50 Cambridgepark Drive Development

Cambridge, Massachusetts

PREPARED FOR

Hanover RS Limited Partnership
c/o The Hanover Company
2 Seaport Lane, 11th Floor
Boston, MA 02210

PREPARED BY

99 High Street
Boston, MA 02110
617.728.7777

May 29, 2018

UNDER THE DIRECTION OF

Ryan White, P.E.
Massachusetts Registration No. 52666

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Introduction & Project Overview

On behalf of Hanover RS Limited Partnership (the Owner), VHB, Inc. has conducted a Transportation Impact Study (TIS) for the proposed 50 Cambridgepark Drive residential development (the Project Site) for up to 299 residential units and approximately 7,000 square feet of ground floor retail/restaurant space. The Project will be supported by an internal parking structure with approximately 187 vehicle parking spaces and approximately 315 long-term interior bicycle spaces along with 37 exterior short-term bicycle parking spaces (the Proposed Project).

The TIS responds to the scope dated March 2, 2018 defined by the City of Cambridge Traffic, Parking and Transportation (TP&T) Department in response to VHB's Request for Scoping dated January 25, 2018. Copies of the City's scoping letter and VHB's Request for Scoping are included in the Appendix. The TIS has been prepared in conformance with the current City of Cambridge Guidelines for Transportation Impact Studies, as required under the Article 19 Special Permit Project Review. This document is comprised of three sections, as follows:

- Introduction and Project Overview – describing the framework in which the transportation component of the Project was evaluated;
- Transportation Impact Study (TIS) – presenting the technical information and analysis results as required under the guidelines; and,
- Planning Board Special Permit Criteria – summarizing the evaluation of the proposed Project as defined under the guidelines.

The required TIS Summary Sheets and Planning Board Criteria Performance Summary are included. Supplementary data and analysis worksheets are provided on an accompanying CD. Electronic files for Automatic Traffic Recorder (ATR) counts, Turning Movement Counts (TMC), and Synchro analyses are included on an accompanying CD.

Project Overview

The Proposed Project will consider the development of up to 299 residential units and approximately 7,000 square feet of ground floor retail/restaurant that will be supported by approximately 187 new parking spaces contained within the building, as well as approximately 315 long term bicycle parking spaces and 38 short term bicycle parking spaces, in accordance with the City's Bicycle Parking Guidelines.

The following figures illustrate details of the Proposed Project program.

- **Figure A** presents a regional context site location map.

- **Figure B** presents a neighborhood context site location map.
- **Figure C** presents the existing conditions of the proposed site.
- **Figure D** presents the proposed site plan.
- **Figure E** presents the TIS study area.
- **Figure F.1 – F.2** present the proposed on-site parking layout
- **Figure G.1 – G.3** present the proposed bicycle parking layout

As shown in Figures A and B, the Project consists of an approximately 79,325 square foot site on Cambridgepark Drive in Cambridge, Massachusetts. This site will contain a new residential building with street level retail/restaurant use and parking.

The Proposed Project consists of up to 299 residential units within a single, eight-story building. The Proposed Project will include affordable units per City of Cambridge requirements and will also have common lobby and amenity spaces for its residents on the first two floors. The ground floor will also house main MEP rooms, meters, bike parking, trash, loading dock and similar back of house spaces, but there will also be additional mechanical allocation at the roof of the buildings and MEP closets on each floor. Above the first level, the units will generally stack vertically, but it is expected that there may be some unique units in places that may take advantage of the views, corners or the façade composition. The vehicular parking is located within the building on the first and second floors.

As shown in Figure C, the site currently contains three office/research buildings totaling approximately 39,000 square feet that will be demolished as part of the project. The surface parking lot currently supporting the office building will also be demolished.

TABLE A EXISTING SITE CONDITIONS AND USES

Existing Building	Size / Quantity
Square Footage	39,000 SF
Land Use	Office/Research
# of Parking Spaces	68 spaces[1]

[1]Source: City's 1990 parking inventory

Figure D presents the proposed 50 Cambridgepark Drive Development site plan. As noted above, the site will include up to 299 residential units and 7,000 square feet of retail/restaurant space. As part of the Project, the current 100 Cambridgepark Drive driveway will be reconstructed and serve as a shared driveway for the 50 Cambridgepark Drive Development as well as 88 Cambridgepark Drive, 100 Cambridgepark Drive and 130 Cambridgepark Drive. The shared driveway will provide sidewalks, streetscape and on-street parking.

It is currently envisioned that 187 parking spaces will be provided for residential parking. In addition, 9 on-street spaces will be provided along the building frontage of the new shared driveway.

The Proposed Project program is summarized in Table B below.

TABLE B PROPOSED DEVELOPMENT PROGRAM

Project Component	Size / Quantity
Residential	299 units (309,000 GSF)
Retail/Restaurant	7,000 square feet
Vehicle Parking	187 spaces within the building (0.63 spaces/unit); 9 spaces along driveway for short-term use
Bicycle Parking	315 long term spaces, and 38 short-term spaces

TIS Study Area

The TIS study area for the Proposed Project, as defined by the City of Cambridge, is shown in Figure E. The study intersections include the following:

1. Cambridgepark Drive/100 Cambridgepark Drive Driveway
2. Cambridgepark Drive/Site West (outbound) Driveway
3. Cambridgepark Drive/Site East (inbound) Driveway
4. Cambridgepark Drive/Steel Place (signalized)
5. Cambridgepark Drive/Alewife Brook Parkway (signalized)
6. Alewife Brook Parkway/Rindge Avenue (signalized)
7. Steel Place/Alewife Station Access Road (Route 2 Connector)
8. Fresh Pond Rotary
9. Alewife Brook Parkway at Route 2/16 (signalized)

Planning Board Criteria Summary

Based on the TIS analysis, the Project has been evaluated within the context of the Planning Board Criteria to determine if the Project has any potential adverse transportation impacts. Exceeding one or more of the Criteria is indicative of a potentially adverse impact on the City's transportation network. However, the Planning Board will consider mitigation efforts, their anticipated effectiveness, and other information that identifies a reduction in adverse transportation impacts.

The Planning Board Criteria consider the Project's vehicular trip generation, impact to intersection level of service and queuing, as well as increase of volume on residential streets. In addition, pedestrian and bicycle conditions are considered. A discussion of the Criteria set forth by the Planning Board is presented in the final section of the TIS, and the Planning Board Criteria Performance Summary is presented below.

The Project has an estimated 14 exceedances out of 143 data entries. All exceedances are due to existing pedestrian crossing and infrastructure conditions.

CITY OF CAMBRIDGE
Special Permit – Transportation Impact Study (TIS)
Planning Board Criteria Performance Summary
50 Cambridgepark Drive Development Planning Board Permit Number: _____TBD_____

PROJECT

Project Name:	50 Cambridgepark Drive Development
Project Address:	50 Cambridgepark Drive Cambridge, MA 02138
Owner/Developer Name:	Hanover RS Limited Partnership
Contact Person:	David S. Hall
Contact Address:	c/o The Hanover Company 2 Seaport Lane, 11th Floor Boston, MA 02210 dhall@hanoverco.com
Contact Phone Number:	(857) 400-0681

SIZE

ITE sq. ft. :	309,000 GSF – 299 residential units
Land Use Type:	Residential
ITE sq. ft. :	7,000 SF
Land Use Type:	Retail/Restaurant

PARKING

Existing Parking Spaces:	68	Use: Office/Research
New Parking Spaces:	187	Use: Residential
Net New Parking Spaces:	+119	

TRIP GENERATION*:

	Daily	Morning Peak Hour	Evening Peak Hour
Total Trips	2,343		
SOV	578	61	63
HOV	24	2	2
Transit	926	101	105
Bike	122	13	13
Walk	634	57	54
Other	116	12	13

* *Does not include trips eliminated by elimination of existing site use*

MODE SPLIT (Person Trips)

	Residential	Retail/Restaurant
SOV	28%	18%
HOV	2%	2%
Transit	51%	20%
Bike	5%	5%
Walk	8%	52%
Other	6%	3%

TRANSPORTATION CONSULTANT

Company Name:	VHB
Contact Name:	R. David Black
Contact Phone Number:	617-607-2906

Date of Building Permit Approval: _____

CITY OF CAMBRIDGE
Special Permit – Transportation Impact Study (TIS)
Planning Board Criteria Performance Summary
50 Cambridgepark Drive Development Planning Board Permit Number: _____TBD_____

Planning Board Criteria

Total Data Entries = 143 **Total Number of Criteria Exceedances = 14**

Criteria A –Project Vehicle Trip Generation

Time Period	Criteria (trips)	Build*	Exceeds Criteria?
Weekday Daily	2,000	602	No
Weekday Moring Peak Hour	240	63	No
Weekday Evening Peak Hour	240	65	No

** Does not include trips eliminated by elimination of existing site use*

Criteria B – Vehicular LOS

	Morning Peak Hour				Evening Peak Hour			
Intersection	Existing Condition	Build Condition	Traffic Increase	Exceeds Criterion?	Existing Condition	Build Condition	Traffic Increase	Exceeds Criterion?
Cambridgepark Drive/100 Cambridgepark Drive Driveway	C	C	9%	No	B	B	11%	No
Cambridgepark Drive/Site West (outbound) Driveway	A	-	9%	No	B	-	9%	No
Cambridgepark Drive/Site East (inbound) Driveway	A	-	6%	No	A	-	9%	No
Cambridgepark Drive/Steel Place	C	C	4%	No	C	C	3%	No
Cambridgepark Drive/Alewife Brook Parkway	E	E	1%	No	F	F	1%	No
Alewife Brook Parkway/Rindge Avenue	F	F	1%	No	F	F	1%	No
Steel Place/Alewife Station Access Road (Route 2 Connector)	F	F	0%	No	F	F	0%	No
Fresh Pond Rotary	F	F	1%	No	F	F	1%	No
Alewife Brook Parkway at Route 2/16 – Signal A	B	B	0%	No	B	B	0%	No
Alewife Brook Parkway at Route 2/16 – Signal B	E	E	0%	No	F	F	0%	No
Alewife Brook Parkway at Route 2/16 – Signal C	C	C	3%	No	B	B	0%	No
Alewife Brook Parkway at Route 2/16 – Signal D	B	B	0%	No	A	A	1%	No

Criteria C – Traffic on Residential Streets

Roadway	Segment	Amount of Residential	Morning Peak Hour			Evening Peak Hour		
			Existing[1]	Increase[2]	Exceeds Criteria?	Existing[1]	Increase[2]	Exceeds Criteria?
Cambridgepark Drive	west of 100 Cambridgepark Dr	> 1/3 but <1/2	621	0	No	425	0	No
	between 100 Cambridgepark Dr and Site West Driveway	1/3 or less	736	63	No	574	65	No
	between Site West Driveway and Site East Driveway	1/3 or less	736	63	No	588	51	No
	between Site East Driveway and Steel Pl	1/3 or less	754	45	No	587	50	No
	between Steel Pl and Alewife Brook Parkway	1/3 or less	979	42	No	1261	46	No
Steel Place	between Cambridgepark Dr and Alewife Station Access Rd	1/3 or less	727	3	No	799	2	No
	north of Alewife Station Access Rd	1/3 or less	1099	-7	No	922	2	No
Rindge Avenue	west of Cambridgepark Dr	1/2 or more	948	1	No	813	6	No
Concord Avenue	west of Fresh Pond Rotary	1/3 or less	1765	13	No	1325	14	No
	east of Fresh Pond Rotary	1/3 or less	3550	18	No	3010	19	No
Alewife Brook Parkway	between Fresh Pond Rotary and Rindge Ave	1/3 or less	3200	31	No	3091	33	No
	between Rindge Ave and Cambridgepark Dr	1/3 or less	3738	32	No	3503	39	No
	Between Cambridgepark Dr and Route 2/16 Interchange	1/3 or less	3411	10	No	3180	7	No
	north of Route 2/16 Interchange	1/3 or less	2344	12	No	2578	12	No
Route 2	west of Route 2/16 Interchange	1/3 or less	4251	8	No	4558	-5	No
Alewife Station Access Road	between Route 2/16 Interchange and Steel Place	1/3 or less	285	10	No	801	0	No

1 Where driveways/on-street parking created a segment inflow/outflow volume imbalance, an average was calculated per direction and added

2 Net new project trips after trip credits are applied

Criteria D – Lane Queue (for signalized intersections)

Intersection	Lane	Morning Peak Hour 2018 Existing	Morning Peak Hour 2018 Build	Morning Peak Hour Exceeds Criteria?	Evening Peak Hour 2018 Existing	Evening Peak Hour 2018 Build	Evening Peak Hour Exceeds Criteria?
Cambridgepark Drive/Steel Place	Steel Place NB L/T/R	1	1	No	1	1	No
	Steel Place SB L	4	4	No	7	7	No
	Steel Place SB L/T/R	1	1	No	7	7	No
	Cambridgepark Drive EB L/T/R	4	5	No	8	8	No
	Cambridgepark Drive WB L/T	10	11	No	4	5	No
	Cambridgepark Drive WB R	0	0	No	0	0	No
Cambridgepark Drive/Alewife Brook Parkway	Alewife Brook Parkway NB L	4*	5*	No	4*	4*	No
	Alewife Brook Parkway NB T	5*	5*	No	6*	6*	No
	Alewife Brook Parkway SB T	~39	~39	No	~23	~29	No
	Cambridgepark Drive EB	3	3	No	8*	9*	No
Alewife Brook Parkway/Rindge Avenue	Alewife Brook Parkway NB	63*	63*	No	91*	91*	No
	Alewife Brook Parkway SB	7*	4*	No	7*	7*	No
	Rindge Avenue WB L	7	7	No	7*	7*	No
	Rindge Avenue WB R	~18	~19	No	27*	27*	No
Alewife Brook Parkway at Route 2/16	Alewife Brook Parkway NB L	~25	~26	No	~24	~24	No
	Alewife Brook Parkway NB T	4	4	No	3	3	No
	Alewife Brook Parkway SB T	7	7	No	4	4	No
	Alewife Brook Parkway SB R	17	17	No	15	15	No
	Route 2 EB L	~11	~11	No	~11	~11	No
	Route 2 EB R	9	9	No	6	6	No
	Alewife Station Exit Ramp WB T	3	2	No	7	7	No
	Alewife Station Exit Ramp WB R	1	1	No	3	3	No

Note: Synchro provides queue data in feet, the table presents queue data in number of vehicles. As directed by the TIS guidelines 1 vehicle = 25 ft

~ Volume exceeds capacity; queue is theoretically infinite

* SimTraffic results presented instead of Synchro results

Criteria E – Pedestrian Delay

Intersection	Crosswalk	Morning Peak Hour Existing	Morning Peak Hour Build	Morning Peak Hour Exceeds Criteria?	Evening Peak Hour Existing	Evening Peak Hour Build	Evening Peak Hour Exceeds Criteria?
Cambridgepark Drive/Steel Place	East	D	D	No	E	E	Yes
	West	D	D	No	E	E	Yes
	North	D	D	No	E	E	Yes

Intersection	Crosswalk	Morning Peak Hour			Evening Peak Hour		
		Existing	Build	Exceeds Criteria?	Existing	Build	Exceeds Criteria?
	South	D	D	No	E	E	Yes
Cambridgepark Drive/Alewife Brook Parkway	No pedestrian facilities provided						
Alewife Brook Parkway/Rindge Avenue	East	E	E	Yes	E	E	Yes
	South	E	E	Yes	E	E	Yes
Alewife Brook Parkway at Route 2/16	East	E	E	Yes	E	E	Yes
Cambridgepark Drive/100 Cambridgepark Drive Driveway	South	A	B	Yes	B	B	No
Cambridgepark Drive/Site West (outbound) Driveway	South	A	*	*	A	*	*
Cambridgepark Drive/Site East (inbound) Driveway	West	F	*	*	E	*	*
	South	A	*	*	A	*	*
Steel Place/Alewife Station Access Road (Route 2 Connector)	East	B	B	No	E	E	Yes
	West	A	A	No	A	A	No
	North	F	F	Yes	E	E	Yes

** Driveway eliminated by Project*

Criteria E – Pedestrian and Bicycle Facilities

Adjacent Street	Link (between)	Sidewalk or Walkway Present	Exceeds Criteria?	Bicycle Facilities or Right of Ways Present	Exceeds Criteria?
Cambridgepark Drive	Site Driveway	Yes	No	Yes	No

Transportation Impact Study

This Transportation Impact Study for the proposed 50 Cambridgepark Drive Development (the Project) describes existing and future transportation conditions in the study area in accordance with the City of Cambridge Sixth Revision (November 28, 2011) of the Transportation Impact Study Guidelines. The study area for the TIS includes 4 signalized intersections and 5 unsignalized intersections as shown in Figure E above.

This section includes inventories of physical and operational conditions in the study area including roadways, intersections, crosswalks, sidewalks, on-street and off-street parking, transit facilities, and land uses in the study area. Transportation data that were collected and compiled are presented, including automatic traffic recorder counts, intersection turning movement counts, pedestrian and bicycle counts, vehicle crash data, and transit service data.

1 Inventory of Existing Conditions

1.a Roadways

The Project Site is located on Cambridgepark Drive, in an area referred to as the "Triangle" in North Cambridge. Cambridgepark Drive intersects Steel Place and Alewife Brook Parkway at a location east of the Project Site. Figure B, presented above, shows the roadway layout near the Project Site on Cambridgepark Drive.

1.b Intersections

The project study area included the following twelve study intersections which were presented above in Figure E and illustrated in Figures 1.b.1 through 1.b.7.

1. Cambridgepark Drive/100 Cambridgepark Drive Driveway
2. Cambridgepark Drive/Site West (outbound) Driveway
3. Cambridgepark Drive/Site East (inbound) Driveway
4. Cambridgepark Drive/Steel Place (signalized)
5. Cambridgepark Drive/Alewife Brook Parkway (signalized)
6. Alewife Brook Parkway/Rindge Avenue (signalized)
7. Steel Place/Alewife Station Access Road (Route 2 Connector)
8. Fresh Pond Rotary
9. Alewife Brook Parkway at Route 2/16 (signalized)

The Alewife Brook Parkway at Route 2/16 intersection is complex, and is controlled by four (4) separate, but coordinated, traffic signals, all of which are evaluated.

1.c Parking

On-Site Parking

According to the City's 1990 parking inventory, 50/54 Cambridgepark Drive was reported as having 68 employee parking spaces, although 79 spaces are shown on the ALTA survey plan. The existing office building and all supporting parking spaces will be demolished as part of this project.

Off-Site Parking

On-street parking is not available on study area streets, except for about 30 two-hour/loading spaces along the north side of Cambridgepark Drive. The majority of off-site parking in the area is accommodated in private lots or the MBTA garage. The MBTA Alewife Station parking garage, which provides approximately 2,733 parking spaces, is regularly full on most weekdays before 10 AM.

1.d Transit Services

Public Transit Services

Figure 1.d.1 illustrates existing Massachusetts Bay Transportation Authority (MBTA) services in the study area. The site is located within an eighth of a mile of Alewife Station, the terminal for Red Line and several MBTA Bus routes.

Buses terminating at Alewife Station include MBTA routes 62, 67, 76, 79, 84, 350 and 351. The passenger pickup and drop-off areas inside the MBTA parking structure provide shelter and scheduling information for all the buses. These routes provide access to and from the west along the Route 2 corridor. Only routes 62, 76 and 350 operate during the weekends and most routes run on 20 to 30-minute headways during the weekday peak hours. Routes 62, 76 and 351 provide service through Lexington towards Hanscom and Bedford. Routes 67, 79 and 84 provide service into Arlington while Route 350 provides service to Burlington.

The Red Line subway line runs on 4.5-minute headways during peak hours, with southbound trains destined for both Braintree and Ashmont. The Red Line connects with the Green Line at Park Street and the Orange Line at Downtown Crossing. Connections to all southern branch commuter rail lines and the Silver Line are made at South Station. In addition, a connection with the Fitchburg commuter rail line with a terminus at North Station is available at Porter Square station. Commuter parking spaces are available at Alewife at a rate of $7.00 per day. Bicycle parking is also available with approximately 174 spaces in the garage.

Zipcar vehicles are available inside the garage at Alewife Garage, while one others are available on Cambridgepark Drive. Additional Zipcar spaces are expected to become available as and when certain already permitted residential projects on Cambridgepark Drive are constructed.

Private Transit Services

There are several Transportation Management Associations (TMAs) that operate private shuttle services from Alewife Station. These TMAs are non-profit organizations that provide alternative transportation to various commercial areas for member organization employees/residents. The Alewife TMA provides shuttle service via a single route to/from the nearby quadrangle neighborhood. The 128 Business Council provides nine shuttle routes, mainly serving destinations in Waltham and Lexington. The Middlesex 3 TMA provides two shuttle routes traveling to/from Bedford and Billerica. The routes are shown in Figure 1.d.2.

Additionally, Hubway and Zipcar are available in the surrounding area as shown in Figure 1.d.3.

1.e Land Use

Figure 1.e.1 illustrates land uses in the Cambridgepark Drive area surrounding the site, which also shows the existing uses on the Project Site. The area is largely characterized by commercial, R&D and office land use, and the presence of the Alewife MBTA terminal. In addition, there are residential developments (existing, under construction or approved) at 30, 130, 165, and 160 Cambridgepark Drive, and restaurant land uses within the MBTA station structure.

2 Data Collection

2.a ATR Counts

48-hour Automatic Traffic Recorder (ATR) counts were conducted on Wednesday, November 15th and Thursday, November 16th, 2017, to capture existing daily vehicle volumes within the Project study area. ATR counts were collected at the following locations (presented in Figure E), as requested in the TP&T Scoping Letter:

- Cambridgepark Drive, west of Steel Place
- Cambridgepark Drive, between Steel Place and Alewife Brook Parkway
- Steel Place, north of Cambridgepark Drive
- Alewife Brook Parkway, north of Cambridgepark Drive

Traffic volume summaries for these ATR locations are presented in Tables 2.a.1 and 2.a.2 as well as graphically in Figures 2.a.1 - 2.a.8. These data, representing the averages of data collected over two weekdays, illustrate the daily variations of traffic demands and the directional flow of traffic over the course of an average weekday. Electronic ATR data collection files are on the CD accompanying this document.

TABLE 2.A.1 EXISTING TRAFFIC VOLUME SUMMARY (NOVEMBER 2017)

Location	Daily[a]	Morning Peak Hour			Evening Peak Hour		
		Volume[b]	K[c]	Peak Dir	Volume	K	Peak Dir
Cambridgepark Drive *west of Steel Place*	5,278	554	10%	72% WB	420	8%	72% EB
Cambridgepark Drive *between Steel Place and Alewife Brook Parkway*	10,383	790	8%	64% WB	990	10%	81% EB
Steel Place *north of Cambridgepark Drive*	6,938	642	9%	83% NB	591	9%	86% NB
Alewife Brook Parkway *north of Cambridgepark Drive*	39,826	2,668	7%	50% NB	2,423	6%	51% NB

a vehicles per day
b vehicles per peak hour
c percentage of daily traffic that occurs during the peak hour

TABLE 2.A.2 EXISTING AVERAGE DAILY TRAFFIC SUMMARY (NOVEMBER 2017)

	Cambridgepark Drive *west of Steel Place*			Cambridgepark Drive *between Steel Place and Alewife Brook Parkway*			Steel Place *north of Cambridgepark Drive*			Alewife Brook Parkway *north of Cambridgepark Drive*		
Start Time	**EB**	**WB**	**Total**	**EB**	**WB**	**Total**	**NB**	**SB**	**Total**	**NB**	**SB**	**Total**
12:00 AM	16	19	35	24	31	65	21	10	31	244	106	350
1:00 AM	6	11	17	17	17	34	11	6	17	109	56	165
2:00 AM	3	5	8	9	8	17	7	5	12	66	41	107
3:00 AM	3	3	6	5	5	10	2	5	7	54	62	116
4:00 AM	7	12	19	11	14	25	7	4	11	82	211	293
5:00 AM	25	47	72	59	68	127	86	29	115	304	944	1,248
6:00 AM	68	137	205	399	138	537	496	78	574	742	1,149	1,891
7:00 AM	139	239	378	408	304	712	400	176	576	1,336	1,312	2,648
8:00 AM	163	347	510	354	429	783	321	223	544	1,236	1,244	2,480
9:00 AM	131	364	495	509	282	791	533	109	642	1,155	1,243	2,398
10:00 AM	109	195	304	330	171	501	328	63	391	1,083	1,253	2,336
11:00 AM	144	131	275	289	161	450	193	71	264	1,136	1,260	2,396
12:00 PM	139	123	262	273	167	440	142	45	187	1,130	1,145	2,275
1:00 PM	131	126	257	275	154	429	151	61	212	1,184	1,062	2,246
2:00 PM	148	103	251	330	147	477	196	98	294	1,245	1,178	2,423
3:00 PM	192	95	287	497	139	636	366	91	457	1,258	1,104	2,362
4:00 PM	297	97	394	746	146	892	473	98	571	1,271	910	2,181
5:00 PM	280	133	413	801	189	990	511	80	591	1,297	922	2,216
6:00 PM	234	118	352	607	184	791	454	90	544	1,238	965	2,203
7:00 PM	159	116	275	425	178	603	268	88	356	1,217	935	2,152
8:00 PM	97	82	179	237	148	385	125	69	194	991	667	1,658
9:00 PM	56	81	137	183	143	326	107	58	165	1,005	585	1,590
10:00 PM	40	47	87	121	91	212	61	49	110	799	410	1,209
11:00 PM	32	40	72	71	65	136	43	30	73	647	243	890
Total	**2,619**	**2,671**	**5,290**	**6,990**	**3,379**	**10,369**	**5,302**	**1,636**	**6,938**	**20,829**	**19,007**	**39,836**

2.b Pedestrian and Bicycle Counts

Twelve-hour pedestrian and bicycle counts were performed on Wednesday, November 15, 2018, between 7:00AM and 7:00PM along Cambridgepark Drive, near the Project site, Pedestrian and Bicycle count data is summarized in Table 2.b.1.

TABLE 2.B.1 EXISTING 12-HOUR PEDESTRIAN AND BICYCLE VOLUMES (NOVEMBER 2018)

	Pedestrian Volumes				Bicycle Volumes			
	North Sidewalk[1]		South Sidewalk		North Bike Lane[1]		South Sidewalk	
Start Time	EB	WB	EB	WB	EB	WB	EB	WB
7:00 AM	3	2	93	69	0	0	1	0
8:00 AM	0	0	124	140	0	2	5	0
9:00 AM	0	0	90	105	0	1	4	0
10:00 AM	0	0	66	90	0	1	1	0
11:00 AM	3	1	104	96	0	1	1	1
12:00 PM	7	4	118	81	0	1	0	0
1:00 PM	5	3	57	69	0	0	1	1
2:00 PM	3	5	42	42	0	0	2	0
3:00 PM	13	12	34	35	0	0	2	0
4:00 PM	66	49	58	46	0	2	2	1
5:00 PM	95	85	57	67	0	1	3	0
6:00 PM	93	122	50	57	0	1	1	0
Total	**288**	**283**	**893**	**897**	**0**	**10**	**23**	**3**

[1] Construction occurring on the north side of Cambridgepark Drive prohibits all users of the north sidewalk
-Pedestrians are instructed to travel in the temporary walkway provided (located on the existing bike lane)
-Bicycle travel was impacted by the temporary pedestrian walkway – bikes travelling on the north side are instructed to share the travel lane with vehicle

2.c Intersection Turning Movement Counts and Queues

Turning movement counts, including vehicles, pedestrians, and bicycles, were conducted at the following study area intersections on Wednesday, November 15, 2018:

1. Cambridgepark Drive/100 Cambridgepark Drive Driveway
2. Cambridgepark Drive/Site West (outbound) Driveway
3. Cambridgepark Drive/Site East (inbound) Driveway
4. Cambridgepark Drive/Steel Place
5. Cambridgepark Drive/Alewife Brook Parkway
6. Alewife Brook Parkway/Rindge Avenue
7. Steel Place/Alewife Station Access Road (Route 2 Connector)

The results of these counts indicated that the peak hours for vehicular traffic in the study area are:

- Morning Peak Hour, 8:00AM – 9:00AM
- Evening Peak Hour, 5:00PM – 6:00PM

As directed in the TIS scoping letter, 2016 TMC counts were used for the following study area intersections:

8. Fresh Pond Rotary (data collected October 5, 2016 from the 55 Wheeler Street TIS)

9. Alewife Brook Parkway at Route 2/16 (data collected September 14, 2016 from the Residences at Alewife Station TIS)

Comparison of the ATR counts collect in November 2017 at Alewife Brook Parkway, north of Cambridgepark Drive with daily traffic from other area TIS ATRs collected in 2016 showed no increase. Therefore existing 2016 TMC counts were used with no growth rate adjustments.

The existing morning and evening peak hour vehicle, pedestrian, and bicycle turning movement volumes are presented in Figures 2.c.1 through 2.c.4. The raw count data is included on the accompanying CD.

VHB staff also conducted queue observations during the morning and evening peak hours at the signalized intersections on Tuesday, February 27, 2018 and Thursday, March 1, 2018. Table 2.c.1 presents the existing queue observations for the signalized study area intersections. A detailed queue analysis is provided in Section 7 of this report.

As traffic counts and queue observations conducted on different days can vary, some calibration of data and the traffic model are needed to relect actual conditions. The turning movement counts conducted in November 2017 appeared to be low as compared to previous studies (35 and 180R Cambridgepark Drive). The November 2017 counts also modeled lower traffic queues than what was observed in the field on February 27th and March 1st. In an effort to accurately model existing traffic conditions on the study area roadways, and working closely with TP&T, adjustments were made to accurately reflect existing traffic patterns in the area.

TABLE 2.C.1 SIGNALIZED INTERSECTION QUEUE OBSERVATIONS (# OF CARS)

Intersection	Lane Group	# of observed cars Morning Peak Hour	# of observed cars Evening Peak Hour (Tuesday)*	# of observed cars Evening Peak Hour (Thursday)*
Cambridgepark Drive/Steel Place*	Steel Place NB L/T/R	1	0	1
	Steel Place SB L	3	7	23
	Steel Place SB L/T/R	3	8	21
	Cambridgepark Drive EB L/T/R	5	19	32
	Cambridgepark Drive WB L/T	4	2	3
	Cambridgepark Drive WB R	1	1	1
Cambridgepark Drive/Alewife Brook Parkway	Alewife Brook Parkway NB L	2	3	-
	Alewife Brook Parkway NB T	5	7	-
	Alewife Brook Parkway SB T	28	29	-
	Cambridgepark Drive EB L	2	7	-
Alewife Brook Parkway/Rindge Avenue	Alewife Brook Parkway NB T/R	46	85+	-
	Alewife Brook Parkway SB	4	7	-
	Rindge Avenue WB L	7	4	-
	Rindge Avenue WB R	23+	23+	-
Alewife Brook Parkway at Route 2/16	Alewife Brook Parkway NB L	16	20	-
	Alewife Brook Parkway NB T	2	3	-
	Alewife Brook Parkway SB T	10	12	-
	Alewife Brook Parkway SB R	17	20	-
	Route 2 EB L	31+	31+	-
	Route 2 EB R	37+	37+	-
	Alewife Station Exit Ramp WB T	4	15	-
	Alewife Station Exit Ramp WB R	1	2	-

Based on observations conducted by VHB on February 27 and March 1, 2018

* Per the TIS Scoping Letter, queue observations were conducted on two different days (Tuesday and Thursday) during the PM peak hour for the Cambridgepark Dr/Steel Pl intersection.

2.d Crash Analysis

Study area crash data was obtained from MassDOT's records for the most recent three-year period available (January 2013 through December 2015). Analysis of the crash data is summarized in Table 2.d.1 and includes the calculated crash rates (number of reported crashes per million entering vehicles) based on the evening peak traffic volumes. A detailed summary by crash type is included in the Appendix.

TABLE 2.D.1 MASSDOT CRASH ANALYSIS (JANUARY 2013 – DECEMBER 2015)

	Total Crashes (3-year period)	Crashes Involving Pedestrians	Crashes Involving Bicycles	Calculated Crash Rate [1]
Cambridgepark Drive/100 Cambridgepark Drive Cambridgepark Drive/Site West Driveway Cambridgepark Drive/Site East Driveway	4*	0	0	0.28
Cambridgepark Drive/Steel Place	3	0	0	0.18
Cambridgepark Drive at Alewife Brook Parkway	18	0	0	0.37
Alewife Brook Parkway/Rindge Avenue	31	3	0	0.60
Steel Place/Alewife Station Access Road	1	1	0	0.06
Fresh Pond Rotary	61	0	2	1.40
Alewife Brook Parkway at Route 2/16	61*	0	1	0.24

Source: MassDOT data

[1] Vehicle crash rate per million entering vehicles

* Number of crashes in the total intersection cluster – crash rate based on an average # of crashes in the cluster

MassDOT has 6 districts within Massachusetts, and Cambridge falls under the jurisdiction of District 6. The average crash rate per million entering vehicles for District 6 is 0.70 for signalized intersections and 0.53 for unsignalized intersections. Eight of the nine study area intersections fall under the District 6 average for signalized/unsignalized intersections. Only the Fresh Pond Rotary exceeds the MassDOT average crash rate based on vehicle crashes.

The Fresh Pond Rotary reported 61 crashes during the three-year period. The majority of the crashes were angle collisions or sideswipes in the same direction involving only property damage. Five occurred in wet conditions and 56 occurred in dry conditions. Two crashes involved bicyclists.

2.e Public Transit

Transit stops and stations closest to the site are shown in Figure 1.d.1 presented above. Daily weekday ridership as well as operating hours and peak-hour headway data are provided in Table 2.e.1 for bus routes accessible from the site and for the Red Line. A more detailed transit analysis is provided in Section 10 of this report.

TABLE 2.E.1 MBTA SERVICES

Route	Origin/Destination	Hours of Operation	Weekday Ridership[1]	Peak Hour Headways
Route 62	Bedford V.A. Hospital – Alewife Station	5:47AM – 9:04PM	1,345	~ 30 minutes
Route 67	Turkey Hill – Alewife Station	5:53AM – 8:32PM	668	~ 24-29 minutes
Route 76	Hanscom/Lincoln Lab – Alewife Station	6:00AM – 10:39PM	874	~ 25-36 minutes
Route 79	Arlington Heights – Alewife Station	6:35AM – 10:03PM	881	~ 20-30 minutes
Route 84	Arlmont Village – Alewife Station	6:42AM – 6:59PM	337	~ 17-38 minutes
Route 350	North Burlington – Alewife Station	6:04AM – 11:00PM	1,634	~ 20-30 minutes
Route 351	EMD Serono/Bedford Woods – Alewife Station	6:15AM – 9:30AM & 3:20PM – 7:01PM	173	~ 50-60 minutes
Red Line[2]	Alewife/Ashmont-Braintree Combined	5:05AM - 1:05AM	276,167	4.5 minutes

Sources: MBTA Schedule Winter 2018
[1] MBTA provided ridership data (Fall 2017 for buses; Fall 2016 Red line)
[2] Ashmont/Braintree Ridership Data is combined

2.f Parking

The existing office building on the Project Site is currently active (open for business) and is supported by approximately 68 parking spaces, per the City's 1990 parking inventory. Because the building and parking lot will be demolished as part of the Project, a parking utilization study was not conducted for the existing building.

3 Project Traffic

3.a Mode Share and Vehicle Occupancy Rate

In coordination with the City of Cambridge, Traffic, Parking and Transportation Department (TP&T), residential mode shares for the Project were developed from data based on 160 Cambridgepark Drive 2017 TDM monitoring report. Retail/restaurant mode shares are based on discussions with TP&T, along with the 2015 Alewife intercept study and the 160 Cambridgepark Drive 2017 TDM monitoring report. Table 3.a.1 presents the TP&T approved mode share rates for this analysis.

TABLE 3.A.1 MODE SHARE

Mode	Project Residential Use	Project Retail/ Restaurant Use
SOV	28%	18%
HOV	2%	2%
Transit	51%	20%
Bike	5%	5%
Walk	8%	52%
Other	6%	3%
Total	**100%**	**100%**

The Federal Highway Administration *2009 National Household Travel Survey Summary of Travel Trends* provided the national vehicle occupancy rates (VOR) of 1.13 for work trips which are used to convert Institute of Transportation Engineers (ITE) unadjusted vehicle trips to person trips. Two local VORs were used for the Project. The SOV VOR is 1.0 while the HOV VOR was calculated to be 2.08 based on data from the 2012-2016 American Community Survey (ACS) 5 Year Estimates for the census tract 3549, Middlesex County, MA.

3.b Trip Generation and Trip Credit for Existing Use on Site

In an effort to provide the most accurate trip generation estimates for the proposed project, each proposed land use (residential and retail/restaurant) was examined individually.

Per the City's scoping letter, instead of using the ITE *Trip Generation Manual* (9th Edition) rates for Apartments (LUC 220), the residential trip generation analysis is based on observed vehicle trip rates from the comparable and adjacent 130 Cambridgepark Drive residential building.

In coordination with the TP&T, a methodology for vehicle trip generation was developed using a combination of the trip rates from ITE for Apartments (LUC 220) adjusted for local mode split of 28% SOV and 2% HOV and observed 130 Cambridgepark Drive vehicle trips rates (from both the 130 and 140 Cambridgepark Drive garages).

Table 3.b.1 presents the TP&T approved trip rates for this analysis.

TABLE 3.B.1 VEHICLE TRIP RATES

	ITE Adjusted (LUC 220)	130 Cambridgepark Dr (February 2018)	**Rates Used for the Project**
Morning Peak Hour			
In	0.03	0.03	**0.03**
Out	0.13	0.13	**0.13**
+			
Evening Peak Hour			
In	0.13	0.12	**0.12**
Out	0.07	0.05	**0.05**

ITE *Trip Generation Manual* 9th Edition LUC 220 – Apartment

Rates for 130 Cambridgepark Drive based on Hanover Company data from February 2018 (based on occupied units)

For other travel modes (transit, walk, bike and other), the mode shares (28% SOV and 2% HOV) along with the VORs were applied to the vehicle trip rate to determine the total project person generation estimate. These persons trip were then distributed, per the mode shares, to each commuting option. Table 3.b.2, below, shows the residential project generated trips (before existing use credit) using the proposed trip rates shown in Table 3.B.1.

TABLE 3.B.2 PROJECT RESIDENTIAL USE GENERATED TRIPS (BEFORE EXISTING USE CREDIT)

	Vehicle Trips			Transit Trips			Bicycle Trips			Walk Trips		
	Daily	Morning Peak	Evening Peak	Daily	Morning Peak	Evening Peak	Daily	Morning Peak	Evening Peak	Daily	Morning Peak	Evening Peak
Entering	206	9	36	363	16	63	36	2	6	57	2	10
Exiting	206	39	14	363	68	26	36	7	3	57	11	4
Total	312	48	50	726	84	89	72	9	9	114	13	14

For the retail/restaurant use, many ITE *Trip Generation Manual* land use codes (LUC) were examined to determine which would be the best fit for the area. Per the City's scoping letter and after consideration of various Institute of Transportation Engineers (ITE) Trip Generation rates, it was decided that High-Turnover Restaurant (LUC 932) was the most appropriate as it best matches the size of the retail/restaurant space proposed for this project compared to other commercial trip generation rates.

Table 3.b.3 summarizes the retail/restaurant project generated trips (before existing use credit) by mode.

TABLE 3.B.3 PROJECT RETAIL/RESTAURANT USE GENERATED TRIPS (BEFORE EX. USE CREDIT)

	Vehicle Trips			Transit Trips			Bicycle Trips			Walk Trips		
	Daily	Morning Peak	Evening Peak	Daily	Morning Peak	Evening Peak	Daily	Morning Peak	Evening Peak	Daily	Morning Peak	Evening Peak
Entering	95	8	8	100	9	9	25	2	2	260	24	24
Exiting	95	7	6	100	8	6	25	2	2	260	20	16
Total	190	15	14	200	17	15	50	4	4	520	44	40

The total project trip generation estimate is a combination of the two land uses trip generation estimates presented in Tables 3.b.2 and 3.b.3. The resulting project trip generation by mode for the proposed project is summarized in Table 3.b.4.

TABLE 3.B.4 TOTAL PROJECT GENERATED TRIPS (BEFORE EXISTING USE CREDIT)

	Vehicle Trips			Transit Trips			Bicycle Trips			Walk Trips		
	Daily	Morning Peak	Evening Peak	Daily	Morning Peak	Evening Peak	Daily	Morning Peak	Evening Peak	Daily	Morning Peak	Evening Peak
Entering	301	17	44	463	25	72	61	4	8	317	26	34
Exiting	301	46	20	463	76	32	61	9	5	317	31	20
Total	602	63	64	926	101	104	122	13	13	634	57	54

As approved by TP&T, the analysis includes a vehicle trip generation credit for existing on-site uses. The existing approximately 39,000 square foot office buildings will be demolished as part of the project. Accordingly, vehicle trips associated with the existing buildings will be removed from the roadway network.

Counts conducted on November 15, 2017 at the existing site driveway were compared with estimates using ITE trip rates to determine the trip credit for eliminating the existing use on the site, as summarized in Table 3.b.5. ITE LUC 760 – Research and Development Center was used for the estimate. The ITE vehicle trip generation estimate was adjusted based on metrics from the 35 Cambridgepark Drive Transportation Study (61% auto mode share and VOR of 1.13).

TABLE 3.B.5 VEHICLE TRIP CREDIT

	ITE Adjusted (LUC 760)	Ex Driveway Counts (November 2017)
Morning Peak Hour		
In	29	18
Out	6	0
Evening Peak Hour		
In	6	3
Out	31	14

Source:
ITE Trip Generation Manual, 9th Edition LUC 760 – Research and Development Center
Existing driveway counts conducted on Nov. 15, 2017

As seen in Table 3.b.5, the driveway counts produce a lower vehicle trip estimate as compared to ITE. Therefore, it was determined that the vehicle trip credit should be based on actual driveway counts. Trip credits (i.e. trips to be removed from roadway network due to removal of office building form existing site) and net-new project trips are presented in Table 3.b.6.

TABLE 3.B.6 NET-NEW PROJECT GENERATED VEHICLE TRIPS

	Project Generated Trips (Table 3.B.4)	Existing Site Generated Trips	Net New Trips
Morning Peak Hour			
In	17	-18	-1
Out	46	0	46
Evening Peak Hour			
In	44	-3	41
Out	20	-14	6

3.c Trip Distribution and Assignment

Two vehicle distributions were used for this analysis. For project trips, work being done as part of the Envision Citywide Cambridge planning study was used as a basis to determine distribution of project vehicle trips onto the roadway network, as directed by the TP&T. Table 3.c.1 and Figure 3.c.1 summarize the project vehicle trip distribution.

TABLE 3.C.1 SUMMARY OF PROJECT VEHICLE TRIP DISTRIBUTION

		Distribution	
Trip Assignment	Direction	Inbound	Outbound
Route 2	To/From Northwest	10%	15%
Route 16	To/from Northeast	20%	28%
Route 16 (Fresh Pond Parkway)/ Concord Avenue	To/from South	35%	35%
Concord Avenue	To/From West	22%	22%
Rindge Avenue	To/From East	13%	0%

Source: Envision Citywide Cambridge Planning Study

As the existing site use (office/research use) is different from the proposed use, a separate distribution was used to remove the existing site trips from the roadway network before adding in the proposed project trips. This trip credit distribution is based on 35 Cambridgepark Drive Transportation Study from October 2016. Table 3.c.2 and Figure 3.c.2 summarize the existing site credit vehicle trip distribution.

TABLE 3.C.2 SUMMARY OF EXISTING SITE CREDIT VEHICLE TRIP DISTRIBUTION

		Distribution	
Trip Assignment	Direction	Inbound	Outbound
Route 2	To/From Northwest	52%	47%
Route 16	To/from Northeast	18%	24%
Route 16 (Fresh Pond Parkway)	To/from South	21%	25%
Concord Avenue	To/From West	4%	4%
Rindge Avenue	To/From East	5%	0%

Source: 35 Cambridgepark Drive Transportation Study, October 2016

Project vehicle trips and existing trip credits were assigned to the roadway network using the appropriate distribution and are presented in the Project Generated network figures. Because the site has an active existing use, both "Total" Project Generated Trips (only project vehicle trips) as well as "Net-New" Project Generated Trips (project vehicle trips minus existing trip credit), are presented graphically in Figures 3.c.3 through 3.c.6.

3.d Service and Loading

The proposed project is expected to generate a limited number of delivery trips over the course of a normal day. Typical deliveries will include mail and trash collection for the building as a whole. These types of deliveries will be directed to use the loading dock along the shared driveway. As this is a residential building, move-in/move-out activity will occur occasionally. Depending on the size of the vehicle, move-in/move-out activity can occur in the loading dock or within a dedicated loading area within the garage. Building management will actively schedule move-in/move-out activity with tenants to ensure multiple tenants are not moving at the same time. Proposed service and loading facilities are presented in Figure 3.d.1. and truck

turns for the loading dock are shown in Figure 3.d.2. The design of the sidewalk and streetscape will be carefully developed in coordination with TP&T to ensure adequate sight-lines at the sevice and garage curb-cuts.

Typically, residential trash will be picked up two times per week. Move-ins are expected to be more frequent in the first 12 months of building occupancy, and taper off after that time period.

4 Background Traffic

In accordance with the City's Scoping Letter and TIS Guidelines, a general background traffic growth of 0.5% per year for five years to the 2023 Future Condition was included in the Future condition analysis.

In addition, trips associated with specific planned projects in the area of the Project site have been incorporated into the 2023 Future Condition analysis. These specific projects include:

- 605 Concord Avenue
- 87-95 Fawcett Street
- 75 New Street
- 130 Cambridgepark Drive
- 88 Cambridgepark Drive
- 35 Cambridgepark Drive renovation project
- 55 Wheeler Street
- The Residences at Alewife Station (195 & 211 Concord Turnpike)

5 Traffic Analysis

Morning and Evening peak hour traffic networks were developed in accordance with the TIS Guidelines, for the 2018 Existing, 2018 Build and 2023 Future Condition scenarios.

5.a 2018 Existing Condition

The 2018 Existing Condition analysis is based on existing vehicle, bicycle, and pedestrian counts at the study area intersections (see Section 2). The Existing Condition networks are shown in Figures 2.c.1 through 2.c.4 presented above.

5.b 2018 Build Condition

The 2018 Build Condition assumes full occupancy of 299 residential units. Since the counts for the Existing Condition were completed while the existing office building was still occupied as offices, these driveway trips were subtracted from the network before the project-generated trips were added to the network. Therefore, the resulting 2018 Build network consists of the

2018 Existing volumes plus the net-new project generated trips. These networks are shown in Figures 4.c.1 and 4.c.2.

5.c 2023 Future Condition

Background traffic growth was assumed to occur at 0.5 percent per year for five years to the 2023 Future Condition. Additionally, volumes generated from background projects that are planned to come on-line during this five-year period were added to the network. The 2023 Future Condition networks are shown in Figures 5.c.1 and 5.c.2. In addition, Figure 5.c.3. shows evening cumulative impacts on study are roadways inclusive of both the proposed project as well as background projects planned to come on-line during the five-year period.

6 Vehicle Capacity Analysis

6.a Capacity Analysis

Synchro 9 software was used to determine the vehicle level of service (VLOS) for the ten signalized and unsignalized study area intersections. Synchro software is based on the 2000 Highway Capacity Manual. Because of Synchro's limitations when analyzing rotaries SIDRA 7 software was used for the Fresh Pond Rotary to determine the vehicle level of service. SIDRA software is based on the 2010 Highway Capacity Manual.

Results for the 2018 Existing, 2018 Build, and 2023 Future Conditions are presented in Table 6.a.1 and Table 6.a.2 for signalized intersections, Table 6.a.3 and Table 6.a.4 for unsignalized intersections, and Table 6.a.5 and Table 6.a.6 for the Fresh Pond Rotary. The tables also show the difference in delay between the Existing and Build conditions (delay due to project impact) and between the Existing and Future delay (total delay from project and other background growth). Figures 6.a.1 and 6.a.2 illustrate the overall VLOS and Figures 6.b.1 and 6.b.2 illustrate the net change in delay for each intersection for the morning and evening peak hour respectively. A summary of the analysis results follows.

The existing conditions of the signalized intersections during the morning peak hour operate at an LOS C or better with the exception of Alewife Brook Parkway at Rindge Ave which operates at an LOS F and Alewife Brook Parkway at Route 2/16 and Cambridgepark Drive at Alewife Brook Parkway which operate at an LOS E. The unsignalized intersections primarily operate at a LOS C or better with the exception of Steel Place at Alewife Station Access Road which operated at an LOS F.

The existing conditions of the signalized intersections during the evening peak hour operate at an LOS C or better with the exception of Alewife Brook Parkway at Rindge Ave, Alewife Brook Parkway at Route 2/16 and Cambridgepark Drive at Alewife Brook Parkway which operate at an LOS F. The unsignalized intersections primarily operate at a LOS C or better with the exception of Steel Place at Alewife Station Access Road which operated at an LOS F.

During both the morning and evening peak hour, the project impacts are no greater than 10 seconds of delay at each of the study area intersections, and LOS at each intersection does not decline.

TABLE 6.A.1 SIGNALIZED INTERSECTION LEVEL OF SERVICE RESULTS – MORING PEAK HOUR

		Existing (2018)			Build (2018)				Future (2023)			
Intersection	**Movement**	v/c	Delay	VLOS	v/c	Delay	VLOS	Difference in Delay	v/c	Delay	VLOS	Difference in Delay
Cambridgepark Drive/Steel Place	Cambridgepark Drive EB Left/Thru/Right	0.41	25.9	C	0.58	30.9	C	5.0	0.96	69.5	E	43.6
	Cambridgepark Drive WB Left/Thru	0.78	37.7	D	0.79	38.7	D	1.0	0.85	43.0	D	5.3
	Cambridgepark Drive WB Right	0.18	23.2	C	0.18	23.2	C	0.0	0.21	23.8	C	0.6
	Steel Place NB Left/Thru/Right	0.21	37.8	D	0.21	37.8	D	0.0	0.21	37.8	D	0.0
	Steel Place SB Left	0.40	26.8	C	0.40	26.8	C	0.0	0.43	27.4	C	0.6
	Steel Place SB Thru/Right	0.42	30.2	C	0.41	29.7	C	-0.5	0.43	30.2	C	0.0
	Overall	**0.54**	**31.4**	**C**	**0.54**	**32.5**	**C**	**1.1**	**0.62**	**42.7**	**D**	**11.3**
Cambridgepark Drive/Alewife Brook Parkway	Cambridgepark Drive EB Left/Right	0.35	37.8	D	0.40	38.5	D	0.7	0.52	40.1	D	2.3
	Alewife Brook Parkway NB Left	1.09	94.1	F	1.11	97.0	F	2.9	1.24	152.7	F	58.6
	Alewife Brook Parkway NB Thru	0.94	14.3	B	0.94	12.7	B	-1.6	0.98	15.2	B	0.9
	Alewife Brook Parkway SB Thru	1.19	129.9	F	1.19	129.9	F	0.0	1.24	149.1	F	19.2
	Alewife Brook Parkway SB Right	0.23	0.4	A	0.23	0.4	A	0.0	0.24	0.4	A	0.0
	Overall	**0.95**	**62.0**	**E**	**0.97**	**61.4**	**E**	**-0.6**	**1.06**	**72.6**	**E**	**10.6**
Alewife Brook Parkway/Rindge Avenue	Rindge Avenue WB Left	0.98	109.0	F	0.98	109.0	F	0.0	1.00	116.3	F	7.3
	Rindge Avenue WB Right	1.89	473.7	F	1.89	476.0	F	2.3	2.05	546.4	F	72.7
	Alewife Brook Parkway NB Thru/Right	0.85	21.3	C	0.85	21.5	C	0.2	0.89	24.5	C	3.2
	Alewife Brook Parkway SB Thru	1.04	31.1	C	1.05	38.3	D	7.2	1.12	70.0	E	38.9
	Overall	**1.12**	**86.9**	**F**	**1.13**	**90.1**	**F**	**3.2**	**1.21**	**114.4**	**F**	**27.5**

		Existing (2018)			Build (2018)				Future (2023)			
Intersection	**Movement**	v/c	Delay	VLOS	v/c	Delay	VLOS	Difference in Delay	v/c	Delay	VLOS	Difference in Delay
Alewife Brook Parkway at Route 2/16 – Signal A	Alewife Station Access Road WB Thru	0.83	5.4	A	0.83	5.5	A	0.1	0.86	6.0	A	0.6
	Alewife Brook Parkway SB Right	0.89	38.2	D	0.89	38.2	D	0.0	0.91	40.3	D	2.1
	Overall	**0.91**	**18.4**	**B**	**0.91**	**18.4**	**B**	**0.0**	**0.94**	**19.5**	**B**	**1.1**
	Concord Turnpike EB Left	1.06	104.9	F	1.06	104.9	F	0.0	1.10	119.3	F	14.4
Alewife Brook Parkway at Route 2/16 - Signal B	Alewife Station Access Road WB Thru	0.29	14.5	B	0.30	14.5	B	0.0	0.32	14.8	B	0.3
	Alewife Brook Parkway SB Thru	0.55	41.8	D	0.55	41.8	D	0.0	0.58	42.4	D	0.6
	Alewife Brook Parkway NB Left	1.02	61.7	E	1.02	62.4	E	0.7	1.06	73.4	E	11.7
	Overall	**0.89**	**64.2**	**E**	**0.89**	**64.6**	**E**	**0.4**	**0.93**	**73.6**	**E**	**9.4**
Alewife Brook Parkway at Route 2/16 – Signal C	Alewife Station Access Road WB Thru	0.20	8.5	A	0.20	8.5	A	0.0	0.22	8.6	A	0.1
	Alewife Station Access Road WB Right	0.08	7.5	A	0.08	7.6	A	0.1	0.11	7.8	A	0.3
	Alewife Brook Parkway NB Thru	0.33	37.8	D	0.34	37.9	D	0.1	0.38	38.6	D	0.8
	Overall	**0.25**	**22.9**	**C**	**0.25**	**22.9**	**C**	**0.0**	**0.27**	**23.2**	**C**	**0.3**
Alewife Brook Parkway at Route 2/16 - Signal D	Alewife Brook Parkway SB Thru	0.57	7.1	A	0.57	7.1	A	0.0	0.60	7.3	A	0.2
	Concord Turnpike EB Right	0.53	11.7	B	0.53	11.7	B	0.0	0.55	12.0	B	0.3
	Overall	**0.57**	**10.4**	**B**	**0.57**	**10.4**	**B**	**0.0**	**0.59**	**10.7**	**B**	**0.3**

v/c = volume-to-capacity ratio; Delay = average delay expressed in seconds per vehicle; VLOS = vehicular level of service

TABLE 6.A.2 SIGNALIZED INTERSECTION LEVEL OF SERVICE RESULTS - EVENING PEAK HOUR

		Existing (2018)			Build (2018)				Future (2023)			
Intersection	**Movement**	v/c	Delay	VLOS	v/c	Delay	VLOS	Difference in Delay	v/c	Delay	VLOS	Difference in Delay
Cambridgepark Drive/Steel Place	Cambridgepark Drive EB Left/Thru/Right	0.70	32.0	C	0.72	32.7	C	0.7	0.86	44.1	D	12.1
	Cambridgepark Drive WB Left/Thru	0.43	24.3	C	0.51	25.9	C	1.6	0.61	28.8	C	4.5
	Cambridgepark Drive WB Right	0.09	19.7	B	0.09	19.7	B	0.0	0.10	20.0	B	0.3
	Steel Place NB Left/Thru/Right	0.28	40.0	D	0.28	40.0	D	0.0	0.35	40.6	D	0.6
	Steel Place SB Left	0.64	30.8	C	0.65	31.2	C	0.4	0.68	32.5	C	1.7
	Steel Place SB Thru/Right	0.71	34.7	C	0.71	34.5	C	-0.2	0.76	38.0	D	3.3
	Overall	**0.66**	**31.1**	**C**	**0.66**	**31.4**	**C**	**0.3**	**0.76**	**35.8**	**D**	**4.7**
Cambridgepark Drive/Alewife Brook Parkway	Cambridgepark Drive EB Left/Right	1.05	72.9	E	1.06	75.2	E	2.3	1.12	97.6	F	24.7
	Alewife Brook Parkway NB Left	0.95	54.8	D	1.12	102.3	F	47.5	1.39	209.4	F	154.6
	Alewife Brook Parkway NB Thru	0.98	21.5	C	0.98	21.1	C	-0.4	1.01	23.4	C	1.9
	Alewife Brook Parkway SB Thru	1.44	243.5	F	1.44	243.5	F	0.0	1.50	270.0	F	26.5
	Alewife Brook Parkway SB Right	0.07	0.1	A	0.08	0.1	A	0.0	0.09	0.1	A	0.0
	Overall	**1.28**	**107.1**	**F**	**1.28**	**109.2**	**F**	**2.1**	**1.36**	**130.1**	**F**	**23.0**
Alewife Brook Parkway/Rindge Avenue	Rindge Avenue WB Left	0.59	43.6	D	0.59	43.6	D	0.0	0.60	44.2	D	0.6
	Rindge Avenue WB Right	0.60	44.4	D	0.63	45.5	D	1.1	0.81	59.3	E	14.9
	Alewife Brook Parkway NB Thru/Right	0.99	50.6	D	1.01	55.0	D	4.4	1.05	67.5	E	16.9
	Alewife Brook Parkway SB Thru	1.42	204.9	F	1.42	207.8	F	2.9	1.50	240.5	F	35.6
	Overall	**0.94**	**125.4**	**F**	**0.95**	**128.1**	**F**	**2.7**	**1.03**	**150.1**	**F**	**24.7**

		Existing (2018)			Build (2018)				Future (2023)			
Intersection	**Movement**	v/c	Delay	VLOS	v/c	Delay	VLOS	Difference in Delay	v/c	Delay	VLOS	Difference in Delay
Alewife Brook Parkway at Route 2/16 – Signal A	Alewife Station Access Road WB Thru	0.97	6.7	A	0.97	6.6	A	-0.1	1.01	12.8	B	6.1
	Alewife Brook Parkway SB Right	0.95	42.4	D	0.95	42.4	D	0.0	0.97	46.8	D	4.4
	Overall	**1.03**	**19.1**	**B**	**1.03**	**19.0**	**B**	**-0.1**	**1.06**	**24.5**	**C**	**5.4**
Alewife Brook Parkway at Route 2/16 – Signal B	Concord Turnpike EB Left	1.31	197.4	F	1.31	197.4	F	0.0	1.35	213.2	F	15.8
	Alewife Station Access Road WB Thru	1.35	189.6	F	1.35	189.6	F	0.0	1.43	220.4	F	30.8
	Alewife Brook Parkway SB Thru	0.48	34.8	C	0.49	35.0	C	0.2	0.52	35.5	D	0.7
	Alewife Brook Parkway NB Left	1.18	117.2	F	1.18	115.9	F	-1.3	1.22	132.1	F	14.9
	Overall	**1.10**	**137.0**	**F**	**1.10**	**136.1**	**F**	**-0.9**	**1.15**	**152.7**	**F**	**15.7**
Alewife Brook Parkway at Route 2/16 – Signal C	Alewife Station Access Road WB Thru	0.54	11.5	B	0.54	11.5	B	0.0	0.57	12.0	B	0.5
	Alewife Station Access Road WB Right	0.37	9.2	A	0.37	9.2	A	0.0	0.39	9.5	A	0.3
	Alewife Brook Parkway NB Thru	0.35	32.7	C	0.35	32.8	C	0.1	0.37	33.1	C	0.4
	Overall	**0.52**	**15.9**	**B**	**0.52**	**15.9**	**B**	**0.0**	**0.55**	**16.3**	**B**	**0.4**
Alewife Brook Parkway at Route 2/16 – Signal D	Alewife Brook Parkway SB Thru	0.50	6.7	A	0.51	6.8	A	0.1	0.54	7.0	A	0.3
	Concord Turnpike EB Right	0.44	9.3	A	0.44	9.3	A	0.0	0.46	9.4	A	0.1
	Overall	**0.48**	**8.5**	**A**	**0.49**	**8.5**	**A**	**0.0**	**0.51**	**8.7**	**A**	**0.2**

v/c = volume-to-capacity ratio; Delay = average delay expressed in seconds per vehicle; VLOS = vehicular level of service

TABLE 6.A.3 UNSIGNALIZED INTERSECTION LEVEL OF SERVICE RESULTS – MORNING PEAK HOUR

		Existing (2018)			Build (2018)				Future (2023)			
Intersection	**Approach**	v/c	Delay	VLOS	v/c	Delay	VLOS	Difference in Delay	v/c	Delay	VLOS	Difference in Delay
Cambridgepark Drive/100 Cambridgepark Drive Driveway	100 Cambridgepark Drive Driveway NB	0.12	17.8	C	0.25	16.9	C	-0.9	0.46	20.0	C	2.2
Cambridgepark Drive/Site West (outbound) Driveway	Site West (outbound) Driveway NB	0.00	0.0	A	-	-	-	-	-	-	-	-
Cambridgepark Drive/Site East (inbound) Driveway	Cambridgepark Drive WB	0.02	0.5	A	-	-	-	-	-	-	-	-
Steel Place/Alewife Station Access Road (Route 2 Connector)	Alewife Station Access Road SB	-	153.9	F	-	151.3	F	-2.6	-	188.2	F	36.9

TABLE 6.A.4 UNSIGNALIZED INTERSECTION LEVEL OF SERVICE RESULTS – EVENING PEAK HOUR

		Existing (2018)			Build (2018)				Future (2023)			
Intersection	**Approach**	v/c	Delay	VLOS	v/c	Delay	VLOS	Difference in Delay	v/c	Delay	VLOS	Difference in Delay
Cambridgepark Drive/100 Cambridgepark Drive Driveway (Site Driveway in Build and Future Condition)	100 Cambridgepark Drive Driveway NB	0.24	12.8	B	0.28	13.3	B	0.5	0.34	14.2	B	1.4
Cambridgepark Drive/Site West (outbound) Driveway	Site West (outbound) Driveway NB	0.06	12.7	B	-	-	-	-	-	-	-	-
Cambridgepark Drive/Site East (inbound) Driveway	Cambridgepark Drive WB	0.00	0.0	A	-	-	-	-	-	-	-	-
Steel Place/Alewife Station Access Road (Route 2 Connector)	Alewife Station Access Road SB	-	93.5	F	-	93.5	F	0.0	-	116.4	F	22.9

TABLE 6.A.5 ROTARY LEVEL OF SERVICE RESULTS – MORNING PEAK HOUR

		Existing (2018)			Build (2018)				Future (2023)			
Intersection	**Approach**	Demand[1]	Delay	VLOS	Demand	Delay	VLOS	Difference in Delay	Demand	Delay	VLOS	Difference in Delay
Fresh Pond Rotary	Concord Ave WB	1,920	144.4	F	1,923	145.7	F	1.3	2,020	160.0	F	15.6
	Hotel Driveway SWB	80	19.0	C	80	19.0	C	0.0	82	20.2	C	1.2
	Alewife Brook Pkwy SB	1,566	168.3	F	1,592	177.2	F	8.9	1,702	241.9	F	73.6
	Concord Ave EB	995	83.1	F	998	82.9	F	-0.2	1,135	118.6	F	35.5
	Overall	**4,561**	**137.0**	**F**	**4,593**	**140.8**	**F**	**3.8**	**4,956**	**176.4**	**F**	**49.4**

1 Approach volume in vehicles per hour

TABLE 6.A.6 ROTARY LEVEL OF SERVICE RESULTS – EVENING PEAK HOUR

		Existing (2018)			Build (2018)				Future (2023)			
Intersection	**Approach**	Demand[1]	Delay	VLOS	Demand	Delay	VLOS	Difference in Delay	Demand	Delay	VLOS	Difference in Delay
Fresh Pond Rotary	Concord Ave WB	1,342	47.7	E	1,361	53.9	F	6.2	1,492	62.5	F	14.8
	Hotel Driveway SWB	42	11.7	B	42	11.7	B	0.0	44	12.8	B	1.1
	Alewife Brook Pkwy SB	1,828	96.3	F	1,836	98.2	F	1.9	1,932	158.8	F	62.5
	Concord Ave EB	778	79.3	F	789	82.2	F	2.9	871	86.4	F	7.1
	Overall	**3,990**	**75.8**	**F**	**4,028**	**79.2**	**F**	**3.4**	**4,340**	**109.7**	**F**	**33.9**

1 Approach volume in vehicles per hour

7 Queue Analysis

Queue analysis was performed in combination with the LOS analysis. Tables 7.a.1 and 7.a.2 show the results for the modeled average queues (expressed in the number of vehicles) for each scenario for the morning and evening peak hour, respectively. Because of the limitations of Synchro, when two intersections are close to each other due to recognizing queue backups, Sim Traffic was used to evaluate queueing.

VHB staff conducted queue observations during the morning and evening peak hours at the signalized intersections on Tuesday, February 27th, 2018 and during the evening peak hour on Thursday, March 1st, 2018 at Cambridge Park Drive at Steel Place. Cambridgepark Drive at Steel Place queues in the evening are presented in Table 7.a.3 in order to identify variations in the study day queues.

TABLE 7.A.1 SIGNALIZED INTERSECTION QUEUE ANALYSIS - MORNING PEAK HOUR

Intersection	Lane Group	Average Queue in Vehicles			
		2018 Observed	2018 Existing Modeled	2018 Build Modeled	2023 Future Modeled
Cambridgepark Drive/Steel Place	Steel Place NB L/T/R	1	1	1	1
	Steel Place SB L	3	4	4	5
	Steel Place SB L/T/R	3	1	1	1
	Cambridgepark Drive EB L/T/R	5	4	5	9
	Cambridgepark Drive WB L/T	4	10	11	12
	Cambridgepark Drive WB R	1	0	0	0
Cambridgepark Drive/Alewife Brook Parkway	Alewife Brook Parkway NB L	2	4*	5*	5*
	Alewife Brook Parkway NB T	5	5*	5*	5*
	Alewife Brook Parkway SB T	28	~39	~39	~41
	Cambridgepark Drive EB	2	3	3	5
Alewife Brook Parkway/Rindge Avenue	Alewife Brook Parkway NB	46	63*	63*	63*
	Alewife Brook Parkway SB	4	7*	4*	5*
	Rindge Avenue WB L	7	7	7	7
	Rindge Avenue WB R	23+	~18	~19	~21
Alewife Brook Parkway at Route 2/16	Alewife Brook Parkway NB L	16	~25	~26	~27
	Alewife Brook Parkway NB T	2	4	4	4
	Alewife Brook Parkway SB T	10	7	7	7
	Alewife Brook Parkway SB R	17	17	17	18
	Route 2 EB L	31+	~11	~11	~11
	Route 2 EB R	37+	9	9	10
	Alewife Station Exit Ramp WB T	4	3	2	3
	Alewife Station Exit Ramp WB R	1	1	1	1

Note: Synchro provides queue data in feet, the table presents queue data in number of vehicles. As directed by the TIS guidelines 1 vehicle = 25 ft

Morning queue observations conducted at signalized intersections on Tuedsay, February 27, 2018.
~Volume exceeds capacity; queue is theoretically infinite.

*SimTraffic results presented instead of Synchro results

TABLE 7.A.2 SIGNALIZED INTERSECTION QUEUE ANALYSIS - EVENING PEAK HOUR

Intersection	Lane Group	Average Queue in Vehicles			
		2018 Observed	2018 Existing Modeled	2018 Build Modeled	2023 Future Modeled
Cambridgepark Drive/Alewife Brook Parkway	Alewife Brook Parkway NB L	3	4*	4*	5*
	Alewife Brook Parkway NB T	7	6*	6*	6*
	Alewife Brook Parkway SB T	29	~23	~29	~31
	Cambridgepark Drive EB	7	8*	9*	9*
Alewife Brook Parkway/Rindge Avenue	Alewife Brook Parkway NB T	85+	91*	91*	91*
	Alewife Brook Parkway SB	7	7*	7*	8*
	Rindge Avenue WB L	4	7*	7*	7*
	Rindge Avenue WB R	23+	27*	27*	27*
Alewife Brook Parkway at Route 2/16	Alewife Brook Parkway NB L	20	~24	~24	~26
	Alewife Brook Parkway NB T	3	3	3	3
	Alewife Brook Parkway SB T	12	4	4	5
	Alewife Brook Parkway SB R	20	15	15	16
	Route 2 EB L	31+	~11	~11	~11
	Route 2 EB R	37+	6	6	6
	Alewife Station Exit Ramp WB T	15	7	7	8
	Alewife Station Exit Ramp WB R	2	3	3	4

Note: Synchro provides queue data in feet, the table presents queue data in number of vehicles. As directed by the TIS guidelines 1 vehicle = 25 ft

~Volume exceeds capacity; queue is theoretically infinite.

Evening queue observations conducted at signalized intersections on Tuedsay, February 27, 2018.

*SimTraffic results presented instead of Synchro results

TABLE 7.A.3 CAMBRIDGEPARK DRIVE AT STEEL PLACE QUEUE ANALYSIS - EVENING PEAK HOUR

Intersection	Lane Group	Average Queue in Vehicles					
		Tuesday Observed	Thursday Observed	2018 Observed (Average)[1]	2018 Existing Modeled	2018 Build Modeled	2023 Future Modeled
Cambridgepark Drive/Steel Place	Steel Place NB L/T/R	0	1	1	1	1	1
	Steel Place SB L	7	23	13	7	7	7
	Steel Place SB L/T/R	8	21	13	7	7	8
	Cambridgepark Drive EB L/T/R	19	32	24	8	8	10
	Cambridgepark Drive WB L/T	2	3	3	4	5	7
	Cambridgepark Drive WB R	1	1	1	0	0	0

Note: Synchro provides queue data in feet, the table presents queue data in number of vehicles. As directed by the TIS guidelines 1 vehicle = 25 ft

Evening queue observations conducted at Cambridgepark Drive at Steel Place on both Tuesday, February, 27, 2018 and Thursday, March 1, 2018.

[1]2018 Observed Average Queues were an average of the trials taken overall on both Tuesday and Thursday.

The queue analysis results presented in the tables above correspond to the level of service analyses conducted for the study area intersections.

The queue observations conducted on Tuesday and Thursday, showed similar queue lengths at some Cambridgepark Drive at Steel Place approaches. At the Steel Place southbound approach in the evening on Thursday, approximately 13 more vehicles were observed in queue in the shared lane and approximately 16 more vehicles in the left lane than that on Tuesday. Similarly, Cambridgepark Drive eastbound in the evening on Thursday, had approximately 13 more vehicles in queue than what was observed on Tuesday. The multi-day queue observations indicate that day-to-day operations at Cambridgepark Drive at Steel Place are not always identical and the variation in observed queues has been considered in the traffic analysis.

8 Residential Street Volume Analysis

Roadway segments within the study area with residential street frontage were evaluated to understand Project impacts. The peak hour volumes (both directions) traveling the analyzed roadway segments are presented in Tables 8.a.1 and 8.a.2. For analyzed segments that are between study area intersections, the average volumes at these intersections were taken as the volume traveling along the segment. The analysis shows the percent increase in traffic along the residential roadway segments between Existing and Build volumes and Build and Future volumes.

Of all of the roadway segments in the study area, a total of three of the sixteen segments identified are streets which have more than 1/3 of residential frontage, as determined by the existing first floor use. These segments are evaluated in the Planning Board Criteria for increased volume on residential streets.

TABLE 8.A.1 TRAFFIC ON STUDY AREA ROADWAYS – MORNING PEAK HOUR

Roadway	Segment	Amount of Residential	Existing[1]	Build	Increase[2]	Percent Increase	Future[3]	Increase	Percent Increase
Cambridgepark Drive	west of 100 Cambridgepark Drive	> 1/3 but <1/2	621	621	0	0%	780	159	26%
	between 100 Cambridgepark Drive and Site West Driveway	1/3 or less	736	799	63[4]	9%	912	113	14%
	between Site West Driveway and Site East Driveway	1/3 or less	736	799	63	9%	912	113	14%
	between Site East Driveway and Steel Place	1/3 or less	754	799	45	6%	912	113	14%
	between Steel Place and Alewife Brook Parkway	1/3 or less	979	1021	42	4%	1148	127	12%
Steel Place	between Cambridgepark Drive and Alewife Station Access Road	1/3 or less	727	730	3	0%	794	64	9%
	north of Alewife Station Access Road	1/3 or less	1099	1092	-7	-1%	1156	64	6%
Rindge Avenue	west of Alewife Brook Parkway	1/2 or more	948	949	1	0%	986	37	4%
Concord Avenue	west of Fresh Pond Rotary	1/3 or less	1765	1778	13	1%	1965	187	11%
	east of Fresh Pond Rotary	1/3 or less	3550	3568	18	1%	3841	273	8%
Alewife Brook Parkway	between Fresh Pond Rotary and Rindge Avenue	1/3 or less	3200	3231	31	1%	3418	187	6%
	between Rindge Avenue and Cambridgepark Drive	1/3 or less	3738	3770	32	1%	3983	213	6%
	Between Cambridgepark Drive and Route 2/16 Interchange	1/3 or less	3411	3421	10	0%	3569	148	4%
	north of Route 2/16 Interchange	1/3 or less	2344	2356	12	1%	2473	117	5%
Route 2	west of Route 2/16 Interchange	1/3 or less	4251	4259	8	0%	4406	147	3%
Alewife Station Access Road	between Route 2/16 Interchange and Steel Place	1/3 or less	285	295	10	4%	327	32	11%

1 Where driveways/on-street parking created a segment inflow/outflow volume imbalance, an average was calculated per direction and added
2 Net new project trips after trip credits are applied
3 Future accounts for area background project volumes, Project generated volumes, and a background growth rate of 0.5%
4 Not an indication of exact number of net-new project trips; trip credits and project generated trips utilize different driveways (site east and west driveways & 100 Cambridgepark Drive driveway)

TABLE 8.A.2 TRAFFIC ON STUDY AREA ROADWAYS – EVENING PEAK HOUR

Roadway	Segment	Amount of Residential	Existing[1]	Build	Increase[2]	Percent Increase	Future[3]	Increase	Percent Increase
Cambridgepark Drive	west of 100 Cambridgepark Drive	> 1/3 but <1/2	425	425	0	0%	457	32	8%
	between 100 Cambridgepark Drive and Site West Driveway	1/3 or less	574	639	65[4]	11%	736	97	15%
	between Site West Driveway and Site East Driveway	1/3 or less	588	639	51	9%	736	97	15%
	between Site East Driveway and Steel Place	1/3 or less	587	637	50	9%	732	95	15%
	between Steel Place and Alewife Brook Parkway	1/3 or less	1261	1307	46	4%	1422	115	9%
Steel Place	between Cambridgepark Drive and Alewife Station Access Road	1/3 or less	799	801	2	0%	858	57	7%
	north of Alewife Station Access Road	1/3 or less	922	924	2	0%	964	40	4%
Rindge Avenue	west of Alewife Brook Parkway	1/2 or more	813	819	6	1%	872	53	6%
Concord Avenue	west of Fresh Pond Rotary	1/3 or less	1325	1339	14	1%	1521	182	14%
	east of Fresh Pond Rotary	1/3 or less	3010	3029	19	1%	3258	229	8%
Alewife Brook Parkway	between Fresh Pond Rotary and Rindge Avenue	1/3 or less	3091	3124	33	1%	3273	149	5%
	between Rindge Avenue and Cambridgepark Drive	1/3 or less	3503	3542	39	1%	3757	215	6%
	Between Cambridgepark Drive and Route 2/16 Interchange	1/3 or less	3180	3187	7	0%	3312	125	4%
	north of Route 2/16 Interchange	1/3 or less	2578	2590	12	0%	2692	102	4%
Route 2	west of Route 2/16 Interchange	1/3 or less	4558	4553	-5	0%	4707	154	3%
Alewife Station Access Road	between Route 2/16 Interchange and Steel Place	1/3 or less	801	801	0	0%	850	49	6%

1 Where driveways/on-street parking created2578 a segment inflow/outflow volume imbalance, an average was calculated per direction and added
2 Net new project trips after trip credits are applied
3 Future accounts for area background project volumes, Project generated volumes, and a background growth rate of 0.5%
4 Not an indication of exact number of net-new project trips due to trip credits and project generated trips utilizing different driveways (site east and west driveways & 100 Cambridgepark Drive driveway)

9 Parking Analysis

9.a Vehicle Parking

According to the City's 1990 parking inventory, the Project site has 68 employee parking spaces registered under 50/54 Cambridgepark Drive for Wyeth Research. As noted above in Section 2.f of this report, a parking utilization study was not conducted for existing buildings on the proposed Project Site. The building and parking lot will be demolished as part of the Project.

The Project is proposing to supply a total of 187 vehicle parking spaces for 299 residential units, at a parking ratio of approximately 0.63 spaces per unit. Residents, on a first come, first serve basis, will have the ability to lease a vehicle parking space with the building's garage. Parking spaces will be managed by the transportation coordinator. Short-term loading and visitors will be accommodated by the new on-street parking along the shared parking as well as limited visitor parking within the proposed garage.

The site is located within walking distance to the Alewife Train Station and several bus routes, which is an indicator of lower parking utilization rates. due to higher numbers of car-free commuters. Table 9.a.1 summarizes other nearby residential building parking rates compared to the proposed Project.

TABLE 9.A.1 AREA RESIDENTIAL BUILDING PARKING RATES

Residence	Total Units (Total Leased Units)	Total Built Parking Spaces (Total Leased Parking Spaces)	Overall Parking Rate (Actual Parking Rate)
Proposed Project	299	187	0.63 spaces/unit
130 Cambridgepark Dr[1]	213 (147)	145 (101)	0.68 spaces/unit (0.69 spaces/unit)
160 Cambridgepark Dr[2]	398 (369)	394 (256)	0.99 spaces/unit (0.68 spaces/unit)

Source:
[1] Information provided by Hanover Company as of February 27, 2018
[2] Information taken from 2017 City of Cambridge TDM Annual Report Summary

Although the nearby 130 and 160 Cambridgepark Drive residential buildings have a leased parking ratio of 0.68 and 0.69 leased spaces/occupied unit, a slightly lower ratio is proposed for the proposed 50 Cambridgepark Drive Project to reflect the fact that the parking occupancy in the other buildings (see Table 9.A.2) is below the actual capacity.

The Project is expected to reflect a pattern of parking occupancy similar to current parking demand for 130 Cambridgepark Drive. 130 Cambridgepark Drive is supported by a garage in the building itself and spaces in the abutting parking garage at 140 Cambridgepark Drive. Garage data for February 2018 was used to estimate how the occupancy of the Project garage

would vary throughout the day. The garage data are included in the accompanying CD. Table 9.A.2 presents the estimated average weekday parking occupancy by hour-of-day for the Project based on the parking occupancies for 130 Cambridgepark Drive.

TABLE 9.A.2 ESTIMATED AVERAGE WEEKDAY PROJECT PARKING OCCUPANCY

Time	130 Cambridgepark Drive		Estimated Parking Occupancy for Proposed Project
	Number of Occupied Spaces [1]	Ratio of Occupied Spaces per Occupied Unit [2]	
12:00-1:00 AM	80	0.55	166
1:00-2:00 AM	80	0.56	167
2:00-3:00 AM	81	0.56	169
3:00-4:00 AM	82	0.57	169
4:00-5:00 AM	82	0.57	170
5:00-6:00 AM	82	0.57	170
6:00-7:00 AM	81	0.56	167
7:00-8:00 AM	76	0.52	157
8:00-9:00 AM	65	0.45	135
9:00-10:00 AM	55	0.38	113
10:00-11:00 AM	48	0.33	99
11:00-12:00 PM	45	0.31	92
12:00-1:00 PM	43	0.30	89
1:00-2:00 PM	42	0.29	87
2:00-3:00 PM	41	0.29	86
3:00-4:00 PM	40	0.28	83
4:00-5:00 PM	42	0.29	87
5:00-6:00 PM	47	0.33	99
6:00-7:00 PM	54	0.38	113
7:00-8:00 PM	61	0.43	128
8:00-9:00 PM	57	0.40	119
9:00-10:00 PM	71	0.49	147
10:00-11:00 PM	75	0.52	156
11:00-12:00 PM	78	0.54	161

[1] Based on dedicated residential parking space data for February, 2018 in 130 Cambridgepark Drive garage and abutting garage at 140 Cambridgepark Drive, provided by Hanover Company.

[2] Number of occupied parking spaces per 144 total occupied residential unit at 130 Cambridgepark Drive. [where 144 was the average # of occupied units for the month of February 2018]

As shown, peak parking demand on an average weekday is estimated at 0.57 spaces per occupied unit, occurring over-night as expected. Therefore. the peak parking occupancy on an average weekday for the 299 units in the proposed Project is 170 spaces out of the total 187 spaces proposed. However, review of the parking data for 130 Cambridgepark Drive shows that the absolute maximum over-night demand on any single day was as high as 0.66 spaces per occupied unit. This absolute maximum occurs only once in the entire month of February.

Otherwise, over-night parking rates reach as high as 0.62, therefore the 187 parking spaces at a parking rate of 0.63 spaces/unit for 50 Cambridgepark Drive is expected to be adequate to meet the 50 Cambridgepark Drive's expected parking demand.

9.a Bicycle Parking

The Project will provide parking in accordance with the City of Cambridge's Bicycle Parking Zoning Ordinance, as shown in Table 9.b.1.

TABLE 9.B.1 BICYCLE PARKING

Type of Parking	Parking Rate	# of Bicycle Spaces
Residential		
Long Term	1.05 spaces per dwelling[1]	313
Short Term	0.10 spaces per dwelling	30
	Total	343
Retail/Restaurant		
Long Term	0.2 spaces per 1,000 SF	2
Short Term	1.00 spaces per 1,000 SF	8
	Total	9
Total Long Term		315
Total Short Term		38

Source: City of Cambridge Zoning Ordinance Article 6.100
[1] per city guide – 1.00 spaces per unit for the first 20 units for a residential building

The Project will provide 315 long term bicycle parking spaces in two ground level bike rooms within the building. Each room will have direct access to the building exterior and sidewalk. The Project will also provide 37 short term spaces located along Cambridgepark Drive to support visitors and patrons to the site. The total 352 spaces will result in the installation of approximately 176 bicycle racks (assuming each rack fits 2 bicycles). Although the type of bike racks have not been selected, they will be similar, if not the same, as those bike racks installed at 88 and 130 Cambridgepark Drive Residences.

Figures G.1 - G.3 presented above illustrate the location and layout of the long term and short term bicycle parking spaces.

10 Transit Analysis

As requested by the City's Scoping Letter, a transit analysis has been conducted for the Project. The analysis reviewed existing Red Line operations and assessed the impacts of project-generated transit trips and future transit trips.

The following sections summarize existing transit services availability in the study area and provide an assessment of transit utilization and capacity for the key transit line, the Red Line,

accessed at Alewife Station. Although several bus routes are also accessed by Alewife Station, the transit analysis assumes transit rider trips produced by the background projects and the Proposed project will all be Red Line rider trips.

The transit analysis was based on the following 8-step methodology:

1. Quantify the existing transit system capacity
2. Quantify the existing system ridership
3. Report on existing transit system utilization (ridership/capacity) – 2018 Existing Conditions
4. Develop and assign project-generated transit trips to the existing transit system
5. Report on project impacts to the transit system utilization - 2018 Build Conditions
6. Grow 2018 existing transit system ridership to year 2023
7. Compile area background project transit trips and assign to transit system network
8. Report on future transit system utilization (impacts from project as well as other background projects and general system growth) – 2023 Future Conditions

The V/C ratio (Volume to Capacity) is the resulting metric that is used to reflect the level of utilization for each transit service line. The V/C ratios (or utilization rates) are presented for the Existing Condition (2016), Build Condition (Existing + Project trips), and Future Condition (Existing + Project trips + background growth).

10.a Existing Transit System Capacity – STEP 1

The capacity of a transit line depends on the number of trains operating during a specified time period (frequency), the number of people that can be accommodated on a vehicle (a train car), and the number of individual cars in each train.

The study period for this analysis includes the morning and evening transit peak hours defined as 8:00 AM to 9:00 AM and 5:00 PM to 6:00 PM, respectively.

Train frequencies were compiled from latest published MBTA schedules[1] and MBTA Bus Ridecheck data from Winter 2018, as presented in Table 10.a.1.

The vehicle load standards (i.e. number of people safely and comfortably riding on a train car) are based on the MBTA's Service Delivery Policy[2] and the MBTA *Blue Book* (14th Edition) data (Red Line policy capacity of 167 passengers per car, with a standard operation of 6-car trains).

The average Red Line on-time performance was adjusted by 89%, based on the 30-day average (February 12 to March 14, 2018) provided by the MBTA Dashboard. The on-time performance adjustment of 89% reduced the number of available trains during peak hour to account for schedule irregularities and resulting wait times experienced by the passengers.

[1] MBTA schedules, Winter 2018
[2] MBTA Service Delivery Policy, approved by the Board of Directors in June 2010

Table 10.a.1 shows the resulting system capacities for the Red Line based on MBTA provided data.

TABLE 10.A.1 SYSTEM PEAK HOUR CAPACITY (PER MBTA DATA)

Mode	Frequency[(a)]	OTP Factor[(b)]	# Passengers / Vehicle[(c)]	# Cars / Train	Resulting Capacity[(d)] (# Passengers per Peak Hour)
Red Line at Alewife Station					
Inbound	13	0.89	167	6	11,593
Outbound	13	0.89	167	6	11,593

Notes:
(a) Number of vehicles per hour, per MBTA published schedules
(b) On-Time Performance Factor from MBTA Dashboard as of March 15, 2018
(c) Number of policy level capacity per MBTA Blue Book 14th Edition
(d) Calculated Capacity = # of Trains x OTP Factor x # pax per vehicle x # of cars – shown as number of passengers per peak hour

252 new Red line cars are scheduled to be delivered between 2019-2023 along with improvements in signal equipment which will significantly increase capacity and address overcrowding at some stations along the Red Line. MBTA Red / Orange Line New Vehicle Technical Provisions (May 2014) report indicates that capacity increase will allow a decrease in the existing headway from 4.5 minutes to 3 minutes for an approximately additional 7,000 transit riders per hour.

Table 10.a.2 shows the resulting system capacities for the Red Line based on MBTA provided data and technical provisions. Steps 6 and 7 are performed considering both existing Red line capacity as well as this future condition.

TABLE 10.A.2 FUTURE SYSTEM PEAK HOUR CAPACITY (PER MBTA DATA)

Mode	Frequency[(a)]	OTP Factor[(b)]	# Passengers / Vehicle[(c)]	# Cars / Train	Resulting Capacity[(d)] (# Passengers / Peak Hour)
Red Line at Alewife Station					
Inbound	20	0.89	175	6	18,690
Outbound	20	0.89	175	6	18,690

Notes:
(e) Number of vehicles per hour, per MBTA presentation to the Fiscal & Management Control Board (September 19, 2016)
(f) On-Time Performance Factor from MBTA Dashboard as of March 15, 2018
(g) MBTA technical provisions:
280 avg. pax/car (published crush capacity) - No available published policy capacity so existing crush-to-policy ratio of 1.6 used to estimate future policy capacity
(h) Calculated Capacity = # of Trains x OTP Factor x # pax per vehicle x # of cars – shown as number of passengers per peak hour

10.b Existing Transit System Ridership and Utilization – Steps 2 & 3

The MBTA Ridership data from Fall 2016 was used to obtain peak hour passenger loads. Red Line ridership for the analysis was based on data for Alewife Station from Fall 2016 with no growth rate adjustments applied (consistent with vehicle growth assumption).

Inbound trains start their trip from Alewife Station and continue to Ashmont or Braintree Stations, and Outbound trains end at Alewife Station from either Ashmont or Braintree Stations. Since this is the end of the Red Line, passengers board the inbound line and exit the outbound line. Specific boarding and alighting volumes during the morning and evening peak hours are presented in the accompanying CD.

Combining the system capacity developed in Step 1 and the system ridership, the system's utilization rates were calculated and are presented in Table 10.b.1.

TABLE 10.B.1 EXISTING TRANSIT SERVICE UTILIZATION (PER MBTA DATA)

Route and Direction	Capacity	Morning Peak Hour Ridership	Evening Peak Hour Ridership	Morning Peak Hour V/C	Evening Peak Hour V/C
Red Line at Alewife Station					
Inbound Exiting Alewife	11,593	2,502	917	0.22	0.08
Outbound Entering Alewife	11,593	631	2,316	0.05	0.20

As shown in Table 10.b.1, the existing Red Line at Alewife Station is operating with V/C ratios below 1.0 in the morning and evening inbound and outbound directions.

10.c Development of Transit Project Trips – Step 4

As presented in Section 3 of this report, the Project is expected to generate 101 transit trips (25 entering, 76 exiting) during the morning peak hour and 104 transit trips (72 entering, 32 exiting) during the evening peak hour, according to the trip generation calculations. For a conservative analysis, no transit trip credits were taken into account for the existing office building.

As discussed above, project transit trips were all assigned to the Red line. A detailed transit distribution by direction and peak hour is presented in Table 10.c.1.

TABLE 10.C.1 TRANSIT TRIP DISTRIBUTION

	Morning Peak Hour		Evening Peak Hour	
	% OUT	% IN	% OUT	% IN
Red Line at Alewife Station				
Inbound	100%	0.0%	100%	0.0%
Outbound	0.0%	100%	0.0%	100%
Total	**100%**	**100%**	**100%**	**100%**

Source: MBTA existing station ridership levels, Fall 2016

Transit distribution is then applied to the Project-generated transit trips in order to determine the Project-generated transit trips, as presented in Table 10.c.2.

TABLE 10.C.2 PROJECT-GENERATED TRANSIT TRIPS BY LINE

Route and Direction	Morning Peak Hour			Evening Peak Hour		
	Trips OUT (Boardings)	Trips IN (Alightings)	Trips Total	Trips OUT (Boardings)	Trips IN (Alightings)	Trips Total
Red Line at Alewife Station						
Inbound	76	0	76	32	0	32
Outbound	0	25	25	0	72	72
Total	76	25	101	32	72	104

10.d Build Transit System Utilization – Step 5

The Project-generated transit trips from Step 4 above are added to the existing route volumes to develop the "Build Condition" utilization scenario (Existing + Project trips). Resulting v/c ratios are presented in Table 10.d.1.

TABLE 10.D.1 BUILD CONDITION TRANSIT SERVICE UTILIZATION (PER MBTA DATA)

Route and Direction	Capacity Policy (from Step 1)	Morning Peak Hour Ridership (Existing + Project Trips)	Evening Peak Hour Ridership (Existing + Project Trips)	Morning Peak Hour V/C	Evening Peak Hour V/C
Red Line at Alewife Station					
Inbound Exiting Alewife	11,593	2,578	949	0.22	0.08
Outbound Entering Alewife	11,593	656	2,388	0.06	0.21

As presented in Table 10.d.1 and compared to Table 10.b.1, the Red Line is expected to operate at similar levels in the Build Condition as under Existing Conditions with only minor increases, if any, in the V/C ratios.

10.e Development of Future Transit Trips – Step 6

To analyze the 2023 Future Condition for transit, the MBTA existing ridership was grown to year 2023 based on growth rates presented in the July 2015 MIT Kendall Square TIS (4% per year assumption for the Red Line ridership). As mentioned above, the Fall 2016 MBTA Ridership data was assumed to be the baseline 2018 existing condition with no growth rate adjustments applied. This 2018 baseline data was then grown by 4% per year for 5 years to derive the future baseline ridership. The project generated transit trips, presented in Table 10.c.2, were then added to the ridership estimates. The 2023 Future ridership is presented in Table 10.e.1.

TABLE 10.E.1 2023 FUTURE GROWTH TRANSIT SERVICE UTILIZATION (PER MBTA DATA)

	Capacity Policy	Morning Peak Hour Ridership	Evening Peak Hour Ridership	Morning Peak Hour V/C	Evening Peak Hour V/C
Red Line at Alewife Station (based on Existing Capacity)					
Inbound Exiting Alewife	11,593	3,121	1,148	0.27	0.10
Outbound Entering Alewife	11,593	793	2,890	0.07	0.25
Red Line at Alewife Station (based on Future Capacity)					
Inbound Exiting Alewife	18,690	3,121	1,148	0.17	0.06
Outbound Entering Alewife	18,690	793	2,890	0.04	0.15

As presented in Table 10.e.1, because of the scheduled improvements, the Red Line is expected to operate in the Build Condition with V/C ratios better than under existing conditions.

10.f Compile and Assign Area Background Project Transit Trips – Step 7

In addition to growing the transit trips to 2023 Future Conditions, it is necessary to add transit trips from area projects that have not yet come on-line. The same projects listed in the traffic analysis were also used in this transit analysis. Transit trips for each background project, as presented in Table 10.f.1 below, were included in the Future analysis.

TABLE 10.F .1 BACKGROUND PROJECT TRANSIT TRIPS

Project	Morning Peak Hour			Evening Peak Hour		
	In	Out	Total	In	Out	Total
605 Concord Ave	2	7	9	14	7	21
87-95 Fawcett Street	2	7	9	7	4	11
75 New Street	3	12	15	12	6	18
130 Cambridgepark Drive	9	36	45	35	19	54
88 Cambridgepark Drive	20	89	109	109	59	168
35 Cambridgepark Drive renovation project	13	2	15	5	13	18
55 Wheeler Street	15	62	77	61	33	94
The Residences at Alewife Station (195 & 211 Concord Turnpike)	28	67	95	38	38	76
TOTAL	**92**	**282**	**374**	**184**	**126**	**310**

Similar to the Project generated transit trips, all of the background transit trips were assigned to the Red Line.

10.g Future Transit System Utilization – Step 8

The 2023 Future transit scenario is based on grown ridership levels, combined with background project transit trips and Project-generated transit trips. The resulting transit ridership and calculated V/C ratios for morning and evening peak hours for 2023 Future Condition is shown in Table 10.g.1.

TABLE 10.G.1 2023 FUTURE GROWTH CONDITION WITH BACKGROUND PROJECTS TRANSIT SERVICE UTILIZATION

Route and Direction	Capacity Policy (from Step 1)	Morning Peak Hour Ridership (2023 Future + Background Project Trips)	Evening Peak Hour Ridership (2023 Future + Background Project Trips)	Morning Peak Hour V/C (a)	Evening Peak Hour V/C (a)
Red Line at Alewife Station (based on Existing Capacity)					
Inbound Exiting Alewife	11,593	3,403	1,327	0.29	0.11
Outbound Entering Alewife	11,593	885	3,171	0.08	0.27
Red Line at Alewife Station (based on Future Capacity)					
Inbound Exiting Alewife	18,690	3,403	1,327	0.18	0.07
Outbound Entering Alewife	18,690	885	3,171	0.05	0.17

As presented in Table 10.g.1, the Red Line is again expected to operate in the Future Condition with V/C ratios better than under Existing conditions.

11 Pedestrian Analysis

Pedestrian crossing volumes at study area intersections are presented above in Figure 2.c.4. The results of pedestrian level of service (PLOS) analysis at intersection crosswalks are presented in Table 11.a.1 for signalized intersections and Table 11.a.2 for unsignalized intersections, as well as graphically illustrated in Figures 11.a.1 and 11.a.2.

Pedestrian level of service at signalized intersections is dictated by the portion of the signal cycle dedicated to the pedestrian crossings. Accordingly, increasing pedestrian volumes does not alter pedestrian level of service at signalized intersections, and no changes in PLOS are projected under build or future conditions. It is assumed that the walk time and cycle length at these intersections will not change from existing and therefore PLOS will remain consistent.

For unsignalized intersections, the PLOS is calculated using the crosswalk length and the conflicting vehicle floor rates for morning and evening peak hours.

The only intersection that shows a slight change in PLOS with the addition of Project trips is Cambridgepark Drive at the Shared Driveway. The intersection crosswalk on the south side of Cambridgepark Drive changes from A to B in the morning peak hour. This change occurs due to the removal of the two existing site driveways from the Project Site elimination of those associated pedestrian-vehicle conflicts, and the utilization of the existing driveway between 100 Cambridgepark Drive and the Project Site as the proposed Project access. The change includes the addition of 65 net new vehicles trips (44 entering and 21 exiting) that conflict with pedestrian movement as the vehicles pass through the crosswalk. The impact is minimal, with the addition of 2.38 seconds added during the morning peak which barely tips the LOS threshold at this crosswalk location. All other intersections show no change in PLOS with the addition of project trips. Figures 11.a.1 and 11.a.2 show the PLOS for the various conditions for morning and evening peak hour.

TABLE 11.A.1 SIGNALIZED INTERSECTION – PEDESTRIAN LOS SUMMARY

Intersection	Crosswalk	Morning Peak Hour			Evening Peak Hour		
		Existing 2018	Build 2018	Future 2023	Existing 2018	Build 2018	Future 2023
Cambridgepark Drive/Steel Place	East	D	D	D	E	E	E
	West	D	D	D	E	E	E
	North	D	D	D	E	E	E
	South	D	D	D	E	E	E
Cambridgepark Drive/Alewife Brook Parkway	No pedestrian facilities provided						
Alewife Brook Parkway/Rindge Avenue	East	E	E	E	E	E	E
	South	E	E	E	E	E	E
Alewife Brook Parkway at Route 2/16	East	E	E	E	E	E	E

TABLE 11.A.2 UNSIGNALIZED INTERSECTION – PEDESTRIAN LOS SUMMARY

Intersection	Crosswalk	Morning Peak Hour			Evening Peak Hour		
		Existing 2018	Build 2018	Future 2023	Existing 2018	Build 2018	Future 2023
Cambridgepark Drive/100 Cambridgepark Drive Driveway	South	A	B	C	B	B	C
Cambridgepark Drive/Site West (outbound) Driveway	South	A	*	*	A	*	*
Cambridgepark Drive/Site East (inbound) Driveway	West	F	*	*	E	*	*
	South	A	*	*	A	*	*
Steel Place/Alewife Station Access Road (Route 2 Connector)	East	B	B	C	E	E	E
	West	A	A	B	A	A	A
	North	F	F	F	E	E	E

12 Bicycle Analysis

12.a Conflicting Movements

Conflicting vehicle turning movements at the study area intersections are presented above in Figure 2.c.1 and 2.c.2, and summarized in Table 12.a.1 for Existing 2018, Build 2018, and Future 2023 conditions.

TABLE 12.A.1 CONFLICTING BICYCLE/VEHICLE MOVEMENTS AT STUDY INTERSECTIONS

			Existing Peak Hour	Conflicting Vehicle Movements					
				Existing 2018		Build 2018		Future 2023	
Intersection	Time Period	Bicycle Direction	Bicycle Volume	Right Turn[a]	Left Turn[b]	Right Turn[a]	Left Turn[b]	Right Turn[a]	Left Turn[b]
Cambridgepark Drive/100 Cambridgepark Drive	Morning	EB	3	5	104	5	121	5	139
		WB	3	n/a	n/a	n/a	n/a	n/a	n/a
		NB	3	23	n/a	69	n/a	144	n/a
	Evening	EB	2	6	31	6	75	6	109
		WB	1	n/a	n/a	n/a	n/a	n/a	n/a
		NB	0	132	n/a	153	n/a	184	n/a
Cambridgepark Drive/Site West (outbound) Driveway	Morning	EB	5	0	0	-	-	-	-
		WB	2	n/a	n/a	-	-	-	-
		NB	0	0	n/a	-	-	-	-
	Evening	EB	2	0	0	-	-	-	-
		WB	1	n/a	n/a	-	-	-	-
		NB	3	14	n/a	-	-	-	-
Cambridgepark Drive/Site East (inbound) Driveway	Morning	EB	5	0	18	-	-	-	-
		WB	2	n/a	n/a	-	-	-	-
	Evening	EB	3	2	1	-	-	-	-
		WB	1	n/a	n/a	-	-	-	-
Cambridgepark Drive/Steel Place	Morning	EB	5	5	23	5	23	5	24
		WB	3	120	19	120	29	139	44
		NB	2	48	208	48	208	49	224
		SB	2	147	3	140	3	147	3
	Evening	EB	2	6	19	6	19	6	19
		WB	2	69	37	69	37	77	44
		NB	2	93	576	93	576	95	601
		SB	1	37	3	39	3	48	3

Intersection	Time Period	Bicycle Direction	Existing Peak Hour Bicycle Volume	Conflicting Vehicle Movements					
				Existing 2018		Build 2018		Future 2023	
				Right Turn[a]	Left Turn[b]	Right Turn[a]	Left Turn[b]	Right Turn[a]	Left Turn[b]
Cambridgepark Drive/Alewife Brook Parkway	Morning	EB	2	278	n/a	304	n/a	365	n/a
		NB	0	n/a	n/a	n/a	n/a	n/a	n/a
		SB	1	298	252	298	258	313	289
	Evening	EB	0	544	n/a	552	n/a	593	n/a
		NB	0	n/a	n/a	n/a	n/a	n/a	n/a
		SB	0	98	171	106	202	115	251
Alewife Brook Parkway/Rindge Avenue	Morning	WB	0	595	n/a	596	n/a	624	n/a
		NB	0	143	n/a	143	n/a	147	n/a
		SB	0	n/a	n/a	n/a	n/a	n/a	n/a
	Evening	WB	0	455	n/a	461	n/a	505	n/a
		NB	0	195	n/a	195	n/a	200	n/a
		SB	0	n/a	n/a	n/a	n/a	n/a	n/a
Steel Place/Alewife Station Access Road (Route 2 Connector)	Morning	NB	0	254	83	264	83	289	92
		SB	0	348	n/a	348	n/a	357	n/a
	Evening	NB	0	363	403	363	403	400	414
		SB	0	34	n/a	34	n/a	35	n/a
Fresh Pond Rotary	Morning	EB[1]	0	n/a	n/a	n/a	n/a	n/a	n/a
		WB	0	45	n/a	45	n/a	46	n/a
		SB	7	245	n/a	255	n/a	271	n/a
		SWB	1	5	n/a	5	n/a	5	n/a
	Evening	EB[1]	0	n/a	n/a	n/a	n/a	n/a	n/a
		WB	0	10	n/a	10	n/a	10	n/a
		SB	0	280	n/a	284	n/a	311	n/a
		SWB	0	0	n/a	0	n/a	0	n/a
Alewife Brook Parkway at Route 2/16 – Signal A	Morning	WB	2	n/a	n/a	n/a	n/a	n/a	n/a
		SB	0	n/a	n/a	n/a	n/a	n/a	n/a
	Evening	WB	0	n/a	n/a	n/a	n/a	n/a	n/a
		SB	0	n/a	n/a	n/a	n/a	n/a	n/a
Alewife Brook Parkway at Route 2/16 – Signal B	Morning	EB	0	n/a	n/a	n/a	n/a	n/a	n/a
		WB	0	n/a	n/a	n/a	n/a	n/a	n/a
		NB	2	n/a	n/a	n/a	n/a	n/a	n/a
		SB	1	n/a	n/a	n/a	n/a	n/a	n/a
	Evening	EB	0	n/a	n/a	n/a	n/a	n/a	n/a
		WB	0	n/a	n/a	n/a	n/a	n/a	n/a
		NB	0	n/a	n/a	n/a	n/a	n/a	n/a
		SB	1	n/a	n/a	n/a	n/a	n/a	n/a

Intersection	Time Period	Bicycle Direction	Existing Peak Hour	Conflicting Vehicle Movements					
				Existing 2018		Build 2018		Future 2023	
			Bicycle Volume	Right Turn[a]	Left Turn[b]	Right Turn[a]	Left Turn[b]	Right Turn[a]	Left Turn[b]
Alewife Brook Parkway at Route 2/16 – Signal C	Morning	WB	0	56	n/a	62	n/a	83	n/a
		NB	0	n/a	n/a	n/a	n/a	n/a	n/a
	Evening	WB	0	303	n/a	304	n/a	325	n/a
		NB	0	n/a	n/a	n/a	n/a	n/a	n/a
Alewife Brook Parkway at Route 2/16 – Signal D	Morning	EB	0	n/a	n/a	n/a	n/a	n/a	n/a
		SB	1	n/a	n/a	n/a	n/a	n/a	n/a
	Evening	EB	0	n/a	n/a	n/a	n/a	n/a	n/a
		SB	1	n/a	n/a	n/a	n/a	n/a	n/a

a Advancing volume
b Opposing volume
NA Movement not available
[1] Bicycle path is independent from the roadway

13 Transportation Demand Management

The Proponent will implement a program of transportation demand management (TDM) actions to reduce automobile trips generated by the Project. The goal of the Project's TDM plan is to reduce the use of single occupant vehicles (SOVs) by encouraging carpooling and vanpooling, bicycle commuting and walking, and increased use of the area's public transportation system by residents.

The Proponent will consider the following TDM programs as part of the proposed Project to encourage residents to use alternatives to SOV travel:

- Make available 1 carshare parking space for a vehicle-sharing company.
- Subsidize MBTA passes for new building residents.
- Encourage car/vanpooling in coordination with MassRIDES or other private ride-matching service provider.
- Provide up to 4 EV-ready parking spaces.
- Provide air pumps and other bike tools, such as a "fix-it" stand in the bicycle storage areas.
- Do not charge residents additional fees for regular bicycle parking.
- Charge parking separately from the residential rent.
- Join the Alewife Transportation Management Association (TMA).
- Designate a transportation coordinator (TC) for the site to manage the TDM program.
- Post information in a prominent location in the building and on the building's website, social media and property newsletters promoting the use of transportation options and service information.
- Provide packages for new residents providing information on transit and other alternative transportation modes.

14 Transportation Mitigation

The proposed Project exceeds 14 out of 143 possible data entries, resulting in an 8% exceedance rate. As requested by the TP&T Department, Table 13.a.1 provides a listing of all Planning Board Special Permit Exceedances, and indicates how transportation mitigation measures will or cannot mitigate the Project Exceedances.

TABLE 14.A.1 EXCEEDANCE MITIGATION SUMMARY

#	Location		Reason for Exceedance	Mitigation
	Criteria E-1 Pedestrian Delay			
1 2 3 4	Cambridgepark Drive at Steel Place	East Crosswalk – Evening West Crosswalk – Evening North Crosswalk – Evening South Crosswalk - Evening	Existing and Build PLOS = E. Threshold is PLOS D with the project	Existing PLOS conditions are maintained at this location with the construction of the Project and do not deteriorate in the Build Condition.
5 6 7 8	Alewife Brook Parkway at Rindge Avenue	East Crosswalk – Morning East Crosswalk – Evening South Crosswalk - Morning South Crosswalk - Evening	Existing and Build LOS = E. Threshold is PLOS D with the project.	Existing PLOS conditions are maintained at this location with the construction of the Project and do not deteriorate in the Build Condition.
9 10	Alewife Brook Parkway at Route 2/16	East Crosswalk – Morning East Crosswalk – Evening	Existing and Build LOS = E. Threshold is PLOS D with the project.	Existing PLOS conditions are maintained at this location with the construction of the Project and do not deteriorate in the Build Condition.
11	Cambridgepark Drive at 100 Cambridgepark Drive Driveway	South Crosswalk – Morning	Existing PLOS = A and Build PLOS = B. Threshold is PLOS A with project.	Project consolidates 3 curb cuts into 1. No mitigation proposed.
12 13 14	Steel Place at Alewife Station Access Road (Route 2 Connector)	East Crosswalk - Evening North Crosswalk – Morning North Crosswalk – Evening	Existing and Build LOS = E and F. Threshold is PLOS D with the project.	Existing PLOS conditions are maintained at this location with the construction of the Project and do not deteriorate in the Build Condition.

Planning Board Special Permit Criteria

Criterion A – Project Vehicle Trip Generation

Table A-1 presents the Project vehicle trip generation criterion. Project vehicle trip generation is based on ITE trip rates, adjusted for local mode split and vehicle occupancy rates as discussed above.

TABLE A-1 PROJECT VEHICLE TRIP GENERATION

Time Period	Criteria (trips)	Build*	Exceeds Criteria?
Weekday Daily	2,000	602	No
Weekday Morning Peak Hour	240	63	No
Weekday Evening Peak Hour	240	65	No

** Does not include trips eliminated by elimination of existing site use*

The Project is not expected to exceed the Planning Board Criteria for daily, morning peak, and evening peak Project vehicle trip generation under the Build program.

Criterion B – Vehicle LOS

The criteria for a Project's impact to traffic operations at signalized intersections are summarized in Table B-1 below. These criteria are evaluated for each signalized study-area intersection and presented in Table B-2.

TABLE B-1 CRITERION - VEHICULAR LEVEL OF SERVICE

Existing	With Project
VLOS A	VLOS C
VLOS B, C	VLOS D
VLOS D	VLOS D or 7% roadway volume increase
VLOS E	7% roadway volume increase
VLOS F	5% roadway volume increase

TABLE B-2 VEHICULAR LEVEL OF SERVICE

Intersection	Morning Peak Hour				Evening Peak Hour			
	Existing Condition	Build Condition	Traffic Increase	Exceeds Criterion?	Existing Condition	Build Condition	Traffic Increase	Exceeds Criterion?
Cambridgepark Drive/100 Cambridgepark Drive Driveway	C	C	9%	No	B	B	11%	No
Cambridgepark Drive/Site West (outbound) Driveway	A	-	9%	No	B	-	9%	No
Cambridgepark Drive/Site East (inbound) Driveway	A	-	6%	No	A	-	9%	No
Cambridgepark Drive/Steel Place	C	C	4%	No	C	C	3%	No
Cambridgepark Drive/Alewife Brook Parkway	E	E	1%	No	F	F	1%	No
Alewife Brook Parkway/Rindge Avenue	F	F	1%	No	F	F	1%	No
Steel Place/Alewife Station Access Road (Route 2 Connector)	F	F	0%	No	F	F	0%	No
Fresh Pond Rotary	F	F	1%	No	F	F	1%	No
Alewife Brook Parkway at Route 2/16 – Signal A	B	B	0%	No	B	B	0%	No
Alewife Brook Parkway at Route 2/16 – Signal B	E	E	0%	No	F	F	0%	No
Alewife Brook Parkway at Route 2/16 – Signal C	C	C	3%	No	B	B	0%	No
Alewife Brook Parkway at Route 2/16 – Signal D	B	B	0%	No	A	A	1%	No

Criterion C – Traffic on Residential Streets

This criterion considers the magnitude of Project vehicle trip generation during any peak hour that may reasonably be expected to arrive and/or depart by traveling on a residential street. The criteria, based on a Project-induced traffic volume increase on any two-block residential street segment in the study area, are summarized in Table C-1.

TABLE C-1 CRITERION – TRAFFIC ON RESIDENTIAL STREETS

Parameter 1: Amount of Residential[1]	Parameter 2: Current Peak Hour Street Volume (two-way vehicles)		
	< 150 VPH	150-400 VPH	> 400 VPH
1/2 or more	20 VPH[2]	30 VPH[2]	40 VPH[2]
>1/3 but <1/2	30 VPH[2]	45 VPH[2]	60 VPH[2]
1/3 or less	No Max.	No Max.	No Max

1 - Amount of residential for a two block segment as determined by first floor frontage
2 - Additional Project vehicle trip generation in vehicles per lane, both directions
VPH - Vehicles per hour

15 of the 23 roadway segments in the study area identified as street segments which have more than 1/3 of residential frontage, and are therefore evaluated against the traffic volume criteria. The results are presented in Table C-2.

TABLE C-2 TRAFFIC ON RESIDENTIAL STREETS

			Morning Peak Hour			Evening Peak Hour		
Roadway	Segment	Amount of Residential	Existing[1]	Increase[2]	Exceeds Criteria?	Existing[1]	Increase[2]	Exceeds Criteria?
Cambridgepark Drive	west of 100 Cambridgepark Drive	> 1/3 but <1/2	621	0	No	425	0	No
	between 100 Cambridgepark Drive and Site West Driveway	1/3 or less	736	63	No	574	65	No
	between Site West Driveway and Site East Driveway	1/3 or less	736	63	No	588	51	No
	between Site East Driveway and Steel Place	1/3 or less	754	45	No	587	50	No
	between Steel Place and Alewife Brook Parkway	1/3 or less	979	42	No	1261	46	No
Steel Place	between Cambridgepark Drive and Alewife Station Access Road	1/3 or less	727	3	No	799	2	No

Roadway	Segment	Amount of Residential	Morning Peak Hour Existing[1]	Morning Peak Hour Increase[2]	Morning Peak Hour Exceeds Criteria?	Evening Peak Hour Existing[1]	Evening Peak Hour Increase[2]	Evening Peak Hour Exceeds Criteria?
	north of Alewife Station Access Road	1/3 or less	1099	-7	No	922	2	No
Rindge Avenue	west of Cambridgepark Drive	1/2 or more	948	1	No	813	6	No
Concord Avenue	west of Fresh Pond Rotary	1/3 or less	1765	13	No	1325	14	No
	east of Fresh Pond Rotary	1/3 or less	3550	18	No	3010	19	No
Alewife Brook Parkway	between Fresh Pond Rotary and Rindge Avenue	1/3 or less	3200	31	No	3091	33	No
	between Rindge Avenue and Cambridgepark Drive	1/3 or less	3738	32	No	3503	39	No
	Between Cambridgepark Drive and Route 2/16 Interchange	1/3 or less	3411	10	No	3180	7	No
	north of Route 2/16 Interchange	1/3 or less	2344	12	No	2578	12	No
Route 2	west of Route 2/16 Interchange	1/3 or less	4251	8	No	4558	-5	No
Alewife Station Access Road	between Route 2/16 Interchange and Steel Place	1/3 or less	285	10	No	801	0	No

Note: Volume interpolated from nearest data available in study area

1 Where driveways/on-street parking created a segment inflow/outflow volume imbalance, an average was calculated per direction and added

2 Net new project trips after trip credits are applied

Criterion D – Lane Queue

The criteria for a project's impact to queues at signalized intersections are summarized in Table D-1 below. These criteria are evaluated for each lane group at study-area signalized intersections and presented in Table D-2.

TABLE D-1 CRITERION – VEHICULAR QUEUES AT SIGNALIZED INTERSECTIONS

Existing	With Project
Under 15 vehicles	Under 15 vehicles, or 15+ vehicles with an increase of 6 vehicles
15 or more vehicles	Increase of 6 vehicles

TABLE D-2 LENGTH OF VEHICULAR QUEUES AT SIGNALIZED INTERSECTIONS

Intersection	Lane	Morning Peak Hour			Evening Peak Hour		
		2018 Existing	2018 Build	Exceeds Criteria?	2018 Existing	2018 Build	Exceeds Criteria?
Cambridgepark Drive/Steel Place	Steel Place NB L/T/R	1	1	No	1	1	No
	Steel Place SB L	4	4	No	7	7	No
	Steel Place SB L/T/R	1	1	No	7	7	No
	Cambridgepark Drive EB L/T/R	4	5	No	8	8	No
	Cambridgepark Drive WB L/T	10	11	No	4	5	No
	Cambridgepark Drive WB R	0	0	No	0	0	No
Cambridgepark Drive/Alewife Brook Parkway	Alewife Brook Parkway NB L	4*	5*	No	4*	4*	No
	Alewife Brook Parkway NB T	5*	5*	No	6*	6*	No
	Alewife Brook Parkway SB T	~39	~39	No	~23	~29	No
	Cambridgepark Drive EB	3	3	No	8*	9*	No
Alewife Brook Parkway/Rindge Avenue	Alewife Brook Parkway NB	63*	63*	No	91*	91*	No
	Alewife Brook Parkway SB	7*	4*	No	7*	7*	No
	Rindge Avenue WB L	7	7	No	7*	7*	No
	Rindge Avenue WB R	~18	~19	No	27*	27*	No
Alewife Brook Parkway at Route 2/16	Alewife Brook Parkway NB L	~25	~26	No	~24	~24	No
	Alewife Brook Parkway NB T	4	4	No	3	3	No
	Alewife Brook Parkway SB T	7	7	No	4	4	No
	Alewife Brook Parkway SB R	17	17	No	15	15	No
	Route 2 EB L	~11	~11	No	~11	~11	No
	Route 2 EB R	9	9	No	6	6	No
	Alewife Station Exit Ramp WB T	3	2	No	7	7	No
	Alewife Station Exit Ramp WB R	1	1	No	3	3	No

Note: Synchro provides queue data in feet, the table presents queue data in number of vehicles. As directed by the TIS guidelines 1 vehicle = 25 ft
~Volume exceeds capacity; queue is theoretically infinite.

*SimTraffic results presented instead of Synchro results

Criterion E – Pedestrian and Bicycle Facilities

Criteria 1: Pedestrian Delay

Pedestrian delay is a measure of the pedestrian crossing delay on a crosswalk during the peak hour as determined by the pedestrian level of service analysis in the HCM 2000.

Table E-1 presents the indicators for this criterion. Tables E-2 present the evaluation of PLOS criteria for each crosswalk at study area intersections under existing and full build conditions.

TABLE E-1 CRITERION – PLOS INDICATORS

Existing	With Project
PLOS A	PLOS A
PLOS B	PLOS B
PLOS C	PLOS C
PLOS D	PLOS D or increase of 3 seconds
PLOS E, F	PLOS D

TABLE E-2 STUDY AREA INTERSECTIONS PLOS SUMMARY

		Morning Peak Hour			Evening Peak Hour		
Intersection	**Crosswalk**	**Existing**	**Build**	**Exceeds Criteria?**	**Existing**	**Build**	**Exceeds Criteria?**
Cambridgepark Drive/Steel Place	East	D	D	No	E	E	Yes
	West	D	D	No	E	E	Yes
	North	D	D	No	E	E	Yes
	South	D	D	No	E	E	Yes
Cambridgepark Drive/Alewife Brook Parkway	No pedestrian facilities provided						
Alewife Brook Parkway/Rindge Avenue	East	E	E	Yes	E	E	Yes
	South	E	E	Yes	E	E	Yes
Alewife Brook Parkway at Route 2/16	East	E	E	Yes	E	E	Yes
Cambridgepark Drive/100 Cambridgepark Drive Driveway	South	A	B	Yes	B	B	No
Cambridgepark Drive/Site West (outbound) Driveway	South	A	-	-	A	-	-
Cambridgepark Drive/Site East (inbound) Driveway	West	F	-	-	E	-	-
	South	A	-	-	A	-	-
Steel Place/Alewife Station Access Road (Route 2 Connector)	East	B	B	No	E	E	Yes
	West	A	A	No	A	A	No
	North	F	F	Yes	E	E	Yes

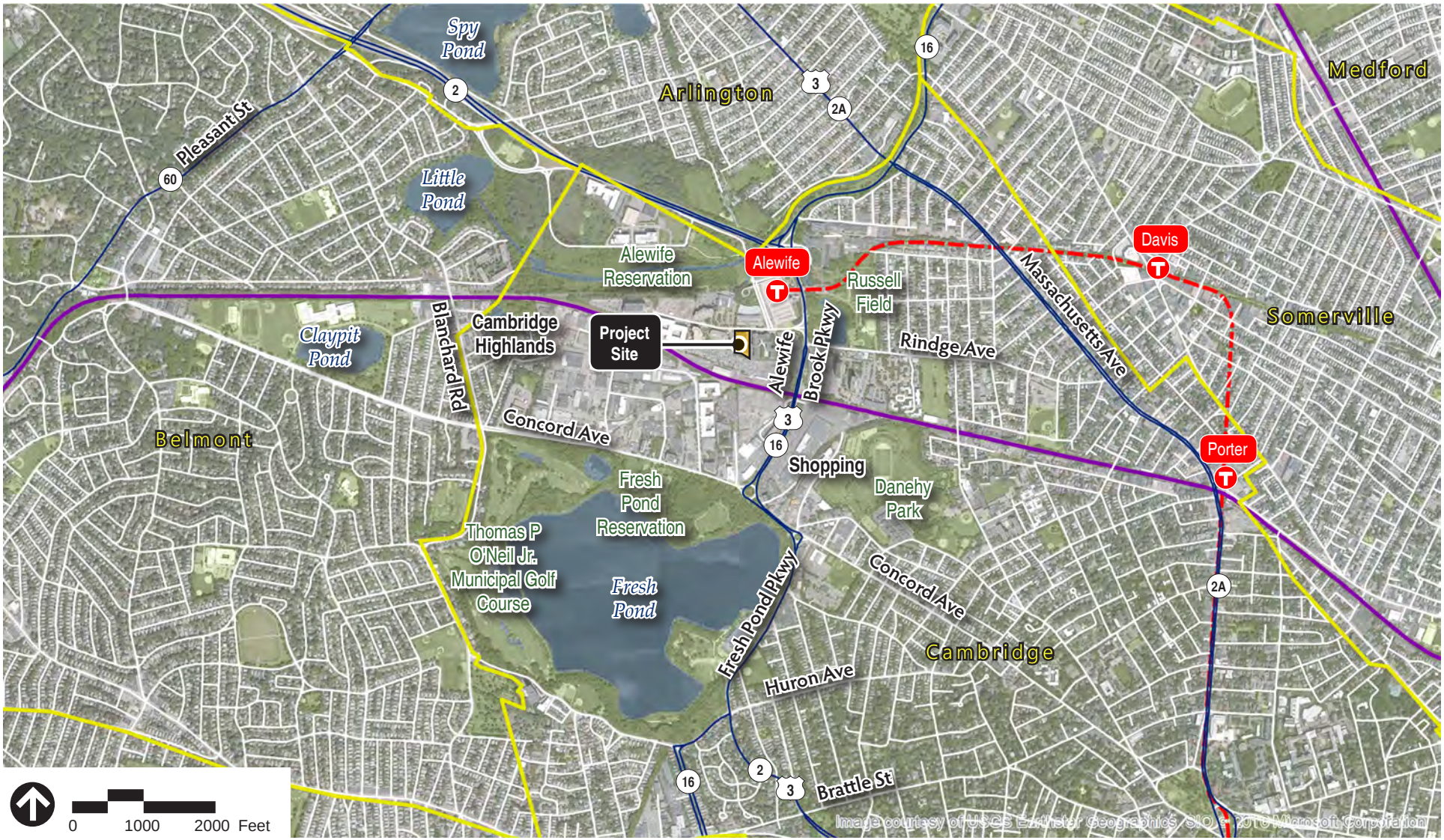
Criteria 2 & 3: Safe Pedestrian and Bicycle Facilities

Safe pedestrian and bicycle facilities are off-road or non-street bicycle lanes and sidewalks that are along a publicly-accessible street.

Table E-3 presents the indicators for this criterion. The evaluation of sidewalks or walkways and bicycle facilities are displayed.

TABLE E-3 PEDESTRIAN AND BICYCLE FACILITIES

Adjacent Street	Link (between)	Sidewalk or Walkway Present	Exceeds Criteria?	Bicycle Facilities or Right of Ways Present	Exceeds Criteria?
Cambridgepark Drive	Site Driveway	Yes	No	Yes	No



Source: Bing Aerial

Key Regional Roadways
MBTA Red Line
MBTA Commuter Rail

Figure A

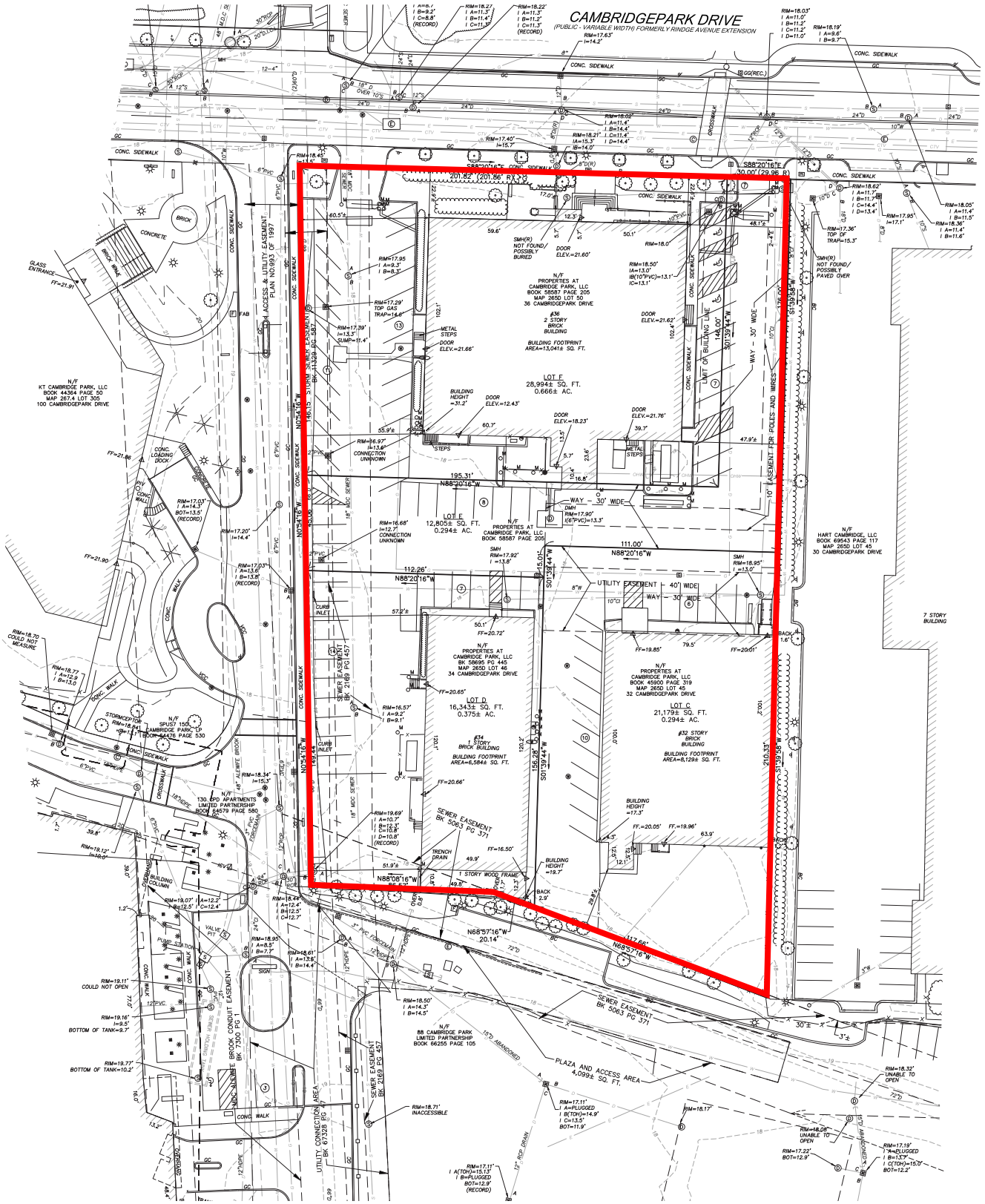
Site Location Map

The Residences at 50 Cambridgepark Drive
Cambridge, Massachusetts

Source: World Aerial

Figure B
Project Site

The Residences at 50 Cambridgepark Drive
Cambridge, Massachusetts



Source: BSC Group

Figure C

Existing Conditions Site Plan

The Residences at 50 Cambridgepark Drive
Cambridge, Massachusetts

Source: BSC Group

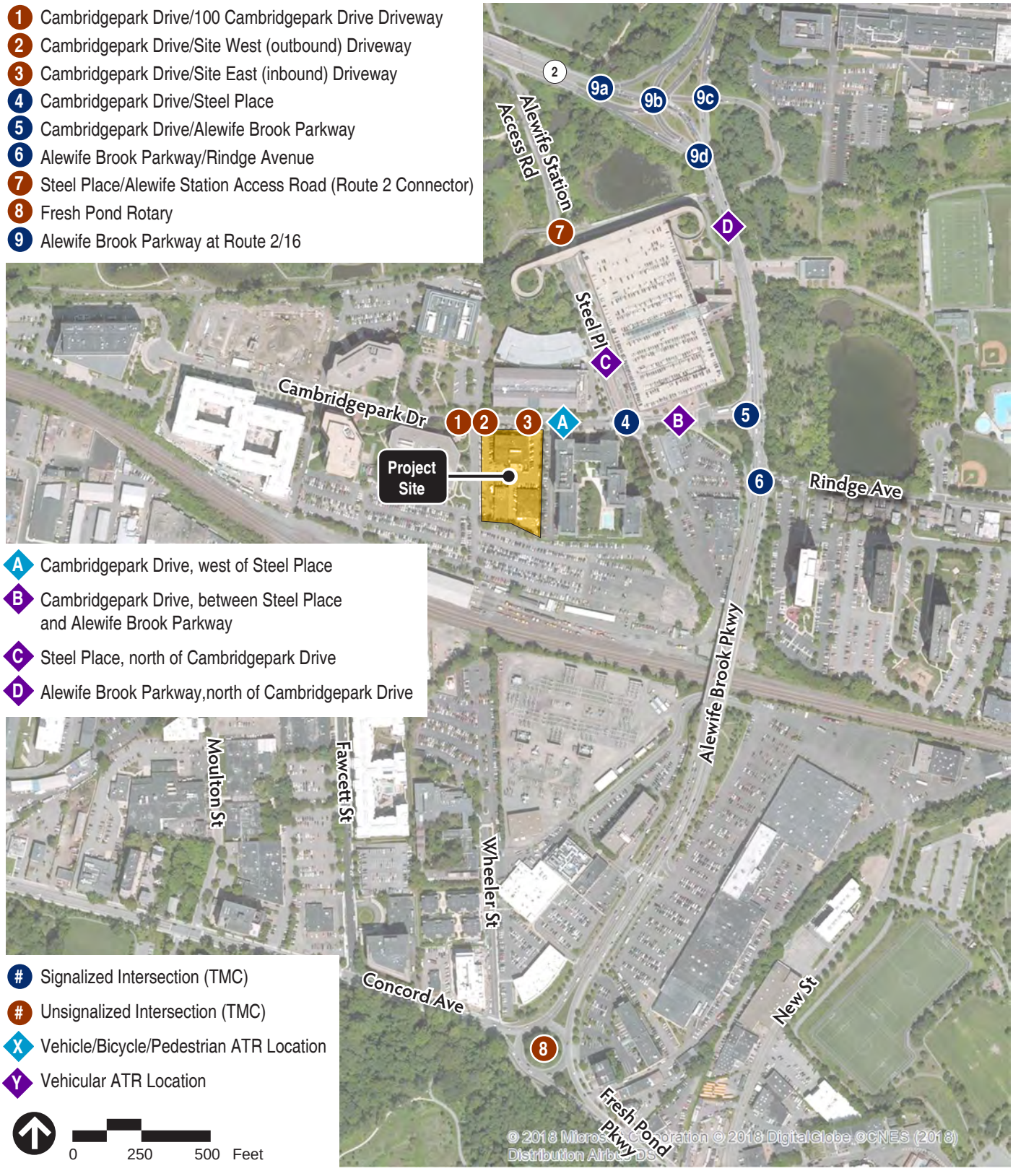
▲ Pedestrian Access

▲ Vehicle Access

Figure D

Proposed Site Plan

The Residences at 50 Cambridgepark Drive
Cambridge, Massachusetts



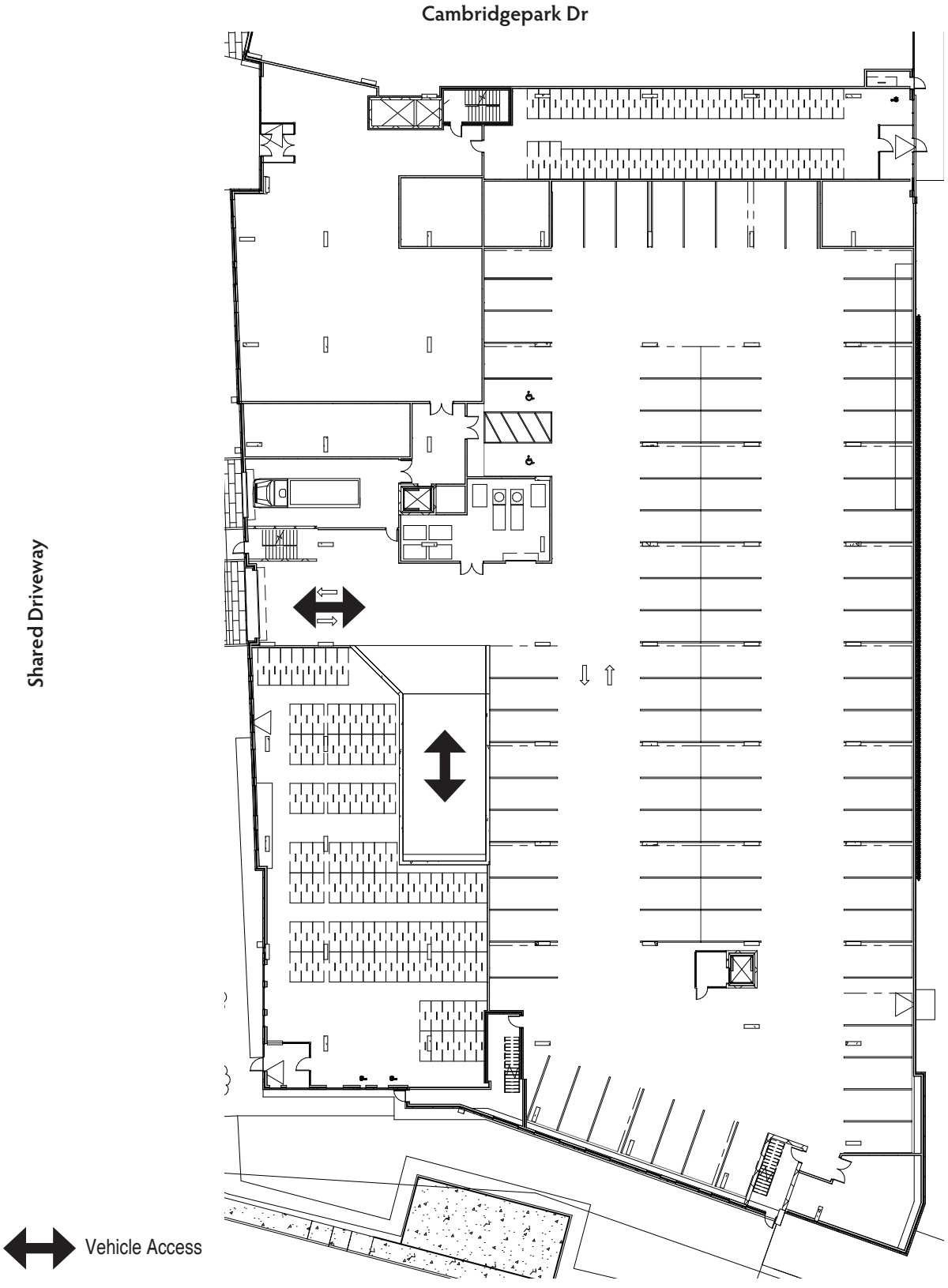
Source: Bing Aerial

Turning Movement Conut = TMC
Automatic Traffic Recorder = ATR

Figure E

TIS Study Area Intersections

The Residences at 50 Cambridgepark Drive
Cambridge, Massachusetts

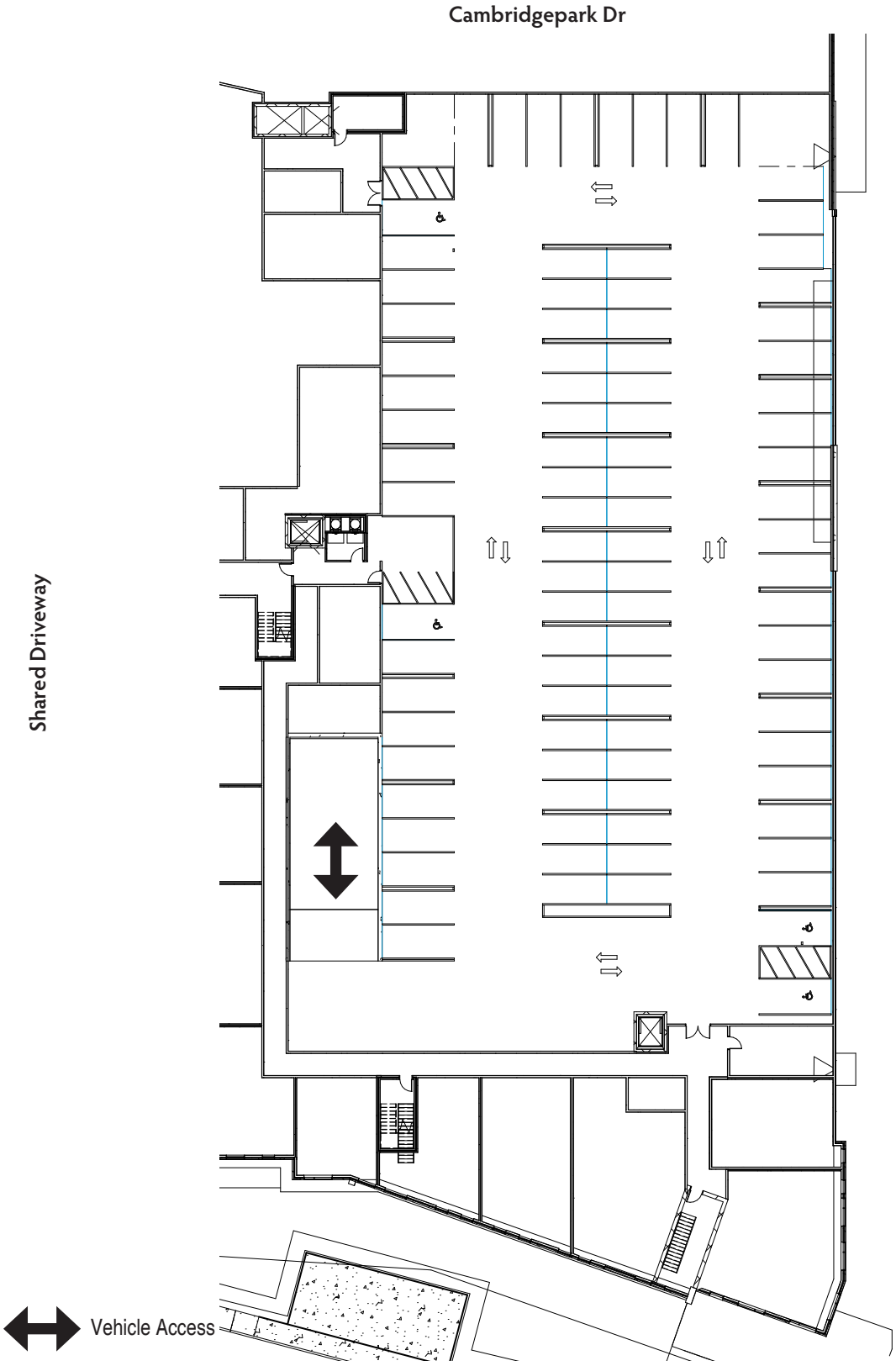


Source: Cube 3 Studio

Figure F.1

Proposed Vehicular Parking Plans
Ground Floor

The Residences at 50 Cambridgepark Drive
Cambridge, Massachusetts



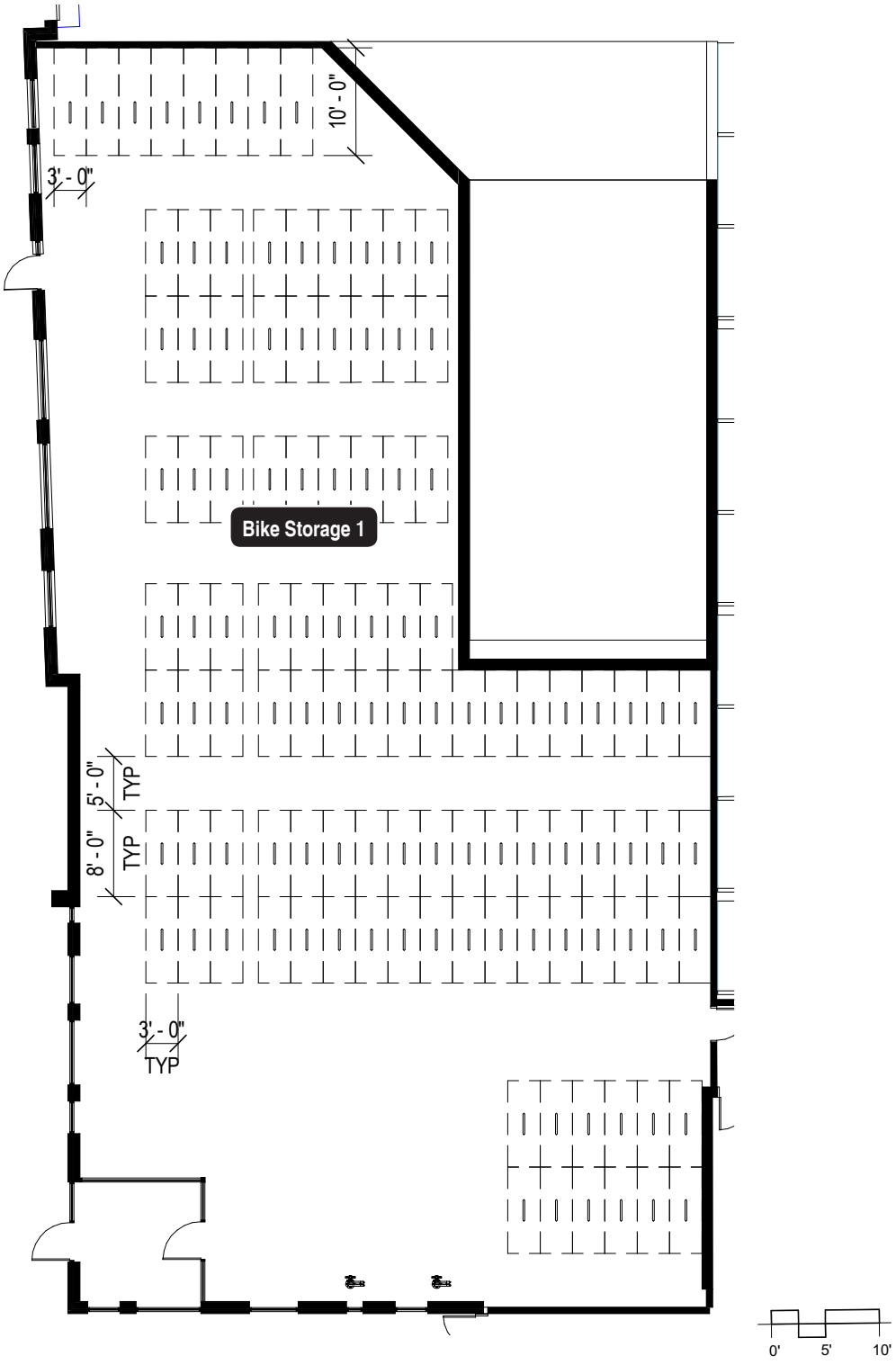
Source: Cube 3 Studio

Figure F.2

Proposed Vehicualr Parking Plans
Second Floor

The Residences at 50 Cambridgepark Drive
Cambridge, Massachusetts

Cambridgepark Dr

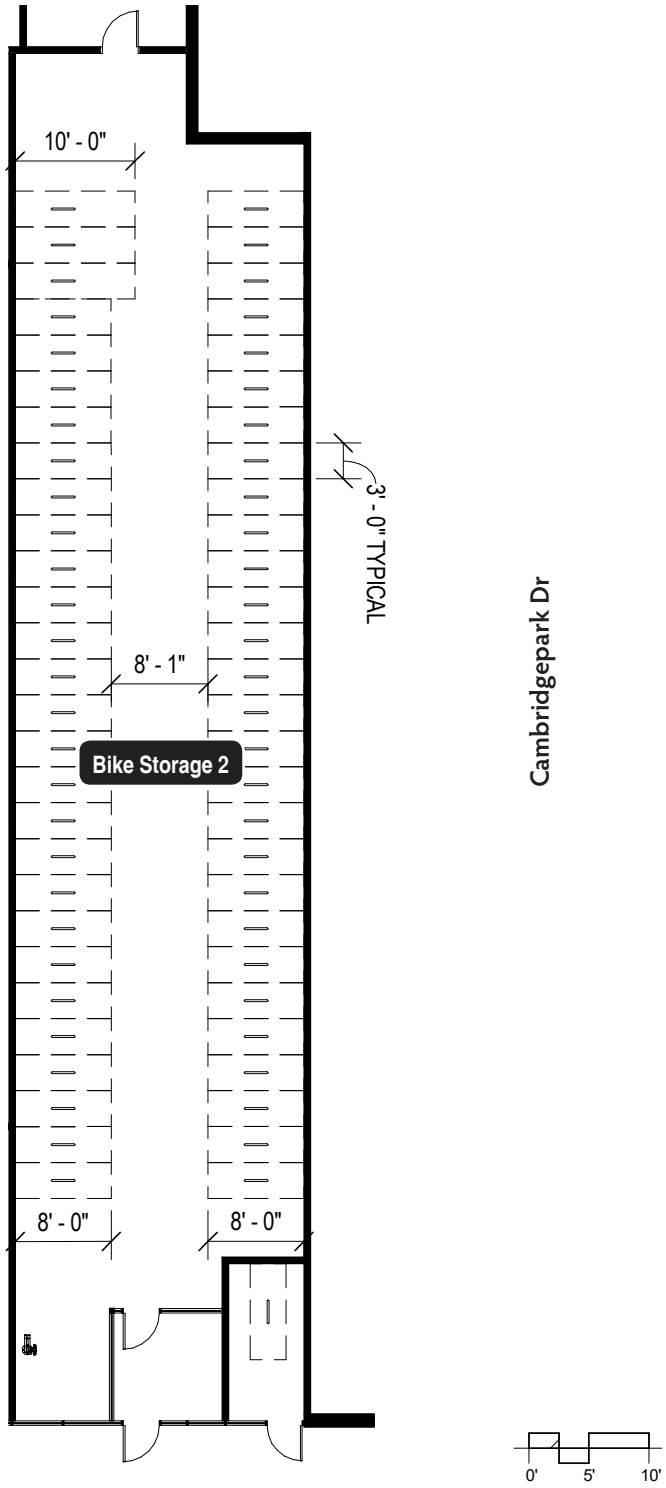


Source: Cube 3 Studio

Figure G.1

Proposed Long-Term Bike Parking

The Residences at 50 Cambridgepark Drive
Cambridge, Massachusetts



Source: Cube 3 Studio

Figure G.2

Proposed Long-Term Bike Parking

The Residences at 50 Cambridgepark Drive
Cambridge, Massachusetts

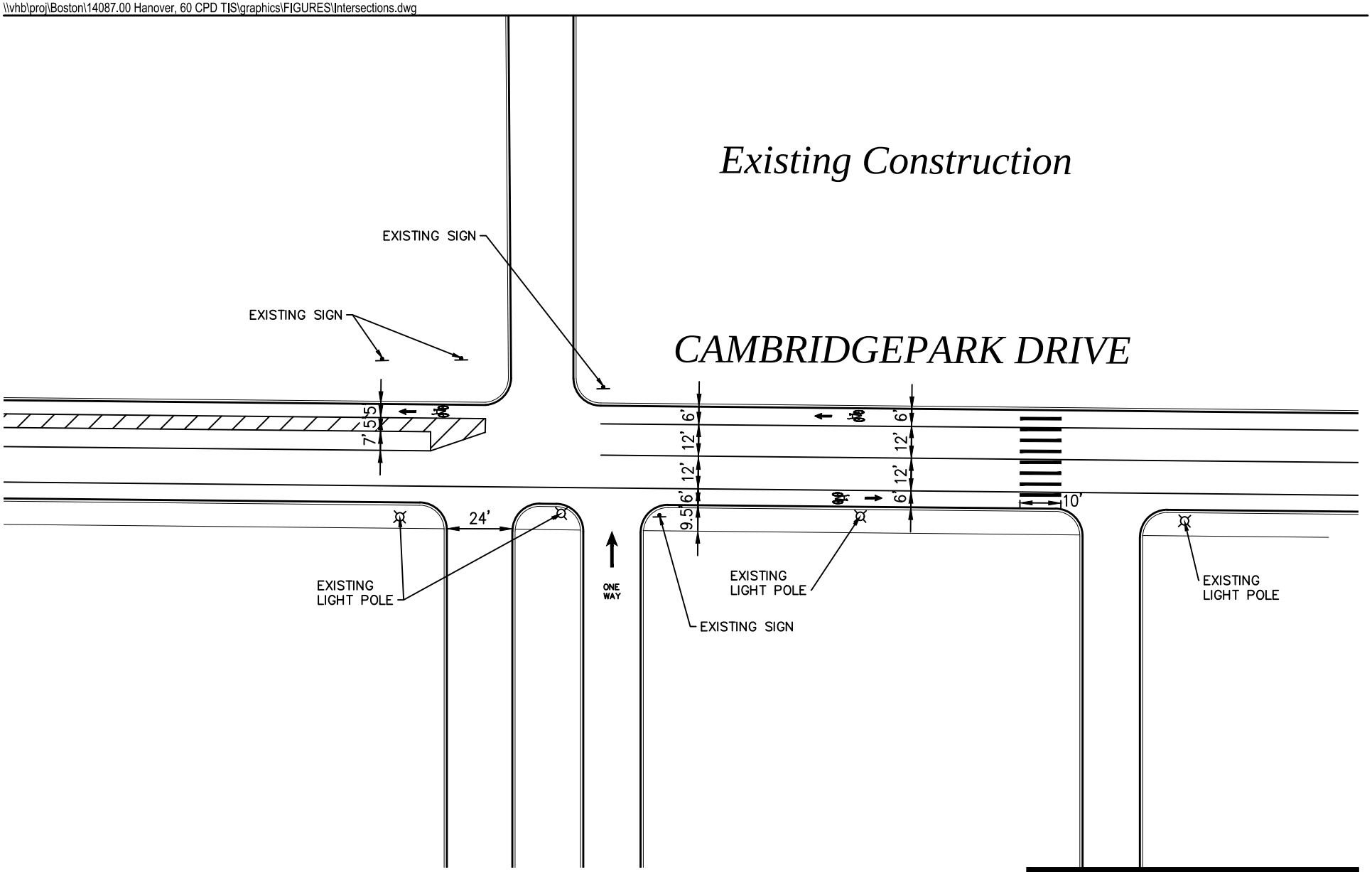
Short-Term Bicycle Spaces

Source: Cube 3 Studio

Figure G.3

Proposed Short-Term Bike Parking

The Residences at 50 Cambridgepark Drive
Cambridge, Massachusetts



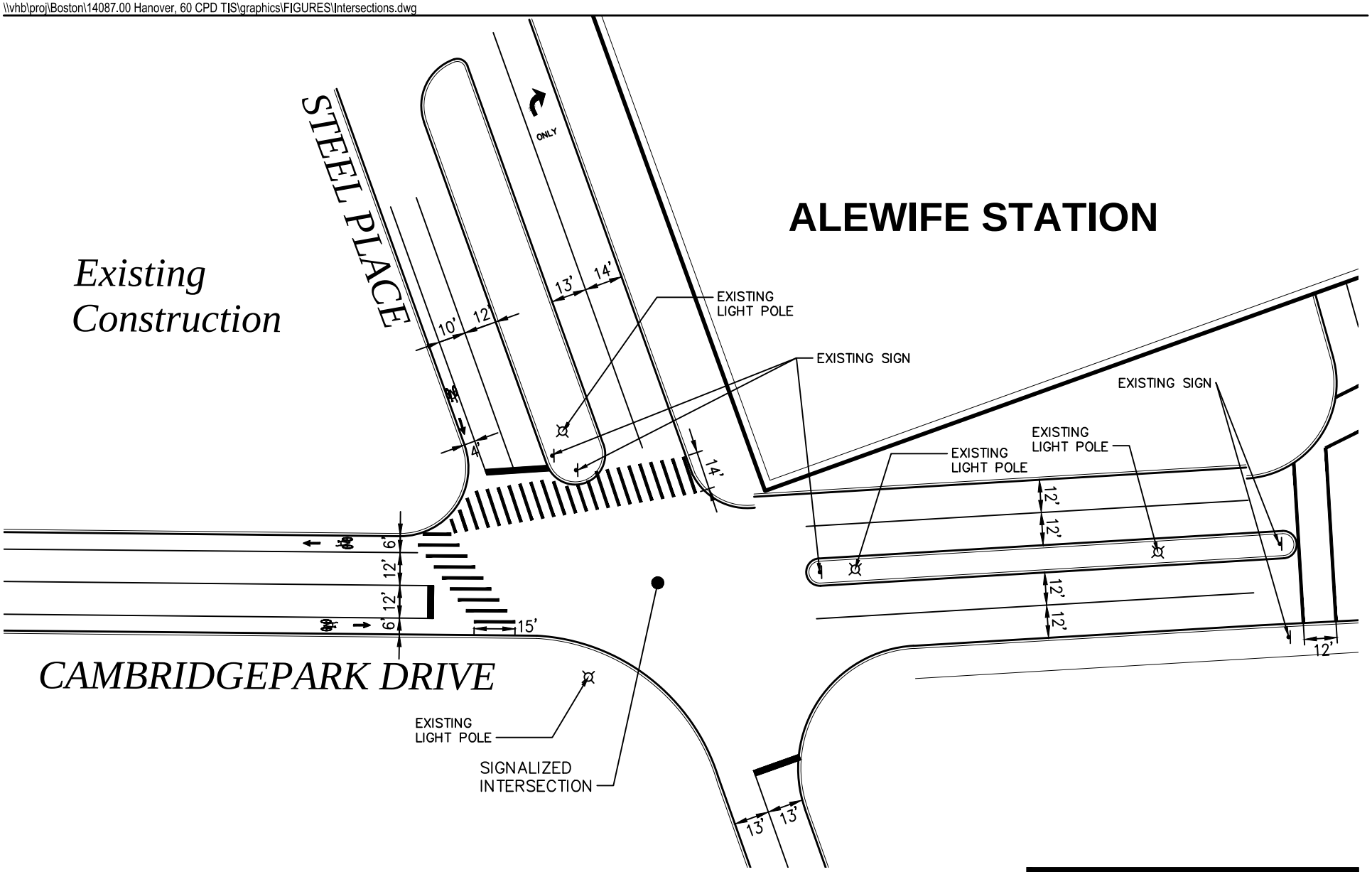
0 25 50 Feet

Vanasse Hangen Brustlin, Inc.

Figure 1.B.1

Cambridgepark Drive at
100 Cambridgepark Drive and Site Entrance

50 Cambridgepark Drive
Cambridge, Massachusetts



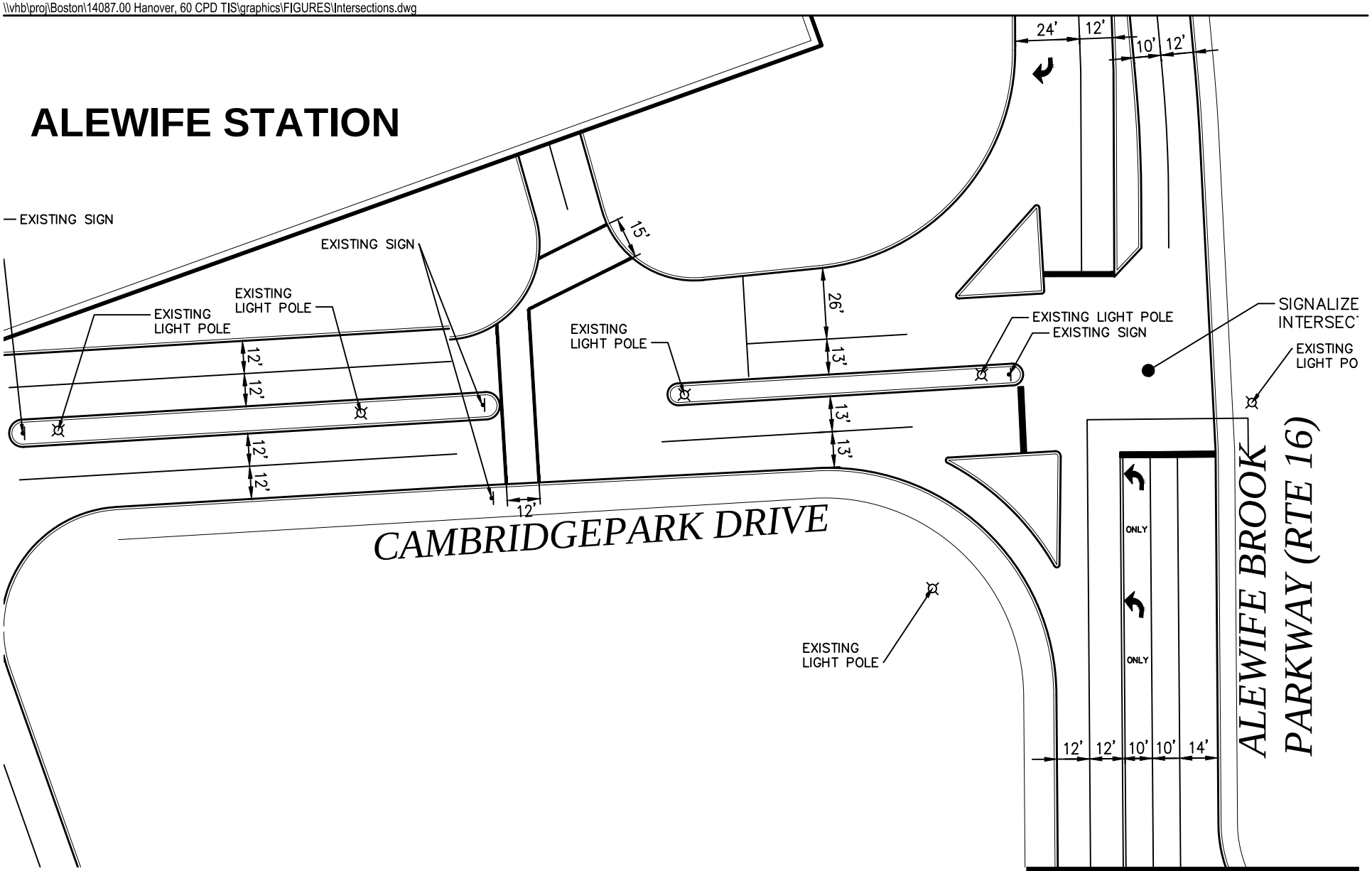
0 25 50 Feet

Vanasse Hangen Brustlin, Inc.

Figure 1.B.2

Cambridgepark Drive at
Steel Place

50 Cambridgepark Drive
Cambridge, Massachusetts

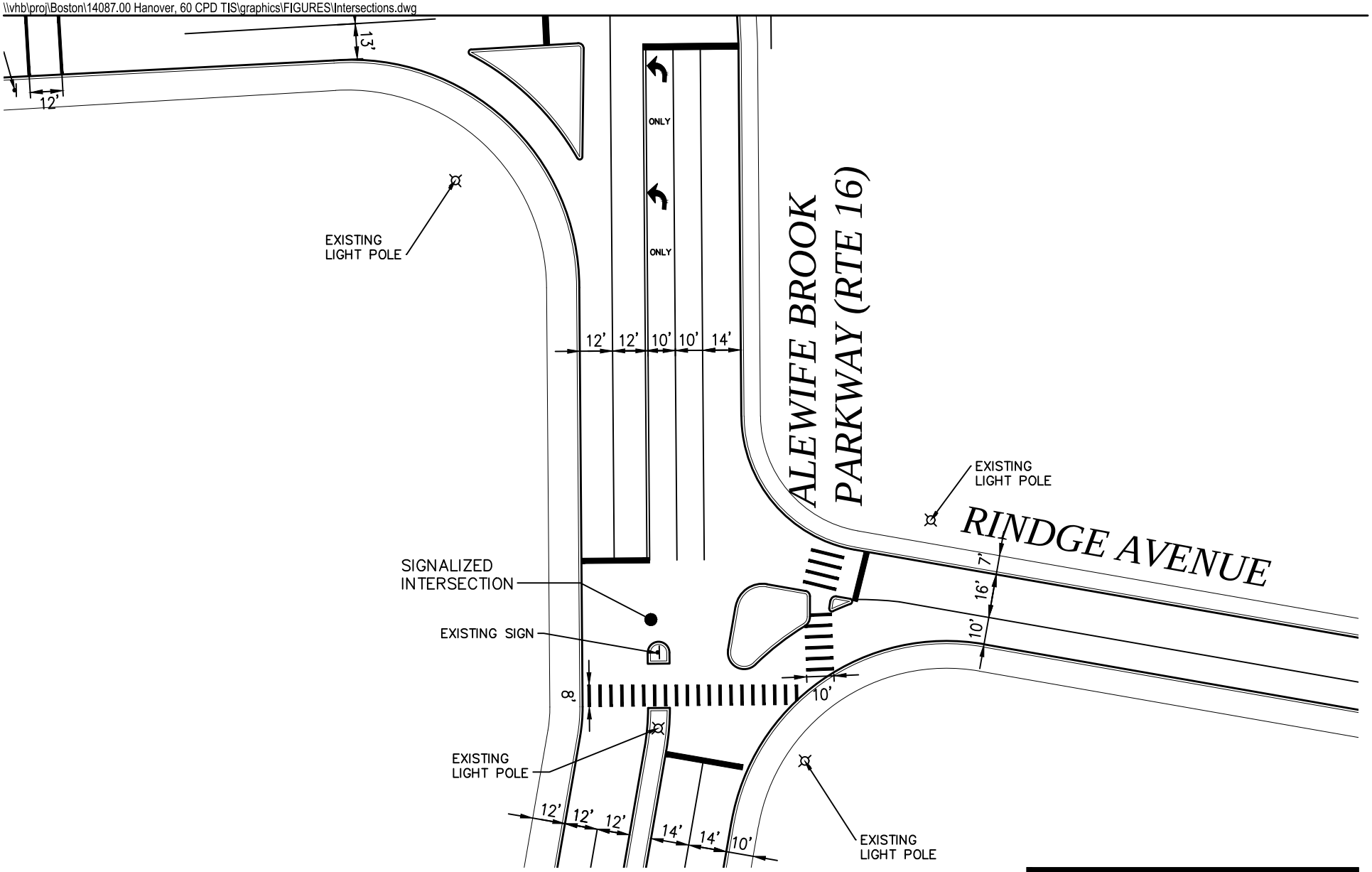


Vanasse Hangen Brustlin, Inc.

Figure 1.B.3

Cambridgepark Drive at
Alewife Brook Parkway

50 Cambridgepark Drive
Cambridge, Massachusetts



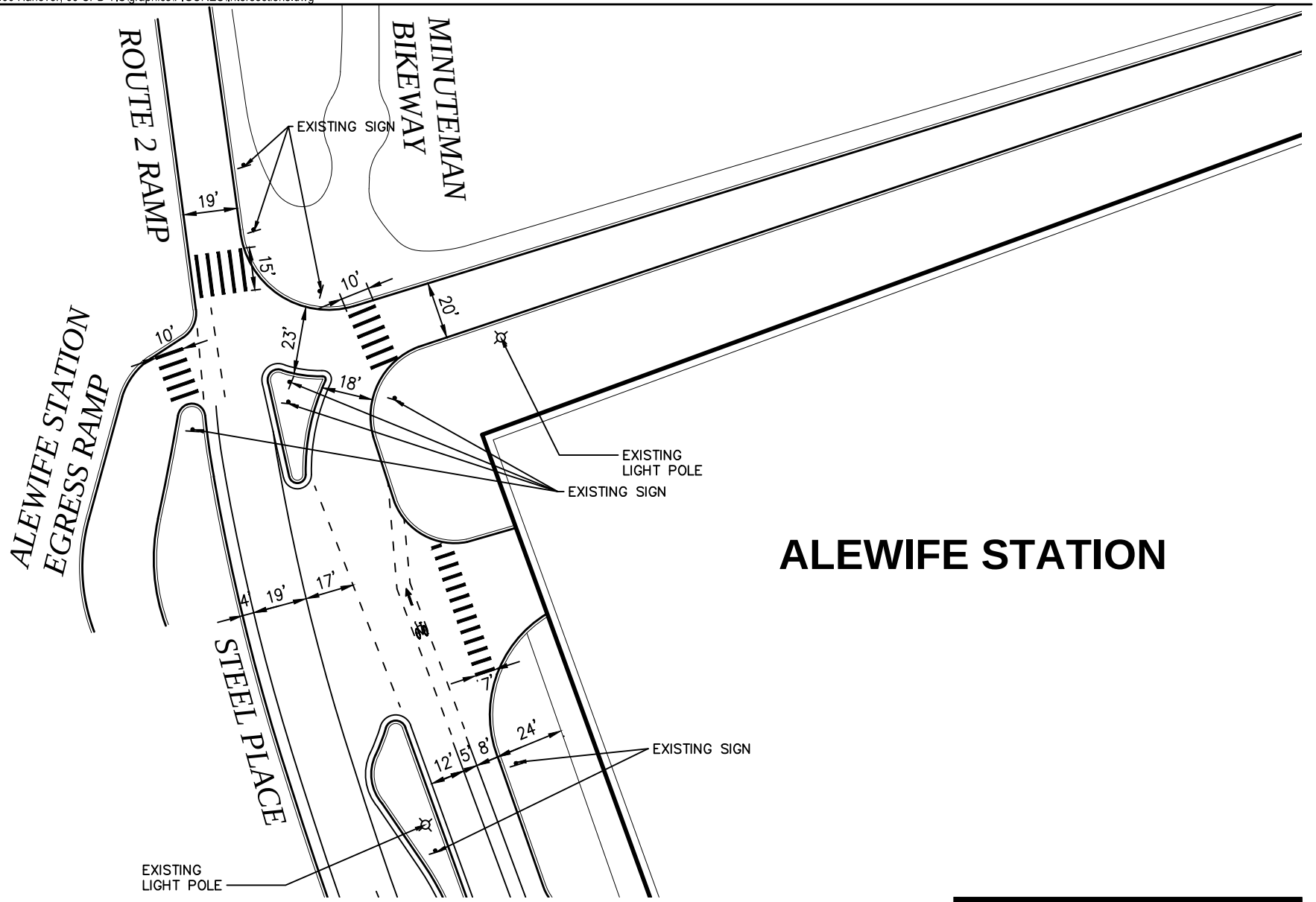
0 25 50 Feet

Vanasse Hangen Brustlin, Inc.

Figure 1.B.4

Cambridgepark Drive at
Rindge Avenue

50 Cambridgepark Drive
Cambridge, Massachusetts



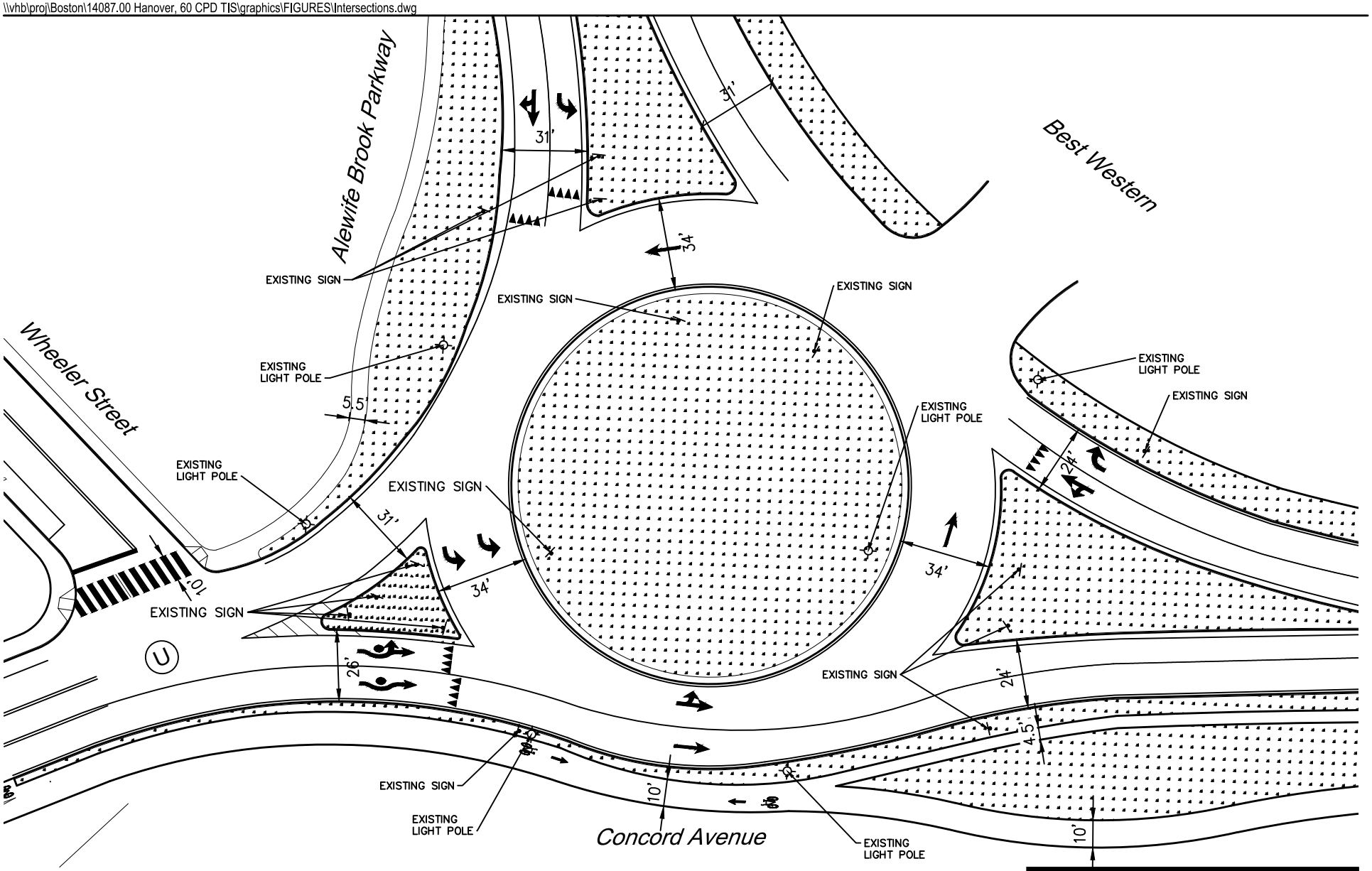
ALEWIFE STATION

0 25 50 Feet

Vanasse Hangen Brustlin, Inc.

Figure 1.B.5

Steel Place at
Alewife Station Access Road
(Route 2 Connector)
50 Cambridgepark Drive
Cambridge, Massachusetts



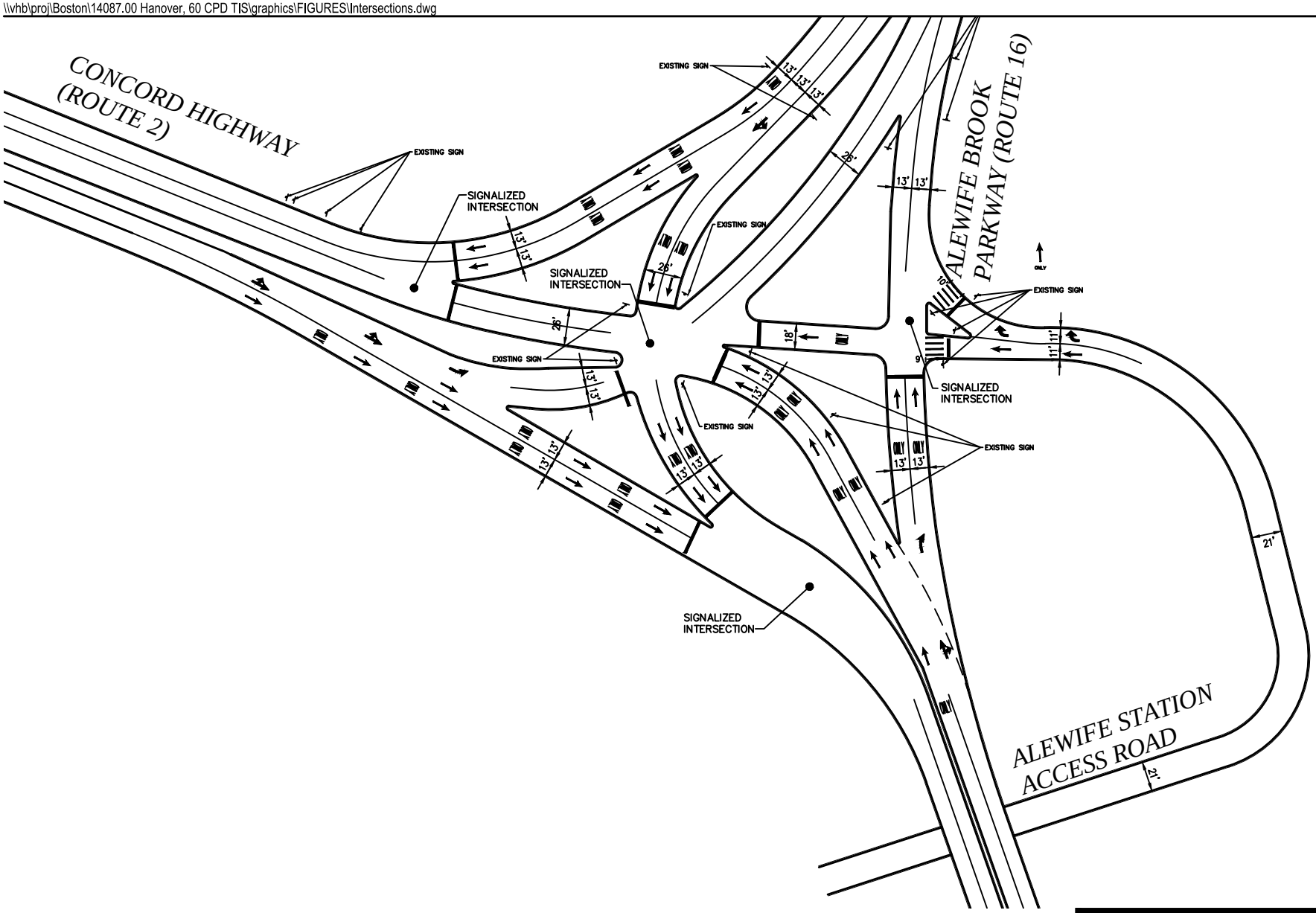
0 25 50 Feet

Vanasse Hangen Brustlin, Inc.

Figure 1.B.6

Fresh Pond Rotary

50 Cambridgepark Drive
Cambridge, Massachusetts



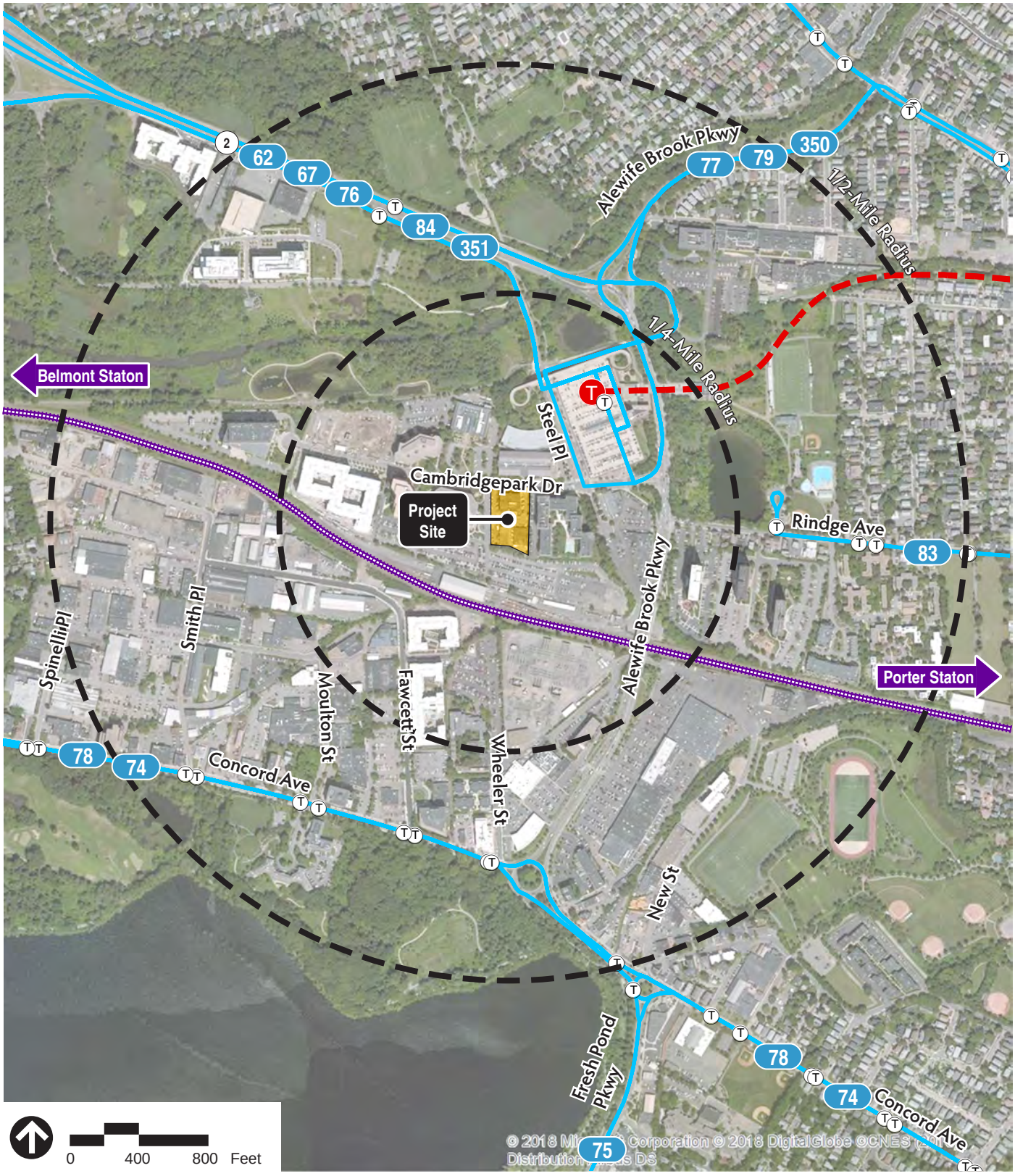
0 50 100 Feet

Vanasse Hangen Brustlin, Inc.

Figure 1.B.7

Alewife Brook Parkway at
Route 2/16

50 Cambridgepark Drive
Cambridge, Massachusetts

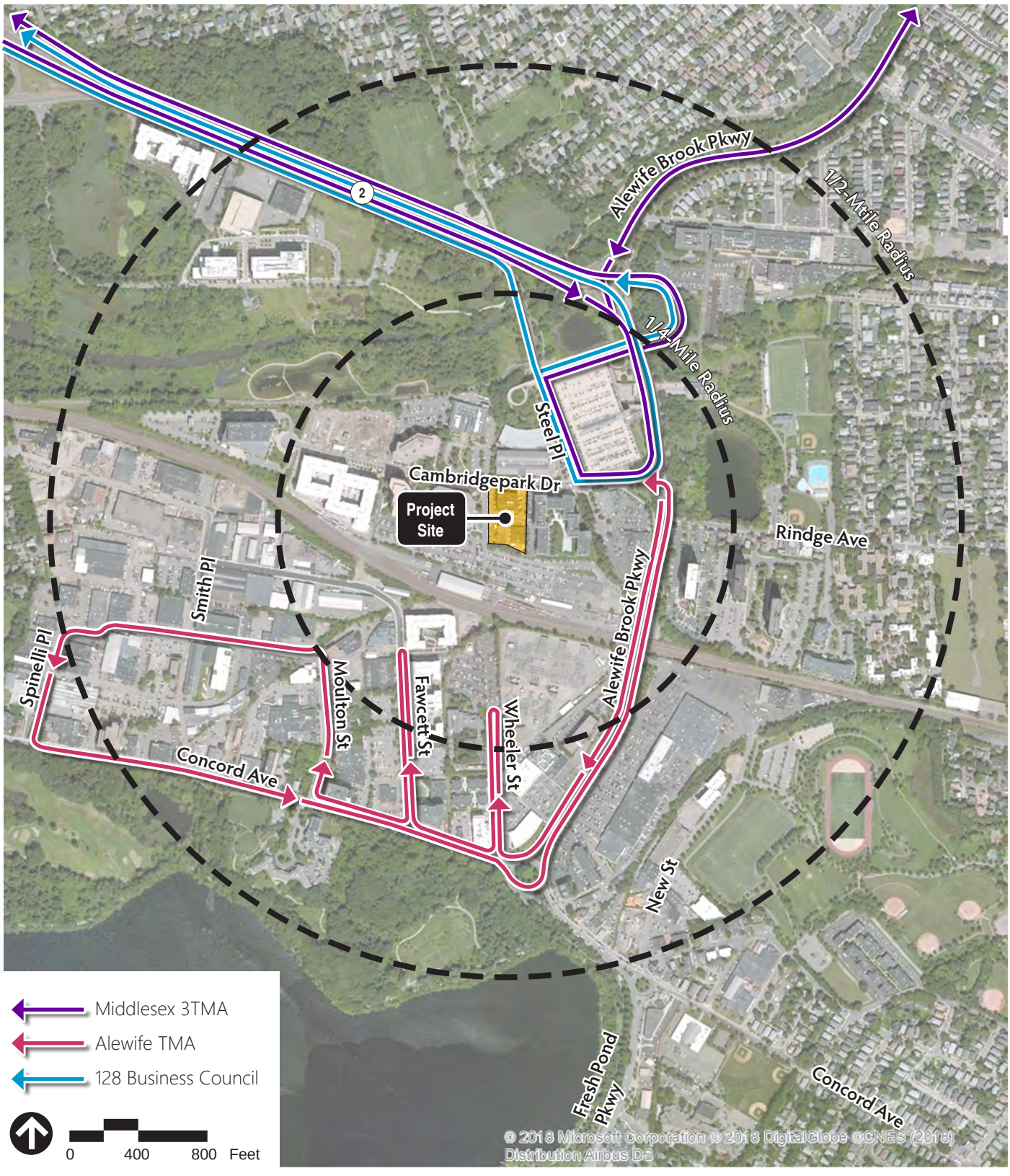


Source: Bing Aerial, MBTA

Figure 1.d.1

Public Transit

The Residences at 50 Cambridgepark Drive
Cambridge, Massachusetts



Source: Bing Aerial, Alewifetma.org

Figure 1.d.2

Private Transit Services

The Residences at 50 Cambridgepark Drive
Cambridge, Massachusetts

Source: Bing Aerial, Hubway.com, Zipcar.com

Figure 1.d.3

Bike and Car Sharing Services

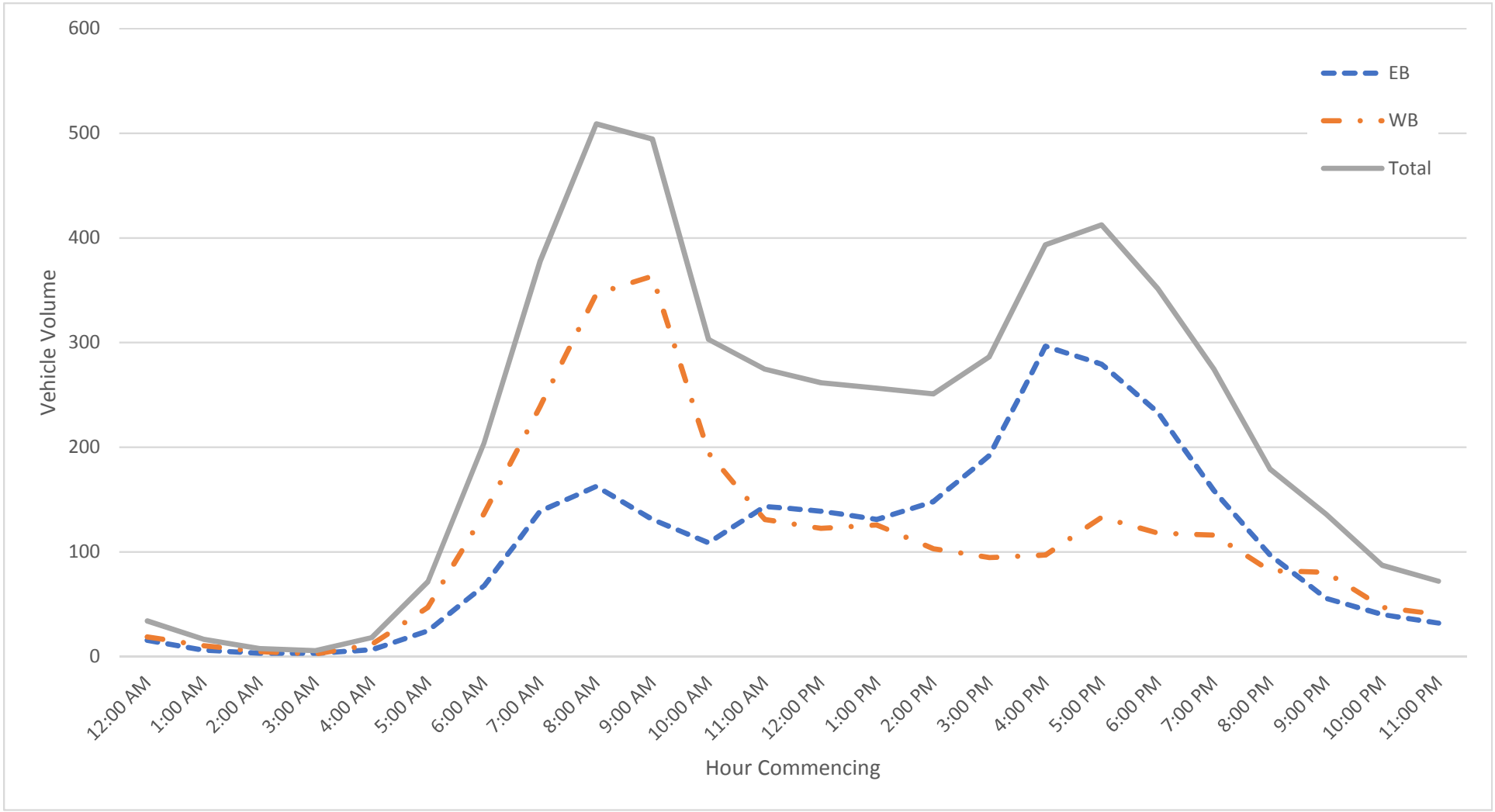
The Residences at 50 Cambridgepark Drive
Cambridge, Massachusetts

Source: Bing Aerial 2014, City of Cambridge GIS

Figure 1.e.1

Current Land Use

The Residences at 50 Cambridgepark Drive
Cambridge, Massachusetts

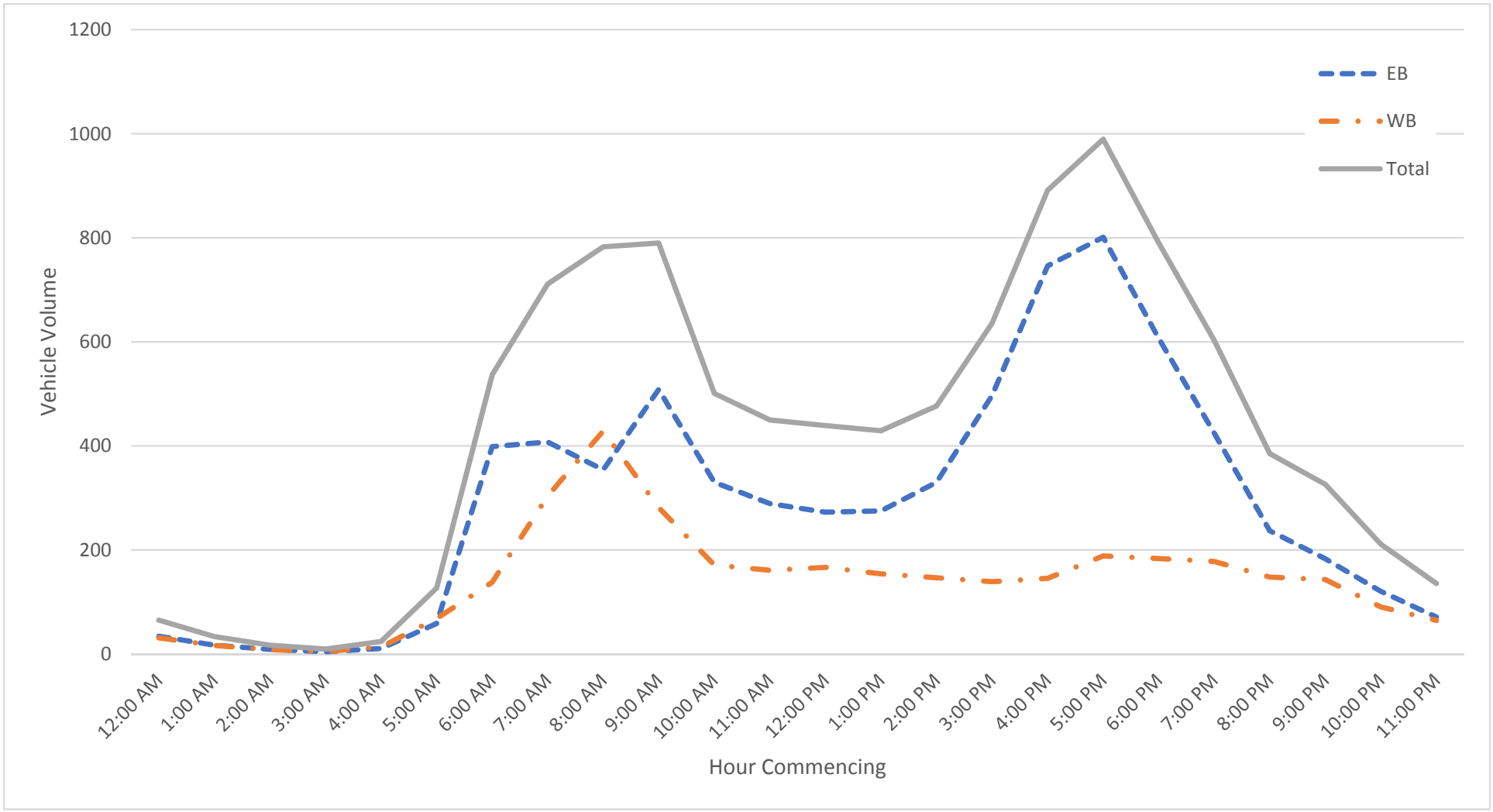


Note: Vehicle volumes are the average volume from the 48-hour ATR collected on Nov 15 and 16, 2017

Figure 2.a.1

Cambridgepark Drive, West of Steel Place
Daily ATR Summary

The Residences at 50 Cambridgepark Drive
Cambridge, Massachusetts

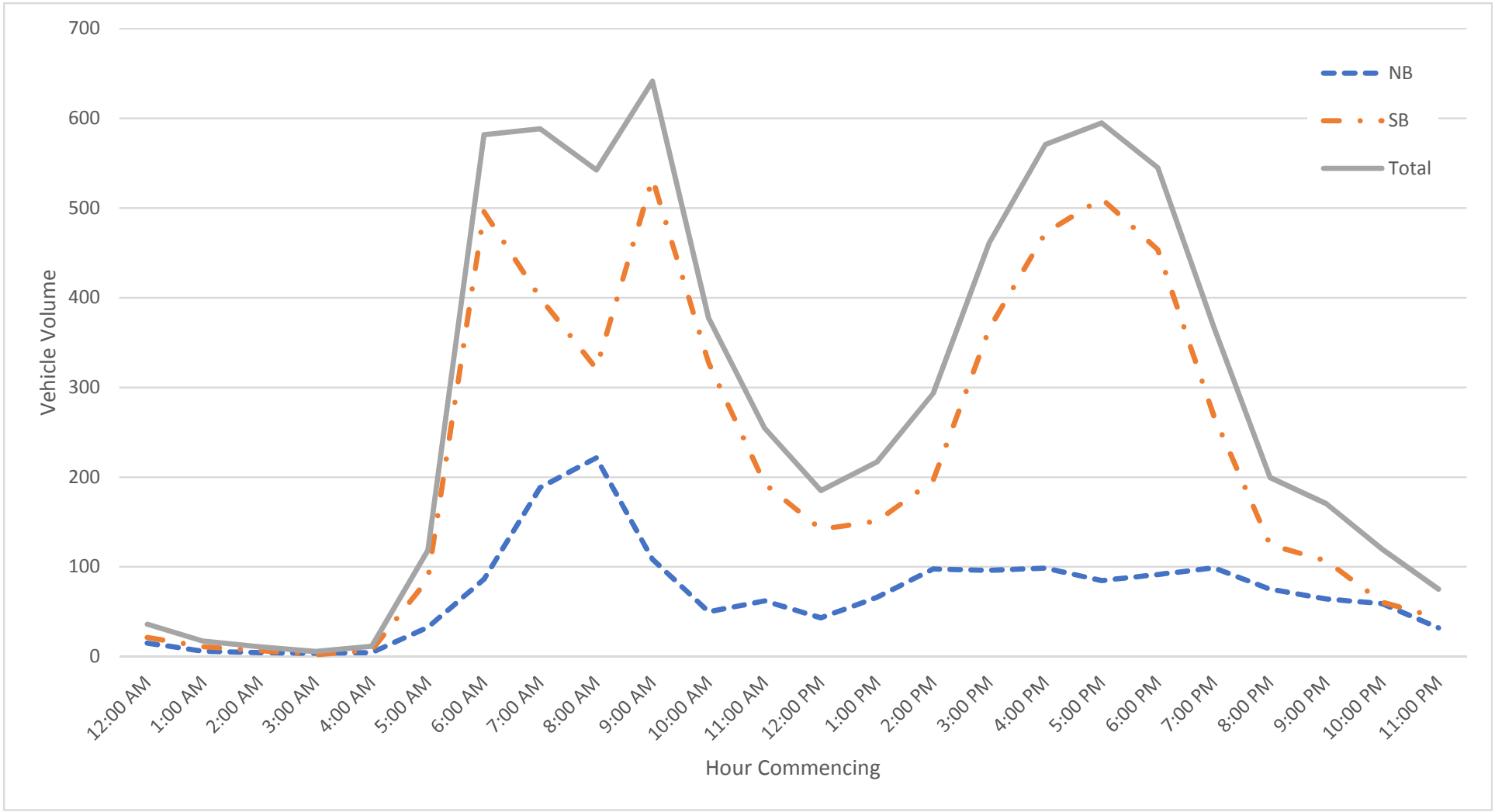


Note: Vehicle volumes are the average volume from the 48-hour ATR collected on Nov 15 and 16, 2017

Figure 2.a.2

Cambridgepark Drive, East of Steel Place
Daily ATR Summary

The Residences at 50 Cambridgepark Drive
Cambridge, Massachusetts

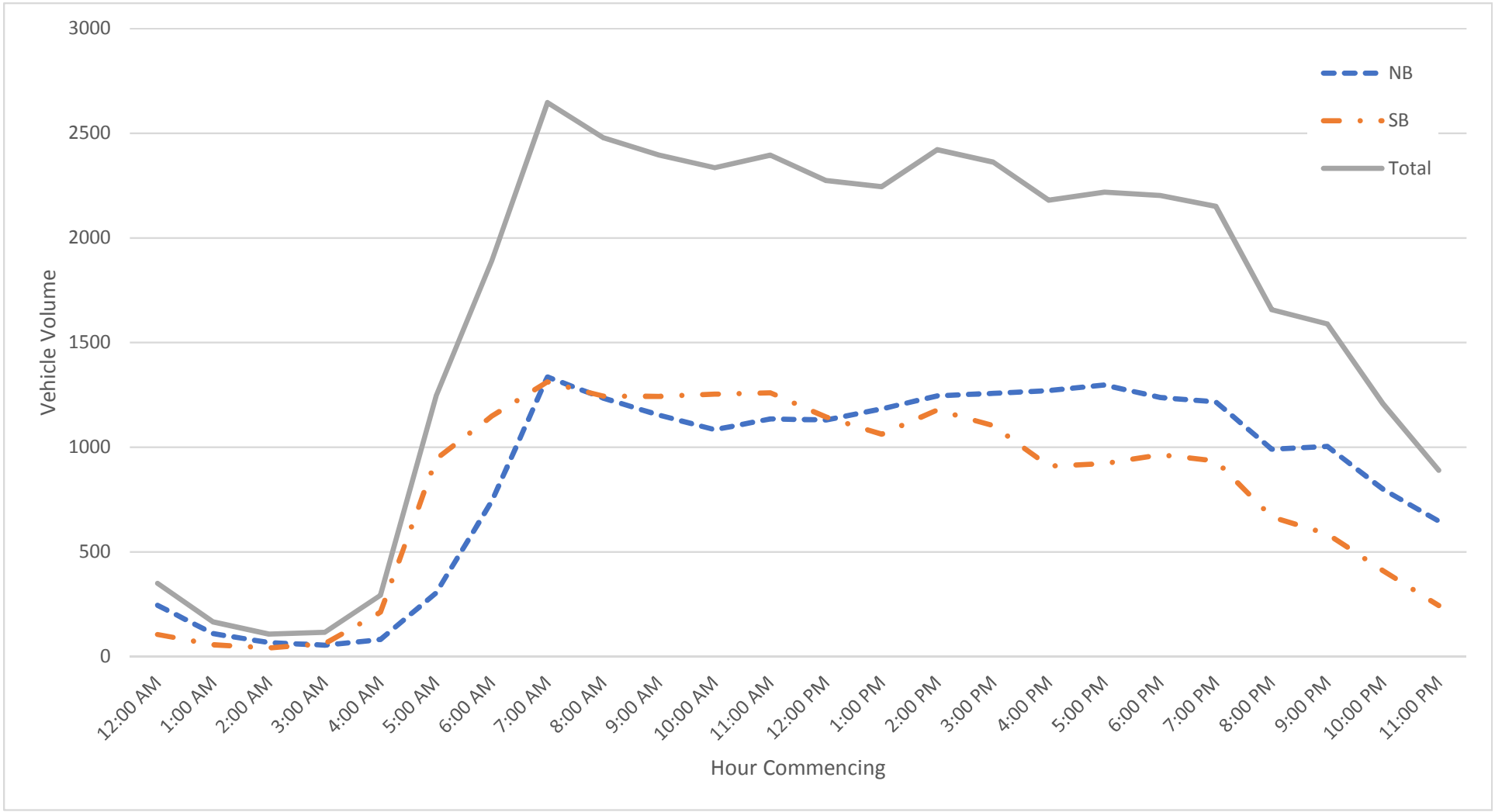


Note: Vehicle volumes are the average volume from the 48-hour ATR collected on Nov 15 and 16, 2017

Figure 2.a.3

Steel Place, North of Cambridgepark Drive
Daily ATR Summary

The Residences at 50 Cambridgepark Drive
Cambridge, Massachusetts

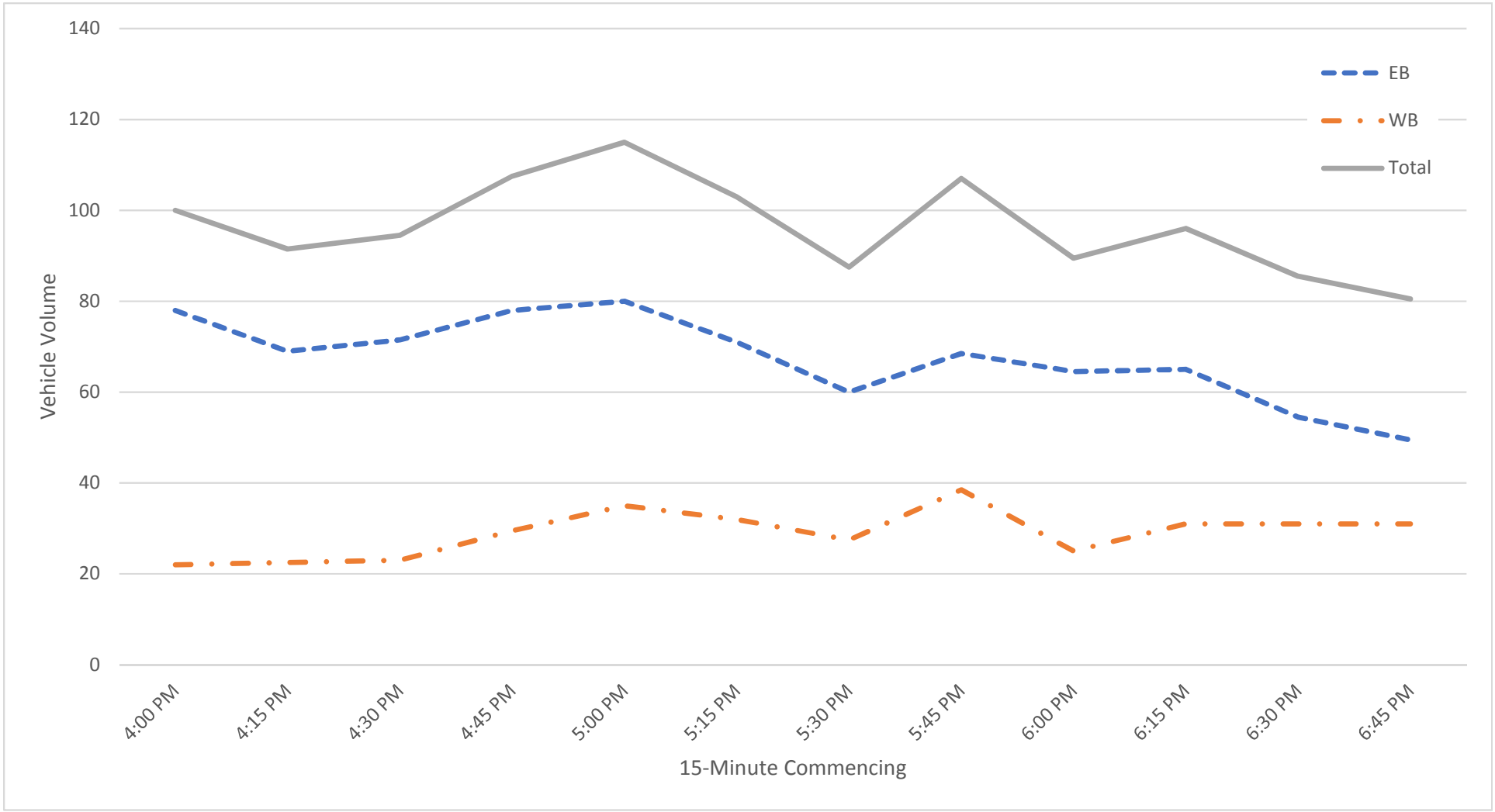


Note: Vehicle volumes are the average volume from the 48-hour ATR collected on Nov 15 and 16, 2017

Figure 2.a.4

Alewife Brook Parkway, North of Cambridgepark Drive-
Daily ATR Summary

The Residences at 50 Cambridgepark Drive
Cambridge, Massachusetts

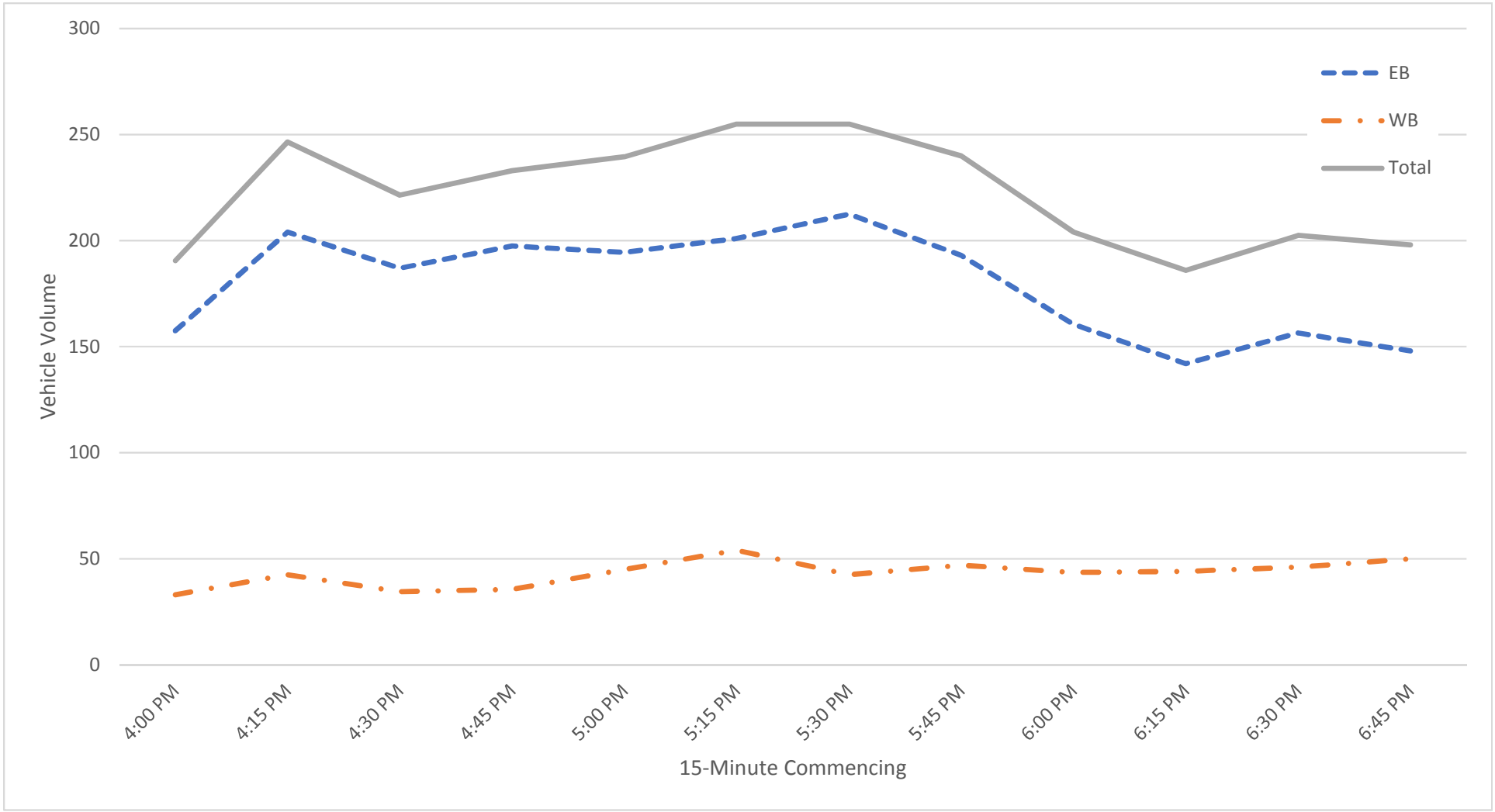


Note: Vehicle volumes are the average volume from the 48-hour ATR collected on Nov 15 and 16, 2017

Figure 2.a.5

Cambridgepark Drive, West of Steel Place
PM Peak Period Summary

The Residences at 50 Cambridgepark Drive
Cambridge, Massachusetts

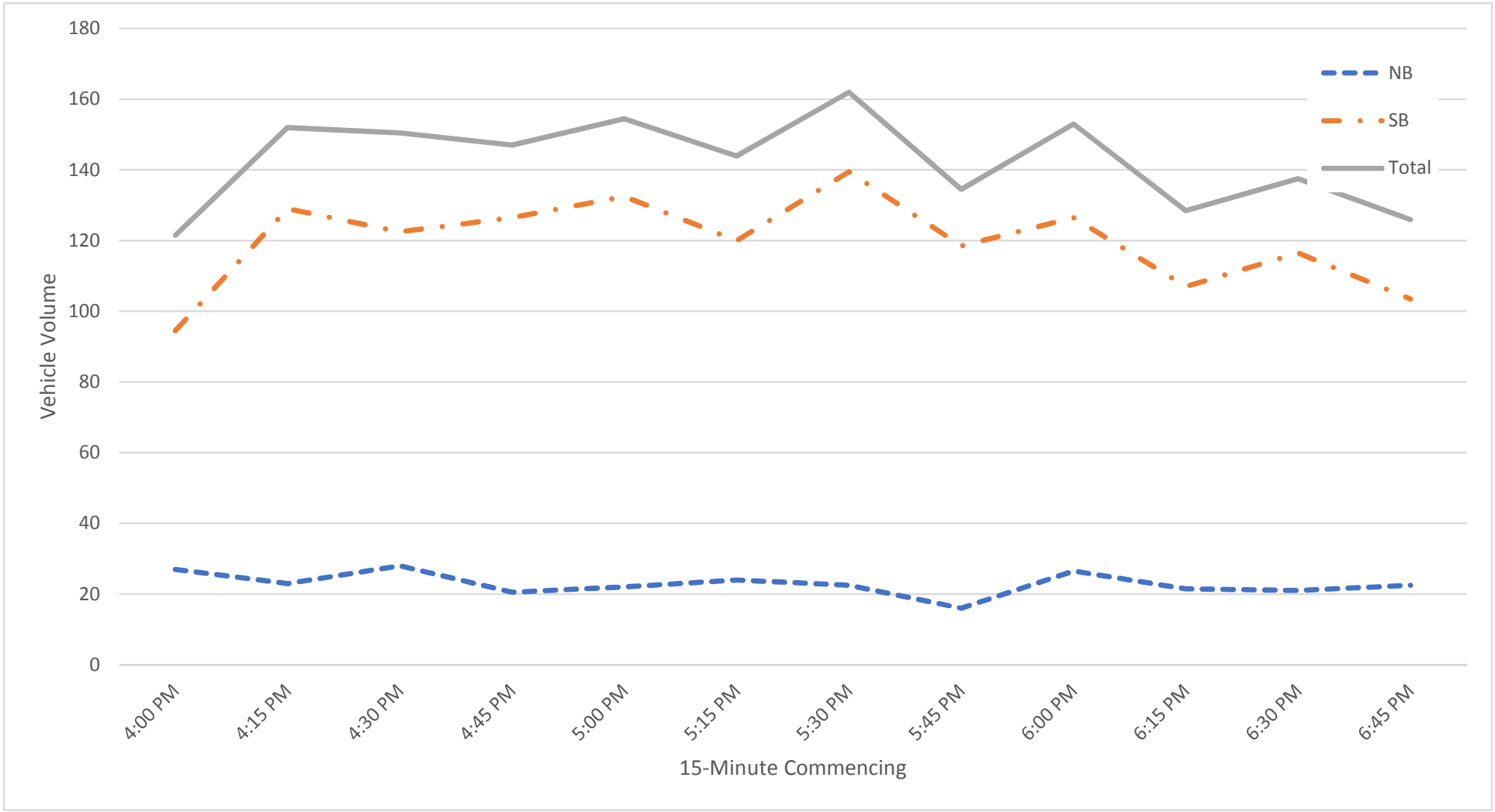


Note: Vehicle volumes are the average volume from the 48-hour ATR collected on Nov 15 and 16, 2017

Figure 2.a.6

Cambridgepark Drive, East of Steel Place
PM Peak Period Summary

The Residences at 50 Cambridgepark Drive
Cambridge, Massachusetts

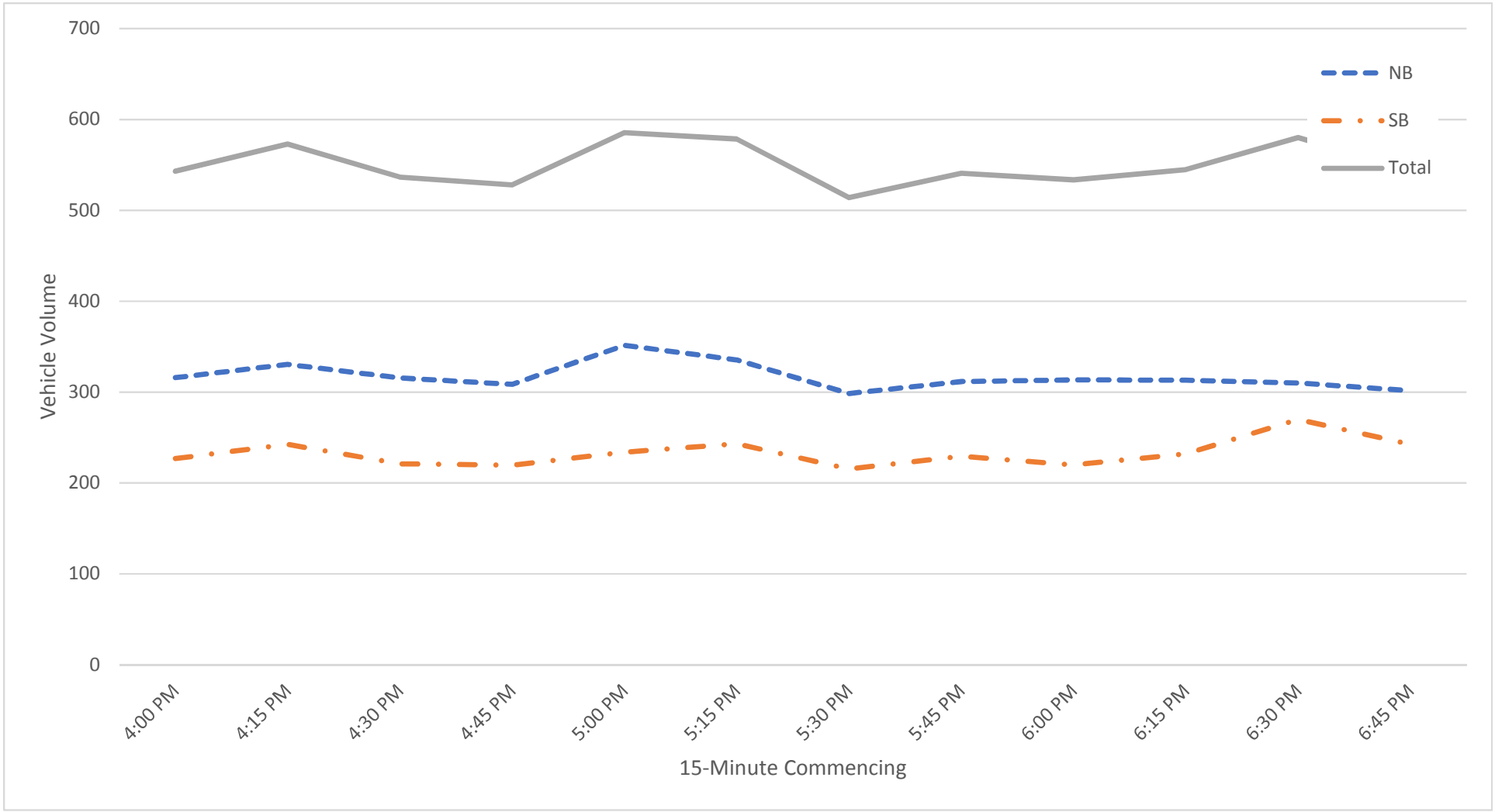


Note: Vehicle volumes are the average volume from the 48-hour ATR collected on Nov 15 and 16, 2017

Figure 2.a.7

Steel Place, North of Cambridgepark Drive
PM Peak Period Summary

The Residences at 50 Cambridgepark Drive
Cambridge, Massachusetts

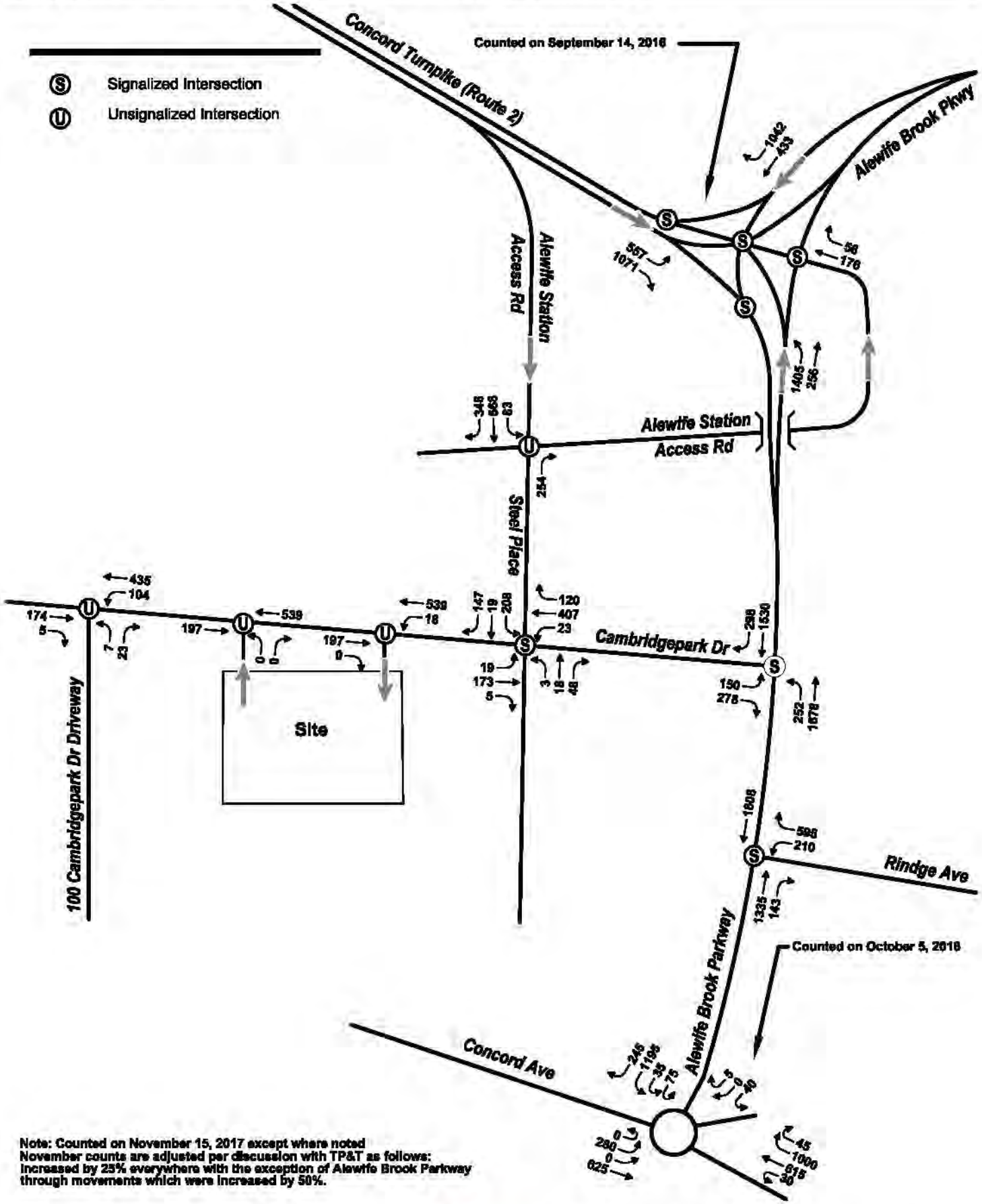


Note: Vehicle volumes are the average volume from the 48-hour ATR collected on Nov 15 and 16, 2017

Figure 2.a.8

Alewife Brook Parkway, North of Cambridgepark Drive
PM Peak Period Summary

The Residences at 50 Cambridgepark Drive
Cambridge, Massachusetts



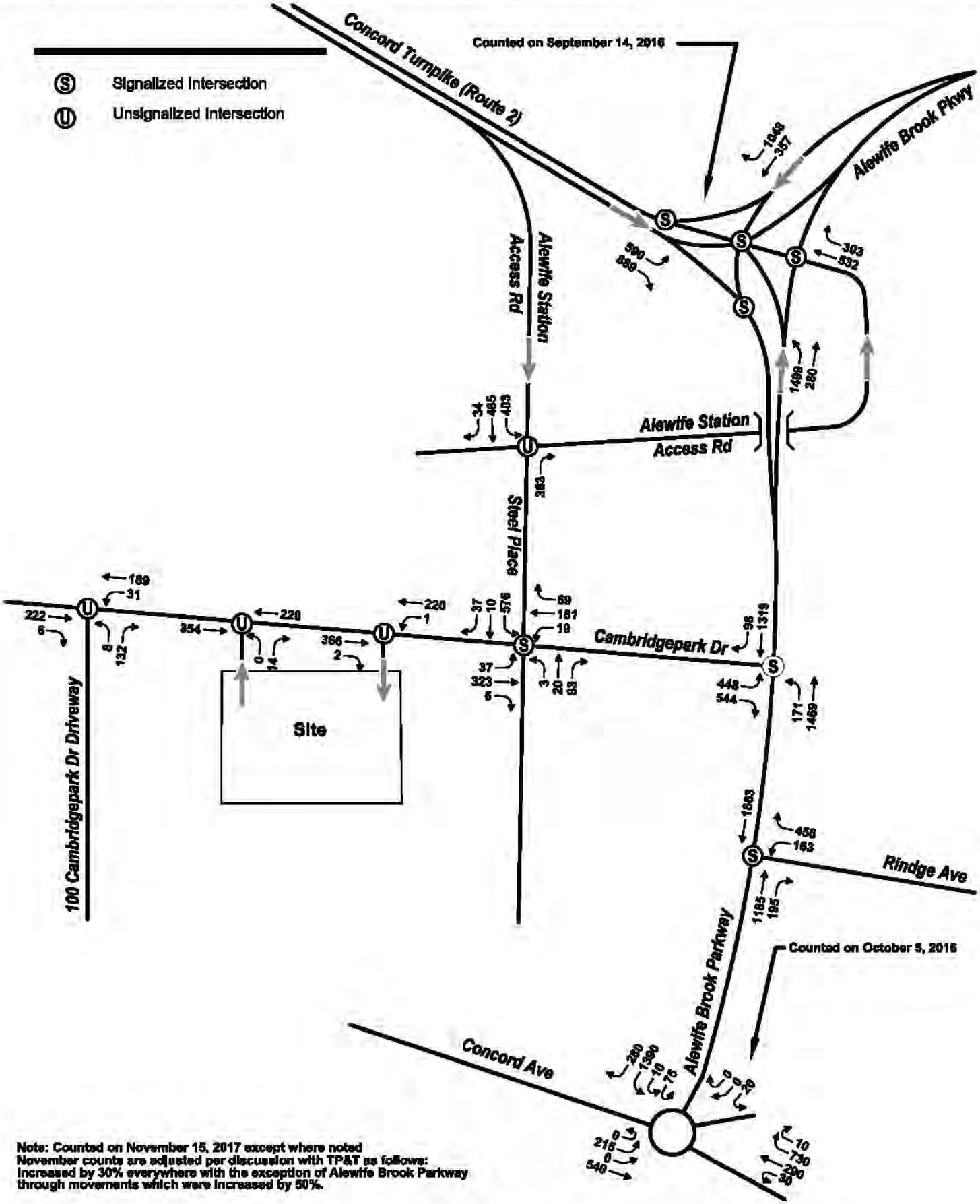
Note: Counted on November 15, 2017 except where noted
November counts are adjusted per discussion with TP&T as follows:
Increased by 25% everywhere with the exception of Alewife Brook Parkway through movements which were increased by 50%.

Not to Scale

2018 Existing Condition
Morning Peak Hour Vehicle Volumes

Figure 2.c.1

50 Cambridgepark Drive
Cambridge, MA



2018 Existing Condition
Evening Peak Hour Vehicle Volumes

Figure 2.c.2

50 Cambridgepark Drive
Cambridge, MA

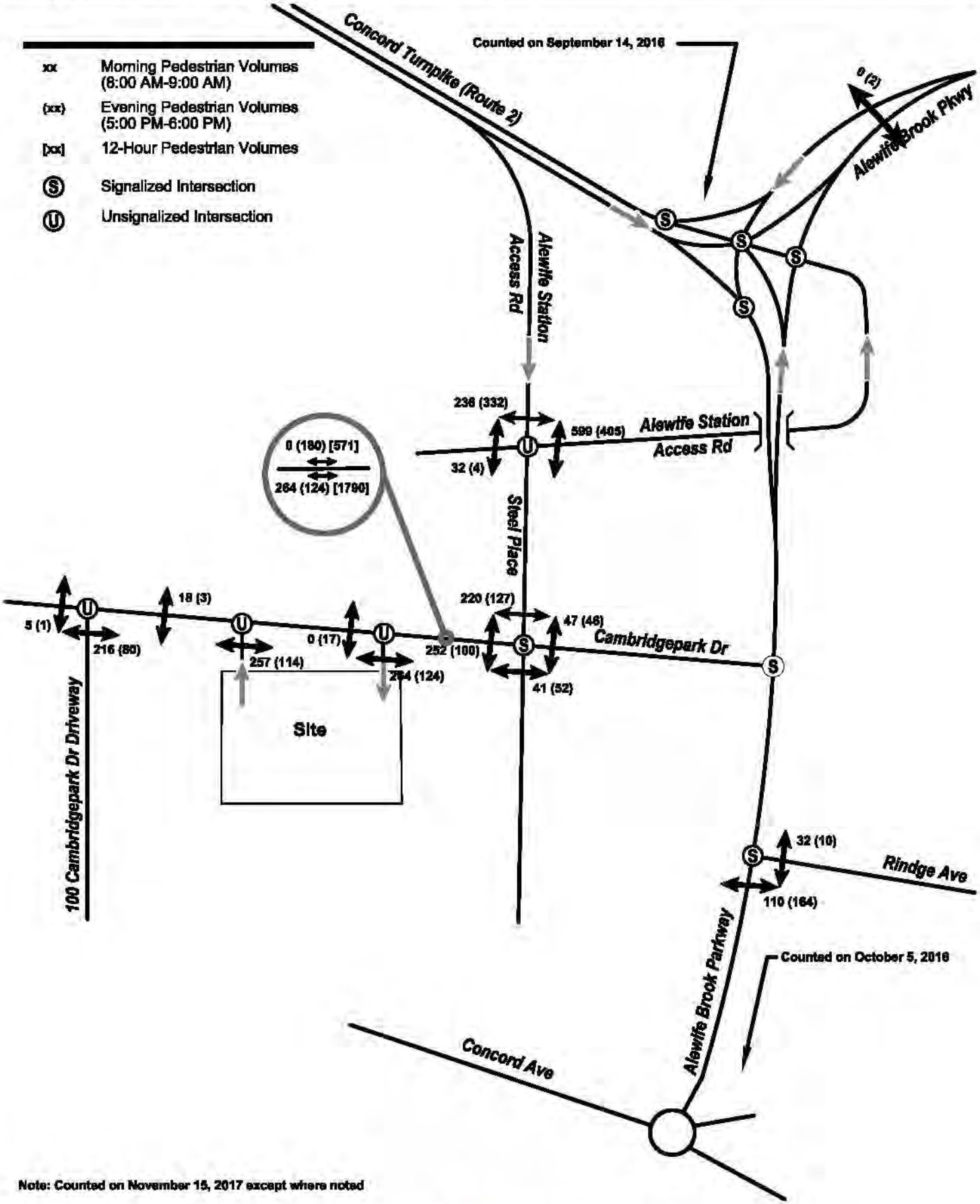
Note: Counted on November 15, 2017 except where noted

Not to Scale

2018 Existing Condition Bicycle Volumes

50 Cambridgepark Drive
Cambridge, MA

Figure 2.c.3



Note: Counted on November 15, 2017 except where noted

Not to Scale

2018 Existing Condition
Pedestrian Volumes

Figure 2.c.4

50 Cambridgepark Drive
Cambridge, MA

Source: Bing Aerial

Figure 3.c.1

Project Trip Distribution

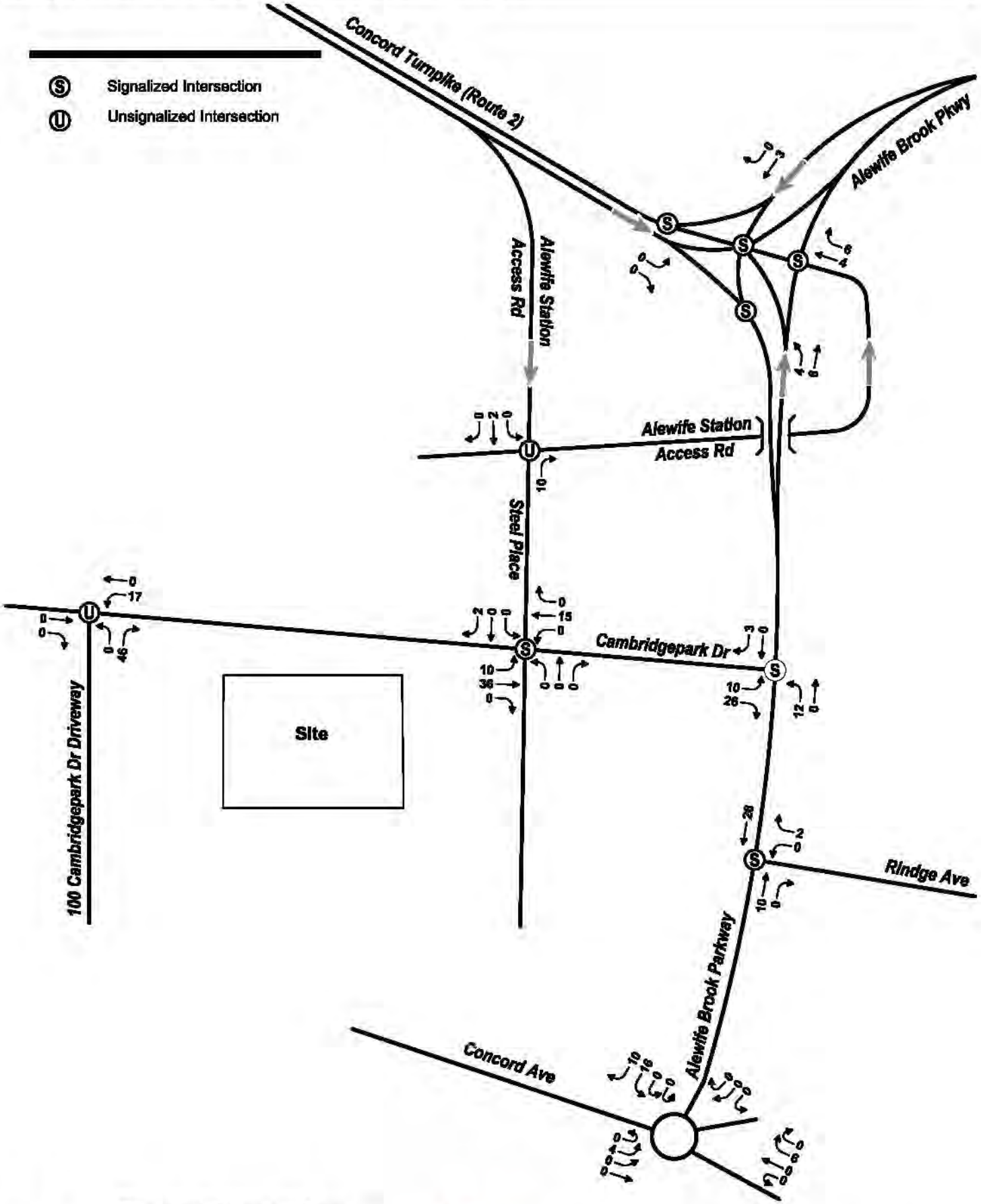
The Residences at 50 Cambridgepark Drive
Cambridge, Massachusetts

Source: Bing Aerial

Figure 3.c.2

Existing Site Trip Distribution

The Residences at 50 Cambridgepark Drive
Cambridge, Massachusetts



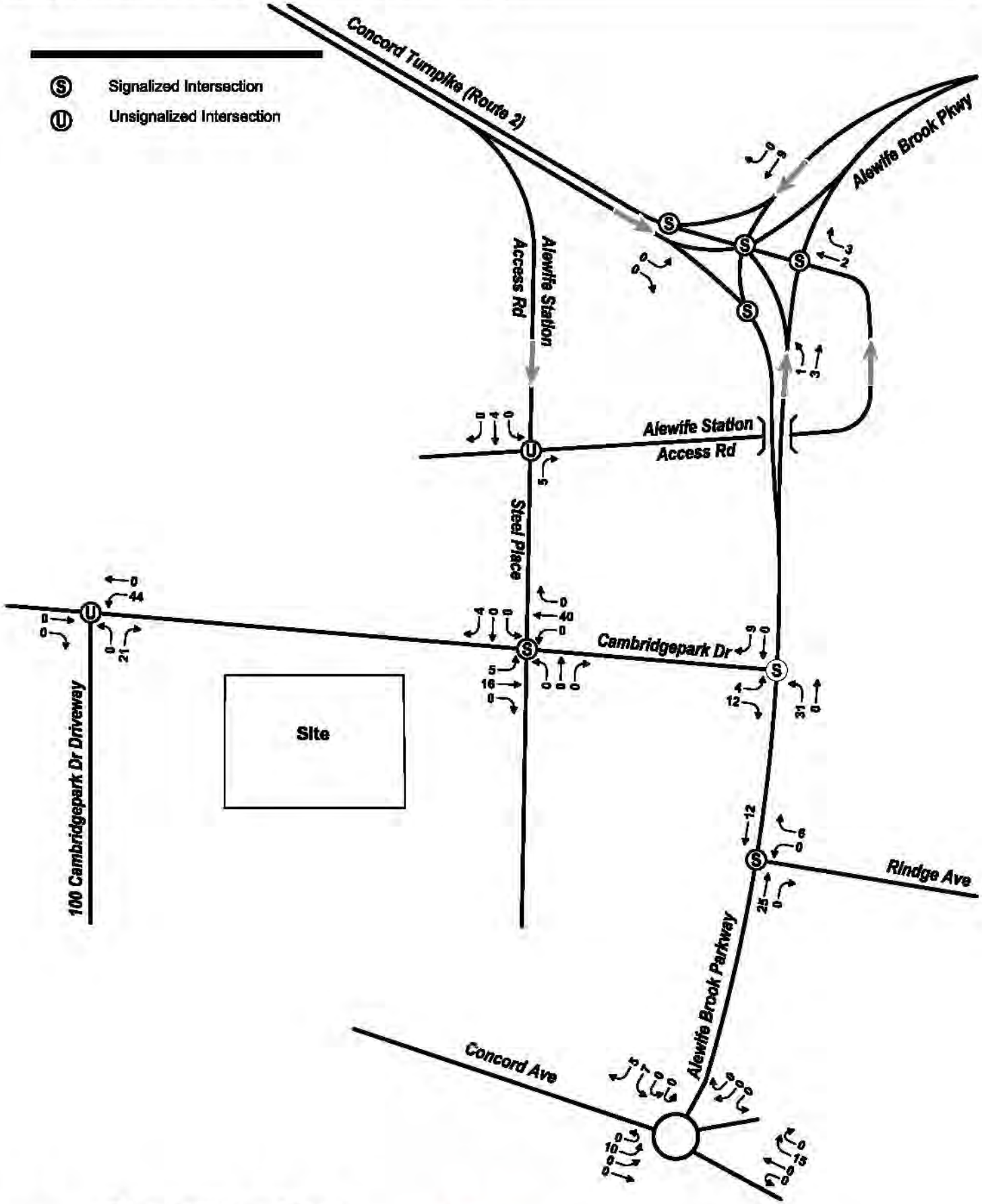
*Trips generated by new project uses

Not to Scale

Total Project Generated Trips*
Morning Peak Hour Vehicle Volumes

Figure 3.c.3

50 Cambridgepark Drive
Cambridge, MA



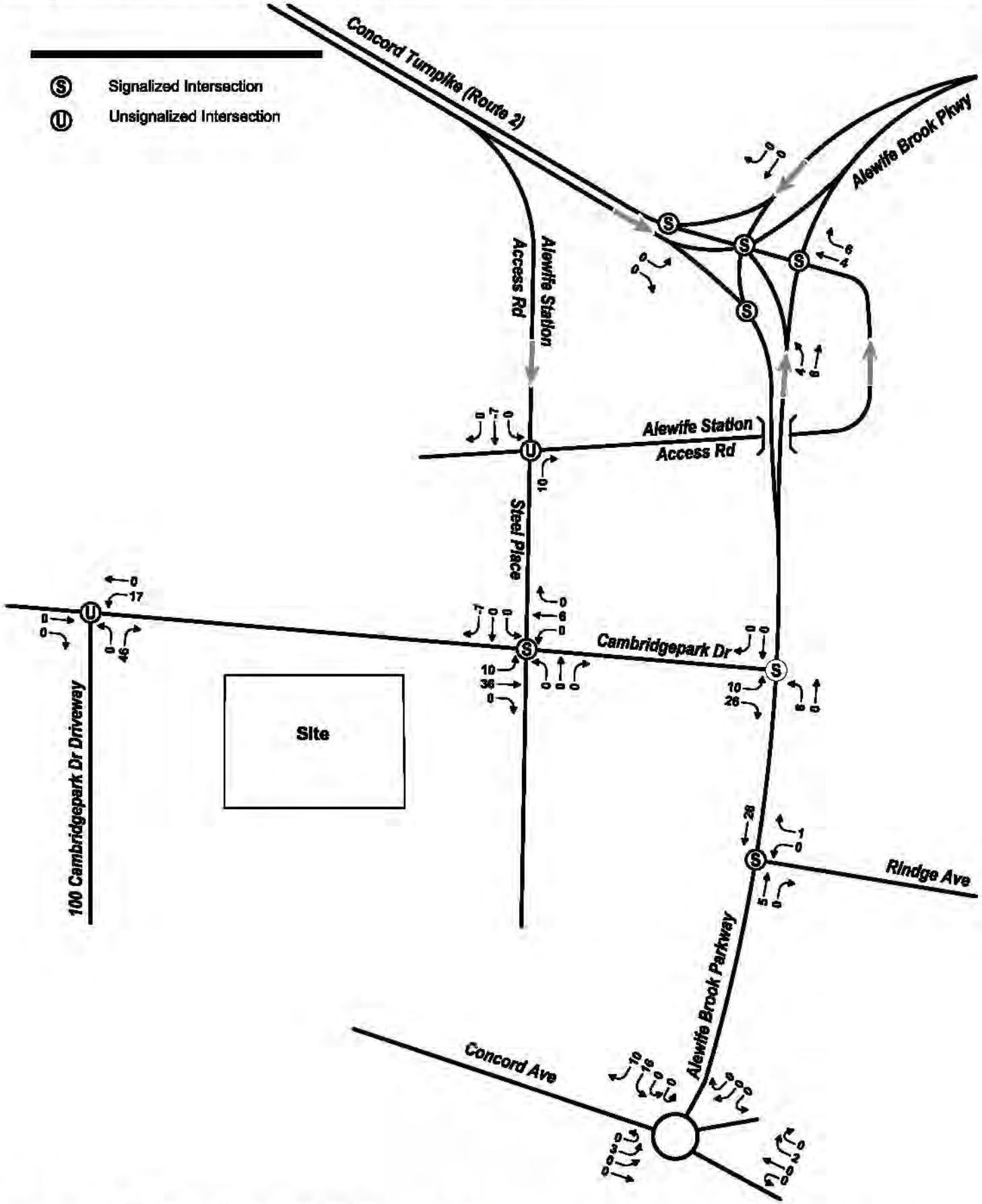
*Trips generated by new project uses

Not to Scale

Total Project Generated Trips*
Evening Peak Hour Vehicle Volumes

Figure 3.c.4

50 Cambridgepark Drive
Cambridge, MA



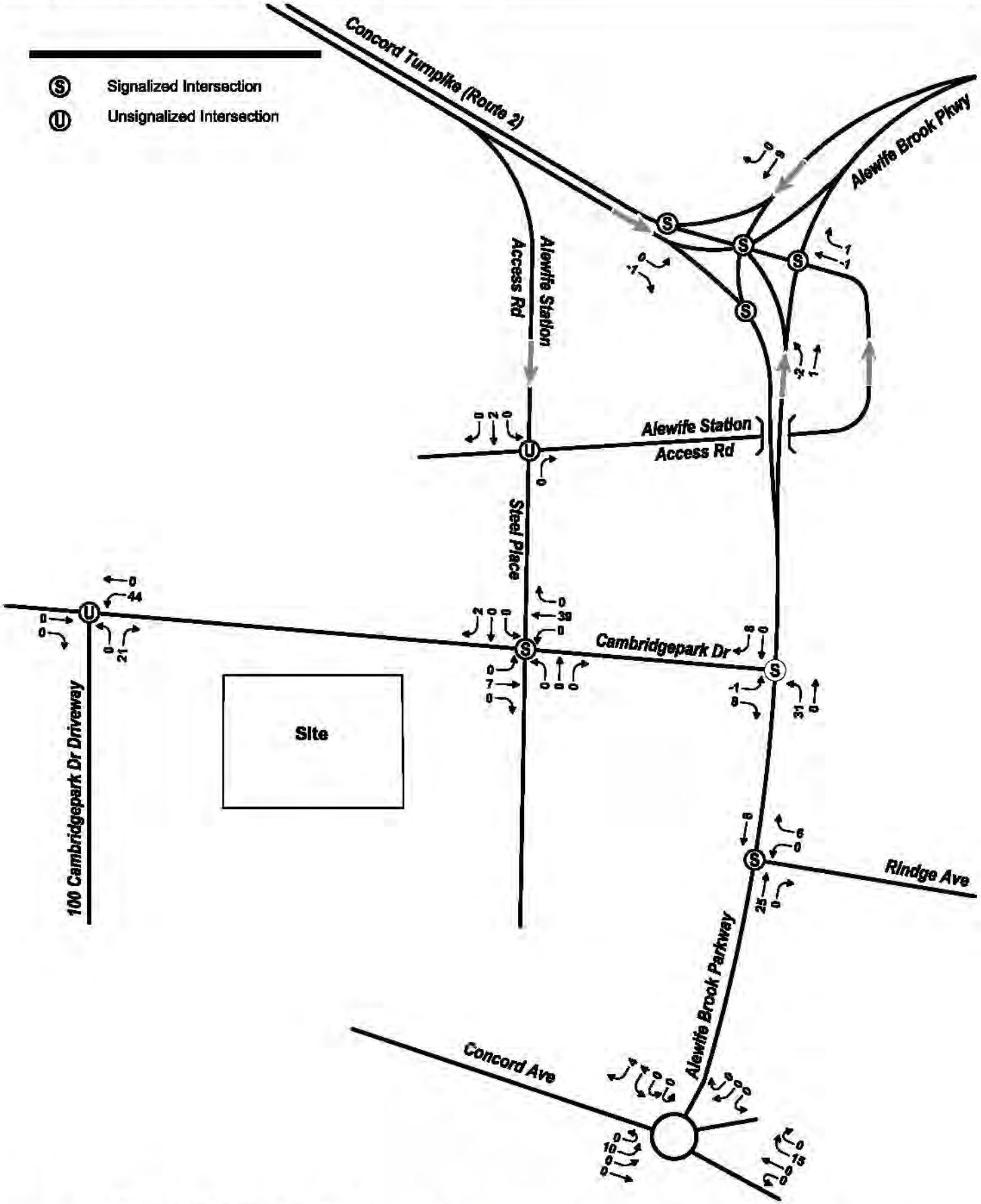
*Trips generated by project uses less trips generated by existing site uses

Not to Scale

Net New Project Generated Trips*
Morning Peak Hour Vehicle Volumes

Figure 3.c.5

50 Cambridgepark Drive
Cambridge, MA



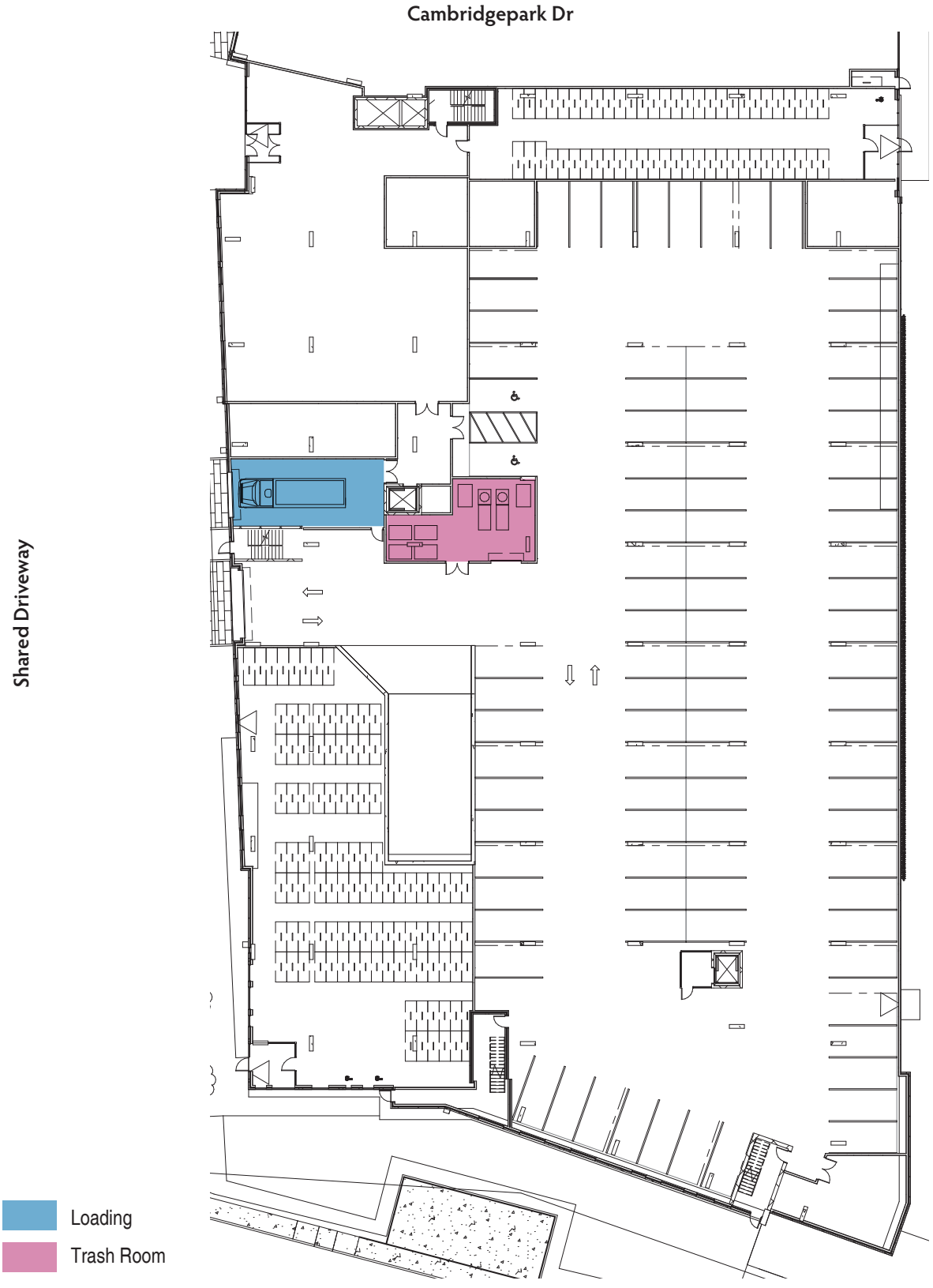
*Trips generated by project uses less trips generated by existing site uses

Not to Scale

Net New Project Generated Trips*
Evening Peak Hour Vehicle Volumes

Figure 3.c.6

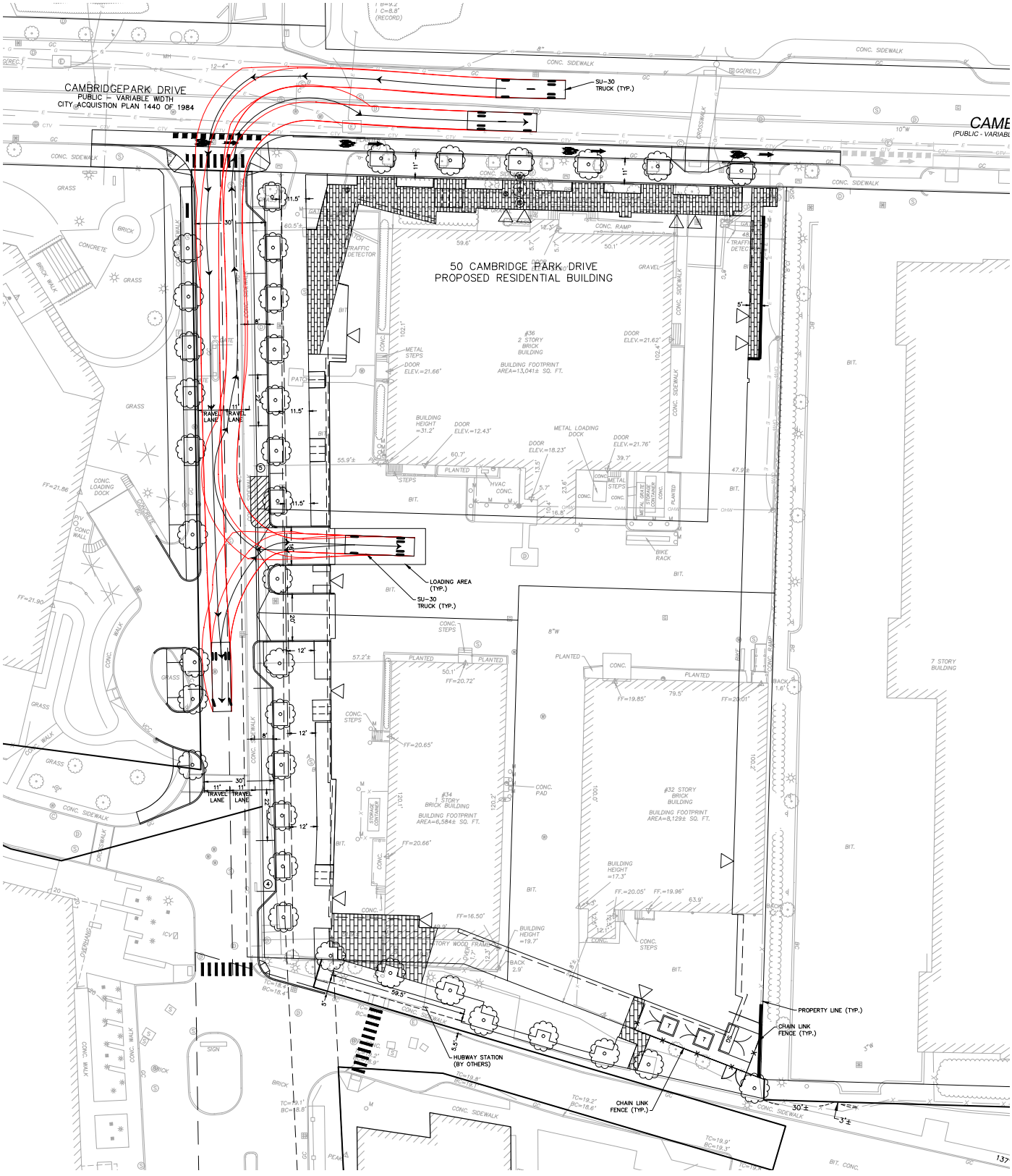
50 Cambridgepark Drive
Cambridge, MA



Source: Cube 3 Studio

Figure 3.d.1
Service and Loading

The Residences at 50 Cambridgepark Drive
Cambridge, Massachusetts

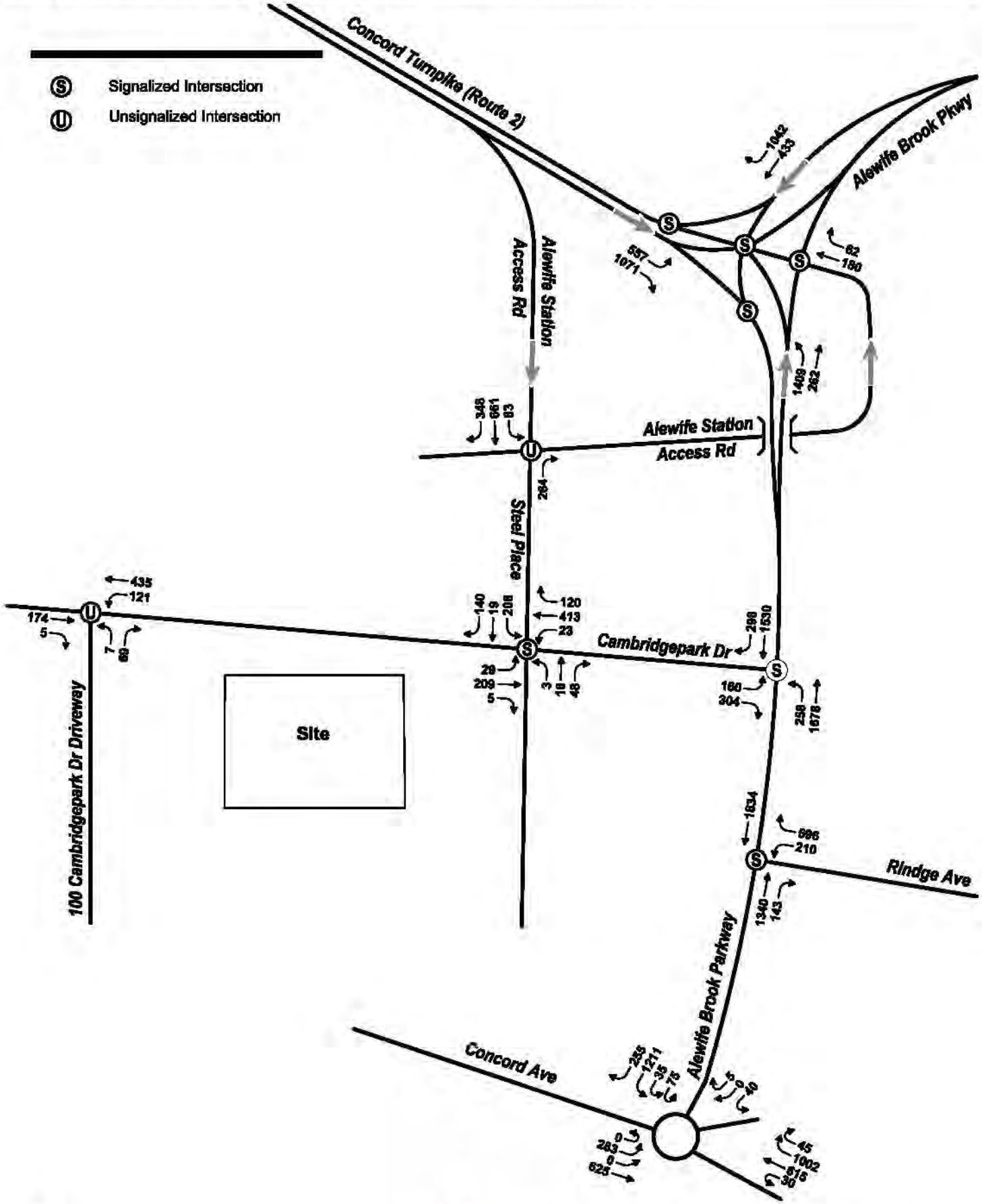


Source: Cube 3 Studio

Figure 3.d.2

Loading Dock Truck Turns

The Residences at 50 Cambridgepark Drive
Cambridge, Massachusetts

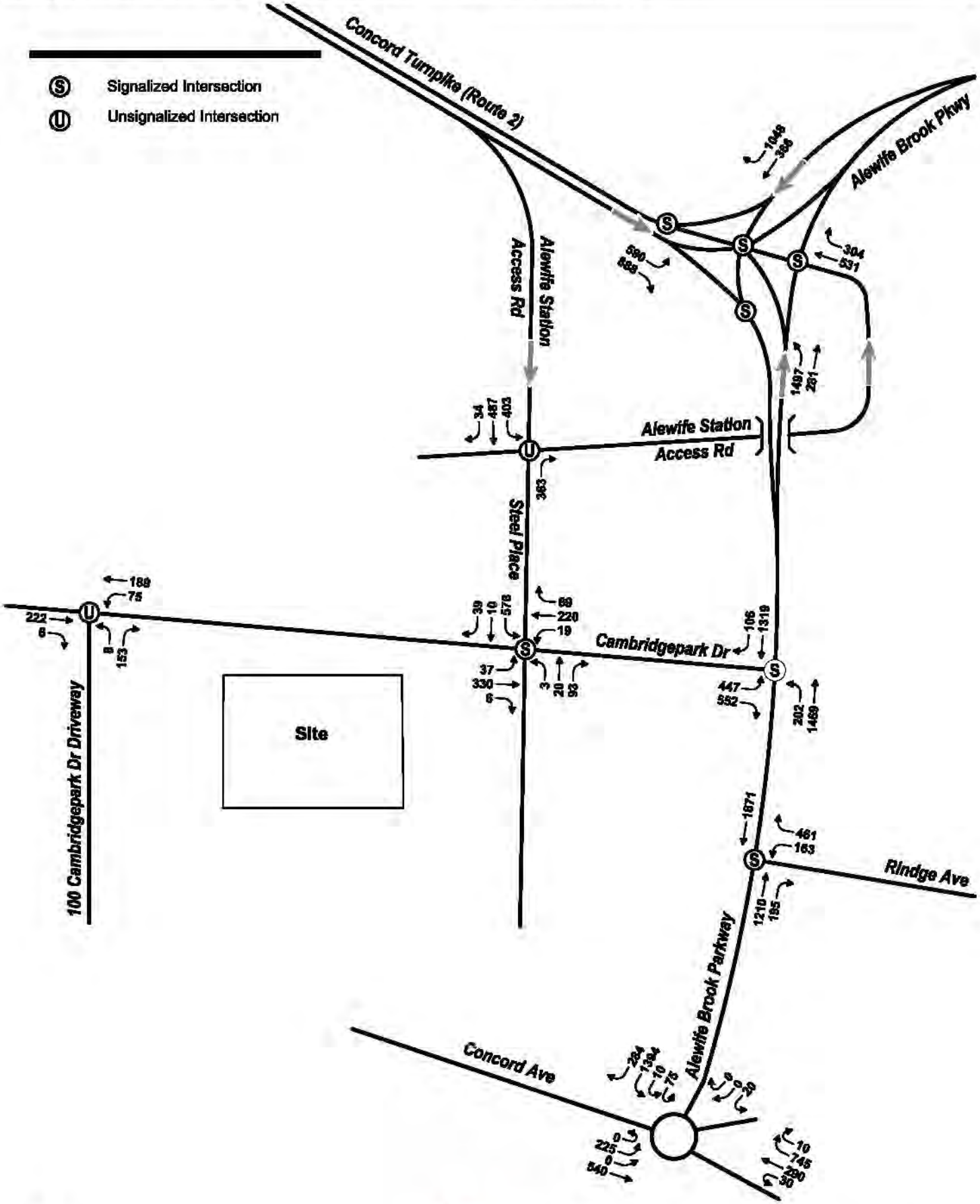


Not to Scale

2018 Build Conditions
Morning Peak Hour Vehicle Volumes

Figure 4.c.1

50 Cambridgepark Drive
Cambridge, MA



Not to Scale

2018 Build Conditions
Evening Peak Hour Vehicle Volumes

Figure 4.c.2

50 Cambridgepark Drive
Cambridge, MA

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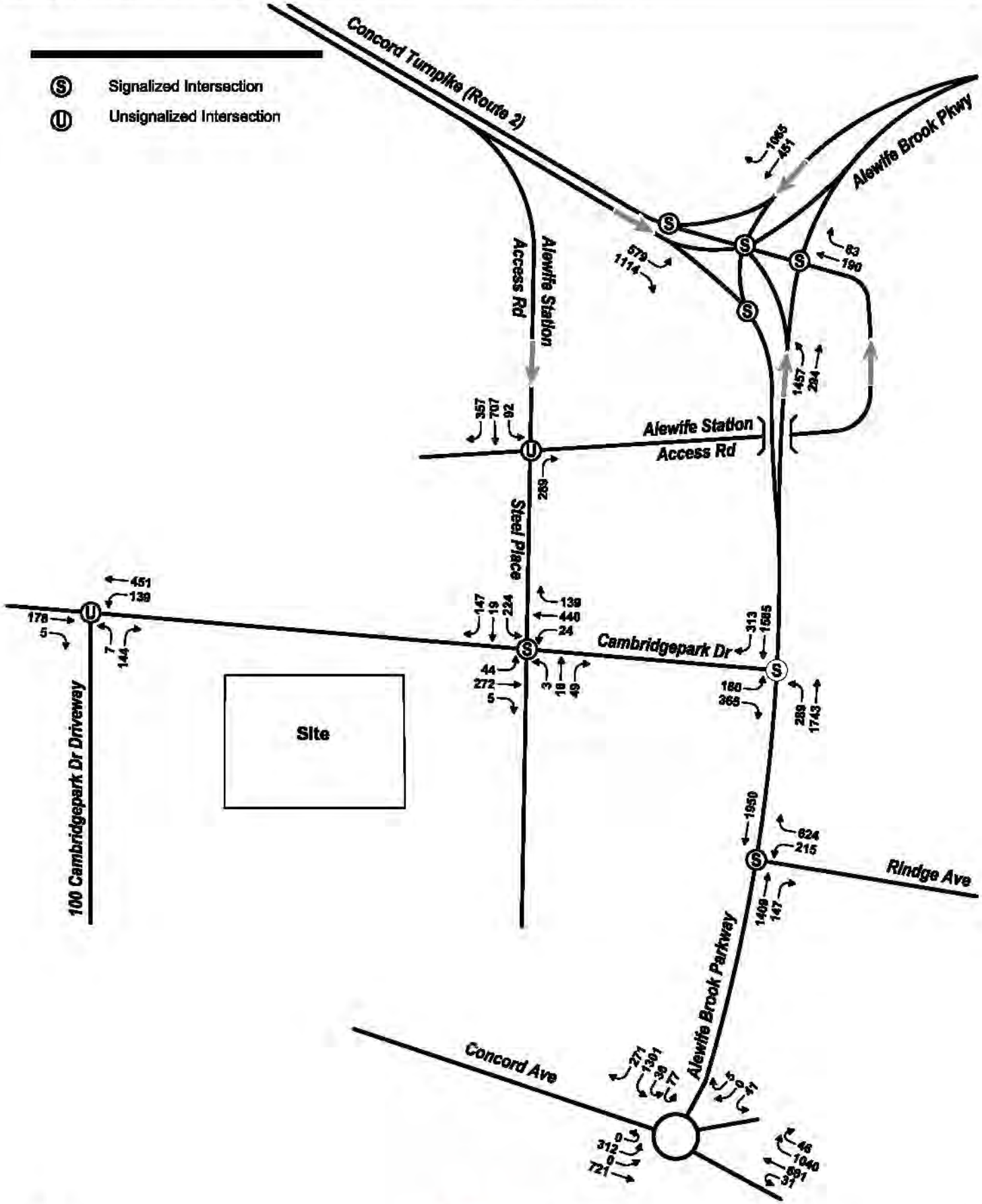


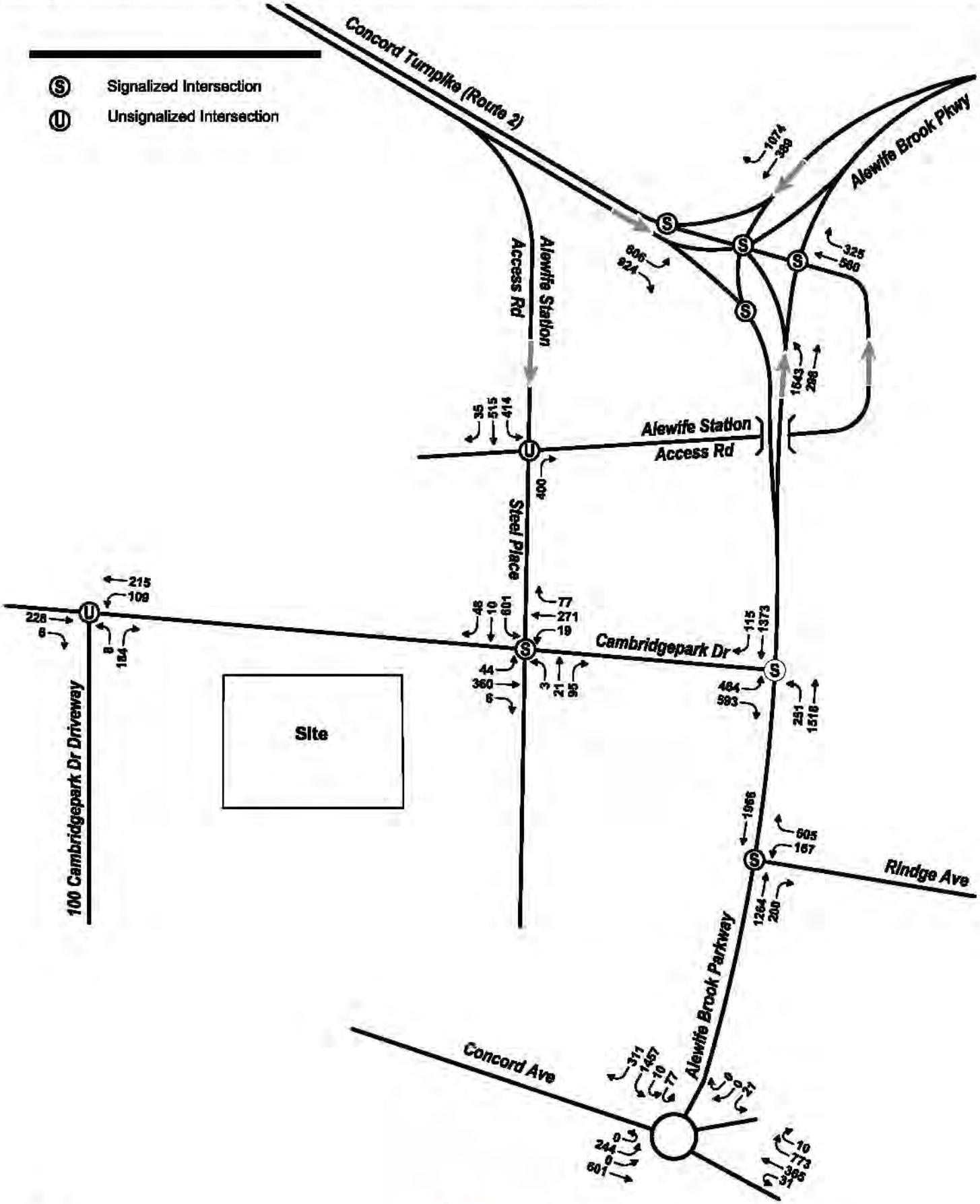
Not to Scale

vhb

2023 Future Conditions
Morning Peak Hour Vehicle Volumes

Figure 5.c.1

50 Cambridgepark Drive
Cambridge, MA



Not to Scale

2023 Future Conditions
Evening Peak Hour Vehicle Volumes

Figure 5.c.2

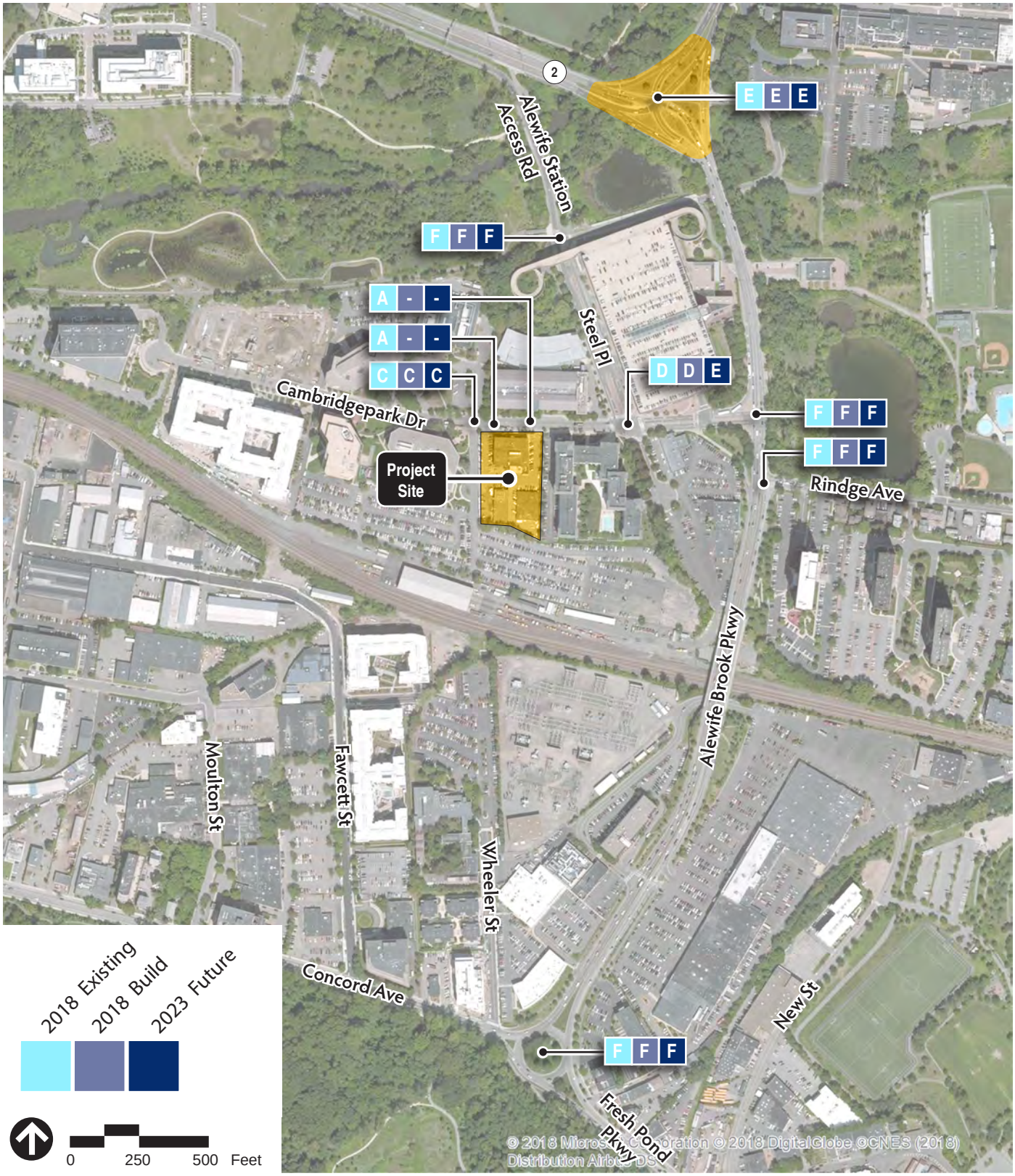
50 Cambridgepark Drive
Cambridge, MA

Source: Bing Aerial

Figure 5.c.3

Cumulative Area Developments Impact
Evening Peak Hour Vehicle Volumes

The Residences at 50 Cambridgepark Drive
Cambridge, Massachusetts

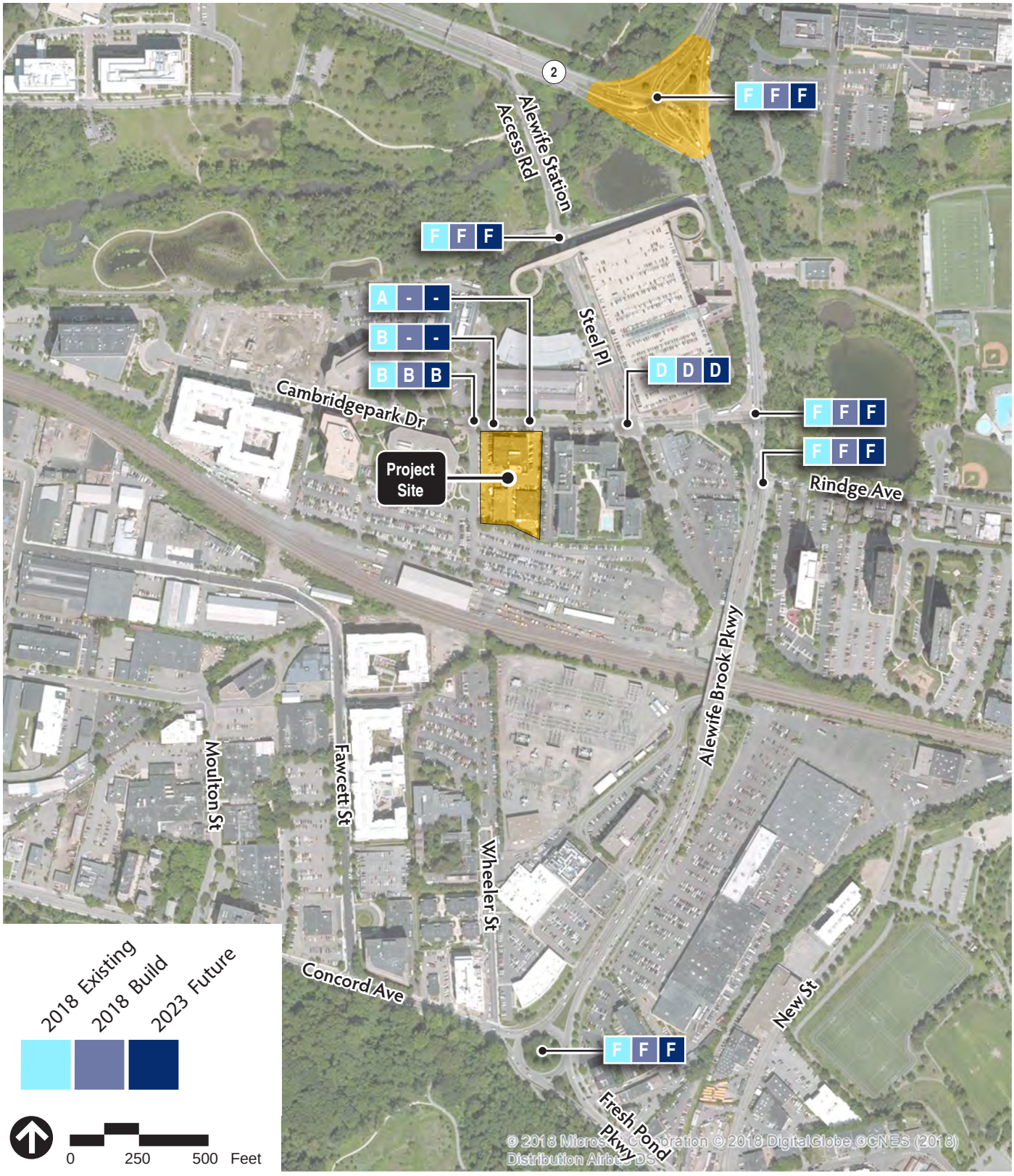


Source: Bing Aerial

Figure 6.a.1

AM Peak Vehicle Level of Service

The Residences at 50 Cambridgepark Drive
Cambridge, Massachusetts

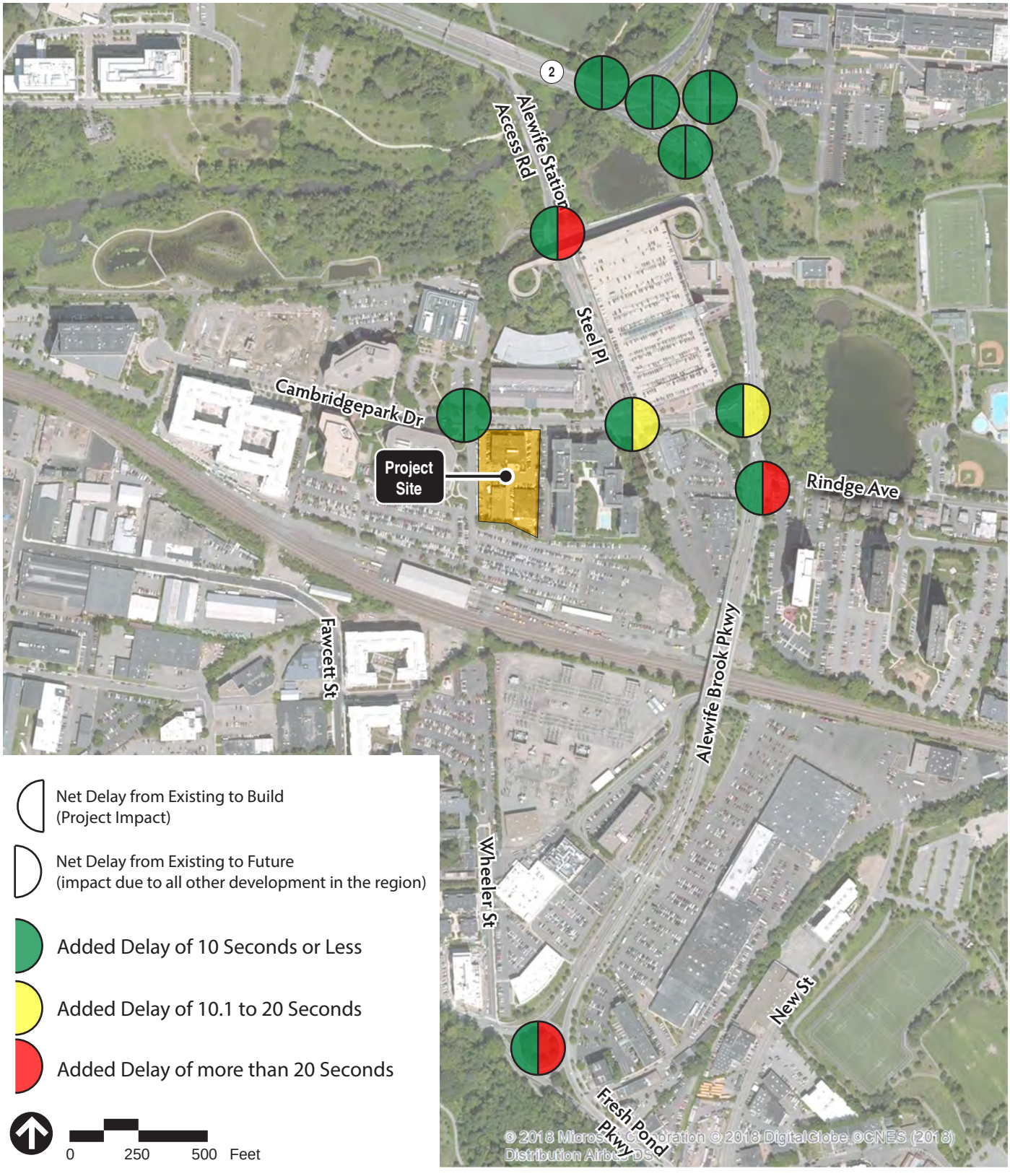


Source: Bing Aerial

Figure 6.a.2

PM Peak Vehicle Level of Service

The Residences at 50 Cambridgepark Drive
Cambridge, Massachusetts

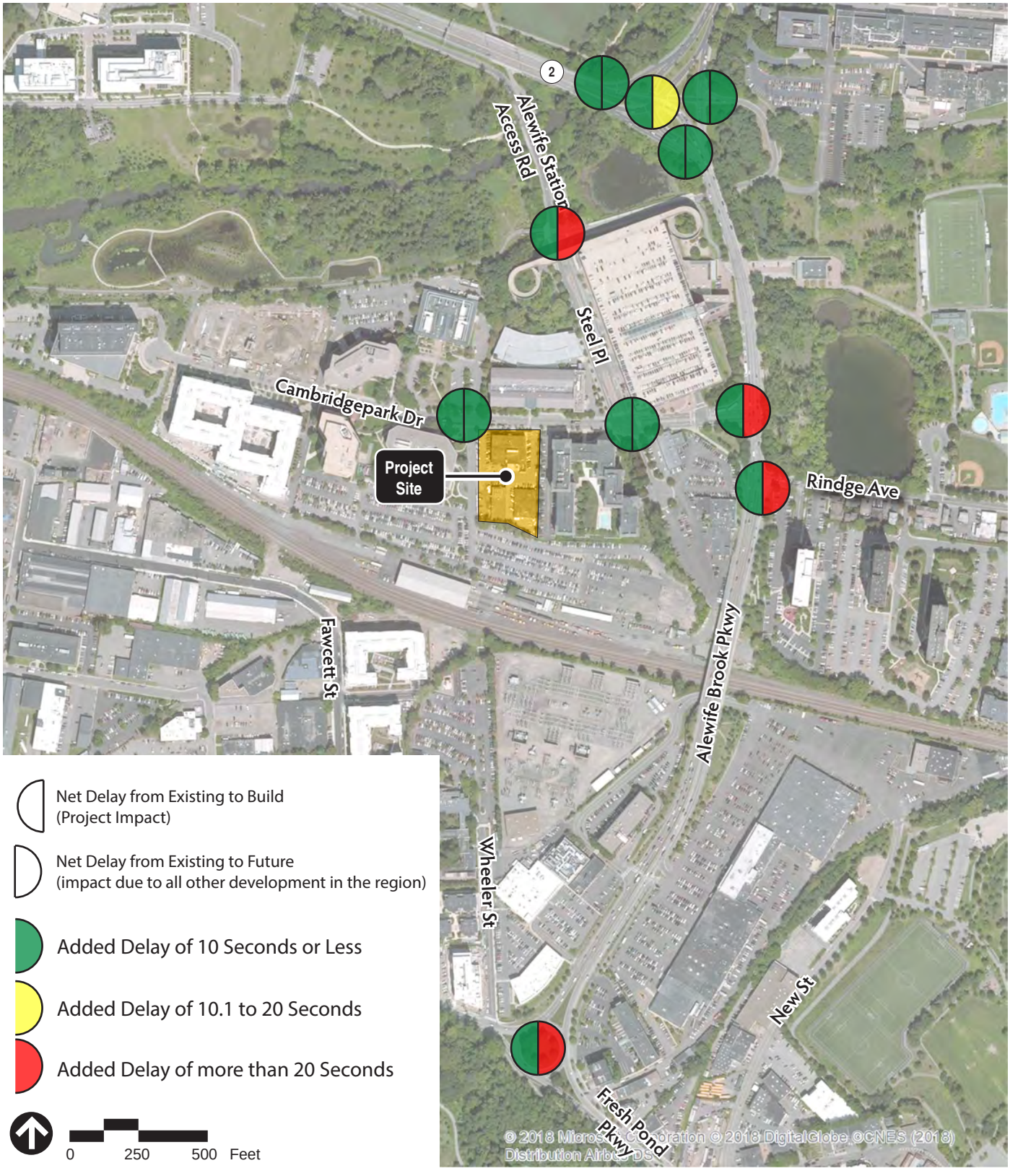


Source: Bing Aerial

Figure 6.b.1

AM Peak Net Change in Vehicular Delay

The Residences at 50 Cambridgepark Drive
Cambridge, Massachusetts

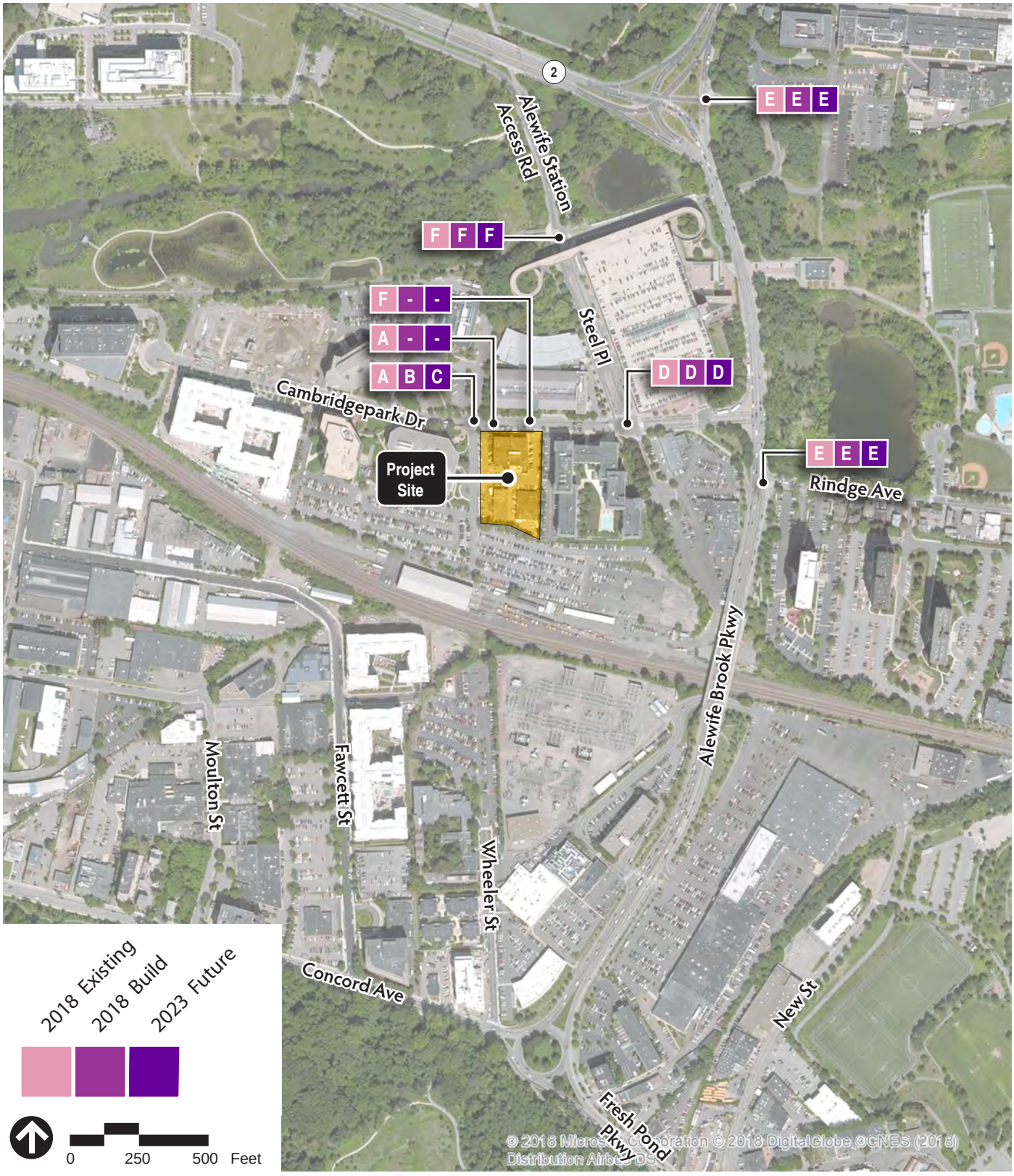


Source: Bing Aerial

Figure 6.b.2

PM Peak Net Change in Vehicular Delay

The Residences at 50 Cambridgepark Drive
Cambridge, Massachusetts

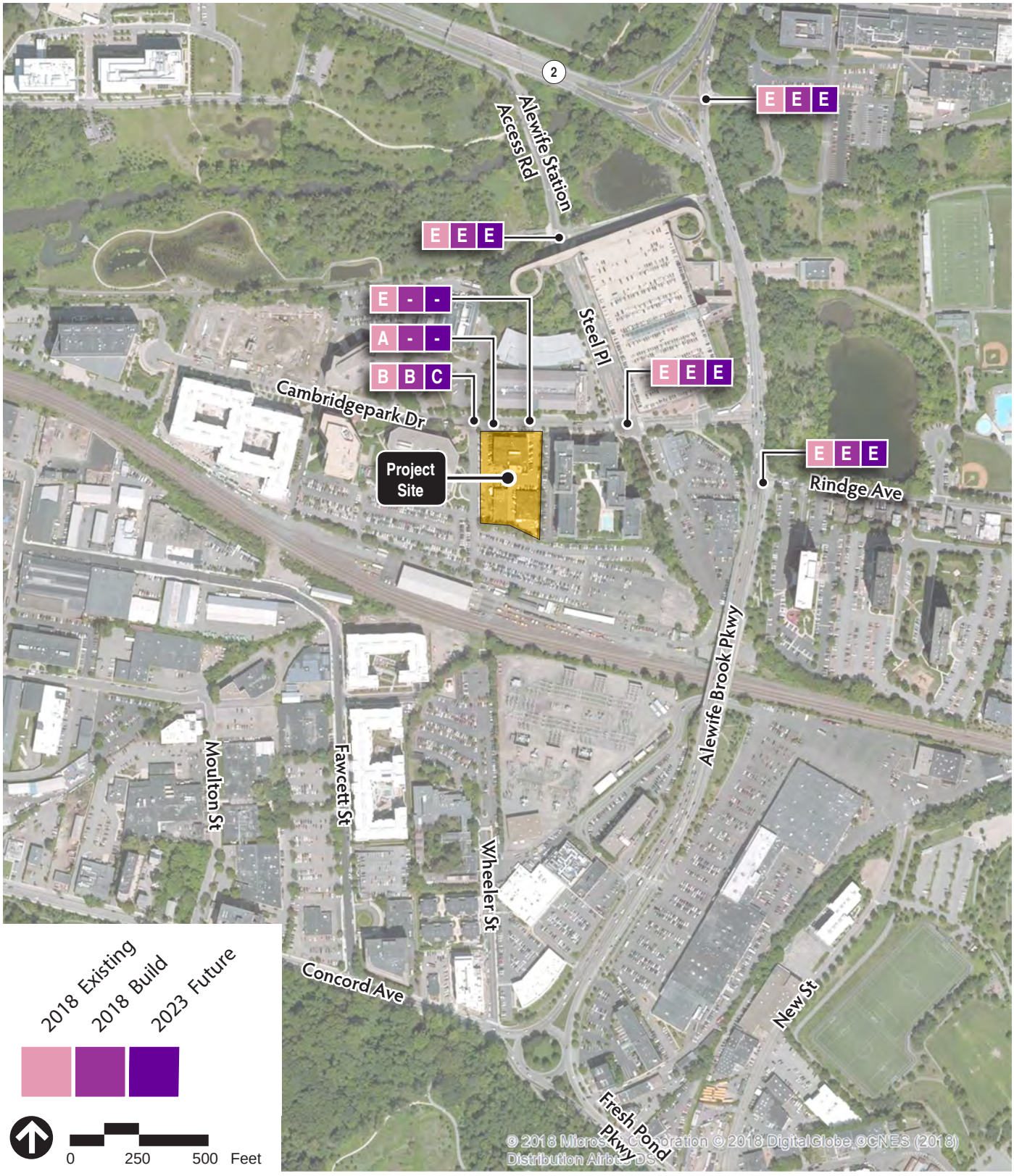


Source: Bing Aerial

Figure 11.a.1

AM Peak Pedestrian Level of Service

The Residences at 50 Cambridgepark Drive
Cambridge, Massachusetts



Source: Bing Aerial

Figure 11.a.2

PM Peak Pedestrian Level of Service

The Residences at 50 Cambridgepark Drive
Cambridge, Massachusetts