

# Boynton Yards

## Somerville, Massachusetts

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January 2018

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# 1

## Introduction

VHB, on behalf of DLJ Real Estate Capital Partners, LLC ("DLJ", or the "Proponent"), has prepared a detailed Traffic Impact and Access Study for the proposed Boynton Yards mixed-use redevelopment (the "Project").

The Project will be developed within a combined 3.44-acre site located north of and adjacent to South Street between Windsor Place and Harding Street in the City of Somerville (the "Site"). The development program will include a mixture of residential and commercial uses. Specifically, based on materials provided by the Proponent, approximately 425 residential units within 380,000 square feet (sf) of total building area and almost 570,000 sf of commercial space (the "Project") are proposed within five buildings. The Project will be constructed on a phased basis. Buildings 1 and 2 (totaling 374,000 sf of commercial and incubator space) are planned to be constructed with the next three years. The remainder of the development program will be constructed four to seven years from the present. The Project location is shown in Figure 1.







The 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**

DLJ intends to develop a dynamic, mixed-use, transit-oriented project in the heart of the historically industrial Boynton Yards. The development objective is to transform Boynton Yards, an underutilized area containing scrap yards, industrial buildings, and parking lots, into a vibrant, transit-oriented, live-work-play, mixed-use neighborhood featuring innovative commercial spaces, diverse housing options, integrative community open spaces, engaging pedestrian streetscapes, and differentiated retail experiences.

The Project is located in Boynton Yards and bound by Windsor Street, Windsor Place, Earle Street, Harding Street, and South Street. The 3.44 acres are currently home to surface parking, a construction equipment storage lot, and two one- and two-story concrete block commercial buildings totaling 25,000 GSF. The Building 1 site is located along South Street between Earle and Harding Street, which is currently improved by a surface parking lot. Building 2 is to be located at the northwest corner of the intersection of South Street and Earle Street on an unimproved, roughly 1.0-acre lot currently being used for scaffolding and construction equipment storage and dispatching.

Under the newly proposed Somerville Zoning Ordinance, this Site is to be defined as a "High-Rise District", which allows for a range of building types including General Building, Commercial Building, Lab Building and Mid-Rise Podium Tower. The General and Mid-Rise Podium Tower Building types allow residential uses while the Lab and Commercial types do not. The site is approximately 0.25 miles from the upcoming new Union Square Green Line station and 0.5 miles from the heart of Union Square. Surrounding uses currently include parking, low-end office space, scrap auto lots, manufacturing, and industrial.

Upon full build out, DLJ's development could provide up to 950,000 sf comprised of approximately 570,000 sf of commercial uses and 380,000 sf of residential space consisting of 425 units across 3.44 acres. The mixed-use, transit-oriented development will include commercial space for cutting-edge labs, modern offices, innovative startups, and arts uses, as well as both neighborhood convenience and destination retail offerings, with open space to promote interaction between tenants, residents, and the community. The residential component of the development will include 20% affordable units and a wide range of unit sizes and types to accommodate families, single professionals, empty nesters, roommates, artists, and others. Publicly accessible and sustainably designed open spaces will benefit the wider neighborhood as well as the project's tenants and residents. DLJ believes the Project will be the first step in transforming Boynton Yards into an economic engine to stimulate and complement Somerville's surrounding, existing



neighborhoods and reestablishing Union Square as a commercial hub. The Project will connect the Union Square neighborhood to Inman Square to the south and the Medford Street/McGrath Highway corridor to the east. The Project also is designed to strengthen the connection between Union Square and Kendall Square to the south.

The Project's initial phase will consist of 374,000 sf of commercial space across two buildings and will provide Class A lab and life sciences space, flexible, modern office space, and approximately 15,478 of first-floor retail space. A four-level, below-grade parking garage will provide approximately 301 total parking spaces to serve Buildings 1 and 2. Building 1 also will include 45 secured bicycle parking spaces, and Building 2 will provide 94 secured bike spaces within the building. The two buildings aim to draw tenants out of Kendall Square where available space is non-existent and commercial rents are untenable for all but the largest and most well-funded life science companies and provide flexible office space intended to attract and promote young companies coming out of incubators at local universities such as MIT, Harvard, and Tufts, as well as Somerville's startup hubs such as Greentown Labs and the Ames Business Park.

Additional information regarding the full build out and city plans for the area can be found in Section 2.0 of this Project submittal.

The overall Project development is summarized in Table 1, and described in the following sections.

**Table 1 Development Program**

Analysis Condition	Apartments	Office	Research & Development	Retail	Total Building Area (all uses)
<b>Phase 1 (years 0-3)</b>					
Building 1	0 units	133,300 sf	0 sf	5,700 sf	139,000 sf
<u>Building 2</u>	<u>0 units</u>	<u>112,611 sf</u>	<u>112,611 sf</u>	<u>9,778 sf</u>	<u>235,000 sf</u>
Cumulative Total	0 units	245,911 sf	112,611 sf	15,478 sf	374,000 sf
<b>Phase 2 (years 4-7)</b>					
Building 3	213 units	0 sf	0 sf	2,500 sf	192,500 sf
Building 4	0 units	181,000 sf	0 sf	7,500 sf	188,500 sf
<u>Building 5</u>	<u>212 units</u>	<u>0 sf</u>	<u>0 sf</u>	<u>5,000 sf</u>	<u>195,000 sf</u>
Cumulative Total	0 units	181,000 sf	0 sf	15,000 sf	576,000 sf
Full Build	425 units	426,911 sf	112,250 sf	30,478 sf	950,000 sf

A summary of the first Project phase which is planned to be constructed within the next three years is summarized in the following section.

## Phase 1

As summarized in Table 1, Building 1 is a ten-story office and retail building aggregating 139,000 sf to be located at the intersection of South Street, Harding Street, and Earle Street. The building offers 133,300 sf of office space on the upper floors with 5,700 sf of retail space being provided on the first floor. An approximately 14,000 sf basement will provide space for retail back-of-house, building and tenant storage, and amenities. A landscaped roof deck also is contemplated for commercial tenant use. Building 1 will not provide any parking spaces, but will share the below-grade automobile parking facility in Building 2 as described below.

Building 2 is an eight-story lab building with supporting retail aggregating 235,000 sf to be located at the intersection of South Street and Earle Street. The building will also include four levels of underground parking providing approximately 301 total automobile parking spaces to support the 374,000 sf of commercial uses across DLJ's Buildings 1 and 2. The building offers 225,222 sf of lab and office space on floors two through eight and approximately 9,778 sf of retail space on the first floor. The first floor also will accommodate a 94-space bike room, three loading docks, a 1,500 sf lobby, and utility connections. A landscaped roof deck also is contemplated for commercial tenant use.

## Phase 2

The latter phase of the Project including Buildings 3, 4, and 5 is envisioned by DLJ as a mixed-use Project building upon the environment created through the first Phase. This portion of the Project is expected to be constructed between four and seven years from present conditions. While detailed design plans have not yet been developed for this phase, the Project team has developed a conceptual-level vision for the full build-out of the site as described as follows.

Building 3 is envisioned by DLJ as a twenty-four-story residential building with supporting retail aggregating 192,500 sf located west of an adjacent to Building 2 on South Street. The building is expected to include a total of 213 residential units on floors two through twenty-four and 2,500 sf of supporting first floor retail space. A total of 57 parking spaces will be provided.

As part of the full build-out of the Site, DLJ also is planning to construct Building 4 as an eleven-story office building with supporting ground-floor retail space. The building is expected to be 188,500 sf in size, with 181,000 sf of office space proposed along with 7,500 sf of retail use. A total of 57 parking spaces will be provided.

Finally, Building 5 is planned to be a 195,000 sf, twenty-four-story residential building with supporting retail space located at the intersection of South Street and Windsor Street. The building will include 212 residential units on floors two through twenty-four and approximately 5,000 sf of retail space on the first floor. As with Buildings 3 and 4, a total of 57 parking spaces will be provided within this parcel.

The development team has designed a pedestrian and bike-friendly streetscape experience to improve the walkability of the neighborhood for nearby residents, tenants, and mass-transit commuters and create a dynamic retail environment for the project. Retail tenants will include both convenient community staples as well as destination operators potentially including a coffee shop, a brewery/restaurant, a gym studio, healthy lunch takeout, or art gallery uses.

Existing trees in good health will be kept and supplemented with new native tree plantings along Earle, South, and Windsor Streets to increase Somerville's tree canopy. Planting beds along the streetscape will contain native species which do not require irrigation and will add to the site's pervious ground cover. Public bike racks will be sited to balance biking convenience and pedestrian mobility and access. Traffic calming measures such as raised sidewalks, signage, textured pavements, and bump outs will be included as appropriate.

DLJ also intends to upgrade and improve water, sewer, and stormwater infrastructure at and near the Buildings 1 and 2 sites. These improvements will be intended to serve not only Phase 1, but also the remainder of Boynton Yards.

## Study Methodology

The following transportation analysis has been performed in general conformance with the Massachusetts Executive Office of Environmental Affairs (EEA)/Executive Office of Transportation (EOT) guidelines. It also has been prepared to be consistent with the goals and overall vision of the Union Square Neighborhood Plan<sup>1</sup>.

VHB prepared the traffic assessment in three stages. The first stage involved an assessment of existing traffic conditions within the Project study 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 developments that may occur independent of the proposed development. The year 2024, a seven-year time horizon, was selected as the design year for analysis for the preparation of this traffic impact and access assessment in accordance with the standard industry practices in Massachusetts. An additional 2020 analysis year also was evaluated for Phase 1 of the Project, which consists of Building 1 and 2 at easterly side of the Site assemblage. This supplemental analysis phase is required as it is expected that both buildings will be in place prior to the new MBTA Union Square Green Line station being in operation.

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<sup>1</sup> [Union Square Neighborhood Plan](#) – City of Somerville (Somerville, Massachusetts) May 2016.

The third and final stage of the study discusses possible measures to improve existing and future traffic operations in the area and offsetting the traffic-related impacts associated with the development of the proposed Project.



# 2

## Existing Conditions

Evaluation of the transportation impacts associated with the Project requires a thorough understanding of the existing transportation conditions in the study area including, roadway geometry, traffic controls, daily and peak hour traffic flow, and traffic safety data. Each of these elements is described in detail below.

### Study Area

As noted earlier, based on VHB's knowledge of the area transportation network and the operational characteristics of the Project, the following intersections and their approach roadways were included in the assessment. The City of Somerville traffic and planning staffs also were consulted to confirm the appropriateness of the resulting study area. The following study area intersections are highlighted in Figure 2:

#### Windsor Street at:

- › Windsor Place / Boynton Yards Driveway – *unsignalized*
- › South Street – *unsignalized*



South Street at:

- › Willow Street – *unsignalized*
- › Earle Street – *unsignalized*
- › Hunting Street – *unsignalized*
- › Harding Street – *unsignalized*

Medford Street at:

- › Warren Street – *unsignalized*
- › South Street – *unsignalized*
- › Ward Street – *unsignalized*

Somerville Avenue at:

- › Medford Street/Route 28 interchange – *signalized*
- › Prospect Street – *signalized*

Webster Avenue at:

- › Prospect Street / Concord Avenue – *signalized*
- › Columbia Street / Tremont Street – *unsignalized*

Cambridge Street (City of Cambridge) at:

- › Prospect Street – *signalized*
- › Webster Avenue / Columbia Street – *signalized*
- › Windsor Street – *unsignalized*
- › Willow Street – *signalized*
- › Hunting Street – *signalized*
- › Harding Street – *unsignalized*

The existing conditions analysis consisted of an inventory of the traffic control, the roadway, driveway and intersection geometry in the study area, the collection of daily and peak hour traffic volumes, and a review of recent crash history.



### Figure 2

## **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 intersections, and the roadway jurisdiction in this area.

### **Roadways**

#### **South Street**

South Street runs between Windsor Street and Medford Street. It is classified as a local roadway and is under local City of Somerville jurisdiction. South Street runs in a generally east/west direction and consists of one travel lane in both directions between Windsor Street and Hunting Street and becomes one way traveling west with one lane between Hunting Street and Medford Street. The posted speed limit on the roadway is 30 mph. On-street parking is provided on the south side of South Street. Sidewalks are provided along both sides of the street and crosswalks are provided at Windsor Street, Hunting Street, and Medford Street. Land use along South Street consists of a mix of industrial and residential.

#### **Medford Street**

Medford Street runs between Warren Street and Somerville Avenue within the study area. It is classified as a minor arterial roadway and is under local City of Somerville jurisdiction. Medford Street runs in a generally north/south direction and consists of one travel lane in both directions until it reaches Somerville Avenue where additional turning lanes are provided. There is no posted speed limit within the study area. On-street parking is provided on the east side of the roadway between South Street and Ward Street. Sidewalks are provided on both sides and crosswalks are provided at South Street and Somerville Avenue. Sharrows are provided between South Street and Ward Street. Bike lanes and a northbound sharrow are provided between Ward Street and Somerville Avenue. Land use along Medford Street is a mixture of commercial and residential.

#### **Somerville Avenue**

Somerville Avenue runs from Medford Street to Prospect Street within the study area. It is classified as a principal artery and is under local City of Somerville jurisdiction. Somerville Avenue runs in a generally east/west direction and consists of one travel lane in both directions with additional turn lanes at major intersections. There is no posted speed limit within the study area. On-street parking is provided on both sides of Somerville Avenue. Sidewalks are provided along both sides of the roadway and crosswalks are provided at major intersections. Bike lanes are provided along both sides of the roadway. Bus stops are provided at major intersections within the study area. Land use along Somerville Avenue is a mixture of commercial, industrial, and residential.

### **Webster Avenue**

Webster Avenue runs from Prospect Street to Cambridge Street within the study area. It is classified as a minor arterial roadway and is under local City of Somerville jurisdiction between Prospect Street and Elm Street and City of Cambridge jurisdiction between Elm Street and Cambridge Street. Webster Avenue runs in a generally north/south direction and consists of one travel lane in both directions with additional turn lanes at major intersections. There is no posted speed limit within the study area. On-street parking is provided along both sides for most of the roadway. Sidewalks are provided along both sides and crosswalks are provided at major intersections and between Elm Street and Norfolk Street. Bus stops are provided at major intersections within the study area. Land use along Webster Avenue is a mixture of industrial and residential.

### **Cambridge Street**

Cambridge Street runs from Prospect Street to Warren Street within the study area. It is classified as a minor arterial roadway and is under local City of Cambridge jurisdiction. Cambridge Street runs in a generally east/west direction and consists of one travel lane in both directions. There is no posted speed limit within the study area. On-street parking is provided along both sides of the roadway. Sidewalks are provided along both sides and crosswalks are provided at most intersections. Bike lanes are provided along both sides of the roadway. Bus stops are provided at major intersections within the study area. Land use along Cambridge Street is a mixture of commercial and residential.

## **Intersections**

### **Windsor Street at Windsor Place/Boynton Yards Driveway**

Windsor Street, Windsor Place, Boynton Yards driveway, and the parking lot driveway form a four-way unsignalized intersection. Windsor Street is to the south, Windsor Place is to the west, Boynton Yards driveway is to the east, and the parking lot driveway is to the north. All approaches consist of one general purpose lane. The Windsor Place eastbound approach and Boynton Yards driveway are under stop control. Sidewalks are provided along both sides of the Windsor Place and the Windsor Street approaches. The sidewalks extend across the entrances to the Site and the parking lot driveway. A crosswalk is provided across the Windsor Street northbound approach. On-street parking is provided on the west side of the Windsor Street approach. Land use around the intersection is a mixture of industrial and residential.

### **Windsor Street at South Street**

South Street and Windsor Street form a three-way unsignalized intersection. Windsor Street runs north/south and South Street intersects from the east. All approaches consist of one general purpose lane. The South Street westbound

approach is under stop control. Sidewalks are provided along both sides of all approaches. Crosswalks are provided across the Windsor Street northbound approach and South Street westbound approach. On-street parking is provided on the west side of the Windsor Street north- and southbound approaches and the south side of South Street westbound approach. Land use around the intersection is a mixture of industrial and residential.

#### **South Street at Willow Street**

South Street and Willow Street form a three-way unsignalized intersection. South Street runs east/west and Willow Street intersects from the south. All approaches consist of one general purpose lane. The Willow Street northbound approach is one way approaching the intersection and under stop control. Sidewalks are provided along both sides of all approaches. A crosswalk is provided across the Willow Street northbound approach. On-street parking is provided on the south side of South Street east- and westbound approaches. Land use around the intersection is a mixture of industrial and residential.

#### **South Street at Earle Street**

South Street and Earle Street form a three-way unsignalized intersection. South Street runs east/west and Earle Street intersects from the north. All approaches consist of one general purpose lane. The Earle Street southbound approach is under stop control. Sidewalks are provided along both sides of all approaches. A crosswalk is provided across the Earle Street southbound approach. On-street parking is provided along the south side of South Street and the west side of Earle Street. Land use around the intersection is a mixture of industrial and residential.

#### **South Street at Hunting Street**

South Street and Hunting Street form a three-way unsignalized intersection. South Street runs east/west and Hunting Street intersects from the south. All approaches consist of one general purpose lane. Hunting Street northbound approach is one way departing the intersection. South Street westbound approach is one way approaching the intersection. Sidewalks are provided along both sides of all approaches. Crosswalks are provided across Hunting Street northbound approach and South Street westbound approach. On-street parking is provided along the south side of the South Street east- and westbound approaches and the easterly side of the Hunting Street northbound approach. Land use around the intersection is a mixture of industrial and residential.

#### **South Street at Harding Street**

South Street and Harding Street form a four-way unsignalized intersection. South Street runs east/west and Harding Street runs north/south and is under stop control. All intersections consist of one general purpose lane. South Street is one way westbound; approaching from the South Street westbound approach and departing



from the eastbound approach. Harding Street is one way approaching from both the north- and southbound approaches converging at the intersection. Sidewalks are provided along both sides of all approaches. Crosswalks are provided across the Harding Street north- and southbound approaches. On-street parking is provided along the south side of the South Street east- and westbound approaches and the east side of the Harding Street north- and southbound approaches. Land use around the intersection is a mixture of industrial and residential.

#### **Medford Street at Warren Street**

Medford Street, Warren Street, and driveway form a three-way unsignalized intersection. Medford Street runs north/south, Warren Street intersects from the southwest, and the driveway intersects from the northeast. All approaches consist of one general purpose lane. The Warren Street eastbound approach is one way approaching the intersection and is under stop control. Sidewalks are provided along both sides of all approaches. The sidewalk goes across the driveway entrance. A crosswalk is provided across the Warren Street eastbound approach. Land use around the intersection is a mixture of commercial and residential.

#### **Medford Street at South Street**

Medford Street and South Street form a three-way unsignalized intersection. Medford Street runs north/south and South Street intersects from the west. All approaches consist of one general purpose lane. South Street eastbound approach is one way departing the intersection. Sidewalks are provided along both sides of all approaches. Crosswalks are provided across the South Street eastbound approach and the Medford Street northbound approach. Sharrows are provided on Medford Street in both directions. On-street parking is provided along the east side of the Medford Street southbound approach. Land use around the intersection is a mixture of industrial and residential.

#### **Medford Street at Ward Street**

Medford Street, Ward Street, and driveway form a four-way unsignalized intersection. Medford Street runs north/south, Ward Street intersects from the west, and the driveway intersects from the east. All approaches consist of one general purpose lane. Ward Street is under stop control. Sidewalks are provided along both side of all approaches. No crosswalks are provided across any approach. Sharrows markings are provided on the Medford Street north- and southbound approaches. Land use around the intersection is a mixture of commercial and residential.

#### **Somerville Avenue at Medford Street**

Somerville Avenue and Medford Street form a four-way signalized intersection with Somerville Avenue extending in an east/west direction and Medford Street having a north/south orientation. The Somerville Avenue eastbound approach consists of an exclusive through lane and an exclusive right-turn lane. The Somerville Avenue

westbound approach is one way departing the intersection and consists of a general-purpose lane. The Medford Street northbound approach consists of an exclusive left-turn lane. The Medford Street southbound approach is one way approaching the intersection and consists of an exclusive left-turn lane, a through lane, and a shared through/right-turn lane. Sidewalks are provided along both sides of all approaches. Crosswalks are provided across all approaches. Bike lanes are provided on the Somerville Avenue east- and westbound approaches and the Medford Street northbound approach. Sharrow markings are provided runs southbound through the intersection along Medford Street. The intersection and the approaches. This location was reconstructed in 2016 in a redesign of the area that eliminated the off-ramp from Route 28 Southbound to Medford Street, closed the northbound tunnel from Somerville Avenue to Washington Street, and created a new signalized access point to Route 28 Northbound via Medford Street Extension, and improved pedestrian and bicycle accommodations. Land use around the intersection is a mixture of commercial and industrial.

#### **Somerville Avenue/Somerville Avenue Extension at Medford Street Extension**

Approximately 100 feet east of the intersection of Somerville Avenue and Medford Street, Somerville Avenue meets Somerville Avenue Extension and Medford Street Extension at a signalized intersection. This intersection and Medford Street Extension were reconstructed in 2016 in a redesign of the area that eliminated the off-ramp from Route 28 Southbound to Medford Street, closed the northbound tunnel from Somerville Avenue to Washington Street, and created a new signalized access point to Route 28 Northbound via Medford Street Extension, and improved pedestrian and bicycle accommodations. Somerville Avenue/Somerville Avenue Extension runs east/west and Medford Street Extension runs north/south. The Somerville Avenue eastbound approach is one way approaching the intersection and consists of a single general-purpose lane. The Somerville Avenue Extension westbound approach is one way departing the intersection, which that splits approximately 150 feet east of the intersection into an on-ramp for Route 28 Southbound and a through roadway for Somerville Avenue Extension. Medford Street Extension northbound approach is one way approaching the intersection and consists of a through lane and a shared through/right-turn lane. The Medford Street Extension southbound approach is one way departing the intersection and consists of two travel receiving travel lanes. Sidewalks are provided on both sides of all approaches. Crosswalks are provided across the Somerville Avenue/Somerville Avenue Extension eastbound- and westbound approaches and the Medford Street Extension northbound approach. Bike lanes are provided along the east side of Medford Street Extension and the south side of the Somerville Avenue eastbound approach which transitions into a sharrow on the Somerville Avenue Extension westbound approach. Land use around the intersection is a mixture of commercial and industrial.

**Medford Street Extension at Route 28 Northbound/Route 28 Northbound Off-Ramp**

Medford Street Extension and Route 28 Northbound/Route 28 Northbound Off-Ramp form a four-way signalized intersection approximately 100 feet north of the intersection of Somerville Avenue/Somerville Avenue Extension and Medford Street Extension. This intersection and Medford Street Extension were reconstructed in 2016 in a redesign of the area that eliminated the off-ramp from Route 28 Southbound to Medford Street, closed the northbound tunnel from Somerville Avenue to Washington Street, and created a new signalized access point to Route 28 Northbound via Medford Street Extension, and improved pedestrian and bicycle accommodations. Route 28 Northbound runs northwest/southeast, Medford Street Extension intersects with Route 28 Northbound from the south, and the Route 28 Northbound Off-Ramp intersects from the north. Route 28 Northbound is one way and consists of two through lanes and an exclusive right-turn lane on the northbound approach, approaching the intersection, and two receiving lanes on the southeastbound approach, departing the intersection. The Medford Street Extension northbound approach is one-way approaching the intersection and consists of an exclusive left-turn lane and a shared left-turn/through lane. The Route 28 Northbound Off-Ramp southbound approach is one-way departing the intersection and provides a vehicular connection to Washington Street. Bike lanes are provided on the east side of the Medford Street Extension approach and along the east side of the Route 28 Northbound approach. An MBTA bus stop is located on the north side of the Route 28 Northbound approach. Land use around the intersection is a mixture of commercial and industrial.

**Somerville Avenue at Prospect Street**

Prospect Street intersects from the north and south to form a four-way signalized intersection. The Somerville Avenue east- and westbound approaches consist of an exclusive left-turn lane and a shared through/right-turn lane. The Prospect Street northbound approach is one way approaching the intersection and consists of an exclusive left-turn lane and a shared through/right-turn lane. The Prospect Street southbound approach consists of an exclusive right-turn lane and an exclusive through lane.

This intersection and the approaching roadways were reconfigured in July 2017 as part of the Union Square Early Action Plan with bike accommodations added and Prospect Street south of the intersection converted from one-way directional traffic only to two-way directional traffic. Sidewalks are provided along both sides of all approaches. Crosswalks are provided across all approaches. Bike lanes are provided on both sides of on the Somerville Avenue east- and westbound approaches and the Prospect Street southbound approach. The Prospect Street northbound approach provides a bike lane on the east side of the approaching lane and a sharrow in the departing lane. On-street parking is provided on the south side of the Somerville Avenue eastbound approach and the east side of the Prospect Street northbound

approach. Land use around the intersection is a mixture of commercial and residential.

### **Webster Avenue at Prospect Street/Concord Avenue**

Webster Avenue, Prospect Street, and Concord Avenue form a five-way signalized intersection. Webster Avenue runs north/south, Prospect Street runs northeast/southwest, and Concord Avenue intersects from the west. The Prospect Street northeast- and southwesterly approaches and the Concord Avenue eastbound approach consist of single general-purpose lanes. The Webster Avenue north- and southbound approaches consist of an exclusive left turn lane and a shared through/right-turn lane. The Concord Avenue eastbound approach is one way departing the intersection. The intersection and the approaching roadways were reconfigured in July 2017 as part of the Union Square Early Action Plan with bike accommodations added and both Webster Avenue and Prospect Street north of the intersection converted from one-way directional traffic only to two-way directional traffic. Sidewalks are provided on both sides of all approaches. Crosswalks are provided across all approaches. Bike lanes are provided on the southeast side of the Prospect Street southwesterly approach, departing the intersection, and the west side of the Webster Avenue southbound approach, approaching the intersection. Sharrows are provided on the Prospect Street northeast- and southwesterly approach, approaching the intersection, and the Webster Avenue north- and southbound approaches, departing the intersection. On-street parking is provided on both sides of the Concord Avenue eastbound approach and on the southeast side of the Prospect Street northeast- and southwesterly approaches. An MBTA bus stop is located on the east side of the Webster Avenue northbound approach. Land use around the intersection is a mixture of commercial and residential.

### **Webster Avenue at Columbia Street/Tremont Street**

Webster Avenue, Columbia Street, and Tremont Street form a four-way unsignalized intersection. Webster Avenue runs north/south, Tremont Street intersects from the west, and Columbia Street intersects from the east. All approaches consist of one general purpose lane. The Tremont Street eastbound approach is one-way departing the intersection. The Columbia Street westbound approach is under stop control. Sidewalks are provided along both sides of all approaches. No crosswalks are provided across any approach. Sharrows are provided on Webster Avenue in both directions. On-street parking is provided along the north side of the Tremont Street eastbound approach and both sides of the Webster Avenue southbound approach. An MBTA bus stop is located on the east corner of the Webster Avenue northbound approach. Land use around the intersection is a mixture of industrial and residential.

### **Cambridge Street at Prospect Street**

Cambridge Street and Prospect Street form a four-way signalized intersection. Cambridge Street runs east/west and Prospect Street runs north/south. All approaches consist of one general purpose lane. Sidewalks are provided on both

sides of all approaches. Crosswalks are provided across all approaches. Bike lanes are provided along Cambridge Street in both directions. On-street parking is provided along both sides of the Cambridge Street east- and westbound approaches and along the east side of the Prospect Street north- and southbound approaches. MBTA bus stops are located on the south corner of the Cambridge Street eastbound approach and the north corner of the Cambridge Street westbound approach. Land use around the intersection is a mixture of commercial and residential.

### **Cambridge Street at Webster Avenue/Columbia Street**

Cambridge Street, Webster Avenue, and Columbia street form a four-way signalized intersection. Cambridge Street runs east/west, Webster Avenue intersects from the north, and Columbia Street intersects from the south. The Columbia Street northbound approach and the Cambridge Street east- and westbound approaches consist of one general purpose lane. The Webster Avenue southbound approach consists of an exclusive left-turn lane and a shared through/right-turn lane. Sidewalks are provided on both sides of all approaches. Crosswalks are provided across all approaches. Bike lanes are provided along Cambridge Street in both directions. On-street parking is provided on both sides of the Cambridge Street east- and westbound approaches and the east side of the Columbia Street northbound approach. MBTA bus stops are located on the east side of the Columbia Street northbound approach and the west side of the Webster Avenue southbound approach. A Hubway bike rental station is located on the east side of the Webster Avenue southbound approach. Land use around the intersection is a mixture of commercial and residential.

### **Cambridge Street at Windsor Street**

Cambridge Street and Windsor Street form a four-way unsignalized intersection. Cambridge Street runs east/west and Windsor Street runs north/south. All approaches consist of one general purpose lane, with the Windsor Street northbound approach being one-way departing the intersection. The Windsor Street southbound approach is under stop control. Sidewalks are provided along both sides of all approaches. Crosswalks are provided across all approaches. Bike lanes are provided along Cambridge Street in both directions. On-street parking is provided along both sides of the Cambridge Street east- and westbound approaches, both sides of the Windsor Street northbound approach, and the west side of the Windsor Street southbound approach. MBTA bus stops are located on the north and south sides of the Cambridge Street westbound approach. Land use around the intersection is a mixture of commercial and residential.

### **Cambridge Street at Willow Street**

Cambridge Street and Willow Street form a four-way signalized intersection. Cambridge Street runs east/west and Willow Street runs north/south. All approaches consist of one general purpose lane. The Willow Street north- and southbound



approaches are both one way departing the intersection. The traffic signal primarily serves to assist pedestrians crossing Cambridge Street. Sidewalks are provided along both sides of all approaches. Crosswalks are provided across all approaches. Bike lanes are provided on Cambridge Street in both directions. On-street parking is provided along both sides of the Cambridge Street east- and westbound approaches and the Willow Street northbound approach. The Willow Street southbound approach provides on-street parking on the east side. Land use around the intersection is a mixture of commercial and residential.

### **Cambridge Street at Hunting Street**

Cambridge Street and Hunting Street form a three-way signalized intersection with Cambridge Street running in a general east/west direction and Hunting Street intersecting this roadway from the north. All approaches consist of one general purpose lane. The Hunting Street southbound approach is one way approaching the intersection. Sidewalks are provided along both sides of all approaches. Crosswalks are provided across all approaches. Bike lanes are provided on Cambridge Street in both directions. On-street parking is provided on both sides of the Cambridge Street eastbound approach and Hunting Street southbound approach. The Cambridge Street westbound approach provides on-street parking on the north side. Land use around the intersection is a mixture of commercial and residential.

### **Cambridge Street at Harding Street**

Cambridge Street and Harding Street form a three-way unsignalized intersection. Cambridge Street runs east/west and Harding Street intersects from the north. All approaches consist of one general purpose lane. The Harding Street southbound approach is one way departing the intersection. Sidewalks are provided along both sides of all approaches. A crosswalk is provided across the Harding Street southbound approach. Bike lanes are provided along Cambridge Street in both directions. On-street parking is provided along the north side of Cambridge Street and the east side of Harding Street. Land use around the intersection is a mixture of commercial and residential.

## **Traffic Volumes**

Traffic volumes for the study area roadways and intersections were collected by VHB in September 2017. This time of year specifically was chosen to capture representative conditions in Somerville when schools were in operation and typical commuter traffic was present on the study area roadways. The counts also were conducted after the implementation of various roadway improvements near Union Square in late July 2017. Several of these measures involved changes removing one-way restrictions. To allow for the new traffic patterns to become established in this area, the required traffic counts for this study were conducted after these improvements had been in place for over one month.

The appropriateness of this data collection in terms of timing and the general scope was confirmed through subsequent consultation with the City of Somerville. Peak-period turning movement and classification (TMC) counts were collected at the study area intersections on a typical weekday from 7:00 PM to 9:00 AM and 4:00 PM to 6:00 PM, and on a typical Saturday from 11:00 AM to 2:00 PM. These time periods were selected so that the combined peak periods for the roadway and Project Site activity would be evaluated. Based on the TMCs, the weekday morning peak period generally occurs from 7:30 AM to 8:30 AM, the weekday evening peak period generally occurs from 4:45 PM to 5:45 PM, and the Saturday midday peak period occurs from 12:00 PM to 1:00 PM.

In addition, VHB conducted automatic traffic (ATR) counts for a continuous 72-hour period, including a typical weekday and Saturday. These counts were conducted on South Street adjacent to the Site, Webster Avenue to the south of Prospect Street, and on Medford Street to the south of South Street. The observed traffic volumes are summarized in Table 2. All traffic count data is included in the Appendix to this document.

**Table 2 Observed Traffic Volumes**

Location	Weekday Daily <sup>a</sup>	Weekday Morning Peak Hour			Weekday Evening Peak Hour			Saturday Daily	Saturday Midday Peak Hour		
	Vol.	Vol. <sup>b</sup>	K Factor <sup>c</sup>	Dir. Dist. <sup>d</sup>	Vol.	K Factor	Dir. Dist.	Vol.	Vol.	K Factor	Dir. Dist.
South Street - East of Windsor Street	4,700	420	9.0%	WB 96%	320	6.8%	WB 91%	3,600	305	8.5%	WB 92%
Webster Avenue - South of Prospect Street	8,600	575	6.7%	SB 63%	590	6.9%	NB 69%	7,900	545	6.9%	NB 54%
Medford Street - South of South Street	12,400	935	7.5%	SB 62%	875	7.1%	NB 67%	9,300	745	8.0%	NB 53%

Source: VHB; Based on automatic traffic recorder (ATR) counts conducted in September 2017.

a Average Daily Traffic volume, expressed in vehicles per day

b Represents the percent daily traffic which occurs during the peak hour

c 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 2, South Street east of Windsor Street carries approximately 4,700 vehicles on a typical weekday with the peak hours accounting for 9.0 percent (morning peak hour) and 6.8 percent (evening peak hour) of the weekday daily traffic flow. On a typical Saturday, South Street east of Windsor Street carries

approximately 3,600 vehicles with the midday peak hour accounting for 8.5 percent of the Saturday daily traffic flow. Traffic flow along South Street is significantly heavier in the westbound direction during all peak periods, as South Street becomes one-way in the westbound direction east of Hunting Street.

Webster Avenue south of Prospect Street carries approximately 8,600 vehicles on a typical weekday with the peak hours accounting for 6.7 percent (morning peak hour) and 6.9 percent (evening peak hour) of the weekday daily traffic flow. On a typical Saturday, Webster Avenue south of Prospect Street carries approximately 7,900 vehicles with the midday peak hour accounting for 6.9 percent of the Saturday daily traffic flow. Traffic flow along Webster Avenue is heavier in the southbound direction during the weekday morning peak period and heavier in the northbound direction during the weekday evening and Saturday midday peak periods.

Medford Street south of South Street carries approximately 12,400 vehicles on a typical weekday with the peak hours accounting for 7.5 percent (morning peak hour) and 7.1 percent (evening peak hour) of the weekday daily traffic flow. On a typical Saturday, Medford Street south of South Street carries approximately 9,300 vehicles with the midday peak hour accounting for 8.0 percent of the Saturday daily traffic flow. The predominant flow of traffic along Medford Street is in the southbound direction during the weekday morning peak period, but heavier in the northbound direction during the weekday evening and Saturday midday conditions.

## **Seasonal Adjustment**

The traffic data collected for the study area was obtained during the month of September. As noted earlier, the appropriateness of this time period was confirmed through subsequent consultation with the Somerville Transportation and Infrastructure Department. To quantify the seasonal variation of traffic volumes in the area, historic traffic data available from MassDOT were reviewed. Specifically, 2015 monthly traffic volumes (broken down by hour) were reviewed at MassDOT permanent counting station 8495 located on Route I-93 in Somerville. Based on the review, traffic volumes in September are slightly higher than average-month conditions. To present a conservative analysis, the observed traffic volumes were not adjusted. The seasonal adjustment factors are included in the Appendix to this study.

The resulting 2017 Existing Conditions weekday morning, weekday evening, and Saturday midday peak hour traffic volumes are shown in Figures 3, 4 and 5, respectively.

### Figure 3

### Figure 4





### Figure 5

## Public Transportation

Ample public transportation services by the Massachusetts Bay Transportation Authority (MBTA) currently are provided within 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 study area is currently served by eight MBTA bus routes within a half mile of the Project Site. While no routes currently provide direct service to the Site, there are multiple MBTA bus stops in close proximity to the Site. These include the nearest bus stops located approximately 800 feet west of the Site on Webster Avenue at Columbia Street (Route 85), and 1000 feet south of the site on Cambridge Street at Windsor Street (Route 69). Furthermore, MBTA Routes 80, 86, 87, 88, 91, and CT2 provide nearby access to the Site. The nearest bus stop on Route 86 is located on Somerville Avenue at Union Square, and the nearest stop on Route 91 is located on Webster Avenue at Newton Street. The closest MBTA bus stops for Routes 80, 87, and 88 are located on Somerville Avenue Extension and Route 28 Northbound. Route CT2 is one of three cross-town routes operated by the MBTA and by design these have fewer stops than a traditional bus route. The nearest stop to the Site on Route CT2 is located at the intersection of Cambridge Street and Webster Avenue/Columbia Street. Peak period frequencies/headways for MBTA bus services are summarized in Table 3, and are shown graphically in Figure 6.

**Table 3 Project Area MBTA Service**

Service	Origin / Destination	Peak-Hour Frequency (minutes)
Route 69	Harvard Square – Lechmere Station	10-20
Route 80	Arlington Center – Lechmere Station (via Medford Hillside)	15-30
Route 85	Spring Hill – Kendall/MIT	25-45
Route 86	Sullivan Square – Reservoir	10-18
Route 87	Arlington Center – Lechmere Station (via Somerville Avenue)	20-30
Route 88	Clarendon Hill – Lechmere Station	16-20
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 Union Square station will be located on Prospect Street, approximately one-quarter of a mile from the project site. The Green Line extension is expected to be completed in 2021, which is prior to Phase 2 for this Project. Additional information regarding the planned MBTA Union Square Station is provided under the Future Conditions section of this report.

**Figure 6 Existing Public Transit Map**

## Crash History

A detailed crash analysis was conducted to identify potential vehicle accident trends and/or roadway deficiencies in the traffic study area. The most current vehicle accident data for the traffic study area intersections were obtained from MassDOT for the years 2011 to 2015. The MassDOT database is comprised of crash data from the Massachusetts Registry of Motor Vehicles (RMV) Division primarily for use in traffic studies and safety evaluations. Data files are provided for an entire city or town for an entire year, though it is possible that some crash records may be omitted either due to individual crashes not being reported, or the city crash records not being provided in a compatible format for RMV use. A summary of the study intersections vehicle accident history based on the available RMV data is presented in Table 4 and the detailed crash data is provided in the Appendix to this study.

Crash rates are calculated based on the number of accidents at an intersection and the volume of traffic traveling through that intersection on a daily basis. Rates that exceed MassDOT's average for accidents at intersections in the MassDOT district in which the town or city is located could indicate safety or geometric issues for a particular intersection. For our study area, the calculated crash rates for intersections located in Somerville were compared to MassDOT's District 4 average and the calculated crash rates for intersections located in Cambridge were compared to MassDOT's District 6 average, as Somerville is located in District 4 and Cambridge is located in District 6. In District 4, the average crash rate is 0.73 for signalized intersections and 0.56 for unsignalized intersections. In District 6, the average crash rate is 0.70 for signalized intersection and 0.53 for unsignalized intersections. These rates imply that, on average, 0.73 and 0.70 accidents occurred per million vehicles entering signalized intersections throughout Districts 4 and 6, respectively, and 0.56 and 0.53 accidents occurred per million vehicles entering unsignalized intersections in Districts 4 and 6, respectively. It should be noted that the location for some accidents cannot be precisely determined from the database. These locations typically involve interchange intersections. Additionally, some accidents may have occurred but were either not reported or not included in the database, and therefore not considered.

**Table 4    Vehicular Crash Summary (2011-2015)**

	Windsor Street at Windsor Place/Boynton Yards driveway	South Street at Windsor Street	South Street at Willow Street	South Street at Earle Street	South Street at Hunting Street	South Street at Harding Street	Medford Street at Warren Street	Medford Street at South Street	Medford Street at Ward Street	Somerville Avenue at Medford Street <sup>a</sup>
Signalized?	No	No	No	No	No	No	No	No	No	Yes
MassDOT Average Crash Rate	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.73
Calculated Crash Rate	0.00	0.43	0.12	0.13	0.32	0.61	0.36	0.05	0.05	0.88
Exceeds Average?	No	No	No	No	No	Yes	No	No	No	Yes
<b>Year</b>										
2011	0	0	1	1	1	0	1	0	1	5
2012	0	1	0	0	1	0	1	0	0	6
2013	0	0	0	0	0	3	1	0	0	4
2014	0	1	0	0	1	1	3	0	0	3
<u>2015</u>	<u>0</u>	<u>2</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>1</u>	<u>0</u>	<u>1</u>	<u>0</u>	<u>5</u>
<b>Total</b>	<b>0</b>	<b>4</b>	<b>1</b>	<b>1</b>	<b>3</b>	<b>5</b>	<b>6</b>	<b>1</b>	<b>1</b>	<b>23</b>
<b>Collision Type</b>										
Angle	0	1	0	0	0	4	2	0	0	6
Head-on	0	1	0	0	0	0	0	0	0	0
Rear-end	0	0	0	1	0	0	1	0	1	4
Rear-to-rear	0	0	0	0	0	0	0	0	0	0
Sideswipe, opposite direction	0	0	0	0	0	0	0	0	0	2
Sideswipe, same direction	0	1	1	0	2	0	1	1	0	2
Single Vehicle Crash	0	1	0	0	1	1	2	0	0	8
Not reported	0	0	0	0	0	0	0	0	0	1
<b>Severity</b>										
Fatal Injury	0	0	0	0	0	0	0	0	0	0
Non-Fatal Injury	0	0	0	0	0	3	2	0	1	8
Property Damage Only	0	2	0	1	0	1	3	0	0	13
Not Reported	0	2	1	0	3	1	1	1	0	2
<b>Time of day</b>										
Weekday ,7:00 AM - 9:00 AM	0	1	0	0	1	0	2	0	0	1
Weekday, 4:00 – 6:00 PM	0	0	0	0	0	0	2	0	1	2
Saturday 11:00 AM – 2:00 PM	0	0	0	0	0	0	0	0	0	0
Weekday, other time	0	2	1	1	1	4	1	0	0	13
Weekend, other time	0	1	0	0	1	1	1	1	0	7
<b>Pavement Conditions</b>										
Dry	0	2	0	0	1	1	5	0	0	17
Wet	0	1	0	0	0	3	0	1	1	4
Snow	0	0	1	0	1	1	1	0	0	1
Ice	0	0	0	0	0	0	0	0	0	0
Slush	0	0	0	0	0	0	0	0	0	0
Not reported	0	1	0	1	1	0	0	0	0	1
<b>Non-Motorist (Bike, Pedestrian)</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>1</b>

Source: Crash data was obtained from MassDOT Crash Portal, accessed in October 2017.

a      Intersection reconstructed in 2016. All crash data for intersection prior to reconstruction.

Table 4    Vehicular Crash Summary (2011-2015) (Continued)

	Somerville Avenue at Prospect Street	Webster Avenue at Prospect Street / Concord Avenue	Webster Avenue at Columbia Street / Tremont Street	Cambridge Street at Prospect Street	Cambridge Street at Webster Avenue / Columbia Street	Cambridge Street at Windsor Street	Cambridge Street at Willow Street	Cambridge Street at Hunting Street	Cambridge Street at Harding Street
Signalized?	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No
MassDOT Average Crash Rate	0.73	0.73	0.56	0.70	0.70	0.53	0.70	0.70	0.53
Calculated Crash Rate	1.17	0.60	0.98	0.85	1.17	2.14	0.45	0.78	0.60
Exceeds Average?	Yes	No	Yes	Yes	Yes	Yes	No	Yes	Yes
<b>Year</b>									
2011	8	2	2	5	7	9	1	5	2
2012	11	5	0	8	11	5	2	2	2
2013	4	6	3	6	4	12	1	1	4
2014	7	3	7	4	5	10	1	2	0
2015	<u>7</u>	<u>1</u>	<u>1</u>	<u>2</u>	<u>4</u>	<u>5</u>	<u>2</u>	<u>3</u>	<u>2</u>
Total	37	17	13	25	31	41	7	13	10
<b>Collision Type</b>									
Angle	8	7	4	8	9	22	2	1	3
Head-on	3	1	0	0	1	1	1	0	1
Rear-end	8	4	2	10	8	1	1	5	2
Rear-to-rear	0	0	0	0	0	0	0	2	0
Sideswipe, opposite direction	0	0	0	1	0	1	0	0	1
Sideswipe, same direction	9	1	3	1	2	4	1	3	1
Single Vehicle Crash	9	3	3	2	5	4	0	1	1
Not reported	0	1	1	3	6	8	2	1	1
<b>Severity</b>									
Fatal Injury	0	0	0	0	0	0	0	1	0
Non-Fatal Injury	16	4	7	2	10	15	1	2	1
Property Damage Only	20	8	5	19	15	13	3	5	6
Not Reported	1	5	1	4	6	13	3	5	3
<b>Time of day</b>									
Weekday ,7:00 AM - 9:00 AM	5	2	2	3	1	2	0	1	0
Weekday, 4:00 – 6:00 PM	1	0	1	0	3	6	0	0	3
Saturday 11:00 AM – 2:00 PM	0	0	0	0	2	1	0	1	0
Weekday, other time	22	11	9	12	19	26	5	9	4
Weekend, other time	9	4	1	10	6	6	2	2	3
<b>Pavement Conditions</b>									
Dry	29	14	12	20	23	26	3	8	8
Wet	4	1	1	4	5	9	2	3	0
Snow	1	0	0	0	1	1	0	2	0
Ice	0	0	0	0	0	0	0	0	0
Slush	0	0	0	0	0	0	0	0	0
Not reported	3	2	0	1	2	5	2	0	2
Non-Motorist (Bike, Pedestrian)	8	4	5	3	14	16	2	1	2

Source: Crash data was obtained from MassDOT Crash Portal, accessed in October 2017.

As shown in Table 4, review of the accident data indicates that nine of the study area intersections are above the district crash rate averages. Three of the intersections had crash rates greater than 1.00: Somerville Avenue at Prospect Street, Cambridge Street at Webster Avenue/Columbia Street, and Cambridge Street at Windsor Street. The majority of crashes throughout the study area were angle crashes and rear-end crashes occurring on dry pavement resulting in property damage only. Based on the MassDOT records there was one fatal accident that occurred within the study area at the intersection of Cambridge Street at Hunting Street during the five-year period studied. In addition, over ten crashes involving bicycles or pedestrians occurred during the five-year period at the intersections of Cambridge Street at Webster Avenue/Columbia Street and Cambridge Street at Windsor Street. As referenced below, the benefits of recently implemented bicycle improvements are not reflected by the 2011 through 2015 data, but should result in significantly improved cycling conditions in the future.

Several of the study area intersections have been reconstructed in recent years, which may have addressed some of the existing safety concerns listed above. Intersections that have seen improvements include the intersections of Somerville Avenue at Medford Street, Somerville Avenue at Prospect Street, and Webster Avenue at Prospect Street/Concord Avenue. However, the intersection improvements at these locations have occurred since 2015 and therefore are not reflected in the data above.

## Highway Safety Improvement Program

In addition to calculating the crash rate, 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"<sup>2</sup> 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 the following intersections are listed under the following HSIP-eligible clusters:

- › 2012-2014 HSIP Cluster:
  - Somerville Avenue at Prospect Street
  - Cambridge Street at Webster Avenue / Columbia Street
  - Cambridge Street at Windsor Street

<sup>2</sup> 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.



› 2005-2014 HSIP Pedestrian Cluster:

- Somerville Avenue at Prospect Street
- Cambridge Street at Prospect Street
- Cambridge Street at Webster Avenue / Columbia Street
- Cambridge Street at Windsor Street
- Cambridge Street at Harding Street

› 2005-2014 HSIP Bicycle Cluster:

- Somerville Avenue at Prospect Street
- Webster Avenue at Prospect Street / Concord Avenue
- Webster Avenue at Columbia Street / Tremont Street
- Cambridge Street at Prospect Street
- Cambridge Street at Webster Avenue / Columbia Street
- Cambridge Street at Windsor Street



# 3

## Future Conditions

Traffic volumes in the study area were projected to a seven-year traffic-planning horizon. Independent of the Project, volumes on the roadway network under the future No-Build conditions were assumed to include existing traffic and new traffic resulting from background traffic growth. Under the Build condition, Project generated traffic volumes were added to the No-Build volumes to reflect the Build conditions within the Project study area.

### Background Traffic Growth

Traffic growth on area roadways is a function of the expected land development, economic activity, and changes in demographics. Several methods can be used to estimate this growth. A procedure frequently employed is to estimate an annual percentage increase and apply that increase to study area traffic volumes. An alternative procedure is to identify estimated traffic generated by planned new major developments that would be expected to impact the project study area roadways. For the purpose of this assessment, both methods were considered.

### Historic Traffic Growth

Historic traffic data in the vicinity of the Project Site was reviewed to determine an appropriate growth rate. Based on this research, a growth rate of one-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 and/or approved developments. Based on research by VHB, and discussions with the City of Somerville, it was determined that there are six planned development projects within the vicinity of the study area and was considered as part of the background development.

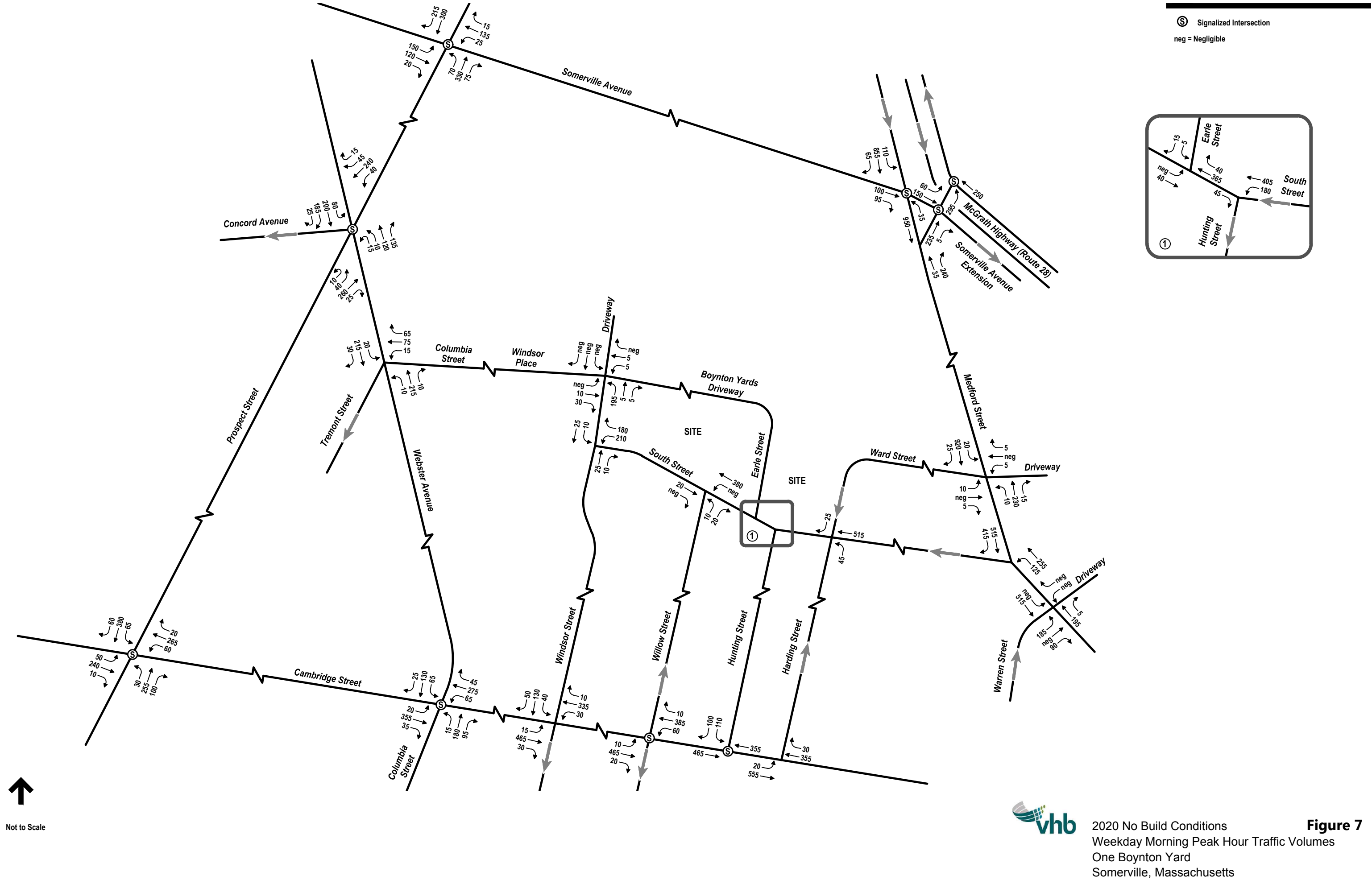
- › **Union Square Revitalization Project:** The proposed project being developed by US<sup>2</sup> is a large mixed-use development in Union Square in Somerville, consisting of a total of 1,159,000 sf of office, 984 residential units, 143,000 sf of retail and a 175-room hotel. The project will be phased, with Phase 1 scheduled to start construction in 2018. Phase 1 is expected to be completed prior to the new MBTA station being operational in 2021. Therefore, only the Phase 1 trips have been applied to the 2024 analyses. Projected traffic volumes expected to be generated by Phase 1 of this project were obtained from the published traffic study submitted as part of the permitting process for the project. While the report does identify mitigation measures for some of the study area signalized intersections, the analysis demonstrated that these improvements were not required for the initial phase of development.
- › **King Open/Cambridge Street School:** The development, located at 850 Cambridge Street in Cambridge, proposes replacing reconstruct the existing school with expanded library, a reconstructed pool, more space for academic and human services and a new space for Cambridge Public School Administration offices. Projected traffic volumes expected to be generated by this project were obtained from the published traffic study submitted as part of the permitting process for the project.
- › **399 Binney Street:** The development, located at 399 Binney Street in Cambridge, proposes replacing two small office buildings with a 134,700 sf office/lab building with 1,900 sf of first-floor retail space. Projected traffic volumes expected to be generated by this project were obtained from the published traffic study submitted as part of the permitting process for the project.
- › **Columbia Court:** The development proposed a mixed-use development, located at 305 Webster Avenue in Cambridge, consisting of 35 residential units and 1,780 sf of retail. Project traffic volumes expected to be generated by this project were estimated using ITE trip generation manual and distributed based on existing travel patterns.
- › **70 Prospect Street:** The development, located at 70 Prospect Street in Somerville, proposes replacing an existing building with a 14-unit residential building with 1,300 sf of first floor retail. Projected traffic volumes expected to be generated by this project were obtained from the published traffic study submitted as part of the permitting process for the project.

- › **Courthouse Redevelopment:** The development, located at 40 Thorndike Street in Cambridge, proposes a mixed-use building that will be comprised of 24 residential units, 15,000 sf of retail, and 460,000 sf of R&D/office. Projected traffic volumes expected to be generated by this project were obtained from the published traffic study submitted as part of the permitting process for the project.

Phase 1 of the Boynton Yards project evaluated by this study is expected to be constructed by 2020. Therefore, while it is part of the overall Project, the Phase 1 Project generated trips have been included as part of the 2024 No-Build volumes. This is due to the traffic associated with the Project's first phase of development being part of the established baseline traffic volumes on the study area roadways at that time.

The 2020 Phase 1 No-Build traffic volumes were developed using a growth rate of one-percent per year and adding in the background projects described above. The resulting No-Build weekday morning, weekday evening, and Saturday midday peak hour traffic volume networks are shown in Figures 7 through 9, respectively.

Development of the 2024 future conditions volumes both with and without the Project full build-out is discussed later in this chapter.





### Figure 8



### Figure 9

## **Roadway Improvements**

Research by VHB did not reveal any definitively planned roadway improvement projects that would significantly affect traffic conditions within the Project study area. The City of Somerville recently completed its "Union Square Utility and Roadway Early Action Project" in the summer of 2017. That project involved work along Prospect Street, Webster Avenue, Somerville Avenue, and Washington Street. Changes included signal improvements, the implementation of bicycle accommodations, and converting one-way segments of Prospect Street and Webster Avenue to two-way, among other changes. Following that work, the City has since made minor post-construction changes to signal phasing and timing at some locations. This work also is scheduled to be revisited in spring 2018 as part of the normal follow-up work for traffic pattern changes such as these, and possible signal operational changes may still be implemented at that time.

## **Union Square Neighborhood Development Plan**

In May 2017 the City of Somerville published its "Union Square Neighborhood Development Plan" (USNDP). This plan outlined the City's long-standing goals for an improved transportation network in this area. The Project Site is located adjacent to two of the most notable parts of this plan. The realignment of South Street from Earle Street heading westerly to Windsor Street has been a longstanding goal of the City. The relocation of this roadway also could help advance a new direct connection between South Street and Columbia Street, and Webster Avenue. As discussed in the Site Access section of this report, the Phase 1 Buildings 1 and 2 have been located to be compatible both with existing roadway alignment, as well as with the desired future reconfiguration. The USNDP also presented improved connectivity being provided between Boynton Yards and the area to the north of the Green Line Extension. Specifically, the USNDP vision involves Earle Street being extended to the north underneath the MBTA Green Line by utilizing an existing underpass connection which would be enhanced under the USNDP. The Project's compatibility, and participation with this first step, also is discussed in the Site Access section of this study. Other notable changes considered for the area involved converting the one-way westbound segment of South Street between Harding Street and Medford Street to two-way travel, with potential associated changes to both Harding Street and Ward Street as well.

The timeframe for the City of Somerville's implementation of the USNDP changes is uncertain. As discussed in the Site Access section of this evaluation, the Project is being designed so as not to preclude any of these changes from occurring. Furthermore, to provide for a conservative analysis, the future conditions analysis both with and without the Project has been conducted assuming that the existing roadway network would remain unchanged. This methodology is being used only so that the maximum potential impacts on the study area roadways would be evaluated as part of this study. DLJ continues to fully support the vision presented in the USNDP.



## **MBTA Transit Improvements**

In early 2017 the Federal Transit Administration granted final approvals for the MBTA's Green Line Extension project. As noted earlier, the MBTA will be extending the Green Line by approximately 4.3-miles from Lechmere Station in Cambridge heading northbound into Somerville and Medford. Following that project, approximately 85-percent of Somerville's population will be within reasonable walking distance of train service. Construction of this station will change the transportation dynamic of the Project study area, with a significant increase in transit ridership expected, corresponding to a decrease in automobile travel. The expected changes in automobile travel to and from the Project Site, as well as changes to existing roadway volumes within the study area are discussed in the Trip Generation section of this report.

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 MBTA Union Square Green Line station will be located on Prospect Street, approximately one-quarter of a mile from the project site. The Green Line extension is expected to be completed in 2021, which is prior to Phase 2 for this development Project. Headways for the trains servicing the new station are scheduled to be six- and five-minutes during the respective weekday morning and evening peak periods, and under ten minutes for all other time periods while the Green Line is in operation.

## **Project-Generated Traffic Volumes**

The Project is comprised of office/lab, residential, and retail use being developed in two overall phases as shown in Table 1. The ITE *Trip Generation Manual*<sup>3</sup> categorizes these land uses and provides weekday daily, weekday morning, weekday evening, Saturday daily and midday peak hour unadjusted vehicle trip generation estimates for each use. The trip generation estimates for the proposed uses were projected using Land Use Code (LUC) 222 (High-Rise Residential), LUC 710 (General Office Building), LUC 760 (Research & Development Center) and LUC 820 (Shopping Center). The trip generation analyses have been separated out by phase, as presented below.

### **Phase 1**

#### **Project-Generated Trips – Phase 1**

Estimating future conditions volumes for Phase 1 involved a review of the existing development on those parcels, along with the additional trip generation expected from the Project development.

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<sup>3</sup> Trip Generation Manual, 10th Edition, Institute of Transportation Engineers, Washington, D.C., 2017.

### **Existing Site-Generated Traffic – Phase 1 Parcels**

The planned Phase 1 Building 1 and 2 development parcels currently are occupied by a private commercial parking lot at 2 Harding Street, located between Earle Street and Harding Street, and a commercial truck storage lot on the opposite side of Earle Street. While there is regular parking activity at 2 Harding Street neither lot generates significant peak-hour traffic volumes. Accordingly, no “credit” was taken for the existing nominal traffic generation associated with either lot.

### **Proposed Phase 1 Project-Generated Traffic**

Phase 1 of the proposed development consists of office/lab and supporting retail uses. As noted above, traffic associated with the office/lab space was estimated using ITE LUC 710 (General Office Building) and LUC 760 (Research & Development Center) trip generation data. The retail uses are expected to be small, service-oriented businesses. While exact tenants have not yet been secured, these are not expected to be large destination-retail uses. Instead, potential uses will include small eating establishments, coffee shops, or gallery uses. While these clearly do not fit the description of a transitional ITE “Shopping Center”, retail traffic was estimated using this land use code, which results in an overly conservative analysis. The unadjusted vehicle trip estimates for Phase 1 are presented in Table 5 and trip generation worksheets are included in the Appendix.

**Table 5 Phase 1 Unadjusted Vehicle Trips**

	Office <sup>a</sup>	R&D <sup>b</sup>	Retail <sup>c</sup>	Total Vehicle Trips
<b>Weekday Daily</b>				
Enter	1,194	676	321	<b>2,191</b>
<u>Exit</u>	<u>1,194</u>	<u>676</u>	<u>321</u>	<u><b>2,191</b></u>
Total	2,388	1,352	642	<b>4,382</b>
<b>Weekday Morning</b>				
Enter	305	35	10	<b>350</b>
<u>Exit</u>	<u>42</u>	<u>12</u>	<u>6</u>	<u><b>60</b></u>
Total	347	47	16	<b>410</b>
<b>Weekday Evening</b>				
Enter	57	8	31	<b>97</b>
<u>Exit</u>	<u>262</u>	<u>47</u>	<u>34</u>	<u><b>343</b></u>
Total	319	55	65	<b>439</b>
<b>Saturday Daily</b>				
Enter	255	107	392	<b>754</b>
<u>Exit</u>	<u>255</u>	<u>107</u>	<u>392</u>	<u><b>754</b></u>
Total	510	214	784	<b>1,508</b>
<b>Saturday Midday</b>				
Enter	66	13	40	<b>119</b>
<u>Exit</u>	<u>56</u>	<u>13</u>	<u>37</u>	<u><b>106</b></u>
Total	122	27	77	<b>225</b>

a Based on ITE LUC 710 (General Office Building), assumes 230,750 sf of office space.

b Based on ITE LUC 760 (Research & Development Center), assumes 112,250 sf of R&D space.

c Based on ITE LUC 820 (Shopping Center), assumes 17,000 sf of retail space.

### Person Trips

The unadjusted vehicle trips are converted into person trips by applying the average vehicle occupancy (AVO) of 1.13 for all uses as presented in the Union Square Neighborhood Plan<sup>4</sup>.

### Internal Capture Trips

As described in the ITE Trip Generation Handbook "because of the complementary nature of these land uses, some trips are made among the on-site uses. This capture of trips internal to the site has the net effect of reducing vehicle trip generation between the overall development site and the external street system (compared to the total number of trips generated by comparable land uses developed individually on stand-alone sites)...an internal capture rate can generally be defined as the percentage of total person trips generated by a site that are made entirely within the site. The trip origin, destination, and travel path are all within the site."

<sup>4</sup> Union Square Neighborhood Plan Appendix B – Trip and Parking Generation Methodology, Nelson\Nygaard Consulting Associates (Boston, Massachusetts), 2017.

Based on the methodology outlined in the ITE Trip Generation Handbook, internal capture rates were applied to the gross person trips. The resulting peak-hour person trip estimates for the Project and are presented in Table 6 and worksheets are included in the Appendix.

**Table 6 Phase 1 Peak-Hour Person Trips**

	Office <sup>a</sup>	R&D <sup>a</sup>	Retail <sup>a</sup>	Total Vehicle Trips
<b>Weekday Morning</b>				
Enter	343	40	7	<b>390</b>
Exit	<u>44</u>	<u>12</u>	<u>5</u>	<b><u>61</u></b>
Total	387	52	12	<b>451</b>
<b>Weekday Evening</b>				
Enter	64	9	32	<b>105</b>
Exit	<u>293</u>	<u>53</u>	<u>37</u>	<b><u>383</u></b>
Total	357	62	69	<b>488</b>
<b>Saturday Midday</b>				
Enter	74	15	41	<b>130</b>
Exit	<u>61</u>	<u>14</u>	<u>40</u>	<b><u>115</u></b>
Total	135	29	81	<b>245</b>

<sup>a</sup> Person trip generation estimate with internal capture credits applied.

### Mode Share

The mode shares used are based on existing mode share data presented in the Union Square Neighborhood Plan. The peak hour/peak direction mode share estimates, by use, are presented in Table 7 and all mode share data is included in the Appendix.

**Table 7 Phase 1 Mode Share**

Use	Vehicle	Transit	Bike	Walk
Office/Lab	75%	14%	8%	3%
Retail	75%	14%	8%	3%

Source: Peak hour/peak direction mode share estimates based on the Union Square Neighborhood Plan.

The mode shares discussed above were applied to the net-new person trips to generate the adjusted Project trips by mode.

The local average vehicle occupancy, based on data presented in the Union Square Neighborhood Plan, of 1.13 was then applied to the vehicle mode to reflect the number of vehicle trips generated by the Site.

### Pass-By Trips

While the ITE rates provide estimates for all the traffic associated with each land use, not all of the traffic generated by the Project will be new to the area roadways. For example, a portion of the vehicle-trips generated by the retail land use will likely be

drawn from the traffic volume roadways adjacent to the Project Site. For example, someone traveling on South Street may choose to deviate from their original travel path to visit the site retail, before heading back to continue to their final destination. For this evaluation, ITE pass-by rates for LUC 820 (Shopping Center) were utilized for the retail trip generation, and applied to existing trips on South Street. Specifically, 34- and 26-percent of the Site trip generation was assumed to be drawn from the surrounding roadway network during the weekday evening and Saturday midday peak hours, respectively. For all other time periods studied, a 25-percent pass-by rate was assumed.

### Project-Generated Trips – Phase 1

The mode share and local AVO were applied to the person trips to estimate net new trips by mode, and then a 25-percent pass-by reduction was applied to the vehicle trips generated by the retail portion of the site. Tables 8 and 9 summarize the net new trips by mode and net new vehicle trips by use, respectively. Detailed trip generation worksheets are provided in the Appendix.

**Table 8 Phase 1 Project-Generated Peak-Hour Trips by Mode**

	Vehicle <sup>a</sup>	Transit	Bike	Walk
<b>Weekday Morning</b>				
Enter	259	55	12	31
Exit	<u>39</u>	<u>9</u>	<u>2</u>	<u>5</u>
Total	298	64	14	36
<b>Weekday Evening</b>				
Enter	61	14	3	9
Exit	<u>246</u>	<u>53</u>	<u>11</u>	<u>31</u>
Total	307	67	14	40
<b>Saturday Midday</b>				
Enter	79	18	4	11
Exit	<u>69</u>	<u>17</u>	<u>4</u>	<u>9</u>
Total	148	35	8	20

a Net vehicle trips not including pass-by trips associated with the retail portion.

**Table 9 Phase 1 Project-Generated Peak-Hour Vehicle Trips by Use**

	Office <sup>a</sup>	R&D <sup>b</sup>	Retail <sup>c</sup>	Pass-By <sup>d</sup>	Total Net Vehicle Trips <sup>e</sup>
<b>Weekday Morning</b>					
Enter	228	27	4	1	259
Exit	<u>29</u>	<u>8</u>	<u>2</u>	<u>1</u>	<u>39</u>
Total	257	35	6	2	298
<b>Weekday Evening</b>					
Enter	42	6	13	8	61
Exit	<u>194</u>	<u>35</u>	<u>17</u>	<u>8</u>	<u>246</u>
Total	236	41	30	16	307
<b>Saturday Midday</b>					
Enter	49	10	20	7	79
Exit	<u>40</u>	<u>9</u>	<u>20</u>	<u>7</u>	<u>69</u>
Total	89	19	40	14	148

a New vehicle trips with internal capture credits applied.

b New vehicle trips with internal capture credits applied.

c New vehicle trips with internal capture and pass-by credits applied.

d 25% pass-by credit.

e Sum of columns a through c.

As shown in Tables 8 and 9, Phase 1 of the Project is expected to generate 298, 307, and 148 additional "new" vehicle trips during the weekday morning, weekday evening, and Saturday midday peak hours. This traffic was assigned to the study area roadways and intersections based on trip distribution patterns developed as discussed in the following section.

### Trip Distribution – Phase 1

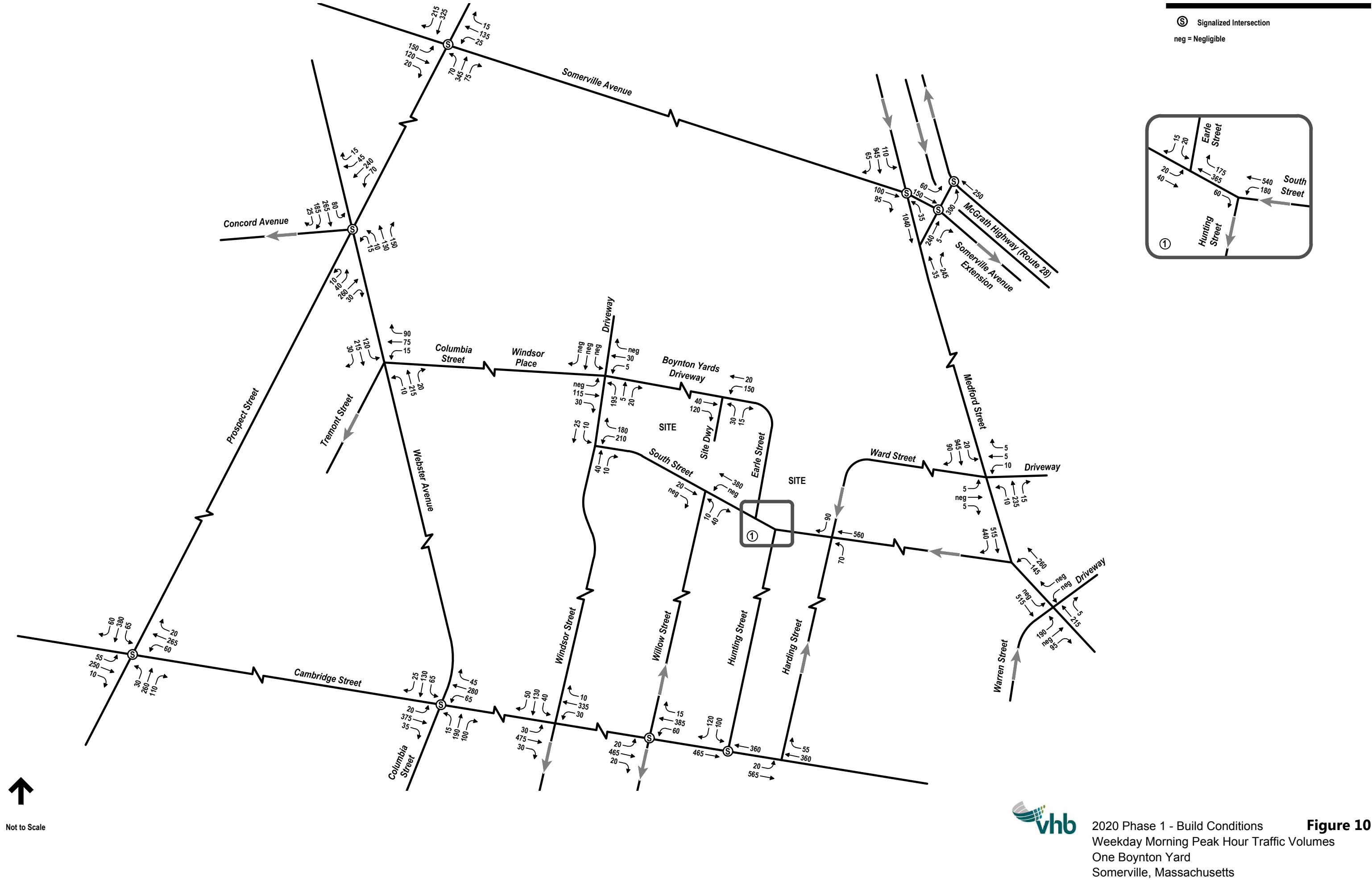
The directional distribution of the traffic approaching and departing the Site is a function of population densities, the location of employment opportunities, existing travel patterns, and the efficiency of the roadway system. Trips made from and to the proposed office/lab space during the peak hours are expected to be predominantly home-to-work and work-to-home trips in the morning and evening peak hours, respectively. Accordingly, the trip distribution for the office/lab portion of the proposed development has been derived based on Journey-to-Work data for the City of Somerville with the 2010 U.S. Census data. The trip distribution for the retail portion of the proposed development is assumed to follow similar trip distribution patterns as the office/lab space. Larger-scale retail uses frequently will have unique trip distribution patterns that are dependent on their customer base and, therefore, may be different than those for office use. However, in this instance the retail uses are smaller, generally non-destination uses as compared to a standard shopping center. Accordingly, the retail distribution should closely mimic that of the office/lab uses. Table 10 and Figure 16 (presented later in this chapter) illustrate the

trip distribution. Detailed trip distribution calculations are provided in the Appendix to this document.

**Table 10 Trip Distribution Summary**

Travel Route	Direction	Office/R&D Trips
McGrath Highway	North	43%
Gore Street	East	7%
Cambridge Street	East	12%
	West	5%
Somerville Avenue	West	24%
Columbia Street	South	4%
<u>Prospect Street</u>	<u>South</u>	<u>5%</u>
Total		100%

The future 2020 Phase 1 Build Conditions and 2024 Full Build traffic volumes were developed by adding the Phase 1 generated traffic volumes as shown in Table 9 to the 2020 No-Build conditions peak-hour traffic volumes. Figures 10,11,and 12 show the resulting 2020 Phase 1 Build Conditions weekday morning, weekday evening, and Saturday midday peak hour traffic volumes, respectively.



Not to Scale

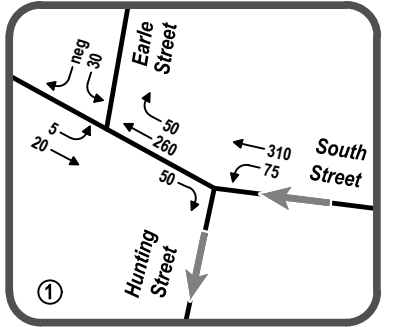


**Figure 10**  
2020 Phase 1 - Build Conditions  
Weekday Morning Peak Hour Traffic Volumes  
One Boynton Yard  
Somerville, Massachusetts





### Figure 11



## **Full Build**

The full build condition of the proposed Project consists of office/lab, residential and retail uses. The same trip generation methodology used for the Phase 1 trip generation estimates also was used for determining the trip generation for the full build-out.

As the full build-out of the Project is expected to occur over a four- to seven-year period, the 2020 baseline volumes were projected another four years to the 2024 horizon year for this study. The resulting baseline volumes were developed using the same 1.0-percent annual growth rate added onto the 2020 Build volumes. Based on research by VHB, no further background development projects needed to be considered. This is mainly due to the subsequent phases of the Union Square Revitalization Project after its first phase being expected to occur beyond the timeframe of this study's 2024 analysis horizon.

The resulting 2024 No-Build volumes for the weekday morning, weekday evening, and Saturday midday peak hours are shown in Figures 13, 14, and 15, respectively. The additional traffic generated by the full build-out of the Project following Phase 1 was estimated as discussed in the following section.

### **Project-Generated Trips – Full Build-Out**

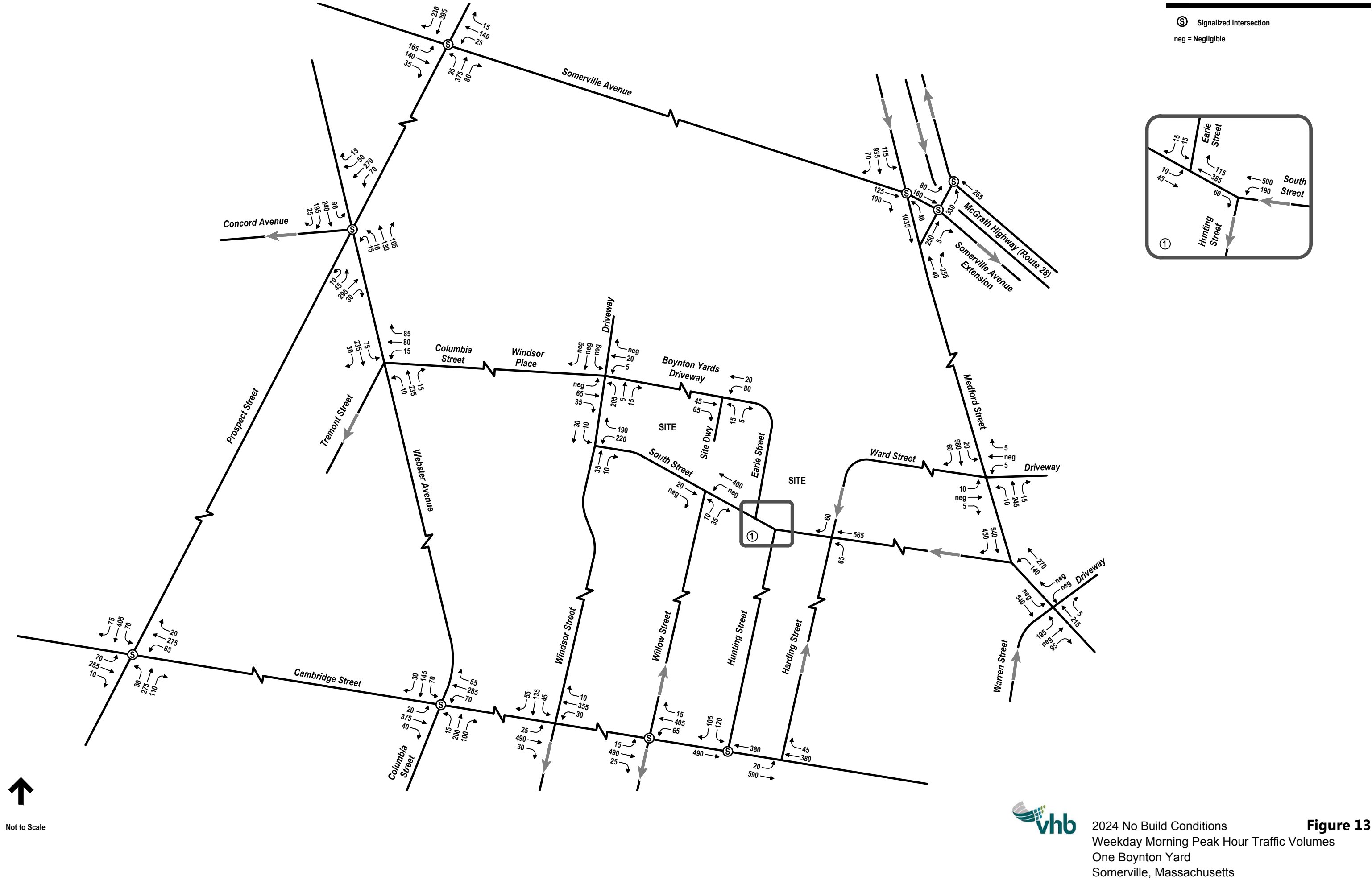
To estimate the future conditions volumes for the full build-out of the Project, the existing traffic generation for the Building 3, 4, and 5 development parcels was considered, along with the additional trip generation expected from the Project.

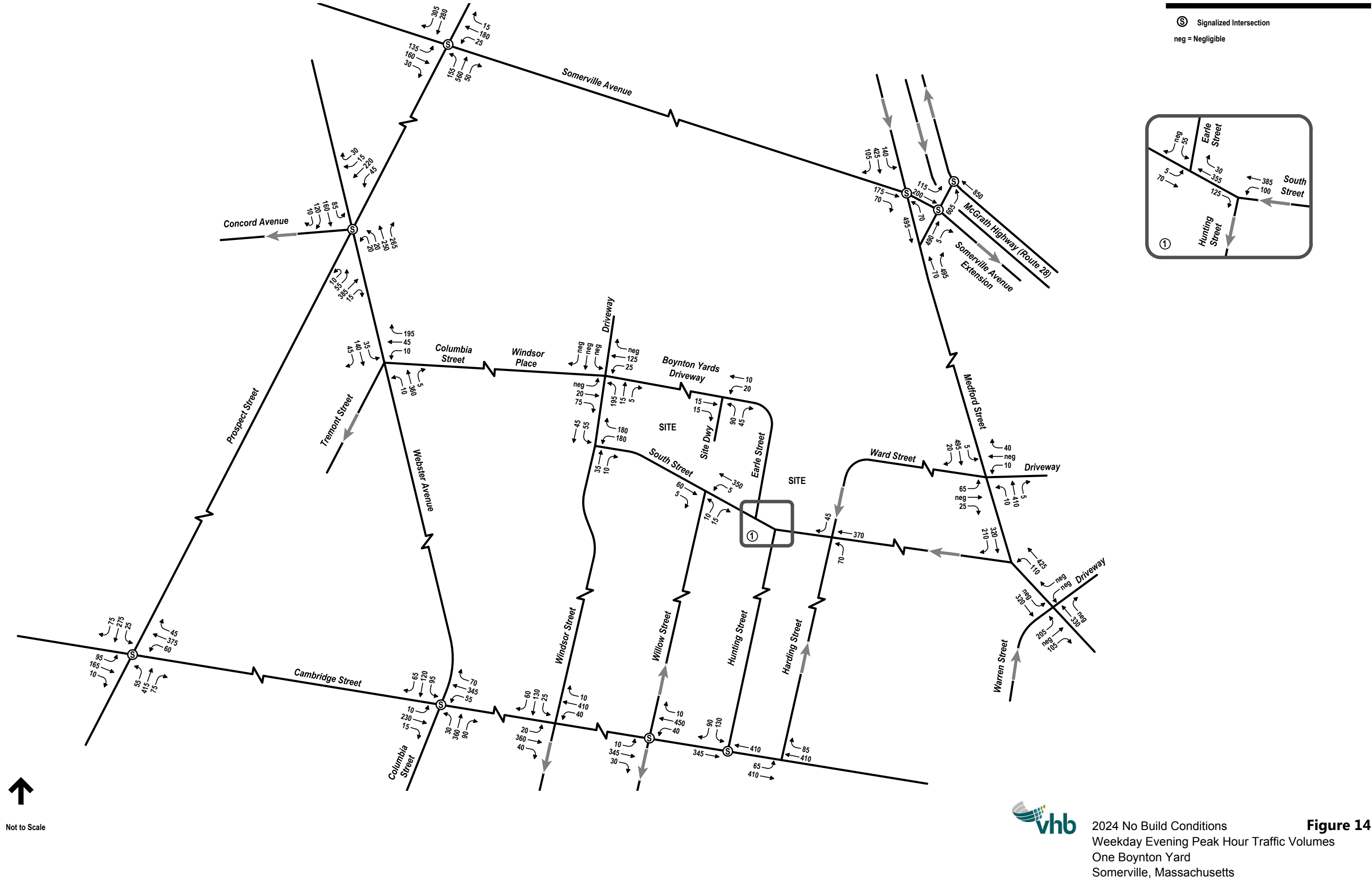
#### **Existing Site-Generated Traffic**

The future Building 3, 4, and 5 development parcels beyond Phase 1 currently are occupied by an approximately 15,140 sf office building at the westerly end of that area, and an 11,665 sf building used by the "Jam Spot" recording studio at the easterly end of the parcels. Based on ITE data, the existing office use may generate up to 20 to 40 peak hour trips. While the adjacent Jam Spot use is an active business, traffic visiting the Site appears to be spread out over the day, with minimal peak-hour trip generation. Therefore, to provide for a conservative analysis, no credit was taken for the traffic generated by these existing uses.

#### **Proposed Project-Generated Traffic**

Trip generation for the full build-out of the Project was estimated using the same methodology as for Phase 1. The resulting unadjusted trip generation is shown in Table 11.





↑  
Not to Scale



**Figure 14**  
2024 No Build Conditions  
Weekday Evening Peak Hour Traffic Volumes  
One Boynton Yard  
Somerville, Massachusetts



**Table 11 Full Build Unadjusted Vehicle Trips**

	Office <sup>a</sup>	R&D <sup>b</sup>	Retail <sup>c</sup>	Residential <sup>d</sup>	Total Vehicle Trips
<b>Weekday Daily</b>					
Enter	2,163	676	604	943	<b>4,386</b>
Exit	<u>2,163</u>	<u>676</u>	<u>604</u>	<u>943</u>	<b><u>4,386</u></b>
Total	4,326	1,352	1,208	1,886	<b>8,772</b>
<b>Weekday Morning</b>					
Enter	367	35	19	32	<b>453</b>
Exit	<u>60</u>	<u>12</u>	<u>11</u>	<u>100</u>	<b><u>183</u></b>
Total	427	47	30	132	<b>636</b>
<b>Weekday Evening</b>					
Enter	72	8	59	93	<b>232</b>
Exit	<u>379</u>	<u>47</u>	<u>63</u>	<u>60</u>	<b><u>549</u></b>
Total	451	55	122	153	<b>781</b>
<b>Saturday Daily</b>					
Enter	470	107	738	960	<b>2,275</b>
Exit	<u>470</u>	<u>107</u>	<u>738</u>	<u>960</u>	<b><u>2,275</u></b>
Total	940	214	1,476	1,920	<b>4,550</b>
<b>Saturday Midday</b>					
Enter	122	13	75	86	<b>296</b>
Exit	<u>104</u>	<u>13</u>	<u>69</u>	<u>70</u>	<b><u>296</u></b>
Total	226	26	144	156	<b>552</b>

a Based on ITE LUC 710 (General Office Building), assumes 425,750 sf of office space.

b Based on ITE LUC 760 (Research & Development Center), assumes 112,250 sf of R&D space.

c Based on ITE LUC 820 (Shopping Center), assumes 17,000 sf of retail space.

d Based on ITE LUC 222 (High Rise Residential), assumes 425 units.

### Person Trips

The unadjusted vehicle trips are converted into person trips by applying the average vehicle occupancy (AVO) of 1.13.

### Internal Capture Trips

As noted early, the same ITE-based internal trip-sharing assumptions used for Phase 1 were used for the full build-out of the Project. The resulting person-trip estimates for the Project and are presented in Table 12 and worksheets are included in the Appendix.

**Table 12 Full Build Peak-Hour Person Trips**

	Office <sup>a</sup>	R&D <sup>a</sup>	Retail <sup>a</sup>	Residential <sup>a</sup>	Total Vehicle Trips
<b>Weekday Morning</b>					
Enter	415	40	21	36	512
Exit	<u>68</u>	<u>12</u>	<u>13</u>	<u>113</u>	<u>206</u>
Total	483	52	34	149	718
<b>Weekday Evening</b>					
Enter	82	9	66	106	263
Exit	<u>428</u>	<u>53</u>	<u>72</u>	<u>67</u>	<u>620</u>
Total	510	62	138	173	883
<b>Saturday Midday</b>					
Enter	138	15	85	97	335
Exit	<u>117</u>	<u>14</u>	<u>78</u>	<u>79</u>	<u>288</u>
Total	225	29	163	176	593

<sup>a</sup> Person trip generation estimate with internal capture credits applied.

### Mode Share

The mode shares used are based on proposed mode share data presented in the Union Square Neighborhood Plan and CTPS report. The Union Square Neighborhood Plan proposed a vehicle mode share of 38% and very high walk and bike shares (23% and 15%, respectively). VHB chose to use more conservative walking and bike shares given the Site location and surrounding roadway network. The Project design, parking supply, and Transportation Demand Management program all are being developed with the intent of minimizing travel by single-occupant automobile, and maximizing transit use. The pedestrian friendly setting being advanced for this and other projects also will help promote walking and biking to the Site. Secured bicycle parking within the building also will encourage biking. Regardless of these benefits, evaluating the maximum vehicular traffic that could be on the study area roadways in the future is critical in confirming the adequacy of the street network to accommodate this traffic.

The increased transit mode share used for this analysis is primarily due to the scheduled opening of the new MBTA Union Square Green Line station in 2021. The resulting peak hour/peak direction mode share estimates, by use, are presented in Table 13 and all mode share data is included in the Appendix.



**Table 13 Full Build Mode Share**

Use	Vehicle	Transit	Bike	Walk
Office/Lab	40%	40%	8%	12%
Retail	40%	40%	8%	12%
Residential	40%	40%	8%	12%

Source: Peak hour/peak direction mode share estimates based on the Union Square Neighborhood Plan.

The mode shares discussed above were applied to the net-new person trips to generate the adjusted Project trips by mode. The local average vehicle occupancy, 1.13, was then applied to the vehicle mode to reflect the number of vehicle trips generated by the Site.

### Pass-By Trips

As with Phase 1, standard ITE pass-by rates for LUC 820 (Shopping Center) were utilized and applied to existing trips on South Street. Specifically, 34- and 26-percent pass-by rates were used for the weekday evening and Saturday midday peak hours, respectively, with a 25-percent pass-by rate used during the other time periods evaluated.

### Project-Generated Trips

The mode share and local AVO were applied to the person trips to estimate net new trips by mode, and then a 25-percent pass-by reduction was applied to the vehicle trips generated by the retail portion of the site. Tables 14 and 15 summarize the net new trips by mode and net new vehicle trips by use, respectively. Detailed trip generation worksheets are provided in the Appendix.

**Table 14 Full Build Project-Generated Peak-Hour Trips by Mode**

	Vehicle <sup>a</sup>	Transit	Bike	Walk
<b>Weekday Morning</b>				
Enter	175	200	27	73
<u>Exit</u>	<u>67</u>	<u>78</u>	<u>11</u>	<u>28</u>
Total	242	278	38	101
<b>Weekday Evening</b>				
Enter	74	91	13	33
<u>Exit</u>	<u>201</u>	<u>235</u>	<u>32</u>	<u>85</u>
Total	275	326	45	118
<b>Saturday Midday</b>				
Enter	100	119	16	44
<u>Exit</u>	<u>84</u>	<u>102</u>	<u>14</u>	<u>37</u>
Total	184	221	30	81

<sup>a</sup> Net vehicle trips not including pass-by trips associated with the retail portion.

**Table 15 Full Build Project-Generated Peak-Hour Vehicle Trips by Use**

	<b>Office <sup>a</sup></b>	<b>R&amp;D <sup>b</sup></b>	<b>Retail <sup>c</sup></b>	<b>Residential <sup>d</sup></b>	<b>Pass-By <sup>e</sup></b>	<b>Total Net Vehicle Trips <sup>f</sup></b>
<b>Weekday Morning</b>						
Enter	145	14	4	12	1	<b>175</b>
Exit	<u>22</u>	<u>4</u>	<u>2</u>	<u>39</u>	<u>1</u>	<b><u>67</u></b>
Total	167	18	6	51	2	<b>242</b>
<b>Weekday Evening</b>						
Enter	28	3	13	30	6	<b>74</b>
Exit	<u>149</u>	<u>18</u>	<u>13</u>	<u>21</u>	<u>6</u>	<b><u>201</u></b>
Total	177	21	26	51	12	<b>275</b>
<b>Saturday MIDDAY</b>						
Enter	48	5	20	27	6	<b>100</b>
Exit	<u>39</u>	<u>5</u>	<u>15</u>	<u>25</u>	<u>6</u>	<b><u>84</u></b>
Total	87	10	35	52	12	<b>184</b>

a New vehicle trips with internal capture credits applied.

b New vehicle trips with internal capture credits applied.

c New vehicle trips with internal capture and pass-by credits applied.

d New vehicle trips with internal capture credits applied.

e 25% pass-by credit.

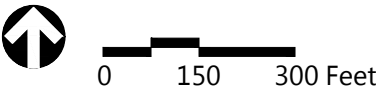
f Sum of columns a through d.

As shown in Tables 14 and 15, the full build-out of the Project is expected to generate an additional 242, 275, and 184 vehicle trips during the respective weekday morning, weekday evening, and Saturday midday peak hours. This additional traffic was added on to the 2024 No-Build volumes as discussed in the following section.

### **Trip Distribution – Full Build-Out**

The expected trip generation for the office/lab and retail components of Buildings 3 through 5 is expected to be the same as that considered for Phase 1. Trips made from and to the proposed residential units are expected to be predominantly home-to-work and work-to-home trips in the morning and evening peak hours, respectively. Therefore, residential trip distribution for the Project was estimated based on Journey-to-Work data for the City of Somerville with the 2010 U.S. Census data. Table 16 and Figure 16 illustrate the trip distribution. Detailed trip distribution calculations are provided in the Appendix to this document.





Trip Distribution  
One Boynton Yard  
Somerville, Massachusetts

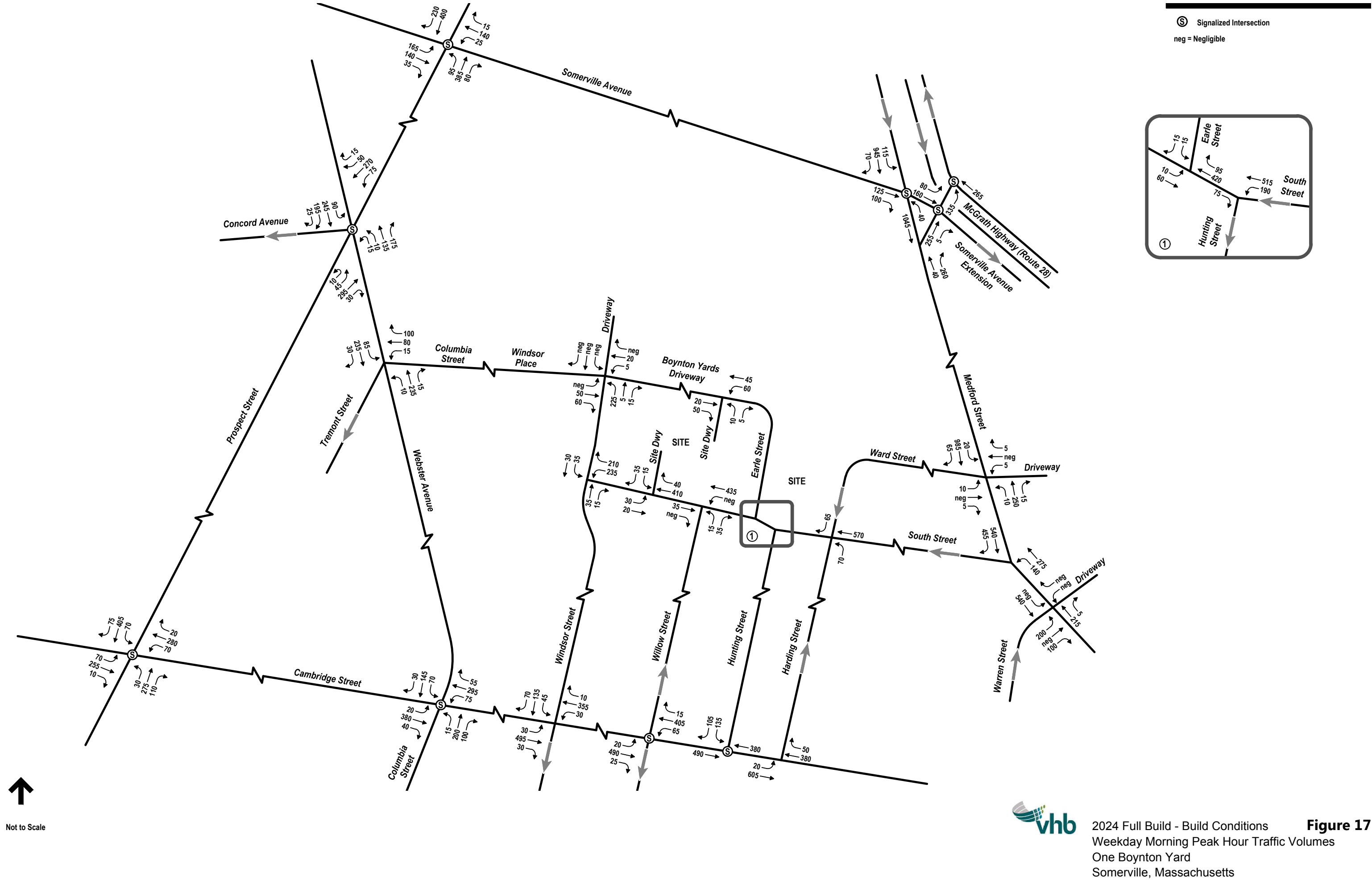
Figure 16



**Table 16 Trip Distribution Summary – Full Build-Out**

Travel Route	Direction	Residential Trips	Office/R&D Trips
McGrath Highway	North	21%	43%
Gore Street	East	9%	7%
Cambridge Street	East	17%	12%
	West	14%	5%
Somerville Avenue	West	14%	24%
Columbia Street	South	11%	4%
<u>Prospect Street</u>	<u>South</u>	<u>14%</u>	<u>5%</u>
Total		100%	100%

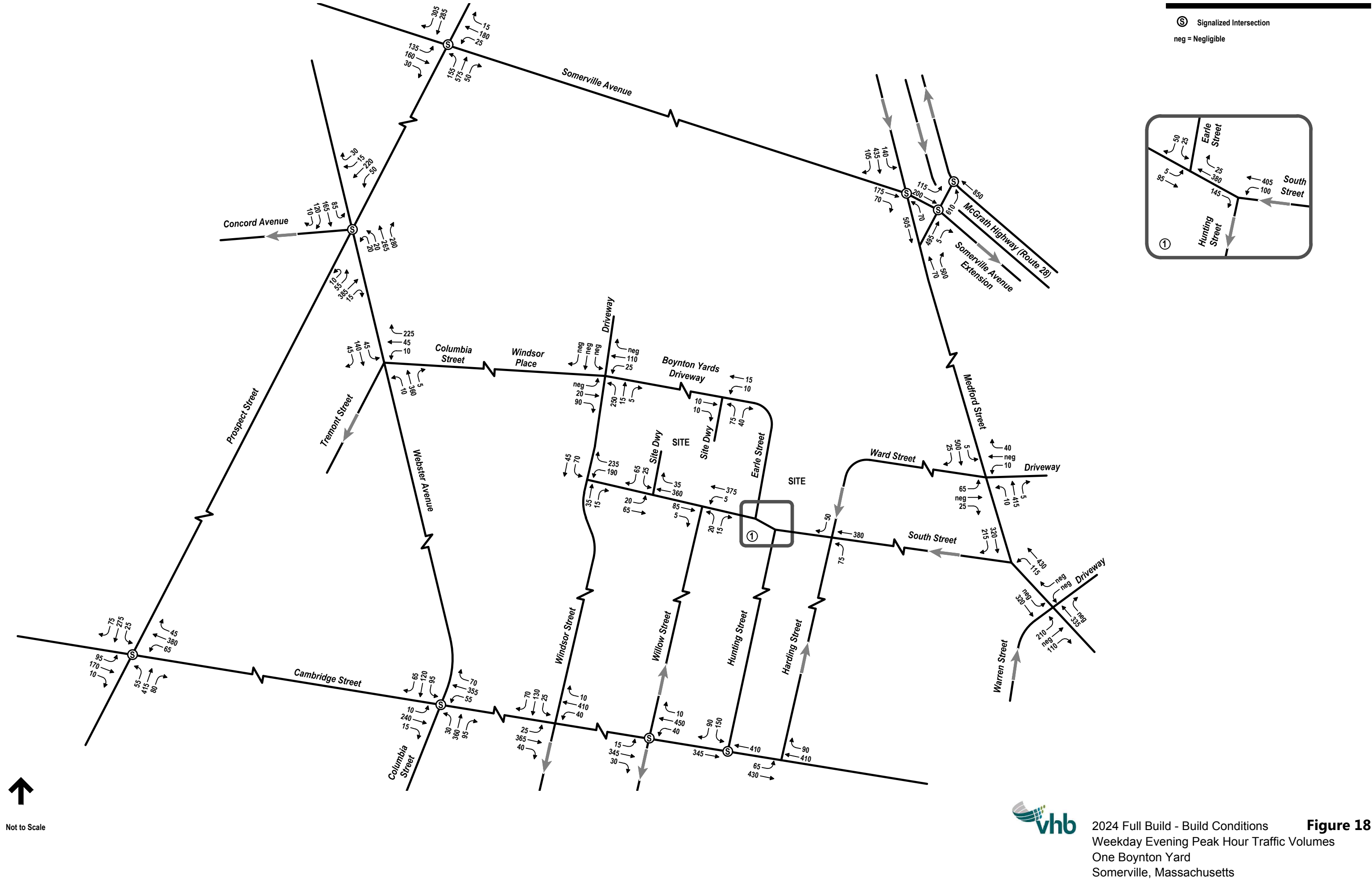
The future 2020 Phase 1 Build Conditions and 2024 Full Build traffic volumes were developed by adding project generated traffic volumes noted above to the No-Build conditions peak hour traffic volumes. Figures 17, 18, and 19 show the 2024 Full Build Conditions weekday morning, weekday evening, and Saturday midday peak hour traffic volumes, respectively.

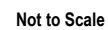
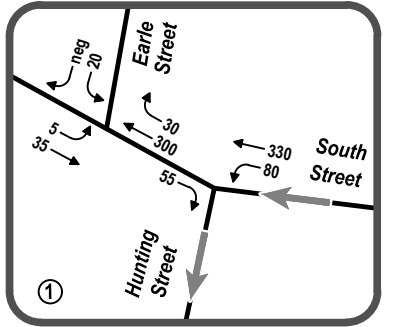


Not to Scale



**Figure 17**  
2024 Full Build - Build Conditions  
Weekday Morning Peak Hour Traffic Volumes  
One Boynton Yard  
Somerville, Massachusetts





## **Proposed Site Access Plan**

In addition to the off-Site traffic operations analysis, a detailed review of the proposed Site access plan also was conducted as part of this evaluation as described in the following sections.

### **Existing Site Access**

Access to the easterly portion of the Site (2 Harding Street) currently is provided by a single full-access curb cut on Earle Street approximately 200 feet to the north of South Street. The future Building 2 parcel to the west currently has a single full-access driveway at the center of its northerly frontage on Windsor Place. The future Building 3, 4, and 5 development parcels currently are occupied by an approximately 15,140 sf office building at the westerly end of that area, and an 11,665 sf building used by the “Jam Spot” recording studio at the easterly end of the parcels. Access to both uses currently is provided by six curb cuts along the parcels’ 350-foot frontage on Windsor Place. These driveways provide direct access and egress to the striped parking field serving both businesses.

### **Proposed Project Site Access**

As noted earlier, there will not be any parking provided within the Building 1 development parcel. Therefore, the existing curb cut on Earle Street will be closed as part of the Phase 1 construction. Building 2 will contain an underground parking facility containing 252 standard automobile spaces, 42 compact spaces, and 7 accessible spaces. Bike parking for 94 bicycles also will be provided within the garage. Access to that garage will be provided by a single full-access driveway just west of the Building 2 development parcel. As this driveway falls within the parcel to be used for Building 3, an easement will be established to allow for this driveway to be located on a different parcel from Building 2. A full-access loading driveway (serving three internal loading spaces) also will be provided at the midpoint of the Building 2 frontage on Windsor Place.

Detailed design plans have not yet been developed for Buildings 3, 4, and 5 to the same level as those which have been prepared for Phase 1. However, the six curb cuts along Windsor Place will be consolidated, likely into a single full-access curb cut on a realigned South Street. The resulting driveway will be clearly configured and appropriately separated from other nearby curb cuts. The realignment of South Street has been a longstanding goal of the City in this area. Accordingly, Buildings 1 and 2 have been laid out to be compatible with both the existing roadway, and the future condition involving shifting the roadway to the south. Conceptual plans developed to date indicate that Buildings 3 through 5 also be constructed with either the existing or desired roadway alignments. This is consistent with the City of Somerville’s May 2017 “Union Square Neighborhood Development Plan” (USNDP) discussed earlier. The USNDP presented the City’s vision for a reconfigured roadway network surrounding the Project Site. The reconstruction of Earle Street between



Buildings 1 and 2 will be the first step in this process. Ultimately, this reconfigured roadway may extend further to the north under the future Green Line Extension providing even greater connectivity in the area.

### **Pedestrian Access**

As part of Phase 1, new and improved sidewalks will be provided along the perimeters of both Building 1 and Building 2. Standard sidewalks complying with Massachusetts Architectural Access Board (AAB) requirements will be installed along the easterly, westerly, and southerly ends of Building 1. A continuous sidewalk ranging from 6- to 12-feet will be provided along the northerly, southerly and easterly ends of Building 2. Most of this area also will feature a 5.5-foot wide area to be used for tree pits, pavers, or street furniture. In addition to crosswalks across Earle Street just north of South Street, there will be a mid-block crossing of Earle Street. This crosswalk will help connect Building 1 and 2, and will feature a raised crossing so that the crosswalk and sidewalks will be at the same elevations. Accompanying standard warning signage will be provided on the approaches to this crossing so that both motorists and pedestrians are fully aware of its presence. This traffic-calming feature will require Earle Street traffic to reduce its speed, which will help maintain a pedestrian-friendly environment in conjunction with the Project.

### **Bicycle Accommodations**

The potential bicycle parking needs for the Proposed Project will be accommodated through the provision of secured bicycle parking within the various Project buildings, and by bicycle racks through the development. While no automobile parking will be provided within Building 1 there will be 45 secured bicycle parking spaces. Approximately 94 bicycle parking spaces also will be provided within Building 2, with standard bicycle racks also provided adjacent to the building. Similar accommodations will be provided for the subsequent Phase 2 development.

### **Bike-Sharing Stations**

The City of Boston is continuing to advance its city-wide bike-sharing program known as "Hubway", with service now also being provided in Cambridge and Somerville. This program began operating in July 2011 and the goal is for it to continue expanding with accommodations for over 5,000 bikes at 300 bike-sharing stations. In addition to the on-site bicycle parking specified above, bike-share stations may be provided conjunction with the Proposed Project. These requirements can be waived if another bike share station is located within 200 yards. In this instance, it is possible that new "Hubway" bike-share stations may be provided near the new MBTA Union Square Station, or near the Union Square Revitalization Project. If such new stations are not provided, the Proponent can implement one as part of the Phase 2 development. The Proponent also is committed to installing at new station at the Proposed Project as part of Phase 1 if desired by the City.

### **Service and Loading**

While no automobile parking will be provided within Building 1, there will be a full-access loading driveway on Harding Street roughly 100 feet to the north of South Street. A full-access loading driveway also will be provided at the midpoint of Building 2's frontage on Windsor Place. This driveway will serve three loading bays to be provided within Building 2. While the designs of Buildings 3, 4, and 5 have not been advanced to the same degree as Phase 1, loading driveways will be located so as to minimize visual impacts and conflicts with other nearby driveways and intersections.

The exact number and timing of deliveries will vary depending on the nature of the various retail establishments, in addition to standard office and residential delivery activity. Most retail activity typically occurs during morning hours so as not to interfere with the operation of the business. Due to the smaller sizes of the retail uses, most deliveries likely will be made by smaller, single-unit trucks. These are the same types of vehicles, typically seen on a daily basis in the Union Square area making deliveries to other existing retail businesses and restaurants. Smaller single-unit trucks can easily be accommodated and should typically only be on Site for a short time.

### **Sight Distance – Phase 1**

VHB conducted a sight distance analysis, conforming to guidelines of the American Association of State Highway and Transportation Officials (AASHTO)<sup>5</sup>, at the proposed Site driveway locations on Windsor Place. 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 avoid collisions, ISD is the minimum distance needed so that mainline motorists will not have to substantially reduce their speed due to turning vehicles.

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

To calculate the required sight distances at the proposed Phase 1 Site driveway a 30-mph design speed was utilized. While actual lower travel speeds are envisioned for the area, the 30-mph design speed was evaluated to help ensure that adequate sight lines would be available. Table 17 summarizes the sight distance analysis for Phase 1.

**Table 17 Sight Distance Analysis<sup>a</sup>**

Location	Stopping Sight Distance			Intersection Sight Distance		
	Traveling	Required (ft)	Measured (ft)	Looking	Desired (ft)	Measured (ft)
Building 2 Windsor Place Site driveway	Eastbound	200	350	Left	335	350
	Westbound <sup>b</sup>	200	150	Right <sup>b</sup>	335	150

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 Speeds are based on 30 mph design speed for Windsor Place.

b Vehicles looking to the left have a clear line of sight to the Windsor Place/Earle Street intersection.

As shown in Table 17, both the critical stopping sight distance and desirable intersections sight distances are available at the proposed Phase 1 Site driveway looking to and from the west. The available sight lines looking from the Building 2 driveway to the right extend to Windsor Road's intersection with Earle Street. However, while the measured 150-foot sight line falls short of the AASHTO levels for a 30-mph design speed, traffic turning from Earle Street will be doing so at lower speeds due to the 90-degree turn. Accordingly, with this clear sight line available motorists will be able to adjust their already reduced speed as needed if they see a vehicle turning from the Site driveway.

The exact driveway locations for Phase 2 have not yet been finalized. As the designs for Building 3, 4, and 5 advance the adequacy of the sight lines will be evaluated, with corrective measures implemented if necessary.



# 4

## Traffic Operations Analysis

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

### Level-of-Service Criteria

The evaluation criteria used to analyze area intersections in this traffic study are based on the 2010 Highway Capacity Manual (HCM)<sup>6</sup>. The term 'Level of Service' (LOS) is used to denote the different operating conditions that occur on a given roadway segment under various traffic volume loads. It is a qualitative measure that considers a number of factors including roadway geometry, speed, travel delay and freedom to maneuver. LOS provides an index to the operational qualities of a roadway segment or an intersection. LOS designations range from A to F, with LOS A representing the best operating conditions and LOS F representing the worst operating conditions.

In addition to LOS, two other measures of effectiveness (MOEs) are typically used to quantify the traffic operations at intersections; volume-to-capacity ratio ( $v/c$ ) and delay

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6

Transportation Research Board, *Highway Capacity Manual*, Washington, D.C., 2010.

(expressed in seconds per vehicle). For example, an existing v/c ratio of 0.9 for an intersection indicates that the intersection is operating at 90 percent of its available capacity. A delay of 15 seconds for a particular vehicular movement or approach indicates that vehicles on the movement or approach will experience an average additional travel time of 15 seconds. For a given LOS letter designation there may be a wide range of values for both v/c ratios and delay. Comparison of intersection capacity results therefore requires that, in addition to the LOS, the other MOEs should also be considered.

The LOS designations, which are based on delay, are reported differently for signalized and unsignalized intersections. For signalized intersections, the analysis considers the operation of all traffic entering the intersection and the LOS designation is for overall conditions at the intersection. For unsignalized intersections, however, the analysis assumes that traffic on the mainline is not affected by traffic on the side streets. Thus, the LOS designation is for the critical movement exiting the side street, which is generally the left turn out of the side street or site driveway. Table 9 shows the LOS criteria for both signalized intersections and unsignalized intersections.

It should be noted that the analytical methodologies typically used for the analysis of unsignalized intersections use conservative analysis parameters, such as long critical gaps. Actual field observations indicate that drivers on minor streets generally accept shorter gaps in traffic than those used in the analysis procedures and therefore experience less delay than reported by the analysis software. The analysis methodologies also do not fully take into account the beneficial grouping effects caused by nearby signalized intersections. The net effect of these analysis procedures is the over-estimation of calculated delays at unsignalized intersections in the study area. Cautious judgment should therefore be exercised when interpreting the capacity analysis results at unsignalized intersections.

**Table 18 Level of Service Criteria**

Level of Service	Delay – Signalized Intersection	Delay – Unsignalized Intersection
A	0 to 10 seconds	0 to 10 seconds
B	10 to 20 seconds	10 to 15 seconds
C	20 to 35 seconds	15 to 25 seconds
D	35 to 55 seconds	25 to 35 seconds
E	55 to 80 seconds	35 to 50 seconds
F	Greater than 80 seconds	Greater than 50 seconds

Source: 2010 Highway Capacity Manual.

## Signalized Intersection Capacity Analysis – Phase 1

Capacity analyses conducted by VHB for the signalized intersections are summarized in Table 19. The capacity analyses were conducted for the 2017 Existing, 2020 No-Build, and 2020 Build conditions.

**Table 19 Signalized Intersection Capacity Analysis – Phase 1**

Location / Movement	2017 Existing Conditions					2020 No-Build Conditions					2020 Build Conditions				
	v/c <sup>a</sup>	Del <sup>b</sup>	LOS <sup>c</sup>	50 Q <sup>d</sup>	95 Q <sup>e</sup>	v/c	Del	LOS	50 Q	95 Q	v/c	Del	LOS	50 Q	95 Q
<b>Somerville Avenue at Medford Street</b>															
<i>Weekday Morning</i>															
EB T	0.41	35	D	36	107	0.44	36	D	39	113	0.45	38	D	42	113
EB R	0.19	16	B	22	73	0.20	17	B	24	76	0.21	18	B	27	76
NB L	0.12	29	C	13	49	0.12	30	C	13	48	0.13	31	C	14	48
SB L	0.15	3	A	0	22	0.15	3	A	0	25	0.14	3	A	0	25
SB T/R	0.69	20	B	142	285	0.71	20	C	158	311	0.73	21	C	184	354
<b>Overall</b>		<b>20</b>	<b>B</b>				<b>20</b>	<b>C</b>				<b>21</b>	<b>C</b>		
<i>Weekday Evening</i>															
EB T	0.44	30	C	40	113	0.47	32	C	46	125	0.48	33	C	47	125
EB R	0.09	9	A	9	36	0.10	10	A	11	39	0.1	10	B	11	40
NB L	0.17	22	C	19	64	0.17	23	C	20	67	0.17	23	C	20	68
SB L	0.24	5	A	0	39	0.24	6	A	1	43	0.24	6	A	1	42
SB T/R	0.55	21	C	71	157	0.55	21	C	79	170	0.57	21	C	85	178
<b>Overall</b>		<b>19</b>	<b>B</b>				<b>20</b>	<b>B</b>				<b>20</b>	<b>C</b>		
<i>Saturday Midday</i>															
EB T	0.54	31	C	55	150	0.56	33	C	60	164	0.57	33	C	61	16
EB R	0.11	10	A	12	43	0.12	11	B	13	48	0.12	11	B	13	49
NB L	0.17	25	C	17	60	0.17	26	C	18	62	0.17	27	C	18	63
SB L	0.26	6	A	4	47	0.28	7	A	8	55	0.27	7	A	8	55
SB T/R	0.55	20	C	71	161	0.57	20	C	82	180	0.58	21	C	88	190
<b>Overall</b>		<b>20</b>	<b>B</b>				<b>20</b>	<b>B</b>				<b>20</b>	<b>C</b>		
<b>Somerville Avenue / Somerville Avenue Extension at Medford Street Extension</b>															
<i>Weekday Morning</i>															
EB L/T	0.18	2	A	6	10	0.19	2	A	7	11	0.19	1.7	A	7	1
NB T/R	0.45	30	C	50	109	0.44	31	C	48	114	0.46	32	C	53	116
<b>Overall</b>		<b>18</b>	<b>B</b>				<b>17</b>	<b>B</b>				<b>18</b>	<b>B</b>		
<i>Weekday Evening</i>															
EB L/T	0.25	2	A	11	13	0.27	2	A	12	14	0.28	2	A	13	14
NB T/R	0.59	25	C	75	160	0.61	26	C	82	183	0.62	27	C	89	196
<b>Overall</b>		<b>17</b>	<b>B</b>				<b>18</b>	<b>B</b>				<b>18</b>	<b>B</b>		
<i>Saturday Midday</i>															
EB L/T	0.32	2	A	11	13	0.33	2	A	11	13	0.33	2	A	11	13
NB T/R	0.51	25	C	58	118	0.48	27	C	56	131	0.49	27	C	58	135
<b>Overall</b>		<b>15</b>	<b>B</b>				<b>14</b>	<b>B</b>				<b>15</b>	<b>B</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.

~ Volume exceeds capacity, queue is theoretically infinite.

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

m Volume for 95th percentile queue is metered by upstream signal.

**Table 19 Signalized Intersection Capacity Analysis – Phase 1 (continued)**

Location / Movement	2017 Existing Conditions					2020 No-Build Conditions					2020 Build Conditions				
	v/c <sup>a</sup>	Del <sup>b</sup>	LOS <sup>c</sup>	50 Q <sup>d</sup>	95 Q <sup>e</sup>	v/c	Del	LOS	50 Q	95 Q	v/c	Del	LOS	50 Q	95 Q
<b>Medford Street Extension at Route 28 Northbound / Route 28 Northbound Off-Ramp</b>															
<i>Weekday Morning</i>															
NB L	0.16	0	A	1	0	0.16	0	A	0	0	0.17	0.3	A	0	0
NWB T	0.12	13	B	19	44	0.13	13	B	22	48	0.12	12.2	B	23	48
<b>Overall</b>		<b>6</b>	<b>A</b>				<b>6</b>	<b>A</b>				<b>6</b>	<b>A</b>		
<i>Weekday Evening</i>															
NB L	0.30	1	A	0	0	0.31	1	A	0	0	0.33	1	A	0	0
NWB T	0.54	20	B	81	154	0.57	20	C	95	177	0.57	21	C	98	177
<b>Overall</b>		<b>12</b>	<b>B</b>				<b>13</b>	<b>B</b>				<b>13</b>	<b>B</b>		
<i>Saturday MIDDAY</i>															
NB L	0.24	0	A	0	1	0.24	0	A	1	1	0.24	0	A	1	0
NWB T	0.36	18	B	49	102	0.35	18	B	53	106	0.34	17.3	B	53	106
<b>Overall</b>		<b>10</b>	<b>A</b>				<b>10</b>	<b>A</b>				<b>10</b>	<b>A</b>		
<b>Somerville Avenue at Prospect Street</b>															
<i>Weekday Morning</i>															
EB L	0.40	44	D	105	173	0.42	44	D	111	180	0.42	44	D	111	180
EB T/R	0.40	44	D	98	165	0.42	44	D	103	171	0.42	44	D	103	171
WB L	0.09	43	D	17	44	0.09	43	D	18	46	0.09	43	D	18	46
WB T/R	0.50	52	D	106	175	0.55	54	D	117	190	0.55	54	D	117	190
NB L	0.30	25	C	24	m61	0.33	24	C	21	m55	0.37	29	C	33	m60
NB T/R	0.76	35	C	241	431	0.81	36	C	244	458	0.84	42	D	358	#489
SB T	0.66	48	D	212	312	0.70	50	D	229	336	0.76	53	D	253	#372
SB R	0.43	25	C	100	156	0.46	26	C	107	165	0.46	26	C	107	165
<b>Overall</b>		<b>39</b>	<b>D</b>				<b>40</b>	<b>D</b>				<b>43</b>	<b>D</b>		
<i>Weekday Evening</i>															
EB L	0.35	44	D	84	144	0.39	45	D	92	154	0.39	45	D	92	154
EB T/R	0.50	48	D	116	190	0.54	49	D	126	203	0.55	50	D	126	203
WB L	0.10	46	D	18	46	0.11	46	D	18	47	0.11	46	D	18	47
WB T/R	0.73	66	E	143	#245	0.79	71	E	156	#275	0.79	71	E	156	#275
NB L	0.32	20	C	36	89	0.36	21	C	43	98	0.37	25	C	53	m99
NB T/R	0.77	32	C	324	509	0.83	36	D	366	#573	0.97	57	E	457	#736
SB T	0.39	36	D	124	194	0.42	36	D	140	215	0.43	37	D	144	220
SB R	0.53	24	C	130	196	0.57	26	C	145	216	0.57	26	C	145	216
<b>Overall</b>		<b>37</b>	<b>D</b>				<b>40</b>	<b>D</b>				<b>46</b>	<b>D</b>		
<i>Saturday MIDDAY</i>															
EB L	0.31	41	D	132	203	0.34	42	D	143	218	0.34	42	D	143	218
EB T/R	0.35	42	D	142	218	0.38	43	D	154	234	0.39	43	D	154	234
WB L	0.15	60	E	34	72	0.15	60	E	34	72	0.15	60	E	34	72
WB T/R	0.84	93	F	213	#353	0.87	96	F	219	#370	0.87	96	F	219	#370
NB L	0.33	45	D	68	115	0.35	46	D	72	120	0.36	46	D	75	120
NB T/R	0.73	57	E	332	451	0.73	57	E	339	462	0.78	60	E	372	501
SB T	0.46	54	D	172	247	0.48	54	D	180	258	0.50	55	D	190	271
SB R	0.26	19	B	85	129	0.27	20	B	87	132	0.27	20	B	87	132
<b>Overall</b>		<b>53</b>	<b>D</b>				<b>53</b>	<b>D</b>				<b>54</b>	<b>D</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.

~ Volume exceeds capacity, queue is theoretically infinite.

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

**Table 19 Signalized Intersection Capacity Analysis – Phase 1 (continued)**

Location / Movement	2017 Existing Conditions					2020 No-Build Conditions					2020 Build Conditions				
	v/c <sup>a</sup>	Del <sup>b</sup>	LOS <sup>c</sup>	50 Q <sup>d</sup>	95 Q <sup>e</sup>	v/c	Del	LOS	50 Q	95 Q	v/c	Del	LOS	50 Q	95 Q
<b>Webster Avenue at Prospect Street / Concord Avenue</b>															
<i>Weekday Morning</i>															
NB L	0.09	25	C	9	39	0.07	24	C	8	40	0.10	28	C	10	42
NB T/R	0.35	21	C	86	228	0.32	20	B	78	234	0.38	23	C	103	268
SB L	0.19	25	C	31	101	0.18	24	C	28	98	0.20	27	C	32	102
SB T/R	0.58	30	C	190	#525	0.56	29	C	182	#544	0.69	35	D	256	#683
NEB L/T/R	0.82	55	D	239	313	0.91	67	E	270	352	0.76	45	D	249	329
SWB L/T/R	0.88	87	F	313	403	0.89	89	F	305	406	0.93	95	F	335	413
<b>Overall</b>		<b>47</b>	<b>D</b>				<b>50</b>	<b>D</b>				<b>49</b>	<b>D</b>		
<i>Weekday Evening</i>															
NB L	0.08	27	C	12	50	0.08	27	C	13	54	0.10	28	C	15	60
NB T/R	0.48	27	C	145	#422	0.53	29	C	172	#507	0.73	35	C	275	#782
SB L	0.22	28	C	29	105	0.25	30	C	30	109	0.39	37	D	33	#147
SB T/R	0.37	27	C	108	291	0.39	28	C	117	309	0.41	39	C	125	#337
NEB L/T/R	0.85	53	D	316	390	0.86	53	D	324	399	0.86	54	D	324	400
SWB L/T/R	0.50	62	E	187	260	0.55	63	E	206	272	0.58	65	E	211	291
<b>Overall</b>		<b>41</b>	<b>D</b>				<b>42</b>	<b>D</b>				<b>43</b>	<b>D</b>		
<i>Saturday Midday</i>															
NB L	0.10	27	C	23	57	0.11	27	C	23	57	0.11	27	C	23	58
NB T/R	0.32	24	C	138	242	0.34	25	C	154	266	0.40	26	C	185	313
SB L	0.07	27	C	17	44	0.07	27	C	17	46	0.08	27	C	17	46
SB T/R	0.42	30	C	215	352	0.45	30	C	236	384	0.48	31	C	255	412
NEB L/T/R	0.93	80	E	353	432	0.94	81	F	351	440	0.93	81	F	351	439
SWB L/T/R	0.60	50	D	215	277	0.69	54	D	243	310	0.76	60	E	258	331
<b>Overall</b>		<b>47</b>	<b>D</b>				<b>48</b>	<b>D</b>				<b>48</b>	<b>D</b>		
<b>Cambridge Street at Prospect Street</b>															
<i>Weekday Morning</i>															
EB L/T/R	0.48	25	C	120	194	0.55	26	C	143	228	0.59	27	C	153	243
WB L/T/R	0.61	43	D	193	279	0.62	43	D	195	288	0.62	44	D	196	m283
NB L/T/R	0.52	21	C	150	234	0.58	23	C	172	267	0.60	23	C	182	281
SB L/T/R	0.69	26	C	223	342	0.76	30	C	254	390	0.76	30	C	254	391
<b>Overall</b>		<b>29</b>	<b>C</b>				<b>30</b>	<b>C</b>				<b>31</b>	<b>C</b>		
<i>Weekday Evening</i>															
EB L/T/R	0.55	28	C	113	192	0.59	30	C	118	202	0.60	30	C	119	203
WB L/T/R	0.67	45	D	228	329	0.77	49	D	269	#383	0.81	51	D	285	m#309
NB L/T/R	0.64	24	C	209	318	0.71	26	C	241	367	0.71	26	C	242	367
SB L/T/R	0.42	19	B	121	190	0.46	19	B	136	211	0.47	20	B	141	219
<b>Overall</b>		<b>29</b>	<b>C</b>				<b>32</b>	<b>C</b>				<b>33</b>	<b>C</b>		
<i>Saturday Midday</i>															
EB L/T/R	0.49	22	C	96	164	0.56	24	C	109	186	0.57	24	C	112	190
WB L/T/R	0.53	23	C	116	192	0.58	24	C	130	213	0.60	25	C	135	221
NB L/T/R	0.65	22	C	168	269	0.68	23	C	180	287	0.69	24	C	182	292
SB L/T/R	0.57	20	C	143	230	0.62	21	C	157	252	0.62	21	C	157	252
<b>Overall</b>		<b>22</b>	<b>C</b>				<b>23</b>	<b>C</b>				<b>23</b>	<b>C</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.

~ Volume exceeds capacity, queue is theoretically infinite.

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

m Volume for 95th percentile queue is metered by upstream signal.



**Table 19 Signalized Intersection Capacity Analysis – Phase 1 (continued)**

Location / Movement	2017 Existing Conditions					2020 No-Build Conditions					2020 Build Conditions				
	v/c <sup>a</sup>	Del <sup>b</sup>	LOS <sup>c</sup>	50 Q <sup>d</sup>	95 Q <sup>e</sup>	v/c	Del	LOS	50 Q	95 Q	v/c	Del	LOS	50 Q	95 Q
<b>Cambridge Street at Webster Avenue / Columbia Street</b>															
<i>Weekday Morning</i>															
EB L/T/R	0.57	19	B	125	186	0.65	20	C	138	m218	0.68	21	C	147	m237
WB L/T/R	0.69	30	C	191	301	0.72	32	C	198	313	0.74	33	C	203	#321
NB L/T/R	0.38	19	B	107	171	0.42	20	B	121	190	0.44	20	C	129	202
SB L	0.15	17	B	21	46	0.18	17	B	24	53	0.18	17	B	24	53
SB T/R	0.22	17	B	60	99	0.22	17	B	58	101	0.22	17	B	58	101
<b>Overall</b>		<b>22</b>	<b>C</b>				<b>23</b>	<b>C</b>				<b>24</b>	<b>C</b>		
<i>Weekday Evening</i>															
NB L	0.39	18	B	73	141	0.39	19	B	74	m150	0.40	19	B	76	m154
NB T/R	0.65	30	C	189	291	0.75	34	C	228	348	0.80	37	D	248	#408
SB L	0.59	22	C	193	292	0.62	23	C	206	310	0.62	23	C	206	310
NEB L/T/R	0.24	17	B	27	60	0.27	18	B	31	68	0.27	18	B	31	68
SWB L/T/R	0.20	16	B	54	94	0.23	16	B	62	105	0.24	16	B	66	112
<b>Overall</b>		<b>23</b>	<b>C</b>				<b>24</b>	<b>C</b>				<b>26</b>	<b>C</b>		
<i>Saturday MIDDAY</i>															
NB L	0.46	24	C	135	211	0.49	24	C	144	223	0.50	25	C	146	227
NB T/R	0.59	27	C	171	265	0.65	29	C	195	299	0.66	29	C	199	304
SB T/R	0.28	17	B	75	119	0.27	17	B	72	121	0.27	17	B	72	121
NEB L/T/R	0.17	16	B	27	57	0.18	16	B	31	62	0.18	16	B	31	62
SWB L/T/R	0.17	16	B	45	81	0.18	16	B	49	87	0.18	16	B	49	87
<b>Overall</b>		<b>22</b>	<b>C</b>				<b>23</b>	<b>C</b>				<b>23</b>	<b>C</b>		
<b>Cambridge Street at Willow Street</b>															
<i>Weekday Morning</i>															
EB L/T/R	0.50	14	B	83	325	0.58	16	B	103	#442	0.61	17	B	109	#467
WB L/T/R	0.57	11	B	55	#410	0.60	12	B	58	#431	0.61	12	B	58	#445
<b>Overall</b>		<b>12</b>	<b>B</b>				<b>14</b>	<b>B</b>				<b>15</b>	<b>B</b>		
<i>Weekday Evening</i>															
EB L/T/R	0.35	11	B	54	193	0.39	12	B	64	220	0.42	13	B	76	220
WB L/T/R	0.46	8	A	53	295	0.52	8	A	55	341	0.56	9	A	61	353
<b>Overall</b>		<b>9</b>	<b>A</b>				<b>10</b>	<b>A</b>				<b>11</b>	<b>B</b>		
<i>Saturday MIDDAY</i>															
EB L/T/R	0.42	11	B	59	237	0.41	11	B	64	263	0.47	12	B	67	269
WB L/T/R	0.41	6	A	35	63	0.41	5	A	35	59	0.47	6	A	36	62
<b>Overall</b>		<b>8</b>	<b>A</b>				<b>8</b>	<b>A</b>				<b>9</b>	<b>A</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.  
~ Volume exceeds capacity, queue is theoretically infinite.  
# 95th percentile volume exceeds capacity, queue may be longer.  
m Volume for 95th percentile queue is metered by upstream signal.

**Table 19 Signalized Intersection Capacity Analysis – Phase 1 (continued)**

Location / Movement	2017 Existing Conditions					2020 No-Build Conditions					2020 Build Conditions				
	v/c <sup>a</sup>	Del <sup>b</sup>	LOS <sup>c</sup>	50 Q <sup>d</sup>	95 Q <sup>e</sup>	v/c	Del	LOS	50 Q	95 Q	v/c	Del	LOS	50 Q	95 Q
<b>Cambridge Street at Hunting Street</b>															
<i>Weekday Morning</i>															
EB T	0.40	3	A	13	30	0.46	4	A	14	45	0.47	4	A	14	46
WB T	0.35	11	B	61	228	0.35	12	B	62	238	0.36	12	B	64	245
SB L/R	0.58	31	C	73	172	0.59	31	C	76	179	0.60	31	C	79	187
<b>Overall</b>		<b>12</b>	<b>B</b>				<b>12</b>	<b>B</b>				<b>13</b>	<b>B</b>		
<i>Weekday Evening</i>															
EB T	0.27	3	A	9	13	0.30	3	A	10	14	0.32	3	A	10	14
WB T	0.30	10	B	53	185	0.36	11	B	66	221	0.38	12	B	79	221
SB L/R	0.60	41	D	70	153	0.63	42	D	75	165	0.78	48	D	112	#288
<b>Overall</b>		<b>14</b>	<b>B</b>				<b>14</b>	<b>B</b>				<b>19</b>	<b>B</b>		
<i>Saturday Midday</i>															
EB T	0.35	3	A	11	16	0.34	3	A	12	24	0.38	3	A	12	30
WB T	0.31	9	A	47	184	0.31	9	A	50	205	0.34	10	A	2	205
SB L/R	0.51	29	C	50	104	0.45	28	C	45	107	0.51	29	C	51	125
<b>Overall</b>		<b>10</b>	<b>A</b>				<b>9</b>	<b>A</b>				<b>10</b>	<b>B</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.  
~ Volume exceeds capacity, queue is theoretically infinite.  
# 95th percentile volume exceeds capacity, queue may be longer.  
m Volume for 95th percentile queue is metered by upstream signal.

As shown in Table 19, the signalized study area intersections currently function at an acceptable LOS D or better during peak-hour conditions, and are expected to remain at those levels under the 2020 future condition with or without the Phase 1 development. While queues on some intersection approaches can be lengthy under peak-hour conditions, these locations generally operate acceptably throughout the day. Accordingly, the Phase 1-generated traffic can be accommodated at the signalized study area intersections without the need for any signal phasing or timings changes, or any further physical improvements beyond those recently implemented by the City.

## Unsignalized Intersection Capacity Analysis – Phase 1

The unsignalized capacity analysis results for the study area intersections are summarized in Table 20. The capacity analyses were conducted for the 2017 Existing, 2020 No-Build, and 2020 Build conditions.

**Table 20 Unsignalized Intersection Capacity Analysis – Phase 1**

Location / Movement	2017 Existing Conditions					2020 No-Build Conditions					2020 Build Conditions				
	D <sup>a</sup>	v/c <sup>b</sup>	Del <sup>c</sup>	LOS <sup>d</sup>	95 Q <sup>e</sup>	D	v/c	Del	LOS	95 Q	D	v/c	Del	LOS	95 Q
<b>Windsor Street at Windsor Place / Boynton Yards Driveway</b>															
<i>Weekday Morning</i>															
EB L/T/R	41	0.07	10	B	5	41	0.06	10	B	5	146	0.33	16	C	35
WB L/T/R	10	0.03	14	B	3	10	0.03	14	B	3	35	0.1	15	C	7.5
NB L	190	0.13	8	A	13	195	0.13	8	A	13	195	0.13	8	A	12.5
SB L	neg	-	0	A	0	neg	-	0	A	0	neg	-	0	A	0
<i>Weekday Evening</i>															
EB L/T/R	76	0.09	9	A	8	76	0.09	9	A	8	101	0.15	11	B	12.5
WB L/T/R	50	0.14	14	B	13	50	0.12	14	B	10	230	0.55	22.4	C	82.5
NB L	180	0.12	8	A	10	185	0.12	8	A	10	180	0.12	7.5	A	10
SB L	neg	-	0	A	0	neg	-	0	A	0	neg	-	0	A	0
<i>Saturday Midday</i>															
EB L/T/R	32	0.04	9	A	3	32	0.04	9	A	3	62	0.1	11	B	7.5
WB L/T/R	30	0.07	12	B	5	30	0.06	12	B	5	85	0.17	13	B	15
NB L	135	0.09	8	A	8	140	0.09	8	A	8	135	0.09	7.5	A	7.5
SB L	neg	-	0	A	0	neg	-	0	A	0	neg	-	0	A	0
<b>South Street at Windsor Street</b>															
<i>Weekday Morning</i>															
WB L/R	380	0.41	12	B	53	390	0.45	12	B	58	390	0.45	12	B	2.4
SB L	10	0.01	7	A	0	10	0.01	7	A	0	10	0.01	7	A	0
<i>Weekday Evening</i>															
WB L/R	335	0.41	12	B	50	345	0.43	12	B	53	340	0.29	10	B	55
SB L	50	0.05	8	A	3	50	0.04	7	A	3	10	0.04	0	A	2.5
<i>Saturday Midday</i>															
WB L/R	250	0.29	10	B	30	260	0.29	10	B	28	255	0.29	10	B	30
SB L	10	0.01	7	A	0	10	0.01	7	A	0	10	0.01	7.3	A	0
<b>South Street at Willow Street</b>															
<i>Weekday Morning</i>															
WB L	2	0.00	7	A	0	2	0.00	7	A	0	2	0.6	9	A	0.2
NB L/R	30	0.06	10	A	5	30	0.04	10	A	3	50	0	4	A	0
<i>Weekday Evening</i>															
WB L	5	0.00	7	A	0	5	0.00	7	A	0	5	0.04	10	A	2.5
NB L/R	20	0.03	10	B	3	20	0.03	10	B	3	25	0.00	7.3	A	0
<i>Saturday Midday</i>															
WB L	5	0.00	7	A	0	5	0.00	7	A	0	5	0.01	8.6	A	0
NB L/R	6	0.01	9	A	0	6	0.01	9	A	0	11	0.00	7.2	A	0

a Demand

b Volume to capacity ratio.

c Average total delay, in seconds per vehicle.

d Level-of-service.

e 95th percentile queue, in feet.

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

**Table 20 Unsignalized Intersection Capacity Analysis – Phase 1 (continued)**

Location / Movement	2017 Existing Conditions					2020 No-Build Conditions					2020 Build Conditions				
	D <sup>a</sup>	v/c <sup>b</sup>	Del <sup>c</sup>	LOS <sup>d</sup>	95 Q <sup>e</sup>	D	v/c	Del	LOS	95 Q	D	v/c	Del	LOS	95 Q
<b>South Street at Earle Street</b>															
<i>Weekday Morning</i>															
EB L	2	0.00	8	A	0	2	0.00	8	A	0	20	.02	8.8	A	2.5
SB L/R	20	0.04	11	B	3	20	0.04	11	B	3	35	.01	13	B	7.5
<i>Weekday Evening</i>															
EB L	5	0.01	8	A	0	5	0.01	8	A	0	10	0.01	8	A	0
SB L/R	10	0.03	12	B	3	10	0.02	12	B	3	95	0.2	13	B	17.5
<i>Saturday Midday</i>															
EB L	2	0.00	8	A	0	2	0.00	8	A	0	5	0.00 0	8	A	0
SB L/R	6	0.02	11	B	3	6	0.01	10	B	0	31	0.05	11	B	5
<b>South Street at Hunting Street</b>															
<i>Weekday Morning</i>															
WB L	175	0.12	8	A	10	180	0.12	8	A	10	180	0.12	7.5	A	10
<i>Weekday Evening</i>															
WB L	95	0.06	7	A	5	100	0.07	7	A	5	100	0.07	7.4	A	5
<i>Saturday Midday</i>															
WB L	75	0.05	7	A	5	75	0.05	7	A	5	75	0.05	7.3	A	5
<b>South Street at Harding Street</b>															
<i>Weekday Morning</i>															
NB L	45	0.11	15	B	10	45	0.12	15	B	10	70	0.23	19	C	22.5
SB R	25	0.06	12	B	5	25	0.05	12	B	5	90	0.2	14	B	17.5
<i>Weekday Evening</i>															
NB L	60	0.12	12	B	10	60	0.12	13	B	10	65	0.14	13	B	12.5
SB R	35	0.06	11	B	5	35	0.06	11	B	5	50	0.08	11	B	7.5
<i>Saturday Midday</i>															
NB L	65	0.11	11	B	10	65	0.11	11	B	10	70	0.12	12	B	10
SB R	10	0.02	10	A	3	10	0.01	10	A	0	30	0.04	10	B	2.5
<b>Medford Street at Warren Street / Driveway</b>															
<i>Weekday Morning</i>															
SB L	2	0.00	8	A	0	2	0.00	8	A	0	2	0.00	8	A	0
NEB L/T/R	261	0.76	41	E	153	276	0.84	51	F	193	186	0.89	60	F	217.5
SWB L/R	3	0.01	13	B	0	3	0.01	13	B	0	3	0.1	14	B	0
<i>Weekday Evening</i>															
SB L	1	0.00	8	A	0	1	0.00	8	A	0	1	0.00	8	A	0
NEB L/T/R	240	0.70	31	D	130	280	0.69	29	D	128	325	0.8	39	E	180
SWB L/R	4	0.02	15	B	3	4	0.01	14	B	0	4	0.01	14.5	B	0
<i>Saturday Midday</i>															
SB L	neg	-	0	A	0	neg	-	0	A	0	neg	-	0	A	0
NEB L/T/R	20	0.07	14	B	5	30	0.08	15	B	8	40	0.11	15	B	10
SWB L/R	5	0.04	18	C	3	5	0.02	17	C	5	5	0.02	17	B	2.5

a Demand

b Volume to capacity ratio.

c Average total delay, in seconds per vehicle.

d Level-of-service.

e 95th percentile queue, in feet.

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

**Table 20 Unsignalized Intersection Capacity Analysis – Phase 1 (continued)**

Location / Movement	2017 Existing Conditions					2020 No-Build Conditions					2020 Build Conditions				
	D <sup>a</sup>	v/c <sup>b</sup>	Del <sup>c</sup>	LOS <sup>d</sup>	95 Q <sup>e</sup>	D	v/c	Del	LOS	95 Q	D	v/c	Del	LOS	95 Q
<b>Medford Street at South Street</b>															
<i>Weekday Morning</i>															
NB L	120	0.20	12	B	18	125	0.20	12	B	20	145	0.24	12	B	22.5
<i>Weekday Evening</i>															
NB L	100	0.12	9	A	10	105	0.11	9	A	10	110	0.12	9	A	10
<i>Saturday Midday</i>															
NB L	65	0.08	9	A	5	65	0.07	9	A	5	70	0.08	9	A	5
<b>Medford Street at Ward Street / Driveway</b>															
<i>Weekday Morning</i>															
EB L/T/R	15	0.13	32	D	10	15	0.11	32	D	10	15	0.12	36	E	10
WB L/T/R	10	0.10	24	C	8	10	0.05	23	C	5	10	0.06	25	D	5
NB L	10	0.02	10	B	3	10	0.02	11	B	3	10	0.02	11	B	2.5
SB L	20	0.02	8	A	3	20	0.02	8	A	3	20	0.02	8	A	2.5
<i>Weekday Evening</i>															
EB L/T/R	85	0.42	29	D	50	85	0.37	27	D	40	85	0.39	29	D	42.5
WB L/T/R	45	0.12	14	B	10	45	0.11	14	B	10	45	0.12	15	B	10
NB L	10	0.01	9	A	0	10	0.01	9	A	0	10	0.01	9	A	0
SB L	5	0.01	8	A	0	5	0.01	8	A	0	5	0.01	8	A	0
<i>Saturday Midday</i>															
EB L/T/R	15	0.09	18	C	8	15	0.05	17	C	5	15	0.06	9	A	0
WB L/T/R	1	0.01	10	B	0	1	0.00	10	B	0	1	0.00	18	C	5
NB L	5	0.01	9	A	0	5	0.01	9	A	0	5	0.01	10	B	0
SB L	5	0.01	8	A	0	5	0.00	8	A	0	5	0.00	8	A	0
<b>Webster Avenue at Columbia Street / Tremont Street</b>															
<i>Weekday Morning</i>															
WB L/T/R	155	0.26	12	B	25	155	0.25	12	B	25	180	0.3	14	B	35
NB L	10	0.01	8	A	0	10	0.01	8	A	0	10	0.01	8	A	0
SB L	20	0.02	8	A	3	20	0.02	8	A	3	120	0.1	8	A	7.5
<i>Weekday Evening</i>															
WB L/T/R	150	0.24	12	B	23	155	0.25	12	B	25	315	0.52	16	C	77.5
NB L	10	0.01	8	A	0	10	0.01	8	A	0	10	0.01	8	A	0
SB L	20	0.02	8	A	3	20	0.02	8	A	3	40	0.04	8	A	2.5
<i>Saturday Midday</i>															
WB L/T/R	155	0.23	11	B	23	160	0.24	11	B	23	200	0.29	12	B	30
NB L	10	0.01	8	A	0	10	0.01	8	A	0	10	0.01	8	A	0
SB L	25	0.02	8	A	3	25	0.02	8	A	3	55	0.05	8	A	2.5

a Demand

b Volume to capacity ratio.

c Average total delay, in seconds per vehicle.

d Level-of-service.

e 95th percentile queue, in feet.

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

**Table 20 Unsignalized Intersection Capacity Analysis – Phase 1 (continued)**

Location / Movement	2017 Existing Conditions					2020 No-Build Conditions					2020 Build Conditions				
	D <sup>a</sup>	v/c <sup>b</sup>	Del <sup>c</sup>	LOS <sup>d</sup>	95 Q <sup>e</sup>	D	v/c	Del	LOS	95 Q	D	v/c	Del	LOS	95 Q
<b>Cambridge Street at Windsor Street</b>															
<i>Weekday Morning</i>															
EB L	15	0.01	8	A	0	15	0.01	8	A	0	30	0.03	8	A	2.5
WB L	30	0.03	9	A	3	30	0.03	9	A	3	30	0.03	9	A	2.5
SB L/T/R	215	0.62	29	D	100	220	0.69	36	E	123	220	0.73	41	E	135
<i>Weekday Evening</i>															
EB L	15	0.01	8	A	0	15	0.02	8	A	0	20	0.02	8	A	2.5
WB L	35	0.03	8	A	3	35	0.03	8	A	3	35	0.03	8	A	2.5
SB L/T/R	195	0.45	19	C	58	200	0.53	23	C	75	215	0.56	24	C	82.5
<i>Saturday Midday</i>															
EB L	5	0.00	8	A	0	5	0.01	8	A	0	10	0.01	8	A	0
WB L	20	0.02	8	A	3	20	0.02	8	A	3	20	0.02	8	A	2.5
SB L/T/R	140	0.35	16	C	38	145	0.33	16	C	35	150	0.34	16	C	37.5
<b>Cambridge Street at Harding Street</b>															
<i>Weekday Morning</i>															
EB L	20	0.02	8	A	3	20	0.02	8	A	3	20	0.02	8	A	2.5
<i>Weekday Evening</i>															
EB L	60	0.06	9	A	5	60	0.06	9	A	5	60	0.06	9	A	5
<i>Saturday Midday</i>															
EB L	20	0.02	8	A	3	20	0.02	8	A	3	20	0.02	8	A	2.5

a Demand

b Volume to capacity ratio.

c Average total delay, in seconds per vehicle.

d Level-of-service.

e 95th percentile queue, in feet.

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

As shown in Table 20, the critical movements at almost all of the unsignalized study area intersections currently operate at acceptable levels of service. These conditions generally are expected to continue under the future 2020 conditions with and without the addition of Phase 1 traffic. The only exceptions to this are at Medford Street's intersection with Warren Street, and to a lesser degree, at Medford Street's intersection with Ward Street and the Cambridge Street/Windsor Street intersection. Conditions at these locations are discussed in greater detail below.

The northbound Warren Street approach to Medford Street operates under Stop-sign control. Under existing conditions, this movement operates at LOS E and D during the respective weekday morning and evening peak hours, and at LOS B during the Saturday midday peak hour. Independent of the Phase 1 development, this movement will decrease to LOS F due to delays for this movement falling one second beyond the LOS E/LOS F dividing line. The LOS during the weekday evening and Saturday midday peak hours will remain unchanged under the 2020 No Build condition. However, with the additional Phase 1 traffic this approach will decrease from LOS D to LOS E during the weekday evening peak hour. This approach will still operate well under theoretical capacity, though peak hour queues could extend to seven or eight vehicles during this time period.

The Medford Street/Ward Street intersection provides single lane on each approach, with Ward Street operating under Stop-sign control. The critical Ward Street approach currently operates at LOS D or better under peak hour conditions, and those operations are expected to continue under the 2020 No-Build condition. With the addition of Phase 1 traffic, the LOS on this approach is projected to change from LOS D to LOS E during the weekday morning peak hour. This is due to the delays on this approach exceeding the LOS D/LOS E threshold by one second. The projected demand on this approach is relatively low, and queues are expected to be limited to a single vehicle. Accordingly, there should not be the need for any mitigation measures at this location to accommodate Phase 1 of the Project.

The Cambridge Street/Windsor Street intersection functions with Windsor Street operating under Stop-sign control. That approach currently operates at LOS D or better under existing conditions. Under the 2020 No-Build condition, this approach is projected to decrease to LOS E from LOS D. This same LOS will be maintained under the 2020 Phase 1 Build condition. With queues being limited to five or six vehicles, there are not any corrective measures which should be implemented to address the projected negligible impact of Phase 1 of the project.

### **Signalized Intersection Capacity Analysis – Full Build**

Capacity analyses also were conducted by VHB for the signalized intersections under the 2024 Full-Build conditions. These results are summarized in Table 21. For comparison purposes, the previously-presented 2020 Phase 1 Build results also are shown, along with the 2024 No-Build condition results.

**Table 21 Signalized Intersection Capacity Analysis – Full-Build**

Location / Movement	2020 Build Conditions (Phase 1)					2024 No-Build Conditions					2024 Build Conditions (Full Build)				
	v/c <sup>a</sup>	Del <sup>b</sup>	LOS <sup>c</sup>	50 Q <sup>d</sup>	95 Q <sup>e</sup>	v/c	Del	LOS	50 Q	95 Q	v/c	Del	LOS	50 Q	95 Q
<b>Somerville Avenue at Medford Street</b>															
<i>Weekday Morning</i>															
EB T	0.45	38	D	42	113	0.51	39	D	56	136	0.52	40	D	56	137
EB R	0.21	18	B	27	76	0.21	18	B	30	80	0.21	18	B	30	80
NB L	0.13	31	C	14	48	0.15	33	C	17	54	0.15	33	C	17	54
SB L	0.14	3	A	0	25	0.15	3	A	0	29	0.15	3	A	0	29
SB T/R	0.73	21	C	184	354	0.74	22	C	192	377	0.74	22	C	196	383
<b>Overall</b>		<b>21</b>	<b>C</b>				<b>22</b>	<b>C</b>				<b>22</b>	<b>C</b>		
<i>Weekday Evening</i>															
EB T	0.48	33	C	47	125	0.57	35	C	67	167	0.58	35	D	68	168
EB R	0.10	10	B	11	40	0.11	10	B	13	46	0.11	10	B	13	46
NB L	0.17	23	C	20	68	0.18	25	C	23	73	0.18	25	C	23	73
SB L	0.24	6	A	1	42	0.25	6	A	3	45	0.25	6	A	3	45
SB T/R	0.57	21	C	85	178	0.58	22	C	93	183	0.58	23	C	96	186
<b>Overall</b>		<b>20</b>	<b>C</b>				<b>22</b>	<b>C</b>				<b>22</b>	<b>C</b>		
<i>Saturday Midday</i>															
EB T	0.57	33	C	61	166	0.60	34	C	76	199	0.61	35	D	77	#205
EB R	0.12	11	B	13	49	0.13	12	B	16	56	0.13	12	B	16	57
NB L	0.17	27	C	18	63	0.19	28	C	22	68	0.19	28	C	22	68
SB L	0.27	7	A	8	55	0.28	7	A	10	58	0.28	7	A	10	59
SB T/R	0.58	21	C	88	190	0.59	21	C	100	195	0.60	22	C	103	205
<b>Overall</b>		<b>20</b>	<b>C</b>				<b>21</b>	<b>C</b>				<b>22</b>	<b>C</b>		
<b>Somerville Avenue / Somerville Avenue Extension at Medford Street Extension</b>															
<i>Weekday Morning</i>															
EB L/T	0.19	2	A	7	11	0.21	2	A	9	59	0.21	2	A	9	12
NB T/R	0.46	32	C	53	116	0.49	34	C	12	125	0.49	34	C	61	126
<b>Overall</b>		<b>18</b>	<b>B</b>				<b>18</b>	<b>B</b>				<b>19</b>	<b>B</b>		
<i>Weekday Evening</i>															
EB L/T	0.28	2	A	13	14	0.32	2	A	14	14	0.32	3	A	14	14
NB T/R	0.62	27	C	89	196	0.64	28	C	96	204	0.65	29	C	98	207
<b>Overall</b>		<b>18</b>	<b>B</b>				<b>18</b>	<b>B</b>				<b>19</b>	<b>B</b>		
<i>Saturday Midday</i>															
EB L/T	0.33	2	A	11	13	0.36	3	A	12	28	0.36	3	A	12	30
NB T/R	0.49	27	C	58	135	0.52	29	C	65	142	0.52	29	C	67	144
<b>Overall</b>		<b>15</b>	<b>B</b>				<b>15</b>	<b>B</b>				<b>15</b>	<b>B</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.

~ Volume exceeds capacity, queue is theoretically infinite.

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

m Volume for 95th percentile queue is metered by upstream signal.



**Table 21 Signalized Intersection Capacity Analysis – Full-Build (continued)**

Location / Movement	2020 Build Conditions (Phase 1)					2024 No-Build Conditions					2024 Build Conditions (Full Build)				
	v/c <sup>a</sup>	Del <sup>b</sup>	LOS <sup>c</sup>	50 Q <sup>d</sup>	95 Q <sup>e</sup>	v/c	Del	LOS	50 Q	95 Q	v/c	Del	LOS	50 Q	95 Q
<b>Medford Street Extension at Route 28 Northbound / Route 28 Northbound Off-Ramp</b>															
<i>Weekday Morning</i>															
NB L	0.17	0	A	0	0	0.19	0	A	0	0	0.19	0	A	0	0
NWB T	0.12	12	B	23	48	0.13	13	B	25	54	0.13	13	B	26	55
<b>Overall</b>		<b>6</b>	<b>A</b>				<b>6</b>	<b>A</b>				<b>6</b>	<b>A</b>		
<i>Weekday Evening</i>															
NB L	0.33	1	A	0	0	0.35	2	A	1	0	0.35	2	A	1	0
NWB T	0.57	21	C	98	177	0.60	22	C	110	187	0.60	22	C	111	187
<b>Overall</b>		<b>13</b>	<b>B</b>				<b>14</b>	<b>B</b>				<b>14</b>	<b>B</b>		
<i>Saturday Midday</i>															
NB L	0.24	0	A	1	0	0.26	1	A	0	3	0.26	1	A	0	3
NWB T	0.34	17	B	53	106	0.36	18	B	63	113	0.36	18	B	63	116
<b>Overall</b>		<b>10</b>	<b>A</b>				<b>10</b>	<b>B</b>				<b>10</b>	<b>B</b>		
<b>Somerville Avenue at Prospect Street</b>															
<i>Weekday Morning</i>															
EB L	0.42	44	D	111	180	0.50	47	D	123	197	0.50	47	D	123	197
EB T/R	0.42	44	D	103	171	0.57	50	D	132	212	0.57	50	D	132	212
WB L	0.09	43	D	18	46	0.09	43	D	18	46	0.09	43	D	18	46
WB T/R	0.55	54	D	117	190	0.56	54	D	121	196	0.56	54	D	121	196
NB L	0.37	29	C	33	m60	0.65	48	D	45	m#74	0.66	51	D	46	m#80
NB T/R	0.84	42	D	358	#489	0.86	44	D	395	#555	0.88	47	D	400	#570
SB T	0.76	53	D	253	#372	0.92	70	E	325	#518	0.94	73	E	331	#529
SB R	0.46	26	C	107	165	0.51	28	C	116	177	0.51	28	C	116	177
<b>Overall</b>		<b>43</b>	<b>D</b>				<b>50</b>	<b>D</b>				<b>51</b>	<b>D</b>		
<i>Weekday Evening</i>															
EB L	0.39	45	D	92	154	0.42	46	D	100	165	0.42	46	D	100	165
EB T/R	0.55	50	D	126	203	0.65	54	D	148	233	0.65	54	D	148	233
WB L	0.11	46	D	18	47	0.11	46	D	18	47	0.11	46	D	18	47
WB T/R	0.79	71	E	156	#275	0.81	74	E	161	#286	0.81	74	E	161	#286
NB L	0.37	25	C	53	m99	0.59	32	C	81	m121	0.59	33	C	83	m121
NB T/R	0.97	57	E	457	#736	1.02	68	E	~538	#793	1.05	75	E	~566	#822
SB T	0.43	37	D	144	220	0.56	40	D	196	288	0.57	40	D	200	295
SB R	0.57	26	C	145	216	0.61	27	C	155	229	0.61	27	C	155	229
<b>Overall</b>		<b>47</b>	<b>D</b>				<b>52</b>	<b>D</b>				<b>54</b>	<b>D</b>		
<i>Saturday Midday</i>															
EB L	0.34	42	D	143	218	0.37	43	D	158	236	0.37	43	D	158	236
EB T/R	0.39	43	D	154	234	0.45	45	D	181	268	0.46	45	D	180	268
WB L	0.15	60	E	34	72	0.17	61	E	39	80	0.17	61	E	29	80
WB T/R	0.87	96	F	219	#370	0.91	102	F	232	#394	0.91	102	F	232	#394
NB L	0.36	46	D	72	120	0.47	51	D	85	137	0.48	52	D	85	137
NB T/R	0.78	60	E	372	501	0.82	62	E	402	541	0.84	64	E	416	559
SB T	0.50	55	D	190	271	0.59	57	E	239	332	0.61	58	E	245	340
SB R	0.27	20	B	87	132	0.28	20	B	93	139	0.28	20	B	93	139
<b>Overall</b>		<b>54</b>	<b>D</b>				<b>57</b>	<b>E</b>				<b>57</b>	<b>E</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.  
~ Volume exceeds capacity, queue is theoretically infinite.  
# 95th percentile volume exceeds capacity, queue may be longer.  
m Volume for 95th percentile queue is metered by upstream signal.

**Table 21 Signalized Intersection Capacity Analysis – Full-Build (continued)**

Location / Movement	2020 Build Conditions (Phase 1)					2024 No-Build Conditions					2024 Build Conditions (Full Build)				
	v/c <sup>a</sup>	Del <sup>b</sup>	LOS <sup>c</sup>	50 Q <sup>d</sup>	95 Q <sup>e</sup>	v/c	Del	LOS	50 Q	95 Q	v/c	Del	LOS	50 Q	95 Q
<b>Webster Avenue at Prospect Street / Concord Avenue</b>															
<i>Weekday Morning</i>															
NB L	0.10	28	C	10	42	0.11	29	C	10	42	0.11	29	C	11	42
NB T/R	0.38	23	C	103	268	0.42	25	C	117	283	0.45	26	C	129	301
SB L	0.20	27	C	32	102	0.25	29	C	40	115	0.27	30	C	41	116
SB T/R	0.69	35	D	256	#683	0.71	37	D	264	#657	0.73	38	D	276	#665
NEB L/T/R	0.76	45	D	249	329	0.80	47	D	279	384	0.78	44	D	272	383
SWB L/T/R	0.93	95	F	335	413	0.94	87	F	366	m381	0.94	88	F	371	m382
<b>Overall</b>		<b>49</b>	<b>D</b>				<b>49</b>	<b>D</b>				<b>49</b>	<b>D</b>		
<i>Weekday Evening</i>															
NB L	0.10	28	C	15	60	0.11	31	C	17	63	0.11	31	C	17	63
NB T/R	0.73	35	C	275	#782	0.75	38	D	282	#771	0.80	40	D	309	#826
SB L	0.39	37	D	33	#147	0.49	44	D	42	#178	0.56	50	D	44	#188
SB T/R	0.41	29	C	125	#337	0.45	32	C	141	#392	0.46	32	C	144	#400
NEB L/T/R	0.86	54	D	324	400	0.88	52	D	358	440	0.88	52	D	358	440
SWB L/T/R	0.58	65	E	211	291	0.65	65	E	257	319	0.68	66	E	280	325
<b>Overall</b>		<b>43</b>	<b>D</b>				<b>46</b>	<b>D</b>				<b>47</b>	<b>D</b>		
<i>Saturday Midday</i>															
NB L	0.11	27	C	23	58	0.14	31	C	28	67	0.15	31	C	28	68
NB T/R	0.40	26	C	185	313	0.42	29	C	196	329	0.45	30	C	215	357
SB L	0.08	27	C	17	46	0.10	30	C	21	55	0.10	30	C	21	55
SB T/R	0.48	31	C	255	412	0.52	35	C	274	441	0.53	35	D	285	455
NEB L/T/R	0.93	81	F	351	439	0.93	77	E	379	468	0.93	75	E	377	466
SWB L/T/R	0.76	60	E	258	331	0.83	64	E	306	387	0.88	69	E	317	400
<b>Overall</b>		<b>48</b>	<b>D</b>				<b>51</b>	<b>D</b>				<b>52</b>	<b>D</b>		
<b>Cambridge Street at Prospect Street</b>															
<i>Weekday Morning</i>															
EB L/T/R	0.59	27	C	153	243	0.66	30	C	169	269	0.67	31	C	169	270
WB L/T/R	0.62	44	D	196	m283	0.66	45	D	208	m278	0.69	45	D	216	m273
NB L/T/R	0.60	23	C	182	281	0.62	24	C	191	294	0.62	24	C	191	294
SB L/T/R	0.76	30	C	254	391	0.84	36	D	293	#494	0.84	36	D	293	#494
<b>Overall</b>		<b>31</b>	<b>C</b>				<b>34</b>	<b>C</b>				<b>34</b>	<b>C</b>		
<i>Weekday Evening</i>															
EB L/T/R	0.60	30	C	119	203	0.75	39	D	143	#274	0.77	41	D	148	#282
WB L/T/R	0.81	51	D	285	m#309	0.84	53	D	293	m#390	0.87	55	D	300	m#398
NB L/T/R	0.71	26	C	242	367	0.77	29	C	273	414	0.78	29	C	276	420
SB L/T/R	0.47	20	B	141	219	0.53	21	C	160	246	0.53	21	C	160	246
<b>Overall</b>		<b>33</b>	<b>C</b>				<b>36</b>	<b>D</b>				<b>37</b>	<b>D</b>		
<i>Saturday Midday</i>															
EB L/T/R	0.57	24	C	112	190	0.64	27	C	121	209	0.65	28	C	124	213
WB L/T/R	0.60	25	C	135	221	0.62	25	C	141	229	0.64	26	C	146	239
NB L/T/R	0.69	24	C	182	292	0.72	25	C	194	309	0.73	25	C	196	314
SB L/T/R	0.62	21	C	157	252	0.67	23	C	176	280	0.67	23	C	176	280
<b>Overall</b>		<b>23</b>	<b>C</b>				<b>25</b>	<b>C</b>				<b>25</b>	<b>C</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.

~ Volume exceeds capacity, queue is theoretically infinite.

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

m Volume for 95th percentile queue is metered by upstream signal.

**Table 21 Signalized Intersection Capacity Analysis – Full-Build (continued)**

Location / Movement	2020 Build Conditions (Phase 1)					2024 No-Build Conditions					2024 Build Conditions (Full Build)				
	v/c <sup>a</sup>	Del <sup>b</sup>	LOS <sup>c</sup>	50 Q <sup>d</sup>	95 Q <sup>e</sup>	v/c	Del	LOS	50 Q	95 Q	v/c	Del	LOS	50 Q	95 Q
<b>Cambridge Street at Webster Avenue / Columbia Street</b>															
<i>Weekday Morning</i>															
EB L/T/R	0.68	21	C	147	m237	0.69	23	C	149	m251	0.69	23	C	151	m255
WB L/T/R	0.74	33	C	203	#321	0.80	37	D	220	#381	0.85	42	D	235	#412
NB L/T/R	0.44	20	C	129	202	0.46	21	C	133	209	0.46	21	C	133	209
SB L	0.18	17	B	24	53	0.20	18	B	26	56	0.20	18	B	26	56
SB T/R	0.22	17	B	58	101	0.24	17	B	67	113	0.24	17	B	67	113
<b>Overall</b>		<b>24</b>	<b>C</b>				<b>25</b>	<b>C</b>				<b>27</b>	<b>C</b>		
<i>Weekday Evening</i>															
EB L/T/R	0.40	19	B	76	m154	0.42	21	C	94	m153	0.43	22	C	100	m158
WB L/T/R	0.80	37	D	248	#408	0.82	39	D	259	#431	0.84	41	D	267	#447
NB L/T/R	0.62	23	C	206	310	0.65	24	C	221	334	0.66	24	C	225	338
SB L	0.27	18	B	31	68	0.32	19	B	36	77	0.32	19	B	36	77
SB T/R	0.24	16	B	66	112	0.25	16	B	68	114	0.25	16	B	68	114
<b>Overall</b>		<b>26</b>	<b>C</b>				<b>27</b>	<b>C</b>				<b>28</b>	<b>C</b>		
<i>Saturday Midday</i>															
EB L/T/R	0.50	25	C	146	227	0.51	25	C	152	235	0.53	25	C	158	243
WB L/T/R	0.66	29	C	199	304	0.69	31	C	212	325	0.71	31	C	219	334
NB L/T/R	0.27	17	B	72	121	0.29	17	B	78	129	0.29	17	B	78	129
SB L	0.18	16	B	31	62	0.21	17	B	35	69	0.21	17	B	35	69
SB T/R	0.18	16	B	49	87	0.21	16	B	37	98	0.21	16	B	57	98
<b>Overall</b>		<b>23</b>	<b>C</b>				<b>24</b>	<b>C</b>				<b>24</b>	<b>C</b>		
<b>Cambridge Street at Willow Street</b>															
<i>Weekday Morning</i>															
EB L/T/R	0.61	17	B	109	#467	0.63	18	B	118	#501	0.66	19	B	125	#513
WB L/T/R	0.61	13	B	58	#445	0.65	14	B	61	#487	0.66	14	B	61	#486
<b>Overall</b>		<b>15</b>	<b>B</b>				<b>11</b>	<b>B</b>				<b>17</b>	<b>B</b>		
<i>Weekday Evening</i>															
EB L/T/R	0.42	13	B	76	220	0.44	13	B	80	241	0.46	13	B	85	246
WB L/T/R	0.56	9	A	61	353	0.58	9	A	61	378	0.59	9	A	62	379
<b>Overall</b>		<b>11</b>	<b>B</b>				<b>11</b>	<b>B</b>				<b>11</b>	<b>B</b>		
<i>Saturday Midday</i>															
EB L/T/R	0.47	12	B	67	269	0.48	12	B	72	286	0.50	12	B	75	291
WB L/T/R	0.47	6	A	36	62	0.49	6	A	37	62	0.50	6	A	36	63
<b>Overall</b>		<b>9</b>	<b>A</b>				<b>9</b>	<b>A</b>				<b>9</b>	<b>A</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.  
~ Volume exceeds capacity, queue is theoretically infinite.  
# 95th percentile volume exceeds capacity, queue may be longer.  
m Volume for 95th percentile queue is metered by upstream signal.

**Table 21 Signalized Intersection Capacity Analysis – Full-Build (continued)**

Location / Movement	2020 Build Conditions (Phase 1)					2024 No-Build Conditions					2024 Build Conditions (Full Build)				
	v/c <sup>a</sup>	Del <sup>b</sup>	LOS <sup>c</sup>	50 Q <sup>d</sup>	95 Q <sup>e</sup>	v/c	Del	LOS	50 Q	95 Q	v/c	Del	LOS	50 Q	95 Q
<b>Cambridge Street at Hunting Street</b>															
<i>Weekday Morning</i>															
EB T	0.47	4	A	14	46	0.50	4	A	15	48	0.50	4	A	15	48
WB T	0.36	12	B	64	245	0.38	12	B	69	262	0.39	13	B	72	262
SB L/R	0.60	31	C	79	187	0.60	31	C	81	191	0.62	31	C	88	205
<b>Overall</b>		<b>13</b>	<b>B</b>				<b>13</b>	<b>B</b>				<b>13</b>	<b>B</b>		
<i>Weekday Evening</i>															
EB T	0.32	3	A	10	14	0.33	3	A	11	15	0.34	3	A	11	15
WB T	0.38	12	B	79	221	0.39	12	B	83	238	0.40	12	B	85	238
SB L/R	0.78	48	D	112	#288	0.72	45	D	94	#235	0.76	47	D	105	#266
<b>Overall</b>		<b>19</b>	<b>B</b>				<b>16</b>	<b>B</b>				<b>17</b>	<b>B</b>		
<i>Saturday Midday</i>															
EB T	0.38	3	A	12	30	0.40	4	A	13	41	0.41	4	A	13	44
WB T	0.34	10	A	52	205	0.36	10	A	56	218	0.36	10	B	57	218
SB L/R	0.51	29	C	51	125	0.50	29	C	50	121	0.53	28	C	53	132
<b>Overall</b>		<b>10</b>	<b>B</b>				<b>10</b>	<b>B</b>				<b>11</b>	<b>B</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.  
~ Volume exceeds capacity, queue is theoretically infinite.  
# 95th percentile volume exceeds capacity, queue may be longer.  
m Volume for 95th percentile queue is metered by upstream signal.

As shown in Table 21, the signalized study area intersections are expected to function at an acceptable LOS D or better during peak-hour conditions during the 2020 Phase 1 Build, and are expected to remain at those levels under the 2024 future condition with or without the Full Build development. The intersection of Somerville Avenue at Prospect Street during the Saturday midday peak period is the only study area location where the LOS is expected to decrease to LOS E under future 2024 conditions. However, this projected change is expected to occur under future conditions with or without the Project. While queues on some intersection approaches can be lengthy under peak-hour conditions, these locations generally operate acceptably throughout the day. Accordingly, the Full Build-generated traffic can be accommodated at the signalized study area intersections without the need for any signal phasing or timings changes, or any further physical improvements beyond those recently implemented by the City.

## Unsignalized Intersection Capacity Analysis – Full Build

The unsignalized capacity analysis results for the study area intersections are summarized in Table 22. As with the signalized analysis summary, the 2024 Full-Build condition results are compared to both the results for the previously-presented 2020 Phase 1 Build condition, and the 2024 No-Build condition.

**Table 22 Unsignalized Intersection Capacity Analysis – Full-Build**

Location / Movement	2020 Build Conditions (Phase 1)					2024 No-Build Conditions					2024 Build Conditions (Full Build)				
	D <sup>a</sup>	v/c <sup>b</sup>	Del <sup>c</sup>	LOS <sup>d</sup>	95 Q <sup>e</sup>	D	v/c	Del	LOS	95 Q	D	v/c	Del	LOS	95 Q
<b>Windsor Street at Windsor Place / Boynton Yards Driveway</b>															
<i>Weekday Morning</i>															
EB L/T/R	146	0.33	16	C	35	101	0.21	14	B	20	111	0.21	13	B	20
WB L/T/R	35	0.10	15	C	8	25	0.07	15	C	5	25	0.08	16	C	5
NB L	195	0.13	8	A	13	205	0.14	8	A	13	225	0.15	8	A	13
SB L	neg	-	0	A	0	neg	-	0	A	0	neg	-	0	A	0
<i>Weekday Evening</i>															
EB L/T/R	101	0.15	11	B	13	96	0.13	10	B	10	111	0.16	11	B	15
WB L/T/R	230	0.55	22	C	83	150	0.38	18	C	43	135	0.42	23	C	50
NB L	180	0.12	8	A	10	195	0.13	8	A	13	250	0.17	8	A	15
SB L	neg	-	0	A	0	neg	-	0	A	0	neg	-	0	A	0
<i>Saturday Midday</i>															
EB L/T/R	62	0.10	11	B	8	52	0.08	10	B	5	72	0.10	10	B	8
WB L/T/R	85	0.17	13	B	15	60	0.12	13	B	10	55	0.12	14	B	10
NB L	135	0.09	8	A	8	145	0.10	8	A	8	170	0.12	8	A	10
SB L	neg	-	0	A	0	neg	-	0	A	0	neg	-	0	A	0
<b>South Street at Windsor Street</b>															
<i>Weekday Morning</i>															
WB L/R	390	0.45	12	B	60	410	0.48	12	B	65	445	0.55	14	B	85
SB L	10	0.01	7	A	0	10	0.01	7	A	0	35	0.03	7	A	3
<i>Weekday Evening</i>															
WB L/R	340	0.43	12	B	55	360	0.46	13	B	60	425	0.55	14	B	85
SB L	50	0.04	7	A	3	55	0.04	7	A	0	70	0.05	8	A	5
<i>Saturday Midday</i>															
WB L/R	255	0.29	10	B	30	270	0.30	10	B	33	310	0.36	11	B	38
SB L	10	0.01	7	A	0	10	0.01	7	A	0	30	0.02	7	A	3
<b>South Street at Willow Street</b>															
<i>Weekday Morning</i>															
WB L	2	0.00	7	A	0	2	0.00	7	A	0	2	0.00	7	A	0
NB L/R	50	0.06	9	A	5	45	0.06	9	A	5	50	0.07	10	A	5
<i>Weekday Evening</i>															
WB L	5	0.00	7	A	0	5	0.00	7	A	0	5	0.00	7	A	0
NB L/R	25	0.04	10	A	3	25	0.04	10	A	3	35	0.06	11	B	5
<i>Saturday Midday</i>															
WB L	5	0.00	7	A	0	5	0.00	7	A	0	5	0.00	7	A	0
NB L/R	11	0.01	9	A	0	11	0.01	9	A	0	20	0.03	10	A	3

- a Demand  
b Volume to capacity ratio.  
c Average total delay, in seconds per vehicle.  
d Level-of-service.  
e 95th percentile queue, in feet.  
# 95th percentile volume exceeds capacity, queue may be longer.

**Table 22 Unsignalized Intersection Capacity Analysis – Full-Build (continued)**

Location / Movement	2020 Build Conditions (Phase 1)					2024 No-Build Conditions					2024 Build Conditions (Full Build)				
	D <sup>a</sup>	v/c <sup>b</sup>	Del <sup>c</sup>	LOS <sup>d</sup>	95 Q <sup>e</sup>	D	v/c	Del	LOS	95 Q	D	v/c	Del	LOS	95 Q
<b>South Street at Earle Street</b>															
<i>Weekday Morning</i>															
EB L	20	0.02	9	A	3	10	0.01	9	A	0	10	0.01	9	A	0
SB L/R	35	0.08	13	B	8	30	0.06	13	B	5	30	0.07	13	B	5
<i>Weekday Evening</i>															
EB L	10	0.01	8	A	0	5	0.01	8	A	0	5	0.01	8	A	0
SB L/R	95	0.20	13	B	18	55	0.11	13	B	10	50	0.11	13	B	10
<i>Saturday Midday</i>															
EB L	5	0.00	8	A	0	5	0.00	8	A	0	5	0.01	8	A	0
SB L/R	31	0.05	11	B	5	21	0.04	11	B	3	21	0.04	11	B	3
<b>South Street at Hunting Street</b>															
<i>Weekday Morning</i>															
WB L	180	0.12	8	A	10	190	0.13	8	A	10	190	0.13	8	A	10
<i>Weekday Evening</i>															
WB L	100	0.07	7	A	5	100	0.07	7	A	5	100	0.07	7	A	5
<i>Saturday Midday</i>															
WB L	75	0.05	7	A	5	80	0.05	7	A	5	80	0.05	7	A	5
<b>South Street at Harding Street</b>															
<i>Weekday Morning</i>															
NB L	70	0.23	19	C	23	65	0.20	18	C	18	70	0.22	19	C	20
SB R	90	0.20	14	B	18	60	0.13	14	B	13	65	0.15	14	B	13
<i>Weekday Evening</i>															
NB L	65	0.14	13	B	13	70	0.15	13	B	13	75	0.16	14	B	15
SB R	50	0.08	11	B	8	45	0.08	11	B	5	50	0.09	11	B	3
<i>Saturday Midday</i>															
NB L	70	0.12	12	B	10	75	0.13	12	B	10	80	0.14	12	B	13
SB R	30	0.04	10	B	3	20	0.03	10	B	3	30	0.05	10	B	3
<b>Medford Street at Warren Street / Driveway</b>															
<i>Weekday Morning</i>															
SB L	2	0.00	8	A	0	2	0.00	8	A	0	2	0.00	8	A	0
NEB L/T/R	286	0.89	60	F	218	291	0.95	74	F	250	301	0.98	81	F	268
SWB L/R	3	0.01	14	B	0	3	0.01	14	B	0	3	0.01	14	B	0
<i>Weekday Evening</i>															
SB L	1	0.00	8	A	0	1	0.00	8	A	0	1	0.00	8	A	0
NEB L/T/R	325	0.80	39	E	180	310	0.80	40	E	180	320	0.83	44	E	195
SWB L/R	4	0.01	15	B	0	4	0.01	15	B	0	4	0.01	15	B	0
<i>Saturday Midday</i>															
SB L	neg	-	0	A	0	neg	-	0	A	0	neg	-	0	A	0
NEB L/T/R	40	0.11	15	B	10	35	0.10	15	C	8	45	0.12	15	C	10
SWB L/R	5	0.02	17	B	3	5	0.02	18	C	3	5	0.02	18	C	3

a Demand

b Volume to capacity ratio.

c Average total delay, in seconds per vehicle.

d Level-of-service.

e 95th percentile queue, in feet.

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

**Table 22 Unsignalized Intersection Capacity Analysis – Full-Build (continued)**

Location / Movement	2020 Build Conditions (Phase 1)					2024 No-Build Conditions					2024 Build Conditions (Full Build)				
	D <sup>a</sup>	v/c <sup>b</sup>	Del <sup>c</sup>	LOS <sup>d</sup>	95 Q <sup>e</sup>	D	v/c	Del	LOS	95 Q	D	v/c	Del	LOS	95 Q
<b>Medford Street at South Street</b>															
<i>Weekday Morning</i>															
NB L	145	0.24	12	B	23	140	0.24	13	B	23	140	0.24	13	B	23
<i>Weekday Evening</i>															
NB L	110	0.12	9	A	10	110	0.12	9	A	10	115	0.13	9	A	10
<i>Saturday Midday</i>															
NB L	70	0.08	9	A	5	75	0.08	9	A	8	80	0.01	9	A	8
<b>Medford Street at Ward Street / Driveway</b>															
<i>Weekday Morning</i>															
EB L/T/R	15	0.12	36	E	10	15	0.13	38	E	10	15	0.13	38	E	10
WB L/T/R	10	0.06	25	D	5	10	0.06	27	D	5	10	0.06	27	D	5
NB L	10	0.02	11	B	3	10	0.02	11	B	3	10	0.02	11	B	3
SB L	20	0.02	8	A	3	20	0.02	8	A	3	20	0.02	8	A	3
<i>Weekday Evening</i>															
EB L/T/R	85	0.39	29	D	43	90	0.44	33	D	28	90	0.45	34	D	53
WB L/T/R	45	0.12	15	B	10	50	0.13	15	C	13	50	0.13	15	C	13
NB L	10	0.01	9	A	0	10	0.01	9	A	0	10	0.01	9	A	0
SB L	5	0.01	8	A	0	5	0.01	8	A	0	5	0.01	8	A	0
<i>Saturday Midday</i>															
EB L/T/R	15	0.06	18	C	5	15	0.06	18	C	5	15	0.06	19	C	5
WB L/T/R	1	0.00	10	B	0	1	0.00	10	B	0	1	0.00	10	B	0
NB L	5	0.01	9	A	0	5	0.01	9	A	0	5	0.01	9	A	0
SB L	5	0.00	8	A	0	5	0.00	8	A	0	5	0.01	8	A	0
<b>Webster Avenue at Columbia Street / Tremont Street</b>															
<i>Weekday Morning</i>															
WB L/T/R	180	0.32	14	B	35	180	0.31	13	B	33	195	0.34	14	B	38
NB L	10	0.01	8	A	0	10	0.01	8	A	0	10	0.01	8	A	0
SB L	120	0.10	8	A	8	75	0.06	8	A	5	85	0.07	8	A	5
<i>Weekday Evening</i>															
WB L/T/R	315	0.52	16	C	78	250	0.44	15	C	55	280	0.49	16	C	68
NB L	10	0.01	8	A	0	10	0.01	8	A	0	10	0.01	8	A	0
SB L	40	0.05	8	A	3	35	0.03	8	A	3	45	0.04	8	A	3
<i>Saturday Midday</i>															
WB L/T/R	200	0.29	12	B	30	190	0.29	12	B	30	210	0.32	12	B	35
NB L	10	0.01	8	A	0	10	0.01	8	A	0	10	0.01	8	A	0
SB L	55	0.05	8	A	3	40	0.03	8	A	3	55	0.05	8	A	3

a Demand

b Volume to capacity ratio.

c Average total delay, in seconds per vehicle.

d Level-of-service.

e 95th percentile queue, in feet.

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

**Table 22 Unsignalized Intersection Capacity Analysis – Full-Build (continued)**

Location / Movement	2020 Build Conditions (Phase 1)					2024 No-Build Conditions					2024 Build Conditions (Full Build)				
	D <sup>a</sup>	v/c <sup>b</sup>	Del <sup>c</sup>	LOS <sup>d</sup>	95 Q <sup>e</sup>	D	v/c	Del	LOS	95 Q	D	v/c	Del	LOS	95 Q
Cambridge Street at Windsor Street															
Weekday Morning															
EB L	30	0.03	8	A	3	25	0.02	8	A	3	30	0.03	9	A	3
WB L	30	0.03	9	A	3	30	0.03	9	A	3	30	0.03	8	A	3
SB L/T/R	220	0.73	41	E	135	235	0.81	51	F	168	250	0.83	52	F	178
Weekday Evening															
EB L	20	0.02	8	A	3	20	0.02	8	A	3	25	0.03	8	A	3
WB L	35	0.03	8	A	3	40	0.04	8	A	3	40	0.04	9	A	3
SB L/T/R	215	0.56	24	C	83	215	0.60	27	D	95	225	0.62	28	D	100
Saturday Midday															
EB L	10	0.01	8	A	0	10	0.01	8	A	0	15	0.01	8	A	0
WB L	20	0.02	8	A	3	20	0.02	9	A	3	20	0.02	9	A	3
SB L/T/R	150	0.34	16	C	38	150	0.35	17	C	40	160	0.37	17	C	43
Cambridge Street at Harding Street															
Weekday Morning															
EB L	20	0.02	8	A	3	20	0.02	8	A	3	20	0.02	8	A	3
Weekday Evening															
EB L	60	0.06	9	A	5	65	0.07	9	A	5	65	0.07	9	A	5
Saturday Midday															
EB L	20	0.02	8	A	3	20	0.02	8	A	3	20	0.02	8	A	3
Boynton Yards Driveway at Site Driveway															
Weekday Morning															
WB L	155	0.13	8	A	10	80	0.06	8	A	5	45	0.05	8	A	3
NB L/R	45	0.09	12	B	8	20	0.03	10	B	3	15	0.02	10	A	3
Weekday Evening															
WB L	40	0.03	7	A	3	20	0.01	7	A	0	10	0.01	7	A	0
NB L/R	265	0.32	11	B	35	140	0.16	10	A	15	115	0.13	9	A	10
Saturday Midday															
WB L	50	0.03	7	A	3	25	0.02	7	A	3	25	0.02	7	A	3
NB L/R	80	0.10	10	A	8	45	0.05	9	A	5	40	0.05	9	A	3
South Street at Site Driveway															
Weekday Morning						Intersection does not exist under 2024 No-Build conditions									
EB L											30 0.03 9 A 3				
SB L/R											50 0.10 12 B 8				
Weekday Evening															
EB L											20 0.02 8 A 3				
SB L/R											90 0.16 12 B 15				
Saturday Midday															
EB L											25 0.02 8 A 3				
SB L/R											55 0.09 11 B 8				

- a Demand  
b Volume to capacity ratio.  
c Average total delay, in seconds per vehicle.  
d Level-of-service.  
e 95th percentile queue, in feet.  
# 95th percentile volume exceeds capacity, queue may be longer.



As shown in Table 22, the critical movements at almost all of the unsignalized study area intersections are expected to continue to operate at acceptable levels of service under the future 2024 conditions with and without the addition of Full Build traffic. Similar to the Phase 1 capacity results, the only exceptions to this are at Medford Street's intersection with Warren Street, and to a lesser degree, at Medford Street's intersection with Ward Street and the Cambridge Street/Windsor Street intersection.

At the intersection of Medford Street/Warren Street, during the 2020 and 2024 future conditions, independent of the Project, the northbound Warren Street approach operates at LOS F and E during the respective weekday morning and evening peak hours, and at LOS B during the Saturday midday peak hour. This approach still will operate well under theoretical capacity, though peak hour queues could extend to seven or eight vehicles during this time period.

At the Medford Street/Ward Street intersection, the critical Ward Street approach is projected to operate at LOS E during the weekday morning peak hour under the 2020 Build, 2024 No-Build and 2024 Build conditions. This is due to the delays on this approach exceeding the LOS D/LOS E threshold by one to three seconds. The projected demand on this approach is relatively low, and queues are expected to be limited to a single vehicle. Accordingly, there should not be the need for any mitigation measures at this location to accommodate the Project.

At the Cambridge Street/Windsor Street intersection, the Windsor Street approach is projected to operate at LOS E during the weekday morning peak hour under all future 2020 and 2024 conditions. With queues being limited to six or seven vehicles, there are not any corrective measures which should be implemented to address the projected negligible impact of the project.

## **Transportation Demand Management**

Transportation Demand Management (TDM) measures are most often directed at commuter travel and implemented at office sites. However, due to the mixed-use and transit-orientated nature of the Proposed Project, there also are opportunities to bring TDM programs to the Proposed Project's other land uses, including the retail shops and residential housing.

The following sections discuss the land use types for which TDM measures will be implemented. A description of the TDM elements is presented in this section along with information on how those elements aid employees, residents, visitors, residents, and retail patrons getting to and from the Project Site.

The following plan first addresses general TDM measures that apply to the whole Project Site, then special programs for the residents, office/laboratory uses, and retail shops and restaurants.

## **General Measures**

### **TMA involvement**

While there are not any active Transportation Management Associations (TMAs) in the vicinity of the Project, the Proponent is committed to being an active member of any TMAs formed in the future. The mission of most TMAs is to enhance quality of life through focusing on Transportation and Infrastructure, Land Use and Development, and Energy and the Environment. In the absence of a formal, established TMA, the Proponent still will support local efforts in Somerville in improving and expanding public transportation in the area. Through this involvement, the pedestrian-friendly nature of the Site design, and internal roadway networks a framework for offering alternative transportation services will be provided. Post-construction traffic monitoring and evaluation of TDM programs will also be the responsibility of the Proponent.

### **Transportation Coordinator**

In conjunction with the initial phase of development, an overall on-site TDM coordinator will be designated to oversee all TDM programs for each building of the Proposed Project, and the Project Site in its entirety. The person(s) in this role will coordinate with organizations within the area evaluated in the Union Square Planning Study to help promote a reduced reliance on single-occupant motor-vehicle travel to the Project Site. To that end, the TDM measures identified in the following sections will be implemented under the direction and supervision of this person.

The final job description for this role will be determined over time, but the duties of the on-site TDM coordinator may include, but not be limited to:

- › Acting as a liaison with site employers and MassRIDES.
- › Assisting site employees and residents with ride matching and transportation planning.
- › Developing and implementing appropriate TDM measures.
- › Disseminating information on alternate modes of transportation and developing transportation related marketing and education materials, including a website.
- › Developing and maintaining information pertaining to pedestrian and cycling access to and from the Project Site.
- › Hosting occasional transportation-related events to promote the use of commuting alternatives.
- › Distributing transit maps and passes.
- › Advocating with the state and local governments to improve transportation infrastructure and services.
- › Monitoring the effectiveness of TDM measures through surveys and other tools.
- › Completing regulatory reports to state and city agencies, as required.
- › Implementing a website providing travel-related information, and promoting awareness of the items listed above.

**Promote Transit Use**

Access to public transportation will significantly reduce demand for vehicular travel and parking spaces. This should be particularly effective in relation to the new Union Square MBTA Green Line station, which is planned to open in 2021. To serve visitors, employees, and residents, the Proponent will work with the MBTA to identify appropriate locations for new or relocated bus stops within the Project Site and other possible amenities, including bus shelters and real-time transit information.

The on-site TDM coordinator will provide a central commuter information center within the Project Site in a prominent location such as in a building foyer, or near garage elevators. This will provide employees and visitors (and Phase 2 residents) with transit maps and schedules and route information for pedestrians and cyclists. One or two smaller centers also may be provided at central locations within the overall development, or possibly within each building. This also could include the residential lobbies or at the entrance of the planned office building among other possible locations that would be identified by the on-site TDM coordinator in consultation with the City of Somerville planning staff.

**Facilitate Bicycle and Pedestrian Travel**

Travel to the Project Site by cycling or walking will be promoted by the Proponent through the provision of improved bicycle and pedestrian connections within the Project Site. In addition to secured, covered bike storage within each building, bicycle racks also will be provided at locations near various buildings within the overall development. Walking to and from, and throughout the Project Site will be encouraged by the provision of a pedestrian-friendly site layout, which features sidewalks and crosswalks at key points both within the Site and connecting to adjacent planned developments. The bicycle and pedestrian infrastructure improvements will help to promote non-vehicular travel to the Project Site.

**Office/Laboratory Uses**

Office/lab employers within the Project Site will be encouraged to implement appropriate TDM measures by the on-site TDM coordinator. As not every TDM program will be suitable for every type of employer, such as telecommuting or flexible work hours, the on-site TDM coordinator will offer technical assistance to employers to evaluate potential programs and implement them when appropriate. Employer-based TDM measures may include the following programs:

- › Preferential carpool and vanpool parking within the parking garage and spaces near office building entrances within the parking garage as a convenience to commuters and to promote ride-sharing.
- › Ride matching assistance managed by the on-site TDM coordinator or by MassRIDES so that employees find appropriate carpool and vanpool partners.
- › Disseminating information on alternate modes of transportation and developing transportation.
- › Sponsored vanpools and subsidized expenses.

- › Employees can use pre-tax dollars for the purchase of MBTA passes. The pre-tax purchase is free from both federal and state income and payroll taxes.
- › Provide telecommuting options for employees in appropriate jobs.
- › Provide incentives for bicycle and pedestrian commutes, like covered bicycle storage, changing rooms, and shower facilities.
- › Hold promotional events for transit-riders, cyclists, and pedestrians.
- › Offer direct deposit to employees.
- › The Proponent will consider providing preferred parking for low-emitting fuel-efficient vehicles and/or electric vehicle charging stations within the Phase 1 garage, and possibly within future parking facilities for Buildings 3, 4, and 5.

## **Retail/Restaurants**

The Proponent will seek to attract a variety of retail shops, restaurants, and service tenants as ground-floor supporting uses. These shops will potentially include restaurants, apparel, furnishings, general merchandise, and service uses like banks and office supplies. As most of these businesses will be small shops, there will not be the same levels of TDM opportunities internal to each individual business as will be available with larger employers, but employees who work on the Project Site will be able to take advantage of the transportation guidance and programs coordinated by the transportation coordinator.

The suite of TDM measures to be implemented in association with the retail shops are fewer than for traditional offices, but will still have an impact in reducing single-occupant vehicle travel. The retail TDM program may include the following:

- › Improved site amenities, like cycling paths and pedestrian crossings which enhance the ability of employees to walk or cycle to work.
- › Ride matching services and transit information provided by the on-site TDM coordinator or MassRIDES.
- › Hold promotional events for cyclists, pedestrians, and transit-riders.
- › Offer direct deposit to employees.
- › As noted earlier, the Proponent will consider providing preferred parking for low-emitting fuel-efficient vehicles and/or electric vehicle charging stations within each of the garages serving the buildings comprising the Proposed Project.

## **Residential**

In addition to providing a pedestrian friendly, mixed-use transit-orientated environment, the Proponent will enact a variety of additional strategies to reduce the need for auto trips by residents. This will include working with a car-sharing service (such as Zipcar) to provide cars for periodic use by residents.

Several of the TDM measures to be implemented for the entire Project Site will be attractive to new residents. Specifically, the provision of secured bicycle storage, bicycle

racks, pedestrian walkways, and proximity to public transportation, including several bus lines and the planned Union Square MBTA Green Line station should help to minimize the need for vehicular travel and parking spaces. As noted earlier, the Proponent will consider providing preferred parking for low-emitting fuel-efficient vehicles and/or electric vehicle charging stations within the garage parking serving the Proposed Project.



# 5

## Conclusion

The Proposed Project is consistent with the City of Somerville's transportation-related goals for the Boynton Yards area as presented in the Union Square Neighborhood Plan. The Project Site has been designed to accommodate Project-generated traffic, as well as traffic other nearby planned or potential developments, such as the Union Square Revitalization Project. In summary, the Project will provide the following transportation-related benefits:

- › The Project will be a mixed-use, transit-oriented development consistent with the City's goals for this area. With the mixed-use environment, there should be considerable internal trip-sharing between the various uses proposed within the Site. For example, the retail space provided should be largely oriented to workers or residents already on-Site as opposed to traditional shopping center.
- › The proposed on-Site parking supply will be kept to the minimum levels needed to satisfy tenant and resident needs, while being low enough to help promote travel by biking, walking, or using MBTA transit service, including the planned MBTA Green Line Station which is expected to be operational in 2021.
- › Ample secured bicycle parking will be provided within the Project buildings, with outdoor bicycle racks provided at key points near the building entrances.
- › The Project will not preclude the implementation of roadway improvements in the future. The site access plan involves curb cut consolidation along

Windsor Place which will help minimize conflicts with potential future development on the opposite side of the roadway. Likewise, the analysis demonstrates that the Project-generated traffic can be accommodate on the existing study area roadway infrastructure without modification.

- › The Project is entirely consistent with the goals of the City of Somerville's 2017 "Union Square Neighborhood Development Plan" (USNDP). The Project's reconstruction of Earle Street between Buildings 1 and 2 will be the first step in advancing the USNDP. The Phase 1 and 2 Buildings also are being developed to be compatible with both the existing South Street configuration next to the Site, as well as the realignment desired by the City.
- › The transportation analysis for the Project was conducted in a highly conservative manner. The underlaying mode shares used assume higher automobile use than is anticipated for this area based on prior studies. However, the conservatively high auto use was assumed so that the maximum potential vehicular traffic on the study area roadways would be evaluated. Even with these assumptions, the analysis indicates that the study area roadway will still functionally acceptably, even prior to the implementation of the desired USNDP changes by the City of Somerville at some point in the future.
- › With the uncertain timeframe for the City's implementation of the USNDP changes, the Project is being designed so as not to preclude any of these improvements. This study's analysis was conducted assuming that the existing roadway network would remain unchanged. However, this was done solely to evaluate the maximum potential traffic impacts. DLJ continues to fully support the vision presented in the USNDP.
- › New and improved sidewalks along the Phase 1 and Phase 2 Site frontage will significantly improve existing, long-standing deficiencies for pedestrians.

Overall, the additional new traffic generated by both Phase 1 and the subsequent full build-out of the Proposed Project can be accommodated on the surrounding roadway network and, minimal impacts are expected from this proposed development.