



Memorandum

To: Stephen S. Rolle, PE
Commissioner of Transportation & Mobility
City of Worcester

Date: April 25, 2023

Project #: 15752.00

From: Erin L. Thompson, PE, IMSA III
Supervising Traffic Engineer

Re: Grove Street North – 3 Locations
Traffic Signal Warrant Analysis
Worcester, MA

Matthew J. Chase, PE, PTOE
Director Municipal Services

Introduction

A petition was submitted to the Traffic & Parking Committee in 2020 to install a traffic signal at the intersection of North Street and Grove Street. This petition has been continually held in committee until a traffic study could be conducted. In May 2022, the city authorized VHB to perform traffic signal warrant analyses for this intersection plus two additional locations. The following three (3) locations, also shown in Figure 1, have been evaluated as part of this study:

1. Grove Street at Glennie Street
2. Grove Street at Sagamore Road
3. Grove Street at North Street

All locations are currently unsignalized and STOP-controlled, with free-flow Grove Street movements. The following provide a summary of each intersection and side street characteristics.

1. Glennie Street intersects Grove Street from the east to form a T-intersection and is approximately 700-feet north of Sagamore Road. Glennie Street runs parallel to Gold Star Boulevard and provides connections to several different office and commercial uses. Glennie Street intersect Millbrook Street to the north, which is also unsignalized.
2. Sagamore Road intersects Grove Street from the west, forming a T-intersection. This section of Sagamore Road is approximately 700-feet long connecting to Park Avenue in the west. There is a traffic signal at the intersection of Park Avenue and Sagamore Road. Retail and commercial uses exist along this short section of Sagamore Road, while Sagamore Road to the west of Park Avenue consists of a dense residential neighborhood that connects to a network of other residential streets.
3. North Street is approximately 315-feet south of Sagamore Road and intersects Grove Street from the east. There are two driveways for the Oak Barrel Tavern across from North Street, forming an off-set 4-way intersection. The Rural Cemetery & Crematory abuts North Street to the south. There are four other streets that connect to North Street (Powers Ct, Milton St, Sigourney St, and Byron Street) and Prescott Street runs south at the most easterly end of North Street.

It is noted that the installation of an unwarranted traffic signal would expose the designer and the municipality to potential liability and litigation associated with any future crashes. In fact, for this reason, VHB will not design a traffic signal for installation at a location that does not meet MUTCD signal warrants. Further, in theory, the municipality could also be subject to forfeiture of Chapter 90 funding as a result of violating Massachusetts General Law. For these reasons, it is not recommended to consider signalizing any locations that do not meet the proper warrants.

Data Collection Effort

VHB collected traffic counts and queried the MassDOT IMPACT Crash Portal (for the review of accident data) to support traffic signal warrant analyses. The following summarizes VHB's findings, which follows MUTCD and MassDOT design guidelines.

Traffic Counts

Automatic Traffic Recorder (ATR) counts were collected over a 24-hour period on March 2, 2022, at seven (7) locations on the roadways that make up the three intersections. The goal was to collect data on approaches and departures of the intersections. At one location, along Grove Street, total traffic volume as well as travel speeds were gathered. Additionally, Turning Movement Counts (TMCs) were collected at the intersection of Grove Street at North Street on March 2, 2022, from 7-9AM and 4-6PM, typical commuting hours. TMCs for the other two locations were provided by the city from the Traffic Impact and Access Study (TIAS) for 288 Grove Street¹. Table 1 summarizes the daily and peak period traffic volumes from the ATR counts. Raw count data may be found in Attachment B of this memo.

Per MassDOT guidelines, traffic counts collected after March 1, 2022, do not need to be adjusted for the COVID-19 pandemic unless the area is predominately office use. The area surrounding this section of Grove Street is primarily commercial, retail, and residential uses, therefore no pandemic-related adjustments have been made.

MassDOT guidelines also require traffic volumes to be seasonally adjusted for regions with notable variations or with primarily retail land uses. Using MassDOT adjustment factors for Urban U4-U7 roadways, March volumes have been increased by 5%. Similarly, the traffic counts gathered in April for the 288 Grove Street TIAS have been adjusted up for 2% to reflect below average conditions during April.

Per conversation with the City, there are no known developments that have come on-line since the traffic counts were collected in March 2022 that would have added traffic volume to the Grove Street corridor. There is a planned residential development on Hemans Street forecast to add approximately 470 vehicles per day to Grove Street and North Street, but the project has yet to start construction.

The ATR count on Grove Street between Sagamore Road and North Street also collected vehicle speeds. The 85th percentile speed in the northbound and southbound directions is 36mph. This is consistent with the speeds gathered for the 288 Grove Street TIAS in April 2017 on Grove Street just north of Brookfield Street. Over a 5-day period, the northbound 85th percentile speed ranged from 34 to 37mph. During the same 5-day period, the southbound 85th percentile speed varied from 33 to 37mph.

¹ *Traffic Impact and Access Study "Proposed Medical Office Building/Adult Day Care Facility, 288 Grove Street, Worcester, Massachusetts*, Green International Affiliates, Inc., May 2018

Table 1: March 2022 ATR Data Summary

Roadway	Daily ^a Weekday	Morning Peak Hour			Evening Peak Hour		
		Volume ^b	K Factor ^c	Dir. Dist. ^d	Volume	K Factor	Dir. Dist.
Glennie Street	3,013	183	6.1%	57% WB	260	8.6%	77% WB
Sagamore Road	4,246	298	7.0%	51% WB	413	9.7%	63% WB
North Street	2,212	141	6.4%	59% WB	230	10.4%	67% WB
Grove Street, north of Glennie Street	14,080	1,058	7.5%	52% SB	1,307	9.3%	51% NB
Grove Street, between Glennie Street and Sagamore Road	16,393	1,129	6.9%	53% SB	1,497	9.1%	54% SB
Grove Street, between Glennie Street and North Street	16,535	1,231	7.4%	53% SB	1,507	9.1%	50%
Grove Street, south of North Street	16,007	1,156	7.2%	54% SB	1,449	9.1%	52% SB

Source: VHB. Based on automatic traffic recorder (ATR) counts collected in March 2022. Data has not been seasonally adjusted.

- a Average daily traffic (ADT) volume expressed in vehicles per day
- b Peak period traffic volume expressed in vehicles per hour
- c Percent of daily traffic that occurs during the peak period
- d Directional distribution of peak period traffic

Crash Data

A query of the MassDOT database for the most recent closed three years (2017-2019) plus two more years of open data (i.e., not finalized by the Registry of Motor Vehicles (RMV)) is summarized in Table 2.

For 2019, the last “closed” 12 months of crash data indicate the intersections experienced the following incidents that could be corrected by signalization:

- Glennie Street – Six (6) crashes, of which three (3) were angle collisions with no apparent injuries.
- Sagamore Road - Two (2) crashes, of which one (1) was a rear-end collision with a reported non-fatal injury and one (1) was an angle collision with property-damage only.
- North Street - Two (2) crashes that did not result in apparent injury, of which one (1) was a rear-end collision and one (1) was an angle collision.

Other types of collisions are generally not considered correctable by signalization and the total number of incidents for each year can be seen in Table 2. Raw crash data may be found in Attachment C of this memo.

Table 2: Crash History Summary

	Glennie Street		Grove Street at Sagamore Road		North Street	
	Closed	Open	Closed	Open	Closed	Open
MassDOT Average Crash Rate (Unsignalized)	0.61		0.61		0.61	
Calculated Crash Rate Exceeds MassDOT Average?	No		No		No	
Year						
2017	3		4		6	
2018	2		3		0	
2019	3		2		2	
2020	0		2		1	
2021		2		0		0
2022		1		0		1
Total	8	3	11	0	9	1
Collision Type						
Angle	5	1	7	0	4	1
Head-on	0	0	0	0	1	0
Rear-end	1	1	3	0	3	0
Rear-to-rear	0	0	0	0	0	0
Sideswipe, opposite direction	0	0	0	0	0	0
Sideswipe, same direction	1	0	0	0	0	0
Single Vehicle Crash	1	1	1	0	1	0
Other/Not reported	0	0	0	0	0	0
Severity						
Fatal Injury	0	0	0	0	0	0
Non-Fatal Injury	2	0	3	0	3	0
Property Damage Only (none injured)	6	3	8	0	5	1
Not Reported	0	0	0	0	1	0
Time of day						
Weekday, 7:00 AM - 9:00 AM	1	0	0	0	2	0
Weekday, 4:00 – 6:00 PM	2	1	3	0	0	0
Saturday 11:00 AM – 1:00 PM	0	0	0	0	0	0
Weekday, other time	5	2	6	0	6	1
Weekend, other time	0	0	2	0	1	0
Pavement Conditions						
Dry	6	2	8	0	6	0
Wet	2	0	2	0	2	1
Snow/Ice/Slush	0	1	1	0	0	0
Not reported	0	0	0	0	1	0
Non-Motorist (Bike, Pedestrian)	1	0	0	0	0	0

Source: MassDOT IMPACT database

It is possible that additional crashes may have occurred but were not included in the crash database. MassDOT receives crash information from the RMV. Drivers must report crashes to the RMV that result in personal injury or more than \$1,000 in property damage (including the vehicle(s) involved). Many minor motor vehicle accidents (“fender benders”) do not cause substantial property damage, and therefore may not be reported.

Signal Warrant Analysis

The Manual on Uniform Traffic Control Devices (MUTCD) includes nine warrants to justify the installation of a traffic signal system. If an intersection satisfies any or more than one of these warrants there is *no requirement* to install a signal, merely that one *could be* installed if it improves the overall safety and/or operations of the intersection. The nine warrants are described below:

- **Warrant 1 (Eight-Hour Vehicular Volume):** Warrant 1 is satisfied if either of Condition A or B is met. In addition, Warrant 1 can be satisfied by 80 percent satisfaction of both Condition A and Condition B.
 - **Condition A (Minimum Vehicular Volume):** Satisfied when the volume of intersecting traffic (major and minor streets) exceeds MUTCD thresholds for eight or more hours.
 - **Condition B (Interruption of Continuous Traffic):** Satisfied when the volume of major street traffic is so heavy that minor street traffic suffers excessive delay in entering or crossing the major street for eight or more hours.
- **Warrant 2 (Four-Hour Vehicular Volume):** Satisfied when volumes (major and minor streets) exceed MUTCD thresholds for four or more hours.
- **Warrant 3 (Peak Hour):** Satisfied when for the peak hour of a typical day, major and minor street traffic exceeds MUTCD thresholds.
- **Warrant 4 - Pedestrian Volume:** Pedestrian volumes need to exceed 107 persons per hour for four hours or 133 persons per hour for one hour to meet criteria for this warrant.
- **Warrant 5-School Crossing:** A gap study would be required to establish if there are not adequate gaps in the traffic stream to accommodate students and there must be a minimum of twenty (20) students in the highest hour.
- **Warrant 6 – Coordinated Signal System:** Warrant would be satisfied if signalization would provide better vehicle platooning between intersections within 1,000 feet. The signalized intersection of Grove Street and Park Road is approximately 400-feet north of Glennie Street. The signalized intersection of Grove Street at Lancaster Street is approximately 1,600 feet south of North Street. This warrant is not applicable for these locations as Grove Street vehicle platoons are largely unaffected by movements to/from the side streets.
- **Warrant 7 – Crash Experience:** Satisfaction of this warrant requires five or more crashes in a 12-month period and the crash types must be correctable by signalization.
- **Warrant 8 – Roadway Network** Typically applied to an intersection of two major roadways to concentrate and organize traffic flow. This warrant is not applicable for this location.
- **Warrant 9 – Intersection Near a Grade Crossing –** If no other warrant is met, this warrant may be used if there is an at-grade crossing within 140-feet of a STOP-controlled approach. This warrant is not applicable for this location.

The FHWA issued an Interim Approval to the MUTCD on February 24, 2017, providing the optional use of an alternative crash experience warrant. MassDOT has authorized use of this warrant.

- **Alternative Warrant 7 – Crash Experience:** MUTCD Interim Approval IA-19 lowers the threshold of “correctable” crashes based on resulting injuries, if pedestrians were involved, and the number of years. See Table 3 for minimum number of reported angle and pedestrian crashes necessary to meet this warrant.

Table 3: IA-19 Minimum Number of Reported Crashes in Urban Area

Number of Lanes		Total of Angle and Pedestrian Crashes (all severities)		Total of Fatal-and-Injury Angle and Pedestrian Crashes	
Major Street	Minor Street	Four Legs	Three Legs	Four Legs	Three Legs
One-Year Period					
1	1	5	4	3	3
2 or more	1	5	4	3	3
2 or more	2 or more	5	4	3	3
1	2 or more	5	4	3	3
Three-Year Period					
1	1	6	5	4	4
2 or more	1	6	5	4	4
2 or more	2 or more	6	5	4	4
1	2 or more	6	5	4	4

Source: MUTCD Interim Approval IA-19

The total number of crashes for the traffic signal system as a whole, per year, are broken down by Angle, Pedestrian and Fatal and Injury (FI) collisions in Table 4. Using 2017 through 2020 data, Grove Street at North Street does not meet or exceed thresholds presented in Table 3 for a Three-Leg or Four-Leg intersection for the most recent (closed) years. Grove Street at Sagamore Road and Glennie Street do meet three-year period thresholds, using 2017-2019 crash data.

Table 4 Grove Street at 3 Locations Crash Experience

	Glennie Street				Grove Street at Sagamore Road				North Street			
	Total	Angle	Ped	FI	Total	Angle	Ped	FI	Total	Angle	Ped	FI
Year												
2017	3	1	0	1	4	4	0	1	6	3	0	1
2018	2	2	0	0	3	1	0	1	0	0	0	0
2019	3	2	1	0	2	1	0	0	2	1	0	0
2020	0	0	0	0	2	1	0	0	1	0	0	0

Source: VHB

Methodology

A recent revision to the Massachusetts Amendments² to the MUTCD suggests a minimum of eight (8) hours of traffic count data should be collected to justify installation of a traffic signal. For this study, 24 hours of data was collected in early 2022 for each approach to all three study intersections. It is standard practice to exclude all or a percentage of minor road right-turn vehicles from warrant analyses as these vehicles typically have less trouble entering the mainline traffic stream. To determine the percentage of right-turn volume from the side streets, the four hours of peak TMC data along with the geometric configuration of the approach was evaluated.

At minor-road STOP-controlled intersections, vehicles turning left or travelling straight from the minor road need to wait for an acceptable gap in mainline traffic in both directions before proceeding, while right-turning traffic only needs an adequate gap in one direction. If a minor-road approach is not wide enough for two vehicles, a right-turning vehicle would be subjected to a larger delay if a vehicle in front of them was turning left or travelling straight through the intersection. A higher percentage of right-turns from a minor road decreases the likelihood of being impeded by other movements. From the perspective of a signalized intersection, the percentage of vehicles that would be able to make a right-turn on RED are often excluded from the warrant analyses. Right-turns on RED may be prohibited based a number of conditions, including sight-distance constraints and pedestrian/bicycle-vehicle conflicts. In those cases, all of the right-turn volume would be included in the warrant analyses.

The following summarizes the results:

1. For Glennie Street, right-turns accounted for 6- to 23-percent of the total approach volume during peak periods. As most traffic on Glennie Street is turning left and the approach to Grove Street is not flared, it would be unlikely for a right-turning vehicles to be able to make a right-turn on red if the intersection is signalized. Therefore, the total approach volume could be used but to present a conservative warrant analysis, an average of fifteen (15) percent of the volume from the ATRs have been excluded.
2. For Sagamore Road, the majority (60- to 81- percent) of traffic is turning right during peak periods of over the course of the four-hours. An average of 72-percent of traffic (about two-thirds of total volume) is turning right so it was assumed approximately half is likely to be unimpeded by left-turning traffic and half would be delayed by a left-turning vehicle since the approach is not flared. For the warrant analyses, 36-percent of the total approach volume was excluded to provide a more realistic analysis.
3. Similarly for North Street, 58- to 71-percent of the peak hour traffic is right turns. While the North Street approach to Grove Street is somewhat flared, a right-turning vehicle would not be able to maneuver around another vehicle stopped at the STOP line. Over the course of the four peak hours of collected turning movement counts, an average of 64-percent of traffic is turning right, so it was assumed that approximately half is likely to be unimpeded by left-turning or through traffic. Therefore 32-percent (approximately one-third) of the total volume has been excluded from the warrant analysis, which provides a more realistic analysis.

Analyses Results

Table 5 summarizes the three (3) volume-based warrants and the two (2) crash experience-based warrants. The intersection of Grove Street at Glennie Street meets all three volume-based warrants and one crash experience

² *The Massachusetts Amendments to the 2009 Manual on Uniform Traffic Control Devices for Streets and Highways*, November 2022.
<https://www.mass.gov/doc/massachusetts-amendments-to-the-mutcd-2022/download>

warrant. The intersection of Grove Street at Sagamore Road meets one volume-based warrant and a crash experience warrant. The intersection of Grove Street at North Street does not meet any traffic signal warrants.

Traffic Signal Warrant spreadsheets may be found in Attachment D.

Table 5: Traffic Signal Warrants Analysis Summary

Grove Street at	Warrant Met?				
	Warrant 1: Eight-Hour	Warrant 2: Four Hour	Warrant 3: Peak Hour	Warrant 7: Crash Experience	Alternate Warrant 7: Crash Experience
Glennie Street	Yes	Yes	Yes	No	Yes ¹
Sagamore Road	No	Yes	No	No	Yes ¹
North Street	No	No	No	No	No

Source Based on guidelines established in the Manual on Uniform Traffic Control Devices (MUTCD), 2009.

¹ Using 2017-2019 crash data

Summary and Recommendations for Next Steps

The following provides a summary on the results of the assessment above, including field observations, and recommendations to consider for next steps.

Glennie Street

Glennie Street intersects Grove Street approximately 400-feet south of the signalized intersection of Park Avenue, Grove Street, and Gold Star Boulevard. Grove Street north of Park Avenue is one-way southbound and Gold Star Boulevard is one-way northbound and is separated by a raised planted median at the intersection. While land-use along Glennie Street is not in itself large traffic generators, it does serve several office- and commercial-type uses which also have access to Gold Star Boulevard. Glennie Street also appears to serve as a cut-thru for traffic on Millbrook Street. Millbrook Street traffic is restricted to right-turn only at Gold Star Boulevard; therefore, drivers take a circuitous route to reverse direction to head south on Park Avenue or Grove Street. Millbrook Street at Gold Star Boulevard was identified by MassDOT as a 2015-2017 Crash Cluster and continues to experience over ten angle and side-swipe collisions annually. Signalizing Grove Street at Glennie Street could increase the amount of cut-thru traffic, which may offer crash and congestion reduction benefits to the Gold Star Boulevard intersection and reduce congestion at other intersections traversed to reverse direction. If a traffic signal is installed at Glennie Street, monitoring is advised. As illustrated in Figure 2, traffic patterns to the north from Millbrook Street (reversing direction to southbound via Ruthven Avenue or Route 12 U-turn) could shift to this location and potentially use Sagamore Road or Grove Street to access Park Avenue or Salisbury Street to the south.

There is approximately 300-feet between the intersection of Park Avenue and Grove Street to Glennie Street. For vehicle queue storage. Coordination between the two traffic signal systems may be necessary to manage vehicle platoons depending on the lane configuration at Glennie Street. The existing phasing scheme at the intersection of Park Avenue and Grove Street may also need to be re-evaluated. Currently northbound Grove Street and northbound Park Avenue operate concurrently. If the Glennie Street intersection is to be signalized, northbound vehicles may become platooned and further complicate the movement from Park Avenue northbound to the gas station.

Recommendations: Out of the three locations studied, this location would be the best location for a traffic signal given the amount of traffic observed. That said, the location should continue to be monitored and traffic calming along the Grove Street corridor should be explored; see Sagamore Road summary below.

Sagamore Road

Most of the turns from this side street to Grove Street were right-turn movements. As noted above, 36-percent of the right-turn movements were excluded from the warrant analyses. However, the following is noted:

- If the Sagamore approach were to be posted as No-Turn-On-Red (NTOR) if signalized, no volume reduction would be necessary. A thorough sight-distance evaluation has not been performed to date but appears to be adequate to allow turns on red. The city could consider posting NTOR to reduce pedestrian-vehicle conflicts if an exclusive pedestrian phase is chosen.
- If only 25-percent of volume from Sagamore Road were excluded, the intersection would satisfy all three volume-based warrants.
- This intersection meets a crash experience warrant, so a traffic signal could be considered at the Sagamore Road intersection regardless of meeting any volume-based warrants.

Sagamore Road is within the Montvale Historic District which has been the topic of several petitions to the City for traffic calming and cut-thru traffic issues. Signalizing Grove Street at Sagamore Road could increase the amount of cut-thru traffic using Sagamore Road from Forest Street and Salisbury Street.

The 85th-percentile speed on Grove Street was observed to be around 36 mph in both the northbound and southbound directions. These observations were made between Sagamore Road and North Street where the pavement width is very wide.

Recommendations: While the intersection satisfies warrants for signalization, a traffic signal at this time is not recommended, as congestion may be limited to peak hours and cut-thru traffic volume in the Montvale Historic District could increase. This location should however be monitored, especially if the intersection of Glennie Street is signalized.

Also, while on-road bike lanes were implemented in 2020, each travel lane is still wide (13- to 15-feet). One additional traffic calming measure that could be explored would be to narrow the travel lanes to 11-feet and provide striped bike buffers adjacent to the bike lanes. Since most of the turning movements from Sagamore are right-turn movements, traffic calming could alleviate the crash warrant noted above. In addition, slower speeds and a traffic signal at Glennie Street could potentially increase the frequency and size of vehicle-gaps for side street traffic to enter the mainline. From the crash data summarized above, it appears that crashes might be decreasing since bike lanes were implemented in 2020. More recent crash data could be reviewed to confirm the trend however conclusions may be difficult to draw from a small number of crashes.

North Street

Most of the turns from this side street to Grove Street were right-turn movements. As noted above, 32.5-percent of the right-turn movements were excluded from the warrant analyses. However, the following is noted:

- If only 5-percent of the volume from North Street were excluded, the intersection would satisfy Warrant 2: Four-Hour and Warrant 3: Peak Hour for a single hour in the afternoon. Signalization could encourage cut-

thru traffic from Millbrook Street via Bryon Street or Milton Street, which are narrower and more residential roadways than Glennie Street.

- If none of the right-turn volume from North Street is excluded from the warrant analyses and the area experiences an approximately 4% increase in traffic, the intersection would satisfy Warrant 1: Eight Hour. The proposed residential development on Hemans Street could generate enough traffic to reach warrant thresholds.

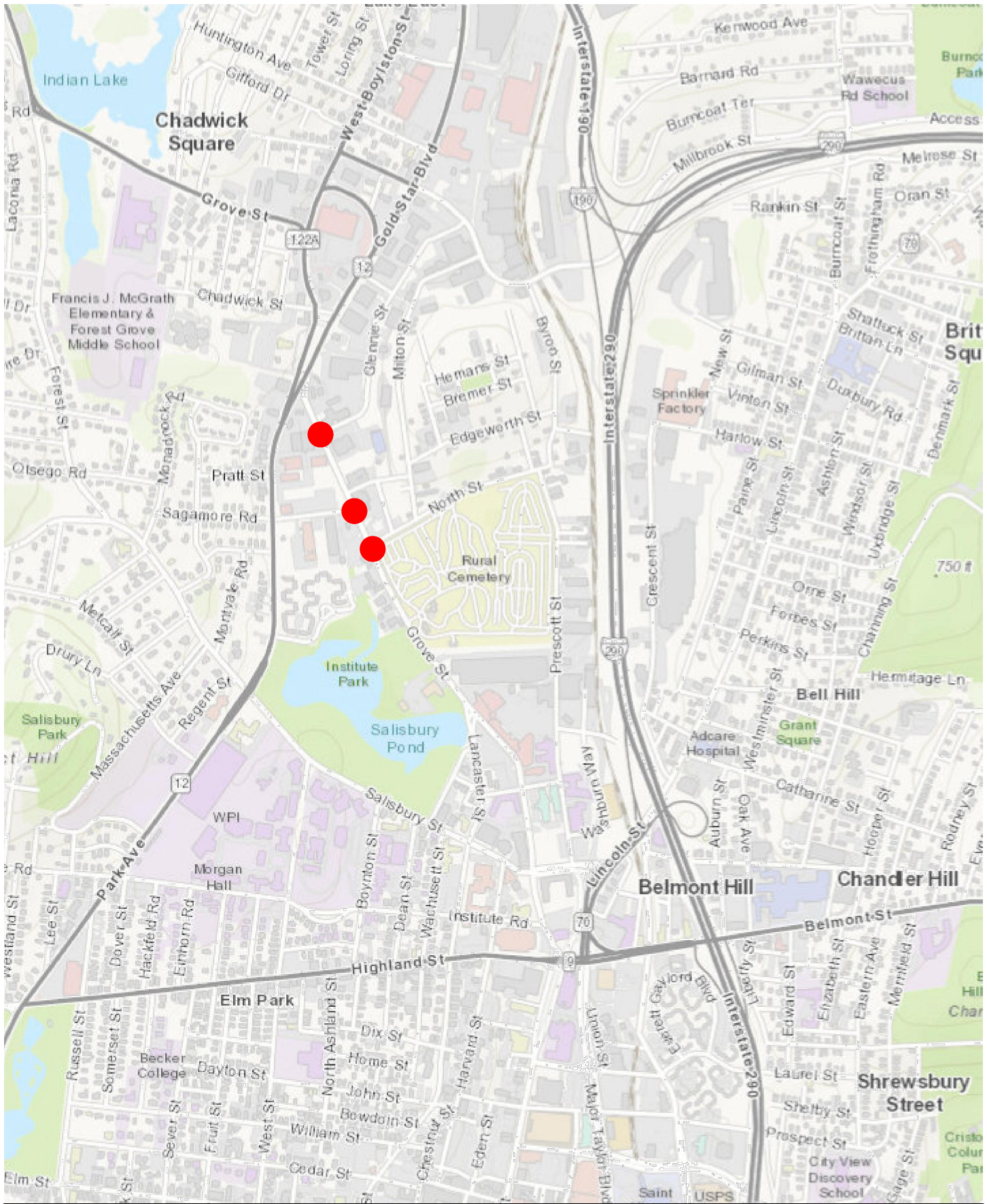
Recommendations: A traffic signal is not recommended at this location at this time. Similar to the Sagamore Road location, the signalization of Glennie Street could slow travel speeds on Grove Street and create gaps in traffic to facilitate turns from North Street. For additional traffic calming measures, one of the following could be considered:

- Construct a median on the north side of intersection to provide pedestrian refuge for the existing crosswalk and reduce pedestrian exposure to traffic; or,
- Construct curb extensions to shorten pedestrian exposure. This would require shifting the on-road bike lanes; or,
- Narrow the travel lanes by adding a buffer to the on-road bike lanes as mentioned under the Sagamore Road location.

Stephen S. Rolle, PE
Ref: 15752.00
April 25, 2023



Attachment A: Figures



● Study Area Intersection

↑ Not to Scale



Figure 1
Study Locations
Grove Street - 3 Locations
Worcester, Massachusetts

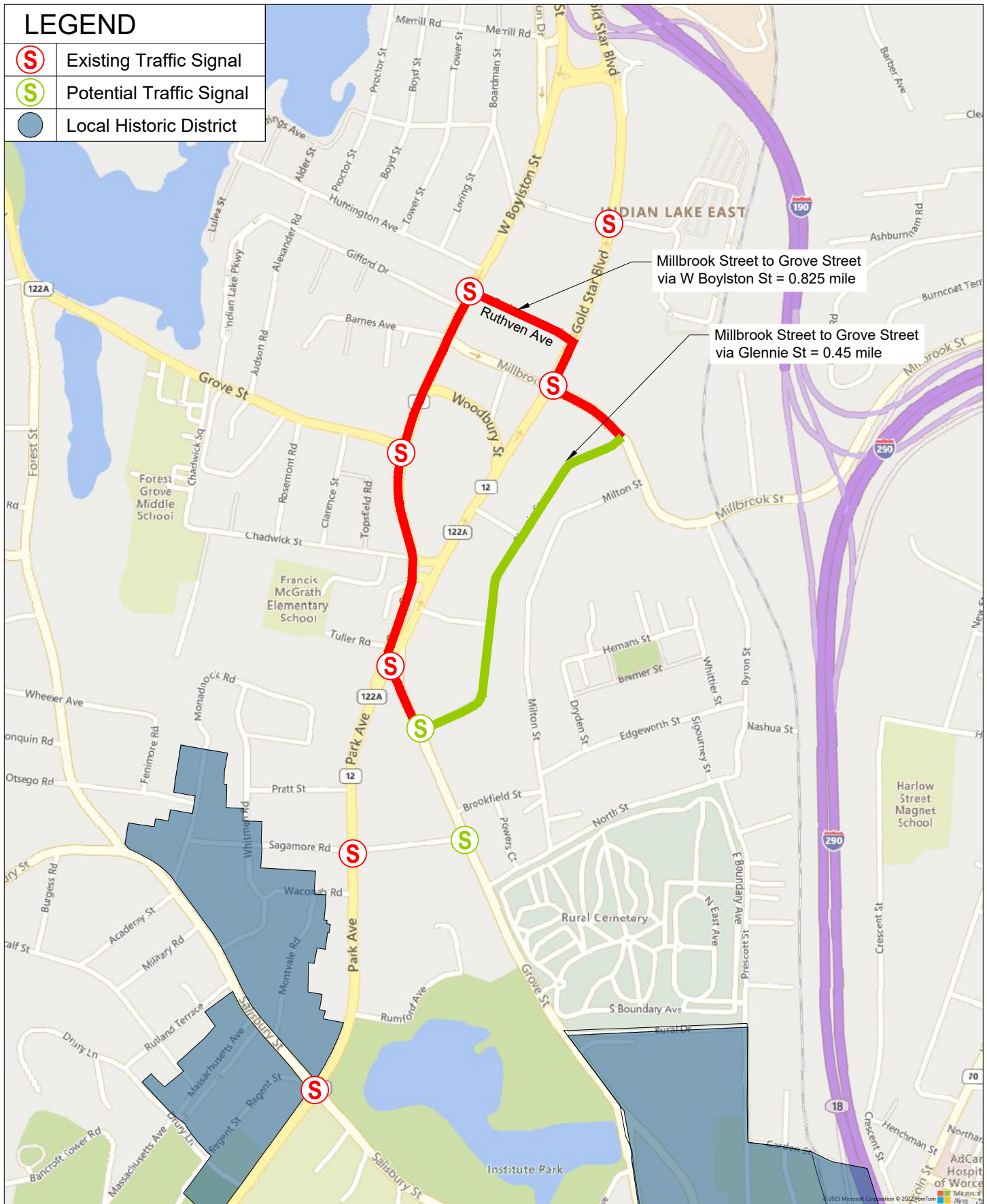


Figure 2

Glennie Street Cut-Thru Potential
Grove Street - 3 Locations
Worcester, Massachusetts



0 400 800 Feet

Stephen S. Rolle, PE
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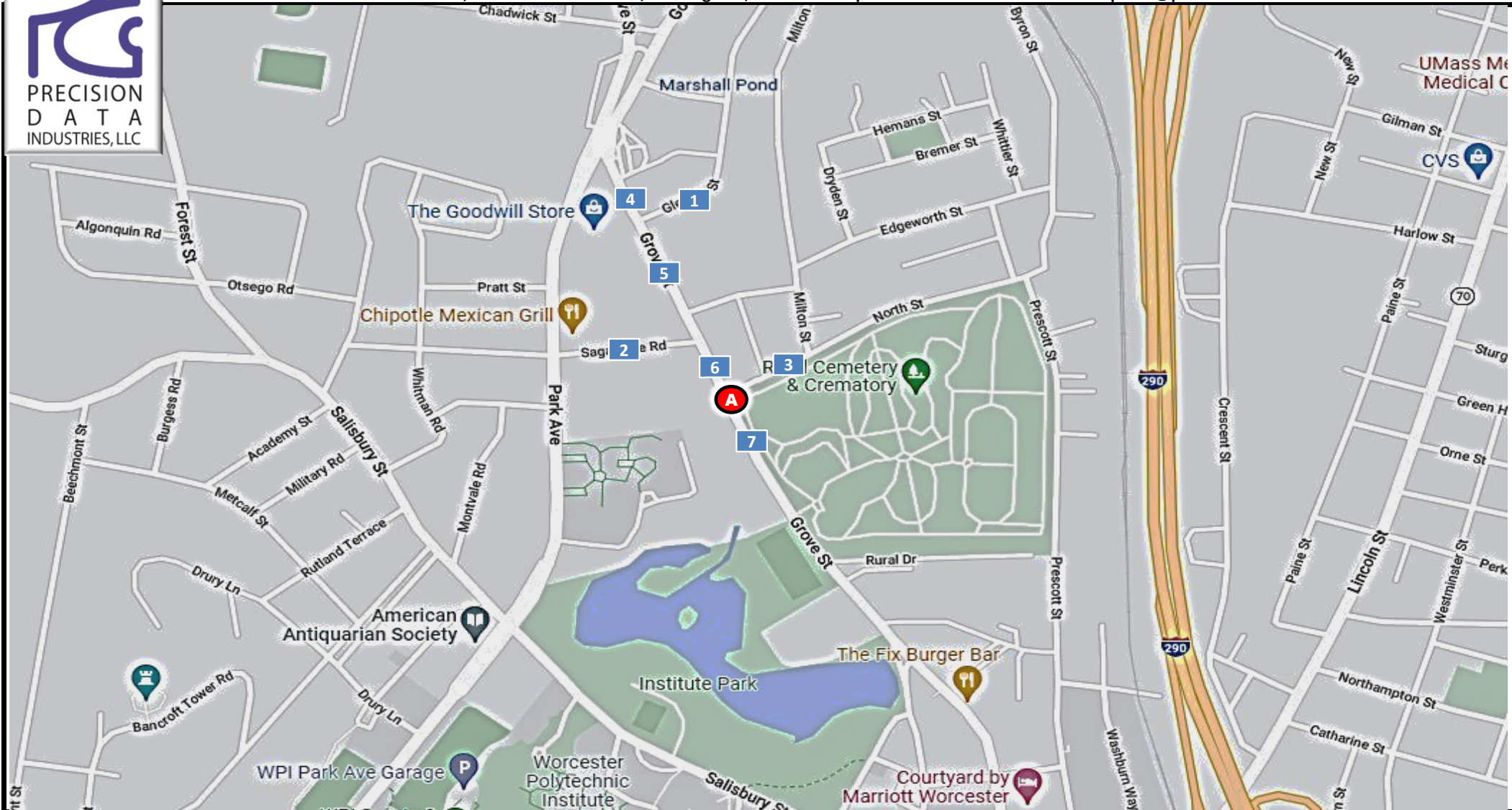
Attachment B: Traffic Counts



PRECISION
DATA
INDUSTRIES, LLC

Location Map: 228438 Worcester, MA

Precision Data Industries, LLC 46 Morton Street, Framingham, MA 01702 ph: 508-875-0100 email: datarequests@pdillc.com



Client: VHB	Engineer: E. Thompson	Site Code: 15245.00	Date: Wednesday 3/2/22	PDI Job # 228438	City, State: Worcester, MA
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Glennie Street
 east of Grove Street
 City, State: Worcester, MA
 Client: VHB/E. Thompson
 Site Code: 15245



157 Washington Street, Suite 2
 Hudson, MA 01749
 Office: 508-875-0100 Fax: 508-875-0118

PDI File # 228438 ATR 1

Count Date: Wednesday, March 2, 2022
 Direction: EB

AM	Cars	Single Unit Heavy	Multi Unit Heavy	Total
12:00 AM	0	0	0	0
12:15 AM	1	0	0	1
12:30 AM	0	0	0	0
12:45 AM	0	0	0	0
1:00 AM	0	0	0	0
1:15 AM	0	0	0	0
1:30 AM	1	0	0	1
1:45 AM	0	0	0	0
2:00 AM	0	0	0	0
2:15 AM	0	0	0	0
2:30 AM	0	0	0	0
2:45 AM	0	1	0	1
3:00 AM	0	0	0	0
3:15 AM	0	0	0	0
3:30 AM	1	0	0	1
3:45 AM	0	0	0	0
4:00 AM	1	0	0	1
4:15 AM	5	1	0	6
4:30 AM	2	1	0	3
4:45 AM	5	0	0	5
5:00 AM	2	1	0	3
5:15 AM	5	0	0	5
5:30 AM	7	2	0	9
5:45 AM	12	0	0	12
6:00 AM	5	0	0	5
6:15 AM	10	0	0	10
6:30 AM	16	0	0	16
6:45 AM	21	1	0	22
7:00 AM	17	0	0	17
7:15 AM	15	1	0	16
7:30 AM	17	0	0	17
7:45 AM	24	0	0	24
8:00 AM	7	0	0	7
8:15 AM	23	0	0	23
8:30 AM	24	1	0	25
8:45 AM	20	0	0	20
9:00 AM	10	0	0	10
9:15 AM	10	1	0	11
9:30 AM	12	0	0	12
9:45 AM	11	0	0	11
10:00 AM	18	2	0	20
10:15 AM	17	2	0	19
10:30 AM	16	0	0	16
10:45 AM	20	0	0	20
11:00 AM	16	2	0	18
11:15 AM	14	0	0	14
11:30 AM	19	0	0	19
11:45 AM	15	2	0	17

PM	Cars	Single Unit Heavy	Multi Unit Heavy	Total
12:00 PM	17	1	0	18
12:15 PM	22	0	0	22
12:30 PM	21	0	0	21
12:45 PM	22	0	0	22
1:00 PM	12	0	0	12
1:15 PM	17	1	0	18
1:30 PM	19	0	0	19
1:45 PM	10	0	0	10
2:00 PM	16	0	0	16
2:15 PM	14	2	0	16
2:30 PM	13	0	0	13
2:45 PM	14	2	0	16
3:00 PM	11	0	1	12
3:15 PM	12	0	0	12
3:30 PM	19	1	0	20
3:45 PM	19	0	0	19
4:00 PM	9	0	0	9
4:15 PM	15	2	0	17
4:30 PM	14	0	0	14
4:45 PM	14	0	0	14
5:00 PM	9	0	0	9
5:15 PM	7	0	0	7
5:30 PM	14	0	0	14
5:45 PM	13	0	0	13
6:00 PM	12	0	0	12
6:15 PM	12	0	1	13
6:30 PM	9	0	0	9
6:45 PM	9	0	0	9
7:00 PM	10	0	0	10
7:15 PM	10	0	0	10
7:30 PM	6	0	0	6
7:45 PM	8	0	0	8
8:00 PM	10	0	0	10
8:15 PM	8	0	0	8
8:30 PM	8	0	0	8
8:45 PM	4	0	0	4
9:00 PM	7	0	0	7
9:15 PM	4	0	0	4
9:30 PM	4	0	0	4
9:45 PM	3	0	0	3
10:00 PM	1	0	0	1
10:15 PM	3	0	0	3
10:30 PM	2	0	0	2
10:45 PM	0	0	0	0
11:00 PM	1	0	0	1
11:15 PM	2	0	0	2
11:30 PM	2	0	0	2
11:45 PM	0	0	0	0

AM Total 419 18 0 437
 Percentage 95.88% 4.12% 0.00%
 AM Peak 7:45 AM 9:30 AM 12:00 AM 7:45 AM
 Volume 78 4 0 79

PM Total 488 9 2 499
 Percentage 97.80% 1.80% 0.40%
 PM Peak 12:00 PM 2:00 PM 2:15 PM 12:00 PM
 Volume 82 4 1 83

Day Total 907 27 2 936
 Percentage 96.90% 2.88% 0.21%

Glennie Street
 east of Grove Street
 City, State: Worcester, MA
 Client: VHB/E. Thompson
 Site Code: 15245



157 Washington Street, Suite 2
 Hudson, MA 01749
 Office: 508-875-0100 Fax: 508-875-0118

PDI File # 228438 ATR 1

Count Date: Wednesday, March 2, 2022
 Direction: WB

AM	Cars	Single Unit Heavy	Multi Unit Heavy	Total
12:00 AM	3	0	0	3
12:15 AM	2	0	0	2
12:30 AM	0	0	0	0
12:45 AM	0	0	1	1
1:00 AM	0	0	0	0
1:15 AM	1	0	0	1
1:30 AM	0	0	0	0
1:45 AM	0	0	0	0
2:00 AM	0	0	0	0
2:15 AM	0	0	0	0
2:30 AM	0	0	0	0
2:45 AM	0	0	0	0
3:00 AM	1	0	0	1
3:15 AM	2	0	0	2
3:30 AM	0	0	0	0
3:45 AM	1	0	0	1
4:00 AM	0	0	0	0
4:15 AM	0	0	0	0
4:30 AM	0	0	0	0
4:45 AM	3	0	0	3
5:00 AM	4	0	0	4
5:15 AM	2	1	0	3
5:30 AM	3	1	0	4
5:45 AM	3	2	0	5
6:00 AM	8	2	0	10
6:15 AM	8	0	0	8
6:30 AM	13	2	0	15
6:45 AM	13	2	0	15
7:00 AM	13	1	0	14
7:15 AM	21	1	0	22
7:30 AM	19	5	0	24
7:45 AM	21	3	0	24
8:00 AM	25	0	0	25
8:15 AM	20	1	0	21
8:30 AM	32	1	0	33
8:45 AM	22	2	0	24
9:00 AM	26	1	0	27
9:15 AM	23	1	0	24
9:30 AM	20	0	0	20
9:45 AM	25	3	0	28
10:00 AM	30	0	0	30
10:15 AM	35	1	0	36
10:30 AM	31	1	0	32
10:45 AM	24	1	0	25
11:00 AM	36	2	0	38
11:15 AM	35	3	0	38
11:30 AM	29	1	1	31
11:45 AM	48	0	0	48

PM	Cars	Single Unit Heavy	Multi Unit Heavy	Total
12:00 PM	51	2	0	53
12:15 PM	44	0	0	44
12:30 PM	29	0	0	29
12:45 PM	24	0	0	24
1:00 PM	44	0	0	44
1:15 PM	45	0	0	45
1:30 PM	24	2	0	26
1:45 PM	32	2	0	34
2:00 PM	27	1	0	28
2:15 PM	35	1	0	36
2:30 PM	38	0	0	38
2:45 PM	39	0	0	39
3:00 PM	55	1	0	56
3:15 PM	34	3	0	37
3:30 PM	49	0	0	49
3:45 PM	48	1	0	49
4:00 PM	55	1	0	56
4:15 PM	51	1	0	52
4:30 PM	43	1	0	44
4:45 PM	42	0	0	42
5:00 PM	54	0	0	54
5:15 PM	40	1	0	41
5:30 PM	40	0	0	40
5:45 PM	41	0	0	41
6:00 PM	38	0	0	38
6:15 PM	37	0	0	37
6:30 PM	37	1	0	38
6:45 PM	36	0	0	36
7:00 PM	30	0	0	30
7:15 PM	31	1	0	32
7:30 PM	21	0	0	21
7:45 PM	18	1	0	19
8:00 PM	16	0	0	16
8:15 PM	20	0	0	20
8:30 PM	19	0	0	19
8:45 PM	13	0	0	13
9:00 PM	27	0	0	27
9:15 PM	19	0	0	19
9:30 PM	19	0	0	19
9:45 PM	9	0	1	10
10:00 PM	7	0	0	7
10:15 PM	7	1	0	8
10:30 PM	5	0	0	5
10:45 PM	10	0	0	10
11:00 PM	6	0	0	6
11:15 PM	0	0	0	0
11:30 PM	1	0	0	1
11:45 PM	3	0	0	3

AM Total 602 38 2 642
 Percentage 93.77% 5.92% 0.31%
 AM Peak 11:00 AM 7:00 AM 12:00 AM 11:00 AM
 Volume 148 10 1 155

PM Total 1413 21 1 1435
 Percentage 98.47% 1.46% 0.07%
 PM Peak 3:30 PM 1:30 PM 9:00 PM 3:30 PM
 Volume 203 6 1 206

Day Total 2015 59 3 2077
 Percentage 97.01% 2.84% 0.14%

Sagamore Road
 west of Grove Street
 City, State: Worcester, MA
 Client: VHB/E. Thompson
 Site Code: 15245



157 Washington Street, Suite 2
 Hudson, MA 01749
 Office: 508-875-0100 Fax: 508-875-0118

PDI File # 228438 ATR 2

Count Date: Wednesday, March 2, 2022
 Direction: EB

AM	Cars	Single Unit Heavy	Multi Unit Heavy	Total
12:00 AM	2	0	0	2
12:15 AM	2	0	0	2
12:30 AM	0	0	0	0
12:45 AM	1	0	0	1
1:00 AM	0	0	0	0
1:15 AM	0	0	0	0
1:30 AM	2	0	0	2
1:45 AM	2	0	0	2
2:00 AM	2	0	0	2
2:15 AM	1	0	0	1
2:30 AM	0	0	0	0
2:45 AM	0	0	0	0
3:00 AM	0	0	0	0
3:15 AM	0	0	0	0
3:30 AM	1	0	0	1
3:45 AM	1	0	0	1
4:00 AM	2	0	0	2
4:15 AM	2	0	0	2
4:30 AM	4	0	0	4
4:45 AM	7	0	0	7
5:00 AM	4	1	0	5
5:15 AM	7	1	0	8
5:30 AM	4	0	0	4
5:45 AM	18	0	0	18
6:00 AM	11	0	0	11
6:15 AM	22	0	0	22
6:30 AM	19	1	0	20
6:45 AM	28	1	0	29
7:00 AM	23	0	0	23
7:15 AM	19	0	0	19
7:30 AM	26	1	0	27
7:45 AM	36	1	0	37
8:00 AM	42	0	0	42
8:15 AM	28	1	0	29
8:30 AM	41	0	0	41
8:45 AM	39	1	0	40
9:00 AM	28	0	0	28
9:15 AM	25	3	0	28
9:30 AM	31	0	1	32
9:45 AM	21	1	0	22
10:00 AM	23	1	0	24
10:15 AM	34	0	0	34
10:30 AM	22	0	0	22
10:45 AM	23	0	0	23
11:00 AM	19	0	0	19
11:15 AM	37	0	0	37
11:30 AM	31	0	0	31
11:45 AM	21	0	0	21

PM	Cars	Single Unit Heavy	Multi Unit Heavy	Total
12:00 PM	29	0	0	29
12:15 PM	23	1	0	24
12:30 PM	34	1	1	36
12:45 PM	31	0	0	31
1:00 PM	29	2	0	31
1:15 PM	30	0	0	30
1:30 PM	26	1	0	27
1:45 PM	27	1	0	28
2:00 PM	37	1	0	38
2:15 PM	28	0	0	28
2:30 PM	39	0	0	39
2:45 PM	32	1	0	33
3:00 PM	44	1	0	45
3:15 PM	36	1	0	37
3:30 PM	35	0	0	35
3:45 PM	24	1	0	25
4:00 PM	40	0	0	40
4:15 PM	27	0	0	27
4:30 PM	44	0	0	44
4:45 PM	42	0	0	42
5:00 PM	26	3	0	29
5:15 PM	23	0	0	23
5:30 PM	31	1	0	32
5:45 PM	28	0	0	28
6:00 PM	23	1	0	24
6:15 PM	28	0	0	28
6:30 PM	26	1	0	27
6:45 PM	26	0	0	26
7:00 PM	21	2	0	23
7:15 PM	24	0	0	24
7:30 PM	18	1	0	19
7:45 PM	17	0	0	17
8:00 PM	13	0	0	13
8:15 PM	12	0	0	12
8:30 PM	14	0	0	14
8:45 PM	15	0	0	15
9:00 PM	13	0	0	13
9:15 PM	17	0	0	17
9:30 PM	17	1	0	18
9:45 PM	9	0	0	9
10:00 PM	6	0	0	6
10:15 PM	4	0	0	4
10:30 PM	4	0	0	4
10:45 PM	4	0	0	4
11:00 PM	5	0	0	5
11:15 PM	6	0	0	6
11:30 PM	1	0	0	1
11:45 PM	1	0	0	1

AM Total 711 13 1 725
 Percentage 98.07% 1.79% 0.14%
 AM Peak 8:00 AM 9:15 AM 8:45 AM 8:00 AM
 Volume 150 5 1 152

PM Total 1089 21 1 1111
 Percentage 98.02% 1.89% 0.09%
 PM Peak 4:00 PM 12:15 PM 12:00 PM 2:30 PM
 Volume 153 4 1 154

Day Total 1800 34 2 1836
 Percentage 98.04% 1.85% 0.11%

Sagamore Road
 west of Grove Street
 City, State: Worcester, MA
 Client: VHB/E. Thompson
 Site Code: 15245



157 Washington Street, Suite 2
 Hudson, MA 01749
 Office: 508-875-0100 Fax: 508-875-0118

PDI File # 228438 ATR 2

Count Date: Wednesday, March 2, 2022
 Direction: WB

AM	Cars	Single Unit Heavy	Multi Unit Heavy	Total	PM	Cars	Single Unit Heavy	Multi Unit Heavy	Total
12:00 AM	4	0	0	4	12:00 PM	50	0	0	50
12:15 AM	5	0	0	5	12:15 PM	38	1	0	39
12:30 AM	1	0	0	1	12:30 PM	30	0	0	30
12:45 AM	0	0	0	0	12:45 PM	29	1	0	30
1:00 AM	2	0	0	2	1:00 PM	33	0	0	33
1:15 AM	0	0	0	0	1:15 PM	34	0	0	34
1:30 AM	0	0	0	0	1:30 PM	38	1	0	39
1:45 AM	0	0	0	0	1:45 PM	34	2	0	36
2:00 AM	1	0	0	1	2:00 PM	43	0	0	43
2:15 AM	0	0	0	0	2:15 PM	49	0	0	49
2:30 AM	1	0	0	1	2:30 PM	52	0	0	52
2:45 AM	0	0	0	0	2:45 PM	56	0	0	56
3:00 AM	2	0	0	2	3:00 PM	75	0	0	75
3:15 AM	0	0	0	0	3:15 PM	51	2	0	53
3:30 AM	0	0	0	0	3:30 PM	59	0	0	59
3:45 AM	0	1	0	1	3:45 PM	62	0	0	62
4:00 AM	0	0	0	0	4:00 PM	60	0	0	60
4:15 AM	1	0	0	1	4:15 PM	69	0	0	69
4:30 AM	1	0	0	1	4:30 PM	73	0	0	73
4:45 AM	1	0	0	1	4:45 PM	58	0	0	58
5:00 AM	5	1	1	7	5:00 PM	68	0	0	68
5:15 AM	3	0	0	3	5:15 PM	50	0	0	50
5:30 AM	4	0	0	4	5:30 PM	56	0	0	56
5:45 AM	2	1	0	3	5:45 PM	57	0	0	57
6:00 AM	12	0	0	12	6:00 PM	49	0	0	49
6:15 AM	7	2	0	9	6:15 PM	54	0	0	54
6:30 AM	11	1	0	12	6:30 PM	49	0	0	49
6:45 AM	14	0	0	14	6:45 PM	34	0	0	34
7:00 AM	20	0	0	20	7:00 PM	29	0	0	29
7:15 AM	23	1	0	24	7:15 PM	29	1	0	30
7:30 AM	16	2	0	18	7:30 PM	21	1	0	22
7:45 AM	21	1	0	22	7:45 PM	22	0	0	22
8:00 AM	31	1	0	32	8:00 PM	15	0	0	15
8:15 AM	38	0	0	38	8:15 PM	24	0	0	24
8:30 AM	41	0	0	41	8:30 PM	22	0	0	22
8:45 AM	33	1	1	35	8:45 PM	20	0	0	20
9:00 AM	26	0	0	26	9:00 PM	23	0	0	23
9:15 AM	30	1	0	31	9:15 PM	15	0	0	15
9:30 AM	24	0	0	24	9:30 PM	20	1	0	21
9:45 AM	26	1	0	27	9:45 PM	7	0	0	7
10:00 AM	35	0	0	35	10:00 PM	6	1	0	7
10:15 AM	29	0	0	29	10:15 PM	10	0	0	10
10:30 AM	39	0	0	39	10:30 PM	10	0	0	10
10:45 AM	17	2	0	19	10:45 PM	13	0	0	13
11:00 AM	30	0	0	30	11:00 PM	8	0	0	8
11:15 AM	38	0	0	38	11:15 PM	4	0	0	4
11:30 AM	31	2	0	33	11:30 PM	6	0	0	6
11:45 AM	37	0	0	37	11:45 PM	3	0	0	3

AM Total	662	18	2	682	PM Total	1717	11	0	1728
Percentage	97.07%	2.64%	0.29%		Percentage	99.36%	0.64%	0.00%	
AM Peak	8:00 AM	7:15 AM	4:15 AM	8:00 AM	PM Peak	4:15 PM	1:00 PM	12:00 PM	4:15 PM
Volume	143	5	1	146	Volume	268	3	0	268
					Day Total	2379	29	2	2410
					Percentage	98.71%	1.20%	0.08%	

North Street
 east of Grove Street
 City, State: Worcester, MA
 Client: VHB/E. Thompson
 Site Code: 15245



157 Washington Street, Suite 2
 Hudson, MA 01749
 Office: 508-875-0100 Fax: 508-875-0118

PDI File # 228438 ATR 3

Count Date: Wednesday, March 2, 2022
 Direction: EB

AM	Cars	Single Unit Heavy	Multi Unit Heavy	Total
12:00 AM	0	0	0	0
12:15 AM	0	0	0	0
12:30 AM	0	0	0	0
12:45 AM	1	0	0	1
1:00 AM	0	0	0	0
1:15 AM	1	0	0	1
1:30 AM	0	0	0	0
1:45 AM	1	0	0	1
2:00 AM	2	0	0	2
2:15 AM	0	0	0	0
2:30 AM	2	0	0	2
2:45 AM	0	0	0	0
3:00 AM	0	0	0	0
3:15 AM	0	0	0	0
3:30 AM	0	0	0	0
3:45 AM	1	0	0	1
4:00 AM	0	0	0	0
4:15 AM	1	0	0	1
4:30 AM	0	0	0	0
4:45 AM	0	0	0	0
5:00 AM	0	0	0	0
5:15 AM	2	0	0	2
5:30 AM	2	0	0	2
5:45 AM	3	0	0	3
6:00 AM	1	1	0	2
6:15 AM	8	0	0	8
6:30 AM	11	0	0	11
6:45 AM	11	0	0	11
7:00 AM	4	2	0	6
7:15 AM	7	0	0	7
7:30 AM	16	0	0	16
7:45 AM	21	2	0	23
8:00 AM	9	1	0	10
8:15 AM	14	1	0	15
8:30 AM	10	0	0	10
8:45 AM	18	2	0	20
9:00 AM	13	1	0	14
9:15 AM	15	0	0	15
9:30 AM	15	1	1	17
9:45 AM	5	0	0	5
10:00 AM	12	1	0	13
10:15 AM	11	0	0	11
10:30 AM	10	1	0	11
10:45 AM	7	0	0	7
11:00 AM	4	2	0	6
11:15 AM	12	2	0	14
11:30 AM	10	0	0	10
11:45 AM	9	0	0	9

PM	Cars	Single Unit Heavy	Multi Unit Heavy	Total
12:00 PM	11	0	0	11
12:15 PM	20	0	0	20
12:30 PM	20	0	0	20
12:45 PM	16	0	0	16
1:00 PM	8	1	0	9
1:15 PM	14	0	0	14
1:30 PM	18	1	0	19
1:45 PM	13	1	0	14
2:00 PM	16	0	0	16
2:15 PM	17	0	0	17
2:30 PM	13	1	0	14
2:45 PM	13	0	0	13
3:00 PM	28	0	0	28
3:15 PM	23	1	0	24
3:30 PM	12	0	0	12
3:45 PM	16	0	0	16
4:00 PM	16	1	0	17
4:15 PM	19	0	0	19
4:30 PM	27	0	0	27
4:45 PM	23	1	0	24
5:00 PM	12	1	0	13
5:15 PM	13	0	0	13
5:30 PM	20	1	0	21
5:45 PM	13	0	0	13
6:00 PM	15	1	0	16
6:15 PM	12	0	0	12
6:30 PM	11	0	0	11
6:45 PM	12	0	0	12
7:00 PM	9	0	0	9
7:15 PM	12	3	0	15
7:30 PM	11	0	0	11
7:45 PM	15	2	0	17
8:00 PM	5	0	0	5
8:15 PM	13	0	0	13
8:30 PM	13	0	0	13
8:45 PM	8	0	0	8
9:00 PM	5	0	0	5
9:15 PM	1	0	0	1
9:30 PM	6	1	0	7
9:45 PM	5	0	0	5
10:00 PM	4	0	0	4
10:15 PM	6	0	0	6
10:30 PM	1	0	0	1
10:45 PM	3	0	0	3
11:00 PM	1	0	0	1
11:15 PM	3	0	0	3
11:30 PM	2	0	0	2
11:45 PM	2	0	0	2

AM Total 269 17 1 287
 Percentage 93.73% 5.92% 0.35%
 AM Peak 8:45 AM 10:30 AM 8:45 AM 8:45 AM
 Volume 61 5 1 66

PM Total 576 16 0 592
 Percentage 97.30% 2.70% 0.00%
 PM Peak 4:00 PM 7:00 PM 12:00 PM 4:00 PM
 Volume 85 5 0 87

Day Total 845 33 1 879
 Percentage 96.13% 3.75% 0.11%

North Street
 east of Grove Street
 City, State: Worcester, MA
 Client: VHB/E. Thompson
 Site Code: 15245



157 Washington Street, Suite 2
 Hudson, MA 01749
 Office: 508-875-0100 Fax: 508-875-0118

PDI File # 228438 ATR 3

Count Date: Wednesday, March 2, 2022
 Direction: WB

AM	Cars	Single Unit Heavy	Multi Unit Heavy	Total
12:00 AM	3	0	0	3
12:15 AM	0	0	0	0
12:30 AM	0	0	0	0
12:45 AM	2	0	0	2
1:00 AM	4	0	0	4
1:15 AM	2	0	0	2
1:30 AM	1	0	0	1
1:45 AM	1	0	0	1
2:00 AM	3	0	0	3
2:15 AM	1	0	0	1
2:30 AM	1	0	0	1
2:45 AM	1	0	0	1
3:00 AM	1	0	0	1
3:15 AM	1	0	0	1
3:30 AM	2	0	0	2
3:45 AM	1	0	0	1
4:00 AM	0	0	0	0
4:15 AM	2	0	0	2
4:30 AM	1	0	0	1
4:45 AM	4	1	0	5
5:00 AM	1	1	0	2
5:15 AM	6	2	0	8
5:30 AM	1	1	0	2
5:45 AM	3	0	0	3
6:00 AM	9	2	0	11
6:15 AM	9	1	0	10
6:30 AM	12	0	0	12
6:45 AM	22	1	0	23
7:00 AM	18	1	0	19
7:15 AM	21	0	0	21
7:30 AM	13	0	0	13
7:45 AM	18	1	0	19
8:00 AM	21	0	0	21
8:15 AM	21	2	0	23
8:30 AM	19	1	0	20
8:45 AM	16	0	0	16
9:00 AM	13	0	0	13
9:15 AM	18	0	0	18
9:30 AM	14	1	0	15
9:45 AM	13	0	1	14
10:00 AM	10	0	0	10
10:15 AM	14	0	0	14
10:30 AM	20	0	0	20
10:45 AM	13	0	0	13
11:00 AM	19	0	0	19
11:15 AM	22	0	0	22
11:30 AM	11	1	0	12
11:45 AM	21	2	0	23

PM	Cars	Single Unit Heavy	Multi Unit Heavy	Total
12:00 PM	13	0	0	13
12:15 PM	21	1	0	22
12:30 PM	22	0	0	22
12:45 PM	22	0	1	23
1:00 PM	15	0	0	15
1:15 PM	17	0	0	17
1:30 PM	17	1	0	18
1:45 PM	19	0	0	19
2:00 PM	17	0	0	17
2:15 PM	27	3	0	30
2:30 PM	18	0	0	18
2:45 PM	22	2	0	24
3:00 PM	19	2	0	21
3:15 PM	32	0	0	32
3:30 PM	28	1	0	29
3:45 PM	38	1	0	39
4:00 PM	31	1	0	32
4:15 PM	18	0	0	18
4:30 PM	37	0	0	37
4:45 PM	50	0	0	50
5:00 PM	32	0	0	32
5:15 PM	34	0	0	34
5:30 PM	34	0	0	34
5:45 PM	28	0	0	28
6:00 PM	31	0	0	31
6:15 PM	14	0	0	14
6:30 PM	14	0	0	14
6:45 PM	25	0	0	25
7:00 PM	15	0	0	15
7:15 PM	11	0	0	11
7:30 PM	16	0	0	16
7:45 PM	18	0	0	18
8:00 PM	13	0	0	13
8:15 PM	11	0	0	11
8:30 PM	7	0	0	7
8:45 PM	9	0	0	9
9:00 PM	5	0	0	5
9:15 PM	6	0	0	6
9:30 PM	8	0	0	8
9:45 PM	8	0	0	8
10:00 PM	5	0	0	5
10:15 PM	11	0	0	11
10:30 PM	4	0	0	4
10:45 PM	6	0	0	6
11:00 PM	9	0	0	9
11:15 PM	4	0	0	4
11:30 PM	9	0	0	9
11:45 PM	2	0	0	2

AM Total 429 18 1 448
 Percentage 95.76% 4.02% 0.22%
 AM Peak 7:45 AM 4:45 AM 9:00 AM 7:45 AM
 Volume 79 5 1 83

PM Total 872 12 1 885
 Percentage 98.53% 1.36% 0.11%
 PM Peak 4:30 PM 2:15 PM 12:00 PM 4:30 PM
 Volume 153 7 1 153

Day Total 1301 30 2 1333
 Percentage 97.60% 2.25% 0.15%

Grove Street
north of Glennie Street
City, State: Worcester, MA
Client: VHB/E. Thompson
Site Code: 15245



157 Washington Street, Suite 2
Hudson, MA 01749
Office: 508-875-0100 Fax: 508-875-0118

PDI File # 228438 ATR 4

Count Date: Wednesday, March 2, 2022
Direction: NB

AM	Cars	Single Unit Heavy	Multi Unit Heavy	Total
12:00 AM	7	1	0	8
12:15 AM	8	0	0	8
12:30 AM	4	0	0	4
12:45 AM	5	0	1	6
1:00 AM	4	0	0	4
1:15 AM	2	0	0	2
1:30 AM	2	0	0	2
1:45 AM	2	0	0	2
2:00 AM	2	0	0	2
2:15 AM	2	0	0	2
2:30 AM	5	0	0	5
2:45 AM	3	0	0	3
3:00 AM	7	0	0	7
3:15 AM	6	0	0	6
3:30 AM	5	0	0	5
3:45 AM	9	0	0	9
4:00 AM	6	2	0	8
4:15 AM	6	1	0	7
4:30 AM	10	1	0	11
4:45 AM	17	2	1	20
5:00 AM	17	0	0	17
5:15 AM	15	3	0	18
5:30 AM	16	3	0	19
5:45 AM	25	1	0	26
6:00 AM	22	2	0	24
6:15 AM	26	2	0	28
6:30 AM	35	5	0	40
6:45 AM	68	4	0	72
7:00 AM	57	5	1	63
7:15 AM	84	10	0	94
7:30 AM	90	5	0	95
7:45 AM	89	3	0	92
8:00 AM	108	3	0	111
8:15 AM	116	5	0	121
8:30 AM	144	8	0	152
8:45 AM	112	4	0	116
9:00 AM	119	3	1	123
9:15 AM	100	3	0	103
9:30 AM	100	3	0	103
9:45 AM	75	7	0	82
10:00 AM	99	2	0	101
10:15 AM	108	3	2	113
10:30 AM	118	3	0	121
10:45 AM	117	5	0	122
11:00 AM	106	2	1	109
11:15 AM	111	7	1	119
11:30 AM	143	7	1	151
11:45 AM	135	3	0	138

PM	Cars	Single Unit Heavy	Multi Unit Heavy	Total
12:00 PM	131	4	0	135
12:15 PM	126	7	0	133
12:30 PM	134	4	1	139
12:45 PM	131	2	1	134
1:00 PM	136	0	0	136
1:15 PM	140	2	1	143
1:30 PM	121	2	3	126
1:45 PM	121	3	0	124
2:00 PM	138	6	0	144
2:15 PM	137	5	0	142
2:30 PM	152	0	0	152
2:45 PM	146	5	1	152
3:00 PM	159	6	0	165
3:15 PM	162	6	0	168
3:30 PM	158	3	0	161
3:45 PM	169	1	0	170
4:00 PM	159	5	0	164
4:15 PM	167	0	0	167
4:30 PM	164	2	0	166
4:45 PM	159	0	0	159
5:00 PM	186	0	0	186
5:15 PM	166	2	1	169
5:30 PM	132	3	0	135
5:45 PM	103	0	0	103
6:00 PM	99	1	0	100
6:15 PM	108	1	0	109
6:30 PM	77	1	0	78
6:45 PM	69	0	0	69
7:00 PM	68	0	0	68
7:15 PM	76	2	0	78
7:30 PM	82	2	0	84
7:45 PM	78	0	0	78
8:00 PM	62	0	0	62
8:15 PM	59	2	0	61
8:30 PM	46	2	0	48
8:45 PM	47	0	0	47
9:00 PM	41	0	1	42
9:15 PM	28	1	1	30
9:30 PM	35	1	0	36
9:45 PM	27	2	1	30
10:00 PM	18	2	0	20
10:15 PM	15	1	0	16
10:30 PM	12	0	0	12
10:45 PM	25	0	0	25
11:00 PM	13	0	0	13
11:15 PM	18	0	0	18
11:30 PM	27	0	0	27
11:45 PM	9	0	0	9

AM Total 2467 118 9 2594
 Percentage 95.10% 4.55% 0.35%
 AM Peak 11:00 AM 6:30 AM 10:15 AM 11:00 AM
 Volume 495 24 3 517

PM Total 4636 86 11 4733
 Percentage 97.95% 1.82% 0.23%
 PM Peak 4:15 PM 2:45 PM 12:45 PM 4:30 PM
 Volume 676 20 5 680

Day Total 7103 204 20 7327
 Percentage 96.94% 2.78% 0.27%

Grove Street
north of Glennie Street
City, State: Worcester, MA
Client: VHB/E. Thompson
Site Code: 15245



157 Washington Street, Suite 2
Hudson, MA 01749
Office: 508-875-0100 Fax: 508-875-0118

PDI File # 228438 ATR 4

Count Date: Wednesday, March 2, 2022
Direction: SB

AM	Cars	Single Unit Heavy	Multi Unit Heavy	Total
12:00 AM	8	1	0	9
12:15 AM	5	0	0	5
12:30 AM	4	0	0	4
12:45 AM	3	0	0	3
1:00 AM	6	0	0	6
1:15 AM	2	0	0	2
1:30 AM	3	0	0	3
1:45 AM	1	0	0	1
2:00 AM	5	0	0	5
2:15 AM	1	1	0	2
2:30 AM	6	2	0	8
2:45 AM	0	0	1	1
3:00 AM	7	0	0	7
3:15 AM	1	0	0	1
3:30 AM	5	0	0	5
3:45 AM	5	0	0	5
4:00 AM	3	0	0	3
4:15 AM	3	1	0	4
4:30 AM	9	0	0	9
4:45 AM	8	1	0	9
5:00 AM	12	2	0	14
5:15 AM	13	1	0	14
5:30 AM	19	1	0	20
5:45 AM	24	1	0	25
6:00 AM	29	1	0	30
6:15 AM	46	1	0	47
6:30 AM	60	2	0	62
6:45 AM	68	2	0	70
7:00 AM	68	8	0	76
7:15 AM	72	4	0	76
7:30 AM	122	3	0	125
7:45 AM	136	0	0	136
8:00 AM	113	5	0	118
8:15 AM	138	3	0	141
8:30 AM	138	6	0	144
8:45 AM	127	12	0	139
9:00 AM	108	14	0	122
9:15 AM	87	10	0	97
9:30 AM	99	5	0	104
9:45 AM	93	5	0	98
10:00 AM	88	3	1	92
10:15 AM	79	3	0	82
10:30 AM	84	3	0	87
10:45 AM	132	1	0	133
11:00 AM	91	4	1	96
11:15 AM	95	7	0	102
11:30 AM	105	3	0	108
11:45 AM	141	5	0	146

PM	Cars	Single Unit Heavy	Multi Unit Heavy	Total
12:00 PM	142	3	0	145
12:15 PM	113	5	0	118
12:30 PM	117	2	1	120
12:45 PM	111	4	0	115
1:00 PM	110	3	0	113
1:15 PM	105	2	0	107
1:30 PM	121	2	0	123
1:45 PM	98	4	0	102
2:00 PM	116	4	0	120
2:15 PM	101	3	0	104
2:30 PM	112	1	0	113
2:45 PM	128	3	0	131
3:00 PM	162	5	1	168
3:15 PM	154	4	0	158
3:30 PM	160	6	0	166
3:45 PM	147	4	0	151
4:00 PM	143	2	0	145
4:15 PM	130	2	0	132
4:30 PM	167	4	1	172
4:45 PM	127	4	0	131
5:00 PM	154	4	0	158
5:15 PM	111	1	1	113
5:30 PM	131	2	1	134
5:45 PM	107	0	0	107
6:00 PM	107	1	0	108
6:15 PM	92	1	1	94
6:30 PM	73	1	0	74
6:45 PM	78	0	0	78
7:00 PM	60	1	0	61
7:15 PM	69	1	0	70
7:30 PM	69	1	0	70
7:45 PM	42	2	0	44
8:00 PM	44	1	0	45
8:15 PM	39	1	0	40
8:30 PM	45	1	0	46
8:45 PM	36	2	0	38
9:00 PM	28	0	0	28
9:15 PM	22	0	0	22
9:30 PM	21	1	0	22
9:45 PM	18	3	0	21
10:00 PM	24	0	0	24
10:15 PM	19	3	0	22
10:30 PM	23	1	0	24
10:45 PM	18	1	0	19
11:00 PM	22	0	0	22
11:15 PM	10	1	0	11
11:30 PM	17	0	0	17
11:45 PM	11	0	0	11

AM Total	2472	121	3	2596
Percentage	95.22%	4.66%	0.12%	
AM Peak	7:45 AM	8:30 AM	2:00 AM	8:15 AM
Volume	525	42	1	546

PM Total	4054	97	6	4157
Percentage	97.52%	2.33%	0.14%	
PM Peak	3:00 PM	3:00 PM	4:30 PM	3:00 PM
Volume	623	19	2	643

Day Total	6526	218	9	6753
Percentage	96.64%	3.23%	0.13%	

Grove Street
 between Glennis Street & Sagamore Road
 City, State: Worcester, MA
 Client: VHB/E. Thompson
 Site Code: 15245



157 Washington Street, Suite 2
 Hudson, MA 01749
 Office: 508-875-0100 Fax: 508-875-0118

PDI File # 228438 ATR 5

Count Date: Wednesday, March 2, 2022
 Direction: NB

AM	Cars	Single Unit Heavy	Multi Unit Heavy	Total
12:00 AM	7	1	0	8
12:15 AM	8	0	0	8
12:30 AM	4	0	0	4
12:45 AM	5	0	0	5
1:00 AM	4	0	0	4
1:15 AM	3	0	0	3
1:30 AM	2	0	0	2
1:45 AM	2	0	0	2
2:00 AM	2	0	0	2
2:15 AM	2	0	0	2
2:30 AM	5	0	0	5
2:45 AM	3	0	0	3
3:00 AM	7	0	0	7
3:15 AM	5	0	0	5
3:30 AM	5	0	0	5
3:45 AM	8	0	0	8
4:00 AM	7	2	0	9
4:15 AM	11	2	0	13
4:30 AM	12	2	0	14
4:45 AM	22	3	1	26
5:00 AM	19	1	0	20
5:15 AM	21	2	0	23
5:30 AM	21	4	0	25
5:45 AM	36	1	0	37
6:00 AM	26	3	0	29
6:15 AM	32	2	0	34
6:30 AM	48	4	0	52
6:45 AM	87	5	0	92
7:00 AM	71	5	1	77
7:15 AM	96	11	0	107
7:30 AM	98	6	0	104
7:45 AM	104	5	0	109
8:00 AM	110	3	0	113
8:15 AM	136	6	0	142
8:30 AM	156	9	0	165
8:45 AM	122	7	0	129
9:00 AM	121	5	1	127
9:15 AM	110	4	0	114
9:30 AM	105	3	0	108
9:45 AM	77	6	0	83
10:00 AM	110	5	0	115
10:15 AM	120	5	2	127
10:30 AM	126	3	0	129
10:45 AM	130	6	0	136
11:00 AM	108	7	1	116
11:15 AM	112	7	1	120
11:30 AM	158	7	0	165
11:45 AM	137	5	0	142

PM	Cars	Single Unit Heavy	Multi Unit Heavy	Total
12:00 PM	133	4	0	137
12:15 PM	135	5	0	140
12:30 PM	147	4	1	152
12:45 PM	142	4	1	147
1:00 PM	139	0	0	139
1:15 PM	150	3	1	154
1:30 PM	126	4	3	133
1:45 PM	125	3	0	128
2:00 PM	150	6	0	156
2:15 PM	140	5	0	145
2:30 PM	160	0	0	160
2:45 PM	153	5	1	159
3:00 PM	162	6	0	168
3:15 PM	169	5	1	175
3:30 PM	171	4	0	175
3:45 PM	177	1	0	178
4:00 PM	163	4	0	167
4:15 PM	185	3	0	188
4:30 PM	170	1	0	171
4:45 PM	167	1	0	168
5:00 PM	189	0	0	189
5:15 PM	158	3	1	162
5:30 PM	141	3	0	144
5:45 PM	111	0	0	111
6:00 PM	107	0	0	107
6:15 PM	116	1	0	117
6:30 PM	86	1	0	87
6:45 PM	75	0	0	75
7:00 PM	77	0	0	77
7:15 PM	86	2	0	88
7:30 PM	85	2	0	87
7:45 PM	84	0	0	84
8:00 PM	68	0	0	68
8:15 PM	67	2	0	69
8:30 PM	53	2	0	55
8:45 PM	49	0	0	49
9:00 PM	48	0	1	49
9:15 PM	33	1	1	35
9:30 PM	38	1	0	39
9:45 PM	30	2	2	34
10:00 PM	18	2	0	20
10:15 PM	17	1	0	18
10:30 PM	13	0	0	13
10:45 PM	24	0	0	24
11:00 PM	15	0	0	15
11:15 PM	20	0	0	20
11:30 PM	29	0	0	29
11:45 PM	9	0	0	9

AM Total 2721 147 7 2875
 Percentage 94.64% 5.11% 0.24%
 AM Peak 8:15 AM 6:45 AM 10:15 AM 8:15 AM
 Volume 535 27 3 563

PM Total 4910 91 13 5014
 Percentage 97.93% 1.81% 0.26%
 PM Peak 4:15 PM 2:45 PM 12:45 PM 4:15 PM
 Volume 711 20 5 716

Day Total 7631 238 20 7889
 Percentage 96.73% 3.02% 0.25%

Grove Street
 between Glennis Street & Sagamore Road
 City, State: Worcester, MA
 Client: VHB/E. Thompson
 Site Code: 15245



157 Washington Street, Suite 2
 Hudson, MA 01749
 Office: 508-875-0100 Fax: 508-875-0118

PDI File # 228438 ATR 5

Count Date: Wednesday, March 2, 2022
 Direction: SB

AM	Cars	Single Unit Heavy	Multi Unit Heavy	Total
12:00 AM	9	1	0	10
12:15 AM	9	0	0	9
12:30 AM	4	0	0	4
12:45 AM	3	0	0	3
1:00 AM	5	1	0	6
1:15 AM	3	0	0	3
1:30 AM	3	0	0	3
1:45 AM	1	0	0	1
2:00 AM	5	0	0	5
2:15 AM	1	1	0	2
2:30 AM	6	1	1	8
2:45 AM	0	0	1	1
3:00 AM	8	0	0	8
3:15 AM	2	0	0	2
3:30 AM	5	0	0	5
3:45 AM	5	0	0	5
4:00 AM	3	0	0	3
4:15 AM	3	1	0	4
4:30 AM	8	0	0	8
4:45 AM	11	1	0	12
5:00 AM	15	1	1	17
5:15 AM	14	2	0	16
5:30 AM	22	2	0	24
5:45 AM	26	3	0	29
6:00 AM	36	2	0	38
6:15 AM	51	1	0	52
6:30 AM	71	2	0	73
6:45 AM	76	4	0	80
7:00 AM	81	8	0	89
7:15 AM	92	3	0	95
7:30 AM	141	5	0	146
7:45 AM	146	4	0	150
8:00 AM	141	3	0	144
8:15 AM	153	3	0	156
8:30 AM	164	5	0	169
8:45 AM	144	16	0	160
9:00 AM	128	13	0	141
9:15 AM	115	8	1	124
9:30 AM	114	5	0	119
9:45 AM	106	8	0	114
10:00 AM	112	3	1	116
10:15 AM	113	2	0	115
10:30 AM	109	4	0	113
10:45 AM	149	2	0	151
11:00 AM	112	7	1	120
11:15 AM	122	8	1	131
11:30 AM	126	6	0	132
11:45 AM	175	3	0	178

PM	Cars	Single Unit Heavy	Multi Unit Heavy	Total
12:00 PM	181	4	0	185
12:15 PM	143	4	0	147
12:30 PM	138	2	2	142
12:45 PM	129	2	0	131
1:00 PM	139	4	0	143
1:15 PM	146	2	0	148
1:30 PM	138	4	0	142
1:45 PM	124	6	0	130
2:00 PM	138	4	0	142
2:15 PM	135	2	0	137
2:30 PM	146	1	0	147
2:45 PM	158	2	0	160
3:00 PM	204	6	0	210
3:15 PM	189	5	0	194
3:30 PM	197	6	0	203
3:45 PM	188	6	0	194
4:00 PM	195	4	0	199
4:15 PM	182	3	0	185
4:30 PM	206	3	1	210
4:45 PM	163	4	0	167
5:00 PM	203	4	0	207
5:15 PM	144	2	1	147
5:30 PM	167	1	0	168
5:45 PM	147	0	1	148
6:00 PM	143	1	0	144
6:15 PM	126	1	0	127
6:30 PM	108	3	0	111
6:45 PM	108	0	0	108
7:00 PM	91	1	0	92
7:15 PM	102	2	0	104
7:30 PM	83	1	0	84
7:45 PM	62	3	0	65
8:00 PM	57	1	0	58
8:15 PM	57	1	0	58
8:30 PM	64	1	0	65
8:45 PM	49	2	0	51
9:00 PM	56	0	0	56
9:15 PM	42	0	0	42
9:30 PM	39	0	0	39
9:45 PM	26	4	0	30
10:00 PM	31	0	0	31
10:15 PM	27	4	0	31
10:30 PM	28	1	0	29
10:45 PM	28	1	0	29
11:00 PM	28	0	0	28
11:15 PM	10	1	0	11
11:30 PM	18	0	0	18
11:45 PM	13	0	0	13

AM Total 2948 139 7 3094
 Percentage 95.28% 4.49% 0.23%
 AM Peak 7:45 AM 8:30 AM 2:00 AM 8:00 AM
 Volume 604 42 2 629

PM Total 5296 109 5 5410
 Percentage 97.89% 2.01% 0.09%
 PM Peak 3:00 PM 3:00 PM 12:00 PM 3:00 PM
 Volume 778 23 2 801

Day Total 8244 248 12 8504
 Percentage 96.94% 2.92% 0.14%

Grove Street
 between Sagamore Road & North Street
 City, State: Worcester, MA
 Client: VHB/E. Thompson
 Site Code: 15245



157 Washington Street, Suite 2
 Hudson, MA 01749
 Office: 508-875-0100 Fax: 508-875-0118

PDI File # 228438 ATR 6

Count Date: Wednesday, March 2, 2022
 Direction: NB

AM	Cars	Single Unit Heavy	Multi Unit Heavy	Total
12:00 AM	7	1	0	8
12:15 AM	8	0	0	8
12:30 AM	6	0	0	6
12:45 AM	4	0	0	4
1:00 AM	4	0	0	4
1:15 AM	2	0	0	2
1:30 AM	1	0	0	1
1:45 AM	2	0	0	2
2:00 AM	4	0	0	4
2:15 AM	2	0	0	2
2:30 AM	5	0	0	5
2:45 AM	3	1	0	4
3:00 AM	7	0	0	7
3:15 AM	5	0	0	5
3:30 AM	5	0	0	5
3:45 AM	8	1	0	9
4:00 AM	5	2	0	7
4:15 AM	10	3	0	13
4:30 AM	9	1	0	10
4:45 AM	20	1	1	22
5:00 AM	16	2	0	18
5:15 AM	18	3	0	21
5:30 AM	18	3	0	21
5:45 AM	25	1	0	26
6:00 AM	32	3	0	35
6:15 AM	25	3	0	28
6:30 AM	41	7	0	48
6:45 AM	75	3	0	78
7:00 AM	70	6	1	77
7:15 AM	90	11	0	101
7:30 AM	94	6	0	100
7:45 AM	111	5	0	116
8:00 AM	120	4	0	124
8:15 AM	136	4	0	140
8:30 AM	164	10	0	174
8:45 AM	127	7	2	136
9:00 AM	124	5	1	130
9:15 AM	116	5	0	121
9:30 AM	102	3	0	105
9:45 AM	90	7	0	97
10:00 AM	110	5	0	115
10:15 AM	113	6	2	121
10:30 AM	144	3	0	147
10:45 AM	118	6	0	124
11:00 AM	122	7	1	130
11:15 AM	118	4	1	123
11:30 AM	155	7	0	162
11:45 AM	157	3	0	160

PM	Cars	Single Unit Heavy	Multi Unit Heavy	Total
12:00 PM	144	3	0	147
12:15 PM	146	4	0	150
12:30 PM	144	4	1	149
12:45 PM	159	4	1	164
1:00 PM	139	0	0	139
1:15 PM	148	3	1	152
1:30 PM	136	3	2	141
1:45 PM	135	3	0	138
2:00 PM	153	8	0	161
2:15 PM	141	4	0	145
2:30 PM	150	0	0	150
2:45 PM	165	5	1	171
3:00 PM	164	5	1	170
3:15 PM	176	7	0	183
3:30 PM	185	3	0	188
3:45 PM	189	2	0	191
4:00 PM	184	3	0	187
4:15 PM	198	2	0	200
4:30 PM	176	1	0	177
4:45 PM	185	1	0	186
5:00 PM	191	1	0	192
5:15 PM	172	3	1	176
5:30 PM	158	2	0	160
5:45 PM	130	0	0	130
6:00 PM	125	0	0	125
6:15 PM	130	1	0	131
6:30 PM	105	1	0	106
6:45 PM	83	0	0	83
7:00 PM	84	0	0	84
7:15 PM	93	3	0	96
7:30 PM	95	1	0	96
7:45 PM	82	0	0	82
8:00 PM	64	0	0	64
8:15 PM	73	2	0	75
8:30 PM	46	2	0	48
8:45 PM	46	0	0	46
9:00 PM	44	0	1	45
9:15 PM	31	1	1	33
9:30 PM	35	2	0	37
9:45 PM	29	2	1	32
10:00 PM	13	3	0	16
10:15 PM	22	1	0	23
10:30 PM	13	0	0	13
10:45 PM	30	0	0	30
11:00 PM	17	0	0	17
11:15 PM	22	0	0	22
11:30 PM	30	0	0	30
11:45 PM	8	0	0	8

AM Total 2748 149 9 2906
 Percentage 94.56% 5.13% 0.31%
 AM Peak 11:00 AM 7:00 AM 8:15 AM 8:15 AM
 Volume 552 28 3 580

PM Total 5188 90 11 5289
 Percentage 98.09% 1.70% 0.21%
 PM Peak 3:30 PM 2:45 PM 12:45 PM 3:30 PM
 Volume 756 20 4 766

Day Total 7936 239 20 8195
 Percentage 96.84% 2.92% 0.24%

Grove Street
 between Sagamore Road & North Street
 City, State: Worcester, MA
 Client: VHB/E. Thompson
 Site Code: 15245



157 Washington Street, Suite 2
 Hudson, MA 01749
 Office: 508-875-0100 Fax: 508-875-0118

PDI File # 228438 ATR 6

Count Date: Wednesday, March 2, 2022
 Direction: SB

AM	Cars	Single Unit Heavy	Multi Unit Heavy	Total
12:00 AM	7	1	0	8
12:15 AM	7	0	0	7
12:30 AM	4	0	0	4
12:45 AM	4	0	0	4
1:00 AM	5	1	0	6
1:15 AM	3	0	0	3
1:30 AM	3	1	0	4
1:45 AM	3	0	0	3
2:00 AM	6	0	0	6
2:15 AM	2	1	0	3
2:30 AM	2	1	1	4
2:45 AM	0	0	1	1
3:00 AM	5	0	0	5
3:15 AM	2	0	0	2
3:30 AM	4	0	0	4
3:45 AM	4	1	0	5
4:00 AM	1	0	0	1
4:15 AM	4	1	0	5
4:30 AM	5	1	0	6
4:45 AM	10	1	0	11
5:00 AM	9	0	1	10
5:15 AM	13	3	0	16
5:30 AM	22	2	0	24
5:45 AM	29	2	0	31
6:00 AM	29	2	0	31
6:15 AM	65	1	0	66
6:30 AM	74	5	0	79
6:45 AM	85	2	0	87
7:00 AM	76	11	0	87
7:15 AM	92	3	0	95
7:30 AM	133	5	0	138
7:45 AM	165	6	0	171
8:00 AM	157	4	0	161
8:15 AM	145	5	0	150
8:30 AM	171	6	0	177
8:45 AM	152	16	1	169
9:00 AM	124	15	0	139
9:15 AM	113	11	1	125
9:30 AM	114	6	1	121
9:45 AM	110	7	0	117
10:00 AM	98	3	1	102
10:15 AM	112	5	0	117
10:30 AM	108	4	0	112
10:45 AM	145	1	0	146
11:00 AM	106	6	1	113
11:15 AM	129	8	0	137
11:30 AM	123	5	0	128
11:45 AM	161	2	0	163

PM	Cars	Single Unit Heavy	Multi Unit Heavy	Total
12:00 PM	164	3	0	167
12:15 PM	127	2	1	130
12:30 PM	158	4	0	162
12:45 PM	146	3	0	149
1:00 PM	135	5	0	140
1:15 PM	141	2	0	143
1:30 PM	142	4	0	146
1:45 PM	121	5	0	126
2:00 PM	154	5	0	159
2:15 PM	121	3	0	124
2:30 PM	159	0	0	159
2:45 PM	149	3	0	152
3:00 PM	182	6	0	188
3:15 PM	190	6	0	196
3:30 PM	184	6	0	190
3:45 PM	168	5	0	173
4:00 PM	194	5	0	199
4:15 PM	165	2	0	167
4:30 PM	201	4	1	206
4:45 PM	171	5	0	176
5:00 PM	176	8	0	184
5:15 PM	144	2	1	147
5:30 PM	168	2	0	170
5:45 PM	133	0	0	133
6:00 PM	137	2	1	140
6:15 PM	108	1	0	109
6:30 PM	103	3	0	106
6:45 PM	111	1	0	112
7:00 PM	96	3	0	99
7:15 PM	95	4	0	99
7:30 PM	92	2	0	94
7:45 PM	58	2	1	61
8:00 PM	55	1	0	56
8:15 PM	52	1	0	53
8:30 PM	53	1	0	54
8:45 PM	46	1	0	47
9:00 PM	42	1	0	43
9:15 PM	40	0	0	40
9:30 PM	34	2	0	36
9:45 PM	28	3	2	33
10:00 PM	30	0	0	30
10:15 PM	19	4	0	23
10:30 PM	24	0	0	24
10:45 PM	24	2	0	26
11:00 PM	26	0	0	26
11:15 PM	11	1	0	12
11:30 PM	16	0	0	16
11:45 PM	11	0	0	11

AM Total 2941 155 8 3104
 Percentage 94.75% 4.99% 0.26%
 AM Peak 7:45 AM 8:30 AM 8:45 AM 7:45 AM
 Volume 638 48 3 659

PM Total 5104 125 7 5236
 Percentage 97.48% 2.39% 0.13%
 PM Peak 3:15 PM 3:00 PM 4:30 PM 3:15 PM
 Volume 736 23 2 758

Day Total 8045 280 15 8340
 Percentage 96.46% 3.36% 0.18%

Grove Street
 between Sagamore Road & North Street
 City, State: Worcester, MA
 Client: VHB/E. Thompson
 Site Code: 15245.00



PDI File #: 228438

Count Date
 Wednesday, March 2, 2022

Speed (60-minute)

NB																
Start Time:	1 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70+	Total	85th %ile	Ave Speed
12:00 AM	0	0	3	4	6	4	4	2	0	0	0	0	0	23	40.0	33.6
1:00 AM	0	0	1	3	4	1	3	1	0	0	0	0	0	13	41.4	34.7
2:00 AM	0	0	1	3	4	2	1	3	0	0	0	0	0	14	46.1	34.6
3:00 AM	1	0	1	2	6	7	1	0	0	1	0	0	0	19	39.0	33.9
4:00 AM	0	1	3	7	12	4	1	2	0	0	0	0	0	30	35.0	31.0
5:00 AM	1	2	2	23	37	26	2	1	0	0	0	0	0	94	36.1	31.5
6:00 AM	2	3	10	44	97	68	20	5	1	0	0	0	0	250	38.0	33.0
7:00 AM	0	3	29	71	205	120	14	1	1	0	0	0	0	444	36.0	32.1
8:00 AM	4	5	24	178	258	91	20	5	2	0	0	0	0	587	36.0	31.1
9:00 AM	1	4	30	113	194	96	10	1	0	0	0	0	0	449	36.0	31.3
10:00 AM	0	1	21	124	204	89	15	0	1	0	0	0	0	455	36.0	31.5
11:00 AM	0	4	32	141	203	99	16	2	0	0	0	0	0	497	36.0	31.2
12:00 PM	0	5	44	142	268	76	12	2	0	0	0	0	0	549	35.0	30.8
1:00 PM	1	5	37	130	224	75	6	1	1	0	0	0	0	480	35.0	30.7
2:00 PM	1	4	33	148	218	84	16	0	1	0	0	0	0	505	35.4	30.9
3:00 PM	5	14	68	279	206	42	7	0	0	0	0	0	0	621	33.0	28.6
4:00 PM	6	9	85	245	181	53	6	3	2	0	0	0	0	590	33.0	28.6
5:00 PM	3	3	62	222	207	61	5	0	1	0	0	0	0	564	34.0	29.5
6:00 PM	3	5	28	150	159	56	11	0	1	0	0	0	0	413	35.0	30.1
7:00 PM	1	3	21	91	139	63	10	3	0	1	0	0	0	332	36.0	31.3
8:00 PM	2	3	21	44	84	44	12	0	1	0	0	0	0	211	37.0	31.1
9:00 PM	0	1	10	27	45	45	12	1	0	1	0	0	0	142	38.0	33.1
10:00 PM	0	3	5	13	27	27	18	7	2	1	0	0	0	103	42.0	34.9
11:00 PM	0	1	6	4	20	26	11	4	2	0	0	0	0	74	41.0	35.1
Total	31	79	577	2208	3008	1259	233	44	16	4	0	0	0	7459	36.0	30.8
Percent	0.42%	1.06%	7.74%	29.60%	40.33%	16.88%	3.12%	0.59%	0.21%	0.05%	0.00%	0.00%	0.00%			

AM Peak	8:00 AM	8:00 AM	11:00 AM	8:00 AM	8:00 AM	7:00 AM	6:00 AM	6:00 AM	8:00 AM	3:00 AM					8:00 AM
Volume	4	5	32	178	258	120	20	5	2	1	0	0	0	0	587
PM Peak	4:00 PM	3:00 PM	4:00 PM	3:00 PM	12:00 PM	2:00 PM	10:00 PM	10:00 PM	4:00 PM	7:00 PM					3:00 PM
Volume	6	14	85	279	268	84	18	7	2	1	0	0	0	621	

15th Percentile:	26.0 MPH	Average Speed:	30.8 MPH	Posted Speed Limit:	25 MPH
50th Percentile:	31.0 MPH	10 MPH Pace:	26 to 35 MPH	Number of Vehicles > 25 MPH:	6475
85th Percentile:	36.0 MPH	Number in Pace:	5318	Percent of Vehicles > 25 MPH:	86.8%
95th Percentile:	39.0 MPH	Percent in Pace:	71.3%		

0
0
City, State: Worcester, MA
Client: VHB/E. Thompson
Site Code: 15245.00



Count Date
Wednesday, March 2, 2022

Speed (60-minute)

SB																
Start Time:	1 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70+	Total	85th %ile	Ave Speed
12:00 AM	0	2	0	3	13	7	3	0	0	1	0	0	0	29	37.8	33.4
1:00 AM	0	0	1	1	2	2	0	3	0	0	0	0	0	9	47.6	36.4
2:00 AM	1	2	1	2	3	4	4	1	0	0	0	0	0	18	41.0	32.3
3:00 AM	1	0	1	4	10	11	1	2	0	0	0	0	0	30	37.0	33.2
4:00 AM	1	1	8	13	21	12	11	2	1	0	2	0	0	72	41.0	33.2
5:00 AM	3	11	14	17	35	27	13	2	2	1	0	1	0	126	39.3	31.6
6:00 AM	7	12	25	31	76	66	16	4	2	0	3	0	0	242	37.0	31.8
7:00 AM	7	14	31	109	147	61	13	1	0	1	2	0	0	386	36.0	30.3
8:00 AM	21	23	66	139	151	93	15	4	2	1	0	0	0	515	36.0	29.3
9:00 AM	10	16	43	116	155	69	11	1	3	0	1	0	0	425	35.4	30.0
10:00 AM	12	16	50	117	193	93	10	2	2	0	0	1	0	496	36.0	30.1
11:00 AM	11	19	64	124	201	68	19	4	0	1	1	1	0	513	35.0	29.9
12:00 PM	24	18	48	174	199	65	8	3	0	0	0	1	0	540	34.0	29.0
1:00 PM	19	27	57	150	184	64	11	3	1	1	0	0	0	517	35.0	28.9
2:00 PM	17	24	88	169	165	71	7	3	1	2	0	0	0	547	35.0	28.6
3:00 PM	32	31	94	190	156	50	11	5	2	0	1	0	0	572	34.0	27.5
4:00 PM	31	30	91	165	159	63	5	0	1	0	0	0	0	545	34.0	27.4
5:00 PM	28	18	73	196	194	68	8	0	1	0	1	0	0	587	34.0	28.3
6:00 PM	19	14	46	136	127	55	6	0	0	0	0	1	0	404	35.0	28.6
7:00 PM	14	10	28	81	158	60	8	1	3	0	0	0	0	363	35.0	30.1
8:00 PM	1	8	20	52	88	58	13	3	2	0	0	0	0	245	37.0	31.6
9:00 PM	2	5	13	27	47	52	17	1	2	1	0	0	0	167	39.0	32.6
10:00 PM	4	3	4	4	34	26	3	3	1	0	1	1	0	84	38.0	33.0
11:00 PM	0	4	6	10	24	23	11	3	0	0	0	0	0	81	40.0	33.0
Total	265	308	872	2030	2542	1168	224	51	26	9	12	6	0	7513	36.0	29.5
Percent	3.53%	4.10%	11.61%	27.02%	33.83%	15.55%	2.98%	0.68%	0.35%	0.12%	0.16%	0.08%	0.00%			

AM Peak	8:00 AM	8:00 AM	8:00 AM	8:00 AM	11:00 AM	8:00 AM	11:00 AM	6:00 AM	9:00 AM	12:00 AM	6:00 AM	5:00 AM		8:00 AM
Volume	21	23	66	139	201	93	19	4	3	1	3	1	0	515
PM Peak	3:00 PM	3:00 PM	3:00 PM	5:00 PM	12:00 PM	2:00 PM	9:00 PM	3:00 PM	7:00 PM	2:00 PM	3:00 PM	12:00 PM		5:00 PM
Volume	32	31	94	196	199	71	17	5	3	2	1	1	0	587

15th Percentile:	23.0 MPH	Average Speed:	29.5 MPH	Posted Speed Limit:	25 MPH
50th Percentile:	30.0 MPH	10 MPH Pace:	27 to 36 MPH	Number of Vehicles > 25 MPH:	5828
85th Percentile:	36.0 MPH	Number in Pace:	4705	Percent of Vehicles > 25 MPH:	77.6%
95th Percentile:	39.0 MPH	Percent in Pace:	62.6%		

0
0
City, State: Worcester, MA
Client: VHB/E. Thompson
Site Code: 15245.00



Count Date
Wednesday, March 2, 2022

Speed (60-minute)

Combined NB and SB

Start Time:	1 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70+	Total	85th %ile	Ave Speed
12:00 AM	0	2	3	7	19	11	7	2	0	1	0	0	0	52	40.0	33.5
1:00 AM	0	0	2	4	6	3	3	4	0	0	0	0	0	22	45.6	35.4
2:00 AM	1	2	2	5	7	6	5	4	0	0	0	0	0	32	42.0	33.3
3:00 AM	2	0	2	6	16	18	2	2	0	1	0	0	0	49	38.8	33.5
4:00 AM	1	2	11	20	33	16	12	4	1	0	2	0	0	102	40.9	32.6
5:00 AM	4	13	16	40	72	53	15	3	2	1	0	1	0	220	38.2	31.6
6:00 AM	9	15	35	75	173	134	36	9	3	0	3	0	0	492	38.0	32.4
7:00 AM	7	17	60	180	352	181	27	2	1	1	2	0	0	830	36.0	31.2
8:00 AM	25	28	90	317	409	184	35	9	4	1	0	0	0	1102	36.0	30.3
9:00 AM	11	20	73	229	349	165	21	2	3	0	1	0	0	874	36.0	30.7
10:00 AM	12	17	71	241	397	182	25	2	3	0	0	1	0	951	36.0	30.8
11:00 AM	11	23	96	265	404	167	35	6	0	1	1	1	0	1010	36.0	30.6
12:00 PM	24	23	92	316	467	141	20	5	0	0	0	1	0	1089	35.0	29.9
1:00 PM	20	32	94	280	408	139	17	4	2	1	0	0	0	997	35.0	29.8
2:00 PM	18	28	121	317	383	155	23	3	2	2	0	0	0	1052	35.0	29.7
3:00 PM	37	45	162	469	362	92	18	5	2	0	1	0	0	1193	33.0	28.1
4:00 PM	37	39	176	410	340	116	11	3	3	0	0	0	0	1135	34.0	28.0
5:00 PM	31	21	135	418	401	129	13	0	2	0	1	0	0	1151	34.0	28.9
6:00 PM	22	19	74	286	286	111	17	0	1	0	0	1	0	817	35.0	29.3
7:00 PM	15	13	49	172	297	123	18	4	3	1	0	0	0	695	36.0	30.7
8:00 PM	3	11	41	96	172	102	25	3	3	0	0	0	0	456	37.0	31.4
9:00 PM	2	6	23	54	92	97	29	2	2	2	0	0	0	309	38.8	32.8
10:00 PM	4	6	9	17	61	53	21	10	3	1	1	1	0	187	40.0	34.0
11:00 PM	0	5	12	14	44	49	22	7	2	0	0	0	0	155	40.0	34.0
Total	296	387	1449	4238	5550	2427	457	95	42	13	12	6	0	14972	36.0	30.1
Percent	1.98%	2.58%	9.68%	28.31%	37.07%	16.21%	3.05%	0.63%	0.28%	0.09%	0.08%	0.04%	0.00%			

AM Peak	8:00 AM	8:00 AM	11:00 AM	8:00 AM	8:00 AM	8:00 AM	6:00 AM	6:00 AM	8:00 AM	12:00 AM	6:00 AM	5:00 AM		8:00 AM
Volume	25	28	96	317	409	184	36	9	4	1	3	1	0	1102
PM Peak	3:00 PM	3:00 PM	4:00 PM	3:00 PM	12:00 PM	2:00 PM	9:00 PM	10:00 PM	4:00 PM	2:00 PM	3:00 PM	12:00 PM		3:00 PM
Volume	37	45	176	469	467	155	29	10	3	2	1	1	0	1193

15th Percentile: 25.0 MPH Average Speed: 30.1 MPH Posted Speed Limit: 25 MPH
 50th Percentile: 31.0 MPH 10 MPH Pace: 27 to 36 MPH Number of Vehicles > 25 MPH: 12303
 85th Percentile: 36.0 MPH Number in Pace: 10023 Percent of Vehicles > 25 MPH: 82.2%
 95th Percentile: 39.0 MPH Percent in Pace: 66.9%

Grove Street
 south of North Street
 City, State: Worcester, MA
 Client: VHB/E. Thompson
 Site Code: 15245



157 Washington Street, Suite 2
 Hudson, MA 01749
 Office: 508-875-0100 Fax: 508-875-0118

PDI File # 228438 ATR 7

Count Date: Wednesday, March 2, 2022
 Direction: NB

AM	Cars	Single Unit Heavy	Multi Unit Heavy	Total
12:00 AM	7	1	0	8
12:15 AM	8	0	0	8
12:30 AM	8	0	0	8
12:45 AM	6	0	0	6
1:00 AM	4	0	0	4
1:15 AM	2	0	0	2
1:30 AM	1	0	0	1
1:45 AM	4	0	0	4
2:00 AM	1	0	0	1
2:15 AM	2	0	0	2
2:30 AM	7	0	0	7
2:45 AM	3	0	0	3
3:00 AM	8	0	0	8
3:15 AM	5	0	0	5
3:30 AM	4	0	0	4
3:45 AM	8	0	0	8
4:00 AM	5	0	0	5
4:15 AM	10	2	0	12
4:30 AM	10	1	0	11
4:45 AM	19	2	1	22
5:00 AM	17	0	1	18
5:15 AM	19	2	0	21
5:30 AM	20	3	0	23
5:45 AM	22	1	0	23
6:00 AM	28	1	0	29
6:15 AM	22	2	0	24
6:30 AM	40	6	0	46
6:45 AM	69	1	0	70
7:00 AM	55	3	1	59
7:15 AM	84	11	0	95
7:30 AM	93	6	0	99
7:45 AM	107	7	0	114
8:00 AM	109	4	0	113
8:15 AM	126	1	0	127
8:30 AM	156	7	2	165
8:45 AM	122	6	2	130
9:00 AM	123	6	0	129
9:15 AM	108	4	0	112
9:30 AM	98	4	0	102
9:45 AM	91	6	0	97
10:00 AM	114	4	0	118
10:15 AM	105	3	2	110
10:30 AM	125	3	0	128
10:45 AM	114	6	0	120
11:00 AM	118	9	1	128
11:15 AM	108	4	1	113
11:30 AM	151	4	1	156
11:45 AM	156	2	0	158

PM	Cars	Single Unit Heavy	Multi Unit Heavy	Total
12:00 PM	136	2	2	140
12:15 PM	148	4	0	152
12:30 PM	127	4	0	131
12:45 PM	152	2	0	154
1:00 PM	137	1	0	138
1:15 PM	136	3	1	140
1:30 PM	138	2	2	142
1:45 PM	124	5	0	129
2:00 PM	150	5	0	155
2:15 PM	123	4	0	127
2:30 PM	149	1	0	150
2:45 PM	163	5	1	169
3:00 PM	175	2	1	178
3:15 PM	171	4	0	175
3:30 PM	166	3	0	169
3:45 PM	179	1	0	180
4:00 PM	173	3	0	176
4:15 PM	191	2	0	193
4:30 PM	165	1	0	166
4:45 PM	159	0	0	159
5:00 PM	179	0	0	179
5:15 PM	162	3	1	166
5:30 PM	153	2	0	155
5:45 PM	125	0	0	125
6:00 PM	120	1	0	121
6:15 PM	123	1	0	124
6:30 PM	94	1	0	95
6:45 PM	78	0	0	78
7:00 PM	77	0	0	77
7:15 PM	94	5	1	100
7:30 PM	77	2	0	79
7:45 PM	81	0	0	81
8:00 PM	55	0	0	55
8:15 PM	70	2	0	72
8:30 PM	50	2	0	52
8:45 PM	44	0	0	44
9:00 PM	44	0	1	45
9:15 PM	30	1	1	32
9:30 PM	38	2	0	40
9:45 PM	26	2	0	28
10:00 PM	14	3	0	17
10:15 PM	21	1	0	22
10:30 PM	14	0	0	14
10:45 PM	28	0	0	28
11:00 PM	15	0	0	15
11:15 PM	24	0	0	24
11:30 PM	24	0	0	24
11:45 PM	8	0	0	8

AM Total 2622 122 12 2756
 Percentage 95.14% 4.43% 0.44%
 AM Peak 11:00 AM 7:15 AM 8:00 AM 11:00 AM
 Volume 533 28 4 555

PM Total 4930 82 11 5023
 Percentage 98.15% 1.63% 0.22%
 PM Peak 3:30 PM 1:30 PM 12:45 PM 3:30 PM
 Volume 709 16 3 718

Day Total 7552 204 23 7779
 Percentage 97.08% 2.62% 0.30%

Grove Street
 south of North Street
 City, State: Worcester, MA
 Client: VHB/E. Thompson
 Site Code: 15245



157 Washington Street, Suite 2
 Hudson, MA 01749
 Office: 508-875-0100 Fax: 508-875-0118

PDI File # 228438 ATR 7

Count Date: Wednesday, March 2, 2022
 Direction: SB

AM	Cars	Single Unit Heavy	Multi Unit Heavy	Total
12:00 AM	11	0	0	11
12:15 AM	7	0	0	7
12:30 AM	4	0	0	4
12:45 AM	5	0	0	5
1:00 AM	8	0	0	8
1:15 AM	4	0	0	4
1:30 AM	5	0	0	5
1:45 AM	2	0	0	2
2:00 AM	5	0	0	5
2:15 AM	1	1	0	2
2:30 AM	5	1	0	6
2:45 AM	1	0	1	2
3:00 AM	6	0	0	6
3:15 AM	4	0	0	4
3:30 AM	5	0	0	5
3:45 AM	6	0	0	6
4:00 AM	1	0	0	1
4:15 AM	5	1	0	6
4:30 AM	8	0	0	8
4:45 AM	15	1	0	16
5:00 AM	12	1	1	14
5:15 AM	20	1	0	21
5:30 AM	23	3	0	26
5:45 AM	27	1	0	28
6:00 AM	33	0	0	33
6:15 AM	59	1	0	60
6:30 AM	71	4	0	75
6:45 AM	85	1	0	86
7:00 AM	77	8	0	85
7:15 AM	97	2	0	99
7:30 AM	122	4	0	126
7:45 AM	156	3	0	159
8:00 AM	147	5	0	152
8:15 AM	144	4	0	148
8:30 AM	163	6	0	169
8:45 AM	138	14	0	152
9:00 AM	115	16	0	131
9:15 AM	107	11	1	119
9:30 AM	107	5	1	113
9:45 AM	107	5	2	114
10:00 AM	95	1	1	97
10:15 AM	104	4	0	108
10:30 AM	104	4	0	108
10:45 AM	142	1	0	143
11:00 AM	114	6	1	121
11:15 AM	133	6	1	140
11:30 AM	119	5	1	125
11:45 AM	165	1	0	166

PM	Cars	Single Unit Heavy	Multi Unit Heavy	Total
12:00 PM	155	4	0	159
12:15 PM	121	6	0	127
12:30 PM	141	3	0	144
12:45 PM	144	3	0	147
1:00 PM	139	3	0	142
1:15 PM	139	4	0	143
1:30 PM	138	1	2	141
1:45 PM	109	5	0	114
2:00 PM	154	4	0	158
2:15 PM	114	5	0	119
2:30 PM	150	0	0	150
2:45 PM	146	2	1	149
3:00 PM	169	6	0	175
3:15 PM	184	3	1	188
3:30 PM	187	6	0	193
3:45 PM	173	6	0	179
4:00 PM	185	4	0	189
4:15 PM	159	2	0	161
4:30 PM	191	2	1	194
4:45 PM	176	5	0	181
5:00 PM	177	6	0	183
5:15 PM	149	2	1	152
5:30 PM	172	0	0	172
5:45 PM	137	1	0	138
6:00 PM	137	1	1	139
6:15 PM	109	1	0	110
6:30 PM	105	2	0	107
6:45 PM	108	3	0	111
7:00 PM	93	3	0	96
7:15 PM	100	2	1	103
7:30 PM	87	3	0	90
7:45 PM	66	1	0	67
8:00 PM	64	1	0	65
8:15 PM	50	1	0	51
8:30 PM	54	1	0	55
8:45 PM	52	1	0	53
9:00 PM	47	1	0	48
9:15 PM	47	0	0	47
9:30 PM	39	0	0	39
9:45 PM	32	2	1	35
10:00 PM	30	0	0	30
10:15 PM	22	4	0	26
10:30 PM	25	0	0	25
10:45 PM	26	2	0	28
11:00 PM	32	0	0	32
11:15 PM	14	0	0	14
11:30 PM	18	0	0	18
11:45 PM	10	0	0	10

AM Total 2894 127 10 3031
 Percentage 95.48% 4.19% 0.33%
 AM Peak 7:45 AM 8:30 AM 9:15 AM 7:45 AM
 Volume 610 47 5 628

PM Total 5076 112 9 5197
 Percentage 97.67% 2.16% 0.17%
 PM Peak 3:15 PM 3:00 PM 12:45 PM 3:15 PM
 Volume 729 21 2 749

Day Total 7970 239 19 8228
 Percentage 96.86% 2.90% 0.23%

PDI File #: **228438 A**
 Location: **N: Grove Street S: Grove Street**
 Location: **E: North Street W: Parking Lot**
 City, State: **Worcester, MA**
 Client: **VHB/E. Thompson**
 Site Code: **15245.00**
 Count Date: **Wednesday, March 2, 2022**
 Start Time: **7:00 AM**
 End Time: **9:00 AM**
 Class:



Cars and Heavy Vehicles (Combined)

	Grove Street					North Street					Grove Street					Parking Lot					Total
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	
7:00 AM	0	83	7	0	90	17	1	2	0	20	0	59	0	0	59	0	1	0	0	1	170
7:15 AM	0	88	7	0	95	11	0	10	0	21	3	91	0	0	94	0	0	1	0	1	211
7:30 AM	1	122	13	0	136	6	0	5	0	11	8	93	0	0	101	1	1	0	0	2	250
7:45 AM	0	149	25	0	174	9	0	9	0	18	5	108	1	0	114	1	0	0	0	1	307
Total	1	442	52	0	495	43	1	26	0	70	16	351	1	0	368	2	2	1	0	5	938
8:00 AM	0	147	14	0	161	17	0	5	0	22	5	107	0	0	112	0	0	0	0	0	295
8:15 AM	0	139	14	0	153	19	0	9	0	28	6	120	1	0	127	0	0	0	0	0	308
8:30 AM	0	164	10	0	174	18	0	6	0	24	6	156	1	0	163	0	0	0	0	0	361
8:45 AM	1	145	22	0	168	12	0	7	0	19	7	126	2	0	135	1	0	0	0	1	323
Total	1	595	60	0	656	66	0	27	0	93	24	509	4	0	537	1	0	0	0	1	1287
Grand Total	2	1037	112	0	1151	109	1	53	0	163	40	860	5	0	905	3	2	1	0	6	2225
Approach %	0.2	90.1	9.7	0.0		66.9	0.6	32.5	0.0		4.4	95.0	0.6	0.0		50.0	33.3	16.7	0.0		
Total %	0.1	46.6	5.0	0.0	51.7	4.9	0.0	2.4	0.0	7.3	1.8	38.7	0.2	0.0	40.7	0.1	0.1	0.0	0.0	0.3	
Exiting Leg Total					970					154					1093					8	2225
Cars	2	988	103	0	1093	105	1	51	0	157	39	812	2	0	853	2	2	1	0	5	2108
% Cars	100.0	95.3	92.0	0.0	95.0	96.3	100.0	96.2	0.0	96.3	97.5	94.4	40.0	0.0	94.3	66.7	100.0	100.0	0.0	83.3	94.7
Exiting Leg Total					918					144					1041					5	2108
Heavy Vehicles	0	49	9	0	58	4	0	2	0	6	1	48	3	0	52	1	0	0	0	1	117
% Heavy Vehicles	0.0	4.7	8.0	0.0	5.0	3.7	0.0	3.8	0.0	3.7	2.5	5.6	60.0	0.0	5.7	33.3	0.0	0.0	0.0	16.7	5.3
Exiting Leg Total					52					10					52					3	117

Peak Hour Analysis from 07:00 AM to 09:00 AM begins at:

8:00 AM	Grove Street					North Street					Grove Street					Parking Lot					Total
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	
8:00 AM	0	147	14	0	161	17	0	5	0	22	5	107	0	0	112	0	0	0	0	0	295
8:15 AM	0	139	14	0	153	19	0	9	0	28	6	120	1	0	127	0	0	0	0	0	308
8:30 AM	0	164	10	0	174	18	0	6	0	24	6	156	1	0	163	0	0	0	0	0	361
8:45 AM	1	145	22	0	168	12	0	7	0	19	7	126	2	0	135	1	0	0	0	1	323
Total Volume	1	595	60	0	656	66	0	27	0	93	24	509	4	0	537	1	0	0	0	1	1287
% Approach Total	0.2	90.7	9.1	0.0		71.0	0.0	29.0	0.0		4.5	94.8	0.7	0.0		100.0	0.0	0.0	0.0		
PHF	0.250	0.907	0.682	0.000	0.943	0.868	0.000	0.750	0.000	0.830	0.857	0.816	0.500	0.000	0.824	0.250	0.000	0.000	0.000	0.250	0.891
Cars	1	566	56	0	623	63	0	26	0	89	23	488	1	0	512	0	0	0	0	0	1224
Cars %	100.0	95.1	93.3	0.0	95.0	95.5	0.0	96.3	0.0	95.7	95.8	95.9	25.0	0.0	95.3	0.0	0.0	0.0	0.0	0.0	95.1
Heavy Vehicles	0	29	4	0	33	3	0	1	0	4	1	21	3	0	25	1	0	0	0	1	63
Heavy Vehicles %	0.0	4.9	6.7	0.0	5.0	4.5	0.0	3.7	0.0	4.3	4.2	4.1	75.0	0.0	4.7	100.0	0.0	0.0	0.0	100.0	4.9
Cars Enter Leg	1	566	56	0	623	63	0	26	0	89	23	488	1	0	512	0	0	0	0	0	1224
Heavy Enter Leg	0	29	4	0	33	3	0	1	0	4	1	21	3	0	25	1	0	0	0	1	63
Total Entering Leg	1	595	60	0	656	66	0	27	0	93	24	509	4	0	537	1	0	0	0	1	1287
Cars Exiting Leg					551					79					592					2	1224
Heavy Exiting Leg					24					5					31					3	63
Total Exiting Leg					575					84					623					5	1287

PDI File #: **228438 A**
 Location: **N: Grove Street S: Grove Street**
 Location: **E: North Street W: Parking Lot**
 City, State: **Worcester, MA**
 Client: **VHB/E. Thompson**
 Site Code: **15245.00**
 Count Date: **Wednesday, March 2, 2022**
 Start Time: **7:00 AM**
 End Time: **9:00 AM**
 Class:



Cars

	Grove Street					North Street					Grove Street					Parking Lot					Total
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	
7:00 AM	0	74	4	0	78	16	1	2	0	19	0	53	0	0	53	0	1	0	0	1	151
7:15 AM	0	84	7	0	91	11	0	10	0	21	3	80	0	0	83	0	0	1	0	1	196
7:30 AM	1	118	13	0	132	6	0	5	0	11	8	86	0	0	94	1	1	0	0	2	239
7:45 AM	0	146	23	0	169	9	0	8	0	17	5	105	1	0	111	1	0	0	0	1	298
Total	1	422	47	0	470	42	1	25	0	68	16	324	1	0	341	2	2	1	0	5	884
8:00 AM	0	142	13	0	155	16	0	5	0	21	4	104	0	0	108	0	0	0	0	0	284
8:15 AM	0	135	13	0	148	17	0	8	0	25	6	119	1	0	126	0	0	0	0	0	299
8:30 AM	0	158	10	0	168	18	0	6	0	24	6	145	0	0	151	0	0	0	0	0	343
8:45 AM	1	131	20	0	152	12	0	7	0	19	7	120	0	0	127	0	0	0	0	0	298
Total	1	566	56	0	623	63	0	26	0	89	23	488	1	0	512	0	0	0	0	0	1224
Grand Total	2	988	103	0	1093	105	1	51	0	157	39	812	2	0	853	2	2	1	0	5	2108
Approach %	0.2	90.4	9.4	0.0		66.9	0.6	32.5	0.0		4.6	95.2	0.2	0.0		40.0	40.0	20.0	0.0		
Total %	0.1	46.9	4.9	0.0	51.9	5.0	0.0	2.4	0.0	7.4	1.9	38.5	0.1	0.0	40.5	0.1	0.1	0.0	0.0	0.2	
Exiting Leg Total					918					144					1041					5	2108

Peak Hour Analysis from 07:00 AM to 09:00 AM begins at:

	Grove Street					North Street					Grove Street					Parking Lot					Total
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	
7:45 AM	0	146	23	0	169	9	0	8	0	17	5	105	1	0	111	1	0	0	0	1	298
8:00 AM	0	142	13	0	155	16	0	5	0	21	4	104	0	0	108	0	0	0	0	0	284
8:15 AM	0	135	13	0	148	17	0	8	0	25	6	119	1	0	126	0	0	0	0	0	299
8:30 AM	0	158	10	0	168	18	0	6	0	24	6	145	0	0	151	0	0	0	0	0	343
Total Volume	0	581	59	0	640	60	0	27	0	87	21	473	2	0	496	1	0	0	0	1	1224
% Approach Total	0.0	90.8	9.2	0.0		69.0	0.0	31.0	0.0		4.2	95.4	0.4	0.0		100.0	0.0	0.0	0.0		
PHF	0.000	0.919	0.641	0.000	0.947	0.833	0.000	0.844	0.000	0.870	0.875	0.816	0.500	0.000	0.821	0.250	0.000	0.000	0.000	0.250	0.892
Entering Leg	0	581	59	0	640	60	0	27	0	87	21	473	2	0	496	1	0	0	0	1	1224
Exiting Leg					533					80					609					2	1224
Total					1173					167					1105					3	2448

PDI File #: **228438 A**
 Location: **N: Grove Street S: Grove Street**
 Location: **E: North Street W: Parking Lot**
 City, State: **Worcester, MA**
 Client: **VHB/E. Thompson**
 Site Code: **15245.00**
 Count Date: **Wednesday, March 2, 2022**
 Start Time: **7:00 AM**
 End Time: **9:00 AM**
 Class:



Heavy Vehicles-Combined (Buses, Single-Unit Trucks, Articulated Trucks)

	Grove Street					North Street					Grove Street					Parking Lot					Total
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	
7:00 AM	0	9	3	0	12	1	0	0	0	1	0	6	0	0	6	0	0	0	0	0	19
7:15 AM	0	4	0	0	4	0	0	0	0	0	0	11	0	0	11	0	0	0	0	0	15
7:30 AM	0	4	0	0	4	0	0	0	0	0	0	7	0	0	7	0	0	0	0	0	11
7:45 AM	0	3	2	0	5	0	0	1	0	1	0	3	0	0	3	0	0	0	0	0	9
Total	0	20	5	0	25	1	0	1	0	2	0	27	0	0	27	0	0	0	0	0	54
8:00 AM	0	5	1	0	6	1	0	0	0	1	1	3	0	0	4	0	0	0	0	0	11
8:15 AM	0	4	1	0	5	2	0	1	0	3	0	1	0	0	1	0	0	0	0	0	9
8:30 AM	0	6	0	0	6	0	0	0	0	0	0	11	1	0	12	0	0	0	0	0	18
8:45 AM	0	14	2	0	16	0	0	0	0	0	0	6	2	0	8	1	0	0	0	1	25
Total	0	29	4	0	33	3	0	1	0	4	1	21	3	0	25	1	0	0	0	1	63
Grand Total	0	49	9	0	58	4	0	2	0	6	1	48	3	0	52	1	0	0	0	1	117
Approach %	0.0	84.5	15.5	0.0		66.7	0.0	33.3	0.0		1.9	92.3	5.8	0.0		100.0	0.0	0.0	0.0		
Total %	0.0	41.9	7.7	0.0	49.6	3.4	0.0	1.7	0.0	5.1	0.9	41.0	2.6	0.0	44.4	0.9	0.0	0.0	0.0	0.9	
Exiting Leg Total	52					10					52					3					117
Buses	0	26	3	0	29	2	0	1	0	3	1	17	1	0	19	1	0	0	0	1	52
% Buses	0.0	53.1	33.3	0.0	50.0	50.0	0.0	50.0	0.0	50.0	100.0	35.4	33.3	0.0	36.5	100.0	0.0	0.0	0.0	100.0	44.4
Exiting Leg Total	19					4					28					1					52
Single-Unit Trucks	0	23	6	0	29	2	0	1	0	3	0	29	1	0	30	0	0	0	0	0	62
% Single-Unit	0.0	46.9	66.7	0.0	50.0	50.0	0.0	50.0	0.0	50.0	0.0	60.4	33.3	0.0	57.7	0.0	0.0	0.0	0.0	0.0	53.0
Exiting Leg Total	31					6					24					1					62
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	2	1	0	3	0	0	0	0	0	3
% Articulated	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.2	33.3	0.0	5.8	0.0	0.0	0.0	0.0	0.0	2.6
Exiting Leg Total	2					0					0					1					3

Peak Hour Analysis from 07:00 AM to 09:00 AM begins at:

8:00 AM	Grove Street					North Street					Grove Street					Parking Lot					Total
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	
8:00 AM	0	5	1	0	6	1	0	0	0	1	1	3	0	0	4	0	0	0	0	0	11
8:15 AM	0	4	1	0	5	2	0	1	0	3	0	1	0	0	1	0	0	0	0	0	9
8:30 AM	0	6	0	0	6	0	0	0	0	0	0	11	1	0	12	0	0	0	0	0	18
8:45 AM	0	14	2	0	16	0	0	0	0	0	0	6	2	0	8	1	0	0	0	1	25
Total Volume	0	29	4	0	33	3	0	1	0	4	1	21	3	0	25	1	0	0	0	1	63
% Approach Total	0.0	87.9	12.1	0.0		75.0	0.0	25.0	0.0		4.0	84.0	12.0	0.0		100.0	0.0	0.0	0.0		
PHF	0.000	0.518	0.500	0.000	0.516	0.375	0.000	0.250	0.000	0.333	0.250	0.477	0.375	0.000	0.521	0.250	0.000	0.000	0.000	0.250	0.630
Buses	0	19	1	0	20	2	0	0	0	2	1	7	1	0	9	1	0	0	0	1	32
Buses %	0.0	65.5	25.0	0.0	60.6	66.7	0.0	0.0	0.0	50.0	100.0	33.3	33.3	0.0	36.0	100.0	0.0	0.0	0.0	100.0	50.8
Single-Unit Trucks	0	10	3	0	13	1	0	1	0	2	0	13	1	0	14	0	0	0	0	0	29
Single-Unit %	0.0	34.5	75.0	0.0	39.4	33.3	0.0	100.0	0.0	50.0	0.0	61.9	33.3	0.0	56.0	0.0	0.0	0.0	0.0	0.0	46.0
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	1	1	0	2	0	0	0	0	0	2
Articulated %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.8	33.3	0.0	8.0	0.0	0.0	0.0	0.0	0.0	3.2
Buses	0	19	1	0	20	2	0	0	0	2	1	7	1	0	9	1	0	0	0	1	32
Single-Unit Trucks	0	10	3	0	13	1	0	1	0	2	0	13	1	0	14	0	0	0	0	0	29
Articulated Trucks	0	0	0	0	0	0	0	0	0	0	0	1	1	0	2	0	0	0	0	0	2
Total Entering Leg	0	29	4	0	33	3	0	1	0	4	1	21	3	0	25	1	0	0	0	1	63
Buses	9					2					20					1					32
Single-Unit Trucks	14					3					11					1					29
Articulated Trucks	1					0					0					1					2
Total Exiting Leg	24					5					31					3					63

PDI File #: **228438 A**
 Location: **N: Grove Street S: Grove Street**
 Location: **E: North Street W: Parking Lot**
 City, State: **Worcester, MA**
 Client: **VHB/E. Thompson**
 Site Code: **15245.00**
 Count Date: **Wednesday, March 2, 2022**
 Start Time: **7:00 AM**
 End Time: **9:00 AM**
 Class:



Buses

	Grove Street					North Street					Grove Street					Parking Lot					Total	
	from North					from East					from South					from West						
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total		
7:00 AM	0	3	2	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	
7:15 AM	0	1	0	0	1	0	0	0	0	0	0	7	0	0	7	0	0	0	0	0	8	
7:30 AM	0	2	0	0	2	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	5	
7:45 AM	0	1	0	0	1	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	2	
Total	0	7	2	0	9	0	0	1	0	1	0	10	0	0	10	0	0	0	0	0	20	
8:00 AM	0	3	0	0	3	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	4	
8:15 AM	0	2	0	0	2	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0	4	
8:30 AM	0	4	0	0	4	0	0	0	0	0	0	5	0	0	5	0	0	0	0	0	9	
8:45 AM	0	10	1	0	11	0	0	0	0	0	0	2	1	0	3	1	0	0	0	1	15	
Total	0	19	1	0	20	2	0	0	0	2	1	7	1	0	9	1	0	0	0	1	32	
Grand Total	0	26	3	0	29	2	0	1	0	3	1	17	1	0	19	1	0	0	0	1	52	
Approach %	0.0	89.7	10.3	0.0		66.7	0.0	33.3	0.0		5.3	89.5	5.3	0.0		100.0	0.0	0.0	0.0			
Total %	0.0	50.0	5.8	0.0	55.8	3.8	0.0	1.9	0.0	5.8	1.9	32.7	1.9	0.0	36.5	1.9	0.0	0.0	0.0	1.9		
Exiting Leg Total						19					4					28					1	52

Peak Hour Analysis from 07:00 AM to 09:00 AM begins at:

	Grove Street					North Street					Grove Street					Parking Lot					Total	
	from North					from East					from South					from West						
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total		
8:00 AM	0	3	0	0	3	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	4	
8:15 AM	0	2	0	0	2	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0	4	
8:30 AM	0	4	0	0	4	0	0	0	0	0	0	5	0	0	5	0	0	0	0	0	9	
8:45 AM	0	10	1	0	11	0	0	0	0	0	0	2	1	0	3	1	0	0	0	1	15	
Total Volume	0	19	1	0	20	2	0	0	0	2	1	7	1	0	9	1	0	0	0	1	32	
% Approach Total	0.0	95.0	5.0	0.0		100.0	0.0	0.0	0.0		11.1	77.8	11.1	0.0		100.0	0.0	0.0	0.0			
PHF	0.000	0.475	0.250	0.000	0.455	0.250	0.000	0.000	0.000	0.250	0.250	0.350	0.250	0.000	0.450	0.250	0.000	0.000	0.000	0.250	0.533	
Entering Leg	0	19	1	0	20	2	0	0	0	2	1	7	1	0	9	1	0	0	0	1	32	
Exiting Leg						9					2					20					1	32
Total						29					4					29					2	64

PDI File #: **228438 A**
 Location: **N: Grove Street S: Grove Street**
 Location: **E: North Street W: Parking Lot**
 City, State: **Worcester, MA**
 Client: **VHB/E. Thompson**
 Site Code: **15245.00**
 Count Date: **Wednesday, March 2, 2022**
 Start Time: **7:00 AM**
 End Time: **9:00 AM**
 Class:



Single-Unit Trucks

	Grove Street					North Street					Grove Street					Parking Lot					Total
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	
7:00 AM	0	6	1	0	7	1	0	0	0	1	0	5	0	0	5	0	0	0	0	0	13
7:15 AM	0	3	0	0	3	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	7
7:30 AM	0	2	0	0	2	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	6
7:45 AM	0	2	2	0	4	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	7
Total	0	13	3	0	16	1	0	0	0	1	0	16	0	0	16	0	0	0	0	0	33
8:00 AM	0	2	1	0	3	1	0	0	0	1	0	3	0	0	3	0	0	0	0	0	7
8:15 AM	0	2	1	0	3	0	0	1	0	1	0	1	0	0	1	0	0	0	0	0	5
8:30 AM	0	2	0	0	2	0	0	0	0	0	0	6	0	0	6	0	0	0	0	0	8
8:45 AM	0	4	1	0	5	0	0	0	0	0	0	3	1	0	4	0	0	0	0	0	9
Total	0	10	3	0	13	1	0	1	0	2	0	13	1	0	14	0	0	0	0	0	29
Grand Total	0	23	6	0	29	2	0	1	0	3	0	29	1	0	30	0	0	0	0	0	62
Approach %	0.0	79.3	20.7	0.0		66.7	0.0	33.3	0.0		0.0	96.7	3.3	0.0		0.0	0.0	0.0	0.0		
Total %	0.0	37.1	9.7	0.0	46.8	3.2	0.0	1.6	0.0	4.8	0.0	46.8	1.6	0.0	48.4	0.0	0.0	0.0	0.0	0.0	
Exiting Leg Total	31					6					24					1					62

Peak Hour Analysis from 07:00 AM to 09:00 AM begins at:

7:00 AM	Grove Street					North Street					Grove Street					Parking Lot					Total
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	
7:00 AM	0	6	1	0	7	1	0	0	0	1	0	5	0	0	5	0	0	0	0	0	13
7:15 AM	0	3	0	0	3	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	7
7:30 AM	0	2	0	0	2	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	6
7:45 AM	0	2	2	0	4	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	7
Total Volume	0	13	3	0	16	1	0	0	0	1	0	16	0	0	16	0	0	0	0	0	33
% Approach Total	0.0	81.3	18.8	0.0		100.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0		0.0	0.0	0.0	0.0		
PHF	0.000	0.542	0.375	0.000	0.571	0.250	0.000	0.000	0.000	0.250	0.000	0.800	0.000	0.000	0.800	0.000	0.000	0.000	0.000	0.000	0.635
Entering Leg	0	13	3	0	16	1	0	0	0	1	0	16	0	0	16	0	0	0	0	0	33
Exiting Leg	17					3					13					0					33
Total	33					4					29					0					66

PDI File #: **228438 A**
 Location: **N: Grove Street S: Grove Street**
 Location: **E: North Street W: Parking Lot**
 City, State: **Worcester, MA**
 Client: **VHB/E. Thompson**
 Site Code: **15245.00**
 Count Date: **Wednesday, March 2, 2022**
 Start Time: **7:00 AM**
 End Time: **9:00 AM**
 Class:



Articulated Trucks

	Grove Street					North Street					Grove Street					Parking Lot					Total
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	1
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
Total	0	0	0	0	0	0	0	0	0	0	0	1	1	0	2	0	0	0	0	0	2
Grand Total	0	0	0	0	0	0	0	0	0	0	0	2	1	0	3	0	0	0	0	0	3
Approach %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	66.7	33.3	0.0	100.0	0.0	0.0	0.0	0.0	0.0	
Total %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	66.7	33.3	0.0	100.0	0.0	0.0	0.0	0.0	0.0	
Exiting Leg Total						2						0						1	3		

Peak Hour Analysis from 07:00 AM to 09:00 AM begins at:

	Grove Street					North Street					Grove Street					Parking Lot					Total				
	from North					from East					from South					from West									
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total					
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	1				
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1				
Total Volume	0	0	0	0	0	0	0	0	0	0	0	1	1	0	2	0	0	0	0	0	2				
% Approach Total	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	50.0	50.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0					
PHF	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.250	0.250	0.000	0.500	0.000	0.000	0.000	0.000	0.000	0.500				
Entering Leg	0	0	0	0	0	0	0	0	0	0	0	1	1	0	2	0	0	0	0	0	2				
Exiting Leg						1						0						1	2						
Total						1						0						2						1	4

PDI File #: **228438 A**
 Location: **N: Grove Street S: Grove Street**
 Location: **E: North Street W: Parking Lot**
 City, State: **Worcester, MA**
 Client: **VHB/E. Thompson**
 Site Code: **15245.00**
 Count Date: **Wednesday, March 2, 2022**
 Start Time: **7:00 AM**
 End Time: **9:00 AM**
 Class:



Bicycles (on Roadway and Crosswalks)

	Grove Street							North Street							Grove Street							Parking Lot							Total
	from North							from East							from South							from West							
	Right	Thru	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	Left	U-Turn	CW-SB	CW-NB	Total	Right	Thru	Left	U-Turn	CW-WB	CW-EB	Total	Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total	
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	
Approach %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total %	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	
Exiting Leg Total	1							0							0							0							1

Peak Hour Analysis from 07:00 AM to 09:00 AM begins at:

7:00 AM	Grove Street							North Street							Grove Street							Parking Lot							Total
	from North							from East							from South							from West							
	Right	Thru	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	Left	U-Turn	CW-SB	CW-NB	Total	Right	Thru	Left	U-Turn	CW-WB	CW-EB	Total	Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total	
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Total Volume	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	
% Approach Total	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	
PHF	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.250	0.000	0.000	0.000	0.000	0.000	0.000	0.250	
Entering Leg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	
Exiting Leg	1							0							0							0							1
Total	1							0							1							0							2

PDI File #: **228438 A**
 Location: **N: Grove Street S: Grove Street**
 Location: **E: North Street W: Parking Lot**
 City, State: **Worcester, MA**
 Client: **VHB/E. Thompson**
 Site Code: **15245.00**
 Count Date: **Wednesday, March 2, 2022**
 Start Time: **7:00 AM**
 End Time: **9:00 AM**
 Class:



Pedestrians

	Grove Street								North Street								Grove Street								Parking Lot								Total
	from North								from East								from South								from West								
	Right	Thru	Left	U-Turn	CW-EB	CW-WB	Total		Right	Thru	Left	U-Turn	CW-SB	CW-NB	Total		Right	Thru	Left	U-Turn	CW-WB	CW-EB	Total		Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total		
7:00 AM	0	0	0	0	0	1	1	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2		
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1		
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	3		
7:45 AM	0	0	0	0	0	1	1	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2		
Total	0	0	0	0	0	2	2	0	0	0	0	4	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	8		
8:00 AM	0	0	0	0	0	1	1	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	3	5		
8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	3		
8:30 AM	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1		
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Total	0	0	0	0	0	2	2	0	0	0	0	1	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	3	2	5	9		
Grand Total	0	0	0	0	0	4	4	0	0	0	0	5	1	6	0	0	0	0	0	0	0	0	0	0	0	0	0	5	2	7	17		
Approach %	0	0	0	0	0	100		0	0	0	0	83.3	16.7		0	0	0	0	0	0	0		0	0	0	0	0	71.4	28.6				
Total %	0	0	0	0	0	23.5	23.5	0	0	0	0	29.4	5.88	35.3	0	0	0	0	0	0	0		0	0	0	0	0	29.4	11.8	41.2			
Exiting Leg Total								4								6								0								7	17

Peak Hour Analysis from 07:00 AM to 09:00 AM begins at:

	Grove Street								North Street								Grove Street								Parking Lot								Total
	from North								from East								from South								from West								
	Right	Thru	Left	U-Turn	CW-EB	CW-WB	Total		Right	Thru	Left	U-Turn	CW-SB	CW-NB	Total		Right	Thru	Left	U-Turn	CW-WB	CW-EB	Total		Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total		
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	3		
7:45 AM	0	0	0	0	0	1	1	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2		
8:00 AM	0	0	0	0	0	1	1	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	3	5		
8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	3		
Total Volume	0	0	0	0	0	2	2	0	0	0	0	4	1	5	0	0	0	0	0	0	0	0	0	0	0	0	0	4	2	6	13		
% Approach Total	0.0	0.0	0.0	0.0	0.0	100.0		0.0	0.0	0.0	0.0	80.0	20.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	66.7	33.3				
PHF	0.000	0.000	0.000	0.000	0.000	0.500	0.500	0.000	0.000	0.000	0.000	0.500	0.250	0.625	0.000	0.000	0.000	0.000	0.000	0.000	0.000		0.000	0.000	0.000	0.000	0.500	0.250	0.500	0.650			
Entering Leg	0	0	0	0	0	2	2	0	0	0	0	4	1	5	0	0	0	0	0	0	0	0	0	0	0	0	0	4	2	6	13		
Exiting Leg								2								5								0								6	13
Total								4								10								0								12	26

PDI File #: **228438 A**
 Location: **N: Grove Street S: Grove Street**
 Location: **E: North Street W: Parking Lot**
 City, State: **Worcester, MA**
 Client: **VHB/E. Thompson**
 Site Code: **15245.00**
 Count Date: **Wednesday, March 2, 2022**
 Start Time: **4:00 PM**
 End Time: **6:00 PM**
 Class:



Cars and Heavy Vehicles (Combined)

	Grove Street					North Street					Grove Street					Parking Lot					Total
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	
4:00 PM	1	183	12	0	196	26	0	9	0	35	7	164	3	0	174	0	0	0	0	0	405
4:15 PM	3	154	10	0	167	17	0	7	0	24	15	174	3	0	192	1	0	0	0	1	384
4:30 PM	2	183	22	0	207	28	1	10	0	39	13	146	3	0	162	1	0	0	0	1	409
4:45 PM	3	158	16	0	177	33	1	20	0	54	7	154	1	0	162	2	0	1	0	3	396
Total	9	678	60	0	747	104	2	46	0	152	42	638	10	0	690	4	0	1	0	5	1594
5:00 PM	3	169	11	0	183	23	0	10	0	33	5	172	1	0	178	2	0	2	0	4	398
5:15 PM	1	136	9	0	146	19	1	15	0	35	8	155	3	0	166	1	1	0	0	2	349
5:30 PM	6	155	11	0	172	19	1	13	0	33	12	139	4	0	155	3	1	4	0	8	368
5:45 PM	2	120	8	0	130	15	0	14	0	29	8	116	2	0	126	4	1	1	0	6	291
Total	12	580	39	0	631	76	2	52	0	130	33	582	10	0	625	10	3	7	0	20	1406
Grand Total	21	1258	99	0	1378	180	4	98	0	282	75	1220	20	0	1315	14	3	8	0	25	3000
Approach %	1.5	91.3	7.2	0.0		63.8	1.4	34.8	0.0		5.7	92.8	1.5	0.0		56.0	12.0	32.0	0.0		
Total %	0.7	41.9	3.3	0.0	45.9	6.0	0.1	3.3	0.0	9.4	2.5	40.7	0.7	0.0	43.8	0.5	0.1	0.3	0.0	0.8	
Exiting Leg Total					1408					177					1370					45	3000
Cars	21	1231	95	0	1347	179	4	98	0	281	75	1206	20	0	1301	14	3	8	0	25	2954
% Cars	100.0	97.9	96.0	0.0	97.8	99.4	100.0	100.0	0.0	99.6	100.0	98.9	100.0	0.0	98.9	100.0	100.0	100.0	0.0	100.0	98.5
Exiting Leg Total					1393					173					1343					45	2954
Heavy Vehicles	0	27	4	0	31	1	0	0	0	1	0	14	0	0	14	0	0	0	0	0	46
% Heavy Vehicles	0.0	2.1	4.0	0.0	2.2	0.6	0.0	0.0	0.0	0.4	0.0	1.1	0.0	0.0	1.1	0.0	0.0	0.0	0.0	0.0	1.5
Exiting Leg Total					15					4					27					0	46

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

	Grove Street					North Street					Grove Street					Parking Lot					Total
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	
4:00 PM	1	183	12	0	196	26	0	9	0	35	7	164	3	0	174	0	0	0	0	0	405
4:15 PM	3	154	10	0	167	17	0	7	0	24	15	174	3	0	192	1	0	0	0	1	384
4:30 PM	2	183	22	0	207	28	1	10	0	39	13	146	3	0	162	1	0	0	0	1	409
4:45 PM	3	158	16	0	177	33	1	20	0	54	7	154	1	0	162	2	0	1	0	3	396
Total Volume	9	678	60	0	747	104	2	46	0	152	42	638	10	0	690	4	0	1	0	5	1594
% Approach Total	1.2	90.8	8.0	0.0		68.4	1.3	30.3	0.0		6.1	92.5	1.4	0.0		80.0	0.0	20.0	0.0		
PHF	0.750	0.926	0.682	0.000	0.902	0.788	0.500	0.575	0.000	0.704	0.700	0.917	0.833	0.000	0.898	0.500	0.000	0.250	0.000	0.417	0.974
Cars	9	664	58	0	731	103	2	46	0	151	42	631	10	0	683	4	0	1	0	5	1570
Cars %	100.0	97.9	96.7	0.0	97.9	99.0	100.0	100.0	0.0	99.3	100.0	98.9	100.0	0.0	99.0	100.0	0.0	100.0	0.0	100.0	98.5
Heavy Vehicles	0	14	2	0	16	1	0	0	0	1	0	7	0	0	7	0	0	0	0	0	24
Heavy Vehicles %	0.0	2.1	3.3	0.0	2.1	1.0	0.0	0.0	0.0	0.7	0.0	1.1	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	1.5
Cars Enter Leg	9	664	58	0	731	103	2	46	0	151	42	631	10	0	683	4	0	1	0	5	1570
Heavy Enter Leg	0	14	2	0	16	1	0	0	0	1	0	7	0	0	7	0	0	0	0	0	24
Total Entering Leg	9	678	60	0	747	104	2	46	0	152	42	638	10	0	690	4	0	1	0	5	1594
Cars Exiting Leg					735					100					714					21	1570
Heavy Exiting Leg					8					2					14					0	24
Total Exiting Leg					743					102					728					21	1594

PDI File #: **228438 A**
 Location: **N: Grove Street S: Grove Street**
 Location: **E: North Street W: Parking Lot**
 City, State: **Worcester, MA**
 Client: **VHB/E. Thompson**
 Site Code: **15245.00**
 Count Date: **Wednesday, March 2, 2022**
 Start Time: **4:00 PM**
 End Time: **6:00 PM**
 Class:



Cars

	Grove Street					North Street					Grove Street					Parking Lot					Total
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	
4:00 PM	1	179	11	0	191	25	0	9	0	34	7	160	3	0	170	0	0	0	0	0	395
4:15 PM	3	152	10	0	165	17	0	7	0	24	15	172	3	0	190	1	0	0	0	1	380
4:30 PM	2	180	22	0	204	28	1	10	0	39	13	145	3	0	161	1	0	0	0	1	405
4:45 PM	3	153	15	0	171	33	1	20	0	54	7	154	1	0	162	2	0	1	0	3	390
Total	9	664	58	0	731	103	2	46	0	151	42	631	10	0	683	4	0	1	0	5	1570
5:00 PM	3	161	10	0	174	23	0	10	0	33	5	172	1	0	178	2	0	2	0	4	389
5:15 PM	1	133	9	0	143	19	1	15	0	35	8	150	3	0	161	1	1	0	0	2	341
5:30 PM	6	154	10	0	170	19	1	13	0	33	12	137	4	0	153	3	1	4	0	8	364
5:45 PM	2	119	8	0	129	15	0	14	0	29	8	116	2	0	126	4	1	1	0	6	290
Total	12	567	37	0	616	76	2	52	0	130	33	575	10	0	618	10	3	7	0	20	1384
Grand Total	21	1231	95	0	1347	179	4	98	0	281	75	1206	20	0	1301	14	3	8	0	25	2954
Approach %	1.6	91.4	7.1	0.0		63.7	1.4	34.9	0.0		5.8	92.7	1.5	0.0		56.0	12.0	32.0	0.0		
Total %	0.7	41.7	3.2	0.0	45.6	6.1	0.1	3.3	0.0	9.5	2.5	40.8	0.7	0.0	44.0	0.5	0.1	0.3	0.0	0.8	
Exiting Leg Total					1393					173					1343					45	2954

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

	Grove Street					North Street					Grove Street					Parking Lot					Total
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	
4:00 PM	1	179	11	0	191	25	0	9	0	34	7	160	3	0	170	0	0	0	0	0	395
4:15 PM	3	152	10	0	165	17	0	7	0	24	15	172	3	0	190	1	0	0	0	1	380
4:30 PM	2	180	22	0	204	28	1	10	0	39	13	145	3	0	161	1	0	0	0	1	405
4:45 PM	3	153	15	0	171	33	1	20	0	54	7	154	1	0	162	2	0	1	0	3	390
Total Volume	9	664	58	0	731	103	2	46	0	151	42	631	10	0	683	4	0	1	0	5	1570
% Approach Total	1.2	90.8	7.9	0.0		68.2	1.3	30.5	0.0		6.1	92.4	1.5	0.0		80.0	0.0	20.0	0.0		
PHF	0.750	0.922	0.659	0.000	0.896	0.780	0.500	0.575	0.000	0.699	0.700	0.917	0.833	0.000	0.899	0.500	0.000	0.250	0.000	0.417	0.969
Entering Leg	9	664	58	0	731	103	2	46	0	151	42	631	10	0	683	4	0	1	0	5	1570
Exiting Leg					735					100					714					21	1570
Total					1466					251					1397					26	3140

PDI File #: **228438 A**
 Location: **N: Grove Street S: Grove Street**
 Location: **E: North Street W: Parking Lot**
 City, State: **Worcester, MA**
 Client: **VHB/E. Thompson**
 Site Code: **15245.00**
 Count Date: **Wednesday, March 2, 2022**
 Start Time: **4:00 PM**
 End Time: **6:00 PM**
 Class:



Heavy Vehicles-Combined (Buses, Single-Unit Trucks, Articulated Trucks)

	Grove Street					North Street					Grove Street					Parking Lot					Total
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	
4:00 PM	0	4	1	0	5	1	0	0	0	1	0	4	0	0	4	0	0	0	0	0	10
4:15 PM	0	2	0	0	2	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	4
4:30 PM	0	3	0	0	3	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	4
4:45 PM	0	5	1	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6
Total	0	14	2	0	16	1	0	0	0	1	0	7	0	0	7	0	0	0	0	0	24
5:00 PM	0	8	1	0	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9
5:15 PM	0	3	0	0	3	0	0	0	0	0	0	5	0	0	5	0	0	0	0	0	8
5:30 PM	0	1	1	0	2	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	4
5:45 PM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Total	0	13	2	0	15	0	0	0	0	0	0	7	0	0	7	0	0	0	0	0	22
Grand Total	0	27	4	0	31	1	0	0	0	1	0	14	0	0	14	0	0	0	0	0	46
Approach %	0.0	87.1	12.9	0.0		100.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0		0.0	0.0	0.0	0.0		
Total %	0.0	58.7	8.7	0.0	67.4	2.2	0.0	0.0	0.0	2.2	0.0	30.4	0.0	0.0	30.4	0.0	0.0	0.0	0.0	0.0	
Exiting Leg Total	15					4					27					0					46
Buses	0	12	3	0	15	1	0	0	0	1	0	6	0	0	6	0	0	0	0	0	22
% Buses	0.0	44.4	75.0	0.0	48.4	100.0	0.0	0.0	0.0	100.0	0.0	42.9	0.0	0.0	42.9	0.0	0.0	0.0	0.0	0.0	47.8
Exiting Leg Total	7					3					12					0					22
Single-Unit Trucks	0	11	1	0	12	0	0	0	0	0	0	7	0	0	7	0	0	0	0	0	19
% Single-Unit	0.0	40.7	25.0	0.0	38.7	0.0	0.0	0.0	0.0	0.0	0.0	50.0	0.0	0.0	50.0	0.0	0.0	0.0	0.0	0.0	41.3
Exiting Leg Total	7					1					11					0					19
Articulated Trucks	0	4	0	0	4	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	5
% Articulated	0.0	14.8	0.0	0.0	12.9	0.0	0.0	0.0	0.0	0.0	0.0	7.1	0.0	0.0	7.1	0.0	0.0	0.0	0.0	0.0	10.9
Exiting Leg Total	1					0					4					0					5

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

	Grove Street					North Street					Grove Street					Parking Lot					Total
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	
4:30 PM	0	3	0	0	3	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	4
4:45 PM	0	5	1	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6
5:00 PM	0	8	1	0	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9
5:15 PM	0	3	0	0	3	0	0	0	0	0	0	5	0	0	5	0	0	0	0	0	8
Total Volume	0	19	2	0	21	0	0	0	0	0	0	6	0	0	6	0	0	0	0	0	27
% Approach Total	0.0	90.5	9.5	0.0		0.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0		0.0	0.0	0.0	0.0		
PHF	0.000	0.594	0.500	0.000	0.583	0.000	0.000	0.000	0.000	0.000	0.000	0.300	0.000	0.000	0.300	0.000	0.000	0.000	0.000	0.000	0.750
Buses	0	8	1	0	9	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	11
Buses %	0.0	42.1	50.0	0.0	42.9	0.0	0.0	0.0	0.0	0.0	0.0	33.3	0.0	0.0	33.3	0.0	0.0	0.0	0.0	0.0	40.7
Single-Unit Trucks	0	7	1	0	8	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	11
Single-Unit %	0.0	36.8	50.0	0.0	38.1	0.0	0.0	0.0	0.0	0.0	0.0	50.0	0.0	0.0	50.0	0.0	0.0	0.0	0.0	0.0	40.7
Articulated Trucks	0	4	0	0	4	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	5
Articulated %	0.0	21.1	0.0	0.0	19.0	0.0	0.0	0.0	0.0	0.0	0.0	16.7	0.0	0.0	16.7	0.0	0.0	0.0	0.0	0.0	18.5
Buses	0	8	1	0	9	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	11
Single-Unit Trucks	0	7	1	0	8	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	11
Articulated Trucks	0	4	0	0	4	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	5
Total Entering Leg	0	19	2	0	21	0	0	0	0	0	0	6	0	0	6	0	0	0	0	0	27
Buses	2					1					8					0					11
Single-Unit Trucks	3					1					7					0					11
Articulated Trucks	1					0					4					0					5
Total Exiting Leg	6					2					19					0					27

PDI File #: **228438 A**
 Location: **N: Grove Street S: Grove Street**
 Location: **E: North Street W: Parking Lot**
 City, State: **Worcester, MA**
 Client: **VHB/E. Thompson**
 Site Code: **15245.00**
 Count Date: **Wednesday, March 2, 2022**
 Start Time: **4:00 PM**
 End Time: **6:00 PM**
 Class:



Buses

	Grove Street					North Street					Grove Street					Parking Lot					Total	
	from North					from East					from South					from West						
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total		
4:00 PM	0	1	1	0	2	1	0	0	0	1	0	2	0	0	2	0	0	0	0	0	5	
4:15 PM	0	2	0	0	2	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	3	
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1	
4:45 PM	0	2	1	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	
Total	0	5	2	0	7	1	0	0	0	1	0	4	0	0	4	0	0	0	0	0	12	
5:00 PM	0	4	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	
5:15 PM	0	2	0	0	2	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	3	
5:30 PM	0	0	1	0	1	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	2	
5:45 PM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
Total	0	7	1	0	8	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	10	
Grand Total	0	12	3	0	15	1	0	0	0	1	0	6	0	0	6	0	0	0	0	0	22	
Approach %	0.0	80.0	20.0	0.0		100.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0		0.0	0.0	0.0	0.0			
Total %	0.0	54.5	13.6	0.0	68.2	4.5	0.0	0.0	0.0	4.5	0.0	27.3	0.0	0.0	27.3	0.0	0.0	0.0	0.0	0.0		
Exiting Leg Total						7					3					12					0	22

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

4:00 PM	Grove Street					North Street					Grove Street					Parking Lot					Total	
	from North					from East					from South					from West						
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total		
4:00 PM	0	1	1	0	2	1	0	0	0	1	0	2	0	0	2	0	0	0	0	0	5	
4:15 PM	0	2	0	0	2	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	3	
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1	
4:45 PM	0	2	1	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	
Total Volume	0	5	2	0	7	1	0	0	0	1	0	4	0	0	4	0	0	0	0	0	12	
% Approach Total	0.0	71.4	28.6	0.0		100.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0		0.0	0.0	0.0	0.0			
PHF	0.000	0.625	0.500	0.000	0.583	0.250	0.000	0.000	0.000	0.250	0.000	0.500	0.000	0.000	0.500	0.000	0.000	0.000	0.000	0.000	0.600	
Entering Leg	0					5					4					0					12	
Exiting Leg						5					2					5					0	12
Total						12					3					9					0	24

PDI File #: **228438 A**
 Location: **N: Grove Street S: Grove Street**
 Location: **E: North Street W: Parking Lot**
 City, State: **Worcester, MA**
 Client: **VHB/E. Thompson**
 Site Code: **15245.00**
 Count Date: **Wednesday, March 2, 2022**
 Start Time: **4:00 PM**
 End Time: **6:00 PM**
 Class:



Single-Unit Trucks

	Grove Street					North Street					Grove Street					Parking Lot					Total	
	from North					from East					from South					from West						
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total		
4:00 PM	0	3	0	0	3	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	5	
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1	
4:30 PM	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	
4:45 PM	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	
Total	0	7	0	0	7	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	10	
5:00 PM	0	3	1	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	3	
5:30 PM	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	2	
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Total	0	4	1	0	5	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	9	
Grand Total	0	11	1	0	12	0	0	0	0	0	0	7	0	0	7	0	0	0	0	0	19	
Approach %	0.0	91.7	8.3	0.0		0.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0		0.0	0.0	0.0	0.0			
Total %	0.0	57.9	5.3	0.0	63.2	0.0	0.0	0.0	0.0	0.0	0.0	36.8	0.0	0.0	36.8	0.0	0.0	0.0	0.0	0.0		
Exiting Leg Total						7					1					11					0	19

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

4:30 PM	Grove Street					North Street					Grove Street					Parking Lot					Total	
	from North					from East					from South					from West						
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total		
4:30 PM	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	
4:45 PM	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	
5:00 PM	0	3	1	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	3	
Total Volume	0	7	1	0	8	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	11	
% Approach Total	0.0	87.5	12.5	0.0		0.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0		0.0	0.0	0.0	0.0			
PHF	0.000	0.583	0.250	0.000	0.500	0.000	0.000	0.000	0.000	0.000	0.000	0.250	0.000	0.000	0.250	0.000	0.000	0.000	0.000	0.000	0.688	
Entering Leg	0	7	1	0	8	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	11	
Exiting Leg						3					1					7					0	11
Total						11					1					10					0	22

PDI File #: **228438 A**
 Location: **N: Grove Street S: Grove Street**
 Location: **E: North Street W: Parking Lot**
 City, State: **Worcester, MA**
 Client: **VHB/E. Thompson**
 Site Code: **15245.00**
 Count Date: **Wednesday, March 2, 2022**
 Start Time: **4:00 PM**
 End Time: **6:00 PM**
 Class:



Articulated Trucks

	Grove Street					North Street					Grove Street					Parking Lot					Total
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
4:45 PM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Total	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
5:00 PM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
5:15 PM	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	2
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	2	0	0	2	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	3
Grand Total	0	4	0	0	4	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	5
Approach %	0.0	100.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0		0.0	0.0	0.0	0.0		
Total %	0.0	80.0	0.0	0.0	80.0	0.0	0.0	0.0	0.0	0.0	0.0	20.0	0.0	0.0	20.0	0.0	0.0	0.0	0.0	0.0	
Exiting Leg Total	1					0					4					0					5

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

	Grove Street					North Street					Grove Street					Parking Lot					Total
	from North					from East					from South					from West					
	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	Right	Thru	Left	U-Turn	Total	
4:30 PM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
5:00 PM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
5:15 PM	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	2
Total Volume	0	4	0	0	4	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	5
% Approach Total	0.0	100.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0		0.0	0.0	0.0	0.0		
PHF	0.000	1.000	0.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.250	0.000	0.000	0.250	0.000	0.000	0.000	0.000	0.000	0.625
Entering Leg	0	4	0	0	4	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	5
Exiting Leg	1					0					4					0					5
Total	5					0					5					0					10

PDI File #: **228438 A**
 Location: **N: Grove Street S: Grove Street**
 Location: **E: North Street W: Parking Lot**
 City, State: **Worcester, MA**
 Client: **VHB/E. Thompson**
 Site Code: **15245.00**
 Count Date: **Wednesday, March 2, 2022**
 Start Time: **4:00 PM**
 End Time: **6:00 PM**
 Class:



Pedestrians

	Grove Street							North Street							Grove Street							Parking Lot							Total
	from North							from East							from South							from West							
	Right	Thru	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	Left	U-Turn	CW-SB	CW-NB	Total	Right	Thru	Left	U-Turn	CW-WB	CW-EB	Total	Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total	
4:00 PM	0	0	0	0	1	2	3	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	2	1	3	8
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	10	10	11
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	2	2	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
4:45 PM	0	0	0	0	0	2	2	0	0	0	0	0	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5
Total	0	0	0	0	1	4	5	0	0	0	0	2	8	10	0	0	0	0	0	0	0	0	0	0	0	2	11	13	28
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2	2
Total	0	0	0	0	0	0	0	0	0	0	0	1	1	2	0	0	0	0	0	0	0	0	0	0	0	1	2	3	5
Grand Total	0	0	0	0	1	4	5	0	0	0	0	3	9	12	0	0	0	0	0	0	0	0	0	0	0	3	13	16	33
Approach %	0	0	0	0	20	80		0	0	0	0	25	75		0	0	0	0	0	0		0	0	0	0	18.8	81.3		
Total %	0	0	0	0	3.03	12.1	15.2	0	0	0	0	9.09	27.3	36.4	0	0	0	0	0	0		0	0	0	0	9.09	39.4	48.5	
Exiting Leg Total	5							12							0							16							33

Peak Hour Analysis from 04:00 PM to 06:00 PM begins at:

4:00 PM	Grove Street							North Street							Grove Street							Parking Lot							Total
	from North							from East							from South							from West							
	Right	Thru	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	Left	U-Turn	CW-SB	CW-NB	Total	Right	Thru	Left	U-Turn	CW-WB	CW-EB	Total	Right	Thru	Left	U-Turn	CW-NB	CW-SB	Total	
4:00 PM	0	0	0	0	1	2	3	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	2	1	3	8
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	10	10	11
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	2	2	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
4:45 PM	0	0	0	0	0	2	2	0	0	0	0	0	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5
Total Volume	0	0	0	0	1	4	5	0	0	0	0	2	8	10	0	0	0	0	0	0	0	0	0	0	0	2	11	13	28
% Approach Total	0.0	0.0	0.0	0.0	20.0	80.0		0.0	0.0	0.0	0.0	20.0	80.0		0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	15.4	84.6		
PHF	0.000	0.000	0.000	0.000	0.250	0.500	0.417	0.000	0.000	0.000	0.000	0.250	0.667	0.625	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.250	0.275	0.325	0.636
Entering Leg	0	0	0	0	1	4	5	0	0	0	0	2	8	10	0	0	0	0	0	0	0	0	0	0	0	2	11	13	28
Exiting Leg	5							10							0							13							28
Total	10							20							0							26							56

Stephen S. Rolle, PE
Ref: 15752.00
April 25, 2023



Attachment C: Crash Data

Grove Street at Glennie Street: January 2017 thru December 2022

Crash Number	Crash Date	Crash Severity	Crash Status	Crash Time	Crash Year	Max Injury Severity Reported	Age of Driver - Youngest Known	Age of Driver - Oldest Known	Motorist - Youngest Known	Age of Non-Motorist - Oldest Known	Driver Contributing Circumstances (All Drivers)	Driver Distracted By (All Vehicles)	First Harmful Event	Light Conditions	Manner of Collision	Non-Motorist Action (All Persons)	Non-Motorist Location (All Persons)	Non-Motorist Type (All Persons)	Road Surface Condition	Vehicle Actions Prior to Crash (All Vehicles)	Vehicle Configuration (All Vehicles)
4366065	04/25/2017	Property damage only (none injured)	Closed	8:16 PM	2017	No injury	35-44	35-44			D1: (No improper driving),(No improper driving)	D1: Not Distracted	Collision with motor vehicle in traffic	Dark - lighted roadway	Sideswipe, same direction				Wet	V1: Travelling straight ahead	V1:(Light truck(van, mini-van, pickup, sport utility))
4403940	06/26/2017	Property damage only (none injured)	Closed	8:15 AM	2017	No injury	55-64	55-64			D2: (No improper driving)	D2: Not Distracted	Collision with motor vehicle in traffic	Daylight	Rear-end				Dry	V1: Not reported / V2: Turning left	V2:(Passenger car)
4506489	11/14/2017	Non-fatal injury	Closed	5:25 PM	2017	Non-fatal injury - Possible	25-34	25-34			D1: (No improper driving),(No improper driving) / D2: (Failed to yield right of way),(Inattention)	D1: Not Distracted	Collision with motor vehicle in traffic	Dark - lighted roadway	Angle				Dry	V1: Travelling straight ahead / V2: Turning left	V1:(Light truck(van, mini-van, pickup, sport utility)) / V2:(Passenger car)
4568907	05/14/2018	Property damage only (none injured)	Closed	4:06 PM	2018	No injury	25-34	>84			D1: (No improper driving),(No improper driving) / D2: (Failed to yield right of way)	D1: Not Distracted	Collision with motor vehicle in traffic	Daylight	Angle				Dry	V1: Travelling straight ahead / V2: Turning left	V1:(Passenger car) / V2:(Passenger car)
4571613	05/17/2018	Property damage only (none injured)	Closed	3:56 PM	2018	No injury	25-34	65-74			D1: (Unknown) / D2: (Unknown)	D1: Not Distracted / D2: Not Distracted	Collision with motor vehicle in traffic	Daylight	Angle				Dry	V1: Turning left / V2: Travelling straight ahead	V1:(Passenger car) / V2:(Passenger car)
4684807	02/05/2019	Property damage only (none injured)	Closed	9:24 AM	2019	No injury	35-44	75-84			D1: (Unknown) / D2: (Unknown)	D1: Not Distracted / D2: Not Distracted	Collision with motor vehicle in traffic	Daylight	Angle				Wet	V1: Travelling straight ahead / V2: Travelling straight ahead	V1:(Passenger car) / V2:(Passenger car)
4800700	07/17/2019	Non-fatal injury	Closed	10:13 AM	2019	Suspected Minor Injury (B)	35-44	35-44	45-54	45-54	D1: (Unknown)		Collision with pedalcycle (bicycle, tricycle, unicycle, pedal car)	Daylight	Single vehicle crash	P2: Walkir	P2: In roac	P2: Cyclist	Dry	V1: Travelling straight ahead	V1:(Passenger car)
4891514	12/27/2019	Property damage only (none injured)	Closed	3:44 PM	2019	No Apparent Injury (O)	21-24	65-74			D1: (No improper driving) / D2: (No improper driving)	D1: Not Distracted / D2: Not Distracted	Collision with motor vehicle in traffic	Daylight	Angle				Dry	V1: Travelling straight ahead / V2: Turning left	V1:(Passenger car) / V2:(Passenger car)
4948779	03/23/2021	Property damage only (none injured)	Open	4:09 PM	2021	No Apparent Injury (O)	18-20	35-44			D1: (Unknown),(Unknown) / D2: (Unknown),(Unknown)	D1: Not Distracted	Collision with motor vehicle in traffic	Daylight	Angle				Dry	V1: Turning left / V2: Overtaking/passing	V1:(Passenger car) / V2:(Light truck(van, mini-van, pickup, sport utility))
5027423	09/03/2021	Property damage only (none injured)	Open	8:15 PM	2021	No Apparent Injury (O)	18-20	65-74			D1: (No improper driving),(No improper driving) / D2: (Followed too closely),(Physical impairment)	D1: Not Distracted	Collision with motor vehicle in traffic	Dark - lighted roadway	Rear-end				Dry	V1: Travelling straight ahead / V2: Travelling straight ahead	V1:(Passenger car) / V2:(Light truck(van, mini-van, pickup, sport utility))
5074589	01/17/2022	Property damage only (none injured)	Open	11:34 PM	2022	No Apparent Injury (O)	45-54	45-54			D1: (No improper driving)	D1: Not Distracted	Collision with curb	Dark - lighted roadway	Single vehicle crash				Ice	V1: Turning right	V1:(Passenger car)

Grove Street at Sagamore Road: January 2017 thru December 2022

Crash Number	Crash Date	Crash Severity	Crash Status	Crash Time	Max Injury Severity Reported	Number of Vehicles	Age of Driver - Youngest Known	Age of Driver - Oldest Known	Driver Contributing Circumstances (All Drivers)	Driver Distracted By (All Vehicles)	First Harmful Event	Light Conditions	Manner of Collision	Road Surface Condition	Vehicle Actions Prior to Crash (All Vehicles)	Vehicle Configuration (All Vehicles)	Vehicle Travel Directions (All Vehicles)	Weather Conditions
4459929	09/29/2017	Property damage only (none injured)	Closed	4:43 PM	No injury	2	18-20	25-34	D1: (No improper driving) / D2: (No improper driving)	D1: Not Distracted / D2: Not Distracted	Collision with motor vehicle in traffic	Daylight	Angle	Dry	V1: Travelling straight ahead / V2: Turning right	V1:(Light truck(van, mini-van, pickup, sport utility)) / V2:(Light truck(van, mini-van, pickup, sport utility))	V1: Not Reported / V2: Not Reported	Clear
4472145	09/20/2017	Property damage only (none injured)	Closed	5:17 AM	No injury	2	21-24	45-54	D1: (Over-correcting/over-steering)	D1: Not Distracted / D2: Not Distracted	Collision with motor vehicle in traffic	Dark - lighted roadway	Angle	Wet	V1: Turning left / V2: Entering traffic lane	V1:(Passenger car) / V2:(Light truck(van, mini-van, pickup, sport utility))	V1: N / V2: E	Rain
4500962	10/19/2017	Property damage only (none injured)	Closed	5:59 PM	No injury	2	35-44	35-44	D1: (Unknown) / D2: (Unknown)	D1: Not Distracted / D2: Not Distracted	Collision with motor vehicle in traffic	Dusk	Angle	Dry	V1: Travelling straight ahead / V2: Turning left	V1:(Passenger car) / V2:(Passenger car)	V1: Not Reported / V2: Not Reported	Clear/Cloudy
4505635	11/20/2017	Non-fatal injury	Closed	1:50 PM	Non-fatal injury	2	25-34	55-64	D1: (No improper driving) / D2: (No improper driving)	D1: Not Distracted / D2: Not Distracted	Collision with motor vehicle in traffic	Daylight	Angle	Dry	V1: Travelling straight ahead / V2: Turning left	V1:(Passenger car) / V2:(Passenger car)	V1: S / V2: E	Cloudy/Clear
4558378	01/01/2018	Property damage only (none injured)	Closed	2:48 AM	No injury	1	25-34	25-34	D1: (Unknown)		Collision with unknown fixed object	Dark - lighted roadway	Single vehicle crash	Snow	V1: Travelling straight ahead	V1:(Passenger car)	V1: N	Clear
4570967	05/27/2018	Non-fatal injury	Closed	5:50 PM	Non-fatal injury	2	18-20	65-74	D1: (Unknown) / D2: (Unknown)		Collision with motor vehicle in traffic	Daylight	Angle	Wet	V1: Travelling straight ahead / V2: Travelling straight ahead	V2:(Light truck(van, mini-van, pickup, sport utility))	V1: N / V2: S	Cloudy/Rain
4589217	08/02/2018	Property damage only (none injured)	Closed	11:12 AM	No injury	2	25-34	45-54	D1: (No improper driving) / D2: (Inattention)	D1: Not Distracted	Collision with motor vehicle in traffic	Daylight	Rear-end	Dry	V1: Slowing or stopped in traffic / V2: Travelling straight ahead	V1:(Single-unit truck (2-axle, 6-tires)) / V2:(Single-unit truck (2-axle, 6-tires))	V1: S / V2: S	Clear
4825592	08/08/2019	Non-fatal injury	Closed	5:40 PM	Non-fatal injury	2	35-44	55-64	D1: (No improper driving),(No improper driving) / D2: (Inattention),(Unknown)	D1: Not Distracted	Collision with motor vehicle in traffic	Daylight	Rear-end	Dry	V1: Slowing or stopped in traffic / V2: Travelling straight ahead	V1:(Light truck(van, mini-van, pickup, sport utility)) / V2:(Passenger car)	V1: N / V2: N	Clear/Clear
4890353	12/26/2019	Property damage only (none injured)	Closed	11:30 AM	No Apparent Injury	2	35-44	35-44	D1: (No improper driving) / D2: (Failed to yield right of way)	D1: Not Distracted / D2: Not Distracted	Collision with motor vehicle in traffic	Daylight	Angle	Dry	V1: Travelling straight ahead / V2: Turning left	V1:(Passenger car) / V2:(Light truck(van, mini-van, pickup, sport utility))	V1: Not Reported / V2: Not Reported	Cloudy/Cloudy
4906604	11/07/2020	Property damage only (none injured)	Closed	9:11 AM	No Apparent Injury	2	25-34	35-44	D1: (No improper driving) / D2: (Disregarded traffic signs, signals, road markings)	D1: Not Distracted	Collision with motor vehicle in traffic	Daylight	Angle	Dry	V1: Travelling straight ahead / V2: Travelling straight ahead	V1:(Light truck(van, mini-van, pickup, sport utility)) / V2:(Light truck(van, mini-van, pickup, sport utility))	V1: Not Reported / V2: Not Reported	Clear/Clear
4922887	09/03/2020	Property damage only (none injured)	Closed	12:10 PM	No Apparent Injury	2	21-24	25-34	D1: (No improper driving) / D2: (Unknown)	D1: Not Distracted	Collision with motor vehicle in traffic	Daylight	Rear-end	Dry	V1: Travelling straight ahead / V2: Travelling straight ahead	V1:(Passenger car) / V2:(Passenger car)	V1: Not Reported / V2: Not Reported	Clear

Grove Street at North Street: January 2017 thru December 2022

Crash Number	Crash Date	Crash Severity	Crash Status	Crash Time	Max Injury Severity Reported	Number of Vehicles	Age of Driver - Youngest Known	Age of Driver - Oldest Known	Driver Contributing Circumstances (All Drivers)	Driver Distracted By (All Vehicles)	First Harmful Event	Light Conditions	Manner of Collision	Road Surface Condition	Vehicle Actions Prior to Crash (All Vehicles)	Vehicle Configuration (All Vehicles)	Vehicle Emergency Use (All Vehicles)	Vehicle Towed From Scene (All Vehicles)	Vehicle Travel Directions (All Vehicles)	Weather Conditions
4346279	02/17/2017	Property damage only (none injured)	Closed	6:06 PM	No injury	2	45-54	65-74	D1: (No improper driving) / D2: (Failed to yield right of way)	D1: Not Distracted	Collision with motor vehicle in traffic	Dark - lighted roadway	Angle	Dry	V1: Travelling straight ahead / V2: Turning left	V1:(Light truck(van, mini-van, pickup, sport utility)) / V2:(Passenger car)	V1:(No) / V2:(No)	V1:(No) / V2:(No)	V1: N / V2: W	Clear
4394479	05/08/2017	Non-fatal injury	Closed	8:42 PM	Non-fatal injury Possible	2	21-24	21-24	D1: (Unknown)		Collision with motor vehicle in traffic	Dark - lighted roadway	Angle	Dry	V1: Turning left / V2: Not reported	V1:(Light truck(van, mini-van, pickup, sport utility)) / V2:(Light truck(van, mini-van, pickup, sport utility))		V1:(No)	V1: W / V2: S	Clear
4400801	06/24/2017	Property damage only (none injured)	Closed	12:20 AM	No injury	1	18-20	18-20	D1: (No improper driving)	D1: Not Distracted	Collision with motor vehicle in traffic	Dark - lighted roadway	Head-on	Wet	V1: Turning left	V1:(Passenger car) / V2:(Light truck(van, mini-van, pickup, sport utility))		V1:(Yes, other reason not disabled)	V1: E	Rain/Clear
4404791	06/01/2017	Property damage only (none injured)	Closed	1:26 PM	No injury	2	55-64	75-84	D1: (Unknown) / D2: (Unknown)		Collision with other light pole or other post/support	Daylight	Single vehicle crash	Not reported	V1: Travelling straight ahead / V2: Turning left	V1:(Passenger car) / V2:(Light truck(van, mini-van, pickup, sport utility))		V1:(No) / V2:(No)	V1: S / V2: N	Clear
4412202	07/11/2017	Not Reported	Closed	8:30 AM	Not reported	2	25-34	25-34	D1: (No improper driving) / D2: (Disregarded traffic signs, signals, road markings)	D1: Not Distracted	Collision with motor vehicle in traffic	Daylight	Angle	Wet	V1: Turning left / V2: Turning left	V1:(Light truck(van, mini-van, pickup, sport utility))		V1:(Yes, vehicle or trailer disabled) / V2:(No)	V1: E / V2: S	Cloudy/Rain
4536212	12/20/2017	Non-fatal injury	Closed	1:39 PM	Non-fatal injury Possible	2	25-34	35-44	D1: (No improper driving),(No improper driving) / D2: (Unknown),(Unknown)	D1: Not Distracted	Collision with motor vehicle in traffic	Daylight	Rear-end	Dry	V1: Slowing or stopped in traffic / V2: Travelling straight ahead	V1:(Light truck(van, mini-van, pickup, sport utility)) / V2:(Passenger car)		V1:(No) / V2:(No)	V1: W / V2: W	Clear/Clear
4800687	07/25/2019	Property damage only (none injured)	Closed	8:03 AM	No Apparent Injury (O)	2	18-20	45-54	D1: (No improper driving) / D2: (Followed too closely)	D1: Not Distracted / D2: Not Distracted	Collision with motor vehicle in traffic	Daylight	Rear-end	Dry	V1: Turning left / V2: Travelling straight ahead	V1:(Passenger car) / V2:(Passenger car)		V1:(No) / V2:(No)	V1: Not Reported / V2: Not Reported	Clear/Clear
4893520	01/22/2020	Property damage only (none injured)	Closed	10:44 AM	No injury	2	35-44	65-74	D1: (No improper driving) / D2: (Followed too closely)	D1: Not Distracted / D2: Not Distracted	Collision with motor vehicle in traffic	Daylight	Rear-end	Dry	V1: Slowing or stopped in traffic / V2: Slowing or stopped in traffic	V1:(Passenger car) / V2:(Passenger car)		V1:(No) / V2:(No)	V1: W / V2: W	Clear/Clear
4893587	12/12/2019	Non-fatal injury	Closed	3:23 PM	No injury	2	25-34	25-34	D1: (Operating vehicle in erratic, reckless, careless, negligent or aggressive manner),(Driving too fast for conditions) / D2: (No improper driving),(No improper driving)		Collision with motor vehicle in traffic	Daylight	Angle	Dry	V1: Travelling straight ahead / V2: Turning left	V1:(Passenger car) / V2:(Passenger car)	V1:(No) / V2:(No)	V1:(Yes, vehicle or trailer disabled) / V2:(Yes, vehicle or trailer disabled)	V1: Not Reported / V2: Not Reported	Clear/Clear
5171534	10/13/2022	Property damage only (none injured)	Open	11:03 AM	No Apparent Injury (O)	2	55-64	55-64	D1: (No improper driving) / D2: (Inattention)	D1: Manually operating an electronic device	Collision with motor vehicle in traffic	Daylight	Angle	Wet	V1: Travelling straight ahead / V2: Turning left	V1:(Passenger car) / V2:(Passenger car)	V1:(No) / V2:(No)	V1:(No) / V2:(Yes, vehicle or trailer disabled)	V1: Not Reported / V2: Not Reported	Clear

Stephen S. Rolle, PE
Ref: 15752.00
April 25, 2023



Attachment D: Traffic Signal Warrant Analyses

2009 MUTCD

TRAFFIC SIGNAL WARRANT ANALYSIS (VOLUME BASED)

Intersection: **Grove Street at Glennie Street**

Major Street Direction: Northbound-Southbound ▼

Year: **2022** Condition: **Existing Conditions (15% of Glennie volume excluded)**

Operating speed on major roadway: **35** mph

Number of approaches: **3**

Required approach volumes

Warrant 1 EIGHT-HOUR VEHICULAR VOLUME		Minimum*	Adjusted Minimum**
Warrant 1A	MINIMUM VEHICULAR VOLUME (8 hours of day)		
	Major Street : 1 Lane(s) on each approach	500	500
	Minor Street : 1 Lane(s) on each approach	150	150
Warrant 1B	INTERRUPTION OF CONTINUOUS TRAFFIC (8 hours of day)		
	Major Street : 1 Lane(s) on each approach	750	750
	Minor Street : 1 Lane(s) on each approach	75	75
80 PERCENT SATISFACTION OF WARRANT 1A AND WARRANT 1B		Warrant 1A	Warrant 1B
	Major Street : 1 Lane(s) on each approach	400	600
	Minor Street : 1 Lane(s) on each approach	120	60

Warrant 2 FOUR HOUR VEHICULAR VOLUME	
Major Street :	1 Lane(s) on each approach
Minor Street :	1 Lane(s) on each approach

If "verify" indicated, see Figure 4C-1 or 4C-2.
25 = accuracy of regression equations

Warrant 3 PEAK HOUR VOLUME	
Major Street :	1 Lane(s) on each approach
Minor Street :	1 Lane(s) on each approach

If "verify" indicated, see Figure 4C-3 or 4C-4.
25 = accuracy of regression equations

Hour	Entering Vol. Minor Road+	Entering Vol. on Major Road		Tot. Ent. Vol. On Major Rd	Meets the following volume-based warrants?				
		Northbound	Southbound		1A	1B	80%(1A&1B)	2	3
6:00 - 7:00 AM	39	197	199	395	No	No	No	No	No
7:00 - 8:00 AM	68	377	392	770	No	No	No	No	No
8:00 - 9:00 AM	83	522	515	1036	No	Yes	No	No	No
9:00 - 10:00 AM	80	410	400	810	No	Yes	No	No	No
10:00 - 11:00 AM	99	482	374	856	No	Yes	No	No	No
11:00 - 12:00 AM	125	516	429	945	No	Yes	Yes	Yes	No
12:00 - 1:00 PM	121	641	473	1114	No	Yes	Yes	Yes	No
1:00 - 2:00 PM	120	526	423	949	No	Yes	Yes	Yes	No
2:00 - 3:00 PM	114	589	445	1034	No	Yes	No	Yes	No
3:00 - 4:00 PM	154	661	611	1272	Yes	Yes	Yes	Yes	Yes
4:00 - 5:00 PM	157	659	551	1210	Yes	Yes	Yes	Yes	Yes
5:00 - 6:00 PM	142	576	486	1062	No	Yes	Yes	Yes	No
6:00 - 7:00 PM	120	367	336	703	No	No	Yes	No	No
					No	Yes	No	Yes	Yes
					Warrants Met?	1	2	3	
						Yes	Yes	Yes	Yes

*From the criteria described for the warrant in the MUTCD.

**If the operating speed is higher than 40mph then the volumes can be adjusted to 70%. (If no adjusted minimum, the minimum from the previous column is shown)

+If more than one approach, report the approach that has the higher volume.

NON-VOLUME-BASED WARRANTS

Warrant 4, Minimum Pedestrian Volume: No
 Peak Four Hour Pedestrian Volumes:
 (non-concurrent) 1
 *Grove only 0
 0

Warrant 6, Coordinated Signal System: No
 See MUTCD for details.

Warrant 8, Roadway Network: No
 See MUTCD for details.

Warrant 5, School Crossing: No
 See MUTCD for details.

Warrant 7, Crash Experience: No
 # of accidents "correctable by signalization" occurring in the last 12 months: 4

Alternate Warrant 7, Crash Experience: Yes*
 (IA-19, MassDOT has state-wide permission)
 # of angle and pedestrian accidents occurring in the last 3 years: 13

Source: Manual on Uniform Traffic Control Devices (MUTCD); 2009 Edition

2009 MUTCD

TRAFFIC SIGNAL WARRANT ANALYSIS (VOLUME BASED)

Intersection: **Grove Street at Sagamore Road**

Major Street Direction: Northbound-Southbound ▼

Year: **2022** Condition: **Existing Conditions (36% of Sagamore volume excluded)**

Operating speed on major roadway: **35** mph

Number of approaches: **3**

Required approach volumes

Warrant 1	EIGHT-HOUR VEHICULAR VOLUME	Adjusted	
		Minimum*	Minimum**
Warrant 1A	MINIMUM VEHICULAR VOLUME (8 hours of day)		
	Major Street :	1 Lane(s) on each approach	500
	Minor Street :	1 Lane(s) on each approach	150
Warrant 1B	INTERRUPTION OF CONTINUOUS TRAFFIC (8 hours of day)		
	Major Street :	1 Lane(s) on each approach	750
	Minor Street :	1 Lane(s) on each approach	75
80 PERCENT SATISFACTION OF WARRANT 1A AND WARRANT 1B			
	Major Street :	1 Lane(s) on each approach	400
	Minor Street :	1 Lane(s) on each approach	120

Warrant 2	FOUR HOUR VEHICULAR VOLUME	
	Major Street :	1 Lane(s) on each approach
	Minor Street :	1 Lane(s) on each approach

If "verify" indicated, see Figure 4C-1 or 4C-2.
25 = accuracy of regression equations

Warrant 3	PEAK HOUR VOLUME	
	Major Street :	1 Lane(s) on each approach
	Minor Street :	1 Lane(s) on each approach

If "verify" indicated, see Figure 4C-3 or 4C-4.
25 = accuracy of regression equations

Hour	Entering Vol. Minor Road+	Entering Vol. on Major Road		Tot. Ent. Vol. On Major Rd	Meets the following volume-based warrants?				
		Northbound	Southbound		1A	1B	80%(1A&1B)	2	3
6:00 - 7:00 AM	50	180	231	410	No	No	No	No	No
7:00 - 8:00 AM	64	374	456	830	No	No	No	No	No
8:00 - 9:00 AM	92	545	598	1143	No	Yes	No	Yes	No
9:00 - 10:00 AM	67	430	473	903	No	No	No	No	No
10:00 - 11:00 AM	63	482	470	952	No	No	No	No	No
11:00 - 12:00 AM	66	546	533	1079	No	No	No	No	No
12:00 - 1:00 PM	73	580	575	1154	No	No	No	No	No
1:00 - 2:00 PM	71	542	535	1076	No	No	No	No	No
2:00 - 3:00 PM	84	596	557	1152	No	Yes	No	Yes	No
3:00 - 4:00 PM	86	695	761	1456	No	Yes	No	Yes	No
4:00 - 5:00 PM	93	713	723	1435	No	Yes	No	Yes	No
5:00 - 6:00 PM	68	625	637	1262	No	No	No	No	No
6:00 - 7:00 PM	64	423	466	888	No	No	No	No	No
					No	No	No	Yes	No
					Warrants Met?	1	2	3	3
						NO	Yes	No	No

*From the criteria described for the warrant in the MUTCD.

**If the operating speed is higher than 40mph then the volumes can be adjusted to 70%. (If no adjusted minimum, the minimum from the previous column is shown)

+If more than one approach, report the approach that has the higher volume.

NON-VOLUME-BASED WARRANTS

Warrant 4, Minimum Pedestrian Volume: No
 Peak Four Hour Pedestrian Volumes:
 (non-concurrent) 11
 *Grove Only 0
 0

Warrant 6, Coordinated Signal System: No
 See MUTCD for details.

Warrant 8, Roadway Network: No
 See MUTCD for details.

Warrant 5, School Crossing: No
 See MUTCD for details.

Warrant 7, Crash Experience: No
 # of accidents "correctable by signalization" occurring in the last 12 months: 1

Alternate Warrant 7, Crash Experience: Yes*
 (IA-19, MassDOT has state-wide permission)
 # of angle and pedestrian accidents occurring in the last 3 years: 6

2009 MUTCD

TRAFFIC SIGNAL WARRANT ANALYSIS (VOLUME BASED)

Intersection: **Grove Street at Sagamore Road**

Major Street Direction: Northbound-Southbound ▼

Year: **2022** Condition: **Existing Conditions (25% of Sagamore volume excluded)**

Operating speed on major roadway: **35** mph

Number of approaches: **3**

Required approach volumes

		Adjusted	
		Minimum*	Minimum**
Warrant 1	EIGHT-HOUR VEHICULAR VOLUME		
Warrant 1A	MINIMUM VEHICULAR VOLUME (8 hours of day)		
	Major Street : 1 Lane(s) on each approach	500	500
	Minor Street : 1 Lane(s) on each approach	150	150
Warrant 1B	INTERRUPTION OF CONTINUOUS TRAFFIC (8 hours of day)		
	Major Street : 1 Lane(s) on each approach	750	750
	Minor Street : 1 Lane(s) on each approach	75	75
80 PERCENT SATISFACTION OF WARRANT 1A AND WARRANT 1B		Warrant 1A	Warrant 1B
	Major Street : 1 Lane(s) on each approach	400	600
	Minor Street : 1 Lane(s) on each approach	120	60

Warrant 2	FOUR HOUR VEHICULAR VOLUME	
	Major Street : 1 Lane(s) on each approach	If "verify" indicated, see Figure 4C-1 or 4C-2.
	Minor Street : 1 Lane(s) on each approach	25 = accuracy of regression equations

Warrant 3	PEAK HOUR VOLUME	
	Major Street : 1 Lane(s) on each approach	If "verify" indicated, see Figure 4C-3 or 4C-4.
	Minor Street : 1 Lane(s) on each approach	25 = accuracy of regression equations

Hour	Entering Vol. Minor Road+	Entering Vol. on Major Road		Tot. Ent. Vol. On Major Rd	Meets the following volume-based warrants?				
		Northbound	Southbound		1A	1B	80%(1A&1B)	2	3
6:00 - 7:00 AM	58	180	231	410	No	No	No	No	No
7:00 - 8:00 AM	76	374	456	830	No	Yes	No	No	No
8:00 - 9:00 AM	108	545	598	1143	No	Yes	No	Yes	No
9:00 - 10:00 AM	78	430	473	903	No	Yes	No	No	No
10:00 - 11:00 AM	73	482	470	952	No	No	No	No	No
11:00 - 12:00 AM	77	546	533	1079	No	Yes	No	No	No
12:00 - 1:00 PM	86	580	575	1154	No	Yes	No	Yes	No
1:00 - 2:00 PM	83	542	535	1076	No	Yes	No	No	No
2:00 - 3:00 PM	98	596	557	1152	No	Yes	No	Yes	No
3:00 - 4:00 PM	101	695	761	1456	No	Yes	No	Yes	No
4:00 - 5:00 PM	109	713	723	1435	No	Yes	No	Yes	Yes
5:00 - 6:00 PM	80	625	637	1262	No	Yes	No	No	No
6:00 - 7:00 PM	75	423	466	888	No	No	No	No	No
					No	Yes	No	Yes	Yes
					Warrants Met?	1	2	3	
						Yes	Yes	Yes	Yes

*From the criteria described for the warrant in the MUTCD.

**If the operating speed is higher than 40mph then the volumes can be adjusted to 70%. (If no adjusted minimum, the minimum from the previous column is shown)

+If more than one approach, report the approach that has the higher volume.

NON-VOLUME-BASED WARRANTS

Warrant 4, Minimum Pedestrian Volume: No
 Peak Four Hour Pedestrian Volumes: 11
 (non-concurrent) 0
**Grove Only* 0
 0

Warrant 6, Coordinated Signal System: No
 See MUTCD for details.

Warrant 8, Roadway Network: No
 See MUTCD for details.

Warrant 5, School Crossing: No
 See MUTCD for details.

Warrant 7, Crash Experience: No
 # of accidents "correctable by signalization" occurring in the last 12 months: 1

Alternate Warrant 7, Crash Experience: Yes
 (IA-19, MassDOT has state-wide permission)
 # of angle and pedestrian accidents occurring in the last 3 years: 6

2009 MUTCD

TRAFFIC SIGNAL WARRANT ANALYSIS (VOLUME BASED)

Intersection: **Grove Street at North Street**

Major Street Direction: Northbound-Southbound ▼

Year: **2022** Condition: **Existing Conditions (32.5% excluded to account for North right-turns)**

Operating speed on major roadway: **35** mph

Number of approaches: **3**

Required approach volumes

Warrant 1 <u>EIGHT-HOUR VEHICULAR VOLUME</u>		Minimum*	Adjusted Minimum**
Warrant 1A	MINIMUM VEHICULAR VOLUME (8 hours of day)		
	Major Street : 1 Lane(s) on each approach	500	500
	Minor Street : 1 Lane(s) on each approach	150	150
Warrant 1B	INTERRUPTION OF CONTINUOUS TRAFFIC (8 hours of day)		
	Major Street : 1 Lane(s) on each approach	750	750
	Minor Street : 1 Lane(s) on each approach	75	75
80 PERCENT SATISFACTION OF WARRANT 1A AND WARRANT 1B		Warrant 1A	Warrant 1B
	Major Street : 1 Lane(s) on each approach	400	600
	Minor Street : 1 Lane(s) on each approach	120	60

Warrant 2 <u>FOUR HOUR VEHICULAR VOLUME</u>	
Major Street :	1 Lane(s) on each approach
Minor Street :	1 Lane(s) on each approach

If "verify" indicated, see Figure 4C-1 or 4C-2.
25 = accuracy of regression equations

Warrant 3 <u>PEAK HOUR VOLUME</u>	
Major Street :	1 Lane(s) on each approach
Minor Street :	1 Lane(s) on each approach

If "verify" indicated, see Figure 4C-3 or 4C-4.
25 = accuracy of regression equations

Hour	Entering Vol. Minor Road+	Entering Vol. on Major Road		Tot. Ent. Vol. On Major Rd	Meets the following volume-based warrants?					
		Northbound	Southbound		1A	1B	80%(1A&1B)	2	3	
6:00 - 7:00 AM	36	161	250	410	No	No	No	No	No	
7:00 - 8:00 AM	46	349	466	815	No	No	No	No	No	
8:00 - 9:00 AM	51	508	624	1132	No	No	No	No	No	
9:00 - 10:00 AM	38	418	477	895	No	No	No	No	No	
10:00 - 11:00 AM	37	452	453	905	No	No	No	No	No	
11:00 - 12:00 AM	49	527	514	1041	No	No	No	No	No	
12:00 - 1:00 PM	51	548	578	1126	No	No	No	No	No	
1:00 - 2:00 PM	4	522	527	1049	No	No	No	No	No	
2:00 - 3:00 PM	57	571	564	1135	No	No	No	No	No	
3:00 - 4:00 PM	78	667	710	1377	No	Yes	No	No	No	
4:00 - 5:00 PM	88	659	711	1370	No	Yes	No	Yes	No	
5:00 - 6:00 PM	82	594	602	1196	No	Yes	No	Yes	No	
6:00 - 7:00 PM	54	397	444	841	No	No	No	No	No	
					No	No	No	No	No	
					Warrants Met?	1	2	3	3	3
						NO		No	No	

*From the criteria described for the warrant in the MUTCD.

**If the operating speed is higher than 40mph then the volumes can be adjusted to 70%. (If no adjusted minimum, the minimum from the previous column is shown)

+If more than one approach, report the approach that has the higher volume.

NON-VOLUME-BASED WARRANTS

Warrant 4, Minimum Pedestrian Volume: No
 Peak Four Hour Pedestrian Volumes:
 (non-concurrent) 2
 *Grove Only 5
 0

Warrant 6, Coordinated Signal System: No
 See MUTCD for details.

Warrant 8, Roadway Network: No
 See MUTCD for details.

Warrant 5, School Crossing: No
 See MUTCD for details.

Warrant 7, Crash Experience: No
 # of accidents "correctable by signalization" occurring in the last 12 months: 1

Alternate Warrant 7, Crash Experience: No
 (IA-19, MassDOT has state-wide permission)
 # of angle and pedestrian accidents occurring in the last 3 years: 4

2009 MUTCD

TRAFFIC SIGNAL WARRANT ANALYSIS (VOLUME BASED)

Intersection: **Grove Street at North Street**

Major Street Direction: Northbound-Southbound ▼

Year: **2022** Condition: **Existing Conditions (5% of North excluded)**

Operating speed on major roadway: **35** mph

Number of approaches: **3**

Required approach volumes

Warrant 1 <u>EIGHT-HOUR VEHICULAR VOLUME</u>		Minimum*	Adjusted Minimum**
Warrant 1A MINIMUM VEHICULAR VOLUME (8 hours of day)			
Major Street :	1 Lane(s) on each approach	500	500
Minor Street :	1 Lane(s) on each approach	150	150
Warrant 1B INTERRUPTION OF CONTINUOUS TRAFFIC (8 hours of day)			
Major Street :	1 Lane(s) on each approach	750	750
Minor Street :	1 Lane(s) on each approach	75	75
80 PERCENT SATISFACTION OF WARRANT 1A AND WARRANT 1B		Warrant 1A	Warrant 1B
Major Street :	1 Lane(s) on each approach	400	600
Minor Street :	1 Lane(s) on each approach	120	60

Warrant 2 <u>FOUR HOUR VEHICULAR VOLUME</u>	
Major Street :	1 Lane(s) on each approach
Minor Street :	1 Lane(s) on each approach

If "verify" indicated, see Figure 4C-1 or 4C-2.
25 = accuracy of regression equations

Warrant 3 <u>PEAK HOUR VOLUME</u>	
Major Street :	1 Lane(s) on each approach
Minor Street :	1 Lane(s) on each approach

If "verify" indicated, see Figure 4C-3 or 4C-4.
25 = accuracy of regression equations

Hour	Entering Vol. Minor Road+	Entering Vol. on Major Road		Tot. Ent. Vol. On Major Rd	Meets the following volume-based warrants?				
		Northbound	Southbound		1A	1B	80%(1A&1B)	2	3
6:00 - 7:00 AM	51	161	250	410	No	No	No	No	No
7:00 - 8:00 AM	65	349	466	815	No	No	No	No	No
8:00 - 9:00 AM	72	508	624	1132	No	No	No	No	No
9:00 - 10:00 AM	54	418	477	895	No	No	No	No	No
10:00 - 11:00 AM	51	452	453	905	No	No	No	No	No
11:00 - 12:00 AM	69	527	514	1041	No	No	No	No	No
12:00 - 1:00 PM	72	548	578	1126	No	No	No	No	No
1:00 - 2:00 PM	5	522	527	1049	No	No	No	No	No
2:00 - 3:00 PM	80	571	564	1135	No	Yes	No	Yes	No
3:00 - 4:00 PM	109	667	710	1377	No	Yes	No	Yes	No
4:00 - 5:00 PM	124	659	711	1370	No	Yes	Yes	Yes	Yes
5:00 - 6:00 PM	116	594	602	1196	No	Yes	No	Yes	No
6:00 - 7:00 PM	76	397	444	841	No	Yes	No	No	No
					No	No	No	Yes	Yes
					Warrants Met?	1	2	3	
						NO	Yes	Yes	

*From the criteria described for the warrant in the MUTCD.

**If the operating speed is higher than 40mph then the volumes can be adjusted to 70%. (If no adjusted minimum, the minimum from the previous column is shown)

+If more than one approach, report the approach that has the higher volume.

NON-VOLUME-BASED WARRANTS

Warrant 4, Minimum Pedestrian Volume: No
 Peak Four Hour Pedestrian Volumes:
 (non-concurrent) 2
 *Grove Only 5
 0

Warrant 6, Coordinated Signal System: No
 See MUTCD for details.

Warrant 8, Roadway Network: No
 See MUTCD for details.

Warrant 5, School Crossing: No
 See MUTCD for details.

Warrant 7, Crash Experience: No
 # of accidents "correctable by
 signalization" occurring in the last 12 months: 1

Alternate Warrant 7, Crash Experience: No
 (IA-19, MassDOT has state-wide permission)
 # of angle and pedestrian accidents
 occurring in the last 3 years: 4

2009 MUTCD

TRAFFIC SIGNAL WARRANT ANALYSIS (VOLUME BASED)

Intersection: **Grove Street at North Street**

Major Street Direction: Northbound-Southbound ▼

Year: **2022** Condition: **Conditions w/approx 4% growth & NTOR from North**

Operating speed on major roadway: **35** mph

Number of approaches: **3**

Required approach volumes

Warrant 1 EIGHT-HOUR VEHICULAR VOLUME		Minimum*	Adjusted Minimum**
Warrant 1A	MINIMUM VEHICULAR VOLUME (8 hours of day)		
	Major Street : 1 Lane(s) on each approach	500	500
	Minor Street : 1 Lane(s) on each approach	150	150
Warrant 1B	INTERRUPTION OF CONTINUOUS TRAFFIC (8 hours of day)		
	Major Street : 1 Lane(s) on each approach	750	750
	Minor Street : 1 Lane(s) on each approach	75	75
80 PERCENT SATISFACTION OF WARRANT 1A AND WARRANT 1B		Warrant 1A	Warrant 1B
	Major Street : 1 Lane(s) on each approach	400	600
	Minor Street : 1 Lane(s) on each approach	120	60

Warrant 2 FOUR HOUR VEHICULAR VOLUME	
Major Street :	1 Lane(s) on each approach
Minor Street :	1 Lane(s) on each approach

If "verify" indicated, see Figure 4C-1 or 4C-2.
25 = accuracy of regression equations

Warrant 3 PEAK HOUR VOLUME	
Major Street :	1 Lane(s) on each approach
Minor Street :	1 Lane(s) on each approach

If "verify" indicated, see Figure 4C-3 or 4C-4.
25 = accuracy of regression equations

Hour	Entering Vol. Minor Road+	Entering Vol. on Major Road		Tot. Ent. Vol. On Major Rd	Meets the following volume-based warrants?				
		Northbound	Southbound		1A	1B	80%(1A&1B)	2	3
6:00 - 7:00 AM	55	167	260	428	No	No	No	No	No
7:00 - 8:00 AM	71	363	486	849	No	No	No	No	No
8:00 - 9:00 AM	79	530	650	1180	No	Yes	No	No	No
9:00 - 10:00 AM	59	436	497	933	No	No	No	No	No
10:00 - 11:00 AM	56	471	472	943	No	No	No	No	No
11:00 - 12:00 AM	75	549	536	1085	No	Yes	No	No	No
12:00 - 1:00 PM	79	571	602	1173	No	Yes	No	No	No
1:00 - 2:00 PM	6	544	549	1093	No	No	No	No	No
2:00 - 3:00 PM	88	595	588	1183	No	Yes	No	Yes	No
3:00 - 4:00 PM	120	695	740	1435	No	Yes	No	Yes	Yes
4:00 - 5:00 PM	136	687	741	1428	No	Yes	Yes	Yes	Yes
5:00 - 6:00 PM	127	619	628	1246	No	Yes	Yes	Yes	No
6:00 - 7:00 PM	83	414	462	876	No	Yes	No	No	No
					No	Yes	No	Yes	Yes
					Warrants Met?	1	2	3	3
						Yes		Yes	Yes

*From the criteria described for the warrant in the MUTCD.

**If the operating speed is higher than 40mph then the volumes can be adjusted to 70%. (If no adjusted minimum, the minimum from the previous column is shown)

+If more than one approach, report the approach that has the higher volume.

NON-VOLUME-BASED WARRANTS

Warrant 4, Minimum Pedestrian Volume: No
 Peak Four Hour Pedestrian Volumes:
 (non-concurrent)
 2
 2
 *Grove Only 5
 0

Warrant 6, Coordinated Signal System: No
 See MUTCD for details.

Warrant 8, Roadway Network: No
 See MUTCD for details.

Warrant 5, School Crossing: No
 See MUTCD for details.

Warrant 7, Crash Experience: No
 # of accidents "correctable by
 signalization" occurring in the last 12 months: 1

Alternate Warrant 7, Crash Experience: No
 (IA-19, MassDOT has state-wide permission)
 # of angle and pedestrian accidents
 occurring in the last 3 years: 4