CITY OF CAMBRIDGE
Traffic, Parking and Transportation
344 Broadway
Cambridge, Massachusetts 02139

www.cambridgema.gov/traffic

Monica R. Lamboy, Interim Director
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Phone: (617) 349-4700
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January 22, 2015

Joe SanClemente
Howard Stein-Hudson Associates, Inc.
11 Beacon Street, 10th Floor
Boston MA 02108

RE: 249 Third Street Project

Dear Mr. SanClemente,

The Cambridge Traffic, Parking and Transportation Department (TP&T) received the Transportation Impact Study (TIS) prepared by your office on November 13, 2014 for the 249 Third Street Project. TP&T reviewed the TIS and submitted a comment letter to you on December 3, 2014 with corrections needed to the TIS.

On January 8, 2015 TP&T received a revised TIS dated December 22, 2014. Based on TP&T review, the TIS is certified as complete and reliable.

Please call Adam Shulman at 617-349-4745 if you have any questions.

Sincerely,

Monica R. Lamboy
Interim Director

cc: Adam Shulman, TPT

Traffic Impact Study

249 Third Street

Cambridge, Massachusetts

Prepared for
City of Cambridge
Traffic, Parking, and Transportation Department

Prepared by
Howard/Stein-Hudson Associates, Inc.

In association with
Equity Residential

Under the direction of

Joe SanClemente, P.E., AICP
Massachusetts Registration No. 47358

November 13, 2014
Revised: December 22, 2014

Howard/Stein-Hudson Associates, Inc.
CREATIVE SOLUTIONS • EFFECTIVE PARTNERING ®

CITY OF CAMBRIDGE
Summary Sheet

Special Permit Transportation Impact Study (TIS)

Planning Board Permit Number: _____

PROJECT NAME: **249 Third Street**

Address: **249 Third Street, Cambridge, Massachusetts**

Owner/Developer Name: Equity Residential

Contact Person: Mr. Richard Boales, Senior Vice President

Contact Address: 1500 Massachusetts Avenue, NW, Suite 25 Washington, DC 20005

Contact Phone: 202-971-7063

SIZE:

Building: 84 residential units
1,500 sf retail
75,971 Square feet

Land Use Type: 220 – Apartment, 820 – Shopping Center

PARKING:

Existing Parking Spaces: 721 Use: Residential

New Parking Spaces: (74) Use: Residential

Total Parking Spaces: 647

Date of Parking Registration Approval: _____

Parking spaces to be shared between the proposed 249 Third Street Project and existing 482 units at 195 Binney Street.

TRIP GENERATION:

	Daily	AM Peak Hour	PM Peak Hour
Total Trips	782	51	79
Vehicle	212	14	21
Transit	260	17	27
Pedestrian	252	16	26
Bicycle	58	4	5

MODE SPLIT (PERSON TRIPS): Residential/Retail

Vehicles (SOV): 26.3%
Rideshare (HOV): 2.6%
Transit: 31.7%
Bicycle: 7.2%
Pedestrian: 30.7%
Work from Home: 1.5%

TRANSPORTATION CONSULTANT:

Company Name: Howard/Stein-Hudson Associates

Contact Name: Joe SanClemente, P.E., AICP

Phone: 617-348-3334

Date of Building Permit Approval: _____

Planning Board Permit Number: _____

Project Name: 249 Third Street

Total Data Entries = 84 Total Number of Criteria Exceedance = 1

1. Project Vehicle Trip Generation
   Weekday = 212 AM Peak Hour = 14 PM Peak Hour = 21 Meets Criteria? *No* _ _

2. Level of Service (LOS)

Intersection	A.M. Peak Hour			P.M. Peak Hour		
	Existing	With Project	Meets Criteria?	Existing	With Project	Meets Criteria?
Signalized Intersection						
Third Street at Binney Street	C	C	*N*	D	D	*N*
Binney EB left	D	D	*N*	D	E	*Y*
Binney EB thru|thru/right	C	C	*N*	B	B	*N*
Binney WB left	D	D	*N*	F	F	*N*
Binney WB thru/right	C	C	*N*	D	D	*N*
Third NB left/thru	B	B	*N*	C	C	*N*
Third NB right	B	B	*N*	C	C	*N*
Third SB left/thru/right	D	D	*N*	D	D	*N*
Unsignalized Intersection						
Third Street at Bent Street	-	-	-	-	-	-
Bent EB left/thru/right	C	C	*N*	C	C	*N*
Parking Lot WB left/thru/right	C	C	*N*	D	D	*N*
Third NB left/thru/right	A	A	*N*	A	A	*N*
Third SB left/thru/right	A	A	*N*	A	A	*N*

3. Traffic on Residential Streets

Street Segment	A.M. Peak Hour			P.M. Peak Hour		
	Existing Volume	With Project	Meets Criteria?	Existing Volume	With Project	Meets Criteria?
Third Street (north of Charles St)	555	554	*N*	798	800	*N*
Binney Street (west of Third St)	835	837	*N*	975	982	*N*

4. Lane Queue (for signalized intersections critical lane)

Intersection	No. of Lanes Analyzed	A.M. Peak Hour			P.M. Peak Hour		
		Existing	With Project	Meets Criteria?	Existing	With Project	Meets Criteria?
Third Street at Binney Street	-	-	-	-	-	-	-
Binney EB left	1	2.08	2.08	*N*	7.28	7.36	*N*
Binney EB thru|thru/right	2	1.96	2.00	*N*	2.56	2.60	*N*
Binney WB left	1	3.92	3.96	*N*	2.60	2.68	*N*
Binney WB thru/right	1	8.16	8.24	*N*	5.32	5.40	*N*
Third NB left/thru	1	1.72	1.72	*N*	5.48	5.56	*N*
Third NB right	1	0.68	0.72	*N*	1.80	1.84	*N*
Third SB left/thru/right	1	8.12	8.24	*N*	6.04	6.24	*N*

5. Pedestrian and Bicycle Facilities

Intersection	A.M. Peak Hour			P.M. Peak Hour		
	Existing PLOS	With Project	Meets Criteria?	Existing PLOS	With Project	Meets Criteria?
Third Street/Binney Street	-	-	-	-	-	-
Binney East	*D*	*D*	*N*	*D*	*D*	*N*
Binney West	*D*	*D*	*N*	*D*	*D*	*N*
Third North	*C*	*C*	*N*	*C*	*C*	*N*
Third South	*C*	*C*	*N*	*C*	*C*	*N*
Third Street/Bent Street	-	-	-	-	-	-
Bent East	*A*	*A*	*N*	*A*	*A*	*N*
Bent West	*A*	*A*	*N*	*A*	*A*	*N*
Third North	*D*	*D*	*N*	*E*	*F*	*Y*
Third South	*C*	*C*	*N*	*F*	*F*	*N*

Adjacent Street Public Right-of-	Sidewalks or Walkways Present?	Meets Criteria?	Bicycle Facilities or Right-of-Ways Present?	Meets Criteria?
Third Street	Yes	*N*	Yes	*N*
Binney Street	Yes	*N*	Yes	*N*
Rogers Street	Yes	*N*	Yes	*N*
Bent Street	Yes	*N*	Yes	*N*

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Inventory of Existing Conditions

The Project site is located on the 249 Third Street Parking Lot with access and egress via a site driveway on Third Street. The surface lot currently serves the residents of the neighboring 195 Binney Street (Lofts at Kendall Square) apartment building, which also has a 106-space parking garage and 14 surface parking spaces on-site. The Site is bound by The Foundry Building, Bent Street, Third Street, and Rogers Street (see **Figure 1.A**). The Project site is located within walking distance of the Kendall Square MBTA station and Lechmere MBTA Station.

Upon completion, the proposed Project will include 84 residential units and approximately 1,500 sf of ground-floor retail space with no on-site parking. Parking for the proposed Project would be provided within the 195 Binney Street Garage, which is currently underutilized, averaging 30-40% occupancy. The Proponent is proposing to reassign a portion of the 195 Binney Street residents, including those parking at the 249 Third Street Lot, to park in the 285/303 Third Street residential garage off of Potter Street. The 285/303 Third Street residential building has a 527-space parking garage on-site, which is also underutilized, with peak residential occupancy of only 49%. As part of this plan, the Proponent is proposing to reduce the overall parking requirement for each of 249 Third Street, 195 Binney Street, and 285/303 Third Street to 0.70 spaces per residential unit, consistent with the current parking demand.

Loading, move-in/out, trash, and delivery services for the proposed Project will occur on-site and be accessed via a proposed curb cut on Rogers Street. The main pedestrian entrance to the building will be accessed off of Third Street and a courtyard will be located at the back of the site (west side of the building).

Roadways

The Project site is located on Third Street between Bent Street to the north and Rogers Street to the south. The major study area roadways are described below. The descriptions reflect functional classification by the Massachusetts Department of Transportation (MassDOT) Highway Division's Office of Transportation Planning.

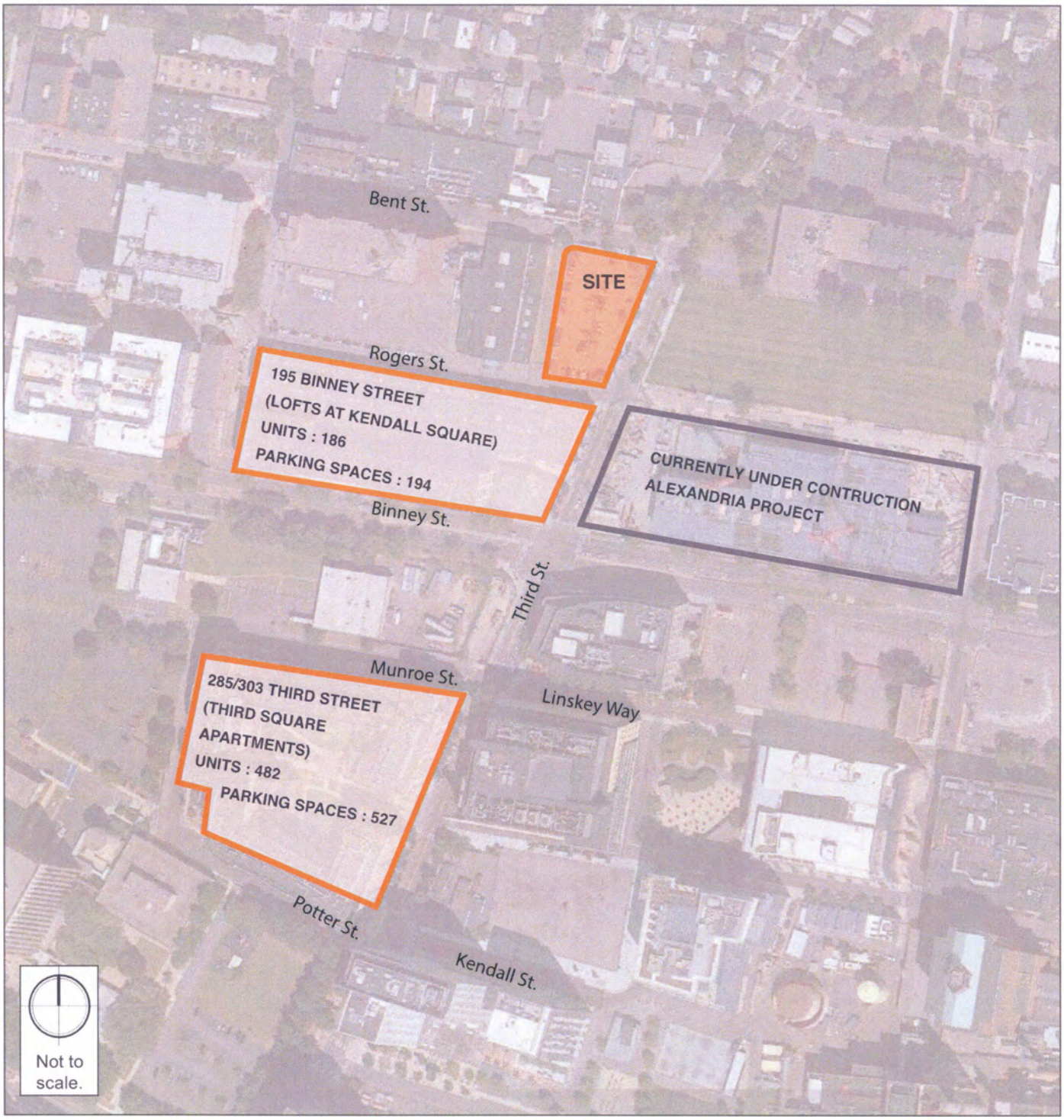
Bent Street borders the Project site to the north, and runs in an east-west direction from Fulkerson Street to Third Street. Adjacent to the Site, Bent Street consists of one travel lane in either direction, with parking on both sides of the road. Sidewalks are provided along both sides of the road.

Third Street borders the Project site to the east, and is classified by the MassDOT as a major collector between Monsignor O'Brien Highway and Broadway. Adjacent to the Site, Third Street consists of one travel lane in either direction, with parking on the west side of the road. Sidewalks are provided along both sides of the road.

Rogers Street borders the Project site to the south, and runs east-west between Fulkerson Street and Land Boulevard. In the vicinity of the Site, Rogers Street consists of an unmarked roadway with two-way traffic. Parking occupies the south side of the roadway. To the east of the Site, Rogers Street is temporarily closed for construction of the Alexandria's Binney Street Project. Once the Alexandria project is complete in 2014, Rogers Street will reopen to one-way westbound between Third Street and Second Street with parking on both sides of the road. Sidewalks are provided along the south side of the road.

Binney Street is classified by the MassDOT as a major collector and runs east-west between Cardinal Medeiros Avenue and Land Boulevard. In the vicinity of the study area, Binney Street generally consists of two travel lanes in either direction, separated by a landscaped median. Bike lanes are provided on both sides of the road between Third Street and Second Street. Sidewalks run along both sides of the road. At the time of the study,

Figure 1.A Locus Map



Binney Street between First Street and Third Street was temporarily reduced to one lane in each direction as a result of the on-going construction at Alexandria.

Intersections

The study area includes the following five intersections (see **Figure 1.B**):

- Third Street at Bent Street (unsignalized);
- Third Street at 249 Third Street Lot driveway (unsignalized);
- Rogers Street at 195 Binney Street driveways (unsignalized);
- Third Street at Binney Street (signalized); and
- Potter Street at 285/303 Third Street driveway (unsignalized).

Intersection characteristics such as traffic control, lane usage, pedestrian facilities, pavement markings, and crosswalks are described.

Third Street/Bent Street is an unsignalized intersection with four approaches. The Bent Street eastbound approach is stop-controlled and consists of one unmarked 9-foot shared left-turn/through/right-turn lane. The Officepark Parking Lot Driveway westbound approach consists of one unmarked 13-foot shared left-turn/through/right-turn lane. The Third Street northbound and southbound approaches consist of one 12-foot shared left-turn/through/right-turn lane. An 8-foot parking lane is provided along the Bent Street eastbound approach and the Third Street southbound approach. Sidewalks are provided along all roadways and vary in width from 8 to 10 feet. Crosswalks are provided at the Bent Street and Third Street approach, with a raised crossing at the Third Street southbound approach.

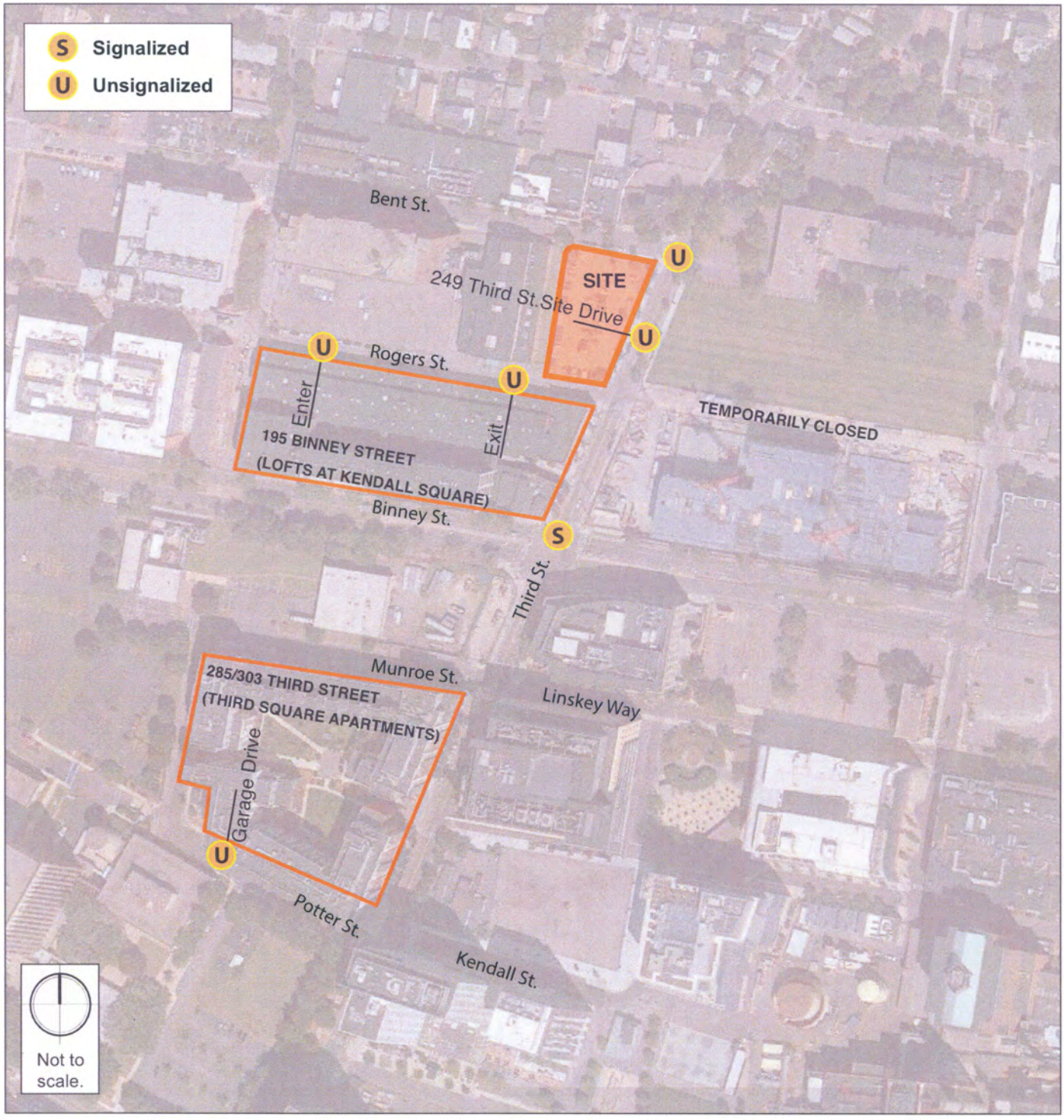
Third Street/249 Third Street Lot Driveway is an unsignalized intersection with three approaches. The Driveway eastbound approach consists of one unmarked 11-foot shared left-turn/right-turn lane. The Third Street northbound approach is one 13-foot shared left-turn/through lane. The Third Street southbound approach is one 12-foot shared through/right-turn lane with an adjacent 9-foot parking lane. Sidewalks are provided along both sides of Third Street and range from 9 to 9.5 feet. No crosswalks are provided at the intersection.

Rogers Street/Lofts at Kendall Square Exit is an unsignalized intersection with three approaches. Rogers Street is an unmarked 20-foot wide roadway allowing travel in either direction. The 195 Binney Street Exit driveway is a 15-foot shared left-turn/right-turn lane. A 9-foot parking lane and 4.5-foot sidewalk runs along the south side of the roadway.

Rogers Street/Lofts at Kendall Square Entrance is an unsignalized intersection with two approaches. Rogers Street is an unmarked 15-foot wide roadway with travel in either direction. The 195 Binney Street entrance driveway is 14-feet wide and only allows for garage entry. An 8-foot parking lane runs along both sides of the roadway. A 4.5-foot sidewalk is provided on the south side of Rogers Street.

Rogers Street/285/303 Third Street Garage Driveway is an unsignalized intersection with four approaches. Potter Street is a 34-foot wide unmarked roadway with travel in either direction. The Private Parking Lot Driveway northbound approach is a 12-foot shared left-turn/right-turn approach. The 285/303 Third Street Garage Driveway southbound approach is a 30-foot wide driveway allowing entry and exit to the below-ground garage. A 4-foot wide sidewalk is provided along the south side of Potter Street, and an 8-foot wide sidewalk is provided along the north side of the road.

Figure 1.B Study Area Intersections



Third Street/Binney Street is a signalized intersection with four approaches. The Binney Street eastbound and westbound approaches consists of one 10-foot exclusive left-turn lane, one 10-foot exclusive through lane, one 10-foot shared through/right-turn lane, and one 5-foot bike lane. During field work, HSH noted that construction was occurring for the Alexandria Development project which is expected to last through the end of 2014. Due to the construction and streetscape improvements, Binney Street is temporarily reduced to one lane in either direction between First and Third Street. Binney Street is two lanes in either direction west of Third Streett. As a result of the construction, the Binney Street westbound approach consists of one 11-foot exclusive left-turn lane, one 11-foot shared through/right-turn lane, and no bike lane. The Existing 2014 and Build 2014 conditions were model based on this lane configuration. The Third Street northbound approach consists of one 11-foot shared left-turn/through lane, one 5-foot bike lane, and one 11-foot exclusive right-turn lane. The Third Street southbound approach consists of one 11-foot shared left-turn/through/right-turn lane. Sidewalks are provided along all roadways and range from 7 to 10 feet wide. As a result of the construction, a 6-foot wide protected pedestrian walkway is provided on the east side of the Third Street southbound approach, and the sidewalk is closed along the north side of the Binney Street westbound approach. Crosswalks and handicap ramps are provided at all approaches.

Parking

On-Site Parking

Parking Supply

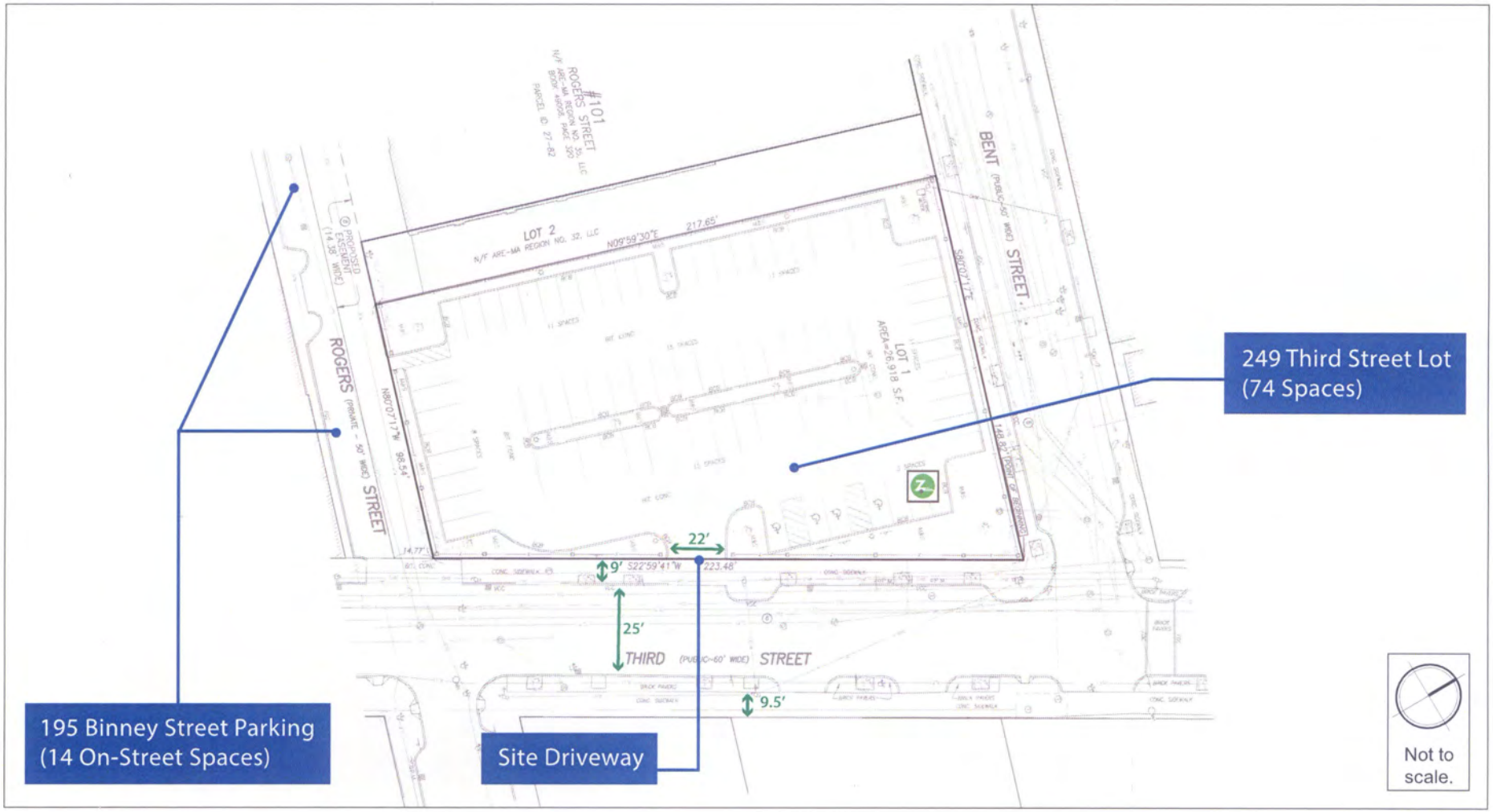
The existing site currently contains 74 surface parking spaces (see **Figure 1.C.1**) for use by residents at the 195 Binney Street (Lofts at Kendell Square), which is also owned and operated by Equity Residential (EQR).

The 186-unit 195 Binney Street building has a total of 194 parking spaces, including the 74 spaces at 249 Third Street, 14 spaces along the south side of Rogers Street, and 106 spaces within the 195 Binney Street garage with access via Rogers Street. The resulting parking ratio is 1.04 spaces per unit.

EQR also owns and operates the 285/303 Third Street, which is located two blocks south of 195 Binney Street. The 482-unit 285/303 Third Street residential building has on-site parking for 527 vehicles within a below-grade parking, which corresponds to a parking ratio of 1.09 spaces per unit.

Since parking at 285/303 Third Street is currently underutilized, the Alexandria (ARE) has entered into a short-term agreement with EQR for 200 parking permits at the 285/303 Third Street Garage until early 2017 to meet its current parking needs. Upon expiration of the EQR/ARE short-term parking agreement in early 2017, vehicles associated with Alexandria's uses in Kendall Square will no longer be permitted to park in 285/303 Third Square parking garage.

Figure 1.C.1 Existing Site



Residential Auto-Ownership

According to parking lease data provided by EQR, residents at 195 Binney Street and 285/303 Third Street are only leasing parking at a rate of 0.58 and 0.68 EQR parking passes per residential unit, respectively – well below the approximately one plus space per unit constructed. Both residential developments currently have ZipCar on-site. The residential parking supply is summarized in **Table 1.C.1.**

Table 1.C.1 Residential Parking Supply

Location	Units	Parking Supply	Parking Spaces/Unit	EQR Parking Pass	EQR Parking Pass/Unit
195 Binney Street	186	194	1.04	108	0.58
285/303 Third Street	482	527	1.09	329	0.68

In connection with this study, the City of Cambridge provided Cambridge Parking Permit (CPP) data that details the number of residents in the 195 Binney Street and 285/303 Third Street who have parking permits. The Project team then compared this information with those that currently have an EQR pass for on-site parking to identify residents that have both CPP and EQR on-site parking, as well as those who rely solely on on-street parking (i.e., do not pay a monthly fee for parking in an EQR garage). Review of this information indicates that there are currently 25 outstanding CPP's at the 195 Binney Street; however, 12 of those vehicles also have an EQR parking permit, leaving just 13 vehicles (or 7% of the overall units) relying exclusively on on-street parking. Meanwhile, there are currently 65 CPP's for 285/303 Third Street, with 47 vehicles having both CPP and EQR parking passes and just 18 (or only 3.8%) with CPP's only.

The 195 Binney Street residents likely have a higher percentage of CPP's due to the proximity of permit parking in the area (as illustrated in Figure 1.C.2). The proposed Project is just north of the 195 Binney Street with similar proximity to on-street resident parking. Assuming that the proposed Project has a similar level of therefore CPP holders as 195 Binney Street (7%), this would correspond to just 6 vehicles parking on-street, which is expected to be easily accommodated within the existing on-street parking supply as summarized in **Table 1.C.3** and described below.

When taking into account the CPP data, the resulting residential parking demand for 195 Binney Street and 285/303 Third Street is approximately 0.65 and 0.74 spaces per unit respectively. This parking ratio is consistent with vehicle ownership data from the 2010-2012 US Census Data for Tract 3523. The Census data for *Household Count by Number of Vehicles Available* is summarized in **Table 1.C.2**.

Table 1.C.2 Vehicle-to-Household Ratio, Census Tract 3523

Year	2010	2011	2012	Average
Vehicle-to-Household Ratio	0.79	0.82	0.72	0.78

Source: Household Count by Number of Vehicles Available, Census Tract 3523, US Census Data.

The 195 Binney Street building has a parking supply ratio of 1.04 spaces per unit (see **Table 1.C.1**). The building has 108 active EQR parking passes for a parking demand ratio of 0.58 EQR passes per unit, much lower than the parking supply ratio.

Similarly, the garage at 285/303 Third Street currently has a parking supply ratio of 1.09 spaces per unit (see **Table 1.C.1**). The building has 329 active EQR parking passes for a parking demand ratio of 0.68 EQR passes per unit, also significantly lower than the parking supply ratio.

Parking Demand

HSH conducted a parking demand inventory at the existing 195 Binney Street and 285/303 Third Street parking lots and garages. Observations were made on fair weather days in September 2014 during eight time periods: weekday/Saturday morning (6:00-7:00 a.m.), weekday/Saturday midday (12:00-1:00 p.m.), weekday/Saturday afternoon (5:00-6:00 p.m.), and weekday/Saturday evening (10:00-11:00 p.m.). Since 285/303 Third Street is currently shared by Alexandria and 285/303 Third Street residents (pursuant to PB# 189, as amended through August 15, 2014), demand observations required manual inspection of parking permit ID numbers to determine user type.

Table 1.C.3 and **Table 1.C.4** summarize the total number of occupied spaces at each parking facility by time of day.

Table 1.C.3 On-Site Parking Supply and Demand - Weekday

Location/User	Total Spaces	Demand (spaces)			
		Morning (6-7 a.m.)	Midday (12-1 p.m.)	Afternoon (5-6 p.m.)	Evening (10-11 p.m.)
249 Third Street Lot					
195 Binney Residents	74	52	29	40	51
Rogers Street					
195 Binney Residents	14	6	9	6	2
195 Binney Parking Garage					
195 Binney Residents	106	43	37	33	40
285/303 Third Street Garage	527	-	-	-	-
285/303 Third Street Residents	-	258	186	219	254
Alexandria	-	3	134	53	4
Total	721	362	395	351	351
% Occupancy		50%	55%	49%	49%

Table 1.C.4 On-Site Parking Supply and Demand - Saturday

Location/User	Total Spaces	Demand (spaces)			
		Morning (6-7 a.m.)	Midday (12-1 p.m.)	Afternoon (5-6 p.m.)	Evening (10-11 p.m.)
249 Third Street Lot					
LKS Residents	74	46	46	43	47
Rogers Street					
195 Binney Residents	14	9	8	6	8
195 Binney Parking Garage					
195 Binney Residents	106	36	33	33	36
285/303 Third Street Garage	527	-	-	-	-
285/303 Third Street Residents	-	242	205	209	250
Alexandria	-	6	7	6	8
Total	721	339	299	297	349
% Occupancy		47%	41%	41%	48%

Combined, there are approximately 721 parking spaces provided for the 195 Binney Street and 285/303 Third Street residents. As shown in Table1.C.3 and Table 1.C.4, the parking garages are generally underutilized with approximately 50-55% (approximately 351 to 395 combined spaces) occupancy during the week and approximately 41-48% (approximately 297 to 349 combined spaces) occupancy during the Saturday study period, including demand for Alexandria.

It is notable that not all vehicles that have parking permits are parked within the garages/lots at the same time, which is expected as some residents may work nights or may leave during the week or weekend, and office workers associated with Alexandria may have off-site meetings, etc. As a result, the peak residential parking demand occurs overnight and is only 0.54 spaces per residential unit (or just 50% of overall supply), while Alexandria peaks mid-day at just 134 spaces out of the 200 leased.

Off-Site Parking

HSH conducted an inventory of the existing on-street curb regulations within a one-quarter mile radius of the Project site (see **Figure 1.C.2**). To demonstrate a comprehensive understanding of parking demand in the area, HSH conducted detailed observations of parking demand within a one-block radius on fair weather days in September 2014 during three time periods: weekday midday (12:00-1:00 p.m.), weekday evening (10:00-11:00 p.m.), and Saturday midday (12:00-1:00 p.m.). HSH inventoried the total number of public on-street parking spaces within the one-block study area, and the number of vacant spaces during the three observations time periods.

Within a one-block radius of the site, there are approximately 243 on-street parking spaces including 45 two-hour Monday through Saturday 8:00 a.m. to 6:00 p.m. spaces, 97 permit only except Sunday spaces, and 101 unrestricted spaces. As shown in **Table 1.C.5**, public on-street parking in the area is generally underutilized with approximately 30% (approximately 74 to 93 spaces) vacant in the weekday evening and Saturday midday study periods. Peak on-street parking demand within the vicinity of the site generally occurs during the weekday midday period, with 15 spaces available – residential demand is typically at its lowest during this time period. The existing parking supply will more than adequately serve the projected on-street parking demand associated with the Project (6 spaces).

Table 1.C.5 On-Street Parking Supply and Demand

Parking Restrictions	Total Spaces	Vacant Spaces		
		Weekday (Midday)	Weekday (Evening)	Saturday (Midday)
2 Hour - 8am-6pm (except Sunday)	45	0	30	20
Permit Only (except Sunday)	97	9	34	34
Unrestricted	101	6	29	20
Total	243	15	93	74
% Vacant	-	6%	38%	30%

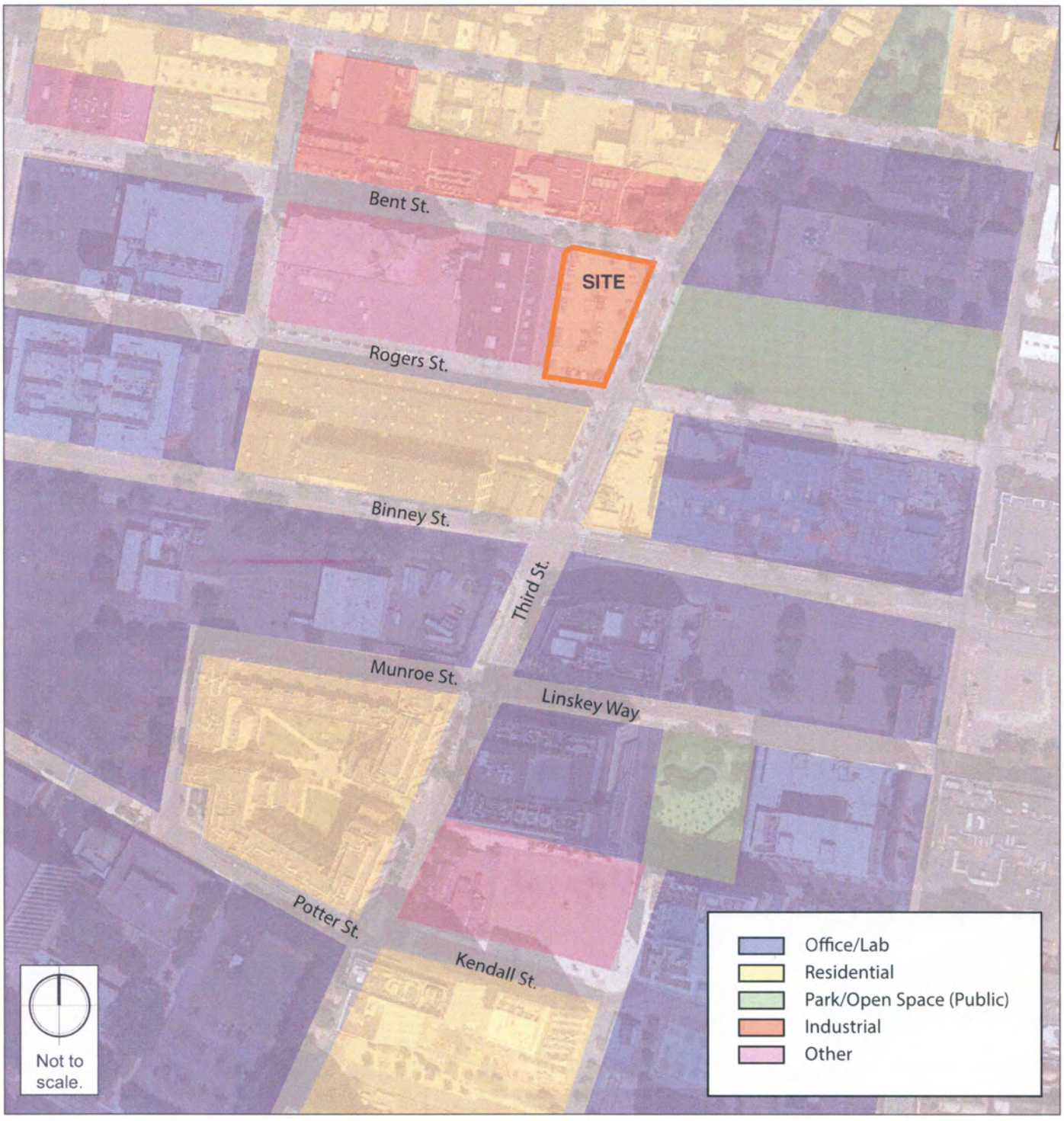
Land Use

The site is primarily surrounded by office buildings and research laboratories, with a residential area to the north of the site (see **Figure 1.D**).

In addition, there are a number of nearby developments currently under construction. Adjacent to the Project site, 75/125 Binney Street is expected to be complete in early 2015. The project will consist of a combined 237,000 SF of research and development/office space as well 2,000 SF of retail. South of the Project site, 450 Kendall Street is scheduled for completion in late 2014 and will consist of 53,000 sf of research and development/office space. East of the Project site, 159 First Street will contain 115 residential units with ground-floor retail space.

Figure 1.C.2 On-Street Parking in the Study Area

Figure 1.D Land Use

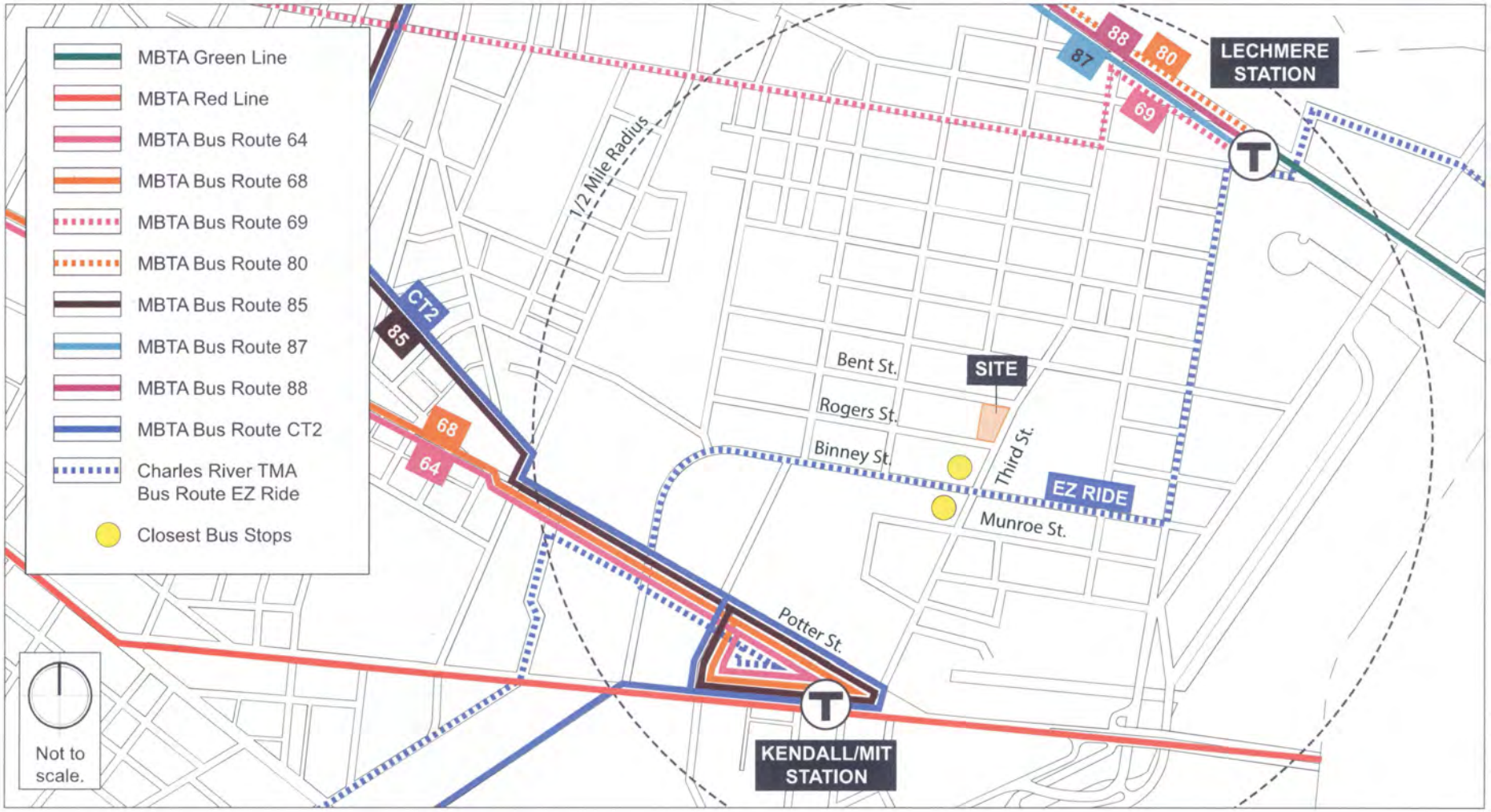


Transit Services

The Project site is located within a one-half mile radius of Lechmere Station, which provides access to the MBTA Green E Line, and to Kendall Square Station which provides access to the MBTA Red Line. The area has a number of MBTA bus routes and shuttle services in the area. A map of the nearby public transportation services is shown in **Figure 1.E**.

- ***EZRide*** –This bus service is run by the Charles River Transportation Management Association. The route runs between Cambridgeport and North Station via Kendall Square and Lechmere Station on weekdays only. Peak-hour headways are approximately 7 minutes. This is the closest regular bus route to the Project site with a stop at Third Street and Binney Street. The shuttle is available for all users and is free for children and Massachusetts Institute of Technology (MIT) students.
- ***MBTA Green Line*** – The Green Line "E" branch of the MBTA subway system terminates at Lechmere Station and provides service to Heath Street with access to downtown Boston, the Back Bay, and Mission Hill. Connections to the other branches of the Green Line are all available at Park Street Station in downtown Boston. The Green Line "E" branch operates with peak-hour headways of approximately 6 minutes.
- ***MBTA Red Line*** – The Red Line of the MBTA subway system stops at Kendall/MIT Station. The rapid transit line provides service between Alewife Station and either Ashmont Station or Braintree Station with access to Somerville, downtown Boston, South Boston, Dorchester, and Quincy. The Red Line operates with peak-hour headways of approximately 5 minutes.
- ***MBTA Bus Route CT2*** – This route provides limited-stop service on weekdays only, between Sullivan Station and Ruggles Station via Kendall/MIT Station. Peak-hour headways are approximately 20 minutes.
- ***MBTA Bus Route 64*** – This route provides service between Kendall/MIT Station and Oak Square in Brighton during weekday rush hours only (at other times, the line terminates at Central Square). Peak-hour headways are approximately 15 minutes.
- ***MBTA Bus Route 68*** – This route provides service between Kendall/MIT Station and Harvard Square via Broadway during weekdays only. Peak-hour headways are approximately 30 minutes.
- ***MBTA Bus Route 69*** – This route provides service between Lechmere Station and Harvard Square. Peak-hour headways are approximately 10 minutes.
- ***MBTA Bus Route 80*** – This route provides service between Lechmere Station and Arlington Center. Peak-hour headways are approximately 20 minutes.
- ***MBTA Bus Route 85*** – This route provides weekday-only service between Kendall/MIT Station and Spring Hill via Union Square in Somerville. Peak-hour headways are approximately 40 minutes.
- ***MBTA Bus Route 87*** – This route provides service between Lechmere Station and Arlington Center or Clarendon Hill via Somerville Avenue. Peak-hour headways are approximately 20 minutes.
- ***MBTA Bus Route 88*** – This route provides service between Lechmere Station and Clarendon Hill via Highland Avenue. Peak-hour headways are approximately 10 to 20 minutes.

Figure 1.E Public Transportation



Data Collection

ATR Counts

To estimate daily traffic and hourly variations, Automatic Traffic Recorder (ATR) counts were recorded for two consecutive days from September 9, 2014 to September 10, 2014 on Binney Street, west of Third Street and Third Street, north of Charles Street. However, the ATR tube across the Binney Street westbound travel lanes was damaged by a street sweeper and recounted on September 17, 2014 and September 18, 2014.

Traffic volume summaries for a typical weekday are summarized in **Table 2.A.1** and **Table 2.A.2**. Full 15-minute increment ATR data is provided in **Appendix A**.

Table 2.A.1 Average Weekday Traffic Volumes

Location	ADT	K	T	Peak Direction
Binney Street west of Third Street	11,821	8%	12%	EB
Third Street north of Charles Street	7,915	10%	2%	SB

ADT= Average Daily Traffic; K= Peak Hour Percentage; T= Percent Heavy Vehicles

Table 2.A.2 Average Weekday Traffic Summary by Hour

Start Time	Binney Street			Third Street		
	EB[1]	WB[2]	TOTAL	NB[1]	SB[1]	TOTAL
12:00 a.m.	48	29	**77**	33	22	**55**
1:00 a.m.	14	25	**39**	12	8	**20**
2:00 a.m.	18	13	**31**	11	7	**18**
3:00 a.m.	13	21	**34**	9	8	**17**
4:00 a.m.	11	50	**61**	4	23	**27**
5:00 a.m.	52	229	**281**	10	183	**193**
6:00 a.m.	144	427	**571**	49	407	**456**
7:00 a.m.	275	410	**685**	119	440	**559**
8:00 a.m.	339	496	**835**	114	441	**555**
9:00 a.m.	297	427	**724**	43	485	**528**
10:00 a.m.	267	353	**620**	44	314	**358**
11:00 a.m.	289	318	**607**	37	182	**219**
12:00 p.m.	290	313	**603**	80	204	**284**
1:00 p.m.	341	327	**668**	76	183	**259**
2:00 p.m.	466	320	**786**	129	164	**293**
3:00 p.m.	594	248	**842**	482	173	**655**
4:00 p.m.	707	273	**980**	589	199	**788**
5:00 p.m.	691	284	**975**	580	218	**798**
6:00 p.m.	555	268	**823**	506	175	**681**
7:00 p.m.	352	209	**561**	272	130	**402**
8:00 p.m.	203	148	**351**	149	82	**231**
9:00 p.m.	155	127	**282**	122	99	**221**
10:00 p.m.	122	113	**235**	129	63	**192**
11:00 p.m.	88	62	**150**	60	46	**106**
Total	6,331	5,490	11,821	3,659	4,256	**7,915**

1. Counted on September 10, 2014
2. Counted on September 17, 2014

Intersection Turning Movement Counts

Turning movement data was collected at the Third Street/249 Third Street Lot, Rogers Street/195 Binney Driveways, and Potter Street/285/303 Third Street Driveway on June 11, 2014 and June 17, 2014 during weekday morning and evening peak periods (7:30 to 9:30 a.m. and 4:30 to 6:30 p.m., respectively). These counts were conducted prior to the Alexandria parking in the 285/303 Third Street Garage. Turning movement data was collected at Third Street/Bent Street and Third Street/Binney Street on September 4, 2014 during the weekday morning and evening peak periods. Based on the TMCs, the peak hours of the vehicular traffic throughout the study area is 8:00 to 9:00 a.m. and 5:00 to 6:00 p.m. Existing weekday morning and evening peak hour traffic volumes are shown in **Figure 2.B.1** and **Figure 2.B.2**, respectively. The detailed counts broken down in 15-minute increments are provided in **Appendix B**.

At the time of data collection in June and September, the Alexandria Development Project was ongoing at the intersection of Third Street/Binney Street. The primary site access for the project occurred opposite of Rogers Street via Third Street. During various periods of the day, Third Street would close down to allow a construction truck to back into the site via the gate on Third Street. The Alexandria project is expected to be complete at the end of 2015.

Pedestrian and Bicycle Counts
Sidewalks are provided along all streets within the study area, with the exception of the north side of Rogers Street, and are generally in good condition. Adjacent to the Project site, sidewalks are approximately 8 feet in width along Bent Street, and range between approximately 9 and 10 feet in width along Third Street.

Twelve-hour pedestrian and bicycle counts were performed on June 11 and June 17, 2014 between 7:00 a.m. and 7:00 p.m. at the following locations:

- Third Street at 249 Third Street Lot Driveway;
- Rogers Street at 195 Binney Street Driveway; and
- Potter Street at 285/303 Third Street Driveway.

On September 4, 2014, morning (7:30-9:30 a.m.) and evening (4:30-6:30 p.m.) pedestrian and bicycle counts were performed at Third Street/Bent Street and at Third Street/Binney Street. The existing pedestrian activity during the weekday morning and evening peak hours is shown in **Figure 2.C.1.**

Binney Street and Third Street (south of Binney Street) have protected bicycle lanes on both sides of the roadway, although the westbound bike lane had been temporarily eliminated at the intersection of Binney Street and Third Street because of construction at 75/125 Binney Street. The existing bicycle activity during the weekday morning and evening peak hours is shown in **Figure 2.C.2**.

Figure 2.B.1 Existing Conditions (2014) Turning Movement Volumes, a.m. Peak Hours (8:00 a.m. - 9:00 a.m.)

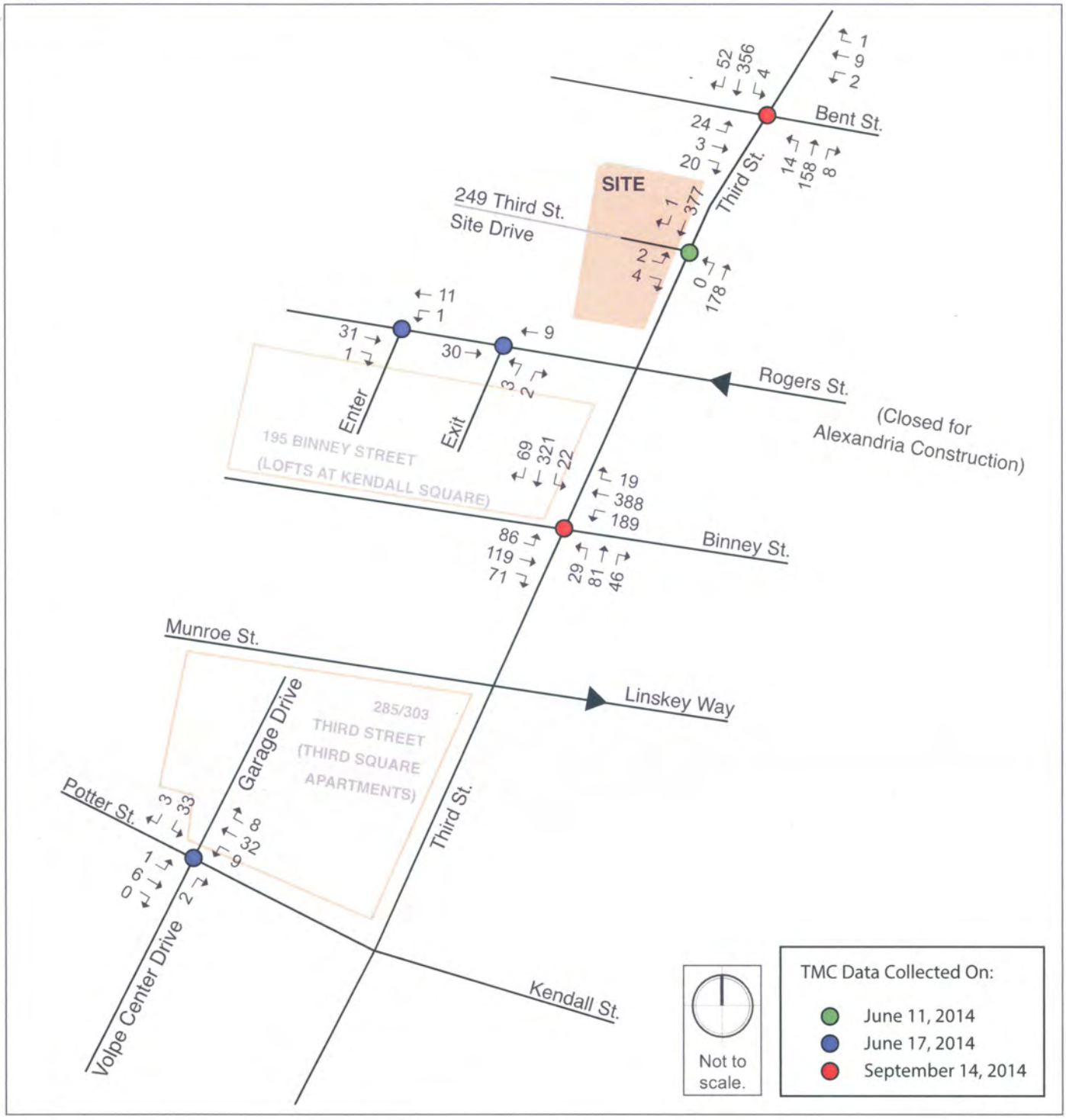


Figure 2.B.2 Existing Conditions (2014) Turning Movement Volumes, p.m. Peak Hours (5:00 p.m. - 6:00 p.m.)

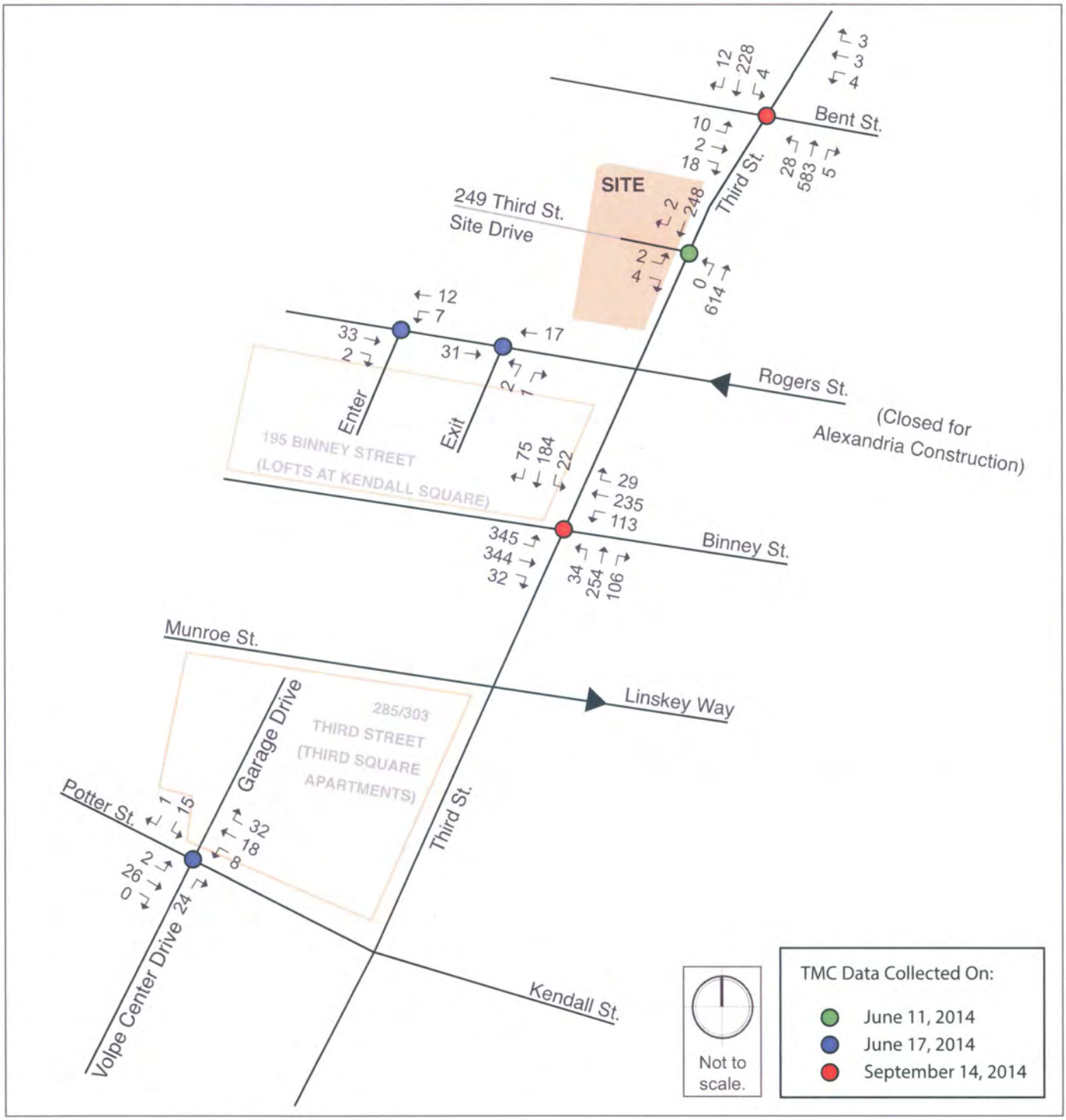


Figure 2.C.1 Existing Conditions (2014) Pedestrian Volumes, a.m. and p.m. Peak Hours

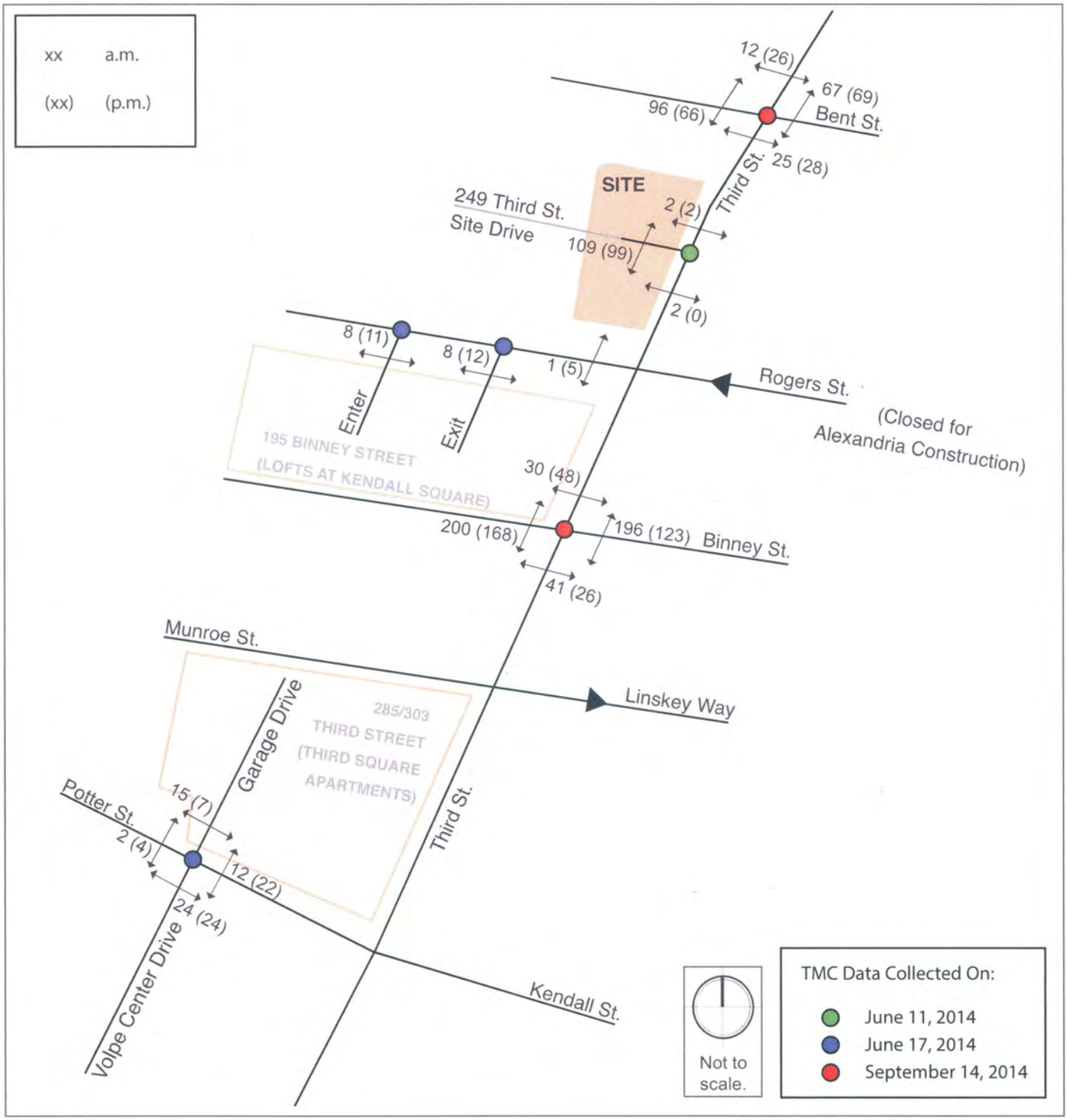
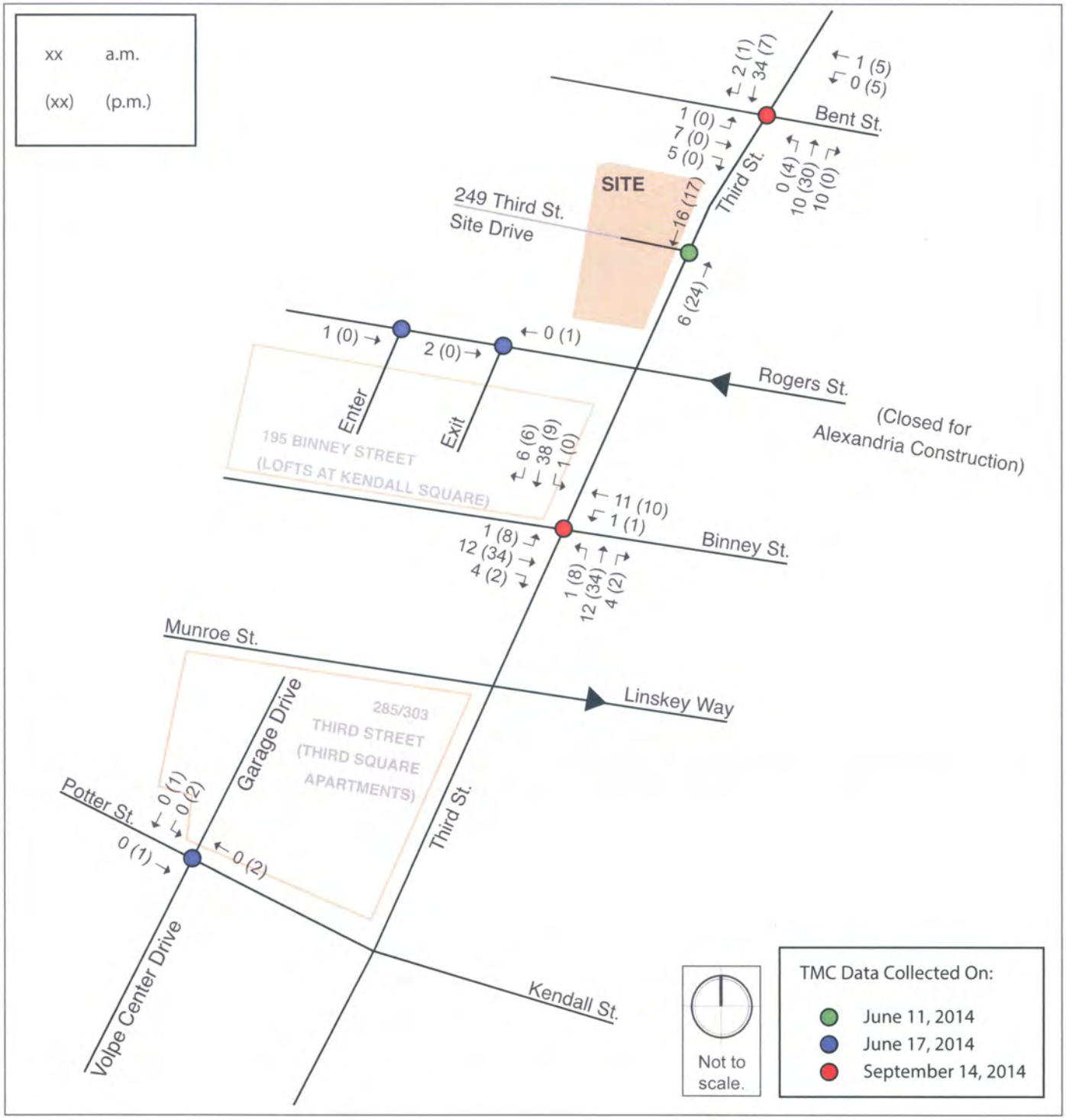


Figure 2.C.2 Existing Conditions (2014) Bicycle Volumes, a.m. and p.m. Peak Hours



Traffic Crashes

HSH compiled motor vehicle crash data from the MassDOT Highway Department Crash Records System for the most recent three-year period for which they are available (2009–2011). Crash rates were then calculated for each study area intersection based on the number of crashes per million vehicles entering and compared to the MassDOT district average (see **Table 2.D.1**). Detailed crash data and crash rate worksheets are included in **Appendix C**.

As shown in Table 2.D.1, 12 crashes occurred at the study area intersections over the three-year period, with no reported fatalities. 11 crashes occurred at the Third Street / Binney Street intersection, and one crash was reported at the Third Street/Bent Street intersection.

In addition to the 12 crashes listed in Table 2.D.1, one crash occurred involving a bicyclist in 2010 at Third Street/Binney Street. The crash occurred on a Friday morning in dry conditionals. The manner of collision was not reported and resulted in personal injury.

The crash rates at the analyzed intersections are below the district average for signalized and unsignalized intersections (0.76 and 0.58 crashes per million vehicles entering the intersection, respectively).

Table 2.D.1 MassDOT Crash Summary, 2009-2011

Scenario	Intersection/Number of Crashes	
	Third Street/ Binney Street (Signalized)	Third Street/ Bent Street (Unsignalized)
Year		
2009	3	0
2010	5	0
2011	3	1
Crash Type		
Single vehicle	1	0
Angle	3	1
Rear-end	3	0
Head-on	0	0
Sideswipe	3	0
Unknown/other	1	0
Injury		
Property Damage Only	8	0
Personal Injury	2	0
Fatality	0	0
Hit-and-run	0	0
Unknown	1	1
Light Conditions		
Day	10	0
Dusk/Dawn	0	0
Dark (road lit)	1	0
Unknown	0	1
Dark (road unlit)	0	0
Surface Conditions		
Dry	7	0
Wet	3	1
Snow	1	0
Ice	0	0
Unknown/other	0	0
Hour of Day		
6:00–9:00 a.m.	1	0
9:00 a.m.–3:00 p.m.	4	0
3:00–6:00 p.m.	3	0
6:00 p.m.–6:00 a.m.	3	1
Day of Week		
Monday	2	0
Tuesday	0	0
Wednesday	0	0
Thursday	2	0
Friday	4	0
Saturday	1	1
Sunday	2	0
Total	**11**	1
Crash Rate	**0.61**	0.11
District Average[1]	0.76	**0.58**

Source: MassHighway's District 6 2010 Average Crash Rates, per Million Entering vehicles

Public Transit

The Project site is located within ½ mile (10-minute walk) from public transportation services. Weekday and Saturday boarding/alighting information, and peak headway times are provided in **Table 2.E.1.** Transit stops are shown in Figure 1.D.

Table 2.E.1 Public Transportation

Route	Description	Peak-hour Headway (minutes)[1]	Weekday Average Daily Boarding[2] (people)	Saturday Average Daily Boarding[2] (people)
Local Rapid Transit				
Green Line E Branch	Lechmere – Heath Street	6	25,629 – 81,783	Unavailable
Red Line	Alewife – Ashmont or Braintree	5	217,329	Unavailable
Local Bus Routes				
CT2	Sullivan Station - Ruggles Station	20	2,815	Unavailable
64	Oak Square - University Park, Cambridge or Kendall/MIT	15	1,977	770
68	Harvard - Kendall/MIT	30	468	Unavailable
69	Harvard - Lechmere	10	3,185	2,092
80	Arlington Center - Lechmere	20	2,058	1,415
85	Spring Hill - Kendall/MIT	40	589	Unavailable
87	Arlington Center or Clarendon Hill - Lechmere	20	3,796	2,858
88	Clarendon Hill - Lechmere	10	4,075	2,794
Other Bus Routes				
EZRIDE	North Station - Cambridgeport	10	Unavailable	Unavailable
Cambridge-side Galleria	Cambridgeside Galleria – Kendall/MIT	20	Unavailable	Unavailable
MIT Costco/Target Shuttle	MIT – Costco/Target	60	Unavailable	Unavailable

1. Source: MBTA.com, August 2014. Headway varies.
2. Source: MBTA 2013 Ridership and Service Statistics

MBTA weekday average daily boarding and capacity shown above in Table 2.E.1 was obtained from 2013 MBTA Ridership and Service Statistics. Lechmere station on the MBTA Green Line E Branch and Kendall / MIT station on the MBTA Red Line Branch are within a ½-mile radius of the Project Site. Lechmere station is a terminus for several MBTA local bus routes including the 69, 80, 87, and 88. Kendall / MIT station is the terminus for the 64, 68, and 85 MBTA local bus routes. The station is also an intermediary stop for the CT2 limited stop bus route.

In addition, the Charles River Transportation Management Association operates the EZRide shuttle service which includes a stop at Binney Street and Third Street. The free Cambridgeside Galleria shuttle service stops at the Kendall/MIT station as well as Binney Street and Sixth Street. On Saturdays, a shuttle bus transports MIT students to and from the Costco and Target in Everett from 11:00 a.m. to 4:30 p.m.

Bicycle and Car Sharing

Hubway is a bicycle sharing system in the Boston, Cambridge, and Somerville areas, which was launched in 2011 and consists of over 140 stations and 1,300 bicycles. There are five Hubway Stations within a one-quarter mile radius (an approximately 5-10 minute walk) of the site, containing 77 bike docks.

Car sharing, predominantly served by Zipcar in the Cambridge area, provides easy access to vehicular transportation for those who do not own cars. Vehicles are rented hourly or daily and are checked out for a specific time period and returned to their original designated location. There are a total of three Zipcar locations containing within a one-quarter mile radius of the Project site. Of the three locations, the 285/303 Third Street garage houses Zipcar vehicles, and the existing 249 Third Street Lot provides parking accommodations for two Zipcar vehicles.

Project Traffic

Upon completion, the proposed Project would include the development of 75,971 sf composed of 84 residential units and approximately 1,500 sf of ground-floor retail space. Resident parking will be provided offsite at the 195 Binney Street garage, accessed on Rogers Street. Vehicular access will on site will be limited to loading, deliveries, and trash/recycling services, which will occur via a proposed curb cut on Rogers Street. The primary pedestrian access to the building will be provided via an entrance to a courtyard off of Third Street (see the **Figure 3.A**).

Trip Generation

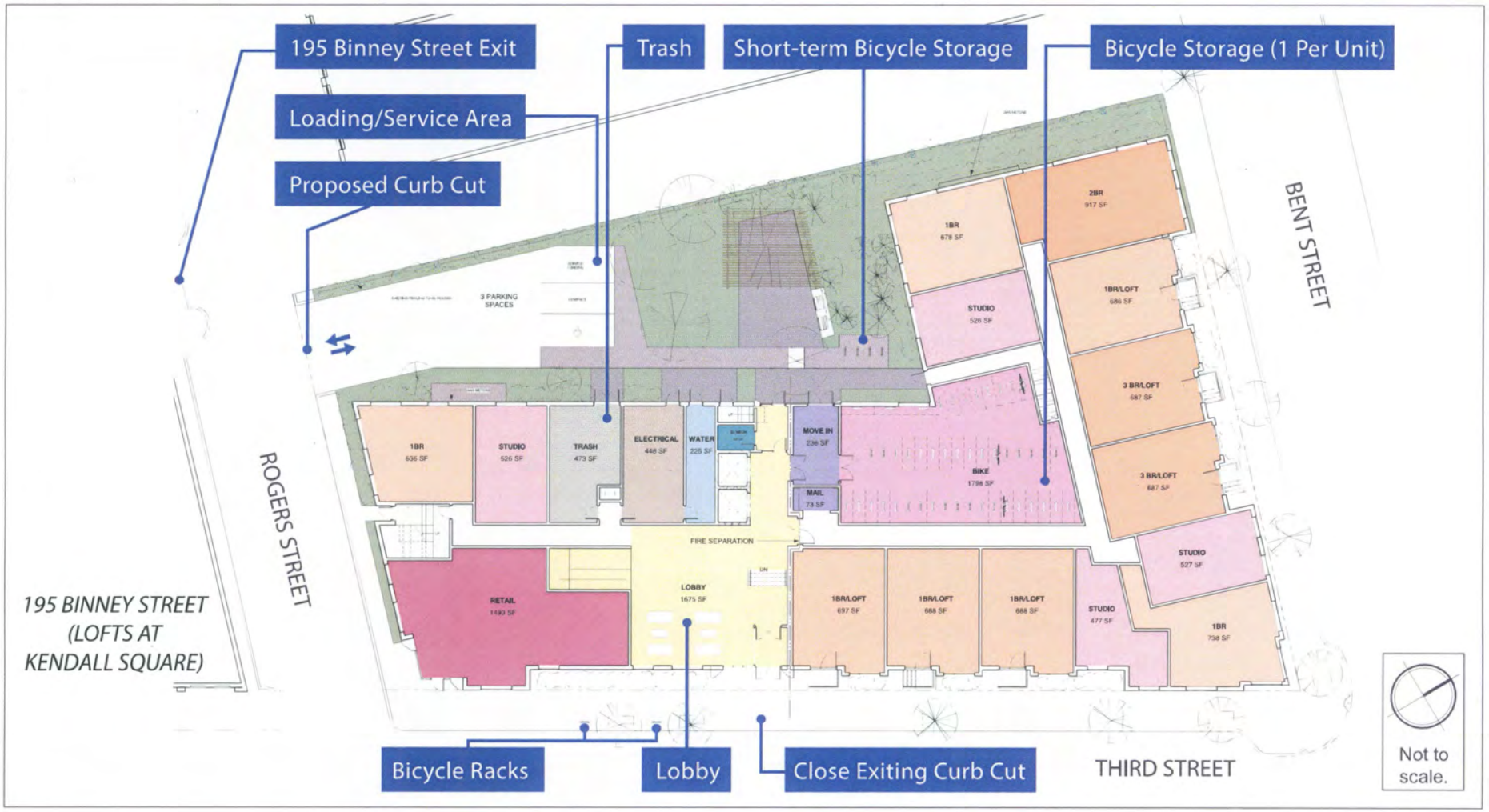
To estimate the unadjusted number of vehicular trips for the Project, land use data published by the Institute of Transportation Engineers (ITE) in the *Trip Generation Manual*[1] were used. ITE provides data to estimate the total number of unadjusted vehicular trips associated with the Project. In an urban setting well-served by transit, adjustments are necessary to account for other travel mode shares such as walking, bicycling, and transit.

The ITE Land Use code (LUC) 220 defines apartments as rental dwellings located within the same building with at least three other dwelling units. Trip generation estimates are based on average vehicle rates per unit. The Apartment land use code was selected because it has slightly higher trip generation rates than the other similar residential land uses provided in the *Trip Generation Manual* and presents a more conservative scenario.

The ITE Land Use code (LUC) 820 defines shopping centers as integrated groups of commercial establishments that are planned, developed, owned, and managed as a unit. Trip generation estimates are based on average vehicle rates per unit. The Shopping Center land use code was selected because it has slightly higher trip generation rates than the other similar residential land uses provided in the *Trip Generation Manual* and presents a more conservative scenario.

1 *Trip Generation Manual*, 9th Edition; Institute of Transportation Engineers; Washington, D.C.; 2012.

Figure 3.A Site Plan



Mode Share

The unadjusted vehicular trips were converted to person trips using the national vehicle occupancy rate of 1.13 published by the Federal Highway Administration (FHWA)[2]. The person trips were then distributed to different modes. The mode split data for the proposed Project was obtained from the 2008-2012 American Community Survey 5-year estimate data for Census Tract 3523 as detailed in **Table 3.B.1**.

Table 3.B.1 Mode Split

Mode	Percent of People
Drove Alone	26.3%
Carpool	2.6%
Transit	31.7%
Bicycle	7.2%
Walk	30.7%
Work from Home	1.5%

Source: Means of Transportation to Work by Geography, American Community Survey 2008-2012 5-Year Estimates, US Census Tract 3523

The total mode split assumes vehicle trips is 28.9% (26.3% drove alone and 2.6% carpool), 31.7% for transit use, 7.2% for bicycle use, 30.7% for walk use, and 1.5% for people who work from home.

Vehicle Trip Generation

To convert vehicle-person trips to vehicle trips, a local vehicle occupancy rate is applied to trips with the residential component as either an origin or destination. For residential trips, vehicle-person trips are adjusted back to vehicle trips by applying the calculated average vehicle occupancy rate (AVO) of 1.05 based on the 2008-2012 US Census data for Tract 3523. The AVO calculation is derived from the vehicle occupancy data provided in **Table 3.C.1**. Retail vehicle-person trips are adjusted back to vehicle trips by applying the 2009 national vehicle occupancy rate for shopping trips of 1.78.

2 Summary of Travel Trends: 2009 National Household Travel Survey, FHWA; Washington, D.C.; June 2011.

Table 3.C.1 Vehicle Occupancy by Means of Transportation to Work

Mode	Number of Workers
Drove Alone	449
2 Person Carpool	44
3 Person Carpool	0
4 Person Carpool	0
5 or 6 Person Carpool	0
7 or more Person Carpool	0
Calculated Average Vehicle Occupancy Rate	1.05

Source: 2008 to 2012 American Community Survey 5-Year Estimates, Census Bureau for Tract 3523

The project generated trips are distributed based on the mode share previously listed in **Table 3.B.1** to determine the number of vehicle, transit, bicycle, walk, and work from home trips estimated to be generated by the Project. **Table 3.C.2** presents the estimated project trips by each mode.

Table 3.C.2 Project Trip Generation by Mode

Time Period	Direction	Transit Trips	Bicycle Trips	Walk Trips	Work at Home Trips	Vehicle Trips
Daily	In	130	29	126	6	**106**
	Out	130	29	126	6	**106**
	Total	260	58	252	12	**212**
a.m. Peak Hour	In	4	1	4	0	**4**
	Out	13	3	12	1	**10**
	Total	17	4	16	1	**14**
p.m. Peak Hour	In	17	3	16	1	**13**
	Out	10	2	10	0	**8**
	Total	27	5	26	1	**21**

Source: Mode shares based on 2008-2012 American Community Survey, US Census Bureau for Tract 3523.

As shown in Table 3.C.2, the Project is expected to generate only approximately 14 vehicle trips during the morning peak hour (4 entering and 10 exiting) and 18 vehicle trips during the evening peak hour (13 entering and 8 exiting). This corresponds to an increase of approximately one vehicle trip every 3 to 5 minutes on the adjacent roadway network during the peak periods as a result of the Project.

The trip generation worksheet with mode share splits is included in **Appendix D**.

Trip Rate Comparison

For comparison, the existing trip generation, using count data at the 195 Binney Street and the 285/303 Third Street were compared to the ITE trip generation rates. Parking for the 195 Binney Street residents is provided via a surface lot at 249 Third Street, on-street parking on Rogers Street, and via a parking garage off of Rogers Street at 195 Binney Street. Parking for 285/303 Third Street is provided for residents via a below-grade parking garage. 12-hour turning movement counts were collected at the driveways to the residential buildings. The traffic observed counts were used to calculate the site-generated trip rates associated with each building, and are compared to the ITE LUC 220 (Apartments) in **Table 3.A.5** and **Table 3.A.6.**

Table 3.D.1 Comparison of Actual Trips and ITE Trip Generation Estimates – 195 Binney Street

Period	Direction	Observed[1]		ITE Trip Generation Estimate[2]	
		Number of Trips	Trip Rate (Trips/Unit)	Number of Trips	Trip Rate (Trips/Unit)
Daily	In	100	0.54	192	1.03
	Out	100	0.54	192	1.03
	Total	200	1.08	384	2.06
a.m. Peak Hour	In	3	0.02	6	0.03
	Out	11	0.06	24	0.13
	Total	14	0.08	30	0.16
p.m. Peak Hour	In	11	0.06	23	0.12
	Out	9	0.05	12	0.07
	Total	20	0.11	35	0.19

1. The trips were counted on June 12, 2014. The 195 Binney Street trips include the 249 Third Street Lot Driveway and the 195 Binney Street garage driveways.

2. The ITE Trip Generation was calculated as LUC 220 (Apartment) for 186 units.

Table 3.D.2 Comparison of Actual Trips and ITE Trip Generation Estimates – 285/303 Third Street

Period	Direction	Observed[1]		ITE Trip Generation Estimate[2]	
		Number of Trips	Trip Rate (Trips/Unit)	Number of Trips	Trip Rate (Trips/Unit)
Daily	In	280	0.58	487	1.03
	Out	280	0.58	498	1.01
	Total	560	1.16	974	2.02
a.m. Peak Hour	In	9	0.02	15	0.03
	Out	36	0.07	60	0.12
	Total	45	0.09	75	0.16
p.m. Peak Hour	In	34	0.07	59	0.12
	Out	16	0.03	31	0.06
	Total	50	0.10	90	0.19

1. The trips were counted on June 12, 2014. The LKS trips include the 249 Third Street Lot Driveway and the LKS Driveway.
2. The ITE Trip Generation was calculated using as LUC 220 (Apartment) for 482 units.

As seen in Table 3.D.1, the current observed trips at the 195 Binney Street are generally half (45%-50%) of the estimated number of adjusted vehicle trips. As seen in Table 3.D.2, the current observed trips at the 285/303 Third Street are generally half (40%-45%) of the estimated number of adjusted vehicle trips. Therefore, the Project generated trips, as summarized in Table 3.C.2, are conservative.

Proposed Parking and Reassignment

The Project-generated and existing garage vehicle trips were relocated assuming a future parking ratio of 0.7 spaces per residential unit at 195 Binney Street and 285/303 Third Street. The existing vehicle trips to and from the Project site were redistributed to the 195 Binney Street parking garage and a portion of the 195 Binney Street trips were redistributed to the 285/303 Third Street garage driveway (see **Table 3.C.3** for future parking space assignment). The resulting a.m. and p.m. peak hour re-distributed traffic volume networks are shown in **Figure 3.D.1** through **Figure 3.D.4**.

Table 3.C.3 Proposed Parking Allocation Plan

Location	Units	Existing		Proposed	
		Spaces	Ratio (spaces/ unit)	Required Spaces	Ratio (spaces/ unit)
195 Binney Street	186				
195 Binney Street Garage		106		46	
249 Third Street Lot		74		-	
Rogers Street		14		14	
285/303 Third Street Garage		-	-	70	
Subtotal	*186*	*194*	*1.04*	*130*	*0.70*
285/303 Third Street	482				
285/303 Third Street Garage		527	1.12	338	0.70
Subtotal	*482*	*527*	*1.12*	*338*	*0.70*
249 Third Street Proposed Project	84				
195 Binney Street Garage				59	0.70
Subtotal	*84*	-	-	*59*	*0.70*
Total	**752**	**721**	**0.97**	**527**[1]	**0.70**

1. **527 spaces would be required at 0.70 spaces per unit, leaving 120 spaces unused in the 285/303 Third Street Garage.**

Following the redevelopment of the 74-space surface lot at 249 Third Street, the combined parking supply at 249 Third Street, 285/303 Third Street, and 195 Binney Street would total 647 spaces (721-74=647). As shown in Table 3.C.3, 527 spaces would be allocated for the combined 752 units at the proposed parking ratio of 0.70 spaces per unit rather than the 1.0 ratio required in the IA-1 district. Therefore, the 285/303 Third Street garage will have an additional capacity of 120 spaces (647-527=120).

Figure 3.D.1 Project Relocated Trips - 249 Third Lot, a.m. Peak Hour

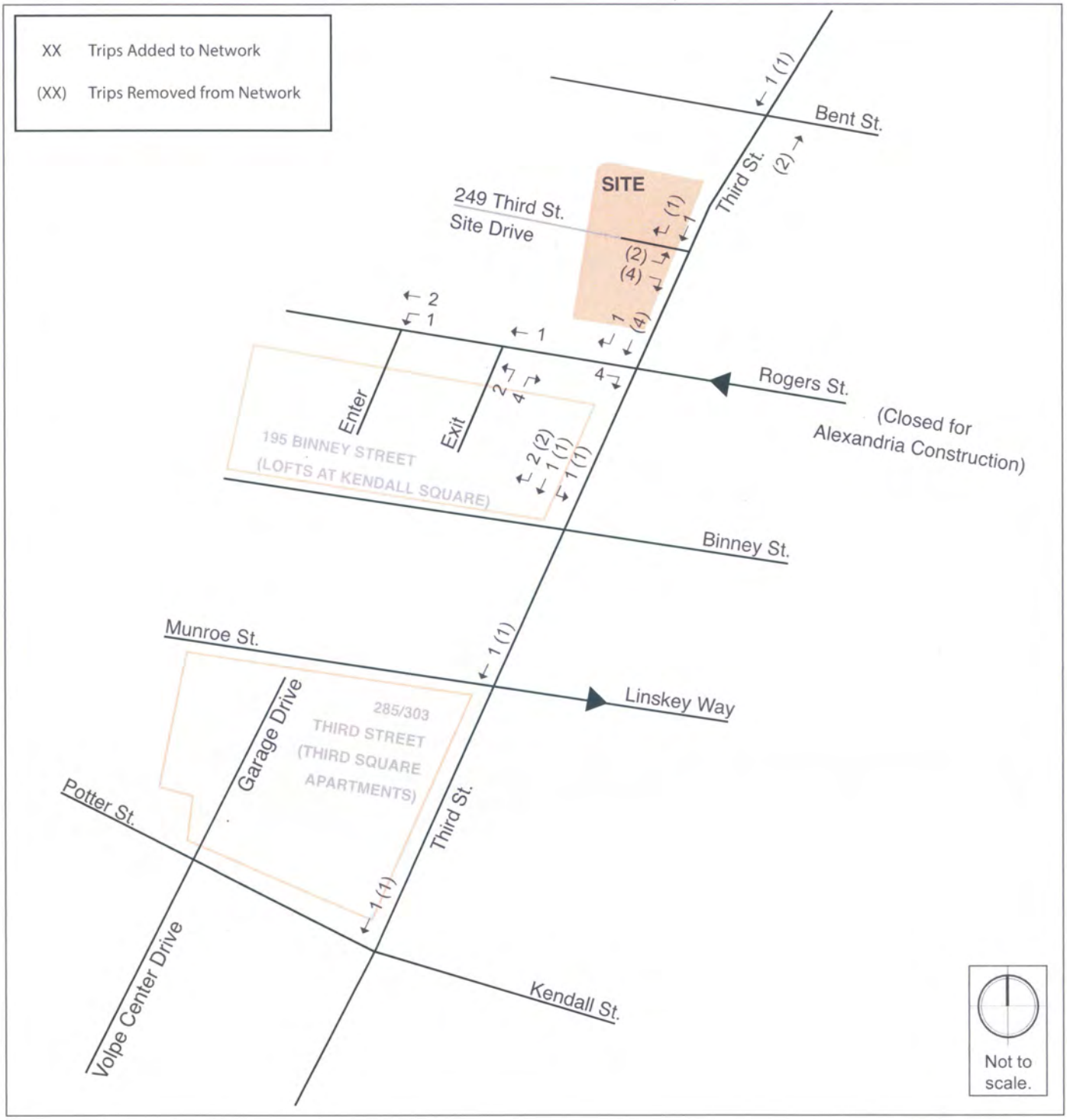


Figure 3.D.2 Project Relocated Trips - Lofts at Kendall Square, a.m. Peak Hour

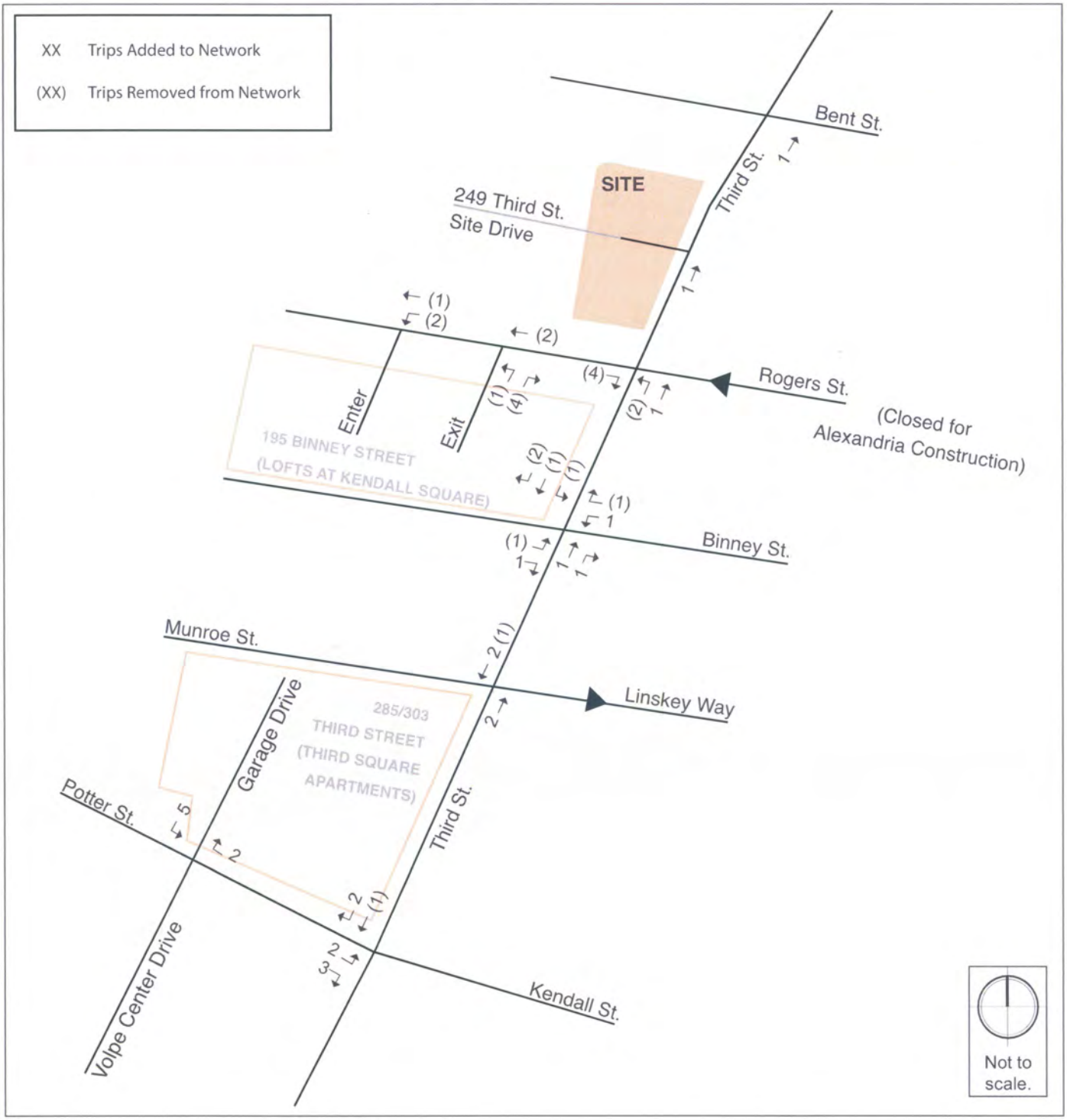


Figure 3.D.3 Project Relocated Trips - 249 Third Lot, p.m. Peak Hour

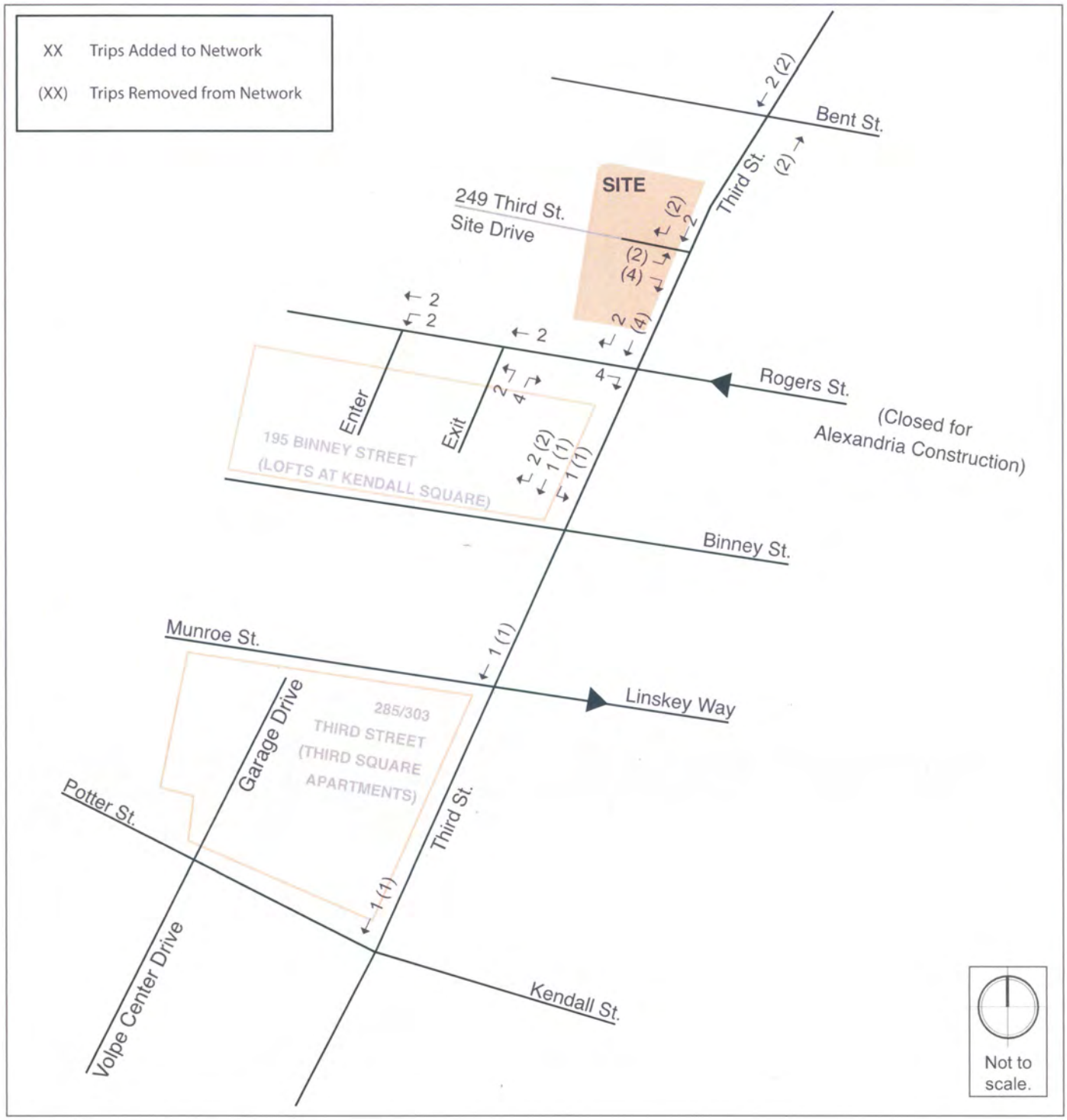
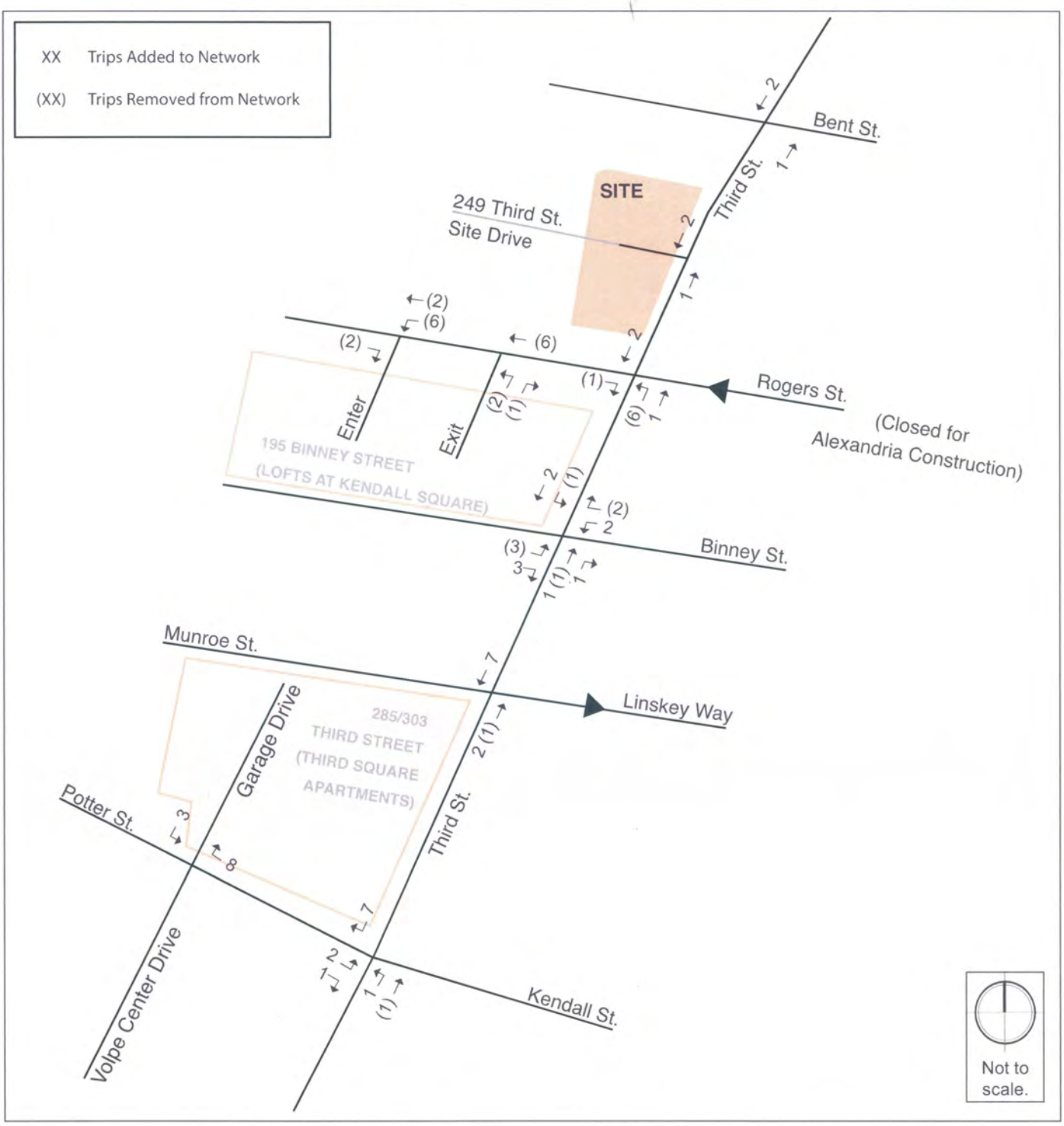


Figure 3.D.4 Project Relocated Trips - Lofts at Kendall square, p.m. Peak Hour



Trip Distribution

The trip distribution identifies the various travel paths for vehicles arriving and leaving the Project site. Trip distribution patterns for the Project were based on the 2010 journey-to-work census data for tract 3523[3]. The trip distribution patterns were refined based on existing traffic patterns and review of the adjacent roadway network. The trip distribution pattern for the overall Project is illustrated in **Figure 3.E.1.** Based on the future parking plan as described in Table 3.C.3, all project generated trips will enter and exit the 195 Binney Street garage driveway via Rogers Street. The Project generated trips are shown in **Figure 3.E.2** and **Figure 3.E.3**.

Although 25% of Project trips to and from the garage at 195 Binney Street are distributed along Fifth Street, the traffic impact on Fifth Street will be minimal. After taking into account both the Project-relocated and Project-generated trips, five trips will be added to Fifth Street in the a.m. peak hour and three trips will be added to Fifth Street in the p.m. peak hour. This amounts to approximately one trip every 12 minutes in the a.m. peak hour and approximately one trip every 20 minutes in the p.m. peak hour, which will have an imperceptible impact.

Loading and Deliveries

Service and loading activity will occur on-site within a designated loading area at the southwest corner of the site. Access and egress to the loading area will be provided by a proposed curb cut along Rogers Street.

3. 2006-2010 Journey to Work data by workplace, Census Bureau

Figure 3.E.1 Trip Distribution

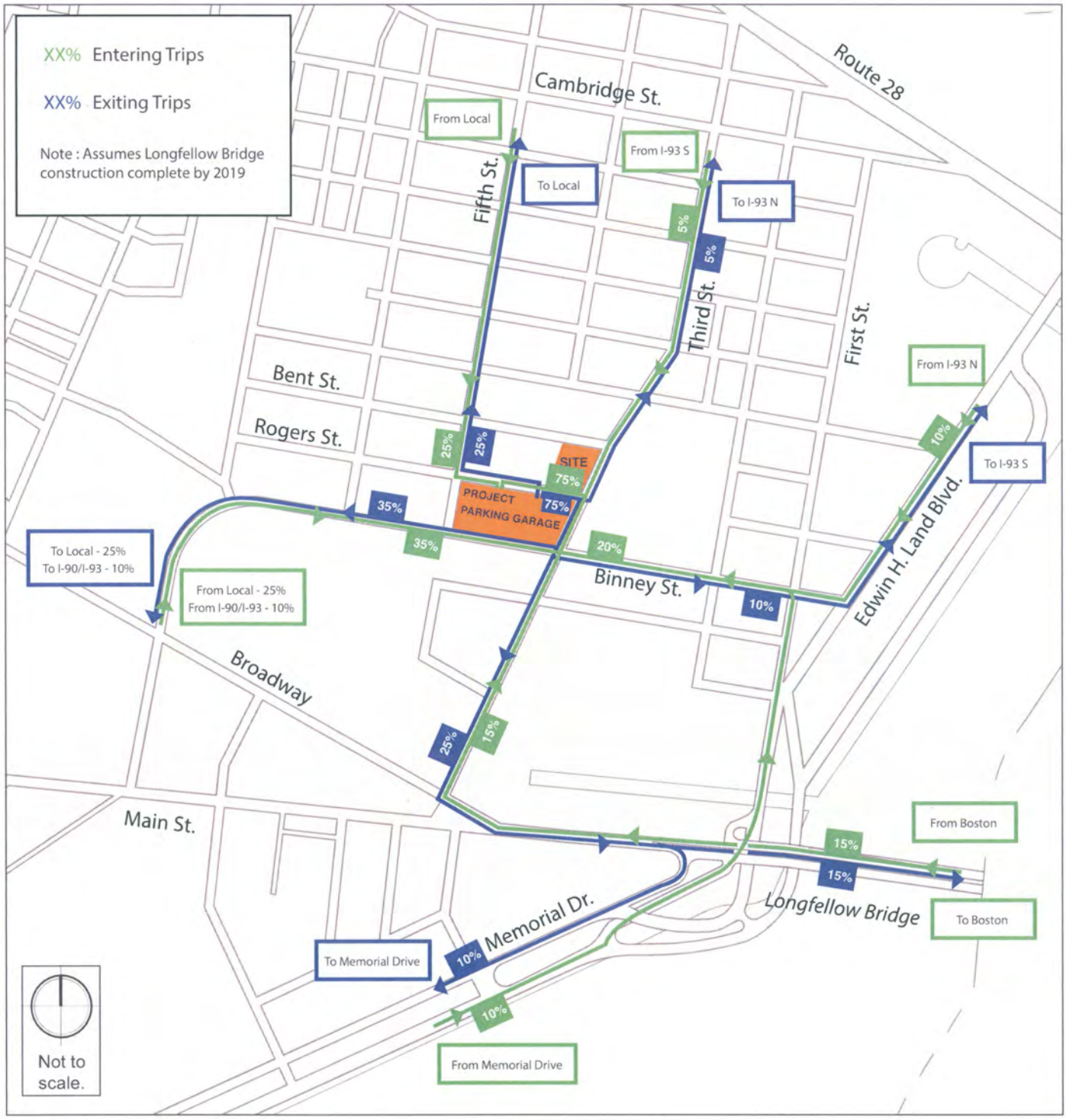


Figure 3.E.2 Project Generated Trips, a.m. Peak Hour

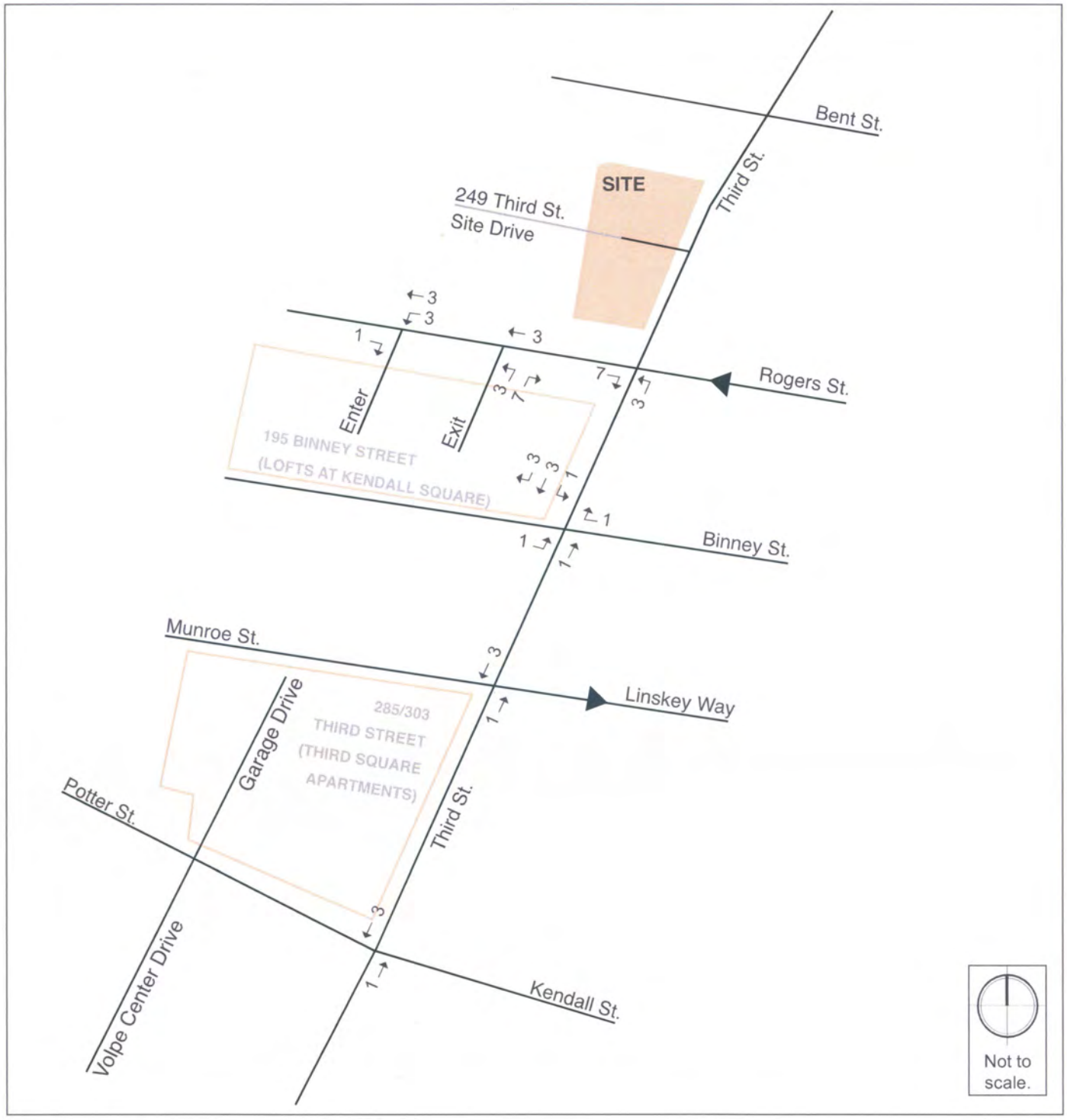
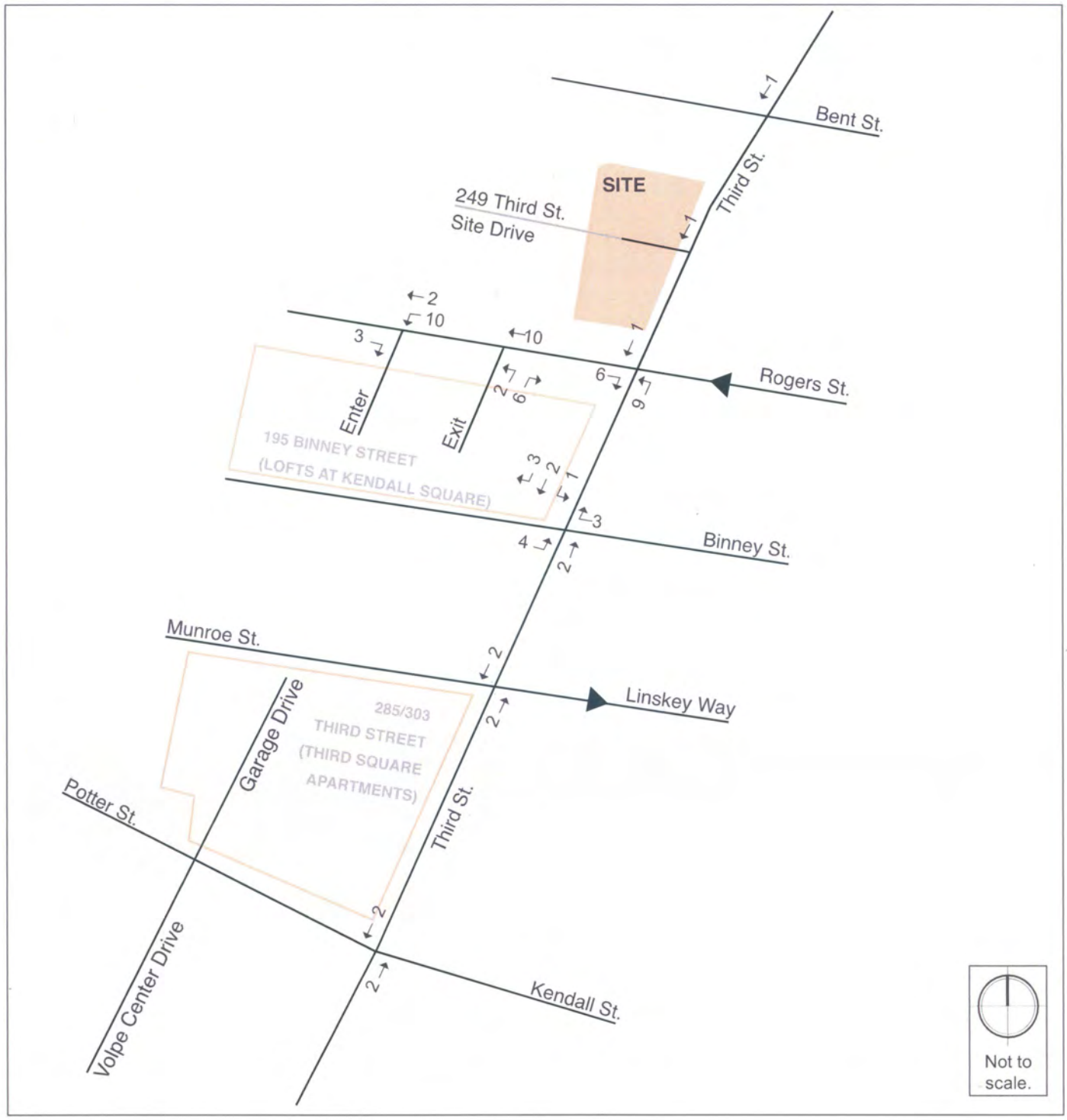


Figure 3.E.3 Project Generated Trips, p.m. Peak Hour



Background Traffic

Two methodologies are used to account for future traffic growth, independent of the Project. The first methodology accounts for general background traffic growth that may be affected by changes in demographics, automobile usage, and automobile ownership. Based on information provided by the City of Cambridge, a 0.5% annual traffic growth rate was used to develop the future conditions traffic volumes.

The second methodology identifies any specific planned developments that are expected to affect traffic patterns throughout the study area within the future analysis time horizon. The following projects were specified by the City of Cambridge to be included as background projects. The traffic volumes associated with these projects were incorporated into the future conditions traffic volumes.

- **Courthouse Redevelopment**– Located to the north of the Project site at 40 Thorndike Street, this existing building will be redeveloped into approximately 420,000 square feet (sf) of R&D/office space, 15,000 sf of retail space, and 24 residential apartment units. The project will provide 92 on-site parking spaces and 420 leased spaces from the nearby existing First Street parking garage. This project is currently under review by the Cambridge Planning Board. Traffic volumes were obtained from the traffic study conducted for this project and were included in the Future Build conditions.
- **Alexandria's Binney Street Development** – This multi-site development with buildings located both to the west and east of the Project site consists of a total of 1,753,200 sf, including R&D, residential, and retail uses. The 75 Binney Street, 125 Binney Street, and 270 Third Street proposed buildings will include 237,000 SF of Research and Design space, 10,000 SF of retail space, and approximately 91 residential units, with a 532-space, below-grade parking garage. The garage entry will be on Second Street and the loading dock entry points will be on Rogers Street. The project is currently under construction and traffic volumes were included in the Future Build conditions.
- **Ames Street Residences** – Located south of the Project site, this proposed project will include 280 residential apartment units and 16,000 sf of ground-level retail space. Parking spaces for the development will be allocated within the existing East Garage adjacent to the Project site. This project is currently under review by the Cambridge Planning Board. Traffic volumes were obtained from the traffic study conducted for this project and were included in the Future Build conditions.
- **Cambridge Research Park (unbuilt)** – This multi-site development, consisting of approximately 757,970 sf of R&D/office space, 467,530 sf of residential space, and 150,500 sf of retail (including theater) is currently 89 percent complete and occupied, based on information from the City of Cambridge. The remaining project to be constructed will consist of 53,000 SF of research and design space and office space, and a 75,000 SF theater. The traffic volumes were included in the Future Build Conditions.
- **First and Bent Street project (i.e., 159 First Street, 150 Second Street)** - This multi-site development is located east of the Project site. A 108,000 sf office and laboratory building at 150 Second Street has already been completed and occupied. A 115-unit residential building with ground-floor retail space at 159 First Street is currently under construction. A third site at 29 Charles Street remains a commercial parking lot and is not yet seeking any building permit. Based on the Traffic Impact Study, there are no projected generated trips associated with this project that go through the study area intersections.

Traffic Analysis

The criterion for evaluating traffic operations is level of service (LOS), which is determined by assessing average delay incurred by vehicles at intersections and along intersection approaches. Trafficware's Synchro Version 6.0 was used to calculate average delay and associated LOS at the study area intersections. This software is based on the traffic operational analysis methodology of the Transportation Research Board's 2000 *Highway Capacity Manual* (HCM).

Level of service and delay (in seconds) are based on intersection geometry, traffic data, and traffic control for each intersection. For the signalized intersections within the study area, traffic signal timing and phasing plans provided by the City of Cambridge were used in the analysis.

Table 5.1 summarizes the delay and LOS thresholds for signalized and unsignalized intersections, as defined in the HCM. LOS A defines the most favorable condition, with minimum traffic delay. LOS F represents the worst condition (unacceptable), with significant traffic delay. The threshold at LOS E/LOS F indicates that the intersection, or intersection approach, is theoretically at capacity. However, in an urban setting, LOS E or LOS F are typical for stop controlled minor approaches that intersect a major roadway. LOS D is generally considered acceptable in an urban environment, such as the Project study area, and below theoretical operating capacity.

Table 5.1 Level of Service Criteria

Level of Service	Average Stopped Delay (seconds/vehicle)	
	Signalized Intersections	Unsignalized Intersections
A	≤10	≤10
B	>10 and ≤20	>10 and ≤15
C	>20 and ≤35	>15 and ≤25
D	>35 and ≤55	>25 and ≤35
E	>55 and ≤80	>35 and ≤50
F	>80	>50

Source: 2000 Highway Capacity Manual, Transportation Research Board.

Vehicle Capacity Analysis

The following sections summarize the Existing 2014, Build 2014, and Future Build 2019 Conditions during the morning and evening peak hours at the study area intersections, using the methodology described above. Synchro output reports are provided in **Appendix E**.

Existing Conditions

The Existing 2014 Conditions Analysis is based on the current data collected at the study area intersections including traffic counts, signal timings, and geometries. Construction activity related to the Alexandria Binney Street Development resulted in (i) a temporary lane reduction in each direction of Binney Street between First Street and Third Street and (ii) a temporary closure of the through/right-turn lane at the Binney Street westbound approach at the intersection with Third Street. The reduction in vehicle capacity along Binney Street may have resulted in greater delay at the intersection of Third Street than there would be with full use of the roadway. It is not anticipated that the reduction in travels lanes resulted in a significant change in travel behavior on the network. The operational analysis for the morning and evening peak hours is provided in **Table 5.A.1** and **Table 5.A.2**, respectively.

Build Conditions

The Build 2014 Conditions Analysis is based on analysis of the existing study area intersections with the additional project generated vehicle trips, as previously described in the report. The morning and evening peak hour Build (2014) Conditions volumes are provided in **Figure 5.B.1** and **Figure 5.B.2**, respectively. The operational analysis for the morning and evening peak hours is provided in **Table 5.B.1** and **Table 5.B.2**, respectively.

Future Conditions

The Future Build 2019 Conditions Analysis uses the methodology discussed in the background section of this report to understand the roadway capacity in 2019. The Future Build volumes combine the grown existing volumes, the project generated volumes, and any trips related to projects currently under construction or undergoing City of Cambridge permitting process.

In the Existing and Build Conditions, the Binney Street westbound approach had consisted of two approach lanes (a left-turn lane and a through/right-turn lane) due to a lane reduction related to construction of the Alexandria Development. In the Future Condition, the Binney Street westbound approach is assumed to be re-opened to its original condition of 3 approach lanes (a left-turn lane, a through-only lane, and a through/right-turn lane) as it is expected that construction of the Alexandria Development will be complete prior to the 2019 Future Condition. The additional lane is accommodated in the inputs for the Synchro analysis for this intersection. It is also assumed that Binney Street between First Street and Third Street is restored to two lanes in each direction following the completion of Alexandria.

Additionally, as part of the Alexandria mitigation, the project has committed to reconstructing the Binney Street/Third Street intersection to include a cycle track, an updated traffic signal controller, cabinet, loops, and vehicle count station, and to coordinate the Binney Street/Third Street intersection with the proposed signal at Binney Street/First Street.

The morning and evening peak hour Future Build (2019) Conditions volumes are provided in **Figure 5.C.1** and **Figure 5.C.2**, respectively. The operational analysis for the morning and evening peak hours is provided in **Table 5.C.1** and **Table 5.C.2**, respectively.

Figure 5.B.1 Build Conditions (2014) Turning Movement Volumes, a.m. Peak Hour

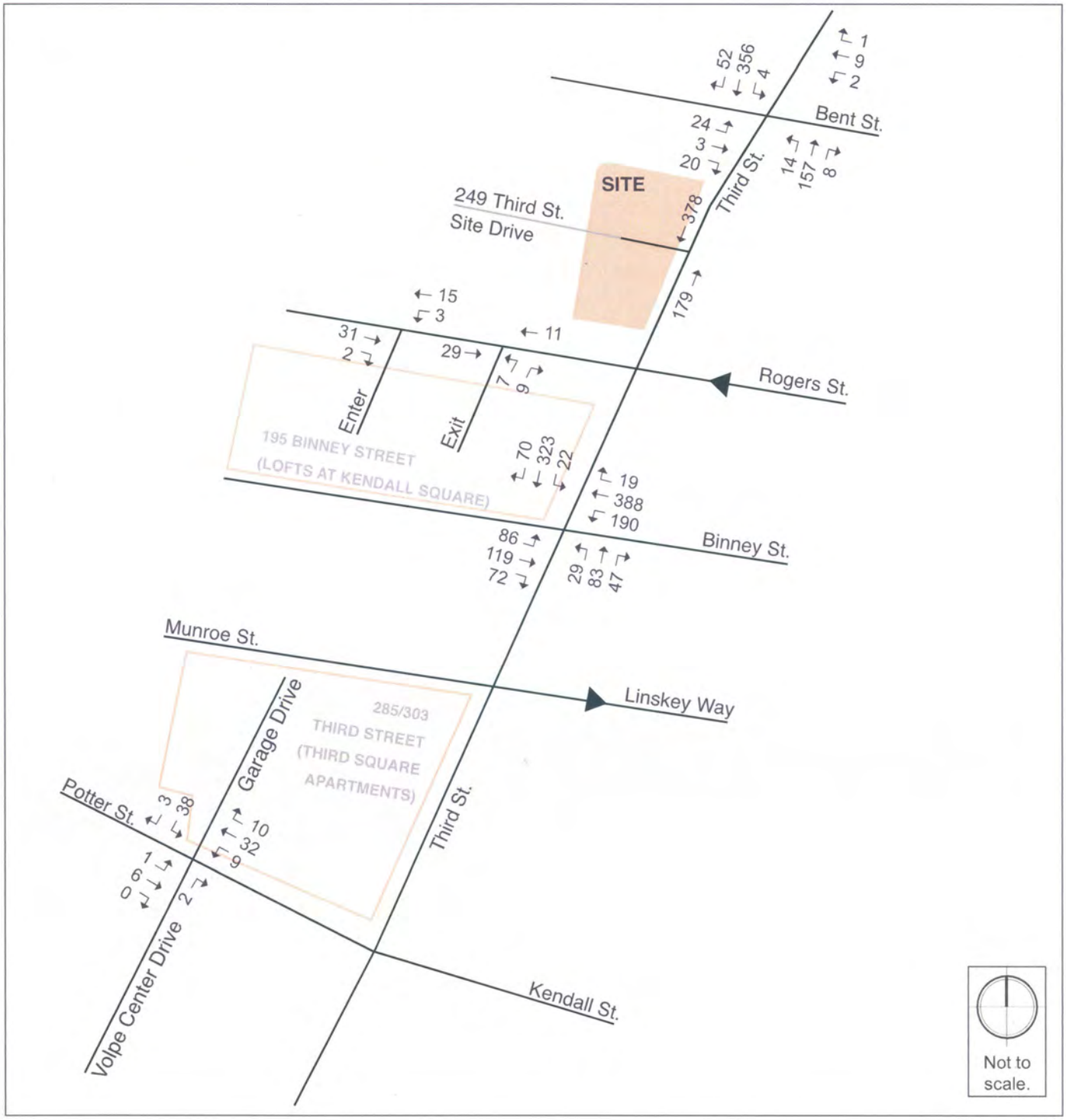


Figure 5.B.2 Build Conditions (2014) Turning Movement Volumes, p.m. Peak Hour

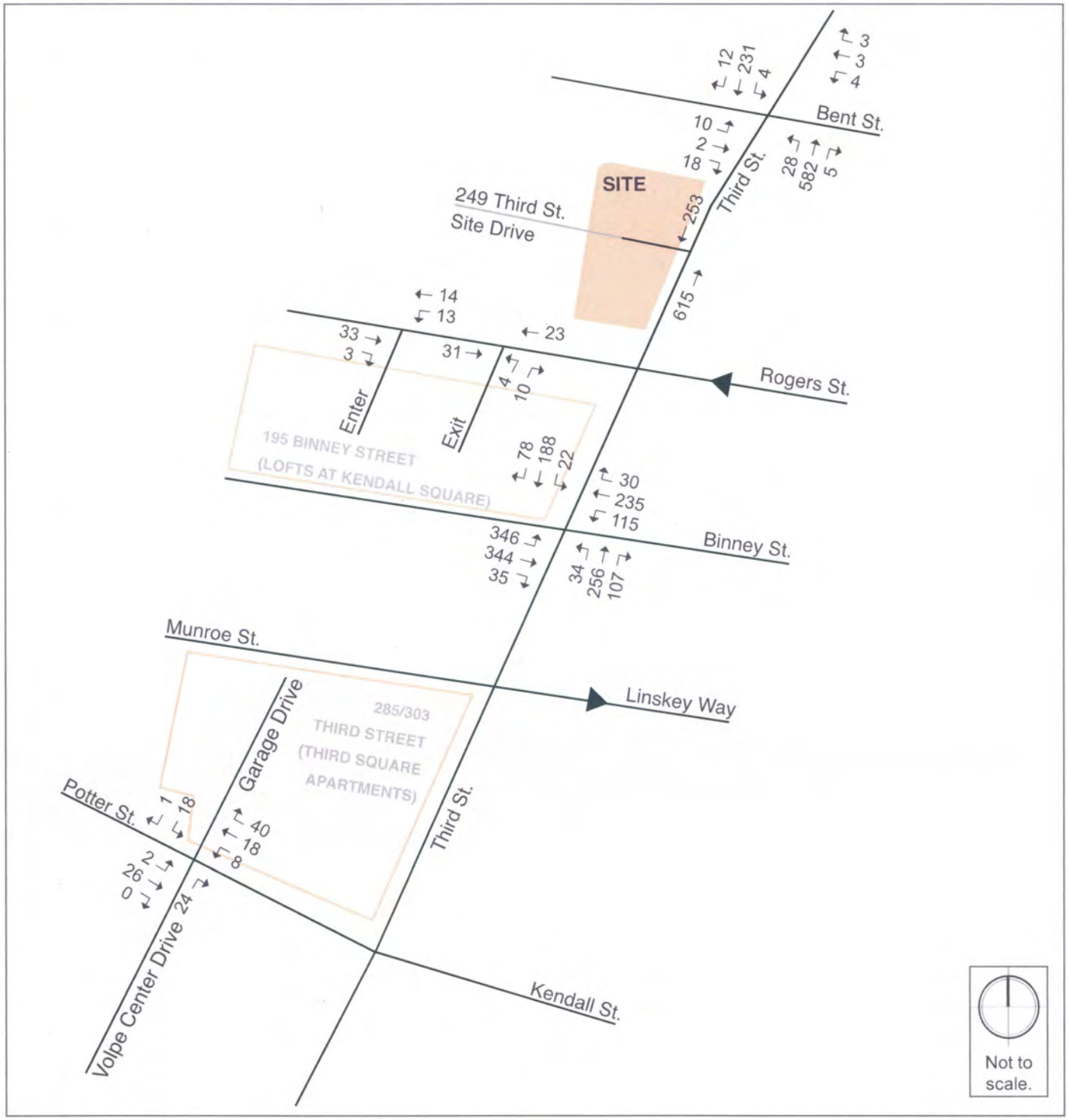


Figure 5.C.1 Future Build Conditions (2019) Turning Movement Volumes, a.m. Peak Hour

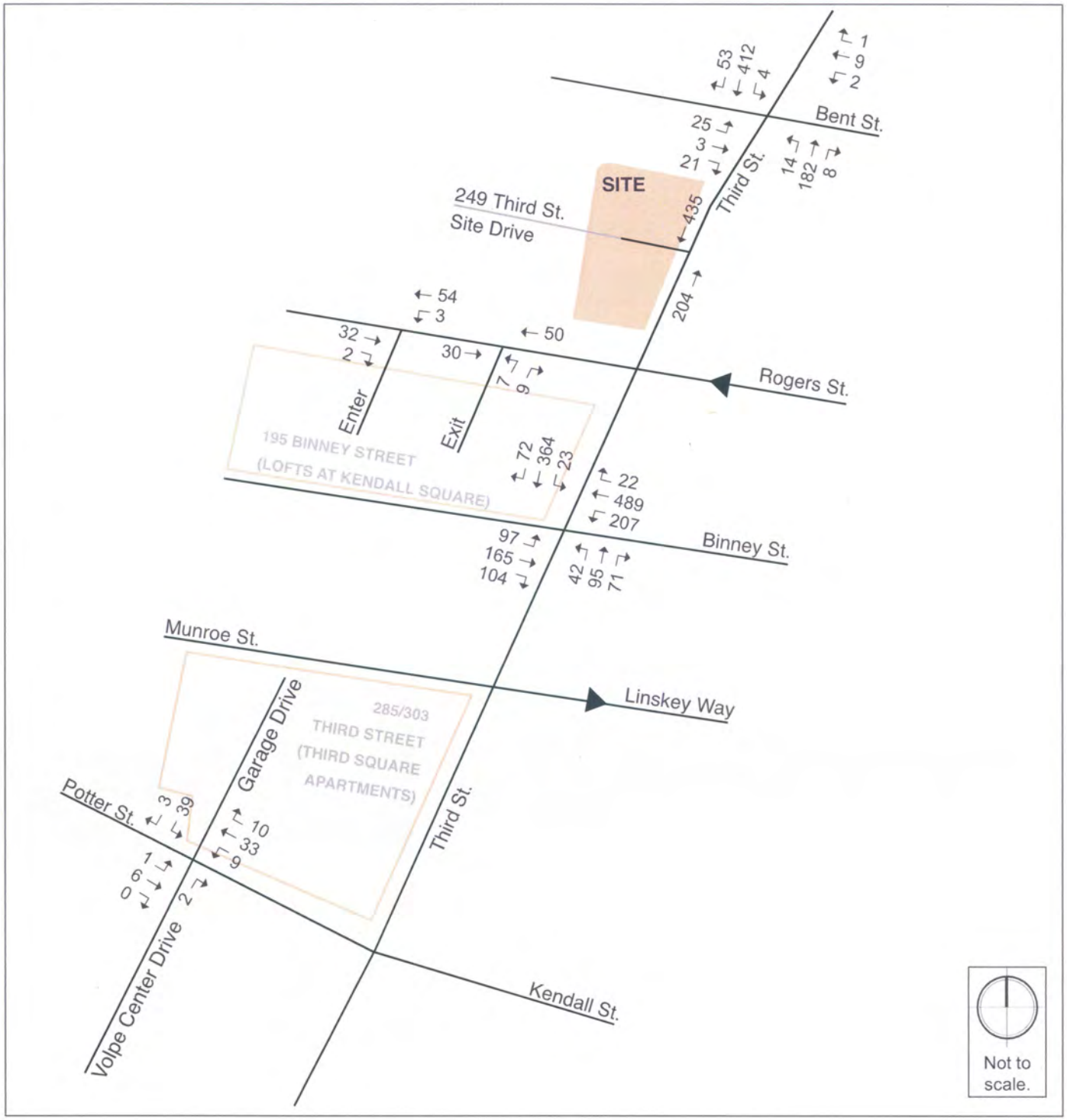


Figure 5.C.2 Future Build Conditions (2019) Turning Movement Volumes, p.m. Peak Hour

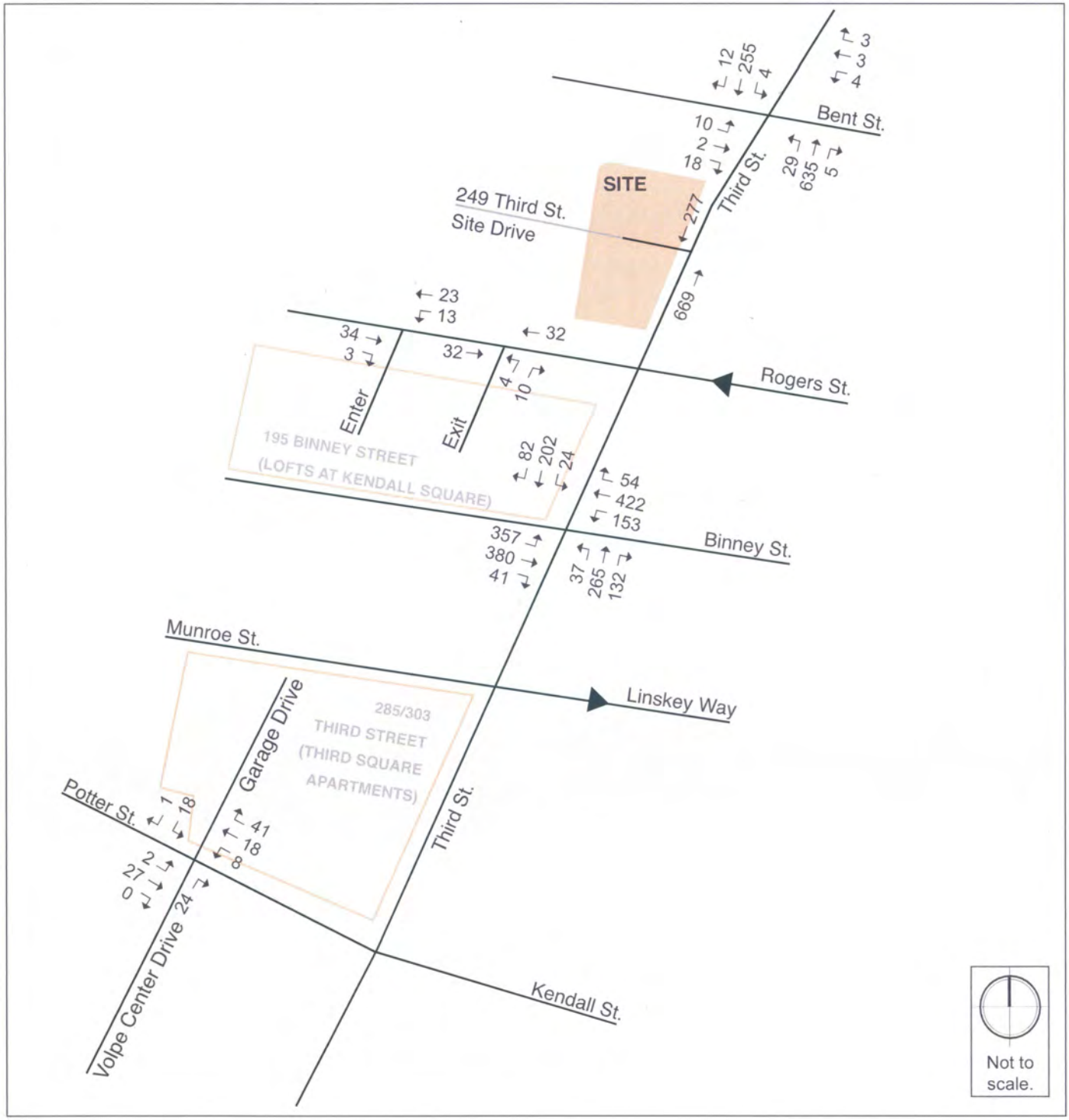


Table 5.A.1 Existing Conditions (2014), Capacity Analysis Summary, a.m. Peak Hour

Intersection/Approach	LOS	Delay (s)	V/C Ratio	50th Percentile Queue (ft)	95th Percentile Queue (ft)
Signalized Intersection					
Third Street at Binney Street	**C**	**34.4**	-	-	-
Binney EB left	D	50.0	0.58	52	100
Binney EB thru|thru/right	C	26.0	0.32	49	82
Binney WB left	D	45.6	0.70	98	#186
Binney WB thru/right	C	34.5	0.75	204	#406
Third NB left/thru	B	19.5	0.25	43	81
Third NB right	B	18.2	0.14	17	41
Third SB left/thru/right	D	35.8	0.81	203	322
Unsignalized Intersections					
Third Street at Bent Street					
Bent EB left/thru/right	C	18.0	0.16	-	14
Parking Lot WB left/thru/right	C	19.2	0.10	-	8
Third NB left/thru/right	A	0.8	0.02	-	1
Third SB left/thru/right	A	0.1	0.00	-	0
Third Street at 249 Third Street Lot Driveway					
Driveway EB left/thru/right	B	14.9	0.03	-	2
Third NB left/thru	A	0.0	0.00	-	0
Third SB thru/right	A	0.0	0.25	-	0
Rogers Street at 195 Binney Exit Driveway					
Rogers EB thru	A	0.0	0.03	-	0
Rogers WB thru	A	0.0	0.01	-	0
Driveway SB left/right	A	8.8	0.01	-	1
Rogers Street at 195 Binney Entrance Driveway					
Rogers EB thru/right	A	0.0	0.03	-	0
Rogers WB left/thru	A	0.6	0.00	-	0
Potter Street at 285/303 Third Street Driveway					
Potter EB left/thru/right	A	1.1	0.00	-	0
Potter WB left/thru/right	A	1.4	0.01	-	1
Private Driveway NB left/thru/right	A	8.7	0.00	-	0
Driveway SB left/thru/right	B	10.2	0.08	-	7

95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.

Table 5.A.2 Existing Conditions (2014), Capacity Analysis Summary, p.m. Peak Hour

Intersection/Approach	LOS	Delay (s)	V/C Ratio	50th Percentile Queue (ft)	95th Percentile Queue (ft)
Signalized Intersection					
Third Street at Binney Street	**D**	**38.6**	-	-	-
Binney EB left	D	54.4	0.88	182	#369
Binney EB thru | thru/right	B	15.3	0.31	64	108
Binney WB left	F	98.8	0.90	65	#182
Binney WB thru/right	D	39.1	0.70	133	#262
Third NB left/thru	C	31.8	0.64	137	222
Third NB right	C	25.8	0.34	45	89
Third SB left/thru/right	D	37.2	0.74	151	241
Unsignalized Intersections					
Third Street at Bent Street					
Bent EB left/thru/right	C	20.2	0.13	-	11
Parking Lot WB left/thru/right	D	25.2	0.08	-	7
Third NB left/thru/right	A	0.7	0.03	-	2
Third SB left/thru/right	A	0.2	0.01	-	0
Third Street at 249 Third Street Lot Driveway					
Driveway EB left/thru/right	B	14.4	0.02	-	2
Third NB left/thru	A	0.0	0.00	-	0
Third SB thru/right	A	0.0	0.18	-	0
Rogers Street at 195 Binney Exit Driveway					
Rogers EB thru	A	0.0	0.03	-	0
Rogers WB thru	A	0.0	0.01	-	0
Driveway SB left/right	A	8.9	0.01	-	1
Rogers Street at 195 Binney Entrance Driveway					
Rogers EB thru/right	A	0.0	0.03	-	0
Rogers WB left/thru	A	2.7	0.01	-	0
Potter Street at 285/303 Third Street Driveway					
Potter EB left/thru/right	A	0.5	0.00	-	0
Potter WB left/thru/right	A	1.1	0.01	-	0
Private Driveway NB left/thru/right	A	8.9	0.04	-	3
Driveway SB left/thru/right	B	10.0	0.05	-	4

95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.
GRAY shading indicates LOS E or F.

All of the study area intersections operate at a LOS D or better, which is typically considered acceptable in an urban environment such as this study area, with the exception of the Binney Street westbound left-turn lane at the Third Street/Binney Street intersection, which is operating at a LOS F. However, it should be noted that the Binney Street westbound through movement is operating at LOS C and LOS D during the morning and evening

peak hours, respectively. If the additional through lane was available for use under existing conditions, these approaches would operate at LOS C during both peak hours. Given the small change in operations if the additional lane were available, it is not anticipated that the lane closure resulted in a significant number of diverted vehicle trips.

Table 5.B.1 Build Conditions (2014), Capacity Analysis Summary, a.m. Peak Hour

Intersection/Approach	LOS	Delay (s)	V/C Ratio	50th Percentile Queue (ft)	95th Percentile Queue (ft)
Signalized Intersection					
Third Street at Binney Street	C	34.6	-	-	-
Binney EB left	D	50.3	0.59	52	100
Binney EB thru|thru/right	C	26.2	0.33	50	82
Binney WB left	D	45.9	0.70	99	#189
Binney WB thru/right	C	34.7	0.75	206	#406
Third NB left/thru	B	19.5	0.26	43	83
Third NB right	B	18.3	0.15	18	42
Third SB left/thru/right	D	36.0	0.81	206	325
Unsignalized Intersections					
Third Street at Bent Street					
Bent EB left/thru/right	C	18.0	0.16	-	14
Parking Lot WB left/thru/right	C	19.2	0.10	-	8
Third NB left/thru/right	A	0.8	0.02	-	1
Third SB left/thru/right	A	0.1	0.00	-	0
Rogers Street at 195 Binney Exit Driveway					
Rogers EB thru	A	0.0	0.03	-	0
Rogers WB thru	A	0.0	0.01	-	0
Driveway SB left/right	A	8.9	0.03	-	3
Rogers Street at 195 Binney Entrance Driveway					
Rogers EB thru/right	A	0.0	0.03	-	0
Rogers WB left/thru	A	1.3	0.00	-	0
Potter Street at 285/303 Third Street Driveway					
Potter EB left/thru/right	A	1.1	0.00	-	0
Potter WB left/thru/right	A	1.4	0.01	-	1
Private Driveway NB left/thru/right	A	8.7	0.00	-	0
Driveway SB left/thru/right	B	10.3	0.09	-	8

95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.

Table 5.B.2 Build Conditions (2014), Capacity Analysis Summary, p.m. Peak Hour

Intersection/Approach	LOS	Delay (s)	V/C Ratio	50th Percentile Queue (ft)	95th Percentile Queue (ft)
Signalized Intersection					
Third Street at Binney Street	**D**	**39.3**	-	-	-
Binney EB left	E	55.2	0.89	184	#372
Binney EB thru|thru/right	B	15.4	0.31	65	110
Binney WB left	F	102.8	0.93	67	#185
Binney WB thru/right	D	39.6	0.70	135	#265
Third NB left/thru	C	31.7	0.64	139	224
Third NB right	C	25.7	0.34	46	90
Third SB left/thru/right	D	38.1	0.75	156	249
Unsignalized Intersections					
Third Street at Bent Street					
Bent EB left/thru/right	C	20.3	0.13	-	11
Parking Lot WB left/thru/right	D	25.3	0.08	-	7
Third NB left/thru/right	A	0.7	0.03	-	2
Third SB left/thru/right	A	0.2	0.01	-	0
Rogers Street at 195 Binney Exit Driveway					
Rogers EB thru	A	0.0	0.03	-	0
Rogers WB thru	A	0.0	0.02	-	0
Driveway SB left/right	A	8.9	0.04	-	3
Rogers Street at 195 Binney Entrance Driveway					
Rogers EB thru/right	A	0.0	0.03	-	0
Rogers WB left/thru	A	3.6	0.01	-	1
Potter Street at 285/303 Third Street Driveway					
Potter EB left/thru/right	A	0.5	0.00	-	0
Potter WB left/thru/right	A	0.9	0.01	-	0
Private Driveway NB left/thru/right	A	8.9	0.04	-	3
Driveway SB left/thru/right	B	10.1	0.05	-	4

95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.
GRAY shading indicates a decrease in LOS from existing conditions to the Build scenario.

All of the study area intersections continue to operate at the same LOS as the Existing Conditions with the exception of the Binney Street eastbound left turn lane at the Third Street/Binney Street intersection. This change in LOS is due to the increase in delay of less than one second.

Table 5.C.1 Future Build Conditions (2019), Capacity Analysis Summary, a.m. Peak Hour

Intersection/Approach	LOS	Delay (s)	V/C Ratio	50th Percentile Queue (ft)	95th Percentile Queue (ft)
Signalized Intersection					
Third Street at Binney Street	C	32.6	-	-	-
Binney EB left	D	51.1	0.59	53	#121
Binney EB thru|thru/right	C	28.7	0.45	71	114
Binney WB left	D	47.9	0.74	110	#224
Binney WB thru|thru/right	C	24.2	0.52	130	190
Third NB left/thru	C	20.0	0.33	52	103
Third NB right	B	18.7	0.21	26	59
Third SB left/thru/right	D	39.1	0.86	228	#417
Unsignalized Intersection					
Third Street at Bent Street					
Bent EB left/thru/right	C	19.6	0.18	-	16
Parking Lot WB left/thru/right	C	20.2	0.05	-	4
Third NB left/thru/right	A	0.8	0.02	-	1
Third SB left/thru/right	A	0.1	0.00	-	0
Rogers Street at 195 Binney Exit Driveway					
Rogers EB thru	A	0.0	0.02	-	0
Rogers WB thru	A	0.0	0.03	-	0
Driveway SB left/right	A	8.8	0.02	-	1
Rogers Street at 195 Binney Entrance Driveway					
Rogers EB thru/right	A	0.0	0.02	-	0
Rogers WB left/thru	A	0.4	0.00	-	0
Potter Street at 285/303 Third Street Driveway	-	-	-	-	-
Potter EB left/thru/right	A	1.1	0.00	-	0
Potter WB left/thru/right	A	1.3	0.01	-	1
Private Driveway NB left/thru/right	A	8.7	0.00	-	0
Driveway SB left/thru/right	B	10.3	0.10	-	8

95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.
GRAY shading indicates a decrease in LOS from the Build scenario to the Future Build scenario.

Table 5.C.2 Future Build Conditions (2019), Capacity Analysis Summary, p.m. Peak Hour

Intersection/Approach	LOS	Delay (s)	V/C Ratio	50th Percentile Queue (ft)	95th Percentile Queue (ft)
Signalized Intersection					
Third Street at Binney Street	**D**	**46.3**	-	-	-
Binney EB left	E	57.6	0.91	198	#399
Binney EB thru|thru/right	B	15.8	0.35	76	125
Binney WB left	F	198.0	>1.00	~113	#250
Binney WB thru|thru/right	C	33.7	0.68	128	198
Third NB left/thru	C	34.7	0.70	154	246
Third NB right	C	28.1	0.44	61	114
Third SB left/thru/right	D	38.6	0.76	161	260
Unsignalized Intersection					
Third Street at Bent Street					
Bent EB left/thru/right	C	21.4	0.13	-	11
Parking Lot WB left/thru/right	D	26.8	0.06	-	5
Third NB left/thru/right	A	0.7	0.03	-	2
Third SB left/thru/right	A	0.2	0.01	-	0
Rogers Street at 195 Binney Exit Driveway					
Rogers EB thru	A	0.0	0.02	-	0
Rogers WB thru	A	0.0	0.02	-	0
Driveway SB left/right	A	8.7	0.02	-	1
Rogers Street at 195 Binney Entrance Driveway					
Rogers EB thru/right	A	0.0	0.02	-	0
Rogers WB left/thru	A	2.7	0.01	-	1
Potter Street at 285/303 Third Street Driveway					
Rogers EB left/thru/right	A	0.5	0.00	-	0
Rogers WB left/thru/right	A	0.9	0.01	-	0
Private Driveway NB left/thru/right	A	8.9	0.04	-	3
Driveway SB left/thru/right	B	10.2	0.05	-	4

95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.
~ Volume exceeds capacity, queue is theoretically infinite. Queue shown is maximum after two cycles.

All of the study area intersections continue to operate at the same or improved LOS from the Build 2014 conditions with the exception of one approach at the intersection of Third Street/Binney Street. During the morning peak hour at this intersection, the Third Street northbound left-turn/through approach will decrease from LOS B to LOS C as a result of a an increase in delay of less than one second.

Meanwhile, operations at the Binney Street westbound approach at the the intersection of Third Street/Binney Street are expected to improve during both peak hours due to the re-opening of the third approach lane following the completion of consturciton at Alexandirai.

Queue Analysis

HSH performed vehicle queue analysis during field observations on September 4, 2014 to verify the Synchro capacity analysis. **Table 6.A.1** and **Table 6.A.2** summarize the actual Existing, modeled Existing, modeled Build, and modeled Future queues. During the time of queue observations, construction was occurring on the north side of Binney Street from Third Street to First Street. As a result, the right-most westbound lane along Binney Street was closed. The construction activity reduced the westbound approach capacity to a left-turn lane with limited storage length and a through/right-turn lane. The Existing through Build conditions were modeled based on this lane reduction.

Table 6.A.1 Signalized Average Queue Analysis – a.m. Peak Hour

Intersection/Approach	Observed[1] Existing 2014 (ft)	Modeled Existing 2014 (ft)	Modeled Build 2014 (ft)	Modeled Future Build 2019 (ft)
Third Street at Binney Street				
Binney EB left	46	52	52	53
Binney EB thru|thru/right	50	49	50	71
Binney WB left	54	98	99	110
Binney WB thru/right	83	204	206	-
Binney WB thru|thru/right	-	-	-	130
Third NB left/thru	25	43	43	52
Third NB right	0	17	18	26
Third SB left/thru/right	246	203	206	228

1. Average queues observed assume one vehicle length equals 25 feet.

Table 6.A.2 Signalized Average Queue Analysis – p.m. Peak Hour

Intersection/Approach	Observed[1] Existing 2014 (ft)	Modeled Existing 2014 (ft)	Modeled Build 2014 (ft)	Modeled Future Build 2019 (ft)
Third Street at Binney Street				
Binney EB left	80	182	184	198
Binney EB thru|thru/right	65	64	65	76
Binney WB left	65	65	67	~113
Binney WB thru/right	110	133	135	-
Binney WB thru|thru/right	-	-	-	128
Third NB left/thru	310	137	139	154
Third NB right	80	45	46	61
Third SB left/thru/right	95	151	156	161

1. Average queues observed assume one vehicle length equals 25 feet.
~ Volume exceeds capacity, queue is theoretically infinite. Queue shown is maximum after two cycles.

Residential Street Volume Analysis

The peak hour volumes and percent increase on the study area roadways are presented in **Table 7.A.**

Table 7.A Vehicular Traffic on Study Area Roadways

Study Area Roadway	Existing Conditions 2014[1] (veh)	Build Conditions 2014			Future Build Conditions 2019 (veh)
		(veh)	Change in Volume	% Change	
a.m. Peak Hour					
Third Street (north of Charles Street)	555	554	-1	-0.2%	637
Binney Street (west of Third Street)	835	837	2	+0.2%	1042
p.m. Peak Hour					
Third Street (north of Charles Street)	798	800	2	+0.3%	877
Binney Street (west of Third Street)	975	982	7	+0.5%	1229

1. Peak Hour volumes summed from ATR counts on September 10, 2014

As shown in **Table 7.A**, the Project will have little impact on the adjacent street network, with volumes changing less than 1%. During the morning peak hour, it is anticipated that traffic volumes will decrease by one vehicle on Third Street north of Charles Street as a result of the relocation of vehicle trips from the existing 249 Third Street Lot to 195 Binney Street Garage. Due to the new position on the network, it is anticipated that some of these vehicles will in the future choose to use Fifth Street rather than Third Street to access points north and west – this is more consistent with the trip distribution illustrated in **Figure 3.E.1**.

Transit Analysis

Based on the transit mode shares presented in **Table 3.B.1**, the future transit trips associated with the Project were estimated and are summarized in **Table 9.A.1.**

Table 9.A.1 Project Transit Trips

Time Period	Direction	Transit Trips
Daily	In	130
	Out	130
	Total	**260**
a.m. Peak Hour	In	4
	Out	13
	Total	**17**
p.m. Peak Hour	In	17
	Out	10
	Total	**27**

As shown in **Table 9.A.1,** the Project is expected to generate approximately 260 new transit trips daily, with 17 new transit trips (4 alighting and 13 boarding) during the a.m. peak hour and 27 new trips (17 alighting and 10 boarding) during the p.m. peak hour.

Based on the 2005-2013 American Community Survey data for Census Tract 3523, approximately 82% of persons using transit for work/retail purposes use rail-based options and approximately 18% use the bus. Transit trips were assigned based on the 2010 journey-to-work census data for tract 3523[4]. Since the retail portion of the Project generates a relatively low number of transit trips, both the residential and retail-based transit trips were not distributed separately. The assignment of Project-generated transit trips to each of the main transit lines is shown on **Table 9.A.2**.

Table 9.A.2 Project Transit Trip Assignment

		a.m. Peak Hour			p.m. Peak Hour		
Line	Direction	In	Out	Total	In	Out	Total
Red Line (Kendall)	*Inbound*	2	5	**7**	7	4	**11**
	Outbound	1	5	**6**	6	4	**10**
	Both Directions	3	10	**13**	13	8	**21**
Green Line (Lechmere)	*Inbound*	-	1	**1**	-	1	**1**
	Outbound	0	-	**0**	1	-	**1**
	Both Directions	0	1	**1**	1	1	**2**
Buses (all)	*All Directions*	**1**	**2**	**3**	**3**	**2**	**5**

All residents and retail customers/employees using the Red Line are assumed to board or exit the transit system at Kendall/MIT Station. With approximately 13 trains per peak hour per direction, the Project is adding an average of less than one rider per Red Line train during both the a.m. and p.m. peak hours, which should be easily accommodated. The increases in peak hour ridership along the inbound and outbound segments before and after Kendall/MIT Station are presented in **Table 9.B.1**.

All residents and retail customers/employees using the Green Line are assumed to board or exit the transit system at Lechmere Station. With a peak hour headway of 6 minutes, equivalent to 10 trains per peak hour per direction, the Green Line should not be affected by the addition of Project-generated transit trips with just one additional trip during the a.m. peak hour and two additional trips during the p.m. peak hour.

Eight MBTA bus routes plus the EZ-Ride bus service provided by the Charles River Transportation Management Association serve the Project site. With just three additional bus trips in the a.m. peak hour and five additional trips in the p.m. peak hour, the number of Project-generated bus riders is not high enough to distribute to all the bus routes. Therefore, the addition of Project-generated bus trips is not expected to result in a noticeable impact to any of the bus routes.

4. 2006-2010 Journey to Work data by workplace, Census Bureau

Table 9.B.1 Red Line Capacity Analysis

			a.m. Peak Hour					p.m. Peak Hour				
Segment	Frequency* (trains/ hour)	Capacity (riders/ hour)	Existing Ridership ^	Existing V/C	Project Trips	Build Ridership	Build V/C	Existing Ridership ^	Existing V/C	Project Trips	Build Ridership	Build V/C
Inbound												
Entering Kendall	13	13,026	9,000	0.69	2	9,002	0.69	4,094	0.31	7	4,101	**0.31**
Exiting Kendall	13	13,026	8,677	0.67	5	8,682	0.67	5,822	0.45	4	5,825	**0.45**
Outbound												
Entering Kendall	13	13,026	4,808	0.37	1	4,810	0.37	6,417	0.49	6	6,423	**0.49**
Exiting Kendall	**13**	**13,026**	**3,199**	**0.25**	**5**	**3,204**	**0.25**	**7,102**	**0.55**	**4**	**7,106**	**0.55**

*MBTA.com, December 2014
^ From MBTA Red Line Passenger Flows and Capacity by Hour (FY2012)

Pedestrian Analysis

Pedestrian level of service is determined through analysis of crosswalk geometry, signal timing, and pedestrian volumes. The methodology for determining the pedestrian LOS analysis is based on the TRB's HCM 2000 methodologies, as previously described. Based on HCM 2000 methodologies, the level of service for a signalized intersection is determined based on the effective green time dedicated to a pedestrian crossing and the dimensions of the crosswalk they are crossing. At unsignalized intersections, the LOS is based on the average delay per pedestrian as a result of conflicting vehicular turning movements and critical gap time.

LOS A defines the most favorable condition, with minimal delay to cross the intersection, while LOS F represents the worst condition, with significant delay to a pedestrian. LOS D is generally considered acceptable for the urban nature of the Project study area.

Turning movement counts were performed on September 4, 2014 at Third Street/Binney Street and at Third Street/Bent Street. The pedestrian volumes were shown in Figure 2.C.1 in the Existing Conditions section of the report. Pedestrian level of service analysis was analyzed at the two intersections use the HCM 2000 methodologies, similar to that described in the Methodology section. The morning and evening intersection pedestrian LOS is shown in **Table 10.A.1** for Existing 2014, Build 2014, and Future Build 2019 conditions.

Table 10.A.1 Pedestrian Level of Service Summary

Intersection/ Crosswalk Approach	a.m. Peak Hour			p.m. Peak Hour		
	Existing 2014 (peds)	Build 2014 (peds)	Future 2019 (peds)	Existing 2014 (peds)	Build 2014 (peds)	Future 2019 (peds)
Signalized Intersection						
Third Street/ Binney Street						
Binney East	D	D	D	D	D	D
Binney West	D	D	D	D	D	D
Third North	C	C	C	C	C	C
Third South	C	C	C	C	C	C
Unsignalized Intersection						
Third Street/ Bent Street						
Bent East	A	A	A	A	A	A
Bent West	A	A	A	A	A	A
Third North	D	D	D	E	F	F
Third South	C	C	D	F	F	F

Note: GRAY shading in Existing 2014 Conditions indicates LOS E or LOS F. GRAY shading in Future 2019 Conditions indicates a worsening LOS from Build 2014 Conditions.

The Third Street/Binney Street signalized intersection operates at a LOS D or better at all crossings during all study analysis periods.

At the Third Street/Bent Street unsignalized intersection, during the p.m. peak hour, the Third Street North crossing currently operates at a pedestrian LOS E, and the Third Street South crossing operates at a pedestrian LOS F. During the morning peak hour, the Third Street South crossing worsens from a pedestrian LOS C to pedestrian LOS D from the Build 2014 condition to the Future Build 2019 condition. During the evening peak hour, the Third Street North crossing worsens from a pedestrian LOS E to pedestrian LOS F from the Existing 2014 condition to the Build 2019 condition.

Pedestrian operations at Third Street/Bent Street are conservative based on HCM 2000 analysis. HSH observed that pedestrians generally experience no delay to cross Third Street. In addition, the Third Street north crosswalk across the southbound approach is a raised crossing which slows vehicles down to allow pedestrians to cross safely.

Full pedestrian level-of-service analysis worksheets for both intersections at each time period and condition are included in **Appendix F**.

Pedestrian conditions in the study area are generally in good condition, with sidewalks provided along all roadways and crosswalks at all intersections. The north side of Rogers Street currently does not have a sidewalk, but the Project is proposing a new sidewalk.

Based on the walk mode shares presented in Table 3.B.1, the future walk trips were estimated and are summarized in **Table 10.A.2**.

Table 10.A.2 Project Pedestrian Trips

Time Period	Direction	Pedestrian Trips
Daily	In	126
	Out	126
	Total	**252**
a.m. Peak Hour	In	4
	Out	12
	Total	**16**
p.m. Peak Hour	In	16
	Out	10
	Total	**26**

As shown in Table 10.A, the Project is expected to generate approximately 16 new pedestrian trips during the a.m. peak hour and approximately 26 new pedestrian trips during the p.m. peak hour. Approximately 252 new pedestrian trips will occur daily, with an additional 260 new transit trips that will require a walk to or from the site, resulting in a total of 512 new pedestrian trips per day.

Bicycle Analysis

Based on the bicycle mode shares presented in Table 3.B.1, the future bicycle trips were estimated and are summarized in **Table 11.A**.

Table 11.A Project Bicycle Trips

Time Period	Direction	Bicycle Trips
Daily	In	29
	Out	29
	Total	**58**
a.m. Peak Hour	In	1
	Out	3
	Total	**4**
p.m. Peak Hour	In	3
	Out	2
	Total	**5**

As shown in Table 11.A, the Project is expected to generate approximately 58 new bicycle trips daily, with approximately 4 new bicycle trips during the a.m. peak hour and approximately 5 new bicycle trips during the p.m. peak hour. The Project will provide covered bicycle parking spaces at ratio of one per unit inside the building with access via the pedestrian courtyard. Additional bicycle parking will be provided on-site for residents and visitors.

Transportation Demand Management

TDM measures encourage travelers to use alternatives to driving, especially during peak periods and will be facilitated by the transit oriented nature of the Project and its convenient proximity to a wide range of non-auto alternatives. The Proponent will emphasize the site's convenient transit and pedestrian access in marketing the Project to future residents and tenants.

TDM measures for the Project may include but are not limited to the following:

- Orientation Packets: The Proponent will provide orientation packets to new residents and tenants containing information on available transportation choices, including transit routes/schedules and nearby ZipCar locations. On-site management will work with residents and tenants as they move in to help facilitate transportation for new arrivals.
- Electric Vehicle Charging: The Proponent will explore the feasibility of providing electric vehicle charging stations within the garage for the Phase III office use.
- Shared-car Services: the Proponent will explore the feasibility of providing a shared car service (e.g., ZipCar) on-site to help reduce the need for residents to own a vehicle.
- Transportation Coordinator: The Proponent will designate a transportation coordinator to oversee transportation issues including parking, service and loading, and deliveries and will work with residents as they move in to raise awareness of public transportation, bicycling, and walking opportunities.
- Project Web Site: The web site will include transportation-related information for residents, workers, and visitors.

The Proponent will work with the City of Cambridge to determine an appropriate TDM .