Transportation Study

35 Cambridgepark Drive

Cambridge, Massachusetts

PREPARED FOR

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October 26, 2016

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1.0 Introduction

On behalf of the Davis Companies (the Proponent), VHB has conducted a Transportation Study for the proposed expansion of 35 Cambridge Park Drive. The proposed expansion comprises a 47,139 SF addition to the existing 137,635 SF building supported by an existing parking structure (the "Project"). The scale of the expansion is determined by the allowable floor area ratio (FAR) for the Project site.

Although the Project does not trigger the zoning threshold for a Transportation Impact Study (TIS), this report provides an analysis of the trip generation impacts associated with the Project and its potential impact to the roadway network. Parking for autos and bicycles, along with loading, is also described, and potential Transportation Demand Management (TDM) strategies to support the Project are identified.

The Proponent has worked with the Traffic, Parking and Transportation Department (TP&T), including several meetings to discuss the Project. A meeting with City Staff was held on July 20, 2016, to discuss the scope of work for this analysis and identify potential mitigation. Mitigation may include the performance of transportation studies intended to help inform the TP&T and the Alewife area stakeholders in advancing the understanding and further analysis of transportation needs in the area.

TP&T's Memorandum to the Planning Board dated July 27, 2016 (see Appendix) summarizes the status of these discussions, and identifies a list of questions and issues that need to be addressed. The Project information presented in this report is intended to respond to these issues.

Supplementary data and analysis worksheets are provided in a technical appendix. Electronic files for automatic traffic recorder (ATR) counts, turning movement counts (TMC), and Synchro analyses are included on an accompanying CD.

2.0 Project Overview

The Project includes a 47,139 SF expansion comprising approximately 39,639 SF of office space and 7,500 SF of convenience retail supported by existing vehicle parking. There are 351 parking spaces registered for the site. The capacity of the parking garage will be reduced by 20 spaces to accommodate improvements for bicycle access and parking, and resiliency. Bicycle parking will be provided in excess of City of Cambridge guidelines, including 60 long-term and 18 short-term bicycle spaces. The Project program is summarized in Table 1.

Table 1: Proposed Project Program

	Existing Building	Proposed Building	Net Change
Approx. Gross Floor Area	137,635 SF	184,774 SF	+ 47,139
Building Use	Office	Office, 177,274 SF Retail, 7,500 SF	
Auto Parking Spaces	351*	331*	- 20
Bicycle Parking Spaces	20	60 Long-term 18 Short-term	58

* Includes 2 existing Van Accessible surface spaces outside the garage which will be re-located inside the modified building

3.0 Site Plan

The following figures depict access, circulation and parking for the Project site:

- Figure 1 presents the site location
- Figure 2 presents the existing site plan
- Figure 3 presents the proposed Project site plan
- Figure 4 presents vehicle turns
- Figure 5 presents truck turns to and from Steel Place
- Figure 6 presents the auto parking layout
- Figure 7 presents the long-term bicycle parking layout
- Figure 8 presents the short-term bicycle parking layout

As shown in **Figure 1**, the Project site is located on Cambridgepark Drive at its intersection with Steel Place (formerly Alewife Station Access Road), immediately across from Alewife Station.

3.1 Existing Site Plan

The existing site plan in **Figure 2** shows that the existing building is located along the Cambridgepark Drive frontage of the site, with the main pedestrian lobby located roughly at its mid-point. There is a stair-well egress on the west side of the building, and the parking garage is attached to the rear of the building by a single-level pedestrian corridor which provides an enclosed pedestrian connection between the

garage and the building. There are two additional pedestrian access points in the garage – one located at the northeast corner on Steel Place, and the other at the southwest corner connecting to the external pedestrian pathway system.

Vehicle access to the existing site is provided via a curb-cut on Cambridgepark Drive immediately adjacent to the intersection with Steel Place. This driveway accommodates all vehicle traffic entering the Project site, including cars and trucks, and also accommodates trucks exiting the site. Cars exiting the site are accommodated by an exit/curb-cut on Steel Place at the northeast corner of the garage, with the exception of users of the 2 van-accessible surface parking spaces who exit via the curb-cut on Cambridgepark Drive.

Currently, there is a bicycle cage in the garage accommodating 20 bicycle parking spaces.

Loading accommodations for the existing building are extremely limited. There are no loading docks per se, and the geometry of the driveway is too constrained to accommodate anything larger than a small truck or van. There is, however, a curbside pull-off area in front of the main lobby on Cambridgepark Drive which is designated as a drop-off/pick-up zone.

3.2 Proposed Site Plan

A primary beneficial change in the proposed site plan is the closure of the existing curb-cut on Cambridgepark Place, as shown in **Figure 3**. This will eliminate conflicting traffic maneuvers between vehicle, bicycles and pedestrians at this poorly-located curb-cut immediately adjoining the Steel Place intersection.

Auto Access

To accommodate access to the parking garage, the existing garage exit curb-cut on Steel Place will be widened to 30 ft. to accommodate both entry to and exit from the garage. As the curb-cut was used previously for cars exiting the garage, the configuration of the garage façade is already wide enough to accommodate both entry and exit at this location, and can therefore be simply re-opened. As a result, vehicles approaching the site southbound on Steel Place will be intercepted at the new entry, and therefore eliminated from the intersection with Cambridgepark Drive. **Figure 4** demonstrates how vehicles will be able to safely make left-turns out of the parking garage onto Steel Place.

Trucks

The building will be modified in a way that creates loading accommodations for trucks, including an external loading dock capable of accommodating tractor-trailer trucks, and an internal loading dock capable of accommodating a single-unit trucks,

including a garbage truck. **Figure 5** demonstrates a truck turning template for trucks entering and exiting the loading docks from Steel Place. A new curb-cut is proposed on Steel Place for use by service vehicles only. Due to the closure of the Cambridgepark Drive curb-cut, the truck curb-cut will also be used to access the 2 Van Accessible spaces. As the headroom in the garage is insufficient to accommodate vans, those spaces have been relocated inside the building envelope adjacent to the internal loading dock. All truck turning movements will be accommodated on-site. The pick-up/drop-off area on Cambridgepart Drive will not be changed, and will continue to serve the building.

Pedestrian Access

Pedestrian circulation will remain largely un-changed, but the pedestrian environment will be significantly enhanced by the landscaping and reconfiguration/expansion of the pedestrian pathways. The main entrance for the retail unit will be located on the eastern side of the building, and will be supported by additional doorways along the Cambridgepark Drive frontage. Due to grade changes, the frontage of the modified building along Steel Place will comprise a low wall at the back of sidewalk, thereby encouraging pedestrians to cross at the Cambridgepark Drive intersections to access the site from Alewife Station. Pedestrians arriving from either the MBTA Alewife Station, Cambridgepark Drive east of the site or Steel Place may prefer to use the pedestrian entrance on Steel Place or they may enter through the main entrance on Cambridgepark Drive.

Parking

The parking garage layout/circulation is presented in **Figure 6**. Other than the relocation of the entry point, the parking garage will remain largely unchanged. However, 20 of the existing 351 parking spaces will be eliminated to allow parking for bicycle to be provided, yielding a total proposed parking supply of 331 spaces on the four levels. As a result, the existing parking ratio of 2.55 parking spaces per 1,000 SF will be reduced to 1.79 spaces per 1,000 SF. This reduction in parking ratio would be expected to reduce the number of employees commuting by car to work.

Bicycle Accommodations

The Project will include much-needed bicycle facilities. **Figure 7** presents the layout of the secure bicycle area within the garage. The bicycle parking is located at the lower garage level to facilitate ease of access, and convenient proximity to the enclosed pedestrian corridor into the building and the external pedestrian doorway at the southwest corner of the garage. It is intended that the design will provide a quality facility for users, and will include 2 bike repair stations. Shower/changing facilities will be available in the building.

Bicycle parking conforming to City of Cambridge design guidelines will be provided for 60 bicycles supported by a bike-repair station. In addition, short-term bicycle parking for 24 bicycles will be provided in convenient locations proximate to the

building pedestrian entrances. Twelve bicycle parking spaces will be provided on the southeast corner of the site near the Steel place side entrance and 12 additional bicycle parking spaces will be provided to the west of the main entrance on Cambridgepark Drive as shown in Figure 8. The bicycle parking supply to be provided will exceed City of Cambridge zoning requirements which call for only 55 long-term and 16 short-term bicycle parking spaces.

4.0 Existing Transportation Network

The location of the Project site in the context of the roadway network is shown in **Figure 1** (presented previously).

The Project site fronts Cambridgepark Drive and Steel Place (formerly Alewife Station Access Road) in the northwest quadrant of the intersection. Cambridgepark Drive intersects with Alewife Brook Parkway to the east of the site. To the north, the southwest off-ramp from Route 2 connects to Steel Place at the point where Alewife Station Access Road departs one-way to connect with the Alewife Brook Parkway/Route 2 intersection. The roadway layout in the vicinity of the site is shown in **Figure 2** (presented previously).

4.1 Study Intersections

The project study area includes the following eight study intersections, as shown in **Figure 9**:

Un-signalized Intersections

1. Steel Place / Alewife Station Access Road
2. Steel Place at MBTA Driveway #1 (Bus & Parking Entry/Exit)
3. Steel Place at MBTA Driveway #2 (Passenger Pick-up/Drop-off Entry/Exit)
4. Steel Place at MBTA Driveway #3 (Passenger Pick-up/Drop-off Entry)
5. Steel Place at MBTA Driveway #4 (Parking Entry/Exit, Pick-up/Drop-off Exit)

Signalized Intersections

6. Steel Place at Cambridgepark Drive
7. Cambridgepark Drive at Alewife Brook Parkway
8. Alewife Brook Parkway / Rindge Avenue

4.2 Transit Services

Figure 10 shows existing Massachusetts Bay Transportation Authority (MBTA) services in the study area. Because the site is ideally located across from the Alewife Station, the terminal for the Red Line and several MBTA Bus routes, the Project is a transit-oriented development.

Buses terminating at Alewife Station include MBTA routes 62, 67, 76, 79, 84, 350 and 351. The passenger pickup and drop-off areas are inside the MBTA parking structure and provide shelter and scheduling information for all of 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 periods. 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 a combined 4.5-minute headway during peak hours, with south eastbound 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 is available at Porter Square station. 2,733 commuter parking spaces are available at Alewife at a rate of $7.00 per day. On average, the weekday availability of parking is less than 5% at this garage. Bicycle parking is also available with approximately 174 spaces in the garage.

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

4.2 Pedestrian and Bicycle Accommodations

The study area is well-served by several multi-use/bicycle paths, cycle tracks and bicycle lanes. Multi-use/bicycle paths are distinguished by their physical off-road separation from vehicular traffic and by the various types of modes that utilize them. Cycle tracks generally run alongside the roadway, but are separated from vehicle traffic by a vertical change in grade or horizontal buffer. Bicycle facilities in the area are shown in **Figure 11**.

Near Alewife Station, bicycle access to the east is provided via the Alewife Linear Path which connects with the Somerville Bicycle Path. The Minuteman Commuter Bikeway provides service to the northwest into Bedford. The Fitchburg Cutoff Bike

path provides a multi-use path towards the west to Belmont. On-Street bike lanes are provided near Alewife Station along both sides of Alewife Station Access Road. Multi-use paths are also provided along Alewife Brook Parkway and around Fresh Pond to the south of Alewife. A cycle track has been installed along both sides of Concord Avenue in the Quadrangle. In the future, Cambridgepark Drive will benefit from the direct pathway connection to the Belmont path, to be built by the City of Cambridge and MassDOT.

The Minuteman Commuter Bikeway traverses through four towns in Massachusetts: Bedford, Lexington, Arlington and Cambridge. The 10 mile long bikeway provides commuter and recreational service for biking, walking, jogging, in-line skating, and cross country skiing from the Alewife T Station to the communities along the bikeway and terminates in Bedford. There are plans to extend the Minuteman Bikeway from Depot Park in Bedford along the Reformatory Branch Trail to the Bedford/Concord Town Line.

5.0 Data Collection

To facilitate operational analysis of Adjusted Existing and Build conditions with the Project, peak period turning movement counts and daily traffic counts were performed at the locations shown in **Figure 9** (presented previously).

5.1 ATR Counts

Automatic traffic recorders (ATR) were installed on June 28, 2016 for a period of 48 consecutive hours on Alewife Brook Parkway and Cambridgepark Drive. The ATR's, shown in **Figure 9**, were located as follows:

- Alewife Brook Parkway north of Cambridgepark Drive
- Cambridgepark Drive west of Steel Place

Traffic volume summaries for these ATR locations are presented in Tables 2 and 3. 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 submitted on the CD accompanying this document.

Table 2: 2016 Traffic Volume Summary

Location	Daily [a]	Weekday AM Peak Hour Volume [b]	Weekday AM Peak Hour K [c]	Weekday PM Peak Hour Volume [b]	Weekday PM Peak Hour K [c]
Alewife Brook Parkway *north of Cambridgepark Drive*	48,077	3,203	7%	3,237	7%
Cambridgepark Drive *west of Steel Place*	5,689	584	10%	525	9%

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

Table 3: Existing 2016 Average Daily Traffic (ADT) Summary

Start Time	Cambridgepark Drive, west of Steel Place			Alewife Brook Pkwy north of Cambridgepark Drive		
	EB	WB	Total	NB	SB	Total
12:00	14	16	29	224	108	332
1:00	8	9	17	110	65	175
2:00	3	5	7	69	56	125
3:00	4	4	8	50	83	133
4:00	9	13	22	70	206	275
5:00	15	30	45	243	1085	1328
6:00	57	164	220	623	1842	2464
7:00	106	293	399	1453	1750	3203
8:00	149	435	584	1400	1612	3012
9:00	119	449	568	1209	1436	2645
10:00	119	227	345	1144	1449	2593
11:00	134	130	264	1241	1292	2533
12:00	141	148	289	1376	1325	2700
13:00	136	129	265	1446	1143	2588
14:00	177	101	277	1752	1213	2965
15:00	192	83	274	1786	1367	3153
16:00	346	110	456	1842	1395	3237
17:00	395	130	525	1843	1239	3082
18:00	292	115	406	1734	1314	3048
19:00	147	101	247	1592	1040	2632
20:00	87	78	165	1297	780	2076
21:00	52	75	127	1141	675	1816
22:00	46	49	94	756	460	1216
23:00	28	33	61	532	221	752
Total	2,769	2,920	5,689	24,926	23,151	48,077

5.2 Intersection Turning Movement Counts

Manual turning movement counts, including pedestrians and bicycles, were conducted at study intersections on June 28, 2016. Detailed count data are provided in the Appendix. The results of these counts indicate that the peak hours for traffic in the study area are generally 7:30 to 8:30 AM and 4:45 to 5:45 PM on weekdays.

At the time the counts were conducted in June, Cambridge Public Schools were no longer in session. Therefore, a 4% growth factor was applied to the peak hour turning movements to account for additional school related traffic[1]. Additionally, at the time the counts were conducted, the parking garage on the Project site was being used by 103 vehicles, which are estimated to generate approximately 0.33 trips per space during the peak hours. The 2016 Existing conditions turning movement counts are presented in **Figure 12.1 and 12.2** for the morning and evening peak hours, respectively.

The building was 20 percent occupied in March of 2016. Since the building was not fully occupied during the peak hour turning movement counts, the traffic volumes were increased to account for full occupancy of the office building and its garage. The trip increases for full occupancy of the garage are included in the Appendix as figures. The existing site is estimated to generate approximately 151 and 142 morning and evening peak hour trips if it were to be fully occupied as presented in the following *Project Trips* section. The 151 and 142 morning and evening peak hour trips were distributed onto the network and added to the 2016 Existing conditions traffic volumes (existing driveway counts were subtracted from the existing conditions). The resulting Adjusted 2016 Existing conditions turning movement volumes are presented in **Figure 12.3 and Figure 12.4** for the morning and evening peak hours, respectively.

Peak hour pedestrian volumes at study intersections are presented in **Figure 13**, and peak hour bicycle volumes are presented in **Figure 14**.

[1] Adjustment factor based on City of Cambridge TIS Guidelines

6.0 Project Trips

6.1 Trip Generation, Mode Share and Vehicle Occupancy

Total person trip generation estimates were developed based on Institute of Transportation Engineers (ITE) Trip Generation Manual (9th Edition) regression formulas for Office (LUC 710) and average rates for Shopping Center (LUC 820). Unadjusted ITE vehicle trips and adjusted person trips are presented in Table 4 for the existing site, proposed expansion and the net change. The national AVO of 1.08 was used to convert ITE vehicle trips to person trips.

The Existing trip generation for the unoccupied office building site was estimated based on 137,635 SF. The office building does not currently generate peak hour vehicle trips, however, 103 parking spaces are used and the site was 20 percent occupied in March, 2016. To account for this existing garage activity, 0.33 percent of the 103 parking spaces are assumed to enter and exit during the morning and evening peak hours respectively. The trip generation for the full occupancy of the existing site is summarized in Table 4 under the first section, Existing Site Estimate. The total proposed project trip generation estimate (assuming a 184,774 SF building) is provided under the second section of Table 4, Build Total. The difference in peak hour trips between the Existing Site Estimate and the Build Total is provided under the third section, Net New (this represents the Expansion Project – 47,139 SF).

Table 4: Total Project Trip Generation

	Unadjusted ITE Vehicle Trips			Adjusted Person Trips[1]		
	Daily	AM Peak	PM Peak	Daily	AM Peak	PM Peak
Existing Site Estimate[2]						
Enter	837	217	40	946	246	45
Exit	837	30	193	946	34	218
Total	1,674	247	233	1,892	280	263
Build Total[3]						
Enter	1,174	271	60	1,327	306	68
Exit	1,174	39	244	1,327	44	276
Total	2,348	310	304	2,654	350	344
Net New (Build Total-Existing Site Estimate)[4]						
Enter	338	53	21	381	60	24
Exit	338	9	51	381	11	58
Total	676	62	72	762	71	82

[1] Adjusted Person trips = ITE vehicle trips x 1.13 persons/vehicle (Local AVO)
[2] Assumes Full Build out of the Existing Site – 137,635 SF of Office
[3] Assumes the 47,139 SF Office and Ancillary Retail Expansion Project is Constructed and Occupied/Total Program Assumed: 177,274 SF of office and 7,500 SF of Ancillary Retail
[4] Represents the net change in trips between Existing and Build Conditions (39,639 SF of Office and 7,500 SF of Ancillary Retail)

If the existing office building was fully occupied, the trip generation analysis estimates there would be 247 morning and 233 evening peak hour unadjusted vehicle trips. The proposed project is expected to generate an additional 62 morning peak hour and 72 evening peak hour unadjusted vehicle trips.

In order to determine the number of transit, bicycle and walk trips for the Project, mode-share characteristics are based on the Alewife TMA Study PTDM Report data. The mode shares from the compiled PTDM survey data that were used for transit, bicycle and walk trips are presented in Table 5.

Table 5: Unadjusted Mode-Share: American Community Survey Data

Mode	Percentage of Trips
Automobile (SOV)	56%
Automobile (HOV)	5%
Transit	22%
Bicycle	6%
Walk	3%
Work at Home/Other	8%

The resulting project trip generation for the proposed Project is summarized in the following tables. Table 6 presents vehicle trips for the office and retail components of the Expansion Project (39,639 SF of Office and 7,500 SF of Ancillary Retail). Table 7 presents total site trips by mode for the Existing building on the site and the projected Build condition (Existing plus Project), and identifies the net new trips under the Build condition.

Table 6: Net New Vehicle Project Trip Generation by Land Use

	Daily	AM Peak	PM Peak
Office			
Enter	108	30	5
Exit	108	4	22
Total	216	34	27
Retail			
Enter	98	2	8
Exit	98	2	9
Total	196	4	17
Total			
Enter	206	32	13
Exit	206	6	31
Total	412	38	44

Table 7: Project Trip Generation by Mode

	Vehicle			Transit			Walk			Bicycle		
	Daily	AM Peak	PM Peak	Daily	AM Peak	PM Peak	Daily	AM Peak	PM Peak	Daily	AM Peak	PM Peak
Existing Site Estimate[1]												
Enter	510	133	24	208	54	10	29	7	1	57	14	3
Exit	510	18	118	208	8	48	29	1	6	57	2	14
Total	1,020	151	142	416	62	58	58	8	7	114	16	17
Build Total[2]												
Enter	716	165	37	292	67	15	40	9	2	80	18	4
Exit	716	24	149	292	10	61	40	1	8	80	3	17
Total	1432	189	186	584	77	76	80	10	10	160	21	21
Net New (Build Total-Existing Site Estimate)[3]												
Enter	206	32	13	84	13	5	11	2	1	23	4	1
Exit	206	6	31	84	2	13	11	0	2	23	1	3
Total	412	38	44	168	15	18	22	2	3	46	5	4

[1] Assumes Full Build out of the Existing Site – 137,635 SF of Office

[2] Assumes the 47,139 SF Office and Ancillary Retail Expansion Project is Constructed and Occupied/Total Program Assumed: 177,274 SF of office and 7,500 SF of Ancillary Retail

[3] Represents the net change in trips between Existing and Build Conditions (39,639 SF of Office and 7,500 SF of Ancillary Retail)

The Expansion Project will result in an increase of 38 and 44 morning and evening peak hour vehicle trips respectively.

As previously mentioned, the 35 Cambridgepark Drive site has been designed to promote the use of the Steel Place crosswalk at Cambridgepark Drive. The existing counts show pedestrians crossing Steel Place mid-block. Since the site is vacant, none of these crossings are destined to the 35 Cambridge Drive building. Other pedestrians crossing mid-block are most likely destined for the sidewalk on Cambridgepark Drive west of Steel Place. Realistically, it is expected they may continue to do so regardless of the site design.

The existing site does not currently generate truck deliveries since it is vacant. The site is expected to generate 8-10 trucks per day depending on the type of use in the building.

6.2 Trip Distribution and Assignment

Project-generated traffic was distributed through the study area intersections based on the Alewife Area PTDM Zip Code data, using only survey respondents that drove

to work. The top 10 town/city origin locations of workers that drive are presented in Table 8. The remainder of the cities/towns make up to 2% each of the origin data. The highest percent of workers (9%) travel from Boston to Alewife for work while 5 % of workers travel from Arlington and 5% from Waltham. The overall trip distribution is presented in **Figure 15**.

Table 8: Origin Data for Workers in Alewife Area

City/Town	Percent
Boston	9%
Arlington	5%
Waltham	5%
Somerville	4%
Cambridge	4%
Lexington	4%
Newton	4%
Watertown	3%
Belmont	2%
Acton	2%

Trip assignments at study area intersections are shown in **Figures 16.1 and 16.2** for the weekday AM and PM peak hours, respectively.

The resulting vehicular project-generated trips at study intersections are presented in **Figures 17.1 and 17.2** for the weekday AM and PM peak hours, respectively.

7.0 Vehicular Level of Service Analysis

7.1 Traffic Analysis Scenarios

Traffic analysis was performed for the following scenarios:

- **Adjusted Existing (2016) Conditions**: The Adjusted Existing (2016) Condition analysis is based on existing vehicle, pedestrian and bicycle counts at the study area intersections as previously presented in Section 2, reflecting a fully occupied 137,635 SF existing office building.
- **Build Condition**: The Build (2016) Condition assumes the Adjusted Existing (2016) Condition plus the Project (47,139 SF office and retail addition). Net new Project-generated trips are added to the Adjusted Existing Conditions turning movements at study area intersections. The resulting Build Condition peak hour turning movements are presented in **Figures 18.1 and 18.2** for the AM and PM peak hours, respectively.

7.2 Vehicle Capacity Analysis

Synchro 9 software is used to determine the vehicle level of service (VLOS) for un-signalized and signalized study intersections. Synchro software is based on the 2000 Highway Capacity Manual.

Results for the Adjusted Existing (2016) and Build (2016) conditions are presented in Tables 9 and 10 (AM peak hour) and Tables 11 and 12 (PM peak hour) for un-signalized and signalized intersections, respectively.

Table 9: Un-signalized Intersection Level of Service Results – AM Peak Hour

Intersection	Approach	Adjusted Existing (2016) Condition			Build (2016) Condition		
		Demand	Delay	VLOS	Demand	Delay	VLOS
1. Steel Place / Route 2 Ramp	Steel Place NB	4	9.7	A	4	9.8	A
	Route 2 SB	29	49.7	E	29	49.7	E
2. Steel Place / MBTA Driveway #1	MBTA Driveway WB	9	100.4	F	9	101.3	F
	Steel Place SB	11	1.5	A	11	1.5	A
3. Steel Place / MBTA Driveway #2	MBTA Driveway WB	152	13.8	B	152	13.9	B
4. Steel Place / MBTA Driveway #3/35 CPD Driveway	35 CPD EB	18	37.0	E	24	49.7	E
	Steel Place NB	1	0.0	A	80	3.3	A
	Steel Place SB	152	3.5	A	152	3.5	A
5. Steel Place / MBTA Driveway #4	MBTA Driveway WB	91	145.3	F	91	202.6	F
	Steel Place SB	247	8.2	B	247	10.0	B

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

Table 10: Signalized Intersection Level of Service Results – AM Peak Hour

Intersection	Approach	Adjusted Existing (2016) Condition				Build (2016) Condition			
		v/c	Delay	VLOS	Queue	v/c	Delay	VLOS	Queue
6. Cambridgepark Drive / Steel Place	CPD EB	0.45	27.6	C	96	0.37	25.6	C	93
	CPD WBT	0.84	42.9	D	285	0.71	34.6	C	220
	CPD WBR	0.28	24.3	C	0	0.35	25.7	C	0
	CPP NB	0.18	37.0	D	23	0.18	37.0	D	23
	SP SBL	0.32	27.3	C	84	0.32	27.4	C	84
	SP SB	0.68	39.7	D	125	0.49	31.8	C	92
	Overall	**0.65**	**34.4**	**C**		**0.52**	**29.8**	**C**	
7. Alewife Brook Pkwy / Cambridgepark Dr	CPD EB	0.37	32.6	C	130	0.38	32.6	C	130
	ABP NBL	1.14	106.1	F	~231	1.18	123.4	F	~249
	ABP NBT	0.77	10.9	B	241	0.77	10.9	B	241
	ABP SBT	1.14	104.8	F	~764	1.14	104.8	F	~764
	ABP SBR	0.29	0.5	A	0	0.30	0.5	A	0
	Overall	**0.92**	**52.6**	**D**		**0.95**	**53.9**	**D**	
8. Alewife Brook Pkwy / Rindge Ave	Rindge WBL	0.90	87.5	F	172	0.90	87.5	F	172
	Rindge WBR	1.50	301.1	F	~319	1.51	305.0	F	~322
	ABP NB	1.29	161.9	F	~816	1.30	165.1	F	~824
	ABP SB	0.94	9.8	A	801	0.94	9.9	A	801
	Overall	**1.15**	**108.8**	**F**		**1.16**	**110.7**	**F**	

v/c volume-to-capacity ratio
Delay average delay expressed in seconds per vehicle
VLOS vehicular level of service
Queue average queue Length (ft)

Table 11: Un-signalized Intersection Level of Service Results – PM Peak Hour

Intersection	Approach	Adjusted Existing (2016) Condition			Build (2016) Condition		
		Demand	Delay	VLOS	Demand	Delay	VLOS
1. Steel Place / Route 2 Ramp	Steel Place NB	0	36.7	E	0	42.6	E
	Route 2 SB	331	54.3	F	331	54.5	F
2. Steel Place / MBTA Driveway #1	MBTA Driveway WB	235	345.1	F	235	375.3	F
	Steel Place SB	9	0.9	A	9	1.0	A
3. Steel Place / MBTA Driveway #2	MBTA Driveway WB	126	23.3	C	126	24.8	C
4. Steel Place / MBTA Driveway #3/35 CPD Driveway	35 CPD EB	119	81.1	F	150	152.0	F
	Steel Place NB	2	0.0	A	20	0.6	A
	Steel Place SB	150	4.2	A	150	4.2	A
5. Steel Place / MBTA Driveway #4	MBTA Driveway WB	370	139.3	F	370	153.6	F
	Steel Place SB	36	1.0	A	36	1.0	A

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

Table 12: Signalized Intersection Level of Service Results – PM Peak Hour

Intersection	Approach	Adjusted Existing (2016) Condition				Build (2016) Condition			
		v/c	Delay	VLOS	Queue	v/c	Delay	VLOS	Queue
6. Cambridgepark Drive / Steel Place	CPD EB	0.74	36.0	D	253	0.74	36.0	D	253
	CPD WBT	0.55	30.1	C	121	0.53	29.3	C	112
	CPD WBR	0.09	26.4	C	9	0.11	28.8	C	14
	CPP NB	0.16	36.6	D	15	0.16	36.6	D	16
	SP SBL	0.68	35.7	D	213	0.68	35.7	D	213
	SP SB	0.71	37.9	D	209	0.70	37.1	D	206
	Overall	**0.61**	**35.1**	**D**		**0.61**	**35.0**	**C**	
7. Alewife Brook Pkwy / Cambridgepark Dr	CPD EB	1.03	64.3	E	~665	1.04	67.1	E	~678
	ABP NBL	1.04	61.3	E	~87	1.06	70.2	E	~93
	ABP NBT	0.89	14.7	B	220	0.89	14.7	B	220
	ABP SBT	1.25	151.1	F	~623	1.25	151.1	F	~623
	ABP SBR	0.05	0.1	A	0	0.05	0.1	A	0
	Overall	**1.21**	**75.2**	**E**		**1.21**	**76.2**	**E**	
8. Alewife Brook Pkwy / Rindge Ave	Rindge WBL	0.52	40.3	D	109	0.52	40.3	D	109
	Rindge WBR	0.84	61.2	E	118	0.84	61.9	E	120
	ABP NB	1.60	302.0	F	~760	1.61	303.3	F	~762
	ABP SB	1.21	106.1	F	~797	1.21	108.8	F	~803
	Overall	**1.12**	**171.6**	**F**		**1.12**	**173.4**	**F**	

v/c volume-to-capacity ratio
Delay average delay expressed in seconds per vehicle
VLOS vehicular level of service
Queue average queue Length (ft)

Pertinent results of the analysis with regard to the Project include the following:

- Alewife Brook Parkway at Rindge Avenue (Intersection #8) operates at LOS F during the morning and evening peak hours under Adjusted Existing conditions, and will continue to do so under Build conditions with a slight increase in average delay of 1.9 and 1.8 seconds in the AM and PM peak hours, respectively, as a result of the Project.
- Alewife Brook Parkway at Cambridgepark Drive (Intersection #7) operates at LOS D and LOS E during the morning and evening peak hours, respectively, under both Adjusted Existing and Build conditions, with a slight increase in average delay of 1.3 and 1.0 seconds in the AM and PM peak hours, respectively, as a result of the Project. Field observations indicate that vehicles at this intersection experience longer delays than reported. The model demonstrates that the queue in the Cambridgepark Drive eastbound approach is estimated at 665 feet which is longer than the storage space of approximately 430 feet provided for this approach. This is likely caused by upstream queueing that backs up into the intersection of Alewife Brook Parkway at Cambridge Park Drive during the evening commute period due to regional traffic demand. The software and reporting methodologies do not account for this impact from queueing.
- Due to the relocation of the existing site entrance from Cambridgepark Drive to Steel Place as part of the Project, the intersection of Steel Place at Cambridgepark Drive (Intersection #6) will continue to operate at LOS C during the morning peak hour, but will experience a slight decrease of 4.6 seconds in average delay due to a reduction of vehicle trips traveling through the intersection with the Project. Similarly, during the evening peak hour, the intersection will continue to operate at a LOS D under the Build condition, but will experience a nominal decrease in average delay with the Project. Field observations indicate that vehicles at this intersection experience longer delays than reported. This may be caused by upstream queueing that backs up into the intersection of Cambridge Park Drive at Steel Place during the evening commute period. The software and reporting methodologies do not account for this impact from queueing.
- At the un-signalized intersections along Steel Place at the Route 2 Ramp/Alewife Station Access Road (Intersection #1) and at the four MBTA driveways (Intersection # 2, 3, 4 & 5), several movements experience good LOS A, B or C while several experience failing LOS E or F under Adjusted Existing conditions during the morning and evening peak hours. While some movements are projected to experience slight increases in average delay as a result of the Project, all locations will continue to experience the same LOS grades under all Build conditions.

- At the Project Site Driveway on Steel Place (Intersection #4), while the LOS grades are maintained under all conditions, the exit from the Project garage is expected to experience increase in average delay of approximately 12.7 and 70.9 seconds during the AM and PM peak hours respectively. The increase in delay is expected to result in increased queuing inside the project garage for exiting Project trips.

The Project impacts described above will be mitigated as described in section 9.0 Transportation Demand Management and Mitigation.

8.0 Pedestrian Level of Service Analysis

The turning movement counts performed in June, 2016 also included pedestrian movements. Pedestrian volumes within the study area are presented in **Figure 14** (presented previously). A comparison of Adjusted Existing and Build pedestrian level-of-service (PLOS) at signalized locations is presented in Table 13.

Table 13: Signalized Pedestrian (2016) Level of Service Summary

		AM Peak Hour		PM Peak Hour	
Intersection	Crosswalk	Adjusted Existing (2016)	Build (2016)	Adjusted Existing (2016)	Build (2016)
6. Cambridgepark Drive / Steel Place	East	D	D	D	D
	West	D	D	D	D
	North	D	D	D	D
	South	D	D	D	D
7. Alewife Brook Pkwy/Rindge Avenue	East	E	E	E	E
	South	E	E	E	E

Pedestrian level-of-service at signalized intersections is dictated by the portion of the signal cycle dedicated to pedestrian crossings as well as the distance pedestrians have to cross. Accordingly, increasing pedestrian volumes does not alter pedestrian level of service at signalized intersections. The crosswalks at the intersection of Cambridgepark Drive/Steel Place will continue to operate at a PLOS D while the crosswalks at Alewife Brook Parkway/Rindge Avenue will continue to operate at a PLOS E.

9.0 Transportation Demand Management and Mitigation

The Project Proponent is committed to optimizing the transit-oriented opportunity afforded by the Project site to minimize auto travel and encourage alternative travel modes. The reduction in the auto parking ratio is expected to have a positive impact in this regard. Further, in light of the very limited bicycle accommodations in the existing building, the provision of bicycle parking in excess of zoning requirements is expected to also have a positive impact.

A primary beneficial change in the proposed site plan is the closure of the existing curb-cut on Cambridgepark Place. This will eliminate conflicting traffic maneuvers between vehicle, bicycles and pedestrians at this poorly-located curb-cut immediately adjoining the Steel Place intersection. The entrance to the existing garage will be provided at the existing exit on Steel Place.

The Proponent will support a program of transportation demand management (TDM) actions to reduce single occupancy vehicle (SOV) automobile trips, encourage car/van-pooling, and expand the use of transit, biking and walking.

The following potential TDM programs could be implemented as part of the proposed Project to encourage Project employees and visitors to use alternatives to SOV travel:

- Charge market rate monthly parking fees consistent with structured parking facilities used for technical office in the Alewife Area.
- Membership in the Alewife TMA, including free access for employees to use shuttle buses operated by the TMA. Provide emergency ride home and ride-matching benefits to all employees through the Alewife TMA or other provider acceptable to TP&T.
- Provide 50% transit subsidies to employees.
- Mount real time transit screens in office lobby.
- Designate a Transportation Coordinator for the site responsible for:
    - Aggressively promoting and marketing non-SOV modes of transportation to employees
    - Overseeing the marketing and promotion of transportation options such as posting information on the Project's web site, social media, and property newsletters
    - Responding to individual requests for information
    - Performing annual transportation surveys
    - Coordinating with Alewife TMA

- Providing up to date information to all new employees through a New Employee Packet

- Provide Hubway corporate membership (minimum Gold level) paid by employer for employees that chooses to become Hubway members.
- Require corporate membership paid by the employer to allow employees to use carshare vehicles for work related trips during the day instead of needing to drive private vehicles to work.
- Provide electric vehicle Level 2 plug-in station in the garage.
- Dedicate 5 carpool/vanpool parking spaces. If actual experience shows that the carpool/vanpool spaces are fully utilized, add additional spaces to satisfy demand.
- Update existing bicycle parking to meet City standards.
- Provide air pumps and other bike tools such as a bicycle repair station.
- Consider providing lender bike for employees to use during the day for errands.
- Provided validated parking for retail patrons.

As noted in Section 1.0, the Proponent has worked with the TP&T, including several meeting to discuss the Project. A meeting with City Staff was held on July 20, 2016 to discuss the scope of work for the analysis in this report, and to identify potential mitigation. Mitigation may include the performance of transportation studies intended to help inform the TP&T and the Alewife area stakeholders in advancing the understanding and further analysis of transportation needs in the area.

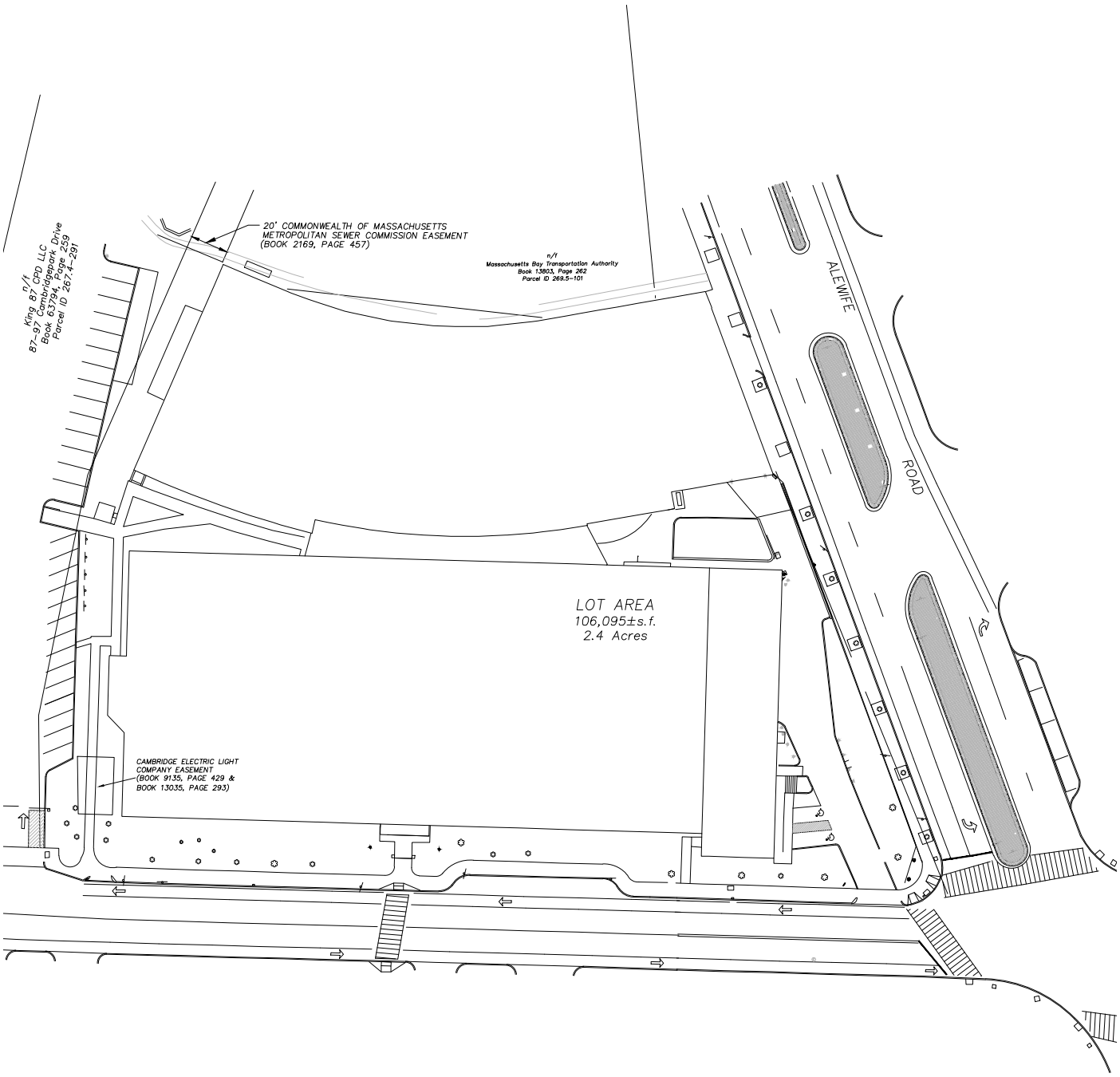
The Proponent will continue to work with TP&T to develop and agree upon an appropriate mitigation package.

\\MABOSDATA\projects\13511.00 Davis 35 CambridgeparkDr\graphics\FIGURES\Site Location Map.dwg

Figure 1

Site Location

35 Cambridgepark Drive
Cambridge, Massachusetts



0 40 80 Feet

Figure 2

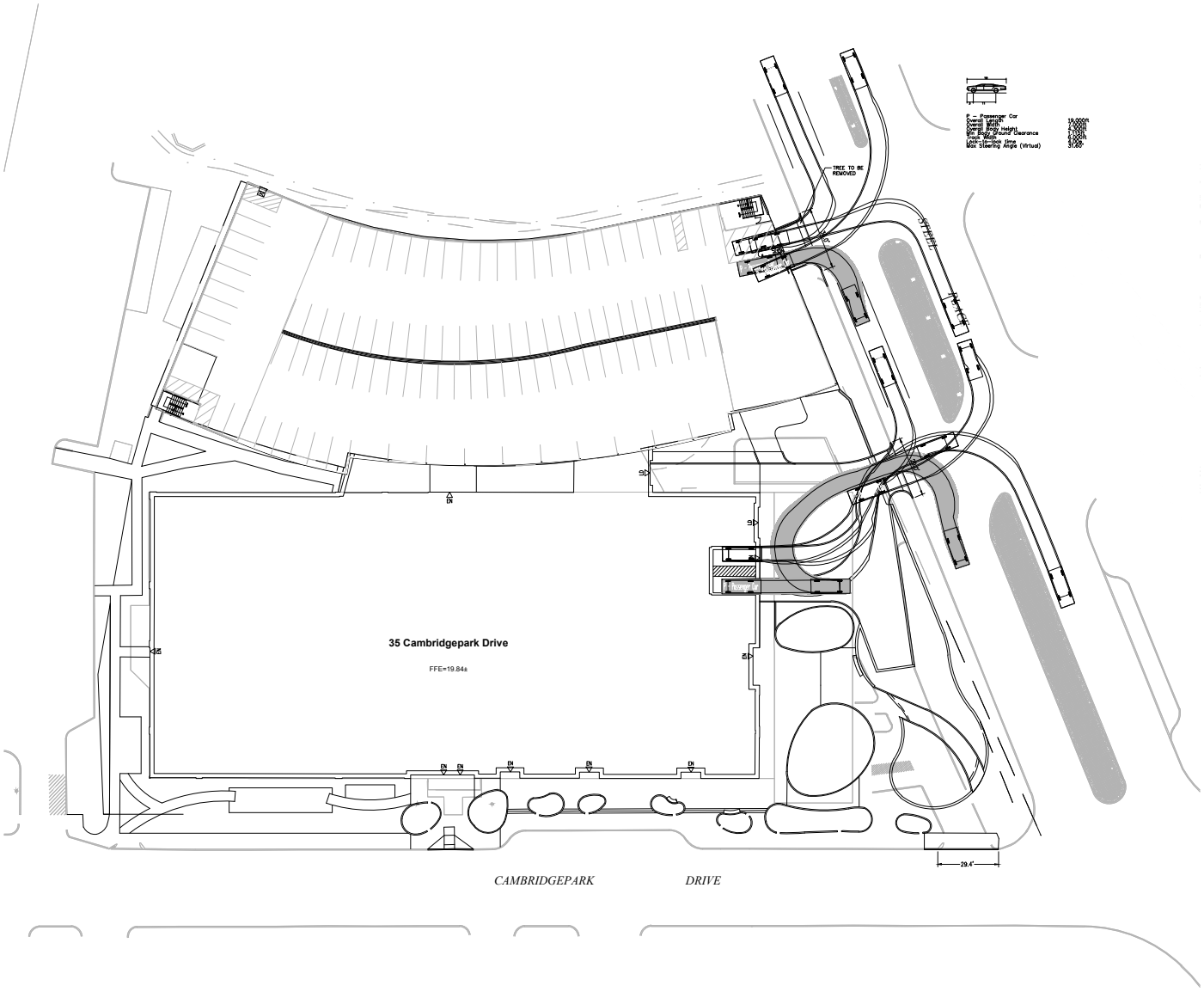
Existing Site Plan

35 Cambridgepark Drive
Cambridge, Massachusetts

Source: SGA

Figure 3
Proposed Project Site Plan

35 Cambridgepark Drive
Cambridge, Massachusetts

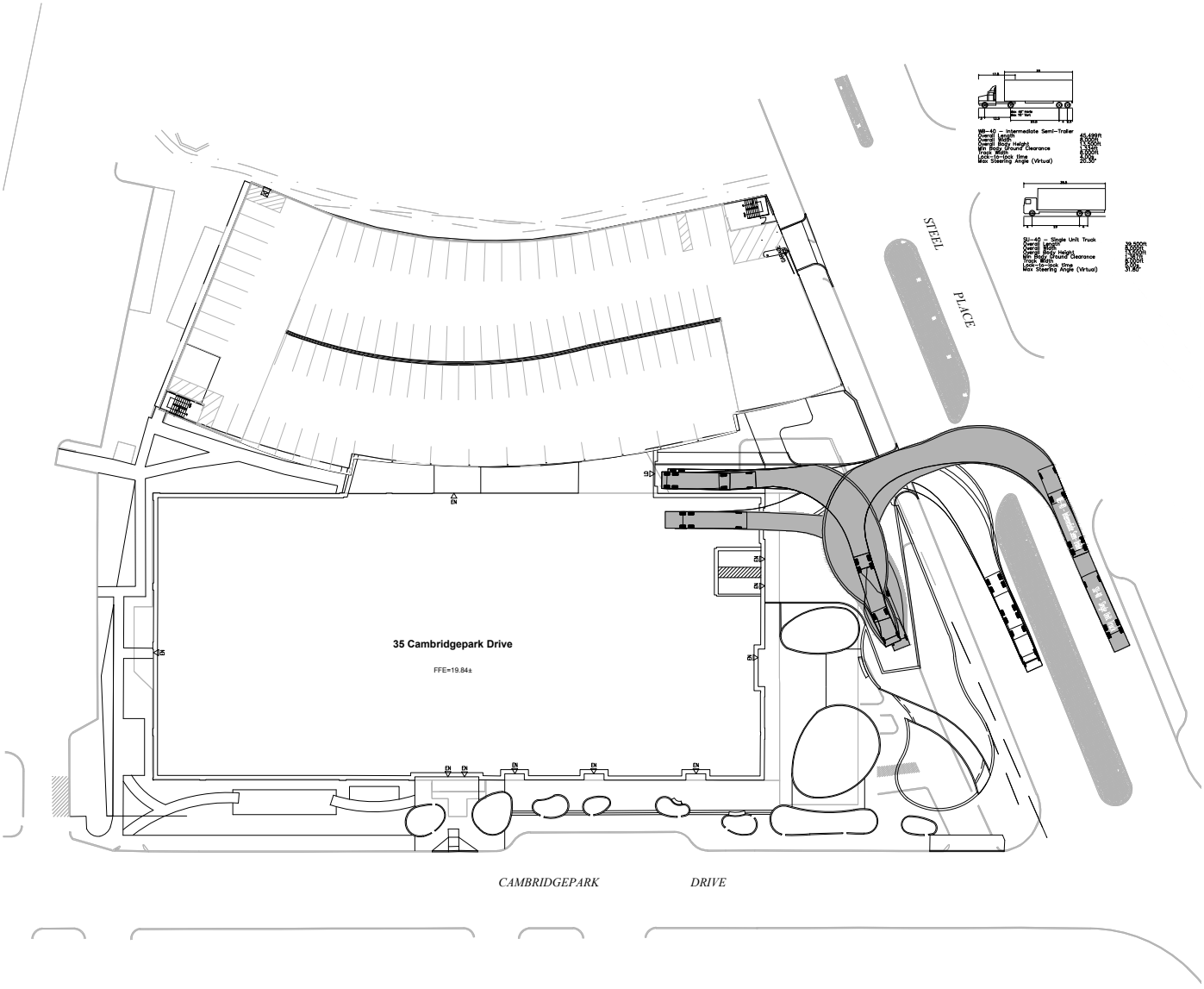


0 40 80 Feet

Source: SGA

Figure 4
Vehicle Turns

35 Cambridgepark Drive
Cambridge, Massachusetts



0 40 80 Feet

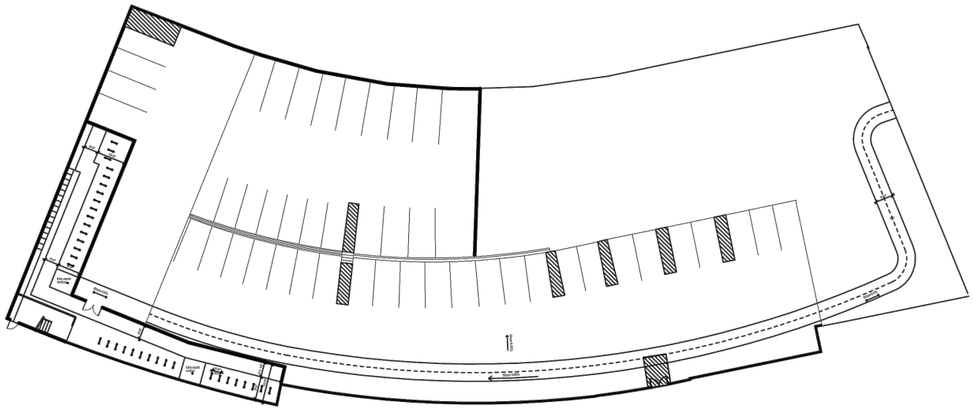
Source: SGA

Figure 5

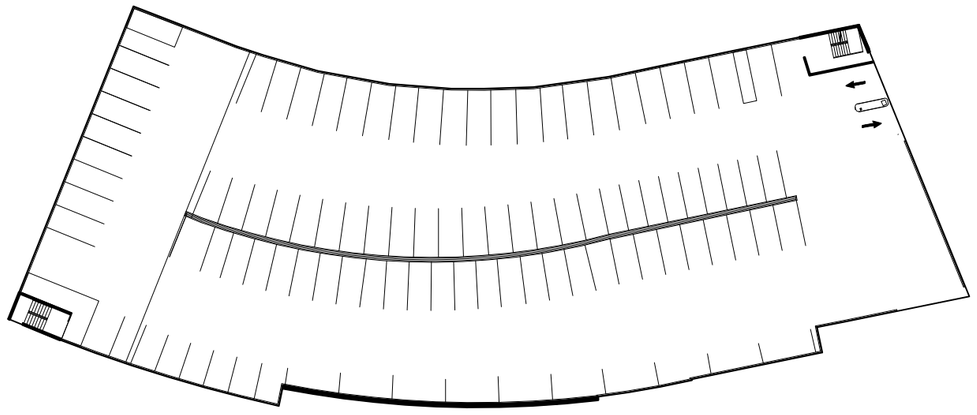
Truck Turns to and from Steel Place

35 Cambridgepark Drive
Cambridge, Massachusetts

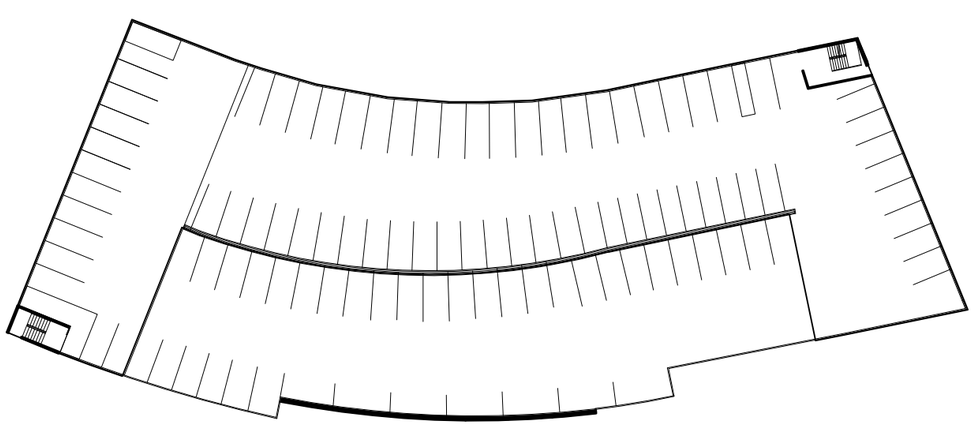
Garage - Lower Level



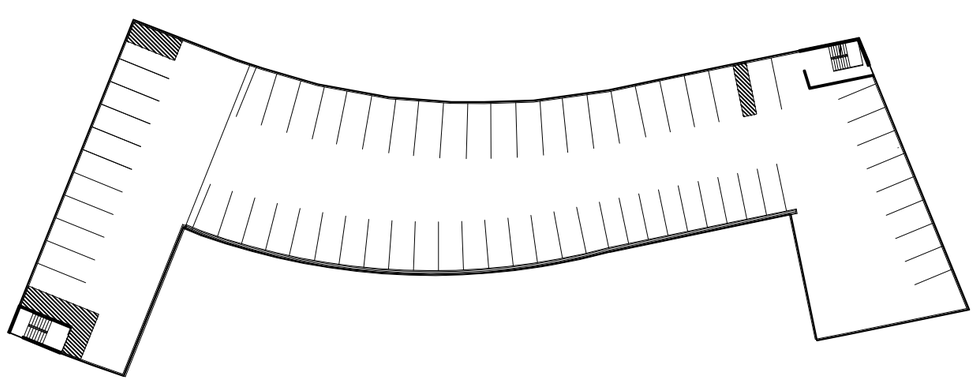
Garage - Level 1



Garage - Level 2



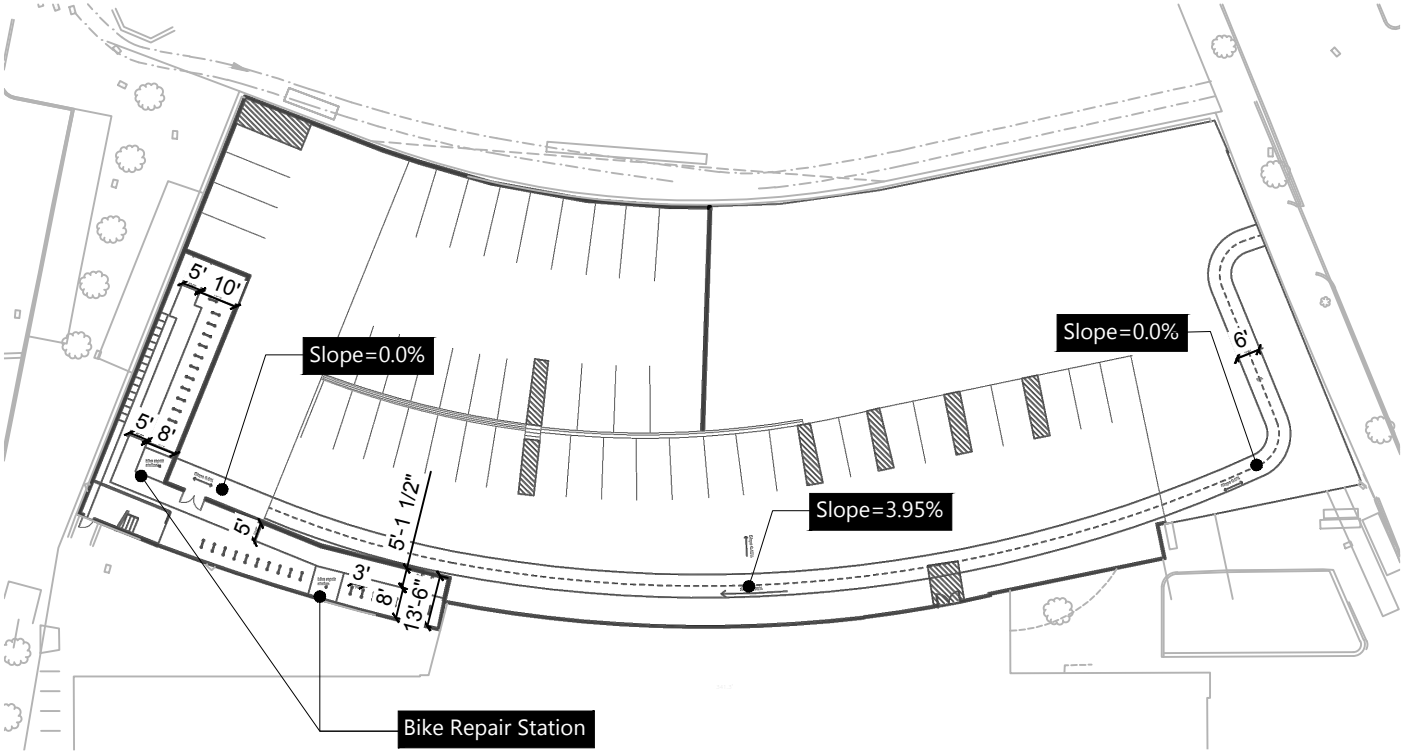
Garage - Level 3



Source: SGA

Figure 6
Parking Garage Layout

35 Cambridgepark Drive
Cambridge, Massachusetts



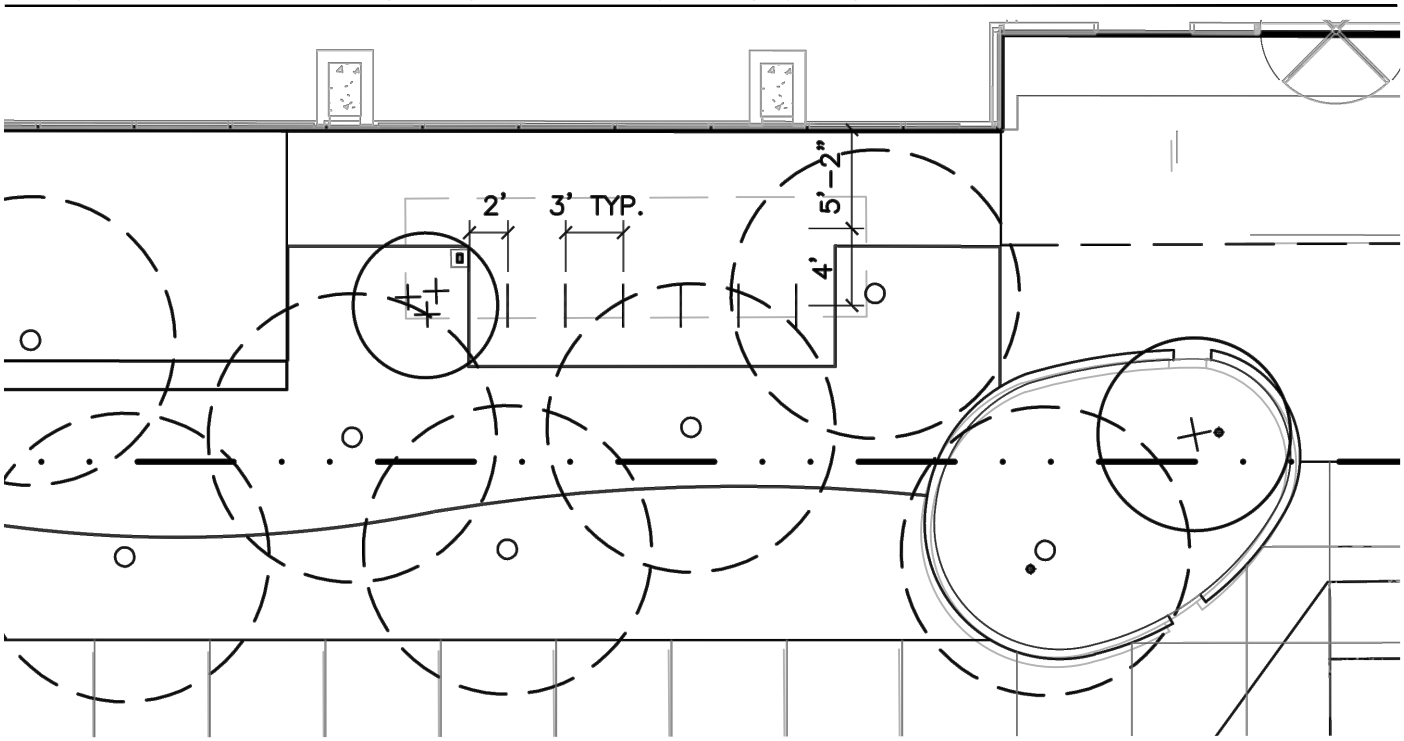
0 25 50 Feet

Source: SGA

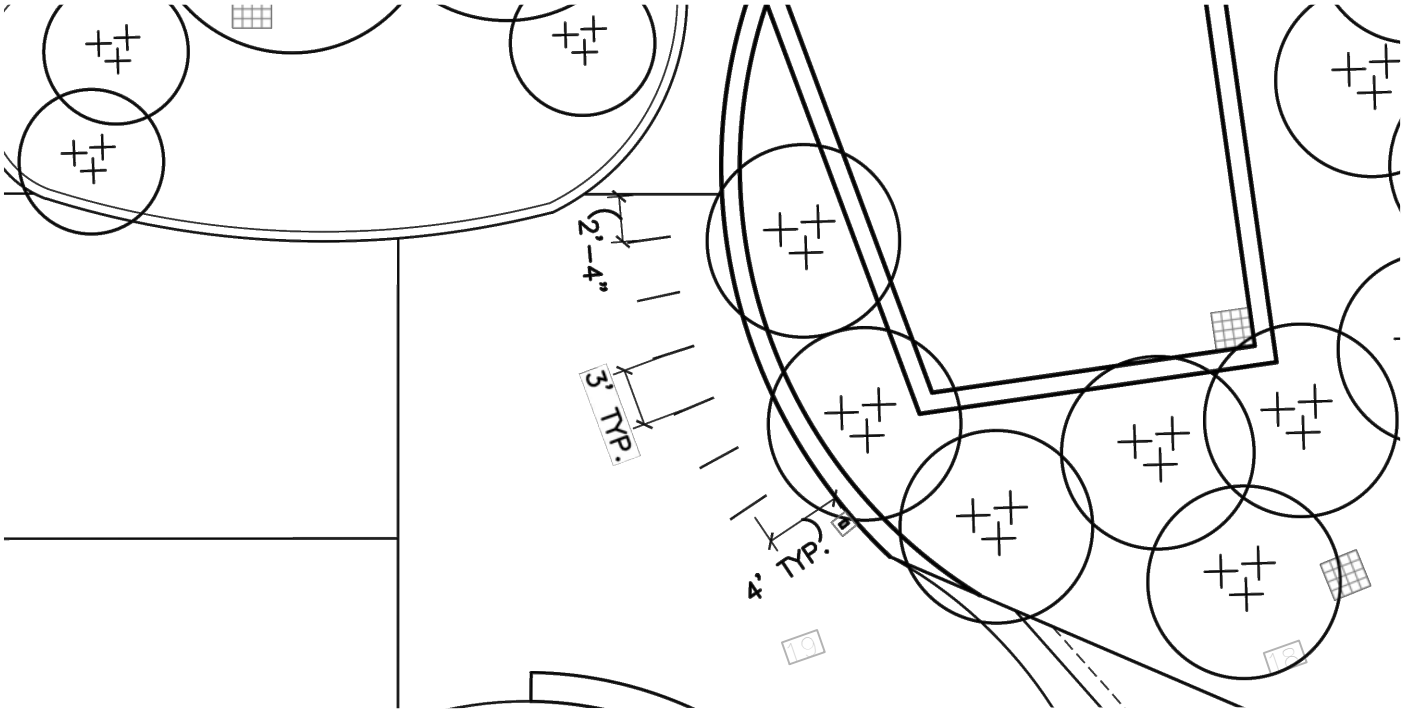
Figure 7

Long-Term Bicycle Parking Layout

35 Cambridgepark Drive
Cambridge, Massachusetts



Office: 12 Bike Parking Spots



Retail: 12 Bike Parking Spots

0 5 10 Feet

Source: SGA

Figure 8

Short-Term Bicycle Parking Layout

35 Cambridgepark Drive
Cambridge, Massachusetts

\\MABOSDATA\projects\13511.00 Davis 35 CambridgeparkDr\graphics\FIGURES\Study Intersections.dwg

Figure 9

Study Intersections

35 Cambridgepark Drive
Cambridge, Massachusetts

Figure 10

Transit Service

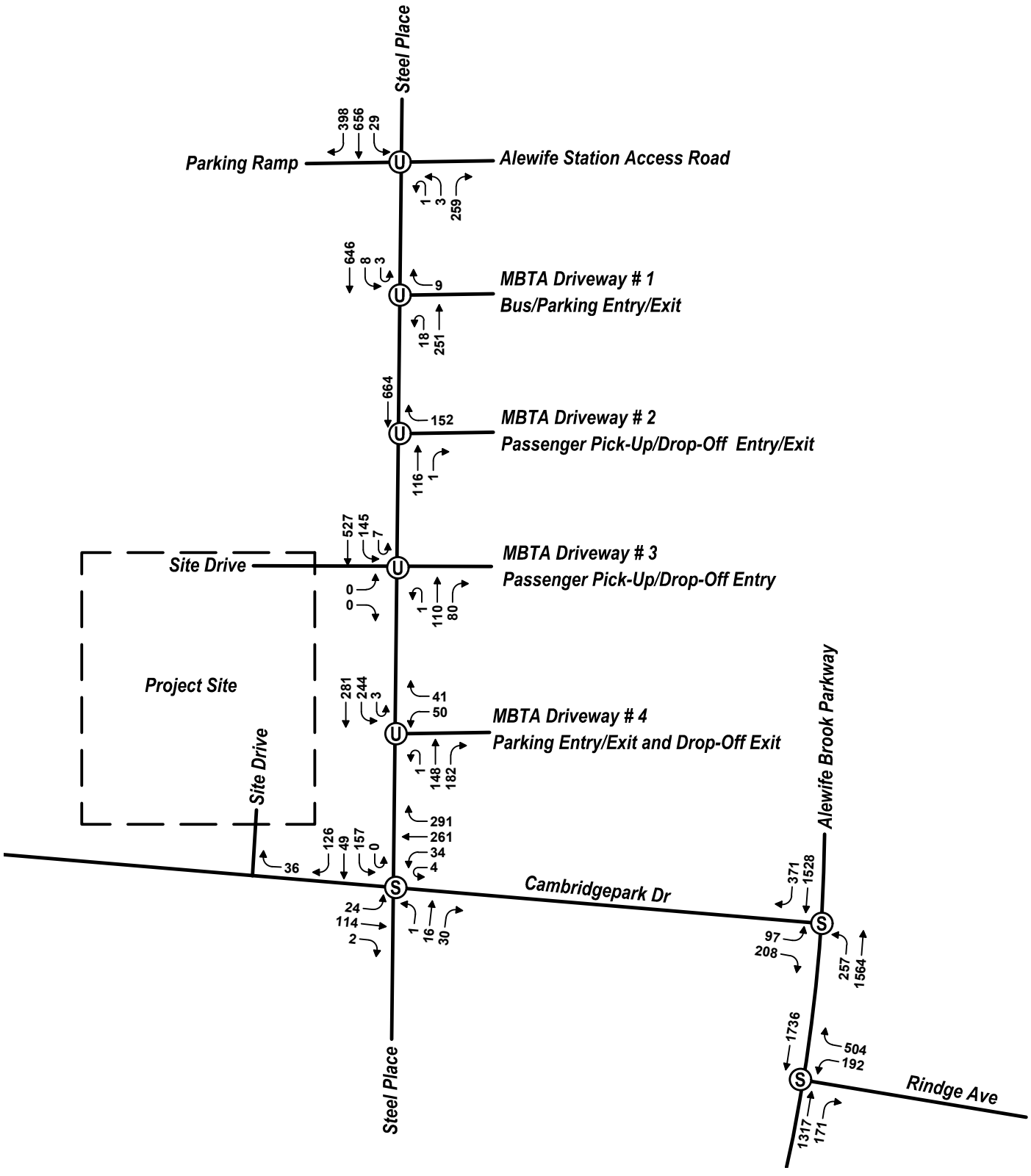
35 Cambridgepark Drive
Cambridge, Massachusetts

Figure 11

Bicycle Accommodations

35 Cambridgepark Drive
Cambridge, Massachusetts

Source: City of Cambridge



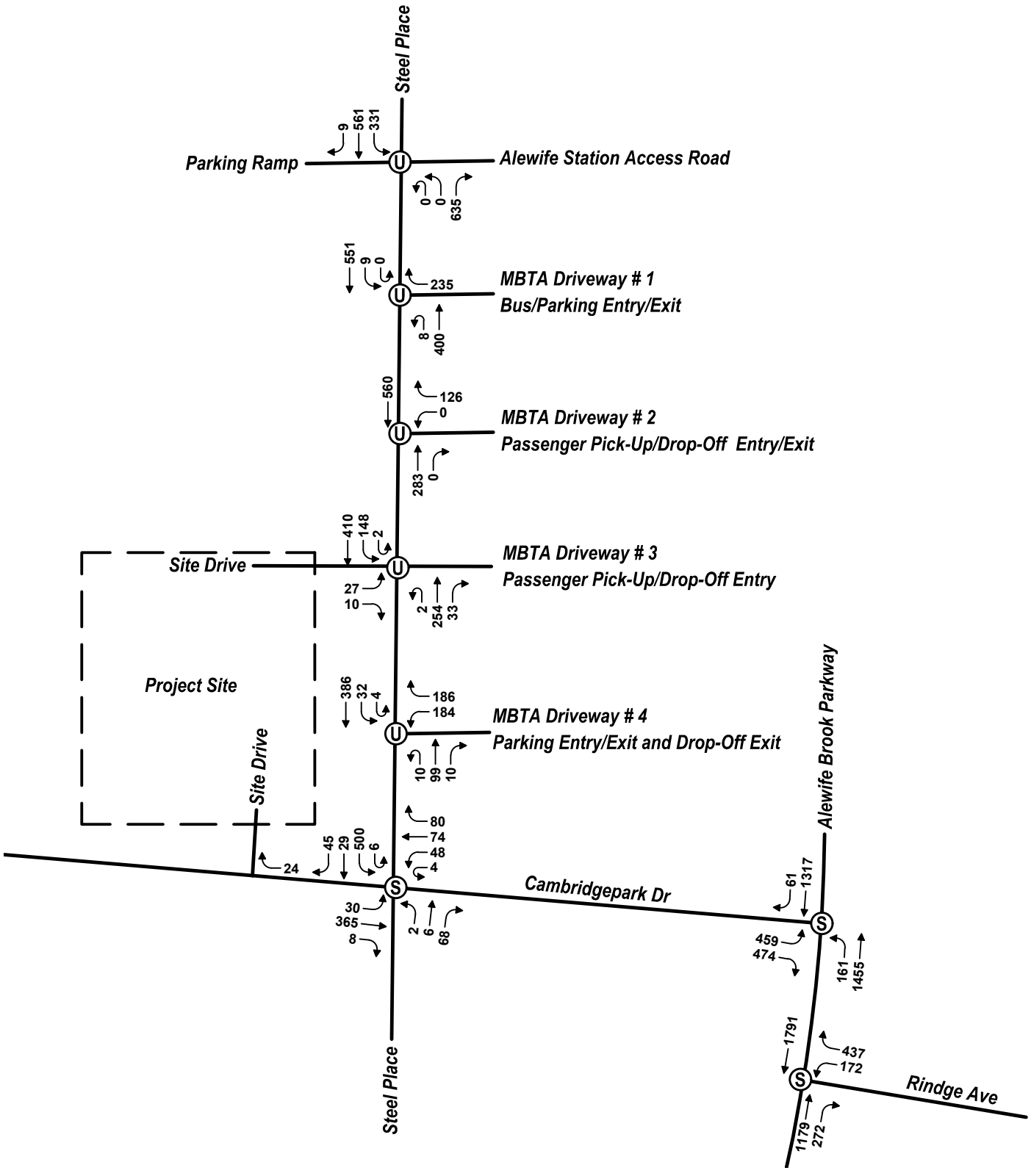
Not to Scale

Note: Counts conducted on June 28, 2016, increased by 4% to account for school traffic

Figure 12.1

2016 Existing Traffic Volumes
Morning Peak Hour (7:30-8:30 AM)

35 Cambridgepark Drive
Cambridge, Massachusetts



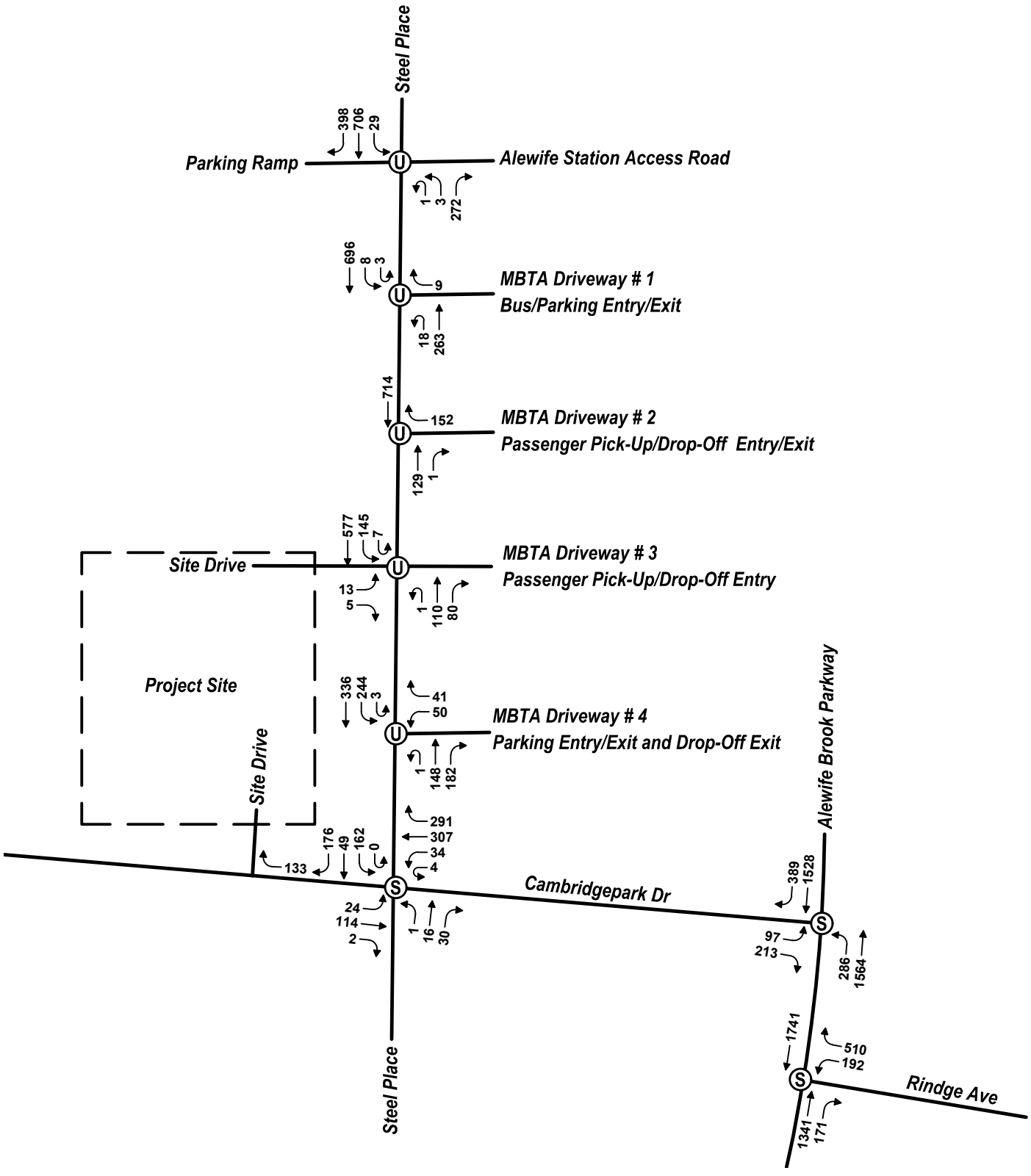
Not to Scale

Figure 12.2

2016 Existing Traffic Volumes
Evening Peak Hour (4:45-5:45 PM)

35 Cambridgepark Drive
Cambridge, Massachusetts

Note: Counts conducted on June 28, 2016, increased by 4% to account for school traffic



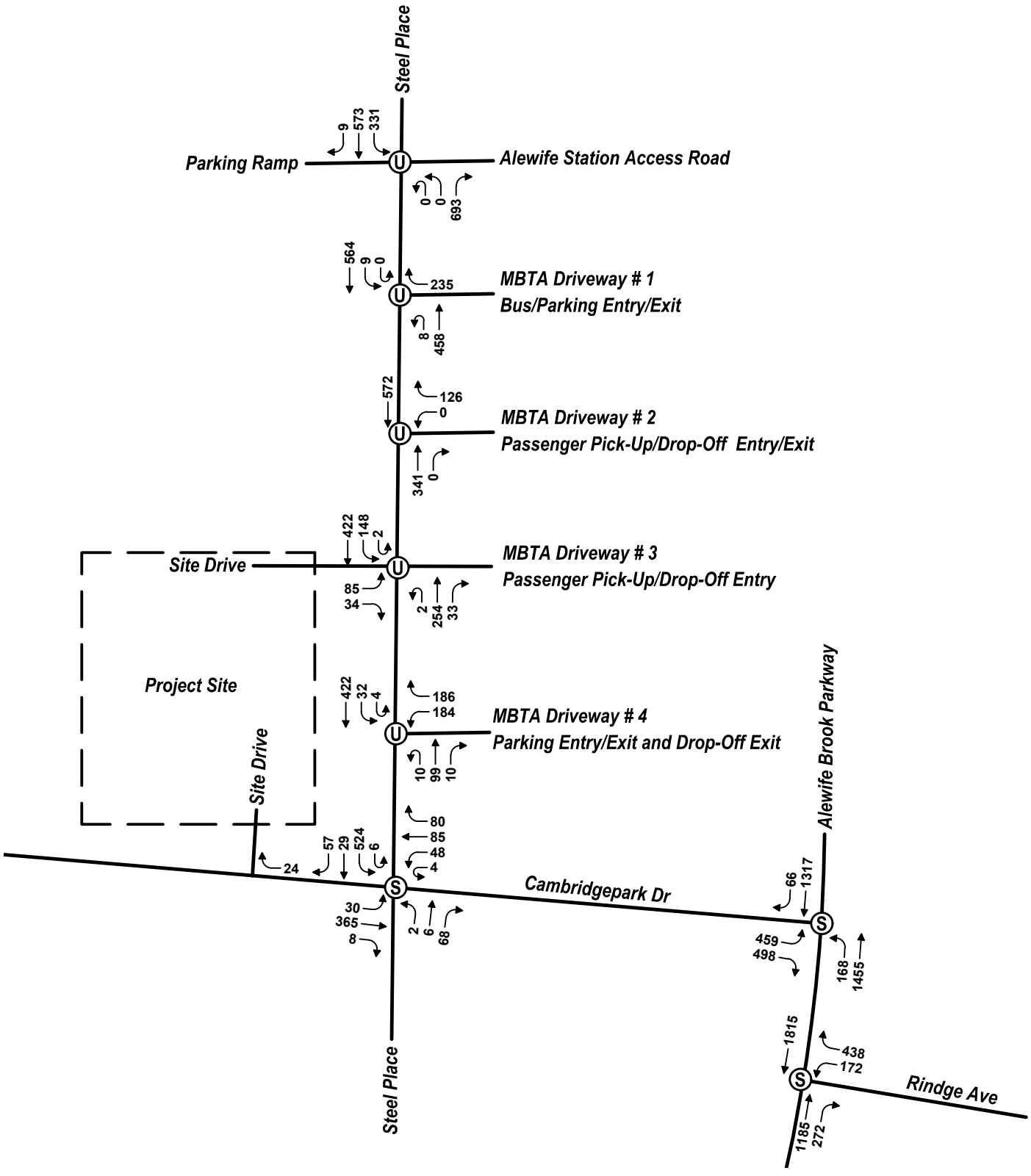
Not to Scale

Note: Existing counts adjusted to assume a full-occupancy of 35 Cambridgepark Drive

Figure 12.3

2016 Adjusted Existing Traffic Volumes
Morning Peak Hour (7:30-8:30 AM)

35 Cambridgepark Drive
Cambridge, Massachusetts



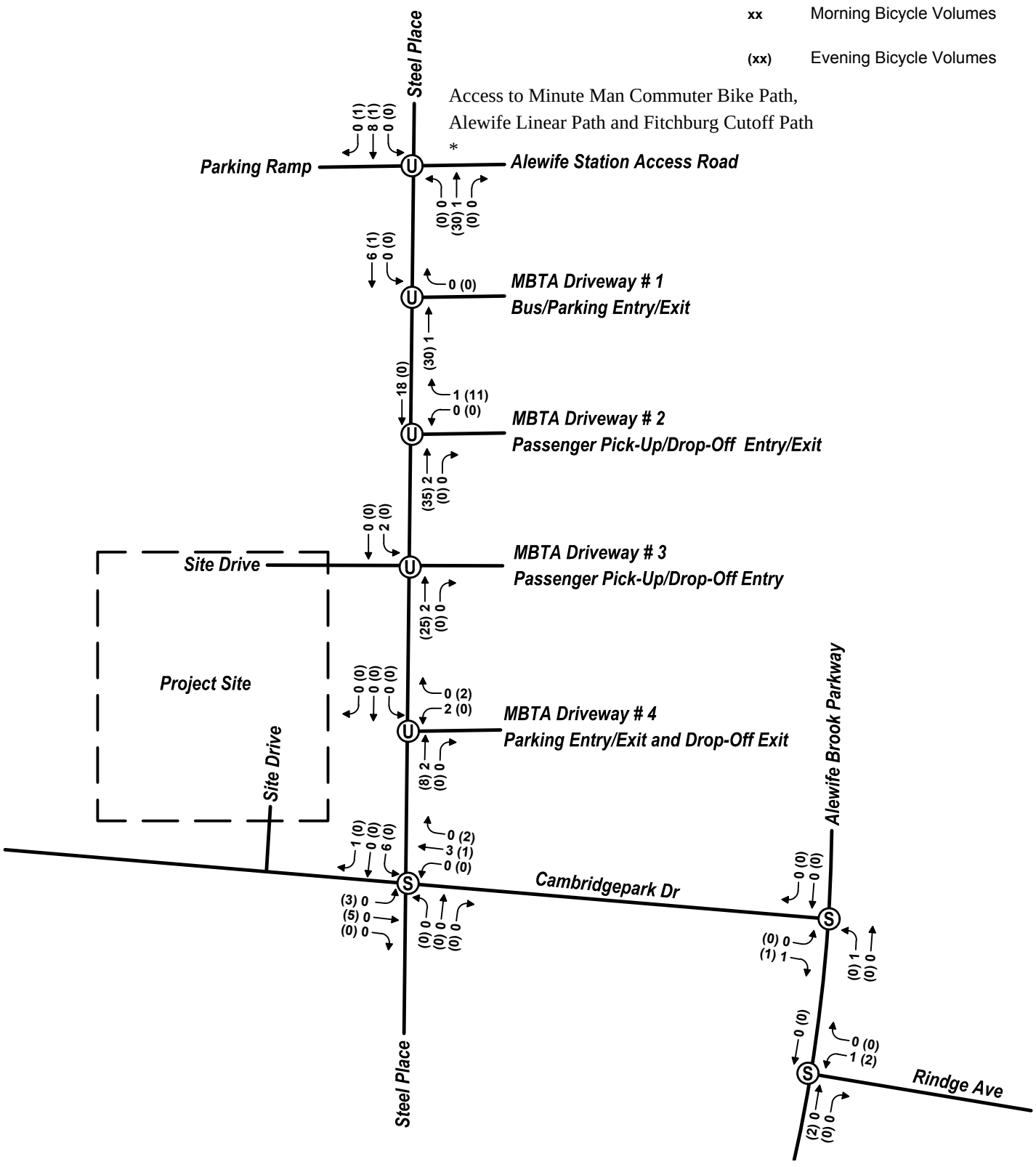
Not to Scale

Note: Existing counts adjusted to assume a full-occupancy of 35 Cambridgepark Drive

Figure 12.4

2016 Adjusted Existing Traffic Volumes
Evening Peak Hour (4:45-5:45 PM)

35 Cambridgepark Drive
Cambridge, Massachusetts



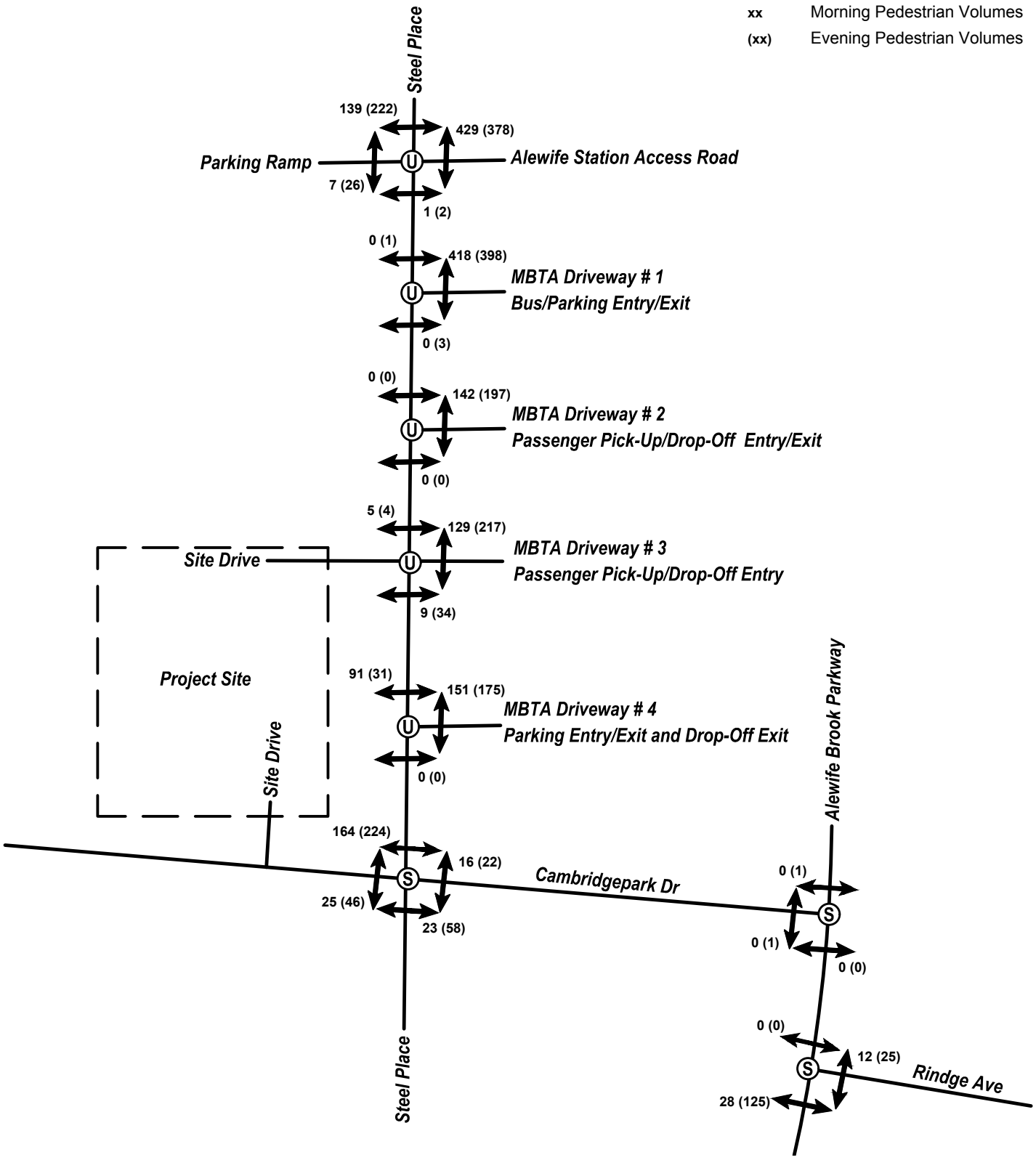
Not to Scale

Note: Counts conducted on June 28, 2016

Figure 13

2016 Existing Bicycle Volumes
Morning and Evening Peak Hour

35 Cambridgepark Drive
Cambridge, Massachusetts



Not to Scale

Note: Counts conducted on June 28, 2016

Figure 14

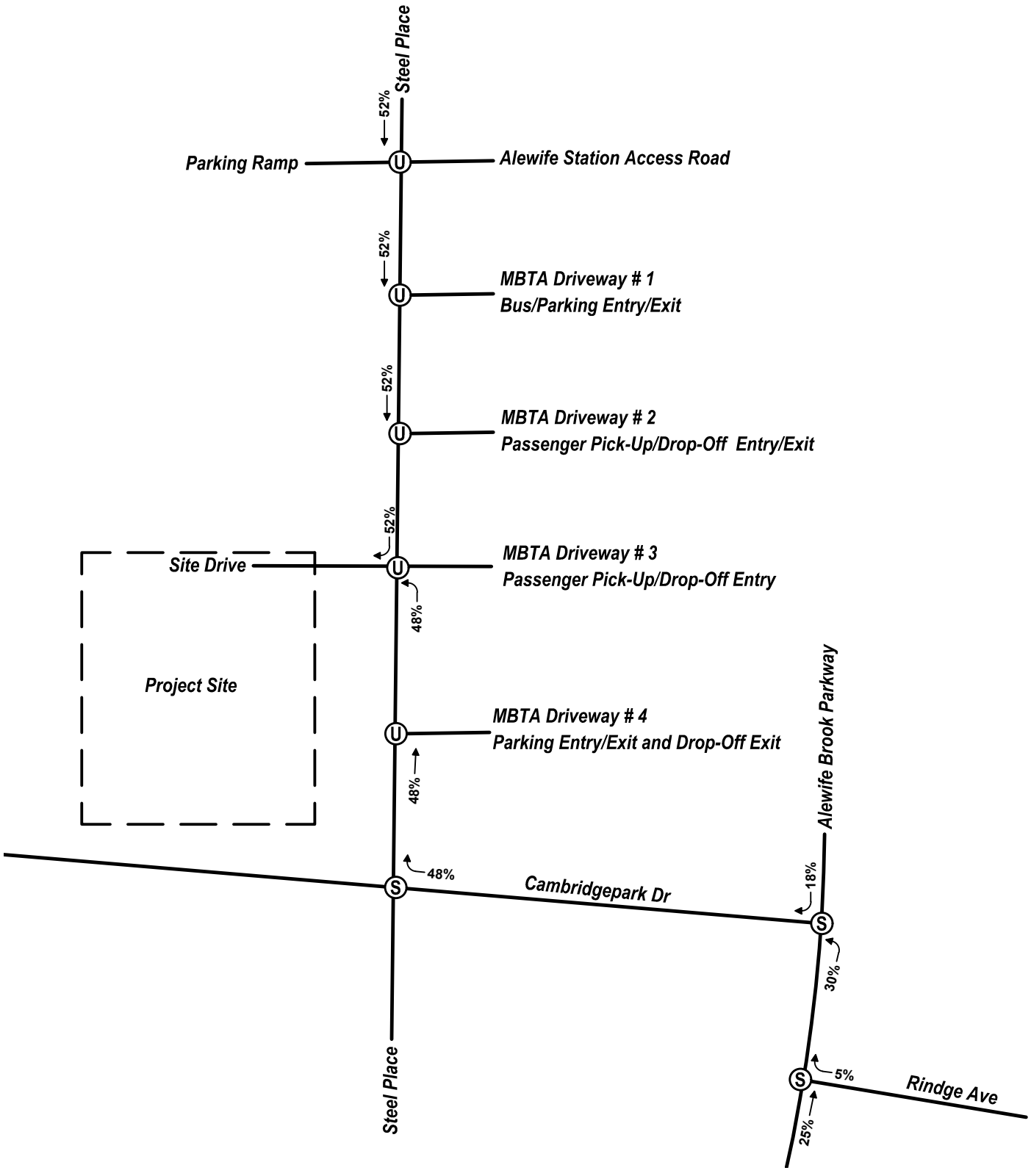
2016 Existing Pedestrian Volumes
Morning and Evening Peak Hour

35 Cambridgepark Drive
Cambridge, Massachusetts

Figure 15

Project Trip Distribution

35 Cambridgepark Drive
Cambridge, Massachusetts

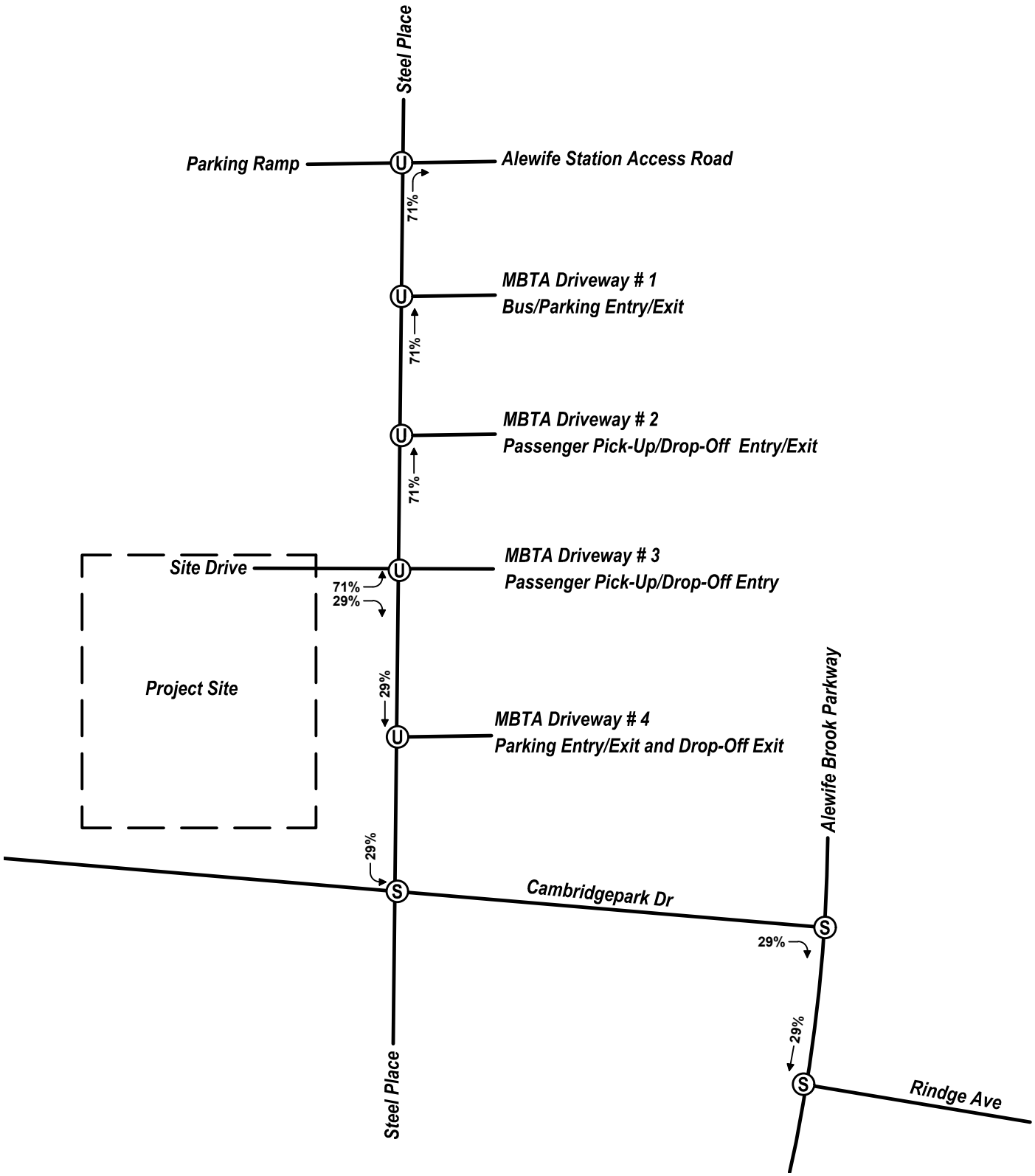


Not to Scale

Figure 16.1

Project Trip Assignments Inbound

35 Cambridgepark Drive
Cambridge, Massachusetts

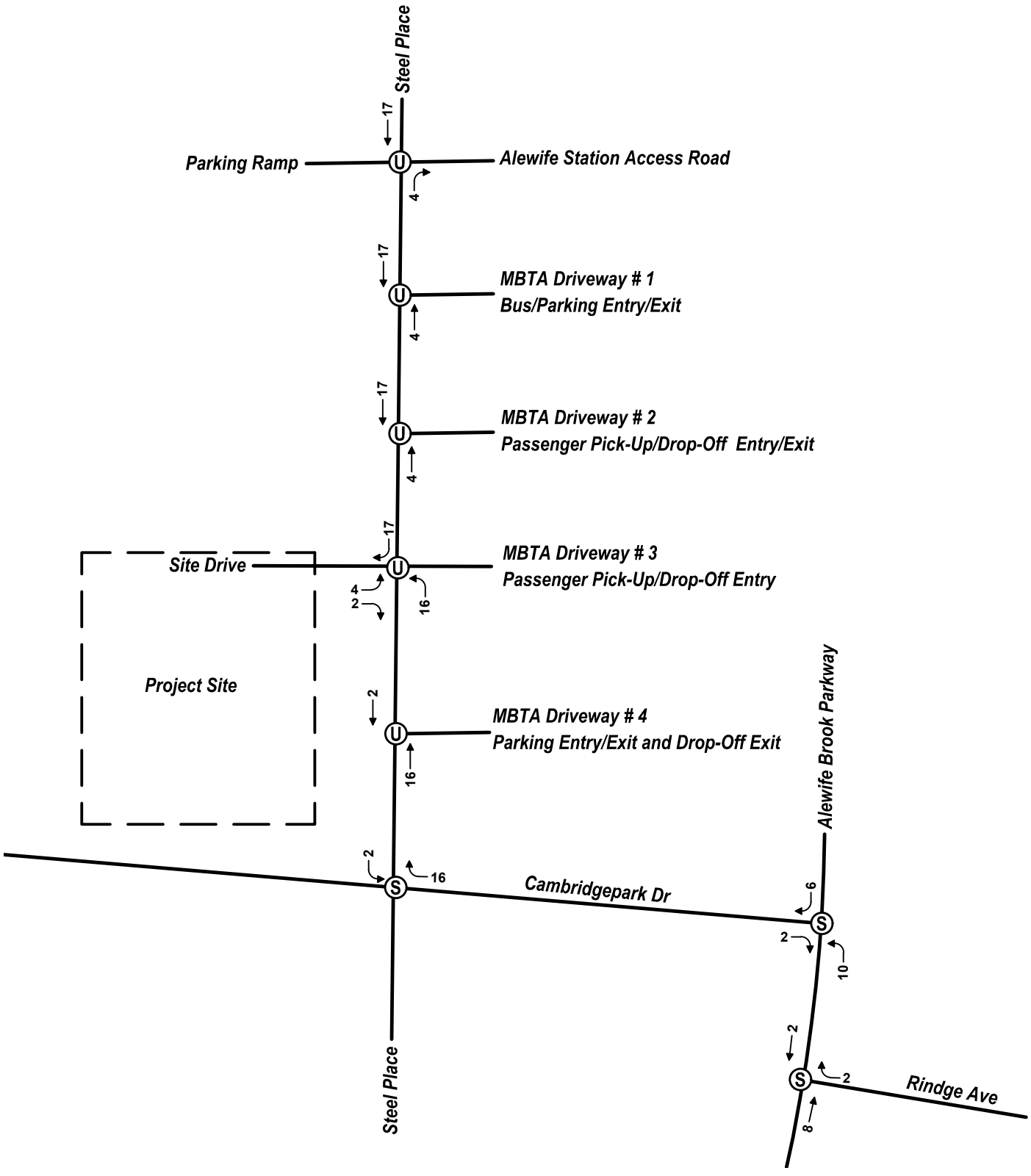


Not to Scale

Figure 16.2

Project Trip Assignments Outbound

35 Cambridgepark Drive
Cambridge, Massachusetts

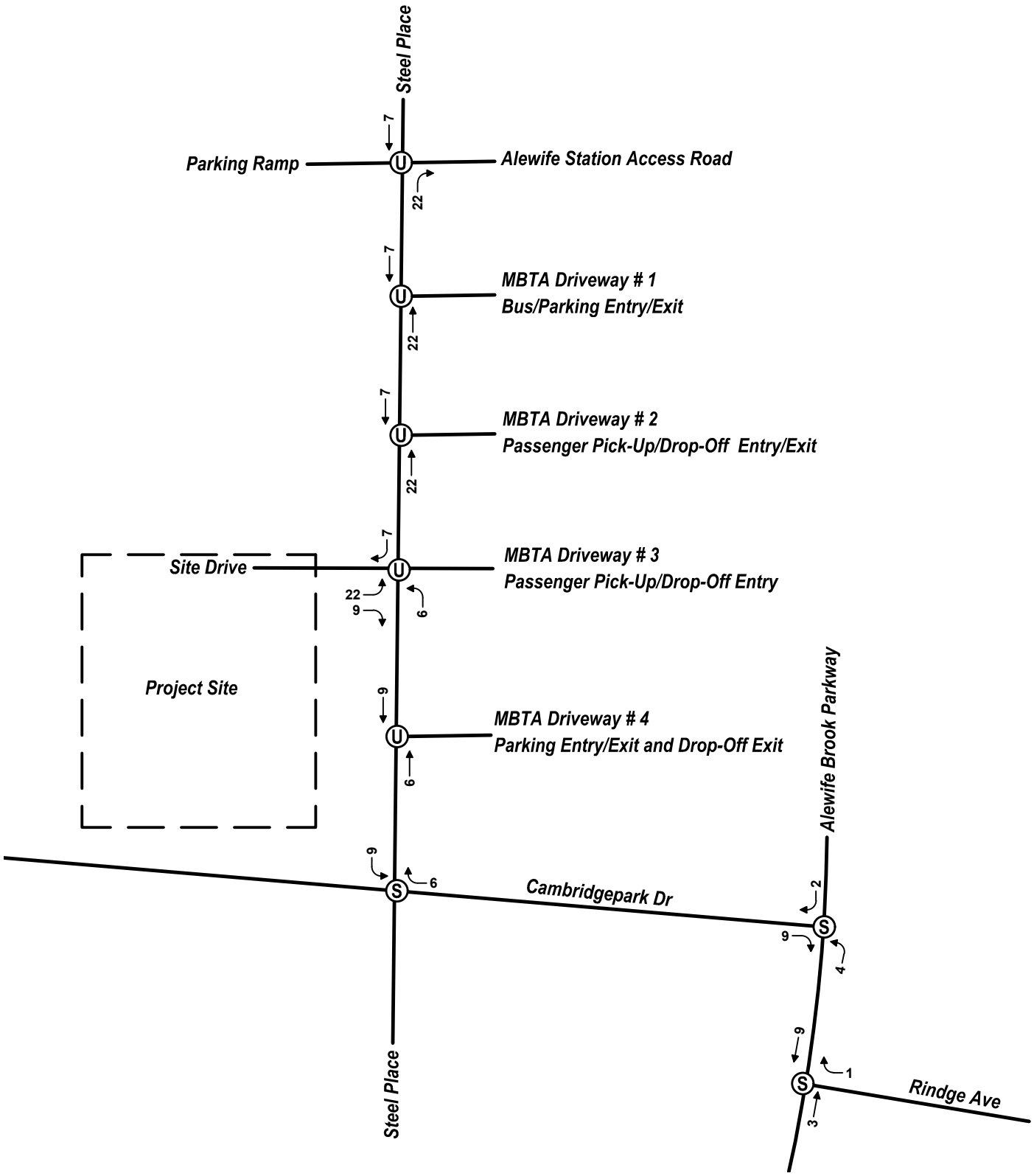


Not to Scale

Figure 17.1

Project Generated Trips
Morning Peak Hour (7:30-8:30 AM)

35 Cambridgepark Drive
Cambridge, Massachusetts



Not to Scale

Figure 17.2

Project Generated Trips
Evening Peak Hour (4:45-5:45 PM)

35 Cambridgepark Drive
Cambridge, Massachusetts

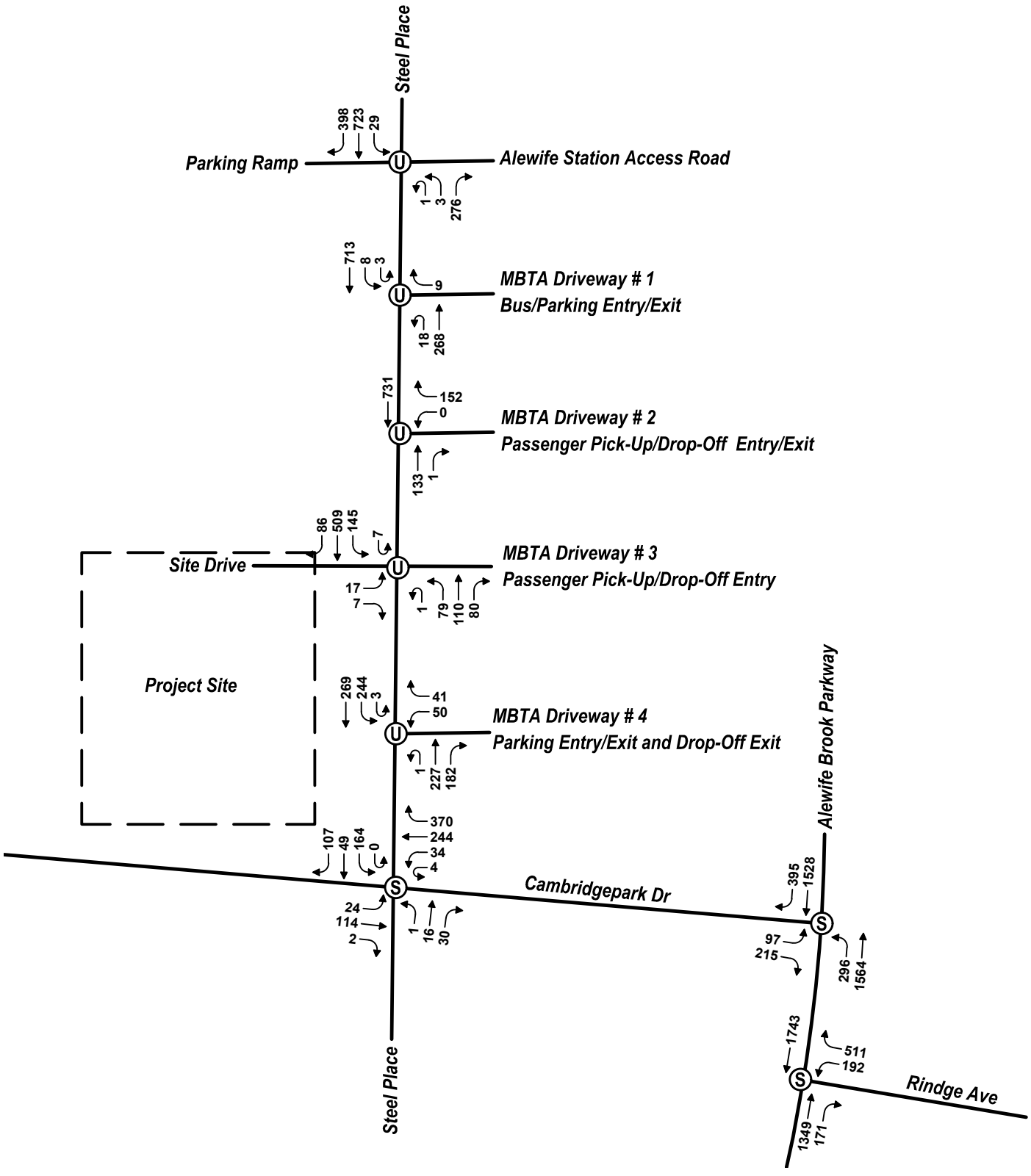
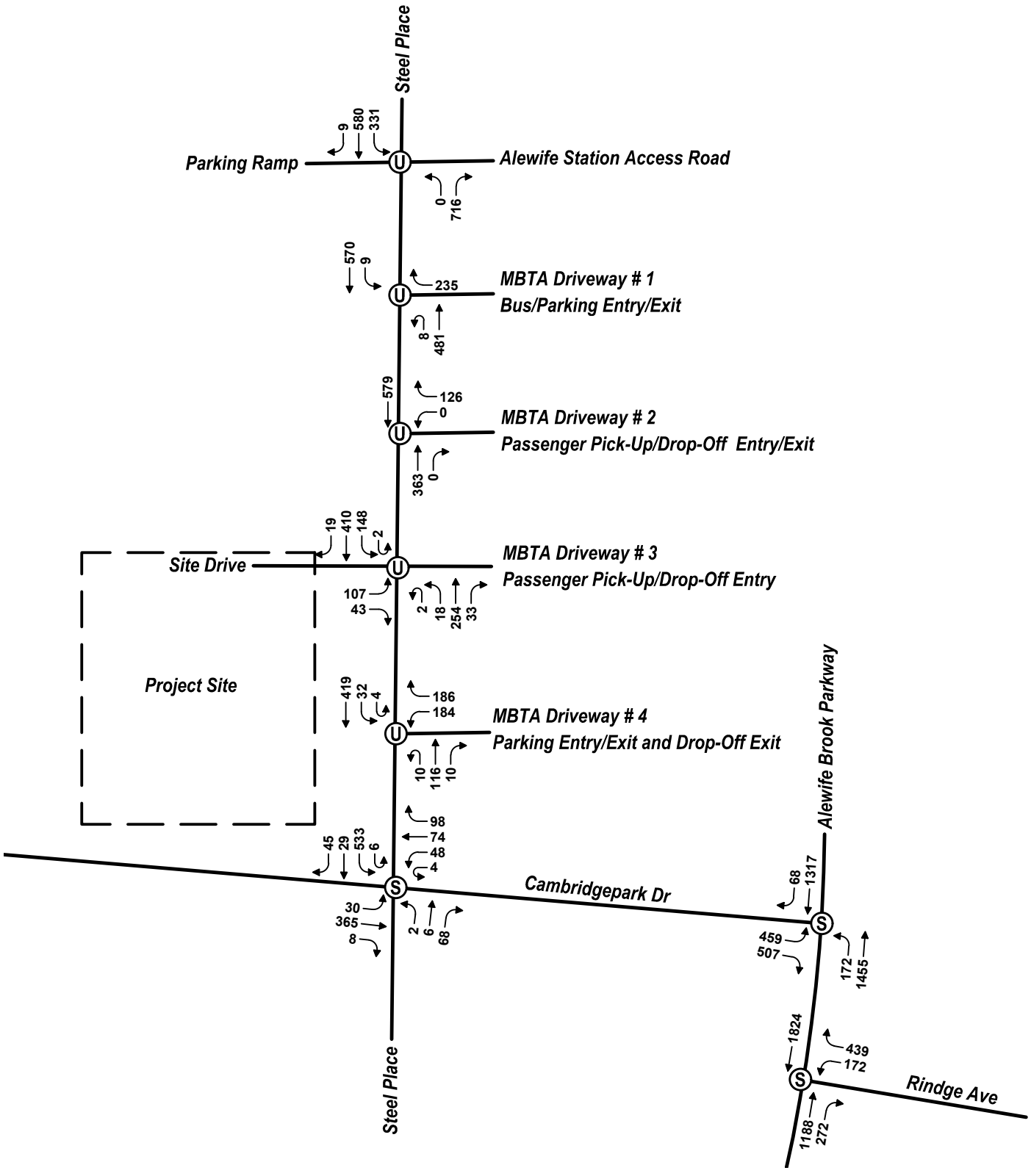


Figure 18.1

Build Conditions
Morning Peak Hour (7:30-8:30 AM)

35 Cambridgepark Drive
Cambridge, Massachusetts



Not to Scale

Figure 18.2

Build Conditions
Evening Peak Hour (4:45-5:45 PM)

35 Cambridgepark Drive
Cambridge, Massachusetts