TRANSPORTATION IMPACT AND ACCESS STUDY

1314 Washington Street Redevelopment

Newton, Massachusetts

PREPARED FOR

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Introduction

VHB, on behalf of Mark Development ("the Proponent") has prepared a detailed Transportation Impact and Access Study (TIAS) for the proposed mixed-use redevelopment ("the Project") at 1314 Washington Street in Newton, MA ("the Site"). The Site is the previous location of Santander Bank, in the southeast corner of the intersection of Washington Street at Highland Street in the village of West Newton.

The project consists of a five-story mixed use building with 50 apartment units and amenities and approximately 3,873 sf of commercial space on the ground floor. Approximately 63 parking spaces will be provided, with 50 spaces for residents in a below-ground parking floor accessed via Davis Street and 13 spaces for the commercial use in a ground-level parking floor accessed via Davis Street for entering traffic and Highland Avenue for exiting traffic. The building is within a five-minute walk of both commuter rail and bus stops, which will diminish automobile dependency for the residents.

The TIAS below quantifies existing and future traffic conditions with and without the Project. Based on the analysis of the future traffic conditions, the Project is expected to have negligible impacts on the roadway network.

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. The scope of the study was determined through consultation with the City of Newton.

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; a summary of existing public transit facilities in the area; 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 Project. The year 2029, a

seven-year time horizon, was selected as the design year for analysis for the preparation of this traffic impact and access assessment.

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

Analysis Conditions

This study contains transportation analyses conducted under the following three conditions during the weekday morning and weekday evening peak hours:

- 2022 Existing Conditions
- 2029 No-Build Conditions
- 2029 Build Conditions

The 2022 Existing Conditions analyses provide a snapshot of conditions today in the study area. The 2029 No-Build Conditions and 2029 Build Conditions analyses provide a picture of what transportation conditions will look like in the study area in the future with and without the Project in place. These three analyses allow for a comparison of the Project's impact on the transportation network and help to determine what transportation mitigation measures are necessary to offset the impacts of the Project, if necessary.

Summary of Findings

The Project is expected to generate approximately 13 new vehicle trips (5 entering/8 exiting) during the weekday morning peak hour and 28 new vehicle trips (16 entering/12 exiting) during the weekday evening peak hour. Overall, this will result in about one new vehicle every two-to-four minutes added to the roadway network during the weekday morning and weekday evening peak hours, respectively. It should be noted that if the existing building at 1314 Washington Street was to be re-tenanted as a general retail use without any redevelopment, the Site would be expected to generate a similar number of trips as the proposed Project. Based on the results of the intersection capacity analyses for the Existing, No-Build, and Build Conditions, the additional trips generated to and from the Project Site are expected to produce negligible impacts on the surrounding transportation infrastructure.

The Site has been designed to accommodate Project-generated vehicular traffic, as well as pedestrians, bicyclists, and transit riders. Located in West Newton village within a five-minute walk of shops, restaurants, and the commuter rail at West Newton Station, the residents of the Site will be able to meet many of their daily demands without using their vehicles. In addition, parking on-Site has been restricted in order to encourage travel by non-vehicular modes, with a proposed residential parking ratio of slightly less than 1.0 spaces per unit.

The Proponent is also committed to implementing a travel demand management (TDM) program in connection with the Project's development and operation. The TDM plan will encourage travel to and from the Site by walking, biking, and public transit, and will help to further offset the impacts of the Project on the roadway network.

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Project Description

A detailed review of the proposed building program and Site access plan was conducted as part of this evaluation and is described in the following sections. Included in the review of the Site access plan are descriptions of the proposed access from Washington Street, Highland Street, and Davis Street, pedestrian and bicycle accommodations, loading and delivery activities, and parking supply.

Building Program

The development proposal for the Site consists of the renovation of the former Santander Bank building into approximately 3,873 sf of retail space and the construction of a five-story addition containing 50 residential units. The five-story residential addition will be located behind the former Santander Bank building on Washington Street on the site of the existing surface parking lot fronting Highland Street and Davis Street. The main lobby for the residential units will be on Washington Street providing easy pedestrian access to the commercial businesses in West Newton village. Approximately 63 parking spaces will be provided, with 50 spaces for residents and 13 spaces for the retail use.

Under existing conditions, the Site consists of one commercial building of approximately 7,887 sf formerly occupied by a Santander Bank branch. The Site also includes approximately 58 parking spaces under existing conditions in a surface lot fronting Highland Street and Davis Street.

Site Access

Existing Site Access

The Site is bounded by Washington Street, Highland Street, and Davis Street in Newton, Massachusetts. The building is located on the northern section of the Site, with the main pedestrian entrance for the building located on Washington Street. Vehicle access under existing conditions to the surface parking lot behind the building is provided via one curb cut on Highland Street and two curb cuts on Davis Street. The Davis Street driveways are one-way into and out of the Site, respectively.

Proposed Project Site Access

Under proposed conditions, vehicle access to the Site will be provided via one curb cut on Highland Street (near the location of the existing curb cut) and one curb cut on Davis Street. The below-ground parking garage containing approximately 50 residential parking spaces will be accessed via the Davis Street curb cut for both entering and exiting traffic. The ground-level parking floor containing 13 commercial parking spaces will have one-way circulation and will be accessed via the Davis Street curb cut for entering traffic and via the Highland Street curb cut for exiting traffic. There will be no internal connection between the residential parking level and the retail parking level.

The retail space and the lobby for the residential units will be located on the northern portion of the Site with the main pedestrian entrances located on Washington Street. The retail space will also have a pedestrian entrance to the outdoor terrace on Highland Street and the residential units will have secondary pedestrian access points on Highland Street and Davis Street.

A Site plan is provided in the Appendix to this report.

Loading and Deliveries

A loading location will be provided for the Site within the ground-level parking floor adjacent to the entrances to the retail and residential uses. The loading location within the ground-level parking floor will ensure that loading vehicles will be parked internal to the Site and will not block the sidewalk or general traffic flow along Washington Street, Highland Street, or Davis Street. Due to the nature of the development, the Site is expected to attract mostly smaller loading vehicles (such as box trucks) and is not anticipated to be serviced by tractor-trailers. Delivery vehicles will be able to use the loading location within the ground-level parking floor or the existing on-street parking spaces along Washington Street.

Pick-Up/Drop-Off Activity

The loading location within the ground-level parking floor adjacent to the entrances to the retail and residential uses will also be used by pick-up/drop-off activity. In addition, pick-up and drop-off activity can occur in the existing on-street parking spaces along Washington Street and Davis Street. The on-street parking spaces along Washington Street are located directly in front of the main entrances for the retail and residential uses.

Pedestrian and Bicycle Accommodations

Travel to/from the Project by bicycling or walking will be promoted through the provision of strong bicycle and pedestrian connections near the Project Site. The Site is located in the heart of West Newton village, which has a very strong bicycle and pedestrian network. The Site is adjacent to a movie theater, a gym, a CVS pharmacy, several cafes, restaurants, and bars, and a short walk from the MBTA bus stops/commuter rail at West Newton Station. With so many destinations within a short walk, the residents of the Site will be able to meet many of their daily demands without using their vehicles. The Site will include entry and exit points on Washington Street, Highland Street, and Davis Street to accommodate walkers heading in different directions. The main retail and residential

entrances will be located along Washington Street to provide easy access to the adjacent commercial businesses and transit stations.

In addition, Washington Street through West Newton village was recently reconstructed to include improved pedestrian facilities and dedicated bicycle accommodations in each direction, further supporting the ability to walk and bike through the area.

The Site is located approximately 350 feet walking distance from the nearest Bluebikes station at the corner of Washington Street and Waltham Street. The Site will also include both secure, indoor bicycle parking for residents and employees of the Site and short-term outdoor bicycle parking spaces for patrons of the retail uses.

Parking

Vehicle Parking

The Project will be supported by approximately 63 parking spaces, of which 50 will be dedicated for residential use and 13 will be designated for retail use. The residential parking will be located in a below-ground parking garage accessed via a curb cut on Davis Street and the retail parking will be located in a ground-level parking floor accessed via Davis Street for entering traffic and Highland Avenue for exiting traffic. Two of the residential spaces will be designated as accessible spaces and one of the retail spaces will be designated as an accessible space.

The amount of parking on-Site has been designed to encourage the use of non-vehicular modes of travel while still providing an adequate amount of parking for the proposed uses. Residential parking will be provided at a rate of slightly less than one parking space per unit, while retail parking will be provided at a rate of approximately one parking space per 0.30 ksf.

Bicycle Parking

The Project will be supported by both secure, indoor bicycle parking for residents and employees of the Site and short-term outdoor bicycle parking for visitors to the Site. A total of 50 secure, indoor bicycle parking spaces will be provided and short-term outdoor bicycle parking spaces for retail patrons and guests will also be located on Site.

Washington Street Vision Plan

The City of Newton recently finished conducting a vision plan for the Washington Street corridor, which included the area surrounding the Site. The Washington Street Vision Plan is meant to act as a guideline for future development along the Washington Street corridor and incorporates the segment of Washington Street from West Newton village to Lewis Terrace. The plan identifies a specific vision for the corridor and focuses on creating lively village centers, making Washington Street safe for everyone, creating diverse housing options, developing places for Newton residents to connect with their community, being sensitive to climate and environmental necessities, and incorporating excellence in placemaking principles.

Specifically, the Washington Street Vision Plan focuses on converting the Washington Street corridor into a dense, walkable neighborhood and transforming the roadway from a high-speed throughway into a local neighborhood street. The Vision Plan proposed to reduce the cross-section on Washington Street and provide enhanced pedestrian and bicycle accommodations along the corridor. In addition, the Vision Plan encourages the development of dense, multi-family housing units near transit stations along the corridor and to limit visible parking lots by providing below ground parking.

The proposed Project was designed with the vision plan in mind. The proposed Project is expected to contribute to realizing the vision plan by building multi-family housing that relies on more alternative means of transportation improvements than the traditional capacity-adding infrastructure improvements. The Project incorporates many features proposed in the vision plan, such as below ground parking and multi-story residential development in walking distance to transit stations, shops, and restaurants. In addition, the Site is in an area the vision plan identified as village in character, with low height (1-4 stories) development preferred along Washington Street and medium height (3-6 stories) development preferred along Davis Street. The proposed Project meets the desired heigh targets by maintaining the existing low-rise building along Washington Street while adding a medium-height 5-story addition along Highland Street and Davis Street.

The Washington Street Vision Plan was approved by the Newton City Council on December 16, 2019.

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Existing Conditions

Evaluation of the transportation impacts associated with the Project requires an understanding of the existing transportation conditions in the study area including; an inventory of the traffic control, roadway, driveway, and intersection geometry in the study area, the collection of daily and peak hour traffic volumes, a summary of public transit options in the area, and a review of recent crash history. Each of these elements is described in detail below.

Study Area

Based on VHB's knowledge of the area transportation network and the operational characteristics of the Project, a study area was established consisting of the following 10 intersections:

- Washington Street at:
  - Elm Street – *signalized*
  - Cherry Street – *signalized*
  - Highland Street – *signalized*
  - Waltham Street and Watertown Street – *signalized*
  - Chestnut Street – *signalized*
- Highland Street at:
  - Site Driveway – *unsignalized*
  - Church North Driveway – *unsignalized*
  - Davis Street / Church South Driveway – *unsignalized*
- Davis Street at:
  - Site Driveway(s) – *unsignalized*
- Chestnut Street at:
  - Davis Street – *unsignalized*

A map of the project location and study area intersections are shown in Figure 1 and the observed existing geometry and traffic control at each study area intersection are illustrated in Figure 2.

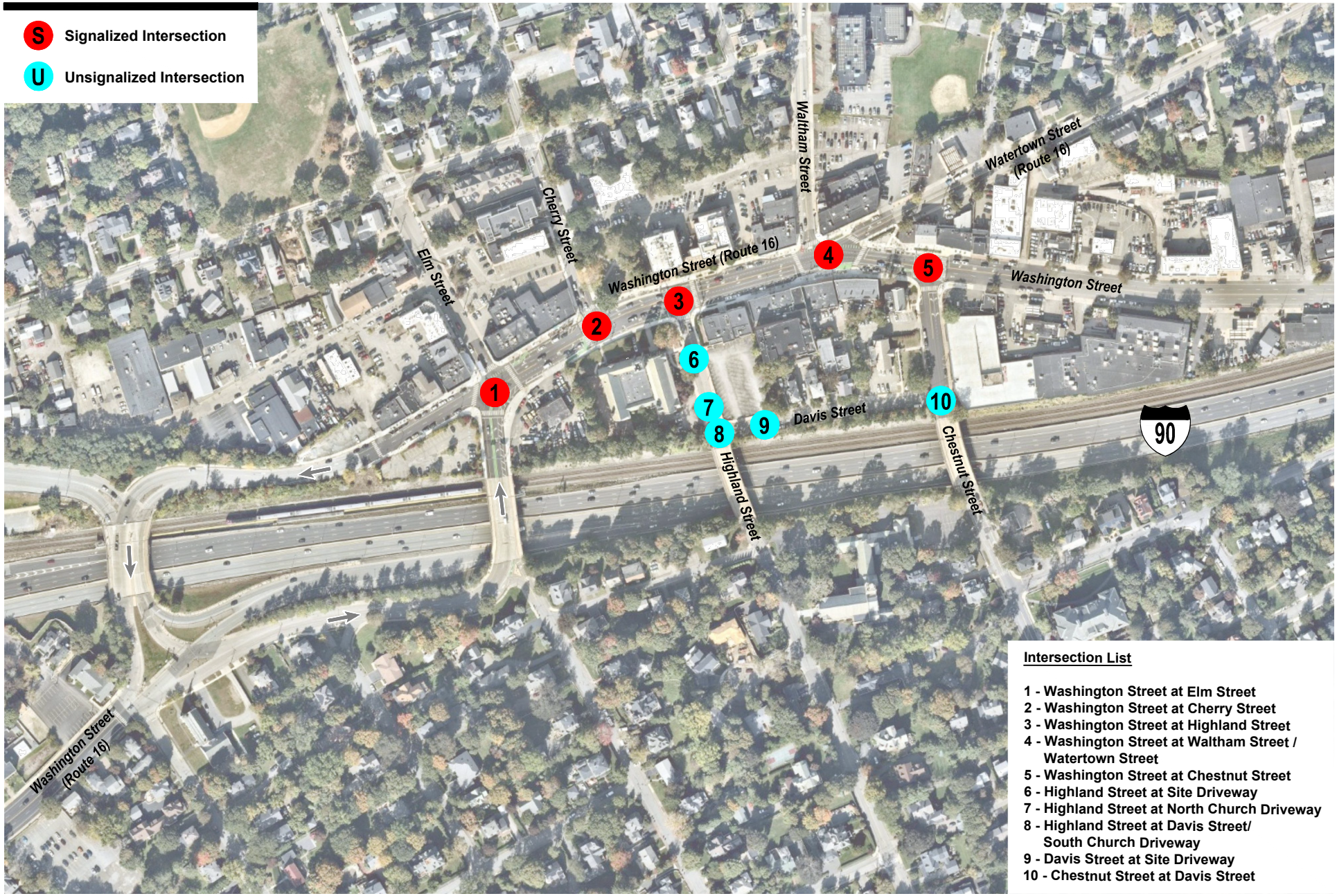
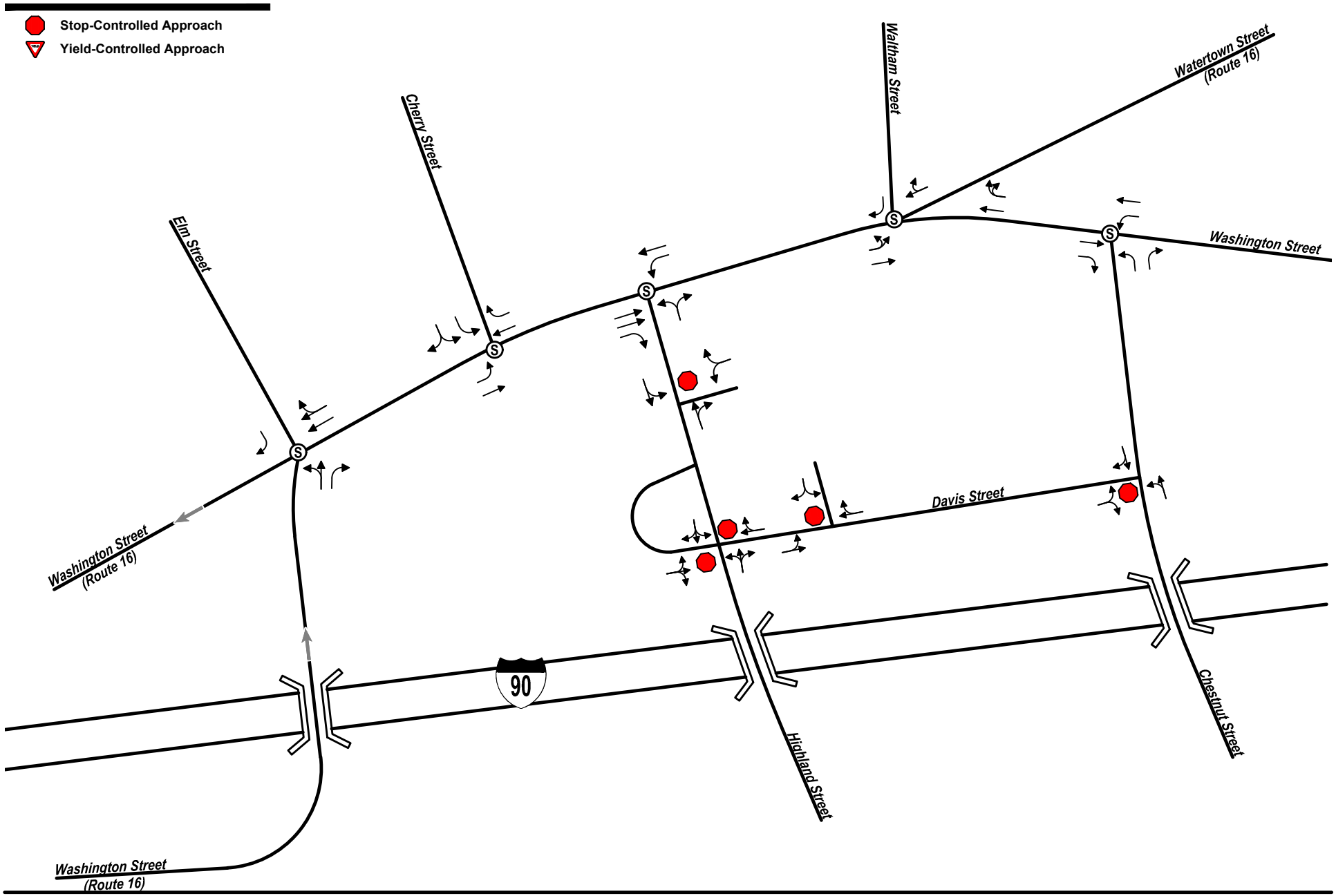


Figure 1
Study Area Intersections

1314 Washington Street Redevelopment
West Newton, Massachusetts



Not to Scale

Figure 2
Intersection Lane Geometry and Traffic Control

1314 Washington Street Redevelopment
Newton, Massachusetts

West Newton Square Enhancements

The City of Newton recently completed construction in Fall 2021 on a series of roadway improvements to Washington Street through West Newton village. The enhancements included roadway, sidewalk, and streetscape improvements along the roadway with the goals of applying a "complete streets" approach to the core area along Washington Street prioritizing safety for all and upgrading the landscape and streetscape conditions to create a more inviting environment. Some of the improvements included changes to the lane geometry and the addition of bike lanes in both directions on Washington Street between just west of Elm Street and Chestnut Street, the reconstruction of sidewalks and crosswalk ramps on both sides of Washington Street, and updated signal timings at the signalized intersections in West Newton village.

Study Area Roadways

All roadways within the study area are under the jurisdiction of the City of Newton. Descriptions of the study area roadways are provided below.

Washington Street

Washington Street within the study area is a four-lane roadway running generally in an east-west direction. The roadway is classified as an urban principal arterial roadway west of Watertown Street and an urban minor arterial roadway east of Watertown Street. Washington Street connects Wellesley and I-95 in the west to Newtonville, Newton Corner, and I-90 in the east. The roadway carries the designation of Route 16 from the Newton/Wellesley Town Line to the intersection of Washington Street and Watertown Street. Between Elm Street and Chestnut Street, Washington Street generally provides one through lane per direction with an additional turn or shared through/turn lane at each intersection. Outside of this area, Washington Street generally provides two travel lanes per direction. The posted speed limit along Washington Street is 25 mph within the study area. Land use along Washington Street is mainly commercial in the study area. On-street parking is provided in the eastbound direction east of Highland Street and in the westbound direction along most of the roadway in the study area, except from Chestnut Street to Waltham Street and from Highland Street to Cherry Street.

Highland Street

Highland Street within the study area is a two-lane (one lane per direction) local roadway running generally in a north-south direction. Highland Street provides a bridge across I-90 and connects West Newton village center in the north to residential neighborhoods in the south. There is no posted speed limit along the roadway in the vicinity of the study area. Land use along Highland Street is mainly residential, with some commercial properties in the West Newton village center. No on-street parking is provided on weekdays. On-street parking is allowed on the southbound side from approximately across from the existing site driveway to the bridge on Saturdays, Sundays, and holidays.

Chestnut Street

Chestnut Street within the study area is a two-lane (one lane per direction) urban minor arterial roadway running generally in a north-south direction. Chestnut Street provides a bridge across I-90 and connects West Newton village center in the north to residential neighborhoods, Commonwealth Avenue (Route 30), and Newton Upper Falls in the south. The posted speed limit along the roadway is 30 mph in the study area. Land use along Chestnut Street is mainly residential, with some commercial properties in the West Newton village center. Six two-hour on-street parking spaces are provided on the southbound side north of Davis Street and four two-hour on-street parking spaces are provided on the northbound side across from Davis Street.

Davis Street

Davis Street is a two-lane (one lane per direction) local roadway running in a north-south direction between Highland Street in the west and Chestnut Street in the east. There is no posted speed limit. On-street parking is provided on the south side of the roadway, with the parking east of Spencer Street reserved for police only Monday through Friday, 7 AM to 5 PM.

Study Area Intersections

Washington Street at Elm Street

- Four-legged signalized intersection
- Washington Street westbound approach provides one through travel lane and one shared through/right-turn lane
- Washington Street northbound approach provides one shared left-turn/through lane and one right-turn lane that continues as Washington Street (Route 16) eastbound
- Elm Street southbound approach provides one right-turn only lane
- Sidewalks are provided along both sides of all streets
- Crosswalks are provided across all legs
- Bicycle lanes are provided on the Washington Street westbound and northbound approaches
- Land use in the area consists of commercial properties and a parking lot for the West Newton Commuter Rail Station in the southwest corner
- MBTA bus stops are located on the northbound side of Elm Street north of the intersection and on the eastbound side of Washington Street east of the intersection
- MBTA West Newton Commuter Rail Stop is located southwest of the intersection

Washington Street at Cherry Street

- Three-legged signalized intersection
- Washington Street eastbound approach provides one left-turn lane and one through travel lane
- Washington Street westbound approach provides one through travel lane and one right-turn lane
- Cherry Street southbound approach provides one left-turn lane and one shared left-turn/right-turn lane
- Sidewalks are provided along both sides of both streets
- Crosswalks are provided across the west and north legs
- Separated bicycle lanes are provided on the Washington Street eastbound and westbound approaches
- Land use in the area consists of commercial properties, the Captain John Ryan Memorial Park, and the First Unitarian Universalist Society in Newton Church
- MBTA bus stops are located on both sides of Washington Street east of the intersection
- The traffic signal at this location is connected to the same controller as the traffic signal at Washington Street/Highland Street

Washington Street at Highland Street

- Three-legged signalized intersection
- Washington Street eastbound approach provides two through travel lanes and one right-turn lane
- Washington Street westbound approach provides one left-turn lane and one through travel lane
- Highland Street northbound approach provides a single general-purpose lane
- Sidewalks are provided along both sides of both streets
- Crosswalks are provided across the east and south legs
- Bicycle lanes are provided on the Washington Street eastbound and westbound approaches
- Land use in the area consists of commercial properties, the Captain John Ryan Memorial Park, the Newton Police Department, and the First Unitarian Universalist Society in Newton Church
- MBTA bus stops are located on both sides of Washington Street west of the intersection
- The traffic signal at this location is connected to the same controller as the traffic signal at Washington Street/Cherry Street

Washington Street at Waltham Street and Watertown Street

- Four-legged signalized intersection
- Washington Street eastbound approach provides one left-turn lane (to Watertown Street only) and one through travel lane
- Washington Street westbound approach provides one through lane and one shared through/right-turn lane
- Watertown Street southwestbound approach provides one right-turn only lane
- Waltham Street southbound approach provides one right-turn only lane
- Sidewalks are provided along both sides of all streets
- Crosswalks are provided across all legs
- Bicycle lanes are provided on the Washington Street eastbound and westbound approaches
- Land use in the area consists of commercial properties
- MBTA bus stop is located on the westbound side of Washington Street east of the intersection

Washington Street at Chestnut Street

- Three-legged signalized intersection
- Washington Street eastbound approach provides one through travel lane and one 50-foot long right-turn lane
- Washington Street westbound approach provides one left-turn lane and one through lane
- Chestnut Street northbound approach provides one left-turn lane and one right-turn lane
- Sidewalks are provided along both sides of both streets
- Crosswalks are provided across the east and south legs
- Bicycle lane is provided on the Washington Street eastbound approach
- Land use in the area consists of commercial properties
- MBTA bus stops are located on the westbound side of Washington Street west of the intersection and the eastbound side of Washington Street east of the intersection

Highland Street at Site Driveway

- Three-legged unsignalized intersection
- As of 2022, the Site parking lot is closed to vehicular access and the driveway is blocked off
- All approaches provide one general-purpose lane
- The Site driveway is under stop-control
- Sidewalks are provided along both sides of Highland Street
- The sidewalk material continues across the Site driveway
- Land use in the area consists of commercial properties and the First Unitarian Universalist Society in Newton Church

Highland Street at Church North Driveway

- Three-legged unsignalized intersection
- Both Highland Avenue approaches provide one general-purpose lane
- Church driveway westbound approach is one-way into the driveway with one lane
- Sidewalks are provided along both sides of Highland Street
- The sidewalk material continues across the church driveway
- Land use in the area consists of commercial properties and the First Unitarian Universalist Society in Newton Church

Highland Street at Davis Street

- Four-legged unsignalized intersection
- Both Highland Street approaches provide one general-purpose lane
- Davis Street provides one right-turn only lane under stop-control
- Church driveway westbound approach is one-way out of the driveway with one lane
- Sidewalks are provided along both sides of Highland Street and the north side of Davis Street
- Crosswalks are provided across the east and north legs
- The sidewalk material continues across the church driveway
- Land use in the area consists of commercial and residential properties and First Unitarian Universalist Society in Newton Church

Davis Street at Site Driveway(s)

- Three-legged unsignalized intersection(s)
- Under Existing Conditions, separate driveways are provided for entering and exiting the Site parking lot and the two driveways are approximately 60 feet apart
- As of 2022, the Site parking lot is closed to vehicular access and the driveways are blocked-off
- All approaches provide one general-purpose lane
- The Site driveway is under stop-control
- Sidewalks are provided along the north side of Davis Street
- The sidewalk material continues across the Site driveway
- Land use in the area consists of commercial and residential properties

Chestnut Street at Davis Street

- Three-legged unsignalized intersection
- All approaches provide one general-purpose lane
- Davis Street is under stop-control
- Sidewalks are provided along both sides of Highland Street and the north side of Davis Street
- Crosswalk is provided across Davis Street
- Land use in the area consists of Newton Police Department, commercial and residential properties

Traffic Volumes

To identify current traffic flow characteristics along the primary roadways serving the Project study area, peak-hour turning movement counts (TMCs) and daily traffic volumes were collected within the study area. Traffic volumes for the analysis were collected in February 2022, but due to the closure of the Chestnut Street bridge over I-90 on the day TMCs were recorded, data provided by the City from October 2021 was used where possible. The February 2022 and October 2021 traffic count data is included in the Appendix.

Count Data

Peak-hour turning movement counts (TMCs) to collect peak hour data were conducted at each of the study-area intersections on Thursday, February 10, 2022 from 7:00 AM to 9:00 AM and from 4:00 PM to 6:00 PM. These time periods were selected so that the combined peak periods for the roadway and Project Site activity would be evaluated. Concurrent with the TMCs, 48-hour automatic traffic recorder (ATR) counts were conducted on Highland Street and Davis Street on February 9th and February 10th. Due to the closure of the Chestnut Street bridge over I-90 on February 10th, data provided by the City from October 2021 was used where possible and supplemented by ATR data from February 9th for Davis Street movements and TMC data from February 10th for driveway movements.

The TMC data collection included the typical weekday morning and weekday evening peak periods, with counts occurring when schools were in operation and typical commuter traffic was present on the study area roadways. The counting effort included counts for heavy vehicles, cars, bicycles, and pedestrians. The weekday morning and evening peak hours occurring on a typical weekday in October 2021 were found to be 7:45 AM to 8:45 AM and 5:00 PM to 6:00 PM, respectively. The weekday morning and evening peak hours occurring on a typical weekday in February 2022 were found to be 8:00 AM to 9:00 AM and 5:00 PM to 6:00 PM, respectively. For a conservative analysis, the peak hours for each count period were used.

Count Adjustments

As stated previously, the traffic data collected for the study area was obtained during the months of October 2021 and February 2022. Negligible difference was found between the October 2021 and February 2022 volumes on roadways not affected by the Chestnut Street bridge closure. The peak

hour traffic volumes for October 2021 were compared to April 2019 volumes to determine an adjustment to account for the effects of the COVID-19 pandemic. The comparison showed that the October 2021 weekday morning and evening peak hour volumes required adjustments of 1.23 and 1.11 to reach pre-pandemic (April 2019) traffic levels. Therefore, adjustments of 1.23 and 1.11 were applied to the weekday morning and evening peak hour volumes, respectively, for the October 2021 and February 2022 count data. As traffic volumes in April are slightly higher than average month conditions, no additional count adjustments were necessary to account for seasonal variation of traffic volumes as both October 2021 and February 2022 traffic volumes were adjusted to match April 2019 traffic levels.

Existing Traffic Volumes

The resulting 2022 Existing Conditions weekday morning and weekday evening peak hour traffic volumes are shown in Figures 3 and 4, respectively.

The observed ATR volumes are summarized in Table 1 and all traffic count data is included in the Appendix to this document. Only the ATR counts conducted on February 9th are presented, as the count data for February 10th was impacted by the Chestnut Street bridge closure.

Table 1 Observed Traffic Volumes

	Weekday Daily	Weekday Morning Peak Hour			Weekday Evening Peak Hour		
Location	Volume [a]	Volume [b]	K Factor [c]	Dir. Dist. [d]	Volume	K Factor	Dir. Dist.
Highland Street, south of Santander Bank driveway	5,600	615	11.0%	67% SB	520	9.3%	54% SB
Davis Street, east of Santander Bank driveway	1,400	210	15.4%	71% EB	145	10.6%	51% EB

Source: VHB; Based on automatic traffic recorder (ATR) counts conducted on February 9, 2022. Adjustment of 1.23 applied to AM volumes and adjustment of 1.11 applied to PM volumes to account for COVID-19 conditions.

Note: Peak hours do not necessarily coincide with the peak hours of turning movement counts.

a Average Daily Traffic volume, expressed in vehicles per day

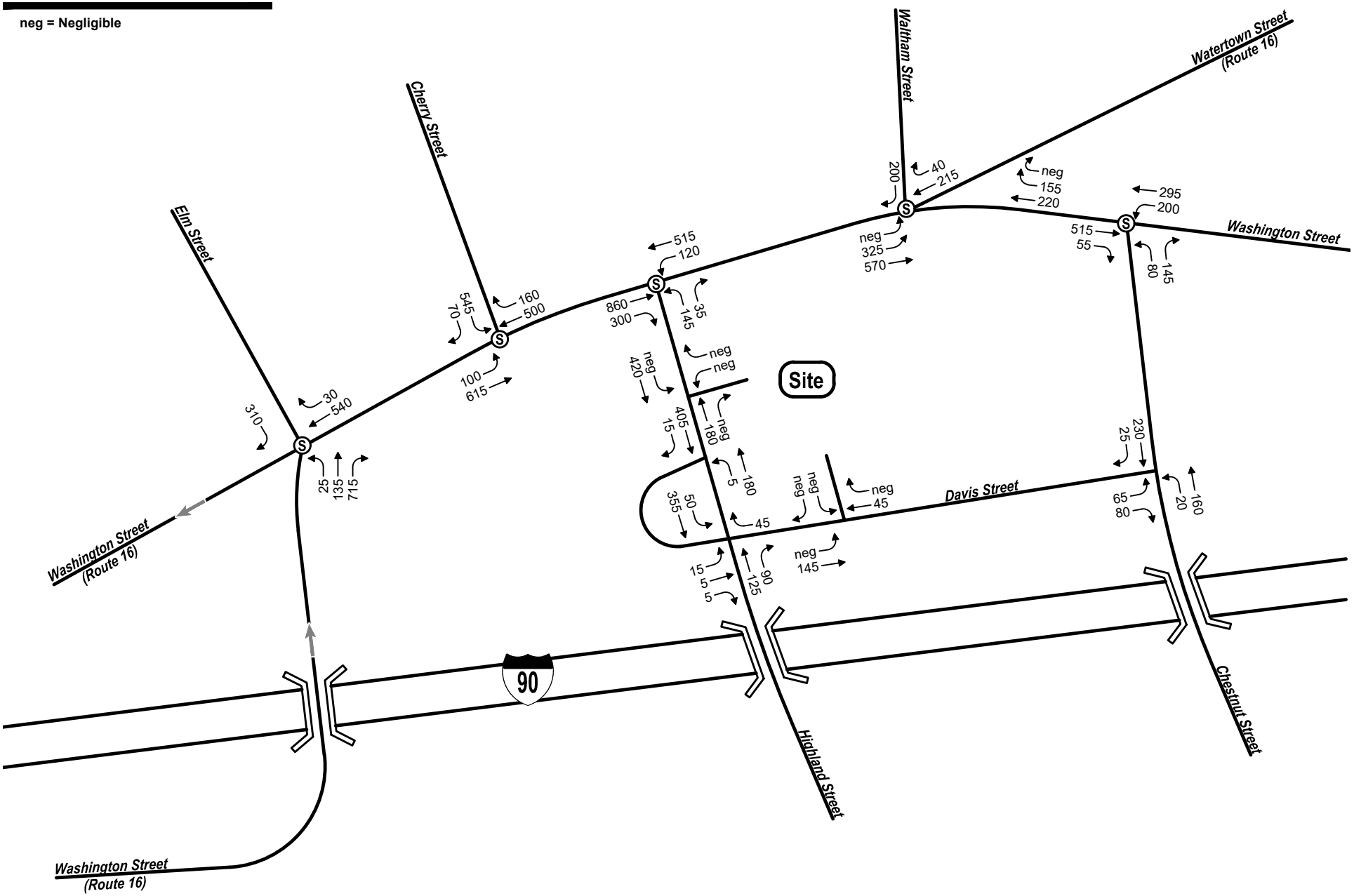
b Peak period traffic volume, expressed in vehicles per hour

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

d Directional distribution of peak hour traffic

As shown in Table 1, Highland Street carries approximately 5,600 vehicles on a typical weekday with the peak hours accounting for 11.0 percent (morning peak hour) and 9.3 percent (evening peak hour) of the weekday daily traffic flow. Traffic flow along Highland Street is heavier in the southbound direction during the weekday morning peak hour, and almost evenly split during the weekday evening peak hour.

Davis Street carries approximately 1,400 vehicles on a typical weekday with the peak hours accounting for 15.4 percent (morning peak hour) and 10.6 percent (evening peak hour) of the weekday daily traffic flow. Traffic flow along Davis Street is heavier in the eastbound direction during the weekday morning peak hour, and almost evenly split during the weekday evening peak hour.



Not to Scale

Figure 3

2022 Existing Conditions
Weekday Morning Peak Hour Traffic Volumes
1314 Washington Street Redevelopment
Newton, Massachusetts

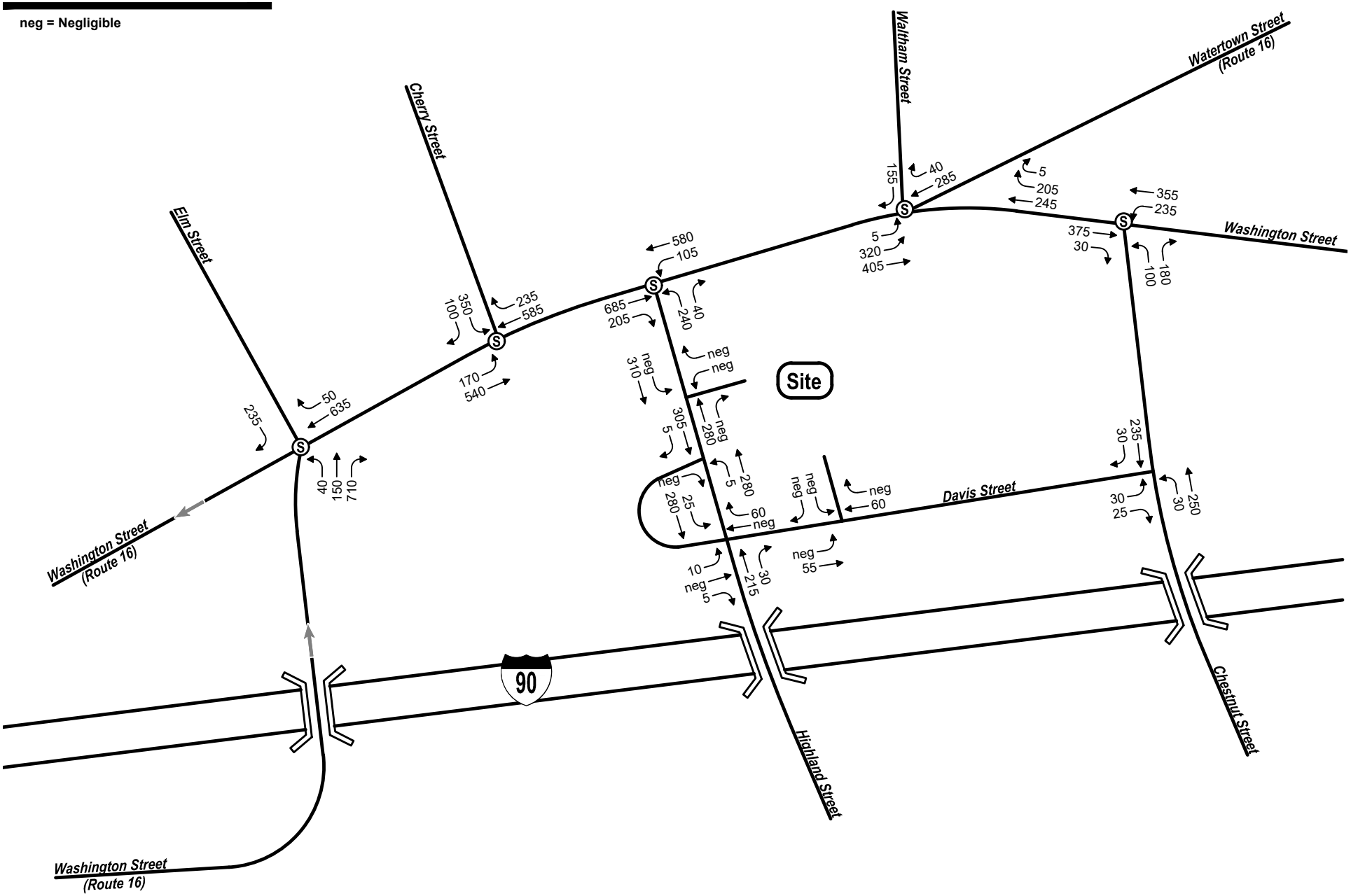


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Figure 4

2022 Existing Conditions
Weekday Evening Peak Hour Traffic Volumes
1314 Washington Street Redevelopment
Newton, Massachusetts

Pedestrian and Bicycle Facilities

Due to the recent West Newton Square Enhancements project, pedestrian and bicycle facilities in the study area are robust. The project included the addition of bike lanes in both directions on Washington Street between just west of Elm Street and Chestnut Street as well as the reconstruction of sidewalks and crosswalk ramps and both sides of Washington Street.

West Newton has a pedestrian-friendly village center with nearly all businesses located directly at sidewalk level and with crosswalks across Washington Street located every 100-250 feet in the study area. Crosswalks are provided at all intersections in the study area.

An eastbound bike lane is provided from Putnam Street to Chestnut Street, and a westbound bike lane is provided from Chestnut Street to approximately 300 feet west of Elm Street. The westbound bike lane is protected with vertical buffers (flexposts, parking, or curbing) from Chestnut Street to Elm Street. Separate bike signals are provided at the intersections on Washington Street with Elm Street, Cherry Street, Highland Street, and Waltham Street/Watertown Street.

Bluebikes Program

In addition, Bluebikes provides a bike-sharing service with a network of over 400 stations in Metro Boston. The nearest Bluebikes station is located on Waltham Street at its intersection with Washington Street, approximately 350 feet walking distance from the Site retail building entrance on Washington Street. This Bluebikes location currently includes nine docking stations.

Public Transportation

Public transportation in Newton is provided by the Massachusetts Bay Transportation Authority (MBTA). The proposed development is directly served by two MBTA bus routes; Bus Routes 553 and 554. The Framingham/Worcester Line of the commuter rail also provides additional service at West Newton Station in close proximity of the Site. Descriptions of each transit service is provided below.

Figure 5 displays the existing public transportation services provided in the study area and detailed schedules can be found in the Appendix to this document.

MBTA Commuter Rail

Framingham/Worcester Line

The Framingham/Worcester Line of the MBTA Commuter Rail travels between Union Station in Worcester and Back Bay Station and South Station in Boston. The nearest stop to the Site is West Newton Station, approximately 0.15-mile west of the Site on Washington Street. The nearest station entrance is an approximately three-minute walk to the Site. Service to/from West Newton Station on the Framingham/Worcester Line is provided seven days a week and during peak periods service is provided every hour in peak directions. Service is approximately every two hours on weekends. One-way fare between West Newton and Boston Landing, Lansdowne, Back Bay, or South Station costs $7.00 per ride. The station provides a bicycle rack and vehicle parking.

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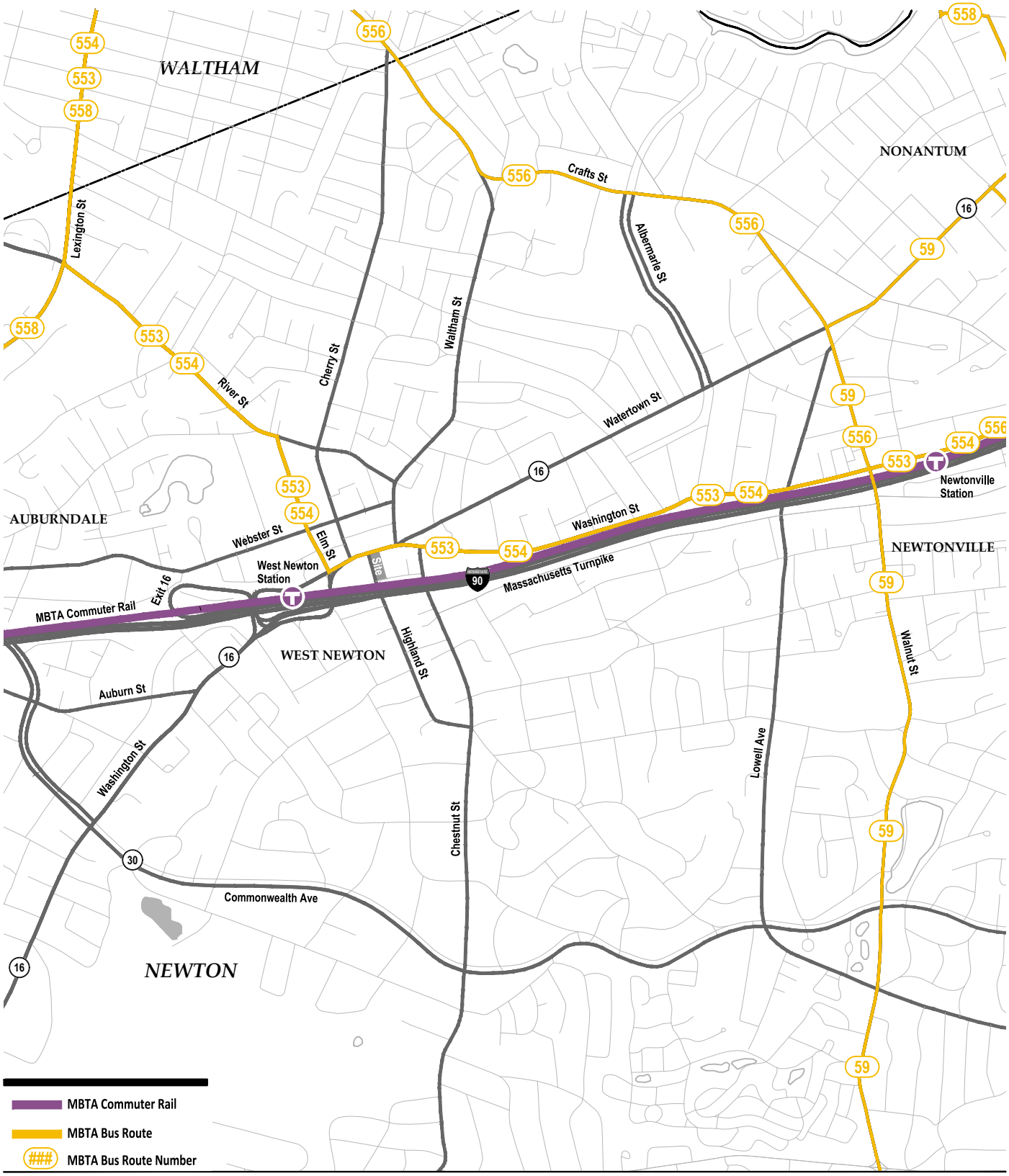


0 750 1500 Feet

Figure 5
Existing Local Public Transportation

1314 Washington Street Redevelopment
Newton, Massachusetts

MBTA Bus Routes

Route 553

Bus Route 553 travels between Brandeis/Roberts in Waltham and Washington Street in Newton Corner. The closest inbound stops are on Elm Street at Washington Street and Washington Street at Chestnut Street (approximately 650 and 550 feet away respectively), and the closest outbound stop is on Washington Street at Cherry Street (approximately 250 feet away). Bus Route 553 runs six days a week, Monday through Saturday, and has a frequency of approximately 45 minutes on weekdays and 60-90 minutes on Saturdays. One-way fares cost $1.70 per ride.

Route 554

Bus Route 554 travels between Waverly Square in Belmont and Washington Street in Newton Corner. The closest inbound stops are on Elm Street at Washington Street and Washington Street at Chestnut Street (approximately 650 and 550 feet away respectively), and the closest outbound stop is on Washington Street at Cherry Street (approximately 250 feet away). Bus Route 554 runs five days a week, Monday through Friday, during the morning and evening peak periods with a frequency of approximately 90 minutes. One-way fares cost $1.70 per ride.

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 2015 to 2019. 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 2 and the detailed crash data is provided in the Appendix to this document.

Crash rates are calculated based on the number of crashes at an intersection and the volume of traffic traveling through that intersection on a daily basis. Rates that exceed MassDOT's average for crashes 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 the study area, the calculated crash rates were compared to MassDOT's District 6 average, as Newton is located in District 6. In District 6, the average crash rate is 0.71 for signalized intersections and 0.52 for unsignalized intersections. These rates imply that, on average, 0.71 crashes occurred per million vehicles entering signalized intersections throughout District 6 and 0.52 crashes occurred per million vehicles entering unsignalized intersections in District 6. It should be noted that the location for some crashes cannot be precisely determined from the database. These locations typically involve interchange intersections. Additionally, some crashes may have occurred but were either not reported or not included in the database, and therefore not considered.

Table 2 Vehicular Crash Summary (2015-2019)

	Washington St at Elm St	Washington St at Cherry St	Washington St at Highland St	Washington St at Waltham St and Watertown St	Washington St at Chestnut Street	Highland St at Site Driveway	Highland St at Church North Driveway	Highland St at Davis St / Church South Driveway	Davis St at Site Driveways	Chestnut St at Davis St
Signalized?	Yes	Yes	Yes	Yes	Yes	No	No	No	No	No
MassDOT Average Crash Rate	0.71	0.71	0.71	0.71	0.71	0.52	0.52	0.52	0.52	0.52
Calculated Crash Rate	0.43	0.60	0.77	0.89	0.77	0.00	0.00	0.24	0.00	0.25
Exceeds Average?	No	No	Yes	Yes	Yes	No	No	No	No	No
Year										
2015	4	2	5	3	3	0	0	0	0	2
2016	5	4	7	8	4	0	0	1	0	0
2017	2	9	4	10	5	0	0	2	0	0
2018	4	3	8	4	7	0	0	0	0	0
2019	1	6	5	5	1	0	0	0	0	1
Total	**16**	**24**	**29**	**30**	**20**	**0**	**0**	**3**	**0**	**3**
Collision Type										
Angle	4	2	11	7	10	0	0	1	0	1
Head-on	0	1	0	0	0	0	0	1	0	0
Rear-end	3	5	6	8	3	0	0	0	0	2
Rear-to-rear	0	1	0	0	0	0	0	0	0	0
Sideswipe, opposite direction	2	0	1	1	0	0	0	0	0	0
Sideswipe, same direction	2	12	8	5	4	0	0	0	0	0
Single Vehicle Crash	3	3	3	6	2	0	0	1	0	0
Unknown/Not Reported	2	0	0	3	1	0	0	0	0	0
Severity										
Fatal Injury	0	0	0	1	0	0	0	0	0	0
Non-Fatal Injury	2	3	4	4	3	0	0	2	0	0
Property Damage Only	12	20	23	22	15	0	0	1	0	3
Unknown/Not Reported	2	1	2	3	2	0	0	0	0	0
Time of day										
Weekday ,7:00 AM - 9:00 AM	1	5	3	0	4	0	0	1	0	0
Weekday, 4:00 – 6:00 PM	2	3	3	1	2	0	0	1	0	0
Saturday 11:00 AM – 2:00 PM	0	0	1	1	1	0	0	0	0	0
Weekday, other time	12	11	14	23	9	0	0	1	0	3
Weekend, other time	1	5	8	5	4	0	0	0	0	0
Pavement Conditions										
Dry	8	15	20	27	15	0	0	2	0	2
Wet	5	6	6	2	4	0	0	1	0	0
Sand, Mud, Dirt, Oil, Gravel	0	1	0	0	0	0	0	0	0	0
Snow / Ice / Slush	2	1	3	1	1	0	0	0	0	1
Unknown/Not Reported	1	1	0	0	0	0	0	0	0	0
Non-Motorist (Bike, Pedestrian)	1	1	2	4	2	0	0	1	0	0

Source: Crash data obtained from MassDOT IMPACT Portal, accessed in February 2022.

It should be noted that the 2015-2019 crash data shown in Table 2 does not reflect the West Newton Square Enhancements project completed in Fall 2021 that improved pedestrian and bicycle accommodations in the area.

As shown in Table 2, review of the accident data indicates that three of the study area intersections are above the district crash rate averages; the intersections of Washington Street at Highland Street, Washington Street at Waltham Street/Watertown Street, and Washington Street at Chestnut Street. The majority of crashes throughout the study area were angle, sideswipe same direction, or rear-end crashes occurring on dry pavement resulting in property damage only. Based on the MassDOT records, one fatal accident occurred within the study area during the five-year period. The fatal accident occurred in March 2016 when a vehicle traveling down Chestnut Street lost control and plowed into the front of the Sweet Tomatoes restaurant on Washington Street. In addition, all five Washington Street intersections and the intersection of Highland Street at Davis Street reported at least one crash involving bicyclists or pedestrians over the five-year period.

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"[1] crashes in the area is within the top 5% of all clusters in that region. Being HSIP-eligible makes the location eligible for FHWA and MassDOT funds to address the identified safety issues at these locations.

As part of this effort, VHB reviewed this database and found that all study area intersections are part of a 2010-2019 HSIP Pedestrian Cluster. It should be noted that the 2010-2019 crash data does not reflect the West Newton Square Enhancements project completed in Fall 2021 that improved pedestrian and bicycle accommodations in the area.

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

4

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

Previously submitted traffic studies in the area were reviewed to determine an appropriate growth rate. Based on the recently submitted Transportation Impact and Access Study[2] for the Dunstan Residences development located less than a quarter-mile away, a growth rate of 0.5-percent was determined to be appropriate for this study. The study found that other traffic studies in the area used annual growth rates between 0.3-percent and 0.5-percent to project future traffic conditions. Specifically, the traffic memo submitted in August 2017 for the West Newton roadway improvements project (described below) assumed annual growth rates of 0.3-percent and 0.4-percent to determine future traffic projections for the weekday morning and weekday evening peak periods, respectively[3]. In addition, the Transportation Impact and Access Study for the Riverside MBTA Station redevelopment used an annual growth rate of 0.5-percent to project future traffic conditions[4].

[2] The Dunstan Residences Transportation Impact and Access Study; VHB; April 2021.

[3] West Newton Enhancement Project Traffic Analysis Technical Memo; HDR; August 2017.

[4] The Station at Riverside Redevelopment Transportation Impact and Access Study; VHB; April 2019.

In addition, the study compared historic traffic data in the area to assess the change in traffic in Newton from 2015/2016 to 2019. The West Newton Enhancements Project Traffic Analysis Technical Memo prepared by HDR in August 2017 included traffic counts from June 2016 along Washington Street between I-90 and Chestnut Street. The Washington Place Mixed Use Transit Oriented Redevelopment included traffic counts from November 2015 along Washington Street between Lowell Avenue and Walnut Street. Based on a comparison between the traffic volumes in these documents and those counted by VHB in April 2019 for the Dunstan Residences, it was determined that 2019 counts indicated *slightly lower* traffic volumes. A table summarizing the change in traffic volumes from 2015-2016 to 2019 is included in the Appendix to this report.

To present a conservative analysis and to be consistent with previous traffic studies conducted in the area, a growth rate of 0.5-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 near the Site was also considered. Based on research by VHB and discussions with the City of Newton, it was determined that there are several planned development projects within the vicinity of the study area that would need to be considered as part of the future traffic conditions, independent of the Project. The planned/approved projects are described below in detail and the projected traffic volumes expected to be generated by each project were taken from filed traffic impact studies or estimated based on ITE projections and added to the study area roadways based on existing travel patterns. The associated site-specific growth traffic volumes are included in the Appendix to this report.

- **The Dunstan Residences:** The project involves the construction of 302 residential units and approximately 5,800 sf of ground-floor retail space along Washington Street adjacent to Dunstan Street and Kempton Place in the West Newton neighborhood of Newton. This project is approved but not yet under construction as of March 2022.
- **283 Melrose Street:** The project involves the restoration of a 200-seat theater, construction of an addition to the theater to contain office space, and construction of a second building on-site to contain 16 residential units at 283 Melrose Street in the Auburndale neighborhood of Newton. This project is currently under construction.
- **Riverside Redevelopment:** The project involves the construction of 1.025 million square feet of development on the existing Hotel Indigo and Riverside T Station parking lot on Grove Street in Newton. The proposal includes approximately 362,000 sf of office/lab space, 550 residential units, and approximately 22,000 sf of restaurant/retail space. This project is approved but not yet under construction as of March 2022.
- **Russian School of Math:** The project involves the proposed redevelopment of the 4,000-sf medical office at 46-48, 60, and 66-68 Austin Street in Newton to a space designed for the Russian School of Mathematics.
- **131 Rumford Avenue:** The project involves the construction of an approximately 5,000 sf medical marijuana facility.
- **15-21 Lexington Avenue:** The project involves the construction of 24 residential units in a three-story structure.

- **967 Washington Street:** The project involves the construction of 28 residential units in a three-story structure.
- **275 Grove Street:** The project involves the conversion of approximately 126,100 sf of existing office space into lab space. Based on the traffic study submitted for this project, the conversion of existing office space into lab space is expected to result in a net decrease in traffic generation. To be conservative, no adjustment to the traffic volumes on the roadway network had been made and this project is included for informational purposes only.

Roadway Improvements

In assessing future traffic conditions, proposed roadway improvements within the study area were considered. Based on research by VHB and discussions with the City of Newton, there are no roadway improvements projects that may affect traffic volumes within the seven-year horizon. However, it should be noted that Washington Street in the study area is included in the Washington Street Vision Plan.

Washington Street Vision Plan

As stated previously, the City of Newton completed a long-range vision planning process in 2019 for the Washington Street corridor. The West Newton Square Enhancements project advanced many of the guiding principles named in the Washington Street Vision Plan Report, including design for engaging walks, invest in public art and programming, prioritize people safety and comfort, actively manage driving & parking, and expand access to open green spaces and recreation.

The Washington Street Vision Plan identifies a specific vision for the corridor and focuses on creating lively village centers, making Washington Street safe for everyone, creating diverse housing options, developing places for Newton residents to connect with their community, being sensitive to climate and environmental necessities, and incorporating excellence in placemaking principles.

Specifically, the Washington Street Vision Plan focuses on converting the Washington Street corridor into a dense, walkable neighborhood and transforming the roadway from a high-speed throughway into a local neighborhood street. The Vision Plan also encourages the development of dense, multi-family housing units near commuter rail stations along the corridor.

The City of Newton does not have any immediate plans to implement additional improvements to the study area, and therefore no changes are reflected in future conditions.

Public Transportation Improvements

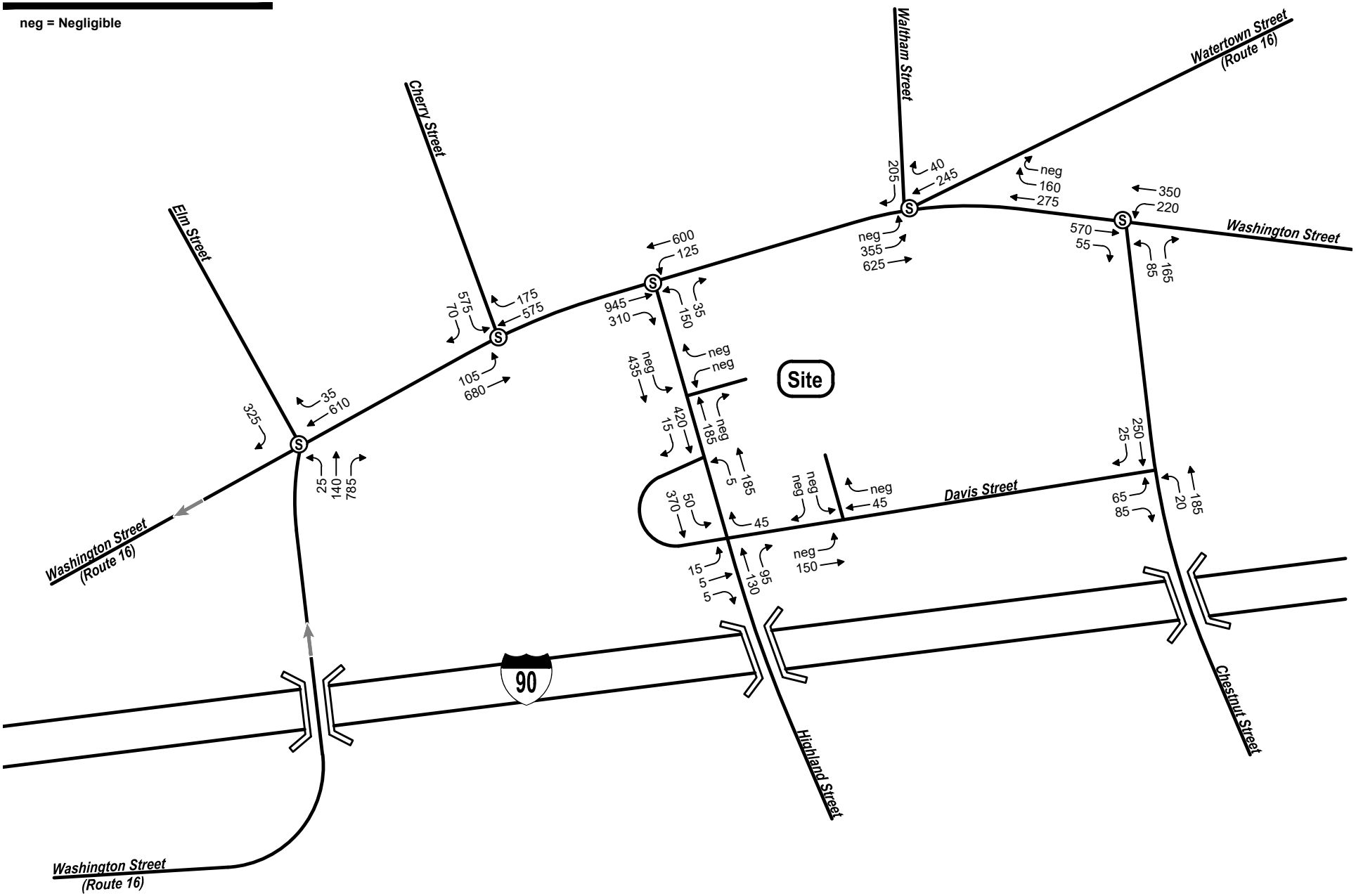
In addition to the proposed roadway improvements listed above, proposed public transportation improvements within the study area were also considered. Based on research by VHB, there are several public transportation improvement projects planned by the MBTA in the upcoming years that may affect capacity on the public transportation services provided in the study area. The proposed public transportation improvement projects are described in detail below:

- **Bus Network Redesign:** The MTBA is currently conducting a review of all bus networks within the service area as part of the Bus Network Redesign project. In May 2022, the MBTA released a draft of the proposed Bus Network Redesign. In West Newton, the draft plan proposes to eliminate Bus Routes 553 and 554 and replace them with modified Routes 61 and 505:
  - **Proposed Route 61:** Proposed Bus Route 61 will travel between North Waltham and Watertown Yard via Waltham Center, Washington Street, and Newton Corner. The closest inbound stop will be on Washington Street west of Highland Avenue (across the street from the Site) and the closest outbound stop will be on Waltham Street south of Webster Street (approximately 600 feet from the Site). Bus Route 61 is proposed to operate seven days a week with frequency every 60 minutes or better between 6:00 AM and 7:00 PM.
  - **Proposed Route 505:** Proposed Bus Route 505 will travel between Waltham Center and Downtown Boston via Elm Street, Washington Street, and I-90 (accessed at Newton Corner). The closest inbound stop will be on Washington Street west of Highland Avenue (across the street from the Site) and the closest outbound stop will be on Washington Street at Cherry Street (approximately 250 feet away). Bus Route 505 may operate five days a week (Monday through Friday) during peak periods only, with peak period frequency of 60 minutes or less.

  While the Bus Network Redesign proposes to eliminate the existing Bus Routes 553 and 554 serving West Newton, the proposed Bus Routes 61 and 505 will approximately replace the existing service. In some cases, service will be expanded over existing conditions as bus service is expected to operate seven days a week (under existing conditions there is no bus service in West Newton on Sunday). In addition, the proposed Bus Route 505 will provide a direction bus connection to Downtown Boston during peak hours, replacing the direct service that was eliminated because of service cuts during the COVID-19 pandemic.
- **West Newton Station Improvements:** Under existing conditions, the platform at the West Newton Station on the Framingham/Worcester Line is not ADA accessible and it only serves one of the two tracks that travels through the station. This restricts the number of trains that can stop at West Newton and limits it mainly to inbound trains in the weekday morning peak period and outbound trains in the weekday evening peak period. Long-term plans by the MBTA include reconstructing West Newton Station (along with the two other commuter rail stations in Newton; Auburndale and Newtonville) to make it ADA accessible and to serve both of the tracks that travel through the station. West Newton accessibility upgrades will include pedestrian connections between the station and Washington Street sidewalk, Webster Street parking lot, and a redesign of the Washington Street parking lot. The project is at 30 percent design.

No-Build Traffic Volumes

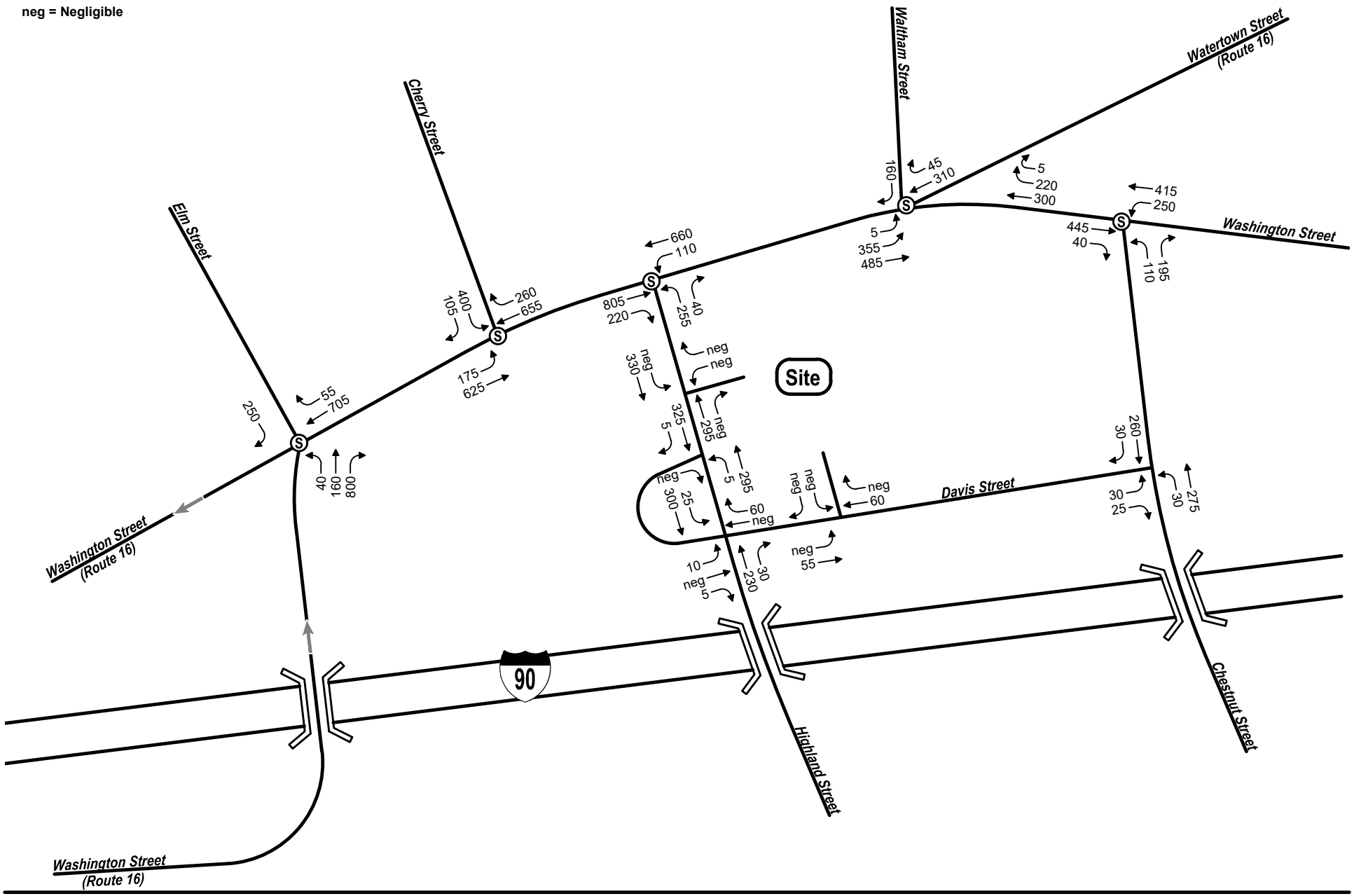
The 2029 No-Build traffic volumes were developed using a growth rate of 0.5-percent per year and adding in the background projects described above. The resulting 2029 No-Build weekday morning and weekday evening peak hour traffic volume networks are shown in Figures 6 and 7, respectively.



Not to Scale

Figure 6

2029 No-Build Conditions
Weekday Morning Peak Hour Traffic Volumes
1314 Washington Street Redevelopment
Newton, Massachusetts



Not to Scale

Figure 7

2029 No-Build Conditions
Weekday Evening Peak Hour Traffic Volumes
1314 Washington Street Redevelopment
Newton, Massachusetts

Trip Generation

The rate at which any development generates traffic is dependent upon the size, location, and concentration of surrounding developments. As mentioned previously, the Project is comprised of retail and residential uses. The ITE Trip Generation Manual[5] categorizes these land uses and provides weekday daily, weekday morning peak hour, weekday evening peak hour, Saturday daily, and Saturday 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) 221 (Mid-Rise Residential) and LUC 822 (Strip Retail Plaza). The trip generation analyses are presented below.

Existing Site-Generated Traffic

As the parcel is currently unoccupied, it was assumed to have no trip generation. While the Site was previously occupied by a Santander Bank branch, no credit was taken for the previous use on Site to provide a conservative analysis.

Project-Generated Trips

Estimating future conditions volumes for the Site involved adjusting the ITE unadjusted vehicle trip generation estimates for each use by converting to person trips and applying internal capture, mode share, and pass-by trip credits.

Unadjusted Project-Generated Traffic

The proposed development will consist of approximately 50 residential units and 3,873 sf of retail space. Traffic associated with the residential units was estimated using ITE LUC 221 (Mid-Rise Residential) and traffic associated with the retail space was estimated using ITE LUC 822 (Strip Retail Plaza).

The unadjusted new vehicle trip estimates are presented in Table 3 and trip generation worksheets are included in the Appendix.

5 Trip Generation Manual, 11th Edition, Institute of Transportation Engineers, Washington, D.C., 2021.

Table 3 Project Trip Generation – New Unadjusted Vehicle Trips

	Residential [a]	Retail [b]	Total New Unadjusted Vehicle Trips
Weekday Daily			
Enter	97	106	**203**
Exit	97	106	**203**
Total	194	212	**406**
Weekday Morning			
Enter	2	5	**7**
Exit	8	4	**12**
Total	10	9	**19**
Weekday Evening			
Enter	14	20	**34**
Exit	9	20	**29**
Total	23	40	**63**

a Based on ITE LUC 221 (Mid-Rise Residential) for 50 residential units.
b Based on ITE LUC 822 (Strip Retail Plaza) for 3,873 sf

Person Trips

The unadjusted vehicle trips using the ITE data were converted into person trips by applying the average vehicle occupancy (AVO) of 1.18 for residential trips and of 1.82 for retail trips, as outlined by the U.S. Department of Transportation[6]. The national rates are applied when converting to person trips to be consistent with ITE data, which is also based on national data. The unadjusted vehicle trips were converted into person trips in order to apply internal capture credits and applicable mode share credits, as described below. Applying these credits to person trips allows for estimates to be made for the total number of Site-generated transit users, walkers, and bicyclists in addition to the total number of Site-generated vehicles.

Internal Capture Trips

Since the proposed development is a mixed-use project, the trip generation characteristics of the Site will be different from a single-use project. Some of the traffic to be generated by the proposed development will be contained on site as "internal" or "shared vehicle" trips. For example, residents who live in the development may also shop at the retail uses. While these shared trips represent new traffic to the individual uses, they would not show up as new vehicle trips on the surrounding roadway network.

As described in the ITE Trip Generation Handbook[7], "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

6 Summary of Travel Trends: 2017 National Household Survey, US Department of Transportation, Federal Highway Administration, Washington D.C., 2017.

7 Trip Generation Handbook, 3rd Edition, Institute of Transportation Engineers, Washington, D.C., 2017.

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."

Net Person Trips

Based on the methodology outlined in the ITE Trip Generation Handbook, internal capture rates were applied to the gross person trips. The resulting person trip estimates for the Project are presented in Table 4.

Table 4 Project Trip Generation – Net Person Trips

	Residential [a]	Retail [b]	Net Person Trips
Weekday Daily			
Enter	93	176	**269**
Exit	97	172	**269**
Total	190	348	**538**
Weekday Morning			
Enter	3	9	**12**
Exit	9	7	**16**
Total	12	16	**28**
Weekday Evening			
Enter	9	32	**41**
Exit	6	29	**35**
Total	15	61	**76**

Mode Share

It is expected that residents, visitor, and commuters to the Site will use a variety of transportation options to reach the Site, including private vehicles, walking, bicycling, and public transportation. The Project is conveniently located within one-quarter mile of the West Newton MBTA Commuter Rail Station, providing direct access to Boston via the Framingham/Worcester line to South Station. Additionally, two MBTA bus routes are available in the vicinity of the Project. The Project is also located in the dense, walkable neighborhood of West Newton Village.

The mode shares are consistent with the nearby Dunstan Residences project.

To determine the potential mode shares for the residential component of the site, mode share data from the US Census Bureau's 2013-2017 American Community Survey[8] was reviewed. Based on that data, approximately 79-percent of all Newton residents that commute to work travel via private vehicle, 13-percent commute via public transit, and 8-percent commute via walking or bicycling. To provide a conservative estimate, a 13-percent transit reduction credit and an 8-percent walk/bike reduction credit was applied to the vehicular trips related to the residential component of the Project. While the Project may have higher transit use than the average household in Newton due to

[8] US Census Bureau, 2013-2017 American Community Survey, City of Newton

the proximity to the commuter rail, applying a low residential mode share provides the City of Newton with a conservative assessment of future traffic and impacts.

In general, retail uses are expected to generate fewer transit trips than residential uses, as the main trip generator of retail uses are customers, not commuters. While there are expected to be some customers and employees of the retail establishments on Site that will take transit, walk, or bike, to present a conservative analysis, it was assumed that 90-percent of the retail-generated trips will be vehicular trips, 5-percent will be transit trips, and the remaining 5-percent will be walking or bicycle trips. These retail mode shares are consistent with the 2017 National Household Travel Survey developed by the US Department of Transportation, which estimates that nationwide the mode share for all trips generated for the purpose of shopping or running errands was approximately 88.5-percent by private vehicle, 1.8-percent by public transit, 8.1-percent by walking, and 1.7-percent by other modes of transportation. Using a 90-percent retail vehicular mode share for this study provides a conservative assessment of future traffic impacts, while using a 5-percent mode share for transit takes into account the high level of public transit available in the area.

Table 5 provides a summary of the projected mode shares by land use and the mode share references are provided in the Appendix to this report.

Table 5 Project Mode Share

Use	Vehicle	Transit	Walk/Bike
Residential	79%	13%	8%
Retail	90%	5%	5%

Project-Generated Trips

The mode shares discussed above were applied to the net person trips shown in Table 4 to generate the adjusted Project trips by mode. To reflect the number of vehicle trips generated by the Site, the adjusted person trips are converted back to vehicle trips by applying the local AVO rates. The local AVO of 1.12 for residential trips was determined based US Census data. Local VOR data is not available for retail uses, so the national average vehicle occupancy rate of 1.82 persons/vehicle was used.

Table 6 summarizes the new trips by mode.

Table 6 New Project-Generated Trips by Mode

	Net New Vehicle Trips [a]	New Transit Trips	New Walk and Bike Trips
Weekday Daily			
Enter	131	21	16
Exit	131	22	17
Total	262	43	33
Weekday Morning			
Enter	5	0	0
Exit	8	1	1
Total	13	1	1
Weekday Evening			
Enter	16	3	3
Exit	12	2	1
Total	28	5	4

Note Trip generation estimates by mode with internal capture credits applied.
a Vehicle trips do not include pass-by trips.

As shown in Table 6, during the weekday morning peak hour, the Project is expected to generate 13 net new vehicle trips, 1 new transit trips, and 1 new walk/bike trips. During the weekday evening peak hour, the Project is expected to generate 28 net new vehicle trips, 5 new transit trips, and 4 new walk/bike trips.

Pass-By Trips

While the ITE rates provide estimates for all the traffic associated with each land use, not all the traffic generated by the Project will be new to the area roadways. 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 Washington Street may choose to deviate from their original travel path to visit the site retail as an intermediate stop on their way to their ultimate destination. For this evaluation, ITE pass-by rates for LUC 821 (Shopping Plaza) were utilized for the retail trip generation, as data for ITE LUC 822 (Strip Retail Plaza) is unavailable. The pass-by rates were applied to existing trips on Washington Street, Highland Street, and Chestnut Street. Specifically, 40-percent of the retail trip generation was assumed to be drawn from the surrounding roadway network during the weekday evening peak hour. For all other time periods studied, a 25-percent pass-by rate was assumed.

New Vehicle Trips

Table 7 presents the Project-generated net new vehicle trips by land use.

Table 7 Project-Generated Vehicle Trips by Use

	Residential [a]	Retail [b]	Total Net New Vehicle Trips [c]	Pass-By [d]	Total New Vehicle Trips w/ Pass-By [e]
Weekday Daily					
Enter	66	65	**131**	22	**153**
Exit	68	63	**131**	22	**153**
Total	134	128	**262**	44	**306**
Weekday Morning					
Enter	2	3	**5**	1	**6**
Exit	6	2	**8**	1	**9**
Total	8	5	**13**	2	**15**
Weekday Evening					
Enter	6	10	**16**	6	**22**
Exit	4	8	**12**	6	**18**
Total	10	18	**28**	12	**40**

a Residential vehicle trips with internal capture and mode share credits applied.
b Retail vehicle trips with internal capture, mode share, and pass-by credits applied.
c Sum of columns a and b.
d Pass-by Credits of 25% and 40% applied to weekday morning and weekday evening peak hour retail trip generation, respectively.
e Sum of columns c and d.

As shown in Table 7, including pass-by trips, the Project is expected to generate a total of 306 vehicle trips (153 entering / 153 exiting) during the weekday, 15 vehicle trips (6 entering / 9 exiting) during the weekday morning peak hour, and 40 vehicle trips (22 entering / 18 exiting) during the weekday evening peak hour.

Project-Generated Trips Comparison to Previous Use

For comparison purposes, the project trip generation was compared to the previous use on site, which included approximately 7,887 sf of general retail space that was most recently occupied by a Santander Bank branch. Due to limited available data for walk-in banks, the trips associated with the previous use was estimated using ITE LUC 822 (Strip Retail Plaza). ITE LUC 911 (Walk-in Bank) was considered but has limited data that shows much higher trip generation than ITE LUC 822 (Strip Retail Plaza). Therefore, VHB determined that ITE LUC 822 (Strip Retail Plaza) most likely shows a more accurate representation of the previous trip generation. The comparison of net vehicle trips is shown in Table 8. No credit was taken for the previous use on site and the trip generation volumes presented in Table 8 are shown for comparison purposes only.

Table 8 Net Vehicle Trip Comparison to Previous Use

	Previous [a]	Proposed [b]	Difference
Weekday Daily			
Enter	145	131	-14
Exit	145	131	-14
Total	290	262	-28
Weekday Morning			
Enter	8	5	-3
Exit	5	8	+3
Total	13	13	+0
Weekday Evening			
Enter	18	16	-2
Exit	18	12	-6
Total	36	28	-8

a Based on ITE LUC 822 (Strip Retail Plaza) for 7,887 sf. AVO rates and mode share applied. Does not include pass-by trips.

b Shown in Table 6. Does not include pass-by trips.

As shown in Table 8, the Project is projected to have similar trip generation as the previous use, with no additional trips in the weekday morning peak hour and eight fewer trips in the weekday evening peak hour.

Trip Distribution

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. Due to the varying trip characteristics of the Project uses – residential and retail – each use is expected to experience a different distribution pattern. Thus, regional trip distribution percentages were calculated separately for each of the Project's uses.

The trip distribution is consistent with the trip distribution presented in the Dunstan East Residences traffic study. Trips made from and to the proposed residential development during the peak hours are expected to be predominantly home-to-work and work-to-home trips. Accordingly, the trip distribution for the residential portion of the proposed development has been derived based on Journey-to-Work data for the City of Newton based on a U.S. Census Bureau five-year estimate (2012-2016). The trip distribution for the retail portion of the proposed development was derived based on the existing traffic patterns in the study area. As the retail space under the proposed development is expected to cater more to neighborhood residents than regional customers, it is expected that most trips will start and end in the local area. The residential trips are expected to use the Highland Street driveway, while the retail trips are expected to use the Davis Street driveway.

Table 9 summarizes the trip distribution. Detailed trip distribution calculations are provided in the Appendix to this document.

Table 9 Trip Distribution Summary

Travel Route	Direction	Residential Trips [a]	Retail Trips [b]
Washington Street (Route 16)	West	44%	28%
Elm Street/Cherry Street/Waltham Street	North	18%	10%
Watertown Street (Route 16)	East	9%	10%
Washington Street	East	12%	23%
Highland Street/Chestnut Street	South	17%	31%

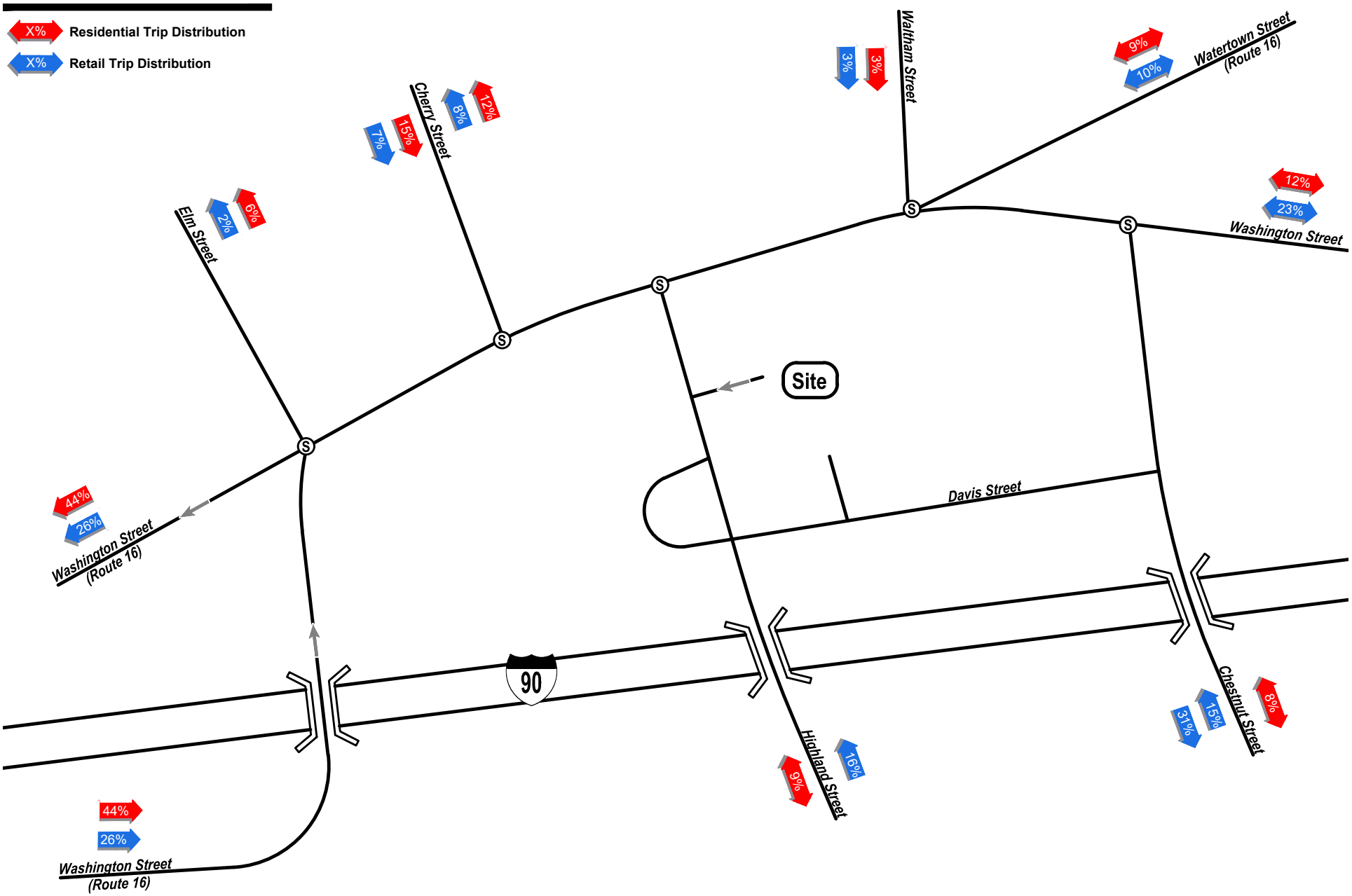
a Based-on Journey-to-Work data for the City of Newton from the U.S Census Bureau's five-year estimate (2012-2016).
b Based on existing traffic patterns in the study area.

A graphic illustrating the trip distribution is provided in Figure 8.

Build Traffic Volumes

The project-related traffic volumes for the Build Condition are assigned to the study area roadway network based on the trip distribution patterns shown in Table 9. The assigned volumes are then added to the 2029 No-Build peak hour traffic volume networks to develop the 2029 Build Condition weekday morning and weekday evening peak hour traffic volume networks.

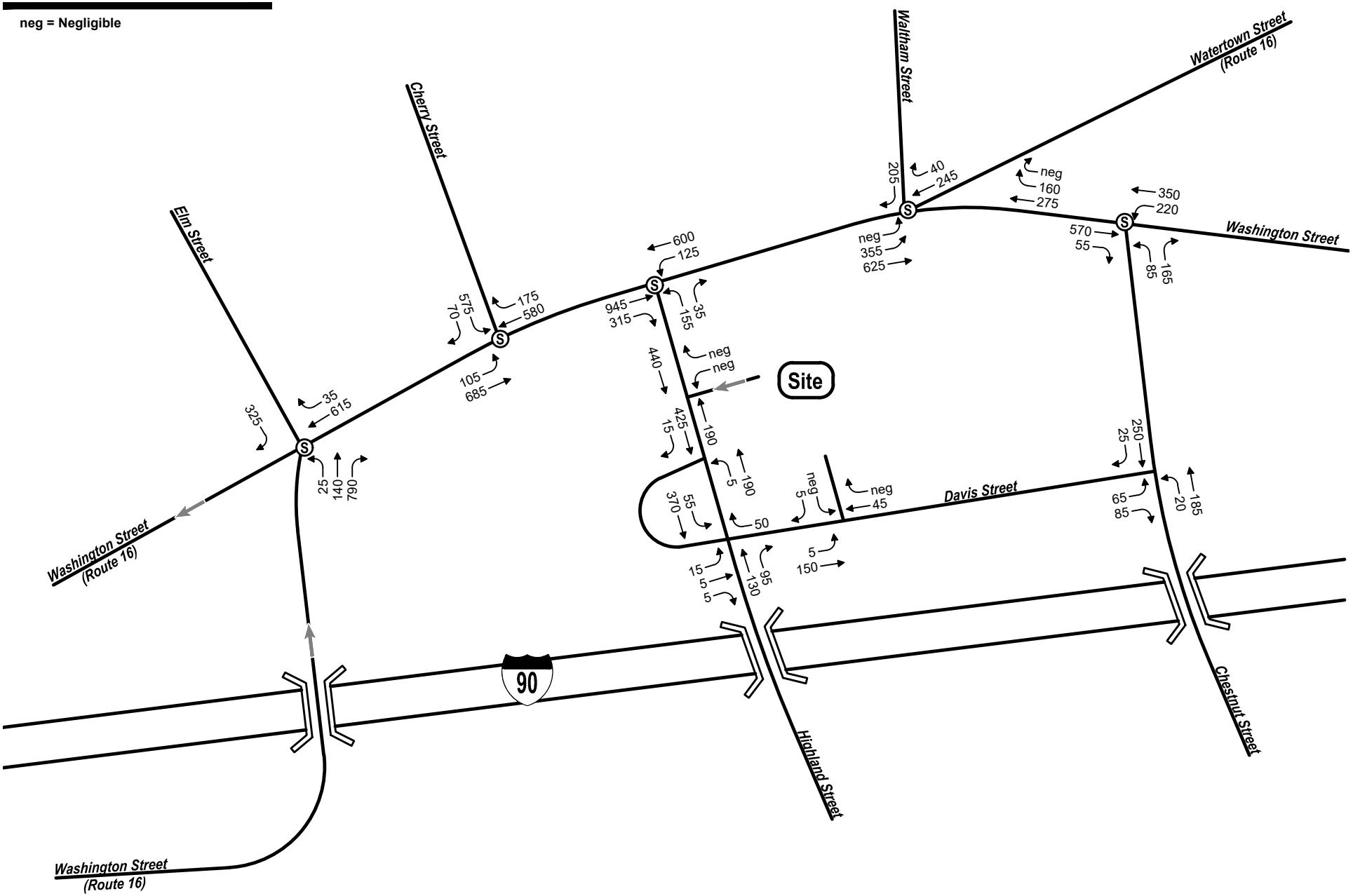
The 2029 Build Condition traffic volumes are shown in Figures 9 and 10 for the weekday morning and weekday evening peak hours, respectively. The site-generated traffic volume networks are provided in the Appendix to this report.



Not to Scale

Figure 8
Trip Distribution

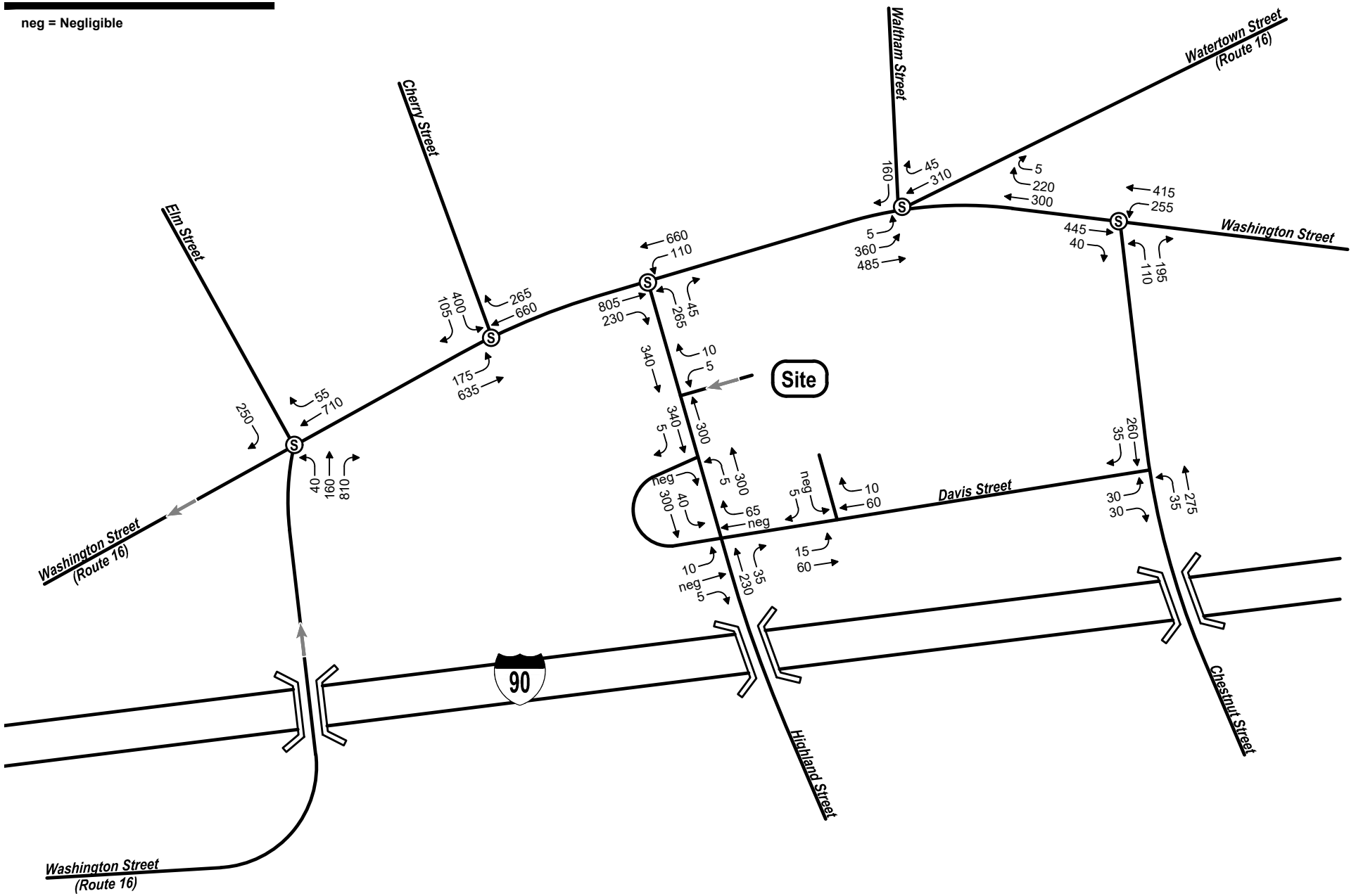
1314 Washington Street Redevelopment
Newton, Massachusetts



Not to Scale

Figure 9

2029 Build Conditions
Weekday Morning Peak Hour Traffic Volumes
1314 Washington Street Redevelopment
Newton, Massachusetts



Not to Scale

Figure 10

2029 Build Conditions
Weekday Evening Peak Hour Traffic Volumes
1314 Washington Street Redevelopment
Newton, Massachusetts

5

Transportation Operations Analysis

Measuring existing traffic volumes and projecting future traffic volumes quantifies traffic flow within the study area. To assess quality flow, intersection capacity analyses were conducted with respect to the 2022 Existing Conditions, 2029 No-Build Conditions, and 2029 Build Conditions. Capacity analyses provide an indication of how well the roadway facilities serve the traffic demands placed upon them.

Intersection Capacity Analysis

The evaluation criteria used to analyze area intersections in this traffic study are based on the Highway Capacity Manual (HCM)[9]. 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 several 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 are typically used to quantify the traffic operations at intersections; volume-to-capacity ratio (v/c) and delay (expressed in seconds per vehicle). For example, an existing v/c ratio of 0.90 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 measures of effectiveness 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

9 Transportation Research Board, *Highway Capacity Manual*, 6th Edition, Washington, D.C., 2016.

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 10 shows the LOS criteria for both signalized intersections and unsignalized intersections.

Table 10 Level of Service Criteria for Intersections

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: Highway Capacity Manual, 6th Edition.

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 consider 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.

Signalized Intersection Capacity Analysis

Capacity analyses were conducted for the signalized study area intersections. Table 11 summarizes the results for the 2022 Existing, 2029 No-Build, and 2029 Build Conditions. All capacity analysis worksheets are included in the Appendix.

As shown in Table 11, negligible changes in operations are expected at the signalized study area intersections between the 2029 No-Build Conditions and the 2029 Build Conditions. The overall LOS remains the same for all signalized study area intersections between the 2029 No-Build Conditions and the 2029 Build Conditions, with increases in overall delay of no more than three seconds.

Table 11 Signalized Intersection Capacity Analysis

Location / Movement	2022 Existing Conditions					2029 No-Build Conditions					2029 Build Conditions				
	v/c [a]	Del [b]	LOS [c]	50 Q [d]	95 Q [e]	v/c	Del	LOS	50 Q	95 Q	v/c	Del	LOS	50 Q	95 Q
Washington Street at Elm Street															
Weekday Morning															
WB T/R	0.63	36	D	162	#384	0.69	39	D	162	m#450	0.70	39	D	165	m#455
NB L/T	0.42	11	B	5	68	0.44	12	B	10	75	0.44	12	B	10	75
NB R	0.73	69	E	102	#617	0.81	73	E	127	#916	0.81	73	E	129	#927
SB R	0.46	2	A	0	0	0.40	1	A	0	0	0.40	1	A	0	0
Total		**40**	**D**				**44**	**D**				**44**	**D**		
Weekday Evening															
WB T/R	0.61	32	C	250	#456	0.66	34	C	235	m#444	0.66	35	C	236	m#445
NB L/T	0.51	17	B	28	101	0.54	19	B	37	114	0.54	19	B	37	114
NB R	0.66	23	C	97	#530	0.75	65	E	128	#924	0.76	66	E	131	#941
SB R	0.34	1	A	0	0	0.34	1	A	0	0	0.34	1	A	0	0
Total		**23**	**C**				**41**	**D**				**41**	**D**		
Washington Street at Cherry Street															
Weekday Morning															
EB L	0.65	58	E	56	m97	0.64	54	D	54	m84	0.64	53	D	53	m83
EB T	>1.20	>120	F	~675	#835	>1.20	>120	F	~716	#1011	>1.20	>120	F	~725	#1021
WB T	0.77	19	B	138	m115	0.87	35	D	218	m127	0.87	37	D	222	m128
WB R	0.16	2	A	4	m4	0.17	2	A	6	m4	0.17	2	A	5	m4
SB L/R	0.85	61	E	268	#387	0.86	70	E	276	#403	0.87	71	E	276	#403
Total		**108**	**F**				**119**	**F**				**122**	**F**		
Weekday Evening															
EB L	0.84	74	E	120	#209	0.80	66	E	109	m#166	0.80	65	E	109	m#163
EB T	1.14	118	F	~592	#573	>1.20	>120	F	~500	#718	>1.20	>120	F	~518	#735
WB T	0.83	62	E	189	m163	0.95	62	E	272	m195	0.95	61	E	266	m191
WB R	0.22	2	A	16	m14	0.25	3	A	20	m16	0.26	3	A	20	m15
SB L/R	0.67	48	D	170	228	0.74	53	D	197	260	0.74	53	D	197	260
Total		**70**	**E**				**77**	**E**				**79**	**E**		
Washington Street at Highland Street															
Weekday Morning															
EB T	0.63	19	B	91	m82	0.71	27	C	102	m90	0.71	28	C	102	m90
EB R	0.30	2	A	5	m4	0.32	2	A	7	m5	0.32	2	A	7	m5
WB L	0.71	67	E	103	m#126	0.66	60	E	92	m#115	0.66	60	E	92	m#115
WB T	>1.20	>120	F	~556	#657	>1.20	>120	F	~581	#781	>1.20	>120	F	~581	#781
NB L/R	0.61	48	D	148	193	0.54	45	D	129	200	0.55	45	D	133	205
Total		**72**	**E**				**77**	**E**				**77**	**E**		
Weekday Evening															
EB T	0.57	20	C	107	m104	0.63	23	C	115	m110	0.63	24	C	116	m110
EB R	0.22	2	A	13	m16	0.22	3	A	14	m15	0.23	3	A	16	m17
WB L	0.44	48	D	65	m96	0.45	46	D	64	m90	0.45	46	D	64	m90
WB T	1.18	>120	F	~474	#688	>1.20	>120	F	~582	#801	>1.20	>120	F	~582	#800
NB L/R	0.86	71	E	241	#355	0.82	66	E	233	#379	0.86	74	E	248	#410
Total		**62**	**E**				**78**	**E**				**78**	**E**		

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 cannot be calculated
# 95th percentile volume exceeds capacity, queue may be longer
m Volume for 95th percentile queue is metered by upstream signal

Table 11 Signalized Intersection Capacity Analysis (continued)

Location / Movement	2022 Existing Conditions					2029 No-Build Conditions					2029 Build Conditions				
	v/c [a]	Del [b]	LOS [c]	50 Q [d]	95 Q [e]	v/c	Del	LOS	50 Q	95 Q	v/c	Del	LOS	50 Q	95 Q
Washington Street at Waltham Street and Watertown Street															
Weekday Morning															
EB L	0.45	53	D	271	330	0.50	52	D	311	340	0.50	52	D	312	339
EB T	0.40	7	A	85	100	0.46	9	A	91	135	0.46	9	A	92	135
WB T/R	0.47	42	D	148	212	0.53	44	D	165	248	0.53	44	D	165	248
SB R	0.39	3	A	0	0	0.40	3	A	0	0	0.40	3	A	0	0
SWB BR/R	0.72	60	E	205	#406	0.71	58	E	196	#465	0.71	58	E	196	#465
Total		**32**	**C**				**32**	**C**				**32**	**C**		
Weekday Evening															
EB L	0.45	58	E	280	m355	0.47	65	E	311	m378	0.48	65	E	313	m376
EB T	0.29	6	A	90	m109	0.35	7	A	99	m124	0.35	7	A	99	m123
WB T/R	0.63	87	F	191	256	0.72	103	F	218	#320	0.72	103	F	218	#323
SB R	0.34	3	A	0	0	0.35	3	A	0	0	0.35	3	A	0	0
SWB BR/R	0.74	54	D	240	#490	0.74	66	E	241	#546	0.74	66	E	241	#546
Total		**47**	**D**				**55**	**E**				**56**	**E**		
Washington Street at Chestnut Street															
Weekday Morning															
EB T	0.59	20	B	130	#620	0.62	20	B	99	#715	0.62	20	B	100	#716
EB R	0.07	7	A	0	22	0.06	7	A	1	24	0.06	7	A	1	24
WB L	0.46	11	B	32	123	0.50	12	B	36	133	0.50	12	B	36	133
WB T	0.25	9	A	51	184	0.29	9	A	62	218	0.29	9	A	62	218
NB L	0.55	64	E	68	118	0.56	64	E	69	122	0.56	64	E	69	122
NB R	0.33	5	A	0	31	0.34	5	A	0	34	0.34	5	A	0	34
Total		**17**	**B**				**16**	**B**				**16**	**B**		
Weekday Evening															
EB T	0.40	15	B	116	396	0.47	16	B	130	470	0.47	16	B	130	470
EB R	0.04	9	A	2	16	0.05	9	A	2	18	0.05	9	A	2	18
WB L	0.39	11	B	39	145	0.48	12	B	45	158	0.49	12	B	46	161
WB T	0.29	10	A	63	225	0.35	11	B	84	278	0.35	11	B	84	278
NB L	0.58	63	E	79	134	0.62	65	E	90	150	0.62	65	E	90	150
NB R	0.37	5	A	0	34	0.39	5	A	0	36	0.39	5	A	0	36
Total		**15**	**B**				**16**	**B**				**16**	**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 cannot be calculated
# 95th percentile volume exceeds capacity, queue may be longer
m Volume for 95th percentile queue is metered by upstream signal

While the Project is not expected to have a major effect on operations at the majority study area signalized intersections, several of the intersections are expected to operate at poor conditions without and with the Project. The following signalized intersections are expected to operate at overall LOS E or F under the 2029 No-Build Conditions and the 2029 Build Conditions during the weekday morning or weekday evening peak hours:

- Washington Street at Cherry Street: LOS F (AM), LOS E (PM)
- Washington Street at Highland Street: LOS E (AM and PM)
- Washington Street at Waltham Street and Watertown Street: LOS E (PM)

As stated above, these intersections are expected to operate with failing overall LOS without and with the Project, and the Project is not expected to noticeably worsen operations beyond the current failing conditions.

Unsignalized Intersection Capacity Analysis

Capacity analyses were also conducted for the unsignalized study area intersections. Table 12 summarizes the results for the 2022 Existing, 2029 No-Build, and 2029 Build Conditions. All capacity analysis worksheets are included in the Appendix.

As shown in Table 12, the Project is expected to have minimal impacts at the unsignalized study area intersections. The LOS for each movement remains the same at all unsignalized study area intersections between the 2029 No-Build Conditions and the 2029 Build Conditions, except for the eastbound approach at the intersection of Highland Street at Davis Street which is expected to change from LOS B to LOS C during the weekday evening peak hour due to an increase in delay of less than one second. The longest queue in the study area is the Davis Street eastbound movement at Chestnut Street during the weekday morning peak hour, which is expected to be no more than two vehicles long.

Table 12 Unsignalized Intersection Capacity Analysis

Location / Movement	2022 Existing Conditions					2029 No-Build Conditions					2029 Build Conditions				
	D [a]	v/c [b]	Del [c]	LOS [d]	95 Q [e]	D	v/c	Del	LOS	95 Q	D	v/c	Del	LOS	95 Q
Highland Street at Site Driveway															
Weekday Morning															
WB L/R	*Site not in use under 2022 Existing Conditions*					*Site not in use under 2029 No-Build Conditions*					3	0.01	11	B	0
Weekday Evening															
WB L/R											15	0.03	11	B	3
Highland Street at Church North Driveway															
Weekday Morning															
EB L/R	0	0.00	-	A	-	0	0.00	-	A	-	0	0.00	-	A	-
NB L	5	0.01	9	A	0	5	0.01	9	A	0	5	0.01	9	A	0
Weekday Evening															
EB L/R	1	0.01	10	B	0	1	0.00	11	B	0	1	0.00	11	B	0
NB L	5	0.01	8	A	0	5	0.01	8	A	0	5	0.01	8	A	0
Highland Street at Davis Street/Church South Driveway															
Weekday Morning															
EB L/T/R [f]	25	0.14	19	C	13	25	0.08	17	C	8	25	0.09	17	C	8
WB L/T/R	45	0.07	10	A	5	45	0.06	10	A	5	50	0.07	10	A	5
NB L	0	0.00	-	A	-	0	0.00	-	A	-	0	0.00	-	A	-
SB L	50	0.05	8	A	3	50	0.04	8	A	3	55	0.05	8	A	3
Weekday Evening															
EB L/T/R [f]	16	0.08	15.5	C	8	16	0.04	14.5	B	3	16	0.05	15.2	C	3
WB L/T/R	61	0.12	11	B	10	61	0.09	10	B	8	66	0.10	10	B	8
NB L	0	0.00	-	A	-	0	0.00	-	A	-	0	0.00	-	A	-
SB L	25	0.02	8	A	3	25	0.02	8	A	3	40	0.03	8	A	3
Davis Street at Site Driveway															
Weekday Morning															
EB L											5	0.00	7	A	0
SB L/R	*Site not in use under 2022 Existing Conditions*					*Site not in use under 2029 No-Build Conditions*					7	0.01	9	A	0
Weekday Evening															
EB L											15	0.01	7	A	0
SB L/R											6	0.01	9	A	0
Chestnut Street at Davis Street															
Weekday Morning															
EB L/R [f]	145	0.39	15	C	45	150	0.27	13	B	28	150	0.27	13	B	28
NB L	20	0.02	8	A	3	20	0.02	8	A	3	20	0.02	8	A	3
Weekday Evening															
EB L/R	55	0.13	13	B	10	55	0.12	13	B	10	60	0.13	13	B	10
NB L	30	0.03	8	A	3	30	0.03	8	A	3	35	0.03	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
f Improvements from Existing Conditions to No Build Conditions due to universal future PHF of 0.92, as per MassDOT guidelines.

The Highland Street Site driveway is expected to operate at LOS B and the Davis Street Site driveway is expected to operate at LOS A under 2029 Build Conditions, both with negligible 95th percentile queue lengths of less than one vehicle. However, it should be noted that the capacity analysis at the signalized intersection of Washington Street at Highland Street indicates that the northbound approach queue in the weekday morning peak hour (up to 200 feet) and weekday evening peak hour (up to 400 feet) may extend past the Site driveway. Operations on Highland Street will be monitored and if necessary additional mitigation will be implemented, such as the addition of Do Not Block the Box pavement markings and signage or the restriction of left turns out of this driveway.

Sight Distance

Sight distance analysis, in conformance with guidelines of the American Association of State Highway and Transportation Officials (AASHTO)[10] was performed at the proposed Site driveways on Highland Street and Davis Street, which are located in the general vicinity of the existing Site driveways.

Sight distance considerations are generally divided into two categories: Stopping Sight Distance (SSD) and Intersection Sight Distance (ISD). Stopping Sight Distance (SSD) is the distance required for a vehicle approaching an intersection from either direction to perceive, react and come to a complete stop before colliding with an object in the road, in this case the exiting vehicle from a driveway. In this respect, SSD can be considered as the minimum visibility criterion for the safe operation of an unsignalized intersection.

Intersection Sight Distance (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 or driveway 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. To maintain the safe operation of an unsignalized intersection, ISD only needs to be equal to the stopping sight distance, though it is desirable to meet ISD requirements by themselves.

Speed assumptions were used to calculate the required stopping sight distance (SSD) for traffic approaching the Site driveway and intersection sight distance (ISD) for traffic exiting the Site driveway. Based on the characteristics of each roadway, a vehicle speed of 30 mph was assumed for Highland Street and a vehicle speed of 25 mph was assumed for Davis Street. Since both driveways are located within 150 feet of nearby signalized or stop-controlled intersections, these speeds are assumed to be conservative as they do not consider vehicles slowing down as they approach the signal or stop sign, as would be included in any speed measurements.

[10] A Policy on the Geometric Design of Highways and Streets, American Association of State Highway and Transportation Officials (AASHTO), 2013.

Table 13 summarizes the sight distance analyses based on field measurements conducted by VHB. The sight distance worksheets are included in the Appendix to this document.

Table 13 Sight Distance Summary

		Stopping Sight Distance (feet)			Intersection Sight Distance (feet)	
Location	**Traveling**	**Required [a]**	**Measured [b]**	**Looking**	**Desirable [a]**	**Measured [b]**
Highland Street at proposed Site driveway	NB [c]	200	340	Left [c]	335	285
	SB [d]	200	90	Right [d]	335	90
Davis Street at proposed Site driveway	EB [e]	155	85	Left [e]	280	360
	WB [f]	155	360	Right [f]	280	85

a Based on standards established in A Policy on the Geometric Design of Highways and Streets. American Association of State Highway and Transportation Officials, 2013. Based on assumed speeds of 30 mph northbound and southbound for Highland Street and 25 mph eastbound and westbound for Davis Street to provide a conservative analysis.
b Based on field measurements taken by VHB in March 2022.
c Sight distance limited by vertical curve on Highland Street overpass over I-90.
d Sight distance visible to signalized intersection of Washington Street at Highland Street.
e Sight distance visible to stop-controlled intersection of Highland Street at Davis Street.
f Sight distance visible to stop-controlled intersection of Chestnut Street at Davis Street.

As shown in Table 13, at the intersection of Highland Street at the proposed Site driveway, the required stopping sight distance is met traveling northbound. The stopping sight distance traveling southbound is limited by the signalized intersection of Washington Street at Highland Street. Since all southbound vehicles at the Site driveway will have just turned onto Highland Street from Washington Street, it is likely that vehicles will be traveling slower and will be more aware of their surroundings. This also applies to the intersection sight distance looking right out of the Site driveway, which allows drivers to see north to the signalized intersection of Washington Street at Highland Street. For drivers looking left out of the Site, while the desired intersection sight distance is not met, the required sight distance (equal to the stopping sight distance) has been met. The limiting factor looking left is the sag in the vertical curve just south of the Highland Street overpass over I-90. While sight distance is limited to the low point within the sag curve, drivers are able to see vehicles on Highland Street beyond that point traveling down the hill. Therefore, there is expected to be adequate intersection sight distance at the Highland Street Site driveway.

At the intersection of Davis Street and the Site driveway, the required stopping sight distance is met traveling westbound and the desired intersection sight distance is met looking left. The stopping sight distance traveling eastbound and the intersection sight distance looking right is limited by the intersection of Highland Street at Davis Street, where Davis Street operates under stop-control. Since all eastbound vehicles at the Site driveway will have just turned onto Davis Street from Highland Street, it is likely that vehicles will be traveling slower and will be more aware of their surroundings. Therefore, there is expected to be adequate intersection sight distance at the Davis Street Site driveway.

6

Transportation Mitigation

The preceding study has outlined the general impacts of the proposed Project on the study area roadways as they currently exist. In general, the Project will have a minor impact at the study area intersections in relation to the operations and safety of the roadway network.

This chapter summarizes the proposed transportation demand management plan for the Project and the proposed site access improvements.

Transportation Demand Management (TDM)

In addition to the proposed roadway mitigation described previously, the Proponent is committed to providing a variety of Transportation Demand Management (TDM) measures. The goal of a Transportation Demand Management (TDM) plan is to reduce the Project's overall traffic impact through the implementation of measures that are aimed at affecting the demand side of the transportation equation, rather than the supply side. By their nature, TDM programs are intended to change people's behavior, and to be successful, they must rely on incentives or disincentives to make these shifts in behavior attractive to the commuter or retail customer. TDM programs are designed to maximize the people-moving capability of the existing transportation infrastructure by increasing the number of persons in a vehicle, providing and/or encouraging the use of alternate modes of travel, or influencing the time of, or need to, travel.

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 are opportunities to bring TDM programs to the Proposed Project's retail and residential land uses.

General TDM Measures

Transportation Coordinator

In conjunction with the development, an on-site TDM coordinator will be designated. The person in this role will coordinate with organizations within the area 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:

- Assisting site 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 and adjusting them as needed.
- 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 reduce demand for vehicular travel and parking spaces. With the existing West Newton MBTA Commuter Rail Station and MBTA bus stops located near the Site, it is expected that the Project will be attractive to residents or retail employees wishing to commute via public transportation, but additional measures can still be implemented to further encourage public transit use. The on-Site TDM coordinator will provide a central commuter information center within the Project Site in a prominent location such as in the building foyer, or near garage elevators. This will provide employees, visitors, and residents with transit maps and schedules and route information for pedestrians and cyclists.

Facilitate Bicycle and Pedestrian Travel

Travel to/from the Project by bicycling or walking will be promoted by the Proponent through the provision of strong bicycle and pedestrian connections near the Project Site. The Site is located in the heart of West Newton village, which has a very strong bicycle and pedestrian network. The Site is adjacent to a movie theater, a gym, a CVS pharmacy, several cafes, restaurants, and bars, a Bluebikes Station, and a short walk from the MBTA bus stops/commuter rail at West Newton Station. With so many destinations within a short walk, the residents of the Site will be able to meet many of their daily demands without using their vehicles.

In addition, Washington Street through West Newton village was recently reconstructed to include improved pedestrian facilities and dedicated bicycle accommodations in each direction, further supporting the ability to walk and bike through the area.

The Site will include entry and exit points on Washington Street, Highland Street, and Davis Street to accommodate walkers heading in different directions. In addition, the Site will include both secure, indoor bicycle parking for residents of the Site and short-term outdoor bicycle parking spaces for patrons of the retail uses.

Retail

The Project's retail component will be relatively small and likely consist of a restaurant, so there will not be the same levels of TDM opportunities as available with other land uses. However, 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 retail uses 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:

- 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.
- Access to Bike share via the nearby Bluebikes station.
- Electric vehicle charging stations within the parking area as a convenience to commuters and customers and to promote environmentally-friendly transportation.

Residential

In addition to providing a pedestrian friendly environment, the Proponent will enact a variety of additional strategies to reduce the need for auto trips by residents. Additional residential-based TDM measures may include the following programs:

- Disseminating information on alternate modes of transportation and developing transportation.
- Provide incentives for bicycle and pedestrian commutes, like covered bicycle storage to be available to all residents.
- Bike storage with fix-it station.
- Hold promotional events for transit-riders, cyclists, and pedestrians.
- Electric vehicle charging stations within the parking garage as a convenience to residents and to promote environmentally-friendly transportation.
- "Unbundling" of parking costs from rent/leases so that residents with vehicles will pay more to allow access to the parking garage.
- Financial incentives for alternative transportation modes, such as discounted MBTA passes.

Proposed Site Access Improvements

The proposed Project will rehabilitate the former Santander Bank building at 1314 Washington Street and include the construction of a new five-story residential building on Highland Street and Davis Street on the location of an existing surface parking lot. The replacement of an existing surface parking lot with a residential building will help to activate the streetscape of Highland Street and improve the walking experience for pedestrians. As part of the Project, the existing sidewalks along the Site frontage along Highland Street and Davis Street will be reconstructed to improve accommodations for pedestrians.

Under existing conditions, there are two curb cuts along Davis Street providing access and egress to the existing surface parking lot. Under the Proposed conditions, the two driveways on Davis Street will be consolidated into a single curb cut. With one of the two curb cuts along Davis Street eliminated, there will be fewer conflict points between vehicles traveling straight on Davis Street and vehicles turning into and out of the Site.

Egress from the commercial parking area will be provided via a one-way driveway outbound from the Site on Highland Street near the location of the existing Highland Street curb cut. The results of the traffic analyses presented previously show that the northbound queue on Highland Street at Washington Street may extend up to 200 feet during the weekday morning peak hour and up to 400 feet during the weekday evening peak hour. As these queues may extend past the driveway for the commercial parking area, operations on Highland Street will be monitored and if necessary additional mitigation will be implemented, such as the addition of Do Not Block the Box pavement markings and signage or the restriction of left turns out of this driveway.

7

Conclusion

VHB has prepared a detailed Transportation Impact and Access Study for the proposed redevelopment at 1314 Washington Street in Newton. The Project consists of the renovation of the former Santander Bank building into approximately 3,873 sf of commercial space and the construction of a five-story addition containing 50 residential units on the site of the existing surface parking lot fronting Highland Street and Davis Street. Approximately 63 parking spaces will be provided, with 50 spaces for residents in a below-ground parking floor accessed via Davis Street and 13 spaces for the commercial use in a ground-level parking floor accessed via Davis Street for entering traffic and Highland Avenue for exiting traffic. The main entrances for both the commercial space and the residential lobby will be on Washington Street.

The Project is expected to generate approximately 13 new vehicle trips (5 entering/8 exiting) during the weekday morning peak hour and 28 new vehicle trips (16 entering/12 exiting) during the weekday evening peak hour. Overall, this will result in about one new vehicle added to the roadway network every two-to-four minutes during the weekday morning and evening peak hours, respectively. It should be noted that if the existing building at 1314 Washington Street was to be re-tenanted as a general retail use without any redevelopment, the Site would be expected to generate a similar number of trips as the proposed Project.

Based on the results of the intersection capacity analyses for the Existing, No-Build, and Build Conditions, the additional trips generated to and from the Project Site are expected to produce negligible impacts on the surrounding transportation infrastructure.

The Site has been designed to accommodate Project-generated vehicular traffic, as well as pedestrians, bicyclists, and transit riders. Located in West Newton village within a five-minute walk of shops, restaurants, and the commuter rail at West Newton Station, the residents of the Site will be able to meet many of their daily demands without using their vehicles. In addition, parking on-Site has been restricted in order to encourage travel by non-vehicular modes, with a proposed residential parking ratio of 1.0 spaces per unit.

The Proponent is also committed to implementing a travel demand management (TDM) program in connection with the Project's development and operation. The TDM plan will encourage travel to and from the Site by walking, biking, and public transit, and will help to further offset the impacts of the Project on the roadway network.