

MEMORANDUM

DATE: October 14, 2016

TO: Mr. Robert Roth
Roth Family LLC
40 Centre Street
Brookline, MA 02445

FROM: Daniel J. Mills, P.E., PTOE – Principal *DJM*
Daniel A. Dumais, P.E. – Senior Transportation Engineer

RE: **Traffic & Parking Assessment - Proposed Residential Development**
40 Centre Street – Brookline, MA

MDM Transportation Consultants, Inc. (MDM) has prepared this traffic impact and parking assessment for the proposed residential development to be located at 40 Centre Street in Brookline, Massachusetts. This memorandum supplements prior assessments conducted by others, including the following reports, and is intended to address comments made by the Town and their peer review consultant, Environmental Partners Group.

- Traffic Assessment Memorandum, prepared by Vanasse & Associates, Inc., dated April 15, 2016.
- Memorandum, prepared by Vanasse & Associates, Inc., dated August 22, 2016.

This assessment describes existing (baseline) traffic conditions for adjacent roadways, trip generation characteristics of the proposed development, incremental traffic impacts of the site development on area roadways, parking demands based on local vehicle ownership statistics and evaluates safety-related conditions at the study intersection.

Key findings of this traffic assessment are as follows:

- *Alternative Travel Options (Mode Share).* Non-auto travel modes account for approximately 50 percent of trips to work by residents in the Coolidge Corner neighborhood, of which public transportation is the largest share (30 percent) followed by walk mode (16 percent) and other modes (4 percent).

- *Modest Trip Generation.* The development project is estimated to generate approximately 10 vehicle trips during the weekday morning peak hour and 12 vehicle trips during the weekday evening peak hour. On a daily basis, the development is estimated to generate approximately 126 vehicle trips on a weekday with 50 percent entering and exiting.
- *Adequate Roadway Capacity.* The site driveway intersection with Centre Street/Centre Street East parking lot is expected to operate below capacity at LOS B or better during peak hours. Incremental traffic increases at the study intersection due to the proposed development generally result in inconsequential changes in intersection operations compared to No-Build conditions. Therefore, no specific roadway improvements are warranted to accommodate the project.
- *Safety Characteristics.* A review of the crash data indicates that no immediate safety countermeasures are warranted at the study intersection. However, MDM recommends that the existing hedge located along the northerly property line be cut back approximately 3-feet from the back of sidewalk to enhance sight lines to/from the proposed site driveway. In addition, any new plantings (shrubs/bushes) or structures (fences, walls, etc.) in the line of sight be maintained at a height of 2 feet or less above the adjacent existing roadway grade to ensure clear sight lines to oncoming traffic.
- *On-site Parking Supply.* Based on a review of residential parking demand statistics, it is anticipated that the proposed 21-space parking garage will provide a reasonable supply of parking to perspective tenants that choose to own a vehicle. In the event that there are additional demands for off-street parking, supplemental stacked parking systems in the first floor garage and/or arrangements to park at one of the area's private parking lots should be considered.

In summary, vehicle trip generation for the development is expected to be nominal. As such, MDM finds that incremental traffic associated with the proposed development is not expected to materially impact operating conditions at the study intersection. In addition, the study intersection exhibits below-average crash rates based on historic crash data; safety countermeasures are therefore not warranted. The 21-space parking garage is expected to reasonably meet the needs of the tenants with the ability to arrange additional off-street parking in area private parking lots should prospective tenant demands dictate.

PROJECT DESCRIPTION

Existing Conditions

The project site is situated at 40 Centre Street in Brookline, Massachusetts. The location of the site relative to adjacent roadways is shown in **Figure 1**. The mixed-use building on the Site includes two first floor medial office tenants and one (1) residential unit on the second floor.

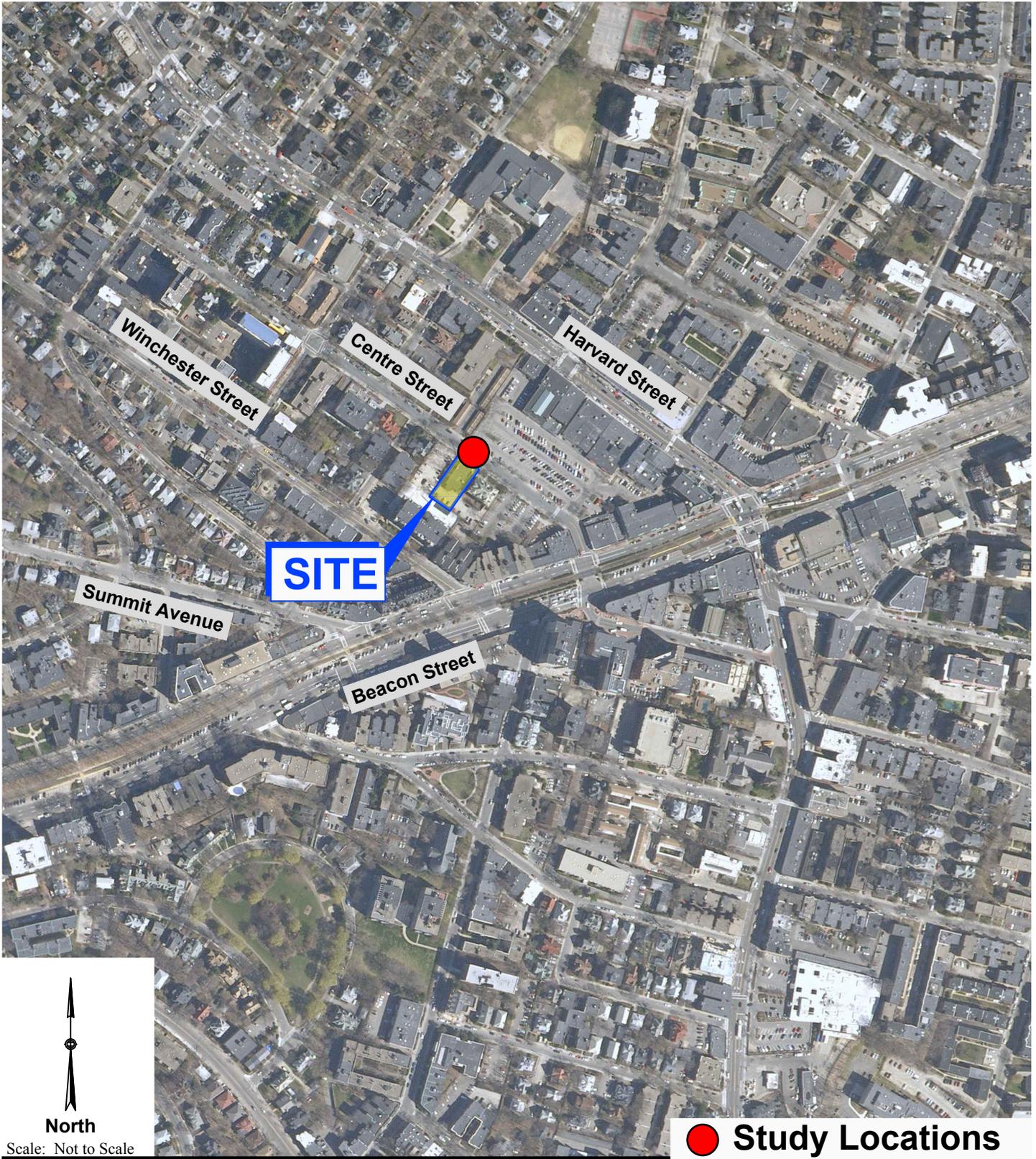


Figure 1

Vehicle access to the site is provided via a curb cut along Centre Street on the southerly side of the building. On-site parking is provided for approximately 11 vehicles. The site is also served by an existing network of sidewalks within the Coolidge Corner neighborhood.

Proposed Conditions

Under the proposed development plan, the existing mixed-use building will be razed and replaced with a 40-unit residential apartment building. An access driveway will be located slightly north of the existing driveway location. A total of 21 off-street vehicle parking spaces and 32 bicycle racks will be provided in the first-floor parking garage to support the proposed use. A preliminary site plan prepared by Cube 3 Studio, LLC is shown in **Figure 2**.

BASELINE CONDITIONS

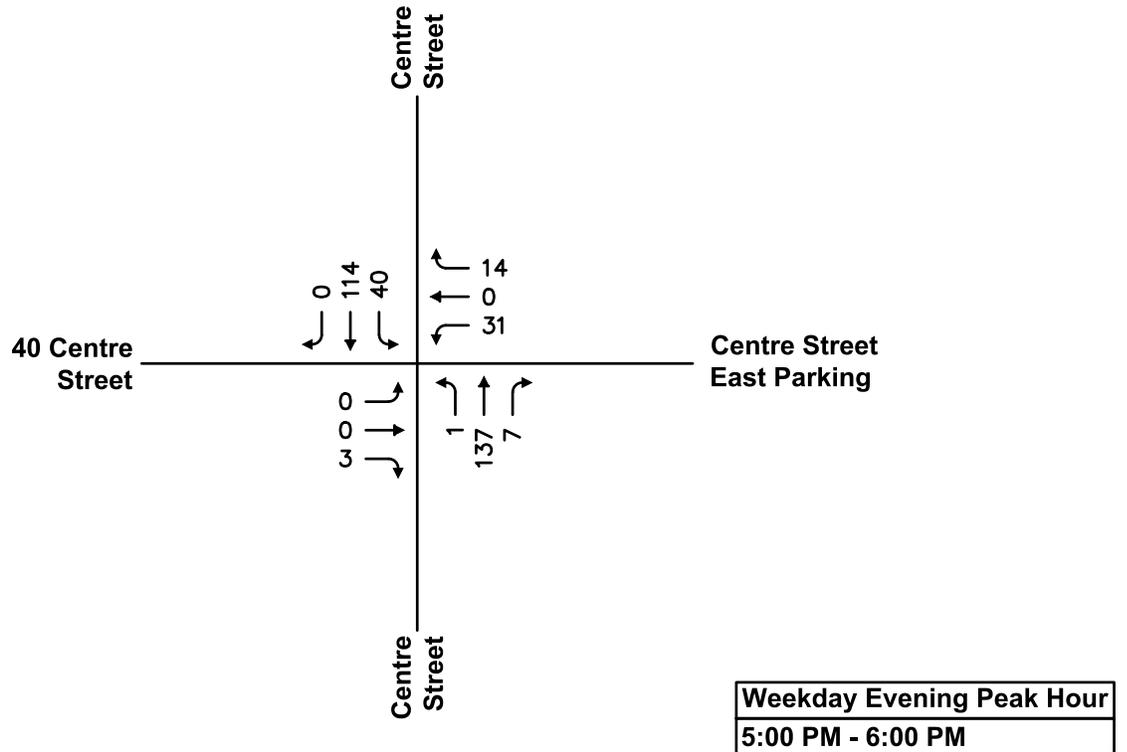
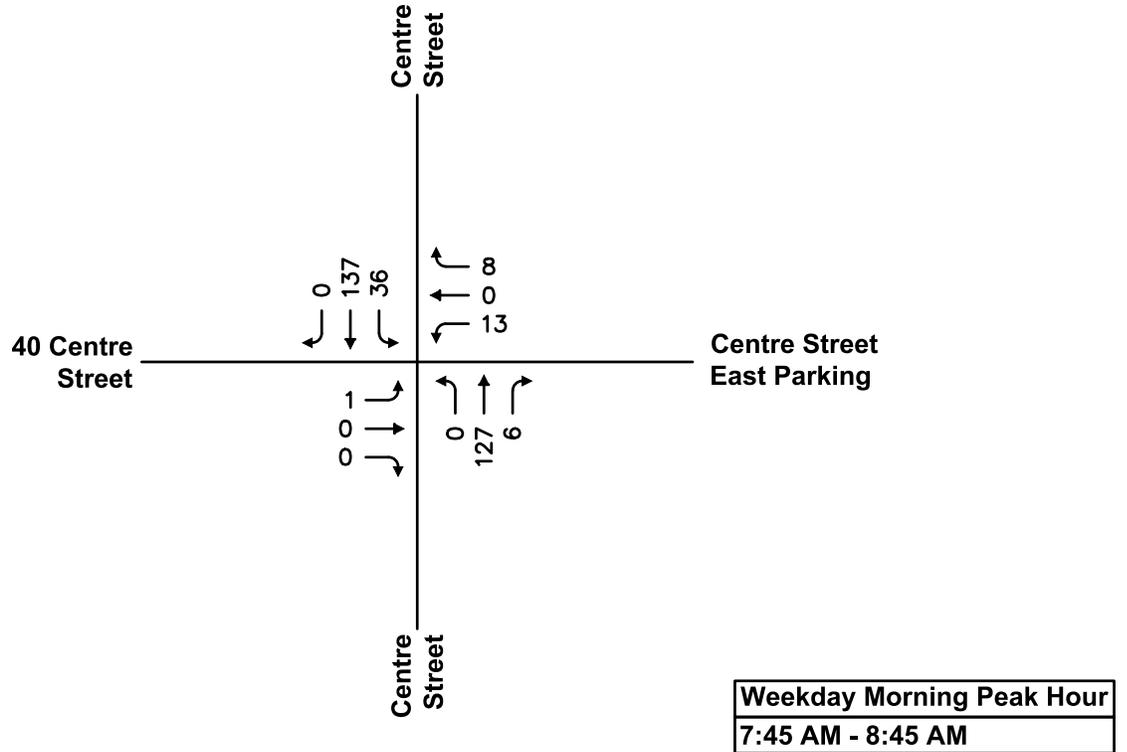
This TIA evaluates transportation characteristics of roadways and intersection that provide a primary means of access to the site, and that could potentially sustain a measurable level of traffic impact from the development. The study area includes the following intersection, which is also identified in **Figure 1**:

- Centre Street at Centre Street East/Site Driveway (Unsignalized)

According to the Massachusetts Department of Transportation (MassDOT), Centre Street is classified as an Urban Collector and is under local (Town) jurisdiction. Adjacent to the Site, Centre Street is approximately 35 feet wide, is a two-way roadway with metered parking along the eastern side. Sidewalks are provided on both sides of the roadway. The metered spaces are in effect Monday to Saturday, 8:00 AM to 6:00 PM with a maximum parking duration of three hours. The prima-facie speed limit along Centre Street is 30 mph. Land use along Centre Street includes a mix of commercial and residential and the Centre Street East and West surface parking lots.

Baseline Traffic Data

Traffic volume data were collected at the study area intersection during the weekday morning (7:00 AM - 9:00 AM) and weekday evening (4:00 PM – 6:00 PM) periods to coincide with peak traffic activity of the proposed use and the adjacent streets. Traffic data used in this evaluation was collected in September 2016, which represents above-average traffic conditions based on review of MassDOT permanent count station data for the area. As a conservative measure, no adjustment (reduction) was made to the traffic counts to represent average conditions. The weekday morning and evening peak hours of traffic volume for the study intersections are shown in **Figure 3**. Traffic count data and MassDOT permanent count station data are provided in the **Attachments**.



North

Scale: Not to Scale

Figure 3

**2016 Existing Condition
 Weekday Peak Hour Traffic Volumes**

Intersection Crash History

In order to identify crash trends and safety characteristics for study area intersections, crash data were obtained from MassDOT for the Town of Brookline for the three-year period covering 2012 through 2014 (the most recent data currently available). No crashes were reported at the study intersection during the three-year period reviewed. Crash record data has also been requested from the Brookline Police Department and indicates that approximately one (1) motor vehicle accident per year occurs along Centre Street between Beacon Street and Wellman Street. Based on this information, no immediate safety countermeasures appear to be warranted for this section of Centre Street.

ALTERNATIVE TRANSPORTATION/ MODE SHARE STATISTICS

An inventory of the existing car and bicycle sharing services and available public transit routes within ¼ mile of 40 Centre Street are shown graphically in **Figure 4** and described in the following section. Mode share statistics are also summarized based on the latest 5-year projections from the US Census data for the immediate Census Tract (4004).

Public Transit

The Massachusetts Bay Transportation Authority (MBTA) operates bus and rapid transit subway services in the immediate study area that correspond to a substantial usage of public transportation systems (approximately 30 percent of trips to work) by area residents. Specific route and schedule information is provided in the **Attachments**. Nearby transit routes include:

- **Green Line C:** The Green Line C provides service between North Station and Cleveland Circle with the closet stops located at Coolidge Corner and Summit Avenue with direct connections to the MBTA Red, Blue, Orange and Commuter Rail.
- **Route 66 (Harvard Square – Dudley Station via Allston & Brookline Village):** This bus route provides service between Harvard Square and Dudley Square via Coolidge Corner along Harvard Street.

Car Sharing Services

Car sharing services provide access to short-term vehicle transportation. Vehicles can be rented by the hour or day and all standard vehicle costs (gas, maintenance, insurance, etc.) are included in the rental fee. Vehicles are checked out for a period of time and returned to their designated location. There are approximately eleven (11) Zipcar cars located within a ¼ mile radius (5 minute walk) of 40 Centre Street with four (4) of the Zipcars located in the parking lot adjacent to the Site. Real-time availability and vehicle statistics can be found on Zipcar's webpage (www.zipcar.com).

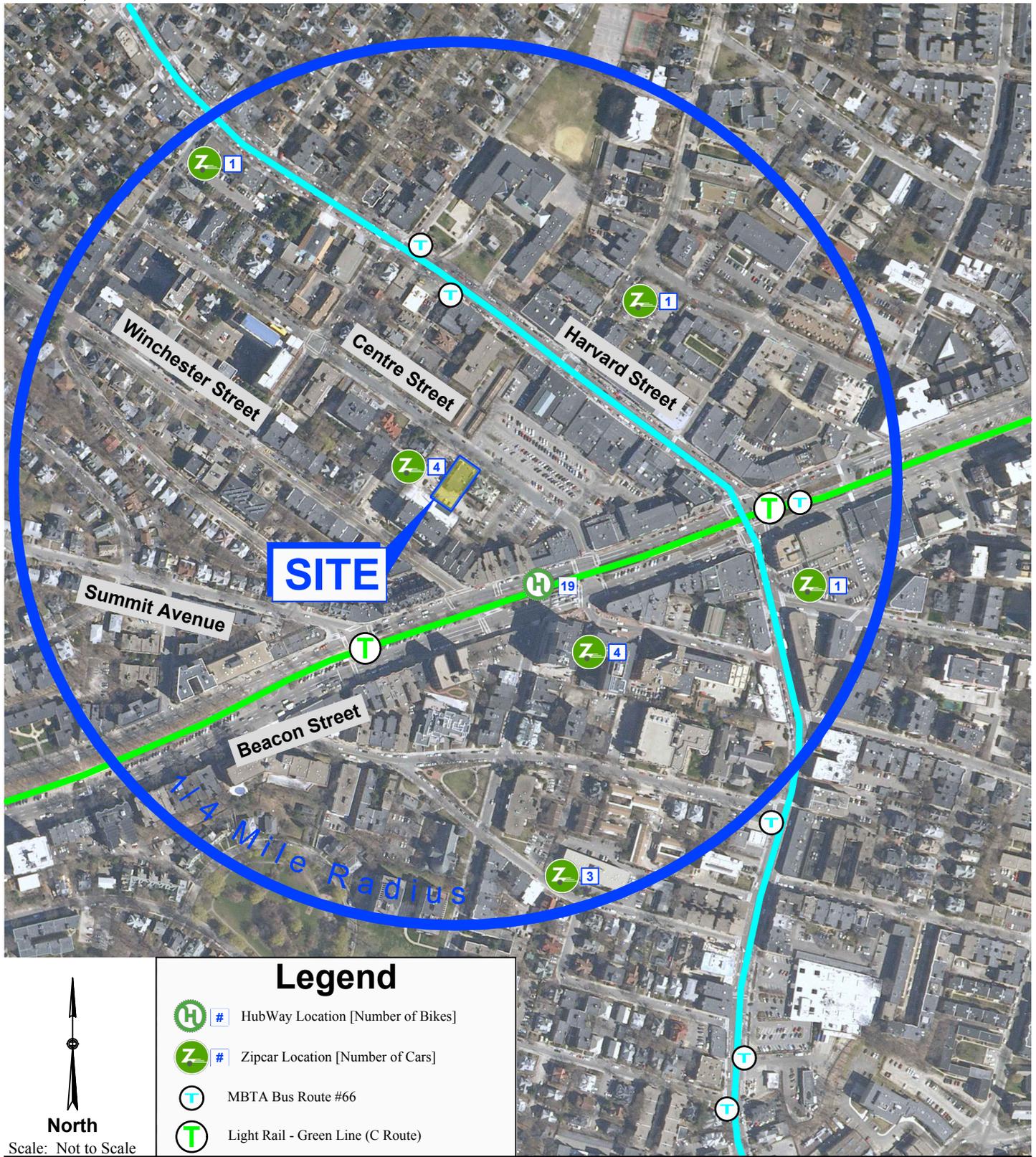


Figure 4

Bicycle Sharing Services

Bicycle sharing services provide access to short-term bicycle transportation. Hubway is the Boston area's shared bicycle system, which allows members to rent bicycles for a period of time and return to any Hubway location. The system is designed for quick trips with the first 30 minutes free for members and an incurred user fee thereafter. Membership passes are available for purchase in daily (24 hr), 72-hour, monthly and yearly increments. There are currently 19 bicycle-docking stations located at Beacon Street/ Centre Street in Coolidge Corner. Real-time availability and online utilization reports can be found on Hubway's webpage (www.thehubway.com).

US Census Travel Mode Statistics

MDM has reviewed US Census Tract data for the 40 Centre Street vicinity to identify transit and auto use statistics that are applicable to estimating parking and traffic generation cited in this memorandum. US Census data for residents of the neighborhood (Census Tract 4004) from the 2010-2014 American Community Survey 5-Year Estimates is summarized in **Table 1** with supporting documentation in the **Attachments**.

TABLE 1
US Census 2010-2014 – Travel Modes (Tract 4004)

Travel Mode	Percent¹
Auto (Single Occupant Vehicle)	44%
Non-SOV	
- Auto (Carpool)	6%
- Public Transportation	30%
- Walk	16%
- Other (Taxi, Bike, etc.)	4%
Total	100%

¹Census Tract 4004 – Norfolk County, Brookline MA

As summarized in **Table 1**, non-SOV auto travel modes account for approximately 56 percent of trips made to/from the Coolidge Corner neighborhood by residents, of which public transportation is the largest share (30 percent) followed by walk mode (16 percent).

PROJECTED FUTURE TRAFFIC CONDITIONS

Evaluation of the proposed development impacts requires the establishment of a future baseline analysis condition. This section estimates future roadway and traffic conditions with and without the proposed development. For this evaluation, a five-year planning horizon (year 2021) was selected consistent with standard industry practice.

To determine the impact of site-generated traffic volumes on the roadway network under future conditions, baseline traffic volumes in the study area were projected to a 5-year design condition. Traffic volumes on the roadway network at that time, in the absence of the development (that is, the No-Build condition), includes existing traffic, new traffic due to general background traffic growth, and traffic related to specific developments by others that are currently under review at the local and/or state level. Consideration of these factors resulted in the development of No-Build traffic volumes. Anticipated site-generated traffic volumes were then superimposed upon these No-Build traffic-flow networks to develop future Build conditions.

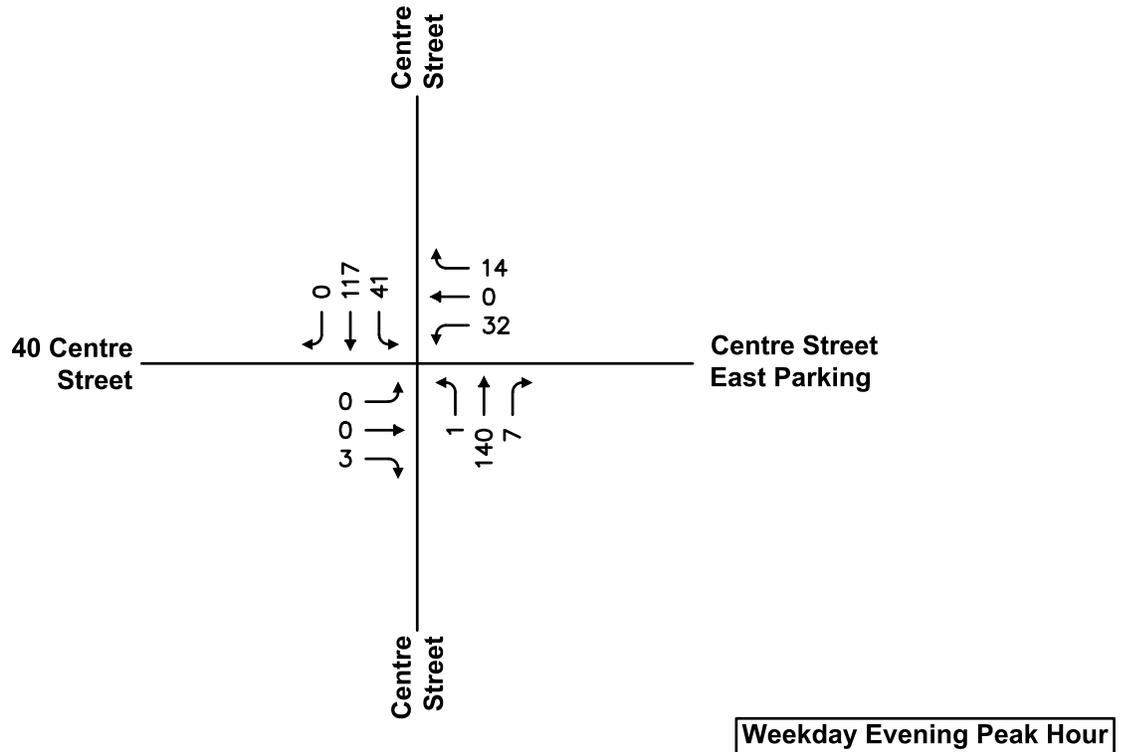
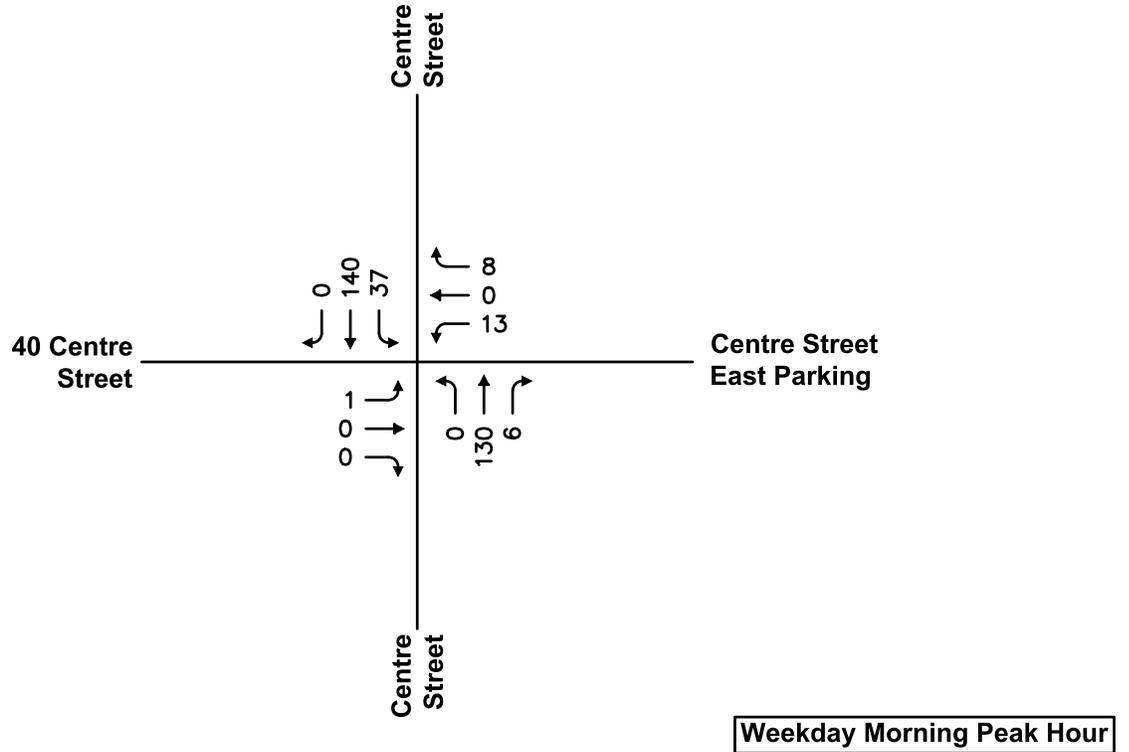
The following sections provide details for the development of future No-Build traffic volumes.

Background Growth

Background traffic includes demand generated by other planned developments in the area as well as demand increases caused by external factors. External factors are general increases in traffic not attributable to a specific development and are determined using historical traffic volume data.

Nearby permanent count station data published by MassDOT indicates a negative (-0.3) per year growth rate. For purposes of this evaluation, a 0.5 percent growth rate was used (2.5 percent increase over a 5-year horizon). This growth rate is higher than historic rates, and, as such, is also expected to account for any small fluctuation in hourly traffic as may occur from time to time in the study area and traffic associated with other potential small developments in the area. MassDOT permanent count station data and background growth calculations are provided in the **Attachments**.

The Brookline Planning Staff indicates that there are currently five (5) known permitted/proposed projects in the study area that may increase traffic at the study intersection.



North

Scale: Not to Scale

Figure 5

**2021 No-Build Condition
 Weekday Peak Hour Traffic Volumes**

- 1 - *Permitted Devotion School.* The Devotion School located at 345 Harvard Street was permitted for an 180,000 sf expansion. Proposed access/egress would be via direct connection(s) to Harvard Street.
- 2 - *Proposed 54 Auburn Street.* 54 Auburn Street is a proposed 15,000 gsf residential development to be located along Auburn Street. Proposed access/egress would be via direct connection(s) to Auburn Street.
- 3 - *Proposed 384 Harvard Street.* 384 Harvard Street is a proposed mixed use development. It consists of 64 residential units (56,500 sf) and 2,500 sf of retail space.
- 4 - *Proposed JFK Crossing.* The proposed JFK Crossing is located at 420 Harvard Street and consists of 31,000 sf of residential use and 5,000 sf of retail.
- 5 - *Proposed 1299 Beacon Street.* 1299 Beacon Street is a proposed mixed use development consisting of 6,000 sf of retail use and 144,000 sf of age-restricted residential use.

A review of known permitted/proposed area development projects indicate that traffic generated by the background projects will have a nominal impact to the Centre Street study area. Therefore, these projects are adequately accounted for within the general background growth rate used for this assessment.

2021 No-Build Traffic Volume Networks

In summary, to account for future traffic growth in the study area future No-Build traffic volumes are developed by increasing the existing (2016) volumes by approximately 2.5 percent (0.5 percent compounded annually over 5 years). The resulting 2021 No-Build traffic volumes are displayed in **Figure 5**.

Trip Generation

The proposed development involves a 40-unit residential apartment. As such, traffic generated by the Site is estimated using trip rates published in ITE's *Trip Generation*¹ for the Land Use Code (LUC) 220 – Apartments for the weekday morning and evening periods, which correspond to the critical weekday analysis periods for the proposed use and adjacent street traffic flow. Based on a review of the US Census mode share data for the neighborhood, a trip reduction credit has been applied to account for the high percentage of residents that use alternative modes of transportation for trips to work.

¹*Ibid 2*

Table 2 presents the trip-generation estimate for the proposed development based on ITE methodology for a 40-unit apartment building with reductions for area mode share statistics. Not that this summary takes no credit for the existing medical office and residential use of the existing building. Trip generation calculations are provided in the **Attachments**.

**TABLE 2
TRIP-GENERATION SUMMARY**

Period/Direction	Site Trips (Unadjusted) ¹	Mode Share Reduction ²	Net New Vehicle Trips
<i>Weekday Morning Peak Hour:</i>			
Entering	4	-2	2
<u>Exiting</u>	<u>16</u>	<u>-8</u>	<u>8</u>
Total	20	-10	10
<i>Weekday Evening Peak Hour:</i>			
Entering	16	-8	8
<u>Exiting</u>	<u>9</u>	<u>-5</u>	<u>4</u>
Total	25	-13	12
<i>Weekday Daily</i>	266	-140	126

Source: ITE *Trip Generation*, Ninth Edition; 2012.

¹Based on ITE LUC 220 (Apartments) applied to 40 Dwelling Units prior to mode share adjustment.

²Based on a mode share reduction of 53% for Census Tract 4004.

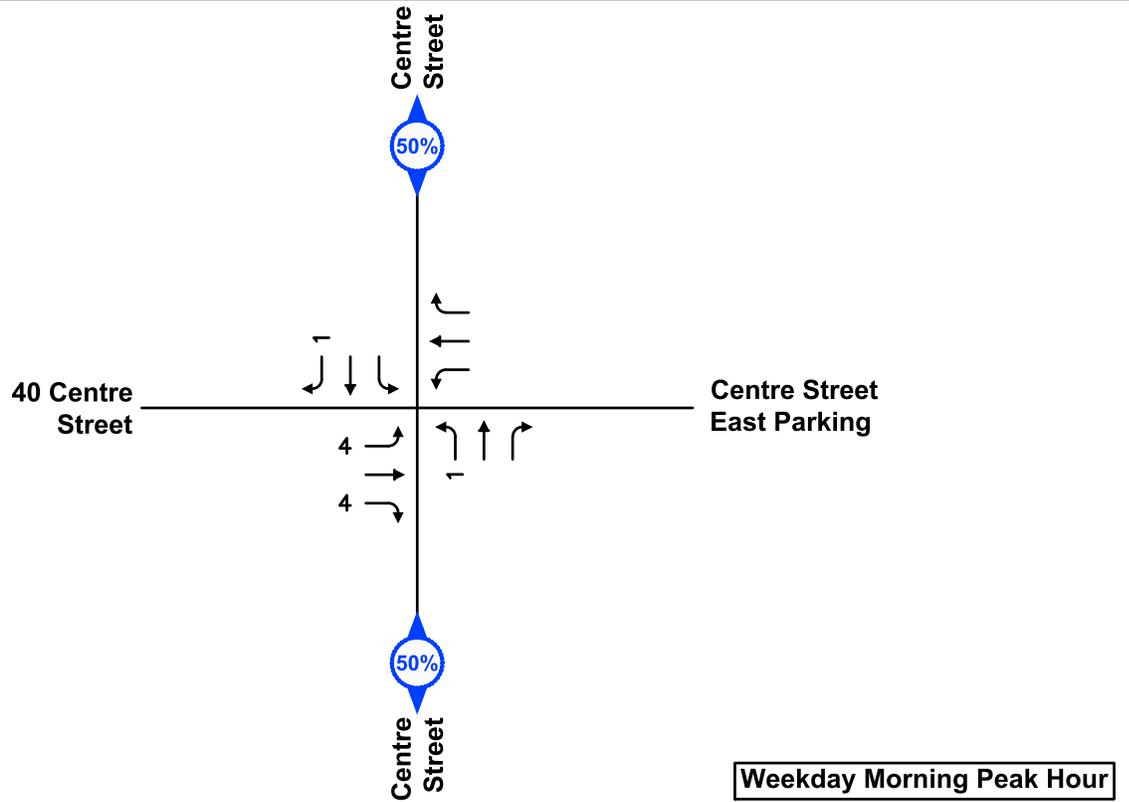
As summarized in **Table 2**, projected vehicle trip generation for the proposed development is approximately 10 vehicle trips (2 entering and 8 exiting) during the weekday morning peak hour and 12 vehicle trips (8 entering and 4 exiting) during the weekday evening peak hour. On a daily basis, the site is estimated to generate approximately 126 vehicle trips on a weekday.

Trip Distribution

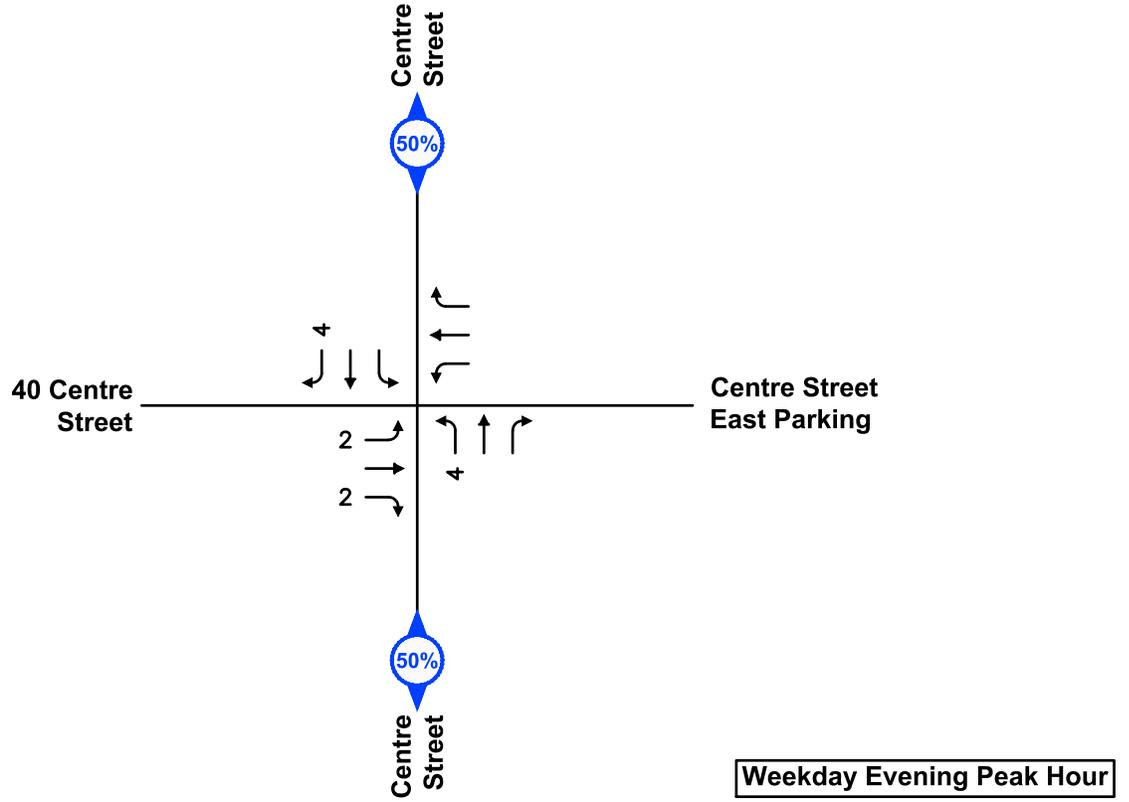
Development-related vehicular trips for the proposed Site are assigned to the roadway network using the ITE trip-generation estimates shown in **Table 2** based on existing travel patterns in the study area. New development-related trips at each intersection approach for the weekday morning and weekday evening peak hours are quantified in **Figure 6**. Trip distribution calculations are provided in the **Attachments**.

2021 Build Traffic Conditions

2021 Build condition traffic volumes are derived by removing the site trips associated with the existing medical office and residential uses and then adding the incremental traffic associated with the apartment building to the 2021 No-Build conditions. **Figure 7** present the 2021 Build condition traffic-volume networks for the weekday morning and evening peak hours.



Weekday Morning Peak Hour



Weekday Evening Peak Hour

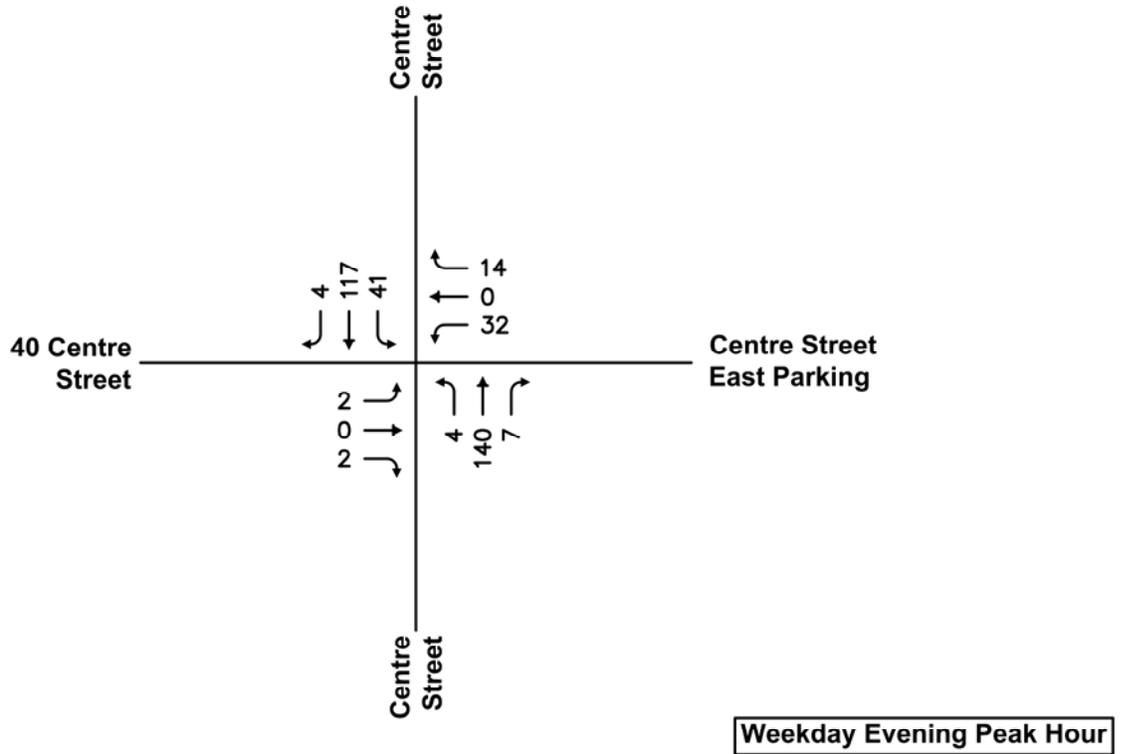
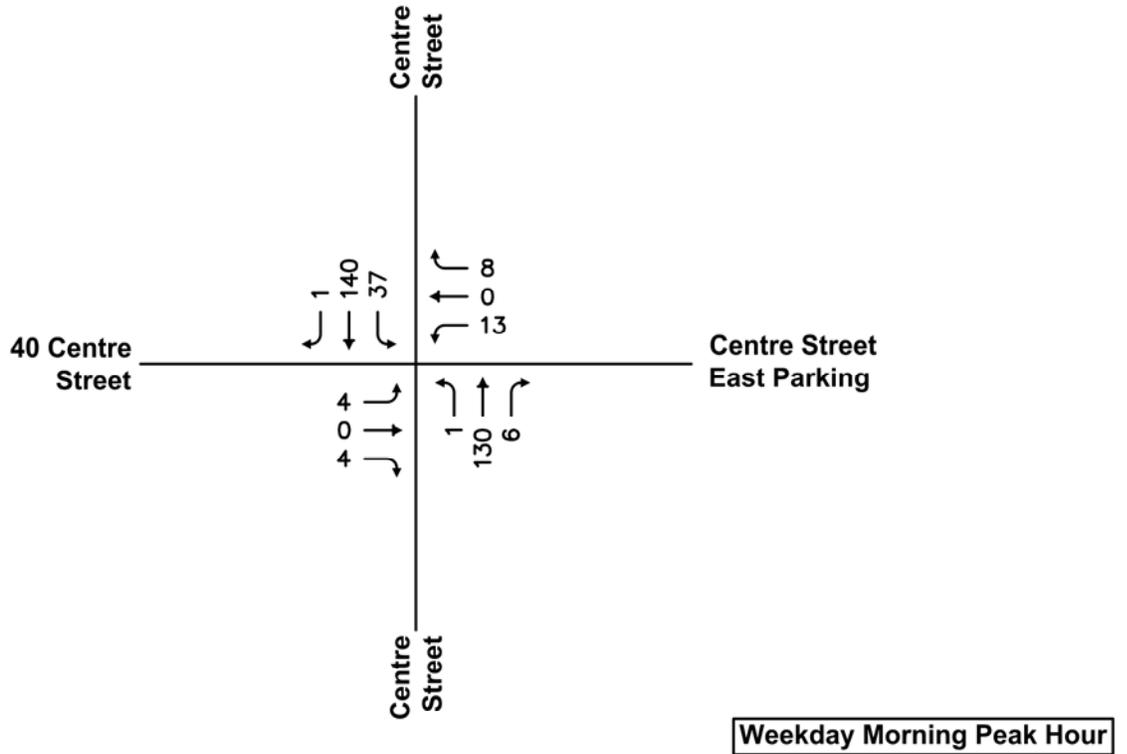


North

Scale: Not to Scale

Figure 6

Trip Distribution



North

Scale: Not to Scale

Figure 7

**2021 Build Condition
 Weekday Peak Hour Traffic Volumes**

OPERATIONS ANALYSIS

This section provides an overview of operational analysis methodology, an assessment of intersection operations under existing (baseline) and projected future No-Build and Build conditions.

Analysis Methodology

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

Capacity analysis of intersections is developed using the Synchro® computer software, which implements the methods of the 2010 Highway Capacity Manual (HCM). The resulting analysis presents a level-of-service (LOS) designation for individual intersection movements. The LOS is a letter designation that provides a qualitative measure of operating conditions based on several factors including roadway geometry, speeds, ambient traffic volumes, traffic controls, and driver characteristics. Since the LOS of a traffic facility is a function of the traffic flows placed upon it, such a facility may operate at a wide range of LOS, depending on the time of day, day of week, or period of year. A range of six levels of service are defined on the basis of average delay, ranging from LOS A (the least delay) to LOS F (delays greater than 50 seconds for unsignalized movements). The specific control delays and associated LOS designations are presented in the **Attachments**.

Intersection Capacity Analysis Results

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

**TABLE 3
INTERSECTION CAPACITY ANALYSIS RESULTS – 40 Centre Street/Centre Street East Lot**

Period	Approach	2016 Baseline			2021 No-Build			2021 Build		
		v/c ¹	Delay ²	LOS ³	v/c	Delay	LOS	v/c	Delay	LOS
<i>Weekday Morning Peak Hour</i>										
<i>Centre Street at</i>	EB Exit	0.00	12	B	0.00	12	B	0.01	11	B
<i>Site Driveway/Centre</i>	WB Exit	0.04	11	B	0.04	11	B	0.04	11	B
<i>Street East Parking Lot</i>	Centre St NB	0.00	<5	A	0.00	<5	A	0.00	<5	A
	Centre St SB	0.03	<5	A	0.03	<5	A	0.03	<5	A
<i>Weekday Evening Peak Hour</i>										
<i>Centre Street at</i>	EB Exit	0.00	9	A	0.00	9	A	0.01	10	A
<i>Site Driveway/Centre</i>	WB Exit	0.08	11	B	0.08	11	B	0.08	11	B
<i>Street East Parking Lot</i>	Centre St NB	0.00	<5	A	0.00	<5	A	0.00	<5	A
	Centre St SB	0.03	<5	A	0.03	<5	A	0.03	<5	A

¹Volume-to-capacity ratio

²Average control delay per vehicle (in seconds)

³Level of service

As summarized in **Table 3**, the unsignalized Centre Street intersection with the site driveway and Centre Street East Parking will continue to operate below capacity at LOS B or better during peak hours with the proposed residential development in place. Mainline travel along Centre Street will remain un-impeded with minimal delay. Furthermore, the proposed development is not expected to materially impact study area intersections and will not result in any material changes in traffic operations in the study area between future No-Build and Build conditions.

PROJECTED RESIDENT PARKING DEMAND

The proposed development will provide 21 off-street parking spaces for the 40 residential units proposed – equivalent to a 0.53 space per unit parking ratio. It is anticipated that non-resident driving to the site will utilize on-street metered parking spaces, public parking lots and/or obtain a Temporary or Guest parking permit offered by the Town of Brookline.

According to Section 6.02 of the Town of Brookline zoning code for the G1.75 Coolidge Corner zoning, 92 parking spaces are required for the proposed residential building. In order to assess the likely parking demand for the 40 residential units, the following items were reviewed:

- US Census Data - Vehicle Ownership by Rental Unit for Tract 4004
- 2012 Town Survey - Vehicle Ownership by Rental Unit
- ITE Parking Generation Estimates
- Town of Brookline Guest Overnight Parking Program

Vehicle Ownership by Rental Unit

In order to estimate the likely parking demand generated by the proposed 40 residential units, the American Community Survey (ACS) Census data was reviewed for Census Tract 4004 which includes the immediate study area. In addition, findings in the Town's 2012 Town Survey² and industry standard parking demand rates as published in ITE's *Parking Generation*³ were also reviewed. As previously described under *Alternative Transportation/Mode Share Statistics*, the following public transportation and alternative travel opportunities are easily accessible from the Site (less than a 3 minute walk) and significantly reduce the need for automobile ownership by prospective residents:

- MBTA Green Line Subway
- MBTA Route 66 bus service
- Hubway's regional bike share system
- Zipcar regional car share system

In addition, the Coolidge Corner area offers a mixed-use environment, including grocery stores, pharmacies, restaurants, houses of worship and retail and service establishments that reduce dependence on vehicle ownership.

As shown in **Table 4** below, peak parking demand for the 40 apartment units has been estimated based on ACS vehicle ownership information, ITE parking generation rates and Town Survey data for rental units. Specific data and calculations are provided in the **Attachments**.

²"The Minimum Off-Street Parking Requirements in Brookline's Zoning By-Law, Analysis and Recommendations for Modification," Moderator's Committee on Parking, August 30, 2013.

³ITE, *Parking Generation*, 3rd Edition, Land Use Code 221 (Apartment).

**TABLE 4
PEAK PARKING DEMAND SUMMARY**

Peak Parking Demand Source	Parking Demand Rate (per Rental Unit)	Estimated Peak Parking Demand
<i>Census Data</i>		
ACS – Tract 4004	0.45 ¹	18
<i>ITE Parking Generation</i>		
Average Rate (Adjusted for mode share)	0.58 ²	23
<i>2012 Town Survey – Rental Units³</i>		
Studio (16 units)	0.36	6
1 Bedroom (14 units)	0.62	9
2 Bedroom (5 units)	0.98	5
<u>3+ Bedroom</u> (5 units)	<u>1.31</u>	<u>7</u>
Total (40 Units)	0.68	27

¹Average vehicle ownership per rental unit within Census Tract 4004 based on ACS 2010-2014 5-year estimates.

²Based on average rate for LUC 221 (Apartment) adjusted to reflect 53% alternative travel mode per **Table 1**.

³Based on 2012 Town Survey results for cars/household (rental/non-single family) in neighborhoods 1-10 & 12.

As summarized in **Table 4**,

- *Census Data.* Rental apartments within the immediate Census Tract 4004 have an average vehicle ownership of 0.45 vehicles per unit based on the latest ACS Census data resulting in an estimated peak demand of 18 parked vehicles.
- *ITE Data.* ITE parking demand data, when adjusted for a 47% automobile mode share, has an average parking demand of 0.58 vehicles per unit resulting in an estimated peak demand of 23 parked vehicles.
- *Town Survey.* Vehicle per household (rental) data collected by the town in 2012 for areas close to public transportation indicate an average of 0.68 vehicles per unit when adjusted for the proposed bedroom mix, resulting in an estimated peak demand of 27 parked vehicles for the 40-unit building.

In summary, peak parking demand for the residential development based on industry standard and empirical data indicate an estimated peak parking demand of between 18 and 27 vehicles. The proposed parking supply of 21 spaces falls within this range, however, based on the above findings, the project may generate a need for six (6) additional parking spaces. It is our understanding that up to four additional parking spaces may be provided within the first floor parking lot by way of additional stacked parking systems, for a total supply of 25 parking spaces. Additional parking demand, if generated, can be addressed through agreements with area private lot owners (e.g., 19 Winchester Street, 43 Winchester Street and Marriot Courtyard on Webster Street). Currently, approximately 19 parking spaces are available in two private lots located close to the site with additional opportunities located within walking distance.

Guest Overnight Parking

The proposed parking spaces are intended to accommodate residents of the development, as such, overnight guests will need to rely on Brookline's Guest Overnight Parking Program. As described on the Town's website, ..."As a Brookline resident, you may purchase a guest overnight parking pass that will allow a guest to park in a designated parking space reserved by the town for overnight guest parking. Parking on-street or in a public lot where overnight parking is prohibited. A guest overnight parking pass entitles the holder to park in a guest space between the hours of 11 PM and 8 AM." The nightly cost is \$10 per permit. A review of guest parking inventory indicates that the Town has 46 spaces in the Coolidge Corner neighborhood.

Other parking programs are offered by the Town to address the various needs of the community including the Residential Parking Permit Program, Resident Overnight Parking Program and Temporary Parking Permits.

CONCLUSIONS AND RECOMMENDATIONS

Given the high degree of alternative transportation modes within the Coolidge Corner neighborhood, the development is estimated to generate a nominal 10 vehicle trips during the weekday morning peak hour and 12 vehicle trips during the weekday evening peak hour. MDM finds that the incremental traffic associated with the proposed development is not expected to materially impact operating conditions along Centre Street or at the Centre Street intersection with the proposed site driveway. The traffic volume increases will generally remain within the day-to-day fluctuations of the area roadway and intersections.

The study intersection does not exhibit any specific motor vehicle accident trend, as such, specific safety countermeasures are not warranted for the nominal increase in traffic due to the development. MDM does however, recommend that the existing hedge located along the northerly property line be cut back approximately 3-feet from the back of sidewalk to enhance sight lines to/from the proposed site driveway. In addition, any new plantings (shrubs/bushes) or structures (fences, walls, etc.) in the line of sight be maintained at a height of 2 feet or less above the adjacent existing roadway grade to ensure clear sight lines to oncoming traffic.

Based on a review of residential parking demand statistics, it is anticipated that the proposed 21-space parking garage will provide a reasonable supply of parking to perspective tenants that choose to own a vehicle. In the event that there are additional demands for off-street parking, supplemental stacked parking systems in the first floor garage and/or arrangements to park at one of the area's private parking lots, which have been shown to have ample capacity, should be considered. In addition, the Town of Brookline's metered parking spaces, overnight parking programs and temporary parking permits should be sufficient to meet the short-term parking needs associated with guests and other visitors of the development.

Appendix

- Traffic Volume Data
- Yearly/Seasonal Calculations
- Centre Street Crash data
- Public Transportation Information
- US Census Travel Mode Statistics
- Trip Generation Data
- Trip Distribution Calculations
- Capacity Analyses
- Parking Data
- Car Sharing/Bike Sharing

□ Traffic Volume Data

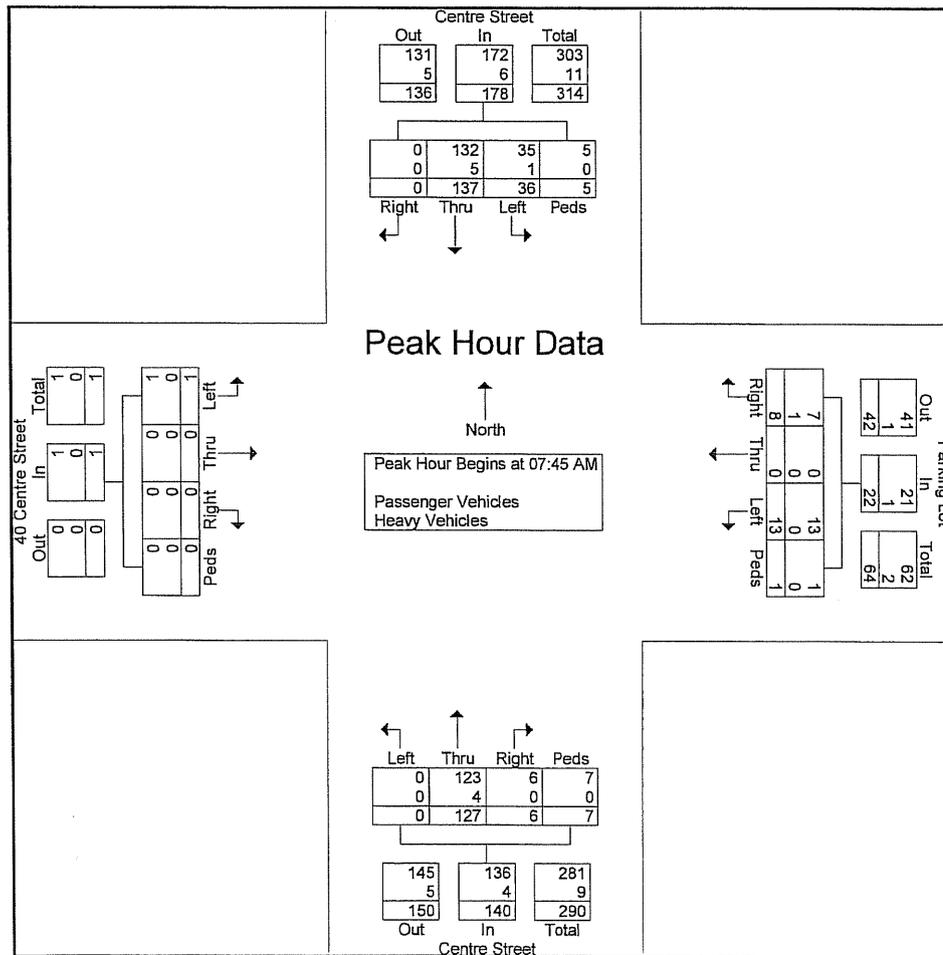
MDM Transportation Consultants, Inc.

28 Lord Road, Suite 280
Marlborough, MA

N/S: Centre Street
E/W: 40 Centre Street/Parking Lot
Brookline, MA

File Name : 894 Centre St AM Count
Site Code : 894
Start Date : 9/26/2016
Page No : 2

Start Time	Centre Street From North					Parking Lot From East					Centre Street From South					40 Centre Street From West					Int. Total
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	
Peak Hour Analysis From 07:00 AM to 08:30 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:45 AM																					
07:45 AM	0	39	22	4	65	5	0	3	0	8	1	24	0	4	29	0	0	0	0	0	102
08:00 AM	0	46	6	1	53	1	0	4	0	5	2	40	0	1	43	0	0	0	0	0	101
08:15 AM	0	34	4	0	38	0	0	1	0	1	2	36	0	2	40	0	0	1	0	1	80
08:30 AM	0	18	4	0	22	2	0	5	1	8	1	27	0	0	28	0	0	0	0	0	58
Total Volume	0	137	36	5	178	8	0	13	1	22	6	127	0	7	140	0	0	1	0	1	341
% App. Total	0	77	20.2	2.8		36.4	0	59.1	4.5		4.3	90.7	0	5		0	0	100	0		
PHF	.000	.745	.409	.313	.685	.400	.000	.650	.250	.688	.750	.794	.000	.438	.814	.000	.000	.250	.000	.250	.836
Passenger Vehicles	0	132	35	5	172	7	0	13	1	21	6	123	0	7	136	0	0	1	0	1	330
% Passenger Vehicles																					
Heavy Vehicles	0	5	1	0	6	1	0	0	0	1	0	4	0	0	4	0	0	0	0	0	11
% Heavy Vehicles	0	3.6	2.8	0	3.4	12.5	0	0	0	4.5	0	3.1	0	0	2.9	0	0	0	0	0	3.2



MDM Transportation Consultants, Inc.

28 Lord Road, Suite 280
Marlborough, MA

N/S: Centre Street
E/W: 40 Centre Street/Parking Lot
Brookline, MA

File Name : 894 Centre St AM Count
Site Code : 894
Start Date : 9/26/2016
Page No : 1

Groups Printed- Passenger Vehicles - Heavy Vehicles

Start Time	Centre Street From North					Parking Lot From East					Centre Street From South					40 Centre Street From West					Int. Total
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	
07:00 AM	0	11	1	0	12	1	0	1	0	2	3	14	0	0	17	0	0	0	0	0	31
07:15 AM	0	12	5	3	20	0	0	2	0	2	5	16	0	0	21	0	0	0	0	0	43
07:30 AM	0	18	7	1	26	0	0	2	0	2	0	19	0	2	21	0	0	0	0	0	49
07:45 AM	0	39	22	4	65	5	0	3	0	8	1	24	0	4	29	0	0	0	0	0	102
Total	0	80	35	8	123	6	0	8	0	14	9	73	0	6	88	0	0	0	0	0	225
08:00 AM	0	46	6	1	53	1	0	4	0	5	2	40	0	1	43	0	0	0	0	0	101
08:15 AM	0	34	4	0	38	0	0	1	0	1	2	36	0	2	40	0	0	1	0	1	80
08:30 AM	0	18	4	0	22	2	0	5	1	8	1	27	0	0	28	0	0	0	0	0	58
Grand Total	0	178	49	9	236	9	0	18	1	28	14	176	0	9	199	0	0	1	0	1	464
Apprch %	0	75.4	20.8	3.8		32.1	0	64.3	3.6		7	88.4	0	4.5		0	0	100	0		
Total %	0	38.4	10.6	1.9	50.9	1.9	0	3.9	0.2	6	3	37.9	0	1.9	42.9	0	0	0.2	0	0.2	
Passenger Vehicles	0	172	48	9	229	8	0	18	1	27	14	171	0	9	194	0	0	1	0	1	451
% Passenger Vehicles																					
Heavy Vehicles	0	6	1	0	7	1	0	0	0	1	0	5	0	0	5	0	0	0	0	0	13
% Heavy Vehicles	0	3.4	2	0	3	11.1	0	0	0	3.6	0	2.8	0	0	2.5	0	0	0	0	0	2.8

MDM Transportation Consultants, Inc.

28 Lord Road, Suite 280
Marlborough, MA

N/S: Centre Street
E/W: 40 Centre Street/41 Centre Street
Brookline, MA

File Name : 894 Centre St PM Count
Site Code : 894
Start Date : 9/26/2016
Page No : 1

Groups Printed- Passenger Vehicles - Heavy Vehicles

Start Time	Centre Street From North					Parking Lot From East					Centre Street From South					40 Centre Street From West					Int. Total
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	
04:00 PM	0	24	8	0	32	3	0	7	0	10	1	38	0	0	39	0	0	2	0	2	83
04:15 PM	0	12	4	2	18	5	0	7	0	12	1	36	0	0	37	0	0	0	0	0	67
04:30 PM	0	20	8	4	32	1	0	3	0	4	2	24	0	1	27	0	0	0	0	0	63
04:45 PM	0	22	5	0	27	4	0	6	0	10	1	29	0	0	30	0	0	0	0	0	67
Total	0	78	25	6	109	13	0	23	0	36	5	127	0	1	133	0	0	2	0	2	280
05:00 PM	0	30	7	4	41	2	0	7	0	9	0	32	0	0	32	0	0	0	0	0	82
05:15 PM	0	26	10	4	40	4	0	9	0	13	0	42	1	1	44	1	0	0	0	1	98
05:30 PM	0	30	13	0	43	3	0	9	0	12	2	30	0	1	33	2	0	0	0	2	90
05:45 PM	0	28	10	4	42	5	0	6	0	11	5	33	0	0	38	0	0	0	0	0	91
Total	0	114	40	12	166	14	0	31	0	45	7	137	1	2	147	3	0	0	0	3	361
Grand Total	0	192	65	18	275	27	0	54	0	81	12	264	1	3	280	3	0	2	0	5	641
Apprch %	0	69.8	23.6	6.5		33.3	0	66.7	0		4.3	94.3	0.4	1.1		60	0	40	0		
Total %	0	30	10.1	2.8	42.9	4.2	0	8.4	0	12.6	1.9	41.2	0.2	0.5	43.7	0.5	0	0.3	0	0.8	
Passenger Vehicles	0	188	65	18	271	27	0	54	0	81	12	263	1	3	279	3	0	2	0	5	636
% Passenger Vehicles																					
Heavy Vehicles	0	4	0	0	4	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	5
% Heavy Vehicles	0	2.1	0	0	1.5	0	0	0	0	0	0	0.4	0	0	0.4	0	0	0	0	0	0.8

□ Yearly/Seasonal Calculations

SECTION I - CONTINUOUS COUNTING STATION MONTHLY AVERAGE DAILY TRAFFIC

STATION 691 - QUINCY - RTE.1-93 - NORTH OF RTE.28

YR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
09	173,000	175,000	177,697	194,334	196,834	199,477	196,208	194,125	190,885	186,291	176,509	174,000	186,197
	-2%	0%	4%	-1%	-1%	0%	-1%	-1%	1%	1%	3%	4%	0%
11	166,541	175,019	190,696	192,155	193,034	197,594	193,303	191,197	193,140	188,694	187,378	187,895	188,054
	-2%	6%	0%	0%	1%	-1%	-1%	3%	-1%	-2%	0%	-3%	0%
12	164,007	185,226	190,193	192,337	194,846	195,145	191,419	196,457	190,548	185,609	186,469	181,669	187,827
	9%	-1%	-5%	-3%	-1%	0%	0%	1%	0%	2%	-1%	-3%	0%
13	179,468	182,613	180,861	187,402	193,159	194,612	192,130	197,467	191,411	190,128	185,233	176,163	187,554
Seasonal Adjustment Factor (to average month)	1.10	1.04	1.01	0.98	0.96	0.95	0.97	0.96	0.98	1.00	1.02	1.04	0.1%

STATION 703 - ABINGTON - RTE.123 - AT THE BROCKTON C.I.

YR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
09	12,251	13,199	13,301	13,860	13,231	13,817	13,354	13,212	14,037	13,712	13,161	13,327	13,372
	0%	0%	2%	1%	5%	1%	0%	1%	-1%	0%	2%	-1%	1%
10	12,196	13,134	13,560	14,051	13,835	13,900	13,353	13,338	13,928	13,733	13,414	13,225	13,472
	-5%	-4%	-1%	-4%	-3%	-2%	-3%	-2%	-1%	-2%	0%	1%	-2%
11	11,629	12,651	13,451	13,518	13,476	13,655	12,907	13,088	13,778	13,495	13,434	13,377	13,205
	5%	4%	0%	-1%	0%	-1%	-6%	0%	-2%	1%	0%	-2%	0%
12	12,181	13,151	13,410	13,379	13,452	13,479	12,127	13,103	13,441	13,679	13,452	13,136	13,166
	1%	-6%	-4%	2%	0%	-1%	7%	0%	0%	0%	-2%	0%	0%
13	12,347	12,336	12,870	13,591	13,426	13,372	12,964	13,064	13,462	13,726	13,217	13,081	13,121
Seasonal Adjustment Factor (to average month)	1.10	1.03	1.00	0.97	0.98	0.97	1.03	1.01	0.97	0.97	0.99	1.00	-0.5%

STATION 6255 - WEYMOUTH - RTE.3 - NORTH OF RTE.18

YR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
09	120,200	123,983	124,807	134,354	135,239	143,114	143,685	144,937	140,079	137,288	138,708	136,428	135,235
	4%	3%	6%	-1%	0%	-1%	-1%	-2%	-3%	-3%	-1%	-7%	-1%
10	125,304	127,637	132,301	133,124	135,880	141,633	141,706	142,327	135,767	133,473	137,526	127,100	134,482
	-3%	-1%	-1%	-6%	0%	0%	-1%	0%	-1%	-2%	-3%	-1%	-2%
12	118,936	125,494	129,712	116,911	136,235	140,277	139,048	142,140	132,674	128,923	129,593	125,409	130,446
	4%	-7%	-4%	13%	0%	-1%	1%	0%	1%	4%	-1%	-1%	1%
13	123,783	116,501	124,813	131,533	136,712	138,977	140,057	141,851	133,978	134,144	128,712	124,607	131,306
Seasonal Adjustment Factor (to average month)	1.09	1.08	1.04	1.03	0.98	0.94	0.94	0.93	0.98	1.00	0.99	1.04	-0.5%

Average	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Seasonal Adjustment Factor (to average month)	1.09	1.05	1.02	0.99	0.97	0.96	0.98	0.97	0.97	0.99	1.00	1.03

Average Yearly Growth Calculated -0.29%
Yearly Growth Factor Used 0.5%

ITALICS = ESTIMATED DATA
MADT

□ Centre Street Crash Data

Daniel Mills

From: Robert Roth <rroth@capitolcoveri.com>
Sent: Wednesday, October 12, 2016 1:37 PM
To: Daniel Mills
Subject: FW: 40 Centre St Accident Report

Accident report

From: Neil Harrington [<mailto:nharrington@brooklinema.gov>]
Sent: Tuesday, October 11, 2016 2:11 PM
To: rroth@capitolcoveri.com
Subject: RE: 40 Centre St Accident Report

Sir,

This Department never received your original request, which is why you never received a response.

The following are the total responses the BPD made to the following locations for accidents since 1/1/14:

Beacon St/Centre St

2014: 2
2015: 10
2016: 3

Wellman St/Centre St

2014: 1
2015: 0
2016: 0

1-55 Centre St:

2014: 1
2015: 1
2016: 1

Total responses for accidents in the area: 19

From: Myles Murphy
Sent: Tuesday, October 11, 2016 1:47 PM
To: Neil Harrington
Subject: FW: 40 Centre St Accident Report

Neil, see if you can assist. Thanks, DS MM

From: Maria Morelli
Sent: Tuesday, October 11, 2016 9:57 AM
To: Myles Murphy
Cc: Daniel Mills; Robert Roth
Subject: FW: 40 Centre St Accident Report

Dep. Superintendent Murphy,

This email pertains to another 40B project, 40 Centre, for crash/accident data. Attached is the letter the developer, Robert Roth, sent to the Traffic Administrator on 9/20. The letter specifies the study area.

If possible, please submit the data to us by Wednesday. Please let me know if I should direct this inquiry to another colleague, or if the timeframe is a problem.

Thank you very much for your help. I appreciate it sincerely. Maria

When responding, please remember the Secretary of State considers e-mail a public record.

Maria Morelli, AICP
Senior Planner
Town of Brookline
mmorelli@brooklinema.gov
617-730-2670

From: Robert Roth [<mailto:rroth@capitolcoveri.com>]
Sent: Tuesday, October 11, 2016 7:55 AM
To: Maria Morelli
Cc: 'Daniel Mills'
Subject: 40 Centre St Accident Report

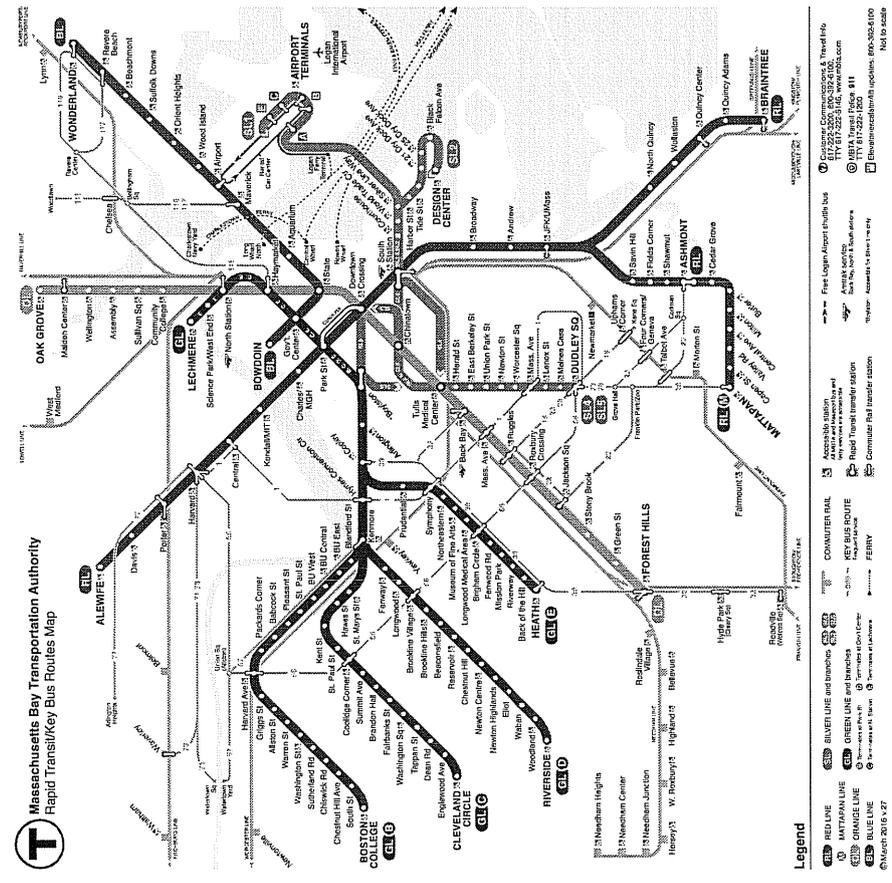
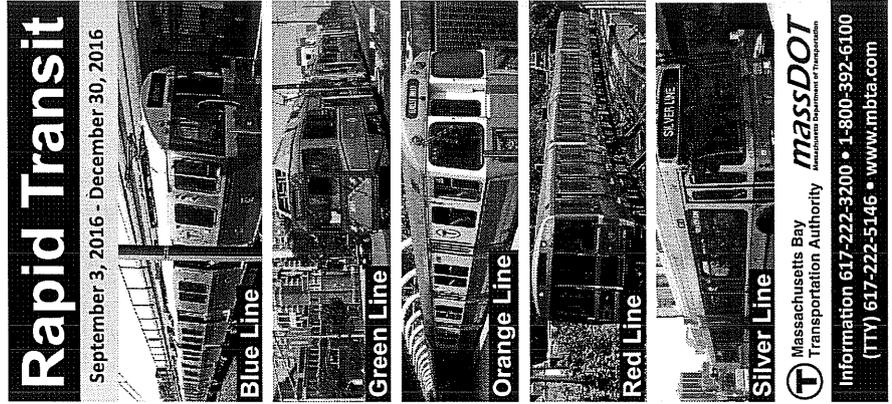
Hi Maria,

The attached requested was hand delivered on September 20th. The traffic engineer also submitted a request. Your help is greatly appreciated.

Thanks,
Bob

The substance of this message, including any attachments, may be confidential, legally privileged and/or exempt from disclosure pursuant to Massachusetts law. It is intended solely for the addressee. If you received this in error, please contact the sender and delete the material from any computer.

□ Public Transportation Information



T Fares		Local Bus	Bus + Bus	Rapid Transit	Bus + Rapid Transit
PRICE PER TRIP		\$1.70	\$1.50	\$2.25	\$2.25
CharlieCard		\$2.00	\$2.00	\$2.75	\$4.75***
Cash-on-Board		\$0.85	\$0.85	\$1.10	\$1.10
Student*		\$0.85	\$0.85	\$1.10	\$1.10
Senior/TAP**		\$0.85	\$0.85	\$1.10	\$1.10
UNLIMITED TRIP PASSES					
1-Day		\$12.00	\$12.00	\$12.00	\$12.00
7-Day		\$21.25	\$21.25	\$21.25	\$21.25
Monthly		\$55.00	\$55.00	\$84.50	\$84.50
Senior/TAP Monthly		\$30.00	\$30.00	unlimited travel on Local Bus and Rapid Transit	

VALID PASSES: LinkPass (\$84.50/mo.); Student LinkPass* (\$30/mo.); Senior/TAP LinkPass** (\$30/mo.); and express bus, commuter rail, and boat passes.

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

* Available to students through participating middle schools and high schools.
 ** Available to Medicare cardholders, seniors 65+, and persons with disabilities.
 *** For Silver Line SL4 or SL5 pay \$2.75. Also see "transfers."

TRANSFERS
 If paying with a CharlieCard or CharlieCard, discounted transfers that are available are automatic — just use the same ticket or card throughout your trip. If paying with cash onboard a vehicle, free transfers are only allowed between rapid transit lines and inside paid platform areas at gated stations.

SCHEDULES
 Schedules are available at the following stations: Park Street, Airport, Malden, Harvard, Haymarket (Green Line Level), Back Bay, Downtown Crossing (Orange Line Level), and Quincy Center, or ask a Customer Service Agent. Schedules are also available at the State Transportation Building (10 Park Plaza), 45 High St, and online at mbta.com.

Rapid Transit Line	Weekday					Saturday					Sunday							
	First Trip	Rush Hour Service	Midday Service	Evening Service	Late Night Service	Last Trip	First Trip	A.M. Peak Service	P.M. Peak Service	Evening Service	Late Night Service	Last Trip	First Trip	A.M. Peak Service	P.M. Peak Service	Evening Service	Late Night Service	Last Trip
Red Line Alewife Braintree Alewife Ashmont "M" Ashmont Mattapan	5:24AM 5:15AM 5:16AM 5:16AM 5:17AM 5:05AM	9 min 9 min 9 min 9 min 5 min 5 min	14 min 14 min 14 min 14 min 8 min 8 min	12 min 12 min 12 min 12 min 12 min 12 min	12 min 12 min 12 min 12 min 12 min 12 min	12:15AM 12:17AM 12:22AM 12:30AM 1:05AM 12:53AM	5:24AM 5:15AM 5:16AM 5:16AM 5:17AM 5:05AM	14 min 14 min 14 min 14 min 26 min 26 min	14 min 14 min 14 min 14 min 12 min 12 min	14 min 14 min 14 min 14 min 12 min 12 min	14 min 14 min 14 min 14 min 26 min 26 min	12:15AM 12:17AM 12:22AM 12:30AM 1:05AM 12:53AM	6:08AM 6:00AM 6:00AM 6:00AM 6:03AM 5:51AM	15 min 15 min 15 min 15 min 26 min 26 min	15 min 15 min 15 min 15 min 12 min 12 min	15 min 15 min 15 min 15 min 12 min 12 min	16 min 16 min 16 min 16 min 26 min 26 min	12:15AM 12:17AM 12:22AM 12:30AM 1:05AM 12:53AM
Blue Line Wonderland Orient Heights Bowdoin	5:13AM 5:13AM 5:29AM	5 min 5 min 5 min	9 min 9 min 9 min	9 min 9 min 9 min	10 min 10 min 10 min	12:35AM 12:40AM 1:00AM	5:25AM 5:13AM 5:29AM	9 min 9 min 9 min	9 min 9 min 9 min	9 min 9 min 9 min	9 min 9 min 9 min	12:32AM 12:37AM 1:00AM	5:58AM 6:03AM 6:21AM	13 min 13 min 13 min	9 min 9 min 9 min	9 min 9 min 9 min	13 min 13 min 13 min	12:26AM 12:31AM 1:00AM
Orange Line Oak Grove Forest Hills	5:16AM 5:16AM	6 min 6 min	9 min 9 min	10 min 10 min	10 min 10 min	12:30AM 12:35AM	5:16AM 5:16AM	10 min 10 min	9 min 9 min	11 min 11 min	11 min 11 min	12:30AM 12:35AM	6:00AM 6:00AM	13 min 13 min	11 min 11 min	11 min 11 min	11 min 11 min	12:30AM 12:35AM
Green Line "B" Boston College Park Street "C" Cleveland Circle North Station "D" Riverside Government Ctr. "E" Lechmere Heath Street	5:01AM 5:42AM 5:01AM* 5:55AM 4:56AM 5:40AM 5:01AM 5:38AM	6 min 6 min 6 min 6 min 6 min 6 min 6 min 6 min	8 min 8 min 9 min 9 min 8 min 8 min 9 min 9 min	8 min 8 min 7 min 9 min 8 min 8 min 9 min 9 min	9 min 9 min 9 min 9 min 9 min 9 min 9 min 9 min	12:10AM 12:52AM 12:10AM 12:46AM 12:05AM 12:49AM 12:30AM 12:47AM	4:45AM* 5:38AM 4:50AM* 5:30AM 4:55AM 5:34AM 5:01AM 5:32AM	12 min 12 min 12 min 12 min 12 min 12 min 10 min 10 min	7 min 7 min 8 min 8 min 8 min 8 min 9 min 9 min	7 min 7 min 8 min 8 min 8 min 8 min 9 min 9 min	7 min 7 min 8 min 8 min 8 min 8 min 9 min 9 min	12:10AM 12:52AM 12:10AM 12:46AM 12:05AM 12:49AM 12:30AM 12:47AM	5:20AM* 6:11AM 5:30AM* 6:06AM 5:25AM 6:05AM 5:35AM 6:15AM	12 min 12 min 12 min 12 min 12 min 12 min 12 min 12 min	9 min 9 min 10 min 10 min 10 min 10 min 12 min 12 min	9 min 9 min 10 min 10 min 10 min 10 min 12 min 12 min	10 min 10 min 10 min 10 min 10 min 10 min 12 min 12 min	12:10AM 12:52AM 12:10AM 12:46AM 12:05AM 12:49AM 12:30AM 12:47AM
Silver Line SL1 Logan Airport South Station SL2 Design Center South Station Additional Waterfront-only service Silver Line Way South Station SL4 Dudley Station South Station SL5 Dudley Station Downtown Xing	5:38AM 5:40AM 6:03AM 5:45AM 5:28AM 5:35AM 5:20AM 5:40AM 5:15AM 5:30AM	*8 min 8 min 5 min 5 min 5 min 5 min 10 min 10 min 7 min 7 min	8 min 8 min 10 min 10 min 15 min 15 min 15 min 15 min 10 min 10 min	8 min 8 min 9 min 9 min 15 min 15 min 15 min 15 min 10 min 10 min	12 min 12 min 15 min 15 min 15 min 15 min 20 min 20 min 15 min 15 min	12:44AM 12:30AM 12:30AM 12:50AM 12:53AM 12:20AM 12:40AM 12:48AM 1:02AM	5:33AM 5:35AM 6:10AM 5:50AM 5:28AM 5:23AM 5:40AM 5:19AM 5:34AM	12 min 12 min 15 min 15 min 10 min 10 min 15 min 15 min 10 min 10 min	12 min 12 min 15 min 15 min 10 min 10 min 15 min 15 min 10 min 10 min	12 min 12 min 15 min 15 min 10 min 10 min 15 min 15 min 10 min 10 min	12 min 12 min 15 min 15 min 10 min 10 min 15 min 15 min 10 min 10 min	12:45AM 12:30AM 12:35AM 12:49AM 12:26AM 12:20AM 12:40AM 12:46AM 1:00AM	5:50AM 6:12AM 6:50AM 6:35AM 6:05AM 6:02AM 6:20AM 6:00AM 6:15AM	12 min 12 min 15 min 15 min 10 min 10 min 15 min 15 min 10 min 10 min	8 min 8 min 15 min 15 min 8 min 8 min 15 min 15 min 8 min 8 min	8 min 8 min 15 min 15 min 8 min 8 min 15 min 15 min 8 min 8 min	12:45AM 12:30AM 12:34AM 12:48AM 1:01AM 12:20AM 12:40AM 12:25AM 12:47AM	

Schedule Periods (approximate):
 AM Rush Hour: 6:30 AM - 9:00 AM
 MIDDAY: 9:00 AM - 3:30 PM
 PM Rush Hour: 3:30 PM - 6:30 PM
 Evening: 6:30 PM - 8:00 PM
 Late Night: 8:00 PM - CLOSE

Mattapan Note:
 Saturday and Sunday before 10:00 AM and after 8:00 PM trips depart every 26 minutes and the rest of the day every 12 minutes. Also, see Mattapan Line Schedule Card.

Green Line Notes:
 *The first two "C" Line AM inbound trips run through to Lechmere Station on weekdays.
 *The first "B" Line and second "C" Line AM inbound trips run through to Lechmere Station on weekends.

w - Last trips wait at some stations, primarily in the Downtown area, for connecting service. Departure times are approximate.
 * Silver Line - For AM rush 8 minutes and for the PM rush 10 minutes.

Fall 2016 Holidays
 October 10 & November 11: see Weekday
 September 5, November 24 & December 26: see Sunday

schedule change

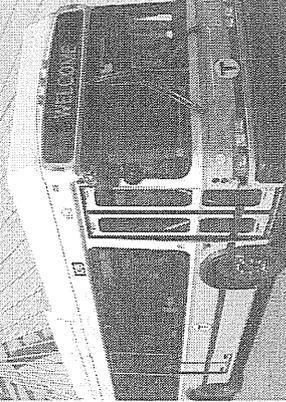
66

Fall, September 3, 2016 - December 30, 2016

Harvard Square- Dudley Station

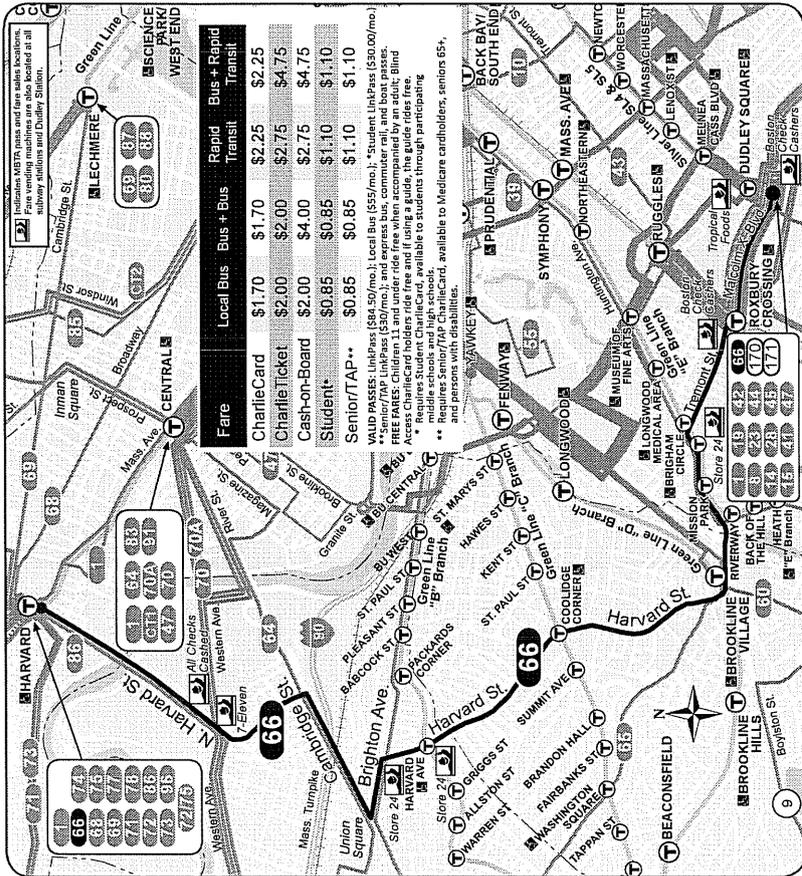
Serving

- Brigham and Women's Hospital
- Brigham Circle
- Brookline Village
- Coolidge Corner
- Union Square (Allston)
- Red Line
- Orange Line
- Green Line



Massachusetts Bay
Transportation Authority **MBTA**
Information 617-222-3200 • 1-800-392-6100
(TTY) 617-222-5146 • www.mbta.com

Route 66 Harvard Station - Dudley Station



66

Weekday

Saturday

Sunday

66

66

66

66

Inbound		Outbound		Inbound		Outbound		Inbound		Outbound		Inbound		Outbound	
Leave Harvard/Island	Arrive Union Square	Leave Brookline Village	Arrive Brookline Square	Leave Dudley Station	Arrive Union Square	Leave Harvard/Island	Arrive Union Square	Leave Dudley Station	Arrive Union Square	Leave Harvard/Island	Arrive Union Square	Leave Dudley Station	Arrive Union Square	Leave Harvard/Island	Arrive Union Square
5:00A	5:08A	5:16A	5:24A	4:45A	4:53A	4:40A	4:48A	5:02A	5:10A	5:09A	5:17A	5:04A	5:12A	5:09A	5:17A
5:05	5:13	5:21	5:29	5:10	5:18	5:12	5:20	5:35	5:43	5:39	5:47	5:22	5:30	5:28	5:36
5:45	5:53	6:01	6:09	5:30	5:38	5:42	5:50	6:05	6:13	6:18	6:26	6:01	6:09	6:14	6:22
6:00	6:08	6:16	6:24	6:00	6:08	6:00	6:08	6:25	6:33	6:35	6:43	6:15	6:23	6:25	6:33
6:17	6:25	6:33	6:41	6:00	6:08	6:15	6:23	6:40	6:48	6:50	6:58	6:30	6:38	6:40	6:48
.....	.....	.....	.....	bs 6:17	bs 6:25	6:30	6:38	6:37	6:45	6:47	6:55	6:27	6:35	6:37	6:45
6:31	6:39	6:47	6:55	6:16	6:24	6:48	6:56	6:55	7:03	7:05	7:13	6:45	6:53	6:55	7:03
6:37	6:45	6:53	7:01	6:22	6:30	7:06	7:14	7:15	7:23	7:25	7:33	7:07	7:15	7:17	7:25
6:57	7:05	7:13	7:21	6:30	6:38	7:19	7:27	7:48	7:56	7:58	8:06	7:25	7:33	7:35	8:03
6:55	7:03	7:11	7:19	6:36	6:44	7:06	7:14	7:30	7:38	7:40	7:48	7:21	7:29	7:31	7:55
.....	.....	.....	.....	bs 6:31	bs 6:39	7:32	7:40	8:01	8:09	8:11	8:19	7:45	7:53	7:55	8:23
9:01	9:09	9:17	9:25	6:42	6:50	7:32	7:40	8:01	8:09	8:11	8:19	7:45	7:53	7:55	8:23
9:09	9:17	9:25	9:33	6:46	6:54	7:45	7:53	8:14	8:22	8:24	8:32	8:00	8:08	8:10	8:38
9:17	9:25	9:33	9:41	6:50	6:58	8:16	8:24	8:50	8:58	9:00	9:08	8:16	8:24	8:26	9:14
9:25	9:33	9:41	9:49	6:54	7:02	8:16	8:24	8:50	8:58	9:00	9:08	8:16	8:24	8:26	9:14
9:33	9:41	9:49	9:57	6:58	7:06	8:32	8:40	9:09	9:17	9:19	9:27	8:24	8:32	8:34	9:22
9:41	9:49	9:57	10:05	6:54	7:02	8:32	8:40	9:09	9:17	9:19	9:27	8:24	8:32	8:34	9:22
9:51	9:59	10:07	10:15	6:54	7:02	8:32	8:40	9:09	9:17	9:19	9:27	8:24	8:32	8:34	9:22
.....	.....	.....	.....	bs 6:42	bs 6:50	8:32	8:40	9:09	9:17	9:19	9:27	8:24	8:32	8:34	9:22
11:49	12:00N	12:18P	12:37P	6:54	7:02	8:32	8:40	9:09	9:17	9:19	9:27	8:24	8:32	8:34	9:22
.....	.....	.....	.....	bs 6:47	bs 6:55	8:32	8:40	9:09	9:17	9:19	9:27	8:24	8:32	8:34	9:22
12:05P	12:16P	12:36P	12:55P	6:54	7:02	8:32	8:40	9:09	9:17	9:19	9:27	8:24	8:32	8:34	9:22
1:41	1:54	2:14	2:34	6:58	7:10	8:45	8:57	9:26	9:34	9:36	9:44	8:28	8:40	8:42	9:30
.....	.....	.....	.....	6:58	7:10	8:45	8:57	9:26	9:34	9:36	9:44	8:28	8:40	8:42	9:30
1:57	2:11	2:31	2:51	7:06	7:18	8:51	9:03	9:32	9:40	9:42	9:50	8:34	8:46	8:48	9:36
1:57	2:11	2:31	2:51	7:12	7:24	8:51	9:03	9:32	9:40	9:42	9:50	8:34	8:46	8:48	9:36
2:08	2:24	2:44	3:04	7:24	7:36	9:03	9:15	9:44	9:52	9:54	10:02	8:46	8:58	9:00	9:48
.....	.....	.....	.....	7:24	7:36	9:03	9:15	9:44	9:52	9:54	10:02	8:46	8:58	9:00	9:48
4:58	5:14	5:33	5:51	7:36	7:48	9:15	9:27	9:56	10:04	10:06	10:14	8:58	9:10	9:12	10:00
5:08	5:24	5:41	5:59	7:40	7:52	9:15	9:27	9:56	10:04	10:06	10:14	8:58	9:10	9:12	10:00
5:18	5:33	5:50	6:06	7:44	7:56	9:15	9:27	9:56	10:04	10:06	10:14	8:58	9:10	9:12	10:00
5:38	5:51	6:08	6:26	7:48	7:56	9:15	9:27	9:56	10:04	10:06	10:14	8:58	9:10	9:12	10:00
5:48	6:01	6:18	6:36	7:52	8:00	9:15	9:27	9:56	10:04	10:06	10:14	8:58	9:10	9:12	10:00
5:59	6:12	6:29	6:47	7:56	8:04	9:15	9:27	9:56	10:04	10:06	10:14	8:58	9:10	9:12	10:00
6:10	6:23	6:40	6:58	8:00	8:08	9:15	9:27	9:56	10:04	10:06	10:14	8:58	9:10	9:12	10:00
6:21	6:34	6:51	7:09	8:04	8:12	9:15	9:27	9:56	10:04	10:06	10:14	8:58	9:10	9:12	10:00
6:32	6:45	7:02	7:20	8:08	8:16	9:15	9:27	9:56	10:04	10:06	10:14	8:58	9:10	9:12	10:00
6:44	6:57	7:14	7:32	8:12	8:20	9:15	9:27	9:56	10:04	10:06	10:14	8:58	9:10	9:12	10:00
6:54	7:07	7:24	7:42	8:16	8:24	9:15	9:27	9:56	10:04	10:06	10:14	8:58	9:10	9:12	10:00
7:05	7:18	7:34	7:52	8:20	8:28	9:15	9:27	9:56	10:04	10:06	10:14	8:58	9:10	9:12	10:00
7:17	7:30	7:43	7:56	8:24	8:32	9:15	9:27	9:56	10:04	10:06	10:14	8:58	9:10	9:12	10:00
7:29	7:42	7:55	8:08	8:28	8:36	9:15	9:27	9:56	10:04	10:06	10:14	8:58	9:10	9:12	10:00
7:41	7:54	8:07	8:20	8:32	8:40	9:15	9:27	9:56	10:04	10:06	10:14	8:58	9:10	9:12	10:00
7:53	8:06	8:19	8:32	8:36	8:44	9:15	9:27	9:56	10:04	10:06	10:14	8:58	9:10	9:12	10:00
8:05	8:18	8:31	8:44	8:40	8:48	9:15	9:27	9:56	10:04	10:06	10:14	8:58	9:10	9:12	10:00
8:17	8:30	8:43	8:56	8:44	8:52	9:15	9:27	9:56	10:04	10:06	10:14	8:58	9:10	9:12	10:00
8:35	8:48	9:01	9:14	8:48	8:56	9:15	9:27	9:56	10:04	10:06	10:14	8:58	9:10	9:12	10:00
8:50	9:03	9:16	9:29	8:52	8:60	9:15	9:27	9:56	10:04	10:06	10:14	8:58	9:10	9:12	10:00
9:05	9:18	9:31	9:44	8:56	9:04	9:15	9:27	9:56	10:04	10:06	10:14	8:58	9:10	9:12	10:00
9:25	9:38	9:51	10:04	9:00	9:08	9:15	9:27	9:56	10:04	10:06	10:14	8:58	9:10	9:12	10:00
9:45	9:58	10:11	10:24	9:04	9:12	9:15	9:27	9:56	10:04	10:06	10:14	8:58	9:10	9:12	10:00
10:05	10:18	10:31	10:44	9:08	9:16	9:15	9:27	9:56	10:04	10:06	10:14	8:58	9:10	9:12	10:00
10:15	10:28	10:41	10:54	9:12	9:20	9:15	9:27	9:56	10:04	10:06	10:14	8:58	9:10	9:12	10:00
12:30	12:40	12:50A	12:59A	12:10A	12:20A	12:10A	12:20A	12:30A	12:40A	12:50A	12:59A	12:10A	12:20A	12:30A	12:40A
1:00	1:10	1:20	1:31	12:30	12:40	12:30	12:40	12:50	1:00	1:10	1:20	12:30	12:40	12:50	1:00
.....	.....	.....	.....	w 1:05	w 1:12	w 1:05	w 1:12	w 1:05	w 1:12	w 1:05	w 1:12	w 1:05	w 1:12	w 1:05	w 1:12

Fall 2016 Holidays
 October 10 & 11, see Weekday
 September 5, November 24 & December 26, see Sunday

All buses are accessible to persons with disabilities
 b - To Brighton Center
 c - Leaves from Cambridge Street at Warren Street
 s - Does NOT run during school vacation
 w - Waits for last Red Line or Silver Line vehicle to arrive at station.

Route 66
 Harvard Square - Dudley Station

□ US Census Travel Mode Statistics



B08134

MEANS OF TRANSPORTATION TO WORK BY TRAVEL TIME TO WORK

Universe: Workers 16 years and over who did not work at home
2010-2014 American Community Survey 5-Year Estimates

Supporting documentation on code lists, subject definitions, data accuracy, and statistical testing can be found on the American Community Survey website in the Data and Documentation section.

Sample size and data quality measures (including coverage rates, allocation rates, and response rates) can be found on the American Community Survey website in the Methodology section.

Although the American Community Survey (ACS) produces population, demographic and housing unit estimates, it is the Census Bureau's Population Estimates Program that produces and disseminates the official estimates of the population for the nation, states, counties, cities and towns and estimates of housing units for states and counties.

	Census Tract 4004, Norfolk County, Massachusetts	
	Estimate	Margin of Error
Total:	2,586	+/-259
Less than 10 minutes	182	+/-95
10 to 14 minutes	217	+/-88
15 to 19 minutes	370	+/-154
20 to 24 minutes	426	+/-147
25 to 29 minutes	251	+/-116
30 to 34 minutes	433	+/-148
35 to 44 minutes	269	+/-119
45 to 59 minutes	305	+/-122
60 or more minutes	133	+/-75
Car, truck, or van:	1,303	+/-244
Less than 10 minutes	66	+/-56
10 to 14 minutes	182	+/-81
15 to 19 minutes	255	+/-129
20 to 24 minutes	236	+/-119
25 to 29 minutes	157	+/-89
30 to 34 minutes	226	+/-116
35 to 44 minutes	59	+/-58
45 to 59 minutes	49	+/-46
60 or more minutes	73	+/-60
Drove alone:	1,147	+/-225
Less than 10 minutes	50	+/-49
10 to 14 minutes	164	+/-82
15 to 19 minutes	228	+/-122
20 to 24 minutes	212	+/-107
25 to 29 minutes	110	+/-79
30 to 34 minutes	202	+/-111
35 to 44 minutes	59	+/-58
45 to 59 minutes	49	+/-46
60 or more minutes	73	+/-60
Carpooled:	156	+/-95
Less than 10 minutes	16	+/-28
10 to 14 minutes	18	+/-30
15 to 19 minutes	27	+/-43
20 to 24 minutes	24	+/-38
25 to 29 minutes	47	+/-47

	Census Tract 4004, Norfolk County, Massachusetts	
	Estimate	Margin of Error
30 to 34 minutes	24	+/-32
35 to 44 minutes	0	+/-17
45 to 59 minutes	0	+/-17
60 or more minutes	0	+/-17
In 2-person carpool:	140	+/-88
Less than 10 minutes	0	+/-17
10 to 14 minutes	18	+/-30
15 to 19 minutes	27	+/-43
20 to 24 minutes	24	+/-38
25 to 29 minutes	47	+/-47
30 to 34 minutes	24	+/-32
35 to 44 minutes	0	+/-17
45 to 59 minutes	0	+/-17
60 or more minutes	0	+/-17
In 3-or-more-person carpool:	16	+/-28
Less than 10 minutes	16	+/-28
10 to 14 minutes	0	+/-17
15 to 19 minutes	0	+/-17
20 to 24 minutes	0	+/-17
25 to 29 minutes	0	+/-17
30 to 34 minutes	0	+/-17
35 to 44 minutes	0	+/-17
45 to 59 minutes	0	+/-17
60 or more minutes	0	+/-17
Public transportation (excluding taxicab):	759	+/-189
Less than 10 minutes	0	+/-17
10 to 14 minutes	0	+/-17
15 to 19 minutes	5	+/-10
20 to 24 minutes	45	+/-44
25 to 29 minutes	66	+/-62
30 to 34 minutes	160	+/-87
35 to 44 minutes	210	+/-119
45 to 59 minutes	213	+/-115
60 or more minutes	60	+/-48
Bus or trolley bus:	142	+/-98
Less than 10 minutes	0	+/-17
10 to 14 minutes	0	+/-17
15 to 19 minutes	5	+/-10
20 to 24 minutes	14	+/-24
25 to 29 minutes	26	+/-43
30 to 34 minutes	63	+/-59
35 to 44 minutes	0	+/-17
45 to 59 minutes	34	+/-39
60 or more minutes	0	+/-17
Streetcar or trolley car (carro publico in Puerto Rico), subway or elevated:	617	+/-171
Less than 10 minutes	0	+/-17
10 to 14 minutes	0	+/-17
15 to 19 minutes	0	+/-17
20 to 24 minutes	31	+/-35
25 to 29 minutes	40	+/-45
30 to 34 minutes	97	+/-66
35 to 44 minutes	210	+/-119
45 to 59 minutes	179	+/-115
60 or more minutes	60	+/-48
Railroad or ferryboat:	0	+/-17
Less than 10 minutes	0	+/-17
10 to 14 minutes	0	+/-17
15 to 19 minutes	0	+/-17

	Census Tract 4004, Norfolk County, Massachusetts	
	Estimate	Margin of Error
20 to 24 minutes	0	+/-17
25 to 29 minutes	0	+/-17
30 to 34 minutes	0	+/-17
35 to 44 minutes	0	+/-17
45 to 59 minutes	0	+/-17
60 or more minutes	0	+/-17
Walked:	414	+/-174
Less than 10 minutes	116	+/-77
10 to 14 minutes	35	+/-38
15 to 19 minutes	61	+/-59
20 to 24 minutes	127	+/-115
25 to 29 minutes	28	+/-31
30 to 34 minutes	47	+/-41
35 to 44 minutes	0	+/-17
45 to 59 minutes	0	+/-17
60 or more minutes	0	+/-17
Taxicab, motorcycle, bicycle, or other means:	110	+/-77
Less than 10 minutes	0	+/-17
10 to 14 minutes	0	+/-17
15 to 19 minutes	49	+/-57
20 to 24 minutes	18	+/-28
25 to 29 minutes	0	+/-17
30 to 34 minutes	0	+/-17
35 to 44 minutes	0	+/-17
45 to 59 minutes	43	+/-49
60 or more minutes	0	+/-17

Data are based on a sample and are subject to sampling variability. The degree of uncertainty for an estimate arising from sampling variability is represented through the use of a margin of error. The value shown here is the 90 percent margin of error. The margin of error can be interpreted roughly as providing a 90 percent probability that the interval defined by the estimate minus the margin of error and the estimate plus the margin of error (the lower and upper confidence bounds) contains the true value. In addition to sampling variability, the ACS estimates are subject to nonsampling error (for a discussion of nonsampling variability, see Accuracy of the Data). The effect of nonsampling error is not represented in these tables.

Workers include members of the Armed Forces and civilians who were at work last week.

While the 2010-2014 American Community Survey (ACS) data generally reflect the February 2013 Office of Management and Budget (OMB) definitions of metropolitan and micropolitan statistical areas; in certain instances the names, codes, and boundaries of the principal cities shown in ACS tables may differ from the OMB definitions due to differences in the effective dates of the geographic entities.

Estimates of urban and rural population, housing units, and characteristics reflect boundaries of urban areas defined based on Census 2010 data. As a result, data for urban and rural areas from the ACS do not necessarily reflect the results of ongoing urbanization.

Source: U.S. Census Bureau, 2010-2014 American Community Survey 5-Year Estimates

Explanation of Symbols:

1. An '***' entry in the margin of error column indicates that either no sample observations or too few sample observations were available to compute a standard error and thus the margin of error. A statistical test is not appropriate.
2. An '-' entry in the estimate column indicates that either no sample observations or too few sample observations were available to compute an estimate, or a ratio of medians cannot be calculated because one or both of the median estimates falls in the lowest interval or upper interval of an open-ended distribution.
3. An '-l' following a median estimate means the median falls in the lowest interval of an open-ended distribution.
4. An '+u' following a median estimate means the median falls in the upper interval of an open-ended distribution.
5. An '****' entry in the margin of error column indicates that the median falls in the lowest interval or upper interval of an open-ended distribution. A statistical test is not appropriate.
6. An '*****' entry in the margin of error column indicates that the estimate is controlled. A statistical test for sampling variability is not appropriate.
7. An 'N' entry in the estimate and margin of error columns indicates that data for this geographic area cannot be displayed because the number of sample cases is too small.
8. An '(X)' means that the estimate is not applicable or not available.

□ Trip Generation Data

Institute of Transportation Engineers (ITE) 9th Edition
Land Use Code (LUC) 720 - Medical-Dental Office Building

Average Vehicle Trips Ends vs: 1000 Sq. Feet Gross Floor Area
Independent Variable (X): 3.42

AVERAGE WEEKDAY DAILY

$T = 36.13 * (X)$
 $T = 36.13 * 3.42$
 $T = 123.46$
 $T = 124$ vehicle trips
with 50% (62 vpd) entering and 50% (62 vpd) exiting.

WEEKDAY MORNING PEAK HOUR OF ADJACENT STREET TRAFFIC

$T = 2.39 * (X)$
 $T = 2.39 * 3.42$
 $T = 8.17$
 $T = 8$ vehicle trips
with 79% (6 vpd) entering and 21% (2 vpd) exiting.

WEEKDAY EVENING PEAK HOUR OF ADJACENT STREET TRAFFIC

$T = 3.57 * (X)$
 $T = 3.57 * 3.42$
 $T = 12.20$
 $T = 12$ vehicle trips
with 28% (3 vpd) entering and 72% (9 vpd) exiting.

SATURDAY DAILY

$T = 8.96 * (X)$ (Small Sample Size - Use with Caution)
 $T = 8.96 * 3.417$
 $T = 30.62$
 $T = 30$ vehicle trips
with 50% (15 vpd) entering and 50% (15 vpd) exiting.

SATURDAY MIDDAY PEAK HOUR OF GENERATOR

$T = 3.63 * (X)$ (Small Sample Size - Use with Caution)
 $T = 3.63 * 3.417$
 $T = 12.40$
 $T = 12$ vehicle trips
with 57% (7 vph) entering and 43% (5 vph) exiting.

Institute of Transportation Engineers (ITE) 9th Edition
Land Use Code (LUC) 220 - Apartment

Average Vehicle Trips Ends vs: Dwelling Units
Independent Variable (X): 1

AVERAGE WEEKDAY DAILY

$$T = 6.65 * X$$

$$T = 6.65 * 1$$

$$T = 6.65$$

T = 6 vehicle trips

with 50% (3 vpd) entering and 50% (3 vpd) exiting.

WEEKDAY MORNING PEAK HOUR OF ADJACENT STREET TRAFFIC

$$T = 0.51 * X$$

$$T = 0.51 * 1$$

$$T = 0.51$$

T = 1 vehicle trips

with 20% (0 vph) entering and 80% (1 vph) exiting.

WEEKDAY EVENING PEAK HOUR OF ADJACENT STREET TRAFFIC

$$T = 0.62 * X$$

$$T = 0.62 * 1$$

$$T = 0.62$$

T = 1 vehicle trips

with 65% (1 vph) entering and 35% (0 vph) exiting.

SATURDAY DAILY

$$T = 6.39 * X$$

$$T = 6.39 * 1$$

$$T = 6.39$$

T = 6 vehicle trips

with 50% (3 vpd) entering and 50% (3 vpd) exiting.

SATURDAY MIDDAY PEAK HOUR OF GENERATOR

$$T = 0.52 * X$$

$$T = 0.52 * 1$$

$$T = 0.52$$

T = 1 vehicle trips

with 50% (1 vph) entering and 50% (0 vph) exiting.

**Institute of Transportation Engineers (ITE) 9th Edition
Land Use Code (LUC) 220 - Apartment**

Average Vehicle Trips Ends vs: Dwelling Units
Independent Variable (X): 40

AVERAGE WEEKDAY DAILY

$$T = 6.65 * X$$

$$T = 6.65 * 40$$

$$T = 266.00$$

T = 266 vehicle trips

with 50% (133 vpd) entering and 50% (133 vpd) exiting.

WEEKDAY MORNING PEAK HOUR OF ADJACENT STREET TRAFFIC

$$T = 0.51 * X$$

$$T = 0.51 * 40$$

$$T = 20.40$$

T = 20 vehicle trips

with 20% (4 vph) entering and 80% (16 vph) exiting.

WEEKDAY EVENING PEAK HOUR OF ADJACENT STREET TRAFFIC

$$T = 0.62 * X$$

$$T = 0.62 * 40$$

$$T = 24.80$$

T = 25 vehicle trips

with 65% (16 vph) entering and 35% (9 vph) exiting.

SATURDAY DAILY

$$T = 6.39 * X$$

$$T = 6.39 * 40$$

$$T = 255.60$$

T = 256 vehicle trips

with 50% (128 vpd) entering and 50% (128 vpd) exiting.

SATURDAY MIDDAY PEAK HOUR OF GENERATOR

$$T = 0.52 * X$$

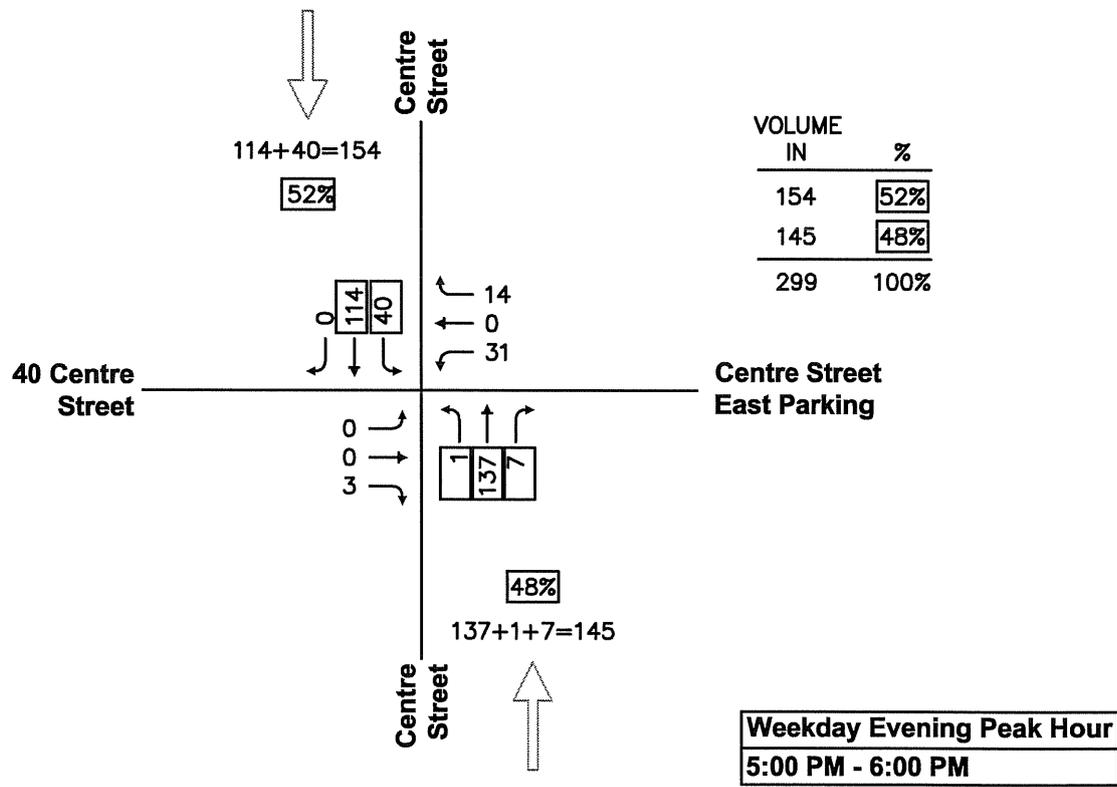
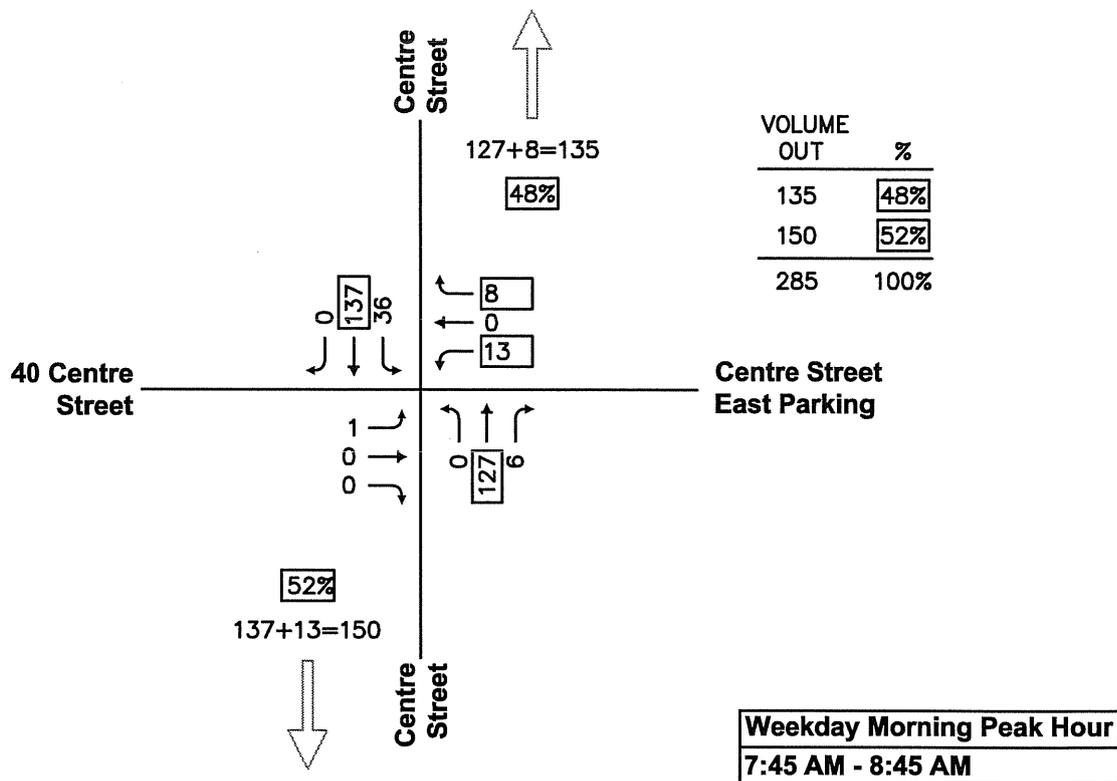
$$T = 0.52 * 40$$

$$T = 20.80$$

T = 21 vehicle trips

with 50% (11 vph) entering and 50% (10 vph) exiting.

□ Trip Distribution Calculations



North

Scale: Not to Scale

□ Capacity Analyses

LEVEL OF SERVICE METHODOLOGY

Capacity analysis of intersections is developed using the Synchro® computer software, which implements the methods of the 2010 Highway Capacity Manual (HCM). The resulting analysis presents a level-of-service (LOS) designation for individual intersection movements and (for signalized intersections) for the entire intersection. The LOS is a letter designation that provides a qualitative measure of operating conditions based on several factors including roadway geometry, speeds, ambient traffic volumes, traffic controls, and driver characteristics. Since the LOS of a traffic facility is a function of the traffic flows placed upon it, such a facility may operate at a wide range of LOS, depending on the time of day, day of week, or period of year. A range of six levels of service are defined on the basis of average delay, ranging from LOS A (the least delay) to LOS F (delays greater than 50 seconds for unsignalized movements, and greater than 80 seconds for signalized movements).

Signalized Intersection Performance Measures

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

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

The LOS for signalized intersections are calculated using the operational analysis methodology of the 2010 *Highway Capacity Manual*.¹ This method assesses the effects of signal type, timing, phasing, and progression; vehicle mix; and geometrics on delay. LOS designations are based on the criterion of control or signal delay per vehicle. Control or signal delay is a measure of driver discomfort, frustration, and fuel consumption, and includes initial deceleration delay approaching the traffic signal, queue move-up time, stopped delay and final acceleration delay. **Table A1** summarizes the relationship between LOS and control delay. The tabulated control delay criterion may be applied in assigning LOS designations to individual lane groups, to individual intersection approaches, or to entire intersections.

Table A1
LEVEL-OF-SERVICE CRITERIA
FOR SIGNALIZED INTERSECTIONS¹

Level of Service	Control (Signal) 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

¹Source: *Highway Capacity Manual 2010*; Transportation Research Board; Washington, DC; 2010.

¹*Highway Capacity Manual 2010*; Transportation Research Board; Washington, DC; 2010.

Unsignalized Intersection Performance Measures

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

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

The LOS designations of unsignalized intersections are determined by application of a procedure described in the 2010 *Highway Capacity Manual*.² LOS is measured in terms of average control delay. Mathematically, control delay is a function of the capacity and degree of saturation of the lane group and/or approach under study and is a quantification of motorist delay associated with traffic control devices such as traffic signals and STOP signs. Control delay includes the effects of initial deceleration delay approaching a STOP sign, stopped delay, queue move-up time, and final acceleration delay from a stopped condition. Definitions for LOS at unsignalized intersections are also given in the *Highway Capacity Manual 2010*. **Table A2** summarizes the relationship between LOS and average control delay.

Table A2
LEVEL-OF-SERVICE CRITERIA FOR
UNSIGNALIZED INTERSECTIONS¹

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

¹Source: *Highway Capacity Manual 2010*, Transportation Research Board; Washington, DC; 2010.

² *ibid*

Intersection

Int Delay, s/veh 1.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	1	0	0	13	0	8	0	127	6	36	137	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	84	84	84	84	84	84	84	84	84	84	84	84
Heavy Vehicles, %	0	0	0	0	0	0	0	3	0	3	4	0
Mvmt Flow	1	0	0	15	0	10	0	151	7	43	163	0

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	409	407	163	404	404	155	163	0	0	158	0	0
Stage 1	249	249	-	155	155	-	-	-	-	-	-	-
Stage 2	160	158	-	249	249	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.1	-	-	4.13	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.227	-	-
Pot Cap-1 Maneuver	556	537	887	561	539	896	1428	-	-	1416	-	-
Stage 1	759	704	-	852	773	-	-	-	-	-	-	-
Stage 2	847	771	-	759	704	-	-	-	-	-	-	-
Platoon blocked, %												
Mov Cap-1 Maneuver	536	519	887	547	521	896	1428	-	-	1416	-	-
Mov Cap-2 Maneuver	536	519	-	547	521	-	-	-	-	-	-	-
Stage 1	759	681	-	852	773	-	-	-	-	-	-	-
Stage 2	838	771	-	734	681	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	11.7	10.8	0	1.6
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1428	-	-	536	642	1416	-	-
HCM Lane V/C Ratio	-	-	-	0.002	0.039	0.03	-	-
HCM Control Delay (s)	0	-	-	11.7	10.8	7.6	0	-
HCM Lane LOS	A	-	-	B	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0	0.1	0.1	-	-

HCM 2010 TWSC
 1: Centre Street & 40 Centre St/Centre Street East Parking

2016 Baseline Condition
 Weekday Evening Peak Hour

Intersection

Int Delay, s/veh 2.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	0	0	3	31	0	14	1	137	7	40	114	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	2	0
Mvmt Flow	0	0	3	34	0	15	1	149	8	43	124	0

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	374	370	124	368	366	153	124	0	0	157	0	0
Stage 1	211	211	-	155	155	-	-	-	-	-	-	-
Stage 2	163	159	-	213	211	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	587	563	932	592	566	898	1475	-	-	1435	-	-
Stage 1	796	731	-	852	773	-	-	-	-	-	-	-
Stage 2	844	770	-	794	731	-	-	-	-	-	-	-
Platoon blocked, %												
Mov Cap-1 Maneuver	563	544	932	575	547	898	1475	-	-	1435	-	-
Mov Cap-2 Maneuver	563	544	-	575	547	-	-	-	-	-	-	-
Stage 1	795	708	-	851	772	-	-	-	-	-	-	-
Stage 2	829	769	-	766	708	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	8.9	11	0.1	2
HCM LOS	A	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1475	-	-	932	647	1435	-	-
HCM Lane V/C Ratio	0.001	-	-	0.003	0.076	0.03	-	-
HCM Control Delay (s)	7.4	0	-	8.9	11	7.6	0	-
HCM Lane LOS	A	A	-	A	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0	0.2	0.1	-	-

Intersection

Int Delay, s/veh 1.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	1	0	0	13	0	8	0	130	6	37	140	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	84	84	84	84	84	84	84	84	84	84	84	84
Heavy Vehicles, %	0	0	0	0	0	0	0	3	0	3	4	0
Mvmt Flow	1	0	0	15	0	10	0	155	7	44	167	0

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	418	417	167	413	413	158	167	0	0	162	0	0
Stage 1	255	255	-	158	158	-	-	-	-	-	-	-
Stage 2	163	162	-	255	255	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.1	-	-	4.13	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.227	-	-
Pot Cap-1 Maneuver	549	530	882	553	532	893	1423	-	-	1411	-	-
Stage 1	754	700	-	849	771	-	-	-	-	-	-	-
Stage 2	844	768	-	754	700	-	-	-	-	-	-	-
Platoon blocked, %												
Mov Cap-1 Maneuver	529	512	882	539	514	893	1423	-	-	1411	-	-
Mov Cap-2 Maneuver	529	512	-	539	514	-	-	-	-	-	-	-
Stage 1	754	676	-	849	771	-	-	-	-	-	-	-
Stage 2	835	768	-	728	676	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	11.8	10.9	0	1.6
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1423	-	-	529	635	1411	-	-
HCM Lane V/C Ratio	-	-	-	0.002	0.039	0.031	-	-
HCM Control Delay (s)	0	-	-	11.8	10.9	7.6	0	-
HCM Lane LOS	A	-	-	B	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0	0.1	0.1	-	-

Intersection

Int Delay, s/veh 2.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	0	0	3	32	0	14	1	140	7	41	117	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	2	0
Mvmt Flow	0	0	3	35	0	15	1	152	8	45	127	0

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	382	378	127	376	374	156	127	0	0	160	0	0
Stage 1	216	216	-	158	158	-	-	-	-	-	-	-
Stage 2	166	162	-	218	216	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	580	557	929	585	560	895	1472	-	-	1432	-	-
Stage 1	791	728	-	849	771	-	-	-	-	-	-	-
Stage 2	841	768	-	789	728	-	-	-	-	-	-	-
Platoon blocked, %												
Mov Cap-1 Maneuver	555	538	929	567	540	895	1472	-	-	1432	-	-
Mov Cap-2 Maneuver	555	538	-	567	540	-	-	-	-	-	-	-
Stage 1	790	703	-	848	770	-	-	-	-	-	-	-
Stage 2	826	767	-	759	703	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	8.9	11.1	0.1	2
HCM LOS	A	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1472	-	-	929	638	1432	-	-
HCM Lane V/C Ratio	0.001	-	-	0.004	0.078	0.031	-	-
HCM Control Delay (s)	7.4	0	-	8.9	11.1	7.6	0	-
HCM Lane LOS	A	A	-	A	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0	0.3	0.1	-	-

HCM 2010 TWSC
 1: Centre Street & 40 Centre St/Centre Street East Parking

2021 Build Condition
 Weekday Morning Peak Hour

Intersection

Int Delay, s/veh 1.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	4	0	4	13	0	8	1	130	6	37	140	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	84	84	84	84	84	84	84	84	84	84	84	84
Heavy Vehicles, %	0	0	0	0	0	0	0	3	0	3	4	0
Mvmt Flow	5	0	5	15	0	10	1	155	7	44	167	1

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	420	419	167	419	417	158	168	0	0	162	0	0
Stage 1	255	255	-	161	161	-	-	-	-	-	-	-
Stage 2	165	164	-	258	256	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.1	-	-	4.13	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.227	-	-
Pot Cap-1 Maneuver	547	528	882	548	530	893	1422	-	-	1411	-	-
Stage 1	754	700	-	846	769	-	-	-	-	-	-	-
Stage 2	842	766	-	751	699	-	-	-	-	-	-	-
Platoon blocked, %												
Mov Cap-1 Maneuver	527	510	882	530	511	893	1422	-	-	1411	-	-
Mov Cap-2 Maneuver	527	510	-	530	511	-	-	-	-	-	-	-
Stage 1	753	676	-	845	768	-	-	-	-	-	-	-
Stage 2	832	765	-	722	675	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	10.5	11	0.1	1.6
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1422	-	-	660	627	1411	-	-
HCM Lane V/C Ratio	0.001	-	-	0.014	0.04	0.031	-	-
HCM Control Delay (s)	7.5	0	-	10.5	11	7.6	0	-
HCM Lane LOS	A	A	-	B	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0	0.1	0.1	-	-

HCM 2010 TWSC
 1: Centre Street & 40 Centre St/Centre Street East Parking

2021 Build Condition
 Weekday Evening Peak Hour

Intersection

Int Delay, s/veh 2.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	2	0	2	32	0	14	4	140	7	41	117	4
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	2	0
Mvmt Flow	2	0	2	35	0	15	4	152	8	45	127	4

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	390	386	129	385	386	156	132	0	0	160	0	0
Stage 1	218	218	-	165	165	-	-	-	-	-	-	-
Stage 2	172	168	-	220	221	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	573	551	926	577	551	895	1466	-	-	1432	-	-
Stage 1	789	726	-	842	766	-	-	-	-	-	-	-
Stage 2	835	763	-	787	724	-	-	-	-	-	-	-
Platoon blocked, %												
Mov Cap-1 Maneuver	547	531	926	559	531	895	1466	-	-	1432	-	-
Mov Cap-2 Maneuver	547	531	-	559	531	-	-	-	-	-	-	-
Stage 1	787	701	-	839	764	-	-	-	-	-	-	-
Stage 2	818	761	-	758	699	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	10.3	11.2	0.2	1.9
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1466	-	-	688	631	1432	-	-
HCM Lane V/C Ratio	0.003	-	-	0.006	0.079	0.031	-	-
HCM Control Delay (s)	7.5	0	-	10.3	11.2	7.6	0	-
HCM Lane LOS	A	A	-	B	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0	0.3	0.1	-	-

□ Parking Data



B25044

TENURE BY VEHICLES AVAILABLE

Universe: Occupied housing units
2010-2014 American Community Survey 5-Year Estimates

Supporting documentation on code lists, subject definitions, data accuracy, and statistical testing can be found on the American Community Survey website in the Data and Documentation section.

Sample size and data quality measures (including coverage rates, allocation rates, and response rates) can be found on the American Community Survey website in the Methodology section.

Although the American Community Survey (ACS) produces population, demographic and housing unit estimates, it is the Census Bureau's Population Estimates Program that produces and disseminates the official estimates of the population for the nation, states, counties, cities and towns and estimates of housing units for states and counties.

$$(947 \times 0 \text{ veh}) + (682 \times 1 \text{ veh}) + (33 \times 2 \text{ veh}) = 748 \text{ veh}$$

$$\frac{748 \text{ veh}}{1,662 \text{ RENTAL UNITS}} = 0.45 \text{ veh/RENTAL UNIT}$$

	Census Tract 4004, Norfolk County, Massachusetts	
	Estimate	Margin of Error
Total:	2,972	+/-125
Owner occupied:	1,310	+/-196
No vehicle available	208	+/-102
1 vehicle available	798	+/-187
2 vehicles available	290	+/-92
3 vehicles available	14	+/-23
4 vehicles available	0	+/-17
5 or more vehicles available	0	+/-17
Renter occupied:	1,662	+/-183
No vehicle available	947	+/-151
1 vehicle available	682	+/-173
2 vehicles available	33	+/-36
3 vehicles available	0	+/-17
4 vehicles available	0	+/-17
5 or more vehicles available	0	+/-17

Data are based on a sample and are subject to sampling variability. The degree of uncertainty for an estimate arising from sampling variability is represented through the use of a margin of error. The value shown here is the 90 percent margin of error. The margin of error can be interpreted roughly as providing a 90 percent probability that the interval defined by the estimate minus the margin of error and the estimate plus the margin of error (the lower and upper confidence bounds) contains the true value. In addition to sampling variability, the ACS estimates are subject to nonsampling error (for a discussion of nonsampling variability, see Accuracy of the Data). The effect of nonsampling error is not represented in these tables.

While the 2010-2014 American Community Survey (ACS) data generally reflect the February 2013 Office of Management and Budget (OMB) definitions of metropolitan and micropolitan statistical areas; in certain instances the names, codes, and boundaries of the principal cities shown in ACS tables may differ from the OMB definitions due to differences in the effective dates of the geographic entities.

Estimates of urban and rural population, housing units, and characteristics reflect boundaries of urban areas defined based on Census 2010 data. As a result, data for urban and rural areas from the ACS do not necessarily reflect the results of ongoing urbanization.

Source: U.S. Census Bureau, 2010-2014 American Community Survey 5-Year Estimates

Explanation of Symbols:

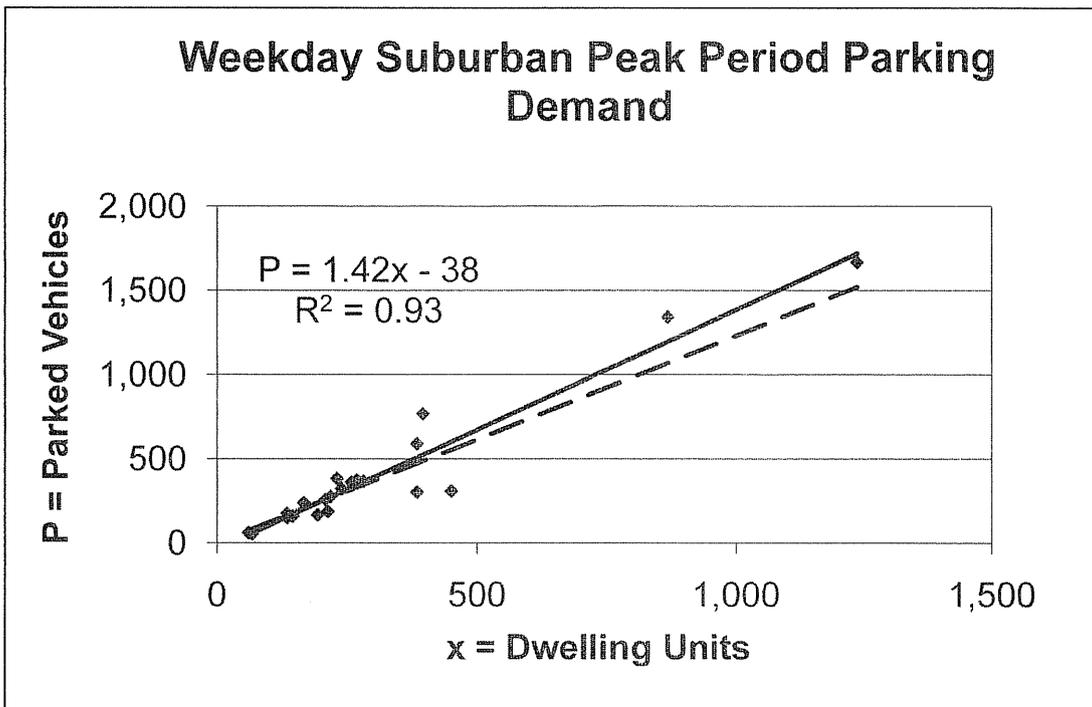
1. An "*" entry in the margin of error column indicates that either no sample observations or too few sample observations were available to compute a standard error and thus the margin of error. A statistical test is not appropriate.

2. An '-' entry in the estimate column indicates that either no sample observations or too few sample observations were available to compute an estimate, or a ratio of medians cannot be calculated because one or both of the median estimates falls in the lowest interval or upper interval of an open-ended distribution.
3. An '-' following a median estimate means the median falls in the lowest interval of an open-ended distribution.
4. An '+' following a median estimate means the median falls in the upper interval of an open-ended distribution.
5. An '****' entry in the margin of error column indicates that the median falls in the lowest interval or upper interval of an open-ended distribution. A statistical test is not appropriate.
6. An '*****' entry in the margin of error column indicates that the estimate is controlled. A statistical test for sampling variability is not appropriate.
7. An 'N' entry in the estimate and margin of error columns indicates that data for this geographic area cannot be displayed because the number of sample cases is too small.
8. An '(X)' means that the estimate is not applicable or not available.

Land Use: 221 Low/Mid-Rise Apartment

Average Peak Period Parking Demand vs. Dwelling Units On a Weekday Location: Suburban

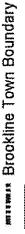
Statistic	Peak Period Demand
Peak Period	12:00–5:00 a.m.
Number of Study Sites	21
Average Size of Study Sites	311 dwelling units
Average Peak Period Parking Demand	1.23 vehicles per dwelling unit
Standard Deviation	0.32
Coefficient of Variation	21%
95% Confidence Interval	1.10–1.37 vehicles per dwelling unit
Range	0.59–1.94 vehicles per dwelling unit
85th Percentile	1.94 vehicles per dwelling unit
33rd Percentile	0.68 vehicles per dwelling unit

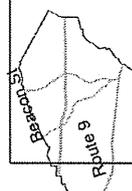
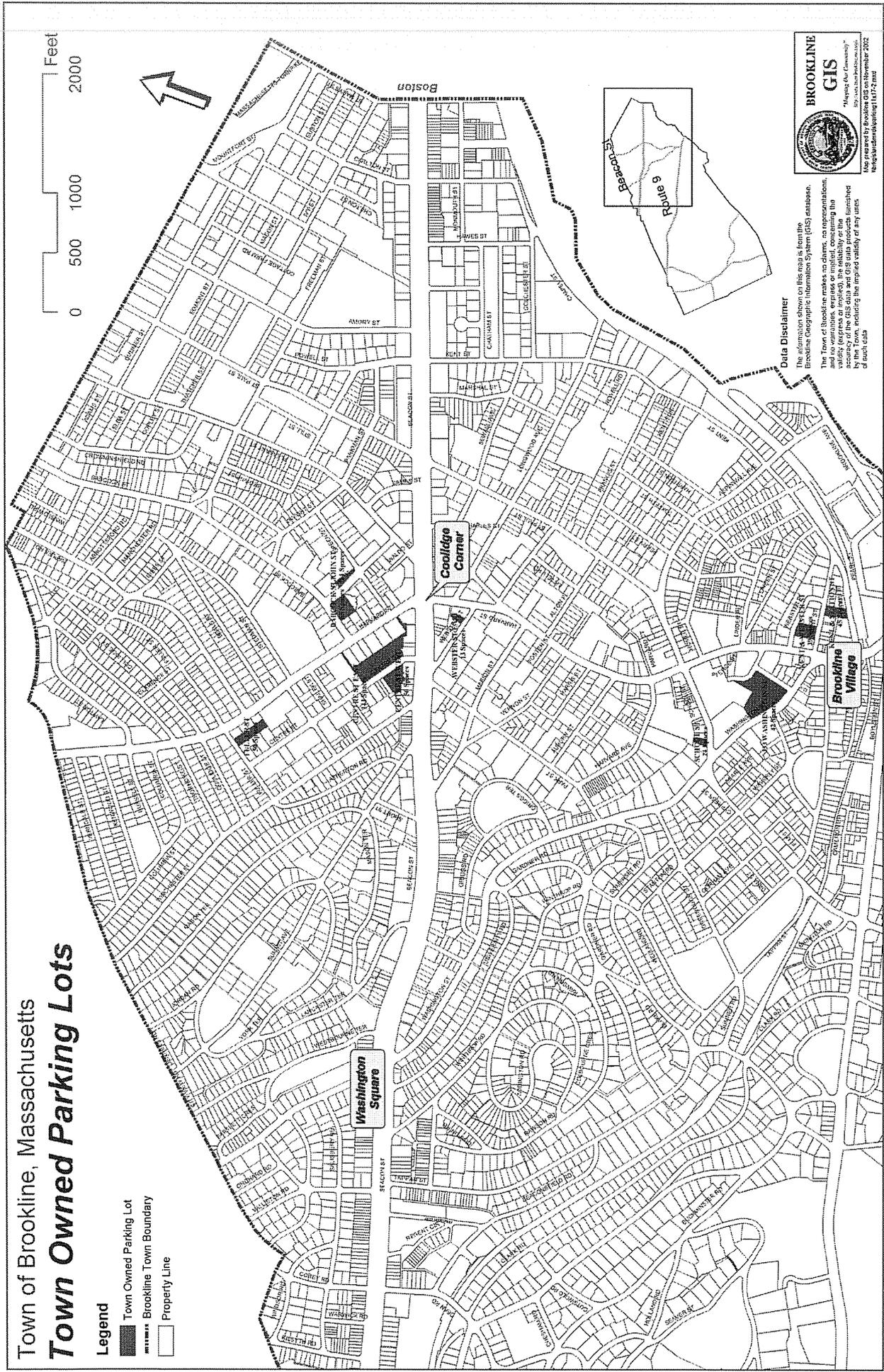
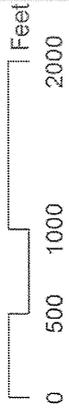


◆ Actual Data Points — Fitted Curve - - - Average Rate

Town of Brookline, Massachusetts Town Owned Parking Lots

Legend

-  Town Owned Parking Lot
-  Brookline Town Boundary
-  Property Line



Data Disclaimer

The information shown on this map is from the Brookline Geographic Information System (GIS) database. The Town of Brookline makes no claims, representations, and warranties, expressed or implied, concerning the accuracy, reliability, or the suitability or the fitness for any purpose of the GIS data and GIS data products furnished hereon, including the accuracy, reliability, or any other of such data.



BROOKLINE GIS
Map prepared by Brookline GIS on November 2002
<http://www.townofbrookline.com/gis/>

Parking

MEMO: Maria Morelli

RE: Centre St

Date Sept 27, 2016

On September 12, 2016 I sent you an picture of the Brookline Town Parking Lot Availability Chart. This Chart is directly comes directly from the Brookline Transportation, dated September 8th, 2016.

PUBLIC

Centre Street (West) rents 56 spaces out and 40 were vacant

Centre Street (East) rents 10 spaces out and 4 were vacant

Babcock Street rents 47 spaces out and 40 were vacant

John Street rents out 14 spaces and 7 are vacant.

As of September 8th there were 91 vacant spaces available.

PRIVATE

19 Winchester (Hamilton Properties) 15 spaces

43 Winchester (Burrows) 15 spaces

Marriott Courtyard depends time of season availability estimate 10 spaces

[Listen](#)

Guest Overnight Parking

About the Brookline Guest Overnight Parking Program

As a Brookline resident, you may purchase a guest overnight parking pass that will allow a guest to park in a designated parking space reserved by the town for overnight guest parking. Parking on-street or in a public lot where overnight parking is prohibited. A guest overnight parking pass entitles the holder to park in a guest space between the hours of 11 PM and 8 AM. An overnight guest parking pass does not guarantee the holder that a guest parking space will be available in the lot closest to their residence. If you live outside a 1/4 mile radius of the nearest Guest Overnight Parking Lot, you can apply for a guest overnight permit for your street by completing the [Temporary Parking Permit Application](#). The cost for either permit is \$10 per night.

Parking Spaces for Overnight Guests Locations

The town has designated a total of 83 parking spaces for overnight guest use. Spaces are available in:

- Babcock Street lot - 18 spaces
- Beacon Street Median / Washington Square lot - 6 spaces
- Centre Street East lot - 15 spaces
- Fuller Street lot - 10 spaces
- Kent / Station Street lot - 5 spaces
- Kent / Webster Place lot - 16 spaces
- Webster Street lot - 13 spaces

As a reminder, park only in those parking spaces that have been reserved with a green and white overnight parking sign. If you park in any other spaces, you may be found in violation of the overnight parking ban and be fined.

Purchasing Guest Overnight Parking Passes

Guest overnight passes can be purchased at the multi-space meters located in the overnight parking lots starting at 8 PM. These machines will accept: quarters, \$1, \$5, and \$10 bills, Master Card, Visa, and Discover as payment. Please note that no change or refund is given.

The parking meters are pay by space so no receipt is needed, although we suggest you print one out for your records.

You must purchase the guest overnight pass after 8 p.m. on the day in which you intend to use it. Guest overnight passes expire at 8 a.m. the following morning.

Contact Us



Todd Kirrane

Transportation
Administrator
[Email](#)

Brookline Town Hall

333 Washington St.
4th Floor
Brookline, MA 02445

Ph: 617-730-2177

Hours

Monday - Thursday
8 a.m. - 5 p.m.

Friday
8 a.m. - 12:30 p.m.

[Staff Directory](#)

Quick Links

[Guest Parking Brochure](#)

[Temporary Permit Application](#)

[Town-Owned Lots Map](#)

Frequently Asked Questions

Where are parking spaces for overnight guests located?

The town has designated a total of 83 parking spaces for overnight guest use:

- Coolidge Corner -
 - Centre Street East lot (15 spaces)
 - Babcock Street lot (18 spaces)
 - Webster Street lot (13 spaces)
- JFK Crossing -
 - Fuller Street lot (10 spaces)
- Brookline Village -
 - Kent & Webster Street lot (16 spaces)
 - Kent & Station lot (5 spaces)
- Washington Square (past Corey Road) -
 - Outbound Median (6 spaces)

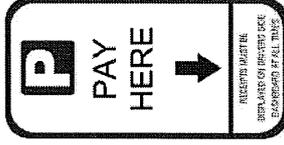
When should I purchase a guest parking pass and does it expire after a specified amount of time?

You must purchase the guest parking pass after 6 pm on the day in which you intend to use it. Guest parking passes expire at 8 am the morning after the day of purchase.

Can I park in a non-Guest Overnight space if all designated spaces are taken?

No. Please park only in those parking spaces that have been reserved with a green and white overnight guest parking sign. If all spaces are occupied please park in one of the other nearby lots. If you park in any other spaces, you may be found in violation of the overnight parking ban and fined.

Look for these signs in the parking lot



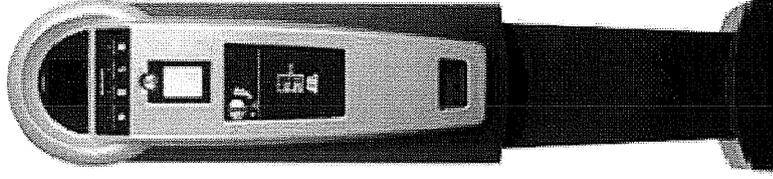
Located at Multi-space Meter



Located on pole indicating parking spaces where you can park

Town of Brookline
Department of Public Works
Andrew Pappastergion, P.E. - Commissioner
333 Washington Street
Brookline, MA 02445
www.brooklinema.gov
617-730-2177

GUEST OVERNIGHT PARKING



Town of Brookline
Department of Public Works
Transportation Division

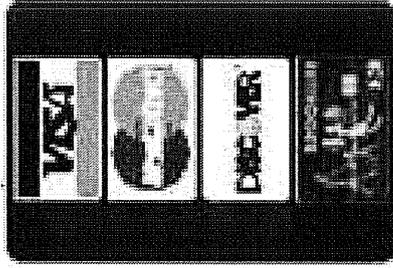
Step by Step

1) Proceed to the overnight parking lot and park the vehicle in a designated "Visitor Space" after 6 pm. Look for:



2) Go to a Multi-space meter, press "OK" twice on multi-space meter, and follow on-screen instructions

3) Insert \$10 payment. Use coins, \$1, 5, 10 bills or



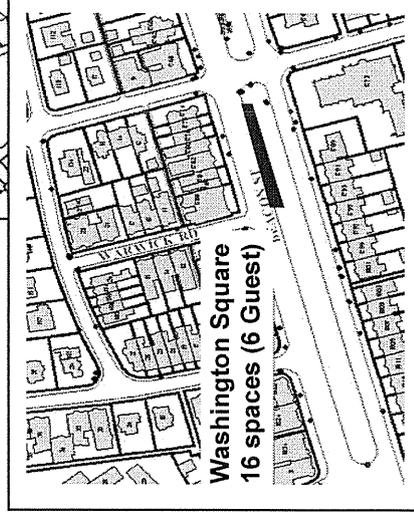
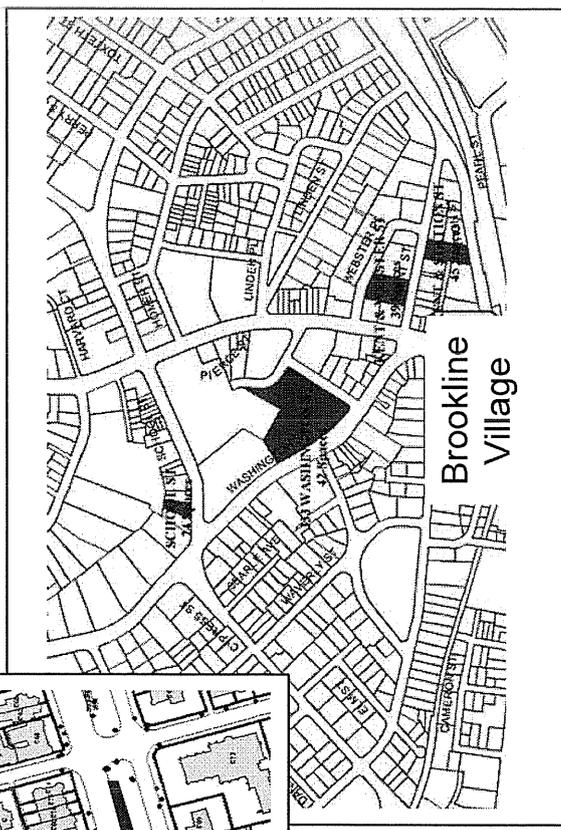
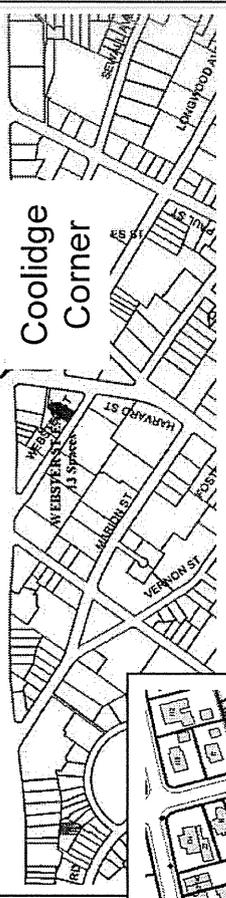
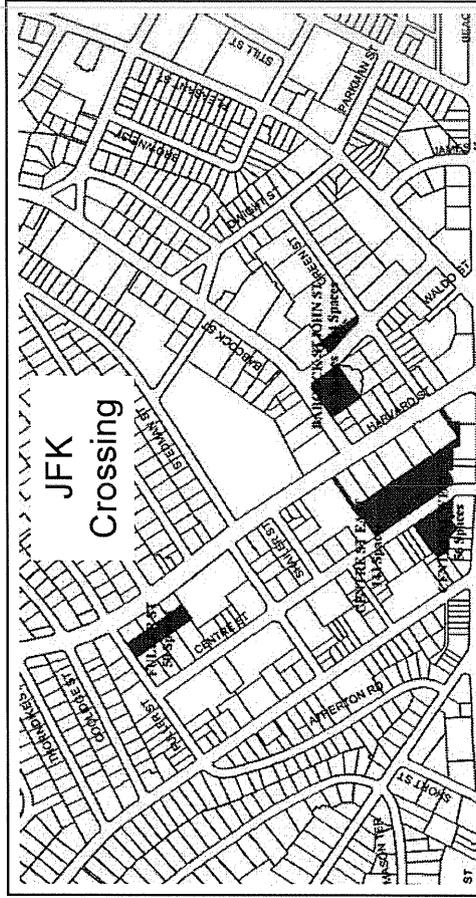
(no change is given)

4) Take receipt from slot on the bottom of the meter

5) Place receipt face up on the driver's side of the dashboard

6) Exit space or pay meter by 8 am the next morning (Monday - Saturday)

Maps of Designated Guest Spaces 11 pm to 8 am





TOWN OF BROOKLINE
Massachusetts

Temporary Parking Permit Pre-Approval Application

Applicant Information	Vehicle Information
-----------------------	---------------------

Resident Name: _____ Address: _____ Location Where Permit is requested: _____ Tel. No. (H) _____ Tel. No. (W) _____	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="text-align: center;">Veh. Registration</td></tr> <tr><td style="text-align: center;">Car Make</td></tr> <tr><td style="text-align: center;">Car Model</td></tr> <tr><td style="text-align: center;">State</td></tr> </table>	Veh. Registration	Car Make	Car Model	State
Veh. Registration					
Car Make					
Car Model					
State					

Date permit to begin _____ Date permit to end _____

Daytime Hours: 8 am to 6 pm Overnight: 6 pm to 8 am

Temporary Parking For:	Description	Fee
<input type="checkbox"/>	Tradesman Daytime Tradesman employed by a Brookline resident or establishment with no off-street parking options (30 day maximum)	Free*
<input type="checkbox"/>	Resident Overnight Brookline resident displaced from an off-street parking space by construction-related activities residing on street with daytime permit available (30 day maximum)	Free*
<input type="checkbox"/>	Resident Daytime Brookline resident displaced from an off-street parking space by construction-related activities residing on street without daytime permit (30 day maximum)	Free*
<input type="checkbox"/>	Healthcare Aide Daytime Healthcare aides employed by Brookline resident (180 day maximum)	Free*
<input type="checkbox"/>	Healthcare Aide Overnight Healthcare aides employed by Brookline resident during evening hours. If within 500 feet radius of overnight lot permit will be issued for lot. (180 day maximum)	Free*
<input type="checkbox"/>	Childcare Provider Childcare provider employed by Brookline resident during the daytime only (180 day maximum)	Free*
<input type="checkbox"/>	Guest/Visitor Overnight guests or visitors of Brookline residents not within 1/4 mile of overnight visitor lot (30 day maximum)	\$10.00 per night
<input type="checkbox"/>	Seasonal Employees Seasonal employees employed by a Brookline resident or establishment during the daytime with no off-street parking options (240 day maximum)	Free*

Please Read Terms & Conditions on Rear of Form Before Signing
BY SIGNING BELOW THE APPLICANT AGREES TO ALL TERMS AND CONDITIONS OF USE:

Signature of Applicant: _____ Date: _____

Terms and Conditions of Use

1. A Temporary Parking Permit allows its holder to park a uniquely identified vehicle on a designated street during the hours and on the dates specified. Parking for less than 2 hours does not require a temporary permit.
2. A Temporary Parking Permit is valid only for the time period shown on the permit. If conditions warrant, this permit may be renewed. The issue and continued use of this permit shall be at the discretion of the DPW - Transportation Division.
3. A Temporary Parking Permit must be displayed on the dashboard of the driver side of the car.
4. The holder of a Temporary Parking Permit must conform with all parking restriction and prohibitions posted by signage or otherwise in effect on the assigned street (e.g., do not park in a loading zone, on a crosswalk, in a no parking zone, etc.).
5. The issuance of a Temporary Parking Permit does not guarantee the holder that a parking space will be available when needed.
6. Applicants for a Temporary Parking Permit must demonstrate that no alternative off-street parking is available to meet their needs.
7. Residents applying for a Temporary Parking Permit must provide proof of residency (i.e copy of MA Driver's License).
8. Valid Building Permit is required for all permits being sought due to construction. If Building Permit is not applicable a valid contract between the resident and contractor must be provided.
9. Valid letter of employment from resident must be presented for all permits being sought by childcare providers and seasonal employees.
10. Valid letter of need submitted by a doctor, home health agency, or social worker from the Brookline Senior Center must be presented for all permit being sought by healthcare providers.
11. Applications may be presented by mail or in person to DPW - Transportation 333 Washington Street, Brookline MA 02445 or via fax 617-264-6450 with all applicable paperwork and fees. Permits will not be issued until they are deemed complete.
12. Permit may be revoked at the discretion of DPW - Transportation personnel for just causes.
13. These permits are issued under the authority of the Transportation Board in accordance with Article V(b) of the Traffic Rules & Regulations and this abbreviated list of terms & conditions does not fully represent nor replace the requirements as set forth in these regulations.

Veh. Registration
Car Make
Car Model
State

Veh. Registration
Car Make
Car Model
State

Veh. Registration
Car Make
Car Model
State

Veh. Registration
Car Make
Car Model
State

Veh. Registration
Car Make
Car Model
State

Veh. Registration
Car Make
Car Model
State

Veh. Registration
Car Make
Car Model
State

Veh. Registration
Car Make
Car Model
State

[Listen](#)

Parking

Daytime Parking

Unless posted otherwise, no driver may park a vehicle on the same street in Brookline between the hours of 6 a.m. of one day and 1 a.m. of the following day for a period of time longer than 2 hours with the exception of Sundays and public holidays.

Overnight Parking

No driver may park on any street in Brookline, or in any town-owned off-street parking facility, for a period longer than 1 hour between the hours of 2 a.m. and 6 a.m. on any day of the week unless allowed by the Transportation Board.

Overnight Parking Locations

Coolidge Corner

- Lot 1 - Beacon Street Median, 60 Spaces
- Lot 2 - Centre Street West, 56 Spaces
- Lot 11 - Centre Street East, 10 Spaces
- Lot 3 - Babcock Street, 47 Spaces
- Lot 4 - John Street, 14 Spaces
- Lot 9 - Marriott Courtyard Hotel, 60 Spaces

Brookline Village

- Lot 5 - School Street, 14 Spaces
- Lot 6 - Kent / Webster Place, 23 Spaces
- Lot 7 - Kent / Station Street, 15 Spaces

JFK Crossing

- Lot 8 - Fuller Street, 10 Spaces

St. Mary's

- Lot 14 - Beacon Street Median, 10 Spaces

Washington Square

- Lot 10 - Beacon Street Median, 10 Spaces

Snow Emergency

No car may be parked on any street in the Town of Brookline once a snow emergency has been declared. To learn if Brookline has called a snow emergency, listen to the local broadcast media outlets or call the DPW at 617-730-2610.

Contact Us



Todd Kirrane

Transportation
Administrator

[Email](#)

Brookline Town Hall

333 Washington St.
4th Floor
Brookline, MA 02445

Ph: 617-730-2177

Hours

Monday - Thursday
8 a.m. - 5 p.m.

Friday
8 a.m. - 12:30 p.m.

[Staff Directory](#)

[Listen](#)

Resident Permit Parking

About the Program

The Brookline Resident Permit Parking (RPP) Program allows a motor vehicle displaying a valid resident permit sticker to park on your residential side street, within your police sector, in excess of 2 hours from 6 a.m. to 2 a.m.

About the Permits

The Transportation Board wants to preserve the livability of our residential neighborhoods by discouraging non-residents (e.g., commuters and commercial area shoppers) from parking on residential streets for long periods.

Fees

Cost: Annual fee of \$25 per permit

Renewal: Annual renewal by July 1st, expiring June 30th

Permit Restrictions

The Brookline RPP Program does not prohibit non-residents from parking on local streets for less than 2 hours, nor does it guarantee neighborhood residents an on-street parking space whenever they want one. Participants in the RPP Program also are not allowed to park overnight or to violate any other parking regulations that may be in effect on your street. However, residents who live in areas that experience high levels of on-street parking by non-resident vehicles will benefit from not having to move their vehicles to another street every 2 hours during daytime hours.

Applying for Resident Permit Parking

Residents may submit a completed [Resident Permit Parking Application](#) to the DPW - Transportation Division office either in-person or by mail:

DPW - Transportation Division
333 Washington Street
4th Floor
Brookline, MA 02445

Application Requirements

This application must include:

- Payment of the \$25 permit fee per vehicle by cash or check made out to the "Town of Brookline"
- A valid Massachusetts drivers license bearing a Brookline address
- A valid Massachusetts vehicle registration indicating that the vehicle is garaged in Brookline (Note: owners of leased vehicles must provide a copy of a signed lease)

Contact Us



Todd Kirrane

Transportation

Administrator

[Email](#)

Brookline Town Hall

333 Washington St.
4th Floor
Brookline, MA 02445

Ph: 617-730-2177

Hours

Monday - Thursday
8 a.m. - 5 p.m.

Friday
8 a.m. - 12:30 p.m.

[Staff Directory](#)

FAQs

- [Are visitor permits included in the new resident permit program?](#)
- [How do residents apply for resident parking permits?](#)
- [How long is a resident parking permit valid?](#)

[View All](#)

Quick Links

[Resident Parking Permit Application](#)

A resident parking permit may be issued to the owner of vehicle that is registered to a Brookline address with the Massachusetts Registry of Motor Vehicles. The only exceptions are leased or company cars under the custody of an applicant who can provide proof of residency on a residential street within the Town of Brookline that qualifies for the program under Article V(b) Section 7 of the Traffic Rules & Regulations.

Renewing Resident Parking Permits

Residential parking permits are valid for a term of 1 year from July 1 to June 30, regardless of the actual date of issuance. Renewals can be made either by mail, online, or in-person at the DPW - Transportation Division at:

DPW Transportation Divisions
333 Washington St.
4th Floor
Brookline, MA 02445

No additional verification will be required to renew a permit, as long as that vehicle is indicated in the previous year's list of permit holders and its vehicle registration on file has not expired.

Unqualified Parking Permit Streets

All private ways within the Town of Brookline and the following public ways:

- Adams Street
- Beacon Street (999 - 1441; 1609 - 1730)
- Boylston Place
- Boylston Street
- Chapel Street
- Copley Street
- Crowninshield Road
- Elba Street
- Harvard Street
- Hayden Road
- Holden Street
- John Street
- Mountfort Street
- Pearl Street
- Pierce Street
- St. Mary's
- Station Street
- Webster Place
- Webster Street

Visitor Permits

Only those streets that are restricted, by a vote of the Transportation Board, as 'Permit Parking Only' qualify for a visitor permit. These permits allow a vehicle visiting a residential address on one of the streets listed below to park for a maximum of 5

consecutive days. The cost of these permit has tags is \$5.00 with

visitor program:

- Chestnut Hill Avenue (439 - 474)
- Clinton Road (300 - 419)
- Penniman Road
- Taylor Crossway
- Willard Road

Resident Permits Near Brookline High School

If you live on one of the following streets you should go to the administration office at the Brookline High School to apply for your resident permit sticker:

- Blake Road
- Davis Avenue (151 - 205)
- Gorham Avenue
- Greenough Street
- Lowell Road
- Somerset Road
- Stanton Road
- Tappan Street (46 - 125)
- Welland Road

[Listen](#)

Resident Overnight Parking

Residents with no off-street parking spaces may find it difficult to comply with the all night parking ban. To minimize this inconvenience, the Town of Brookline rents out a total of 325 spaces in 11 town-owned parking lots and the Courtyard Marriott Hotel.

Overnight Resident Parking Lots

Coolidge Corner

- Lot 1 - Beacon Street Median - 60 spaces
- Lot 2 - Centre Street West - 56 Spaces
- Lot 3 - Babcock Street - 47 Spaces
- Lot 4 - John St. - 14 Spaces
- Lot 9 - Courtyard Marriott Hotel - 60 Spaces
- Lot 11 - Centre Street East - 10 Spaces

Brookline Village

- Lot 5 - School Street - 14 Spaces
- Lot 6 - Kent/Webster Pl - 13 Spaces
- Lot 7 - Kent/Station St - 15 Spaces

JFK Crossing

- Lot 8 - Fuller Street - 10 Spaces

Washington Square

- Lot 10 - Beacon Street Median - 10 Spaces

St. Mary's/Lower Beacon

- Lot 14 - Beacon Street Median - 10 Spaces

Cost for a space: \$100.00/month (Billed to your address and payable each quarter (\$300))

Hours of parking: Weekdays and Saturday: 8 PM to 9 AM

Sundays and Holidays: All Day/Evening

Eligibility: Car must be registered in Massachusetts to a Brookline address.

(Exceptions: lease vehicles, company cars, and full time students.)

Current excise tax must be paid

Waiting List

If you would like to place your name on the waiting list for one or more of the above lots please call (617)730-2177 with the following information:

1. Name
2. Brookline Address
3. Contact Phone Number

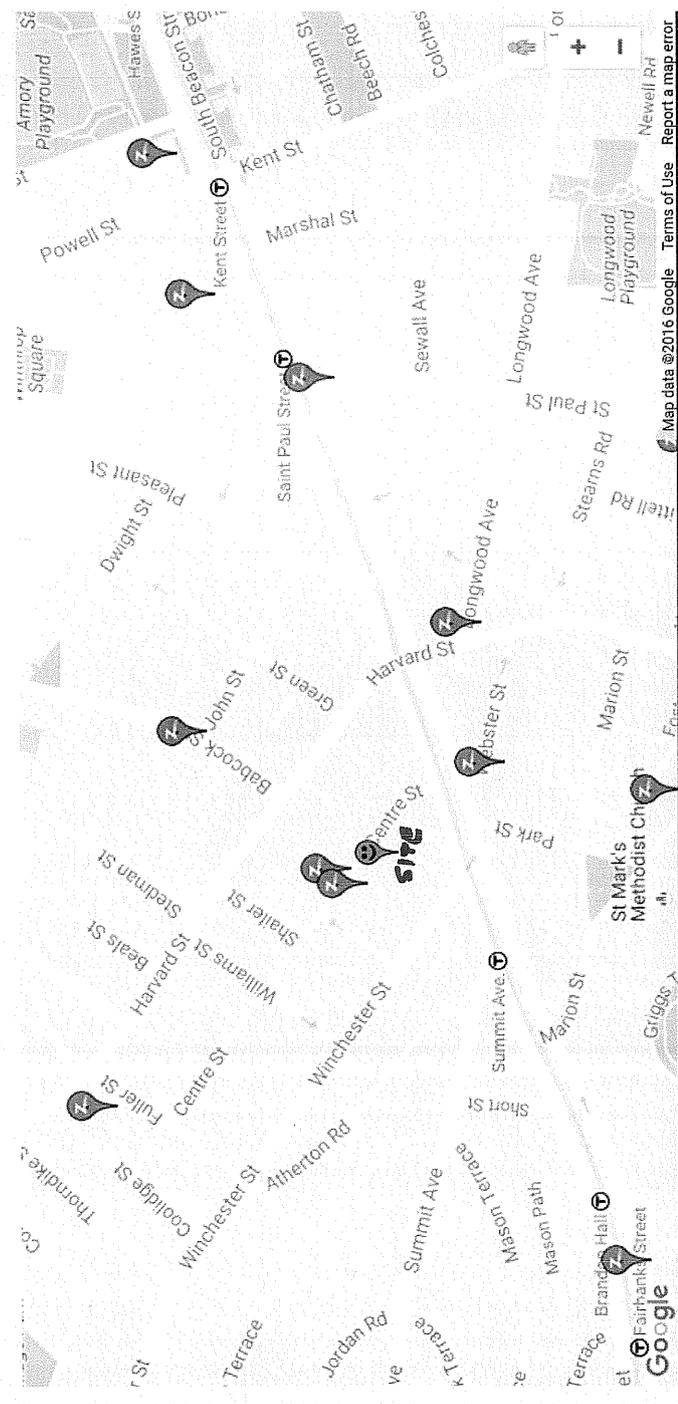
We will contact you via telephone when a space becomes available. The spaces turn-over significantly every three months due to our billing cycle, but it could be a shorter wait for a space.

Private Parking Lots

A number of private lot owners also rent overnight parking spaces on a monthly basis to area residents. Those property owners renting out parking spaces to anyone other than a tenant, are required to obtain an Open Air Parking Space License. [Click here](#) for a current list of the names, locations and lot sizes of those who have received an Open Air Parking Space License for this year. Residents who need an overnight parking space and live in close proximity to one of these private lots may want to contact the lot owner directly to determine the availability of overnight parking spaces.

□ Car Sharing/Bike Sharing

explore the one that you call yours.

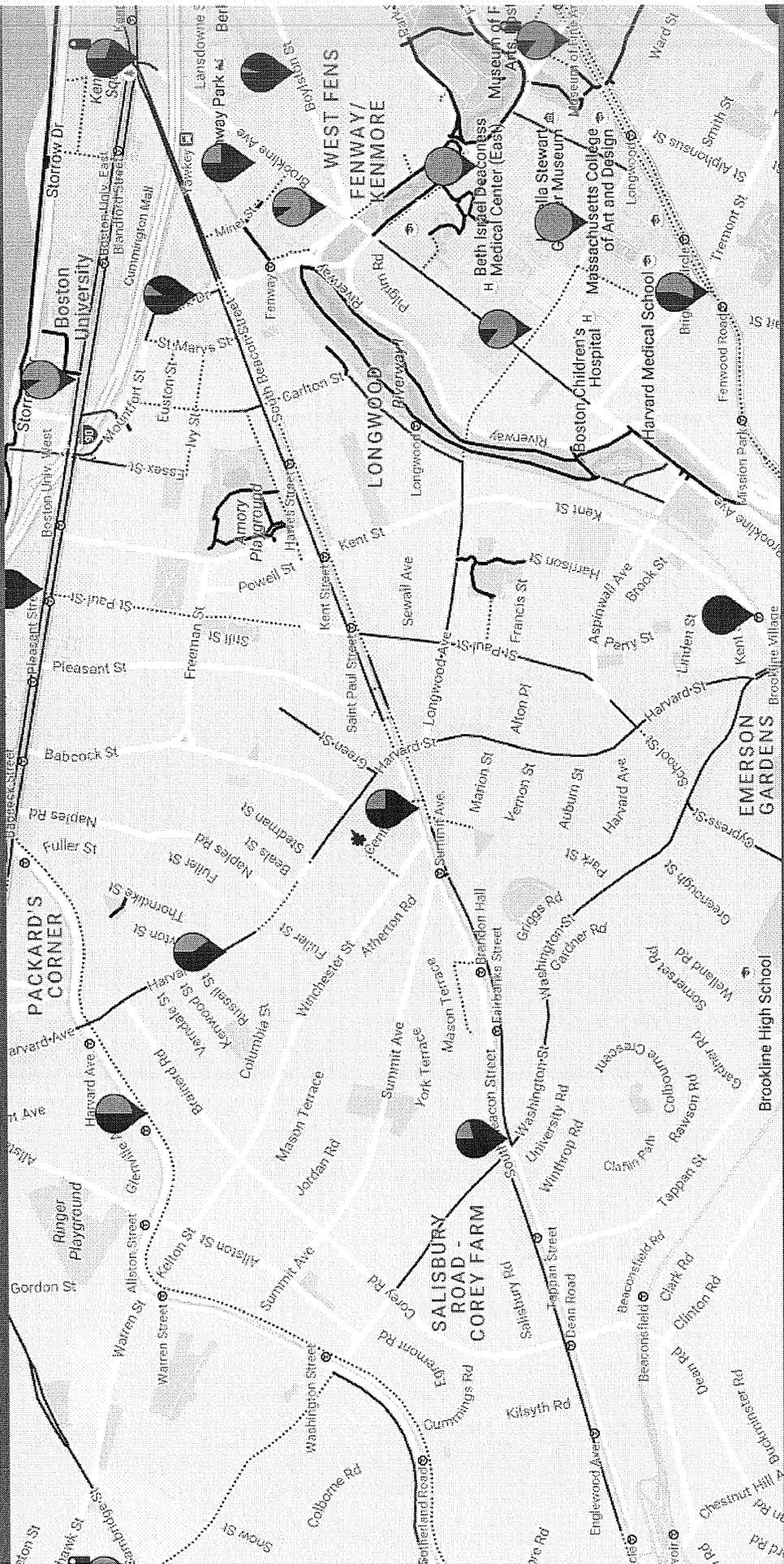


Find Zipcars near you.

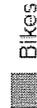
Find a station

Enter a station name, street name or address.

[Suggest a station](#)



★ SITE



Bikes

Bike docks

Bike key dispenser

Not installed

Out of service

In service