TRANSPORTATION IMPACT AND ACCESS STUDY

Proposed Crafts Street Elderly Housing with Services

Newton, Massachusetts

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Introduction

Vanasse Hangen Brustlin, Inc. (VHB) has conducted a traffic impact and access study for the redevelopment of an approximately 2.7-acre site located at 36-48 Crafts Street in Newton, Massachusetts (the "Site"). The existing Site consists of two commercial buildings and a school bus parking lot on Crafts Street and two residential properties on Court Street. The redevelopment proposal includes the demolition of the existing uses on Site and the construction of a 209-unit elderly living facility (the "Project"). The breakdown of units includes 129 Independent units, 52 Assisted Living units, and 28 memory care types of units (209 total). This study quantifies existing and projected future traffic conditions and identifies potential improvements within the study area to support the project.

Study Methodology

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

The second stage of the study established the framework for evaluating the transportation impacts of the proposed Project. Specific travel demand forecasts for the Project were assessed along with future traffic demands on the study area roadways due to projected background traffic growth and other proposed area development that may occur independent of the proposed development. 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 study, consistent with typical traffic impact studies prepared for the City of Newton and MassDOT. Analysis of area traffic operations in the year 2029 would fully reflect the effects of the proposed development as well as background traffic independent of the proposed development. The traffic analysis conducted in the second stage identifies both existing and projected future roadway capacities and demands.

The third and final stage of the study discusses possible measures to improve existing and future traffic operations in the area and offset 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 proposed provider will have a multi-modal approach to operations and will have a small-scale shuttle, van, and comfortable sedan on-Site that will be available to all residents of the facility. Residents can schedule rides to appointments and/or for service needs and the shuttle and van will likely also run between the facility and key community centers that offer retail, restaurants, and other needed/desired services on a regular or as needed basis.

The Project is expected to generate approximately 21 new vehicle trips (13 entering/8 exiting) during the weekday morning peak hour and 62 new vehicle trips (26 entering/36 exiting) during the weekday evening peak hour. Overall, this will result in about one new vehicle every three minutes added to the roadway network during the weekday morning peak hour and about one new vehicle every minute added to the roadway network during the weekday evening peak hour. 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.

As part of the Project, the Proponent is proposing site access improvements that will consolidate the number of curb cuts along the Site frontage from five to two, with the northern proposed curb cut to be used only for loading and emergency access exclusively. With fewer curb cuts located along Crafts Street, there will be fewer conflict points between through vehicles on Crafts Street and vehicles pulling into and out of the Site.

In addition, the Site access improvements will enhance the pedestrian environment. The sidewalk along the Crafts Street Site frontage will be reconstructed to make the roadway more accommodating for pedestrians and the number of curb cuts will be reduced, eliminating the number of conflict points between pedestrians and turning vehicles. The Project will include a new path running along the southern edge of the Site and open to the public that will connect Crafts Street and Court Street. This will provide a new connection for pedestrians and bicyclists between the residential neighborhood east of Crafts Street and the shops, restaurants, and commuter rail station at Newtonville village.

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.

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 Crafts Street, pedestrian and bicycle accommodations, loading and delivery activities, and parking supply.

Building Program

The development proposal for the Site consists of a seven-story elderly living facility that will include approximately 209 units. The 209 units will consist of a verity of elderly living options, including:

- 129 independent living units,
- 52 assisted living units, and
- 28 memory care units

Under existing conditions, the Site consists of two commercial buildings at 36 and 38 Crafts Street and a school bus parking lot at 48 Crafts Street. The Site also includes two residential properties on the southeast corner of the Site at 19 Court Street and 21 Court Street. All existing buildings on-Site will be demolished as part of the proposed Project.

The proposed provider will have a multi-modal approach to operations and will have a small-scale shuttle, van, and comfortable sedan on site that will be available to all residents of the facility. Residents can schedule rides to appointments and/or for service needs and the shuttle and van will likely also run between the facility and key community centers that offer retail, restaurants, and other needed/desired services on a regular or as needed basis.

Site Access

Existing Site Access

The Site is located along Crafts Street in Newton, Massachusetts. Under existing conditions, the Site is served by five different curb cuts within a 270 feet section along the west side of Crafts Street. The northern curb cut serves the school bus parking lot, the middle two curb cuts serve the commercial building at 38 Crafts Street (providing access to the surface parking lot and to two accessible spaces

in front of the building, respectively), and the southern two curb cuts serve the commercial building at 36 Crafts Street (providing access to the covered parking area and to a side alley, respectively).

Access to the two existing residential properties on the southeast corner of the Site is served by Court Street. There is no internal connection between the two residential parcels on Court Street and the parcels on Crafts Street.

Proposed Project Site Access

Under proposed conditions, the main access to the Site will be served by a primary driveway on Crafts Street. This driveway will provide access to a pick-up/drop-off loop on the southern portion of the Site, several surface parking spaces, and the parking garage entrance. This curb cut will be aligned with the existing curb cut on the east side of Crafts Street at 29 Crafts Street.

A second curb cut along Crafts Street on the northern edge of the Site will be used for loading and emergency access only. An internal roadway for loading and emergency access will surround the southern and western sides of the building and will connect the northern Crafts Street driveway with a curb cut on Court Street that will be gated. Only loading and emergency vehicles will be allowed to access the Site from the gated Court Street driveway and all general vehicle traffic will use the southern curb cut on Crafts Street.

The proposed Project will consolidate the number of curb cuts on the Site frontage along Crafts Street from five to two. With fewer curb cuts located along Crafts Street, there will be fewer conflict points between through vehicles on Crafts Street and vehicles pulling into and out of the Site.

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

Pedestrian and Bicycle Accommodations

Pedestrian and bicycle access to the Site will be provided via Crafts Street in the east and Court Street in the southwest. A path running along the southern edge of the Site will connect Court Street with Crafts Street and the main entrance of the proposed building. This path will be open to all and will provide new connectivity between Crafts Street and the Court Street neighborhood.

The Project Site includes pedestrian connections to the rest of Newton via the existing sidewalk network. The Site is located adjacent to a Whole Food Market, providing residents the ability to buy groceries without driving to the nearest store. The Site is also within a 5–10-minute walk of the shops and restaurants in Newtonville along Washington Street and Walnut Street and the commuter rail station in Newtonville.

As part of the proposed Project, the sidewalk along the west side of Crafts Street along the Site frontage will be reconstructed. The number of curb cuts will be reduced from five to two, eliminating several potential conflict points between pedestrians walking on the sidewalk and vehicles turning into and out of the Site.

The Site is located within 500 feet of the nearest Bluebike station along Washington Street in front of the Whole Foods Market. The Site will also include secure bicycle racks for residents and employees of the Site and outdoor bicycle racks for visitors.

Loading and Deliveries

A service and loading dock location will be provided for the Site on the north side of the building. The loading dock will be accessed via the northern curb cut on Crafts Street and via the gated curb cut on Court Street. General traffic will be directed to use the southern curb cut on Crafts Street, which eliminates the mixing of service and loading vehicles and general vehicles.

A pick-up/drop-off loop will be provided on the southern portion of the Site near the main entrance and three on-street parking spaces will be located in front of the Site on Crafts Street. Small delivery vehicles (such as Amazon vans and food deliveries) will be able to use the visitor parking spaces provided near the pick-up/drop-off loop and the on-street spaces on Crafts Street.

Parking

Vehicle Parking

The Project will be supported by approximately 144 parking spaces. A parking garage below the building to be used primarily by residents and employees of the Site will accommodate 137 parking spaces. An additional 7 surface parking spaces will be provided near the main entrance by the pick-up/drop-off loop and will be used primarily by visitors to the Site. In addition, three on-street parking spaces will be provided along the Site frontage on the west side of Crafts Street.

Bicycle Parking

The Project will be supported by both secure, indoor bicycle parking for residents and employees of the Site and outdoor bicycle racks for visitors to the Site. A total of 50 bicycle parking spaces will be provided on Site.

Washington Street Vision Plan

The City of Newton recently finished conducting a vision plan for the Washington Street corridor, which included the Site along Crafts Street. 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 Project incorporates many features proposed in the vision plan, such as below ground parking, multi-story residential development in walking distance to transit stations, shops, and restaurants, and the addition of new housing choices that will allow local residents to remain living in the area as they age. In addition, the Site is located in an area the vision plan targeted for medium height development.

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

Existing Conditions

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

Study Area

The transportation study area is based on an understanding of traffic conditions in this area and includes the following ten existing intersections identified in Figure 1:

- Crafts Street at Ashmont Avenue – *unsignalized*
- Crafts Street at Clinton Street / Maguire Court – *unsignalized*
- Crafts Street at Lincoln Road / 48 Crafts Street (Bus Lot) Driveway – *unsignalized*
- Crafts Street at 29 Crafts Street / 38 Crafts Street Parking Lot Driveway – *unsignalized*
- Crafts Street at 36 Crafts Street Parking Lot Driveway – *unsignalized*
- Crafts Street at Lenglen Road / Whole Foods Driveway – *unsignalized*
- Washington Street at Harvard Street – *signalized*
- Washington Street at Crafts Street / Bank Driveway – *signalized*
- Washington Street at Adams Street / Lewis Terrace – *signalized*
- Washington Street at Jackson Road – *signalized*

It should be noted that the study area intersections does not include the existing Site curb cuts that serve the two accessible parking spaces in front of 38 Crafts Street and the side alley next to 36 Crafts Street, as typical movements in and out of those two curb cuts are minimal.

Roadway Network

Descriptions of the study area roadways and intersections are included below. Figure 2 shows lane configuration and traffic control at the study intersections.

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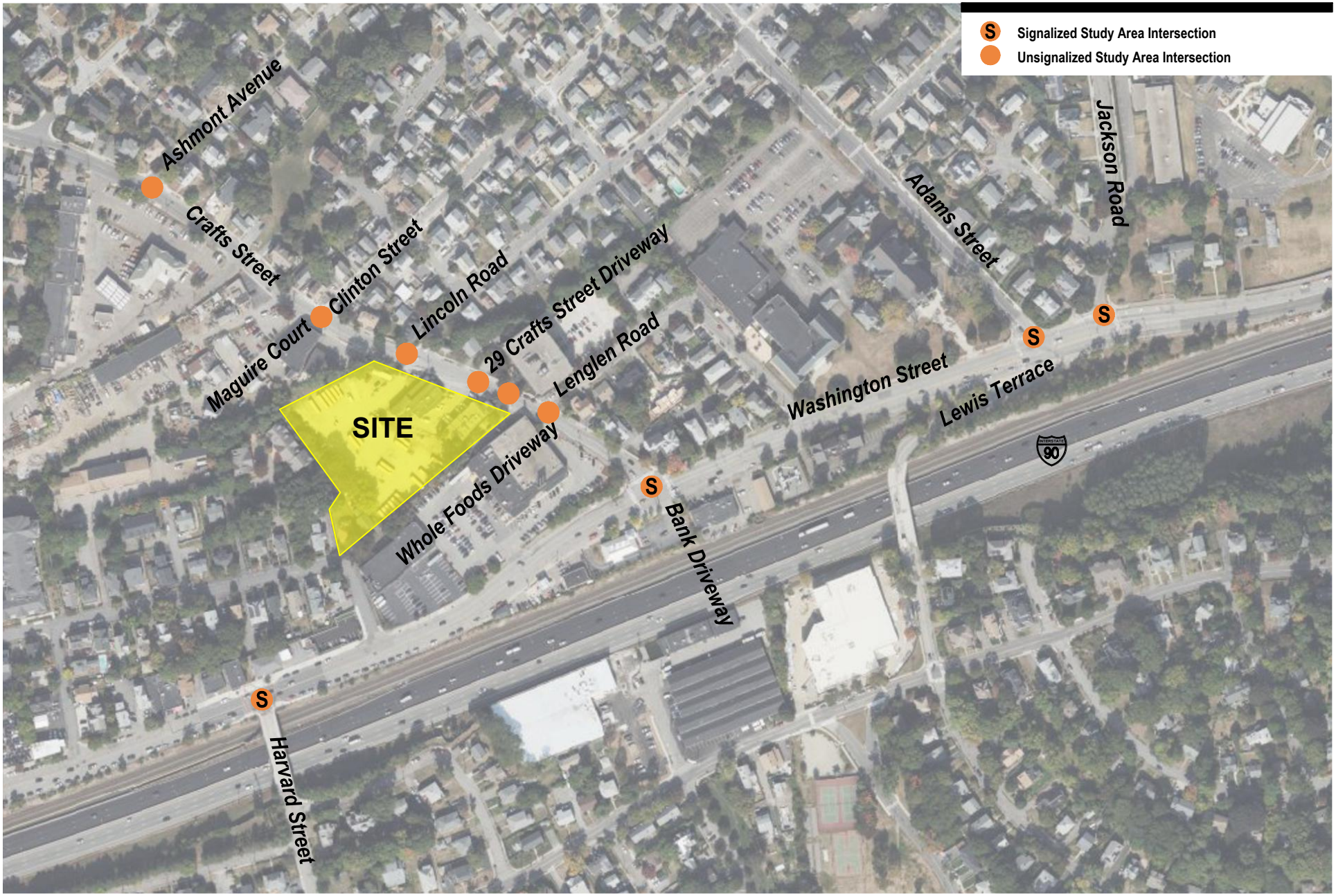

Site Location Map

Figure 1

Crafts Street Elderly Housing with Services
Newton, Massachusetts

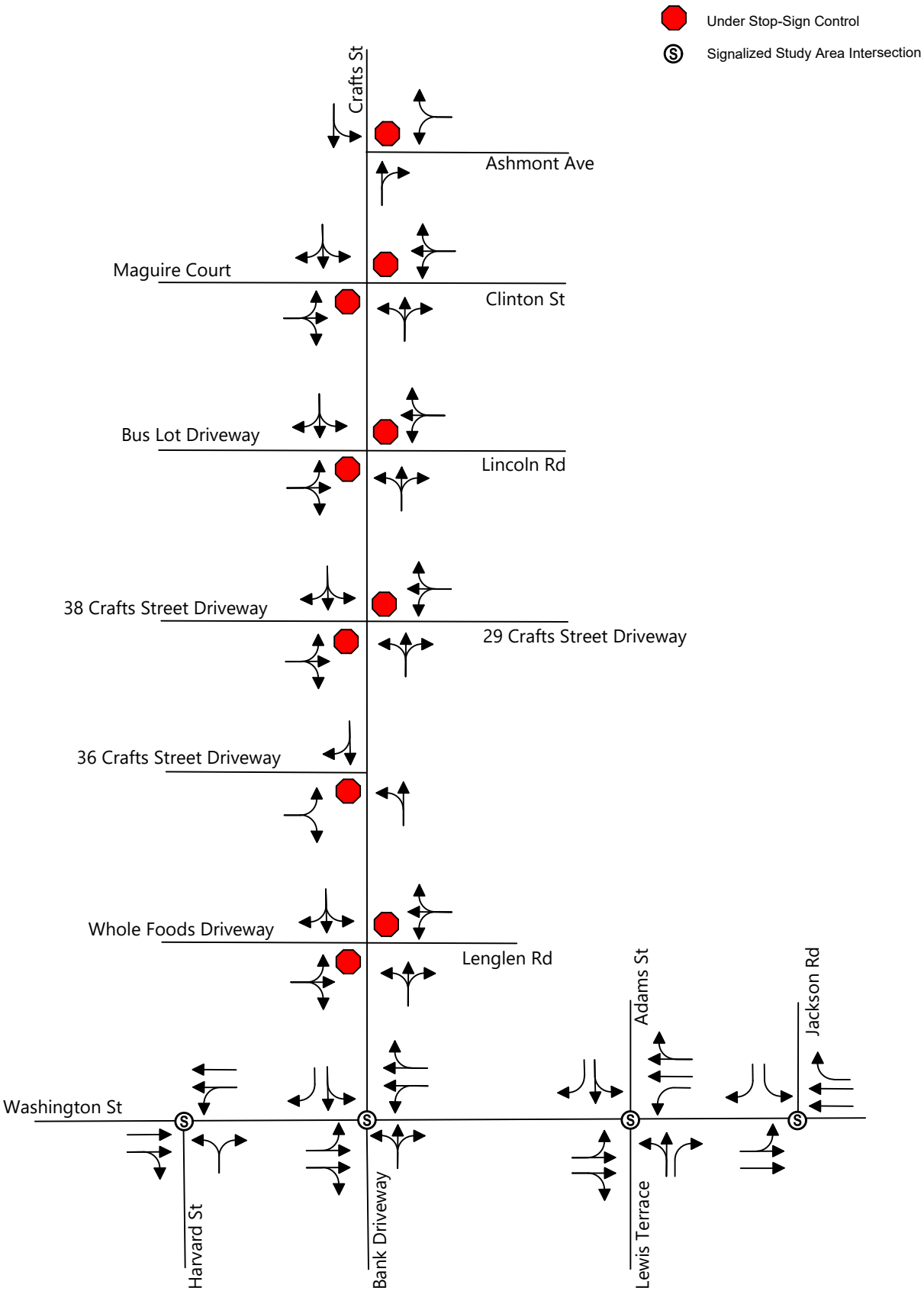

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Figure 2

Intersection Lane Geometry and Traffic Control

Crafts Street Elderly Housing with Services
Newton, Massachusetts

Study Area Roadways

Crafts Street

Crafts Street is an urban arterial roadway under City of Newton jurisdiction that runs north/south in the vicinity of the Site. Crafts Street is a two-lane roadway (one lane in each direction) and there is no posted speed limit on Crafts Street within the vicinity of the Site. Sidewalks are present along both sides of the roadway. On-street, one-hour parking is provided on the east side of Crafts Street. Land use along Crafts Street is a mix of commercial, industrial, and residential uses.

Washington Street

Washington Street is an urban arterial roadway under City of Newton jurisdiction that runs east/west in the vicinity of the Site. Washington Street is a four-lane roadway (two lanes in each direction) and there is no posted speed limit on Washington Street within the vicinity of the Site. Sidewalks are present along both sides of the roadway. On-street, unrestricted, parking is provided on both sides of Washington Street east of Court Street and metered parking is available on both sides of Washington Street near its intersection with Harvard Street. Land use along Washington Street is a mix of commercial and residential uses.

Study Area Intersections

Crafts Street at Ashmont Avenue

Ashmont Street intersects with Crafts Street from the east to form a three-legged unsignalized intersection. The northbound and southbound Crafts Street approaches each consist of one general purpose lane. The westbound Ashmont Street approach consists of one general purpose lane under STOP-control, though no STOP-sign is currently in place. Sidewalks exist on both sides of all approaches. At the intersection, no pedestrian crossings exist but pedestrian ramps are available at all crossing points. On-street parking is available on both sides of Ashmont Street and the east side of Crafts Street. Land use near the intersection is a mix of residential, industrial, and commercial uses.

Crafts Street at Clinton Street / Maguire Court

Crafts Street is intersected by Clinton Street from the east and Maguire Court from the west to form a four-legged unsignalized intersection. The northbound and southbound Crafts Street approaches each consist of one general purpose lane. Both minor street approaches consist of one general purpose lane and are under STOP-control, though no STOP-signs are currently in place. Sidewalks exist on both sides of all approaches. No pedestrian crossings exist at this intersection, but pedestrian ramps are available to cross Clinton Street. There is on-street parking on both sides of Clinton Street and the east side of Crafts Street. Land use near the intersection is a mix of residential, industrial, and commercial uses.

Crafts Street at Lincoln Road / 48 Crafts Street (Bus Lot) Driveway

Crafts Street is intersected by Lincoln Road from the east and the 48 Crafts Street (bus lot) driveway from the west to form a four-legged unsignalized intersection. The northbound and southbound Crafts Street approaches each consist of one general purpose lane. The eastbound Lincoln Road

consists of a single general purpose lane and is one-way approaching the intersection. The driveway consists of just one general purpose lane utilized for both entering and exiting vehicles. Both minor street approaches are under STOP-control, though no STOP-signs are currently in place. Sidewalks exist on both sides of all approaches. No crosswalks are present at this intersection. There is on-street parking on both sides of Lincoln Road and the east side of Crafts Street. Land use near the intersection is a mix of residential and commercial uses.

Crafts Street at 29 Crafts Street / 38 Crafts Street Parking Lot Driveway

Crafts Street is intersected by the 29 Crafts Street from the east and the 38 Crafts Street Parking Lot driveway from the west to form a four-legged unsignalized intersection. The northbound and southbound Crafts Street approaches each consist of one general purpose lane. Both driveway approaches consist of one general purpose lane utilized for both entering and exiting vehicles and are under STOP-control, though no STOP-signs are currently in place. Sidewalks exist on both sides of Crafts Street. No crosswalks are present at this intersection. There is on-street parking on the east side of Crafts Street. Land use near the intersection is a mix of residential and commercial uses. Under future conditions the Site driveway will be located within the vicinity of the existing 38 Crafts Street Parking Lot driveway.

Crafts Street at 36 Crafts Street Parking Lot Driveway

Crafts Street is intersected by the 36 Crafts Street driveway from the west to form a three-legged unsignalized intersection. The Site Driveway consist of one general purpose lane utilized for both entering and exiting vehicles. and is under STOP-control, though no STOP-sign is currently in place. Sidewalks exists both sides of Crafts Street. No crosswalks are present at this intersection. There is on-street parking on the east side of Crafts Street. Land use near the intersection is residential and commercial.

Crafts Street at Lenglen Road/Whole Foods Driveway

Crafts Street is intersected by Lenglen Road from the east and the Whole Foods driveway from the west to form a four-legged unsignalized intersection. The northbound and southbound Crafts Street approaches each consist of one general purpose lane. Lenglen Road consists of one general purpose lane. The Whole Foods driveway consists of one general purpose lane utilized for both entering and exiting vehicles. Sidewalks exist on the north side of Lenglen Road and both sides of Crafts Street. No pedestrian crossings exist at this intersection, but pedestrian ramps are available to cross Lenglen Road. There is on-street parking on both sides of Lenglen Road and on the east side of Crafts Street. Land use near the intersection is a mix of residential and commercial uses.

Washington Street at Harvard Street

Washington Street is intersected by Harvard Street from the south to form a three-legged signalized intersection. The eastbound Washington Street approach consists of a through lane and a shared through/right-turn lane. The westbound Washington Street approach consists of a shred left-turn/through lane and a through lane. The northbound Harvard Street approach consists of one general purpose lane. Sidewalks on both sides of all approaches and crosswalks are provided across each intersection leg. There is on-street, metered parking on both sides of Washington Street. Land use near the intersection is primarily commercial, with the MBTA commuter rail tracks to the south of

the intersection. The traffic signal at this intersection was installed in 2018 and prior to that the intersection was unsignalized with Harvard Street operating under STOP-control.

Washington Street at Crafts Street / Bank Driveway

Washington Street is intersected by Crafts Street from the north and the Santander Bank driveway from the south to form a four-legged signalized intersection. The eastbound and westbound Washington Street approaches each consist of a shared left-turn/through lane and a shared through/right-turn lane. The Crafts Street approach consists of a shared left-turn/through lane and a right-turn lane. The Bank driveway consists of one general purpose lane utilized for both entering and exiting vehicles. There are sidewalks on both sides of all roadways and crosswalks are provided across all approaches. There is on-street parking on both sides of Washington Street and the east side of Crafts Street. Land use near the intersection is primarily commercial and residential.

Washington Street at Adams Street / Lewis Terrace

Washington Street is intersected from the north by Adams Street and from the south by Lewis Terrace to form a four-legged signalized intersection. The eastbound Washington Street approach consists of a shared left-turn/through lane, a through lane, and a channelized right-turn lane. The westbound Washington Street approach consists of an exclusive left-turn lane, a through lane, and a shared through/right-turn lane. The northbound Lewis Terrace approach consists of a shared left-turn/through lane and a channelized right-turn lane. The southbound Adams Street approach consists of a shared left-turn/through lane and an exclusive right-turn lane. Sidewalks exist on both sides of Washington Street and Adams Street and along the north side of Lewis Terrace. There are crosswalks across the north and west legs of the intersection. No on-street parking is available. Land use near the intersection is primarily residential.

Washington Street at Jackson Road

Washington Street is intersected by Jackson Road from the north to form a three-legged signalized intersection. The eastbound Washington Street approach consists of a shared left-turn/through lane and a through lane. The westbound Washington Street approach consists of two through lanes and an exclusive right-turn lane. The southbound Jackson Road approach consists of an exclusive left-turn lane and an exclusive right-turn lane. Sidewalks are provided on both sides of all roadways and crosswalks are present across the north and east legs of the intersection. There is on-street parking on both sides of Washington Street, east of its intersection with Jackson Road. Land use near the intersection is primarily residential and institutional.

Pedestrian and Bicycle Facilities

Varying levels of pedestrian and bicycle facilities are provided in the study area. Sidewalks are provided on both sides of all major roadways in the study area. Crosswalks are provided at all signalized intersections and at some unsignalized intersections. Within the vicinity of the Site, there are pedestrian-friendly businesses as well as a Whole Foods, located at the northwest corner of the intersection of Washington Street at Crafts Street.

Bicycle facilities are currently limited in the study area, with no study area roadway having on-road or off-road bike lanes. There are no off-road bike and pedestrian paths within immediate proximity to the Site, with the nearest shared use path located over a mile north of the Site along the Charles River.

Bluebike Program

The City of Newton is now utilizing Bluebike, Metro Boston's biggest public bike share program. Bluebikes began operating in July 2011 and currently provides over 4,000 bikes at 400+ bike-sharing stations. The closest permanent Bluebikes bike-share station is located adjacent the Washington Street at Crafts Street MBTA bus stop in front of the Whole Food Market, approximately 550 ft southwest of the Site. This station currently hosts seven docking stations.

Existing Traffic Volumes

Daily traffic volumes were collected on Crafts and Washington Street over a 24-hour period on Thursday, February 10, 2022, using an automatic traffic recorder (ATR). This date represents a typical weekday for traffic count purposes (non-holidays) while schools were in session. The volumes are summarized in Table 1 and included in the Appendix to this document.

Table 1 Existing Traffic Volume Summary

		Weekday Morning Peak Hour			Weekday Evening Peak Hour		
Location	ADT [a]	Volume	K Factor [b]	Dir. Dist. [c]	Volume	K Factor	Dir. Dist.
Crafts Street, south of Lincoln Street	10,900	750	6.9%	55% SB	965	8.9%	58% NB

Source: VHB based on automatic traffic recorder counts conducted on February 10th, 2022 and adjusted for COVID-19.
Note: Peak hours do not necessarily coincide with the peak hours of turning movement counts.
a Average Daily Traffic (ADT) volume expressed in vehicles per day.
b Represents the percent of daily traffic that occurs during the peak hour.
c Directional distribution of peak hour traffic.

As shown in Table 1, Crafts Street, south of Lincoln Street carries approximately 10,900 vehicles on a typical weekday with the peak hours accounting for 6.9 percent (morning peak hour) and 8.9 percent (evening peak hour) of the weekday daily traffic flow. Traffic flow along Crafts Street is heavier in the southbound direction during the weekday morning peak hour and heavier in the northbound direction during the weekday evening peak hour.

Concurrent with the ATR counts, turning movement counts (TMCs) were conducted at the study area intersections in February 2022 during the weekday morning peak period from 7:00 AM to 9:00 AM and the weekday afternoon peak period from 4:00 PM to 6:00 PM. The TMC data indicates that the weekday morning peak hour generally occurs between 7:45 AM and 8:45 AM and the weekday evening peak hour occurs between 4:30 PM and 5:30 PM.

COVID-19 Adjustment

It should be noted that the counts for this Project were conducted in February 2022, and, while the state has returned to full capacity and pre-pandemic protocols, the effects of the COVID-19 pandemic continue to influence travel patterns across Massachusetts. To account for this, VHB

determined a highly conservative 14-percent weekday morning and 19-percent weekday evening adjustment factor be applied to all count data. This adjustment factor was determined based on a review of nearby traffic volume counts conducted before the COVID-19 pandemic. Specifically, traffic volumes from 2019 at the intersection of Washington Street at Harvard Street were reviewed.

This adjustment is believed to be highly conservative, as it is unknown if traffic patterns will ever return to pre-pandemic levels. The COVID-19 adjustment data is provided in the Appendix.

Seasonal Variation

MassDOT 2019 seasonal adjustment factors were reviewed to understand the seasonality of traffic count data collected in the month of February. MassDOT seasonal adjustment factors are broken down by roadway functional classification, sometimes indicating different adjustment factors based on the roadway type. Based on this review, traffic volumes during the month of February are representative of average month conditions. As such, the existing count data was not adjusted for seasonal variation. The MassDOT seasonal adjustment factors are provided in the Appendix for reference.

The resulting 2022 Existing peak hour traffic volume networks for the weekday morning and evening are shown in Figures 3 and 4, respectively.

Public Transportation

Public transportation is readily available in proximity to the Site by the Massachusetts Bay Transportation Authority (MBTA) via the Framingham/Worcester Line of the commuter rail and the MBTA bus routes 553, 554, 556, and 558.

Sidewalks are provided throughout the study area along the routes to transit stops and stations, and crosswalks exist at the signalized intersections. Details on current transit opportunities are provided below and the transit routes and stops are shown in Figure 5. The route maps and schedules for all public transportation services within the study area are provided in the Appendix to this document.

MBTA Commuter Rail

Framingham/Worcester Line

The MBTA's Framingham/Worcester Line of the commuter rail provides direct, scheduled service between Union Station in Worcester and South Station in Boston. The Newtonville station is located adjacent to Washington Street, between Walnut Street and Harvard Street, approximately 0.30 miles southwest of the Site. The approximate walk time from the Site to the Newtonville station is 7 minutes. Weekday headways are approximately one hour during peak periods and weekend headways are approximately two hours. Travel time between Newtonville and South Station on the commuter rail is approximately 20-25 minutes.

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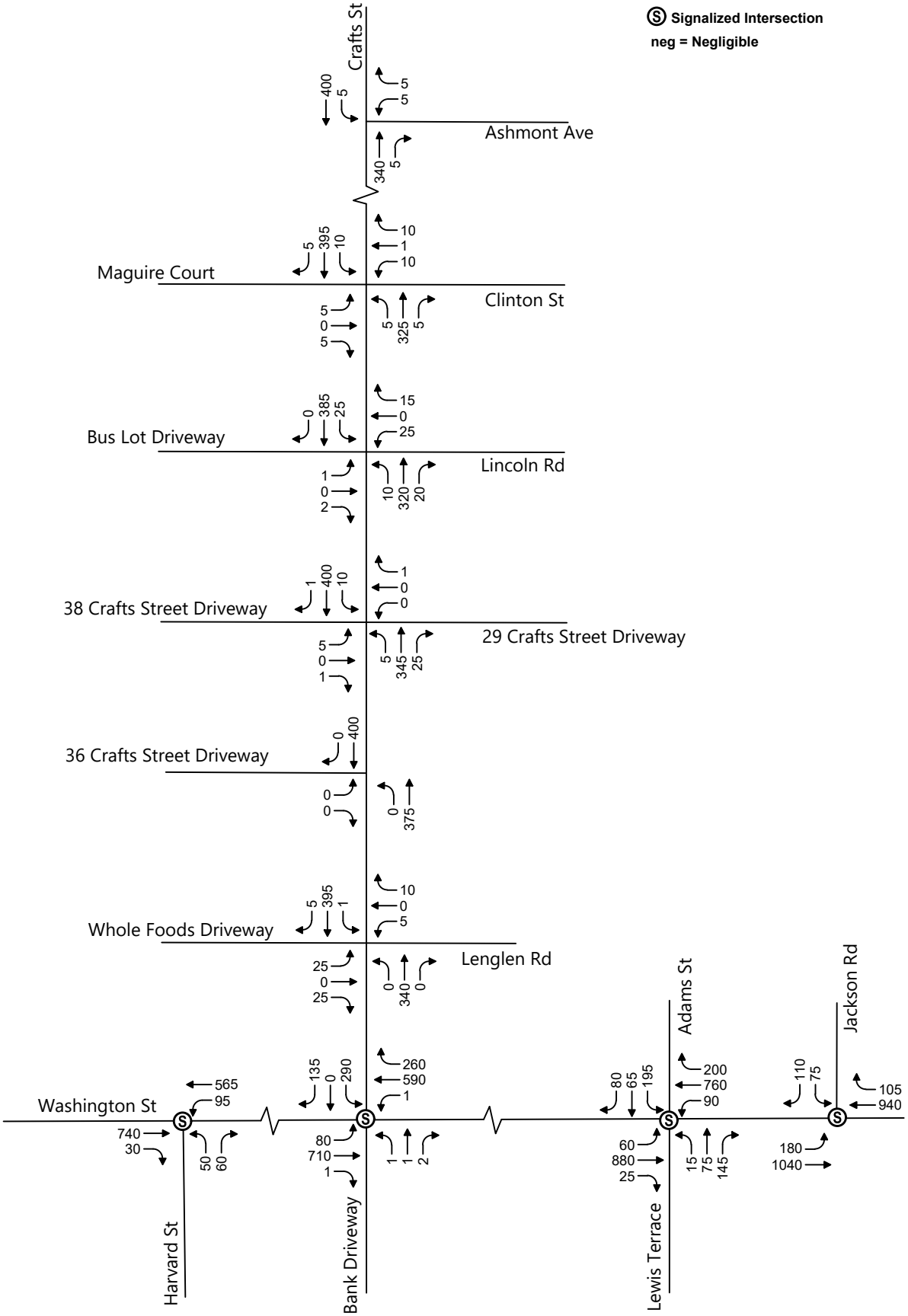

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Figure 3

2022 Existing Conditions
Weekday Morning Peak Hour Traffic Volumes
Crafts Street Elderly Housing with Services
Newton, Massachusetts

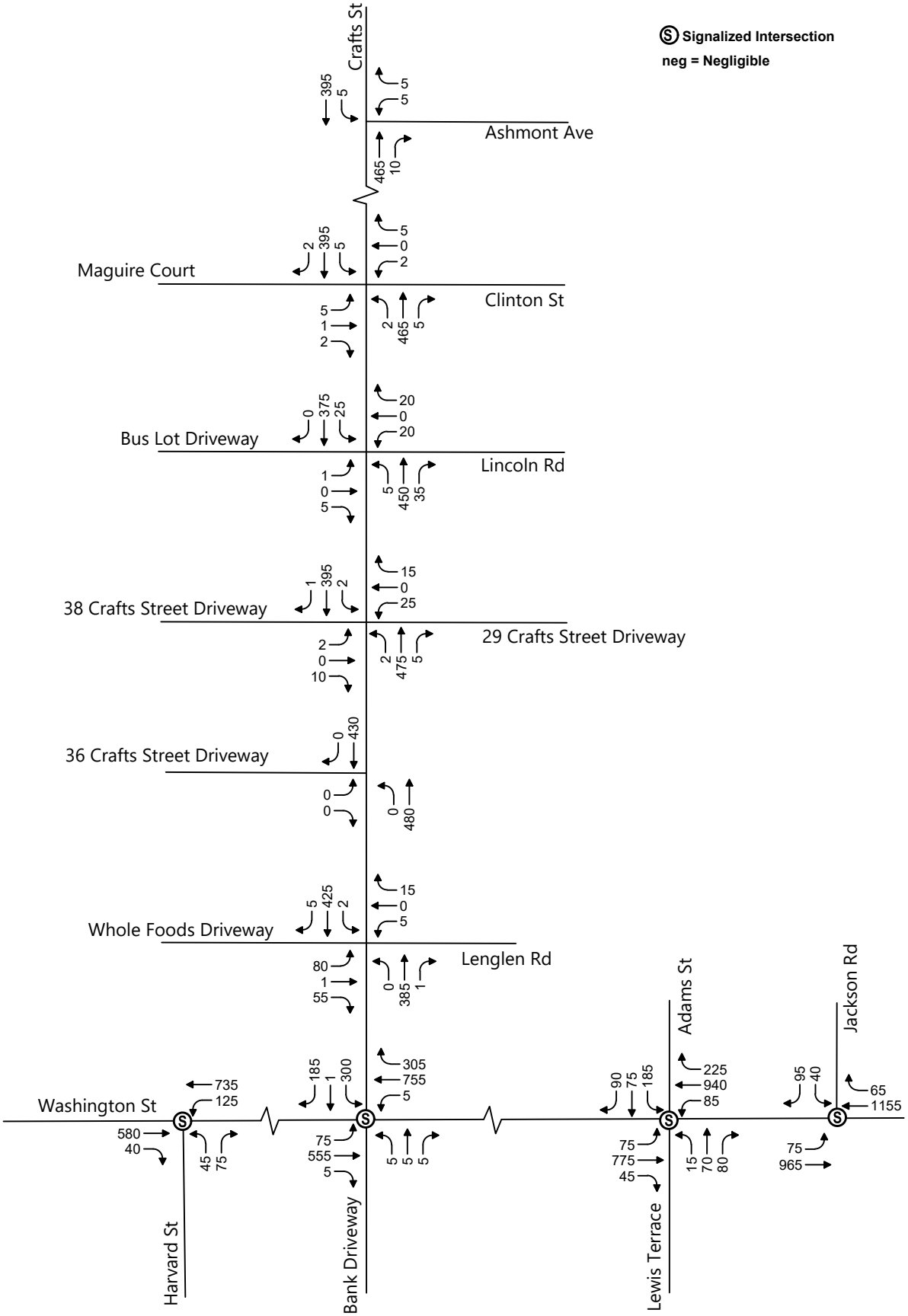

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Figure 4

2022 Existing Conditions
Weekday Evening Peak Hour Traffic Volumes
Crafts Street Elderly Housing with Services
Newton, Massachusetts

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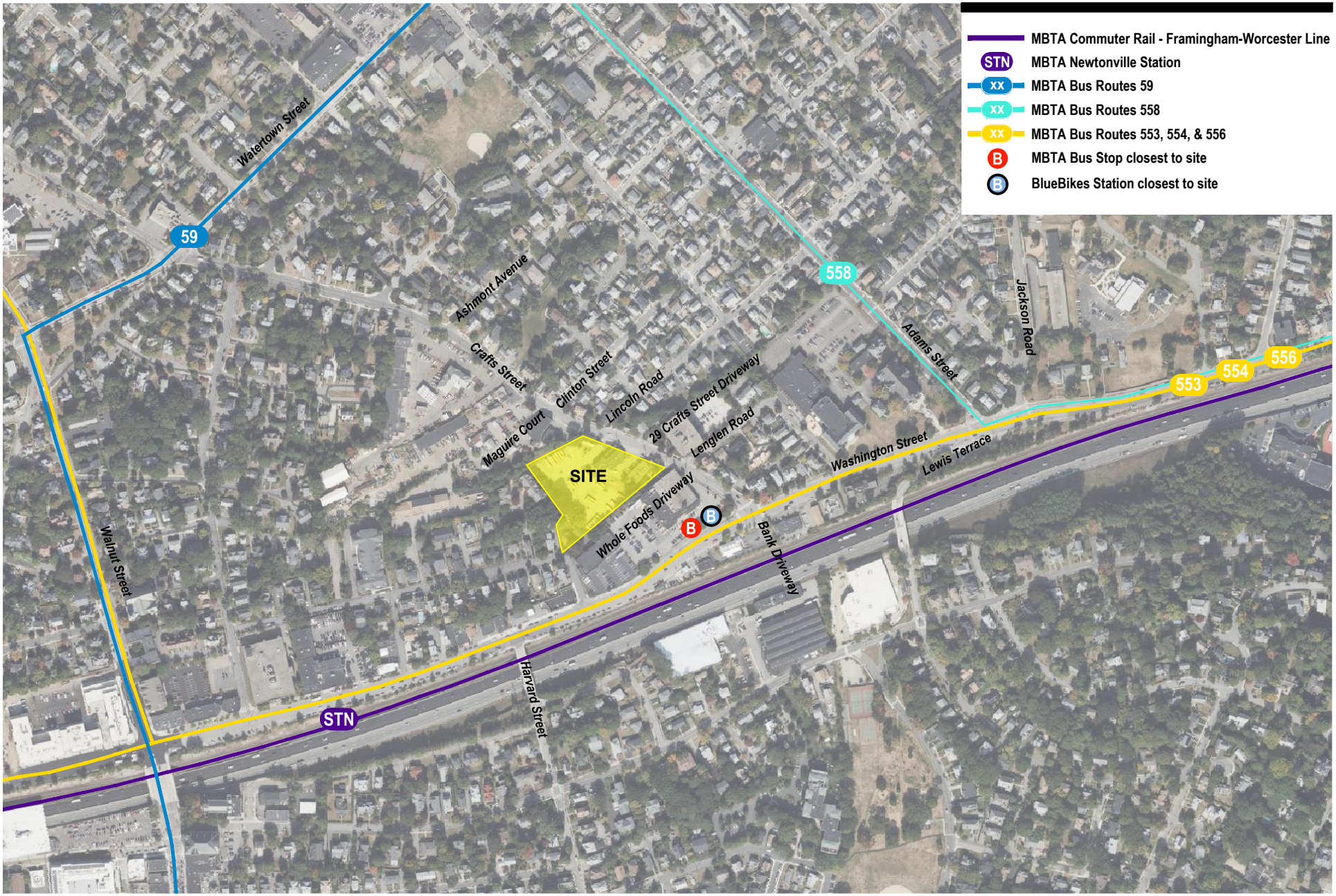

0 250 500 Feet

Public Transportation Routes

Figure 5

Crafts Street Elderly Housing with Services
Newton, Massachusetts

MBTA Bus Routes

Route 553

The Route 553 bus runs from Brandeis-Roberts Station in Waltham to Newton Corner in Newton and travels along Washington Street within the study area. The nearest bus stop to the Site is Washington Street at Crafts Street, located on the northwest corner of the intersection of Washington Street at Crafts Street, approximately 550 ft southwest of the Site. Service is provided on weekdays and Saturdays. Weekday headways are approximately one hour, with approximately 30-minute headways during peak periods. Saturday headways are approximately one hour.

Route 554

The Route 554 bus runs from Waverly Square in Belmont to Newton Corner in Newton and travels along Washington Street within the study area. The nearest bus stop to the Site is Washington Street at Crafts Street, located on the northwest corner of the intersection of Washington Street at Crafts Street, approximately 550 ft southwest of the Site. Service is provided on weekdays only. Headways are approximately 90 minutes, with an evening peak headway of 45 minutes.

Route 556

The Route 556 bus runs from Waltham Highlands to Newton Corner and travels along Washington Street within the study area. The nearest bus stop to the Site is Washington Street at Crafts Street, located on the northwest corner of the intersection of Washington Street at Crafts Street, approximately 550 ft southwest of the Site. Service is provided on weekdays only. Headways are approximately one hour during peak periods.

Route 558

The Route 558 bus runs from Riverside Station in Newton to Newton Corner and travels along Washington Street and Adams Street within the study area. The nearest bus stop is Adams Street at Washington Street, located on the northeast corner of the intersection of Washington Street at Adams Street, approximately one-quarter mile east of the Site. Service is provided on weekdays only. Headways are approximately 80 minutes during peak periods.

Vehicular Crash History

To identify motor vehicle crash trends in the project study area, the most current crash data for the study area intersections was obtained from MassDOT for the five-year period from 2015 through 2019. A summary of the vehicular crash data is presented in Table 2 and included in the Appendix to this document.

Table 2 Vehicular Crash Summary (2015-2019)

	Crafts Street at Ashmont Avenue	Crafts Street at Clinton Street / Maguire Court	Crafts Street at Lincoln Road / Bus Lot Dwy	Crafts Street at 29 Crafts Street Dwy / 38 Crafts Street Dwy	Crafts Street at 36 Crafts Street Dwy
Signalized?	No	No	No	No	No
MassDOT Average Crash Rate	0.52	0.52	0.52	0.52	0.52
Calculated Crash Rate	0.17	0.33	0.32	0.26	0.05
Exceeds Average?	No	No	No	No	No
Year					
2015	1	1	1	1	1
2016	0	1	1	1	0
2017	1	3	2	1	0
2018	1	1	1	0	0
2019	0	0	1	2	0
Total	3	6	6	5	1
Collision Type					
Angle	0	2	4	2	0
Head-on	0	0	0	0	0
Rear-end	1	1	1	0	1
Rear-to-rear	0	0	0	0	0
Sideswipe, opposite direction	0	0	0	0	0
Sideswipe, same direction	0	0	0	1	0
Single Vehicle Crash	2	2	1	2	0
Not reported	0	1	0	0	0
Severity					
Fatal Injury	0	0	0	0	0
Non-Fatal Injury	0	1	2	1	0
Property Damage Only	3	5	4	4	1
Not Reported	0	0	0	0	0
Time of day					
Weekday, 7:00 AM - 9:00 AM	0	0	3	0	0
Weekday, 4:00 – 6:00 PM	0	0	2	0	0
Saturday, 11:00 AM – 2:00 PM	0	0	0	0	0
Weekday, other time	2	4	1	3	1
Weekend, other time	1	2	0	2	0
Pavement Conditions					
Dry	3	5	2	5	1
Wet	0	0	3	0	0
Snow/ Ice/ Slush	0	0	0	0	0
Not Reported	0	1	0	0	0
Non-Motorist (Bike, Pedestrian)	0	0	0	0	0

Source: MassDOT Crash Portal (2015-2019), accessed March 2022.

Table 2 Vehicular Crash Summary (2015-2019) (continued)

	Crafts Street at Lenglen Road / Whole Foods Dwy	Washington Street at Harvard Street	Washington Street at Crafts Street	Washington Street at Adams Street / Lewis Terrace	Washington Street at Jackson Road
Signalized?	No	Yes	Yes	Yes	Yes
MassDOT Average Crash Rate	0.52	0.71	0.71	0.71	0.71
Calculated Crash Rate	0.15	0.55	0.25	0.82	0.37
Exceeds Average?	No	No	No	Yes	No
Year					
2015	2	3	5	7	3
2016	1	7	0	11	2
2017	0	2	3	12	2
2018	0	4	3	9	5
2019	0	2	0	5	6
Total	3	18	11	44	18
Collision Type					
Angle	1	5	3	20	9
Head-on	0	0	0	1	0
Rear-end	0	1	3	9	6
Rear-to-rear	0	0	0	0	0
Sideswipe, opposite direction	1	1	1	0	0
Sideswipe, same direction	0	6	2	7	1
Single Vehicle Crash	1	4	2	6	2
Not reported	0	1	0	1	0
Severity					
Fatal Injury	0	0	0	0	0
Non-Fatal Injury	1	3	3	12	2
Property Damage Only	1	12	8	30	16
Not Reported	1	3	0	2	0
Time of day					
Weekday, 7:00 AM - 9:00 AM	0	3	2	6	2
Weekday, 4:00 – 6:00 PM	1	5	0	5	2
Saturday, 11:00 AM – 2:00 PM	0	0	0	1	1
Weekday, other time	2	7	6	26	12
Weekend, other time	0	3	3	6	1
Pavement Conditions					
Dry	3	15	10	32	11
Wet	0	2	1	8	5
Snow/ Ice/ Slush	0	0	0	0	1
Not Reported	0	0	0	2	0
Non-Motorist (Bike, Pedestrian)	1	4	1	3	0

Source: MassDOT Crash Portal (2015-2019), accessed March 2022.

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. MassDOT average crash rates for District 6 (the MassDOT district designation for Newton) are 0.71 and 0.52 for signalized and unsignalized intersections, respectively. In other words, on average, 0.71 crashes occurred per million vehicles entering signalized intersections, and 0.52 crashes occurred per million vehicles entering unsignalized intersections throughout District 6. The crash rate worksheets for the study area intersections are included in the Appendix to this document.

As shown in Table 2, one of the ten study area intersections over the five-year period had an average crash rate above the average crash rate for District 6: the intersection of Washington Street at Adams Street / Lewis Terrace. The majority of the crashes were angle and single vehicle crashes at the unsignalized study area intersections and angle and rear-end crashes at the signalized study area intersections resulting in property damage only. No fatal crashes were reported at any of the study area intersections.

The intersection with the highest number of non-motorists (pedestrian and bicycle) crashes over the five-year period was the intersection of Washington Street and Harvard Street, where four such crashes occurred. It should be noted that the traffic signal at this intersection was installed in 2018, so crash data from 2015-2017 at this location represent an unsignalized condition.

Highway Safety Improvement Program

In addition to calculating the crash rate, study area intersections should also be reviewed in MassDOT's Highway Safety Improvement Program (HSIP) database. The HSIP database identifies crash clusters. An HSIP-eligible cluster is one in which the total number of equivalent property damage only[1] (EPDO) crashes in the area is within the top 5-percent of all clusters in that region. An HSIP-eligible location is eligible for FHWA and MassDOT funds to address the identified safety issues at these locations.

As part of this effort, VHB reviewed this database and found that the intersection of Washington Street at Adams Street / Lewis Terrace is a 2017-2019 HSIP cluster.

[1] Equivalent property damage only (EPDO) 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.

Future Conditions

To determine future roadway operations, traffic volumes in the study area were projected to the year 2029 to reflect a seven-year planning horizon from the Existing conditions consistent with City of Newton and MassDOT guidelines.

Traffic volumes on the roadway network under future conditions without the Project (No-Build Condition) are assumed to include all existing traffic, any new traffic due to regional and area background traffic growth, and traffic related to any specific nearby development projects expected to be completed by the 2029 horizon year. Roadway improvements proposed within the boundaries of the study area were also considered and incorporated where appropriate. The anticipated traffic volumes from the proposed development were added to the No-Build traffic volumes to reflect future conditions with the project in place (Build Condition).

No Build Conditions

No-Build traffic volumes were determined by considering existing traffic volumes and adding regional traffic growth and traffic from other nearby developments. Traffic growth is a function of expected new development, changes in demographics, and changes in auto usage and ownership in the region. Regional traffic growth is projected by examining historic traffic growth trends.

Regional Traffic Growth

Traffic studies conducted in the City of Newton and historic count data were reviewed to establish a rate at which traffic volumes can be expected to grow. A review of recent traffic studies showed a 0.5-percent per year growth rate has been utilized. Historical count data available from MassDOT prior to 2020 within the vicinity of the project show fluctuations in traffic volumes over the last five years, with no consistent increase or decrease in traffic volumes. Based on this research, informed by the information available and to present a conservative analysis, a growth rate 0.5-percent per year has been assumed for this study.

Planned/Approved Developments

In addition to accounting for background growth, the traffic associated with other planned/approved developments near the site was also considered. Based on discussions with the City of Newton, it

was determined that there are several planned development projects within the vicinity of the study area that should be considered as part of the background development:

- **967 Washington Street:** The development proposes a three-story building with 28 residential units. Projected traffic volumes expected to be generated by this project were estimated based on trip generation rates published by the Institute of Transportation Engineers.
- **386 Watertown Street:** The development proposes a three-story building with 10 residential units and ground floor commercial space. Projected traffic volumes expected to be generated by this project were estimated based on trip generation rates published by the Institute of Transportation Engineers.
- **60 & 66-68 Austin Street**: The project consists of transitioning approximately 4,000 square feet of medical office space to space designated for the Russian School of Mathematics. Projected traffic volumes expected to be generated by this project were obtained from the published traffic study submitted as part of the permitting process for the project.
- **15 Riverdale Avenue:** The project proposes a mixed-use redevelopment that will include 204 residential units in multiple buildings and commercial space that includes a limited amount of ancillary retail uses. Projected traffic volumes expected to be generated by this project were obtained from the published traffic study submitted as part of the permitting process for the project.
- **1149 Washington Street**: The project, also known as Dunstan East, proposes a mixed-use redevelopment that will include approximately 292 residential units in multiple buildings and approximately 8,000 square feet of commercial space. Projected traffic volumes expected to be generated by this project were obtained from the published traffic study submitted as part of the permitting process for the project.

The trips expected to be generated by each planned/approved development are included in the Appendix to this report for reference.

Future Roadway Conditions

In assessing future traffic conditions, proposed roadway improvements within the study area were considered. Based on discussions with the City of Newton and information available from MassDOT, there are no imminent roadway improvement projects located within the vicinity of the site were identified.

Washington Street Vision Plan

As stated previously, the Newton City Council approved the Washington Street Vision Plan in December 2019. The plan includes a goal to reconfigure Washington Street for the safety of all users, including providing a narrower roadway cross section to provide a single lane of travel and a separated bike lane in each direction and additional landscaping. While the plan provides the future vision of the Washington Street corridor, currently the City of Newton does not have any immediate plans to implement the suggested improvements within the study area. Therefore, the 2029 No Build Condition does not incorporate the improvements outlined in the Washington Street Vision Plan.

No-Build Traffic Volumes

The 2029 No-Build traffic volume networks were developed by applying the 0.5-percent annual growth rate over the seven-year study horizon to the existing volume networks and adding the traffic volumes associated with the background development described above. Figures 6 and 7 show the resulting 2029 No-Build peak hour traffic volume networks for the weekday morning and weekday evening peak hours, respectively.

Build Conditions

Build traffic volumes were determined by estimating site-generated traffic volumes and distributing these volumes over the study area roadways. The site-generated traffic volumes include new trips that are likely to be generated by the proposed development.

Project-Generated Traffic Volumes

The rate at which any development generates traffic is dependent upon a number of factors such as size, location, and concentration of surrounding developments. As previously discussed, the proposed redevelopment plan consists of the removal of the existing uses on Site and construction of the proposed 209-unit elderly living facility.

Existing Site-Generated Traffic

The planned development parcels are currently occupied by two commercial office buildings and a school bus parking lot on Crafts Street and two residential properties on Court Street. Traffic volumes generated by the Crafts Street parcels under Existing conditions were captured in the turning movement counts conducted at the study area intersections in February 2022. Based on those counts, the existing uses on the Site collectively currently generate approximately 28 vehicle trips (19 entering / 9 exiting) during the weekday evening peak hour and 20 vehicle trips (6 entering / 14 exiting) during the weekday evening peak hour.

It should be noted that the traffic counts conducted in February 2022 reported no vehicles entering or exiting the parking lot for the office building at 36 Crafts Street. Without redevelopment of the Site, this office building could be re-tenanted by a use that would generate vehicle trips during the weekday morning and weekday evening peak hours, which would result in a higher number of site-generated trips than reported above. In addition, the traffic counts conducted for the Site driveways did not include the two residential properties on Court Street that will be demolished as part of the Project. To be conservative, no additional trip generation estimates were added to account for the office building at 36 Crafts Street and the two residential parcels on Court Street.

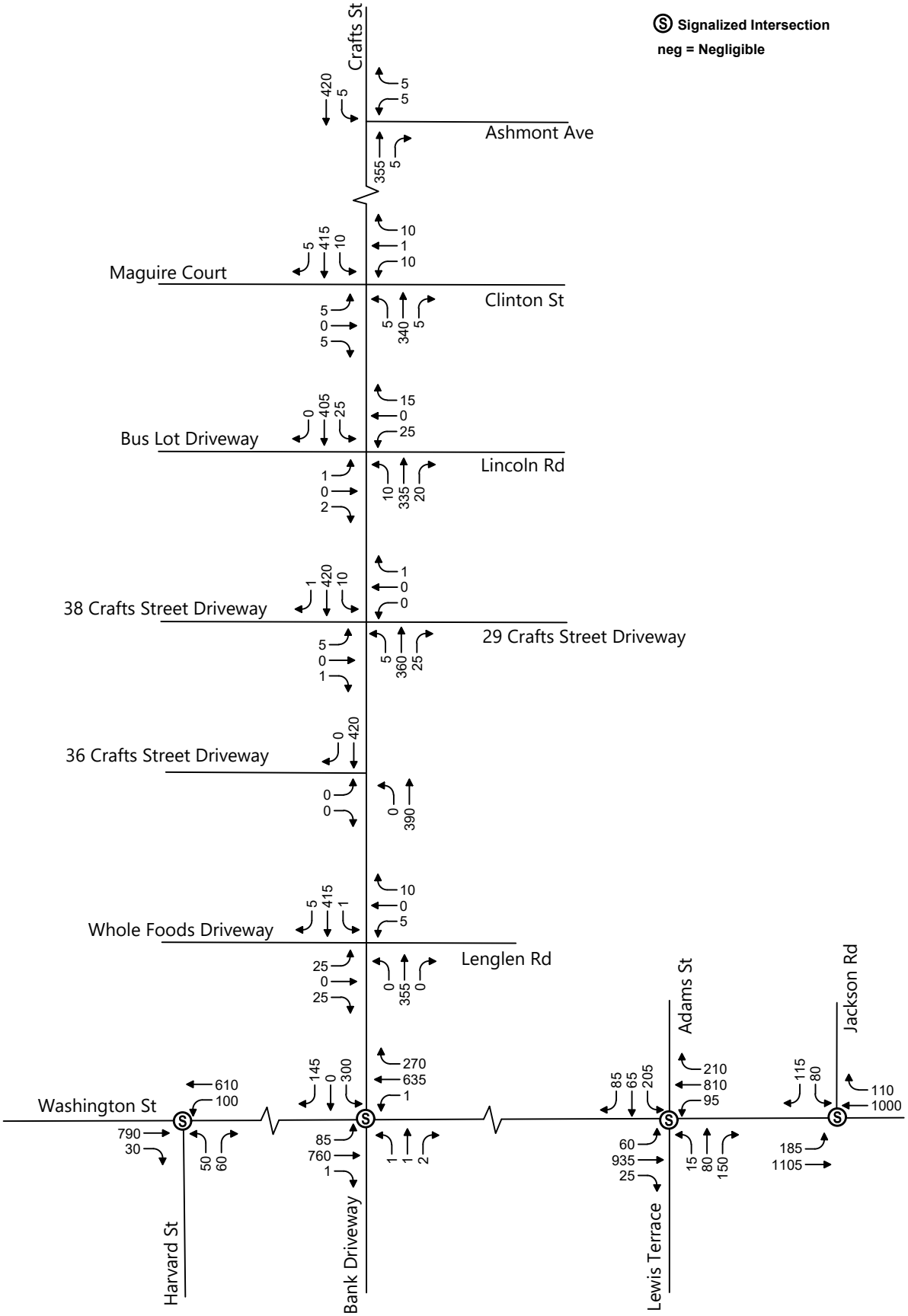

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Figure 6

2029 No-Build Conditions
Weekday Morning Peak Hour Traffic Volumes
Crafts Street Elderly Housing with Services
Newton, Massachusetts

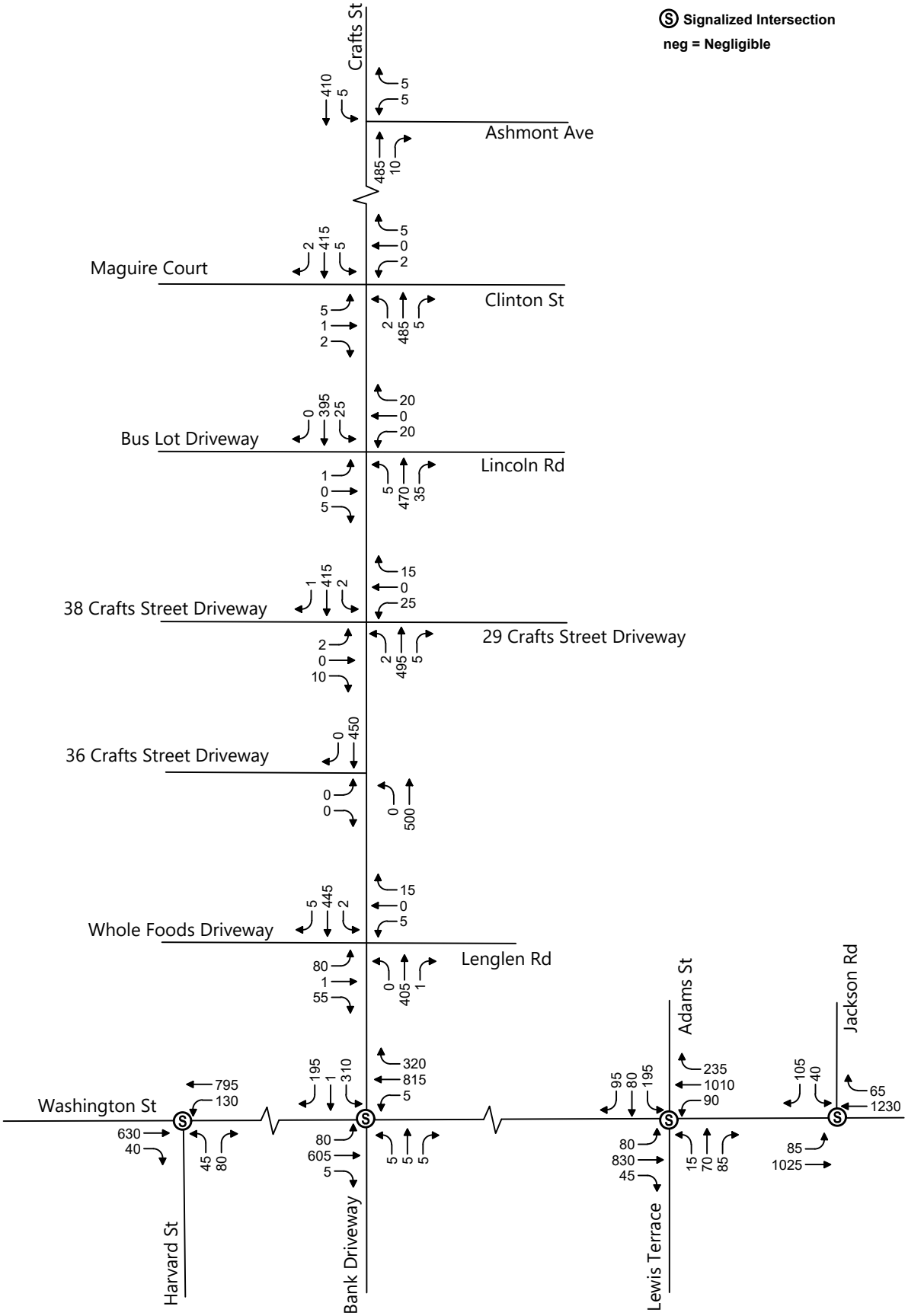

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Figure 7

2029 No-Build Conditions
Weekday Evening Peak Hour Traffic Volumes
Crafts Street Elderly Housing with Services
Newton, Massachusetts

Proposed Site-Generated Traffic

Trip generation estimates for the proposed Project were projected using trip generation rates published by the Institute of Transportation Engineers (ITE) *Trip Generation, 11th Edition*[2]. The number of vehicle-trips generated by the proposed use were estimated based on ITE land use code (LUC) 255 (Continuing Care Retirement Community) for 209 units. As the Project will include a mix of independent living units, assisted living units, and a memory care center, LUC 255 was determined to be the most applicable land use code as it represents a facility that provides multiple elements of elderly adult living in one location. The trip generation worksheet is included in the Appendix to this report.

Table 3 summarizes the existing and proposed projected trip generation associated with the proposed development.

Table 3 Site-Generated Vehicle Trips

	Existing Site Trips [a]	Proposed Trips [b]	Net New Trips
Weekday Daily [c]			
Enter	n/a	335	n/a
Exit	n/a	335	n/a
Total	n/a	670	n/a
Weekday Morning			
Enter	19	32	+13
Exit	9	17	+8
Total	28	49	+21
Weekday Evening			
Enter	6	32	+26
Exit	14	50	+36
Total	20	82	+62

a Based-on traffic counts conducted by VHB in February 2022.
b Trip Generation estimate based ITE LUC 255 (Continuing Care Retirement Community) based on regression equations for 209 units.
c Existing site-generated trips only counted during the weekday morning and evening peak hours.

As shown in Table 3, the proposed development is estimated to generate approximately 21 new vehicle trips (13 entering/8 exiting) during the weekday morning peak hour and approximately 62 new vehicle trips (26 entering/36 exiting) during the weekday evening peak hour.

As noted previously, the existing trips were counted in February 2022 and no traffic was recorded entering or existing the driveway for the office building at 36 Crafts Street or the residential parcels along Court Street. Therefore, the existing Site-generated volumes shown in Table 3 are a conservative estimate of the change in trips the redevelopment will generate, and it is likely that the Project will have less of an impact on the roadway network than currently shown. However, to present a conservative analysis, the net new trips generated by the proposed Project are based on the February 2022 counts and no adjustments have been made.

[2] Trip Generation, 11th Edition, Institute of Transportation Engineers, Washington D.C., 2021.

Mode Share

It is expected that some residents, visitors, and employees will use a variety of transportation options to reach the Site, including private vehicles, walking, bicycling, and public transportation. The Project is connected to the rest of Newton with sidewalks, an existing Bluebike station is located less than 600 feet from the Site, and nearby public transit is provided through several MBTA bus lines and the Newtonville Station of the commuter rail. The Site is also located next to a Whole Foods Market, which provides residents the ability to walk to and from the nearest grocery store without needing to drive in a vehicle.

The site will also provide 50 secure bicycle parking spaces and the proposed provider will have a multi-modal approach to operations and will have a small-scale shuttle, van, and comfortable sedan on-Site that will be available to all residents of the facility. Residents can schedule rides to appointments and/or for service needs and the shuttle and van will likely also run between the facility and key community centers that offer retail, restaurants, and other needed/desired services on a regular or as needed basis.

However, to provide a highly conservative analysis, no mode share credits have been applied to the trip generation estimates and the Project-generated trips assume that 100-percent of the Site traffic will access the Site via private vehicles.

Trip Distribution

The directional distribution of traffic approaching and departing the Site is a function of several variables: population densities, existing travel patterns, and the efficiency of the roadways leading to the Site. The trip distribution patterns for the proposed Project have 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), as Site-generated trips during the peak hours will generally be characterized by residents and employees commuting to/from work. The assignment of site-generated traffic to specific travel routes was based on existing traffic patterns at the study area intersections and the assumption that most motorists will seek the fastest and most direct routes to and from the site.

The trip distribution patterns are summarized in Table 4 and shown in Figure 8. The detailed trip distribution calculation worksheets are included in the Appendix.

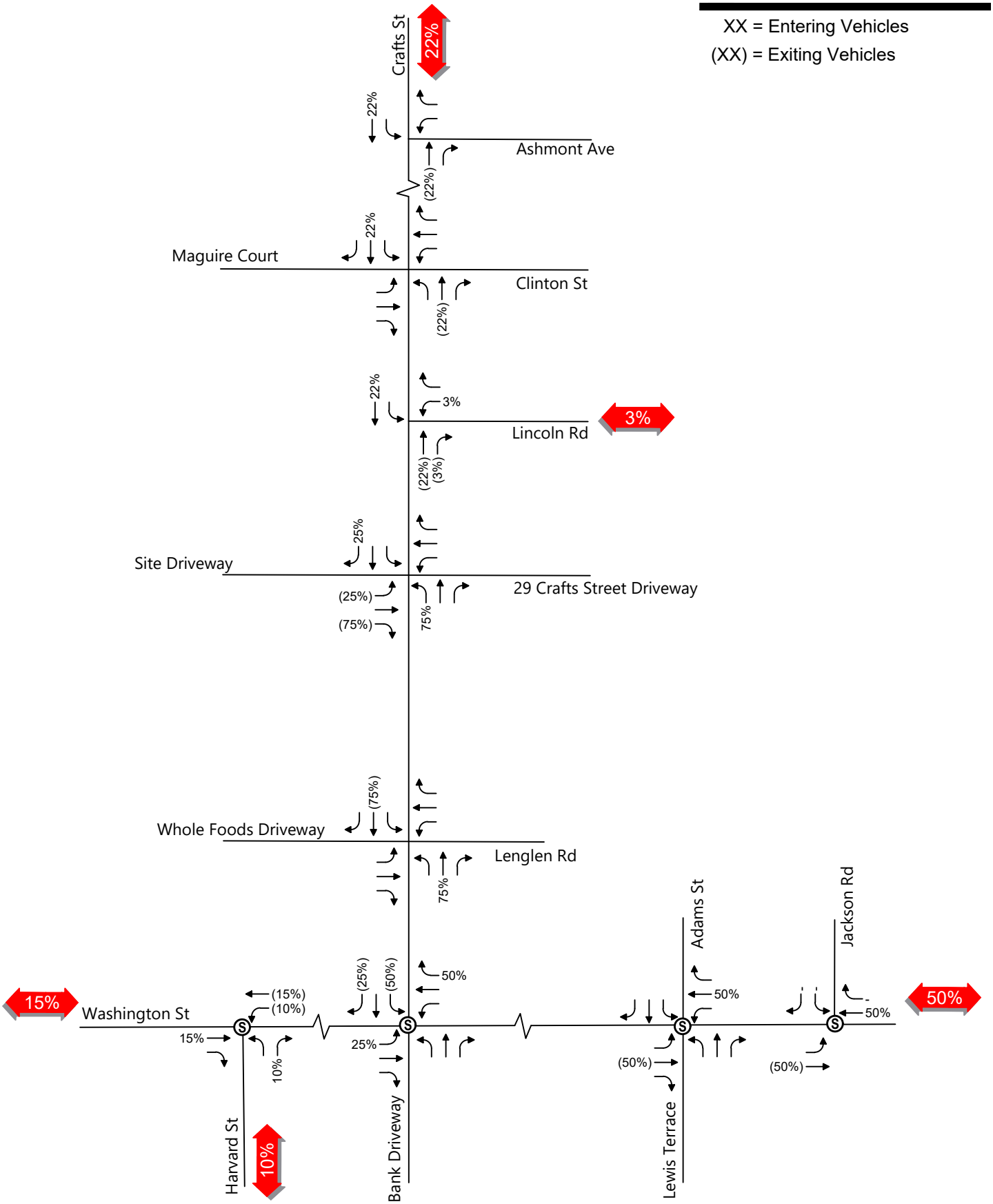
Table 4 Trip Distribution Summary

Travel Route	Direction (To/From)	Automobile Trips
Washington Street	East	50%
Washington Street	West	15%
Crafts Street	North	22%
Harvard Street	South	10%
Lincoln Road	East	3%
Total		100%

Source: Based on Journey-to-Work data for the City of Newton from the U.S Census Bureau's five-year estimate (2012-2016).

#260-22

XX = Entering Vehicles
(XX) = Exiting Vehicles



Not to Scale

Figure 8
Trip Distribution

Crafts Street Elderly Housing with Services
Newton, Massachusetts

Build Traffic Volumes

The site-generated traffic volumes were assigned to the roadway network according to the distribution and travel patterns described above and added to the No-Build traffic volumes to develop the peak hour Build traffic volume networks. Figures 9 and 10 illustrate the weekday morning and weekday evening Site-generated traffic volumes, respectively, and Figures 11 and 12 present the resulting 2029 Build Condition weekday morning and weekday evening peak hour traffic volumes, respectively.

XX = Entering Vehicles
(XX) = Exiting Vehicles

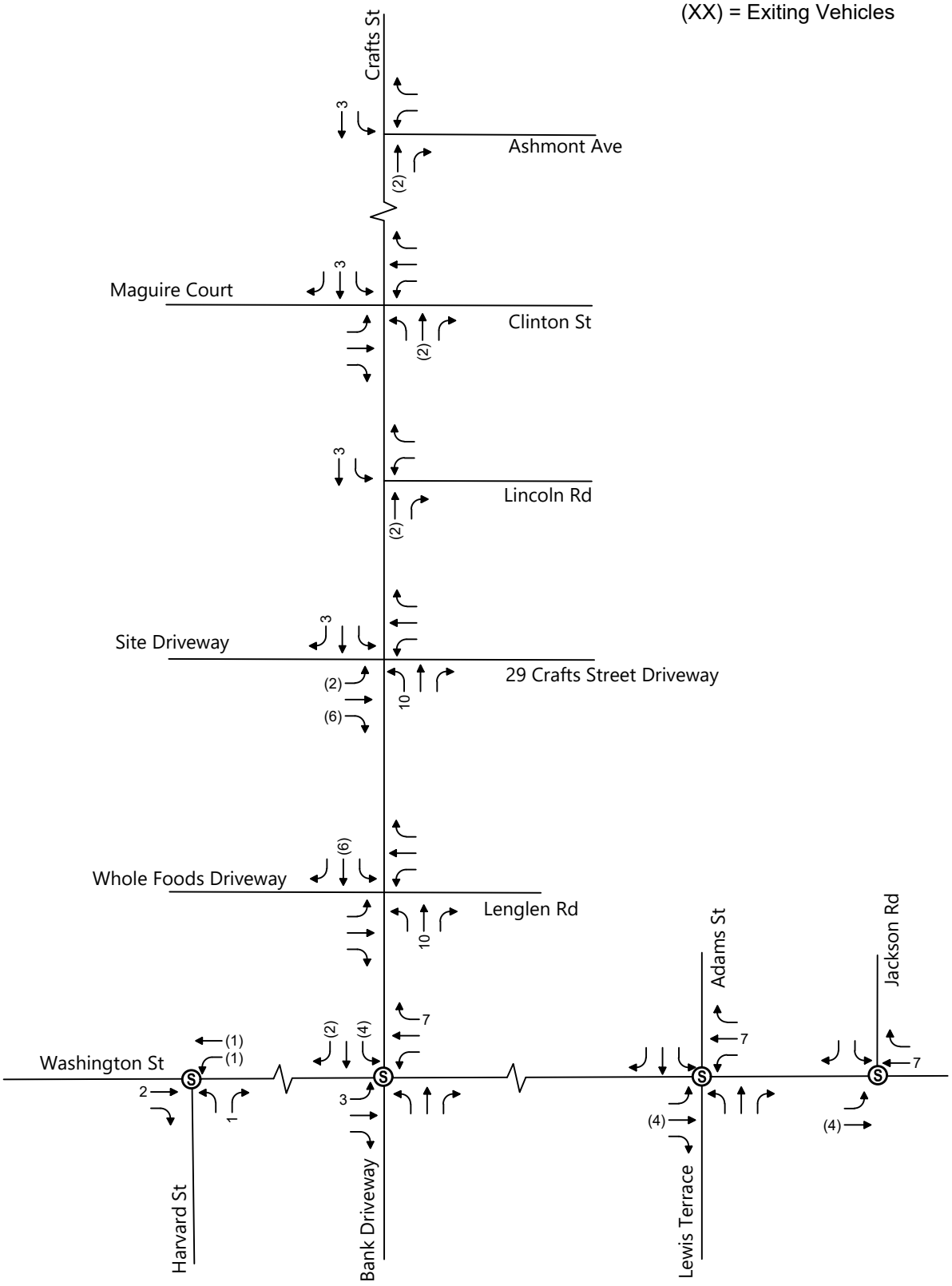


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Figure 9

Net New Site-Generated Traffic Volumes
Weekday Morning Peak Hour
Crafts Street Elderly Housing with Services
Newton, Massachusetts

XX = Entering Vehicles
(XX) = Exiting Vehicles

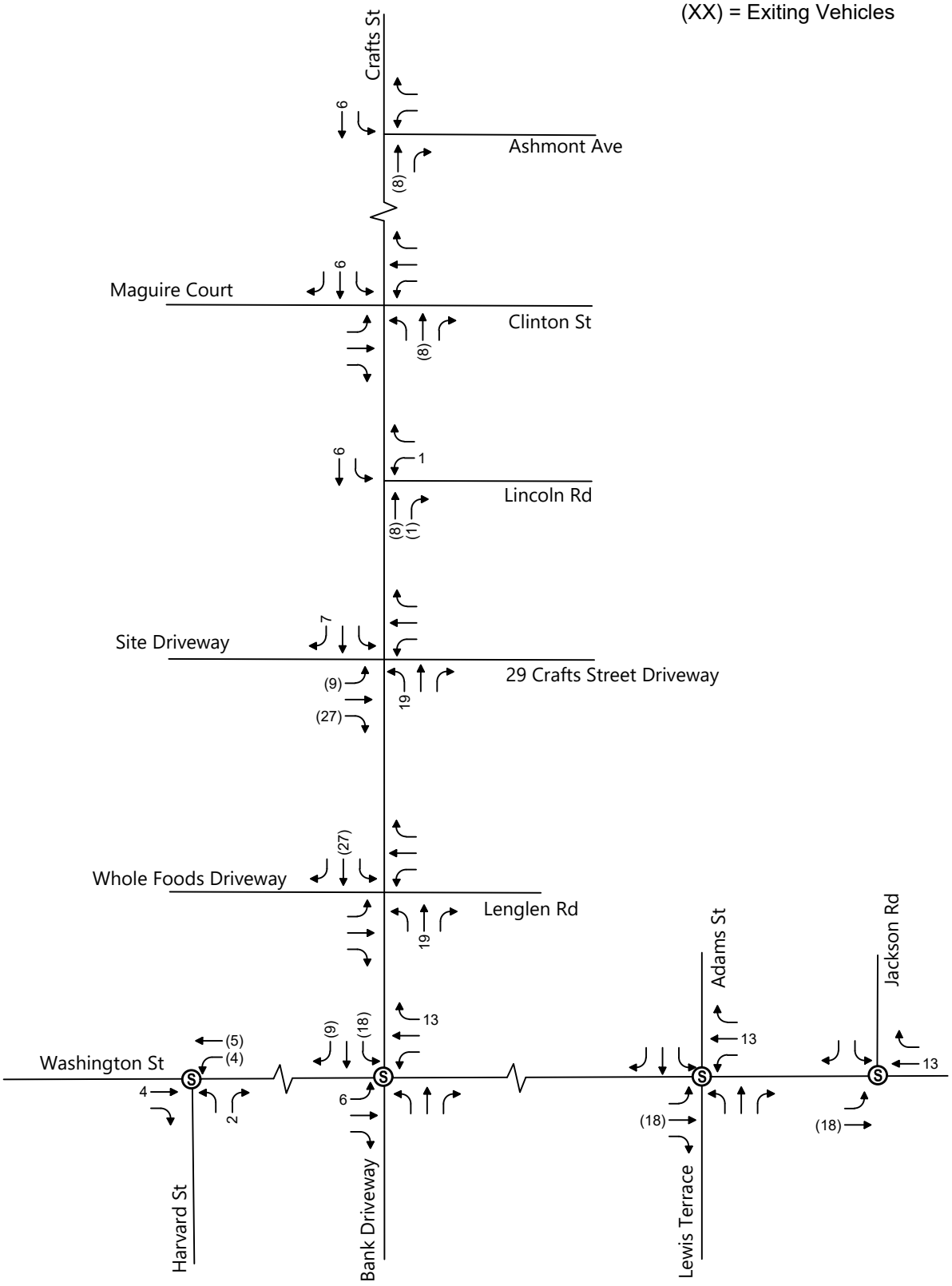

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Figure 10

Net New Site-Generated Traffic Volumes
Weekday Evening Peak Hour
Crafts Street Elderly Housing with Services
Newton, Massachusetts

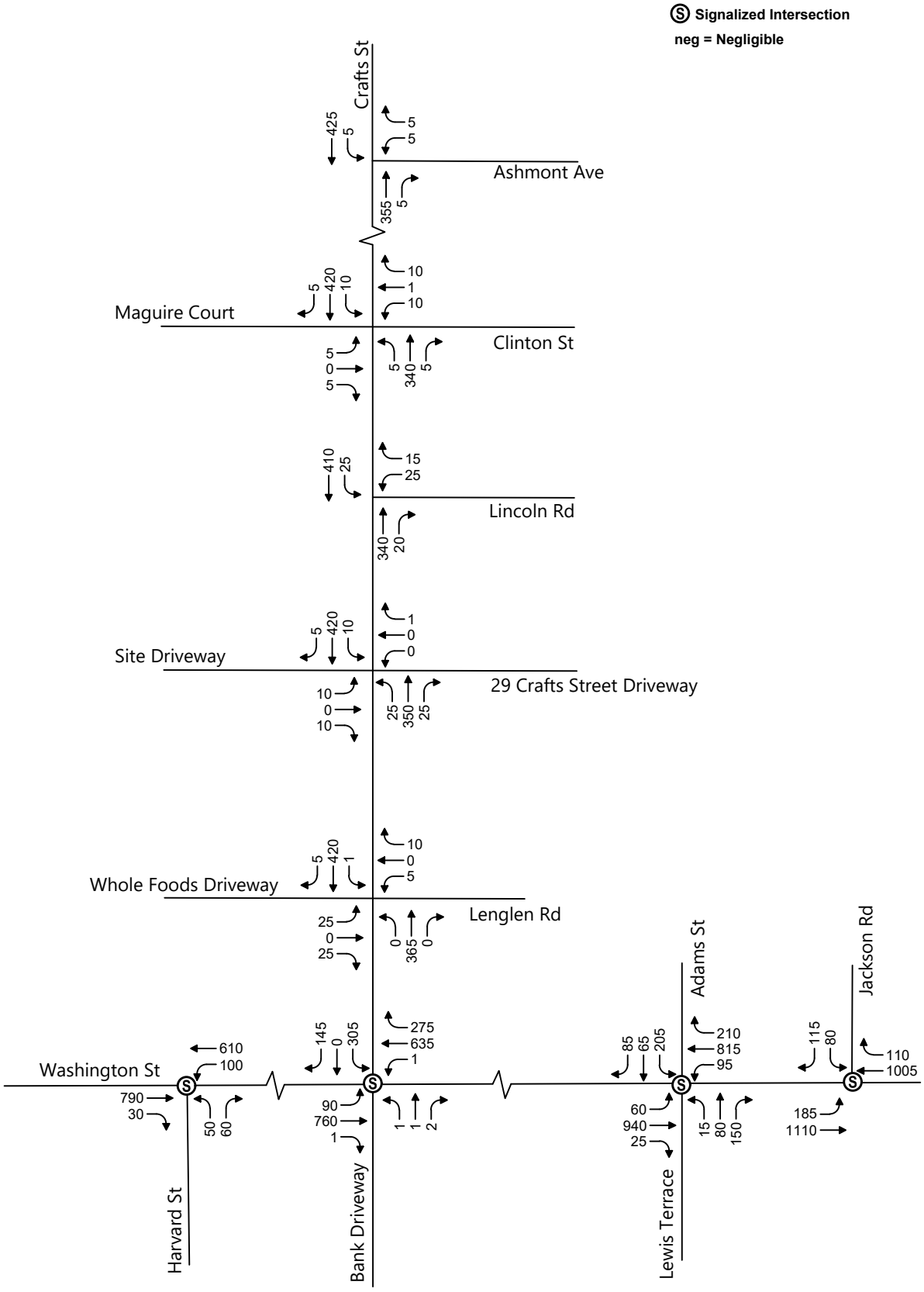

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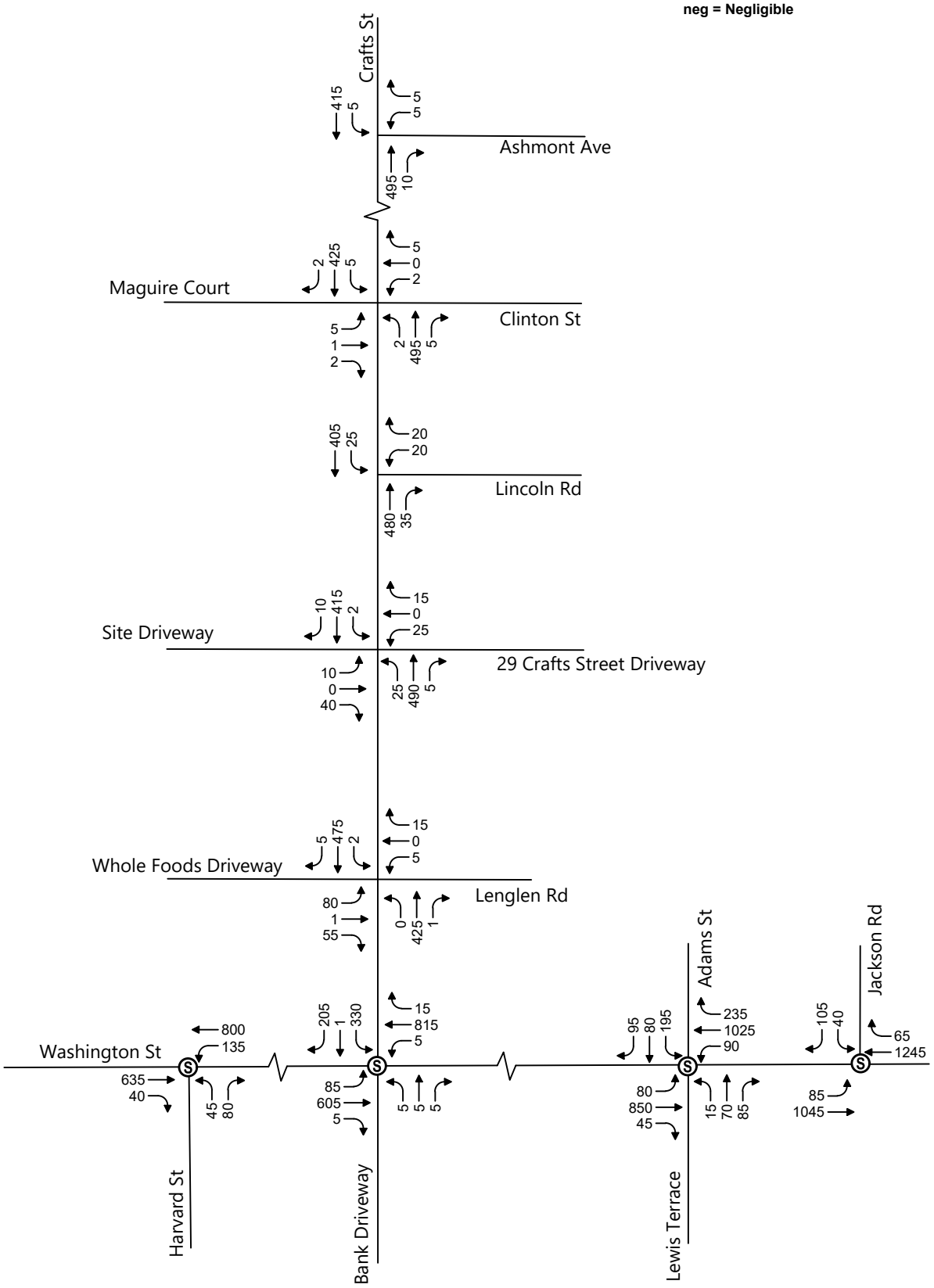
Figure 11

2029 Build Conditions
Weekday Morning Peak Hour Traffic Volumes
Crafts Street Elderly Housing with Services
Newton, Massachusetts



Not to Scale

Figure 12

2029 Build Conditions
Weekday Evening Peak Hour Traffic Volumes
Crafts Street Elderly Housing with Services
Newton, Massachusetts

Transportation Operations Analyses

Measuring existing traffic volumes and projecting future traffic volumes quantifies traffic within the study area. To assess quality of flow, roadway capacity analyses were conducted with respect to the 2022 Existing conditions and projected 2029 No-Build and 2029 Build traffic volume conditions. Capacity analyses provide an indication of the adequacy of the roadway facilities to serve the anticipated traffic demands.

Level-of-Service and Delay Criteria

The evaluation criteria used to analyze area intersections in this traffic study are based on the Highway Capacity Manual (HCM)[3]. 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

[3] Transportation Research Board, Highway Capacity Manual, 6th Edition, Washington, D.C., 2016.

intersection. For unsignalized intersections, however, the analysis assumes that traffic on the mainline is not affected by traffic on the side streets. Thus, the LOS designation is for the critical movement exiting the side street and for the conflicting movement on the mainline, which is generally the left turn from the mainline into a side street or driveway. Table 5 shows the LOS criteria for both signalized intersections and unsignalized intersections.

Table 5 Intersection Level-of-Service Criteria

Level of Service	Signalized Intersection Delay	Unsignalized Intersection Delay
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 take into account the beneficial grouping effects caused by nearby signalized intersections. The net effect of these analysis procedures is the over-estimation of calculated delays at unsignalized intersections in the study area. Cautious judgment should therefore be exercised when interpreting the capacity analysis results at unsignalized intersections.

Intersection Capacity Analysis

Consistent with MassDOT guidelines, Synchro 10 software was used to model LOS operations at the study area intersections. Both signalized and unsignalized intersection capacity analyses were conducted under 2022 Existing, 2029 No-Build, and 2029 Build conditions.

Signalized Intersection Capacity Analyses

Table 6 summarizes the intersection capacity analyses for the signalized study area intersections and the capacity analysis worksheets are included in the Appendix to this report.

Table 6 Signalized Intersection Capacity Analysis Summary

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 Harvard Street															
Weekday Morning															
EB T/R	0.49	11	B	66	224	0.41	10	A	69	237	0.41	10	A	69	237
WB L/T	0.56	13	B	56	205	0.49	11	B	65	236	0.49	11	B	65	236
NB L/R	0.49	24	C	19	#85	0.41	21	C	16	#93	0.41	21	C	16	#93
Overall		**13**	**B**				**11**	**B**				**11**	**B**		
Weekday Evening															
EB T/R	0.29	8	A	45	163	0.35	9	A	51	183	0.34	9	A	51	184
WB L/T	0.57	12	B	88	310	0.66	14	B	94	#378	0.66	14	B	96	#388
NB L/R	0.47	21	C	16	#93	0.52	22	C	17	#92	0.53	22	C	17	#92
Overall		**11**	**B**				**12**	**B**				**12**	**B**		
Washington Street at Crafts Street / Bank Driveway															
Weekday Morning															
EB L/T/R	0.69	22	C	100	#332	0.74	24	C	112	#391	0.77	25	C	116	#409
WB L/T/R	0.71	27	C	145	#415	0.77	30	C	172	#471	0.78	30	C	176	#475
NB L/T/R	0.02	25	C	1	8	0.01	26	C	1	10	0.01	26	C	1	10
SB L/T	0.79	49	D	122	#343	0.79	49	D	131	#371	0.79	49	D	133	#381
SB R	0.28	15	B	20	87	0.30	15	B	23	95	0.30	15	B	24	96
Overall		**27**	**C**				**29**	**C**				**30**	**C**		
Weekday Evening															
EB L/T/R	0.66	21	C	81	231	0.67	21	C	88	#264	0.71	23	C	91	#282
WB L/T/R	0.94	41	D	226	#620	0.98	50	D	253	#667	1.02	59	E	263	#678
NB L/T/R	0.09	24	C	6	17	0.04	26	C	3	23	0.04	26	C	3	23
SB L/T	0.78	47	D	119	#350	0.78	47	D	130	#388	0.78	46	D	141	#423
SB R	0.36	15	B	26	110	0.38	15	B	31	124	0.38	16	B	34	134
Overall		**34**	**C**				**38**	**D**				**43**	**D**		

Note: Improvements from Existing Conditions to No Build Conditions due to peak hour factor of 0.92 used for all future analyses, as specified in MassDOT TIA guidelines.

a Volume to capacity ratio.
b Average total delay, in seconds per vehicle.
c Level-of-service.
d 50th percentile queue, in feet.
e 95th percentile queue, in feet.
~ Volume exceeds capacity, queue is theoretically infinite.
# 95th percentile volume exceeds capacity, queue may be longer.

Table 6 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 Adams Street / Lewis Terrace															
Weekday Morning															
EB L/T/R	1.00	94	F	~408	#570	1.09	92	F	~492	#628	1.10	92	F	~498	#635
WB L	0.33	11	B	6	m14	0.38	13	B	5	m18	0.38	13	B	5	m19
WB T/R	0.63	6	A	31	49	0.70	6	A	26	42	0.71	6	A	26	42
NB L/T/R	1.00	>120	F	163	#320	0.99	>120	F	161	#336	0.99	>120	F	161	#336
SB L/T	1.03	109	F	~244	#385	1.00	100	F	222	#402	1.00	100	F	222	#402
SB R [f]	0.20	7	A	0	34	0.20	7	A	0	38	0.20	7	A	0	38
Overall		**67**	**E**				**63**	**E**				**63**	**E**		
Weekday Evening															
EB L/T/R	1.17	92	F	~433	#566	>1.20	>120	F	~493	#632	>1.20	>120	F	~513	#652
WB L	0.28	8	A	4	m7	0.32	8	A	4	m7	0.32	9	A	4	m7
WB T/R	0.76	5	A	26	41	0.83	6	A	28	43	0.84	7	A	28	48
NB L/T/R	0.82	>120	F	115	#201	0.80	>120	F	107	#204	0.80	>120	F	107	#204
SB L/T	0.93	84	F	218	#383	0.95	88	F	223	#400	0.95	88	F	223	#400
SB R [f]	0.21	8	A	4	43	0.21	9	A	5	46	0.21	9	A	5	46
Overall		**53**	**D**				**64**	**E**				**69**	**E**		
Washington Street at Jackson Road															
Weekday Morning															
EB L/T	0.78	60	E	141	m136	0.82	64	E	193	m151	0.83	64	E	198	m151
WB T	0.60	25	C	287	355	0.65	26	C	318	391	0.65	26	C	320	394
WB R	0.15	6	A	9	41	0.16	6	A	12	45	0.16	6	A	12	45
SB L	0.47	54	D	77	100	0.37	51	D	60	112	0.37	51	D	60	112
SB R [f]	0.47	13	B	3	22	0.39	12	B	0	55	0.39	12	B	0	55
Overall		**42**	**D**				**44**	**D**				**44**	**D**		
Weekday Evening															
EB L/T	0.61	53	D	52	m51	0.67	56	E	58	m47	0.69	57	E	68	m47
WB T	0.74	28	C	392	479	0.80	30	C	436	536	0.81	31	C	444	546
WB R	0.09	8	A	10	36	0.10	9	A	11	37	0.10	9	A	11	37
SB L	0.23	49	D	33	65	0.21	48	D	29	65	0.21	48	D	29	65
SB R [f]	0.40	13	B	0	43	0.40	13	B	0	53	0.40	13	B	0	53
Overall		**38**	**D**				**40**	**D**				**41**	**D**		

Note: Improvements from Existing Conditions to No Build Conditions due to peak hour factor of 0.92 used for all future analyses, as specified in MassDOT TIA guidelines.

a Volume to capacity ratio.
b Average total delay, in seconds per vehicle.
c Level-of-service.
d 50th percentile queue, in feet.
e 95th percentile queue, in feet.
~ Volume exceeds capacity, queue is theoretically infinite.
# 95th percentile volume exceeds capacity, queue may be longer.
m Volume for 95th percentile queue is metered by upstream signal.

As shown in Table 6, the proposed Project-generated trips are expected to have minimal impacts on the signalized study area intersections. No intersection is expected to experience a change in overall LOS between the 2029 No Build and 2029 Build Conditions. The intersection of Washington Street at Adams Street / Lewis Terrace is expected to operate at overall LOS E during the weekday morning and evening peak hours under the 2029 No Build and 2029 Build Conditions, while the other three signalized intersections are expected to operate at overall LOS D or better.

Unsignalized Intersection Capacity Analyses

Table 7 summarizes the intersection capacity analyses for the unsignalized study area intersections and the capacity analysis worksheets are included in the Appendix to this report.

Table 7 Unsignalized Intersection Capacity Analysis Summary

Location / Movement	2022 Existing Conditions					2029 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
Crafts Street at Ashmont Avenue															
Weekday Morning															
WB L/T/R	10	0.03	11	B	3	10	0.02	11	B	3	10	0.02	11	B	3
SB L	5	0.01	8	A	0	5	0.01	8	A	0	5	0.01	8	A	0
Weekday Evening															
WB L/T/R	10	0.04	12	B	3	10	0.02	12	B	3	10	0.02	12	B	3
SB L	5	0.01	8	A	0	5	0.01	9	A	0	5	0.01	9	A	0
Crafts Street at Clinton Street / Maguire Court															
Weekday Morning															
EB L/T/R	10	0.04	15	C	3	10	0.03	15	C	3	10	0.03	15	C	3
WB L/T/R	21	0.10	16	C	8	21	0.06	15	C	5	21	0.06	15	C	5
NB L	5	0.01	8	A	0	5	0.01	8	A	0	5	0.01	8	A	0
SB L	10	0.01	8	A	0	10	0.01	8	A	0	10	0.01	8	A	0
Weekday Evening															
EB L/T/R	8	0.08	21	C	8	8	0.04	21	C	3	8	0.04	21	C	3
WB L/T/R	7	0.04	14	B	3	7	0.02	15	B	3	7	0.02	15	B	3
NB L	2	0.00	8	A	0	2	0.00	8	A	0	2	0.00	8	A	0
SB L	5	0.01	9	A	0	5	0.01	9	A	0	5	0.01	9	A	0
Crafts Street at Lincoln Road / 48 Crafts Street (Bus Parking Lot) Driveway															
Weekday Morning															
EB L/T/R	3	0.01	15	C	0	3	0.01	15	C	0	n/a	n/a	n/a	n/a	n/a
WB L/T/R	40	0.15	18	C	13	40	0.13	18	C	13	40	0.11	16	C	10
NB L	10	0.02	10	A	0	10	0.02	10	A	0	n/a	n/a	n/a	n/a	n/a
SB L	25	0.03	8	A	3	25	0.02	8	A	3	25	0.02	8	A	3
Weekday Evening															
EB L/T/R	6	0.03	13	B	3	6	0.02	14	B	0	n/a	n/a	n/a	n/a	n/a
WB L/T/R	40	0.18	19	C	15	40	0.15	19	C	13	40	0.13	17	C	10
NB L	5	0.01	10	A	0	5	0.01	10	A	0	n/a	n/a	n/a	n/a	n/a
SB L	25	0.03	9	A	3	25	0.03	9	A	3	25	0.03	9	A	3

Note: Improvements from Existing Conditions to No Build Conditions due to peak hour factor of 0.92 used for all future analyses, as specified in MassDOT TIA guidelines.

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.

Table 7 Unsignalized Intersection Capacity Analysis Summary (continued)

Location / Movement	2022 Existing Conditions					2029 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
Crafts Street at 29 Crafts Street / 38 Crafts Street Parking Lot Driveway (Proposed Site Driveway)															
Weekday Morning															
EB L/T/R	6	0.04	19	C	3	6	0.02	18	C	3	20	0.06	16	C	5
WB L/T/R	1	0.01	11	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	25	0.03	8	A	3
SB L	10	0.01	8	A	0	10	0.01	8	A	0	10	0.01	8	A	0
Weekday Evening															
EB L/T/R	12	0.04	13	B	3	12	0.03	13	B	3	50	0.13	15	B	10
WB L/T/R	40	0.18	20	C	18	40	0.16	20	C	13	40	0.18	23	C	18
NB L	2	0.00	8	A	0	2	0.00	8	A	0	25	0.03	8	A	3
SB L	2	0.00	8	A	0	2	0.00	9	A	0	2	0.00	9	A	0
Crafts Street at 36 Crafts Street Parking Lot Driveway															
Weekday Morning															
EB L/R	0	n/a	n/a	A	n/a	0	n/a	n/a	A	n/a					
NB L	0	n/a	n/a	A	n/a	0	n/a	n/a	A	n/a	*Driveway does not exist under 2029 Build Conditions*				
Weekday Evening															
EB L/R	0	n/a	n/a	A	n/a	0	n/a	n/a	A	n/a					
NB L	0	n/a	n/a	A	n/a	0	n/a	n/a	A	n/a					
Crafts Street at Legnlen Road / Whole Foods Driveway															
Weekday Morning															
EB L/T/R	50	0.21	17	C	20	50	0.14	16	C	13	50	0.15	16	C	13
WB L/T/R	15	0.05	14	B	5	15	0.04	14	B	3	15	0.04	14	B	3
NB L	0	n/a	n/a	A	n/a	0	n/a	n/a	A	n/a	0	n/a	n/a	A	n/a
SB L	1	0.00	8	A	0	1	0.00	8	A	0	1	0.00	8	A	0
Weekday Evening															
EB L/T/R	136	0.47	25	C	60	136	0.48	27	D	60	136	0.52	30	D	70
WB L/T/R	20	0.09	15	B	8	20	0.06	15	C	5	20	0.06	16	C	5
NB L	0	n/a	n/a	A	n/a	0	n/a	n/a	A	n/a	0	n/a	n/a	A	n/a
SB L	2	0.00	8	A	0	2	0.00	8	A	0	2	0.00	8	A	0

Note: Improvements from Existing Conditions to No Build Conditions due to peak hour factor of 0.92 used for all future analyses, as specified in MassDOT TIA guidelines.

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.

As shown in Table 7, the proposed Project-generated trips are expected to have minimal impacts on the unsignalized study area intersections. All unsignalized movements are expected to operate at LOS D or better during the weekday morning and evening peak hours under the 2029 No Build and Build Conditions, and no movement is expected to change LOS between the two future conditions.

Under proposed conditions, the Site will be accessed from the main driveway opposite the driveway for the Chatham Center. The proposed Site driveway is expected to operate at LOS C or better with queues not expected to exceed one vehicle length.

The proposed Project will consolidate the number of curb cuts on the Site frontage from five to two, with the northern proposed curb cut to be used only for loading and emergency

access. With fewer curb cuts located along Crafts Street, there will be fewer conflict points between through vehicles on Crafts Street and vehicles pulling into and out of the Site.

Sight Distance

Sight distance analysis, in conformance with guidelines of the American Association of State Highway and Transportation Officials (AASHTO)[4] was performed at the proposed Site driveway, which is located in the general vicinity of the existing 38 Crafts Street parking lot driveway on Crafts Street across from the 29 Crafts Street .

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 observations recorded during the data collection phase 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. The observed 85th percentile speeds along Crafts Street are 33 miles per hour (mph) in the northbound direction and 31 mph in the southbound direction.

Table 8 summarizes the sight distance analysis based on field measurements conducted by VHB. The sight distance worksheet is included in the Appendix to this document.

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

Table 8 Sight Distance Summary

		Stopping Sight Distance (feet)			Intersection Sight Distance (feet)	
Location	**Traveling**	**Required [a]**	**Measured [b]**	**Looking**	**Desirable [a]**	**Measured [b]**
Crafts Street at proposed Site driveway	NB	230	485	Left	365	>500
	SB	210	>500	Right	365	485

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 85th percentile speed of 33 mph northbound and 31 mph southbound. All measurements taken in February 2022.

b Based on field measurements taken by VHB.

As shown in Table 8, both the required SSD and desirable ISD are exceeded in both directions at the proposed Site driveway. There are clear sight lines to the signalized intersection of Washington Street at Crafts Street to the south, and vehicles exiting the Site driveway will be able to see a vehicle traveling northbound as soon as they turn onto Crafts Street.

Transportation Mitigation

As outlined above, the proposed development project is expected to have minor impacts on traffic conditions in the study area. However, the Proponent proposes to implement Transportation Demand Management (TDM) measures on Site and to incorporate site access improvements that will improve the walking and driving experience along Crafts Street in front of the Site.

Transportation Demand Management (TDM)

Given the Site's proximity to numerous MBTA bus stops and the commuter rail at Newtonville Station, there are strong opportunities to implement Transportation Demand Management (TDM) measures on site to minimize the proposed Project's impacts on the surrounding roadways. Implementation of TDM measures will offer alternatives to traveling in single occupancy vehicles, which will reduce traffic and parking demand on the Site. As part of the proposed project, the following TDM measures will be implemented on Site:

- Display all public transit schedules in a central location within the facility;
- To promote pedestrian safety, a map of the area will be provided for transit users that displays the location of Newtonville station, MBTA bus stops, sidewalks, and crosswalks. This information will be distributed to employees and will also be posted in common areas;
- Provide a secure bicycle storage area on site; and
- Implement an onsite car-pool rideshare program with guaranteed ride home.

In addition, the proposed provider will have a multi-modal approach to operations and will have a small-scale shuttle, van, and comfortable sedan on-Site that will be available to all residents of the facility. Residents can schedule rides to appointments and/or for service needs and the shuttle and van will likely also run between the facility and key community centers that offer retail, restaurants, and other needed/desired services on a regular or as needed basis.

Proposed Site Access Improvements

Consolidation of Curb Cuts

A major feature of the proposed site access improvements is the elimination of several curb cuts on Crafts Street. Under existing conditions, the Site is served by five different curb cuts within 270 feet along the west side of Crafts Street. Under proposed conditions, the main access to the Site will be served by a single driveway on Crafts Street and a second curb cut along Crafts Street on the northern edge of the Site will be used for loading and emergency access only.

By consolidating the number of curb cuts for the Site along Crafts Street from five to two, there will be fewer conflict points between through vehicles on Crafts Street and vehicles pulling into and out of the Site. There will also be fewer conflict points between turning vehicles and pedestrians walking along the sidewalk on the west side of Crafts Street.

Pedestrian and Bicycle Accommodations

Pedestrian and bicycle access to the Site will be provided via Crafts Street in the east and Court Street in the southwest. The site will provide 50 secure bicycle parking spaces. A path running along the southern edge of the Site will connect Court Street and Crafts Street with the main entrance of the proposed building.

As part of the proposed Project, the sidewalk along the west side of Crafts Street along the Site frontage will be reconstructed. In addition, a new path will be constructed running along the southern edge of the Site connecting Crafts Street and Court Street. This path will be open to all and will provide new connectivity between Crafts Street and Court Street. This will provide a more direct route for pedestrians and bicyclists traveling between the residential neighborhood east of Crafts Street and the shops, restaurants, and commuter rail station at Newtonville village.

Conclusion

VHB, Inc. has prepared a traffic impact and access study for the redevelopment of an approximately 2.7-acre site located at 38 Crafts Street. The existing Site consists of two commercial buildings and a school bus parking lot on Crafts Street and two residential properties on Court Street. The redevelopment proposal includes the demolition of the existing uses on Site and the construction of a 209-unit elderly living facility. The Site will be accessed via two driveways on Crafts Street, one for general-purpose traffic and the other one for loading and emergency vehicles.

The Project is expected to generate approximately 21 new vehicle trips (13 entering/8 exiting) during the weekday morning peak hour and 62 new vehicle trips (26 entering/36 exiting) during the weekday evening peak hour. Overall, this will result in about one new vehicle every three minutes added to the roadway network during the weekday morning peak hour and about one new vehicle every minute added to the roadway network during the weekday evening peak hour.

The proposed provider will have a multi-modal approach to operations and will have a small-scale shuttle, van, and comfortable sedan on-Site that will be available to all residents of the facility. Residents can schedule rides to appointments and/or for service needs and the shuttle and van will likely also run between the facility and key community centers that offer retail, restaurants, and other needed/desired services on a regular or as needed basis. While these services will be provided, no modal reductions in the traffic projections were taken to provide a conservative assessment.

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.

As part of the Project, the Proponent is proposing site access improvements that will consolidate the number of curb cuts on the Site frontage from five to two, with the northern proposed curb cut to be used only for loading and emergency access. With fewer curb cuts located along Crafts Street, there will be fewer conflict points between through vehicles and vehicles pulling into and out of the Site.

In addition, the Site access improvements will enhance the pedestrian environment. The sidewalk along the Crafts Street Site frontage will be reconstructed to make the roadway more accommodating for pedestrians and the number of curb cuts will be reduced, eliminating the number of conflict points between pedestrians and turning vehicles. The Project will include a new path running along the

southern edge of the Site and open to the public that will connect Crafts Street and Court Street. This will provide a new connection for pedestrians and bicyclists between the residential neighborhood east of Crafts Street and the shops, restaurants, and commuter rail station at Newtonville village.

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.