
RAILROAD SQUARE TRANSPORTATION STUDY



Prepared by:

Northern Middlesex Council of Governments

For:

Town of Pepperell

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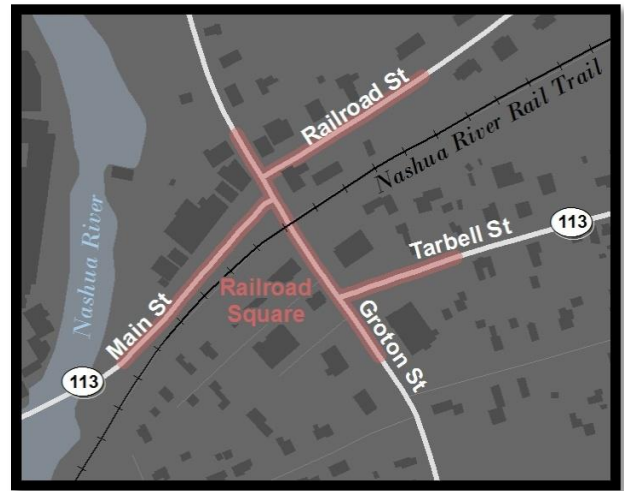
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I. INTRODUCTION

The Northern Middlesex Council of Governments (NMCOG) has undertaken a comprehensive traffic study of the Railroad Square area of Pepperell, Massachusetts. Map 1 outlines the major streets and intersections within the study area, while Map 2 on page 3 shows the location of the study area within the Town. The purpose of the study is to assess existing traffic operations, inventory parking supply, assess transportation needs, and develop recommendations and strategies to improve travel conditions for motorized and non-motorized modes. The findings of the study will assist local decision-makers in addressing future transportation, parking and land use issues within the Railroad Square area.



MAP 1: RAILROAD SQUARE ROADWAYS

Railroad Square functions as the Town's primary central business district and has the character of a typical New England mill village. The eastern end of Main Street is comprised of numerous retail establishments, restaurant and businesses. The Nashua River Rail Trail runs in a general east-west direction through the Square paralleling Main Street and is popular with bicyclists, walkers, equestrians and other users. As a Town gathering place, the Square hosts festivals, road races and other community events, and contains one of the few covered bridges in the Commonwealth. The Prudence Wright Memorial Bridge, located on Groton Street just north of the Square, is an attraction for visitors, artists and local tourists. Originally known as Jo Blood's Fordway, it was one of a handful of places where settlers could cross the Nashua River. In 1742, a bridge was built, and until 1857 it served as the boundary between Pepperell and Groton. Jewett's Bridge survived until 1963, when it was replaced to accommodate automobile traffic generated by Pepperell's post World War II baby boom. In 2010 the bridge was replaced with the covered bridge that residents and visitors see today.



PHOTO 1: HISTORICAL PHOTO OF THE COVERED BRIDGE.

SOURCE: PEPPERELL HISTORICAL COMMISSION

The transportation network within the Square has remained unchanged for decades, even as the town and the region grew and traffic volumes increased. The community recognizes that some modifications may benefit traffic flow and help protect the safety of bicyclists and pedestrians as they travel through the area.

BRIEF HISTORY OF RAILROAD SQUARE

In 1848, the Worcester & Nashua Railroad came to Pepperell and this area of town became known as Railroad Square. At that time, the land east of the Nashua River belonged to Groton. The Worcester & Nashua Railroad constructed a station opposite of the Pepperell Paper Mill, which resulted in a bridge being constructed to join Main Street with Railroad Square in 1851. Around this time the Nashua River was dammed, creating Pepperell Pond. In 1857, Railroad Square, and what was northern Groton at the time, was annexed by the Town of Pepperell. The original bridge, which was constructed of wood, was replaced forty years later. The second bridge was damaged beyond repair by floods in spring of 1936.

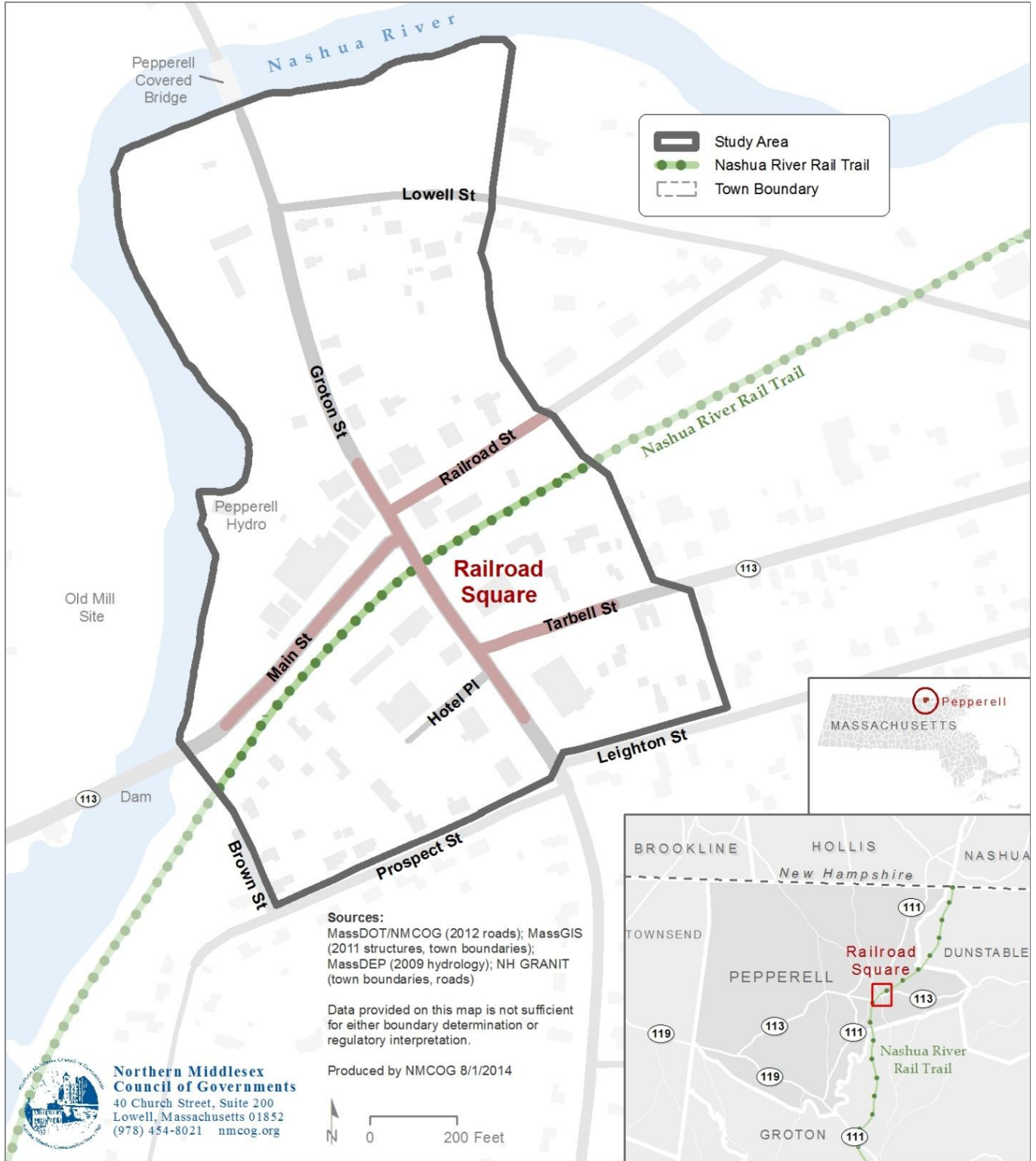


PHOTO 2: HISTORICAL PICTURE OF RAILROAD SQUARE.

SOURCE: PEPPERELL HISTORICAL COMMISSION

In 1886, the Worcester & Nashua line became part of the Boston & Maine Railroad and transported passengers along the line until 1934. Visitors from urban area in Massachusetts came via rail to Pepperell to enjoy the rustic setting that the town provided. Freight cars ran along the rail line until 1981, and in 1984 the tracks were removed.

MAP 2: RAILROAD SQUARE STUDY AREA



II. LAND USE, ZONING AND MUNICIPAL POLICIES

Railroad Square is one of the four major commercial and industrial centers in the Town of Pepperell. The commercial corridor is situated along Main Street, extending from Crescent Street east over the Nashua River to Groton Street, and then south for one block on Groton Street. For purposes of this study, Railroad Square is defined as the section of Main Street east of the Nashua River, across Groton Street to a portion of Railroad Street, and from Groton Street south of the River to Leighton Street (see Map 2 on the previous page). Compared to the other commercial centers in Town, Railroad Square is the only traditional mill village. The Square is quite “walkable” with its zero setbacks and compact line of storefronts, which encourages and invites pedestrian activity along Main Street.

ZONING WITHIN RAILROAD SQUARE

The Railroad Square study area contains approximately thirty-seven (37) acres of land. Map 3 delineates the parcel boundaries within the study area and identifies corresponding zoning classifications. Major land uses include small retail stores and personal service establishments, along with single-family and multi-family residences. There is an ice cream stand along Main Street which attracts bicyclists from the Nashua River Rail Trail. The trail is a significant recreational asset that runs parallel to Main Street. Table 1 below summarizes the zoning districts within the study area based on land area. A Land Use Inventory (LUI) can be found in Appendix B which details the use, ownership, size and zoning classification for each parcel in the study area.

TABLE 1: RAILROAD SQUARE ZONING DISTRICTS

Zoning District	No. of Parcels	Acreage	Percentage
Suburban Residence (SR)	15	1.6	0.4
Urban Residence (UR)	11	8.6	23.6
Commercial (C)	43	26.3	72.0

The most prevalent zoning classification within the study area is Commercial, which comprises 72% of the study area acreage. Commercial businesses are primarily concentrated along Main and Groton Streets. Both Suburban Residence (SR) and Urban Residence (UR) zoning districts are located toward the outer edges of the study area.

The former mill site is the only area in town to which the Mixed Use Overlay District (MUOD) Bylaw has been applied. Section 8500 of the Zoning Bylaw allows mixed-use development by Special Permit in the Commercial or Industrial Districts, provided the area is at least five (5) acres (inclusive of wetlands). The goal of the MUOD is to:

- create mixed commercial, residential and open space areas;
- encourage pedestrian activity, and reduce traffic congestion and air pollution;
- provide opportunities for retail services, housing and employment in close proximity; and
- encourage the sharing of parking lots and driveway curb cuts, thereby minimizing the amount of paved parking surface area

PEPPERELL POLICY DOCUMENTS AND PREVIOUS STUDIES

The Town of Pepperell has devoted significant resources in planning for the continued and future vitality of its commercial centers, including Railroad Square. These efforts have resulted in a number of strategies to ensure the continued vitality of the area through the recommendations outlined in the Comprehensive Plan Update and Downtown Business District Study, along with the addition of the Mixed Use Overlay District for the former mill site.

The *Town of Pepperell Comprehensive Plan Update* identified as a priority the desire of residents to preserve the town’s remaining rural landscape and reduce sprawl. The document recommended directing future growth in and around its existing commercial and neighborhood centers. The Comprehensive Plan was framed around the following four goals:

Goal 1: Protect Pepperell’s rural heritage while fostering traditional growth patterns.

Goal 2: Revitalize Pepperell’s economy.

Goal 3: Plan and manage public infrastructure.

Goal 4: Facilitate communication and collaboration between departments, committees, and Pepperell Citizens.

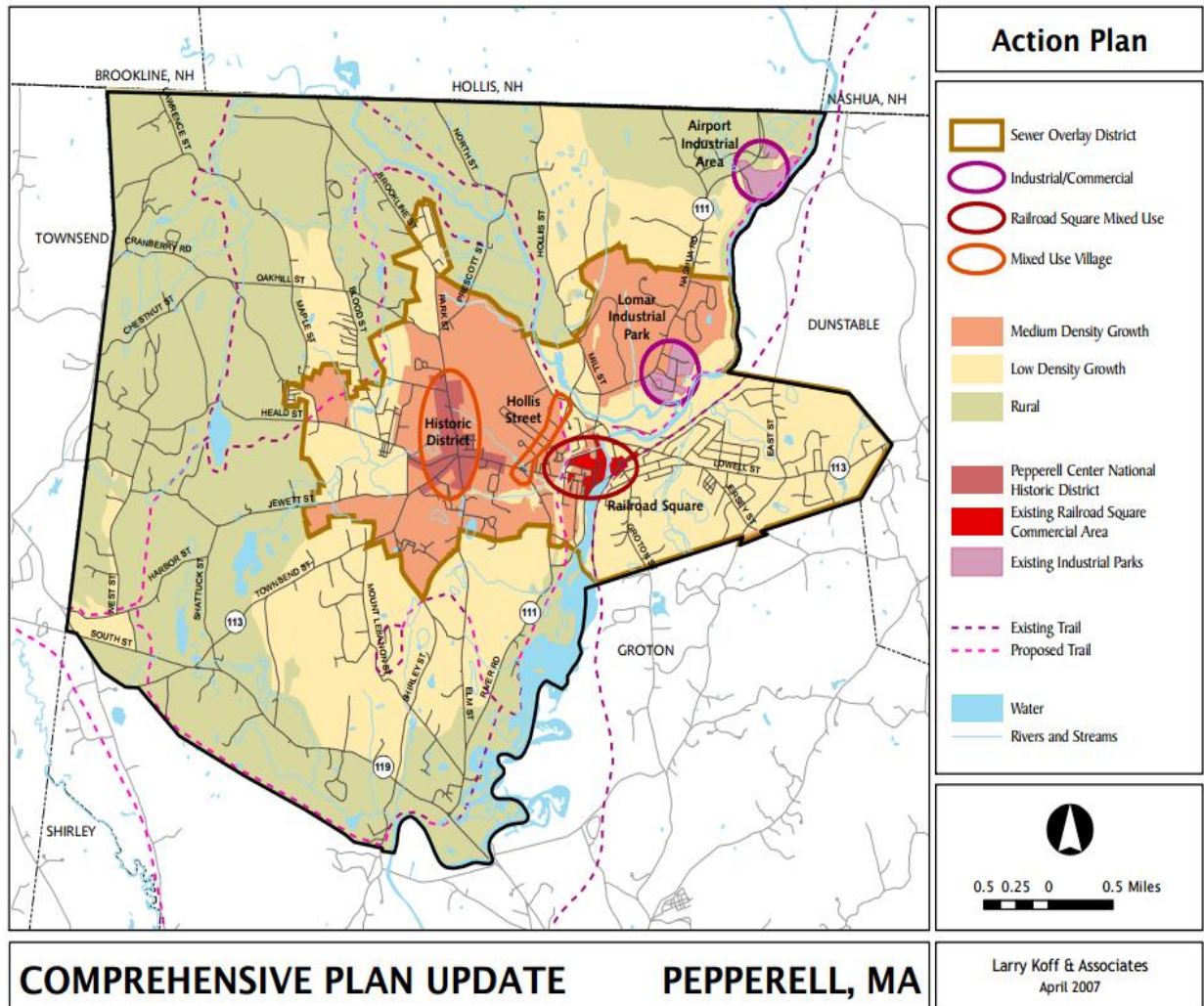
The Town developed an action plan (see Figure 1 on the following page) with a range of growth management strategies to deter sprawl and retain its traditional settlement pattern. The action plan envisions concentrated growth around commercial and industrial areas, including mixed use development within Railroad Square.

Specific to the Railroad square study area, the update identifies the following economic development and transportation strategies to improve the Railroad Square business areas:

- Focus development in Railroad Square and existing industrial parks to protect Pepperell’s rural character.
- Utilize the existing Mixed Use Overlay District as incentive for revitalization.
- Adopt design standards to reinforce the historic character of Railroad square.
- Utilize the presence of the Nashua River and the Nashua River Rail Trail.
- Improve roadway standards for new roads so that they are in scale with local rural character and Low Impact design principles.
- Undertake needed intersection improvements at high accident and problem intersections.

- Coordinate sidewalk planning and trail system planning to provide a better pedestrian network.
- Develop a long term plan for trails system connectivity and maintenance.

FIGURE 1: ACTION PLAN FOR GROWTH MANAGEMENT AREAS



Source: Town of Pepperell Comprehensive Plan Update, 2007-2016

Only 3.3 percent of the parcels in the Town of Pepperell are zoned for commercial or industrial use. The Town officials are working to add more commercial property to the tax base in order to address structural budget deficits that have challenged the community over the past few years. The *Pepperell Downtown Business District and Mill Site Preliminary Assessment* addressed the potential redevelopment of the vacant former paper mill property and outlined strategies for improving the business district.

To encourage the redevelopment of the mill site the Town adopted a Mixed Use Overlay Zoning Bylaw which encourages increased density, inclusionary housing, and mixed use development on the mill site property. The assessment described several assets and obstacles to business and real estate development within the commercial district. The following assets specific to the Railroad Square study area included:

- Compact, pedestrian-oriented layout;
- The Nashua Rail Trail brings visitors to the area;
- Daily traffic counts provide a volume of potential customers; and
- The MUOD Overlay District is amenable to mixed use residential and commercial development.

The only obstacle specific to the Railroad Square study area that outlined in the assessment is that the business mix is almost entirely convenience goods and personal services, which may not attract non-local customers.

III. PUBLIC OUTREACH PROCESS

Public outreach supports the exchange of ideas and information among interested individuals and groups. As part of the Railroad Square Transportation Study, Northern Middlesex Council of Governments (NMCOG) distributed a written survey to businesses located in the study area. This survey assisted in identifying and assessing the parking and transportation issues that are of concern to the Railroad Square business community. A copy of the survey instrument is included in Appendix A.

On May 29, 2014, NMCOG staff canvassed the Square and hand delivered the survey to each business. In order to achieve the best response rate, NMCOG staff provided two options for completing the survey. Businesses could either complete the survey immediately while NMCOG staff waited, or they could complete the survey at a later time and return it by mail.

SURVEY RESULTS

Twenty-five (25) surveys were distributed and ten (10) completed surveys were returned, for a response rate of 40%. Some of the businesses in Railroad Square chose to not fill out the survey but nonetheless discussed the transportation issues at Railroad Square with NMCOG staff. The concerns that were orally conveyed are as follows:

- There is not enough parking at the privately-owned lot behind the Main Street businesses for all business employees. If all business employees were allowed to park at the privately-owned lot, spaces would be freed up along Main Street for patrons.
- According to the business owner, the Rail Trail attracts 6,000 – 7,000 people on the weekends; and that number doubles during holidays.
- The Rail Trail has not helped to attract customers or new businesses to Main Street.
- The Rail Trail needs comfort stations (restrooms, watering fountains, etc.) for the trail users.
- Trail users park on Main Street, which takes up parking spaces for Main Street business customers; as a result Main Street businesses have lost business.
- Because of inadequate parking supply, employees are parking right in front of businesses, occupying valuable spaces that could be used by customers.
- There is a need for signage, metering, delineation, and enforcement of parking for the Rail Trail versus Main Street businesses.
- Rail Trail is not maintained or and the rules of use are not enforced properly.
- Parking configuration on Main Street should be different.
- Building owners on Main Street are strapped when they want to do anything to the building; there are permits for everything.
- We need to attract more businesses to Pepperell.
- A bicycle service station would be a good business to bring to Main Street.

- One business owner indicated that parking is not an issue.

The ten-question survey asked that business owners provide background information regarding where their employees and customers/ clients park, provide their perspective on the impacts of the Nashua River Rail Trail, and offer their suggestions on ways to improve parking, walking or bicycling within Railroad Square. Table 2 lists the businesses that responded to the survey.

TABLE 2: LIST OF SURVEY RESPONDENTS

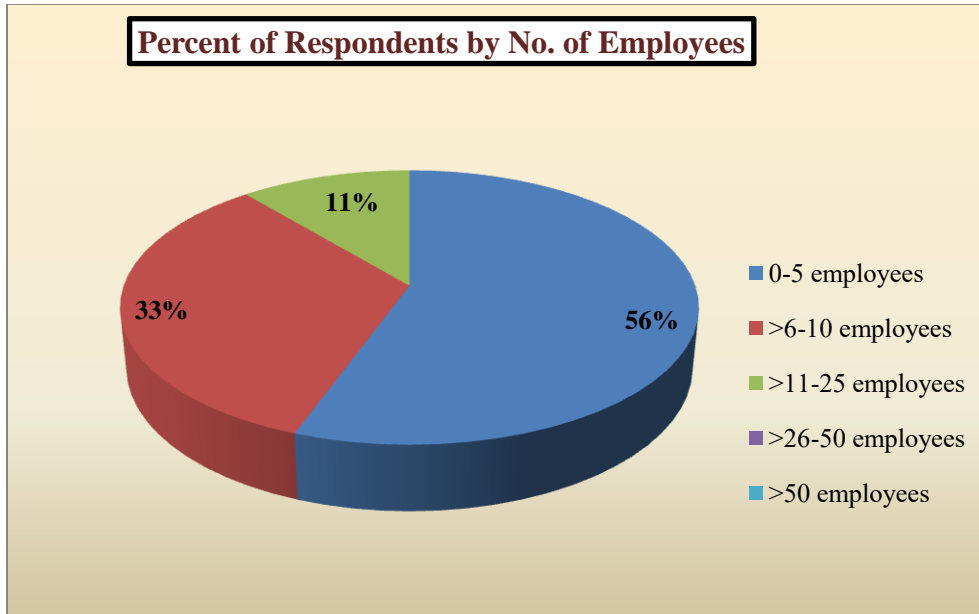
Business Name	Address
Tick's Boutique	156 Main Street
Auto Value (Carparts of Pepperell)	166 Main Street
Kemp's Service Station	52 Groton Street
Benefits to Marketing	4 Railroad Street
Lowell Five Cent Savings Bank	65 Groton Street
7-Eleven	2 Tarbell Street
Arch Fitness	152 Main Street
Wellesley Therapeutic Services Inc.	2 Tarbell Street
Therapeutic Massage of Pepperell	150 Main Street
Charlotte's Cozy Kitchen	142 Main Street

The following section summarizes the responses to each survey question.

QUESTION #1 – HOW MANY EMPLOYEES WORK AT YOUR BUSINESS?

Five (5) businesses (56%) indicated that they have less than five (5) employees, three (3) businesses (33%) employed six (6) to ten (10) employees and one (1) business (11%) employed eleven (11) to twenty five (25) employees. One respondent did not answer this question. Figure 2 below graphically displays the percentage of responding businesses by employment size.

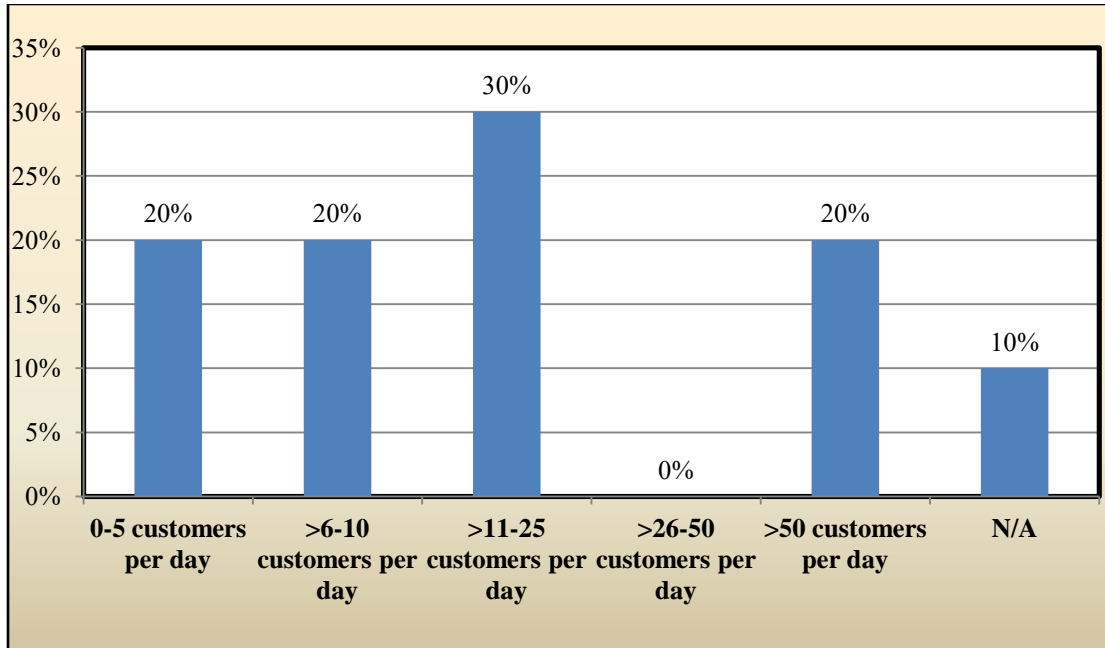
FIGURE 2: RAILROAD SQUARE BUSINESS RESPONDENTS BY EMPLOYMENT SIZE



QUESTION #2 – ON A TYPICAL DAY, HOW MANY CUSTOMERS/CLIENTS FREQUENT YOUR BUSINESS?

Question two (2) asked each business to estimate the number of customers/ clients that frequent the business on a typical day. The results show that for those businesses responding, the number of customers varies widely, depending on the specific type of business. Two (2) businesses or twenty percent (20%) reported having an average of zero (0) to five (5) customers/ clients per day, while two businesses (20%) that responded that they average six (6) to ten (10) customers/clients per day. Three (3) businesses (30%) responded that they had eleven (11) to twenty-five (25) customers per day, and two businesses (20%) indicated that they have more than 50 customers/clients per day. One (1) business (10%) responded that the question as not applicable. Figure 3 provides a breakdown by percentage of the responses to Question #2.

FIGURE 3: RAILROAD SQUARE BUSINESSES RESPONDING BY CUSTOMERS/CLIENTS PER DAY



QUESTION #3 – WHERE DO YOUR CUSTOMERS PARK?

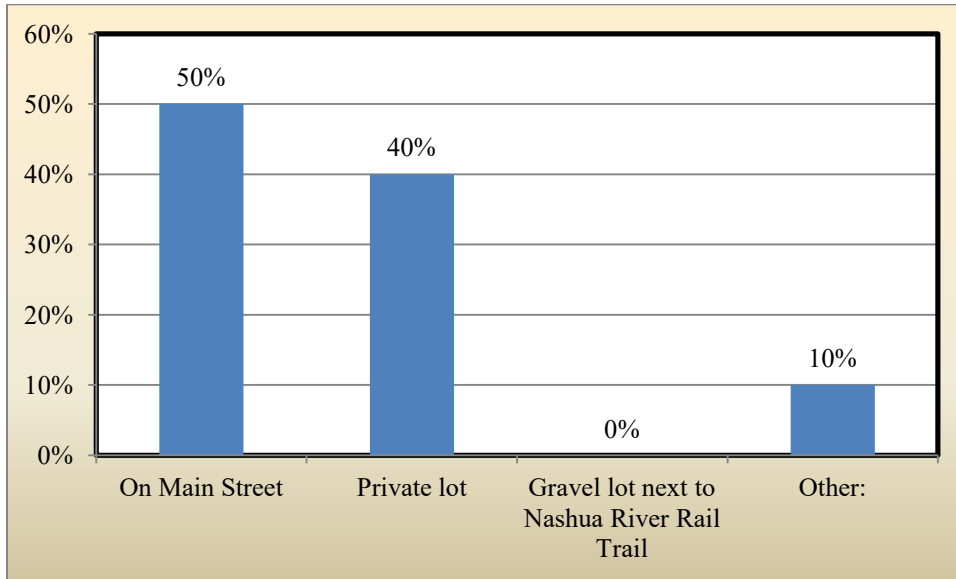
The survey queried the location of customer parking for each business. Survey results showed that business customers use multiple parking areas and some respondents indicated that their customers park in multiple locations. According to the responses from the survey, fifty percent (50%) of customers parked on Main Street, forty percent (40%) parked at a private lot and ten percent (10%) indicated that the customers park at the rear of the building or answered other. No of the respondents indicated that customers/ clients park in the Nashua River Rail Trail lot. Figure 4 shows the number of responses received for each parking location within the study area.

TABLE 3: LOCATION OF CUSTOMER/CLIENT PARKING

On Main St.	Private Lot	Gravel lot next to Nashua River Rail Trail	Other
5	5	0	1

Note: One business allowed customers in front and to the side of the business, entirely on the business' lot.

FIGURE 4: CUSTOMER/CLIENT PARKING LOCATIONS



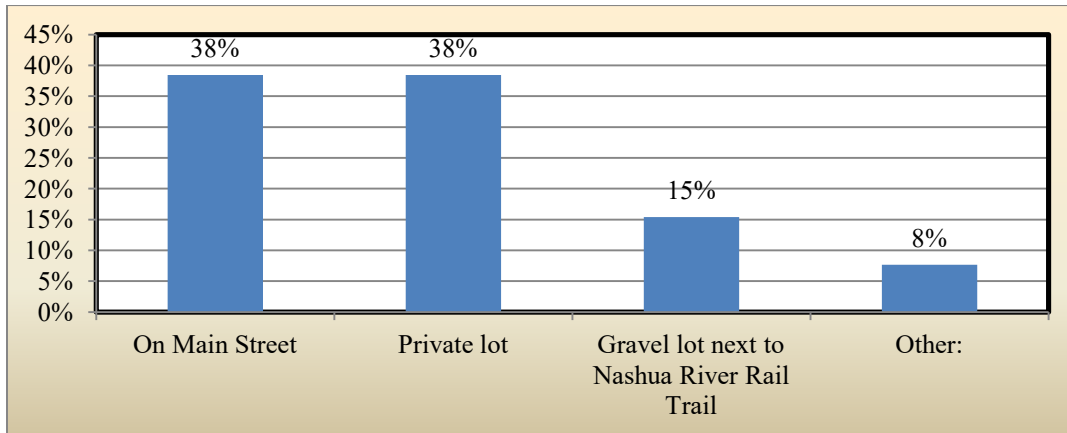
QUESTION #4 – WHERE DO YOUR EMPLOYEES PARK?

Businesses provided information on where their employees park in response to Question #4. Seventy five percent (75%) of the respondents stated that employees parked at either the private lot behind the businesses or on Main Street. Fifteen percent (15%) of the respondents stated that their employees parked at the gravel lot next to the Nashua River Rail Trail. One respondent stated that employees parked on the premises of the building. Some respondents answered Question #4 with multiple responses. Figure 5 graphically displays the parking locations used by employees of those businesses responding to the survey.

TABLE 4: LOCATION OF EMPLOYEE PARKING

On Main St	Private Lot	Gravel lot next to Nashua River Rail Trail	Other
5	4	2	1
Note: Two of the respondents identified multiple locations			

FIGURE 5: PARKING LOCATIONS UTILIZED BY EMPLOYEES



QUESTION #5 – WHAT ARE YOUR HOURS OF OPERATION?

As shown in Table 5, on a typical weekday the majority of businesses that responded open between 7:30 a.m.– 8:30 a.m. and close between 4 – 6 p.m. One business is open twenty-four hours per day, seven days per week. Three of the businesses surveyed open for limited hours or by appointment only. Some respondents did not answer this question.

On Saturday, most businesses are open during the first part of the day, although two businesses are closed. Similar to weekday conditions, most businesses open between 8:00 a.m. and 9:00 a.m. on Saturdays. Survey respondents indicated that two (2) of the six (6) businesses close at noon, one closes at 1 p.m., and another closes at 4:00 p.m.

With the exception of the 7-Eleven Store, there is very little business activity within Railroad Square on Sundays. As indicated in Table 5, most retail and personal services operations are closed throughout the day.

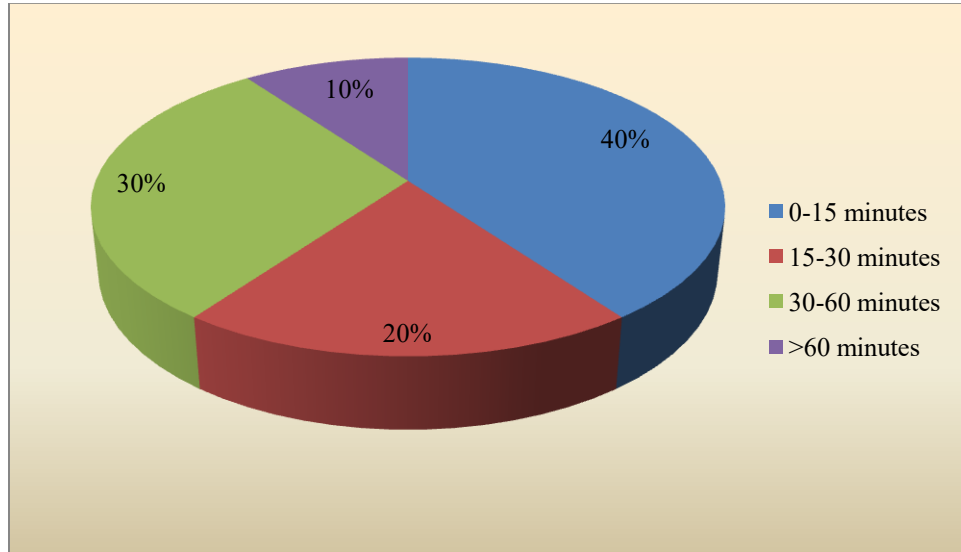
TABLE 5: HOURS OF OPERATION FOR RESPONDING BUSINESSES

Name of Business	Weekday Hours	Saturday Hours	Sunday Hours
Arch Fitness	Only open 2-3 hours per day	Only open 2-3 hours per day	Closed
Lowell Five Savings Bank	8 a.m. - 6 p.m.	8 a.m. - 12 p.m.	Closed
7-Eleven	Open 24 hours	Open 24 hours	Open 24 hours
Tick's Boutique	8:30 a.m. - 9 p.m.	9 a.m. - 4 p.m.	Closed
Benefits to Marketing Inc.	8 a.m. - 4 p.m.	Closed	Closed
Kemp's Service Station	8 a.m. - 5 p.m.	8 a.m. - 12 p.m.	Closed
Auto Value (Carparts of Pepperell)	7:30 a.m. - 5 p.m.	8 a.m. - 1 p.m.	Closed
Wellesley Therapeutic Services, Inc.	Wed - Fri: 7 a.m.- 12 p.m./ Tues – Thurs: 10 a.m. - 7:30 p.m.	Closed	Closed
Therapeutic Massage of Pepperell	By appointment (9 a.m. - 9 p.m.)	By appointment (9 a.m. - 9 p.m.)	Closed

QUESTION #6 – ON AVERAGE, HOW LONG DO YOUR CUSTOMERS STAY AT YOUR BUSINESS?

As shown in Figure 6, four (4) businesses (40%) reported that customer/client transactions last less than 15 minutes. Two (2) businesses (20%) reported customer transactions averaging between 15-30 minutes, three (3) businesses (30%) reported 30 – 60 minutes, and only one (1) business (10%) reported customers/ clients staying for longer than an hour.

FIGURE 6: REPORTED LENGTH OF CUSTOMER/CLIENT TRANSACTION



QUESTIONS 7 & 8– WHAT IS YOUR BUSIEST TIME DURING THE DAY AND YOUR BUSIEST DAY OF THE WEEK?

To better understand peak periods of business activity in Railroad Square, respondents were asked to identify the busiest time period during a typical week. While responses varied widely, the busiest time of the week was reported to be Fridays before 9 a.m. and between 3 – 6 p.m., as shown in Table 6. The gas station, diner, and convenience store reported a morning rush on Fridays. The gas station, convenience store, and bank all reported an afternoon peak on Fridays as well. It should be noted that some respondents gave multiple answers regarding their busiest times.

TABLE 6: PEAK HOURS OF BUSINESS IN RAILROAD SQUARE

Day of the week	Before 9 a.m	9 a.m. - 11 a.m.	11 a.m. - 3 p.m.	3 p.m. - 6 p.m.	6 p.m. - 10 p.m.
Monday	1	1		1	1
Tuesday		1			1
Wednesday			1		
Thursday					
Friday	3	1	1	3	
Saturday	1	2			
Sunday	1	1			

QUESTION #9 – THE NASHUA RIVER RAIL TRAIL HAS...?

Question 9 was included to assess whether the Nashua River Rail Trail has impacted area businesses. As shown in Table 7, most respondents (56%) indicated that there has been no impact to their business as a result of the rail trail. Thirty (30) percent reported an increase in business, while only two (2) businesses or 22%, felt that the rail trail had negatively impacted their business. Of the two business negatively impacted, one mentioned that users of the trail took up parking spaces that would otherwise be used for customers, while another stated that bicyclists constantly coming in looking for repairs or air (services that they do not provide). The three businesses that have benefited include a restaurant/ice cream parlor, a convenience store, and a fitness center.

TABLE 7: BUSINESS IMPACT OF THE NASHUA RIVER RAIL TRAIL

Helped my business	Hurt my business	Had no impact
3 (30%)	2 (22%)	5 (56%)

QUESTION #10–DO YOUR CUSTOMERS/ CLIENTS HAVE DIFFICULTY PARKING WITHIN RAILROAD SQUARE? IF SO, AT WHAT TIME OF DAY IS PARKING MOST DIFFICULT?

In answering the question of whether customers/clients have difficulty parking, forty four (44) percent responded “yes”, while forty four (44) percent of respondents answered “no”. One respondent answered that they experience parking issues “sometimes”, and other respondents choose not to answer the question.

The second part of the question asked businesses to state the time of day that parking is most difficult. Saturday mornings were the most common response, but respondents also felt that all day Saturday, Friday evening, late mornings and afternoons all were difficult times to park.

QUESTION #11–DO YOUR CUSTOMERS/ CLIENTS HAVE DIFFICULTY WALKING AROUND THE SQUARE DUE TO THE LACK OF PEDESTRIAN ACCOMMODATIONS?

Question 11 asked if customers/ clients experience difficulty walking around Railroad Square. Only thirty three (33) % of the respondents said that their customers/ clients did had trouble walking around the Square, while sixty six (66) % of the respondents survived replied that their clients did not have trouble. Question 11 also asked for comments regarding walking around Railroad Square and the following remarks were received:

- Need more crosswalks.
- Parking is limited.
- Crossing can be scary as people go quickly.
- Crosswalks are almost non-existent to drivers-they don't pay attention.

QUESTION #12–DO YOUR CUSTOMERS/ CLIENTS HAVE DIFFICULTY MOVING AROUND RAILROAD SQUARE BY BICYCLE?

Question 12 asked if the customers/ clients have a hard time navigating Railroad square by bicycle. This question was met with an overwhelming (87.5%) negative response, meaning that the businesses surveyed felt that their customers/ clients had no problem moving around Railroad Square by bicycle. The second part of the question asked for comments from the businesses regarding customers on bicyclists and only two businesses commented. One comment stated that customers/ clients on bicycles were a rare sight and the other commented that the bicyclists should not be riding on the sidewalk.

QUESTION #13–DO YOU HAVE ANY ADDITIONAL SUGGESTIONS FOR IMPROVING TRANSPORTATION WITHIN RAILROAD SQUARE?

Respondents offered many suggestions for improving transportation within Railroad Square. The following provides a summary of suggestions:

- More notification to motorists that there is a bike crossing. Also when backing out of parking spots, vehicles don't like to let you go. They zoom around you because the street is wide and they can.
- More stop signs
- Make stop sign besides the Spa on Groton Street larger. Most people drive through it. Educate bicycle riders that they need to stop at stop signs.
- Find some parking for rail trail and enforce it.
- Customers who are parked in front of store have a very difficult time backing up; traffic does not let most people out.

IV. TRANSPORTATION ASSESSMENT

To assess the traffic conditions on both weekdays and weekends, seven-day traffic volume counts were conducted along key roadways in the study area. In addition, manual turning movement counts were performed at key intersections during both AM and PM peak travel periods. The traffic operations analysis and assessment includes safety conditions and accident history, level of service, parking, and bicycle/pedestrian facilities. The following section examines existing roadway and intersection characteristics, as well as existing and projected operating conditions within the study area.

ROADWAY CHARACTERISTICS

Each major roadway within the study area is described below in terms of roadway classification, land use, and the presence of bicycle and pedestrian accommodations.

Tarbell Street:

Tarbell Street includes the section of State Route 113 that runs between the spot where Lowell Road leaves Route 113 and to the intersection of Groton Street. This two-lane road is classified by MassDOT as an urban principal arterial, and is approximately 0.43 miles long. Single and multi-family homes make up the majority of buildings at the eastern end of Tarbell Street. As Tarbell Street nears Groton Street, the primary land uses are commercial. Tarbell Street has two crosswalks, as well as a sidewalk that runs along the eastbound side of the roadway for the entire length of the street.

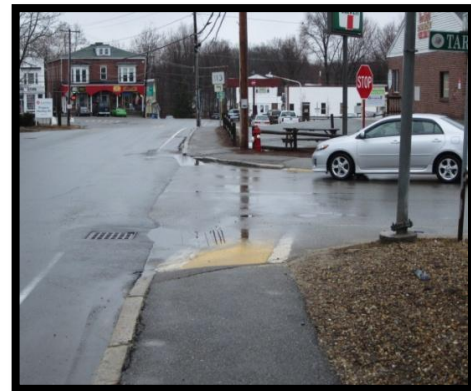


PHOTO 3: INTERSECTION OF
TARBELL AND GROTON ST

Groton Street:

Groton Street is classified as an urban minor arterial roadway and has a north/ south orientation.



PHOTO 4: GROTON STREET

The roadway intersects Route 113 at Railroad Square and is the border between Tarbell Street to the east and Main Street to the west. Land uses are primarily commercial within Railroad Square, and predominantly single family residences once outside of the Square. The section of Groton Street in the study area extends between Lowell Street and Prospect Street, an approximate distance of 0.28 miles.

Main Street:

Main Street runs east-west, from the Groton Street intersection in Railroad Square to the intersection of Townsend, Elm and Park Street, west of Town Hall. Classified as an urban principal arterial, the roadway is also listed as State Route 113 west of Groton Street, until the Townsend, Elm and Park Street intersection. This study examines Main Street from Groton Street to the Mill Street.



PHOTO 5: MAIN STREET

Railroad Street:

Railroad Street is functionally classified as a local road and extends for 0.19 miles in an east-west direction between Lowell Road and Groton Street. The roadway connects to Groton Street at a T- intersection just north of the main Railroad Square intersection. This low volume roadway primarily serves residential land uses, with a few businesses located closer to the Groton Street intersection.



PHOTO 6: RAILROAD STREET

Hotel Place:

Hotel Place is classified as a local road, and is located off Groton Street directly south of Main Street. The road is approximately 0.13 miles long and adjacent land uses include small businesses as well as some single- and multi-family residences.



PHOTO 7: HOTEL PLACE

Mill Street:

Mill Street is a two-lane roadway, with 12-foot travel lanes west of the Study Area. This roadway serves as the main entrance to the proposed 1-A Auto development project located on the former Pepperell Paper Mill site.

INTERSECTION CHARACTERISTICS

This section examines existing traffic flow patterns, geometrics, bicycle and pedestrian movements, and parking at the following study area intersections:

- Groton Street at Main (Route 113);
- Tarbell Street (Route 113) at Groton Street; and
- Groton Street at Railroad Street.

Intersection of Groton Street at Main Street:

Groton Street is laid out in a North/ South orientation and forms a T-intersection with Main Street at Railroad Square. Route 113, which follows Groton and Main Street in Railroad Square,



PHOTO 8: INTERSECTION OF MAIN STREET AND GROTON STREET

is one of Pepperell’s major travel corridors, connecting the community with the Town of Dunstable to the east and Townsend to the west. Route 113 also provides connections to US Route 3 and to Route 111.

The intersection where Main Street and Groton Street meet is a large open paved area with stop sign traffic control for all Main Street movements and Groton street southbound

movements. Traveling eastbound on Main Street towards the Groton Street intersection, the roadway widens to approximately 84 feet and the eastbound lane splits into dedicated turning lanes. A dedicated right turn lane has been striped to accommodate traffic heading eastbound on Route 113. Traffic that turns left at the end of Main Street has a dedicated lane with stop sign control. The two lanes are separated and delineated by a striped median painted in the roadway. With the skewed alignment of the intersection, vehicles that wish to travel on to Railroad Street must first turn left at the intersection and head north before turning right onto Railroad Street. This could be a cause of confusion for operators of vehicles passing through the intersection.

The Groton Street approach from the north has one lane dedicated to all turning movements and is stop sign controlled. Traveling northbound, faded pavement markings delineate an exclusive left turn lane and a through movement lane on Groton Street. Main Street vehicles yield to Groton Street northbound turning movements, as this direction does not stop in the intersection. Traffic looking to turn left on to Main Street from Groton Street defers to Groton Street traffic heading southbound. Southbound traffic north of Railroad Square on Groton Street is stop controlled.

Tarbell Street at Groton Street:

Groton Street and Tarbell Street form an unsignalized T-intersection with all turns allowed. The intersection is located directly south of the Groton/ Main Street intersection. All approaches consist of a single general-purpose lane. Sidewalks are present on the east side of Groton Street, and a crosswalk is provided on Tarbell Street. A stop sign controls traffic on the Tarbell Street approach. Traffic on Groton Street is allowed to flow freely without traffic control.



PHOTO 9: INTERSECTION OF GROTON AND TARBELL STREET

Groton Street at Railroad Street:

Groton Street at Railroad Street is classified as a T-intersection. Traffic heading southbound on Groton Street is controlled by a stop sign directly north of Main Street, while traffic along the rest of Groton Street flows through without any traffic control.

Railroad Street intersects with Groton Street north of the Main Street intersection and then heads east from Groton Street. Traffic wishing to travel westbound on Main Street from Railroad Street must enter the intersection almost parallel or slightly ahead of the stop line on Groton Street, and navigate through the intersection and the oncoming traffic to access Main Street westbound.



PHOTO 10: INTERSECTION OF GROTON STREET AND RAILROAD STREET

Mill Street at Main Street

Main Street and Mill Street form a four-way unsignalized intersection. All four approaches consist of a single general purpose lane. Sidewalks are provided on the north side of Main Street and on the east side of Mill Street. Crosswalks are provided on all four approaches.

While this intersection is west of the study area, the A1 Auto development project will add vehicular traffic to this intersection, which has sight distance deficiencies for vehicles turning from Mill Street and looking eastbound. A multi-family home and retaining wall, as well as the curve on Main Street, makes this location one that requires mitigation. The proponents of the planned development proposal have outlined some mitigation strategies which will be further discussed later in this report.



PHOTO 11: MAIN STREET APPROACH TO THE MILL STREET/CANAL STREET INTERSECTION

TRAFFIC VOLUMES AND TURNING MOVEMENTS

Automated traffic recorder (ATR) counts were collected along key roadway segments in and around Railroad Square. The counts quantify the traffic volumes moving through the area on a daily basis and help to identify peak travel times. Table 8 shows the Average Daily Traffic (ADT) volumes within the study area and Map 3 on page 21 shows the location of each count. Full traffic count data is provided in Appendix G.

Main Street west of Groton Street experiences the highest traffic volumes within the study area, with an ADT of 11,400 vehicles per day. Traffic volumes on Main Street decrease towards the Mill Street intersection, with an ADT of 9,100 vehicles per day. Traffic volumes increase the closer one gets to Railroad Square, this holds true on Groton Street as well. Groton Street south of Main Street had the second highest traffic volume, with an ADT of 9,600 vehicles per day. Further away from Railroad Square on Groton Street, the traffic volumes drop. Groton Street

south of Tarbell Street has an ADT of 3,500 vehicles, while the Groton Street location north of Railroad Street has an ADT of 2,700 vehicles per day.

As shown in Table 8 below, the highest traffic volumes within the study area are along the Route 113 corridor, especially within the retail area of Railroad Square.

TABLE 8: AVERAGE DAILY TRAFFIC VOLUMES (2013)

Location	Average Daily Traffic (ADT), Vehicles Per Day (VPD)	P.M. Peak Hour Volume	A.M. Peak Hour Volume
Groton Street north of Railroad Street	2,700	245	199
Groton Street south of Main Street (Rte 113)	9,600	1,011	784
Groton Street south of Tarbell Street (Rte 113)	3,500	384	309
Hotel Place west of Groton Street	310	58	20
Main Street (Route 113) east of Mill Street	9,100	798	742
Main Street (Rte 113) west of Groton Street	11,400	1027	765
Railroad Street east of Groton Street	410	39	31

Manual Turning Movement Counts (TMCs) were collected in March and April 2013 during peak hour travel periods of the day (7:00 – 9:00 A.M. and 4:00 – 6:00 P.M.). Tables 9 and 10 summarize the turning movement count data for the A.M. and P.M. peak periods. For purposes of analysis, this study examined two distinct intersections: (1) Main Street (Route 113) at Groton/ Railroad Street; and (2) Tarbell Street (Route 113) at Groton Street.

During the morning peak travel period, the majority of traffic is travelling to major travel routes and employment centers outside of Pepperell, such as US Route 3 and the employment hubs of Lowell, MA and Nashua, NH. A reversal of this trend can be seen during the evening peak hours, as people return home from work and activities within the community. The two study area intersections experienced a dramatic increase in traffic volumes during the P.M. peak travel period, when compared to the A.M. peak hour. Figures 7 and 8 show the peak hour turning movement volumes for each intersection, while Tables 9 and 10 show the number of vehicles processed through each intersection during the peak hour for the A.M. and P.M. peak periods, as well as the directional distribution of traffic.

MAP 3: RAILROAD SQUARE – TRAFFIC COUNT DATA LOCATIONS AND VOLUMES

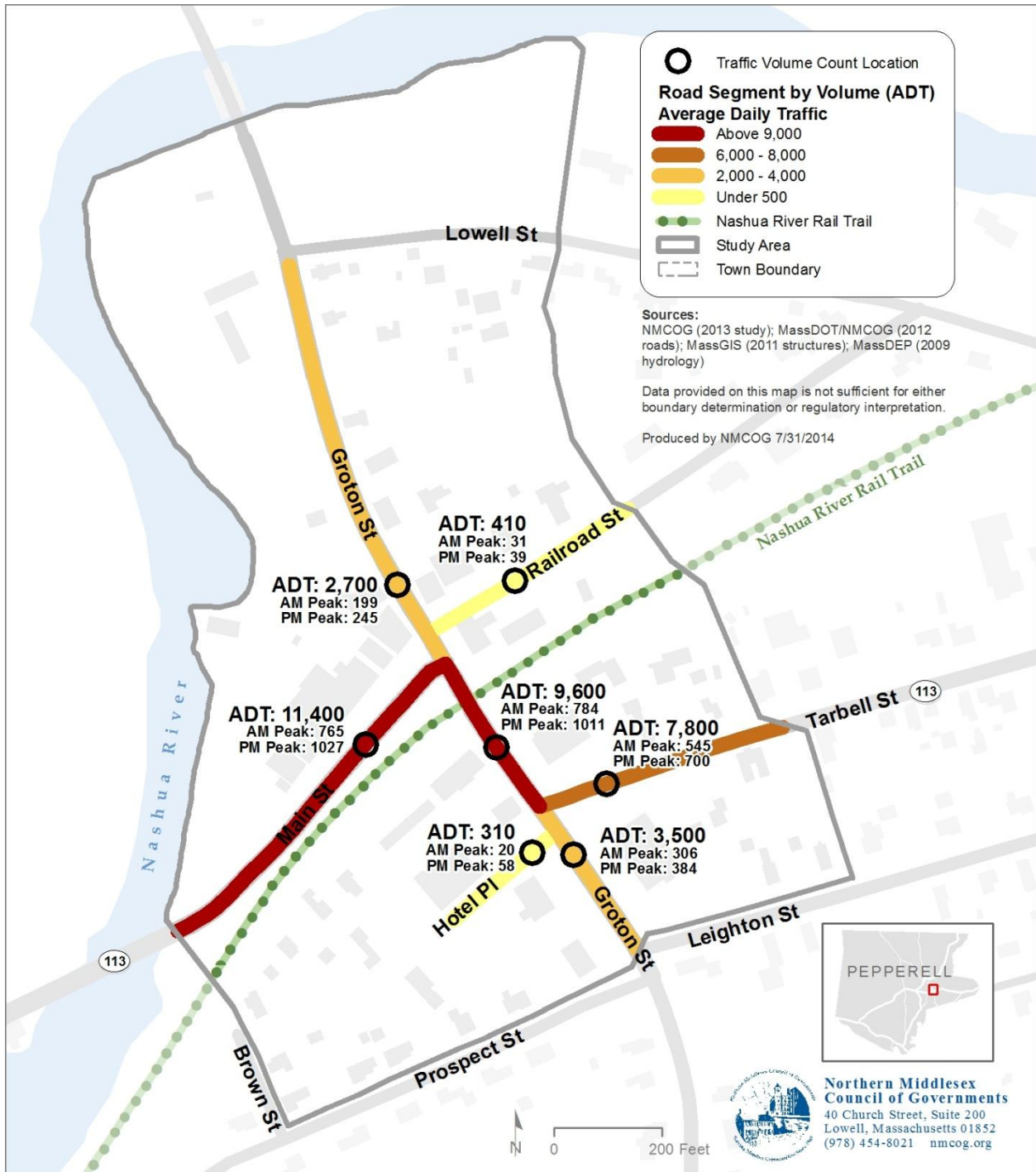


TABLE 9: INTERSECTION TURNING MOVEMENT VOLUMES AND DIRECTIONAL DISTRIBUTION (AM PEAK)

Intersection	A.M. Peak Period				
	No. of vehicles processed through intersection	Percent Directional Distribution			
		Southbound	Westbound	Northbound	Eastbound
Main Street (Route 113) at Groton/ Railroad Street	868	18%	3%	28%	51%
Groton Street at Tarbell Street (Route 113)	844	62%	23%	14%	N/A

TABLE 10: INTERSECTION TURNING MOVEMENT VOLUMES AND DIRECTION DISTRIBUTION (PM PEAK)

Intersection	P.M. Peak Period				
	No. of vehicles processed through intersection	Percent Directional Distribution			
		Southbound	Westbound	Northbound	Eastbound
Main Street (Route 113) at Groton/ Railroad Street	1,023	11%	2%	55%	32%
Groton Street at Tarbell Street (Route 113)	1,006	40%	38%	21%	N/A

FIGURE 7: PEAK HOUR TURNING MOVEMENT COUNTS AT MAIN STREET/RAILROAD STREET AND GROTON STREET

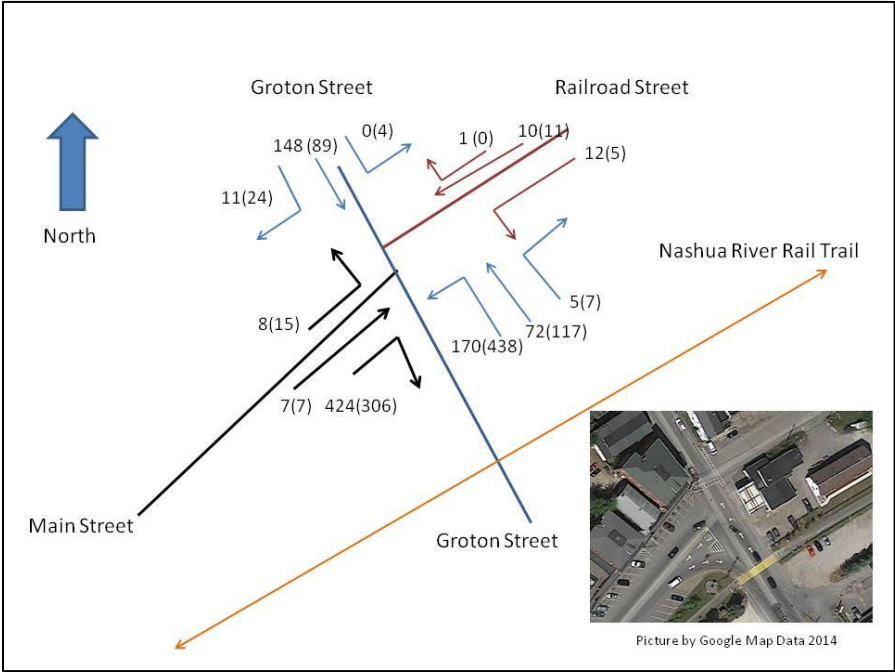
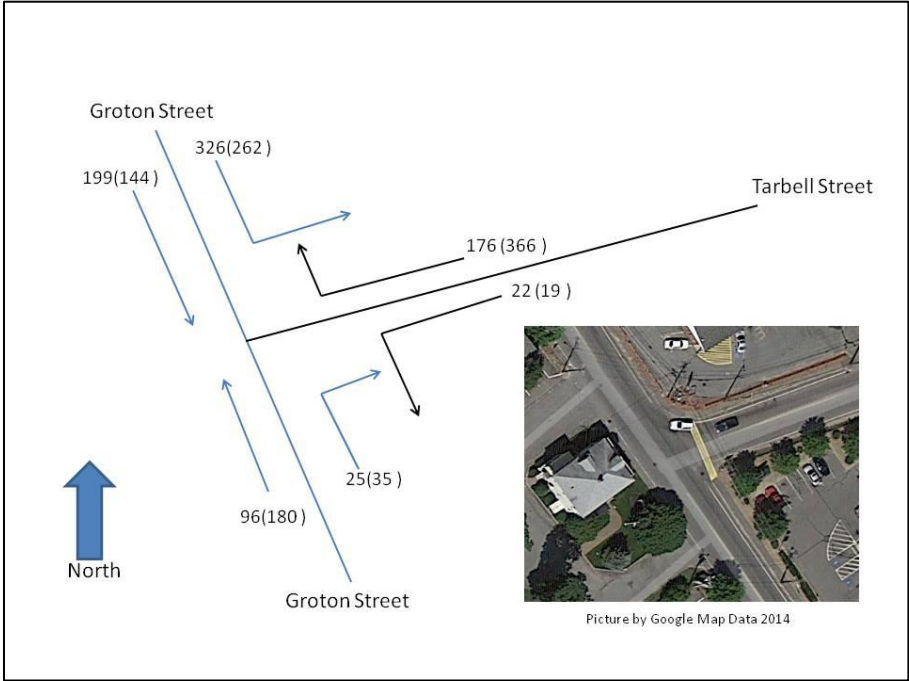


FIGURE 8: PEAK HOUR TURNING MOVEMENT COUNTS AT GROTON STREET AND TARBELL STREET



TRAFFIC OPERATIONS

Traffic operations within the study area were analyzed using accepted traffic analysis techniques. The level of service (LOS) was calculated for the morning and evening peak travel periods. Level of Service (LOS), as defined within in the Institute of Traffic Engineer's *Highway Capacity Manual*, is used to qualitatively describe general operating conditions based on performance measures such as control delay, speed and travel time, freedom to maneuver, traffic interruptions, and comfort and convenience. There are six levels of service ranging from A (free flow conditions) to F (highly delayed conditions). LOS takes into account factors specific to each location, such as traffic volume, roadway capacity, speed, roadway grade, traffic control devices, geometry, and delay. LOS A through D is considered acceptable in areas like Railroad Square, while LOS E and F indicate delay and congestion warranting mitigation. Level of Service worksheets can be found in Appendix I.

Level of Service (LOS) for a two-way stop-controlled intersection is determined by the computed or measured control delay. Control delay at an unsignalized intersection is the result of vehicle delay associated with a traffic control device. Control delay includes initial deceleration delay, stopped delay, queue move up time, and final acceleration delay.

LOS is determined for each minor street movement, as well as for major street left turns, using criteria described in Table 11. LOS is not defined for the major street approaches or for the overall intersection for three primary reasons: (1) major street through vehicles are assumed to experience zero delay; (2) the disproportionate number of major street through vehicles at a typical two-way stop-controlled intersection skews the weighted average of all movements, resulting in a very low overall average delay for all vehicles; and (3) the resulting low delay can mask important LOS deficiencies for minor movements.

TABLE 11: LEVEL OF SERVICE BY DELAY FOR UNSIGNALIZED INTERSECTIONS*

LOS	Control Delay per Vehicle (s/veh)
A	≤ 10
B	> 10-15
C	>15-25
D	> 25-35
E	> 35-50
F	> 50

**Highway Capacity Manual*, Transportation Research Board, Washington DC, 2000, p. 17-2

LOS ANALYSIS: EXISTING CONDITIONS

The results of the traffic operations analysis for Railroad Square under existing conditions are provided in Table 12 on the following page. The average control delay for each vehicle, as well as the critical movement level of service for each intersection, is shown for the peak travel period during a typical weekday.

TABLE 12: RAILROAD SQUARE EXISTING CONDITIONS LEVEL OF SERVICE

Intersection	Minor Street Movement ¹	Type of Control	AM Control Delay (sec/veh)	AM LOS	PM Control Delay (sec/veh)	PM Peak
Route 113 (Tarbell Street) at Groton Street	Tarbell Rd WB Left Turns	Stop	16.6	B	15.3	B
	Tarbell Rd WB Right Turns	Stop	3.3	A	4.7	A
Route 113 (Main Street) at Groton Street and Railroad Street	Main Street EB Through/Left Turns	Stop	8.3	A	9.7	A
	Main Street EB Right Turns	Stop	10.1	B	8.6	A
	Groton Street SB All Movements	Stop	9.0	A	15.1	B
	Railroad Street All Movements	Stop	8.4	A	10.5	B

¹ For unsignalized intersections, the minor street movement with most control delay is considered the critical movement. HCM 2000.

The analysis showed that minor street movements controlled by stop signs do not currently experience long delays. An acceptable level of service is achieved during the peak commute periods. The main cause of any congestion throughout the Square is generally related to pedestrians and vehicle conflicts. The presence of on-street parking means that vehicles must maneuver in and out spaces, sometimes disrupting traffic flow, and the Nashua River Rail Trail generates bicycle and pedestrian traffic. The establishments in the Square rely on pedestrian traffic to support their businesses, and those responding to the survey stressed the importance of on-street parking. Needed improvements include better pedestrian connectivity to businesses, and clearer delineation of the vehicle travel lanes throughout the area.

PROJECTED TRAFFIC OPERATIONS BASED ON KNOWN DEVELOPMENT PROPOSALS

Two planned development project will potentially contribute additional traffic to the Railroad Square area when constructed:

1. A1 Auto on Mill Street just north of Main Street
2. A proposed mixed use (commercial/residential) development near the intersection of Railroad Street and Groton Street.

A1 Auto/Mill Site Redevelopment

A1 Auto proposes to redevelop the former site of the Pepperell Paper Mill on Mill Street. The project consists of the construction of 100,000 square feet of office space to house the headquarters of A1 Auto, currently located on Chapel Place across the street from the former paper mill. Building uses will include a customer support call center and executive offices, with approximately 380 employees. Primary access will be on Mill Street with secondary right in/right out driveways on Main Street south of the property.

Vanasse Hangen Brustlin, Inc (VHB) prepared a traffic impact study relative to the project in early 2015. According to the findings presented in the VHB report, the project is expected to generate approximately 1,312 vehicle trips per day, including 191 new vehicle trips during the weekday morning peak hour and 190 vehicle trips during the weekday evening peak hour.

Capacity analyses conducted by VHB project that the intersections that will be impacted by the construction should not experience significant increases in delays due to traffic generation by the A1 Auto project. The proponent of the project has agreed to implement mitigating measures at the Main/ Mill/ Canal Street intersection. These mitigation measures are described in the report as:

- Improve striping on Main, Mill and Canal Street.
- Install advance warning signage on Main St. to warn motorists of the dangerous intersection at Main/ Mill/ Canal Street.
- Replace the existing 8-inch flashing beacon with a 12-inch beacon head to improve visibility.
- Remove any sight distance restrictions at this intersection that falls within the Town's right-of-way or on land that could be secured by the Town.

PROPOSED COMMERCIAL/RESIDENTIAL DEVELOPMENT AT GROTON AND RAILROAD STREETS

The development at Groton Street and Railroad Street includes a mix of commercial and residential uses. There will be an entrance only on Railroad Street, an exit only on Groton Street, and a full driveway further north on Groton Street. The site plans provided to the Town include the construction of four new buildings- three commercial, and one residential. As part of the development, two apartment buildings and a house will be removed from the property.

As part of this study NMCOG staff calculated the vehicle trips that would be generated by the proposed traffic and distributed the trips throughout the study area, in order to project future traffic conditions. Figures 9-10 shows the project traffic volumes at key intersections, which include the incorporation of potential trips to be added by the 1A Auto project and the commercial/residential proposal outlined above.

FIGURE 9: PROJECTED PEAK HOUR TURNING MOVEMENT COUNTS AT MAIN STREET/RAILROAD STREET AND GROTON STREET WITH TRAFFIC FROM KNOWN DEVELOPMENT PROPOSALS

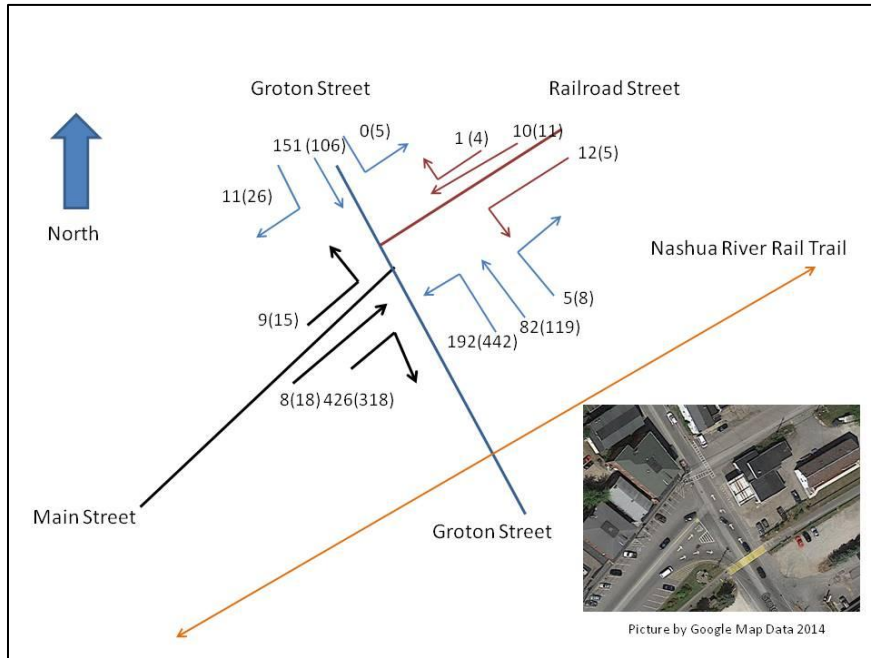
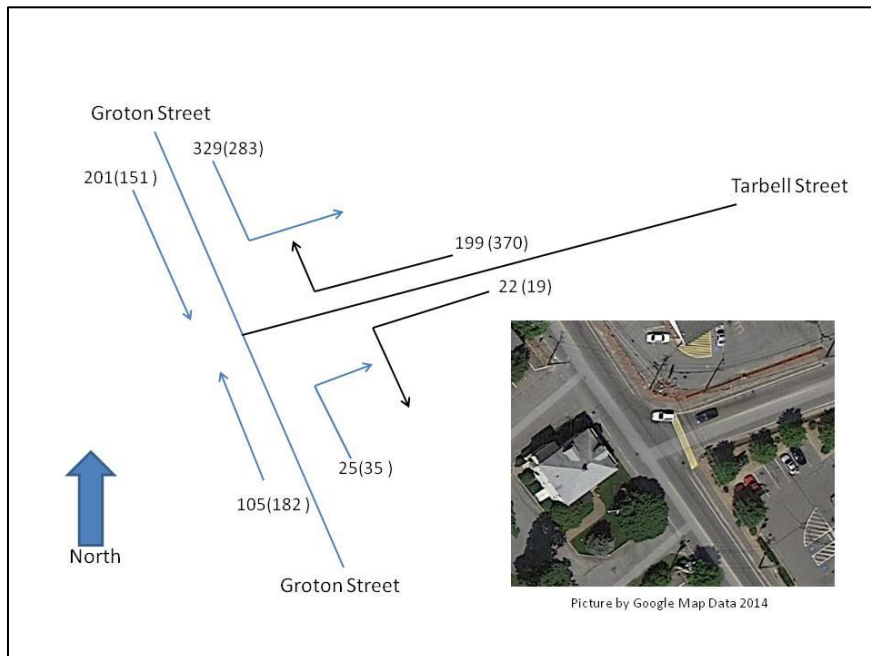


FIGURE 10: PROJECTED PEAK HOUR TURNING MOVEMENT COUNTS AT GROTON STREET AND TARBELL STREET WITH TRAFFIC FROM KNOWN DEVELOPMENT PROPOSALS



OPERATING CONDITIONS WITH ADDED VEHICLE TRIPS FROM KNOWN DEVELOPMENT PROPOSALS

Traffic operations analyses were performed for the study area intersections during the morning and evening peak hours incorporating additional trips that will be potentially generated by known development proposals. The results are shown in Table 13 below. The area intersections will continue to operate at acceptable levels of service during peak hours of the day with the known development projects in place.

TABLE 13: LOS FOR RAILROAD SQUARE INTERSECTIONS WITH VEHICLE TRIPS FROM KNOWN DEVELOPMENT PROPOSALS

Intersection	Minor Street Movement ¹	Type of Control	AM Control Delay (sec/veh)	AM Peak LOS	PM Control Delay (sec/veh)	PM Peak LOS
Route 113 (Tarbell Rd) at Groton Street	Tarbell Rd WB All Movements	Stop	13.5	B	16.9	C
	Groton St SB Left Turns	Yield	6.1	A	6.3	A
Route 113 (Main Street) at Groton Street and Railroad Street	Main Street EB Through/Left Turns	Stop	14.1	B	13.3	B
	Main Street EB Right Turns	Stop	14.1	B	13.3	B
	Groton Street SB All Movements	Stop	9.0	A	15.1	B
	Railroad Street All Movements	Stop	10.2	B	10.3	B
¹ For unsignalized intersections, the minor street movement with most control delay is considered the critical movement. HCM 2000.						

CRASH DATA ANALYSIS

Crash data was analyzed for the key intersections within the study area. The data has been extracted from Mass Dot's statewide accident database, and includes traffic crashes that occurred over a three- year period from 2009 through 2011. A summary of the data is provided in Table 14, along with the crash rate for each intersection (worksheets can be found in Appendix H). The crash rates for Railroad square are compared to other similar intersections in the Mass DOT District 3 area.

TABLE 14: RAILROAD SQUARE CRASH DATA SUMMARY

Major Street:	Groton Street	Groton Street
Minor Street:	Tarbell Street/Hotel Place	Main Street/Railroad Street
Year	Number of Crashes	Number of Crashes
2009	6	8
2010	9	4
2011	3	1
Total	18	13
Mass DOT District 3 Crash Rate	0.66	0.66
Calculated Crash Rate	1.47	1.04
Higher than expected?	yes	yes
Type	Number of Crashes	Number of Crashes
Angle	5	4
Rear-End	4	5
Side Swipe	1	2
Run off Rd	0	0
Other	8	2
Time of Day	Number of Crashes	Number of Crashes
AM Peak	0	1
PM Peak	6	4
Non Peak	12	8
Pavement Conditions	Number of Crashes	Number of Crashes
Dry	16	9
Wet	2	4
Snow/Ice	0	0
Other	0	0
Severity	Number of Crashes	Number of Crashed
Property Damage Only	15	11
Personal Injury	3	2
Fatal	0	0
Other/unknown	0	0

Both study area intersections had a higher than expected crash rate when compared with the MassDOT District 3 averages. Railroad Square had one non-fatal bicycle injury in 2009 that occurred at the Main Street/Groton Street intersection. In 2010, Tarbell Street was the location of a non-fatal pedestrian accident. Those two incidents were the crashes that involved bicyclists or pedestrians between 2009 and 2011.

The intersection of Groton Street /Tarbell Street and Hotel Place was the site of eighteen (18) crashes during the study period. Single vehicle crashes accounted for more than half of the crashes and the majority occurred during off-peak traffic hours. Sixteen (16) out of the eighteen (18) crashes happened under dry pavement conditions. Fifteen (15) of those crashes resulted in

property damage only, three (3) non-fatal injuries were reported, and fortunately no fatal accidents were recorded. Eight (8) of the crashes at the Groton St/ Tarbell St/ Hotel Place intersections were crashes that were classified as “other”. These crashes were single vehicle accidents that involved a vehicle hitting property, such as telephone poles, or single vehicle crashes that involved a non fatal accident with a pedestrian or cyclists.

The Groton/ Main/ Railroad Street intersection experienced thirteen (13) crashes over the three-year study period. Five (5) of the thirteen (13) crashes were rear-end type crashes, four (4) were angle type crashes, two (2) crashes were side swipe accident, and there were two (2) single vehicle crashes, which are classified as other and resulted in property damage. Eight (8) crashes occurred during non-peak hours, four (4) crashes happened during P.M. peak hours, and a single crash took place during the A.M. peak hours. Nine (9) of the thirteen (13) crashes happened on dry pavement, while the other four (4) crashes occurred under wet pavement conditions. Two (2) of the thirteen (13) crashes resulted in personal injury, the other eleven (11) crashes resulted in property damage only. No fatal crashes were recorded at this location during the study period.

STOP SIGN JUSTIFICATION

In the past the intersection of Main Street and Groton Street had no posted regulatory signage or pavement markings for vehicles turning right from Main Street eastbound onto Groton Street southbound. The unwritten rule was to treat the movement like a yield sign, giving right of way to vehicles already in the intersection. Recently, a stop sign was installed for this movement. Upon request of the Town, a stop sign justification analysis was performed.



PHOTO 12: STOP SIGN AT MAIN STREET/GROTON ST INTERSECTION

The Manual of Uniform Traffic Control Devices (MUTCD) handbook serves to provide the criteria for justification of a stop sign. A copy of the MUTCD guidance for stop signs is included in Appendix F. The guidance states that: “*Engineering judgment should be used to establish intersection control.*” The following factors should be considered:

- Vehicular, bicycle, and pedestrian traffic volumes on all approaches;
- Number and angle of approaches;
- Approach speeds;
- Sight distance available on each approach; and
- Reported crash experience.

Intersections with no regulatory traffic control follow the right of way rule in that a vehicle approaching an intersection must yield the right-of-way to any vehicle or pedestrian already in the intersection. The rule also states that the driver of a vehicle on the left yields the right-of-

way to the vehicle on the right. These can be modified through the use of traffic control signage such as yield or stop signs.

As mentioned previously, justification of a stop sign at an intersection, such as Main Street and Groton Street, is determined from guidance outlined in the MUTCD. NMCOG undertook such an analysis and the results are summarized below.

Criterion: The use of STOP signs on the minor-street approaches should be considered if engineering judgment indicates that a stop is always required because of one or more of the following conditions:

- The vehicular traffic volumes on the through street or highway exceed 6,000 vehicles per day

Groton Street south of Main Street carries 9,600 vehicles per day, while Main Street west of Groton Street carries 11,400 vehicles per day. The intersection passes volume criteria for installation of a stop sign.

- A restricted view exists that requires road users to stop in order to adequately observe conflicting traffic on the through street or highway

The Nashua River Rail Trail crossing on Groton Street just south of the intersection potentially conflicts with vehicles turning right from Main Street onto Groton Street, and it is difficult to see approaching bicyclists when approaching the intersection.

- Crash records indicate that three or more crashes that are susceptible to correction by the installation of a STOP sign have been reported within a 12-month period, or that five or more such crashes have been reported within a 2-year period. Such crashes include right-angle collisions involving road users on the minor-street approach failing to yield the right-of-way to traffic on the through street or highway.

Main Street at Groton Street experienced one crash in 2009 (involving a vehicle and a bicyclist), and one crash in 2011 (involving turning vehicles not yielding right of way) that were susceptible to correction by a multi-way stop installation. This criterion is deemed not to be met.

In summary, the intersection meets the traffic volume criteria guidance for installing a stop sign.

Because the intersection already has sign control in place for three of the four approaches, staff analyzed multi-way stop application criteria outlined in the MUTCD, as outlined below:

- The multi-way stops generally used when traffic volumes on the intersection roads are approximately equal, and in this case the volumes are similar. The multi-way stop

is generally used as an interim measure in a location where a traffic control signal is warranted.

The intersection of Groton and Main Streets does not meet the 8-hour warrant, peak hour warrant or crash experience warrant, although it does meet the 4-hour warrant. A traffic signal is not recommended for this location.

- Five or more reported crashes in a 12-month period that are susceptible to correction by a multi-way stop installation. Such crashes include right-turn and left-turn collisions as well as right-angle collisions.

Main Street at Groton Street experienced one crash in 2009 (involving a vehicle and a bicyclist), and one crash in 2011 (involving turning vehicles not yielding right of way) that were susceptible to correction by a multi-way stop installation. This criterion is deemed not to be met.

- The vehicular volume entering the intersection from the major street approaches (total of both approaches) averages at least 300 vehicles per hour for any 8 hours of an average day

Traffic on the Groton Street approach: averages over 300 vehicles per hour for an 8-hour period, as does the Main Street approach. This criterion is met for justification of a multi-way stop sign.

- The combined vehicular, pedestrian, and bicycle volume entering the intersection from the minor street approaches (total of both approaches) averages at least 200 units per hour for the same 8 hours, with an average delay to minor-street vehicular traffic of at least 30 seconds per vehicle during the highest hour

The volumes meet the warrant, but average delays are less than 30 seconds per vehicle, thus the criterion is not met.

- If the 85th-percentile approach speed of the major-street traffic exceeds 40 mph, the minimum vehicular volume warrants are 70 percent of the values provided in Items 1 and 2.

Speeds are less than 40 mph due to congested nature of the area. The criteria are not met.

- Where no single criterion above is satisfied, but where the above criteria are all satisfied to 80 percent of the minimum values, excluding the 85th percentile speed criteria.

Criteria are not met at the 80% level.

Traffic volumes are such that conflicts would begin to occur if the existing multi-way stop sign control were not in place. Generally, vehicles turning right from Main Street eastbound have treated the movement as if it had stop/yield control, with drivers often checking the rail trail crossing before making their turning movement. A stop sign at this location will serve to clear up any confusion as to the responsibilities of the driver approaching the intersection.

STOP SIGN LOCATION

With justification for a Stop Sign established, the decision of where to put the Stop sign is based on engineering judgment. Generally, the stop control is put on the lower volume approach. However, in this case, Main Street and Groton Street experience similar traffic volumes. The geometry of the intersection is such that the Groton Street approach does not have traffic control. Even though the two roadways have similar traffic volumes, NMCOG staff recommends that the Stop control remain on Main Street due to conflicts with rail trail users crossing Groton Street just south of the intersection.

While this intersection processes high volumes of traffic, only two crashes susceptible to correction by a multi-way stop sign installation have been reported. The justification for the Stop control is provided by volume data and conflicts with pedestrians and bicyclists using the Nashua River Rail Trail crossing. Right turning vehicles from Main Street eastbound to Groton Street southbound must be aware of pedestrians and bicyclists crossing Groton Street on the Nashua River Rail Trail just to the south of the intersection. The stop sign serves as an additional regulatory sign to encourage drivers to stop and look before proceeding through the intersection. The stop sign meets the justification criteria outlined in the MUTCD, and NMCOG staff recommends that it be maintained. NMCOG has outlined best practices and procedures that other Massachusetts communities employ when deciding on stop sign installation. Those procedures can be found in the recommendations section and in Appendix E.

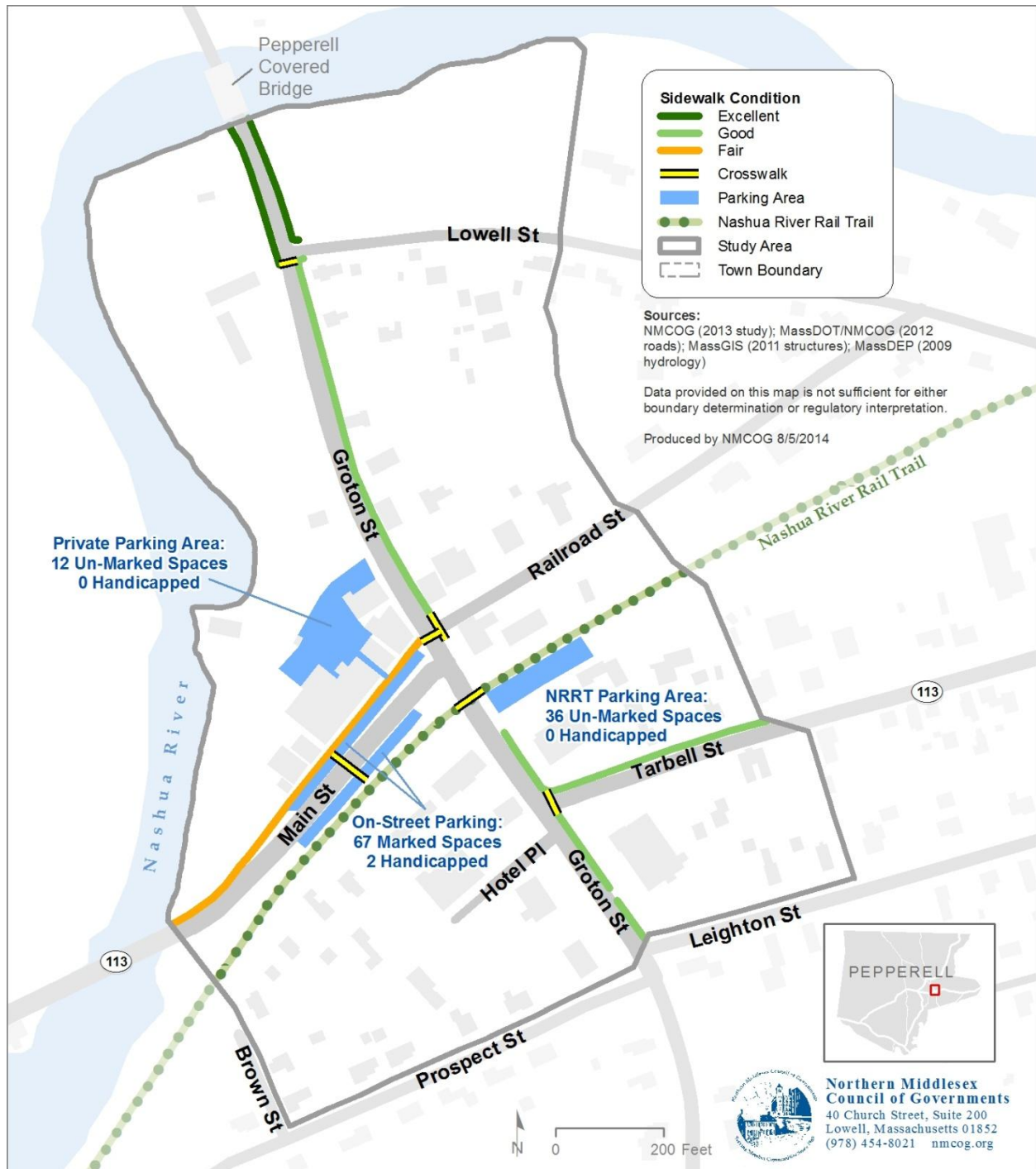
BICYCLE AND PEDESTRIAN FACILITIES

Communities that promote walking and other forms of non-motorized transportation can reap significant social, environmental and health benefits. Safe, convenient and pedestrian-friendly sidewalks and walkways provide opportunities for exercise, help people meet and socialize and give children and others who do not drive mobility options. With the option to walk and bike available, communities can decrease the number of vehicles on the roadway, helping reduce congestion, air pollution and the need for large parking facilities.

When considering improvements to pedestrian and bicycle facilities, it is important to take into account the needs of all users, including those with disabilities or physical impairments. Sidewalks should be wide enough to safely accommodate wheelchairs and wheelchair ramps at crosswalks. All sidewalk facilities should be designed and constructed to meet Americans with Disabilities Act (ADA) standards.

Map 4 shows the location and the extent of the sidewalk network within the study area. Sidewalk conditions within Railroad Square were evaluated and deficiencies were noted such as cracking, distortion and ADA compliance. Sidewalks that are rated in good condition show very little distress, usually less than 30% of the sidewalk area. Sidewalks that are in fair condition typically have distress areas that cover up to 45%.

MAP 4: SIDEWALK, CROSSWALK, AND PARKING INVENTORY



Tarbell Street

A four-foot wide asphalt sidewalk with granite curbing runs along the westbound side of Tarbell Street throughout the study area. The sidewalk along Tarbell Street is in good condition, extending approximately 1,900 feet from the Tarbell Street/ Lowell Road intersection to the Tarbell Street/ Groton Street intersection.



PHOTO 13: TARBELL STREET
LOOKING EAST

Main Street



PHOTO 14: ACCESSIBLE RAMP IN
FRONT OF SPA CAFÉ IN POOR
CONDITION

The Main Street sidewalk runs along the westbound side of Main Street from Groton Street to the Main Street Bridge over the Nashua River, for an approximate distance of 680 feet. The six foot wide sidewalk along the westbound lane of Main Street is in fair condition and is ADA accessible, but is not without challenges for people with mobility and sight disabilities. Handicapped parking can be found on-street by the Main Street Bridge and in front of 162 Main Street. The handicapped parking spot located by the Main Street Bridge is ADA accessible and in fair to good condition, the only negative at this spot is a raised curb that could make accessing the sidewalk difficult for some people. The handicap access

ramp seen in Photo 14 is not located next to the handicap parking spot in front of 162 Main Street; rather the ramp is located in front of 170 Main Street. This forces people with mobility impairments to either use the driveway to access a private lot behind the buildings in order to get to the sidewalks or to use the ramp located in front of 170 Main Street. The roadway and the sidewalk slants toward Groton Street at this end of Main Street, and could hinder movement or create unsafe conditions for the people that need to use this ramp as an access point to the Main Street sidewalk and businesses located there.

The eastbound side of Main Street does not have a sidewalk but the Nashua River Rail Trail runs parallel to Main Street from Groton Street to the Nashua River Bridge. A crosswalk traverses Main Street at 166 Main Street and provides access for pedestrians and bicyclists to the sidewalk and businesses along the westbound side of Main Street. A small section of sidewalk (266 feet) runs along the eastbound side of Main Street, starting at the Main and Canal Street intersection and continuing eastbound along Main Street, and ending at the bridge.

Groton Street

Sidewalks can be found on both sides of Groton Street between the covered bridge and Lowell Street, a distance of 225 feet. The sidewalks were constructed when the bridge was built in 2009 and are the newest of any sidewalk within the study area. Granite curbing runs alongside the sidewalk and truncated domes can be found on the sidewalks at the intersection of Groton and Lowell Street, and at the crosswalks around this intersection.

South of Lowell Street, the sidewalk is only found on the northbound side of Groton Street. This sidewalk segment ends at the Groton/Railroad Street intersection. The length of sidewalk on the northbound side of Groton Street from the Lowell Street intersection to Railroad Street intersection is approximately 735 feet. This section of sidewalk is in fair condition.



PHOTO15: GROTON/LOWELL ST INTERSECTION

The northbound sidewalk on Groton Street ends at the Railroad Street intersection, creating a gap



PHOTO16: GAP IN SIDEWALK ALONG GROTON ST

in the sidewalk network between Railroad Street and Tarbell Street. The break in the sidewalk (216 feet long) passes Kemp's Service Station, the NRRT, the parking lot for the NRRT, and the back entrance to the Prescott Plaza. A faded crosswalk traverses the frontage of Kemp's service station. South of Prescott Plaza, the sidewalk continues along the northbound lane of Groton Street. The sidewalk is in good condition throughout this section. The southbound side of Groton Street does not have a sidewalk.

Railroad Street

Railroad Street currently does not have sidewalks.

CROSSWALKS

The Railroad Square study area contains eight crosswalks, six of which are located at intersections and two that are at mid-block locations. The crosswalk characteristics for each location are described as follows:

- Main Street has one existing crosswalk located in front of 148 Main Street. This crosswalk connects the parking area on the south side of Main Street, users of the Nashua River Rail Trail, and the businesses along the westbound side of Main Street.
- The crosswalk traversing Groton Street at Lowell Street is one of the two newer crosswalks within the study area. The pedestrian amenities in this area were upgraded and repainted when the Pepperell Covered Bridge was rehabilitated in 2010.
- A crosswalk is located on Groton Street at the southern edge of Railroad Street and the northern corner of Kemp’s Service Station. The crosswalk is in front of the Groton Street stop line southbound traffic and connects to the crosswalk that crosses Railroad Street at the Railroad/ Groton Street intersection. A crosswalk also spans Groton Street at the Nashua River Rail Trail and an additional crosswalk is located on Groton Street south of Leighton Street.
- The crosswalk traversing Lowell Street at Groton Street was part of the pedestrian upgrades that were made as part of the Pepperell Covered Bridge project. Truncated domes were added at the crossings around this intersection to assist visually impaired pedestrians.
- A crosswalk traverses Tarbell Street at the Groton Street intersection.

BICYCLE FACILITIES

On June 2, 2010, the Massachusetts Department of Transportation introduced the Green DOT Policy Directive, a comprehensive environmental responsibility and sustainability initiative that is intended to “green” the state’s transportation system. The following are the principal goals of the Green DOT policy directive:

- Reduce greenhouse gas (GHG) emissions:
- Promote the healthy transportation options of walking, bicycling and public transit; and
- Support smart growth development.

The plan details sustainability goals, including MassDOT’s statewide mode shift goal, which aims to triple the current mode share of bicycling, public transit, and walking each by 2030. By law, bicyclists are considered vehicle operators and are allowed to use all roadways except limited access highways within the Commonwealth of Massachusetts.

Encouraging safe bicycle usage along the roadways of Railroad Square would not only help promote a healthier lifestyle, but could translate into more residents using alternative modes of transportation for shorter distance trips.



PHOTO17: NASHUA RIVER RAIL TRAIL AT GROTON ST

NASHUA RIVER RAIL TRAIL (NRRT)

The Nashua River Rail Trail is a 12.5 mile paved, multi-use rail trail which begins in Ayer, follows the course of the Nashua River through Groton, Pepperell and Dunstable, and then crosses over the state line ending in Nashua, NH. The trail is maintained by the Massachusetts Department of Conservation and Recreation (DCR). Within Massachusetts, the NRRT is a ten-foot wide paved multi-use path, and sections of the trail include a separate path for equestrians.

The Ayer trailhead, located close to the Ayer commuter rail station, provides access to rail service between Boston and Fitchburg. The Ayer Center parking lot is the largest parking area along the trail with sixty (60) paved parking spaces. Parking can also be found in Groton Center which can accommodate between ten (10) and fifteen (15) vehicles. Additional unpaved parking lots can be found at Sand Hill Road in Groton, Railroad Square in Pepperell and Hollis Street in Dunstable at the trailhead at Yudicky Park at the New Hampshire State line.

The NRRT is an important and popular transportation and recreation asset for the Town and the region, providing a safe off-road alternative to Route 111 and 113. The close proximity of the Ayer trailhead to the Ayer commuter rail station provides commuters from as far away as Nashua and Hollis, NH with an opportunity to commute to work into Boston and the surrounding employment hubs without ever having to step into a passenger vehicle.



PHOTO18: SIGNAGE FOR NASHUA RIVER RAIL TRAIL

Trail counts were performed at Railroad Square on Thursday, May 29th, 2014 and on Saturday, July 12th, 2014 in order to get a sense of the level of use and types of users of the trail. The weekday trail count was conducted between 7-9 a.m., 11 a.m. – 1 p.m., and 4 – 6 p.m., and users of the trail were categorized by mode of travel. The weekend trail count was conducted continuously between the hours of 8 a.m. until 4 p.m. Results from the weekday and weekend trail counts are provided in Table 15 which shows that, on May 29th, 2014 one hundred and ninety two (192) people were counted the NRRT. The vast majority (83%) of the trail users preferred to enjoy the NRRT while on bicycle, with pedestrians, joggers and rollerblade enthusiasts coming in a distant second, third and fourth respectively. On Saturday, July 12, 2014, between the hours of 8 a.m. to 4 p.m., 913 people were observed utilizing the Nashua River Rail Trail.

TABLE 15: NASHUA RIVER RAIL TRAIL COUNT DATA

Mode of travel along the trail	Trail Count: Thursday, May 29th, 2014	Trail Count: Saturday, July 12th, 2014
Bicycle	160	822
Baby Carriage/ Stroller	0	2
Jogger	7	36
Pedestrian	21	5
Skater/ Rollerblader	4	48
Wheelchair	0	0
Other	0	0
Totals	192	913

Parking is provided for the NRRT at Railroad Square in a small unpaved and un-striped parking lot alongside the trail where the NRRT crosses Groton Street. The dedicated parking lot can potentially accommodate 30 vehicles. This parking lot was underutilized and local business employees and residents own half of the vehicles in the lot.

RAILROAD SQUARE PARKING FACILITIES

Public parking in Railroad Square is primarily located on the east- and westbound sides of Main Street, and at the NRRT parking area east of Groton Street. Table 16 on the following page, details the number of parking spaces, marked, unmarked and handicapped, at each location.

Private Parking

A small privately-owned parking area is located behind the businesses on Main Street and is used for deliveries and employee parking for certain businesses. The driveway to this parking lot is located between 162 and 164 Main Street. The private parking area is gravel and does not have marked spaces, however, it is estimated to accommodate approximately thirty six (36) vehicles. There are no dedicated handicapped parking spaces in this lot..



PHOTO 19: PRIVATE PARKING LOT BEHIND MAIN ST BUSINESSES

On-Street Parking

The majority of the public parking within Railroad Square is comprised of head-in, sixty-degree, angled on-street parking stalls, located on the east- and westbound sides of Main Street. Main Street westbound has 32 parking spaces with two spaces dedicated for drivers with handicapped plates or placards. Ten (10) of the 32 spaces are 90-degree



PHOTO 20: ANGLED PARKING ALONG MAIN ST

parking stalls. Main Street eastbound has approximately 36 parking stalls, none of which are designated for individuals with disabilities. Site visits conducted on weekdays showed the majority of the street parking is utilized, especially during the afternoon and early evening hours, although it was never observed to be completely full. Weekend site visits did show an increase in the number of people using the parking on Main Street and an increase in a number of people parking on Main Street to access the NRRT.

Nashua River Rail Trail Parking Lot

Parking for the Nashua River Rail Trail can be found east of the NRRT’s Groton Street crossing. The lot is unpaved and un-striped and can accommodate thirty (30) vehicles. Observations have shown that this lot is severely underutilized on weekdays. Weekend site visits showed that this lot was underutilized by people accessing the NRRT, and in general, no more than six (6) vehicles were observed using this lot at any time. Most users were observed to be employees of local businesses or residents of Railroad Square.



PHOTO 21: NRRT PARKING LOT OFF GROTON ST

TABLE 16: RAILROAD SQUARE PARKING INVENTORY

Parking Area	Marked Spaces	Un-Marked Spaces	Handicapped Spaces	Total Parking Spaces
On-Street Parking	67	0	2	69
Private Parking Area	0	12	0	12
NRRT Parking Area	0	30	0	30
Total Spaces	67	42	2	111

V. RECOMMENDATIONS

The following recommendations are being put forth for the consideration of local policymakers. The recommendations are aimed at improving the overall experience and safety of those who visit, work, live or do business within Railroad Square. As development and economic investment occurs within the Square, town officials should strive to achieve the following goals:

- Provide safe bicycle- and pedestrian-friendly streets and facilities to connect the residential neighborhood with services and jobs;
- Ensure that Railroad Square is a vibrant center of economic activity, with a character that is consistent with the community and that respects the area's historic past, while accommodating growth and change and enhancing quality of life ;
- Promote quality design for commercial and residential areas that considers transportation, parking, environmental and economic needs of the overall community.

LAND USE CONSIDERATIONS

The Town of Pepperell should consider expanding the Mixed Use Overlay District (MUOD) to encompass the Railroad Square commercial center. This would strengthen the identification of Railroad Square as the main commercial center. Such a designation could also provide predictability for potential developers in terms of permitting, which translates into economic marketability of buildings and vacant sites.

Future changes to local zoning regulations should support infill and redevelopment, and clearly articulate their intent. Such changes would encourage the rehabilitation of existing structures. Generally, any new development or redevelopment of property within Railroad Square area should be required to provide pedestrian accessibility to and from the front door and from side or rear parking areas, meet ADA accessibility requirements, and, if appropriate, provide provisions for bicyclists and pedestrians. Shared access to off-street parking facilities for Railroad Square businesses should be encouraged, as well as parking to the side and rear of buildings, landscape buffers for parking facilities, and pedestrian accommodations and lighting to increase safety.

ADOPT A COMPLETE STREETS POLICY

According to the National Complete Street Coalition, "Complete Streets are streets for everyone. They are designed and operated to enable safe access for all users, including pedestrians, bicyclists, motorists and transit riders of all ages and abilities. Complete Streets make it easy to cross the street, walk to shops, and bicycle to work." By adopting a Complete Streets policy, communities direct their planners and engineers to routinely design and operate the transportation network enable safe access for all users, regardless of age, ability, or mode of transportation. This means that every transportation project will make the street network safer for drivers, pedestrians, and bicyclists.

MassDOT and many towns in Massachusetts have adopted and earned recognition for their complete street policies. As part of the MassDOT Complete Streets Policy, projects designed and funded by MassDOT must provide facilities for healthy transportation modes.

PARKING RECOMMENDATIONS

The lack of available parking was identified as a significant issue for business owners who felt that NRRT users were parking on Main Street for many hours, thereby limiting the availability of parking for customers. A gravel parking lot with dedicated NRRT parking is located adjacent to the NRRT, where it crosses Groton Street. This lot is underutilized, and is generally used by less than ten (10) vehicles, some of which belong to local employees. During the weekend, it was observed that the number of vehicles in the gravel lot was highest in the morning and steadily decreased as the day went on, even as the number of people recorded using the trail increased.

In order to preserve parking for customers, way-finding signage advising NRRT users where to park should be erected throughout the Square. The gravel lot for NRRT users is difficult to find if you are not familiar with the area. Improving the number and visibility of sign directing NRRT users to the gravel would free up parking on Main Street for business customers. Way-finding signage could also direct visitors to local businesses within the Square, and to historical or cultural landmarks. Kiosks could be placed at the NRRT parking lot that would provide the walking distance to different destinations on and off the trail. Signage could be erected that states that the parking along Main Street is dedicated for customers of businesses within Railroad Square and is not available to NRRT users. As stated above additional signage directing people on where to park for rail trail activities would help ensure adequate parking for Railroad Square business patrons.

BICYCLE AND PEDESTRIAN RECOMMENDATIONS

A well defined sidewalk network connecting Railroad Square businesses and attractions to the surrounding neighborhoods is key to a thriving pedestrian and bicycle friendly commercial center. The *2008 Pepperell Open Space and Recreation Plan*, recommended that the Town initiate a community-wide alternative transportation effort focused on adding and upgrading sidewalks, trail connectivity, improving bicycle facilities, and system maintenance. This effort should be included in the next Comprehensive Plan update.



PHOTO 22: STOP SIGN ON NRRT AT GROTON ST

Currently there is a 216-foot break in the sidewalk along Groton Street, as the sidewalk ends at the back entrance of Prescott Plaza and does not start again until the Groton/ Railroad Street intersection. A sidewalk should be constructed along this portion of Groton Street to complete the sidewalk network within the Square. The sidewalk would have to

be constructed to ADA standards and curb cuts would allow access to the service station and the parking lots along Groton Street.

ADA COMPLIANCE

ADA compliance in any sidewalk design is necessary to accommodate those with mobility issues. Some of the parking areas and sidewalks on Main Street should be brought up to ADA compliance by addressing the grade on curb cuts, improving handicapped parking and signage, and addressing grade issues on some sections of sidewalk.

One specific location mentioned that lacks sidewalk access is in front of the handicapped parking space at 170 Main Street. The ramp for the sidewalk is now located at 162 Main Street and vehicles are sometimes parked in front of the access. Installing an ADA accessible ramp for at 170 Main Street should be a priority for the town.

The last parking spot heading westbound on Main Street is reserved for vehicles with a handicapped parking placard. As can be seen in Photo 22, the curb cut provided for access from the parking spot to the sidewalk has granite curbing encroaching in the area that should be the entry way to the sidewalk. This, coupled with the buckling of the asphalt along much of the curb cut, is difficult to navigate for individuals with mobility or sight impairments. An individual in a wheelchair would have difficulty getting over the raised asphalt and an individual with impaired sight could trip over the granite curbing or raised asphalt. Removing the granite curbing and leveling the asphalt is needed and a truncated dome should also be installed.



PHOTO 232: HANDICAPPED PARKING SPACE ALONG MAIN STREET

BICYCLE AND PEDESTRIAN AMENITIES

Adding amenities in and around Railroad Square would give visitors to Pepperell reason to stay longer and frequent businesses in the area. Currently there are no amenities in place for bicyclists or pedestrians. The addition of benches, bathroom facilities or a water fountain would add to the attractiveness of the area for users of the trail. On more than one occasion, parents were observed taking children to the local businesses to use the rest rooms.

Incorporating provisions for pedestrians and bicyclists such as improved bicycle racks, improved cross walks, parking bulb-outs, and general streetscape improvements, such as better street tree definition and tree pits and grates would improve the area. Enhancing street furniture around the trail and near the Groton Street covered bridge to accommodate walkers, bicyclists, as well as adding an informational kiosk and way-finding signage will enhance pedestrian and bicyclist awareness of local destinations and events.

Trimming and managing the shrubs and other vegetation that grows between the trail and the eastbound lane of Main Street will allow bicyclists and motorists heading east and approaching Groton Street to see each other sooner when approaching the intersection.

EDUCATION OF USERS AND ENFORCEMENT

Currently, some bicyclists and joggers do not stop to assess whether it is safe to cross at the NRRT/ Groton Street crossing, and instead cross the intersection without breaking stride. A stop sign is in place on the



PHOTO 25: NRRT SIGNAGE: RULES OF THE TRAIL

Nashua River Trail on both sides of Groton Street, (photos 23



PHOTO 24: STOP SIGN FOR NRRT AT GROTON ST

and 24), and the rules and regulations posted

for the NRRT at the Groton Street intersection clearly state that trail users need to “Stop at ALL stop signs”, (photo

25). A program of education and enforcement could be used to curb dangerous behavior. DCR could add another sign, or

paint on the trail, to remind users that they are required to stop on both sides of the Groton Street intersection. It was observed during site visits that police officers often park near Hotel Place facing Groton Street. This practice is beneficial for slowing vehicles as they come to the trail crossing, making motorists mindful of the rules of the road, and correcting bad behavior. The same technique may be effective for trail users. The presence of a uniformed police officer on the trail would heighten awareness, and warnings, tickets and other corrective actions could be imposed for those that do not comply.

ADVANCE WARNING

The Nashua River Rail Trail crosswalk at Groton Street could be modified to include in-roadway lighting that would alert motorists to the presence of a trail user preparing to cross Groton Street. Since the lights only flash when activated, motorists would pay attention when compared to lights that flash constantly. The lights shown in the photo to the right are embedded in the pavement on both sides of the crosswalk and orientated to face

oncoming traffic. When the system is activated the lights begin to flash at a constant rate, warning motorists that a trail user is preparing to cross. Traffic Safety Corporation is one vendor of this product. Because the

lights are flush to the pavement, they are not damaged by snowplow blades in the winter. In addition, the TS40 sign produced by Traffic Safety Corporation (shown below) could be used and conforms to the specifications of the Federal Highway Administration (FHWA) set forth in the Manual on Uniform Traffic Control Devices (MUTCD). Using LED technology, the TS40 employs a set of synchronized high-intensity LEDs to extend the range of visibility of the sign during the day or night. Furthermore, the LEDs are flashed, which increases driver awareness of the sign and allows drivers to act sooner in advance of the intersection, as shown below.



PHOTO 26: EXAMPLE OF LIGHTED CROSSWALK.

COURTESY OF EAST HAMPTON PRESS.



PHOTO 27: EXAMPLE OF LIGHTED SIGNS AT A CROSSWALK. COURTESY TRAFFIC SAFETY CORPORATION WWW.XWALK.COM

INTERSECTION IMPROVEMENT RECOMMENDATIONS

The intersection Mill Street and Main Street west of the study area suffers from reduced sight distance looking east from the intersection. A retaining wall and multi-family house on the northeast corner of the intersection inhibit a driver's view when turning from Mill Street. The proponent of 1A Auto proposes to make improvements to the intersection as mitigation for the development project. However, the main sight distance obstructions are on private property and will probably not be addressed through 1A's mitigation.

A stop sign has been installed for right turning movements at the Main Street intersection with Groton Street. This stop sign provides control for a movement that was previously treated as yield control due to the lack of signage or pavement markings for right turn movements. Right turn movements represent the highest volume movement the intersection. The stop sign regulates traffic and improves visibility of the rail trail crossing just south of the intersection.

NMCOG CONCEPTUAL IMPROVEMENT PLAN FOR RAILROAD SQUARE

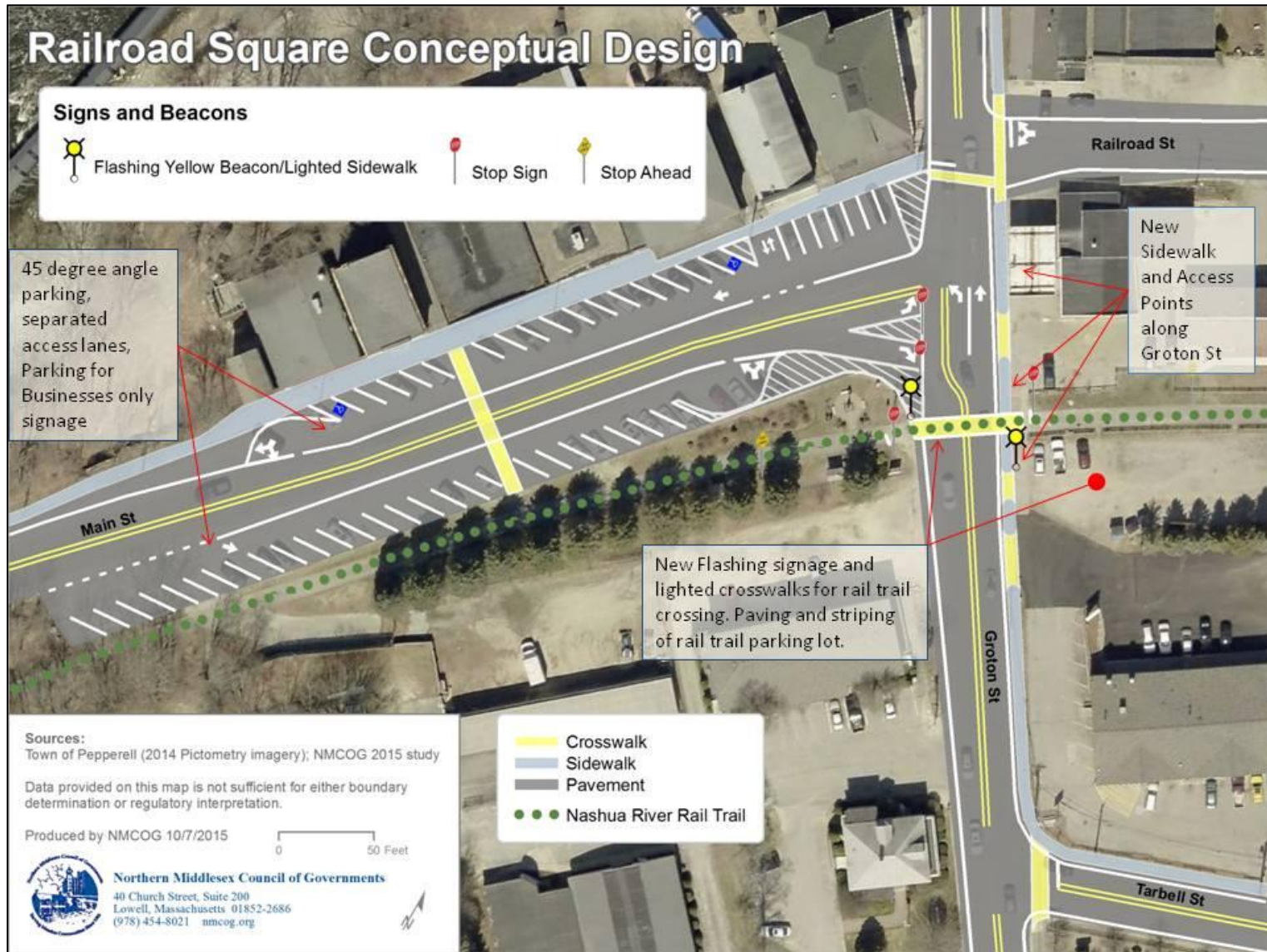
In an effort to improve the flow of traffic, maximize parking, and minimize interactions between motorized and non-motorized users of the Square, NMCOG staff developed a conceptual improvement plan for the area as shown in Figure 11 on page 49. The redesign consists of the following elements:

- A dedicated left turn only lane is added on the northbound side of Groton Street at the Groton/ Main Street intersection. This creates a protected lane for vehicles turning on to Main Street from the northbound side of Groton Street. The additional road space on the northbound lane will allow for uninterrupted traffic flow northbound on Groton Street past the Main Street intersection.
- A stop sign is placed at the right turn only lane on the eastbound side of Main Street. Forcing traffic turning on to the southbound lane of Groton Street to come to a complete stop provides additional time for motorists to check for bicyclists and pedestrians in the NRRT crosswalk. In addition, bicyclists and pedestrians crossing Groton Street will be able to better anticipate vehicle movements through the intersection if drivers come to a complete stop before proceeding.
- Stop signs are already in place on the Nashua River Rail Trail on both sides of the Groton Street crossing. Placing "Stop ahead" warning signs further away from the Groton Street crossing on the NRRT would give bicyclists and trail users additional time to slow down and come to a complete stop at Groton Street.
- The parking configuration at Railroad Square is changed from 60 degree angled parking stalls to 45 degree angled parking stalls. This redesign reduces the width of pavement vehicles need for entering and exiting. This would also allow for the

separation of parking areas and travel lanes on Main Street. Main Street at the mid-block crosswalk is currently 80 feet wide, including parking stalls. NMCOC proposes to create two 12-foot travel lanes for east- and westbound Main Street traffic, leaving 56 feet of roadway for 45-degree parking stalls, line markings or raised median separating the travel lanes from the parking area, and an additional frontage lane within the parking area, to accommodate vehicle maneuvering. Each parking area would be designated for one-way travel in the direction of Main Street traffic flow. When leaving, a vehicle would back out and follow the general direction of through traffic to the end of the parking area, where a widened area would allow vehicles to continue in the same direction or to take a left out of the parking area to reverse direction. Approximately ten on-street parking spaces would be lost with this configuration. However these spaces are often used by rail trail users, and could be opened up to patrons of Railroad Square businesses by designating the spaces as being for businesses only. The underutilized Nashua River Rail Trail parking lot at Groton Street could be improved to compensate for the lost spaces, with informational signage directing NRRT users toward the parking lot. Another more drastic option for discouraging use of these spaces by NRRT users would be to install parking meters with a 2-hour parking limit and ticket violators.

- A marked curb extension (“bump out”) would be installed at the northwest and southwest corners of Main Street and Groton Street. The curb extension would provide protection for cars parked at the parking stalls adjacent to the Main Street westbound lane closest to Groton Street, and would allow for a no-parking buffer so handicapped residents and visitors could access the ramp leading to the sidewalk. A painted median would be created between the left and right turn lanes on Main Street eastbound. This would give greater separation between vehicles at the split and allow a safe zone for erecting a stop sign. The curb extension for the right turn lane on eastbound Main Street would push vehicles further away from the NRRT crossing at Groton Street, giving vehicles and trail users more time to react to the traffic on Groton Street as well as the trail. “Bump outs” can also be designed using pavement markings to allow larger emergency response vehicles the room to navigate the intersection safely.

FIGURE 11: A CONCEPTUAL IMPROVEMENT PLAN FOR RAILROAD SQUARE



PEPPERELL CONCEPT PLAN FOR RAILROAD SQUARE

Town of Pepperell staff has developed an alternative conceptual plan for the Railroad Square area. Some elements of the concept plan have been implemented. As shown in Figure 12 on page 51, this design includes changes to the travel ways, access management, improved MUTCD compliant pavement markings and stop signs on Railroad Street and Main Street. The new stop signs have been installed.

In comparing the Pepperell concept to the NMCOG concept, the following differences have been noted. First, the Pepperell concept leaves the on-street parking as is and adds a median strip separating directions of travel on Main Street. The NMCOG concept changes the parking from 60 degree angle parking to 45 degree and adds two parking lanes separate from the travel lanes. The NMCOG concept results in the loss of approximately 10 spaces although this loss is intended to be offset by requiring rail trail users to utilize the parking lot on Groton Street. Both plans improve the sidewalk network by adding new sidewalk and access along Groton Street, connecting Railroad Street to Tarbell Street. Both plans show improvements to Main Street right turning traffic with the addition of a stop sign, new pavement markings and an extended curb. The Pepperell concept relocates the Groton Street southbound stop line further south in an effort to provide more room for Railroad Street vehicles to turn left before entering the Main Street/Groton Street intersection. The NMCOG concept strives to make Nashua River Rail Trail users more visible to vehicles with the addition of flashing signs and a lighted crosswalk at the Groton Street crossing. Each concept is MUTCD compliant and aims to improve safety and provide better lane designations for vehicles entering and exiting the Square.

FIGURE 12: PROPOSED RAILROAD SQUARE IMPROVEMENTS – TOWN OF PEPPERELL CONCEPT



HANDLING REQUESTS FOR TRAFFIC CONTROL SIGN INSTALLATIONS

As improvements to Railroad Square have been studied and discussed over the past months, the Town has expressed a desire to review and perhaps approve its procedures for proposing and installing traffic control signs. Such procedures should be clear to all Town officials and residents. Toward that end, NMCOG staff has researched municipal policies in other communities across the State.

Currently, Pepperell addresses traffic sign installation requests through its Police Department. The Police Department provides a Sign and Safety Form that can be completed containing information on the location and description of a particular sign and/or safety concern. The form is available to residents online for added convenience. It is unclear how a Sign and Safety Form is handled internally once it is submitted.

NMCOG staff has found that most communities use this form as a first step in a lengthier process. In many communities individual residents and/or neighborhoods are able to request a stop sign warrant analysis by filling out a request form through the local Police Department or Public Works Department (forms are often available for pick up at the departments or online). In many communities, the Police Department personnel then reviews the requests and meets with the individual residents and/or neighborhoods to review the location and understand their concerns.

Almost all the communities researched have an established traffic and safety committee, which reviews, in detail, each sign installation request once the first pass through the Police Department or DPW is complete. The committee is charged with determining whether or not a sign is warranted based on the Manual for Uniform Traffic Control Devices (MUTCD). The Massachusetts Highway Department requires that all cities and towns follow the national guidelines set forth in the MUTCD to determine the use of traffic control devices, such as stop signs. These committees often establish evaluation criteria based on the MUTCD. Examples of criteria include: road classification, speeds, accident history, traffic volumes, traffic generators, sight distances, impacts to local residences and businesses, and neighborhood support. At times, the committee may need to request more information – such as traffic counts or engineering analysis – to determine if a sign is warranted. The procurement of traffic consultants, if necessary, is typically arranged through the traffic and safety committee.

The traffic and safety committee is commonly comprised of representatives from the community's police, fire, engineering, and public works departments. Some communities have additional members such a representative of the Board of Selectmen, planning, school officials, members of the business community and chambers of commerce; local Council of Aging, bicycle, pedestrian, and sidewalk committee members; and concerned citizens.

In all communities we researched, the traffic and safety committee recommends a sign installation to the Board of Selectmen for consideration. As a community's road commission,

the Board of Selectmen must approve all traffic sign installations. Once a stop sign installation has been approved, it is typical for the Department of Public Works to install and maintain the new sign. A common timeframe is six (6) months from the initial request to the completion of the installation.

NMCOG staff has found that some communities formalize their approach to sign installations more than others. An example of a sign policy and a public education brochure that could be adopted by Pepperell if it decides to further formalize its process is included in Appendix E. Pepperell should consider how it officially records stop sign installations, whether it be by adopting new bylaws for each installation and/or by revising the municipal code language as necessary.

APPENDICES:

APPENDIX A: RAILROAD SQUARE BUSINESS SURVEY

APPENDIX B: LAND USE INVENTORY (L.U.I.) FOR RAILROAD
SQUARE

APPENDIX C: STOP SIGN INSTALLATION AND WARRANT
PROCEDURES

APPENDIX D: MUTCD STOP SIGN INSTALLATION GUIDANCE

APPENDIX E: TRAFFIC VOLUME DATA

APPENDIX F: CRASH RATE WORKSHEETS

APPENDIX : LEVEL OF SERVICE WORKSHEETS
