157-169 Lowland Street, Holliston, MA

Traffic Impact Assessment

Prepared for
Town of Holliston

Prepared by
Howard Stein Hudson

September 2022

HOWARD STEIN HUDSON

Engineers + Planners

TO:	Henrique Oliveira, Master Paving	DATE:	September 30, 2022
FROM:	Keri Pyke, P.E., PTOE Melissa Restrepo	HSH PROJECT NO.:	2022135.00
SUBJECT:	Traffic Impact Assessment 157-165 Lowland Street, Holliston, Massachusetts		

Introduction

This memorandum, prepared by ***Howard Stein Hudson (HSH),*** describes the traffic impacts of the proposed expansion of pavement processing and paving services facility at 157-165 Lowland Street (hereinafter the "Project" or "Project Site") located in Holliston, Massachusetts. This traffic impact assessment follows the methodology provide below:

- The Existing (2022) Condition analysis includes an inventory of the existing transportation conditions such as roadway characteristics, site conditions, and crash data. Existing traffic counts were collected at the study area intersection. The traffic data collection effort forms the basis for the transportation analysis conducted as part of this evaluation.
- The future transportation conditions analysis evaluates potential transportation impacts associated with the Project. The long-term transportation impacts are evaluated for the year 2029, based on a seven-year horizon from the year of the filing of this traffic study.
- The No-build (2029) Condition analysis includes general background traffic growth, traffic growth associated with specific developments (not including this Project), and transportation improvements that are planned in the vicinity of the Project Site.
- The Build (2029) Condition analysis includes a net increase in traffic volume due to the addition of Project-generated trip estimates to the traffic volumes developed as part of the No-build (2029) Condition analysis. The transportation study identifies any expected roadway impacts.
- The final part of the transportation study identifies measures to mitigate Project-related impacts and to address any traffic, safety, or construction-related issues that are necessary to accommodate the Project.

Project Description

The Project aims to improve the current pavement recycling process with new additional equipment, as well as providing parking for the paving operations trucks in a new building. The Project will limit the recycling process to cleaner concrete and asphalt pavement and eliminate bricks and other

earth materials including wood chips and loam. The new building will primarily serve as parking for the paving trucks and repair space for the equipment on-site.

Study Area

The study area includes one unsignalized intersection, shown in **Figure 1**, at Washington Street/Whitney Street.

Existing Condition

This section includes descriptions of existing study area roadway geometries, intersection traffic control, peak-hour vehicular volumes, and crash data.

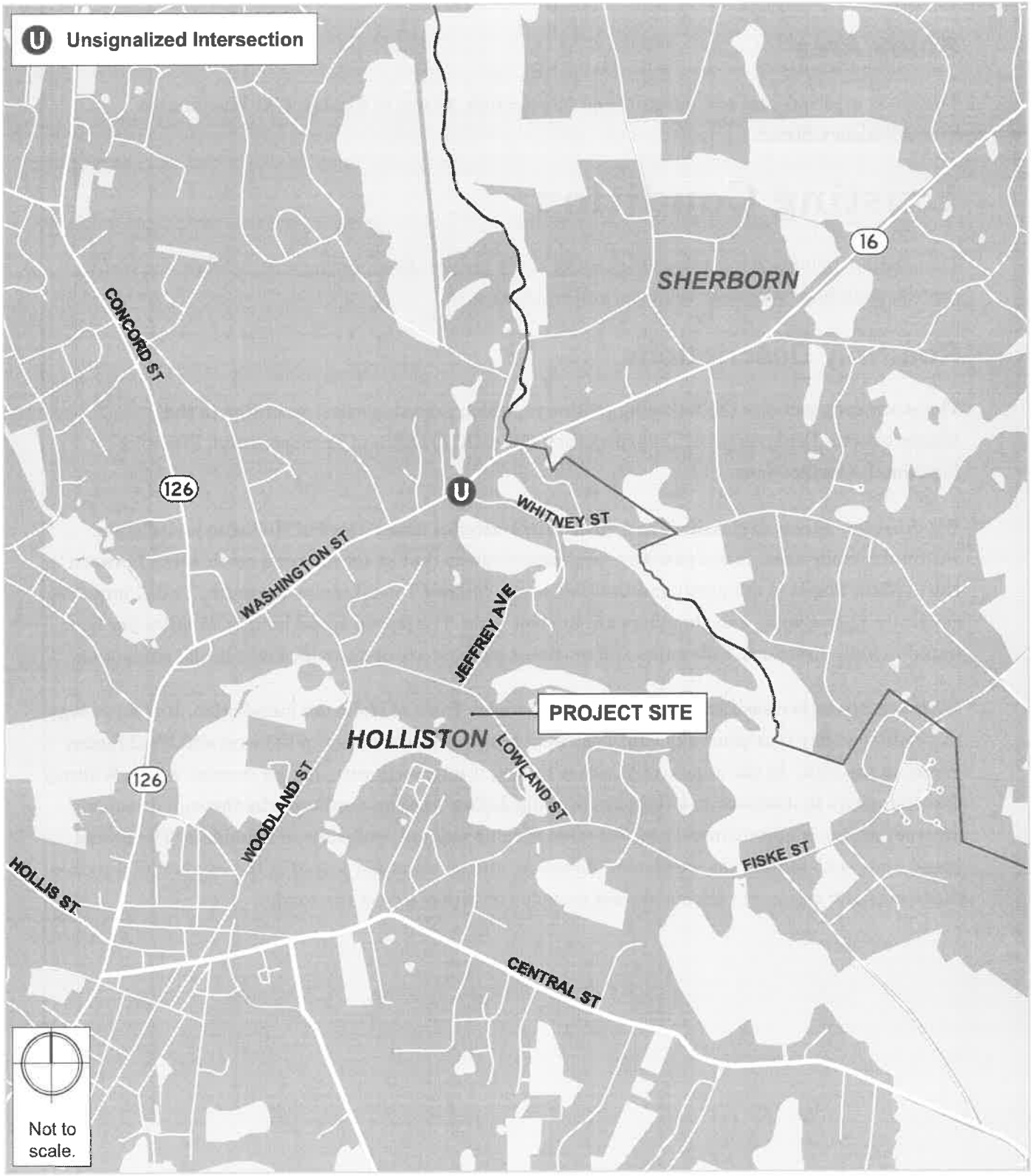
Roadway Descriptions

The study area includes the following roadways, which are categorized according to the Massachusetts Department of Transportation (MassDOT) Office of Transportation Planning functional classifications:

Washington Street is classified as a rural minor arterial under Town of Holliston jurisdiction within the study area. It is a two-way, two-lane roadway that generally runs north-south between North Main Street to the north and the Holliston – Milford Town Line to the south. Travel lanes are generally 11 feet wide, and shoulders are 2-8 feet wide. The posted speed limit is 35 miles per hour (mph) in both directions. Sidewalks and on-street parking are not provided within the study area.

Whitney Street is classified as a local roadway under Town of Holliston jurisdiction. It is a two-way, two-lane roadway that generally runs east-west between Hollis Street to the east and Washington Street to the west. At the middle of Whitney Street, it intersects with Jeffrey Avenue where Whitney Street appears to intersect at a right angle while Jeffrey Avenue continues the through direction. Whitney Street is approximately 30 feet wide with no painted centerline or shoulders. The posted speed limit is 25 mph in the westbound direction, and no signs are posted in the eastbound direction. Sidewalks and on-street parking are not provided on either side of the road.

Figure 1. *Study Area*



Intersection Descriptions

Existing conditions at the study area intersection are described below:

Washington Street/Whitney Street is a three-legged, unsignalized intersection with a commercial driveway approaching from the north. The Washington Street northbound, Washington Street southbound, and Whitney Street westbound approaches each consist of a single left-turn/through/right-turn lane. The Whitney Street westbound approach is stop-controlled and has an approximately six-foot-wide median island. The commercial driveway on the southbound approach allows left-turn/through/right-turn movements and is not stop-controlled. Crosswalks are not provided across any of the approaches.

Data Collection

Turning Movement Counts (TMCs) were recorded during the morning peak hours (7:00 – 9:00 a.m.) and evening peak hours (4:00 – 6:00 p.m.) on Thursday, October 8, 2020. The TMCs included car, heavy vehicle, bicycle, and pedestrian counts at the study area intersection. The results of the counts indicate that the vehicle morning peak hour occurs between 7:00 – 8:00 a.m. and the evening peak hour between 4:30 – 5:30 p.m. The detailed traffic counts are provided in **Appendix A** attached hereto.

SEASONAL ADJUSTMENT

To account for the seasonal variation in traffic volumes throughout the year, data provided by MassDOT, were reviewed. The most recent (2019) MassDOT Weekday Seasonal Factors were used to determine the need for seasonal adjustments to the October 2020 TMCs. The 2019 seasonal adjustment factor for October for roadways like the study area (R4 and R7) is 0.98. This indicates that traffic volumes for October are approximately 2% greater than average traffic volumes for the year. The traffic counts were not adjusted down to reflect average month conditions to provide a conservatively high analysis consistent with the peak-season traffic volumes. The MassDOT 2019 Weekday Seasonal Factors table is provided in **Appendix B** attached hereto.

COVID-19 ADJUSTMENT

Collected data from October 2020 were compared to historical nearby traffic data, pre-pandemic, to evaluate if recent traffic has changed. Counts from March 2020, just before the start of the pandemic, were used at MassDOT count location ID 4815 for comparison. This spot counter is located on Washington Street just east of Whitney Street. Counts along Washington Street were generally lower in October than in March, therefore the counts were adjusted up for this study by approximately 50%. COVID adjustments were determined to provide some general correction for

COVID-19 variation; however, they are not expected to adjust volumes exactly to pre-COVID numbers. Research shows that post-pandemic volumes might not completely recover to pre-COVID patterns.

Existing Traffic Volumes

The existing traffic volumes that were collected in October 2020 were adjusted based on the seasonal and COVID-19 factors to develop the Existing (2022) Condition traffic volumes. The Existing Condition weekday a.m. and p.m. peak hour vehicle volumes are shown in **Figure 2**. Note that the counts collected at this intersection captured part of the existing ABC facility vehicle activity; therefore, the Build Condition analysis, presented under Traffic Operations Analysis in this report, represents a conservative analysis.

Motor Vehicle Collision Data

HSH compiled motor vehicle crash data from the MassDOT crash records on the IMPACT portal for the most recent three-year period for which they are available (2017-2019). No segment crashes occurred along Whitney Street/Jeffrey Avenue, and there were six crashes at the intersection of Washington Street and Whitney Street. No crashes between 2017 – 2019 involved heavy trucks or trailers. Crashes were primarily property damage only under dry conditions in the daylight.

The crash rate for an intersection is based on crashes per million entering vehicles (MEV). At the study area intersection, the crash rate is 0.47 crashes per MEV, lower than the District 3 average of 0.61 crashes per MEV. Crash data are summarized in **Table 1**. The crash rate worksheet is provided in **Appendix C** attached hereto.

Figure 2. *Existing Condition Vehicle Volumes, Weekday a.m. and p.m. Peak Hours*

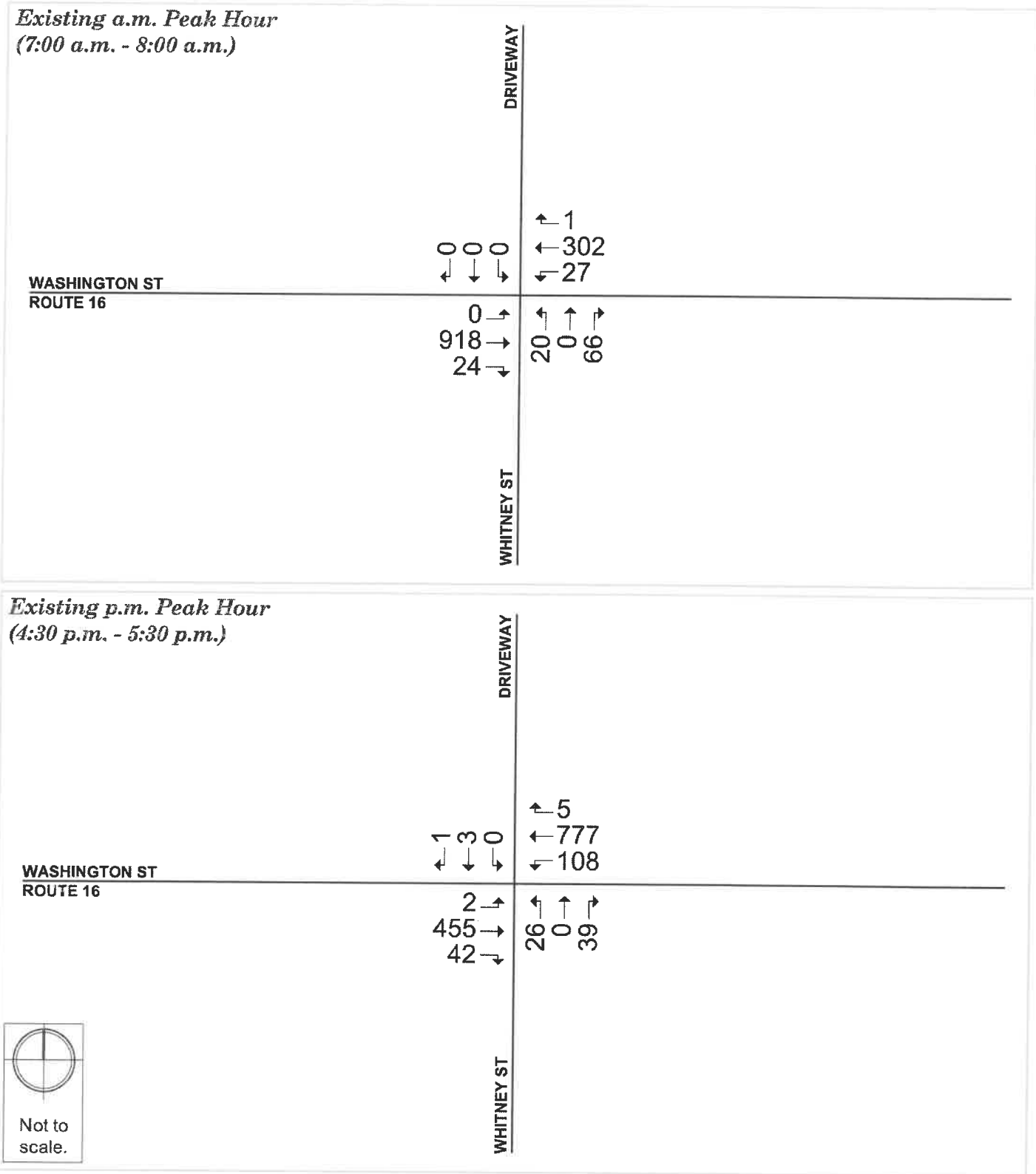


Table 1. Crash Data Summary

Description/Scenario		Segment	Intersection
		Whitney Street/Jeffrey Avenue *Between Washington St and Lowland St*	Washington Street at Whitney Street
Total Crashes		**0**	**6**
Year	2017	0	1
	2018	0	1
	2019	0	4
Severity	Property Damage Only	0	5
	Injury	0	1
Collision Type	Angle	0	2
	Rear-end	0	2
	Sideswipe, opposite direction	0	0
	Single vehicle crash	0	2
Time of Day	Weekday a.m. Peak (7 – 9 a.m.)	0	3
	Weekday p.m. Peak (4 – 6 p.m.)	0	2
	Weekday Off-Peak	0	1
Roadway Surface	Dry	0	6
	Snow	0	0
Light Condition	Daylight	0	5
	Dark – roadway not lighted	0	1
Involving Heavy Truck/Trailer		0	0
Crash Rate		--	0.47
District Crash Rate		1.20	0.61**

Source: MassDOT, Impact Crash Data Portal
***Crashes per million entering vehicles (MEV)*

No-build (2029) Condition

The No-build (2029) Condition reflects a future scenario that incorporates anticipated traffic volume changes associated with background traffic growth independent of any specific project, traffic associated with other planned specific developments, and planned infrastructure improvements that will affect travel patterns throughout the study area.

Background Traffic Growth

The methodology to account for general background traffic growth, independent of the Project, may be affected by changes in demographics, smaller scale development projects, or projects unforeseen at this time. Based on a review of recent and historic traffic data from the MassDOT MS2 Transportation Data Management System, a traffic growth rate of 1% per year, compounded

annually was selected. This is also consistent with growth rates used for other development projects in the area. The traffic volumes were grown to the Future Year of 2029, as is prescribed in the MassDOT Traffic Impact Study Guidelines.

Specific Development Projects

Based on a review of the Town of Holliston website, the following projects were identified in the Project area. It is assumed that any unidentified projects will be captured by the background growth rate.

- ***245 Washington Street (Village on the Green 40B)*** – This project includes 16 detached single-family homes. The project will have site access via a driveway on Washington Street.
- ***555 Hopping Brook Road*** – This project consists of 800,000 square feet (sf) of warehouse space within the Hopping Brook Business Park.
- ***194 Lowland Street*** – This project consists of a vehicle storage facility for approximately 585 cars and a 26-sf security booth.

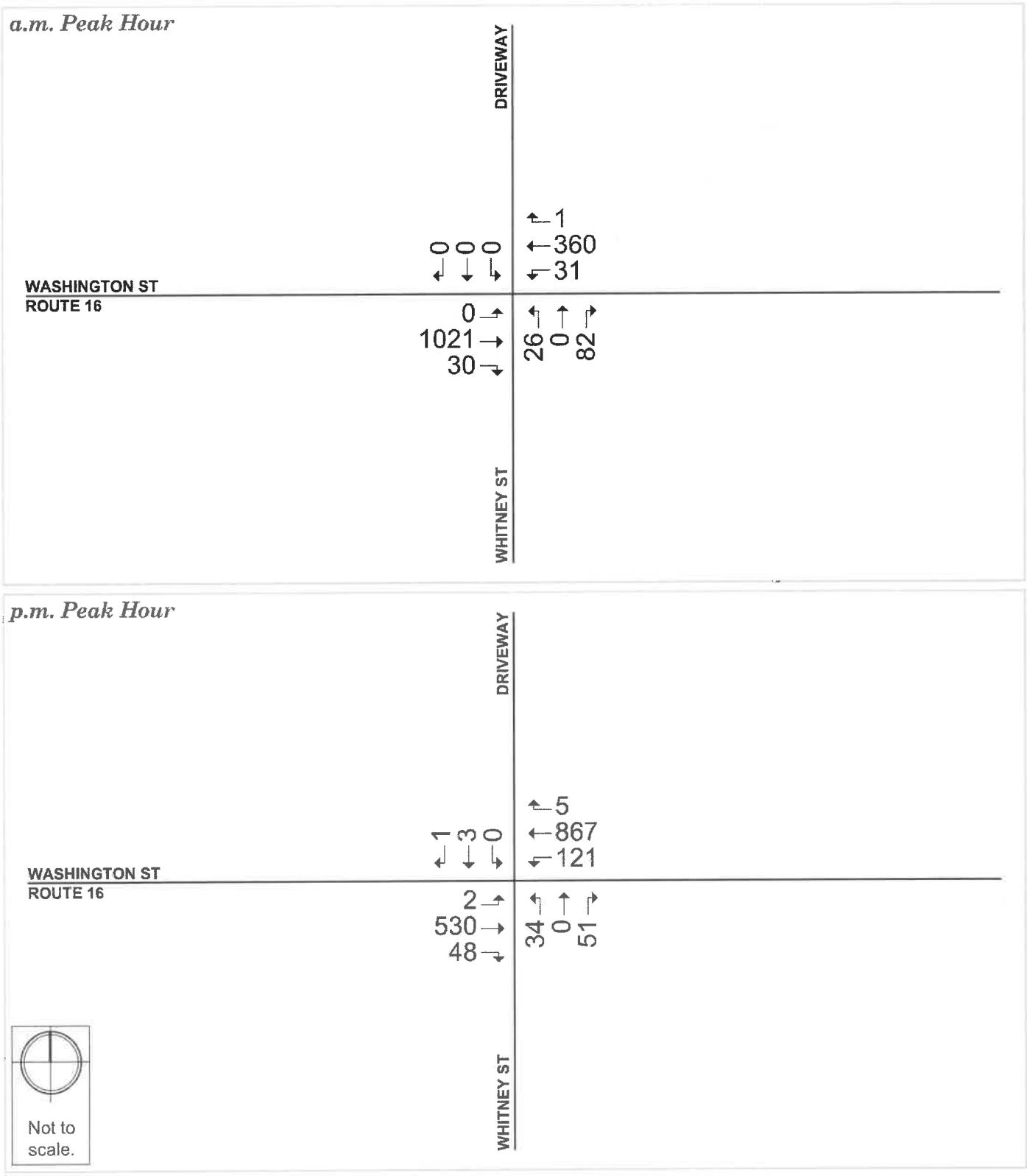
Roadway Improvement Projects

Based on a review of the Town of Holliston website, no future roadway improvement projects were identified to be completed by 2029 outside of routine maintenance work.

No-build (2029) Traffic Volumes

The 1% per year annual growth rate, compounded annually, was applied to the Existing (2022) Condition traffic volumes; then the traffic volumes associated with the background development projects listed previously were added to develop the No-build (2029) Condition traffic volumes. The No-build (2029) peak hour vehicle volumes for the a.m. and p.m. peak hours are shown in **Figure 3**.

Figure 3. *No-build (2029) Condition Vehicle Volumes, Weekday a.m. and p.m. Peak Hours*



Build (2029) Condition

The proposed Project will consist of the expansion of the current facility, providing parking for the paving trucks in a new building and streamlining the current recycling process with new additional equipment. The site plan is shown in **Figure 4.**

Project Trip Generation

Typically, the number of trips expected to be generated by a project are estimated using data published by the Institute of Transportation Engineers (ITE) in the *Trip Generation Manual,* 11th Edition. Because this is an atypical use, the ITE Trip Generation Manual does not have land use data that covers this use; therefore, trips for the Project were estimated based on expected facility operations and assumptions based on Proponent-provided data. Based on the type of land use and location of the Project, all trips to the Project Site are expected to be vehicle trips, by car or truck.

As previously described, the Project is seeking to improve the current ABC recycling services and incorporate a new building to serve as parking storage for paving trucks. The following sections describe the assumptions that were used to calculate the Project's vehicle trips. A summary of trip generation is shown in **Table 2.** Note that the counts collected captured part of the existing ABC facility vehicle activity, but no credit was taken for the existing ABC facility activity; therefore, the Build Condition analysis, presented under Traffic Operations Analysis in this report, represents a conservative analysis.

ABC RECYCLING FACILITY

The ABC recycling facility operates from 7:00 a.m. – 7:00 p.m. Monday through Friday and from 7:00 a.m. – 3:00 p.m. on Saturday. The facility will employ a total of three (3) employees, which are expected to arrive before 7:00 a.m. and depart after 7:00 p.m. In a typical day, the facility is expecting approximately 100 truck trips throughout the day, with approximately 25 trucks entering full, unloading, and departing empty, twice a day. The majority of these trips will occur between 7:00 a.m. and 4:00 p.m.

PAVING TRUCK STORAGE FACILITY

The paving truck storage facility will operate from 6:00 a.m. – 7:00 p.m. Monday through Friday and from 7:00 a.m. – 3:00 p.m. on Saturday. The proposed new building will only serve as parking storage for the paving trucks. The facility will employ a total of 16 employees, which are expected to arrive before 6:00 a.m. and depart after 7:00 p.m. In a typical day, employees will arrive in their own private vehicles, park on-site, and depart in one of the company's paving trucks (one employee per

truck). Depending on the work available and the season, pavers' trucks may return to the Site before 7:00 p.m. and occasionally (1-2 times per month) between 8:00-9:00 p.m. During the typical day, some trucks may occasionally return to the Site to unload materials at the ABC facility and return to the corresponding work site. As shown in **Table 2,** there are expected to be 12 vehicle trips (six in and six out) during the a.m. peak hour and 22 vehicle trips (22 in and 22 out) during the p.m. peak hour. There are expected to be 188 daily vehicle trips (94 in and 94 out).

Table 2. Project Vehicle Trip Generation

Time Period/ Direction		ABC Recycling Facility	Paving Truck Storage Facility	Total Trips
Daily	In	54	40	94
	Out	54	40	94
	Total	108	80	188
a.m. Peak Hour	In	6	0	6
	Out	6	0	6
	Total	12	0	12
p.m. Peak Hour	In	6	16	22
	Out	6	16	22
	Total	12	32	44

Trip Distribution

The trip distribution identifies the various travel paths for vehicles associated with the Project. Based on information provided by the Proponent, it is expected that approximately 50% of truck trips will come from Route 16 east of the Project Site and the remaining 50% of truck trips will come from either I-495 east on Route 16 or I-90 south on Route 126 to the Project Site. The trip distribution percentages were applied to the vehicle trip generation to determine the project-generated trips for the weekday a.m. and p.m. peak hours as shown in **Figure 5**.

Build (2029) Traffic Volumes

Project-generated vehicle trips were added to the No-build (2029) Condition vehicular traffic volumes to develop the Build (2029) Condition vehicular traffic volumes. The Build (2029) Condition a.m. and p.m. peak hour traffic volumes are shown in **Figure 6**.

Figure 4. *Site Plan and Driveway Access*

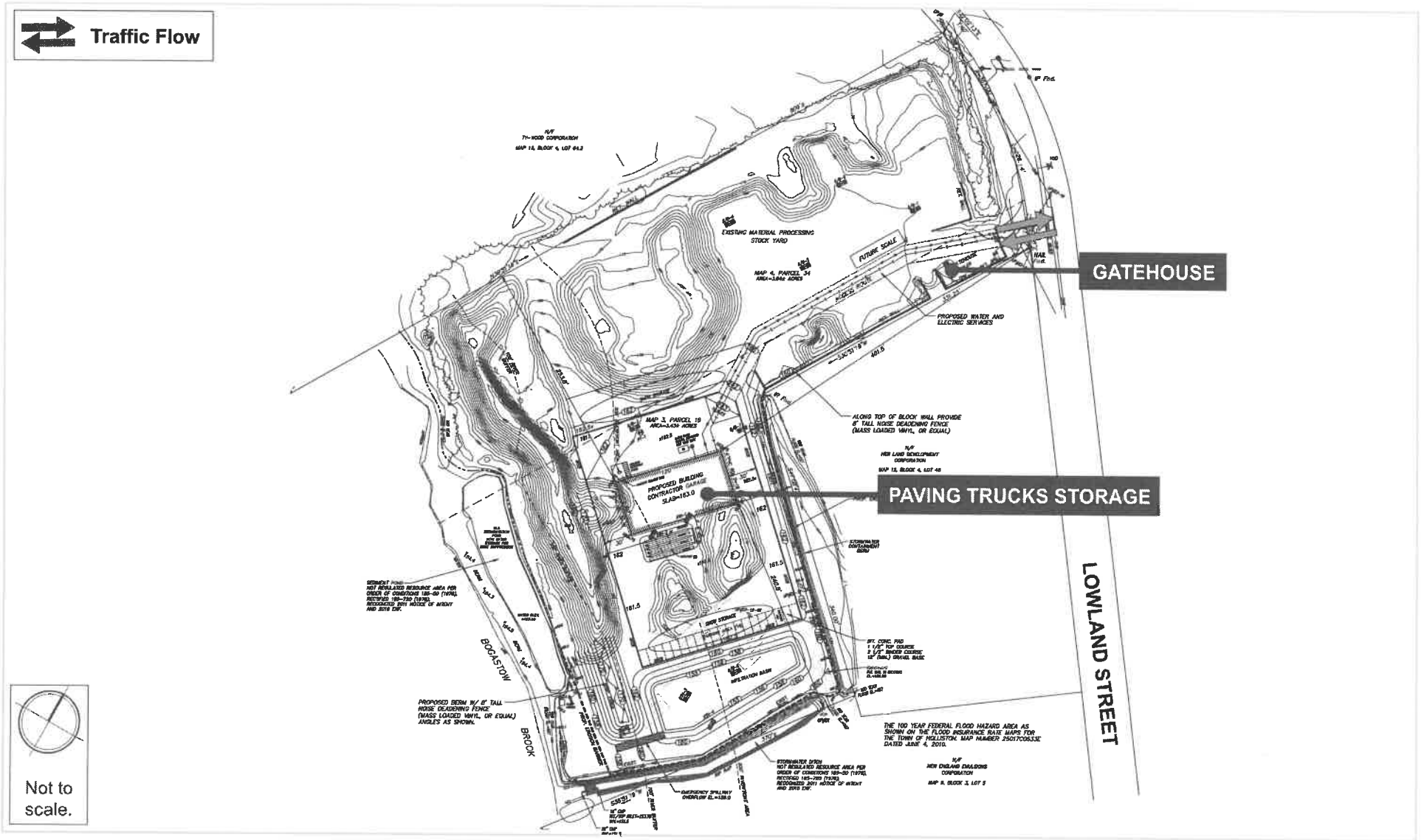


Figure 5. *Project-generated Vehicle Trips, Weekday a.m. and p.m. Peak Hours*

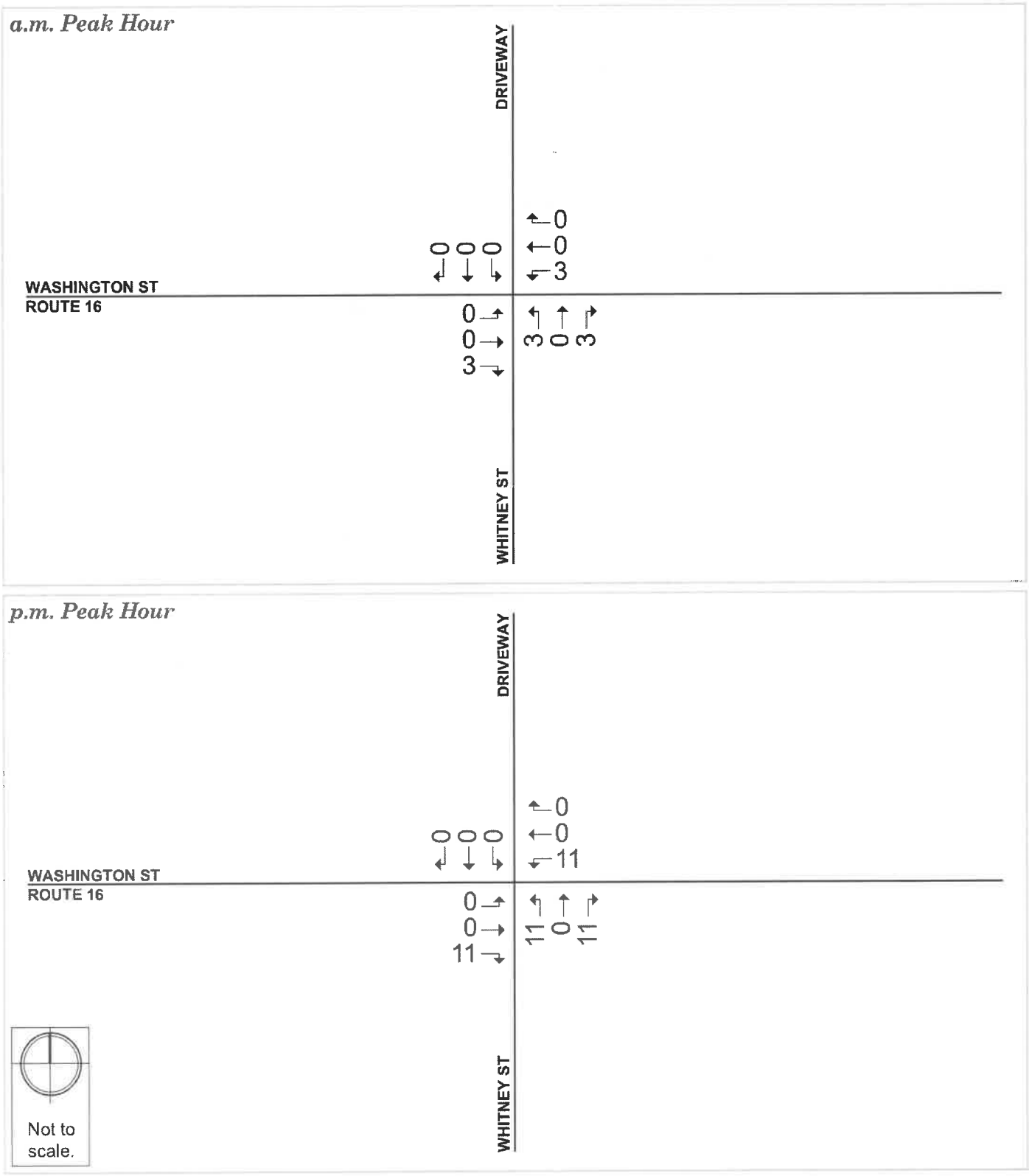
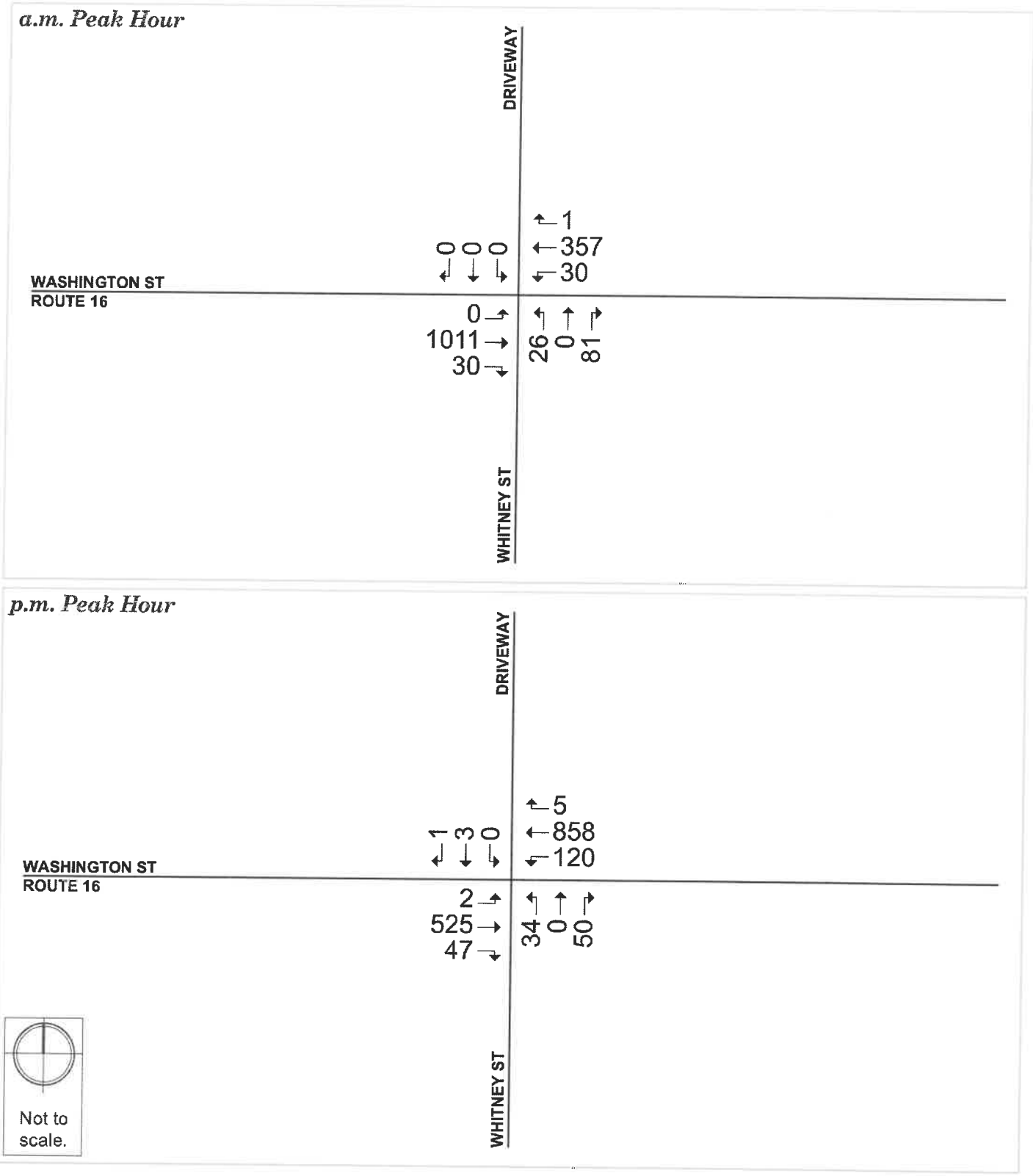


Figure 6. ***Build (2029) Condition Vehicle Volumes, Weekday a.m. and p.m. Peak Hours***



Traffic Operations Analysis

The criterion for evaluating traffic operations is level of service (LOS), which is determined by assessing average delay experienced by vehicles at intersections and along intersection approaches. The latest Trafficware's Synchro (version 11) software package was used to calculate average delay and associated LOS at all study area intersections. This software is based on the traffic operational analysis methodology of the Transportation Research Board's *Highway Capacity Manual (HCM), 6th Edition.* The latest HCM edition, 6th, methodology outputs were used.

In accordance with MassDOT guidelines, the peak 15 minutes of data collected during the peak hour were isolated to calculate the peak-hour factors (PHFs) for each approach. In the future conditions, a peak hour factor of 0.88 was applied to all approaches based on MassDOT guidelines for rural areas. The percentage of heavy vehicles was noted for each land group movement.

LOS designations are based on average delay per vehicle for all vehicles entering an intersection. **Table 3,** an excerpt from the HCM, provides LOS criteria for signalized intersections. LOS A indicates the most favorable condition, with minimum traffic delay, while LOS F represents the worst condition, with significant traffic delay. LOS D or better is typically considered desirable during the peak hours of traffic in urban and suburban settings. However, LOS E or LOS F is often typical for a stop-controlled minor street that intersects a major roadway.

Table 3. Level of Service Criteria

Level of Service	Average Stopped Delay (sec.)
	Unsignalized Intersection
A	0.0–10.0
B	10.1–15.0
C	15.1–25.0
D	25.1–35.0
E	35.1–50.0
F	>50.0

In addition to delay and LOS, the operational capacity and vehicular queues are calculated and used to further quantify traffic operations at intersections. The following describes the other measures.

The volume-to-capacity ratio (v/c ratio) is a measure of congestion at an intersection approach. A v/c ratio below one indicates that the intersection approach has adequate capacity to process the arriving traffic volumes over the course of an hour. A v/c ratio of one or greater indicates that the traffic volume on the intersection approach exceeds capacity.

The 95th percentile queue, measured in feet, denotes the farthest extent of the vehicle queue (to the last stopped vehicle) upstream from the stop line. This maximum queue occurs five percent, or less, of the time during the peak hour, and typically does not develop during off-peak hours. Since volumes fluctuate throughout the hour, the 95th percentile queue represents what can be considered a "worst case" condition. Queues at an intersection are generally below the 95th percentile length throughout most of the peak hour. It is also unlikely that 95th percentile queues for each approach to an intersection occur simultaneously.

Table 4 summarizes the LOS, delay, volume to capacity ratio, and queue analysis for the study area intersection during the morning and evening peak hours for the Existing, No-build 2029, and Build 2029 Conditions.

SYNCHRO METHODOLOGY

At unsignalized intersections, it is not uncommon for the minor street approaches to operate at LOS E or F. This is partly due to the conservative gap acceptance time used in the Synchro software for vehicles waiting to enter the main street from a stopped condition. Under these conservative conditions, small and large increases in volumes may show large changes in delay. When activity is more continuous on the main road, drivers are more willing to turn with smaller gaps between vehicles rather than wait for a larger gap. Under normal conditions, this typically would be corrected for by collecting actual gap acceptance times through field observations. As discussed previously, the current volumes are lower than pre-pandemic volumes, therefore there is not a reliable way to adjust for actual conditions in the field as current traffic is not comparable to the higher volume conditions represented in the traffic model. Instead, the operations analysis will also be presented for the Existing, No-build 2029, and Build 2029 Conditions where volumes are not adjusted to correct for COVID-19 traffic variation, shown in **Table 5**. Even though levels of traffic are slowly returning, the future traffic is not certain and may be somewhere in between these two analysis scenarios.

Table 4. Operations Analysis Summary (with COVID-19 Adjustment), Weekday a.m. and p.m. Peak Hours

Intersection/Movement	Existing Condition				No-build (2029) Condition				Build (2029) Condition			
	LOS	Delay (sec)	V/C Ratio	95th % Queue (ft)	LOS	Delay (sec)	V/C Ratio	95th % Queue (ft)	LOS	Delay (sec)	V/C Ratio	95th % Queue (ft)
a.m. Peak Hour												
Washington Street/Whitney Street	-	-	-	-	-	-	-	-	-	-	-	-
Washington St NB left/thru/right	A	0	0	0	A	0	0	0	A	0	0	0
Washington St SB left/thru/right	B	10.9	0.06	5	B	11.8	0.06	5	B	11.8	0.06	5
Whitney St WB left/thru/right	F	>50.0	0.64	90	F	>50.0	0.88	145	F	>50.0	0.98	170
Driveway EB left/thru/right	A	0	0	0	A	0	0	0	A	0	0	0
p.m. Peak Hour												
Washington Street/Whitney Street	-	-	-	-	-	-	-	-	-	-	-	-
Washington St NB left/thru/right	A	9.6	0	0	B	10.1	0	0	B	10.1	0	0
Washington St SB left/thru/right	A	9.0	0.12	10	A	9.6	0.15	13	A	9.8	0.16	15
Whitney St WB left/thru/right	F	>50.0	0.67	90	F	>50.0	1.25	185	F	>50.0	1.79	273
Driveway EB left/thru/right	E	45.0	0.08	8	F	>50.0	0.08	5	F	>50.0	0.09	8

Grey shading indicates LOS E or F under the Existing Condition or a change from LOS D or better in a previous condition to LOS E or F.
 # = 95th percentile volume exceeds capacity; queue may be longer.
~ = Volume exceeds capacity, queue is theoretically infinite.

Table 5. Operations Analysis Summary (without COVID-19 Adjustment), Weekday a.m. and p.m. Peak Hours

Intersection/Movement	Existing Condition				No-build (2029) Condition				Build (2029) Condition			
	LOS	Delay (sec)	V/C Ratio	95th % Queue (ft)	LOS	Delay (sec)	V/C Ratio	95th % Queue (ft)	LOS	Delay (sec)	V/C Ratio	95th % Queue (ft)
a.m. Peak Hour												
Washington Street/Whitney Street	-	-	-	-	-	-	-	-	-	-	-	-
Washington St NB left/thru/right	A	0	0	0	A	0	0	0	A	0	0	0
Washington St SB left/thru/right	A	9.3	0.04	3	A	9.8	0.04	3	A	9.8	0.04	5
Whitney St WB left/thru/right	C	21.9	0.35	38	D	28.8	0.45	55	D	30.9	0.45	63
Driveway EB left/thru/right	A	0	0	0	A	0	0	0	A	0	0	0
p.m. Peak Hour												
Washington Street/Whitney Street	-	-	-	-	-	-	-	-	-	-	-	-
Washington St NB left/thru/right	A	8.6	0	0	A	8.9	0	0	A	8.9	0	0
Washington St SB left/thru/right	A	8.4	0.10	8	A	8.8	0.13	10	A	8.9	0.14	13
Whitney St WB left/thru/right	D	25.1	0.33	35	E	42.8	0.51	65	F	>50.0	0.70	108
Driveway EB left/thru/right	C	24.1	0.04	3	D	32.4	0.03	3	D	34.4	0.03	3

Grey shading indicates LOS E or F under the Existing Condition or a change from LOS D or better in a previous condition to LOS E or F.
 # = 95th percentile volume exceeds capacity; queue may be longer.
~ = Volume exceeds capacity, queue is theoretically infinite.

EXISTING CONDITION

All intersection approaches operate at LOS D or better in the Existing Condition except the Whitney Street westbound approach, which operates at LOS F during the a.m. and p.m. peak hours and the driveway opposite of Whitney Street, which operates at LOS E during the p.m. peak hour. Note that without the COVID-19 adjustment, these approaches operate at LOS D, more closely representing the current existing conditions in the field.

NO-BUILD (2029) CONDITION

All intersection approaches continue to operate at similar levels of service in the No-build (2029) Condition as the Existing Condition, except for the Driveway eastbound approach during the p.m. peak hour in the scenario with the COVID-19 adjustments and the Whitney Street westbound approach during the peak hour in the scenario without the COVID-19 adjustments.

BUILD (2029) CONDITION

The intersections and approaches are expected to operate the same in the Build (2029) Condition as in the No-build (2029) Condition except for the increases in delay on the Whitney Street westbound approach. It is not uncommon to experience an increase in delay at a stop-controlled approach; however, the large increase in delay in the scenario with COVID-19 adjustment is likely representative of the model's sensitivity to volume changes without correcting for gap acceptance.

In the Build (2029) Condition, with COVID-19 adjustments, the 95th percentile queue is 273 feet, about 11 vehicles, during the p.m. peak hour, while the scenario without COVID-19 adjustments shows a queue of 108 feet, or four vehicles. The 95th percentile queue is only expected to occur 5% of the time; therefore, even in the worst case with traffic returning to pre-pandemic levels, queues on average are not expected to be longer than seven vehicles. Additionally, as it was previously noted, the Build Condition provides a conservative analysis as it consists of the counts collected in October 2020, which includes part of the existing ABC facility vehicle activity, and the future Site projections which includes the existing ABC facility and the proposed expansion. The full Synchro reports for all scenarios are provided in **Appendix D.**

Conclusion

Based on forecasted business operations logistics, the Project is expected to generate 188 daily trips to occur during business operating hours between 6 a.m. and 7 p.m. on a weekday. Typical morning and evening peak hours are expected generate 12 and 44 new peak hour trips per hour which, on average, is one vehicle every one to five minutes. Any new truck activity will be focused through the existing Lowland Industrial Park area and is not expected to impact the nearby neighborhood streets. The Project is expected to have a minimal impact on traffic operations in the study area.

Appendix A

Traffic Count Data

Client:	Vannesa Methoxha
Project #:	621_C81_HSH
BTD #:	Location 1
Location:	Holliston, MA
Street 1:	Washington Street (Route 16)
Street 2:	Whitney Street
Count Date:	10/8/2020
Day of Week:	Thursday
Weather:	Clouds & Sun, 60°F

BOSTON
TRAFFIC DATA
PO BOX 1723, Framingham, MA 01701
Office: 978-746-1259
DataRequest@BostonTrafficData.com
www.BostonTrafficData.com

PASSENGER CARS & HEAVY VEHICLES COMBINED

	Whitney Street Northbound				Parking Lot Driveway Southbound				Washington Street (Route 16) Eastbound				Washington Street (Route 16) Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
7:00 AM	0	2	0	23	0	0	0	0	0	0	150	8	0	12	46	0
7:15 AM	0	3	0	14	0	0	0	0	0	0	148	4	0	1	44	0
7:30 AM	0	10	0	18	0	0	0	0	0	0	170	6	0	4	47	0
7:45 AM	0	5	0	11	0	0	0	0	0	0	144	6	0	10	64	1
8:00 AM	0	4	0	12	0	0	0	0	0	0	124	10	0	8	65	0
8:15 AM	0	2	0	10	0	0	0	0	0	0	133	2	0	4	58	0
8:30 AM	0	0	0	9	0	0	1	0	0	0	124	8	0	4	55	0
8:45 AM	0	5	0	2	0	0	0	0	0	0	104	8	0	11	55	0

	Whitney Street Northbound				Parking Lot Driveway Southbound				Washington Street (Route 16) Eastbound				Washington Street (Route 16) Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
4:00 PM	0	11	0	14	0	1	0	2	0	1	54	5	0	21	136	0
4:15 PM	0	9	0	9	0	1	0	1	0	1	78	4	0	11	150	1
4:30 PM	0	4	0	11	0	0	1	0	0	1	82	9	0	19	125	1
4:45 PM	0	7	0	6	0	0	1	1	0	0	68	8	0	39	134	1
5:00 PM	0	10	0	12	0	0	0	0	0	0	79	14	0	26	112	1
5:15 PM	0	5	0	10	0	0	1	0	0	1	74	11	0	24	147	2
5:30 PM	0	2	0	8	0	0	1	2	0	1	78	6	0	19	127	2
5:45 PM	0	8	0	9	0	0	1	0	0	0	81	13	0	13	97	0

AM PEAK HOUR 7:00 AM to 8:00 AM	Whitney Street Northbound				Parking Lot Driveway Southbound				Washington Street (Route 16) Eastbound				Washington Street (Route 16) Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	0	**20**	**0**	**66**	**0**	**0**	**0**	**0**	**0**	**0**	**612**	**24**	**0**	**27**	**201**	**1**
PHF	**0.77**				**0.00**				**0.90**				**0.76**			
HV %	**0.0%**	**25.0%**	**0.0%**	**18.2%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**5.7%**	**4.2%**	**0.0%**	**7.4%**	**5.0%**	**0.0%**

PM PEAK HOUR 4:30 PM to 5:30 PM	Whitney Street Northbound				Parking Lot Driveway Southbound				Washington Street (Route 16) Eastbound				Washington Street (Route 16) Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	0	**26**	**0**	**39**	**0**	**0**	**3**	**1**	**0**	**2**	**303**	**42**	**0**	**108**	**518**	**5**
PHF	**0.74**				**0.50**				**0.93**				**0.91**			
HV %	**0.0%**	**11.5%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**2.6%**	**11.9%**	**0.0%**	**4.6%**	**3.3%**	**0.0%**

Client:	Vannesa Methoxha
Project #:	621_C81_HSH
BTD #:	Location 1
Location:	Holliston, MA
Street 1:	Washington Street (Route 16)
Street 2:	Whitney Street
Count Date:	10/8/2020
Day of Week:	Thursday
Weather:	Clouds & Sun, 60°F

BOSTON
TRAFFIC DATA
PO BOX 1723, Framingham, MA 01701
Office: 978-746-1259
DataRequests@BostonTrafficData.com
www.BostonTrafficData.com

HEAVY VEHICLES

	Whitney Street Northbound				Parking Lot Driveway Southbound				Washington Street (Route 16) Eastbound				Washington Street (Route 16) Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
7:00 AM	0	0	0	7	0	0	0	0	0	0	10	0	0	0	0	0
7:15 AM	0	1	0	1	0	0	0	0	0	0	12	0	0	0	3	0
7:30 AM	0	3	0	1	0	0	0	0	0	0	8	0	0	0	3	0
7:45 AM	0	1	0	3	0	0	0	0	0	0	5	1	0	2	4	0
8:00 AM	0	0	0	2	0	0	0	0	0	0	6	2	0	3	6	0
8:15 AM	0	0	0	3	0	0	0	0	0	0	8	1	0	0	2	0
8:30 AM	0	0	0	1	0	0	0	0	0	0	13	0	0	2	6	0
8:45 AM	0	1	0	0	0	0	0	0	0	0	5	1	0	1	4	0

	Whitney Street Northbound				Parking Lot Driveway Southbound				Washington Street (Route 16) Eastbound				Washington Street (Route 16) Westbound			
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
4:00 PM	0	3	0	0	0	0	0	0	0	0	2	0	0	0	3	0
4:15 PM	0	0	0	0	0	0	0	0	0	0	3	0	0	0	4	0
4:30 PM	0	3	0	0	0	0	0	0	0	0	4	3	0	1	3	0
4:45 PM	0	0	0	0	0	0	0	0	0	0	1	0	0	1	5	0
5:00 PM	0	0	0	0	0	0	0	0	0	0	1	1	0	3	4	0
5:15 PM	0	0	0	0	0	0	0	0	0	0	2	1	0	0	5	0
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	1	0	2	2	0
5:45 PM	0	1	0	0	0	0	0	0	0	0	3	0	0	0	1	0

AM PEAK HOUR 7:45 AM to 8:45 AM	Whitney Street Northbound				Parking Lot Driveway Southbound				Washington Street (Route 16) Eastbound				Washington Street (Route 16) Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	0	**1**	**0**	**9**	**0**	**0**	**0**	**0**	**0**	**0**	**32**	**4**	**0**	**7**	**18**	**0**
PHF	**0.63**				**0.00**				**0.69**				**0.69**			

PM PEAK HOUR 4:30 PM to 5:30 PM	Whitney Street Northbound				Parking Lot Driveway Southbound				Washington Street (Route 16) Eastbound				Washington Street (Route 16) Westbound			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right
	0	**3**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**8**	**5**	**0**	**5**	**17**	**0**
PHF	**0.25**				**0.00**				**0.46**				**0.79**			

Client:	Vannesa Methoxha
Project #:	621_C81_HSH
BTD #:	Location 1
Location:	Holliston, MA
Street 1:	Washington Street (Route 16)
Street 2:	Whitney Street
Count Date:	10/8/2020
Day of Week:	Thursday
Weather:	Clouds & Sun, 60°F

BOSTON TRAFFIC DATA
PO BOX 1723, Framingham, MA 01701
Office: 978-746-1259
DataRequest@BostonTrafficData.com
www.BostonTrafficData.com

PEDESTRIANS & BICYCLES

	Whitney Street Northbound					Parking Lot Driveway Southbound					Washington Street (Route 16) Eastbound					Washington Street (Route 16) Westbound				
Start Time	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
7:00 AM	0	0	0	0		0	0	0	0		0	0	0	0		0	0	0	0	
7:15 AM	0	0	0	0		0	0	0	0		0	0	0	0		0	0	0	0	
7:30 AM	0	0	0	0		0	0	0	0		0	0	0	0		0	0	0	0	
7:45 AM	0	0	0	0		0	0	0	0		0	0	0	0		0	0	0	0	
8:00 AM	0	0	0	0		0	0	0	0		0	0	0	0		0	0	0	0	
8:15 AM	0	0	0	0		0	0	0	0		0	0	0	0		0	0	0	0	
8:30 AM	0	0	0	0		0	0	0	0		0	0	0	0		0	0	0	0	
8:45 AM	0	0	0	0		0	0	0	0		0	0	0	0		0	0	0	0	

	Whitney Street Northbound					Parking Lot Driveway Southbound					Washington Street (Route 16) Eastbound					Washington Street (Route 16) Westbound				
Start Time	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
4:00 PM	0	0	0	0		0	0	0	0		0	0	0	0		0	0	0	0	
4:15 PM	0	0	0	0		0	0	0	0		0	0	0	0		0	0	0	0	
4:30 PM	0	0	0	0		0	0	0	0		0	0	0	0		0	0	0	0	
4:45 PM	0	0	0	0		0	0	0	0		0	0	0	2		0	0	0	1	
5:00 PM	0	0	0	0		0	0	0	0		0	0	0	0		0	0	0	0	
5:15 PM	0	0	0	0		0	0	0	0		0	0	1	0		0	0	0	0	
5:30 PM	0	0	0	0		0	0	0	0		0	0	0	0		0	0	0	0	
5:45 PM	0	0	0	0		0	0	0	0		0	0	0	0		0	0	0	0	

AM PEAK HOUR[1] 7:00 AM to 8:00 AM	Whitney Street Northbound					Parking Lot Driveway Southbound					Washington Street (Route 16) Eastbound					Washington Street (Route 16) Westbound				
	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
	0	0	0	0		0	0	0	0		0	0	0	0		0	0	0	0	

PM PEAK HOUR[1] 4:30 PM to 5:30 PM	Whitney Street Northbound					Parking Lot Driveway Southbound					Washington Street (Route 16) Eastbound					Washington Street (Route 16) Westbound				
	Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED		Left	Thru	Right	PED	
	0	0	0	0		0	0	0	0		0	0	1	2		0	0	0	1	

[1] *NOTE: Peak hour summaries here correspond to peak hours identified for passenger cars and heavy vehicles combined.*

Appendix B

Adjustment Factors

Massachusetts Highway Department
Statewide Traffic Data Collection
2019 Weekday Seasonal Factors

Factor Group	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Axle Factor
R1	1.22	1.14	1.12	1.06	1.00	0.96	0.87	0.85	0.96	0.99	1.04	1.12	0.85
R2	0.95	0.96	0.98	0.97	0.97	0.93	0.97	0.94	0.96	0.90	0.92	0.93	0.96
R3	1.15	1.06	1.07	1.00	0.89	0.88	0.89	0.89	0.95	0.92	1.02	1.01	0.97
R4-R7	1.09	1.09	1.11	1.02	0.96	0.92	0.89	0.89	0.99	0.98	1.09	1.13	0.98
U1-Boston	1.03	1.01	0.98	0.94	0.94	0.92	0.95	0.93	0.94	0.94	0.97	1.04	0.96
U1-Essex	1.09	1.06	1.03	0.99	0.94	0.90	0.88	0.86	0.93	0.94	0.99	1.06	0.93
U1-Southeast	1.06	1.05	1.01	0.97	0.95	0.93	0.93	0.90	0.94	0.94	0.98	1.04	0.98
U1-West	1.19	1.14	1.09	0.95	0.92	0.89	0.89	0.86	0.91	0.95	0.97	1.07	0.84
U1-Worcester	1.02	1.04	0.97	0.94	0.93	0.91	0.95	0.91	0.93	0.92	0.95	1.10	0.88
U2	1.01	1.00	0.94	0.93	0.91	0.89	0.93	0.90	0.90	0.91	0.94	1.02	0.99
U3	1.06	1.03	0.98	0.94	0.93	0.91	0.95	0.91	0.92	0.93	0.97	1.00	0.98
U4-U7	1.01	1.00	0.95	0.92	0.88	0.86	0.92	0.91	0.92	0.94	0.99	1.04	0.99
Rec - East	1.04	1.16	1.12	0.98	0.92	0.88	0.77	0.81	0.94	1.02	1.08	1.12	0.99
Rec - West	1.30	1.23	1.32	1.18	0.95	0.82	0.70	0.69	0.97	0.96	1.16	1.15	0.98

Round off:
0-999 = 10
>1000 = 100

U = Urban
R = Rural

1 - Interstate
2 - Freeway and Expressway
3 - Other Principal Arterial
4 - Minor Arterial
5 - Major Collector
6 - Minor Collector
7 - Local Road and Street

Recreational - East Group - Cape Cod (all towns) including the town of Plymouth south of Route 3A (stations 7014,7079,7080,7090,7091,7092,7093,7094,7095,7096,7097,7108 and 7178), Martha's Vineyard and Nantucket.

Recreational - West Group - Continuous Stations 2 and 189 including stations 1066,1067,1083,1084,1085,1086,1087,1088,1089,1090,1091,1092,1093,1094,1095,1096,1097,1098,1099,1100,1101,1102,1103,1104,1105,1106,1107,1108,1113, 1114,1116,2196,2197 and 2198.

9/26/20

Appendix C

Crash Rate Worksheet

Moving Massachusetts Forward. massDOT Highway

INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Holliston, MA COUNT DATE : 10/8/2020

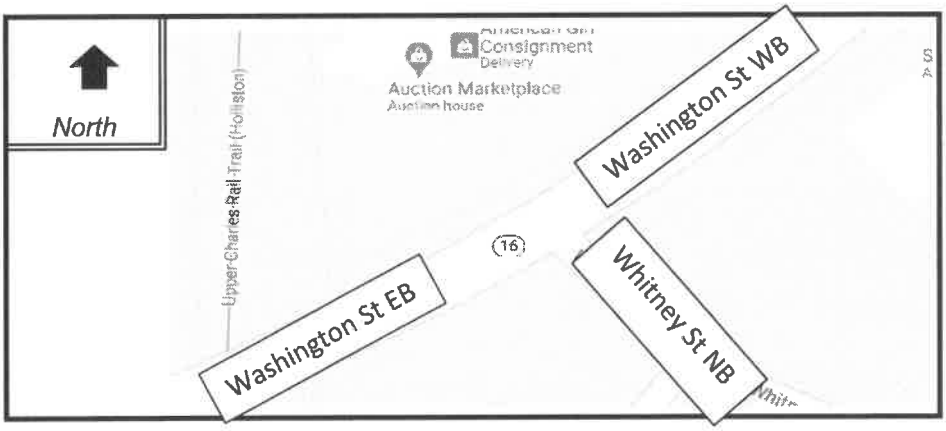
DISTRICT : 3 UNSIGNALIZED : Yes SIGNALIZED :

~ INTERSECTION DATA ~

MAJOR STREET : Washington Street

MINOR STREET(S) : Whitney Street

INTERSECTION DIAGRAM (Label Approaches)



PEAK HOUR VOLUMES

APPROACH :	1	2	3	4	5	Total Peak Hourly Approach Volume
DIRECTION :	EB	WB	NB			
PEAK HOURLY VOLUMES (AM/**PM**) :	347	631	65			**1,043**

" K " FACTOR : **0.090** INTERSECTION ADT (**V**) = TOTAL DAILY APPROACH VOLUME : **11,589**

TOTAL # OF CRASHES : 6 # OF YEARS : 3 AVERAGE # OF CRASHES PER YEAR (**A**) : **2.00**

CRASH RATE CALCULATION : **0.47** RATE = $\frac{(A * 1{,}000{,}000)}{(V * 365)}$

Comments :

Project Title & Date: 157-165 Lowland Street

Appendix D

Synchro Reports

Intersection	
Int Delay, s/veh	4.2

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	0	0	0	20	0	66	0	918	24	27	302	1
Future Vol, veh/h	0	0	0	20	0	66	0	918	24	27	302	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	77	77	77	90	90	90	76	76	76
Heavy Vehicles, %	0	0	0	25	0	18	0	6	4	7	5	0
Mvmt Flow	0	0	0	26	0	86	0	1020	27	36	397	1

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1547	1517	398	1504	1504	1034	398	0	0	1047	0	0
Stage 1	470	470	-	1034	1034	-	-	-	-	-	-	-
Stage 2	1077	1047	-	470	470	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.35	6.5	6.38	4.1	-	-	4.17	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.35	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.35	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.725	4	3.462	2.2	-	-	2.263	-	-
Pot Cap-1 Maneuver	94	120	656	88	123	263	1172	-	-	646	-	-
Stage 1	578	563	-	254	312	-	-	-	-	-	-	-
Stage 2	268	308	-	533	563	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	60	111	656	83	114	263	1172	-	-	646	-	-
Mov Cap-2 Maneuver	60	111	-	83	114	-	-	-	-	-	-	-
Stage 1	578	522	-	254	312	-	-	-	-	-	-	-
Stage 2	181	308	-	495	522	-	-	-	-	-	-	-

Approach	SE	NW	NE	SW
HCM Control Delay, s	0	56.1	0	0.9
HCM LOS	A	F		

Minor Lane/Major Mvmt	NEL	NET	NER	NWLn1	SELn1	SWL	SWT	SWR
Capacity (veh/h)	1172	-	-	175	-	646	-	-
HCM Lane V/C Ratio	-	-	-	0.638	-	0.055	-	-
HCM Control Delay (s)	0	-	-	56.1	0	10.9	0	-
HCM Lane LOS	A	-	-	F	A	B	A	-
HCM 95th %tile Q(veh)	0	-	-	3.6	-	0.2	-	-

Intersection	
Int Delay, s/veh	5

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	0	3	1	26	0	39	2	455	42	108	777	5
Future Vol, veh/h	0	3	1	26	0	39	2	455	42	108	777	5
Conflicting Peds, #/hr	1	0	2	2	0	1	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	50	50	50	74	74	74	93	93	93	91	91	91
Heavy Vehicles, %	0	0	0	12	0	0	0	3	12	5	3	0
Mvmt Flow	0	6	2	35	0	53	2	489	45	119	854	5

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1638	1633	859	1617	1613	513	859	0	0	534	0	0
Stage 1	1095	1095	-	516	516	-	-	-	-	-	-	-
Stage 2	543	538	-	1101	1097	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.22	6.5	6.2	4.1	-	-	4.15	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.22	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.22	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.608	4	3.3	2.2	-	-	2.245	-	-
Pot Cap-1 Maneuver	81	102	359	79	105	565	791	-	-	1019	-	-
Stage 1	261	292	-	524	538	-	-	-	-	-	-	-
Stage 2	528	526	-	246	291	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	61	79	358	61	81	564	791	-	-	1019	-	-
Mov Cap-2 Maneuver	61	79	-	61	81	-	-	-	-	-	-	-
Stage 1	260	227	-	522	536	-	-	-	-	-	-	-
Stage 2	476	524	-	184	226	-	-	-	-	-	-	-

Approach	SE	NW	NE	SW
HCM Control Delay, s	45	75.8	0	1.1
HCM LOS	E	F		

Minor Lane/Major Mvmt	NEL	NET	NER	NWLn1	SELn1	SWL	SWT	SWR
Capacity (veh/h)	791	-	-	131	98	1019	-	-
HCM Lane V/C Ratio	0.003	-	-	0.671	0.082	0.116	-	-
HCM Control Delay (s)	9.6	0	-	75.8	45	9	0	-
HCM Lane LOS	A	A	-	F	E	A	A	-
HCM 95th %tile Q(veh)	0	-	-	3.6	0.3	0.4	-	-

Intersection	
Int Delay, s/veh	7.8

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	0	0	0	26	0	82	0	1021	30	31	360	1
Future Vol, veh/h	0	0	0	26	0	82	0	1021	30	31	360	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	0	0	0	25	0	18	0	6	4	7	5	0
Mvmt Flow	0	0	0	30	0	93	0	1160	34	35	409	1

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1704	1674	410	1657	1657	1177	410	0	0	1194	0	0
Stage 1	480	480	-	1177	1177	-	-	-	-	-	-	-
Stage 2	1224	1194	-	480	480	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.35	6.5	6.38	4.1	-	-	4.17	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.35	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.35	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.725	4	3.462	2.2	-	-	2.263	-	-
Pot Cap-1 Maneuver	73	97	646	69	99	216	1160	-	-	567	-	-
Stage 1	571	558	-	210	267	-	-	-	-	-	-	-
Stage 2	221	262	-	526	558	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	39	89	646	65	91	216	1160	-	-	567	-	-
Mov Cap-2 Maneuver	39	89	-	65	91	-	-	-	-	-	-	-
Stage 1	571	513	-	210	267	-	-	-	-	-	-	-
Stage 2	126	262	-	484	513	-	-	-	-	-	-	-

Approach	SE	NW	NE	SW
HCM Control Delay, s	0	109.4	0	0.9
HCM LOS	A	F		

Minor Lane/Major Mvmt	NEL	NET	NER	NWLn1	SELn1	SWL	SWT	SWR
Capacity (veh/h)	1160	-	-	139	-	567	-	-
HCM Lane V/C Ratio	-	-	-	0.883	-	0.062	-	-
HCM Control Delay (s)	0	-	-	109.4	0	11.8	0	-
HCM Lane LOS	A	-	-	F	A	B	A	-
HCM 95th %tile Q(veh)	0	-	-	5.8	-	0.2	-	-

Intersection	
Int Delay, s/veh	15.3

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	0	3	1	34	0	51	2	530	48	121	867	5
Future Vol, veh/h	0	3	1	34	0	51	2	530	48	121	867	5
Conflicting Peds, #/hr	1	0	2	2	0	1	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	0	0	0	12	0	0	0	3	12	5	3	0
Mvmt Flow	0	3	1	39	0	58	2	602	55	138	985	6

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1928	1925	990	1902	1901	631	991	0	0	657	0	0
Stage 1	1264	1264	-	634	634	-	-	-	-	-	-	-
Stage 2	664	661	-	1268	1267	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.22	6.5	6.2	4.1	-	-	4.15	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.22	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.22	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.608	4	3.3	2.2	-	-	2.245	-	-
Pot Cap-1 Maneuver	51	68	302	49	70	485	706	-	-	916	-	-
Stage 1	210	243	-	451	476	-	-	-	-	-	-	-
Stage 2	453	463	-	197	242	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	33	45	301	~ 34	46	485	706	-	-	916	-	-
Mov Cap-2 Maneuver	33	45	-	~ 34	46	-	-	-	-	-	-	-
Stage 1	209	161	-	449	474	-	-	-	-	-	-	-
Stage 2	396	461	-	127	161	-	-	-	-	-	-	-

Approach	SE	NW	NE	SW
HCM Control Delay, s	73.6	281.2	0	1.2
HCM LOS	F	F		

Minor Lane/Major Mvmt	NEL	NET	NER	NWLn1	SELn1	SWL	SWT	SWR
Capacity (veh/h)	706	-	-	77	57	916	-	-
HCM Lane V/C Ratio	0.003	-	-	1.254	0.08	0.15	-	-
HCM Control Delay (s)	10.1	0	-	281.2	73.6	9.6	0	-
HCM Lane LOS	B	A	-	F	F	A	A	-
HCM 95th %tile Q(veh)	0	-	-	7.4	0.2	0.5	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	10.3

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	0	0	0	29	0	85	0	1021	33	34	360	1
Future Vol, veh/h	0	0	0	29	0	85	0	1021	33	34	360	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	0	0	0	25	0	18	0	6	4	7	5	0
Mvmt Flow	0	0	0	33	0	97	0	1160	38	39	409	1

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1716	1686	410	1667	1667	1179	410	0	0	1198	0	0
Stage 1	488	488	-	1179	1179	-	-	-	-	-	-	-
Stage 2	1228	1198	-	488	488	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.35	6.5	6.38	4.1	-	-	4.17	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.35	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.35	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.725	4	3.462	2.2	-	-	2.263	-	-
Pot Cap-1 Maneuver	72	95	646	67	97	215	1160	-	-	565	-	-
Stage 1	565	553	-	209	267	-	-	-	-	-	-	-
Stage 2	220	261	-	520	553	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	37	87	646	62	88	215	1160	-	-	565	-	-
Mov Cap-2 Maneuver	37	87	-	62	88	-	-	-	-	-	-	-
Stage 1	565	504	-	209	267	-	-	-	-	-	-	-
Stage 2	121	261	-	474	504	-	-	-	-	-	-	-

Approach	SE	NW	NE	SW
HCM Control Delay, s	0	137.9	0	1
HCM LOS	A	F		

Minor Lane/Major Mvmt	NEL	NET	NER	NWLn1	SELn1	SWL	SWT	SWR
Capacity (veh/h)	1160	-	-	132	-	565	-	-
HCM Lane V/C Ratio	-	-	-	0.981	-	0.068	-	-
HCM Control Delay (s)	0	-	-	137.9	0	11.8	0	-
HCM Lane LOS	A	-	-	F	A	B	A	-
HCM 95th %tile Q(veh)	0	-	-	6.8	-	0.2	-	-

Intersection	
Int Delay, s/veh	32.8

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	0	3	1	45	0	62	2	530	59	132	867	5
Future Vol, veh/h	0	3	1	45	0	62	2	530	59	132	867	5
Conflicting Peds, #/hr	1	0	2	2	0	1	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	0	0	0	12	0	0	0	3	12	5	3	0
Mvmt Flow	0	3	1	51	0	70	2	602	67	150	985	6

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1964	1961	990	1932	1931	637	991	0	0	669	0	0
Stage 1	1288	1288	-	640	640	-	-	-	-	-	-	-
Stage 2	676	673	-	1292	1291	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.22	6.5	6.2	4.1	-	-	4.15	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.22	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.22	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.608	4	3.3	2.2	-	-	2.245	-	-
Pot Cap-1 Maneuver	48	64	302	~ 47	67	481	706	-	-	907	-	-
Stage 1	203	237	-	447	473	-	-	-	-	-	-	-
Stage 2	446	457	-	191	236	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	29	40	301	~ 31	42	481	706	-	-	907	-	-
Mov Cap-2 Maneuver	29	40	-	~ 31	42	-	-	-	-	-	-	-
Stage 1	202	150	-	445	471	-	-	-	-	-	-	-
Stage 2	378	455	-	117	149	-	-	-	-	-	-	-

Approach	SE	NW	NE	SW
HCM Control Delay, s	82.4	$ 507.4	0	1.3
HCM LOS	F	F		

Minor Lane/Major Mvmt	NEL	NET	NER	NWLn1	SELn1	SWL	SWT	SWR
Capacity (veh/h)	706	-	-	68	51	907	-	-
HCM Lane V/C Ratio	0.003	-	-	1.788	0.089	0.165	-	-
HCM Control Delay (s)	10.1	0	-	$ 507.4	82.4	9.8	0	-
HCM Lane LOS	B	A	-	F	F	A	A	-
HCM 95th %tile Q(veh)	0	-	-	10.9	0.3	0.6	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	2.5

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	0	0	0	20	0	66	0	612	24	27	201	1
Future Vol, veh/h	0	0	0	20	0	66	0	612	24	27	201	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	77	77	77	90	90	90	76	76	76
Heavy Vehicles, %	0	0	0	25	0	18	0	6	4	7	5	0
Mvmt Flow	0	0	0	26	0	86	0	680	27	36	264	1

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1074	1044	265	1031	1031	694	265	0	0	707	0	0
Stage 1	337	337	-	694	694	-	-	-	-	-	-	-
Stage 2	737	707	-	337	337	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.35	6.5	6.38	4.1	-	-	4.17	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.35	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.35	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.725	4	3.462	2.2	-	-	2.263	-	-
Pot Cap-1 Maneuver	199	231	779	192	235	417	1311	-	-	869	-	-
Stage 1	681	645	-	398	447	-	-	-	-	-	-	-
Stage 2	413	441	-	632	645	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	152	220	779	185	223	417	1311	-	-	869	-	-
Mov Cap-2 Maneuver	152	220	-	185	223	-	-	-	-	-	-	-
Stage 1	681	613	-	398	447	-	-	-	-	-	-	-
Stage 2	328	441	-	601	613	-	-	-	-	-	-	-

Approach	SE	NW	NE	SW
HCM Control Delay, s	0	21.9	0	1.1
HCM LOS	A	C		

Minor Lane/Major Mvmt	NEL	NET	NER	NWLn1	SELn1	SWL	SWT	SWR
Capacity (veh/h)	1311	-	-	323	-	869	-	-
HCM Lane V/C Ratio	-	-	-	0.346	-	0.041	-	-
HCM Control Delay (s)	0	-	-	21.9	0	9.3	0	-
HCM Lane LOS	A	-	-	C	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	1.5	-	0.1	-	-

Intersection	
Int Delay, s/veh	2.9

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	0	3	1	26	0	39	2	303	42	108	518	5
Future Vol, veh/h	0	3	1	26	0	39	2	303	42	108	518	5
Conflicting Peds, #/hr	1	0	2	2	0	1	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	50	50	50	74	74	74	93	93	93	91	91	91
Heavy Vehicles, %	0	0	0	12	0	0	0	3	12	5	3	0
Mvmt Flow	0	6	2	35	0	53	2	326	45	119	569	5

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1190	1185	574	1169	1165	350	574	0	0	371	0	0
Stage 1	810	810	-	353	353	-	-	-	-	-	-	-
Stage 2	380	375	-	816	812	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.22	6.5	6.2	4.1	-	-	4.15	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.22	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.22	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.608	4	3.3	2.2	-	-	2.245	-	-
Pot Cap-1 Maneuver	166	191	522	162	196	698	1009	-	-	1171	-	-
Stage 1	377	396	-	644	634	-	-	-	-	-	-	-
Stage 2	646	621	-	357	395	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	135	162	521	138	166	697	1009	-	-	1171	-	-
Mov Cap-2 Maneuver	135	162	-	138	166	-	-	-	-	-	-	-
Stage 1	376	337	-	642	632	-	-	-	-	-	-	-
Stage 2	595	619	-	297	336	-	-	-	-	-	-	-

Approach	SE	NW	NE	SW
HCM Control Delay, s	24.1	25.1	0	1.4
HCM LOS	C	D		

Minor Lane/Major Mvmt	NEL	NET	NER	NWLn1	SELn1	SWL	SWT	SWR
Capacity (veh/h)	1009	-	-	266	196	1171	-	-
HCM Lane V/C Ratio	0.002	-	-	0.33	0.041	0.101	-	-
HCM Control Delay (s)	8.6	0	-	25.1	24.1	8.4	0	-
HCM Lane LOS	A	A	-	D	C	A	A	-
HCM 95th %tile Q(veh)	0	-	-	1.4	0.1	0.3	-	-

Intersection	
Int Delay, s/veh	3.1

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	0	0	0	26	0	82	0	686	30	31	250	1
Future Vol, veh/h	0	0	0	26	0	82	0	686	30	31	250	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	0	0	0	25	0	18	0	6	4	7	5	0
Mvmt Flow	0	0	0	30	0	93	0	780	34	35	284	1

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1199	1169	285	1152	1152	797	285	0	0	814	0	0
Stage 1	355	355	-	797	797	-	-	-	-	-	-	-
Stage 2	844	814	-	355	355	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.35	6.5	6.38	4.1	-	-	4.17	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.35	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.35	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.725	4	3.462	2.2	-	-	2.263	-	-
Pot Cap-1 Maneuver	164	195	759	157	199	363	1289	-	-	792	-	-
Stage 1	666	633	-	348	401	-	-	-	-	-	-	-
Stage 2	361	394	-	617	633	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	117	185	759	151	188	363	1289	-	-	792	-	-
Mov Cap-2 Maneuver	117	185	-	151	188	-	-	-	-	-	-	-
Stage 1	666	599	-	348	401	-	-	-	-	-	-	-
Stage 2	268	394	-	584	599	-	-	-	-	-	-	-

Approach	SE	NW	NE	SW
HCM Control Delay, s	0	28.8	0	1.1
HCM LOS	A	D		

Minor Lane/Major Mvmt	NEL	NET	NER	NWLn1	SELn1	SWL	SWT	SWR
Capacity (veh/h)	1289	-	-	271	-	792	-	-
HCM Lane V/C Ratio	-	-	-	0.453	-	0.044	-	-
HCM Control Delay (s)	0	-	-	28.8	0	9.8	0	-
HCM Lane LOS	A	-	-	D	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	2.2	-	0.1	-	-

Intersection	
Int Delay, s/veh	4

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	0	3	1	34	0	51	2	363	48	121	584	5
Future Vol, veh/h	0	3	1	34	0	51	2	363	48	121	584	5
Conflicting Peds, #/hr	1	0	2	2	0	1	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	0	0	0	12	0	0	0	3	12	5	3	0
Mvmt Flow	0	3	1	39	0	58	2	413	55	138	664	6

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1418	1415	669	1392	1391	442	670	0	0	468	0	0
Stage 1	943	943	-	445	445	-	-	-	-	-	-	-
Stage 2	475	472	-	947	946	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.22	6.5	6.2	4.1	-	-	4.15	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.22	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.22	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.608	4	3.3	2.2	-	-	2.245	-	-
Pot Cap-1 Maneuver	116	139	461	113	143	620	930	-	-	1078	-	-
Stage 1	318	344	-	573	578	-	-	-	-	-	-	-
Stage 2	574	562	-	301	343	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	88	110	460	92	114	619	930	-	-	1078	-	-
Mov Cap-2 Maneuver	88	110	-	92	114	-	-	-	-	-	-	-
Stage 1	317	274	-	571	576	-	-	-	-	-	-	-
Stage 2	518	560	-	236	273	-	-	-	-	-	-	-

Approach	SE	NW	NE	SW
HCM Control Delay, s	32.4	42.8	0	1.5
HCM LOS	D	E		

Minor Lane/Major Mvmt	NEL	NET	NER	NWLn1	SELn1	SWL	SWT	SWR
Capacity (veh/h)	930	-	-	188	136	1078	-	-
HCM Lane V/C Ratio	0.002	-	-	0.514	0.033	0.128	-	-
HCM Control Delay (s)	8.9	0	-	42.8	32.4	8.8	0	-
HCM Lane LOS	A	A	-	E	D	A	A	-
HCM 95th %tile Q(veh)	0	-	-	2.6	0.1	0.4	-	-

Intersection	
Int Delay, s/veh	3.5

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	0	0	0	29	0	85	0	686	33	34	250	1
Future Vol, veh/h	0	0	0	29	0	85	0	686	33	34	250	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	0	0	0	25	0	18	0	6	4	7	5	0
Mvmt Flow	0	0	0	33	0	97	0	780	38	39	284	1

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1211	1181	285	1162	1162	799	285	0	0	818	0	0
Stage 1	363	363	-	799	799	-	-	-	-	-	-	-
Stage 2	848	818	-	363	363	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.35	6.5	6.38	4.1	-	-	4.17	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.35	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.35	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.725	4	3.462	2.2	-	-	2.263	-	-
Pot Cap-1 Maneuver	161	192	759	155	197	362	1289	-	-	789	-	-
Stage 1	660	628	-	347	401	-	-	-	-	-	-	-
Stage 2	359	393	-	611	628	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	113	181	759	148	185	362	1289	-	-	789	-	-
Mov Cap-2 Maneuver	113	181	-	148	185	-	-	-	-	-	-	-
Stage 1	660	591	-	347	401	-	-	-	-	-	-	-
Stage 2	263	393	-	575	591	-	-	-	-	-	-	-

Approach	SE	NW	NE	SW
HCM Control Delay, s	0	30.9	0	1.2
HCM LOS	A	D		

Minor Lane/Major Mvmt	NEL	NET	NERNWLn1	SELn1	SWL	SWT	SWR
Capacity (veh/h)	1289	-	- 265	-	789	-	-
HCM Lane V/C Ratio	-	-	- 0.489	-	0.049	-	-
HCM Control Delay (s)	0	-	- 30.9	0	9.8	0	-
HCM Lane LOS	A	-	- D	A	A	A	-
HCM 95th %tile Q(veh)	0	-	- 2.5	-	0.2	-	-

Intersection	
Int Delay, s/veh	6.5

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	0	3	1	45	0	62	2	363	59	132	584	5
Future Vol, veh/h	0	3	1	45	0	62	2	363	59	132	584	5
Conflicting Peds, #/hr	1	0	2	2	0	1	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	0	0	0	12	0	0	0	3	12	5	3	0
Mvmt Flow	0	3	1	51	0	70	2	413	67	150	664	6

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1454	1451	669	1422	1421	448	670	0	0	480	0	0
Stage 1	967	967	-	451	451	-	-	-	-	-	-	-
Stage 2	487	484	-	971	970	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.22	6.5	6.2	4.1	-	-	4.15	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.22	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.22	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.608	4	3.3	2.2	-	-	2.245	-	-
Pot Cap-1 Maneuver	109	132	461	108	138	615	930	-	-	1067	-	-
Stage 1	308	335	-	569	574	-	-	-	-	-	-	-
Stage 2	566	555	-	292	334	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	80	102	460	87	107	614	930	-	-	1067	-	-
Mov Cap-2 Maneuver	80	102	-	87	107	-	-	-	-	-	-	-
Stage 1	307	260	-	567	572	-	-	-	-	-	-	-
Stage 2	499	553	-	223	259	-	-	-	-	-	-	-

Approach	SE	NW	NE	SW
HCM Control Delay, s	34.4	64.1	0	1.6
HCM LOS	D	F		

Minor Lane/Major Mvmt	NEL	NET	NER	NWLn1	SELn1	SWL	SWT	SWR
Capacity (veh/h)	930	-	-	173	127	1067	-	-
HCM Lane V/C Ratio	0.002	-	-	0.703	0.036	0.141	-	-
HCM Control Delay (s)	8.9	0	-	64.1	34.4	8.9	0	-
HCM Lane LOS	A	A	-	F	D	A	A	-
HCM 95th %tile Q(veh)	0	-	-	4.3	0.1	0.5	-	-

HOWARD STEIN HUDSON

11 Beacon Street, Suite 1010
Boston, Massachusetts 02108
617.482.7080

www.hshassoc.com