

Transportation Impact Assessment

Proposed Residential Development
Wakefield, Massachusetts

Prepared for:

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Wakefield, Massachusetts

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EXECUTIVE SUMMARY

DESCRIPTION OF PROJECT

Vanasse & Associates, Inc. (VAI) has prepared this Transportation Impact Assessment (TIA) to identify traffic impacts associated with a proposed 38-unit residential development to be located at 572-590 North Avenue in Wakefield, Massachusetts (the “Project”). The purpose of this TIA is to review existing and future traffic conditions in the vicinity of the site, determine the traffic impact from the proposed Project at key intersections expected to experience increased traffic levels from the Project, and review the need for improvements to mitigate the Project’s traffic impact.

PROPOSED PROJECT

Currently, the site is undeveloped and is bounded by North Avenue to the east, the Massachusetts Bay Transit Authority (MBTA) Haverhill Line of the commuter rail system to the west, residential properties to the north, and the Knights of Columbus facility to the south. The Project proposes to construct a four-story, 38-unit multifamily residential building on-site. Parking will be provided on-site via a surface parking lot with 58 spaces. Access to the site will be provided via a new full-access curb cut onto North Avenue.

EXISTING CONDITIONS

A comprehensive field inventory was conducted to collect existing roadway geometrics, traffic volumes, operating characteristics, speed limits, and sight distances, as well as land use information. Traffic volumes were collected in October 2021 at the North Avenue at Wolcott Street/Linda Road intersection.

FUTURE CONDITIONS

Traffic volumes within the study area were projected to 2028, which reflect a seven-year planning horizon consistent with State traffic study guidelines. These conditions incorporate traffic growth due to general background traffic increases as well as development projects currently being proposed/permitted or under construction and expected to generate traffic in the future. This condition is referred to as the No-Build condition.

PROJECT-GENERATED TRAFFIC

The Project is expected to generate 172 vehicle trips on an average weekday (two-way, 24-hour volume), with 14 vehicle trips (3 entering and 11 exiting) expected during the weekday morning peak hour. During the weekday evening peak hour, the Project is expected to generate 15 vehicle trips (9 entering and 6 exiting).

The projected vehicle trips were distributed onto area roadways based on existing travel patterns and the U.S. Census Journey-to-Work data for Wakefield, Massachusetts. Traffic-volume increases due to the Project were shown to range from 0.3 to 0.6 percent during the peak periods and are expected to be less during other hours of the day.

The Project-generated traffic was added to the No-Build condition to assess future operations of the roadways and intersections in the study area.

TRAFFIC OPERATIONS ANALYSIS

In future conditions, intersection operations are generally preserved with minimal increases to delay on the various approaches and no changes to critical movement level of service. The addition of Project-related traffic to the study area roadways and intersections is not anticipated to significantly impact traffic operations within the study area over No-Build conditions.

RECOMMENDATIONS AND CONCLUSIONS

Site Recommendations

The site driveway onto North Avenue should be placed under STOP-sign control, with painted STOP bars on the drives at the STOP-sign locations. All signs and pavement markings to be installed within the Project site should conform to the applicable standards of the *Manual on Uniform Traffic Devices* (MUTCD)¹ and be shorter than 24 inches or be placed outside of the sight lines for drivers exiting the driveway and those approaching the driveway on North Avenue. Snow windrows within sight triangle areas of the Project site driveway should be promptly removed where such accumulations would impede sight lines. Vegetation within sight triangle areas should be shorter than 24 inches or be placed outside of the sight lines for drivers exiting the driveway and those approaching the driveway on North Avenue. A 5-foot wide concrete sidewalk is proposed along the site frontage that would connect to a 4-foot wide sidewalk on-site that creates a pedestrian path to the front entrance of the building and to the parking field on the south and west sides of the building.

Transportation Demand Management (TDM) Plan

Information regarding public transportation services, maps, schedules, and fare information will be posted in a central location and/or otherwise made available to residents and employees of the restaurant. A “welcome packet” will be provided to residents and restaurant employees detailing available public transportation services, bicycle and walking alternatives, and available commuter options. Consideration should be given to installing accommodations for the charging of electric vehicles by residents of the Project. The Applicant will also consider coordinating with the Town

¹*Manual on Uniform Traffic Control Devices (MUTCD)*; Federal Highway Administration; Washington, DC; 2009.

and other area projects on the provision of shuttle bus service in the event that an area shuttle bus service become available.

Based on the above, VAI has concluded that the Project can be safely accommodated with minimal impact on the area road network.

INTRODUCTION

Vanasse & Associates, Inc. (VAI) has prepared this Transportation Impact Assessment (TIA) in order to identify the traffic impacts associated with a proposed residential redevelopment to be located at 572-590 North Avenue in Wakefield, Massachusetts. This report identifies and analyzes existing and future traffic conditions both with and without the Project and reviews access requirements, potential off-site improvements, and safety considerations.

STUDY METHODOLOGY

This study was prepared in accordance with the State guidelines for Transportation Impact Assessments (TIAs); and was conducted in three distinct stages.

The first stage involved an assessment of existing conditions in the study area and included an inventory of roadway geometry, observations of traffic flow, and collection of peak-period traffic counts.

In the second stage of the study, future traffic conditions were projected and analyzed. Specific travel demand forecasts for the Project were assessed along with future traffic demands due to expected traffic growth independent of the Project. A seven-year time horizon was selected for these analyses consistent with state guidelines for the preparation of TIAs. The traffic analysis conducted in stage two identifies projected future roadway capacity, traffic safety, and site access issues.

The third stage of the study presents and evaluates measures to address traffic and safety issues, if any are necessary, based on the results from stage two of the study.

EXISTING CONDITIONS

A comprehensive field inventory of existing conditions within the study area was conducted in October 2021. The field investigation consisted of an inventory of existing roadway geometrics, as well as posted speed limits, and land use information within the study area. The study area for the Project contains the major roadways which provide access to the Project, as well as the intersections which are expected to accommodate the majority of Project-related traffic. The study area is graphically depicted on Figure 1.

The following describes the study area roadways and intersections which are also shown on Figure 2 which summarizes existing lane use, travel lane widths, and sidewalk and crosswalk locations at the study area intersections.

GEOMETRY

Roadway

North Avenue

North Avenue is classified as a minor arterial roadway under the jurisdiction of the Town of Wakefield, Massachusetts. North Avenue runs in a general northwest-southeast direction from the town line with Reading to Main Street. Direction of travel on North Avenue is separated by a double-yellow centerline. Land use along North Avenue consists of a mix of residential and commercial properties.

Intersection

North Avenue at Wolcott Street/Linda Road

North Avenue is intersected by Wolcott Street from the west and Linda Road from the east to form this four-way intersection under STOP control. Traffic signal equipment is present at the intersection, but the minor street approaches are under flashing red control while North Avenue has a flashing green indication. Hence the intersection essentially operates as a two-way STOP control intersection. Direction of travel on North Avenue is separated by a double-yellow centerline. No demarcation is present on Wolcott Street or Linda Road that delineate direction of travel, but two-way travel is permitted. Illumination is provided via streetlights mounted on wooden utility poles.



Figure 1

Site Location Map

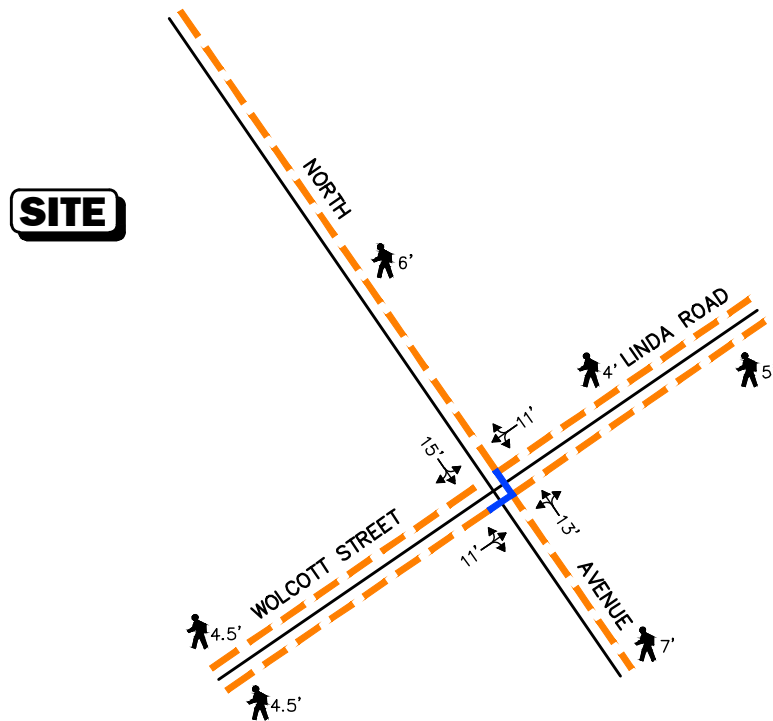
Legend:

— Sidewalk

— Crosswalk

XX' Lane Use and Travel Lane Width

XX' Sidewalk Width



Not To Scale



Figure 2

**Existing Intersection Lane Use,
Travel Lane Width, and
Pedestrian Facilities**

Land use in the vicinity of this intersection consists of residential properties. This intersection is under the jurisdiction of the Town of Wakefield.

EXISTING TRAFFIC VOLUMES

In order to establish existing traffic-volume demands and flow patterns within the study area, manual turning movement counts (TMCs) and an automatic traffic recorder count (ATR) were completed in October 2021. The TMCs were performed from 7:00 to 9:00 AM and from 4:00 to 6:00 PM at the study area intersection. The ATR was placed on North Avenue in the vicinity of the proposed site driveway.

Traffic-Volume Adjustments

In order to develop 2021 Baseline traffic-volume conditions, the data collected required adjustment due to the effects of the COVID-19 pandemic. To achieve this, count data from the Massachusetts Department of Transportation (MassDOT) permanent count station ID 5080² located on Yankee Division Highway north of Route 1 were used. Daily count data from October 2019 and October 2021 were used to develop a COVID-19 correction factor. Based on this evaluation, the 2021 week-day daily traffic volumes were increased by 6 percent, weekday morning peak-hour traffic volumes were increased by 13 percent, and the weekday evening peak-hour traffic volumes were increased by 4 percent. The 2019 COVID-corrected traffic volumes were then grown by 1 percent per year to 2021 baseline conditions.

In addition to correction factors for COVID-19, adjustments were made to account for seasonal fluctuations in traffic. The MassDOT permanent count station ID 5080 again were used to adjust the traffic volumes for seasonal fluctuations. Based on this data, it was determined that October traffic volumes are approximately 2 percent higher than average-month conditions for this station. Therefore, traffic volumes were not decreased to average-month conditions in order to provide a conservative analysis. The 2021 Baseline traffic volumes on North Avenue are summarized in Table 1.

Table 1
2021 BASELINE ROADWAY TRAFFIC-VOLUME SUMMARY

Location	Weekday	Weekday Morning Peak Hour			Weekday Evening Peak Hour		
	Daily Volume (vpd) ^a	Volume (vph) ^b	Percent of Daily Traffic ^c	Predominant Flow	Volume (vph)	Percent of Daily Traffic	Predominant Flow
North Avenue, near Proposed Site Driveway	19,000	1,368	7.2	53% NB	1,431	7.5	51% SB

Source: COVID-19 correction factors and seasonal adjustment applied to ATR and TMCs conducted by VAI in October 2021.

^aTwo-way daily traffic expressed in vehicles per day.

^bTwo-way peak-hour volume expressed in vehicles per hour.

^cThe percent of daily traffic that occurs during the peak hour.

NB = northbound; SB = southbound.

²MassDOT Transportation Data Management System; Location ID 5080; Located on Yankee Division Highway (I-95) north of Route 1.

As can be seen in Table 1, North Avenue was found to accommodate approximately 19,000 vehicles per day (vpd) with 1,368 vehicles per hour (vph) during the weekday morning peak hour and 1,431 vph during the weekday evening peak hour. During the weekday morning peak hour, 53 percent of the traffic is traveling northbound and during the weekday evening peak hour 51 percent of the traffic is traveling southbound. The baseline weekday morning and weekday evening traffic volumes for the study area intersections are graphically depicted in Figure 3.

PEDESTRIAN AND BICYCLE FACILITIES

A comprehensive field inventory of pedestrian and bicycle facilities within the study area was conducted in October 2021. The field inventory consisted of a review of the location of sidewalks and pedestrian crossing locations along the study roadways and at the study intersections, as well as the location of bicycle facilities. Sidewalks are provided along both sides of Wolcott Street and Linda Road and along the east side of North Avenue. The intersection of North Avenue with Wolcott Street/Linda Road has crosswalks provided across the northbound and westbound approaches. While the streets in the study area do not provide exclusive bicycle facilities, the North Avenue travel lanes can accommodate bicycles due to widths of between 13 and 15 feet per lane. North Avenue also has sharrow pavement markings indicating the roadway is meant for shared use between bicycles and motor vehicles.

PUBLIC TRANSPORTATION

Public transportation services are provided within the study area by the MBTA for fixed-route bus and commuter rail services. Table 2 summarizes the characteristics of these services. Schedules and fare information for the fixed-route bus and commuter rail services are provided in the Appendix.

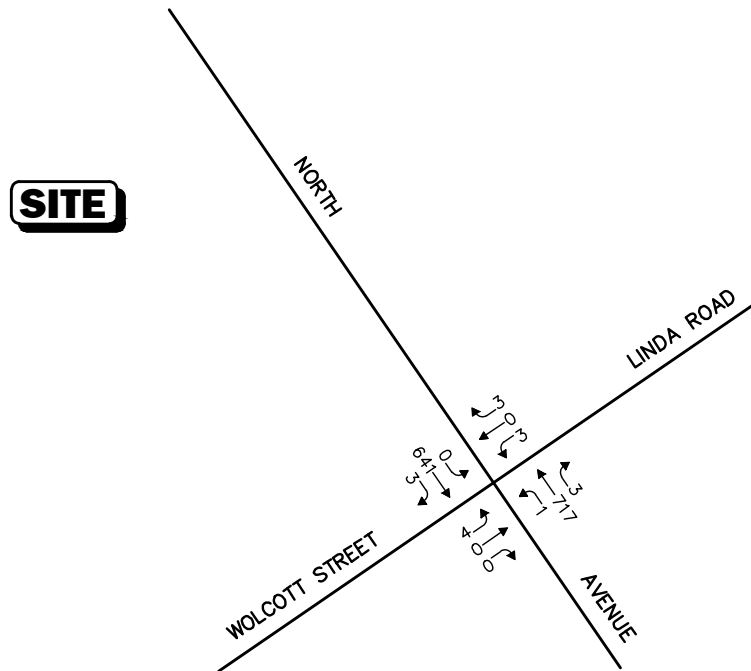
Table 2
PUBLIC TRANSPORTATION SERVICES

Service	Stop Closest to Site	Distance from Site	Weekday		Saturday		Sunday	
			Hours of Operation	Headway (minutes)	Hours of Operation	Headway (minutes)	Hours of Operation	Headway (minutes)
Bus Route 137: Reading Depot – Malden Center Station	North Avenue at Wolcott Street	300 feet South	4:49 AM - 11:00 PM	3-55	6:00 AM - 9:28 PM	40-55	8:00 AM - 5:46 PM	82-100
Commuter Rail: Haverhill Line	Wakefield Station	0.9 mile South	5:27 AM - 12:04 AM	45-99	5:35 AM - 12:04 AM	120-180	5:27 AM - 12:04 AM	120-180

MOTOR VEHICLE CRASH DATA

Motor vehicle crash information for the study area intersections was provided by the MassDOT Safety Management/Traffic Operations Unit for the most recent five-year period available (2014 through 2018). The data is summarized in Table 3 by intersection, type, weather condition, lighting condition, pavement condition, and severity.

WEEKDAY MORNING PEAK HOUR



WEEKDAY EVENING PEAK HOUR

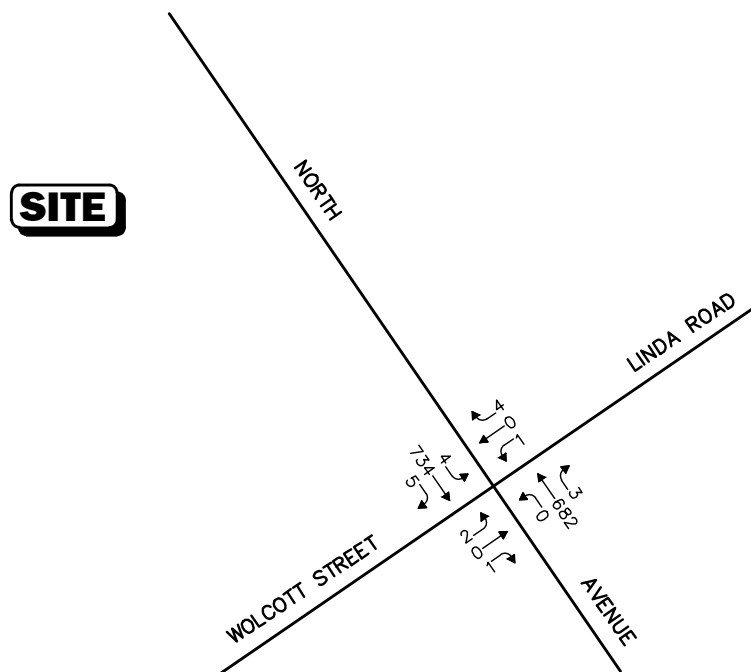


Figure 3

2021 Baseline
Peak-Hour Traffic Volumes

Table 3
MOTOR VEHICLE CRASH DATA SUMMARY

Scenario	North Avenue at Wolcott Street/Linda Road
<i>Year:</i>	
2014	0
2015	3
2016	0
2017	0
<u>2018</u>	<u>2</u>
Total	5
Average ^a	1.0
Crash Rate ^b	0.14
Significant ^c	No
<i>Type:</i>	
Angle	4
Rear-End	1
Head-On	0
Sideswipe	0
Fixed Object	0
Pedestrian	0
Bicyclist	0
<u>Unknown/Other</u>	<u>0</u>
Total	5
<i>Weather Conditions:</i>	
Clear	5
Cloudy/Rain	0
Snow/Ice	0
Fog	0
<u>Unknown/Other</u>	<u>0</u>
Total	5
<i>Lighting Conditions:</i>	
Daylight	4
Dawn/Dusk	1
Dark (lit)	0
Dark (unlit)	0
<u>Unknown/Other</u>	<u>0</u>
Total	5
<i>Pavement Conditions:</i>	
Dry	5
Wet	0
Snow/Ice	0
<u>Unknown/Other</u>	<u>0</u>
Total	5
<i>Severity:</i>	
Property Damage Only	3
Personal Injury	2
Fatality	0
<u>Unknown/Other</u>	<u>0</u>
Total	5

^aAverage number of crashes over five-year period.

^bCrash rate per million entering vehicles (mev).

^cSignificant if crash rate > 0.73 for signalized intersections or > 0.57 for unsignalized intersections (MassDOT District 4 rates).

Source: MassDOT Crash Data, 2014 through 2018.

As can be seen in Table 3, the intersection of North Avenue at Wolcott Street/Linda Road experienced a total of 5 accidents over the five-year review period, averaging 1 accident per year. The majority of the accidents were angle collisions (4 out of 5), occurred on dry pavement (5 out of 5), during the daylight (4 out of 5), in clear weather (5 out of 5), and caused property damage only (3 out of 5). In addition, no fatalities were reported over the five-year period reviewed. The crash rate for the intersection was observed to be lower than the MassDOT District 4 crash rates for unsignalized intersections.

VEHICLE SPEEDS

Existing vehicle speeds along North Avenue, near the proposed site driveway, were recorded to determine the average and 85th percentile vehicle speeds. The speed limit on North Avenue is posted at 30 miles per hour (mph) southbound in the vicinity of the site. No speed limit is posted northbound on North Avenue in the vicinity of the site. The results of the speed measurements are shown in Table 4.

Table 4
OBSERVED VEHICLE SPEEDS – (In Miles Per Hour)

<u>Location/Direction</u>	<u>Average Speed</u>	<u>85th Percentile Speed^a</u>
<i>North Avenue, near Proposed Site Driveway:</i>		
Northbound	32	36
Southbound	31	35

^aThe 85th percentile speed is the speed at which 85 percent of the traffic is traveling at or below. It is commonly used for setting speed limits on roadways.

As can be seen from Table 4, the average speed recorded northbound on North Avenue was 32 mph and the 85th percentile speed recorded was 36 mph. The average speed recorded southbound was 31 mph and the 85th percentile speed was 35 mph.

SIGHT DISTANCE EVALUATION

Sight distances were reviewed at the location of the proposed site driveway where it intersects with North Avenue in accordance with MassDOT and American Association of State Highway and Transportation Officials (AASHTO)³ standards. Stopping sight distance (SSD) is the minimum distance required for an approaching driver at a height of 3.5 feet to perceive and react accordingly to a stationary object 2 feet tall in its path. The values are based on a perception and reaction time of 2.5 seconds and braking distance required under wet, level pavements. Intersection sight distance (ISD) is based on the time required to perceive, react, and complete desired exiting maneuver from a driveway once the driver decides to execute the maneuver. Values for exiting sight distance rep-

³A Policy on Geometric Design of Highway and Streets, 7th Edition; American Association of State Highway and Transportation Officials (AASHTO); 2018.

resent the time to: 1) turn left or right, in addition to accelerating to the operating speed of the roadway, without causing approaching vehicles to reduce speed by more than 10 mph, and 2) upon turning left, to clear the near half of the intersection without conflicting with the vehicles approaching from the left. When the roadway is either on an upgrade or downgrade, grade correction factors are applied. Table 5 summarizes sight distance measurements at the site driveway location.

Table 5
SIGHT DISTANCE MEASUREMENTS

Location/Sight Distance	Required Distances Based on 85 th Percentile Speed ^a	Measured Distances (Feet)
<i>North Avenue at Site Driveway</i>		
<i>Stopping Sight Distance:</i>		
Looking north to the driveway	257 ^a	600+
Looking south to the driveway	247 ^b	600+
<i>Intersection Sight Distance:</i>		
Looking north from the driveway	397 ^b	600+ ^c
Looking south from the driveway	386 ^a	600+

^aBased on northbound 85th percentile speed of 36 mph.

^bBased on southbound 85th percentile speed of 35 mph.

^cTrimming of vegetation on-site required for sight distance to be 600+ feet.

As shown in Table 5, adequate SSD and ISD are available based on the 85th percentile speeds as long as the current vegetation on-site is trimmed.

FUTURE CONDITIONS

To determine the impact of site-generated traffic volumes on the roadway network under future conditions, baseline traffic volumes in the study area were projected to the year 2028. Traffic volumes on the roadway network at that time, in the absence of the Project (that is, the No-Build condition), would include existing traffic, new traffic due to general background traffic growth, and traffic related to specific development by others expected to be completed by 2028. Inclusion of these factors resulted in the development of 2028 No-Build traffic volumes. Anticipated site-generated traffic volumes were then superimposed upon these No-Build traffic-flow networks to develop the 2028 Build traffic-volume conditions.

FUTURE TRAFFIC GROWTH

Traffic growth on area roadways is a function of the expected land development impacting the study area. Several methods are used to estimate this growth. A procedure frequently employed estimates an annual percentage increase in traffic growth and applies that percentage to all existing traffic volumes under study. The drawback to such a procedure is that some turning volumes may actually grow at either a higher or a lower rate at particular intersections.

In addition, we identified the location and type of planned development affecting the study area, estimated the traffic to be generated by that development, and assigned it to the area roadway network. This produces a more realistic estimate of growth for local traffic. However, the drawback of this procedure is that the potential growth in population and development external to the study area would not be accounted for in the traffic projections.

To provide a conservative analysis framework, both procedures were used in this TIA.

General Background Growth

Traffic-volume data compiled by MassDOT from permanent count stations and historic traffic counts in the area were reviewed in order to determine general background traffic growth trends. Based on a review of this data and other area traffic studies, it was determined that the traffic volumes are fluctuating in the area with an average increase of approximately 0.85 percent per year. To be conservative, a 1.0 percent per year compounded annual background traffic growth rate was used to account for future traffic growth including presently unforeseen development within the study area.

Specific Development by Others

The Town of Wakefield was contacted in order to determine if there are any planned or approved specific development projects within the area that would have an impact on future traffic volumes at the study intersections. Based on these discussions, the following projects were identified for review for possible inclusion in this assessment.

62-76 Foundry Street – This development entails the construction of 58 residential units with 3,750 square feet (sf) of restaurant space and 92 on-site parking spaces to be located at 62-76 Foundry Street in Wakefield, Massachusetts. Traffic volumes from the *Transportation Impact Statement*⁴ dated April 2021 and the *Response to TAC Comments*⁵ letter dated July 14, 2021, both submitted by VAI, were added to the future condition networks.

200-400 Quannapowitt Parkway – This development entails the construction of 440 residential units with a 2,750 sf restaurant to be located at 200-400 Quannapowitt Parkway in Wakefield, Massachusetts. Traffic volumes from the *Transportation Impact Assessment*⁶ dated April 2021, the *Supplemental Traffic Analysis*⁷ memorandum dated August 30, 2021, and the *Proposed Project Program Change*⁸ letter dated October 13, 2021, all submitted by VAI, were added to the future condition networks.

44-48 Crescent Street – This development entails constructing 45 residential units and 70 on-site parking spaces. Traffic volumes from the *Traffic Impact Statement*⁹ dated February 8, 2021 and the *Response to Traffic Advisory Committee Comments*¹⁰ memorandum dated May 14, 2021, both submitted by VAI, were added to the future condition networks.

Planned Roadway Improvements

The Town of Wakefield was contacted in order to determine if there are any planned roadway improvement projects expected to be completed within the study area in the seven-year planning horizon. Based on these discussions, no roadway improvement projects beyond general maintenance are planned within the study area and study horizon.

⁴*Transportation Impact Statement – Proposed Residential Development – Wakefield, Massachusetts*; Vanasse and Associates Inc.; April 2021.

⁵*Responses to TAC Comments – Residential Development 62-76 Foundry Street Wakefield, Massachusetts*; Vanasse and Associates Inc.; July 14, 2021.

⁶*Transportation Impact Assessment – Proposed Mixed-Use Development 200 Quannapowitt Parkway – Wakefield, Massachusetts*; Vanasse and Associates Inc.; April 2021.

⁷*Supplemental Traffic Analysis – 200-400 Quannapowitt – Wakefield, Massachusetts*; Vanasse and Associates Inc.; August 30, 2021.

⁸*Proposed Project Program Change – 200-400 Quannapowitt Parkway Mixed-Use Development – Wakefield, Massachusetts*; Vanasse and Associates Inc.; October 13, 2021.

⁹*Traffic Impact Statement – Proposed Residential Development – 44-48 Crescent Street – Wakefield, Massachusetts*; Vanasse and Associates Inc.; February 8, 2021.

¹⁰*Responses to Traffic Advisory Committee Comments – 44-48 Crescent Street – Wakefield, Massachusetts*; Vanasse and Associates Inc.; May 14, 2021.

NO-BUILD TRAFFIC VOLUMES

The 2028 No-Build peak-hour traffic-volume networks were developed by applying the 1.0 percent per year compounded annual background traffic growth rate to the 2021 Baseline peak-hour traffic volumes and incorporating traffic projections from the identified background developments. The resulting 2028 No-Build weekday morning and weekday evening peak-hour traffic-volume networks are shown on Figure 4.

PROJECT-GENERATED TRAFFIC

The Project entails constructing 38 residential units. In order to develop the traffic characteristics of the proposed Project, trip-generation statistics published by the Institute of Transportation Engineers (ITE)¹¹ for Land Use Code (LUC) 221, *Multifamily Housing (Mid-Rise) Not Close to Rail Transit* were used. A summary of the expected vehicle-trip generation is provided in Table 6.

Table 6
PROJECT TRIP-GENERATION SUMMARY^a

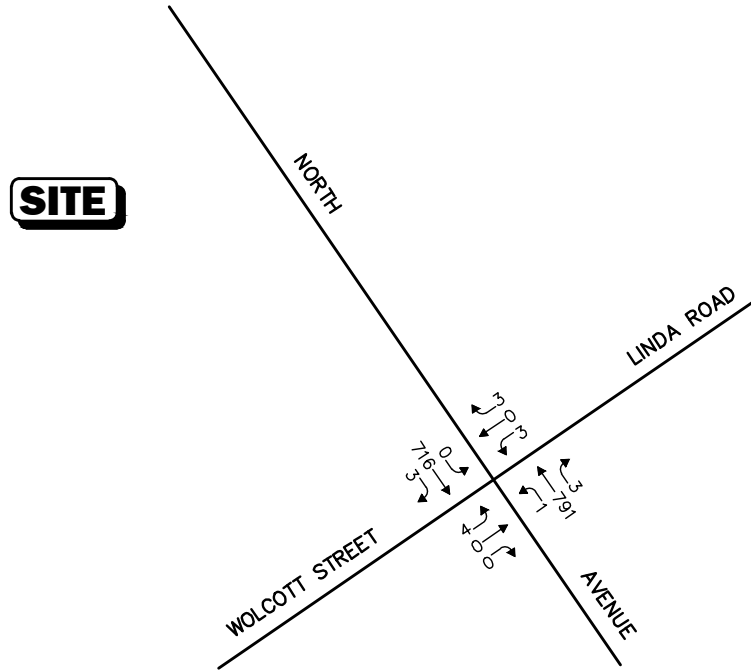
<u>Time Period/ Directional Distribution</u>	<u>Multifamily Residential^a Vehicle Trips</u>
Weekday Daily	172
<i>Weekday Morning Peak Hour:</i>	
Entering	3
<u>Exiting</u>	<u>11</u>
Total	14
<i>Weekday Evening Peak Hour:</i>	
Entering	9
<u>Exiting</u>	<u>6</u>
Total	15

^aBased on ITE LUC 221, *Multifamily Housing (Mid-Rise) Not Close to Rail Transit*; 38 units.

As can be seen in Table 6, the Project is expected to generate 172 vehicle trips on an average weekday (two-way, 24-hour volume), with 14 vehicle trips (3 entering and 11 exiting) expected during the weekday morning peak hour. During the weekday evening peak hour, the Project is expected to generate 15 vehicle trips (9 entering and 6 exiting).

¹¹*Trip Generation*, 11th Edition; Institute of Transportation Engineers; Washington, DC; September 2021.

WEEKDAY MORNING PEAK HOUR



WEEKDAY EVENING PEAK HOUR

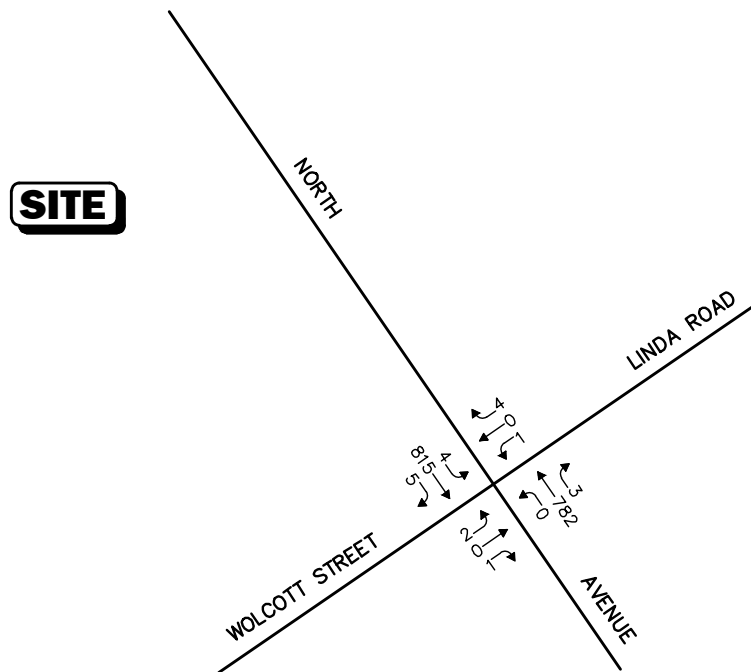


Figure 4

2028 No-Build
Peak-Hour Traffic Volumes

TRIP DISTRIBUTION AND ASSIGNMENT

The directional distribution of the site-generated trips to and from the Project was determined and was based on a review of existing travel patterns at the study area intersections and Journey-to-Work data for Wakefield obtained from the United States Census Bureau.¹² The trip distributions for the Project are summarized in Table 7 and graphically depicted on Figure 5. The weekday morning and weekday evening peak-hour traffic volumes expected to be generated by the Project were assigned on the study area roadway network as shown on Figure 6.

Table 7
TRIP-DISTRIBUTION SUMMARY

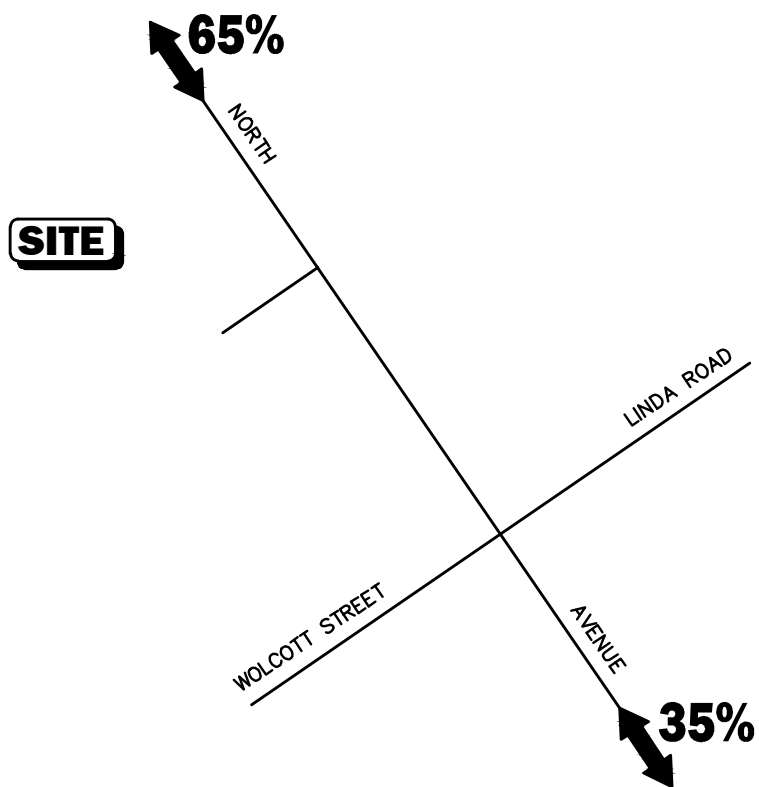
Roadway	Direction (To/From)	Percent (To/From)
North Avenue	North	65
North Avenue	South	<u>35</u>
TOTAL		100

FUTURE TRAFFIC VOLUMES – BUILD CONDITION

The 2028 Build condition networks consist of the 2028 No-Build traffic volumes with the anticipated site-generated traffic added to them. The 2028 Build weekday morning and weekday evening peak-hour traffic-volume networks are graphically depicted on Figure 7.

A summary of peak-hour projected traffic-volume increases external to the study area that is the subject of this assessment is shown in Table 8. These volumes are based on the expected increases from the Project.

¹²2011-2015 5-Year American Community Survey; U.S. Census Bureau; 2021.



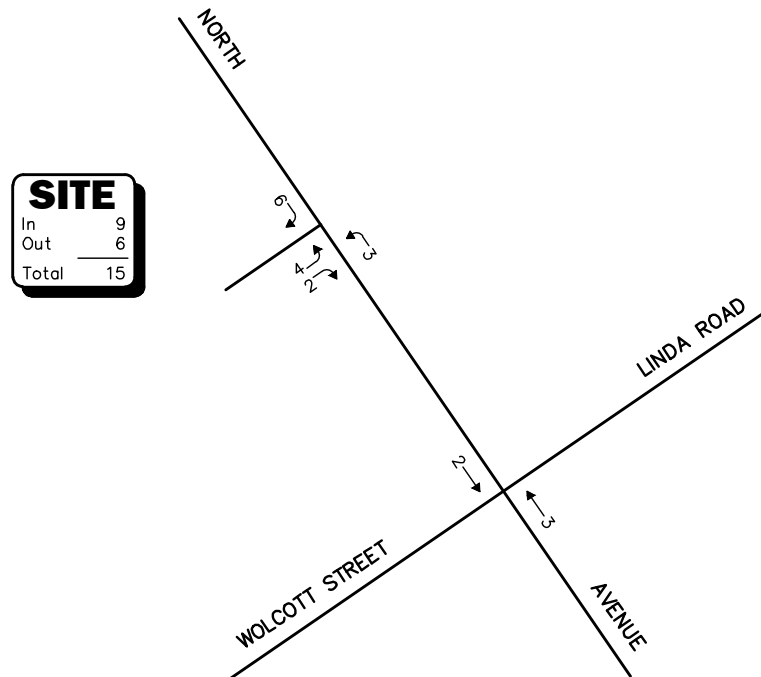
Not To Scale



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Figure 5

Trip Distribution Map



Not To Scale

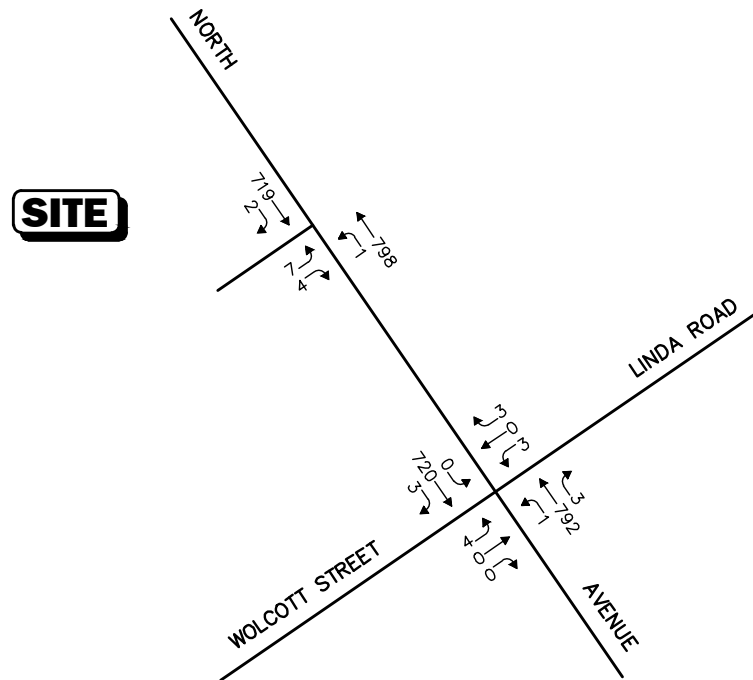


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Figure 6

Site-Generated Peak-Hour Traffic Volumes

WEEKDAY MORNING PEAK HOUR



WEEKDAY EVENING PEAK HOUR

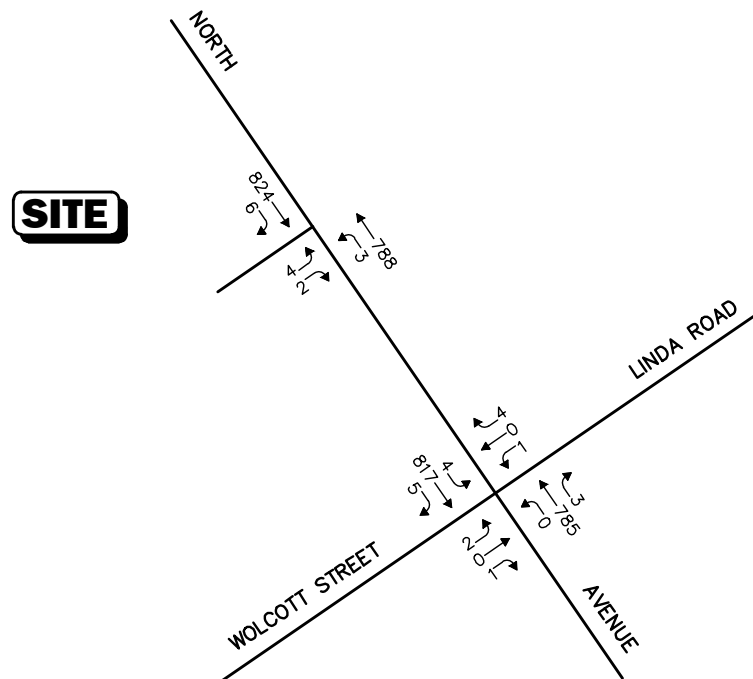


Figure 7

2028 Build
Peak-Hour Traffic Volumes

Table 8
PEAK-HOUR TRAFFIC-VOLUME INCREASES^a

Location/Peak Hour	2028 No-Build	2028 Build	Traffic-Volume Increase Over No-Build	Percent Increase Over No-Build
<i>North Avenue, north of Site Driveway:</i>				
Weekday Morning	1,517	1,526	9	0.6
Weekday Evening	1,612	1,622	10	0.6
<i>North Avenue, south of Wolcott Street:</i>				
Weekday Morning	1,514	1,519	5	0.3
Weekday Evening	1,602	1,607	5	0.3

^aTwo-way traffic total.

As shown in Table 8, Project-related traffic-volume increases external to the study area relative to 2028 No-Build conditions are anticipated to range from 0.3 to 0.6 percent during the peak periods.

TRAFFIC OPERATIONS ANALYSIS

Measuring existing and future traffic volumes quantifies traffic flow within the study area. To assess quality of flow, roadway capacity and vehicle queue analyses were conducted under Existing, No-Build, and Build traffic-volume conditions. Capacity analyses provide an indication of how well the roadway facilities serve the traffic demands placed upon them, with vehicle queue analyses providing a secondary measure of the operational characteristics of an intersection or section of roadway under study.

METHODOLOGY

Levels of Service

A primary result of capacity analyses is the assignment of level of service to traffic facilities under various traffic-flow conditions.¹³ The concept of level of service is defined as a qualitative measure describing operational conditions within a traffic stream and their perception by motorists and/or passengers. A level-of-service definition provides an index to quality of traffic flow in terms of such factors as speed, travel time, freedom to maneuver, traffic interruptions, comfort, convenience, and safety.

Six levels of service are defined for each type of facility. They are given letter designations from A to F, with level-of-service (LOS) A representing the best operating conditions and LOS F representing congested or constrained operating conditions.

Since the level of service of a traffic facility is a function of the traffic flows placed upon it, such a facility may operate at a wide range of levels of service, depending on the time of day, day of week, or period of year.

¹³The capacity analysis methodology is based on the concepts and procedures presented in the *Highway Capacity Manual 6th Edition*; Transportation Research Board; Washington, DC; 2016.

Unsignalized Intersections

The six levels of service for unsignalized intersections may be described as follows:

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

The levels of service of unsignalized intersections are determined by application of a procedure described in the *Highway Capacity Manual 6th Edition*.¹⁴ Level of service is measured in terms of average control delay. Mathematically, control delay is a function of the capacity and degree of saturation of the lane group and/or approach under study and is a quantification of motorist delay associated with traffic control devices such as traffic signals and STOP signs. Control delay includes the effects of initial deceleration delay approaching a STOP sign, stopped delay, queue move-up time, and final acceleration delay from a stopped condition. Definitions for level of service at unsignalized intersections are also given in the *Highway Capacity Manual 6th Edition*. Table 9 summarizes the relationship between level of service and average control delay for two-way STOP-controlled and all-way STOP-controlled intersections.

Table 9
LEVEL-OF-SERVICE CRITERIA FOR
UNSIGNALIZED INTERSECTIONS^a

Level-Of-Service by Volume-to-Capacity Ratio		Average Control Delay (Seconds Per Vehicle)
$v/c \leq 1.0$	$v/c > 1.0$	
A	F	≤ 10.0
B	F	10.1 to 15.0
C	F	15.1 to 25.0
D	F	25.1 to 35.0
E	F	35.1 to 50.0
F	F	> 50.0

^aSource: *Highway Capacity Manual 6th Edition*; Transportation Research Board; Washington, DC; 2016; page 20-6.

¹⁴*Highway Capacity Manual 6th Edition*; Transportation Research Board; Washington, DC; 2016.

ANALYSIS RESULTS

Level-of-service analyses were conducted for 2021 Baseline, 2028 No-Build, and 2028 Build conditions for the study area intersections. The results of the intersection capacity analysis within the study area are described below, with a tabular summary provided in Table 10.

Unsignalized Intersection Analysis Results

North Avenue at Wolcott Street/Linda Road

Under 2021 Baseline and 2028 No-Build conditions, the critical movements at this intersection operate at LOS F during the weekday morning and weekday evening peak hours. No changes to critical movement level of service occur as a result of the addition of Project volumes under 2028 Build conditions. The 95th percentile queues lengths for the critical movements are estimated to be 15 feet or less over the course of the peak hours which is less than the length of one vehicle.

North Avenue at Site Driveway

Under 2028 Build conditions, the critical movement at this intersection operates at LOS E during the weekday morning peak hour and LOS D during the weekday evening peak hour. The 95th percentile queues for the critical movements are estimated to be 8 feet or less over the course of the peak hours which is less than the length of one vehicle.

Table 10
UNSIGNALIZED INTERSECTION CAPACITY ANALYSIS SUMMARY

Unsignalized Intersection/ Peak Hour/Critical Movement	2021 Baseline				2028 No-Build				2028 Build			
	V/C ^a	Delay ^b	LOS ^c	95 th Queue ^d	V/C	Delay	LOS	95 th Queue	V/C	Delay	LOS	95 th Queue
<i>North Avenue at Wolcott Street/Linda Road</i>												
<i>Weekday Morning:</i>												
Wolcott Street EB LT/RT	0.13	>50	F	10	0.17	>50	F	18	0.17	>50	F	15
Linda Road WB LT/RT	0.14	>50	F	13	0.18	>50	F	18	0.18	>50	F	15
<i>Weekday Evening:</i>												
Wolcott Street EB LT/RT	0.05	49	E	3	0.06	>50	F	5	0.06	>50	F	5
Linda Road WB LT/RT	0.06	36	E	5	0.08	45	E	8	0.08	45	E	8
<i>North Avenue at Site Driveway</i>												
<i>Weekday Morning:</i>												
Site Driveway EB LT/RT									0.10	40	E	8
<i>Weekday Evening:</i>												
Site Driveway EB LT/RT		Intersection is constructed under 2028 Build Conditions							0.05	34	D	5

^aVolume-to-capacity ratio.

^bDelay in seconds per vehicle.

^cLevel of service.

^d95th percentile queue length in feet.

NB = northbound; SB = southbound; EB = eastbound; WB = westbound; LT = left-turning movements; TH = through movements; RT = right-turning movements.

RECOMMENDATIONS AND CONCLUSIONS

RECOMMENDATIONS

The traffic assessment contained herein indicates that the Project will not have substantial impacts at the study area intersections and Project-related traffic increases are expected to be between 0.3 percent and 0.6 percent during the peak hours depending on location. VAI recommends the following:

Site Recommendations

- The site driveway onto North Avenue should be placed under STOP-sign control, with painted STOP bars on the drives at the STOP-sign locations.
- All signs and pavement markings to be installed within the Project site should conform to the applicable standards of the *Manual on Uniform Traffic Devices* (MUTCD)¹⁵ and be shorter than 24 inches or be placed outside of the sight lines for drivers exiting the driveway and those approaching the driveway on North Avenue.
- Snow windrows within sight triangle areas of the Project site driveway should be promptly removed where such accumulations would impede sight lines.
- Vegetation within sight triangle areas should be shorter than 24 inches or be placed outside of the sightlines for drivers exiting the driveway and those approaching the driveway on North Avenue.
- A 5-foot wide concrete sidewalk is proposed along the site frontage that would connect to a 4-foot wide sidewalk on-site that creates a pedestrian path to the front entrance of the building and to the parking field on the south and west sides of the building.

Transportation Demand Management (TDM) Plan

As is the case with many developments, a major focus of the traffic mitigation plan focuses on the reduction of single-occupant vehicles arriving and departing to and from the site. This is predominantly accomplished by developing a comprehensive TDM strategy. In an effort to encourage the

¹⁵Ibid 1.

use of alternative modes of transportation to single-occupant vehicles, the following TDM measures will be implemented as a part of the Project:

- Information regarding public transportation services, maps, schedules, and fare information will be posted in a central location and/or otherwise made available to residents.
- A “welcome packet” will be provided to residents detailing available public transportation services, bicycle and walking alternatives, and available commuter options.
- Consideration should be given to installing accommodations for the charging of electric vehicles by residents of the Project.
- The Applicant will also consider coordinating with the Town and other area projects on the provision of shuttle bus service in the event that an area shuttle bus service become available.

CONCLUSIONS

VAI has completed a transportation assessment of the potential impacts on the surrounding transportation infrastructure associated with the proposed 38-unit residential development to be located at 572-590 North Avenue in Wakefield, Massachusetts. The following specific areas have been evaluated as they relate to the Project: i) access requirements; ii) potential off-site improvements; and iii) safety considerations; under existing and future conditions, both with and without the Project.

The Project is expected to produce a minor increase in traffic volumes in the vicinity of the site with minimal increases in delays and no changes to level of service for movements at the study area intersections. Based on the above, VAI has concluded that the Project can be safely accommodated with minimal impact on the area road network.

APPENDIX

TRAFFIC COUNT DATA
COVID-19 ADJUSTMENT DATA
SEASONAL ADJUSTMENT DATA
PUBLIC TRANSPORTATION SCHEDULES
MOTOR VEHICLE CRASH DATA
VEHICLE SPEED DATA
GROWTH RATE DATA
TRIP GENERATION CALCULATIONS
JOURNEY TO WORK DATA
CAPACITY ANALYSIS



TRAFFIC COUNT DATA



Location : North Avenue
 Location : South of Willard Street
 City/State: Wakefield, MA

87150001

10/21/2021	SB,		Hour Totals		NB,		Hour Totals		Combined Totals	
Time	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon
12:00	10	162			8	166				
12:15	11	146			6	165				
12:30	11	167			7	144				
12:45	7	171	39	646	11	154	32	629	71	1275
1:00	6	158			5	134				
1:15	2	153			2	160				
1:30	5	146			2	132				
1:45	2	162	15	619	2	161	11	587	26	1206
2:00	4	178			1	161				
2:15	4	155			0	153				
2:30	1	147			3	144				
2:45	1	157	10	637	1	169	5	627	15	1264
3:00	1	162			0	180				
3:15	1	159			6	188				
3:30	4	151			3	162				
3:45	3	153	9	625	1	168	10	698	19	1323
4:00	1	170			5	156				
4:15	9	169			9	157				
4:30	7	163			7	151				
4:45	16	155	33	657	24	141	45	605	78	1262
5:00	7	184			31	164				
5:15	20	155			37	158				
5:30	28	181			37	158				
5:45	38	185	93	705	59	150	164	630	257	1335
6:00	54	170			68	133				
6:15	52	143			99	147				
6:30	78	144			99	95				
6:45	106	133	290	590	115	118	381	493	671	1083
7:00	86	132			128	86				
7:15	99	128			159	78				
7:30	100	133			147	77				
7:45	134	103	419	496	180	73	614	314	1033	810
8:00	111	76			144	63				
8:15	151	98			171	54				
8:30	169	82			137	65				
8:45	150	69	581	325	161	63	613	245	1194	570
9:00	145	56			139	60				
9:15	145	62			119	55				
9:30	132	43			133	45				
9:45	138	53	560	214	133	25	524	185	1084	399
10:00	118	38			119	27				
10:15	120	32			141	26				
10:30	113	30			168	27				
10:45	127	26	478	126	143	17	571	97	1049	223
11:00	130	24			142	14				
11:15	119	27			141	12				
11:30	135	22			139	7				
11:45	159	8	543	81	142	14	564	47	1107	128
Total	3070	5721			3534	5157			6604	10878
Percent	34.9%	65.1%			40.7%	59.3%			37.8%	62.2%
Grand Total	3070	5721			3534	5157			6604	10878
Percent	34.9%	65.1%			40.7%	59.3%			37.8%	62.2%

ADT

ADT: 17,482

AADT: 17,482

Location : North Avenue
 Location : South of Willard Street
 City/State: Wakefield, MA

87150001

10/21/2021	SB,	NB,	
Time			Total
12:00 AM	39	32	71
1:00	15	11	26
2:00	10	5	15
3:00	9	10	19
4:00	33	45	78
5:00	93	164	257
6:00	290	381	671
7:00	419	614	1033
8:00	581	613	1194
9:00	560	524	1084
10:00	478	571	1049
11:00	543	564	1107
12:00 PM	646	629	1275
1:00	619	587	1206
2:00	637	627	1264
3:00	625	698	1323
4:00	657	605	1262
5:00	705	630	1335
6:00	590	493	1083
7:00	496	314	810
8:00	325	245	570
9:00	214	185	399
10:00	126	97	223
11:00	81	47	128
Total	8791	8691	17482
Percent	50.3%	49.7%	
AM Peak	8:00	7:00	8:00
Volume	581	614	1194
PM Peak	5:00	3:00	5:00
Volume	705	698	1335
Grand Total	8791	8691	17482
Percent	50.3%	49.7%	
ADT		ADT: 17,482	AADT: 17,482

Accurate Counts

978-664-2565

N/S Street : North Ave
E/W Street : Linda Road / Walcott Street
City/State : Wakefield, MA
Weather : Clear

File Name : 87150001
Site Code : 87150001
Start Date : 10/21/2021
Page No : 1

Groups Printed- Cars - Trucks

	North Ave From North			Linda Rd From East			North Ave From South			Walcott St From West			Int. Total
Start Time	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
07:00 AM	0	89	0	1	1	1	0	135	0	0	0	2	229
07:15 AM	0	99	0	0	0	2	2	148	1	1	0	3	256
07:30 AM	1	104	0	1	0	1	0	143	1	0	0	1	252
07:45 AM	0	128	1	0	0	1	1	185	0	1	0	0	317
Total	1	420	1	2	1	5	3	611	2	2	0	6	1054
08:00 AM	0	109	1	1	0	0	0	143	1	0	0	0	255
08:15 AM	0	148	0	2	0	1	0	173	1	1	0	0	326
08:30 AM	0	171	1	0	0	1	0	121	1	2	0	0	297
08:45 AM	0	144	1	0	0	1	0	159	0	0	0	0	305
Total	0	572	3	3	0	3	0	596	3	3	0	0	1183
Grand Total	1	992	4	5	1	8	3	1207	5	5	0	6	2237
Apprch %	0.1	99.5	0.4	35.7	7.1	57.1	0.2	99.3	0.4	45.5	0	54.5	
Total %	0	44.3	0.2	0.2	0	0.4	0.1	54	0.2	0.2	0	0.3	
Cars	1	963	4	5	1	8	3	1187	5	5	0	6	2188
% Cars	100	97.1	100	100	100	100	100	98.3	100	100	0	100	97.8
Trucks	0	29	0	0	0	0	0	20	0	0	0	0	49
% Trucks	0	2.9	0	0	0	0	0	1.7	0	0	0	0	2.2

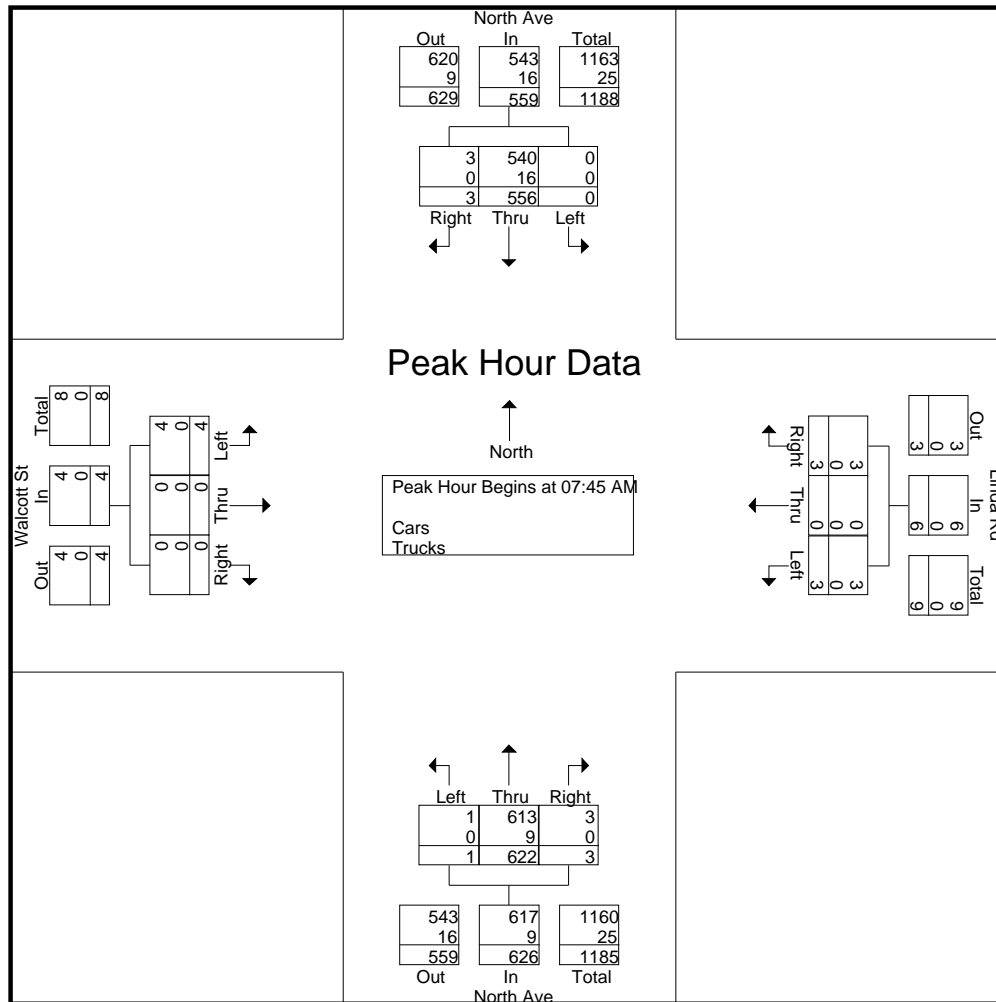
	North Ave From North				Linda Rd From East				North Ave From South				Walcott St From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:45 AM																	
07:45 AM	0	128	1	129	0	0	1	1	1	185	0	186	1	0	0	1	317
08:00 AM	0	109	1	110	1	0	0	1	0	143	1	144	0	0	0	0	255
08:15 AM	0	148	0	148	2	0	1	3	0	173	1	174	1	0	0	1	326
08:30 AM	0	171	1	172	0	0	1	1	0	121	1	122	2	0	0	2	297
Total Volume	0	556	3	559	3	0	3	6	1	622	3	626	4	0	0	4	1195
% App. Total	0	99.5	0.5		50	0	50		0.2	99.4	0.5		100	0	0		
PHF	.000	.813	.750	.813	.375	.000	.750	.500	.250	.841	.750	.841	.500	.000	.000	.500	.916
Cars	0	540	3	543	3	0	3	6	1	613	3	617	4	0	0	4	1170
% Cars	0	97.1	100	97.1	100	0	100	100	100	98.6	100	98.6	100	0	0	100	97.9
Trucks	0	16	0	16	0	0	0	0	0	9	0	9	0	0	0	0	25
% Trucks	0	2.9	0	2.9	0	0	0	0	0	1.4	0	1.4	0	0	0	0	2.1

Accurate Counts

978-664-2565

N/S Street : North Ave
E/W Street : Linda Road / Walcott Street
City/State : Wakefield, MA
Weather : Clear

File Name : 87150001
Site Code : 87150001
Start Date : 10/21/2021
Page No : 2



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	08:00 AM				07:00 AM				07:30 AM				07:00 AM			
+0 mins.	0	109	1	110	1	1	1	3	0	143	1	144	0	0	2	2
+15 mins.	0	148	0	148	0	0	2	2	1	185	0	186	1	0	3	4
+30 mins.	0	171	1	172	1	0	1	2	0	143	1	144	0	0	1	1
+45 mins.	0	144	1	145	0	0	1	1	0	173	1	174	1	0	0	1
Total Volume	0	572	3	575	2	1	5	8	1	644	3	648	2	0	6	8
% App. Total	0	99.5	0.5		25	12.5	62.5		0.2	99.4	0.5		25	0	75	
PHF	.000	.836	.750	.836	.500	.250	.625	.667	.250	.870	.750	.871	.500	.000	.500	.500
Cars	0	557	3	560	2	1	5	8	1	634	3	638	2	0	6	8
% Cars	0	97.4	100	97.4	100	100	100	100	100	98.4	100	98.5	100	0	100	100
Trucks	0	15	0	15	0	0	0	0	0	10	0	10	0	0	0	0
% Trucks	0	2.6	0	2.6	0	0	0	0	0	1.6	0	1.5	0	0	0	0

Accurate Counts

978-664-2565

N/S Street : North Ave
E/W Street : Linda Road / Walcott Street
City/State : Wakefield, MA
Weather : Clear

File Name : 87150001
Site Code : 87150001
Start Date : 10/21/2021
Page No : 7

Groups Printed- Trucks

	North Ave From North			Linda Rd From East			North Ave From South			Walcott St From West			
Start Time	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Int. Total
07:00 AM	0	4	0	0	0	0	0	4	0	0	0	0	8
07:15 AM	0	2	0	0	0	0	0	1	0	0	0	0	3
07:30 AM	0	3	0	0	0	0	0	2	0	0	0	0	5
07:45 AM	0	5	0	0	0	0	0	3	0	0	0	0	8
Total	0	14	0	0	0	0	0	10	0	0	0	0	24
08:00 AM	0	5	0	0	0	0	0	3	0	0	0	0	8
08:15 AM	0	3	0	0	0	0	0	2	0	0	0	0	5
08:30 AM	0	3	0	0	0	0	0	1	0	0	0	0	4
08:45 AM	0	4	0	0	0	0	0	4	0	0	0	0	8
Total	0	15	0	0	0	0	0	10	0	0	0	0	25
Grand Total	0	29	0	0	0	0	0	20	0	0	0	0	49
Apprch %	0	100	0	0	0	0	0	100	0	0	0	0	
Total %	0	59.2	0	0	0	0	0	40.8	0	0	0	0	

	North Ave From North				Linda Rd From East				North Ave From South				Walcott St From West				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:30 AM																	
07:30 AM	0	3	0	3	0	0	0	0	0	2	0	2	0	0	0	0	5
07:45 AM	0	5	0	5	0	0	0	0	0	3	0	3	0	0	0	0	8
08:00 AM	0	5	0	5	0	0	0	0	0	3	0	3	0	0	0	0	8
08:15 AM	0	3	0	3	0	0	0	0	0	2	0	2	0	0	0	0	5
Total Volume	0	16	0	16	0	0	0	0	0	10	0	10	0	0	0	0	26
% App. Total	0	100	0		0	0	0		0	100	0		0	0	0		
PHF	.000	.800	.000	.800	.000	.000	.000	.000	.000	.833	.000	.833	.000	.000	.000	.000	.813

978-664-2565

N/S Street : North Ave
E/W Street : Linda Road / Walcott Street
City/State : Wakefield, MA
Weather : Clear

File Name : 87150001
Site Code : 87150001
Start Date : 10/21/2021
Page No : 1

Groups Printed- Cars - Trucks

	North Ave From North			Linda Rd From East			North Ave From South			Walcott St From West			
Start Time	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Int. Total
04:00 PM	2	165	0	2	0	0	0	168	0	0	0	0	337
04:15 PM	0	160	2	2	0	0	0	155	1	0	0	0	320
04:30 PM	0	163	0	0	0	3	0	155	0	0	0	0	321
04:45 PM	1	159	0	0	0	1	0	152	1	0	0	1	315
Total	3	647	2	4	0	4	0	630	2	0	0	1	1293
05:00 PM	1	179	2	0	0	1	0	173	1	1	0	0	358
05:15 PM	1	158	0	1	0	1	0	163	2	0	0	0	326
05:30 PM	0	175	1	0	0	1	0	152	0	0	0	1	330
05:45 PM	2	180	2	0	0	1	0	155	0	1	0	0	341
Total	4	692	5	1	0	4	0	643	3	2	0	1	1355
Grand Total	7	1339	7	5	0	8	0	1273	5	2	0	2	2648
Apprch %	0.5	99	0.5	38.5	0	61.5	0	99.6	0.4	50	0	50	
Total %	0.3	50.6	0.3	0.2	0	0.3	0	48.1	0.2	0.1	0	0.1	
Cars	7	1326	7	5	0	8	0	1270	5	2	0	2	2632
% Cars	100	99	100	100	0	100	0	99.8	100	100	0	100	99.4
Trucks	0	13	0	0	0	0	0	3	0	0	0	0	16
% Trucks	0	1	0	0	0	0	0	0.2	0	0	0	0	0.6

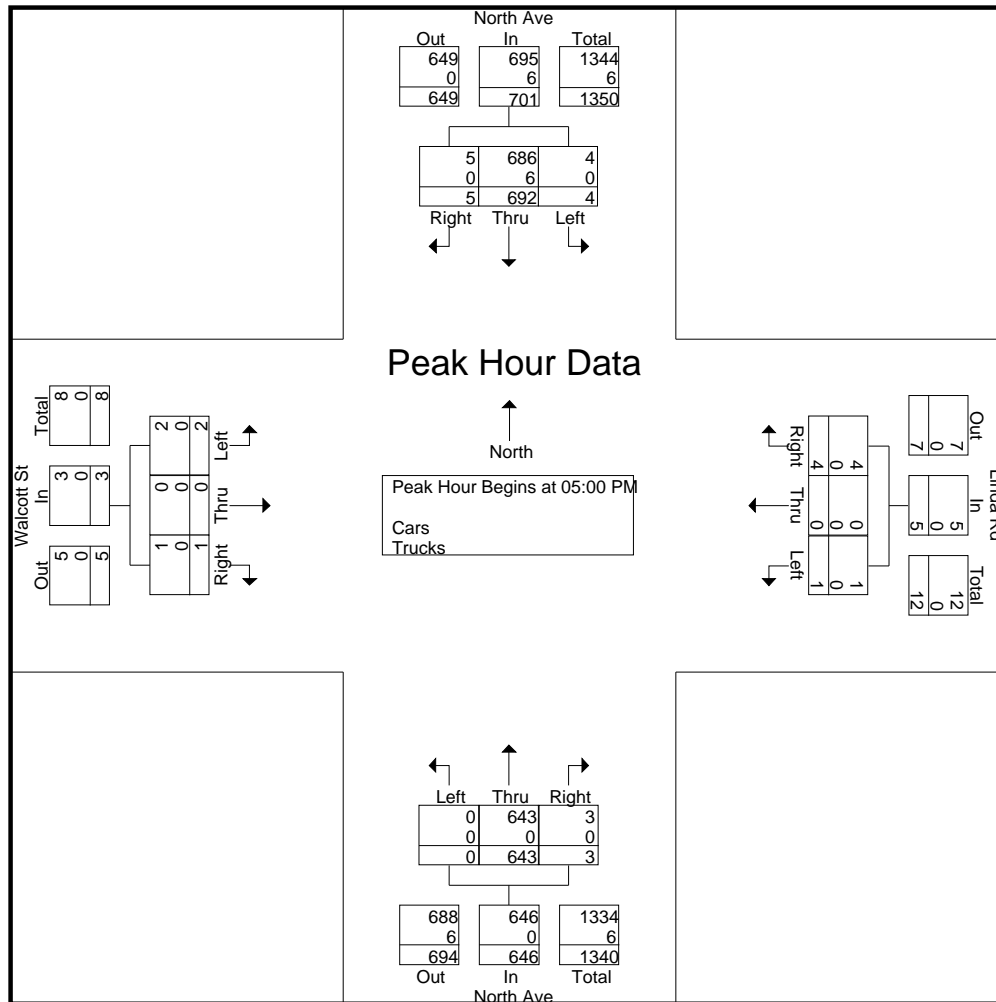
[illegible]

Accurate Counts

978-664-2565

N/S Street : North Ave
E/W Street : Linda Road / Walcott Street
City/State : Wakefield, MA
Weather : Clear

File Name : 87150001
Site Code : 87150001
Start Date : 10/21/2021
Page No : 2



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	05:00 PM				04:00 PM				04:30 PM				04:45 PM			
+0 mins.	1	179	2	182	2	0	0	2	0	155	0	155	0	0	1	1
+15 mins.	1	158	0	159	2	0	0	2	0	152	1	153	1	0	0	1
+30 mins.	0	175	1	176	0	0	3	3	0	173	1	174	0	0	0	0
+45 mins.	2	180	2	184	0	0	1	1	0	163	2	165	0	0	1	1
Total Volume	4	692	5	701	4	0	4	8	0	643	4	647	1	0	2	3
% App. Total	0.6	98.7	0.7		50	0	50		0	99.4	0.6		33.3	0	66.7	
PHF	.500	.961	.625	.952	.500	.000	.333	.667	.000	.929	.500	.930	.250	.000	.500	.750
Cars	4	686	5	695	4	0	4	8	0	641	4	645	1	0	2	3
% Cars	100	99.1	100	99.1	100	0	100	100	0	99.7	100	99.7	100	0	100	100
Trucks	0	6	0	6	0	0	0	0	0	2	0	2	0	0	0	0
% Trucks	0	0.9	0	0.9	0	0	0	0	0	0.3	0	0.3	0	0	0	0

Accurate Counts

978-664-2565

N/S Street : North Ave
E/W Street : Linda Road / Walcott Street
City/State : Wakefield, MA
Weather : Clear

File Name : 87150001
Site Code : 87150001
Start Date : 10/21/2021
Page No : 7

Groups Printed- Trucks

	North Ave From North			Linda Rd From East			North Ave From South			Walcott St From West			Int. Total
Start Time	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
04:00 PM	0	2	0	0	0	0	0	0	0	0	0	0	2
04:15 PM	0	1	0	0	0	0	0	1	0	0	0	0	2
04:30 PM	0	2	0	0	0	0	0	1	0	0	0	0	3
04:45 PM	0	2	0	0	0	0	0	1	0	0	0	0	3
Total	0	7	0	0	0	0	0	3	0	0	0	0	10
05:00 PM	0	2	0	0	0	0	0	0	0	0	0	0	2
05:15 PM	0	1	0	0	0	0	0	0	0	0	0	0	1
05:30 PM	0	1	0	0	0	0	0	0	0	0	0	0	1
05:45 PM	0	2	0	0	0	0	0	0	0	0	0	0	2
Total	0	6	0	0	0	0	0	0	0	0	0	0	6
Grand Total	0	13	0	0	0	0	0	3	0	0	0	0	16
Apprch %	0	100	0	0	0	0	0	100	0	0	0	0	
Total %	0	81.2	0	0	0	0	0	18.8	0	0	0	0	

	North Ave From North				Linda Rd From East				North Ave From South				Walcott St From West				Int. Total
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:00 PM																	
04:00 PM	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	2
04:15 PM	0	1	0	1	0	0	0	0	0	1	0	1	0	0	0	0	2
04:30 PM	0	2	0	2	0	0	0	0	0	1	0	1	0	0	0	0	3
04:45 PM	0	2	0	2	0	0	0	0	0	1	0	1	0	0	0	0	3
Total Volume	0	7	0	7	0	0	0	0	0	3	0	3	0	0	0	0	10
% App. Total	0	100	0		0	0	0		0	100	0		0	0	0		
PHF	.000	.875	.000	.875	.000	.000	.000	.000	.000	.750	.000	.750	.000	.000	.000	.000	.833

Accurate Counts

978-664-2565

N/S Street : North Ave
E/W Street : Linda Road / Walcott Street
City/State : Wakefield, MA
Weather : Clear

File Name : 87150001
Site Code : 87150001
Start Date : 10/21/2021
Page No : 10

Groups Printed- Bikes Peds

	North Ave From North				Linda Rd From East				North Ave From South				Walcott St From West				Exclu. Total	Inclu. Total	Int. Total
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds			
04:00 PM	0	1	0	0	0	0	0	29	0	4	0	1	0	0	0	0	30	5	35
04:15 PM	1	0	0	0	0	0	0	27	0	5	0	0	0	0	0	0	27	6	33
04:30 PM	0	1	0	0	1	0	0	20	0	2	0	0	0	0	0	0	20	4	24
04:45 PM	0	0	0	0	0	0	0	37	0	4	0	0	0	0	0	1	38	4	42
Total	1	2	0	0	1	0	0	113	0	15	0	1	0	0	0	1	115	19	134
05:00 PM	0	0	0	0	0	0	0	28	0	2	0	0	0	0	1	0	28	3	31
05:15 PM	0	0	0	0	0	0	0	42	0	4	1	0	0	0	0	0	42	5	47
05:30 PM	0	0	0	0	0	0	0	39	0	9	0	0	0	0	0	0	39	9	48
05:45 PM	0	0	0	0	0	0	0	28	0	7	0	1	0	0	0	0	29	7	36
Total	0	0	0	0	0	0	0	137	0	22	1	1	0	0	1	0	138	24	162
Grand Total	1	2	0	0	1	0	0	250	0	37	1	2	0	0	1	1	253	43	296
Apprch %	33.3	66.7	0		100	0	0		0	97.4	2.6		0	0	100				
Total %	2.3	4.7	0		2.3	0	0		0	86	2.3		0	0	2.3		85.5	14.5	

	North Ave From North				Linda Rd From East				North Ave From South				Walcott St From West						
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total		
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																			
Peak Hour for Entire Intersection Begins at 05:00 PM																			
05:00 PM	0	0	0	0	0	0	0	0	0	2	0	2	0	0	0	1	1		3
05:15 PM	0	0	0	0	0	0	0	0	0	4	1	5	0	0	0	0	0		5
05:30 PM	0	0	0	0	0	0	0	0	0	9	0	9	0	0	0	0	0		9
05:45 PM	0	0	0	0	0	0	0	0	0	7	0	7	0	0	0	0	0		7
Total Volume	0	0	0	0	0	0	0	0	0	22	1	23	0	0	1	1			24
% App. Total	0	0	0		0	0	0		0	95.7	4.3		0	0	100				
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.611	.250	.639	.000	.000	.250	.250			.667

COVID-19 ADJUSTMENT DATA



Massachusetts Highway Department

5080: Monthly Hourly Volume for October 2019

Location ID: 5080
County: Essex
Functional Class: 1
Location: YANKEE DIVISION HIGHWAY

Seasonal Factor Group: U1-Essex
Daily Factor Group:
Axle Factor Group: U1-Essex
Growth Factor Group:

	0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00	TOTAL	QC Status
1	732	480	377	558	1512	5643	8398	10315	9107	8738	8636	8885	8750	9124	10194	10981	11287	11446	9493	6958	5037	3842	2564	1573	154630	Accepted
2	779	441	394	552	1446	5765	8753	10841	10101	8867	8694	8647	8994	9016	9004	9731	10308	10923	9299	7204	5113	3821	2484	1602	152779	Accepted
3																										
4	933	543	405	546	1402	4875	8150	10226	9608	8573	8811	8467	9000	9851	10368	10513	10292	10508	9701	8067	5196	4379	3624	2750	156788	Accepted
5	1503	847	508	461	665	1607	2997	4930	7276	9316	10575	10974	11181	10725	9282	10119	10366	9807	8785	7617	6256	5600	4757	3208	149362	Accepted
6	1684	1024	561	375	472	893	1854	2958	5254	7417	10316	11258	11834	11323	10540	10171	9890	9030	7772	6460	4706	3392	2125	1246	132555	Accepted
7	655	467	378	553	1406	5519	8908	11086	9897	8637	8775	8228	8476	8770	9708	10049	10523	10838	8379	6167	4131	3039	1796	1203	147588	Accepted
8	655	435	352	490	1414	5636	8177	9811	8922	8418	8197	8268	8212	8407	9327	10541	10618	11080	9251	6602	4775	3681	2385	1545	147199	Accepted
9	816	420	419	576	1437	5874	8602	10354	9628	8735	8401	8646	8767	9086	10057	10106	9794	10364	8683	6496	4932	3601	2260	1516	149570	Accepted
10	799	465	405	560	1460	5485	8436	10732	9825	8568	8376	8510	8868	9574	10392	10459	10672	11304	9161	6855	4965	3704	2691	2045	154311	Accepted
11	1322	862	530	577	1376	4803	7939	10396	9405	9096	9424	10217	10566	9985	10366	9387	9899	10758	9101	7899	5934	4648	3513	2692	160695	Accepted
12	1437	832	596	464	665	1481	2879	4622	6503	8551	9843	10026	10969	10333	11048	10162	10963	10271	8804	7367	5918	5222	4811	3250	147017	Accepted
13	1661	1095	599	401	444	897	1762	2837	4766	8008	9773	10311	10365	11031	11192	10906	9809	8825	8188	7212	5941	4653	3443	1988	136107	Accepted
14	929	511	369	446	996	3050	5129	6713	7324	8260	9519	10725	10793	10713	10123	9848	9803	9210	8579	7005	5309	3858	2254	1343	142809	Accepted
15	702	426	389	532	1532	5630	8802	10513	9519	8538	8378	8410	8761	9030	9791	10119	10208	10696	9468	6741	4786	3490	2327	1463	150251	Accepted
16	782	440	407	480	1420	5634	8569	10544	9947	8472	8286	8622	8810	9082	9977	10594	10700	11076	9018	6519	4571	3606	2232	1350	151138	Accepted
17	711	412	396	524	1365	5083	8087	9870	9552	8656	8391	8545	8631	9027	9243	10101	10084	10491	8882	6647	4927	3885	2597	1681	147788	Accepted
18	851	541	462	547	1441	4944	7895	10148	9564	8926	9092	9470	9716	9571	10243	10238	10592	10709	9593	7474	5544	4364	3787	2668	158380	Accepted
19	1560	886	544	444	733	1749	3081	5337	7286	9010	9902	10206	10121	10312	10115	8520	9970	9663	9492	7520	6361	5764	4980	3472	147028	Accepted
20	2005	1121	627	437	478	879	1852	3206	4764	7071	9315	10398	10662	10774	10849	9057	9571	8514	8015	6732	4937	3426	2087	1333	128110	Accepted
21	640	392	346	487	1530	5534	8517	10557	9872	8475	8250	8275	8253	8598	9607	10076	10171	10607	9021	6183	3954	3012	2112	1454	145923	Accepted
22	707	399	358	553	1426	5589	8440	10875	9466	8339	8158	8228	8273	8828	9787	10141	10461	10558	8439	6137	4316	3283	2226	1408	146395	Accepted
23	714	410	354	515	1369	5376	7896	9807	9222	7965	8283	8308	8515	8797	9562	10120	10264	10739	9138	6570	4658	3927	2430	1410	146349	Accepted
24	770	439	376	557	1443	5593	7239	10412	9655	8404	8657	8993	8712	9101	10008	10131	10750	8830	9999	7412	5357	3946	2831	1950	151565	Accepted
25	1075	625	460	550	1394	5059	8052	10142	9479	8987	8872	9263	9599	9905	10257	10723	10766	11073	9467	6930	5188	4697	4183	3089	159835	Accepted
26	1838	1055	669	597	683	1571	2977	4913	7435	9003	9972	10279	10379	10345	10350	10088	9938	10168	9127	7677	6328	5645	5278	3746	150061	Accepted
27	2182	1403	653	472	440	784	1537	2412	3976	5949	8321	9294	9075	8977	8737	8159	7335	5855	5028	4509	4220	2971	1857	1098	105244	Accepted
28	529	408	505	1139	4589	5715	8551	9684	8802	7863	8064	8051	8524	9166	9882	9945	10298	8729	7343	5196	3636	2459	1681	1083	141842	Accepted
29	560	416	475	1176	4850	6564	8642	10049	8898	7866	8211	7991	8063	9121	10239	10459	10487	9219	7472	5733	4142	3177	2072	1169	147051	Accepted
30	707	452	508	1168	4358	6247	8619	9935	8986	8237	8290	8279	8571	9473	10211	10105	10675	9212	7490	6003	4206	3254	2093	1310	148389	Accepted
31	693	516	495	1122	4599	6306	8410	9653	8753	7981	7531	8135	8314	8970	9486	10268	9622	7804	6407	5223	4625	3857	2844	1793	143407	Accepted
						6638.3	8462.6	8426.4										10204	9943.6	8619.8					146672.2	
						7842.4												9589.1								

Massachusetts Highway Department

5080: Monthly Hourly Volume for October 2021

Location ID: 5080
County: Essex
Functional Class: 1
Location: YANKEE DIVISION HIGHWAY

Seasonal Factor Group: U1-Essex
Daily Factor Group:
Axle Factor Group: U1-Essex
Growth Factor Group:

	0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00	TOTAL	QC Status	
1	897	556	390	513	1071	3600	7013	9452	8721	8295	8584	9252	9388	9802	10070	10469	10411	10124	9717	7693	5244	4420	3695	2554	151931	Accepted	
2	1701	823	458	462	703	1576	2919	4735	6658	9274	10209	10282	9723	9593	10528	10353	9790	8960	8186	7466	6082	5373	4487	2710	143051	Accepted	
3	1698	865	490	383	441	1069	1933	3149	4784	7575	10002	11128	11149	10713	9493	9135	9106	8227	8131	6273	4097	2686	1856	1239	125622	Accepted	
4	1110	802	630	447	1040	3463	6924	9002	8271	7472	7469	7875	8039	8180	9477	9827	9472	9304	7267	4926	3537	2418	1642	1100	129694	Accepted	
5	693	347	334	447	1072	3698	7537	9762	8389	7825	7877	8068	8228	8583	9778	10534	10707	10762	8389	5834	4139	3034	1977	1388	139402	Accepted	
6	1037	481	387	493	1120	3762	7866	9948	9054	8382	8556	8955	8790	9091	9788	10414	10651	10708	9698	6717	4486	3391	2341	1352	147468	Accepted	
7	759	404	374	492	1171	3872	7798	9728	9152	8074	8738	8885	9070	9595	9837	10288	10705	9961	9447	7529	5110	3939	2775	1639	149342	Accepted	
8	851	495	407	497	1099	3625	7221	9051	8715	8748	9211	9389	10148	10373	10956	11131	10801	9991	9225	8344	6068	4849	4006	2957	158158	Accepted	
9	1606	863	488	451	618	1558	3098	4795	6959	9640	10103	9885	10165	10160	9562	10213	10289	9931	8935	7309	6098	5620	4699	3119	146164	Accepted	
10	1531	873	503	383	445	920	1702	2924	4343	7201	9516	10744	10644	10559	10399	10265	10355	9307	8101	6805	5431	4390	3247	1652	132240	Accepted	
11	932	515	378	443	910	2352	4850	6210	6714	8098	8891	9890	9964	9900	9641	9076	8937	8205	7861	6448	5362	3545	1997	1537	132656	Accepted	
12	876	414	350	452	1145	3906	7854	9760	8892	8331	8200	8251	8370	9097	9988	10204	10300	10296	8280	5877	4131	3036	2115	1390	141515	Accepted	
13	720	416	378	464	1136	3942	8141	9739	9196	8348	7997	8350	8321	9131	9715	10141	10211	10543	8576	6192	4397	3191	2217	1395	142857	Accepted	
14	705	410	387	453	1186	3892	7877	9315	9146	8061	8761	8588	7703	8853	9915	10642	11060	10598	8757	6599	4780	3614	2724	1774	145800	Accepted	
15	896	553	395	528	1190	3739	7407	9712	9037	8394	8767	8992	9305	10277	10813	10924	10055	9877	8750	6927	5314	4402	3705	2864	152823	Accepted	
16	1501	821	505	451	656	1485	3029	4780	6739	8228	9572	10428	10982	10839	11064	10428	10054	9185	8146	6738	5697	5025	4730	3149	144232	Accepted	
17	1691	910	463	450	435	919	1754	2958	4635	7600	9740	9925	10178	10464	9900	9482	8383	7538	7707	6604	5884	3833	2629	1327	125409	Accepted	
18	697	398	302	439	1179	3810	7734	9657	8982	7804	7946	8204	7894	8414	9242	10020	9831	10247	8249	5420	3671	2639	1824	1402	136005	Accepted	
19	908	459	331	466	1191	3711	7552	9554	9070	7935	7890	8231	7857	8220	9267	9950	9683	9504	8193	5793	4128	2974	1958	1354	136179	Accepted	
20	874	640	420	442	1232	3748	7855	9415	8660	8147	7793	8151	8313	8686	10042	10542	10417	9986	8118	6001	4436	3543	2396	1483	141340	Accepted	
21	830	450	361	498	1185	3728	7845	9835	9020	8362	8097	8482	8451	9090	9990	10269	10691	10145	8681	6595	4826	3739	2511	1634	145315	Accepted	
22	823	506	409	479	1093	3671	7236	9481	8839	8346	8680	9058	9594	9879	10273	10337	10486	9726	9370	7226	5641	4557	4003	2967	152680	Accepted	
23	1495	781	484	477	652	1528	2926	4725	6726	9026	10239	10692	10528	9887	9967	9311	9398	9510	8536	7622	6135	5192	4471	3125	143433	Accepted	
24	1744	988	565	445	432	941	1846	3212	4771	7280	9717	10851	10376	9593	9422	9468	9043	9286	8003	5783	4890	3284	2103	1260	125303	Accepted	
25	652	457	329	424	1138	3442	6741	8822	8093	7227	7357	7322	7749	7872	8706	9848	9458	9430	7025	4782	3564	2487	1654	1293	125872	Accepted	
26	756	363	347	433	1094	3429	7044	9132	7848	7122	7044	7014	7388	7442	8496	9094	9051	9034	6710	4534	3175	2363	1563	1123	121599	Accepted	
27	629	334	345	366	1061	3233	6276	7720	7458	6841	6582	6698	6984	7138	7998	8623	8795	8977	6916	4946	3772	2933	1996	1443	118064	Accepted	
28	781	416	361	475	1249	3784	7549	9536	9011	8442	8512	8643	8078	8418	9759	10549	10284	10029	8874	6617	4771	3504	2540	1708	143890	Accepted	
29	879	508	437	477	1131	3519	7034	9369	8662	8332	8353	8508	8900	9554	10111	10497	10607	10147	8524	6909	5313	4456	3640	2745	148612	Accepted	
30	1541	934	612	472	540	1354	2329	3656	5072	6889	8316	9083	9168	9524	9406	9474	8900	7812	7148	5516	4731	3937	3407	2577	122398	Accepted	
31	1668	1079	683	479	400	809	1394	2424	3952	6130	8131	9625	9920	9312	9399	9895	9288	8129	6787	6472	5383	4284	3144	2561	121348	Accepted	
						5686.6	7469.6	7599											9910.3	9531.6	8268						138400.1
						6918.4											9236.6										

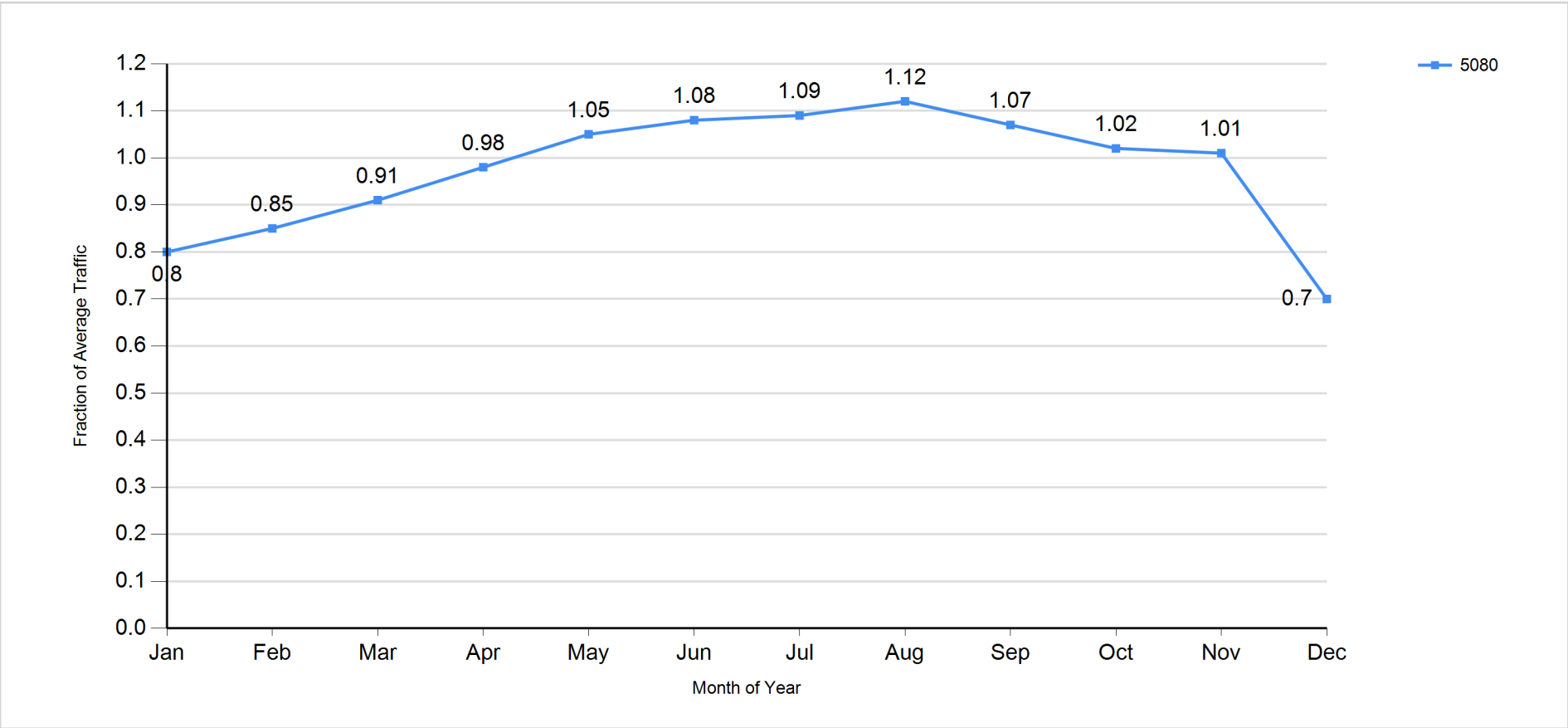
		AM	PM	Daily
October	2019	7842.444	9589.089	146672.2
October	2021	6918.398	9236.613	138400.1
	Change	1.133564	1.038161	1.05977
	Use	1.13	1.04	1.06

SEASONAL ADJUSTMENT DATA





Traffic Pattern by Month for 1/1/2019 - 12/31/2019
Criteria: Location ID = 5080, From 1/1/1900 To 12/31/2049 12:00:00 AM





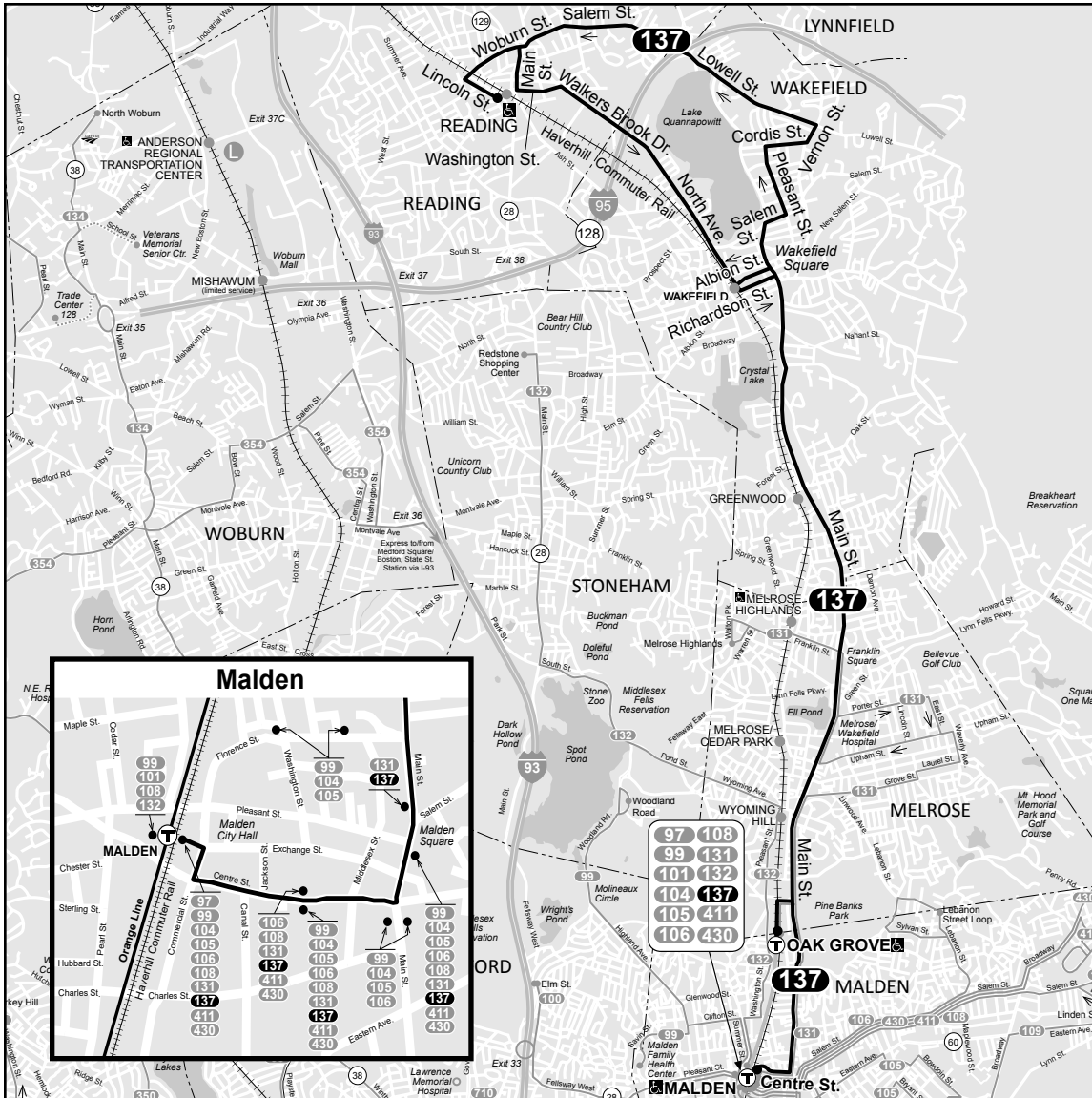
Massachusetts Highway Department

Traffic Pattern by Month for 1/1/2019 - 12/31/2019
Criteria: Location ID = 5080, From 1/1/1900 To 12/31/2049 12:00:00 AM

Factor Group	Station	Weight	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
U1-Essex	5080	0	0.798	0.851	0.914	0.983	1.046	1.083	1.094	1.117	1.068	1.021	1.006	0.700
	Average of Weighted Factors		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

PUBLIC TRANSPORTATION SCHEDULES





A Information in this timetable is subject to change without notice. Traffic conditions and weather can affect running time.

Effective Aug 29, 2021

A Schedule Change

137

Reading Depot - Malden Center Sta



mbta.com
 617-222-3200
 617-222-5146 (TTY)
Lost & Found
 617-222-5607



137

Weekday

Inbound					Outbound				
Leave Reading Depot	Lv/Arrive Wakefield Square	Arrive Franklin Square	Arrive Oak Grove Station	Arrive Malden Station	Leave Malden Station	Lv/Arrive Oak Grove Station	Arrive Franklin Square	Arrive Wakefield Square	Arrive Reading Depot
5:25A	5:35A	5:41A	5:50A	6:00A	4:49A	4:55A	5:01A	5:08A	5:22A
6:05	6:15	6:21	6:30	6:40	5:25	5:32	5:40	5:48	6:02
6:35	6:45	6:51	7:00	.....	.....	6:02	6:10	6:18	6:32
7:00	7:12	7:20	7:30	.....	.....	6:27	6:35	6:43	6:57
7:16	7:28	7:36	7:46	.....	.....	6:59	7:07	7:15	7:29
7:32	7:44	7:52	8:02	.....	.....	7:11	7:19	7:27	7:44
7:48	8:00	8:08	8:18	.....	.....	7:41	7:51	7:59	8:17
8:04	8:14	8:22	8:32	.....	.....	7:57	8:07	8:15	8:33
8:20	8:30	8:38	8:48	.....	.....	8:16	8:26	8:34	8:52
8:36	8:46	8:54	9:04	.....	.....	8:36	8:46	8:54	9:12
8:55	9:06	9:13	9:23	9:33	.....	9:01	9:10	9:19	9:37
9:15	9:27	9:34	9:44	9:54	.....	9:27	9:36	9:45	10:02
9:40	9:52	9:59	10:09	10:19	9:40	9:50	9:59	10:08	10:23
10:05	10:17	10:24	10:34	10:48	10:05	10:15	10:26	10:35	10:50
10:26	10:39	10:46	10:57	11:11	10:30	10:40	10:51	11:00	11:15
10:53	11:06	11:13	11:24	11:38	10:55	11:05	11:16	11:25	11:42
11:18	11:31	11:38	11:49	12:03P	11:20	11:30	11:41	11:50	12:08P
11:45	11:58	12:05P	12:16P	12:30	11:45	11:53	12:04P	12:13P	12:31
12:11P	12:24P	12:31	12:42	12:56	12:10P	12:18P	12:29	12:38	12:56
12:34	12:47	12:54	1:06	1:17	12:35	12:43	12:54	1:03	1:19
12:59	1:14	1:20	1:31	1:42	1:00	1:10	1:22	1:32	1:48
1:22	1:37	1:43	1:54	2:06	1:25	1:35	1:47	1:57	2:12
1:50	2:04	2:13	2:23	2:36	1:50	2:00	2:11	2:21	2:36
2:16	2:29	2:38	2:48	3:01	s 2:10	2:19	2:30	2:40	.....
.....	s 2:45	2:54	3:04	3:17	2:15	2:24	2:35	2:45	3:00
2:39	2:52	3:01	3:11	3:24	2:40	2:49	3:00	3:10	3:25
3:03	3:16	3:25	3:35	3:48	3:05	3:14	3:25	3:35	3:50
3:28	3:41	3:50	4:00	.....	.....	3:23	3:34	3:44	3:59
3:53	4:06	4:15	4:25	4:38	3:30	3:39	3:50	4:00	4:15
4:02	4:15	4:24	4:33	.....	.....	4:00	4:12	4:22	4:37
4:22	4:35	4:41	4:52	.....	.....	4:20	4:32	4:42	4:57
4:40	4:54	5:00	5:11	.....	.....	4:37	4:49	4:59	5:14
5:00	5:14	5:20	5:31	.....	.....	4:53	5:05	5:15	5:30
5:17	5:31	5:37	5:48	.....	.....	5:09	5:21	5:31	5:46
5:33	5:47	5:53	6:04	.....	.....	5:25	5:37	5:47	6:02
5:49	6:02	6:08	6:18	.....	.....	5:41	5:53	6:02	6:16
6:05	6:17	6:23	6:33	.....	.....	5:57	6:06	6:15	6:29
6:19	6:31	6:37	6:47	.....	.....	6:13	6:22	6:31	6:45
6:32	6:44	6:50	7:00	.....	.....	6:29	6:38	6:47	7:01
6:48	7:00	7:06	7:16	.....	.....	6:45	6:54	7:03	7:17
7:04	7:16	7:22	7:31	.....	.....	7:05	7:14	7:23	7:37
7:20	7:31	7:37	7:46	7:57	7:30	7:40	7:49	7:58	8:12
7:40	7:49	7:55	8:04	8:15	8:10	8:20	8:29	8:38	8:52
8:15	8:24	8:30	8:39	8:50	8:55	9:05	9:14	9:23	9:37
8:55	9:04	9:10	9:19	9:30	9:40	9:50	9:59	10:08	10:22
9:40	9:49	9:55	10:04	10:15					
10:25	10:34	10:40	10:49	11:00					

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Saturday

Inbound					Outbound				
Leave Reading Depot	Lv/Arrive Wakefield Square	Arrive Franklin Square	Arrive Oak Grove Station	Arrive Malden Station	Leave Malden Station	Arrive Oak Grove Station	Arrive Franklin Square	Arrive Wakefield Square	Arrive Reading Depot
6:00A	6:10A	6:17A	6:25A	6:36A	6:00A	6:08A	6:16A	6:23A	6:38A
6:41	6:51	6:58	7:06	7:17	6:40	6:48	6:56	7:03	7:18
7:21	7:31	7:38	7:46	7:57	7:25	7:33	7:41	7:48	8:03
8:06	8:16	8:23	8:31	8:42	8:05	8:13	8:23	8:31	8:46
8:49	8:59	9:06	9:16	9:27	8:50	8:58	9:09	9:18	9:33
9:36	9:48	9:55	10:07	10:18	9:35	9:43	9:54	10:03	10:18
10:21	10:34	10:42	10:55	11:07	10:30	10:38	10:49	10:58	11:14
11:17	11:31	11:39	11:50	12:02P	11:15	11:24	11:38	11:50	12:06P
12:09P	12:23P	12:31P	12:42P	12:54	12:10P	12:19P	12:30P	12:41P	12:56
12:59	1:13	1:21	1:32	1:44	1:00	1:09	1:20	1:31	1:46
1:49	2:03	2:12	2:23	2:34	1:50	1:59	2:10	2:21	2:36
2:39	2:53	3:01	3:11	3:22	2:40	2:49	3:00	3:11	3:26
3:29	3:42	3:50	4:00	4:11	3:30	3:39	3:50	4:00	4:15
4:18	4:30	4:37	4:47	4:58	4:20	4:29	4:40	4:50	5:05
5:08	5:20	5:27	5:37	5:48	5:05	5:15	5:26	5:34	5:49
5:52	6:04	6:11	6:21	6:32	5:55	6:05	6:16	6:24	6:39
6:42	6:54	7:01	7:11	7:22	6:45	6:55	7:06	7:14	7:29
7:32	7:44	7:51	8:01	8:12	8:30	8:38	8:46	8:53
.....	9:00	9:07	9:17	9:28					

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Sunday

Inbound					Outbound				
Leave Reading Depot	Arrive Wakefield Square	Arrive Franklin Square	Arrive Oak Grove Station	Arrive Malden Station	Leave Malden Station	Arrive Oak Grove Station	Arrive Franklin Square	Arrive Wakefield Square	Arrive Reading Depot
8:00A	8:11A	8:17A	8:25A	8:36A	8:40A	8:49A	8:57A	9:05A	9:19A
9:22	9:34	9:40	9:50	10:01	10:10	10:19	10:28	10:36	10:50
10:53	11:05	11:11	11:21	11:34	11:40	11:50	11:58	12:07P	12:21P
12:24P	12:36P	12:44P	12:54P	1:06P	1:20P	1:29P	1:39P	1:47	2:01
2:04	2:16	2:23	2:32	2:44	2:55	3:05	3:15	3:23	3:37
3:40	3:51	3:58	4:06	4:17	4:25	4:34	4:44	4:52	5:06
5:09	5:20	5:27	5:35	5:46					

Holidays Fall 2021/Winter 2022

Saturday
Christmas Eve; NY Eve; MLK Day; President's Day

Sunday
Labor Day; Thanksgiving; Christmas Day; NY Day



All MBTA buses accessible to persons with disabilities

Fare	Local Bus	Bus + Bus	Subway	Bus + Subway
CharlieCard	\$1.70	\$1.70	\$2.40	\$2.40
CharlieTicket	\$1.70	\$1.70	\$2.40	\$4.10*
Cash-on-Board	\$1.70	\$3.40	\$2.40	\$4.10
Student/Youth**	\$0.85	\$0.85	\$1.10	\$1.10
Senior/TAP***	\$0.85	\$0.85	\$1.10	\$1.10

FREE FARES: Children 11 and under ride free when accompanied by a paying customer; Blind Access CharlieCard holders ride free and if using a guide, the guide rides free.

* Transfers Subway to Silver Line SL4 or SL5 pay \$2.40

** Requires Student CharlieCard or Youth CharlieCard. Student CharlieCards available to students through participating middle and high schools. Youth CharlieCards available through community partners across Greater Boston.

*** Requires Senior/TAP CharlieCard, available to Medicare cardholders, seniors 65+, and persons with disabilities.

HAVERHILL LINE

2021 Fall/Winter Schedule

Effective October 11, 2021

Monday to Friday (except when Storm Service is operating)

Inbound to Boston

Inbound to Boston			AM											PM											
ZONE	STATION	TRAIN #	280	200	202	282	204	284	206	286	208	288	210	290	212	292	214	294	216	218	296	298	220	222	224
	Bikes Allowed																								
7	Haverhill		-	5:27	6:12	-	7:25	-	8:27	-	9:57	-	11:27	-	12:57	-	2:27	-	3:57	5:20	-	-	6:57	8:12	9:27
7	Bradford		-	5:29	6:14	-	7:27	-	8:29	-	f 9:59	-	f 11:29	-	f 12:59	-	f 2:29	-	f 3:59	f 5:22	-	-	f 6:59	f 8:14	f 9:29
6	Lawrence		-	5:36	6:21	-	7:34	-	8:36	-	10:06	-	11:36	-	1:06	-	2:36	-	4:06	5:29	-	-	7:06	8:21	9:36
5	Andover		-	5:43	6:28	-	7:41	-	8:43	-	f 10:13	-	f 11:43	-	f 1:13	-	f 2:43	-	f 4:13	f 5:36	-	-	f 7:13	f 8:28	f 9:43
4	Ballardvale		-	5:48	6:33	-	7:46	-	8:48	-	f 10:18	-	f 11:48	-	f 1:18	-	f 2:48	-	f 4:18	f 5:41	-	-	f 7:18	f 8:33	f 9:48
3	North Wilmington		-	5:56	6:41	-	-	-	8:56	-	f 10:26	-	f 11:56	-	f 1:26	-	f 2:56	-	f 4:26	-	-	-	f 7:26	f 8:41	f 9:55
2	Reading		5:18	6:03	6:48	7:33	-	8:18	9:03	9:48	10:33	11:18	12:03	12:48	1:33	2:18	3:03	3:48	4:33	-	6:03	6:48	7:33	8:48	10:02
2	Wakefield		5:24	6:09	6:54	7:39	-	8:24	9:09	9:54	10:39	11:24	12:09	12:54	1:39	2:24	3:09	3:54	4:39	-	f 6:09	f 6:54	f 7:39	f 8:54	f 10:08
2	Greenwood		5:27	6:12	6:57	7:42	-	8:27	9:12	f 9:57	f 10:42	f 11:27	f 12:12	f 12:57	f 1:42	f 2:27	f 3:12	f 3:57	f 4:42	-	f 6:12	f 6:57	f 7:42	f 8:57	f 10:11
1	Melrose Highlands		5:29	6:14	6:59	7:44	-	8:29	9:14	9:59	10:44	11:29	12:14	12:59	1:44	2:29	3:14	3:59	4:44	-	f 6:14	f 6:59	f 7:44	f 8:59	f 10:13
1	Melrose/Cedar Park		5:31	6:16	7:01	7:46	-	8:31	9:16	f 10:01	f 10:46	f 11:31	f 12:16	f 1:01	f 1:46	f 2:31	f 3:16	f 4:01	f 4:46	-	f 6:16	f 7:01	f 7:46	f 9:01	f 10:15
1	Wyoming Hill		5:33	6:18	7:03	7:48	-	8:33	9:18	f 10:03	f 10:48	f 11:33	f 12:18	f 1:03	f 1:48	f 2:33	f 3:18	f 4:03	f 4:48	-	f 6:18	f 7:03	f 7:48	f 9:03	f 10:17
1A	Malden Center		L 5:37	L 6:22	L 7:07	L 7:52	-	L 8:37	L 9:22	L 10:07	L 10:52	L 11:37	L 12:22	L 1:07	L 1:52	L 2:37	L 3:22	L 4:07	L 4:52	-	L 6:22	L 7:07	L 7:52	L 9:07	L 10:21
1A	North Station		5:51	6:38	7:23	8:07	8:24	8:52	9:37	10:21	11:06	11:51	12:36	1:21	2:06	2:51	3:36	4:21	5:06	6:18	6:36	7:21	8:06	9:21	10:35

Monday to Friday (except when Storm Service is operating)

Outbound from Boston

Outbound from Boston			AM										PM											
ZONE	STATION	TRAIN #	201	281	283	203	285	205	287	207	289	209	291	211	293	213	215	295	217	297	219	221	223	225
	Bikes Allowed																							
1A	North Station		5:55	6:40	7:25	8:10	8:55	9:40	10:25	11:10	11:55	12:40	1:25	2:10	2:55	3:40	4:25	5:10	5:40	5:55	6:40	7:55	9:35	10:55
1A	Malden Center		f 6:06	f 6:51	f 7:36	f 8:21	f 9:06	f 9:51	f 10:36	f 11:21	f 12:06	f 12:51	f 1:36	f 2:21	f 3:06	3:51	4:36	5:21	-	6:06	6:51	f 8:06	f 9:46	f 11:06
1	Wyoming Hill		f 6:09	f 6:54	f 7:39	f 8:24	f 9:09	f 9:54	f 10:39	f 11:24	f 12:09	f 12:54	f 1:39	f 2:24	f 3:09	3:54	4:39	5:24	-	6:09	6:54	f 8:09	f 9:49	f 11:09
1	Melrose/Cedar Park		f 6:11	f 6:56	f 7:41	f 8:26	f 9:11	f 9:56	f 10:41	f 11:26	f 12:11	f 12:56	f 1:41	f 2:26	f 3:11	3:56	4:41	5:26	-	6:11	6:56	f 8:11	f 9:51	f 11:11
1	Melrose Highlands		f 6:14	f 6:59	f 7:44	f 8:29	f 9:14	9:59	10:44	11:29	12:14	12:59	1:44	2:29	3:14	3:59	4:44	5:29	-	6:14	6:59	8:14	f 9:54	f 11:14
2	Greenwood		f 6:17	f 7:02	f 7:47	f 8:32	f 9:17	f 10:02	f 10:47	f 11:32	f 12:17	f 1:02	f 1:47	f 2:32	f 3:17	4:02	4:47	5:32	-	6:17	7:02	f 8:17	f 9:57	f 11:17
2	Wakefield		f 6:21	f 7:06	f 7:51	f 8:36	f 9:21	10:06	10:51	11:36	12:21	1:06	1:51	2:36	3:21	4:06	4:51	5:36	-	6:21	7:06	8:21	f 10:01	f 11:21
2	Reading		6:27	7:12	7:57	8:42	9:27	10:12	10:57	11:42	12:27	1:12	1:57	2:42	3:27	4:12	4:58	5:43	-	6:28	7:12	8:27	10:07	11:27
3	North Wilmington		f 6:33	-	-	f 8:48	-	f 10:18	-	f 11:48	-	f 1:18	-	f 2:48	-	4:18	5:04	-	-	-	7:18	f 8:33	f 10:13	f 11:33
4	Ballardvale		f 6:41	-	-	f 8:56	-	f 10:26	-	f 11:56	-	f 1:26	-	f 2:56	-	4:26	5:12	-	6:12	-	7:26	8:41	f 10:20	f 11:40
5	Andover		f 6:46	-	-	f 9:01	-	f 10:31	-	f 12:01	-	f 1:31	-	f 3:01	-	4:31	5:17	-	6:17	-	7:31	8:46	f 10:25	f 11:45
6	Lawrence		6:53	-	-	9:08	-	10:38	-	12:08	-	1:38	-	3:08	-	4:38	5:24	-	6:24	-	7:38	8:53	10:32	11:52
7	Bradford		f 7:01	-	-	f 9:16	-	f 10:46	-	f 12:16	-	L 1:48	-	L 3:18	-	L 4:49	L 5:36	-	L 6:36	-	L 7:49	L 9:03	f 10:40	f 12:00
7	Haverhill		7:05	-	-	9:20	-	10:50	-	12:20	-	1:50	-	3:20	-	4:52	5:39	-	6:39	-	7:52	9:05	10:44	12:04

Weekend & Storm Service

Inbound to Boston

ZONE	STATION	SATURDAY TRAIN #	SUNDAY TRAIN #	AM				PM			
				1200	1202	1204	1206	1208	1210	1212	1214
	Bikes Allowed										
7	Haverhill			5:35	8:35	10:35	12:35	2:35	4:35	6:35	9:35
7	Bradford			5:37	8:37	10:37	12:37	2:37	4:37	6:37	9:37
6	Lawrence			5:44	8:44	10:44	12:44	2:44	4:44	6:44	9:44
5	Andover			f 5:51	f 8:51	f 10:51	f 12:51	f 2:51	f 4:51	f 6:51	f 9:51
4	Ballardvale			f 5:56	f 8:56	f 10:56	f 12:56	f 2:56	f 4:56	f 6:56	f 9:56
3	North Wilmington			f 6:03	f 9:03	f 11:03	f 1:03	f 3:03	f 5:03	f 7:03	f 10:03
2	Reading			6:10	9:10	11:10	1:10	3:10	5:10	7:10	10:10
2	Wakefield			6:16	9:16	11:16	1:16	3:16	5:16	7:16	10:16
2	Greenwood			f 6:19	f 9:19	f 11:19	f 1:19	f 3:19	f 5:19	f 7:19	f 10:19
1	Melrose Highlands			6:21	9:21	11:21	1:21	3:21	5:21	7:21	10:21
1	Melrose/Cedar Park			f 6:23	f 9:23	f 11:23	f 1:23	f 3:23	f 5:23	f 7:23	f 10:23
1	Wyoming Hill			f 6:25	f 9:25	f 11:25	f 1:25	f 3:25	f 5:25	f 7:25	f 10:25
1A	Malden Center			L 6:29	L 9:29	L 11:29	L 1:29	L 3:29	L 5:29	L 7:29	L 10:29
1A	North Station			6:43	9:43	11:43	1:43	3:43	5:43	7:43	10:43

Weekend & Storm Service

Outbound from Boston

Outbound from Boston			AM			PM				
ZONE	STATION	SATURDAY TRAIN #	1201	1203	1205	1207	1209	1211	1213	1215
		SUNDAY TRAIN #	2201	2203	2205	2207	2209	2211	2213	2215
Bikes Allowed										
1A	North Station		7:00	9:00	11:00	1:00	3:00	5:00	8:00	10:55
1A	Malden Center		f 7:11	f 9:11	f 11:11	f 1:11	f 3:11	f 5:11	f 8:11	f 11:06
1	Wyoming Hill		f 7:14	f 9:14	f 11:14	f 1:14	f 3:14	f 5:14	f 8:14	f 11:09
1	Melrose/Cedar Park		f 7:16	f 9:16	f 11:16	f 1:16	f 3:16	f 5:16	f 8:16	f 11:11
1	Melrose Highlands		7:19	9:19	11:19	1:19	3:19	5:19	8:19	11:14
2	Greenwood		f 7:22	f 9:22	f 11:22	f 1:22	f 3:22	f 5:22	f 8:22	f 11:17
2	Wakefield		7:26	9:26	11:26	1:26	3:26	5:26	8:26	11:21
2	Reading		7:32	9:32	11:32	1:32	3:32	5:32	8:32	11:27
3	North Wilmington		f 7:38	f 9:38	f 11:38	f 1:38	f 3:38	f 5:38	f 8:38	f 11:33
4	Ballardvale		f 7:45	f 9:45	f 11:45	f 1:45	f 3:45	f 5:45	f 8:45	f 11:40
5	Andover		f 7:50	f 9:50	f 11:50	f 1:50	f 3:50	f 5:50	f 8:50	f 11:45
6	Lawrence		7:57	9:57	11:57	1:57	3:57	5:57	8:57	11:52
7	Bradford		f 8:05	f 10:05	f 12:05	f 2:05	f 4:05	f 6:05	f 9:05	f 12:00
7	Haverhill		8:09	10:09	12:09	2:09	4:09	6:09	9:09	12:00

MOTOR VEHICLE CRASH DATA



MassDOT Crash Report for North Avenue at Wolcott Street/Linda Road in Wakefield MA 2014-2018

Crash Date	Crash Severity	Crash Time	Number of Vehicles	Driver Contributing Circumstances (All Drivers)	Light Conditions	Manner of Collision	Road Surface Condition	Vehicle Actions Prior to Crash (All Vehicles)	Vehicle Travel Directions (All Vehicles)	Weather Conditions	Vehicle Sequence of Events (All Vehicles)	Street Number	Roadway
01/07/2015	Property damage only (none injured)	7:07 AM	2	D1: (Failed to yield right of way) / D2: (Other improper action)	Dawn	Angle	Dry	V1: Turning left / V2: Travelling straight ahead	V1: W / V2: N	Clear	V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)		NORTH AVE / LINDA RD
06/20/2015	Property damage only (none injured)	1:37 PM	2	D1: (Failed to yield right of way) / D2: (No improper driving),(No improper driving)	Daylight	Angle	Dry	V1: Entering traffic lane / V2: Travelling straight ahead	V1: W / V2: N	Clear	V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)		NORTH AVE / LINDA RD
08/30/2015	Non-fatal injury	12:39 PM	2	D1: (Disregarded traffic signs, signals, road markings) / D2: (No improper driving)	Daylight	Angle	Dry	V1: Entering traffic lane / V2: Travelling straight ahead	V1: E / V2: S	Clear	V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)		NORTH AVE / WOLCOTT ST
04/09/2018	Non-fatal injury	3:19 PM	2	D1: (No improper driving) / D2: (No improper driving)	Daylight	Rear-end	Dry	V1: Slowing or stopped in traffic / V2: Travelling straight ahead	V1: W / V2: W	Clear	V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)		NORTH AVE / LINDA RD
12/12/2018	Property damage only (none injured)	7:53 AM	2	D1: (No improper driving) / D2: (No improper driving)	Daylight	Angle	Dry	V1: Turning left / V2: Travelling straight ahead	V1: E / V2: S	Clear	V1:(Collision with motor vehicle in traffic) V2:(Collision with motor vehicle in traffic)		NORTH AVE / WOLCOTT ST

Masshighway

C+A2:L45RASH RATE WORKSHEET

CITY/TOWN : Wakefield COUNT DATE : 2021

DISTRICT : 4 UNSIGNALIZED : ☒ SIGNALIZED : ☐

MHD USE ONLY

Source #

~ INTERSECTION DATA ~

MAJOR STREET : North Avenue

ST #

MINOR STREET(S) : Wolcott Street

ST #

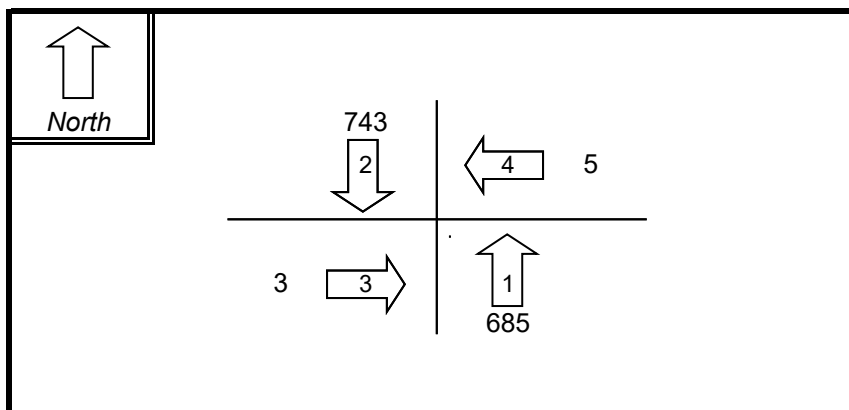
Linda Road

ST #

ST #

ST #

**INTERSECTION
DIAGRAM**
(Label Approaches)



INTERSECTION
REF #

Peak Hour Volumes

APPROACH :	1	2	3	4	5	Total Entering Vehicles
DIRECTION :	NB	SB	EB	WB		
VOLUMES (PM) :	685	743	3	5		1,436

" K " FACTOR : APPROACH ADT : ADT = TOTAL VOL/"K" FACT.

TOTAL # OF ACCIDENTS : # OF YEARS : AVERAGE # OF ACCIDENTS (A) :

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

Comments : Accident Rate for District 4 signalized intersections = 0.73
Accident Rate for District 4 unsignalized intersections = 0.57

VEHICLE SPEED DATA



87150001

10/21/2021	0 - 15	> 15 -	> 20 -	> 25 -	> 30 -	> 35 -	> 40 -	> 45 -	> 50 -	> 55 -	> 60 -	> 65 -	> 70	
Time	MPH	20 MPH	25 MPH	30 MPH	35 MPH	40 MPH	45 MPH	50 MPH	55 MPH	60 MPH	65 MPH	70 MPH	MPH	Total
12:00 AM	0	2	6	2	6	7	5	2	0	0	0	2	0	32
1:00	0	0	1	1	3	5	1	0	0	0	0	0	0	11
2:00	0	0	0	0	2	2	0	1	0	0	0	0	0	5
3:00	0	1	1	0	4	3	1	0	0	0	0	0	0	10
4:00	0	0	0	5	19	18	2	1	0	0	0	0	0	45
5:00	0	0	1	12	72	61	15	3	0	0	0	0	0	164
6:00	0	0	3	67	167	122	20	2	0	0	0	0	0	381
7:00	3	1	8	97	342	146	13	3	0	0	0	1	0	614
8:00	1	5	14	95	338	135	23	1	0	1	0	0	0	613
9:00	1	5	14	97	274	125	6	0	0	0	2	0	0	524
10:00	0	5	14	139	281	110	20	1	0	0	1	0	0	571
11:00	2	10	21	124	278	112	16	1	0	0	0	0	0	564
12:00 PM	1	7	19	179	315	95	12	0	0	0	0	1	0	629
1:00	2	7	43	133	283	109	10	0	0	0	0	0	0	587
2:00	2	7	45	192	283	90	7	1	0	0	0	0	0	627
3:00	3	4	32	201	340	108	9	1	0	0	0	0	0	698
4:00	1	1	20	137	316	124	6	0	0	0	0	0	0	605
5:00	1	4	38	137	363	76	10	0	1	0	0	0	0	630
6:00	1	5	23	140	252	64	7	0	0	0	1	0	0	493
7:00	0	2	4	47	171	77	13	0	0	0	0	0	0	314
8:00	0	2	1	35	104	84	13	5	0	0	1	0	0	245
9:00	0	0	5	25	67	63	19	4	2	0	0	0	0	185
10:00	0	0	1	7	34	37	16	2	0	0	0	0	0	97
11:00	0	0	0	2	11	19	14	0	1	0	0	0	0	47
Total	18	68	314	1874	4325	1792	258	28	4	1	5	4	0	8691
Grand Total	18	68	314	1874	4325	1792	258	28	4	1	5	4	0	8691
Stats	Percentile		15th	50th	85th	95th								
	Speed		28.5	32.2	35.9	39								
Mean Speed (Average)			32.4											
10 MPH Pace Speed			26-35											
Number in Pace			6184											
Percent in Pace			71.2%											
Number > 30 MPH			6417											
Percent > 30 MPH			73.8%											

GROWTH RATE DATA

Massachusetts Highway Department

4125: Annual Growth Rate 2011-2017

Location ID:	4125	Seasonal Factor Group:	U3
County:	Middlesex	Daily Factor Group:	
Functional Class	3 - Other Principal Arterial	Axle Factor Group:	U3
Location:	Main Street at Melrose City Line	Growth Factor Group:	U3

Year	AADT
2017	13207
2011	12841

A = 2017/2011	1.0285
B = A ^(1/6)	1.0047

**Average Annual
Growth Rate**

0.47

Massachusetts Highway Department

4122: Annual Growth Rate 2011-2016

Location ID:	4122	Seasonal Factor Group:	U3
County:	Middlesex	Daily Factor Group:	
Functional Class	3 - Other Principal Arterial	Axle Factor Group:	U3
Location:	Lynn Fells Parkway at Saugus Town Line	Growth Factor Group:	U3

Year	AADT
2016	12976
2011	11992

A = 2016/2011	1.0821
B = A ^(1/5)	1.0159

Average Annual Growth Rate	1.59
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Massachusetts Highway Department

4848: Annual Growth Rate 2012-2018

Location ID:	4848	Seasonal Factor Group:	U3
County:	Middlesex	Daily Factor Group:	
Functional Class	3 - Other Principal Arterial	Axle Factor Group:	U3
Location:	Main Street north of Minot Street	Growth Factor Group:	U3

Year	AADT
2018	15214
2012	14788

A = 2018/2012	1.0288
B = A ^(1/6)	1.0047

Average Annual Growth Rate	0.47
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Station	Percent Change
4125	0.47
4122	1.59
4848	0.47
Average	0.84

TRIP GENERATION CALCULATIONS



Institute of Transportation Engineers (ITE)
Trip Generation, 11th Edition
Land Use Code (LUC) 221 - Multifamily Housing (Mid-Rise) Not Close

Average Vehicle Trips Ends vs: Dwelling Units
Independent Variable (X): 38

AVERAGE WEEKDAY DAILY

$T = 4.54 * (X)$
 $T = 4.54 * 38$
 $T = 172.52$
 $T = 172.00$
 $T = 172$ vehicle trips
with 50% (86 vpd) entering and 50% (86 vpd) exiting.

WEEKDAY MORNING PEAK HOUR OF ADJACENT STREET TRAFFIC

$T = 0.37 * (X)$
 $T = 0.37 * 38$
 $T = 14.06$
 $T = 14$ vehicle trips
with 23% (3 vph) entering and 77% (11 vph) exiting.

WEEKDAY EVENING PEAK HOUR OF ADJACENT STREET TRAFFIC

$T = 0.39 * (X)$
 $T = 0.39 * 38$
 $T = 14.82$
 $T = 15.00$
 $T = 15$ vehicle trips
with 61% (9 vph) entering and 39% (6 vph) exiting.

JOURNEY TO WORK DATA



Journey to Work: Exiting Traffic			
Town/City/County	Percent	North Avenue North	North Avenue South
Andover town	1.55	1.55	
Beverly city	1.79	1.79	
Danvers town	1.76	1.76	
Lynnfield town	1.09	1.09	
Peabody city	1.54	1.54	
Salem city	1.25	1.25	
Saugus town	1.61		1.61
Bedford town	1.19	1.19	
Burlington town	3.27	3.27	
Cambridge city	4.88	4.88	
Everett city	1.22		1.22
Lexington town	1.19	1.19	
Malden city	1.41		1.41
Medford city	1.71		1.71
Melrose city	2.55		2.55
Newton city	1.36	1.36	
Reading town	4.46	4.46	
Somerville city	1.44	1.44	
Stoneham town	1.47		1.47
Wakefield town	17.45	1.75	15.71
Waltham city	2.59	2.59	
Wilmington town	1.74	1.74	
Winchester town	1.18		1.18
Woburn city	5.83		5.83
Boston city	19.69	19.69	
Chelsea city	1.14		1.14
Barnstable County	0.16	0.16	
Bristol County	0.11	0.11	
Essex County	3.28	3.28	
Middlesex County	7.65	7.65	
Norfolk County	1.55	1.55	
Plymouth County	0.13	0.13	
Suffolk County	0.69	0.69	
Worcester County	0.04	0.04	
TOTAL	100.00	66.16	33.84
USE	100	65	35

Journey to Work: Entering Traffic			
Town/City/County	Percent	North Avenue North	North Avenue South
Andover town	1.55	1.55	
Beverly city	1.79	1.79	
Danvers town	1.76	1.76	
Lynnfield town	1.09	1.09	
Peabody city	1.54	1.54	
Salem city	1.25	1.25	
Saugus town	1.61		1.61
Bedford town	1.19	1.19	
Burlington town	3.27	3.27	
Cambridge city	4.88	4.88	
Everett city	1.22		1.22
Lexington town	1.19	1.19	
Malden city	1.41		1.41
Medford city	1.71		1.71
Melrose city	2.55		2.55
Newton city	1.36	1.36	
Reading town	4.46	4.46	
Somerville city	1.44	1.44	
Stoneham town	1.47		1.47
Wakefield town	17.45	1.75	15.71
Waltham city	2.59	2.59	
Wilmington town	1.74	1.74	
Winchester town	1.18		1.18
Woburn city	5.83		5.83
Boston city	19.69	19.69	
Chelsea city	1.14		1.14
Barnstable County	0.16	0.16	
Bristol County	0.11	0.11	
Essex County	3.28	3.28	
Middlesex County	7.65	7.65	
Norfolk County	1.55	1.55	
Plymouth County	0.13	0.13	
Suffolk County	0.69	0.69	
Worcester County	0.04	0.04	
TOTAL	100.00	66.16	33.84
USE	100	65	35

CAPACITY ANALYSIS

2021 Baseline Weekday Morning Peak Hour
2021 Baseline Weekday Evening Peak Hour
2028 No-Build Weekday Morning Peak Hour
2028 No-Build Weekday Evening Peak Hour
2028 Build Weekday Morning Peak Hour
2028 Build Weekday Evening Peak Hour



2021 Baseline Weekday Morning Peak Hour



Intersection												
Int Delay, s/veh	0.7											
Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	0	641	3	1	717	3	4	0	0	3	0	3
Future Vol, veh/h	0	641	3	1	717	3	4	0	0	3	0	3
Conflicting Peds, #/hr	74	0	0	2	0	76	0	0	2	76	0	74
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	81	81	81	84	84	84	50	50	50	50	50	50
Heavy Vehicles, %	0	3	0	0	1	0	0	0	0	0	0	0
Mvmt Flow	0	791	4	1	854	4	8	0	0	6	0	6

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	934	0	0	797	0	0	1730	1731	871	1803	1731	1006
Stage 1	-	-	-	-	-	-	795	795	-	934	934	-
Stage 2	-	-	-	-	-	-	935	936	-	869	797	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	741	-	-	834	-	-	70	89	353	62	89	295
Stage 1	-	-	-	-	-	-	384	402	-	322	347	-
Stage 2	-	-	-	-	-	-	321	346	-	349	401	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	692	-	-	833	-	-	62	83	325	53	83	251
Mov Cap-2 Maneuver	-	-	-	-	-	-	62	83	-	53	83	-
Stage 1	-	-	-	-	-	-	383	401	-	301	323	-
Stage 2	-	-	-	-	-	-	285	322	-	322	400	-

Approach	SE	NW	NE	SW
HCM Control Delay, s	0	0	71.5	52.3
HCM LOS			F	F

Minor Lane/Major Mvmt	NELn1	NWL	NWT	NWR	SEL	SET	SERSWLn1
Capacity (veh/h)	62	833	-	-	692	-	88
HCM Lane V/C Ratio	0.129	0.001	-	-	-	-	0.136
HCM Control Delay (s)	71.5	9.3	0	-	0	-	52.3
HCM Lane LOS	F	A	A	-	A	-	F
HCM 95th %tile Q(veh)	0.4	0	-	-	0	-	0.5

2021 Baseline Weekday Evening Peak Hour



Intersection												
Int Delay, s/veh	0.4											
Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	4	734	5	0	682	3	2	0	1	1	0	4
Future Vol, veh/h	4	734	5	0	682	3	2	0	1	1	0	4
Conflicting Peds, #/hr	137	0	0	1	0	138	0	0	1	138	0	137
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	93	93	93	75	75	75	63	63	63
Heavy Vehicles, %	0	1	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	4	773	5	0	733	3	3	0	1	2	0	6

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	874	0	0	779	0	0	1660	1659	915	1795	1660	1010
Stage 1	-	-	-	-	-	-	785	785	-	873	873	-
Stage 2	-	-	-	-	-	-	875	874	-	922	787	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	781	-	-	847	-	-	78	99	333	63	98	294
Stage 1	-	-	-	-	-	-	389	407	-	348	370	-
Stage 2	-	-	-	-	-	-	347	370	-	327	406	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	687	-	-	846	-	-	63	86	285	47	85	216
Mov Cap-2 Maneuver	-	-	-	-	-	-	63	86	-	47	85	-
Stage 1	-	-	-	-	-	-	385	403	-	303	326	-
Stage 2	-	-	-	-	-	-	282	326	-	276	402	-

Approach	SE	NW	NE	SW
HCM Control Delay, s	0.1	0	49.4	35.5
HCM LOS			E	E

Minor Lane/Major Mvmt	NELn1	NWL	NWT	NWR	SEL	SET	SERSWLn1
Capacity (veh/h)	85	846	-	-	687	-	126
HCM Lane V/C Ratio	0.047	-	-	-	0.006	-	0.063
HCM Control Delay (s)	49.4	0	-	-	10.3	0	35.5
HCM Lane LOS	E	A	-	-	B	A	E
HCM 95th %tile Q(veh)	0.1	0	-	-	0	-	0.2

2028 No-Build Weekday Morning Peak Hour



Intersection												
Int Delay, s/veh	0.9											
Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	0	716	3	1	791	3	4	0	0	3	0	3
Future Vol, veh/h	0	716	3	1	791	3	4	0	0	3	0	3
Conflicting Peds, #/hr	74	0	0	2	0	76	0	0	2	76	0	74
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	81	81	81	84	84	84	50	50	50	50	50	50
Heavy Vehicles, %	0	3	0	0	1	0	0	0	0	0	0	0
Mvmt Flow	0	884	4	1	942	4	8	0	0	6	0	6

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1022	0	0	890	0	0	1911	1912	964	1984	1912	1094
Stage 1	-	-	-	-	-	-	888	888	-	1022	1022	-
Stage 2	-	-	-	-	-	-	1023	1024	-	962	890	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	687	-	-	770	-	-	52	69	312	46	69	263
Stage 1	-	-	-	-	-	-	341	365	-	287	316	-
Stage 2	-	-	-	-	-	-	287	315	-	310	364	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	641	-	-	769	-	-	46	64	287	39	64	224
Mov Cap-2 Maneuver	-	-	-	-	-	-	46	64	-	39	64	-
Stage 1	-	-	-	-	-	-	340	364	-	268	294	-
Stage 2	-	-	-	-	-	-	254	293	-	286	363	-

Approach	SE	NW	NE	SW
HCM Control Delay, s	0	0	99.1	71.3
HCM LOS			F	F

Minor Lane/Major Mvmt	NELn1	NWL	NWT	NWR	SEL	SET	SERSWLn1
Capacity (veh/h)	46	769	-	-	641	-	66
HCM Lane V/C Ratio	0.174	0.002	-	-	-	-	0.182
HCM Control Delay (s)	99.1	9.7	0	-	0	-	71.3
HCM Lane LOS	F	A	A	-	A	-	F
HCM 95th %tile Q(veh)	0.6	0	-	-	0	-	0.6

2028 No-Build Weekday Evening Peak Hour



Intersection												
Int Delay, s/veh	0.4											
Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	4	815	5	0	782	3	2	0	1	1	0	4
Future Vol, veh/h	4	815	5	0	782	3	2	0	1	1	0	4
Conflicting Peds, #/hr	137	0	0	1	0	138	0	0	1	138	0	137
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	93	93	93	75	75	75	63	63	63
Heavy Vehicles, %	0	1	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	4	858	5	0	841	3	3	0	1	2	0	6

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	982	0	0	864	0	0	1853	1852	1000	1988	1853	1118
Stage 1	-	-	-	-	-	-	870	870	-	981	981	-
Stage 2	-	-	-	-	-	-	983	982	-	1007	872	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	711	-	-	787	-	-	57	75	298	46	75	254
Stage 1	-	-	-	-	-	-	349	372	-	303	330	-
Stage 2	-	-	-	-	-	-	302	330	-	293	371	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	625	-	-	786	-	-	46	65	255	34	65	187
Mov Cap-2 Maneuver	-	-	-	-	-	-	46	65	-	34	65	-
Stage 1	-	-	-	-	-	-	344	367	-	263	290	-
Stage 2	-	-	-	-	-	-	244	290	-	247	366	-

Approach	SE	NW	NE	SW
HCM Control Delay, s	0.1	0	66	44.9
HCM LOS			F	E

Minor Lane/Major Mvmt	NELn1	NWL	NWT	NWR	SEL	SET	SERSWLn1
Capacity (veh/h)	63	786	-	-	625	-	98
HCM Lane V/C Ratio	0.063	-	-	-	0.007	-	0.081
HCM Control Delay (s)	66	0	-	-	10.8	0	44.9
HCM Lane LOS	F	A	-	-	B	A	E
HCM 95th %tile Q(veh)	0.2	0	-	-	0	-	0.3

2028 Build Weekday Morning Peak Hour






Intersection												
Int Delay, s/veh	0.9											
Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	0	720	3	1	792	3	4	0	0	3	0	3
Future Vol, veh/h	0	720	3	1	792	3	4	0	0	3	0	3
Conflicting Peds, #/hr	74	0	0	2	0	76	0	0	2	76	0	74
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	81	81	81	84	84	84	50	50	50	50	50	50
Heavy Vehicles, %	0	3	0	0	1	0	0	0	0	0	0	0
Mvmt Flow	0	889	4	1	943	4	8	0	0	6	0	6

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1023	0	0	895	0	0	1917	1918	969	1990	1918	1095
Stage 1	-	-	-	-	-	-	893	893	-	1023	1023	-
Stage 2	-	-	-	-	-	-	1024	1025	-	967	895	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	686	-	-	767	-	-	52	68	310	46	68	262
Stage 1	-	-	-	-	-	-	339	363	-	287	316	-
Stage 2	-	-	-	-	-	-	286	315	-	308	362	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	640	-	-	766	-	-	46	63	285	39	63	223
Mov Cap-2 Maneuver	-	-	-	-	-	-	46	63	-	39	63	-
Stage 1	-	-	-	-	-	-	338	362	-	268	294	-
Stage 2	-	-	-	-	-	-	253	293	-	284	361	-

Approach	SE	NW	NE	SW
HCM Control Delay, s	0	0	99.1	71.3
HCM LOS			F	F

Minor Lane/Major Mvmt	NELn1	NWL	NWT	NWR	SEL	SET	SERSWLn1
Capacity (veh/h)	46	766	-	-	640	-	66
HCM Lane V/C Ratio	0.174	0.002	-	-	-	-	0.182
HCM Control Delay (s)	99.1	9.7	0	-	0	-	71.3
HCM Lane LOS	F	A	A	-	A	-	F
HCM 95th %tile Q(veh)	0.6	0	-	-	0	-	0.6

Intersection						
Int Delay, s/veh	0.3					
Movement	SET	SER	NWL	NWT	NEL	NER
Lane Configurations						
Traffic Vol, veh/h	719	2	1	798	7	4
Future Vol, veh/h	719	2	1	798	7	4
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	81	81	84	84	92	92
Heavy Vehicles, %	3	0	0	1	0	0
Mvmt Flow	888	2	1	950	8	4

Major/Minor	Major1	Major2	Minor1		
Conflicting Flow All	0	0	890	0	1841
Stage 1	-	-	-	-	889
Stage 2	-	-	-	-	952
Critical Hdwy	-	-	4.1	-	6.4
Critical Hdwy Stg 1	-	-	-	-	5.4
Critical Hdwy Stg 2	-	-	-	-	5.4
Follow-up Hdwy	-	-	2.2	-	3.5
Pot Cap-1 Maneuver	-	-	770	-	84
Stage 1	-	-	-	-	405
Stage 2	-	-	-	-	378
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	770	-	84
Mov Cap-2 Maneuver	-	-	-	-	84
Stage 1	-	-	-	-	405
Stage 2	-	-	-	-	377

Approach	SE	NW	NE
HCM Control Delay, s	0	0	39.6
HCM LOS			E

Minor Lane/Major Mvmt	NELn1	NWL	NWT	SET	SER
Capacity (veh/h)	116	770	-	-	-
HCM Lane V/C Ratio	0.103	0.002	-	-	-
HCM Control Delay (s)	39.6	9.7	0	-	-
HCM Lane LOS	E	A	A	-	-
HCM 95th %tile Q(veh)	0.3	0	-	-	-

2028 Build Weekday Evening Peak Hour






Intersection												
Int Delay, s/veh	0.4											
Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	4	817	5	0	785	3	2	0	1	1	0	4
Future Vol, veh/h	4	817	5	0	785	3	2	0	1	1	0	4
Conflicting Peds, #/hr	137	0	0	1	0	138	0	0	1	138	0	137
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	93	93	93	75	75	75	63	63	63
Heavy Vehicles, %	0	1	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	4	860	5	0	844	3	3	0	1	2	0	6

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	985	0	0	866	0	0	1858	1857	1002	1993	1858	1121
Stage 1	-	-	-	-	-	-	872	872	-	984	984	-
Stage 2	-	-	-	-	-	-	986	985	-	1009	874	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	709	-	-	786	-	-	57	74	297	46	74	253
Stage 1	-	-	-	-	-	-	348	371	-	302	329	-
Stage 2	-	-	-	-	-	-	301	329	-	292	370	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	624	-	-	785	-	-	46	64	254	34	64	186
Mov Cap-2 Maneuver	-	-	-	-	-	-	46	64	-	34	64	-
Stage 1	-	-	-	-	-	-	343	366	-	262	290	-
Stage 2	-	-	-	-	-	-	243	290	-	246	365	-

Approach	SE	NW	NE	SW
HCM Control Delay, s	0.1	0	66	44.9
HCM LOS			F	E

Minor Lane/Major Mvmt	NELn1	NWL	NWT	NWR	SEL	SET	SERSWLn1
Capacity (veh/h)	63	785	-	-	624	-	98
HCM Lane V/C Ratio	0.063	-	-	-	0.007	-	0.081
HCM Control Delay (s)	66	0	-	-	10.8	0	44.9
HCM Lane LOS	F	A	-	-	B	A	E
HCM 95th %tile Q(veh)	0.2	0	-	-	0	-	0.3

Intersection						
Int Delay, s/veh	0.1					
Movement	SET	SER	NWL	NWT	NEL	NER
Lane Configurations						
Traffic Vol, veh/h	824	6	3	788	4	2
Future Vol, veh/h	824	6	3	788	4	2
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	93	93	92	92
Heavy Vehicles, %	1	0	0	0	0	0
Mvmt Flow	867	6	3	847	4	2
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	873	0	1723	870
Stage 1	-	-	-	-	870	-
Stage 2	-	-	-	-	853	-
Critical Hdwy	-	-	4.1	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	781	-	99	354
Stage 1	-	-	-	-	413	-
Stage 2	-	-	-	-	421	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	781	-	98	354
Mov Cap-2 Maneuver	-	-	-	-	98	-
Stage 1	-	-	-	-	413	-
Stage 2	-	-	-	-	418	-
Approach	SE		NW		NE	
HCM Control Delay, s	0		0		34.4	
HCM LOS	D					
Minor Lane/Major Mvmt	NELn1	NWL	NWT	SET	SER	
Capacity (veh/h)	129	781	-	-	-	
HCM Lane V/C Ratio	0.051	0.004	-	-	-	
HCM Control Delay (s)	34.4	9.6	0	-	-	
HCM Lane LOS	D	A	A	-	-	
HCM 95th %tile Q(veh)	0.2	0	-	-	-	