

## M E M O R A N D U M

**DATE:** October 20, 2021

**TO:** Chad Wise  
Battle Green Holdings, LLC  
306 E. Gay Street  
Columbus, OH 43215

**FROM:** Daniel J. Mills, P.E., PTOE – Principal  
Jack Lawrence, E.I.T. – Transportation Engineer

**RE:** **Proposed Marijuana Dispensary**  
366 Hathaway Road, New Bedford, MA

DJM

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MDM Transportation Consultants, Inc. (MDM) has prepared this traffic memorandum (TM) for the proposed Marijuana Dispensary to be located at 366 Hathaway Road in New Bedford, MA. The project location and surrounding roadway network is shown in **Figure 1**. This memorandum provides a primary summary of the baseline traffic conditions at the Site and adjacent roadways/intersections, evaluates projected trip generation, evaluates safety-related conditions at the study locations, and provides an operational analysis of project impact.

Key findings of the traffic assessment are as follows:

- *Baseline Traffic Volumes.* Hathaway Road adjacent to the Site carries approximately 1,690 vehicles per hour (vph) during the morning peak hour, 1,850 vph during the evening peak hour, and 1,570 vph during the Saturday midday peak hour.
- *Safety Characteristics.* The study intersections generally experienced crash rates at or below the District 5 averages; the exception being the signalized Hathaway Road at Shawmut Avenue intersection. None of the study intersections along are classified as high crash locations according to MassDOT (HSIP 2015-2017).



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Figure 1

Site Location

- *Moderate Trip Generation.* Based on ITE trip generation methodology, the proposed redevelopment is estimated to generate approximately 45 vehicle trips during the weekday morning peak hour, 81 vehicle trips during the weekday evening peak hour, and 124 vehicle trips during the Saturday midday peak hour.
- *Adequate Roadway Capacity & Operations.* Under 2028 Build conditions, the Site driveway and adjacent shared driveway approaches to Hathaway Road have been calculated to operate with minimal delays during the weekday morning, weekday evening, and Saturday midday peak hours. Mainline traffic along Hathaway Road will continue to operate with minimal delay (LOS A) during the peak hours.

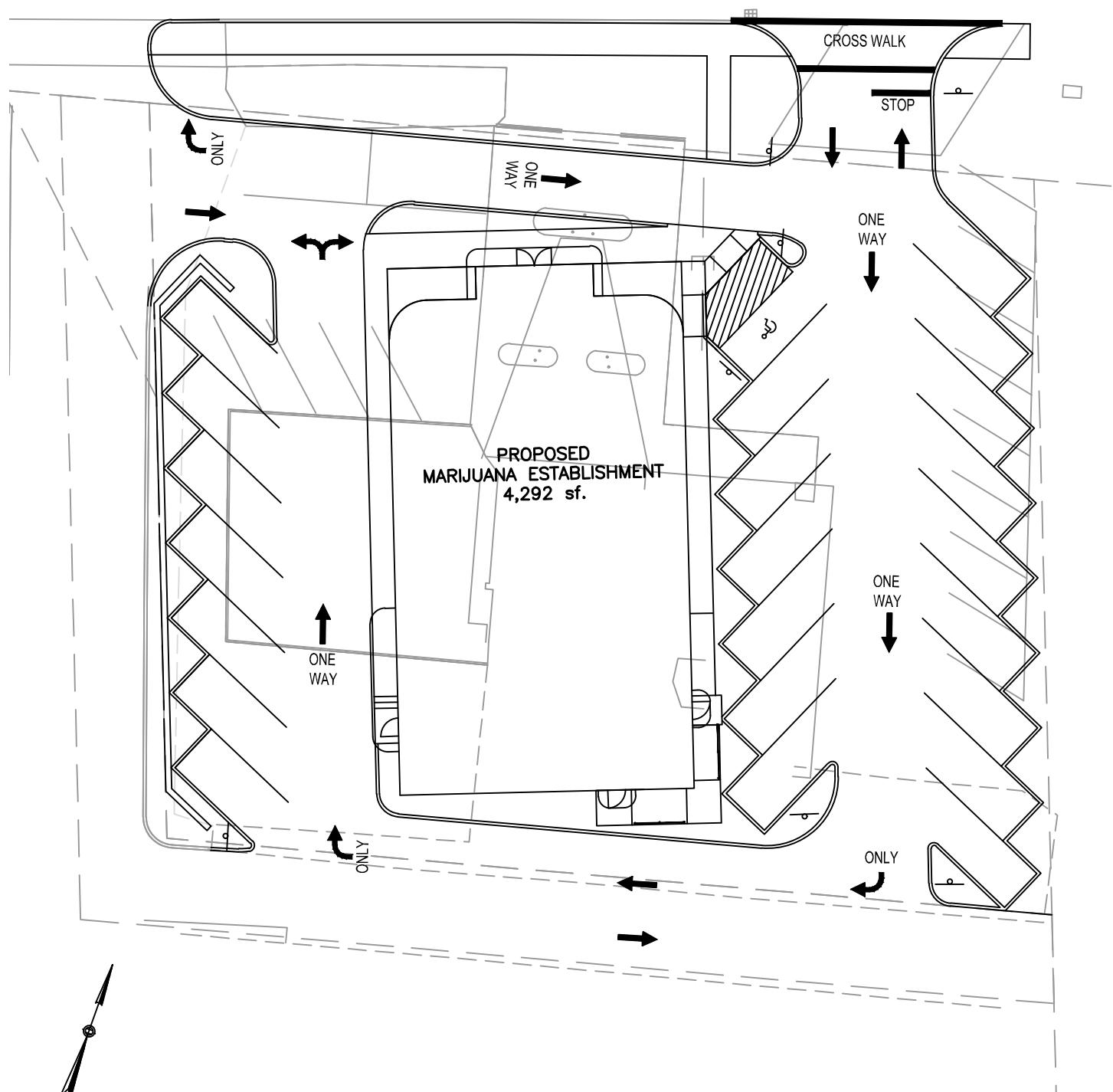
In summary, trip generation for the development is projected to be moderate at 124 or fewer net new trips during peak hours. Traffic increases for the proposed project represent minimal changes to traffic operations along Hathaway Road. Based on review of MassDOT crash data, the unsignalized intersection of Hathaway Road and the Route 140 Southbound Ramps/Site Driveway experience a crash rate below the District 5 average, and the nearby study intersections are not listed as a high crash location (HSIP 2015-2017). Site access and on-site design elements are outlined under *Recommendations and Conclusions* that will provide ample capacity to accommodate site-generated traffic while enhancing safety and capacity and promoting alternative modes of transportation.

## PROJECT DESCRIPTION

The Site consists of approximately 0.44± acres of land located at 366 Hathaway Road in New Bedford, MA. The existing Site includes one currently vacant 1,788 sf general retail building which was most recently occupied by a local fast-food restaurant/ice cream stand. Access/egress is provided via a driveway along Hathaway Road across from the Route 140 Southbound ramps as well as internal connections to the adjacent restaurant and self-storage uses which each have individual driveways along Hathaway Road.

Under the proposed Site programming the existing site will be redeveloped to include a 4,292 sf marijuana dispensary (medical and/or adult use retail sales). The proposed use will be supported by 23 surface parking spaces. The site's primary vehicle access point will be located along Hathaway Road via a driveway located opposite the Route 140 southbound ramps. A second access/egress driveway will be provided via a connection to the adjacent self-storage facility. A preliminary site plan prepared by Hayes Engineering is presented in **Figure 2**.

Hathaway Road



Source: Hayes Engineering, Inc.

Figure 2

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Preliminary Site Plan

## **BASELINE TRAFFIC & SAFETY CHARACTERISTICS**

An overview of baseline roadway conditions, traffic volumes, and safety characteristics of area roadways is provided below.

### *Hathaway Road*

Hathaway Road is generally an east-west roadway under state jurisdiction within the Route 140/Hathaway Road interchange area. Hathaway Road is classified by the Massachusetts Department of Transportation (MassDOT) as an Urban Minor Arterial roadway, and it provides a connection between the Route 6 to the west and Mt Pleasant Street to the east. Hathaway Road provides one travel lane in each direction within the study area with additional turn lanes or channelized turning movements provided at its major intersections. Sidewalks are provided along the southern side of Hathaway Road within the immediate area of the site. The posted (regulatory) speed limit on Hathaway Road in the study area is 30 mph in both travel directions. Land use along Hathaway Road in the study area is a mix of land uses including residential, gasoline station, and commercial uses including an adjacent restaurant and self-storage facility.

### **Baseline Traffic Data**

This traffic memorandum includes the following intersections:

- Hathaway Road at Shawmut Avenue (Signalized)
- Hathaway Road at Rte 140 Northbound Ramps (Unsignalized)
- Hathaway Road at Rte 140 Southbound Ramps/Proposed Site Driveway (Unsignalized)
- Hathaway Road at Self-Storage Driveway – #376 (Unsignalized)
- Hathaway Road at Rockdale Avenue (Unsignalized)

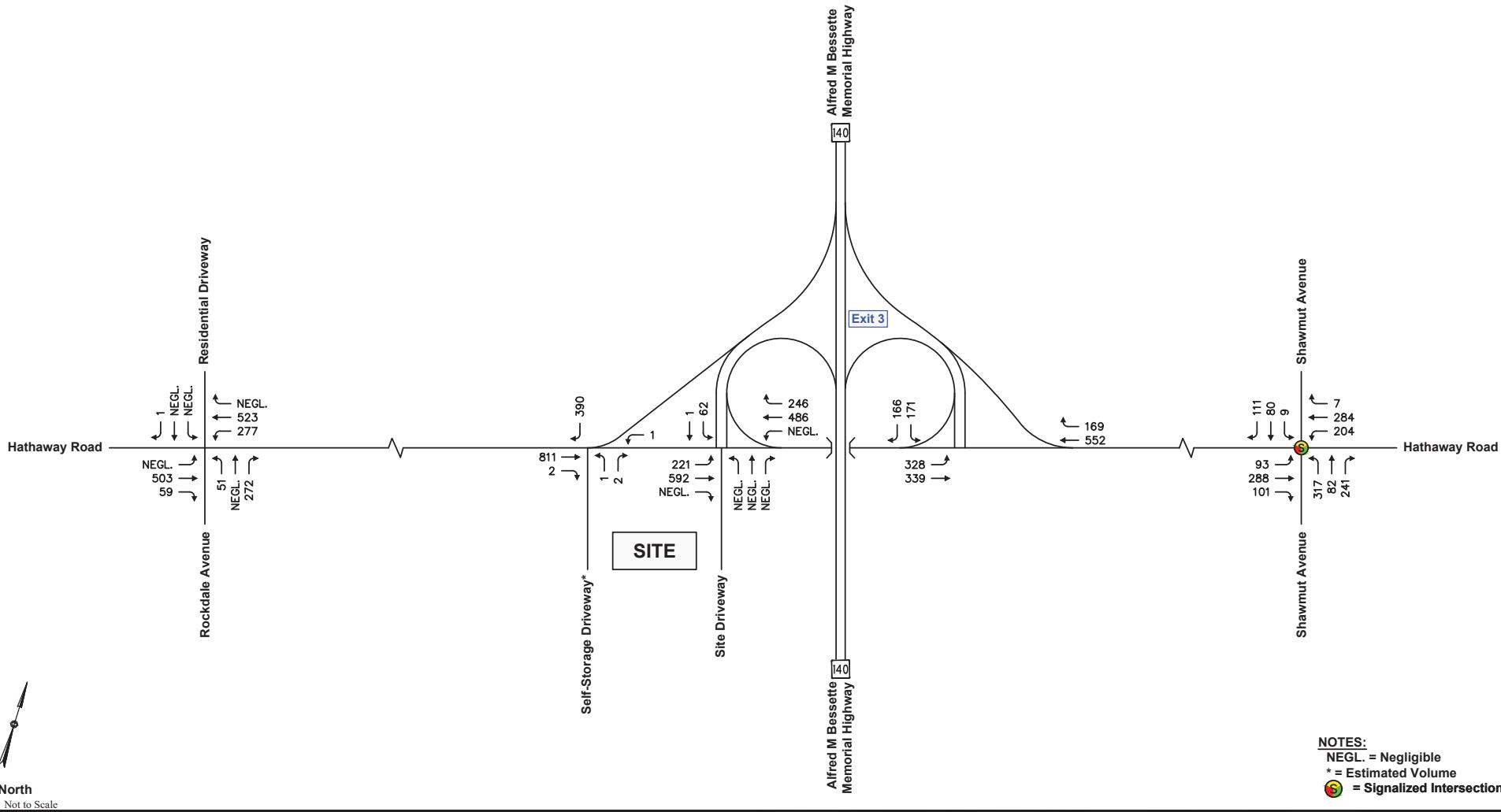
Traffic volume data were collected in September and October 2021 at the study area intersections during the weekday morning peak period (7:00 AM – 9:00 AM), the weekday evening peak period (4:00 PM - 6:00 PM), and Saturday midday peak period (11:00 AM – 1:00 PM) periods to coincide with peak traffic activity of the adjacent streets. Review of MassDOT permanent count station data indicates that September and October are above average traffic months (approximately 3-5 percent above average month conditions). Therefore, to remain conservative, no seasonal adjustment was applied to the 2021 traffic counts. Compared to pre-pandemic conditions in 2019, review of MassDOT permanent count station data indicates that 2021 traffic data remains 9 percent low in weekday morning peak periods and 3 percent low in weekday evening peak periods, so 2021 traffic counts were adjusted (increased) to reflect pre-pandemic conditions. Saturday midday peak periods showed nominal difference between 2019 and 2021 data, therefore 2021 traffic counts for were not adjusted. Traffic volumes for the self-storage facility at 376 Hathaway Road were estimated based on ITE trip generation methodology and existing travel patterns in the area.

The resulting 2021 Baseline weekday morning, weekday evening, and Saturday midday peak hour traffic volumes for the study intersections are shown in **Figure 3**, **Figure 4**, and **Figure 5**. Traffic count data, MassDOT permanent count station data, seasonal adjustment calculations, and pandemic adjustment data are provided in the **Attachments**.

### **Intersection Crash History**

In order to identify crash trends and safety characteristics for study area intersections, crash data were obtained from MassDOT for the City of New Bedford for the five-year period covering 2016 through 2020 (the most recent full years of data currently available from MassDOT). In addition, review of the MassDOT high crash cluster mapping was conducted to determine locations listed as eligible for Highway Safety Improvement Program (HSIP) evaluation and funding. Crash data for the study intersections is summarized in **Table 1** with detailed data provided in the **Attachments**.

Crash rates were calculated for the study area intersections as reported in **Table 1**. This rate quantifies the number of crashes per million entering vehicles. MassDOT has determined the District 5 (which includes the City of New Bedford) average crash rate to be 0.57 for unsignalized intersections and 0.75 for signalized intersections. These rates represent MassDOT's "average" crash experience for study area and serve as a basis for comparing reported crash rates for the study intersections. Where calculated crash rates notably exceed the district average, some form of safety countermeasures may be warranted.



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Figure 3

2021 Baseline Conditions  
Weekday Morning Peak Hour Traffic Volumes

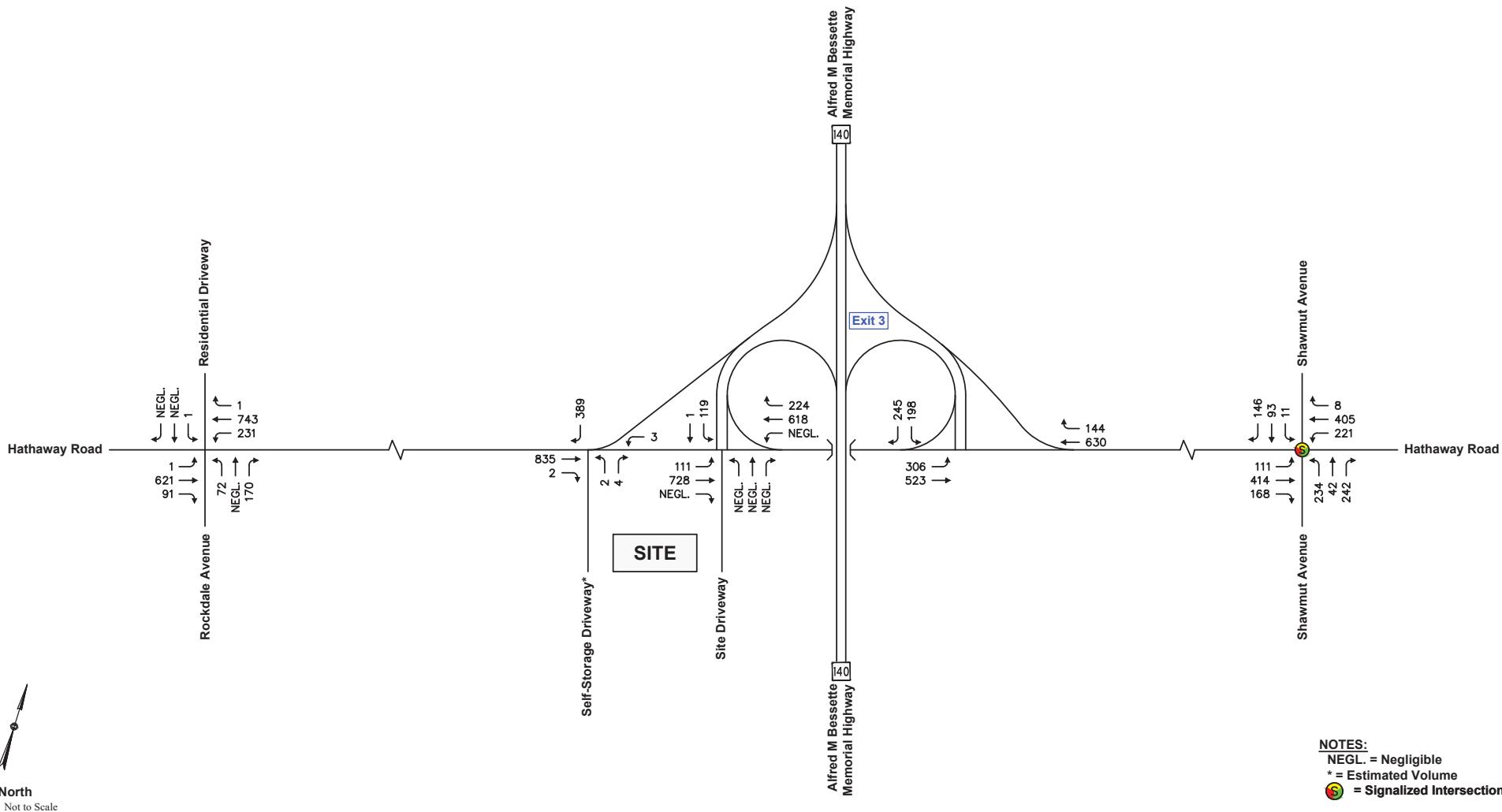
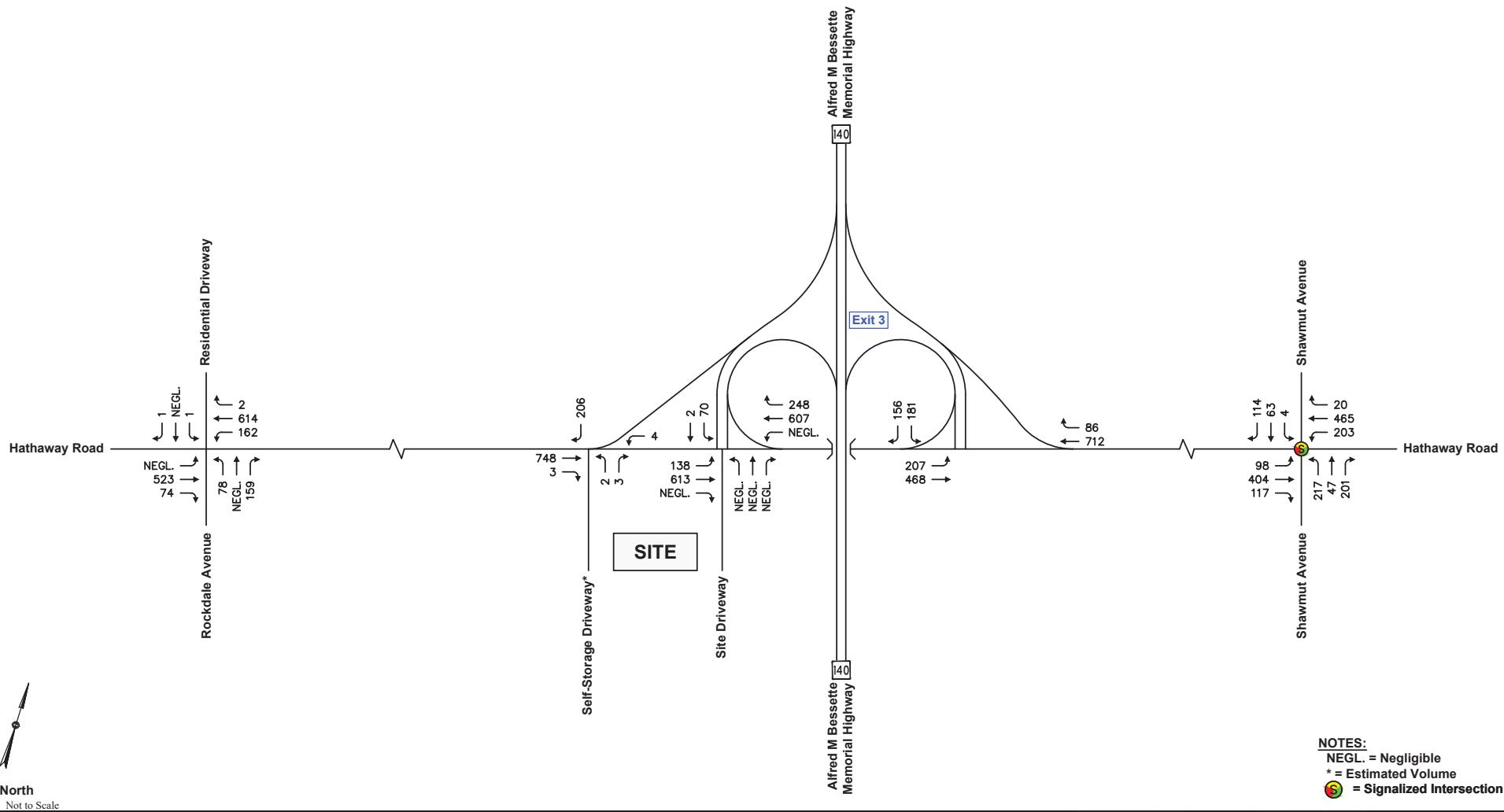


Figure 4

2021 Baseline Conditions  
Weekday Evening Peak Hour Traffic Volumes



**Figure 5**

**NOTES:**  
NEGL. = Negligible  
\* = Estimated Volume  
 = Signalized Intersection

2021 Baseline Conditions  
Saturday Midday Peak Hour Traffic Volumes

**TABLE 1**  
**INTERSECTION CRASH SUMMARY**  
**2016 THROUGH 2020<sup>1</sup>**

Data Category	INTERSECTION			
	Hathaway Rd at Rockdale Ave	Hathaway Rd at Rt 140 SB Ramps	Hathaway Rd at Rt 140 NB Ramps	Hathaway Rd at Shawmut Ave
Traffic Control	Unsignalized	Unsignalized	Unsignalized	Signalized
Crash Rate <sup>2</sup>	<b>0.48</b>	<b>0.56</b>	<b>0.54</b>	<b>1.17</b>
District Avg. <sup>3</sup>	0.57	0.57	0.57	0.75
<i>Year:</i>				
2016	3	1	6	12
2017	8	6	11	12
2018	2	11	2	11
2019	4	8	1	12
<u>2020</u>	<u>4</u>	<u>2</u>	<u>5</u>	<u>9</u>
Total	<b>21</b>	<b>28</b>	<b>25</b>	<b>56</b>
<i>Type:</i>				
Angle	11	18	14	21
Rear-End	5	8	7	20
Head-On	0	0	0	2
Sideswipe	2	1	2	9
Single Vehicle	2	1	2	4
Other/Unknown	1	0	0	0
<i>Severity:</i>				
P. Damage Only	10	20	12	37
Personal Injury	11	8	13	19
Fatality	0	0	0	0
<i>Conditions:</i>				
Dry	14	24	21	46
Wet	7	4	4	9
Snow	0	0	0	1
Other/Unknown	0	0	0	0
<i>Time:</i>				
7:00 to 9:00 AM	0	2	1	2
4:00 to 6:00 PM	2	10	5	13
Rest of Day	19	16	19	41

<sup>1</sup>Source: MassDOT Crash Database

<sup>2</sup>Crashes per million entering vehicles

<sup>3</sup>District 5 average = 0.75 for signalized intersections and 0.57 for unsignalized intersections

As summarized in **Table 1**:

- *Hathaway Road at Rockdale Avenue:* Twenty-one (21) crashes were reported at the Rockdale Avenue intersection with Hathaway Road over the five-year study period resulting crash rate of 0.48, which is below the District 5 average of 0.57. The reported crashes included eleven (11) angle type collisions and five (5) rear-end type collisions. Approximately half (52%) of the crashes resulted in personal injury with the majority crashes under dry (67%) roadway conditions during off-peak travel periods (90%). No fatalities or pedestrian-related incidents were reported during the study period.
- *Hathaway Road at Route 140 Southbound Ramps:* Twenty-eight (28) crashes were reported at Route 140 SB Ramps intersection with Hathaway Road over the five-year study period resulting crash rate of 0.56, which is at the District 5 average of 0.57. The reported crashes included eighteen (18) angle type collisions and eight (8) rear-end type collisions. The majority (71%) of the crashes resulted in property damage type collision with the majority crashes under dry (86%) roadway conditions during off-peak travel periods (57%). No fatalities or pedestrian-related incidents were reported during the study period.
- *Hathaway Road at Route 140 Northbound Ramps:* Twenty-five (25) crashes were reported at Route 140 SB Ramps intersection with Hathaway Road over the five-year study period resulting crash rate of 0.54, which is slightly below the District 5 average of 0.57. The reported crashes included nine (9) rear-end type collisions and one (1) sideswipe type collision. Approximately half (52%) of the crashes resulted in personal injury with the majority crashes under dry (84%) roadway conditions during off-peak travel periods (76%). No fatalities or pedestrian-related incidents were reported during the study period.
- *Hathaway Road at Shawmut Avenue:* A total of fifty-six (56) crashes were reported at the Hathaway Road signalized intersection with Shawmut Avenue over the five-year study period resulting crash rate of 1.17, which is above the District 5 average of 0.75. The reported crashes included twenty-one (21) angle type collisions and twenty (20) rear-end type collisions. The majority (66%) resulted in property damage type collision under dry (82%) roadway conditions during off-peak travel periods (73%). There were two pedestrian related crashes at the marked crosswalks in the intersection. No fatalities or bicycle related accidents were reported during the study period.

In summary, the study intersections generally experienced crash rates at or below the District 5 averages; the exception being the signalized Hathaway Road at Shawmut Avenue intersection. None of the study intersections along are classified as high crash locations according to MassDOT (HSIP 2015-2017).

## **PROJECTED FUTURE TRAFFIC CONDITIONS**

Evaluation of the proposed development impacts requires the establishment of a future baseline analysis condition. This section estimates future roadway and traffic conditions with and without the proposed development. A seven-year planning horizon (year 2028) was selected consistent with industry standard guidelines.

To determine the impact of site-generated traffic volumes on the roadway network under future conditions, baseline traffic volumes in the study area were projected to a future year condition. Traffic volumes on the roadway network at that time, in the absence of the development (that is, the No-Build condition), includes existing (baseline) traffic, new traffic due to general background traffic growth, and traffic related to specific developments by others that are currently under review at the local and/or state level. Consideration of these factors resulted in the development of No-Build traffic volumes. Anticipated Site-generated traffic volumes were then superimposed upon these No-Build traffic-flow networks to develop future Build conditions.

The following sections provide an overview of future No-Build traffic volumes and projected Build traffic volumes.

### **Background Growth**

Nearby permanent count station data published by MassDOT indicates a growth rate of approximately 1.0 percent per year. For purposes of this evaluation, a 1.0-percent compounded annual growth rate was used (7.2 percent increase over a 7-year horizon). MassDOT permanent count station data and background growth calculations are provided in the **Attachments**.

Development of future No-Build traffic volumes also considers traffic generated through the study area from other specific area developments. Discussion with the Town planning staff and review of Massachusetts Environmental Policy Act (MEPA) files indicates that there are three (3) site-specific development projects in the area that may increase baseline traffic traffic at the study intersection as follows:

- *Whaling Golf Course Development.* This is a potential large-scale project that would develop a 100-acre portion of the municipal golf located along Hathaway Road into a business park. The project could comprise one million square feet of office and industrial space supported by approximately 1,000 employees. There has been no formal submission to date and the mitigation requirements for a project of this scale are beyond the scope of this study, therefore, this project was not included as a background site-specific project.

- *Self-Storage Facility.* A self-storage facility is currently under construction at 969 Shawmut Avenue near the intersection of Hathaway Road and Shawmut Road. The project is a re-use of the 75,076 square foot building on the Site. Based on the use and review of the trip generation characteristics projected for this project is accounted for in the background growth rate used for the project.
- *McDonalds Renovation.* The existing McDonalds located at the corner of Hathaway Road and Shawmut Road is proposed to be renovated in the near future. Given that the same use exists at the site and the project is only a renovation of an existing facility any minor trip increases due to the project are likely to be pass-by in nature and will be accounted for in the background growth rate used for the project.

### **2028 No-Build Traffic Volumes**

To account for future traffic growth in the study area, the 1.0-percent annual growth rate was applied to existing traffic volumes over a seven-year period. Future 2028 No-Build traffic volume networks are displayed in **Figure 6**, **Figure 7**, and **Figure 8**.

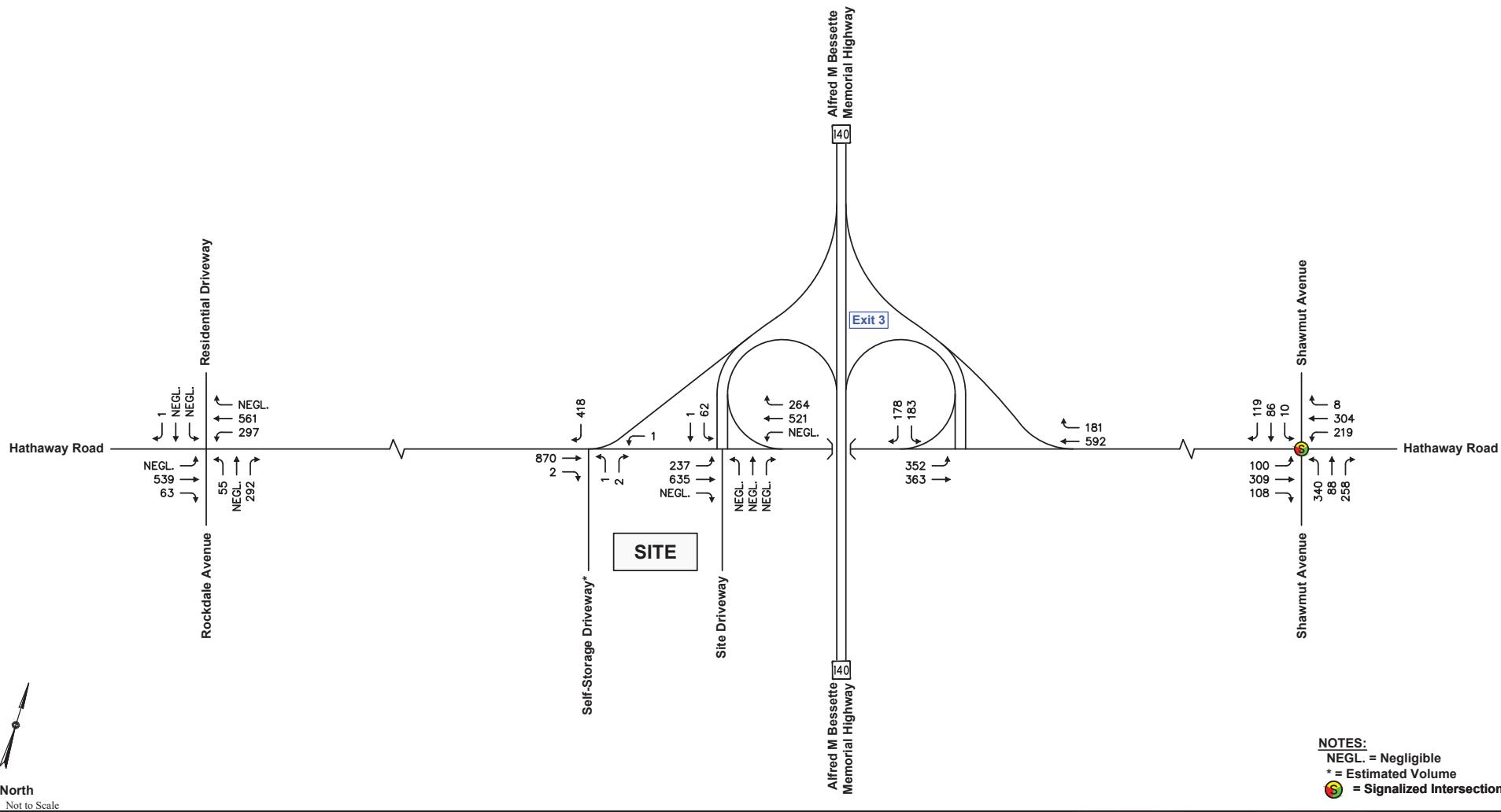
### **Trip Generation**

The trip generation estimates for the Site are provided for the weekday morning, weekday evening, and Saturday midday periods, which correspond to the critical analysis periods for the proposed uses and adjacent street traffic flow.

New traffic generated by the project was estimated using trip rates published in ITE's *Trip Generation*<sup>1</sup> for the Land Use Code (LUC) 882 – Marijuana Dispensary (represents medical and adult use retail sales use). **Table 2** presents the trip-generation for the trips to be generated by the re-development based on ITE trip rate methodology. MDM notes that while a significant percentage of the trips (50%) could be drawn from the existing traffic stream (i.e., pass-by trips) no reduction was taken for analysis purposes. Trip generation calculations are provided in the **Attachments**.

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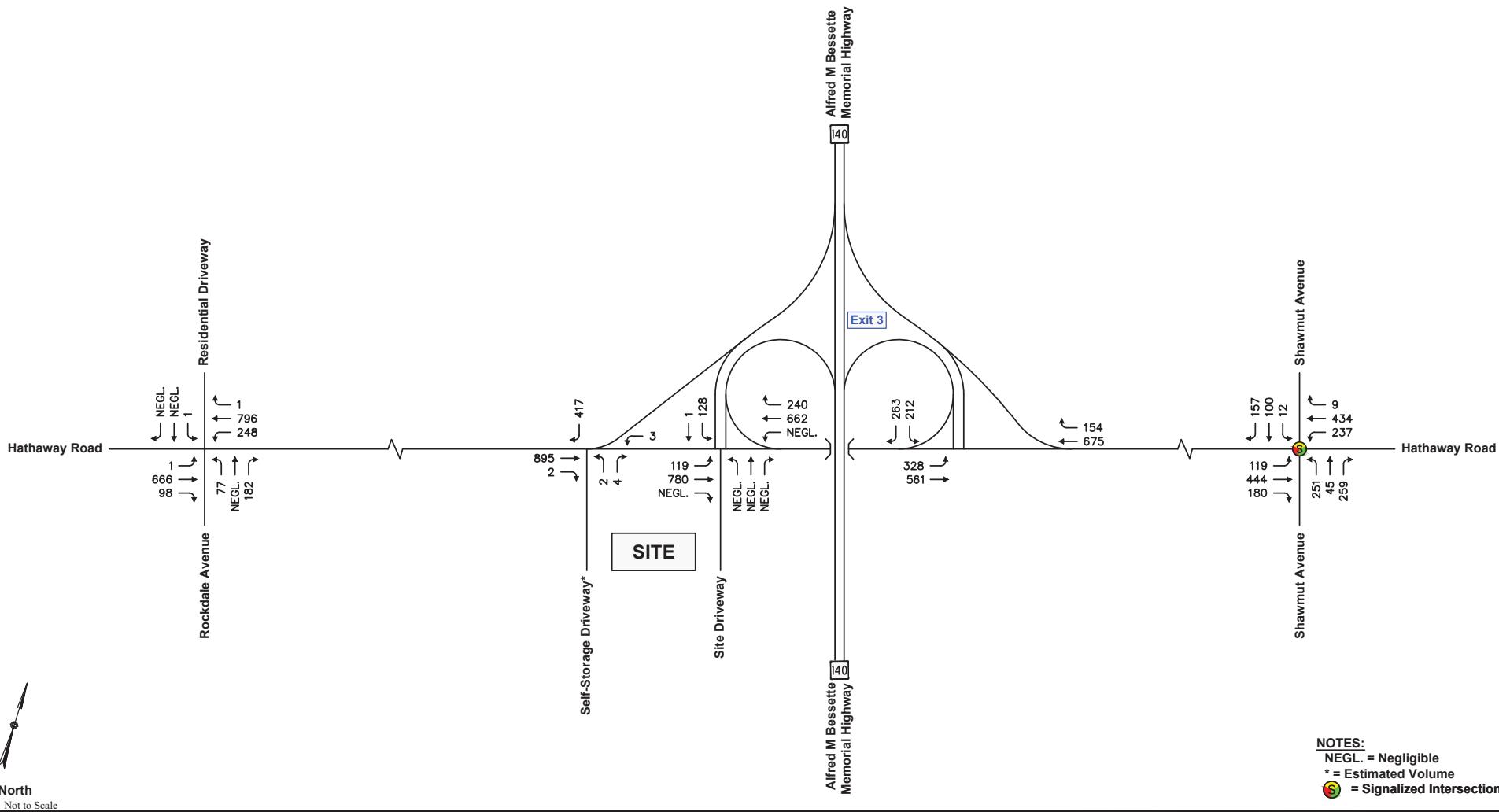
<sup>1</sup>*Trip Generation*, 11th Edition; Institute of Transportation Engineers; Washington, DC; 2021.



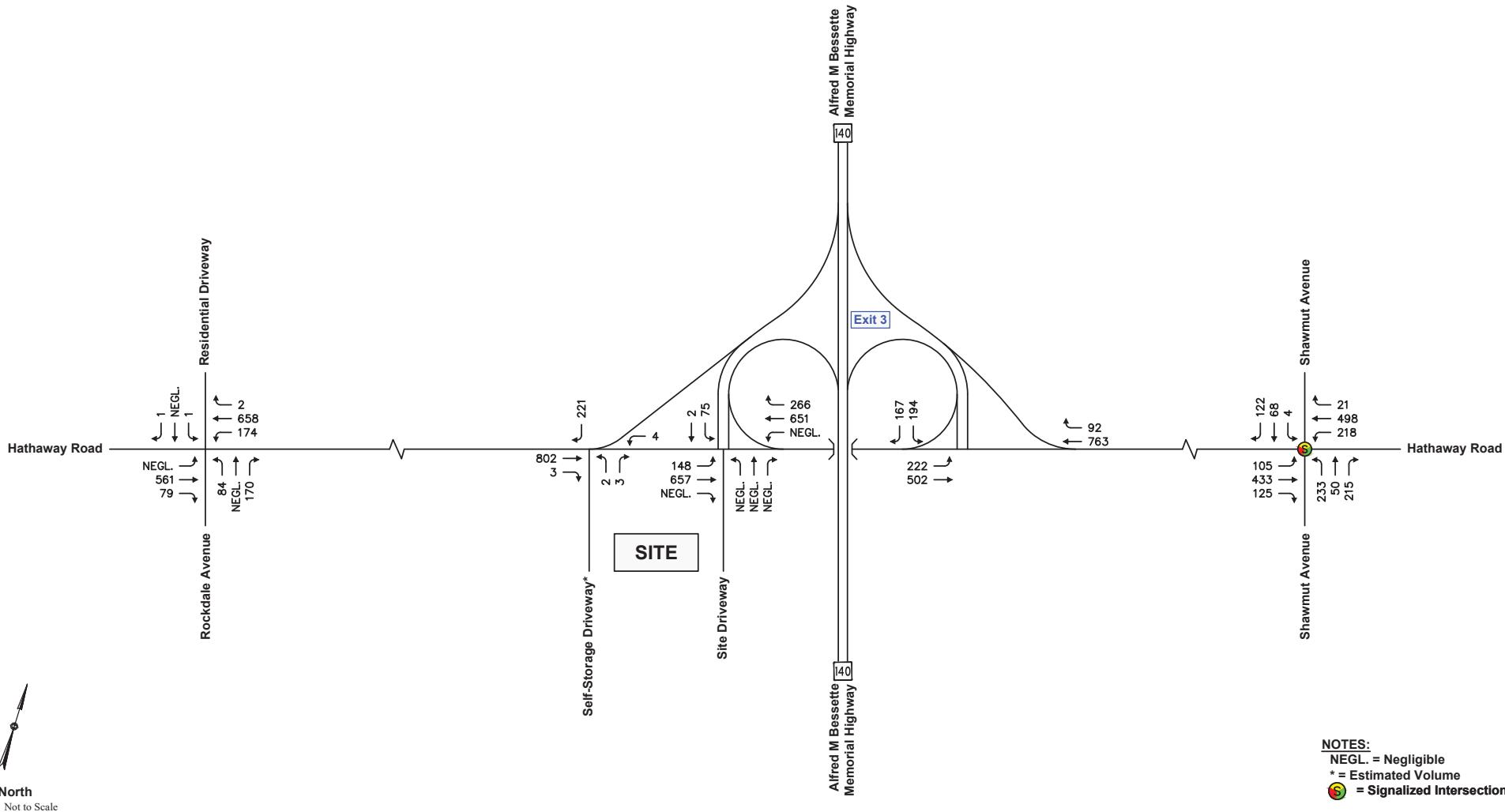
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Figure 6

2028 No Build Conditions  
Weekday Morning Peak Hour Traffic Volumes



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Figure 8

2028 No Build Conditions  
Saturday Midday Peak Hour Traffic Volumes

**TABLE 2**  
**TRIP-GENERATION SUMMARY**

<b>Period</b>	<b>Marijuana Dispensary<sup>1</sup> (Medical &amp; Adult Retail Sales)</b>
<i>Weekday Morning Peak-Hour:</i>	
Enter	23
<u>Exit</u>	<u>22</u>
Total	45
<i>Weekday Evening Peak-Hour:</i>	
Enter	41
<u>Exit</u>	<u>40</u>
Total	81
<i>Saturday Midday Peak-Hour:</i>	
Enter	62
<u>Exit</u>	<u>62</u>
Total	124

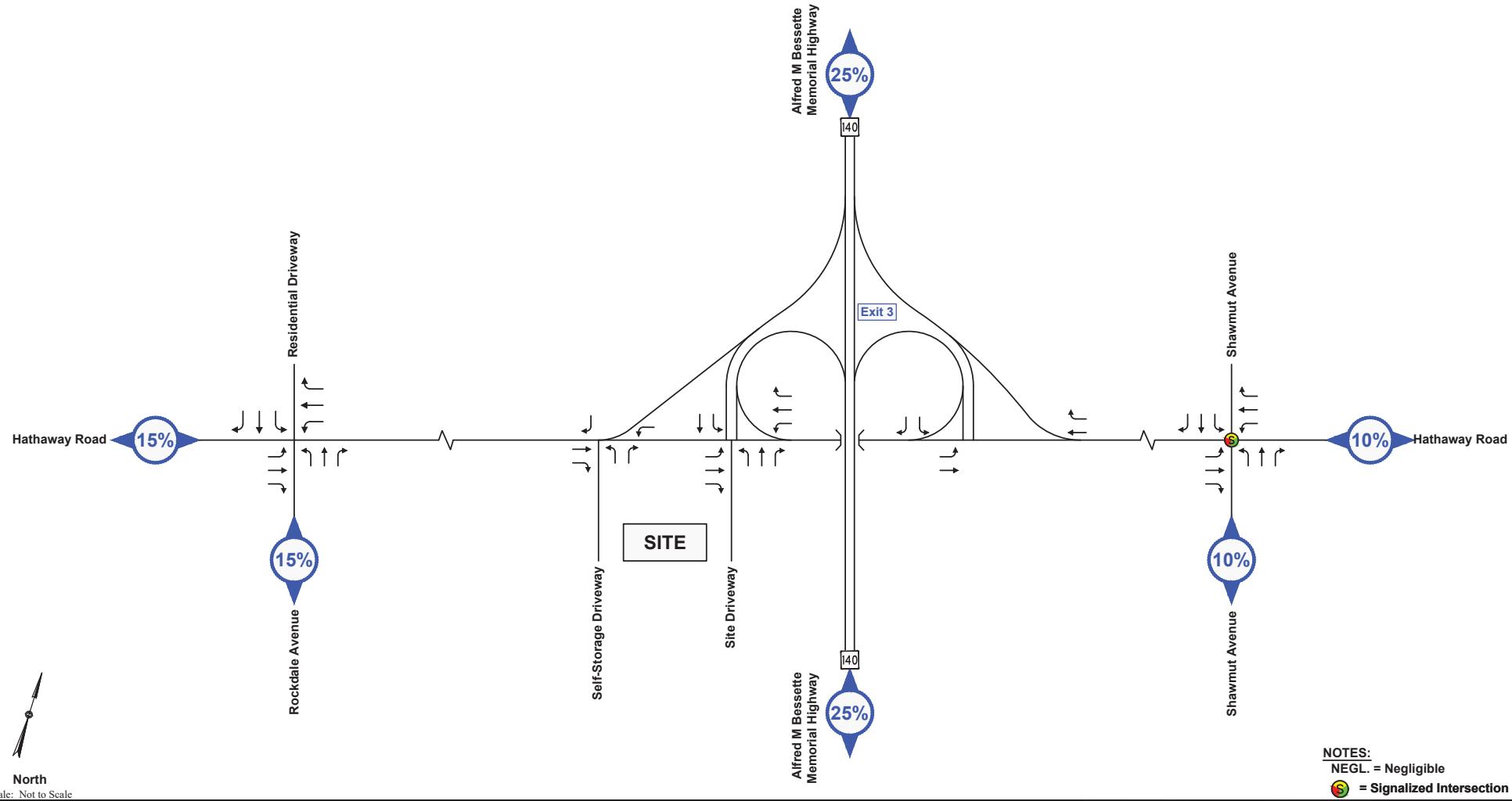
<sup>1</sup>Based on ITE LUC 882 (Marijuana Dispensary) trip rates applied to 4,292 sf.

As summarized in **Table 2**, based on ITE methodology the proposed redevelopment is estimated to generate approximately 45 vehicle trips (23 entering and 22 exiting) during the weekday morning peak hour, 81 vehicle trips (41 entering and 40 exiting) during the weekday evening peak hour, and 124 vehicle trips (62 entering and 62 exiting) during the Saturday midday peak hour. Depending on specific morning hours of operation, vehicle trips generated may be overly conservative

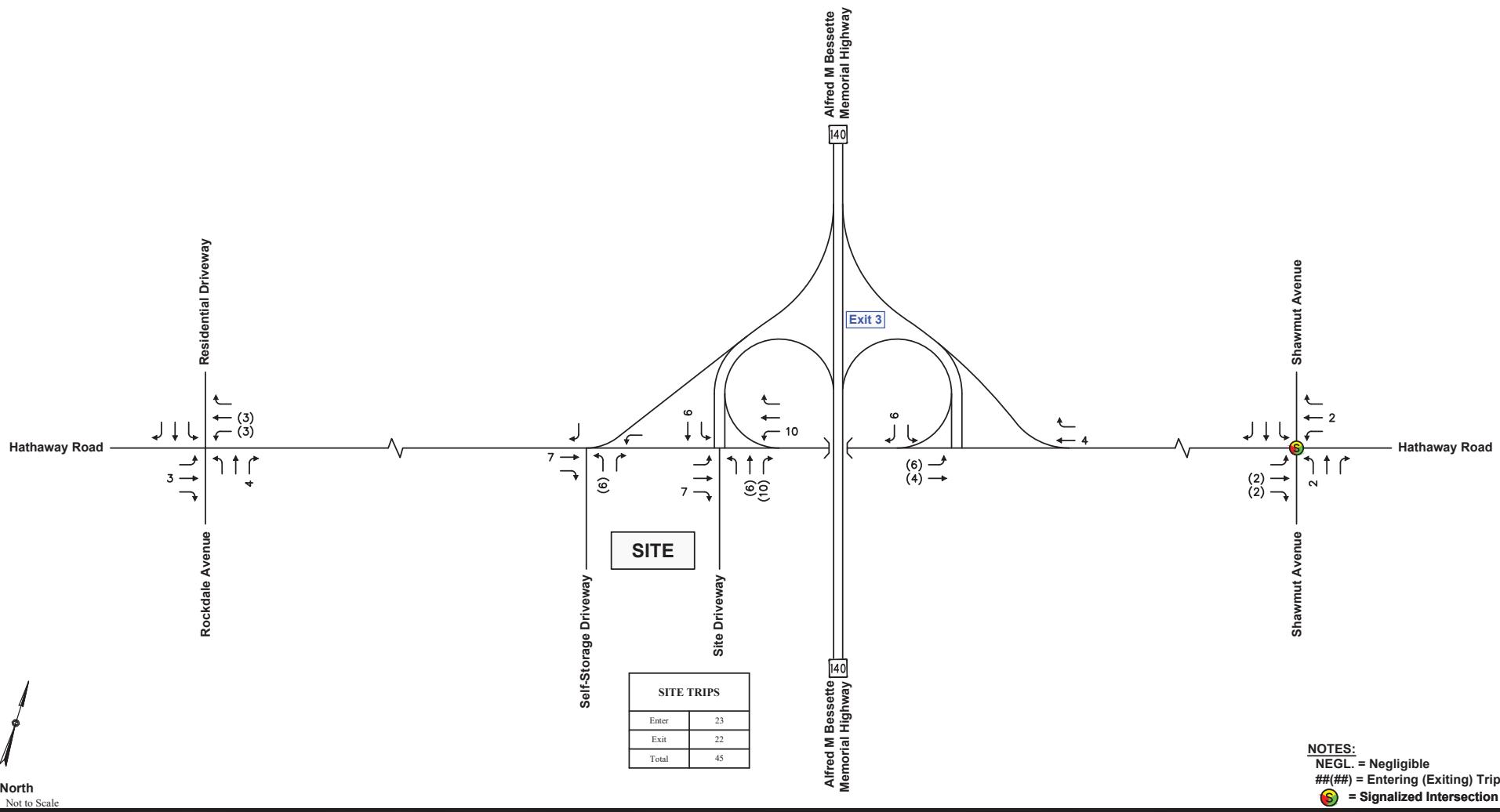
### **Trip Distribution**

The distribution for Site use is based primarily on existing travel patterns and volumes of the adjacent roadway system with adjustments based on the existing roadway network. The resulting trip distribution for new trips is presented in **Figure 9**. Note that due to the one-way clockwise circulation pattern within the site, it is assumed that all left-turn traffic will exit the site via the secondary (shared) driveway.

Development-related trips for the proposed development are assigned to the roadway network using the trip-generation estimates shown in **Table 2** and the distribution patterns presented in **Figure 9**. Development-related trips at each intersection approach for the weekday morning, weekday evening, and Saturday midday peak hours are quantified in **Figure 10**, **Figure 11**, and **Figure 12**.



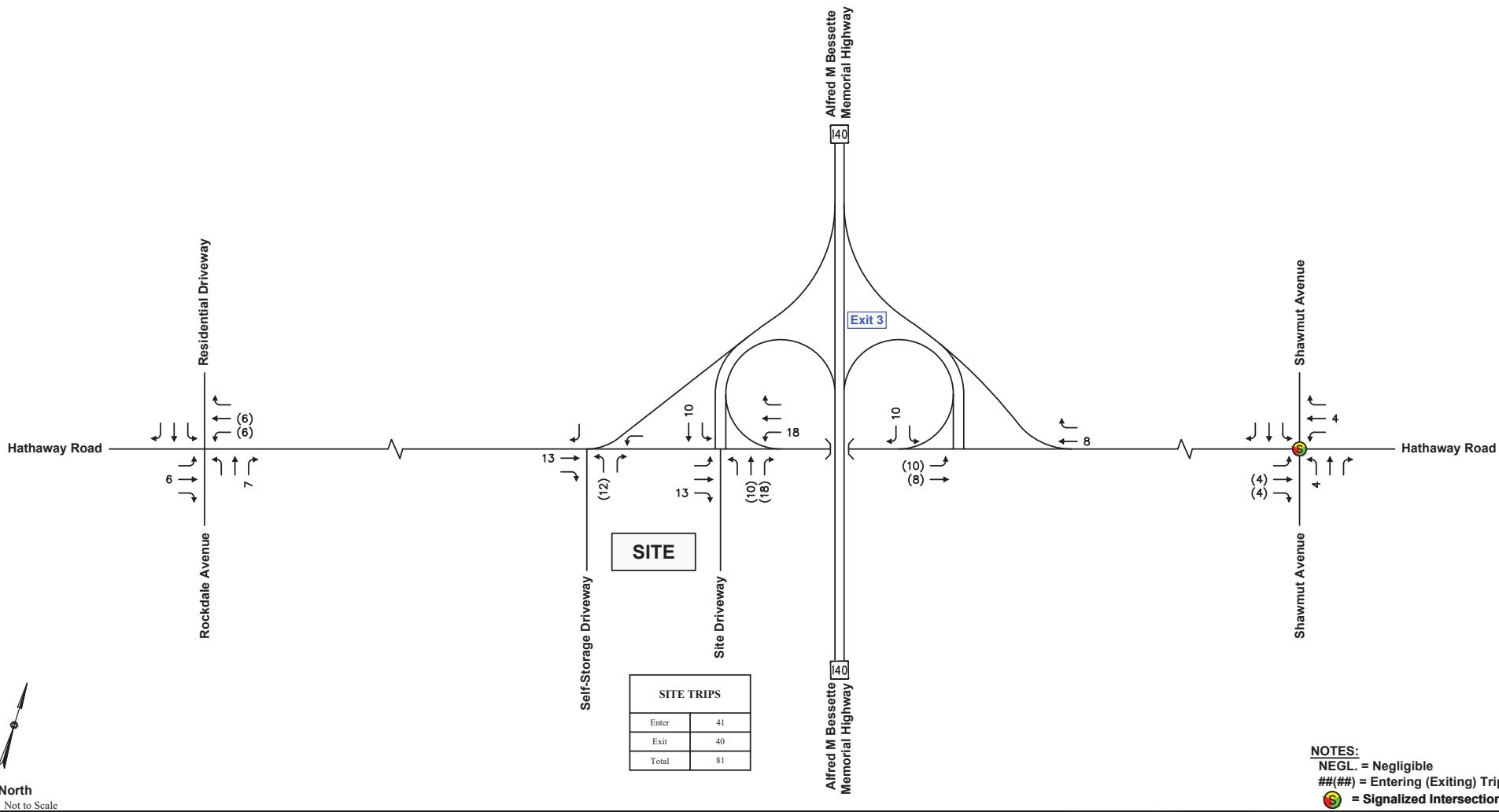
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**Figure 10**

**NOTES:**  
NEGL. = Negligible  
##(##) = Entering (Exiting) Trips  
 = Signalized Intersection

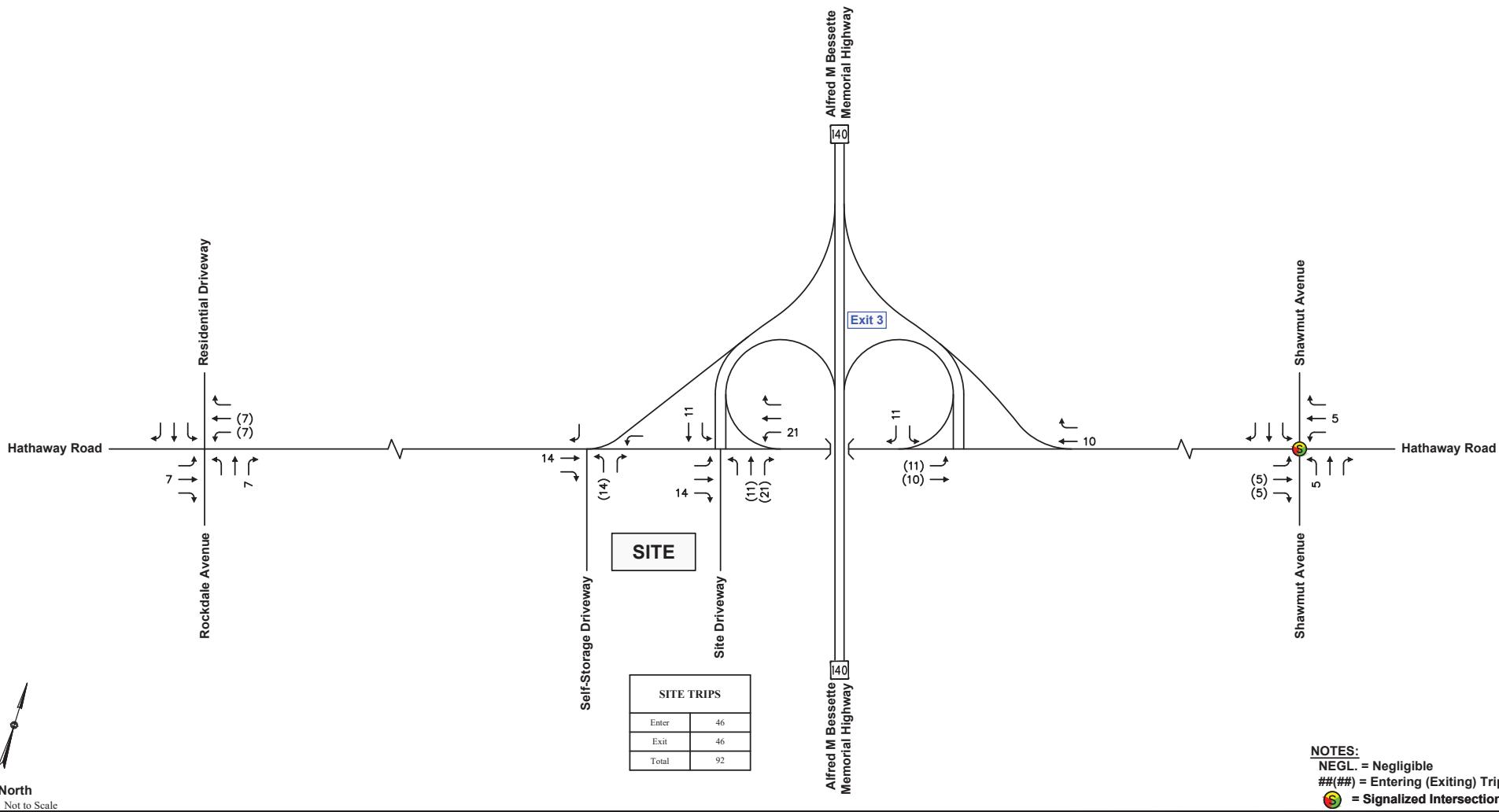
## Trip Generation Weekday Morning Peak Hour



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Figure 11

Trip Generation  
Weekday Evening Peak Hour



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## **2028 Build Condition Traffic Volumes**

2028 Build condition traffic volumes are derived by adding incremental traffic increases for the proposed development to the 2028 No-Build conditions. **Figure 13**, **Figure 14**, and **Figure 15** present the Build traffic-volume networks for the weekday morning, weekday evening, and Saturday midday peak hours.

## **TRAFFIC OPERATIONS ANALYSIS**

This section provides an overview of operational analysis methodology, an assessment of driveway operations under Baseline and projected future No-Build and Build conditions.

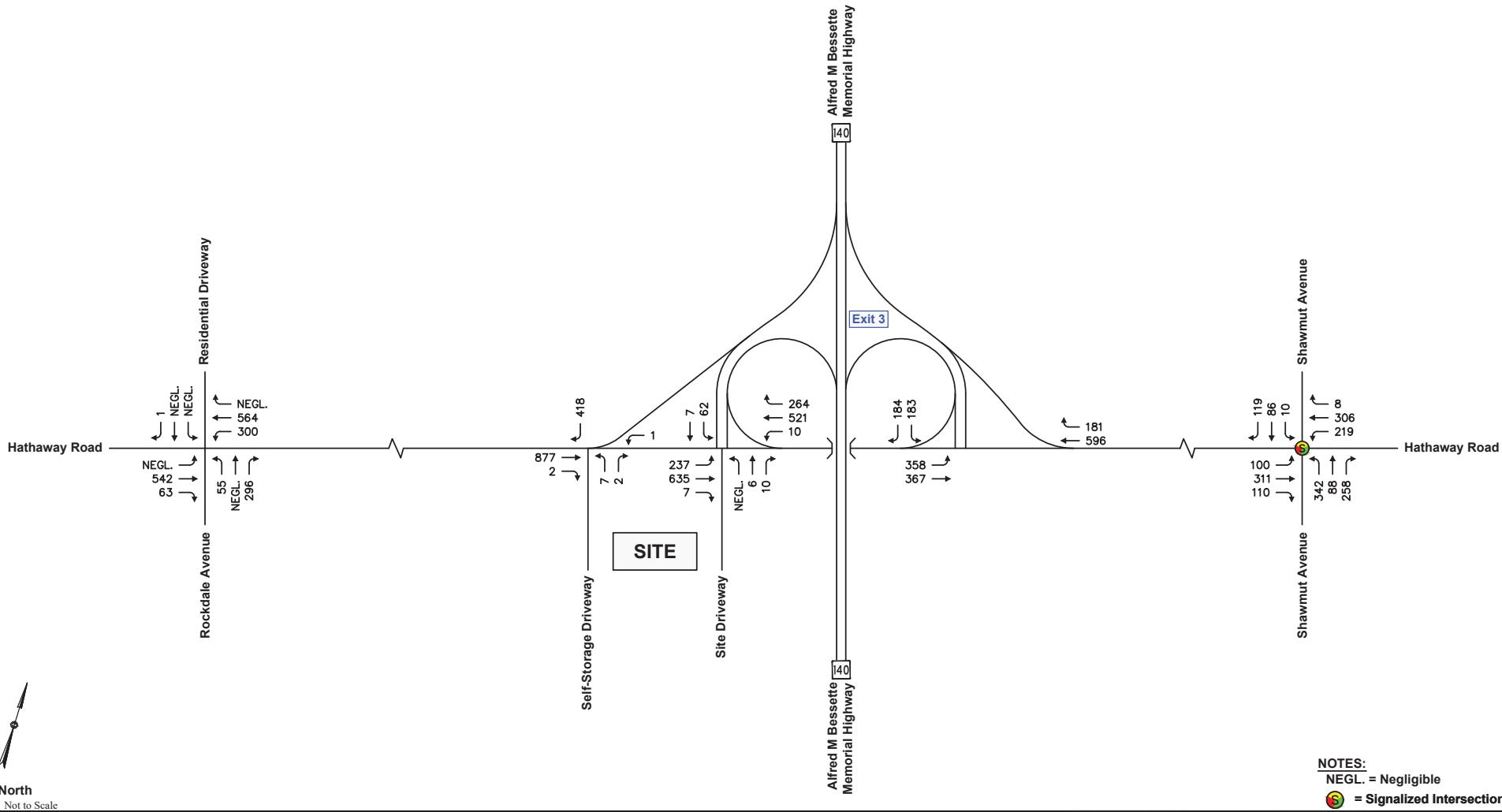
### **Analysis Methodology**

Intersection capacity analyses are presented in this section for the Baseline, No-Build, and Build traffic-volume conditions. Capacity analyses, conducted in accordance with EEA/MassDOT guidelines, provide an index of how well the roadway facilities serve the traffic demands placed upon them. The operational results provide the basis for recommended access and roadway improvements in the following section.

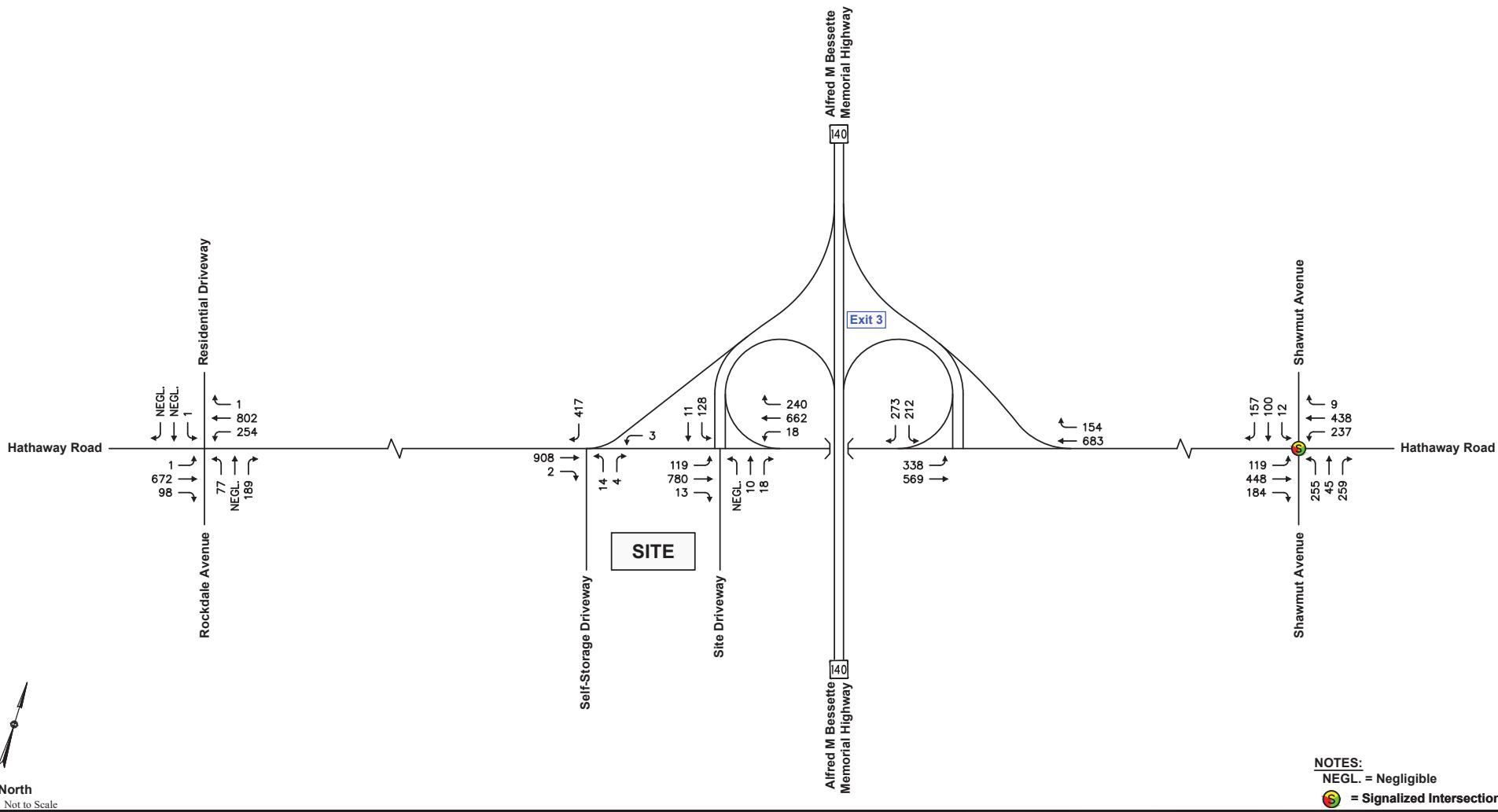
Capacity analysis of intersections is developed using the Synchro® computer software, which implements the methods of the Highway Capacity Manual 6<sup>th</sup> Edition (HCM). The resulting analysis presents a level-of-service (LOS) designation for individual intersection movements. The LOS is a letter designation that provides a qualitative measure of operating conditions based on several factors including roadway geometry, speeds, ambient traffic volumes, traffic controls, and driver characteristics. Since the LOS of a traffic facility is a function of the traffic flows placed upon it, such a facility may operate at a wide range of LOS, depending on the time of day, day of week, or period of year. A range of six levels of service are defined on the basis of average delay, ranging from LOS A (the least delay) to LOS F (delays greater than 50 seconds for unsignalized movements). The specific control delays and associated LOS designations are presented in the **Attachments**.

### **Model Calibration**

In order to calibrate the Synchro® model to reflect actual delays on critical approaches to Hathaway Road during the peak hours and average vehicle delays were observed in September 2021 for the critical left turn movements from the Route 140 southbound off-ramp onto Hathaway Road during the critical study period (weekday evening peak hour). The observed delay was then compared to the calculated delay based on the Synchro® model and used to calibrate the model for analysis purposes. The delay study is included in the **Attachments**. Accordingly, the modeled intersection operations described below more accurately reflect the actual field conditions for the intersection and provide a more accurate estimate of incremental delays and queuing in the area.



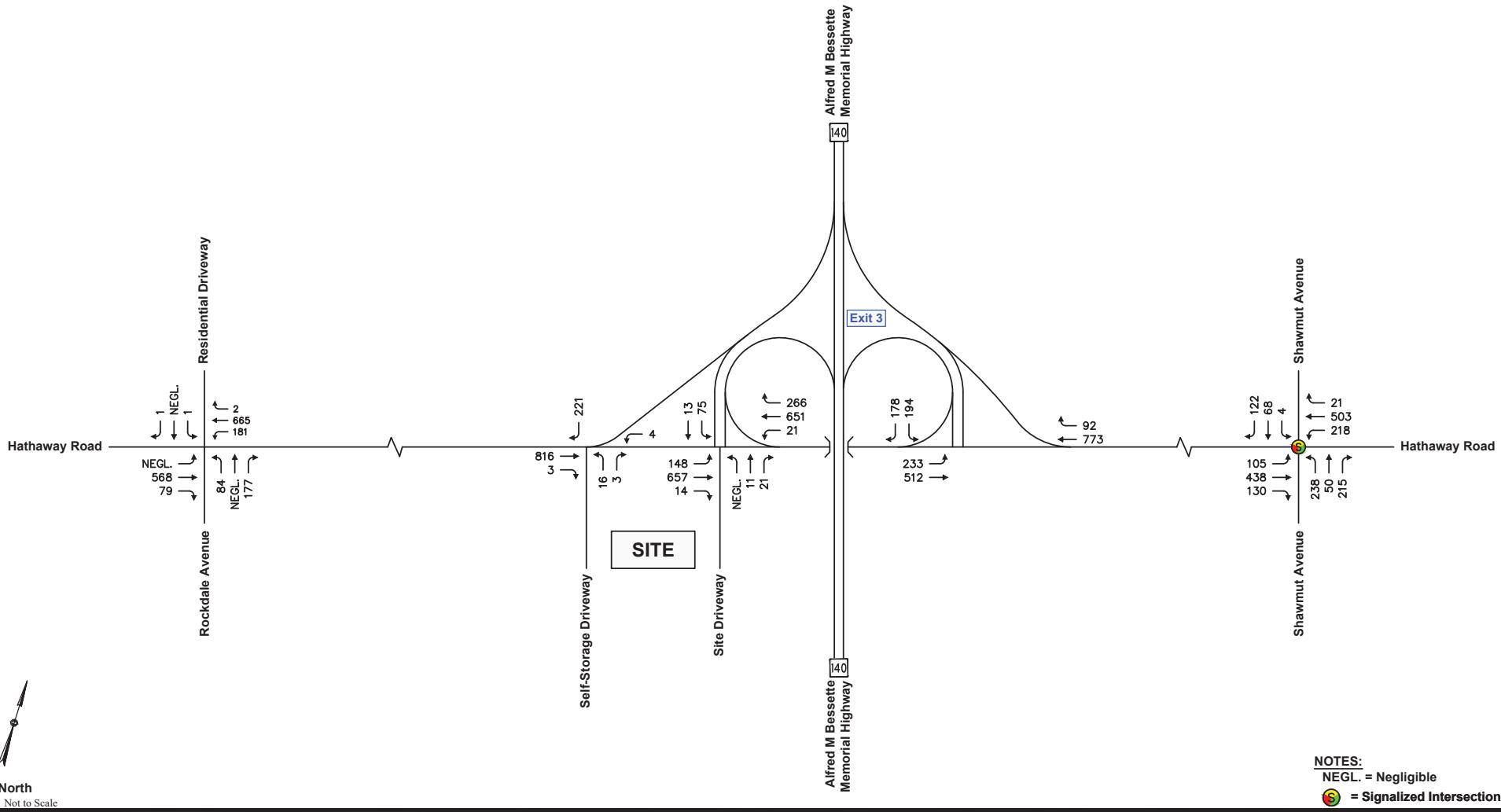
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Date: October 2021  
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**Figure 14**  
**2028 Build Conditions**  
**Weekday Evening Peak Hour Traffic Volumes**



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## Analysis Results

Level-of-Service (LOS) analyses were conducted for the Baseline, No-Build, and Build conditions for the study intersections. The results of the intersection capacity are summarized below in **Table 3**, **Table 4**, and **Table 5**. Detailed analysis results are presented in the **Attachments**.

**TABLE 3**  
**INTERSECTION CAPACITY ANALYSIS RESULTS**  
**WEEKDAY MORNING PEAK HOUR**

Intersection	Approach	2021 Baseline			2028 No-Build			2028 Build		
		v/c <sup>1</sup>	Delay <sup>2</sup>	LOS <sup>3</sup>	v/c	Delay	LOS	v/c	Delay	LOS
Hathaway Road at Rockdale Avenue/Residential Driveway	Eastbound	0.00	<5	A	0.00	<5	A	0.00	<5	A
	Westbound	0.33	<5	A	0.37	<5	A	0.37	<5	A
	Northbound <sup>5</sup>	0.41	15	C	0.45	17	C	0.46	17	C
	Southbound <sup>5</sup>	0.00	10	A	0.00	10	B	0.00	10	B
Hathaway Road at Site Driveway/Route 140 SB Ramps	Eastbound	0.24	<5	A	0.27	<5	A	0.27	<5	A
	Westbound	0.00	<5	A	0.00	<5	A	0.00	<5	A
	Northbound <sup>5</sup>	n/a	n/a	n/a	n/a	n/a	n/a	0.05	16	C
	Southbound <sup>5</sup>	0.27	24	C	0.30	27	D	0.36	31	D
Hathaway Road at Route 140 NB Ramps	Eastbound	0.35	5	A	0.39	6	A	0.39	6	A
	Westbound	0.00	<5	A	0.00	<5	A	0.00	<5	A
	Southbound <sup>5</sup>	0.81	40	E	>1.0	>50	F	>1.0	>50	F
Hathaway Road at Self-Storage Driveway	Eastbound	0.00	<5	A	0.00	<5	A	0.00	<5	A
	Westbound	0.00	<5	A	0.00	<5	A	0.00	<5	A
	Northbound <sup>5</sup>	0.01	15	C	0.01	16	C	0.03	16	C
Hathaway Road at Shawmut Avenue	Eastbound	0.84	35	C	0.89	40	D	0.89	41	D
	Westbound	0.60	23	C	0.73	27	C	0.73	27	C
	Northbound	0.88	28	C	0.88	28	C	0.89	28	C
	Southbound	0.43	17	B	0.49	19	B	0.49	19	B
	<b>OVERALL</b>	<b>0.88</b>	<b>27</b>	<b>C</b>	<b>0.89</b>	<b>30</b>	<b>C</b>	<b>0.89</b>	<b>30</b>	<b>C</b>

<sup>1</sup>Volume-to-capacity ratio

<sup>2</sup>Average control delay per vehicle (in seconds)

<sup>3</sup>Level of service

<sup>4</sup>n/a = not applicable

<sup>5</sup>Unsignalized approaches to Hathaway Road are calibrated based on delay study conducted at the Route 140 Southbound Ramps during the critical weekday evening peak hour.

**TABLE 4**  
**INTERSECTION CAPACITY ANALYSIS RESULTS**  
**WEEKDAY EVENING PEAK HOUR**

Intersection	Approach	2021 Baseline			2028 No-Build			2028 Build		
		v/c <sup>1</sup>	Delay <sup>2</sup>	LOS <sup>3</sup>	v/c	Delay	LOS	v/c	Delay	LOS
Hathaway Road at Rockdale	Eastbound	0.00	<5	A	0.00	<5	A	0.00	<5	A
	Westbound	0.28	<5	A	0.31	<5	A	0.32	<5	A
	Northbound <sup>5</sup>	0.35	17	C	0.43	20	C	0.45	21	C
	Southbound <sup>5</sup>	0.01	30	D	0.01	36	E	0.01	37	E
Hathaway Road at Site Driveway/Route 140 SB Ramps	Eastbound	0.12	<5	A	0.14	<5	A	0.14	<5	A
	Westbound	0.00	<5	A	0.00	<5	A	0.02	<5	A
	Northbound <sup>5</sup>	n/a	n/a	n/a	n/a	n/a	n/a	0.08	15	C
	Southbound <sup>5</sup>	0.43	28	D	0.51	31	D	0.62	42	E
Hathaway Road at Route 140 NB Ramps	Eastbound	0.34	<5	A	0.38	<5	A	0.39	<5	A
	Westbound	0.00	<5	A	0.00	<5	A	0.00	<5	A
	Southbound <sup>5</sup>	>1.0	>50	F	>1.0	>50	F	>1.0	>50	F
Hathaway Road at Self-Storage Driveway	Eastbound	0.00	<5	A	0.00	<5	A	0.00	<5	A
	Westbound	0.00	<5	A	0.00	<5	A	0.00	<5	A
	Northbound <sup>5</sup>	0.02	15	C	0.02	16	C	0.06	17	C
Hathaway Road at Shawmut Avenue	Eastbound	0.95	47	D	>1.0	62	E	>1.0	66	E
	Westbound	0.73	26	C	0.79	29	C	0.79	29	C
	Northbound	0.69	21	C	0.74	22	C	0.75	23	C
	Southbound	0.51	24	C	0.54	25	C	0.54	25	C
	<b>OVERALL</b>	<b>0.95</b>	<b>31</b>	<b>C</b>	<b>&gt;1.0</b>	<b>38</b>	<b>D</b>	<b>&gt;1.0</b>	<b>39</b>	<b>D</b>

<sup>1</sup>Volume-to-capacity ratio

<sup>2</sup>Average control delay per vehicle (in seconds)

<sup>3</sup>Level of service

<sup>4</sup>n/a = not applicable

<sup>5</sup>Unsignalized approaches to Hathaway Road are calibrated based on delay study conducted at the Route 140 Southbound Ramps during the critical weekday evening peak hour.

**TABLE 5**  
**INTERSECTION CAPACITY ANALYSIS RESULTS**  
**SATURDAY MIDDAY PEAK HOUR**

Intersection	Approach	2021 Baseline			2028 No-Build			2028 Build		
		v/c <sup>1</sup>	Delay <sup>2</sup>	LOS <sup>3</sup>	v/c	Delay	LOS	v/c	Delay	LOS
Hathaway Road at Rockdale	Eastbound	0.00	<5	A	0.00	<5	A	0.00	<5	A
	Westbound	0.17	<5	A	0.19	<5	A	0.20	<5	A
	Northbound <sup>5</sup>	0.24	14	B	0.29	15	C	0.30	15	C
	Southbound <sup>5</sup>	0.01	15	C	0.01	17	C	0.01	17	C
Hathaway Road at Site Driveway/Route 140 SB Ramps	Eastbound	0.15	<5	A	0.17	<5	A	0.17	<5	A
	Westbound	0.00	<5	A	0.00	<5	A	0.02	<5	A
	Northbound <sup>5</sup>	n/a	n/a	n/a	n/a	n/a	n/a	0.08	14	B
	Southbound <sup>5</sup>	0.24	20	C	0.28	22	C	0.36	28	D
Hathaway Road at Route 140 NB Ramps	Eastbound	0.24	<5	A	0.26	<5	A	0.28	<5	A
	Westbound	0.00	<5	A	0.00	<5	A	0.00	<5	A
	Southbound <sup>5</sup>	0.71	31	D	0.86	45	E	0.90	50	F
Hathaway Road at Self-Storage Driveway	Eastbound	0.00	<5	A	0.00	<5	A	0.00	<5	A
	Westbound	0.01	<5	A	0.01	<5	A	0.00	<5	A
	Northbound <sup>5</sup>	0.01	14	B	0.01	15	B	0.05	16	C
Hathaway Road at Shawmut Avenue	Eastbound	0.84	34	C	0.89	39	D	0.90	39	D
	Westbound	0.58	19	B	0.63	22	C	0.63	22	C
	Northbound	0.64	20	C	0.64	20	C	0.66	21	C
	Southbound	0.33	17	B	0.37	19	B	0.37	19	B
	<b>OVERALL</b>	<b>0.84</b>	<b>24</b>	<b>C</b>	<b>0.89</b>	<b>27</b>	<b>C</b>	<b>0.90</b>	<b>27</b>	<b>C</b>

<sup>1</sup>Volume-to-capacity ratio

<sup>2</sup>Average control delay per vehicle (in seconds)

<sup>3</sup>Level of service

<sup>4</sup>n/a = not applicable

<sup>5</sup>Unsignalized approaches to Hathaway Road are calibrated based on delay study conducted at the Route 140 Southbound Ramps during the critical weekday evening peak hour.

As summarized in **Table 3**, **Table 4**, and **Table 5**:

- *Hathaway Road at Rockdale Avenue/Residential Driveway.* Under future No-Build conditions, the Hathaway Road and Rockdale Avenue approaches operate at LOS C or better during peak hours. With the project in place under Build conditions, these approaches will continue to operate at LOS C or better with only nominal changes in delay compared to No-Build conditions. Mainline traffic along Hathaway Road will continue to operate with minimal delay under all analysis scenarios.
- *Hathaway Road at Site Driveway/Route 140 SB Ramps.* Under future No-Build conditions, the intersection operates below capacity at LOS D or better during the peak hours. With the project in place under Build conditions, the intersection will operate below capacity at LOS E or better. Mainline traffic along Hathaway Road will continue to operate with minimal delay under all analysis scenarios.
- *Hathaway Road at Route 140 NB Ramps.* Under future No-Build conditions, the southbound Route 140 NB off-ramp approach operates above capacity at LOS F during the peak hours. With the project in place under Build conditions, the approach will continue to operate above capacity. Mainline traffic along Hathaway Road will continue to operate with minimal delay under all analysis scenarios.
- *Hathaway Road at Self-Storage Driveway.* Under future No-Build conditions, the intersection operates below capacity at LOS C or better during the peak hours. With the project in place under Build conditions, including processing all westbound exiting site trips through the self-storage driveway, the intersection will continue to operate at LOS C or better with only nominal changes in delay compared to No-Build conditions.
- *Hathaway Road at Shawmut Avenue.* Under future No-Build conditions, the overall intersection operates below capacity at LOS D or better during the peak hours. With the project in place under Build conditions, the overall intersection will continue to operate at LOS D or better with only nominal changes in delay compared to No-Build conditions.

In summary, incremental traffic increases at the study intersections due to the proposed development generally result in inconsequential changes in intersection operations compared to No-Build conditions. While no roadway improvements are warranted to accommodate the project, the Proponent will work with MassDOT to implement pavement markings improvements near the Route 140 and Hathaway Road interchange as outlined under *Conclusions and Recommendations*.

## **CONCLUSIONS AND RECOMMENDATIONS**

The proposed redevelopment is estimated to generate 124 vehicle trips or less during the peak hours. Roadway improvements and transportation management actions are identified that support projected traffic increases associated with the proposed re-development serve to minimize/offset project-related traffic impacts, and that reduces or minimizes dependence on single-occupant auto trips generated by the Site. Recommended improvements include (a) access/site-related improvements that are subject to ongoing traffic monitoring and warrants; (b)pedestrian and bicycle accommodations, and (c) off-site improvements as follows:

### **Access/Site Improvements**

- *Driveway Design.* A STOP sign (R1-1) and STOP line pavement markings are recommended on the site driveway approaches to Hathaway Road. The sign and pavement markings shall be compliant with the Manual on Uniform Traffic Control Devices (MUTCD). The final Site layout should be designed to accommodate the largest anticipated delivery vehicle and should accommodate trash removal operations, delivery operations, and d the largest potential responding vehicle (ladder truck). The Proponent will work with MassDOT to obtain a Highway Access Permit for the access along State Highway.
- *Pavement Markings & Signs.* Pavement markings and signage will be provided to promote the one-way circulation on the Site and to re-enforce the restrictions. The signs and pavement markings shall conform to MUTCD standards.
- *Maintain Clear Driveway Sight Lines.* The sight lines should be maintained along Hathaway Road. Any new plantings (shrubs, bushes) or physical landscape features to be located within the project driveway sight line should also be maintained at a height of 2 feet or less above the adjacent roadway grade to ensure unobstructed lines of sight.

### **Pedestrian and Bicycle Accommodations**

- *Pedestrian Accommodations.* An 8-foot sidewalk will be provided along Hathaway Road and an on-site sidewalk connecting the parking areas to the main entranceways will be provided. MDM recommends that the sidewalk connection to the on-site sidewalk system is provided to the proposed sidewalk along Hathaway Road near the front entranceway.
- *Bicycle Accommodations.* A secure bike parking area shall be provided on-site near the building entrance for employees and patrons.

## **Off-Site Improvements**

- *Update Pavement Markings.* The proponent will work with MassDOT during the Highway Access Permit process to enhance the pavement markings along Hathaway Road at its interchange with Route 140 to formalized left turn lanes for the ramps and to provide bicycle accommodations if warranted and feasible within the existing roadway width.

## **Grand Opening**

- *Customer Processing Time.* Increase facility staff as needed to minimize customer wait times. Also, consider advance/on-line ordering to facilitate in-store processing times
- *Traffic Management.* Establish a Traffic Management Plan, including Police Details, in preparation for “Grand Opening” conditions.

In summary, implementation of access/site improvements, proposed pedestrian and bicycle improvements, and off-site improvements as outlined in this study will establish a framework of minimizing Site traffic impacts by encouraging non-motorized travel modes and pedestrian/bicycle accommodation that is compatible with other projects in the study area.

## **ATTACHMENTS**

- Traffic Volume Data
- Seasonal/Yearly Growth Data
- Pandemic Adjustment Data
- Crash Data
- Trip Generation Calculations
- Delay Study Results
- Capacity Analysis

Traffic Volume Data

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28 Lord Road, Suite 280  
Marlborough, MA, 01752

SB: Rt 140 NB Ramps  
E/W: Hathaway Road  
New Bedford, MA

File Name : 1166\_Hathaway\_at\_140\_NB\_Ramps\_881463\_09-30-2021  
Site Code : 1166  
Start Date : 9/30/2021  
Page No : 1

Groups Printed- Lights - Mediums - Articulated Trucks

Start Time	Route 140 NB Ramps From North				Hathaway Road From East				Hathaway Road From West				Int. Total
	Right	Left	Peds	App. Total	Right	Thru	Peds	App. Total	Thru	Left	Peds	App. Total	
07:00 AM	37	35	0	72	50	105	0	155	65	75	0	140	367
07:15 AM	44	38	0	82	36	127	0	163	86	80	0	166	411
07:30 AM	29	33	0	62	51	126	0	177	83	72	0	155	394
07:45 AM	41	51	0	92	18	148	0	166	77	73	0	150	408
Total	151	157	0	308	155	506	0	661	311	300	0	611	1580
08:00 AM	31	42	0	73	26	135	0	161	76	43	0	119	353
08:15 AM	35	32	0	67	36	140	0	176	96	50	0	146	389
08:30 AM	25	39	0	64	27	133	0	160	79	49	0	128	352
08:45 AM	33	48	0	81	18	138	0	156	78	37	0	115	352
Total	124	161	0	285	107	546	0	653	329	179	0	508	1446
04:00 PM	61	48	0	109	33	161	0	194	128	65	0	193	496
04:15 PM	56	45	0	101	36	145	0	181	152	80	0	232	514
04:30 PM	57	49	0	106	36	173	0	209	122	70	0	192	507
04:45 PM	63	50	0	113	35	131	0	166	104	81	0	185	464
Total	237	192	0	429	140	610	0	750	506	296	0	802	1981
05:00 PM	52	50	0	102	22	151	0	173	102	74	0	176	451
05:15 PM	57	50	0	107	30	150	0	180	119	70	0	189	476
05:30 PM	48	55	0	103	24	137	0	161	97	59	0	156	420
05:45 PM	37	61	0	98	20	113	0	133	127	39	0	166	397
Total	194	216	0	410	96	551	0	647	445	242	0	687	1744
Grand Total	706	726	0	1432	498	2213	0	2711	1591	1017	0	2608	6751
Apprch %	49.3	50.7	0		18.4	81.6	0		61	39	0		
Total %	10.5	10.8	0	21.2	7.4	32.8	0	40.2	23.6	15.1	0	38.6	
Lights	695	650	0	1345	459	2097	0	2556	1549	986	0	2535	6436
% Lights	98.4	89.5	0	93.9	92.2	94.8	0	94.3	97.4	97	0	97.2	95.3
Mediums	10	55	0	65	33	99	0	132	37	28	0	65	262
% Mediums	1.4	7.6	0	4.5	6.6	4.5	0	4.9	2.3	2.8	0	2.5	3.9
Articulated Trucks	1	21	0	22	6	17	0	23	5	3	0	8	53
% Articulated Trucks	0.1	2.9	0	1.5	1.2	0.8	0	0.8	0.3	0.3	0	0.3	0.8

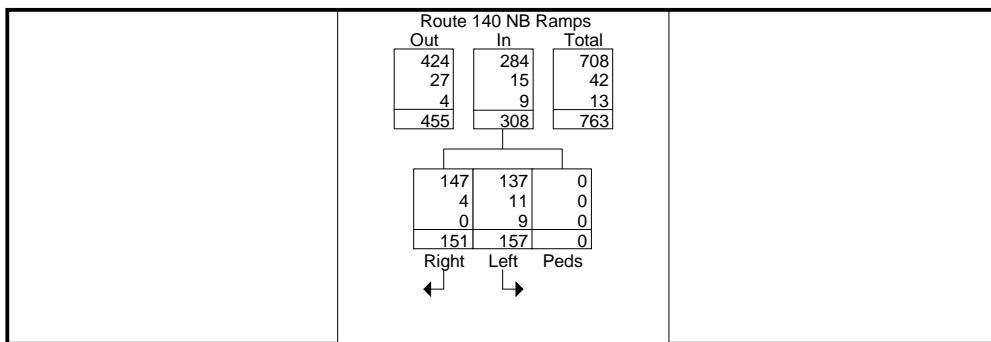
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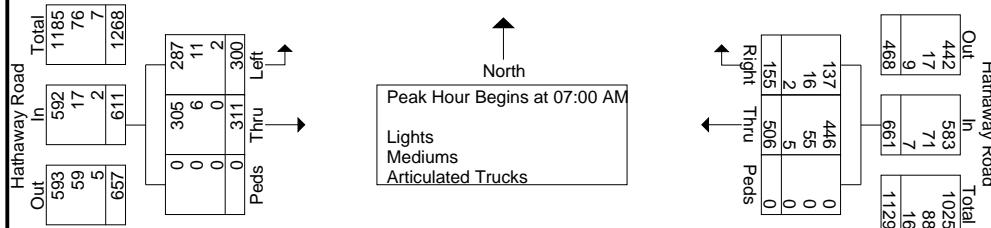
SB: Rt 140 NB Ramps  
E/W: Hathaway Road  
New Bedford, MA

File Name : 1166\_Hathaway\_at\_140\_NB\_Ramps\_881463\_09-30-2021  
Site Code : 1166  
Start Date : 9/30/2021  
Page No : 2

Start Time	Route 140 NB Ramps From North				Hathaway Road From East				Hathaway Road From West				Int. Total
	Right	Left	Peds	App. Total	Right	Thru	Peds	App. Total	Thru	Left	Peds	App. Total	
<b>Peak Hour Analysis From 07:00 AM to 11:45 AM - Peak 1 of 1</b>													
Peak Hour for Entire Intersection Begins at 07:00 AM													
07:00 AM	37	35	0	72	50	105	0	155	65	75	0	140	367
07:15 AM	44	38	0	82	36	127	0	163	86	80	0	166	411
07:30 AM	29	33	0	62	51	126	0	177	83	72	0	155	394
07:45 AM	41	51	0	92	18	148	0	166	77	73	0	150	408
Total Volume	151	157	0	308	155	506	0	661	311	300	0	611	1580
% App. Total	49	51	0		23.4	76.6	0		50.9	49.1	0		
PHF	.858	.770	.000	.837	.760	.855	.000	.934	.904	.938	.000	.920	.961
Lights	147	137	0	284	137	446	0	583	305	287	0	592	1459
% Lights	97.4	87.3	0	92.2	88.4	88.1	0	88.2	98.1	95.7	0	96.9	92.3
Mediums	4	11	0	15	16	55	0	71	6	11	0	17	103
% Mediums	2.6	7.0	0	4.9	10.3	10.9	0	10.7	1.9	3.7	0	2.8	6.5
Articulated Trucks	0	9	0	9	2	5	0	7	0	2	0	2	18
% Articulated Trucks	0	5.7	0	2.9	1.3	1.0	0	1.1	0	0.7	0	0.3	1.1



## Peak Hour Data



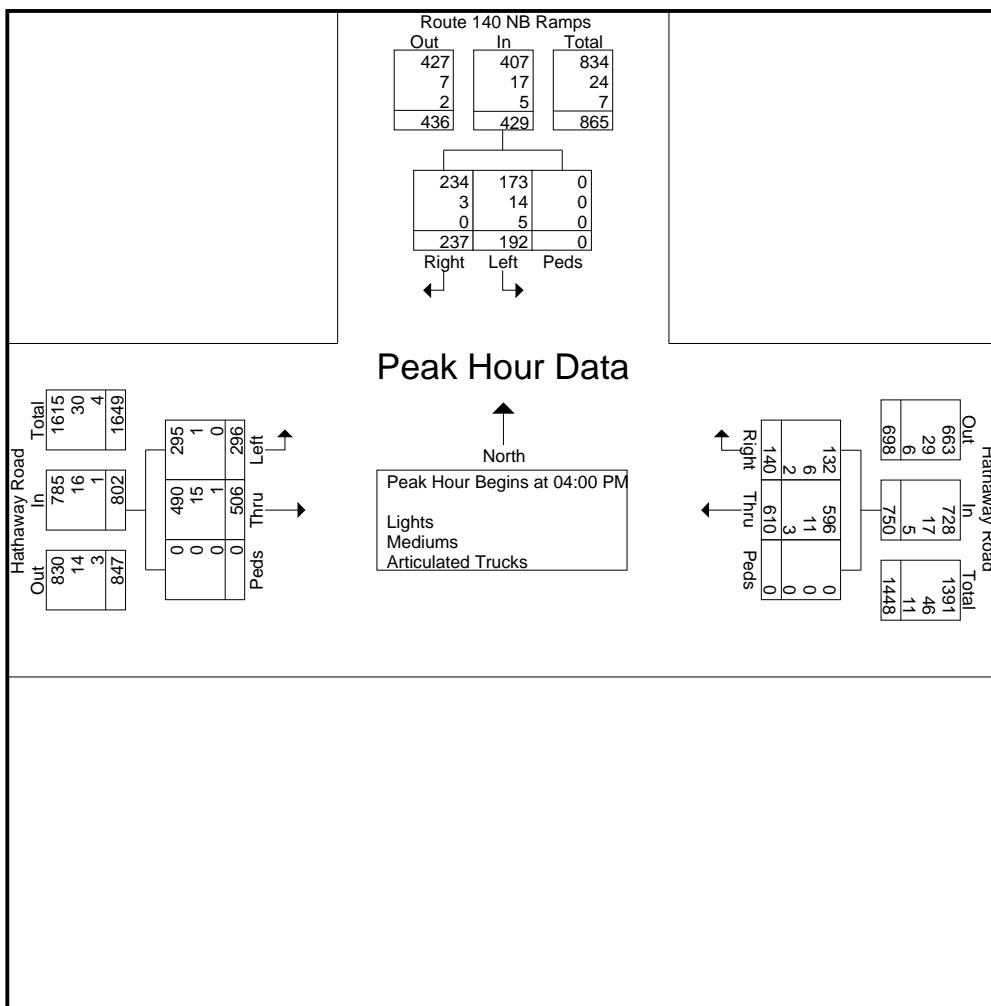
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SB: Rt 140 NB Ramps  
E/W: Hathaway Road  
New Bedford, MA

File Name : 1166\_Hathaway\_at\_140\_NB\_Ramps\_881463\_09-30-2021  
Site Code : 1166  
Start Date : 9/30/2021  
Page No : 3

Start Time	Route 140 NB Ramps From North				Hathaway Road From East				Hathaway Road From West				Int. Total
	Right	Left	Peds	App. Total	Right	Thru	Peds	App. Total	Thru	Left	Peds	App. Total	
<b>Peak Hour Analysis From 12:00 PM to 05:45 PM - Peak 1 of 1</b>													
<b>Peak Hour for Entire Intersection Begins at 04:00 PM</b>													
04:00 PM	61	48	0	109	33	161	0	194	128	65	0	193	496
04:15 PM	56	45	0	101	36	145	0	181	152	80	0	232	514
04:30 PM	57	49	0	106	36	173	0	209	122	70	0	192	507
04:45 PM	<b>63</b>	<b>50</b>	0	<b>113</b>	35	131	0	166	104	<b>81</b>	0	185	464
Total Volume	237	192	0	429	140	610	0	750	506	296	0	802	1981
% App. Total	55.2	44.8	0		18.7	81.3	0		63.1	36.9	0		
PHF	.940	.960	.000	.949	.972	.882	.000	.897	.832	.914	.000	.864	.964
Lights	234	173	0	407	132	596	0	728	490	295	0	785	1920
% Lights	98.7	90.1	0	94.9	94.3	97.7	0	97.1	96.8	99.7	0	97.9	96.9
Mediums	3	14	0	17	6	11	0	17	15	1	0	16	50
% Mediums	1.3	7.3	0	4.0	4.3	1.8	0	2.3	3.0	0.3	0	2.0	2.5
Articulated Trucks	0	5	0	5	2	3	0	5	1	0	0	1	11
% Articulated Trucks	0	2.6	0	1.2	1.4	0.5	0	0.7	0.2	0	0	0.1	0.6



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28 Lord Road, Suite 280  
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SB: Rt 140 SB Ramps  
E/W: Hathaway Road  
New Bedford, MA

File Name : 1166\_Hathaway\_at\_140\_SB\_Ramps\_881461\_09-30-2021  
Site Code : 1166  
Start Date : 9/30/2021  
Page No : 1

Groups Printed- Lights - Mediums - Articulated Trucks

Start Time	Route 140 SB Ramps From North				Hathaway Road From East				Hathaway Road From West				Int. Total
	Right	Left	Peds	App. Total	Right	Thru	Peds	App. Total	Thru	Left	Peds	App. Total	
07:00 AM	90	16	0	106	46	99	0	145	122	43	0	165	416
07:15 AM	112	15	0	127	57	123	0	180	145	54	0	199	506
07:30 AM	86	14	0	100	54	102	0	156	139	49	0	188	444
07:45 AM	70	12	0	82	69	121	0	190	136	56	0	192	464
Total	358	57	0	415	226	445	0	671	542	202	0	744	1830
08:00 AM	65	14	0	79	66	111	0	177	109	51	0	160	416
08:15 AM	65	22	0	87	65	109	0	174	124	44	0	168	429
08:30 AM	57	16	0	73	60	98	0	158	115	35	0	150	381
08:45 AM	56	17	0	73	56	112	0	168	101	28	0	129	370
Total	243	69	0	312	247	430	0	677	449	158	0	607	1596
04:00 PM	84	25	0	109	57	152	0	209	173	26	0	199	517
04:15 PM	109	30	0	139	58	130	0	188	199	24	0	223	550
04:30 PM	90	36	0	126	65	167	0	232	171	27	0	198	556
04:45 PM	95	25	0	120	37	148	0	185	161	30	0	191	496
Total	378	116	0	494	217	597	0	814	704	107	0	811	2119
05:00 PM	101	26	0	127	51	141	0	192	155	35	0	190	509
05:15 PM	97	25	0	122	49	157	0	206	166	27	0	193	521
05:30 PM	103	21	0	124	46	144	0	190	142	37	0	179	493
05:45 PM	88	20	0	108	46	113	0	159	152	31	0	183	450
Total	389	92	0	481	192	555	0	747	615	130	0	745	1973
Grand Total	1368	334	0	1702	882	2027	0	2909	2310	597	0	2907	7518
Apprch %	80.4	19.6	0		30.3	69.7	0		79.5	20.5	0		
Total %	18.2	4.4	0	22.6	11.7	27	0	38.7	30.7	7.9	0	38.7	
Lights	1341	319	0	1660	815	1969	0	2784	2255	579	0	2834	7278
% Lights	98	95.5	0	97.5	92.4	97.1	0	95.7	97.6	97	0	97.5	96.8
Mediums	22	12	0	34	52	53	0	105	52	17	0	69	208
% Mediums	1.6	3.6	0	2	5.9	2.6	0	3.6	2.3	2.8	0	2.4	2.8
Articulated Trucks	5	3	0	8	15	5	0	20	3	1	0	4	32
% Articulated Trucks	0.4	0.9	0	0.5	1.7	0.2	0	0.7	0.1	0.2	0	0.1	0.4

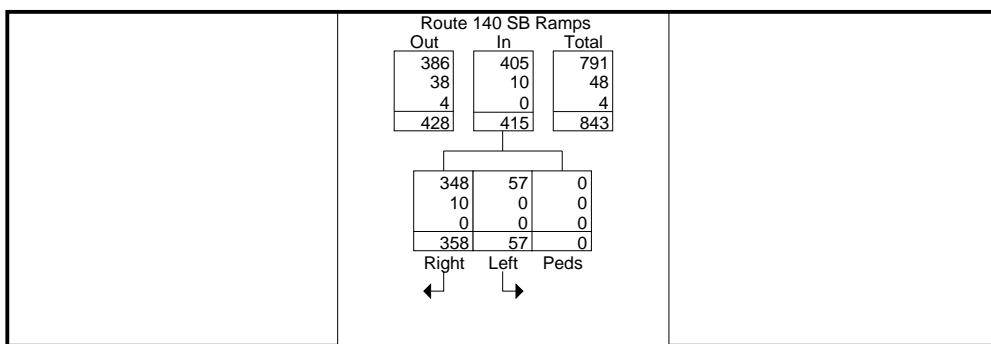
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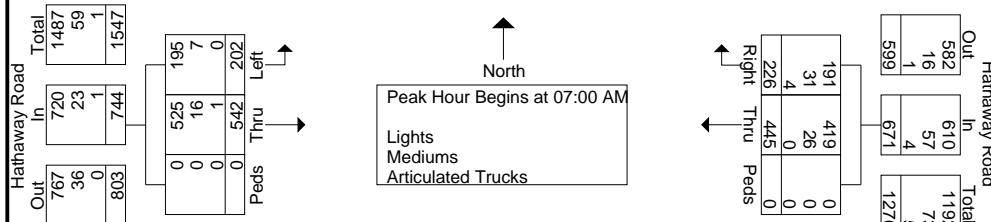
SB: Rt 140 SB Ramps  
E/W: Hathaway Road  
New Bedford, MA

File Name : 1166\_Hathaway\_at\_140\_SB\_Ramps\_881461\_09-30-2021  
Site Code : 1166  
Start Date : 9/30/2021  
Page No : 2

Start Time	Route 140 SB Ramps From North				Hathaway Road From East				Hathaway Road From West				Int. Total
	Right	Left	Peds	App. Total	Right	Thru	Peds	App. Total	Thru	Left	Peds	App. Total	
<b>Peak Hour Analysis From 07:00 AM to 11:45 AM - Peak 1 of 1</b>													
Peak Hour for Entire Intersection Begins at 07:00 AM													
07:00 AM	90	16	0	106	46	99	0	145	122	43	0	165	416
07:15 AM	112	15	0	127	57	123	0	180	145	54	0	199	506
07:30 AM	86	14	0	100	54	102	0	156	139	49	0	188	444
07:45 AM	70	12	0	82	69	121	0	190	136	56	0	192	464
Total Volume	358	57	0	415	226	445	0	671	542	202	0	744	1830
% App. Total	86.3	13.7	0		33.7	66.3	0		72.8	27.2	0		
PHF	.799	.891	.000	.817	.819	.904	.000	.883	.934	.902	.000	.935	.904
Lights	348	57	0	405	191	419	0	610	525	195	0	720	1735
% Lights	97.2	100	0	97.6	84.5	94.2	0	90.9	96.9	96.5	0	96.8	94.8
Mediums	10	0	0	10	31	26	0	57	16	7	0	23	90
% Mediums	2.8	0	0	2.4	13.7	5.8	0	8.5	3.0	3.5	0	3.1	4.9
Articulated Trucks	0	0	0	0	4	0	0	4	1	0	0	1	5
% Articulated Trucks	0	0	0	0	1.8	0	0	0.6	0.2	0	0	0.1	0.3



## Peak Hour Data



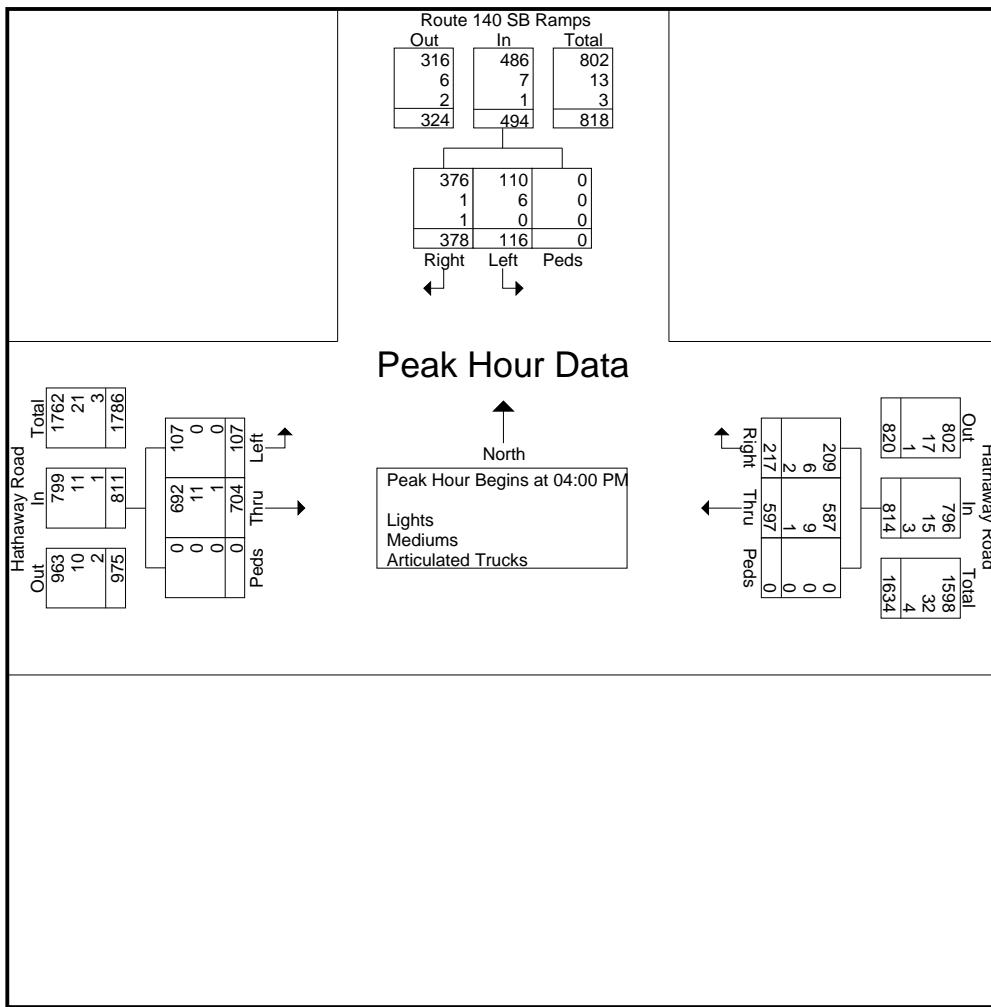
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E/W: Hathaway Road  
New Bedford, MA

File Name : 1166\_Hathaway\_at\_140\_SB\_Ramps\_881461\_09-30-2021  
Site Code : 1166  
Start Date : 9/30/2021  
Page No : 3

Start Time	Route 140 SB Ramps From North				Hathaway Road From East				Hathaway Road From West				Int. Total
	Right	Left	Peds	App. Total	Right	Thru	Peds	App. Total	Thru	Left	Peds	App. Total	
<b>Peak Hour Analysis From 12:00 PM to 05:45 PM - Peak 1 of 1</b>													
<b>Peak Hour for Entire Intersection Begins at 04:00 PM</b>													
04:00 PM	84	25	0	109	57	152	0	209	173	26	0	199	517
04:15 PM	109	30	0	139	58	130	0	188	199	24	0	223	550
04:30 PM	90	36	0	126	65	167	0	232	171	27	0	198	556
04:45 PM	95	25	0	120	37	148	0	185	161	30	0	191	496
Total Volume	378	116	0	494	217	597	0	814	704	107	0	811	2119
% App. Total	76.5	23.5	0		26.7	73.3	0		86.8	13.2	0		
PHF	.867	.806	.000	.888	.835	.894	.000	.877	.884	.892	.000	.909	.953
Lights	376	110	0	486	209	587	0	796	692	107	0	799	2081
% Lights	99.5	94.8	0	98.4	96.3	98.3	0	97.8	98.3	100	0	98.5	98.2
Mediums	1	6	0	7	6	9	0	15	11	0	0	11	33
% Mediums	0.3	5.2	0	1.4	2.8	1.5	0	1.8	1.6	0	0	1.4	1.6
Articulated Trucks	1	0	0	1	2	1	0	3	1	0	0	1	5
% Articulated Trucks	0.3	0	0	0.2	0.9	0.2	0	0.4	0.1	0	0	0.1	0.2



**MDM Transportation Consultants, Inc.**

28 Lord Road, Suite 280  
Marlborough, MA, 01752

E/W: Hathaway Road  
NB: Rockdale Avenue  
New Bedford, MA

File Name : 1166\_Hathaway\_at\_Rockdale\_881456\_09-30-2021  
Site Code : 1166  
Start Date : 9/30/2021  
Page No : 1

	Groups Printed- Lights - Mediums - Articulated Trucks																				
	Southbound Approach From North					Hathaway Road From East					Rockdale Avenue From South					Hathaway Road From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
07:00 AM	0	0	0	0	0	0	68	76	0	144	43	0	12	0	55	20	112	0	0	132	331
07:15 AM	0	0	0	0	0	0	137	89	0	226	70	0	7	0	77	13	116	0	0	129	432
07:30 AM	0	0	0	0	0	0	133	49	0	182	68	0	15	0	83	10	104	0	0	114	379
07:45 AM	1	0	0	0	1	0	141	40	0	181	68	0	13	0	81	11	129	0	0	140	403
Total	1	0	0	0	1	0	479	254	0	733	249	0	47	0	296	54	461	0	0	515	1545
08:00 AM	0	0	1	0	1	0	135	28	0	163	38	0	18	0	56	20	108	0	0	128	348
08:15 AM	0	0	0	0	0	0	138	21	0	159	49	0	16	0	65	18	100	0	0	118	342
08:30 AM	0	0	0	0	0	0	113	36	0	149	44	0	8	0	52	10	101	0	0	111	312
08:45 AM	0	0	0	0	0	0	119	35	0	154	38	1	10	0	49	5	78	0	0	83	286
Total	0	0	1	0	1	0	505	120	0	625	169	1	52	0	222	53	387	0	0	440	1288
04:00 PM	0	0	0	0	0	1	174	49	0	224	48	0	16	0	64	34	150	0	0	184	472
04:15 PM	0	0	1	0	1	0	179	56	0	235	38	0	16	0	54	15	156	1	0	172	462
04:30 PM	0	0	0	0	0	0	187	61	0	248	42	0	19	0	61	25	151	0	0	176	485
04:45 PM	0	0	0	0	0	0	180	57	0	237	36	0	19	0	55	14	145	0	0	159	451
Total	0	0	1	0	1	1	720	223	0	944	164	0	70	0	234	88	602	1	0	691	1870
05:00 PM	0	0	0	0	0	0	162	55	0	217	42	0	15	0	57	22	140	0	0	162	436
05:15 PM	0	0	0	0	0	1	187	68	0	256	41	0	12	0	53	22	146	0	0	168	477
05:30 PM	0	0	0	0	0	0	150	71	0	221	35	0	17	0	52	20	136	0	0	156	429
05:45 PM	0	0	0	0	0	0	145	49	0	194	46	0	17	0	63	16	129	0	0	145	402
Total	0	0	0	0	0	1	644	243	0	888	164	0	61	0	225	80	551	0	0	631	1744
Grand Total	1	0	2	0	3	2	2348	840	0	3190	746	1	230	0	977	275	2001	1	0	2277	6447
Appr %	33.3	0	66.7	0		0.1	73.6	26.3	0		76.4	0.1	23.5	0		12.1	87.9	0	0		
Total %	0	0	0	0	0	0	36.4	13	0	49.5	11.6	0	3.6	0	15.2	4.3	31	0	0	35.3	
Lights	1	0	2	0	3	2	2305	824	0	3131	734	1	227	0	962	272	1962	1	0	2235	6331
% Lights	100	0	100	0	100	100	98.2	98.1	0	98.2	98.4	100	98.7	0	98.5	98.9	98.1	100	0	98.2	98.2
Mediums	0	0	0	0	0	0	38	16	0	54	12	0	3	0	15	3	37	0	0	40	109
% Mediums	0	0	0	0	0	0	1.6	1.9	0	1.7	1.6	0	1.3	0	1.5	1.1	1.8	0	0	1.8	1.7
Articulated Trucks						0	0	0	0	0	0	0.2	0	0	0.2	0	0	0.1	0	0	0.1
% Articulated Trucks	0	0	0	0	0	0	0.2	0	0	0.2	0	0	0	0	0	0	0.1	0	0	0.1	

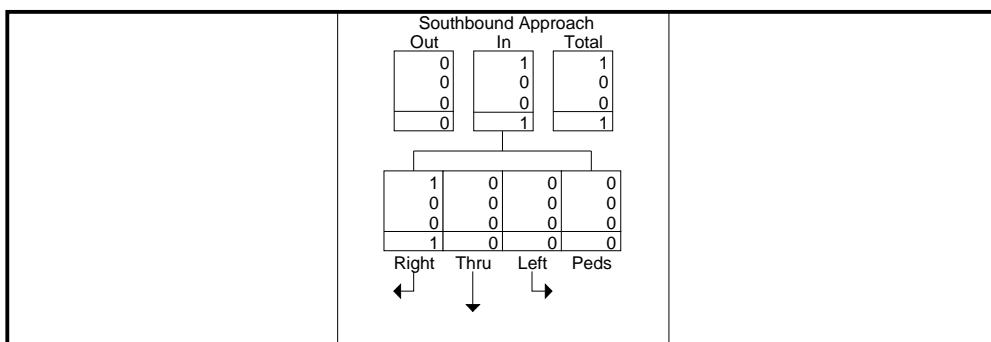
# MDM Transportation Consultants, Inc.

28 Lord Road, Suite 280  
Marlborough, MA, 01752

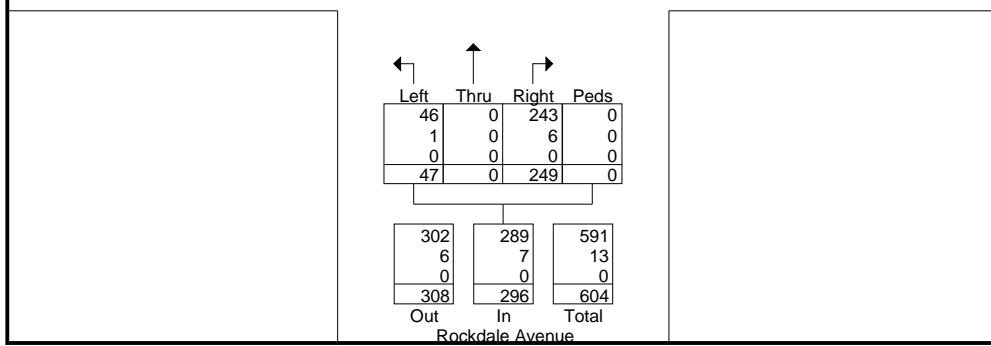
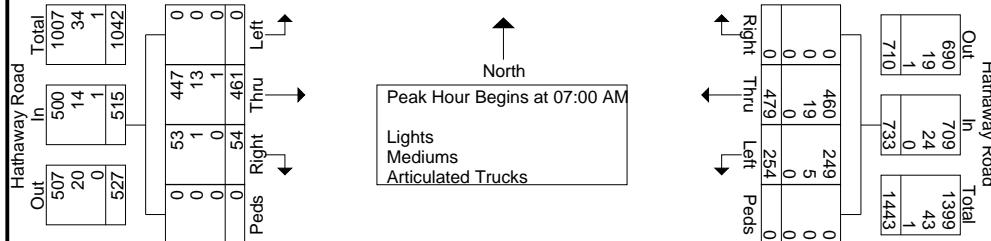
E/W: Hathaway Road  
NB: Rockdale Avenue  
New Bedford, MA

File Name : 1166\_Hathaway\_at\_Rockdale\_881456\_09-30-2021  
Site Code : 1166  
Start Date : 9/30/2021  
Page No : 2

Start Time	Southbound Approach From North					Hathaway Road From East					Rockdale Avenue From South					Hathaway Road From West					
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 07:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00 AM																					
07:00 AM	0	0	0	0	0	0	68	76	0	144	43	0	12	0	55	20	112	0	0	132	331
07:15 AM	0	0	0	0	0	0	137	89	0	226	70	0	7	0	77	13	116	0	0	129	432
07:30 AM	0	0	0	0	0	0	133	49	0	182	68	0	15	0	83	10	104	0	0	114	379
07:45 AM	1	0	0	0	1	0	141	40	0	181	68	0	13	0	81	11	129	0	0	140	403
Total Volume	1	0	0	0	1	0	479	254	0	733	249	0	47	0	296	54	461	0	0	515	1545
% App. Total	100	0	0	0	0	0	65.3	34.7	0	84.1	0	15.9	0	0	10.5	89.5	0	0	0	0	1545
PHF	.250	.000	.000	.000	.250	.000	.849	.713	.000	.811	.889	.000	.783	.000	.892	.675	.893	.000	.920	.894	
Lights	1	0	0	0	1	0	460	249	0	709	243	0	46	0	289	53	447	0	0	500	1499
% Lights	100	0	0	0	100	0	96.0	98.0	0	96.7	97.6	0	97.9	0	97.6	98.1	97.0	0	0	97.1	97.0
Mediums	0	0	0	0	0	0	19	5	0	24	6	0	1	0	7	1	13	0	0	14	45
% Mediums	0	0	0	0	0	0	4.0	2.0	0	3.3	2.4	0	2.1	0	2.4	1.9	2.8	0	0	2.7	2.9
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
% Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	0	0.1



## Peak Hour Data



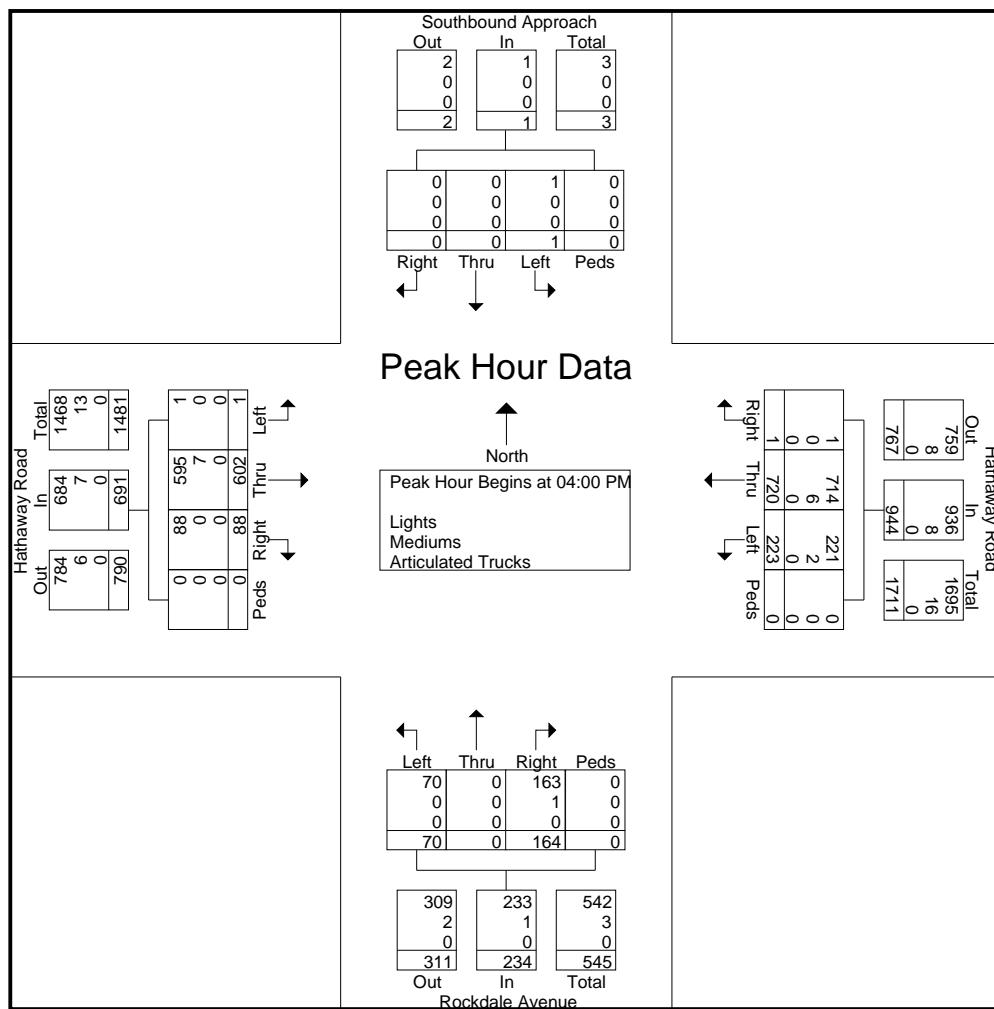
# MDM Transportation Consultants, Inc.

28 Lord Road, Suite 280  
Marlborough, MA, 01752

E/W: Hathaway Road  
NB: Rockdale Avenue  
New Bedford, MA

File Name : 1166\_Hathaway\_at\_Rockdale\_881456\_09-30-2021  
Site Code : 1166  
Start Date : 9/30/2021  
Page No : 3

Start Time	Southbound Approach From North					Hathaway Road From East					Rockdale Avenue From South					Hathaway Road From West						
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total	
Peak Hour Analysis From 12:00 PM to 05:45 PM - Peak 1 of 1																						
Peak Hour for Entire Intersection Begins at 04:00 PM																						
04:00 PM	0	0	0	0	0	1	174	49	0	224	48	0	16	0	64	34	150	0	0	184	472	
04:15 PM	0	0	1	0	1	0	179	56	0	235	38	0	16	0	54	15	156	1	0	172	462	
04:30 PM	0	0	0	0	0	0	187	61	0	248	42	0	19	0	61	25	151	0	0	176	485	
04:45 PM	0	0	0	0	0	0	180	57	0	237	36	0	19	0	55	14	145	0	0	159	451	
Total Volume	0	0	1	0	1	1	720	223	0	944	164	0	70	0	234	88	602	1	0	691	1870	
% App. Total	0	0	100	0	0	0.1	76.3	23.6	0	70.1	0	29.9	0	0	12.7	87.1	0.1	0	0	0	0	
PHF	.000	.000	.250	.000	.250	.250	.963	.914	.000	.952	.854	.000	.921	.000	.914	.647	.965	.250	.000	.939	.964	
Lights	0	0	1	0	1	1	714	221	0	936	163	0	70	0	233	88	595	1	0	684	1854	
% Lights	0	0	100	0	100	100	99.2	99.1	0	99.2	99.4	0	100	0	99.6	100	98.8	100	0	99.0	99.1	
Mediums	0	0	0	0	0	0	0	6	2	0	8	1	0	0	0	1	0	7	0	0	16	
% Mediums	0	0	0	0	0	0	0	0.8	0.9	0	0.8	0.6	0	0	0	0.4	0	1.2	0	0	1.0	0.9
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
% Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	



# **MDM Transportation Consultants, Inc.**

28 Lord Road, Suite 280  
Marlborough, MA, 01752

N/S: Shawmut Avenue  
E/W: Hathaway Road  
New Bedford, MA

File Name : 1166\_Hathaway\_at\_Shawmut\_881460\_09-30-2021  
Site Code : 1166  
Start Date : 9/30/2021  
Page No : 1

	Shawmut Avenue										Hathaway Road										Shawmut Avenue										Hathaway Road									
	From North					From East					From South					From West																								
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total																			
07:00 AM	20	17	2	0	39	2	58	65	0	125	34	18	72	0	124	26	50	22	0	98	386																			
07:15 AM	23	18	1	0	42	0	61	53	0	114	71	22	84	0	177	25	67	23	0	115	448																			
07:30 AM	23	14	1	0	38	1	67	41	0	109	55	16	83	0	154	19	71	20	0	110	411																			
07:45 AM	36	24	4	0	64	3	75	28	0	106	61	19	52	0	132	23	76	20	0	119	421																			
Total	102	73	8	0	183	6	261	187	0	454	221	75	291	0	587	93	264	85	0	442	1666																			
08:00 AM	23	15	0	0	38	2	71	32	0	105	46	8	72	0	126	17	74	21	0	112	381																			
08:15 AM	20	12	2	0	34	2	77	29	0	108	39	14	76	0	129	22	70	27	0	119	390																			
08:30 AM	26	13	2	0	41	1	83	34	0	118	51	14	54	0	119	17	59	30	0	106	384																			
08:45 AM	33	11	1	0	45	1	69	32	0	102	33	15	46	0	94	18	79	25	0	122	363																			
Total	102	51	5	0	158	6	300	127	0	433	169	51	248	0	468	74	282	103	0	459	1518																			
04:00 PM	55	47	5	0	107	3	96	36	0	135	74	11	51	0	136	34	100	27	0	161	539																			
04:15 PM	33	16	0	0	49	0	86	61	0	147	58	13	63	0	134	42	119	36	0	197	527																			
04:30 PM	36	16	3	0	55	3	117	65	0	185	60	8	56	0	124	38	103	22	0	163	527																			
04:45 PM	18	11	3	0	32	2	93	53	0	148	43	9	56	0	108	48	79	23	0	150	438																			
Total	142	90	11	0	243	8	392	215	0	615	235	41	226	0	502	162	401	108	0	671	2031																			
05:00 PM	44	16	5	0	65	1	88	57	0	146	49	10	41	0	100	39	91	19	0	149	460																			
05:15 PM	32	15	0	0	47	3	98	63	0	164	49	2	50	0	101	35	100	26	0	161	473																			
05:30 PM	25	7	3	0	35	2	92	37	0	131	52	5	43	0	100	32	95	9	0	136	402																			
05:45 PM	10	12	0	0	22	1	81	53	0	135	61	8	46	0	115	30	123	19	0	172	444																			
Total	111	50	8	0	169	7	359	210	0	576	211	25	180	0	416	136	409	73	0	618	1779																			
Grand Total	457	264	32	0	753	27	1312	739	0	2078	836	192	945	0	1973	465	1356	369	0	2190	6994																			
Appr %	60.7	35.1	4.2	0		1.3	63.1	35.6	0		42.4	9.7	47.9	0		21.2	61.9	16.8	0																					
Total %	6.5	3.8	0.5	0	10.8	0.4	18.8	10.6	0	29.7	12	2.7	13.5	0	28.2	6.6	19.4	5.3	0	31.3																				
Lights	387	237	28	0	652	23	1265	717	0	2005	817	164	910	0	1891	451	1313	307	0	2071	6619																			
% Lights	84.7	89.8	87.5	0	86.6	85.2	96.4	97	0	96.5	97.7	85.4	96.3	0	95.8	97	96.8	83.2	0	94.6	94.6																			
Mediums	53	26	4	0	83	4	43	21	0	68	18	28	33	0	79	14	32	49	0	95	325																			
% Mediums	11.6	9.8	12.5	0	11	14.8	3.3	2.8	0	3.3	2.2	14.6	3.5	0	4	3	2.4	13.3	0	4.3	4.6																			
Articulated Trucks																																								
% Articulated Trucks	3.7	0.4	0	0	2.4	0	0.3	0.1	0	0.2	0.1	0	0.2	0	0.2	0	0.8	3.5	0	1.1	0.7																			

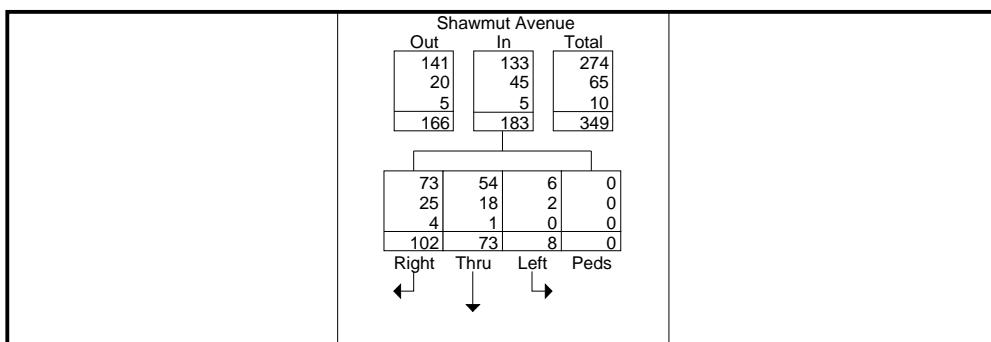
# MDM Transportation Consultants, Inc.

28 Lord Road, Suite 280  
Marlborough, MA, 01752

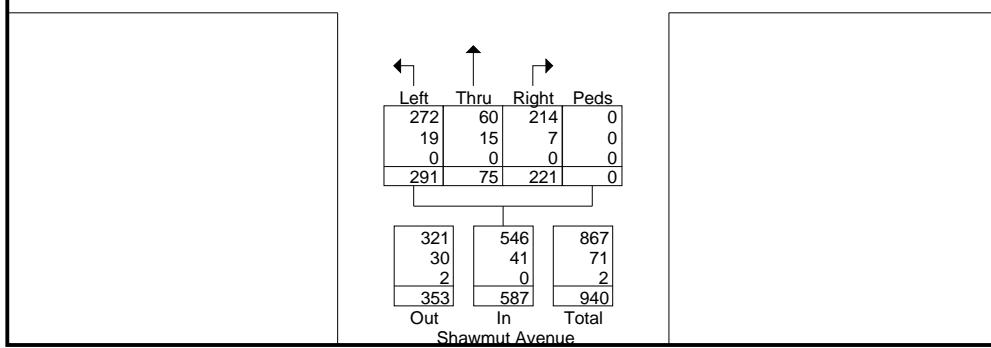
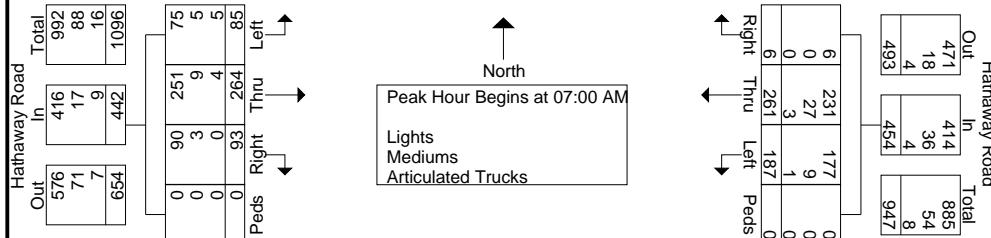
N/S: Shawmut Avenue  
E/W: Hathaway Road  
New Bedford, MA

File Name : 1166\_Hathaway\_at\_Shawmut\_881460\_09-30-2021  
Site Code : 1166  
Start Date : 9/30/2021  
Page No : 2

	Shawmut Avenue From North					Hathaway Road From East					Shawmut Avenue From South					Hathaway Road From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
<b>Peak Hour Analysis From 07:00 AM to 11:45 AM - Peak 1 of 1</b>																					
Peak Hour for Entire Intersection Begins at 07:00 AM																					
07:00 AM	20	17	2	0	39	2	58	65	0	125	34	18	72	0	124	26	50	22	0	98	386
07:15 AM	23	18	1	0	42	0	61	53	0	114	71	22	84	0	177	25	67	23	0	115	448
07:30 AM	23	14	1	0	38	1	67	41	0	109	55	16	83	0	154	19	71	20	0	110	411
07:45 AM	36	24	4	0	64	3	75	28	0	106	61	19	52	0	132	23	76	20	0	119	421
Total Volume	102	73	8	0	183	6	261	187	0	454	221	75	291	0	587	93	264	85	0	442	1666
% App. Total	55.7	39.9	4.4	0		1.3	57.5	41.2	0		37.6	12.8	49.6	0		21	59.7	19.2	0		
PHF	.708	.760	.500	.000	.715	.500	.870	.719	.000	.908	.778	.852	.866	.000	.829	.894	.868	.924	.000	.929	.930
Lights	73	54	6	0	133	6	231	177	0	414	214	60	272	0	546	90	251	75	0	416	1509
% Lights	71.6	74.0	75.0	0	72.7	100	88.5	94.7	0	91.2	96.8	80.0	93.5	0	93.0	96.8	95.1	88.2	0	94.1	90.6
Mediums	25	18	2	0	45	0	27	9	0	36	7	15	19	0	41	3	9	5	0	17	139
% Mediums	24.5	24.7	25.0	0	24.6	0	10.3	4.8	0	7.9	3.2	20.0	6.5	0	7.0	3.2	3.4	5.9	0	3.8	8.3
Articulated Trucks	4	1	0	0	5	0	3	1	0	4	0	0	0	0	0	0	0	4	5	0	9
% Articulated Trucks	3.9	1.4	0	0	2.7	0	1.1	0.5	0	0.9	0	0	0	0	0	0	1.5	5.9	0	2.0	1.1



## Peak Hour Data



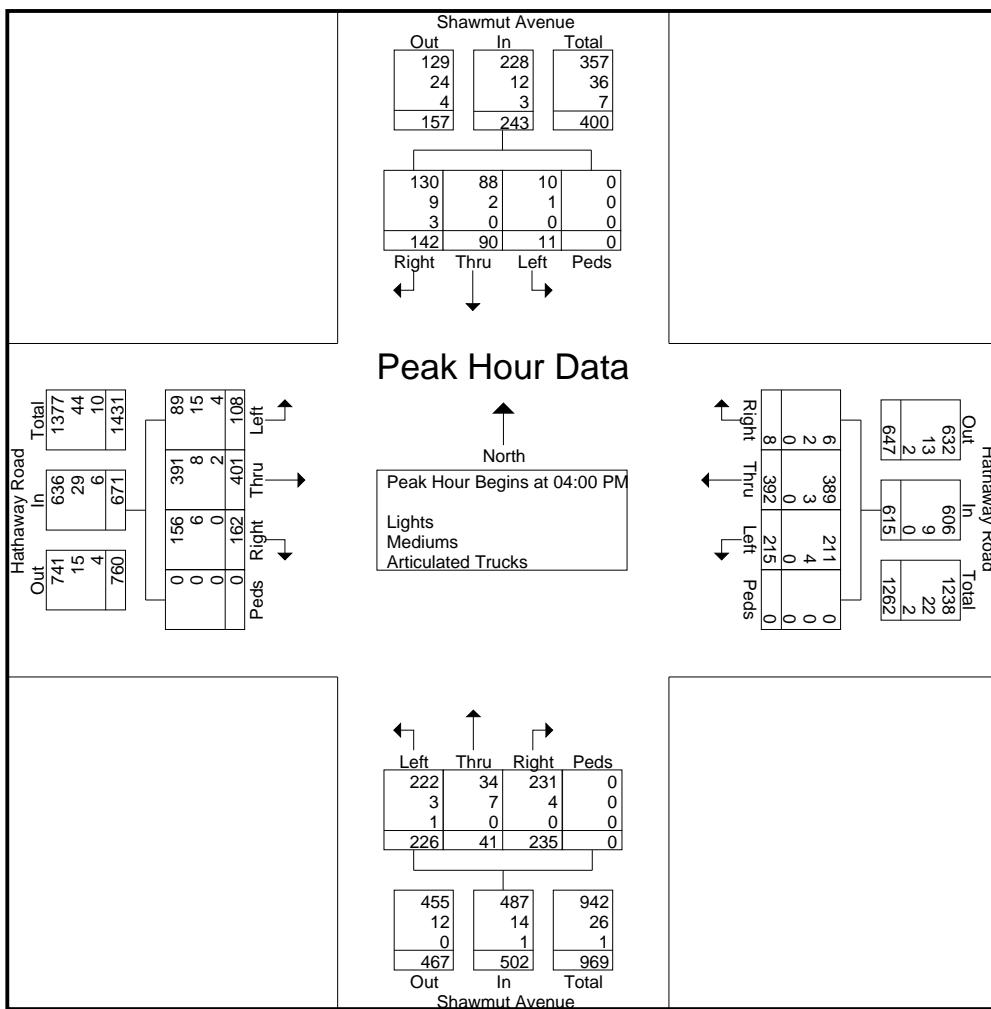
# MDM Transportation Consultants, Inc.

28 Lord Road, Suite 280  
Marlborough, MA, 01752

N/S: Shawmut Avenue  
E/W: Hathaway Road  
New Bedford, MA

File Name : 1166\_Hathaway\_at\_Shawmut\_881460\_09-30-2021  
Site Code : 1166  
Start Date : 9/30/2021  
Page No : 3

	Shawmut Avenue From North				Hathaway Road From East				Shawmut Avenue From South				Hathaway Road From West								
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
<b>Peak Hour Analysis From 12:00 PM to 05:45 PM - Peak 1 of 1</b>																					
<b>Peak Hour for Entire Intersection Begins at 04:00 PM</b>																					
04:00 PM	55	47	5	0	107	3	96	36	0	135	74	11	51	0	136	34	100	27	0	161	539
04:15 PM	33	16	0	0	49	0	86	61	0	147	58	13	63	0	134	42	119	36	0	197	527
04:30 PM	36	16	3	0	55	3	117	65	0	185	60	8	56	0	124	38	103	22	0	163	527
04:45 PM	18	11	3	0	32	2	93	53	0	148	43	9	56	0	108	48	79	23	0	150	438
Total Volume	142	90	11	0	243	8	392	215	0	615	235	41	226	0	502	162	401	108	0	671	2031
% App. Total	58.4	37	4.5	0		1.3	63.7	35	0		46.8	8.2	45	0		24.1	59.8	16.1	0		
PHF	.645	.479	.550	.000	.568	.667	.838	.827	.000	.831	.794	.788	.897	.000	.923	.844	.842	.750	.000	.852	.942
Lights	130	88	10	0	228	6	389	211	0	606	231	34	222	0	487	156	391	89	0	636	1957
% Lights	91.5	97.8	90.9	0	93.8	75.0	99.2	98.1	0	98.5	98.3	82.9	98.2	0	97.0	96.3	97.5	82.4	0	94.8	96.4
Mediums	9	2	1	0	12	2	3	4	0	9	4	7	3	0	14	6	8	15	0	29	64
% Mediums	6.3	2.2	9.1	0	4.9	25.0	0.8	1.9	0	1.5	1.7	17.1	1.3	0	2.8	3.7	2.0	13.9	0	4.3	3.2
Articulated Trucks	3	0	0	0	3	0	0	0	0	0	0	0	1	0	1	0	2	4	0	6	10
% Articulated Trucks	2.1	0	0	0	1.2	0	0	0	0	0	0	0	0.4	0	0.2	0	0.5	3.7	0	0.9	0.5



# MDM Transportation Consultants, Inc.

28 Lord Road, Suite 280  
Marlborough, MA, 01752

SB: Rt 140 NB Ramps  
E/W: Hathaway Road  
New Bedford, MA

File Name : 1166\_Hathaway\_at\_140\_NB\_Ramps\_Sat\_10-2-2021  
Site Code : 1166  
Start Date : 10/2/2021  
Page No : 1

Groups Printed- Lights - Mediums - Articulated Trucks

Start Time	Route 140 NB Ramps From North				Hathaway Road From East				Hathaway Road From West				Int. Total
	Right	Left	Peds	App. Total	Right	Thru	Peds	App. Total	Thru	Left	Peds	App. Total	
11:00 AM	40	42	0	82	19	149	0	168	114	42	0	156	406
11:15 AM	41	36	0	77	24	161	0	185	125	43	0	168	430
11:30 AM	34	38	0	72	30	158	0	188	119	37	0	156	416
11:45 AM	37	45	0	82	37	172	0	209	108	52	0	160	451
Total	152	161	0	313	110	640	0	750	466	174	0	640	1703
12:00 PM	30	50	0	80	24	174	0	198	117	49	0	166	444
12:15 PM	36	47	0	83	23	184	0	207	107	54	0	161	451
12:30 PM	42	43	0	85	23	181	0	204	126	43	0	169	458
12:45 PM	46	41	0	87	16	171	0	187	117	60	0	177	451
Total	154	181	0	335	86	710	0	796	467	206	0	673	1804
Grand Total	306	342	0	648	196	1350	0	1546	933	380	0	1313	3507
Apprch %	47.2	52.8	0		12.7	87.3	0		71.1	28.9	0		
Total %	8.7	9.8	0	18.5	5.6	38.5	0	44.1	26.6	10.8	0	37.4	
Lights	304	326	0	630	193	1337	0	1530	922	378	0	1300	3460
% Lights	99.3	95.3	0	97.2	98.5	99	0	99	98.8	99.5	0	99	98.7
Mediums	2	15	0	17	3	13	0	16	10	2	0	12	45
% Mediums	0.7	4.4	0	2.6	1.5	1	0	1	1.1	0.5	0	0.9	1.3
Articulated Trucks	0	1	0	1	0	0	0	0	1	0	0	1	2
% Articulated Trucks	0	0.3	0	0.2	0	0	0	0	0.1	0	0	0.1	0.1

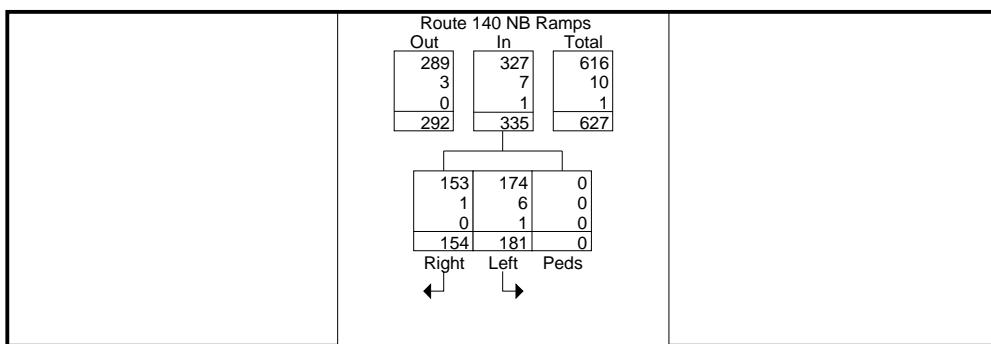
# MDM Transportation Consultants, Inc.

28 Lord Road, Suite 280  
Marlborough, MA, 01752

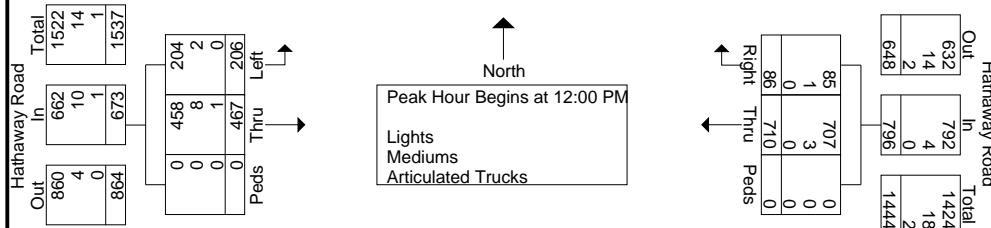
SB: Rt 140 NB Ramps  
E/W: Hathaway Road  
New Bedford, MA

File Name : 1166\_Hathaway\_at\_140\_NB\_Ramps\_Sat\_10-2-2021  
Site Code : 1166  
Start Date : 10/2/2021  
Page No : 2

Start Time	Route 140 NB Ramps From North				Hathaway Road From East				Hathaway Road From West				Int. Total
	Right	Left	Peds	App. Total	Right	Thru	Peds	App. Total	Thru	Left	Peds	App. Total	
<b>Peak Hour Analysis From 12:00 PM to 12:45 PM - Peak 1 of 1</b>													
<b>Peak Hour for Entire Intersection Begins at 12:00 PM</b>													
12:00 PM	30	50	0	80	24	174	0	198	117	49	0	166	444
12:15 PM	36	47	0	83	23	184	0	207	107	54	0	161	451
12:30 PM	42	43	0	85	23	181	0	204	126	43	0	169	458
12:45 PM	46	41	0	87	16	171	0	187	117	60	0	177	451
Total Volume	154	181	0	335	86	710	0	796	467	206	0	673	1804
% App. Total	46	54	0		10.8	89.2	0		69.4	30.6	0		
PHF	.837	.905	.000	.963	.896	.965	.000	.961	.927	.858	.000	.951	.985
Lights	153	174	0	327	85	707	0	792	458	204	0	662	1781
% Lights	99.4	96.1	0	97.6	98.8	99.6	0	99.5	98.1	99.0	0	98.4	98.7
Mediums	1	6	0	7	1	3	0	4	8	2	0	10	21
% Mediums	0.6	3.3	0	2.1	1.2	0.4	0	0.5	1.7	1.0	0	1.5	1.2
Articulated Trucks	0	1	0	1	0	0	0	0	1	0	0	1	2
% Articulated Trucks	0	0.6	0	0.3	0	0	0	0	0.2	0	0	0.1	0.1



## Peak Hour Data



# **MDM Transportation Consultants, Inc.**

28 Lord Road, Suite 280  
Marlborough, MA, 01752

SB: Rt 140 SB Ramps  
E/W: Hathaway Road  
New Bedford, MA

File Name : 1166\_Hathaway\_at\_140\_SB\_Ramps\_Sat\_10-2-2021  
Site Code : 1166  
Start Date : 10/2/2021  
Page No : 1

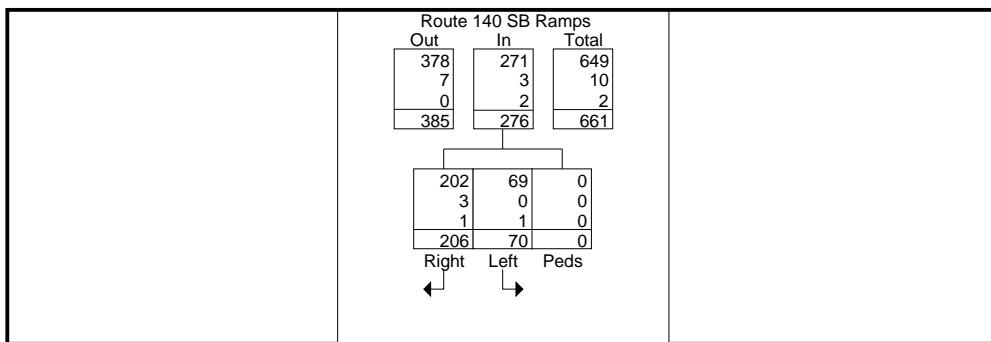
# MDM Transportation Consultants, Inc.

28 Lord Road, Suite 280  
Marlborough, MA, 01752

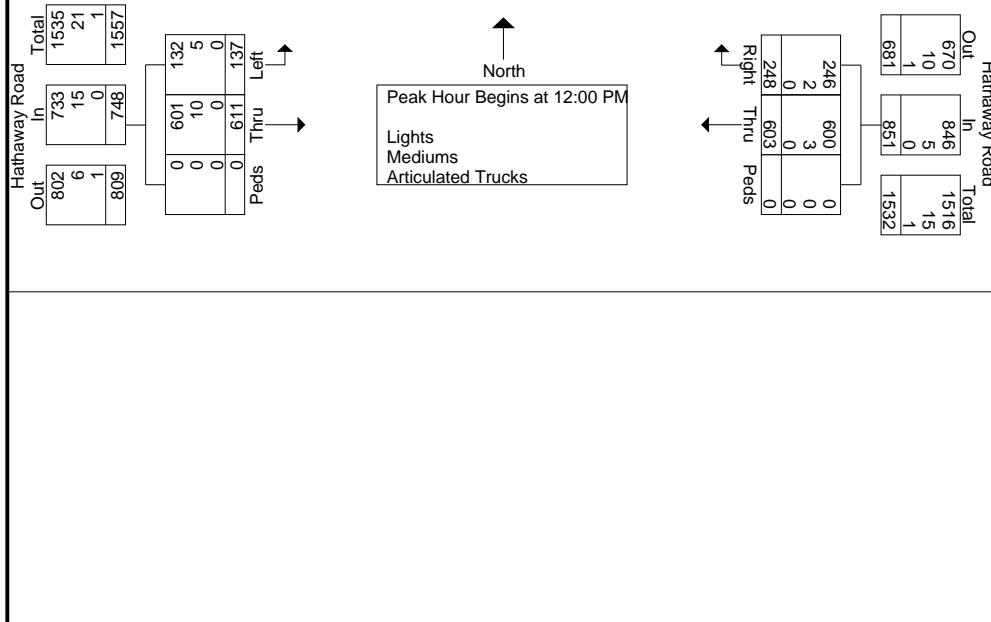
SB: Rt 140 SB Ramps  
E/W: Hathaway Road  
New Bedford, MA

File Name : 1166\_Hathaway\_at\_140\_SB\_Ramps\_Sat\_10-2-2021  
Site Code : 1166  
Start Date : 10/2/2021  
Page No : 2

Start Time	Route 140 SB Ramps From North				Hathaway Road From East				Hathaway Road From West				Int. Total
	Right	Left	Peds	App. Total	Right	Thru	Peds	App. Total	Thru	Left	Peds	App. Total	
<b>Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1</b>													
Peak Hour for Entire Intersection Begins at 12:00 PM													
12:00 PM	50	12	0	62	48	147	0	195	151	37	0	188	445
12:15 PM	49	21	0	70	77	149	0	226	144	31	0	175	471
12:30 PM	52	22	0	74	62	155	0	217	155	36	0	191	482
12:45 PM	55	15	0	70	61	152	0	213	161	33	0	194	477
Total Volume	206	70	0	276	248	603	0	851	611	137	0	748	1875
% App. Total	74.6	25.4	0		29.1	70.9	0		81.7	18.3	0		
PHF	.936	.795	.000	.932	.805	.973	.000	.941	.949	.926	.000	.964	.973
Lights	202	69	0	271	246	600	0	846	601	132	0	733	1850
% Lights	98.1	98.6	0	98.2	99.2	99.5	0	99.4	98.4	96.4	0	98.0	98.7
Mediums	3	0	0	3	2	3	0	5	10	5	0	15	23
% Mediums	1.5	0	0	1.1	0.8	0.5	0	0.6	1.6	3.6	0	2.0	1.2
Articulated Trucks	1	1	0	2	0	0	0	0	0	0	0	0	2
% Articulated Trucks	0.5	1.4	0	0.7	0	0	0	0	0	0	0	0	0.1



## Peak Hour Data



**MDM Transportation Consultants, Inc.**

28 Lord Road, Suite 280  
Marlborough, MA, 01752

E/W: Hathaway Road  
NB: Rockdale Avenue  
New Bedford, MA

File Name : 1166\_Hathaway\_at\_Rockdale\_Sat\_10-2-2021  
Site Code : 1166  
Start Date : 10/2/2021  
Page No : 1

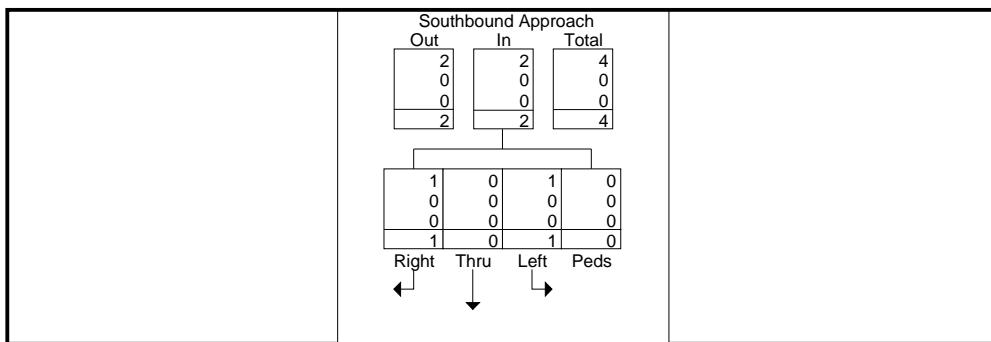
# MDM Transportation Consultants, Inc.

28 Lord Road, Suite 280  
Marlborough, MA, 01752

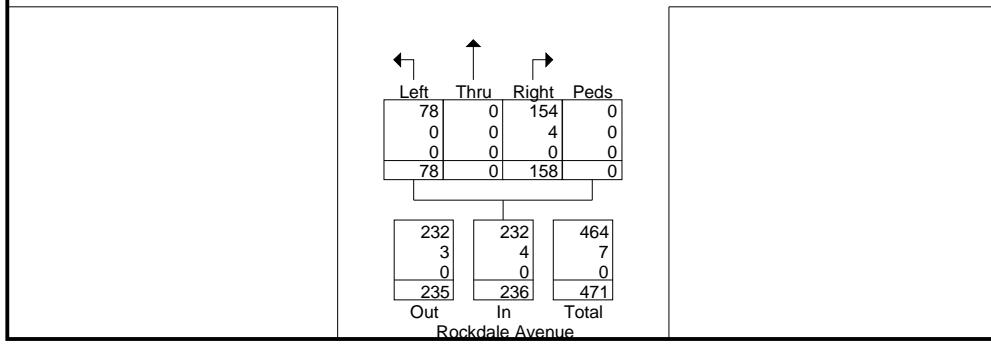
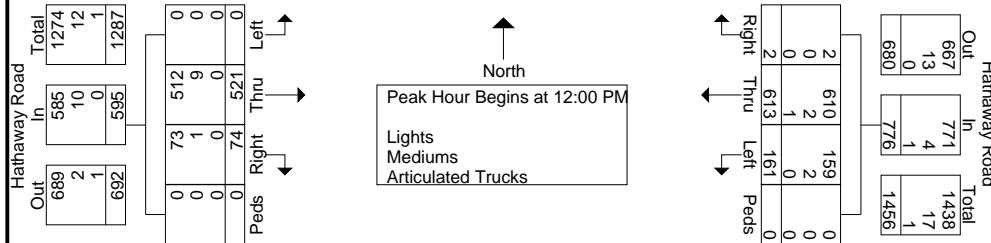
E/W: Hathaway Road  
NB: Rockdale Avenue  
New Bedford, MA

File Name : 1166\_Hathaway\_at\_Rockdale\_Sat\_10-2-2021  
Site Code : 1166  
Start Date : 10/2/2021  
Page No : 2

Start Time	Southbound Approach From North					Hathaway Road From East					Rockdale Avenue From South					Hathaway Road From West						
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total	
Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1																						
Peak Hour for Entire Intersection Begins at 12:00 PM																						
12:00 PM	0	0	1	0	1	1	152	41	0	194	45	0	21	0	66	15	130	0	0	145	406	
12:15 PM	0	0	0	0	0	0	147	45	0	192	39	0	22	0	61	16	122	0	0	0	391	
12:30 PM	0	0	0	0	0	1	155	38	0	194	50	0	15	0	65	17	125	0	0	0	401	
12:45 PM	1	0	0	0	1	0	159	37	0	196	24	0	20	0	44	26	144	0	0	0	411	
Total Volume	1	0	1	0	2	2	613	161	0	776	158	0	78	0	236	74	521	0	0	595	1609	
% App. Total	50	0	50	0	0.3	79	20.7	0	66.9	0	33.1	0	12.4	87.6	0	0	0	0	0	0	0	
PHF	.250	.000	.250	.000	.500	.500	.964	.894	.000	.990	.790	.000	.886	.000	.894	.712	.905	.000	.000	.875	.979	
Lights	1	0	1	0	2	2	610	159	0	771	154	0	78	0	232	73	512	0	0	585	1590	
% Lights	100	0	100	0	100	100	99.5	98.8	0	99.4	97.5	0	100	0	98.3	98.6	98.3	0	0	98.3	98.8	
Mediums	0	0	0	0	0	0	0	2	2	0	4	4	0	0	0	4	1	9	0	0	10	18
% Mediums	0	0	0	0	0	0	0.3	1.2	0	0.5	2.5	0	0	0	1.7	1.4	1.7	0	0	0	1.1	
Articulated Trucks	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	1	
% Articulated Trucks	0	0	0	0	0	0	0	0.2	0	0	0.1	0	0	0	0	0	0	0	0	0	0.1	



## Peak Hour Data



# MDM Transportation Consultants, Inc.

28 Lord Road, Suite 280  
Marlborough, MA, 01752

N/S: Shawmut Avenue  
E/W: Hathaway Road  
New Bedford, MA

File Name : 1166\_Hathaway\_at\_Shawmut\_Sat\_10-2-2021  
Site Code : 1166  
Start Date : 10/2/2021  
Page No : 1

Groups Printed- Lights - Mediums - Articulated Trucks																					
	Shawmut Avenue From North					Hathaway Road From East					Shawmut Avenue From South					Hathaway Road From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
11:00 AM	30	6	1	0	37	1	101	40	0	142	59	11	39	0	109	24	99	18	0	141	429
11:15 AM	18	16	2	0	36	4	103	49	0	156	52	8	59	0	119	17	92	37	0	146	457
11:30 AM	30	10	3	0	43	6	112	58	0	176	56	14	53	0	123	24	108	32	0	164	506
11:45 AM	19	18	6	0	43	2	123	45	0	170	54	14	64	0	132	33	97	17	0	147	492
Total	97	50	12	0	159	13	439	192	0	644	221	47	215	0	483	98	396	104	0	598	1884
12:00 PM	21	12	1	0	34	5	123	51	0	179	52	9	56	0	117	28	106	27	0	161	491
12:15 PM	40	20	1	0	61	4	112	47	0	163	51	18	53	0	122	32	88	23	0	143	489
12:30 PM	34	17	1	0	52	9	112	55	0	176	44	11	59	0	114	27	98	29	0	154	496
12:45 PM	19	14	1	0	34	2	117	50	0	169	54	9	48	0	111	30	111	19	0	160	474
Total	114	63	4	0	181	20	464	203	0	687	201	47	216	0	464	117	403	98	0	618	1950
Grand Total	211	113	16	0	340	33	903	395	0	1331	422	94	431	0	947	215	799	202	0	1216	3834
Apprch %	62.1	33.2	4.7	0		2.5	67.8	29.7	0		44.6	9.9	45.5	0		17.7	65.7	16.6	0		
Total %	5.5	2.9	0.4	0	8.9	0.9	23.6	10.3	0	34.7	11	2.5	11.2	0	24.7	5.6	20.8	5.3	0	31.7	
Lights	202	111	15	0	328	33	899	394	0	1326	418	93	426	0	937	212	784	191	0	1187	3778
% Lights	95.7	98.2	93.8	0	96.5	100	99.6	99.7	0	99.6	99.1	98.9	98.8	0	98.9	98.6	98.1	94.6	0	97.6	98.5
Mediums	9	2	1	0	12	0	4	1	0	5	4	1	4	0	9	3	13	11	0	27	53
% Mediums	4.3	1.8	6.2	0	3.5	0	0.4	0.3	0	0.4	0.9	1.1	0.9	0	1	1.4	1.6	5.4	0	2.2	1.4
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	2	0	0	2	3
% Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0	0.1	0	0.3	0	0	0.2	0.1

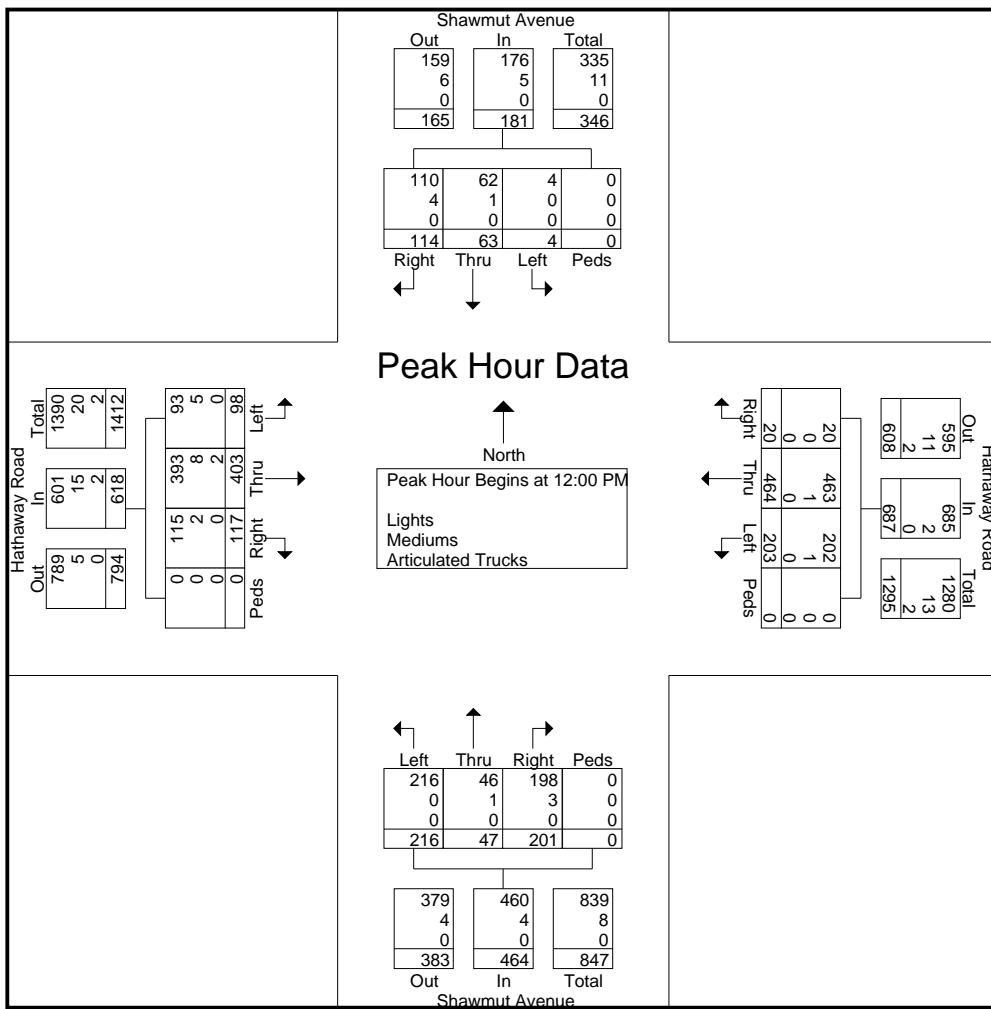
# MDM Transportation Consultants, Inc.

28 Lord Road, Suite 280  
Marlborough, MA, 01752

N/S: Shawmut Avenue  
E/W: Hathaway Road  
New Bedford, MA

File Name : 1166\_Hathaway\_at\_Shawmut\_Sat\_10-2-2021  
Site Code : 1166  
Start Date : 10/2/2021  
Page No : 2

	Shawmut Avenue From North					Hathaway Road From East					Shawmut Avenue From South					Hathaway Road From West						
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total	
Peak Hour Analysis From 12:00 PM to 12:45 PM - Peak 1 of 1																						
Peak Hour for Entire Intersection Begins at 12:00 PM																						
12:00 PM	21	12	1	0	34	5	123	51	0	179	52	9	56	0	117	28	106	27	0	161	491	
12:15 PM	40	20	1	0	61	4	112	47	0	163	51	18	53	0	122	32	88	23	0	143	489	
12:30 PM	34	17	1	0	52	9	112	55	0	176	44	11	59	0	114	27	98	29	0	154	496	
12:45 PM	19	14	1	0	34	2	117	50	0	169	54	9	48	0	111	30	111	19	0	160	474	
Total Volume	114	63	4	0	181	20	464	203	0	687	201	47	216	0	464	117	403	98	0	618	1950	
% App. Total	63	34.8	2.2	0		2.9	67.5	29.5	0		43.3	10.1	46.6	0		18.9	65.2	15.9	0			
PHF	.713	.788	1.0	0	.000	.742	.556	.943	.923	.000	.959	.931	.653	.915	.000	.951	.914	.908	.845	.000	.960	.983
Lights	110	62	4	0	176	20	463	202	0	685	198	46	216	0	460	115	393	93	0	601	1922	
% Lights	96.5	98.4	100	0	97.2	100	99.8	99.5	0	99.7	98.5	97.9	100	0	99.1	98.3	97.5	94.9	0	97.2	98.6	
Mediums	4	1	0	0	5	0	1	1	0	2	3	1	0	0	0	4	2	8	5	0	15	26
% Mediums	3.5	1.6	0	0	2.8	0	0.2	0.5	0	0.3	1.5	2.1	0	0	0.9	1.7	2.0	5.1	0	2.4	1.3	
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	
% Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	0	0	0.1	



Seasonal/Yearly Growth Data

**STATION 25 - SOMERSET - RTE.138 - SOUTH OF WHETSTONE HILL ROAD**

YR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
16	8,466	8,434	9,128	9,303	9,868	10,229	9,494	9,632	9,675	9,593	9,174	8,907	9,325
	-6%	1%	-2%	2%	2%	3%	2%	2%	2%	2%	1%	1%	1%
17	7,975	8,560	8,928	9,471	10,048	10,563	9,661	9,801	9,861	9,819	9,280	8,965	9,411
	6%	2%	2%	-2%	1%	-2%	1%	-3%	-3%	-3%	-2%	1%	0%
18	8,480	8,741	9,116	9,310	10,131	10,360	9,719	9,520	9,573	9,492	9,113	9,079	9,386
	1%	-2%	-2%	1%	-1%	-1%	-1%	2%	3%	1%	0%	-2%	0%
19	8,525	8,559	8,969	9,448	9,983	10,223	9,628	9,706	9,881	9,551	9,118	8,883	9,373
Seasonal Adjustment Factor (to average month)	1.12	1.09	1.04	1.00	0.94	0.91	0.97	0.97	0.96	0.98	1.02	1.05	
													Growth <b>0.17%</b>

**STATION 617 - NEW BEDFORD - RTE.140 - NORTH OF FREETOWN T.L.**

YR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
16	29,349	30,033	32,192	32,901	33,613	34,369	33,196	33,849	33,752	33,958	32,699	32,107	32,668
	4%	5%	-1%	3%	2%	3%	1%	2%	2%	3%	3%	-1%	2%
17	30,513	31,456	31,986	33,916	34,349	35,280	33,608	34,382	34,490	34,881	33,753	31,788	33,367
	-7%	3%	-1%	1%	2%	1%	2%	2%	2%	1%	-1%	4%	1%
18	28,394	32,363	31,762	34,283	34,920	35,670	34,203	34,944	35,186	35,128	33,511	33,004	33,614
	11%	0%	5%	1%	0%	0%	-2%	1%	2%	2%	2%	-2%	2%
19	31,548	32,465	33,266	34,747	34,995	35,761	33,651	35,351	36,043	35,693	34,159	32,359	34,170
Seasonal Adjustment Factor (to average month)	1.12	1.06	1.04	0.99	0.97	0.95	0.99	0.97	0.96	0.96	1.00	1.04	
													Growth <b>1.51%</b>

**STATION 38 - NEW BEDFORD - RTE.195 - EAST OF ROUTE 140**

YR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
12	41,104	43,232	49,381	47,514	50,205	52,950	55,566	56,474	50,849	47,748	47,516	44,036	48,881
	1%	-5%	-14%	-6%	-7%	-5%	-3%	-3%	-1%	1%	-7%	-1%	-4%
13	41,372	41,284	42,306	44,429	46,918	50,208	54,136	54,862	50,296	48,017	44,425	43,425	46,807
	-7%	-2%	3%	18%	8%	6%	3%	2%	3%	3%	2%	6%	4%
14	38,554	40,662	43,496	52,547	50,828	53,050	55,851	55,952	51,889	49,310	45,254	46,120	48,626
	4%	4%	3%	-2%	2%	2%	2%	2%	2%	2%	3%	2%	2%
17	43,212	45,372	47,839	49,954	53,344	57,001	58,556	59,974	54,391	53,008	49,165	48,891	51,726
	-2%	5%	1%	-2%	2%	1%	1%	1%	2%	1%	1%	-1%	1%
19	41,583	49,558	49,177	48,388	55,666	58,228	60,124	60,870	56,255	53,780	50,005	48,271	52,659
Seasonal Adjustment Factor (to average month)	1.21	1.13	1.07	1.03	0.97	0.92	0.87	0.86	0.94	0.99	1.05	1.08	
													Growth <b>0.67%</b>

Average Seasonal Adjustment Factor (to average month)	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
	1.15	1.10	1.05	1.00	0.96	0.92	0.95	0.93	0.95	0.97	1.02	1.05

Average Yearly Growth Calculated **0.8%**  
**Yearly Growth Factor Used** **1.0%**

□ Pandemic Adjustment Data

## Pandemic Adjustment Calculations

Based on Location 38 Interstate 195 in New Bedford (See Attached Sheets)

### 2019 Volume    2021 Volume

Location 38

Thursday <u>Weekday</u>	9/26/2019	9/30/2021	Correction Factor
7:00 to 9:00	9,081	8,349	1.09
4:00 to 6:00	9,742	9,443	1.03
Daily	59,039	58,584	1.01

Location 38

Saturday <u>Weekend</u>	10/5/2019	10/2/2021	Correction Factor
11:00 to 1:00	7,804	8,221	0.95
Daily	50,826	51,410	0.99

### Volume Count Report

LOCATION INFO	
Location ID	38
Type	SPOT
Fnc'tl Class	1
Located On	INTERSTATE 195
EAST OF	ACUSHNET RIVER
Direction	2-WAY
County	Bristol
Community	New Bedford
MPO ID	
HPMS ID	094034201600
Agency	MHD

COUNT DATA INFO	
Count Status	Accepted
Start Date	Thu 9/26/2019
End Date	Fri 9/27/2019
Start Time	12:00:00 AM
End Time	12:00:00 AM
Direction	
Notes	
Station	000000003804
Study	
Speed Limit	
Description	
Sensor Type	
Source	TCDS_COUNT_IMPORT_COMBINE
Latitude,Longitude	

Count Navigation: |<<| < | > | >>|

Count Type: VOLUME ▾

Directions: 2-WAY EB WB ?  
 1 2 1 2

### Volume Count Report

LOCATION INFO	
Location ID	38
Type	SPOT
Fnc'tl Class	1
Located On	INTERSTATE 195
EAST OF	ACUSHNET RIVER
Direction	2-WAY
County	Bristol
Community	New Bedford
MPO ID	
HPMS ID	094034201600
Agency	MHD

COUNT DATA INFO	
Count Status	Accepted
Start Date	Thu 9/30/2021
End Date	Fri 10/1/2021
Start Time	12:00:00 AM
End Time	12:00:00 AM
Direction	
Notes	
Station	000000003804
Study	
Speed Limit	
Description	
Sensor Type	
Source	TCDS_COUNT_IMPORT_COMBINE
Latitude,Longitude	

Count Navigation: |<<| < | > | >>|

Count Type: VOLUME ▾

Directions: 2-WAY EB WB ?  
 1 2 1 2

INTERVAL:15-MIN					
Time	15-min Interval				Hourly Count
	1st	2nd	3rd	4th	
0:00-1:00	84	50	63	47	244
1:00-2:00	39	25	30	30	124
2:00-3:00	26	40	31	26	123
3:00-4:00	35	31	41	41	148
4:00-5:00	75	96	106	178	455
5:00-6:00	197	285	355	499	1,336
6:00-7:00	556	690	982	1,033	3,261
7:00-8:00	1,097	1,159	1,259	1,276	4,791
8:00-9:00	1,183	1,101	1,030	976	4,290
9:00-10:00	870	879	834	792	3,375
10:00-11:00	847	787	790	854	3,278
11:00-12:00	759	801	793	809	3,162
12:00-13:00	801	819	842	816	3,278
13:00-14:00	808	855	852	845	3,360
14:00-15:00	979	992	977	987	3,935
15:00-16:00	1,089	1,427	1,279	1,207	5,002
16:00-17:00	1,289	1,258	1,199	1,095	4,841
17:00-18:00	1,270	1,362	1,177	1,092	4,901
18:00-19:00	887	798	736	651	3,072
19:00-20:00	628	541	483	507	2,159
20:00-21:00	411	389	377	329	1,506
21:00-22:00	289	290	250	238	1,067
22:00-23:00	212	224	202	163	801
23:00-24:00	170	159	104	97	530
Total					59,039
AADT					54,611
AM Peak					07:15-08:15 4,877
PM Peak					15:15-16:15 5,202

INTERVAL:15-MIN					
Time	15-min Interval				Hourly Count
	1st	2nd	3rd	4th	
0:00-1:00	83	65	50	42	240
1:00-2:00	62	34	30	28	154
2:00-3:00	28	30	31	27	116
3:00-4:00	33	36	36	47	152
4:00-5:00	62	89	108	165	424
5:00-6:00	231	287	370	493	1,381
6:00-7:00	585	786	907	974	3,252
7:00-8:00	969	1,141	1,180	1,139	4,429
8:00-9:00	1,009	985	994	932	3,920
9:00-10:00	839	864	874	840	3,417
10:00-11:00	815	837	808	864	3,324
11:00-12:00	818	823	765	825	3,231
12:00-13:00	829	948	820	810	3,407
13:00-14:00	792	840	888	894	3,414
14:00-15:00	892	983	1,119	940	3,934
15:00-16:00	1,045	1,161	1,248	1,249	4,703
16:00-17:00	1,243	1,244	1,272	1,197	4,956
17:00-18:00	1,224	1,139	1,102	1,022	4,487
18:00-19:00	996	909	787	660	3,352
19:00-20:00	632	572	568	478	2,250
20:00-21:00	428	391	376	334	1,529
21:00-22:00	332	306	292	233	1,163
22:00-23:00	246	221	200	132	799
23:00-24:00	146	149	146	109	550
Total					58,584
AADT					54,190
AM Peak					07:15-08:15 4,469
PM Peak					15:45-16:45 5,008

### Volume Count Report

LOCATION INFO	
Location ID	38
Type	SPOT
Fnc'l Class	1
Located On	INTERSTATE 195
EAST OF	ACUSHNET RIVER
Direction	2-WAY
County	Bristol
Community	New Bedford
MPO ID	
HPMS ID	094034201600
Agency	MHD

INTERVAL:15-MIN						
Time	15-min Interval				Hourly Count	
	1st	2nd	3rd	4th		
0:00-1:00	134	102	104	105	445	
1:00-2:00	78	69	61	55	263	
2:00-3:00	41	62	42	31	176	
3:00-4:00	35	32	37	56	160	
4:00-5:00	62	72	74	81	289	
5:00-6:00	103	125	171	218	617	
6:00-7:00	239	315	379	364	1,297	
7:00-8:00	362	525	543	576	2,006	
8:00-9:00	522	579	682	679	2,462	
9:00-10:00	734	769	852	809	3,164	
10:00-11:00	818	888	932	957	3,595	
11:00-12:00	928	1,047	969	983	3,927	
12:00-13:00	929	1,015	980	953	3,877	
13:00-14:00	950	981	951	885	3,767	
14:00-15:00	913	996	982	875	3,766	
15:00-16:00	957	943	928	883	3,711	
16:00-17:00	895	995	948	909	3,747	
17:00-18:00	823	852	792	818	3,285	
18:00-19:00	829	773	718	741	3,061	
19:00-20:00	654	611	490	472	2,227	
20:00-21:00	445	407	400	359	1,611	
21:00-22:00	403	363	374	364	1,504	
22:00-23:00	287	303	276	232	1,098	
23:00-24:00	211	227	144	189	771	
Total					50,826	
AADT					48,590	
AM Peak					11:15-12:15 3,928	
PM Peak					12:15-13:15 3,898	

Count Navigation: << < > >>

Count Type: VOLUME ▾

Directions: 2-WAY EB WB ?  
 1 2 1 2

### Volume Count Report

LOCATION INFO	
Location ID	38
Type	SPOT
Fnc'l Class	1
Located On	INTERSTATE 195
EAST OF	ACUSHNET RIVER
Direction	2-WAY
County	Bristol
Community	New Bedford
MPO ID	
HPMS ID	094034201600
Agency	MHD

INTERVAL:15-MIN						
Time	15-min Interval				Hourly Count	
	1st	2nd	3rd	4th		
0:00-1:00	131	115	108	85	439	
1:00-2:00	78	71	55	57	261	
2:00-3:00	68	46	51	35	200	
3:00-4:00	32	32	46	37	147	
4:00-5:00	59	83	101	92	335	
5:00-6:00	89	113	176	197	575	
6:00-7:00	223	314	359	412	1,308	
7:00-8:00	402	499	481	609	1,991	
8:00-9:00	568	613	640	697	2,518	
9:00-10:00	685	755	802	898	3,140	
10:00-11:00	926	980	953	1,016	3,875	
11:00-12:00	961	1,009	1,045	984	3,999	
12:00-13:00	1,063	1,141	1,042	976	4,222	
13:00-14:00	957	1,007	930	1,025	3,919	
14:00-15:00	890	947	923	907	3,667	
15:00-16:00	984	1,014	980	969	3,947	
16:00-17:00	909	939	818	867	3,533	
17:00-18:00	879	886	779	800	3,344	
18:00-19:00	811	777	728	639	2,955	
19:00-20:00	678	607	573	473	2,331	
20:00-21:00	432	461	407	303	1,603	
21:00-22:00	344	342	344	311	1,341	
22:00-23:00	294	237	268	214	1,013	
23:00-24:00	222	198	176	151	747	

COUNT DATA INFO						
Count Status	Accepted					
Start Date	Sat 10/2/2021					
End Date	Sun 10/3/2021					
Start Time	12:00:00 AM					
End Time	12:00:00 AM					
Direction						
Notes						
Station	000000003804					
Study						
Speed Limit						
Description						
Sensor Type						
Source	TCDS_COUNT_IMPORT_COMBINE					
Latitude,Longitude						
Total						
AADT						
AM Peak	11:15-12:15 3,928					
PM Peak	12:15-13:15 3,898					

Count Navigation: ||<< < > >>||

Count Type: VOLUME ▾

Directions: 2-WAY EB WB ?  
 1 2 1 2

Crash Data



## INTERSECTION CRASH RATE WORKSHEET

---

CITY/TOWN : New Bedford, MA COUNT DATE : Sep-21

DISTRICT : 5 UNSIGNALIZED :  SIGNALIZED :

### ~ INTERSECTION DATA ~

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MAJOR STREET : Hathaway Road

MINOR STREET(S) : Rockdale Avenue

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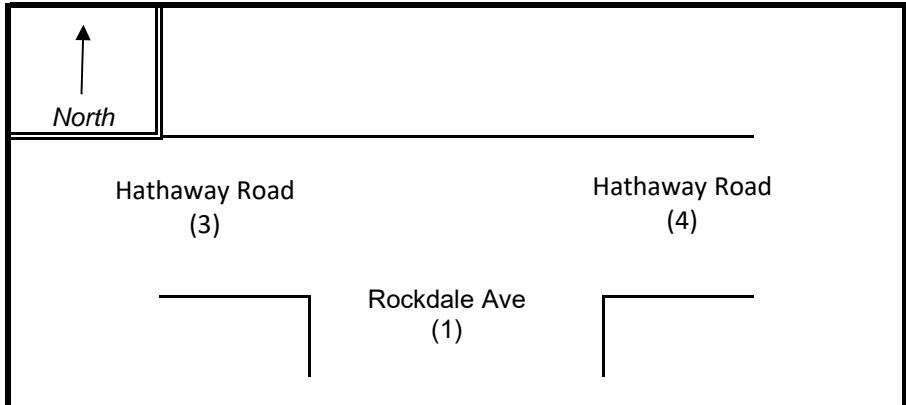


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**INTERSECTION  
DIAGRAM  
(Label Approaches)**



### PEAK HOUR VOLUMES

APPROACH :	1	2	3	4	5	Total Peak Hourly Approach Volume
DIRECTION :	NB	SB	EB	WB		
PEAK HOURLY VOLUMES (PM) :	241	1	712	973		1,927

"K" FACTOR :	<b>0.080</b>	INTERSECTION ADT (V) = TOTAL DAILY APPROACH VOLUME :	<b>24,088</b>
TOTAL # OF CRASHES :	<b>21</b>	# OF YEARS :	<b>5</b>

AVERAGE # OF CRASHES PER YEAR (A) :

**4.20**

**CRASH RATE CALCULATION :**

**0.48**

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

Comments : MassDOT District 4 Avg: Signalized = 0.75; Unsignalized = 0.57

Project Title & Date: 1166 - New Bedford



## INTERSECTION CRASH RATE WORKSHEET

---

CITY/TOWN : New Bedford, MA COUNT DATE : Sep-21

DISTRICT : 5 UNSIGNALIZED :  SIGNALIZED :

### ~ INTERSECTION DATA ~

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MAJOR STREET : Hathaway Road

MINOR STREET(S) : Route 140 Southbound Ramps

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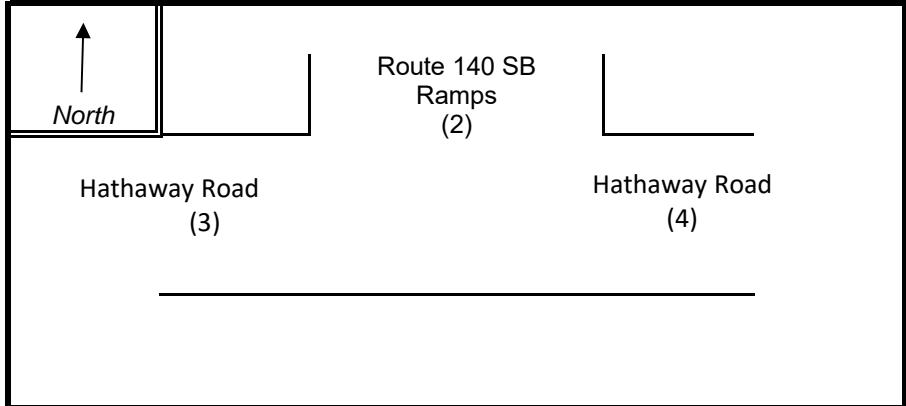


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**INTERSECTION  
DIAGRAM  
(Label Approaches)**



### PEAK HOUR VOLUMES

APPROACH :	1	2	3	4	5	Total Peak Hourly Approach Volume
DIRECTION :	NB	SB	EB	WB		
PEAK HOURLY VOLUMES (PM) :	0	508	833	839		<b>2,180</b>

"K" FACTOR :	<b>0.080</b>	INTERSECTION ADT (V) = TOTAL DAILY APPROACH VOLUME :			<b>27,250</b>
TOTAL # OF CRASHES :	<b>28</b>	# OF YEARS :	<b>5</b>	AVERAGE # OF CRASHES PER YEAR (A) :	<b>5.60</b>

**CRASH RATE CALCULATION :** **0.56** RATE = 
$$\frac{(A * 1,000,000)}{(V * 365)}$$

Comments : MassDOT District 4 Avg: Signalized = 0.75; Unsignalized = 0.57

Project Title & Date: 1166 - New Bedford



## INTERSECTION CRASH RATE WORKSHEET

---

CITY/TOWN : New Bedford, MA COUNT DATE : Sep-21

DISTRICT : 5 UNSIGNALIZED :  SIGNALIZED :

### ~ INTERSECTION DATA ~

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MAJOR STREET : Hathaway Road

MINOR STREET(S) : Route 140 Northbound Ramps

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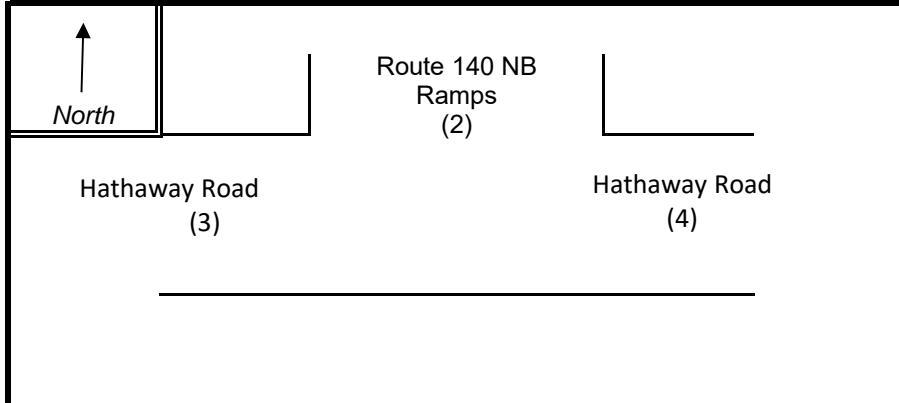


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**INTERSECTION  
DIAGRAM  
(Label Approaches)**



### PEAK HOUR VOLUMES

APPROACH :	1	2	3	4	5	Total Peak Hourly Approach Volume
DIRECTION :	NB	SB	EB	WB		
PEAK HOURLY VOLUMES (PM) :	0	442	772	826		<b>2,040</b>

"K" FACTOR : 0.080 INTERSECTION ADT (V) = TOTAL DAILY APPROACH VOLUME : 25,500

TOTAL # OF CRASHES : 25 # OF YEARS : 5 AVERAGE # OF CRASHES PER YEAR (A) : 5.00

---

**CRASH RATE CALCULATION :** 0.54 RATE = 
$$\frac{(A * 1,000,000)}{(V * 365)}$$

Comments : MassDOT District 4 Avg: Signalized = 0.75; Unsignalized = 0.57

Project Title & Date: 1166 - New Bedford



## INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : New Bedford, MA COUNT DATE : Sep-21

DISTRICT :       5       UNSIGNALIZED :                  SIGNALIZED :             X

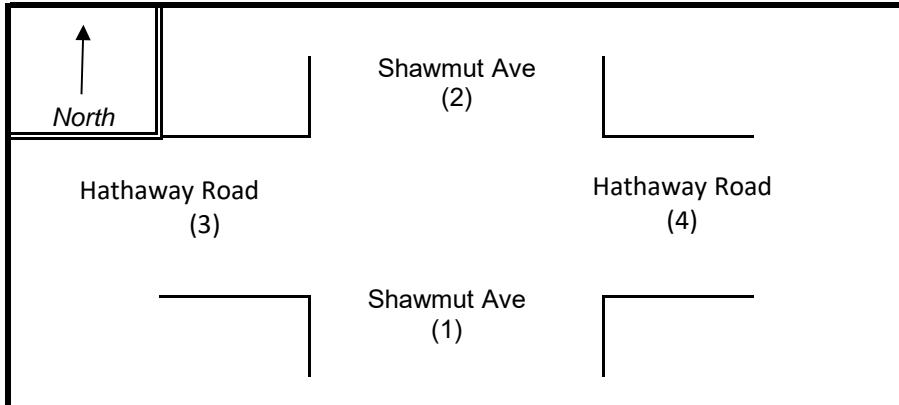
### ~ INTERSECTION DATA ~

MAJOR STREET : Hathaway Road

MINOR STREET(S) : Shawmut Avenue

# INTERSECTION DIAGRAM

## (Label Approaches)



## PEAK HOUR VOLUMES

APPROACH :	1	2	3	4	5	Total Peak Hourly Approach Volume
DIRECTION :	NB	SB	EB	WB		
PEAK HOURLY VOLUMES (PM) :	517	250	691	633		
" K " FACTOR :	0.080	INTERSECTION ADT ( V ) = TOTAL DAILY APPROACH VOLUME :				26,138
TOTAL # OF CRASHES :	56	# OF YEARS :	5	AVERAGE # OF CRASHES PER YEAR ( A ) :		
				11.20		

**CRASH RATE CALCULATION :**      **1.17**      RATE =  $\frac{(A * 1,000,000)}{(V * 365)}$

Comments : MassDOT District 4 Avg: Signalized = 0.75; Unsignalized = 0.57

Project Title & Date: 1166 - New Bedford

## Hathaway at Route 140 NB Ramps

Crash Number	City Town Name	Crash Date	Crash Severity	Crash Time	Crash Year	First Harmful Event	Manner of Collision	Road Surface	C Total Fatalities	Total Non-Fatal Injuries	X	Y
4194281	NEW BEDFORD	04/21/2016	Property damage only	(n8:21 PM	2016	Collision with motor vehicle in t Angle		Dry	0	0	245799	823254.7
4212927	NEW BEDFORD	06/19/2016	Non-fatal injury	7:52 PM	2016	Collision with curb	Single vehicle crash	Dry	0	1	245731.8	823224.1
4258130	NEW BEDFORD	09/02/2016	Non-fatal injury	2:45 PM	2016	Collision with motor vehicle in t Angle		Dry	0	4	245731	823223.7
4260478	NEW BEDFORD	10/07/2016	Non-fatal injury	3:47 PM	2016	Collision with motor vehicle in t Angle		Dry	0	5	245732.4	823220.1
4286543	NEW BEDFORD	11/17/2016	Property damage only	(n6:08 AM	2016	Collision with motor vehicle in t Angle		Dry	0	0	245799	823254.7
4292598	NEW BEDFORD	11/30/2016	Non-fatal injury	4:42 PM	2016	Collision with motor vehicle in t Angle		Wet	0	2	245731	823223.7
4322714	NEW BEDFORD	02/06/2017	Property damage only	(n9:47 AM	2017	Collision with motor vehicle in t Angle		Dry	0	0	245731	823223.7
4331478	NEW BEDFORD	02/24/2017	Property damage only	(n1:44 PM	2017	Collision with motor vehicle in t Single vehicle crash		Dry	0	0	245731	823223.7
4340774	NEW BEDFORD	03/21/2017	Property damage only	(n7:17 AM	2017	Collision with motor vehicle in t Angle		Dry	0	0	245799	823254.7
4354255	NEW BEDFORD	04/09/2017	Non-fatal injury	10:42 AM	2017	Collision with motor vehicle in t Rear-end		Dry	0	1	245731	823223.7
4354245	NEW BEDFORD	04/19/2017	Non-fatal injury	8:08 PM	2017	Collision with motor vehicle in t Sideswipe, same direction		Wet	0	1	245731	823223.7
4375630	NEW BEDFORD	06/07/2017	Property damage only	(n1:09 PM	2017	Collision with motor vehicle in t Rear-end		Dry	0	0	245731	823223.7
4377413	NEW BEDFORD	06/12/2017	Property damage only	(n2:45 PM	2017	Collision with motor vehicle in t Rear-end		Dry	0	0	245731	823223.7
4385258	NEW BEDFORD	06/29/2017	Non-fatal injury	4:19 PM	2017	Collision with motor vehicle in t Angle		Dry	0	1	245799	823254.7
4397416	NEW BEDFORD	07/24/2017	Non-fatal injury	4:21 PM	2017	Collision with motor vehicle in t Angle		Wet	0	1	245799	823254.7
4397417	NEW BEDFORD	07/25/2017	Property damage only	(n6:10 PM	2017	Collision with motor vehicle in t Angle		Dry	0	0	245799	823254.7
4458914	NEW BEDFORD	11/21/2017	Non-fatal injury	5:00 PM	2017	Collision with motor vehicle in t Angle		Dry	0	2	245731	823223.7
4586888	NEW BEDFORD	08/26/2018	Non-fatal injury	5:43 PM	2018	Collision with motor vehicle in t Rear-end		Dry	0	4	245773.8	823243.2
4643713	NEW BEDFORD	12/23/2018	Property damage only	(n12:43 PM	2018	Collision with motor vehicle in t Rear-end		Dry	0	0	245749.7	823232.4
4734505	NEW BEDFORD	08/06/2019	Non-fatal injury	3:23 PM	2019	Collision with motor vehicle in t Angle		Wet	0	0	245731	823223.7
4842856	NEW BEDFORD	05/08/2020	Property damage only	(n1:20 PM	2020	Collision with motor vehicle in t Rear-end		Dry	0	0	245787.1	823263.7
4851988	NEW BEDFORD	06/19/2020	Property damage only	(n11:01 PM	2020	Collision with motor vehicle in t Sideswipe, same direction		Dry	0	0	245731	823223.7
4856090	NEW BEDFORD	06/30/2020	Non-fatal injury	11:27 AM	2020	Collision with motor vehicle in t Rear-end		Dry	0	0	245731	823223.7
4856811	NEW BEDFORD	07/03/2020	Non-fatal injury	12:23 PM	2020	Collision with motor vehicle in t Angle		Dry	0	0	245731	823223.7
4898191	NEW BEDFORD	11/14/2020	Property damage only	(n7:20 PM	2020	Collision with motor vehicle in t Angle		Dry	0	0	245731	823223.7

Data Level: CRASH

Query Type: Spatial

Criteria: If you conducted an Advanced Query your SQL statement will be listed here

## Hathaway at Route 140 SB Ramps

Crash Number	City/Town Name	Crash Date	Crash Severity	Crash Time	Crash Year	First Harmful Event	Manner of Collision	Road Surface	C Total Fatalities	Total Non-Fatal Injuries	X	Y
4303151	NEW BEDFORD	12/23/2016	Property damage only	(n 10:01 AM	2016	Collision with motor vehicle in t Angle		Dry	0	0	245452.6	823110.4
4321192	NEW BEDFORD	02/04/2017	Non-fatal injury	6:48 PM	2017	Collision with motor vehicle in t Angle		Dry	0	3	245452.6	823110.4
4328784	NEW BEDFORD	02/14/2017	Property damage only	(n 3:21 PM	2017	Collision with motor vehicle in t Angle		Dry	0	0	245401.9	823093.4
4355306	NEW BEDFORD	04/12/2017	Property damage only	(n 9:20 PM	2017	Collision with motor vehicle in t Angle		Dry	0	0	245452.6	823110.4
4421732	NEW BEDFORD	09/13/2017	Property damage only	(n 5:43 PM	2017	Collision with motor vehicle in t Angle		Dry	0	0	245452.6	823110.4
4440511	NEW BEDFORD	10/14/2017	Non-fatal injury	7:48 PM	2017	Collision with motor vehicle in t Angle		Wet	0	2	245448.7	823109.1
4445809	NEW BEDFORD	10/26/2017	Non-fatal injury	8:53 AM	2017	Collision with motor vehicle in t Angle		Wet	0	3	245452.6	823110.4
4540302	NEW BEDFORD	04/30/2018	Property damage only	(n 2:58 PM	2018	Collision with motor vehicle in t Rear-end		Dry	0	0	245501.6	823128
4547450	NEW BEDFORD	05/09/2018	Property damage only	(n 10:29 PM	2018	Collision with motor vehicle in t Rear-end		Dry	0	0	245501.6	823128
4577045	NEW BEDFORD	08/03/2018	Property damage only	(n 5:13 PM	2018	Collision with motor vehicle in t Rear-end		Dry	0	0	245501.6	823128
4578335	NEW BEDFORD	08/03/2018	Non-fatal injury	1:46 PM	2018	Collision with motor vehicle in t Angle		Dry	0	1	245501.6	823128
4600435	NEW BEDFORD	09/17/2018	Property damage only	(n 5:15 PM	2018	Collision with motor vehicle in t Angle		Dry	0	0	245501.6	823128
4600466	NEW BEDFORD	09/21/2018	Non-fatal injury	7:14 AM	2018	Collision with motor vehicle in t Angle		Dry	0	1	245460.6	823113.2
4622136	NEW BEDFORD	10/26/2018	Property damage only	(n 9:31 PM	2018	Collision with motor vehicle in t Angle		Dry	0	0	245501.6	823128
4622166	NEW BEDFORD	10/29/2018	Property damage only	(n 4:50 PM	2018	Collision with motor vehicle in t Angle		Dry	0	0	245501.6	823128
4622281	NEW BEDFORD	11/09/2018	Non-fatal injury	6:47 PM	2018	Collision with motor vehicle in t Angle		Wet	0	1	245501.6	823128
4633836	NEW BEDFORD	12/05/2018	Property damage only	(n 4:11 PM	2018	Collision with motor vehicle in t Rear-end		Dry	0	0	245501.6	823128
4643542	NEW BEDFORD	12/28/2018	Property damage only	(n 5:14 PM	2018	Collision with motor vehicle in t Rear-end		Wet	0	0	245460.6	823113.2
4647422	NEW BEDFORD	01/02/2019	Unknown	5:55 PM	2019	Collision with motor vehicle in t Rear-end		Dry	0	0	245501.6	823128
4694514	NEW BEDFORD	04/25/2019	Property damage only	(n 5:19 PM	2019	Collision with motor vehicle in t Rear-end		Dry	0	0	245501.6	823128
4714215	NEW BEDFORD	06/15/2019	Property damage only	(n 10:20 AM	2019	Collision with motor vehicle in t Angle		Dry	0	0	245460.6	823113.2
4725999	NEW BEDFORD	07/17/2019	Property damage only	(n 12:18 PM	2019	Collision with motor vehicle in t Angle			0	0	245501.6	823128
4732092	NEW BEDFORD	07/30/2019	Property damage only	(n 9:23 AM	2019	Collision with motor vehicle in t Angle			0	0	245431.3	823103.2
4735062	NEW BEDFORD	08/06/2019	Property damage only	(n 6:45 PM	2019	Collision with motor vehicle in t Angle		Dry	0	0	245501.6	823128
4737946	NEW BEDFORD	08/15/2019	Non-fatal injury	9:22 PM	2019	Collision with motor vehicle in t Sideswipe, same direction		Dry	0	0	245501.6	823128
4739641	NEW BEDFORD	08/19/2019	Property damage only	(n 4:42 PM	2019	Collision with motor vehicle in t Rear-end		Dry	0	0	245501.6	823128
4806040	NEW BEDFORD	01/12/2020	Property damage only	(n 1:16 PM	2020	Collision with motor vehicle in t Single vehicle crash		Dry	0	0	245452.5	823111.3
4840726	NEW BEDFORD	05/02/2020	Non-fatal injury	5:04 PM	2020	Collision with motor vehicle in t Angle		Dry	0	0	245460.6	823113.2

Data Level: CRASH

Query Type: Spatial

Criteria: If you conducted an Advanced Query your SQL statement will be listed here

## Hathaway at Rockdale

Crash Number	City/Town Name	Crash Date	Crash Severity	Crash Time	Crash Year	First Harmful Event	Manner of Collision	Road Surface	C Total Fatalities	Total Non-Fatal Injuries	X	Y
4194274	NEW BEDFORD	04/21/2016	Non-fatal injury	6:08 PM	2016	Collision with motor vehicle in t	Single vehicle crash	Dry	0	1	244819.6	822628.9
4198784	NEW BEDFORD	05/12/2016	Property damage only	(n 6:13 PM	2016	Collision with motor vehicle in t	Angle	Dry	0	0	244819.6	822628.9
4224755	NEW BEDFORD	06/24/2016	Non-fatal injury	12:53 PM	2016	Collision with motor vehicle in t	Angle	Dry	0	1	244819.6	822628.9
4341555	NEW BEDFORD	03/22/2017	Non-fatal injury	5:20 PM	2017	Collision with motor vehicle in t	Single vehicle crash	Dry	0	2	244819.6	822628.9
4350128	NEW BEDFORD	04/07/2017	Non-fatal injury	7:04 PM	2017	Collision with motor vehicle in t	Angle	Wet	0	1	244819.6	822628.9
4366694	NEW BEDFORD	05/20/2017	Property damage only	(n 11:21 AM	2017	Collision with motor vehicle in t	Angle	Dry	0	0	244819.6	822628.9
4377411	NEW BEDFORD	06/09/2017	Property damage only	(n 1:52 PM	2017	Collision with motor vehicle in t	Angle	Dry	0	0	244819.6	822628.9
4426119	NEW BEDFORD	09/19/2017	Property damage only	(n 6:31 PM	2017	Collision with motor vehicle in t	Rear-end	Wet	0	0	244819.6	822628.9
4467329	NEW BEDFORD	12/11/2017	Non-fatal injury	6:35 PM	2017	Collision with motor vehicle in t	Angle	Dry	0	1	244819.6	822628.9
4469607	NEW BEDFORD	12/13/2017	Property damage only	(n 2:42 PM	2017	Collision with motor vehicle in t	Sideswipe, opposite direction	Dry	0	0	244819.6	822628.9
4471996	NEW BEDFORD	12/20/2017	Non-fatal injury	3:46 PM	2017	Collision with motor vehicle in t	Angle	Dry	0	1	244829.5	822638
4638649	NEW BEDFORD	12/15/2018	Non-fatal injury	1:28 PM	2018	Collision with motor vehicle in t	Rear-end	Wet	0	4	244833.5	822641.8
4639624	NEW BEDFORD	12/18/2018	Property damage only	(n 4:37 PM	2018	Collision with motor vehicle in t	Angle	Dry	0	0	244833.5	822641.8
4667721	NEW BEDFORD	02/20/2019	Non-fatal injury	9:42 PM	2019	Collision with motor vehicle in t	Angle	Wet	0	1	244819.6	822628.9
4717564	NEW BEDFORD	06/25/2019	Property damage only	(n 2:17 PM	2019	Collision with motor vehicle in t	Sideswipe, same direction	Wet	0	0	244819.6	822628.9
4767519	NEW BEDFORD	10/25/2019	Non-fatal injury	12:10 AM	2019	Collision with motor vehicle in t	Angle	Dry	0	0	244819.6	822628.9
4797168	NEW BEDFORD	12/31/2019	Property damage only	(n 12:20 PM	2019	Collision with motor vehicle in t	Angle	Dry	0	0	244819.6	822628.9
4827046	NEW BEDFORD	03/05/2020	Property damage only	(n 2:01 PM	2020	Collision with motor vehicle in t	Rear-end	Dry	0	0	244819.6	822628.9
4858898	NEW BEDFORD	07/06/2020	Property damage only	(n 2:41 PM	2020	Collision with motor vehicle in t	Unknown	Dry	0	0	244819.6	822628.9
4892375	NEW BEDFORD	10/28/2020	Non-fatal injury	2:36 PM	2020	Collision with motor vehicle in t	Rear-end	Wet	0	0	244819.6	822628.9
4910002	NEW BEDFORD	12/12/2020	Non-fatal injury	10:07 AM	2020	Collision with motor vehicle in t	Rear-end	Wet	0	0	244819.6	822628.9

Data Level: CRASH

Query Type: Spatial

Criteria: If you conducted an Advanced Query your SQL statement will be listed here

## Hathaway at Shawmut Signal

Crash Number	City Town Name	Crash Date	Crash Severity	Crash Time	Crash Year	First Harmful Event	Manner of Collision	Road Surface	C Total Fatalities	Total Non-Fatal Injuries	X	Y
4186923	NEW BEDFORD	02/03/2016	Non-fatal injury	8:57 AM	2016	Collision with motor vehicle in t Angle	Dry	0	1	246053.4	823383.9	
4189220	NEW BEDFORD	02/11/2016	Property damage	2:55 PM	2016	Collision with motor vehicle in t Sideswipe, opposite direction	Dry	0	0	246053.4	823383.9	
4194211	NEW BEDFORD	04/25/2016	Non-fatal injury	5:09 PM	2016	Collision with motor vehicle in t Angle	Dry	0	5	246053.4	823383.9	
4196682	NEW BEDFORD	05/03/2016	Property damage	5:01 PM	2016	Collision with motor vehicle in t Angle	Dry	0	0	246053.4	823383.9	
4240766	NEW BEDFORD	08/15/2016	Property damage	2:01 PM	2016	Collision with motor vehicle in t Angle	Dry	0	0	246053.4	823383.9	
4242111	NEW BEDFORD	08/07/2016	Non-fatal injury	4:01 PM	2016	Collision with motor vehicle in t Angle	Dry	0	6	246046.9	823396.6	
4254684	NEW BEDFORD	09/27/2016	Property damage	12:07 PM	2016	Collision with motor vehicle in t Angle	Dry	0	0	246053.4	823383.9	
4255210	NEW BEDFORD	09/08/2016	Property damage	6:17 AM	2016	Collision with motor vehicle in t Sideswipe, same direction	Dry	0	0	246053.4	823383.9	
4257327	NEW BEDFORD	10/03/2016	Non-fatal injury	2:25 PM	2016	Collision with motor vehicle in t Rear-end	Dry	0	1	246053.4	823383.9	
4270442	NEW BEDFORD	10/24/2016	Non-fatal injury	10:38 AM	2016	Collision with motor vehicle in t Rear-end	Dry	0	2	246053.4	823383.9	
4277494	NEW BEDFORD	11/06/2016	Non-fatal injury	5:44 PM	2016	Collision with pedestrian	Single vehicle crash	Wet	0	1	246053.4	823383.9
4299030	NEW BEDFORD	12/12/2016	Non-fatal injury	10:15 PM	2016	Collision with motor vehicle in t Head-on	Dry	0	2	246053.4	823383.9	
4319957	NEW BEDFORD	01/31/2017	Property damage	4:43 PM	2017	Collision with motor vehicle in t Sideswipe, opposite direction	Snow	0	0	246053.4	823383.9	
4328682	NEW BEDFORD	02/17/2017	Property damage	3:11 PM	2017	Collision with motor vehicle in t Angle	Dry	0	0	246053.4	823383.9	
4339696	NEW BEDFORD	03/18/2017	Property damage	10:56 AM	2017	Collision with motor vehicle in t Sideswipe, same direction	Dry	0	0	246046.9	823396.6	
4356129	NEW BEDFORD	04/24/2017	Property damage	12:37 PM	2017	Collision with motor vehicle in t Head-on	Dry	0	0	246053.4	823383.9	
4387500	NEW BEDFORD	07/05/2017	Property damage	5:40 PM	2017	Collision with motor vehicle in t Sideswipe, same direction	Dry	0	0	246053.4	823383.9	
4409338	NEW BEDFORD	08/15/2017	Property damage	8:44 AM	2017	Collision with motor vehicle in t Rear-end	Dry	0	0	246053.4	823383.9	
4413455	NEW BEDFORD	08/23/2017	Non-fatal injury	9:58 AM	2017	Collision with motor vehicle in t Angle	Dry	0	2	246053.4	823383.9	
4416542	NEW BEDFORD	09/02/2017	Property damage	10:23 AM	2017	Collision with motor vehicle in t Angle	Dry	0	0	246053.4	823383.9	
4428949	NEW BEDFORD	09/24/2017	Property damage	1:37 PM	2017	Collision with motor vehicle in t Sideswipe, same direction	Dry	0	0	246053.4	823383.9	
4454684	NEW BEDFORD	11/14/2017	Non-fatal injury	3:18 PM	2017	Collision with motor vehicle in t Rear-end	Dry	0	1	246053.4	823383.9	
4458918	NEW BEDFORD	11/22/2017	Property damage	2:52 PM	2017	Collision with motor vehicle in t Angle	Wet	0	0	246046.9	823396.6	
4466630	NEW BEDFORD	12/08/2017	Property damage	5:27 PM	2017	Collision with motor vehicle in t Angle	Dry	0	0	246053.4	823383.9	
4500812	NEW BEDFORD	02/04/2018	Property damage	2:50 PM	2018	Collision with motor vehicle in t Sideswipe, same direction	Wet	0	0	246053.4	823383.9	
4513198	NEW BEDFORD	03/08/2018	Non-fatal injury	7:14 PM	2018	Collision with pedestrian	Angle	Dry	0	1	246053.4	823383.9
4523137	NEW BEDFORD	04/03/2018	Non-fatal injury	3:45 PM	2018	Collision with motor vehicle in t Rear-end	Wet	0	1	246053.4	823383.9	
4540160	NEW BEDFORD	04/13/2018	Property damage	11:33 AM	2018	Collision with motor vehicle in t Rear-end	Wet	0	0	246053.4	823383.9	
4583708	NEW BEDFORD	08/20/2018	Non-fatal injury	11:55 AM	2018	Collision with motor vehicle in t Rear-end	Dry	0	4	246053.4	823383.9	
4603974	NEW BEDFORD	10/01/2018	Property damage	3:51 PM	2018	Collision with motor vehicle in t Rear-end	Dry	0	0	246053.4	823383.9	
4622323	NEW BEDFORD	11/08/2018	Property damage	3:45 PM	2018	Collision with motor vehicle in t Rear-end	Dry	0	0	246047.6	823395.3	
4622324	NEW BEDFORD	11/08/2018	Non-fatal injury	3:55 PM	2018	Collision with motor vehicle in t Angle	Dry	0	1	246047.6	823395.3	
4622334	NEW BEDFORD	11/10/2018	Property damage	3:28 AM	2018	Collision with curb	Single vehicle crash	Wet	0	0	246053.4	823383.9
4637674	NEW BEDFORD	12/13/2018	Property damage	3:28 PM	2018	Collision with motor vehicle in t Angle	Dry	0	0	246047.6	823395.3	
4639266	NEW BEDFORD	12/17/2018	Property damage	4:21 PM	2018	Collision with motor vehicle in t Angle	Dry	0	0	246053.4	823383.9	
4666155	NEW BEDFORD	02/15/2019	Non-fatal injury	2:34 PM	2019	Collision with motor vehicle in t Rear-end	Wet	0	1	246053.4	823383.9	
4671795	NEW BEDFORD	02/26/2019	Property damage	5:30 PM	2019	Collision with motor vehicle in t Angle	Dry	0	0	246053.4	823383.9	
4675365	NEW BEDFORD	03/08/2019	Unknown	6:12 PM	2019	Collision with motor vehicle in t Rear-end	Dry	0	0	246053.4	823383.9	
4678237	NEW BEDFORD	03/18/2019	Property damage	4:19 PM	2019	Collision with motor vehicle in t Single vehicle crash	Dry	0	0	246053.4	823383.9	
4701337	NEW BEDFORD	05/12/2019	Non-fatal injury	7:56 PM	2019	Collision with motor vehicle in t Rear-end	Wet	0	0	246053.4	823383.9	
4709504	NEW BEDFORD	06/04/2019	Non-fatal injury	3:26 PM	2019	Collision with motor vehicle in t Angle	Dry	0	0	246053.4	823383.9	
4720516	NEW BEDFORD	07/02/2019	Unknown	9:09 PM	2019	Collision with motor vehicle in t Rear-end	Dry	0	0	246053.4	823383.9	
4764069	NEW BEDFORD	10/18/2019	Property damage	5:00 PM	2019	Collision with motor vehicle in t Angle	Dry	0	0	246053.4	823383.9	
4764986	NEW BEDFORD	10/17/2019	Property damage	8:56 PM	2019	Collision with curb	Single vehicle crash	Dry	0	0	246053.4	823383.9
4767602	NEW BEDFORD	10/18/2019	Unknown	5:00 PM	2019	Collision with motor vehicle in t Angle	Dry	0	0	246053.4	823383.9	
4797068	NEW BEDFORD	12/30/2019	Property damage	6:29 AM	2019	Collision with motor vehicle in t Sideswipe, same direction	Dry	0	0	246053.4	823383.9	
4799428	NEW BEDFORD	03/26/2019	Unknown	11:09 AM	2019	Collision with motor vehicle in t Rear-end	Dry	0	0	246053.4	823383.9	
4825513	NEW BEDFORD	03/03/2020	Property damage	11:55 AM	2020	Collision with motor vehicle in t Rear-end	Dry	0	0	246053.4	823383.9	
4840167	NEW BEDFORD	04/29/2020	Non-fatal injury	1:46 PM	2020	Collision with motor vehicle in t Rear-end	Dry	0	0	246053.4	823383.9	
4842346	NEW BEDFORD	05/02/2020	Property damage	3:07 PM	2020	Collision with motor vehicle in t Rear-end	Dry	0	0	246053.4	823383.9	
4847574	NEW BEDFORD	05/30/2020	Property damage	12:29 PM	2020	Collision with motor vehicle in t Angle	Dry	0	0	246053.4	823383.9	
4861222	NEW BEDFORD	07/15/2020	Property damage	10:55 AM	2020	Collision with motor vehicle in t Angle	Dry	0	0	246053.4	823383.9	
4872244	NEW BEDFORD	08/25/2020	Property damage	11:05 AM	2020	Collision with motor vehicle in t Sideswipe, same direction	Dry	0	0	246047.6	823395.3	
4876110	NEW BEDFORD	09/04/2020	Property damage	5:15 PM	2020	Collision with motor vehicle in t Rear-end	Dry	0	0	246047.6	823395.3	
4877254	NEW BEDFORD	09/10/2020	Property damage	11:55 AM	2020	Collision with motor vehicle in t Rear-end	Wet	0	0	246047.6	823395.3	
4890595	NEW BEDFORD	10/24/2020	Non-fatal injury	2:44 PM	2020	Collision with motor vehicle in t Rear-end	Dry	0	0	246053.4	823383.9	

## Trip Generation Calculations

# Land Use: 882

## Marijuana Dispensary

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### Description

A marijuana dispensary is a stand-alone facility where cannabis is sold to patients or retail consumers in a legal manner. Marijuana cultivation and processing facility (Land Use 190) is a related land use.

### Additional Data

The technical appendices provide supporting information on time-of-day distributions for this land use. The appendices can be accessed through either the ITETripGen web app or the trip generation resource page on the ITE website (<https://www.ite.org/technical-resources/topics/trip-and-parking-generation/>).

The sites were surveyed in the 2010s in California, Colorado, Massachusetts, and Oregon.

### Source Numbers

867, 893, 919, 1041, 1059

# Marijuana Dispensary (882)

Vehicle Trip Ends vs: 1000 Sq. Ft. GFA  
On a: Weekday

Setting/Location: General Urban/Suburban

Number of Studies: 7

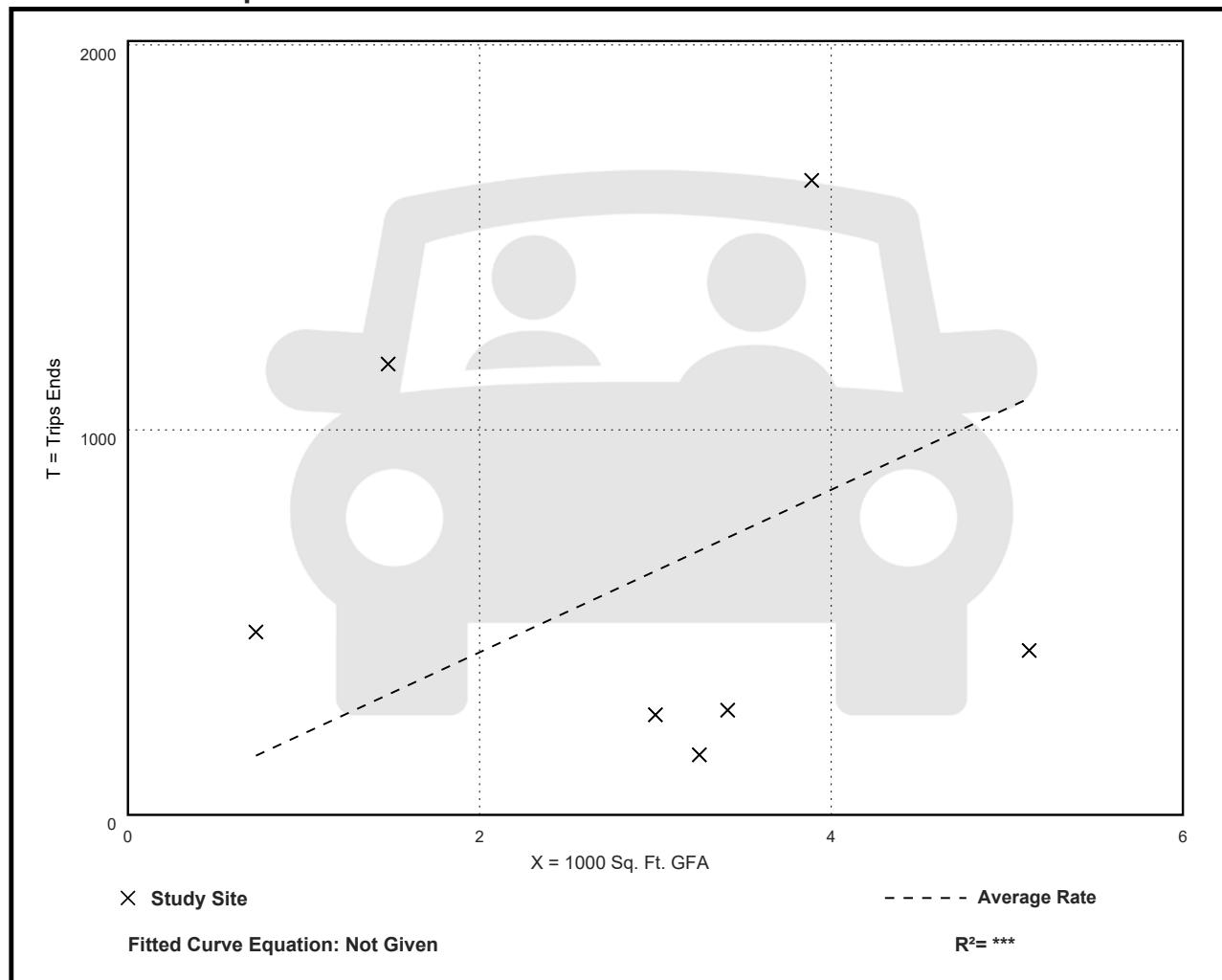
Avg. 1000 Sq. Ft. GFA: 3

Directional Distribution: 50% entering, 50% exiting

## Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
211.12	48.00 - 791.22	246.90

## Data Plot and Equation



# Marijuana Dispensary (882)

Vehicle Trip Ends vs: 1000 Sq. Ft. GFA

On a: Weekday,

Peak Hour of Adjacent Street Traffic,

One Hour Between 7 and 9 a.m.

Setting/Location: General Urban/Suburban

Number of Studies: 6

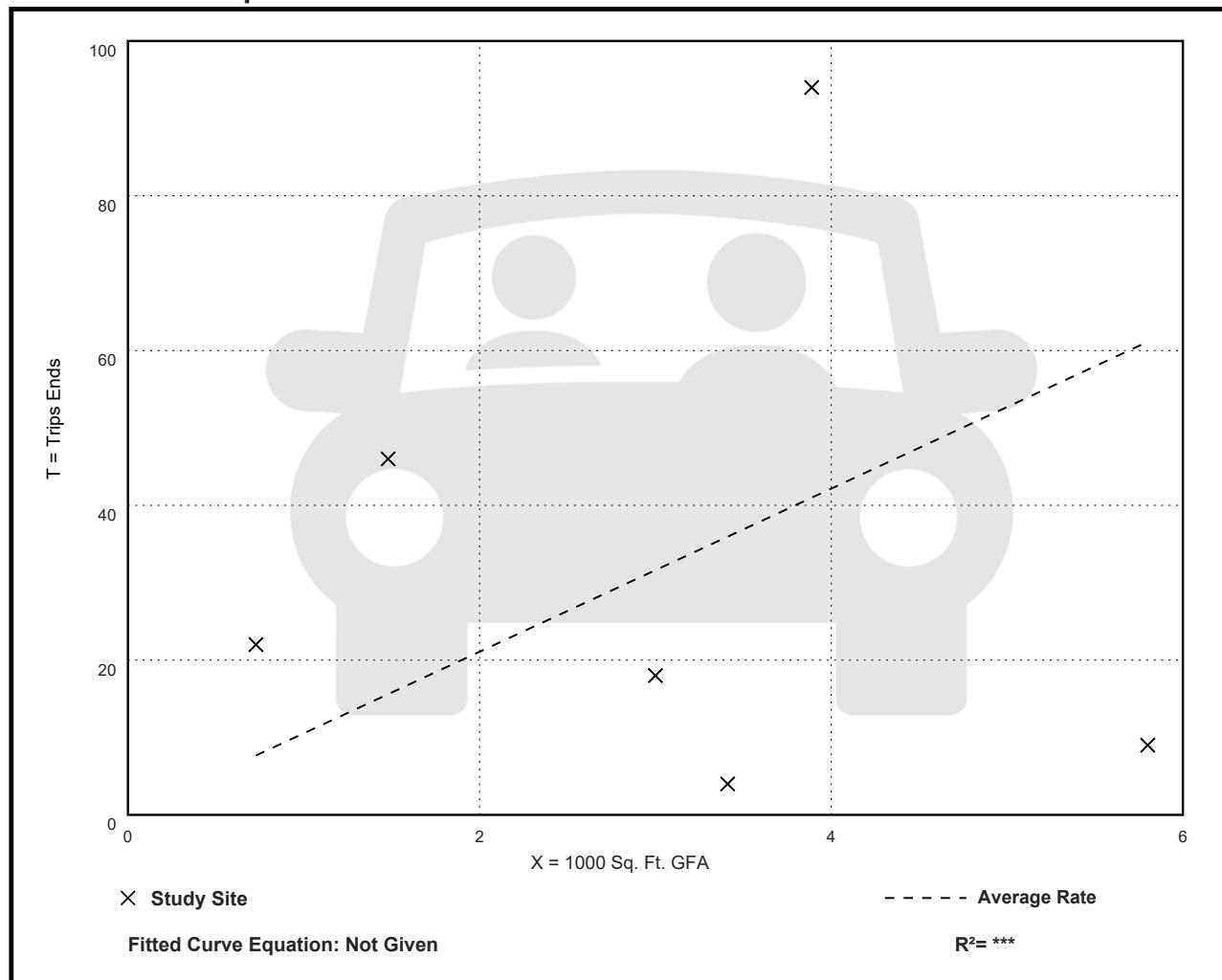
Avg. 1000 Sq. Ft. GFA: 3

Directional Distribution: 52% entering, 48% exiting

## Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
10.54	1.17 - 31.08	12.69

## Data Plot and Equation



# Marijuana Dispensary (882)

Vehicle Trip Ends vs: 1000 Sq. Ft. GFA

On a: Weekday,

Peak Hour of Adjacent Street Traffic,

One Hour Between 4 and 6 p.m.

Setting/Location: General Urban/Suburban

Number of Studies: 16

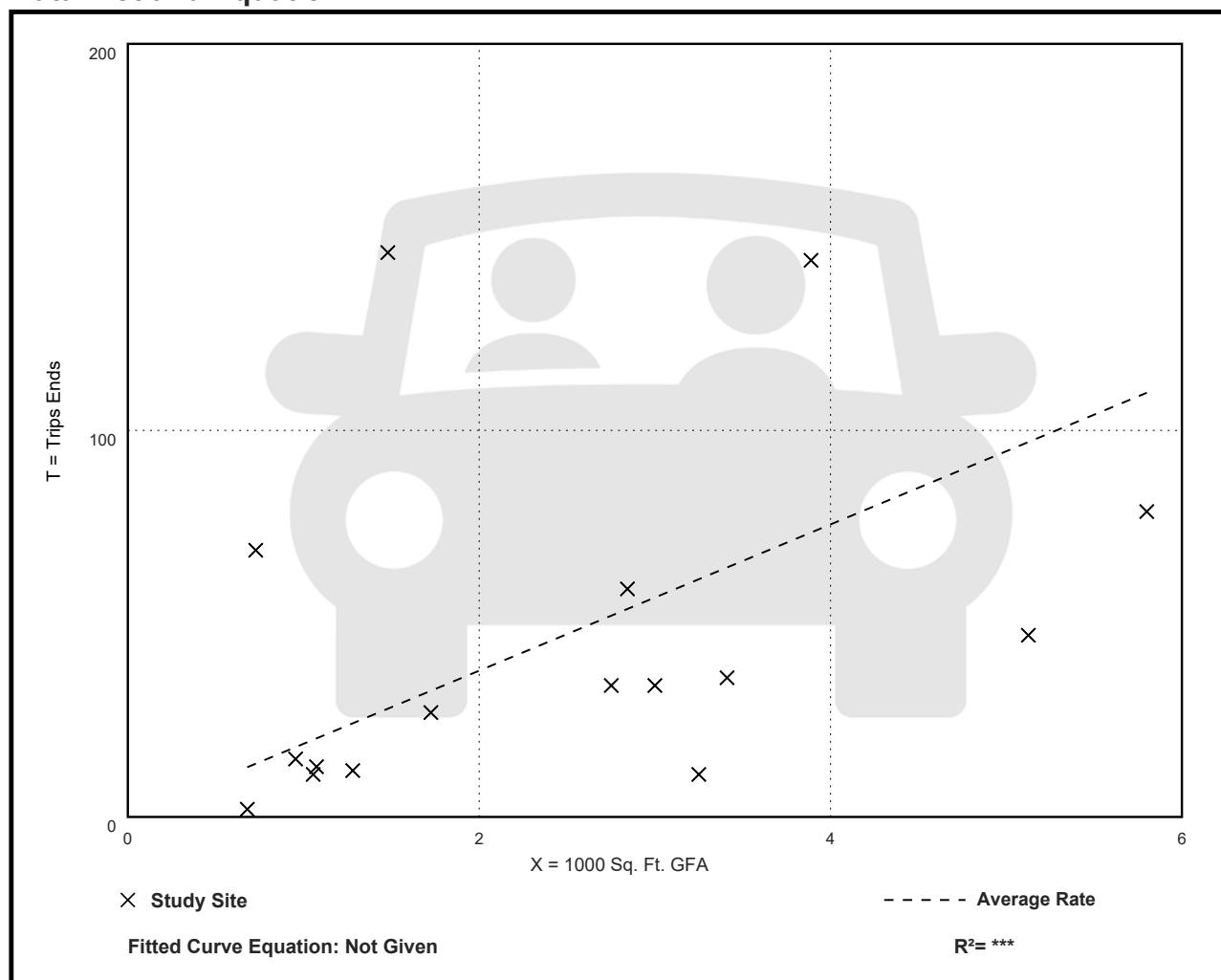
Avg. 1000 Sq. Ft. GFA: 2

Directional Distribution: 50% entering, 50% exiting

## Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
18.92	2.94 - 98.65	21.73

## Data Plot and Equation



# Marijuana Dispensary (882)

Vehicle Trip Ends vs: 1000 Sq. Ft. GFA

On a: Weekday,

AM Peak Hour of Generator

**Setting/Location: General Urban/Suburban**

Number of Studies: 7

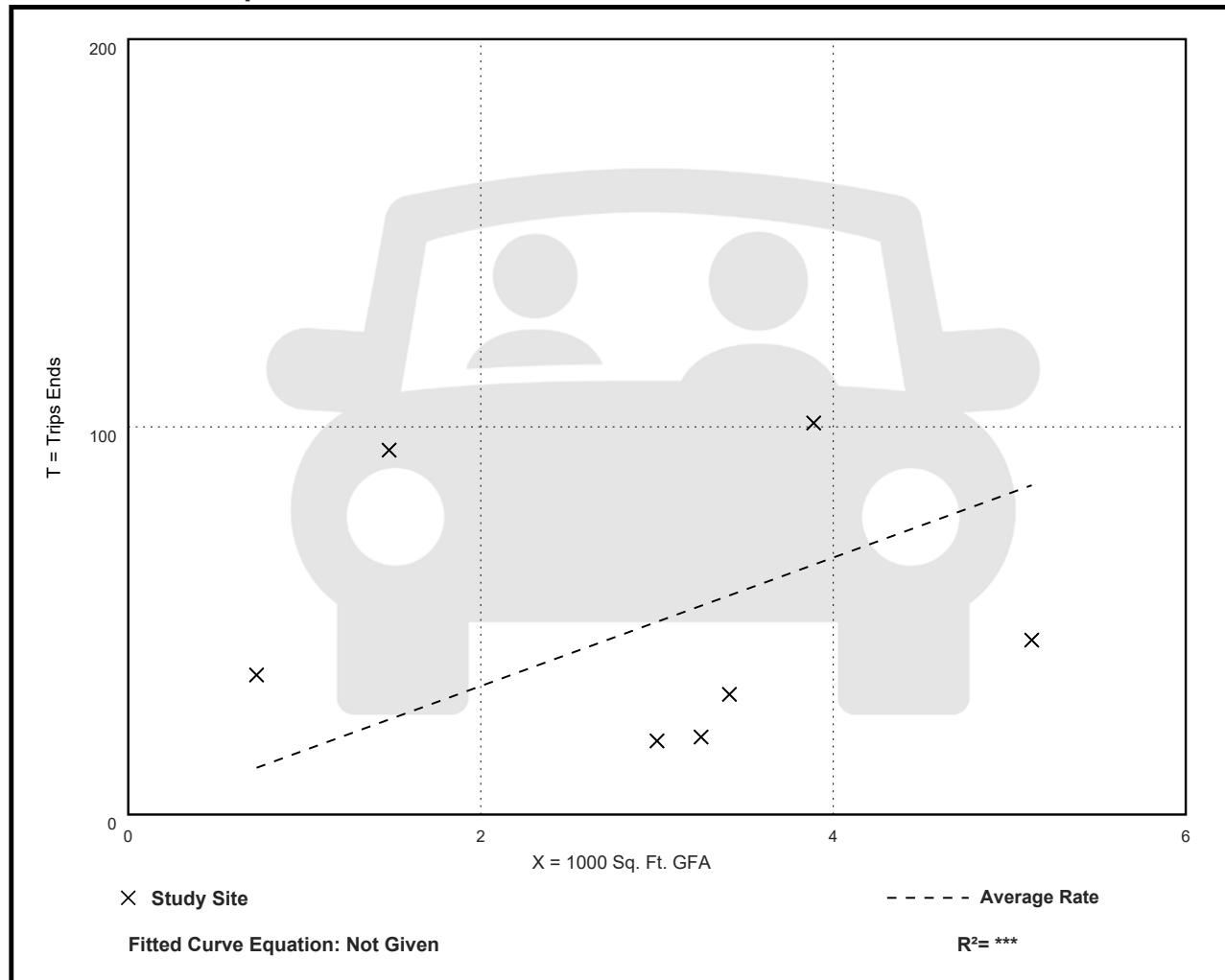
Avg. 1000 Sq. Ft. GFA: 3

Directional Distribution: 54% entering, 46% exiting

## Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
16.57	6.15 - 63.51	17.63

## Data Plot and Equation



# Marijuana Dispensary (882)

Vehicle Trip Ends vs: 1000 Sq. Ft. GFA

On a: Weekday,

PM Peak Hour of Generator

**Setting/Location: General Urban/Suburban**

Number of Studies: 12

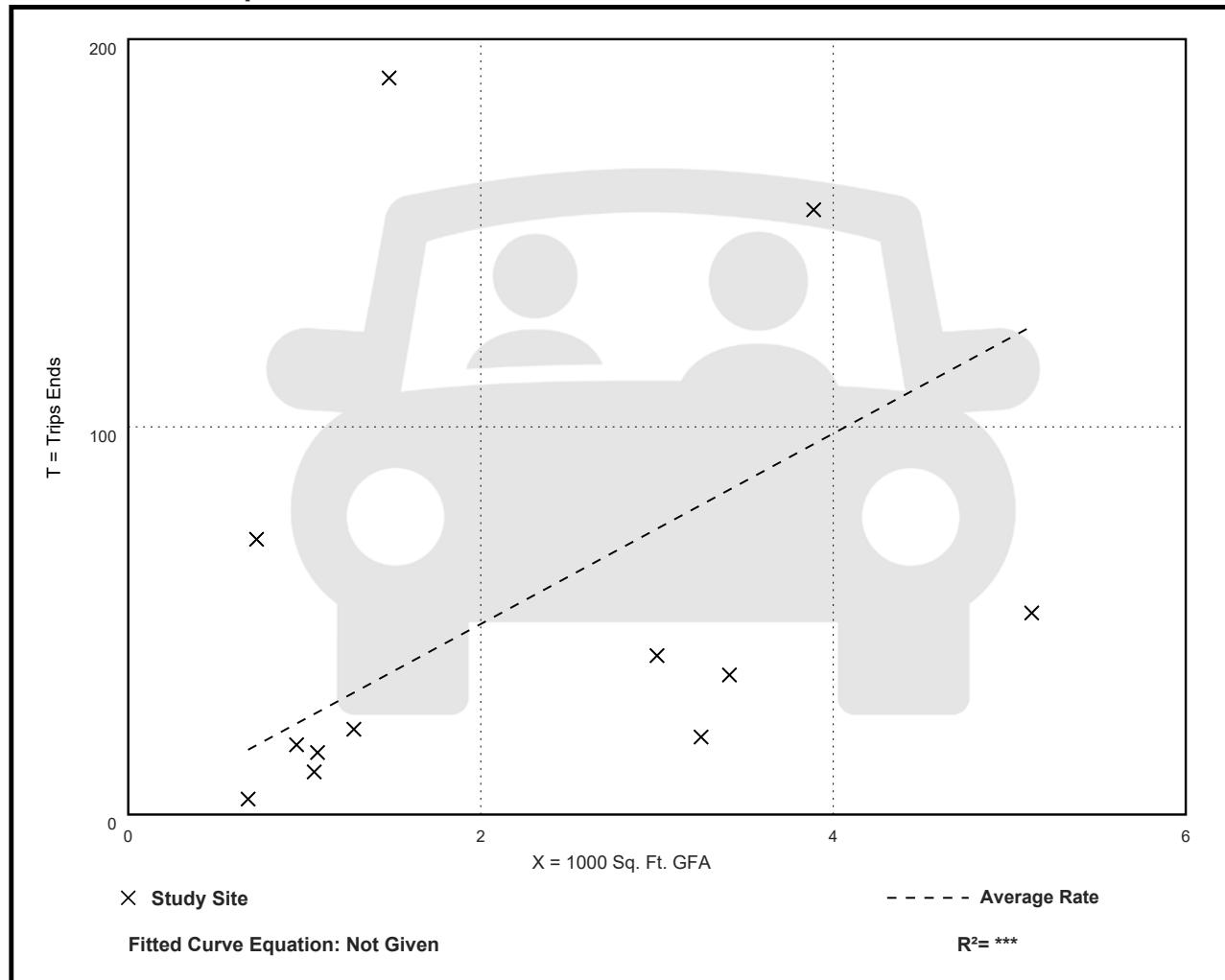
Avg. 1000 Sq. Ft. GFA: 2

Directional Distribution: 49% entering, 51% exiting

## Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
24.57	5.88 - 128.38	32.18

## Data Plot and Equation



# Marijuana Dispensary (882)

Vehicle Trip Ends vs: 1000 Sq. Ft. GFA

On a: Saturday

**Setting/Location: General Urban/Suburban**

Number of Studies: 4

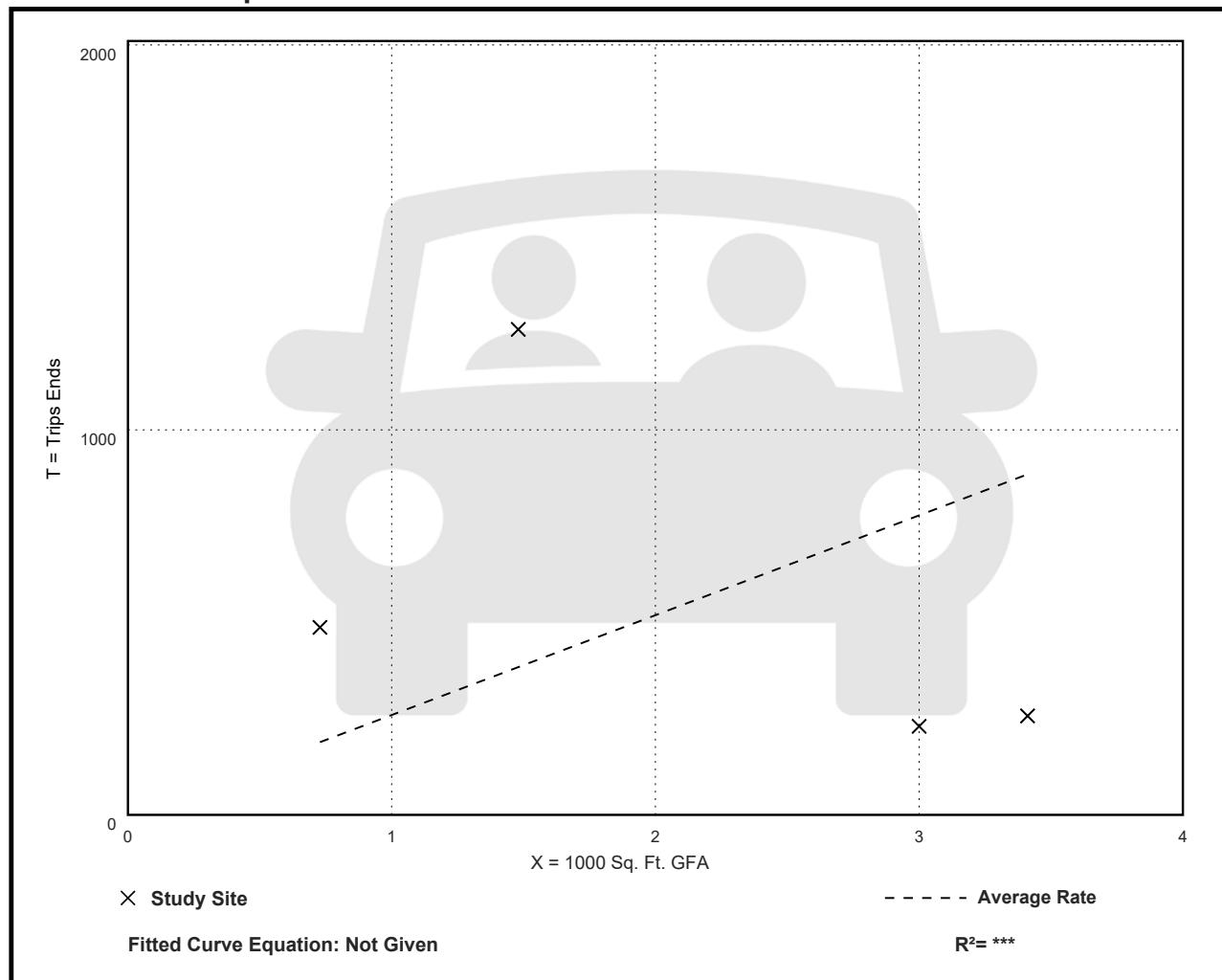
Avg. 1000 Sq. Ft. GFA: 2

Directional Distribution: 50% entering, 50% exiting

## Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
259.31	75.34 - 852.03	364.24

## Data Plot and Equation



# Marijuana Dispensary (882)

Vehicle Trip Ends vs: 1000 Sq. Ft. GFA

On a: Saturday, Peak Hour of Generator

**Setting/Location: General Urban/Suburban**

Number of Studies: 5

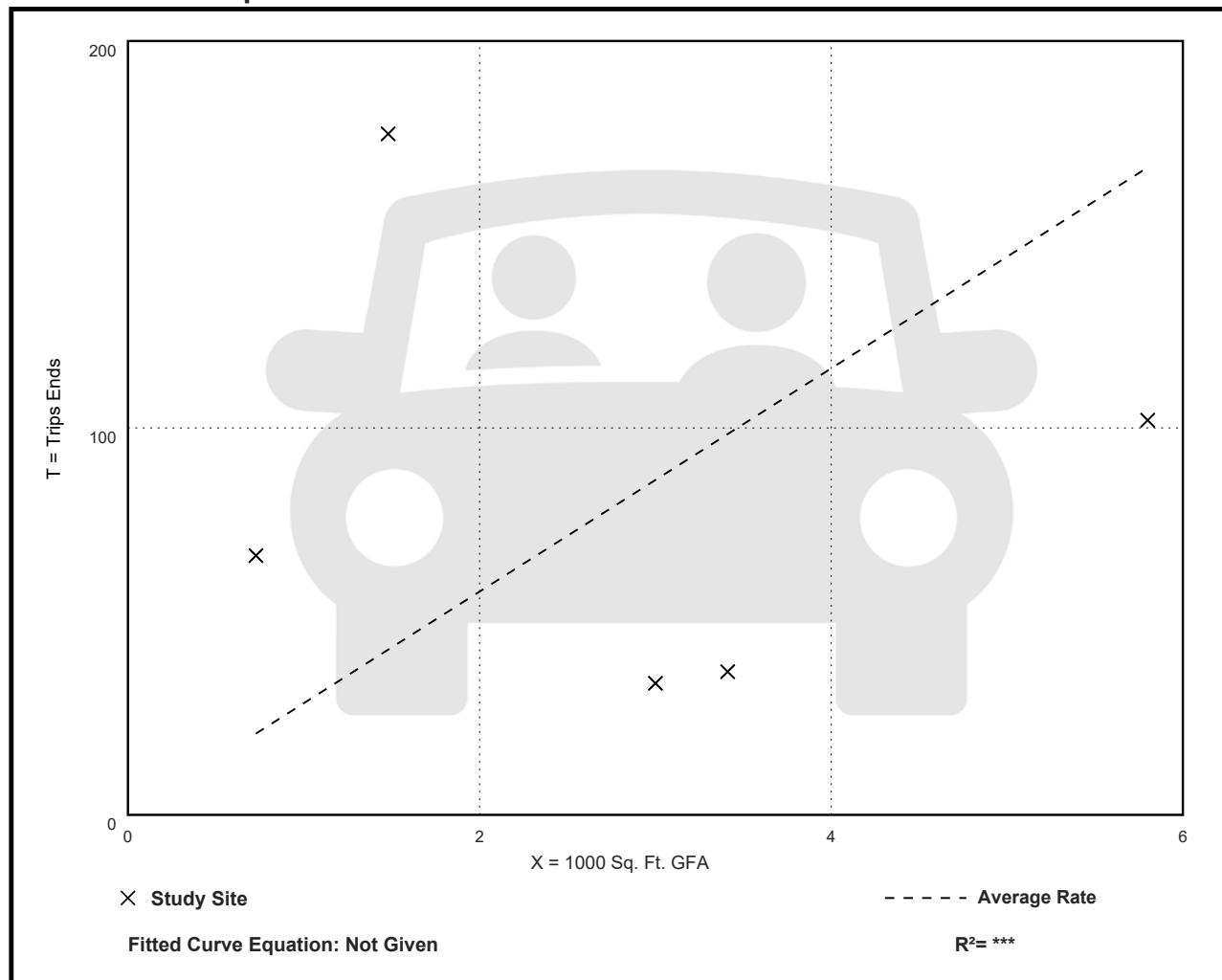
Avg. 1000 Sq. Ft. GFA: 3

Directional Distribution: 50% entering, 50% exiting

## Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
28.85	10.85 - 118.92	39.14

## Data Plot and Equation



**Institute of Transportation Engineers (ITE) 11th Edition  
Land Use Code (LUC) 882 - Marijuana Dispensary**

Average Vehicle Trips Ends vs: 1,000 Sq. Feet Gross Leasable Area  
Independent Variable (X): 4.292

**AVERAGE WEEKDAY DAILY**

T = 211.12\*(X)  
T = 211.12\* 4.29  
T = 906.13  
T = 906 vehicle trips  
with 50% ( 453 vpd) entering and 50% ( 453 vpd) exiting.

**WEEKDAY MORNING PEAK HOUR OF ADJACENT STREET TRAFFIC**

T = 10.54 \* (X)  
T = 10.54 \* 4.29  
T = 45.24  
T = 45 vehicle trips  
with 52% ( 23 vph) entering and 48% ( 22 vph) exiting.

**WEEKDAY EVENING PEAK HOUR OF ADJACENT STREET TRAFFIC**

T = 18.92 \*(X)  
T = 18.92\* 4.29  
T = 81.20  
T = 81 vehicle trips  
with 50% ( 41 vph) entering and 50% ( 40 vph) exiting.

**SATURDAY DAILY**

T = 259.31 \*(X)  
T = 259.31\* 4.29  
T = 1,112.96  
T = 1,112 vehicle trips  
with 50% ( 556 vpd) entering and 50% ( 556 vpd) exiting.

**SATURDAY MIDDAY PEAK HOUR OF GENERATOR**

T = 28.85 \*(X)  
T = 28.85\* 4.29  
T = 123.82  
T = 124 vehicle trips  
with 50% ( 62 vph) entering and 50% ( 62 vph) exiting.

**Institute of Transportation Engineers (ITE) 11th Edition  
Land Use Code (LUC) 151 - Mini Warehousing**

Average Vehicle Trips Ends vs: 1000 Sq. Feet Gross Floor Area  
Independent Variable (X): 80

**AVERAGE WEEKDAY DAILY**

T = 1.45 \* (X)  
T = 1.45 \* 80  
T = 116.00  
T = 116 vehicle trips  
with 50% ( 58 vpd) entering and 50% ( 58 vpd) exiting.

**WEEKDAY MORNING PEAK HOUR OF ADJACENT STREET TRAFFIC**

T = 0.09 \* (X)  
T = 0.09 \* 80  
T = 7.20  
T = 7 vehicle trips  
with 59% ( 4 vph) entering and 39% ( 3 vph) exiting.

**WEEKDAY EVENING PEAK HOUR OF ADJACENT STREET TRAFFIC**

T = 0.15 \* (X)  
T = 0.15 \* 80  
T = 12.00  
T = 12 vehicle trips  
with 47% ( 6 vph) entering and 53% ( 6 vph) exiting.

**SATURDAY DAILY**

T = 1.77 \* (X) (Small Sample Size - Use with Caution)  
T = 1.77 \* 80  
T = 141.60  
T = 142 vehicle trips  
with 50% ( 71 vpd) entering and 50% ( 71 vpd) exiting.

**SATURDAY MIDDAY PEAK HOUR OF GENERATOR**

T = 0.17 \* (X) (Small Sample Size - Use with Caution)  
T = 0.17 \* 80  
T = 13.60  
T = 14 vehicle trips  
with 62% ( 9 vph) entering and 38% ( 5 vph) exiting.

## □ Delay Study Results

# MDM Transportation Consultants, Inc.

28 Lord Road, Suite 280  
Marlborough, MA, 01752

SB Left: Route 140 Ramps  
E/W: Hathaway Road  
Weekday Evening Peak Hour  
New Bedford, MA

File Name : 1166 Route 140 SB Ramp Left Delay Study  
Site Code : 1166  
Start Date : 9/30/2021  
Page No : 1

## Summary Information:

4:00:00 PM - 5:00:00 PM	SB Left onto Hathaway Rd
Total Vehicle Count:	118
Delayed Vehicle Count:	118
Through Vehicle Count:	0
Average Stopped Time:	27.84
Maximum Stopped Time:	95
Min. Secs. for Delay:	0
Average Queue:	0.95
Queue Density:	1.65
Maximum Queue:	5
Delay in Vehicle Hour:	0.95
Total Delay:	3285

□ Capacity Analysis

## **LEVEL OF SERVICE METHODOLOGY**

Capacity analysis of intersections is developed using the Synchro® computer software, which implements the methods of the Highway Capacity Manual 6<sup>th</sup> Edition (HCM). The resulting analysis presents a level-of-service (LOS) designation for individual intersection movements and (for signalized intersections) for the entire intersection. The LOS is a letter designation that provides a qualitative measure of operating conditions based on several factors including roadway geometry, speeds, ambient traffic volumes, traffic controls, and driver characteristics. Since the LOS of a traffic facility is a function of the traffic flows placed upon it, such a facility may operate at a wide range of LOS, depending on the time of day, day of week, or period of year. A range of six levels of service are defined on the basis of average delay, ranging from LOS A (the least delay) to LOS F (delays greater than 50 seconds for unsignalized movements, and greater than 80 seconds for signalized movements).

### **Signalized Intersection Performance Measures**

The six LOS designations for signalized intersections may be described as follows:

- *LOS A* describes operations with low control delay; most vehicles do not stop at all.
- *LOS B* describes operations with relatively low control delay. However, more vehicles stop than LOS A.
- *LOS C* describes operations with higher control delays. Individual cycle failures may begin to appear. The number of vehicles stopping is significant at this level, although many still pass through the intersection without stopping.
- *LOS D* describes operations with control delay in the range where the influence of congestion becomes more noticeable. Many vehicles stop and individual cycle failures are noticeable.
- *LOS E* describes operations with high control delay values. Individual cycle failures are frequent occurrences.
- *LOS F* describes operations with high control delay values that often occur with over-saturation. Poor progression and long cycle lengths may also be major contributing causes to such delay levels.

The LOS for signalized intersections are calculated using the operational analysis methodology of the *Highway Capacity Manual 6<sup>th</sup> Edition*.<sup>1</sup> This method assesses the effects of signal type, timing, phasing, and progression; vehicle mix; and geometrics on delay. LOS designations are based on the criterion of control or signal delay per vehicle. Control or signal delay is a measure of driver discomfort, frustration, and fuel consumption, and includes initial deceleration delay approaching the traffic signal, queue move-up time, stopped delay and final acceleration delay. **Table A1** summarizes the relationship between LOS and control delay. The tabulated control delay criterion may be applied in assigning LOS designations to individual lane groups, to individual intersection approaches, or to entire intersections.

**Table A1**  
**LEVEL-OF-SERVICE CRITERIA**  
**FOR SIGNALIZED INTERSECTIONS<sup>1</sup>**

Control (Signal) Delay per Vehicle (seconds per vehicle)	Level of Service	
	v/c ≤ 1	v/c > 1
≤10.0	A	F
10.1 to 20.0	B	F
20.1 to 35.0	C	F
35.1 to 55.0	D	F
55.1 to 80.0	E	F
>80.0	F	F

<sup>1</sup>Source: *Highway Capacity Manual 6<sup>th</sup> Edition*, Transportation Research Board; Washington, DC; 2016.

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<sup>1</sup>*Highway Capacity Manual 6<sup>th</sup> Edition*; Transportation Research Board; Washington, DC; 2016.

## Unsignalized Intersection Performance Measures

The six LOS designations for unsignalized intersections may be described as follows:

- *LOS A* represents a condition with little or no control delay to minor street traffic.
- *LOS B* represents a condition with short control delays to minor street traffic.
- *LOS C* represents a condition with average control delays to minor street traffic.
- *LOS D* represents a condition with long control delays to minor street traffic.
- *LOS E* represents operating conditions at or near capacity level, with very long control delays to minor street traffic.
- *LOS F* represents a condition where minor street demand volume exceeds capacity of an approach lane, with extreme control delays resulting.

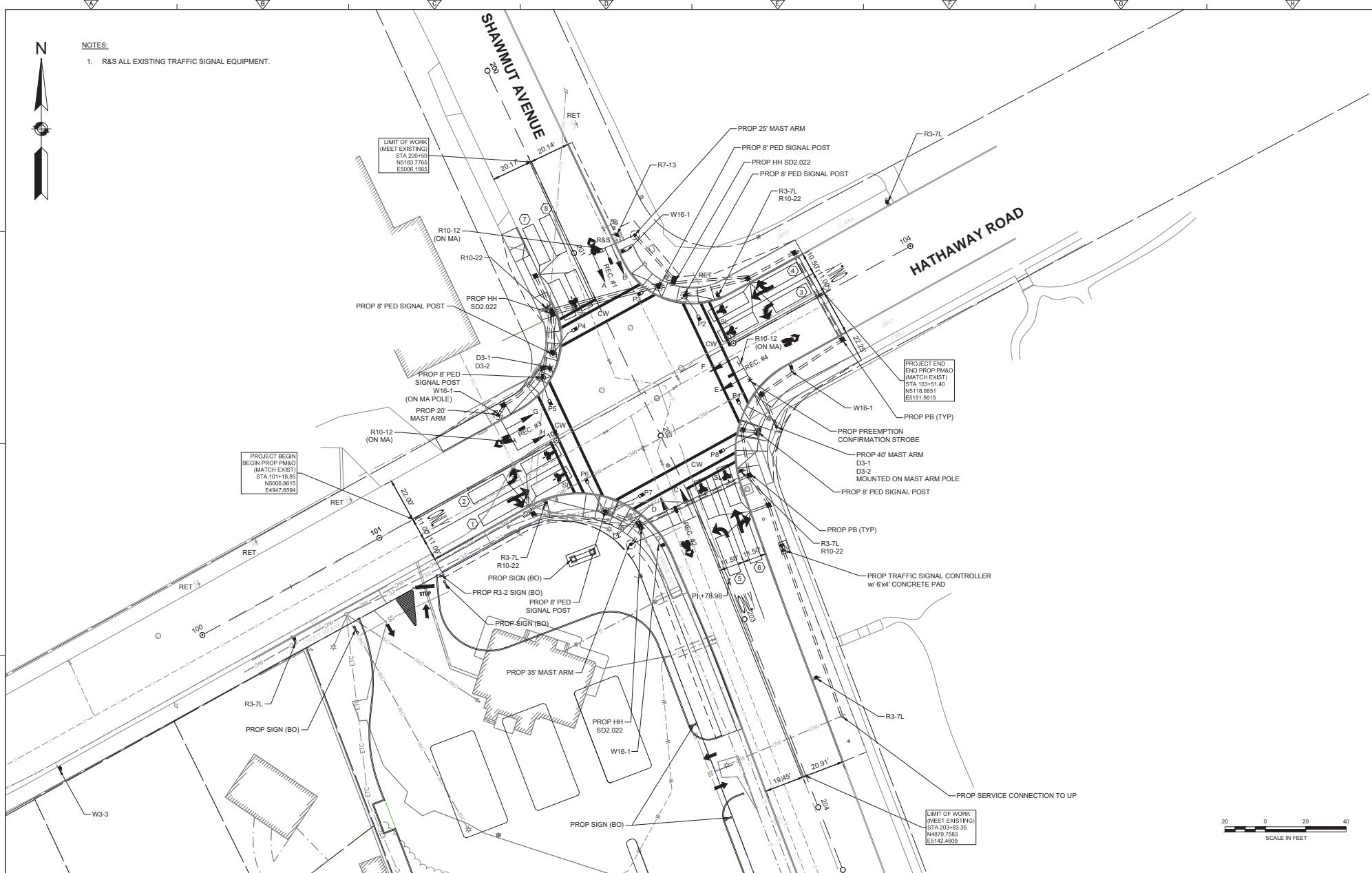
The LOS designations of unsignalized intersections are determined by application of a procedure described in the *Highway Capacity Manual 6th Edition*.<sup>2</sup> LOS is measured in terms of average control delay. Mathematically, control delay is a function of the capacity and degree of saturation of the lane group and/or approach under study and is a quantification of motorist delay associated with traffic control devices such as traffic signals and STOP signs. Control delay includes the effects of initial deceleration delay approaching a STOP sign, stopped delay, queue move-up time, and final acceleration delay from a stopped condition. Definitions for LOS at unsignalized intersections are also given in the *Highway Capacity Manual 6th Edition*. **Table A2** summarizes the relationship between LOS and average control delay.

**Table A2**  
**LEVEL-OF-SERVICE CRITERIA FOR**  
**UNSIGNALIZED INTERSECTIONS<sup>1</sup>**

Average Control Delay (seconds per vehicle)	Level of Service	
	v/c ≤ 1	v/c > 1
≤ 10.0	A	F
10.1 to 15.0	B	F
15.1 to 25.0	C	F
25.1 to 35.0	D	F
35.1 to 50.0	E	F
>50.0	F	F

<sup>1</sup>Source: *Highway Capacity Manual 6<sup>th</sup> Edition*, Transportation Research Board; Washington, DC; 2016.

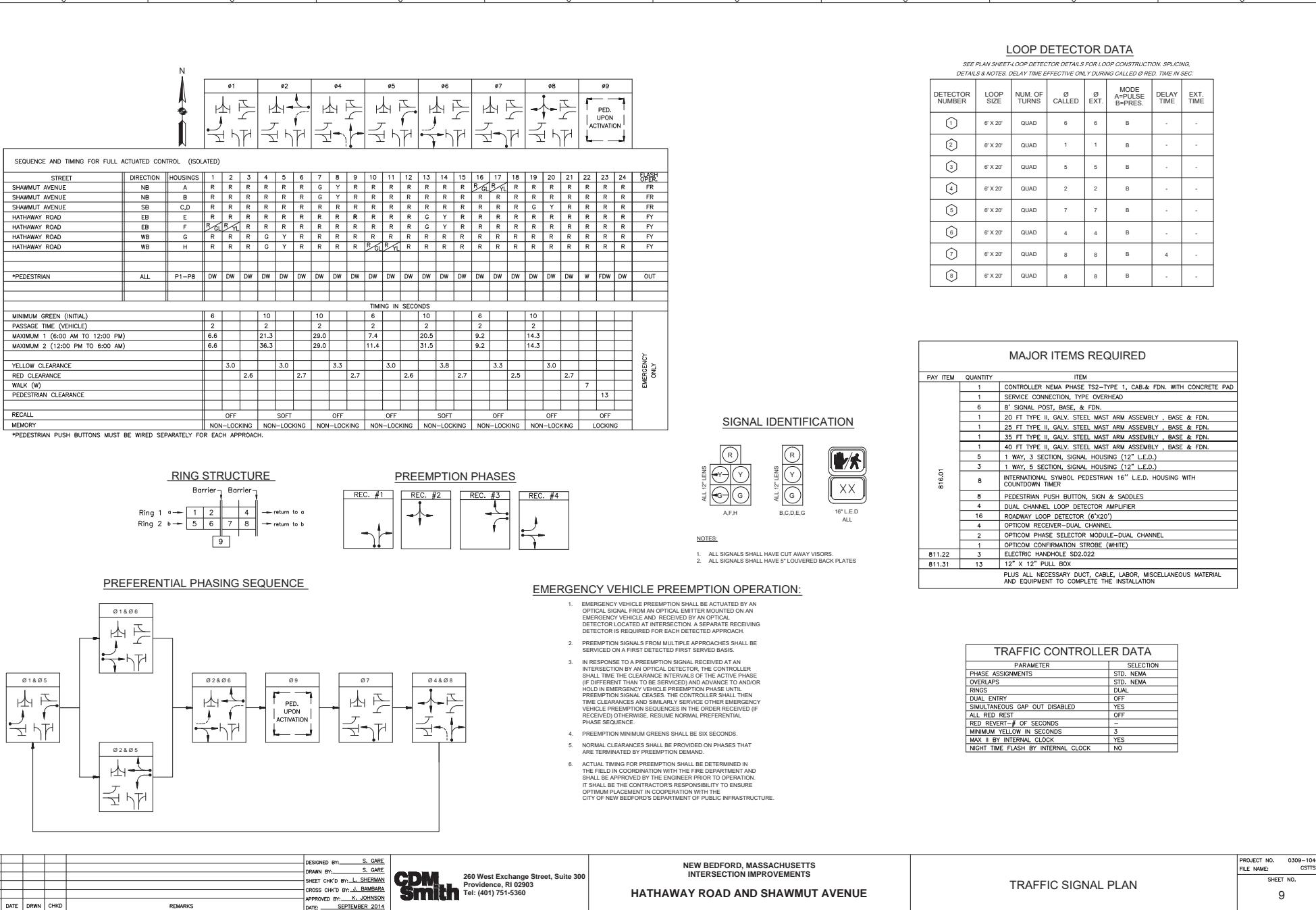
<sup>2</sup> ibid



REV. NO.	DATE	DRWN	CHKD	REMARKS

**CDM Smith**  
260 West Exchange Street, Suite 300  
Providence, RI 02903  
Tel: (401) 751-5360

**NEW BEDFORD, MASSACHUSETTS  
INTERSECTION IMPROVEMENTS**  
**HATHAWAY ROAD AND SHAWMUT AVENUE**



Lanes, Volumes, Timings  
9: Shawmut Avenue & Hathaway Road

2021 Baseline Conditions  
Weekday Morning Peak Hour Conditions

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑	↓		↑	↓		↑	↓		↑	↓	↑
Traffic Volume (vph)	93	288	101	204	284	7	317	82	241	9	80	111
Future Volume (vph)	93	288	101	204	284	7	317	82	241	9	80	111
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100		0	100		0	80		0	0		50
Storage Lanes	1		0	1		0	1		0	0		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.961			0.996			0.888				0.850
Flt Protected	0.950			0.950			0.950				0.995	
Satd. Flow (prot)	1612	1748	0	1719	1709	0	1687	1572	0	0	1502	1262
Flt Permitted	0.539			0.267			0.405				0.913	
Satd. Flow (perm)	914	1748	0	483	1709	0	719	1572	0	0	1378	1262
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		21			2			225				202
Link Speed (mph)		30			30			30				30
Link Distance (ft)		950			500			500				500
Travel Time (s)		21.6			11.4			11.4				11.4
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	12%	5%	3%	5%	11%	0%	7%	20%	3%	25%	26%	28%
Adj. Flow (vph)	100	310	109	219	305	8	341	88	259	10	86	119
Shared Lane Traffic (%)												
Lane Group Flow (vph)	100	419	0	219	313	0	341	347	0	0	96	119
Enter Blocked Intersection	No											
Lane Alignment	Left	Left	Right									
Median Width(ft)		12			12			12				12
Link Offset(ft)		0			0			0				0
Crosswalk Width(ft)		16			16			16				16
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	1
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	Right
Leading Detector (ft)	20	100		20	100		20	100		20	100	20
Trailing Detector (ft)	0	0		0	0		0	0		0	0	0
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	0
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94				94
Detector 2 Size(ft)		6			6			6				6
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		Perm	NA	Perm
Protected Phases	1	6		5	2		7	4			8	

Lanes, Volumes, Timings  
9: Shawmut Avenue & Hathaway Road

2021 Baseline Conditions  
Weekday Morning Peak Hour Conditions

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	6			2			4			8		8
Detector Phase	1	6		5	2		7	4		8	8	8
Switch Phase												
Minimum Initial (s)	6.0	10.0		6.0	10.0		6.0	10.0		10.0	10.0	10.0
Minimum Split (s)	11.6	16.5		11.6	15.7		11.8	16.0		15.7	15.7	15.7
Total Split (s)	12.6	27.5		13.6	28.5		15.8	39.5		23.7	23.7	23.7
Total Split (%)	15.6%	34.1%		16.9%	35.4%		19.6%	49.0%		29.4%	29.4%	29.4%
Maximum Green (s)	7.0	21.0		8.0	22.8		10.0	33.5		18.0	18.0	18.0
Yellow Time (s)	3.0	3.8		3.0	3.0		3.3	3.3		3.0	3.0	3.0
All-Red Time (s)	2.6	2.7		2.6	2.7		2.5	2.7		2.7	2.7	2.7
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.6	6.5		5.6	5.7		5.8	6.0		5.7	5.7	
Lead/Lag	Lead	Lag		Lead	Lag		Lead			Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes			Yes	Yes	Yes
Vehicle Extension (s)	3.0	2.0		3.0	2.0		3.0	2.0		2.0	2.0	2.0
Recall Mode	None	Min		None	Min		None	None		None	None	
Act Effct Green (s)	26.9	19.0		30.5	24.4		22.9	22.7			11.2	11.2
Actuated g/C Ratio	0.39	0.28		0.44	0.36		0.33	0.33			0.16	0.16
v/c Ratio	0.23	0.84		0.60	0.51		0.88	0.52			0.43	0.32
Control Delay	12.8	40.3		20.8	24.5		46.5	9.6			35.1	2.8
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0			0.0	0.0
Total Delay	12.8	40.3		20.8	24.5		46.5	9.6			35.1	2.8
LOS	B	D		C	C		D	A			D	A
Approach Delay		35.0			23.0			27.9			17.2	
Approach LOS		C			C			C			B	
90th %ile Green (s)	7.0	21.0		8.0	22.8		10.0	29.4		13.9	13.9	13.9
90th %ile Term Code	Max	Max		Max	Max		Max	Hold		Gap	Gap	Gap
70th %ile Green (s)	7.0	21.0		8.0	22.8		10.0	26.5		11.0	11.0	11.0
70th %ile Term Code	Max	Max		Max	Hold		Max	Hold		Gap	Gap	Gap
50th %ile Green (s)	7.0	21.0		8.0	22.8		10.0	25.5		10.0	10.0	10.0
50th %ile Term Code	Max	Max		Max	Hold		Max	Hold		Min	Min	Min
30th %ile Green (s)	7.0	19.8		8.0	21.6		10.0	25.5		10.0	10.0	10.0
30th %ile Term Code	Max	Gap		Max	Hold		Max	Hold		Min	Min	Min
10th %ile Green (s)	0.0	12.8		8.0	27.2		10.2	10.0		0.0	0.0	0.0
10th %ile Term Code	Skip	Gap		Max	Hold		Hold	Min		Skip	Skip	Skip
Queue Length 50th (ft)	23	165		54	116		122	38			41	0
Queue Length 95th (ft)	53	#334		#110	209		#257	102			85	6
Internal Link Dist (ft)		870			420			420			420	
Turn Bay Length (ft)	100			100			80					50
Base Capacity (vph)	435	564		362	615		386	900			371	487
Starvation Cap Reductn	0	0		0	0		0	0			0	0
Spillback Cap Reductn	0	0		0	0		0	0			0	0
Storage Cap Reductn	0	0		0	0		0	0			0	0
Reduced v/c Ratio	0.23	0.74		0.60	0.51		0.88	0.39			0.26	0.24

Intersection Summary

Area Type: Other

Cycle Length: 80.6

Actuated Cycle Length: 68.6

Lanes, Volumes, Timings  
9: Shawmut Avenue & Hathaway Road

2021 Baseline Conditions  
Weekday Morning Peak Hour Conditions

Natural Cycle: 75

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.88

Intersection Signal Delay: 27.3

Intersection Capacity Utilization 71.9%

Analysis Period (min) 15

90th %ile Actuated Cycle: 76.5

70th %ile Actuated Cycle: 73.6

50th %ile Actuated Cycle: 72.6

30th %ile Actuated Cycle: 71.4

10th %ile Actuated Cycle: 48.9

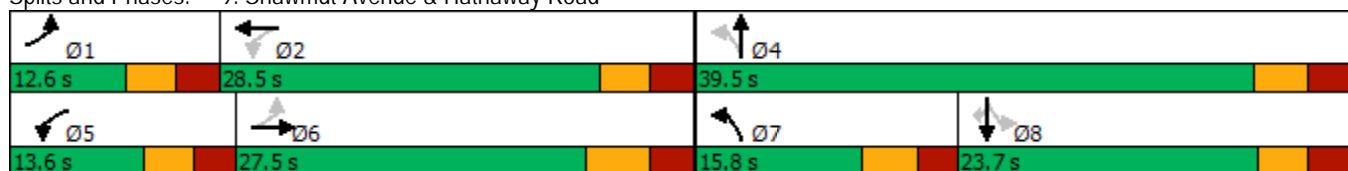
# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Intersection LOS: C

ICU Level of Service C

Splits and Phases: 9: Shawmut Avenue & Hathaway Road



## Intersection

Int Delay, s/veh 4.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↑	↗	↖	↗			↖	↗	↖	↖	
Traffic Vol, veh/h	0	503	59	277	523	0	51	0	272	0	0	1
Future Vol, veh/h	0	503	59	277	523	0	51	0	272	0	0	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None									
Storage Length	50	-	150	150	-	-	-	-	50	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	89	89	89	89	89	89	89	89	89	89	89	89
Heavy Vehicles, %	0	3	2	2	4	0	2	0	2	0	0	0
Mvmt Flow	0	565	66	311	588	0	57	0	306	0	0	1

Major/Minor	Major1	Major2		Minor1		Minor2						
Conflicting Flow All	588	0	0	631	0	0	1776	1775	565	1961	1841	588
Stage 1	-	-	-	-	-	-	565	565	-	1210	1210	-
Stage 2	-	-	-	-	-	-	1211	1210	-	751	631	-
Critical Hdwy	4.1	-	-	4.12	-	-	4	4	4	4	4	4
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.218	-	-	3.518	4	3.318	3.5	4	3.3
Pot Cap-1 Maneuver	997	-	-	951	-	-	300	287	743	261	273	734
Stage 1	-	-	-	-	-	-	510	511	-	225	258	-
Stage 2	-	-	-	-	-	-	223	258	-	406	477	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	997	-	-	951	-	-	224	193	743	115	184	734
Mov Cap-2 Maneuver	-	-	-	-	-	-	224	193	-	115	184	-
Stage 1	-	-	-	-	-	-	510	511	-	225	174	-
Stage 2	-	-	-	-	-	-	150	174	-	239	477	-

Approach	EB	WB		NB		SB	
HCM Control Delay, s	0	3.7		15.3		9.9	
HCM LOS				C		A	

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	224	743	997	-	-	951	-	-	734
HCM Lane V/C Ratio	0.256	0.411	-	-	-	0.327	-	-	0.002
HCM Control Delay (s)	26.5	13.2	0	-	-	10.6	-	-	9.9
HCM Lane LOS	D	B	A	-	-	B	-	-	A
HCM 95th %tile Q(veh)	1	2	0	-	-	1.4	-	-	0

## Intersection

Int Delay, s/veh 2.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑	↓		↑	↑			↑			↑	
Traffic Vol, veh/h	221	592	0	0	486	0	0	0	0	62	1	0
Future Vol, veh/h	221	592	0	0	486	0	0	0	0	62	1	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None									
Storage Length	50	-	-	50	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	4	3	0	0	6	0	0	0	0	0	0	0
Mvmt Flow	246	658	0	0	540	0	0	0	0	69	1	0

Major/Minor	Major1	Major2		Minor1		Minor2						
Conflicting Flow All	540	0	0	658	0	0	-	1690	658	1690	1690	-
Stage 1	-	-	-	-	-	-	-	1150	-	540	540	-
Stage 2	-	-	-	-	-	-	-	540	-	1150	1150	-
Critical Hdwy	4.14	-	-	4.1	-	-	-	4	4	4	4	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.236	-	-	2.2	-	-	-	4	3.3	3.5	4	-
Pot Cap-1 Maneuver	1018	-	-	939	-	0	0	305	699	320	305	0
Stage 1	-	-	-	-	-	0	0	275	-	530	524	0
Stage 2	-	-	-	-	-	0	0	524	-	243	275	0
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1018	-	-	939	-	-	-	231	699	260	231	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	231	-	260	231	-
Stage 1	-	-	-	-	-	-	-	208	-	402	524	-
Stage 2	-	-	-	-	-	-	-	524	-	184	208	-

Approach	EB	WB		NB		SB
HCM Control Delay, s	2.6		0		0	24
HCM LOS				A		C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	SBLn1
Capacity (veh/h)	-	1018	-	-	939	-	259
HCM Lane V/C Ratio	-	0.241	-	-	-	-	0.27
HCM Control Delay (s)	0	9.7	-	-	0	-	24
HCM Lane LOS	A	A	-	-	A	-	C
HCM 95th %tile Q(veh)	-	0.9	-	-	0	-	1.1

HCM 6th TWSC  
7: Hathaway Road & Route 140 NB Ramps

2021 Baseline Conditions  
Weekday Morning Peak Hour Conditions

Intersection

Int Delay, s/veh 10.9

Movement	EBL	EBT	WBT	WBR	SBL	SBR
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Lane Configurations						
Traffic Vol, veh/h	328	339	552	169	171	166
Future Vol, veh/h	328	339	552	169	171	166
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	Free	-	Yield
Storage Length	100	-	-	-	0	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	4	2	12	12	13	3
Mvmt Flow	342	353	575	176	178	173

Major/Minor	Major1	Major2	Minor2
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Conflicting Flow All	575	0	-	0	1612	575
Stage 1	-	-	-	-	575	-
Stage 2	-	-	-	-	1037	-
Critical Hdwy	4.14	-	-	-	4	4
Critical Hdwy Stg 1	-	-	-	-	5.53	-
Critical Hdwy Stg 2	-	-	-	-	5.53	-
Follow-up Hdwy	2.236	-	-	-	3.617	3.327
Pot Cap-1 Maneuver	988	-	-	0	335	736
Stage 1	-	-	-	0	542	-
Stage 2	-	-	-	0	326	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	988	-	-	-	219	736
Mov Cap-2 Maneuver	-	-	-	-	219	-
Stage 1	-	-	-	-	354	-
Stage 2	-	-	-	-	326	-

Approach	EB	WB	SB
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HCM Control Delay, s	5.2	0	39.9
HCM LOS			E

Minor Lane/Major Mvmt	EBL	EBT	WBT	SBLn1	SBLn2
Capacity (veh/h)	988	-	-	219	736
HCM Lane V/C Ratio	0.346	-	-	0.813	0.235
HCM Control Delay (s)	10.6	-	-	67.6	11.4
HCM Lane LOS	B	-	-	F	B
HCM 95th %tile Q(veh)	1.6	-	-	6	0.9

## Intersection

Int Delay, s/veh

0

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	SWL	SWR
<b>Lane Configurations</b>										
Traffic Vol, veh/h	0	811	2	1	485	0	1	0	0	390
Future Vol, veh/h	0	811	2	1	485	0	1	0	0	390
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Yield	Yield
RT Channelized	-	-	None	-	-	None	-	-	-	None
Storage Length	-	-	-	50	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	0	-	0	-
Grade, %	-	0	-	-	0	-	0	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	0	3	2	2	6	0	2	2	2	3
Mvmt Flow	0	901	2	1	539	0	1	0	0	433

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	-	0	903
Stage 1	-	-	-
Stage 2	-	-	541
Critical Hdwy	-	-	4.12
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	-	2.218
Pot Cap-1 Maneuver	0	-	753
Stage 1	0	-	-
Stage 2	0	-	0
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	-	753
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	582

Approach	EB	WB	NB
HCM Control Delay, s	0	0	15.4
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	351	-	-	753	-
HCM Lane V/C Ratio	0.009	-	-	0.001	-
HCM Control Delay (s)	15.4	-	-	9.8	-
HCM Lane LOS	C	-	-	A	-
HCM 95th %tile Q(veh)	0	-	-	0	-

Lanes, Volumes, Timings  
9: Shawmut Avenue & Hathaway Road

2021 Baseline Conditions  
Weekday Evening Peak Hour Conditions

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑	↓		↑	↓		↑	↓		↑	↓	↑
Traffic Volume (vph)	111	414	168	221	405	8	234	42	242	11	93	146
Future Volume (vph)	111	414	168	221	405	8	234	42	242	11	93	146
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100		0	100		0	80		0	0		50
Storage Lanes	1		0	1		0	1		0	0		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.957			0.997			0.872				0.850
Flt Protected	0.950			0.950			0.950				0.995	
Satd. Flow (prot)	1530	1760	0	1770	1866	0	1770	1589	0	0	1840	1495
Flt Permitted	0.413			0.111			0.447				0.927	
Satd. Flow (perm)	665	1760	0	207	1866	0	833	1589	0	0	1714	1495
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		23			1			257				170
Link Speed (mph)		30			30			30				30
Link Distance (ft)		950			500			500				500
Travel Time (s)		21.6			11.4			11.4				11.4
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	18%	3%	4%	2%	1%	25%	2%	17%	2%	9%	2%	8%
Adj. Flow (vph)	118	440	179	235	431	9	249	45	257	12	99	155
Shared Lane Traffic (%)												
Lane Group Flow (vph)	118	619	0	235	440	0	249	302	0	0	111	155
Enter Blocked Intersection	No											
Lane Alignment	Left	Left	Right									
Median Width(ft)		12			12			12				12
Link Offset(ft)		0			0			0				0
Crosswalk Width(ft)		16			16			16				16
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	1
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	Right
Leading Detector (ft)	20	100		20	100		20	100		20	100	20
Trailing Detector (ft)	0	0		0	0		0	0		0	0	0
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	0
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94				94
Detector 2 Size(ft)		6			6			6				6
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		Perm	NA	Perm
Protected Phases	1	6		5	2		7	4			8	

Lanes, Volumes, Timings  
9: Shawmut Avenue & Hathaway Road

2021 Baseline Conditions  
Weekday Evening Peak Hour Conditions

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	6			2			4			8		8
Detector Phase	1	6		5	2		7	4		8	8	8
Switch Phase												
Minimum Initial (s)	6.0	10.0		6.0	10.0		6.0	10.0		10.0	10.0	10.0
Minimum Split (s)	11.6	16.5		11.6	15.7		11.8	16.0		15.7	15.7	15.7
Total Split (s)	12.6	38.5		17.6	43.5		15.8	39.5		23.7	23.7	23.7
Total Split (%)	13.2%	40.3%		18.4%	45.5%		16.5%	41.3%		24.8%	24.8%	24.8%
Maximum Green (s)	7.0	32.0		12.0	37.8		10.0	33.5		18.0	18.0	18.0
Yellow Time (s)	3.0	3.8		3.0	3.0		3.3	3.3		3.0	3.0	3.0
All-Red Time (s)	2.6	2.7		2.6	2.7		2.5	2.7		2.7	2.7	2.7
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.6	6.5		5.6	5.7		5.8	6.0		5.7	5.7	
Lead/Lag	Lead	Lag		Lead	Lag		Lead			Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes			Yes	Yes	Yes
Vehicle Extension (s)	3.0	2.0		3.0	2.0		3.0	2.0		2.0	2.0	2.0
Recall Mode	None	Min		None	Min		None	None		None	None	None
Act Effct Green (s)	39.8	32.0		49.4	37.6		26.9	26.7			11.2	11.2
Actuated g/C Ratio	0.45	0.36		0.56	0.42		0.30	0.30			0.13	0.13
v/c Ratio	0.32	0.95		0.73	0.55		0.69	0.46			0.51	0.46
Control Delay	12.6	53.7		31.0	22.7		36.7	7.5			45.0	9.5
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0			0.0	0.0
Total Delay	12.6	53.7		31.0	22.7		36.7	7.5			45.0	9.5
LOS	B	D		C	C		D	A			D	A
Approach Delay		47.1			25.6			20.7			24.3	
Approach LOS		D			C			C			C	
90th %ile Green (s)	7.0	32.0		12.0	37.8		10.0	30.0		14.5	14.5	14.5
90th %ile Term Code	Max	Max		Max	Hold		Max	Hold		Gap	Gap	Gap
70th %ile Green (s)	7.0	32.0		12.0	37.8		10.0	27.2		11.7	11.7	11.7
70th %ile Term Code	Max	Max		Max	Hold		Max	Hold		Gap	Gap	Gap
50th %ile Green (s)	7.0	32.0		12.0	37.8		10.0	25.5		10.0	10.0	10.0
50th %ile Term Code	Max	Max		Max	Hold		Max	Hold		Min	Min	Min
30th %ile Green (s)	7.0	32.0		12.0	37.8		10.0	25.5		10.0	10.0	10.0
30th %ile Term Code	Max	Max		Max	Hold		Max	Hold		Min	Min	Min
10th %ile Green (s)	6.3	32.0		10.4	36.9		10.0	25.5		10.0	10.0	10.0
10th %ile Term Code	Gap	Max		Gap	Hold		Max	Hold		Min	Min	Min
Queue Length 50th (ft)	28	315		68	175		113	18			59	0
Queue Length 95th (ft)	59	#576		#187	289		182	80			111	45
Internal Link Dist (ft)		870			420			420			420	
Turn Bay Length (ft)	100			100			80					50
Base Capacity (vph)	368	651		328	797		359	761			348	439
Starvation Cap Reductn	0	0		0	0		0	0			0	0
Spillback Cap Reductn	0	0		0	0		0	0			0	0
Storage Cap Reductn	0	0		0	0		0	0			0	0
Reduced v/c Ratio	0.32	0.95		0.72	0.55		0.69	0.40			0.32	0.35

Intersection Summary

Area Type: Other

Cycle Length: 95.6

Actuated Cycle Length: 88.5

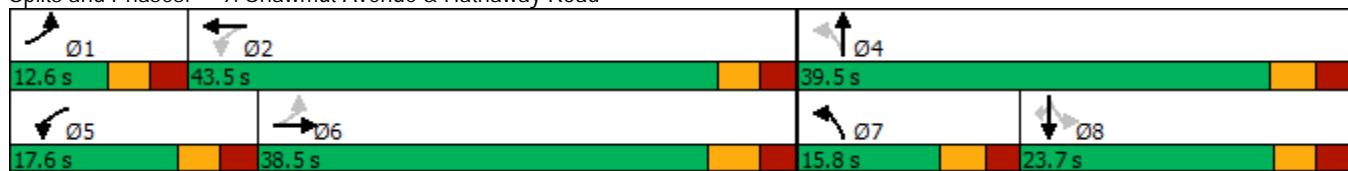
Lanes, Volumes, Timings  
9: Shawmut Avenue & Hathaway Road

2021 Baseline Conditions  
Weekday Evening Peak Hour Conditions

Natural Cycle: 90  
Control Type: Actuated-Uncoordinated  
Maximum v/c Ratio: 0.95  
Intersection Signal Delay: 31.4  
Intersection Capacity Utilization 79.0%  
Analysis Period (min) 15  
90th %ile Actuated Cycle: 92.1  
70th %ile Actuated Cycle: 89.3  
50th %ile Actuated Cycle: 87.6  
30th %ile Actuated Cycle: 87.6  
10th %ile Actuated Cycle: 86  
# 95th percentile volume exceeds capacity, queue may be longer.  
Queue shown is maximum after two cycles.

Intersection LOS: C  
ICU Level of Service D

Splits and Phases: 9: Shawmut Avenue & Hathaway Road



## Intersection

Int Delay, s/veh 3.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↑	↗	↖	↗			↖	↗		↖	
Traffic Vol, veh/h	1	621	91	231	743	1	72	0	170	1	0	0
Future Vol, veh/h	1	621	91	231	743	1	72	0	170	1	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None									
Storage Length	50	-	150	150	-	-	-	-	50	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	0	1	0	1	1	0	0	0	1	0	0	0
Mvmt Flow	1	647	95	241	774	1	75	0	177	1	0	0

Major/Minor	Major1	Major2		Minor1		Minor2						
Conflicting Flow All	775	0	0	742	0	0	1906	1906	647	2042	2001	775
Stage 1	-	-	-	-	-	-	649	649	-	1257	1257	-
Stage 2	-	-	-	-	-	-	1257	1257	-	785	744	-
Critical Hdwy	4.1	-	-	4.11	-	-	4	4	4	4	4	4
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.209	-	-	3.5	4	3.309	3.5	4	3.3
Pot Cap-1 Maneuver	850	-	-	870	-	-	272	261	703	245	243	644
Stage 1	-	-	-	-	-	-	462	469	-	212	245	-
Stage 2	-	-	-	-	-	-	212	245	-	389	424	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	850	-	-	870	-	-	214	188	703	144	175	644
Mov Cap-2 Maneuver	-	-	-	-	-	-	214	188	-	144	175	-
Stage 1	-	-	-	-	-	-	462	469	-	212	177	-
Stage 2	-	-	-	-	-	-	153	177	-	291	424	-

Approach	EB	WB		NB		SB	
HCM Control Delay, s	0	2.5		17.4		30.2	
HCM LOS				C		D	

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	214	703	850	-	-	870	-	-	144
HCM Lane V/C Ratio	0.35	0.252	0.001	-	-	0.277	-	-	0.007
HCM Control Delay (s)	30.6	11.8	9.2	-	-	10.7	-	-	30.2
HCM Lane LOS	D	B	A	-	-	B	-	-	D
HCM 95th %tile Q(veh)	1.5	1	0	-	-	1.1	-	-	0

## Intersection

Int Delay, s/veh 2.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖ ↗	↖ ↗	0	0	618	0	0	0	0	119	1	0
Traffic Vol, veh/h	111	728	0	0	618	0	0	0	0	119	1	0
Future Vol, veh/h	111	728	0	0	618	0	0	0	0	119	1	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None									
Storage Length	50	-	-	50	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	0	2	0	0	2	0	0	0	0	5	0	0
Mvmt Flow	117	766	0	0	651	0	0	0	0	125	1	0

Major/Minor	Major1	Major2		Minor1		Minor2						
Conflicting Flow All	651	0	0	766	0	0	-	1651	766	1651	1651	-
Stage 1	-	-	-	-	-	-	-	1000	-	651	651	-
Stage 2	-	-	-	-	-	-	-	651	-	1000	1000	-
Critical Hdwy	4.1	-	-	4.1	-	-	-	4	4	4	4	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	5.5	-	6.15	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	5.5	-	6.15	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	-	4	3.3	3.545	4	-
Pot Cap-1 Maneuver	945	-	-	856	-	0	0	314	648	328	314	0
Stage 1	-	-	-	-	-	0	0	324	-	452	468	0
Stage 2	-	-	-	-	-	0	0	468	-	289	324	0
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	945	-	-	856	-	-	-	275	648	297	275	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	275	-	297	275	-
Stage 1	-	-	-	-	-	-	-	284	-	396	468	-
Stage 2	-	-	-	-	-	-	-	468	-	253	284	-

Approach	EB	WB		NB		SB	
HCM Control Delay, s	1.2		0		0		25.8
HCM LOS				A		D	

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	SBLn1
Capacity (veh/h)	-	945	-	-	856	-	297
HCM Lane V/C Ratio	-	0.124	-	-	-	-	0.425
HCM Control Delay (s)	0	9.3	-	-	0	-	25.8
HCM Lane LOS	A	A	-	-	A	-	D
HCM 95th %tile Q(veh)	-	0.4	-	-	0	-	2

HCM 6th TWSC  
7: Hathaway Road & Route 140 NB Ramps

2021 Baseline Conditions  
Weekday Evening Peak Hour Conditions

Intersection

Int Delay, s/veh 18.6

Movement	EBL	EBT	WBT	WBR	SBL	SBR
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Lane Configurations						
Traffic Vol, veh/h	306	523	630	144	198	245
Future Vol, veh/h	306	523	630	144	198	245
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	Free	-	Yield
Storage Length	100	-	-	-	0	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	0	3	2	6	10	1
Mvmt Flow	319	545	656	150	206	255

Major/Minor	Major1	Major2	Minor2
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Conflicting Flow All	656	0	-	0	1839	656
Stage 1	-	-	-	-	656	-
Stage 2	-	-	-	-	1183	-
Critical Hdwy	4.1	-	-	-	4	4
Critical Hdwy Stg 1	-	-	-	-	5.5	-
Critical Hdwy Stg 2	-	-	-	-	5.5	-
Follow-up Hdwy	2.2	-	-	-	3.59	3.309
Pot Cap-1 Maneuver	941	-	-	0	284	699
Stage 1	-	-	-	0	502	-
Stage 2	-	-	-	0	280	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	941	-	-	-	~188	699
Mov Cap-2 Maneuver	-	-	-	-	~188	-
Stage 1	-	-	-	-	332	-
Stage 2	-	-	-	-	280	-

Approach	EB	WB	SB
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HCM Control Delay, s	4	0	72.3
HCM LOS			F

Minor Lane/Major Mvmt	EBL	EBT	WBT	SBLn1	SBLn2
Capacity (veh/h)	941	-	-	188	699
HCM Lane V/C Ratio	0.339	-	-	1.097	0.365
HCM Control Delay (s)	10.8	-	-	145.6	13.1
HCM Lane LOS	B	-	-	F	B
HCM 95th %tile Q(veh)	1.5	-	-	10	1.7

Notes

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

## Intersection

Int Delay, s/veh 0.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	SWL	SWR
<b>Lane Configurations</b>										
Traffic Vol, veh/h	0	835	0	3	615	0	2	0	0	389
Future Vol, veh/h	0	835	0	3	615	0	2	0	0	389
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Yield	Yield
RT Channelized	-	-	None	-	-	None	-	-	-	None
Storage Length	-	-	-	50	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	0	-	0	-
Grade, %	-	0	-	-	0	-	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	0	2	2	2	2	0	2	2	2	1
Mvmt Flow	0	879	0	3	647	0	2	0	0	409

Major/Minor	Major1	Major2		Minor1		
Conflicting Flow All	-	0	0	879	0	0
Stage 1	-	-	-	-	-	879
Stage 2	-	-	-	-	-	653
Critical Hdwy	-	-	-	4.12	-	-
Critical Hdwy Stg 1	-	-	-	-	-	5.42
Critical Hdwy Stg 2	-	-	-	-	-	5.42
Follow-up Hdwy	-	-	-	2.218	-	-
Pot Cap-1 Maneuver	0	-	-	769	-	0
Stage 1	0	-	-	-	-	406
Stage 2	0	-	-	-	-	518
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	-	769	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	359
Stage 1	-	-	-	-	-	406
Stage 2	-	-	-	-	-	516

Approach	EB	WB	NB
HCM Control Delay, s	0	0	15.4
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	351	-	-	769	-
HCM Lane V/C Ratio	0.018	-	-	0.004	-
HCM Control Delay (s)	15.4	-	-	9.7	-
HCM Lane LOS	C	-	-	A	-
HCM 95th %tile Q(veh)	0.1	-	-	0	-

Lanes, Volumes, Timings  
9: Shawmut Avenue & Hathaway Road

2021 Baseline Conditions  
Saturday Midday Peak Hour Conditions

	↑	→	↓	↗	↖	↙	↖	↑	↗	↙	↓	↖
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑	↑		↑	↑		↑	↑		↑	↑	↑
Traffic Volume (vph)	98	404	117	203	465	20	217	47	201	4	63	114
Future Volume (vph)	98	404	117	203	465	20	217	47	201	4	63	114
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100		0	100		0	80		0	0		50
Storage Lanes	1		0	1		0	1		0	0		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.966			0.994			0.878				0.850
Flt Protected	0.950			0.950			0.950				0.997	
Satd. Flow (prot)	1719	1786	0	1787	1889	0	1805	1635	0	0	1859	1553
Flt Permitted	0.387			0.190			0.397				0.959	
Satd. Flow (perm)	700	1786	0	357	1889	0	754	1635	0	0	1788	1553
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		16			3			205				170
Link Speed (mph)		30			30			30				30
Link Distance (ft)		950			500			500				500
Travel Time (s)		21.6			11.4			11.4				11.4
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	5%	3%	2%	1%	0%	0%	0%	2%	2%	0%	2%	4%
Adj. Flow (vph)	100	412	119	207	474	20	221	48	205	4	64	116
Shared Lane Traffic (%)												
Lane Group Flow (vph)	100	531	0	207	494	0	221	253	0	0	68	116
Enter Blocked Intersection	No											
Lane Alignment	Left	Left	Right									
Median Width(ft)		12			12			12				12
Link Offset(ft)		0			0			0				0
Crosswalk Width(ft)		16			16			16				16
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	1
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	Right
Leading Detector (ft)	20	100		20	100		20	100		20	100	20
Trailing Detector (ft)	0	0		0	0		0	0		0	0	0
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	0
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94				94
Detector 2 Size(ft)		6			6			6				6
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		Perm	NA	Perm
Protected Phases	1	6		5	2		7	4			8	

Lanes, Volumes, Timings  
9: Shawmut Avenue & Hathaway Road

2021 Baseline Conditions  
Saturday Midday Peak Hour Conditions

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	6			2			4			8		8
Detector Phase	1	6		5	2		7	4		8	8	8
Switch Phase												
Minimum Initial (s)	6.0	10.0		6.0	10.0		6.0	10.0		10.0	10.0	10.0
Minimum Split (s)	11.6	16.5		11.6	15.7		11.8	16.0		15.7	15.7	15.7
Total Split (s)	12.6	38.5		17.6	43.5		15.8	39.5		23.7	23.7	23.7
Total Split (%)	13.2%	40.3%		18.4%	45.5%		16.5%	41.3%		24.8%	24.8%	24.8%
Maximum Green (s)	7.0	32.0		12.0	37.8		10.0	33.5		18.0	18.0	18.0
Yellow Time (s)	3.0	3.8		3.0	3.0		3.3	3.3		3.0	3.0	3.0
All-Red Time (s)	2.6	2.7		2.6	2.7		2.5	2.7		2.7	2.7	2.7
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.6	6.5		5.6	5.7		5.8	6.0		5.7	5.7	
Lead/Lag	Lead	Lag		Lead	Lag		Lead			Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes			Yes	Yes	Yes
Vehicle Extension (s)	3.0	2.0		3.0	2.0		3.0	2.0		2.0	2.0	2.0
Recall Mode	None	Min		None	Min		None	None		None	None	None
Act Effct Green (s)	35.6	27.7		44.8	36.0		22.2	22.0			10.5	10.5
Actuated g/C Ratio	0.45	0.35		0.56	0.45		0.28	0.28			0.13	0.13
v/c Ratio	0.25	0.84		0.52	0.58		0.64	0.42			0.29	0.33
Control Delay	11.0	37.8		13.9	21.7		33.5	8.6			38.7	4.6
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0			0.0	0.0
Total Delay	11.0	37.8		13.9	21.7		33.5	8.6			38.7	4.6
LOS	B	D		B	C		C	A			D	A
Approach Delay		33.5			19.4			20.2			17.3	
Approach LOS		C			B			C			B	
90th %ile Green (s)	7.0	32.0		12.0	37.8		10.0	26.3		10.8	10.8	10.8
90th %ile Term Code	Max	Max		Max	Hold		Max	Hold		Gap	Gap	Gap
70th %ile Green (s)	7.0	32.0		12.0	37.8		10.0	25.5		10.0	10.0	10.0
70th %ile Term Code	Max	Max		Max	Hold		Max	Hold		Min	Min	Min
50th %ile Green (s)	7.0	30.6		12.0	36.4		10.0	25.5		10.0	10.0	10.0
50th %ile Term Code	Max	Gap		Max	Hold		Max	Hold		Min	Min	Min
30th %ile Green (s)	7.0	25.5		10.4	29.7		10.0	25.5		10.0	10.0	10.0
30th %ile Term Code	Max	Gap		Gap	Hold		Max	Hold		Min	Min	Min
10th %ile Green (s)	0.0	18.9		8.8	34.1		10.2	10.0		0.0	0.0	0.0
10th %ile Term Code	Skip	Gap		Gap	Hold		Hold	Min		Skip	Skip	Skip
Queue Length 50th (ft)	23	252		51	202		95	19			35	0
Queue Length 95th (ft)	46	#426		87	309		162	77			76	18
Internal Link Dist (ft)		870			420			420			420	
Turn Bay Length (ft)	100			100			80					50
Base Capacity (vph)	408	750		424	927		347	825			417	492
Starvation Cap Reductn	0	0		0	0		0	0			0	0
Spillback Cap Reductn	0	0		0	0		0	0			0	0
Storage Cap Reductn	0	0		0	0		0	0			0	0
Reduced v/c Ratio	0.25	0.71		0.49	0.53		0.64	0.31			0.16	0.24

Intersection Summary

Area Type: Other

Cycle Length: 95.6

Actuated Cycle Length: 79.5

Lanes, Volumes, Timings  
9: Shawmut Avenue & Hathaway Road

2021 Baseline Conditions  
Saturday Midday Peak Hour Conditions

Natural Cycle: 70

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.84

Intersection Signal Delay: 23.9

Intersection Capacity Utilization 73.4%

Analysis Period (min) 15

90th %ile Actuated Cycle: 88.4

70th %ile Actuated Cycle: 87.6

50th %ile Actuated Cycle: 86.2

30th %ile Actuated Cycle: 79.5

10th %ile Actuated Cycle: 55.8

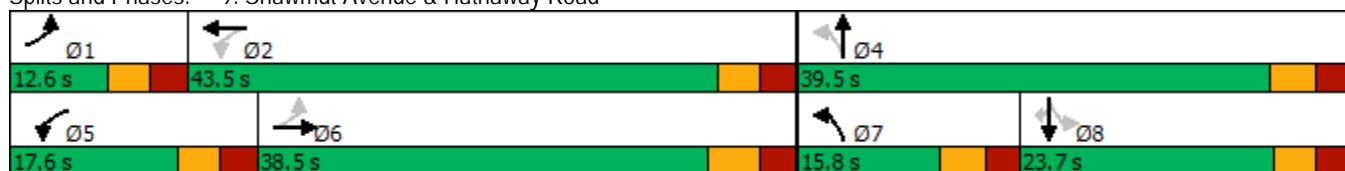
# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Intersection LOS: C

ICU Level of Service D

Splits and Phases: 9: Shawmut Avenue & Hathaway Road



## Intersection

Int Delay, s/veh

3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↑	↗	↖	↗			↖	↗		↖	
Traffic Vol, veh/h	0	521	74	161	613	2	78	0	158	1	0	1
Future Vol, veh/h	0	521	74	161	613	2	78	0	158	1	0	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None									
Storage Length	50	-	150	150	-	-	-	-	50	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	98	98	98	98	98	98	98	98	98	98	98	98
Heavy Vehicles, %	0	2	1	1	1	0	0	0	3	0	0	0
Mvmt Flow	0	532	76	164	626	2	80	0	161	1	0	1

Major/Minor	Major1	Major2			Minor1			Minor2				
Conflicting Flow All	628	0	0	608	0	0	1488	1488	532	1606	1563	627
Stage 1	-	-	-	-	-	-	532	532	-	955	955	-
Stage 2	-	-	-	-	-	-	956	956	-	651	608	-
Critical Hdwy	4.1	-	-	4.11	-	-	4	4	4	4	4	4
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.209	-	-	3.5	4	3.327	3.5	4	3.3
Pot Cap-1 Maneuver	964	-	-	975	-	-	372	352	758	341	334	715
Stage 1	-	-	-	-	-	-	535	529	-	313	339	-
Stage 2	-	-	-	-	-	-	313	339	-	461	489	-
Platoon blocked, %	-	-	-	-	-	-						
Mov Cap-1 Maneuver	964	-	-	975	-	-	324	293	758	234	278	715
Mov Cap-2 Maneuver	-	-	-	-	-	-	324	293	-	234	278	-
Stage 1	-	-	-	-	-	-	535	529	-	313	282	-
Stage 2	-	-	-	-	-	-	260	282	-	363	489	-

Approach	EB	WB			NB			SB			
HCM Control Delay, s	0	2			13.9			15.3			
HCM LOS					B			C			

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	324	758	964	-	-	975	-	-	353
HCM Lane V/C Ratio	0.246	0.213	-	-	-	0.168	-	-	0.006
HCM Control Delay (s)	19.7	11	0	-	-	9.4	-	-	15.3
HCM Lane LOS	C	B	A	-	-	A	-	-	C
HCM 95th %tile Q(veh)	0.9	0.8	0	-	-	0.6	-	-	0

## Intersection

Int Delay, s/veh 1.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑	↓		↑	↑			↑			↑	
Traffic Vol, veh/h	138	613	0	0	607	0	0	0	0	70	2	0
Future Vol, veh/h	138	613	0	0	607	0	0	0	0	70	2	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None									
Storage Length	50	-	-	50	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	97	97	97	97	97	97	97	97	97	97	97	97
Heavy Vehicles, %	4	2	0	0	1	0	0	0	0	1	0	0
Mvmt Flow	142	632	0	0	626	0	0	0	0	72	2	0

Major/Minor	Major1	Major2		Minor1		Minor2						
Conflicting Flow All	626	0	0	632	0	0	-	1542	632	1542	1542	-
Stage 1	-	-	-	-	-	-	-	916	-	626	626	-
Stage 2	-	-	-	-	-	-	-	626	-	916	916	-
Critical Hdwy	4.14	-	-	4.1	-	-	-	4	4	4	4	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	5.5	-	6.11	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	5.5	-	6.11	5.5	-
Follow-up Hdwy	2.236	-	-	2.2	-	-	-	4	3.3	3.509	4	-
Pot Cap-1 Maneuver	946	-	-	960	-	0	0	339	712	357	339	0
Stage 1	-	-	-	-	-	0	0	354	-	474	480	0
Stage 2	-	-	-	-	-	0	0	480	-	328	354	0
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	946	-	-	960	-	-	-	288	712	316	288	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	288	-	316	288	-
Stage 1	-	-	-	-	-	-	-	301	-	403	480	-
Stage 2	-	-	-	-	-	-	-	480	-	279	301	-

Approach	EB	WB		NB		SB	
HCM Control Delay, s	1.7		0		0		19.9
HCM LOS				A		C	

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	SBLn1
Capacity (veh/h)	-	946	-	-	960	-	315
HCM Lane V/C Ratio	-	0.15	-	-	-	-	0.236
HCM Control Delay (s)	0	9.5	-	-	0	-	19.9
HCM Lane LOS	A	A	-	-	A	-	C
HCM 95th %tile Q(veh)	-	0.5	-	-	0	-	0.9

HCM 6th TWSC  
7: Hathaway Road & Route 140 NB Ramps

2021 Baseline Conditions  
Saturday Midday Peak Hour Conditions

Intersection

Int Delay, s/veh 7.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↑ ↘	↑ ↗	↗ ↘	↖ ↗	↖ ↗	↗ ↘
Traffic Vol, veh/h	207	468	712	86	181	156
Future Vol, veh/h	207	468	712	86	181	156
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	Free	-	Yield
Storage Length	100	-	-	-	0	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	99	99	99	99	99	99
Heavy Vehicles, %	1	2	0	1	4	1
Mvmt Flow	209	473	719	87	183	158

Major/Minor	Major1	Major2	Minor2			
Conflicting Flow All	719	0	-	0	1610	719
Stage 1	-	-	-	-	719	-
Stage 2	-	-	-	-	891	-
Critical Hdwy	4.11	-	-	-	4	4
Critical Hdwy Stg 1	-	-	-	-	5.44	-
Critical Hdwy Stg 2	-	-	-	-	5.44	-
Follow-up Hdwy	2.209	-	-	-	3.536	3.309
Pot Cap-1 Maneuver	887	-	-	0	339	669
Stage 1	-	-	-	0	479	-
Stage 2	-	-	-	0	397	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	887	-	-	-	259	669
Mov Cap-2 Maneuver	-	-	-	-	259	-
Stage 1	-	-	-	-	366	-
Stage 2	-	-	-	-	397	-

Approach	EB	WB	SB
HCM Control Delay, s	3.2	0	30.5
HCM LOS			D

Minor Lane/Major Mvmt	EBL	EBT	WBT	SBLn1	SBLn2
Capacity (veh/h)	887	-	-	259	669
HCM Lane V/C Ratio	0.236	-	-	0.706	0.236
HCM Control Delay (s)	10.3	-	-	46.5	12
HCM Lane LOS	B	-	-	E	B
HCM 95th %tile Q(veh)	0.9	-	-	4.8	0.9

## Intersection

Int Delay, s/veh 0.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	SWL	SWR
<b>Lane Configurations</b>										
Traffic Vol, veh/h	0	748	3	4	603	0	2	0	0	206
Future Vol, veh/h	0	748	3	4	603	0	2	0	0	206
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Yield	Yield
RT Channelized	-	-	None	-	-	None	-	-	-	None
Storage Length	-	-	-	50	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	0	-	0	-
Grade, %	-	0	-	-	0	-	0	-	0	-
Peak Hour Factor	97	97	97	97	97	97	97	97	97	97
Heavy Vehicles, %	0	2	2	2	1	0	2	2	2	2
Mvmt Flow	0	771	3	4	622	0	2	0	0	212

Major/Minor	Major1	Major2		Minor1		
Conflicting Flow All	-	0	0	774	0	0
Stage 1	-	-	-	-	-	773
Stage 2	-	-	-	-	-	630
Critical Hdwy	-	-	-	4.12	-	-
Critical Hdwy Stg 1	-	-	-	-	-	5.42
Critical Hdwy Stg 2	-	-	-	-	-	5.42
Follow-up Hdwy	-	-	-	2.218	-	-
Pot Cap-1 Maneuver	0	-	-	842	-	0
Stage 1	0	-	-	-	-	455
Stage 2	0	-	-	-	-	531
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	-	842	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	394
Stage 1	-	-	-	-	-	455
Stage 2	-	-	-	-	-	528

Approach	EB	WB	NB
HCM Control Delay, s	0	0.1	14.2
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	397	-	-	842	-
HCM Lane V/C Ratio	0.013	-	-	0.005	-
HCM Control Delay (s)	14.2	-	-	9.3	-
HCM Lane LOS	B	-	-	A	-
HCM 95th %tile Q(veh)	0	-	-	0	-

Lanes, Volumes, Timings  
9: Shawmut Avenue & Hathaway Road

2028 No-Build Conditions  
Weekday Morning Peak Hour Conditions

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑	↓		↑	↓		↑	↓		↑	↓	↑
Traffic Volume (vph)	100	309	108	219	304	8	340	88	258	10	86	119
Future Volume (vph)	100	309	108	219	304	8	340	88	258	10	86	119
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100		0	100		0	80		0	0		50
Storage Lanes	1		0	1		0	1		0	0		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.961			0.996			0.888				0.850
Flt Protected	0.950			0.950			0.950				0.995	
Satd. Flow (prot)	1612	1748	0	1719	1709	0	1687	1572	0	0	1502	1262
Flt Permitted	0.477			0.232			0.451				0.922	
Satd. Flow (perm)	809	1748	0	420	1709	0	801	1572	0	0	1391	1262
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		21			2			223				202
Link Speed (mph)		30			30			30				30
Link Distance (ft)		950			500			500				500
Travel Time (s)		21.6			11.4			11.4				11.4
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	12%	5%	3%	5%	11%	0%	7%	20%	3%	25%	26%	28%
Adj. Flow (vph)	108	332	116	235	327	9	366	95	277	11	92	128
Shared Lane Traffic (%)												
Lane Group Flow (vph)	108	448	0	235	336	0	366	372	0	0	103	128
Enter Blocked Intersection	No											
Lane Alignment	Left	Left	Right									
Median Width(ft)		12			12			12				12
Link Offset(ft)		0			0			0				0
Crosswalk Width(ft)		16			16			16				16
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	1
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	Right
Leading Detector (ft)	20	100		20	100		20	100		20	100	20
Trailing Detector (ft)	0	0		0	0		0	0		0	0	0
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	0
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94				94
Detector 2 Size(ft)		6			6			6				6
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		Perm	NA	Perm
Protected Phases	1	6		5	2		7	4			8	

Lanes, Volumes, Timings  
9: Shawmut Avenue & Hathaway Road

2028 No-Build Conditions  
Weekday Morning Peak Hour Conditions

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	6			2			4			8		8
Detector Phase	1	6		5	2		7	4		8	8	8
Switch Phase												
Minimum Initial (s)	6.0	10.0		6.0	10.0		6.0	10.0		10.0	10.0	10.0
Minimum Split (s)	11.6	16.5		11.6	15.7		11.8	16.0		15.7	15.7	15.7
Total Split (s)	12.6	27.5		13.6	28.5		15.8	39.5		23.7	23.7	23.7
Total Split (%)	15.6%	34.1%		16.9%	35.4%		19.6%	49.0%		29.4%	29.4%	29.4%
Maximum Green (s)	7.0	21.0		8.0	22.8		10.0	33.5		18.0	18.0	18.0
Yellow Time (s)	3.0	3.8		3.0	3.0		3.3	3.3		3.0	3.0	3.0
All-Red Time (s)	2.6	2.7		2.6	2.7		2.5	2.7		2.7	2.7	2.7
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.6	6.5		5.6	5.7		5.8	6.0		5.7	5.7	
Lead/Lag	Lead	Lag		Lead	Lag		Lead			Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes			Yes	Yes	Yes
Vehicle Extension (s)	3.0	2.0		3.0	2.0		3.0	2.0		2.0	2.0	2.0
Recall Mode	None	Min		None	Min		None	None		None	None	None
Act Effct Green (s)	28.2	20.5		31.4	24.9		26.9	26.7			11.2	11.2
Actuated g/C Ratio	0.38	0.28		0.43	0.34		0.37	0.36			0.15	0.15
v/c Ratio	0.28	0.89		0.73	0.58		0.88	0.52			0.49	0.35
Control Delay	13.5	46.8		29.0	26.2		45.5	10.1			37.0	3.7
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0			0.0	0.0
Total Delay	13.5	46.8		29.0	26.2		45.5	10.1			37.0	3.7
LOS	B	D		C	C		D	B			D	A
Approach Delay		40.4			27.3			27.7			18.6	
Approach LOS		D			C			C			B	
90th %ile Green (s)	7.0	21.0		8.0	22.8		10.0	30.0		14.5	14.5	14.5
90th %ile Term Code	Max	Max		Max	Max		Max	Hold		Gap	Gap	Gap
70th %ile Green (s)	7.0	21.0		8.0	22.8		10.0	27.0		11.5	11.5	11.5
70th %ile Term Code	Max	Max		Max	Hold		Max	Hold		Gap	Gap	Gap
50th %ile Green (s)	7.0	21.0		8.0	22.8		10.0	25.5		10.0	10.0	10.0
50th %ile Term Code	Max	Max		Max	Hold		Max	Hold		Min	Min	Min
30th %ile Green (s)	7.0	21.0		8.0	22.8		10.0	25.5		10.0	10.0	10.0
30th %ile Term Code	Max	Max		Max	Hold		Max	Hold		Min	Min	Min
10th %ile Green (s)	0.0	18.6		8.0	33.0		10.0	25.5		10.0	10.0	10.0
10th %ile Term Code	Skip	Gap		Max	Hold		Max	Hold		Min	Min	Min
Queue Length 50th (ft)	25	181		59	126		133	47			44	0
Queue Length 95th (ft)	57	#373		#150	228		#279	118			89	11
Internal Link Dist (ft)		870			420			420			420	
Turn Bay Length (ft)	100			100			80					50
Base Capacity (vph)	390	516		321	583		414	839			341	462
Starvation Cap Reductn	0	0		0	0		0	0			0	0
Spillback Cap Reductn	0	0		0	0		0	0			0	0
Storage Cap Reductn	0	0		0	0		0	0			0	0
Reduced v/c Ratio	0.28	0.87		0.73	0.58		0.88	0.44			0.30	0.28

Intersection Summary

Area Type: Other

Cycle Length: 80.6

Actuated Cycle Length: 73.3

Lanes, Volumes, Timings  
9: Shawmut Avenue & Hathaway Road

2028 No-Build Conditions  
Weekday Morning Peak Hour Conditions

Natural Cycle: 80  
Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.89

Intersection Signal Delay: 29.9

Intersection Capacity Utilization 75.6%

Analysis Period (min) 15

90th %ile Actuated Cycle: 77.1

70th %ile Actuated Cycle: 74.1

50th %ile Actuated Cycle: 72.6

30th %ile Actuated Cycle: 72.6

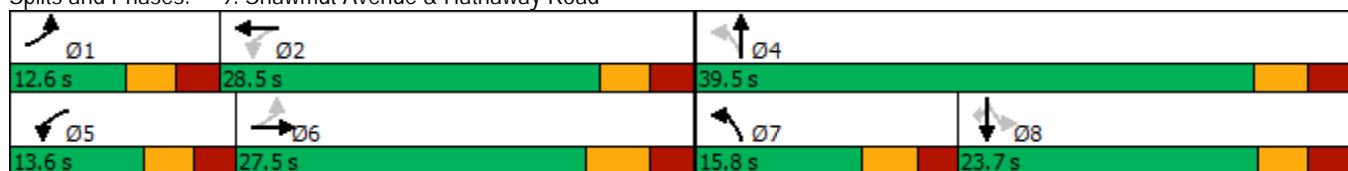
10th %ile Actuated Cycle: 70.2

# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Intersection LOS: C  
ICU Level of Service D

Splits and Phases: 9: Shawmut Avenue & Hathaway Road



## Intersection

Int Delay, s/veh 5.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↑	↗	↖	↗			↖	↗		↖	
Traffic Vol, veh/h	0	539	63	297	561	0	55	0	292	0	0	1
Future Vol, veh/h	0	539	63	297	561	0	55	0	292	0	0	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None									
Storage Length	50	-	150	150	-	-	-	-	50	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	89	89	89	89	89	89	89	89	89	89	89	89
Heavy Vehicles, %	0	3	2	2	4	0	2	0	2	0	0	0
Mvmt Flow	0	606	71	334	630	0	62	0	328	0	0	1

Major/Minor	Major1	Major2		Minor1		Minor2						
Conflicting Flow All	630	0	0	677	0	0	1905	1904	606	2104	1975	630
Stage 1	-	-	-	-	-	-	606	606	-	1298	1298	-
Stage 2	-	-	-	-	-	-	1299	1298	-	806	677	-
Critical Hdwy	4.1	-	-	4.12	-	-	4	4	4	4	4	4
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.218	-	-	3.518	4	3.318	3.5	4	3.3
Pot Cap-1 Maneuver	962	-	-	915	-	-	272	261	722	233	248	713
Stage 1	-	-	-	-	-	-	484	490	-	201	234	-
Stage 2	-	-	-	-	-	-	199	234	-	379	455	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	962	-	-	915	-	-	194	166	722	91	157	713
Mov Cap-2 Maneuver	-	-	-	-	-	-	194	166	-	91	157	-
Stage 1	-	-	-	-	-	-	484	490	-	201	149	-
Stage 2	-	-	-	-	-	-	126	149	-	207	455	-

Approach	EB	WB		NB		SB	
HCM Control Delay, s	0	3.9		16.9		10.1	
HCM LOS				C		B	

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	194	722	962	-	-	915	-	-	713
HCM Lane V/C Ratio	0.319	0.454	-	-	-	0.365	-	-	0.002
HCM Control Delay (s)	32	14.1	0	-	-	11.2	-	-	10.1
HCM Lane LOS	D	B	A	-	-	B	-	-	B
HCM 95th %tile Q(veh)	1.3	2.4	0	-	-	1.7	-	-	0

## Intersection

Int Delay, s/veh 2.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑	↑		↑	↑			↑			↑	
Traffic Vol, veh/h	237	635	0	0	521	0	0	0	0	62	1	0
Future Vol, veh/h	237	635	0	0	521	0	0	0	0	62	1	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None									
Storage Length	50	-	-	50	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	4	3	0	0	6	0	0	0	0	0	0	0
Mvmt Flow	263	706	0	0	579	0	0	0	0	69	1	0

Major/Minor	Major1	Major2		Minor1		Minor2						
Conflicting Flow All	579	0	0	706	0	0	-	1811	706	1811	1811	-
Stage 1	-	-	-	-	-	-	-	1232	-	579	579	-
Stage 2	-	-	-	-	-	-	-	579	-	1232	1232	-
Critical Hdwy	4.14	-	-	4.1	-	-	-	4	4	4	4	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.236	-	-	2.2	-	-	-	4	3.3	3.5	4	-
Pot Cap-1 Maneuver	985	-	-	902	-	0	0	279	676	292	279	0
Stage 1	-	-	-	-	-	0	0	252	-	504	504	0
Stage 2	-	-	-	-	-	0	0	504	-	219	252	0
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	985	-	-	902	-	-	-	205	676	232	205	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	205	-	232	205	-
Stage 1	-	-	-	-	-	-	-	185	-	369	504	-
Stage 2	-	-	-	-	-	-	-	504	-	161	185	-

Approach	EB	WB		NB		SB	
HCM Control Delay, s	2.7		0		0		27.1
HCM LOS				A		D	

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	SBLn1
Capacity (veh/h)	-	985	-	-	902	-	232
HCM Lane V/C Ratio	-	0.267	-	-	-	-	0.302
HCM Control Delay (s)	0	10	-	-	0	-	27.1
HCM Lane LOS	A	A	-	-	A	-	D
HCM 95th %tile Q(veh)	-	1.1	-	-	0	-	1.2

HCM 6th TWSC  
7: Hathaway Road & Route 140 NB Ramps

2028 No-Build Conditions  
Weekday Morning Peak Hour Conditions

Intersection

Int Delay, s/veh 16.7

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↑ ↘	↑ ↗	↗ ↘	↖ ↗	↖ ↗	↗ ↘
Traffic Vol, veh/h	352	363	592	181	183	178
Future Vol, veh/h	352	363	592	181	183	178
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	Free	-	Yield
Storage Length	100	-	-	-	0	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	4	2	12	12	13	3
Mvmt Flow	367	378	617	189	191	185

Major/Minor	Major1	Major2	Minor2			
Conflicting Flow All	617	0	-	0	1729	617
Stage 1	-	-	-	-	617	-
Stage 2	-	-	-	-	1112	-
Critical Hdwy	4.14	-	-	-	4	4
Critical Hdwy Stg 1	-	-	-	-	5.53	-
Critical Hdwy Stg 2	-	-	-	-	5.53	-
Follow-up Hdwy	2.236	-	-	-	3.617	3.327
Pot Cap-1 Maneuver	953	-	-	0	307	715
Stage 1	-	-	-	0	518	-
Stage 2	-	-	-	0	299	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	953	-	-	-	~189	715
Mov Cap-2 Maneuver	-	-	-	-	~189	-
Stage 1	-	-	-	-	319	-
Stage 2	-	-	-	-	299	-

Approach	EB	WB	SB
HCM Control Delay, s	5.5	0	66.1
HCM LOS			F

Minor Lane/Major Mvmt	EBL	EBT	WBT	SBLn1	SBLn2
Capacity (veh/h)	953	-	-	189	715
HCM Lane V/C Ratio	0.385	-	-	1.009	0.259
HCM Control Delay (s)	11.1	-	-	119	11.8
HCM Lane LOS	B	-	-	F	B
HCM 95th %tile Q(veh)	1.8	-	-	8.6	1

Notes

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

## Intersection

Int Delay, s/veh

0

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	SWL	SWR
<b>Lane Configurations</b>										
Traffic Vol, veh/h	0	870	2	1	520	0	1	0	0	418
Future Vol, veh/h	0	870	2	1	520	0	1	0	0	418
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Yield	Yield
RT Channelized	-	-	None	-	-	None	-	-	-	None
Storage Length	-	-	-	50	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	0	-	0	-
Grade, %	-	0	-	-	0	-	0	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	0	3	2	2	6	0	2	2	2	3
Mvmt Flow	0	967	2	1	578	0	1	0	0	464

Major/Minor	Major1	Major2		Minor1		
Conflicting Flow All	-	0	0	969	0	0
Stage 1	-	-	-	-	-	968
Stage 2	-	-	-	-	-	580
Critical Hdwy	-	-	-	4.12	-	-
Critical Hdwy Stg 1	-	-	-	-	-	5.42
Critical Hdwy Stg 2	-	-	-	-	-	5.42
Follow-up Hdwy	-	-	-	2.218	-	-
Pot Cap-1 Maneuver	0	-	-	711	-	0
Stage 1	0	-	-	-	-	368
Stage 2	0	-	-	-	-	560
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	-	711	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	356
Stage 1	-	-	-	-	-	368
Stage 2	-	-	-	-	-	559

Approach	EB	WB	NB
HCM Control Delay, s	0	0	16.3
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	322	-	-	711	-
HCM Lane V/C Ratio	0.01	-	-	0.002	-
HCM Control Delay (s)	16.3	-	-	10.1	-
HCM Lane LOS	C	-	-	B	-
HCM 95th %tile Q(veh)	0	-	-	0	-

Lanes, Volumes, Timings  
9: Shawmut Avenue & Hathaway Road

2028 No-Build Conditions  
Weekday Evening Peak Hour Conditions

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	1	1	1	1	1	1	1	1	1	1	1	1
Traffic Volume (vph)	119	444	180	237	434	9	251	45	259	12	100	157
Future Volume (vph)	119	444	180	237	434	9	251	45	259	12	100	157
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100		0	100		0	80		0	0		50
Storage Lanes	1		0	1		0	1		0	0		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.957			0.997			0.872				0.850
Flt Protected	0.950			0.950			0.950				0.995	
Satd. Flow (prot)	1530	1760	0	1770	1866	0	1770	1590	0	0	1840	1495
Flt Permitted	0.378			0.106			0.448				0.923	
Satd. Flow (perm)	609	1760	0	197	1866	0	835	1590	0	0	1707	1495
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		23			1			276				170
Link Speed (mph)		30			30			30				30
Link Distance (ft)		950			500			500				500
Travel Time (s)		21.6			11.4			11.4				11.4
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	18%	3%	4%	2%	1%	25%	2%	17%	2%	9%	2%	8%
Adj. Flow (vph)	127	472	191	252	462	10	267	48	276	13	106	167
Shared Lane Traffic (%)												
Lane Group Flow (vph)	127	663	0	252	472	0	267	324	0	0	119	167
Enter Blocked Intersection	No											
Lane Alignment	Left	Left	Right									
Median Width(ft)		12			12			12				12
Link Offset(ft)		0			0			0				0
Crosswalk Width(ft)		16			16			16				16
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	1
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	Right
Leading Detector (ft)	20	100		20	100		20	100		20	100	20
Trailing Detector (ft)	0	0		0	0		0	0		0	0	0
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	0
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94				94
Detector 2 Size(ft)		6			6			6				6
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		Perm	NA	Perm
Protected Phases	1	6		5	2		7	4			8	

Lanes, Volumes, Timings  
9: Shawmut Avenue & Hathaway Road

2028 No-Build Conditions  
Weekday Evening Peak Hour Conditions

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	6			2			4			8		8
Detector Phase	1	6		5	2		7	4		8	8	8
Switch Phase												
Minimum Initial (s)	6.0	10.0		6.0	10.0		6.0	10.0		10.0	10.0	10.0
Minimum Split (s)	11.6	16.5		11.6	15.7		11.8	16.0		15.7	15.7	15.7
Total Split (s)	12.6	38.5		17.6	43.5		15.8	39.5		23.7	23.7	23.7
Total Split (%)	13.2%	40.3%		18.4%	45.5%		16.5%	41.3%		24.8%	24.8%	24.8%
Maximum Green (s)	7.0	32.0		12.0	37.8		10.0	33.5		18.0	18.0	18.0
Yellow Time (s)	3.0	3.8		3.0	3.0		3.3	3.3		3.0	3.0	3.0
All-Red Time (s)	2.6	2.7		2.6	2.7		2.5	2.7		2.7	2.7	2.7
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.6	6.5		5.6	5.7		5.8	6.0		5.7	5.7	
Lead/Lag	Lead	Lag		Lead	Lag		Lead			Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes			Yes	Yes	Yes
Vehicle Extension (s)	3.0	2.0		3.0	2.0		3.0	2.0		2.0	2.0	2.0
Recall Mode	None	Min		None	Min		None	None		None	None	None
Act Effct Green (s)	39.8	32.0		49.9	37.9		27.2	27.0			11.5	11.5
Actuated g/C Ratio	0.45	0.36		0.56	0.43		0.31	0.30			0.13	0.13
v/c Ratio	0.37	1.02		0.79	0.60		0.74	0.48			0.54	0.49
Control Delay	13.6	71.4		37.1	23.9		39.7	7.6			45.8	10.8
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0			0.0	0.0
Total Delay	13.6	71.4		37.1	23.9		39.7	7.6			45.8	10.8
LOS	B	E		D	C		D	A			D	B
Approach Delay		62.1			28.5			22.1			25.4	
Approach LOS			E			C			C			C
90th %ile Green (s)	7.0	32.0		12.0	37.8		10.0	30.7		15.2	15.2	15.2
90th %ile Term Code	Max	Max		Max	Hold		Max	Hold		Gap	Gap	Gap
70th %ile Green (s)	7.0	32.0		12.0	37.8		10.0	27.8		12.3	12.3	12.3
70th %ile Term Code	Max	Max		Max	Hold		Max	Hold		Gap	Gap	Gap
50th %ile Green (s)	7.0	32.0		12.0	37.8		10.0	25.9		10.4	10.4	10.4
50th %ile Term Code	Max	Max		Max	Hold		Max	Hold		Gap	Gap	Gap
30th %ile Green (s)	7.0	32.0		12.0	37.8		10.0	25.5		10.0	10.0	10.0
30th %ile Term Code	Max	Max		Max	Hold		Max	Hold		Min	Min	Min
10th %ile Green (s)	6.4	32.0		11.6	38.0		10.0	25.5		10.0	10.0	10.0
10th %ile Term Code	Gap	Max		Gap	Hold		Max	Hold		Min	Min	Min
Queue Length 50th (ft)	30	-363		82	194		122	19			64	0
Queue Length 95th (ft)	64	#642		#221	320		#204	83			118	53
Internal Link Dist (ft)		870			420			420			420	
Turn Bay Length (ft)	100			100			80					50
Base Capacity (vph)	345	647		322	793		360	770			345	438
Starvation Cap Reductn	0	0		0	0		0	0			0	0
Spillback Cap Reductn	0	0		0	0		0	0			0	0
Storage Cap Reductn	0	0		0	0		0	0			0	0
Reduced v/c Ratio	0.37	1.02		0.78	0.60		0.74	0.42			0.34	0.38

Intersection Summary

Area Type: Other

Cycle Length: 95.6

Actuated Cycle Length: 89.1

## Lanes, Volumes, Timings 9: Shawmut Avenue & Hathaway Road

2028 No-Build Conditions  
Weekday Evening Peak Hour Conditions

Natural Cycle: 90

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 1.02

Intersection Signal Delay: 37.7

Intersection Capacity Utilization 83.1%

Intersection LOS: D

ICU Level of Service E

Analysis Period (min) 15

90th %ile Actuated Cycle: 92.8

70th %ile Actuated Cycle: 89.9

50th %ile Actuated Cycle: 88

30th %ile Actuated Cycle: 87.6

10th %ile Actuated Cycle: 87.2

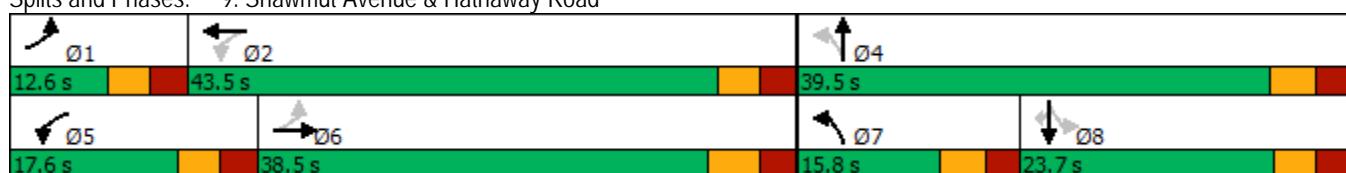
~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 9: Shawmut Avenue & Hathaway Road



## Intersection

Int Delay, s/veh 3.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑ ↗	↑ ↗	↑ ↗	↑ ↗	↑ ↗		↑ ↗	↑ ↗	↑ ↗	↑ ↗	↑ ↗	↑ ↗
Traffic Vol, veh/h	1	666	98	248	796	1	77	0	182	1	0	0
Future Vol, veh/h	1	666	98	248	796	1	77	0	182	1	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None									
Storage Length	50	-	150	150	-	-	-	-	50	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	0	1	0	1	1	0	0	0	1	0	0	0
Mvmt Flow	1	694	102	258	829	1	80	0	190	1	0	0

Major/Minor	Major1	Major2			Minor1			Minor2				
Conflicting Flow All	830	0	0	796	0	0	2042	2042	694	2188	2144	830
Stage 1	-	-	-	-	-	-	696	696	-	1346	1346	-
Stage 2	-	-	-	-	-	-	1346	1346	-	842	798	-
Critical Hdwy	4.1	-	-	4.11	-	-	4	4	4	4	4	4
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.209	-	-	3.5	4	3.309	3.5	4	3.3
Pot Cap-1 Maneuver	811	-	-	830	-	-	245	236	681	218	218	620
Stage 1	-	-	-	-	-	-	435	446	-	189	222	-
Stage 2	-	-	-	-	-	-	189	222	-	362	401	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	811	-	-	830	-	-	186	162	681	119	150	620
Mov Cap-2 Maneuver	-	-	-	-	-	-	186	162	-	119	150	-
Stage 1	-	-	-	-	-	-	435	446	-	189	153	-
Stage 2	-	-	-	-	-	-	130	153	-	261	401	-

Approach	EB	WB			NB	SB		
HCM Control Delay, s	0	2.7			20	35.5		
HCM LOS					C	E		

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	186	681	811	-	-	830	-	-	119
HCM Lane V/C Ratio	0.431	0.278	0.001	-	-	0.311	-	-	0.009
HCM Control Delay (s)	38.3	12.3	9.4	-	-	11.3	-	-	35.5
HCM Lane LOS	E	B	A	-	-	B	-	-	E
HCM 95th %tile Q(veh)	2	1.1	0	-	-	1.3	-	-	0

## Intersection

Int Delay, s/veh 3.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖ ↗	↖ ↗	0	0	662	0	0	0	0	128	1	0
Traffic Vol, veh/h	119	780	0	0	662	0	0	0	0	128	1	0
Future Vol, veh/h	119	780	0	0	662	0	0	0	0	128	1	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None									
Storage Length	50	-	-	50	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	0	2	0	0	2	0	0	0	0	5	0	0
Mvmt Flow	125	821	0	0	697	0	0	0	0	135	1	0

Major/Minor	Major1	Major2		Minor1		Minor2						
Conflicting Flow All	697	0	0	821	0	0	-	1768	821	1768	1768	-
Stage 1	-	-	-	-	-	-	-	1071	-	697	697	-
Stage 2	-	-	-	-	-	-	-	697	-	1071	1071	-
Critical Hdwy	4.1	-	-	4.1	-	-	-	4	4	4	4	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	5.5	-	6.15	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	5.5	-	6.15	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	-	4	3.3	3.545	4	-
Pot Cap-1 Maneuver	909	-	-	817	-	0	0	288	623	301	288	0
Stage 1	-	-	-	-	-	0	0	300	-	427	446	0
Stage 2	-	-	-	-	-	0	0	446	-	264	300	0
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	909	-	-	817	-	-	-	248	623	269	248	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	248	-	269	248	-
Stage 1	-	-	-	-	-	-	-	259	-	368	446	-
Stage 2	-	-	-	-	-	-	-	446	-	228	259	-

Approach	EB	WB		NB		SB	
HCM Control Delay, s	1.3		0		0		31.3
HCM LOS				A		D	

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	SBLn1
Capacity (veh/h)	-	909	-	-	817	-	269
HCM Lane V/C Ratio	-	0.138	-	-	-	-	0.505
HCM Control Delay (s)	0	9.6	-	-	0	-	31.3
HCM Lane LOS	A	A	-	-	A	-	D
HCM 95th %tile Q(veh)	-	0.5	-	-	0	-	2.6

HCM 6th TWSC  
7: Hathaway Road & Route 140 NB Ramps

2028 No-Build Conditions  
Weekday Evening Peak Hour Conditions

Intersection

Int Delay, s/veh 30.6

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↑ ↘	↑ ↗	↗ ↘	↖ ↗	↖ ↗	↗ ↘
Traffic Vol, veh/h	328	561	675	154	212	263
Future Vol, veh/h	328	561	675	154	212	263
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	Free	-	Yield
Storage Length	100	-	-	-	0	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	0	3	2	6	10	1
Mvmt Flow	342	584	703	160	221	274

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	703	0	-	0	1971
Stage 1	-	-	-	-	703
Stage 2	-	-	-	-	1268
Critical Hdwy	4.1	-	-	-	4
Critical Hdwy Stg 1	-	-	-	-	5.5
Critical Hdwy Stg 2	-	-	-	-	5.5
Follow-up Hdwy	2.2	-	-	-	3.59
Pot Cap-1 Maneuver	904	-	-	0	676
Stage 1	-	-	-	0	477
Stage 2	-	-	-	0	255
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	904	-	-	-	~160
Mov Cap-2 Maneuver	-	-	-	-	~160
Stage 1	-	-	-	-	297
Stage 2	-	-	-	-	255

Approach	EB	WB	SB
HCM Control Delay, s	4.2	0	123.3
HCM LOS			F

Minor Lane/Major Mvmt	EBL	EBT	WBT	SBLn1	SBLn2
Capacity (veh/h)	904	-	-	160	676
HCM Lane V/C Ratio	0.378	-	-	1.38	0.405
HCM Control Delay (s)	11.4	-	-	259	13.9
HCM Lane LOS	B	-	-	F	B
HCM 95th %tile Q(veh)	1.8	-	-	13.7	2

Notes

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

## Intersection

Int Delay, s/veh 0.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	SWL	SWR
<b>Lane Configurations</b>										
Traffic Vol, veh/h	0	895	2	3	659	0	2	0	0	417
Future Vol, veh/h	0	895	2	3	659	0	2	0	0	417
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Yield	Yield
RT Channelized	-	-	None	-	-	None	-	-	-	None
Storage Length	-	-	-	50	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	0	-	0	-
Grade, %	-	0	-	-	0	-	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	0	2	2	2	2	0	2	2	2	1
Mvmt Flow	0	942	2	3	694	0	2	0	0	439

Major/Minor	Major1	Major2		Minor1		
Conflicting Flow All	-	0	0	944	0	0
Stage 1	-	-	-	-	-	943
Stage 2	-	-	-	-	-	700
Critical Hdwy	-	-	-	4.12	-	-
Critical Hdwy Stg 1	-	-	-	-	-	5.42
Critical Hdwy Stg 2	-	-	-	-	-	5.42
Follow-up Hdwy	-	-	-	2.218	-	-
Pot Cap-1 Maneuver	0	-	-	727	-	0
Stage 1	0	-	-	-	-	379
Stage 2	0	-	-	-	-	493
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	-	727	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	330
Stage 1	-	-	-	-	-	379
Stage 2	-	-	-	-	-	491

Approach	EB	WB	NB
HCM Control Delay, s	0	0	16.4
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	322	-	-	727	-
HCM Lane V/C Ratio	0.02	-	-	0.004	-
HCM Control Delay (s)	16.4	-	-	10	-
HCM Lane LOS	C	-	-	A	-
HCM 95th %tile Q(veh)	0.1	-	-	0	-

Lanes, Volumes, Timings  
9: Shawmut Avenue & Hathaway Road

2028 No-Build Conditions  
Saturday Midday Peak Hour Conditions

	↑ ↗	→	↗ ↘	↖ ↙	← ↙	↖ ↘	↑ ↗	↗ ↘	↑ ↘	↖ ↙	↓ ↘	↖ ↙
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑ ↗	↑ ↘		↑ ↗	↑ ↘		↑ ↗	↑ ↘		↑ ↗	↑ ↘	↑ ↗
Traffic Volume (vph)	105	433	125	218	498	21	233	50	215	4	68	122
Future Volume (vph)	105	433	125	218	498	21	233	50	215	4	68	122
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100		0	100		0	80		0	0		50
Storage Lanes	1		0	1		0	1		0	0		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.966			0.994			0.878				0.850
Flt Protected	0.950			0.950			0.950				0.997	
Satd. Flow (prot)	1719	1786	0	1787	1889	0	1805	1635	0	0	1859	1553
Flt Permitted	0.340			0.154			0.449				0.968	
Satd. Flow (perm)	615	1786	0	290	1889	0	853	1635	0	0	1805	1553
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		16			3			219				170
Link Speed (mph)		30			30			30				30
Link Distance (ft)		950			500			500				500
Travel Time (s)		21.6			11.4			11.4				11.4
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	5%	3%	2%	1%	0%	0%	0%	2%	2%	0%	2%	4%
Adj. Flow (vph)	107	442	128	222	508	21	238	51	219	4	69	124
Shared Lane Traffic (%)												
Lane Group Flow (vph)	107	570	0	222	529	0	238	270	0	0	73	124
Enter Blocked Intersection	No											
Lane Alignment	Left	Left	Right									
Median Width(ft)		12			12			12				12
Link Offset(ft)		0			0			0				0
Crosswalk Width(ft)		16			16			16				16
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	1
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	Right
Leading Detector (ft)	20	100		20	100		20	100		20	100	20
Trailing Detector (ft)	0	0		0	0		0	0		0	0	0
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	0
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94				94
Detector 2 Size(ft)		6			6			6				6
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		Perm	NA	Perm
Protected Phases	1	6		5	2		7	4			8	

Lanes, Volumes, Timings  
9: Shawmut Avenue & Hathaway Road

2028 No-Build Conditions  
Saturday Midday Peak Hour Conditions

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	6			2			4			8		8
Detector Phase	1	6		5	2		7	4		8	8	8
Switch Phase												
Minimum Initial (s)	6.0	10.0		6.0	10.0		6.0	10.0		10.0	10.0	10.0
Minimum Split (s)	11.6	16.5		11.6	15.7		11.8	16.0		15.7	15.7	15.7
Total Split (s)	12.6	38.5		17.6	43.5		15.8	39.5		23.7	23.7	23.7
Total Split (%)	13.2%	40.3%		18.4%	45.5%		16.5%	41.3%		24.8%	24.8%	24.8%
Maximum Green (s)	7.0	32.0		12.0	37.8		10.0	33.5		18.0	18.0	18.0
Yellow Time (s)	3.0	3.8		3.0	3.0		3.3	3.3		3.0	3.0	3.0
All-Red Time (s)	2.6	2.7		2.6	2.7		2.5	2.7		2.7	2.7	2.7
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.6	6.5		5.6	5.7		5.8	6.0		5.7	5.7	
Lead/Lag	Lead	Lag		Lead	Lag		Lead			Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes			Yes	Yes	Yes
Vehicle Extension (s)	3.0	2.0		3.0	2.0		3.0	2.0		2.0	2.0	2.0
Recall Mode	None	Min		None	Min		None	None		None	None	None
Act Effct Green (s)	37.7	30.0		47.4	38.1		26.0	25.8			10.2	10.2
Actuated g/C Ratio	0.44	0.35		0.56	0.45		0.30	0.30			0.12	0.12
v/c Ratio	0.30	0.89		0.61	0.63		0.64	0.42			0.34	0.37
Control Delay	11.7	44.1		18.6	23.1		33.9	8.2			40.4	5.7
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0			0.0	0.0
Total Delay	11.7	44.1		18.6	23.1		33.9	8.2			40.4	5.7
LOS	B	D		B	C		C	A			D	A
Approach Delay		38.9			21.8			20.2			18.6	
Approach LOS		D			C			C			B	
90th %ile Green (s)	7.0	32.0		12.0	37.8		10.0	26.6		11.1	11.1	11.1
90th %ile Term Code	Max	Max		Max	Hold		Max	Hold		Gap	Gap	Gap
70th %ile Green (s)	7.0	32.0		12.0	37.8		10.0	25.5		10.0	10.0	10.0
70th %ile Term Code	Max	Max		Max	Hold		Max	Hold		Min	Min	Min
50th %ile Green (s)	7.0	32.0		12.0	37.8		10.0	25.5		10.0	10.0	10.0
50th %ile Term Code	Max	Max		Max	Hold		Max	Hold		Min	Min	Min
30th %ile Green (s)	7.0	31.0		11.5	36.3		10.0	25.5		10.0	10.0	10.0
30th %ile Term Code	Max	Gap		Gap	Hold		Max	Hold		Min	Min	Min
10th %ile Green (s)	0.0	23.7		9.9	40.0		10.0	25.5		10.0	10.0	10.0
10th %ile Term Code	Skip	Gap		Gap	Hold		Max	Hold		Min	Min	Min
Queue Length 50th (ft)	25	279		55	222		107	21			38	0
Queue Length 95th (ft)	49	#479		112	340		175	80			80	24
Internal Link Dist (ft)		870			420			420			420	
Turn Bay Length (ft)	100			100			80					50
Base Capacity (vph)	363	680		372	850		371	775			381	462
Starvation Cap Reductn	0	0		0	0		0	0			0	0
Spillback Cap Reductn	0	0		0	0		0	0			0	0
Storage Cap Reductn	0	0		0	0		0	0			0	0
Reduced v/c Ratio	0.29	0.84		0.60	0.62		0.64	0.35			0.19	0.27

Intersection Summary

Area Type: Other

Cycle Length: 95.6

Actuated Cycle Length: 85.4

Lanes, Volumes, Timings  
9: Shawmut Avenue & Hathaway Road

2028 No-Build Conditions  
Saturday Midday Peak Hour Conditions

Natural Cycle: 80

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.89

Intersection Signal Delay: 26.6

Intersection Capacity Utilization 77.1%

Analysis Period (min) 15

90th %ile Actuated Cycle: 88.7

70th %ile Actuated Cycle: 87.6

50th %ile Actuated Cycle: 87.6

30th %ile Actuated Cycle: 86.1

10th %ile Actuated Cycle: 77.2

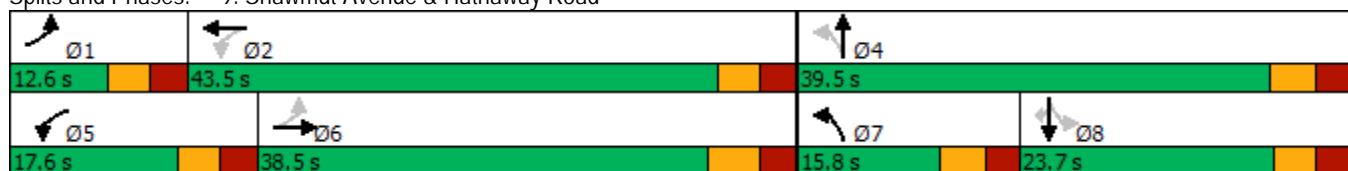
# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Intersection LOS: C

ICU Level of Service D

Splits and Phases: 9: Shawmut Avenue & Hathaway Road



HCM 6th TWSC  
3: Rockdale Avenue/Résidentiel Driveway & Hathaway Road

2028 No-Build Conditions  
Saturday Midday Peak Hour Conditions

Intersection

Int Delay, s/veh 3.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑ ↗	↑ ↗	↗ ↗	↖ ↗	↗ ↗		↖ ↗	↖ ↗	↗ ↗	↖ ↗	↖ ↗	↖ ↗
Traffic Vol, veh/h	0	561	79	174	658	2	84	0	170	1	0	1
Future Vol, veh/h	0	561	79	174	658	2	84	0	170	1	0	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None									
Storage Length	50	-	150	150	-	-	-	-	50	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	98	98	98	98	98	98	98	98	98	98	98	98
Heavy Vehicles, %	0	2	1	1	1	0	0	0	3	0	0	0
Mvmt Flow	0	572	81	178	671	2	86	0	173	1	0	1

Major/Minor	Major1	Major2		Minor1		Minor2						
Conflicting Flow All	673	0	0	653	0	0	1601	1601	572	1727	1681	672
Stage 1	-	-	-	-	-	-	572	572	-	1028	1028	-
Stage 2	-	-	-	-	-	-	1029	1029	-	699	653	-
Critical Hdwy	4.1	-	-	4.11	-	-	4	4	4	4	4	4
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.209	-	-	3.5	4	3.327	3.5	4	3.3
Pot Cap-1 Maneuver	927	-	-	939	-	-	343	325	738	312	307	693
Stage 1	-	-	-	-	-	-	509	508	-	285	314	-
Stage 2	-	-	-	-	-	-	285	314	-	434	467	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	927	-	-	939	-	-	293	263	738	204	249	693
Mov Cap-2 Maneuver	-	-	-	-	-	-	293	263	-	204	249	-
Stage 1	-	-	-	-	-	-	509	508	-	285	254	-
Stage 2	-	-	-	-	-	-	231	254	-	332	467	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	2	15	16.5
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	293	738	927	-	-	939	-	-	315
HCM Lane V/C Ratio	0.293	0.235	-	-	-	0.189	-	-	0.006
HCM Control Delay (s)	22.3	11.4	0	-	-	9.7	-	-	16.5
HCM Lane LOS	C	B	A	-	-	A	-	-	C
HCM 95th %tile Q(veh)	1.2	0.9	0	-	-	0.7	-	-	0

## Intersection

Int Delay, s/veh 2.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖ ↗ ↘ ↗ ↗ ↘ ↗ ↘ ↗ ↘ ↗ ↗ ↘											
Traffic Vol, veh/h	148	657	0	0	651	0	0	0	0	75	2	0
Future Vol, veh/h	148	657	0	0	651	0	0	0	0	75	2	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	50	-	-	50	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	97	97	97	97	97	97	97	97	97	97	97	97
Heavy Vehicles, %	4	2	0	0	1	0	0	0	0	1	0	0
Mvmt Flow	153	677	0	0	671	0	0	0	0	77	2	0

Major/Minor	Major1	Major2		Minor1		Minor2						
Conflicting Flow All	671	0	0	677	0	0	-	1654	677	1654	1654	-
Stage 1	-	-	-	-	-	-	-	983	-	671	671	-
Stage 2	-	-	-	-	-	-	-	671	-	983	983	-
Critical Hdwy	4.14	-	-	4.1	-	-	-	4	4	4	4	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	5.5	-	6.11	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	5.5	-	6.11	5.5	-
Follow-up Hdwy	2.236	-	-	2.2	-	-	-	4	3.3	3.509	4	-
Pot Cap-1 Maneuver	910	-	-	924	-	0	0	313	690	329	313	0
Stage 1	-	-	-	-	-	0	0	329	-	448	458	0
Stage 2	-	-	-	-	-	0	0	458	-	301	329	0
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	910	-	-	924	-	-	-	260	690	287	260	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	260	-	287	260	-
Stage 1	-	-	-	-	-	-	-	274	-	373	458	-
Stage 2	-	-	-	-	-	-	-	458	-	250	274	-

Approach	EB	WB		NB		SB	
HCM Control Delay, s	1.8		0		0		22.4
HCM LOS				A		C	

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	SBLn1
Capacity (veh/h)	-	910	-	-	924	-	286
HCM Lane V/C Ratio	-	0.168	-	-	-	-	0.278
HCM Control Delay (s)	0	9.8	-	-	0	-	22.4
HCM Lane LOS	A	A	-	-	A	-	C
HCM 95th %tile Q(veh)	-	0.6	-	-	0	-	1.1

HCM 6th TWSC  
7: Hathaway Road & Route 140 NB Ramps

2028 No-Build Conditions  
Saturday Midday Peak Hour Conditions

Intersection

Int Delay, s/veh 10

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↑ ↘	↑ ↗	↗ ↘	↖ ↗	↖ ↗	↖ ↗
Traffic Vol, veh/h	222	502	763	92	194	167
Future Vol, veh/h	222	502	763	92	194	167
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	Free	-	Yield
Storage Length	100	-	-	-	0	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	99	99	99	99	99	99
Heavy Vehicles, %	1	2	0	1	4	1
Mvmt Flow	224	507	771	93	196	169

Major/Minor	Major1	Major2	Minor2			
Conflicting Flow All	771	0	-	0	1726	771
Stage 1	-	-	-	-	771	-
Stage 2	-	-	-	-	955	-
Critical Hdwy	4.11	-	-	-	4	4
Critical Hdwy Stg 1	-	-	-	-	5.44	-
Critical Hdwy Stg 2	-	-	-	-	5.44	-
Follow-up Hdwy	2.209	-	-	-	3.536	3.309
Pot Cap-1 Maneuver	848	-	-	0	311	645
Stage 1	-	-	-	0	453	-
Stage 2	-	-	-	0	371	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	848	-	-	-	229	645
Mov Cap-2 Maneuver	-	-	-	-	229	-
Stage 1	-	-	-	-	333	-
Stage 2	-	-	-	-	371	-

Approach	EB	WB	SB
HCM Control Delay, s	3.3	0	44.8
HCM LOS			E

Minor Lane/Major Mvmt	EBL	EBT	WBT	SBLn1	SBLn2
Capacity (veh/h)	848	-	-	229	645
HCM Lane V/C Ratio	0.264	-	-	0.856	0.262
HCM Control Delay (s)	10.8	-	-	72.6	12.5
HCM Lane LOS	B	-	-	F	B
HCM 95th %tile Q(veh)	1.1	-	-	6.8	1

## Intersection

Int Delay, s/veh 0.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	SWL	SWR
<b>Lane Configurations</b>										
Traffic Vol, veh/h	0	802	3	4	647	0	2	0	0	221
Future Vol, veh/h	0	802	3	4	647	0	2	0	0	221
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Yield	Yield
RT Channelized	-	-	None	-	-	None	-	-	-	None
Storage Length	-	-	-	50	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	0	-	0	-
Grade, %	-	0	-	-	0	-	0	-	0	-
Peak Hour Factor	97	97	97	97	97	97	97	97	97	97
Heavy Vehicles, %	0	2	2	2	1	0	2	2	2	2
Mvmt Flow	0	827	3	4	667	0	2	0	0	228

Major/Minor	Major1	Major2			Minor1		
Conflicting Flow All	-	0	0	830	0	0	1504 829
Stage 1	-	-	-	-	-	-	829 -
Stage 2	-	-	-	-	-	-	675 -
Critical Hdwy	-	-	-	4.12	-	-	4 6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	5.42 -
Critical Hdwy Stg 2	-	-	-	-	-	-	5.42 -
Follow-up Hdwy	-	-	-	2.218	-	-	3.518 3.318
Pot Cap-1 Maneuver	0	-	-	802	-	0	367 370
Stage 1	0	-	-	-	-	0	429 -
Stage 2	0	-	-	-	-	0	506 -
Platoon blocked, %	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	-	802	-	-	365 370
Mov Cap-2 Maneuver	-	-	-	-	-	-	365 -
Stage 1	-	-	-	-	-	-	429 -
Stage 2	-	-	-	-	-	-	503 -

Approach	EB	WB	NB
HCM Control Delay, s	0	0.1	14.9
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	368	-	-	802	-
HCM Lane V/C Ratio	0.014	-	-	0.005	-
HCM Control Delay (s)	14.9	-	-	9.5	-
HCM Lane LOS	B	-	-	A	-
HCM 95th %tile Q(veh)	0	-	-	0	-

Lanes, Volumes, Timings  
9: Shawmut Avenue & Hathaway Road

2028 Build Conditions  
Weekday Morning Peak Hour Conditions

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑	↓		↑	↓		↑	↓		↑	↓	↑
Traffic Volume (vph)	100	311	110	219	306	8	342	88	258	10	86	119
Future Volume (vph)	100	311	110	219	306	8	342	88	258	10	86	119
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100		0	100		0	80		0	0		50
Storage Lanes	1		0	1		0	1		0	0		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.961			0.996			0.888				0.850
Flt Protected	0.950			0.950			0.950				0.995	
Satd. Flow (prot)	1612	1748	0	1719	1709	0	1687	1572	0	0	1502	1262
Flt Permitted	0.472			0.230			0.451				0.921	
Satd. Flow (perm)	801	1748	0	416	1709	0	801	1572	0	0	1390	1262
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		21			2			223				202
Link Speed (mph)		30			30			30				30
Link Distance (ft)		950			500			500				500
Travel Time (s)		21.6			11.4			11.4				11.4
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	12%	5%	3%	5%	11%	0%	7%	20%	3%	25%	26%	28%
Adj. Flow (vph)	108	334	118	235	329	9	368	95	277	11	92	128
Shared Lane Traffic (%)												
Lane Group Flow (vph)	108	452	0	235	338	0	368	372	0	0	103	128
Enter Blocked Intersection	No											
Lane Alignment	Left	Left	Right									
Median Width(ft)		12			12			12				12
Link Offset(ft)		0			0			0				0
Crosswalk Width(ft)		16			16			16				16
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	1
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	Right
Leading Detector (ft)	20	100		20	100		20	100		20	100	20
Trailing Detector (ft)	0	0		0	0		0	0		0	0	0
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	0
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94				94
Detector 2 Size(ft)		6			6			6				6
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		Perm	NA	Perm
Protected Phases	1	6		5	2		7	4			8	

Lanes, Volumes, Timings  
9: Shawmut Avenue & Hathaway Road

2028 Build Conditions  
Weekday Morning Peak Hour Conditions

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	6			2			4			8		8
Detector Phase	1	6		5	2		7	4		8	8	8
Switch Phase												
Minimum Initial (s)	6.0	10.0		6.0	10.0		6.0	10.0		10.0	10.0	10.0
Minimum Split (s)	11.6	16.5		11.6	15.7		11.8	16.0		15.7	15.7	15.7
Total Split (s)	12.6	27.5		13.6	28.5		15.8	39.5		23.7	23.7	23.7
Total Split (%)	15.6%	34.1%		16.9%	35.4%		19.6%	49.0%		29.4%	29.4%	29.4%
Maximum Green (s)	7.0	21.0		8.0	22.8		10.0	33.5		18.0	18.0	18.0
Yellow Time (s)	3.0	3.8		3.0	3.0		3.3	3.3		3.0	3.0	3.0
All-Red Time (s)	2.6	2.7		2.6	2.7		2.5	2.7		2.7	2.7	2.7
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.6	6.5		5.6	5.7		5.8	6.0		5.7	5.7	
Lead/Lag	Lead	Lag		Lead	Lag		Lead			Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes			Yes	Yes	Yes
Vehicle Extension (s)	3.0	2.0		3.0	2.0		3.0	2.0		2.0	2.0	2.0
Recall Mode	None	Min		None	Min		None	None		None	None	None
Act Effct Green (s)	28.4	20.7		31.6	25.1		26.9	26.7			11.2	11.2
Actuated g/C Ratio	0.39	0.28		0.43	0.34		0.37	0.36			0.15	0.15
v/c Ratio	0.28	0.89		0.73	0.58		0.89	0.52			0.49	0.35
Control Delay	13.5	47.1		29.2	26.2		46.6	10.1			37.1	3.7
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0			0.0	0.0
Total Delay	13.5	47.1		29.2	26.2		46.6	10.1			37.1	3.7
LOS	B	D		C	C		D	B			D	A
Approach Delay		40.6			27.4			28.3			18.6	
Approach LOS		D			C			C			B	
90th %ile Green (s)	7.0	21.0		8.0	22.8		10.0	30.0		14.5	14.5	14.5
90th %ile Term Code	Max	Max		Max	Max		Max	Hold		Gap	Gap	Gap
70th %ile Green (s)	7.0	21.0		8.0	22.8		10.0	27.0		11.5	11.5	11.5
70th %ile Term Code	Max	Max		Max	Hold		Max	Hold		Gap	Gap	Gap
50th %ile Green (s)	7.0	21.0		8.0	22.8		10.0	25.5		10.0	10.0	10.0
50th %ile Term Code	Max	Max		Max	Hold		Max	Hold		Min	Min	Min
30th %ile Green (s)	7.0	21.0		8.0	22.8		10.0	25.5		10.0	10.0	10.0
30th %ile Term Code	Max	Max		Max	Hold		Max	Hold		Min	Min	Min
10th %ile Green (s)	0.0	19.6		8.0	34.0		10.0	25.5		10.0	10.0	10.0
10th %ile Term Code	Skip	Gap		Max	Hold		Max	Hold		Min	Min	Min
Queue Length 50th (ft)	25	183		59	127		134	47			44	0
Queue Length 95th (ft)	57	#378		#151	230		#283	118			89	11
Internal Link Dist (ft)		870			420			420			420	
Turn Bay Length (ft)	100			100			80					50
Base Capacity (vph)	389	514		320	585		413	838			340	461
Starvation Cap Reductn	0	0		0	0		0	0			0	0
Spillback Cap Reductn	0	0		0	0		0	0			0	0
Storage Cap Reductn	0	0		0	0		0	0			0	0
Reduced v/c Ratio	0.28	0.88		0.73	0.58		0.89	0.44			0.30	0.28

Intersection Summary

Area Type: Other

Cycle Length: 80.6

Actuated Cycle Length: 73.5

## Lanes, Volumes, Timings 9: Shawmut Avenue & Hathaway Road

2028 Build Conditions  
Weekday Morning Peak Hour Conditions

Natural Cycle: 80

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.89

Intersection Signal Delay: 30.3

Intersection Capacity Utilization 75.9%

Analysis Period (min) 15

90th %ile Actuated Cycle: 77.1

70th %ile Actuated Cycle: 74.1

50th %ile Actuated Cycle: 72.6

30th %ile Actuated Cycle: 72.6

10th %ile Actuated Cycle: 71.2

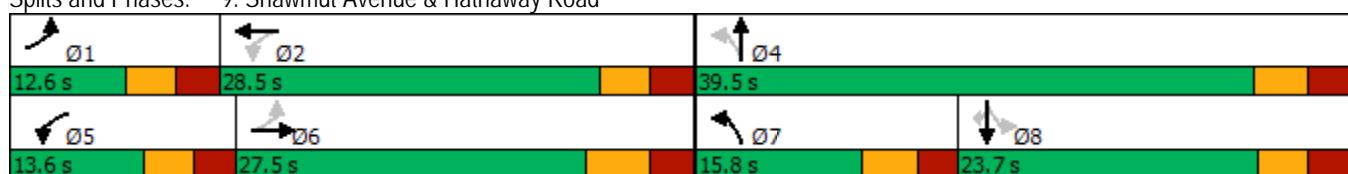
# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Intersection LOS: C

ICU Level of Service D

Splits and Phases: 9: Shawmut Avenue & Hathaway Road



## Intersection

Int Delay, s/veh 5.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑	↑	↑	↑	↑		↑	↑	↑	↑	↑	
Traffic Vol, veh/h	0	542	63	300	564	0	55	0	296	0	0	1
Future Vol, veh/h	0	542	63	300	564	0	55	0	296	0	0	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None									
Storage Length	50	-	150	150	-	-	-	-	50	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	89	89	89	89	89	89	89	89	89	89	89	89
Heavy Vehicles, %	0	3	2	2	4	0	2	0	2	0	0	0
Mvmt Flow	0	609	71	337	634	0	62	0	333	0	0	1

Major/Minor	Major1	Major2		Minor1		Minor2						
Conflicting Flow All	634	0	0	680	0	0	1918	1917	609	2119	1988	634
Stage 1	-	-	-	-	-	-	609	609	-	1308	1308	-
Stage 2	-	-	-	-	-	-	1309	1308	-	811	680	-
Critical Hdwy	4.1	-	-	4.12	-	-	4	4	4	4	4	4
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.218	-	-	3.518	4	3.318	3.5	4	3.3
Pot Cap-1 Maneuver	959	-	-	912	-	-	269	259	721	231	245	711
Stage 1	-	-	-	-	-	-	482	488	-	198	231	-
Stage 2	-	-	-	-	-	-	196	231	-	376	454	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	959	-	-	912	-	-	191	163	721	89	154	711
Mov Cap-2 Maneuver	-	-	-	-	-	-	191	163	-	89	154	-
Stage 1	-	-	-	-	-	-	482	488	-	198	146	-
Stage 2	-	-	-	-	-	-	123	146	-	203	454	-

Approach	EB	WB		NB		SB	
HCM Control Delay, s	0	3.9		17.1		10.1	
HCM LOS				C		B	

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	191	721	959	-	-	912	-	-	711
HCM Lane V/C Ratio	0.324	0.461	-	-	-	0.37	-	-	0.002
HCM Control Delay (s)	32.6	14.2	0	-	-	11.2	-	-	10.1
HCM Lane LOS	D	B	A	-	-	B	-	-	B
HCM 95th %tile Q(veh)	1.3	2.4	0	-	-	1.7	-	-	0

## Intersection

Int Delay, s/veh 3.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑	↓		↑	↑			↑			↑	
Traffic Vol, veh/h	237	635	7	10	521	0	0	6	10	62	7	0
Future Vol, veh/h	237	635	7	10	521	0	0	6	10	62	7	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None									
Storage Length	50	-	-	50	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	4	3	0	0	6	0	0	0	0	0	0	0
Mvmt Flow	263	706	8	11	579	0	0	7	11	69	8	0

Major/Minor	Major1	Major2			Minor1		Minor2					
Conflicting Flow All	579	0	0	714	0	0	-	1837	710	1846	1841	-
Stage 1	-	-	-	-	-	-	-	1236	-	601	601	-
Stage 2	-	-	-	-	-	-	-	601	-	1245	1240	-
Critical Hdwy	4.14	-	-	4.1	-	-	-	4	4	4	4	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.236	-	-	2.2	-	-	-	4	3.3	3.5	4	-
Pot Cap-1 Maneuver	985	-	-	895	-	0	0	274	674	285	273	0
Stage 1	-	-	-	-	-	0	0	250	-	491	493	0
Stage 2	-	-	-	-	-	0	0	493	-	215	249	0
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	985	-	-	895	-	-	-	198	674	215	198	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	198	-	215	198	-
Stage 1	-	-	-	-	-	-	-	183	-	360	487	-
Stage 2	-	-	-	-	-	-	-	487	-	149	183	-

Approach	EB	WB			NB		SB		
HCM Control Delay, s	2.7	0.2			15.7		31.1		
HCM LOS					C		D		

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	SBLn1
Capacity (veh/h)	354	985	-	-	895	-	213
HCM Lane V/C Ratio	0.05	0.267	-	-	0.012	-	0.36
HCM Control Delay (s)	15.7	10	-	-	9.1	-	31.1
HCM Lane LOS	C	A	-	-	A	-	D
HCM 95th %tile Q(veh)	0.2	1.1	-	-	0	-	1.5

HCM 6th TWSC  
7: Hathaway Road & Route 140 NB Ramps

2028 Build Conditions  
Weekday Morning Peak Hour Conditions

Intersection

Int Delay, s/veh 17.6

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↑ ↘	↑ ↗	↗ ↘	↖ ↗	↖ ↗	↗ ↘
Traffic Vol, veh/h	358	367	596	181	183	184
Future Vol, veh/h	358	367	596	181	183	184
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	Free	-	Yield
Storage Length	100	-	-	-	0	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	4	2	12	12	13	3
Mvmt Flow	373	382	621	189	191	192

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	621	0	-	0	1749
Stage 1	-	-	-	-	621
Stage 2	-	-	-	-	1128
Critical Hdwy	4.14	-	-	-	4
Critical Hdwy Stg 1	-	-	-	-	5.53
Critical Hdwy Stg 2	-	-	-	-	5.53
Follow-up Hdwy	2.236	-	-	-	3.617
Pot Cap-1 Maneuver	950	-	-	0	303
Stage 1	-	-	-	0	515
Stage 2	-	-	-	0	294
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	950	-	-	-	~184
Mov Cap-2 Maneuver	-	-	-	-	~184
Stage 1	-	-	-	-	313
Stage 2	-	-	-	-	294

Approach	EB	WB	SB
HCM Control Delay, s	5.5	0	70
HCM LOS			F

Minor Lane/Major Mvmt	EBL	EBT	WBT	SBLn1	SBLn2
Capacity (veh/h)	950	-	-	184	713
HCM Lane V/C Ratio	0.393	-	-	1.036	0.269
HCM Control Delay (s)	11.2	-	-	128.5	11.9
HCM Lane LOS	B	-	-	F	B
HCM 95th %tile Q(veh)	1.9	-	-	8.9	1.1

Notes

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

## HCM 6th TWSC

2028 Build Conditions

## 13: Storage Facility Driveway &amp; Hathaway Road &amp; Route 140 SB Ramps

Wednesday Morning Peak Hour Conditions

## Intersection

Int Delay, s/veh 0.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	SWL	SWR
<b>Lane Configurations</b>										
Traffic Vol, veh/h	0	877	2	1	520	0	7	0	0	418
Future Vol, veh/h	0	877	2	1	520	0	7	0	0	418
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Yield	Yield
RT Channelized	-	-	None	-	-	None	-	-	-	None
Storage Length	-	-	-	50	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	0	-	0	-
Grade, %	-	0	-	-	0	-	0	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	0	3	2	2	6	0	2	2	2	3
Mvmt Flow	0	974	2	1	578	0	8	0	0	464

Major/Minor	Major1	Major2		Minor1		
Conflicting Flow All	-	0	0	976	0	0
Stage 1	-	-	-	-	-	975
Stage 2	-	-	-	-	-	580
Critical Hdwy	-	-	-	4.12	-	-
Critical Hdwy Stg 1	-	-	-	-	-	5.42
Critical Hdwy Stg 2	-	-	-	-	-	5.42
Follow-up Hdwy	-	-	-	2.218	-	-
Pot Cap-1 Maneuver	0	-	-	707	-	0
Stage 1	0	-	-	-	-	366
Stage 2	0	-	-	-	-	560
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	-	707	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	354
Stage 1	-	-	-	-	-	366
Stage 2	-	-	-	-	-	559

Approach	EB	WB	NB
HCM Control Delay, s	0	0	15.8
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	342	-	-	707	-
HCM Lane V/C Ratio	0.029	-	-	0.002	-
HCM Control Delay (s)	15.8	-	-	10.1	-
HCM Lane LOS	C	-	-	B	-
HCM 95th %tile Q(veh)	0.1	-	-	0	-

Lanes, Volumes, Timings  
9: Shawmut Avenue & Hathaway Road

2028 Build Conditions  
Weekday Evening Peak Hour Conditions

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑	↓		↑	↓		↑	↓		↑	↓	↑
Traffic Volume (vph)	119	448	184	237	438	9	255	45	259	12	100	157
Future Volume (vph)	119	448	184	237	438	9	255	45	259	12	100	157
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100		0	100		0	80		0	0		50
Storage Lanes	1		0	1		0	1		0	0		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.956			0.997			0.872				0.850
Flt Protected	0.950			0.950			0.950				0.995	
Satd. Flow (prot)	1530	1759	0	1770	1866	0	1770	1590	0	0	1840	1495
Flt Permitted	0.373			0.106			0.448				0.923	
Satd. Flow (perm)	601	1759	0	197	1866	0	835	1590	0	0	1707	1495
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		23			1			276				170
Link Speed (mph)		30			30			30				30
Link Distance (ft)		950			500			500				500
Travel Time (s)		21.6			11.4			11.4				11.4
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	18%	3%	4%	2%	1%	25%	2%	17%	2%	9%	2%	8%
Adj. Flow (vph)	127	477	196	252	466	10	271	48	276	13	106	167
Shared Lane Traffic (%)												
Lane Group Flow (vph)	127	673	0	252	476	0	271	324	0	0	119	167
Enter Blocked Intersection	No											
Lane Alignment	Left	Left	Right									
Median Width(ft)		12			12			12				12
Link Offset(ft)		0			0			0				0
Crosswalk Width(ft)		16			16			16				16
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	1
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	Right
Leading Detector (ft)	20	100		20	100		20	100		20	100	20
Trailing Detector (ft)	0	0		0	0		0	0		0	0	0
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	0
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94				94
Detector 2 Size(ft)		6			6			6				6
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		Perm	NA	Perm
Protected Phases	1	6		5	2		7	4			8	

Lanes, Volumes, Timings  
9: Shawmut Avenue & Hathaway Road

2028 Build Conditions  
Weekday Evening Peak Hour Conditions

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	6			2			4			8		8
Detector Phase	1	6		5	2		7	4		8	8	8
Switch Phase												
Minimum Initial (s)	6.0	10.0		6.0	10.0		6.0	10.0		10.0	10.0	10.0
Minimum Split (s)	11.6	16.5		11.6	15.7		11.8	16.0		15.7	15.7	15.7
Total Split (s)	12.6	38.5		17.6	43.5		15.8	39.5		23.7	23.7	23.7
Total Split (%)	13.2%	40.3%		18.4%	45.5%		16.5%	41.3%		24.8%	24.8%	24.8%
Maximum Green (s)	7.0	32.0		12.0	37.8		10.0	33.5		18.0	18.0	18.0
Yellow Time (s)	3.0	3.8		3.0	3.0		3.3	3.3		3.0	3.0	3.0
All-Red Time (s)	2.6	2.7		2.6	2.7		2.5	2.7		2.7	2.7	2.7
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.6	6.5		5.6	5.7		5.8	6.0		5.7	5.7	
Lead/Lag	Lead	Lag		Lead	Lag		Lead			Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes			Yes	Yes	Yes
Vehicle Extension (s)	3.0	2.0		3.0	2.0		3.0	2.0		2.0	2.0	2.0
Recall Mode	None	Min		None	Min		None	None		None	None	None
Act Effct Green (s)	39.8	32.0		49.9	37.9		27.2	27.0			11.5	11.5
Actuated g/C Ratio	0.45	0.36		0.56	0.43		0.31	0.30			0.13	0.13
v/c Ratio	0.37	1.04		0.79	0.60		0.75	0.48			0.54	0.49
Control Delay	13.7	75.8		37.1	24.0		40.5	7.6			45.8	10.8
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0			0.0	0.0
Total Delay	13.7	75.8		37.1	24.0		40.5	7.6			45.8	10.8
LOS	B	E		D	C		D	A			D	B
Approach Delay		66.0			28.6			22.6			25.4	
Approach LOS			E			C			C			C
90th %ile Green (s)	7.0	32.0		12.0	37.8		10.0	30.7		15.2	15.2	15.2
90th %ile Term Code	Max	Max		Max	Hold		Max	Hold		Gap	Gap	Gap
70th %ile Green (s)	7.0	32.0		12.0	37.8		10.0	27.8		12.3	12.3	12.3
70th %ile Term Code	Max	Max		Max	Hold		Max	Hold		Gap	Gap	Gap
50th %ile Green (s)	7.0	32.0		12.0	37.8		10.0	25.9		10.4	10.4	10.4
50th %ile Term Code	Max	Max		Max	Hold		Max	Hold		Gap	Gap	Gap
30th %ile Green (s)	7.0	32.0		12.0	37.8		10.0	25.5		10.0	10.0	10.0
30th %ile Term Code	Max	Max		Max	Hold		Max	Hold		Min	Min	Min
10th %ile Green (s)	6.4	32.0		11.6	38.0		10.0	25.5		10.0	10.0	10.0
10th %ile Term Code	Gap	Max		Gap	Hold		Max	Hold		Min	Min	Min
Queue Length 50th (ft)	30	-395		82	196		124	19			64	0
Queue Length 95th (ft)	64	#656		#221	323		#211	83			118	53
Internal Link Dist (ft)		870			420			420			420	
Turn Bay Length (ft)	100			100			80					50
Base Capacity (vph)	342	646		322	793		360	770			345	438
Starvation Cap Reductn	0	0		0	0		0	0			0	0
Spillback Cap Reductn	0	0		0	0		0	0			0	0
Storage Cap Reductn	0	0		0	0		0	0			0	0
Reduced v/c Ratio	0.37	1.04		0.78	0.60		0.75	0.42			0.34	0.38

Intersection Summary

Area Type: Other

Cycle Length: 95.6

Actuated Cycle Length: 89.1

## Lanes, Volumes, Timings 9: Shawmut Avenue & Hathaway Road

2028 Build Conditions  
Weekday Evening Peak Hour Conditions

Natural Cycle: 90

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 1.04

Intersection Signal Delay: 39.1

Intersection LOS: D

Intersection Capacity Utilization 83.8%

ICU Level of Service E

Analysis Period (min) 15

90th %ile Actuated Cycle: 92.8

70th %ile Actuated Cycle: 89.9

50th %ile Actuated Cycle: 88

30th %ile Actuated Cycle: 87.6

10th %ile Actuated Cycle: 87.2

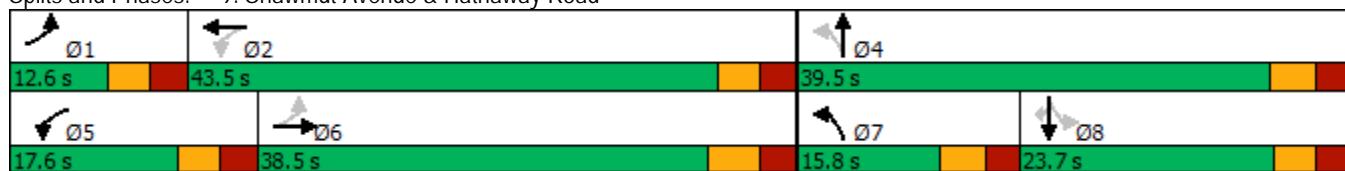
~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 9: Shawmut Avenue & Hathaway Road



## Intersection

Int Delay, s/veh

4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑	↑	↑	↑	↑		↑	↑	↑	↑	↑	
Traffic Vol, veh/h	1	672	98	254	802	1	77	0	189	1	0	0
Future Vol, veh/h	1	672	98	254	802	1	77	0	189	1	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None									
Storage Length	50	-	150	150	-	-	-	-	50	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	0	1	0	1	1	0	0	0	1	0	0	0
Mvmt Flow	1	700	102	265	835	1	80	0	197	1	0	0

Major/Minor	Major1	Major2		Minor1		Minor2						
Conflicting Flow All	836	0	0	802	0	0	2068	2068	700	2218	2170	836
Stage 1	-	-	-	-	-	-	702	702	-	1366	1366	-
Stage 2	-	-	-	-	-	-	1366	1366	-	852	804	-
Critical Hdwy	4.1	-	-	4.11	-	-	4	4	4	4	4	4
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.209	-	-	3.5	4	3.309	3.5	4	3.3
Pot Cap-1 Maneuver	807	-	-	826	-	-	240	231	678	213	214	617
Stage 1	-	-	-	-	-	-	432	443	-	184	217	-
Stage 2	-	-	-	-	-	-	184	217	-	357	398	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	807	-	-	826	-	-	180	157	678	114	145	617
Mov Cap-2 Maneuver	-	-	-	-	-	-	180	157	-	114	145	-
Stage 1	-	-	-	-	-	-	432	443	-	184	147	-
Stage 2	-	-	-	-	-	-	125	147	-	253	398	-

Approach	EB	WB		NB		SB	
HCM Control Delay, s	0	2.7		20.5		36.9	
HCM LOS				C		E	

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	180	678	807	-	-	826	-	-	114
HCM Lane V/C Ratio	0.446	0.29	0.001	-	-	0.32	-	-	0.009
HCM Control Delay (s)	40.2	12.5	9.5	-	-	11.4	-	-	36.9
HCM Lane LOS	E	B	A	-	-	B	-	-	E
HCM 95th %tile Q(veh)	2.1	1.2	0	-	-	1.4	-	-	0

## Intersection

Int Delay, s/veh 4.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖ ↗ ↘ ↗ ↗ ↘ ↗ ↗ ↘ ↗ ↗ ↘ ↗											
Traffic Vol, veh/h	119	780	13	18	662	0	0	10	18	128	11	0
Future Vol, veh/h	119	780	13	18	662	0	0	10	18	128	11	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	50	-	-	50	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	0	2	0	0	2	0	0	0	0	5	0	0
Mvmt Flow	125	821	14	19	697	0	0	11	19	135	12	0

Major/Minor	Major1	Major2		Minor1		Minor2					
Conflicting Flow All	697	0	0	835	0	0	-	1813	828	1828	1820
Stage 1	-	-	-	-	-	-	-	1078	-	735	735
Stage 2	-	-	-	-	-	-	-	735	-	1093	1085
Critical Hdwy	4.1	-	-	4.1	-	-	-	4	4	4	4
Critical Hdwy Stg 1	-	-	-	-	-	-	-	5.5	-	6.15	5.5
Critical Hdwy Stg 2	-	-	-	-	-	-	-	5.5	-	6.15	5.5
Follow-up Hdwy	2.2	-	-	2.2	-	-	-	4	3.3	3.545	4
Pot Cap-1 Maneuver	909	-	-	807	-	0	0	279	620	287	278
Stage 1	-	-	-	-	-	0	0	297	-	407	428
Stage 2	-	-	-	-	-	0	0	428	-	256	295
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	909	-	-	807	-	-	-	235	620	236	234
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	235	-	236	234
Stage 1	-	-	-	-	-	-	-	256	-	351	418
Stage 2	-	-	-	-	-	-	-	418	-	205	254

Approach	EB	WB		NB		SB	
HCM Control Delay, s	1.3	0.3		15		42.3	
HCM LOS				C		E	

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	SBLn1
Capacity (veh/h)	391	909	-	-	807	-	236
HCM Lane V/C Ratio	0.075	0.138	-	-	0.023	-	0.62
HCM Control Delay (s)	15	9.6	-	-	9.6	-	42.3
HCM Lane LOS	C	A	-	-	A	-	E
HCM 95th %tile Q(veh)	0.2	0.5	-	-	0.1	-	3.7

HCM 6th TWSC  
7: Hathaway Road & Route 140 NB Ramps

2028 Build Conditions  
Weekday Evening Peak Hour Conditions

Intersection

Int Delay, s/veh 33.9

Movement	EBL	EBT	WBT	WBR	SBL	SBR
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Lane Configurations						
Traffic Vol, veh/h	338	569	683	154	212	273
Future Vol, veh/h	338	569	683	154	212	273
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	Free	-	Yield
Storage Length	100	-	-	-	0	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	0	3	2	6	10	1
Mvmt Flow	352	593	711	160	221	284

Major/Minor	Major1	Major2	Minor2
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Conflicting Flow All	711	0	-	0	2008	711
Stage 1	-	-	-	-	711	-
Stage 2	-	-	-	-	1297	-
Critical Hdwy	4.1	-	-	-	4	4
Critical Hdwy Stg 1	-	-	-	-	5.5	-
Critical Hdwy Stg 2	-	-	-	-	5.5	-
Follow-up Hdwy	2.2	-	-	-	3.59	3.309
Pot Cap-1 Maneuver	898	-	-	0	249	673
Stage 1	-	-	-	0	472	-
Stage 2	-	-	-	0	246	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	898	-	-	-	~151	673
Mov Cap-2 Maneuver	-	-	-	-	~151	-
Stage 1	-	-	-	-	287	-
Stage 2	-	-	-	-	246	-

Approach	EB	WB	SB
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HCM Control Delay, s	4.3	0	137.2
HCM LOS			F

Minor Lane/Major Mvmt	EBL	EBT	WBT	SBLn1	SBLn2
Capacity (veh/h)	898	-	-	151	673
HCM Lane V/C Ratio	0.392	-	-	1.462	0.423
HCM Control Delay (s)	11.6	-	-	295.7	14.2
HCM Lane LOS	B	-	-	F	B
HCM 95th %tile Q(veh)	1.9	-	-	14.5	2.1

Notes

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

## HCM 6th TWSC

2028 Build Conditions

13: Storage Facility Driveway & Hathaway Road & Route 140 SB Ramps

WEEKDAY EVENING PEAK HOUR CONDITIONS

## Intersection

Int Delay, s/veh 0.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	SWL	SWR
<b>Lane Configurations</b>										
Traffic Vol, veh/h	0	908	2	3	659	0	14	0	0	417
Future Vol, veh/h	0	908	2	3	659	0	14	0	0	417
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Yield	Yield
RT Channelized	-	-	None	-	-	None	-	-	-	None
Storage Length	-	-	-	50	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	0	-	0	-
Grade, %	-	0	-	-	0	-	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	0	2	2	2	2	0	2	2	2	1
Mvmt Flow	0	956	2	3	694	0	15	0	0	439

Major/Minor	Major1	Major2		Minor1		
Conflicting Flow All	-	0	0	958	0	0
Stage 1	-	-	-	-	-	957
Stage 2	-	-	-	-	-	700
Critical Hdwy	-	-	-	4.12	-	-
Critical Hdwy Stg 1	-	-	-	-	-	5.42
Critical Hdwy Stg 2	-	-	-	-	-	5.42
Follow-up Hdwy	-	-	-	2.218	-	-
Pot Cap-1 Maneuver	0	-	-	718	-	0
Stage 1	0	-	-	-	-	373
Stage 2	0	-	-	-	-	493
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	-	718	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	327
Stage 1	-	-	-	-	-	373
Stage 2	-	-	-	-	-	491

Approach	EB	WB	NB
HCM Control Delay, s	0	0	16.8
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	324	-	-	718	-
HCM Lane V/C Ratio	0.058	-	-	0.004	-
HCM Control Delay (s)	16.8	-	-	10	-
HCM Lane LOS	C	-	-	B	-
HCM 95th %tile Q(veh)	0.2	-	-	0	-

Lanes, Volumes, Timings  
9: Shawmut Avenue & Hathaway Road

2028 Build Conditions  
Saturday Midday Peak Hour Conditions

	↑	→	↓	↗	↖	↙	↖	↑	↗	↓	↙	
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑	↑		↑	↑		↑	↑		↑	↑	↑
Traffic Volume (vph)	105	438	130	208	503	21	238	50	215	4	68	122
Future Volume (vph)	105	438	130	208	503	21	238	50	215	4	68	122
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100		0	100		0	80		0	0		50
Storage Lanes	1		0	1		0	1		0	0		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Fr <sub>t</sub>		0.966			0.994			0.878				0.850
Flt Protected	0.950			0.950			0.950				0.997	
Satd. Flow (prot)	1719	1786	0	1787	1889	0	1805	1635	0	0	1859	1553
Flt Permitted	0.334			0.150			0.449				0.968	
Satd. Flow (perm)	604	1786	0	282	1889	0	853	1635	0	0	1805	1553
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		17			3			219				170
Link Speed (mph)		30			30			30				30
Link Distance (ft)		950			500			500				500
Travel Time (s)		21.6			11.4			11.4				11.4
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	5%	3%	2%	1%	0%	0%	0%	2%	2%	0%	2%	4%
Adj. Flow (vph)	107	447	133	212	513	21	243	51	219	4	69	124
Shared Lane Traffic (%)												
Lane Group Flow (vph)	107	580	0	212	534	0	243	270	0	0	73	124
Enter Blocked Intersection	No											
Lane Alignment	Left	Left	Right									
Median Width(ft)		12			12			12				12
Link Offset(ft)		0			0			0				0
Crosswalk Width(ft)		16			16			16				16
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	1
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	Right
Leading Detector (ft)	20	100		20	100		20	100		20	100	20
Trailing Detector (ft)	0	0		0	0		0	0		0	0	0
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	0
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94				94
Detector 2 Size(ft)		6			6			6				6
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				Cl+Ex
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		Perm	NA	Perm
Protected Phases	1	6		5	2		7	4			8	

Lanes, Volumes, Timings  
9: Shawmut Avenue & Hathaway Road

2028 Build Conditions  
Saturday Midday Peak Hour Conditions

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	6			2			4			8		8
Detector Phase	1	6		5	2		7	4		8	8	8
Switch Phase												
Minimum Initial (s)	6.0	10.0		6.0	10.0		6.0	10.0		10.0	10.0	10.0
Minimum Split (s)	11.6	16.5		11.6	15.7		11.8	16.0		15.7	15.7	15.7
Total Split (s)	12.6	38.5		17.6	43.5		15.8	39.5		23.7	23.7	23.7
Total Split (%)	13.2%	40.3%		18.4%	45.5%		16.5%	41.3%		24.8%	24.8%	24.8%
Maximum Green (s)	7.0	32.0		12.0	37.8		10.0	33.5		18.0	18.0	18.0
Yellow Time (s)	3.0	3.8		3.0	3.0		3.3	3.3		3.0	3.0	3.0
All-Red Time (s)	2.6	2.7		2.6	2.7		2.5	2.7		2.7	2.7	2.7
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.6	6.5		5.6	5.7		5.8	6.0		5.7	5.7	
Lead/Lag	Lead	Lag		Lead	Lag		Lead			Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes			Yes	Yes	Yes
Vehicle Extension (s)	3.0	2.0		3.0	2.0		3.0	2.0		2.0	2.0	2.0
Recall Mode	None	Min		None	Min		None	None		None	None	None
Act Effct Green (s)	38.2	30.5		47.7	38.4		26.0	25.8			10.2	10.2
Actuated g/C Ratio	0.45	0.36		0.56	0.45		0.30	0.30			0.12	0.12
v/c Ratio	0.30	0.90		0.60	0.63		0.66	0.42			0.34	0.37
Control Delay	11.7	44.4		18.1	23.2		34.8	8.2			40.5	5.7
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0			0.0	0.0
Total Delay	11.7	44.4		18.1	23.2		34.8	8.2			40.5	5.7
LOS	B	D		B	C		C	A			D	A
Approach Delay		39.3			21.8			20.8			18.6	
Approach LOS		D			C			C			B	
90th %ile Green (s)	7.0	32.0		12.0	37.8		10.0	26.6		11.1	11.1	11.1
90th %ile Term Code	Max	Max		Max	Max		Max	Hold		Gap	Gap	Gap
70th %ile Green (s)	7.0	32.0		12.0	37.8		10.0	25.5		10.0	10.0	10.0
70th %ile Term Code	Max	Max		Max	Hold		Max	Hold		Min	Min	Min
50th %ile Green (s)	7.0	32.0		12.0	37.8		10.0	25.5		10.0	10.0	10.0
50th %ile Term Code	Max	Max		Max	Hold		Max	Hold		Min	Min	Min
30th %ile Green (s)	7.0	32.0		11.1	36.9		10.0	25.5		10.0	10.0	10.0
30th %ile Term Code	Max	Max		Gap	Hold		Max	Hold		Min	Min	Min
10th %ile Green (s)	0.0	25.0		9.6	41.0		10.0	25.5		10.0	10.0	10.0
10th %ile Term Code	Skip	Gap		Gap	Hold		Max	Hold		Min	Min	Min
Queue Length 50th (ft)	25	286		52	225		109	21			38	0
Queue Length 95th (ft)	49	#492		107	344		178	80			80	24
Internal Link Dist (ft)		870			420			420			420	
Turn Bay Length (ft)	100			100			80					50
Base Capacity (vph)	361	678		368	851		369	773			379	461
Starvation Cap Reductn	0	0		0	0		0	0			0	0
Spillback Cap Reductn	0	0		0	0		0	0			0	0
Storage Cap Reductn	0	0		0	0		0	0			0	0
Reduced v/c Ratio	0.30	0.86		0.58	0.63		0.66	0.35			0.19	0.27

Intersection Summary

Area Type: Other

Cycle Length: 95.6

Actuated Cycle Length: 85.8

Lanes, Volumes, Timings  
9: Shawmut Avenue & Hathaway Road

2028 Build Conditions  
Saturday Midday Peak Hour Conditions

Natural Cycle: 80

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.90

Intersection Signal Delay: 26.8

Intersection Capacity Utilization 77.4%

Analysis Period (min) 15

90th %ile Actuated Cycle: 88.7

70th %ile Actuated Cycle: 87.6

50th %ile Actuated Cycle: 87.6

30th %ile Actuated Cycle: 86.7

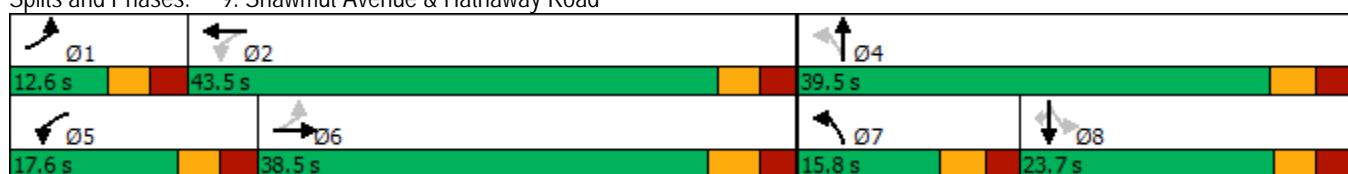
10th %ile Actuated Cycle: 78.2

# 95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Intersection LOS: C  
ICU Level of Service D

Splits and Phases: 9: Shawmut Avenue & Hathaway Road



## Intersection

Int Delay, s/veh 3.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↑	↑	↑	↑	↑		↑	↑	↑	↑	↑	
Traffic Vol, veh/h	0	568	79	181	665	2	84	0	177	1	0	1
Future Vol, veh/h	0	568	79	181	665	2	84	0	177	1	0	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None									
Storage Length	50	-	150	150	-	-	-	-	50	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	98	98	98	98	98	98	98	98	98	98	98	98
Heavy Vehicles, %	0	2	1	1	1	0	0	0	3	0	0	0
Mvmt Flow	0	580	81	185	679	2	86	0	181	1	0	1

Major/Minor	Major1	Major2		Minor1		Minor2						
Conflicting Flow All	681	0	0	661	0	0	1631	1631	580	1761	1711	680
Stage 1	-	-	-	-	-	-	580	580	-	1050	1050	-
Stage 2	-	-	-	-	-	-	1051	1051	-	711	661	-
Critical Hdwy	4.1	-	-	4.11	-	-	4	4	4	4	4	4
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.209	-	-	3.5	4	3.327	3.5	4	3.3
Pot Cap-1 Maneuver	921	-	-	932	-	-	335	318	734	304	301	689
Stage 1	-	-	-	-	-	-	504	503	-	277	307	-
Stage 2	-	-	-	-	-	-	277	306	-	427	463	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	921	-	-	932	-	-	283	255	734	194	241	689
Mov Cap-2 Maneuver	-	-	-	-	-	-	283	255	-	194	241	-
Stage 1	-	-	-	-	-	-	504	503	-	277	246	-
Stage 2	-	-	-	-	-	-	222	245	-	322	463	-

Approach	EB	WB		NB		SB	
HCM Control Delay, s	0	2.1		15.3		17	
HCM LOS				C		C	

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	283	734	921	-	-	932	-	-	303
HCM Lane V/C Ratio	0.303	0.246	-	-	-	0.198	-	-	0.007
HCM Control Delay (s)	23.2	11.5	0	-	-	9.8	-	-	17
HCM Lane LOS	C	B	A	-	-	A	-	-	C
HCM 95th %tile Q(veh)	1.2	1	0	-	-	0.7	-	-	0

## Intersection

Int Delay, s/veh 2.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖ ↗ ↘ ↗ ↗ ↘ ↗ ↗ ↘ ↗ ↗ ↘ ↗											
Traffic Vol, veh/h	148	657	14	21	651	0	0	11	21	75	13	0
Future Vol, veh/h	148	657	14	21	651	0	0	11	21	75	13	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	50	-	-	50	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	97	97	97	97	97	97	97	97	97	97	97	97
Heavy Vehicles, %	4	2	0	0	1	0	0	0	0	1	0	0
Mvmt Flow	153	677	14	22	671	0	0	11	22	77	13	0

Major/Minor	Major1	Major2		Minor1		Minor2						
Conflicting Flow All	671	0	0	691	0	0	-	1705	684	1722	1712	-
Stage 1	-	-	-	-	-	-	-	990	-	715	715	-
Stage 2	-	-	-	-	-	-	-	715	-	1007	997	-
Critical Hdwy	4.14	-	-	4.1	-	-	-	4	4	4	4	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	5.5	-	6.11	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	5.5	-	6.11	5.5	-
Follow-up Hdwy	2.236	-	-	2.2	-	-	-	4	3.3	3.509	4	-
Pot Cap-1 Maneuver	910	-	-	913	-	0	0	302	687	312	300	0
Stage 1	-	-	-	-	-	0	0	327	-	423	438	0
Stage 2	-	-	-	-	-	0	0	438	-	292	325	0
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	910	-	-	913	-	-	-	245	687	250	244	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	245	-	250	244	-
Stage 1	-	-	-	-	-	-	-	272	-	352	427	-
Stage 2	-	-	-	-	-	-	-	427	-	225	270	-

Approach	EB	WB		NB		SB	
HCM Control Delay, s	1.8	0.3		14.2		27.5	
HCM LOS				B		D	

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	SBLn1
Capacity (veh/h)	424	910	-	-	913	-	249
HCM Lane V/C Ratio	0.078	0.168	-	-	0.024	-	0.364
HCM Control Delay (s)	14.2	9.8	-	-	9	-	27.5
HCM Lane LOS	B	A	-	-	A	-	D
HCM 95th %tile Q(veh)	0.3	0.6	-	-	0.1	-	1.6

HCM 6th TWSC  
7: Hathaway Road & Route 140 NB Ramps

2028 Build Conditions  
Saturday Midday Peak Hour Conditions

Intersection

Int Delay, s/veh 11.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↑ ↘	↑ ↗	↗ ↘	↖ ↗	↖ ↗	↖ ↗
Traffic Vol, veh/h	233	512	773	92	194	178
Future Vol, veh/h	233	512	773	92	194	178
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	Free	-	Yield
Storage Length	100	-	-	-	0	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	99	99	99	99	99	99
Heavy Vehicles, %	1	2	0	1	4	1
Mvmt Flow	235	517	781	93	196	180

Major/Minor	Major1	Major2	Minor2			
Conflicting Flow All	781	0	-	0	1768	781
Stage 1	-	-	-	-	781	-
Stage 2	-	-	-	-	987	-
Critical Hdwy	4.11	-	-	-	4	4
Critical Hdwy Stg 1	-	-	-	-	5.44	-
Critical Hdwy Stg 2	-	-	-	-	5.44	-
Follow-up Hdwy	2.209	-	-	-	3.536	3.309
Pot Cap-1 Maneuver	841	-	-	0	301	640
Stage 1	-	-	-	0	448	-
Stage 2	-	-	-	0	358	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	841	-	-	-	217	640
Mov Cap-2 Maneuver	-	-	-	-	217	-
Stage 1	-	-	-	-	323	-
Stage 2	-	-	-	-	358	-

Approach	EB	WB	SB		
HCM Control Delay, s	3.4	0	50.3		
HCM LOS			F		

Minor Lane/Major Mvmt	EBL	EBT	WBT	SBLn1	SBLn2
Capacity (veh/h)	841	-	-	217	640
HCM Lane V/C Ratio	0.28	-	-	0.903	0.281
HCM Control Delay (s)	10.9	-	-	84.7	12.8
HCM Lane LOS	B	-	-	F	B
HCM 95th %tile Q(veh)	1.1	-	-	7.4	1.1

## HCM 6th TWSC

2028 Build Conditions

## 13: Storage Facility Driveway &amp; Hathaway Road &amp; Route 140 SB Ramps

Sunday Midday Peak Hour Conditions

## Intersection

Int Delay, s/veh 0.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBR	SWL	SWR
<b>Lane Configurations</b>										
Traffic Vol, veh/h	0	816	3	4	647	0	16	0	0	221
Future Vol, veh/h	0	816	3	4	647	0	16	0	0	221
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Yield	Yield
RT Channelized	-	-	None	-	-	None	-	-	-	None
Storage Length	-	-	-	50	-	-	0	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	0	-	0	-
Grade, %	-	0	-	-	0	-	0	-	0	-
Peak Hour Factor	97	97	97	97	97	97	97	97	97	97
Heavy Vehicles, %	0	2	2	2	1	0	2	2	2	2
Mvmt Flow	0	841	3	4	667	0	16	0	0	228

Major/Minor	Major1	Major2			Minor1			
Conflicting Flow All	-	0	0	844	0	0	1518	843
Stage 1	-	-	-	-	-	-	843	-
Stage 2	-	-	-	-	-	-	675	-
Critical Hdwy	-	-	-	4.12	-	-	4	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	-	2.218	-	-	3.518	3.318
Pot Cap-1 Maneuver	0	-	-	792	-	0	363	364
Stage 1	0	-	-	-	-	0	422	-
Stage 2	0	-	-	-	-	0	506	-
Platoon blocked, %	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	-	792	-	-	361	364
Mov Cap-2 Maneuver	-	-	-	-	-	-	361	-
Stage 1	-	-	-	-	-	-	422	-
Stage 2	-	-	-	-	-	-	503	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.1	15.5
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	361	-	-	792	-
HCM Lane V/C Ratio	0.054	-	-	0.005	-
HCM Control Delay (s)	15.5	-	-	9.6	-
HCM Lane LOS	C	-	-	A	-
HCM 95th %tile Q(veh)	0.2	-	-	0	-