

## ATTACHMENT I

### TRAFFIC MONITORING AND MITIGATION AGREEMENT

This Traffic Monitoring and Mitigation Agreement ("Agreement") is entered into as of November 22, 1999 by and between the Town of Belmont, acting by and through its Board of Selectmen ("Belmont"), and The McLean Hospital Corporation ("McLean"). This Agreement establishes the maximum level of permitted traffic to be generated by uses within the Research & Development, Senior Living and McLean Institutional zoning subdistricts and to set forth the recourse actions to be taken by Belmont in the event that the actual traffic levels exceed such permitted levels. This Agreement also details the traffic mitigation measures for which McLean agrees to provide the funding.

Belmont acknowledges that McLean intends that one or more unrelated parties will actually develop the proposed uses within the Research & Development and Senior Living Subdistricts and that McLean will likely sell the land within such subdistricts to such parties in connection with the development. Performance of the obligations set forth in Section I with respect to any subdistrict shall be the responsibility of (and at the expense of) the owner of the land within such subdistrict (the joint and several liability of the owners of the land, if more than one party owns the land within a given subdistrict). Performance of the obligations set forth in Section II shall be the responsibility (and at the expense of) McLean, except that no building within any subdistrict shall be occupied if McLean has failed to perform any obligation under Section II which was required by the provisions of Section II to have been performed by such time.

#### I. MONITORING PROGRAM

A traffic monitoring program is to be conducted following completion and substantial occupancy of any building within any of the Research & Development; Senior Living; and McLean Institutional Subdistricts. The traffic monitoring program and recourse actions described herein will ensure that these components of the project generate:

1. peak hour traffic flows at a rate that is less than or equal to a rate of 692 peak hour trips during morning peak hours (206 for the Research & Development Subdistrict ; 36 for the Senior Living Subdistrict and 450 for the McLean Institutional Subdistrict) and a rate of 742 peak hour trips during evening peak hours (180 for the Research & Development Subdistrict; 92 for the Senior Living Subdistrict and 470 for the McLean Institutional Subdistrict); and
2. daily traffic flows at a rate that is less than or equal to a rate of 7,692 daily trips (1,784 for the Research & Development Subdistrict; 1,148 for the Senior Living Subdistrict and 4,760 for the McLean Institutional Subdistrict).

Notwithstanding any provision hereof to the contrary, this Agreement shall not be applicable to the McLean Institutional Subdistrict so long as the buildings and improvements within such subdistrict continue to be used exclusively for psychiatric hospital purposes and uses functionally dependent upon and necessary to psychiatric hospital use, except for either (i) up to 75,000 square feet of gross floor area of other uses permitted by zoning (other than medical offices) or (ii) up to 25,000 square feet of gross floor area of medical offices as permitted by zoning. McLean represents that as of the date hereof the entirety of the McLean Institutional Subdistrict is used for psychiatric hospital purposes and uses functionally dependent upon and necessary to psychiatric hospital use, Belmont acknowledging that such representation includes the Arlington School and the existing day care facility (but no expansion thereof) within such definition. McLean agrees to provide Belmont with an annual certification, on a building-by-building basis, of the number of square feet used for other purposes. McLean shall notify Belmont promptly upon any change in use causing the foregoing thresholds to be exceeded. Belmont shall have the right to obtain such further reasonable evidence from McLean as it shall require to confirm the accuracy of such certifications.

#### A. STUDY DATA

Data collected for the traffic monitoring program will include traffic volumes entering and exiting the Research & Development Subdistrict; Senior Living Subdistrict and McLean Institutional Subdistrict. Monitoring will involve continuous Automatic Traffic Recorder (ATR) counts on a daily basis. (Data will be collected in 15 minute increments.) Data collected shall be retained for at least one year from the date of collection.

A "weekly sampling report" shall mean a data collection report providing monitoring results over five consecutive, non-holiday weekdays, summarized by one hour intervals and by daily totals. The morning and evening peak hour volumes for each weekday will be determined and average morning and evening peak hour volumes will be determined for the week. In addition, the daily trip totals for each weekday will be determined and average daily trip totals will be determined for the week.

#### B. PROGRAM

1. Within six months after the issuance of a building permit for a structure within a subdistrict governed hereby, the owner of the land within the subdistrict (the "owner") shall file with the Town Engineer a detailed Traffic Demand Management (TDM) plan, describing the measures to be taken by the owner to avoid traffic generation in excess of the levels permitted hereby and describing the further measures to be taken by the owner in the event traffic generation exceeds permitted levels. The owner shall consult with the Town Engineer prior to filing the TDM plan and shall take into account any comments of the Town Engineer with respect thereto. The owner shall file an updated TDM plan annually thereafter.

2. Within thirty days of such structure reaching a 90% occupancy level, or one year after a certificate of occupancy has been issued, whichever is earlier, the owner shall notify the Town Engineer. The Town Engineer shall thereafter have the right (in the McLean Institutional Subdistrict, whenever this Agreement becomes applicable thereto) to require submission of a weekly sampling report for such subdistrict for any week designated by the Town Engineer. A weekly sampling report shall thereupon be submitted to the Town Engineer within seven days of such request (or seven days after the end of the week to be reported upon, if later). Notwithstanding the foregoing, Belmont agrees to observe the guideline that weekly sampling reports should generally not be required more than bi-monthly during development of a subdistrict and more than annually after one year following substantial completion of the build-out and occupancy within the subdistrict, reserving Belmont's right to require more frequent weekly sampling reports upon changes in use, changes in ownership, the occurrence of violations or other reasonable basis for more frequent reporting.

#### C. RECOURSE ACTIONS

1. There shall be deemed to be a violation of this Agreement whenever a weekly sampling report reveals that:

- (a) either the morning or evening average peak hour trip generation rate exceeds the permitted rate; or
- (b) the average daily trip total exceeds the permitted rate.

2. If a weekly sampling report contains a violation, then the owner shall: (a) prepare and submit to the Town Engineer an updated TDM plan (if one has not been filed within the previous three months); (b) use diligent efforts to implement such plan as soon as possible and (c) provide follow-up weekly sampling reports to the Town Engineer until no further violations exist. If a weekly sampling report (including a follow-up report) contains a violation, then the owner shall pay the Town of Belmont a traffic mitigation payment of \$10,000 (\$2,500 for a follow-up report) for each such weekly sampling report, which shall be applied by the Town against its costs in monitoring and enforcing this Agreement and/or in taking further action to mitigate the effect of traffic generated by the Property upon Town streets.

3. If follow-up weekly sampling reports continue to show violations for two weeks, then Belmont may restrict the number of parking spaces which can be used during the morning and evening peak hours to the extent that the Town Engineer determines is needed to correct the violations. If follow-up weekly sampling reports still continue to show violations thereafter, the Town Engineer may further increase such parking restrictions.

4. If for two consecutive months, follow-up weekly sampling reports evidence that average trip generation is below the permitted rates, the Town will return full control of parking to the owner. The owner shall continue to be obligated to file follow-up weekly sampling reports for one month after full control of parking has been returned.

## II. MITIGATION PROGRAM

McLean agrees to provide the funding for the mitigation measures listed below. The measures proposed will mitigate project related traffic impacts at intersections where:

1. the project may have a material impact on traffic operations.
2. state funding is not readily available to fund the improvements, or where pursuing or securing state funding will jeopardize, or compete with, the prospects of other eligible projects where funding is being sought. (State funding has been approved for the reconstruction of Pleasant Street, consequently, it is assumed suggested improvements for Pleasant Street can be incorporated into the ongoing Pleasant Street project. McLean shall fund increased design and construction costs associated with changes to the Pleasant Street design, if they are not able to be incorporated in the normal design process).
3. there is sufficient public support to ensure timely implementation of proposed improvements.

Based on these criteria, McLean agrees to fund the design and construction of improvements at two intersections in the project vicinity at an estimated cost of \$690,000. McLean agrees it will collaborate with Belmont in developing the actual mitigation to be implemented. In addition, McLean will provide an additional \$310,000 to Belmont to be spent at Belmont's discretion for the design and construction of improvements at other intersections in the site vicinity not listed below.

Location	Proposed Action	Schedule	Estimated Construction Cost
A. Pleasant Street At McLean Driveway	Construct Drive Add Left Turn Lane Signalize	Prior to Occupancy of R&D Building or Senior Housing	\$375,000
B. Pleasant Street at Trapelo Road	Extend Right Turn Lane Extend R.O.W. Install Signal Interconnect Signal	Prior to Occupancy of R&D Building	\$315,000
C. At discretion of Town	Design and/or construct offsite intersection improvements		\$310,000
		TOTAL	\$1,000,000

The above-identified funding will be provided based on the following conditions:

A. Upon certification by Belmont that Belmont has need for funding with respect to an improvement (identifying the dollar amount required therefor), McLean shall place such funds in escrow.

B. Belmont and McLean shall maintain such funds in an interest bearing account with the full amount of interest earned payable to McLean.

C. Belmont shall cooperate with McLean in seeking PWED and/or CDAG grants available by application filed prior to June 30, 2000 in order to fund any or all of the above improvements at locations A and B.

D. If such grants are obtained to fund such improvements McLean's obligation to fund such improvements shall be reduced by the amount of such state grants and, upon actual receipt by Belmont of such state grants, McLean shall be entitled to withdraw such amount from the escrowed funds; provided, however, that if such grants exceed \$500,000 in the aggregate, then McLean's commitment to fund other improvements shall increase dollar-for-dollar up to a limit of \$190,000 (raising McLean's total commitment to other improvements to \$500,000).

E. Belmont shall be authorized to draw funds from the escrow account in order to pay for the above-identified mitigation projects. Projects under Heading C must pertain to one or more of the following intersections: Mill Street at McLean Driveway; Mill Street at Trapelo Road; Trapelo Road at Waverley Oaks Road; Trapelo Road at Star Market Driveway; Concord Avenue at Winter Street; Concord Avenue at Mill Street; Pleasant Street at Clifton/Leonard Streets; Pleasant Street at Brighton Street; Concord Avenue at Blanchard Road; Concord Avenue at Pleasant Street; Concord Avenue at Common Street; Concord Avenue at Channing/Leonard Streets. Such projects can include transit, shuttle, pedestrian and/or bicycle enhancements associated with such intersections. Draws under Headings A and B shall not exceed \$690,000 (less any grant funds as described above) and McLean shall be responsible for any additional sums needed to complete such projects.

F. Two years from the date of the certificate of occupancy representing 85% or more completion (on a square footage basis) of the permitted development within the Research & Development and Senior Living subdistricts, McLean shall be entitled to withdraw any remaining funds from the escrow account unless and for so long as Belmont is actively pursuing any of the above-identified mitigation projects and such remaining funds are necessary to pay for such project.

### III. LEGAL EFFECT

The foregoing obligations shall run with the land now owned by McLean Hospital Corporation in Belmont, Massachusetts. McLean shall require any successor owner of land governed hereby to acknowledge in writing its obligations hereunder and to provide the same to Belmont prior to or upon transfer. A notice hereof shall, at the request of Belmont, be executed by McLean and recorded with the Registry of Deeds. This Agreement shall not take effect until ratified by a majority vote of Town Meeting of the Town of Belmont. Upon such ratifying vote, this Agreement shall not be amended in any material respect except by a further majority vote of Town Meeting.

Town of Belmont

By: Allen P. Koucha  
Selectman

By: [Signature]  
Selectman

By: [Signature]  
Selectman

The McLean Hospital Corporation

By: [Signature]

Its Duly Authorized President

# **Transportation Impact Assessment**

McLean Zone 3 Residential Development  
Belmont, Massachusetts

*Prepared for:*

Northland Residential Corporation  
Concord, Massachusetts

April 2021

*Prepared by:*

 **Vanasse &  
Associates inc**  
Transportation Engineers & Planners

35 New England Business Center Drive  
Suite 140  
Andover, MA 01810

# TRANSPORTATION IMPACT ASSESSMENT

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## MCLEAN HOSPITAL ZONE 3 RESIDENTIAL DEVELOPMENT BELMONT, MASSACHUSETTS

*Prepared for:*

Northland Residential Corporation  
Concord, Massachusetts

April 16, 2021

*Prepared by:*

VANASSE & ASSOCIATES, INC.  
35 New England Business Center Drive  
Suite 140  
Andover, MA 01810

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## **EXECUTIVE SUMMARY**

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Vanasse & Associates, Inc. (VAI) has prepared this Transportation Impact Assessment (TIA) to assess the potential traffic impacts associated with the proposed residential development located off Olmsted Drive in Belmont, Massachusetts (the “Project”). This study evaluates the following specific areas as they relate to the Project:

- Access requirements;
- Potential off-site improvements;
- Safety considerations;
- Identifies and analyzes existing and future traffic conditions, both with and without the Project;
- Traffic Signal Warrant Analysis (TSWA) for the intersection of Pleasant Street at Olmsted Drive; and,
- Monitoring and Compliance.

## **PROJECT DESCRIPTION**

The project is located within Zone 3 of the McLean District and is projected to consist of a total of 150 residential units. The proposal entails construction of 40 for sale, age-restricted townhouse condominiums and 110 multi-family rental units comprised of 53 age-restricted units and 57 non-age restricted units. On-site parking will be provided for approximately 257 vehicles (165 parking spaces for the apartment buildings (1.5 spaces per unit), 80 spaces for the townhouse residents (2.0 spaces per unit), and 12 visitor spaces (0.3 spaces per unit). The proposed parking spaces comply with the *McLean Zone 3 Zoning Bylaw - Section 6B.3.1g and 6B.3.2.g* for allowed parking spaces per unit per subdistrict, as amended through the September 2020 Special Town Meeting Article. Access to the Project site is provided by Olmsted Drive. Olmsted Drive is an existing private, dead-end roadway which extends from an unsignalized intersection with Pleasant Street and serves Zone 3 and 4 parcels of the Mclean District.

## **EXISTING CONDITIONS**

A comprehensive field inventory of traffic conditions on the study area roadways was conducted in December 2020. The field investigations consisted of an inventory of existing roadway geometrics, traffic volumes, operating characteristics, posted speed limits and land use information within the study area. The study area for the Project was selected to focus on the major roadways providing access to the Project site.

### **Existing Traffic Volumes**

In order to determine existing traffic-volume demands and flow patterns within the study area, manual turning movement counts (TMCs) and automatic traffic recorder counts (ATRs) were conducted on Tuesday, November 10, 2020. The TMC counts at Trapelo Road with Pleasant Street were conducted during the weekday morning (7:00 to 9:00 AM) and weekday evening (4:00 to 6:00 PM) peak periods. The TMC counts at the Olmsted Drive intersection with Pleasant Street were conducted from 7:00 AM to 7:00 PM. The ATR was placed on Pleasant Street, east of Olmsted Drive for a 48-hour count. These time periods were selected for analysis purposes as they are representative of the peak-traffic-volume hours for both the Project and the adjacent roadway network.

In order to account for COVID-19 travel restrictions, historic traffic count data conducted in April 2018<sup>1</sup> and November 2019<sup>2</sup> in the same study area were analyzed. It is important to note that the 2018 data were obtained from the earlier town wide traffic study conducted by the Town of Belmont. Using the historic 2018 and 2019 data of the study periods, the November 2020 weekday morning and evening peak-hour volumes were found to be approximately 40 percent lower. The traffic counts that form the basis of this assessment have been/are adjusted upward by 40 percent in order to provide an appropriate and conservative estimate of roadway operating conditions. It is important to note that in order to establish a 2021 Baseline condition, the November 2020 existing traffic volumes were grown by 1.0 percent per year.

Pleasant Street, east of Olmsted Drive was found to accommodate approximately 12,175 vehicles on an average weekday (24-hour, two-way volume), with approximately 949 vehicles per hour (vph) during the weekday morning peak hour and 1,148 vph during the weekday morning peak hour. The predominant flow on Pleasant Street during the weekday morning and evening peak hours is in the westbound direction.

A review of the peak-period traffic counts indicates that the weekday morning peak hour generally occurs between 7:30 and 8:30 AM with the weekday evening peak hour generally occurring between 4:30 and 5:30 PM.

## **FUTURE CONDITIONS**

Traffic volumes within the study area were projected to 2028, a seven-year planning horizon consistent with State traffic study guidelines, by applying a 1 percent per year compounded annual background traffic growth rate to the 2021 Baseline condition peak-hour traffic volumes (discussion follows). The 2028-year traffic-volume projections incorporated identified specific development by others expected to be complete by 2028, as well as general background traffic

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<sup>1</sup>*Town of Belmont – Town Wide Traffic Study* by BSC group, April 2019.

<sup>2</sup>*Transportation Impact Assessment*, Proposed Marijuana Dispensary, Belmont MA, VAI, February 2020.

growth as a result of development external to the study area and presently unforeseen projects. Anticipated project-generated traffic added to these future conditions reflect 2028 Build conditions with the Project.

### **Site-Generated Traffic Volumes**

The proposal entails construction of 40 for sale, age-restricted townhouse condominiums and 110 multi-family residences comprised of 53 age-restricted units and 57 non-age restricted units. In order to estimate the trip-generation characteristics of the proposed development, the Institute of Transportation Engineers (ITE) *Trip Generation* manual<sup>3</sup> for ITE Land Use Code (LUC) 221, *Multifamily Housing (Mid-Rise)* and LUC 252 *Senior Adult Housing* were used to project traffic volume of the Project. Adjustments were applied to account for transit usage.

The proposed 150 housing units are expected to generate approximately 610 vehicle trips on an average weekday (two-way, 24-hour volume), with 36 vehicle trips (11 vehicles entering and 25 exiting) expected during the weekday morning peak hour and 46 vehicle trips (26 vehicles entering and 20 exiting) expected during the weekday evening peak hour.

### **Trip Distribution and Assignment**

The directional distribution of site-generated trips to and from the proposed development was determined based on a review of existing travel patterns at the study area intersections. In summary, 40 percent will arrive and depart the site to/from Pleasant Street to the east, 15 percent will arrive and depart the site to/from Trapelo Road to the north, and 45 percent will arrive and depart the site to/from Trapelo Road to the south.

## **TRAFFIC OPERATIONS ANALYSIS**

In order to assess the impact of the proposed residential on the Project area roadway network, traffic operations analyses were performed at the study intersections under:

- 2021 Baseline condition Existing,
- 2028 No-Build, and
- 2028 Build conditions.

The addition of site-related traffic will result in a measurable, but not a significant, impact on overall operations at the signalized study intersection.

## **OLMSTED DRIVE/PLEASANT STREET TRAFFIC SIGNAL WARRANT ANALYSIS**

Under all Existing and Future conditions analyzed, the intersection of Pleasant Street at Olmsted Drive does not meet any criteria requiring the installation of a traffic signal at this intersection; therefore, the installation of a traffic signal is not recommended. The Traffic Signal Warrant Analysis section starts on page 29 of this report.

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<sup>3</sup>*Trip Generation*, 10<sup>th</sup> Edition; Institute of Transportation Engineers; Washington, DC; 2017.

## **RECOMMENDATIONS**

A transportation improvement program has been developed that is designed to provide safe and efficient access to the Project and provide measures to reduce the Project vehicle trip generation and in turn congestion in the study area. The following recommendations are noted with regard to Project access and Transportation Demand Management (TDM) measures.

### **Project Access**

Access to the Project site will be provided by way of private access driveways from the development site to Olmsted Drive. The following recommendations are offered with respect to the design and operation of the Development site driveway:

- Improved Olmstead Drive through striping of travel lanes and centerlines, with signage provided where appropriate. Vehicles exiting the Project site onto Olmsted Drive should be placed under STOP-sign control (Manual on Uniform Traffic Devices (MUTCD)<sup>4</sup> R-1), with a painted STOP bar included.
- Any landscaping or building features near the new intersections and driveways should be limited to 24 inches in height or should be located out of the lines of sight for motorists.
- Snow windrows within sight triangle areas will be promptly removed where such accumulations would impede sight lines.

### **Off-Site Improvements**

#### **Olmsted Drive at Pleasant Street (Route 60)**

In order to improve definition for vehicle movements, it is recommended that Olmstead Drive be improved through striping of travel lanes and centerlines. A painted STOP bar is also recommended to accompany the existing STOP-sign currently present at the intersection.

### **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 accomplished by developing a comprehensive TDM strategy. The proponent is supportive of the development of a balanced multimodal transportation plan to serve the residents when demand is warranted, and the provision of such service is economically feasible. The major features of this TDM plan that support this commitment are as follows:

- The property management team will assign a transportation coordinator to focus on coordinating transportation aspects of the Project with the Town and the promotion of alternative modes of transportation to and from the site.

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<sup>4</sup>*Manual on Uniform Traffic Control Devices (MUTCD)*; Federal Highway Administration; Washington, DC; 2009.

- While currently there is no Transportation Management Association (TMA) responsible for the Project area, the Applicant is willing to consider providing funds to initiate a TMA for the area.
- A “welcome packet” will be provided to residents detailing available public transportation services, bicycle and walking alternatives, and commuter options available.
- The Project Management Team is committed to coordinate with area shuttle services to provide site connections to the downtown areas, recreational centers, and public transportation connections.
- In order to encourage the use of public transportation, the property management team will make available public transportation schedules which will be posted in a centralized location for the residents. Transit screens/displays will be provided in the building lobby to display real-time transportation information (similar to <https://transitscreen.com>).
- To encourage car/vanpooling, the property management team will identify car/vanpool resources that may be available to residents of the proposed Project. This information will be posted in a centralized location for the residents, employees and visitors.
- The property management team will provide information on available pedestrian and bicycle facilities in the vicinity of the Project site. This information will be posted in a centralized location.
- Bicycle racks will be provided on-site both inside and outside the buildings.

The Project proponent will investigate the implementation of these traffic reduction strategies and will work with the Town to implement such programs.

### **TMMA - TRAFFIC MONITORING PROGRAM**

To ensure compliance with the Traffic Monitoring and Mitigation Agreement (TMMA), the proposed Zone 3 development in conjunction with the proposed Zone 4 development shall be subject to a post occupancy traffic monitoring reporting to the Town of Belmont, including the following features:

- Data collected for the traffic monitoring program will include traffic volume entering and existing the proposed Research and Development subdistrict and the Senior Living subdistrict developments. The monitoring will involve continuous Automatic Traffic Recorder (ATR) counts on a daily basis (Data will be collected in 15-minute increments). Data shall be retained for at least one year from the data of collection.
- A “Weekly Sampling Report” shall mean a data collection report providing monitoring results over five consecutive, non-holiday weekdays, summarized by on hour intervals and by daily totals. The morning and evening peak hour volumes or each weekday will be determined, and average morning and evening peak hour volumes will be determined for the week. In addition, the daily trip totals for each weekday will be determined and average daily trips totals will be determined for the week.

- Within six months after the issuance of a building permit for a structure for the Proposed Project, a TDM plan shall be submitted to the Town.
- Within thirty days of a project located within the Research and Development subdistrict or the Senior Living subdistrict reaching a 90% occupancy level, or one year after certificate of occupancy has been issued, whichever is earlier, the proponent shall coordinate with the Town Engineer to provide a Weekly Sampling Report. The Town engineer will designate which week the data should be collected. After the determination of the week the sampling report shall be submitted to the town within seven days.

### **TMMA - RECOURSE ACTIONS**

The proponent will take additional actions to manage site traffic conditions should the weekly sampling report indicate that the performance goals are not being met. Triggers requiring further action include:

- Either the morning or evening average peak hour trip generation rate exceeds the permitted rate.
- The average daily trip total exceeds the permitted rate.

Additional actions that may be implemented if the performance criteria are not met may include but are not limited to:

- Prepare and submit to the Town Engineers an updated TDM plan.
- Use diligent efforts to implement such plan as soon as possible.

The proponent will provide follow-up weekly sampling reports to the Town engineer until no further violation exists. If a weekly sampling report contains a violation, then the proponent shall pay the town of Belmont a traffic mitigation payment. If the weekly sampling report continues to show violations for two weeks, then Belmont may restrict the number of parking spaces which can be used during the morning and evening peak hour to the extent that Town Engineer determines is needed to correct the violations. If two consecutive months follow-up weekly sampling reports indicate that average trip generation is below the permitted rate, the Town will return full control of parking to the proponent. The proponent will be obligated to file follow-up weekly sampling reports for one month after full control of parking has been returned.

### **CONCLUSIONS**

Overall, the proposed Project will result in a measurable but not significant impact on overall operations. With the implementation of the above recommendations, safe and efficient access will be provided to the planned development and the development can be constructed with minimal impact to the area.

## **INTRODUCTION**

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Vanasse & Associates, Inc. (VAI) has prepared this Transportation Impact Assessment (TIA) to evaluate potential traffic impacts associated with a proposed residential development to be located off Olmsted Drive in Belmont, Massachusetts (the “Project”). This study evaluates the following specific areas as they relate to the Project:

- access requirements;
- ii) potential off-site improvements;
- iii) safety considerations; and
- identifies and analyzes existing and future traffic conditions, both with and without the Project.

## **PROJECT DESCRIPTION**

The project is located within Zone 3 of the McLean District and is projected to consist of a total of 150 residential units. The proposal entails construction of 40 for sale, age-restricted townhouse condominiums and 110 multi-family rental units comprised of 53 age-restricted units and 57 non-age restricted units. On-site parking will be provided for approximately 257 vehicles (165 parking spaces for the apartment buildings (1.5 spaces per unit), 80 spaces for the townhouse residents (2.0 spaces per unit), and 12 visitor spaces (0.3 spaces per unit). The proposed parking spaces comply with the *McLean Zone 3 Zoning Bylaw - Section 6B.3.1g and 6B.3.2.g* for allowed parking spaces per unit per subdistrict, as amended through the September 2020 Special Town Meeting Article. Access to the Project site is provided by Olmsted Drive. Olmsted Drive is an existing private, dead-end roadway which extends from an unsignalized intersection with Pleasant Street and serves Zone 3 and 4 parcels of the Mclean District.

## **STUDY METHODOLOGY**

This study was prepared in consultation with the Town of Belmont officials and in accordance with the MassDOT Guidelines for *Transportation Impact Assessment (TIA) Guideline*; and the standards of the Traffic Engineering and Transportation Planning professions for the preparation of such reports; 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 geometrics
- Pedestrian facilities
- Observations of traffic flow
- Review of safety characteristics along area roadways
- The collection of daily and peak-period traffic counts.

In the second stage of the study, future traffic conditions were projected out 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 analyses consistent with State guidelines for the preparation of TIAs. The traffic analysis conducted in stage two identifies existing or 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, identified in stage two of the study.

## **EXISTING CONDITIONS**

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A comprehensive field inventory of existing conditions within the study area was conducted in December 2020. The field investigation consisted of inventorying existing roadway geometrics, pedestrian facilities, traffic volumes, operating characteristics, posted speed limits, and land use information for the major roadways providing access to the Project. The study area for the Project is listed below and graphically depicted on Figure 1.

1. Trapelo Road (Route 60) at Pleasant Street (Route 60)
2. Olmsted Drive at Pleasant Street (Route 60)

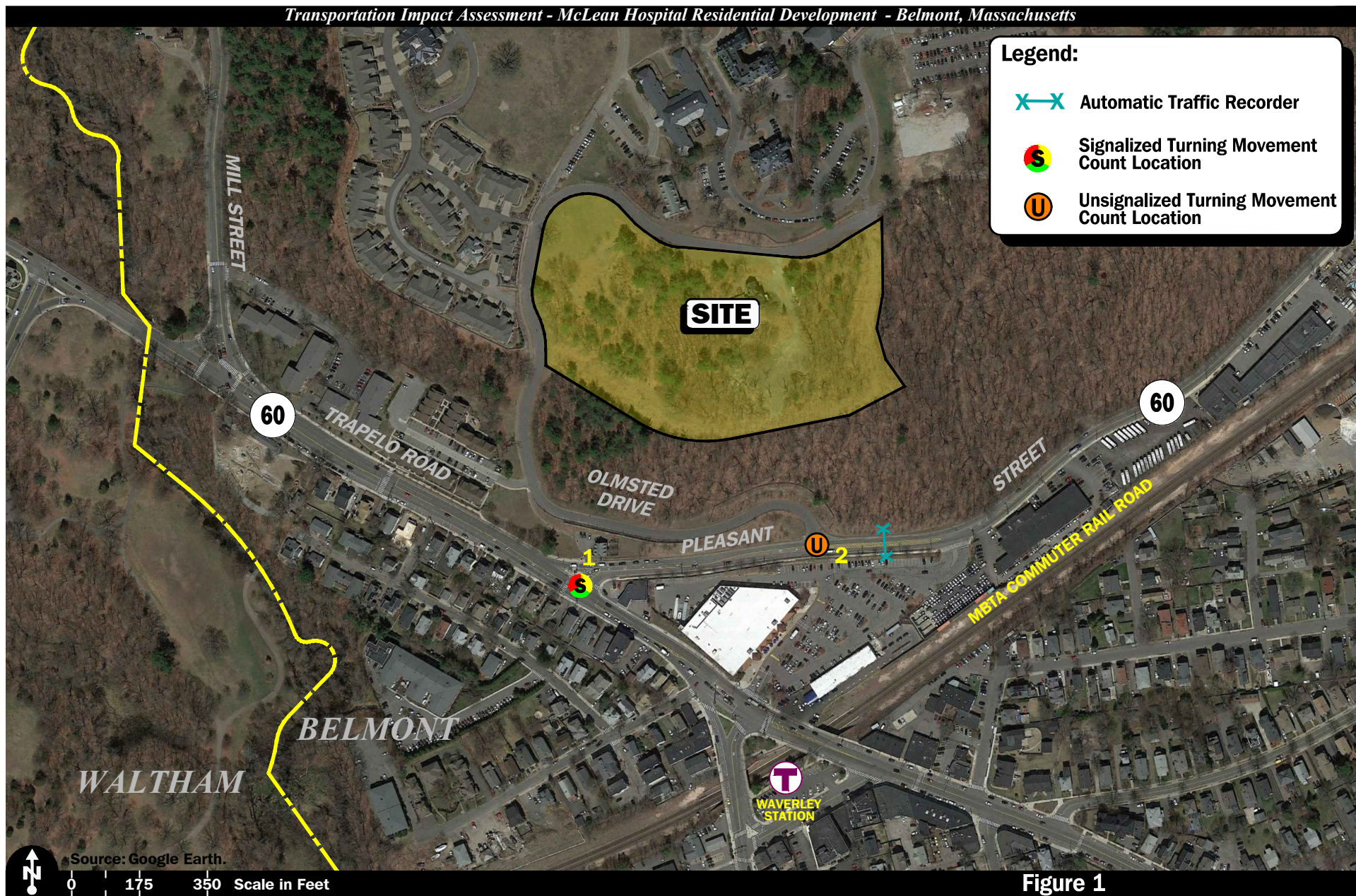
The following describes the study area roadway and intersections:

### **GEOMETRY**

#### **Roadways**

##### **Pleasant Street (Route 60)**

Pleasant Street (Route 60) is a two-lane local arterial roadway under the jurisdiction of the Town of Belmont which traverses the study area in a general north-south orientation, providing access between Trapelo Road to the south and the Town of Arlington to the north. Within the study area, Pleasant Street provides a single 12-foot wide travel lane in each direction with an 4-foot shoulder provided along both sides of the corridor. In the vicinity of the Project site, on-street parking is prohibited along both sides of the corridor. A sidewalk is provided along the eastern side of the corridor, adjacent to the Project site. The speed limit on Pleasant Street is not posted in the vicinity of the Project. Land use along the corridor consists primarily of a mix of commercial and residential properties.



## **Intersections**

### **Pleasant Street at Trapelo Road**

Pleasant Street and private residential driveways intersect Trapelo Road from the north and south to form a four-way intersection that operates under traffic signal control. The Trapelo Road eastbound approach provides an approximate 12-foot wide exclusive left-turn lane and an approximate 12-foot wide through/right-turn lane with an approximate 5-foot wide marked shoulder provided. The Trapelo Road westbound approach provides two approximate 12-foot wide general-purpose travel lanes with an approximate 4-foot wide marked shoulder provided. The Pleasant Street southbound approach provides an approximate 14-foot wide left-turn/through lane and an approximate 12-foot wide channelized right-turn lane that operates under YIELD-sign control. The northbound approach consists of two residential driveways that provide approximately 25 total feet in width. The traffic signal at this location operates under a three-phase signal sequence, with a protected left-turn phase provided for eastbound traffic on Trapelo Road. Sidewalks are provided along both sides of Trapelo Road and the eastern side of Pleasant Street at this location, with painted crosswalks provide across the eastbound and southbound approaches to this intersection. Land use in the vicinity of this intersection consists primarily of a mix of commercial and residential uses.

### **Olmsted Drive at Pleasant Street**

Olmsted Drive intersects Pleasant Street from the north to form a three-way intersection that operates under STOP-sign control. The Pleasant Street eastbound approach provides an approximate 10-foot wide exclusive left-turn lane and an approximate 11-foot wide through/right-turn lane with an approximate 4-foot wide marked shoulder provided. The Pleasant Street westbound approach provides one approximate 11-foot wide general-purpose travel lane with an approximate 4-foot wide marked shoulder provided. The Olmsted Drive southbound approach provides an approximate 20-foot wide general-purpose travel lane. A sidewalk is provided along the eastern side of Pleasant Street at this location. Crosswalks are not provided for this intersection as there is no sidewalk along the north side of Pleasant Street or on Olmstead Drive. Land use in the vicinity of this intersection consists primarily of commercial uses and open space.

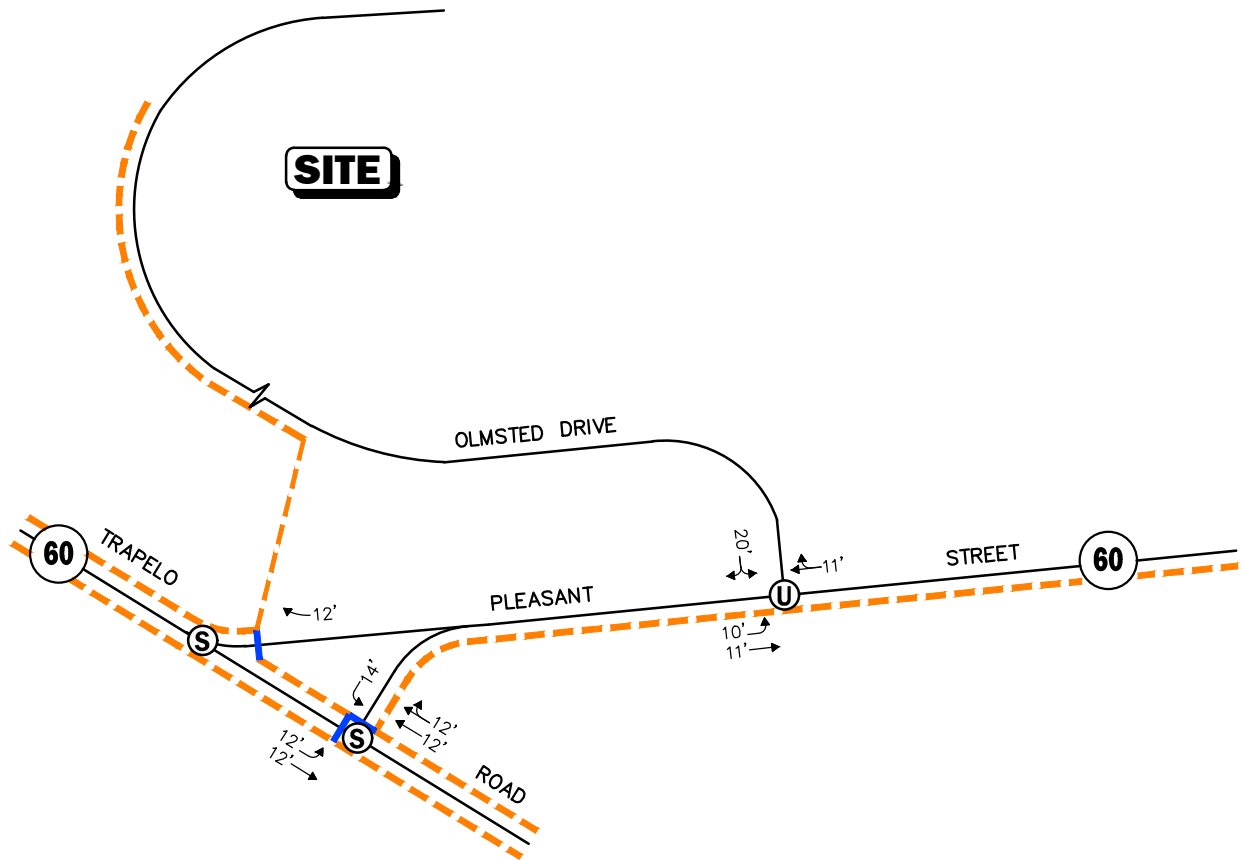
Figure 2 summarizes existing lane use and travel lane widths at the study area intersections as observed in December 2020.

## **EXISTING TRAFFIC VOLUMES**

In order to determine existing traffic-volume demands and flow patterns within the study area, manual TMCs and ATRs were conducted on Tuesday, November 10, 2020. The TMC counts at Trapelo Road with Pleasant Street were conducted during the weekday morning (7:00 to 9:00 AM) and weekday evening (4:00 to 6:00 PM) peak periods. The TMC counts at the Olmsted Drive intersection with Pleasant Street were conducted from 7:00 AM to 7:00 PM. The ATR was placed at Pleasant Street east of Olmsted Drive for a 48-hour count. These time periods were selected for analysis purposes as they are representative of the peak-traffic-volume hours for both the Project and the adjacent roadway network.

**Legend:**

- Ⓢ Signalized Intersection
- Ⓤ Unsignalized Intersection
- Sidewalk
- Crosswalk
- XX' Lane Use and Travel Lane Width



Not To Scale



**Figure 2**

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

## Seasonal Adjustment

In order to determine whether traffic volumes collected in November are representative of average annual conditions, historical traffic data collected by MassDOT was examined. Based on a review of this data, it was found that November traffic volumes are approximately 1 percent above average-month conditions. In order to provide a conservative analysis, November traffic count were not adjusted downward.

## Traffic Adjustment

In order to account for the reduction in traffic volumes caused by COVID-19 travel restrictions, historic traffic count data conducted in April 2018<sup>5</sup> and November 2019<sup>6</sup> in the same study area was reviewed. It is important to note that the 2018 data were obtained from the earlier town wide traffic study conducted by the Town of Belmont. Based upon this comparison, the November 2020 weekday morning and evening peak-hour volumes were found to be approximately 40 percent lower. The traffic counts that form the basis of this assessment were adjusted upward by 40 percent in order to provide an appropriate and conservative estimate of roadway operating conditions. It is important to note that in order to provide a 2021 Baseline condition, the November 2020 existing traffic volumes were grown by 1.0 percent per year.

The 2021 Baseline condition traffic volumes are summarized in Table 1, with the weekday morning and evening peak-hour traffic volumes graphically depicted on Figure 3.

**Table 1**  
**EXISTING ROADWAY TRAFFIC-VOLUME SUMMARY**

Location	Daily Volume (vpd) <sup>a</sup>	Weekday Morning Peak Hour (7:30– 8:30 AM)			Weekday Evening Peak Hour (4:30 – 5:30 PM)		
		Volume (vph) <sup>b</sup>	Percent of Daily Traffic <sup>c</sup>	Predominant Flow	Volume (vph)	Percent of Daily Traffic	Predominant Flow
Pleasant Street east of Olmsted Drive	12,175	949	7.8	52% WB	1,148	9.4	52% WB

<sup>a</sup>Average daily traffic in vehicles per day (vpd) based on ATR counts collected in November 2020 (increased by 40 percent year to represent COVID adjustment and increased by 1 percent year to represent 2021 exiting condition).

<sup>b</sup> Manual TMCs conducted in November 2020.

<sup>c</sup>The percent of daily traffic that occurs during the peak hour.

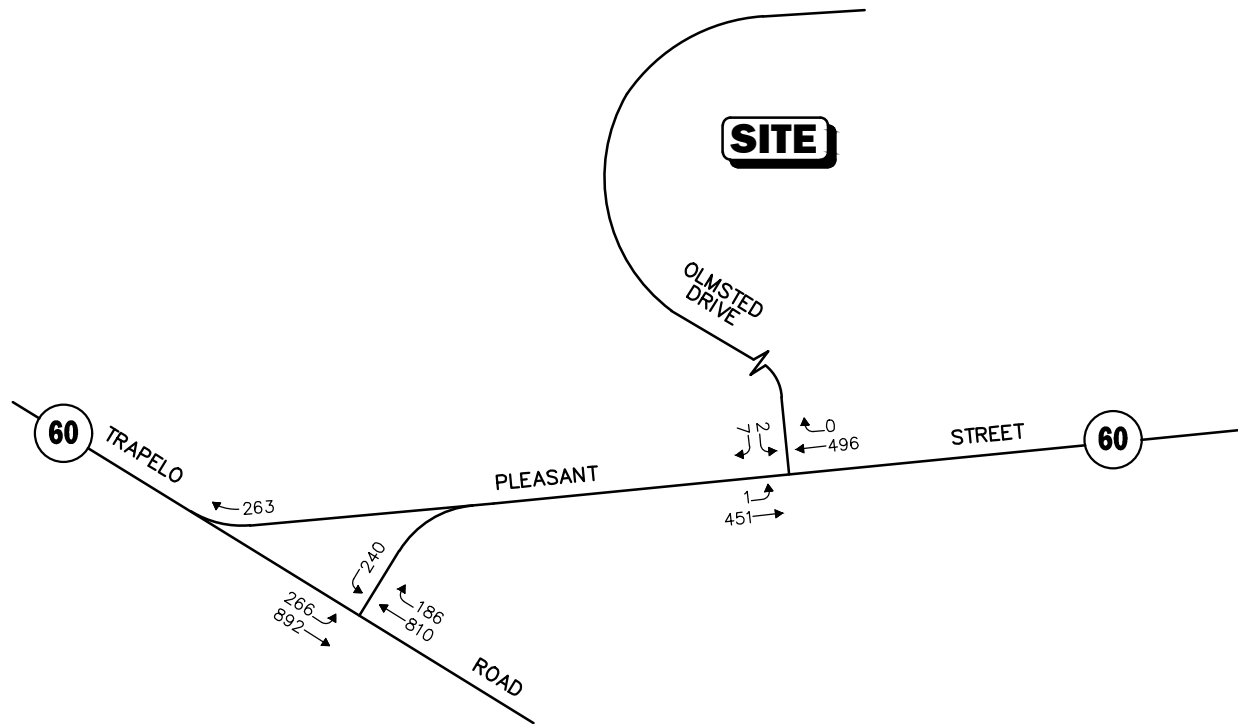
WB= westbound.

As reflected in Table 1, Pleasant Street east of Olmsted Drive was found to accommodate approximately 12,175 vehicles on an average weekday (24-hour, two-way volume), with approximately 949 vph during the weekday morning peak hour and 1,148 vph during the weekday morning peak hour. The predominant flow on Pleasant Street during the weekday morning and evening peak hour is in the westbound direction.

<sup>5</sup>*Town of Belmont – Town Wide Traffic Study* by BSC group, April 2019.

<sup>6</sup>*Transportation Impact Assessment*, Proposed Marijuana Dispensary, Belmont MA, VAI, February 2020.

WEEKDAY MORNING PEAK HOUR (7:30 - 8:30 AM)



WEEKDAY EVENING PEAK HOUR (4:30 - 5:30 PM)

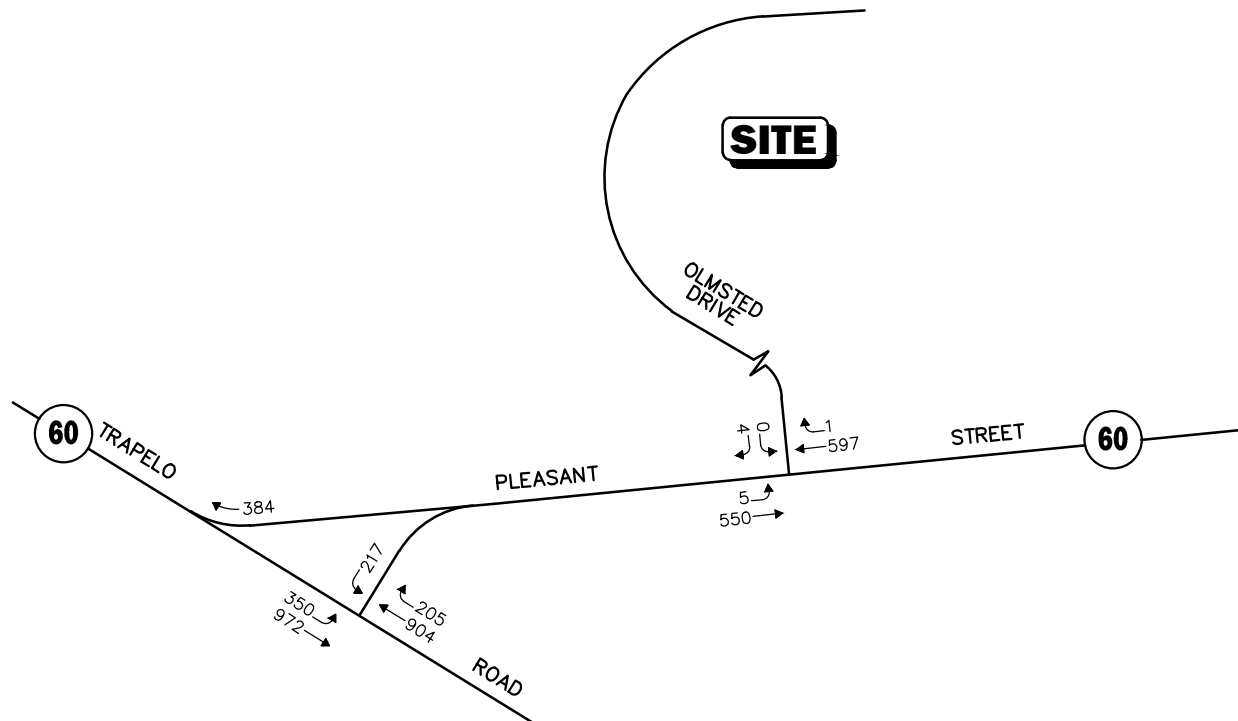


Figure 3

2021 Existing Conditions  
Weekday  
Peak Hour Traffic Volumes

A review of the peak-period traffic counts indicates that the weekday morning peak hour generally occurs between 7:30 and 8:30 PM with the weekday evening peak hour generally occurring between 4:30 and 5:30 PM.

## **PEDESTRIAN AND BICYCLE FACILITIES**

A comprehensive field inventory of pedestrian and bicycle facilities within the study area was undertaken in December 2020. The field inventory consisted of a review of the location of sidewalks and pedestrian crossing locations along the study area roadways and at the study area intersections.

In general, sidewalks are currently provided along the eastern side of Pleasant Street within the study area. Painted crosswalks and pedestrian signal equipment are provided at the signalized intersections with Trapelo Road and Concord Avenue. No formal bicycle facilities were noted in the study area, though the combined travel width along Pleasant Street (travel lane and shoulder) can accommodate vehicular and bicycle traffic in a shared manner.

## **PUBLIC TRANSPORTATION**

Public transportation services, including bus and commuter rail service, are provided within the study area by the Massachusetts Bay Transportation Authority (MBTA). Specifically, commuter rail service is provided on the Fitchburg commuter rail line, with service provided within the study area via the Waverly station, located approximately 1/3 of a mile from the site and within walking distance. It is important to note that on weekdays, March 1-May 2, 2021, buses will replace all Fitchburg Line trains between Littleton/495 & Alewife for a connection with the Red Line while the signal system for Positive Train Control (PTC) be upgraded.

Local bus service is also provided within the study area by the MBTA. Bus service within the study area is provided along Trapelo Road, within walking distance of the Project site. Specifically, bus service is provided via the following routes:

- ***Route 73 – Waverly Square – Harvard*** – Route 73 stops at the Trapelo Road intersection with Church Street approximately 0.4 miles south of the Project site. Route 73 provides a connection to Mount Auburn Hospital, Cushing Square, Harvard University, Red Line and Fitchburg Commuter Rail. Roundtrip fares for adults are \$1.70 with a Charlie Card, \$0.85 for students with valid ID, and \$0.85 for senior citizens (65 years of age or older). This line operates seven days a week Monday through Sunday (inbound: 5:02 AM to 1:41 AM; outbound: 4:47 AM to 1:25 AM), Saturday (inbound: 5:01 AM to 1:33 AM; outbound: 4:45 AM to 1:18 AM) and Sunday (inbound: 6:37 AM to 12:58 AM; outbound: 6:27 AM to 1:27 AM). All MBTA buses are handicapped and wheelchair accessible.
- ***Route 554 – Waverly Square – Downtown Boston*** – Route 554 stops at the Trapelo Road intersection with Church Street approximately 0.4 miles south of the Project site. Route 554 provides a connection to Central Square, Waltham, Newtonville, Newton Courthouse, Brandeis University, Bentley College. This line does not operate on Saturday and Sundays. Roundtrip fares for adults are \$1.70 with a Charlie Card, \$0.85 for students with valid ID, and \$0.85 for senior citizens (65 years of age or older). This line operates Monday through Friday (inbound: 6:44 AM to 8:01 PM; outbound: 6:00 AM to 7:16 PM). All MBTA buses are handicapped and wheelchair accessible.

## **SPOT SPEED MEASUREMENTS**

Vehicle travel speed measurements were performed on Pleasant Street (Route 60) in the vicinity of the Project site. Table 2 summarizes the vehicle travel speed measurements.

**Table 2**  
**VEHICLE TRAVEL SPEED MEASUREMENTS**

	Pleasant Street Eastbound	Pleasant Street Westbound
Mean Travel Speed (mph)	31	31
85 <sup>th</sup> Percentile Speed (mph)	34	34
Speed Limit (mph)	--	--

mph = miles per hour.

As reflected in Table 2, the mean (average) vehicle travel speed along Pleasant Street, in the vicinity of the Project site, was found to be approximately 31 miles per hour (mph) in both directions. The measured 85<sup>th</sup> percentile vehicle travel speed, or the speed at which 85 percent of the observed vehicles traveled at or below, was found to be approximately 34 mph in both directions. It is important to note that there are no speed limit signs along both directions of Pleasant Street in the vicinity of the Project site.

## **MOTOR VEHICLE CRASH DATA**

Motor vehicle crash data was acquired from the MassDOT Safety Management/Traffic Operations Unit for the most recent five-year period available (2013 through 2017) to examine motor vehicle crash trends occurring within the study area. The data is summarized by intersection, type, and severity, and is presented in Table 3.

**Table 3**  
**MOTOR VEHICLE CRASH DATA SUMMARY<sup>a</sup>**

Scenario	Trapelo Road at Pleasant Street (Signalized)	Pleasant Street at Olmsted Drive (Unsignalized)
<i>Year:</i>		
2013	7	0
2014	13	0
2015	14	0
2016	8	0
<u>2017</u>	<u>7</u>	<u>1</u>
Total	49	1
Average <sup>b</sup>	9.8	0.20
Crash Rate <sup>c</sup>	0.72	0.04
Significant	No	No
<i>Manner of Collision:</i>		
Angle	15	1
Rear-End	19	0
Head-On	3	0
Sideswipe	10	0
Fixed Object	2	0
<u>Unknown/Other</u>	<u>0</u>	<u>0</u>
Total	49	1
<i>Time of Day:</i>		
Weekday (Monday through Friday)	44	1
Saturday	1	0
<u>Sunday</u>	<u>4</u>	<u>0</u>
Total	49	1
<i>Lighting Conditions:</i>		
Daylight	40	0
Dawn/Dusk	3	1
Dark (lit)	5	0
Dark (unlit)	0	0
<u>Unknown</u>	<u>1</u>	<u>0</u>
Total	49	1
<i>Pavement Conditions</i>		
Dry	38	1
Wet	6	0
Snow	2	0
Ice	1	0
<u>Unknown (Other)</u>	<u>2</u>	<u>0</u>
Total	49	1
<i>Severity:</i>		
Property Only	34	0
Injury Accident	9	1
Fatal Accident	0	0
<u>Other</u>	<u>6</u>	<u>0</u>
Total	49	1

<sup>a</sup>Source: MassDOT, 2013 through 2017.

<sup>b</sup>Average crashes over five-year period.

<sup>c</sup>Crash rate per million entering vehicles.

Unsignalized intersections are significant if rate >0.57 crashes per million vehicles (District 4) or if rate >0.57 crashes per million vehicles (Statewide).

Signalized intersections are significant if rate >0.73 crashes per million vehicles (District 4) or if rate >0.78 crashes per million vehicles (Statewide).

As summarized in Table 3, the intersection of Pleasant Street with Trapelo Road experienced the highest frequency of accidents over the five-year review period with a total of 49 accidents reported at the intersection, averaging 9.8 accidents per year. The majority of the accidents involved property damage only (37 out of 49), occurred on dry pavement (38 out of 49), were during daylight (40 out of 49), and involved angle-type and rear-end collisions (34 out of 49). The motor vehicle crash rate for this location exceeds MassDOT's average crash rate for signalized intersections in this MassDOT District (District 4). No fatalities were reported at any of the study area intersections over the five-year period reviewed. The intersection of Pleasant Street at Trapelo Road appears on the high crash location database and is included on MassDOT's HSIP listing as a high crash location. Designated as an HSIP location allows for MassDOT to prioritize funding for safety-related improvements in a specific region of the state. According to the MassDOT RSA database, no RSAs have been conducted at this location.

## **FUTURE CONDITIONS**

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Traffic volumes in the study area were projected to the year 2028, which reflects a seven-year planning horizon consistent with State Traffic Study Guidelines. Independent of the Project, traffic volumes on the roadway network in the year 2028 under No-Build conditions include all existing traffic and new traffic resulting from background traffic growth. Anticipated Project-generated traffic volumes superimposed upon this 2028 No-Build traffic network reflect the 2028 Build conditions with the Project.

### **FUTURE TRAFFIC GROWTH**

Future traffic growth is a function of the expected land development in the immediate area and the surrounding region. Several methods can be used to estimate this growth. A procedure frequently employed estimates an annual percentage increase in traffic growth and applies that percentage to all traffic volumes under study. The drawback to such a procedure is that some turning volumes may grow at either a higher or a lower rate at particular intersections. An alternative procedure identifies the location and type of planned development, estimates the traffic to be generated, and assigns it to the area roadway network. This procedure 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, the salient components of which are described below.

### **GENERAL BACKGROUND TRAFFIC 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, it was determined that traffic volumes within the study area have fluctuated over the past several years. In order to be consistent with previous traffic studies in the area, a 1.0 percent per year compounded annual growth rate was used to account for general background traffic growth for weekday morning and evening peak hour

## **SPECIFIC DEVELOPMENT BY OTHERS**

The Town of Belmont was contacted 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 project was identified in the immediate area of the Project site, including a proposed marijuana facility to be located at 1010 Pleasant Street (Route 60).

- ***1010 Pleasant Street - Proposed Marijuana Facility*** - This project entails the repurposing of approximately 4,150 square feet (sf) of commercial space within a multi-tenant commercial building located at 1010 Pleasant Street in Belmont, Massachusetts. The Project also includes the reconfiguration of the existing parking field in order to provide a total of 25 spaces for employees and customers of the facility. Traffic volumes associated with this project were obtained from the traffic study prepared for the facility and were added to the No-Build volumes (see distribution in Appendix).

No other developments were identified at this time that are expected to result in an increase in traffic within the study area beyond the general background traffic growth rate.

## **ROADWAY IMPROVEMENT PROJECTS**

The Town of Belmont Planning Department was contacted to determine if there were any planned roadway improvement projects expected to be completed within the study area. Based on these discussions, no improvements are planned beyond general maintenance.

## **NO-BUILD TRAFFIC VOLUMES**

The 2028 No-Build peak-hour traffic-volume networks were developed by applying the 1 percent per year compounded annual background traffic growth rate to the 2021 Baseline condition peak-hour traffic volumes plus the identified background development. The resulting 2028 No-Build weekday morning and evening peak-hour traffic-volume networks are shown on Figure 4.

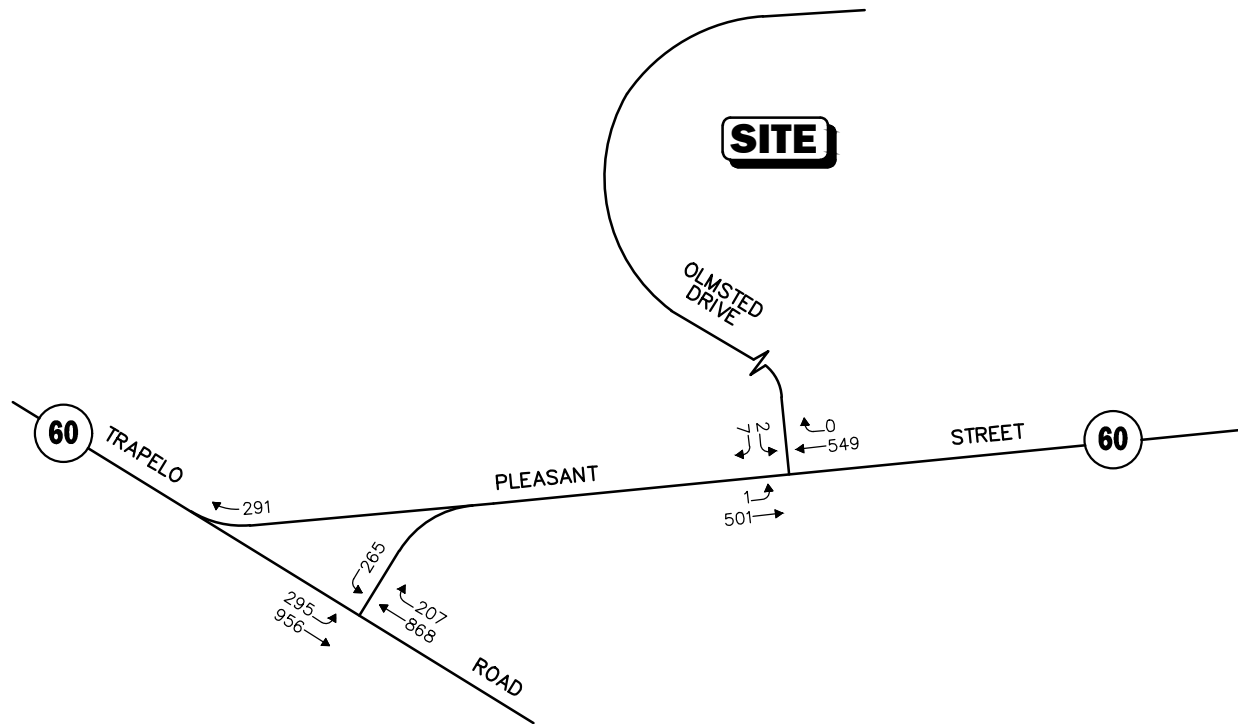
## **PROJECT-GENERATED TRAFFIC**

The proposal entails construction of 40 age-restricted townhouse style condominiums and 110 multi-family residences including 53 age-restricted units and 57 non-age restricted units. In order to estimate the trip-generation characteristics of the proposed development, the ITE *Trip Generation* manual<sup>7</sup> ITE LUC 221, *Multifamily Housing (Mid-Rise)* and LUC 252, *Senior Adult Housing* were used. Trip-generation calculations were performed for a typical weekday, as well as the weekday morning and weekday evening peak hours, the critical time periods for project-related traffic activity. Based on the Commuting Characteristics by Sex of the 2015-2019 American Community Survey 5-Year Estimation, approximately 22 percent of residents who live in Belmont (Census Tract 3577 Middlesex County) travel to work by either transit or walk trips. Due to the site's proximity to public transportation and for purposes of this study, a conservative 5 percent non-auto trip reduction was assumed for the age-restricted units and 10 percent non-auto trip reduction was assumed for the non-age restricted units. The expected vehicle-trip generation is

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<sup>7</sup>Ibid 3.

WEEKDAY MORNING PEAK HOUR (7:30 - 8:30 AM)



WEEKDAY EVENING PEAK HOUR (4:30 - 5:30 PM)

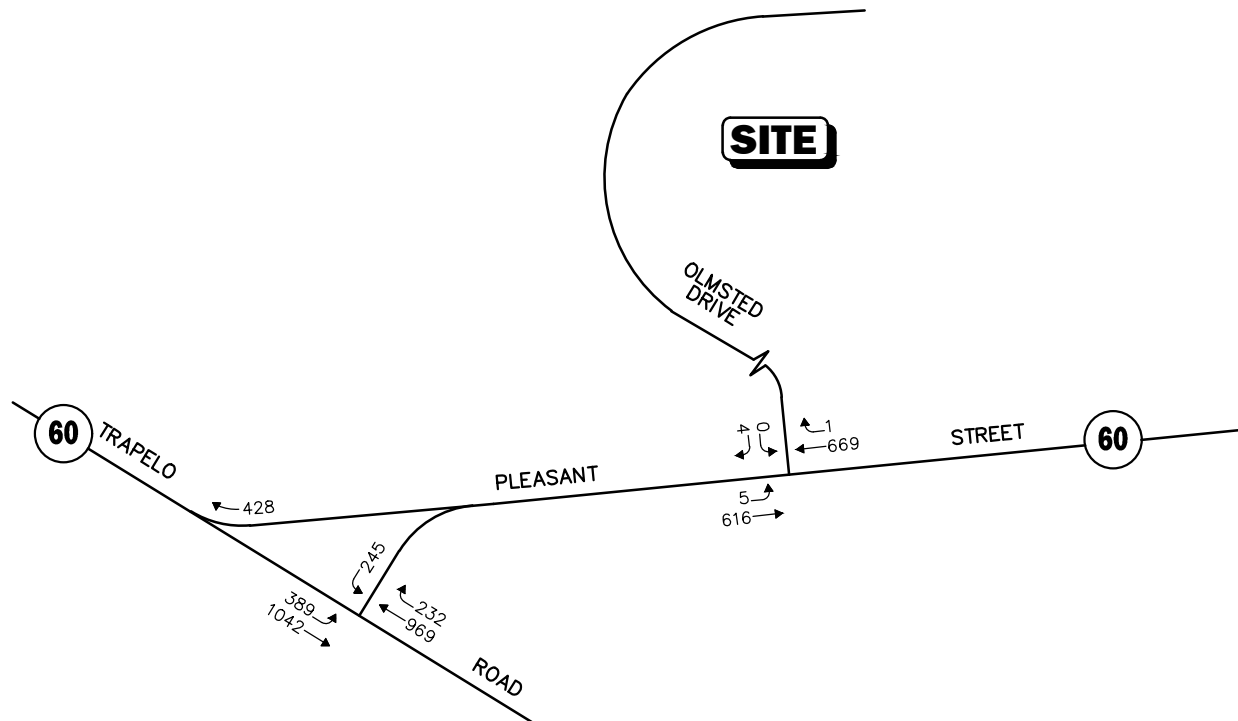


Figure 4

2028 No-Build Conditions  
Weekday  
Peak Hour Traffic Volumes

summarized in Table 4.

**Table 4**  
**TRIP-GENERATION SUMMARY**

Time Period/Direction	ITE Senior Housing			ITE Multifamily Housing			TOTAL	Total New trips
	(93 Units) <sup>a</sup>	Transit Reduction Trips (5%)	Total	(57 Units) <sup>b</sup>	Transit Reduction Trips (10%)	Total		
Average Weekday	348.49	17.42	331.07	308.90	30.89	278.01	<b>609.08</b>	<b>610</b>
<i>Weekday Morning Peak Hour:</i>								
Entering	6.45	0.32	6.13	5.34	0.53	4.81	<b>10.94</b>	<b>11</b>
Exiting	<u>11.97</u>	<u>0.60</u>	<u>11.37</u>	<u>15.18</u>	<u>1.52</u>	<u>13.66</u>	<b>25.03</b>	<b>25</b>
Total	18.42	0.92	17.50	20.52	2.05	18.47	<b>35.97</b>	<b>36</b>
<i>Weekday Evening Peak Hour:</i>								
Entering	13.27	0.66	12.61	15.30	1.53	13.77	<b>26.38</b>	<b>26</b>
Exiting	<u>11.31</u>	<u>0.57</u>	<u>10.74</u>	<u>9.78</u>	<u>0.98</u>	<u>8.80</u>	<b>19.54</b>	<b>20</b>
Total	24.58	1.23	23.35	25.08	2.51	22.57	<b>45.92</b>	<b>46</b>

<sup>a</sup>Based on ITE LUC 252, *Senior Adult Housing*.

<sup>b</sup>Based on ITE LUC 221, *Multifamily Housing (MidRise)*.

As can be seen in Table 4, the proposed 150 housing units are expected to generate approximately 610 vehicle trips on an average weekday (two-way, 24-hour volume), with 36 vehicle trips (11 entering and 25 exiting) expected during the weekday morning peak hour and 46 vehicle trips (26 entering and 20 exiting) expected during the weekday evening peak hour.

#### **TRAFFIC MONITORING AND MITIGATION AGREEMENT (TMMA)**

In order to set up a goal for the McLean development a Traffic Mitigation and Monitoring Agreement (TMMA) was outlined in November of 1999. The TMMA includes trip-generation estimations for Zone 3 in which the proposed project is located. Trip-generation estimates for the proposed 150 housing units were compared to the TMMA limits. The comparison is summarized in Table 5.

**Table 5**  
**PROJECT TRIP-TMMA LIMIT COMPARISON**

Time Period/ Direction	150 Housing Units (Vehicle Trips)	TMMA (Vehicle Trips)
Average Weekday	610	1,148
Weekday Morning Peak Hour	36	36
Weekday Evening Peak Hour	46	92

### **TRIP DISTRIBUTION AND ASSIGNMENT**

The directional distribution of the site-generated trips to and from the Project was determined based on a review of existing travel patterns at the study area intersections and Journey-to-work data for Belmont obtained from the United States Census Bureau.<sup>8</sup> The trip distribution for the Project is summarized in Table 6 and graphically depicted on Figure 5.

**Table 6**  
**TRIP-DISTRIBUTION SUMMARY**

Roadway	Direction (To/From)	Percentage (To/From)
Trapelo Road	North/West	15%
Trapelo Road	South/East	45%
Pleasant Street	East	40%
<b>TOTAL</b>		<b>100%</b>

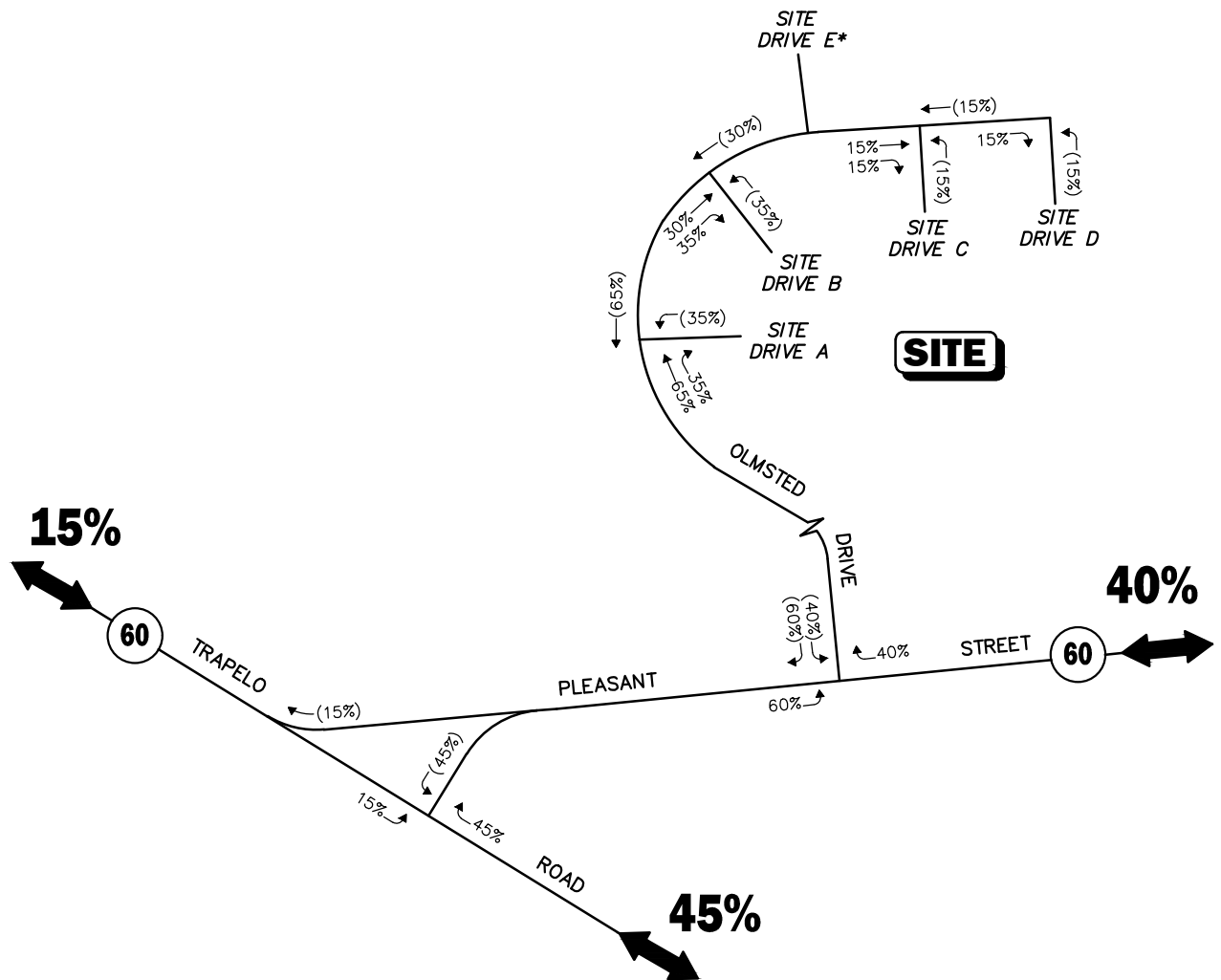
Based on these distribution patterns the weekday morning and evening peak-hour site-generated traffic volumes were assigned on the study area roadway network as shown on Figure 6.

### **FUTURE TRAFFIC VOLUMES - BUILD CONDITION**

The 2028 Build condition networks consist of the 2028 No-Build traffic volumes, plus the proposed 150 housing units traffic added to them. The 2028 Build weekday morning and 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 7. These volumes are based on the expected increases from the Project.

**Table 7**

<sup>8</sup> 2011-2015 5-Year American Community Survey; U.S. Census Bureau; 2019.



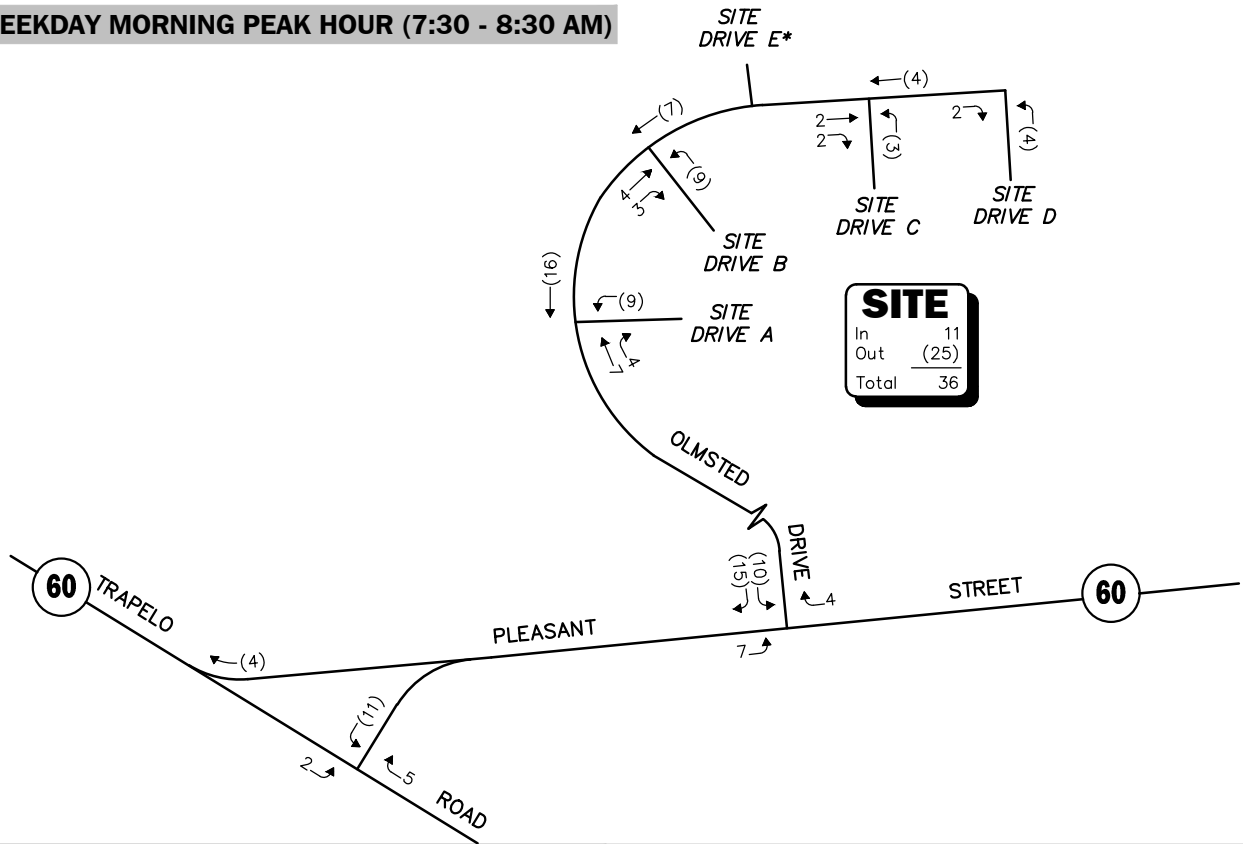
**NOTE: \* Traffic Associated with Townhouse Building 1**  
Not To Scale

**Figure 5**

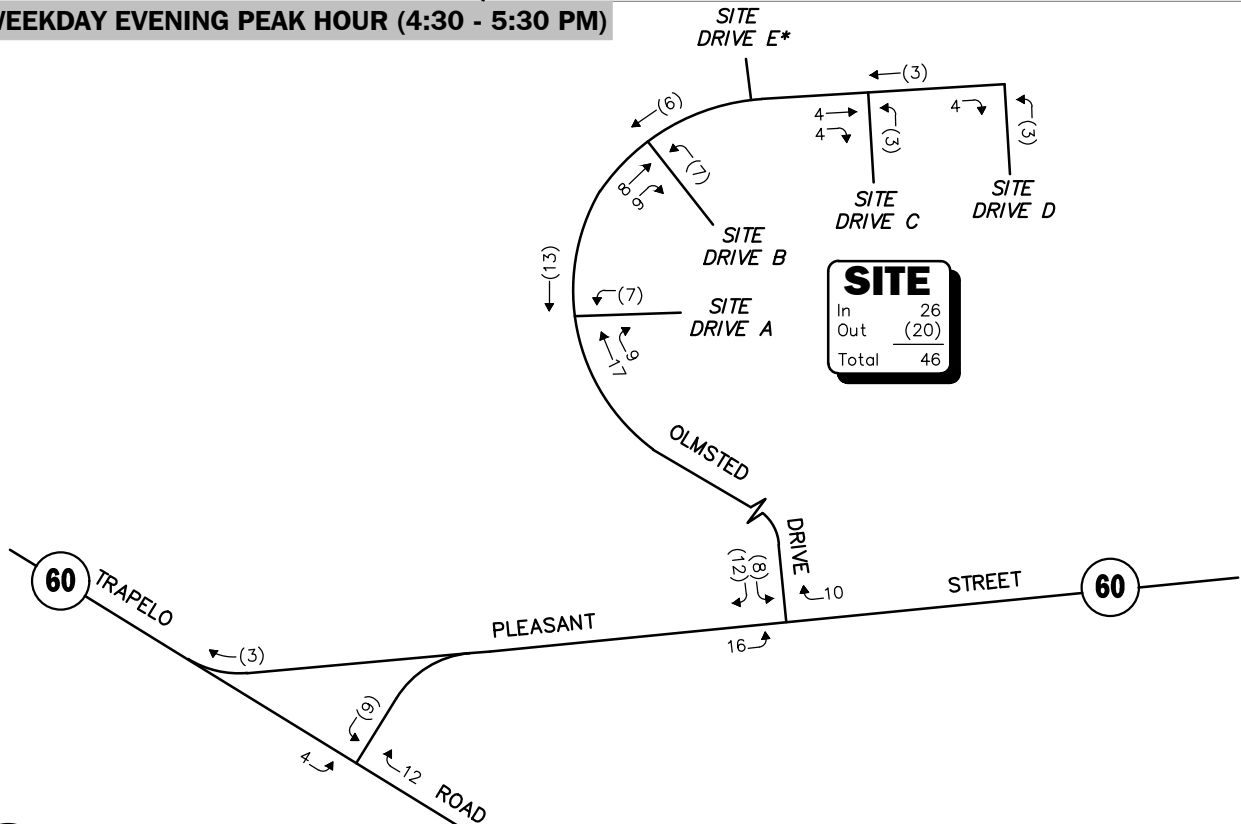
**Trip Distribution Map**



WEEKDAY MORNING PEAK HOUR (7:30 - 8:30 AM)



WEEKDAY EVENING PEAK HOUR (4:30 - 5:30 PM)



NOTE: \* Traffic Associated with Townhouse Building 1

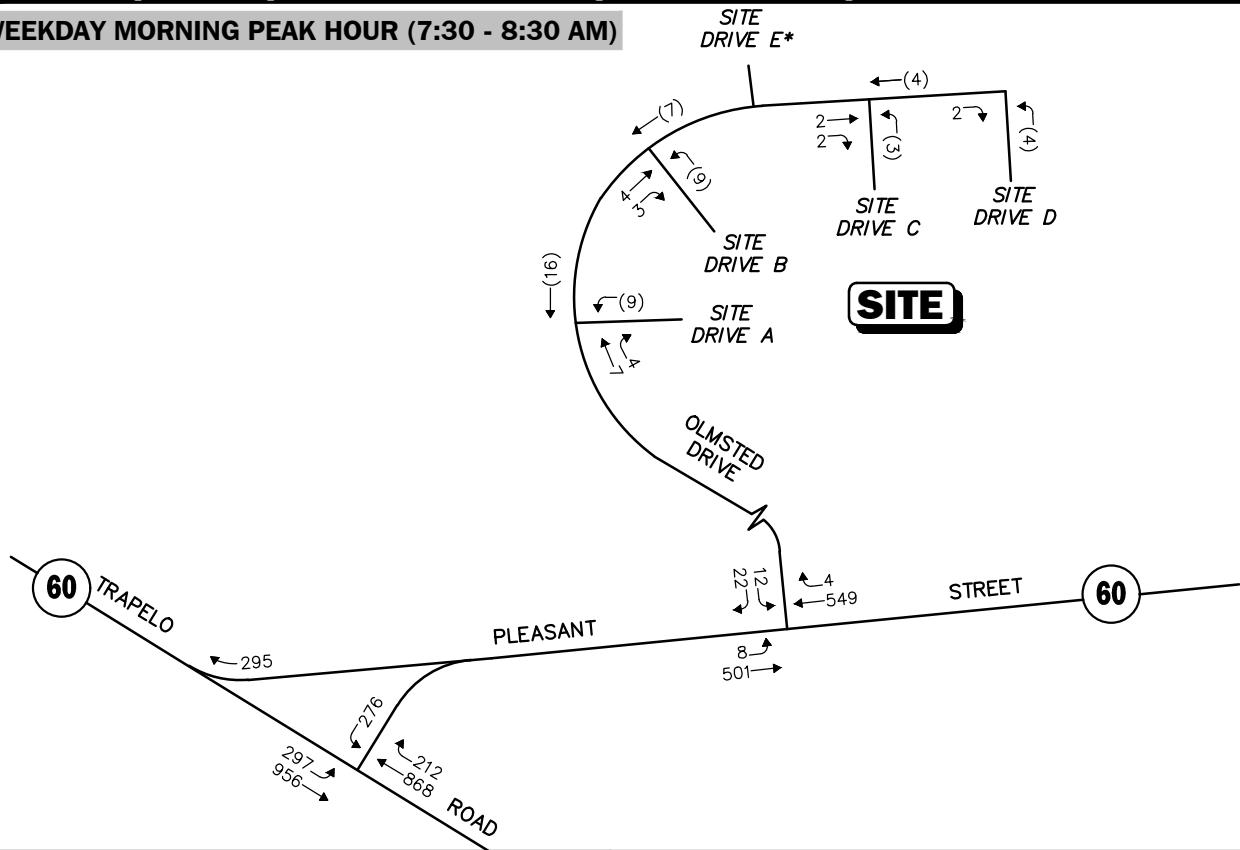
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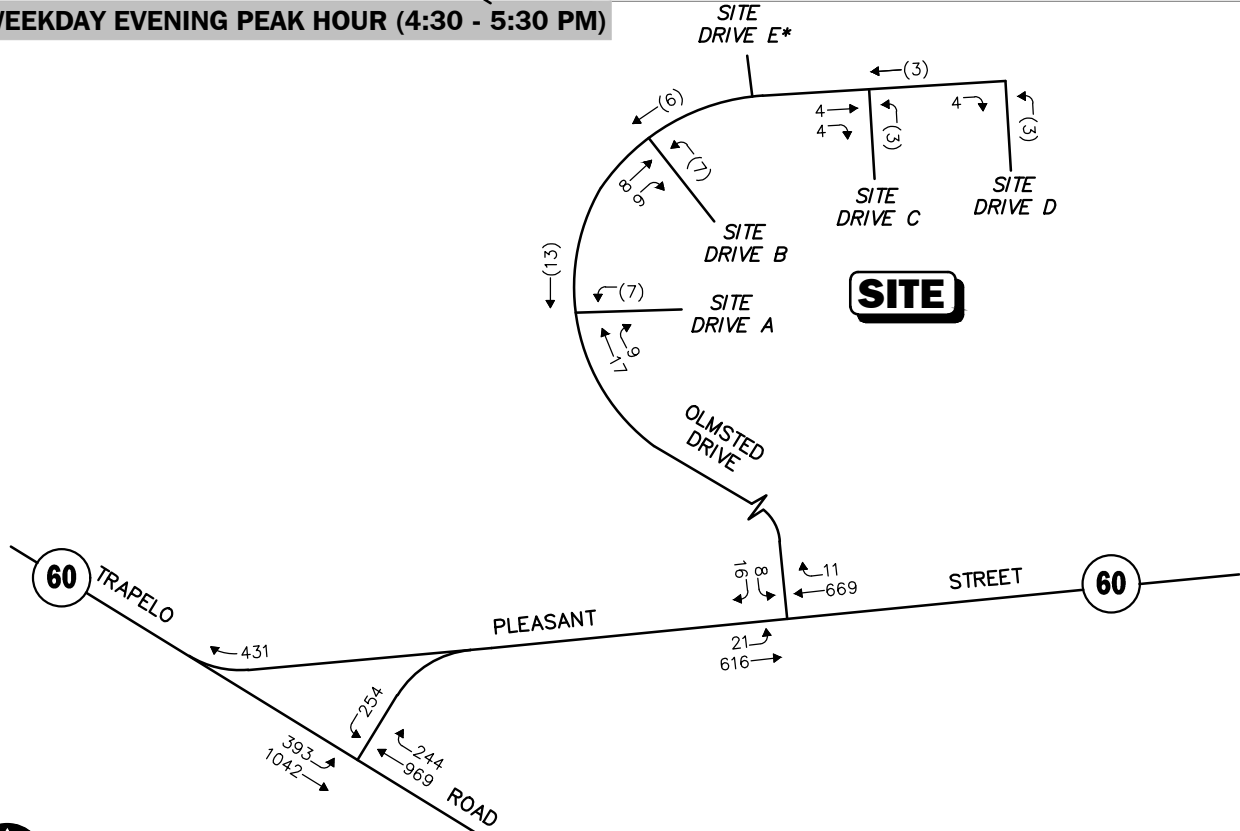
Figure 6

Project Generated  
Weekday  
Peak Hour Traffic Volumes

WEEKDAY MORNING PEAK HOUR (7:30 - 8:30 AM)



WEEKDAY EVENING PEAK HOUR (4:30 - 5:30 PM)



NOTE: \* Traffic Associated with Townhouse Building 1

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Associates inc

Figure 7

2028 Build Conditions  
Weekday  
Peak Hour Traffic Volumes

## PEAK HOUR TRAFFIC-VOLUME INCREASES

Location/Peak Hour	2028 No-Build	2028 Build	Traffic Volume Increase Over No-Build	Percent Increase Over No-Build
<i>Trapelo Road north of Pleasant Street:</i>				
Weekday Morning	2,410	2,416	6	0.2
Weekday Evening	2,828	2,835	7	0.2
<i>Trapelo Road south of Pleasant Street:</i>				
Weekday Morning	2,296	2,312	16	0.7
Weekday Evening	2,488	2,509	21	0.8
<i>Pleasant Street east of Olmsted Drive:</i>				
Weekday Morning	1,052	1,066	14	1.3
Weekday Evening	1,286	1,304	18	1.4

As shown in Table 7, in comparison to future No-Build conditions, project-related traffic increases are projected to range between 0.2 to 1.4 percent on the periphery of the study area.

## SIGHT DISTANCE EVALUATION

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Sight distance measurements were performed at the Pleasant Street intersection with Olmsted Drive and at the proposed Project site driveway intersections with Olmsted Drive in accordance with MassDOT and American Association of State Highway and Transportation Officials (AASHTO)<sup>9</sup> requirements. In brief, Stop Sight Distance (SSD) is the distance required by a vehicle traveling at the design speed of a roadway, on wet pavement, to stop prior to striking an object in its travel path. In accordance with AASHTO standards, if the measured distance is at least equal to the required SSD value for the appropriate design speed, the intersection can operate in a safe manner. Table 8 presents the measured SSD at the site driveways.

As can be seen in Table 8, the available lines of sight at the intersection of Pleasant Street at Olmsted Drive and all Project site driveway intersections with Olmsted Drive were found to exceed the recommended minimum sight distance requirements to function in a safe and efficient manner based on the observed 85<sup>th</sup> percentile approach speeds or posted speed limits.

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<sup>9</sup>*A Policy on Geometric Design of Highway and Streets*, 6th Edition; American Association of State Highway and Transportation Officials (AASHTO); Washington D.C.; 2011.

**Table 8**  
**SIGHT DISTANCE MEASUREMENTS<sup>a</sup>**

Sight Distance Measurement	Distances (Feet)			Measured
	Posted Speed Limit (25 mph)	Posted Speed Limit (30 mph)	85 <sup>th</sup> Percentile Speed (35 mph) <sup>b</sup>	
<b><i>Pleasant Street at Olmsted Drive:</i></b>				
<i>Stopping Sight Distance:</i>				
Pleasant Street approaching from the east	--	200	250	316
Pleasant Street approaching from the west	--	200	250	423
<b><i>Site Drive A at Olmsted Drive:</i></b>				
<i>Stopping Sight Distance:</i>				
Olmsted Drive approaching from the north	155	--	--	303
Olmsted Drive approaching from the south	155	--	--	229
<b><i>Site Drive B at Olmsted Drive:</i></b>				
<i>Stopping Sight Distance:</i>				
Olmsted Drive approaching from the north	155	--	--	234
Olmsted Drive approaching from the south	155	--	--	261
<b><i>Site Drive C and D at Olmsted Drive:</i></b>				
<i>Stopping Sight Distance:</i>				
Olmsted Drive approaching from the east	155	--	--	287
Olmsted Drive approaching from the west	155	--	--	227

<sup>a</sup>Recommended minimum values obtained from *A Policy on Geometric Design of Highways and Streets*, 6th Edition; American Association of State Highway and Transportation Officials (AASHTO); 2011.

<sup>b</sup>Based on 85<sup>th</sup> percentile speed of 34 mph.

## **TRAFFIC OPERATIONS ANALYSIS**

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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.<sup>10</sup> 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.

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<sup>10</sup>The capacity analysis methodology is based on the concepts and procedures presented in the *Highway Capacity Manual*; Transportation Research Board; Washington, DC; 2010.

## **Signalized Intersections**

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

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

Levels of service for signalized intersections were calculated using the Percentile Delay Method implemented as a part of the Synchro™ 10 software as required by MassDOT. The Percentile Delay Method assesses the effects of signal type, timing, phasing, and progression; vehicle mix; and geometrics on “percentile” delay. Level-of-service designations are based on the criterion of percentile delay per vehicle and is a measure of: i) driver discomfort; ii) motorist frustration; and iii) fuel consumption; and includes a uniform delay based on percentile volumes using a Poisson arrival pattern, an initial queue move-up time, and a queue interaction delay that accounts for delays resulting from queues extending from adjacent intersections. Table 9 summarizes the relationship between level-of-service and percentile delay and uses the same numerical delay thresholds as the HCM method. The tabulated percentile delay criterion may be applied in assigning level-of-service designations to individual lane groups, to individual intersection approaches, or to entire intersections.

**Table 9**  
**LEVEL-OF-SERVICE CRITERIA**  
**FOR SIGNALIZED INTERSECTIONS**

Level of Service	Percentile Delay Per Vehicle (Seconds)
A	≤10.0
B	10.1 to 20.0
C	20.1 to 35.0
D	35.1 to 55.0
E	55.1 to 80.0
F	>80.0

## 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 2010 *Highway Capacity Manual*.<sup>11</sup> 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 2010 *Highway Capacity Manual*. Table 10 summarizes the relationship between level of service and average control delay for two-way STOP-sign-controlled and all-way STOP-sign-controlled intersections.

**Table 10**  
**LEVEL-OF-SERVICE CRITERIA FOR**  
**UNSIGNALIZED INTERSECTIONS<sup>a</sup>**

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	$\leq 10.0$
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	$> 50.0$

<sup>a</sup>Source: *Highway Capacity Manual*; Transportation Research Board; Washington, DC; 2010; page 19-2.

<sup>11</sup>*Highway Capacity Manual*; Transportation Research Board; Washington, DC; 2010.

## **ANALYSIS RESULTS**

Level-of-service and vehicle queue analyses were conducted for 2021 Baseline, 2028 No-Build, and 2028 Build conditions for the intersections within the study area. The results of the intersection capacity and vehicle queue analyses are summarized for signalized intersections in Table 11 and for unsignalized intersections in Table 12 with the detailed analysis results presented in the Appendix. The following is a summary of the level-of-service and delay analyses for the intersections within the study area:

### **Signalized Intersections**

#### **Trapelo Road at Pleasant Street**

Under 2021 Existing conditions, this signalized intersection was shown to operate at an overall LOS C during the weekday morning and evening peak hours. Under future conditions, this signalized intersection is projected to continue operate at an overall LOS C during the weekday morning peak hour and at an overall LOS D during the weekday evening peak hour, with Project-related traffic increase resulting in increases to overall delays of approximately 2 seconds or less as compared to No-Build conditions.

### **Unsignalized Intersections**

#### **Pleasant Street at Olmsted Drive**

Under existing conditions, the critical movements at this unsignalized intersection are expected to operate at LOS B during the weekday morning and evening peak hours. Under No-Build conditions, the critical movements at this unsignalized intersection are expected to operate at LOS C during the weekday morning peak hour and at LOS B during the weekday evening peak hour. Under Build conditions, the critical movements at this unsignalized intersection are expected to operate at LOS C during the weekday morning peak hour and at LOS D during the weekday evening peak hour. Under future conditions vehicle queues at this intersection were shown to range from 0 to 2 vehicle during the peak periods.

#### **Olmsted Drive at Site Driveways**

Under future conditions, the critical movements at the site driveways are expected to operate at LOS A during the weekday morning and evening peak hours. Vehicle queues are not expected at site driveways during the peak periods.

**Table 11**  
**SIGNALIZED INTERSECTION LEVEL-OF-SERVICE SUMMARY**

Signalized Intersection/ Peak Hour/Movement	2021 Baseline Condition				2028 No-Build			2028 Build		
	V/C <sup>a</sup>	Delay <sup>b</sup>	LOS <sup>c</sup>	Queue <sup>d</sup> Avg/95 <sup>th</sup>	V/C	Delay	LOS	V/C	Delay	LOS
<b>Trapelo Road at Pleasant Street:</b>										
<i>Weekday Morning:</i>										
Trapelo Road EB LT	0.75	28.9	C	86/206	0.83	40.4	D	0.84	41.7	D
Trapelo Road EB TH	0.82	21	C	361/768	0.90	28.8	C	0.92	30.9	C
Trapelo Road WB TH/RT	0.75	27.3	C	264/466	0.87	35.2	D	0.89	37.4	D
Pleasant Street WB LT	0.7	41.2	D	135/195	0.72	40.7	D	0.72	40.1	D
Pleasant Street WB RT	0.35	6.6	A	39/69	0.37	7.1	A	0.37	7	A
<b>Overall</b>	--	<b>24.6</b>	<b>C</b>	--	--	<b>31.3</b>	<b>C</b>	--	<b>32.9</b>	<b>C</b>
<i>Weekday Evening:</i>										
Trapelo Road EB LT	0.82	36.8	D	144/322	0.94	55.5	E	0.94	56.5	E
Trapelo Road EB TH	0.87	23.3	C	409/848	0.93	29	C	0.93	28.3	C
Trapelo Road WB TH/RT	0.92	40.8	D	364/549	0.98	47.2	D	0.99	48.7	D
Pleasant Street WB LT	0.69	42.1	D	123/182	0.77	49.4	D	0.81	53.5	D
Pleasant Street WB RT	0.47	9.9	A	80/136	0.58	18.2	B	0.71	12.4	B
<b>Overall</b>	--	<b>31.0</b>	<b>C</b>	--	--	<b>38.9</b>	<b>D</b>	--	<b>39.0</b>	<b>D</b>

<sup>a</sup>Volume-to-capacity ratio.

<sup>b</sup>Control (signal) delay per vehicle in seconds.

<sup>c</sup>Level-of-Service.

<sup>d</sup>Queue length in feet.

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

**Table 12**  
**UNSIGNALIZED INTERSECTION LEVEL-OF-SERVICE AND VEHICLE QUEUE SUMMARY**

Unsignalized Intersection/ Peak Hour/Movement	2021 Baseline Condition				2028 No-Build				2028 Build			
	Demand <sup>a</sup>	Delay <sup>b</sup>	LOS <sup>c</sup>	Queue 95 <sup>th</sup> Percentile	Demand	Delay	LOS	Queue 95 <sup>th</sup> Percentile	Demand	Delay	LOS	Queue 95 <sup>th</sup> Percentile
<b><i>Olmsted Drive at Pleasant Street:</i></b>												
<i>Weekday Morning:</i>												
Olmsted Drive SB LT RT	9	14.2	B	0.2	9	15.3	C	0.2	40	21.7	C	1.4
<i>Weekday Evening:</i>												
Olmsted Drive SB LT RT	4	13.5	B	0.1	4	14.5	B	0.1	25	27.9	D	1.4
<b><i>Olmsted Drive at Site Drive A:</i></b>												
<i>Weekday Morning:</i>												
Olmsted Drive WB LT RT	--	--	--	--	--	--	--	--	9	8.7	A	0.0
<i>Weekday Evening:</i>												
Olmsted Drive WB LT RT	--	--	--	--	--	--	--	--	7	8.7	A	0.0
<b><i>Olmsted Drive at Site Drive B:</i></b>												
<i>Weekday Morning:</i>												
Olmsted Drive NB LT RT	--	--	--	--	--	--	--	--	9	8.6	A	0.0
<i>Weekday Evening:</i>												
Olmsted Drive NB LT RT	--	--	--	--	--	--	--	--	7	8.6	A	0.0
<b><i>Olmsted Drive at Site Drive C:</i></b>												
<i>Weekday Morning:</i>												
Olmsted Drive NB LT RT	--	--	--	--	--	--	--	--	3	8.6	A	0.0
<i>Weekday Evening:</i>												
Olmsted Drive NB LT RT	--	--	--	--	--	--	--	--	6	8.6	A	0.0
<b><i>Olmsted Drive at Site Drive D:</i></b>												
<i>Weekday Morning:</i>												
Olmsted Drive NB LT RT	--	--	--	--	--	--	--	--	4	8.5	A	0.0
<i>Weekday Evening:</i>												
Olmsted Drive NB LT RT	--	--	--	--	--	--	--	--	3	8.5	A	0.0

<sup>a</sup>Volume-to-capacity ratio.

<sup>b</sup>Control (signal) delay per vehicle in seconds.

<sup>c</sup>Level-of-Service.

<sup>d</sup>Queue length in vehicle.

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

## OLMSTED DRIVE AT PLEASANT STREET TRAFFIC SIGNAL WARRANT ANALYSIS

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A Traffic Signal Warrant Analysis (TSWA) has been conducted for the intersection of Pleasant Street at Olmsted Drive as required in the TMMA. The TMMA states that a traffic signal should be evaluated at this intersection along with traffic projections of the future McLean Zone 4. In order to project the impacts of the future development within the McLean Zone 4 District, the maximum level of permitted traffic for this District were reviewed, as stipulated in the TTMA. Based on the TTMA, the Zone 4 entails construction of a research and development building and is expected to generate approximately 1,784 vehicle trips on an average weekday, with 206 vehicle trips expected during the weekday morning peak hour and 180 vehicle trips expected during the weekday evening peak hour.

The MUTCD<sup>12</sup> establishes nine warrants or criteria to evaluate a location for the installation or retention of a traffic signal. At least one of the nine warrants should be satisfied in order to justify the installation of a traffic signal; however, satisfaction of a warrant in and of itself does not justify traffic signal control. An engineering evaluation of the location in question should indicate that the establishment of traffic signal control will improve the overall safety and/or operation of the intersection. Table 13 identifies the nine traffic signal warrants.

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<sup>12</sup>*Ibid 4*

**Table 13**  
**TRAFFIC SIGNAL WARRANTS<sup>a</sup>**

Warrant No.	Description
1	Eight-Hour Vehicular Volume Condition A – Min. Vehicular Volume <sup>b</sup> Condition B – Interruption of Continuous Traffic <sup>c</sup>
2	Four-Hour Vehicular Volume
3	Peak Hour
4	Pedestrian Volume
5	School Crossing
6	Coordinated Signal System
7	Crash Experience
8	Roadway Network
9	Intersection near a Grade Crossing

<sup>a</sup>MUTCD; Federal Highway Administration; Washington, DC; 2009.

<sup>b</sup>A large number of intersecting traffic is the principal reason to consider installing a traffic control signal.

<sup>c</sup>Traffic volume on a major street is so heavy that traffic on a minor intersecting street suffer excessive delay in entering or crossing the major street.

In order to performance an analysis a 12-hour TMC was conducted at Pleasant Street at Olmsted Drive in November 2020. The hourly intersection volumes were then grown by 40 percent per year to represent COVID-19 adjustments and increased by 1 percent year to represent 2021 existing conditions. The 2028 No-Build traffic-volume networks were developed by applying the 1 percent per year compounded annual background traffic growth rate to the 2021 baseline condition peak-hour traffic volumes plus the identified background developments. The proposed background development trips were then added to develop volumes for the 2028 No-Build conditions, to which the trips from the Project were added in order to obtains the 2028 Build traffic signal warrant analysis. An additional condition analyzed included trips associated with both the Project and Zone 4. Table 14 identifies the results of the TSWA for the study intersection under existing and Future conditions.

**Table 14**  
**TRAFFIC SIGNAL WARRANTS ANALYSIS RESULTS**

Warrant No.	Description	Satisfied for 2021 Existing Conditions	Satisfied for 2028 No-Build Conditions	Satisfied for 2028 Build Conditions w/Zone 3	Satisfied for 2028 Build Conditions w/Zones 3 and 4
1	Eight-Hour Vehicular Volume	No	No	No	No
	Condition A – Min. Vehicular Volume	No	No	No	No
	Condition B – Interruption of Continuous Traffic	No	No	No	No
2	Four-Hour Vehicular Volume	No	No	No	No
3	Peak Hour	No	No	No	No
4	Pedestrian Volume	No	No	No	No
5	School Crossing	No	No	No	No
6	Coordinated Signal System	No	No	No	No
7	Crash Experience	No	No	No	No
8	Roadway Network	No	No	No	No
9	Grade Crossing	No	No	No	No

As can be seen in Table 14, under all conditions analyzed the intersection of Pleasant Street at Olmsted Drive does not meet any of the warrant criteria. Accordingly, the installation of a traffic signal at this intersection is not justified. The detailed TSWA worksheets are provided in the Appendix.

## **RECOMMENDATIONS AND CONCLUSION**

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VAI has prepared this TIA to evaluate potential traffic impacts associated with the proposed residential development to be located off Olmsted Drive in Belmont, Massachusetts. This study was prepared in accordance with the MassDOT Guidelines for *TIA Guidelines* and was conducted pursuant to the standards of the Traffic Engineering and Transportation Planning Professions for the preparation of such reports. Based on the results of this study, the following can be concluded:

- The proposed 150 housing units are expected to generate approximately 610 vehicle trips on an average weekday (two-way, 24-hour volume), with 36 vehicle trips (11 entering and 25 exiting) expected during the weekday morning peak hour and 46 vehicle trips (26 entering and 20 exiting) expected during the weekday evening peak hour.
- Project-related traffic increases in the area are expected to be between 0.2 and 1.4 percent during the peak hours.
- Lines of sight were found to exceed the recommended minimum sight distance requirements to function in a safe and efficient manner at the intersection of Pleasant Street at Olmsted Drive and all Project site driveway intersections with Olmsted Drive.
- The analysis has indicated that the Project will result in minimal impact on motorist delays at the study intersections, as compared to future No-Build conditions.
- The installation of a traffic signal at Pleasant Street at Olmsted Drive is not justified.

### **RECOMMENDATIONS**

A transportation improvement program has been developed that is designed to provide safe and efficient access to the Project and provide measures to reduce the Project vehicle trip generation and in turn congestion in the study area. The following recommendations are noted with regard to Project access and Transportation Demand Management (TDM) measures.

## **Project Access**

Access to the project site will be located by way of private access driveways from the development site to Olmsted drive. The following recommendations are offered with respect to the design and operation of the development site driveway:

- Improved Olmstead Drive through striping of travel lanes and centerlines, with signage provided where appropriate. Vehicles exiting the Project site onto Olmsted Drive should be placed under STOP-sign control (Manual on Uniform Traffic Devices (MUTCD)<sup>13</sup> R-1), with a painted STOP bar included.
- Any landscaping or building features near the new intersections and driveways should be limited to 24 inches in height or located out of the lines of sight for motorists.
- Snow windrows within sight triangle areas will be promptly removed where such accumulations would impede sight lines.

## **Off-Site Improvements**

### **Olmsted Drive at Pleasant Street (Route 60)**

In order to improve definition for vehicle movements, it is recommended that Olmstead Drive leg be improved through striping of travel lanes and centerlines. A painted STOP bar is also recommended to accompany the existing STOP-sign currently present at the intersection.

Figure 8 graphically depicts the proposed improvements at the proposed site driveway and within the study area as is detailed above.


## **Transportation Demand Management (TDM) Plan**

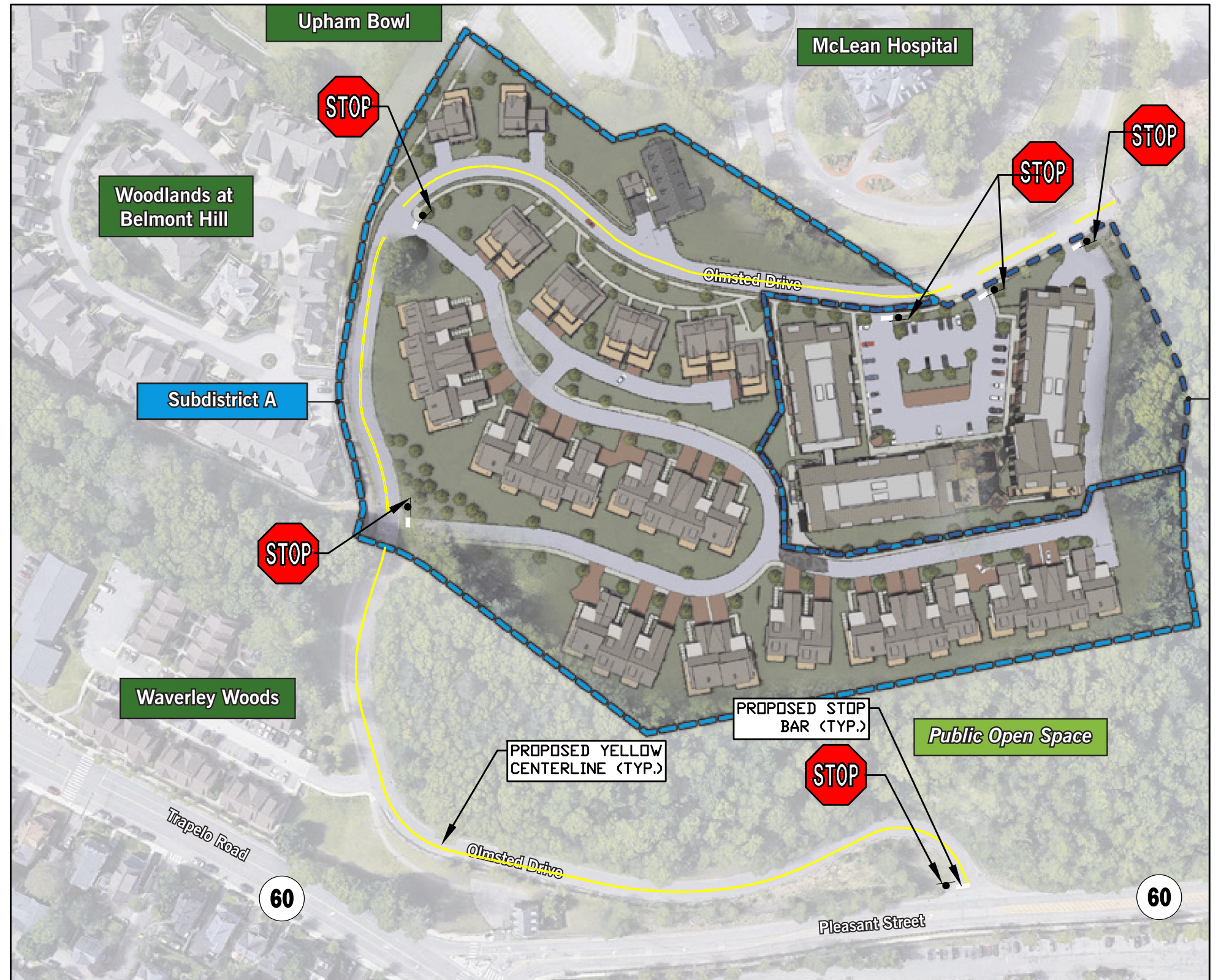
As is the case with many developments, a major focus of the traffic mitigation plan focuses on the reduction of single-occupant vehicles arriving and departing to and from the site. This is accomplished by developing a comprehensive TDM strategy. The proponent is supportive of the development of a balanced multimodal transportation plan to serve the residents when demand is warranted, and the provision of such service is economically feasible. The major features of this TDM plan that support this commitment are as follows:

- The property management team will assign a transportation coordinator to focus on coordinating transportation aspects of the Project with the Town and the promotion of alternative modes of transportation to and from the site.
- While currently there is no Transportation Management Association (TMA) responsible for the Project area, the Applicant is willing to consider providing funds to initiate a TMA for the area.
- A “welcome packet” will be provided to residents detailing available public transportation services, bicycle and walking alternatives, and commuter options available.
- The Project Management Team is committed to coordinate with area shuttle services to

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<sup>13</sup> *Manual on Uniform Traffic Control Devices (MUTCD)*; Federal Highway Administration; Washington, DC; 2009.

SIGN LEGEND	
R1-1	



NOTES: 1. THIS PLAN IS FOR REVIEW PURPOSES ONLY AND IS NOT INTENDED FOR CONSTRUCTION.



**Figure 8**  
Conceptual Improvement Plan

provide site connections to the downtown areas, recreational centers, and public transportation connections.

- In order to encourage the use of public transportation, the property management team will make available public transportation schedules which will be posted in a centralized location for the residents. Transit screens/displays will be provided in the building lobby to display real-time transportation information (similar to <https://transitscreen.com>).
- To encourage car/vanpooling, the property management team will identify car/vanpool resources that may be available to residents of the proposed Project. This information will be posted in a centralized location for the residents, employees and visitors.
- The property management team will provide information on available pedestrian and bicycle facilities in the vicinity of the Project site. This information will be posted in a centralized location.
- Bicycle racks will be provided on-site both inside and outside the buildings.

The Project proponent will investigate the implementation of these traffic reduction strategies and will work with the Town to implement such programs.

### **TMMA - TRAFFIC MONITORING PROGRAM**

To ensure compliance with the Traffic Monitoring and Mitigation Agreement (TMMA), the proposed Zone 3 development in conjunction with the proposed Zone 4 development shall be subject to a post occupancy traffic monitoring reporting to the Town of Belmont, including the following features:

- Data collected for the traffic monitoring program will include traffic volume entering and existing the proposed Research and Development subdistrict and the Senior Living subdistrict developments. The monitoring will involve continuous Automatic Traffic Recorder (ATR) counts on a daily basis (Data will be collected in 15-minute increments). Data shall be retained for at least one year from the data of collection.
- A “Weekly Sampling Report” shall mean a data collection report providing monitoring results over five consecutive, non-holiday weekdays, summarized by on hour intervals and by daily totals. The morning and evening peak hour volumes for each weekday will be determined, and average morning and evening peak hour volumes will be determined for the week. In addition, the daily trip totals for each weekday will be determined and average daily trips totals will be determined for the week.
- Within six months after the issuance of a building permit for a structure for the Proposed Project, a TDM plan shall be submitted to the Town.
- Within thirty days of a project located within the Research and Development subdistrict or the Senior Living subdistrict reaching a 90% occupancy level, or one year after certificate of occupancy has been issued, whichever is earlier, the proponent shall coordinate with the Town Engineer to provide a Weekly Sampling Report. The Town engineer will designate which week the data should be collected. After the determination of the week the sampling report shall be submitted to the town within seven days.

## **TMMA - RECOURSE ACTIONS**

The proponent will take additional actions to manage site traffic conditions should the weekly sampling report indicate that the performance goals are not being met. Triggers requiring further action include:

- Either the morning or evening average peak hour trip generation rate exceeds the permitted rate.
- The average daily trip total exceeds the permitted rate.

Additional actions that may be implemented if the performance criteria are not met may include but are not limited to:

- Prepare and submit to the Town Engineers an updated TDM plan.
- Use diligent efforts to implement such plan as soon as possible.

The proponent will provide follow-up weekly sampling reports to the Town engineer until no further violation exists. If a weekly sampling report contains a violation, then the proponent shall pay the town of Belmont a traffic mitigation payment. If the weekly sampling report continues to show violations for two weeks, then Belmont may restrict the number of parking spaces which can be used during the morning and evening peak hour to the extent that Town Engineer determines is needed to correct the violations. If two consecutive months follow-up weekly sampling reports indicate that average trip generation is below the permitted rate, the Town will return full control of parking to the proponent. The proponent will be obligated to file follow-up weekly sampling reports for one month after full control of parking has been returned.

## **CONCLUSIONS**

The proposed Project will result in a measurable but a significant impact on overall operations. With the implementation of the above recommendations, safe and efficient access will be provided to the planned development and the development can be constructed with minimal impact to the area.

## APPENDIX

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SITE PLAN  
TURNING MOVEMENT COUNTS  
AUTOMATIC TRAFFIC RECORDER  
SEASONAL ADJUSTMENT  
COVID ADJUSTMENTS  
MOTOR VEHICLE CRASH DATA  
PUBLIC TRANSPORTATION SCHEDULE  
BACKGROUND DEVELOPMENT  
GENERAL BACKGROUND TRAFFIC GROWTH  
US CENSUS  
TRIP GENERATION  
TRIP DISTRIBUTION  
TRAFFIC SIGNAL WARRANT ANALYSIS (TSWA)  
CAPACITY ANALYSIS

## SITE PLAN

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# McLean Zone 3 | Residences at Bel Mont

March 18, 2021



## TURNING MOVEMENT COUNTS

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# Accurate Counts

978-664-2565

N/S Street : Pleasant Street  
E/W Street : Trapelo Road  
City/State : Belmont, MA  
Weather : Clear

File Name : 80580002  
Site Code : 80580002  
Start Date : 11/10/2020  
Page No : 1

## Groups Printed- Cars - Trucks

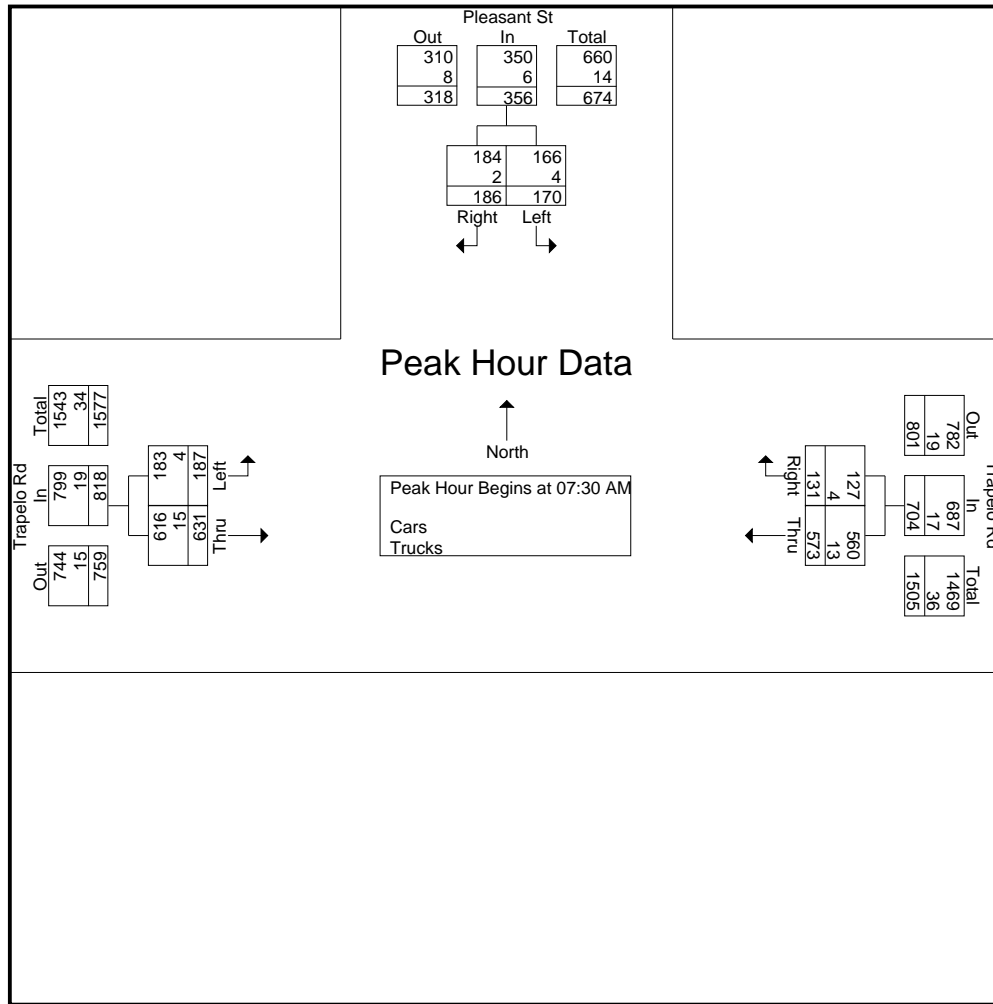
	Pleasant St From North		Trapelo Rd From East		Trapelo Rd From West		
Start Time	Left	Right	Thru	Right	Left	Thru	Int. Total
07:00 AM	32	37	116	14	37	111	347
07:15 AM	37	36	101	17	46	146	383
07:30 AM	46	41	126	33	62	157	465
07:45 AM	43	41	145	34	40	160	463
Total	158	155	488	98	185	574	1658
08:00 AM	35	54	157	37	44	145	472
08:15 AM	46	50	145	27	41	169	478
08:30 AM	27	45	157	26	41	151	447
08:45 AM	34	54	128	19	38	155	428
Total	142	203	587	109	164	620	1825
Grand Total	300	358	1075	207	349	1194	3483
Apprch %	45.6	54.4	83.9	16.1	22.6	77.4	
Total %	8.6	10.3	30.9	5.9	10	34.3	
Cars	295	352	1053	201	342	1165	3408
% Cars	98.3	98.3	98	97.1	98	97.6	97.8
Trucks	5	6	22	6	7	29	75
% Trucks	1.7	1.7	2	2.9	2	2.4	2.2

	Pleasant St From North			Trapelo Rd From East			Trapelo Rd From West			
Start Time	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	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	<b>46</b>	41	87	126	33	159	<b>62</b>	157	<b>219</b>	465
07:45 AM	43	41	84	145	34	179	40	160	200	463
08:00 AM	35	<b>54</b>	89	<b>157</b>	<b>37</b>	<b>194</b>	44	145	189	472
08:15 AM	46	50	<b>96</b>	145	27	172	41	<b>169</b>	210	<b>478</b>
Total Volume	170	186	356	573	131	704	187	631	818	1878
% App. Total	47.8	52.2		81.4	18.6		22.9	77.1		
PHF	.924	.861	.927	.912	.885	.907	.754	.933	.934	.982
Cars	166	184	350	560	127	687	183	616	799	1836
% Cars	97.6	98.9	98.3	97.7	96.9	97.6	97.9	97.6	97.7	97.8
Trucks	4	2	6	13	4	17	4	15	19	42
% Trucks	2.4	1.1	1.7	2.3	3.1	2.4	2.1	2.4	2.3	2.2

**Accurate Counts**  
978-664-2565

N/S Street : Pleasant Street  
E/W Street : Trapelo Road  
City/State : Belmont, MA  
Weather : Clear

File Name : 80580002  
Site Code : 80580002  
Start Date : 11/10/2020  
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:

	07:30 AM			07:45 AM			07:30 AM		
+0 mins.	<b>46</b>	41	87	145	34	179	<b>62</b>	157	<b>219</b>
+15 mins.	43	41	84	<b>157</b>	<b>37</b>	<b>194</b>	40	160	200
+30 mins.	35	<b>54</b>	89	145	27	172	44	145	189
+45 mins.	46	50	<b>96</b>	157	26	183	41	<b>169</b>	210
Total Volume	170	186	356	604	124	728	187	631	818
% App. Total	47.8	52.2		83	17		22.9	77.1	
PHF	.924	.861	.927	.962	.838	.938	.754	.933	.934
Cars	166	184	350	591	118	709	183	616	799
% Cars	97.6	98.9	98.3	97.8	95.2	97.4	97.9	97.6	97.7
Trucks	4	2	6	13	6	19	4	15	19
% Trucks	2.4	1.1	1.7	2.2	4.8	2.6	2.1	2.4	2.3

# Accurate Counts

978-664-2565

N/S Street : Pleasant Street  
E/W Street : Trapelo Road  
City/State : Belmont, MA  
Weather : Clear

File Name : 80580002  
Site Code : 80580002  
Start Date : 11/10/2020  
Page No : 10

## Groups Printed- Bikes Peds

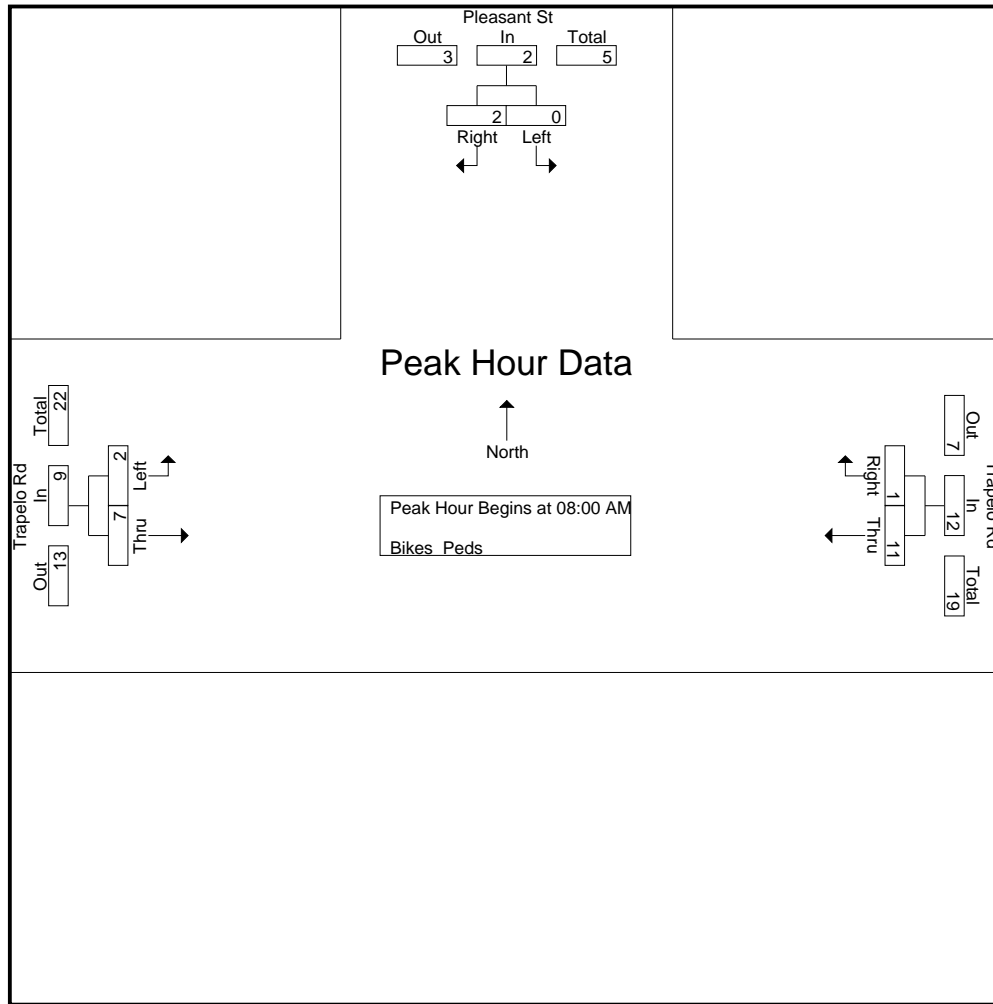
	Pleasant St From North			Trapelo Rd From East			Trapelo Rd From West			Exclu. Total	Inclu. Total	Int. Total
Start Time	Left	Right	Peds	Thru	Right	Peds	Left	Thru	Peds			
07:00 AM	0	0	0	2	0	0	0	3	0	0	5	5
07:15 AM	0	0	2	0	0	1	0	3	0	3	3	6
07:30 AM	0	0	3	0	0	0	0	5	2	5	5	10
07:45 AM	1	0	2	0	0	0	1	0	0	2	2	4
Total	1	0	7	2	0	1	1	11	2	10	15	25
08:00 AM	0	0	5	5	0	0	0	0	3	8	5	13
08:15 AM	0	0	1	0	0	1	0	2	1	3	2	5
08:30 AM	0	1	4	3	1	0	1	1	2	6	7	13
08:45 AM	0	1	2	3	0	0	1	4	0	2	9	11
Total	0	2	12	11	1	1	2	7	6	19	23	42
Grand Total	1	2	19	13	1	2	3	18	8	29	38	67
Apprch %	33.3	66.7		92.9	7.1		14.3	85.7				
Total %	2.6	5.3		34.2	2.6		7.9	47.4		43.3	56.7	

	Pleasant St From North			Trapelo Rd From East			Trapelo Rd From West			Int. Total
Start Time	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. Total	
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 08:00 AM										
08:00 AM	0	0	0	5	0	5	0	0	0	5
08:15 AM	0	0	0	0	0	0	0	2	2	2
08:30 AM	0	1	1	3	1	4	1	1	2	7
08:45 AM	0	1	1	3	0	3	1	4	5	9
Total Volume	0	2	2	11	1	12	2	7	9	23
% App. Total	0	100		91.7	8.3		22.2	77.8		
PHF	.000	.500	.500	.550	.250	.600	.500	.438	.450	.639

**Accurate Counts**  
978-664-2565

N/S Street : Pleasant Street  
E/W Street : Trapelo Road  
City/State : Belmont, MA  
Weather : Clear

File Name : 80580002  
Site Code : 80580002  
Start Date : 11/10/2020  
Page No : 11



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

	07:45 AM			08:00 AM			07:00 AM		
+0 mins.	1	0	1	5	0	5	0	3	3
+15 mins.	0	0	0	0	0	0	0	3	3
+30 mins.	0	0	0	3	1	4	0	5	5
+45 mins.	0	1	1	3	0	3	1	0	1
Total Volume	1	1	2	11	1	12	1	11	12
% App. Total	50	50		91.7	8.3		8.3	91.7	
PHF	.250	.250	.500	.550	.250	.600	.250	.550	.600

# Accurate Counts

978-664-2565

N/S Street : Pleasant Street  
E/W Street : Trapelo Road  
City/State : Belmont, MA  
Weather : Clear

File Name : 80580002  
Site Code : 80580002  
Start Date : 11/10/2020  
Page No : 1

## Groups Printed- Cars - Trucks

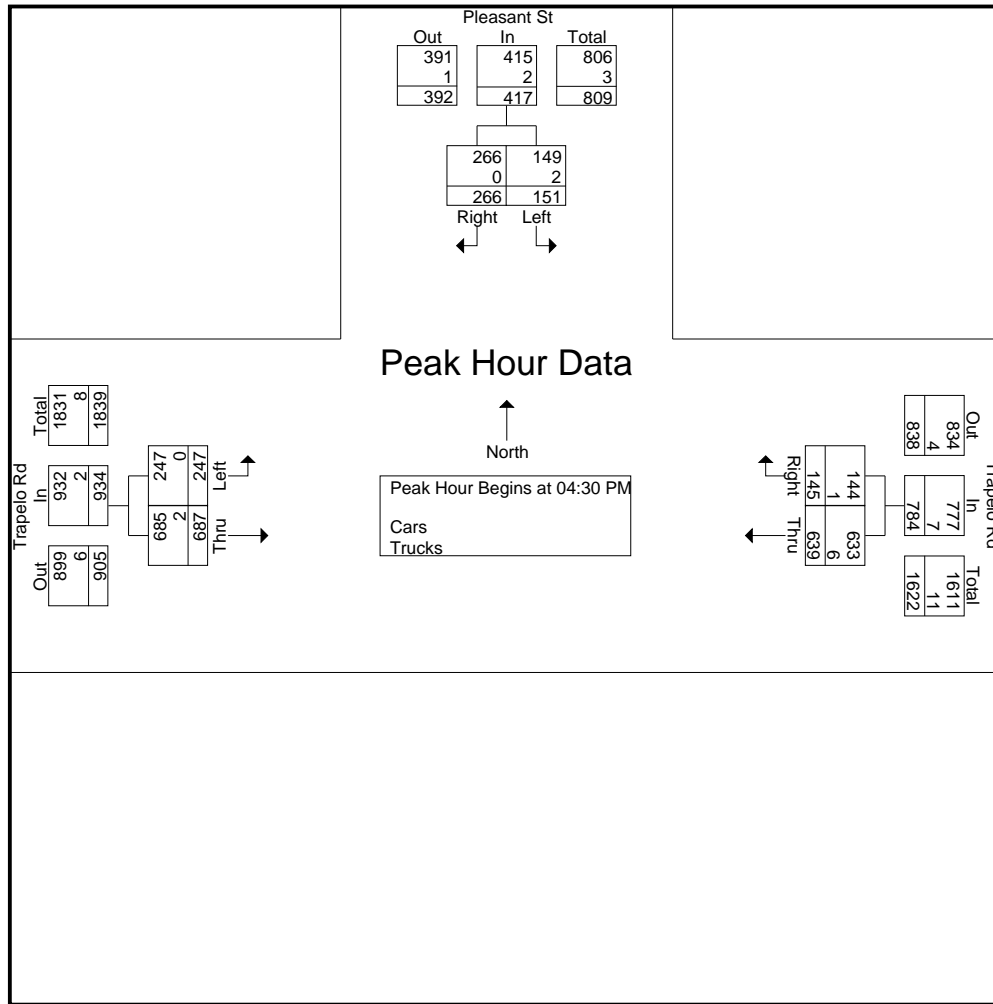
	Pleasant St From North		Trapelo Rd From East		Trapelo Rd From West		
Start Time	Left	Right	Thru	Right	Left	Thru	Int. Total
04:00 PM	35	63	158	32	73	168	529
04:15 PM	36	48	157	35	48	168	492
04:30 PM	42	54	166	45	67	186	560
04:45 PM	41	76	152	33	55	167	524
Total	154	241	633	145	243	689	2105
05:00 PM	24	70	161	26	71	161	513
05:15 PM	44	66	160	41	54	173	538
05:30 PM	32	53	131	26	51	138	431
05:45 PM	31	37	103	25	50	109	355
Total	131	226	555	118	226	581	1837
Grand Total	285	467	1188	263	469	1270	3942
Apprch %	37.9	62.1	81.9	18.1	27	73	
Total %	7.2	11.8	30.1	6.7	11.9	32.2	
Cars	283	467	1178	260	469	1265	3922
% Cars	99.3	100	99.2	98.9	100	99.6	99.5
Trucks	2	0	10	3	0	5	20
% Trucks	0.7	0	0.8	1.1	0	0.4	0.5

	Pleasant St From North			Trapelo Rd From East			Trapelo Rd From West			
Start Time	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	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 04:30 PM										
04:30 PM	42	54	96	<b>166</b>	<b>45</b>	<b>211</b>	67	<b>186</b>	<b>253</b>	<b>560</b>
04:45 PM	41	<b>76</b>	<b>117</b>	152	33	185	55	167	222	524
05:00 PM	24	70	94	161	26	187	<b>71</b>	161	232	513
05:15 PM	<b>44</b>	66	110	160	41	201	54	173	227	538
Total Volume	151	266	417	639	145	784	247	687	934	2135
% App. Total	36.2	63.8		81.5	18.5		26.4	73.6		
PHF	.858	.875	.891	.962	.806	.929	.870	.923	.923	.953
Cars	149	266	415	633	144	777	247	685	932	2124
% Cars	98.7	100	99.5	99.1	99.3	99.1	100	99.7	99.8	99.5
Trucks	2	0	2	6	1	7	0	2	2	11
% Trucks	1.3	0	0.5	0.9	0.7	0.9	0	0.3	0.2	0.5

**Accurate Counts**  
978-664-2565

N/S Street : Pleasant Street  
E/W Street : Trapelo Road  
City/State : Belmont, MA  
Weather : Clear

File Name : 80580002  
Site Code : 80580002  
Start Date : 11/10/2020  
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:

	04:30 PM			04:30 PM			04:30 PM		
+0 mins.	42	54	96	<b>166</b>	<b>45</b>	<b>211</b>	67	<b>186</b>	<b>253</b>
+15 mins.	41	<b>76</b>	<b>117</b>	152	33	185	55	167	222
+30 mins.	24	70	94	161	26	187	<b>71</b>	161	232
+45 mins.	<b>44</b>	66	110	160	41	201	54	173	227
Total Volume	151	266	417	639	145	784	247	687	934
% App. Total	36.2	63.8		81.5	18.5		26.4	73.6	
PHF	.858	.875	.891	.962	.806	.929	.870	.923	.923
Cars	149	266	415	633	144	777	247	685	932
% Cars	98.7	100	99.5	99.1	99.3	99.1	100	99.7	99.8
Trucks	2	0	2	6	1	7	0	2	2
% Trucks	1.3	0	0.5	0.9	0.7	0.9	0	0.3	0.2

# Accurate Counts

978-664-2565

N/S Street : Pleasant Street  
E/W Street : Trapelo Road  
City/State : Belmont, MA  
Weather : Clear

File Name : 80580002  
Site Code : 80580002  
Start Date : 11/10/2020  
Page No : 10

## Groups Printed- Bikes Peds

	Pleasant St From North			Trapelo Rd From East			Trapelo Rd From West			Exclu. Total	Inclu. Total	Int. Total
Start Time	Left	Right	Peds	Thru	Right	Peds	Left	Thru	Peds			
04:00 PM	0	0	3	0	1	0	0	3	1	4	4	8
04:15 PM	0	1	5	3	0	0	0	1	1	6	5	11
04:30 PM	0	0	8	1	0	0	0	0	5	13	1	14
04:45 PM	0	0	7	0	0	0	0	2	1	8	2	10
Total	0	1	23	4	1	0	0	6	8	31	12	43
05:00 PM	0	0	6	0	0	0	0	2	5	11	2	13
05:15 PM	0	0	9	0	0	0	0	0	2	11	0	11
05:30 PM	0	0	2	0	0	0	0	0	1	3	0	3
05:45 PM	1	0	5	0	0	0	1	0	0	5	2	7
Total	1	0	22	0	0	0	1	2	8	30	4	34
Grand Total	1	1	45	4	1	0	1	8	16	61	16	77
Apprch %	50	50		80	20		11.1	88.9				
Total %	6.2	6.2		25	6.2		6.2	50		79.2	20.8	

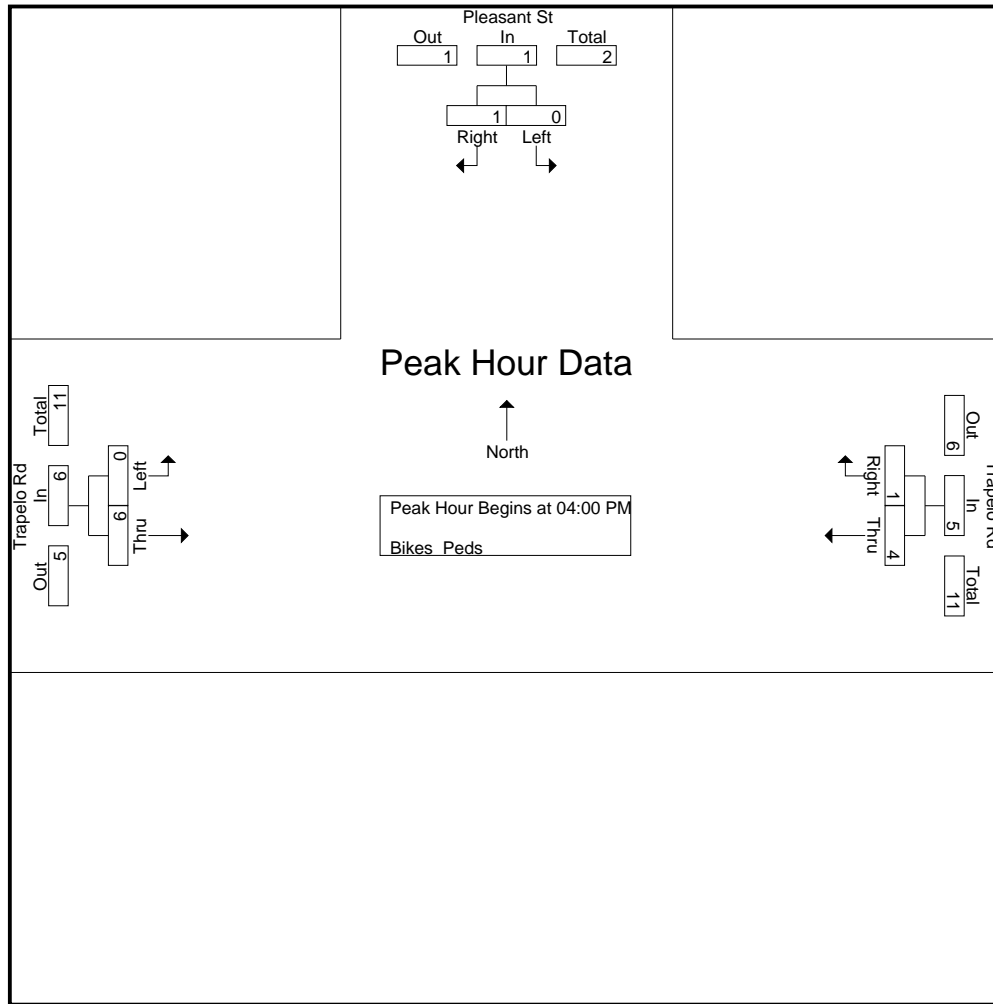
	Pleasant St From North			Trapelo Rd From East			Trapelo Rd From West			
Start Time	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 04:00 PM										
04:00 PM	0	0	0	0	1	1	0	3	3	4
04:15 PM	0	1	1	3	0	3	0	1	1	5
04:30 PM	0	0	0	1	0	1	0	0	0	1
04:45 PM	0	0	0	0	0	0	0	2	2	2
Total Volume	0	1	1	4	1	5	0	6	6	12
% App. Total	0	100		80	20		0	100		
PHF	.000	.250	.250	.333	.250	.417	.000	.500	.500	.600

# Accurate Counts

978-664-2565

N/S Street : Pleasant Street  
 E/W Street : Trapelo Road  
 City/State : Belmont, MA  
 Weather : Clear

File Name : 80580002  
 Site Code : 80580002  
 Start Date : 11/10/2020  
 Page No : 11



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

	04:00 PM			04:00 PM			04:00 PM		
+0 mins.	0	0	0	0	1	1	0	3	3
+15 mins.	0	1	1	3	0	3	0	1	1
+30 mins.	0	0	0	1	0	1	0	0	0
+45 mins.	0	0	0	0	0	0	0	2	2
Total Volume	0	1	1	4	1	5	0	6	6
% App. Total	0	100		80	20		0	100	
PHF	.000	.250	.250	.333	.250	.417	.000	.500	.500

# Accurate Counts

978-664-2565

N/S Street : Olmsted Drive  
E/W Street : Pleasant Street  
City/State : Belmont, MA  
Weather : Clear

File Name : 80580003  
Site Code : 80580003  
Start Date : 11/10/2020  
Page No : 1

## Groups Printed- Cars - Trucks

	Olmsted Dr From North		Pleasant St From East		Pleasant St From West		
Start Time	Left	Right	Thru	Right	Left	Thru	Int. Total
07:00 AM	0	0	77	0	0	51	128
07:15 AM	1	2	69	1	2	61	136
07:30 AM	1	5	79	0	0	93	178
07:45 AM	1	2	82	0	0	78	163
Total	3	9	307	1	2	283	605
08:00 AM	0	0	89	0	0	81	170
08:15 AM	0	0	98	0	1	67	166
08:30 AM	2	1	73	1	1	69	147
08:45 AM	0	1	84	1	0	55	141
Total	2	2	344	2	2	272	624
09:00 AM	1	2	91	1	0	60	155
09:15 AM	1	2	61	0	1	54	119
09:30 AM	1	2	67	0	1	54	125
09:45 AM	0	1	74	1	1	61	138
Total	3	7	293	2	3	229	537
10:00 AM	3	2	68	2	4	54	133
10:15 AM	0	2	48	1	1	66	118
10:30 AM	0	5	65	3	0	62	135
10:45 AM	0	1	71	0	1	59	132
Total	3	10	252	6	6	241	518
11:00 AM	0	0	60	1	0	64	125
11:15 AM	2	0	56	0	2	62	122
11:30 AM	0	2	62	3	1	56	124
11:45 AM	1	1	66	1	2	70	141
Total	3	3	244	5	5	252	512
12:00 PM	1	1	67	0	2	69	140
12:15 PM	1	4	83	0	0	65	153
12:30 PM	0	2	74	1	1	50	128
12:45 PM	1	1	67	1	0	72	142
Total	3	8	291	2	3	256	563
01:00 PM	1	1	71	1	3	66	143
01:15 PM	1	0	56	3	2	87	149
01:30 PM	2	2	69	0	2	83	158
01:45 PM	2	1	64	3	1	73	144
Total	6	4	260	7	8	309	594
02:00 PM	1	0	76	0	1	69	147
02:15 PM	1	0	75	0	1	67	144
02:30 PM	0	2	98	0	3	78	181
02:45 PM	0	3	106	0	0	80	189
Total	2	5	355	0	5	294	661
03:00 PM	2	2	90	1	3	87	185
03:15 PM	3	2	73	2	2	84	166
03:30 PM	0	3	99	3	4	91	200
03:45 PM	1	3	95	2	2	92	195
Total	6	10	357	8	11	354	746
04:00 PM	2	3	93	0	0	109	207
04:15 PM	0	2	81	0	3	77	163
04:30 PM	0	0	102	0	2	115	219
04:45 PM	0	0	115	1	1	86	203
Total	2	5	391	1	6	387	792
05:00 PM	0	1	102	0	0	96	199
05:15 PM	0	3	103	0	2	92	200

# Accurate Counts

978-664-2565

N/S Street : Olmsted Drive  
E/W Street : Pleasant Street  
City/State : Belmont, MA  
Weather : Clear

File Name : 80580003  
Site Code : 80580003  
Start Date : 11/10/2020  
Page No : 2

## Groups Printed- Cars - Trucks

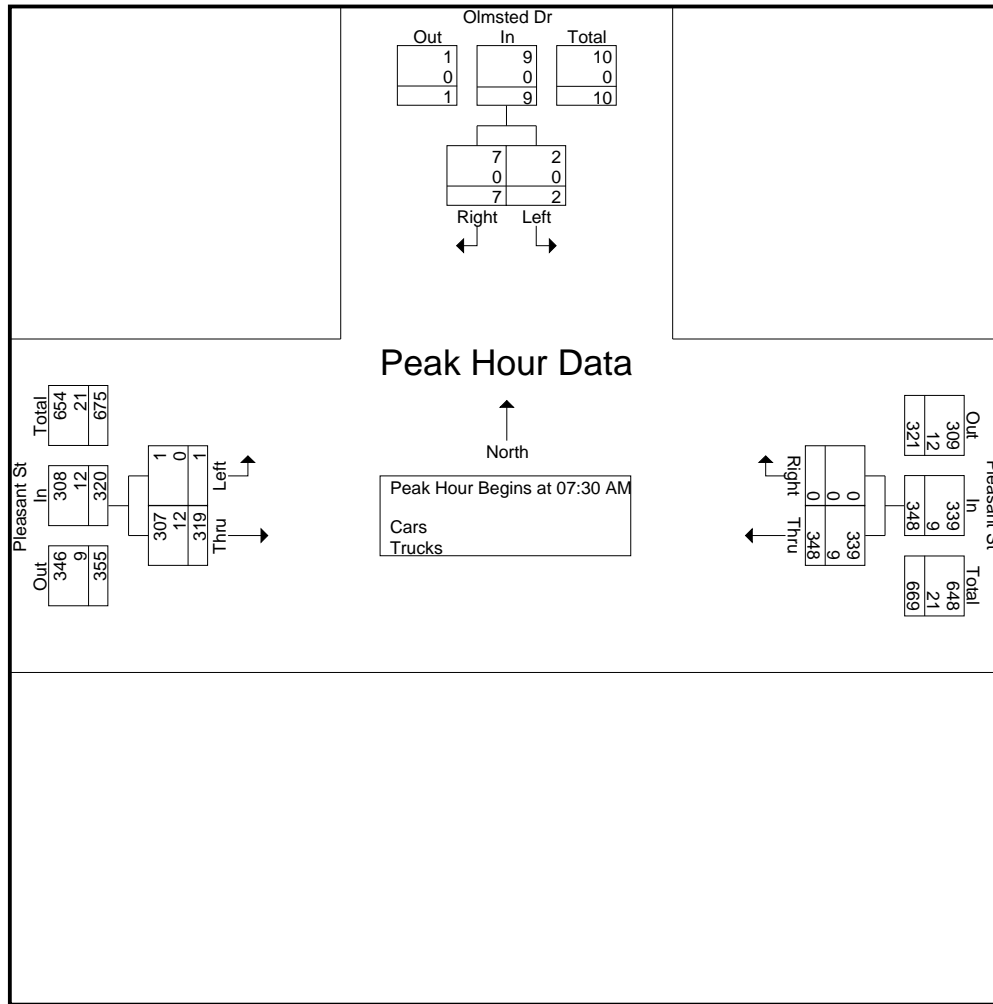
	Olmsted Dr From North		Pleasant St From East		Pleasant St From West		
Start Time	Left	Right	Thru	Right	Left	Thru	Int. Total
05:30 PM	0	0	84	2	1	75	162
05:45 PM	1	0	69	1	0	76	147
Total	1	4	358	3	3	339	708
06:00 PM	3	2	61	1	6	73	146
06:15 PM	3	2	74	3	2	54	138
06:30 PM	1	2	49	1	1	55	109
06:45 PM	0	1	59	0	0	50	110
Total	7	7	243	5	9	232	503
Grand Total	41	74	3695	42	63	3448	7363
Apprch %	35.7	64.3	98.9	1.1	1.8	98.2	
Total %	0.6	1	50.2	0.6	0.9	46.8	
Cars	41	73	3596	42	62	3348	7162
% Cars	100	98.6	97.3	100	98.4	97.1	97.3
Trucks	0	1	99	0	1	100	201
% Trucks	0	1.4	2.7	0	1.6	2.9	2.7

	Olmsted Dr From North			Pleasant St From East			Pleasant St From West			
Start Time	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 09:45 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 07:30 AM										
07:30 AM	1	5	6	79	0	79	0	93	93	178
07:45 AM	1	2	3	82	0	82	0	78	78	163
08:00 AM	0	0	0	89	0	89	0	81	81	170
08:15 AM	0	0	0	98	0	98	1	67	68	166
Total Volume	2	7	9	348	0	348	1	319	320	677
% App. Total	22.2	77.8		100	0		0.3	99.7		
PHF	.500	.350	.375	.888	.000	.888	.250	.858	.860	.951
Cars	2	7	9	339	0	339	1	307	308	656
% Cars	100	100	100	97.4	0	97.4	100	96.2	96.3	96.9
Trucks	0	0	0	9	0	9	0	12	12	21
% Trucks	0	0	0	2.6	0	2.6	0	3.8	3.8	3.1

**Accurate Counts**  
978-664-2565

N/S Street : Olmsted Drive  
E/W Street : Pleasant Street  
City/State : Belmont, MA  
Weather : Clear

File Name : 80580003  
Site Code : 80580003  
Start Date : 11/10/2020  
Page No : 3



Peak Hour Analysis From 07:00 AM to 09:45 AM - Peak 1 of 1  
Peak Hour for Each Approach Begins at:

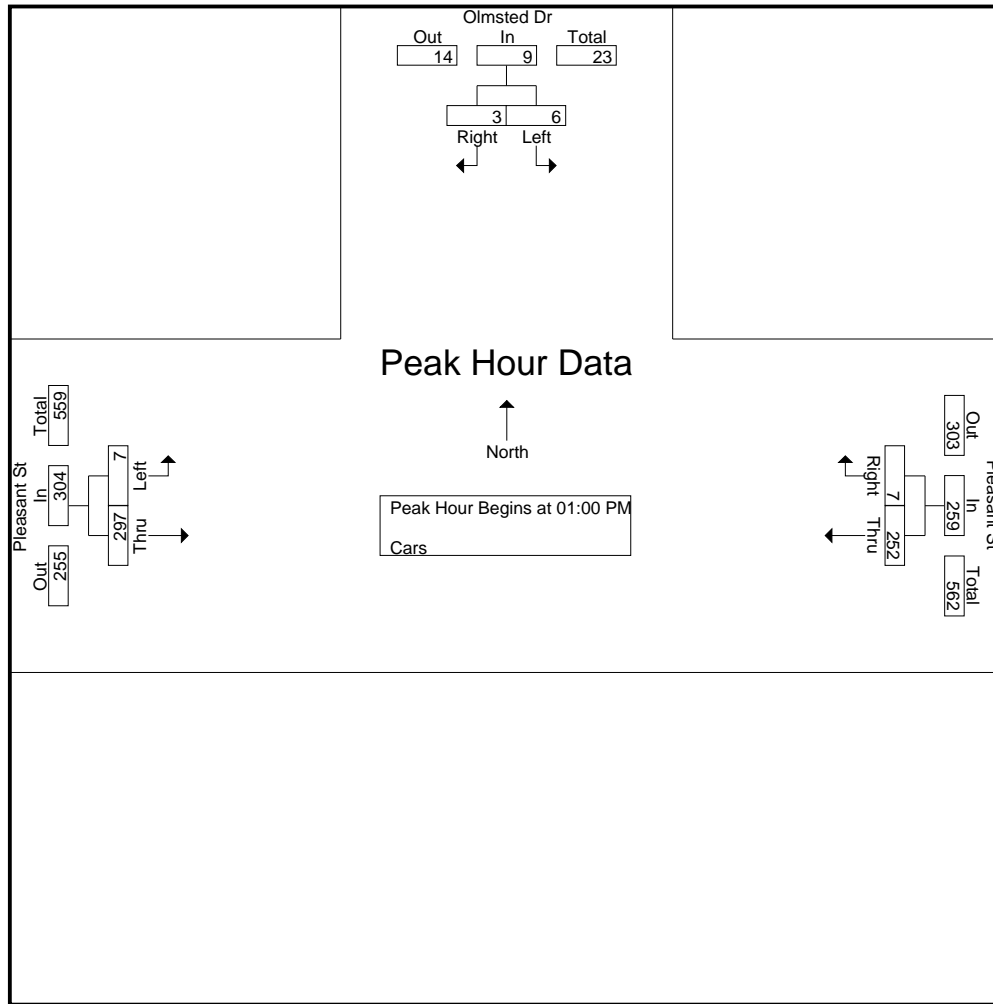
	07:00 AM			08:15 AM			07:30 AM		
+0 mins.	0	0	0	<b>98</b>	0	<b>98</b>	0	<b>93</b>	<b>93</b>
+15 mins.	1	2	3	73	1	74	0	78	78
+30 mins.	1	5	6	84	1	85	0	81	81
+45 mins.	1	2	3	91	1	92	1	67	68
Total Volume	3	9	12	346	3	349	1	319	320
% App. Total	25	75		99.1	0.9		0.3	99.7	
PHF	.750	.450	.500	.883	.750	.890	.250	.858	.860
Cars	3	9	12	332	3	335	1	307	308
% Cars	100	100	100	96	100	96	100	96.2	96.2
Trucks	0	0	0	14	0	14	0	12	12
% Trucks	0	0	0	4	0	4	0	3.8	3.8

# Accurate Counts

978-664-2565

N/S Street : Olmsted Drive  
 E/W Street : Pleasant Street  
 City/State : Belmont, MA  
 Weather : Clear

File Name : 80580003  
 Site Code : 80580003  
 Start Date : 11/10/2020  
 Page No : 12



Peak Hour Analysis From 10:00 AM to 01:45 PM - Peak 1 of 1  
 Peak Hour for Each Approach Begins at:

	10:00 AM			12:15 PM			01:00 PM		
+0 mins.	3	2	5	80	0	80	2	66	68
+15 mins.	0	2	2	67	1	68	2	81	83
+30 mins.	0	5	5	64	1	65	2	80	82
+45 mins.	0	1	1	68	1	69	1	70	71
Total Volume	3	10	13	279	3	282	7	297	304
% App. Total	23.1	76.9		98.9	1.1		2.3	97.7	
PHF	.250	.500	.650	.872	.750	.881	.875	.917	.916

**Accurate Counts**  
978-664-2565

N/S Street : Olmsted Drive  
E/W Street : Pleasant Street  
City/State : Belmont, MA  
Weather : Clear

File Name : 80580003  
Site Code : 80580003  
Start Date : 11/10/2020  
Page No : 23

Groups Printed- Bikes Peds

	Olmsted Dr From North			Pleasant St From East			Pleasant St From West			Exclu. Total	Inclu. Total	Int. Total
Start Time	Left	Right	Peds	Thru	Right	Peds	Left	Thru	Peds			
07:00 AM	0	0	0	0	0	0	0	0	0	0	0	0
07:15 AM	0	0	0	0	0	0	0	0	0	0	0	0
07:30 AM	0	0	0	1	0	0	0	0	0	0	1	1
07:45 AM	0	0	0	1	0	0	0	1	0	0	2	2
Total	0	0	0	2	0	0	0	1	0	0	3	3
08:00 AM	0	0	0	0	0	0	0	0	0	0	0	0
08:15 AM	0	0	0	0	0	0	0	0	0	0	0	0
08:30 AM	0	0	0	1	0	0	0	2	0	0	3	3
08:45 AM	0	0	0	1	0	1	0	1	0	1	2	3
Total	0	0	0	2	0	1	0	3	0	1	5	6
09:00 AM	1	0	0	0	0	0	0	0	0	0	1	1
09:15 AM	0	1	0	0	0	0	0	0	0	0	1	1
09:30 AM	0	0	0	0	0	0	0	0	0	0	0	0
09:45 AM	0	0	0	1	0	0	0	0	0	0	1	1
Total	1	1	0	1	0	0	0	0	0	0	3	3
10:00 AM	0	0	0	0	2	0	0	1	0	0	3	3
10:15 AM	0	1	0	1	0	0	0	0	0	0	2	2
10:30 AM	0	0	0	0	0	0	0	0	0	0	0	0
10:45 AM	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	1	0	1	2	0	0	1	0	0	5	5
11:00 AM	0	0	0	0	0	0	0	1	0	0	1	1
11:15 AM	0	0	0	0	0	0	0	1	0	0	1	1
11:30 AM	0	0	0	0	0	0	0	0	0	0	0	0
11:45 AM	0	0	0	1	0	0	0	0	0	0	1	1
Total	0	0	0	1	0	0	0	2	0	0	3	3
12:00 PM	0	0	0	1	0	0	0	0	0	0	1	1
12:15 PM	0	0	0	2	0	0	0	1	0	0	3	3
12:30 PM	0	0	0	1	0	0	0	0	0	0	1	1
12:45 PM	0	0	0	0	0	0	0	1	0	0	1	1
Total	0	0	0	4	0	0	0	2	0	0	6	6
01:00 PM	0	0	0	0	0	0	0	1	0	0	1	1
01:15 PM	0	0	0	1	0	0	0	0	0	0	1	1
01:30 PM	0	0	0	0	0	0	0	0	0	0	0	0
01:45 PM	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	1	0	0	0	1	0	0	2	2
02:00 PM	0	0	0	0	0	0	0	0	0	0	0	0
02:15 PM	0	0	0	2	0	0	0	2	0	0	4	4
02:30 PM	0	0	0	0	0	0	0	3	0	0	3	3
02:45 PM	0	0	0	1	1	0	0	1	0	0	3	3
Total	0	0	0	3	1	0	0	6	0	0	10	10
03:00 PM	0	0	0	1	0	0	0	1	0	0	2	2
03:15 PM	0	0	0	1	0	0	0	1	0	0	2	2
03:30 PM	1	0	0	1	0	0	0	2	0	0	4	4
03:45 PM	0	0	0	0	0	0	0	2	0	0	2	2
Total	1	0	0	3	0	0	0	6	0	0	10	10
04:00 PM	0	0	0	0	0	0	0	1	0	0	1	1
04:15 PM	0	0	0	1	0	0	0	1	0	0	2	2
04:30 PM	1	0	0	1	0	0	0	1	0	0	3	3
04:45 PM	0	0	0	1	0	0	0	0	0	0	1	1
Total	1	0	0	3	0	0	0	3	0	0	7	7
05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	0
05:30 PM	0	0	0	0	0	0	0	1	0	0	1	1
05:45 PM	0	0	0	0	0	0	0	1	0	0	1	1
Total	0	0	0	0	0	0	0	2	0	0	2	2

# Accurate Counts

978-664-2565

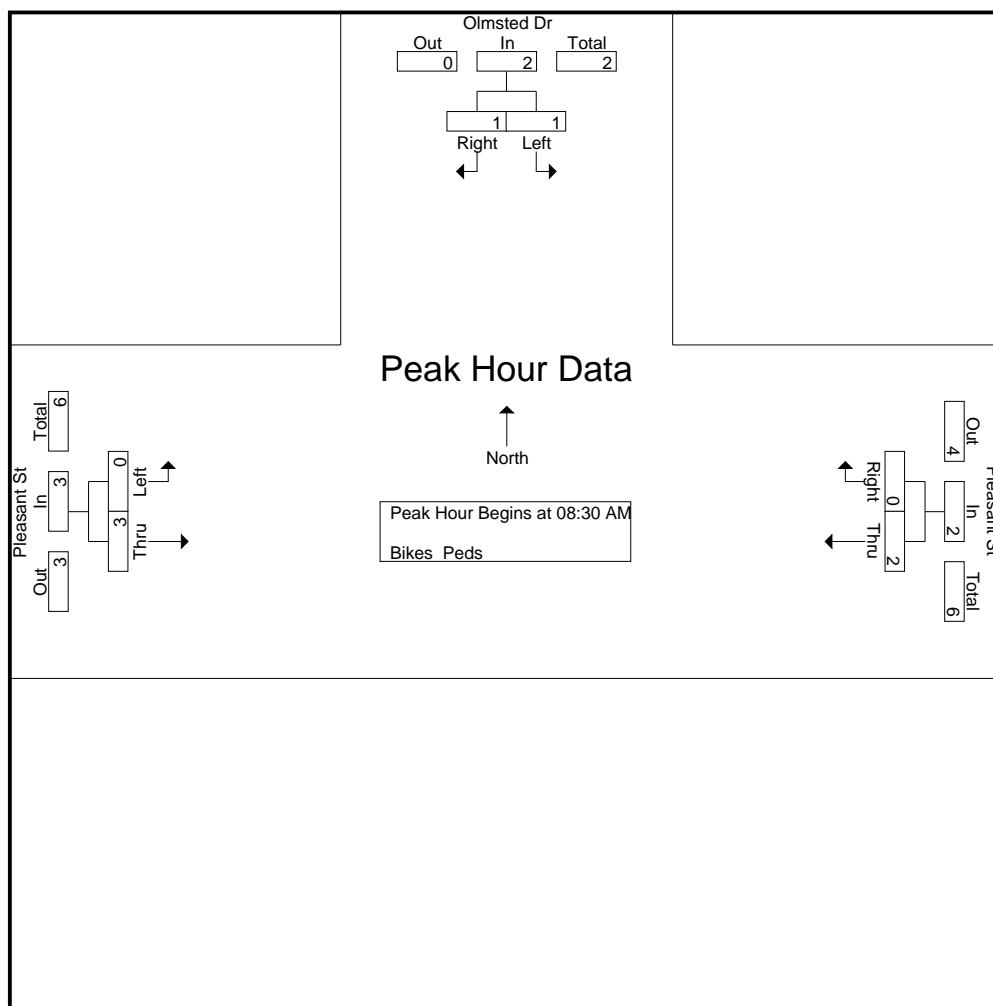
N/S Street : Olmsted Drive  
E/W Street : Pleasant Street  
City/State : Belmont, MA  
Weather : Clear

File Name : 80580003  
Site Code : 80580003  
Start Date : 11/10/2020  
Page No : 24

## Groups Printed- Bikes Peds

	Olmsted Dr From North			Pleasant St From East			Pleasant St From West			Exclu. Total	Inclu. Total	Int. Total
Start Time	Left	Right	Peds	Thru	Right	Peds	Left	Thru	Peds			
06:00 PM	0	0	0	0	0	0	0	0	0	0	0	0
06:15 PM	0	0	0	0	0	0	0	0	0	0	0	0
06:30 PM	0	0	0	0	0	0	0	0	0	0	0	0
06:45 PM	0	0	0	1	0	0	0	1	0	0	2	2
Total	0	0	0	1	0	0	0	1	0	0	2	2
Grand Total	3	2	0	22	3	1	0	28	0	1	58	59
Apprch %	60	40		88	12		0	100				
Total %	5.2	3.4		37.9	5.2		0	48.3		1.7	98.3	

	Olmsted Dr From North			Pleasant St From East			Pleasant St From West			
Start Time	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 09:45 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 08:30 AM										
08:30 AM	0	0	0	1	0	1	0	2	2	3
08:45 AM	0	0	0	1	0	1	0	1	1	2
09:00 AM	1	0	1	0	0	0	0	0	0	1
09:15 AM	0	1	1	0	0	0	0	0	0	1
Total Volume	1	1	2	2	0	2	0	3	3	7
% App. Total	50	50		100	0		0	100		
PHF	.250	.250	.500	.500	.000	.500	.000	.375	.375	.583



AUTOMATIC TRAFFIC RECORDER

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**Accurate Counts**  
978-664-2565

Page 1

Location : Pleasant Street  
Location : East of Olmsted Drive  
City/State: Belmont, MA

8058VL01

Start Time	11/10/2022 Tue	EB		Hour Totals		WB		Hour Totals		Combined Totals	
		Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon
12:00		5	69			1	64				
12:15		4	66			4	88				
12:30		1	52			2	76				
12:45		3	72	13	259	1	64	8	292	21	551
01:00		2	66			1	74				
01:15		2	90			4	61				
01:30		1	83			1	66				
01:45		1	77	6	316	1	70	7	271	13	587
02:00		4	67			0	72				
02:15		1	72			0	75				
02:30		2	78			1	99				
02:45		2	80	9	297	2	103	3	349	12	646
03:00		1	88			2	95				
03:15		2	88			3	75				
03:30		0	91			0	99				
03:45		4	94	7	361	4	97	9	366	16	727
04:00		2	113			1	90				
04:15		7	77			2	81				
04:30		3	113			5	97				
04:45		3	88	15	391	15	116	23	384	38	775
05:00		6	95			8	99				
05:15		5	92			9	106				
05:30		13	73			19	88				
05:45		22	77	46	337	26	65	62	358	108	695
06:00		17	76			41	66				
06:15		35	54			41	73				
06:30		54	56			57	56				
06:45		58	47	164	233	70	58	209	253	373	486
07:00		53	75			76	45				
07:15		62	49			71	37				
07:30		93	43			85	36				
07:45		81	35	289	202	84	52	316	170	605	372
08:00		79	45			86	31				
08:15		68	33			100	29				
08:30		72	25			72	30				
08:45		57	30	276	133	86	23	344	113	620	246
09:00		59	25			91	23				
09:15		54	33			62	22				
09:30		58	24			63	17				
09:45		62	18	233	100	74	22	290	84	523	184
10:00		57	21			69	16				
10:15		65	12			49	20				
10:30		61	18			68	17				
10:45		57	8	240	59	72	16	258	69	498	128
11:00		67	13			61	9				
11:15		65	13			57	11				
11:30		56	15			64	8				
11:45		70	5	258	46	68	4	250	32	508	78
Total		1556	2734			1779	2741			3335	5475
Percent		36.3%	63.7%			39.4%	60.6%			37.9%	62.1%

978-664-2565

Location : Pleasant Street  
Location : East of Olmsted Drive  
City/State: Belmont, MA

8058VL01

Start Time	11/11/202 Wed	EB		Hour Totals		WB		Hour Totals		Combined Totals	
		Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon
12:00		3	87			2	76				
12:15		3	67			5	88				
12:30		0	82			5	82				
12:45		0	84	6	320	3	79	15	325	21	645
01:00		2	66			0	68				
01:15		1	64			4	82				
01:30		2	86			5	80				
01:45		0	73	5	289	1	92	10	322	15	611
02:00		2	66			1	90				
02:15		3	71			4	95				
02:30		3	100			0	86				
02:45		1	85	9	322	4	79	9	350	18	672
03:00		2	84			2	93				
03:15		1	90			0	101				
03:30		0	103			2	92				
03:45		0	77	3	354	1	106	5	392	8	746
04:00		3	89			1	71				
04:15		3	102			3	81				
04:30		0	80			3	84				
04:45		2	98	8	369	11	100	18	336	26	705
05:00		3	85			6	78				
05:15		1	93			11	78				
05:30		11	75			11	69				
05:45		15	66	30	319	23	73	51	298	81	617
06:00		21	73			28	75				
06:15		28	43			36	65				
06:30		39	56			50	49				
06:45		44	42	132	214	48	54	162	243	294	457
07:00		53	46			59	36				
07:15		46	29			63	36				
07:30		64	33			59	29				
07:45		60	44	223	152	53	33	234	134	457	286
08:00		60	40			64	36				
08:15		51	28			67	22				
08:30		51	27			61	28				
08:45		52	29	214	124	90	23	282	109	496	233
09:00		48	25			74	15				
09:15		44	28			63	23				
09:30		56	22			63	24				
09:45		59	16	207	91	77	20	277	82	484	173
10:00		69	17			71	23				
10:15		69	14			70	14				
10:30		75	14			60	19				
10:45		70	13	283	58	88	13	289	69	572	127
11:00		52	10			71	7				
11:15		80	12			76	7				
11:30		66	15			71	12				
11:45		91	8	289	45	86	2	304	28	593	73
Total		1409	2657			1656	2688			3065	5345
Percent		34.7%	65.3%			38.1%	61.9%			36.4%	63.6%
Grand Total		2965	5391			3435	5429			6400	10820
Percent		35.5%	64.5%			38.8%	61.2%			37.2%	62.8%
ADT		ADT 8,610	AADT 8,610								

Location : Pleasant Street  
Location : East of Olmsted Drive  
City/State: Belmont, MA

8058VL01

Start Time	11/9/2020		Tue		Wed		Thu		Fri		Sat		Sun		Week Average	
	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB
12:00 AM	*	*	13	8	6	15	*	*	*	*	*	*	*	*	10	12
01:00	*	*	6	7	5	10	*	*	*	*	*	*	*	*	6	8
02:00	*	*	9	3	9	9	*	*	*	*	*	*	*	*	9	6
03:00	*	*	7	9	3	5	*	*	*	*	*	*	*	*	5	7
04:00	*	*	15	23	8	18	*	*	*	*	*	*	*	*	12	20
05:00	*	*	46	62	30	51	*	*	*	*	*	*	*	*	38	56
06:00	*	*	164	209	132	162	*	*	*	*	*	*	*	*	148	186
07:00	*	*	289	316	223	234	*	*	*	*	*	*	*	*	256	275
08:00	*	*	276	344	214	282	*	*	*	*	*	*	*	*	245	313
09:00	*	*	233	290	207	277	*	*	*	*	*	*	*	*	220	284
10:00	*	*	240	258	283	289	*	*	*	*	*	*	*	*	262	274
11:00	*	*	258	250	289	304	*	*	*	*	*	*	*	*	274	277
12:00 PM	*	*	259	292	320	325	*	*	*	*	*	*	*	*	290	308
01:00	*	*	316	271	289	322	*	*	*	*	*	*	*	*	302	296
02:00	*	*	297	349	322	350	*	*	*	*	*	*	*	*	310	350
03:00	*	*	361	366	354	392	*	*	*	*	*	*	*	*	358	379
04:00	*	*	391	384	369	336	*	*	*	*	*	*	*	*	380	360
05:00	*	*	337	358	319	298	*	*	*	*	*	*	*	*	328	328
06:00	*	*	233	253	214	243	*	*	*	*	*	*	*	*	224	248
07:00	*	*	202	170	152	134	*	*	*	*	*	*	*	*	177	152
08:00	*	*	133	113	124	109	*	*	*	*	*	*	*	*	128	111
09:00	*	*	100	84	91	82	*	*	*	*	*	*	*	*	96	83
10:00	*	*	59	69	58	69	*	*	*	*	*	*	*	*	58	69
11:00	*	*	46	32	45	28	*	*	*	*	*	*	*	*	46	30
Lane	0	0	4290	4520	4066	4344	0	0	0	0	0	0	0	0	4182	4432
Day	0		8810		8410		0		0		0		0		8614	
AM Peak	-	-	07:00	08:00	11:00	11:00	-	-	-	-	-	-	-	-	11:00	08:00
Vol.	-	-	289	344	289	304	-	-	-	-	-	-	-	-	274	313
PM Peak	-	-	16:00	16:00	16:00	15:00	-	-	-	-	-	-	-	-	16:00	15:00
Vol.	-	-	391	384	369	392	-	-	-	-	-	-	-	-	380	379

Comb. Total	0	8810	8410	0	0	0	0
ADT	ADT 8,610	AADT 8,610					

**Accurate Counts**  
978-664-2565

Page 1

Location : Pleasant Street  
Location : East of Olmsted Drive  
City/State: Belmont, MA

8058SP01

**EB**

Start Time	1 15	16 20	21 25	26 30	31 35	36 40	41 45	46 50	51 55	56 60	61 65	66 70	71 75	76 999	Total
11/10/20	0	0	0	4	5	4	0	0	0	0	0	0	0	0	13
01:00	0	0	0	0	5	1	0	0	0	0	0	0	0	0	6
02:00	0	0	0	3	4	2	0	0	0	0	0	0	0	0	9
03:00	0	0	1	2	0	4	0	0	0	0	0	0	0	0	7
04:00	0	0	1	4	8	0	2	0	0	0	0	0	0	0	15
05:00	0	0	1	19	18	8	0	0	0	0	0	0	0	0	46
06:00	0	2	12	40	85	24	1	0	0	0	0	0	0	0	164
07:00	0	2	17	67	144	56	2	1	0	0	0	0	0	0	289
08:00	0	0	16	83	122	49	6	0	0	0	0	0	0	0	276
09:00	0	2	10	69	112	39	1	0	0	0	0	0	0	0	233
10:00	0	2	17	83	117	16	5	0	0	0	0	0	0	0	240
11:00	0	1	20	100	109	28	0	0	0	0	0	0	0	0	258
12 PM	0	1	18	103	111	25	1	0	0	0	0	0	0	0	259
13:00	0	0	16	115	148	36	1	0	0	0	0	0	0	0	316
14:00	0	0	21	84	148	40	4	0	0	0	0	0	0	0	297
15:00	1	0	24	111	183	40	2	0	0	0	0	0	0	0	361
16:00	1	3	33	153	164	34	3	0	0	0	0	0	0	0	391
17:00	0	0	38	143	130	26	0	0	0	0	0	0	0	0	337
18:00	0	0	16	113	84	19	1	0	0	0	0	0	0	0	233
19:00	0	1	13	92	84	11	1	0	0	0	0	0	0	0	202
20:00	0	3	11	50	57	8	4	0	0	0	0	0	0	0	133
21:00	0	0	1	40	43	13	3	0	0	0	0	0	0	0	100
22:00	0	0	3	17	24	13	1	0	1	0	0	0	0	0	59
23:00	0	0	2	16	17	8	3	0	0	0	0	0	0	0	46
Total	2	17	291	1511	1922	504	41	1	1	0	0	0	0	0	4290

Daily

15th Percentile : 26 MPH  
50th Percentile : 30 MPH  
85th Percentile : 34 MPH  
95th Percentile : 38 MPH

Mean Speed(Average) : 31 MPH  
10 MPH Pace Speed : 26-35 MPH  
Number in Pace : 3433  
Percent in Pace : 80.0%  
Number of Vehicles > 30 MPH : 2469  
Percent of Vehicles > 30 MPH : 57.6%

Location : Pleasant Street  
Location : East of Olmsted Drive  
City/State: Belmont, MA

8058SP01

EB

Start Time	1 15	16 20	21 25	26 30	31 35	36 40	41 45	46 50	51 55	56 60	61 65	66 70	71 75	76 999	Total
11/11/20	0	0	0	3	2	1	0	0	0	0	0	0	0	0	6
01:00	0	0	0	2	2	1	0	0	0	0	0	0	0	0	5
02:00	0	0	2	3	3	1	0	0	0	0	0	0	0	0	9
03:00	0	0	1	0	1	1	0	0	0	0	0	0	0	0	3
04:00	0	0	0	2	5	1	0	0	0	0	0	0	0	0	8
05:00	0	0	5	9	11	3	2	0	0	0	0	0	0	0	30
06:00	0	3	7	35	60	24	3	0	0	0	0	0	0	0	132
07:00	0	1	13	62	108	35	3	1	0	0	0	0	0	0	223
08:00	0	0	12	62	102	31	5	2	0	0	0	0	0	0	214
09:00	0	0	9	59	111	24	4	0	0	0	0	0	0	0	207
10:00	1	2	15	76	143	44	2	0	0	0	0	0	0	0	283
11:00	0	1	12	119	115	36	6	0	0	0	0	0	0	0	289
12 PM	1	4	17	109	138	46	4	1	0	0	0	0	0	0	320
13:00	0	1	9	91	153	33	2	0	0	0	0	0	0	0	289
14:00	0	3	30	113	138	36	2	0	0	0	0	0	0	0	322
15:00	0	1	41	133	133	42	4	0	0	0	0	0	0	0	354
16:00	0	5	38	122	167	34	3	0	0	0	0	0	0	0	369
17:00	0	0	30	122	135	32	0	0	0	0	0	0	0	0	319
18:00	0	1	18	81	96	17	0	1	0	0	0	0	0	0	214
19:00	0	1	6	48	79	18	0	0	0	0	0	0	0	0	152
20:00	0	0	3	47	64	10	0	0	0	0	0	0	0	0	124
21:00	0	1	2	12	61	13	2	0	0	0	0	0	0	0	91
22:00	0	1	1	23	25	8	0	0	0	0	0	0	0	0	58
23:00	0	1	3	15	17	9	0	0	0	0	0	0	0	0	45
Total	2	26	274	1348	1869	500	42	5	0	0	0	0	0	0	4066

Daily  
15th Percentile : 26 MPH  
50th Percentile : 31 MPH  
85th Percentile : 34 MPH  
95th Percentile : 38 MPH

Mean Speed(Average) : 31 MPH  
10 MPH Pace Speed : 26-35 MPH  
Number in Pace : 3217  
Percent in Pace : 79.1%  
Number of Vehicles > 30 MPH : 2416  
Percent of Vehicles > 30 MPH : 59.4%

Grand Total	4	43	565	2859	3791	1004	83	6	1	0	0	0	0	0	8356
-------------	---	----	-----	------	------	------	----	---	---	---	---	---	---	---	------

Overall  
15th Percentile : 26 MPH  
50th Percentile : 30 MPH  
85th Percentile : 34 MPH  
95th Percentile : 38 MPH

Mean Speed(Average) : 31 MPH  
10 MPH Pace Speed : 26-35 MPH  
Number in Pace : 6650  
Percent in Pace : 79.6%  
Number of Vehicles > 30 MPH : 4885  
Percent of Vehicles > 30 MPH : 58.5%

Location : Pleasant Street  
Location : East of Olmsted Drive  
City/State: Belmont, MA

8058SP01

WB

Start Time	1 15	16 20	21 25	26 30	31 35	36 40	41 45	46 50	51 55	56 60	61 65	66 70	71 75	76 999	Total
11/10/20	0	0	0	3	3	0	2	0	0	0	0	0	0	0	8
01:00	0	0	0	0	4	2	1	0	0	0	0	0	0	0	7
02:00	0	0	0	0	2	1	0	0	0	0	0	0	0	0	3
03:00	0	2	1	2	2	2	0	0	0	0	0	0	0	0	9
04:00	0	1	3	4	8	6	1	0	0	0	0	0	0	0	23
05:00	0	0	2	11	27	20	1	1	0	0	0	0	0	0	62
06:00	3	3	29	68	85	19	1	1	0	0	0	0	0	0	209
07:00	1	2	30	100	130	45	6	0	1	0	0	0	0	1	316
08:00	2	1	34	95	147	62	1	0	0	0	0	0	0	2	344
09:00	2	0	15	79	124	65	4	0	0	0	0	0	1	0	290
10:00	2	4	26	70	113	36	5	1	0	0	0	0	0	1	258
11:00	1	2	25	73	111	34	4	0	0	0	0	0	0	0	250
12 PM	3	1	28	85	122	50	2	0	0	0	0	0	0	1	292
13:00	1	7	21	84	120	31	7	0	0	0	0	0	0	0	271
14:00	1	2	26	106	159	49	4	1	1	0	0	0	0	0	349
15:00	1	2	40	110	154	54	5	0	0	0	0	0	0	0	366
16:00	1	4	62	138	139	31	7	2	0	0	0	0	0	0	384
17:00	0	4	40	172	115	26	1	0	0	0	0	0	0	0	358
18:00	1	3	30	113	87	16	2	1	0	0	0	0	0	0	253
19:00	0	1	22	71	58	17	1	0	0	0	0	0	0	0	170
20:00	1	3	21	40	34	12	2	0	0	0	0	0	0	0	113
21:00	1	0	9	30	33	10	1	0	0	0	0	0	0	0	84
22:00	0	0	4	30	27	7	0	0	1	0	0	0	0	0	69
23:00	0	0	0	12	12	4	4	0	0	0	0	0	0	0	32
Total	21	42	468	1496	1816	599	62	7	3	0	0	0	1	5	4520

Daily

15th Percentile : 25 MPH  
50th Percentile : 30 MPH  
85th Percentile : 34 MPH  
95th Percentile : 38 MPH

Mean Speed(Average) : 31 MPH  
10 MPH Pace Speed : 26-35 MPH  
Number in Pace : 3312  
Percent in Pace : 73.3%  
Number of Vehicles > 30 MPH : 2493  
Percent of Vehicles > 30 MPH : 55.2%

Location : Pleasant Street  
Location : East of Olmsted Drive  
City/State: Belmont, MA

8058SP01

WB

Start Time	1 15	16 20	21 25	26 30	31 35	36 40	41 45	46 50	51 55	56 60	61 65	66 70	71 75	76 999	Total
11/11/20	0	1	1	3	9	1	0	0	0	0	0	0	0	0	15
01:00	0	0	3	0	3	3	1	0	0	0	0	0	0	0	10
02:00	0	0	0	4	3	2	0	0	0	0	0	0	0	0	9
03:00	0	1	1	2	0	1	0	0	0	0	0	0	0	0	5
04:00	0	0	0	2	8	8	0	0	0	0	0	0	0	0	18
05:00	1	0	2	16	19	9	1	0	1	0	0	0	0	2	51
06:00	0	3	19	46	62	26	5	0	0	0	0	0	0	1	162
07:00	4	2	30	70	86	32	8	0	0	0	0	0	0	2	234
08:00	4	0	14	99	128	34	1	1	0	0	0	0	0	1	282
09:00	0	1	12	84	127	48	5	0	0	0	0	0	0	0	277
10:00	3	2	23	104	123	33	1	0	0	0	0	0	0	0	289
11:00	3	5	26	92	133	39	5	0	1	0	0	0	0	0	304
12 PM	2	1	27	97	140	54	4	0	0	0	0	0	0	0	325
13:00	3	3	27	107	142	36	4	0	0	0	0	0	0	0	322
14:00	3	9	43	134	129	28	3	1	0	0	0	0	0	0	350
15:00	1	3	43	152	145	45	2	1	0	0	0	0	0	0	392
16:00	3	2	46	155	106	23	1	0	0	0	0	0	0	0	336
17:00	0	3	42	139	89	24	1	0	0	0	0	0	0	0	298
18:00	0	1	31	88	107	13	3	0	0	0	0	0	0	0	243
19:00	1	4	23	42	52	10	2	0	0	0	0	0	0	0	134
20:00	2	4	6	47	38	12	0	0	0	0	0	0	0	0	109
21:00	0	1	8	30	31	10	2	0	0	0	0	0	0	0	82
22:00	0	2	4	36	22	4	1	0	0	0	0	0	0	0	69
23:00	0	0	3	10	12	3	0	0	0	0	0	0	0	0	28
Total	30	48	434	1559	1714	498	50	3	2	0	0	0	0	6	4344

Daily

15th Percentile : 25 MPH  
50th Percentile : 30 MPH  
85th Percentile : 34 MPH  
95th Percentile : 38 MPH

Mean Speed(Average) : 31 MPH  
10 MPH Pace Speed : 26-35 MPH  
Number in Pace : 3273  
Percent in Pace : 75.3%  
Number of Vehicles > 30 MPH : 2273  
Percent of Vehicles > 30 MPH : 52.3%

Grand Total	51	90	902	3055	3530	1097	112	10	5	0	0	0	1	11	8864
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Overall

15th Percentile : 25 MPH  
50th Percentile : 30 MPH  
85th Percentile : 34 MPH  
95th Percentile : 38 MPH

Mean Speed(Average) : 31 MPH  
10 MPH Pace Speed : 26-35 MPH  
Number in Pace : 6585  
Percent in Pace : 74.3%  
Number of Vehicles > 30 MPH : 4766  
Percent of Vehicles > 30 MPH : 53.8%

Location : Pleasant Street  
Location : East of Olmsted Drive  
City/State: Belmont, MA

8058SP01

EB, WB

Start Time	1 15	16 20	21 25	26 30	31 35	36 40	41 45	46 50	51 55	56 60	61 65	66 70	71 75	76 999	Total
11/10/20	0	0	0	7	8	4	2	0	0	0	0	0	0	0	21
01:00	0	0	0	0	9	3	1	0	0	0	0	0	0	0	13
02:00	0	0	0	3	6	3	0	0	0	0	0	0	0	0	12
03:00	0	2	2	4	2	6	0	0	0	0	0	0	0	0	16
04:00	0	1	4	8	16	6	3	0	0	0	0	0	0	0	38
05:00	0	0	3	30	45	28	1	1	0	0	0	0	0	0	108
06:00	3	5	41	108	170	43	2	1	0	0	0	0	0	0	373
07:00	1	4	47	167	274	101	8	1	1	0	0	0	0	1	605
08:00	2	1	50	178	269	111	7	0	0	0	0	0	0	2	620
09:00	2	2	25	148	236	104	5	0	0	0	0	0	1	0	523
10:00	2	6	43	153	230	52	10	1	0	0	0	0	0	1	498
11:00	1	3	45	173	220	62	4	0	0	0	0	0	0	0	508
12 PM	3	2	46	188	233	75	3	0	0	0	0	0	0	1	551
13:00	1	7	37	199	268	67	8	0	0	0	0	0	0	0	587
14:00	1	2	47	190	307	89	8	1	1	0	0	0	0	0	646
15:00	2	2	64	221	337	94	7	0	0	0	0	0	0	0	727
16:00	2	7	95	291	303	65	10	2	0	0	0	0	0	0	775
17:00	0	4	78	315	245	52	1	0	0	0	0	0	0	0	695
18:00	1	3	46	226	171	35	3	1	0	0	0	0	0	0	486
19:00	0	2	35	163	142	28	2	0	0	0	0	0	0	0	372
20:00	1	6	32	90	91	20	6	0	0	0	0	0	0	0	246
21:00	1	0	10	70	76	23	4	0	0	0	0	0	0	0	184
22:00	0	0	7	47	51	20	1	0	2	0	0	0	0	0	128
23:00	0	0	2	28	29	12	7	0	0	0	0	0	0	0	78
Total	23	59	759	3007	3738	1103	103	8	4	0	0	0	1	5	8810

Daily

15th Percentile : 25 MPH  
50th Percentile : 30 MPH  
85th Percentile : 34 MPH  
95th Percentile : 38 MPH

Mean Speed(Average) : 31 MPH  
10 MPH Pace Speed : 26-35 MPH  
Number in Pace : 6745  
Percent in Pace : 76.6%  
Number of Vehicles > 30 MPH : 4962  
Percent of Vehicles > 30 MPH : 56.3%

Location : Pleasant Street  
Location : East of Olmsted Drive  
City/State: Belmont, MA

8058SP01

EB, WB

Start Time	1 15	16 20	21 25	26 30	31 35	36 40	41 45	46 50	51 55	56 60	61 65	66 70	71 75	76 999	Total
11/11/20	0	1	1	6	11	2	0	0	0	0	0	0	0	0	21
01:00	0	0	3	2	5	4	1	0	0	0	0	0	0	0	15
02:00	0	0	2	7	6	3	0	0	0	0	0	0	0	0	18
03:00	0	1	2	2	1	2	0	0	0	0	0	0	0	0	8
04:00	0	0	0	4	13	9	0	0	0	0	0	0	0	0	26
05:00	1	0	7	25	30	12	3	0	1	0	0	0	0	2	81
06:00	0	6	26	81	122	50	8	0	0	0	0	0	0	1	294
07:00	4	3	43	132	194	67	11	1	0	0	0	0	0	2	457
08:00	4	0	26	161	230	65	6	3	0	0	0	0	0	1	496
09:00	0	1	21	143	238	72	9	0	0	0	0	0	0	0	484
10:00	4	4	38	180	266	77	3	0	0	0	0	0	0	0	572
11:00	3	6	38	211	248	75	11	0	1	0	0	0	0	0	593
12 PM	3	5	44	206	278	100	8	1	0	0	0	0	0	0	645
13:00	3	4	36	198	295	69	6	0	0	0	0	0	0	0	611
14:00	3	12	73	247	267	64	5	1	0	0	0	0	0	0	672
15:00	1	4	84	285	278	87	6	1	0	0	0	0	0	0	746
16:00	3	7	84	277	273	57	4	0	0	0	0	0	0	0	705
17:00	0	3	72	261	224	56	1	0	0	0	0	0	0	0	617
18:00	0	2	49	169	203	30	3	1	0	0	0	0	0	0	457
19:00	1	5	29	90	131	28	2	0	0	0	0	0	0	0	286
20:00	2	4	9	94	102	22	0	0	0	0	0	0	0	0	233
21:00	0	2	10	42	92	23	4	0	0	0	0	0	0	0	173
22:00	0	3	5	59	47	12	1	0	0	0	0	0	0	0	127
23:00	0	1	6	25	29	12	0	0	0	0	0	0	0	0	73
Total	32	74	708	2907	3583	998	92	8	2	0	0	0	0	6	8410

Daily

15th Percentile : 25 MPH  
50th Percentile : 30 MPH  
85th Percentile : 34 MPH  
95th Percentile : 38 MPH

Mean Speed(Average) : 31 MPH  
10 MPH Pace Speed : 26-35 MPH  
Number in Pace : 6490  
Percent in Pace : 77.2%  
Number of Vehicles > 30 MPH : 4689  
Percent of Vehicles > 30 MPH : 55.8%

Grand Total	55	133	1467	5914	7321	2101	195	16	6	0	0	0	1	11	17220
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Overall

15th Percentile : 25 MPH  
50th Percentile : 30 MPH  
85th Percentile : 34 MPH  
95th Percentile : 38 MPH

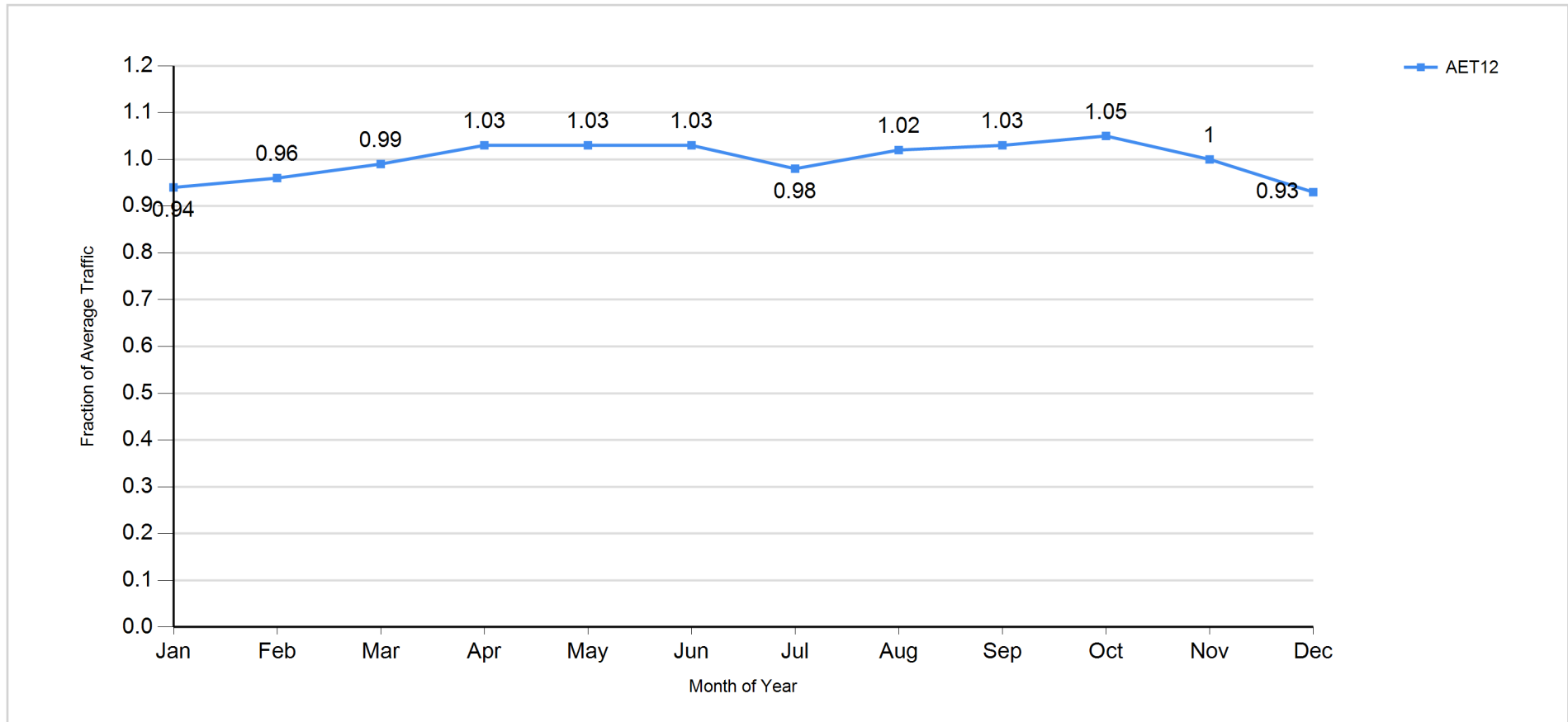
Mean Speed(Average) : 31 MPH  
10 MPH Pace Speed : 26-35 MPH  
Number in Pace : 13235  
Percent in Pace : 76.9%  
Number of Vehicles > 30 MPH : 9651  
Percent of Vehicles > 30 MPH : 56.0%

## SEASONAL ADJUSTMENTS

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Massachusetts Highway Department

Traffic Pattern by Month for 1/1/2019 - 12/31/2019



## COVID ADJUSTMENTS

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Comment 1: N/S Street : Trapelo Road  
 Comment 2: E/W Street : Mill Street  
 Comment 3: City/State : Belmont, MA  
 Comment 4: Weather : Clear

Wednesday, April 11, 2018 6:00 AM

Mill St From North				Trapelo Rd From East				Trapelo Rd From West				Total	Peak
Start Time	Left	Right	Peds	Thru	Right	Peds		Left	Thru	Peds			
7:00:00 AM	30	124	0	108	76	0		149	34	0		521	
7:15:00 AM	31	125	0	136	131	0		150	35	0		608	
7:30:00 AM	43	105	0	131	141	0		170	29	0		619	
7:45:00 AM	25	136	0	175	146	0		163	25	0		670	2418
8:00:00 AM	50	150	0	162	147	0		150	34	0		693	2590
8:15:00 AM	53	149	0	129	169	0		132	36	0		668	2650
8:30:00 AM	69	142	0	152	150	0		138	19	0		670	2701
8:45:00 AM	69	145	0	142	154	0		134	29	0		673	2704
	370	1076	0	1135	1114	0		1186	241	0		5122	2704
												5173	2731
												5277	2786

Seasonal Adj 1 %

2020 Adjusted 1% year

Tuesday, November 10 2020

Mill St From North				Trapelo Rd From East				Trapelo Rd From West				Total	Peak
Start Time	Left	Right	Peds	Thru	Right	Peds		Left	Thru	Peds			
7:00:00 AM	56	19	0	75	72	0		22	89	0		333	
7:15:00 AM	93	24	0	70	77	0		30	103	0		397	
7:30:00 AM	89	27	0	81	81	0		27	131	0		436	
7:45:00 AM	91	23	0	89	97	0		27	104	0		431	1597
8:00:00 AM	89	22	0	105	103	0		18	114	0		451	1715
8:15:00 AM	94	36	0	87	110	0		21	109	0		457	1775
8:30:00 AM	91	26	0	91	113	0		15	102	0		438	1777
8:45:00 AM	74	24	0	92	91	0		30	100	0		411	1757
	677	201	0	690	744	0		190	852	0		3354	1777
												1.57	1.57
												1.57	

Comparisson

Say COVID Adj

4:00:00 PM	52	169	0	121	166	0		123	47	0		678	
4:15:00 PM	41	136	0	121	177	0		134	23	0		632	
4:30:00 PM	37	148	0	93	177	0		166	35	0		656	
4:45:00 PM	40	151	0	91	183	0		150	32	0		647	2613
5:00:00 PM	55	128	0	91	170	0		156	36	0		636	2571
5:15:00 PM	46	137	0	130	175	0		145	43	0		676	2615
5:30:00 PM	33	140	0	100	190	0		163	35	0		661	2620
5:45:00 PM	44	179	0	77	206	0		147	28	0		681	2654
	348	1188	0	824	1444	0		1184	279	0		5267	2654
												5320	2681
												5427	2735

Seasonal Adj 1 %

2020 Adjusted 1% year

4:00:00 PM	88	29	0	113	90	0		44	152	0		516	
4:15:00 PM	109	39	0	123	92	0		24	113	0		500	
4:30:00 PM	114	33	0	123	89	0		27	132	0		518	
4:45:00 PM	101	39	0	148	76	0		33	123	0		520	2054
5:00:00 PM	95	21	0	143	70	0		22	132	0		483	2021
5:15:00 PM	102	34	0	168	77	0		22	107	0		510	2031
5:30:00 PM	85	20	0	97	71	0		26	99	0		398	1911
5:45:00 PM	57	32	0	103	52	0		28	103	0		375	1766
	751	247	0	1018	617	0		226	961	0		3820	2054
												1.42	1.33
												1.40	

Comparisson

Say COVID Adj

TOTAL Peaks

10704

5521

TOTAL Peaks

7174

3831

Comparisson

1.49

1.44

Say COVID Adj

1.50

Comment 1: N/S Street : Pleasant Street  
Comment 2: E/W Street : Trapelo Road  
Comment 3: City/State : Belmont, MA  
Comment 4: Weather : Clear

Thursday, November 14, 2019

	Pleasant St From North			Trapelo Rd From East			Trapelo Rd From West			
Start Time	Left	Right	Peds	Thru	Right	Peds	Left	Thru	Peds	
7:00:00 AM										
7:15:00 AM										
7:30:00 AM										
7:45:00 AM										
8:00:00 AM										
8:15:00 AM										
8:30:00 AM										
8:45:00 AM										
4:00:00 PM	52	71	0	228	42	0	68	212	0	673
4:15:00 PM	50	70	0	218	56	0	69	236	0	699
4:30:00 PM	58	60	0	193	75	0	78	233	0	697
4:45:00 PM	46	63	0	222	55	0	78	234	0	698
5:00:00 PM	52	57	0	180	53	0	79	242	0	663
5:15:00 PM	59	67	0	166	78	0	79	227	0	676
5:30:00 PM	73	53	0	172	65	0	71	194	0	628
5:45:00 PM	57	53	0	182	52	0	65	221	0	630
										5364
										5418
										Seasonal Adj 1 %
										2020 Adjusted 1% year

Tuesday, November, 10 2020

	Pleasant St From North			Trapelo Rd From East			Trapelo Rd From West				
Start Time	Left	Right	Peds	Thru	Right	Peds	Left	Thru	Peds		
7:00:00 AM	32	37	0	116	14	0	37	111	0		
7:15:00 AM	37	36	0	101	17	0	46	146	0		
7:30:00 AM	46	41	0	126	33	0	62	157	0		
7:45:00 AM	43	41	0	145	34	0	40	160	0		
8:00:00 AM	35	54	0	157	37	0	44	145	0		
8:15:00 AM	46	50	0	145	27	0	41	169	0		
8:30:00 AM	27	45	0	157	26	0	41	151	0		
8:45:00 AM	34	54	0	128	19	0	38	155	0		
4:00:00 PM	35	63	0	158	32	0	73	168	0	529	
4:15:00 PM	36	48	0	157	35	0	48	168	0	492	
4:30:00 PM	42	54	0	166	45	0	67	186	0	560	
4:45:00 PM	41	76	0	152	33	0	55	167	0	524	
5:00:00 PM	24	70	0	161	26	0	71	161	0	513	
5:15:00 PM	44	66	0	160	41	0	54	173	0	538	
5:30:00 PM	32	53	0	131	26	0	51	138	0	431	
5:45:00 PM	31	37	0	103	25	0	50	109	0	355	
										3942	
										2135	
Comparisson										1.40	1.34
Say COVID Adj										1.40	

PDI File #: **186178 C**  
 Location: **N: Mill Street**  
 Location: **E: Trapelo Road (Route 60) W: Trapelo Road (Route 60)**  
 City, State: **Belmont, MA**  
 Client: **BSC Group/ S. Offei-Addo**  
 Site Code: **TBA**  
 Count Date: **Wednesday, April 11, 2018**  
 Start Time: **6:00 AM**  
 End Time: **6:00 PM**  
 Class:



**Cars and Heavy Vehicles (Combined)**

	Mill Street				Trapelo Road (Route 60)				Trapelo Road (Route 60)				
	from North				from East				from West				
	Right	Left	U-Turn	Total	Right	Thru	U-Turn	Total	Thru	Left	U-Turn	Total	
6:00 AM	14	50	0	64	51	37	0	88	57	8	0	65	217
6:15 AM	13	71	0	84	55	53	0	108	66	19	0	85	277
6:30 AM	21	88	0	109	103	55	0	158	129	18	0	147	414
6:45 AM	20	121	0	141	114	85	0	199	137	20	0	157	497
Total	68	330	0	398	323	230	0	553	389	65	0	454	1405
7:00 AM	30	124	0	154	108	76	0	184	149	34	0	183	521
7:15 AM	31	125	0	156	136	131	0	267	150	35	0	185	608
7:30 AM	43	105	0	148	131	141	0	272	170	29	0	199	619
7:45 AM	25	136	0	161	175	146	0	321	163	25	0	188	670
Total	129	490	0	619	550	494	0	1044	632	123	0	755	2418
8:00 AM	50	150	0	200	162	147	0	309	150	34	0	184	693
8:15 AM	53	149	0	202	129	169	0	298	132	36	0	168	668
8:30 AM	69	142	0	211	152	150	0	302	138	19	0	157	670
8:45 AM	69	145	0	214	142	154	0	296	134	29	0	163	673
Total	241	586	0	827	585	620	0	1205	554	118	0	672	2704
9:00 AM	68	125	0	193	118	155	0	273	102	24	0	126	592
9:15 AM	50	119	0	169	93	152	0	245	101	17	0	118	532
9:30 AM	42	105	0	147	94	100	0	194	103	26	0	129	470
9:45 AM	57	107	0	164	123	103	0	226	108	26	0	134	524
Total	217	456	0	673	428	510	0	938	414	93	0	507	2118
10:00 AM	44	90	0	134	66	115	0	181	109	23	0	132	447
10:15 AM	31	86	0	117	56	79	0	135	126	24	0	150	402
10:30 AM	29	64	0	93	94	100	0	194	97	24	0	121	408
10:45 AM	31	76	0	107	75	117	0	192	97	24	0	121	420
Total	135	316	0	451	291	411	0	702	429	95	0	524	1677
11:00 AM	29	68	0	97	69	92	0	161	92	19	0	111	369
11:15 AM	36	80	0	116	74	94	0	168	107	21	0	128	412
11:30 AM	24	106	0	130	84	111	0	195	114	28	0	142	467
11:45 AM	32	88	0	120	86	102	0	188	122	39	0	161	469
Total	121	342	0	463	313	399	0	712	435	107	0	542	1717
12:00 PM	35	85	0	120	81	104	0	185	100	24	0	124	429
12:15 PM	33	87	0	120	81	118	0	199	98	20	0	118	437
12:30 PM	34	68	0	102	90	103	0	193	105	25	0	130	425
12:45 PM	32	77	0	109	85	109	0	194	134	30	0	164	467
Total	134	317	0	451	337	434	0	771	437	99	0	536	1758
1:00 PM	30	86	0	116	74	107	0	181	120	32	0	152	449
1:15 PM	24	72	0	96	84	118	0	202	118	34	0	152	450
1:30 PM	29	72	0	101	80	118	0	198	113	27	0	140	439
1:45 PM	18	95	0	113	120	137	0	257	109	28	0	137	507
Total	101	325	0	426	358	480	0	838	460	121	0	581	1845
2:00 PM	40	88	0	128	97	112	0	209	136	28	0	164	501
2:15 PM	25	84	0	109	100	111	0	211	132	39	0	171	491
2:30 PM	27	102	0	129	101	105	0	206	129	46	0	175	510
2:45 PM	43	97	0	140	116	107	0	223	122	42	0	164	527
Total	135	371	0	506	414	435	0	849	519	155	0	674	2029
3:00 PM	38	133	0	171	117	129	0	246	129	32	0	161	578
3:15 PM	52	129	0	181	117	159	0	276	138	35	0	173	630
3:30 PM	32	151	0	183	104	155	0	259	184	23	0	207	649
3:45 PM	41	138	0	179	110	131	0	241	99	27	0	126	546
Total	163	551	0	714	448	574	0	1022	550	117	0	667	2403
4:00 PM	52	169	0	221	121	166	0	287	123	47	0	170	678
4:15 PM	41	136	0	177	121	177	0	298	134	23	0	157	632
4:30 PM	37	148	0	185	93	177	0	270	166	35	0	201	656
4:45 PM	40	151	0	191	91	183	0	274	150	32	0	182	647
Total	170	604	0	774	426	703	0	1129	573	137	0	710	2613
5:00 PM	55	128	0	183	91	170	0	261	156	36	0	192	636
5:15 PM	46	137	0	183	130	175	0	305	145	43	0	188	676
5:30 PM	33	140	0	173	100	190	0	290	163	35	0	198	661
5:45 PM	44	179	0	223	77	206	0	283	147	28	0	175	681
Total	178	584	0	762	398	741	0	1139	611	142	0	753	2654
Grand Total	1792	5272	0	7064	4871	6031	0	10902	6003	1372	0	7375	25341
Approach %	25.4	74.6	0.0		44.7	55.3	0.0		81.4	18.6	0.0		
Total %	7.1	20.8	0.0	27.9	19.2	23.8	0.0	43.0	23.7	5.4	0.0	29.1	
Exiting Leg Total				6243				11275				7823	25341
Cars	1749	5135	0	6884	4727	5823	0	10550	5811	1320	0	7131	24565
% Cars	97.6	97.4	0.0	97.5	97.0	96.6	0.0	96.8	96.8	96.2	0.0	96.7	96.9
Exiting Leg Total				6047				10946				7572	24565
Heavy Vehicles	43	137	0	180	144	208	0	352	192	52	0	244	776
% Heavy Vehicles	2.4	2.6	0.0	2.5	3.0	3.4	0.0	3.2	3.2	3.8	0.0	3.3	3.1
Exiting Leg Total				196				329				251	776

PDI File #: **186178 C**  
 Location: **N: Mill Street**  
 Location: **E: Trapelo Road (Route 60) W: Trapelo Road (Route 60)**  
 City, State: **Belmont, MA**  
 Client: **BSC Group/ S. Offei-Addo**  
 Site Code: **TBA**  
 Count Date: **Wednesday, April 11, 2018**  
 Start Time: **6:00 AM**  
 End Time: **6:00 PM**  
 Class:



### Cars and Heavy Vehicles (Combined)

Mill Street				Trapelo Road (Route 60)				Trapelo Road (Route 60)				Total
from North				from East				from West				
Right	Left	U-Turn	Total	Right	Thru	U-Turn	Total	Thru	Left	U-Turn	Total	

AM Peak Hour Analysis from 06:00 AM to 10:00 AM begins at:

8:00 AM	Mill Street				Trapelo Road (Route 60)				Trapelo Road (Route 60)				Total
	from North				from East				from West				
	Right	Left	U-Turn	Total	Right	Thru	U-Turn	Total	Thru	Left	U-Turn	Total	
8:00 AM	50	150	0	200	162	147	0	309	150	34	0	184	693
8:15 AM	53	149	0	202	129	169	0	298	132	36	0	168	668
8:30 AM	69	142	0	211	152	150	0	302	138	19	0	157	670
8:45 AM	69	145	0	214	142	154	0	296	134	29	0	163	673
Total Volume	241	586	0	827	585	620	0	1205	554	118	0	672	2704
% Approach Total	29.1	70.9	0.0		48.5	51.5	0.0		82.4	17.6	0.0		
PHF	0.873	0.977	0.000	0.966	0.903	0.917	0.000	0.975	0.923	0.819	0.000	0.913	0.975
Cars	235	573	0	808	567	610	0	1177	523	114	0	637	2622
Cars %	97.5	97.8	0.0	97.7	96.9	98.4	0.0	97.7	94.4	96.6	0.0	94.8	97.0
Heavy Vehicles	6	13	0	19	18	10	0	28	31	4	0	35	82
Heavy Vehicles %	2.5	2.2	0.0	2.3	3.1	1.6	0.0	2.3	5.6	3.4	0.0	5.2	3.0
Cars Enter Leg	235	573	0	808	567	610	0	1177	523	114	0	637	2622
Heavy Enter Leg	6	13	0	19	18	10	0	28	31	4	0	35	82
Total Entering Leg	241	586	0	827	585	620	0	1205	554	118	0	672	2704
Cars Exiting Leg				681				1096				845	2622
Heavy Exiting Leg				22				44				16	82
Total Exiting Leg				703				1140				861	2704

MidDay Peak Hour Analysis from 10:00 AM to 2:00 PM begins at:

1:45 PM	Mill Street				Trapelo Road (Route 60)				Trapelo Road (Route 60)				Total
	from North				from East				from West				
	Right	Left	U-Turn	Total	Right	Thru	U-Turn	Total	Thru	Left	U-Turn	Total	
1:45 PM	18	95	0	113	120	137	0	257	109	28	0	137	507
2:00 PM	40	88	0	128	97	112	0	209	136	28	0	164	501
2:15 PM	25	84	0	109	100	111	0	211	132	39	0	171	491
2:30 PM	27	102	0	129	101	105	0	206	129	46	0	175	510
Total Volume	110	369	0	479	418	465	0	883	506	141	0	647	2009
% Approach Total	23.0	77.0	0.0		47.3	52.7	0.0		78.2	21.8	0.0		
PHF	0.688	0.904	0.000	0.928	0.871	0.849	0.000	0.859	0.930	0.766	0.000	0.924	0.985
Cars	105	353	0	458	394	441	0	835	491	134	0	625	1918
Cars %	95.5	95.7	0.0	95.6	94.3	94.8	0.0	94.6	97.0	95.0	0.0	96.6	95.5
Heavy Vehicles	5	16	0	21	24	24	0	48	15	7	0	22	91
Heavy Vehicles %	4.5	4.3	0.0	4.4	5.7	5.2	0.0	5.4	3.0	5.0	0.0	3.4	4.5
Cars Enter Leg	105	353	0	458	394	441	0	835	491	134	0	625	1918
Heavy Enter Leg	5	16	0	21	24	24	0	48	15	7	0	22	91
Total Entering Leg	110	369	0	479	418	465	0	883	506	141	0	647	2009
Cars Exiting Leg				528				844				546	1918
Heavy Exiting Leg				31				31				29	91
Total Exiting Leg				559				875				575	2009

PM Peak Hour Analysis from 2:00 PM to 06:00 PM begins at:

5:00 PM	Mill Street				Trapelo Road (Route 60)				Trapelo Road (Route 60)				Total
	from North				from East				from West				
	Right	Left	U-Turn	Total	Right	Thru	U-Turn	Total	Thru	Left	U-Turn	Total	
5:00 PM	55	128	0	183	91	170	0	261	156	36	0	192	636
5:15 PM	46	137	0	183	130	175	0	305	145	43	0	188	676
5:30 PM	33	140	0	173	100	190	0	290	163	35	0	198	661
5:45 PM	44	179	0	223	77	206	0	283	147	28	0	175	681
Total Volume	178	584	0	762	398	741	0	1139	611	142	0	753	2654
% Approach Total	23.4	76.6	0.0		34.9	65.1	0.0		81.1	18.9	0.0		
PHF	0.809	0.816	0.000	0.854	0.765	0.899	0.000	0.934	0.937	0.826	0.000	0.951	0.974
Cars	176	579	0	755	397	729	0	1126	604	140	0	744	2625
Cars %	98.9	99.1	0.0	99.1	99.7	98.4	0.0	98.9	98.9	98.6	0.0	98.8	98.9
Heavy Vehicles	2	5	0	7	1	12	0	13	7	2	0	9	29
Heavy Vehicles %	1.1	0.9	0.0	0.9	0.3	1.6	0.0	1.1	1.1	1.4	0.0	1.2	1.1
Cars Enter Leg	176	579	0	755	397	729	0	1126	604	140	0	744	2625
Heavy Enter Leg	2	5	0	7	1	12	0	13	7	2	0	9	29
Total Entering Leg	178	584	0	762	398	741	0	1139	611	142	0	753	2654
Cars Exiting Leg				537				1183				905	2625
Heavy Exiting Leg				3				12				14	29
Total Exiting Leg				540				1195				919	2654

PDI File #: **186178 C**  
 Location: **N: Mill Street**  
 Location: **E: Trapelo Road (Route 60) W: Trapelo Road (Route 60)**  
 City, State: **Belmont, MA**  
 Client: **BSC Group/ S. Oftei-Addo**  
 Site Code: **TBA**  
 Count Date: **Wednesday, April 11, 2018**  
 Start Time: **6:00 AM**  
 End Time: **6:00 PM**  
 Class:



**Bicycles (on Roadway and Crosswalks)**

	Mill Street						Trapelo Road (Route 60)						Trapelo Road (Route 60)						Total
	from North						from East						from West						
	Right	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	U-Turn	CW-SB	CW-NB	Total	Thru	Left	U-Turn	CW-NB	CW-SB	Total	
6:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1
6:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1
7:00 AM	0	0	0	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	0
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1
7:30 AM	0	1	0	0	0	1	1	0	0	0	0	1	0	0	0	0	0	0	2
7:45 AM	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	1
Total	0	1	0	0	0	1	1	3	0	0	0	4	1	0	0	0	0	0	6
8:00 AM	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	1
8:15 AM	1	0	0	0	0	1	1	1	0	0	0	2	0	0	0	0	0	0	3
8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:45 AM	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	1
Total	1	0	0	0	0	1	1	3	0	0	0	4	0	0	0	0	0	0	5
9:00 AM	0	0	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	0	2
9:15 AM	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
9:30 AM	0	0	0	0	0	0	1	1	0	0	0	2	2	0	0	0	0	2	4
9:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	1	0	0	0	1	1	3	0	0	0	4	2	0	0	0	0	2	7
10:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:30 AM	0	0	0	0	0	0	1	0	0	0	0	1	1	0	0	0	0	1	2
10:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	1	0	0	0	0	1	1	0	0	0	0	1	2
11:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:15 AM	0	1	0	0	0	1	0	1	0	0	0	1	0	0	0	0	0	0	2
11:30 AM	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
11:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	2	0	0	0	2	0	1	0	0	0	1	0	0	0	0	0	0	3
12:00 PM	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
12:15 PM	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
12:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:45 PM	0	0	0	0	0	0	3	0	0	0	0	3	0	0	0	0	0	0	3
Total	0	2	0	0	0	2	3	0	0	0	0	3	0	0	0	0	0	0	5
1:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1
2:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1
3:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:45 PM	0	0	0	0	1	1	0	0	0	0	0	0	1	0	0	0	0	1	2
Total	0	0	0	0	1	1	0	0	0	0	0	0	1	0	0	0	0	1	2
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1
Total	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	2	2
5:00 PM	0	0	0	0	0	0	2	1	0	0	0	3	1	0	0	0	0	1	4
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	2	2
5:30 PM	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	1
5:45 PM	0	0	0	0	0	0	3	0	0	0	0	3	1	0	0	0	0	1	4
Total	0	0	0	0	0	0	6	1	0	0	0	7	3	1	0	0	0	4	11
Grand Total	1	6	0	0	1	8	13	11	0	0	0	24	12	1	0	0	0	13	45
Approach %	12.5	75.0	0.0	0.0	12.5		54.2	45.8	0.0	0.0	0.0		92.3	7.7	0.0	0.0	0.0		
Total %	2.2	13.3	0.0	0.0	2.2	17.8	28.9	24.4	0.0	0.0	0.0	53.3	26.7	2.2	0.0	0.0	0.0	28.9	
Exiting Leg Total	15						18						12						45

AM Peak Hour Analysis from 06:00 AM to 10:00 AM begins at:

8:45 AM	Mill Street						Trapelo Road (Route 60)						Trapelo Road (Route 60)						Total
	from North						from East						from West						
	Right	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	U-Turn	CW-SB	CW-NB	Total	Thru	Left	U-Turn	CW-NB	CW-SB	Total	

PDI File #: **186178 C**  
 Location: **N: Mill Street**  
 Location: **E: Trapelo Road (Route 60) W: Trapelo Road (Route 60)**  
 City, State: **Belmont, MA**  
 Client: **BSC Group/ S. Offei-Addo**  
 Site Code: **TBA**  
 Count Date: **Wednesday, April 11, 2018**  
 Start Time: **6:00 AM**  
 End Time: **6:00 PM**  
 Class:



### Bicycles (on Roadway and Crosswalks)

	Mill Street						Trapelo Road (Route 60)						Trapelo Road (Route 60)						Total
	from North						from East						from West						
	Right	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	U-Turn	CW-SB	CW-NB	Total	Thru	Left	U-Turn	CW-NB	CW-SB	Total	
8:45 AM	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	1
9:00 AM	0	0	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	0	2
9:15 AM	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
9:30 AM	0	0	0	0	0	0	1	1	0	0	0	2	2	0	0	0	0	2	4
Total Volume	0	1	0	0	0	1	1	4	0	0	0	5	2	0	0	0	0	2	8
% Approach Total	0.0	100.0	0.0	0.0	0.0		20.0	80.0	0.0	0.0	0.0		100.0	0.0	0.0	0.0	0.0		
PHF	0.000	0.250	0.000	0.000	0.000	0.250	0.250	0.500	0.000	0.000	0.000	0.625	0.250	0.000	0.000	0.000	0.000	0.250	0.500
Entering Leg	0	1	0	0	0	1	1	4	0	0	0	5	2	0	0	0	0	2	8
Exiting Leg						1						3						4	8
Total						2						8						6	16

MidDay Peak Hour Analysis from 10:00 AM to 2:00 PM begins at:

12:00 PM	Mill Street						Trapelo Road (Route 60)						Trapelo Road (Route 60)						Total	
	from North						from East						from West							
	Right	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	U-Turn	CW-SB	CW-NB	Total	Thru	Left	U-Turn	CW-NB	CW-SB	Total		
12:00 PM	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
12:15 PM	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
12:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:45 PM	0	0	0	0	0	0	3	0	0	0	0	0	3	0	0	0	0	0	0	3
Total Volume	0	2	0	0	0	2	3	0	0	0	0	3	0	0	0	0	0	0	0	5
% Approach Total	0.0	100.0	0.0	0.0	0.0		100.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0			
PHF	0.000	0.500	0.000	0.000	0.000	0.500	0.250	0.000	0.000	0.000	0.000	0.250	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.417
Entering Leg	0	2	0	0	0	2	3	0	0	0	0	3	0	0	0	0	0	0	0	5
Exiting Leg						3						2							0	5
Total						5						5							0	10

PM Peak Hour Analysis from 2:00 PM to 06:00 PM begins at:

5:00 PM	Mill Street						Trapelo Road (Route 60)						Trapelo Road (Route 60)						Total
	from North						from East						from West						
	Right	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	U-Turn	CW-SB	CW-NB	Total	Thru	Left	U-Turn	CW-NB	CW-SB	Total	
5:00 PM	0	0	0	0	0	0	2	1	0	0	0	3	1	0	0	0	0	1	4
5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	2	2
5:30 PM	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	1
5:45 PM	0	0	0	0	0	0	3	0	0	0	0	3	1	0	0	0	0	1	4
Total Volume	0	0	0	0	0	0	6	1	0	0	0	7	3	1	0	0	0	4	11
% Approach Total	0.0	0.0	0.0	0.0	0.0		85.7	14.3	0.0	0.0	0.0		75.0	25.0	0.0	0.0	0.0		
PHF	0.000	0.000	0.000	0.000	0.000	0.000	0.500	0.250	0.000	0.000	0.000	0.583	0.750	0.250	0.000	0.000	0.000	0.500	0.688
Entering Leg	0	0	0	0	0	0	6	1	0	0	0	7	3	1	0	0	0	4	11
Exiting Leg						7						3						1	11
Total						7						10						5	22

PDI File #: 186178 C  
Location: N: Mill Street  
Location: E: Trapelo Road (Route 60) W: Trapelo Road (Route 60)  
City, State: Belmont, MA  
Client: BSC Group/ S. Oftei-Addo  
Site Code: TBA  
Count Date: Wednesday, April 11, 2018  
Start Time: 6:00 AM  
End Time: 6:00 PM  
Class:



Pedestrians

	Mill Street						Trapelo Road (Route 60)						Trapelo Road (Route 60)						Total	
	from North						from East						from West							
	Right	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	U-Turn	CW-SB	CW-NB	Total	Thru	Left	U-Turn	CW-NB	CW-SB	Total		
6:00 AM	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	1
6:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 AM	0	0	0	0	0	0	0	0	0	0	0	2	2	0	0	0	0	0	0	2
6:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	1	2	3	0	0	0	0	0	0	3
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
8:00 AM	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:30 AM	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	2
9:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1
9:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	1
9:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:45 AM	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	1
Total	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	1	1	2	3
10:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	2
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	2
11:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:15 AM	0	0	0	1	0	1	0	0	0	1	0	1	1	0	0	0	0	2	2	4
11:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	1	0	1	0	0	0	1	0	1	1	0	0	0	0	2	2	4
12:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	2
12:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1
12:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	1	4	4
1:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1:15 PM	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	1	1	2	3
1:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	1	1	2	3
2:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
2:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
2:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	3	3
3:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1
3:15 PM	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	1	1	2
3:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	2	2	3
4:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	1	1	2	3
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	1	1	2	3
Grand Total	0	0	0	3	3	6	0	0	0	2	3	5	0	0	0	11	10	21		32
Approach %	0	0	0	50	50		0	0	0	40	60		0	0	0	52.381	47.619			
Total %	0	0	0	9.375	9.375	18.75	0	0	0	6.25	9.375	15.625	0	0	0	34.375	31.25	65.625		
Exiting Leg Total						6						5						21		32

AM Peak Hour Analysis from 06:00 AM to 10:00 AM begins at:

6:00 AM	Mill Street						Trapelo Road (Route 60)						Trapelo Road (Route 60)						Total
	from North						from East						from West						
	Right	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	U-Turn	CW-SB	CW-NB	Total	Thru	Left	U-Turn	CW-NB	CW-SB	Total	

PDI File #: **186178 C**  
 Location: **N: Mill Street**  
 Location: **E: Trapelo Road (Route 60) W: Trapelo Road (Route 60)**  
 City, State: **Belmont, MA**  
 Client: **BSC Group/ S. Offei-Addo**  
 Site Code: **TBA**  
 Count Date: **Wednesday, April 11, 2018**  
 Start Time: **6:00 AM**  
 End Time: **6:00 PM**  
 Class:



### Pedestrians

	Mill Street						Trapelo Road (Route 60)						Trapelo Road (Route 60)						Total
	from North						from East						from West						
	Right	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	U-Turn	CW-SB	CW-NB	Total	Thru	Left	U-Turn	CW-NB	CW-SB	Total	
6:00 AM	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	1
6:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 AM	0	0	0	0	0	0	0	0	0	0	2	2	0	0	0	0	0	0	2
6:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Volume	0	0	0	0	0	0	0	0	0	1	2	3	0	0	0	0	0	0	3
% Approach Total	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	33.3	66.7		0.0	0.0	0.0	0.0	0.0		
PHF	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.250	0.250	0.375	0.000	0.000	0.000	0.000	0.000	0.000	0.375
Entering Leg	0	0	0	0	0	0	0	0	0	1	2	3	0	0	0	0	0	0	3
Exiting Leg						0						3							3
Total						0						6							6

MidDay Peak Hour Analysis from 10:00 AM to 2:00 PM begins at:

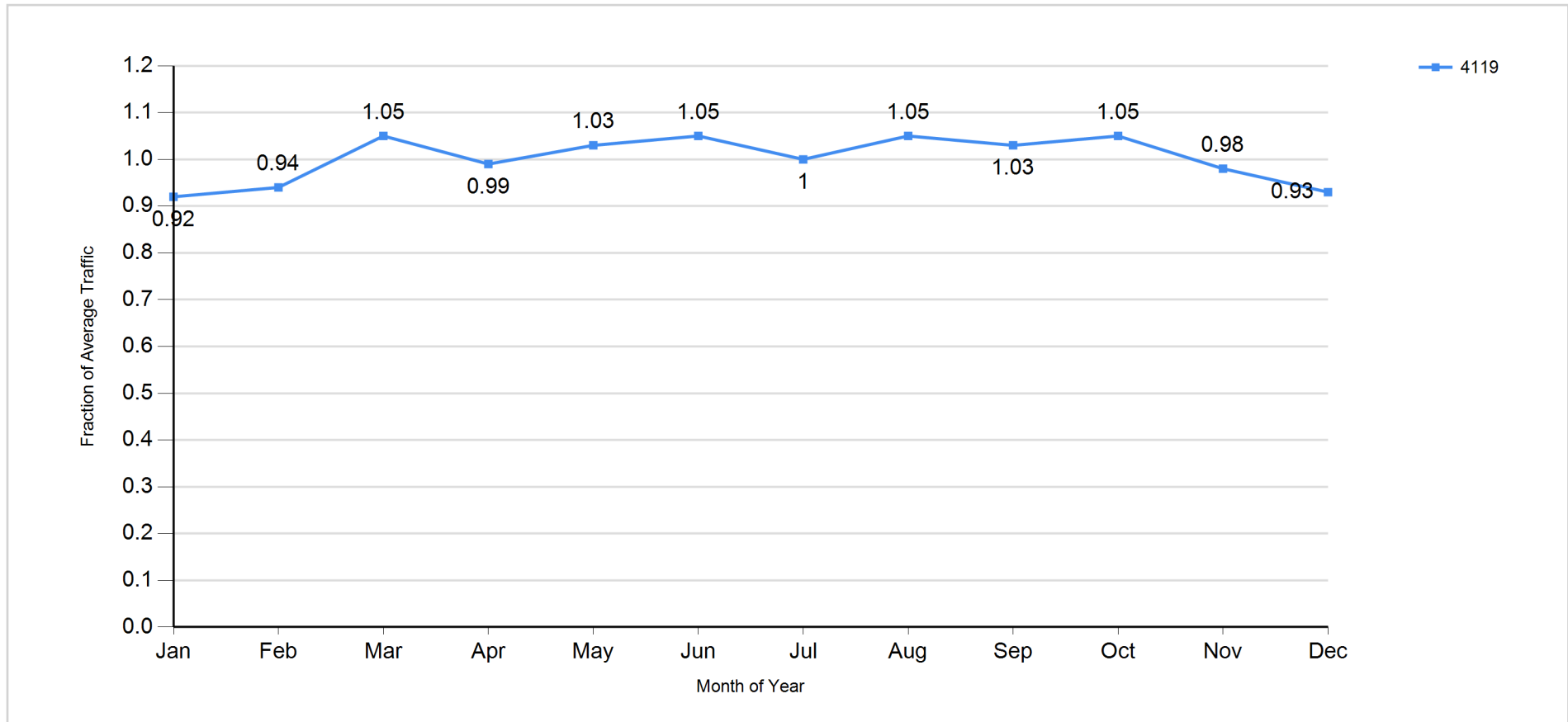
10:30 AM	Mill Street						Trapelo Road (Route 60)						Trapelo Road (Route 60)							
	from North						from East						from West							
	Right	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	U-Turn	CW-SB	CW-NB	Total	Thru	Left	U-Turn	CW-NB	CW-SB	Total	Total	
10:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
10:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	2	
11:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
11:15 AM	0	0	0	1	0	1	0	0	0	1	0	1	0	0	0	0	2	2	4	
Total Volume	0	0	0	1	0	1	0	0	0	1	0	1	0	0	0	2	2	4	6	
% Approach Total	0.0	0.0	0.0	100.0	0.0		0.0	0.0	0.0	100.0	0.0		0.0	0.0	0.0	50.0	50.0			
PHF	0.000	0.000	0.000	0.250	0.000	0.250	0.000	0.000	0.000	0.250	0.000	0.250	0.000	0.000	0.000	0.250	0.250	0.500	0.375	
Entering Leg	0	0	0	1	0	1	0	0	0	1	0	1	0	0	0	2	2	4	6	
Exiting Leg						1						1						4	6	
Total						2						2						8	12	

PM Peak Hour Analysis from 2:00 PM to 06:00 PM begins at:

2:30 PM	Mill Street						Trapelo Road (Route 60)						Trapelo Road (Route 60)						Total
	from North						from East						from West						
	Right	Left	U-Turn	CW-EB	CW-WB	Total	Right	Thru	U-Turn	CW-SB	CW-NB	Total	Thru	Left	U-Turn	CW-NB	CW-SB	Total	
2:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
2:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1
3:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1
3:15 PM	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1	1	2
Total Volume	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	1	3	4	5
% Approach Total	0.0	0.0	0.0	0.0	100.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	25.0	75.0		
PHF	0.000	0.000	0.000	0.000	0.250	0.250	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.250	0.750	1.000	0.625
Entering Leg	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	1	3	4	5
Exiting Leg						1						0						4	5
Total						2						0						8	10

Massachusetts Highway Department

Traffic Pattern by Month for 1/1/2018 - 12/31/2018



**Accurate Counts**  
978-664-2565

N/S Street : Trapelo Road  
E/W Street : Mill Street  
City/State : Belmont, MA  
Weather : Clear

File Name : 80580001  
Site Code : 80580001  
Start Date : 11/10/2020  
Page No : 1

Groups Printed- Cars - Trucks

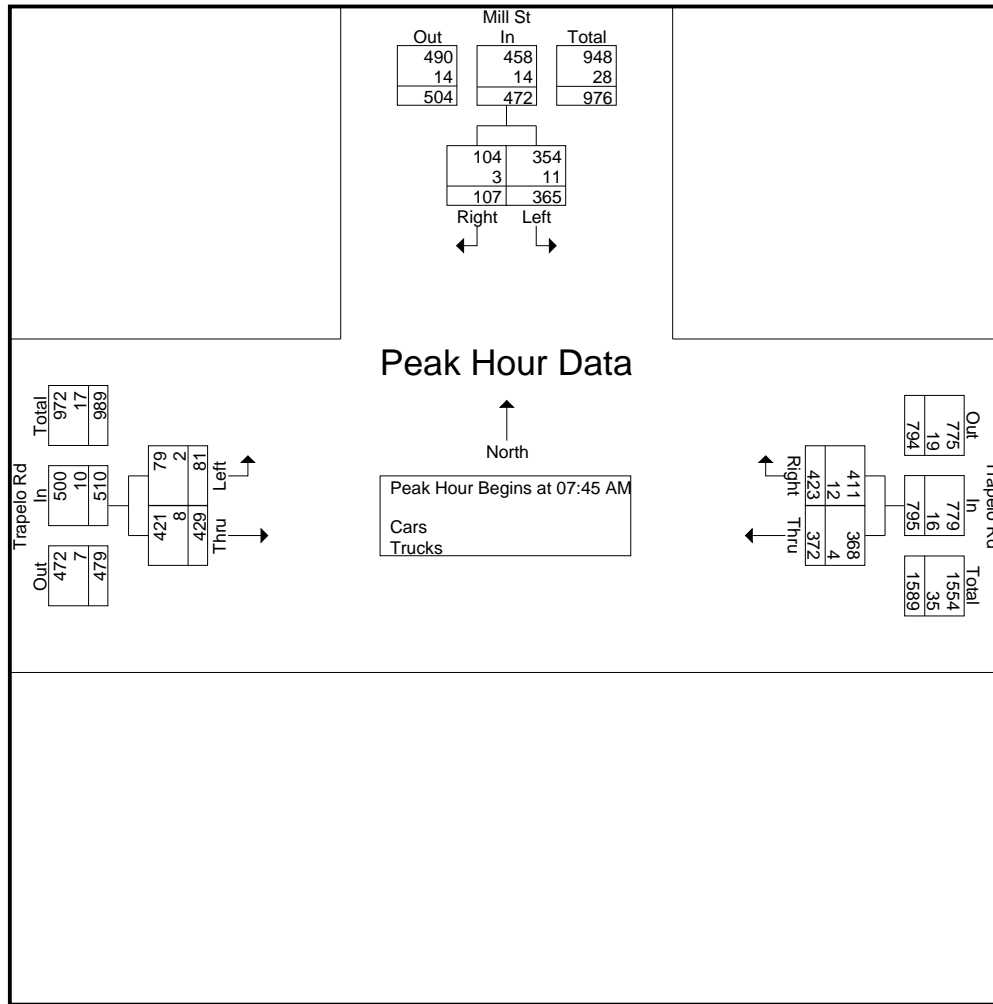
	Mill St From North		Trapelo Rd From East		Trapelo Rd From West		
Start Time	Left	Right	Thru	Right	Left	Thru	Int. Total
07:00 AM	56	19	75	72	22	89	333
07:15 AM	93	24	70	77	30	103	397
07:30 AM	89	27	81	81	27	131	436
07:45 AM	91	23	89	97	27	104	431
Total	329	93	315	327	106	427	1597
08:00 AM	89	22	105	103	18	114	451
08:15 AM	94	36	87	110	21	109	457
08:30 AM	91	26	91	113	15	102	438
08:45 AM	74	24	92	91	30	100	411
Total	348	108	375	417	84	425	1757
Grand Total	677	201	690	744	190	852	3354
Apprch %	77.1	22.9	48.1	51.9	18.2	81.8	
Total %	20.2	6	20.6	22.2	5.7	25.4	
Cars	657	198	681	725	186	832	3279
% Cars	97	98.5	98.7	97.4	97.9	97.7	97.8
Trucks	20	3	9	19	4	20	75
% Trucks	3	1.5	1.3	2.6	2.1	2.3	2.2

	Mill St From North			Trapelo Rd From East			Trapelo Rd From West			
Start Time	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	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	91	23	114	89	97	186	27	104	131	431
08:00 AM	89	22	111	105	103	208	18	114	132	451
08:15 AM	94	36	130	87	110	197	21	109	130	457
08:30 AM	91	26	117	91	113	204	15	102	117	438
Total Volume	365	107	472	372	423	795	81	429	510	1777
% App. Total	77.3	22.7		46.8	53.2		15.9	84.1		
PHF	.971	.743	.908	.886	.936	.956	.750	.941	.966	.972
Cars	354	104	458	368	411	779	79	421	500	1737
% Cars	97.0	97.2	97.0	98.9	97.2	98.0	97.5	98.1	98.0	97.7
Trucks	11	3	14	4	12	16	2	8	10	40
% Trucks	3.0	2.8	3.0	1.1	2.8	2.0	2.5	1.9	2.0	2.3

**Accurate Counts**  
978-664-2565

N/S Street : Trapelo Road  
E/W Street : Mill Street  
City/State : Belmont, MA  
Weather : Clear

File Name : 80580001  
Site Code : 80580001  
Start Date : 11/10/2020  
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:

	07:45 AM			07:45 AM			07:15 AM		
+0 mins.	91	23	114	89	97	186	<b>30</b>	103	133
+15 mins.	89	22	111	<b>105</b>	103	<b>208</b>	27	<b>131</b>	<b>158</b>
+30 mins.	<b>94</b>	<b>36</b>	<b>130</b>	87	110	197	27	104	131
+45 mins.	91	26	117	91	<b>113</b>	204	18	114	132
Total Volume	365	107	472	372	423	795	102	452	554
% App. Total	77.3	22.7		46.8	53.2		18.4	81.6	
PHF	.971	.743	.908	.886	.936	.956	.850	.863	.877
Cars	354	104	458	368	411	779	101	443	544
% Cars	97	97.2	97	98.9	97.2	98	99	98	98.2
Trucks	11	3	14	4	12	16	1	9	10
% Trucks	3	2.8	3	1.1	2.8	2	1	2	1.8

# Accurate Counts

978-664-2565

N/S Street : Trapelo Road  
E/W Street : Mill Street  
City/State : Belmont, MA  
Weather : Clear

File Name : 80580001  
Site Code : 80580001  
Start Date : 11/10/2020  
Page No : 10

## Groups Printed- Bikes Peds

	Mill St From North			Trapelo Rd From East			Trapelo Rd From West			Exclu. Total	Inclu. Total	Int. Total
Start Time	Left	Right	Peds	Thru	Right	Peds	Left	Thru	Peds			
07:00 AM	0	0	0	1	0	0	0	1	0	0	2	2
07:15 AM	2	0	0	0	0	1	0	2	0	1	4	5
07:30 AM	1	0	1	1	0	2	0	1	0	3	3	6
07:45 AM	1	0	2	0	0	2	0	0	0	4	1	5
Total	4	0	3	2	0	5	0	4	0	8	10	18
08:00 AM	0	0	0	1	0	2	0	0	1	3	1	4
08:15 AM	1	0	0	0	0	3	0	1	1	4	2	6
08:30 AM	0	0	0	1	2	1	0	1	0	1	4	5
08:45 AM	1	0	0	2	0	0	0	3	2	2	6	8
Total	2	0	0	4	2	6	0	5	4	10	13	23
Grand Total	6	0	3	6	2	11	0	9	4	18	23	41
Apprch %	100	0		75	25		0	100				
Total %	26.1	0		26.1	8.7		0	39.1		43.9	56.1	

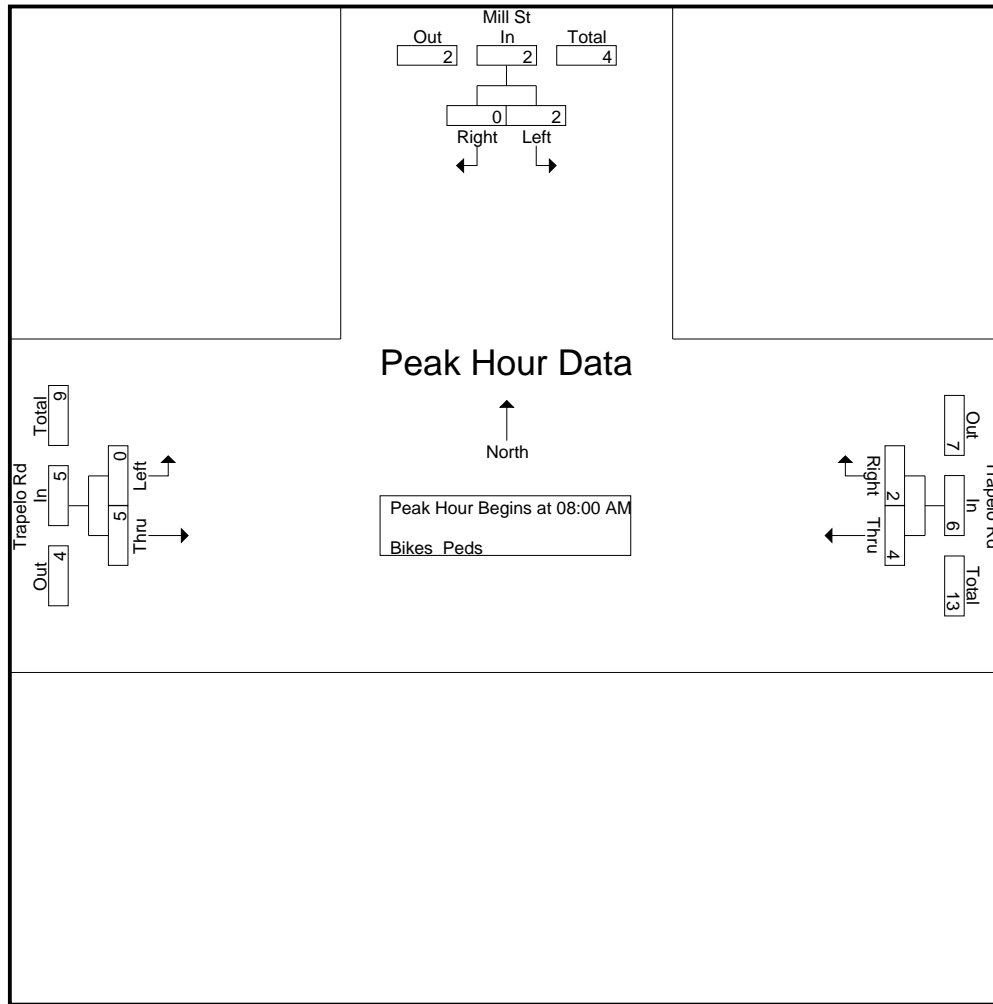
	Mill St From North			Trapelo Rd From East			Trapelo Rd From West			Int. Total
Start Time	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. Total	
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 08:00 AM										
08:00 AM	0	0	0	1	0	1	0	0	0	1
08:15 AM	1	0	1	0	0	0	0	1	1	2
08:30 AM	0	0	0	1	2	3	0	1	1	4
08:45 AM	1	0	1	2	0	2	0	3	3	6
Total Volume	2	0	2	4	2	6	0	5	5	13
% App. Total	100	0		66.7	33.3		0	100		
PHF	.500	.000	.500	.500	.250	.500	.000	.417	.417	.542

# Accurate Counts

978-664-2565

N/S Street : Trapelo Road  
 E/W Street : Mill Street  
 City/State : Belmont, MA  
 Weather : Clear

File Name : 80580001  
 Site Code : 80580001  
 Start Date : 11/10/2020  
 Page No : 11



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

	07:00 AM			08:00 AM			08:00 AM		
+0 mins.	0	0	0	1	0	1	0	0	0
+15 mins.	2	0	2	0	0	0	0	1	1
+30 mins.	1	0	1	1	2	3	0	1	1
+45 mins.	1	0	1	2	0	2	0	3	3
Total Volume	4	0	4	4	2	6	0	5	5
% App. Total	100	0		66.7	33.3		0	100	
PHF	.500	.000	.500	.500	.250	.500	.000	.417	.417

# Accurate Counts

978-664-2565

N/S Street : Trapelo Road  
E/W Street : Mill Street  
City/State : Belmont, MA  
Weather : Clear

File Name : 80580001  
Site Code : 80580001  
Start Date : 11/10/2020  
Page No : 1

## Groups Printed- Cars - Trucks

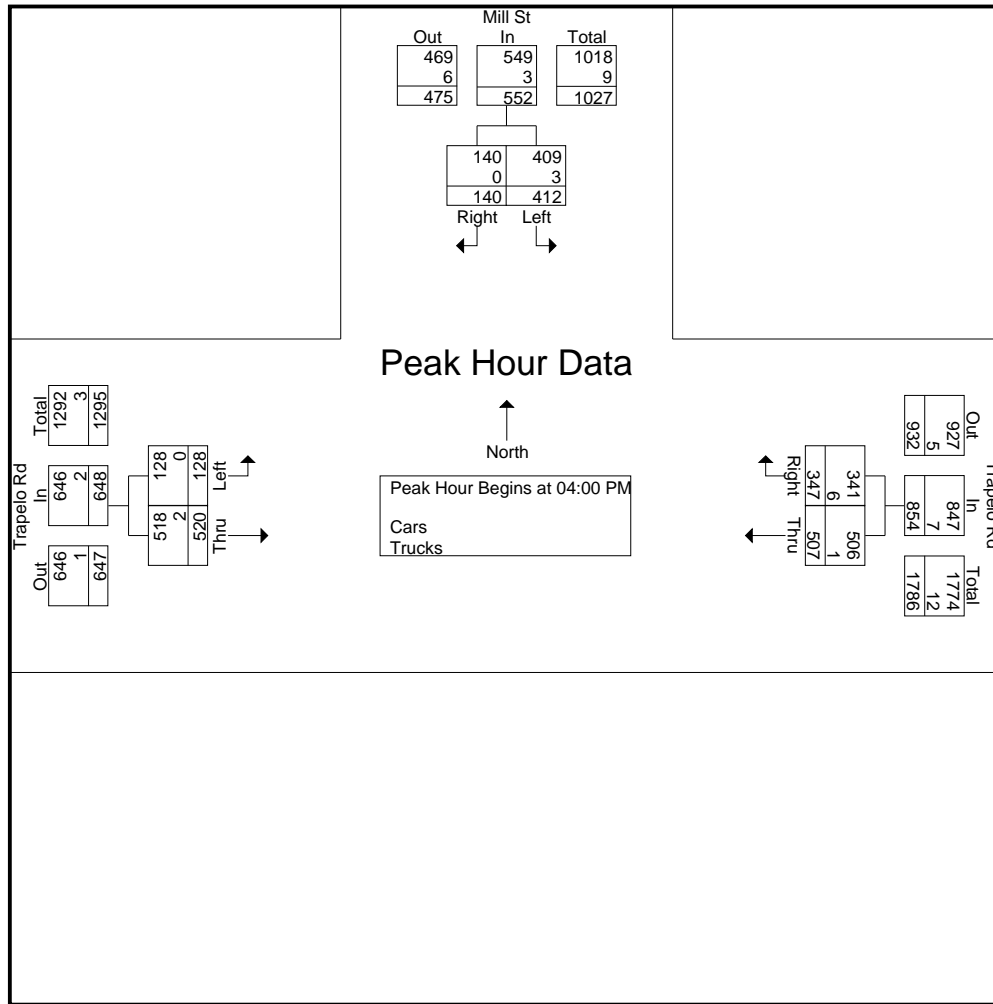
	Mill St From North		Trapelo Rd From East		Trapelo Rd From West		
Start Time	Left	Right	Thru	Right	Left	Thru	Int. Total
04:00 PM	88	29	113	90	44	152	516
04:15 PM	109	39	123	92	24	113	500
04:30 PM	114	33	123	89	27	132	518
04:45 PM	101	39	148	76	33	123	520
Total	412	140	507	347	128	520	2054
05:00 PM	95	21	143	70	22	132	483
05:15 PM	102	34	168	77	22	107	510
05:30 PM	85	20	97	71	26	99	398
05:45 PM	57	32	103	52	28	103	375
Total	339	107	511	270	98	441	1766
Grand Total	751	247	1018	617	226	961	3820
Apprch %	75.3	24.7	62.3	37.7	19	81	
Total %	19.7	6.5	26.6	16.2	5.9	25.2	
Cars	747	247	1016	608	225	958	3801
% Cars	99.5	100	99.8	98.5	99.6	99.7	99.5
Trucks	4	0	2	9	1	3	19
% Trucks	0.5	0	0.2	1.5	0.4	0.3	0.5

	Mill St From North			Trapelo Rd From East			Trapelo Rd From West			
Start Time	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	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 04:00 PM										
04:00 PM	88	29	117	113	90	203	<b>44</b>	<b>152</b>	<b>196</b>	516
04:15 PM	109	<b>39</b>	<b>148</b>	123	<b>92</b>	215	24	113	137	500
04:30 PM	<b>114</b>	33	147	123	89	212	27	132	159	518
04:45 PM	101	39	140	<b>148</b>	76	<b>224</b>	33	123	156	<b>520</b>
Total Volume	412	140	552	507	347	854	128	520	648	2054
% App. Total	74.6	25.4		59.4	40.6		19.8	80.2		
PHF	.904	.897	.932	.856	.943	.953	.727	.855	.827	.988
Cars	409	140	549	506	341	847	128	518	646	2042
% Cars	99.3	100	99.5	99.8	98.3	99.2	100	99.6	99.7	99.4
Trucks	3	0	3	1	6	7	0	2	2	12
% Trucks	0.7	0	0.5	0.2	1.7	0.8	0	0.4	0.3	0.6

**Accurate Counts**  
978-664-2565

N/S Street : Trapelo Road  
E/W Street : Mill Street  
City/State : Belmont, MA  
Weather : Clear

File Name : 80580001  
Site Code : 80580001  
Start Date : 11/10/2020  
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:

	04:00 PM			04:30 PM			04:00 PM		
+0 mins.	88	29	117	123	<b>89</b>	212	<b>44</b>	<b>152</b>	<b>196</b>
+15 mins.	109	<b>39</b>	<b>148</b>	148	76	224	24	113	137
+30 mins.	<b>114</b>	33	147	143	70	213	27	132	159
+45 mins.	101	39	140	<b>168</b>	77	<b>245</b>	33	123	156
Total Volume	412	140	552	582	312	894	128	520	648
% App. Total	74.6	25.4		65.1	34.9		19.8	80.2	
PHF	.904	.897	.932	.866	.876	.912	.727	.855	.827
Cars	409	140	549	581	306	887	128	518	646
% Cars	99.3	100	99.5	99.8	98.1	99.2	100	99.6	99.7
Trucks	3	0	3	1	6	7	0	2	2
% Trucks	0.7	0	0.5	0.2	1.9	0.8	0	0.4	0.3

# Accurate Counts

978-664-2565

N/S Street : Trapelo Road  
E/W Street : Mill Street  
City/State : Belmont, MA  
Weather : Clear

File Name : 80580001  
Site Code : 80580001  
Start Date : 11/10/2020  
Page No : 10

## Groups Printed- Bikes Peds

	Mill St From North			Trapelo Rd From East			Trapelo Rd From West			Exclu. Total	Inclu. Total	Int. Total
Start Time	Left	Right	Peds	Thru	Right	Peds	Left	Thru	Peds			
04:00 PM	0	0	1	0	0	2	0	4	0	3	4	7
04:15 PM	1	0	0	4	1	0	0	2	0	0	8	8
04:30 PM	1	0	0	1	0	0	1	1	0	0	4	4
04:45 PM	2	0	0	1	2	1	0	0	2	3	5	8
Total	4	0	1	6	3	3	1	7	2	6	21	27
05:00 PM	0	0	0	0	0	0	0	1	0	0	1	1
05:15 PM	1	1	0	0	0	0	0	0	0	0	2	2
05:30 PM	1	0	0	0	0	0	0	1	0	0	2	2
05:45 PM	0	0	1	0	0	0	0	2	0	1	2	3
Total	2	1	1	0	0	0	0	4	0	1	7	8
Grand Total	6	1	2	6	3	3	1	11	2	7	28	35
Apprch %	85.7	14.3		66.7	33.3		8.3	91.7				
Total %	21.4	3.6		21.4	10.7		3.6	39.3		20	80	

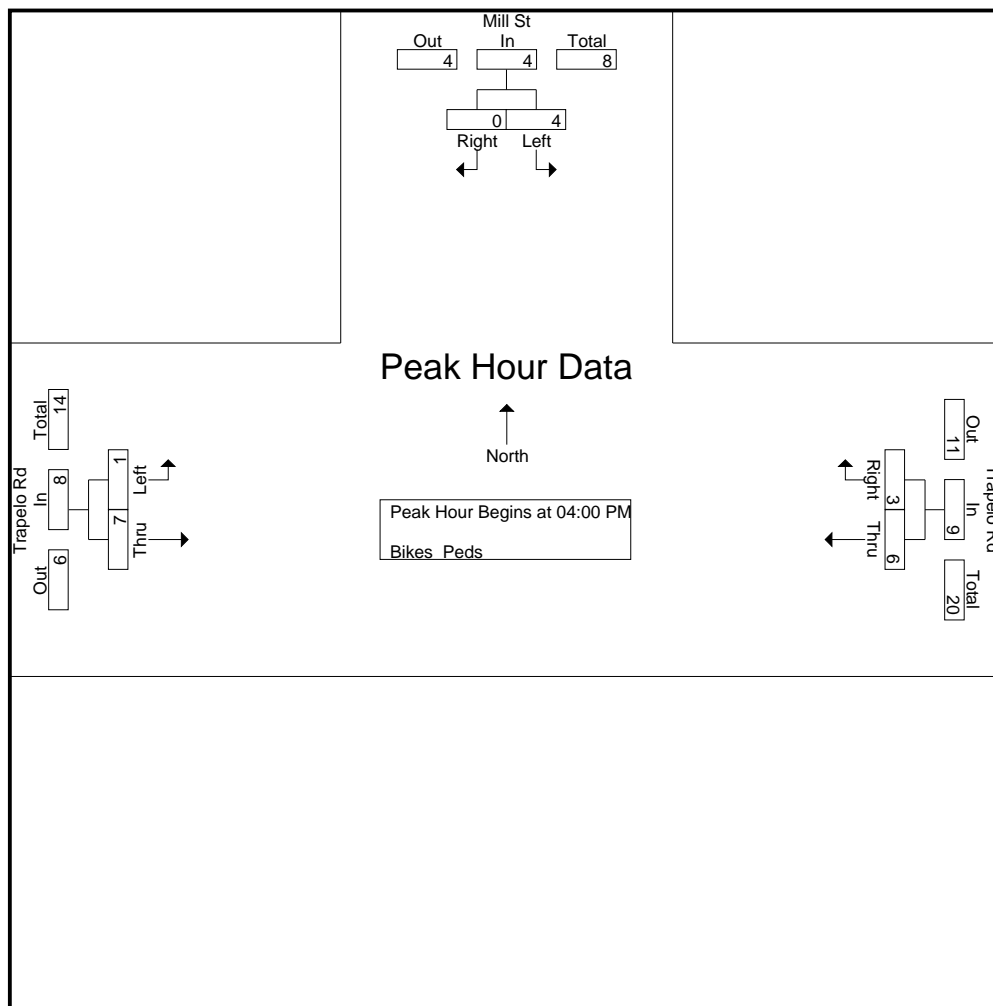
	Mill St From North			Trapelo Rd From East			Trapelo Rd From West			
Start Time	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 04:00 PM										
04:00 PM	0	0	0	0	0	0	0	4	4	4
04:15 PM	1	0	1	4	1	5	0	2	2	8
04:30 PM	1	0	1	1	0	1	1	1	2	4
04:45 PM	2	0	2	1	2	3	0	0	0	5
Total Volume	4	0	4	6	3	9	1	7	8	21
% App. Total	100	0		66.7	33.3		12.5	87.5		
PHF	.500	.000	.500	.375	.375	.450	.250	.438	.500	.656

# Accurate Counts

978-664-2565

N/S Street : Trapelo Road  
 E/W Street : Mill Street  
 City/State : Belmont, MA  
 Weather : Clear

File Name : 80580001  
 Site Code : 80580001  
 Start Date : 11/10/2020  
 Page No : 11



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1

Peak Hour for Each Approach Begins at:

	04:30 PM			04:00 PM			04:00 PM		
+0 mins.	1	0	1	0	0	0	0	4	4
+15 mins.	2	0	2	4	1	5	0	2	2
+30 mins.	0	0	0	1	0	1	1	1	2
+45 mins.	1	1	2	1	2	3	0	0	0
Total Volume	4	1	5	6	3	9	1	7	8
% App. Total	80	20		66.7	33.3		12.5	87.5	
PHF	.500	.250	.625	.375	.375	.450	.250	.438	.500

## MOTOR VEHICLE CRASH DATA

Crash Number	City Town Name	Crash Date	Weekday	Crash Severity	Crash Time	Number of Vehicles	Age of Driver - Youngest Known	Driver Contributing Circumstances (All Drivers)	First Harmful Event	Light Conditions	Manner of Collision	Road Surface Condition	Vehicle Actions Prior to Crash (All Vehicles)	Vehicle Travel Directions (All Vehicles)	Weather Conditions	Latitude	Longitude	Street Number	Roadway	Near Intersection Roadway
PLEASANT ST / TRAPELO RD																				
3372025	BELMONT	03/08/2013	Friday	Property damage only (none injured)	7:55 AM	2	55-64	D1: (Unknown) / D2: (Unknown)	Collision with motor vehicle in traffic	Daylight	Sideswipe, same direction	Snow	V1: Slowing or stopped in traffic / V2: Travelling straight ahead	V1: E / V2: E	Snow/Blowing sand, snow	42.38875325	-71.19264741		PLEASANT ST / TRAPELO RD	
3414798	BELMONT	05/01/2013	Wednesday	Property damage only (none injured)	5:25 PM	2	21-24	D1: (No improper driving) / D2: (Followed too closely)	Collision with motor vehicle in traffic	Daylight	Rear-end	Dry	V1: Entering traffic lane / V2: Entering traffic lane	V1: W / V2: W	Clear	42.38875325	-71.19264741		PLEASANT ST / TRAPELO RD	
3414802	BELMONT	05/05/2013	Sunday	Not Reported	4:02 PM	2	35-44	D1: (Inattention) / D2: (No improper driving)	Collision with motor vehicle in traffic	Daylight	Rear-end	Dry	V1: Travelling straight ahead / V2: Slowing or stopped in traffic	V1: W / V2: W	Clear	42.38875325	-71.19264741		PLEASANT ST / TRAPELO RD	
3430036	BELMONT	05/26/2013	Sunday	Not Reported	7:27 PM	2	18-20	D1: (Failed to yield right of way),(Glare) / D2: (No improper driving)	Collision with motor vehicle in traffic	Dusk	Angle	Dry	V1: Turning left / V2: Travelling straight ahead	V1: S / V2: W	Clear	42.38875325	-71.19264741		PLEASANT ST / TRAPELO RD	
3573487	BELMONT	07/21/2013	Sunday	Non-fatal injury	10:26 AM	1	65-74	D1: (No improper driving)	Collision with pedalcycle (bicycle, tricycle, unicycle, pedal car)	Daylight	Sideswipe, same direction	Dry	V1: Travelling straight ahead	V1: S	Clear	42.38875325	-71.19264741		PLEASANT ST / TRAPELO RD	
3605559	BELMONT	09/25/2013	Wednesday	Property damage only (none injured)	7:11 PM	2	18-20	D1: (Inattention),(Disregarded traffic signs, signals, road markings) / D2: (No improper driving)	Collision with motor vehicle in traffic	Dark - lighted roadway	Angle	Dry	V1: Turning left / V2: Travelling straight ahead	V1: S / V2: W	Clear	42.38875325	-71.19264741		PLEASANT ST / TRAPELO RD	
3700131	BELMONT	12/16/2013	Monday	Non-fatal injury	6:54 PM	3	16-17	D1: (Followed too closely) / D2: (No improper driving) / D3: (No improper driving)	Collision with motor vehicle in traffic	Dark - lighted roadway	Rear-end	Ice	V1: Slowing or stopped in traffic / V2: Slowing or stopped in traffic / V3: Slowing or stopped in traffic	V1: E / V2: E / V3: E	Clear	42.38890721	-71.19298671	576	TRAPELO RD	
3731020	BELMONT	01/05/2014	Sunday	Property damage only (none injured)	4:13 PM	2	21-24	D1: (Followed too closely) / D2: (No improper driving)	Collision with motor vehicle in traffic	Dusk	Rear-end	Wet	V1: Travelling straight ahead / V2: Slowing or stopped in traffic	V1: W / V2: W	Rain/Cloudy	42.38875325	-71.19264741		PLEASANT ST Rte 60 W / TRAPELO RD	
3731027	BELMONT	01/14/2014	Tuesday	Property damage only (none injured)	5:41 PM	2	55-64	D1: (Failed to yield right of way) / D2: (No improper driving)	Collision with motor vehicle in traffic	Dark - lighted roadway	Sideswipe, same direction	Wet	V1: Changing lanes / V2: Travelling straight ahead	V1: E / V2: E	Rain	42.38875325	-71.19264741		PLEASANT ST / TRAPELO RD	
3733273	BELMONT	02/05/2014	Wednesday	Property damage only (none injured)	12:32 PM	1	35-44	D1: (Unknown)	Overturn/rollover	Daylight	Single vehicle crash	Slush	V1: Entering traffic lane	V1: W	Snow/Blowing sand, snow	42.38875325	-71.19264741		PLEASANT STREET / TRAPELO ROAD	
3784412	BELMONT	03/21/2014	Friday	Property damage only (none injured)	7:53 AM	2	25-34	D1: (Unknown) / D2: (Unknown)	Collision with motor vehicle in traffic	Daylight	Angle	Dry	V1: Turning left / V2: Travelling straight ahead	V1: S / V2: W	Cloudy	42.38875325	-71.19264741		PLEASANT ST / TRAPELO RD	
3799403	BELMONT	04/16/2014	Wednesday	Property damage only (none injured)	6:50 PM	2	25-34	D1: (Glare),(Inattention) / D2: (No improper driving)	Collision with motor vehicle in traffic	Dusk	Rear-end	Dry	V1: Entering traffic lane / V2: Slowing or stopped in traffic	V1: W / V2: W	Clear	42.38875325	-71.19264741		PLEASANT ST / TRAPELO RD	
3799409	BELMONT	05/01/2014	Thursday	Non-fatal injury	5:37 PM	2	55-64	D1: (Failed to yield right of way) / D2: (No improper driving)	Collision with motor vehicle in traffic	Daylight	Head-on	Dry	V1: Turning left / V2: Travelling straight ahead	V1: E / V2: W	Clear	42.38875325	-71.19264741		PLEASANT ST / TRAPELO RD	
3869503	BELMONT	06/11/2014	Wednesday	Property damage only (none injured)	10:48 AM	2	25-34	D1: (No improper driving),(No improper driving) / D2: (Failed to yield right of way),(Failed to yield right of way)	Collision with motor vehicle in traffic	Daylight	Angle	Dry	V1: Travelling straight ahead / V2: Turning left	V1: W / V2: W	Clear/Clear	42.38875325	-71.19264741		PLEASANT ST Rte 60 / TRAPELO RD	
3910702	BELMONT	08/13/2014	Wednesday	Property damage only (none injured)	11:38 AM	2	16-17	D1: (No improper driving) / D2: (No improper driving)	Collision with motor vehicle in traffic	Daylight	Rear-end	Wet	V1: Slowing or stopped in traffic / V2: Travelling straight ahead	V1: W / V2: W	Cloudy/Rain	42.38870801	-71.19256262	563	TRAPELO RD	
3911039	BELMONT	07/08/2014	Tuesday	Property damage only (none injured)	9:53 AM	2	25-34	D1: (Unknown) / D2: (No improper driving)	Collision with motor vehicle in traffic	Daylight	Rear-end	Dry	V1: Turning right / V2: Travelling straight ahead	V1: W / V2: W	Clear	42.38875325	-71.19264741		PLEASANT STREET / TRAPELO ROAD	
3950575	BELMONT	08/21/2014	Thursday	Property damage only (none injured)	8:12 AM	2	35-44	D1: (No improper driving)	Collision with motor vehicle in traffic	Daylight	Angle	Dry	V1: Travelling straight ahead / V2: Backing	V1: S / V2: N	Clear	42.38875325	-71.19264741		PLEASANT ST / TRAPELO RD	
3988936	BELMONT	10/30/2014	Thursday	Property damage only (none injured)	8:32 AM	2	45-54	D1: (Failed to yield right of way),(Glare) / D2: (No improper driving)	Collision with motor vehicle in traffic	Daylight	Sideswipe, same direction	Dry	V1: Entering traffic lane / V2: Travelling straight ahead	V1: E / V2: E	Clear	42.38875325	-71.19264741		PLEASANT ST / TRAPELO RD	
3988944	BELMONT	11/13/2014	Thursday	Property damage only (none injured)	7:50 AM	2	35-44	D1: (No improper driving),(No improper driving) / D2: (Disregarded traffic signs, signals, road markings),(Failure to keep in proper lane or running off road)	Collision with motor vehicle in traffic	Daylight	Sideswipe, same direction	Dry	V1: Travelling straight ahead / V2: Travelling straight ahead	V1: E / V2: E	Clear/Clear	42.38875325	-71.19264741		PLEASANT ST / TRAPELO RD	
3990023	BELMONT	10/10/2014	Friday	Not Reported	5:30 PM	2	45-54	D1: (Unknown) / D2: (No improper driving),(No improper driving)	Collision with motor vehicle in traffic	Daylight	Sideswipe, same direction	Dry	V1: Other / V2: Travelling straight ahead	V1: E / V2: Not Reported	Clear	42.38875325	-71.19264741		PLEASANT STREET / TRAPELO ROAD	
4060665	BELMONT	01/29/2015	Thursday	Property damage only (none injured)	12:02 PM	2	35-44	D1: (Inattention) / D2: (No improper driving)	Collision with motor vehicle in traffic	Daylight	Rear-end	Wet	V1: Entering traffic lane / V2: Entering traffic lane	V1: W / V2: W	Clear	42.38875325	-71.19264741		PLEASANT ST / TRAPELO RD	
4060679	BELMONT	02/09/2015	Monday	Not Reported	5:00 PM	3	18-20		Collision with motor vehicle in traffic	Dark - lighted roadway	Rear-end	Snow	V1: Travelling straight ahead / V2: Slowing or stopped in traffic / V3: Entering traffic lane	V1: W / V2: W / V3: Not Reported	Snow	42.38875325	-71.19264741		PLEASANT ST / TRAPELO RD	

Crash Number	City Town Name	Crash Date	Weekday	Crash Severity	Crash Time	Number of Vehicles	Age of Driver - Youngest Known	Driver Contributing Circumstances (All Drivers)	First Harmful Event	Light Conditions	Manner of Collision	Road Surface Condition	Vehicle Actions Prior to Crash (All Vehicles)	Vehicle Travel Directions (All Vehicles)	Weather Conditions	Latitude	Longitude	Street Number	Roadway	Near Intersection Roadway
4060683	BELMONT	02/12/2015	Thursday	Property damage only (none injured)	10:50 AM	2	35-44	D1: (No improper driving) / D2: (Inattention)	Collision with motor vehicle in traffic	Daylight	Sideswipe, same direction	Dry	V1: Travelling straight ahead / V2: Travelling straight ahead	V1: E / V2: E	Clear	42.38875325	-71.19264741	560	TRAPELO ROAD	PLEASANT STREET
4060695	BELMONT	02/20/2015	Friday	Property damage only (none injured)	4:07 PM	2	25-34	D1: (Followed too closely) / D2: (No improper driving)	Collision with motor vehicle in traffic	Daylight	Rear-end	Dry	V1: Travelling straight ahead / V2: Slowing or stopped in traffic	V1: W / V2: W	Clear	42.38875325	-71.19264741		PLEASANT ST / TRAPELO RD	
4060702	BELMONT	02/27/2015	Friday	Property damage only (none injured)	10:37 AM	1	55-64	D1: (No improper driving)	Collision with motor vehicle in traffic	Unknown	Rear-end	Unknown	V1: Slowing or stopped in traffic	V1: E	Unknown	42.38875325	-71.19264741		PLEASANT ST / TRAPELO RD	
4060747	BELMONT	04/23/2015	Thursday	Not Reported	7:39 AM	1			Collision with pedalcycle (bicycle, tricycle, unicycle, pedal car)	Daylight	Sideswipe, same direction	Dry	V1: Turning right	V1: W	Clear	42.38875325	-71.19264741		PLEASANT ST / TRAPELO RD	
4060783	BELMONT	06/04/2015	Thursday	Not Reported	7:29 AM	2	25-34		Collision with motor vehicle in traffic	Daylight	Angle	Dry	V1: Travelling straight ahead / V2: Travelling straight ahead	V1: S / V2: W	Clear	42.38875325	-71.19264741		PLEASANT ST / TRAPELO RD	
4062484	BELMONT	05/29/2015	Friday	Non-fatal injury	1:09 PM	2	45-54	D1: (No improper driving) / D2: (Inattention)	Collision with motor vehicle in traffic	Daylight	Rear-end	Dry	V1: Slowing or stopped in traffic / V2: Travelling straight ahead	V1: W / V2: W	Clear	42.38875325	-71.19264741		PLEASANT STREET / TRAPELO ROAD	
4076411	BELMONT	08/05/2015	Wednesday	Property damage only (none injured)	8:24 AM	3	25-34	D1: (Inattention) / D2: (No improper driving) / D3: (No improper driving)	Collision with motor vehicle in traffic	Daylight	Angle	Dry	V1: Turning left / V2: Travelling straight ahead / V3: Slowing or stopped in traffic	V1: E / V2: W / V3: S	Clear	42.38875325	-71.19264741		TRAPELO ROAD / TRAPELO ROAD / PLEASANT STREET	
4076418	BELMONT	07/07/2015	Tuesday	Non-fatal injury	2:36 PM	2	25-34	D1: (Followed too closely) / D2: (No improper driving)	Collision with motor vehicle in traffic	Daylight	Rear-end	Dry	V1: Travelling straight ahead / V2: Travelling straight ahead	V1: S / V2: S	Clear	42.38875325	-71.19264741		PLEASANT STREET	TRAPELO ROAD
4177563	BELMONT	09/16/2015	Wednesday	Property damage only (none injured)	8:58 AM	2	45-54		Collision with motor vehicle in traffic	Daylight	Angle	Dry	V1: Travelling straight ahead / V2: Entering traffic lane	V1: E / V2: E	Clear	42.38875325	-71.19264741		PLEASANT ST / TRAPELO RD	
4177603	BELMONT	11/03/2015	Tuesday	Property damage only (none injured)	9:46 PM	1	35-44	D1: (Fatigued/asleep)	Collision with utility pole	Dark - lighted roadway	Single vehicle crash	Dry	V1: Travelling straight ahead	V1: E	Clear	42.38875325	-71.19264741		TRAPELO RD / PLEASANT ST	
4178511	BELMONT	09/24/2015	Thursday	Property damage only (none injured)	12:37 PM	3	25-34	D1: (Unknown) / D3: (Unknown)	Collision with motor vehicle in traffic	Daylight	Sideswipe, opposite direction	Dry	V1: Turning right / V2: Turning right / V3: Travelling straight ahead	V1: N / V2: N / V3: W	Clear	42.38875325	-71.19264741		PLEASANT STREET / TRAPELO ROAD	
4178931	BELMONT	09/17/2015	Thursday	Property damage only (none injured)	12:34 PM	2	21-24	D1: (No improper driving) / D2: (Failed to yield right of way)	Collision with motor vehicle in traffic	Daylight	Angle	Dry	V1: Travelling straight ahead / V2: Turning left	V1: S / V2: W	Clear	42.38875325	-71.19264741		PLEASANT STREET / TRAPELO ROAD	
4190363	BELMONT	03/11/2016	Friday	Property damage only (none injured)	3:17 PM	2	35-44	D1: (Failure to keep in proper lane or running off road),(Failed to yield right of way) / D2: (No improper driving),(No improper driving)	Collision with motor vehicle in traffic	Daylight	Angle	Dry	V1: Changing lanes / V2: Travelling straight ahead	V2: W	Clear/Clear	42.38875325	-71.19264741		PLEASANT ST / TRAPELO RD	
4190365	BELMONT	03/15/2016	Tuesday	Non-fatal injury	4:56 PM	2	18-20	D1: (No improper driving) / D2: (Failed to yield right of way),(Inattention)	Not reported	Daylight	Head-on	Wet	V1: Travelling straight ahead / V2: Turning left	V1: W / V2: E	Rain/Cloudy	42.38875325	-71.19264741		PLEASANT ST / TRAPELO RD	
4190407	BELMONT	04/27/2016	Wednesday	Non-fatal injury	3:11 PM	3	55-64	D1: (Unknown) / D2: (Unknown) / D3: (No improper driving)	Collision with motor vehicle in traffic	Daylight	Angle	Dry	V1: Turning left / V2: Travelling straight ahead / V3: Travelling straight ahead	V1: E / V2: W / V3: S	Clear	42.38875325	-71.19264741		PLEASANT ST / TRAPELO RD	
4190408	BELMONT	04/28/2016	Thursday	Property damage only (none injured)	5:31 PM	2	25-34	D1: (Unknown) / D2: (No improper driving)	Collision with motor vehicle in traffic	Daylight	Rear-end	Dry	V1: Turning left / V2: Travelling straight ahead	V1: N / V2: E	Cloudy	42.38875325	-71.19264741		PLEASANT ST / TRAPELO RD	
4190409	BELMONT	04/30/2016	Saturday	Non-fatal injury	4:25 PM	2	21-24		Collision with motor vehicle in traffic	Daylight	Head-on	Dry	V1: Travelling straight ahead / V2: Turning left	V1: W / V2: E	Clear	42.38875325	-71.19264741		PLEASANT ST / TRAPELO RD	
4302300	BELMONT	09/29/2016	Thursday	Property damage only (none injured)	5:35 PM	2	25-34		Collision with motor vehicle in traffic	Daylight	Angle	Dry	V1: Turning left / V2: Travelling straight ahead	V1: E / V2: W	Clear	42.38875325	-71.19264741		PLEASANT ST / TRAPELO RD	
4302314	BELMONT	10/24/2016	Monday	Property damage only (none injured)	9:00 AM	2	21-24		Collision with motor vehicle in traffic	Daylight	Rear-end	Dry	V1: Travelling straight ahead / V2: Travelling straight ahead	V1: E / V2: E	Clear	42.38875325	-71.19264741		PLEASANT ST / TRAPELO RD	
4302347	BELMONT	12/16/2016	Friday	Property damage only (none injured)	7:44 AM	3	25-34		Collision with motor vehicle in traffic	Daylight	Rear-end	Dry	V1: Slowing or stopped in traffic / V2: Slowing or stopped in traffic / V3: Travelling straight ahead	V1: W / V2: W / V3: W	Clear	42.38875325	-71.19264741		PLEASANT ST / TRAPELO RD	
4380481	BELMONT	05/26/2017	Friday	Non-fatal injury	12:04 PM	2	55-64		Collision with motor vehicle in traffic	Daylight	Rear-end	Dry	V1: Travelling straight ahead / V2: Travelling straight ahead	V1: E / V2: E	Clear	42.38900679	-71.19319269		PLEASANT ST / TRAPELO RD	
4380495	BELMONT	06/05/2017	Monday	Property damage only (none injured)	7:52 AM	2	35-44		Collision with motor vehicle in traffic	Daylight	Rear-end	Wet	V1: Turning right / V2: Travelling straight ahead	V1: N / V2: W	Rain	42.38900679	-71.19319269		PLEASANT ST / TRAPELO RD	
4380622	BELMONT	04/14/2017	Friday	Property damage only (none injured)	1:27 PM	2	35-44	D1: (Other improper action),(Unknown) / D2: (Other improper action),(Unknown)	Collision with motor vehicle in traffic	Daylight	Angle	Dry	V1: Slowing or stopped in traffic / V2: Backing	V1: E / V2: N	Clear/Clear	42.38900679	-71.19319269		TRAPELO RD / PLEASANT ST	
4380633	BELMONT	05/19/2017	Friday	Property damage only (none injured)	8:01 AM	2	25-34		Collision with motor vehicle in traffic	Daylight	Angle	Dry	V1: Travelling straight ahead / V2: Entering traffic lane	V1: W / V2: S	Clear/Clear	42.38900679	-71.19319269		PLEASANT ST / TRAPELO RD	
4381828	BELMONT	06/21/2017	Wednesday	Property damage only (none injured)	8:57 AM	2	21-24		Collision with motor vehicle in traffic	Daylight	Rear-end	Dry	V1: Travelling straight ahead / V2: Slowing or stopped in traffic	V1: E / V2: E	Clear/Clear	42.38909769	-71.19352015	590	TRAPELO RD	
4399849	BELMONT	07/28/2017	Friday	Property damage only (none injured)	12:10 PM	2	35-44	D1: (Failed to yield right of way),(Unknown) / D2: (Unknown),(Unknown)	Collision with motor vehicle in traffic	Daylight	Angle	Dry	V1: Turning left / V2: Travelling straight ahead	V1: N / V2: W	Clear/Clear	42.38900679	-71.19319269		PLEASANT ST Rte 60 N / TRAPELO RD	

Crash Number	City Town Name	Crash Date	Weekday	Crash Severity	Crash Time	Number of Vehicles	Age of Driver - Youngest Known	Driver Contributing Circumstances (All Drivers)	First Harmful Event	Light Conditions	Manner of Collision	Road Surface Condition	Vehicle Actions Prior to Crash (All Vehicles)	Vehicle Travel Directions (All Vehicles)	Weather Conditions	Latitude	Longitude	Street Number	Roadway	Near Intersection Roadway
4415759	BELMONT	08/31/2017	Thursday	Property damage only (none injured)	4:03 PM	2	25-34		Collision with motor vehicle in traffic	Daylight	Sideswipe, same direction	Dry	V1: Slowing or stopped in traffic/ V2: Travelling straight ahead	V1: W / V2: W	Clear	42.38900679	-71.19319269		PLEASANT ST / TRAPELO RD	
PLEASANT ST / OLMSTED DRIVE																				
4380932	BELMONT	02/24/2017	Friday	Non-fatal injury	3:47 PM	1	35-44	D1: (Glare)	Collision with pedalcycle (bicycle, tricycle, unicycle, pedal car)	Dusk	Angle	Dry	V1: Turning left	V1: W	Clear	42.38902647	-71.19046006		PLEASANT STREET	OLMSTED DRIVE

# Masshighway

## CRASH RATE WORKSHEET

CITY/TOWN : Belmont COUNT DATE : 2020

DISTRICT : 4 UNSIGNALIZED : ☐ SIGNALIZED : ☒

**MHD USE ONLY**

Source #

~ INTERSECTION DATA ~

MAJOR STREET : Trapello Road

ST #

MINOR STREET(S) : Pleasant St

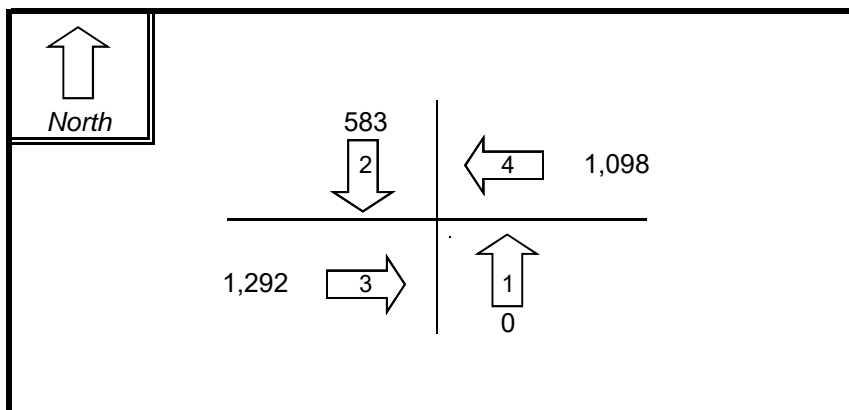
ST #

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) :	0	583	1,292	1,098		2,973

" K " FACTOR : **0.080** APPROACH ADT : **37,163** ADT = TOTAL VOL/"K" FACT.

TOTAL # OF ACCIDENTS : **49** # OF YEARS : **5** AVERAGE # OF ACCIDENTS ( A ) : **9.80**

**CRASH RATE CALCULATION :** **0.72** RATE =  $\frac{(A * 1,000,000)}{(ADT * 365)}$

Comments : Accident Rate for District 6 signalized intersections = 0.73

Accident Rate for District 6 unsignalized intersections = 0.57

Statewide Accident Rate for Signalized Intersection = 0.78 and Unsignalized/Intersection = 0.57

# Masshighway

## CRASH RATE WORKSHEET

CITY/TOWN : Belmont COUNT DATE : 2020

DISTRICT : 4 UNSIGNALIZED : ☒ SIGNALIZED : ☐

**MHD USE ONLY**

Source #

~ INTERSECTION DATA ~

MAJOR STREET : Pleasant Street

ST #

MINOR STREET(S) : Olmsted Drive

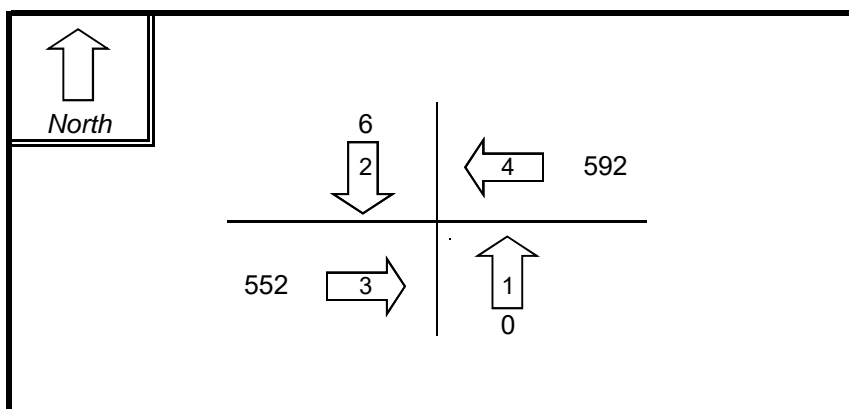
ST #

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) :	0	6	552	592		<b>1,150</b>

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

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

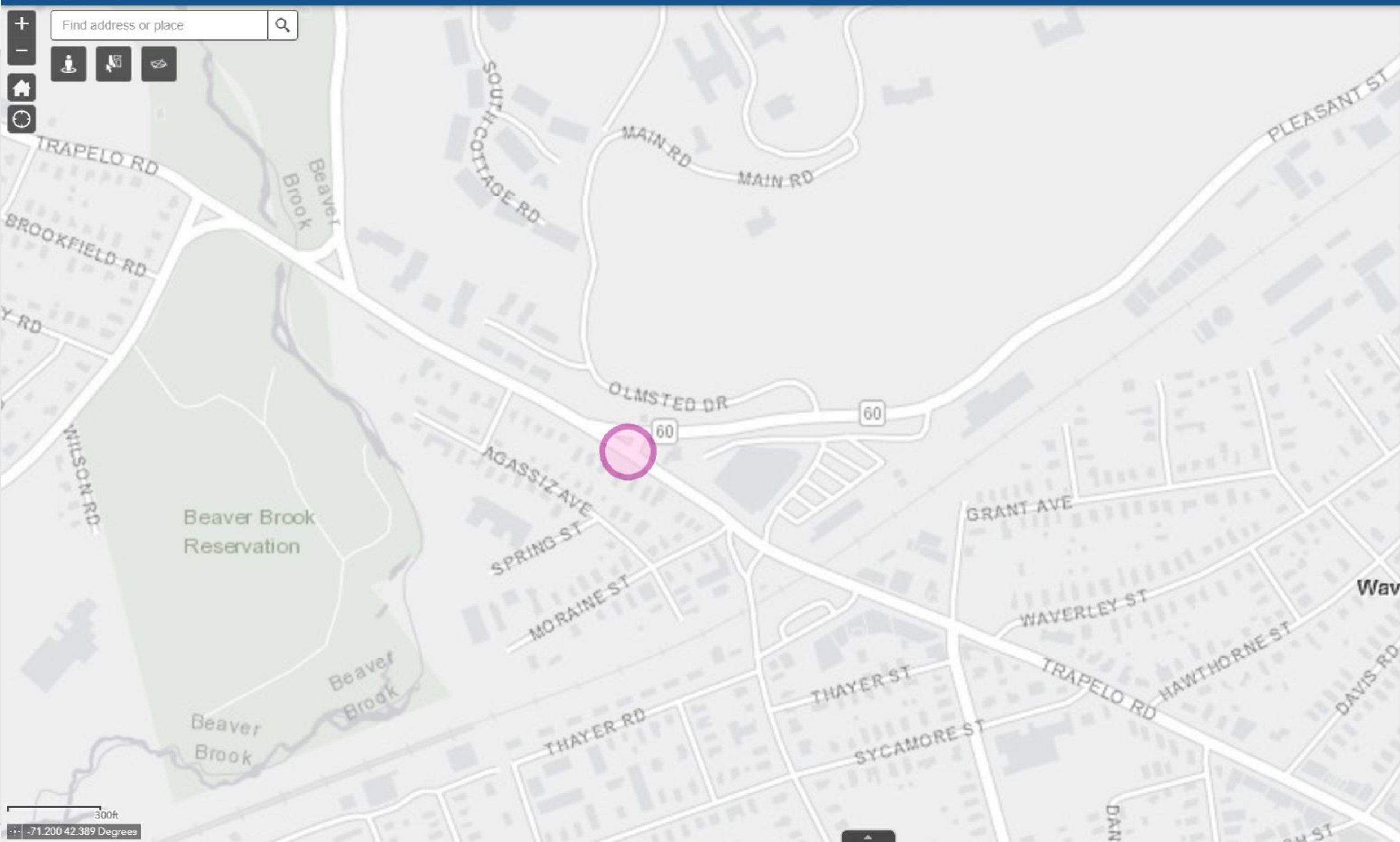
**CRASH RATE CALCULATION :**  RATE =  $\frac{(A * 1,000,000)}{(ADT * 365)}$

Comments : Accident Rate for District 6 signalized intersections = 0.73

Accident Rate for District 6 unsignalized intersections = 0.57

Statewide Accident Rate for Signalized Intersection = 0.78 and Unsignalized/Intersection = 0.57

Map navigation controls: Zoom in (+), Zoom out (-), Home, Full Screen, and a search bar with the text "Find address or place" and a search icon.



**Legend**

**Crash Clusters**

- 2015-2017 HSIP Cluster (Pink square)
- 2008-2017 HSIP Bicycle Clusters (Green square)
- 2008-2017 HSIP Pedestrian Cluster (Brown square)

## PUBLIC TRANSPORTATION SCHEDULE

# FITCHBURG LINE

## Fall/Winter Schedule Effective November 2, 2020



### Monday to Friday

#### Inbound to Boston

ZONE	STATION	TRAIN #	400	402	404	492	406	408	410	412	414	416	418	420	422	494	424	426	428	430	432
8	Wachusett	♂	4:25	5:25	6:20	-	7:10	8:10	9:25	10:25	11:25	12:45	2:05	3:25	4:42	-	5:35	6:57	7:47	8:45	10:10
8	Fitchburg	♂	4:33	5:33	6:28	-	7:18	8:18	9:33	10:33	11:33	12:53	2:13	3:33	4:50	-	5:43	7:05	7:55	8:53	10:18
8	North Leominster	♂	4:40	5:40	6:35	-	7:25	8:25	9:40	10:40	11:40	1:00	2:20	3:40	4:57	-	5:50	7:12	8:02	9:00	10:25
8	Shirley		4:48	5:48	6:43	-	7:33	8:33	<b>f 9:48</b>	<b>f 10:48</b>	<b>f 11:48</b>	<b>f 1:08</b>	<b>f 2:28</b>	<b>f 3:48</b>	<b>f 5:05</b>	-	<b>f 5:58</b>	<b>f 7:20</b>	<b>f 8:10</b>	<b>f 9:08</b>	<b>f 10:33</b>
8	Ayer		4:53	5:53	6:48	-	7:38	8:38	<b>f 9:53</b>	<b>f 10:53</b>	<b>f 11:53</b>	<b>f 1:13</b>	<b>f 2:33</b>	<b>f 3:53</b>	<b>f 5:10</b>	-	<b>f 6:03</b>	<b>f 7:25</b>	<b>f 8:15</b>	<b>f 9:13</b>	<b>f 10:38</b>
7	Littleton/Rte 495	♂	5:01	6:01	6:56	7:05	7:46	8:46	<b>f 10:01</b>	<b>f 11:01</b>	<b>f 12:01</b>	<b>f 1:21</b>	<b>f 2:41</b>	<b>f 4:01</b>	5:19	5:38	<b>f 6:11</b>	<b>f 7:33</b>	<b>f 8:23</b>	<b>f 9:21</b>	<b>f 10:46</b>
6	South Acton	♂	5:08	6:08	7:03	7:12	7:53	8:53	10:07	11:07	12:07	1:27	2:47	4:07	5:26	5:44	6:17	7:39	8:29	9:27	10:52
5	West Concord	♂	5:12	6:12	-	7:17	7:57	8:57	<b>f 10:11</b>	<b>f 11:11</b>	<b>f 12:11</b>	<b>f 1:31</b>	<b>f 2:51</b>	<b>f 4:11</b>	-	<b>f 5:48</b>	<b>f 6:21</b>	<b>f 7:43</b>	<b>f 8:33</b>	<b>f 9:31</b>	<b>f 10:56</b>
5	Concord		5:17	6:17	-	7:22	8:02	9:02	<b>f 10:15</b>	<b>f 11:15</b>	<b>f 12:15</b>	<b>f 1:35</b>	<b>f 2:55</b>	<b>f 4:15</b>	-	<b>f 5:52</b>	<b>f 6:25</b>	<b>f 7:47</b>	<b>f 8:37</b>	<b>f 9:35</b>	<b>f 11:00</b>
4	Lincoln		5:23	6:24	-	7:29	8:09	9:08	<b>f 10:21</b>	<b>f 11:21</b>	<b>f 12:21</b>	<b>f 1:41</b>	<b>f 3:01</b>	<b>f 4:21</b>	-	<b>f 5:58</b>	<b>f 6:31</b>	<b>f 7:53</b>	<b>f 8:43</b>	<b>f 9:41</b>	<b>f 11:06</b>
3	Silver Hill		-	<b>f 6:27</b>	-	-	<b>f 8:12</b>	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3	Hastings		5:27	6:30	-	-	8:15	-	-	<b>f 10:25</b>	-	-	-	-	-	-	-	-	-	-	-
3	Kendal Green		5:30	6:33	-	7:36	8:18	9:14	<b>f 10:28</b>	<b>f 11:27</b>	<b>f 12:27</b>	<b>f 1:47</b>	<b>f 3:07</b>	<b>f 4:27</b>	-	<b>f 6:04</b>	<b>f 6:37</b>	<b>f 7:59</b>	<b>f 8:49</b>	<b>f 9:47</b>	<b>f 11:12</b>
2	Brandeis/Roberts	♂	5:33	6:37	-	7:40	8:22	9:17	<b>f 10:31</b>	<b>f 11:30</b>	<b>f 12:30</b>	<b>f 1:50</b>	<b>f 3:10</b>	<b>f 4:30</b>	-	<b>f 6:07</b>	<b>f 6:41</b>	<b>f 8:03</b>	<b>f 8:53</b>	<b>f 9:51</b>	<b>f 11:16</b>
2	Waltham	♂	5:38	6:41	-	7:44	8:26	9:22	10:35	11:34	12:34	1:53	3:13	4:33	5:43	6:12	6:44	8:06	8:56	9:54	11:19
1	Waverley		5:43	6:46	-	7:49	8:31	9:27	<b>f 10:40</b>	<b>f 11:39</b>	<b>f 12:39</b>	-	-	-	-	<b>f 6:17</b>	-	-	<b>f 9:01</b>	-	-
1	Belmont		5:46	6:49	-	7:52	8:34	9:30	<b>f 10:42</b>	<b>f 11:41</b>	<b>f 12:41</b>	<b>f 2:00</b>	<b>f 3:20</b>	<b>f 4:40</b>	-	<b>f 6:19</b>	<b>f 6:50</b>	<b>f 8:12</b>	<b>f 9:03</b>	<b>f 10:00</b>	<b>f 11:25</b>
1A	Porter Square	♂	5:51	6:54	7:31	7:57	8:39	9:35	10:47	11:46	12:46	2:05	3:25	4:45	5:54	6:24	6:55	8:17	9:08	10:05	11:30
1A	North Station	♂	6:02	7:05	7:42	8:08	8:50	9:46	10:57	11:56	12:56	2:15	3:35	4:56	6:05	6:35	7:05	8:27	9:18	10:15	11:40

### Monday to Friday

#### Outbound from Boston

ZONE	STATION	TRAIN #	491	401	403	405	407	409	411	413	415	417	493	419	421	423	425	427	429	431	433
1A	North Station	♂	5:55	6:30	7:30	8:35	9:35	10:35	11:55	1:15	2:30	3:30	4:15	4:45	5:00	5:45	6:40	7:40	9:15	10:40	12:10
1A	Porter Square	♂	6:05	6:40	7:40	8:45	9:45	10:45	12:05	1:25	2:40	3:40	4:25	4:56	5:10	5:55	6:50	7:50	9:25	10:50	12:20
1	Belmont		<b>f 6:09</b>	-	<b>f 7:45</b>	<b>f 8:50</b>	<b>f 9:50</b>	<b>f 10:50</b>	<b>f 12:10</b>	<b>f 1:30</b>	<b>f 2:45</b>	3:45	4:30	-	5:15	6:00	6:55	<b>f 7:55</b>	<b>f 9:30</b>	<b>f 10:55</b>	<b>f 12:25</b>
1	Waverley		<b>f 6:11</b>	-	<b>f 7:47</b>	<b>f 8:52</b>	<b>f 9:52</b>	-	-	<b>f 1:32</b>	<b>f 2:47</b>	3:48	4:33	-	5:18	6:03	6:58	<b>f 7:57</b>	<b>f 9:32</b>	<b>f 10:57</b>	<b>f 12:27</b>
2	Waltham	♂	6:16	-	7:52	8:57	9:57	10:55	12:15	1:37	2:52	3:53	4:38	-	5:23	6:08	7:03	8:02	9:37	11:02	12:32
2	Brandeis/Roberts	♂	<b>f 6:19</b>	-	<b>f 7:56</b>	<b>f 9:00</b>	<b>f 10:00</b>	<b>f 10:58</b>	<b>f 12:18</b>	<b>f 1:40</b>	<b>f 2:56</b>	3:57	4:42	-	5:27	6:12	7:07	<b>f 8:05</b>	<b>f 9:40</b>	<b>f 11:05</b>	<b>f 12:35</b>
3	Kendal Green		<b>f 6:23</b>	-	<b>f 8:00</b>	<b>f 9:04</b>	<b>f 10:04</b>	<b>f 11:02</b>	<b>f 12:22</b>	<b>f 1:44</b>	<b>f 3:00</b>	4:01	4:46	-	5:31	6:16	7:11	<b>f 8:09</b>	<b>f 9:44</b>	<b>f 11:09</b>	<b>f 12:39</b>
3	Hastings		-	-	-	-	-	-	-	-	-	-	<b>f 4:49</b>	-	<b>f 5:34</b>	<b>f 6:19</b>	<b>f 7:14</b>	<b>f 8:12</b>	-	-	-
3	Silver Hill		-	-	-	-	-	-	-	-	-	-	-	-	-	<b>f 6:21</b>	<b>f 7:16</b>	<b>f 8:14</b>	-	-	-
4	Lincoln		<b>f 6:27</b>	-	<b>f 8:05</b>	<b>f 9:09</b>	<b>f 10:09</b>	<b>f 11:07</b>	<b>f 12:27</b>	<b>f 1:49</b>	<b>f 3:05</b>	4:06	4:53	-	5:40	6:25	7:20	8:18	<b>f 9:49</b>	<b>f 11:14</b>	<b>f 12:44</b>
5	Concord		<b>f 6:32</b>	-	<b>f 8:10</b>	<b>f 9:14</b>	<b>f 10:14</b>	<b>f 11:12</b>	<b>f 12:32</b>	<b>f 1:54</b>	<b>f 3:10</b>	4:11	4:58	-	5:45	6:30	7:25	8:23	<b>f 9:54</b>	<b>f 11:19</b>	<b>f 12:49</b>
5	West Concord	♂	<b>f 6:36</b>	-	<b>f 8:15</b>	<b>f 9:18</b>	<b>f 10:18</b>	<b>f 11:16</b>	<b>f 12:36</b>	<b>f 1:58</b>	<b>f 3:15</b>	4:16	5:03	-	5:50	6:35	7:30	8:28	<b>f 9:58</b>	<b>f 11:23</b>	<b>f 12:53</b>
6	South Acton	♂	6:42	7:04	8:20	9:23	10:23	11:21	12:41	2:03	3:20	4:21	5:08	5:23	5:55	6:40	7:35	8:33	10:03	11:28	12:58
7	Littleton/Rte 495	♂	6:50	7:12	8:27	9:30	10:30	11:28	12:48	2:10	3:27	4:28	5:16	5:30	6:02	6:47	7:42	8:40	10:10	11:35	1:05
8	Ayer		-	<b>f 7:20</b>	<b>f 8:35</b>	<b>f 9:38</b>	<b>f 10:38</b>	<b>f 11:36</b>	<b>f 12:56</b>	<b>f 2:18</b>	<b>f 3:35</b>	4:36	-	5:38	6:10	6:55	7:50	8:48	<b>f 10:18</b>	<b>f 11:43</b>	<b>f 1:13</b>
8	Shirley		-	<b>f 7:25</b>	<b>f 8:40</b>	<b>f 9:43</b>	<b>f 10:43</b>	<b>f 11:41</b>	<b>f 1:01</b>	<b>f 2:23</b>	<b>f 3:41</b>	4:42	-	5:43	6:16	7:01	7:56	8:54	<b>f 10:23</b>	<b>f 11:48</b>	<b>f 1:18</b>
8	North Leominster	♂	-	7:34	8:50	9:52	10:52	11:50	1:10	2:32	3:50	4:51	-	5:52	6:25	7:10	8:05	9:03	10:32	11:57	1:27
8	Fitchburg	♂	-	<b>L 7:44</b>	<b>L 8:58</b>	<b>L 9:59</b>	<b>L 10:59</b>	<b>L 11:59</b>	<b>L 1:19</b>	<b>L 2:40</b>	<b>L 3:57</b>	<b>L 4:58</b>	-	<b>L 5:59</b>	<b>L 6:32</b>	<b>L 7:17</b>	<b>L 8:12</b>	<b>L 9:10</b>	<b>L 10:39</b>	<b>L 12:04</b>	<b>L 1:34</b>
8	Wachusett	♂	-	7:54	9:08	10:09	11:09	12:09	1:29	2:50	4:07	5:08	-	6:10	6:42	7:27	8:22	9:20	10:49	12:14	1:44

**Times in purple with "f" indicate a flag stop:** Passengers must tell the conductor that they wish to leave. Passengers waiting to board must be visible on the platform for the train to stop.

**Times in blue indicate an early departure (L stop):** The train may leave ahead of schedule at these stops.

**Bikes:** Bicycles are allowed on trains with the bicycle symbol shown below the train number.

**High level platform and bridge plate available.**  
Visit [mbta.com/accessibility](https://www.mbta.com/accessibility) for more information.

### Keep in Mind:

This schedule will be effective from November 2, 2020 and will replace the schedule of June 22, 2020.

### Holiday Service

New Year's Day, Thanksgiving Day, and Christmas Day operate on a Sunday schedule. For all holiday schedules, visit [MBTA.com](https://www.mbta.com) or call 617-222-3200.

**Ski Train:** Wachusett Mountain Ski Area operates a shuttle between the Ski Area and Wachusett Station during winter months to connect to these trains, which feature a specially modified coach equipped with racks for ski and snowboard equipment. Please visit [MBTA.com](https://www.mbta.com) for updated information about this service.

### Schedules may change in the event of severe weather

During weather events, the symbols to the right will communicate service level and impact on passengers. These modified schedules are available on [MBTA.com](https://www.mbta.com).



### REGULAR SCHEDULE

Trains will operate on a normal schedule.



### STORM SCHEDULE

Major changes to the regular schedule. Schedules will be available on [mbta.com](https://www.mbta.com), and in Boston stations.



### NO SERVICE

No passenger service on Commuter Rail.



# 2020/2021 REDUCED SERVICE SCHEDULE

Ride Safer.

mbta.com/  
ridesafer



**Wear**  
a face  
covering

**Maintain**  
a healthy  
distance

**Practice**  
good  
hygiene

Reduced service schedule in effect when declared in advance by the MBTA. In most cases, announcement made late in the afternoon on the prior day. Stay connected to MBTA.com for up-to-the minute information.

## FITCHBURG LINE

### Monday to Friday

#### Inbound to Boston

#### AM

#### PM

ZONE	STATION	TRAIN #	7400	1400	1402	1404	1406	1408	1410	1412
8	Wachusett	⬇	4:50	6:30	8:45	10:50	1:15	3:40	6:10	9:45
8	Fitchburg	⬇	4:58	6:38	8:53	10:58	1:23	3:48	6:18	9:53
8	North Leominster	⬇	5:05	6:45	9:00	11:05	1:30	3:55	6:25	10:00
8	Shirley		5:13	6:53	9:08	11:13	1:38	4:03	6:33	10:08
8	Ayer		5:18	6:58	9:13	11:18	1:43	4:08	6:38	10:13
7	Littleton/Route 495	⬇	5:26	7:06	9:21	11:26	1:51	4:16	6:46	10:21
6	South Acton	⬇	5:33	7:12	9:27	11:32	1:57	4:22	6:52	10:27
5	West Concord	⬇	5:37	7:17	9:32	11:37	2:02	4:27	6:57	10:32
5	Concord		5:42	7:21	9:36	11:41	2:06	4:31	7:01	10:36
4	Lincoln		5:49	7:26	9:41	11:46	2:11	4:36	7:06	10:41
3	Kendal Green		5:57	7:31	9:46	11:51	2:16	4:41	7:11	10:46
2	Brandeis/Roberts	⬇	6:01	7:35	9:50	11:55	2:20	4:45	7:15	10:50
2	Waltham	⬇	6:05	7:39	9:54	11:59	2:24	4:49	7:19	10:54
1	Waverley		6:10	7:43	9:58	12:03	2:28	4:53	7:23	10:58
1	Belmont		6:13	7:46	10:01	12:06	2:31	4:56	7:26	11:01
1A	Porter Square	⬇	6:18	7:51	10:06	12:11	2:36	5:01	7:31	11:06
1A	North Station	⬇	6:30	8:01	10:16	12:21	2:46	5:11	7:41	11:16

### Monday to Friday

#### Outbound from Boston

#### AM

#### PM

ZONE	STATION	TRAIN #	1401	1403	1405	1407	1409	1411	1413
1A	North Station	⬆	8:35	10:45	1:10	3:30	5:45	7:55	11:30
1A	Porter Square	⬆	8:45	10:55	1:20	3:40	5:55	8:05	11:40
1	Belmont		8:49	10:59	1:24	3:44	5:59	8:09	11:44
1	Waverley		8:52	11:02	1:27	3:47	6:02	8:12	11:47
2	Waltham	⬆	8:57	11:07	1:32	3:52	6:07	8:17	11:52
2	Brandeis/Roberts	⬆	9:00	11:10	1:35	3:55	6:10	8:20	11:55
3	Kendal Green		9:04	11:14	1:39	3:59	6:14	8:24	11:59
4	Lincoln		9:09	11:19	1:44	4:04	6:19	8:29	12:04
5	Concord		9:15	11:25	1:50	4:10	6:25	8:35	12:10
5	West Concord	⬆	9:18	11:28	1:53	4:13	6:28	8:38	12:13
6	South Acton	⬆	9:24	11:34	1:59	4:19	6:34	8:44	12:19
7	Littleton/Route 495	⬆	9:31	11:41	2:06	4:26	6:41	8:51	12:26
8	Ayer		9:38	11:48	2:13	4:33	6:48	8:58	12:33
8	Shirley		9:43	11:53	2:18	4:38	6:53	9:03	12:38
8	North Leominster	⬆	9:51	12:01	2:26	4:46	7:01	9:11	12:46
8	Fitchburg	⬆	10:01	12:11	2:36	4:58	7:11	9:21	12:56
8	Wachusett	⬆	10:11	12:21	2:46	5:08	7:21	9:31	1:06

**Reduced Schedule advisory system** The MBTA and Keolis closely monitor events to determine if changes to the Commuter Rail schedule are needed. During this time, the symbols to the right will communicate service level and impact on passengers.



**REGULAR SCHEDULE**  
Trains will operate on a normal schedule.

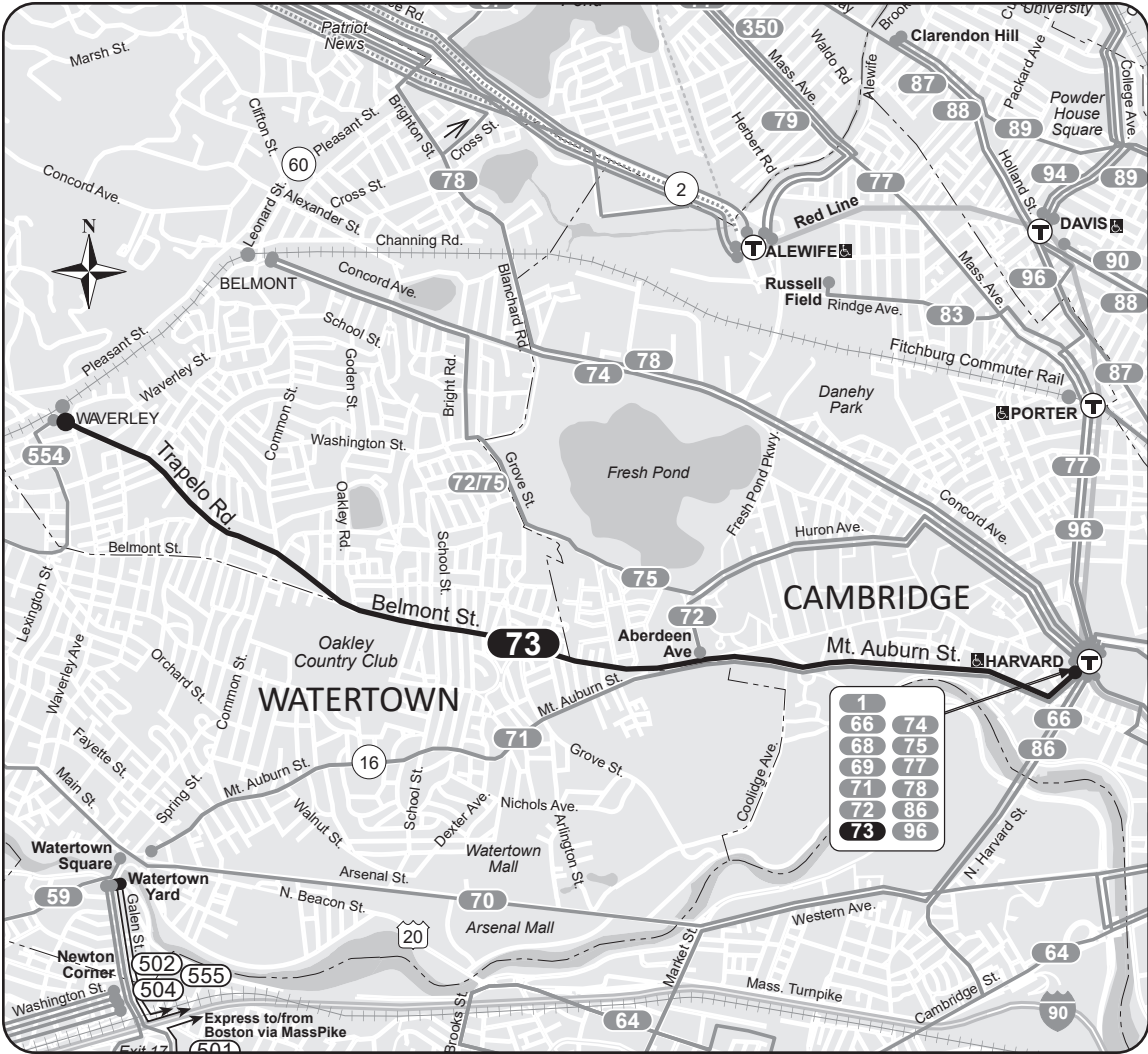


**REDUCED SCHEDULE**  
Major changes to the regular schedule. Schedules also available on MBTA.com and in Boston stations.



**NO SERVICE**  
No passenger service on Commuter Rail.

Route 73 Waverley Square - Harvard Station



Schedule Change

73

Effective December 20, 2020

Waverley Square-  
Harvard Station

Serving

- Mount Auburn Hospital
- Cushing Square
- Harvard University
- Red Line
- Fitchburg Commuter Rail



**T** Massachusetts Bay  
Transportation Authority **massDOT**  
Massachusetts Department of Transportation

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(TTY) 617-222-5146 • [www.mbta.com](http://www.mbta.com)

73

Weekday

Inbound			Outbound		
Leave Waverley Square	Arrive Mt. Auburn Bridge	Arrive Harvard	Leave Harvard	Arrive Mt. Auburn Bridge	Arrive Waverley Square
5:02A	5:12A	5:18A	4:47A	4:54A	5:00A
5:22	5:32	5:38	5:07	5:14	5:20
5:42	5:52	5:58	5:27	5:34	5:40
5:57	6:07	6:13	5:42	5:49	5:55
6:09	6:19	6:25	5:52	5:59	6:05
6:21	6:33	6:43	6:05	6:12	6:18
6:29	6:44	6:54	6:14	6:21	6:27
<i>Every</i>	<i>8 Mins.</i>	<i>or Less</i>	<i>Every</i>	<i>6 Mins.</i>	<i>or Less</i>
9:06	9:22	9:32	8:31	8:39	8:49
9:15	9:30	9:40	8:37	8:45	8:55
9:24	9:39	9:48	8:45	8:53	9:03
9:33	9:47	9:55	8:53	9:01	9:11
9:43	9:56	10:04	9:01	9:09	9:19
9:52	10:05	10:13	9:10	9:18	9:28
10:04	10:17	10:25	9:19	9:27	9:37
10:19	10:32	10:40	9:28	9:36	9:46
10:34	10:47	10:55	9:41	9:49	9:59
10:49	11:02	11:10	9:55	10:03	10:13
11:04	11:17	11:25	10:09	10:17	10:27
11:19	11:32	11:40	10:23	10:31	10:41
11:34	11:47	11:55	10:38	10:46	10:56
11:49	<b>12:02P</b>	<b>12:10P</b>	10:52	11:00	11:10
			11:07	11:15	11:25
<b>12:04P</b>	<b>12:17</b>	<b>12:25</b>	11:22	11:30	11:40
<i>Every</i>	<i>15 Mins.</i>	<i>Until</i>	11:37	11:45	11:55
<b>4:19</b>	<b>4:32</b>	<b>4:41</b>	11:52	<b>12:00N</b>	<b>12:10P</b>
<b>4:25</b>	<b>4:38</b>	<b>4:47</b>			
<b>4:31</b>	<b>4:44</b>	<b>4:53</b>	<b>12:07P</b>	<b>12:15</b>	<b>12:25</b>
<b>4:37</b>	<b>4:50</b>	<b>4:59</b>	<i>Every</i>	<i>15 Mins.</i>	<i>Until</i>
<b>4:43</b>	<b>4:56</b>	<b>5:05</b>	<b>3:51</b>	<b>4:01</b>	<b>4:14</b>
<b>4:49</b>	<b>5:02</b>	<b>5:11</b>	<b>3:56</b>	<b>4:06</b>	<b>4:19</b>
<b>4:55</b>	<b>5:08</b>	<b>5:17</b>	<b>4:01</b>	<b>4:11</b>	<b>4:24</b>
<b>5:01</b>	<b>5:14</b>	<b>5:23</b>	<b>4:07</b>	<b>4:17</b>	<b>4:30</b>
<b>5:07</b>	<b>5:20</b>	<b>5:29</b>	<b>4:11</b>	<b>4:21</b>	<b>4:35</b>
<b>5:14</b>	<b>5:27</b>	<b>5:36</b>	<b>4:17</b>	<b>4:27</b>	<b>4:42</b>
<b>5:20</b>	<b>5:33</b>	<b>5:42</b>	<b>4:23</b>	<b>4:34</b>	<b>4:49</b>
<b>5:26</b>	<b>5:39</b>	<b>5:48</b>	<b>4:29</b>	<b>4:40</b>	<b>4:55</b>
<b>5:32</b>	<b>5:45</b>	<b>5:54</b>	<b>4:35</b>	<b>4:46</b>	<b>5:01</b>
<b>5:38</b>	<b>5:51</b>	<b>6:00</b>	<b>4:41</b>	<b>4:52</b>	<b>5:07</b>
<b>5:44</b>	<b>5:57</b>	<b>6:06</b>	<b>4:47</b>	<b>4:58</b>	<b>5:13</b>
<b>5:50</b>	<b>6:03</b>	<b>6:12</b>	<i>Every</i>	<i>6 Mins.</i>	<i>Until</i>
<b>5:56</b>	<b>6:09</b>	<b>6:17</b>	<b>7:05</b>	<b>7:14</b>	<b>7:25</b>
<b>6:02</b>	<b>6:15</b>	<b>6:22</b>	<b>7:14</b>	<b>7:23</b>	<b>7:34</b>
<b>6:08</b>	<b>6:20</b>	<b>6:27</b>	<b>7:22</b>	<b>7:31</b>	<b>7:42</b>
<i>Every</i>	<i>6 Mins.</i>	<i>or Less</i>	<b>7:31</b>	<b>7:40</b>	<b>7:51</b>
<b>7:35</b>	<b>7:45</b>	<b>7:52</b>	<b>7:43</b>	<b>7:52</b>	<b>8:03</b>
<b>7:41</b>	<b>7:51</b>	<b>7:58</b>	<b>7:59</b>	<b>8:08</b>	<b>8:19</b>
<b>7:47</b>	<b>7:57</b>	<b>8:04</b>	<b>8:14</b>	<b>8:23</b>	<b>8:34</b>
<b>7:56</b>	<b>8:06</b>	<b>8:13</b>	<b>8:31</b>	<b>8:40</b>	<b>8:51</b>
<b>8:06</b>	<b>8:16</b>	<b>8:23</b>	<b>8:48</b>	<b>8:57</b>	<b>9:08</b>
<b>8:22</b>	<b>8:32</b>	<b>8:38</b>	<b>9:08</b>	<b>9:17</b>	<b>9:28</b>
<b>8:38</b>	<b>8:47</b>	<b>8:53</b>	<b>9:27</b>	<b>9:36</b>	<b>9:47</b>
<b>8:55</b>	<b>9:04</b>	<b>9:10</b>	<i>Every</i>	<i>20 Mins.</i>	<i>Until</i>
<b>9:12</b>	<b>9:21</b>	<b>9:27</b>	<b>11:07</b>	<b>11:15</b>	<b>11:24</b>
<i>Every</i>	<i>20 Mins.</i>	<i>Until</i>	<b>11:27</b>	<b>11:35</b>	<b>11:44</b>
<b>12:10A</b>	<b>12:19A</b>	<b>12:25A</b>	<b>11:47</b>	<b>11:55</b>	<b>12:04A</b>
<b>12:30</b>	<b>12:39</b>	<b>12:45</b>	<b>12:07A</b>	<b>12:15A</b>	<b>12:24</b>
<b>12:48</b>	<b>12:57</b>	<b>1:03</b>	<b>12:27</b>	<b>12:35</b>	<b>12:44</b>
<b>1:10</b>	<b>1:19</b>	<b>1:25</b>	<b>12:47</b>	<b>12:55</b>	<b>1:04</b>
<b>1:26</b>	<b>1:35</b>	<b>1:41</b>	w 1:08	<b>1:16</b>	<b>1:25</b>

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Saturday

Inbound			Outbound		
Leave Waverley Square	Arrive Mt. Auburn Bridge	Arrive Harvard	Leave Harvard	Arrive Mt. Auburn Bridge	Arrive Waverley Square
5:01A	5:10A	5:16A	4:45A	4:52A	4:58A
5:21	5:30	5:36	5:05	5:12	5:18
5:41	5:50	5:56	5:25	5:32	5:38
6:01	6:10	6:16	5:45	5:52	5:58
6:21	6:30	6:36	6:05	6:12	6:18
6:41	6:50	6:56	6:25	6:32	6:38
6:56	7:07	7:13	6:40	6:47	6:53
7:11	7:23	7:29	6:54	7:01	7:08
7:27	7:39	7:45	7:09	7:17	7:24
<i>Every</i>	<i>15 Mins.</i>	<i>or Less</i>	<i>Every</i>	<i>15 Mins.</i>	<i>or Less</i>
<b>11:50</b>	<b>12:03P</b>	<b>12:11P</b>	<b>11:55</b>	<b>12:04P</b>	<b>12:15P</b>
<b>12:05P</b>	<b>12:18</b>	<b>12:26</b>	<b>12:10P</b>	<b>12:23</b>	<b>12:30</b>
<i>Every</i>	<i>15 Mins.</i>	<i>Until</i>	<i>Every</i>	<i>15 Mins.</i>	<i>Until</i>
<b>4:20</b>	<b>4:32</b>	<b>4:40</b>	<b>3:55</b>	<b>4:04</b>	<b>4:15</b>
<b>4:35</b>	<b>4:47</b>	<b>4:55</b>	<b>4:10</b>	<b>4:19</b>	<b>4:30</b>
<b>4:50</b>	<b>5:02</b>	<b>5:10</b>	<b>4:25</b>	<b>4:34</b>	<b>4:45</b>
<b>5:05</b>	<b>5:17</b>	<b>5:25</b>	<b>4:40</b>	<b>4:49</b>	<b>5:00</b>
<b>5:20</b>	<b>5:32</b>	<b>5:40</b>	<b>4:55</b>	<b>5:04</b>	<b>5:15</b>
<b>5:35</b>	<b>5:47</b>	<b>5:55</b>	<b>5:10</b>	<b>5:19</b>	<b>5:30</b>
<b>5:50</b>	<b>6:02</b>	<b>6:10</b>	<b>5:25</b>	<b>5:34</b>	<b>5:45</b>
<b>6:05</b>	<b>6:17</b>	<b>6:25</b>	<b>5:40</b>	<b>5:49</b>	<b>6:00</b>
<b>6:20</b>	<b>6:32</b>	<b>6:40</b>	<b>5:55</b>	<b>6:04</b>	<b>6:15</b>
<b>6:35</b>	<b>6:47</b>	<b>6:55</b>	<b>6:10</b>	<b>6:19</b>	<b>6:30</b>
<b>6:50</b>	<b>7:02</b>	<b>7:10</b>	<b>6:25</b>	<b>6:34</b>	<b>6:45</b>
<b>7:05</b>	<b>7:17</b>	<b>7:25</b>	<b>6:40</b>	<b>6:49</b>	<b>7:00</b>
<b>7:20</b>	<b>7:31</b>	<b>7:39</b>	<b>6:55</b>	<b>7:04</b>	<b>7:15</b>
<b>7:35</b>	<b>7:43</b>	<b>7:51</b>	<b>7:10</b>	<b>7:19</b>	<b>7:30</b>
<b>7:50</b>	<b>7:58</b>	<b>8:06</b>	<b>7:27</b>	<b>7:36</b>	<b>7:47</b>
<b>8:10</b>	<b>8:18</b>	<b>8:26</b>	<b>7:47</b>	<b>7:56</b>	<b>8:07</b>
<b>8:30</b>	<b>8:38</b>	<b>8:46</b>	<b>8:07</b>	<b>8:16</b>	<b>8:27</b>
<b>8:50</b>	<b>8:58</b>	<b>9:06</b>	<b>8:27</b>	<b>8:36</b>	<b>8:45</b>
<b>9:10</b>	<b>9:18</b>	<b>9:26</b>	<b>8:47</b>	<b>8:56</b>	<b>9:05</b>
<b>9:30</b>	<b>9:38</b>	<b>9:46</b>	<b>9:07</b>	<b>9:16</b>	<b>9:25</b>
<b>9:50</b>	<b>9:58</b>	<b>10:06</b>	<b>9:27</b>	<b>9:36</b>	<b>9:45</b>
<b>10:10</b>	<b>10:18</b>	<b>10:26</b>	<b>9:47</b>	<b>9:56</b>	<b>10:05</b>
<b>10:30</b>	<b>10:38</b>	<b>10:46</b>	<b>10:07</b>	<b>10:16</b>	<b>10:25</b>
<b>10:50</b>	<b>10:58</b>	<b>11:06</b>	<b>10:27</b>	<b>10:35</b>	<b>10:43</b>
<b>11:10</b>	<b>11:18</b>	<b>11:26</b>	<b>10:47</b>	<b>10:55</b>	<b>11:03</b>
<b>11:30</b>	<b>11:38</b>	<b>11:46</b>	<b>11:07</b>	<b>11:15</b>	<b>11:23</b>
<b>11:50</b>	<b>11:58</b>	<b>12:05A</b>	<b>11:27</b>	<b>11:35</b>	<b>11:43</b>
<b>12:10A</b>	<b>12:18A</b>	<b>12:25</b>	<b>11:47</b>	<b>11:55</b>	<b>12:03A</b>
<b>12:30</b>	<b>12:38</b>	<b>12:45</b>	<b>12:07A</b>	<b>12:15A</b>	<b>12:23</b>
<b>12:55</b>	<b>1:03</b>	<b>1:10</b>	<b>12:27</b>	<b>12:35</b>	<b>12:43</b>
<b>1:10</b>	<b>1:18</b>	<b>1:25</b>	<b>12:47</b>	<b>12:55</b>	<b>1:03</b>
<b>1:18</b>	<b>1:26</b>	<b>1:33</b>	w 1:02	<b>1:10</b>	<b>1:18</b>

w - Waits for last train to arrive at Harvard Station.



All buses are accessible to persons with disabilities

Winter 2021 Holidays

12/25/20 & 1/1/21 Sun; 1/18/21 & 2/15/21: Sat

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Sunday

Inbound			Outbound		
Leave Waverley Square	Arrive Mt. Auburn Bridge	Arrive Harvard	Leave Harvard	Arrive Mt. Auburn Bridge	Arrive Waverley Square
6:37A	6:49A	6:57A	6:27A	6:37A	6:47A
6:57	7:09	7:17	6:47	6:57	7:07
7:17	7:29	7:37	7:07	7:17	7:27
7:37	7:49	7:57	7:25	7:35	7:47
7:57	8:09	8:17	7:45	7:55	8:07
8:17	8:29	8:37	8:05	8:15	8:27
8:37	8:51	8:59	8:25	8:35	8:47
8:57	9:11	9:19	8:45	8:55	9:07
9:17	9:31	9:39	9:04	9:14	9:26
9:37	9:51	9:59	9:22	9:32	9:44
9:57	10:11	10:19	9:39	9:49	10:01
10:16	10:30	10:38	9:56	10:06	10:18
10:33	10:47	10:55	10:13	10:23	10:35
10:50	11:04	11:12	10:30	10:40	10:52
11:07	11:21	11:29	10:47	10:57	11:09
11:24	11:39	11:47	11:04	11:14	11:26
11:41	11:56	<b>12:04P</b>	11:21	11:31	11:44
11:58	<b>12:13P</b>	<b>12:21</b>	11:38	11:48	<b>12:01P</b>
			11:56	<b>12:06P</b>	<b>12:19</b>
<b>12:15P</b>	<b>12:30</b>	<b>12:38</b>	<b>12:13P</b>	<b>12:23</b>	<b>12:36</b>
<i>Every</i>	<i>17 Mins.</i>	<i>or Less</i>	<i>Every</i>	<i>17 Mins.</i>	<i>or Less</i>
<b>7:53</b>	<b>8:05</b>	<b>8:13</b>	<b>8:39</b>	<b>8:49</b>	<b>9:00</b>
<b>8:10</b>	<b>8:22</b>	<b>8:30</b>	<b>8:56</b>	<b>9:06</b>	<b>9:17</b>
<b>8:27</b>	<b>8:39</b>	<b>8:47</b>	<b>9:13</b>	<b>9:23</b>	<b>9:34</b>
<b>8:44</b>	<b>8:56</b>	<b>9:04</b>	<b>9:31</b>	<b>9:41</b>	<b>9:52</b>
<b>9:01</b>	<b>9:13</b>	<b>9:21</b>	<b>9:45</b>	<b>9:55</b>	<b>10:06</b>
<b>9:18</b>	<b>9:30</b>	<b>9:38</b>	<b>10:06</b>	<b>10:16</b>	<b>10:27</b>
<b>9:35</b>	<b>9:47</b>	<b>9:55</b>	<b>10:25</b>	<b>10:35</b>	<b>10:46</b>
<b>9:55</b>	<b>10:07</b>	<b>10:15</b>	<b>10:45</b>	<b>10:55</b>	<b>11:06</b>
<b>10:15</b>	<b>10:27</b>	<b>10:35</b>	<b>11:05</b>	<b>11:15</b>	<b>11:26</b>
<b>10:35</b>	<b>10:47</b>	<b>10:55</b>	<b>11:25</b>	<b>11:35</b>	<b>11:46</b>
<b>10:55</b>	<b>11:07</b>	<b>11:15</b>	<b>11:47</b>	<b>11:57</b>	<b>12:08A</b>
<b>11:16</b>	<b>11:28</b>	<b>11:36</b>	12:07A	12:17A	12:28
<b>11:36</b>	<b>11:48</b>	<b>11:56</b>	12:27	12:37	12:48
<b>11:56</b>	12:08A	12:16A	12:47	12:57	1:08
12:18A	12:30	12:38	w 1:06	1:16	1:27
12:38	12:50	12:58			

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

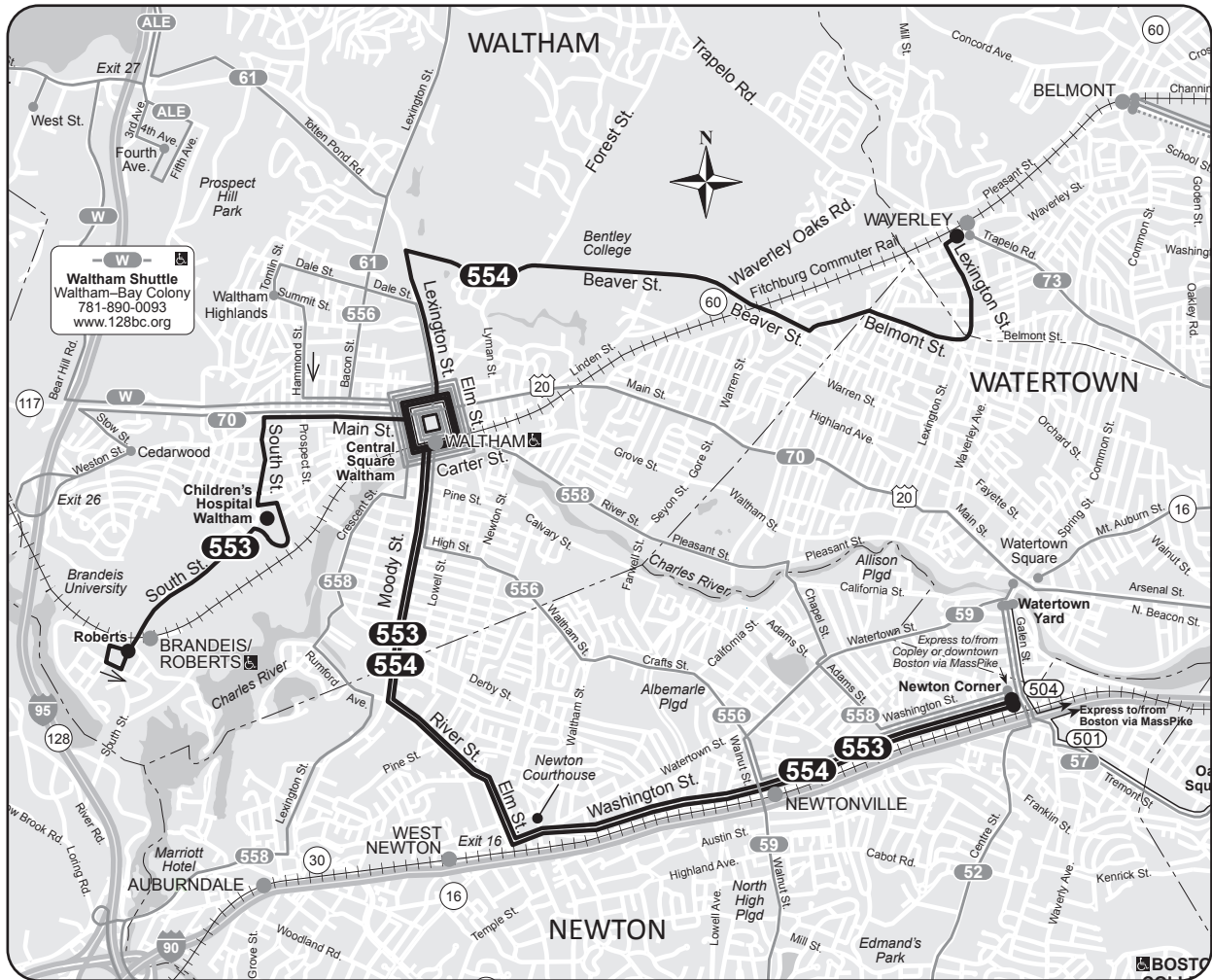
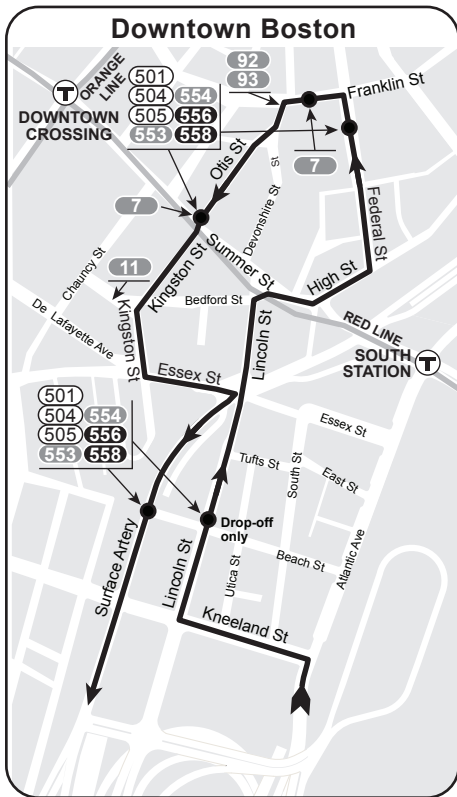
FREE FARES: Children 11 and under ride free when accompanied by a paying customer; Blind Access CharlieCard holders ride free and if using a guide, the guide rides free.

\* 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.

**Route 505 Express – Waltham Center - Federal St & Franklin St**  
**Route 553 Roberts - Federal St & Franklin St**  
**Route 554 Waverley Square - Federal St & Franklin St**



Schedule Change

**505•553•554**

**Effective December 20, 2020**

**505 Express–Waltham Center - Federal St & Franklin St**

**553 Roberts-Federal St & Franklin St**

**554 Waverley Square-Federal St & Franklin St**

**Serving**

- Central Square, Waltham
- Newtonville
- Newton Courthouse
- Brandeis University
- Bentley College



**Massachusetts Bay Transportation Authority**

**massDOT**  
Massachusetts Department of Transportation

**Information 617-222-3200 • 1-800-392-6100**  
**(TTY) 617-222-5146 • www.mbta.com**

Route 505 service may be limited or suspended.

For schedules, alerts and updates, visit: [mbta.com/schedules/505](https://www.mbta.com/schedules/505)

Route 505  
Outer Express Bus–  
Central Square, Waltham-  
Downtown Boston

Inbound bus stops before the route enters the highway are pickup only. Outbound bus stops after the route exits the highway are dropoff only. For local travel, please use Route 553, 554, or 558.

553 & 554

Weekday

Inbound				Outbound			
Leave Roberts	Leave Waverley Square	Lv/Arrive Central Sq. Waltham	Arrive Newton Corner	Leave Newton Corner	Arrive Central Sq. Waltham	Arrive Waverley Square	Arrive Roberts
6:25A	.....	6:34A	6:58A	6:00A	6:21A	6:39A	.....
.....	6:44A	6:56	7:23	6:30	6:46	.....	7:00A
7:10	.....	7:19	7:45	7:05	7:21	.....	7:36
7:55	.....	8:08	8:34	7:30	7:51	8:09	.....
.....	8:17	8:33	8:57	7:55	8:14	.....	8:30
8:40	.....	8:50	9:13	8:40	8:59	.....	9:17
9:25	.....	9:35	9:57	9:05	9:24	9:37	.....
.....	9:43	9:56	10:18	9:20	9:41	.....	9:59
10:10	.....	10:20	10:42	10:05	10:26	.....	10:44
10:55	.....	11:05	11:25	10:50	11:11	.....	11:29
11:40	.....	11:50	12:10P	11:35	11:55	.....	12:12P
12:25P	.....	12:36P	12:59	12:15P	12:34P	.....	12:54
1:10	.....	1:21	1:44	1:05	1:24	.....	1:44
1:55	.....	2:06	2:29	1:50	2:09	.....	2:29
2:40	.....	2:51	3:14	2:35	2:59	.....	3:21
3:25	.....	3:36	3:59	3:20	3:44	.....	4:06
4:10	.....	4:21	4:44	3:30	3:58	4:16P	.....
.....	4:22P	4:37	4:58	4:05	4:29	.....	4:48
4:55	.....	5:06	5:29	4:50	5:16	.....	5:34
5:40	.....	5:51	6:14	5:05	5:35	5:50	.....
.....	5:56	6:11	6:32	5:35	6:02	.....	6:18
6:25	.....	6:35	6:55	6:20	6:47	.....	7:03
7:10	.....	7:20	7:40	6:40	7:01	7:16	.....
.....	7:25	7:40	8:01	7:00	7:27	.....	7:43
7:55	.....	8:05	8:25	7:45	8:12	.....	8:28
8:40	.....	8:50	9:10	8:30	8:57	.....	9:13

Route 554 indicated by shaded areas

Route 553  
Roberts or Central Square,  
Waltham-Downtown Boston

Route 554  
Waverley Square-  
Downtown Boston

553 Saturday

Inbound		
Leave Roberts	Arrive Central Sq. Waltham	Arrive Newton Corner
6:30A	6:38A	6:56A
7:30	7:38	7:56
8:40	8:50	9:09
9:50	10:00	10:23
11:15	11:27	11:50
12:45P	12:58P	1:22P
2:15	2:27	2:49
3:40	3:52	4:14
5:10	5:22	5:45
6:35	6:45	7:06

553 Saturday

Outbound		
Leave Newton Corner	Arrive Central Sq. Waltham	Arrive Roberts
7:00A	7:13A	7:26A
8:05	8:18	8:31
9:15	9:30	9:44
10:35	10:53	11:09
12:00N	12:21P	12:37P
1:30	1:50	2:05
3:00	3:19	3:33
4:25	4:43	4:57
5:55	6:13	6:27
7:15	7:31	7:45

No Route 553 service on Sunday

No Route 554 service  
on weekends

All buses are accessible to persons with disabilities

Outer Express–Route 505 fares

Fare	Outer Express	Outer Express + Local Bus	Outer Express + Subway
CharlieCard	\$5.25	\$5.25	\$5.25
CharlieTicket	\$5.25	\$6.95	\$7.65
Cash-on-Board	\$5.25	\$6.95	\$7.65
Student/Youth*	\$2.60	\$2.60	\$2.60
Senior/TAP**	\$2.60	\$2.60	\$2.60

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.

\* 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.

NO local fare applies for any portion of Route 505

Route 553 & 554 fares

Fare	Inner Express	Inner Express + Local Bus	Inner Express + Subway
CharlieCard	\$4.25	\$4.25	\$4.25
CharlieTicket	\$4.25	\$5.95	\$6.65
Cash-on-Board	\$4.25	\$5.95	\$6.65
Student/Youth*	\$2.10	\$2.10	\$2.10
Senior/TAP**	\$2.10	\$2.10	\$2.10

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.

\* 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.

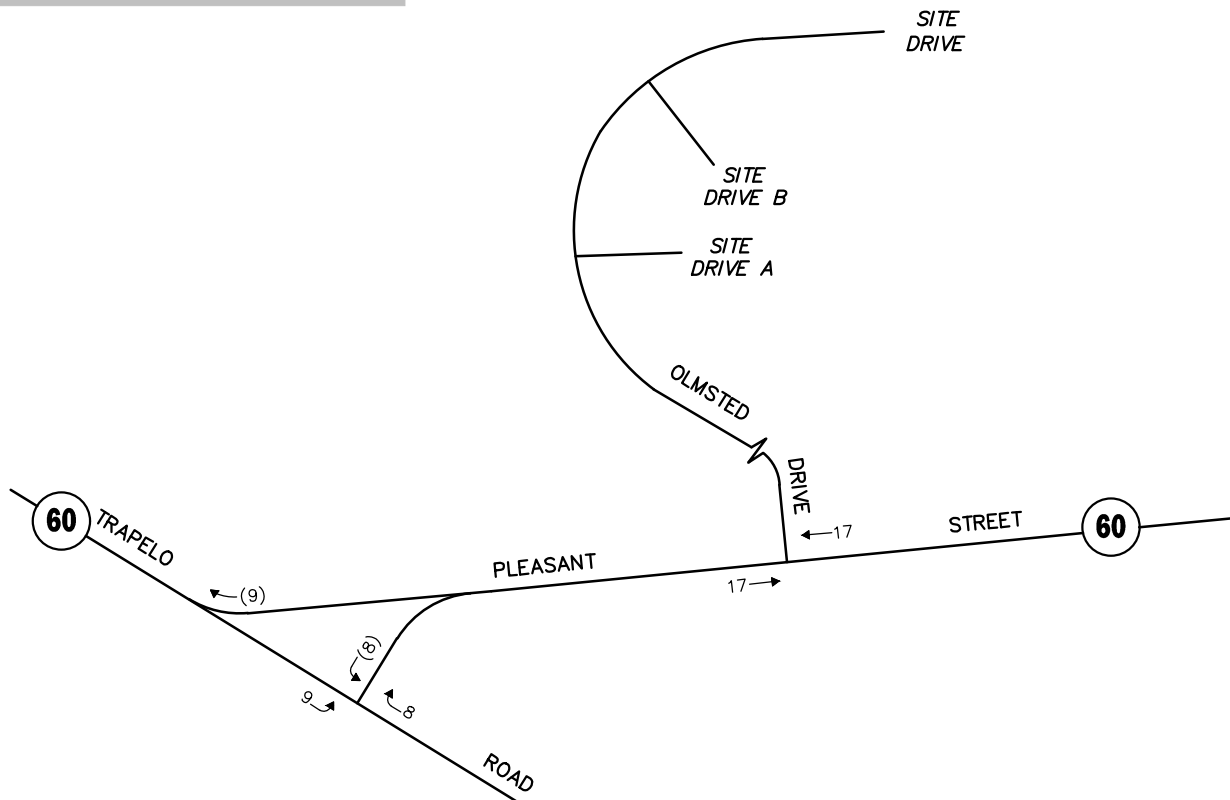
\*\* Requires Senior/TAP CharlieCard, available to Medicare cardholders, seniors 65+, and persons with disabilities.

Winter 2021 Holidays  
12/25/20 & 1/1/21 Sun; 1/18/21 & 2/15/21: Sat

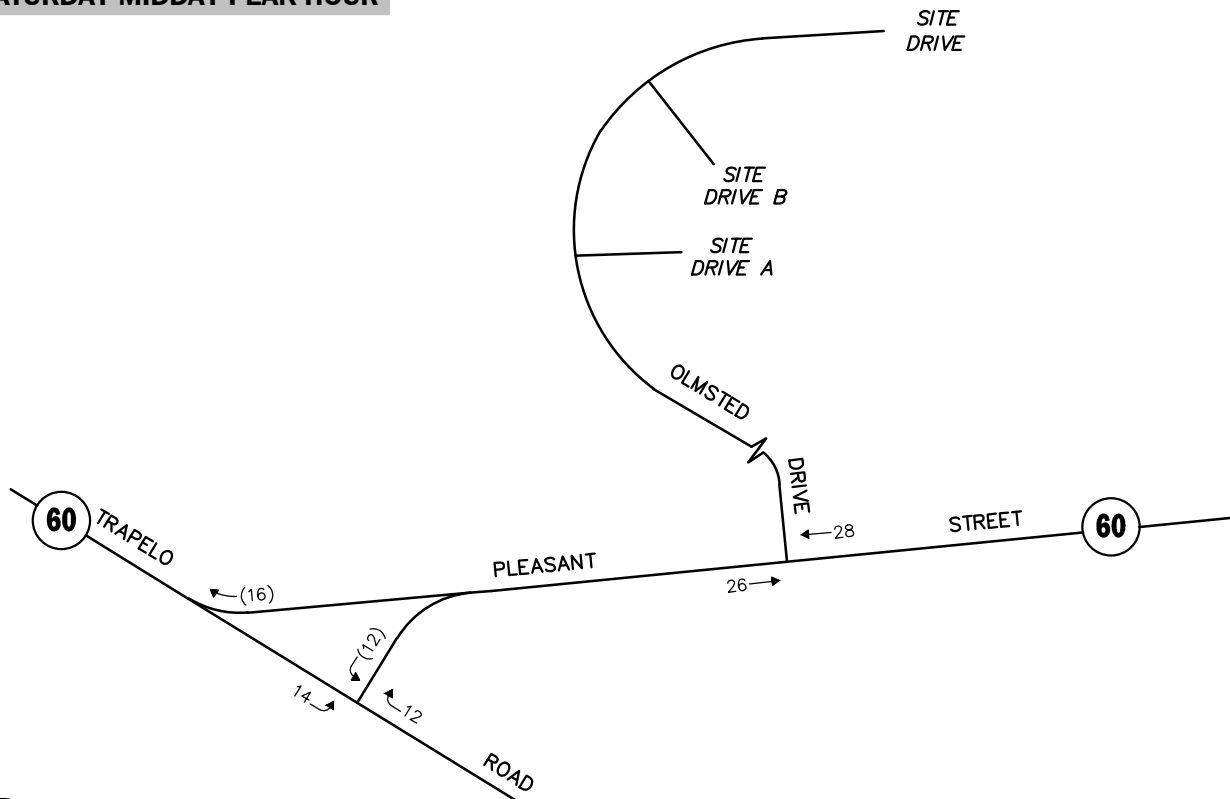
## BACKGROUND DEVELOPMENT

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WEEKDAY EVENING PEAK HOUR



SATURDAY MIDDAY PEAK HOUR



Not To Scale



Figure A1

Marijuana Dispensary  
1010 Pleasant Street  
Peak Hour Traffic Volumes

## GENERAL BACKGROUND TRAFFIC GROWTH

## General Background Traffic Growth - Daily Traffic Volumes

LOCATION ID	Location	2015	2016	2017	2018	2019	Average Annual Growth
4119	YANKEE DIVISION HIGHWAY SOUTH OF WINTER ST.INTERSTATE 95		164,855	168,019	172,064	171,892	1.49
8098	INTERSTATE 93 AT MEDFORD	148,021	152,241	151,784	155,803	147,366	0.13
							0.81
Say							1%

2015	2015	2015	2015	2016	2016	2016	2017	2017	2018	
2016	2017	2018	2019	2017	2018	2019	2018	2019	2019	average
1.02851	1.01263	1.01723	0.99889	0.99700	1.01163	0.98921	1.02648	0.98534	0.94585	1.01489818
										1.00127636

US CENSUS

---

# COMMUTING CHARACTERISTICS BY SEX

**Note:** This is a modified view of the original table produced by the U.S. Census Bureau. This download or printed version may have missing information from the original table.

Census Tract 3577, Middlesex County, Massachusetts			
Total			
Label	Estimate	Margin of Error	
▼ Workers 16 years and over	1,892	±195	
▼ MEANS OF TRANSPORTATION TO WORK			
▼ Car, truck, or van	67.1%	±6.7	
Drove alone	60.6%	±6.6	
▼ Carpooled	6.5%	±3.8	
In 2-person carpool	6.0%	±3.5	
In 3-person carpool	0.5%	±0.8	
In 4-or-more person carpool	0.0%	±1.8	
Workers per car, truck, or van	1.05	±0.03	
Public transportation (excluding taxicab)	20.5%	±5.2	
Walked	2.3%	±2.4	
Bicycle	3.1%	±2.3	
Taxicab, motorcycle, or other means	2.6%	±2.1	
Worked from home	4.4%	±2.3	
▼ PLACE OF WORK			
▼ Worked in state of residence	100.0%	±1.8	
Worked in county of residence	59.2%	±7.4	
Worked outside county of residence	40.8%	±7.4	
Worked outside state of residence	0.0%	±1.8	
▼ Living in a place	100.0%	±1.8	
Worked in place of residence	15.3%	±5.0	
Worked outside place of residence	84.7%	±5.0	
Not living in a place	0.0%	±1.8	
▼ Living in 12 selected states	100.0%	±1.8	
Worked in minor civil division of residence	15.3%	±5.0	
Worked outside minor civil division of residence	84.7%	±5.0	
Not living in 12 selected states	0.0%	±1.8	
▼ Workers 16 years and over who did not work from home	1,809	±193	

VAI Note: In order to be conservative a 10% trip reduction was assumed.

## TRIP DISTRIBUTION

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Table 3. Residence MCD/County to Workplace MCD/County Commuting Flows for the United States and Puerto Rico Sorted by Residence Geography: 5-Year ACS, 2011-2015

For more information on sampling and estimation methods, confidentiality protection, and sampling and nonsampling errors, see <http://www2.census.gov/programs-surveys/acs/tech\_docs/accuracy/MultiyearACSAccuracyofData2015.pdf>.

Universe: Workers 16 years and over.

Commuting flows are sorted by residence state, residence county, and residence minor civil division.

Residence	Place of Work	Commuting Flow	
Minor Civil Division Name	Minor Civil Division Name	Workers in Commuting Flow	Margin of Error
Belmont town	Boston city	3,254	268
Belmont town	Belmont town	2,410	283
Belmont town	Cambridge city	2,286	202
Belmont town	Watertown Town city	562	128
Belmont town	Waltham city	557	116
Belmont town	Newton city	453	99
Belmont town	Lexington town	334	96
Belmont town	Arlington town	239	99
Belmont town	Burlington town	223	64
Belmont town	Somerville city	150	63
Belmont town	Framingham town	123	60
Belmont town	Needham town	114	61
Belmont town	Bedford town	104	43
Belmont town	Medford city	94	47
Belmont town	Woburn city	92	56
Belmont town	Brookline town	88	34
Belmont town	Concord town	87	52
Belmont town	Everett city	83	70
Belmont town	Billerica town	73	42

12,779

Matrix %						
Exit				Enter		
Trapelo Road (West/ North)	Trapelo Road (East/ South)	Pleassant Street (East)	%	Trapelo Road (West/ North)	Trapelo Road (East/ South)	Pleassant Street (East)
	0.5	0.5	1		0.5	0.5
	0.5	0.5	1		0.5	0.5
	0.8	0.2	1		0.5	0.5
	1		1		1	
0.7	0.3		1	0.7	0.3	
0.3	0.7		1	0.3	0.7	
0.9		0.1	1	0.9		0.1
		1	1			1
1			1	1		
		1	1			1
0.8	0.2		1	0.8	0.2	
0.8	0.2		1	0.8	0.2	
1			1	1		
		1	1			1
1			1	1		
	1		1		1	
	1		1		1	
1			1	1		
		1	1			1
1			1	1		
1			1	1		
1			1	1		

Trips									
Exit			Enter						
Trapelo Road (West/ North)	Trapelo Road (East/ South)	Pleasant Street (East)	total	Trapelo Road (West/ North)	Trapelo Road (East/ South)	Pleasant Street (East)	total		
	1627	1627	3254	0	1627	1627	3254		
0	1205	1205	2410	0	1205	1205	2410		
0	1829	457	2286	0	1143	1143	2286		
0	562	0	562	0	562	0	562		
390	167	0	557	390	167	0	557		
136	317	0	453	136	317	0	453		
301	0	33	334	301	0	33	334		
0	0	239	239	0	0	239	239		
223	0	0	223	223	0	0	223		
0	0	150	150	0	0	150	150		
98	25	0	123	98	25	0	123		
91	23	0	114	91	23	0	114		
104	0	0	104	104	0	0	104		
0	0	94	94	0	0	94	94		
92	0	0	92	92	0	0	92		
0	88	0	88	0	88	0	88		
87	0	0	87	87	0	0	87		
0	0	83	83	0	0	83	83		
73	0	0	73	73	0	0	73		
1595	5842	3889	11326	1595	5157	4574	11326		
14%	52%	34%		14%	46%	40%			
SAY	15	45	40	100	15	45	40		100

## TRIP GENERATION



# Trip Generation Handbook

## 3rd Edition

SEPTEMBER 2017

INSTITUTE OF TRANSPORTATION ENGINEERS

### 4.3 Basis for Recommended Process

The recommended approach for using information from *Trip Generation Manual* data pages to estimate trip generation for a study site is based on the following statements:

- The value of the independent variable **for the study site** must be within the range of data included to use the data plot;
- When the data plot has at least 20 data points and a fitted curve equation are provided, the fitted curve equation should be used;
- A fitted curve equation with an  $R^2$  of at least 0.75 is appropriate to use because it indicates the recommended acceptable level of correlation between trips generated by a site and the value measured for an independent variable;
- A weighted average rate is appropriate to use when the weighted standard deviation is less than or equal to 55 percent of the weighted average rate;
- The use of supplemental local data is suggested when the data plot has fewer than six data points; and
- The number of trips determined by either the rate or the equation should be within the cluster of data points (that is, the range of trip values) found at the study site's independent variable value. Otherwise, collecting and using additional local data is suggested.

A detailed step-by-step approach for using *Trip Generation Manual* data is presented in Section 4.4 of this chapter.

### 4.4 Process for Selecting Average Rate or Equation in *Trip Generation Manual* Data

A step-by-step procedure is described below for determining how best to estimate trip generation using data contained in *Trip Generation Manual*. These guidelines are merely tools to help the analyst estimate trip generation. These tools are by design straightforward and uncomplicated. They do not include all considerations that could be relevant to a particular situation. Thus, professional judgment must be applied at all stages in this analysis process. The procedure is also outlined with simplified text in the flow chart in Figure 4.2.

**4.4.1—Step 1:** Determine if the study site is consistent with the description of a land use code in *Trip Generation Manual* and with the described or presumed characteristics of development sites for which data points are provided.

- If the answer is **yes**, proceed to Step 2.
- If the answer is **no**, collect local data for the land use being analyzed and establish a local or consolidated rate. Refer to Chapter 9 for guidance.

**4.4.2—Step 2:** Determine if the size of the study site (in terms of the unit of measurement of the independent variable) is within the range of the data shown in the data plot.

- If the answer is **yes**, proceed to Step 3.
- If the answer is **no**, either (1) consider the use of a different independent variable and its associated data pages, or (2) collect local data and establish a local or consolidated rate. Refer to Chapter 9 for guidance.

Time Period/Direction	ITE Senior housing (93 units) <sup>a</sup>	Transit Reduction Trips 0.05	Total	ITE Multifamily Housing (57 units) <sup>b</sup>	Transit Reduction Trips 0.1	Total	TOTAL	TMMA
Average Weekday	348.49	17.42	331.07	308.90	30.89	278.01	609.08	1,148
Weekday Morning Peak Hour								
Entering	6.45	0.32	6.13	5.34	0.53	4.81	10.94	36
Exiting	<u>11.97</u>	<u>0.60</u>	<u>11.37</u>	<u>15.18</u>	<u>1.52</u>	<u>13.66</u>	<u>25.03</u>	
Total	18.42	0.92	17.50	20.52	2.05	18.47	35.97	
Weekday Evening Peak Hour								92
Entering	13.27	0.66	12.61	15.3	1.53	13.77	26.38	
Exiting	<u>11.31</u>	<u>0.57</u>	<u>10.74</u>	<u>9.78</u>	<u>0.98</u>	<u>8.80</u>	<u>19.54</u>	
Total	24.58	1.23	23.35	25.08	2.51	22.57	45.92	

**Institute of Transportation Engineers (ITE)**  
**Trip Generation, 10th Edition**  
**Land Use Code (LUC) 221 - Multifamily Housing (Mid-Rise)**

Vehicle Trips Ends vs: Dwelling Units

Ident Variable (X): 57

**R<sup>2</sup>**      **Equation**  
0.77      **AVERAGE WEEKDAY DAILY**  

$$T = 5.45 * (X) - 1.75$$

$$T = 5.45 * 57 - (1.75)$$

$$T = 308.90$$

$$T = 308 \text{ vehicle trips}$$

with 50% ( 154.45 vpd) entering and 50% ( 154.45 vpd) exiting.

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

$$T = 0.36 * (X)$$

$$T = 0.36 * 57$$

$$T = 20.52$$

$$T = 21 \text{ vehicle trips}$$

with 26% ( 5.34 vph) entering and 74% ( 15.18 vph) exiting.

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

$$T = 0.44 * (X)$$

$$T = 0.44 * 57$$

$$T = 25.08$$

$$T = 25 \text{ vehicle trips}$$

with 61% ( 15.30 vph) entering and 39% ( 9.78 vph) exiting.

**Institute of Transportation Engineers (ITE)**

**Trip Generation, 10th Edition**

**Land Use Code (LUC) 252 - Senior Adult Housing - Attached**

Average Vehicle Trips Ends vs: Dwelling Units

Independent Variable (X): 93

<b>R<sup>2</sup></b>	<b><u>Equation</u></b>
<b>0.99</b>	<b>AVERAGE WEEKDAY DAILY</b> T = 4.02 * (X) - 25.37 T = 4.02 * 93 - 25.370 T = 348.49 T = 348 vehicle trips with 50% ( 174 vph) entering and 50% ( 174 vph) exiting.
	<b><u>Equation</u></b>
<b>0.98</b>	<b>WEEKDAY MORNING PEAK HOUR OF ADJACENT STREET TRAFFIC</b> T = 0.20 * (X) - 0.18 T = 0.20 * 93 - 0.18 T = 18.42 T = 18 vehicle trips with 35% ( 6.45 vph) entering and 65% ( 11.97 vph) exiting.
	<b><u>Equation</u></b>
<b>0.96</b>	<b>WEEKDAY EVENING PEAK HOUR OF ADJACENT STREET TRAFFIC</b> T = 0.24 * (X) + 2.26 T = 0.24 * 93 + 2.26 T = 24.58 T = 25 vehicle trips with 54% ( 13.27 vph) entering and 46% ( 11.31 vph) exiting.

## TRAFFIC SIGNAL WARRANT ANALYSIS (TSWA)

Start Date: 6/13/2019  
Start Time: 12:00:00 AM  
Site Code: 82890001  
Location : Boston Post Road  
Location : West of Village Drive  
City/State: Marlborough, MA

### 2020 Raw

Start Time	Olmsted Dr From North		Pleasant St From East		Pleasant St From West	
	Left	Right	Thru	Right	Left	Thru
7-8 AM	3	9	307	1	2	283
8-9 AM	2	2	344	2	2	272
9-10 AM	3	7	293	2	3	229
10-11 AM	3	10	252	6	6	241
11-12 PM	3	3	244	5	5	252
12-1 PM	3	8	291	2	3	256
1-2 PM	6	4	260	7	8	309
2-3 PM	2	5	355	0	5	294
3-4 PM	6	10	357	8	11	354
4-5 PM	2	5	391	1	6	387
5-6 PM	1	4	358	3	3	339
6-7 PM	7	7	243	5	9	232

### Covid Adj - 2020 Baseline Condition

COVID adj 1.4						
1% above no seasonal adjustment						
Time	Olmsted Dr From North		Pleasant St From East		Pleasant St From West	
	Left	Right	Thru	Right	Left	Thru
7-8 AM	4	13	430	1	3	396
8-9 AM	3	3	482	3	3	381
9-10 AM	4	10	410	3	4	321
10-11 AM	4	14	353	8	8	337
11-12 PM	4	4	342	7	7	353
12-1 PM	4	11	407	3	4	358
1-2 PM	8	6	364	10	11	433
2-3 PM	3	7	497	0	7	412
3-4 PM	8	14	500	11	15	496
4-5 PM	3	7	547	1	8	542
5-6 PM	1	6	501	4	4	475
6-7 PM	10	10	340	7	13	325

### 2021 Adjustment

1 year 1.01						
1 percent per year compounded annual background						
Time	Olmsted Dr From North		Pleasant St From East		Pleasant St From West	
	Left	Right	Thru	Right	Left	Thru
7-8 AM	4	13	434	1	3	400
8-9 AM	3	3	487	3	3	385
9-10 AM	4	10	414	3	4	324
10-11 AM	4	14	357	8	8	340
11-12 PM	4	4	345	7	7	357
12-1 PM	4	11	411	3	4	362
1-2 PM	8	6	368	10	11	437
2-3 PM	3	7	502	0	7	416
3-4 PM	8	14	505	11	15	501
4-5 PM	3	7	552	1	8	547
5-6 PM	1	6	506	4	4	480
6-7 PM	10	10	343	7	13	328

## Hourly Distribution of Entering and Exiting Vehicle Trips by Land Use

Source: ITE *Trip Generation Manual*, 10th Edition

Land Use Code	882					
Land Use	Marijuana Dispensary					
Setting	General Urban/Suburban					
Time Period	Weekday					
Trip Type	Vehicle	Daily		Daily		
# Data Sites	4	303	303	303	303	
% of 24-Hour Traffic		Entering	Exiting	Entering	Exiting	
Time	Entering	Exiting				
12-1 AM	0	0	0.0	0.0	0	0
1-2 AM	0	0	0.0	0.0	0	0
2-3 AM	0	0	0.0	0.0	0	0
3-4 AM	0	0	0.0	0.0	0	0
4-5 AM	0	0	0.0	0.0	0	0
5-6 AM	0.1	0.1	0.3	0.3	0	0
6-7 AM	0.4	0.1	1.2	0.3	1	0
7-8 AM	1.4	0.2	4.2	0.6	4	1
8-9 AM	4.1	3.6	12.4	10.9	12	11
9-10 AM	5.3	4.3	16.1	13.0	16	13
10-11 AM	8.2	7.5	24.8	22.7	25	23
11-12 PM	8.1	7.9	24.5	23.9	25	24
12-1 PM	9.1	8.9	27.6	27.0	28	27
1-2 PM	8.3	8.0	25.1	24.2	25	24
2-3 PM	8.4	9.3	25.5	28.2	26	28
3-4 PM	9.9	9.6	30.0	29.1	30	29
4-5 PM	11.3	11.4	34.2	34.5	34	34
5-6 PM	12.4	12.4	37.6	37.6	38	38
6-7 PM	12.5	14.7	37.9	44.5	38	45
7-8 PM	0.2	1.6	0.6	4.8	1	5
8-9 PM	0.1	0.2	0.3	0.6	0	1
9-10 PM	0	0.1	0.0	0.3	0	0
10-11 PM	0	0	0.0	0.0	0	0
11-12 AM	0	0	0.0	0.0	0	0
					303	303

Data obtained from the ITE General Urban/Suburban - Trips by time of day

Background Development						
Start Time	out			in		
	From North	From East	From West	From North	From East	From West
Left	Right	Thru	Right	Left	Thru	
%	0	0	0.65	0	0	0.65
7-8 AM	0	0	1	0	0	3
8-9 AM	0	0	7	0	0	8
9-10 AM	0	0	8	0	0	10
10-11 AM	0	0	15	0	0	16
11-12 PM	0	0	16	0	0	16
12-1 PM	0	0	18	0	0	18
1-2 PM	0	0	16	0	0	16
2-3 PM	0	0	18	0	0	17
3-4 PM	0	0	19	0	0	20
4-5 PM	0	0	22	0	0	22
5-6 PM	0	0	25	0	0	25
6-7 PM	0	0	29	0	0	25

2028 No- Build						
7 year 1.01						
1 percent per year compounded annual background						
Start Time	Olmsted Dr	Pleasant St	Pleasant St			
	From North	From East	From West	From North	From East	From West
Left	Right	Thru	Right	Left	Thru	
7-8 AM	4	13	466	1	3	432
8-9 AM	3	3	529	3	3	421
9-10 AM	4	10	452	3	4	357
10-11 AM	4	14	398	8	8	381
11-12 PM	4	4	386	7	7	399
12-1 PM	4	11	459	3	4	406
1-2 PM	8	6	411	10	11	485
2-3 PM	3	7	556	0	7	463
3-4 PM	8	14	560	11	15	557
4-5 PM	3	7	614	1	8	608
5-6 PM	1	6	568	4	4	540
6-7 PM	10	10	397	7	13	377

Source: ITE *Trip Generation Manual* , 10th Edition

Ind Use Code	221	
Setting	Multifamily Housing (Mid-Rise)	
Time Period	General Urban/Suburban	
Trip Type	Weekday	332

# Data Sites	Vehicle		
	8	Daily	
% of 24-Hour Traffic		166	166

Time	Entering	Exiting	Entering	Exiting
------	----------	---------	----------	---------

Time	Entering	Exiting	Entering	Exiting	Entering	Exiting	Entering	Exiting
0	0	0	0	0	0	0	0	0
1	1	0	1	0	1	0	1	0
2	2	0	2	0	2	0	2	0
3	3	0	3	0	3	0	3	0
4	4	0	4	0	4	0	4	0
5	5	0	5	0	5	0	5	0
6	6	0	6	0	6	0	6	0
7	7	0	7	0	7	0	7	0
8	8	0	8	0	8	0	8	0
9	9	0	9	0	9	0	9	0
10	10	0	10	0	10	0	10	0
11	11	0	11	0	11	0	11	0
12	12	0	12	0	12	0	12	0
13	13	0	13	0	13	0	13	0
14	14	0	14	0	14	0	14	0
15	15	0	15	0	15	0	15	0
16	16	0	16	0	16	0	16	0
17	17	0	17	0	17	0	17	0
18	18	0	18	0	18	0	18	0
19	19	0	19	0	19	0	19	0
20	20	0	20	0	20	0	20	0
21	21	0	21	0	21	0	21	0
22	22	0	22	0	22	0	22	0
23	23	0	23	0	23	0	23	0
24	24	0	24	0	24	0	24	0
25	25	0	25	0	25	0	25	0
26	26	0	26	0	26	0	26	0
27	27	0	27	0	27	0	27	0
28	28	0	28	0	28	0	28	0
29	29	0	29	0	29	0	29	0
30	30	0	30	0	30	0	30	0
31	31	0	31	0	31	0	31	0
32	32	0	32	0	32	0	32	0
33	33	0	33	0	33	0	33	0
34	34	0	34	0	34	0	34	0
35	35	0	35	0	35	0	35	0
36	36	0	36	0	36	0	36	0
37	37	0	37	0	37	0	37	0
38	38	0	38	0	38	0	38	0
39	39	0	39	0	39	0	39	0
40	40	0	40	0	40	0	40	0
41	41	0	41	0	41	0	41	0
42	42	0	42	0	42	0	42	0
43	43	0	43	0	43	0	43	0
44	44	0	44	0	44	0	44	0
45	45	0	45	0	45	0	45	0
46	46	0	46	0	46	0	46	0
47	47	0	47	0	47	0	47	0
48	48	0	48	0	48	0	48	0
49	49	0	49	0	49	0	49	0
50	50	0	50	0	50	0	50	0
51	51	0	51	0	51	0	51	0
52	52	0	52	0	52	0	52	0
53	53	0	53	0	53	0	53	0
54								

Data obtained from the ITE General Urban/Suburban - Trips by time of day

e Trips by Land Use

Trip Generation						
	out		out		in	
	From North		From East		From West	
Time	Left	Right	Thru	Right	Left	Thru
%	0.4	0.6	0	0.4	0.6	0
7-8 AM	11	16	0	3	5	0
8-9 AM	10	14	0	4	7	0
9-10 AM	8	11	0	5	7	0
10-11 AM	7	11	0	6	8	0
11-12 PM	7	10	0	7	10	0
12-1 PM	8	12	0	8	12	0
1-2 PM	8	11	0	7	11	0
2-3 PM	7	10	0	9	14	0
3-4 PM	6	10	0	9	14	0
4-5 PM	8	11	0	12	18	0
5-6 PM	8	13	0	12	19	0
6-7 PM	7	11	0	10	14	0

2028 Build Zone 3						
	Olmsted Dr From North		Pleasant St From East		Pleasant St From West	
Start Time	Left	Right	Thru	Right	Left	Thru
7-8 AM	15	29	466	4	8	432
8-9 AM	13	17	529	7	10	421
9-10 AM	12	21	452	8	11	357
10-11 AM	11	25	398	14	16	381
11-12 PM	11	14	386	14	17	399
12-1 PM	12	23	459	11	16	406
1-2 PM	16	17	411	17	22	485
2-3 PM	10	17	556	9	21	463
3-4 PM	14	24	560	20	29	557
4-5 PM	11	18	614	13	26	608
5-6 PM	9	19	568	16	23	540
6-7 PM	17	21	397	17	27	377

### Hourly Distribution of Entering and Exiting Vehicle Trips by Land Use

Source: ITE *Trip Generation Manual*, 10th Edition

Land Use Code 710

Land Use General Office Building

Setting General Urban/Suburban

Daily number obtained from TMA

Time Period Weekday

Trip Type Vehicle

# Data Sites 16

Daily

% of 24-Hour Traffic

892

892

Time	Entering	Exiting	Entering	Exiting
12-1 AM	0.2	0.1	1.8	0.9
1-2 AM	0	0.1	0.0	0.9
2-3 AM	0	0	0.0	0.0
3-4 AM	0	0.1	0.0	0.9
4-5 AM	0.1	0.2	0.9	1.8
5-6 AM	0.4	0.1	3.6	0.9
6-7 AM	4.6	0.5	41.0	4.5
7-8 AM	13.1	1.9	116.9	16.9
8-9 AM	14.4	3.5	128.4	31.2
9-10 AM	6.4	4.3	57.1	38.4
10-11 AM	5.4	5.9	48.2	52.6
11-12 PM	6.2	10.3	55.3	91.9
12-1 PM	10.2	10.4	91.0	92.8
1-2 PM	9.0	6.7	80.3	59.8
2-3 PM	8.2	6.5	73.1	58.0
3-4 PM	7.4	8.5	66.0	75.8
4-5 PM	5.5	15.2	49.1	135.6
5-6 PM	4.2	15.6	37.5	139.2
6-7 PM	1.7	2.9	15.2	25.9
7-8 PM	0.9	2.2	8.0	19.6
8-9 PM	0.7	1.3	6.2	11.6
9-10 PM	0.5	1.5	4.5	13.4
10-11 PM	0.3	2.0	2.7	17.8
11-12 AM	0.4	0.2	3.6	1.8

Daily	
892	892
Entering	Exiting
2	1
0	1
0	0
0	1
1	2
4	1
41	4
117	17
129	31
57	38
48	52
55	92
91	93
81	60
73	58
66	76
49	135
38	139
15	26
8	20
6	12
4	13
3	18
4	2
892	892

Data obtained from the ITE General Urban/Suburban - Trips by time of day

Trip Generation						
	out	out	in	in		
	From North		From East		From West	
Time	Left	Right	Thru	Right	Left	Thru
%	0.4	0.6	0	0.4	0.6	0
7-8 AM	7	10	0	47	70	0
8-9 AM	12	19	0	52	77	0
9-10 AM	15	23	0	23	34	0
10-11 AM	21	31	0	19	29	0
11-12 PM	37	55	0	22	33	0
12-1 PM	37	56	0	36	55	0
1-2 PM	24	36	0	32	49	0
2-3 PM	23	35	0	29	44	0
3-4 PM	30	46	0	26	40	0
4-5 PM	54	81	0	20	29	0
5-6 PM	56	83	0	15	23	0
6-7 PM	10	16	0	6	9	0

Note: Same distribution of the zone 3 was assumed for zone 4 Developments

### 2028 Build - w/ Zone 3 and 4

	Olmsted Dr From North		Pleasant St From East		Pleasant St From West	
Start Time	Left	Right	Thru	Right	Left	Thru
7-8 AM	22	39	466	51	78	432
8-9 AM	25	36	529	59	87	421
9-10 AM	27	44	452	31	45	357
10-11 AM	32	56	398	33	45	381
11-12 PM	48	69	386	36	50	399
12-1 PM	49	79	459	47	71	406
1-2 PM	40	53	411	49	71	485
2-3 PM	33	52	556	38	65	463
3-4 PM	44	70	560	46	69	557
4-5 PM	65	99	614	33	55	608
5-6 PM	65	102	568	31	46	540
6-7 PM	27	37	397	23	36	377

# HCS7 Warrants Report

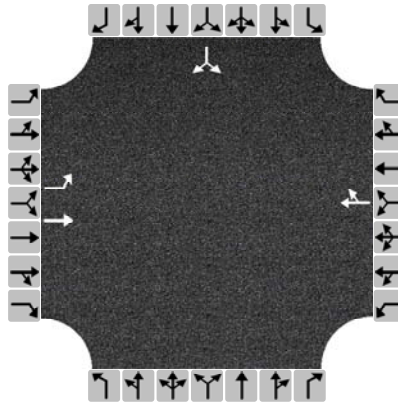
## Project Information

Analyst	JC	Date	1/4/2021
Agency	VAI	Analysis Year	2021
Jurisdiction	McLean Hospital Residential Development - Belmont MA	Time Period Analyzed	2021 Existing Condition
Project Description	Pleasant Street at Olmsted Drive		

## General

Major Street Direction	East-West	Population < 10,000	No
Starting Time Interval	7	Coordinated Signal System	No
Median Type	Undivided	Crashes (crashes/year)	1
Major Street Speed (mi/h)	25	Adequate Trials of Crash Exp. Alt.	No
Nearest Signal (ft)	360		

## Geometry and Traffic



Approach	Eastbound			Westbound			Northbound			Southbound		
Movement	L	T	R	L	T	R	L	T	R	L	T	R
Number of Lanes, N	1	1	0	0	1	0	0	0	0	0	0	0
Lane Usage	L	T			TR						LR	
Vehicle Volumes Averages (veh/h)	7	406	0	0	435	4	0	0	0	4	0	8
Pedestrian Averages (peds/h)	0			0			0			0		
Gap Averages (gaps/h)	0			0			0			0		
Delay (s/veh)	0.0			0.0			0.0			0.0		
Delay (veh-hrs)	0.0			0.0			0.0			0.0		

## School Crossing and Roadway Network

Number of Students in Highest Hour	0	Two or More Major Routes	Yes
Number of Adequate Gaps in Period	0	Weekend Counts	No
Number of Minutes in Period	0	5-year Growth Factor (%)	0

## Railroad Crossing

Grade Crossing Approach	None	Rail Traffic (trains/day)	0
Highest Volume Hour with Trains	Unknown	High Occupancy Buses (%)	0
Distance to Stop Line (ft)		Tractor-Trailer Trucks (%)	0

# HCS7 Warrants Report

## Volume Summary

Hour	Major Volume	Minor Volume	Total Volume	Peds/h	Gaps/h	1A ( 100% )	1A ( 80% )	1B ( 100% )	1B ( 80% )	2 ( 100% )	3A ( 100% )	3B ( 100% )	4A ( 100% )	4B ( 100% )
07 - 08	838	17	855	0	0	No	No	No	No	No	No	No	No	No
08 - 09	878	6	884	0	0	No	No	No	No	No	No	No	No	No
09 - 10	745	14	759	0	0	No	No	No	No	No	No	No	No	No
10 - 11	713	18	731	0	0	No	No	No	No	No	No	No	No	No
11 - 12	716	8	724	0	0	No	No	No	No	No	No	No	No	No
12 - 13	780	15	795	0	0	No	No	No	No	No	No	No	No	No
13 - 14	826	14	840	0	0	No	No	No	No	No	No	No	No	No
14 - 15	925	10	935	0	0	No	No	No	No	No	No	No	No	No
15 - 16	1032	22	1054	0	0	No	No	No	No	No	No	No	No	No
16 - 17	1108	10	1118	0	0	No	No	No	No	No	No	No	No	No
17 - 18	994	7	1001	0	0	No	No	No	No	No	No	No	No	No
18 - 19	691	20	711	0	0	No	No	No	No	No	No	No	No	No
Total	10246	161	10407	0	0	0	0	0	0	0	0	0	0	0

## Warrants

### Warrant 1: Eight-Hour Vehicular Volume

A. Minimum Vehicular Volumes (Both major approaches --and-- higher minor approach) --or--

B. Interruption of Continuous Traffic (Both major approaches --and-- higher minor approach) --or--

80% Vehicular --and-- Interruption Volumes (Both major approaches --and-- higher minor approach)

### Warrant 2: Four-Hour Vehicular Volume

Four-Hour Vehicular Volume (Both major approaches --and-- higher minor approach)

### Warrant 3: Peak Hour

A. Peak-Hour Conditions (Minor delay -- and-- minor volume --and-- total volume) --or--

B. Peak-Hour Vehicular Volumes (Both major approaches --and-- higher minor approach)

### Warrant 4: Pedestrian Volume

A. Four Hour Volumes --or--

B. One-Hour Volumes

### Warrant 5: School Crossing

Gaps Same Period --and--

Student Volumes

Nearest Traffic Control Signal (optional)



### Warrant 6: Coordinated Signal System

Degree of Platooning (Predominant direction or both directions)

### Warrant 7: Crash Experience

A. Adequate trials of alternatives, observance and enforcement failed --and--

B. Reported crashes susceptible to correction by signal (12-month period) --and--

C. 80% Volumes for Warrants 1A, 1B, --or-- 4 are satisfied

### Warrant 8: Roadway Network

A. Weekday Volume (Peak hour total --and-- projected warrants 1, 2, or 3) --or--

B. Weekend Volume (Five hours total)

### Warrant 9: Grade Crossing

A. Grade Crossing within 140 ft --and--

B. Peak-Hour Vehicular Volumes

# HCS7 Warrants Report

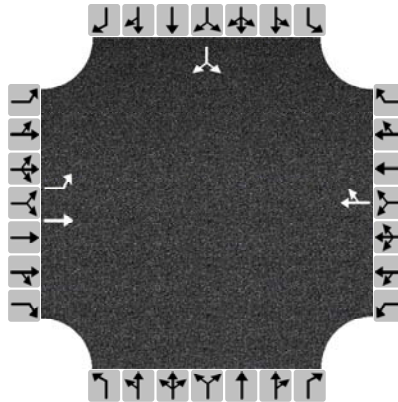
## Project Information

Analyst	JC	Date	1/4/2021
Agency	VAI	Analysis Year	2028
Jurisdiction	McLean Hospital Residential Development - Belmont MA	Time Period Analyzed	2028 No-Build Condition
Project Description	Pleasant Street at Olmsted Drive		

## General

Major Street Direction	East-West	Population < 10,000	No
Starting Time Interval	7	Coordinated Signal System	No
Median Type	Undivided	Crashes (crashes/year)	1
Major Street Speed (mi/h)	34	Adequate Trials of Crash Exp. Alt.	No
Nearest Signal (ft)	360		

## Geometry and Traffic



Approach	Eastbound			Westbound			Northbound			Southbound		
Movement	L	T	R	L	T	R	L	T	R	L	T	R
Number of Lanes, N	1	1	0	0	1	0	0	0	0	0	0	0
Lane Usage	L	T			TR						LR	
Vehicle Volumes Averages (veh/h)	7	452	0	0	483	4	0	0	0	4	0	8
Pedestrian Averages (peds/h)	0			0			0			0		
Gap Averages (gaps/h)	0			0			0			0		
Delay (s/veh)	0.0			0.0			0.0			0.0		
Delay (veh-hrs)	0.0			0.0			0.0			0.0		

## School Crossing and Roadway Network

Number of Students in Highest Hour	0	Two or More Major Routes	Yes
Number of Adequate Gaps in Period	0	Weekend Counts	No
Number of Minutes in Period	0	5-year Growth Factor (%)	0

## Railroad Crossing

Grade Crossing Approach	None	Rail Traffic (trains/day)	0
Highest Volume Hour with Trains	Unknown	High Occupancy Buses (%)	0
Distance to Stop Line (ft)		Tractor-Trailer Trucks (%)	0

# HCS7 Warrants Report

## Volume Summary

Hour	Major Volume	Minor Volume	Total Volume	Peds/h	Gaps/h	1A ( 100% )	1A ( 80% )	1B ( 100% )	1B ( 80% )	2 ( 100% )	3A ( 100% )	3B ( 100% )	4A ( 100% )	4B ( 100% )
07 - 08	902	17	919	0	0	No	No	No	No	No	No	No	No	No
08 - 09	956	6	962	0	0	No	No	No	No	No	No	No	No	No
09 - 10	816	14	830	0	0	No	No	No	No	No	No	No	No	No
10 - 11	795	18	813	0	0	No	No	No	No	No	No	No	No	No
11 - 12	799	8	807	0	0	No	No	No	No	No	No	No	No	No
12 - 13	872	15	887	0	0	No	No	No	No	No	No	No	No	No
13 - 14	917	14	931	0	0	No	No	No	No	No	No	No	No	No
14 - 15	1026	10	1036	0	0	No	No	No	No	No	No	No	No	No
15 - 16	1143	22	1165	0	0	No	No	No	No	No	No	No	No	No
16 - 17	1231	10	1241	0	0	No	No	No	No	No	No	No	No	No
17 - 18	1116	7	1123	0	0	No	No	No	No	No	No	No	No	No
18 - 19	794	20	814	0	0	No	No	No	No	No	No	No	No	No
Total	11367	161	11528	0	0	0	0	0	0	0	0	0	0	0

## Warrants

### Warrant 1: Eight-Hour Vehicular Volume

A. Minimum Vehicular Volumes (Both major approaches --and-- higher minor approach) --or--	
B. Interruption of Continuous Traffic (Both major approaches --and-- higher minor approach) --or--	
80% Vehicular --and-- Interruption Volumes (Both major approaches --and-- higher minor approach)	

### Warrant 2: Four-Hour Vehicular Volume

Four-Hour Vehicular Volume (Both major approaches --and-- higher minor approach)	
--	--

### Warrant 3: Peak Hour

A. Peak-Hour Conditions (Minor delay -- and-- minor volume --and-- total volume) --or--	
B. Peak-Hour Vehicular Volumes (Both major approaches --and-- higher minor approach)	

### Warrant 4: Pedestrian Volume

A. Four Hour Volumes --or--	
B. One-Hour Volumes	

### Warrant 5: School Crossing

Gaps Same Period --and--	
Student Volumes	
Nearest Traffic Control Signal (optional)	✓

### Warrant 6: Coordinated Signal System

Degree of Platooning (Predominant direction or both directions)	
---	--

### Warrant 7: Crash Experience

A. Adequate trials of alternatives, observance and enforcement failed --and--	
B. Reported crashes susceptible to correction by signal (12-month period) --and--	
C. 80% Volumes for Warrants 1A, 1B, --or-- 4 are satisfied	

### Warrant 8: Roadway Network

A. Weekday Volume (Peak hour total --and-- projected warrants 1, 2, or 3) --or--	
B. Weekend Volume (Five hours total)	

### Warrant 9: Grade Crossing

A. Grade Crossing within 140 ft --and--	
B. Peak-Hour Vehicular Volumes	

# HCS7 Warrants Report

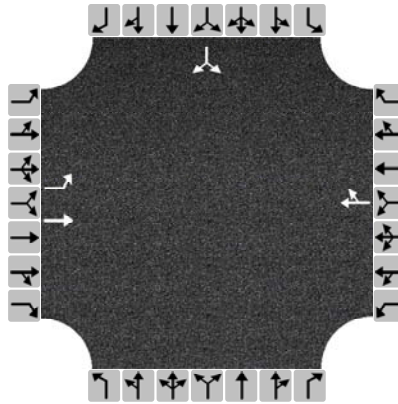
## Project Information

Analyst	JC	Date	1/4/2021
Agency	VAI	Analysis Year	2028
Jurisdiction	McLean Hospital Residential Development - Belmont MA	Time Period Analyzed	2028 No-Build Condition
Project Description	Pleasant Street at Olmsted Drive		

## General

Major Street Direction	East-West	Population < 10,000	No
Starting Time Interval	7	Coordinated Signal System	No
Median Type	Undivided	Crashes (crashes/year)	0
Major Street Speed (mi/h)	25	Adequate Trials of Crash Exp. Alt.	No
Nearest Signal (ft)	360		

## Geometry and Traffic



Approach	Eastbound			Westbound			Northbound			Southbound		
Movement	L	T	R	L	T	R	L	T	R	L	T	R
Number of Lanes, N	1	1	0	0	1	0	0	0	0	0	0	0
Lane Usage	L	T			TR						LR	
Vehicle Volumes Averages (veh/h)	18	452	0	0	483	12	0	0	0	12	0	20
Pedestrian Averages (peds/h)	0			0			0			0		
Gap Averages (gaps/h)	0			0			0			0		
Delay (s/veh)	0.0			0.0			0.0			0.0		
Delay (veh-hrs)	0.0			0.0			0.0			0.0		

## School Crossing and Roadway Network

Number of Students in Highest Hour	0	Two or More Major Routes	Yes
Number of Adequate Gaps in Period	0	Weekend Counts	No
Number of Minutes in Period	0	5-year Growth Factor (%)	0

## Railroad Crossing

Grade Crossing Approach	None	Rail Traffic (trains/day)	0
Highest Volume Hour with Trains	Unknown	High Occupancy Buses (%)	0
Distance to Stop Line (ft)		Tractor-Trailer Trucks (%)	0

# HCS7 Warrants Report

## Volume Summary

Hour	Major Volume	Minor Volume	Total Volume	Peds/h	Gaps/h	1A ( 100% )	1A ( 80% )	1B ( 100% )	1B ( 80% )	2 ( 100% )	3A ( 100% )	3B ( 100% )	4A ( 100% )	4B ( 100% )
07 - 08	910	44	954	0	0	No	No	No	No	No	No	No	No	No
08 - 09	967	30	997	0	0	No	No	No	No	No	No	No	No	No
09 - 10	828	33	861	0	0	No	No	No	No	No	No	No	No	No
10 - 11	809	36	845	0	0	No	No	No	No	No	No	No	No	No
11 - 12	816	25	841	0	0	No	No	No	No	No	No	No	No	No
12 - 13	892	35	927	0	0	No	No	No	No	No	No	No	No	No
13 - 14	935	33	968	0	0	No	No	No	No	No	No	No	No	No
14 - 15	1049	27	1076	0	0	No	No	No	No	No	No	No	No	No
15 - 16	1166	38	1204	0	0	No	No	No	No	No	No	No	No	No
16 - 17	1261	29	1290	0	0	No	No	No	No	No	No	No	No	No
17 - 18	1147	28	1175	0	0	No	No	No	No	No	No	No	No	No
18 - 19	818	38	856	0	0	No	No	No	No	No	No	No	No	No
Total	11598	396	11994	0	0	0	0	0	0	0	0	0	0	0

## Warrants

### Warrant 1: Eight-Hour Vehicular Volume

A. Minimum Vehicular Volumes (Both major approaches --and-- higher minor approach) --or--	
B. Interruption of Continuous Traffic (Both major approaches --and-- higher minor approach) --or--	
80% Vehicular --and-- Interruption Volumes (Both major approaches --and-- higher minor approach)	

### Warrant 2: Four-Hour Vehicular Volume

Four-Hour Vehicular Volume (Both major approaches --and-- higher minor approach)	
--	--

### Warrant 3: Peak Hour

A. Peak-Hour Conditions (Minor delay -- and-- minor volume --and-- total volume) --or--	
B. Peak-Hour Vehicular Volumes (Both major approaches --and-- higher minor approach)	

### Warrant 4: Pedestrian Volume

A. Four Hour Volumes --or--	
B. One-Hour Volumes	

### Warrant 5: School Crossing

Gaps Same Period --and--	
Student Volumes	
Nearest Traffic Control Signal (optional)	✓

### Warrant 6: Coordinated Signal System

Degree of Platooning (Predominant direction or both directions)	
---	--

### Warrant 7: Crash Experience

A. Adequate trials of alternatives, observance and enforcement failed --and--	
B. Reported crashes susceptible to correction by signal (12-month period) --and--	
C. 80% Volumes for Warrants 1A, 1B, --or-- 4 are satisfied	

### Warrant 8: Roadway Network

A. Weekday Volume (Peak hour total --and-- projected warrants 1, 2, or 3) --or--	
B. Weekend Volume (Five hours total)	

### Warrant 9: Grade Crossing

A. Grade Crossing within 140 ft --and--	
B. Peak-Hour Vehicular Volumes	

# HCS7 Warrants Report

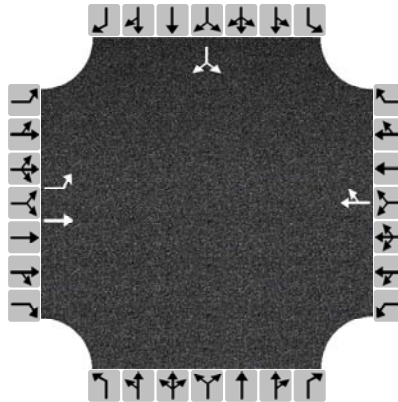
## Project Information

Analyst	JC	Date	1/4/2021
Agency	VAI	Analysis Year	2028
Jurisdiction	McLean Hospital Residential Development - Belmont MA	Time Period Analyzed	2028 Build Condition Zone 3 and Zone 4
Project Description	Pleasant Street at Olmsted Drive		

## General

Major Street Direction	East-West	Population < 10,000	No
Starting Time Interval	7	Coordinated Signal System	No
Median Type	Undivided	Crashes (crashes/year)	0
Major Street Speed (mi/h)	25	Adequate Trials of Crash Exp. Alt.	No
Nearest Signal (ft)	360		

## Geometry and Traffic



Approach	Eastbound			Westbound			Northbound			Southbound		
Movement	L	T	R	L	T	R	L	T	R	L	T	R
Number of Lanes, N	1	1	0	0	1	0	0	0	0	0	0	0
Lane Usage	L	T			TR						LR	
Vehicle Volumes Averages (veh/h)	59	452	0	0	483	39	0	0	0	39	0	61
Pedestrian Averages (peds/h)	0			0			0			0		
Gap Averages (gaps/h)	0			0			0			0		
Delay (s/veh)	0.0			0.0			0.0			0.0		
Delay (veh-hrs)	0.0			0.0			0.0			0.0		

## School Crossing and Roadway Network

Number of Students in Highest Hour	0	Two or More Major Routes	Yes
Number of Adequate Gaps in Period	0	Weekend Counts	No
Number of Minutes in Period	0	5-year Growth Factor (%)	0

## Railroad Crossing

Grade Crossing Approach	None	Rail Traffic (trains/day)	0
Highest Volume Hour with Trains	Unknown	High Occupancy Buses (%)	0
Distance to Stop Line (ft)		Tractor-Trailer Trucks (%)	0

# HCS7 Warrants Report

## Volume Summary

Hour	Major Volume	Minor Volume	Total Volume	Peds/h	Gaps/h	1A ( 100% )	1A ( 80% )	1B ( 100% )	1B ( 80% )	2 ( 100% )	3A ( 100% )	3B ( 100% )	4A ( 100% )	4B ( 100% )
07 - 08	1027	61	1088	0	0	No	No	No	Yes	No	No	No	No	No
08 - 09	1096	61	1157	0	0	No	No	No	Yes	No	No	No	No	No
09 - 10	885	71	956	0	0	No	No	No	Yes	No	No	No	No	No
10 - 11	857	88	945	0	0	No	No	No	Yes	No	No	No	No	No
11 - 12	871	117	988	0	0	No	No	No	Yes	No	No	No	No	No
12 - 13	983	128	1111	0	0	No	Yes	Yes	Yes	No	No	No	No	No
13 - 14	1016	93	1109	0	0	No	No	Yes	Yes	No	No	No	No	No
14 - 15	1122	85	1207	0	0	No	No	Yes	Yes	No	No	No	No	No
15 - 16	1232	114	1346	0	0	No	No	Yes	Yes	Yes	No	No	No	No
16 - 17	1310	164	1474	0	0	Yes	Yes	Yes	Yes	Yes	No	No	No	No
17 - 18	1185	167	1352	0	0	Yes	Yes	Yes	Yes	Yes	No	No	No	No
18 - 19	833	64	897	0	0	No	No	No	Yes	No	No	No	No	No
Total	12417	1213	13630	0	0	2	3	6	12	3	0	0	0	0

## Warrants

### Warrant 1: Eight-Hour Vehicular Volume

A. Minimum Vehicular Volumes (Both major approaches --and-- higher minor approach) --or--	
B. Interruption of Continuous Traffic (Both major approaches --and-- higher minor approach) --or--	
80% Vehicular --and-- Interruption Volumes (Both major approaches --and-- higher minor approach)	

### Warrant 2: Four-Hour Vehicular Volume

Four-Hour Vehicular Volume (Both major approaches --and-- higher minor approach)	
--	--

### Warrant 3: Peak Hour

A. Peak-Hour Conditions (Minor delay -- and-- minor volume --and-- total volume) --or--	
B. Peak-Hour Vehicular Volumes (Both major approaches --and-- higher minor approach)	

### Warrant 4: Pedestrian Volume

A. Four Hour Volumes --or--	
B. One-Hour Volumes	

### Warrant 5: School Crossing

Gaps Same Period --and--	
Student Volumes	
Nearest Traffic Control Signal (optional)	✓

### Warrant 6: Coordinated Signal System

Degree of Platooning (Predominant direction or both directions)	
---	--

### Warrant 7: Crash Experience

A. Adequate trials of alternatives, observance and enforcement failed --and--	
B. Reported crashes susceptible to correction by signal (12-month period) --and--	
C. 80% Volumes for Warrants 1A, 1B, --or-- 4 are satisfied	✓

### Warrant 8: Roadway Network

A. Weekday Volume (Peak hour total --and-- projected warrants 1, 2, or 3) --or--	
B. Weekend Volume (Five hours total)	

### Warrant 9: Grade Crossing

A. Grade Crossing within 140 ft --and--	
B. Peak-Hour Vehicular Volumes	

## CAPACITY ANALYSIS

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Pleasant Street at Trapelo Road  
Pleasant Street at Olmsted Drive  
Olmsted Drive at Site Drive

Pleasant Street at Trapelo Road




















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# Lanes, Volumes, Timings

2021 - Existing Condition - Weekday Morning

## 3: Private Driveway/Pleasant Street & Trapelo Road

01/11/2021

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	266	892	0	0	810	186	0	0	0	240	0	263
Future Volume (vph)	266	892	0	0	810	186	0	0	0	240	0	263
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	11	11	11	11	16	16	16	15	12	12
Storage Length (ft)	0		0	0		0	0		0	300		0
Storage Lanes	1		0	0		0	0		0	1		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.972							0.850
Flt Protected	0.950									0.950		
Satd. Flow (prot)	1711	1801	0	0	3319	0	0	2153	0	1947	0	1599
Flt Permitted	0.119									0.757		
Satd. Flow (perm)	214	1801	0	0	3319	0	0	2153	0	1551	0	1599
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					32							159
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		434			399			175			540	
Travel Time (s)		11.8			10.9			4.8			14.7	
Peak Hour Factor	0.93	0.93	0.93	0.91	0.91	0.91	0.92	0.92	0.92	0.93	0.93	0.93
Heavy Vehicles (%)	2%	2%	2%	0%	2%	3%	0%	0%	0%	2%	0%	1%
Adj. Flow (vph)	286	959	0	0	890	204	0	0	0	258	0	283
Shared Lane Traffic (%)												
Lane Group Flow (vph)	286	959	0	0	1094	0	0	0	0	258	0	283
Number of Detectors	1	2			2		1	2		1		1
Detector Template	Left	Thru			Thru		Left	Thru		Left		Right
Leading Detector (ft)	20	100			100		20	100		20		20
Trailing Detector (ft)	0	0			0		0	0		0		0
Detector 1 Position(ft)	0	0			0		0	0		0		0
Detector 1 Size(ft)	20	6			6		20	6		20		20
Detector 1 Type	Cl+Ex	Cl+Ex			Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex		Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0			0.0		0.0	0.0		0.0		0.0
Detector 1 Queue (s)	0.0	0.0			0.0		0.0	0.0		0.0		0.0
Detector 1 Delay (s)	0.0	0.0			0.0		0.0	0.0		0.0		0.0
Detector 2 Position(ft)		94			94			94				
Detector 2 Size(ft)		6			6			6				
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				
Turn Type	pm+pt	NA			NA					Perm		custom
Protected Phases	5	2			6		3	8				4
Permitted Phases	2						8			4		5
Detector Phase	5	2			6		3	8		4		4
Switch Phase												
Minimum Initial (s)	5.0	5.0			5.0		1.0	5.0		5.0		5.0
Minimum Split (s)	25.0	25.0			25.0		6.0	25.0		25.0		25.0
Total Split (s)	22.0	56.0			34.0		8.0	26.0		26.0		26.0
Total Split (%)	24.4%	62.2%			37.8%		8.9%	28.9%		28.9%		28.9%

# Lanes, Volumes, Timings

2021 - Existing Condition - Weekday Morning

## 3: Private Driveway/Pleasant Street & Trapelo Road

01/11/2021



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Maximum Green (s)	16.0	50.0			28.0		4.0	20.0		20.0		20.0
Yellow Time (s)	4.0	4.0			4.0		3.0	3.0		3.0		3.0
All-Red Time (s)	2.0	2.0			2.0		1.0	3.0		3.0		3.0
Lost Time Adjust (s)	-1.0	-1.0			-1.0			0.0		-1.0		-1.0
Total Lost Time (s)	5.0	5.0			5.0			6.0		5.0		5.0
Lead/Lag	Lead				Lag							
Lead-Lag Optimize?	Yes				Yes							
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0		3.0		3.0
Recall Mode	Min	C-Min			C-Max		None	Min		Min		Min
Walk Time (s)	7.0	7.0			7.0			7.0		7.0		7.0
Flash Dont Walk (s)	11.0	11.0			11.0			11.0		11.0		11.0
Pedestrian Calls (#/hr)	0	0			0			0		0		0
Act Effect Green (s)	58.6	58.6			39.1					21.4		40.9
Actuated g/C Ratio	0.65	0.65			0.43					0.24		0.45
v/c Ratio	0.75	0.82			0.75					0.70		0.35
Control Delay	28.9	21.0			27.3					41.2		6.6
Queue Delay	0.0	0.0			0.0					0.0		0.0
Total Delay	28.9	21.0			27.3					41.2		6.6
LOS	C	C			C					D		A
Approach Delay		22.9			27.3						23.1	
Approach LOS		C			C						C	
Queue Length 50th (ft)	86	361			264					135		39
Queue Length 95th (ft)	#206	#768			#466					195		69
Internal Link Dist (ft)		354			319			95			460	
Turn Bay Length (ft)										300		
Base Capacity (vph)	429	1172			1461					401		805
Starvation Cap Reductn	0	0			0					0		0
Spillback Cap Reductn	0	0			0					0		0
Storage Cap Reductn	0	0			0					0		0
Reduced v/c Ratio	0.67	0.82			0.75					0.64		0.35

### Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBT, Start of Green

Natural Cycle: 85

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.82

Intersection Signal Delay: 24.6

Intersection LOS: C

Intersection Capacity Utilization 68.0%

ICU Level of Service C

Analysis Period (min) 15

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

Queue shown is maximum after two cycles.

### Splits and Phases: 3: Private Driveway/Pleasant Street & Trapelo Road























# Lanes, Volumes, Timings

2021 Existing Condition - Weekday Evening

## 3: Private Driveway/Pleasant Street & Trapelo Road

01/19/2021

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	350	972	0	0	904	205	0	0	0	217	0	384
Future Volume (vph)	350	972	0	0	904	205	0	0	0	217	0	384
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	11	11	11	11	16	16	16	15	12	12
Storage Length (ft)	0		0	0		0	0		0	300		0
Storage Lanes	1		0	0		0	0		0	1		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.972							0.850
Flt Protected	0.950									0.950		
Satd. Flow (prot)	1711	1801	0	0	3319	0	0	2153	0	1947	0	1599
Flt Permitted	0.099									0.757		
Satd. Flow (perm)	178	1801	0	0	3319	0	0	2153	0	1551	0	1599
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					32							151
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		434			399			175			540	
Travel Time (s)		11.8			10.9			4.8			14.7	
Peak Hour Factor	0.93	0.93	0.93	0.91	0.91	0.91	0.92	0.92	0.92	0.93	0.93	0.93
Heavy Vehicles (%)	2%	2%	2%	0%	2%	3%	0%	0%	0%	2%	0%	1%
Adj. Flow (vph)	376	1045	0	0	993	225	0	0	0	233	0	413
Shared Lane Traffic (%)												
Lane Group Flow (vph)	376	1045	0	0	1218	0	0	0	0	233	0	413
Number of Detectors	1	2			2		1	2		1		1
Detector Template	Left	Thru			Thru		Left	Thru		Left		Right
Leading Detector (ft)	20	100			100		20	100		20		20
Trailing Detector (ft)	0	0			0		0	0		0		0
Detector 1 Position(ft)	0	0			0		0	0		0		0
Detector 1 Size(ft)	20	6			6		20	6		20		20
Detector 1 Type	Cl+Ex	Cl+Ex			Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex		Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0			0.0		0.0	0.0		0.0		0.0
Detector 1 Queue (s)	0.0	0.0			0.0		0.0	0.0		0.0		0.0
Detector 1 Delay (s)	0.0	0.0			0.0		0.0	0.0		0.0		0.0
Detector 2 Position(ft)		94			94			94				
Detector 2 Size(ft)		6			6			6				
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				
Turn Type	pm+pt	NA			NA					Perm		custom
Protected Phases	5	2			6		3	8				4
Permitted Phases	2						8			4		5
Detector Phase	5	2			6		3	8		4		4
Switch Phase												
Minimum Initial (s)	5.0	5.0			5.0		1.0	5.0		5.0		5.0
Minimum Split (s)	25.0	25.0			25.0		6.0	25.0		25.0		25.0
Total Split (s)	22.0	56.0			34.0		8.0	26.0		26.0		26.0
Total Split (%)	24.4%	62.2%			37.8%		8.9%	28.9%		28.9%		28.9%

# Lanes, Volumes, Timings

2021 Existing Condition - Weekday Evening

## 3: Private Driveway/Pleasant Street & Trapelo Road

01/19/2021



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Maximum Green (s)	16.0	50.0			28.0		4.0	20.0		20.0		20.0
Yellow Time (s)	4.0	4.0			4.0		3.0	3.0		3.0		3.0
All-Red Time (s)	2.0	2.0			2.0		1.0	3.0		3.0		3.0
Lost Time Adjust (s)	-1.0	-1.0			-1.0			0.0		-1.0		-1.0
Total Lost Time (s)	5.0	5.0			5.0			6.0		5.0		5.0
Lead/Lag	Lead				Lag							
Lead-Lag Optimize?	Yes				Yes							
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0		3.0		3.0
Recall Mode	Min	C-Min			C-Max		None	Min		Min		Min
Walk Time (s)	7.0	7.0			7.0			7.0		7.0		7.0
Flash Dont Walk (s)	11.0	11.0			11.0			11.0		11.0		11.0
Pedestrian Calls (#/hr)	0	0			0			0		0		0
Act Effect Green (s)	60.3	60.3			35.2					19.7		44.8
Actuated g/C Ratio	0.67	0.67			0.39					0.22		0.50
v/c Ratio	0.82	0.87			0.92					0.69		0.47
Control Delay	36.8	23.3			40.8					42.1		9.9
Queue Delay	0.0	0.0			0.0					0.0		0.0
Total Delay	36.8	23.3			40.8					42.1		9.9
LOS	D	C			D					D		A
Approach Delay		26.9			40.8						21.5	
Approach LOS		C			D						C	
Queue Length 50th (ft)	144	409			~364					123		80
Queue Length 95th (ft)	#322	#848			#549					182		136
Internal Link Dist (ft)		354			319			95			460	
Turn Bay Length (ft)										300		
Base Capacity (vph)	469	1205			1319					388		857
Starvation Cap Reductn	0	0			0					0		0
Spillback Cap Reductn	0	0			0					0		0
Storage Cap Reductn	0	0			0					0		0
Reduced v/c Ratio	0.80	0.87			0.92					0.60		0.48

### Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBT, Start of Green

Natural Cycle: 85

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.92

Intersection Signal Delay: 31.0

Intersection LOS: C

Intersection Capacity Utilization 74.6%

ICU Level of Service D

Analysis Period (min) 15

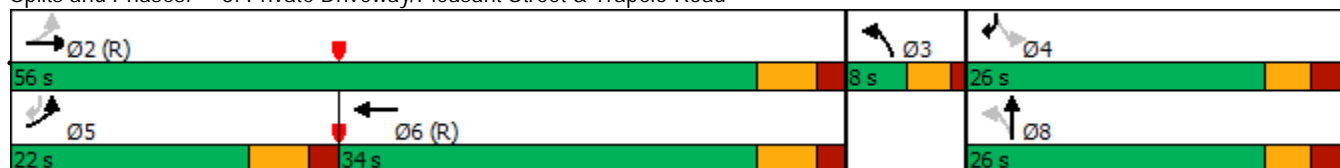
~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

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

Queue shown is maximum after two cycles.

### Splits and Phases: 3: Private Driveway/Pleasant Street & Trapelo Road






















# Lanes, Volumes, Timings

2028 - No-build Condition - Weekday Morning

## 3: Private Driveway/Pleasant Street & Trapelo Road

01/11/2021

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	295	956	0	0	868	207	0	0	0	265	0	291
Future Volume (vph)	295	956	0	0	868	207	0	0	0	265	0	291
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	11	11	11	11	16	16	16	15	12	12
Storage Length (ft)	0		0	0		0	0		0	300		0
Storage Lanes	1		0	0		0	0		0	1		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.971							0.850
Flt Protected	0.950									0.950		
Satd. Flow (prot)	1711	1801	0	0	3316	0	0	2153	0	1947	0	1599
Flt Permitted	0.097									0.757		
Satd. Flow (perm)	175	1801	0	0	3316	0	0	2153	0	1551	0	1599
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					34							153
Link Speed (mph)		25			25			25				25
Link Distance (ft)		434			399			175				540
Travel Time (s)		11.8			10.9			4.8				14.7
Peak Hour Factor	0.93	0.93	0.93	0.91	0.91	0.91	0.92	0.92	0.92	0.93	0.93	0.93
Heavy Vehicles (%)	2%	2%	2%	0%	2%	3%	0%	0%	0%	2%	0%	1%
Adj. Flow (vph)	317	1028	0	0	954	227	0	0	0	285	0	313
Shared Lane Traffic (%)												
Lane Group Flow (vph)	317	1028	0	0	1181	0	0	0	0	285	0	313
Number of Detectors	1	2			2		1	2		1		1
Detector Template	Left	Thru			Thru		Left	Thru		Left		Right
Leading Detector (ft)	20	100			100		20	100		20		20
Trailing Detector (ft)	0	0			0		0	0		0		0
Detector 1 Position(ft)	0	0			0		0	0		0		0
Detector 1 Size(ft)	20	6			6		20	6		20		20
Detector 1 Type	Cl+Ex	Cl+Ex			Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex		Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0			0.0		0.0	0.0		0.0		0.0
Detector 1 Queue (s)	0.0	0.0			0.0		0.0	0.0		0.0		0.0
Detector 1 Delay (s)	0.0	0.0			0.0		0.0	0.0		0.0		0.0
Detector 2 Position(ft)		94			94			94				
Detector 2 Size(ft)		6			6			6				
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				
Turn Type	pm+pt	NA			NA					Perm		custom
Protected Phases	5	2			6		3	8				4
Permitted Phases	2						8			4		5
Detector Phase	5	2			6		3	8		4		4
Switch Phase												
Minimum Initial (s)	5.0	5.0			5.0		1.0	5.0		5.0		5.0
Minimum Split (s)	25.0	25.0			25.0		6.0	25.0		25.0		25.0
Total Split (s)	22.0	56.0			34.0		8.0	26.0		26.0		26.0
Total Split (%)	24.4%	62.2%			37.8%		8.9%	28.9%		28.9%		28.9%

# Lanes, Volumes, Timings

2028 - No-build Condition - Weekday Morning

## 3: Private Driveway/Pleasant Street & Trapelo Road

01/11/2021



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Maximum Green (s)	16.0	50.0			28.0		4.0	20.0		20.0		20.0
Yellow Time (s)	4.0	4.0			4.0		3.0	3.0		3.0		3.0
All-Red Time (s)	2.0	2.0			2.0		1.0	3.0		3.0		3.0
Lost Time Adjust (s)	-1.0	-1.0			-1.0			0.0		-1.0		-1.0
Total Lost Time (s)	5.0	5.0			5.0			6.0		5.0		5.0
Lead/Lag	Lead				Lag							
Lead-Lag Optimize?	Yes				Yes							
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0		3.0		3.0
Recall Mode	Min	C-Min			C-Max		None	Min		Min		Min
Walk Time (s)	7.0	7.0			7.0			7.0		7.0		7.0
Flash Dont Walk (s)	11.0	11.0			11.0			11.0		11.0		11.0
Pedestrian Calls (#/hr)	0	0			0			0		0		0
Act Effect Green (s)	57.0	57.0			36.3					23.0		43.7
Actuated g/C Ratio	0.63	0.63			0.40					0.26		0.49
v/c Ratio	0.83	0.90			0.87					0.72		0.37
Control Delay	40.4	28.8			35.2					40.7		7.1
Queue Delay	0.0	0.0			0.0					0.0		0.0
Total Delay	40.4	28.8			35.2					40.7		7.1
LOS	D	C			D					D		A
Approach Delay		31.5			35.2						23.1	
Approach LOS		C			D						C	
Queue Length 50th (ft)	120	453			326					148		47
Queue Length 95th (ft)	#268	#855			#524					216		85
Internal Link Dist (ft)		354			319			95			460	
Turn Bay Length (ft)										300		
Base Capacity (vph)	412	1140			1356					416		842
Starvation Cap Reductn	0	0			0					0		0
Spillback Cap Reductn	0	0			0					0		0
Storage Cap Reductn	0	0			0					0		0
Reduced v/c Ratio	0.77	0.90			0.87					0.69		0.37

### Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBT, Start of Green

Natural Cycle: 85

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.90

Intersection Signal Delay: 31.3

Intersection LOS: C

Intersection Capacity Utilization 73.3%

ICU Level of Service D

Analysis Period (min) 15

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

Queue shown is maximum after two cycles.




















### Splits and Phases: 3: Private Driveway/Pleasant Street & Trapelo Road



Lanes, Volumes, Timings  
3: Private Driveway/Pleasant Street & Trapelo Road

2028 No Build - Weekday Evening













01/19/2021

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	389	1042	0	0	969	232	0	0	0	245	0	428
Future Volume (vph)	389	1042	0	0	969	232	0	0	0	245	0	428
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	11	11	11	11	16	16	16	15	12	12
Storage Length (ft)	0		0	0		0	0		0	300		0
Storage Lanes	1		0	0		0	0		0	1		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.971							0.850
Flt Protected	0.950									0.950		
Satd. Flow (prot)	1711	1801	0	0	3316	0	0	2153	0	1947	0	1599
Flt Permitted	0.098									0.757		
Satd. Flow (perm)	176	1801	0	0	3316	0	0	2153	0	1551	0	1599
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					38							36
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		434			399			175			540	
Travel Time (s)		11.8			10.9			4.8			14.7	
Peak Hour Factor	0.93	0.93	0.93	0.91	0.91	0.91	0.92	0.92	0.92	0.93	0.93	0.93
Heavy Vehicles (%)	2%	2%	2%	0%	2%	3%	0%	0%	0%	2%	0%	1%
Adj. Flow (vph)	418	1120	0	0	1065	255	0	0	0	263	0	460
Shared Lane Traffic (%)												
Lane Group Flow (vph)	418	1120	0	0	1320	0	0	0	0	263	0	460
Number of Detectors	1	2			2		1	2		1		1
Detector Template	Left	Thru			Thru		Left	Thru		Left		Right
Leading Detector (ft)	20	100			100		20	100		20		20
Trailing Detector (ft)	0	0			0		0	0		0		0
Detector 1 Position(ft)	0	0			0		0	0		0		0
Detector 1 Size(ft)	20	6			6		20	6		20		20
Detector 1 Type	Cl+Ex	Cl+Ex			Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex		Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0			0.0		0.0	0.0		0.0		0.0
Detector 1 Queue (s)	0.0	0.0			0.0		0.0	0.0		0.0		0.0
Detector 1 Delay (s)	0.0	0.0			0.0		0.0	0.0		0.0		0.0
Detector 2 Position(ft)		94			94			94				
Detector 2 Size(ft)		6			6			6				
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				
Turn Type	pm+pt	NA			NA					Perm		custom
Protected Phases	5	2			6			8				4
Permitted Phases	2						8			4		5
Detector Phase	5	2			6		8	8		4		4
Switch Phase												
Minimum Initial (s)	5.0	5.0			5.0		5.0	5.0		5.0		5.0
Minimum Split (s)	25.0	25.0			25.0		25.0	25.0		25.0		25.0
Total Split (s)	24.0	64.0			40.0		26.0	26.0		26.0		26.0
Total Split (%)	26.7%	71.1%			44.4%		28.9%	28.9%		28.9%		28.9%

Lanes, Volumes, Timings  
3: Private Driveway/Pleasant Street & Trapelo Road

2028 No Build - Weekday Evening

01/19/2021

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Maximum Green (s)	18.0	58.0			34.0		20.0	20.0		20.0		20.0
Yellow Time (s)	4.0	4.0			4.0		3.0	3.0		3.0		3.0
All-Red Time (s)	2.0	2.0			2.0		3.0	3.0		3.0		3.0
Lost Time Adjust (s)	-1.0	-1.0			-1.0			0.0		-1.0		-1.0
Total Lost Time (s)	5.0	5.0			5.0			6.0		5.0		5.0
Lead/Lag	Lead				Lag							
Lead-Lag Optimize?	Yes				Yes							
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0		3.0		3.0
Recall Mode	Min	C-Min			C-Max		Min	Min		Min		Min
Walk Time (s)	7.0	7.0			7.0		7.0	7.0		7.0		7.0
Flash Dont Walk (s)	11.0	11.0			11.0		11.0	11.0		11.0		11.0
Pedestrian Calls (#/hr)	0	0			0		0	0		0		0
Act Effct Green (s)	60.2	60.2			36.0					19.8		44.0
Actuated g/C Ratio	0.67	0.67			0.40					0.22		0.49
v/c Ratio	0.94	0.93			0.98					0.77		0.58
Control Delay	55.5	29.0			47.2					49.4		18.2
Queue Delay	0.0	0.0			0.0					0.0		0.0
Total Delay	55.5	29.0			47.2					49.4		18.2
LOS	E	C			D					D		B
Approach Delay		36.2			47.2						29.5	
Approach LOS		D			D						C	
Queue Length 50th (ft)	185	514			~384					139		159
Queue Length 95th (ft)	#371	#873			#543					#249		253
Internal Link Dist (ft)		354			319			95			460	
Turn Bay Length (ft)										300		
Base Capacity (vph)	446	1204			1350					361		785
Starvation Cap Reductn	0	0			0					0		0
Spillback Cap Reductn	0	0			0					0		0
Storage Cap Reductn	0	0			0					0		0
Reduced v/c Ratio	0.94	0.93			0.98					0.73		0.59

Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBT, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.98

Intersection Signal Delay: 38.9

Intersection LOS: D

Intersection Capacity Utilization 81.0%

ICU Level of Service D

Analysis Period (min) 15

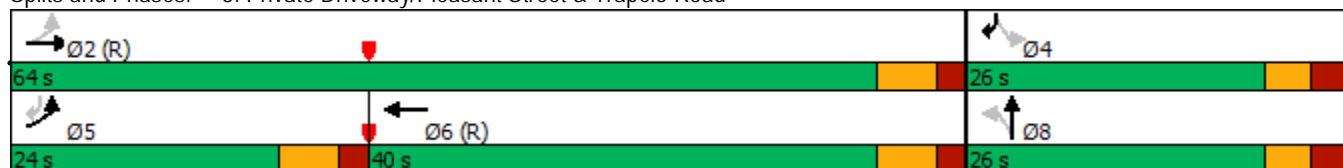
~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

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

Queue shown is maximum after two cycles.

Splits and Phases: 3: Private Driveway/Pleasant Street & Trapelo Road






















# Lanes, Volumes, Timings

2028 - Build Condition - Weekday Morning

## 3: Private Driveway/Pleasant Street & Trapelo Road

02/12/2021

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	297	956	0	0	868	212	0	0	0	276	0	295
Future Volume (vph)	297	956	0	0	868	212	0	0	0	276	0	295
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	11	11	11	11	16	16	16	15	12	12
Storage Length (ft)	0		0	0		0	0		0	300		0
Storage Lanes	1		0	0		0	0		0	1		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.971							0.850
Flt Protected	0.950									0.950		
Satd. Flow (prot)	1711	1801	0	0	3316	0	0	2153	0	1947	0	1599
Flt Permitted	0.099									0.757		
Satd. Flow (perm)	178	1801	0	0	3316	0	0	2153	0	1551	0	1599
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					35							153
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		434			399			175			540	
Travel Time (s)		11.8			10.9			4.8			14.7	
Peak Hour Factor	0.93	0.93	0.93	0.91	0.91	0.91	0.92	0.92	0.92	0.93	0.93	0.93
Heavy Vehicles (%)	2%	2%	2%	0%	2%	3%	0%	0%	0%	2%	0%	1%
Adj. Flow (vph)	319	1028	0	0	954	233	0	0	0	297	0	317
Shared Lane Traffic (%)												
Lane Group Flow (vph)	319	1028	0	0	1187	0	0	0	0	297	0	317
Number of Detectors	1	2			2		1	2		1		1
Detector Template	Left	Thru			Thru		Left	Thru		Left		Right
Leading Detector (ft)	20	100			100		20	100		20		20
Trailing Detector (ft)	0	0			0		0	0		0		0
Detector 1 Position(ft)	0	0			0		0	0		0		0
Detector 1 Size(ft)	20	6			6		20	6		20		20
Detector 1 Type	Cl+Ex	Cl+Ex			Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex		Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0			0.0		0.0	0.0		0.0		0.0
Detector 1 Queue (s)	0.0	0.0			0.0		0.0	0.0		0.0		0.0
Detector 1 Delay (s)	0.0	0.0			0.0		0.0	0.0		0.0		0.0
Detector 2 Position(ft)		94			94			94				
Detector 2 Size(ft)		6			6			6				
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				
Turn Type	pm+pt	NA			NA					Perm		custom
Protected Phases	5	2			6		3	8				4
Permitted Phases	2						8			4		5
Detector Phase	5	2			6		3	8		4		4
Switch Phase												
Minimum Initial (s)	5.0	5.0			5.0		1.0	5.0		5.0		5.0
Minimum Split (s)	25.0	25.0			25.0		6.0	25.0		25.0		25.0
Total Split (s)	22.0	56.0			34.0		8.0	26.0		26.0		26.0
Total Split (%)	24.4%	62.2%			37.8%		8.9%	28.9%		28.9%		28.9%

# Lanes, Volumes, Timings

2028 - Build Condition - Weekday Morning

## 3: Private Driveway/Pleasant Street & Trapelo Road

02/12/2021

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Maximum Green (s)	16.0	50.0			28.0		4.0	20.0		20.0		20.0
Yellow Time (s)	4.0	4.0			4.0		3.0	3.0		3.0		3.0
All-Red Time (s)	2.0	2.0			2.0		1.0	3.0		3.0		3.0
Lost Time Adjust (s)	-1.0	-1.0			-1.0			0.0		-1.0		-1.0
Total Lost Time (s)	5.0	5.0			5.0			6.0		5.0		5.0
Lead/Lag	Lead				Lag							
Lead-Lag Optimize?	Yes				Yes							
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0		3.0		3.0
Recall Mode	Min	C-Min			C-Max		None	Min		Min		Min
Walk Time (s)	7.0	7.0			7.0			7.0		7.0		7.0
Flash Dont Walk (s)	11.0	11.0			11.0			11.0		11.0		11.0
Pedestrian Calls (#/hr)	0	0			0			0		0		0
Act Effect Green (s)	56.2	56.2			35.5					23.8		44.5
Actuated g/C Ratio	0.62	0.62			0.39					0.26		0.49
v/c Ratio	0.84	0.92			0.89					0.72		0.37
Control Delay	41.7	30.9			37.4					40.1		7.0
Queue Delay	0.0	0.0			0.0					0.0		0.0
Total Delay	41.7	30.9			37.4					40.1		7.0
LOS	D	C			D					D		A
Approach Delay		33.5			37.4						23.0	
Approach LOS		C			D						C	
Queue Length 50th (ft)	122	472			338					152		46
Queue Length 95th (ft)	#270	#855			#527					226		87
Internal Link Dist (ft)		354			319			95			460	
Turn Bay Length (ft)										300		
Base Capacity (vph)	408	1123			1328					425		866
Starvation Cap Reductn	0	0			0					0		0
Spillback Cap Reductn	0	0			0					0		0
Storage Cap Reductn	0	0			0					0		0
Reduced v/c Ratio	0.78	0.92			0.89					0.70		0.37

### Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBT, Start of Green

Natural Cycle: 85

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.92

Intersection Signal Delay: 32.9

Intersection LOS: C

Intersection Capacity Utilization 74.2%

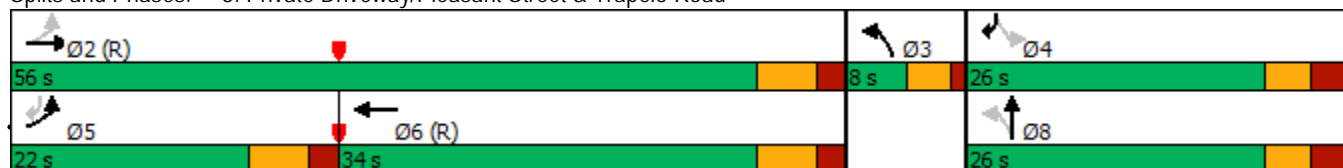
ICU Level of Service D

Analysis Period (min) 15

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

Queue shown is maximum after two cycles.




















### Splits and Phases: 3: Private Driveway/Pleasant Street & Trapelo Road



Lanes, Volumes, Timings  
3: Private Driveway/Pleasant Street & Trapelo Road

2028 Build - Weekday Evening

02/12/2021













												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	393	1042	0	0	969	244	0	0	0	254	0	431
Future Volume (vph)	393	1042	0	0	969	244	0	0	0	254	0	431
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	11	11	11	11	16	16	16	15	12	12
Storage Length (ft)	0		0	0		0	0		0	300		0
Storage Lanes	1		0	0		0	0		0	1		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.970							0.850
Flt Protected	0.950									0.950		
Satd. Flow (prot)	1711	1801	0	0	3312	0	0	2153	0	1947	0	1599
Flt Permitted	0.097									0.757		
Satd. Flow (perm)	175	1801	0	0	3312	0	0	2153	0	1551	0	1599
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					40							395
Link Speed (mph)		25			25			25				25
Link Distance (ft)		434			399			175				540
Travel Time (s)		11.8			10.9			4.8				14.7
Peak Hour Factor	0.93	0.93	0.93	0.91	0.91	0.91	0.92	0.92	0.92	0.93	0.93	0.93
Heavy Vehicles (%)	2%	2%	2%	0%	2%	3%	0%	0%	0%	2%	0%	1%
Adj. Flow (vph)	423	1120	0	0	1065	268	0	0	0	273	0	463
Shared Lane Traffic (%)												
Lane Group Flow (vph)	423	1120	0	0	1333	0	0	0	0	273	0	463
Number of Detectors	1	2			2		1	2		1		1
Detector Template	Left	Thru			Thru		Left	Thru		Left		Right
Leading Detector (ft)	20	100			100		20	100		20		20
Trailing Detector (ft)	0	0			0		0	0		0		0
Detector 1 Position(ft)	0	0			0		0	0		0		0
Detector 1 Size(ft)	20	6			6		20	6		20		20
Detector 1 Type	Cl+Ex	Cl+Ex			Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex		Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0			0.0		0.0	0.0		0.0		0.0
Detector 1 Queue (s)	0.0	0.0			0.0		0.0	0.0		0.0		0.0
Detector 1 Delay (s)	0.0	0.0			0.0		0.0	0.0		0.0		0.0
Detector 2 Position(ft)		94			94			94				
Detector 2 Size(ft)		6			6			6				
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex				
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0				
Turn Type	pm+pt	NA			NA					Perm		Perm
Protected Phases	5	2			6			8				
Permitted Phases	2						8			4		4
Detector Phase	5	2			6		8	8		4		4
Switch Phase												
Minimum Initial (s)	5.0	5.0			5.0		5.0	5.0		5.0		5.0
Minimum Split (s)	25.0	25.0			25.0		25.0	25.0		25.0		25.0
Total Split (s)	24.0	64.0			40.0		26.0	26.0		26.0		26.0
Total Split (%)	26.7%	71.1%			44.4%		28.9%	28.9%		28.9%		28.9%

# Lanes, Volumes, Timings

## 3: Private Driveway/Pleasant Street & Trapelo Road

2028 Build - Weekday Evening

02/12/2021

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Maximum Green (s)	18.0	58.0			34.0		20.0	20.0		20.0		20.0
Yellow Time (s)	4.0	4.0			4.0		3.0	3.0		3.0		3.0
All-Red Time (s)	2.0	2.0			2.0		3.0	3.0		3.0		3.0
Lost Time Adjust (s)	-1.0	-1.0			-1.0			0.0		-1.0		-1.0
Total Lost Time (s)	5.0	5.0			5.0			6.0		5.0		5.0
Lead/Lag	Lead				Lag							
Lead-Lag Optimize?	Yes				Yes							
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0		3.0		3.0
Recall Mode	Min	C-Min			C-Max		Min	Min		Min		Min
Walk Time (s)	7.0	7.0			7.0		7.0	7.0		7.0		7.0
Flash Dont Walk (s)	11.0	11.0			11.0		11.0	11.0		11.0		11.0
Pedestrian Calls (#/hr)	0	0			0		0	0		0		0
Act Effct Green (s)	60.5	60.5			36.1					19.5		19.5
Actuated g/C Ratio	0.67	0.67			0.40					0.22		0.22
v/c Ratio	0.94	0.93			0.99					0.81		0.71
Control Delay	56.5	28.3			48.7					53.5		12.4
Queue Delay	0.0	0.0			0.0					0.0		0.0
Total Delay	56.5	28.3			48.7					53.5		12.4
LOS	E	C			D					D		B
Approach Delay		36.0			48.7						27.6	
Approach LOS		D			D						C	
Queue Length 50th (ft)	189	514			~397					145		31
Queue Length 95th (ft)	#378	#873			#552					#263		132
Internal Link Dist (ft)		354			319			95			460	
Turn Bay Length (ft)										300		
Base Capacity (vph)	448	1210			1353					361		675
Starvation Cap Reductn	0	0			0					0		0
Spillback Cap Reductn	0	0			0					0		0
Storage Cap Reductn	0	0			0					0		0
Reduced v/c Ratio	0.94	0.93			0.99					0.76		0.69

### Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBT, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.99

Intersection Signal Delay: 39.0

Intersection LOS: D

Intersection Capacity Utilization 82.1%

ICU Level of Service E

Analysis Period (min) 15

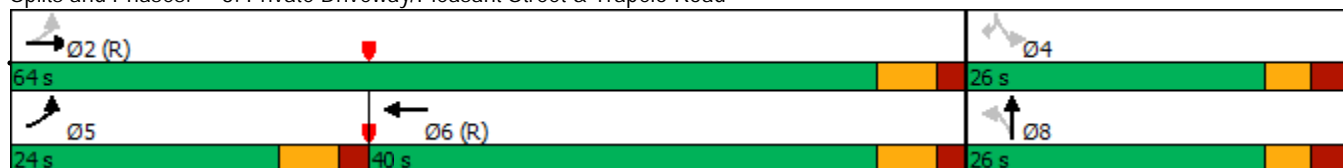
~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

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






Queue shown is maximum after two cycles.

Splits and Phases: 3: Private Driveway/Pleasant Street & Trapelo Road



Pleasant Street at Olmsted Drive






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Intersection						
Int Delay, s/veh	0.3					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	2	7	1	451	496	0
Future Vol, veh/h	2	7	1	451	496	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	150	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	38	38	86	83	89	89
Heavy Vehicles, %	0	0	0	4	3	0
Mvmt Flow	5	18	1	543	557	0

Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	1102	557	557	0	-	0
Stage 1	557	-	-	-	-	-
Stage 2	545	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	236	534	1024	-	-	-
Stage 1	578	-	-	-	-	-
Stage 2	585	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	236	534	1024	-	-	-
Mov Cap-2 Maneuver	236	-	-	-	-	-
Stage 1	577	-	-	-	-	-
Stage 2	585	-	-	-	-	-

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

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1024	-	417	-	-
HCM Lane V/C Ratio	0.001	-	0.057	-	-
HCM Control Delay (s)	8.5	-	14.2	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0	-	0.2	-	-






Intersection						
Int Delay, s/veh	0.2					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	4	5	550	597	1
Future Vol, veh/h	0	4	5	550	597	1
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	150	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	33	33	91	91	84	84
Heavy Vehicles, %	0	0	0	1	1	0
Mvmt Flow	0	12	5	604	711	1
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	1326	712	712	0	-	0
Stage 1	712	-	-	-	-	-
Stage 2	614	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	173	436	897	-	-	-
Stage 1	490	-	-	-	-	-
Stage 2	544	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	172	436	897	-	-	-
Mov Cap-2 Maneuver	172	-	-	-	-	-
Stage 1	487	-	-	-	-	-
Stage 2	544	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	13.5	0.1		0		
HCM LOS	B					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	897	-	436	-	-	
HCM Lane V/C Ratio	0.006	-	0.028	-	-	
HCM Control Delay (s)	9	-	13.5	-	-	
HCM Lane LOS	A	-	B	-	-	
HCM 95th %tile Q(veh)	0	-	0.1	-	-	






Intersection						
Int Delay, s/veh	0.3					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	2	7	1	501	549	0
Future Vol, veh/h	2	7	1	501	549	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	150	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	38	38	86	83	89	89
Heavy Vehicles, %	0	0	0	4	3	0
Mvmt Flow	5	18	1	604	617	0






Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	1223	617	617	0	-	0
Stage 1	617	-	-	-	-	-
Stage 2	606	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	200	494	973	-	-	-
Stage 1	542	-	-	-	-	-
Stage 2	548	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	200	494	973	-	-	-
Mov Cap-2 Maneuver	200	-	-	-	-	-
Stage 1	541	-	-	-	-	-
Stage 2	548	-	-	-	-	-

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

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	973	-	372	-	-
HCM Lane V/C Ratio	0.001	-	0.064	-	-
HCM Control Delay (s)	8.7	-	15.3	-	-
HCM Lane LOS	A	-	C	-	-
HCM 95th %tile Q(veh)	0	-	0.2	-	-

Intersection						
Int Delay, s/veh	0.2					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	4	5	616	669	1
Future Vol, veh/h	0	4	5	616	669	1
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	150	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	33	33	91	91	84	84
Heavy Vehicles, %	0	0	0	1	1	0
Mvmt Flow	0	12	5	677	796	1
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	1484	797	797	0	-	0
Stage 1	797	-	-	-	-	-
Stage 2	687	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	139	390	834	-	-	-
Stage 1	447	-	-	-	-	-
Stage 2	503	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	138	390	834	-	-	-
Mov Cap-2 Maneuver	138	-	-	-	-	-
Stage 1	444	-	-	-	-	-
Stage 2	503	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	14.5	0.1		0		
HCM LOS	B					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	834	-	390	-	-	
HCM Lane V/C Ratio	0.007	-	0.031	-	-	
HCM Control Delay (s)	9.3	-	14.5	-	-	
HCM Lane LOS	A	-	B	-	-	
HCM 95th %tile Q(veh)	0	-	0.1	-	-	

Intersection						
Int Delay, s/veh	1.4					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	12	22	8	501	549	4
Future Vol, veh/h	12	22	8	501	549	4
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	150	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	38	38	86	83	89	89
Heavy Vehicles, %	0	0	0	4	3	0
Mvmt Flow	32	58	9	604	617	4
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	1241	619	621	0	-	0
Stage 1	619	-	-	-	-	-
Stage 2	622	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	195	492	969	-	-	-
Stage 1	541	-	-	-	-	-
Stage 2	539	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	193	492	969	-	-	-
Mov Cap-2 Maneuver	193	-	-	-	-	-
Stage 1	536	-	-	-	-	-
Stage 2	539	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	20.7	0.1		0		
HCM LOS	C					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	969	-	318	-	-	
HCM Lane V/C Ratio	0.01	-	0.281	-	-	
HCM Control Delay (s)	8.8	-	20.7	-	-	
HCM Lane LOS	A	-	C	-	-	
HCM 95th %tile Q(veh)	0	-	1.1	-	-	

Intersection						
Int Delay, s/veh	1.4					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	8	16	21	616	669	11
Future Vol, veh/h	8	16	21	616	669	11
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	150	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	33	33	91	91	84	84
Heavy Vehicles, %	0	0	0	1	1	0
Mvmt Flow	24	48	23	677	796	13

Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	1526	803	809	0	-	0
Stage 1	803	-	-	-	-	-
Stage 2	723	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	131	387	825	-	-	-
Stage 1	444	-	-	-	-	-
Stage 2	484	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	127	387	825	-	-	-
Mov Cap-2 Maneuver	127	-	-	-	-	-
Stage 1	432	-	-	-	-	-
Stage 2	484	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	27.7	0.3	0
HCM LOS	D		




Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	825	-	230	-	-
HCM Lane V/C Ratio	0.028	-	0.316	-	-
HCM Control Delay (s)	9.5	-	27.7	-	-
HCM Lane LOS	A	-	D	-	-
HCM 95th %tile Q(veh)	0.1	-	1.3	-	-

Olmsted Drive at Site Drive

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Intersection

Int Delay, s/veh 2.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	16	7	3	9	0
Future Vol, veh/h	0	16	7	3	9	0
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	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	17	8	3	10	0




Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	11	0	0 27 10
Stage 1	-	-	- 10 -
Stage 2	-	-	- 17 -
Critical Hdwy	4.12	-	- 6.42 6.22
Critical Hdwy Stg 1	-	-	- 5.42 -
Critical Hdwy Stg 2	-	-	- 5.42 -
Follow-up Hdwy	2.218	-	- 3.518 3.318
Pot Cap-1 Maneuver	1608	-	- 988 1071
Stage 1	-	-	- 1013 -
Stage 2	-	-	- 1006 -
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1608	-	- 988 1071
Mov Cap-2 Maneuver	-	-	- 988 -
Stage 1	-	-	- 1013 -
Stage 2	-	-	- 1006 -

Approach	EB	WB	SB
HCM Control Delay, s	0	0	8.7
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1608	-	-	-	988
HCM Lane V/C Ratio	-	-	-	-	0.01
HCM Control Delay (s)	0	-	-	-	8.7
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0

Intersection




Int Delay, s/veh 1.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	13	17	9	7	0
Future Vol, veh/h	0	13	17	9	7	0
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	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	14	18	10	8	0

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	28	0	0 37 23
Stage 1	-	-	- 23 -
Stage 2	-	-	- 14 -
Critical Hdwy	4.12	-	- 6.42 6.22
Critical Hdwy Stg 1	-	-	- 5.42 -
Critical Hdwy Stg 2	-	-	- 5.42 -
Follow-up Hdwy	2.218	-	- 3.518 3.318
Pot Cap-1 Maneuver	1585	-	- 975 1054
Stage 1	-	-	- 1000 -
Stage 2	-	-	- 1009 -
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1585	-	- 975 1054
Mov Cap-2 Maneuver	-	-	- 975 -
Stage 1	-	-	- 1000 -
Stage 2	-	-	- 1009 -




Approach	EB	WB	SB
HCM Control Delay, s	0	0	8.7
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1585	-	-	-	975
HCM Lane V/C Ratio	-	-	-	-	0.008
HCM Control Delay (s)	0	-	-	-	8.7
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0

Intersection						
Int Delay, s/veh	3.4					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	7	4	3	9	0
Future Vol, veh/h	0	7	4	3	9	0
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	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	8	4	3	10	0
Major/Minor	Major1	Major2		Minor2		
Conflicting Flow All	7	0	-	0	14	6
Stage 1	-	-	-	-	6	-
Stage 2	-	-	-	-	8	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1614	-	-	-	1005	1077
Stage 1	-	-	-	-	1017	-
Stage 2	-	-	-	-	1015	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1614	-	-	-	1005	1077
Mov Cap-2 Maneuver	-	-	-	-	1005	-
Stage 1	-	-	-	-	1017	-
Stage 2	-	-	-	-	1015	-
Approach	EB	WB		SB		
HCM Control Delay, s	0	0		8.6		
HCM LOS				A		
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	1614	-	-	-	1005	
HCM Lane V/C Ratio	-	-	-	-	0.01	
HCM Control Delay (s)	0	-	-	-	8.6	
HCM Lane LOS	A	-	-	-	A	
HCM 95th %tile Q(veh)	0	-	-	-	0	

Intersection




Int Delay, s/veh 2




Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	6	8	9	7	0
Future Vol, veh/h	0	6	8	9	7	0
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	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	7	9	10	8	0




Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	19	0	0 21 14
Stage 1	-	-	- - 14 -
Stage 2	-	-	- - 7 -
Critical Hdwy	4.12	-	- - 6.42 6.22
Critical Hdwy Stg 1	-	-	- - 5.42 -
Critical Hdwy Stg 2	-	-	- - 5.42 -
Follow-up Hdwy	2.218	-	- - 3.518 3.318
Pot Cap-1 Maneuver	1597	-	- - 996 1066
Stage 1	-	-	- - 1009 -
Stage 2	-	-	- - 1016 -
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1597	-	- - 996 1066
Mov Cap-2 Maneuver	-	-	- - 996 -
Stage 1	-	-	- - 1009 -
Stage 2	-	-	- - 1016 -




Approach	EB	WB	SB
HCM Control Delay, s	0	0	8.6
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1597	-	-	-	996
HCM Lane V/C Ratio	-	-	-	-	0.008
HCM Control Delay (s)	0	-	-	-	8.6
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0

Intersection						
Int Delay, s/veh	2.3					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	4	2	2	3	0
Future Vol, veh/h	0	4	2	2	3	0
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	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	4	2	2	3	0
Major/Minor	Major1	Major2		Minor2		
Conflicting Flow All	4	0	-	0	7	3
Stage 1	-	-	-	-	3	-
Stage 2	-	-	-	-	4	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1618	-	-	-	1014	1081
Stage 1	-	-	-	-	1020	-
Stage 2	-	-	-	-	1019	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1618	-	-	-	1014	1081
Mov Cap-2 Maneuver	-	-	-	-	1014	-
Stage 1	-	-	-	-	1020	-
Stage 2	-	-	-	-	1019	-
Approach	EB	WB		SB		
HCM Control Delay, s	0	0		8.6		
HCM LOS				A		
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	1618	-	-	-	1014	
HCM Lane V/C Ratio	-	-	-	-	0.003	
HCM Control Delay (s)	0	-	-	-	8.6	
HCM Lane LOS	A	-	-	-	A	
HCM 95th %tile Q(veh)	0	-	-	-	0	

Intersection						
Int Delay, s/veh	1.8					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	3	4	4	3	0
Future Vol, veh/h	0	3	4	4	3	0
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	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	3	4	4	3	0
Major/Minor	Major1	Major2		Minor2		
Conflicting Flow All	8	0	-	0	9	6
Stage 1	-	-	-	-	6	-
Stage 2	-	-	-	-	3	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1612	-	-	-	1011	1077
Stage 1	-	-	-	-	1017	-
Stage 2	-	-	-	-	1020	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1612	-	-	-	1011	1077
Mov Cap-2 Maneuver	-	-	-	-	1011	-
Stage 1	-	-	-	-	1017	-
Stage 2	-	-	-	-	1020	-
Approach	EB	WB		SB		
HCM Control Delay, s	0	0		8.6		
HCM LOS	A					
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	1612	-	-	-	1011	
HCM Lane V/C Ratio	-	-	-	-	0.003	
HCM Control Delay (s)	0	-	-	-	8.6	
HCM Lane LOS	A	-	-	-	A	
HCM 95th %tile Q(veh)	0	-	-	-	0	

Intersection						
Int Delay, s/veh	5.7					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	0	0	2	4	0
Future Vol, veh/h	0	0	0	2	4	0
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	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	0	2	4	0
Major/Minor	Major1	Major2		Minor2		
Conflicting Flow All	2	0	-	0	1	1
Stage 1	-	-	-	-	1	-
Stage 2	-	-	-	-	0	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1620	-	-	-	1022	1084
Stage 1	-	-	-	-	1022	-
Stage 2	-	-	-	-	-	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1620	-	-	-	1022	1084
Mov Cap-2 Maneuver	-	-	-	-	1022	-
Stage 1	-	-	-	-	1022	-
Stage 2	-	-	-	-	-	-
Approach	EB	WB		SB		
HCM Control Delay, s	0	0		8.5		
HCM LOS	A					
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	1620	-	-	-	1022	
HCM Lane V/C Ratio	-	-	-	-	0.004	
HCM Control Delay (s)	0	-	-	-	8.5	
HCM Lane LOS	A	-	-	-	A	
HCM 95th %tile Q(veh)	0	-	-	-	0	

Intersection						
Int Delay, s/veh	3.6					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	0	0	4	3	0
Future Vol, veh/h	0	0	0	4	3	0
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	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	0	4	3	0
Major/Minor	Major1	Major2		Minor2		
Conflicting Flow All	4	0	-	0	2	2
Stage 1	-	-	-	-	2	-
Stage 2	-	-	-	-	0	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1618	-	-	-	1021	1082
Stage 1	-	-	-	-	1021	-
Stage 2	-	-	-	-	-	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1618	-	-	-	1021	1082
Mov Cap-2 Maneuver	-	-	-	-	1021	-
Stage 1	-	-	-	-	1021	-
Stage 2	-	-	-	-	-	-
Approach	EB	WB		SB		
HCM Control Delay, s	0	0		8.5		
HCM LOS	A					
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	1618	-	-	-	1021	
HCM Lane V/C Ratio	-	-	-	-	0.003	
HCM Control Delay (s)	0	-	-	-	8.5	
HCM Lane LOS	A	-	-	-	A	
HCM 95th %tile Q(veh)	0	-	-	-	0	

# MEMORANDUM

**TO:** Mr. John C. Dawley  
Northland Residential Corporation  
80 Beharrell Street, Suite E  
Concord, MA 01742

**FROM:** Scott W. Thornton, P.E. *and*  
Jennifer Connors  
Vanasse & Associates, Inc.  
35 New England Business Center Drive  
Suite 140  
Andover, MA 01810  
(978) 474-8800

**DATE:** April 16, 2021

**RE:** 8058

**SUBJECT:** Traffic Signal Warrants Analysis  
McLean Hospital Residential Development - Olmsted Drive  
Waltham, Massachusetts

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Vanasse & Associates, Inc. (VAI) has performed a detailed Traffic Signal Warrants Analysis (TSWA) for the intersection of Olmsted Drive at Pleasant Street in Belmont, Massachusetts, as part of the McLean Hospital Zone 3 Residential Development to assess the warrants required to justify the installation of a traffic control signal at the subject intersection. This analysis was completed in accordance with the methodology and procedures outlined in the *Manual on Uniform Traffic Control Devices* (MUTCD)<sup>1</sup> and based on traffic counts and field measurements conducted in November 2020.

The traffic Signal Warrant Analysis (TSWA) has been conducted for the intersection of Pleasant Street at Olmsted Drive as required in the Traffic Monitoring and Mitigation Agreement (TMMA). The TMMA states that a traffic signal should be evaluated at this intersection along with traffic projections of the future McLean Zone 3 (Senior Housing subdistrict) and Zone 4 (Research & Development subdistrict). In order to project the impacts of the future development within the McLean Zones 3 and 4 District, the maximum level of permitted traffic for this District were reviewed, as stipulated in the TMMA. The TSWA is summarized below and provided in the Appendix.

## **EXISTING CONDITIONS**

### **Geometry**

***Olmsted Drive at Pleasant Street*** - Olmsted Drive intersects Pleasant Street from the north to form a three-way intersection that operates under STOP-sign control. The Pleasant Street eastbound approach provides an approximate 10-foot wide exclusive left-turn lane and an approximate 11-foot wide through/right-turn lane with an approximate 4-foot wide marked shoulder provided. The Pleasant Street westbound approach provides one approximate 11-foot wide general-purpose travel lane with an approximate 4-foot wide marked shoulder provided. The Olmsted Drive southbound approach provides an approximate 20-foot wide general-purpose travel lane. A sidewalk is provided along the eastern side of Pleasant Street at this location. Crosswalks are not provided for this intersection as there is no sidewalk along the north side of Pleasant Street or on Olmstead Drive. Land use in the vicinity of this intersection consists primarily of commercial uses and open space.

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



## **EXISTING TRAFFIC VOLUMES**

In order to perform an analysis a 12-hour TMC was conducted at Pleasant Street at Olmsted Drive in November 2020. In order to account for the reduction in traffic volumes caused by COVID-19 travel restrictions, historic traffic count data conducted in April 2018 and November 2019 in the same study area was reviewed. It is important to note that the 2018 data were obtained from the earlier town wide traffic study conducted by the Town of Belmont. Based upon this comparison, the November 2020 weekday morning and evening peak-hour volumes were found to be approximately 40 percent lower. The traffic counts that form the basis of this assessment were adjusted upward by 40 percent in order to provide an appropriate and conservative estimate of roadway operating conditions. It is important to note that in order to establish a 2021 Baseline condition, the November 2020 existing traffic volumes were grown by 1.0 percent per year.

## **FUTURE TRAFFIC VOLUMES**

### **General Background Traffic 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, it was determined that traffic volumes within the study area have fluctuated over the past several years. In order to be consistent with previous traffic studies in the area, a 1.0 percent per year compounded annual growth rate was used to account for general background traffic growth for weekday morning and evening peak hour.

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

The 2028 No-Build traffic-volume networks were developed by applying the 1 percent per year compounded annual background traffic growth rate to the 2021 baseline condition peak-hour traffic volumes plus the trips from identified background developments (1010 Pleasant Street - Proposed Marijuana Facility).

### **Project-Generated Traffic – Zone 3**

The development proposal entails construction of 40 for sale, age-restricted townhouse condominiums and 110 multi-family residences comprised of 53 age-restricted units and 57 non-age restricted units. In order to estimate the trip-generation characteristics of the proposed development, the Institute of Transportation Engineers (ITE) *Trip Generation* manual<sup>2</sup> for ITE Land Use Code (LUC) 221, *Multifamily Housing (Mid-Rise)* and LUC 252 *Senior Adult Housing* were used to project traffic volume of the Project. Adjustments were applied to account for transit usage.

The proposed 150 housing units are expected to generate approximately 610 vehicle trips on an average weekday (two-way, 24-hour volume), with 36 vehicle trips (11 vehicles entering and 25 exiting) expected during the weekday morning peak hour and 46 vehicle trips (26 vehicles entering and 20 exiting) expected during the weekday evening peak hour.

### **Build Traffic Volumes – Zone 3**

The proposed development trips were then added to develop volumes for the 2028 No-Build conditions in order to obtain the 2028 Build traffic signal warrant analysis.

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<sup>2</sup>*Trip Generation*, 10<sup>th</sup> Edition; Institute of Transportation Engineers; Washington, DC; 2017.



## **Build Traffic Volumes– Zone 4**

An additional condition was analyzed to include trips associated with the Zone 4 subdistrict. Based on the TMMA, Zone 4 entails construction of a research and development building and is expected to generate approximately 1,784 vehicle trips on an average weekday, with 206 vehicle trips expected during the weekday morning peak hour and 180 vehicle trips expected during the weekday evening peak hour. These Zone 4 trips were combined with the Zone 3 trips to obtain the 2028 Build with Zone 3 and Zone 4 volume scenario for the analysis.

## **TRAFFIC SIGNAL WARRANTS ANALYSIS**

The MUTCD<sup>3</sup> establishes nine (9) warrants or criteria to evaluate a location for the installation or retention of a traffic signal. At least one of the nine warrants should be satisfied in order to justify the installation of a traffic signal; however, satisfaction of a warrant in and of itself does not justify traffic signal control. An engineering evaluation of the location in question should indicate that the establishment of traffic signal control will improve the overall safety and/or operation of the intersection. Table 1 identifies the nine traffic signal warrants. Table 2 identifies the results of the TSWA for the study intersection under existing and Future conditions.

**Table 1**  
**TRAFFIC SIGNAL WARRANTS<sup>a</sup>**

Warrant No.	Description
1	Eight-Hour Vehicular Volume Condition A – Min. Vehicular Volume <sup>b</sup> Condition B – Interruption of Continuous Traffic <sup>c</sup>
2	Four-Hour Vehicular Volume
3	Peak Hour
4	Pedestrian Volume
5	School Crossing
6	Coordinated Signal System
7	Crash Experience
8	Roadway Network
9	Intersection near a Grade Crossing

<sup>a</sup>MUTCD; Federal Highway Administration; Washington, DC; 2009.

<sup>b</sup>A large number of intersecting traffic is the principal reason to consider installing a traffic control signal.

<sup>c</sup>Traffic volume on a major street is so heavy that traffic on a minor intersecting street suffer excessive delay in entering or crossing the major street.

<sup>3</sup>*Manual on Uniform Traffic Control Devices (MUTCD)*; Federal Highway Administration; Washington, DC; 2009.



**Table 2**  
**TRAFFIC SIGNAL WARRANTS ANALYSIS RESULTS**

Warrant No.	Description	Satisfied for 2021 Existing Conditions	Satisfied for 2028 No-Build Conditions	Satisfied for 2028 Build Conditions w/Zone 3	Satisfied for 2028 Build Conditions w/Zones 3 and 4
1	Eight-Hour Vehicular Volume				
	Condition A – Min. Vehicular Volume	No	No	No	No
	Condition B – Interruption of Continuous Traffic	No	No	No	No
2	Four-Hour Vehicular Volume	No	No	No	No
3	Peak Hour	No	No	No	No
4	Pedestrian Volume	No	No	No	No
5	School Crossing	No	No	No	No
6	Coordinated Signal System	No	No	No	No
7	Crash Experience	No	No	No	No
8	Roadway Network	No	No	No	No
9	Grade Crossing	No	No	No	No

As indicated in Table 2, under all conditions analyzed the intersection of Pleasant Street at Olmsted Drive does not meet any of the 9 warrant criteria. Accordingly, the installation of a traffic signal at this intersection is not recommended. The detailed TSWA worksheets are provided in the Appendix.

Of note, a review of motor vehicle crash data available from the Massachusetts Department of Transportation (MassDOT) for the subject intersection indicates that only one (1) motor vehicle crash was reported to have occurred at the subject intersection between 2013 and 2017 (the most recent 5-year period for which data is available).

## **CONCLUSION**

VAI has completed a detailed Traffic Signal Warrants Analysis for the intersection of Pleasant Street at Olmsted Drive in Belmont, Massachusetts, as part of the Mclean Hospital Zone 3 Residential Development to assess the warrants required to justify the installation of a traffic control signal at the subject intersection. This analysis was performed in accordance with the criteria established in the MUTCD for conducting such analyses and has determined that the installation of a traffic control signal at the intersection is not warranted under any of the traffic volume conditions. In the event that the warrant criteria is not met and given the low incidence of motor vehicle crashes occurring at the intersection during the five-year review period, the MUTCD and MassDOT guidelines clearly note that a traffic signal shall not be installed.



## APPENDIX

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AUTOMATIC TRAFFIC RECORDER

SEASONAL ADJUSTMENTS

MOTOR VEHICLE CRASH DATA

GENERAL BACKGROUND TRAFFIC GROWTH

TRAFFIC SIGNAL WARRANT ANALYSIS (TSWA)

AUTOMATIC TRAFFIC RECORDER

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**Accurate Counts**  
978-664-2565

Page 1

Location : Pleasant Street  
Location : East of Olmsted Drive  
City/State: Belmont, MA

8058VL01

Start Time	11/10/2022 Tue	EB		Hour Totals		WB		Hour Totals		Combined Totals	
		Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon
12:00		5	69			1	64				
12:15		4	66			4	88				
12:30		1	52			2	76				
12:45		3	72	13	259	1	64	8	292	21	551
01:00		2	66			1	74				
01:15		2	90			4	61				
01:30		1	83			1	66				
01:45		1	77	6	316	1	70	7	271	13	587
02:00		4	67			0	72				
02:15		1	72			0	75				
02:30		2	78			1	99				
02:45		2	80	9	297	2	103	3	349	12	646
03:00		1	88			2	95				
03:15		2	88			3	75				
03:30		0	91			0	99				
03:45		4	94	7	361	4	97	9	366	16	727
04:00		2	113			1	90				
04:15		7	77			2	81				
04:30		3	113			5	97				
04:45		3	88	15	391	15	116	23	384	38	775
05:00		6	95			8	99				
05:15		5	92			9	106				
05:30		13	73			19	88				
05:45		22	77	46	337	26	65	62	358	108	695
06:00		17	76			41	66				
06:15		35	54			41	73				
06:30		54	56			57	56				
06:45		58	47	164	233	70	58	209	253	373	486
07:00		53	75			76	45				
07:15		62	49			71	37				
07:30		93	43			85	36				
07:45		81	35	289	202	84	52	316	170	605	372
08:00		79	45			86	31				
08:15		68	33			100	29				
08:30		72	25			72	30				
08:45		57	30	276	133	86	23	344	113	620	246
09:00		59	25			91	23				
09:15		54	33			62	22				
09:30		58	24			63	17				
09:45		62	18	233	100	74	22	290	84	523	184
10:00		57	21			69	16				
10:15		65	12			49	20				
10:30		61	18			68	17				
10:45		57	8	240	59	72	16	258	69	498	128
11:00		67	13			61	9				
11:15		65	13			57	11				
11:30		56	15			64	8				
11:45		70	5	258	46	68	4	250	32	508	78
Total		1556	2734			1779	2741			3335	5475
Percent		36.3%	63.7%			39.4%	60.6%			37.9%	62.1%

978-664-2565

Location : Pleasant Street  
Location : East of Olmsted Drive  
City/State: Belmont, MA

8058VL01

Start Time	11/11/202	EB		Hour Totals		WB		Hour Totals		Combined Totals	
	Wed	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon	Morning	Afternoon
12:00		3	87			2	76				
12:15		3	67			5	88				
12:30		0	82			5	82				
12:45		0	84	6	320	3	79	15	325	21	645
01:00		2	66			0	68				
01:15		1	64			4	82				
01:30		2	86			5	80				
01:45		0	73	5	289	1	92	10	322	15	611
02:00		2	66			1	90				
02:15		3	71			4	95				
02:30		3	100			0	86				
02:45		1	85	9	322	4	79	9	350	18	672
03:00		2	84			2	93				
03:15		1	90			0	101				
03:30		0	103			2	92				
03:45		0	77	3	354	1	106	5	392	8	746
04:00		3	89			1	71				
04:15		3	102			3	81				
04:30		0	80			3	84				
04:45		2	98	8	369	11	100	18	336	26	705
05:00		3	85			6	78				
05:15		1	93			11	78				
05:30		11	75			11	69				
05:45		15	66	30	319	23	73	51	298	81	617
06:00		21	73			28	75				
06:15		28	43			36	65				
06:30		39	56			50	49				
06:45		44	42	132	214	48	54	162	243	294	457
07:00		53	46			59	36				
07:15		46	29			63	36				
07:30		64	33			59	29				
07:45		60	44	223	152	53	33	234	134	457	286
08:00		60	40			64	36				
08:15		51	28			67	22				
08:30		51	27			61	28				
08:45		52	29	214	124	90	23	282	109	496	233
09:00		48	25			74	15				
09:15		44	28			63	23				
09:30		56	22			63	24				
09:45		59	16	207	91	77	20	277	82	484	173
10:00		69	17			71	23				
10:15		69	14			70	14				
10:30		75	14			60	19				
10:45		70	13	283	58	88	13	289	69	572	127
11:00		52	10			71	7				
11:15		80	12			76	7				
11:30		66	15			71	12				
11:45		91	8	289	45	86	2	304	28	593	73
Total		1409	2657			1656	2688			3065	5345
Percent		34.7%	65.3%			38.1%	61.9%			36.4%	63.6%
Grand Total		2965	5391			3435	5429			6400	10820
Percent		35.5%	64.5%			38.8%	61.2%			37.2%	62.8%
ADT		ADT 8,610	AADT 8,610								

Location : Pleasant Street  
Location : East of Olmsted Drive  
City/State: Belmont, MA

8058VL01

Start Time	11/9/2020		Tue		Wed		Thu		Fri		Sat		Sun		Week Average	
	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB
12:00 AM	*	*	13	8	6	15	*	*	*	*	*	*	*	*	10	12
01:00	*	*	6	7	5	10	*	*	*	*	*	*	*	*	6	8
02:00	*	*	9	3	9	9	*	*	*	*	*	*	*	*	9	6
03:00	*	*	7	9	3	5	*	*	*	*	*	*	*	*	5	7
04:00	*	*	15	23	8	18	*	*	*	*	*	*	*	*	12	20
05:00	*	*	46	62	30	51	*	*	*	*	*	*	*	*	38	56
06:00	*	*	164	209	132	162	*	*	*	*	*	*	*	*	148	186
07:00	*	*	289	316	223	234	*	*	*	*	*	*	*	*	256	275
08:00	*	*	276	344	214	282	*	*	*	*	*	*	*	*	245	313
09:00	*	*	233	290	207	277	*	*	*	*	*	*	*	*	220	284
10:00	*	*	240	258	283	289	*	*	*	*	*	*	*	*	262	274
11:00	*	*	258	250	289	304	*	*	*	*	*	*	*	*	274	277
12:00 PM	*	*	259	292	320	325	*	*	*	*	*	*	*	*	290	308
01:00	*	*	316	271	289	322	*	*	*	*	*	*	*	*	302	296
02:00	*	*	297	349	322	350	*	*	*	*	*	*	*	*	310	350
03:00	*	*	361	366	354	392	*	*	*	*	*	*	*	*	358	379
04:00	*	*	391	384	369	336	*	*	*	*	*	*	*	*	380	360
05:00	*	*	337	358	319	298	*	*	*	*	*	*	*	*	328	328
06:00	*	*	233	253	214	243	*	*	*	*	*	*	*	*	224	248
07:00	*	*	202	170	152	134	*	*	*	*	*	*	*	*	177	152
08:00	*	*	133	113	124	109	*	*	*	*	*	*	*	*	128	111
09:00	*	*	100	84	91	82	*	*	*	*	*	*	*	*	96	83
10:00	*	*	59	69	58	69	*	*	*	*	*	*	*	*	58	69
11:00	*	*	46	32	45	28	*	*	*	*	*	*	*	*	46	30
Lane	0	0	4290	4520	4066	4344	0	0	0	0	0	0	0	0	4182	4432
Day	0		8810		8410		0		0		0		0		8614	
AM Peak	-	-	07:00	08:00	11:00	11:00	-	-	-	-	-	-	-	-	11:00	08:00
Vol.	-	-	289	344	289	304	-	-	-	-	-	-	-	-	274	313
PM Peak	-	-	16:00	16:00	16:00	15:00	-	-	-	-	-	-	-	-	16:00	15:00
Vol.	-	-	391	384	369	392	-	-	-	-	-	-	-	-	380	379

Comb. Total	0	8810	8410	0	0	0	0	8614
ADT	ADT 8,610	AADT 8,610						

**Accurate Counts**  
978-664-2565

Page 1

Location : Pleasant Street  
Location : East of Olmsted Drive  
City/State: Belmont, MA

8058SP01

**EB**

Start Time	1 15	16 20	21 25	26 30	31 35	36 40	41 45	46 50	51 55	56 60	61 65	66 70	71 75	76 999	Total
11/10/20	0	0	0	4	5	4	0	0	0	0	0	0	0	0	13
01:00	0	0	0	0	5	1	0	0	0	0	0	0	0	0	6
02:00	0	0	0	3	4	2	0	0	0	0	0	0	0	0	9
03:00	0	0	1	2	0	4	0	0	0	0	0	0	0	0	7
04:00	0	0	1	4	8	0	2	0	0	0	0	0	0	0	15
05:00	0	0	1	19	18	8	0	0	0	0	0	0	0	0	46
06:00	0	2	12	40	85	24	1	0	0	0	0	0	0	0	164
07:00	0	2	17	67	144	56	2	1	0	0	0	0	0	0	289
08:00	0	0	16	83	122	49	6	0	0	0	0	0	0	0	276
09:00	0	2	10	69	112	39	1	0	0	0	0	0	0	0	233
10:00	0	2	17	83	117	16	5	0	0	0	0	0	0	0	240
11:00	0	1	20	100	109	28	0	0	0	0	0	0	0	0	258
12 PM	0	1	18	103	111	25	1	0	0	0	0	0	0	0	259
13:00	0	0	16	115	148	36	1	0	0	0	0	0	0	0	316
14:00	0	0	21	84	148	40	4	0	0	0	0	0	0	0	297
15:00	1	0	24	111	183	40	2	0	0	0	0	0	0	0	361
16:00	1	3	33	153	164	34	3	0	0	0	0	0	0	0	391
17:00	0	0	38	143	130	26	0	0	0	0	0	0	0	0	337
18:00	0	0	16	113	84	19	1	0	0	0	0	0	0	0	233
19:00	0	1	13	92	84	11	1	0	0	0	0	0	0	0	202
20:00	0	3	11	50	57	8	4	0	0	0	0	0	0	0	133
21:00	0	0	1	40	43	13	3	0	0	0	0	0	0	0	100
22:00	0	0	3	17	24	13	1	0	1	0	0	0	0	0	59
23:00	0	0	2	16	17	8	3	0	0	0	0	0	0	0	46
Total	2	17	291	1511	1922	504	41	1	1	0	0	0	0	0	4290

Daily

15th Percentile : 26 MPH  
50th Percentile : 30 MPH  
85th Percentile : 34 MPH  
95th Percentile : 38 MPH

Mean Speed(Average) : 31 MPH  
10 MPH Pace Speed : 26-35 MPH  
Number in Pace : 3433  
Percent in Pace : 80.0%  
Number of Vehicles > 30 MPH : 2469  
Percent of Vehicles > 30 MPH : 57.6%

Location : Pleasant Street  
Location : East of Olmsted Drive  
City/State: Belmont, MA

8058SP01

EB

Start Time	1 15	16 20	21 25	26 30	31 35	36 40	41 45	46 50	51 55	56 60	61 65	66 70	71 75	76 999	Total
11/11/20	0	0	0	3	2	1	0	0	0	0	0	0	0	0	6
01:00	0	0	0	2	2	1	0	0	0	0	0	0	0	0	5
02:00	0	0	2	3	3	1	0	0	0	0	0	0	0	0	9
03:00	0	0	1	0	1	1	0	0	0	0	0	0	0	0	3
04:00	0	0	0	2	5	1	0	0	0	0	0	0	0	0	8
05:00	0	0	5	9	11	3	2	0	0	0	0	0	0	0	30
06:00	0	3	7	35	60	24	3	0	0	0	0	0	0	0	132
07:00	0	1	13	62	108	35	3	1	0	0	0	0	0	0	223
08:00	0	0	12	62	102	31	5	2	0	0	0	0	0	0	214
09:00	0	0	9	59	111	24	4	0	0	0	0	0	0	0	207
10:00	1	2	15	76	143	44	2	0	0	0	0	0	0	0	283
11:00	0	1	12	119	115	36	6	0	0	0	0	0	0	0	289
12 PM	1	4	17	109	138	46	4	1	0	0	0	0	0	0	320
13:00	0	1	9	91	153	33	2	0	0	0	0	0	0	0	289
14:00	0	3	30	113	138	36	2	0	0	0	0	0	0	0	322
15:00	0	1	41	133	133	42	4	0	0	0	0	0	0	0	354
16:00	0	5	38	122	167	34	3	0	0	0	0	0	0	0	369
17:00	0	0	30	122	135	32	0	0	0	0	0	0	0	0	319
18:00	0	1	18	81	96	17	0	1	0	0	0	0	0	0	214
19:00	0	1	6	48	79	18	0	0	0	0	0	0	0	0	152
20:00	0	0	3	47	64	10	0	0	0	0	0	0	0	0	124
21:00	0	1	2	12	61	13	2	0	0	0	0	0	0	0	91
22:00	0	1	1	23	25	8	0	0	0	0	0	0	0	0	58
23:00	0	1	3	15	17	9	0	0	0	0	0	0	0	0	45
Total	2	26	274	1348	1869	500	42	5	0	0	0	0	0	0	4066

Daily

15th Percentile : 26 MPH  
50th Percentile : 31 MPH  
85th Percentile : 34 MPH  
95th Percentile : 38 MPH

Mean Speed(Average) : 31 MPH  
10 MPH Pace Speed : 26-35 MPH  
Number in Pace : 3217  
Percent in Pace : 79.1%  
Number of Vehicles > 30 MPH : 2416  
Percent of Vehicles > 30 MPH : 59.4%

Grand Total	4	43	565	2859	3791	1004	83	6	1	0	0	0	0	0	8356
-------------	---	----	-----	------	------	------	----	---	---	---	---	---	---	---	------

Overall

15th Percentile : 26 MPH  
50th Percentile : 30 MPH  
85th Percentile : 34 MPH  
95th Percentile : 38 MPH

Mean Speed(Average) : 31 MPH  
10 MPH Pace Speed : 26-35 MPH  
Number in Pace : 6650  
Percent in Pace : 79.6%  
Number of Vehicles > 30 MPH : 4885  
Percent of Vehicles > 30 MPH : 58.5%

Location : Pleasant Street  
Location : East of Olmsted Drive  
City/State: Belmont, MA

8058SP01

WB

Start Time	1 15	16 20	21 25	26 30	31 35	36 40	41 45	46 50	51 55	56 60	61 65	66 70	71 75	76 999	Total
11/10/20	0	0	0	3	3	0	2	0	0	0	0	0	0	0	8
01:00	0	0	0	0	4	2	1	0	0	0	0	0	0	0	7
02:00	0	0	0	0	2	1	0	0	0	0	0	0	0	0	3
03:00	0	2	1	2	2	2	0	0	0	0	0	0	0	0	9
04:00	0	1	3	4	8	6	1	0	0	0	0	0	0	0	23
05:00	0	0	2	11	27	20	1	1	0	0	0	0	0	0	62
06:00	3	3	29	68	85	19	1	1	0	0	0	0	0	0	209
07:00	1	2	30	100	130	45	6	0	1	0	0	0	0	1	316
08:00	2	1	34	95	147	62	1	0	0	0	0	0	0	2	344
09:00	2	0	15	79	124	65	4	0	0	0	0	0	1	0	290
10:00	2	4	26	70	113	36	5	1	0	0	0	0	0	1	258
11:00	1	2	25	73	111	34	4	0	0	0	0	0	0	0	250
12 PM	3	1	28	85	122	50	2	0	0	0	0	0	0	1	292
13:00	1	7	21	84	120	31	7	0	0	0	0	0	0	0	271
14:00	1	2	26	106	159	49	4	1	1	0	0	0	0	0	349
15:00	1	2	40	110	154	54	5	0	0	0	0	0	0	0	366
16:00	1	4	62	138	139	31	7	2	0	0	0	0	0	0	384
17:00	0	4	40	172	115	26	1	0	0	0	0	0	0	0	358
18:00	1	3	30	113	87	16	2	1	0	0	0	0	0	0	253
19:00	0	1	22	71	58	17	1	0	0	0	0	0	0	0	170
20:00	1	3	21	40	34	12	2	0	0	0	0	0	0	0	113
21:00	1	0	9	30	33	10	1	0	0	0	0	0	0	0	84
22:00	0	0	4	30	27	7	0	0	1	0	0	0	0	0	69
23:00	0	0	0	12	12	4	4	0	0	0	0	0	0	0	32
Total	21	42	468	1496	1816	599	62	7	3	0	0	0	1	5	4520

Daily

15th Percentile : 25 MPH  
50th Percentile : 30 MPH  
85th Percentile : 34 MPH  
95th Percentile : 38 MPH

Mean Speed(Average) : 31 MPH  
10 MPH Pace Speed : 26-35 MPH  
Number in Pace : 3312  
Percent in Pace : 73.3%  
Number of Vehicles > 30 MPH : 2493  
Percent of Vehicles > 30 MPH : 55.2%

Location : Pleasant Street  
Location : East of Olmsted Drive  
City/State: Belmont, MA

8058SP01

WB

Start Time	1 15	16 20	21 25	26 30	31 35	36 40	41 45	46 50	51 55	56 60	61 65	66 70	71 75	76 999	Total
11/11/20	0	1	1	3	9	1	0	0	0	0	0	0	0	0	15
01:00	0	0	3	0	3	3	1	0	0	0	0	0	0	0	10
02:00	0	0	0	4	3	2	0	0	0	0	0	0	0	0	9
03:00	0	1	1	2	0	1	0	0	0	0	0	0	0	0	5
04:00	0	0	0	2	8	8	0	0	0	0	0	0	0	0	18
05:00	1	0	2	16	19	9	1	0	1	0	0	0	0	2	51
06:00	0	3	19	46	62	26	5	0	0	0	0	0	0	1	162
07:00	4	2	30	70	86	32	8	0	0	0	0	0	0	2	234
08:00	4	0	14	99	128	34	1	1	0	0	0	0	0	1	282
09:00	0	1	12	84	127	48	5	0	0	0	0	0	0	0	277
10:00	3	2	23	104	123	33	1	0	0	0	0	0	0	0	289
11:00	3	5	26	92	133	39	5	0	1	0	0	0	0	0	304
12 PM	2	1	27	97	140	54	4	0	0	0	0	0	0	0	325
13:00	3	3	27	107	142	36	4	0	0	0	0	0	0	0	322
14:00	3	9	43	134	129	28	3	1	0	0	0	0	0	0	350
15:00	1	3	43	152	145	45	2	1	0	0	0	0	0	0	392
16:00	3	2	46	155	106	23	1	0	0	0	0	0	0	0	336
17:00	0	3	42	139	89	24	1	0	0	0	0	0	0	0	298
18:00	0	1	31	88	107	13	3	0	0	0	0	0	0	0	243
19:00	1	4	23	42	52	10	2	0	0	0	0	0	0	0	134
20:00	2	4	6	47	38	12	0	0	0	0	0	0	0	0	109
21:00	0	1	8	30	31	10	2	0	0	0	0	0	0	0	82
22:00	0	2	4	36	22	4	1	0	0	0	0	0	0	0	69
23:00	0	0	3	10	12	3	0	0	0	0	0	0	0	0	28
Total	30	48	434	1559	1714	498	50	3	2	0	0	0	0	6	4344

Daily

15th Percentile : 25 MPH  
50th Percentile : 30 MPH  
85th Percentile : 34 MPH  
95th Percentile : 38 MPH

Mean Speed(Average) : 31 MPH  
10 MPH Pace Speed : 26-35 MPH  
Number in Pace : 3273  
Percent in Pace : 75.3%  
Number of Vehicles > 30 MPH : 2273  
Percent of Vehicles > 30 MPH : 52.3%

Grand Total	51	90	902	3055	3530	1097	112	10	5	0	0	0	1	11	8864
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Overall

15th Percentile : 25 MPH  
50th Percentile : 30 MPH  
85th Percentile : 34 MPH  
95th Percentile : 38 MPH

Mean Speed(Average) : 31 MPH  
10 MPH Pace Speed : 26-35 MPH  
Number in Pace : 6585  
Percent in Pace : 74.3%  
Number of Vehicles > 30 MPH : 4766  
Percent of Vehicles > 30 MPH : 53.8%

Location : Pleasant Street  
Location : East of Olmsted Drive  
City/State: Belmont, MA

8058SP01

EB, WB

Start Time	1 15	16 20	21 25	26 30	31 35	36 40	41 45	46 50	51 55	56 60	61 65	66 70	71 75	76 999	Total
11/10/20	0	0	0	7	8	4	2	0	0	0	0	0	0	0	21
01:00	0	0	0	0	9	3	1	0	0	0	0	0	0	0	13
02:00	0	0	0	3	6	3	0	0	0	0	0	0	0	0	12
03:00	0	2	2	4	2	6	0	0	0	0	0	0	0	0	16
04:00	0	1	4	8	16	6	3	0	0	0	0	0	0	0	38
05:00	0	0	3	30	45	28	1	1	0	0	0	0	0	0	108
06:00	3	5	41	108	170	43	2	1	0	0	0	0	0	0	373
07:00	1	4	47	167	274	101	8	1	1	0	0	0	0	1	605
08:00	2	1	50	178	269	111	7	0	0	0	0	0	0	2	620
09:00	2	2	25	148	236	104	5	0	0	0	0	0	1	0	523
10:00	2	6	43	153	230	52	10	1	0	0	0	0	0	1	498
11:00	1	3	45	173	220	62	4	0	0	0	0	0	0	0	508
12 PM	3	2	46	188	233	75	3	0	0	0	0	0	0	1	551
13:00	1	7	37	199	268	67	8	0	0	0	0	0	0	0	587
14:00	1	2	47	190	307	89	8	1	1	0	0	0	0	0	646
15:00	2	2	64	221	337	94	7	0	0	0	0	0	0	0	727
16:00	2	7	95	291	303	65	10	2	0	0	0	0	0	0	775
17:00	0	4	78	315	245	52	1	0	0	0	0	0	0	0	695
18:00	1	3	46	226	171	35	3	1	0	0	0	0	0	0	486
19:00	0	2	35	163	142	28	2	0	0	0	0	0	0	0	372
20:00	1	6	32	90	91	20	6	0	0	0	0	0	0	0	246
21:00	1	0	10	70	76	23	4	0	0	0	0	0	0	0	184
22:00	0	0	7	47	51	20	1	0	2	0	0	0	0	0	128
23:00	0	0	2	28	29	12	7	0	0	0	0	0	0	0	78
Total	23	59	759	3007	3738	1103	103	8	4	0	0	0	1	5	8810

Daily

15th Percentile : 25 MPH  
50th Percentile : 30 MPH  
85th Percentile : 34 MPH  
95th Percentile : 38 MPH

Mean Speed(Average) : 31 MPH  
10 MPH Pace Speed : 26-35 MPH  
Number in Pace : 6745  
Percent in Pace : 76.6%  
Number of Vehicles > 30 MPH : 4962  
Percent of Vehicles > 30 MPH : 56.3%

Location : Pleasant Street  
Location : East of Olmsted Drive  
City/State: Belmont, MA

8058SP01

EB, WB

Start Time	1 15	16 20	21 25	26 30	31 35	36 40	41 45	46 50	51 55	56 60	61 65	66 70	71 75	76 999	Total
11/11/20	0	1	1	6	11	2	0	0	0	0	0	0	0	0	21
01:00	0	0	3	2	5	4	1	0	0	0	0	0	0	0	15
02:00	0	0	2	7	6	3	0	0	0	0	0	0	0	0	18
03:00	0	1	2	2	1	2	0	0	0	0	0	0	0	0	8
04:00	0	0	0	4	13	9	0	0	0	0	0	0	0	0	26
05:00	1	0	7	25	30	12	3	0	1	0	0	0	0	2	81
06:00	0	6	26	81	122	50	8	0	0	0	0	0	0	1	294
07:00	4	3	43	132	194	67	11	1	0	0	0	0	0	2	457
08:00	4	0	26	161	230	65	6	3	0	0	0	0	0	1	496
09:00	0	1	21	143	238	72	9	0	0	0	0	0	0	0	484
10:00	4	4	38	180	266	77	3	0	0	0	0	0	0	0	572
11:00	3	6	38	211	248	75	11	0	1	0	0	0	0	0	593
12 PM	3	5	44	206	278	100	8	1	0	0	0	0	0	0	645
13:00	3	4	36	198	295	69	6	0	0	0	0	0	0	0	611
14:00	3	12	73	247	267	64	5	1	0	0	0	0	0	0	672
15:00	1	4	84	285	278	87	6	1	0	0	0	0	0	0	746
16:00	3	7	84	277	273	57	4	0	0	0	0	0	0	0	705
17:00	0	3	72	261	224	56	1	0	0	0	0	0	0	0	617
18:00	0	2	49	169	203	30	3	1	0	0	0	0	0	0	457
19:00	1	5	29	90	131	28	2	0	0	0	0	0	0	0	286
20:00	2	4	9	94	102	22	0	0	0	0	0	0	0	0	233
21:00	0	2	10	42	92	23	4	0	0	0	0	0	0	0	173
22:00	0	3	5	59	47	12	1	0	0	0	0	0	0	0	127
23:00	0	1	6	25	29	12	0	0	0	0	0	0	0	0	73
Total	32	74	708	2907	3583	998	92	8	2	0	0	0	0	6	8410

Daily

15th Percentile : 25 MPH  
50th Percentile : 30 MPH  
85th Percentile : 34 MPH  
95th Percentile : 38 MPH

Mean Speed(Average) : 31 MPH  
10 MPH Pace Speed : 26-35 MPH  
Number in Pace : 6490  
Percent in Pace : 77.2%  
Number of Vehicles > 30 MPH : 4689  
Percent of Vehicles > 30 MPH : 55.8%

Grand Total	55	133	1467	5914	7321	2101	195	16	6	0	0	0	1	11	17220
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Overall

15th Percentile : 25 MPH  
50th Percentile : 30 MPH  
85th Percentile : 34 MPH  
95th Percentile : 38 MPH

Mean Speed(Average) : 31 MPH  
10 MPH Pace Speed : 26-35 MPH  
Number in Pace : 13235  
Percent in Pace : 76.9%  
Number of Vehicles > 30 MPH : 9651  
Percent of Vehicles > 30 MPH : 56.0%

## TRAFFIC ADJUSTMENTS

---

Comment 1: N/S Street : Trapelo Road  
 Comment 2: E/W Street : Mill Street  
 Comment 3: City/State : Belmont, MA  
 Comment 4: Weather : Clear

Wednesday, April 11, 2018 6:00 AM

Mill St From North				Trapelo Rd From East				Trapelo Rd From West				Total	Peak
Start Time	Left	Right	Peds	Thru	Right	Peds		Left	Thru	Peds			
7:00:00 AM	30	124	0	108	76	0		149	34	0		521	
7:15:00 AM	31	125	0	136	131	0		150	35	0		608	
7:30:00 AM	43	105	0	131	141	0		170	29	0		619	
7:45:00 AM	25	136	0	175	146	0		163	25	0		670	2418
8:00:00 AM	50	150	0	162	147	0		150	34	0		693	2590
8:15:00 AM	53	149	0	129	169	0		132	36	0		668	2650
8:30:00 AM	69	142	0	152	150	0		138	19	0		670	2701
8:45:00 AM	69	145	0	142	154	0		134	29	0		673	2704
	370	1076	0	1135	1114	0		1186	241	0		5122	2704
												5173	2731
												5277	2786

Seasonal Adj 1 %

2020 Adjusted 1% year

Tuesday, November 10 2020

Mill St From North				Trapelo Rd From East				Trapelo Rd From West				Total	Peak
Start Time	Left	Right	Peds	Thru	Right	Peds		Left	Thru	Peds			
7:00:00 AM	56	19	0	75	72	0		22	89	0		333	
7:15:00 AM	93	24	0	70	77	0		30	103	0		397	
7:30:00 AM	89	27	0	81	81	0		27	131	0		436	
7:45:00 AM	91	23	0	89	97	0		27	104	0		431	1597
8:00:00 AM	89	22	0	105	103	0		18	114	0		451	1715
8:15:00 AM	94	36	0	87	110	0		21	109	0		457	1775
8:30:00 AM	91	26	0	91	113	0		15	102	0		438	1777
8:45:00 AM	74	24	0	92	91	0		30	100	0		411	1757
	677	201	0	690	744	0		190	852	0		3354	1777
												1.57	1.57
												1.57	

Comparisson

Say COVID Adj

4:00:00 PM	52	169	0	121	166	0		123	47	0		678	
4:15:00 PM	41	136	0	121	177	0		134	23	0		632	
4:30:00 PM	37	148	0	93	177	0		166	35	0		656	
4:45:00 PM	40	151	0	91	183	0		150	32	0		647	2613
5:00:00 PM	55	128	0	91	170	0		156	36	0		636	2571
5:15:00 PM	46	137	0	130	175	0		145	43	0		676	2615
5:30:00 PM	33	140	0	100	190	0		163	35	0		661	2620
5:45:00 PM	44	179	0	77	206	0		147	28	0		681	2654
	348	1188	0	824	1444	0		1184	279	0		5267	2654
												5320	2681
												5427	2735

Seasonal Adj 1 %

2020 Adjusted 1% year

4:00:00 PM	88	29	0	113	90	0		44	152	0		516	
4:15:00 PM	109	39	0	123	92	0		24	113	0		500	
4:30:00 PM	114	33	0	123	89	0		27	132	0		518	
4:45:00 PM	101	39	0	148	76	0		33	123	0		520	2054
5:00:00 PM	95	21	0	143	70	0		22	132	0		483	2021
5:15:00 PM	102	34	0	168	77	0		22	107	0		510	2031
5:30:00 PM	85	20	0	97	71	0		26	99	0		398	1911
5:45:00 PM	57	32	0	103	52	0		28	103	0		375	1766
	751	247	0	1018	617	0		226	961	0		3820	2054
												1.42	1.33
												1.40	

Comparisson

Say COVID Adj

TOTAL Peaks

10704

5521

TOTAL Peaks

7174

3831

Comparisson

1.49

1.44

Say COVID Adj

1.50

Comment 1: N/S Street : Pleasant Street  
Comment 2: E/W Street : Trapelo Road  
Comment 3: City/State : Belmont, MA  
Comment 4: Weather : Clear

Thursday, November 14, 2019

	Pleasant St From North			Trapelo Rd From East			Trapelo Rd From West			
Start Time	Left	Right	Peds	Thru	Right	Peds	Left	Thru	Peds	
7:00:00 AM										
7:15:00 AM										
7:30:00 AM										
7:45:00 AM										
8:00:00 AM										
8:15:00 AM										
8:30:00 AM										
8:45:00 AM										

Tuesday, November, 10 2020

	Pleasant St From North			Trapelo Rd From East			Trapelo Rd From West				
Start Time	Left	Right	Peds	Thru	Right	Peds	Left	Thru	Peds		
7:00:00 AM	32	37	0	116	14	0	37	111	0		
7:15:00 AM	37	36	0	101	17	0	46	146	0		
7:30:00 AM	46	41	0	126	33	0	62	157	0		
7:45:00 AM	43	41	0	145	34	0	40	160	0		
8:00:00 AM	35	54	0	157	37	0	44	145	0		
8:15:00 AM	46	50	0	145	27	0	41	169	0		
8:30:00 AM	27	45	0	157	26	0	41	151	0		
8:45:00 AM	34	54	0	128	19	0	38	155	0		
4:00:00 PM	35	63	0	158	32	0	73	168	0	529	
4:15:00 PM	36	48	0	157	35	0	48	168	0	492	
4:30:00 PM	42	54	0	166	45	0	67	186	0	560	
4:45:00 PM	41	76	0	152	33	0	55	167	0	524	
5:00:00 PM	24	70	0	161	26	0	71	161	0	513	
5:15:00 PM	44	66	0	160	41	0	54	173	0	538	
5:30:00 PM	32	53	0	131	26	0	51	138	0	431	
5:45:00 PM	31	37	0	103	25	0	50	109	0	355	
										3942	
										2135	
Comparisson										1.40	1.34
Say COVID Adj										1.40	

## MOTOR VEHICLE CRASH DATA

Crash Number	City Town Name	Crash Date	Weekday	Crash Severity	Crash Time	Number of Vehicles	Age of Driver - Youngest Known	Driver Contributing Circumstances (All Drivers)	First Harmful Event	Light Conditions	Manner of Collision	Road Surface Condition	Vehicle Actions Prior to Crash (All Vehicles)	Vehicle Travel Directions (All Vehicles)	Weather Conditions	Latitude	Longitude	Street Number	Roadway	Near Intersection Roadway
PLEASANT ST / OLMSTED DRIVE																				
4380932	BELMONT	02/24/2017	Friday	Non-fatal injury	3:47 PM	1	35-44	D1: (Glare)	Collision with pedalcycle (bicycle, tricycle, unicycle, pedal car)	Dusk	Angle	Dry	V1: Turning left	V1: W	Clear	42.38902647	-71.19046006		PLEASANT STREET	OLMSTED DRIVE

# Masshighway

## CRASH RATE WORKSHEET

CITY/TOWN : Belmont COUNT DATE : 2020

DISTRICT : 4 UNSIGNALIZED : ☒ SIGNALIZED : ☐

**MHD USE ONLY**

Source #

~ INTERSECTION DATA ~

MAJOR STREET : Pleasant Street

ST #

MINOR STREET(S) : Olmsted Drive

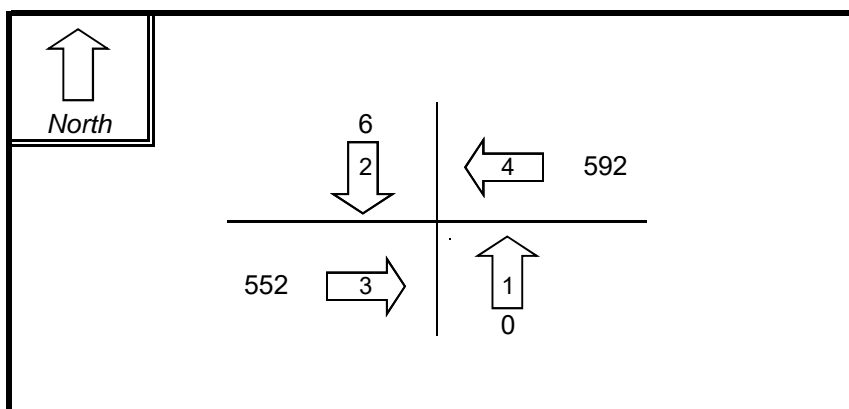
ST #

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) :	0	6	552	592		1,150

" 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 6 signalized intersections = 0.73  
Accident Rate for District 6 unsignalized intersections = 0.57

Statewide Accident Rate for Signalized Intersection = 0.78 and Unsignalized/Intersection = 0.57

## GENERAL BACKGROUND TRAFFIC GROWTH

## TRAFFIC SIGNAL WARRANT ANALYSIS (TSWA)

Start Date: 6/13/2019  
Start Time: 12:00:00 AM  
Site Code: 82890001  
Location : Boston Post Road  
Location : West of Village Drive  
City/State: Marlborough, MA

### 2020 Raw

Start Time	Olmsted Dr From North		Pleasant St From East		Pleasant St From West	
	Left	Right	Thru	Right	Left	Thru
7-8 AM	3	9	307	1	2	283
8-9 AM	2	2	344	2	2	272
9-10 AM	3	7	293	2	3	229
10-11 AM	3	10	252	6	6	241
11-12 PM	3	3	244	5	5	252
12-1 PM	3	8	291	2	3	256
1-2 PM	6	4	260	7	8	309
2-3 PM	2	5	355	0	5	294
3-4 PM	6	10	357	8	11	354
4-5 PM	2	5	391	1	6	387
5-6 PM	1	4	358	3	3	339
6-7 PM	7	7	243	5	9	232

### Covid Adj - 2020 Baseline Condition

COVID adj 1.4						
1% above no seasonal adjustment						
Time	Olmsted Dr From North		Pleasant St From East		Pleasant St From West	
	Left	Right	Thru	Right	Left	Thru
7-8 AM	4	13	430	1	3	396
8-9 AM	3	3	482	3	3	381
9-10 AM	4	10	410	3	4	321
10-11 AM	4	14	353	8	8	337
11-12 PM	4	4	342	7	7	353
12-1 PM	4	11	407	3	4	358
1-2 PM	8	6	364	10	11	433
2-3 PM	3	7	497	0	7	412
3-4 PM	8	14	500	11	15	496
4-5 PM	3	7	547	1	8	542
5-6 PM	1	6	501	4	4	475
6-7 PM	10	10	340	7	13	325

### 2021 Adjustment

1 year 1.01						
1 percent per year compounded annual background						
Time	Olmsted Dr From North		Pleasant St From East		Pleasant St From West	
	Left	Right	Thru	Right	Left	Thru
7-8 AM	4	13	434	1	3	400
8-9 AM	3	3	487	3	3	385
9-10 AM	4	10	414	3	4	324
10-11 AM	4	14	357	8	8	340
11-12 PM	4	4	345	7	7	357
12-1 PM	4	11	411	3	4	362
1-2 PM	8	6	368	10	11	437
2-3 PM	3	7	502	0	7	416
3-4 PM	8	14	505	11	15	501
4-5 PM	3	7	552	1	8	547
5-6 PM	1	6	506	4	4	480
6-7 PM	10	10	343	7	13	328

## Hourly Distribution of Entering and Exiting Vehicle Trips by Land Use

Source: ITE Trip Generation Manual, 10th Edition

Land Use Code	882					
Land Use	Marijuana Dispensary					
Setting	General Urban/Suburban					
Time Period	Weekday					
Trip Type	Vehicle	Daily				
# Data Sites	4	303	303	Daily	303	303
	% of 24-Hour Traffic	Entering	Exiting	Entering	Exiting	
Time	Entering	Exiting				
12-1 AM	0	0	0.0	0.0	0	0
1-2 AM	0	0	0.0	0.0	0	0
2-3 AM	0	0	0.0	0.0	0	0
3-4 AM	0	0	0.0	0.0	0	0
4-5 AM	0	0	0.0	0.0	0	0
5-6 AM	0.1	0.1	0.3	0.3	0	0
6-7 AM	0.4	0.1	1.2	0.3	1	0
7-8 AM	1.4	0.2	4.2	0.6	4	1
8-9 AM	4.1	3.6	12.4	10.9	12	11
9-10 AM	5.3	4.3	16.1	13.0	16	13
10-11 AM	8.2	7.5	24.8	22.7	25	23
11-12 PM	8.1	7.9	24.5	23.9	25	24
12-1 PM	9.1	8.9	27.6	27.0	28	27
1-2 PM	8.3	8.0	25.1	24.2	25	24
2-3 PM	8.4	9.3	25.5	28.2	26	28
3-4 PM	9.9	9.6	30.0	29.1	30	29
4-5 PM	11.3	11.4	34.2	34.5	34	34
5-6 PM	12.4	12.4	37.6	37.6	38	38
6-7 PM	12.5	14.7	37.9	44.5	38	45
7-8 PM	0.2	1.6	0.6	4.8	1	5
8-9 PM	0.1	0.2	0.3	0.6	0	1
9-10 PM	0	0.1	0.0	0.3	0	0
10-11 PM	0	0	0.0	0.0	0	0
11-12 AM	0	0	0.0	0.0	0	0
					303	303

Data obtained from the ITE General Urban/Suburban - Trips by time of day

Background Development						
Start Time	out			in		
	From North	From East	From West	From North	From East	From West
%	0	0	0.65	0	0	0.65
7-8 AM	0	0	1	0	0	3
8-9 AM	0	0	7	0	0	8
9-10 AM	0	0	8	0	0	10
10-11 AM	0	0	15	0	0	16
11-12 PM	0	0	16	0	0	16
12-1 PM	0	0	18	0	0	18
1-2 PM	0	0	16	0	0	16
2-3 PM	0	0	18	0	0	17
3-4 PM	0	0	19	0	0	20
4-5 PM	0	0	22	0	0	22
5-6 PM	0	0	25	0	0	25
6-7 PM	0	0	29	0	0	25

2028 No- Build						
Start Time	7 year			1.01		
	Olmsted Dr From North	Pleasant St From East	Pleasant St From West	Olmsted Dr From North	Pleasant St From East	Pleasant St From West
%	0	0	0.65	0	0	0.65
7-8 AM	4	13	466	1	3	432
8-9 AM	3	3	529	3	3	421
9-10 AM	4	10	452	3	4	357
10-11 AM	4	14	398	8	8	381
11-12 PM	4	4	386	7	7	399
12-1 PM	4	11	459	3	4	406
1-2 PM	8	6	411	10	11	485
2-3 PM	3	7	556	0	7	463
3-4 PM	8	14	560	11	15	557
4-5 PM	3	7	614	1	8	608
5-6 PM	1	6	568	4	4	540
6-7 PM	10	10	397	7	13	377

Source: ITE *Trip Generation Manual* , 10th Edition

Ind Use Code	221	
Setting	Multifamily Housing (Mid-Rise)	
Time Period	General Urban/Suburban	
Trip Type	Weekday	332

# Data Sites	Vehicle		
	8	Daily	
% of 24-Hour Traffic		166	166

Time	Entering	Exiting	Entering	Exiting
12-1 AM	0.7	0.3	1.2	0.5
1-2 AM	0.3	0.2	0.5	0.3
2-3 AM	0.2	0.2	0.3	0.3
3-4 AM	0.4	0.3	0.7	0.5
4-5 AM	0.3	0.8	0.5	1.3
5-6 AM	0.6	2.7	1.0	4.5
6-7 AM	1.5	6.5	2.5	10.8
7-8 AM	2.8	12.1	4.6	20.1
8-9 AM	3.5	8.8	5.8	14.6
9-10 AM	2.9	5.7	4.8	9.5
10-11 AM	2.7	4.7	4.5	7.8
11-12 PM	4.5	4.5	7.5	7.5
12-1 PM	4.8	4.6	8.0	7.6
1-2 PM	4.1	4.8	6.8	8.0
2-3 PM	5.8	5.0	9.6	8.3
3-4 PM	6.7	4.9	11.1	8.1
4-5 PM	10.6	6.2	17.6	10.3
5-6 PM	12.6	7.7	20.9	12.8
6-7 PM	9.3	6.6	15.4	11.0
7-8 PM	7.8	4.8	12.9	8.0
8-9 PM	7.0	3.3	11.6	5.5
9-10 PM	5.5	2.2	9.1	3.7
10-11 PM	3.6	1.9	6.0	3.2
11-12 AM	2.0	1.1	3.3	1.8

	Time	Entering	Exiting	Entering	Exiting	Entering	Exiting	Entering	Exiting
	12-1 AM	0.3	0.4	0.4	0.6	0	1	1	1
	1-2 AM	0.2	0.5	0.3	0.7	0	1	0	1
	2-3 AM	0	0.1	0.0	0.1	0	0	0	0
	3-4 AM	0.1	0.2	0.1	0.3	0	0	1	0
	4-5 AM	0.2	0.5	0.3	0.7	0	1	0	2
	5-6 AM	0.9	2.2	1.3	3.1	1	3	2	7
	6-7 AM	1.3	3.0	1.8	4.2	2	4	4	15
	7-8 AM	2.1	5.1	2.9	7.1	3	7	8	27
	8-9 AM	3.9	6.3	5.4	8.8	5	9	11	24
	9-10 AM	4.7	6.7	6.5	9.3	7	9	12	19
	10-11 AM	6.4	7.5	8.9	10.4	9	10	14	18
	11-12 PM	6.8	6.5	9.5	9.0	10	9	17	17
	12-1 PM	8.5	9.0	11.8	12.5	12	12	20	20
	1-2 PM	7.7	8.0	10.7	11.1	11	11	18	19
	2-3 PM	9.1	6.7	12.6	9.3	13	9	23	17
	3-4 PM	8.7	5.7	12.1	7.9	12	8	23	16
	4-5 PM	8.3	6.3	11.5	8.8	12	9	30	19
	5-6 PM	7.3	5.7	10.1	7.9	10	8	31	21
	6-7 PM	6.3	5.2	8.8	7.2	9	7	24	18
	7-8 PM	5.8	5.2	8.1	7.2	8	7	21	15
	8-9 PM	4.8	4.1	6.7	5.7	7	6	19	12
	9-10 PM	3.1	2.2	4.3	3.1	4	3	13	7
	10-11 PM	2.5	1.8	3.5	2.5	3	3	9	6
	11-12 AM	0.8	1.1	1.1	1.5	1	2	4	4

Data obtained from the ITE General Urban/Suburban - Trips by time of day

e Trips by Land Use

Trip Generation						
	out		out		in	
	From North		From East		From West	
Time	Left	Right	Thru	Right	Left	Thru
%	0.4	0.6	0	0.4	0.6	0
7-8 AM	11	16	0	3	5	0
8-9 AM	10	14	0	4	7	0
9-10 AM	8	11	0	5	7	0
10-11 AM	7	11	0	6	8	0
11-12 PM	7	10	0	7	10	0
12-1 PM	8	12	0	8	12	0
1-2 PM	8	11	0	7	11	0
2-3 PM	7	10	0	9	14	0
3-4 PM	6	10	0	9	14	0
4-5 PM	8	11	0	12	18	0
5-6 PM	8	13	0	12	19	0
6-7 PM	7	11	0	10	14	0

2028 Build Zone 3						
	Olmsted Dr From North		Pleasant St From East		Pleasant St From West	
Start Time	Left	Right	Thru	Right	Left	Thru
7-8 AM	15	29	466	4	8	432
8-9 AM	13	17	529	7	10	421
9-10 AM	12	21	452	8	11	357
10-11 AM	11	25	398	14	16	381
11-12 PM	11	14	386	14	17	399
12-1 PM	12	23	459	11	16	406
1-2 PM	16	17	411	17	22	485
2-3 PM	10	17	556	9	21	463
3-4 PM	14	24	560	20	29	557
4-5 PM	11	18	614	13	26	608
5-6 PM	9	19	568	16	23	540
6-7 PM	17	21	397	17	27	377

### Hourly Distribution of Entering and Exiting Vehicle Trips by Land Use

Source: ITE *Trip Generation Manual*, 10th Edition

Land Use Code 710

Land Use General Office Building

Setting General Urban/Suburban

Daily number obtained from TMA

Time Period Weekday

Trip Type Vehicle

# Data Sites 16

Daily

% of 24-Hour Traffic

892

892

Time	Entering	Exiting	Entering	Exiting
12-1 AM	0.2	0.1	1.8	0.9
1-2 AM	0	0.1	0.0	0.9
2-3 AM	0	0	0.0	0.0
3-4 AM	0	0.1	0.0	0.9
4-5 AM	0.1	0.2	0.9	1.8
5-6 AM	0.4	0.1	3.6	0.9
6-7 AM	4.6	0.5	41.0	4.5
7-8 AM	13.1	1.9	116.9	16.9
8-9 AM	14.4	3.5	128.4	31.2
9-10 AM	6.4	4.3	57.1	38.4
10-11 AM	5.4	5.9	48.2	52.6
11-12 PM	6.2	10.3	55.3	91.9
12-1 PM	10.2	10.4	91.0	92.8
1-2 PM	9.0	6.7	80.3	59.8
2-3 PM	8.2	6.5	73.1	58.0
3-4 PM	7.4	8.5	66.0	75.8
4-5 PM	5.5	15.2	49.1	135.6
5-6 PM	4.2	15.6	37.5	139.2
6-7 PM	1.7	2.9	15.2	25.9
7-8 PM	0.9	2.2	8.0	19.6
8-9 PM	0.7	1.3	6.2	11.6
9-10 PM	0.5	1.5	4.5	13.4
10-11 PM	0.3	2.0	2.7	17.8
11-12 AM	0.4	0.2	3.6	1.8

Daily	
892	892
Entering	Exiting
2	1
0	1
0	0
0	1
1	2
4	1
41	4
117	17
129	31
57	38
48	52
55	92
91	93
81	60
73	58
66	76
49	135
38	139
15	26
8	20
6	12
4	13
3	18
4	2
892	892

Data obtained from the ITE General Urban/Suburban - Trips by time of day

Trip Generation						
	out		in		in	
	From North		From East		From West	
Time	Left	Right	Thru	Right	Left	Thru
%	0.4	0.6	0	0.4	0.6	0
7-8 AM	7	10	0	47	70	0
8-9 AM	12	19	0	52	77	0
9-10 AM	15	23	0	23	34	0
10-11 AM	21	31	0	19	29	0
11-12 PM	37	55	0	22	33	0
12-1 PM	37	56	0	36	55	0
1-2 PM	24	36	0	32	49	0
2-3 PM	23	35	0	29	44	0
3-4 PM	30	46	0	26	40	0
4-5 PM	54	81	0	20	29	0
5-6 PM	56	83	0	15	23	0
6-7 PM	10	16	0	6	9	0

Note: Same distribution of the zone 3 was assumed for zone 4 Developments

### 2028 Build - w/ Zone 3 and 4

	Olmsted Dr From North		Pleasant St From East		Pleasant St From West	
Start Time	Left	Right	Thru	Right	Left	Thru
7-8 AM	22	39	466	51	78	432
8-9 AM	25	36	529	59	87	421
9-10 AM	27	44	452	31	45	357
10-11 AM	32	56	398	33	45	381
11-12 PM	48	69	386	36	50	399
12-1 PM	49	79	459	47	71	406
1-2 PM	40	53	411	49	71	485
2-3 PM	33	52	556	38	65	463
3-4 PM	44	70	560	46	69	557
4-5 PM	65	99	614	33	55	608
5-6 PM	65	102	568	31	46	540
6-7 PM	27	37	397	23	36	377

# HCS7 Warrants Report

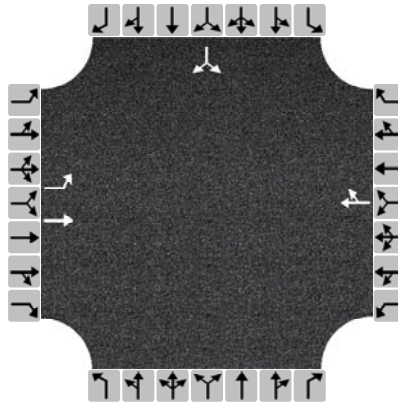
## Project Information

Analyst	JC	Date	1/4/2021
Agency	VAI	Analysis Year	2021
Jurisdiction	McLean Hospital Residential Development - Belmont MA	Time Period Analyzed	2021 Existing Condition
Project Description	Pleasant Street at Olmsted Drive		

## General

Major Street Direction	East-West	Population < 10,000	No
Starting Time Interval	7	Coordinated Signal System	No
Median Type	Undivided	Crashes (crashes/year)	1
Major Street Speed (mi/h)	25	Adequate Trials of Crash Exp. Alt.	No
Nearest Signal (ft)	360		

## Geometry and Traffic



Approach	Eastbound			Westbound			Northbound			Southbound		
Movement	L	T	R	L	T	R	L	T	R	L	T	R
Number of Lanes, N	1	1	0	0	1	0	0	0	0	0	0	0
Lane Usage	L	T			TR						LR	
Vehicle Volumes Averages (veh/h)	7	406	0	0	435	4	0	0	0	4	0	8
Pedestrian Averages (peds/h)	0			0			0			0		
Gap Averages (gaps/h)	0			0			0			0		
Delay (s/veh)	0.0			0.0			0.0			0.0		
Delay (veh-hrs)	0.0			0.0			0.0			0.0		

## School Crossing and Roadway Network

Number of Students in Highest Hour	0	Two or More Major Routes	Yes
Number of Adequate Gaps in Period	0	Weekend Counts	No
Number of Minutes in Period	0	5-year Growth Factor (%)	0

## Railroad Crossing

Grade Crossing Approach	None	Rail Traffic (trains/day)	0
Highest Volume Hour with Trains	Unknown	High Occupancy Buses (%)	0
Distance to Stop Line (ft)		Tractor-Trailer Trucks (%)	0

# HCS7 Warrants Report

## Volume Summary

Hour	Major Volume	Minor Volume	Total Volume	Peds/h	Gaps/h	1A ( 100% )	1A ( 80% )	1B ( 100% )	1B ( 80% )	2 ( 100% )	3A ( 100% )	3B ( 100% )	4A ( 100% )	4B ( 100% )
07 - 08	838	17	855	0	0	No	No	No	No	No	No	No	No	No
08 - 09	878	6	884	0	0	No	No	No	No	No	No	No	No	No
09 - 10	745	14	759	0	0	No	No	No	No	No	No	No	No	No
10 - 11	713	18	731	0	0	No	No	No	No	No	No	No	No	No
11 - 12	716	8	724	0	0	No	No	No	No	No	No	No	No	No
12 - 13	780	15	795	0	0	No	No	No	No	No	No	No	No	No
13 - 14	826	14	840	0	0	No	No	No	No	No	No	No	No	No
14 - 15	925	10	935	0	0	No	No	No	No	No	No	No	No	No
15 - 16	1032	22	1054	0	0	No	No	No	No	No	No	No	No	No
16 - 17	1108	10	1118	0	0	No	No	No	No	No	No	No	No	No
17 - 18	994	7	1001	0	0	No	No	No	No	No	No	No	No	No
18 - 19	691	20	711	0	0	No	No	No	No	No	No	No	No	No
Total	10246	161	10407	0	0	0	0	0	0	0	0	0	0	0

## Warrants

### Warrant 1: Eight-Hour Vehicular Volume

A. Minimum Vehicular Volumes (Both major approaches --and-- higher minor approach) --or--	
B. Interruption of Continuous Traffic (Both major approaches --and-- higher minor approach) --or--	
80% Vehicular --and-- Interruption Volumes (Both major approaches --and-- higher minor approach)	

### Warrant 2: Four-Hour Vehicular Volume

Four-Hour Vehicular Volume (Both major approaches --and-- higher minor approach)	
--	--

### Warrant 3: Peak Hour

A. Peak-Hour Conditions (Minor delay -- and-- minor volume --and-- total volume) --or--	
B. Peak-Hour Vehicular Volumes (Both major approaches --and-- higher minor approach)	

### Warrant 4: Pedestrian Volume

A. Four Hour Volumes --or--	
B. One-Hour Volumes	

### Warrant 5: School Crossing

Gaps Same Period --and--	
Student Volumes	
Nearest Traffic Control Signal (optional)	✓

### Warrant 6: Coordinated Signal System

Degree of Platooning (Predominant direction or both directions)	
---	--

### Warrant 7: Crash Experience

A. Adequate trials of alternatives, observance and enforcement failed --and--	
B. Reported crashes susceptible to correction by signal (12-month period) --and--	
C. 80% Volumes for Warrants 1A, 1B, --or-- 4 are satisfied	

### Warrant 8: Roadway Network

A. Weekday Volume (Peak hour total --and-- projected warrants 1, 2, or 3) --or--	
B. Weekend Volume (Five hours total)	

### Warrant 9: Grade Crossing

A. Grade Crossing within 140 ft --and--	
B. Peak-Hour Vehicular Volumes	

# HCS7 Warrants Report

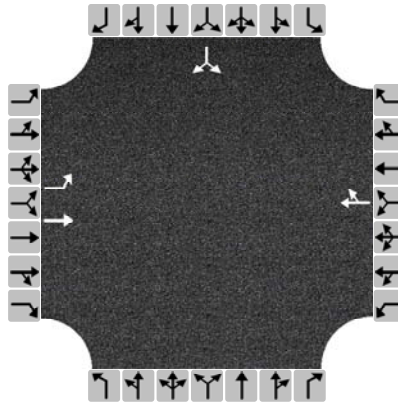
## Project Information

Analyst	JC	Date	1/4/2021
Agency	VAI	Analysis Year	2028
Jurisdiction	McLean Hospital Residential Development - Belmont MA	Time Period Analyzed	2028 No-Build Condition
Project Description	Pleasant Street at Olmsted Drive		

## General

Major Street Direction	East-West	Population < 10,000	No
Starting Time Interval	7	Coordinated Signal System	No
Median Type	Undivided	Crashes (crashes/year)	1
Major Street Speed (mi/h)	34	Adequate Trials of Crash Exp. Alt.	No
Nearest Signal (ft)	360		

## Geometry and Traffic



Approach	Eastbound			Westbound			Northbound			Southbound		
Movement	L	T	R	L	T	R	L	T	R	L	T	R
Number of Lanes, N	1	1	0	0	1	0	0	0	0	0	0	0
Lane Usage	L	T			TR						LR	
Vehicle Volumes Averages (veh/h)	7	452	0	0	483	4	0	0	0	4	0	8
Pedestrian Averages (peds/h)	0			0			0			0		
Gap Averages (gaps/h)	0			0			0			0		
Delay (s/veh)	0.0			0.0			0.0			0.0		
Delay (veh-hrs)	0.0			0.0			0.0			0.0		

## School Crossing and Roadway Network

Number of Students in Highest Hour	0	Two or More Major Routes	Yes
Number of Adequate Gaps in Period	0	Weekend Counts	No
Number of Minutes in Period	0	5-year Growth Factor (%)	0

## Railroad Crossing

Grade Crossing Approach	None	Rail Traffic (trains/day)	0
Highest Volume Hour with Trains	Unknown	High Occupancy Buses (%)	0
Distance to Stop Line (ft)		Tractor-Trailer Trucks (%)	0

# HCS7 Warrants Report

## Volume Summary

Hour	Major Volume	Minor Volume	Total Volume	Peds/h	Gaps/h	1A ( 100% )	1A ( 80% )	1B ( 100% )	1B ( 80% )	2 ( 100% )	3A ( 100% )	3B ( 100% )	4A ( 100% )	4B ( 100% )
07 - 08	902	17	919	0	0	No	No	No	No	No	No	No	No	No
08 - 09	956	6	962	0	0	No	No	No	No	No	No	No	No	No
09 - 10	816	14	830	0	0	No	No	No	No	No	No	No	No	No
10 - 11	795	18	813	0	0	No	No	No	No	No	No	No	No	No
11 - 12	799	8	807	0	0	No	No	No	No	No	No	No	No	No
12 - 13	872	15	887	0	0	No	No	No	No	No	No	No	No	No
13 - 14	917	14	931	0	0	No	No	No	No	No	No	No	No	No
14 - 15	1026	10	1036	0	0	No	No	No	No	No	No	No	No	No
15 - 16	1143	22	1165	0	0	No	No	No	No	No	No	No	No	No
16 - 17	1231	10	1241	0	0	No	No	No	No	No	No	No	No	No
17 - 18	1116	7	1123	0	0	No	No	No	No	No	No	No	No	No
18 - 19	794	20	814	0	0	No	No	No	No	No	No	No	No	No
Total	11367	161	11528	0	0	0	0	0	0	0	0	0	0	0

## Warrants

### Warrant 1: Eight-Hour Vehicular Volume

A. Minimum Vehicular Volumes (Both major approaches --and-- higher minor approach) --or--	
B. Interruption of Continuous Traffic (Both major approaches --and-- higher minor approach) --or--	
80% Vehicular --and-- Interruption Volumes (Both major approaches --and-- higher minor approach)	

### Warrant 2: Four-Hour Vehicular Volume

Four-Hour Vehicular Volume (Both major approaches --and-- higher minor approach)	
--	--

### Warrant 3: Peak Hour

A. Peak-Hour Conditions (Minor delay -- and-- minor volume --and-- total volume) --or--	
B. Peak-Hour Vehicular Volumes (Both major approaches --and-- higher minor approach)	

### Warrant 4: Pedestrian Volume

A. Four Hour Volumes --or--	
B. One-Hour Volumes	

### Warrant 5: School Crossing

Gaps Same Period --and--	
Student Volumes	
Nearest Traffic Control Signal (optional)	✓

### Warrant 6: Coordinated Signal System

Degree of Platooning (Predominant direction or both directions)	
---	--

### Warrant 7: Crash Experience

A. Adequate trials of alternatives, observance and enforcement failed --and--	
B. Reported crashes susceptible to correction by signal (12-month period) --and--	
C. 80% Volumes for Warrants 1A, 1B, --or-- 4 are satisfied	

### Warrant 8: Roadway Network

A. Weekday Volume (Peak hour total --and-- projected warrants 1, 2, or 3) --or--	
B. Weekend Volume (Five hours total)	

### Warrant 9: Grade Crossing

A. Grade Crossing within 140 ft --and--	
B. Peak-Hour Vehicular Volumes	

# HCS7 Warrants Report

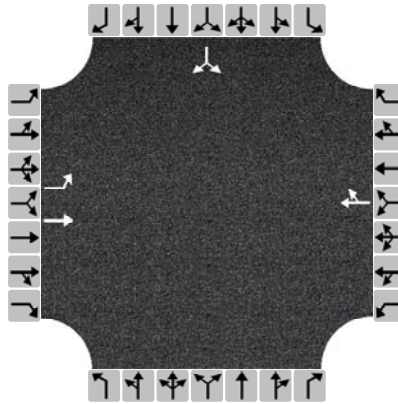
## Project Information

Analyst	JC	Date	1/4/2021
Agency	VAI	Analysis Year	2028
Jurisdiction	McLean Hospital Residential Development - Belmont MA	Time Period Analyzed	2028 No-Build Condition
Project Description	Pleasant Street at Olmsted Drive		

## General

Major Street Direction	East-West	Population < 10,000	No
Starting Time Interval	7	Coordinated Signal System	No
Median Type	Undivided	Crashes (crashes/year)	0
Major Street Speed (mi/h)	25	Adequate Trials of Crash Exp. Alt.	No
Nearest Signal (ft)	360		

## Geometry and Traffic



Approach	Eastbound			Westbound			Northbound			Southbound		
Movement	L	T	R	L	T	R	L	T	R	L	T	R
Number of Lanes, N	1	1	0	0	1	0	0	0	0	0	0	0
Lane Usage	L	T			TR						LR	
Vehicle Volumes Averages (veh/h)	18	452	0	0	483	12	0	0	0	12	0	20
Pedestrian Averages (peds/h)	0			0			0			0		
Gap Averages (gaps/h)	0			0			0			0		
Delay (s/veh)	0.0			0.0			0.0			0.0		
Delay (veh-hrs)	0.0			0.0			0.0			0.0		

## School Crossing and Roadway Network

Number of Students in Highest Hour	0	Two or More Major Routes	Yes
Number of Adequate Gaps in Period	0	Weekend Counts	No
Number of Minutes in Period	0	5-year Growth Factor (%)	0

## Railroad Crossing

Grade Crossing Approach	None	Rail Traffic (trains/day)	0
Highest Volume Hour with Trains	Unknown	High Occupancy Buses (%)	0
Distance to Stop Line (ft)		Tractor-Trailer Trucks (%)	0

# HCS7 Warrants Report

## Volume Summary

Hour	Major Volume	Minor Volume	Total Volume	Peds/h	Gaps/h	1A ( 100% )	1A ( 80% )	1B ( 100% )	1B ( 80% )	2 ( 100% )	3A ( 100% )	3B ( 100% )	4A ( 100% )	4B ( 100% )
07 - 08	910	44	954	0	0	No	No	No	No	No	No	No	No	No
08 - 09	967	30	997	0	0	No	No	No	No	No	No	No	No	No
09 - 10	828	33	861	0	0	No	No	No	No	No	No	No	No	No
10 - 11	809	36	845	0	0	No	No	No	No	No	No	No	No	No
11 - 12	816	25	841	0	0	No	No	No	No	No	No	No	No	No
12 - 13	892	35	927	0	0	No	No	No	No	No	No	No	No	No
13 - 14	935	33	968	0	0	No	No	No	No	No	No	No	No	No
14 - 15	1049	27	1076	0	0	No	No	No	No	No	No	No	No	No
15 - 16	1166	38	1204	0	0	No	No	No	No	No	No	No	No	No
16 - 17	1261	29	1290	0	0	No	No	No	No	No	No	No	No	No
17 - 18	1147	28	1175	0	0	No	No	No	No	No	No	No	No	No
18 - 19	818	38	856	0	0	No	No	No	No	No	No	No	No	No
Total	11598	396	11994	0	0	0	0	0	0	0	0	0	0	0

## Warrants

### Warrant 1: Eight-Hour Vehicular Volume

A. Minimum Vehicular Volumes (Both major approaches --and-- higher minor approach) --or--	
B. Interruption of Continuous Traffic (Both major approaches --and-- higher minor approach) --or--	
80% Vehicular --and-- Interruption Volumes (Both major approaches --and-- higher minor approach)	

### Warrant 2: Four-Hour Vehicular Volume

Four-Hour Vehicular Volume (Both major approaches --and-- higher minor approach)	
--	--

### Warrant 3: Peak Hour

A. Peak-Hour Conditions (Minor delay -- and-- minor volume --and-- total volume) --or--	
B. Peak-Hour Vehicular Volumes (Both major approaches --and-- higher minor approach)	

### Warrant 4: Pedestrian Volume

A. Four Hour Volumes --or--	
B. One-Hour Volumes	

### Warrant 5: School Crossing

Gaps Same Period --and--	
Student Volumes	
Nearest Traffic Control Signal (optional)	✓

### Warrant 6: Coordinated Signal System

Degree of Platooning (Predominant direction or both directions)	
---	--

### Warrant 7: Crash Experience

A. Adequate trials of alternatives, observance and enforcement failed --and--	
B. Reported crashes susceptible to correction by signal (12-month period) --and--	
C. 80% Volumes for Warrants 1A, 1B, --or-- 4 are satisfied	

### Warrant 8: Roadway Network

A. Weekday Volume (Peak hour total --and-- projected warrants 1, 2, or 3) --or--	
B. Weekend Volume (Five hours total)	

### Warrant 9: Grade Crossing

A. Grade Crossing within 140 ft --and--	
B. Peak-Hour Vehicular Volumes	

# HCS7 Warrants Report

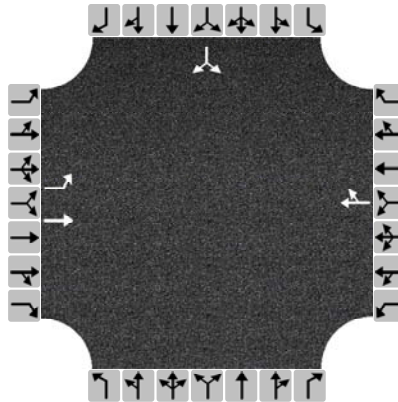
## Project Information

Analyst	JC	Date	1/4/2021
Agency	VAI	Analysis Year	2028
Jurisdiction	McLean Hospital Residential Development - Belmont MA	Time Period Analyzed	2028 Build Condition Zone 3 and Zone 4
Project Description	Pleasant Street at Olmsted Drive		

## General

Major Street Direction	East-West	Population < 10,000	No
Starting Time Interval	7	Coordinated Signal System	No
Median Type	Undivided	Crashes (crashes/year)	0
Major Street Speed (mi/h)	25	Adequate Trials of Crash Exp. Alt.	No
Nearest Signal (ft)	360		

## Geometry and Traffic



Approach	Eastbound			Westbound			Northbound			Southbound		
Movement	L	T	R	L	T	R	L	T	R	L	T	R
Number of Lanes, N	1	1	0	0	1	0	0	0	0	0	0	0
Lane Usage	L	T			TR						LR	
Vehicle Volumes Averages (veh/h)	59	452	0	0	483	39	0	0	0	39	0	61
Pedestrian Averages (peds/h)	0			0			0			0		
Gap Averages (gaps/h)	0			0			0			0		
Delay (s/veh)	0.0			0.0			0.0			0.0		
Delay (veh-hrs)	0.0			0.0			0.0			0.0		

## School Crossing and Roadway Network

Number of Students in Highest Hour	0	Two or More Major Routes	Yes
Number of Adequate Gaps in Period	0	Weekend Counts	No
Number of Minutes in Period	0	5-year Growth Factor (%)	0

## Railroad Crossing

Grade Crossing Approach	None	Rail Traffic (trains/day)	0
Highest Volume Hour with Trains	Unknown	High Occupancy Buses (%)	0
Distance to Stop Line (ft)		Tractor-Trailer Trucks (%)	0

# HCS7 Warrants Report

## Volume Summary

Hour	Major Volume	Minor Volume	Total Volume	Peds/h	Gaps/h	1A ( 100% )	1A ( 80% )	1B ( 100% )	1B ( 80% )	2 ( 100% )	3A ( 100% )	3B ( 100% )	4A ( 100% )	4B ( 100% )
07 - 08	1027	61	1088	0	0	No	No	No	Yes	No	No	No	No	No
08 - 09	1096	61	1157	0	0	No	No	No	Yes	No	No	No	No	No
09 - 10	885	71	956	0	0	No	No	No	Yes	No	No	No	No	No
10 - 11	857	88	945	0	0	No	No	No	Yes	No	No	No	No	No
11 - 12	871	117	988	0	0	No	No	No	Yes	No	No	No	No	No
12 - 13	983	128	1111	0	0	No	Yes	Yes	Yes	No	No	No	No	No
13 - 14	1016	93	1109	0	0	No	No	Yes	Yes	No	No	No	No	No
14 - 15	1122	85	1207	0	0	No	No	Yes	Yes	No	No	No	No	No
15 - 16	1232	114	1346	0	0	No	No	Yes	Yes	Yes	No	No	No	No
16 - 17	1310	164	1474	0	0	Yes	Yes	Yes	Yes	Yes	No	No	No	No
17 - 18	1185	167	1352	0	0	Yes	Yes	Yes	Yes	Yes	No	No	No	No
18 - 19	833	64	897	0	0	No	No	No	Yes	No	No	No	No	No
Total	12417	1213	13630	0	0	2	3	6	12	3	0	0	0	0

## Warrants

### Warrant 1: Eight-Hour Vehicular Volume

A. Minimum Vehicular Volumes (Both major approaches --and-- higher minor approach) --or--	
B. Interruption of Continuous Traffic (Both major approaches --and-- higher minor approach) --or--	
80% Vehicular --and-- Interruption Volumes (Both major approaches --and-- higher minor approach)	

### Warrant 2: Four-Hour Vehicular Volume

Four-Hour Vehicular Volume (Both major approaches --and-- higher minor approach)	
--	--

### Warrant 3: Peak Hour

A. Peak-Hour Conditions (Minor delay -- and-- minor volume --and-- total volume) --or--	
B. Peak-Hour Vehicular Volumes (Both major approaches --and-- higher minor approach)	

### Warrant 4: Pedestrian Volume

A. Four Hour Volumes --or--	
B. One-Hour Volumes	

### Warrant 5: School Crossing

Gaps Same Period --and--	
Student Volumes	
Nearest Traffic Control Signal (optional)	✓

### Warrant 6: Coordinated Signal System

Degree of Platooning (Predominant direction or both directions)	
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### Warrant 7: Crash Experience

A. Adequate trials of alternatives, observance and enforcement failed --and--	
B. Reported crashes susceptible to correction by signal (12-month period) --and--	
C. 80% Volumes for Warrants 1A, 1B, --or-- 4 are satisfied	✓

### Warrant 8: Roadway Network

A. Weekday Volume (Peak hour total --and-- projected warrants 1, 2, or 3) --or--	
B. Weekend Volume (Five hours total)	

### Warrant 9: Grade Crossing

A. Grade Crossing within 140 ft --and--	
B. Peak-Hour Vehicular Volumes	