

PRINCIPALS

Joseph J. DeSantis, P.E., PTOE
John S. DePalma
Casey A. Moore, P.E.
Gary R. McNaughton, P.E., PTOE
Christopher J. Williams, P.E.

ASSOCIATES

John J. Mitchell, P.E.
R. Trent Ebersole, P.E.
Matthew M. Kozsuch, P.E.
Maureen Chlebek, P.E., PTOE
Dean A. Carr, P.E.
Jason T. Adams, P.E., PTOE
Christopher K. Bauer, P.E., PTOE
Mark A. Roth, P.E.
John R. Wichner, P.E., PTOE

FOUNDER

Joseph W. McMahon, P.E.

MEMORANDUM

TO: Karlis Skulte, P.E.
FROM: Erin Fredette, P.E.
DATE: July 22, 2020
RE: Traffic Assessment
44 Wharf Street Development
Weymouth, MA

McMahon Associates has completed a traffic assessment for the proposed residential development to be located at 44 Wharf Street in Weymouth, Massachusetts, as shown in Figure 1 attached. This assessment is based on a concept plan prepared by Civil & Environmental Consultants, Inc., dated July 13, 2020. The following memorandum reviews the project area crash history, estimated project trip generation, expected operations at the proposed site driveways, and provides a sensitivity analysis of the future traffic operations that would be expected to result with the proposed project in place.

Project Description

The project site is located at 44 Wharf Street in Weymouth, Massachusetts. The project site is bound by MBTA Commuter Rail tracks to the south, commercial and residential buildings to the west, Osprey Overlook Park to the north, and Wharf Street to the east. The project site is located less than a quarter mile west of the East Weymouth MBTA Commuter Rail Station.

The project site is currently occupied by an existing mill building with a 21,138 square foot footprint, three full floors, and a partial fourth floor and basement, as well as an attached pre-manufactured building currently used for sheet metal manufacturing with a 6,879 square foot footprint. The existing buildings on the site have a combined gross square footage of 79,687 square feet (excluding the basement area of the existing mill building). The proposed project would raze the 6,879 square foot pre-manufactured building and redevelop the existing 21,138 square foot mill building into a residential development with a total of 66 units. An additional residential building would be constructed north of the reconstructed building and provide 18 residential units for a total of 84 units to be developed as part of the proposed project. The site would continue to be accessed via the two existing driveways on Wharf Street, with the northern site driveway proposed as a full-access driveway and the southern site driveway to be gated and used for emergency vehicle access only.

Study Area Intersections

Based on a review of the anticipated traffic generating characteristics of the proposed project and a review of the adjacent roadways serving the project site, the following study area intersections were selected for review:

- Wharf Street at East Street
- Wharf Street at Southern Site Driveway
- Wharf Street at Northern Site Driveway

The traffic impact assessment presented in this report documents existing and future traffic conditions for the study area intersections noted above.

Existing Roadway Network

The project site benefits from excellent access via the local and regional roadway systems and the MBTA Commuter Rail. A brief description of the roadway and public transportation access serving the project site is presented below.

Wharf Street

Wharf Street generally extends in a north-south direction and is classified as a local roadway. Wharf Street is under Town of Weymouth jurisdiction and allows travel in both directions, providing access to commercial, residential, and recreational land uses. Pavement markings are provided for approximately 300 feet of Wharf Street at the approaches to the intersection with the MBTA Commuter Rail tracks. There are no pavement markings provided in the vicinity of the site. The overall roadway width is approximately 22 feet wide, with a five and a half foot wide sidewalk provided on the east side of Wharf Street. The existing sidewalk connects to a sidewalk provided along the MBTA Commuter Rail tracks, which connects to the East Weymouth Commuter Rail Station. There is no posted speed limit on Wharf Street.

East Street

East Street generally extends in a north-south direction and is classified as an urban collector. East Street is under Town of Weymouth jurisdiction and provides one 12 foot travel lane with shoulders up to two feet wide in each direction, providing both access to residential and commercial land uses. A five foot sidewalk is provided along the western side of East Street in the vicinity of the site. A crosswalk is provided on the northbound approach of the unsignalized intersection of Wharf Street at East Street. East Street has a posted speed limit of 30 miles per hour in the southbound direction approaching Wharf Street. There is no posted speed limit on East Street in the northbound direction.

Public Transportation

The MBTA Commuter Rail East Weymouth Station is located less than one quarter mile from the proposed residential development on Wharf Street. A sidewalk is provided along the Commuter Rail tracks from their intersection with Wharf Street to the station. The station services the MBTA Greenbush Line, which provides rail service between East Weymouth and Boston's South Station. The

first train leaving East Weymouth Station on a typical weekday is at 6:07 AM and the last train travelling to the East Weymouth Station departs South Station at 11:20 PM.

Crash History

Crash data for the study area was obtained from MassDOT for the most recent five-year period available. This data includes complete yearly crash summaries for the year 2013 through the year 2017.

The unsignalized intersection of Wharf Street at East Street is reported to have experienced one crash during the five-year period analyzed. The crash was reported to be a single vehicle collision and resulted in property damage only. No crashes were reported at the project site driveways on Wharf Street from 2013 to 2017.

Based on a review of the available crash data the roadway network in the vicinity of the project site does not appear to have any existing safety deficiencies.

Project Trip Generation

In order to estimate the number of vehicle trips associated with the proposed residential development, the Institute of Transportation Engineers' (ITE) publication, *Trip Generation Manual, 10th Edition*, was referenced. ITE is a national research organization of transportation professionals, and the *Trip Generation Manual, 10th Edition* provides traffic generation information for various land uses compiled from studies conducted by members nationwide. Vehicle trip estimates for the proposed residential development were developed based on data presented in this publication for Land Use Code 221 (Multifamily Housing, Mid-Rise). This reference establishes vehicle trip rates (in this case expressed in trips per dwelling unit) based on actual traffic counts conducted at similar types of existing land uses. Table 1 presents the estimated vehicle trips associated with the proposed residential redevelopment.

Table 1: Summary of Project Trip Generation

Description	Size	Weekday AM			Weekday PM			Weekday		
		In	Out	Total	In	Out	Total	In	Out	Total
Residential ⁽¹⁾	84 units	8	22	30	23	14	37	228	228	456

(1) ITE Land Use Code 221 (Multifamily Housing, Mid-Rise), based on 84 dwelling units.

Table 1 shows that the proposed residential development is estimated to generate approximately 30 vehicle trips during the weekday morning peak hour (8 entering vehicles and 22 exiting vehicles), approximately 37 vehicle trips during the weekday afternoon peak hour (23 entering vehicles and 14 exiting vehicles), and approximately 456 vehicle trips during a typical weekday (228 entering vehicles and 228 exiting vehicles).

As discussed previously, the project site is served by rail transit. As such a portion of the trips to and from the project site would be expected to travel utilizing the existing MBTA Commuter Rail service, which would reduce the number of overall vehicle trips to the site. Based on 2010 Journey-to-Work Census data, approximately one third of working residents in Weymouth commute to the City of Boston or Cambridge.

Due to the building on site being only partially utilized, there was no trip generation credit taken as part of the development of the project volumes shown in Table 1. However, for comparison, and to demonstrate the lesser impact of the proposed redevelopment, Table 2 provides a comparison of the trip generation associated with the residential development and the trip generation associated with the on-site manufacturing operation. Trip generation for the manufacturing operation was estimated using ITE data for Land Use Code 140 (Manufacturing), based on trips per square foot.

Table 2: Summary of Project Trip Generation

Description	Size	Weekday AM			Weekday PM			Weekday		
		In	Out	Total	In	Out	Total	In	Out	Total
Manufacturing ⁽¹⁾	79,687 s.f.	38	11	49	17	37	54	206	206	412
Residential ⁽²⁾	84 units	8	22	30	23	14	37	228	228	456
Total Project Trips		-30	11	-19	6	-23	-17	22	22	44

(1) ITE Land Use Code 140 (Manufacturing), based on 79,687 square feet.

(2) ITE Land Use Code 221 (Multifamily Housing, Mid-Rise), based on 84 dwelling units.

As shown in Table 2, during the weekday morning peak hour, the proposed redevelopment is estimated to result in approximately 19 fewer vehicle trips (30 fewer entering vehicles and 11 additional exiting vehicles) as compared to the manufacturing operation. During the weekday afternoon peak hour, the proposed redevelopment is estimated to result in approximately 17 fewer vehicle trips (six additional entering vehicles and 23 fewer exiting vehicles) as compared to the manufacturing operation. During a typical weekday, the proposed redevelopment is estimated to result in approximately 44 additional vehicle trips (22 additional entering vehicles and 22 additional exiting vehicles) as compared to the manufacturing operation.

Sensitivity Analysis

Due to the current COVID-19 crisis, traffic patterns and operations are significantly different than typical conditions experienced earlier in the year and during previous years. As a result of the current disruption in traffic, collecting traffic volume data that is representative of a typical condition is not possible. Therefore, McMahon has completed a sensitivity analysis to provide an understanding of how the proposed residential project may impact operations along Wharf Street and East Street.

In order to conduct the sensitivity analysis, peak period turning movement volume data provided by the Town of Weymouth was reviewed. The available data includes turning movement counts conducted on January 28, 2020 and January 29, 2020 during the weekday morning (7:00 AM -9:00 AM) and weekday afternoon (3:30 PM – 6:30 PM) peak periods at the intersection of East Street and Unicorn Avenue. Unicorn Avenue is located approximately 3,500 feet north of the intersection of Wharf Street at East Street. Based on the turning movement counts, the weekday morning peak hour on East Street is shown to occur at 7:30 AM and the weekday afternoon peak hour is shown to occur at 3:45 PM. Table 3 below summarizes the peak hour traffic volume information on East Street, south of Unicorn Avenue.

Table 3: Existing Peak Hour Volumes South of Unicorn Avenue

		Northbound	Southbound	Total
AM	Peak hour Volume	104	63	167
	Peak Hour Factor	0.68	0.79	0.85
PM	Peak hour Volume	130	95	225
	Peak Hour Factor	0.83	0.82	0.91

Although the data from Unicorn Avenue is in close proximity to Wharf Street, McMahon recognizes that the peak hour traffic volumes at East Street and Wharf Street may be higher than at the East Street intersection with Unicorn Avenue. Factors that may contribute to higher volumes at East Street and Wharf Street include access to and from Commercial Street for the following uses:

- Commuter rail pick-up and drop-off activity on Wharf Street
- Vehicles traveling to/from the energy business located between East Street and Wharf Street
- Vehicles traveling to/from the auto and motorcycle business located on East Street north of the commuter rail tracks
- Vehicles associated with residences along East Street south of Unicorn Avenue.

In order to account for the potential additional vehicles at the intersection of East Street and Wharf Street, adjustments were made to the East Street traffic volumes including the following:

- Addition of 15 vehicles during the weekday morning peak hour and addition of 21 vehicles during the weekday afternoon peak hour associated with the auto and motorcycle business.
- Addition of 10 vehicles during the weekday morning peak hour and addition of 12 vehicles during the weekday afternoon peak hour associated with the energy business.
- Addition of 63 vehicles during the weekday morning peak hour and addition of 84 vehicles during the weekday afternoon peak hour associated with the residences along East Street, south of Unicorn Avenue. These vehicles represent approximately half of the trips associated with the residences located on East Street or on the intersecting roadways with East Street from Puritan Road to Sumner Road

Details of the trip generation estimates described above are provided as an attachment to this memorandum.

McMahon also accounted for turning movements onto Wharf Street from East Street. The pick-up and drop-off activity associated with East Weymouth Commuter Rail Station would result in a number of left and right turns to/from Wharf Street, which can't be accurately measured at this time. Therefore, a number of vehicles trips equivalent to 20% of the East Street peak hour volumes were estimated to be turning left and right onto Wharf Street for the purposes of the sensitivity analysis

A summary of all of the factors identified above and the resulting peak hour volumes for East Street at its intersection with Wharf Street is provided in Table 4 below.

Table 4: Summary of Peak Hour Volumes South of Unicorn Avenue

		Northbound	Southbound	Total
AM	East Street at Unicorn Avenue Volume	104	63	167
	Business Trips	17	8	25
	Residential Trips	<u>16</u>	<u>47</u>	<u>63</u>
	East Street at Wharf Street ⁽¹⁾	137	118	255
	Turns from East Street onto Wharf Street ⁽²⁾	27	24	51
PM	East Street at Unicorn Avenue Volume	130	95	225
	Business Trips	14	19	33
	Residential Trips	<u>53</u>	<u>31</u>	<u>84</u>
	East Street at Wharf Street ⁽¹⁾	197	145	342
	Turns from East Street onto Wharf Street ⁽²⁾	39	29	68

(1) Sum of East Street at Unicorn Avenue volumes, Business Trips, and Residential Trips

(2) Turning volumes are estimated as 20% of the East Street at Wharf Street volumes

The volumes noted above in Table 4 are considered to be a conservative estimate of peak hour volumes on East Street at Wharf Street under normal conditions.

Since the weekday afternoon peak hour is shown to result in the higher peak hour traffic volumes, the sensitivity analysis was conducted for the weekday afternoon peak hour volumes. The volume and peak hour factor information outlined above in Table 3 and Table 4 was incorporated into a Synchro capacity analysis model of the unsignalized intersection of East Street at Wharf Street. A sensitivity analysis was then completed to understand how many vehicles could exit Wharf Street while maintaining acceptable traffic operations. Using this analysis methodology, up to 250 vehicles could exit Wharf Street during the weekday afternoon peak hour and the Wharf Street approach would still be shown to operate at level of service (LOS) C. With approximately 300 vehicles assigned to exit Wharf Street, the approach is shown to operate at LOS D, which is generally considered to be acceptable in developed environments such as the study area. The Synchro capacity analysis worksheets associated with this sensitivity analysis are attached for reference.

As described in an earlier section of this memorandum, the proposed redevelopment is projected to result in approximately 30 vehicle trips (8 entering trips and 22 existing trips) during the weekday morning peak hour, and approximately 37 vehicle trips (23 entering trips and 14 exiting trips) during the weekday afternoon peak hour. Wharf Street is expected to have fewer peak hour vehicles than East Street, so the Wharf Street volume should be considerably less than the 250 vehicles reviewed as part of the sensitivity analysis.

While existing traffic volume data is not available to analyze the specific operations of the intersection of East Street and Wharf Street with and without the proposed project, the sensitivity analysis conducted as part of this assessment indicates that Wharf Street has more than enough capacity to process the vehicles associated with the project and still operate at LOS C or better during the weekday morning and weekday afternoon peak hours.

Site Access Operations

Access to the proposed residential project would be provided via two unsignalized driveways on Wharf Street; one gated emergency vehicle access driveway on the southern side of the site and one full-access driveway on the northern side of the site. The driveway locations are not expected to change significantly from the existing driveways on-site. Based on a review of the trip generation data presented in Table 1 and an estimation of traffic volumes on Wharf Street, driveway traffic operations are expected to be acceptable with the proposed project in place. The project would not be expected to have a noticeable impact on the operations along Wharf Street.

Sight Distance

A field review of the available sight distance was conducted at the intersection of Wharf Street at East Street, the southern site driveway at Wharf Street, and the northern site driveway at Wharf Street. The American Association of State Highway and Transportation Officials (AASHTO) publication, *A Policy on Geometric Design, 2018 Edition*, defines minimum and recommended sight distances at intersections. The minimum sight distance is based on the required stopping sight distance (SSD) for vehicles traveling along the main road. According to AASHTO, "If the available sight distance for an entering or crossing vehicle is at least equal to the appropriate stopping sight distance for the major road, then drivers have sufficient time to anticipate and avoid collisions."

In order to accurately assess required sight distances on East Street and Wharf Street, speed data was collected. A speed limit of 30 miles per hour is posted in the southbound direction along East Street approaching Wharf Street, and no speed limit is posted in the northbound direction on East Street. A speed study on East Street conducted May 20, 2020 just north of Sumner Road was provided from the Town of Weymouth. The speed study indicated the 85th percentile speed on East Street in the southbound direction was 34 miles per hour while the 85th percentile speed in the northbound direction was 33 miles per hour. The measured speeds are higher than the posted speed limit on East Street, so in order to present a conservative analysis, the 85th percentile speeds of 34 miles per hour in the southbound direction and 33 miles per hour in the northbound direction were utilized to determine the required sight distance at the intersection of Wharf Street at East Street. Speed samples were also collected along Wharf Street that indicated an 85th percentile speed of approximately 27 miles per hour in the southbound direction and an 85th percentile speed of approximately 25 miles per hour in the northbound direction. These 85th percentile speeds were utilized to determine the required sight distance at the two site driveways on Wharf Street.

Table 5 below summarizes the AASHTO sight distance standards for the 85th percentile speeds on East Street and Wharf Street, and the available sight distance at the three study area intersections.

Table 5: Sight Distance Requirements

Location	Looking	Speed	85th %	SSD ¹	Sight Distance	Meets
		Limit (mph)	Speed (mph)	Required	Measured	Required SSD?
Wharf Street at East Street	Left (South)	-	33	230	400	Yes
	Right (North)	30	34	240	260	Yes
Southern Site Driveway	Left (North)	-	27	165	>500	Yes
	Right (South)	-	25	175	275	Yes
Northern Site Driveway	Left (North)	-	27	170	345	Yes
	Right (South)	-	25	160	>500	Yes

(1) Stopping sight distance (see AASHTO equations 3-2 and 3-3) for the 85th percentile speed.

As shown in Table 5, the available sight distance for vehicles exiting from Wharf Street onto East Street looking left towards the south was measured to be approximately 400 feet which exceeds the required AASHTO SSD for an 85th percentile speed of 33 miles per hour. The sight distance extends through the intersection of East Street at Commercial Street. For vehicles exiting from Wharf Street onto East Street looking right towards the north, the sight distance was measured to be approximately 260 feet which satisfies SSD requirements for an 85th percentile speed of 34 miles per hour. Sight distance is partially limited by cars parked in the energy business parking lot to the north of the intersection.

The available sight distance for vehicles exiting from the emergency-only southern site driveway onto Wharf Street looking left towards the north was measured to be greater than 500 feet which exceeds the required AASHTO SSD for an 85th percentile speed of 27 miles per hour. The sight distance looking to the right towards the south was measured to be approximately 275 feet which satisfies the SSD requirements for an 85th percentile speed of 25 miles per hour. Sight distance looking right was primarily obstructed by vertical curvature in the roadway.

Table 5 shows that for a vehicle exiting the full access northern site driveway onto Wharf Street, the available sight distance looking left towards the north is approximately 345 feet, which exceeds SSD requirements for an 85th percentile speed of 27 miles per hour. This available sight distance looking left extends to the end of the Wharf Street. For a vehicle looking right towards the south, the available sight distance was measured to be greater than 500 feet, which exceeds SSD requirements for an 85th percentile speed of 25 miles per hour.

As part of the project, landscaping should be maintained at both site driveways to provide appropriate sight lines for vehicles entering and exiting the site.

Conclusion

The proposed project includes the redevelopment of approximately 79,687 square feet of manufacturing buildings located at 44 Wharf Street in Weymouth, MA into a residential development with 84 units. Access to the site would continue to be provided via two driveways on Wharf Street. Under proposed conditions, the southern site driveway would be used for emergency vehicle access only, while the northern site driveway would be a full-access driveway.

Based on the analysis presented in this assessment, the proposed project is estimated to generate approximately 30 vehicle trips during the weekday morning peak hour (eight entering vehicles and 22 exiting vehicles), and approximately 37 vehicle trips during the weekday afternoon peak hour (23 entering vehicles and 14 exiting vehicles). Due to the nearby location of the East Weymouth MBTA Commuter Rail Station, a portion of trips to and from the site would be expected to be via transit. The total number of vehicle trips related to the site would be estimated to decrease during the weekday morning and afternoon peak hours compared to the existing manufacturing use on the site.

Due to the current COVID-19 crisis, traffic patterns and operations are significantly different from typical conditions, and traffic volume data was not collected. As a result of the inability to collect representative traffic volume information in the vicinity of the project site, McMahon has completed a sensitivity analysis using traffic data collected in January of 2020 at the intersection of Unicorn Avenue at East Street, provided by the Town of Weymouth, to provide an understanding of how the proposed residential project would impact surrounding traffic operations. The sensitivity analysis shows that Wharf Street should have more than enough capacity to continue operating at LOS C or better with the proposed project in place. The project would not be expected to have a significant impact on the operations of East Street or Wharf Street.

Available sight distances at the intersection of Wharf Street and East Street satisfy AASHTO sight distance requirements for the 85th percentile vehicle speeds along East Street. Available sight distances for the two proposed site driveways are also expected to exceed AASHTO sight distance requirements for the 85th percentile vehicle speeds along Wharf Street. Based on the trip generation data outlined in this memorandum, traffic operations at both site driveways are expected to be acceptable with the proposed residential development in place.

Attachments

Figure 1
Crash Summary
Additional Developments Trip Generation Summary
East Street at Unicorn Avenue Turning Movement Count
Synchro Sensitivity Analysis Reports
East Street Speed Study
Wharf Street Speed Samples

Figure 1



Crash Summary

CRASH ANALYSIS

44 Wharf Street Residential Weymouth, MA

	East Street at Wharf Street	Wharf Street at Southern Site Driveway	Wharf Street at Northern Site Driveway
Year			
2013	0	0	0
2014	0	0	0
2015	0	0	0
2016	1	0	0
2017	0	0	0
<i>Total</i>	<i>1</i>	<i>0</i>	<i>0</i>
Type			
Angle	0	0	0
Rear-end	0	0	0
Rear-to-rear	0	0	0
Sideswipe	0	0	0
Head-on	0	0	0
Single Vehicle	1	0	0
<i>Total</i>	<i>1</i>	<i>0</i>	<i>0</i>
Severity			
Property Damage	1	0	0
Personal Injury	0	0	0
Fatality	0	0	0
Unknown	0	0	0
<i>Total</i>	<i>1</i>	<i>0</i>	<i>0</i>
Weather			
Clear	1	0	0
Cloudy	0	0	0
Rain	0	0	0
Snow	0	0	0
Not Reported	0	0	0
<i>Total</i>	<i>1</i>	<i>0</i>	<i>0</i>
Time			
7:00 AM to 9:00 AM	0	0	0
9:00 AM to 4:00 PM	0	0	0
4:00 PM to 6:00 PM	0	0	0
6:00 PM to 7:00 AM	1	0	0
Total	1	0	0

Additional Developments Trip Generation Summary

Additional Developments Trip Generation Summary

Description	Size	Weekday AM			Weekday PM		
		In	Out	Total	In	Out	Total
Auto and Motorcycle Care Center ⁽¹⁾	6,600 s.f.	10	5	15	10	11	21
Energy Contracting Business ⁽²⁾	5,650 s.f.	7	3	10	4	8	12
<u>Residential⁽³⁾</u>	<u>167 units</u>	<u>31</u>	<u>93</u>	<u>124</u>	<u>105</u>	<u>61</u>	<u>166</u>
Total Additional Trips		48	101	149	119	80	199

(1) ITE Land Use Code 942 (Automobile Care Center), based on 6,600 square feet.

(2) ITE Land Use Code 180 (Specialty Trade Contractor), based on 5,650 square feet.

(3) ITE Land Use Code 210 (Single-Family Detached Housing), based on 167 dwelling units.

East Street at Unicorn Avenue Turning Movement Count

East St./ Unicorn Ave. Turning Movement Count 1/28&29/2020 – Mostly Cloudy, 40°F




Time Start	East St. NWB		East St. SEB		Unicorn Ave. NEB		Total	Peak Hr.
	Left	Straight	Straight	Right	Left	Right		
700	11	13	15	19	5	2	65	268
715	6	9	11	7	4	1	38	
730	8	14	13	16	18	2	71	
745	11	15	14	16	7	3	66	
800	16	22	9	11	9	2	69	
815	4	14	18	15	9	2	62	
830	5	13	4	11	7	1	41	
845	6	21	12	6	6	2	53	
AM Peak Hr.	39	65	54	58	43	9		
1530	4	20	22	6	7	6	65	304
1545	2	31	24	7	12	5	81	
1600	3	22	16	5	13	10	69	
1615	6	33	12	12	6	5	74	
1630	9	24	18	12	12	5	80	
1645	6	25	11	7	8	5	62	
1700	3	24	16	6	7	10	66	
1715	2	29	25	11	5	6	78	
1730	3	19	29	15	11	4	81	
1745	2	13	21	8	9	5	58	
1800	2	21	19	14	6	5	67	
1815	0	17	22	11	8	14	72	
1830	5	14	18	5	12	6	60	
PM Peak Hr.	20	110	70	36	43	25	304	
5 1/4 Hr. Total	114	413	349	220	181	101	1378	

Synchro Sensitivity Analysis Reports

44 Wharf Street Residential
3: Wharf Street & East Street

Sensitivity Analysis - 250
Existing PM

Intersection						
Int Delay, s/veh	10.2					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	W		T			T
Traffic Vol, veh/h	250	0	197	39	29	145
Future Vol, veh/h	250	0	197	39	29	145
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	75	75	83	83	82	82
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	333	0	237	47	35	177
Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	508	261	0	0	284	0
Stage 1	261	-	-	-	-	-
Stage 2	247	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	525	778	-	-	1278	-
Stage 1	783	-	-	-	-	-
Stage 2	794	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	509	778	-	-	1278	-
Mov Cap-2 Maneuver	509	-	-	-	-	-
Stage 1	783	-	-	-	-	-
Stage 2	770	-	-	-	-	-
Approach	WB	NB	SB			
HCM Control Delay, s	24.5	0	1.3			
HCM LOS	C					
Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT		
Capacity (veh/h)	-	-	509	1278	-	
HCM Lane V/C Ratio	-	-	0.655	0.028	-	
HCM Control Delay (s)	-	-	24.5	7.9	0	
HCM Lane LOS	-	-	C	A	A	
HCM 95th %tile Q(veh)	-	-	4.7	0.1	-	

Intersection						
Int Delay, s/veh	15.2					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	300	0	197	39	29	145
Future Vol, veh/h	300	0	197	39	29	145
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	75	75	83	83	82	82
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	400	0	237	47	35	177
Major/Minor	Minor1	Major1		Major2		
Conflicting Flow All	508	261	0	0	284	0
Stage 1	261	-	-	-	-	-
Stage 2	247	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	525	778	-	-	1278	-
Stage 1	783	-	-	-	-	-
Stage 2	794	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	509	778	-	-	1278	-
Mov Cap-2 Maneuver	509	-	-	-	-	-
Stage 1	783	-	-	-	-	-
Stage 2	770	-	-	-	-	-
Approach	WB	NB		SB		
HCM Control Delay, s	33.3	0		1.3		
HCM LOS	D					
Minor Lane/Major Mvmt	NBT	NBRWBLn1		SBL	SBT	
Capacity (veh/h)	-	- 509		1278	-	
HCM Lane V/C Ratio	-	- 0.786		0.028	-	
HCM Control Delay (s)	-	- 33.3		7.9	0	
HCM Lane LOS	-	- D		A	A	
HCM 95th %tile Q(veh)	-	- 7.2		0.1	-	

East Street Speed Study

Speed Record
 East St. opposite #513
 5/20/2020, 12:05 to 14:00

Southbound
 Raw Sorted

28	51
32	37
31	37
33	37
31	36
31	36
31	36
26	35
33	35
34	35
21	34
26	34
34	34
32	34
31	34
33	33
30	33
30	33
28	33
30	33
30	33
29	33
37	33
32	33
30	33
33	33
22	33
33	33
30	32
31	32
33	32
28	32
31	32
31	32
28	32
29	32
32	32
37	32
32	32
31	32
31	32
23	31
29	31
28	31
31	31
29	31
28	31
29	31

85% Speed	34 MPH
Mean	31 MPH
Mode	31 MPH
Median	31 MPH

Northbound
 Raw Sorted

36	42
33	39
37	37
23	37
32	37
33	36
32	36
30	36
28	35
31	34
37	34
33	34
32	33
32	33
34	33
29	33
32	33
30	33
29	33
36	33
34	33
31	33
32	33
29	32
24	32
29	32
39	32
27	32
33	32
33	32
25	32
31	32
30	32
28	31
28	31
31	31
29	31
27	31
26	31
33	31
31	31
30	31
31	31
24	31
33	31
32	31
33	31
32	31

85% Speed	33 MPH
Mean	30 MPH
Mode	31 MPH
Median	30 MPH

Southbound	
Raw	Sorted
29	31
28	31
32	31
32	31
36	31
34	31
28	31
23	31
32	31
35	31
32	31
31	31
26	31
23	30
33	30
28	30
30	30
31	30
29	30
37	30
34	30
31	29
33	29
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31	29
33	29
35	29
33	29
32	29
32	29
36	28
35	28
31	28
33	28
33	28
31	28
34	28
32	28
31	28
33	28
32	28
30	28
29	27
31	27
51	26
28	26
28	26
31	23
28	23
27	23
36	22
27	21

Northbound	
Raw	Sorted
30	31
31	30
27	30
26	30
29	30
33	30
30	30
30	30
27	30
29	30
26	30
31	29
24	29
34	29
42	29
30	29
33	29
31	29
33	29
29	29
30	29
22	29
29	29
29	29
35	29
31	28
31	28
25	28
28	28
30	28
29	28
26	28
27	27
29	27
36	27
31	27
31	27
31	27
28	27
27	26
31	26
32	26
32	26
37	26
24	25
26	25
31	24
27	24
29	24
28	24
28	23
29	22

15

14

Wharf Street Speed Samples

Wharf Street Speed Study

NB Time (s)	NB Speed (mph)	SB Time (s)	SB Speed (mph)
7.50	25	6.65	28
7.50	25	7.50	25
7.76	24	11.52	16
7.82	24		
8.00	23		
8.00	23		
Average NB	24	Average SB	23
85th NB	25	85th SB	27