
#19 and 27 Whiting Street Redevelopment Hingham, MA

TRAFFIC IMPACT STUDY

September 2020

Prepared for:

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CHA File: 60903

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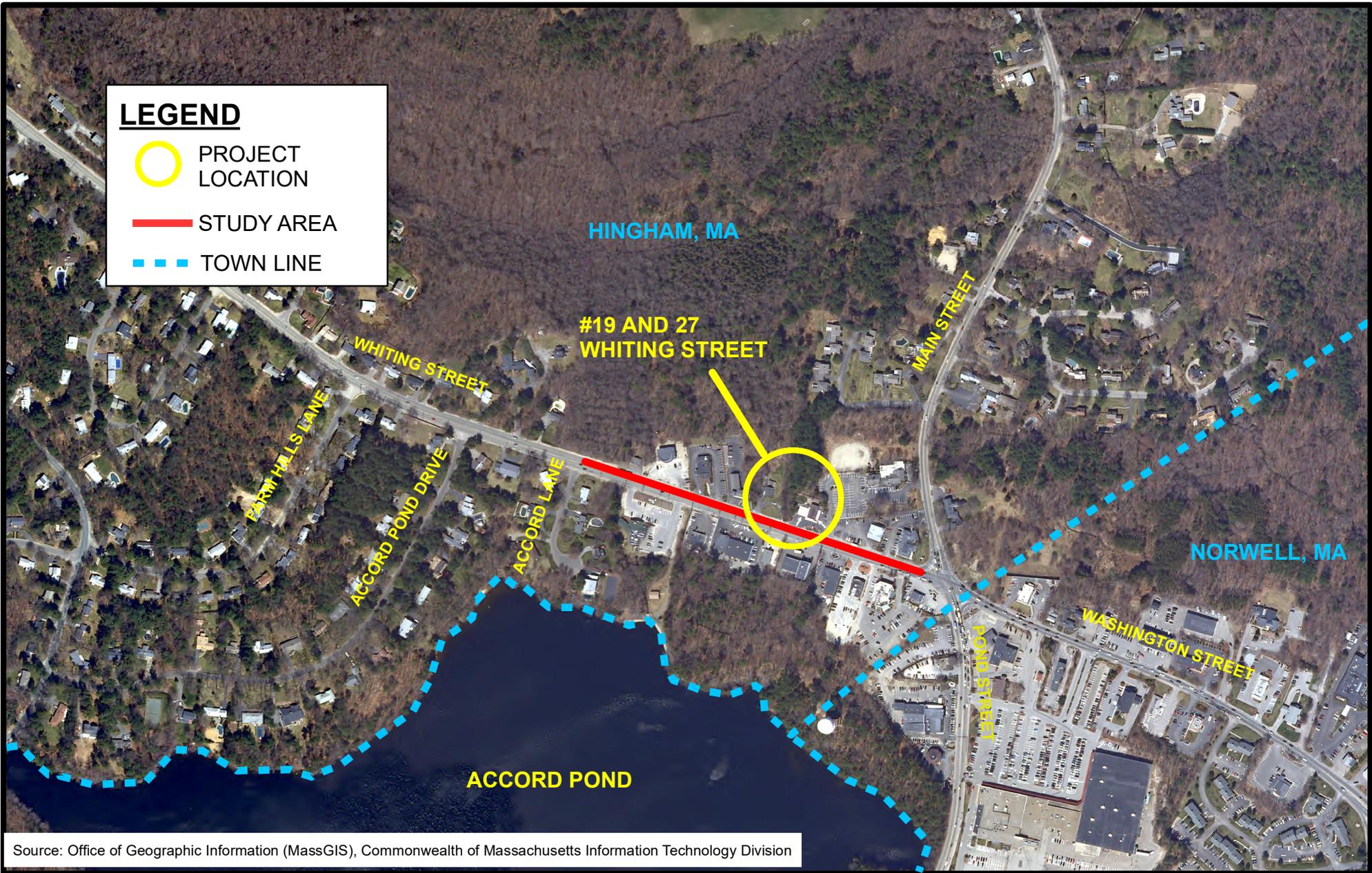
1.0 INTRODUCTION

CHA has prepared this Traffic Impact Safety Study in order to document our review of potential traffic or safety issues associated with the proposed #19 and 27 Whiting Street Redevelopment, which will continue use of an existing gas station and relocate the retail portion of the existing gas station to a newly constructed store on the north side of Whiting Street in Hingham, MA. This study describes the project, the study area conditions, and the effect of the project on traffic and safety on the site and on the surrounding roadways and intersections.

1.1 PROJECT SITE

The project involves the continued use of the existing gas station at 19 Whiting Street, and the demolition of a single-family house at 27 Whiting Street for the construction of a proposed retail store with gasoline station on the combined lots. The existing 200 s.f. kiosk building at the gas station will be razed as part of the re-development. The location of this proposed development is shown on Figure 1. Access to the proposed site will be provided via three of the four curb cut locations that exist today at the two lots. One existing driveway curb cut is proposed to be closed.

The proposed site development plan includes retaining the eight existing fueling stations at the gas station and constructing a new 2,531 s.f. retail store with 1,000 s.f. of additional storage. The retail space is expected to be a convenience store use. The proposed design provides 15 parking spaces, with 2 being handicap accessible spaces. Appendix A includes a conceptual site plan of the proposed project.



TOWN OF HINGHAM, MA

**#19 AND 27 WHITING STREET
REDEVELOPMENT
PROJECT ID: 60903**

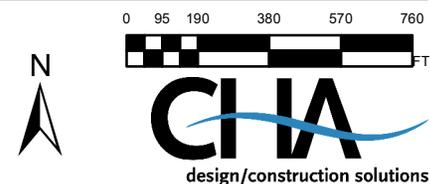


Figure 1. Locus Map

2.0 EXISTING CONDITIONS

2.1 ADJACENT STREET NETWORK

Based on the location of the project, the selected study area is the segment of Whiting Street located between Accord Lane and Pond Street / Main Street. Whiting Street is a four lane east-west roadway that is classified as an Urban Minor Arterial. It is a State Highway under the jurisdiction of MassDOT. The roadway features approximately 11-foot travel lanes with no marked shoulders. A 5-foot sidewalk is provided on the south side of the roadway with curbing on both sides of the roadway. The posted speed limit is 35 mph within the study area. The majority of the land uses in this segment of Whiting Street are commercial.

2.2 TRAFFIC VOLUMES

Traffic Volumes in front of #19 and 27 Whiting Street were documented using an automatic traffic recorder (ATR) to identify daily and hourly traffic volumes at the project site. Counts were performed on Thursday, August 6, 2020 through Saturday, August 8, 2020. Due to the COVID-19 pandemic and the expectation that traffic volumes are currently lower than normal, the traffic volumes were compared to a 2019 Norwell Traffic Impact Study at the nearby Whiting Street / Washington Street and Pond Street / Main Street intersection performed by the Boston Region Metropolitan Planning Organization. The comparison between the ATR counts and Norwell traffic study data showed the current traffic levels are significantly lower than the past counts during the peak hours. Therefore, the ATR counts for this traffic study have been adjusted upwards by 35% for the AM peak hour, 20% for the PM peak hour, and 25% for the daily traffic. Table 1 below summarizes the results for both the adjusted and unadjusted counts. A copy of the ATR count data and the Norwell Traffic Impact Study volumes are included in Appendix C and D, respectively.

Table 1. Existing Traffic Volume Summary

Day of Week	Average Daily Traffic		Period	Peak Hour Traffic	
	Volumes (vpd) ^a	Directional Distribution		Volumes (vph) ^b	Directional Distribution
Unadjusted Counts					
Weekday	19,554	49% EB / 51% WB	Morning	1,006	45% EB / 55% WB
			Evening	1,596	54% EB / 46% WB
Weekend	16,707	50% EB / 50% WB	Morning	646	50% EB / 50% WB
			Evening	1,215	54% EB / 46% WB
Adjusted Counts					
Weekday	24,443	49% EB / 51% WB	Morning	1,358	45% EB / 55% WB
			Evening	1,915	54% EB / 46% WB
Weekend	20,884	50% EB / 50% WB	Morning	872	50% EB / 50% WB
			Evening	1,458	54% EB / 46% WB

^a Vehicles per day

^b Vehicles per hour

Peak hours were chosen between the hours of 6:00 – 9:00 AM and 4:00 – 7:00 PM to reflect the trip generation standards conducted in this study. The AM peak hour is 8:00 – 9:00 AM and the PM peak hour is 3:00 – 4:00 PM.

Seasonal factors are considered to determine whether the traffic count data must be adjusted up or down to reflect average conditions. The 2019 statewide weekday seasonal factors collected by MassDOT indicates that minor arterials statewide are slightly above average during the month of August. However, due to the COVID-19 pandemic, it is assumed current traffic volumes are lower than normal. As a result, the 2020 August count data was not seasonally adjusted for this analysis.

2.3 EXISTING TRAVEL SPEEDS

A speed study was conducted by Transportation Data Corporation on August 6, 2020 through August 8, 2020 in conjunction with the ATR volume counts at #19 and 27 Whiting Street. The speed data from this study was used to determine the actual vehicle travel speeds on these roadways rather than using the posted speed limit, in order to determine the appropriate recommended sight distances and other relevant intersection design criteria. The resulting mean and 85th percentile vehicle travel speeds are summarized in Table 2. The 85th percentile speed is the speed at which 85 percent of the vehicles are traveling at or below, and is commonly used by MassDOT as the design speed.

Table 2. Observed Travel Speeds

Roadway/Direction	Posted Speed Limit ^a	Mean Speed	85 th Percentile Speed ^b
Whiting Street			
Eastbound	35	31	38
Westbound	35	35	40

^a Speeds in miles per hour

^b Speed at or below which 85% of all observed vehicles travel.

3.0 FUTURE YEAR BUILD CONDITIONS

3.1 BACKGROUND GROWTH

In order to assess the traffic impacts associated with the development, existing traffic volumes were adjusted to reflect the estimated future volumes with the project (Build Condition). A horizon year of seven years was selected to assess future traffic operations. To determine the future 2027 condition, the following steps were included:

- Existing 2020 traffic volumes were projected to 2027 using an annual background traffic growth factor;
- Traffic volumes associated with any planned developments that may impact the study area were added;
- Any planned improvements of the roadway network were included in the analysis.

MassDOT ATR data was reviewed to identify recent volume trends in the vicinity of the study area. The closest count station with multiple years of data was located on Derby Street at the Weymouth / Hingham Town Line. The traffic data for this location showed the volumes over a 3-year period (2014-2017) increased at a rate of approximately 2.95% per year. In addition, four other ATR counts were considered on Route 3A and Route 3 to understand the general volume trends for the Town of Hingham. The Count locations reviewed included:

Route 3A in Hingham (west of North Street)
Route 3A in Scituate (south of Cornet Stetson Road)
Route 3 in Hingham
Route 3 in Norwell

All of the locations with the exception of Route 3A in Hingham have shown a negative growth rate in recent years. The average of the five ATR counts came out to be a 0.6% per year growth rate, so a 1% growth rate was used in order to be conservative and consistent with past traffic studies in Hingham.

The Town of Hingham Planning Department was contacted to determine if there are other approved development projects that would affect the study area. At this time, there are no known proposed developments or improvements that will impact traffic volume within this project area.

3.2 SITE GENERATED TRAFFIC

The Institute of Transportation Engineers (ITE) *Trip Generation Manual*, 10th edition, is the industry standard for determining trip generation for various land uses and is based on data collected at case study sites throughout the United States. Under the existing conditions, the number of vehicle trips per day at the site were estimated as a Gas Station and Single-Family Home. The number of trips for the existing uses were derived using the sum of ITE Land Use Code (LUC) 944 Gasoline / Service Station and Land Use Code 210 Single-Family Detached Housing. The gasoline station trips were calculated based on the number of fueling positions, while the trips associated with Single-Family Detached Housing were calculated based on the number of dwelling units. The resultant estimate of the number of existing daily and peak hour trips at the site are depicted in Table 3.

The trip generation for the proposed site conditions was estimated using both Land Use Code 853 Convenience Market with Gas Pumps and Land Use Code 945 Gasoline / Service Station with Convenience Market. For each Land Use Code, calculations were performed for both square footage (3,531 s.f.) and vehicle fueling positions (8). However, the most applicable ITE land use category corresponding to the proposed #19 and 27 Whiting Street Redevelopment was determined to be ITE Land Use Code (LUC) 853 – Convenience Market with Gasoline Pumps.

The number of trips generated was determined using the number of fueling positions, as this resulted in a higher number of trips than the building size and represents a more conservative estimate. Based on ITE rates, the proposed development can be expected to generate 166 trips during the AM peak hour, 184 trips during the PM peak hour, and 2,580 daily trips. ITE has limited data for weekend trip generation for this land use. It is assumed that daily and peak hour site trips on weekends at the site would be similar to weekdays. Table 3 summarizes the estimated site traffic generated by the project.

Table 3. Trip Generation Summary

Trip Type	AM Peak Hour			PM Peak Hour			Daily		
	Enter	Exit	Total	Enter	Exit	Total	Enter	Exit	Total
Existing Trips	41	42	83	57	56	113	693	692	1,385
Proposed Site Trips	83	83	166	92	92	184	1,290	1,290	2,580
Difference	42	41	83	35	36	71	597	598	1,195

3.3 PASS-BY TRAFFIC

Pass-by trips are vehicles that were already traveling on the roadway and turn into the site and exit the site to continue their journey. ITE data indicates that past studies of gasoline / service stations found that 60% of customers of these facilities were pass-by vehicles. This high percentage of pass-by trips is important to note as it indicates the majority of the new trips to the site are expected to be vehicles already on the roadway. While the increase in trip generation at the site is expected to be significant, the added vehicles to the adjacent roadway would not be as notable. Table 4 depicts the number of new vs. pass-by trips predicted for the proposed site based on the ITE data.

Table 4. Pass-By Traffic Summary

Trip Type	AM Peak Hour			PM Peak Hour			Daily		
	Enter	Exit	Total	Enter	Exit	Total	Enter	Exit	Total
Total New Trips to Site (veh)	42	41	83	35	36	71	597	598	1,195
New Pass-By Trips to Site (veh)	25	25	50	21	22	43	358	359	717
Total New Trips to Adjacent Roadway (veh)	17	16	33	14	14	28	239	239	478

3.4 TRIP DISTRIBUTION AND ASSIGNMENT

Trip distribution pertains to the origin and destination of project related trips on the surrounding roadway network. The traffic generated by the project was distributed to the three access driveways to the site based on a set of assumptions and traffic patterns in the surrounding area. As previously discussed, 60% of the proposed total site trips would be pass-by trips and 40% would be primary trips with the gas station and convenience store as the intended destination. For pass-by trips, any vehicles entering the driveways would already be on the road and would exit in the same direction as previously traveling. For example, vehicles going westbound would enter in one of the driveways and exit in the westbound direction. For primary trips, as the site is the destination, it is assumed they would exit in the same direction they approached from. As such, a westbound vehicle entering the site would exit in the eastbound direction. Since pass-by trips are already on the road, the directional distribution between eastbound and westbound vehicles would be the same as the distribution found from the ATR counts conducted for this study. Therefore, pass-by trips would be 45% eastbound and 55% westbound for the AM peak hour and 56% eastbound and 44% westbound for the PM peak hour. It is assumed a 50% directional distribution for primary trips.

The westernmost driveway is considered Driveway #1, the middle is Driveway #2 and the easternmost is Driveway #3. Driveway #1 is a right-turn exit only driveway. Based on the site plan, it is assumed 90% of the vehicles entering from the eastbound direction would turn into Driveway #2 and 10% would turn into Driveway #3. Vehicles entering from the westbound direction are assumed to be split between Driveway #2 and Driveway #3 evenly. It is generally assumed exits would be split between the three driveways as such: 25% exit Driveway #1, 50% exit Driveway #2, and 25% exit Driveway #3. However, there are exceptions to consider based on logic and traffic flow. If a westbound primary trip vehicle enters, it cannot exit out of Driveway #1 as left turns are not allowed. Similarly, if an eastbound pass-by trip enters, it would not exit Driveway #1 for the same reasons. In cases such as these, the final distribution would be split between the remaining two driveways. The trip distribution for new trips is shown on Figure 2.

3.5 BUILD TRAFFIC VOLUMES

For the analysis, a 1% compounded annual growth rate was applied to the existing traffic volumes to project the background traffic volumes for the 2027 Build Condition. The site generated traffic for #19 and 27 Whiting Street Redevelopment was combined with the 2027 Build volumes to represent the estimated future volume conditions for the site. The 2027 Build volumes for the AM Peak Hour are shown on Figure 3 and for the PM Peak Hour on Figure 4.

4.0 OPERATING CONDITIONS

4.1 LEVEL OF SERVICE METHODOLOGY

The operating conditions of transportation facilities are evaluated based on the relationship of existing or projected traffic volumes to the theoretical capacity of the highway. Various factors affect highway capacity, including traffic volume, speed, roadway geometry, grade, number and width of travel lanes and intersection control. The current standards for evaluating capacity and operating conditions are contained in the Highway Capacity Manual 2010 (HCM 2010), published by the Transportation Research Board (TRB). The procedures describe operating conditions in terms of Level of Service (LOS). In general, LOS "A" represents the best operating conditions and LOS "F" represents the worst.

To determine existing traffic operating conditions at the study area intersections, a capacity analysis was performed using SYNCHRO 10 software.

The HCM methodology for unsignalized intersections generally assumes that major street traffic is not affected by minor street flows. Left turns from the major street are assumed to be affected by opposing, or oncoming, major street flow. Minor street traffic is affected by all conflicting movements. Because of these characteristics, the HCM methodology for unsignalized intersections only produces a LOS assessment for the stop-controlled movements and for the left-turn movement from the major street onto the minor street, and not an overall LOS rating for the intersection.

A LOS of D or better is generally considered acceptable for signalized and unsignalized movements during peak periods. Table 5 below summarizes the HCM LOS for signalized and unsignalized intersections.

Table 5: HCM Intersection LOS

LOS	Control Delay per Vehicle (Seconds)	
	Signalized	Unsignalized
A	10 or less	10 or less
B	10-20	10-15
C	20-35	15-25
D	35-55	25-35
E	55-80	35-50
F	greater than 80	greater than 50

4.2 CAPACITY ANALYSIS

To determine the impact of the #19 and 27 Whiting Street Redevelopment on the operations of the adjacent transportation system, traffic operations of the driveways were analyzed for the AM and PM peak hours for the 2027 Build Condition. The Build operating conditions were analyzed using the 2027 Build condition peak hour traffic volumes, along with the existing intersection geometry. The LOS for the 2027 Build conditions for all three driveways are summarized in Table 6.

Table 6.
#19 and 27 Whiting Street Redevelopment
2027 Build Condition

Location/Movement	Weekday Morning Peak Hour				Weekday Evening Peak Hour			
	Delay (spv)	LOS	V/C Ratio	95 th % Queues (veh)	Delay (spv)	LOS	V/C Ratio	95 th % Queues (veh)
<i>Driveway #1</i>								
SB - R	11.4	B	0.024	0.1	12.1	B	0.029	0.1
<i>Driveway #2</i>								
EB - LT	9.9	A	0.052	0.2	10.6	B	0.065	0.2
SB - LR	25.2	D	0.219	0.8	60.0	F	0.470	2.1
<i>Driveway #3</i>								
EB - LT	11.2	B	0.007	0.0	10.4	B	0.008	0.0
SB - LR	34.5	D	0.176	0.6	40.6	E	0.226	0.8

Driveway #1

The proposed site driveway movement is estimated to operate at LOS B or better for both the AM and PM peak hours. Vehicle queues exiting the site driveway are expected to be one or less during the morning and evening peak hours. The major street traffic flow is unaffected by the site driveway movement in this case.

Driveway #2

For the AM peak hour, the eastbound approach operates at LOS A while the southbound approach operates at LOS D. For the PM peak hour, the eastbound approach operates at LOS B and the southbound approach operates at LOS F. It should be noted while delay is 25.2 seconds per vehicle in the AM and 60.0 second per vehicle in the PM, the queue lengths would be less than two vehicles. Also, if there are vehicles waiting to exit Driveway #2, drivers will have the option to utilize one of the other curb cuts to exit the site.

Driveway #3

The eastbound approach is estimated to operate at LOS B or better for both the AM and PM peak hours. The southbound AM peak hour operates at LOS D, while the PM peak hour operates at LOS E. Vehicle queues exiting the site driveway are expected to be one or less during the morning and evening peak hours.

5.0 SAFETY

5.1 CRASH HISTORY

Accident data from 2013 to 2017 for the project segment was compiled from MassDOT. Table 7 provides a tabulated summary of these accidents and Figure 5 provides a collision map detailing the location of the crashes. As shown, a total of 49 accidents were reported over the five year period in the study area, while only 5 of the 49 accidents were reported at the specific site address #19 Whiting Street. Based on the traffic volume data and accident records, this segment has a crash rate of 4.62 accidents per million entering vehicles (MEV) over the five year study period, which is above the MassDOT Urban Minor Arterial average of 3.49.

The majority of the reported accidents were angle or rear end collisions. This is likely attributed to the commercial nature of the segment with a high number of businesses and curb cuts. Vehicles entering curb cuts are required to slow and may result in rear end collisions. The proposed development will reduce the number of curb cuts that exist at the site today and will also restrict one curb cut to a right turn exit only. This should help reduce the frequency of collisions at the site.

Table 7. MassDOT Accident Data Summary (2013-2017)

	#19 Whiting Street	Between Accord Lane and Pond Street / Main Street	Total
Year			
2013	2	6	8
2014	2	4	6
2015	0	9	9
2016	1	12	13
2017	2	13	15
Total	5	44	49
Type			
Angle	3	23	26
Head-on	0	0	0
Rear-end	1	14	15
Sideswipe	1	3	4
Single Vehicle Crash	0	4	4
Severity			
Property Damage	5	30	35
Personal Injury	0	12	12
Fatality	0	0	0
Unknown	0	2	2
Lighting			
Daylight	4	35	39
Dusk	1	4	5
Dark – Lighted Road	0	4	4
Dark – Unlit Road	0	0	0
Unknown	0	1	1
Conditions			
Dry	4	36	40
Wet	1	8	9
Ice/snow	0	0	0
Unknown	0	0	0
Time of Day			
7:00 – 9:00 AM	0	2	2
4:00 – 6:00 PM	2	7	9
Remainder of day	3	35	38

5.2 SIGHT DISTANCE

Stopping sight distance and intersection sight distance were reviewed at the proposed site access driveways with Whiting Street. The existing sight distances measured at these locations were compared to the guidelines in the Association of State Highway and Transportation Officials (AASHTO), *A Policy on Geometric Design of Highways and Streets*, 2011 for the 85th percentile speed of vehicles. These evaluations are summarized in Table 8 below.

Table 8: Sight Distance Summary – #19 and 27 Whiting Street Redevelopment

Location		Intersection Sight Distance			Stopping Sight Distance	
		Right-turn from Site Driveway (D _L)	Left-turn from Site Driveway		SSD ₁ from WEST	SSD ₂ from EAST
			Looking Left (D _L)	Looking Right (D _R)		
Driveway #1	Available	450 ft.*	N/A	N/A	600+ ft.	600+ ft.
	Recommended	385 ft.	N/A	N/A	305 ft.	305 ft.
Driveway #2	Available	425 ft.*	425 ft.*	500+ ft.	600+ ft.	600+ ft.
	Recommended	385 ft.	500 ft.	500 ft.	305 ft.	305 ft.
Driveway #3	Available	500+ ft.	500+ ft.	315 ft.*	600+ ft.	500 ft.
	Recommended	385 ft.	500 ft.	500 ft.	305 ft.	305 ft.

*Sight distance briefly blocked by object (utility pole/proposed trees) and exceeds 500' when looking behind object

This analysis indicates the available sight distance for the proposed site access driveways meets the recommended minimum sight distances. Recommended sight distances for the site driveways were based on an 85th percentile speed of 40 mph as well as number of crossing lanes. However, Whiting Street has a straight alignment for at least 500 feet east and west of the proposed site driveways that allows for a clear line of sight for vehicles approaching the site driveway from Whiting Street in either direction.

There is an existing Utility Pole 5/1 located at approximately Sta. 112+96. It was measured to be in the sight line for right turning vehicles and vehicles looking left for left turns out of Driveway #2, as well as vehicles looking right for left turns from Driveway #3. However, based on field observations, it is only a partial obstruction and oncoming traffic is still visible. The sight distance beyond the utility pole for both Driveway #2 and Driveway #3 meet the recommended distances. It should be noted there is a large "Insurance and Classic Tile and Stone Sign", banner and planter currently located at Sta. 113+71 to the east of Driveway #3. While it is not an obstruction currently, there is a slight incline which could make overgrown planters and bushes a partial obstruction of westbound traffic. Similarly, there are two trees proposed on the island between Driveways #1 and #2 which could be a partial obstruction for vehicles turning out of those driveways.

5.3 SITE CIRCULATION

The site access for larger vehicles such as firetrucks, delivery trucks, and fueling trucks was analyzed using AutoCAD Vehicle Tracking Analysis Software. The Vehicle Tracking Software provides a swept path analysis for different sized vehicles to ensure safety and standards compliance in the design. For a fire truck, with length 43.17' and steering angle of 40°, the proposed pathway is to enter Driveway #3, continue straight toward the building and exit Driveway #1. Delivery trucks are 30.00' long with a steering angle of 31.8°. The delivery spot is at the back of the #19 Whiting Street property, between the proposed building and existing gas station kiosks. The delivery truck will enter in Driveway #2, go straight around the kiosks and back in to the delivery spot. It will exit through Driveway #2. A fueling truck is a tractor-trailer truck with a typical tractor length of 15.00' and trailer length of 48.00'. The steering angle is 28.4°. This truck will enter Driveway #3 to pull in front of the proposed building, back in to the area next to the gas station kiosks, and exit out Driveway #2.

It is proposed to update signing and markings on the site to improve traffic flow in and around the property. "Stop" and "Right Turn Only" signs are proposed at Driveway #1 for cars exiting the site, while two "Do Not Enter" signs on either side of Driveway #1 are proposed to deter incoming vehicles. A "Do Not Enter – Authorized Access Only" sign is proposed near the western side of the building for the storage and garage area. Driveways #1 and #2 have a stop line with "STOP" letters marked. Each driveway has arrows directing traffic flow. Another set of arrows lie in front of the proposed building between Driveways #1 and #2, as well as on the western side of the building for access to the storage and garage area.

There are no existing sidewalk or bicycle facilities along the northern side of Whiting Street, and sidewalks are not proposed on the site. However, an updated walkway is proposed around the building for access from the parking lot. There are 15 total parking spots, with two van accessible handicapped parking spaces.

CONCLUSION & RECOMMENDATIONS

CHA has reviewed the expected impact to traffic operations and safety associated with the proposed #19 and 27 Whiting Street redevelopment the following is a summary of the findings:

- Based on ITE trip generation rates, the proposed development can be expected to generate 166 site trips during the AM peak hour, 184 site trips during the PM peak hour, and 2,580 total daily site trips. These additional trips will be distributed amongst the three access driveways in the eastbound or westbound direction to the adjacent roadway network.
- Approximately 60% of the site trips will involve pass-by traffic. These trips would be vehicles that are already travelling on Whiting Street that stop at the site and then continue their journey. These trips would not represent added traffic to Whiting Street.
- All movements for each driveway operate at a LOS E or above, with the exception of the southbound PM peak hour for Driveway #2 which operates at LOS F. Although a longer delay exiting the site in the PM Peak Hour is expected, the 95th percentile queues would be two vehicles or less at each of the site drives during this peak hour and drivers will have the option to utilize one of the other site driveways if one driveway is experiencing a long delay.
- A review of the crash history of this study area found each location had a crash rate above the State average. The proposed reduction in the number of curb cuts at the site should help minimize the number of collisions.
- The stopping sight distance and intersection sight distance conditions at the proposed site access roadways on Whiting Street meet the recommended design distances.
- Proposed signage and pavement markings will direct drivers on how to properly circulate within the site. Turning templates have confirmed that larger delivery and emergency vehicles will also be able to navigate throughout the site.

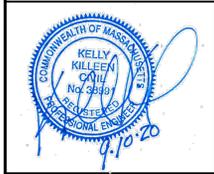
APPENDIX A

Site Plan



OWNER/APPLICANT:

**MERHEJ & SONS
REALTY, LLC**
87 DERBY STREET
HINGHAM, MA 02043



IT IS A VIOLATION OF LAW FOR ANY PERSON UNLESS THEY ARE ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT OR LAND SURVEYOR TO ALTER OR MODIFY ANY PART OF THE SEAL OR STAMP OF A LICENSED PROFESSIONAL IS ALTERED. THE ALTERING ENGINEER, ARCHITECT, LANDSCAPE ARCHITECT OR LAND SURVEYOR SHALL STAMP THE DOCUMENT AND INCLUDE THE WORDING "ALTERED BY FOLLOWED BY THEIR SIGNATURE, THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION."

**HINGHAM GAS
#19 & 27 WHITING
STREET
HINGHAM, MA 02043**

No.	Submittal / Revision	App'd. By	Date
A	PERMIT SET	KK JM	5/1/2020
B	PERMIT SET	KK JM	9/10/2020

SITE PLAN

Designed By:	Drawn By:	Checked By:
DR/BN	DR/BN	KK
Issue Date:	Project No:	Scale:
05/01/2020	060903	1" = 20'

Drawing No.:
C-101

ZONING TABLE				
ZONING DISTRICT: BUSINESS B, ACCORD POND WATERSHED, HINGHAM AQUIFER PROTECTION DISTRICT				
REQUIREMENTS	REQUIRED	19 WHITING ST	27 WHITING ST	PROPOSED (COMBINED)
MINIMUM LOT AREA	N/A	0.41± ACRES (18,056 SF)	1.27± ACRES (55,435 SF)	1.68± ACRES (73,491 SF)
MINIMUM FRONTAGE	200 FEET	150 FEET	144 FEET	294 FEET
MAXIMUM BUILDING HEIGHT	35' / 3 STORIES	1 STORY	2 STORY	1.5 STORY
MAX. BUILDING COVERAGE	25%	1.2% (220 SQ. FT)	3.1% (1,698 SQ. FT)	4.8% (3,531 SQ. FT)
MINIMUM FRONT YARD	40 FEET	40.9± FEET	71.8± FEET	40.9± FEET
MINIMUM SIDE YARD	25 FEET	25.5± FEET	53.2± FEET	25.1± FEET
MINIMUM REAR YARD	25 FEET	N/A	>25 FEET	>25 FEET
MINIMUM GREEN YARD	15 FEET	15 FEET	15 FEET	15 FEET

PARKING REQUIREMENTS

RETAIL - 5 SPACES PER 1,000 SQ. FT. GFA
 ACCESSORY STORAGE - 1 SPACES PER 1,000 SQ. FT. GFA

GROSS FLOOR AREA = 2,531 (RETAIL) + 1,000 (ACCESSORY STORAGE) = 3,531 SQ. FT.
 TOTAL SPACES REQUIRED = (2,531 / 1,000 * 5) + (1,000 / 1,000 * 1) =
 13 (12.66) + 1 SPACES - 14 SPACES
 TOTAL SPACES PROVIDED = 15 SPACES

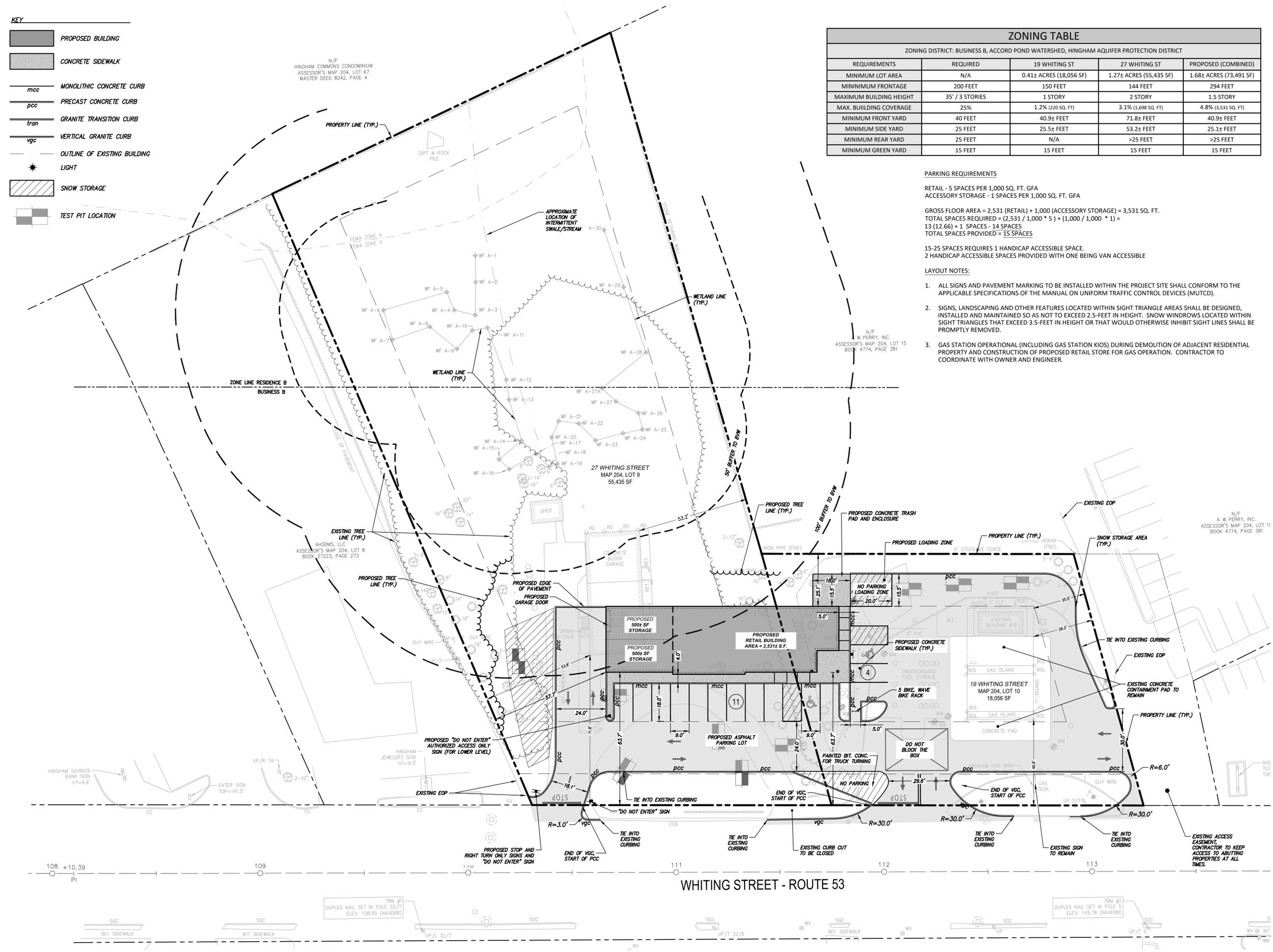
15-25 SPACES REQUIRES 1 HANDICAP ACCESSIBLE SPACE.
 2 HANDICAP ACCESSIBLE SPACES PROVIDED WITH ONE BEING VAN ACCESSIBLE

LAYOUT NOTES:

- ALL SIGNS AND PAVEMENT MARKING TO BE INSTALLED WITHIN THE PROJECT SITE SHALL CONFORM TO THE APPLICABLE SPECIFICATIONS OF THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD).
- SIGNS, LANDSCAPING AND OTHER FEATURES LOCATED WITHIN SIGHT TRIANGLE AREAS SHALL BE DESIGNED, INSTALLED AND MAINTAINED SO AS NOT TO EXCEED 2.5-FEET IN HEIGHT. SNOW WINDROWS LOCATED WITHIN SIGHT TRIANGLES THAT EXCEED 3.5-FEET IN HEIGHT OR THAT WOULD OTHERWISE INHIBIT SIGHT LINES SHALL BE PROMPTLY REMOVED.
- GAS STATION OPERATIONAL (INCLUDING GAS STATION KIOS) DURING DEMOLITION OF ADJACENT RESIDENTIAL PROPERTY AND CONSTRUCTION OF PROPOSED RETAIL STORE FOR GAS OPERATION. CONTRACTOR TO COORDINATE WITH OWNER AND ENGINEER.

KEY

	PROPOSED BUILDING
	CONCRETE SIDEWALK
	MONOLITHIC CONCRETE CURB
	PRECAST CONCRETE CURB
	GRANITE TRANSITION CURB
	VERTICAL GRANITE CURB
	OUTLINE OF EXISTING BUILDING
	LIGHT
	SNOW STORAGE
	TEST PIT LOCATION

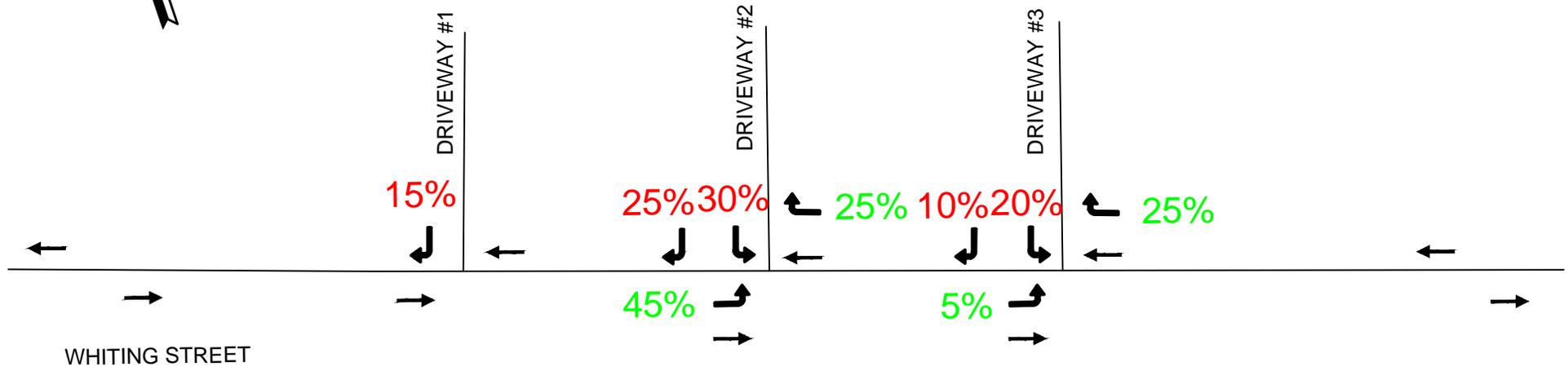


File: \\CHA-LFP-COM\PROJ\PROJECTS\WV\KVS\060903_C-101_SITE_PLAN.DWG Saved: 9/9/2020 6:18:25 PM Plotted: 9/10/2020 8:35:28 PM Current User: Rose, Donald Last Saved By: 4323

APPENDIX B

Figures

LEGEND:
 XX % of Entering Vehicles
 XX % of Exiting Vehicles



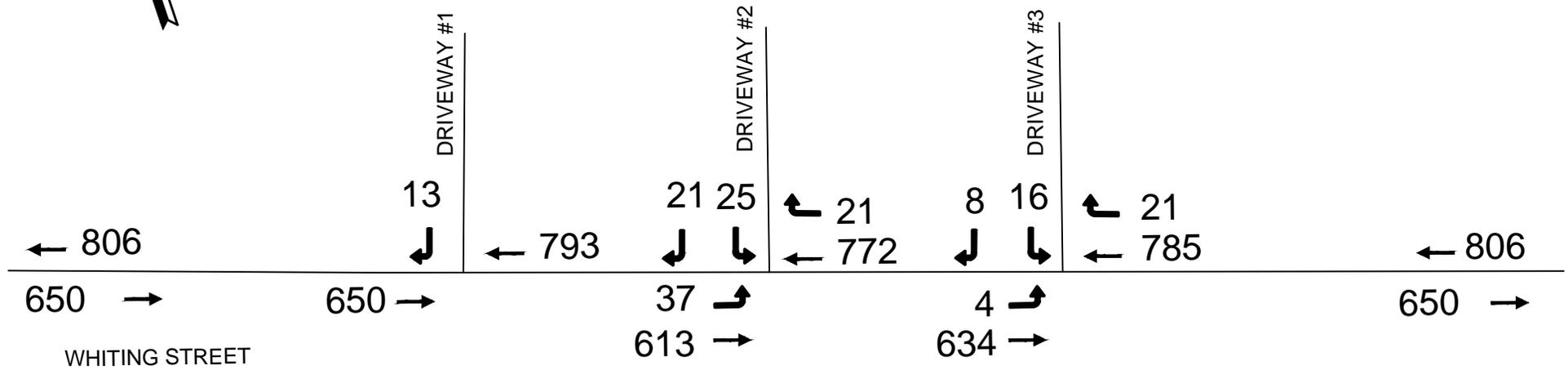
Not to Scale

2027 Build Conditions



141 Longwater Drive - Suite 104
 Norwell, MA 02061
 781.982.5400 • www.chacompanies.com

LEGEND:
 XX # of Vehicles



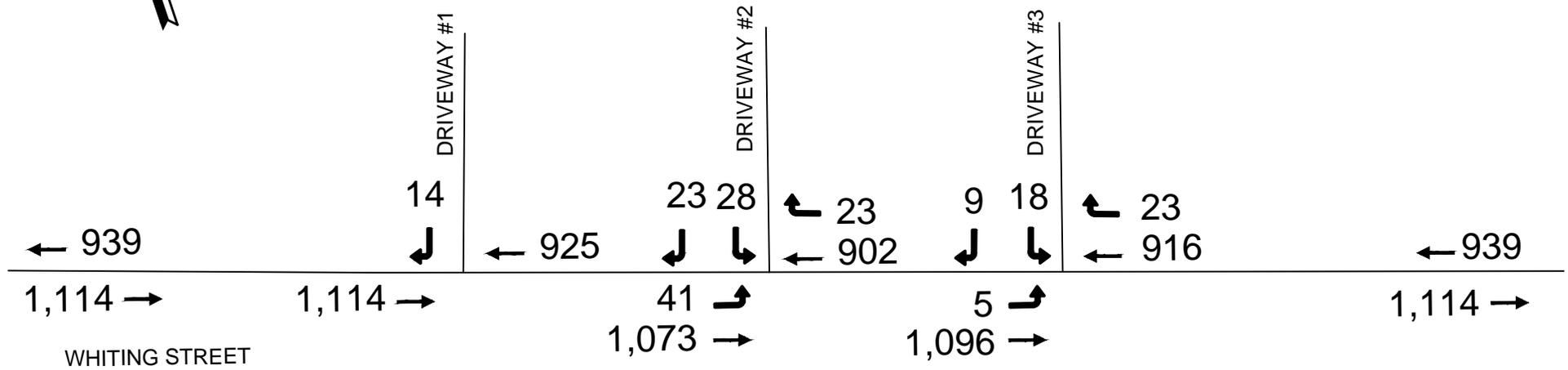
Not to Scale

2027 Build Conditions



141 Longwater Drive - Suite 104
 Norwell, MA 02061
 781.982.5400 • www.chacompanies.com

LEGEND:
 XX # of Vehicles



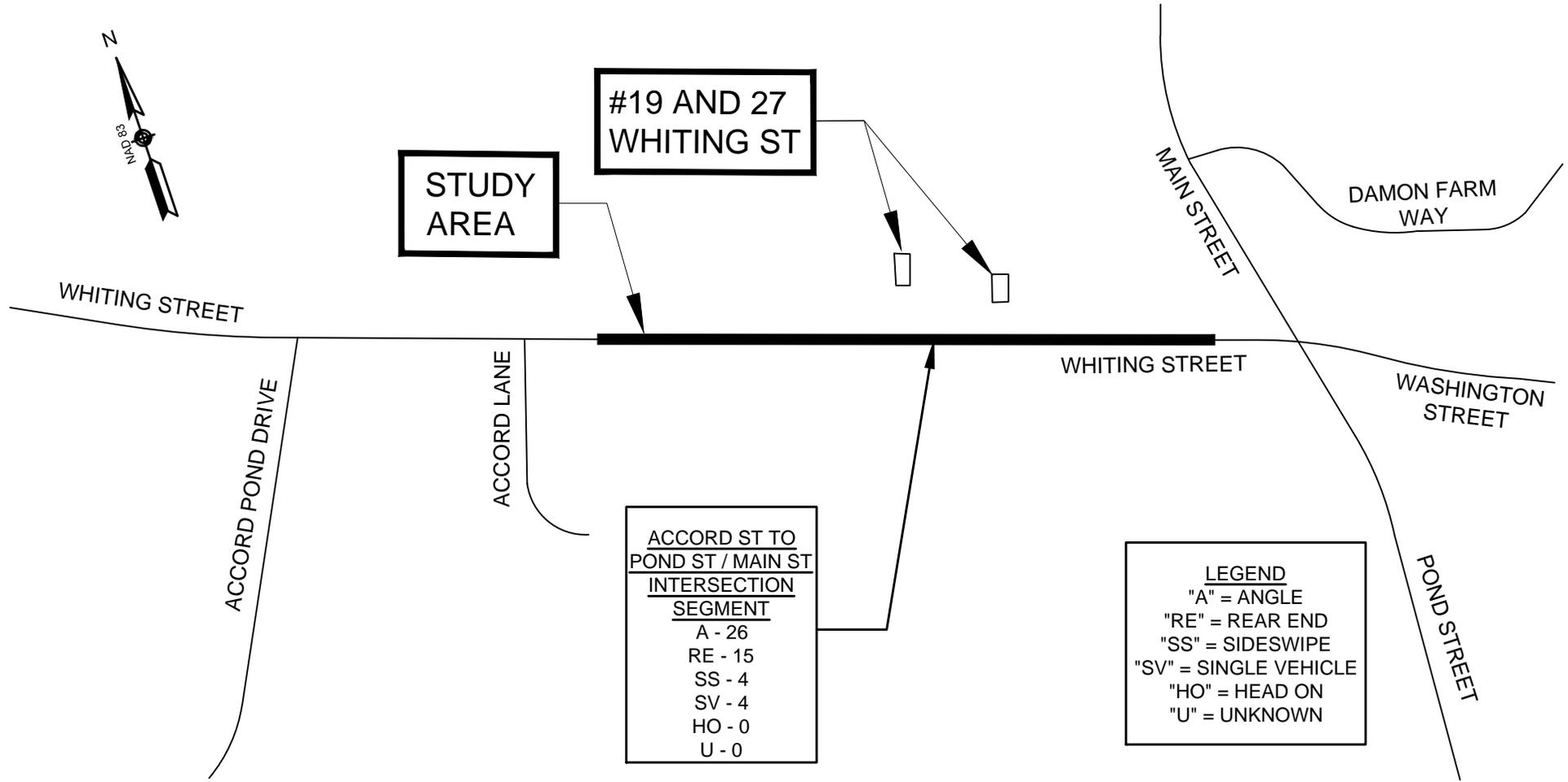
Not to Scale

2027 Build Conditions



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LEGEND:
 XX # of Vehicles



Not to Scale



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Whiting Street Collision Map

APPENDIX C

Traffic Volume Data

Transportation Data Corporation

Mario Perone, mperone1@verizon.net
tel (781) 587-0086 cell (781) 439-4999

Whiting Street (Route 53)
@ #19-#27 (west of Route 228)
City, State: Hingham, MA
Client: CHA/J. Morgan

05339Aclass
Site Code: 060903

Eastbound

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total
08/06/20	0	19	4	0	0	0	0	0	0	0	0	0	0	23
01:00	0	6	1	0	1	0	0	0	0	0	0	0	0	8
02:00	0	9	1	0	0	0	0	0	0	0	0	0	0	10
03:00	0	4	1	0	1	0	0	0	0	0	0	0	0	6
04:00	0	17	0	0	0	0	0	1	0	0	0	0	0	18
05:00	0	38	11	0	1	1	0	0	0	0	0	0	0	51
06:00	1	85	41	0	8	2	0	1	0	0	0	0	1	139
07:00	3	216	61	2	6	3	0	6	0	0	0	0	0	297
08:00	5	358	71	1	18	1	0	1	3	0	0	0	0	458
09:00	1	394	60	1	14	2	0	4	2	0	1	0	0	479
10:00	6	479	82	1	11	1	0	2	0	0	0	0	0	582
11:00	6	590	96	6	11	4	1	3	1	0	0	0	0	718
12 PM	11	684	102	2	13	2	0	5	0	0	0	0	0	819
13:00	3	679	110	3	20	3	0	2	0	0	0	0	0	820
14:00	8	696	115	5	14	6	0	2	0	0	0	0	0	846
15:00	9	722	127	2	12	2	0	2	0	0	0	0	0	876
16:00	9	725	103	3	17	1	1	2	0	0	0	0	0	861
17:00	8	716	98	1	13	0	0	2	0	1	0	0	0	839
18:00	7	502	70	1	17	0	0	0	1	0	0	0	0	598
19:00	3	328	38	1	7	1	0	0	0	0	0	0	0	378
20:00	0	250	30	2	8	0	0	0	0	0	0	0	0	290
21:00	1	134	16	1	4	0	0	0	0	0	0	0	0	156
22:00	0	92	12	0	1	0	0	0	0	0	0	0	0	105
23:00	1	53	6	0	0	1	0	0	0	0	0	0	0	61
Day Total	82	7796	1256	32	197	30	2	33	7	1	1	0	1	9438
Percent	0.9%	82.6%	13.3%	0.3%	2.1%	0.3%	0.0%	0.3%	0.1%	0.0%	0.0%	0.0%	0.0%	
AM Peak	10:00	11:00	11:00	11:00	08:00	11:00	11:00	07:00	08:00		09:00		06:00	11:00
Vol.	6	590	96	6	18	4	1	6	3		1		1	718
PM Peak	12:00	16:00	15:00	14:00	13:00	14:00	16:00	12:00	18:00	17:00				15:00
Vol.	11	725	127	5	20	6	1	5	1	1				876

Transportation Data Corporation

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Client: CHA/J. Morgan

05339Aclass
Site Code: 060903

Eastbound

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total
08/07/20	0	17	4	0	1	0	0	0	0	0	0	0	0	22
01:00	0	8	0	0	1	0	0	0	0	0	0	0	0	9
02:00	0	1	1	0	1	0	0	0	0	0	0	0	0	3
03:00	0	2	2	0	2	0	0	1	0	0	0	0	0	7
04:00	0	17	2	0	0	0	0	1	0	0	0	0	0	20
05:00	1	36	13	0	1	2	0	0	0	0	0	0	0	53
06:00	0	100	38	2	9	2	1	0	4	0	0	0	0	156
07:00	3	248	62	0	11	3	0	1	1	0	0	0	0	329
08:00	1	342	64	3	22	2	0	0	5	0	0	0	0	439
09:00	4	386	74	1	18	4	0	5	0	0	0	0	0	492
10:00	3	437	78	2	9	2	0	2	2	0	0	0	0	535
11:00	7	615	100	4	13	2	0	1	0	0	1	0	0	743
12 PM	4	664	97	3	11	2	0	1	0	0	0	0	0	782
13:00	11	758	101	1	21	0	1	1	0	0	1	0	0	895
14:00	13	796	121	2	15	1	1	2	0	0	0	0	0	951
15:00	14	773	118	3	11	0	0	1	1	0	1	0	0	922
16:00	4	735	111	2	16	2	1	0	0	0	0	0	0	871
17:00	12	676	100	1	14	0	0	2	0	0	1	0	0	806
18:00	6	476	68	2	10	0	0	1	0	0	0	0	0	563
19:00	4	386	48	2	7	0	0	0	0	0	0	0	0	447
20:00	3	248	26	0	9	0	0	0	0	0	0	0	0	286
21:00	2	127	16	0	3	0	0	0	0	0	0	0	0	148
22:00	1	84	7	1	6	0	0	0	0	0	0	0	0	99
23:00	0	44	8	0	1	0	0	0	1	0	0	0	0	54
Day Total	93	7976	1259	29	212	22	4	19	14	0	4	0	0	9632
Percent	1.0%	82.8%	13.1%	0.3%	2.2%	0.2%	0.0%	0.2%	0.1%	0.0%	0.0%	0.0%	0.0%	
AM Peak	11:00	11:00	11:00	11:00	08:00	09:00	06:00	09:00	08:00		11:00			11:00
Vol.	7	615	100	4	22	4	1	5	5		1			743
PM Peak	15:00	14:00	14:00	12:00	13:00	12:00	13:00	14:00	15:00		13:00			14:00
Vol.	14	796	121	3	21	2	1	2	1		1			951

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05339Aclass
Site Code: 060903

Eastbound

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total
08/08/20	0	25	6	0	2	0	0	0	0	0	0	0	0	33
01:00	0	10	1	0	2	0	0	0	0	0	0	0	0	13
02:00	1	4	3	0	0	0	0	0	0	0	0	0	0	8
03:00	0	3	2	1	1	0	0	1	0	0	0	0	0	8
04:00	0	7	0	1	0	0	0	0	0	0	0	0	0	8
05:00	0	18	3	0	1	0	0	1	0	0	0	0	0	23
06:00	0	60	24	2	2	0	0	0	0	0	0	0	0	88
07:00	2	152	37	0	5	3	0	2	0	0	1	0	0	202
08:00	2	251	52	3	7	4	0	4	0	0	0	0	0	323
09:00	0	365	60	3	9	3	0	2	0	0	0	0	0	442
10:00	3	448	60	0	19	1	0	1	0	0	1	0	0	533
11:00	4	623	89	2	13	0	0	2	1	0	1	0	0	735
12 PM	7	752	107	0	21	1	0	2	1	0	0	0	0	891
13:00	6	762	88	0	10	1	0	1	0	0	0	0	0	868
14:00	8	717	87	0	6	0	0	1	1	0	1	0	0	821
15:00	10	674	76	2	5	1	0	3	0	0	0	0	0	771
16:00	6	591	53	1	2	0	0	1	1	0	0	0	0	655
17:00	1	456	63	1	7	0	0	0	0	0	0	0	0	528
18:00	4	382	44	0	6	0	0	0	0	0	0	0	0	436
19:00	5	293	45	0	2	1	0	1	1	0	0	0	0	348
20:00	1	233	25	2	4	0	0	1	0	0	0	0	0	266
21:00	2	127	15	0	2	0	0	0	0	0	0	0	0	146
22:00	1	107	6	0	2	0	0	0	0	0	0	0	0	116
23:00	2	48	4	0	0	0	0	0	0	0	0	0	0	54
Day Total	65	7108	950	18	128	15	0	23	5	0	4	0	0	8316
Percent	0.8%	85.5%	11.4%	0.2%	1.5%	0.2%	0.0%	0.3%	0.1%	0.0%	0.0%	0.0%	0.0%	
AM Peak	11:00	11:00	11:00	08:00	10:00	08:00		08:00	11:00		07:00			11:00
Vol.	4	623	89	3	19	4		4	1		1			735
PM Peak	15:00	13:00	12:00	15:00	12:00	12:00		15:00	12:00		14:00			12:00
Vol.	10	762	107	2	21	1		3	1		1			891
Grand Total	240	22880	3465	79	537	67	6	75	26	1	9	0	1	27386
Percent	0.9%	83.5%	12.7%	0.3%	2.0%	0.2%	0.0%	0.3%	0.1%	0.0%	0.0%	0.0%	0.0%	

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Client: CHA/J. Morgan
Westbound

05339Aclass
Site Code: 060903

Start Time	Bikes	Cars & Trailers	2 Axle Long	Buses	2 Axle 6 Tire	3 Axle Single	4 Axle Single	<5 Axl Double	5 Axle Double	>6 Axl Double	<6 Axl Multi	6 Axle Multi	>6 Axl Multi	Total
08/06/20	0	17	3	0	0	0	0	0	0	0	0	0	0	20
01:00	0	8	0	0	0	0	0	1	0	0	0	0	0	9
02:00	0	8	1	0	0	0	0	0	0	0	0	0	0	9
03:00	2	7	4	0	2	0	0	0	0	0	0	0	0	15
04:00	1	25	21	0	2	0	0	0	0	0	0	0	0	49
05:00	5	133	49	0	15	1	0	0	1	0	0	0	0	204
06:00	5	225	93	1	13	2	0	1	2	0	0	0	0	342
07:00	2	360	84	3	12	4	1	5	0	0	0	0	0	471
08:00	5	444	94	2	16	1	0	3	3	0	0	0	0	568
09:00	4	469	106	3	15	1	1	3	0	0	0	0	0	602
10:00	4	554	87	2	14	4	1	2	2	0	0	0	0	670
11:00	7	594	100	5	15	0	0	5	1	0	0	0	0	727
12 PM	7	679	103	5	24	3	1	6	0	0	0	0	0	828
13:00	4	638	101	4	17	4	1	1	2	0	1	0	0	773
14:00	13	628	95	4	15	4	0	2	1	0	0	0	0	762
15:00	2	603	104	0	13	3	0	3	0	0	0	0	0	728
16:00	1	608	95	1	13	2	0	3	0	0	1	0	0	724
17:00	7	542	72	3	14	0	1	2	0	0	0	0	0	641
18:00	6	440	57	1	7	1	0	2	0	0	1	0	0	515
19:00	5	379	50	0	9	0	0	0	1	0	0	0	0	444
20:00	2	285	44	2	7	0	0	0	0	0	0	0	0	340
21:00	2	240	17	0	3	0	0	0	0	0	0	0	0	262
22:00	1	98	10	0	1	0	0	0	0	0	0	0	0	110
23:00	0	38	10	0	0	1	0	0	1	0	0	0	0	50
Day Total	85	8022	1400	36	227	31	6	39	14	0	3	0	0	9863
Percent	0.9%	81.3%	14.2%	0.4%	2.3%	0.3%	0.1%	0.4%	0.1%	0.0%	0.0%	0.0%	0.0%	
AM Peak	11:00	11:00	09:00	11:00	08:00	07:00	07:00	07:00	08:00					11:00
Vol.	7	594	106	5	16	4	1	5	3					727
PM Peak	14:00	12:00	15:00	12:00	12:00	13:00	12:00	12:00	13:00		13:00			12:00
Vol.	13	679	104	5	24	4	1	6	2		1			828

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08/07/20	0	18	2	0	0	0	0	0	0	0	0	0	0	20
01:00	0	7	0	0	1	0	0	0	0	0	0	0	0	8
02:00	0	8	2	0	0	0	0	0	0	0	0	0	0	10
03:00	2	9	3	0	2	1	0	0	0	0	0	0	0	17
04:00	2	29	12	0	4	0	0	1	0	0	0	0	0	48
05:00	4	148	48	0	12	1	0	0	0	0	0	0	0	213
06:00	2	228	103	1	15	3	0	1	3	0	0	0	0	356
07:00	1	300	93	1	18	3	1	5	0	0	0	0	0	422
08:00	4	420	92	2	17	3	1	7	0	0	0	0	0	546
09:00	5	460	91	3	18	0	0	3	0	0	0	0	0	580
10:00	7	494	96	3	14	3	0	2	0	0	1	0	0	620
11:00	8	644	100	0	14	1	0	3	0	0	0	0	0	770
12 PM	4	639	118	4	23	2	0	2	1	0	2	0	0	795
13:00	12	695	104	4	24	1	2	4	1	0	0	0	0	847
14:00	8	892	145	3	16	2	0	5	1	0	0	0	0	1072
15:00	6	776	113	3	17	0	0	0	0	0	0	0	0	915
16:00	4	619	85	0	17	2	0	7	1	0	0	0	0	735
17:00	2	537	65	4	13	0	0	4	0	0	0	0	0	625
18:00	3	497	66	0	8	0	0	2	0	0	1	0	0	577
19:00	5	320	43	1	9	1	0	1	0	0	0	0	0	380
20:00	5	232	36	0	4	0	0	0	0	0	0	0	0	277
21:00	3	136	17	1	3	1	0	0	0	0	0	0	0	161
22:00	0	113	6	0	4	0	0	0	1	0	0	0	0	124
23:00	0	49	5	0	2	0	0	0	0	0	0	0	0	56
Day Total	87	8270	1445	30	255	24	4	47	8	0	4	0	0	10174
Percent	0.9%	81.3%	14.2%	0.3%	2.5%	0.2%	0.0%	0.5%	0.1%	0.0%	0.0%	0.0%	0.0%	
AM Peak	11:00	11:00	06:00	09:00	07:00	06:00	07:00	08:00	06:00		10:00			11:00
Vol.	8	644	103	3	18	3	1	7	3		1			770
PM Peak	13:00	14:00	14:00	12:00	13:00	12:00	13:00	16:00	12:00		12:00			14:00
Vol.	12	892	145	4	24	2	2	7	1		2			1072

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08/08/20	0	33	3	0	2	0	0	0	0	0	0	0	0	38
01:00	1	7	3	0	1	0	0	0	0	0	0	0	0	12
02:00	0	8	1	0	0	0	0	0	0	0	0	0	0	9
03:00	0	8	3	0	2	0	0	0	0	0	0	0	0	13
04:00	1	17	6	1	2	0	0	0	0	0	0	0	0	27
05:00	1	47	11	0	4	0	0	0	0	0	0	0	0	63
06:00	2	125	23	0	5	2	0	0	0	0	0	0	0	157
07:00	2	187	65	0	4	0	4	2	0	0	0	0	0	264
08:00	3	249	55	0	7	3	1	5	0	0	0	0	0	323
09:00	5	406	70	3	12	0	0	0	0	0	0	0	0	496
10:00	9	576	88	1	18	0	0	3	0	0	0	0	0	695
11:00	2	618	86	0	15	0	1	6	1	0	0	0	0	729
12 PM	2	698	102	1	17	0	0	2	0	0	0	0	0	822
13:00	14	667	88	2	9	1	0	2	0	0	1	0	0	784
14:00	4	585	64	0	5	0	0	0	0	0	0	0	0	658
15:00	7	590	57	1	6	0	0	0	0	0	0	0	0	661
16:00	6	494	55	0	5	0	0	0	0	0	0	0	0	560
17:00	2	435	66	0	3	0	0	1	0	0	0	0	0	507
18:00	14	419	54	0	8	1	0	1	1	0	0	0	0	498
19:00	4	312	31	0	9	0	0	0	0	0	0	0	0	356
20:00	3	260	31	0	1	0	0	0	0	0	0	0	0	295
21:00	3	192	22	0	4	0	0	0	0	0	0	0	0	221
22:00	1	116	10	0	1	0	0	0	1	0	0	0	0	129
23:00	0	70	3	0	1	0	0	0	0	0	0	0	0	74
Day Total	86	7119	997	9	141	7	6	22	3	0	1	0	0	8391
Percent	1.0%	84.8%	11.9%	0.1%	1.7%	0.1%	0.1%	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%	
AM Peak	10:00	11:00	10:00	09:00	10:00	08:00	07:00	11:00	11:00					11:00
Vol.	9	618	88	3	18	3	4	6	1					729
PM Peak	13:00	12:00	12:00	13:00	12:00	13:00		12:00	18:00		13:00			12:00
Vol.	14	698	102	2	17	1		2	1		1			822
Grand Total	258	23411	3842	75	623	62	16	108	25	0	8	0	0	28428
Percent	0.9%	82.4%	13.5%	0.3%	2.2%	0.2%	0.1%	0.4%	0.1%	0.0%	0.0%	0.0%	0.0%	

Transportation Data Corporation

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Whiting Street (Route 53)
@ #19-#27 (west of Route 228)
City, State: Hingham, MA
Client: CHA/J. Morgan

05339Aspeed
Site Code: 060903

Eastbound															Total	85th Percent	95th Percent
Start Time	15	16	21	26	31	36	41	46	51	56	61	66	71				
08/06/20	0	0	0	1	7	11	3	1	0	0	0	0	0	23	40	44	
01:00	0	0	1	1	2	2	2	0	0	0	0	0	0	8	42	44	
02:00	0	0	0	0	3	3	2	2	0	0	0	0	0	10	46	48	
03:00	0	0	0	2	2	2	0	0	0	0	0	0	0	6	37	39	
04:00	0	0	0	0	7	7	2	2	0	0	0	0	0	18	43	47	
05:00	0	4	4	3	7	23	8	2	0	0	0	0	0	51	41	44	
06:00	3	5	9	10	29	41	33	9	0	0	0	0	0	139	43	46	
07:00	12	11	19	20	79	99	44	9	4	0	0	0	0	297	41	44	
08:00	9	8	29	49	142	151	65	4	0	1	0	0	0	458	40	43	
09:00	9	12	31	76	157	155	36	3	0	0	0	0	0	479	38	42	
10:00	15	12	45	99	211	162	34	4	0	0	0	0	0	582	38	41	
11:00	24	30	96	143	249	136	37	2	1	0	0	0	0	718	37	40	
12 PM	38	36	95	208	280	127	34	1	0	0	0	0	0	819	36	39	
13:00	73	61	131	176	227	121	29	2	0	0	0	0	0	820	36	39	
14:00	42	45	136	233	238	124	27	1	0	0	0	0	0	846	36	39	
15:00	65	48	99	234	274	130	24	2	0	0	0	0	0	876	35	39	
16:00	49	37	111	200	263	166	31	4	0	0	0	0	0	861	37	39	
17:00	42	34	86	192	249	188	44	4	0	0	0	0	0	839	37	40	
18:00	14	17	45	105	188	180	42	6	1	0	0	0	0	598	38	42	
19:00	4	5	13	41	134	132	39	10	0	0	0	0	0	378	39	43	
20:00	4	6	19	30	129	87	15	0	0	0	0	0	0	290	38	40	
21:00	0	1	5	14	55	64	15	2	0	0	0	0	0	156	39	43	
22:00	0	0	1	6	39	43	15	0	1	0	0	0	0	105	40	43	
23:00	3	0	2	5	22	19	10	0	0	0	0	0	0	61	40	43	
Total	406	372	977	1848	2993	2173	591	70	7	1	0	0	0	9438			
Percent	4.3%	3.9%	10.4%	19.6%	31.7%	23.0%	6.3%	0.7%	0.1%	0.0%	0.0%	0.0%	0.0%				
AM Peak	11:00	11:00	11:00	11:00	11:00	10:00	08:00	06:00	07:00	08:00				11:00			
Vol.	24	30	96	143	249	162	65	9	4	1				718			
PM Peak	13:00	13:00	14:00	15:00	12:00	17:00	17:00	19:00	18:00					15:00			
Vol.	73	61	136	234	280	188	44	10	1					876			

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Whiting Street (Route 53)
@ #19-#27 (west of Route 228)
City, State: Hingham, MA
Client: CHA/J. Morgan

05339Aspeed
Site Code: 060903

Start Time	1	16	21	26	31	36	41	46	51	56	61	66	71	Total	85th Percent	95th Percent
08/07/20	1	0	0	0	2	14	5	0	0	0	0	0	0	22	41	43
01:00	0	0	0	0	2	4	3	0	0	0	0	0	0	9	42	44
02:00	0	0	0	0	0	2	0	1	0	0	0	0	0	3	47	49
03:00	0	0	1	2	2	0	1	1	0	0	0	0	0	7	44	48
04:00	0	0	1	2	6	8	2	1	0	0	0	0	0	20	40	45
05:00	0	1	4	9	15	17	5	2	0	0	0	0	0	53	39	44
06:00	1	4	15	16	31	60	23	6	0	0	0	0	0	156	41	44
07:00	3	11	28	33	79	120	42	11	2	0	0	0	0	329	40	44
08:00	12	12	24	61	155	140	27	7	1	0	0	0	0	439	38	42
09:00	7	8	40	107	198	105	25	2	0	0	0	0	0	492	37	40
10:00	12	16	30	129	211	120	17	0	0	0	0	0	0	535	37	39
11:00	21	26	88	189	251	146	21	1	0	0	0	0	0	743	36	39
12 PM	171	99	120	163	153	69	6	0	1	0	0	0	0	782	33	37
13:00	161	109	133	225	193	65	9	0	0	0	0	0	0	895	33	37
14:00	146	113	149	240	186	97	19	1	0	0	0	0	0	951	34	38
15:00	200	115	184	225	146	42	8	2	0	0	0	0	0	922	32	35
16:00	50	39	116	232	241	166	22	4	1	0	0	0	0	871	36	39
17:00	21	21	64	164	289	198	47	2	0	0	0	0	0	806	38	40
18:00	8	12	34	78	179	189	58	3	2	0	0	0	0	563	39	43
19:00	7	10	19	73	155	156	26	0	0	1	0	0	0	447	38	40
20:00	5	9	10	31	116	96	19	0	0	0	0	0	0	286	38	41
21:00	0	1	6	17	44	60	18	2	0	0	0	0	0	148	39	43
22:00	1	1	2	8	25	47	14	0	1	0	0	0	0	99	40	43
23:00	0	1	0	6	16	19	7	5	0	0	0	0	0	54	42	47
Total	827	608	1068	2010	2695	1940	424	51	8	1	0	0	0	9632		
Percent	8.6%	6.3%	11.1%	20.9%	28.0%	20.1%	4.4%	0.5%	0.1%	0.0%	0.0%	0.0%	0.0%			
AM Peak	11:00	11:00	11:00	11:00	11:00	11:00	07:00	07:00	07:00					11:00		
Vol.	21	26	88	189	251	146	42	11	2					743		
PM Peak	15:00	15:00	15:00	14:00	17:00	17:00	18:00	23:00	18:00	19:00				14:00		
Vol.	200	115	184	240	289	198	58	5	2	1				951		

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Client: CHA/J. Morgan

05339Aspeed
Site Code: 060903

Start Time	1	16	21	26	31	36	41	46	51	56	61	66	71	Total	85th Percent	95th Percent
08/08/20	0	0	0	4	9	13	7	0	0	0	0	0	0	33	41	43
01:00	0	0	1	1	3	4	4	0	0	0	0	0	0	13	42	44
02:00	0	0	0	1	3	3	1	0	0	0	0	0	0	8	39	42
03:00	0	0	1	1	1	4	1	0	0	0	0	0	0	8	39	42
04:00	1	0	0	0	3	1	1	2	0	0	0	0	0	8	47	49
05:00	0	1	2	1	7	5	5	1	1	0	0	0	0	23	43	49
06:00	4	4	9	5	18	27	19	2	0	0	0	0	0	88	42	44
07:00	2	6	14	22	44	75	33	5	1	0	0	0	0	202	41	44
08:00	9	15	16	33	103	94	46	5	2	0	0	0	0	323	40	44
09:00	14	10	32	69	135	140	40	2	0	0	0	0	0	442	39	42
10:00	19	12	51	121	182	125	18	4	1	0	0	0	0	533	37	39
11:00	25	31	79	179	240	145	33	2	0	1	0	0	0	735	37	39
12 PM	34	41	120	232	287	150	27	0	0	0	0	0	0	891	36	39
13:00	40	49	120	212	257	154	31	5	0	0	0	0	0	868	36	39
14:00	27	21	74	203	287	177	29	2	1	0	0	0	0	821	37	39
15:00	26	21	55	147	281	192	46	2	1	0	0	0	0	771	38	41
16:00	21	11	32	106	264	173	42	6	0	0	0	0	0	655	38	41
17:00	19	11	24	73	175	176	40	9	1	0	0	0	0	528	39	42
18:00	5	4	16	53	164	141	44	9	0	0	0	0	0	436	39	43
19:00	5	5	18	35	117	130	30	7	1	0	0	0	0	348	39	43
20:00	3	3	17	31	99	91	16	4	1	1	0	0	0	266	39	42
21:00	1	0	4	10	54	63	12	2	0	0	0	0	0	146	39	42
22:00	0	0	1	8	42	45	18	2	0	0	0	0	0	116	40	43
23:00	0	1	1	5	19	21	4	1	2	0	0	0	0	54	39	46
Total	255	246	687	1552	2794	2149	547	72	12	2	0	0	0	8316		
Percent	3.1%	3.0%	8.3%	18.7%	33.6%	25.8%	6.6%	0.9%	0.1%	0.0%	0.0%	0.0%	0.0%			
AM Peak	11:00	11:00	11:00	11:00	11:00	11:00	08:00	07:00	08:00	11:00				11:00		
Vol.	25	31	79	179	240	145	46	5	2	1				735		
PM Peak	13:00	13:00	12:00	12:00	12:00	15:00	15:00	17:00	23:00	20:00				12:00		
Vol.	40	49	120	232	287	192	46	9	2	1				891		
Grand Total	1488	1226	2732	5410	8482	6262	1562	193	27	4	0	0	0	27386		
Percent	5.4%	4.5%	10.0%	19.8%	31.0%	22.9%	5.7%	0.7%	0.1%	0.0%	0.0%	0.0%	0.0%			

15th Percentile : 22 MPH
50th Percentile : 31 MPH
85th Percentile : 38 MPH
95th Percentile : 41 MPH

Stats
10 MPH Pace Speed : 31-40 MPH
Number of Vehicles > 35 MPH : 8048
Percent of Vehicles > 35 MPH : 29.4%
Mean Speed(Average) : 31 MPH

Transportation Data Corporation

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Whiting Street (Route 53)
@ #19-#27 (west of Route 228)
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Client: CHA/J. Morgan

05339Aspeed
Site Code: 060903

Westbound

Start Time	15	16	21	26	31	36	41	46	51	56	61	66	71	Total	85th Percent	95th Percent
08/06/20	0	0	0	2	4	6	7	1	0	0	0	0	0	20	43	45
01:00	0	0	0	0	3	3	2	1	0	0	0	0	0	9	44	47
02:00	0	0	0	1	5	1	1	1	0	0	0	0	0	9	43	47
03:00	0	0	0	0	3	7	4	0	0	0	1	0	0	15	43	61
04:00	1	0	0	2	8	20	14	3	0	1	0	0	0	49	43	47
05:00	0	1	4	5	37	68	71	15	3	0	0	0	0	204	44	47
06:00	4	1	12	32	51	142	81	15	3	1	0	0	0	342	43	45
07:00	17	12	24	31	72	174	121	18	2	0	0	0	0	471	42	44
08:00	16	8	15	41	130	248	99	10	1	0	0	0	0	568	41	44
09:00	22	11	21	59	168	234	83	4	0	0	0	0	0	602	39	43
10:00	16	17	35	91	178	258	62	11	1	1	0	0	0	670	39	43
11:00	27	17	42	81	207	271	73	9	0	0	0	0	0	727	39	43
12 PM	24	14	42	102	290	275	71	9	1	0	0	0	0	828	39	42
13:00	30	18	28	78	263	285	61	7	2	1	0	0	0	773	39	42
14:00	25	12	39	93	256	250	79	8	0	0	0	0	0	762	39	43
15:00	32	14	42	53	212	299	66	10	0	0	0	0	0	728	39	43
16:00	19	13	25	67	195	303	89	13	0	0	0	0	0	724	39	43
17:00	22	6	14	46	185	280	82	5	0	1	0	0	0	641	39	43
18:00	15	10	12	31	154	208	81	4	0	0	0	0	0	515	40	43
19:00	5	8	12	34	107	213	62	3	0	0	0	0	0	444	39	43
20:00	3	2	7	21	116	140	45	5	1	0	0	0	0	340	40	43
21:00	2	5	1	6	58	141	42	6	1	0	0	0	0	262	41	44
22:00	1	2	4	2	29	47	21	4	0	0	0	0	0	110	42	44
23:00	0	2	0	3	13	23	7	1	1	0	0	0	0	50	41	44
Total	281	173	379	881	2744	3896	1324	163	16	5	1	0	0	9863		
Percent	2.8%	1.8%	3.8%	8.9%	27.8%	39.5%	13.4%	1.7%	0.2%	0.1%	0.0%	0.0%	0.0%			
AM Peak	11:00	10:00	11:00	10:00	11:00	11:00	07:00	07:00	05:00	04:00	03:00			11:00		
Vol.	27	17	42	91	207	271	121	18	3	1	1			727		
PM Peak	15:00	13:00	12:00	12:00	12:00	16:00	16:00	16:00	13:00	13:00				12:00		
Vol.	32	18	42	102	290	303	89	13	2	1				828		

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Client: CHA/J. Morgan

05339Aspeed
Site Code: 060903

Westbound

Start Time	15	16	21	26	31	36	41	46	51	56	61	66	71	Total	85th Percent	95th Percent
08/07/20	1	0	1	2	4	9	3	0	0	0	0	0	0	20	40	43
01:00	0	0	1	0	3	3	0	1	0	0	0	0	0	8	39	47
02:00	0	0	0	0	6	1	3	0	0	0	0	0	0	10	42	44
03:00	0	0	0	2	5	2	5	2	1	0	0	0	0	17	46	50
04:00	0	0	1	2	7	14	18	4	1	1	0	0	0	48	44	49
05:00	1	0	1	4	32	93	67	14	1	0	0	0	0	213	43	46
06:00	3	2	6	26	42	155	99	22	1	0	0	0	0	356	43	46
07:00	10	2	14	30	80	177	92	12	2	3	0	0	0	422	42	44
08:00	10	5	21	50	139	222	85	14	0	0	0	0	0	546	41	44
09:00	13	5	18	45	139	287	66	7	0	0	0	0	0	580	39	43
10:00	22	11	20	55	181	259	65	7	0	0	0	0	0	620	39	43
11:00	23	16	35	99	231	289	68	8	1	0	0	0	0	770	39	42
12 PM	38	35	54	132	240	227	61	8	0	0	0	0	0	795	38	42
13:00	54	25	54	105	314	236	54	2	3	0	0	0	0	847	38	41
14:00	63	28	62	159	333	335	78	13	1	0	0	0	0	1072	38	42
15:00	32	21	38	92	307	337	78	8	2	0	0	0	0	915	39	42
16:00	19	11	36	78	206	294	74	16	1	0	0	0	0	735	39	43
17:00	20	4	16	25	178	290	75	15	2	0	0	0	0	625	39	44
18:00	15	9	13	32	167	233	96	11	1	0	0	0	0	577	41	44
19:00	8	6	11	30	85	185	46	8	1	0	0	0	0	380	39	43
20:00	1	2	4	15	93	126	29	7	0	0	0	0	0	277	39	43
21:00	0	4	7	5	39	70	32	4	0	0	0	0	0	161	41	44
22:00	1	4	4	7	29	52	20	7	0	0	0	0	0	124	42	45
23:00	0	4	0	1	15	22	9	5	0	0	0	0	0	56	43	47
Total	334	194	417	996	2875	3918	1223	195	18	4	0	0	0	10174		
Percent	3.3%	1.9%	4.1%	9.8%	28.3%	38.5%	12.0%	1.9%	0.2%	0.0%	0.0%	0.0%	0.0%			
AM Peak	11:00	11:00	11:00	11:00	11:00	11:00	06:00	06:00	07:00	07:00				11:00		
Vol.	23	16	35	99	231	289	99	22	2	3				770		
PM Peak	14:00	12:00	14:00	14:00	14:00	15:00	18:00	16:00	13:00					14:00		
Vol.	63	35	62	159	333	337	96	16	3					1072		

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Client: CHA/J. Morgan

05339Aspeed
Site Code: 060903

Westbound

Start Time	1	16	21	26	31	36	41	46	51	56	61	66	71	Total	85th Percent	95th Percent
08/08/20	2	0	0	0	10	15	9	1	1	0	0	0	0	38	42	45
01:00	0	0	0	0	4	4	1	3	0	0	0	0	0	12	47	49
02:00	0	0	0	2	4	1	2	0	0	0	0	0	0	9	41	43
03:00	0	0	0	1	3	4	3	2	0	0	0	0	0	13	45	48
04:00	0	2	0	1	3	9	9	3	0	0	0	0	0	27	44	47
05:00	0	0	3	5	7	25	15	7	0	0	1	0	0	63	44	48
06:00	2	0	3	12	27	61	40	10	2	0	0	0	0	157	43	47
07:00	3	1	9	11	55	101	69	12	3	0	0	0	0	264	43	45
08:00	3	2	13	34	59	133	70	7	2	0	0	0	0	323	42	44
09:00	10	8	25	51	115	233	49	5	0	0	0	0	0	496	39	42
10:00	27	18	27	79	225	249	63	7	0	0	0	0	0	695	39	42
11:00	26	30	63	79	196	257	73	5	0	0	0	0	0	729	39	42
12 PM	30	22	54	78	235	309	83	11	0	0	0	0	0	822	39	43
13:00	31	26	35	64	239	299	79	9	1	1	0	0	0	784	39	43
14:00	13	18	33	47	197	245	95	7	2	1	0	0	0	658	40	43
15:00	14	7	24	44	197	278	82	15	0	0	0	0	0	661	39	43
16:00	17	8	19	26	147	233	102	4	3	1	0	0	0	560	41	44
17:00	6	10	13	30	124	242	68	11	2	0	1	0	0	507	40	44
18:00	8	3	6	22	123	231	87	13	3	2	0	0	0	498	41	44
19:00	5	0	6	19	100	150	67	6	2	1	0	0	0	356	41	44
20:00	2	8	7	21	87	125	40	3	1	1	0	0	0	295	40	43
21:00	1	10	3	12	71	89	29	5	1	0	0	0	0	221	40	44
22:00	1	3	5	6	35	55	21	2	1	0	0	0	0	129	41	44
23:00	0	1	1	7	15	35	13	2	0	0	0	0	0	74	41	44
Total	201	177	349	651	2278	3383	1169	150	24	7	2	0	0	8391		
Percent	2.4%	2.1%	4.2%	7.8%	27.1%	40.3%	13.9%	1.8%	0.3%	0.1%	0.0%	0.0%	0.0%			
AM Peak	10:00	11:00	11:00	10:00	10:00	11:00	11:00	07:00	07:00			05:00		11:00		
Vol.	27	30	63	79	225	257	73	12	3			1		729		
PM Peak	13:00	13:00	12:00	12:00	13:00	12:00	16:00	15:00	16:00	18:00	17:00			12:00		
Vol.	31	26	54	78	239	309	102	15	3	2	1			822		
Grand Total	816	544	1145	2528	7897	11197	3716	508	58	16	3	0	0	28428		
Percent	2.9%	1.9%	4.0%	8.9%	27.8%	39.4%	13.1%	1.8%	0.2%	0.1%	0.0%	0.0%	0.0%			

15th Percentile : 28 MPH
50th Percentile : 35 MPH
85th Percentile : 40 MPH
95th Percentile : 43 MPH

Stats 10 MPH Pace Speed : 31-40 MPH

Number of Vehicles > 35 MPH : 15498
Percent of Vehicles > 35 MPH : 54.5%
Mean Speed(Average) : 35 MPH

Transportation Data Corporation

Whiting Street (Route 53)
 @ #19-#27 (west of Route 228)
 City, State: Hingham, MA
 Client: CHA/J. Morgan

Mario Perone, mperone1@verizon.net
 tel (781) 587-0086 cell (781) 439-4999

05339Avolume
 Site Code: 060903

Start Time	06-Aug-20 Thu		EB		WB		Combined		07-Aug Fri		EB		WB		Combined	
	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.
12:00	11	210	9	224	20	434	10	204	11	203	21	407				
12:15	5	207	4	206	9	413	4	212	5	208	9	420				
12:30	5	200	6	215	11	415	4	183	2	181	6	364				
12:45	2	202	1	183	3	385	4	183	2	203	6	386				
01:00	4	203	2	206	6	409	4	237	2	216	6	453				
01:15	1	230	4	182	5	412	1	211	2	204	3	415				
01:30	3	186	2	202	5	388	1	226	1	217	2	443				
01:45	0	201	1	183	1	384	3	221	3	210	6	431				
02:00	4	200	2	197	6	397	1	230	3	242	4	472				
02:15	1	211	2	200	3	411	1	270	3	283	4	553				
02:30	3	214	3	182	6	396	1	220	3	282	4	502				
02:45	2	221	2	183	4	404	0	231	1	265	1	496				
03:00	1	244	2	170	3	414	1	239	2	252	3	491				
03:15	1	217	3	191	4	408	2	236	2	248	4	484				
03:30	1	218	5	175	6	393	2	232	6	236	8	468				
03:45	3	197	5	192	8	389	2	215	7	179	9	394				
04:00	2	219	3	191	5	410	4	231	5	183	9	414				
04:15	8	220	8	186	16	406	2	200	9	177	11	377				
04:30	2	207	13	176	15	383	5	219	12	183	17	402				
04:45	6	215	25	171	31	386	9	221	22	192	31	413				
05:00	7	214	38	164	45	378	6	209	41	137	47	346				
05:15	12	235	59	141	71	376	15	221	53	175	68	396				
05:30	14	203	40	181	54	384	15	180	53	156	68	336				
05:45	18	187	67	155	85	342	17	196	66	157	83	353				
06:00	22	191	61	153	83	344	22	150	85	148	107	298				
06:15	25	146	82	131	107	277	32	168	82	137	114	305				
06:30	51	135	93	135	144	270	50	119	92	131	142	250				
06:45	41	126	106	96	147	222	52	126	97	161	149	287				
07:00	52	104	91	116	143	220	55	120	79	116	134	236				
07:15	67	94	111	117	178	211	78	105	106	88	184	193				
07:30	70	94	125	119	195	213	81	107	122	97	203	204				
07:45	108	86	144	92	252	178	115	115	115	79	230	194				
08:00	105	81	130	95	235	176	94	83	129	75	223	158				
08:15	104	85	140	82	244	167	96	81	119	75	215	156				
08:30	117	55	136	86	253	141	124	56	159	70	283	126				
08:45	132	69	162	77	294	146	125	66	139	57	264	123				
09:00	128	56	156	87	284	143	121	41	161	37	282	78				
09:15	106	35	122	68	228	103	125	38	111	42	236	80				
09:30	118	26	152	67	270	93	113	28	164	42	277	70				
09:45	127	39	172	40	299	79	133	41	144	40	277	81				
10:00	155	34	139	29	294	63	120	31	131	37	251	68				
10:15	133	37	163	34	296	71	148	22	164	32	312	54				
10:30	146	18	193	34	339	52	127	22	147	29	274	51				
10:45	148	16	175	13	323	29	140	24	178	26	318	50				
11:00	164	25	161	18	325	43	177	16	172	22	349	38				
11:15	168	15	190	15	358	30	159	16	186	10	345	26				
11:30	182	15	180	13	362	28	195	14	202	11	397	25				
11:45	204	6	196	4	400	10	212	8	210	13	422	21				
Total	2789	6649	3686	6177	6475	12826	2808	6824	3610	6564	6418	13388				
Day Total	9438		9863		19301		9632		10174		19806					
% Total	14.5%	34.4%	19.1%	32.0%			14.2%	34.5%	18.2%	33.1%						
Peak	-	11:00	02:45	11:00	12:00	11:00	12:00	-	11:00	02:15	11:00	02:15				
Vol.	-	718	900	727	828	1445	1647	-	743	960	770	1082				
P.H.F.		0.880	0.922	0.927	0.924	0.903	0.949		0.876	0.889	0.917	0.956				

Transportation Data Corporation

Whiting Street (Route 53)
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 Client: CHA/J. Morgan

Mario Perone, mperone1@verizon.net
 tel (781) 587-0086 cell (781) 439-4999

05339Avolume
 Site Code: 060903

Start Time	06-Aug-20 Thu	EB		Hour Totals		WB		Hour Totals		Combined Totals	
		Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon
12:00		11	210			9	224				
12:15		5	207			4	206				
12:30		5	200			6	215				
12:45		2	202	23	819	1	183	20	828	43	1647
01:00		4	203			2	206				
01:15		1	230			4	182				
01:30		3	186			2	202				
01:45		0	201	8	820	1	183	9	773	17	1593
02:00		4	200			2	197				
02:15		1	211			2	200				
02:30		3	214			3	182				
02:45		2	221	10	846	2	183	9	762	19	1608
03:00		1	244			2	170				
03:15		1	217			3	191				
03:30		1	218			5	175				
03:45		3	197	6	876	5	192	15	728	21	1604
04:00		2	219			3	191				
04:15		8	220			8	186				
04:30		2	207			13	176				
04:45		6	215	18	861	25	171	49	724	67	1585
05:00		7	214			38	164				
05:15		12	235			59	141				
05:30		14	203			40	181				
05:45		18	187	51	839	67	155	204	641	255	1480
06:00		22	191			61	153				
06:15		25	146			82	131				
06:30		51	135			93	135				
06:45		41	126	139	598	106	96	342	515	481	1113
07:00		52	104			91	116				
07:15		67	94			111	117				
07:30		70	94			125	119				
07:45		108	86	297	378	144	92	471	444	768	822
08:00		105	81			130	95				
08:15		104	85			140	82				
08:30		117	55			136	86				
08:45		132	69	458	290	162	77	568	340	1026	630
09:00		128	56			156	87				
09:15		106	35			122	68				
09:30		118	26			152	67				
09:45		127	39	479	156	172	40	602	262	1081	418
10:00		155	34			139	29				
10:15		133	37			163	34				
10:30		146	18			193	34				
10:45		148	16	582	105	175	13	670	110	1252	215
11:00		164	25			161	18				
11:15		168	15			190	15				
11:30		182	15			180	13				
11:45		204	6	718	61	196	4	727	50	1445	111
Total		2789	6649			3686	6177			6475	12826
Combined Total		9438				9863				19301	
Percentage	0.0%										

Transportation Data Corporation

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Whiting Street (Route 53)
@ #19-#27 (west of Route 228)
City, State: Hingham, MA
Client: CHA/J. Morgan

05339Avolume
Site Code: 060903

Start Time	07-Aug-20 Fri	EB		Hour Totals		WB		Hour Totals		Combined Totals	
		Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon
12:00		10	204			11	203				
12:15		4	212			5	208				
12:30		4	183			2	181				
12:45		4	183	22	782	2	203	20	795	42	1577
01:00		4	237			2	216				
01:15		1	211			2	204				
01:30		1	226			1	217				
01:45		3	221	9	895	3	210	8	847	17	1742
02:00		1	230			3	242				
02:15		1	270			3	283				
02:30		1	220			3	282				
02:45		0	231	3	951	1	265	10	1072	13	2023
03:00		1	239			2	252				
03:15		2	236			2	248				
03:30		2	232			6	236				
03:45		2	215	7	922	7	179	17	915	24	1837
04:00		4	231			5	183				
04:15		2	200			9	177				
04:30		5	219			12	183				
04:45		9	221	20	871	22	192	48	735	68	1606
05:00		6	209			41	137				
05:15		15	221			53	175				
05:30		15	180			53	156				
05:45		17	196	53	806	66	157	213	625	266	1431
06:00		22	150			85	148				
06:15		32	168			82	137				
06:30		50	119			92	131				
06:45		52	126	156	563	97	161	356	577	512	1140
07:00		55	120			79	116				
07:15		78	105			106	88				
07:30		81	107			122	97				
07:45		115	115	329	447	115	79	422	380	751	827
08:00		94	83			129	75				
08:15		96	81			119	75				
08:30		124	56			159	70				
08:45		125	66	439	286	139	57	546	277	985	563
09:00		121	41			161	37				
09:15		125	38			111	42				
09:30		113	28			164	42				
09:45		133	41	492	148	144	40	580	161	1072	309
10:00		120	31			131	37				
10:15		148	22			164	32				
10:30		127	22			147	29				
10:45		140	24	535	99	178	26	620	124	1155	223
11:00		177	16			172	22				
11:15		159	16			186	10				
11:30		195	14			202	11				
11:45		212	8	743	54	210	13	770	56	1513	110
Total		2808	6824			3610	6564			6418	13388
Combined Total		9632				10174				19806	
Percentage	0.0%										

APPENDIX D

Norwell Traffic Impact Study



Norwell Traffic Impact Study

Route 53 (Washington St) and Route 228 (Pond St)

October 23, 2019

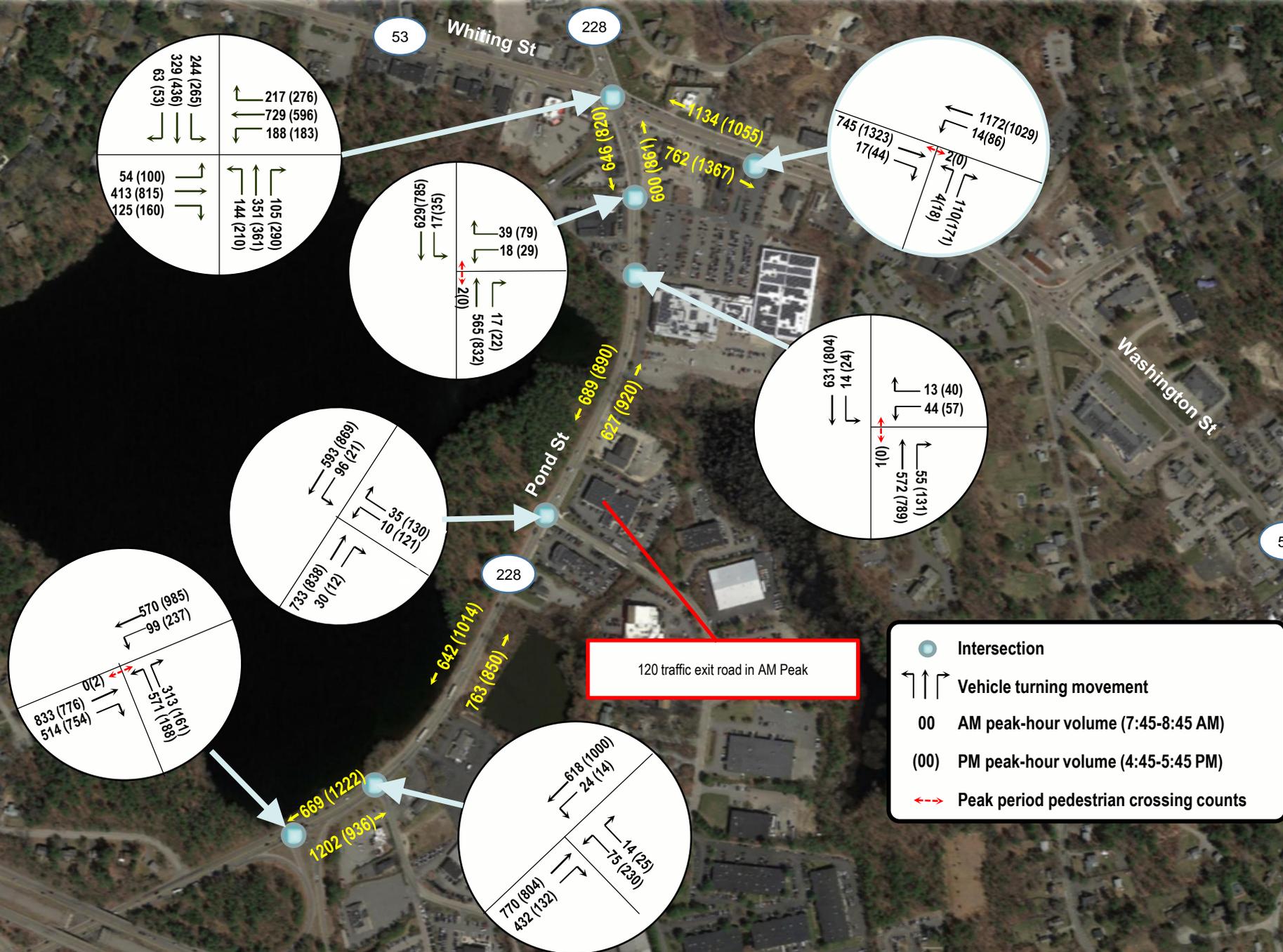
Seth Asante, Mark Abbott, and Chaopeng Hu

Boston Region Metropolitan Planning Organization

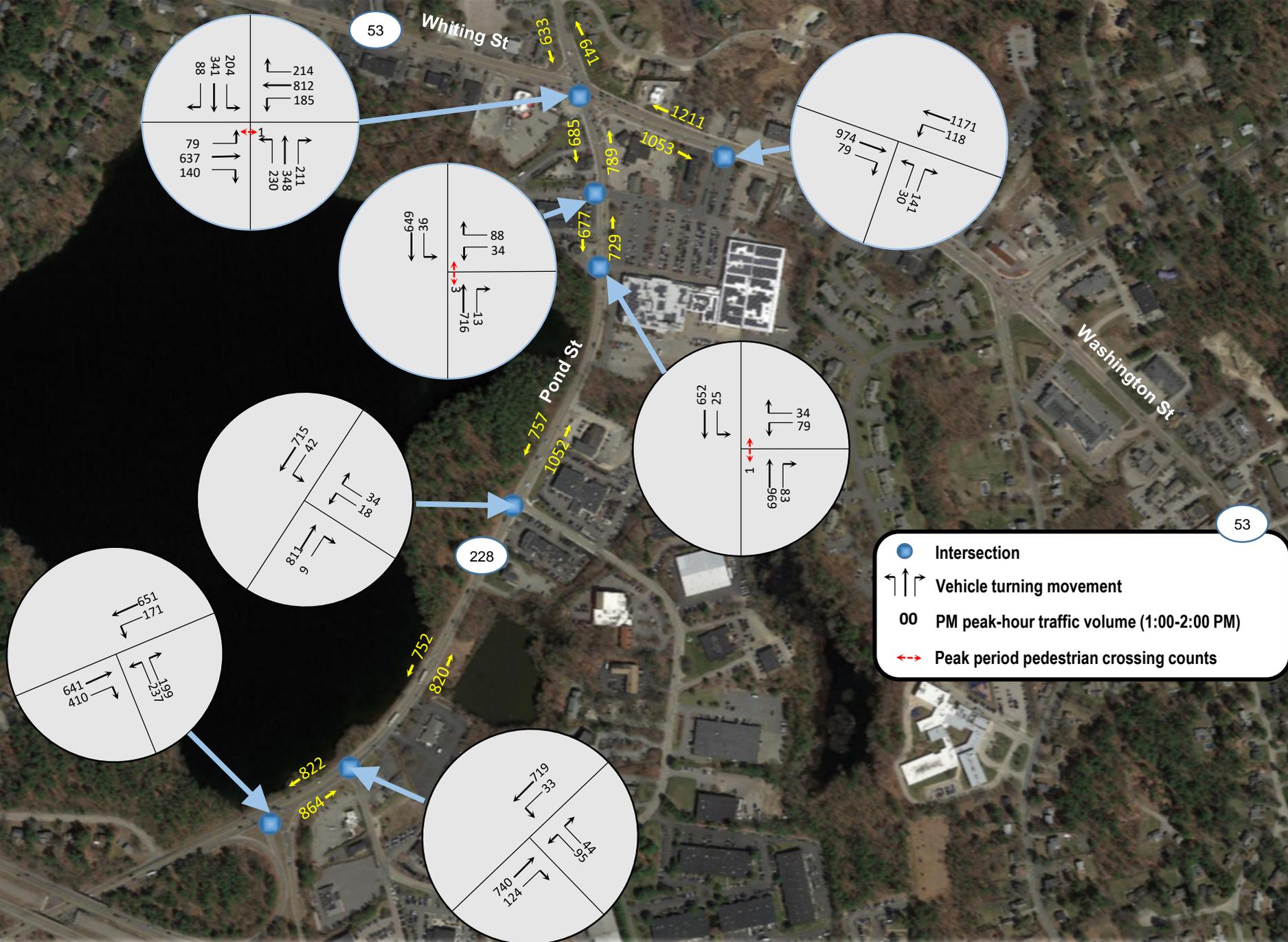
Traffic Count Location Map



Weekday AM+PM Peak-Hour Volumes



Weekend PM Peak-Hour Volumes



APPENDIX E

Capacity Analysis Worksheets

Intersection						
Int Delay, s/veh	0.1					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑			↑
Traffic Vol, veh/h	0	650	793	0	0	13
Future Vol, veh/h	0	650	793	0	0	13
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	0	0
Mvmt Flow	0	707	862	0	0	14

Major/Minor	Major1	Major2	Minor2			
Conflicting Flow All	-	0	-	0	-	431
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.9
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.3
Pot Cap-1 Maneuver	0	-	-	0	0	578
Stage 1	0	-	-	0	0	-
Stage 2	0	-	-	0	0	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	-	-	-	578
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	11.4
HCM LOS			B

Minor Lane/Major Mvmt	EBT	WBT	SBLn1
Capacity (veh/h)	-	-	578
HCM Lane V/C Ratio	-	-	0.024
HCM Control Delay (s)	-	-	11.4
HCM Lane LOS	-	-	B
HCM 95th %tile Q(veh)	-	-	0.1

Intersection						
Int Delay, s/veh	1.2					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑		↑↑	
Traffic Vol, veh/h	37	613	772	21	25	21
Future Vol, veh/h	37	613	772	21	25	21
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	0	0
Mvmt Flow	40	666	839	23	27	23

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	862	0	-	0	1264 431
Stage 1	-	-	-	-	851 -
Stage 2	-	-	-	-	413 -
Critical Hdwy	4.14	-	-	-	6.8 6.9
Critical Hdwy Stg 1	-	-	-	-	5.8 -
Critical Hdwy Stg 2	-	-	-	-	5.8 -
Follow-up Hdwy	2.22	-	-	-	3.5 3.3
Pot Cap-1 Maneuver	776	-	-	-	164 578
Stage 1	-	-	-	-	384 -
Stage 2	-	-	-	-	642 -
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	776	-	-	-	151 578
Mov Cap-2 Maneuver	-	-	-	-	151 -
Stage 1	-	-	-	-	353 -
Stage 2	-	-	-	-	642 -

Approach	EB	WB	SB
HCM Control Delay, s	0.9	0	25.2
HCM LOS			D

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	776	-	-	-	228
HCM Lane V/C Ratio	0.052	-	-	-	0.219
HCM Control Delay (s)	9.9	0.4	-	-	25.2
HCM Lane LOS	A	A	-	-	D
HCM 95th %tile Q(veh)	0.2	-	-	-	0.8

Intersection						
Int Delay, s/veh	0.5					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑		↑↑	
Traffic Vol, veh/h	4	634	1063	21	16	8
Future Vol, veh/h	4	634	1063	21	16	8
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	0	0
Mvmt Flow	4	689	1155	23	17	9

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	1178	0	-	0	1520 589
Stage 1	-	-	-	-	1167 -
Stage 2	-	-	-	-	353 -
Critical Hdwy	4.14	-	-	-	6.8 6.9
Critical Hdwy Stg 1	-	-	-	-	5.8 -
Critical Hdwy Stg 2	-	-	-	-	5.8 -
Follow-up Hdwy	2.22	-	-	-	3.5 3.3
Pot Cap-1 Maneuver	589	-	-	-	112 457
Stage 1	-	-	-	-	262 -
Stage 2	-	-	-	-	688 -
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	589	-	-	-	111 457
Mov Cap-2 Maneuver	-	-	-	-	111 -
Stage 1	-	-	-	-	259 -
Stage 2	-	-	-	-	688 -

Approach	EB	WB	SB
HCM Control Delay, s	0.2	0	34.5
HCM LOS			D

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	589	-	-	-	148
HCM Lane V/C Ratio	0.007	-	-	-	0.176
HCM Control Delay (s)	11.2	0.1	-	-	34.5
HCM Lane LOS	B	A	-	-	D
HCM 95th %tile Q(veh)	0	-	-	-	0.6

Intersection						
Int Delay, s/veh	0.1					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑			↑
Traffic Vol, veh/h	0	1114	925	0	0	14
Future Vol, veh/h	0	1114	925	0	0	14
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	0	0
Mvmt Flow	0	1211	1005	0	0	15

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	-	0	0
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	-	6.9
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	-	3.3
Pot Cap-1 Maneuver	0	-	0
Stage 1	0	-	0
Stage 2	0	-	0
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	-	519
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	12.1
HCM LOS			B

Minor Lane/Major Mvmt	EBT	WBT	SBLn1
Capacity (veh/h)	-	-	519
HCM Lane V/C Ratio	-	-	0.029
HCM Control Delay (s)	-	-	12.1
HCM Lane LOS	-	-	B
HCM 95th %tile Q(veh)	-	-	0.1

Intersection						
Int Delay, s/veh	2.2					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑		↑↑	
Traffic Vol, veh/h	41	1073	902	23	28	23
Future Vol, veh/h	41	1073	902	23	28	23
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	0	0
Mvmt Flow	45	1166	980	25	30	25

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	1005	0	-	0	1666 503
Stage 1	-	-	-	-	993 -
Stage 2	-	-	-	-	673 -
Critical Hdwy	4.14	-	-	-	6.8 6.9
Critical Hdwy Stg 1	-	-	-	-	5.8 -
Critical Hdwy Stg 2	-	-	-	-	5.8 -
Follow-up Hdwy	2.22	-	-	-	3.5 3.3
Pot Cap-1 Maneuver	685	-	-	-	89 519
Stage 1	-	-	-	-	324 -
Stage 2	-	-	-	-	474 -
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	685	-	-	-	72 519
Mov Cap-2 Maneuver	-	-	-	-	72 -
Stage 1	-	-	-	-	263 -
Stage 2	-	-	-	-	474 -

Approach	EB	WB	SB
HCM Control Delay, s	1.3	0	60
HCM LOS			F

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	685	-	-	-	118
HCM Lane V/C Ratio	0.065	-	-	-	0.47
HCM Control Delay (s)	10.6	0.9	-	-	60
HCM Lane LOS	B	A	-	-	F
HCM 95th %tile Q(veh)	0.2	-	-	-	2.1

Intersection						
Int Delay, s/veh	0.6					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑		↑↑	
Traffic Vol, veh/h	5	1096	916	23	18	9
Future Vol, veh/h	5	1096	916	23	18	9
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	0	0
Mvmt Flow	5	1191	996	25	20	10

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	1021	0	-	0	1615 511
Stage 1	-	-	-	-	1009 -
Stage 2	-	-	-	-	606 -
Critical Hdwy	4.14	-	-	-	6.8 6.9
Critical Hdwy Stg 1	-	-	-	-	5.8 -
Critical Hdwy Stg 2	-	-	-	-	5.8 -
Follow-up Hdwy	2.22	-	-	-	3.5 3.3
Pot Cap-1 Maneuver	675	-	-	-	97 513
Stage 1	-	-	-	-	318 -
Stage 2	-	-	-	-	513 -
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	675	-	-	-	95 513
Mov Cap-2 Maneuver	-	-	-	-	95 -
Stage 1	-	-	-	-	311 -
Stage 2	-	-	-	-	513 -

Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	40.6
HCM LOS			E

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	675	-	-	-	130
HCM Lane V/C Ratio	0.008	-	-	-	0.226
HCM Control Delay (s)	10.4	0.1	-	-	40.6
HCM Lane LOS	B	A	-	-	E
HCM 95th %tile Q(veh)	0	-	-	-	0.8