Route 9 Safety and Livability Study
Northampton, MA

May 2017

Prepared in cooperation with the Massachusetts Department of Transportation and the U.S. Department of Transportation. The views and opinions of the Pioneer Valley Planning Commission expressed herein do not reflect those of the Massachusetts Department of Transportation or the U.S. Department of Transportation.

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I. INTRODUCTION

The Route 9 Safety and Livability Study analyzes the Route 9 corridor from Masonic Street to Market Street in the City of Northampton to improve safety for all modes of transportation (Figure 1). Route 9 in Northampton, MA was identified as one of the Top 25 High Crash segments in the Pioneer Valley. This area has a history of bicycle and pedestrian crashes. These safety concerns prompted the City to request that the Pioneer Valley Planning Commission (PVPC) study the transportation safety conditions along this corridor.

The study scope was designed to incorporate Livability and Complete Streets planning aspects for future transportation improvements and development along this roadway. The study includes a review of recommendations by some of the recent studies completed for the City of Northampton. Staff collected geometric data along the corridor to identify locations of existing on-street parking, roadway width, pedestrian crossings, sidewalk width, and bus stops. They also collected data on daily traffic volumes, peak hour traffic volumes, vehicle travel speed data, pedestrian and bicycle traffic volume, parking and transit service along the corridor. Data collected was used to examine existing conditions on vehicle, bicycle, and pedestrian traffic flow and analyze the multimodal level of service throughout the study area. Staff also analyzed existing safety conditions to develop recommendations that could help reduce crashes and improve livability in downtown Northampton.

Figure 1 - Study Area Map

I.1 STUDY AREA

The study area was identified by the City of Northampton as the segment of Route 9 between the intersection of Masonic Street and Market Street. The study area includes the intersection of Main Street (Route 9) with Pleasant and King Streets (Route 5) (Figure 2). Route 9 links Northampton with Interstate Route I-91 at Interchange 19 one mile east of the study area. Route 5 links the city to Interstate Route I-91 via Interchange 18 in Northampton three quarters of a mile south of the study area and via Interchange 20 about a mile and a quarter to the north of the study area. As a result, this intersection is critical in moving traffic in and out of the city. Route 9 links Northampton to Hadley and a high concentration of retail development via the Coolidge Bridge to the east, while Route 5 links Northampton to Holyoke and its shopping and industry centers. Route 5 also serves as an alternate route to I-91 during traffic incidents and extreme weather.

Figure 2 - The Intersection of Route 9 with Route 5 in Northampton, MA

Route 9 is part of the National Highway System which has important federal standards and requirements. The national highway designation makes it eligible for federal aid and expedient construction procedures. Therefore, it “must comply with applicable Federal regulations. These requirements include design standards, contract administration, State-FHWA oversight procedures, Highway Performance Monitoring System reporting, National Bridge Inventory reporting, national performance measures data collection, and outdoor advertisement/junkyard control." [1]

A recent, "rulemaking updates regulations governing new construction, reconstruction, resurfacing (except for maintenance resurfacing), restoration, and rehabilitation projects on the National Highway System (NHS), including the Interstate System, by incorporating by reference the current versions of design standards and standard specifications. While these adopted standards and specifications apply to all projects on the NHS (including the Interstate System), FHWA encourages the use of flexibility and a context-sensitive approach to consider a full range of project and user needs and the impacts to the community and natural and human environment." [2]

[1] Source: https://www.fhwa.dot.gov/map21/qandas/qanhs.cfm
[2] 61302 Federal Register / Vol. 80, No. 197 / Tuesday, October 13, 2015 / Rules and Regulations. Source: https://www.gpo.gov/fdsys/pkg/FR-2015-10-13/pdf/2015-25931.pdf

II. EXISTING TRANSPORTATION CONDITIONS

This section provides a technical evaluation of the transportation components of the study area. It includes a presentation of the data collected and crash history along the Route 9 corridor. Located in the heart of downtown, the study area is characterized by a wide range of residential, commercial, and cultural land uses. Thornes Marketplace, City Hall, the Academy of Music, and the Smith College Art Museum are just a few of the many attractions. This corridor has a high volume of motor vehicles as well as bicycle and pedestrian traffic. The downtown area also has a mix of short and long term on-street and off-street parking spaces. The corridor is well served by public transit routes operated by the regional transit authority (PVTA) and (FRTA), as well as the intercity motor coach carrier PeterPan Bus Lines.

II.1 DATA COLLECTION

PVPC staff collected a comprehensive array of transportation related data for the Route 9 corridor study area. This included roadway geometry, traffic volumes by transportation mode, transit routes, parking space availability, and crashes. The following sections describe the data collected and observed trends.

II.1.1 Roadway Network

Route 9 has three different street names within the City of Northampton. It is named Elm Street west of the study area beginning at its intersection with West Street. It is called Bridge Street east of the study area beginning at its intersection with Hawley Street. However Route 9 is designated as Main Street throughout the study area. It has unmarked travel lanes but operates as two lanes of vehicular travel in each direction between King Street and New South Street. Vehicle turning lanes are properly designated at major intersection.

PVPC staff conducted a field survey of the Route 9 corridor (Main Street) between Masonic Street and Market Street in Northampton. Main Street and intersecting streets throughout the corridor were measured and drawn to represent current widths of pavement surface, sidewalks, lengths of crosswalks, and identify the location and number of parking spaces. An overall drawing of the corridor is presented in Figure 3 followed by close-up drawings dividing the corridor into three sections that display street, crosswalk and sidewalk measurements (Figures 4, 5, and 6).

II.1.1.1 Street and Sidewalk Widths

Main Street in Northampton has variable pavement surface widths between Masonic Street and Market Street. The street's pavement width ranged from 50' to 100' from curb to curb. Details of total street width as well as street width by travel direction and sidewalk width are listed in Table 1 for all streets in the study area.

Figure 3 - Main Street from Masonic Street to Market Street in Northampton, MA

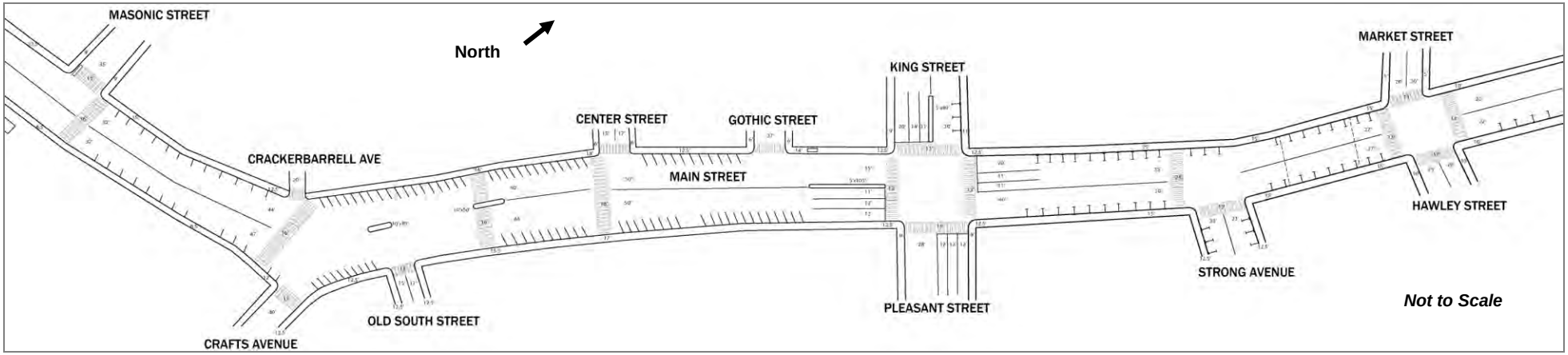


Table 1 - Route 9 Corridor Study Area Street and Sidewalk Width Measurements

Street Name	Location	Total Street Width	Lane Width Eastbound /Westbound	Sidewalk Width Eastbound /Westbound
Main Street (Route 9)	East of Masonic Street	64'	32'/32'	8.5'/15'
Main Street (Route 9)	West of Cracker Barrel Alley	91'	47'/44'	8.5'/12.5'
Main Street (Route 9)	West of Center Street	84'	44'/40'	15.5'/16'
Main Street (Route 9)	East of Center Street	100'	50'/50'	17'/12.5'
Main Street (Route 9)	West of King Street (Route 5)	75'	35'/35'	12.5'/12.5'
Main Street (Route 9)	East of King Street (Route 5)	82'	40'/42'	12.5'/12.5'
Main Street (Route 9)	West of Strong Avenue	65'	30'/35'	15'/15'
Main Street (Route 9)	West of Market Street	54'	27'/27'	15'/15'
Main Street (Route 9)	East of Market Street	50'	22'/28'	10'/10'
Masonic Street	North of Main Street	35'		9'/9'
Cracker Barrel Alley	North of Main Street	20'		
Crafts Avenue	South of Main Street	40'		/12.5'
Old South Street	South of Main Street	32'	15'/17'	12.5'/12.5'
Center Street	North of Main Street	32'	15'/17'	6'/6'
Gothic Street	North of Main Street	37'		6'/6'
King Street	North of Main Street	80'	45'/30'	9'/11'
Pleasant Street	South of Main Street	64'	28'/36'	9'/9'
Strong Avenue	South of Main Street	46'	23'/23'	12.5'/12.5'
Market Street	North of Main Street	40'	20'/20'	5'/5'
Hawley Street	South of Main Street	45'	25'/20'	10'/10'

Figure 4 - Main Street from Masonic Street to Old South Street in Northampton, MA

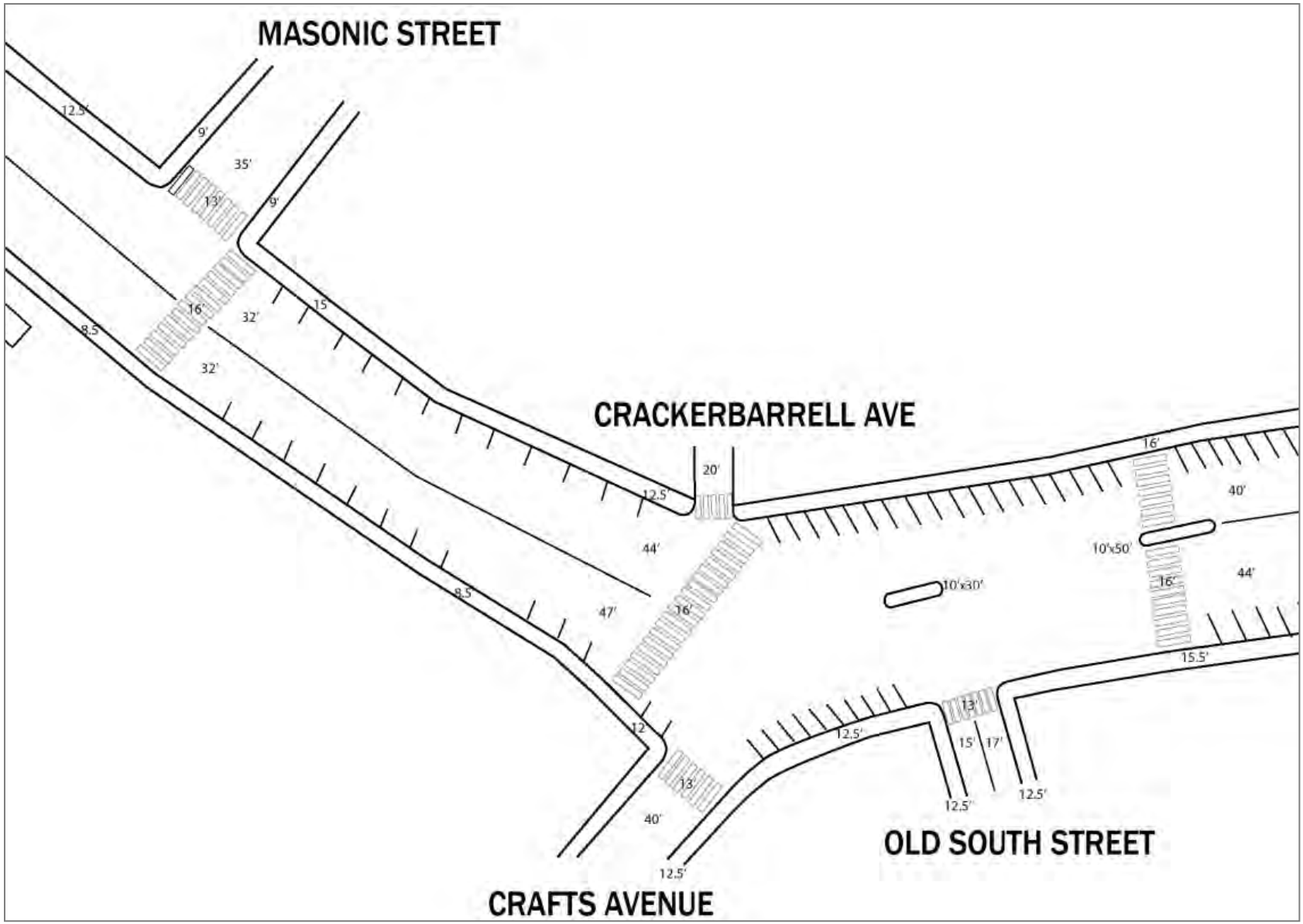


Figure 5 - Main Street from Center Street to King and Pleasant Streets in Northampton, MA

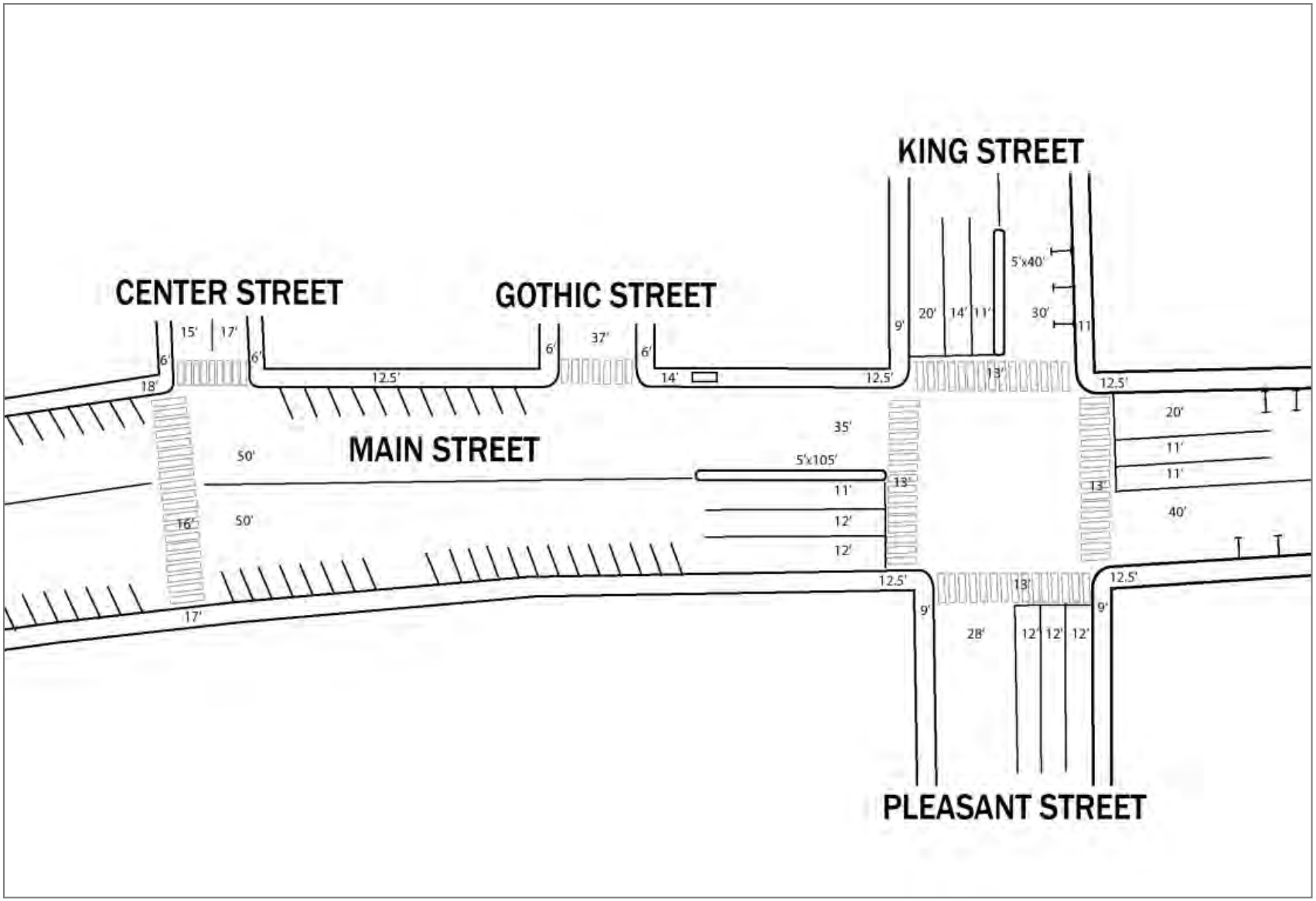
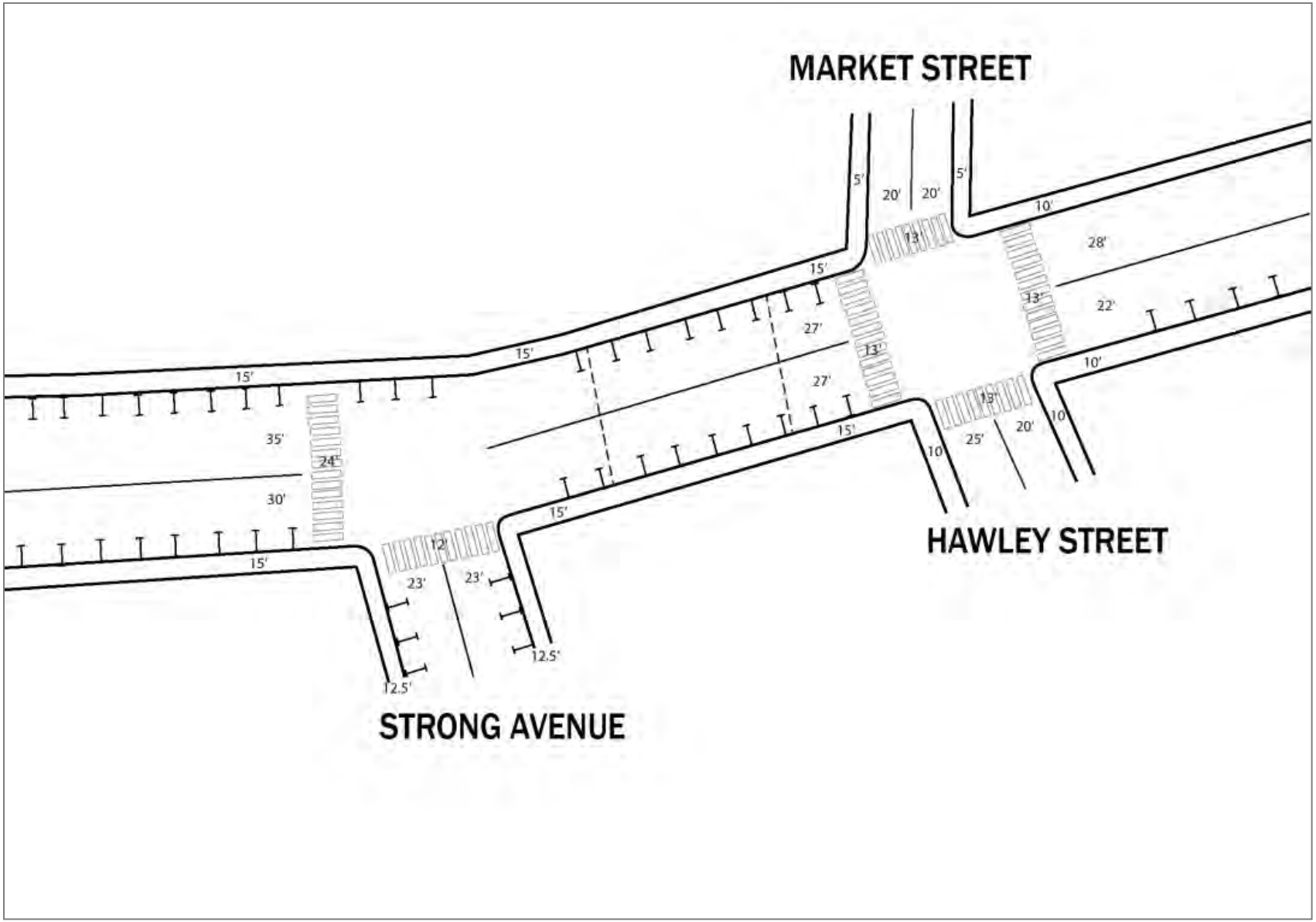


Figure 6 - Main Street from Strong Street to Market and Hawley Streets in Northampton, MA



II.1.1.2 Crosswalks and Medians

In addition to pedestrian crosswalks at major street intersections there is a major midblock crosswalk connecting the bank on the north side of the street with Thornes Marketplace at the southern end of the street (Figures 7, 8, 9, and 10). The variability of street widths throughout the corridor lead to a variability of crosswalk lengths ranging from 50' to 100'. The width of each crosswalk varied from 12' to 16'. A median of 5' width was present near its intersection with Route 5 (Figure 10). However, this median is not designed as a pedestrian refuge area and is usually occupied with flower planters in the summer and snow banks in the winter.

Figure 7 - Main Street Crosswalk to City Hall from Cracker Barrel Alley, Northampton, MA

Figure 8 - Main Street Crosswalk to Thornes Market from TD Bank, Northampton, MA

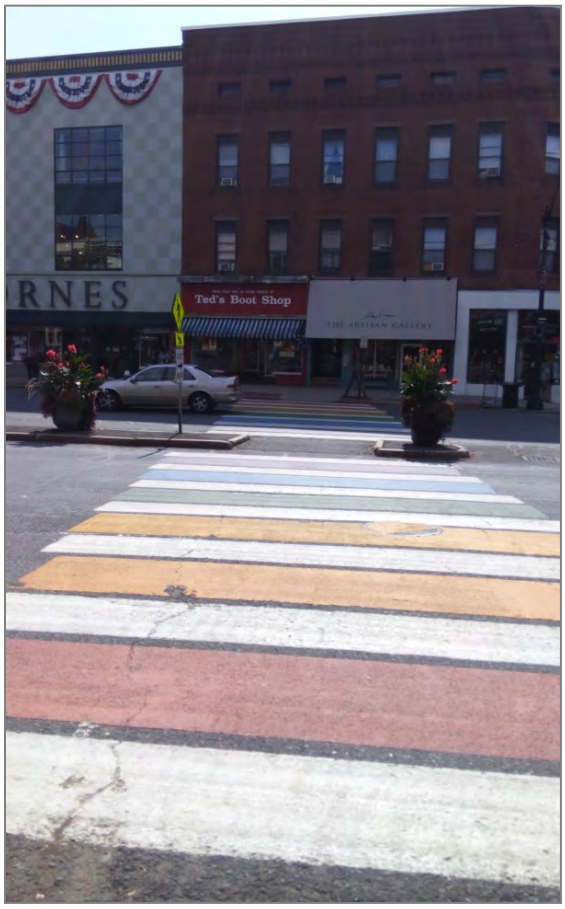


Figure 9 - Main Street Crosswalk from Center Street, Northampton, MA

Figure 10 - Crosswalks at the Intersection of Main Street with Pleasant/King Street

II.1.1.3 On-street Parking Inventory

Metered parking spaces flank both sides of Main Street (Figure 11). Angle parking is provided between Crafts Avenue and King Street (Route 5), while parallel parking is provided beyond the heart of the business district.

Figure 11 - On Street Parking on both Sides of Main Street (Route 9)

A total of 224 parking spaces were surveyed by PVPC staff along Route 9 and its immediate vicinity. Parking maneuvers were counted during the evening peak hour from 4:45 PM to 5:45 PM. A total of 555 parking maneuvers were noted (Figure 12). Numbers along Route 9 indicate parking movements along the adjacent side of that section of the street. Numbers in parenthesis indicate parking maneuvers along side streets. This represents an average turnover rate of 2.5 vehicles per parking space within the study

area. Popular parking spots near local businesses along Main Street had a higher turnover rate than the side streets.

Figure 12 - Parking Maneuvers during Peak Hour (4:45 PM - 5:45 PM)

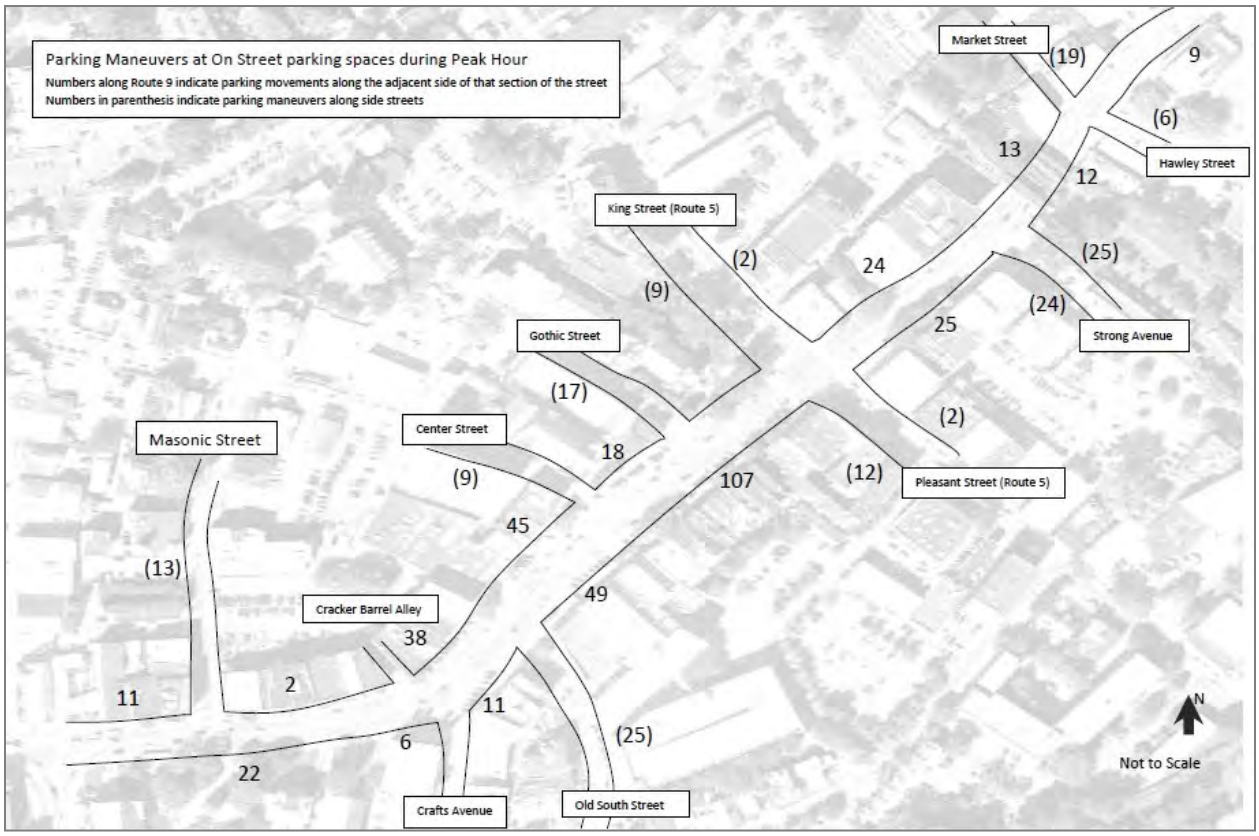


Table 2 - Parking Maneuvers during Afternoon Peak Hour

No.	Location	Roadway	Orientation	Existing On Street Parking Spaces	Parking Maneuvers during Afternoon Peak Hour
1	Between State Street and Masonic Street	Along Route 9	Northern side of the roadway	4	**11**
2	Between Masonic Street and Town Hall	Along Route 9	Southern side of the roadway	8	**22**
3	In the vicinity of the Town Hall	Along Route 9	Southern side of the roadway	4	**6**
4	Between Masonic Street and Cracker Barrel Alley	Along Route 9	Northern side of the roadway	10	**2**
5	Between Route 9 and Button Street	Along Masonic Street	Western side of the roadway	5	**13**
6	Between Cracker Barrel Alley and the mid-block crosswalk in the vicinity of Thornes Marketplace	Along Route 9	Northern side of the roadway	15	**38**
7	Between Craft's Avenue and Old South Street	Along Route 9	Southern side of the roadway	9	**11**
8	Between Route 9 and Brewster Ct.	Along Old South Street	Eastern side of the roadway	10	**25**
9	Between mid-block crosswalk in the vicinity of Thornes Marketplace and Center Street	Along Route 9	Northern side of the roadway	10	**45**
10	Between Old South Street and Center Street	Along Route 9	Southern side of the roadway	8	**49**
11	Between Route 9 and crosswalk in the vicinity of TDBank North parking lot	Along Center Street	Western side of the roadway	7	**9**
12	Between Center Street and Gothic Street	Along Route 9	Northern side of the roadway	9	**18**
13	Between Center Street and Pleasant Street (Route 5)	Along Route 9	Southern side of the roadway	19	**107**
14	Between Route 9 and Gothic Street parking lot	Along Gothic Street	Western side of the roadway	11	**17**
15	Between Route 9 and Hotel Northampton	Along Kings Street (Route 5)	Western side of the roadway	10	**9**
16	Between Route 9 and Merrick Lane	Along Kings Street (Route 5)	Eastern side of the roadway	2	**2**
17	Between Route 9 and Armory Street	Along Pleasant Street (Route 5)	Western side of the roadway	2	**12**
18	Between Route 9 and Armory Street	Along Pleasant Street (Route 5)	Eastern side of the roadway	2	**2**
19	Between Kings Street (Route 5) and Strong Avenue	Along Route 9	Northern side of the roadway	12	**24**
20	Between Pleasant Street (Route 5) and Strong Avenue	Along Route 9	Southern side of the roadway	10	**25**
21	Between Route 9 and The Tunnel Bar	Along Strong Avenue	Western side of the roadway	9	**24**
22	Between Route 9 and The Tunnel Bar	Along Strong Avenue	Eastern side of the roadway	11	**25**
23	Between Strong Avenue and Market Street	Along Route 9	Northern side of the roadway	7*	**13**
24	Between Strong Avenue and Hawley Street	Along Route 9	Southern side of the roadway	7	**12**
25	Between Route 9 and Graves Avenue	Along Market Street	Eastern side of the roadway	8	**19**
26	Between Route 9 and Phillips Pl.	Along Hawley Street	Eastern side of the roadway	7	**6**
27	Between Hawley Street and US Postal Service building	Along Route 9	Southern side of the roadway	6	**9**

* 2 spaces were blocked due to sidewalk repair work

II.1.2 Vehicular Traffic Volumes

Traffic volume data collection included daily traffic counts and turning movement counts. Traffic counts were initially conducted during the standard expected morning and afternoon peak periods, however, the morning peak period counts yielded much smaller traffic volumes compared to the afternoon peak period. City staff confirmed that this was the expected traffic flow pattern for downtown Northampton. Therefore, subsequent analysis focused on the afternoon peak hour of traffic. Turning movement counts were conducted manually by PVPC staff at major intersections in study area for the afternoon peak hour.

Daily counts were collected over several days to obtain the Average Daily Traffic (ADT) using Automatic Traffic Recorders (ATRs). Since traffic volumes tend to fluctuate over the course of a year, MassDOT develops traffic volume adjustment factors to reflect monthly variations. These factors were examined to determine how traffic conditions in the study area compared to an average month conditions in accordance with the month a location was counted. ADT volumes were factored to represent Average Annual Daily Traffic (AADT) levels. The AADT on Main Street (Route 9) west of King Street was 15,162 and the Daily Hourly Volume was 1,585 (Table 3). The 2015 Daily Traffic Volumes were obtained from the MassDOT Transportation Data Management System website:
http://mhd.ms2soft.com/tcds/tsearch.asp?loc=Mhd&mod=

Table 3 - Annual Average Daily Travel on Route 9 Study Corridor

Local ID:	2096
Located On:	MAIN STREET, North of King Street
Direction:	2-WAY
AADT Count:	15,162
Eastbound Count:	8,249
Westbound Count:	6,913
Daily Hourly Volume	1,585

II.1.2.1 Peak Hour Traffic Volumes

Peak Hour Traffic Volumes and Turning Movement Counts (TMC's) were conducted for corridor intersections during the peak afternoon commuter periods between the hours of 4:00 PM to 6:00 PM. The TMC's were conducted to identify the peak four consecutive 15 minute periods of traffic through the intersection. These consecutive peak 15 minute periods constitute a location's Peak Hour Volume. The peak hour of traffic volume represents the most critical period for operations and will be the focus for some of the analysis conducted in this study.

As traffic volumes tend to fluctuate over the course of the year, the Massachusetts Department of Transportation (MassDOT) develops traffic volume adjustment factors to reflect monthly variations. These factors were examined to determine the traffic conditions at the Route 9 corridor intersections.

A total of 11,028 vehicles traveled through the corridor study area during the peak afternoon hour period from 4:45 PM to 5:45 PM. During this peak hour a substantial number of vehicles travel eastbound and southbound from Main Street. It is expected that many of these vehicles were commuters traveling along Route 9 to access I-91 via Bridge Street at Interchange 19 or via Pleasant Street at Interchange 18. A display of turning movement counts at each of the study area's roadway intersections are presented below (Figure 13 and 14).

Figure 13 - Peak Hour Turning Movement Counts

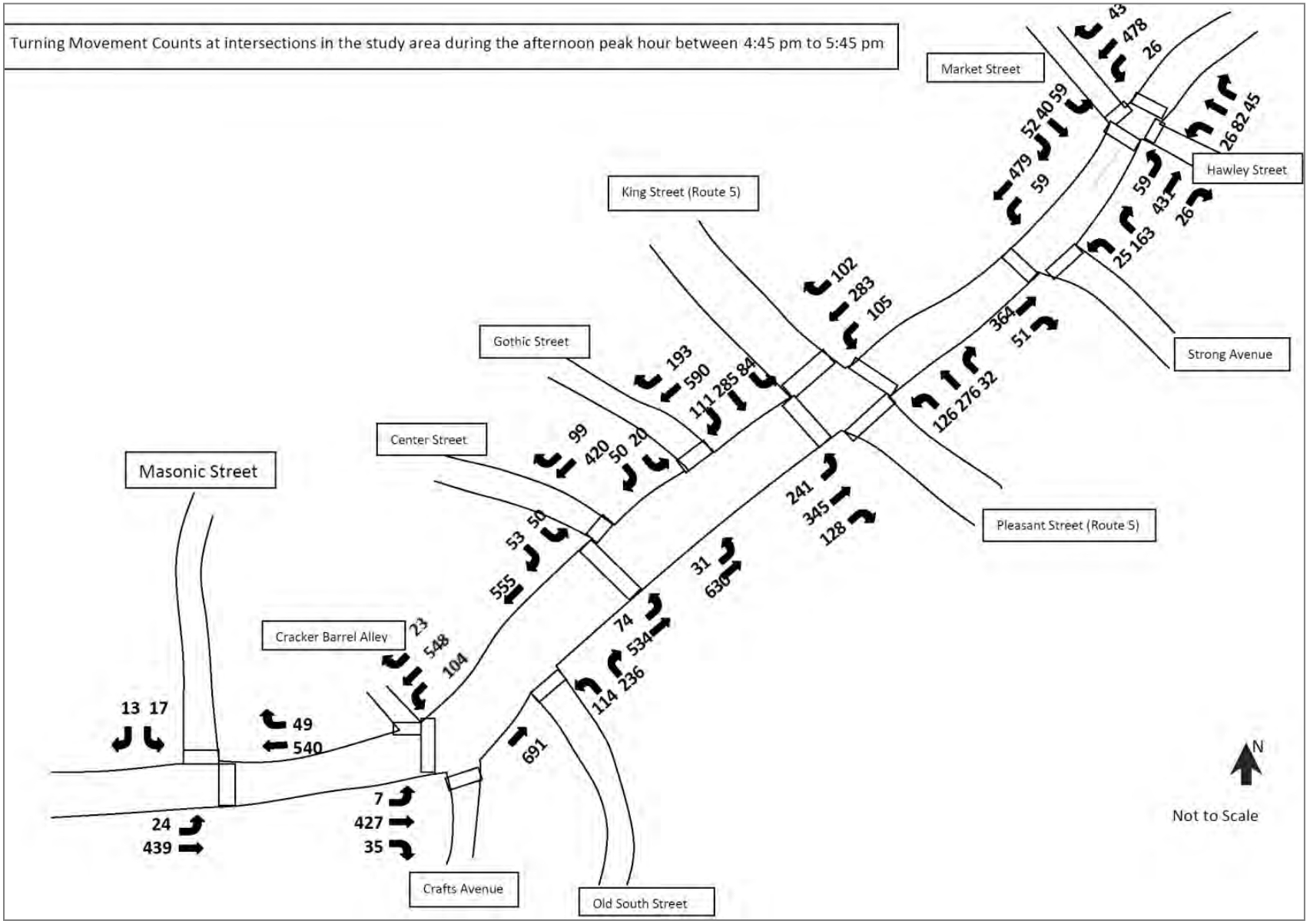
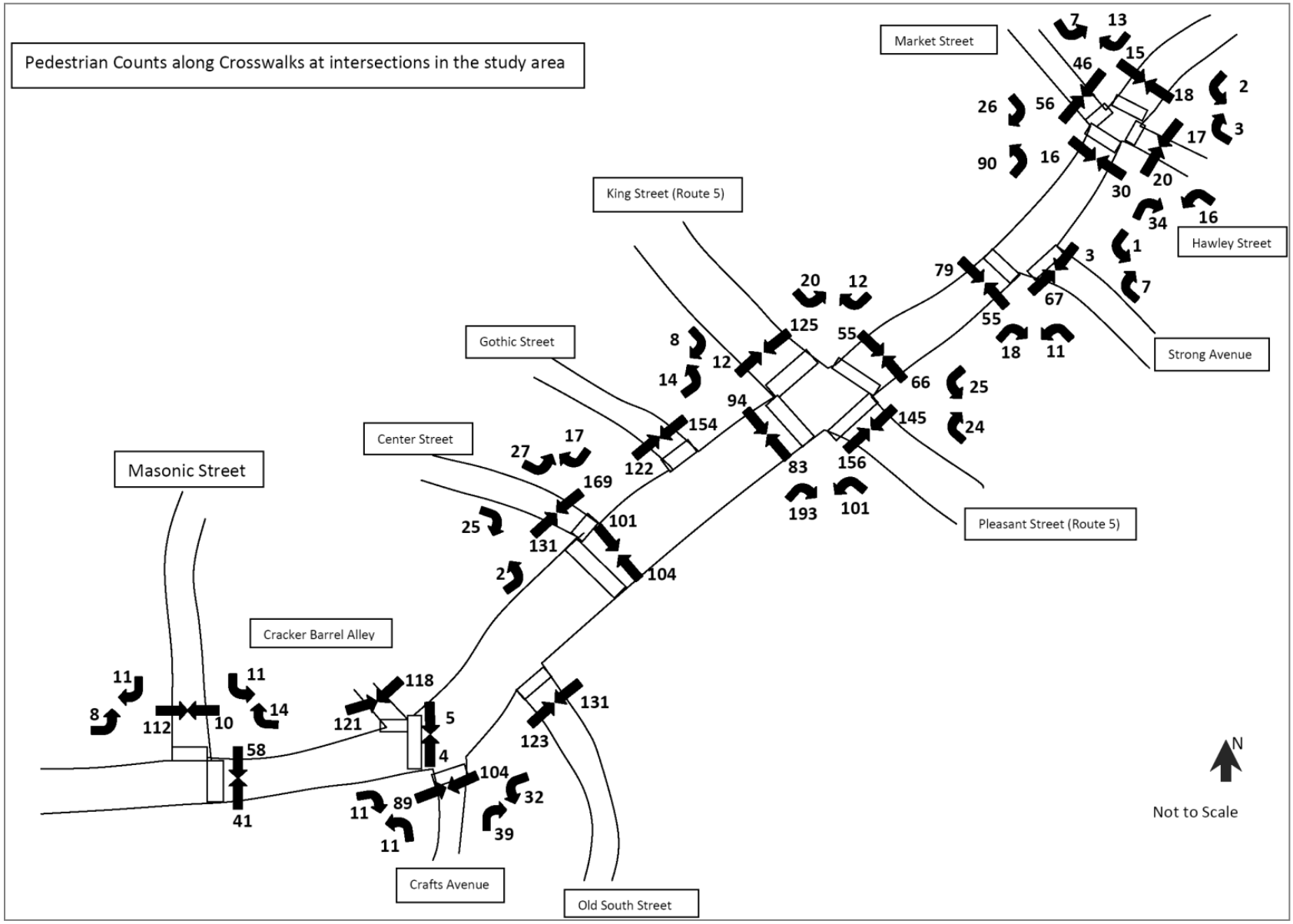


Figure 14 - Peak Hour Pedestrian Traffic Movements



II.1.2.2 Trucks and Heavy Vehicles

TMC data also identifies the number of heavy vehicles on a roadway. Heavy vehicles include trucks, recreational vehicles and buses. The percentage of heavy vehicles in traffic is an important component in calculating the serviceability of a corridor or intersection. Trucks impact traffic flow because they occupy more roadway space than passenger cars and have poorer operating capabilities with respect to acceleration, deceleration and maneuverability. There were a total of 170 heavy vehicles counted during the afternoon peak hour. This represents 1.5% of all traffic during that period of time.

II.1.3 Pedestrians Traffic Volumes

Pedestrian traffic movements were counted at all crosswalks within the study area. Pedestrian volumes during the afternoon peak hour at the various intersections and crosswalks were documented in sketches representing three sections of Route 9 from its intersection with Masonic Street to Market Street (Figure 14). Pedestrian traffic was counted during the afternoon peak hour. Pedestrian peak hour volumes reached 3,949 on the day of counting. Nearly a quarter of this number of pedestrians crossed Main Street (Route 9) at various locations. At the intersection of Route 9 and Route 5 (Main Street and Pleasant/King Street), a total of 460 pedestrians were counted. This is 10% of all intersection traffic during the two hour afternoon peak traffic period (Figure 15).

Figure 15 - Pedestrians Crossing the Signalized Intersection of Route 9 with Route 5

II.1.4 Transit

The local transit hub is located along Main Street (Route 9) in the center of Northampton in front of Pulaski Park next to the Academy of Music Theater (Figure 16). This bus stop is serviced by both local and regional buses. An Interstate Bus Terminal is located one block away south of Main Street off of Crafts Avenue at the Roundhouse Plaza. The Amtrak train station is located at the southern edge of the study corridor about one half mile away from the Academy of Music bus stop off of Pleasant Street (Route 5) (Figure 17). The North-South railroad tracks run along Route 5. The railroad is used for both passenger and freight services.

Figure 16 - Transit Routes Serving Northampton Center (2013)

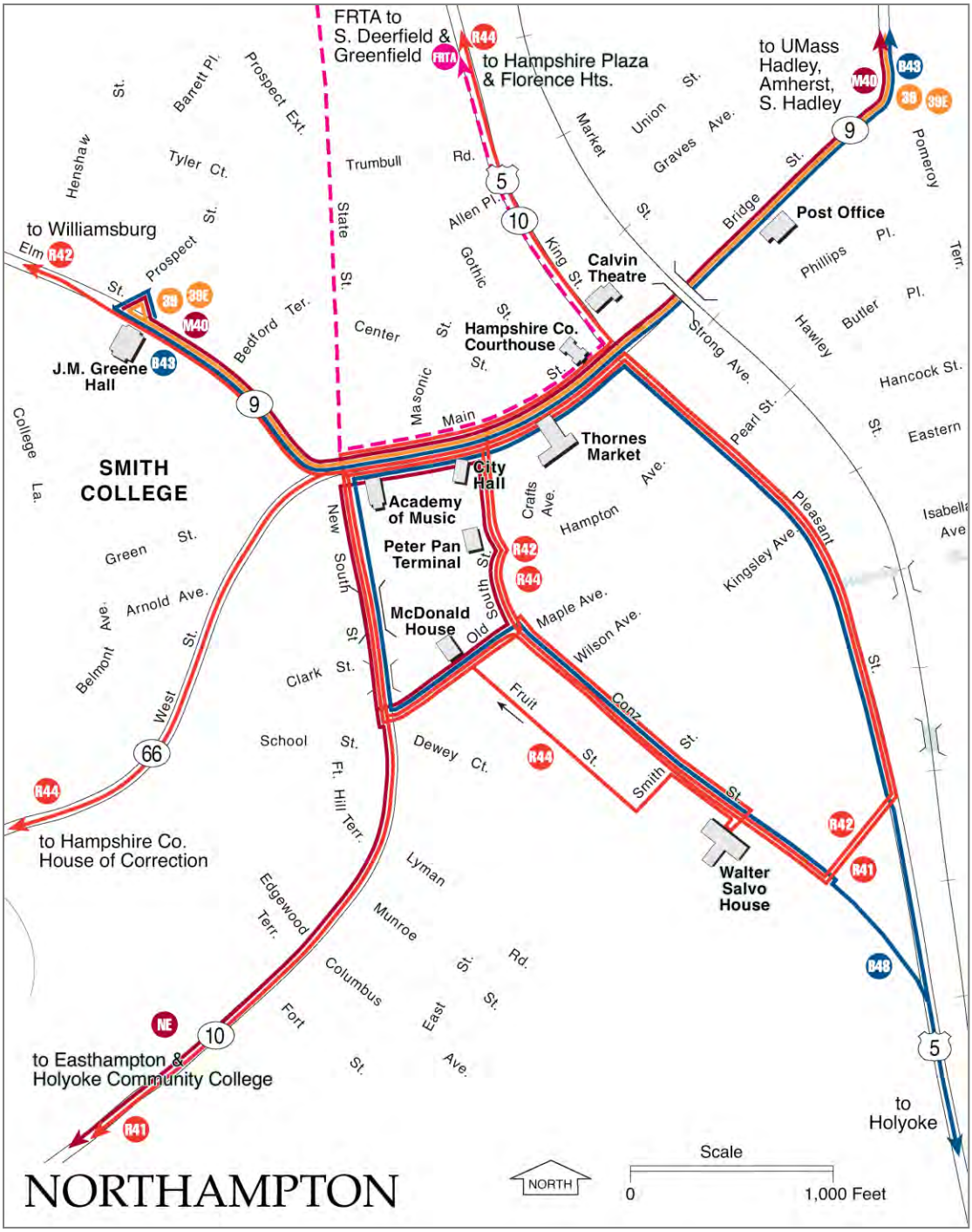


Figure 17 - Street Sign for Amtrak Train Station, Northampton

There are three main bus stop locations within the study area. The Academy of Music bus stop serves as a transportation hub where all bus routes servicing Northampton stop. A few of the bus routes use it as a terminal point with timed stops on the bus schedule sheets (Figure 18). Most bus users congregate between bus transfers at this location where a large bus shelter is available as well as several benches. The Masonic Street bus stop is located on the opposite side of Main Street to service the opposite direction. The third major bus stop is located near the court house.

Figure 18 - Academy of Music Bus Stop in front of Pulaski Park, Northampton

Google Image Capture August 2015.

The study corridor is served by nine public transit routes operated by the regional transit authority (PVTA) and one route operated by (FRTA) which connects Northampton with Greenfield to the north. Three additional bus routes are operated by the intercity motor coach carrier PeterPan Bus Lines. Transit services available are listed in Table 4.

Table 4 - Bus and Rail Routes within the Route 9 Corridor Study Area

Company	**Route Name**	**From**	**To**	**Roadway Used** (within study area)
PVTA	B43	Academy of Music Bus Stop	Hadley, Amherst	Main Street
PVTA	B48	Academy of Music Bus Stop	Holyoke	Main Street, Pleasant Street
PVTA	M40	Academy of Music Bus Stop	Amherst	Main Street (Route 9)
PVTA	NE	Academy of Music Bus Stop	Easthampton	Main Street, Pleasant Street
PVTA	R41	Academy of Music Bus Stop	Easthampton, Holyoke	Main Street, Pleasant Street
PVTA	R42	Academy of Music Bus Stop	Williamsburg	Main Street, Pleasant Street
PVTA	R44	Academy of Music Bus Stop	Florence	Main Street, King Street
PVTA	X98	Academy of Music Bus Stop	Across town	Main Street, King Street
PVTA	39	Academy of Music Bus Stop	Amherst, South Hadley	Main Street
FRTA	31	Academy of Music Bus Stop	Greenfield	Main Street, King Street
PeterPan Bus Co.	PPB	Roundhouse Bus Terminal	All Points East/North/South/	Main Street, Crafts Avenue, Old South Street, King Street
Greyhound Lines	GLI	Roundhouse Bus Terminal	Springfield and All Points North/South	Main Street, Crafts Avenue, Old South Street, King Street
Amtrak	Vermonter	Vermont-Springfield	Washington, D.C.	North-South Railroad Tracks
Multiple Companies	CT River Line	North/South	South/North	North-South Railroad Tracks

II.2 SAFETY

The Northampton Police Department provided crash reports for Route 9 in the study area from January 2011 to March 2014. This information was used to summarize crash patterns and develop collision diagrams for high crash locations in study area. Crash data for six study area intersections was reviewed and summarized by type, severity, lighting, and road surface condition. These tables are included in the Appendix. An overview of the crashes occurring along the study corridor is summarized in the following section.

II.2.1 Crash History

The Route 9 corridor between Masonic Street and Hawley/ Market Street ranked fourth among the top 25 high crash roadway segments in the 2013 Pioneer Valley Regional Crash Report. A total of 150 crashes occurred during the 39 month analysis period with an average of 46 crashes per year. A third of collisions were rear end crashes, 15% occurred during lane changes, 15% were angle collisions, and 15% were collisions with a fixed object. A majority of crashes, 81%, caused property damage over $1000. Pedestrians and cyclist collisions represented 11% of all crashes, and resulted in one fatality. Nearly 90% of all pedestrian and cyclist crashes resulted in an injury (Table 5). Two thirds of crashes occurred during daylight, while a quarter of crashes occurred during dark conditions on a lighted roadway.

Table 5 - Crashes 2011-2014 Main Street (Route 9) Corridor in Northampton

MAIN STREET NORTHAMPTON 2011-2014					
Year	Collisions	Intersection	Severity	Lighting	Road Surface
2011	57	6 Masonic St 9 Old South St 6 Center St 17 Pleasant St 12 Strong St 7 Hawley St/Market St	41 Property Damage > $1000 15 Property Damage < $1000 12 Personal Injury	35 Daylight 2 Dusk 20 Dawn	34 Dry 20 Wet 2 Water 1 Snow
2012	37	4 Masonic St 8 Old South St 2 Center St 11 Pleasant St 6 Strong St 6 Hawley St/Market St	30 Property Damage > $1000 7 Property Damage < $1000 6 Personal Injury 1 Fatality	25 Daylight 8 Dawn 4 Dusk	26 Dry 9 Wet 1 Water 1 Snow
2013	47	6 Masonic St 9 Old South St 4 Center St 18 Pleasant St 7 Strong St 3 Hawley St/Market St	41 Property Damage > $1000 5 Property Damage < $1000 9 Personal Injury	37 Daylight 1 Dark - Lighted Road 1 Dawn 8 Dusk	32 Dry 10 Wet 2 Water 3 Snow
Jan. 2014 - Mar. 2014	9	1 Masonic St 1 Old South St 6 Pleasant St 1 Hawley St/Market St	8 Property Damage > $1000 1 Property Damage < $1000 3 Personal Injury	5 Daylight 4 Dawn	6 Dry 3 Wet

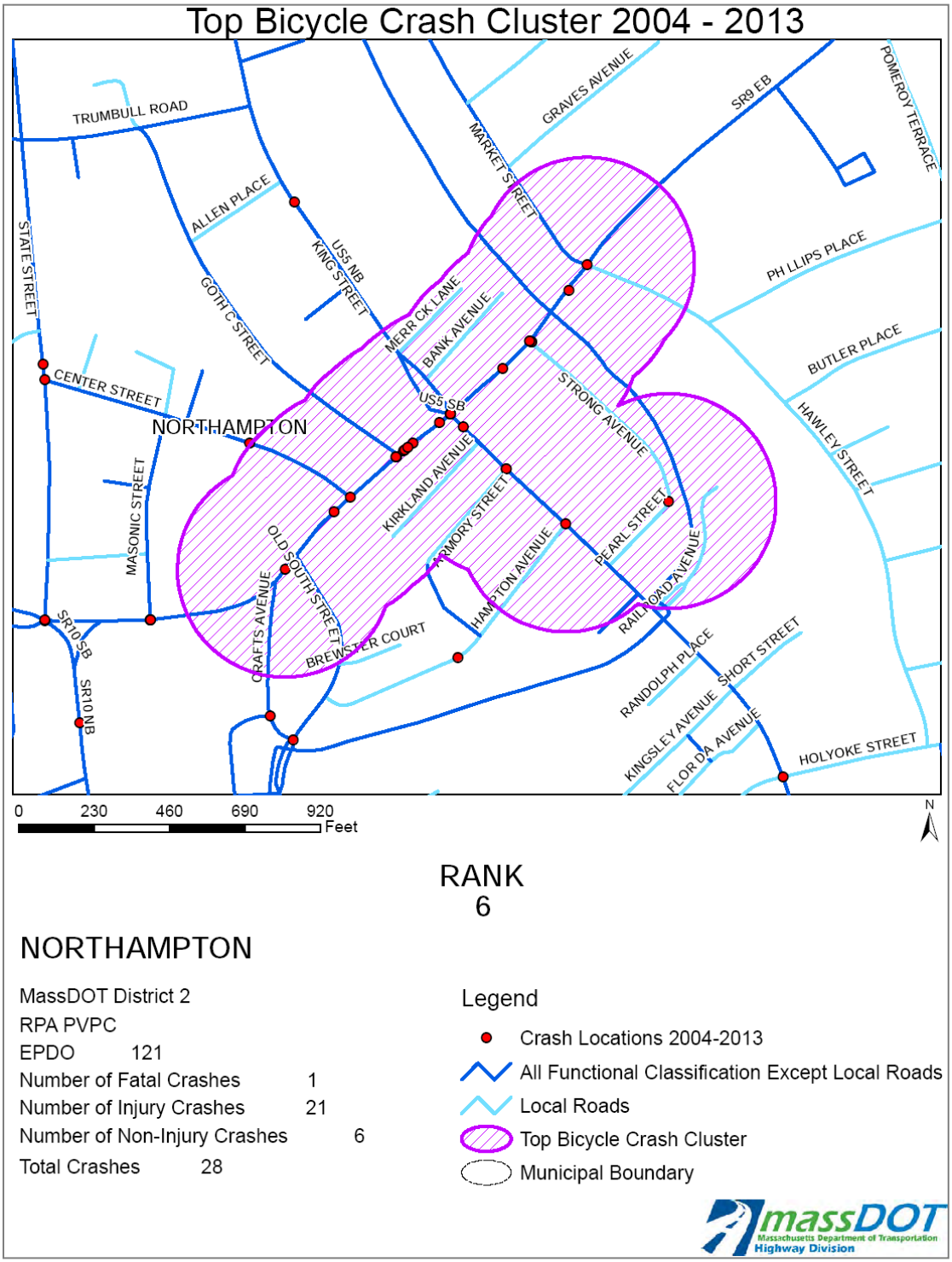
MAIN STREET NORTHAMPTON COLLISIONS 2011-2014 TOTAL					
Total Crashes	Intersection	Type	Severity	Lighting	Road Surfaces
150	17 Masonic St 27 Old South St 12 Center St 52 Pleasant St 25 Strong St 17 Hawley St/Market St	45 Rear End 21 Lane Change 21 Angle 16 Backing 21 Fixed Objects 8 Side Swipe 10 Cyclist 7 Pedestrian 1 Head On	120 Property Damage > $1000 28 Property Damage < $1000 30 Personal Injury 1 Fatality	102 Daylight 1 Dark - Lighted Road 40 Dawn 7 Dusk	98 Dry 42 Wet 5 Water 1 Snow 4 Ice

Route 9 in the Northampton city center had a high rate of non-motorized crashes, ranking third statewide in equivalent property damage only (EPDO) score during the period of 2008-2012. This corridor was also among the top high bicycle crash locations in the Commonwealth in the past three consecutive statewide rankings. Downtown Northampton was listed as a high crash cluster for bicycles and pedestrians in Massachusetts. It ranked sixth statewide during the latest Top Crash Locations Report, a report utilizing 10 years of crash data from 2004 to 2013. The focal point of Northampton's bicycle crash cluster on Main Street (Route 9) appears to between Gothic Street and King/Pleasant Street (Figure 19). It represents a roadway segment spanning 200 feet in the vicinity of a major signalized intersection (Figure 20).

Figure 19 - Distracted Pedestrians Crossing Main Street from Pleasant Street

One fatality occurred at the intersection of Main Street (Route 9) and Pleasant Street (Route 5). The collision occurred on the 19th of May 2012 on a dry Spring day at 7:11pm. A car travelling westbound and turning left onto Pleasant Street from Main Street collided with a bicycle driving east on Main Street. Fatal injuries caused the death of the cyclists a few days later. The cyclist was not wearing a helmet at the time of collision.

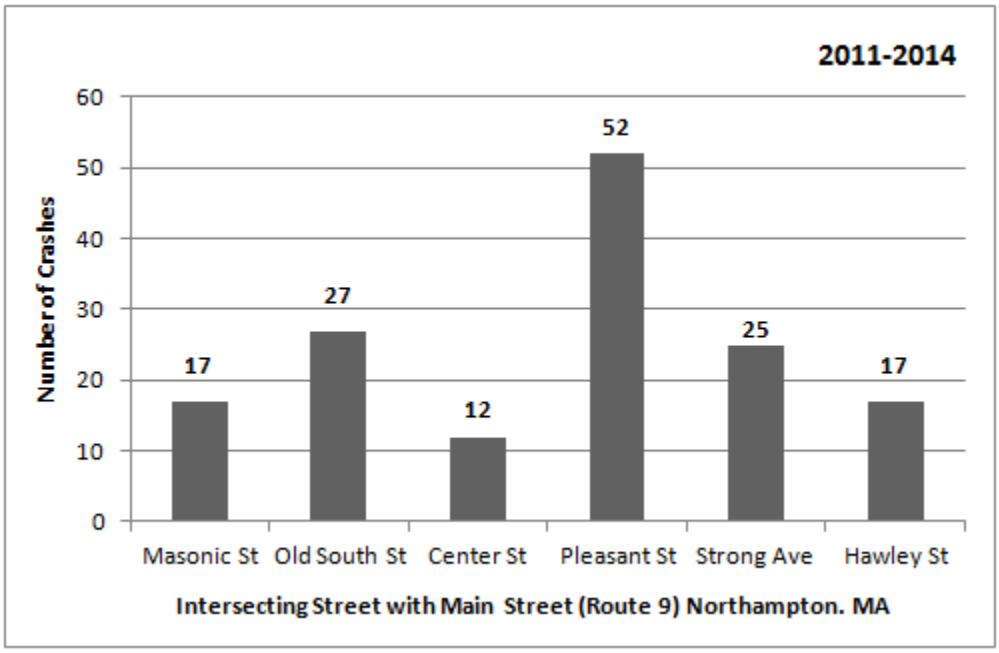
Figure 20 - Northampton Center Ranked 6 in Statewide Top Bicycle Crash Clusters



II.2.2 Collision Patterns

To identify safety concerns and investigate potential solutions, the six intersections within the Route 9 study corridor were analyzed in terms of frequency and manner of collision. Intersecting streets studied include: Masonic Street, Old South Street, Center Street, King Street/Pleasant Street, Strong Ave, and Market Street/Hawley Street (Figure 21). An overall corridor collision diagram is included in the Appendix. The following is an in depth discussion on collision patterns and crash trends observed in the study area.

Figure 21 - Main Street (Route 9) Crashes at Six Intersections 2011-2014



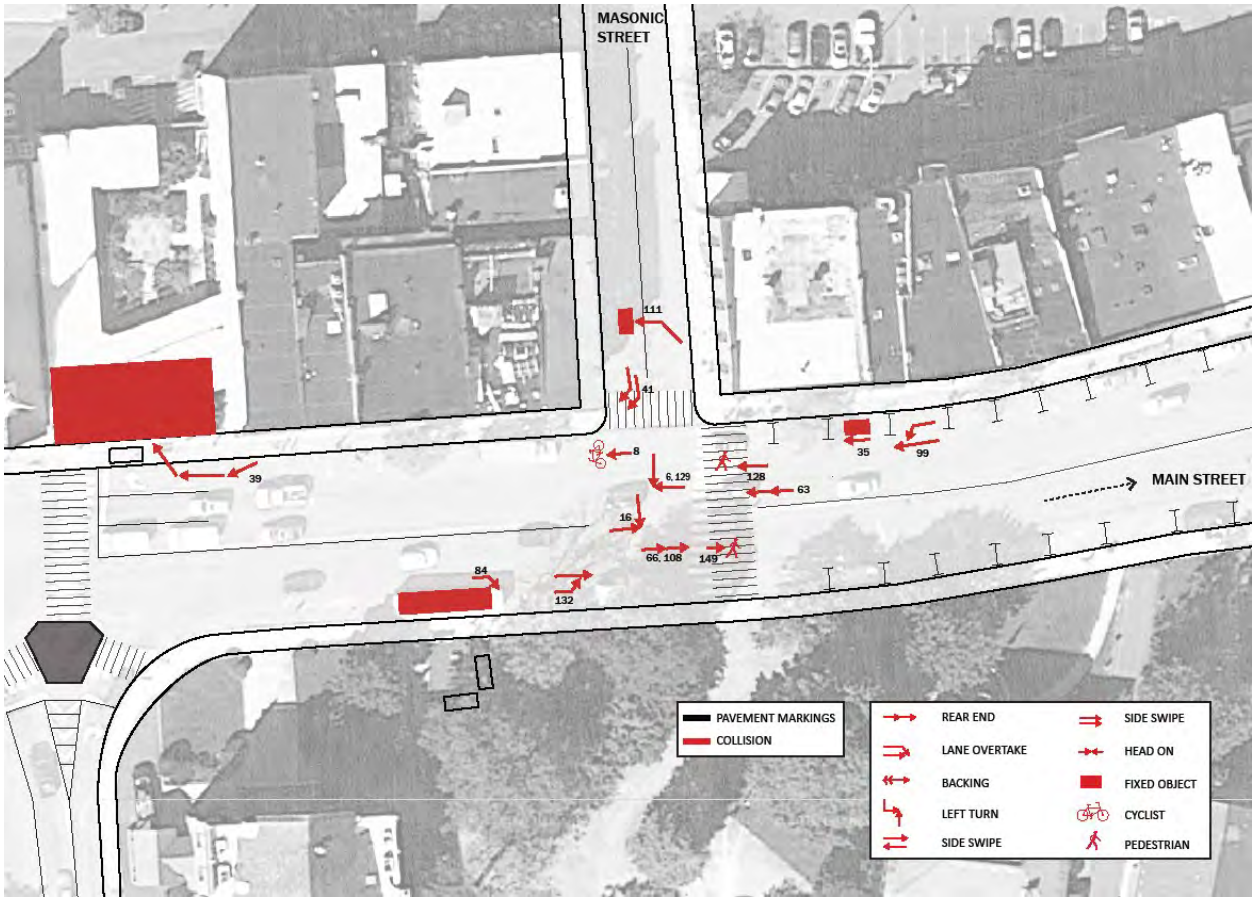
The largest number of crashes occurred at the intersection of Main Street (Route 9) and Pleasant Street (Route 5) (Figure 22). A total of 52 crashes, representing 35% of all corridor crashes occurred at this major signalized intersection. About 18% of crashes occurred at the intersection of Main Street with Old South Street. Next in magnitude of crashes was the intersection of Main Street with Strong Avenue which experienced 17% of all crashes. Two intersections experienced 11% of crashes, the intersection of Main Street with Masonic Street and the intersection of Bridge Street with Hawley Street. The lowest number of crashes, 7%, occurred at the intersection of Main Street and Center Street.

Figure 22 - Main Street (Route 9) and Pleasant/King Street (Route 5) Intersection

The following collision diagrams use symbols that represent the manner of collision and location. A number reference represents the index number of each crash and identifies each crash occurrence as listed in the crashes database table included in the Appendix.

The intersection of Main Street (Route 9) with Masonic Street experienced a variety of crash types (Figure 23). Masonic Street has one lane in each direction. The crosswalk spanning Route 9 experiences heavy pedestrian traffic especially since it leads to Pulaski Park and the main transit hub and bus waiting area in Northampton. During the peak hour 99 pedestrians crossed Route 9 and 122 crossed Masonic Street. There were two vehicular collisions with pedestrians crossing Route 9. These crashes were possibly caused by drivers eager to pass the busy intersection or get through the green phase of the nearby signalized intersection. Another factor could have been a distracted pedestrian rushing to catch a bus, as a bus stop is located in the vicinity of this intersection on both sides of Route 9. There was one collision with a cyclist at this location. Other crash types that occurred include rear end, angle, side swipe, fixed object or parked vehicle.

Figure 23 - Main Street (Route 9) and Masonic Street Collision Diagram



The second highest crash location in the study corridor was at the intersection of Main Street (Route 9) with Old South Street (Figure 24). Old South Street operates as a one way street in the northbound direction and provides one travel lane with two turning lanes that accommodate a queue of up to five regular size vehicles at its intersection with Main Street. Drivers wishing to enter Main Street stop along a steep grade while waiting for a gap in traffic (Figure 25). The crosswalk spanning Old South Street experiences heavy pedestrian traffic. The peak hour pedestrian count was 254, an average of 4 pedestrians per minute. Due to the steep grade, once a vehicle begins entering the intersection it may be difficult to stop should a pedestrian dart across the crosswalk. There were three collisions with a pedestrian at this location, at a rate of one crash per year. Most crashes in the vicinity of this intersection were rear end collisions where it appeared a vehicle was struck when it stopped for a pedestrian in a crosswalk. There were also several crashes resulting from on-street parking maneuvers.

Figure 24 - Main Street (Route 9) and Old South Street Collision Diagram

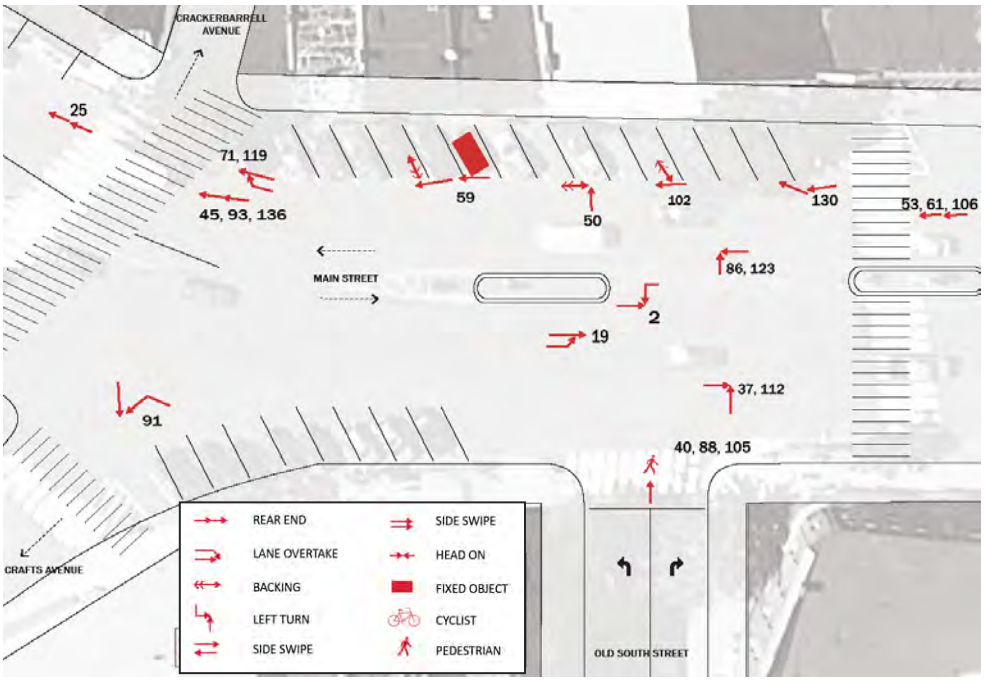
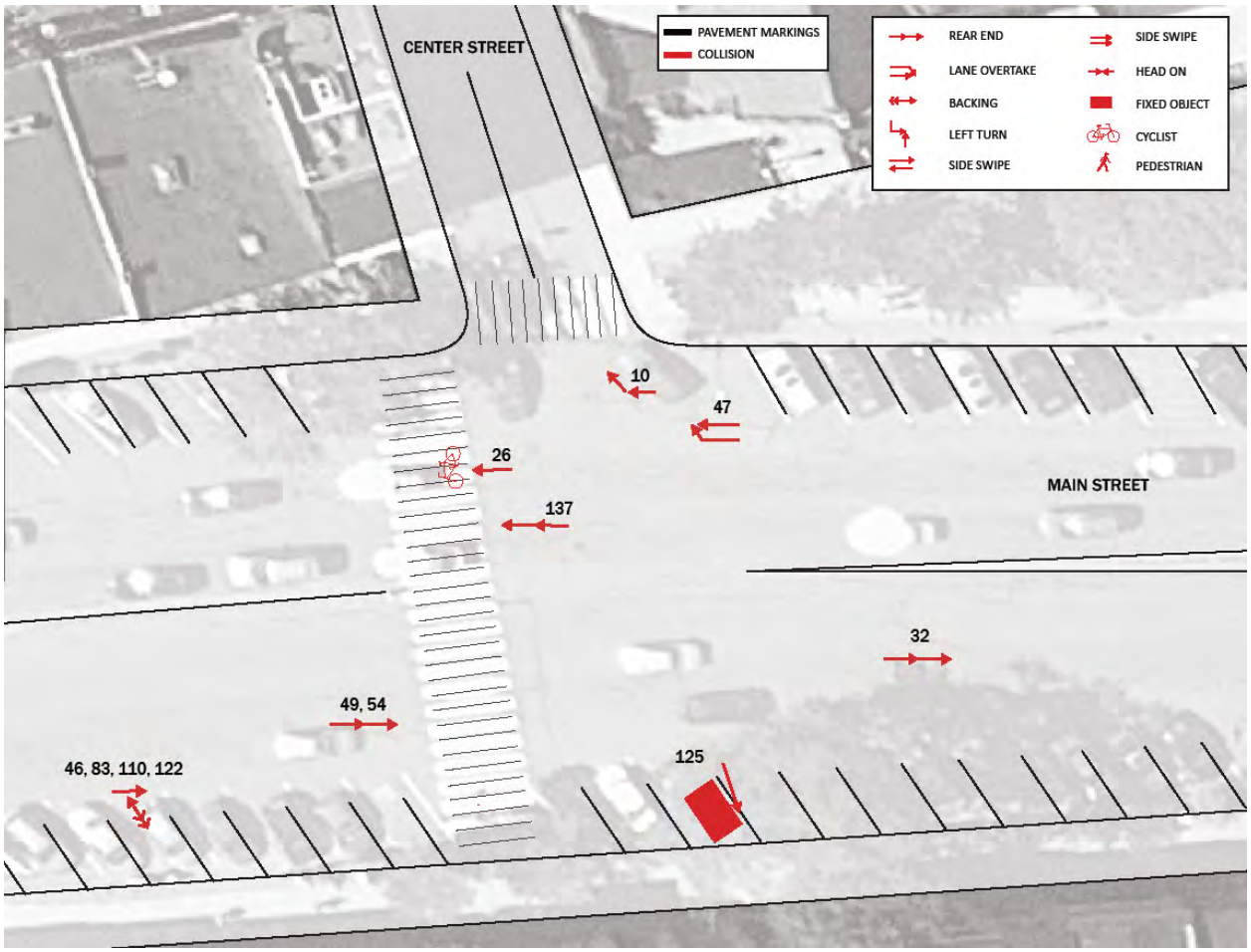


Figure 25 - Heavy Traffic from Old South Street onto Main Street (Route 9).

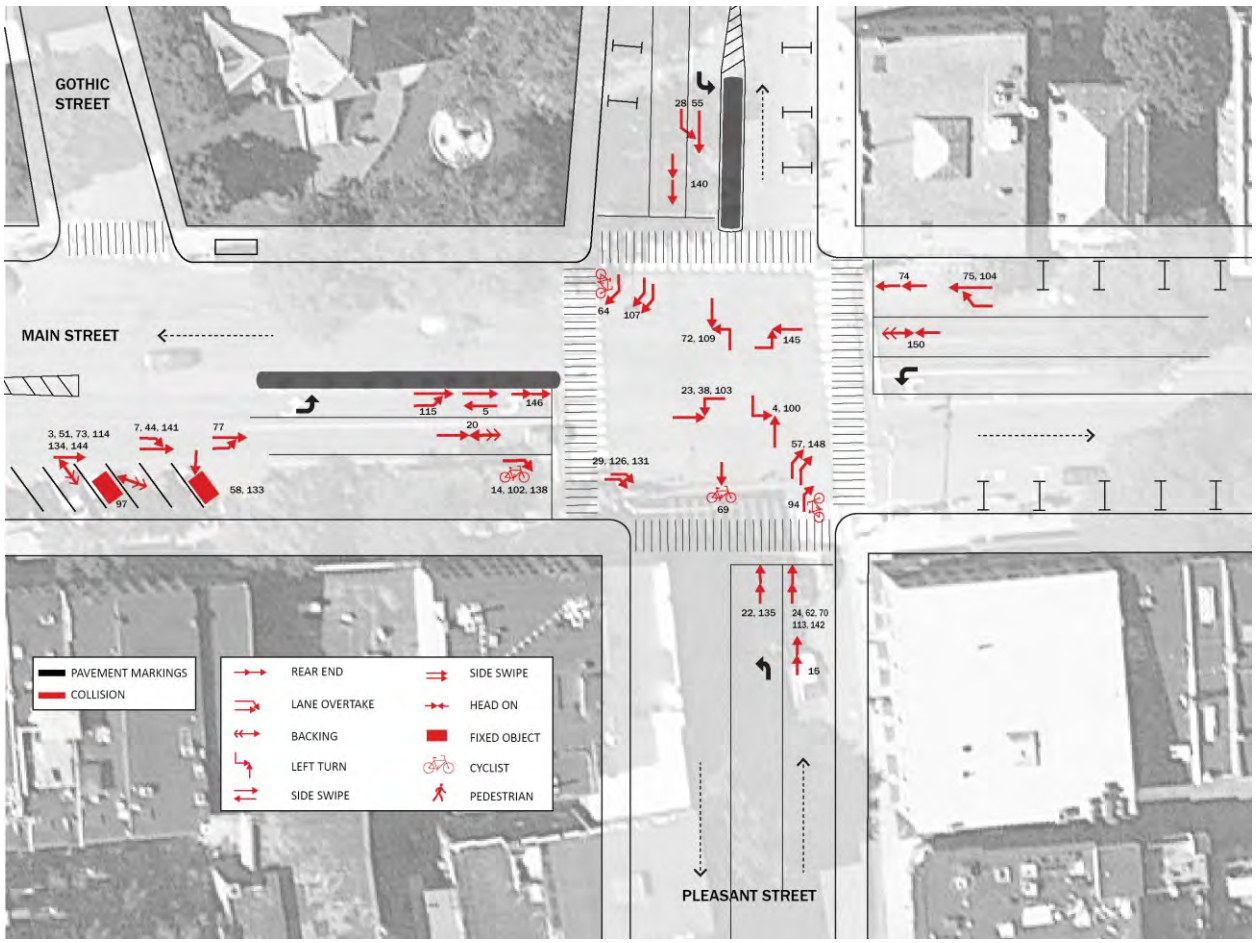
The intersection of Main Street (Route 9) with Center Street experienced the least number of crashes among the six intersections reviewed (Figure 26). Center Street has one lane in each direction. The crosswalk spanning Center Street experiences heavy pedestrian traffic since it leads to many retail establishments. During the peak hour 205 pedestrian crossed Route 9 and 300 crossed Center Street. There was one vehicular collision with a cyclist in a crosswalk while crossing Route 9. Three out of the 11 total crashes were rear ends and three included a vehicle that was backing up. Other crash types included angle, lane change, side swipe, and fixed object.

Figure 26 - Main Street (Route 9) and Center Street Collision Diagram



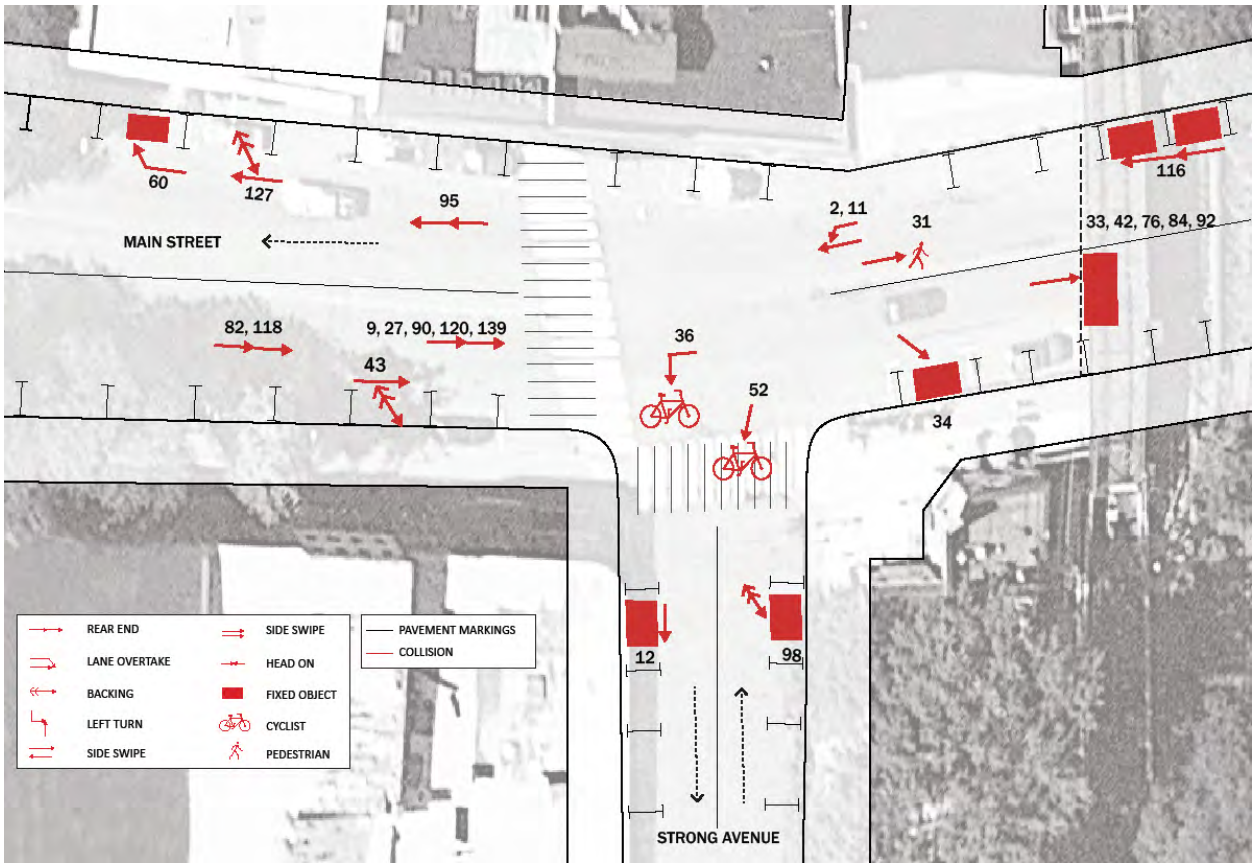
The intersection of Main Street (Route 9) with King and Pleasant Streets (Route 5) experienced the most crashes in the study area (Figure 27). A quarter of crashes at this intersection involved rear end collisions which occurred as vehicles approached the traffic signal or while in queue at the signal. Several crashes occurred between parked vehicles backing out and vehicles in the eastbound travel lane on Main Street. A fifth of crashes occurred during vehicular lane changes as they approached the intersection. There were a number of side swipe collisions during turning movements at the intersection.

Figure 27 - Main Street (Route 9) and King / Pleasant Street (Route 5) Collision Diagram



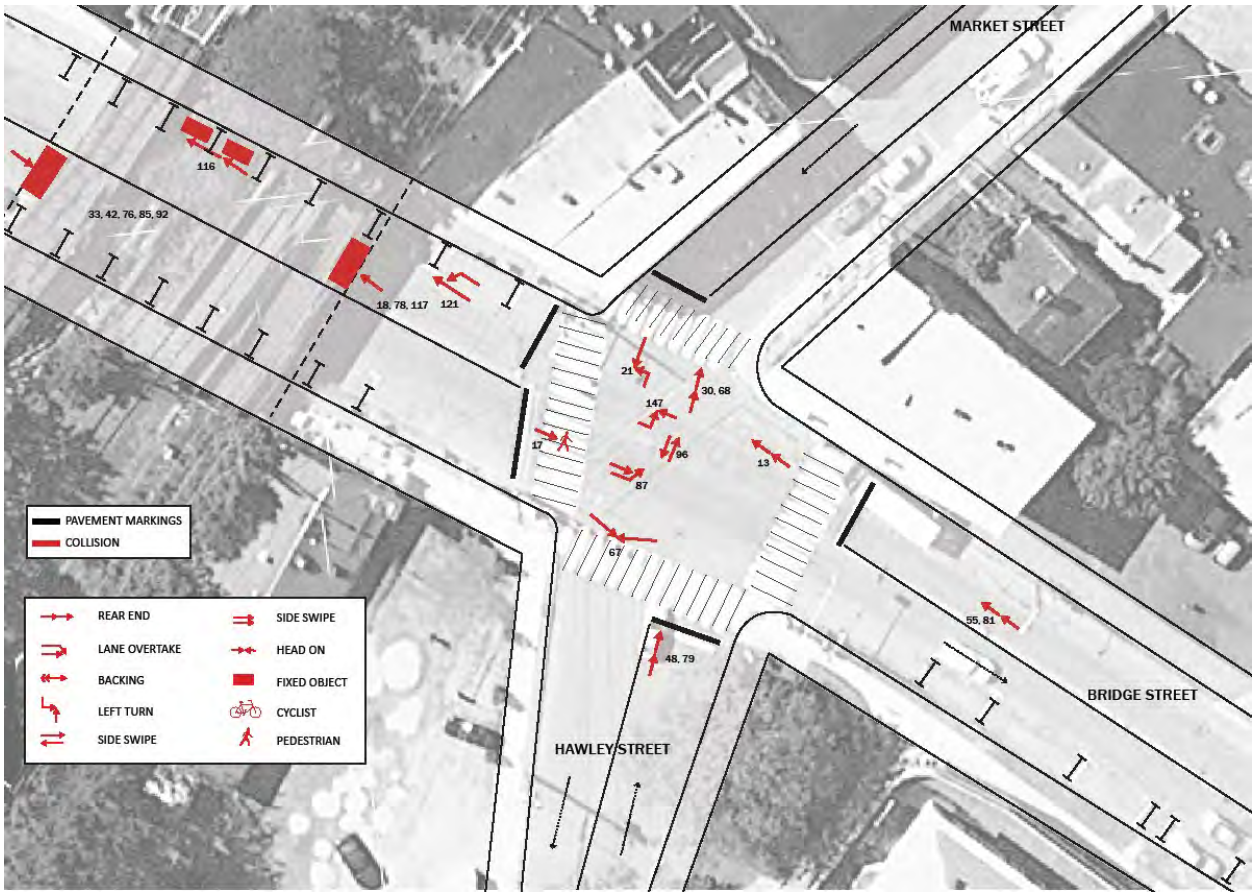
The intersection of Main Street (Route 9) with Strong Avenue experienced several crash types (Figure 28). Strong Avenue has one lane in each direction. The intersection is flanked by many restaurants and generates heavy pedestrian traffic during the evening hours on popular outing days such as Thursday, Friday and Saturday. During the afternoon peak hour, 134 pedestrian crossed Route 9 and 70 crossed Strong Avenue. There were two occurrences of vehicular collisions with a cyclist in crosswalk while crossing Strong Avenue and one pedestrian collision not at the crosswalk. More than a third of all collisions were with a fixed object and another third were due to rear end collisions. Other crash types included backing, lane change, side swipe, and fixed object.

Figure 28 - Main Street (Route 9) and Strong Street Collision Diagram



The intersection of Main Street (Route 9) with Market Street and Hawley Street experienced several crash types (Figure 29). These intersecting streets with Route 9 have one lane in each direction. The intersection is flanked by a variety of retail establishments. It is also in close proximity to the railroad underpass and stairway access to the passenger rail platform at the Northampton Train Station. During the afternoon peak hour, 79 pedestrians crossed Route 9, 102 crossed Market Street, and 37 crossed Hawley Street. A large number, 41%, of collisions occurring at this intersection were rear end collisions. There was one collision between a vehicle and a pedestrian in the crosswalk. Other crash types included head on, left turn, lane change, side swipe, and fixed object. There were also 8 incidents involving oversized vehicles colliding with the 11 foot high railroad bridge west of this intersection.

Figure 29 - Bridge Street (Route 9) and Market / Hawley Street Collision Diagram



The Route 9 Railroad Overpass Safety Study by the Pioneer Valley Planning Commission was completed in 2006. That study included analysis and recommendations to address the issues of oversized vehicles not able to pass under the Northampton railroad bridge which is currently posted at 11 feet, a low-clearance bridge. A high volume of truck traffic travels through the City of Northampton to serve both Northampton and other neighboring cities and towns. On numerous occasions, over height vehicles have collided with the bridge. Many damaged areas can be seen under this bridge. The Northampton Police Department also must routinely provide assistance to clear traffic for vehicles that have not struck the bridge but must back up to a suitable detour point. Route 9 has an over-height vehicle detection system, Warning signs are provided along the corridor and alternate routes have been assigned to assist trucks around the railroad bridge. Bridge Street (Route 9) has also been redesigned to provide more clearance and can no longer be lowered.

Figure 30 – Low Clearance Railroad Bridge Over Main Street

III. DATA ANALYSIS

III.1 SURVEY

PVPC staff conducted a stakeholders' survey using the online platform SurveyMonkey. A total of 867 individuals participated in the survey. The survey was composed of seventeen different questions seeking input and opinion on current traffic and transportation safety conditions within the study area (Table 6). The objective of the survey was to identify the main areas of concern for roadway users and incorporate their feedback in this study. A complete copy of the survey and its results is included in the appendix.

Table 6 - Northampton Traveler Survey Questions

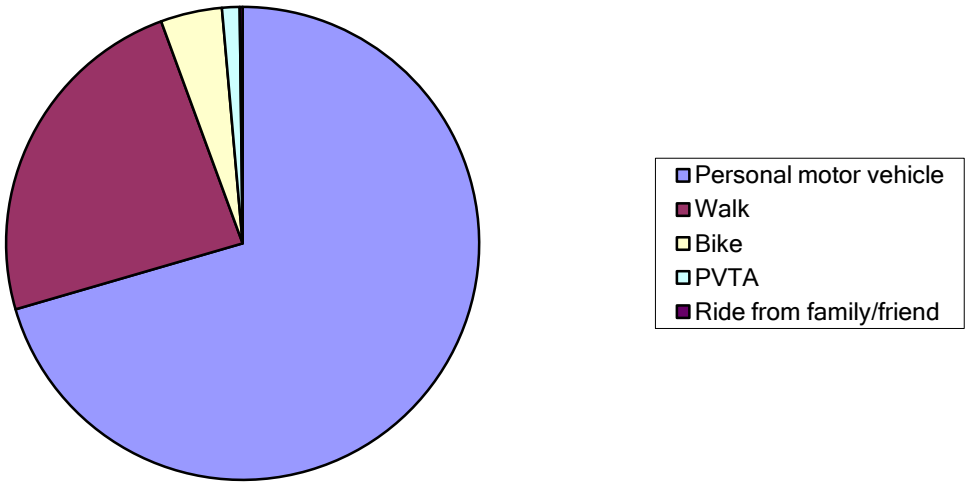
	Question	Answer Choice
1	Community Affiliation	Resident. business owner, employee, student, other
2	How old are you?	5 categories
3	What is your race or national origin?	7 options
4	Do you identify yourself as	Male, Female
5	What mode do you typically use to travel to downtown Northampton?	Personal motor vehicle, walk, bike, PVTA, ride from family/friend, other
6	If you answered 'Personal motor vehicle', where do you typically park?	12 options
7	How often do you ride on a PVTA bus to/from Northampton?	5 options
8	What would encourage you to take a PVTA bus more frequently?	7 options
9	Which PVTA/transit route do you ride most frequently?	10 options
10	Are you aware that passenger train service is returning to Northampton?	Yes, No
11	Would you use a passenger train from Northampton to Springfield, Hartford or New York City?	Yes, No
12	Are you aware of the location of the proposed Northampton Train Station?	Yes, No
13	Rate the importance to you of these aspects in downtown Northampton	10 options
14	What don't you like about walking in downtown Northampton?	13 options
15	What don't you like about biking in downtown Northampton?	11 options
16	If you drive, what makes driving along Main Street difficult?	8 options
17	Rank from 1 to 10 the most important aspects that you would like to see installed/improved along Main Street	10 options

Four out of seventeen questions were basic demographic inquiries identifying groups of roadway users; such as whether the respondent was a resident, commuter, or business owner etc. The remaining questions were related to transportation mode choice such as: bicycle, pedestrian, transit, automobile as well as where people park. Questions were designed to gather input from all users of the transportation system. A few questions were also related to commuter rail service and the then proposed new train station to assess awareness among stakeholders regarding the availability of commuter rail serving the city and region. A summary of select survey question results are included in the following section.

III.1.1 Survey Data Analysis

A vast majority, almost 85%, of all survey responders were City of Northampton residents between the ages of 18-64 years. A third of all respondents chose alternative travel modes to driving when travelling to downtown Northampton. About 70% were motor vehicle users, 24% were pedestrians, 4% were bicyclists, but only 1% were transit users (Figure 31). This is an indication of the inviting nature of the downtown as a walkable and accessible area.

Figure 31 - Results of Survey Question about Mode of Travel



When asked what was important to them among the various aspects of downtown, almost all of the respondents agreed upon the importance of safety and functionality for both roads and sidewalks (Table 7). Second place on the list of important aspects of downtown was its offering of retail uses and restaurants as well as an attractive environment of landscape and streetscape. In their opinion, the least important aspect was parking availability whether on-street or off-street. This is not a surprising answer considering nearly 30% of respondents indicated they had ridden their bicycle or walked to downtown.

Table 7 - Results of Survey Question about the Importance of Various Aspect of Downtown

		Rate the importance to you of these aspects in downtown Northampton					
Not Important	**Important**	**Very Important**	**Total**	**Answer Options**	**Answer Options**	**Important**	**Very Important**
1%	27%	73%	100%	Safe and functional roads	1%	8%	16%
1%	18%	81%	100%	Safe and friendly sidewalks	1%	6%	18%
21%	40%	39%	100%	Better bicycle facilities	17%	13%	8%
17%	45%	37%	100%	Improved transit facilities	14%	14%	8%
22%	39%	38%	100%	Available on-street parking	19%	12%	8%
20%	41%	39%	100%	More off-street parking	17%	13%	8%
5%	29%	66%	100%	Robust retail and restaurants	4%	9%	14%
8%	42%	50%	100%	Attractive landscape and streetscape	7%	13%	11%
26%	37%	37%	100%	Available housing opportunities	21%	12%	8%
				Total	100%	100%	100%

The respondents were asked about what they did not like about walking in downtown Northampton (Table 8). Almost half of them said they did not like that cars drove too fast. A little over a third said they did not like that there were not enough benches to sit on. A third did not like that there was not adequate protection from the elements: snow and rain. About a quarter of respondents did not like the shortage of signalized crosswalks. A similar number of respondents were displeased by the poor maintenance of the sidewalks. Other common responses included panhandlers and poor snow removal. These responses were added by the respondents under the "other" category.

Table 8 - Results of Survey Question about the Undesirable Aspects of Walking in Downtown

What don't you like about walking in downtown Northampton? (select all that apply)	
Answer Options	**Response Percent**
Narrow sidewalks	15.8%
Sidewalks are poorly maintained	23.2%
Poor lighting	10.7%
No good snow and rain protection	29.4%
Not enough benches	36.7%
Not enough landscaping	22.1%
Not enough crosswalks	9.2%
Not enough signalized crosswalks	24.3%
Too much delay crossing streets	11.4%
Few/poor curb wheelchair ramps	8.8%
Cars drive too fast	44.2%
Lack of life on properties abutting the sidewalk	10.3%

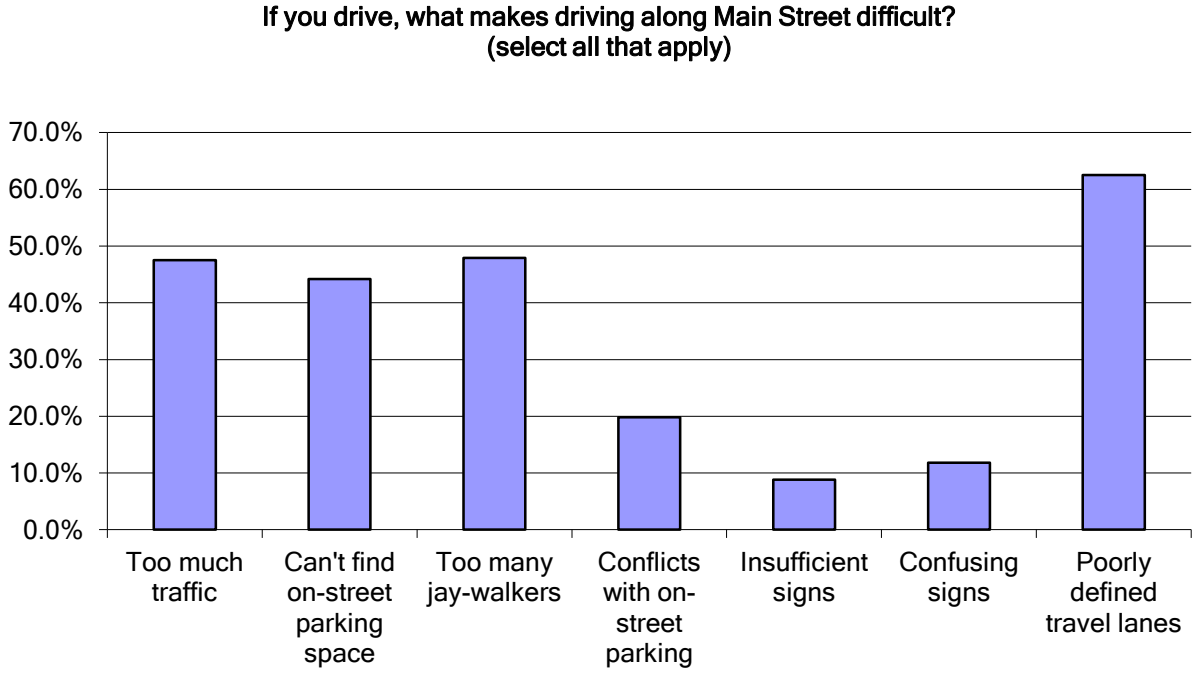
Survey respondents were also asked their opinion about what they did not like about biking in downtown Northampton (Table 9). Many of them, 61.5% of respondents, did not like the fact that there were no bike lanes. Half of them did not like that cars drove too fast. A lack of bike racks near their destination was another aspect that 38.5% of respondents did not like. A third of respondents did not like that street shoulders were not maintained well, which creates a hazard for a cyclist. A fifth of respondents did not like the potential for conflict for cyclists with on-street parking. Other common responses included driver inattention, feeling unsafe, and that they don't ride a bicycle.

Table 9 - Result of Survey Question about the Undesirable Aspect of Cycling in Downtown

What don't you like about biking in downtown Northampton? (select all that apply)	
Answer Options	**Response Percent**
No bike lanes	61.5%
Cars drive too fast	51.0%
Few bike racks near my destination(s)	38.5%
Absence of secure indoor bike parking at my destination(s)	28.1%
Absence of a shower and changing room at work	13.8%
Bike racks on buses are difficult to use	10.5%
Few places to rent/borrow bike	17.3%
Streets/shoulders are not maintained well	31.1%
Bike racks do not support my bike well	5.9%
Conflicts with on-street parking	22.2%

Drivers were asked their opinion about what they thought made driving along Main Street difficult (Figure 32). Over 60% of the respondents were of the opinion that the poorly defined travel lanes made driving difficult along Main Street. Almost half of the respondents found that the amount of traffic as well as the amount jay-walkers made driving difficult. The lack of readily available parking spaces on-street was another factor that made driving difficult according to 44% of respondents. Other common responses to what made driving difficult along Main Street included improper snow removal, poor drivers, and double parking for deliveries

Figure 32 - Results of Survey Question about their Driving Experience along Main Street



The respondents gave their opinion about desired improvements to Main Street in downtown Northampton. They were instructed to rank potential improvements from 1 as most important to 10 as least important. To facilitate this analysis the answers were aggregated to represent the top three highest rankings, medium rankings and lowest rankings. This grouping allowed for top, medium and low priority improvements to emerge from the data gathered. A large number of respondents, 66%, indicated that creating well defined lanes was among their top three priorities (Table 10). Half of respondents also chose "less congestion" on Main Street among their top priorities. Improved lighting was chosen as a medium priority by 58% of respondents. Half of the respondents also set as medium priority: clearly defined on street parking, wider sidewalks, and improved sidewalk amenities.

Table 10 - Desired Modifications to Main Street - Highlighting Priority

Ranking	1+2+3	4+5+6+7	8+9+10	
Most Important Improvements	Top Priority	Medium Priority	Low Priority	
Clearly defined on-street parking	28%	**50%**	22%	100%
Well defined traffic lanes	**66%**	26%	8%	100%
Less congestion	**49%**	39%	12%	100%
Improved lighting	14%	**58%**	28%	100%
Wider sidewalks	17%	**49%**	34%	100%
Improved Street furniture like benches,bike racks, garbage bins	22%	**49%**	29%	100%
Shorter crossing distances for crosswalks	15%	40%	**45%**	100%
Reduced vehicle travel speeds	25%	33%	**42%**	100%
Marked on-street bike lanes	32%	29%	**39%**	100%
More efficient snow removal	33%	28%	**39%**	100%

Comparing the three categories of priority improvements, the highlighted percentage represents the improvement option that received the highest value within that category (Table 11). Well Defined traffic lanes received 15% of the vote within the top priority improvements category. Improved lighting received 58% of the votes within the medium priority category, and shorter crossing distances for crosswalks received 15% of the vote within the low priority category.

Table 11 - Desired Modifications to Main Street - Comparing Options

Ranking	1+2+3	4+5+6+7	8+9+10
Most Important Improvements	Top Priority	Medium Priority	Low Priority
Clearly defined on-street parking	9%	12%	7%
Well defined traffic lanes	**22%**	7%	3%
Less congestion	16%	10%	4%
Improved lighting	5%	**15%**	10%
Wider sidewalks	6%	12%	11%
Improved Street furniture like benches,bike racks, garbage bins	7%	12%	10%
Shorter crossing distances for crosswalks	5%	10%	**15%**
Reduced vehicle travel speeds	8%	8%	14%
Marked on-street bike lanes	11%	7%	13%
More efficient snow removal	11%	7%	13%
	100%	100%	100%

III.1.2 Survey Results

In summary, major concerns of drivers included: poorly defined lanes, heavy traffic, lack of available parking, and jay walking. A majority of pedestrians had concerns regarding traffic speeds, lack of benches along sidewalks, inadequate snow removal and clearing of sidewalks during the winter season, as well as poor sidewalk maintenance in general. When asked about biking in Northampton, more than 60% of respondents identified lack of bicycle lanes as their main concern, followed by high traffic speeds and an insufficient number of bike racks. Top needs identified by users included: shorter crossing distances at crosswalks, wider sidewalks, and improved lighting at night. Half of the respondents, when they traveled as pedestrians or cyclists, did not like the fact that cars drove too fast in downtown Northampton.

III.2 MULTIMODAL LEVEL OF SERVICE ANALYSIS

A multimodal level of service (MMLOS) analysis was conducted for the Route 9 study corridor to identify issues experienced by all travel modes. This analysis method adhered to the level of service analysis guidelines set forth by the Highway Capacity Manual 2010 (HCM2010) and is described in the following section.

III.2.1 Methodology

To facilitate the data collection and survey of the current study area, it was converted to a network of eight intersections along the roadway aligned primarily in a west to east direction. An open source hybrid software called LOS+ was utilized to conduct the MMLOS analysis because six of the eight study area intersections were un-signalized and the Highway Capacity Software (2010) MMLOS analysis has some limitations in analyzing such networks.

LOS+ is a tool developed by the consulting agency Fehr & Peers to conduct MMLOS in a very efficient and less data intensive manner. Non-motorized and transit mode components of the analyses in this tool are consistent with HCM2010 guidelines. This tool adopted an analysis approach that minimized data inputs required while providing results consistent with HCM2010 intersection analysis and actual field conditions.

To analyze the network, the flow conditions along the corridor were divided along five different segments broken down by both travel directions. Level of service by travel direction was then obtained for pedestrian, bicycle, automobile and transit modes along each roadway segment.

The automobile level of service provided by LOS+ is consistent with guidance provided by the National Cooperative Highway Research Program (NCHRP) Project 3-70. NCHRP Project 3-70 offered the basis for the Multimodal Level of Service (MMLOS) methodology in HCM2010, however, there were some differences between the two methodologies for analyzing LOS for automobiles.

The performance of non-motorized modes was analyzed based on several input factors such as motor vehicle traffic volumes and speeds, the width of the outside through travel lane, the degree of separation between non-motorists and motor vehicle traffic, the presence of sidewalks and paths, number of transit bus stops, percentage of bus stops with shelters and/or benches, frequency of buses, locations of bus stops with respect to intersections, on-time performance (%), and other related factors.

LOS+ assigns scores to each mode and ranks the performances or level of service for each mode based on the predetermined designations as shown in Table 12. These ratings take into consideration the interaction of all four types of travel modes: Automobile, Pedestrian, Bicycle, and Transit; and assessed their overall impact on each mode's traffic flow conditions.

III.2.2 Results

A summary of results from the multimodal level of service analysis by roadway segment for Route 9 eastbound is included in Table 13, and for Route 9 westbound in Table 14. The five roadway segments along the Route 9 study corridor are listed in the first left column. Both the eastbound and westbound directions of Route 9 provided good levels of service ratings for pedestrians and transit along all roadway segments. The bicycle mode, however, experienced delays at both ends of the corridor in the westbound direction and also at the eastern edge of the corridor in the eastbound direction. Automobiles were calculated to operate at LOF F between Crafts Avenue and Route 5 in the westbound direction and LOS E in the eastbound direction. Similarly automobiles were calculated to operate at LOS F in both directions between Strong Avenue and Market Street.

Table 12: LOS+ Level of service designations for Each Mode

Automobile

LOS:	A	B	C	D	E	F
weights:	1	2	3	4	5	6

Pedestrian

	LOS by Average Pedestrian Space (ft^2/p)					
LOS Score	60	40	24	15	8	0
-100	A	B	C	D	E	F
2.00001	B	B	C	D	E	F
2.75001	C	C	C	D	E	F
3.50001	D	D	D	D	E	F
4.25001	E	E	E	E	E	F
5.00001	F	F	F	F	F	F

Transit and Bicycle

Score	LOS
-100	A
0	A
2.00001	B
2.75001	C
3.50001	D
4.25001	E
5.00001	F

Table 13 - Level of Service for 5 Roadway Segments of Main Street (Route 9) Eastbound

Segment	From	To	Auto Mode			Pedestrian Mode			Bicycle Mode		Transit Mode	
			V/C Ratio	LOS Score	LOS	Ped Space[1]	LOS Score	LOS	LOS Score	LOS	LOS Score	LOS
1	Masonic Street	Crafts Avenue	0.14	2.34	B	209.02	1.08	A	3.48	C	2.38	B
2	Crafts Avenue	Center Street	0.16	5.93	F	362.95	1.07	A	2.00	B	1.49	A
3	Center Street	King / Pleasant Street	0.24	5.86	F	409.65	1.08	A	3.57	D	1.00	A
4	King / Pleasant Street	Strong Avenue	0.12	2.34	B	559.92	1.06	A	3.71	D	0.18	A
5	Strong Avenue	Hawley / Market Street	0.90	5.62	F	623.93	1.72	A	5.00	F	1.35	A

Note:

1. Pedestrian space is reported in square feet per pedestrian (ft^2/ped)

Source: NCHRP Project 3-70 Multimodal Level of Service For Urban Streets and Highway Capacity Manual 2010, Chapter 17

Table 14 - Level of Service for 5 Roadway Segments of Main Street (Route 9) Westbound

Segment	From	To	Auto Mode			Pedestrian Mode			Bicycle Mode		Transit Mode	
			V/C Ratio	LOS Score	LOS	Ped Space[1]	LOS Score	LOS	LOS Score	LOS	LOS Score	LOS
1	Hawley/Market Street	Strong Avenue	0.28	5.62	F	677.58	1.81	A	5.26	F	0.50	A
2	Strong Avenue	King/Pleasant Street	0.15	2.14	B	462.96	0.87	A	3.44	C	0.91	A
3	King/Pleasant Street	Center Street	0.09	4.49	E	333.78	0.71	A	0.11	A	2.04	B
4	Center Street	Crafts Avenue	0.17	4.83	E	380.57	1.17	A	2.05	B	0.64	A
5	Crafts Avenue	Masonic Street	0.17	2.34	B	304.40	1.26	A	4.87	E	-0.16	A

Note:

1. Pedestrian space is reported in square feet per pedestrian (ft^2/ped)

Source: NCHRP Project 3-70 Multimodal Level of Service For Urban Streets and Highway Capacity Manual 2010, Chapter 17

III.2.2 Automobile Level of Service and Travel Time Delays

As mentioned earlier in the report, there were some differences between the two methodologies of LOS+ and HCM2010 for analyzing the LOS for the automobile mode. Therefore the automobile LOS and congestion scores along the intersections were also separately analyzed with the help of the Synchro 9 software. This software allowed the analysis of each of the eight intersections within the study area utilizing travel times and delays in the conventional manner consistent with HCM2010.

Each intersection was examined with regard to capacity and delay characteristics to determine the existing Level of Service (LOS). LOS is an indicator of the operating conditions which occur on a roadway under different volumes of traffic and is defined in the 2010 Highway Capacity Manual by six levels, 'A' through 'F'. A number of operational factors can influence the LOS including geometry, travel speeds, delay, and the number of pedestrians. Table 15 presents the LOS designations for un-signalized intersections and Table 16 presents the LOS designations for signalized intersections.

Table 15 - Level of Service (LOS) Designations for Un-signalized Intersections

LOS	Expected Delay To Minor Street	Average Control Delay (sec./veh.)
A	Little or no delay	0.0 to 10.0
B	Short traffic delays	>10.0 to 15.0
C	Average traffic delays	>15.0 to 25.0
D	Long traffic delays	>25.0 to 35.0
E	Very long delays	>35.0 to 50.0
F	Extreme delays	>50.0

Source: Highway Capacity Manual 2010, TRB.

Table 16 - Level of Service (LOS) Designations for Signalized Intersections

Category	Description	Delay in seconds
LOS A	Describes a condition of free flow, with low volumes and relatively high speeds. There is little or no reduction in maneuverability due to the presence of other vehicles and drivers can maintain their desired speeds. Little or no delays result for side street motorists.	< 10.0
LOS B	Describes a condition of stable flow, with desired operating speeds relatively unaffected, but with a slight deterioration of maneuverability within the traffic stream. Side street motorists experience short delays.	>10.0 to 20.0
LOS C	Describes a condition still representing stable flow, but speeds and maneuverability begin to be restricted. Motorists entering from side streets experience average delays.	>20.0 to 35.0
LOS D	Describes a high-density traffic condition approaching unstable flow. Speeds and maneuverability become more restricted. Side street motorists may experience longer delays.	>35.0 to 55.0
LOS E	Represents conditions at or near the capacity of the facility. Flow is usually unstable, and freedom to maneuver within the traffic stream becomes extremely difficult. Very long delays may result for side street motorists.	>55.0 to 80.0
LOS F	Describes forced flow or breakdown conditions with significant queuing along critical approaches. Operating conditions are highly unstable as characterized by erratic vehicle movements along each approach.	> 80.0

Source: Highway Capacity Manual 2010, TRB.

Depending on the time of day and year, a roadway may operate at varying levels. Level of Service 'A' represents the best operating conditions and is an indicator of ideal travel conditions with vehicles operating at or above posted speed limits with little or no delays. Conversely, LOS 'F', or failure, generally indicates forced flow conditions illustrated by long delays and vehicle queues. Level of Service 'C' indicates a condition of stable flow and is generally considered satisfactory in rural areas. Under LOS 'D' conditions, delays are considerably longer than under LOS 'C', but are considered acceptable in urban areas. At LOS 'E' the roadway begins to operate at unstable flow conditions as the facility is operating at or near its capacity. Table 17 summarizes the existing level of services at the eight study area intersections during the afternoon peak hour.

In contrast with the multimodal approach, the standard LOS conducted for the eight intersections along the Route 9 corridor favored the automobile mode and factored in pedestrian movements at designated crosswalks only. Therefore the LOS ratings results were different and showed an improved level of service along the primary corridor of Route 9. This improvement was subject to overall intersection delay times; however there are significantly more delays to some of the individual side street movements. The only intersection calculated to operate at LOS F was the un-signalized intersection of Route 9 with Old South Street (Table 17). This was again due to the influence of the high delay experienced by the minor street northbound approach. It is noteworthy to mention again that overall Route 9 was calculated to operate at a good LOS. The one exception was the left turn movement from the Route 9 westbound approach onto Pleasant Street (Route 5). This movement was calculated to operate at LOS E with delays greater than 75 seconds.

Table 17 - Level of Service at 8 Intersections of Main Street (Route 9) in City Center

Number	Intersecting Street	Signalized / Stop Control	Approach	Movement	Delay in Seconds	LOS	Intersection Delay	Intersection LOS
1	Masonic Street	Side Street Stop Control	Route 9 Eastbound	Left	0.7	A	7.2	A
				Through	1.3	A		
			Route 9 Westbound	Through	0	A		
				Right	0	A		
			Masonic Street Southbound	Left	167	F		
				Right	167	F		
2	Crafts Avenue and Cracker Barrell Alley	Only Entering Traffic in Side Streets	Route 9 Eastbound	Left	0.1	A	1	A
				Through	0.3	A		
				Right	0.3	A		
			Route 9 Westbound	Left	10.1	B		
				Through	0	A		
				Right	0	A		
3	Old South Street	Side Street Stop Control	Route 9 Eastbound	Through	0	A	67	F
			Route 9 Westbound	Through	0	A		
			Old South Street Northbound	Left	234.7	F		
				Right	339.7	F		
4	Center Street	Side Street Stop Control	Route 9 Eastbound	Left	1.1	A	17.7	C
				Through	2	A		
			Route 9 Westbound	Through	0	A		
				Right	0	A		
			Center Street Southbound	Left	199.7	F		
				Right	199.7	F		
5	Gothic Street	Side Street Stop Control	Route 9 Eastbound	Left	1.2	A	6.6	A
				Through	1.7	A		
			Route 9 Westbound	Through	0	A		
				Right	0	A		
			Gothic Street Southbound	Left	73.5	F		
				Right	73.5	F		
6	King Street (Route 5) and Pleasant Street (Route 5)	Signalized	Route 9 Eastbound	Left	36.2	D	32.9	C
				Through	17.8	B		
				Right	17.8	B		
			Route 9 Westbound	Left	78.2	E		
				Through	34.1	C		
				Right	34.1	C		
			King Street (Route 5) Southbound	Left	23.6	C		
				Through	41.3	D		
				Right	7.5	A		
			Pleasant Street (Route 5) Northbound	Left	27.4	C		
				Through	42.2	D		
				Right	42.2	D		
7	Strong Avenue	Side Street Stop Control	Route 9 Eastbound	Through	0	A	17.4	C
				Right	0	A		
			Route 9 Westbound	Left	1.5	A		
				Through	2.5	A		
			Strong Avenue Northbound	Left	92.5	F		
				Right	92.5	F		
8	Market Street and Hawley Street	Signalized	Route 9 Eastbound		35.5	D	27.2	C
			Route 9 Westbound		29.9	C		
			Market Street Southbound		10.5	B		
			Hawley Street Northbound		10.4	B		

IV. SUMMARY

IV.1 SUPPORTIVE ONGOING STUDIES

The City of Northampton has adopted a proactive approach to encourage the use of alternative modes of transportation throughout the community. A number of planning studies have been completed with the goal to advance improvement projects that increase opportunities for alternative modes of transportation and improve safety for non-motorists in the study area. These studies are summarized in this section.

IV.1.1 Northampton Walk / Bike Assessment Project

http://www.northamptonma.gov/DocumentCenter/View/4987

Northampton is one of 18 communities that participated in MassDOT's multi-disciplined program to improve safety for non-motorist in Massachusetts. As part of this project, WalkBoston, MassBike and the Toole Design Group performed an assessment of pedestrian and bicycle infrastructure along Main Street to identify existing challenges and develop a series of short and long-term recommendations.

The project report noted that pedestrian and bicycle movements along Main Street are compromised by the varying width of the roadway, multiple undefined travel lanes, poor sight lines adjacent to parked cars, long crosswalks, complex intersections, and head-in/angled parking spaces (for bicyclists).

The team made several general recommendations such as:

- Reroute truck traffic to bypass Main Street through downtown.
- Reconfigure the roadway width and geometry of travel lanes to provide a safer and more-coherent environment for pedestrians and bicyclists.
- Narrow Main Street to reduce pedestrian crossing distances by installing curb extensions and refuge islands.
- Remove parking on-street parking spaces within 20 feet of crosswalks.
- Evaluate traffic signal timing plans and ensure they accommodate all transportation modes through enhanced bicycle detection and pedestrian count-down signals.
- Enforce ordinances to keep sidewalks clear of obstacles for pedestrians.
- Upgrade curb ramps and install detectable warning strips to meet ADA standards.
- Install bike facilities along Main Street (with both short and longer term options), ideally separated from motor vehicle traffic.

In addition, more detailed recommendations were developed for the following intersections:

- Main Street at Elm Street, West Street, State Street and New South Streets
- Main Street at Cracker Barrel Alley and Crafts Avenue
- Main Street from Old South Street to Gothic Street
- Main Street with King Street and Pleasant Street

IV.1.2 Walk/Bike Northampton Plan

http://www.northamptonma.gov/1647/WalkBike-Plan

The City of Northampton commissioned Alta Planning to develop the Walk/Bike Northampton Plan to outline programs and policies directed towards developing a more walkable, bikable and accessible city. The plan helped in creating a long list of projects to support this endeavor. Location specific recommendations pertaining to street design and roadway infrastructure installments were made for entire the City. In addition to several short and long term recommendations, the plan outlined 4 unique Main Street redesign options for the City to consider.

Option 1: Proposes to provide wider sidewalks with bike lanes separated by angled parking. This option improves mobility for bicyclists and pedestrians but may still not reduce the potential for conflict between traffic on Main Street and parked vehicles.

Option 2: Proposes installing Transit Priority lanes between the on-street parking spaces and Main Street traffic. These lanes could be shared by bicyclists. This option reduces the number of travel lanes along the corridor. Bicyclists may be uncomfortable sharing a lane with buses.

Option 3: Proposes installing a wide center median on Main Street between Pleasant Street and Masonic Street. The median would include select designated locations for on-street angled parking. Main Street would be reduced to one travel lane and provide bicycle lanes in each direction. This option provides the opportunity for more streetscaping in the downtown area.

Option 4: Proposes installing a protected cycle track as a center median along Main Street. This is different configuration for bicyclists in the region and may again provide difficulty in user acceptance and comfort, particularly in the areas where bicyclists would need to transition from existing bike lanes to the cycle track.

IV.1.3 MassDOT Transit Mobility Study

MassDOT has developed an alternative as part of its analysis of the redesign of Route 9 in Hadley that looks at implementing a modified Bus Rapid Transit service on PVTA's B-43 route. While bus stops and transit amenities on the downtown section of Northampton are unlikely to be impacted, the alternative could result in the installation of transit signal priority equipment that would allow certain transit vehicles the ability to pre-empt select traffic signals in the study area. This study is not yet completed and will require approval by MassDOT.

IV.2 RECOMMENDATIONS

The following recommendations are presented to improve mobility and safety in the study area. In general, recommendations that have been proposed in previous plans and projects completed for the City of Northampton have not been included as part of this section.

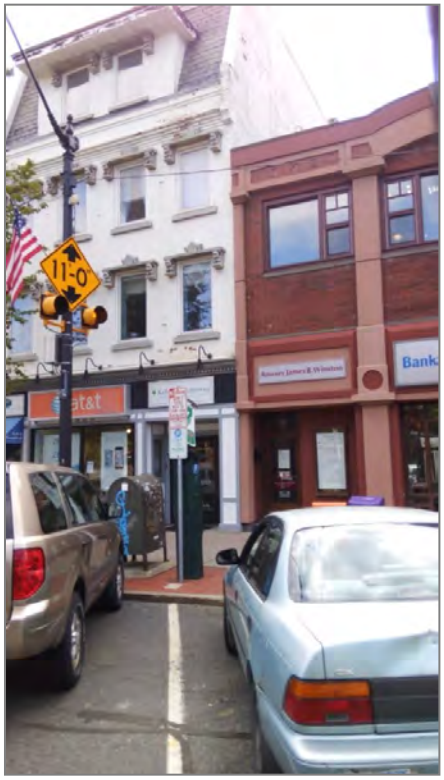
- The majority of crosswalks along the corridor long crossing distances which make it difficult for pedestrians to cross and increase the potential for conflict with vehicles. It is recommended the City consider options for installing curb bump outs or pedestrian refuge islands along medians as appropriate to reducing these crossing distances.
- The City of Northampton is planning to construct a ramp to connect Pulaski Park with the Round House parking lot to facilitate bicyclists. This proposed project would likely change existing bicycle travel patterns and could increase the number of bicyclists along Route 9. As a result, the City should continue to explore options to install bike lanes along Route 9 to improve mobility and safety.
- Historic crash data shows a small crash cluster in the vicinity of the intersection of Route 9 with Cracker Barrel Alley. It is recommended the City install a curb extension in this area to reduce the length of the crossing distance and improve pedestrian visibility to reduce the potential for conflict.
- Several collisions occurred at the intersection of Main Street and Old South Street: The steep grade on Old South Street and high volume of pedestrians that cross in this area create the potential for conflicts in this area. There are currently no advance warning signs on Old South Street to alert drivers of the high volume crosswalk. The City should consider installing advance pedestrian crossing warning signs on both sides of Old South Street approaching its intersection with Main Street. These signs could be supplemented with yellow flashing warning beacons. In the long term, the City should study the feasibility of extending the sidewalk out into Main Street to allow vehicles on Old South Street to stop in an area closer to grade level.
- Many pedestrian injuries were found to have occurred when the pedestrian was walking in a marked crosswalk. The City of Northampton currently participates in a safety campaign to raise pedestrian and bicycle awareness of the Massachusetts Traffic Laws. It is recommended the City continue to pursue opportunities to provide education and outreach to pedestrians and bicyclists on current traffic laws and to discourage unsafe practices such as jaywalking, crossing in conflict to the pedestrian signal and riding in the wrong direction on the roadway. The City should also continue to engage in regular maintenance activities to keep crosswalk pavement markings and signs highly visible.
- Level of service was calculated to be acceptable for the corridor as whole, however choke points were found to occur at both ends of the study area and along many of the minor street approaches to Main Street (Figure 33). Traffic signal timings should be checked on a regular basis to determine if a more efficient plan is necessary due to changes in travel patterns. This also includes the amount of crossing time allocated for pedestrians.

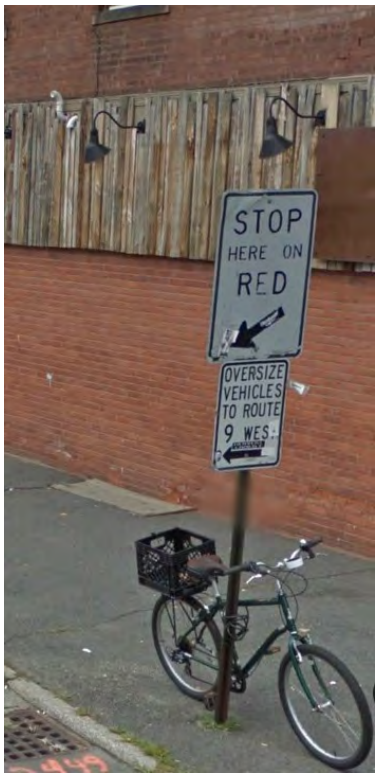
Figure 33 - Morning and Evening Traffic Along the Route 9 Study Corridor

- One of the criticisms that drivers had as part of the stakeholder survey was that travel lanes along the Route 9 corridor are not clearly marked. In general, pavement markings defining lane use in the study area are only provided at intersections. Vehicles were observed to drive Route 9 as both a one lane and a two lane road, particularly between Pleasant Street and Masonic Street. The City of Northampton should develop a pavement marking plan to clearly identify travel lanes in this area.
- The City of Northampton should periodically conduct an assessment of the condition of all traffic signs in the study area. Signs found to be in poor condition should be replaced to ensure they are visible and meet current standards for reflectivity. Similarly, signs should be cleared of any vegetation that could obscure the visibility of existing signs.
- Many of the crashes in the study area involved collisions with vehicles attempting to execute parking maneuvers. In particular, many of the crashes occurred in the vicinity of the angle parking spaces between Pleasant Street and Old South Street. The City of Northampton should review existing on-street parking spaces to determine of there are opportunities to reduce conflicts on Main Street as a result of on-street parking. In the short term, marked travel lanes on Main Street could assist in providing more clearance between the existing angle parking spaces and through traffic on Main Street. The City should consider striping Main Street as one travel lane from Pleasant Street to Masonic Street. This would allow for a larger separation between parked vehicles and through traffic and improve visibility for vehicles backing out of the angle parking spaces. Many communities are converting their angle parking spaces from a “head in” to “back in” configuration. This was experimented with in the City of Northampton in the past but was not popular. The City should continue to explore opportunities to reduce conflicts between on-street parking and all modes of transportation along Main Street.
- Heavy vehicle collisions with the railroad bridge not only cause costly damages, they also negatively impact traffic flow along the entire corridor due to the time required to extract trucks from under the bridge. Current advance warning signs with flashing warning beacons alert over-height heavy vehicles of the upcoming height limitations (Figure 34). However, these signs may not currently be located in the best location, at the correct height for truck drivers to easily see, or are too small to be easily read by truck drivers.
    - The designated detour for trucks on the Route 9 westbound approach directs trucks to detour left onto Hawley Street. Hawley Street ultimately intersects with Holyoke Street in the vicinity of another 11 foot limited height railroad underpass. Additional guide signs are needed along Hawley Street and the other neighborhood streets to clearly direct trucks back to Route 9 and the preferred truck detour route.
    - Many of the warning signs were observed to be mounted too low for truck drivers to clearly see. The warning signs appear to be mounted at a height that is more appropriate for a traditional passenger vehicle. It is recommended the City consider raising the height of all the low clearance warning signs to place them at the eye level of a truck driver. Similarly, the size of some of the detour guide signs was observed to be very small. Larger signs would assist in making them more prominent to truck drivers.
    - The City should request MassDOT to consider installing an overhead warning sign for trucks traveling in the westbound direction on Route 9 prior to its intersection with Damon Road. Posting an overhead sign in this area could increase compliance with the truck detour and would alert oversize vehicle drivers approaching the intersection from the Coolidge Bridge to detour onto Damon Road. While there is currently a white detour sign for Route 9 West on the Coolidge Bridge, redundancy in signage could benefit the drivers who may miss the initial sign while navigating bridge traffic. Similarly, an additional orange detour sign at the intersection of Route 9 and Lincoln Ave could serve as a last reminder for drivers and point them to turn right onto Lincoln Ave. The current white detour sign located on Route 9 West between Day Avenue and Lincoln Ave is difficult to notice due to its low height and the close placement to other signs in the area.
    - Field observations show that while the Oversize Vehicle Detection System is working, it appears the system is falsely triggered at times by vehicles that can safely pass under

the railroad bridge. It is recommended the City consider recalibrating the system to ensure is accurately warning over-height vehicles.

Figure 34 - Advance Warning Signs for Bridge Height Restrictions on Route 9





V. APPENDICES

APPENDIX A: LEVEL OF SERVICE ANALYSIS RESULTS

APPENDIX B: CRASH DATA

APPENDIX C: SURVEY RESULTS

APPENDIX D: TRAFFIC COUNTS

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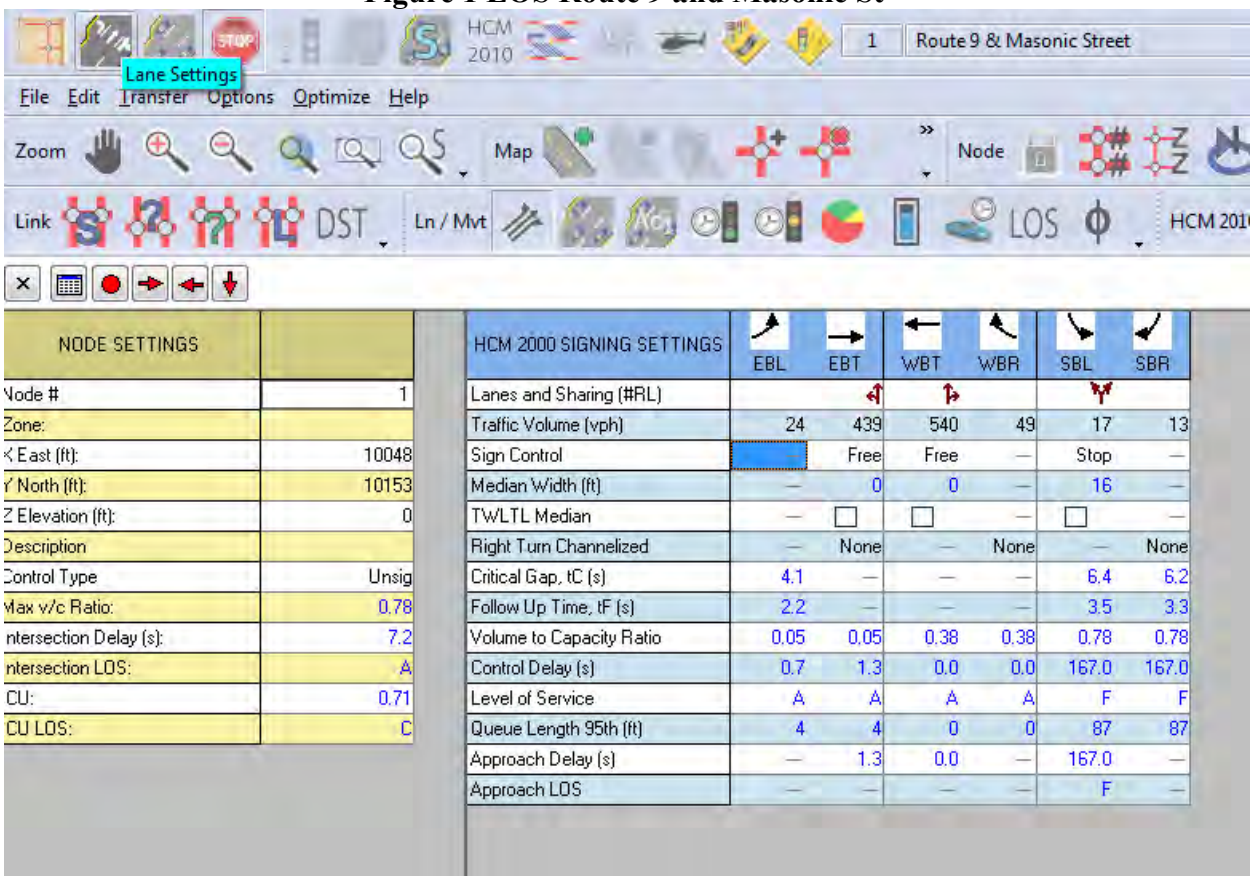
Table 1 LOS BY INTERSECTION

Number	Intersecting Street/s	Signalized / Stop Control	Approach	Movement	Delay in Seconds	LOS	Overall Intersection Delay	Overall Intersection LOS
1	Masonic Street	Side Street Stop Control	Route 9 Eastbound	Left	0.7	A	7.2	A
				Through	1.3	A		
			Route 9 Westbound	Through	0	A		
				Right	0	A		
			Masonic Street Southbound	Left	167	F		
				Right	167	F		
2	Crafts Avenue and Cracker Barrell Alley	Only Entering Traffic in Side Streets	Route 9 Eastbound	Left	0.1	A	1	A
				Through	0.3	A		
				Right	0.3	A		
			Route 9 Westbound	Left	10.1	B		
				Through	0	A		
				Right	0	A		
3	Old South Street	Side Street Stop Control	Route 9 Eastbound	Through	0	A	67	F
			Route 9 Westbound	Through	0	A		
			Old South Street Northbound	Left	234.7	F		
				Right	339.7	F		
4	Center Street	Side Street Stop Control	Route 9 Eastbound	Left	1.1	A	17.7	C
				Through	2	A		
			Route 9 Westbound	Through	0	A		
				Right	0	A		
			Center Street Southbound	Left	199.7	F		
				Right	199.7	F		
5	Gothic Street	Side Street Stop Control	Route 9 Eastbound	Left	1.2	A	6.6	A
				Through	1.7	A		
			Route 9 Westbound	Through	0	A		
				Right	0	A		
			Gothic Street Southbound	Left	73.5	F		
				Right	73.5	F		
6	King Street (Route 5) and Pleasant Street (Route 5)	Signalized	Route 9 Eastbound	Left	36.2	D	32.9	C
				Through	17.8	B		
				Right	17.8	B		
			Route 9 Westbound	Left	78.2	E		
				Through	34.1	C		
				Right	34.1	C		
			King Street (Route 5) Southbound	Left	23.6	C		
				Through	41.3	D		
				Right	7.5	A		
			Pleasant Street (Route 5) Northbound	Left	27.4	C		
				Through	42.2	D		
				Right	42.2	D		
7	Strong Avenue	Side Street Stop Control	Route 9 Eastbound	Through	0	A	17.4	C
				Right	0	A		
			Route 9 Westbound	Left	1.5	A		
				Through	2.5	A		
			Strong Avenue Northbound	Left	92.5	F		
				Right	92.5	F		
6	Market Street and Hawley Street	Signalized	Route 9 Eastbound	Left			27.2	C
				Through				
				Right	35.5	D		
			Route 9 Westbound	Left				
				Through				
				Right	29.9	C		
			Market Street Southbound	Left				
				Through				
				Right	10.5	B		
			Hawley Street Northbound	Left				
				Through				
				Right	10.4	B		

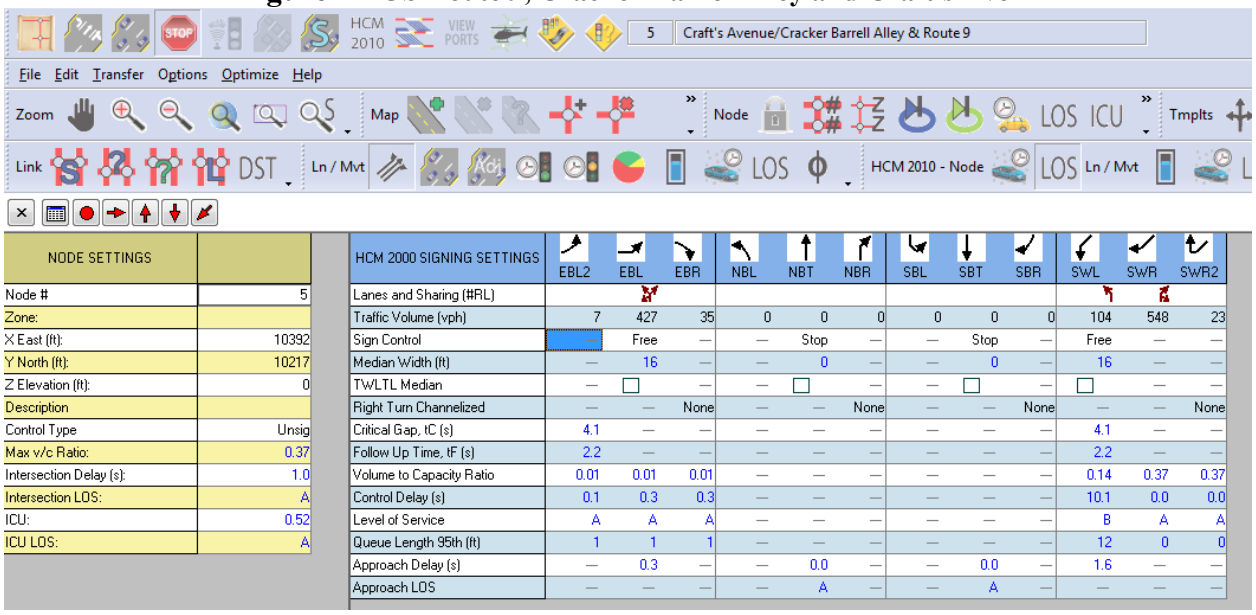
Figure 1 LOS Route 9 and Masonic St



NODE SETTINGS	
Node #	1
Zone:	
X East (ft):	10048
Y North (ft):	10153
Z Elevation (ft):	0
Description	
Control Type	Unsig
Max v/c Ratio:	0.78
Intersection Delay (s):	7.2
Intersection LOS:	A
ICU:	0.71
ICU LOS:	C

HCM 2000 SIGNING SETTINGS	EBL	EBT	WBT	WBR	SBL	SBR
Lanes and Sharing (#RL)						
Traffic Volume (vph)	24	439	540	49	17	13
Sign Control	—	Free	Free	—	Stop	—
Median Width (ft)	—	0	0	—	16	—
TWLTL Median	—	☐	☐	—	☐	—
Right Turn Channelized	—	None	—	None	—	None
Critical Gap, tC (s)	4.1	—	—	—	6.4	6.2
Follow Up Time, tF (s)	2.2	—	—	—	3.5	3.3
Volume to Capacity Ratio	0.05	0.05	0.38	0.38	0.78	0.78
Control Delay (s)	0.7	1.3	0.0	0.0	167.0	167.0
Level of Service	A	A	A	A	F	F
Queue Length 95th (ft)	4	4	0	0	87	87
Approach Delay (s)	—	1.3	0.0	—	167.0	—
Approach LOS	—	—	—	—	F	—

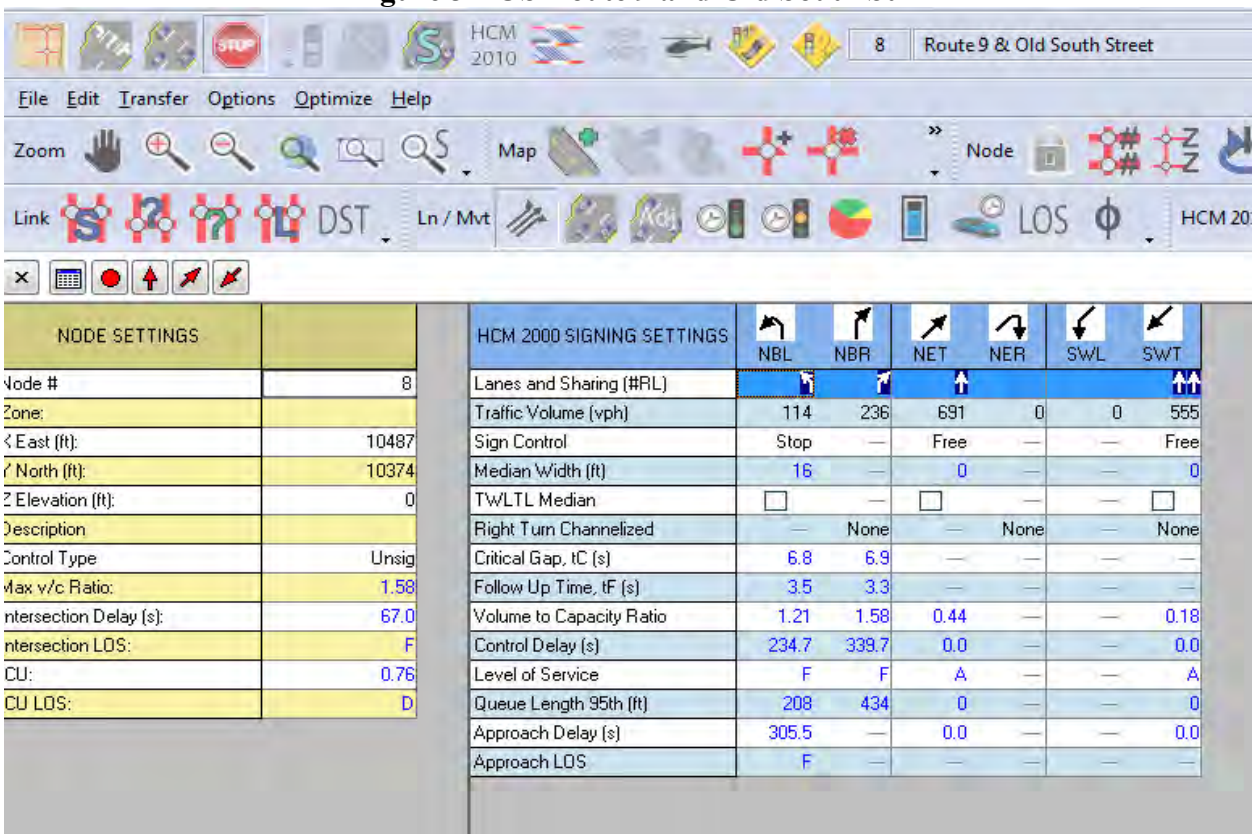
Figure 2 LOS Route 9, Cracker Barrel Alley and Craft's Ave



NODE SETTINGS	
Node #	5
Zone:	
X East (ft):	10392
Y North (ft):	10217
Z Elevation (ft):	0
Description	
Control Type	Unsig
Max v/c Ratio:	0.37
Intersection Delay (s):	1.0
Intersection LOS:	A
ICU:	0.52
ICU LOS:	A

HCM 2000 SIGNING SETTINGS	EBL2	EBL	EBR	NBL	NBT	NBR	SBL	SBT	SBR	SWL	SWR	SWR2
Lanes and Sharing (#RL)												
Traffic Volume (vph)	7	427	35	0	0	0	0	0	0	104	548	23
Sign Control	—	Free	—	—	Stop	—	—	Stop	—	Free	—	—
Median Width (ft)	—	16	—	—	0	—	—	0	—	16	—	—
TWLTL Median	—	☐	—	—	☐	—	—	☐	—	☐	—	—
Right Turn Channelized	—	—	None	—	—	None	—	—	None	—	—	None
Critical Gap, tC (s)	4.1	—	—	—	—	—	—	—	—	4.1	—	—
Follow Up Time, tF (s)	2.2	—	—	—	—	—	—	—	—	2.2	—	—
Volume to Capacity Ratio	0.01	0.01	0.01	—	—	—	—	—	—	0.14	0.37	0.37
Control Delay (s)	0.1	0.3	0.3	—	—	—	—	—	—	10.1	0.0	0.0
Level of Service	A	A	A	—	—	—	—	—	—	B	A	A
Queue Length 95th (ft)	1	1	1	—	—	—	—	—	—	12	0	0
Approach Delay (s)	—	0.3	—	—	0.0	—	—	0.0	—	1.6	—	—
Approach LOS	—	—	—	—	A	—	—	A	—	—	—	—

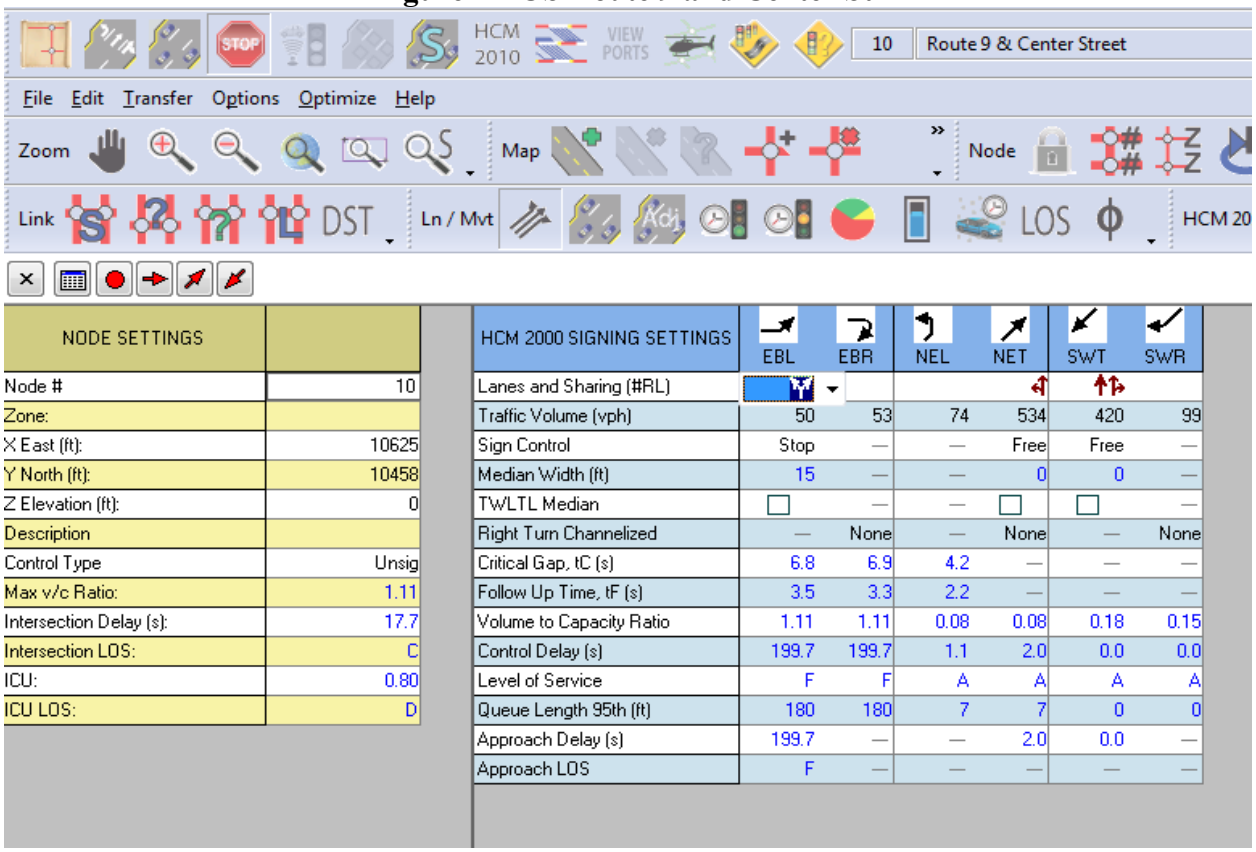
Figure 3 LOS Route 9 and Old South St



NODE SETTINGS	
Node #	8
Zone:	
X East (ft):	10487
Y North (ft):	10374
Z Elevation (ft):	0
Description	
Control Type	Unsig
Max v/c Ratio:	1.58
Intersection Delay (s):	67.0
Intersection LOS:	F
ICU:	0.76
ICU LOS:	D

HCM 2000 SIGNING SETTINGS	NBL	NBR	NET	NER	SWL	SWT
Lanes and Sharing (#RL)						
Traffic Volume (vph)	114	236	691	0	0	555
Sign Control	Stop	—	Free	—	—	Free
Median Width (ft)	16	—	0	—	—	0
TWLTL Median	☐	—	☐	—	—	☐
Right Turn Channelized	—	None	—	None	—	None
Critical Gap, tC (s)	6.8	6.9	—	—	—	—
Follow Up Time, tF (s)	3.5	3.3	—	—	—	—
Volume to Capacity Ratio	1.21	1.58	0.44	—	—	0.18
Control Delay (s)	234.7	339.7	0.0	—	—	0.0
Level of Service	F	F	A	—	—	A
Queue Length 95th (ft)	208	434	0	—	—	0
Approach Delay (s)	305.5	—	0.0	—	—	0.0
Approach LOS	F	—	—	—	—	—

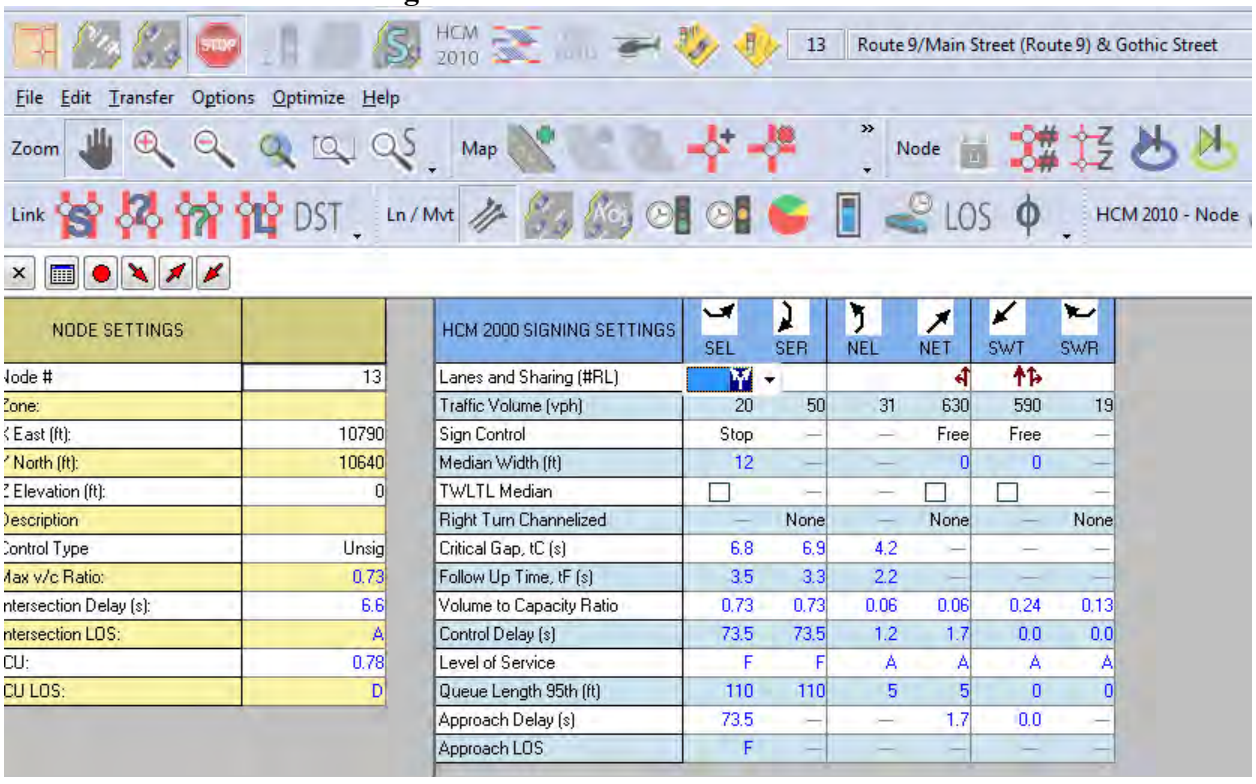
Figure 4 LOS Route 9 and Center St



NODE SETTINGS	
Node #	10
Zone:	
X East (ft):	10625
Y North (ft):	10458
Z Elevation (ft):	0
Description	
Control Type	Unsig
Max v/c Ratio:	1.11
Intersection Delay (s):	17.7
Intersection LOS:	C
ICU:	0.80
ICU LOS:	D

HCM 2000 SIGNING SETTINGS	EBL	EBR	NEL	NET	SWT	SWR
Lanes and Sharing (#RL)						
Traffic Volume (vph)	50	53	74	534	420	99
Sign Control	Stop	—	—	Free	Free	—
Median Width (ft)	15	—	—	0	0	—
TWLTL Median	☐	—	—	☐	☐	—
Right Turn Channelized	—	None	—	None	—	None
Critical Gap, tC (s)	6.8	6.9	4.2	—	—	—
Follow Up Time, tF (s)	3.5	3.3	2.2	—	—	—
Volume to Capacity Ratio	1.11	1.11	0.08	0.08	0.18	0.15
Control Delay (s)	199.7	199.7	1.1	2.0	0.0	0.0
Level of Service	F	F	A	A	A	A
Queue Length 95th (ft)	180	180	7	7	0	0
Approach Delay (s)	199.7	—	—	2.0	0.0	—
Approach LOS	F	—	—	—	—	—

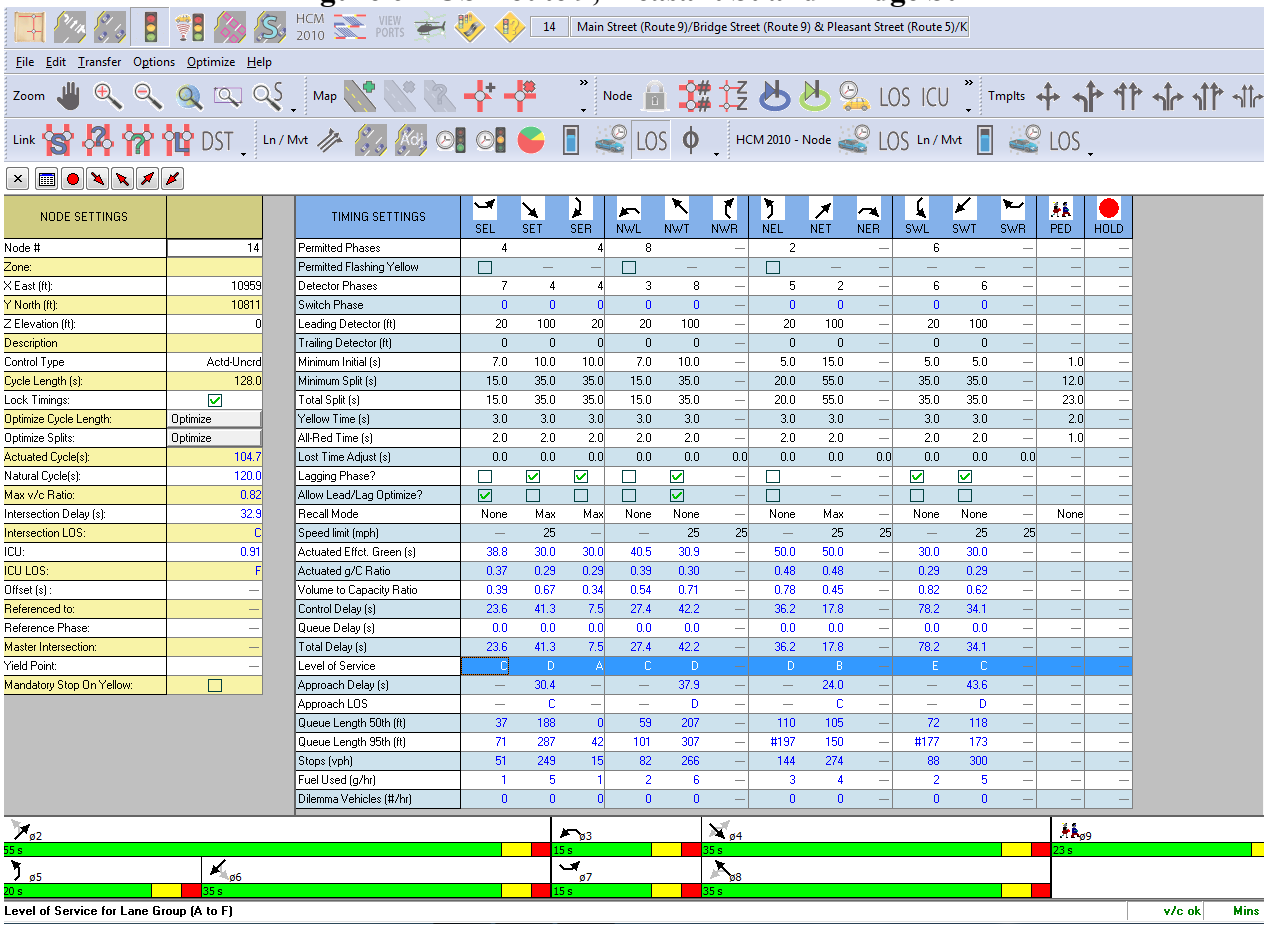
Figure 5 LOS Route 9 and Gothic St



NODE SETTINGS	
Node #	13
Zone:	
X East (ft):	10790
Y North (ft):	10640
Z Elevation (ft):	0
Description	
Control Type	Unsig
Max v/c Ratio:	0.73
Intersection Delay (s):	6.6
Intersection LOS:	A
ICU:	0.78
ICU LOS:	D

HCM 2000 SIGNING SETTINGS	SEL	SER	NEL	NET	SWT	SWR
Lanes and Sharing (#RL)						
Traffic Volume (vph)	20	50	31	630	590	19
Sign Control	Stop	—	—	Free	Free	—
Median Width (ft)	12	—	—	0	0	—
TWLTL Median	☐	—	—	☐	☐	—
Right Turn Channelized	—	None	—	None	—	None
Critical Gap, tC (s)	6.8	6.9	4.2	—	—	—
Follow Up Time, tF (s)	3.5	3.3	2.2	—	—	—
Volume to Capacity Ratio	0.73	0.73	0.06	0.06	0.24	0.13
Control Delay (s)	73.5	73.5	1.2	1.7	0.0	0.0
Level of Service	F	F	A	A	A	A
Queue Length 95th (ft)	110	110	5	5	0	0
Approach Delay (s)	73.5	—	—	1.7	0.0	—
Approach LOS	F	—	—	—	—	—

Figure 6 LOS Route 9, Pleasant St and Bridge St

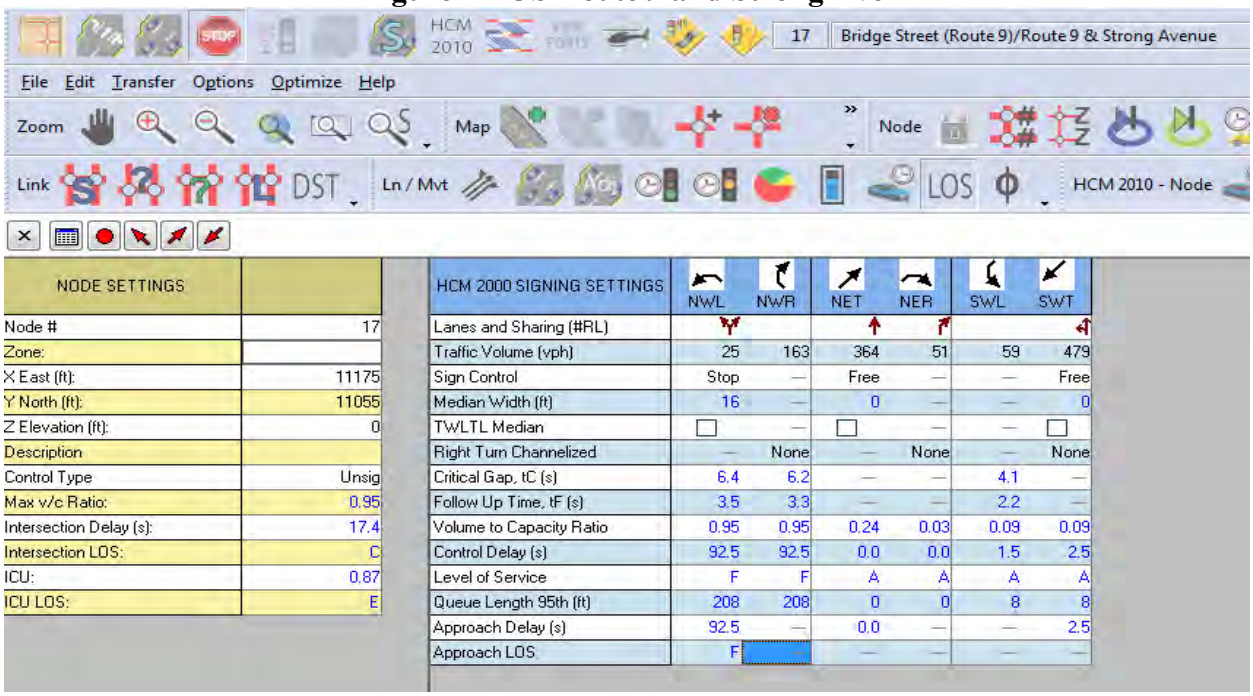


NODE SETTINGS	
Node #	14
Zone:	
X East (ft):	10959
Y North (ft):	10811
Z Elevation (ft):	0
Description	
Control Type	Actd-Uncrd
Cycle Length (s):	128.0
Lock Timings:	☑
Optimize Cycle Length:	Optimize
Optimize Splits:	Optimize
Actuated Cycle(s):	104.7
Natural Cycle(s):	120.0
Max v/c Ratio:	0.82
Intersection Delay (s):	32.9
Intersection LOS:	C
ICU:	0.91
ICU LOS:	F
Offset (s) :	—
Referenced to:	—
Reference Phase:	—
Master Intersection:	—
Yield Point:	—
Mandatory Stop On Yellow:	☐

TIMING SETTINGS	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR	PED	HOLD
Permitted Phases	4		4	8		—	2		—	6		—	—	—
Permitted Flashing Yellow	☐	—	—	☐	—	—	☐	—	—	—	—	—	—	—
Detector Phases	7	4	4	3	8	—	5	2	—	6	6	—	—	—
Switch Phase	0	0	0	0	0	—	0	0	—	0	0	—	—	—
Leading Detector (ft)	20	100	20	20	100	—	20	100	—	20	100	—	—	—
Trailing Detector (ft)	0	0	0	0	0	—	0	0	—	0	0	—	—	—
Minimum Initial (s)	7.0	10.0	10.0	7.0	10.0	—	5.0	15.0	—	5.0	5.0	—	1.0	—
Minimum Split (s)	15.0	35.0	35.0	15.0	35.0	—	20.0	55.0	—	35.0	35.0	—	12.0	—
Total Split (s)	15.0	35.0	35.0	15.0	35.0	—	20.0	55.0	—	35.0	35.0	—	23.0	—
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	—	3.0	3.0	—	3.0	3.0	—	2.0	—
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	—	2.0	2.0	—	2.0	2.0	—	1.0	—
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	—	—
Lagging Phase?	☐	☑	☑	☐	☑	—	☐	—	—	☑	☑	—	—	—
Allow Lead/Lag Optimize?	☑	☐	☐	☐	☑	—	☐	—	—	☐	☐	—	—	—
Recall Mode	None	Max	Max	None	None	—	None	Max	—	None	None	—	None	—
Speed limit (mph)	—	25	—	—	25	25	—	25	25	—	25	25	—	—
Actuated Effct. Green (s)	38.8	30.0	30.0	40.5	30.9	—	50.0	50.0	—	30.0	30.0	—	—	—
Actuated g/C Ratio	0.37	0.29	0.29	0.39	0.30	—	0.48	0.48	—	0.29	0.29	—	—	—
Volume to Capacity Ratio	0.39	0.67	0.34	0.54	0.71	—	0.78	0.45	—	0.82	0.62	—	—	—
Control Delay (s)	23.6	41.3	7.5	27.4	42.2	—	36.2	17.8	—	78.2	34.1	—	—	—
Queue Delay (s)	0.0	0.0	0.0	0.0	0.0	—	0.0	0.0	—	0.0	0.0	—	—	—
Total Delay (s)	23.6	41.3	7.5	27.4	42.2	—	36.2	17.8	—	78.2	34.1	—	—	—
Level of Service	C	D	A	C	D	—	D	B	—	E	C	—	—	—
Approach Delay (s)	—	30.4	—	—	37.9	—	—	24.0	—	—	43.6	—	—	—
Approach LOS	—	C	—	—	D	—	—	C	—	—	D	—	—	—
Queue Length 50th (ft)	37	188	0	59	207	—	110	105	—	72	118	—	—	—
Queue Length 95th (ft)	71	287	42	101	307	—	#197	150	—	#177	173	—	—	—
Stops (vph)	51	249	15	82	266	—	144	274	—	88	300	—	—	—
Fuel Used (g/hr)	1	5	1	2	6	—	3	4	—	2	5	—	—	—
Dilemma Vehicles (#/hr)	0	0	0	0	0	—	0	0	—	0	0	—	—	—

Level of Service for Lane Group (A to F) v/c ok Mins

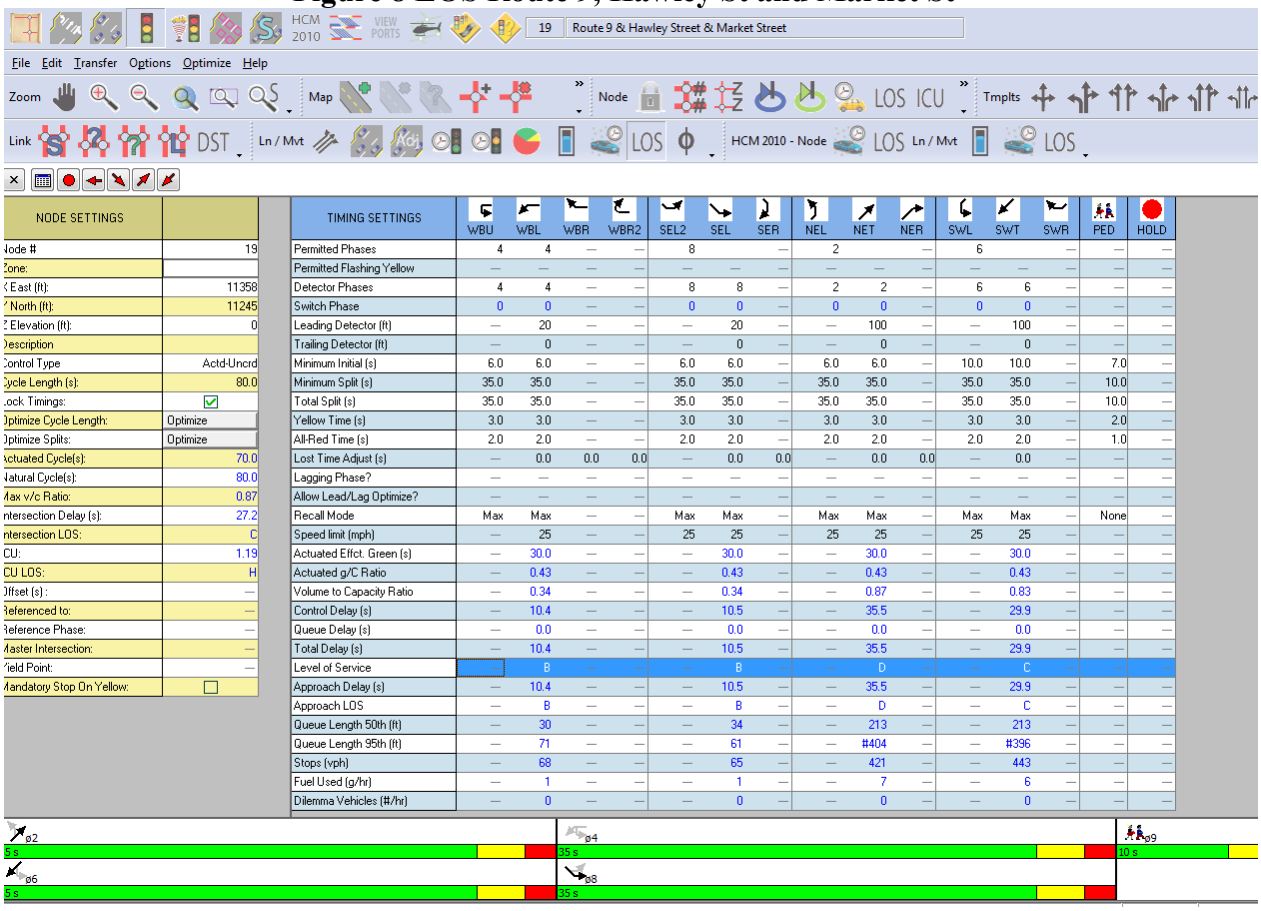
Figure 7 LOS Route 9 and Strong Ave



NODE SETTINGS	
Node #	17
Zone:	
X East (ft):	11175
Y North (ft):	11055
Z Elevation (ft):	0
Description	
Control Type	Unsig
Max v/c Ratio:	0.95
Intersection Delay (s):	17.4
Intersection LOS:	C
ICU:	0.87
ICU LOS:	E

HCM 2000 SIGNING SETTINGS	NWL	NWR	NET	NER	SWL	SWT
Lanes and Sharing (#RL)						
Traffic Volume (vph)	25	163	364	51	59	479
Sign Control	Stop	—	Free	—	—	Free
Median Width (ft)	16	—	0	—	—	0
TWLTL Median	☐	—	☐	—	—	☐
Right Turn Channelized	—	None	—	None	—	None
Critical Gap, tC (s)	6.4	6.2	—	—	4.1	—
Follow Up Time, tF (s)	3.5	3.3	—	—	2.2	—
Volume to Capacity Ratio	0.95	0.95	0.24	0.03	0.09	0.09
Control Delay (s)	92.5	92.5	0.0	0.0	1.5	2.5
Level of Service	F	F	A	A	A	A
Queue Length 95th (ft)	208	208	0	0	8	8
Approach Delay (s)	92.5	—	0.0	—	—	2.5
Approach LOS	F	—	—	—	—	—

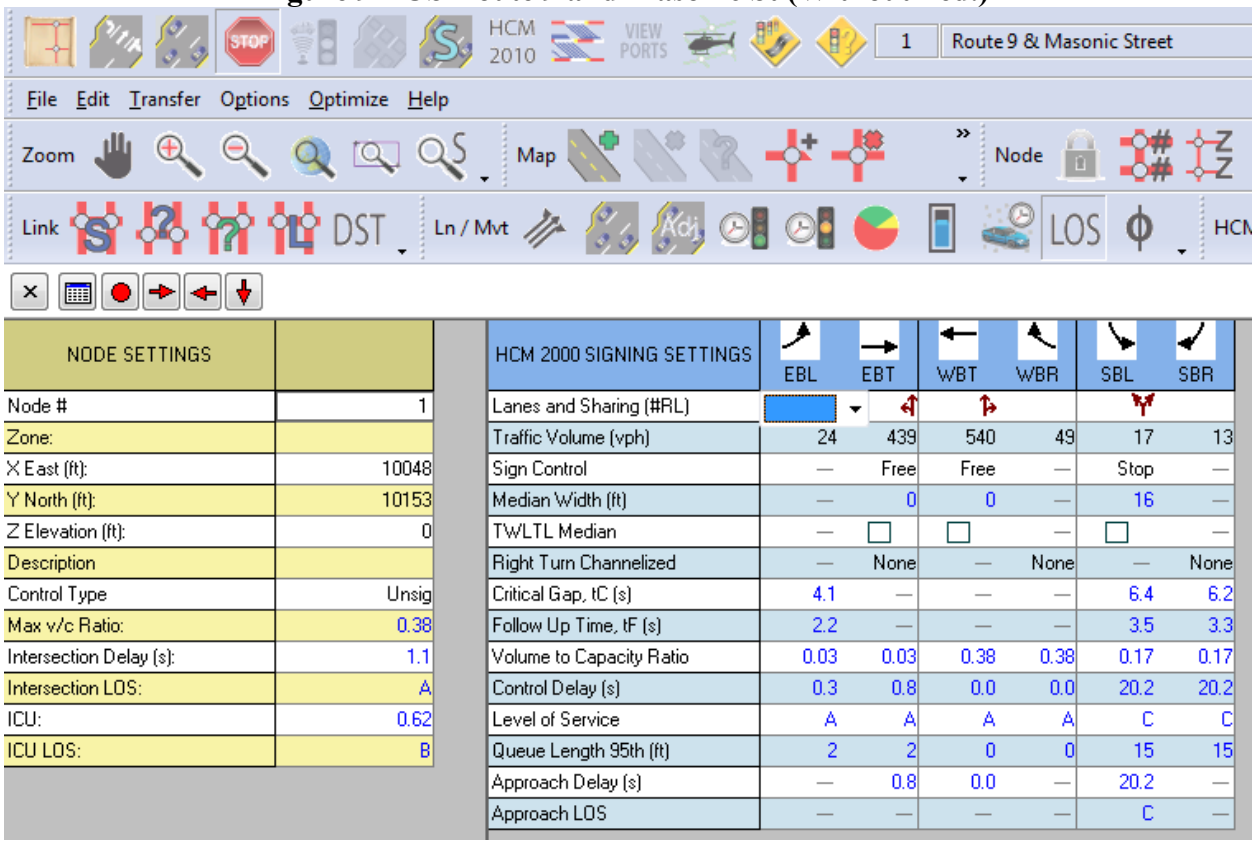
Figure 8 LOS Route 9, Hawley St and Market St



NODE SETTINGS	
Node #	19
Zone:	
X East (ft):	11358
Y North (ft):	11245
Z Elevation (ft):	0
Description	
Control Type	Actd-Uncrd
Cycle Length (s):	80.0
Lock Timings:	☑
Optimize Cycle Length:	Optimize
Optimize Splits:	Optimize
Actuated Cycle(s):	70.0
Natural Cycle(s):	80.0
Max v/c Ratio:	0.87
Intersection Delay (s):	27.2
Intersection LOS:	C
ICU:	1.19
ICU LOS:	H
Offset (s):	—
Referenced to:	—
Reference Phase:	—
Master Intersection:	—
Yield Point:	—
Mandatory Stop On Yellow:	☐

TIMING SETTINGS	WBU	WBL	WBR	WBR2	SEL2	SEL	SER	NEL	NET	NER	SWL	SWT	SWR	PED	HOLD
Permitted Phases	4	4	—	—	8		—	2		—	6		—	—	—
Permitted Flashing Yellow	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Detector Phases	4	4	—	—	8	8	—	2	2	—	6	6	—	—	—
Switch Phase	0	0	—	—	0	0	—	0	0	—	0	0	—	—	—
Leading Detector (ft)	—	20	—	—	—	20	—	—	100	—	—	100	—	—	—
Trailing Detector (ft)	—	0	—	—	—	0	—	—	0	—	—	0	—	—	—
Minimum Initial (s)	6.0	6.0	—	—	6.0	6.0	—	6.0	6.0	—	10.0	10.0	—	7.0	—
Minimum Split (s)	35.0	35.0	—	—	35.0	35.0	—	35.0	35.0	—	35.0	35.0	—	10.0	—
Total Split (s)	35.0	35.0	—	—	35.0	35.0	—	35.0	35.0	—	35.0	35.0	—	10.0	—
Yellow Time (s)	3.0	3.0	—	—	3.0	3.0	—	3.0	3.0	—	3.0	3.0	—	2.0	—
All-Red Time (s)	2.0	2.0	—	—	2.0	2.0	—	2.0	2.0	—	2.0	2.0	—	1.0	—
Lost Time Adjust (s)	—	0.0	0.0	0.0	—	0.0	0.0	—	0.0	0.0	—	0.0	—	—	—
Lagging Phase?	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Allow Lead/Lag Optimize?	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Recall Mode	Max	Max	—	—	Max	Max	—	Max	Max	—	Max	Max	—	None	—
Speed limit (mph)	—	25	—	—	25	25	—	25	25	—	25	25	—	—	—
Actuated Effct. Green (s)	—	30.0	—	—	—	30.0	—	—	30.0	—	—	30.0	—	—	—
Actuated g/C Ratio	—	0.43	—	—	—	0.43	—	—	0.43	—	—	0.43	—	—	—
Volume to Capacity Ratio	—	0.34	—	—	—	0.34	—	—	0.87	—	—	0.83	—	—	—
Control Delay (s)	—	10.4	—	—	—	10.5	—	—	35.5	—	—	29.9	—	—	—
Queue Delay (s)	—	0.0	—	—	—	0.0	—	—	0.0	—	—	0.0	—	—	—
Total Delay (s)	—	10.4	—	—	—	10.5	—	—	35.5	—	—	29.9	—	—	—
Level of Service		B	—	—	—	B	—	—	D	—	—	C	—	—	—
Approach Delay (s)	—	10.4	—	—	—	10.5	—	—	35.5	—	—	29.9	—	—	—
Approach LOS	—	B	—	—	—	B	—	—	D	—	—	C	—	—	—
Queue Length 50th (ft)	—	30	—	—	—	34	—	—	213	—	—	213	—	—	—
Queue Length 95th (ft)	—	71	—	—	—	61	—	—	#404	—	—	#396	—	—	—
Stops (vph)	—	68	—	—	—	65	—	—	421	—	—	443	—	—	—
Fuel Used (g/hr)	—	1	—	—	—	1	—	—	7	—	—	6	—	—	—
Dilemma Vehicles (#/hr)	—	0	—	—	—	0	—	—	0	—	—	0	—	—	—

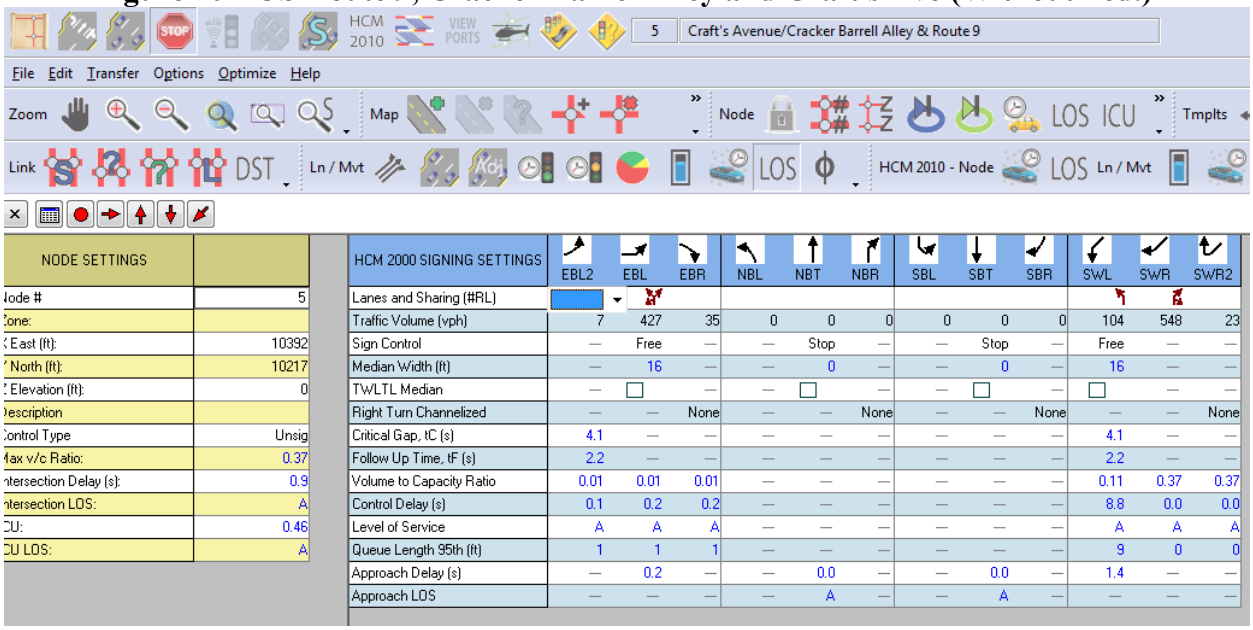
Figure 9 LOS Route 9 and Masonic St (Without Ped.)



NODE SETTINGS	
Node #	1
Zone:	
X East (ft):	10048
Y North (ft):	10153
Z Elevation (ft):	0
Description	
Control Type	Unsig
Max v/c Ratio:	0.38
Intersection Delay (s):	1.1
Intersection LOS:	A
ICU:	0.62
ICU LOS:	B

HCM 2000 SIGNING SETTINGS	EBL	EBT	WBT	WBR	SBL	SBR
Lanes and Sharing (#RL)						
Traffic Volume (vph)	24	439	540	49	17	13
Sign Control	—	Free	Free	—	Stop	—
Median Width (ft)	—	0	0	—	16	—
TWLTL Median	—	☐	☐	—	☐	—
Right Turn Channelized	—	None	—	None	—	None
Critical Gap, tC (s)	4.1	—	—	—	6.4	6.2
Follow Up Time, tF (s)	2.2	—	—	—	3.5	3.3
Volume to Capacity Ratio	0.03	0.03	0.38	0.38	0.17	0.17
Control Delay (s)	0.3	0.8	0.0	0.0	20.2	20.2
Level of Service	A	A	A	A	C	C
Queue Length 95th (ft)	2	2	0	0	15	15
Approach Delay (s)	—	0.8	0.0	—	20.2	—
Approach LOS	—	—	—	—	C	—

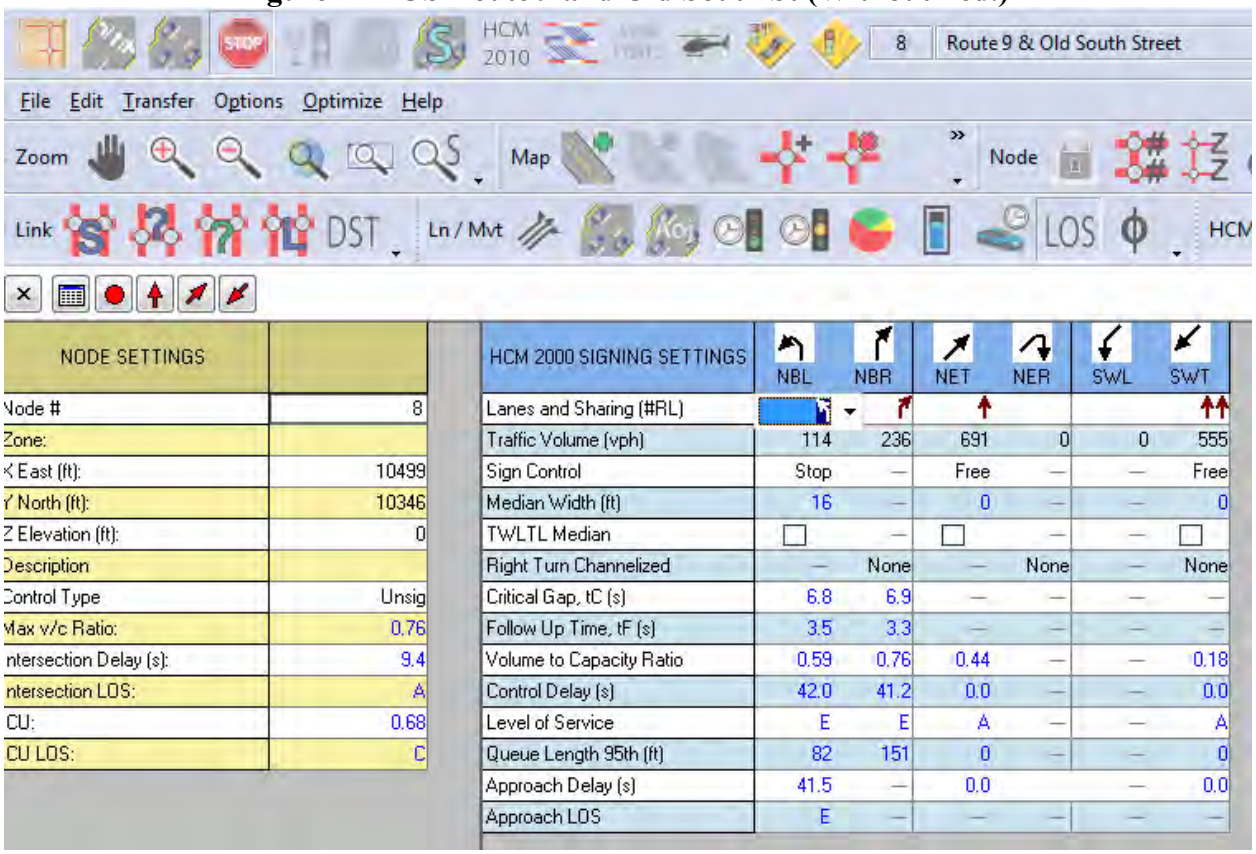
Figure 10 LOS Route 9, Cracker Barrel Alley and Craft's Ave (Without Ped.)



NODE SETTINGS	
Node #	5
Zone:	
X East (ft):	10392
Y North (ft):	10217
Z Elevation (ft):	0
Description	
Control Type	Unsig
Max v/c Ratio:	0.37
Intersection Delay (s):	0.9
Intersection LOS:	A
ICU:	0.46
ICU LOS:	A

HCM 2000 SIGNING SETTINGS	EBL2	EBL	EBR	NBL	NBT	NBR	SBL	SBT	SBR	SWL	SWR	SWR2
Lanes and Sharing (#RL)												
Traffic Volume (vph)	7	427	35	0	0	0	0	0	0	104	548	23
Sign Control	—	Free	—	—	Stop	—	—	Stop	—	Free	—	—
Median Width (ft)	—	16	—	—	0	—	—	0	—	16	—	—
TWLTL Median	—	☐	—	—	☐	—	—	☐	—	☐	—	—
Right Turn Channelized	—	—	None	—	—	None	—	—	None	—	—	None
Critical Gap, tC (s)	4.1	—	—	—	—	—	—	—	—	4.1	—	—
Follow Up Time, tF (s)	2.2	—	—	—	—	—	—	—	—	2.2	—	—
Volume to Capacity Ratio	0.01	0.01	0.01	—	—	—	—	—	—	0.11	0.37	0.37
Control Delay (s)	0.1	0.2	0.2	—	—	—	—	—	—	8.8	0.0	0.0
Level of Service	A	A	A	—	—	—	—	—	—	A	A	A
Queue Length 95th (ft)	1	1	1	—	—	—	—	—	—	9	0	0
Approach Delay (s)	—	0.2	—	—	0.0	—	—	0.0	—	1.4	—	—
Approach LOS	—	—	—	—	A	—	—	A	—	—	—	—

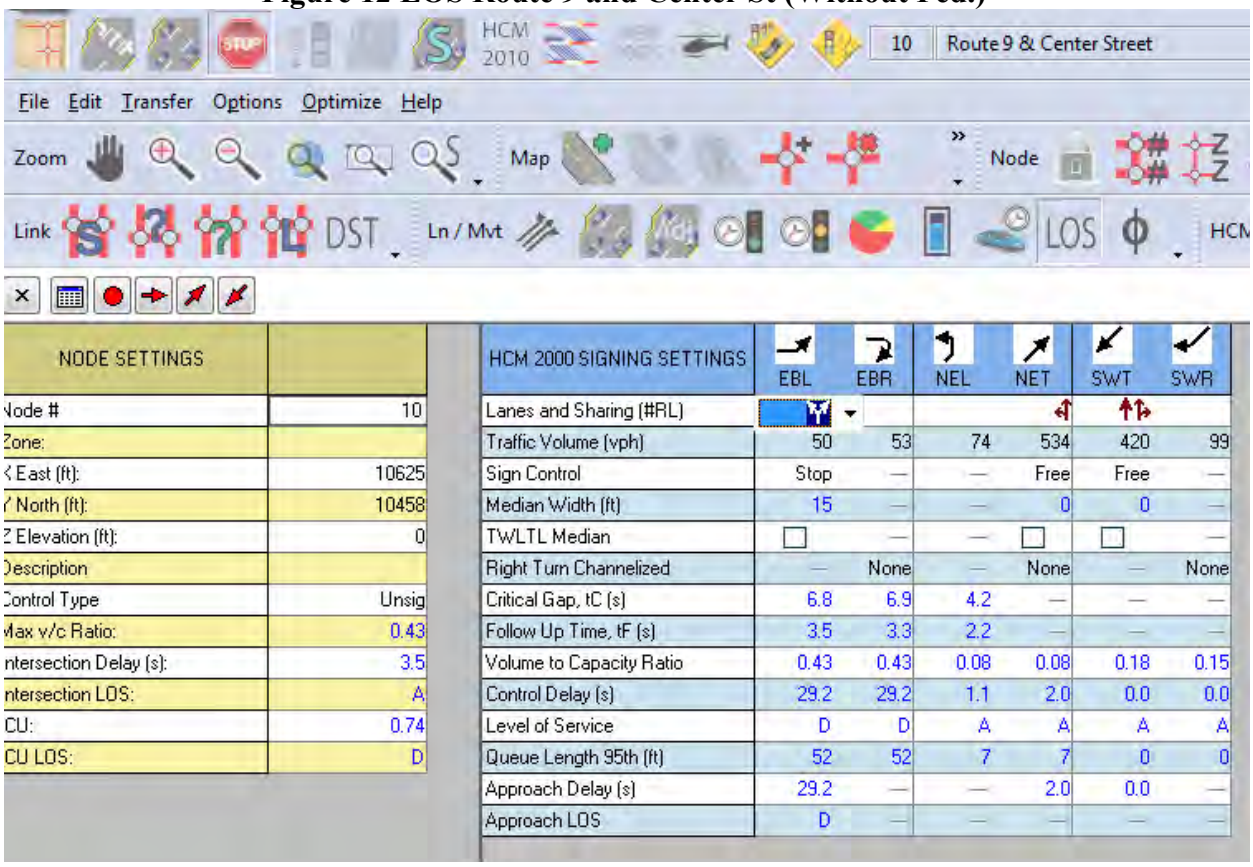
Figure 11 LOS Route 9 and Old South St (Without Ped.)



NODE SETTINGS	
Node #	8
Zone:	
X East (ft):	10499
Y North (ft):	10346
Z Elevation (ft):	0
Description	
Control Type	Unsig
Max v/c Ratio:	0.76
Intersection Delay (s):	9.4
Intersection LOS:	A
ICU:	0.68
ICU LOS:	C

HCM 2000 SIGNING SETTINGS	NBL	NBR	NET	NER	SWL	SWT
Lanes and Sharing (#RL)						
Traffic Volume (vph)	114	236	691	0	0	555
Sign Control	Stop	—	Free	—	—	Free
Median Width (ft)	16	—	0	—	—	0
TWLTL Median	☐	—	☐	—	—	☐
Right Turn Channelized	—	None	—	None	—	None
Critical Gap, tC (s)	6.8	6.9	—	—	—	—
Follow Up Time, tF (s)	3.5	3.3	—	—	—	—
Volume to Capacity Ratio	0.59	0.76	0.44	—	—	0.18
Control Delay (s)	42.0	41.2	0.0	—	—	0.0
Level of Service	E	E	A	—	—	A
Queue Length 95th (ft)	82	151	0	—	—	0
Approach Delay (s)	41.5	—	0.0		—	0.0
Approach LOS	E	—	—	—	—	—

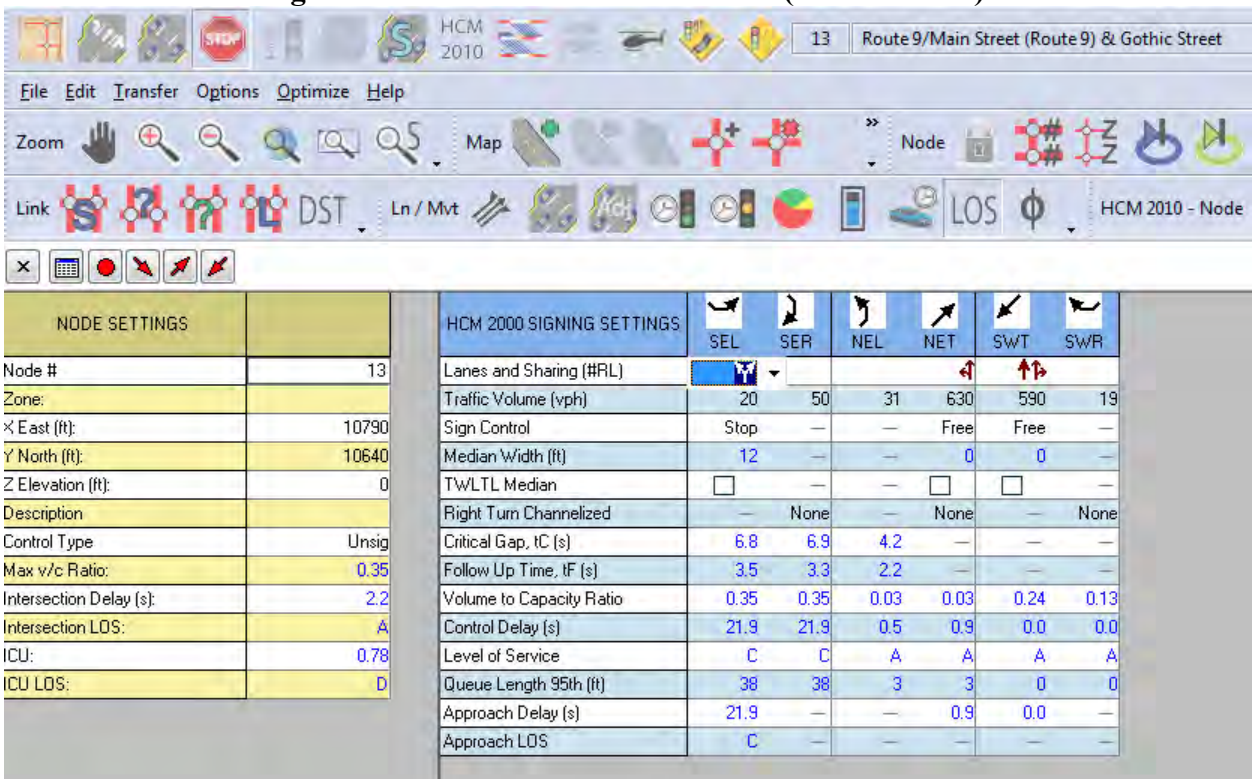
Figure 12 LOS Route 9 and Center St (Without Ped.)



NODE SETTINGS	
Node #	10
Zone:	
X East (ft):	10625
Y North (ft):	10458
Z Elevation (ft):	0
Description	
Control Type	Unsig
Max v/c Ratio:	0.43
Intersection Delay (s):	3.5
Intersection LOS:	A
ICU:	0.74
ICU LOS:	D

HCM 2000 SIGNING SETTINGS	EBL	EBR	NEL	NET	SWT	SWR
Lanes and Sharing (#RL)						
Traffic Volume (vph)	50	53	74	534	420	99
Sign Control	Stop	—	—	Free	Free	—
Median Width (ft)	15	—	—	0	0	—
TWLTL Median	☐	—	—	☐	☐	—
Right Turn Channelized	—	None	—	None	—	None
Critical Gap, tC (s)	6.8	6.9	4.2	—	—	—
Follow Up Time, tF (s)	3.5	3.3	2.2	—	—	—
Volume to Capacity Ratio	0.43	0.43	0.08	0.08	0.18	0.15
Control Delay (s)	29.2	29.2	1.1	2.0	0.0	0.0
Level of Service	D	D	A	A	A	A
Queue Length 95th (ft)	52	52	7	7	0	0
Approach Delay (s)	29.2	—	—	2.0	0.0	—
Approach LOS	D	—	—	—	—	—

Figure 13 LOS Route 9 and Gothic St (Without Ped.)



NODE SETTINGS	
Node #	13
Zone:	
X East (ft):	10790
Y North (ft):	10640
Z Elevation (ft):	0
Description	
Control Type	Unsig
Max v/c Ratio:	0.35
Intersection Delay (s):	2.2
Intersection LOS:	A
ICU:	0.78
ICU LOS:	D

HCM 2000 SIGNING SETTINGS	SEL	SER	NEL	NET	SWT	SWR
Lanes and Sharing (#RL)						
Traffic Volume (vph)	20	50	31	630	590	19
Sign Control	Stop	—	—	Free	Free	—
Median Width (ft)	12	—	—	0	0	—
TWLTL Median	☐	—	—	☐	☐	—
Right Turn Channelized	—	None	—	None	—	None
Critical Gap, tC (s)	6.8	6.9	4.2	—	—	—
Follow Up Time, tF (s)	3.5	3.3	2.2	—	—	—
Volume to Capacity Ratio	0.35	0.35	0.03	0.03	0.24	0.13
Control Delay (s)	21.9	21.9	0.5	0.9	0.0	0.0
Level of Service	C	C	A	A	A	A
Queue Length 95th (ft)	38	38	3	3	0	0
Approach Delay (s)	21.9	—	—	0.9	0.0	—
Approach LOS	C	—	—	—	—	—

Figure 14 LOS Route 9, Bridge St and Pleasant St (Without Ped.)

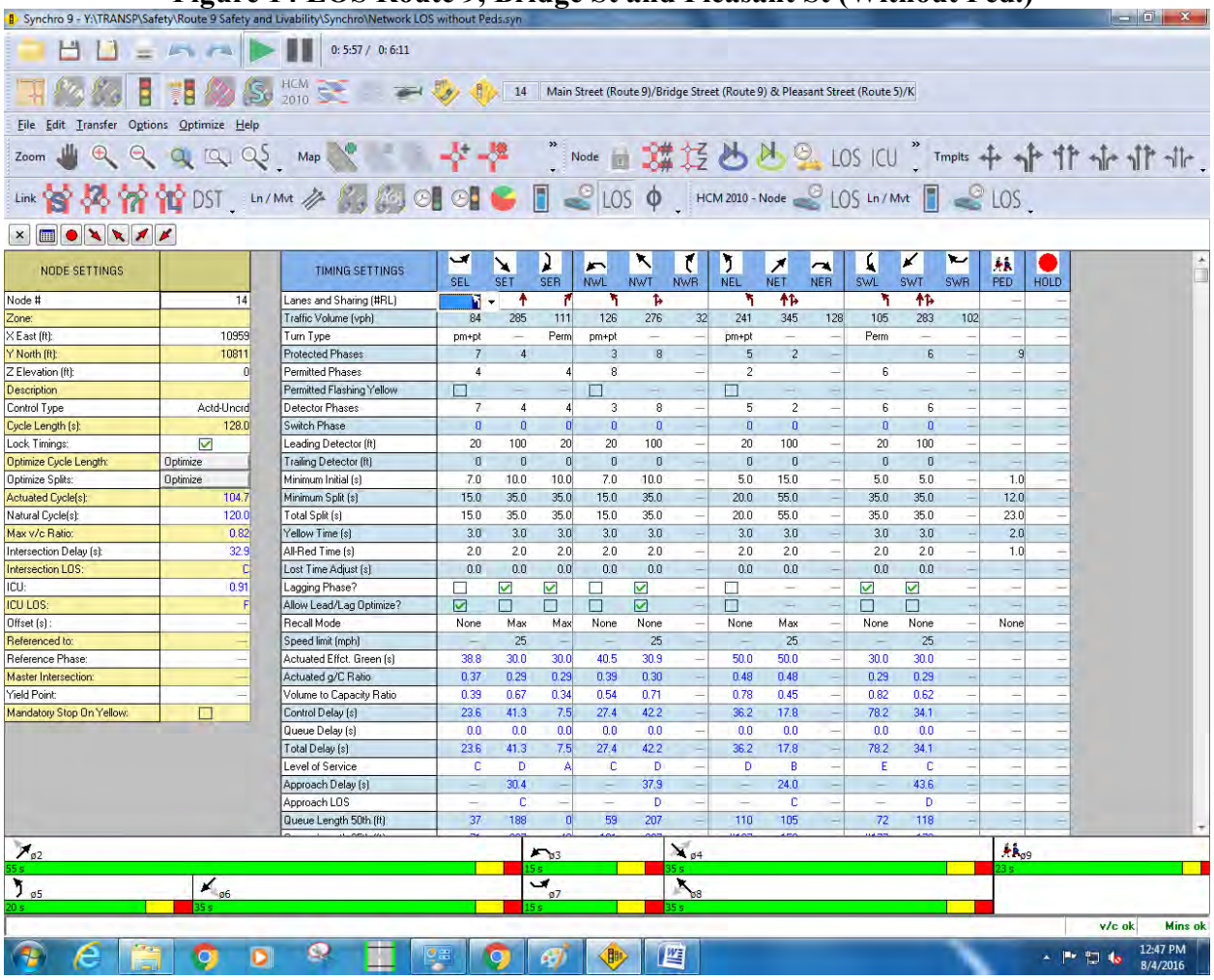
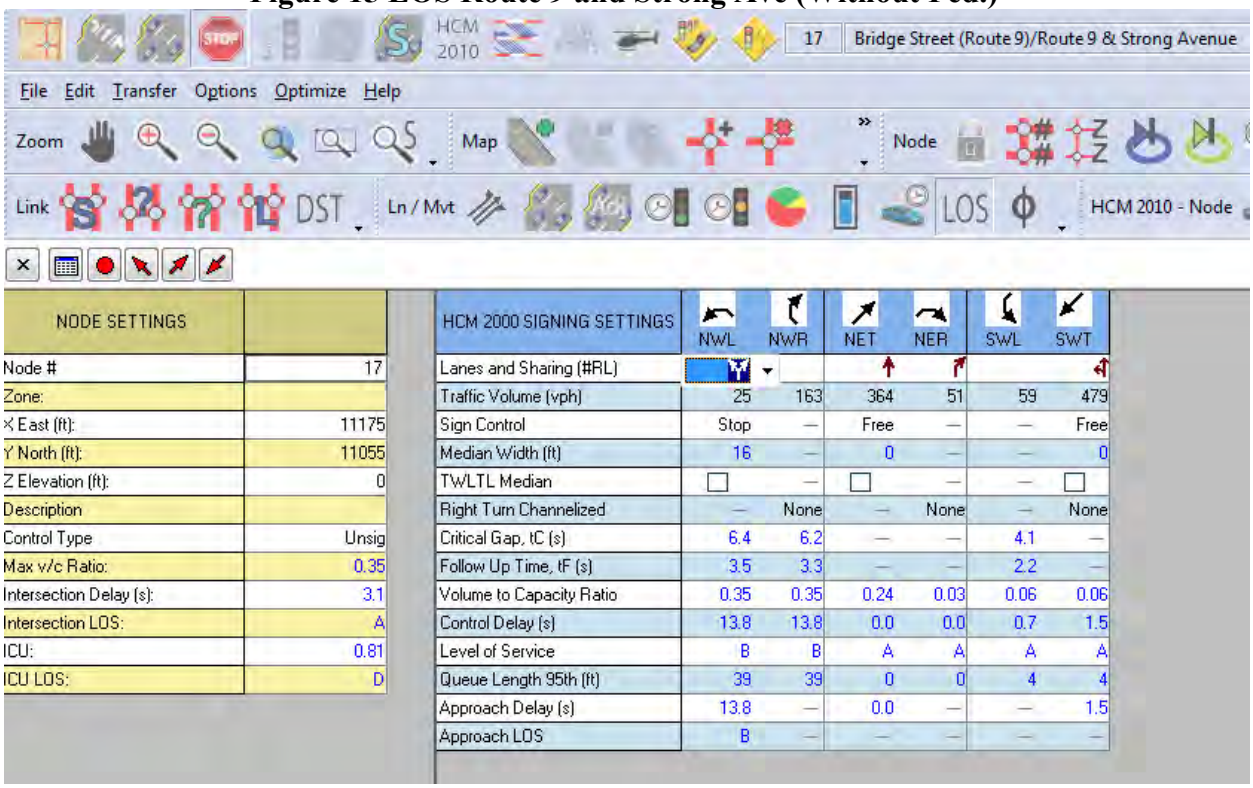


Figure 15 LOS Route 9 and Strong Ave (Without Ped.)



NODE SETTINGS	
Node #	17
Zone:	
X East (ft):	11175
Y North (ft):	11055
Z Elevation (ft):	0
Description	
Control Type	Unsig
Max v/c Ratio:	0.35
Intersection Delay (s):	3.1
Intersection LOS:	A
ICU:	0.81
ICU LOS:	D

HCM 2000 SIGNING SETTINGS	NWL	NWR	NET	NER	SWL	SWT
Lanes and Sharing (#RL)						
Traffic Volume (vph)	25	163	364	51	59	479
Sign Control	Stop	—	Free	—	—	Free
Median Width (ft)	16	—	0	—	—	0
TWLTL Median	☐	—	☐	—	—	☐
Right Turn Channelized	—	None	—	None	—	None
Critical Gap, tC (s)	6.4	6.2	—	—	4.1	—
Follow Up Time, tF (s)	3.5	3.3	—	—	2.2	—
Volume to Capacity Ratio	0.35	0.35	0.24	0.03	0.06	0.06
Control Delay (s)	13.8	13.8	0.0	0.0	0.7	1.5
Level of Service	B	B	A	A	A	A
Queue Length 95th (ft)	39	39	0	0	4	4
Approach Delay (s)	13.8	—	0.0	—	—	1.5
Approach LOS	B	—	—	—	—	—

Figure 16 LOS Route 9 and Market St (Without Ped.)

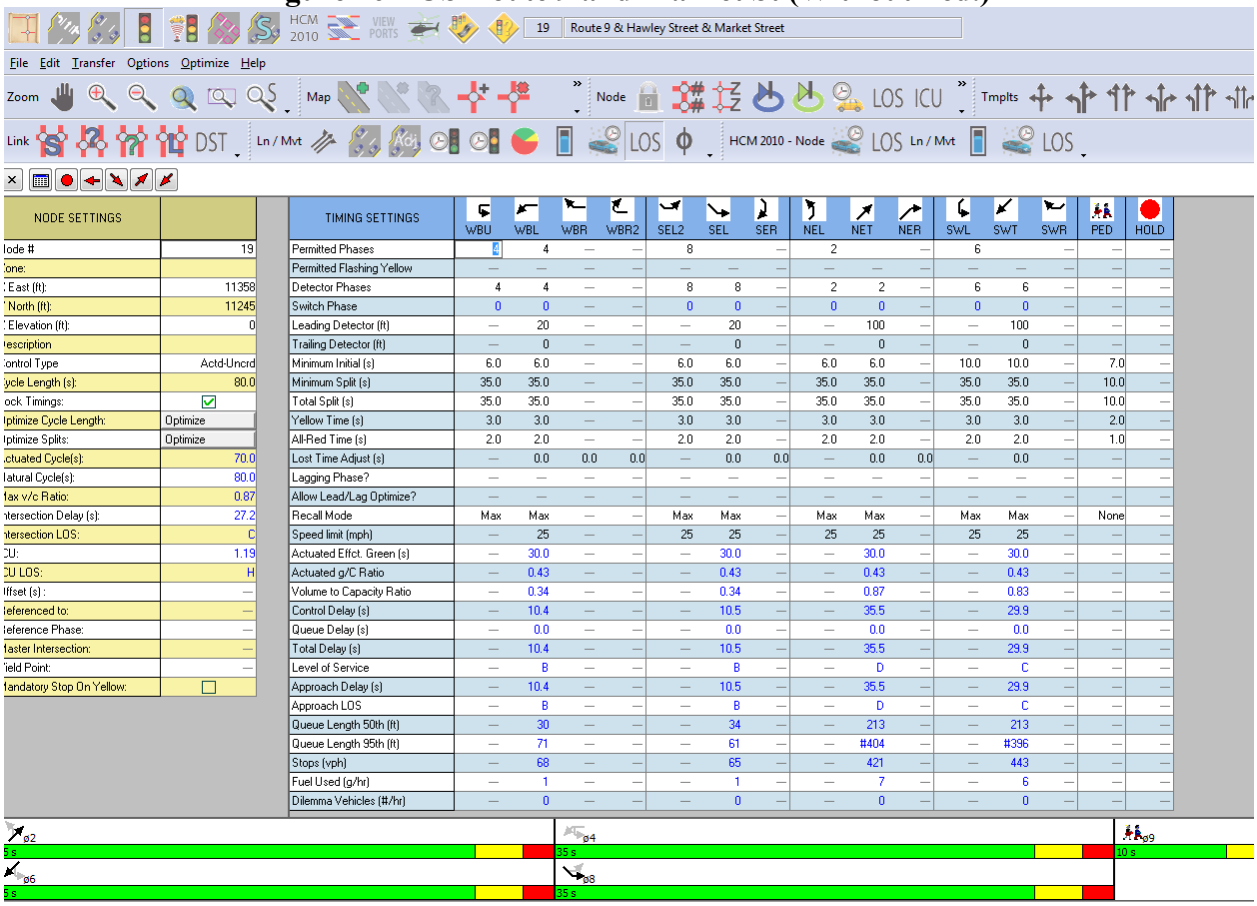


Table 2 Transit Field Survey West Bound

	Segment		Bus Stop	Shelters	Benches	CBD	Running Time	Are stops on near
	From	To	(#)	(% stops)	(% stops)	(Yes/No)	Loss (min/mi)	side of intersection?
1	Hawley / Market Street	Strong Avenue	0	0%	0%	No	1.0	No
2	Strong Avenue	King/Pleasant Street	0	0%	0%	No	1.0	No
3	King/Pleasant Street	Center Street	1	100%	100%	Yes	1.0	Yes
4	Center Street	Crafts Avenue	0	0%	0%	No	1.0	No
5	Crafts Avenue	Masonic Street	0	0%	0%	No	1.0	No

Bus is considered on-time if it arrives within	5.0	minutes of scheduled time
Average Passenger Trip Length	3.7	miles

Table 3 Transit Field Survey East Bound

	Segment		Bus Stop	Shelters	Benches	CBD	Running Time	Are stops on near
	From	To	(#)	(% stops)	(% stops)	(Yes/No)	Loss (min/mi)	side of intersection?
1	Masonic Street	Crafts Avenue	1	100%	100%	Yes	1.0	No
2	Crafts Avenue	Center Street	1	0%	0%	Yes	1.0	Yes
3	Center Street	King Street and Pleasant Stree	0	0%	0%	No	1.0	No
4	King / Pleasant Street	Strong Avenue	0	0%	0%	No	1.0	No
5	Strong Avenue	Hawley / Market Street	0	0%	0%	No	1.0	No

Bus is considered on-time if it arrives within	5.0	minutes of scheduled time
Average Passenger Trip Length	3.7	miles

Table 4 Transit Performance Data West Bound

	Segment		Route	Frequency	Load Factor	On-Time Performance	Average Dwell Time	Reentry Delay
	From	To	#'s	(bus/hr)	(pas/seat)	(%)	(s)	(s)
1	Hawley / Market Street	Strong Avenue	43	3.0	50%	100%	0	0
			all other PVTA	4.0	33%	100%	0	0
2	Strong Avenue	King/Pleasant Street	43	3.0	50%	100%	0	0
			all other PVTA	4.0	33%	100%	0	0
3	King/Pleasant Street	Center Street	43	3.0	50%	85%	10	5
			44	1.0	13%	100%	10	5
			all other PVTA	4.0	33%	100%	10	5
4	Center Street	Crafts Avenue	43	3.0	25%	100%	0	0
			44	1.0	5%	100%	0	0
			all other PVTA	4.0	13%	100%	0	0
5	Crafts Avenue	Masonic Street	43	3.0	25%	100%	0	0
			44	1.0	5%	100%	0	0
			all other PVTA	6.0	13%	100%	0	0

Table 5 Transit Performance Data East Bound

Segment			Route	Frequency	Load Factor	On-Time Performance	Average Dwell Time	Reentry Delay
	From	To	#'s	(bus/hr)	(pas/seat)	(%)	(s)	(s)
1	Masonic Street	Crafts Avenue	43	3.0	25%	85%	20	5
			48	2.0	25%	100%	20	5
			44	1.0	25%	100%	20	5
			all other PVTA	8.0	13%	100%	20	5
2	Crafts Avenue	Center Street	43	3.0	25%	100%	0	0
			48	2.0	25%	100%	0	0
			44	1.0	25%	100%	20	5
			all other PVTA	8.0	13%	100%	0	0
3	Center Street	King Street and Pleasant Stree	43	3.0	25%	100%	0	0
			48	2.0	25%	100%	0	0
			44	1.0	25%	100%	0	0
			all other PVTA	5.0	13%	100%	0	0
4	King / Pleasant Street	Strong Avenue	43	3.0	25%	100%	0	0
			all other PVTA	4.0	13%	100%	0	0
5	Strong Avenue	Hawley / Market Street	43	3.0	25%	100%	0	0
			all other PVTA	4.0	13%	100%	0	0

Table 6 LOS+ Eastbound

LOS+ Multimodal Level of Service for Urban Streets
Results Summary

Street Elm - Main - Bridge Street (Route 9) Northampton Direction Eastbound Date 6/6/2015

Limits Masonic Street to Hawley/ Market Street Scenario Existing Analyst Khyati

Segment	From	To	Auto Mode			Pedestrian Mode			Bicycle Mode		Transit Mode	
			V/C Ratio	LOS Score	LOS	Ped Space[1]	LOS Score	LOS	LOS Score	LOS	LOS Score	LOS
1	Masonic Street	Crafts Avenue	0.14	2.34	B	209.02	1.08	A	3.48	C	2.38	B
2	Crafts Avenue	Center Street	0.16	5.93	F	362.95	1.07	A	2.00	B	1.49	A
3	Center Street	King / Pleasant Street	0.24	5.86	F	409.65	1.08	A	3.57	D	1.00	A
4	King / Pleasant Street	Strong Avenue	0.12	2.34	B	559.92	1.06	A	3.71	D	0.18	A
5	Strong Avenue	Hawley / Market Street	0.90	5.62	F	623.93	1.72	A	5.00	F	1.35	A

Note:

1. Pedestrian space is reported in square feet per pedestrian (ft^2/ped)

Source: NCHRP Project 3-70 Multimodal Level of Service For Urban Streets and Highway Capacity Manual 2010, Chapter 17

Table 7 LOS+ Westbound

LOS+ Multimodal Level of Service for Urban Streets
Results Summary

Street Bridge - Main - Elm Street (Route 9) Northampton Direction Westbound Date 6/6/2015

Limits Hawley/ Market Street to Masonic Street Scenario Existing Analyst Khyati

Segment	From	To	Auto Mode			Pedestrian Mode			Bicycle Mode		Transit Mode	
			V/C Ratio	LOS Score	LOS	Ped Space[1]	LOS Score	LOS	LOS Score	LOS	LOS Score	LOS
1	Hawley/Market Street	Strong Avenue	0.28	5.62	F	677.58	1.81	A	5.26	F	0.50	A
2	Strong Avenue	King/Pleasant Street	0.15	2.14	B	462.96	0.87	A	3.44	C	0.91	A
3	King/Pleasant Street	Center Street	0.09	4.49	E	333.78	0.71	A	0.11	A	2.04	B
4	Center Street	Crafts Avenue	0.17	4.83	E	380.57	1.17	A	2.05	B	0.64	A
5	Crafts Avenue	Masonic Street	0.17	2.34	B	304.40	1.26	A	4.87	E	-0.16	A

Note:

1. Pedestrian space is reported in square feet per pedestrian (ft^2/ped)

Source: NCHRP Project 3-70 Multimodal Level of Service For Urban Streets and Highway Capacity Manual 2010, Chapter 17

Figure 17 Crash Diagram At Main St and Pleasant St

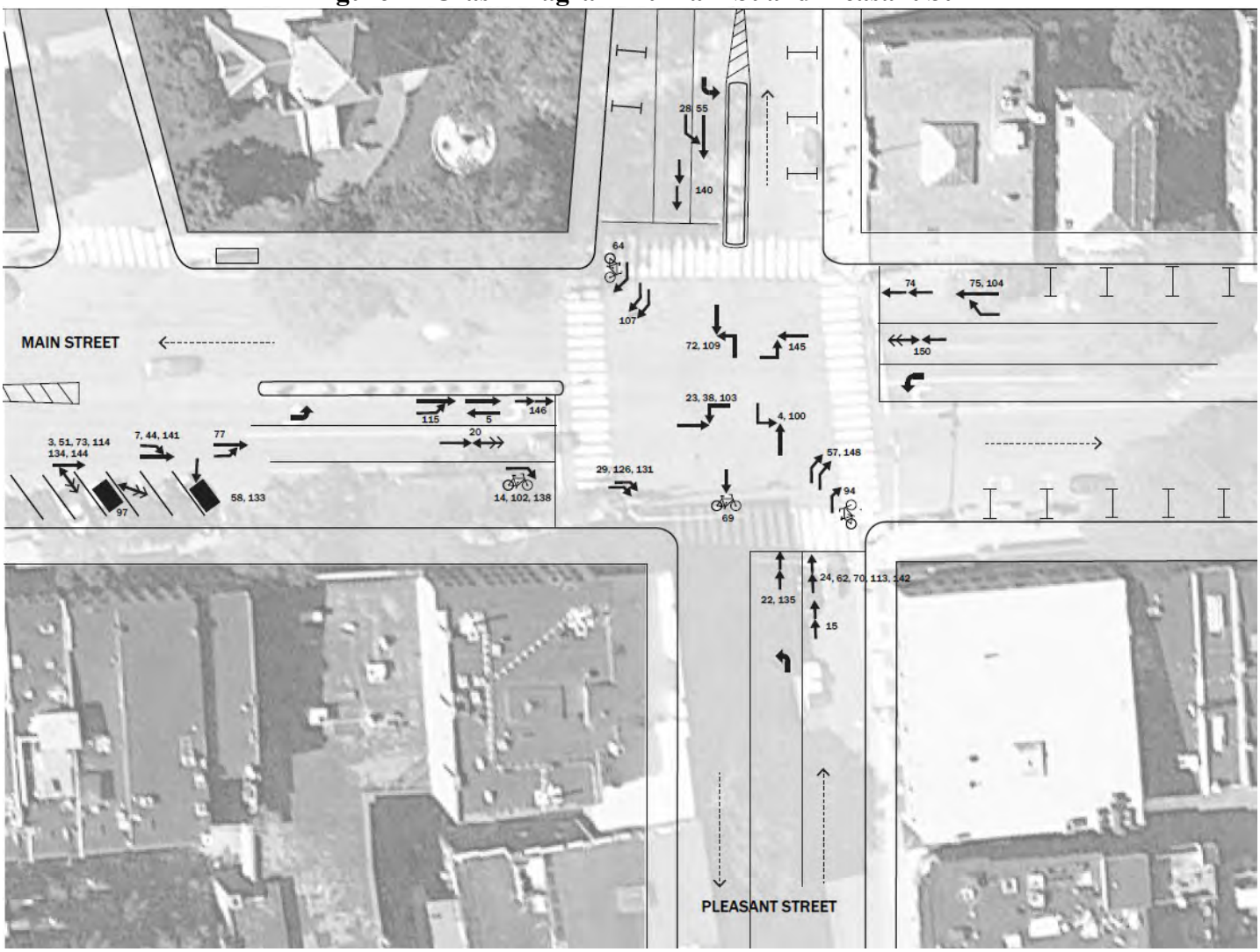


Figure 18 Crash Diagram Main St and Center St

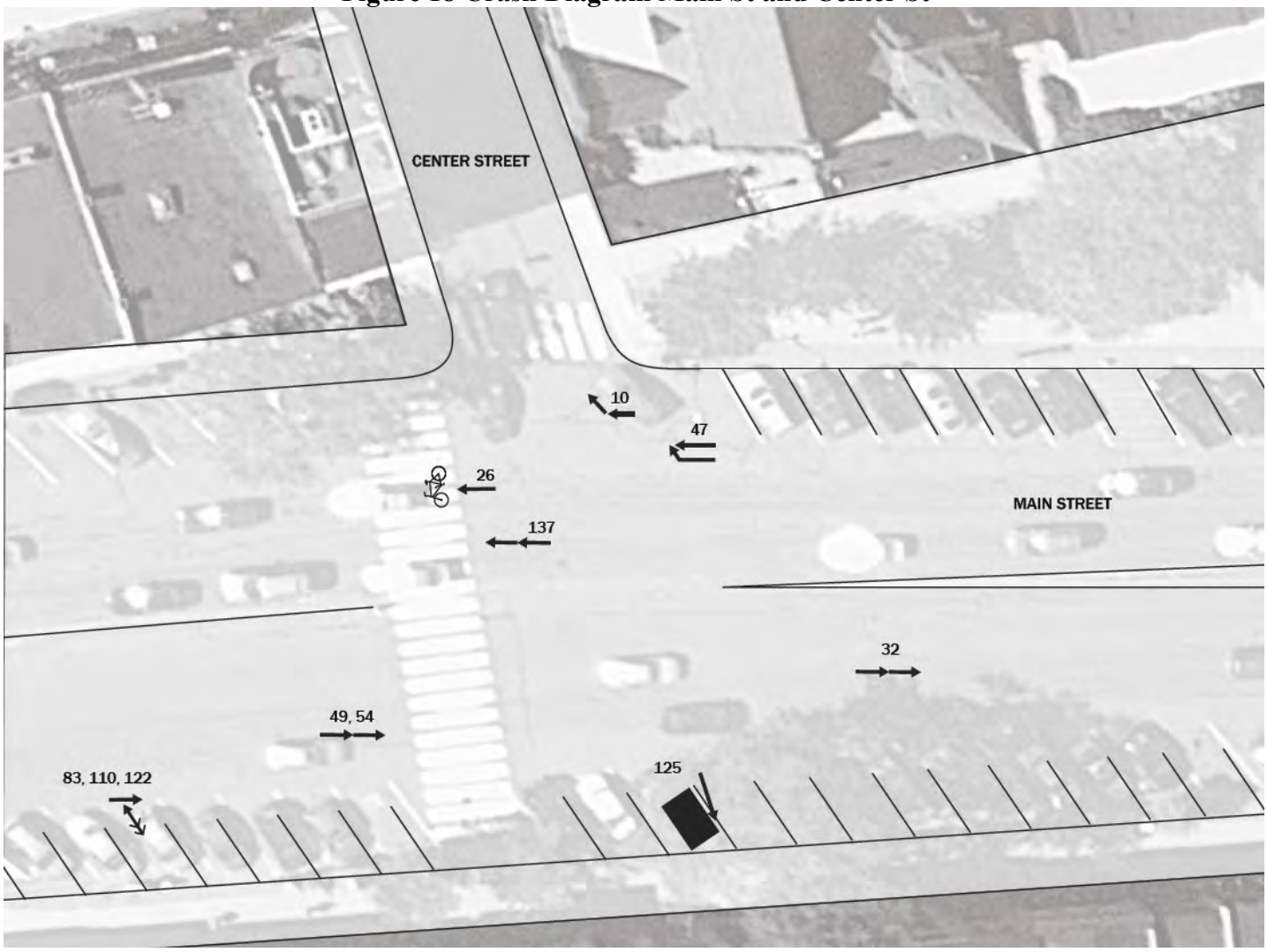


Figure 19 Crash Diagram Main St and Masonic St

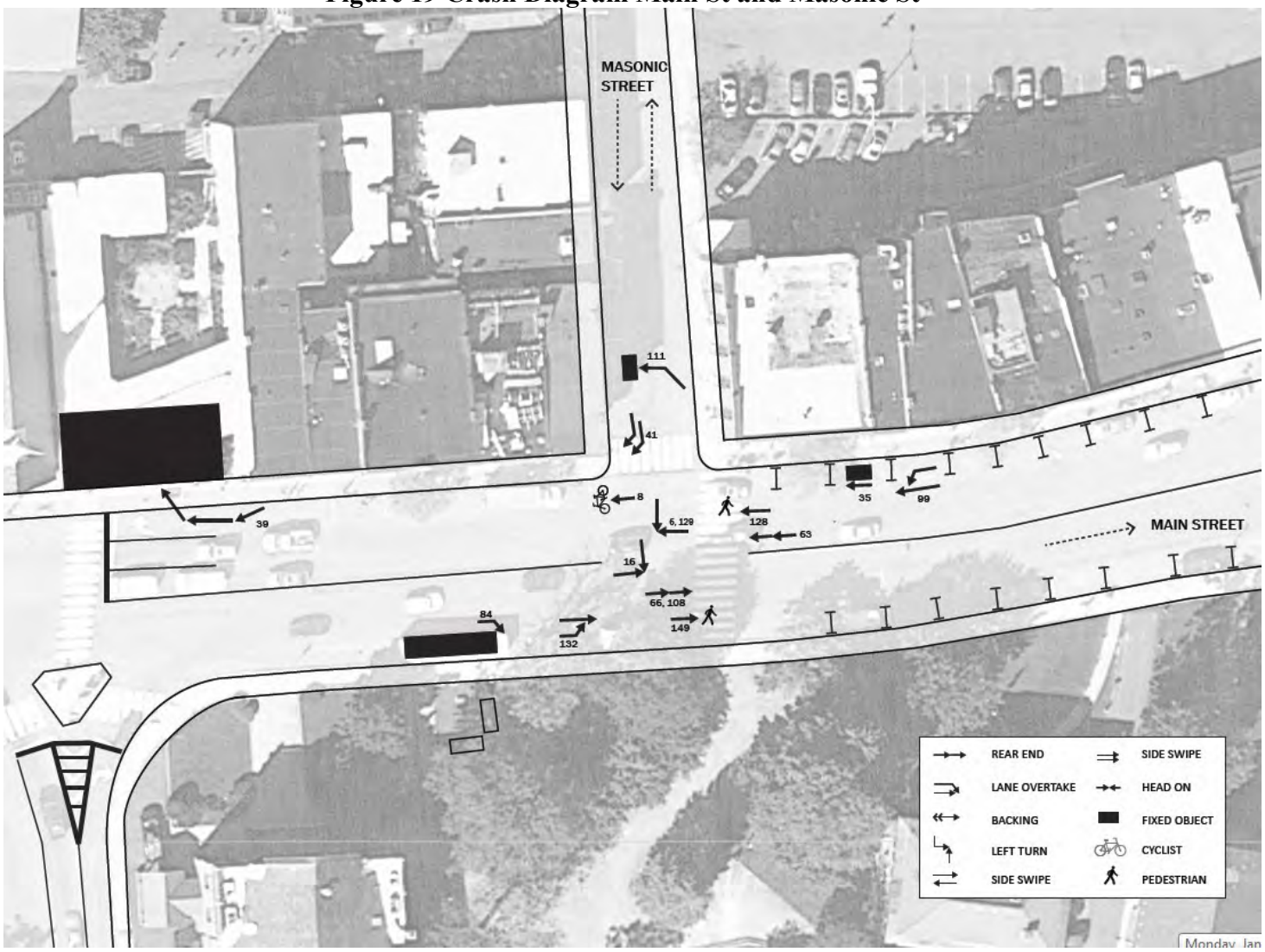


Figure 20 Crash Diagram Main St and Market St

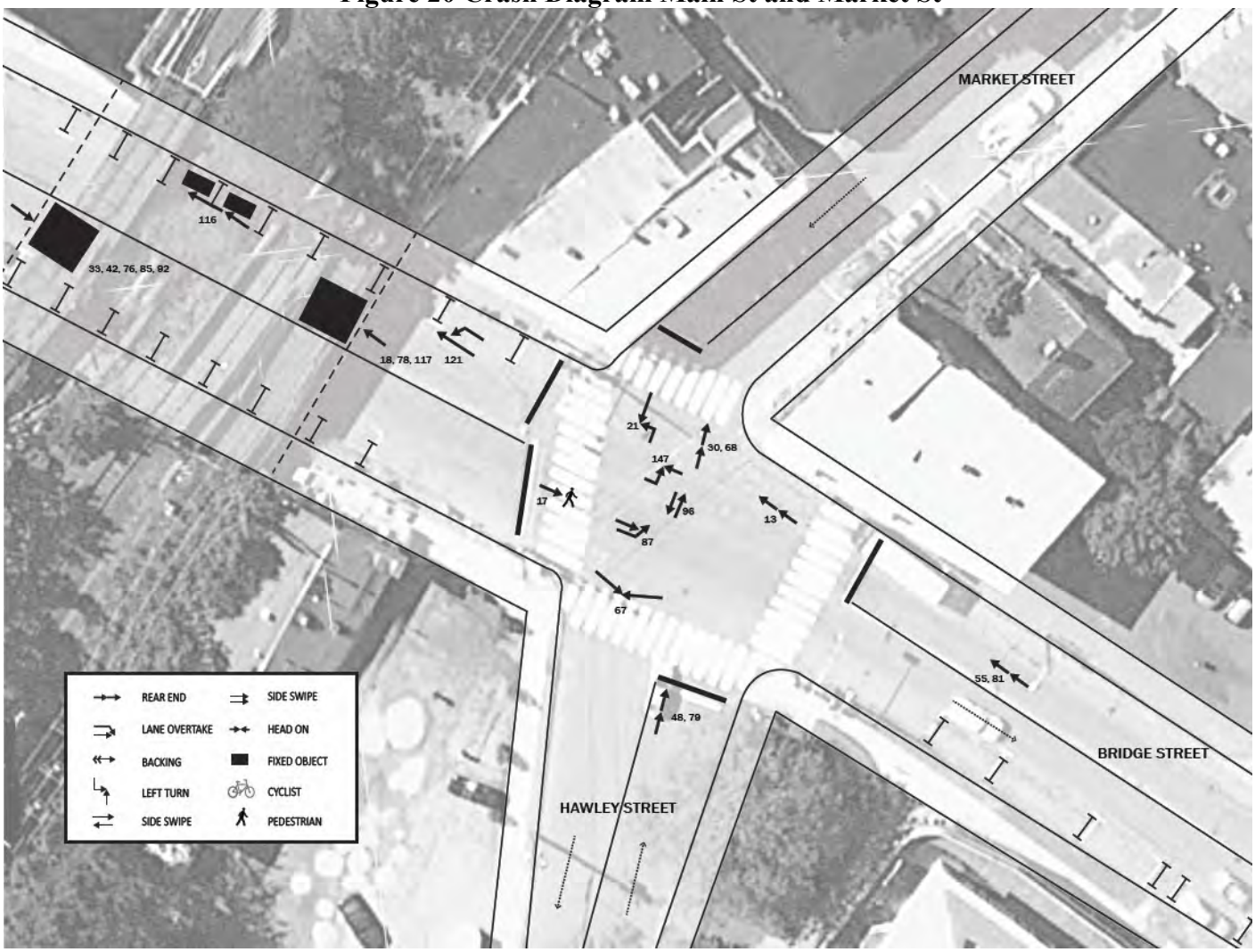


Figure 21 Crash Diagram Main St and Strong Ave

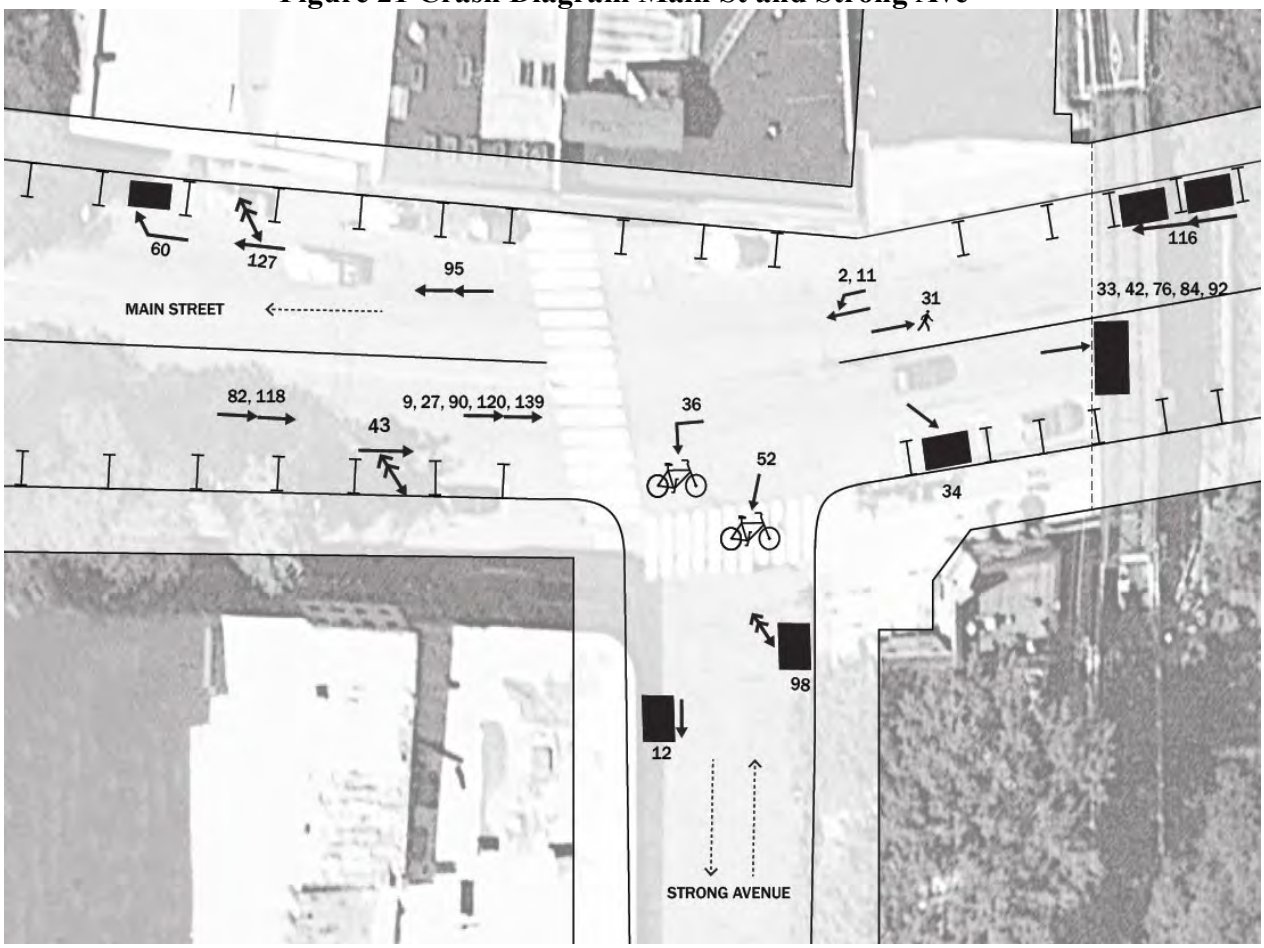


Figure 22 Complete Corridor Collision Diagram

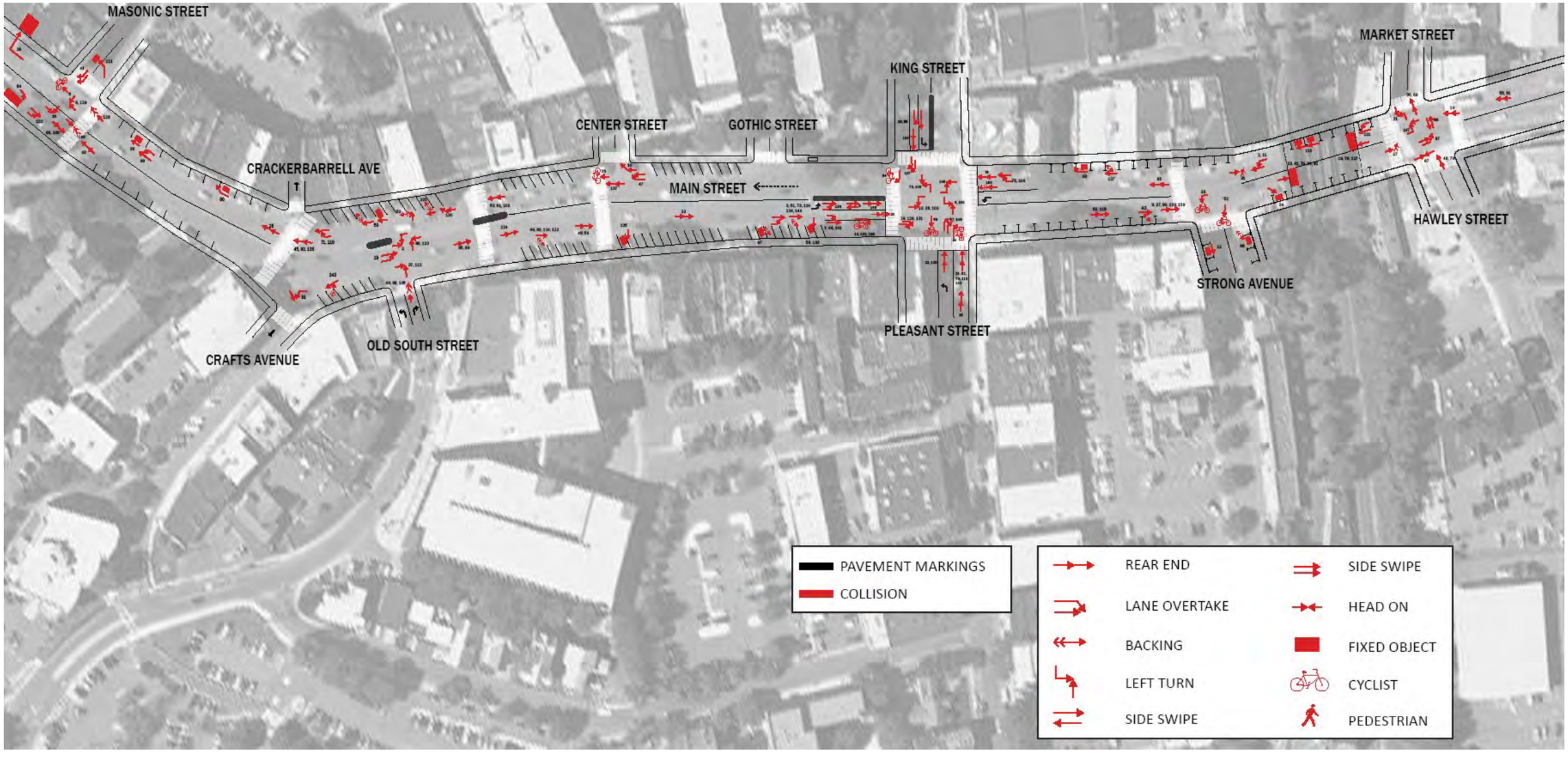


Table 8 Main St Collision List 2011-2014

NUMBER	DATE	TIME	DAY	SEV.	>$1000	L	R	I	PAT
1	1/12/2011	05:34PM	WED	PD	Y	4	3	MAIN/STRONG	LC
2	1/23/2011	06:49PM	SUN	PD	Y	4	1	MAIN/SOUTH	A
3	1/28/2011	05:00PM	FRI	PD	Y	4	2	102 MAIN	B
4	2/3/2011	7:48PM	THU	PD	Y	4	3	MAIN/PLEASANT	A
5	2/6/2011	05:50PM	SUN	PD	Y	4	4	MAIN/PLEASANT	SS
6	2/7/2011	10:53AM	FRI	PD	Y	1	2	MAIN/MASONIC	A
7	2/9/2011	02:10AM	SUN	PD	Y	1	1	MAIN	LC
8	2/26/2011	1:26PM	SAT	I	N	1	2	MAIN/MASONIC	C
9	16-Mar	7:39PM	WED	PD	Y	4	1	MAIN/STRONG	R
10	3/20/2011	11:56AM	SUN	PD	Y	1	1	MAIN/CENTER	R
11	3/29/2011	05:16PM	TUES	PD	Y	1	1	MAIN/STRONG	LC
12	4/3/2011	06:45PM	SUN	PD	N	1	1	MAIN/STRONG	FO
13	4/5/2011	12:08AM	TUES	I	Y	1	2	BRIDGE/HAWLEY	R
14	4/9/2011	12:43PM	SAT	I	N	1	1	MAIN	C
15	4/13/2011	02:44PM	WED	I	Y	1	2	MAIN/PLEASANT	R
16	4/19/2011	05:03PM	TUE	PD	Y	1	2	MAIN/MASONIC	A
17	4/27/2011	09:43PM	WED	I	N	4	1	BRIDGE/MARKET	P
18	5/10/2011	9:24AM	THU	PD	Y	1	1	BRIDGE/HAWLEY	FO
19	5/12/2011	02:50PM	SAT	PD	Y	1	1	MAIN/SOUTH	LC
20	5/14/2011	03:49PM	MON	PD	Y	1	1	MAIN	B
21	5/18/2011	7:44PM	FRI	PD	N	3	1	BRIDGE/MARKET	A
22	5/23/2011	05:04PM	MON	PD	Y	1	2	PLEASANT/MAIN	R
23	6/5/2011	2:40PM	SUN	PD	Y	1	1	MAIN/PLEASANT	A
24	6/5/2011	01:12AM	SUN	I	Y	4	1	MAIN/PLEASANT	R
25	6/11/2011	04:54PM	SAT	PD	Y	1	1	MAIN	R
26	6/16/2011	06:10PM	THU	PD	N	1	1	MAIN/CENTER	C
27	7/8/2011	10:31PM	FRI	PD	Y	4	2	MAIN/STRONG	R
28	7/14/2011	1:38PM	WED	PD	N	1	1	MAIN/KING	LC
29	7/14/2011	12:49AM	WED	PD	Y	1	1	MAIN/PLEASANT	R
30	7/15/2011	7:26PM	THU	I	Y	1	1	BRIDGE/MARKET	R
31	8/1/2011	05:49PM	MON	I	N	1	1	MAIN/STRONG	P
32	8/15/2011	02:42PM	MON	PD	Y	1	2	MAIN/CENTER	R
33	8/25/2011	10:00AM	THU	PD	Y	1	1	BRIDGE/HAWLEY	FO
34	9/3/2011	01:38AM	MON	PD	N	4	1	MAIN	FO
35	9/8/2011	6:38PM	SAT	PD	Y	3	2	MAIN	FO
36	9/16/2011	02:03PM	FRI	I	Y	1	1	MAIN/STRONG	C
37	9/24/2011	4:33PM	SAT	PD	N	1	1	MAIN/OLD SOUTH	A
38	9/24/2011	12:25AM	SAT	PD	Y	4	2	MAIN/PLEASANT	A
39	9/30/2011	1:56AM	FRI	PD	Y	4	2	MAIN	FO
40	10/1/2011	05:02PM	SAT	I	N	1	2	MAIN/OLD SOUTH	P
41	10/4/2011	4:11PM	TUES	PD	N	1	2	MAIN/MASONIC	LC
42	10/5/2011	12:12AM	WED	PD	Y	1	1	MAIN/STRONG	FO
43	10/6/2011	11:03AM	THU	PD	Y	1	1	MAIN/STRONG	B
44	10/7/2011	10:54PM	FRI	PD	Y	4	1	MAIN/PLEASANT	B
45	10/10/2011	9:35PM	MON	I	N	4	1	MAIN	R
46	10/15/2011	6:04PM	SAT	PD	Y	1	1	MAIN/SOUTH	B
47	10/18/2011	11:38PM	TUE	PD	Y	4	1	MAIN/CENTER	LC
48	10/19/2011	8:57AM	WED	PD	N	1	2	BRIDGE/HAWLEY	R
49	10/19/2011	11:37PM	WED	PD	Y	1	2	MAIN	R
50	10/27/2011	06:37PM	SAT	PD	Y	4	2	MAIN/OLD SOUTH	B

NUMBER	DATE	TIME	DAY	SEV.	>$1000	L	R	I	PAT
51	11/2/2011	09:35AM	WED	PD	Y	1	1	90 MAIN ST	B
52	11/8/2011	5:15PM	MON	I	N	4	1	MAIN/STRONG	C
53	11/22/2011	11:35PM	TUE	PD	Y	4	2	150 MAIN ST	R
54	12/6/2011	05:04PM	TU	PD		4	2	134 MAIN ST	R
55	12/7/2011	06:13PM	WED	PD	Y	4	2	MAIN/KING	LC
56	12/8/2011	12:17PM	THU	PD	Y	1	1	BRIDGE/HAWLEY	R
57	12/8/2011	01:36PM	THU	PD	Y	1	1	MAIN/PLEASANT	SS
58	1/8/2012	06:23PM	SUN	PD	N	3	1	96 MAIN ST	FO
59	1/12/2012	11:54AM	THU	PD	Y	1	3	175 MAIN	FO
60	1/24/2012	7:34AM	TUE	PD	Y	4	2	41 MAIN	FO
61	2/2/2012	09:20AM	SUN	PD	Y	1	1	175 MAIN	R
62	2/6/2012	11:03AM	FRI	PD	Y	1	1	MAIN/PLEASANT	R
63	3/7/2012	07:15PM	WED	PD	Y	3	1	MAIN/MASONIC	R
64	3/14/2012	9:11PM	WED	I	N	4	1	MAIN/KING	C
65	3/17/2012	10:34AM	SAT	PD	Y	1	1	150 MAIN ST	R
66	4/10/2012	1:07PM	TUE	PD	Y	1	1	274 MAIN ST	R
67	5/4/2012	10:46PM	FRI	PD	Y	1	2	MARKET/BRIDGE	H
68	5/7/2012	5:00PM	MON	PD	Y	1	1	MARKET/BRIDGE	R
69	5/19/2012	07:11PM	SAT	F	Y	1	1	MAIN/PLEASANT	C
70	5/25/2012	9:45PM	FRI	PD	Y	4	1	MAIN/PLEASANT	R
71	6/4/2012	3:41PM	MON	PD	Y	1	2	189 MAIN	LC
72	6/29/2012	12:42PM	FRI	PD	Y	1	1	MAIN/PLEASANT	A
73	7/12/2012	03:03pm	TUE	PD	Y	1	1	96 MAIN	R
74	7/14/2012	12:45PM	THU	I	N	1	1	MAIN/KING	R
75	7/17/2012	04:13PM	SUN	PD	Y	1	1	MAIN/KING	LC
76	8/10/2012	1:48PM	FRI	PD	Y	1	2	1 BRIDGE	FO
77	8/13/2012	10:33AM	MON	PD	Y	1	1	MAIN/PLEASANT	LC
78	8/18/2012	06:41PM	SAT	PD	Y	1	1	BRIDGE/MAIN	FO
79	9/14/2012	06:52PM	FRI	PD	Y	1	1	BRIDGE/HAWLEY	R
80	9/25/2012	3:45PM	TUE	PD	Y	1	1	229 MAIN ST	FO
81	9/26/2012	06:06PM	WED	I	N	1	1	BRIDGE/MARKET	R
82	9/29/2012	11:40AM	SAT	PD	Y	1	2	40 MAIN ST	R
83	10/24/2012	02:57PM	THU	PD	Y	1	6	134 MAIN	B
84	10/25/2012	04:13PM	FR	PD	Y	3	1	MAIN/BRIDGE	FO
85	10/25/2012	12:19PM	FR	I	Y	1	1	274 MAIN ST	LC
86	10/29/2012	03:48PM	TU	PD	Y	1	2	MAIN/OLD SOUTH	A
87	11/21/2012	10:55PM	TH	PD	Y	4	1	BRIDGE/HAWLEY	A
88	11/21/2012	06:29PM	TH	I	N	4	1	MAIN/OLD SOUTH	P
89	11/23/2012	03:10PM	SA	PD	N	1	1	142 MAIN	R
90	11/24/2012	02:14AM	SU	PD	Y	4	2	MAIN/STRONG	R
91	11/27/2012	07:08AM	WE	PD	Y	4	2	MAIN/CRAFTS	SS
92	12/10/2012	07:05PM	TU	PD	Y	4	1	MAIN/BRIDGE	FO
93	12/18/2012	06:52PM	WE	PD	Y	3	2	MAIN	R
94	12/20/2012	1:25PM	FR	I	N	1	1	MAIN/PLEASANT	C
95	1/5/2013	04:07PM	SA	PD	Y	1	2	MAIN/STRONG	R
96	1/10/2013	5:20PM	TH	PD	Y	4	1	BRIDGE/MARKET	SS
97	1/14/2013	04:07PM	MO	PD	Y	1	1	96 MAIN ST	FO
98	1/15/2013	05:56PM	TU	PD	Y	2	1	MAIN/STRONG	B
99	1/24/2013	11:51AM	TH	PD	Y	1	1	235 MAIN	A
100	1/26/2013	2:09AM	SA	PD	Y	4	2	MAIN/PLEASANT	A

NUMBER	DATE	TIME	DAY	SEV.	>$1000	L	R	I	PAT
101	2/2/2013	11:57PM	SA	PD	N	1	6	MAIN/PLEASANT	C
102	2/2/2013	3:08PM	SA	PD	Y	1	1	150 MAIN	R
103	2/9/2013	05:49PM	SA	PD	Y	4	3	MAIN/PLEASANT	A
104	2/14/2013	3:21PM	TH	PD	Y	1	1	MAIN/KING	LC
105	2/14/2013	2:55PM	TH	I	N	1	1	MAIN/OLD SOUTH	P
106	2/18/2013	1:11PM	MO	PD	Y	1	6	175 MAIN ST	SS
107	2/19/2013	5:37PM	TU	PD	Y	4	3	MAIN/KING	SS
108	2/23/2013	06:44PM	SA	I	Y	4	2	MAIN/MASONIC	R
109	2/27/2013	11:29PM	WE	PD	Y	1	2	MAIN/PLEASANT	A
110	3/5/2013	01:50PM	TU	PD	Y	1	1	134 MAIN	B
111	3/14/2013	12:15PM	TH	PD	Y	1	1	MAIN/MASONIC	FO
112	4/3/2013	4:17PM	WE	PD	Y	1	1	MAIN/OLD SOUTH	A
113	4/7/2013	03:59PM	SU	I	Y	1	1	MAIN/PLEASANT	R
114	4/24/2013	06:22AM	WE	PD	Y	1	1	96 MAIN ST	B
115	4/27/2013	03:03PM	SA	PD	Y	1	1	MAIN/PLEASANT	LC
116	5/1/2013	02:50PM	WE	PD	Y	1	1	BRIDGE/MAIN	FO
117	6/3/2013	5:25PM	MO	PD	Y	1	1	BRIDGE/MAIN	FO
118	6/5/2013	07:16PM	WE	PD	Y	1	1	40 MAIN ST	R
119	6/21/2013	1:08PM	FR	PD	Y	1	1	210 MAIN ST	SS
120	6/26/2013	01:14PM	WE	PD	Y	1	1	16 MAIN/STRONG	R
121	7/3/2013	06:31PM	WE	PD	Y	1	1	RIDGE/MARKET S	LC
122	8/26/2013	3:48PM	MO	PD	Y	1	1	150 MAIN ST	B
123	9/12/2013	09:29PM	TH	PD	Y	3	2	MAIN/OLD SOUTH	A
124	9/13/2013	07:49AM	FR	PD	Y	1	2	150 MAIN	R
125	9/17/2013	04:21pm	TU	PD	Y	1	1	134 MAIN	FO
126	9/23/2013	1:28PM	MO	PD	Y	1	1	MAIN/PLEASANT	LC
127	10/7/2013	03:40PM	MO	PD	Y	1	2	MAIN	B
128	10/8/2013	1:04PM	TU	I	N	1	1	MAIN/MASONIC	P
129	10/15/2013	02:29PM	TU	PD	Y	1	1	MAIN/MASONIC	A
130	10/18/2013	10:10PM	FR	PD	Y	4	1	175 MAIN ST	LC
131	10/20/2013	01:26PM	SU	PD	Y	1	6	MAIN/PLEASANT	LC
132	10/21/2013	12:14PM	MO	PD		1	1	MAIN/MASONIC	LC
133	10/25/2013	01:20PM	FR	PD	N	1	1	90 MAIN ST	FO
134	11/1/2013	12:09PM	FR	I	Y	1	2	MAIN/PLEASANT	B
135	11/9/2013	10:29AM	SA	PD	Y	1	1	MAIN/PLEASANT	R
136	11/17/2013	02:35PM	SU	I	Y	1	2	N/CRACKERBARR	R
137	11/18/2013	02:37PM	MO	PD	Y	1	1	MAIN/CENTER	SS
138	11/23/2013	12:54PM	SA	I	N	1	1	88 MAIN	C
139	11/29/2013	10:54AM	FR	I	Y	1	1	18 MAIN	R
140	12/4/2013	06:03PM	WE	I	Y	4	1	MAIN/KING	R
141	12/6/2013	11:58PM	FRI	PD	Y	4	2	96 MAIN ST	LC
142	1/13/2014	04:12PM	MO	PD	Y	1	1	MAIN/PLEASANT	R
143	1/30/2014	06:46PM	TH	PD	Y	4	1	AIN/CRAFTS AVEN	A
144	2/6/2014	02:34PM	TH	I	Y	1	1	90/MAIN	B
145	2/11/2014	09:06PM	TU	PD	Y	4	1	MAIN/KING	A
146	3/15/2014	09:12PM	SAT	I	Y	4	1	MAIN/KING	R
147	3/20/2014	5:32	TH	PD	Y	1	2	MARKET/BRIDGE	A
148	3/25/2014	08:03AM	TUE	PD	Y	1	1	MAIN/PLEASANT	LC
149	3/29/2014	06:37PM	FR	I	N	4	2	MAIN/MASONIC	P
150	3/30/2014	10:54AM	SUN	PD	Y	1	2	MAIN/KING	B

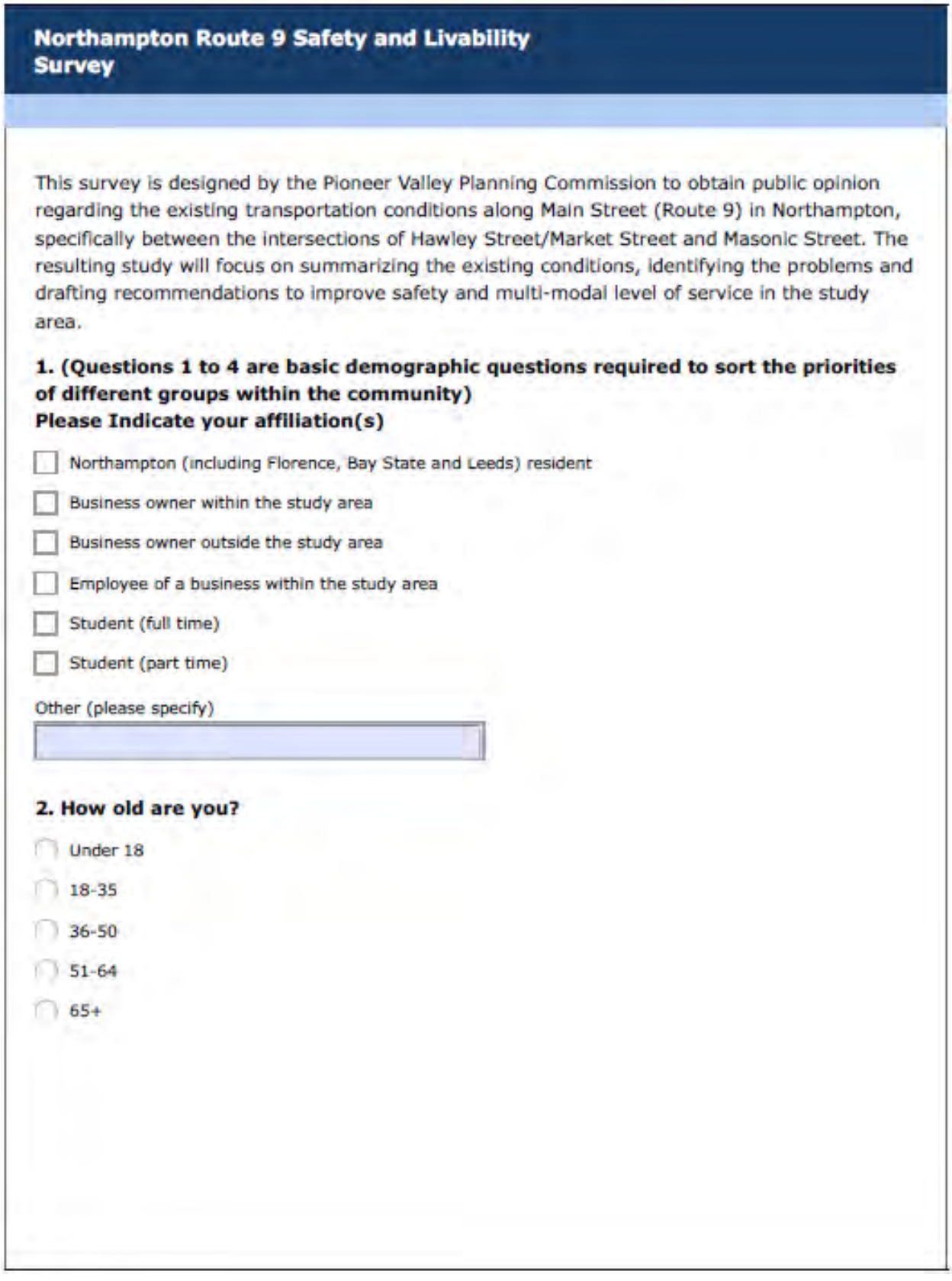
Table 9 Collision List Table By Year

MAIN STREET NORTHAMPTON 2011-2014									
Year	Collisions	Intersection		Severity		Lighting		Road Surface	
2011	57	6	Masonic St	41	Property Damage > $1000	35	Daylight	34	Dry
		9	Old South St	15	Property Damage < $1000	2	Dusk	20	Wet
		6	Center St	12	Personal Injury	20	Dawn	2	Water
		17	Pleasant St					1	Snow
		12	Strong St						
		7	Hawley St/Market St						
2012	37	4	Masonic St	30	Property Damage > $1000	25	Daylight	26	Dry
		8	Old South St	7	Property Damage < $1000	8	Dawn	9	Wet
		2	Center St	6	Personal Injury	4	Dusk	1	Water
		11	Pleasant St	1	Fatality			1	Snow
		6	Strong St						
		6	Hawley St/Market St						
2013	47	6	Masonic St	41	Property Damage > $1000	37	Daylight	32	Dry
		9	Old South St	5	Property Damage < $1000	1	Dark - Lighted Road	10	Wet
		4	Center St	9	Personal Injury	1	Dawn	2	Water
		18	Pleasant St			8	Dusk	3	Snow
		7	Strong St						
		3	Hawley St/Market St						
Jan. 2014 - Mar. 2014	9	1	Masonic St	8	Property Damage > $1000	5	Daylight	6	Dry
		1	Old South St	1	Property Damage < $1000	4	Dawn	3	Wet
		6	Pleasant St	3	Personal Injury				
		1	Hawley St/Market St						

Table 10 Overall Collisions Listed by Category

MAIN STREET NORTHAMPTON COLLISIONS 2011-2014 TOTAL										
Total Crashes		Intersection		Type		Severity		Lighting		Road Surfaces
150	17	Masonic St	45	Rear End	120	Property Damage > $1000	102	Daylight	98	Dry
	27	Old South St	21	Lane Change	28	Property Damage < $1000	1	Dark - Lighted Road	42	Wet
	12	Center St	21	Angle	30	Personal Injury	40	Dawn	5	Water
	52	Pleasant St	16	Backing	1	Fatality	7	Dusk	1	Snow
	25	Strong St	21	Fixed Objects					4	Ice
	17	Hawley St/Market St	8	Side Swipe						
			10	Cyclist						
			7	Pedestrian						
			1	Head On						

Figure 23 Survey Sample Question 1 and 2



Northampton Route 9 Safety and Livability Survey

This survey is designed by the Pioneer Valley Planning Commission to obtain public opinion regarding the existing transportation conditions along Main Street (Route 9) in Northampton, specifically between the intersections of Hawley Street/Market Street and Masonic Street. The resulting study will focus on summarizing the existing conditions, identifying the problems and drafting recommendations to improve safety and multi-modal level of service in the study area.

1. (Questions 1 to 4 are basic demographic questions required to sort the priorities of different groups within the community)
Please Indicate your affiliation(s)

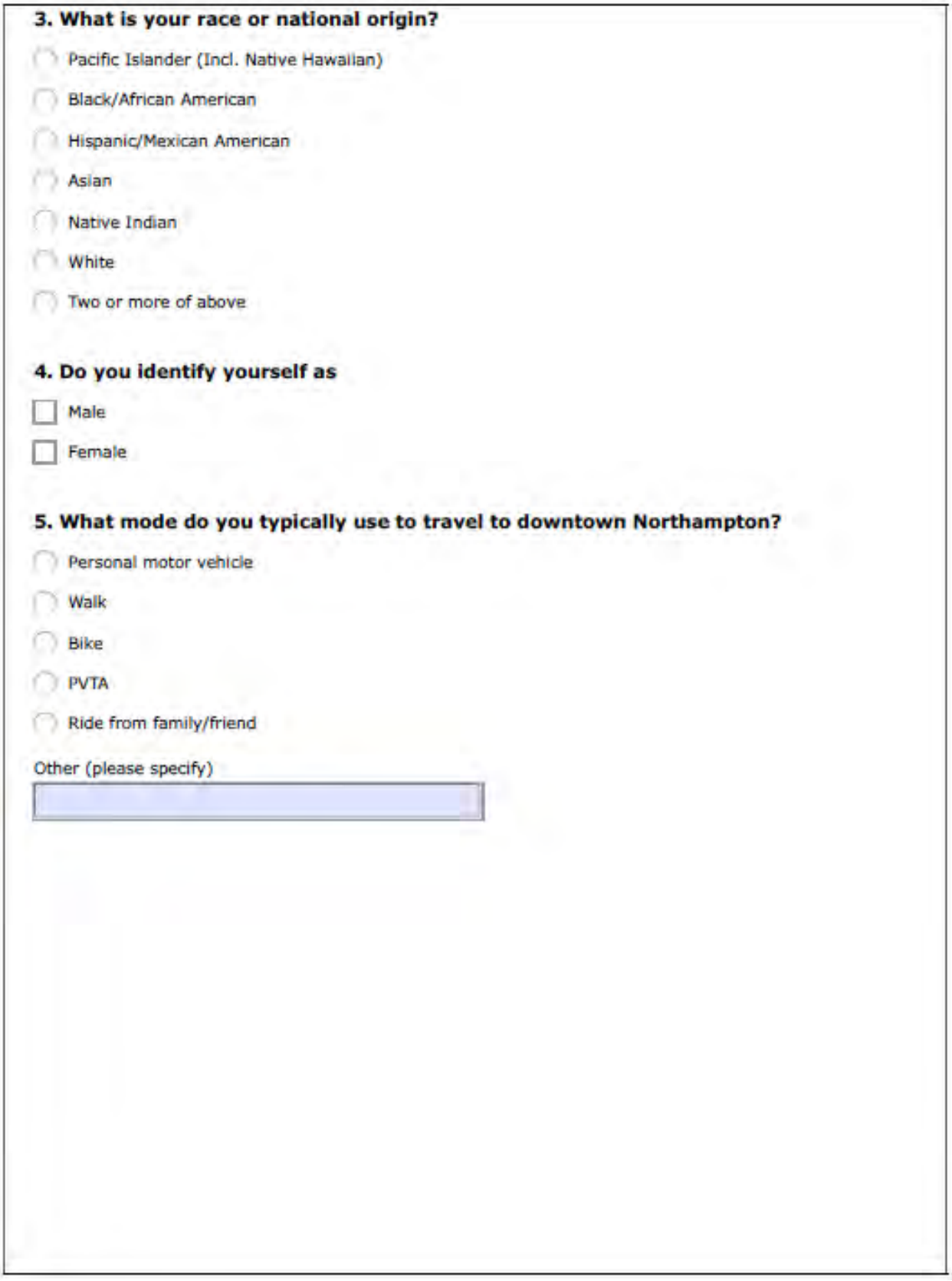
- ☐ Northampton (including Florence, Bay State and Leeds) resident
- ☐ Business owner within the study area
- ☐ Business owner outside the study area
- ☐ Employee of a business within the study area
- ☐ Student (full time)
- ☐ Student (part time)

Other (please specify)

2. How old are you?

- ○ Under 18
- ○ 18-35
- ○ 36-50
- ○ 51-64
- ○ 65+

Figure 24 Survey Sample Question 3, 4 and 5



3. What is your race or national origin?

- Pacific Islander (Incl. Native Hawaiian)
- Black/African American
- Hispanic/Mexican American
- Asian
- Native Indian
- White
- Two or more of above

4. Do you identify yourself as

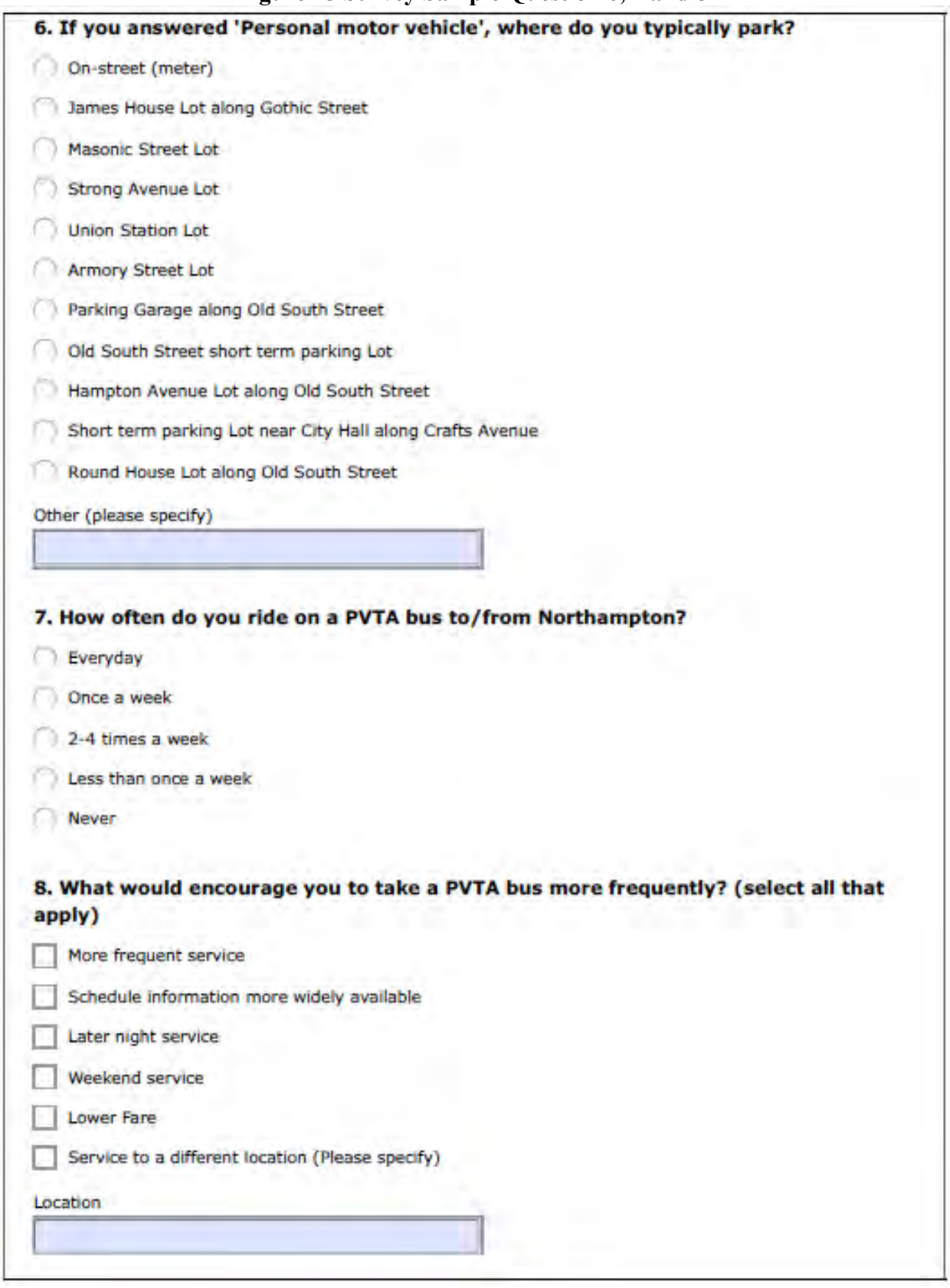
- Male
- Female

5. What mode do you typically use to travel to downtown Northampton?

- Personal motor vehicle
- Walk
- Bike
- PVTA
- Ride from family/friend

Other (please specify)

Figure 25 Survey Sample Question 6, 7 and 8



6. If you answered 'Personal motor vehicle', where do you typically park?

- ○ On-street (meter)
- ○ James House Lot along Gothic Street
- ○ Masonic Street Lot
- ○ Strong Avenue Lot
- ○ Union Station Lot
- ○ Armory Street Lot
- ○ Parking Garage along Old South Street
- ○ Old South Street short term parking Lot
- ○ Hampton Avenue Lot along Old South Street
- ○ Short term parking Lot near City Hall along Crafts Avenue
- ○ Round House Lot along Old South Street

Other (please specify)

7. How often do you ride on a PVTA bus to/from Northampton?

- ○ Everyday
- ○ Once a week
- ○ 2-4 times a week
- ○ Less than once a week
- ○ Never

8. What would encourage you to take a PVTA bus more frequently? (select all that apply)

- ☐ More frequent service
- ☐ Schedule information more widely available
- ☐ Later night service
- ☐ Weekend service
- ☐ Lower Fare
- ☐ Service to a different location (Please specify)

Location

Figure 26 Survey Sample Question 9, 10, 11 and 12

9. Which PVTA/transit Route do you ride most frequently?

- ◯ Route 39
- ◯ 39 Express
- ◯ M40
- ◯ R41
- ◯ R42
- ◯ R44
- ◯ B43
- ◯ B48
- ◯ NE (Easthampton Nashawannuck Express)

Other (please specify)

10. Are you aware that passenger train service is returning to Northampton?

- ◯ Yes
- ◯ No

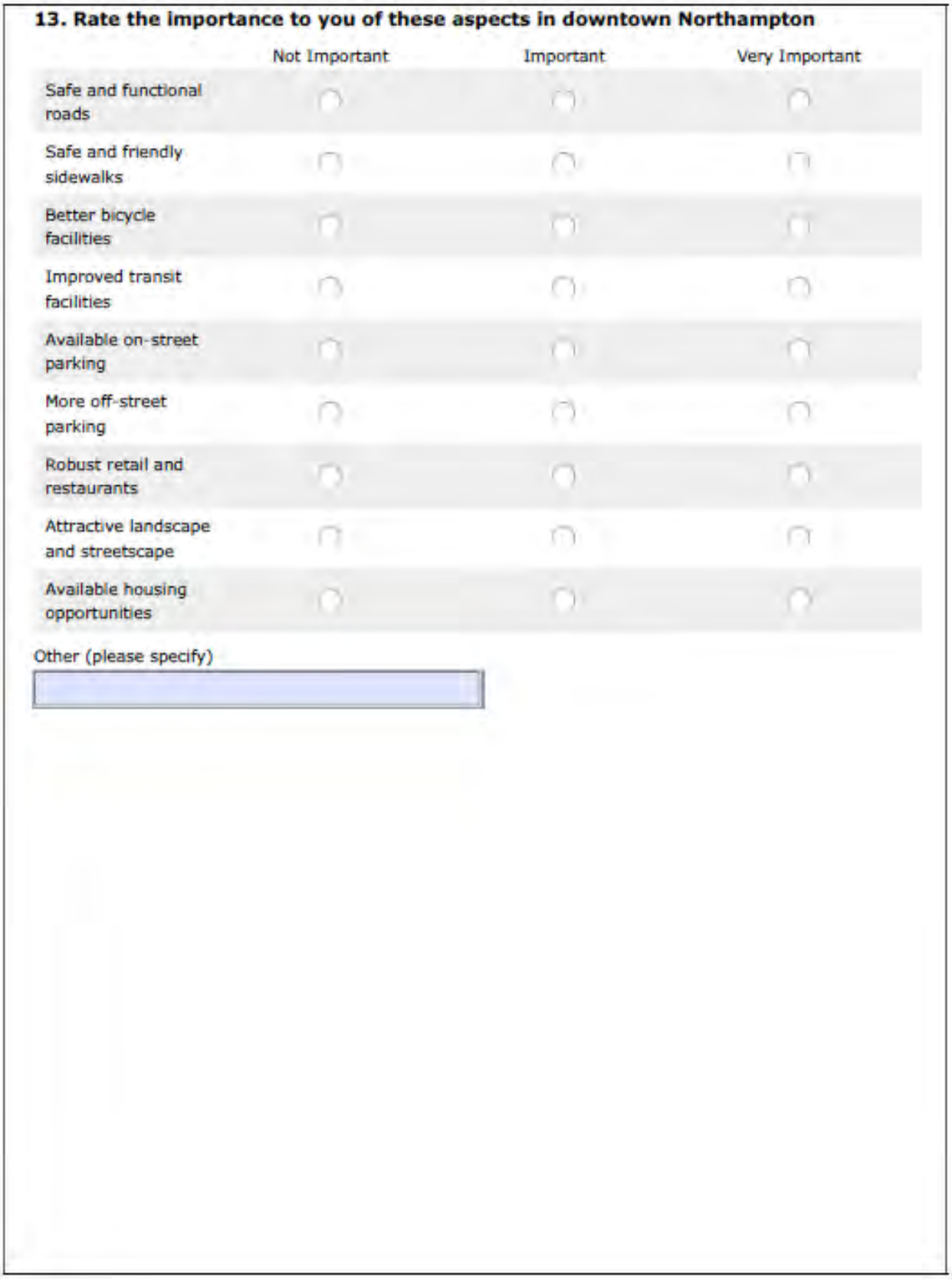
11. Would you use a passenger train from Northampton to Springfield, Hartford or New York City?

- ◯ Yes
- ◯ No

12. Are you aware of the location of the proposed Northampton Train Station?

- ◯ Yes
- ◯ No

Figure 27 Survey Sample Question 13

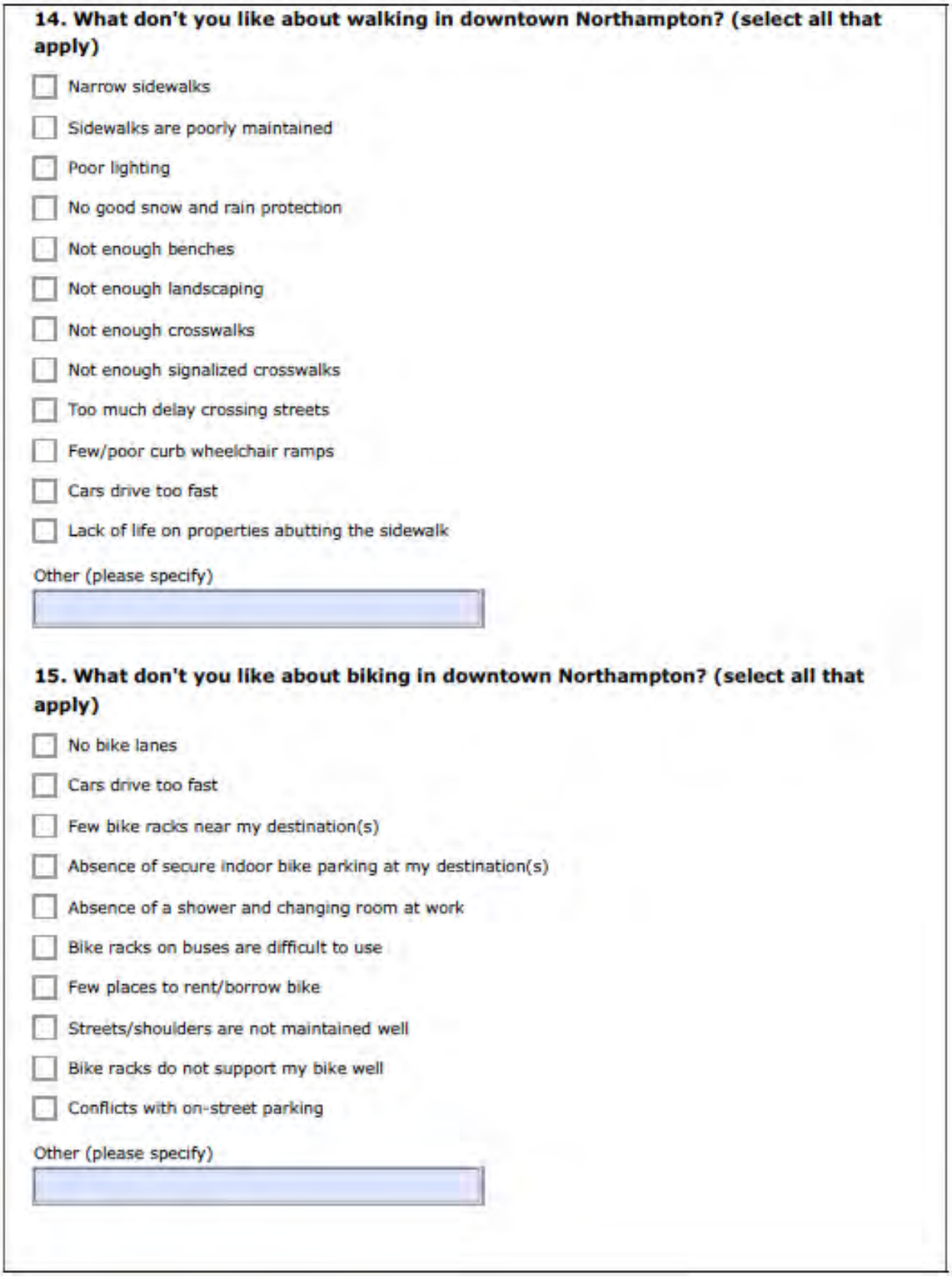


13. Rate the importance to you of these aspects in downtown Northampton

	Not Important	Important	Very Important
Safe and functional roads	○	○	○
Safe and friendly sidewalks	○	○	○
Better bicycle facilities	○	○	○
Improved transit facilities	○	○	○
Available on-street parking	○	○	○
More off-street parking	○	○	○
Robust retail and restaurants	○	○	○
Attractive landscape and streetscape	○	○	○
Available housing opportunities	○	○	○

Other (please specify)

Figure 28 Survey Sample Question 14 and 15



14. What don't you like about walking in downtown Northampton? (select all that apply)

- [ ] Narrow sidewalks
- [ ] Sidewalks are poorly maintained
- [ ] Poor lighting
- [ ] No good snow and rain protection
- [ ] Not enough benches
- [ ] Not enough landscaping
- [ ] Not enough crosswalks
- [ ] Not enough signalized crosswalks
- [ ] Too much delay crossing streets
- [ ] Few/poor curb wheelchair ramps
- [ ] Cars drive too fast
- [ ] Lack of life on properties abutting the sidewalk

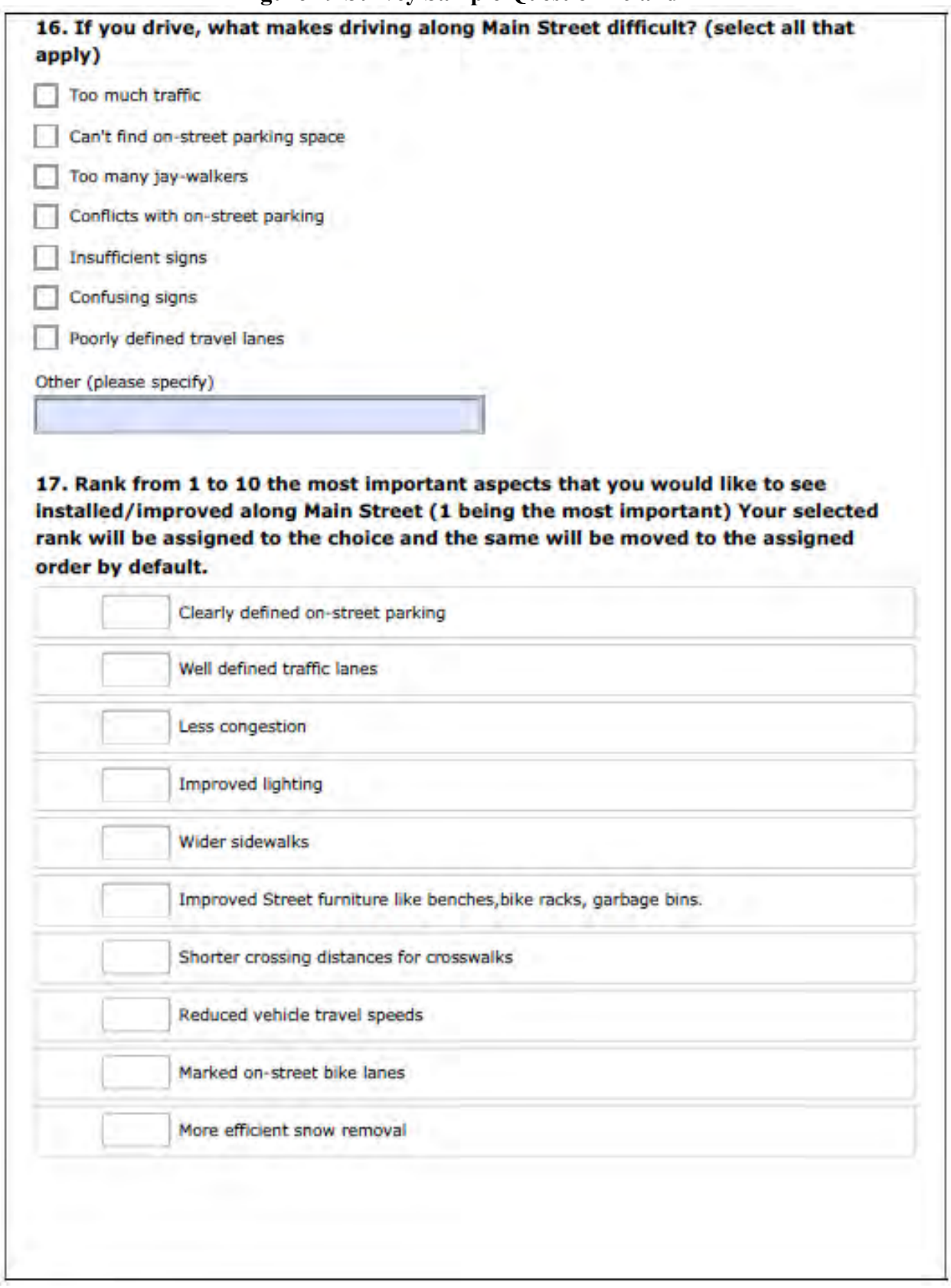
Other (please specify)

15. What don't you like about biking in downtown Northampton? (select all that apply)

- [ ] No bike lanes
- [ ] Cars drive too fast
- [ ] Few bike racks near my destination(s)
- [ ] Absence of secure indoor bike parking at my destination(s)
- [ ] Absence of a shower and changing room at work
- [ ] Bike racks on buses are difficult to use
- [ ] Few places to rent/borrow bike
- [ ] Streets/shoulders are not maintained well
- [ ] Bike racks do not support my bike well
- [ ] Conflicts with on-street parking

Other (please specify)

Figure 29 Survey Sample Question 16 and 17



16. If you drive, what makes driving along Main Street difficult? (select all that apply)

- [ ] Too much traffic
- [ ] Can't find on-street parking space
- [ ] Too many jay-walkers
- [ ] Conflicts with on-street parking
- [ ] Insufficient signs
- [ ] Confusing signs
- [ ] Poorly defined travel lanes

Other (please specify)

17. Rank from 1 to 10 the most important aspects that you would like to see installed/improved along Main Street (1 being the most important) Your selected rank will be assigned to the choice and the same will be moved to the assigned order by default.

- [ ] Clearly defined on-street parking
- [ ] Well defined traffic lanes
- [ ] Less congestion
- [ ] Improved lighting
- [ ] Wider sidewalks
- [ ] Improved Street furniture like benches,bike racks, garbage bins.
- [ ] Shorter crossing distances for crosswalks
- [ ] Reduced vehicle travel speeds
- [ ] Marked on-street bike lanes
- [ ] More efficient snow removal

Figure 30 Survey Question 1 Result

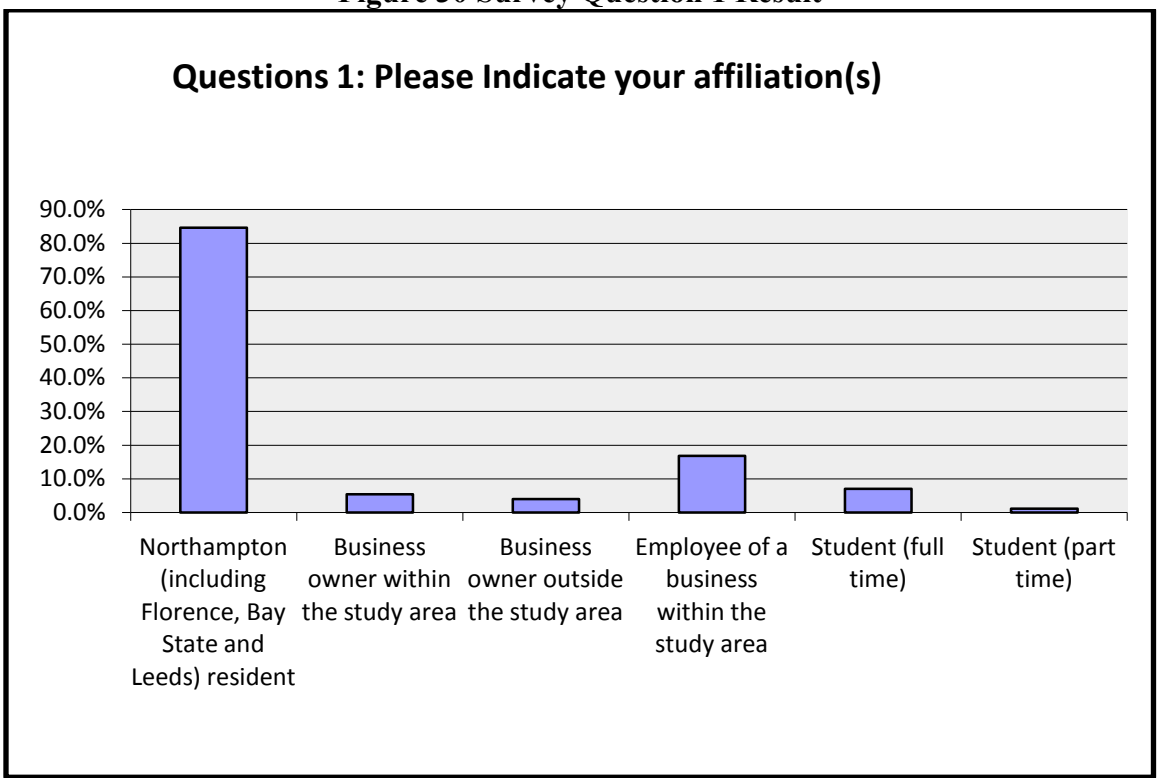


Figure 31 Survey Question 2 Result

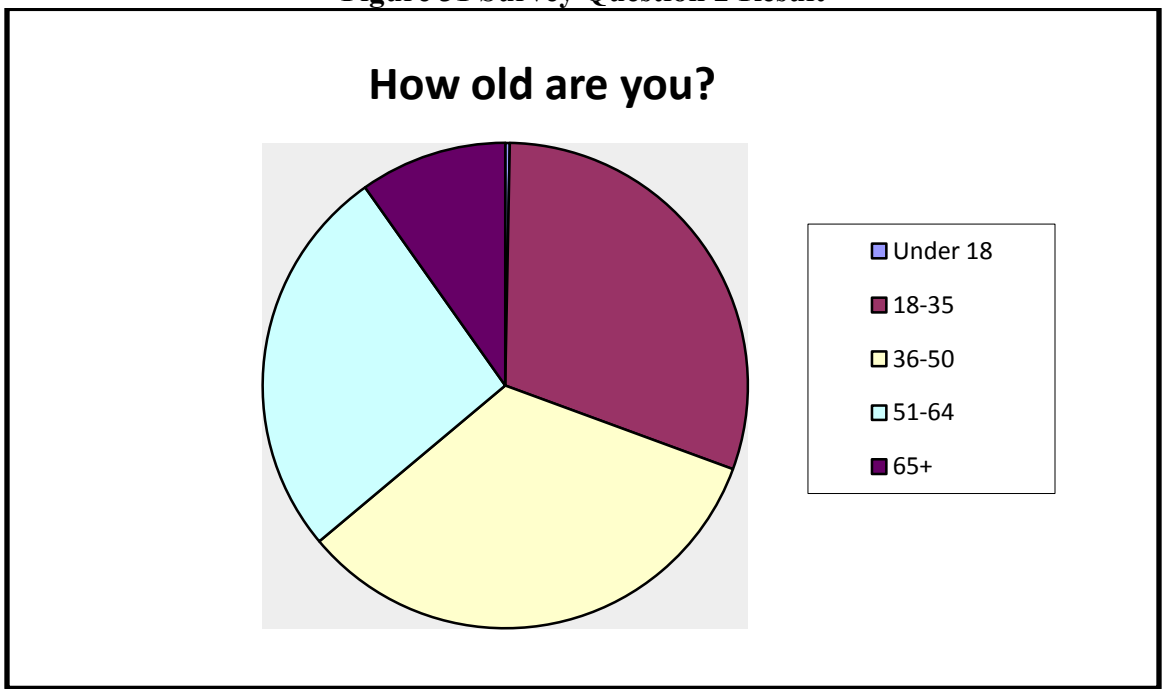


Figure 32 Survey Question 3 Result

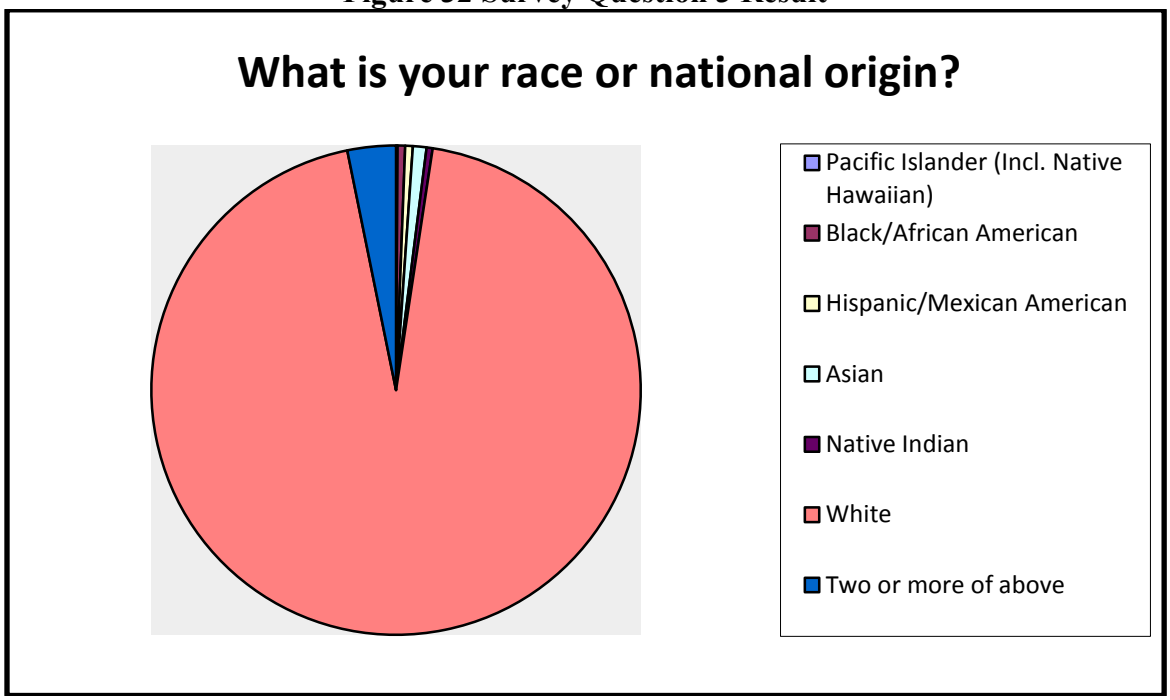


Figure 33 Survey Question 4 Result

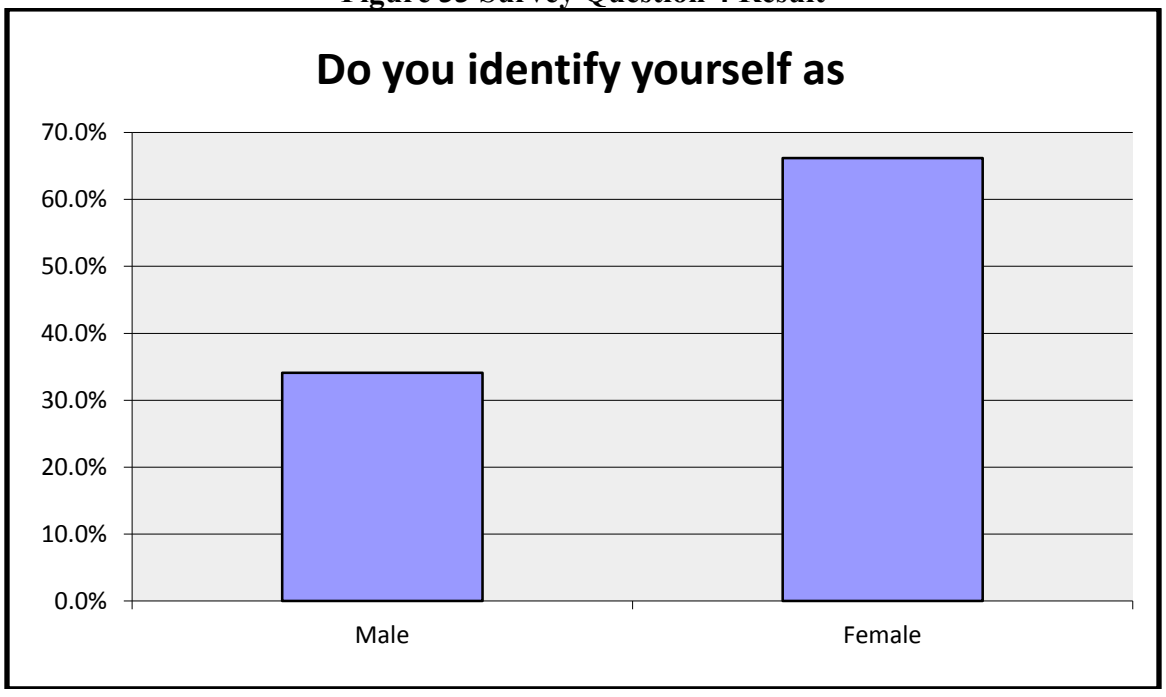


Figure 34 Survey Question 5 Result

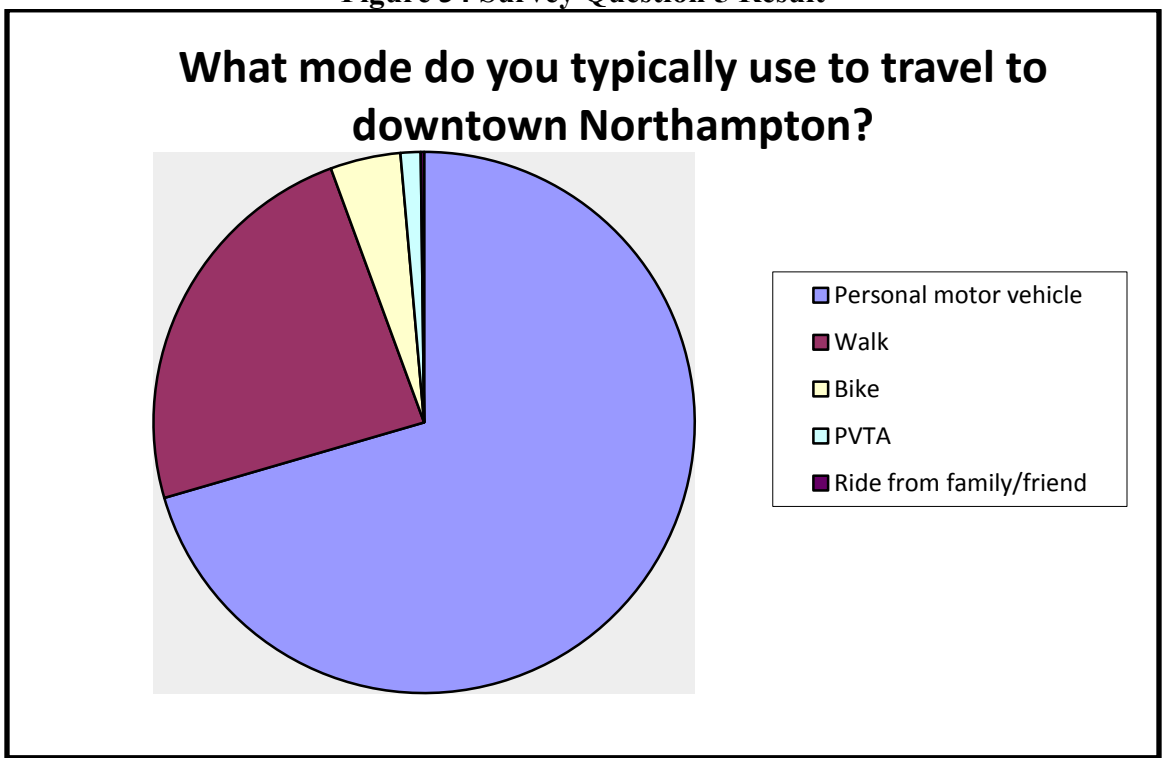


Figure 35 Survey Question 6 Result

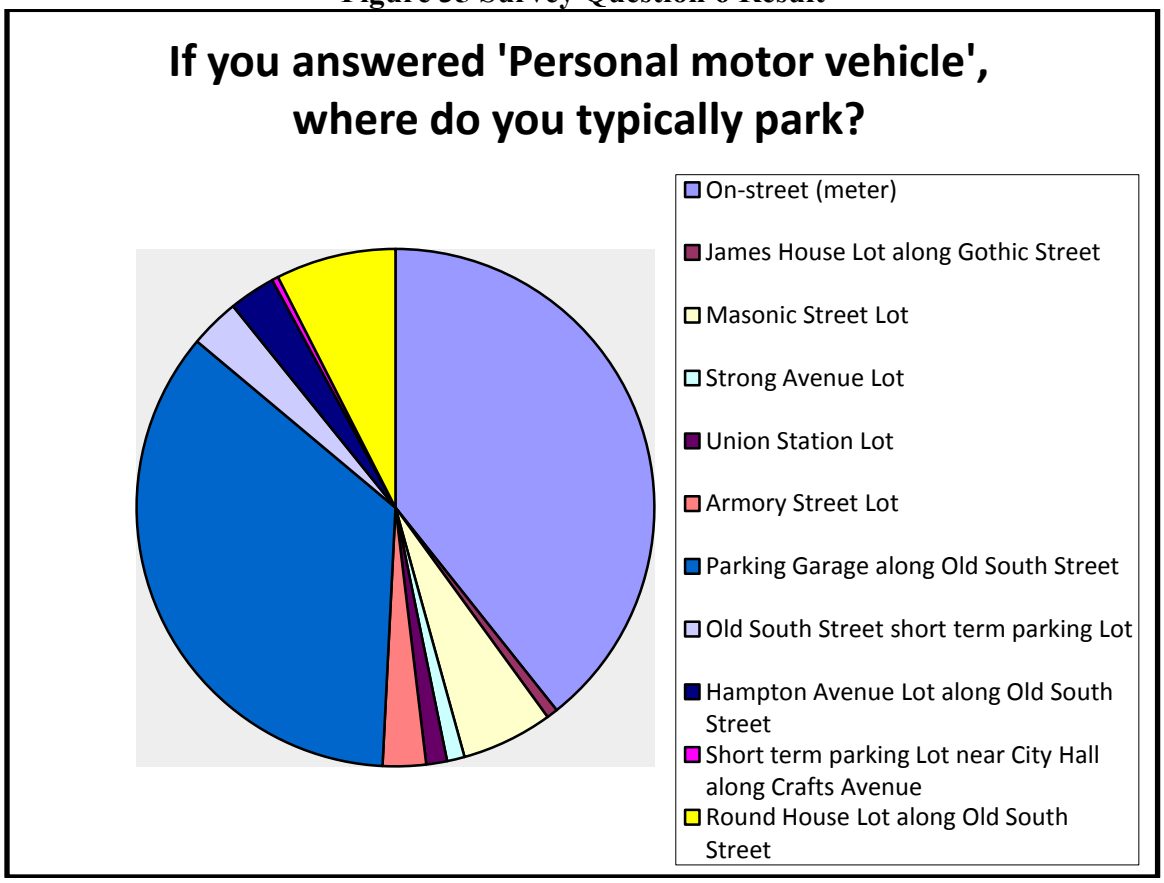


Figure 36 Survey Question 7 Result

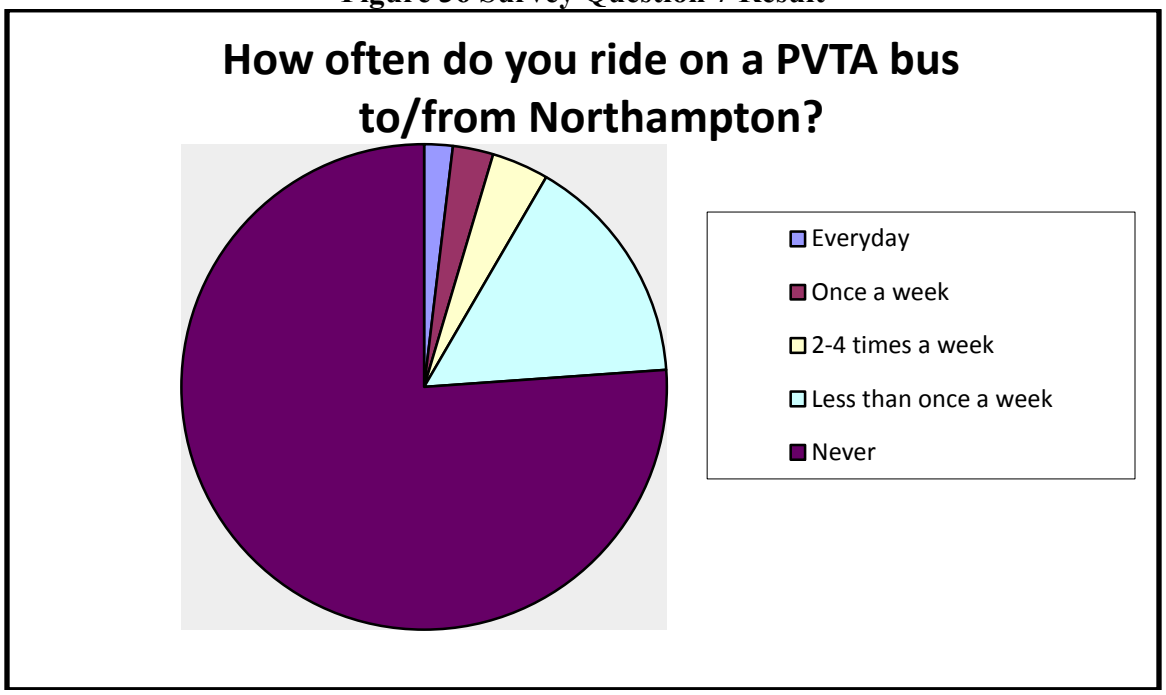


Figure 37 Survey Question 8 Result

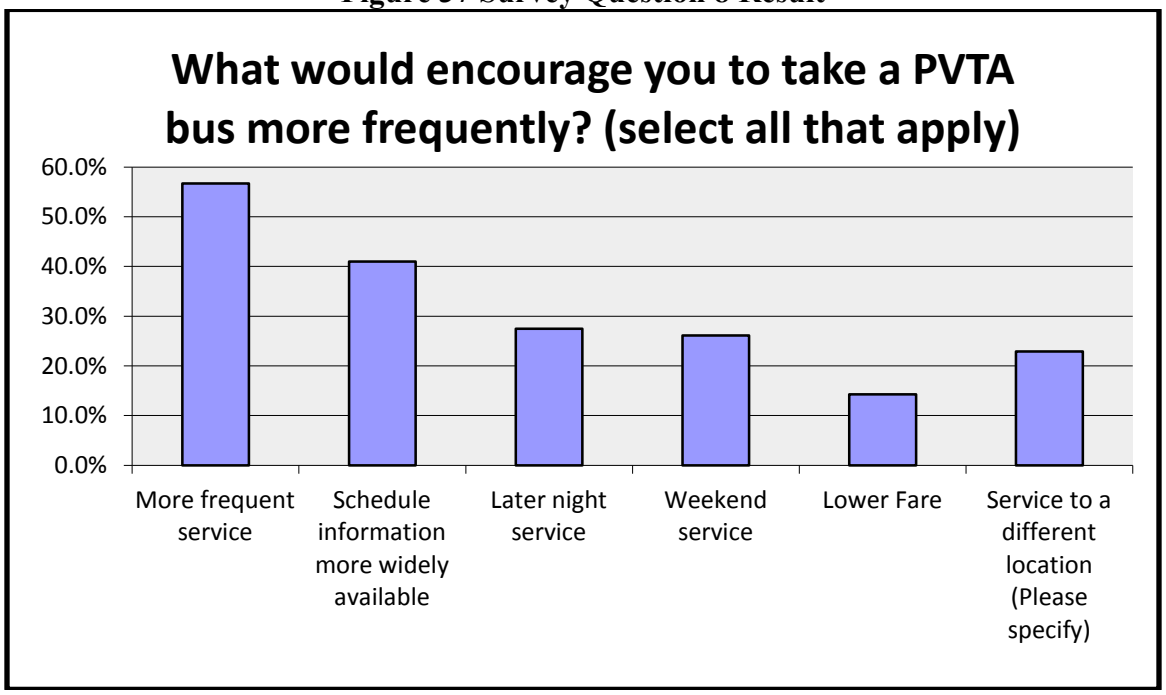


Figure 38 Survey Question 9 Result

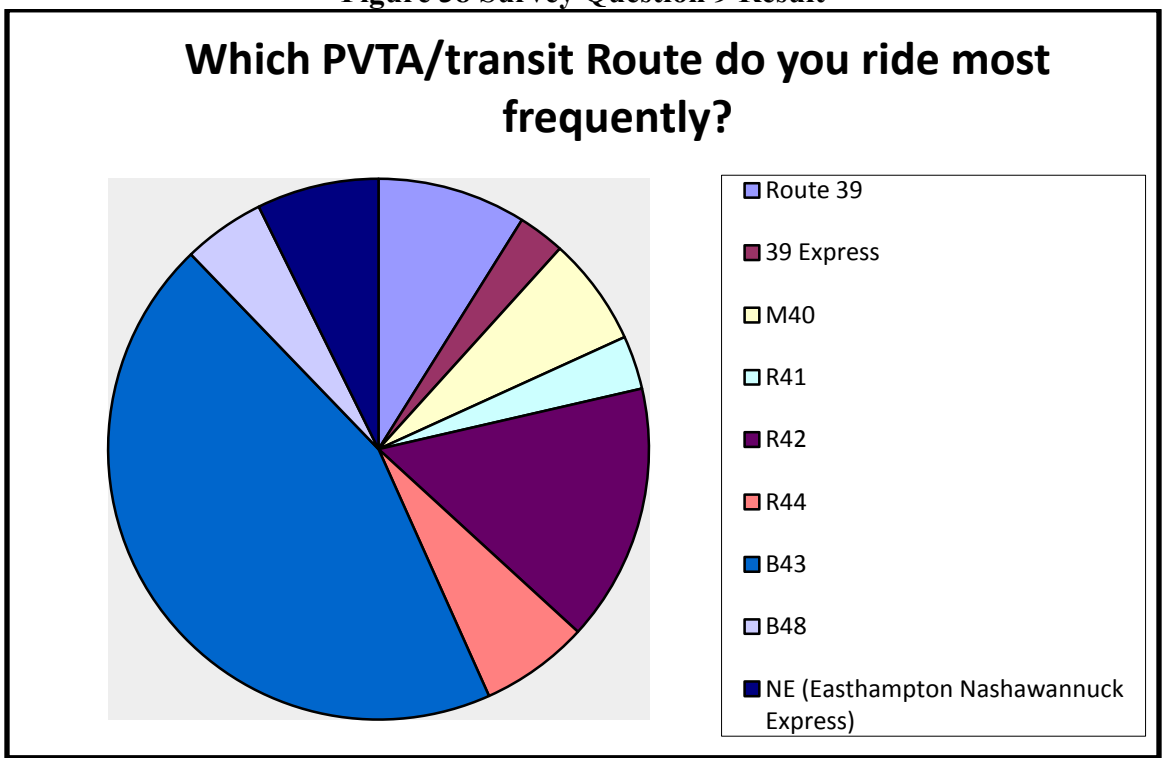


Figure 39 Survey Question 10 Result

Figure 40 Survey Question 11 Result

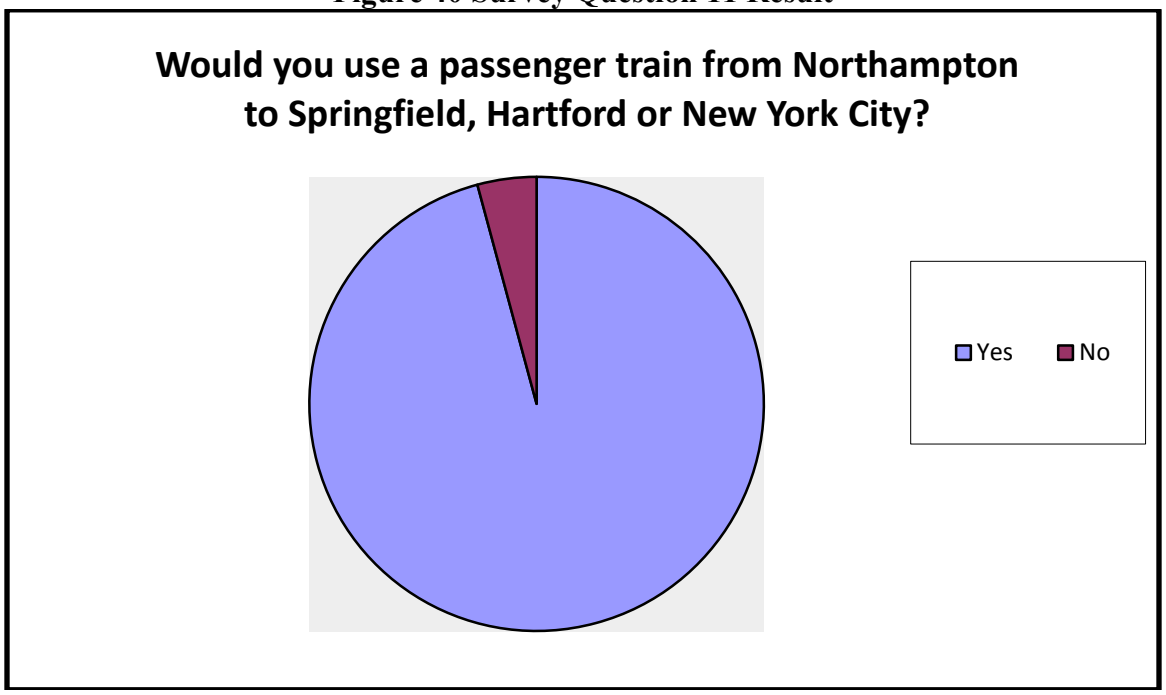


Figure 41 Survey Question 12 Result

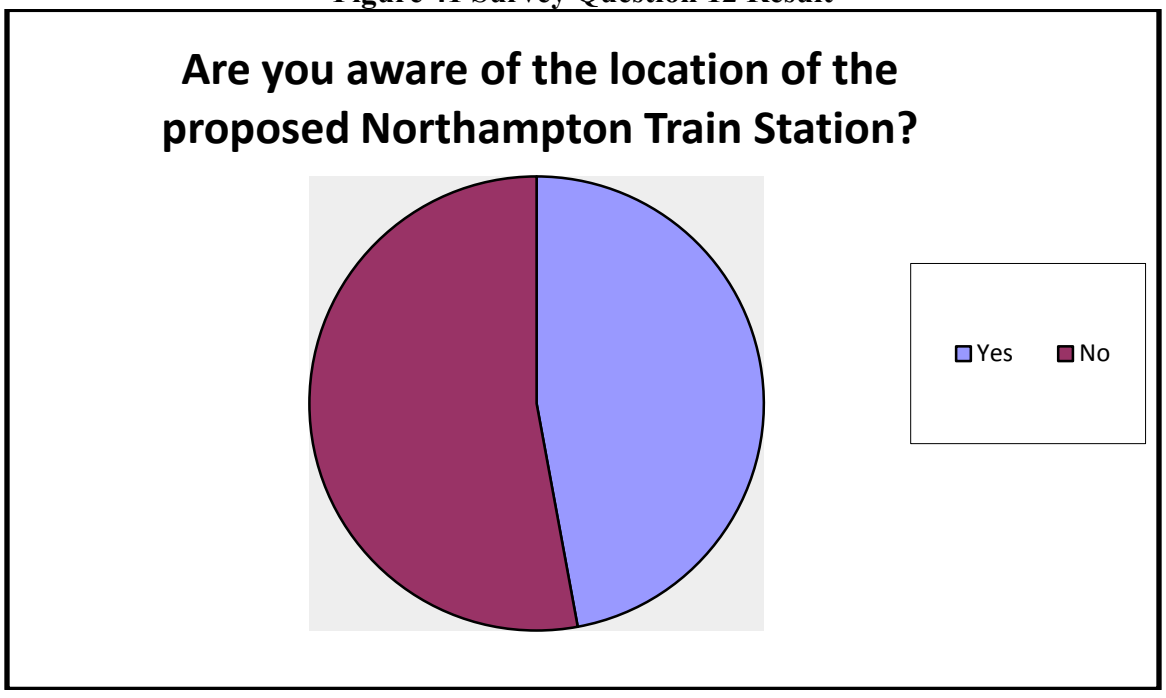


Figure 42 Survey Question 13 Result

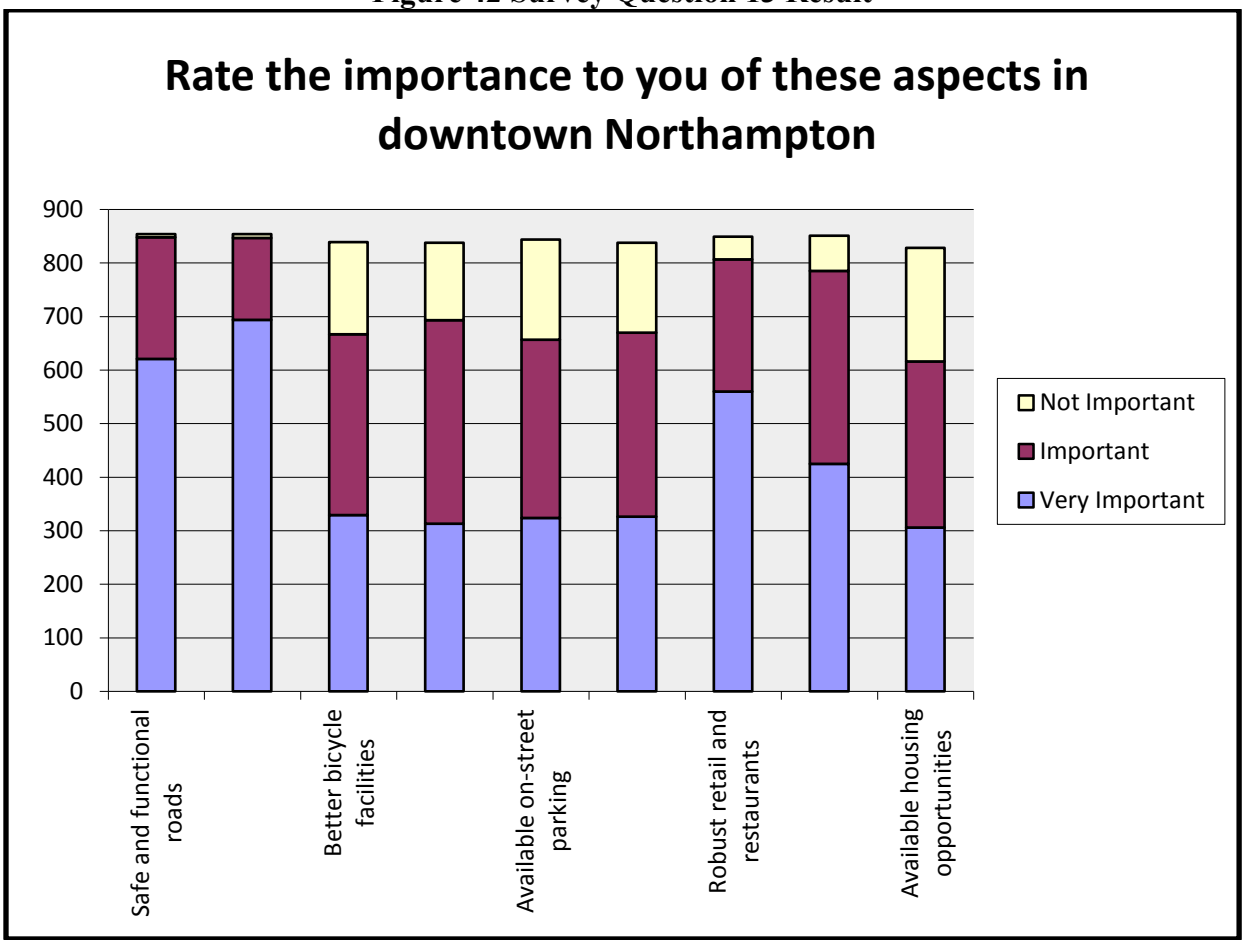


Figure 43 Survey Question 14 Result

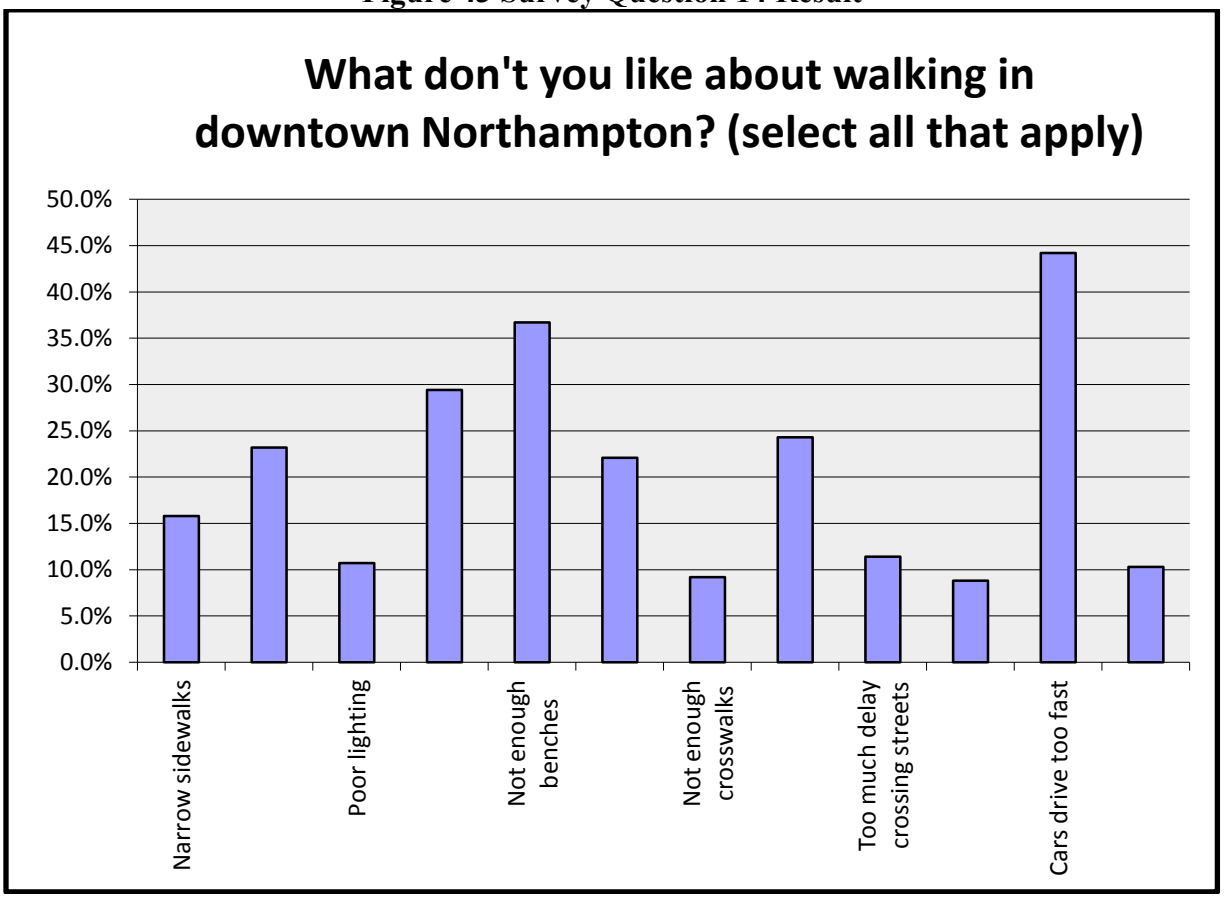


Figure 44 Survey Question 15 Result

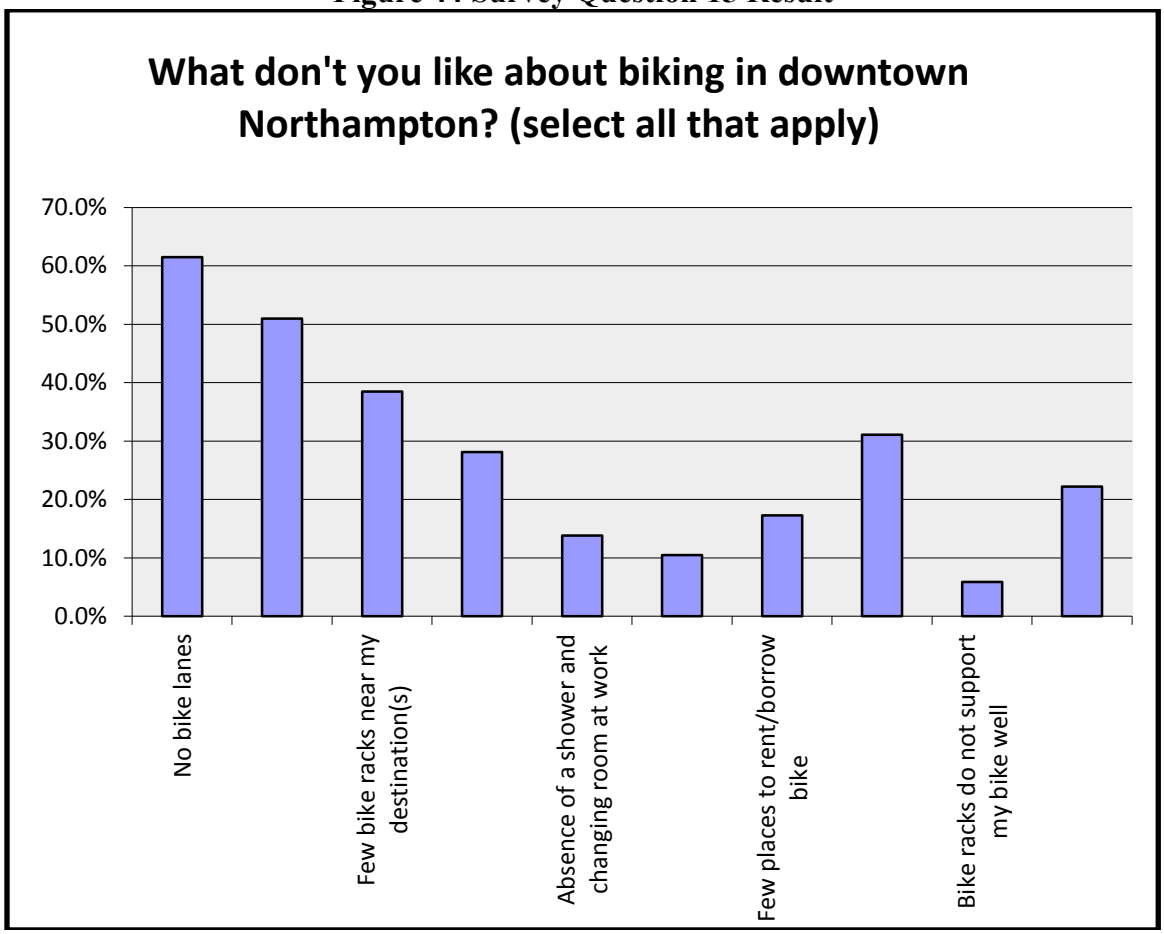


Figure 45 Survey Question 16 Result

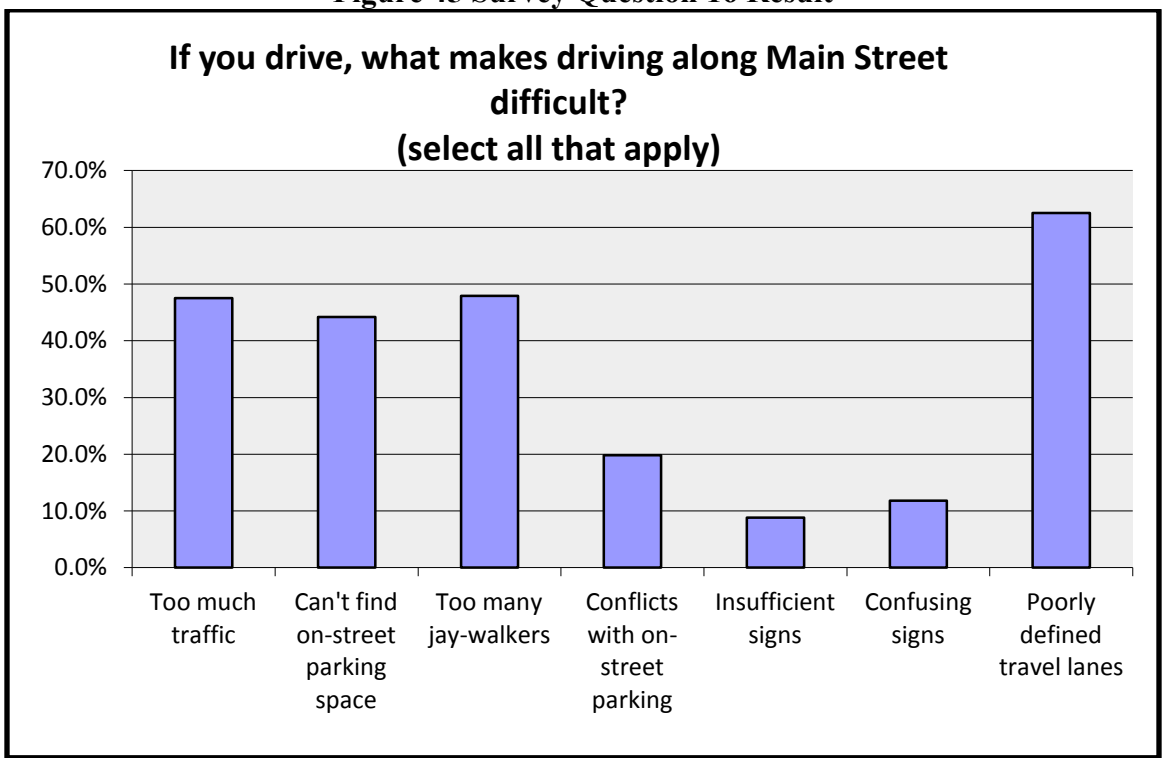


Figure 46 Survey Question 17 Result

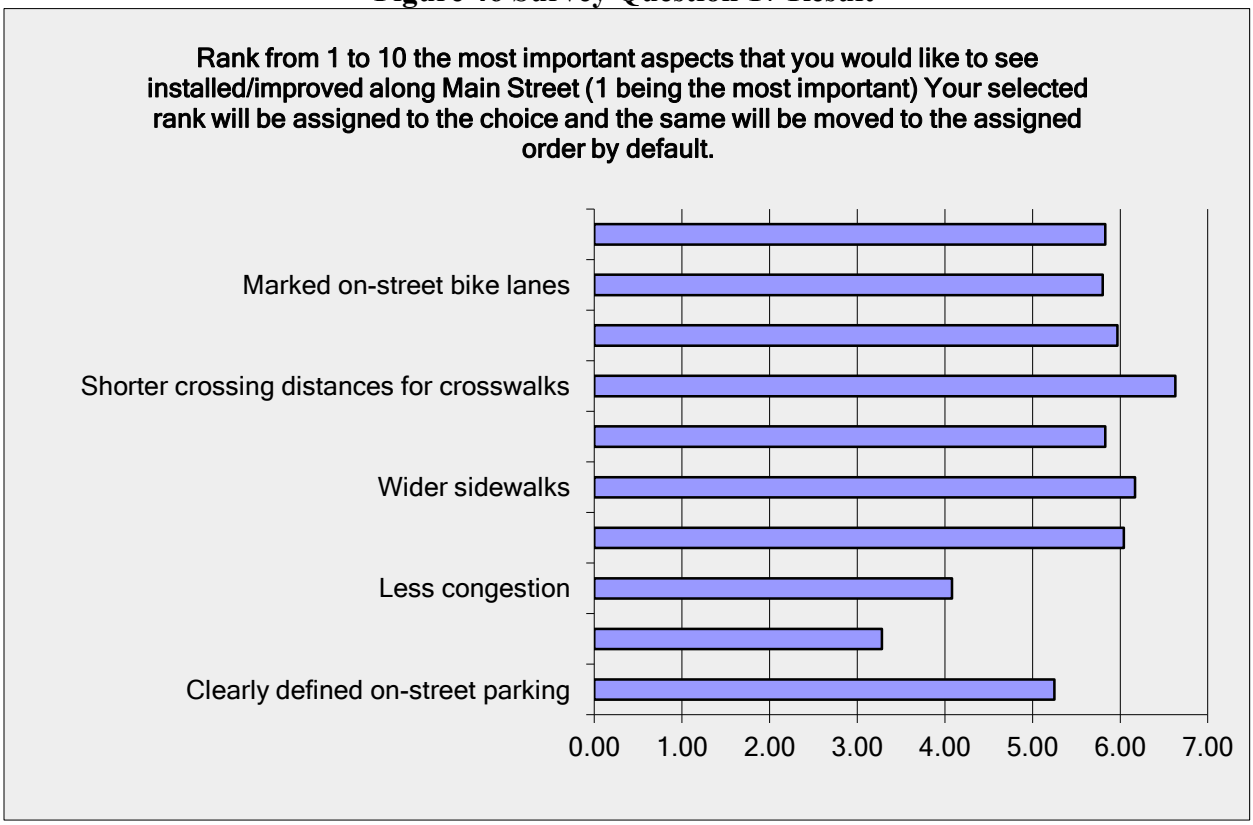


Table 10 Survey Most Common Results

	Question	Answer Choice
1	Community Affiliation	Resident. business owner, employee, student, other
2	How old are you?	5 categories
3	What is your race or national origin?	7 options
4	Do you identify yourself as	Male, Female
5	What mode do you typically use to travel to downtown Northampton?	Personal motor vehicle, walk, bike, PVTA, ride from family/friend, other
6	If you answered 'Personal motor vehicle', where do you typically park?	12 options
7	How often do you ride on a PVTA bus to/from Northampton?	5 options
8	What would encourage you to take a PVTA bus more frequently?	7 options
9	Which PVTA/transit Route do you ride most frequently?	10 options
10	Are you aware that passenger train service is returning to Northampton?	Yes, No
11	Would you use a passenger train from Northampton to Springfield, Hartford or New York City?	Yes, No
12	Are you aware of the location of the proposed Northampton Train Station?	Yes, No
13	Rate the importance to you of these aspects in downtown Northampton	10 options
14	What don't you like about walking in downtown Northampton?	13 options
15	What don't you like about biking in downtown Northampton?	11 options
16	If you drive, what makes driving along Main Street difficult?	8 options
17	Rank from 1 to 10 the most important aspects that you would like to see installed/improved along Main Street	10 options

APPENDIX D: TRAFFIC COUNTS

D.1 TMC Counts

D.2 ATR Counts

Figure 47 2096 WB

Pioneer Valley Planning Commission
60 Congress St
Springfield, MA 01104
(413) 781-6045 www.pvpc.org

Location : Northampton
Operator : AK, YM
Counter # : 2075
Road Class : U2

Site Code: 2096
Station ID:
Main St
W/O Center St
Latitude: 0' 0.0000 Undefined

Start Time	Mon 19-Oct-15	Tue 20-Oct-15	Wed 21-Oct-15	Thu 22-Oct-15	Fri 23-Oct-15	Average Day	Sat 24-Oct-15	Sun 25-Oct-15	Week Average
12:00 AM	*	*	*	61	83	72	*	*	72
01:00	*	*	*	36	63	50	*	*	50
02:00	*	*	*	14	26	20	*	*	20
03:00	*	*	*	12	15	14	*	*	14
04:00	*	*	*	27	20	24	*	*	24
05:00	*	*	*	75	65	70	*	*	70
06:00	*	*	*	274	**235**	254	*	*	254
07:00	*	*	405	348	*	376	*	*	376
08:00	*	*	**480**	**491**	*	**486**	*	*	**486**
09:00	*	*	399	386	*	392	*	*	392
10:00	*	*	433	408	*	420	*	*	420
11:00	*	*	456	465	*	460	*	*	460
12:00 PM	*	*	507	420	*	464	*	*	464
01:00	*	*	435	477	*	456	*	*	456
02:00	*	*	488	499	*	494	*	*	494
03:00	*	*	506	486	*	496	*	*	496
04:00	*	*	566	581	*	574	*	*	574
05:00	*	*	556	**626**	*	591	*	*	591
06:00	*	*	**632**	568	*	**600**	*	*	**600**
07:00	*	*	423	422	*	422	*	*	422
08:00	*	*	347	332	*	340	*	*	340
09:00	*	*	230	277	*	254	*	*	254
10:00	*	*	176	190	*	183	*	*	183
11:00	*	*	94	123	*	108	*	*	108
Day Total	0	0	7133	7598	507	7620	0	0	7620
% Avg. WkDay	0.0%	0.0%	93.6%	99.7%	6.7%				
% Avg. Week	0.0%	0.0%	93.6%	99.7%	6.7%	100.0%	0.0%	0.0%	
AM Peak	-	-	08:00	08:00	06:00	08:00	-	-	08:00
Vol.	-	-	480	491	235	486	-	-	486
PM Peak	-	-	18:00	17:00	-	18:00	-	-	18:00
Vol.	-	-	632	626	-	600	-	-	600

Figure 48 2096 EB

Pioneer Valley Planning Commission
60 Congress St
Springfield, MA 01104
(413) 781-6045 www.pvpc.org

Location : Northampton
Operator : AK, YM
Counter # : 2069
Road Class : U2

Site Code: 2096
Station ID:
Main St
W/O Center St
Latitude: 0' 0.0000 Undefined

Start Time	Mon 19-Oct-15	Tue 20-Oct-15	Wed 21-Oct-15	Thu 22-Oct-15	Fri 23-Oct-15	Average Day	Sat 24-Oct-15	Sun 25-Oct-15	Week Average
12:00 AM	*	*	*	41	81	61	*	*	61
01:00	*	*	*	18	32	25	*	*	25
02:00	*	*	*	16	21	18	*	*	18
03:00	*	*	*	21	15	18	*	*	18
04:00	*	*	*	44	38	41	*	*	41
05:00	*	*	*	99	137	118	*	*	118
06:00	*	*	*	242	213	228	*	*	228
07:00	*	*	*	497	**356**	426	*	*	426
08:00	*	*	**635**	**602**	*	**618**	*	*	**618**
09:00	*	*	517	522	*	520	*	*	520
10:00	*	*	490	534	*	512	*	*	512
11:00	*	*	615	511	*	563	*	*	563
12:00 PM	*	*	638	594	*	616	*	*	616
01:00	*	*	563	543	*	553	*	*	553
02:00	*	*	600	634	*	617	*	*	617
03:00	*	*	695	647	*	671	*	*	671
04:00	*	*	653	616	*	634	*	*	634
05:00	*	*	**711**	**699**	*	**705**	*	*	**705**
06:00	*	*	576	662	*	619	*	*	619
07:00	*	*	464	486	*	475	*	*	475
08:00	*	*	347	378	*	362	*	*	362
09:00	*	*	266	350	*	308	*	*	308
10:00	*	*	211	246	*	228	*	*	228
11:00	*	*	106	139	*	122	*	*	122
Day Total	0	0	8087	9141	893	9058	0	0	9058
% Avg. WkDay	0.0%	0.0%	89.3%	100.9%	9.9%				
% Avg. Week	0.0%	0.0%	89.3%	100.9%	9.9%	100.0%	0.0%	0.0%	
AM Peak	-	-	08:00	08:00	07:00	- 08:00	- -	-	- 08:00 - -
Vol.	-	-	635	602	356	- 618	- -	-	- 618 - -
PM Peak	-	-	17:00	17:00	-	- 17:00	- -	-	- 17:00 - -
Vol.	-	-	711	699	-	- 705	- -	-	- 705 - -

Figure 49 5606 PM

Pioneer Valley Planning Commission
60 Congress Street
Springfield, MA, 01104
www.pvpc.org (413)781-6045

Location: Peds and Parking Route 9 and Masonic
Counter#:
Operator: Khyati
Fun. Class:

File Name : 5606pm
Site Code : 00005606
Start Date : 4/14/2014
Page No : 1

Groups Printed- Unshifted

	Masonic Street From North					Route 9 From East			Smith College Building From South			Route 9 From West				
Start Time	[illegible]	[illegible]	[illegible]	4 Parking Spaces on Masonic Western Side	App. Total	[illegible]	[illegible]	App. Total	[illegible]	147 Parking on Rt. 9 Southern Side, East of Intersection	App. Total	[illegible]	[illegible]	4 Parking Spaces on Rt. 9 Northern Side, West of Intersection	App. Total	Int. Total
Factor	1.0	1.0	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	1.0		
04:00 PM	4	10	1	5	20	1	33	34	20	3	23	24	3	6	33	110
04:15 PM	1	7	1	4	13	3	23	26	8	7	15	24	1	0	25	79
04:30 PM	2	16	6	5	29	4	28	32	9	1	10	27	3	8	38	109
04:45 PM	3	16	4	5	28	1	29	30	7	5	12	26	2	4	32	102
Total	10	49	12	19	90	9	113	122	44	16	60	101	9	18	128	400
05:00 PM	2	24	5	4	35	5	20	25	14	3	17	25	1	2	28	105
05:15 PM	1	8	1	2	12	4	32	36	10	4	14	28	1	2	31	93
05:30 PM	5	10	1	2	18	4	27	31	10	10	20	33	4	3	40	109
05:45 PM	2	9	4	3	18	4	30	34	19	5	24	18	0	2	20	96
Total	10	51	11	11	83	17	109	126	53	22	75	104	6	9	119	403
Grand Total	20	100	23	30	173	26	222	248	97	38	135	205	15	27	247	803
Apprch %	11.6	57.8	13.3	17.3		10.5	89.5		71.9	28.1		83	6.1	10.9		
Total %	2.5	12.5	2.9	3.7	21.5	3.2	27.6	30.9	12.1	4.7	16.8	25.5	1.9	3.4	30.8	

	Masonic Street From North					Route 9 From East			Smith College Building From South			Route 9 From West				
Start Time	[illegible]	[illegible]	[illegible]	4 Parking Spaces on Masonic Western Side	App. Total	[illegible]	[illegible]	App. Total	[illegible]	147 Parking on Rt. 9 Southern Side, East of Intersection	App. Total	[illegible]	[illegible]	4 Parking Spaces on Rt. 9 Northern Side, West of Intersection	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																
Peak Hour for Entire Intersection Begins at 04:30 PM																
04:30 PM	2	16	**6**	**5**	29	4	28	32	9	1	10	27	3	**8**	38	**109**
04:45 PM	**3**	16	4	5	28	1	29	30	7	**5**	12	26	2	4	32	102
05:00 PM	2	**24**	5	4	**35**	**5**	20	25	**14**	3	**17**	25	1	2	28	105
05:15 PM	1	8	1	2	12	4	**32**	**36**	10	4	14	**28**	1	2	31	93
Total Volume	8	64	16	16	104	14	109	123	40	13	53	106	7	16	129	409
% App. Total	7.7	61.5	15.4	15.4		11.4	88.6		75.5	24.5		82.2	5.4	12.4		
PHF	.667	.667	.667	.800	.743	.700	.852	.854	.714	.650	.779	.946	.583	.500	.849	.938

Figure 49 5607 PM

Pioneer Valley Planning Commission

60 Congress Street
Springfield, MA, 01104
www.pvpc.org (413)781-6045

Location: Route 9 and Masonic
Counter# 2
Operator: Dave
Fun. Class: U2

File Name : 5607pm
Site Code : 5607
Start Date : 4/14/2014
Page No : 1

Groups Printed- Unshifted

	Masonic Street From North				Route 9 From East				Route 9 From West						
Start Time	Right	Left	Heavy Vehicles	App. Total	Right	Thru	Heavy Vehicles	App. Total	Thru	Left	Heavy Vehicles	App. Total	Exclu. Total	Inclu. Total	Int. Total
Factor	1.0	1.0	1.0		1.0	1.0	1.0		1.0	1.0	1.0				
04:00 PM	5	4	(0)	9	8	126	(1)	134	89	6	(1)	95	2	238	240
04:15 PM	3	4	(0)	7	10	128	(1)	138	115	8	(2)	123	3	268	271
04:30 PM	13	7	(0)	20	11	125	(2)	136	109	7	(3)	116	5	272	277
04:45 PM	2	8	(0)	10	14	124	(0)	138	110	4	(1)	114	1	262	263
Total	23	23	(0)	46	43	503	(4)	546	423	25	(7)	448	11	1040	1051
05:00 PM	9	3	(1)	12	12	127	(0)	139	102	7	(2)	109	3	260	263
05:15 PM	1	2	(0)	3	11	150	(0)	161	113	4	(0)	117	0	281	281
05:30 PM	1	4	(0)	5	12	139	(0)	151	114	9	(1)	123	1	279	280
05:45 PM	9	4	(0)	13	9	128	(2)	137	95	3	(0)	98	2	248	250
Total	20	13	(1)	33	44	544	(2)	588	424	23	(3)	447	6	1068	1074
Grand Total	43	36	(1)	79	87	1047	(6)	1134	847	48	(10)	895	17	2108	2125
Apprch %	54.4	45.6			7.7	92.3			94.6	5.4					
Total %	2	1.7		3.7	4.1	49.7		53.8	40.2	2.3		42.5	0.8	99.2	

	Masonic Street From North			Route 9 From East			Route 9 From West			
Start Time	Right	Left	App. Total	Right	Thru	App. Total	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 04:45 PM										
04:45 PM	2	8	10	**14**	124	138	110	4	114	262
05:00 PM	9	3	**12**	12	127	139	102	7	109	260
05:15 PM	1	2	3	11	**150**	**161**	113	4	117	**281**
05:30 PM	1	4	5	12	139	151	**114**	9	**123**	279
Total Volume	13	17	30	49	540	589	439	24	463	1082
% App. Total	43.3	56.7		8.3	91.7		94.8	5.2		
PHF	.361	.531	.625	.875	.900	.915	.963	.667	.941	.963

Figure 50 5608 PM

Pioneer Valley Planning Commission

60 Congress Street
Springfield, MA, 01104
www.pvpc.org (413)781-6045

Location: Peds and Parking Route 9 and Crafts Avenue
Counter#:
Operator: Alex
Fun. Class:

File Name : 5609pm
Site Code : 00005609
Start Date : 4/14/2014
Page No : 1

Groups Printed- Unshifted

	Cracker Barrell Alley From North				Route 9 From East			Craft's Avenue From South		Route 9 From West		
Start Time	Peds going southbound across Rt. 9 towards Crafts Avenue	Peds going eastbound on Rt. 9 at Cracker Barrel Alley	10 Parking along Rt. 9 north side between Masonic and Cracker Barrel	App. Total	Peds going westbound on Rt. 9 at Cracker Barrel Alley	15 Parking along Rt. 9 northside along the curve of the road	App. Total	Peds going northbound across Rt. 9 towards Cracker Barrel Alley	App. Total	4 Scattered Parking along Rt. 9 south side near Town Hall	App. Total	Int. Total
Factor	1.0	1.0	1.0		1.0	1.0		1.0		1.0		
04:00 PM	14	46	4	64	45	13	58	13	13	2	2	137
04:15 PM	10	39	3	52	38	7	45	15	15	2	2	114
04:30 PM	15	34	1	50	41	12	53	11	11	2	2	116
04:45 PM	16	34	0	50	30	11	41	11	11	2	2	104
Total	55	153	8	216	154	43	197	50	50	8	8	471
05:00 PM	11	24	1	36	51	6	57	12	12	0	0	105
05:15 PM	10	39	1	50	25	7	32	13	13	3	3	98
05:30 PM	13	24	0	37	12	14	26	8	8	1	1	72
05:45 PM	16	27	3	46	25	13	38	9	9	4	4	97
Total	50	114	5	169	113	40	153	42	42	8	8	372
Grand Total	105	267	13	385	267	83	350	92	92	16	16	843
Apprch %	27.3	69.4	3.4		76.3	23.7		100		100		
Total %	12.5	31.7	1.5	45.7	31.7	9.8	41.5	10.9	10.9	1.9	1.9	

	Cracker Barrell Alley From North				Route 9 From East			Craft's Avenue From South		Route 9 From West		
Start Time	Peds going southbound across Rt. 9 towards Crafts Avenue	Peds going eastbound on Rt. 9 at Cracker Barrel Alley	10 Parking along Rt. 9 north side between Masonic and Cracker Barrel	App. Total	Peds going westbound on Rt. 9 at Cracker Barrel Alley	15 Parking along Rt. 9 northside along the curve of the road	App. Total	Peds going northbound across Rt. 9 towards Cracker Barrel Alley	App. Total	4 Scattered Parking along Rt. 9 south side near Town Hall	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1												
Peak Hour for Entire Intersection Begins at 04:00 PM												
04:00 PM	14	46	4	64	45	13	58	13	13	2	2	137
04:15 PM	10	39	3	52	38	7	45	15	15	2	2	114
04:30 PM	15	34	1	50	41	12	53	11	11	2	2	116
04:45 PM	16	34	0	50	30	11	41	11	11	2	2	104
Total Volume	55	153	8	216	154	43	197	50	50	8	8	471
% App. Total	25.5	70.8	3.7		78.2	21.8		100		100		
PHF	.859	.832	.500	.844	.856	.827	.849	.833	.833	1.00	1.00	.859

Figure 51 5609 PM

Pioneer Valley Planning Commission
60 Congress Street
Springfield, MA, 01104
www.pvpc.org (413)781-6045

Location: Peds and Parking Route 9 and Crafts
Counter#:
Operator: Rana
Fun. Class:

File Name : 5608pm
Site Code : 00005608
Start Date : 4/14/2014
Page No : 1

Groups Printed- Unshifted

	Route 9 From East				Crafts Avenue From South			Route 9 From West			
Start Time				App. Total			App. Total			App. Total	Int. Total
Factor	1.0	1.0	1.0		1.0	1.0		1.0	1.0		
04:00 PM	24	5	3	32	11	2	13	7	22	29	74
04:15 PM	28	20	7	55	22	1	23	5	25	30	108
04:30 PM	29	10	5	44	16	7	23	3	32	35	102
04:45 PM	31	12	0	43	7	5	12	1	21	22	77
Total	112	47	15	174	56	15	71	16	100	116	361
05:00 PM	25	11	2	38	8	1	9	5	27	32	79
05:15 PM	27	0	5	32	12	2	14	3	23	26	72
05:30 PM	21	9	4	34	7	3	10	2	18	20	64
05:45 PM	35	14	8	57	11	2	13	6	16	22	92
Total	108	34	19	161	38	8	46	16	84	100	307
Grand Total	220	81	34	335	94	23	117	32	184	216	668
Apprch %	65.7	24.2	10.1		80.3	19.7		14.8	85.2		
Total %	32.9	12.1	5.1	50.1	14.1	3.4	17.5	4.8	27.5	32.3	

	Route 9 From East				Crafts Avenue From South			Route 9 From West			
Start Time				App. Total			App. Total			App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1											
Peak Hour for Entire Intersection Begins at 04:15 PM											
04:15 PM	28	**20**	**7**	**55**	**22**	1	**23**	**5**	25	30	**108**
04:30 PM	29	10	5	44	16	**7**	23	3	**32**	**35**	102
04:45 PM	**31**	12	0	43	7	5	12	1	21	22	77
05:00 PM	25	11	2	38	8	1	9	5	27	32	79
Total Volume	113	53	14	180	53	14	67	14	105	119	366
% App. Total	62.8	29.4	7.8		79.1	20.9		11.8	88.2		
PHF	.911	.663	.500	.818	.602	.500	.728	.700	.820	.850	.847

Figure 52 5610 PM

Pioneer Valley Planning Commission
60 Congress Street
Springfield, MA, 01104
www.pvpc.org (413)781-6045

Location: Route 9 at Craft's Avenue
Counter#:
Operator: Kyle
Fun. Class:

File Name : 5610pm
Site Code : 00005610
Start Date : 4/14/2014
Page No : 1

Groups Printed- Unshifted

	Route 9 From East					Route 9 From West							
Start Time	[illegible]	Thru	[illegible]	Heavy Vehicles	App. Total	[illegible]	Thru	[illegible]	Heavy Vehicles	App. Total	Exclu. Total	Inclu. Total	Int. Total
Factor	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0				
04:00 PM	5	135	26	(7)	166	14	84	2	(1)	100	8	266	274
04:15 PM	1	134	27	(9)	162	19	102	0	(8)	121	17	283	300
04:30 PM	4	128	32	(7)	164	16	99	0	(4)	115	11	279	290
04:45 PM	6	128	25	(3)	159	14	115	2	(7)	131	10	290	300
Total	16	525	110	(26)	651	63	400	4	(20)	467	46	1118	1164
05:00 PM	2	128	31	(4)	161	4	101	1	(7)	106	11	267	278
05:15 PM	13	150	21	(4)	184	10	100	3	(3)	113	7	297	304
05:30 PM	2	142	27	(3)	171	7	111	1	(2)	119	5	290	295
05:45 PM	3	128	21	(4)	152	11	95	0	(1)	106	5	258	263
Total	20	548	100	(15)	668	32	407	5	(13)	444	28	1112	1140
Grand Total	36	1073	210	(41)	1319	95	807	9	(33)	911	74	2230	2304
Apprch %	2.7	81.3	15.9			10.4	88.6	1					
Total %	1.6	48.1	9.4		59.1	4.3	36.2	0.4		40.9	3.2	96.8	

	Route 9 From East				Route 9 From West				
Start Time	[illegible]	Thru	[illegible]	App. Total	[illegible]	Thru	[illegible]	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1									
Peak Hour for Entire Intersection Begins at 04:45 PM									
04:45 PM	6	128	25	159	14	115	2	131	290
05:00 PM	2	128	31	161	4	101	1	106	267
05:15 PM	13	150	21	184	10	100	3	113	297
05:30 PM	2	142	27	171	7	111	1	119	290
Total Volume	23	548	104	675	35	427	7	469	1144
% App. Total	3.4	81.2	15.4		7.5	91	1.5		
PHF	.442	.913	.839	.917	.625	.928	.583	.895	.963

Figure 53 5611 PM

Pioneer Valley Planning Commission
60 Congress Street
Springfield, MA, 01104
www.pvpc.org (413)781-6045

Location: Parking and Traffic, Route 9 at Old South Street
Counter#:
Operator: Dimitry
Fun. Class:

File Name : 5611pm
Site Code : 00005611
Start Date : 4/14/2014
Page No : 1

Groups Printed- Unshifted

	Parking on north side of Rt. 9 From North		Route 9 From East			Parking on south side of Route 9 From South		Route 9 From West					
Start Time	10 Parking spaces on northside between Old South and Center	App. Total	Thru	Heavy Vehicles	App. Total	9 Parking spaces on southside between Old South and Center	App. Total	Thru	Heavy Vehicles	App. Total	Exclu. Total	Inclu. Total	Int. Total
Factor	1.0		1.0	1.0		1.0		1.0	1.0				
04:00 PM	(11)	0	152	(2)	152	(9)	0	122	(2)	122	24	274	298
04:15 PM	(2)	0	146	(2)	146	(16)	0	169	(8)	169	28	315	343
04:30 PM	(7)	0	151	(3)	151	(12)	0	153	(2)	153	24	304	328
04:45 PM	(9)	0	132	(2)	132	(6)	0	166	(6)	166	23	298	321
Total	(29)	0	581	(9)	581	(43)	0	610	(18)	610	99	1191	1290
05:00 PM	(15)	0	132	(3)	132	(17)	0	182	(6)	182	41	314	355
05:15 PM	(9)	0	148	(1)	148	(13)	0	183	(3)	183	26	331	357
05:30 PM	(12)	0	143	(2)	143	(13)	0	160	(3)	160	30	303	333
05:45 PM	(12)	0	136	(4)	136	(9)	0	145	(1)	145	26	281	307
Total	(48)	0	559	(10)	559	(52)	0	670	(13)	670	123	1229	1352
Grand Total	(77)	0	1140	(19)	1140	(95)	0	1280	(31)	1280	222	2420	2642
Apprch %			100					100					
Total %		0	47.1		47.1		0	52.9		52.9	8.4	91.6	

	From North	Route 9 From East		From South	Route 9 From West		
Start Time	App. Total	Thru	App. Total	App. Total	Thru	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1							
Peak Hour for Entire Intersection Begins at 04:30 PM							
04:30 PM	0	151	151	0	153	153	304
04:45 PM	0	132	132	0	166	166	298
05:00 PM	0	132	132	0	182	182	314
05:15 PM	0	148	148	0	183	183	331
Total Volume	0	563	563	0	684	684	1247
% App. Total		100			100		
PHF	.000	.932	.932	.000	.934	.934	.942

Figure 54 5612 PM

Pioneer Valley Planning Commission
60 Congress Street
Springfield, MA, 01104
www.pvpc.org (413)781-6045

Location: Peds, Parking and Traffic Route 9 and Old South Street
Counter#:
Operator: Andy
Fun. Class:

File Name : 5612PM
Site Code : 00005612
Start Date : 4/14/2014
Page No : 1

Groups Printed- Unshifted

	Route 9 From East			Old South Street From South					Route 9 From West				
Start Time	Peds across Old South Street from Rt. 9 east	Peds going south on Old South Street from Rt. 9 east	App. Total	Right	10 Parking on Old South Street eastside	Left	Peds from Old South Street going east on Rt. 9	App. Total	Peds going south on Old South Street from Rt. 9 west	Peds across Old South Street from Rt. 9 east	Peds from Old South Street going west on Rt. 9	App. Total	Int. Total
Factor	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0		
04:00 PM	28	17	45	29	4	21	18	72	4	46	4	54	171
04:15 PM	35	17	52	44	7	17	9	77	7	29	8	44	173
04:30 PM	32	13	45	54	7	23	7	91	5	46	6	57	193
04:45 PM	36	11	47	58	5	32	11	106	1	20	4	25	178
Total	131	58	189	185	23	93	45	346	17	141	22	180	715
05:00 PM	36	18	54	64	4	24	18	110	2	47	1	50	214
05:15 PM	28	15	43	64	9	36	11	120	1	33	4	38	201
05:30 PM	31	7	38	50	7	22	10	89	1	23	0	24	151
05:45 PM	38	12	50	36	6	20	7	69	6	31	6	43	162
Total	133	52	185	214	26	102	46	388	10	134	11	155	728
Grand Total	264	110	374	399	49	195	91	734	27	275	33	335	1443
Apprch %	70.6	29.4		54.4	6.7	26.6	12.4		8.1	82.1	9.9		
Total %	18.3	7.6	25.9	27.7	3.4	13.5	6.3	50.9	1.9	19.1	2.3	23.2	

	Route 9 From East			Old South Street From South					Route 9 From West				
Start Time	Peds across Old South Street from Rt. 9 east	Peds going south on Old South Street from Rt. 9 east	App. Total	Right	10 Parking on Old South Street eastside	Left	Peds from Old South Street going east on Rt. 9	App. Total	Peds going south on Old South Street from Rt. 9 west	Peds across Old South Street from Rt. 9 east	Peds from Old South Street going west on Rt. 9	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 04:30 PM													
04:30 PM	32	13	45	54	7	23	7	91	5	46	6	57	193
04:45 PM	36	11	47	58	5	32	11	106	1	20	4	25	178
05:00 PM	36	18	54	64	4	24	18	110	2	47	1	50	214
05:15 PM	28	15	43	64	9	36	11	120	1	33	4	38	201
Total Volume	132	57	189	240	25	115	47	427	9	146	15	170	786
% App. Total	69.8	30.2		56.2	5.9	26.9	11		5.3	85.9	8.8		
PHF	.917	.792	.875	.938	.694	.799	.653	.890	.450	.777	.625	.746	.918

Figure 55 5613 PM

Pioneer Valley Planning Commission
60 Congress Street
Springfield, MA, 01104
www.pvpc.org (413)781-6045

Location: Peds and Parking Route 9 and Center Street
Counter #:
Operator: Amir
Fun. Class:

File Name : 5613PM
Site Code : 00005613
Start Date : 4/17/2014
Page No : 1

Groups Printed- Unshifted - Bank 1

	Center Street From North					Route 9 From East			Pedestrians across Route 9 northbound From South		Route 9 From West			
Start Time					App. Total			App. Total		App. Total			App. Total	Int. Total
Factor	1.0	1.0	1.0	1.0		1.0	1.0		1.0		1.0	1.0		
04:00 PM	7	16	12	4	39	2	38	40	23	23	31	4	35	137
04:15 PM	10	34	12	5	61	5	47	52	19	19	35	1	36	168
04:30 PM	1	19	2	1	23	6	59	65	20	20	48	3	51	159
04:45 PM	6	27	10	3	46	6	37	43	20	20	31	5	36	145
Total	24	96	36	13	169	19	181	200	82	82	145	13	158	609
05:00 PM	7	22	7	1	37	3	45	48	41	41	42	9	51	177
05:15 PM	3	28	6	0	37	3	40	43	20	20	24	3	27	127
05:30 PM	9	24	4	5	42	5	47	52	23	23	34	3	37	154
05:45 PM	3	11	9	5	28	6	36	42	22	22	39	6	45	137
Total	22	85	26	11	144	17	168	185	106	106	139	21	160	595
Grand Total	46	181	62	24	313	36	349	385	188	188	284	34	318	1204
Apprch %	14.7	57.8	19.8	7.7		9.4	90.6		100		89.3	10.7		
Total %	3.8	15	5.1	2	26	3	29	32	15.6	15.6	23.6	2.8	26.4	
Unshifted	46	181	62	24	313	36	349	385	188	188	284	34	318	1204
% Unshifted	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Bank 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bank 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Figure 56 5614 PM

Pioneer Valley Planning Commission
60 Congress Street
Springfield, MA, 01104
www.pvpc.org (413)781-6045

Location: Parking and Traffic Route 9 and Center Street
Counter#:
Operator: Dimitry
Fun. Class:

File Name : 5614pm
Site Code : 00005614
Start Date : 4/17/2014
Page No : 1

Groups Printed- Unshifted

	Center Street From North				Route 9 From East				Parking along south of Route 9 between Center and Pleasant From South		Route 9 From West						
Start Time	Right	Left	[illegible]	App. Total	Right	Thru	[illegible]	App. Total	[illegible]	App. Total	Thru	Left	[illegible]	App. Total	Exclu. Total	Inclu. Total	Int. Total
Factor	1.0	1.0	1.0		1.0	1.0	1.0		1.0		1.0	1.0	1.0				
04:00 PM	13	9	(7)	22	19	124	(1)	143	(15)	0	127	22	(2)	149	25	314	339
04:15 PM	17	14	(5)	31	19	112	(4)	131	(24)	0	125	11	(4)	136	37	298	335
04:30 PM	12	9	(18)	21	17	106	(1)	123	(19)	0	127	14	(4)	141	42	285	327
04:45 PM	20	13	(12)	33	24	104	(3)	128	(23)	0	146	13	(2)	159	40	320	360
Total	62	45	(42)	107	79	446	(9)	525	(81)	0	525	60	(12)	585	144	1217	1361
05:00 PM	9	11	(3)	20	20	112	(4)	132	(22)	0	137	24	(5)	161	34	313	347
05:15 PM	15	12	(0)	27	26	94	(2)	120	(42)	0	127	19	(3)	146	47	293	340
05:30 PM	9	14	(3)	23	29	110	(4)	139	(20)	0	124	18	(7)	142	34	304	338
05:45 PM	9	11	(3)	20	26	115	(1)	141	(20)	0	131	12	(1)	143	25	304	329
Total	42	48	(9)	90	101	431	(11)	532	(104)	0	519	73	(16)	592	140	1214	1354
Grand Total	104	93	(51)	197	180	877	(20)	1057	(185)	0	1044	133	(28)	1177	284	2431	2715
Apprch %	52.8	47.2			17	83					88.7	11.3					
Total %	4.3	3.8		8.1	7.4	36.1		43.5		0	42.9	5.5		48.4	10.5	89.5	

Figure 56 5614 PM

Pioneer Valley Planning Commission

60 Congress Street
Springfield, MA, 01104
www.pvpc.org (413)781-6045

Location: Parking and Traffic Route 9 and Center Street
Counter#:
Operator: Dimitry
Fun. Class:

File Name : 5614pm
Site Code : 00005614
Start Date : 4/17/2014
Page No : 1

Groups Printed- Unshifted

	Center Street From North				Route 9 From East				Parking along south of Route 9 between Center and Pleasant From South		Route 9 From West						
Start Time	Right	Left	[illegible]	App. Total	Right	Thru	[illegible]	App. Total	[illegible]	App. Total	Thru	Left	[illegible]	App. Total	Exclu. Total	Inclu. Total	Int. Total
Factor	1.0	1.0	1.0		1.0	1.0	1.0		1.0		1.0	1.0	1.0				
04:00 PM	13	9	(7)	22	19	124	(1)	143	(15)	0	127	22	(2)	149	25	314	339
04:15 PM	17	14	(5)	31	19	112	(4)	131	(24)	0	125	11	(4)	136	37	298	335
04:30 PM	12	9	(18)	21	17	106	(1)	123	(19)	0	127	14	(4)	141	42	285	327
04:45 PM	20	13	(12)	33	24	104	(3)	128	(23)	0	146	13	(2)	159	40	320	360
Total	62	45	(42)	107	79	446	(9)	525	(81)	0	525	60	(12)	585	144	1217	1361
05:00 PM	9	11	(3)	20	20	112	(4)	132	(22)	0	137	24	(5)	161	34	313	347
05:15 PM	15	12	(0)	27	26	94	(2)	120	(42)	0	127	19	(3)	146	47	293	340
05:30 PM	9	14	(3)	23	29	110	(4)	139	(20)	0	124	18	(7)	142	34	304	338
05:45 PM	9	11	(3)	20	26	115	(1)	141	(20)	0	131	12	(1)	143	25	304	329
Total	42	48	(9)	90	101	431	(11)	532	(104)	0	519	73	(16)	592	140	1214	1354
Grand Total	104	93	(51)	197	180	877	(20)	1057	(185)	0	1044	133	(28)	1177	284	2431	2715
Apprch %	52.8	47.2			17	83					88.7	11.3					
Total %	4.3	3.8		8.1	7.4	36.1		43.5		0	42.9	5.5		48.4	10.5	89.5	

Figure 57 5615 PM

Pioneer Valley Planning Commission
60 Congress Street
Springfield, MA, 01104
www.pvpc.org (413)781-6045

Location: Peds, Parking and Traffic Route 9 and Gothic Street
Counter#:
Operator: Khyati
Fun. Class:

File Name : 5615PM
Site Code : 00005615
Start Date : 4/17/2014
Page No : 1

Groups Printed- Unshifted

	Gothic Street From North				Route 9 From East					Pedestrian circulating between Gothic and Route 9 From South					Route 9 From West							
Start Time	[illegible]	Left Traffic	[illegible]	App. Total	[illegible]	[illegible]	[illegible]	[illegible]	App. Total	[illegible]	[illegible]	[illegible]	[illegible]	App. Total	[illegible]	[illegible]	[illegible]	[illegible]	App. Total	Exclu. Total	Inclu. Total	Int. Total
Factor	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0				
04:00 PM	17	2	(6)	19	2	128	(34)	(2)	130	(0)	(0)	(5)	(5)	0	(35)	122	6	(3)	128	90	277	367
04:15 PM	18	5	(6)	23	4	142	(45)	(5)	146	(0)	(2)	(4)	(0)	0	(28)	130	11	(7)	141	97	310	407
04:30 PM	17	5	(1)	22	3	146	(38)	(2)	149	(4)	(0)	(0)	(0)	0	(43)	136	5	(3)	141	91	312	403
04:45 PM	5	6	(3)	11	2	147	(29)	(3)	149	(0)	(1)	(1)	(0)	0	(27)	163	12	(4)	175	68	335	403
Total	57	18	(16)	75	11	563	(146)	(12)	574	(4)	(3)	(10)	(5)	0	(133)	551	34	(17)	585	346	1234	1580
05:00 PM	9	4	(3)	13	4	151	(38)	(4)	155	(0)	(1)	(0)	(0)	0	(31)	164	8	(7)	172	84	340	424
05:15 PM	23	5	(6)	28	10	139	(35)	(3)	149	(0)	(0)	(0)	(1)	0	(27)	154	4	(3)	158	75	335	410
05:30 PM	13	5	(5)	18	3	153	(52)	(4)	156	(0)	(0)	(0)	(1)	0	(37)	149	7	(6)	156	105	330	435
05:45 PM	6	1	(2)	7	3	156	(17)	(2)	159	(0)	(0)	(0)	(0)	0	(42)	144	4	(1)	148	64	314	378
Total	51	15	(16)	66	20	599	(142)	(13)	619	(0)	(1)	(0)	(2)	0	(137)	611	23	(17)	634	328	1319	1647
Grand Total	108	33	(32)	141	31	1162	(288)	(25)	1193	(4)	(4)	(10)	(7)	0	(270)	1162	57	(34)	1219	674	2553	3227
Apprch %	76.6	23.4			2.6	97.4										95.3	4.7					
Total %	4.2	1.3		5.5	1.2	45.5			46.7					0		45.5	2.2		47.7	20.9	79.1	

	Gothic Street From North			Route 9 From East			From South	Route 9 From West			
Start Time	Right Traffic	Left Traffic	App. Total	Right Traffic	Thru Traffic	App. Total	App. Total	Thru Traffic	Left Traffic	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1											
Peak Hour for Entire Intersection Begins at 04:45 PM											
04:45 PM	5	**6**	11	2	147	149	0	163	**12**	**175**	335
05:00 PM	9	4	13	4	151	155	0	**164**	8	172	**340**
05:15 PM	**23**	5	**28**	**10**	139	149	0	154	4	158	335
05:30 PM	13	5	18	3	**153**	**156**	0	149	7	156	330
Total Volume	50	20	70	19	590	609	0	630	31	661	1340
% App. Total	71.4	28.6		3.1	96.9			95.3	4.7		
PHF	.543	.833	.625	.475	.964	.976	.000	.960	.646	.944	.985

Figure 58 5616 PM

Pioneer Valley Planning Commission
60 Congress Street
Springfield, MA, 01104
www.pvpc.org (413)781-6045

Location: Ped and Parking At Kings St. and Rt. 9
Operator : Gary
Counter # :
Road Class :

File Name : 5616 PM
Site Code : 00005616
Start Date : 5/15/2014
Page No : 1

Groups Printed- Unshifted

	Route 5 Kings Street From North					Route 9 From East				Route 5 Pleasant Street From South		Route 9 From West			
Start Time	Peds turning right into Rt. 9 west from Kings St.	Peds going north across Route 9 eastbound approach in west of the intersection	Peds turning left into Rt. 9 east from Kings St	9 Parking along westside of Kings Street	App. Total	Peds from east going north into Kings St.	Peds across Kings St. from East to West	2 Parking on East Side of Kings Street	App. Total	Peds going north across Route 9 eastbound approach in west of the intersection	App. Total	Peds across Kings St. from West to East	Peds from west going north into Kings St.	App. Total	Int. Total
Factor	1.0	1.0	1.0	1.0		1.0	1.0	1.0		1.0		1.0	1.0		
04:00 PM	0	26	5	3	34	7	29	2	38	33	33	38	4	42	147
04:15 PM	1	24	1	1	27	4	22	2	28	25	25	37	0	37	117
04:30 PM	7	29	9	6	51	2	18	1	21	19	19	27	4	31	122
04:45 PM	2	24	3	1	30	3	32	1	36	21	21	27	3	30	117
Total	10	103	18	11	142	16	101	6	123	98	98	129	11	140	503
05:00 PM	1	20	8	1	30	1	34	0	35	24	24	38	5	43	132
05:15 PM	5	32	7	6	50	4	30	1	35	28	28	33	1	34	147
05:30 PM	0	18	2	1	21	4	29	0	33	10	10	30	5	35	99
05:45 PM	1	26	6	2	35	13	30	1	44	23	23	26	8	34	136
Total	7	96	23	10	136	22	123	2	147	85	85	127	19	146	514
Grand Total	17	199	41	21	278	38	224	8	270	183	183	256	30	286	1017
Apprch %	6.1	71.6	14.7	7.6		14.1	83	3		100		89.5	10.5		
Total %	1.7	19.6	4	2.1	27.3	3.7	22	0.8	26.5	18	18	25.2	2.9	28.1	

Figure 59 5617 PM

Pioneer Valley Planning Commission
60 Congress Street
Springfield, MA, 01104
www.pvpc.org (413)781-6045

Location: Peds and Parking along Pleasant Street and Rt. 9
Counter #: Josh
Operator:
Fun. Class:

File Name : 5617PM
Site Code : 00005617
Start Date : 4/17/2014
Page No : 1

Groups Printed- Unshifted - Bank 1

	Route 5 Kings Street From North		Route 9 From East			Route 5 Pleasant Street From South					Route 9 From West				
Start Time		App. Total			App. Total					App. Total				App. Total	Int. Total
Factor	1.0		1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0		
04:00 PM	13	13	29	3	32	6	6	22	1	35	23	25	0	48	128
04:15 PM	10	10	36	8	44	9	25	19	2	55	26	31	0	57	166
04:30 PM	11	11	35	7	42	1	27	22	1	51	23	39	0	62	166
04:45 PM	12	12	28	4	32	7	14	26	2	49	30	24	2	56	149
Total	46	46	128	22	150	23	72	89	6	190	102	119	2	223	609
05:00 PM	19	19	50	10	60	3	21	26	0	50	56	56	2	114	243
05:15 PM	7	7	16	5	21	8	11	21	0	40	33	34	2	69	137
05:30 PM	17	17	51	6	57	6	20	28	0	54	34	42	6	82	210
05:45 PM	27	27	46	1	47	4	20	19	0	43	24	43	0	67	184
Total	70	70	163	22	185	21	72	94	0	187	147	175	10	332	774
Grand Total	116	116	291	44	335	44	144	183	6	377	249	294	12	555	1383
Apprch %	100		86.9	13.1		11.7	38.2	48.5	1.6		44.9	53	2.2		
Total %	8.4	8.4	21	3.2	24.2	3.2	10.4	13.2	0.4	27.3	18	21.3	0.9	40.1	
Unshifted	116	116	291	44	335	44	144	183	6	377	249	294	12	555	1383
% Unshifted	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Bank 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bank 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Figure 60 5618 PM

Pioneer Valley Planning Commission
60 Congress Street
Springfield, MA, 01104
www.pvpc.org (413)781-6045

Location: Parking along Rt. 9 between Rt. 5 and Strong
Counter#: Jeff
Operator:
Fun. Class:

File Name : 5618PM
Site Code : 00005618
Start Date : 4/17/2014
Page No : 1

Groups Printed- Unshifted

	Route 9 From North		Route 9 From South		
Start Time	[illegible]	App. Total	[illegible]	App. Total	Int. Total
Factor	1.0		1.0		
04:00 PM	5	5	7	7	12
04:15 PM	10	10	2	2	12
04:30 PM	7	7	10	10	17
04:45 PM	8	8	5	5	13
Total	30	30	24	24	54
05:00 PM	2	2	5	5	7
05:15 PM	6	6	3	3	9
05:30 PM	8	8	12	12	20
05:45 PM	5	5	1	1	6
Total	21	21	21	21	42
Grand Total	51	51	45	45	96
Apprch %	100		100		
Total %	53.1	53.1	46.9	46.9	

	Route 9 From North		Route 9 From South		
Start Time	[illegible]	App. Total	[illegible]	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1					
Peak Hour for Entire Intersection Begins at 04:00 PM					
04:00 PM	5	5	7	7	12
04:15 PM	**10**	**10**	2	2	12
04:30 PM	7	7	**10**	**10**	**17**
04:45 PM	8	8	5	5	13
Total Volume	30	30	24	24	54
% App. Total	100		100		
PHF	.750	.750	.600	.600	.794

Figure 61 5619 PM

Pioneer Valley Planning Commission
60 Congress Street
Springfield, MA, 01104
www.pvpc.org (413)781-6045

Location: Peds and Parking at Rt. 9 and Strong Avenue
Counter#: Alex
Operator:
Fun. Class:

File Name : 5619PM
Site Code : 00005619
Start Date : 4/29/2014
Page No : 1

Groups Printed- Unshifted

	Toasted Owl Restaurant From North			Route 9 From East				Strong Avenue From South					Route 9 From West			
Start Time		Peds	App. Total				App. Total					App. Total			App. Total	Int. Total
Factor	1.0	1.0		1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0		
04:00 PM	13	1	14	14	0	0	14	3	14	6	2	25	1	12	13	66
04:15 PM	13	0	13	10	3	2	15	0	7	4	3	14	4	4	8	50
04:30 PM	9	0	9	3	3	2	8	0	12	5	1	18	6	10	16	51
04:45 PM	19	0	19	6	0	4	10	1	16	6	4	27	4	11	15	71
Total	54	1	55	33	6	8	47	4	49	21	10	84	15	37	52	238
05:00 PM	24	0	24	10	1	0	11	2	13	1	2	18	8	18	26	79
05:15 PM	12	0	12	13	0	2	15	1	18	3	3	25	3	17	20	72
05:30 PM	19	0	19	8	0	7	15	3	8	1	3	15	3	21	24	73
05:45 PM	23	0	23	21	0	6	27	2	19	1	1	23	7	25	32	105
Total	78	0	78	52	1	15	68	8	58	6	9	81	21	81	102	329
Grand Total	132	1	133	85	7	23	115	12	107	27	19	165	36	118	154	567
Apprch %	99.2	0.8		73.9	6.1	20		7.3	64.8	16.4	11.5		23.4	76.6		
Total %	23.3	0.2	23.5	15	1.2	4.1	20.3	2.1	18.9	4.8	3.4	29.1	6.3	20.8	27.2	

	Toasted Owl Restaurant From North			Route 9 From East				Strong Avenue From South					Route 9 From West			
Start Time		Peds	App. Total				App. Total					App. Total			App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																
Peak Hour for Entire Intersection Begins at 05:00 PM																
05:00 PM	**24**	0	**24**	10	**1**	0	11	2	13	1	2	18	8	18	26	79
05:15 PM	12	0	12	13	0	2	15	1	18	3	3	**25**	3	17	20	72
05:30 PM	19	0	19	8	0	**7**	15	3	8	1	3	15	3	21	24	73
05:45 PM	23	0	23	**21**	0	6	**27**	2	**19**	1	1	23	7	**25**	**32**	**105**
Total Volume	78	0	78	52	1	15	68	8	58	6	9	81	21	81	102	329
% App. Total	100	0		76.5	1.5	22.1		9.9	71.6	7.4	11.1		20.6	79.4		
PHF	.813	.000	.813	.619	.250	.536	.630	.667	.763	.500	.750	.810	.656	.810	.797	.783

Figure 62 5620 PM

Pioneer Valley Planning Commission
60 Congress Street
Springfield, MA, 01104
www.pvpc.org (413)781-6045

Location: Parking along Strong Avenue
Counter #: Khyati
Operator:
Fun. Class:

File Name : 5620PM
Site Code : 00005620
Start Date : 4/29/2014
Page No : 1

Groups Printed- Unshifted - Bank 1

	Strong Avenue From East		Strong Avenue From West		
Start Time	10 Parking spaces along east side of Strong Avenue	App. Total	9 Parking spaces along west side of Strong Avenue	App. Total	Int. Total
Factor	1.0		1.0		
04:00 PM	10	10	1	1	11
04:15 PM	5	5	4	4	9
04:30 PM	5	5	10	10	15
04:45 PM	11	11	7	7	18
Total	31	31	22	22	53
05:00 PM	7	7	4	4	11
05:15 PM	2	2	3	3	5
05:30 PM	5	5	10	10	15
05:45 PM	9	9	4	4	13
Total	23	23	21	21	44
Grand Total	54	54	43	43	97
Apprch %	100		100		
Total %	55.7	55.7	44.3	44.3	
Unshifted	54	54	43	43	97
% Unshifted	100	100	100	100	100
Bank 1	0	0	0	0	0
% Bank 1	0	0	0	0	0

Figure 63 5621 PM

Pioneer Valley Planning Commission
60 Congress Street
Springfield, MA, 01104
www.pvpc.org (413)781-6045

Location: TMC at Rt. 9 and Strong Avenue
Counter#: Andy
Operator:
Fun. Class:

File Name : 5621AM
Site Code : 00005621
Start Date : 4/29/2014
Page No : 1

Groups Printed- Unshifted

	Route 9 From East				Strong Avenue From South			Route 9 From West						
Start Time	Thru	Left	Heavy Vehicles	App. Total	Right	Left	App. Total	Right	Thru	Heavy Vehicles	App. Total	Exclu. Total	Inclu. Total	Int. Total
Factor	1.0	1.0	1.0		1.0	1.0		1.0	1.0	1.0				
04:00 PM	110	18	(3)	128	32	5	37	3	84	(1)	87	4	252	256
04:15 PM	119	20	(1)	139	39	5	44	7	87	(3)	94	4	277	281
04:30 PM	131	14	(5)	145	48	10	58	11	83	(2)	94	7	297	304
04:45 PM	119	14	(1)	133	36	8	44	11	86	(4)	97	5	274	279
Total	479	66	(10)	545	155	28	183	32	340	(10)	372	20	1100	1120
05:00 PM	116	21	(2)	137	35	5	40	10	89	(2)	99	4	276	280
05:15 PM	118	12	(3)	130	48	6	54	12	92	(2)	104	5	288	293
05:30 PM	126	12	(3)	138	44	6	50	18	97	(1)	115	4	303	307
05:45 PM	133	19	(1)	152	44	6	50	19	88	(0)	107	1	309	310
Total	493	64	(9)	557	171	23	194	59	366	(5)	425	14	1176	1190
Grand Total	972	130	(19)	1102	326	51	377	91	706	(15)	797	34	2276	2310
Apprch %	88.2	11.8			86.5	13.5		11.4	88.6					
Total %	42.7	5.7		48.4	14.3	2.2	16.6	4	31		35	1.5	98.5	

	Route 9 From East			Strong Avenue From South			Route 9 From West			
Start Time	Thru	Left	App. Total	Right	Left	App. Total	Right	Thru	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 05:00 PM										
05:00 PM	116	**21**	137	35	5	40	10	89	99	276
05:15 PM	118	12	130	**48**	**6**	**54**	12	92	104	288
05:30 PM	126	12	138	44	6	50	18	**97**	**115**	303
05:45 PM	**133**	19	**152**	44	6	50	**19**	88	107	309
Total Volume	493	64	557	171	23	194	59	366	425	1176
% App. Total	88.5	11.5		88.1	11.9		13.9	86.1		
PHF	.927	.762	.916	.891	.958	.898	.776	.943	.924	.951

Figure 64 5622 PM

Pioneer Valley Planning Commission
60 Congress Street
Springfield, MA, 01104
www.pvpc.org (413)781-6045

Location: Peds and Parking Rt. 9 and Market
Counter#: Gary
Operator:
Fun. Class:

File Name : 5622PM
Site Code : 00005622
Start Date : 4/29/2014
Page No : 1

Groups Printed- Unshifted

	Market Street From North				Route 9 From East				Hawley Street From South		Route 9 From West			
Start Time	Peds turning right to Rt. 9 west from Market	Peds crossing south across Rt. 9 eastbound approach in west of the intersection	Peds turning left to Rt. 9 east from Market	App. Total	Peds turning right into Market from Rt. 9 east	Peds across Market Street going west	9 Parking along east side of Market Street	App. Total	Peds crossing north across Rt. 9 eastbound approach in west of the intersection	App. Total	Peds across Market Street going east	Peds turning left into Market from Rt. 9 west	App. Total	Int. Total
Factor	1.0	1.0	1.0		1.0	1.0	1.0		1.0		1.0	1.0		
04:00 PM	8	3	6	17	11	10	4	25	5	5	13	10	23	70
04:15 PM	4	3	6	13	11	9	1	21	7	7	12	4	16	57
04:30 PM	7	2	8	17	3	13	3	19	0	0	7	5	12	48
04:45 PM	8	3	4	15	3	7	4	14	8	8	9	11	20	57
Total	27	11	24	62	28	39	12	79	20	20	41	30	71	232
05:00 PM	5	8	2	15	2	10	7	19	7	7	18	21	39	80
05:15 PM	4	1	1	6	4	12	5	21	6	6	17	11	28	61
05:30 PM	9	4	0	13	4	17	3	24	9	9	12	7	19	65
05:45 PM	10	5	3	18	3	11	1	15	8	8	9	10	19	60
Total	28	18	6	52	13	50	16	79	30	30	56	49	105	266
Grand Total	55	29	30	114	41	89	28	158	50	50	97	79	176	498
Apprch %	48.2	25.4	26.3		25.9	56.3	17.7		100		55.1	44.9		
Total %	11	5.8	6	22.9	8.2	17.9	5.6	31.7	10	10	19.5	15.9	35.3	

	Market Street From North				Route 9 From East				Hawley Street From South		Route 9 From West			
Start Time	Peds turning right to Rt. 9 west from Market	Peds crossing south across Rt. 9 eastbound approach in west of the intersection	Peds turning left to Rt. 9 east from Market	App. Total	Peds turning right into Market from Rt. 9 east	Peds across Market Street going west	9 Parking along east side of Market Street	App. Total	Peds crossing north across Rt. 9 eastbound approach in west of the intersection	App. Total	Peds across Market Street going east	Peds turning left into Market from Rt. 9 west	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1														
Peak Hour for Entire Intersection Begins at 05:00 PM														
05:00 PM	5	8	2	15	2	10	7	19	7	7	18	21	39	80
05:15 PM	4	1	1	6	4	12	5	21	6	6	17	11	28	61
05:30 PM	9	4	0	13	4	17	3	24	9	9	12	7	19	65
05:45 PM	10	5	3	18	3	11	1	15	8	8	9	10	19	60
Total Volume	28	18	6	52	13	50	16	79	30	30	56	49	105	266
% App. Total	53.8	34.6	11.5		16.5	63.3	20.3		100		53.3	46.7		
PHF	.700	.563	.500	.722	.813	.735	.571	.823	.833	.833	.778	.583	.673	.831

Figure 65 5623 PM

Pioneer Valley Planning Commission
60 Congress Street
Springfield, MA, 01104
www.pvpc.org (413)781-6045

Location: Peds and Parking at Rt. 9 and Hawley Street
Counter#: Dimitri
Operator:
Fun. Class:

File Name : 5623pm
Site Code : 00005623
Start Date : 4/29/2014
Page No : 1

Groups Printed- Unshifted

	Market Street From North		Route 9 From East				Hawley Street From South					Route 9 From West			
Start Time	Peds crossing south across Rt. 9 westbound approach in east of the intersection	App. Total	Peds across Hawley Street going west	Peds turning left from Rt. 9 west into Hawley Street	6 Parking spaces on south side of Rt. 9 east of the intersection	App. Total	Peds turning right to Rt. 9 west from Hawley Street	Peds crossing south across Rt. 9 westbound approach in east of the intersection	Peds turning left to Rt. 9 west from Hawley St.	7 Parking spaces along east side of Hawley Street	App. Total	Peds turning right from Rt. 9 west into Hawley Street	Peds across Hawley Street going east	App. Total	Int. Total
Factor	1.0		1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0		
04:00 PM	10	10	8	1	2	11	1	3	6	0	10	3	7	10	41
04:15 PM	11	11	10	0	3	13	0	4	4	3	11	0	1	1	36
04:30 PM	5	5	6	0	4	10	2	7	2	1	12	6	5	11	38
04:45 PM	2	2	3	0	4	7	1	7	1	1	10	1	5	6	25
Total	28	28	27	1	13	41	4	21	13	5	43	10	18	28	140
05:00 PM	6	6	4	1	1	6	1	4	7	2	14	12	7	19	45
05:15 PM	5	5	5	0	0	5	0	4	3	1	8	9	3	12	30
05:30 PM	2	2	5	1	4	10	1	3	5	2	11	12	5	17	40
05:45 PM	4	4	3	0	0	3	1	3	10	5	19	10	8	18	44
Total	17	17	17	2	5	24	3	14	25	10	52	43	23	66	159
Grand Total	45	45	44	3	18	65	7	35	38	15	95	53	41	94	299
Apprch %	100		67.7	4.6	27.7		7.4	36.8	40	15.8		56.4	43.6		
Total %	15.1	15.1	14.7	1	6	21.7	2.3	11.7	12.7	5	31.8	17.7	13.7	31.4	

	Market Street From North		Route 9 From East				Hawley Street From South					Route 9 From West			
Start Time	Peds crossing south across Rt. 9 westbound approach in east of the intersection	App. Total	Peds across Hawley Street going west	Peds turning left from Rt. 9 west into Hawley Street	6 Parking spaces on south side of Rt. 9 east of the intersection	App. Total	Peds turning right to Rt. 9 west from Hawley Street	Peds crossing south across Rt. 9 westbound approach in east of the intersection	Peds turning left to Rt. 9 west from Hawley St.	7 Parking spaces along east side of Hawley Street	App. Total	Peds turning right from Rt. 9 west into Hawley Street	Peds across Hawley Street going east	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1															
Peak Hour for Entire Intersection Begins at 05:00 PM															
05:00 PM	**6**	**6**	4	**1**	1	6	**1**	4	7	2	14	**12**	7	**19**	**45**
05:15 PM	5	5	**5**	0	0	5	0	4	3	1	8	9	3	12	30
05:30 PM	2	2	5	1	**4**	**10**	1	3	5	2	11	12	5	17	40
05:45 PM	4	4	3	0	0	3	1	3	**10**	**5**	**19**	10	**8**	18	44
Total Volume	17	17	17	2	5	24	3	14	25	10	52	43	23	66	159
% App. Total	100		70.8	8.3	20.8		5.8	26.9	48.1	19.2		65.2	34.8		
PHF	.708	.708	.850	.500	.313	.600	.750	.875	.625	.500	.684	.896	.719	.868	.883

Figure 66 5624 PM

Pioneer Valley Planning Commission
60 Congress Street
Springfield, MA, 01104
www.pvpc.org (413)781-6045

Location: TMC at Rt. 9, Market St. and Hawley St.
Counter#: Josh
Operator:
Fun. Class:

File Name : 5624PM
Site Code : 00005624
Start Date : 4/29/2014
Page No : 1

Groups Printed- Unshifted

	Market Street From North					Route 9 From East					Hawley Street From South					Route 9 From West							
Start Time	Right	Thru	Left	Heavy Vehicles	App. Total	Right	Thru	Left	Heavy Vehicles	App. Total	Right	Thru	Left	Heavy Vehicles	App. Total	Right	Thru	Left	Heavy Vehicles	App. Total	Exclu. Total	Inclu. Total	Int. Total
Factor	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0				
04:00 PM	19	16	15	(1)	50	7	100	1	(1)	108	5	21	5	(0)	31	9	103	9	(1)	121	3	310	313
04:15 PM	8	8	15	(0)	31	4	120	6	(2)	130	11	18	12	(0)	41	8	106	7	(3)	121	5	323	328
04:30 PM	11	9	11	(0)	31	9	111	3	(5)	123	12	19	14	(0)	45	6	119	8	(2)	133	7	332	339
04:45 PM	14	11	9	(0)	34	10	119	6	(2)	135	18	11	8	(1)	37	8	98	15	(4)	121	7	327	334
Total	52	44	50	(1)	146	30	450	16	(10)	496	46	69	39	(1)	154	31	426	39	(10)	496	22	1292	1314
05:00 PM	16	11	22	(0)	49	10	106	4	(2)	120	10	26	12	(2)	48	8	110	12	(3)	130	7	347	354
05:15 PM	14	12	13	(0)	39	9	125	11	(2)	145	10	26	6	(0)	42	3	107	14	(2)	124	4	350	354
05:30 PM	8	6	15	(1)	29	14	128	5	(4)	147	7	19	10	(0)	36	7	116	18	(1)	141	6	353	359
05:45 PM	17	6	6	(0)	29	16	117	4	(2)	137	7	27	11	(1)	45	13	92	14	(0)	119	3	330	333
Total	55	35	56	(1)	146	49	476	24	(10)	549	34	98	39	(3)	171	31	425	58	(6)	514	20	1380	1400
Grand Total	107	79	106	(2)	292	79	926	40	(20)	1045	80	167	78	(4)	325	62	851	97	(16)	1010	42	2672	2714
Apprch %	36.6	27.1	36.3			7.6	88.6	3.8			24.6	51.4	24			6.1	84.3	9.6					
Total %	4	3	4		10.9	3	34.7	1.5		39.1	3	6.2	2.9		12.2	2.3	31.8	3.6		37.8	1.5	98.5	

	Market Street From North				Route 9 From East				Hawley Street From South				Route 9 From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 05:00 PM																	
05:00 PM	16	11	**22**	49	10	106	4	120	**10**	26	**12**	**48**	8	110	12	130	347
05:15 PM	14	**12**	13	39	9	125	**11**	145	10	26	6	42	3	107	14	124	350
05:30 PM	8	6	15	29	14	**128**	5	**147**	7	19	10	36	7	**116**	**18**	**141**	**353**
05:45 PM	**17**	6	6	29	**16**	117	4	137	7	**27**	11	45	**13**	92	14	119	330
Total Volume	55	35	56	146	49	476	24	549	34	98	39	171	31	425	58	514	1380
% App. Total	37.7	24	38.4		8.9	86.7	4.4		19.9	57.3	22.8		6	82.7	11.3		
PHF	.809	.729	.636	.745	.766	.930	.545	.934	.850	.907	.813	.891	.596	.916	.806	.911	.977

Figure 67 6666 PM

Pioneer Valley Planning Commission

60 Congress Street
Springfield, MA, 01104
www.pvpc.org (413)781-6045

Location: Segment 1 Peds on north sidewalk
Counter#: Kyle
Operator:
Fun. Class:

File Name : 6666
Site Code : 00006666
Start Date : 4/16/2014
Page No : 1

Groups Printed- Unshifted

	Route 9 Segment 1 Northside From East		Route 9 Segment 1 Northside From West		
Start Time	Thru	App. Total	Thru	App. Total	Int. Total
04:00 PM	39	39	48	48	87
04:15 PM	45	45	45	45	90
04:30 PM	71	71	53	53	124
04:45 PM	61	61	39	39	100
Total	216	216	185	185	401
05:00 PM	49	49	30	30	79
05:15 PM	27	27	30	30	57
05:30 PM	19	19	28	28	47
05:45 PM	34	34	29	29	63
Total	129	129	117	117	246
Grand Total	345	345	302	302	647
Apprch %	100		100		
Total %	53.3	53.3	46.7	46.7	

	Route 9 Segment 1 Northside From East		Route 9 Segment 1 Northside From West		
Start Time	Thru	App. Total	Thru	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1					
Peak Hour for Entire Intersection Begins at 04:00 PM					
04:00 PM	39	39	48	48	87
04:15 PM	45	45	45	45	90
04:30 PM	**71**	**71**	**53**	**53**	**124**
04:45 PM	61	61	39	39	100
Total Volume	216	216	185	185	401
% App. Total	100		100		

Figure 68 7777 PM

Pioneer Valley Planning Commission
60 Congress Street
Springfield, MA, 01104
www.pvpc.org (413)781-6045

Location: Segment 1 Peds on south sidewalk
Counter#: Dimitri
Operator:
Fun. Class:

File Name : 7777
Site Code : 00007777
Start Date : 4/16/2014
Page No : 1

Groups Printed- Unshifted

	Route 9 Segment 1 south side From East		Route 9 Segment 1 south side From West		
Start Time	Thru	App. Total	Thru	App. Total	Int. Total
04:00 PM	22	22	35	35	57
04:15 PM	31	31	27	27	58
04:30 PM	47	47	48	48	95
04:45 PM	50	50	43	43	93
Total	150	150	153	153	303
05:00 PM	72	72	102	102	174
05:15 PM	82	82	93	93	175
05:30 PM	75	75	74	74	149
05:45 PM	60	60	56	56	116
Total	289	289	325	325	614
Grand Total	439	439	478	478	917
Apprch %	100		100		
Total %	47.9	47.9	52.1	52.1	

	Route 9 Segment 1 south side From East		Route 9 Segment 1 south side From West		
Start Time	Thru	App. Total	Thru	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1					
Peak Hour for Entire Intersection Begins at 05:00 PM					
05:00 PM	72	72	**102**	**102**	174
05:15 PM	**82**	**82**	93	93	**175**
05:30 PM	75	75	74	74	149
05:45 PM	60	60	56	56	116
Total Volume	289	289	325	325	614
% App. Total	100		100		
PHF	.881	.881	.797	.797	.877

Figure 69 8888 PM

Pioneer Valley Planning Commission
60 Congress Street
Springfield, MA, 01104
www.pvpc.org (413)781-6045

Location: Segment 2 Pedestrains on North Sidewalk
Counter#: Kyle
Operator:
Fun. Class:

File Name : 8888
Site Code : 00008888
Start Date : 4/28/2014
Page No : 1

Groups Printed- Unshifted

	Route 9 Segment 2 North sidewalk From East		Route 9 Segment 2 North sidewalk From West		
Start Time	Thru	App. Total	Thru	App. Total	Int. Total
04:00 PM	24	24	28	28	52
04:15 PM	24	24	35	35	59
04:30 PM	20	20	21	21	41
04:45 PM	32	32	21	21	53
Total	100	100	105	105	205
05:00 PM	27	27	36	36	63
05:15 PM	15	15	23	23	38
Grand Total	142	142	164	164	306
Apprch %	100		100		
Total %	46.4	46.4	53.6	53.6	

	Route 9 Segment 2 North sidewalk From East		Route 9 Segment 2 North sidewalk From West		
Start Time	Thru	App. Total	Thru	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:15 PM - Peak 1 of 1					
Peak Hour for Entire Intersection Begins at 04:15 PM					
04:15 PM	24	24	35	35	59
04:30 PM	20	20	21	21	41
04:45 PM	32	32	21	21	53
05:00 PM	27	27	36	36	63
Total Volume	103	103	113	113	216
% App. Total	100		100		
PHF	.805	.805	.785	.785	.857

Figure 70 9999 PM

Pioneer Valley Planning Commission
60 Congress Street
Springfield, MA, 01104
www.pvpc.org (413)781-6045

Location: Segment 2 pedestrians on south sidewalk
Operator: Dimitri
Operator:
Fun. Class:

File Name : 9999
Site Code : 09999999
Start Date : 5/1/2014
Page No : 1

Groups Printed- Unshifted - Bank 1

	Route 9 Segment 2 south sidewalk From East		Route 9 Segment 2 south sidewalk From West		
Start Time	Thru	App. Total	Thru	App. Total	Int. Total
04:30 PM	85	85	77	77	162
04:45 PM	103	103	82	82	185
Total	188	188	159	159	347
05:00 PM	26	26	38	38	64
05:15 PM	21	21	40	40	61
05:30 PM	11	11	9	9	20
05:45 PM	11	11	12	12	23
Total	69	69	99	99	168
Grand Total	257	257	258	258	515
Apprch %	100		100		
Total %	49.9	49.9	50.1	50.1	
Unshifted	257	257	258	258	515
% Unshifted	100	100	100	100	100
Bank 1	0	0	0	0	0
% Bank 1	0	0	0	0	0