TRAFFIC IMPACT AND ACCESS STUDY

Proposed Hotel & Residential Development

Somerville, Massachusetts

PREPARED FOR

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1 Introduction

Introduction

VHB, on behalf of CPC Land Acquisition Co, LLC and Distinctive Hospitality Group (together as the "Proponent"), has conducted a traffic impact and access study for a proposed residential and hotel development (the "Project"). The Project is proposed to be located at 0-20 Inner Belt Road in Somerville, Massachusetts (the "Site"). This study quantifies existing and projected future traffic conditions, with and without the Project. Based on the analysis of the future traffic conditions, the proposed Project is not expected to have a significant impact on the study area locations.

Project Description

The Project Site is bounded by Washington Street to the north, Inner Belt Road to the west, state-owned land to the south, and Crescent Street to the east. The northerly end of the Site is currently occupied by an approximately 139-space parking lot. Access to the lot currently is limited to a single full-access driveway located on Crescent Street at its intersection with Roland Street. The southerly portion of the Site is occupied by the approximately 5,400 square foot (sf) Somerville City Club building. An approximately 61-space surface parking lot is located to the south of that building, with access to the lot provided by two full-access driveways on Inner Belt Road. The first curb cut is located just north of New Washington Street, and the second driveway is located 60 feet further to the north. There also is a small unstriped parking area (roughly 5 to 10 spaces) located to the north of the City Club building, with a single full-access driveway provided on Inner Belt Road.

The proposed Project involves the construction of a new residential building containing 205 units (37 studio, 162 one- or two-bedroom, and 6 three-bedroom units). The residential portion of the Project will be located at the southerly end of the

Site. The hotel component of the Project will consist of a new 120-room hotel to be constructed at the northerly end of the Site adjacent to Washington Street. The existing City Club use will continue to operate on the Site, but within a new and improved area within the residential building.

As part of the Project a new "Roland Street Extension" circulation roadway will be constructed running parallel to Washington Street between the two uses and connecting Inner Belt Road to Crescent Street. Access to the residential portion of the Site will be provided by way of two full-access driveways to the 427-space parking garage within the seven-story residential building. The westerly garage driveway will be located on Inner Belt Road opposite New Washington Street. A driveway also will be provided on the Roland Street Extension running between the two uses, with that curb cut being located at the easterly end of the residential building. A full-access hotel driveway will be located on the northerly side of the new circulation road opposite the residential garage driveway. The hotel driveway will provide access to a six-space surface parking lot and hotel pick-up/drop-off area next to the main building entrance.

Study Methodology

This traffic assessment has been conducted in three stages. The first stage involved an assessment of existing traffic conditions within the project area including an inventory of existing roadway geometry; observations of traffic flow, including daily and peak period traffic counts; and a review of vehicular crash data.

The second stage of the study established the framework for evaluating the transportation impacts of the proposed project. Specific travel demand forecasts for the Project were assessed along with future traffic demands on the study area roadways due to projected background traffic growth and other proposed area development that will occur, independent of the proposed development. The year 2025, a seven-year time horizon, was selected as the design year for analysis for the preparation of this traffic impact and access assessment to satisfy the Executive Office of Environmental Affairs/Executive Office of Transportation (EOEA/EOT) guidelines.

The third and final stage involved conducting traffic analyses to identify both existing and projected future roadway capacities and demands. This analysis was used as the basis for determining potential project impacts and potential mitigation measures.

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Existing Conditions

Evaluation of the transportation impacts associated with the proposed mixed-use redevelopment requires a thorough understanding of the existing transportation system in the project study area. The existing conditions evaluation consisted of an inventory of the traffic control, roadway, driveway, and intersection geometry in the study area; the collection of peak period traffic volumes; an overview of existing public transit options; and a review of recent vehicular crash history. Each of these elements is described in detail below.

Study Area

Based on an understanding of the current traffic operations in the region, a study area comprised of the following intersections and their approach roadways were selected for the review as shown in Figure 1:

- Washington Street at Inner Belt Road/Mt. Vernon Street (*signalized*)
- Washington Street at Crescent Street
- Washington Street at New Washington Street
- Inner Belt Road at New Washington Street
- Crescent Street at Roland Street/Site parking lot driveways
- Inner Belt Road/Holiday Inn driveways (2)
- Existing City Club driveways (2)

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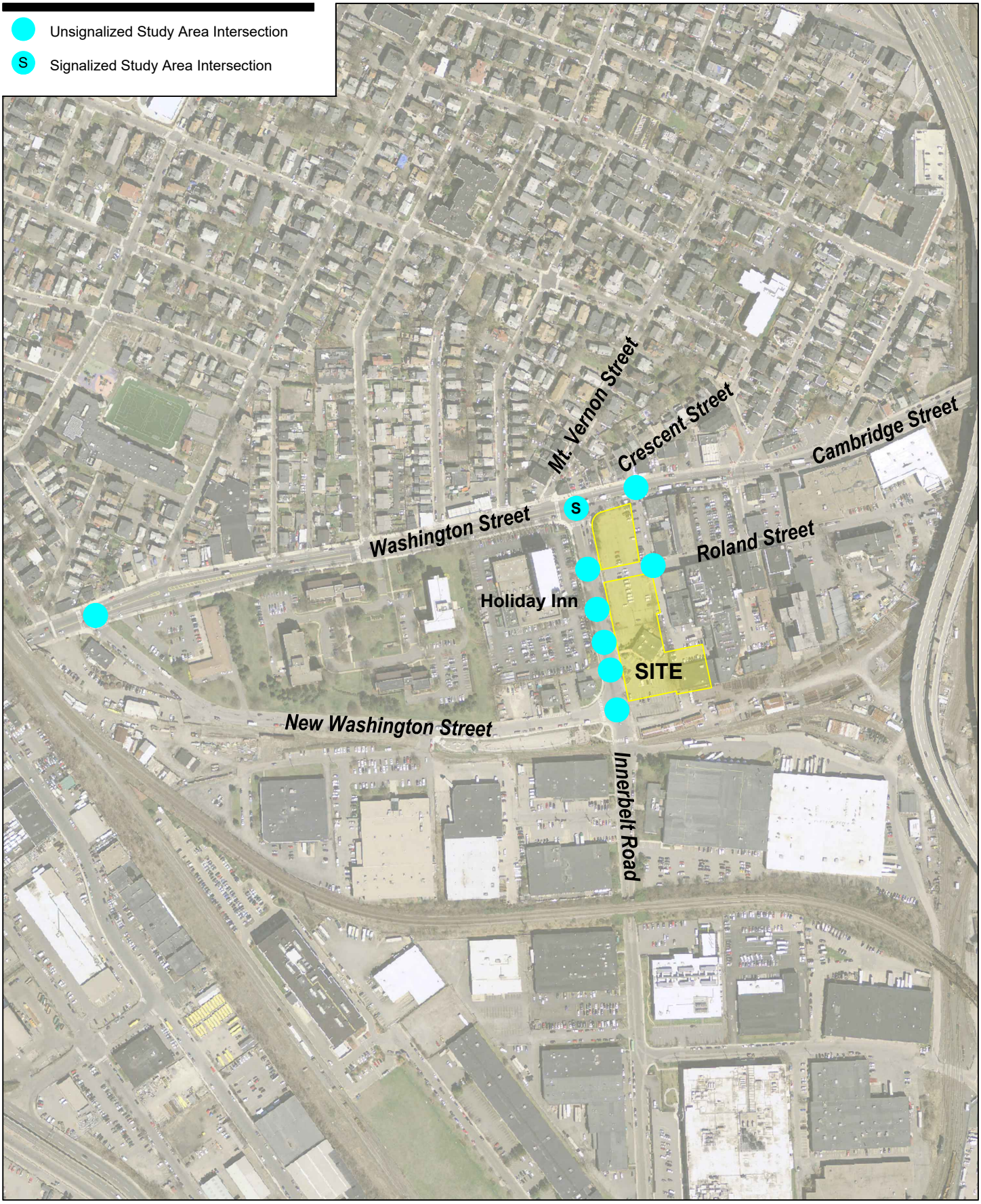

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Figure 1

Site Location/Study Area Map
Hotel and Residential Development
Somerville, Massachusetts

Roadway Geometry

Descriptions of the study area roadways and intersections are provided below, including descriptions of the existing lane configurations, traffic control at the study area intersections, the roadway jurisdiction in this area, and existing pedestrian and bicycle infrastructure. The existing lane use at the study area intersections is shown in Figure 2.

Roadways

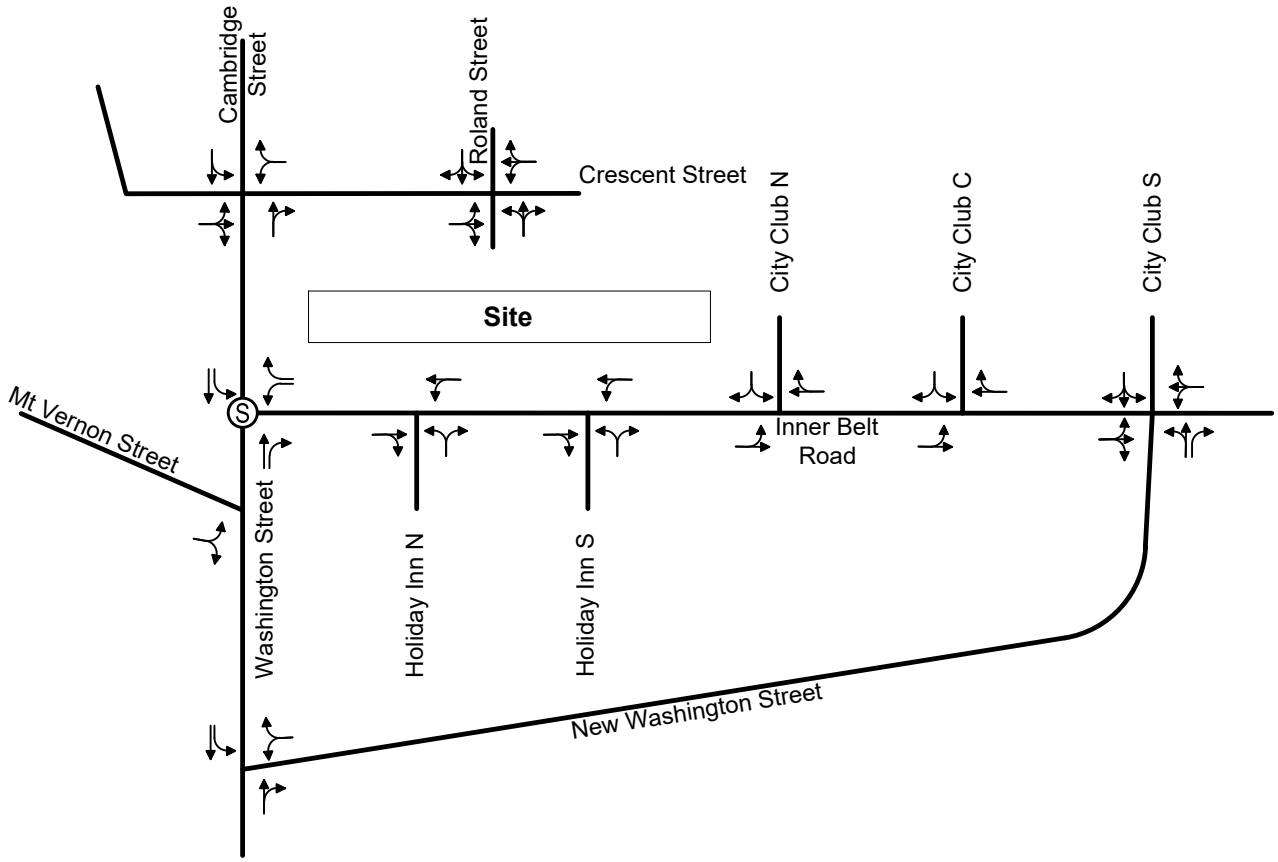
Washington Street

Washington Street is functionally classified as an urban principal arterial and is under the jurisdiction of the City of Somerville adjacent to the Site. Washington Street runs in an east-west direction through Somerville and the City of Boston just east of the Site. Within the study area, Washington Street provides one travel lane in each direction with exclusive turn lanes at prominent intersections. Sidewalks are provided on both sides of the roadway. Dedicated bicycle lanes are provided in both directions on Washington Street within the study area. On-street parking is allowed on both sides of the roadway and 30 miles-per-hour (mph) speed limit signs are posted on Washington Street between New Washington Street and Inner Belt Road. Land use along Washington Street primarily consists of a mixture of residential and commercial uses.

Inner Belt Road

Inner Belt Road is a minor local roadway extending approximately two-thirds of a mile to the south of Washington Street to where it terminates at a cul-de-sac adjacent to a commercial building. This roadway is under City of Somerville jurisdiction and provides access to multiple commercial properties. Sidewalks are provided along both sides of the roadway in the vicinity of the Site, and on-street parking is allowed along the easterly side of the street adjacent to the Site. VHB did not observe any posted speed limit signs on this roadway.

Ⓢ Signalized Intersection



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Lane Geometry and Traffic Control
Hotel and Residential Development
Somerville, Massachusetts

Figure 2

Intersections

Washington Street at Inner Belt Road/ Mt. Vernon Street

Washington Street is intersected by Inner Belt Road from the south to form a three-way signalized intersection at the northwest corner of the Project Site. Washington Street also is intersected from the north by Mt. Vernon Street approximately 30 feet to the west of Inner Belt Road. Due to the offset alignment, the southbound one-way Mt. Vernon Street approach is not part of the signalized operation. Instead, that approach operates under Stop-control. Similarly, a driveway to a 12-space surface parking lot is located opposite Inner Belt Road but operates under Stop-control instead of being included in the signal operation. The Washington Street eastbound approach consists of a single through-lane and an exclusive right-turn lane onto Inner Belt Road. The westbound Washington Street approach features a single through-lane and an exclusive left-turn lane. The northbound Inner Belt Road approach consist of a shared through-/left-turn lane and an exclusive right-turn lane. Sidewalks are provided along both sides of all approaches and the westerly Washington Street and Inner Belt Road approaches feature crosswalks with signalized pedestrian crossings. Land use around the intersection is a mixture of residential and commercial, including the Project Site at the southeast corner of the intersection and the Holiday Inn hotel located at the southwest corner.

Inner Belt Road at New Washington Street

Inner Belt Road is intersected by New Washington Street from the west and the southerly City Club driveway from the east to form a four-way unsignalized intersection. The New Washington Street approach intersects Inner Belt Road slightly south of the City Club driveway to the east. Due to right-of-way restrictions on both sides of the roadway it is not feasible for these roadways to be fully aligned. The eastbound New Washington Street approach is under Stop-sign control. While this approach is striped as a single lane, the large radius at the southeasterly corner allows for right-turning traffic to bypass vehicles waiting to turn left onto Inner Belt Road. While a Stop-sign is not posted on the single-lane City Club driveway approach exiting traffic from that site was observed to stop before turning onto Inner Belt Road.

Sidewalks are provided along both sides of all approaches to the intersection, and a striped crosswalk is provided across the New Washington Street approach. Land use around the intersection primarily is commercial/industrial, with the "Zero New Washington Park" located along the southwesterly side of New Washington Street.

Washington Street at New Washington Street

Washington Street is intersected from the south by New Washington Street to form a three-way unsignalized intersection. The Washington Street approaches feature single travel lanes, with an exclusive left-turn lane onto New Washington Street being provided in the westbound direction. The northbound New Washington Street approach consists of a single travel lane under Stop-sign control. Land use around the intersection primarily is a mixture of commercial and residential uses, with the MBTA's new "Washington Street" Green Line Station planned to be constructed shortly to the west of this intersection.

Traffic Volumes

To identify current traffic flow characteristics along the primary roadways serving the Project study area, peak-hour turning movement counts (TMCs) and daily traffic volumes were collected within the study area in August 2018.

Weekday and Saturday daily volumes along Washington Street and Inner Belt Road were collected using automated traffic recorders (ATRs) on Tuesday, August 21, 2018 and Saturday, August 21, 2018. Table 1 summarizes the observed weekday daily volumes and Saturday daily along the study area roadways.

Table 1 Observed Traffic Volume Summary

	Weekday							Saturday			
	Daily [a]	Morning Peak Hour			Evening Peak Hour			Daily	Midday Peak Hour		
Location	Vol.	Vol. [b]	K Factor [c]	Dir. Dist.[d]	Vol.	K Factor	Dir. Dist.	Vol.	Vol.	K Factor	Dir. Dist.
Washington Street:											
(west of Inner Belt Road)	13,750	840	6.1%	68% WB	880	6.4%	67% WB	14,150	830	5.9%	69% WB
Inner Belt Road:											
(south of Washington Street)	6,950	525	7.6%	80% SB	540	7.8%	59% NB	2,580	210	8.1%	77% SB

Source: VHB; based on automatic recorder counts conducted in August 2018.
a average daily traffic volume expressed in vehicles per day.
b peak hour volume expressed in vehicles per hour.
c percent of traffic occurs during the peak hour.
d directional distribution of peak hour traffic.
Note: Peak hours do not necessarily coincide with the peak hours of turning movement counts.

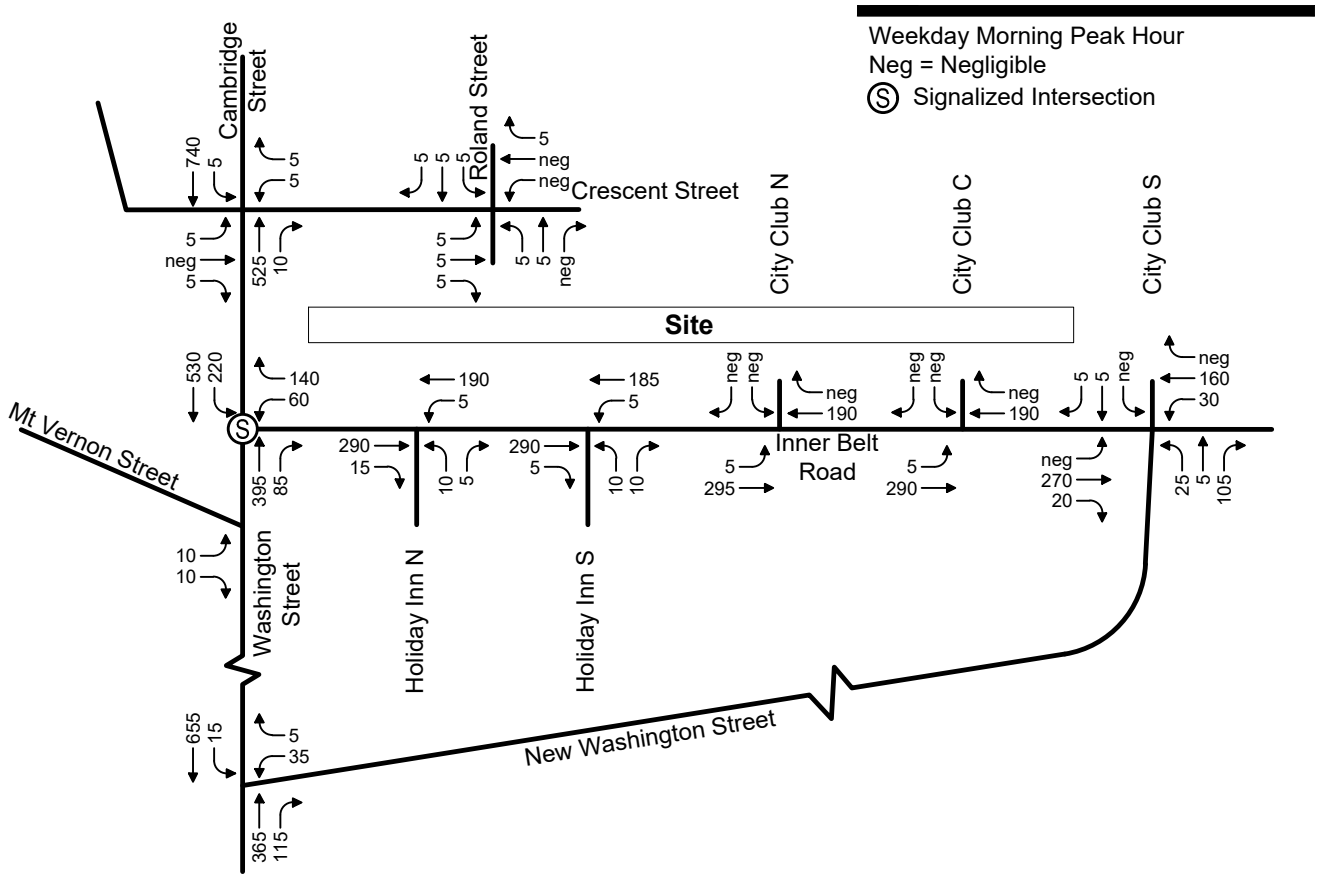
As shown in Table 1, Washington Street carries approximately 13,750 vehicles on a typical weekday. Volumes on Saturday were slightly higher at 14,150 vehicles per day, with peak hour traffic also making up approximately six-percent of the daily volume.

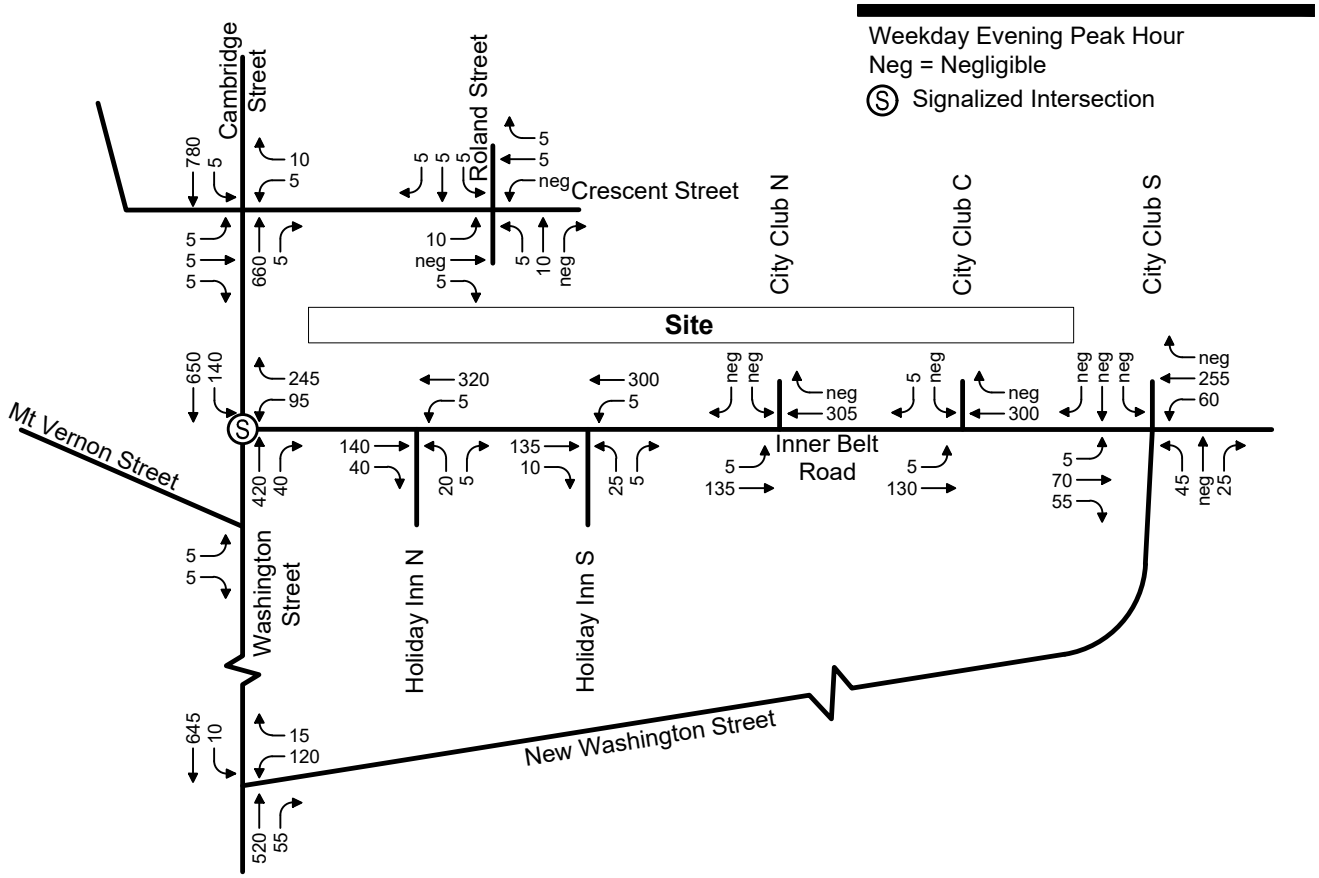
Inner Belt Road volumes were observed to be 6,950 and 2,580 vehicles per day on the respective weekday and Saturday studied.

VHB also conducted manual turning movement/classification counts during the weekday morning (7 AM to 9 AM) and weekday evening (4 PM to 6 PM) peak periods on Thursday, August 9, 2018, and on Saturday August 11, 2018 between 11 AM and 2 PM. These time periods were considered following the standard practice of evaluating the combined peak period for roadway and development traffic. Based on a review of the count data, the weekday morning and evening peak hours of vehicular activity were determined to be 7:45 AM to 8:45 AM and 4:30 PM to 5:30 PM, respectively, while the Saturday peak hour occurred between 1:00 PM and 2:00 PM. The ATR and peak-period TMC data are included in the Appendix to this document.

Seasonal Adjustment

The traffic data collected for the study was obtained during the month of August. To quantify the seasonal variation of traffic volumes in the area, historic traffic data from MassDOT permanent counting stations were reviewed. Based on the review, traffic volumes in August are slightly lower than average-month conditions. Therefore, to present a conservative analysis, the observed August traffic volumes were increased using a 1.016 seasonal factor. The seasonal adjustment factors are included in the Appendix C to this report. The resulting 2018 Existing Conditions peak-hour traffic volumes are shown in Figures 3 and 4.





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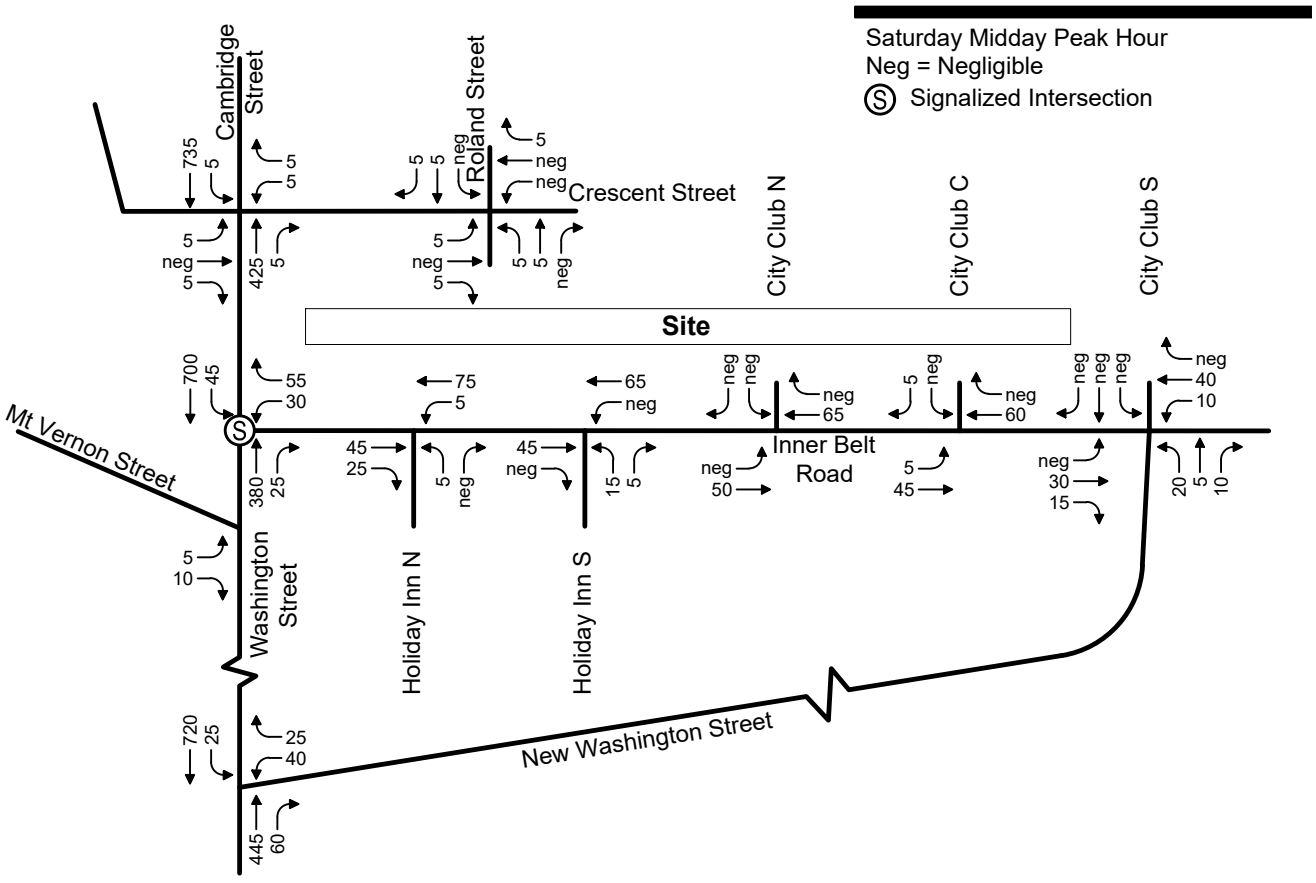
2018 Existing Conditions Weekday Peak Hour Traffic Volumes
Hotel and Residential Development
Somerville, Massachusetts

Figure 3



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2018 Existing Conditions Saturday Peak Hour Traffic Volumes
Hotel and Residential Development
Somerville, Massachusetts

Figure 4

Public Transportation

Ample public transportation services by the Massachusetts Bay Transportation Authority (MBTA) currently are provided with in the study area, with significant enhancements also planned. A summary of existing public transportation amenities in the area is provided below, followed by a discussion of the planned MBTA Green Line Extension project.

Existing Conditions

The Project Site is located roughly 0.36 miles to the west of the MBTA Sullivan Square Orange Line Station. The Project study area also is currently served by three MBTA bus routes passing by the Project Site. Peak period frequencies/headways for MBTA bus services are summarized in Table 2.

Table 2 Project Area MBTA Service

Service	Origin / Destination	Peak-Hour Frequency (minutes)
Route 86	Sullivan Square – Reservoir	10-18
Route 91	Sullivan Square – Central Square	25-30
Route CT2	Sullivan Square – Ruggles Station	15-25

MBTA Green Line Extension Project

Planning is currently underway for a 4.3-mile extension of the MBTA Green Line light rail from its current terminus at Lechmere Station in Cambridge into Somerville and Medford. The extension will have two branches: a 0.9-mile southerly branch that will terminate near Somerville's Union Square, and a 3.4-mile northerly branch that will parallel the Lowell Line of the commuter rail through Somerville and will terminate at College Avenue in Medford. The new Washington Street station will be located just west of the Washington Street/New Washington Street intersection, which is an approximately 0.39 mile walking distance. The Green Line extension is expected to be completed in 2021, which is prior to the analysis horizon year for this study.

Vehicular Crash History

To identify potential vehicle crash trends and/or roadway deficiencies within the project's study area, VHB conducted a review of the MassDOT Crash Database to document the number of vehicular collisions that have taken place over the most recent five-year period (2012-2016). In addition to that review, study area intersections

should also be reviewed in the MassDOT's Highway Safety Improvement Program (HSIP) database. An HSIP-eligible cluster is one in which the total number of "equivalent property damage only"[1] crashes in the area is within the top 5% of all clusters in that region. Being HSIP-eligible makes the location eligible for FHWA and MassDOT funds to address the identified safety issues at these locations.

As part of this effort, VHB reviewed this database and found that only the Washington Street/New Washington Street intersection was listed as being within an HSIP-eligible cluster. Specifically, this intersection falls within a segment of Washington Street that is under the 2006-2015 HSIP bicycle cluster listing. Within these years there was a total crash count of 18, with 12 crashes involving injury.

Using the observed weekday peak-period hour traffic volumes, combined with other observed traffic data, the number of crashes in the five-year total allows for the calculation of standardized crash rates for intersections. The calculation of intersection crash rate is an effective tool to measure and compare the relative safety of an intersection to other, similar, intersections. The resulting crash rate is expressed in million entering vehicles (MEV), which is an industry standard to the traffic engineering profession. It relates to how many crashes occur at a particular intersection for every million vehicles that pass through it.

By way of comparison, the 2016 MassDOT average crash rates for signalized and unsignalized intersections for District 6 (the MassDOT district designation for Somerville) are 0.71 and 0.52, respectively. These rates imply that, on average, 0.71 crashes occurred per million vehicles entering signalized intersections throughout District 6, and 0.52 crashes occurred per million vehicles entering unsignalized intersections in the District. Any crash rate higher than these factors may indicate a higher than average crash tendency for a given facility or intersection.

Table 3 presents the number of crashes, crash characteristics, as well as the crash rate for each of the study area intersections. Detailed crash data is provided in the Appendix to this document.

1 Equivalent property damage only" is a method of combining the number of crashes with the severity of the crashes based on a weighted scale. Crashes involving property damage only are reported at a minimal level of importance, while collisions involving personal injury (or fatalities) are weighted more heavily.

Table 3 Vehicular Crash Summary (2012 – 2016)

	Washington St @ New Washington St	Washington St @ Mt Vernon St	Washington St @ Inner Belt	Washington St @ Crescent Street
Signalized?	No	No	No	Yes
MassDOT Average Crash Rate	0.52	0.52	0.61	0.52
Calculated Crash Rate	0.19	0.11	0.53	0.00
Exceeds Average?	No	No	No	No
Year				
2012	1	0	2	0
2013	2	0	2	0
2014	2	1	3	0
2015	0	0	2	0
2016	0	2	5	0
Total	5	3	14	0
Average	1.0	0.6	2.8	
Collision Type				
Angle	1	2	2	0
Head-on	0	0	2	0
Rear-end	3	1	6	0
Rear-to-rear	0	0	0	0
Sideswipe, opposite direction	0	0	1	0
Sideswipe, same direction	0	0	0	0
Single Vehicle Crash	1	0	1	0
Not reported	0	0	2	0
Severity				
Fatal Injury	0	0	0	0
Non-Fatal Injury	2	2	8	0
Property Damage Only	3	1	3	0
Not Reported	0	0	3	0
Time of day				
Weekday, 7:00 AM - 9:00 AM	0	0	0	0
Weekday, 4:00 – 6:00 PM	1	0	2	0
Weekend, 11:00 AM – 2:00 PM	0	0	0	0
Weekday, other time	3	3	11	0
Weekend, other time	1	0	1	0
Pavement Conditions				
Dry	4	3	11	0
Wet	1	0	2	0
Snow	0	0	0	0
Ice	0	0	0	0
Slush	0	0	0	0
Not reported	0	0	1	0
Non-Motorist (Bike, Pedestrian)	1	1	3	0

Source: Crash data was obtained from MassDOT Crash Portal, accessed August 2018.

3

Future Conditions

Traffic assessments for future conditions were conducted in two steps. First, the baseline traffic volumes in the study area were projected to year 2025, reflecting a typical seven-year traffic planning horizon. Any anticipated roadway improvements that may affect the flow of traffic within the study area and background traffic growth based on known development projects are included in the traffic volumes on the roadway network under year 2025 No-Build Condition. Anticipated Project-generated traffic volumes were then added to the year 2025 No-Build traffic volumes to reflect the year 2025 Build Condition in the study area.

This section describes the process used to arrive at these development conditions.

Background Traffic Growth

Traffic growth on area roadways is a function of the expected land development, economic activity, and changes in local and regional demographics. A frequently used procedure is to estimate the historical annual percentage increase in traffic volumes and apply that increase to the study-area traffic volumes. An alternative procedure involves the estimation of traffic generated by specific planned major developments that would be expected to affect traffic volumes on the study area roadways. For the purpose of this assessment, ***both*** methods were utilized to present a conservative assessment.

Historic Traffic Growth

Historic traffic data in the vicinity of the project Site was reviewed to determine an appropriate growth rate. Traffic studies conducted in the Cities of Somerville and Boston were reviewed. Based on this research, an annual growth rate of 1.0-percent was determined to be appropriate for this study.

Site-Specific Growth

In addition to accounting for background growth, the traffic associated with other planned/approved developments near the Site was also considered. Based on a review of recent traffic studies conducted in the area one planned/approved development in the vicinity of the study area were considered as part of the background development:

- **32 Cambridge Street, Charlestown** – The project involves the construction of 52 residential units with 2,500 sf of supporting street-level retail space, with 16 total surface parking spaces being provided.
- **Encore Boston Harbor –** This project includes the construction of an approximately 2.6 million square foot casino located on Horizon Way off Lower Broadway (Route 99) in Everett. The Project will include a 500-room luxury hotel, gaming area, retail space, food and beverage outlets, convention and meeting spaces, a spa and gym, and nightclub. This development is expected to open in June 2019.
- **Hood Park Master Plan, Charlestown –** This project involves the ongoing development of the existing 20-acre Hood Park site located on Rutherford Avenue in the Charlestown section of Boston. Upon completion, this mixed-use development will include a total of 1,735,800 sf of mixed-use development.

Projected traffic volumes expected to be generated by this were obtained from the traffic studies submitted as part of the permitting processes for the projects listed above. The projected background development trip assignment is included in the Appendix to this document. The Washington Street rail bridge to the west of New Washington Street is planned to be closed during the 2019 construction season and for part of 2020. The design team for that Project will be implementing traffic management plans during that construction. However, there will not be any notable long-term changes to the roadway configuration following that work, so no adjustment was required to the future conditions underlying analysis.

No-Build Traffic Volumes

The 2025 No-Build traffic volumes were developed by applying the 1.0-percent annual growth rate over the seven-year study horizon to the 2018 Existing Conditions traffic volumes and adding the traffic volumes associated with the site-specific background project noted previously. The resulting 2025 No-Build Conditions peak-hour traffic volumes are shown in Figures 5 and 6.

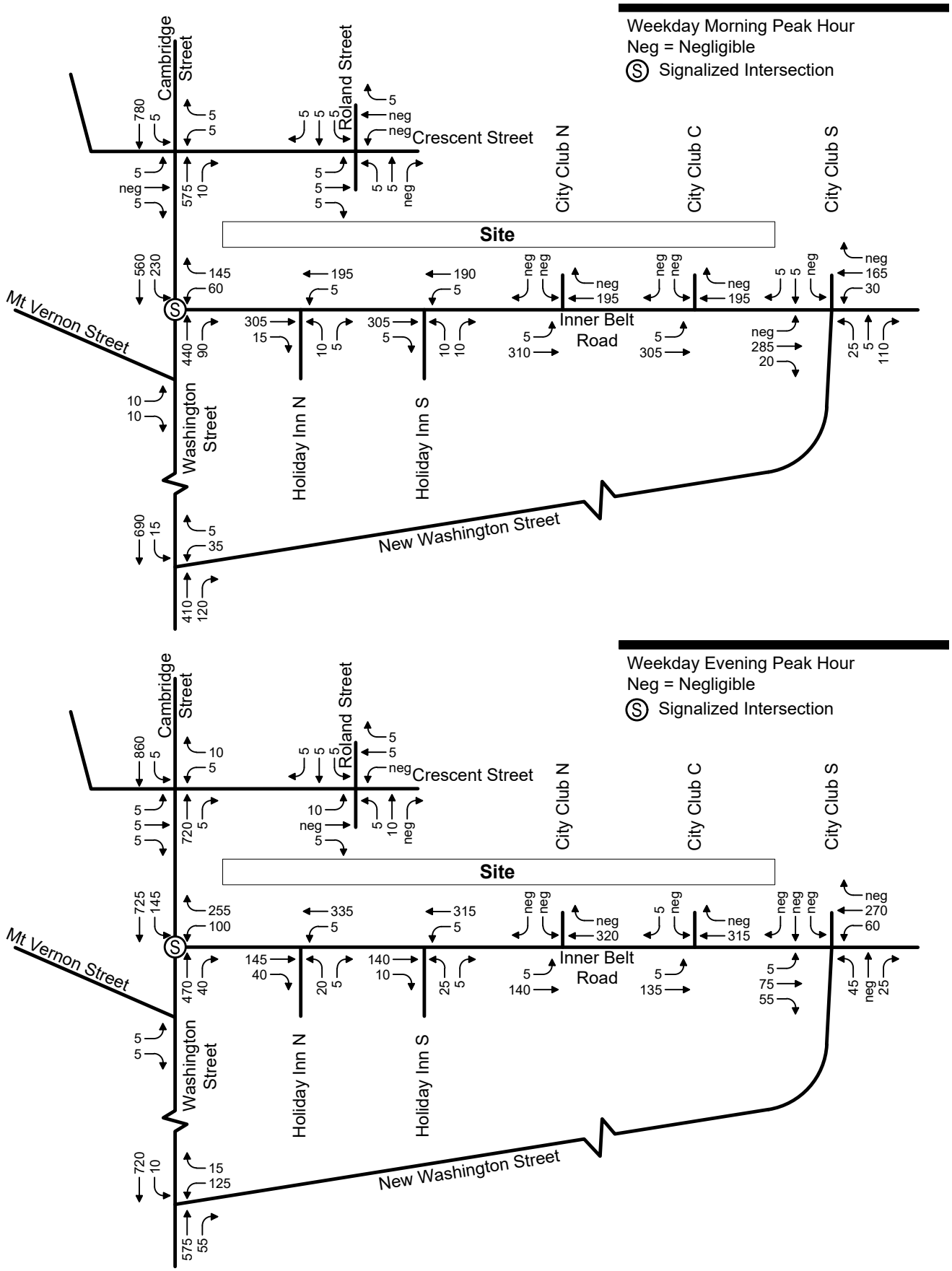

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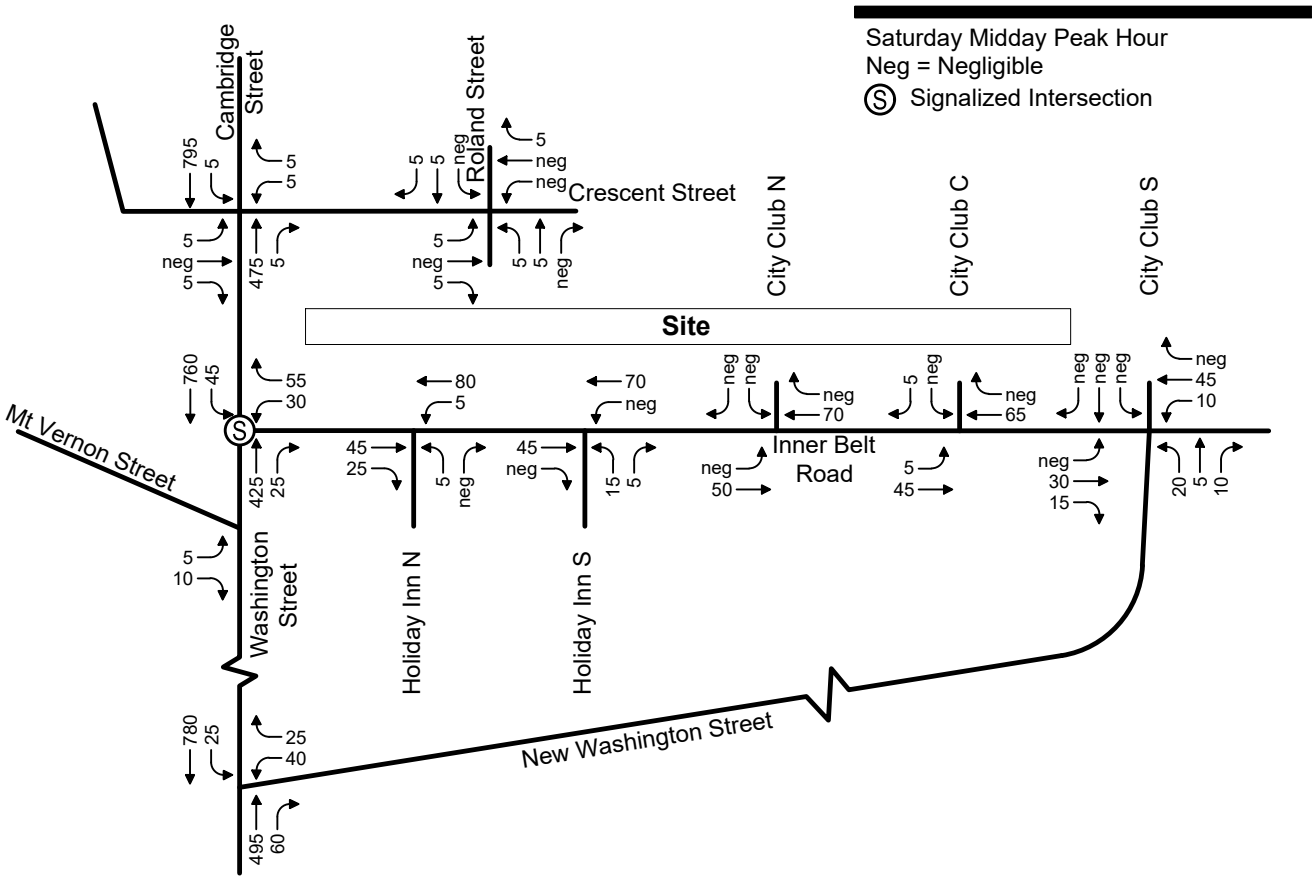
Figure 5

2025 No Build Conditions Weekday Peak Hour Traffic Volumnes
Hotel and Residential Development
Somerville, Massachusetts



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2025 No Build Conditions Saturday Peak Hour Traffic Volumes
Hotel and Residential Development
Somerville, Massachusetts

Figure 6

Trip Generation

The rate at which any development generates traffic is dependent upon a number of factors such as size, location, and concentration of surrounding developments. The number of vehicle-trips to be generated by the proposed project was estimated based on trip generation rates provided in the Trip Generation Manual[2], published by the Institute of Transportation Engineers (ITE). The Project involves the construction of 205 residential units within the proposed seven-story building, and a new 120-room hotel. As noted earlier, the City Club will continue to function on the Site but within a new and improved area within the residential building. However, there is not expected to be any notable difference in the traffic generation associated with that use. ITE land use codes 221 (Mid-Rise Residential) and 312 (Business Hotel) were determined to be the most appropriate land use codes for estimating the traffic generation associated with this development. While the ITE "Business Hotel" database was utilized for the hotel component of the Site, this was only done as the ITE description for this use has several of the same characteristics of the proposed hotel. The hotel is expected to serve a range of visitors, including business travelers as well as recreational visitors.

Table 4 summarizes the base Project-related vehicle trip projections, prior to any adjustment for expected mode splits (transit, biking, walking, etc.). The trip generation calculations are provided in the Appendix to this document.

[2] Trip Generation Manual (10th Edition), Institute of Transportation Engineers, Washington D.C., 2017.

Table 4 Unadjusted Vehicle Trip Generation Summary

	Residential [a]	Hotel [b]	Total Unadjusted Vehicle Trips
Weekday Daily			
Enter	558	250	**808**
Exit	558	250	**808**
Total	1,616	500	**2,116**
Weekday Morning Peak Hour			
Enter	18	23	**41**
Exit	51	32	**83**
Total	69	55	**124**
Weekday Morning Peak Hour			
Enter	54	21	**75**
Exit	34	17	**51**
Total	88	38	**126**
Saturday Daily			
Enter	520	347	**867**
Exit	520	347	**867**
Total	1,040	694	**1,734**
Saturday Midday Peak Hour			
Enter	45	26	**71**
Exit	47	28	**75**
Total	92	54	**146**

a Trip generation estimate based on ITE LUC 221 (Mid-Rise Residential) for 205.
b Trip generation estimate based on ITE LUC 312 (Business Hotel) for 120 rooms.

As shown in Table 4, the project is expected to generate between 124 and 146 unadjusted vehicle trips. However, with its setting in close proximity to MBTA existing and future transit service, and the travel characteristics of the surrounding area, adjustments for these estimates are appropriate. Specifically, VHB reviewed 2010 U.S. census data for the surrounding census tracts. This review revealed that only 51-percent of residents travel to and from this area by automobile. Currently, 32-percent of trips occur by transit, with the remaining trips being made by biking, walking, or considering those that work from home. Following construction of the MBTA Washington Street Station to the west of the Site transit ridership likely will increase.

Projections by the Central Transportation Planning Staff indicate that transit ridership in this area could increase to 41- to 57-percent. However, to provide for a conservative analysis it was assumed that the current 32-percent transit ridership level will be maintained. Accordingly, the future conditions analysis assumes 51-percent automobile usage for the residential component. While the hotel use is residential in nature, the same level of transit ridership is not expected due to visitors not being as familiar with the area. Accordingly, hotel transit use was only expected to be one-quarter of that found for the residential units – 8-percent. Similarly, to provide for a conservative analysis, it was assumed that there would be negligible biking or walking associated with the hotel use. Therefore, 92-percent of the hotel visitors are expected to travel to and from the site by automobile. This approach was undertaken strictly to conservatively estimate potential off-site traffic impacts. In fact, hotel visitors should benefit from the same pedestrian and bicyclist amenities that are in place for Site residents. The resulting net new vehicle trips that will be added to the surrounding roadway network are shown in Table 5.

Table 5 Adjusted Vehicle Trip Generation Summary

	Total Unadjusted Vehicle Trips[a]	Total Adjusted Vehicle Trips
Weekday Daily		
Enter	808	412
Exit	808	412
Total	2,116	824
Weekday Morning Peak Hour		
Enter	41	24
Exit	83	44
Total	124	68
Weekday Morning Peak Hour		
Enter	75	38
Exit	51	27
Total	126	65
Saturday Daily		
Enter	867	469
Exit	867	469
Total	1,734	938
Saturday Midday Peak Hour		
Enter	71	38
Exit	75	40
Total	146	78

a Source: Table 4

As shown in Table 5, following the application of appropriate mode splits, the Project is expected to generate between 65 and 78 total vehicle trips. During the data collection phase of the study, the Site was observed to generate 45 trips during the weekday morning and evening peak hours, and 35 trips during the Saturday midday peak hour. Regardless, no "credit" was taken for the existing traffic generated by the Site. By not accounting for these existing volumes already traveling on the study area roadways, the analysis results are highly conservative.

Trip Distribution

The directional distribution of the vehicular traffic approaching and departing the Site is a function of population densities, the location of employment, existing travel patterns, and the efficiency of the existing roadway system. The trip distribution for the proposed residential portion of the development has been derived based on Journey-to-Work data for the City of Somerville updated with 2010 U.S. Census data. The new vehicle trips shown in Table 5 were added to the roadway network following the overall trip distribution patterns shown in Figure 7 to create the 2025 Build condition traffic volume networks. The Site generated traffic volumes during the peak hours studied are provided in Figures 8 and 9, with the resulting 2025 Build Condition peak-hour traffic volumes shown in Figure 10 and 11.

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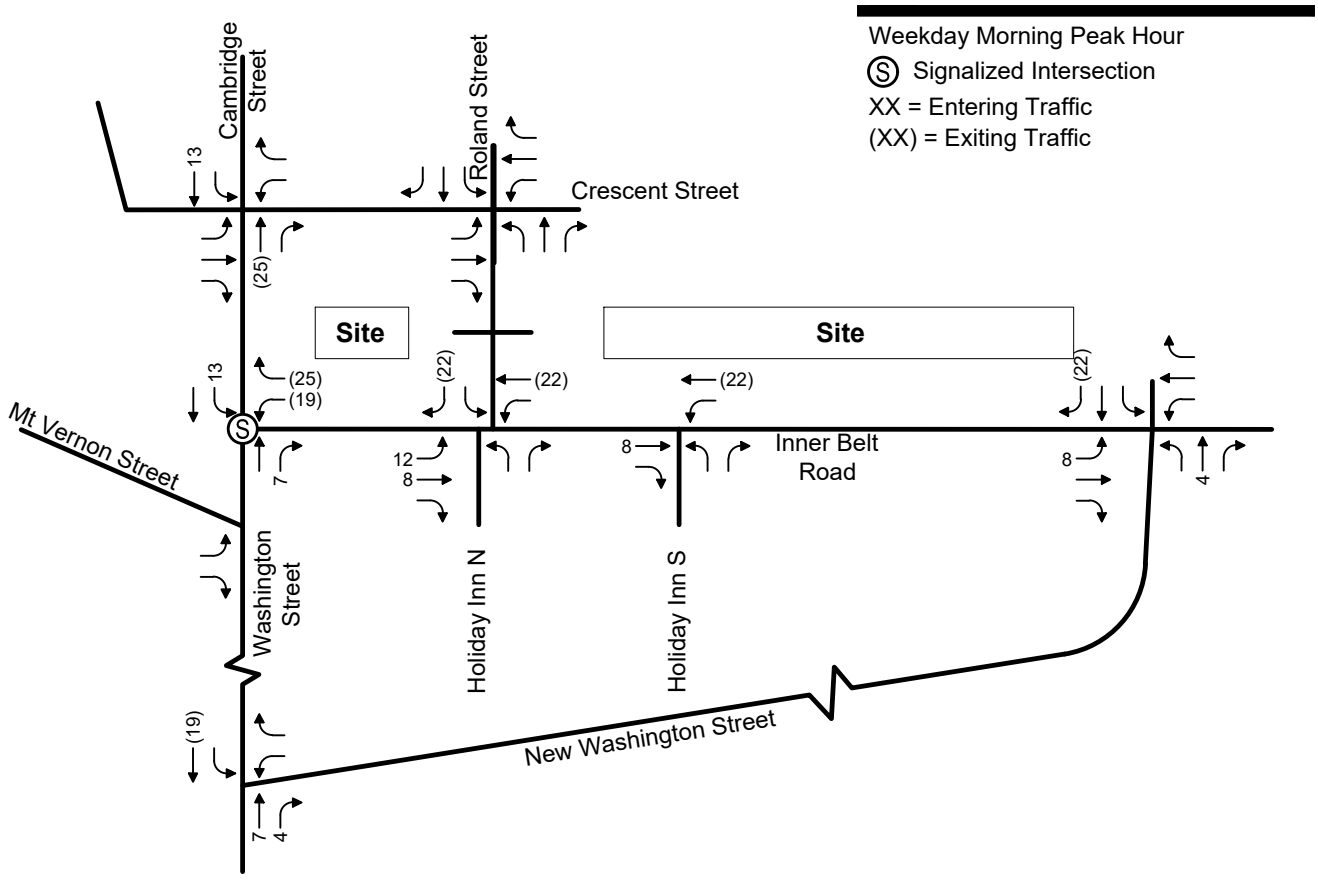
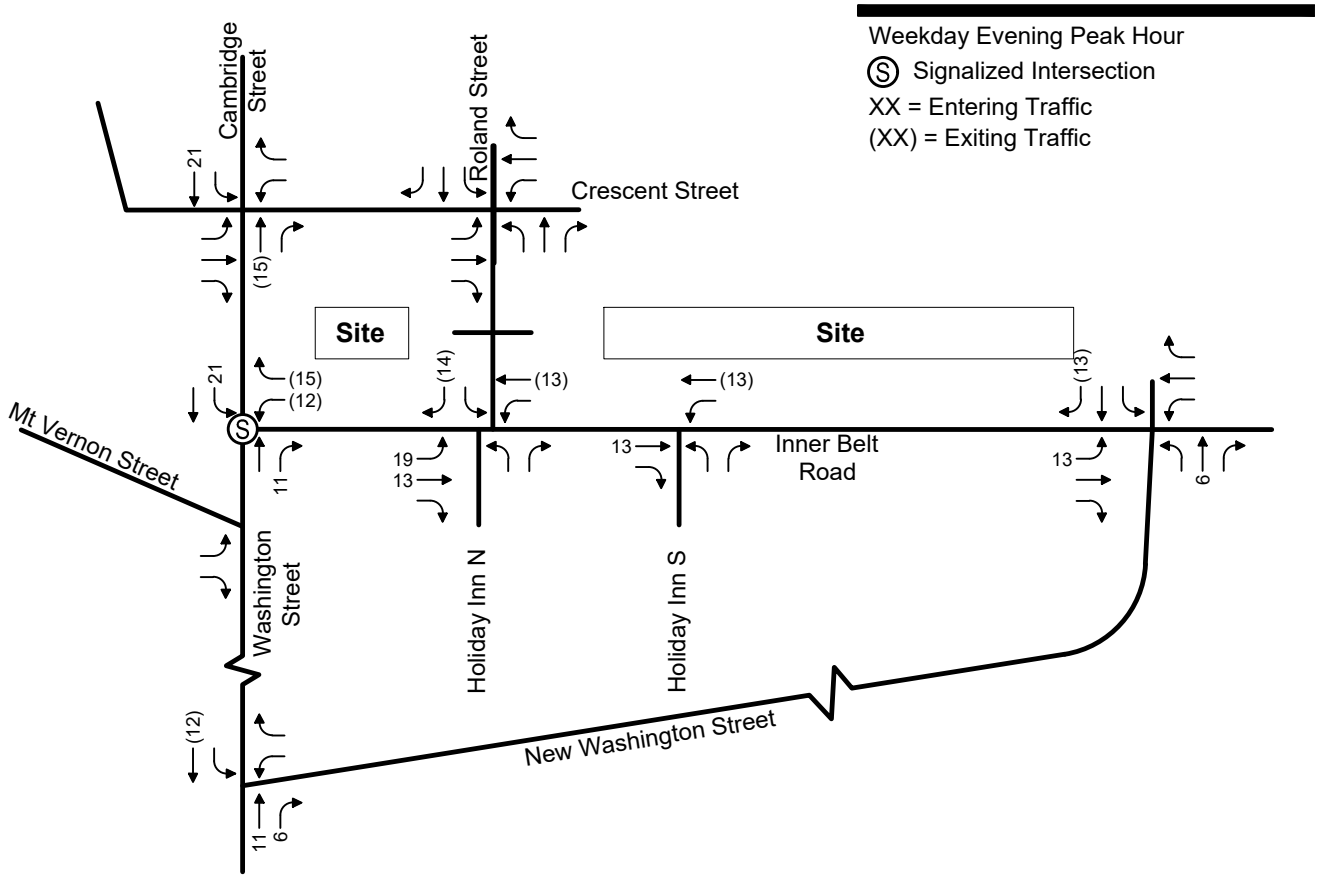
Figure 7

Trip Distribution
Hotel and Residential Development
Somerville, Massachusetts

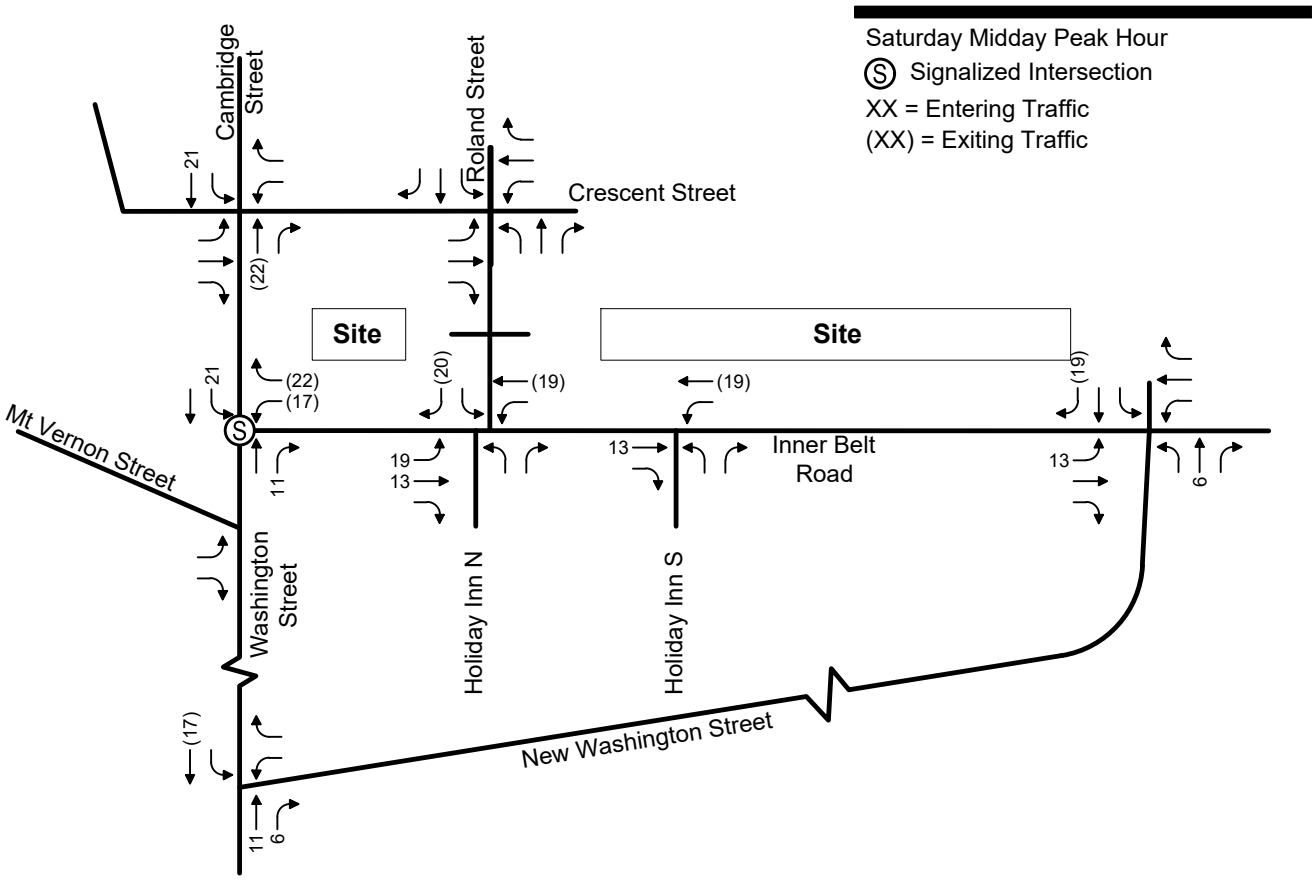




Not to Scale

Site-Generated Trips Weekday
Peak Hour Traffic Volumes
Hotel and Residential Development
Somerville, Massachusetts

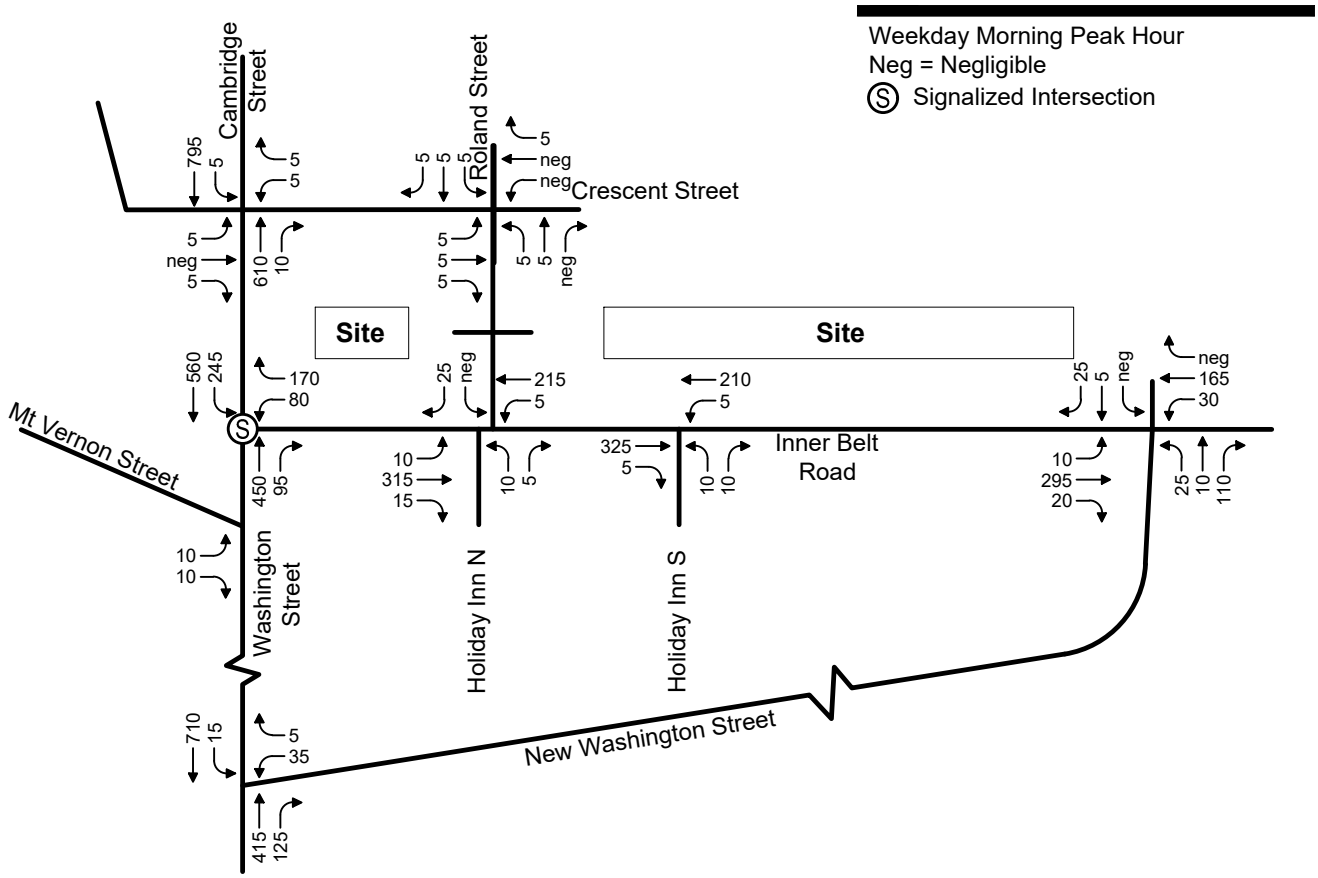
Figure 8

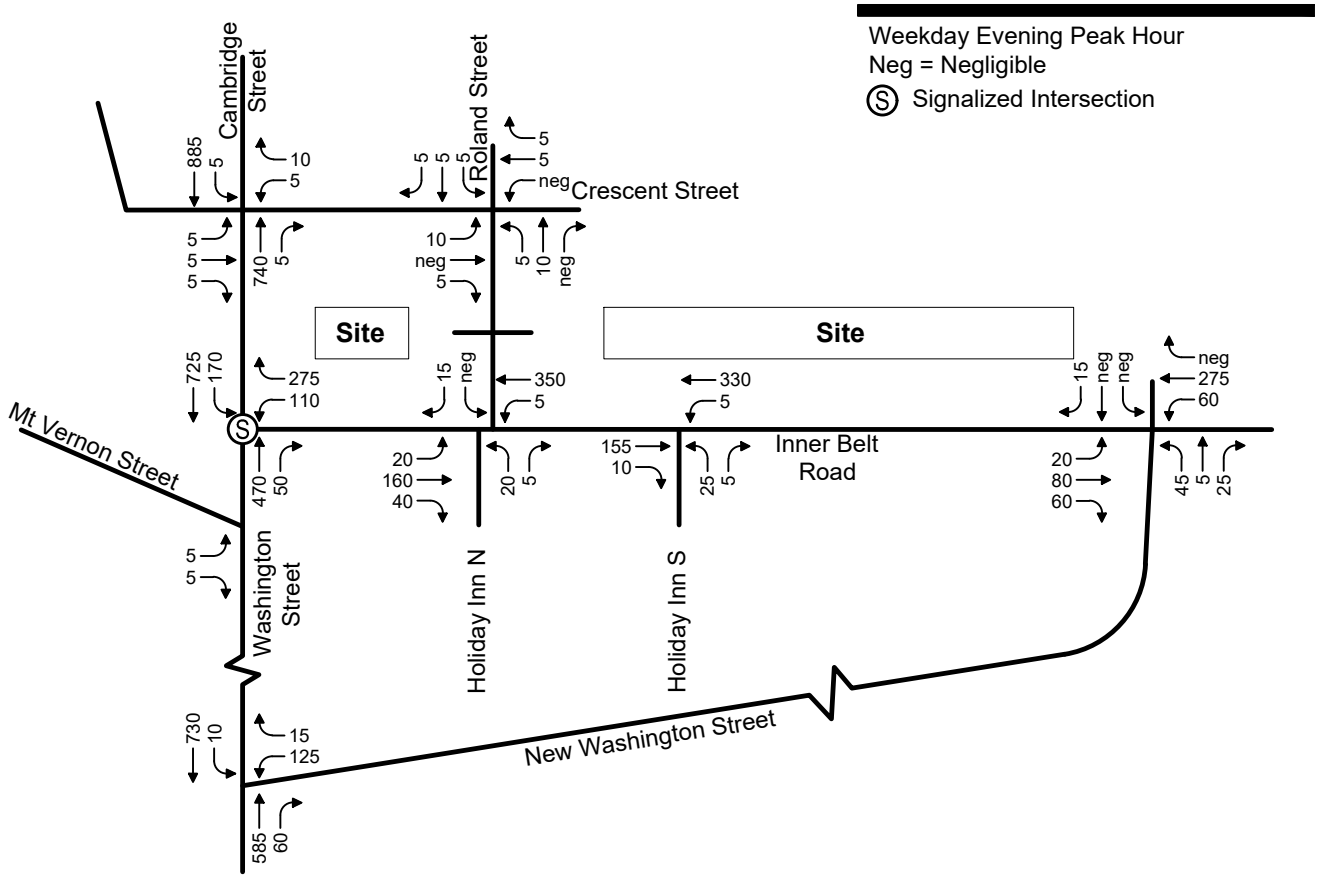


Not to Scale

Site-Generated Trips Saturday Peak Hour Traffic Volumes
Hotel and Residential Development
Somerville, Massachusetts

Figure 9

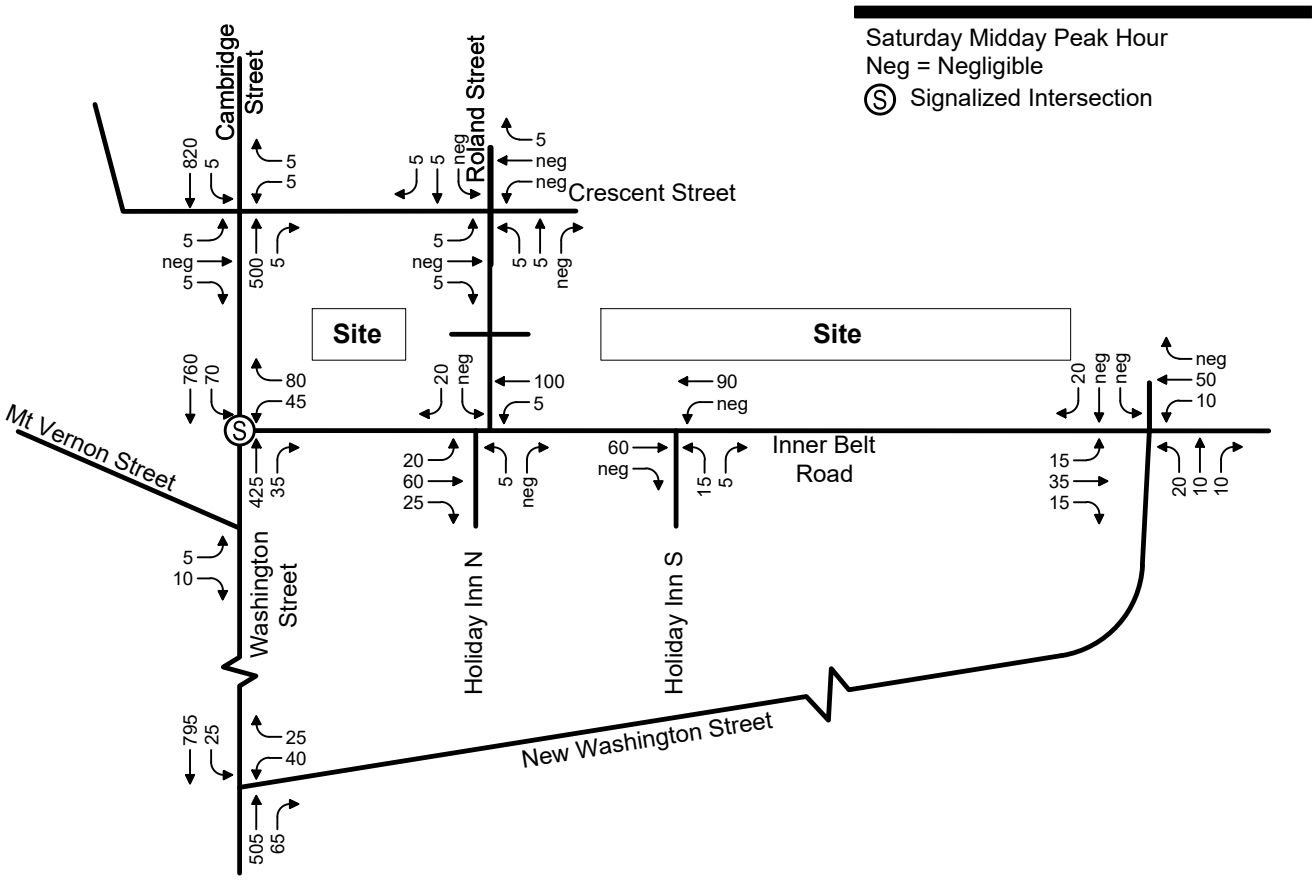




Not to Scale

2025 Build Conditions Weekday Peak Hour Traffic Volumes
Hotel and Residential Development
Somerville, Massachusetts

Figure 10



2025 Build Conditions Saturday Peak Hour Traffic Volumes
Hotel and Residential Development
Somerville, Massachusetts

Figure 11

4

Traffic Operations Analysis

Measuring existing traffic volumes and projecting future traffic volumes quantifies traffic within the study area. To assess quality of flow, roadway capacity analyses were conducted with respect to the 2018 Existing conditions and projected 2025 No-Build and Build traffic volume conditions. Capacity analyses provide an indication of the adequacy of the roadway facilities to serve the anticipated traffic demands. Roadway operating conditions are classified by calculated level of service.

Level-of-Service Criteria

Level-of-service (LOS) is the term used to denote the different operating conditions which occur for a given roadway segment or intersection under various traffic volume loads. It is a qualitative measure of a number of factors including roadway geometrics, speed, travel delay and freedom to maneuver. Level-of-service provides an index to the operational qualities of a roadway segment or an intersection. Level-of-service designations range from A to F, with LOS A representing the best operating conditions and LOS F representing congested operating conditions.

For this study, capacity analyses were completed for the signalized and unsignalized intersections within the study area using Synchro traffic analysis software. Level-of-service designation is reported differently for signalized and unsignalized intersections. For signalized intersections, the analysis considers the operation of each lane or lane group entering the intersection and the LOS designation is for overall conditions at the intersection. For unsignalized intersections, the analysis assumes that traffic on the mainline is not affected by traffic on the side streets. The LOS is only determined for left-turns from the main street and all movements from the minor street. The evaluation criteria used to analyze intersections is based on the HCM.[3]

▼

[3] Highway Capacity Manual 2010; Transportation Research Board (2010); Washington, D.C.

Signalized Intersection Capacity Analysis

Capacity analyses conducted by VHB for the signalized intersection of Washington Street with Inner Belt Road are summarized in Table 6. The capacity analyses were conducted for the 2018 Existing, 2025 No-Build, and 2025 Build conditions for this location. The signalized intersection capacity analysis worksheets are provided in the Appendix to this document.

Table 6 Signalized Intersection Capacity Analysis Summary

Location / Movement	2018 Existing Conditions					2025 No-Build Conditions					2025 Build Conditions				
	v/c [a]	Del [b]	LOS [c]	50 Q [d]	95 Q [e]	v/c	Del	LOS	50 Q	95 Q	v/c	Del	LOS	50 Q	95 Q
Washington Street at Inner Belt Road															
Weekday Morning															
Washington St. EB T	0.69	21	C	102	212	0.70	21	C	121	250	0.71	22	C	135	272
Washington St. EB R	0.16	4	A	0	24	0.15	4	A	0	24	0.16	4	A	0	25
Washington St. WB L	0.48	8	A	25	58	0.49	7	A	25	54	0.52	8	A	29	62
Washington St. WB T	0.53	8	A	78	164	0.53	7	A	80	158	0.52	7	A	86	171
Inner Belt Road NB L	0.34	26	C	22	54	0.31	29	C	19	60	0.39	31	C	28	79
Inner Belt Road NB R	0.50	10	A	0	27	0.49	11	A	0	49	0.52	11	A	0	53
Overall		**12**	**B**				**12**	**B**				**13**	**B**		
Weekday Evening															
Washington St. EB T	0.70	21	C	123	241	0.69	19	C	130	255	0.70	20	C	135	271
Washington St. EB R	0.07	5	A	0	16	0.07	4	A	0	15	0.08	4	A	0	18
Washington St. WB L	0.33	7	A	17	43	0.34	6	A	16	39	0.39	7	A	20	47
Washington St. WB T	0.61	10	A	114	245	0.67	10	A	131	269	0.67	10	A	136	278
Inner Belt Road NB L	0.45	27	C	40	75	0.40	29	C	33	88	0.43	29	C	37	97
Inner Belt Road NB R	0.62	9	A	0	12	0.58	9	A	0	60	0.60	9	A	0	63
Overall		**13**	**B**				**13**	**B**				**13**	**B**		
Saturday Midday															
Washington St. EB T	0.43	12	B	85	163	0.58	11	B	93	182	0.50	14	B	98	192
Washington St. EB R	0.03	5	A	0	11	0.58	4	A	0	11	0.05	4	A	0	13
Washington St. WB L	0.08	4	A	4	12	0.68	4	A	4	12	0.14	4	A	6	18
Washington St. WB T	0.57	7	A	91	192	0.72	8	A	112	233	0.64	9	A	118	249
Inner Belt Road NB L	0.15	20	B	8	28	0.13	21	C	8	28	0.20	22	C	12	40
Inner Belt Road NB R	0.22	9	A	0	23	0.13	10	A	0	26	0.30	9	A	0	32
Overall		**9**	**A**				**9**	**A**				**10**	**B**		

a Volume to capacity ratio.
b Average total delay, in seconds per vehicle.
c Level-of-service.
d 50th percentile queue, in feet.
e 95th percentile queue, in feet.

As shown in Table 6, the intersection of Washington Street and Inner Belt Road is expected to maintain the same level-of-service (LOS B) conditions between 2018 Existing, 2025 No-Build, and 2025 Build conditions. The addition of Project-generated traffic will have a negligible impact on queuing and delay for the individual movements at this intersection.

Unsignalized Intersection Capacity Analysis

Capacity analyses conducted by VHB for the unsignalized intersection are summarized in Table 7. The capacity analyses were conducted for the 2018 Existing, 2025 No-Build, and 2025 Build conditions for the unsignalized study area intersections. The capacity analysis worksheets are provided in the Appendix to this document.

Table 7 Unsignalized Intersection Capacity Analysis Summary

Location / Movement	2018 Existing Conditions					2025 No-Build Conditions					2025 Build Conditions				
	D [a]	v/c [b]	Del [c]	LOS [d]	95 Q [e]	D	v/c	Del	LOS	95 Q	D	v/c	Del	LOS	95 Q
Inner Belt Road at Holiday Inn north driveway/Roland Street Extension															
Weekday Morning															
Holiday EB L/R	15	0.08	13	B	5	15	0.03	12	B	3	15	0.04	13	B	3
Inner Belt Road NB L/T	195	0.01	8	A	0	200	0.01	8	A	0	220	0.01	8	A	0
Roland Street Extension WB L/R			N/A					N/A			25	0.03	10	A	3
Inner Belt Road SB L/T			N/A					N/A			340	0.01	8	A	0
Weekday Evening															
Holiday EB L/R	25	0.09	14	B	8	25	0.05	12	B	5	25	0.06	14	B	5
Inner Belt Road NB L/T	325	0.01	8	A	0	340	0.01	8	A	0	355	0.01	8	A	0
Roland Street Extension WB L/R			N/A					N/A			15	0.02	11	B	3
Inner Belt Road SB L/T			N/A					N/A			220	0.02	8	A	3
Saturday Midday															
Holiday EB L/R	5	0.01	10	A	0	5	0.01	9	A	0	5	0.01	10	B	0
Inner Belt Road NB L/T	80	0.01	7	A	0	85	0.01	70	A	0	105	0.01	7	A	0
Roland Street Extension WB L/R			N/A					N/A			20	0.02	9	A	3
Inner Belt Road SB L/T			N/A					N/A			105	0.02	8	A	0
Inner Belt Road at Holiday Inn south driveway															
Weekday Morning															
Holiday EB L/R	25	0.04	12	B	3	20	0.04	12	B	3	20	0.01	8	A	0
Inner Belt Road NB L/T	190	0.01	8	A	0	195	0.01	8	A	0	215	0.04	12	B	3
Weekday Evening															
Holiday EB L/R	30	0.16	14	B	15	30	0.06	12	B	5	30	0.06	12	B	5
Inner Belt Road NB L/T	305	0.01	85	A	0	320	0.01	8	A	0	335	0.01	8	A	0
Saturday Midday															
Holiday EB L/R	20	0.03	9	A	3	20	0.02	9	A	3	20	0.03	9	A	3
Inner Belt Road NB L/T	65	0.00	0	A	0	70	0.00	0	A	0	90	0.00	0	A	0
Inner Belt Road at City Club north driveway															
Weekday Morning															
City Club WB LR	0	0.00	0	A	0	0	0.00	0	A	0			N/A		
Inner Belt Road SB L/T	300	0.01	8	A	0	315	0.01	8	A	0			N/A		

Table 7 Unsignalized Intersection Capacity Analysis Summary

Location / Movement	2018 Existing Conditions					2025 No-Build Conditions					2025 Build Conditions				
	D [a]	v/c [b]	Del [c]	LOS [d]	95 Q [e]	D	v/c	Del	LOS	95 Q	D	v/c	Del	LOS	95 Q
Weekday Evening															
City Club WB LR	0	0.00	0	A	0	0	0.00	0	A	0			N/A		
Inner Belt Road SB L/T	140	0.01	8	A	0	145	0.01	8	A	0			N/A		
Saturday Midday															
City Club WB LR	0	0.00	0	A	0	0	0.00	0	A	0			N/A		
Inner Belt Road SB L/T	50	0.00	0	A	0	50	0.00	0	A	0			N/A		
Inner Belt Road at City Club center driveway															
Weekday Morning															
City Club WB LR	0	0.00	0	A	0	0	0.00	0	A	0			N/A		
Inner Belt Road SB L/T	295	0.01	8	A	0	310	0.01	8	A	0			N/A		
Weekday Evening															
City Club WB LR	5	0.01	8	A	0	5	0.01	8	A	0			N/A		
Inner Belt Road SB L/T	135	0.03	11	B	3	140	0.01	10	B	0			N/A		
Saturday Midday															
City Club WB LR	5	0.02	9	A	3	5	0.01	9	A	0			N/A		
Inner Belt Road SB L/T	50	0.01	7	A	0	50	0.01	7	A	0			N/A		
Inner Belt Road at New Washington Street/City Club south driveway (Project Site driveway)															
Weekday Morning															
New Washington EB LT	30	0.10	17	C	8	30	0.08	15	B	8	35	0.10	16	C	8
New Washington EB R	105	0.19	12	B	18	110	0.17	11	B	15	110	0.17	11	B	15
City Club (Project Site drive) WB LR	10	0.04	0	A	0	10	0.00	0	A	0	30	0.05	10	B	3
Inner Belt Road NB L/T/R	190	0.03	8	A	3	195	0.02	12	B	3	195	0.03	8	A	3
Inner Belt Road SB L/T/R	290	0.00	0	A	0	305	0.06	0	A	0	325	0.01	8	A	0
Weekday Evening															
New Washington EB LT	45	0.18	20	C	15	45	0.12	15	B	10	45	0.13	16	C	13
New Washington EB R	25	0.03	9	A	3	25	0.03	9	A	0	25	0.03	9	A	3
City Club (Project Site drive) WB LR	0	0.00	0	A	0	0	0.00	0	A	0	15	0.02	10	A	3
Inner Belt Road NB L/T/R	315	0.07	8	A	5	330	0.04	8	A	3	335	0.05	8	A	3
Inner Belt Road SB L/T/R	130	0.01	8	A	0	135	0.01	8	A	0	160	0.02	8	A	3

Table 7 Unsignalized Intersection Capacity Analysis Summary

Location / Movement	2018 Existing Conditions					2025 No-Build Conditions					2025 Build Conditions				
	D [a]	v/c [b]	Del [c]	LOS [d]	95 Q [e]	D	v/c	Del	LOS	95 Q	D	v/c	Del	LOS	95 Q
Saturday Midday															
New Washington EB LT	25	0.04	10	A	3	25	0.00	0	A	0	30	0.04	10	B	3
New Washington EB R	10	0.02	9	A	0	10	0.00	0	A	0	10	0.01	9	A	0
City Club (Project Site drive) WB LR	0	0.00	0	A	0	0	0.00	0	A	0	20	0.02	9	A	3
Inner Belt Road NB L/T/R	50	0.01	7	A	0	55	0.01	7	A	0	60	0.01	7	A	0
Inner Belt Road SB L/T/R	45	0.00	0	A	0	10	0.00	0	A	0	65	0.01	7	A	0
Washington Street at New Washington Street															
Weekday Morning															
New Washington Street NB L/R	40	0.24	27	D	23	40	0.24	31	D	23	40	0.25	32	D	23
Washington Street WB L	15	0.02	9	A	0	15	0.02	9	A	3	15	0.02	9	A	3
Weekday Evening															
New Washington Street NB L/R	135	0.90	97	F	165	140	1.00	130	F	188	140	1.03	142	F	195
Washington Street WB L	10	0.01	9	A	0	10	0.01	9	A	0	10	0.01	9	A	0
Saturday Midday															
New Washington Street NB L/R	65	0.39	31	D	43	65	0.37	35	D	40	65	0.39	37	E	43
Washington Street WB L	25	0.03	9	A	3	25	0.03	9	A	3	25	0.03	9	A	3
Washington Street at Crescent Street															
Weekday Morning															
Crescent Street NB L/R	10	0.12	29	D	10	10	0.07	31	D	5	10	0.08	34	D	8
Crescent Street SB L/T/R	10	0.22	30	D	20	10	0.07	30	D	5	10	0.07	32	D	5
Washington Street WB L/T	745	0.01	9	A	0	785	0.01	9	A	0	800	0.01	9	A	0
Weekday Evening															
Crescent Street NB L/R	15	0.16	31	D	13	15	0.11	33	D	10	15	0.12	36	E	10
Crescent Street SB L/T/R	15	0.25	44	E	23	15	0.16	47	E	13	15	0.17	51	F	15
Washington Street WB L/T	785	0.01	9	A	0	865	0.01	9	A	0	890	0.01	10	A	0

Table 7 Unsignalized Intersection Capacity Analysis Summary

Location / Movement	2018 Existing Conditions					2025 No-Build Conditions					2025 Build Conditions				
	D [a]	v/c [b]	Del [c]	LOS [d]	95 Q [e]	D	v/c	Del	LOS	95 Q	D	v/c	Del	LOS	95 Q
Saturday Midday															
Crescent Street NB L/R	10	0.08	23	C	8	10	0.06	25	C	5	10	0.01	9	A	0
Crescent Street SB L/T/R	10	0.06	24	C	5	10	0.06	27	D	5	10	0.07	29	D	5
Washington Street WB L/T	740	0.01	8	A	0	800	0.01	9	A	0	825	0.01	9	A	0
Washington Street at Mount Vernon Street															
Weekday Morning															
Mt. Vernon Street SB L/T	20	0.10	19	C	8	20	0.08	20	C	8	20	0.09	20	C	8
Weekday Evening															
Mt. Vernon Street SB L/T	10	0.08	21	C	8	10	0.05	24	C	5	10	0.05	24	C	5
Saturday Midday															
Mt. Vernon Street SB L/T	15	0.07	18	C	5	15	0.06	20	C	5	15	0.06	20	C	5

a Demand, in vehicles
b Volume to capacity ratio.
c Average total delay, in seconds per vehicle.
d Level-of-service.
e 95th percentile queue, in feet.
N/A Movement does not exist under analysis condition.

As shown in Table 7, all of the critical movements at the unsignalized study area intersections presently operate at LOS D or better, with the exception of Washington Street's intersections with New Washington Street and Crescent Street. Specifically, the northbound New Washington Street stop-controlled movement onto Washington Street currently operates at LOS F during the weekday evening peak hour. This condition is expected to continue under future conditions with and without the Project. As exiting Project traffic readily will be able to turn left onto Washington Street at its signalized intersection with Inner Belt Road, the Project should not be adding traffic to the New Washington Street left-turn movement contributing to the LOS F conditions. Likewise, the southbound movement from Crescent Street onto Washington Street currently operates at LOS E during the weekday evening peak hour. This condition will continue under the 2025 No-Build condition, but the movement is expected to degrade to LOS F under the 2025 Build condition. This is a function of the additional Project-generated traffic on Washington Street as the Project will not be adding any notable traffic to the southbound Crescent Street movement. Regardless, this movement will be only one second over the dividing line between LOS E and LOS F conditions with only four second of additional delay and a negligible increase in queueing.

Under the 2025 Build condition the center and northerly City Club curb cuts on Inner Belt Road will be closed. As part of the Project, a new "Roland Street Extension" will be constructed extending from Roland Street westbound through the Site where it will intersect Inner Belt Road opposite the existing northerly Holiday Inn driveway. The southerly City Club driveway opposite New Washington Street's intersection with Inner Belt Road will be reconstructed as a Project Site driveway. As shown in Table 7, exiting traffic from these new Site driveways will operate at LOS B or better during the time periods studied. Entering traffic from Inner Belt Road will function at LOS A with negligible queueing during the peak periods analyzed.

Site Access and Circulation

Under existing conditions, the Site has three full-access curb cuts on Inner Belt Road serving the City Club portion of the Site. Two of these curb cuts provide access to an approximately 61-space surface parking lot located to the south of the building. The first curb cut is located just north of New Washington Street, and the second driveway is located 60 feet further to the north. The third curb cut to the City Club is provided to the north of that building, and it services a small parking area for that use. The northerly portion of the Site, which currently is occupied by an approximately 139-space parking lot, has a single full-access driveway located on Crescent Street at its intersection with Roland Street.

In conjunction with the Project, the existing City Club driveways on Inner Belt Road will be closed and replaced by a single new full-access driveway at the southerly end of the Site to the proposed 427-space parking garage. As noted earlier, a new Roland Street Extension also will be constructed between the two uses connecting Inner Belt Road to Crescent Street. A full-access driveway for the garage also will be provided on this roadway, with that curb cut being located at the easterly end of the residential building. A full-access driveway to the hotel will be located on the northerly side of the new circulation road opposite the residential garage driveway. This hotel driveway will provide access to a six-space surface parking lot and hotel pick-up/drop-off area next to the main building entrance.

As part of this effort, VHB reviewed the adequacy of the proposed parking supply. In addition to evaluating on-Site operations, VHB also reviewed the available sight distance at the newly created Inner Belt Road curb cuts. These analyses are discussed in detail in the following sections.

Parking Demand

Estimating the anticipated parking demand on-site is critical in determining an appropriate parking supply for the Project. A new 427-space parking garage will be constructed within the residential building at the south end of the Site, and an

additional 6 surface spaces will be constructed in front of the hotel. The potential parking demand expected for the Project has been estimated based on the Parking Generation Manual[4], published by ITE. Parking generation rates were estimated based on ITE land use codes 222 (High-Rise Apartment) and 310 (Hotel), which were determined to be the most appropriate land use codes for this development. Due to the unique nature of the use, ITE does not have an appropriate land use code for the City Club. Accordingly, the 85th percentile parking demand (the demand that would only be exceeded 15 percent of the time) for that use was assumed to match the City of Somerville Zoning Bylaws' requirement of 80 spaces. Finally, the Proponent also will continue an existing agreement with the nearby Paradigm-operated "RS56" building on Roland Street to the east of the Site in Boston. Under this arrangement, some parking spaces in the existing front parking lot currently are allocated for use by that development. This same arrangement will continue, with parking provided in the new garage at a ratio allowing for the planned expansion of that office-oriented facility.

As with the trip generation evaluation, the ITE-based parking demand estimates were adjusted using the same census-based mode splits discussed earlier. The analysis focusses on critical weekday conditions when the combination of parking demand for the residential, hotel, City Club, and office (Paradigm) uses would be the greatest. The resulting estimated weekday parking demand is summarized below in Table 8.

Table 8 Parking Generation Summary

Weekday	Residential [a]	Hotel [b]	City Club	Paradigm	Total Demand	Supply
Average demand	281	107	80			
85th percentile demand	312	130	80			
85th percentile demand - adjusted[d]	159	99	80	125	**463**	**433**

a Parking demand estimate based on ITE LUC 222 (High-Rise Apartment) for 205 units.
b Parking demand estimate based on ITE LUC 310 (Hotel) for 120 rooms.
c City Club parking demand assumed to match the 8-space City of Somerville Zoning Bylaws requirement.
d Base parking demand estimates adjusted to reflect 51-percent residential auto use reported by 2010 U.S. census data, and the 92-percent auto use assumed for hotel visitors.

As shown in Table 8, the calculated peak parking demand exceeds the available 433-space parking supply by 30 spaces. However, the analysis assumes that almost half of the garage spaces will be used by the combination of the City Club and the Paradigm

▼

[4] Parking Generation Manual (4th Edition), Institute of Transportation Engineers, Washington D.C., 2010.

remote parking. While the calculated peak demand exceeds the supply, this initial analysis is highly conservative in that it was conducted without any time of day considerations. The proposed Project uses, including the City Club, likely will experience their peak parking demand during the evening hours. However, the Paradigm parking is associated with office-related uses which experience their peak demand during daytime hours. Accordingly, if there is an actual shortfall the on-site parking plan can be adjusted to allow for the shared use of certain spaces. With few office workers cars being in the garage into the evening hours, the lack of corresponding residential and office peak times should readily allow for the effective sharing of parking. The expected hourly distribution of the parking demand within the Site is shown in Table 9. This information was developed by using standard industry data comparing hourly conditions throughout the day to the time of the peak demand for each use.

Table 9 Parking Generation Summary – Hourly Distribution

Land Use:	**Residential[b]**		**Hotel[b]**		**Office[b]**		**City Club[c]**		**Total**
85th percentile Demand (w/ Mode Split Adjustment)[a]:	**160**	**spaces**	**120**	**spaces**	**125**	**Spaces**	**80**	**spaces**	
6 AM	*100%*	**160**	95%	114	*3%*	4	100%	80	358
7 AM	*90%*	144	90%	108	*30%*	36	100%	80	368
8 AM	*85%*	136	80%	96	*75%*	90	100%	80	402
9 AM	**80%**	**128**	**70%**	**84**	**95%**	**114**	**100%**	**80**	**406**
10 AM	*75%*	120	60%	72	*100%*	**120**	100%	80	392
11 AM	*70%*	112	60%	72	*100%*	**120**	100%	80	384
12 PM	*65%*	104	55%	66	*90%*	108	100%	80	358
1 PM	*70%*	112	55%	66	*90%*	108	100%	80	366
2 PM	*70%*	112	60%	72	*100%*	**120**	100%	80	384
3 PM	*70%*	112	60%	72	*100%*	**120**	100%	80	384
4 PM	*75%*	120	65%	78	*90%*	108	100%	80	386
5 PM	*85%*	136	70%	84	*50%*	60	100%	80	360
6 PM	*90%*	144	75%	90	*25%*	30	100%	80	344
7 PM	*97%*	155	75%	90	*10%*	12	100%	80	337
8 PM	*98%*	157	80%	96	*7%*	8	100%	80	341
9 PM	*99%*	158	85%	102	*3%*	4	100%	80	344
10 PM	*100%*	**160**	95%	114	*1%*	1	100%	80	355
11 PM	*100%*	**160**	100%	**120**	-		100%	80	360
12 AM	*100%*	**160**	100%	**120**	-		100%	80	360
							Total maximum demand:		**406**
							Proposed Supply:		**433**
							Surplus:		**27**

a Source: Table 8. Peak parking demand based on Parking Generation – 4th Edition, Institute of Transportation Engineers (ITE), and spaces allocated for office and City Club use.
b Time of Day Factors from Shared Parking, Urban Land Institute Table 2.5.
c For analysis purposes, peak parking demand for City Club parking assumed to be occur at any time throughout the day.

As shown in Table 9, the peak parking demands for the residential and hotel uses should occur during the late evening hours, while the peak periods for the designated Paradigm office-related spaces should occur during the weekday midday. The City Club is a unique use with limited parking demand data available. Accordingly, for the purpose of this analysis, it was assumed that the 80 spaces required by the Somerville Zoning Bylaws potentially could be fully utilized at any time during the day. In fact, the regular peak demand for that facility should occur during evening hours depending on what events are scheduled. Regardless, the full use of the 80 spaces required by the Zoning Bylaws was assumed throughout the day to provide a conservative analysis.

Based on the parking analysis, the combined peak demand for these uses should occur at 9 AM on a typical weekday, with 406 of the 433 available parking spaces occupied (94% occupancy). After 6 PM there is a notable decrease in the office parking demand, so a significant portion of the designed 125 Paradigm spaces could be made available for shared use by the residential and hotel uses. With this arrangement there will be sufficient parking available throughout the day, without an excessive parking supply being provided.

The parking demand for residential uses readily can be controlled through the managed allocation of parking spaces per unit as part of the individual leasing of units. Also, with the nearby transit options available as noted earlier, the development may appeal to one-vehicle households, which would help to lower the projected parking demand further below the ITE 85th percentile estimate. The residential parking demand can be reduced further by limiting the number of parking spaces available per unit. This common practice is done by restricting in each tenant's lease how many spaces they are allowed to use on a regular basis.

Sight Distance

VHB conducted a sight distance analysis, conforming to guidelines of the American Association of State Highway and Transportation Officials (AASHTO)[5], at the proposed Site driveway location Inner Belt Road, and the newly created intersection of Inner Belt Road with the proposed connecting circulation roadway. Sight distance considerations are generally divided into two categories: Stopping Sight Distance (SSD) and Intersection Sight Distance (ISD).

SSD is the distance required for a vehicle approaching an intersection to perceive, react, and come to a complete stop before colliding with an object in the road, in this case an exiting vehicle. In this respect, SSD can be considered as the minimum visibility criterion for the safe operation of an unsignalized intersection.

ISD is based on the time required for perception, reaction, and completion of the desired critical exiting maneuver once the driver on a minor street approach decided to execute the maneuver. Calculation for the critical ISD includes the time to (1) turn left, and to clear the half of the intersection without conflicting with the vehicles approaching from the left; and (2) accelerate to the operating speed of the roadway without causing approaching vehicles to unduly reduce their speed. In this context, ISD can be considered as a desirable visibility criterion for the safe operation of an unsignalized intersection. Essentially, while SSD is the minimum distance needed to

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5 A Policy on the Geometric Design of Highways and Streets, American Association of State Highway and Transportation Officials, 2011.

avoid collisions, ISD is the minimum distance needed so that mainline motorists will not have to substantially reduce their speed due to turning vehicles.

To calculate the required sight distances at the proposed Site driveway observed travel speeds were recorded on Inner Belt Road in conjunction with the traffic data collection. The 85th percentile speed on Inner Belt Road was observed to be 30 miles per hour (mph), and this design speed was used for the analysis. Table 10 summarizes the sight distance analyses for the proposed Site driveway on Inner Belt Road, and the new Roland Street Extension intersection with Inner Belt Road. The analysis was conducted using a more realistic 10-foot setback for urban conditions instead of the 14.5-foot AASHTO standard. Sight distance calculations are provided in the Appendix to this document.

Table 10 Sight Distance Analysis Summary

		Stopping Sight Distance		Intersection Sight Distance		
Location	**Traveling**	**Required (ft)**	**Measured (ft)**	**Looking**	**Desired (ft)**	**Measured (ft)**
Proposed Inner Belt Road/Roland Street Extension[a]	Northbound	200	500+	Left	335	450
	Southbound	200	190[b]	Right	335	190[b]
Proposed Inner Belt Road southerly Site driveway [a]	Northbound	200	500+	Left	335	500+
	Southbound	200	550	Right	335	550

Source: Based on guidelines established in A Policy on the Geometric Design of Highways and Streets, American Association of State Highway and Transportation Officials [AASHTO], 2011.

a Design speeds are based on observed 30 mph travel speeds for Inner Belt Road.

b Clear sight lines are available to and from the Washington Street/Inner Belt Road intersection.

As shown in Table 10, both the critical stopping sight distance and desirable intersection sight distance levels are satisfied for the proposed southerly Site driveway on Inner Belt Road. While the southbound stopping sight distance and intersection sight distance looking to and from Roland Street Extension fall below the AASHTO-specified levels, that is not due to any obstructions. Instead, the 190-foot sight line reported is the distance between Washington Street and Roland Street Extension. As vehicles turning from Washington Street will be doing so at speeds well below the 30 mph speeds measured further to the south, motorists will have time to adjust their speeds accordingly for vehicles turning to or from Roland Street Extension.

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Conclusion

VHB has conducted a detailed traffic evaluation to assess the potential impacts associated with the proposed residential and hotel development at 0-20 Inner Belt Road in Somerville. The proposed Project involves the construction of a 205-unit residential building and a 120-room hotel to be constructed at the northerly end of the Site. The existing City Club will continue to operate at this Site, but in a new and improved facility.

The traffic analysis presented in this evaluation shows that the Project will generate between 65 and 78 new vehicle trips during the weekday morning, weekday evening, and Saturday midday peak hours. These estimates were developed considering existing mode shares (automobile, transit, and biking/walking) in the immediate area. With the upcoming construction of the new MBTA Green Line Washington Street Station to the west, Site residents will have a new MBTA train option in addition to the existing MBTA Orange Line Sullivan Square Station to the east. To help reduce the need for private automobile use, the hotel proponent has committed to providing shuttle service to nearby MBTA stations and other major local destinations. Regardless, the future conditions analysis conservatively assumed the same transit ridership percentage would be maintained. Even so, when distributed onto the local roadway network, these Project-generated trips are expected to have a negligible impact on the operations of the study area intersections.

The parking needs for the Site will be accommodated by a new 427-space parking garage to be constructed within the residential building at the south end of the Site, and an additional 6 surface spaces will be constructed in front of the hotel. The Project is estimated to generate a calculated peak parking demand of 463 spaces, which exceeds to total 433-space Project supply. However, this demand assumes 125 spaces being allocated for the nearby Paradigm-operated "RS56" building on Roland Street to the east of the Site in Boston. That parking will be allowed under an existing agreement that will continue with the new Project. The actual peak times for the various uses utilizing this garage should not overlap. Specifically, the Paradigm

parking is associated with office-related uses which experience their peak demand during daytime hours. If there is an actual shortfall, the on-site parking plan can be adjusted to allow for the shared use of certain spaces. With few office workers cars being in the car into the evening hours, the lack of corresponding residential and office peak times should readily allow for the effective sharing of parking. The parking demand for residential uses also can be controlled through the managed allocation of spaces as part of the individual leasing of units. The parking analysis indicates that the combined peak period for all uses should occur at 9 AM on a typical weekday, with the parking facilities being approximately 94-percent full. During the later evening hours there should be ample excess parking available due to the office workers' cars no longer being in the garage. Considering these factors, and the enhanced transit service that will be available, the parking supply is appropriate for the Project, and is not excessive, which would reduce incentives for utilizing public transportation.

The capacity analysis conducted for the study reveal that the intersection of Washington Street and Inner Belt Road is expected to maintain the same LOS B conditions between 2018 Existing, 2025 No-Build, and 2025 Build conditions. The addition of Project-generated traffic will have a negligible impact on queuing and delay for the individual movements at this intersection. Likewise, the analysis indicates that exiting traffic from the Project Site driveways will operate at LOS B or better during the time periods studied, with entering traffic functioning at LOS A with negligible delays and queueing.