or trails separated from the road network providing a greater sense of safety for travelers. Nashua currently has two such paths: the Nashua River Rail Trail and the Interurban Bike Path. The Nashua River Rail Trial runs from Ayer, MA, into the southwestern corner of Nashua and is used primarily for recreational opportunities. The Interurban Bike Path provides a safe alternative for bicycling and walking through one of the most densely populated areas of the City.

9.5 EXCLUSIVE AND CONCURRENT PEDESTRIAN SIGNALS

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Pedestrian signals are installed for two main reasons: a high volume of foot traffic at an intersection or the signals directing motorists don't meet the needs of pedestrians. For example, some intersections are laid out at odd angles resulting in traffic signals that can't be seen by pedestrians. In other cases, turning and merging lanes make intersections so complex that special provisions must be made for pedestrians.

Concurrent pedestrian signals mean that motorists may turn left or right across pedestrian's paths after yielding to pedestrians.

Exclusive pedestrian signals stop traffic in all directions while pedestrians cross and have a higher impact to the Level of Service at intersections.

10.0 PUBLIC TRANSPORTATION

Public Transportation is a general term to describe different forms of transportation available to the general public, including bus, bus rapid transit, rail, trolley and van service. Different forms of public transportation can be successfully operated in both rural and urban settings; however, high density areas have a large potential ridership pool and can often operate a high level of service. Public transportation is often desired and successfully implemented in areas with a high population density, where parking is scarce and costly and traffic congestion is high. As people are faced with high vehicle costs, parking costs and increased congestion, they are more likely to consider using public transportation.

NTS Bus Station

NRPC Staff

NTS Bus

NRPC Staff

Land use and transportation are closely linked. In dense areas with mixed uses, transit is often very successful. Mixed use sites with a combination of housing, commercial and retail uses provide residents and employees with the opportunity to access the retail sites throughout the work day or on the way home. For instance, an ideal location for a mixed use site is at a commuter rail station or transit center or hub. People who drive or walk to the mixed use station to access transit may also visit the retail establishments such as dry cleaners, banks, salons, restaurants, flower shops or book stores. Providing these amenities may prevent the need to drive to another destination on the way home, reducing overall automobile trips.

10.1 WHY PLAN FOR TRANSIT NOW?

It is easier to plan for transit and obtain easements for amenities such as stations and bus stops as development occurs, rather than after the fact. Once easements are obtained, no changes need to occur on the site until they are utilized at a later date as parking availability decreases, and congestion and the demand for transit increases. The following are a series of definitions relevant to public transportation and transit.

SAFETEA-LU – The Safe Accountable, Flexible, Efficient, Transportation Equity Act was signed into law in 2005 by President Bush. SAFETEA-LU authorizes the Federal surface transportation programs for highways, highway safety and transit for the 5-year period from 2005-2009.

Mode – The method of transportation such as bus, bus rapid transit or rail.

Intermodal/Multi-Modal – Affecting two or more different modes of transportation.

Commuter Rail Car- Passenger cars are generally pulled or pushed by a locomotive, but can also be self propelled by an electric source.

Light Rail Car - Refers to streetcars or trolley cars that typically operate on shared roadways and are operated by electricity on overhead wires or catenary wires.

Heavy Rail Car – Operate on electricity and generally via a third rail on an exclusive right of way.

Carpool/Vanpool/Rideshare – These are all viable options for commuting that reduce single occupancy vehicle trips by sharing a ride with one or more other people. Carpools are shared car trips with at least two people traveling to and from the same destinations. Vanpools often carry between 10-15 people (depending on van sizes) and pick up passengers from a central location near riders homes and generally travel to the same destination or work site. The vanpool driver often receives a free trip in exchange for driving. Many worksites offer premier parking spots and guaranteed rides home in case of emergencies.

Reverse Commuting – Generally refers to commuters who travel against the main flow of traffic during peak travel times.

High Occupancy Vehicle (HOV) - This symbol is often used on highways to restrict travel to cars with at least two passengers. HOV lanes are often less congested and encourage riders to carpool or vanpool in order to take advantage of them. In major metropolitan areas it is not unusual for HOV and express lanes to change direction, depending on the time of day, to accommodate the most traffic.

Express Service – Provide faster transportation service by having a limited number of stops during peak hours. This type of service is often offered between outlying suburban stops and downtown stations or locations.

Bus Rapid Transit (BRT) – BRT is a high speed bus service that provides limited stops and often operates on designated guideways. Buses can also operate on high occupancy vehicles lanes, freeways, and typical roads.

10.2 TRANSIT

Fixed Route Service – Service provided to a fixed number of destinations at regularly scheduled times. For instance a bus could pick up passengers at the library, every half hour, between 9:00 am and 5:00 p.m., Monday through Friday.

Demand Response Service – Service is not provided on a regularly scheduled basis like fixed route. Instead riders contact the transit call center to schedule a specific trip to meet their needs. Trips to similar origins and destinations are then grouped together to increase overall efficiency.

Ride Guide/Timetable – A Ride Guide or timetable provides information on all of the regularly scheduled transportation services provided by the transit agency. They are often in the form of brochures that can be easily folded into a compact space. Nashua Transit System prints the current schedules in a newspaper format each quarter. Timetables are typically available on buses, at the transit center and key locations such as City Hall.

Transit Center – The hub at which point all buses begin and end service at. In Nashua, the transit center is located between Elm Street and Main Street just north of City Hall.

Bus Shelter – A small building typically enclosed on three sides where passengers can wait for bus service. Timetable information is typically provided in a display board inside.

Bus Pullouts – A large curb cut or paved area adjacent to the roadway where a bus can safely pull out of moving traffic to discharge and pick up passengers.

Boardings and Alightings – Used to refer to the number of passengers getting on (boardings) or getting off (alightings) transit vehicles. Many transit agencies count boardings and alightings on an annual basis to determine the frequency of usage at specific bus stops.

Sources: www.apta.com/research/stats 3/13/07

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

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