CITY OF CAMBRIDGE
TRAFFIC, PARKING, + TRANSPORTATION

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October 26, 2022

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RE: 75 First Street TIS Scope

The Cambridge Traffic, Parking, and Transportation (TP&T) Department received your Transportation Impact Study (TIS) on July 18, 2022, for the proposed Residential Development at 75 First Street by Urban Spaces, LLC. Based on staff review, some corrections and clarifications were needed. TP+T received your updated TIS on October 18,2022 and based on our review we certify the TIS as accurate and complete.

We look forward to continuing to work with you on this project as it moves through the Development Review process, including a final site plan and transportation mitigation program.

Please call Adam Shulman of my staff at 617-349-4745 if you have any questions or to set up a meeting.

Very truly yours,

Brooke McKenna, Acting Chief

cc: Adam Shulman, TP+T
Patrick Baxter, TP+T

Transportation Impact Study

Proposed Residential Development
75 First Street
Cambridge, Massachusetts

Prepared for:

Urban Spaces, LLC
Cambridge, Massachusetts

October 2022

Prepared by:

Vanasse & Associates inc
Transportation Engineers & Planners

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EXECUTIVE SUMMARY

INTRODUCTION

On behalf of US-Parcel E, LLC (the "Applicant"), Vanasse & Associates, Inc. (VAI) has conducted a Transportation Impact Study (TIS) for the proposed six-story, 90-unit multifamily residential development with approximately 2,400 square feet (sf) of ground floor commercial space to be located at 75 First Street in Cambridge, Massachusetts hereafter referred to as the "Project". This study reviews the potential transportation impacts, defines site access requirements, and identifies strategies to reduce traffic impacts associated with the Project. The study also reviews the Project with respect to the City of Cambridge Special Permit Criteria regarding traffic impacts, is in accordance with the City's guidelines for TIS, and follows the scoping determination dated January 31, 2022.

PROJECT DESCRIPTION

The Project involves razing the existing building on-site and constructing a new six-story addition to the adjacent building at 91-95 First Street with 90 dwelling units and approximately 2,400 sf of ground floor commercial space. Long-term bicycle storage spaces will be provided on-site for 94 bicycles, or a ratio of approximately 1.04 spaces per unit. Short-term bicycle spaces will be provided on-site for 10 bicycles. No vehicle parking is proposed on-site. Parking for the development will be at the recently completed 107 First Street garage with access off of Charles Street. Loading operations for the building will utilize the loading area for 85 First Street which is accessed via Hurley Street.

CONSISTENCY WITH PLANNING STUDIES

The Project has been designed to be generally consistent with the various policy plans and development guidelines for the area, including those set forth in the Eastern Cambridge Planning Study dated October 2001, the guidance provided in the Eastern Cambridge Design Guidelines dated October 15, 2001, and the East Cambridge Development Review Process and Guidelines dated June 1985, which support the development of beneficial and complementary uses throughout the City, and the PUD Special Permit #231A issued by the Cambridge Planning Board.

The Project has also been designed to be consistent with the City's transportation planning efforts

and projects to improve mobility in the surrounding area and region, including the Kendall Square Mobility Task Force, 2015 Transit Strategic Plan, Vision Zero Plan, and Cambridge Bicycle and Pedestrian Plans. The Project also aligns with the Envision Cambridge Vision and Core Values, particularly related to Livability, as well as the Mobility Chapter.

EXISTING CONDITIONS

A field inventory of existing study area roadways was conducted to document traffic conditions in the current 2022 analysis year. Items collected regarding the study area roadways and intersections include roadway geometrics, traffic control devices, traffic signal timing plans, traffic volumes, vehicle queues, pedestrian crossing volumes, bicycle volumes, and safety data for the roadways in the vicinity of the site. March 2022 counts at the study area intersections on First Street could not be collected due to ongoing construction related to the CambridgeSide redevelopment project located on the opposite side of First Street from the Project. Therefore, May 2018 counts conducted by VAI for the CambridgeSide redevelopment project were used for the First Street intersections. Traffic volumes were measured by means of automatic traffic recorder counts (ATRs) and substantiated by manual intersection turning-movement and vehicle-classification counts (TMCs). Other transportation-related data inventoried included on-street parking regulations, transit services, and provision of bicycle and pedestrian facilities. The May 2018 traffic count information was collected prior to the COVID-19 outbreak.

PROJECT-GENERATED TRAFFIC

The Project involves razing the existing structure on-site and constructing a new six-story building with 90 multifamily residential units and approximately 2,400 sf of ground floor retail. Existing trips for the retail site were neglected in this analysis. Trip-generation rates for the residential use were empirically derived from monitoring reports for residential developments in the East Cambridge area. The residential trip and retail trips were added together to determine the total Project trip generation by mode. The Project is expected to generate a total of 480 daily person trips (152 daily vehicle trips), 43 weekday morning peak-hour person trips (13 morning peak-hour vehicle trips), and 57 weekday evening peak-hour person trips (19 evening peak-hour vehicle trips).

ARTICLE 19 PROJECT REVIEW SPECIAL PERMIT CRITERIA ANALYSIS

As required by Section 19.20 of the City of Cambridge Zoning Ordinance (the "Ordinance"), the Project has been evaluated against the five Project Review Special Permit Criteria indicators as measurements of the Project's expected impact on City traffic. Of the 91 measurements analyzed in connection with the five indicators, only 2 were exceeded and both are exceeded under existing conditions and would be considered exceedances of the measurements with or without the Project. The Applicant is committed to the implementation of strategies described in this TIS to lessen any potential impact of the Project on City traffic. Accordingly, the Project is not expected to have a substantial adverse impact on City traffic and issuance of a Project Review Special Permit is appropriate with respect to potential traffic impacts.

TRAFFIC OPERATIONS ANALYSIS

To assess the impact of the Project on the roadway network, traffic operations and vehicle queue analyses were performed at the study intersections under 2022 Baseline, 2022 Build, and 2027 Future conditions. The analysis indicates that the Project will not have a significant effect on operating conditions at the area intersections.

PARKING ANALYSIS

The Project will not provide any new parking spaces. It is expected that residents will utilize the parking garage at 107 First Street, which is currently under construction for the Flats on First development. Retail patrons are expected to utilize on-street parking in the neighborhood. It is expected that the parking garage for the Flats on First development will have 45 parking spaces available for the 75 First Street development, which is only expected to need 38 spaces leaving a surplus of 7 spaces in the garage.

The residential component of the Project requires 94 regular bicycle parking spaces. Section 6,105.1 of the zoning ordinance states that if 20 or more bicycle spaces are required than at least 5 percent of the spaces need to provide an additional 2 feet of spaces to accommodate tandem bicycles or bicycles with trailers. The residential component of the Project therefore requires 5 tandem bicycle spaces. The Project is providing 94 bicycle spaces of which 6 will have the additional 2 feet to accommodate tandem bicycles or bicycles with trailers.

TRANSPORTATION DEMAND MANAGEMENT MEASURES

Generally, the Project's location near transit facilities such as Lechmere Station encourages transit use. Mitigation efforts are therefore geared towards efforts to encourage Project employees and residents towards alternative transportation that would result in a low single-occupancy vehicle (SOV) rate for the Project. The Project will implement the following Transportation Demand Management (TDM) measures.

- Join the Charles River Transportation Management Association (TMA). This membership will provide residents and employees with a computer-based ridesharing information bank to assist in vanpool and carpool arrangements. Membership with the TMA will also provide details of shuttle bus systems including routes, schedules, frequency, and capacity serving the area.

- Encourage residents and employees to obtain a CharlieCard and register it for bike parking, allowing residents and employees the ability to use the bike racks at area Massachusetts Bay Transit Authority (MBTA) stations and Pedal & Park facilities.

- Make available public transportation schedules, which will be posted in a centralized location for residents and employees to be located in the lobby of main building.

- Provide information on available pedestrian and bicycle facilities in the vicinity of the Project site in a central location for residents and employees.

- Charge for parking at market rates with parking fees unbundled from rent.

- Provide information about transportation options available to residents via a welcome packet at move-in and to employees at orientations.

- A 50 percent subsidy will be provided for the cost of a bus/subway link pass for three consecutive months to each adult member of a residential household, up to two per household, upon move in.

- Air pumps and other bicycle repair tools, such as a "fix-it" station will be provided in the bicycle storage area.

CONCLUSION

As described throughout this TIS, the Project consists of the redevelopment of an existing retail facility located at 75 First Street to a new six-story building containing 90 residential units with 2,400 sf of ground floor retail. No new vehicle parking will be constructed on-site. Residents will utilize the 107 First Street parking garage. Long-term bicycle parking will be provided on-site that can accommodate 88 regular bicycles and 6 tandem spaces to accommodate bicycles with trailers. Short-term bicycle parking will be provided on-site for 10 bicycles.

The Project is located in an area close to extensive public transit networks where reliance on personal vehicles is becoming less necessary and through the provision of expanded bicycle parking and storage and proximity to expanded transit services and transit connectivity, the overall traffic impact of the Project will be reduced.

The proposed Project will not result in a public hazard due to substantially increased vehicular traffic or parking in this area of East Cambridge. Specifically, the Project is not anticipated to have a significant adverse impact on motorist delays in the area and adequate parking supply will exist at the 107 First Street garage to support the Project. Accordingly, this TIS finds that the Project can be accommodated within the existing area infrastructure and on the roadway network with minimal effects, resulting in the ability to implement the Project's planned residential and retail uses with the appropriate TDM measures.

INTRODUCTION

Vanasse & Associates, Inc. (VAI) has conducted a Transportation Impact Study (TIS) for the Project as described above. This study reviews the potential transportation impacts, defines site access requirements, and identifies strategies to reduce traffic impacts associated with the Project. The study also reviews the Project with respect to the City of Cambridge Special Permit Criteria regarding traffic impacts, is in accordance with the City's guidelines for TIS, and follows the scoping determination dated January 31, 2021. Table 1.a.1 outlines the existing and proposed characteristics of the Project.

Table 1.a.1
PROJECT CHARACTERISTICS

Characteristics	Existing Condition	Build Condition
Use	Retail	Retail/Residential
Status	Operational	--
Leasable Space	7,046 sf	2,400 sf
Number of Residential Units	0	90
Parking Spaces	4	0
Bicycle Spaces		
Long Term	0	94
Short Term	0	10

The Project's preliminary ground floor plan with points of pedestrian and bicycle access is shown on Figure 1.a.1.

A survey plan is shown on Figure 1.a.2 and Figure 1.a.3 for Parcel D and Parcel E, respectively. including property lines, abutting parcels, and property ownership with easements also depicted.

1.0 EXISTING CONDITIONS

1.1 EXISTING TRAFFIC CONDITIONS

A field inventory of existing study area roadways was conducted to document traffic conditions in the current 2022 analysis year. Items collected regarding the study area roadways and intersections include roadway geometrics, traffic control devices, traffic signal timing plans, traffic volumes, vehicle queues, pedestrian crossing volumes, bicycle volumes, and safety data for the roadways in the vicinity of the site. Transportation information and data used in this study were collected during May 2018 and March 2022. March 2022 counts at the study area intersections on First Street could not be collected due to ongoing construction related to the CambridgeSide redevelopment project located on the opposite side of First Street from the Project. The May 2018 traffic count information was collected prior to the COVID-19 outbreak.

1.2 DESCRIPTION OF PROJECT STUDY AREA

The Project study area was determined in consultation with City transportation officials. The study area was confirmed in the January 31, 2022 Scoping Determination from the City to VAI. The study area is listed below.

1. First Street at Spring Street
2. First Street at Hurley Street
3. First Street at Charles Street/Cambridgeside Place
4. Second Street at Spring Street
5. Second Street at Hurley Street
6. Second Street at Charles Street

Transportation Network

Access to the area is provided via McGrath/O'Brien Highway, Land Boulevard, and Memorial Drive, all of which connect to the general street network surrounding the site. These roadways provide connections to regional roadways such as Massachusetts Turnpike and Interstate 93 (I-93), as well as connections into downtown Cambridge and Boston. Local access to the site is provided from First Street, Second Street, Spring Street, Hurley Street, and Charles Street.

Geometric and Traffic Control

Existing intersection geometry and lane usage was obtained from field inventory and observations conducted by VAI in 2018 and 2022. A graphical depiction of intersection inventories for the study area intersections are provided on Figure 1.b.1 through Figure 1.b.6. Sidewalks and wheelchair ramps along First Street, Spring Street, and Hurley Street are in fair to good condition. Bike lanes currently exist on First Street and Binney Street.

1.3 PARKING AND LOADING FACILITIES

Figure 1.c.1 provides a profile view of the existing parking lot and loading area on-site that can accommodate approximately 4 vehicles. No short-term or long-term bicycle racks are provided on-site.

1.4 TRANSIT SERVICES

Existing transit and bike facilities have been researched and inventoried in March 2022. Figure 1.d.1 provides a graphical depiction of the regional public and private transportation services available in the area, including the Cambridgeside Shuttle Bus service. Figure 1.d.2 depicts the proposed First Street Extension across Cambridge Street and Monsignor O'Brien Highway to the North Point site and the location of the new Lechmere Station. These improvements are expected to be completed later this year. Figure 1.d.3 shows the bicycle parking and route access map for bicycle facilities in the area. Figure 1.d.4 provides a Carsharing and Ridesharing Services Map highlighting nearby locations of taxi stands and carsharing services such as Zipcar. Figure 1.d.5 provides a Bikesharing Station Map that identifies locations of BLUEbikes$_{SM}$ stations in the area.

1.5 LAND USE

Land uses in the vicinity of the site were researched and inventoried in March 2022 and are shown on Figure 1.e.1.

2.0 DATA COLLECTION

2.1 AUTOMATIC TRAFFIC RECORDER COUNTS

To establish baseline traffic conditions within the study area, automatic traffic recorder (ATR) counts and manual turning movement and vehicle classification counts (TMCs) were conducted in March 2022. Due to construction, new data could not be collected on First Street. Therefore, counts collected in May 2018 were used and adjusted to 2022 conditions. This allowed for public schools to be in regular session at the time the data was collected. The traffic count data sheets are provided in the Appendix. A summary of the ATR data is provided in Table 2.a.1, while the average hourly directional volumes recorded at the ATR locations are summarized in Table 2.a.2. The location of the counts and the date the counts were conducted are shown on Figure 2.a.1.

Table 2.a.1
2022 BASELINE TRAFFIC VOLUMES

		Morning Peak Hour			Evening Peak Hour		
Location	Weekday ADT[a]	Vehicles per Hour	K Factor[b]	Directional Distribution[c]	Vehicles per Hour	K Factor	Directional Distribution
First Street, south of Spring Street	7,200	560	7.8	60% NB	678	9.4	66% NB
Second Street, south of Spring Street	2,800	290	10.4	80% SB	280	10.0	80% NB

Source: ATR and TMCs conducted in May 2018 and March 2022 and adjusted to 2022 levels.
[a]Two-way daily traffic expressed in vehicles per day.
[b]Two-way peak-hour volume expressed in vehicles per hour.
[c]Percent of daily volume in peak hour.
[d]Percent traveling in the peak direction.
SB = southbound; NB = northbound.

Table 2.a.2
AVERAGE HOURLY TRAFFIC VOLUMES AT ATR LOCATIONS[a]

	First Street, south of Spring Street			Second Street, south of Spring Street		
Start Time	NB	SB	Total	NB	SB	Total
12:00 AM	16	12	28	1	6	7
1:00	18	13	31	1	4	5
2:00	11	3	14	0	0	0
3:00	12	8	20	2	4	6
4:00	11	8	19	7	2	9
5:00	32	40	72	15	9	24
6:00	96	74	170	29	37	66
7:00	157	166	323	62	53	115
8:00	263	196	459	180	110	290
9:00	272	201	473	106	66	172
10:00	224	156	380	37	62	99
11:00	225	112	337	35	95	130
12:00 PM	253	156	409	35	105	140
1:00	264	135	399	37	110	147
2:00	426	126	552	34	191	225
3:00	489	121	610	33	216	249
4:00	344	246	590	44	308	352
5:00	214	230	444	46	315	361
6:00	397	208	605	41	108	149
7:00	267	147	414	26	65	91
8:00	223	129	352	13	43	56
9:00	192	83	275	20	33	53
10:00	74	51	125	15	13	28
11:00	48	23	71	2	12	14
Total[b]	4528	2644	7172	821	1967	2788

Note: SB = southbound; NB = northbound.

[a]Volumes based on ATR counts conducted by VAI in May 2018 and March 2022 and adjusted to 2022 levels; expressed in vehicles per hour.

[b]Daily volumes expressed in vehicles per day.

2.2 PEDESTRIANS

Pedestrian and bicycle counts for the study area intersections were collected during the vehicle count periods of 2018 and 2022 described above and adjusted as needed to 2022 conditions. The twelve-hour pedestrian counts were performed on First Street and Second Street at the ATR locations and on Hurley Street near the proposed pedestrian access to the Project. Table 2.b.1 through Table 2.b.3 summarize the hourly pedestrian volumes for the twelve-hour counts for the respective locations. All counts were conducted in clear weather. The counts indicate that the majority of the pedestrians on First Street use the east side of the roadway. Counts on Second Street indicate the majority of pedestrians use the east side of the roadway. Counts on Hurley Street indicate the majority of pedestrians use the north side of the roadway.

In the vicinity of the site, all study streets provide 7- to 13-foot-wide sidewalks on both sides of the roadway. At intersections where crosswalks are marked, wheelchair ramps are provided at each crosswalk located across each leg of the intersection.

Table 2.b.1
AVERAGE HOURLY PEDESTRIAN VOLUMES[a]
FIRST STREET

	On Street		On Sidewalk					
			East Side			West Side		
Time	NB	SB	NB	SB	Crossing First Street	NB	SB	Crossing First Street
7:00 AM	0	2	14	39	7	12	33	3
8:00	0	1	47	82	3	23	43	0
9:00	0	0	41	78	5	10	47	3
10:00	0	0	38	45	5	13	27	10
11:00	1	1	43	49	3	37	52	1
12:00 PM	0	0	118	102	4	63	101	7
1:00	2	1	118	105	4	52	28	10
2:00	0	0	70	73	0	22	32	5
3:00	0	0	85	67	1	53	22	5
4:00	0	0	112	57	9	61	24	5
5:00	0	0	146	86	1	85	63	6
6:00	1	0	88	91	4	46	57	3
Total	4	5	920	874	46	477	529	58

[a]Based on counts conducted by VAI in May 2018 and adjusted where appropriate to 2022 levels.

Table 2.b.2
AVERAGE HOURLY PEDESTRIAN VOLUMES[a]
SECOND STREET

	On Street		On Sidewalk					
			East Side			West Side		
Time	NB	SB	NB	SB	Crossing Second Street	NB	SB	Crossing Second Street
7:00 AM	1	0	10	20	0	4	3	0
8:00	0	0	6	17	0	11	7	0
9:00	0	0	7	17	0	10	9	0
10:00	0	0	1	9	0	8	1	0
11:00	0	0	6	7	0	2	4	0
12:00 PM	0	0	26	18	0	9	17	0
1:00	0	1	8	10	0	4	7	0
2:00	0	0	15	19	0	8	0	0
3:00	0	0	14	14	0	10	3	0
4:00	0	0	18	6	0	10	3	0
5:00	0	0	20	21	0	7	11	0
6:00	0	0	22	9	0	13	8	0
Total	1	1	153	167	0	96	73	0

[a]Based on counts conducted by VAI in March 2022 and adjusted where appropriate to 2022 levels.

Table 2.b.3
AVERAGE HOURLY PEDESTRIAN VOLUMES[a]
HURLEY STREET

	On Street		On Sidewalk					
			North Side			South Side		
Time	EB	WB	EB	WB	Crossing Hurley Street	EB	WB	Crossing Hurley Street
7:00 AM	1	0	6	4	0	7	13	0
8:00	0	1	11	9	0	6	8	0
9:00	1	1	13	4	0	3	9	0
10:00	1	1	8	2	0	2	0	0
11:00	0	0	3	2	0	6	2	0
12:00 PM	4	1	8	11	0	8	3	0
1:00	0	3	2	8	0	1	0	0
2:00	2	1	14	6	0	3	0	0
3:00	4	0	11	3	0	6	2	0
4:00	1	2	8	7	0	6	3	0
5:00	2	0	9	12	0	3	1	0
6:00	1	0	2	6	0	3	4	0
Total	17	10	95	74	0	54	45	0

[a]Based on counts conducted by VAI in March 2022 and adjusted where appropriate to 2022 levels.

2.3 BICYCLES

As with the pedestrian counts, bicycle counts for the study area intersections were collected during the vehicle count periods of 2018 and 2022 and adjusted as needed to 2022 conditions. The twelve-hour bicycle counts were performed on First Street and Second Street at the ATR locations and on Hurley Street near the proposed pedestrian access to the Project. Table 2.b.4 through Table 2.b.6 summarize the hourly bicycle volumes for the twelve-hour counts for the respective locations. The counts were conducted in clear weather.

Of the three streets, First Street carries the highest number of bicycles with most traveling southbound.

Table 2.b.4
AVERAGE HOURLY BICYCLE VOLUMES[a]
FIRST STREET

			On Sidewalk					
	On Street		East Side			West Side		
Time	NB	SB	NB	SB	Crossing First Street	NB	SB	Crossing First Street
7:00 AM	13	16	0	0	1	0	0	0
8:00	29	56	1	0	0	0	1	0
9:00	25	41	0	0	0	0	0	0
10:00	12	7	0	0	0	0	0	0
11:00	9	9	1	0	0	0	0	0
12:00 PM	7	20	0	1	0	0	0	0
1:00	12	7	0	1	0	0	0	0
2:00	8	12	0	0	0	0	0	0
3:00	8	19	1	0	0	0	0	0
4:00	15	21	0	1	0	0	0	0
5:00	43	29	0	1	0	0	0	0
6:00	19	28	0	0	0	0	0	0
Total	200	265	3	4	1	0	1	0

[a]Based on counts conducted by VAI in May 2018 and adjusted where appropriate to 2022 levels.

Table 2.b.5
AVERAGE HOURLY BICYCLE VOLUMES[a]
SECOND STREET

	On Street		On Sidewalk					
			East Side			West Side		
Time	NB	SB	NB	SB	Crossing Second Street	NB	SB	Crossing Second Street
7:00 AM	0	3	0	0	0	0	0	0
8:00	1	3	0	0	0	0	0	0
9:00	2	3	0	0	0	0	0	0
10:00	0	1	0	0	0	0	0	0
11:00	0	2	0	0	0	0	0	0
12:00 PM	0	2	0	0	0	0	0	0
1:00	1	1	0	0	0	0	0	0
2:00	1	1	0	0	0	0	0	0
3:00	1	0	0	0	0	0	0	0
4:00	4	0	0	0	0	0	0	0
5:00	1	2	0	0	0	0	0	0
6:00	1	1	0	1	0	0	1	0
Total	12	19	0	1	0	0	1	0

[a]Based on counts conducted by VAI in March 2022 and adjusted where appropriate to 2022 levels.

Table 2.b.6
AVERAGE HOURLY BICYCLE VOLUMES[a]
HURLEY STREET

	On Street		On Sidewalk					
			North Side			South Side		
Time	EB	WB	EB	WB	Crossing Hurley Street	EB	WB	Crossing Hurley Street
7:00 AM	0	0	0	0	0	0	0	0
8:00	2	1	0	1	0	0	0	0
9:00	1	0	0	0	0	0	1	0
10:00	1	0	0	0	0	0	0	0
11:00	0	0	0	0	0	0	0	0
12:00 PM	0	0	0	0	0	0	0	0
1:00	0	0	0	0	0	0	0	0
2:00	0	0	0	0	0	0	0	0
3:00	2	0	0	0	0	1	0	0
4:00	1	0	0	0	0	0	0	0
5:00	1	0	0	0	0	0	0	0
6:00	0	0	0	0	0	0	0	0
Total	8	1	0	1	0	1	1	0

[a]Based on counts conducted by VAI in March 2022 and adjusted where appropriate to 2022 levels.

2.4 INTERSECTION TURNING MOVEMENT COUNTS

Intersection turning movement counts were conducted at the study area intersections for the weekday morning (7:30 to 9:30 AM) and weekday evening (4:30 to 6:30 PM) time periods. Total cars, trucks, buses, pedestrians by movement, bicycles, and vehicle queues were recorded. The 2022 Baseline weekday morning and weekday evening peak-hour traffic-volume networks are depicted on Figure 2.c.1 through Figure 2.c.2. The pedestrian volumes are depicted in Figure 2.c.3 through Figure 2.c.4 for the weekday morning and weekday evening peak-hour periods. Bicycle volumes are depicted in Figure 2.c.5 through Figure 2.c.6 for the weekday morning and weekday evening peak-hour periods.

2.5 EXISTING VEHICLE QUEUES

Vehicle queues were observed at the signalized intersection of First Street at Charles Street/Cambridgeside Place. Table 2.c.1 summarizes the vehicle queue observations by intersection approach and lane.

Table 2.c.1
EXISTING QUEUE OBSERVATIONS

	Weekday Morning Peak Hour		Weekday Evening Peak Hour	
Intersection/Lane	Average Queue	Maximum Queue	Average Queue	Maximum Queue
First Street at Charles Street and Cambridgeside Place:				
Charles Street EB LT/TH/RT	3	5	5	7
Cambridgeside Place WB LT/RT	2	5	8	11
First Street NB TH/RT	4	10	6	9
First Street SB LT/TH	3	6	6	10

Source: Based upon observations conducted by VAI in May 2018.
EB = eastbound; WB = westbound; NB = northbound; SB = southbound; LT = left-turning movements; TH = through movements; RT = right-turning movements.

2.6 MOTOR VEHICLE CRASH DATA

Motor vehicle crash data was obtained from the Massachusetts Department of Transportation (MassDOT) Safety Management/Traffic Operations Unit for the most recent five-year period available (2017-2019) in order to examine motor vehicle crash trends occurring within the study area. In addition, the Cambridge Police Department (CPD) was contacted to obtain crash records form 2017-2019 at the study area intersections. The CPD provided 5 crashes from 2017-2019 that occurred at the study area intersections all but one of which were included in the MassDOT online database. This data is summarized in Table 2.d.1. Separate tables are provided that identify summaries of crashes between vehicles and pedestrians in Table 2.d.2 and crashes between vehicles and bicyclists in Table 2.d.3. Intersections where no pedestrian or bicyclist involvement with vehicles were recorded are not included in Table 2.d.2 or Table 2.d.3.

Table 2.d.1
VEHICLE CRASH DATA SUMMARY[a]

	First Street at Spring Street	First Street at Hurley Street	First Street at Charles Street/ Cambridgeside Place	Second Street at Spring Street	Second Street at Hurley Street	Second Street at Charles Street
Year:						
2017	0	0	1	1	0	2
2018	2	0	2	1	1	1
2019	1	1	1	1	1	0
Total	3	1	4	3	2	3
Average[b]	1.00	0.33	1.33	1.00	0.67	1.00
Crash Rate[c]	0.35	0.12	0.35	0.44	0.43	0.51
Significant[d]	No	No	No	No	No	No
Type:						
Angle	0	0	1	2	1	3
Rear-End	1	0	1	0	0	0
Head-On	0	0	0	0	0	0
Sideswipe	1	0	1	0	1	0
Fixed Object	0	1	0	0	0	0
Pedestrian	1	0	0	0	0	0
Bicyclist	0	0	0	1	0	0
Unknown/Other	0	0	1	0	0	0
Total	3	1	4	3	2	3
Weather Conditions:						
Clear	1	0	4	3	1	0
Cloudy/Rain	1	1	0	0	1	3
Snow/Ice	1	0	0	0	0	0
Fog	0	0	0	0	0	0
Unknown/Other	0	0	0	0	0	0
Total	3	1	4	3	2	3
Lighting Conditions:						
Daylight	2	1	3	2	1	2
Dawn/Dusk	0	0	0	0	1	1
Dark (lit)	1	0	0	1	0	0
Dark (unlit)	0	0	0	0	0	0
Unknown/Other	0	0	1	0	0	0
Total	3	1	4	3	2	3
Pavement Conditions:						
Dry	1	1	4	2	1	0
Wet	1	0	0	1	1	3
Snow/Ice	1	0	0	0	0	0
Unknown/Other	0	0	0	0	0	0
Total	3	1	4	3	2	3
Severity:						
Property Damage Only	2	1	2	2	2	3
Personal Injury	1	0	0	1	0	0
Fatality	0	0	0	0	0	0
Unknown/Other	0	0	2	0	0	0
Total	3	1	4	3	2	3

[a]Source: MassDOT and Cambridge Police Department Crash Data.
[b]Average crashes over three-year period.
[c]Crash Rate in crashes per million entering vehicles (mev).
[d]Crash Rate noted as significant if rate exceeds MassDOT District 6 averages of 0.71 and 0.52 for signalized and unsignalized intersections, respectively.

Table 2.d.2
CRASH DATA SUMMARY: VEHICLE TO PEDESTRIAN[a]

	First Street at Spring Street
Year:	
2017	0
2018	1
2019	0
Total	1
Average[a]	0.33
Time:	
Weekday 7 to 9 AM	0
Weekday 4 to 6 PM	0
Remainder of Day	1
Total	1
Pavement Conditions:	
Dry	0
Wet	0
Snow	1
Icy	0
Other	0
Unknown	0
Total	1
Day of Week:	
Monday through Friday	1
Saturday and Sunday	0
Total	1
Severity:	
Property Damage Only	0
Personal Injury	1
Fatal Crashes	0
Other/Unknown	0
Total	1

[a]Source: MassDOT and Cambridge Police Department Crash Data.
[b]Average crashes over three-year period.

Table 2.d.3
CRASH DATA SUMMARY: VEHICLE TO BICYCLIST[a]

	Second Street at Spring Street
Year:	
2017	1
2018	0
2019	0
Total	1
Average[a]	0.33
Time:	
Weekday 7 to 9 AM	0
Weekday 4 to 6 PM	1
Remainder of Day	0
Total	1
Pavement Conditions:	
Dry	1
Wet	0
Snow	0
Icy	0
Other	0
Unknown	0
Total	1
Day of Week:	
Monday through Friday	1
Saturday and Sunday	0
Total	1
Severity:	
Property Damage Only	0
Personal Injury	1
Fatal Crashes	0
Other/Unknown	0
Total	1

[a]Source: MassDOT and Cambridge Police Department Crash Data.
[b]Average crashes over three-year period.

The crash summary indicates that the study area intersections all experienced 4 crashes or less over the three-year review period, or less than 1.33 crashes per year. One pedestrian crash occurred at the intersection of First Street with Spring Street and 1 bicycle crash occurred at the intersection of Second Street with Spring Street. The only 2 injury crashes reported were the pedestrian-bicyclist collisions. No fatalities were reported over the three-year review period. As noted in Table 2.d.1 above, none of the intersections exceeded the MassDOT District 6 average crash rate for intersections, currently noted at 0.71 crashes per million entering vehicles (mev) for signalized intersections and 0.52 crashes per mev for unsignalized intersections. Accordingly, the crash rates at the studied intersections are not considered significant.

2.7 EXISTING PUBLIC TRANSIT SYSTEM

The site is located near Lechmere Station on the Massachusetts Bay Transit Authority (MBTA) Green Line subway system. The Green Line previously terminated at Lechmere Station, but construction is underway on an extension into Medford. As of March 21, 2022, three of the new Green Line stations were opened to the public: Union Square, Lechmere, and Science Park/West End. Currently, the remaining Green Line station are expected to be opened to the public by Fall 2022.

The Green Line continues to North Station, where connections to the Orange Line and Commuter Rail routes can be made, and also to Park Street where connections to the Red Line are possible. The Lechmere station is also the terminating bus station for MBTA Bus Route 69, 80, 87, and 88. Table 2.e.1 summarizes the most recent pre-COVID Green Line headway and boarding data for the Lechmere station available from the MBTA.

Table 2.e.1
MBTA GREEN LINE SERVICE SUMMARY

Station	On-Time Performance Factor[b]	Rush Hour Headways (minutes)	Daily Ridership	Boarding Counts[a]			
				Weekday Morning Peak Hour		Weekday Evening Peak Hour	
				Boarding	Alighting	Boarding	Alighting
Lechmere	0.76	7.0	10,159	1,220	764	1,624	1,124

[a]Source: MBTA Open Portal Data, Fall 2019.
[b]On-Time Performance Factor from MBTA Dashboard.

Table 2.e.2 summarizes the most recent pre-COVID Red Line headway and boarding data for the Kendall Square station available from the MBTA.

Table 2.e.2
MBTA RED LINE SERVICE SUMMARY

Station	On-Time Performance Factor[b]	Rush Hour Headways (minutes)	Daily Ridership	Boarding Counts[a]			
				Weekday Morning Peak Hour		Weekday Evening Peak Hour	
				Boarding	Alighting	Boarding	Alighting
Kendall/MIT	0.90	7.4	36,823	920	7,405	8,409	1,749

[a]Source: MBTA Open Portal Data, Fall 2019.
[b]On-Time Performance Factor from MBTA Dashboard.

Table 2.e.3 summarizes the most recent pre-COVID peak-hour headways and capacity information for the four bus routes servicing the Lechmere Station supplied by the MBTA.

Table 2.e.3
MBTA BUS SERVICE SUMMARY[a]

Route No.	Route	Hours of Operation	Peak-Hour Headway (minutes)	Peak-Hour Peak-Direction Planning Capacity[b]	Daily Ridership	Estimated Daily Capacity
69	Harvard Square - Lechmere Station	5:25 AM to 1:35 AM	15-20	212	2,731	5,512
80	Arlington Center - Lechmere Station	5:00 AM to 1:33 AM	20-32	159	2,624	3,816
87	Clarendon Hill or Arlington Center - Lechmere Station	5:05 AM to 1:40 AM	13-24	212	3,685	5,406
88	Clarendon Hill - Lechmere Station	5:15 AM to 1:39 AM	9-26	212	3,815	5,512

[a]Source: MBTA Open Portal Data, Fall 2019.
[b]Planning capacity is 53 passengers per bus.

EZRide Shuttle Bus

In addition to the MBTA, the Charles River Transportation Management Association (CRTMA) provides the EZRide Shuttle Bus that circulates between Cambridgeport and North Station in Boston via the Kendall Square Red Line station. The EZRide Shuttle operates on weekdays between 6:20 and 10:42 AM during the morning time period on a 10- to 15-minute frequency. During the midday time period, the EZRide Shuttle operates between 10:45 AM and 2:55 PM on a 15-minute frequency and operates between Pacific Street and Kendall Square only during this time. During the evening time period, the EZRide Shuttle operates between 2:55 and 8:00 PM on a 10- to 15-minute frequency. During the weekday morning and weekday evening time periods, the bus stops closest to the Project site at the intersections of First Street at Otis Street and First Street at Charles Street and Cambridgeside Place. During the midday time period, the EZRide does not travel near the Project site and stays in the Kendall Square-Central Square area only. The EZRide Shuttle does not currently operate on weekends. The shuttle route and schedule are provided in the Appendix.

The public can access the EZRide shuttle for a $1.00 fee for adults and $0.50 for children ages 5 to 11. Children younger than 5 ride for no charge.

CambridgeSide Shuttle Bus

CambridgeSide operates the CambridgeSide shuttle bus providing free shuttle service from the Kendall Square T stop to CambridgeSide for a 6-hour period (12:00 to 6:00 PM) Monday through Sunday. The shuttle is operated by Bethany Transportation. The shuttle bus currently has only two stops: the Kendall Square T station and CambridgeSide. The shuttle bus runs in a continuous loop between these stops which typically results in the bus making three to four loops in an hour, or a headway of between 15 and 20 minutes.

3.0 PROJECT TRAFFIC

3.1 TRIP GENERATION

The Project involves razing the existing structure on-site and constructing a new six-story building with 90 multifamily residential units and approximately 2,400 sf of ground floor retail. Trip-generation rates for the residential use were empirically derived from monitoring reports for residential developments in the East Cambridge area. These rates were developed in coordination with the Cambridge Traffic, Parking, & Transportation (TP&T) Department, due to recognition of observed driveway counts and resulting trip-generation rates that are considerably lower in Cambridge than those suggested by the Institute of Transportation Engineers (ITE) *Trip Generation* manual.[1]

Residential Trip Generation

Parking and Transportation Demand Management (PTDM) studies from 2017 through 2019 for residential sites in East Cambridge were used to develop an empirical trip-generation rate for residential uses in the Project vicinity. In addition, counts were conducted at 159 First Street/33 Rogers Street as requested in the Scoping Letter of January 31, 2022. The resulting empirical rates were compared to combined mode-split data for five residential developments contained in the Scoping Letter, which were obtained from PTDM reports for these sites.

159 First Street/33 Rogers Street counts

Peak-hour vehicle and pedestrian counts of the 115-unit residential community at 159 First Street/33 Rogers Street were conducted on March 1, 2022, from 7:30 to 9:30 AM and from 4:30 to 7:30 PM. The pedestrian and vehicle counts are summarized in Table 3.a.1 with vehicle trip rates summarized in Table 3.a.2.

[1] *Trip Generation,* 11th Edition; Institute of Transportation Engineers; Washington, DC; 2021.

Table 3.a.1
159 FIRST STREET/33 ROGERS STREET COUNT SUMMARY[a]

Time Period	Vehicle Trips	Pedestrian Trips
Weekday Morning Peak Hour:		
Entering	3	14
Exiting	6	10
Total	9	24
Weekday Evening Peak Hour:		
Entering	6	11
Exiting	2	24
Total	8	35

[a]Based on counts conducted March 1, 2022.

Table 3.a.2
159 FIRST STREET/33 ROGERS STREET VEHICLE-TRIP RATES

Time Period	Vehicle Trips[a]	Trip Rates[b]
Weekday Morning Peak Hour:		
Entering	3	0.03
Exiting	6	0.05
Total	9	0.08
Weekday Evening Peak Hour:		
Entering	6	0.05
Exiting	2	0.02
Total	8	0.07

[a]From Table 3.a.1.
[b]Number of vehicle trips divided by the number of units; 115 units.

Residential Vehicle-Trip Rate Comparison

The empirical trip rates derived from the monitoring reports for residential developments in the East Cambridge area were compared to the empirical trip rates from 159 First Street/33 Rogers Street. A summary of this comparison is provided in Table 3.a.3.

Table 3.a.3
RESIDENTIAL VEHICLE-TRIP RATE COMPARISON

Time Period	East Cambridge Area Residential Trip Rates[a]	159 First Street/ 33 Rogers Street Trip Rates[b]
Weekday Morning Peak Hour:		
Entering	0.03	0.03
Exiting	0.07	0.05
Total	0.10	0.08
Weekday Evening Peak Hour:		
Entering	0.06	0.05
Exiting	0.04	0.02
Total	0.10	0.07

[a]Based on 2017-2019 PTDM reports from Avalon Bay North Point, North Point S&T, Twenty20, and 303 Third Street.
[b]From Table 3.a.2.

As shown in Table 3.a.3, the trip rates empirically derived from monitoring reports for residential developments in the East Cambridge area are slightly higher than the trip rates counted at 159 First Street/33 Rogers Street. To be conservative, the higher trip rates were used in this analysis.

Residential Mode Split

The same PTDM studies from 2017 through 2019 for residential sites in East Cambridge were used to develop mode split characteristics. The mode split data is summarized in Table 3.a.4.

Table 3.a.4
RESIDENTIAL MODE SPLITS

Characteristics/Mode Split	Residential[a]
Mode Split Characteristics	
Single Occupancy Vehicle (SOV)	27
High Occupancy Vehicle (HOV)	9
Transit	29
Pedestrian	29
Bicycle	6
Work at Home	0
Other	0
TOTAL	100

[a]Based on 2017-2019 PTDM reports from Avalon Bay North Point, North Point S&T, Twenty20, 303 Third Street, and One First Street.

Residential Person Trip Generation

Trip rates from Table 3.a.3 were used to calculate vehicle trips for the residential land use and the mode splits from Table 3.a.4 were used to calculate a vehicle occupancy ratio (VOR) as suggested by TP&T staff, which was then used to develop person-trip generation. The person trips were then applied to the mode split data to calculate the appropriate share for each transportation mode. The trip-generation summary by mode split is shown in Table 3.a.5. Spreadsheets documenting these calculations are provided in the Appendix.

Table 3.a.5
RESIDENTIAL-TRIP GENERATION BY MODE

			MODE SPLIT PERCENTAGES							
Size	Use	VOR		Total	SOV	HOV	TRANSIT	PED	BIKE	OTHER
90	Apartment Units	1.14		100%	27%	9%	29%	29%	6%	0%

Daily	Trip Rate[a]	Total Vehicle Trips	Person Vehicle Trips	Total Person Trips	SOV Person Trips	HOV Person Trips	Transit Person Trips	Ped Person Trips	Bike Person Trips	Other Person Trips
Enter	0.45	41	47	131	35	12	38	38	8	0
Exit	0.45	41	47	131	35	12	38	38	8	0
Total	0.90	82	94	262	70	24	76	76	16	0
Weekday Morning										
Enter	0.03	3	3	8	2	1	2	2	1	0
Exit	0.07	6	7	19	5	2	5	5	2	0
Total	0.10	9	10	27	7	3	7	7	3	0
Weekday Evening										
Enter	0.06	5	6	17	5	1	5	5	1	0
Exit	0.04	4	5	14	4	1	4	4	1	0
Total	0.10	9	11	31	9	2	9	9	2	0

A comparison of the 159 First Street/33 Rogers Street pedestrian counts were compared to the non-auto trips from Table 3.a.5. The non-auto trips consist of the transit trips, pedestrian trips, bicycle trips, and other trips. A summary of this comparison is provided in Table 3.a.6.

Table 3.a.6
RESIDENTIAL NON-AUTO TRIP-GENERATION COMPARISON

Time Period	Non-Auto Trips[a]	159 First Street/ 33 Rogers Street Non-Auto Trips[b]
Weekday Morning Peak Hour:		
Entering	5	11
Exiting	12	8
Total	17	19
Weekday Evening Peak Hour:		
Entering	11	9
Exiting	9	19
Total	20	28

[a]From Table 3.a.5.
[b]Based on pedestrian trips at 159 First Street/33 Rogers Street multiplied by the ratio of 90 unit/115 units.

As shown in Table 3.a.6, there were 2 more non-auto trip counted at 159 First/33 Rogers Street during the weekday morning peak hour and 8 more non-auto trips during the weekday evening peak hour than expected based on the mode splits used. This indicates that the mode splits derived from the other residential development in East Cambridge are underrepresenting the number of non-auto trips at 159 First Street/33 Rogers Street. In order to address this discrepancy, the mode split data was adjusted such that the weekday evening non-auto trips calculated for the Project equal 28. Table 3.a.7 shows the residential trip generation based on the adjusted mode split.

Table 3.a.7
RESIDENTIAL TRIP GENERATION BY MODE WITH ADJUSTED MODE SPLIT

			MODE SPLIT PERCENTAGES								
Size	Use	VOR		Total	SOV	HOV	TRANSIT	PED	BIKE	OTHER	
90	Apartment Units	1.14		100%	23%	5%	33%	33%	6%	0%	

Daily	Trip Rate[a]	Total Vehicle Trips	Person Vehicle Trips	Total Person Trips	SOV Person Trips	HOV Person Trips	Transit Person Trips	Ped Person Trips	Bike Person Trips	Other Person Trips	Non-Auto Person Trips
Enter	0.45	41	47	168	39	8	55	55	11	0	121
Exit	0.45	41	47	168	39	8	55	55	11	0	121
Total	0.90	82	94	336	78	16	110	110	22	0	242
Weekday Morning											
Enter	0.03	3	3	11	2	1	4	4	0	0	8
Exit	0.07	6	7	25	6	1	8	8	2	0	18
Total	0.10	9	10	36	8	2	12	12	2	0	26
Weekday Evening											
Enter	0.06	5	6	21	5	1	7	7	1	0	15
Exit	0.04	4	5	18	4	1	6	6	1	0	13
Total	0.10	9	11	39	9	2	13	13	2	0	28

As shown in Table 3.a.7, the mode split was adjusted by reducing the SOV and HOV by approximately 8 percent and distributing that to transit, pedestrian, bike, and other. This allowed for the vehicle trips to remain the same but increased the non-auto mode spilt such that the weekday evening peak hour had 25 non-auto trips which align with what was expected based on the counts conducted at 159 First Street/33 Rogers Street.

Retail Trip Generation

The retail trips were determined using ITE Land Use Code (LUC) 822, *Strip Retail Plaza (<40K)*. The independent variable of 2,400 sf was then applied to ITE LUC 822 to determine the number of trips. Table 3.a.8 summarizes the expected trip generation for the retail space.

Table 3.a.8
RETAIL TRIP GENERATION

Time Period	ITE LUC 822
Weekday Daily:	
Entering	65
Exiting	65
Total	130
Weekday Morning Peak Hour:	
Entering	4
Exiting	2
Total	6
Weekday Evening Peak Hour:	
Entering	8
Exiting	8
Total	16

[a]Based on ITE LUC 822, *Strip Retail Plaza (<40K)*; 2,400 sf.

Retail Mode Split

The 2019 PTDM study for CambrideSide was used to develop mode split characteristics for the proposed retail use. The mode split data is summarized in Table 3.a.9.

Table 3.a.9
RETAIL MODE SPLITS

Characteristics/Mode Split	Residential[a]
Mode Split Characteristics	
Single Occupancy Vehicle (SOV)	43
High Occupancy Vehicle (HOV)	10
Transit	44
Pedestrian	2
Bicycle	1
Other	0
TOTAL	100

[a]Based on 2019 PTDM report for patrons of CambridgeSide.

Retail Person-Trip Generation

The mode splits from Table 3.a.9 were used to calculate a VOR as suggested by TP&T staff, which was then used to develop person-trip generation. The person trips were then applied to the mode split data to calculate the appropriate share for each transportation mode. The trip-generation summary by mode split is shown in Table 3.a.10. Spreadsheets documenting these calculations are provided in the Appendix.

Table 3.a.10
RETAIL TRIP GENERATION BY MODE

			MODE SPLIT PERCENTAGES						
Size	Use	VOR	SOV	HOV	TRANSIT	PED	BIKE	OTHER	Total
2,400	sf of Retail	1.10	43%	10%	44%	2%	1%	0%	100%

Daily	ITE LUC 822	Total Person Trips	SOV Person Trips	HOV Person Trips	Transit Person Trips	Ped Person Trips	Bike Person Trips	Other Person Trips	Total Vehicle Trips
Enter	65	72	31	7	32	1	1	0	35
Exit	65	72	31	7	32	1	1	0	35
Total	130	144	62	14	64	2	2	0	70
Weekday Morning									
Enter	4	4	2	0	2	0	0	0	2
Exit	2	3	1	1	1	0	0	0	2
Total	6	7	3	1	3	0	0	0	4
Weekday Evening									
Enter	8	9	4	1	4	0	0	0	5
Exit	8	9	4	1	4	0	0	0	5
Total	16	18	8	2	8	0	0	0	10

Total Project Person-Trip Generation

The residential trip and retail trips were added together to determine the total Project-trip generation by mode which is summarized in Table 3.a.11.

Table 3.a.11
TOTAL PROJECT-TRIP GENERATION BY MODE

		MODE SPLIT PERCENTAGES						
Use/Size	VOR	SOV	HOV	TRANSIT	PED	BIKE	OTHER	
90 Apartment Units	1.14	23%	5%	33%	33%	6%	0%	
2,400 sf of Retail	1.10	43%	10%	44%	2%	1%	0%	
Daily	Total Person Trips	SOV Person Trips	HOV Person Trips	Transit Person Trips	Ped Person Trips	Bike Person Trips	Other Person Trips	Total Vehicle Trips
Residential								
Enter	168	39	8	55	55	11	0	41
Exit	168	39	8	55	55	11	0	41
Total	336	78	16	110	110	22	0	82
Retail								
Enter	72	31	7	32	1	1	0	35
Exit	72	31	7	32	1	1	0	35
Total	144	62	14	64	2	2	0	70
Site Totals								
Enter	240	70	15	87	56	12	0	76
Exit	240	70	15	87	56	12	0	76
Total	480	140	30	174	112	24	0	152
Weekday Morning	Total Person Trips	SOV Person Trips	HOV Person Trips	Transit Person Trips	Ped Person Trips	Bike Person Trips	Other Person Trips	Total Vehicle Trips
Residential								
Enter	11	2	1	4	4	0	0	3
Exit	25	6	1	8	8	2	0	6
Total	36	8	2	12	12	2	0	9
Retail								
Enter	4	2	0	2	0	0	0	2
Exit	3	1	1	1	0	0	0	2
Total	7	3	1	3	0	0	0	4
Site Totals								
Enter	15	4	1	6	4	0	0	5
Exit	28	7	2	9	8	2	0	8
Total	43	11	3	15	12	2	0	13
Weekday Evening	Total Person Trips	SOV Person Trips	HOV Person Trips	Transit Person Trips	Ped Person Trips	Bike Person Trips	Other Person Trips	Total Vehicle Trips
Residential								
Enter	21	5	1	7	7	1	0	5
Exit	18	4	1	6	6	1	0	4
Total	39	9	2	13	13	2	0	9
Retail								
Enter	9	4	1	4	0	0	0	5
Exit	9	4	1	4	0	0	0	5
Total	18	8	2	8	0	0	0	10
Site Totals								
Enter	30	9	2	11	7	1	0	10
Exit	27	8	2	10	6	1	0	9
Total	57	17	4	21	13	2	0	19

3.2 TRIP DISTRIBUTION

Residential Project trips were distributed using the residential distribution from the CambridgeSide 2.0 Redevelopment. Distributions from the residential components of the First Street Assemblage project and the Kendall Square Urban Infill project (Ames Street Residences) were used, and locations of the top 25 employers in Cambridge were also considered in developing the CambridgeSide 2.0 Redevelopment residential distribution. Retail Project trips were distributed using the retail distribution from the CambridgeSide 2.0 Redevelopment which is based on existing traffic patterns and the retail distribution from the First Street Assemblage project, along with employee and customer zip code data from the 2017 and 2019 CambridgeSide TDM Monitoring Report. The residents are expected to park at the garage for 107 First Street while the retail patrons are expected to park on-street. The trip distribution for the Project is shown on Figure 3.b.1. Table 3.b.1 summarizes the trip distribution for the Residential and Retail components of the development.

Table 3.b.1
TRIP-DISTRIBUTION SUMMARY

Use	Route	Direction	Percentage from Direction To the Site	Percentage to Direction From the Site
Residential	Cambridgeside Place	East	--	12
	Charles Street	West	32	--
	Second Street	North	28	--
	Second Street	South	40	--
	First Street	North	--	16
	First Street	South	--	72
	TOTAL		100	100
Retail	Second Street	North	33	33
	Second Street	South	28	28
	First Street	North	24	24
	First Street	South	15	15
	TOTAL		100	100

Project trips were assigned to the road network using the data from Table 3.b.1 and Figure 3.b.1 to derive the Project-generated peak-hour traffic volumes shown on Figure 3.c.1 and Figure 3.c.2 for the weekday morning and weekday evening peak hours, respectively.

3.3 PROJECT SERVICE AND LOADING

The Project service and loading is expected to utilize the same area as 85 First Street, which occurs in the retail parking lot that has access to Hurley Street. Daily residential truck trips are typically limited to package pickup and delivery carried out using single-unit or delivery trucks. Trash is expected to be accommodated within the existing pickup schedule of 85 First Street. The Applicant has purchased 85 First Street and therefore no easement is required to utilize the loading area for 75 First Street.

4.0 BACKGROUND TRAFFIC

Traffic volumes in the study area were projected to the year 2027, which reflects a five-year planning horizon consistent with City traffic study guidelines and the traffic study scope issued by the City TP&T Department. Traffic-volume conditions would include increases due to development projects approved or under construction and not yet occupied and increases to general background traffic levels, assumed to increase at 0.5 percent per year.

As indicated in the Scoping Letter, the following projects were identified for inclusion in the Future 2027 condition:

- MIT Volpe Exchange Parcel project
- 585 Third Street project
- Cambridgeside redevelopment project
- First Street mixed-use project
- 40 Thorndike Street project
- Cambridge Crossing
- Alexandria Binney Street development
- 249 Third Street project
- MIT Kendall Square redevelopment
- Boston Properties/Cambridge Redevelopment Authority Kendal Square Urban Renewal Plan (KSURP) Infill Development Concept Plan
- City Foundry Building at 101 Rogers Street

4.1 FIRST STREET EXTENSION AND LECHMERE STATION RELOCATION

As part of the Cambridge Crossing development project, First Street in Cambridge will be extended from Cambridge Street northerly to O'Brien Highway. O'Brien Highway will be intersected by First Street from the south and North First Street from the north to form a four-way signalized intersection. The intersection of First Street at Cambridge Street will become a four-way signalized intersection under traffic signal control. These layout changes are conceptually shown on Figure 1.d.2 and expected to be completed later this year.

5.0 TRAFFIC ANALYSIS

5.1 SITE ASSIGNMENT

The 2022 Baseline condition traffic volumes were combined with the Project-generated traffic levels to derive the 2022 Build condition networks, shown on Figure 5.b.1 and Figure 5.b.2 for the weekday morning and weekday evening peak-hour time periods. Figure 5.b.3 and Figure 5.b.4 represent the projected 2020 Build weekday morning and weekday evening, peak-hour pedestrian volumes.

The Future 2027 traffic-volume condition includes the traffic volumes from the identified background developments, the increases resulting from the 0.5 percent per year annual growth rate that were applied to the 2022 Baseline conditions traffic volumes, and the Project-generated traffic associated with the Project. These traffic-volume networks are shown on Figure 5.d.1 and Figure 5.d.2 for the weekday morning and weekday evening peak-hour traffic volumes. Figure 5.d.3 and Figure 5.d.4 depicts the cumulative area development impact which is all the traffic from the background developments plus the Project generated traffic.

6.0 CAPACITY ANALYSIS

6.1 VEHICLE LEVEL-OF-SERVICE ANALYSIS

Using the 2022-and 2027-year traffic-volume networks, vehicle level-of-service analyses were conducted for the 2022 Baseline, 2022 Build, and 2027 Future conditions with the results shown in Tables 6.1 and 6.2 for signalized and unsignalized intersections, respectively. These analyses were conducted using Synchro analysis software, calibrated to match vehicle queue observations. The analysis worksheets are contained in the Appendix.

Table 6.1
VEHICLE LEVEL-OF-SERVICE SUMMARY – SIGNALIZED INTERSECTIONS

Intersection/Peak Hour/Movement	2022 Baseline Delay[a]	2022 Baseline LOS[b]	2022 Build Delay	2022 Build LOS	Delay Increase	2027 Future Delay	2027 Future LOS
First Street at Charles Street and Cambridgeside Place							
Weekday Morning Peak Hour:							
Charles Street EB LT/TH/RT	24.9	C	25.1	C	0.2	35.4	D
Cambridgeside Place WB LT/ RT	21.2	C	21.3	C	0.1	22.0	C
First Street NB TH/RT	19.2	B	19.3	B	0.1	29.4	C
First Street SB LT/TH	18.8	B	18.9	B	0.1	36.6	D
Overall	**20.9**	**C**	**21.0**	**C**	**0.1**	**31.3**	**C**
Weekday Evening Peak Hour:							
Charles Street EB LT/TH/RT	26.2	C	26.7	C	0.5	48.3	D
Cambridgeside Place WB LT/ RT	55.0	D	56.1	E	1.1	363.0	F
First Street NB TH/RT	26.3	C	26.3	C	0.0	48.6	D
First Street SB LT/TH	58.0	E	59.0	E	1.0	526.3	F
Overall	**41.9**	**D**	**42.5**	**D**	**0.6**	**248.1**	**F**

[a]Average delay per vehicle (in seconds).
[b]Level of service.
NB = northbound; SB = southbound; WB = westbound; SB = southbound; LT = left-turn movement; TH = through movement; RT = right-turn movement.

Table 6.2
VEHICLE LEVEL-OF-SERVICE SUMMARY - UNSIGNALIZED INTERSECTIONS

Unsignalized Intersection/ Peak Hour/Critical Movement	2022 Baseline			2022 Build			Delay	2027 Future			Delay
	Demand[a]	Delay[b]	LOS[c]	Demand	Delay	LOS	Increase	Demand	Delay	LOS	Increase
First Street at Spring Street											
Weekday Morning Peak Hour:											
First Street NB LT/TH	337	4.6	A	339	4.6	A	0.0	425	6.0	A	1.4
First Street SB TH/RT	467	0.0	A	467	0.0	A	0.0	713	0.0	A	0.0
Weekday Evening Peak Hour:											
First Street NB LT/TH	445	1.6	A	447	1.6	A	0.0	764	2.4	A	0.8
First Street SB TH/RT	316	0.0	A	317	0.0	A	0.0	433	0.0	A	0.0
First Street at Hurley Street											
Weekday Morning Peak Hour:											
Hurley Street EB LT/RT	83	12.4	B	84	12.5	B	0.1	88	18.5	C	6.0
First Street NB LT/TH	328	0.8	A	329	0.8	A	0.0	544	1.0	A	0.2
First Street SB TH/RT	223	0.0	A	223	0.0	A	0.0	346	0.0	A	.0.0
Weekday Evening Peak Hour:											
Hurley Street EB LT/RT	99	14.1	B	101	14.3	B	0.2	113	30.3	D	16.0
First Street NB LT/TH	438	0.7	A	440	0.8	A	0.1	771	1.0	A	0.2
First Street SB TH/RT	233	0.0	A	234	0.0	A	0.0	268	0.0	A	0.0
Second Street at Spring Street											
Weekday Morning Peak Hour:											
Spring Street WB LT/TH/RT	377	16.4	C	377	16.5	C	0.1	411	21.0	C	4.5
First Street NB LT/TH	59	1.8	A	60	1.8	A	0.0	79	1.4	A	-0.4
First Street SB TH/RT	200	0.0	A	202	0.0	A	0.0	224	0.0	A	0.0
Weekday Evening Peak Hour:											
Spring Street WB LT/TH/RT	137	13.1	B	137	13.2	B	0.1	159	15.0	B	1.8
First Street NB LT/TH	225	1.3	A	227	1.3	A	0.0	244	1.3	A	0.0
First Street SB TH/RT	46	0.0	A	49	0.0	A	0.0	73	0.0	A	0.0
Second Street at Hurley Street											
Weekday Morning Peak Hour:											
Hurley Street EB LT/TH/RT	81	8.4	A	81	8.4	A	0.0	88	8.7	A	0.3
Hurley Street WB LT/TH/RT	41	8.0	A	42	8.0	A	0.0	56	8.4	A	0.4
Second Street NB LT/TH/RT	49	7.9	A	50	7.9	A	0.0	69	8.2	A	0.3
Second Street SB LT/TH/RT	231	9.8	A	233	9.8	A	0.0	256	10.6	B	0.8
Weekday Evening Peak Hour:											
Hurley Street EB LT/TH/RT	120	8.7	A	120	8.7	A	0.0	134	9.2	A	0.5
Hurley Street WB LT/TH/RT	38	7.9	A	41	7.9	A	0.0	65	8.5	A	0.6
Second Street NB LT/TH/RT	217	9.2	A	218	9.2	A	0.0	239	9.9	A	0.7
Second Street SB LT/TH/RT	55	8.1	A	58	8.1	A	0.0	80	8.6	A	0.5

See notes at end of table.

Table 6.2 (Continued)
VEHICLE LEVEL-OF-SERVICE SUMMARY - UNSIGNALIZED INTERSECTIONS

Unsignalized Intersection/ Peak Hour/Critical Movement	2022 Baseline			2022 Build			Delay	2027 Future			Delay
	Demand[a]	Delay[b]	LOS[c]	Demand	Delay	LOS	Increase	Demand	Delay	LOS	Increase
Second Street at Charles Street											
Weekday Morning Peak Hour:											
Charles Street EB LT/TH/RT	97	8.8	A	98	8.8	A	0.0	177	10.8	B	2.0
Second Street NB LT/TH/RT	72	8.1	A	74	8.2	A	0.1	115	9.0	A	0.8
Second Street SB LT/TH/RT	235	9.5	A	236	9.6	A	0.1	263	11.0	B	1.4
Weekday Evening Peak Hour:											
Charles Street EB LT/TH/RT	198	10.0	A	200	10.1	B	0.1	236	11.5	B	1.4
Second Street NB LT/TH/RT	270	10.1	B	273	10.2	B	0.1	330	11.7	B	1.5
Second Street SB LT/TH/RT	79	8.6	A	81	8.6	A	0.0	111	9.2	A	0.6

[a]Demand (in vehicles per hour) for the critical movements.
[b]Average delay per vehicle (in seconds) for the critical movements.
[c]Level of service.
NB = northbound; SB = southbound; WB = westbound; SB = southbound; LT = left-turn movement; TH = through movement; RT = right-turn movement.

Figure 6.a.1 through Figure 6.a.2 depict the vehicle level-of-service summaries in a graphical map format for the weekday morning and weekday evening peak hours. Figure 6.a.3 through Figure 6.a.4 provide graphical maps of vehicle delay changes at the study area intersections for the weekday morning and weekday evening peak hours. These delay change maps depict the change in delay from Existing to Build and from Existing to Future conditions.

7.0 QUEUE ANALYSIS

Vehicle queues were calculated for each approach of the signalized study area intersection using SimTraffic simulation software. The analyses were calibrated in an attempt to match the results of the queue observations. Table 7 summarizes the 2018 Existing observed, 2022 Baseline calculated, 2022 Build calculated, and 2027 Future calculated vehicle queues.

Table 7
QUEUE ANALYSIS RESULTS[a]

Intersection/Lane	Weekday Morning Peak Hour					Weekday Evening Peak Hour				
	2018 Observed	2022 Baseline Calculated	2022 Build Calculated	Increase	2027 Future Calculated	2018 Observed	2022 Baseline Calculated	2022 Build Calculated	Increase	2027 Future Calculated
First Street at Charles Street/ Cambridgeside Place:										
Charles Street EB LT/TH/RT	3	3	3	0	6	5	5	5	0	8
Cambridgeside Place WB LT/ RT	2	2	2	0	3	8	8	8	0	21
First Street NB TH/RT	4	4	4	0	7	6	6	6	0	11
First Street SB LT/TH	3	3	3	0	7	6	6	6	0	11

[a]All queues calculated using SimTraffic methodology. Queue in vehicles per lane.
NB = northbound; SB = southbound; WB = westbound; SB = southbound; LT = left-turn movement; TH = through movement; RT = right-turn movement.

8.0 RESIDENTIAL STREET VOLUME ANALYSIS

The Project is located in an area of both residential and commercial/retail uses. Residential streets will be subject to some measure of traffic to and from the Project. These locations and the indicators for the increases in traffic on residential streets are summarized in Table 8.

Table 8
TRAFFIC ON RESIDENTIAL STREETS

Roadway	Peak Period	Reviewed Segment	Amount of Residential	2022 Baseline Two-Way Traffic	Increase due to Project
Charles Street	Morning Peak Hour	Second Street to First Street	>1/3 but <1/2	124	9
	Evening Peak Hour	Second Street to First Street	>1/3 but <1/2	137	9
	Morning Peak Hour	Third Street to Second Street	1/3 or less	118	1
	Evening Peak Hour	Third Street to Second Street	1/3 or less	220	2
Hurley Street	Morning Peak Hour	Second Street to First Street	>1/3 but <1/2	108	3
	Evening Peak Hour	Second Street to First Street	>1/3 but <1/2	241	6

9.0 PARKING ANALYSIS

9.1 INTRODUCTION

The Project will not provide any new parking spaces. It is expected that residents will utilize the parking garage at 107 First Street which is currently under construction for the Flats on First development. Retail patrons are expected to utilize on-street parking in the neighborhood. Figure 9.a.1 shows the anticipated pedestrian route from the 107 First Street parking garage to the Project site.

9.2 EAST CAMBRIDGE RESIDENTIAL PARKING UTILIZATION

In order to determine if adequate parking will be provided in the 107 First Street garage for the Flats on First development and the Project, parking leasing data from 33 Rogers Street, 50 Rogers Street, and 270 Third Street was evaluated. This data was obtained from the ownership of the various residential buildings. Table 9.1 summarizes the parking characteristics for the developments.

Table 9.1
EAST CAMBRIDGE RESIDENTIAL PARKING UTILIZATION[a]

Residential Building	Residential Units	Percent Occupancy	Provided Parking Spaces	Leased Parking Spaces	Surplus Parking Spaces	Leased Parking Ratio
33 Rogers Street	115	99.2	64	51	13	0.45
50 Rogers Street	136	97.8	102	54	48	0.41
270 Third Street	91	96.7	76	34	42	0.39
					Average	**0.42**

[a]Source: Urban Spaces LLC.

AS SHOWN IN TABLE 9.1, DATA FROM THE 33 ROGERS STREET, 50 ROGERS STREET, AND 270 THIRD STREET DEVELOPMENTS INDICATE THAT APPROXIMATELY 42 PERCENT OF OCCUPIED RESIDENTIAL UNITS AT THESE

DEVELOPMENTS IN THE EAST CAMBRIDGE AREA HAVE LEASED AN ON-SITE PARKING SPACE. 9.3 PROJECT RESIDENTIAL PARKING DEMAND

The residential component of the Project is expected to have similar parking demand characteristics as the other East Cambridge area residential developments noted above. As such, the parking demand ratio of 0.42 spaces per occupied residential unit was used to determine the Project anticipated parking demand. Using that ratio, the Project is expected to need 38 parking spaces, which is 90 units times 0.42 spaces per occupied unit. Similarly, the Flats on First development, which includes 118 units at 21 Charles Street and 18 units at 22 Hurley Street, is expected to need 57 parking spaces, which is 136 units times 0.42 spaces per occupied unit. The parking garage for the Flats on First development is to have 102 parking spaces. If the Flats on First development utilities 57 of those spaces, that leaves 45 spaces unused. Those 45 spaces would be available for the 75 First Street development which is expected to need 38 spaces leaving a surplus of 7 spaces in the garage.

9.4 PROJECT RETAIL PARKING DEMAND

The retail component of the Project is expected to have similar parking demand characteristics as other East Cambridge area retail developments. It should be noted that under zoning, there is no requirement to provide parking spaces for a non-residential use of 10,000 sf or less. Based on a parking demand rate 0.7 spaces per 1,000 sf and a proposed retail area of 2,400 sf, the parking demand would be 2 spaces. It is anticipated that retail patrons will use on-street parking.

9.5 BICYCLE PARKING

The bicycle parking requirements for the Project were reviewed per the City of Cambridge Zoning Ordinance 6.100. Section 6.107.2 identifies the long-term bicycle parking requirements for different land uses. Category R2 – townhouse dwellings, multifamily dwellings, trailer park or mobile home park were used in the bicycle parking calculations. Category R2 requires 1.00 spaces per dwelling unit for the first 20 units in a building and then 1.05 spaces per dwelling unit for all units over 20 in that building. Therefore, the residential component of the Project requires 94 regular bicycle parking spaces.

Section 6,105.1 of the zoning ordinance states that if 20 or more bicycle spaces are required than at least 5 percent of the spaces need to provide an additional 2 feet of spaces to accommodate tandem bicycles or bicycles with trailers. The residential component of the Project therefore requires 5 tandem bicycle spaces.

The Project is providing 94 bicycle spaces of which 6 will have the additional 2 feet to accommodate tandem bicycles or bicycles with trailers. Figure 9.d.1 details the long-term bicycle parking for the Project. Routes identifying how these spaces are accessed are also noted on Figure 9.d.1.

The Project is also providing 10 short-term bicycle spaces on-site. Figure 9.d.2 details the short-term bicycle parking for the Project.

9.6 PARKING MANAGEMENT PLAN

The proposed parking for 75 First Street is to be located at the 107 First Street parking garage. The garage currently services residents from 21 Charles Street, 22 Hurley Street, and office tenants from 121 First Street. A total of 36 spaces are proposed to be provided for 75 First Street residents.

Parking logistics are proposed to operate how the office tenants at 121 First Street use and access the garage. The 36 spaces will be contractually available to 75 First Street. The access controls system will allow residents of 75 First Street to use the same entry credentials to access both the building at 75 First Street and the parking garage at 107 First Street. The property manager at 75 First Street will be able to manage the fixed number of licenses and how they are assigned independently from the property manager at 107 First Street. This would be accomplished by using the same secured shared access control system infrastructure that 121 First Street and 21 Charles Street currently utilize. The property management teams will ensure that both office tenant and resident needs are fully addressed and that proper security in 107 First Street is maintained.

10.0 TRANSIT ANALYSIS

10.1 PROJECT TRANSIT DISTRIBUTION

An analysis of transit usage was conducted to determine impacts that might be recognized under Build conditions. There are a total of four bus routes and two subway lines that are available for residents at the site. The distribution on the transit routes is shown in Table 10.1.

Table 10.1
TRANSIT SYSTEM TRIP DISTRIBUTION

Time Period/Directional Distribution	Project Transit Trips[a]	Green Line Distribution[b]	Red Line Distribution[c]	Lechmere Bus Distribution[d]
Weekday Daily:				
Entering	87	63	16	8
Exiting	87	63	16	8
Total	174	126	32	16
Peak-Hour Headways (Minutes)	--	7	2.5	9-32
Weekday Morning:				
Entering	6	4	1	1
Exiting	9	6	2	1
Total	15	10	3	2
Weekday Evening:				
Entering	11	8	2	1
Exiting	10	7	2	1
Total	21	15	4	2

[a]From Table 3.a.11.
[b]72 percent assignment.
[c]18 percent assignment. Total of subway assignments = 90 percent.
[d]10 percent assignment, distributed among all four bus routes.

The peak-hour headways listed in Table 10.1 indicate eight to nine trains arrive/depart the Lechmere Square station during the peak hours. The peak-hour directional passenger loading from

the proposed Project of 10 to 15 peak-hour person trips directed towards the Green Line can be accommodated without a noticeable increase in operating characteristics. Detailed analysis of transit ridership impacts due to the Project is provided in Table 10.2 for the Green Line subway loadings, Table 10.3 for the Red Line subway loadings, and Table 10.4 for the bus loadings, respectively. Relevant capacity information was obtained from the MBTA for the Green Line, Red Line, and Bus Routes 69, 80, 87, and 88.

Table 10.2
MBTA GREEN LINE SUBWAY PEAK-HOUR RIDERSHIP IMPACTS

			Existing								Future								Proposed with Project		Ridership Increase	
Train Line	Time Period	Directional Flow	No. of Trains[a]	No. of Cars per Train	Max. Load per Car[b]	Hourly Capacity[c]	On-Time Performance[d]	Adjusted Hourly Capacity[e]	Ridership[f]	V/C[g]	No. of Trains[h]	No. of Cars per Train	Max. Load per Car	Hourly Capacity	On-Time Performance	Adjusted Hourly Capacity	Ridership[i]	V/C	Ridership	V/C	Percent	V/C
Green Line	Morning Peak Hour	Outbound	10	2	110	2,200	0.76	1,672	764	0.46	12	2	110	2,640	0.76	2,007	917	0.46	921	0.46	0.4	0.00
		Inbound	10	2	110	2,200	0.76	1,672	1,220	0.73	12	2	110	2,640	0.76	2,007	1,464	0.73	1,470	0.73	0.4	0.00
	Evening Peak Hour	Outbound	10	2	110	2,200	0.76	1,672	1,124	0.67	12	2	110	2,640	0.76	2,007	1,349	0.67	1,357	0.68	0.6	0.01
		Inbound	10	2	110	2,200	0.76	1,672	1,624	0.97	12	2	110	2,640	0.76	2,007	1,949	0.97	1,956	0.97	0.4	0.00

[a]Based on scheduled rush-hour headway values of 6 minutes.
[b]Defined on the basis of MBTA design standards.
[c]Based on standard passenger load per car, number of cars per train, and number of trains per hour.
[d]From MBTA Dashboard.
[e]Hourly capacity multiplied by the On-Time Performance.
[f]From MBTA ridership count results.
[g]Volume-to-capacity ratio.
[h]Based on future scheduled rush-hour headway values of 5 minutes.
[i]Increased proportionally to the increase in capacity.

Table 10.3
MBTA RED LINE SUBWAY PEAK-HOUR RIDERSHIP IMPACTS

			Existing								Future								Proposed with Project		Ridership Increase	
Train Line	Time Period	Directional Flow	No. of Trains[a]	No. of Cars per Train	Max. Load per Car[b]	Hourly Capacity[c]	On-Time Performance[d]	Adjusted Hourly Capacity[e]	Ridership[f]	V/C[g]	No. of Trains[h]	No. of Cars per Train	Max. Load per Car	Hourly Capacity	On-Time Performance	Adjusted Hourly Capacity	Ridership[i]	V/C	Ridership	V/C	Percent	V/C
Red Line	Morning Peak Hour	Outbound	13	6	167	13,026	0.90	11,724	4,630	0.39	20	6	167	20,040	0.90	18,036	7,124	0.39	7,125	0.40	0.01	0.01
		Inbound	13	6	167	13,026	0.90	11,724	3,695	0.32	20	6	167	20,040	0.90	18,036	5,685	0.32	5,687	0.32	0.04	0.00
	Evening Peak Hour	Outbound	13	6	167	13,026	0.90	11,724	4,760	0.41	20	6	167	20,040	0.90	18,036	7,324	0.41	7,326	0.41	0.03	0.00
		Inbound	13	6	167	13,026	0.90	11,724	5,390	0.46	20	6	167	20,040	0.90	18,036	8,293	0.46	8,295	0.46	0.02	0.00

[a]Based on average headway of 4.5 minutes.
[b]Defined on the basis of MBTA design standards.
[c]Based on standard passenger load per car, number of cars per train, and number of trains per hour.
[d]From MBTA Dashboard.
[e]Hourly capacity multiplied by the On-Time Performance.
[f]From MBTA ridership count results.
[g]Volume-to-capacity ratio.
[h]Based on average headway of 3 minutes.
[i]Increased proportionally to the increase in capacity.

Table 10.4
MBTA BUS ROUTE PEAK-HOUR RIDERSHIP IMPACTS

Weekday Morning Peak Hour

Route No.	Route Headway[a]	Maximum Load[b]	Hourly Capacity	On-Time Performance[c]	Adjusted Hourly Capacity[d]	Existing		Proposed with Project		Ridership Increase	
						Ridership[e]	V/C[f]	Ridership	V/C	Percent	V/C
69	15 minutes	53	424[g]	0.80	340	103	0.30	103	0.30	0.0	0.00
80	20 minutes	53	318[h]	0.73	233	163	0.70	164	0.70	0.0	0.00
87	20 minutes	53	371[i]	0.74	275	148	0.54	148	0.54	0.0	0.00
88	15 minutes	53	424[g]	0.80	340	171	0.50	172	0.51	0.6	0.01

Weekday Evening Peak Hour

Route No.	Route Headway[a]	Maximum Load[b]	Hourly Capacity	On-Time Performance	Adjusted Hourly Capacity	Existing		Proposed with Project		Ridership Increase	
						Ridership[c]	V/C[d]	Ridership	V/C	Percent	V/C
69	20 minutes	53	371[i]	0.80	297	132	0.44	132	0.44	0.0	0.00
80	25 minutes	53	265[j]	0.73	194	155	0.80	155	0.80	0.0	0.00
87	20 minutes	53	318[h]	0.74	236	158	0.67	159	0.67	0.6	0.00
88	20 minutes	53	371[i]	0.80	297	181	0.61	182	0.61	0.6	0.00

[a]Based on current MBTA schedule.
[b]Defined on the basis of MBTA design standards.
[c]From MBTA Dashboard.
[d]Hourly capacity multiplied by the On-Time Performance.
[e]Based on MBTA Ridership Data for Fall 2019.
[f]Volume-to-capacity ratio.
[g]Capacity calculated based on 4 inbound buses and 4 outbound buses in the peak hour.
[h]Capacity calculated based on 3 inbound buses and 3 outbound buses in the peak hour.
[i]Capacity calculated based on 4 inbound buses and 3 outbound buses in the peak hour.
[j]Capacity calculated based on 2 inbound buses and 3 outbound buses in the peak hour.

10.2 SUMMARY OF ANALYSIS RESULTS

Tables 10.2 through 10.4 demonstrate that sufficient capacity exists on the bus routes and subway lines to accommodate the expected ridership increases due to the Project. Increases in volume-to-capacity (v/c) ratios pertaining to ridership are between 0.00 and 0.01 for all affected bus routes, the Green Line, and the Red Line subway systems.

Seating and lighted shelters are available at the Lechmere Square and Kendall Square stations. No benches or shelters are provided for at any other locations along the other bus routes in proximity to the site.

10.3 FUTURE PUBLIC TRANSIT CONDITIONS

Several future transit, pedestrian, and bicycle facilities are proposed or under construction in the Project vicinity. These are shown on Figure 10.a.1.

Green Line

The MBTA completed introducing 24 new cars on the Green Line as part of its broader Green Line expansion project in Spring 2020. The cars are able to accommodate a 10 percent increase in passengers as compared with the existing cars.

The GLX project is an extension of the Green Line service out to Medford using existing MBTA Commuter Rail rights-of-way. Five new stations will be built in Somerville with the last at College Avenue built near Tufts University in Medford. This expanded service is expected to increase ridership by more than 50,000 trips per day.

Red Line

The MBTA is also in the process of replacing the cars on the Red Line, with plans to replace all cars by 2024. This is expected to increase overall capacity by 50 percent by raising the current number of trains per hour from 13 to 20 and allowing a three-minute headway for trains, which is a reduction from the current four-and-a-half-minute headway.

Proposed Transit Services

Additional transit improvements were identified in the Kendall Square Mobility Task Force Report.[2] These include the potential for bus priority lanes on First Street, Binney Street, and Third Street, as well as the possible implementation of a new CT4 bus. This would connect Sullivan Square and Kenmore Square via Lechmere and Kendall Square through the Inner Belt Road proposed through Cambridge Crossing. These are noted as potential options, as MBTA has stated that no funding has been identified for the CT4 bus and the Report notes that more work is needed to understand the impacts of the bus priority lanes. There is currently a First Street and Second Street corridor study being conducted in coordination with the City to determine how First Street and Second Street should operate in the future. Thus far two options have been assessed. The first option has Second Street as a bicycle priority street while First Street has one travel lane and one bus priority lane in each direction. The second option makes no changes to Second Street and has First Street with a travel lane and separated bicycle lane in each direction with the northbound

[2] *Kendall Square Mobility Task Force Final Report;* City of Cambridge; Cambridge, MA; 2017.

direction also having a dedicated bus lane. Based on stakeholder and community feedback, the City Project team has determined that more information and analysis is needed before one concept can be selected over the other.

Also contained in the Kendall Square Mobility Task Force (KSMTF) were the improvements of a Lechmere-Kendall Shuttle bus as well as expanded EZRide shuttle bus service. The Lechmere-Kendall Shuttle would be a peak-hour service operating from 6:30 to 9:00 AM and from 3:30 to 6:00 PM on approximately 15-minute frequencies. The expansion to the EZRide includes measures to decrease peak-period headways from the current 7 to 4 minutes. The report notes that a reduction in travel time is likely through transit priority treatments on First Street and Binney Street.

The recent bus network redesign proposed by the MBTA includes a proposal for an expanded T101 bus with all-day frequency to extend from Medford Square to Sullivan Square to Kendall Square via First Street.

Proposed Grand Junction Rail with Trail

Future rail service noted in the KSMTF report may include the establishment of the Grand Junction Rail with a trail design, a proposed multi-use path serving pedestrians and bicyclists alongside a future rail transit corridor. The Grand Junction section refers to a railroad right-of-way (ROW) between the Boston University Bridge to where the rail meets the Somerville border past Cambridge Street. The rail is currently used for MBTA commuter rail and some Amtrak 'equipment moves' between North and South Station. This is a vital link between the north and south 'sides' of MBTA commuter and Amtrak services, indicating service will have to be retained. A portion of the multi-use path has been constructed between Main Street and Broadway with an additional portion of the path funded at $10 million for the segment between Broadway and Cambridge Street. MIT committed 8.5 million to design and construct the portion of the path that is on land owned by MIT. There has also been study of Bus Rapid Transit (BRT) and rail service on the ROW, with extensions to Sullivan Square to the north and to Longwood Medical Area to the south. As noted in the Technical Report: Grand Junction Feasibility Review[3] there are technical and monetary funding challenges to provide connections to other transit systems.

Should the multi-use path become constructed and/or rail service be available, visitors to the Project site would be able to utilize this facility, located less than one mile from the site. Some of the other services such as the CT4 bus, the Lechmere-Kendall Shuttle, and the EZRide shuttle would utilize First Street and as such will pass adjacent to the Project site. Funding for these items is also unclear, as discussed above and further below with respect to the EZRide shuttle.

10.4 FUTURE PRIVATE TRANSIT CONDITIONS

In addition to the public transit services provided by the MBTA, private transit services provided by the CRTMA EZRide shuttle bus, and the CambridgeSide Shuttle Bus (CS Shuttle) are also available. The EZRide shuttle bus provides a larger coverage area than the CS Shuttle with connections to Kendall Square and North Station. However, this larger coverage area includes additional bus stops and leads to delays due to congestion particularly in Charles River Dam Road and Leverett Circle to North Station. The EZRide provides service during the weekday morning and evening commuter periods, but not during the weekday midday or weekend time periods.

[3] *Technical Report: Grand Junction Feasibility Review;* IBI Group; Boston, MA; December 2016.

The CS Shuttle travels between CambridgeSide and Kendall Square which is a relatively small area with no stops in between. However, the CS Shuttle consists of one 20-passenger bus making three to four roundtrips per hour between these locations, with a start time of 9:00 AM and an end time of 8:00 PM, resulting in a 15- to 20-minute frequency.

11.0 PEDESTRIAN ANALYSIS

A pedestrian impact analysis was conducted at the study area intersections under 2022 Baseline, 2022 Build, and 2027 Future conditions, as required in the scoping letter. For signalized intersections, the pedestrian level-of-service calculations measure the adequacy of the pedestrian phases (exclusive or concurrent) for sufficient time to cross major or minor streets. The unsignalized analysis relies on a critical gap procedure. The analysis methodology was based on procedures outlined in the 2000 *Highway Capacity Manual*[4] (HCM) for signalized and unsignalized intersections and is provided in the Appendix. Table 11.1 summarizes the results of the pedestrian analysis at the signalized intersections, while Table 11.2 presents a summary of the pedestrian analysis at the unsignalized intersections. The pedestrian level-of-service ratings for the intersections are shown graphically on Figure 11.a.1 for the weekday morning peak hour and on Figure 11.a.2 for the weekday evening peak hour.

The Project does not change the pedestrian level of service of any of the crosswalks studied with the addition of the Project vehicle and pedestrian traffic under 2022 Build conditions. The increases in delays at the study area crosswalks range from 0.1 to 0.2 seconds under 2022 Build conditions.

[4]*Highway Capacity Manual*; Transportation Research Board; Washington, DC; 2000.

Table 11.1
PEDESTRIAN LEVEL-OF-SERVICE SUMMARY – SIGNALIZED INTERSECTIONS

Intersection/Time Period/Crossing Path	2022 Baseline			2022 Build			Delay	2027 Future		
	Demand[a]	Delay[b]	LOS[c]	Demand	Delay	LOS	Increase	Demand	Delay	LOS
First Street at Charles Street/Cambridgeside Place:										
Weekday Morning:										
Crossing Cambridgeside Place (East)	113	16.9	B	113	16.9	B	0	113	16.9	B
Crossing Charles Street (West)	34	16.9	B	34	16.9	B	0	34	16.9	B
Crossing First Street (North)	121	16.9	B	121	16.9	B	0	121	16.9	B
Crossing First Street (South)	24	16.9	B	24	16.9	B	0	24	16.9	B
Weekday Evening:										
Crossing Cambridgeside Place (East)	190	16.9	B	190	16.9	B	0	190	16.9	B
Crossing Charles Street (West)	61	16.9	B	61	16.9	B	0	61	16.9	B
Crossing First Street (North)	307	16.9	B	307	16.9	B	0	307	16.9	B
Crossing First Street (South)	65	16.9	B	65	16.9	B	0	65	16.9	B

[a]Demand in pedestrians per hour.
[b]Average delay per pedestrian (in seconds).
[c]Pedestrian level of service.

Table 11.2
PEDESTRIAN LEVEL-OF-SERVICE SUMMARY – UNSIGNALIZED INTERSECTIONS

Intersection/Time Period/Crossing Path	2022 Baseline			2022 Build			Delay	2027 Future		
	Demand[b]	Delay[c]	LOS[d]	Demand	Delay	LOS	Increase	Demand	Delay	LOS
First Street at Spring Street:										
Weekday Morning:										
Crossing Spring Street (West)	64	10.3	C	76	10.3	C	0.0	76	11.8	C
Weekday Evening:										
Crossing Spring Street (West)	118	2.8	A	135	2.8	A	0.0	135	3.6	A
First Street at Hurley Street:										
Weekday Morning:										
Crossing Hurley Street (West)	64	3.4	A	64	3.4	A	0.0	64	4.1	A
Weekday Evening:										
Crossing Hurley Street (West)	118	3.8	A	118	4.0	A	0.2	118	4.9	A
Second Street at Spring Street:										
Weekday Morning:										
Crossing Spring Street (East)	22	13.9	C	24	13.9	C	0.0	24	15.9	C
Crossing Spring Street (West)	7	1.8	A	7	1.8	A	0.0	7	2.2	A
Crossing Second Street (North)	19	14.5	C	21	14.7	C	0.2	21	17.4	C
Crossing Second Street (South)	21	6.7	B	24	6.8	B	0.1	24	8.2	B
Weekday Evening:										
Crossing Spring Street (East)	36	3.6	A	39	3.6	A	0.0	39	4.3	A
Crossing Spring Street (West)	10	1.8	A	10	1.8	A	0.0	10	2.2	A
Crossing Second Street (North)	32	6.6	B	35	6.8	B	0.2	35	8.2	B
Crossing Second Street (South)	9	6.4	B	10	6.5	B	0.1	10	7.8	B
Second Street at Hurley Street:										
Weekday Morning:										
Crossing Hurley Street (East)	29	3.1	A	37	3.2	A	0.1	37	3.9	A
Crossing Hurley Street (West)	15	2.8	A	15	2.8	A	0.0	15	3.3	A
Crossing Second Street (North)	18	9.4	B	20	9.6	B	0.2	20	11.6	C
Crossing Second Street (South)	5	8.7	B	6	8.8	B	0.1	6	10.8	C
Weekday Evening:										
Crossing Hurley Street (East)	46	3.5	A	58	3.6	A	0.1	58	5.0	A
Crossing Hurley Street (West)	11	4.2	A	11	4.2	A	0.0	11	5.2	B
Crossing Second Street (North)	17	9.0	B	18	9.2	B	0.2	18	11.1	C
Crossing Second Street (South)	8	9.2	B	9	9.3	B	0.1	9	11.7	C

See notes at end of table.

Table 11.2 (Continued)
PEDESTRIAN LEVEL-OF-SERVICE SUMMARY – UNSIGNALIZED INTERSECTIONS

Intersection/Time Period/Crossing Path	2022 Baseline			2022 Build			Delay	2027 Future		
	Demand[b]	Delay[c]	LOS[d]	Demand	Delay	LOS	Increase	Demand	Delay	LOS
Second Street at Charles Street:										
Weekday Morning:										
Crossing Charles Street (East)	34	2.9	A	39	3.0	A	0.1	39	6.9	B
Crossing Charles Street (West)	22	3.2	A	22	3.2	A	0.0	22	6.0	B
Crossing Second Street (North)	12	9.2	B	14	9.3	B	0.1	14	11.5	C
Crossing Second Street (South)	19	9.3	B	21	9.4	B	0.1	21	12.2	C
Weekday Evening:										
Crossing Charles Street (East)	43	7.7	B	51	7.9	B	0.2	51	11.6	C
Crossing Charles Street (West)	23	6.9	B	23	6.9	B	0.0	23	8.5	B
Crossing Second Street (North)	31	9.7	B	34	9.9	B	0.2	34	12.4	C
Crossing Second Street (South)	41	11.1	C	45	11.3	C	0.2	45	15.7	C

[a]Demand in pedestrians per hour.
[b]Average delay per pedestrian (in seconds).
[c]Pedestrian level of service.

12.0 BICYCLE ANALYSIS

A review of bicycle conditions was conducted at the affected intersections and street segments. First Street provides dedicated on-street lanes for bicyclists. Other city streets in the study area such as Second Street and segments of Hurly Street, Spring Street, and Charles Street are wide enough to permit bicycle travel but do not provide exclusive bicycle lanes.

12.1 VEHICLE TURNING VOLUME CONFLICTS

City guidelines require identification of conflicting vehicle-turning volumes at intersections impacted by the Project where bicycle facilities are present or where peak-hour bicycle volumes exceed 10 bicycles on any approach. The locations meeting these criteria are listed in Table 12 for 2022 Baseline and 2022 Build conditions.

Vehicles were considered in conflict with a bicycle movement if the bicycle must cross the vehicle path to execute the movement. For example, the intersection of First Street with Spring Street during the weekday morning peak hour has 0 bicycles turning left northbound and 28 traveling straight. As there are no bicycles turning left northbound and the through movement bicycles do not have to cross a vehicle path to execute the movement, there are no conflicting vehicles northbound. Southbound at this intersection, there are 3 bicycles that turn right and 60 that travel straight during the weekday morning peak hour. In this case, the 3 right-turning bicycles do not have to cross any vehicle path to execute the right turn. The 60 bicycles that travel straight, however, do cross the southbound right-turning vehicles and the northbound left-turning vehicles to execute the movement. Therefore, the southbound bicycles have 377 conflicting vehicles. This same approach is used for unsignalized and signalized intersections. The difference for signalized intersections is you must account for the signal phasing and when vehicles and bicycles are allowed to move. For example, First Street at Charles Street/Cambridgeside Place is a simple two-phase signal in which east and west have a green signal then north and south have a green signal. Therefore, the eastbound and westbound bicycles only conflict with eastbound and westbound vehicle movements and the same for northbound and southbound. With more complicated signal phasing, one must determine which vehicle and bicycle movements are allowed to be made during a specific phase and then determine if the bicycles on that phase cross any of the vehicle paths to determine the number of conflicting vehicles for the approach.

Table 12
BICYCLE-VEHICLE VOLUME CONFLICTS

Roadway/Intersecting Street/ Time Period	Approach Bicycle Volume	Conflicting Vehicles Turning Volume			
		2022 Baseline		2022 Build	
		Advancing Volume	Opposing Volume	Advancing Volume	Opposing Volume
First Street at Spring Street:					
Weekday Morning	EB – <10	--	--	--	--
	NB – 28	337	0	339	0
	SB – 63	467	377	467	377
Weekday Evening	EB – <10	--	--	--	--
	NB – 43	445	0	447	0
	SB – 33	316	137	317	137
First Street at Hurley Street:					
Weekday Morning	EB – <10	--	--	--	--
	NB – 28	328	0	329	0
	SB – 61	223	124	223	125
Weekday Evening	EB – <10	--	--	--	--
	NB – 48	438	266	440	268
	SB – 33	233	137	234	141
First Street at Cambridgeside Place/ Charles Street:					
Weekday Morning	EB – 11	108	209	114	213
	WB – 16	168	221	168	227
	NB – 18	221	64	221	64
	SB – 52	256	221	256	221
Weekday Evening	EB – <10	--	--	--	--
	WB – 17	261	241	261	245
	NB – 34	279	184	280	184
	SB – 31	287	279	288	280
Second Street at Spring Street:					
Weekday Morning	EB – <10 WB – <10 NB – <10 SB – <10	No bicycle facilities are present at this intersection and the bicycle approach volumes are all less than 10 bicycles therefore no analysis is required.			
Weekday Evening	EB – <10 WB – <10 NB – <10 SB – <10				

See notes at end of table.

Table 12 (Continued)
BICYCLE-VEHICLE VOLUME CONFLICTS

Roadway/Intersecting Street/ Time Period	Approach Bicycle Volume	Conflicting Vehicles Turning Volume			
		2022 Baseline		2022 Build	
		Advancing Volume	Opposing Volume	Advancing Volume	Opposing Volume
Second Street at Hurley Street:					
Weekday Morning	EB – <10 WB – <10 NB – <10 SB – <10	No bicycle facilities are present at this intersection and the bicycle approach volumes are all less than 10 bicycles therefore no analysis is required.			
Weekday Evening	EB – <10 WB – <10 NB – <10 SB – <10				
Second Street at Charles Street:					
Weekday Morning	EB – <10 WB – <10 NB – <10 SB – <10	No bicycle facilities are present at this intersection and the bicycle approach volumes are all less than 10 bicycles therefore no analysis is required.			
Weekday Evening	EB – <10 WB – <10 NB – <10 SB – <10				

NB = northbound; SB = southbound; EB = eastbound; WB = westbound; LT = left-turning movement; TH = through movement; RT = right-turning movement.

13.0 ARTICLE 19 SPECIAL PERMIT CRITERIA ANALYSIS

Under Section 19.25.1, the Planning Board shall only grant a Section 19.20 Project Review Special Permit upon finding that the Project will have no substantial adverse impact on City traffic within the study area analyzed in the TIS. Substantial adverse impact is measured by reference to the Special Permit Criteria, which consists of five traffic impact indicators used to evaluate Project impacts. The indicators are: (1) Project vehicle-trip generation weekdays and weekends for a twenty-four-hour period and morning and evening peak-vehicle trips generated; (2) change in level of service at identified signalized intersections; (3) increased volume of trips on residential streets; (4) increase of length of vehicle queues at identified signalized intersections; and (5) lack of sufficient pedestrian and bicycle facilities. The methodology for the analysis of the traffic impact indicators is from the Cambridge "Guidelines for Presenting Information to the Planning Board," approved November 27, 2001, and revised in 2004. Referenced in the guidelines are capacity analysis procedures presented in the HCM and summarized in the Appendix. Exceedance of one or more indicators suggests a potentially substantial adverse impact on City traffic; however, the Planning Board should also consider proposed Project mitigation in making its finding. The following section summarizes the 91 measurements analyzed in applying the five indicators to the proposed Project and the proposed Project mitigation. While the Project indirectly results in exceedance of two measurements, the methods described in the Mitigation section of this TIS outweigh any potential adverse impact of the Project.

Indicator 1: Project Vehicle – Trip Generation

The Project satisfies 3 of 3 City standards for Indicator 1 regarding vehicle-trip generation as demonstrated by the three measurements detailed in Table 13.a.

Indicator 2: Project Vehicle – Level-Of-Service

The Project satisfies 32 of 32 City standards for Indicator 2 regarding vehicle level of service as demonstrated by the measurements detailed in Table 13.b.

Indicator 3: Traffic on Residential Streets

The Project satisfies 6 of 6 City standards for Indicator 3 regarding traffic on residential streets as demonstrated by the six measurements detailed in Table 13.c.

Indicator 4: Lane Queue

The Project satisfies 8 of 8 City standards for Indicator 4 regarding lane queues as demonstrated by the measurements detailed in Table 13.d.

Indicator 5: Lack of Sufficient Pedestrian and Bicycle Facilities

The Project satisfies 40 of 42 City standards for Indicator 5A, 5B, and 5C regarding pedestrian and bicycle facilities as demonstrated by the measurements detailed in Table 13.e.1 and Table 13.e.2. Of the 42 measurements analyzed in connection with Criteria 5, none were exceeded as a result of the Project. A total of two measurements are exceeded under existing conditions, with or without the Project.

Table 13.a
INDICATOR 1 – PROJECT VEHICLE-TRIP GENERATION

Weekday =	152	AM Peak Hour =	13	PM Peak Hour =	19	Exceeds Criteria? [Y/N]	N/N/N

Table 13.b
INDICATOR 2 – PROJECT VEHICLE-LEVEL-OF-SERVICE

	Weekday Morning Peak Hour			Weekday Evening Peak Hour		
Intersection/Critical Movement	2022 Baseline	With Project	Exceeds Criteria?	2022 Baseline	With Project	Exceeds Criteria?
First Street at Charles Street and Cambridgeside Place	C	C	N	D	D	N
First Street at Spring Street:						
First Street NB LT/TH	A	A	N	A	A	N
First Street SB TH/RT	A	A	N	A	A	N
First Street at Hurley Street:						
Hurley Street EB LT/RT	B	B	N	B	B	N
First Street NB LT/TH	A	A	N	A	A	N
First Street SB TH/RT	A	A	N	A	A	N
Second Street at Spring Street:						
Spring Street WB LT/TH/RT	C	C	N	B	B	N
First Street NB LT/TH	A	A	N	A	A	N
First Street SB TH/RT	A	A	N	A	A	N
Second Street at Hurley Street:						
Hurley Street EB LT/TH/RT	A	A	N	A	A	N
Hurley Street WB LT/TH/RT	A	A	N	A	A	N
Second Street NB LT/TH/RT	A	A	N	A	A	N
Second Street SB LT/TH/RT	A	A	N	A	A	N
Second Street at Charles Street:						
Charles Street EB LT/TH/RT	A	A	N	A	B	N
Second Street NB LT/TH/RT	A	A	N	B	B	N
Second Street SB LT/TH/RT	A	A	N	A	A	N

Table 13.c
INDICATOR 3 – TRAFFIC-VOLUME INCREASE ON RESIDENTIAL STREETS

Street Segment	Weekday Morning Peak Hour			Weekday Evening Peak Hour		
	2022 Baseline Volume	With Project	Exceeds Criteria?	2022 Baseline Volume	With Project	Exceeds Criteria?
Charles Street, Second Street to First Street (Amount of residential = >1/3 but <1/2)	124	133	N	137	146	N
Charles Street, Third Street to Second Street (Amount of residential = <1/3)	118	119	N	220	222	N
Hurley Street, Second Street to First Street (Amount of residential = >1/3 but <1/2)	108	111	N	241	247	N

Table 13.d
INDICATOR 4 – LANE QUEUE

Intersection	No. of Lanes Analyzed	Weekday Morning Peak Hour			Weekday Evening Peak Hour		
		2022 Baseline	With Project	Exceeds Criteria?	2022 Baseline	With Project	Exceeds Criteria?
First Street at Charles Street/ Cambridgeside Place:	4						
Charles Street EB LT/TH/RT		3	3	N	5	5	N
Cambridgeside Place WB LT/ RT		2	2	N	8	8	N
First Street NB TH/RT		4	4	N	6	6	N
First Street SB LT/TH		3	3	N	6	6	N

Table 13.e.1
INDICATOR 5A – PEDESTRIAN LEVEL OF SERVICE

Intersection/Critical Movement	Weekday Morning Peak Hour			Weekday Evening Peak Hour		
	Baseline PLOS	With Project	Exceeds Criteria?	Baseline PLOS	With Project	Exceeds Criteria?
First Street at Charles Street/Cambridgeside Place:						
Crossing Cambridgeside Place (East)	B	B	N	B	B	N
Crossing Charles Street (West)	B	B	N	B	B	N
Crossing First Street (North)	B	B	N	B	B	N
Crossing First Street (South)	B	B	N	B	B	N
First Street at Spring Street:						
Crossing Spring Street (West)	C	C	N	A	A	N
First Street at Hurley Street:						
Crossing Hurley Street (West)	A	A	N	A	A	N
Second Street at Spring Street:						
Crossing Spring Street (East)	C	C	N	A	A	N
Crossing Spring Street (West)	A	A	N	A	A	N
Crossing Second Street (North)	C	C	N	B	B	N
Crossing Second Street (South)	B	B	N	B	B	N
Second Street at Hurley Street:						
Crossing Hurley Street (East)	A	A	N	A	A	N
Crossing Hurley Street (West)	A	A	N	A	A	N
Crossing Second Street (North)	B	B	N	B	B	N
Crossing Second Street (South)	B	B	N	B	B	N
Second Street at Charles Street:						
Crossing Charles Street (East)	A	A	N	B	B	N
Crossing Charles Street (West)	A	A	N	B	B	N
Crossing Second Street (North)	B	B	N	B	B	N
Crossing Second Street (South)	B	B	N	C	C	N

Table 13.e.2
INDICATOR 5B AND 5C – PEDESTRIAN AND BICYCLE FACILITIES

Adjacent Street or Public Right-of-Way	Sidewalks or Walkways Present?	Exceeds Criteria?	Bicycle Facilities or Right-of-Ways Present?	Exceeds Criteria?
Spring Street	Y	N	N	**Y**
Hurley Street	Y	N	N	**Y**
First Street	Y	N	Y	N

14.0 PROJECT MITIGATION

14.1 PROJECT MITIGATION

Generally, the Project's location near transit facilities such as Lechmere Station encourages transit use. Mitigation efforts are therefore geared towards efforts to encourage Project employees and residents towards alternative transportation that would result in a low SOV rate for the Project.

14.2 TRANSPORTATION DEMAND MANAGEMENT MEASURES

The Project will implement the following Transportation Demand Management (TDM) measures.

- Join the Charles River TMA. This membership will provide residents and employees with a computer-based ridesharing information bank to assist in vanpool and carpool arrangements. Membership with the TMA will also provide details of shuttle bus systems including routes, schedules, frequency, and capacity serving the area.

- Encourage residents and employees to obtain a CharlieCard and register it for bike parking, allowing residents and employees the ability to use the bike racks at area MBTA stations and Pedal & Park facilities.

- Make available public transportation schedules, which will be posted in a centralized location for residents and employees to be located in the lobby of main building.

- Provide information on available pedestrian and bicycle facilities in the vicinity of the Project site in a central location for residents and employees.

- Charge for parking at market rates with parking fees unbundled from rent.
- Provide information about transportation options available to residents via a welcome packet at move-in and to employees at orientations.
- A 50 percent subsidy will be provided for the cost of a bus/subway link pass for three consecutive months to each adult member of a residential household, up to two per household, upon move-in.

- Air pumps and other bicycle repair tools, such as a "fix-it" station will be provided in the bicycle storage area.

15.0 CONCLUSION

As described throughout this TIS, the Project consists of the redevelopment of an existing retail facility located at 75 First Street to a new six-story building containing 90 residential units with approximately 2,400 sf of ground floor retail. No new vehicle parking will be constructed on-site. Residents will utilize the 107 First Street parking garage. Long-term bicycle parking will be provided on-site that can accommodate 88 regular bicycles and 6 tandem spaces to accommodate bicycles with trailers. Short-term bicycle parking will be provided on-site for 10 bicycles.

The Project is located in an area close to extensive public transit networks where reliance on personal vehicles is becoming less necessary and through the provision of expanded bicycle parking and storage and proximity to expanded transit services and transit connectivity, the overall traffic impact of the Project will be reduced.

The proposed Project will not result in a public hazard due to substantially increased vehicular traffic or parking in this area of East Cambridge. Specifically, the Project is not anticipated to have a significant adverse impact on motorist delays in the area and adequate parking supply will exist at the 107 First Street garage to support the Project. Accordingly, this TIS finds that the Project can be accommodated within the existing area infrastructure and on the roadway network with minimal effects, resulting in the ability to implement the Project's planned residential and retail uses with the appropriate TDM measures.

Transportation Impact Study
Supporting Graphics

Proposed Residential Development
75 First Street
Cambridge, Massachusetts

Prepared for:

Urban Spaced, LLC
Cambridge, Massachusetts

October 2022

Prepared by:

Vanasse & Associates inc
Transportation Engineers & Planners

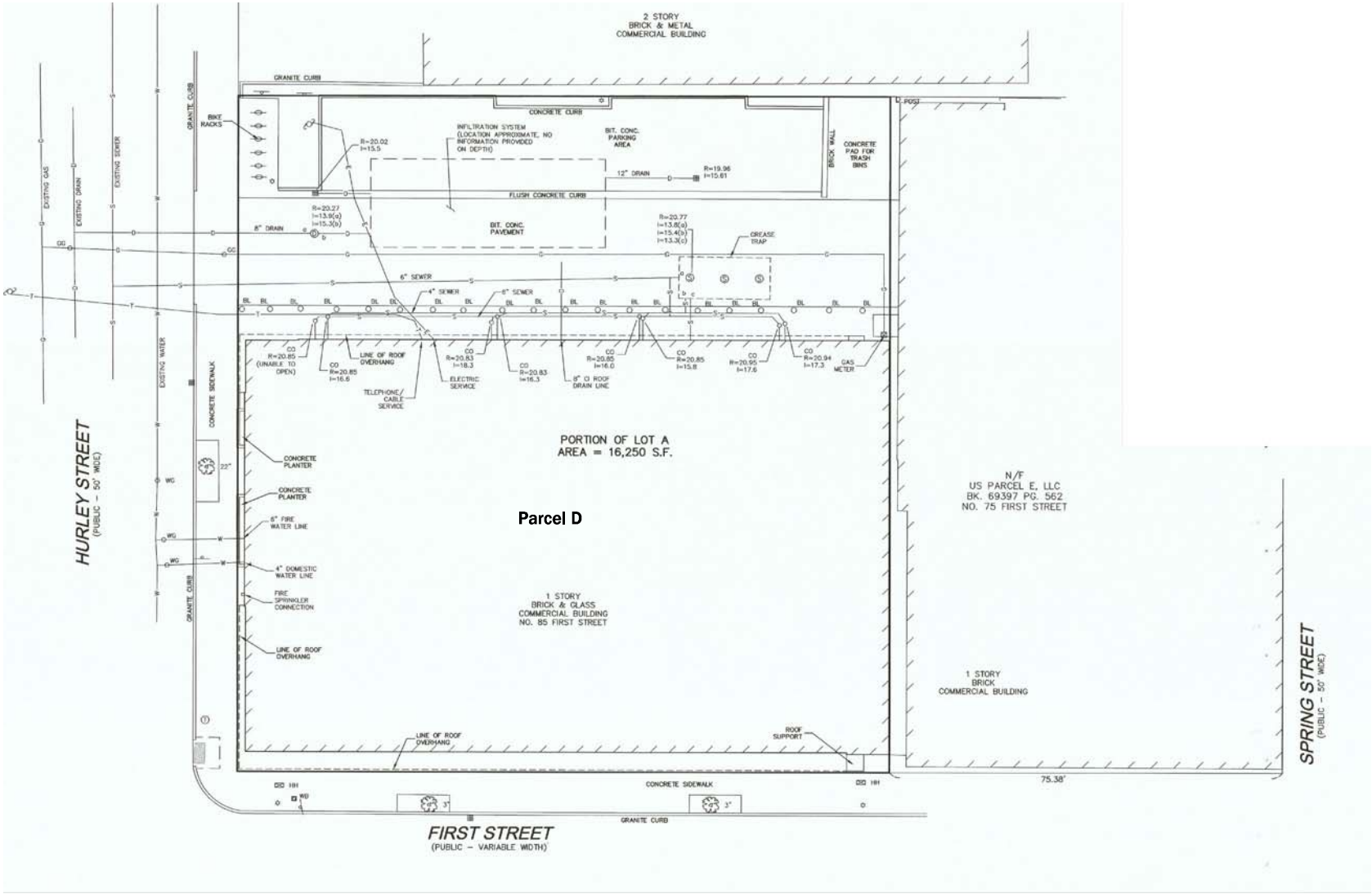
35 New England Business Center Drive
Suite 140
Andover, MA 01810

Figure 1.a.1

Vehicle, Pedestrian, and Bicycle Access

Vanasse & Associates inc

R:\9180\September 2022\9180ACCESS.dwg, 9/20/2022 2:57:37 PM



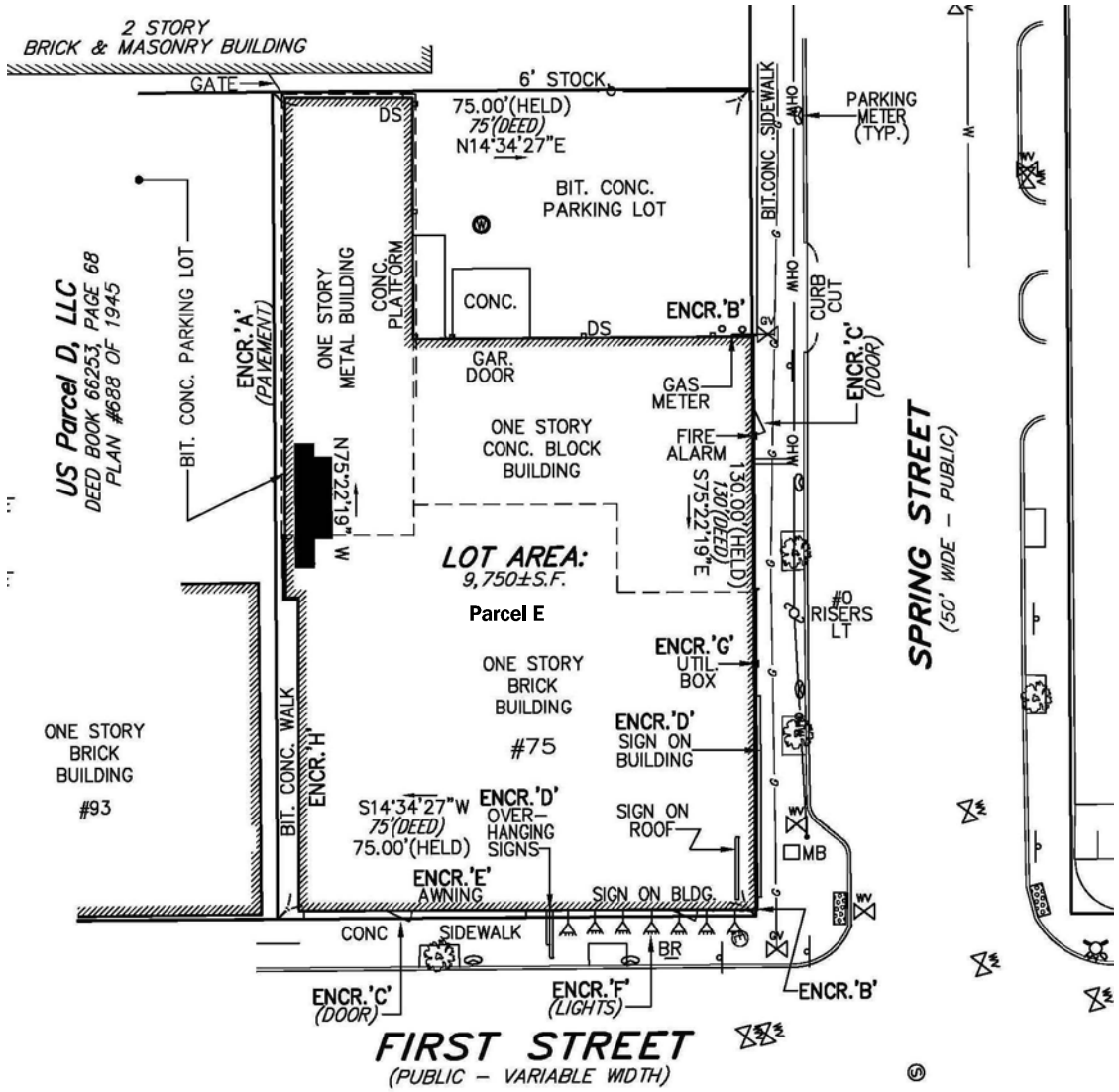
Source: Design Consultants, Inc.

0 15 30 Scale in Feet

Figure 1.a.2

Existing Conditions Plan
Parcel D

Vanasse & Associates inc



Source: Hancock Associates

0 15 30 Scale in Feet

Figure 1.a.3

Existing Conditions Plan
Parcel E

Vanasse & Associates inc

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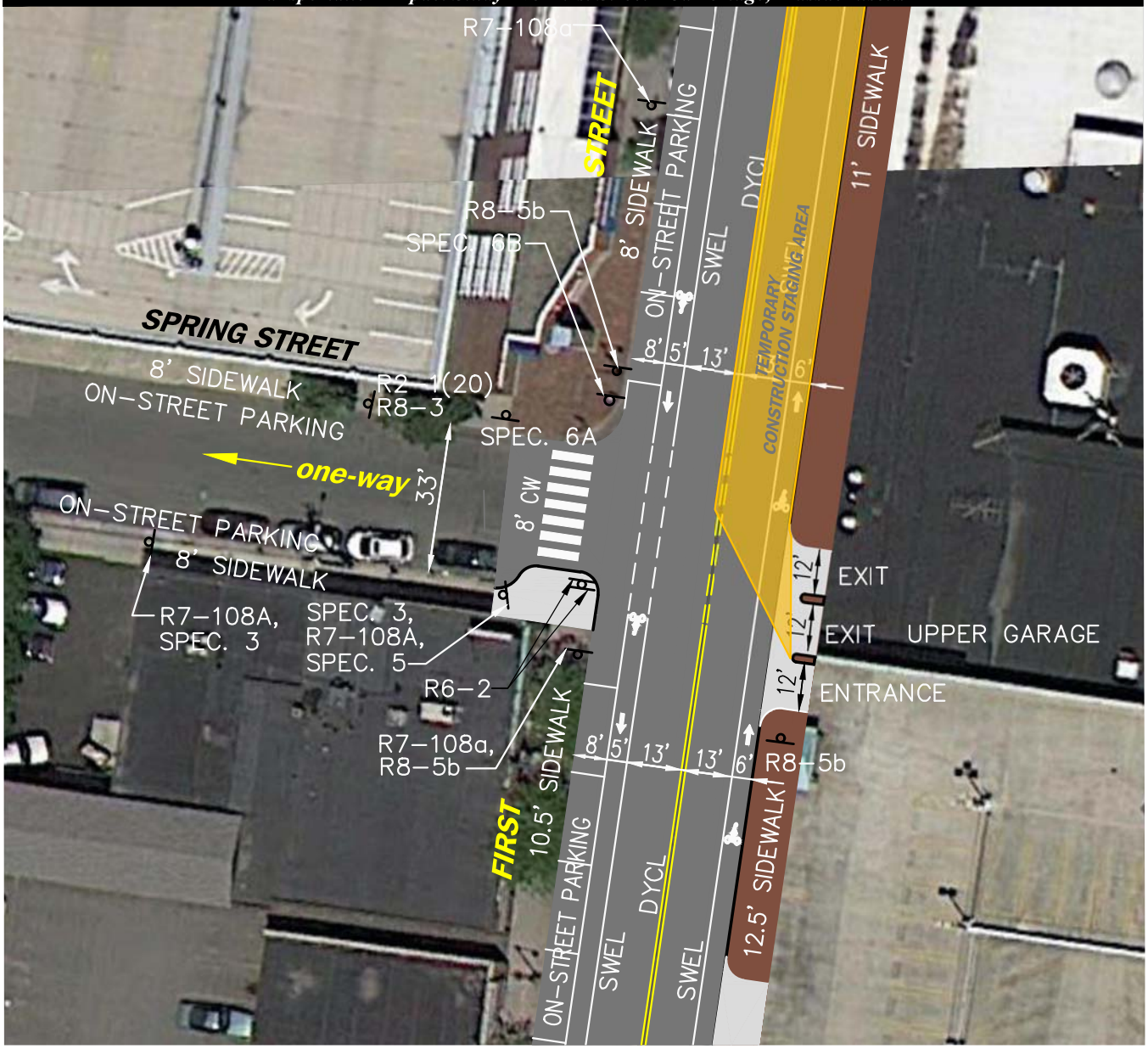


SIGN LEGEND (ARROW DIRECTION ON SIGNAGE VARIES BASED ON LOCATION)

SPEC. 3	TOW AWAY ZONE NO PARKING STREET CLEANING 8 AM - 2 PM THIRD THURSDAY EACH MONTH APRIL 1st to DEC 31st EXCEPT HOLIDAYS	SPEC. 5	TOW ZONE NO PARKING DURING SNOW EMERGENCY	SPEC. 6A	P ARKING	SPEC. 6B	P ARKING	R6-1	ONE WAY / ONE WAY	R6-2	ONE WAY
		R2-1(20)	SPEED LIMIT 20	R7-108a	2 HR PARKING 8AM - 6 PM EXCEPT SUNDAYS	R8-3	TOW ZONE NO PARKING	R8-5b	TOW ZONE NO STOPPING ANYTIME		

MARKING LEGEND

DYCL — DOUBLE YELLOW CENTER LINE
SWEL — SOLID WHITE EDGE LINE

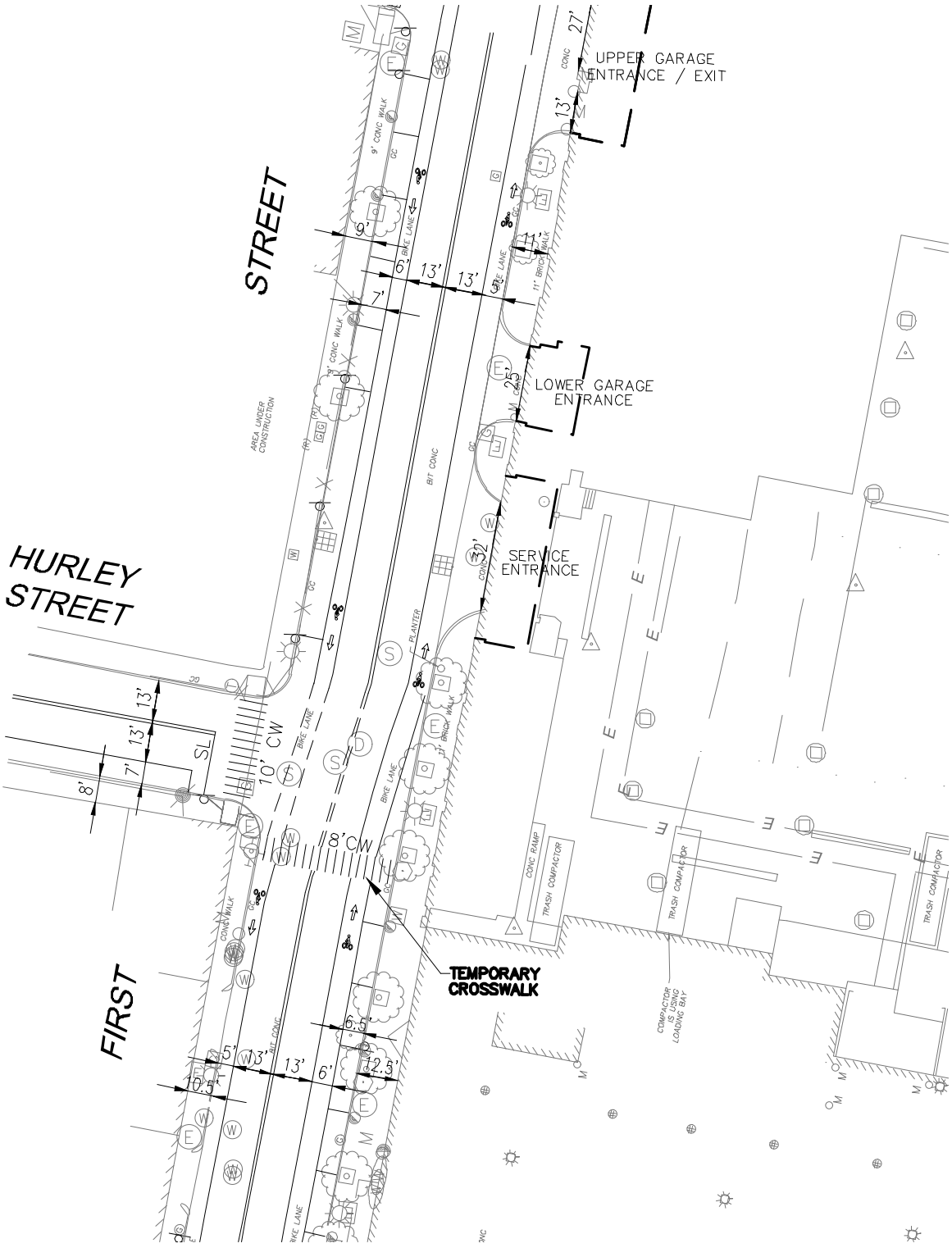
Source: Cambridge Development Map and Field Inventory conducted by VAI, March 2022.

0 20 40 Scale in Feet

Figure 1.b.1

Vanasse & Associates inc

Intersection Inventories
First Street at Spring Street



Source: Cambridge Development Map and Field Inventory conducted by VAI, March 2022.

0 25 50 Scale in Feet

Figure 1.b.2

Intersection Inventories
First Street at Hurley Street

Vanasse & Associates inc

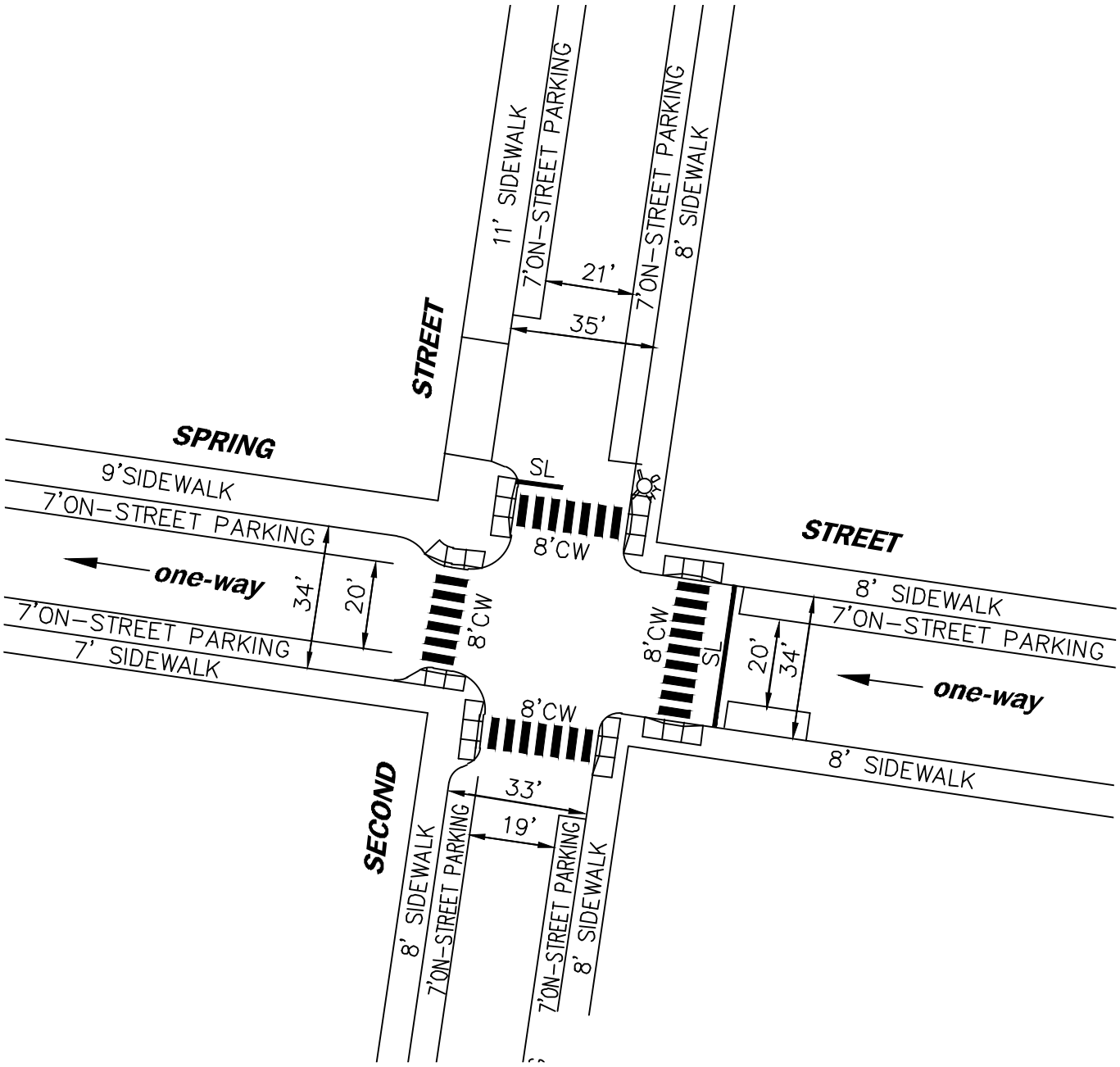
Source: Cambridge Development Map and Field Inventory conducted by VAI, March 2020.

0 20 40 Scale in Feet

Figure 1.b.3

Intersection Inventories
First Street at Cambridgeside Place and Charles Street

Vanasse & Associates inc



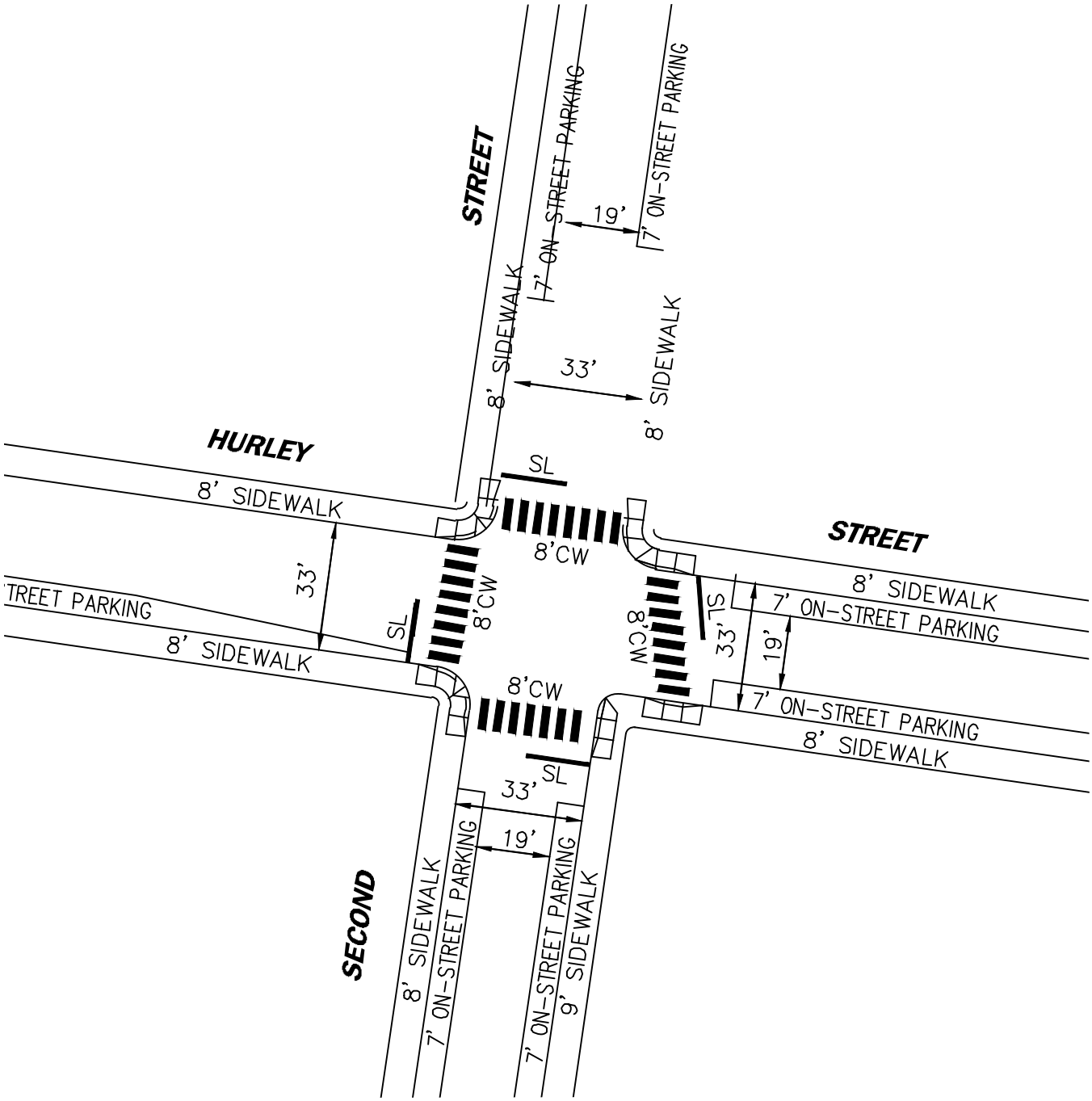
Source: Cambridge Development Map and Field Inventory conducted by VAI, March 2022.

0 20 40 Scale in Feet

Figure 1.b.4

Intersection Inventories
Second Street at Spring Street

Vanasse & Associates inc



Source: Cambridge Development Map and Field Inventory conducted by VAI, March 2022.

0 20 40 Scale in Feet

Figure 1.b.5

Intersection Inventories
Second Street at Hurley Street

Vanasse & Associates inc

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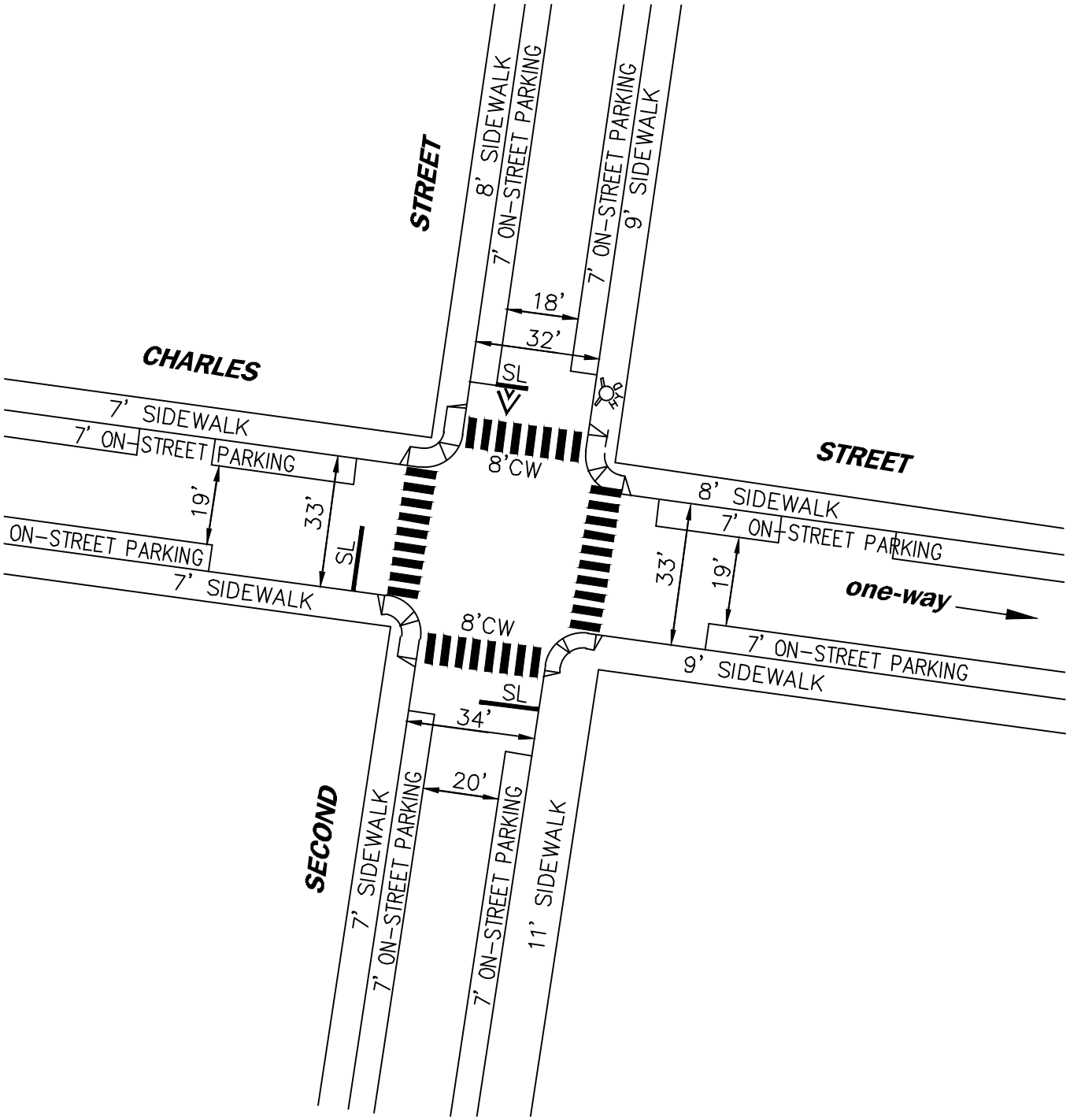


Source: Cambridge Development Map and Field Inventory conducted by VAI, March 2022.

0 20 40 Scale in Feet

Figure 1.b.6

Intersection Inventories
Second Street at Charles Street

Vanasse & Associates inc

Figure 1.c.1

Existing Parking and Loading Facility

Vanasse & Associates inc

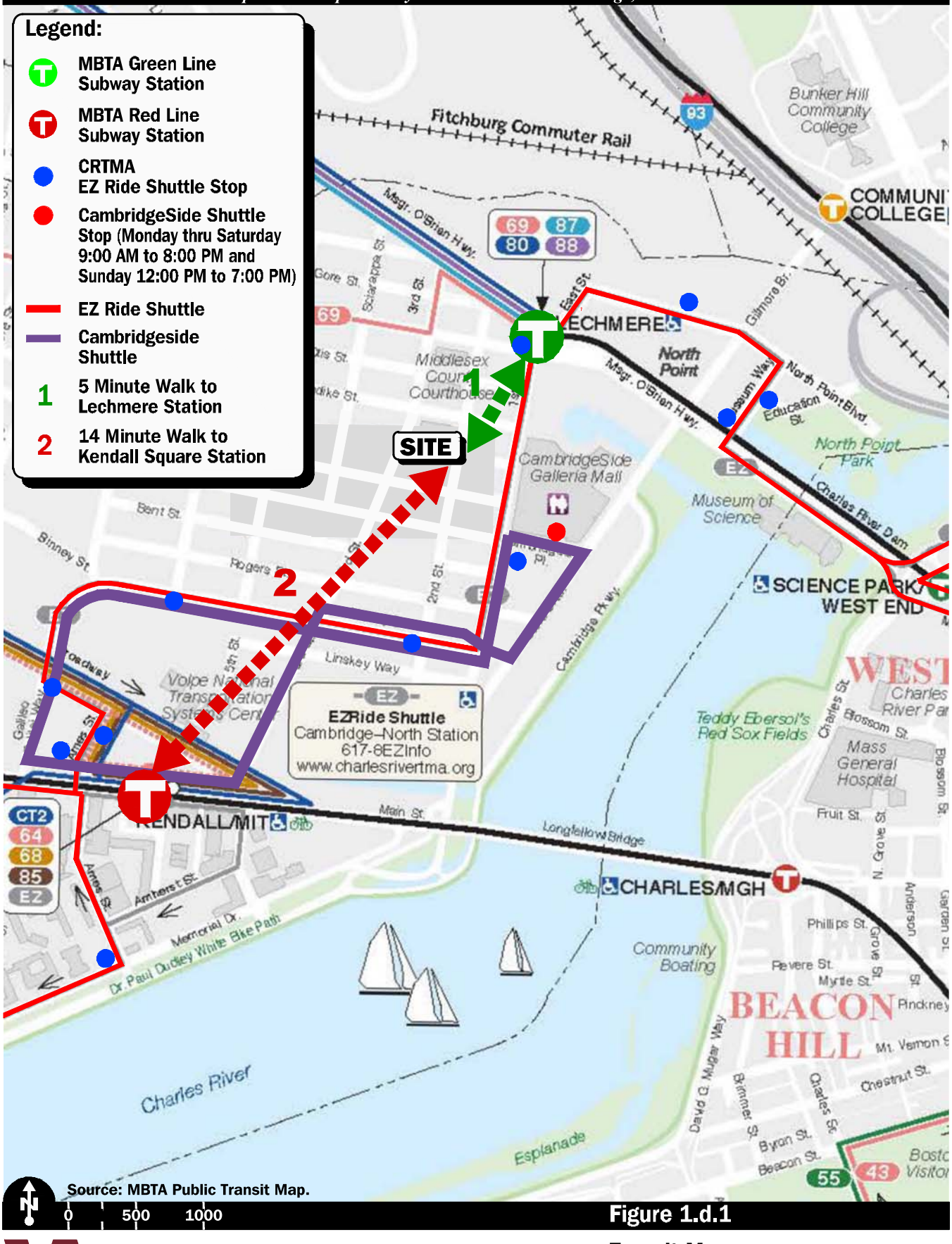
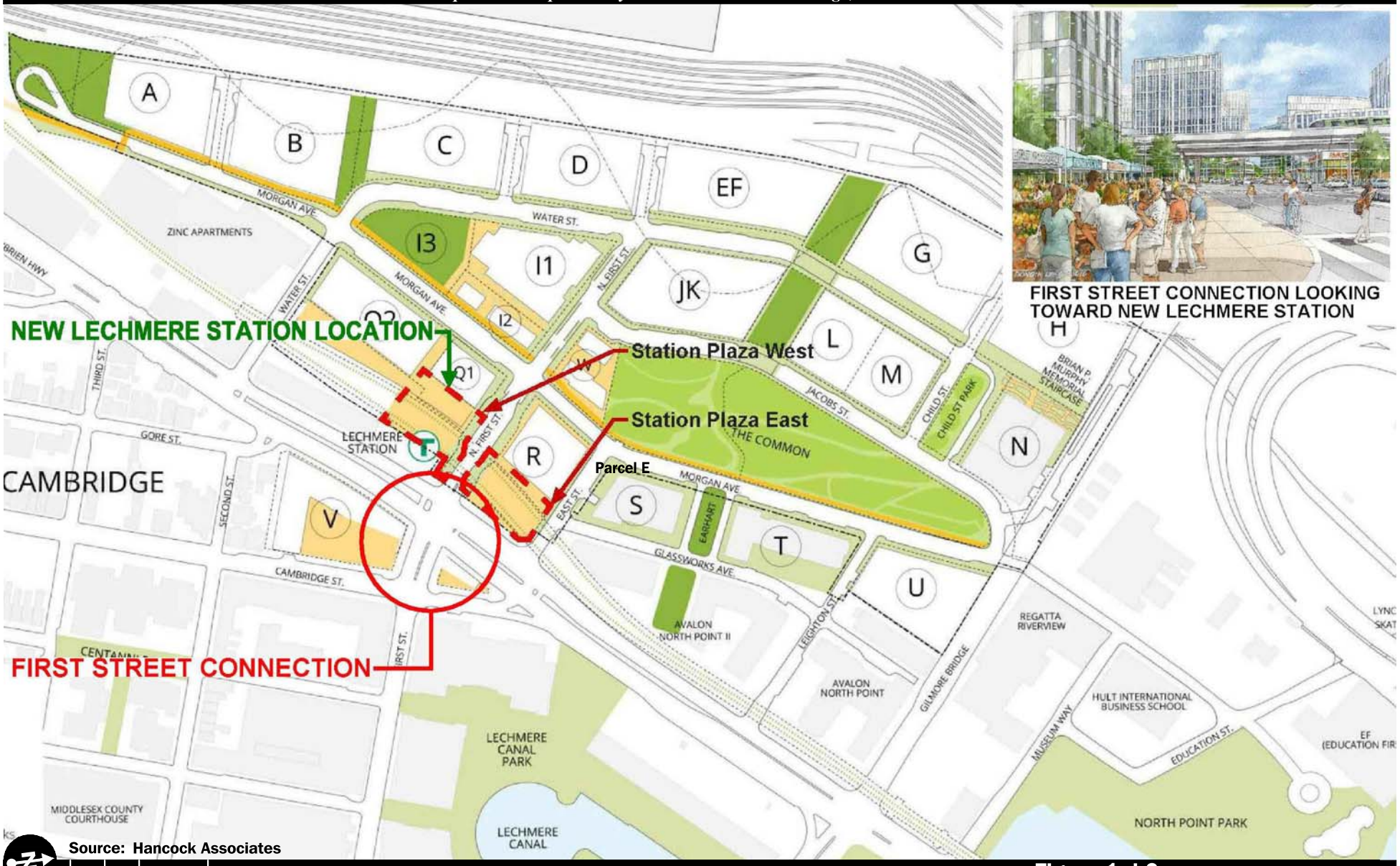


Figure 1.d.1

Transit Map

Vanasse & Associates inc



Source: Hancock Associates

0 15 30 Scale in Feet

Figure 1.d.2

Future First Street Connection and Future Lechmere Station Station Location

Vanasse & Associates inc

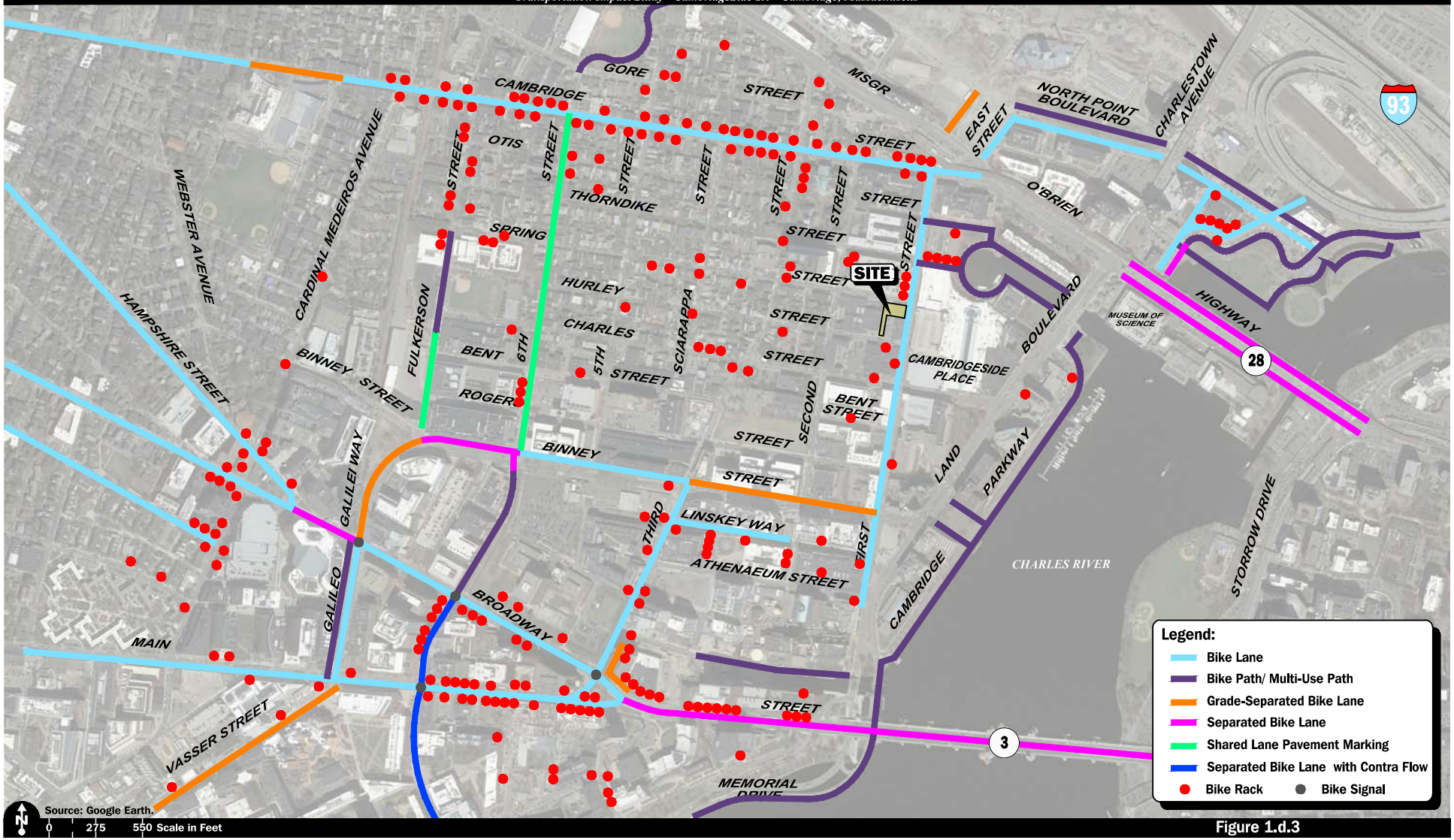


Figure 1.d.3

Bicycle Parking and Route Access Map

Vanasse & Associates inc

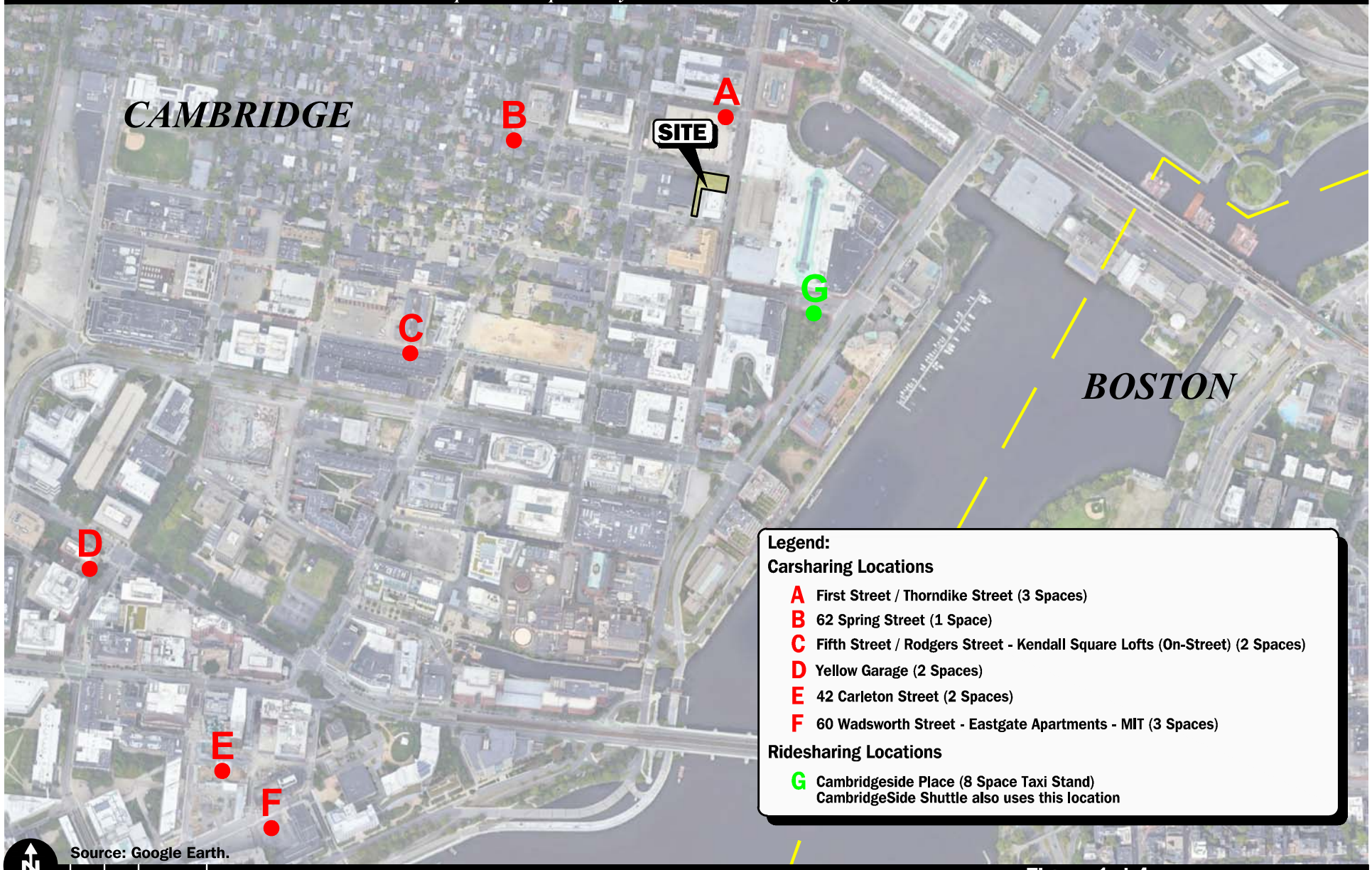


Figure 1.d.4

Carsharing and Ridesharing Services Map

Vanasse & Associates inc

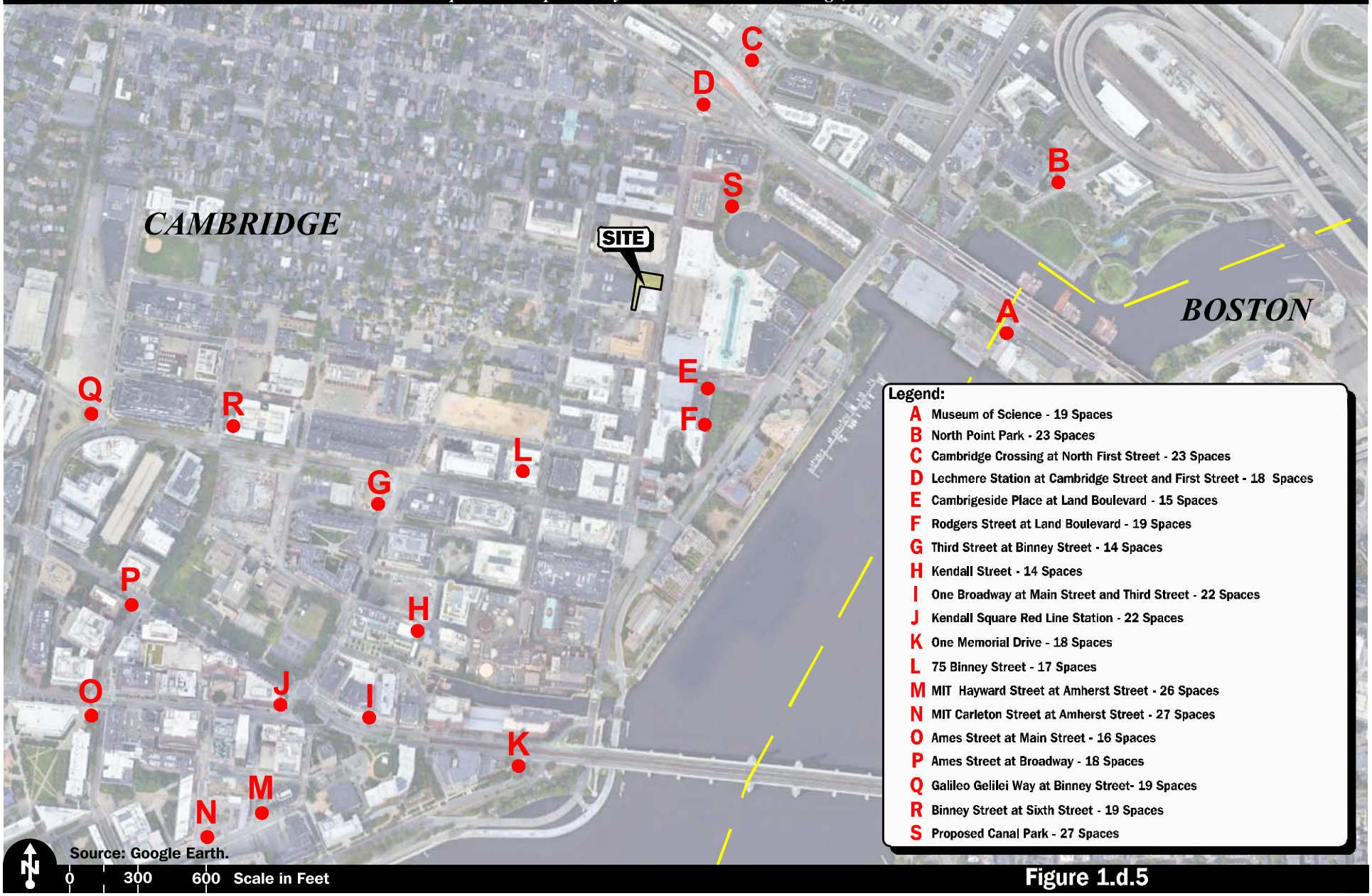


Figure 1.d.5

Bikesharing Stations Map

Vanasse & Associates inc

R:\9180\MARCH 2022\9180RIDESHARE1.dwg, 6/6/2022 3:16:47 PM

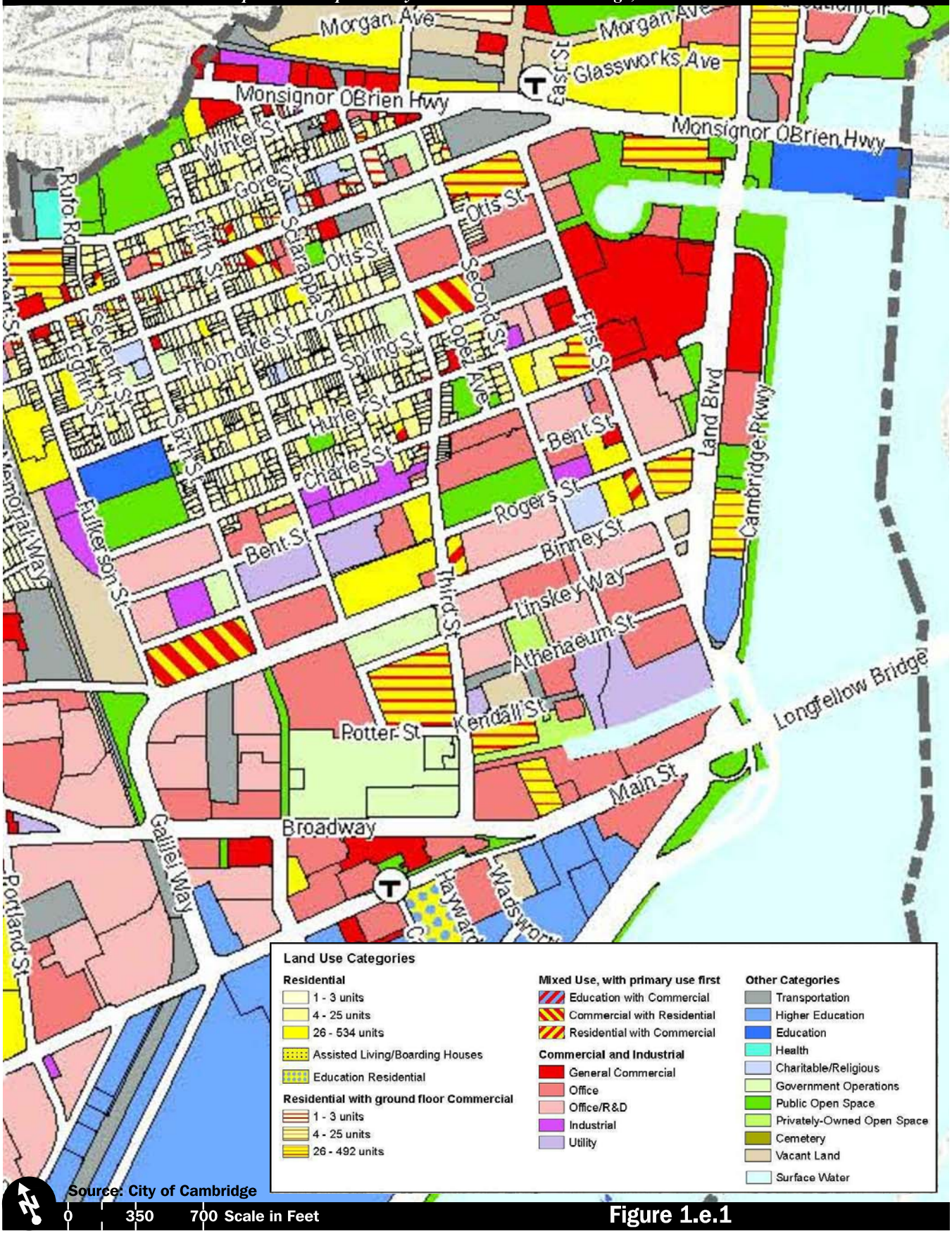
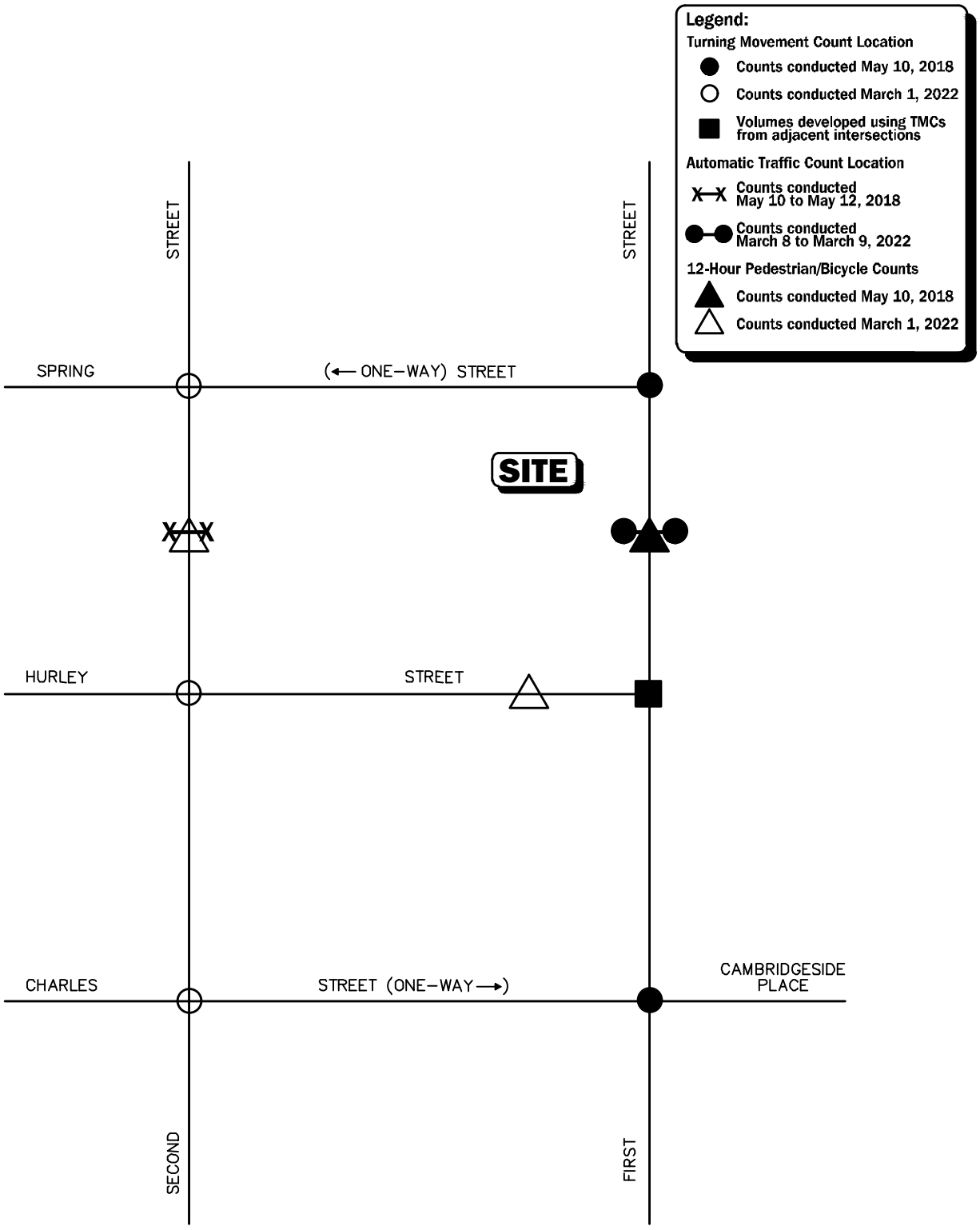


Figure 1.e.1

Land Use Map

Vanasse & Associates inc

R:\9180\9180LANDUSE.dwg, 3/7/2022 3:13:25 PM

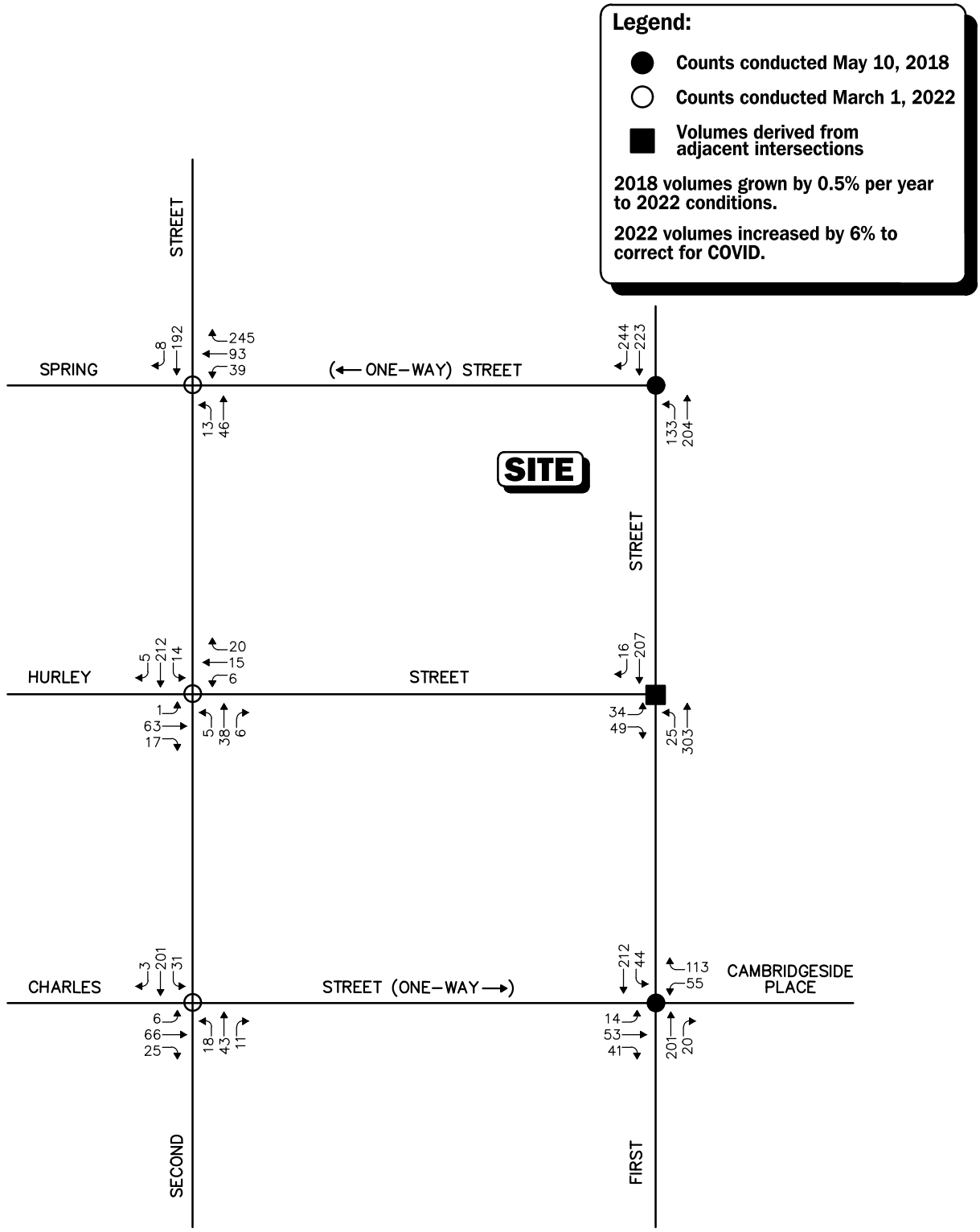


Not To Scale

Figure 2.a.1

Count Location Map

Vanasse & Associates inc



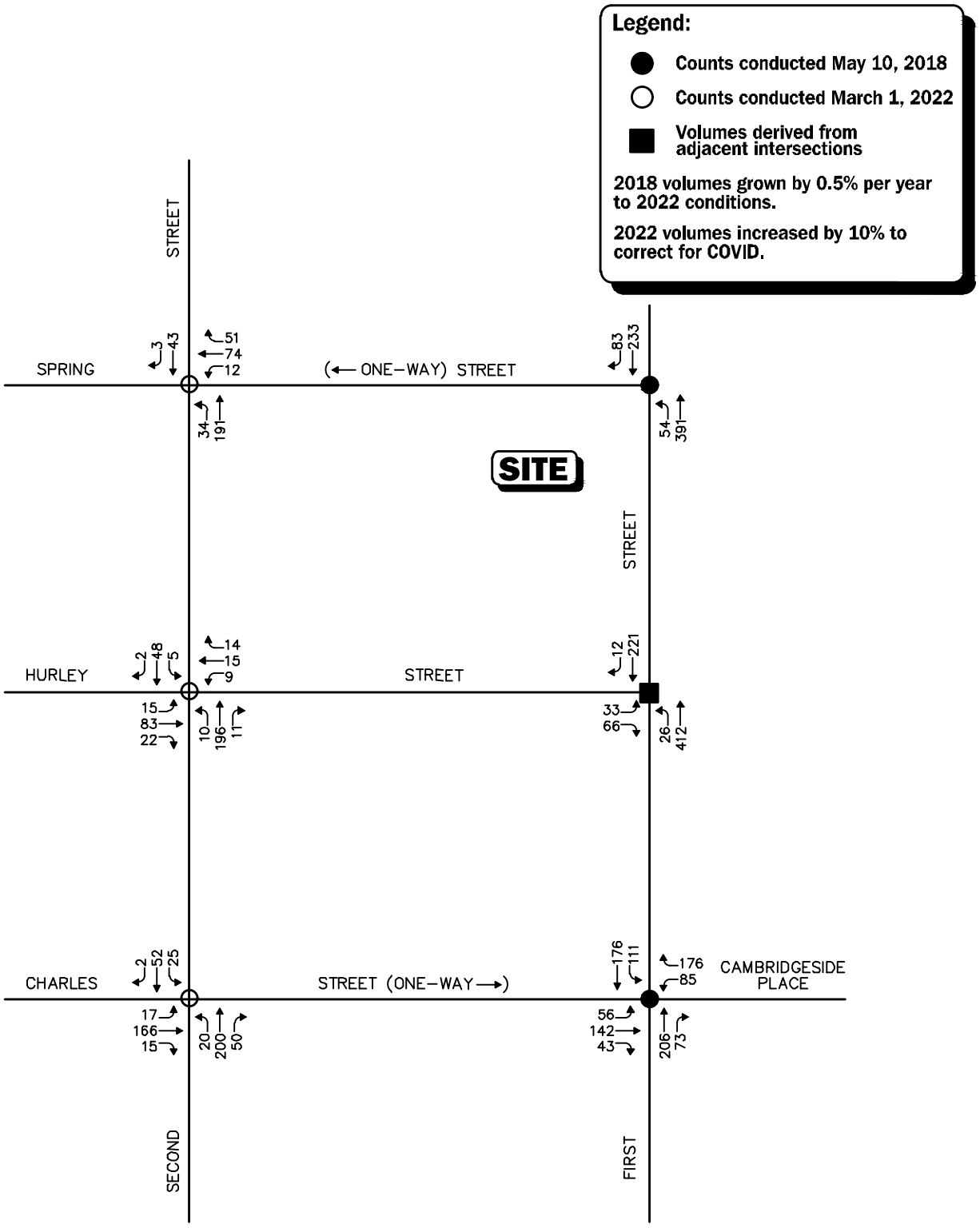
Not To Scale

Figure 2.c.1

2022 Baseline
Weekday Morning
Peak-Hour Traffic Volumes

Vanasse & Associates inc

R:\9180\MARCH 2022\9180NT1.dwg, 4/27/2022 11:39:03 AM

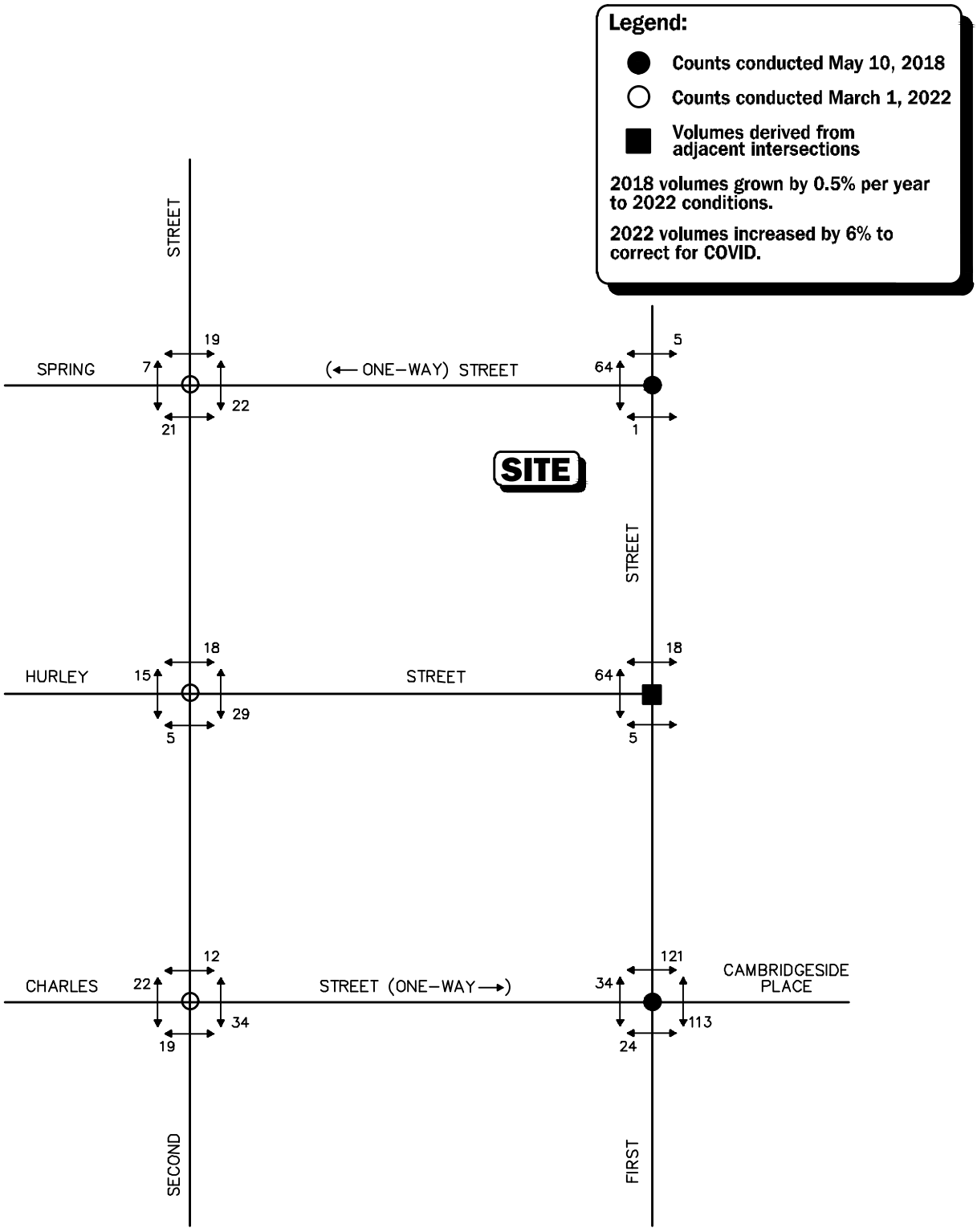


Not To Scale

Figure 2.c.2

2022 Baseline
Weekday Evening
Peak-Hour Traffic Volumes

Vanasse & Associates inc

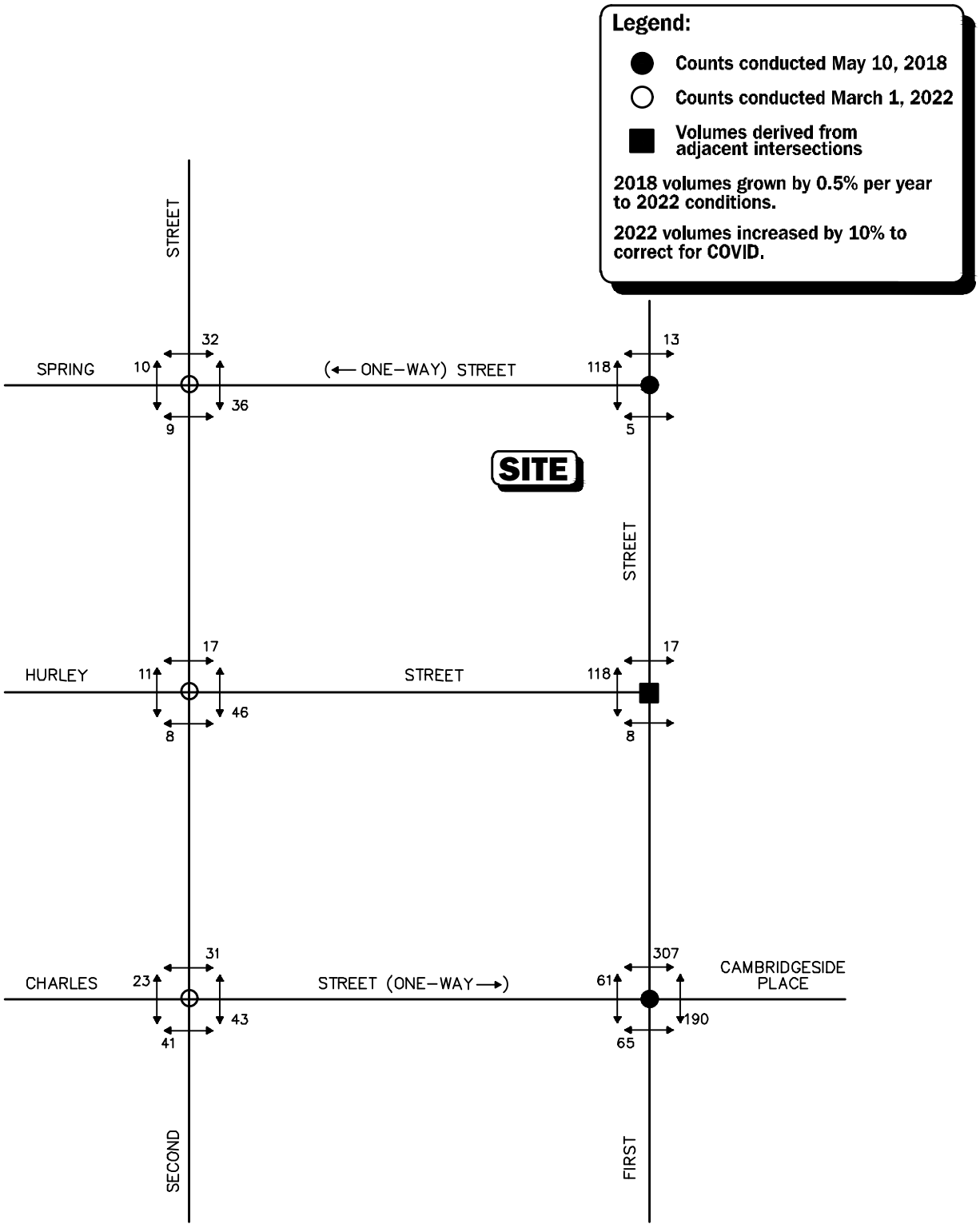


Not To Scale

Figure 2.c.3

2022 Baseline
Weekday Morning
Peak-Hour Pedestrian Volumes

Vanasse & Associates inc

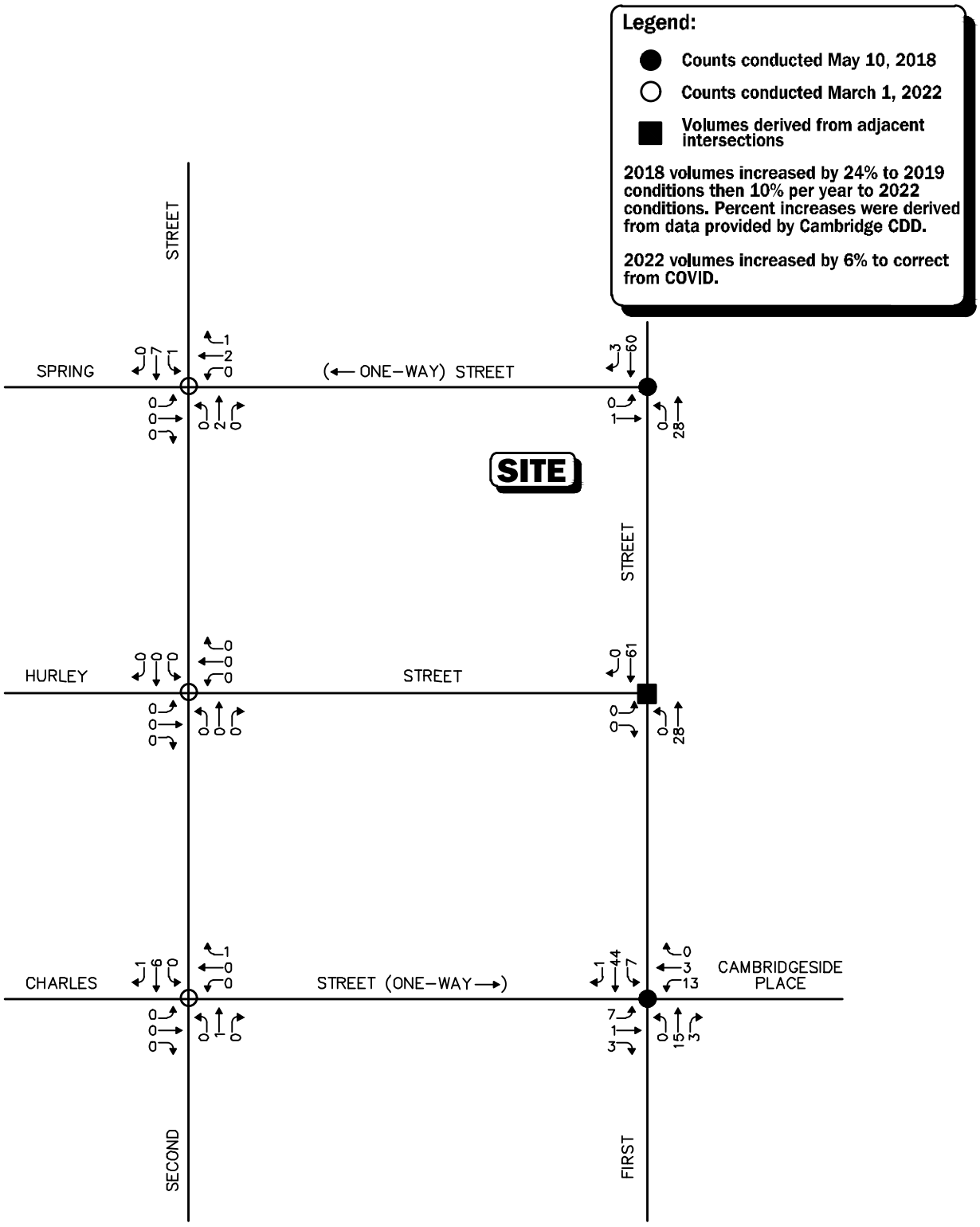


Not To Scale

Figure 2.c.4

2022 Baseline
Weekday Evening
Peak-Hour Pedestrian Volumes

Vanasse & Associates inc

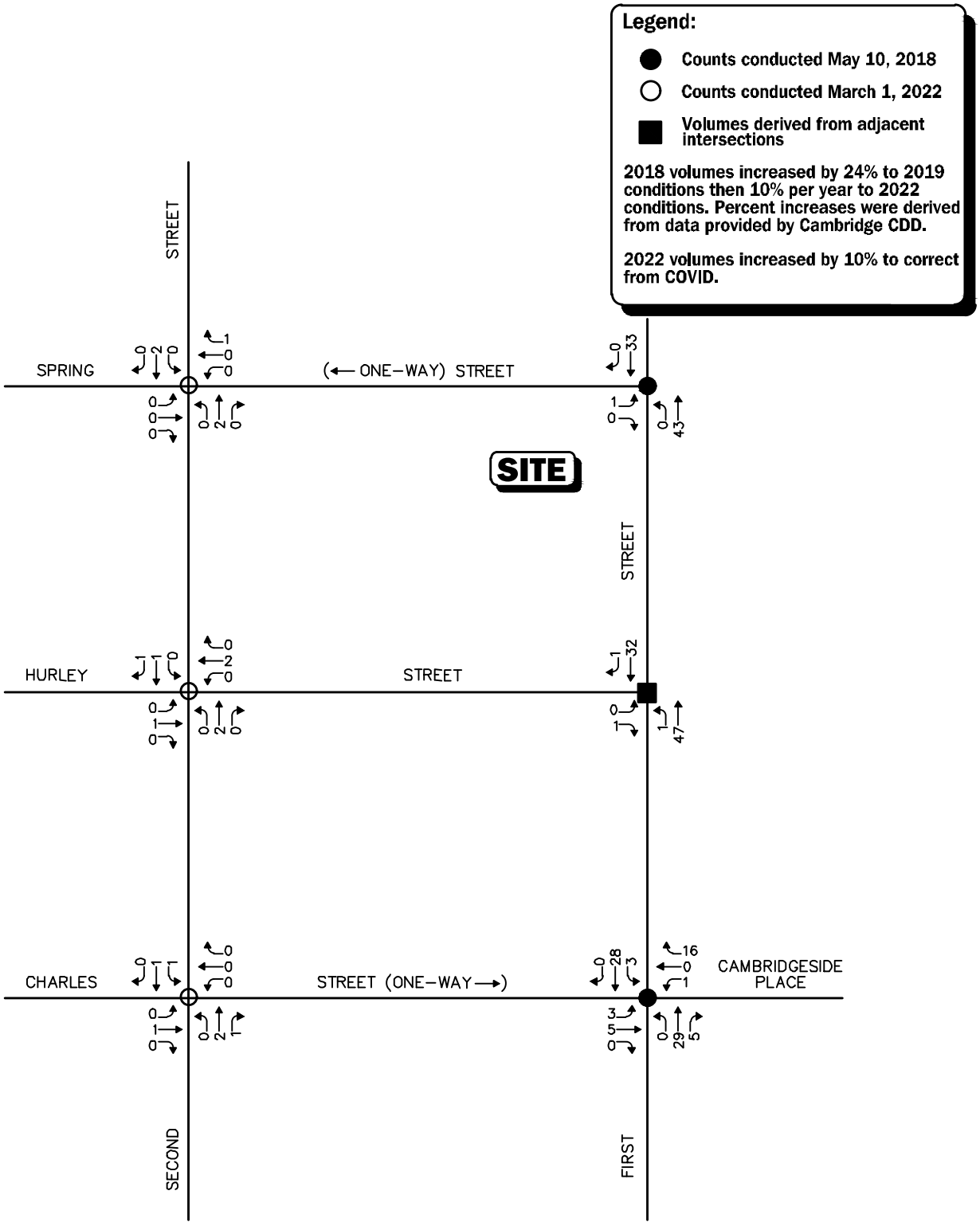


Not To Scale

Figure 2.c.5

2022 Baseline
Weekday Morning
Peak-Hour Bicycle Volumes

Vanasse & Associates inc



Not To Scale

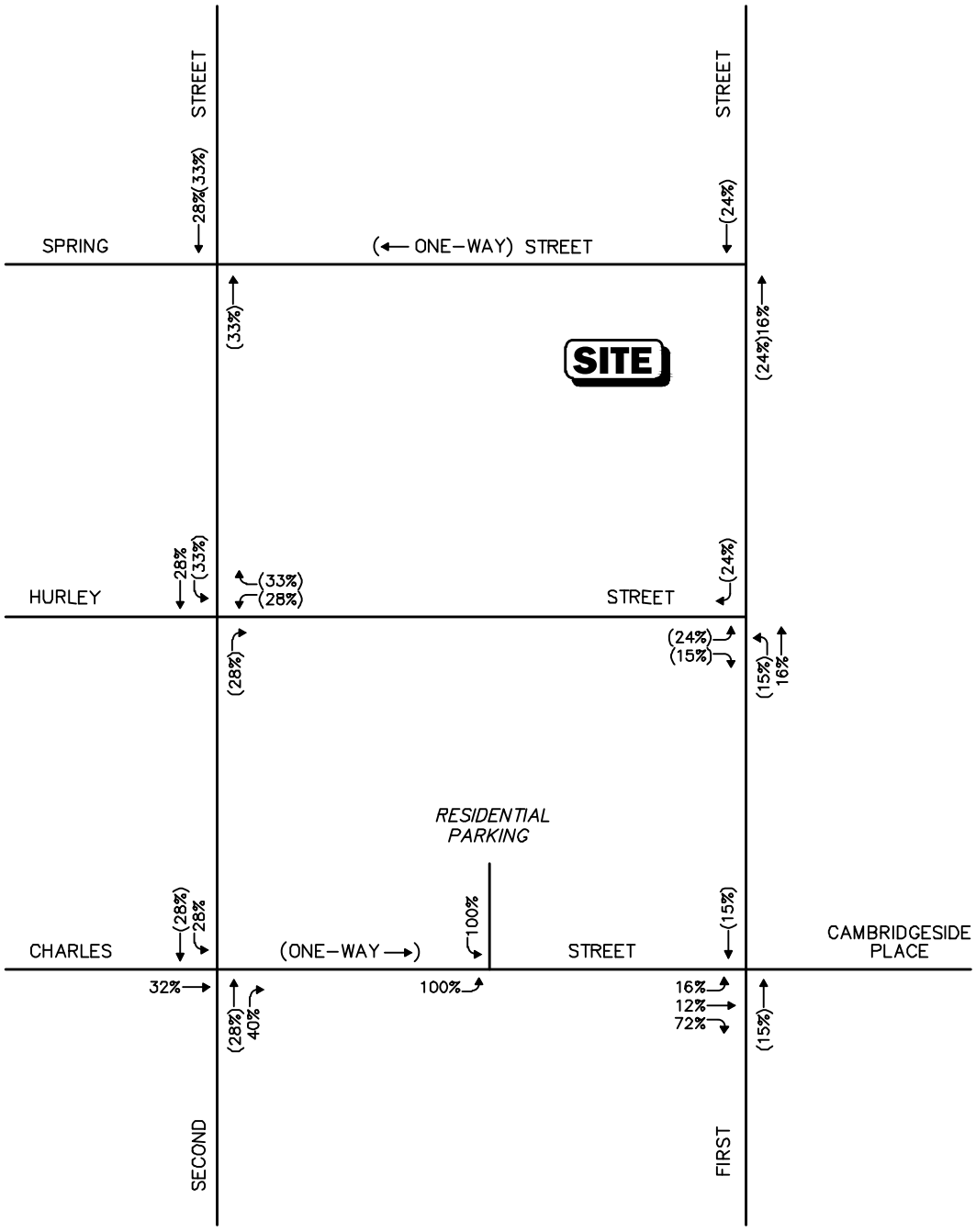
Figure 2.c.6

2022 Baseline
Weekday Evening
Peak-Hour Bicycle Volumes

Vanasse & Associates inc

Legend:

XX	Residential Trips
(XX)	Retail Trips



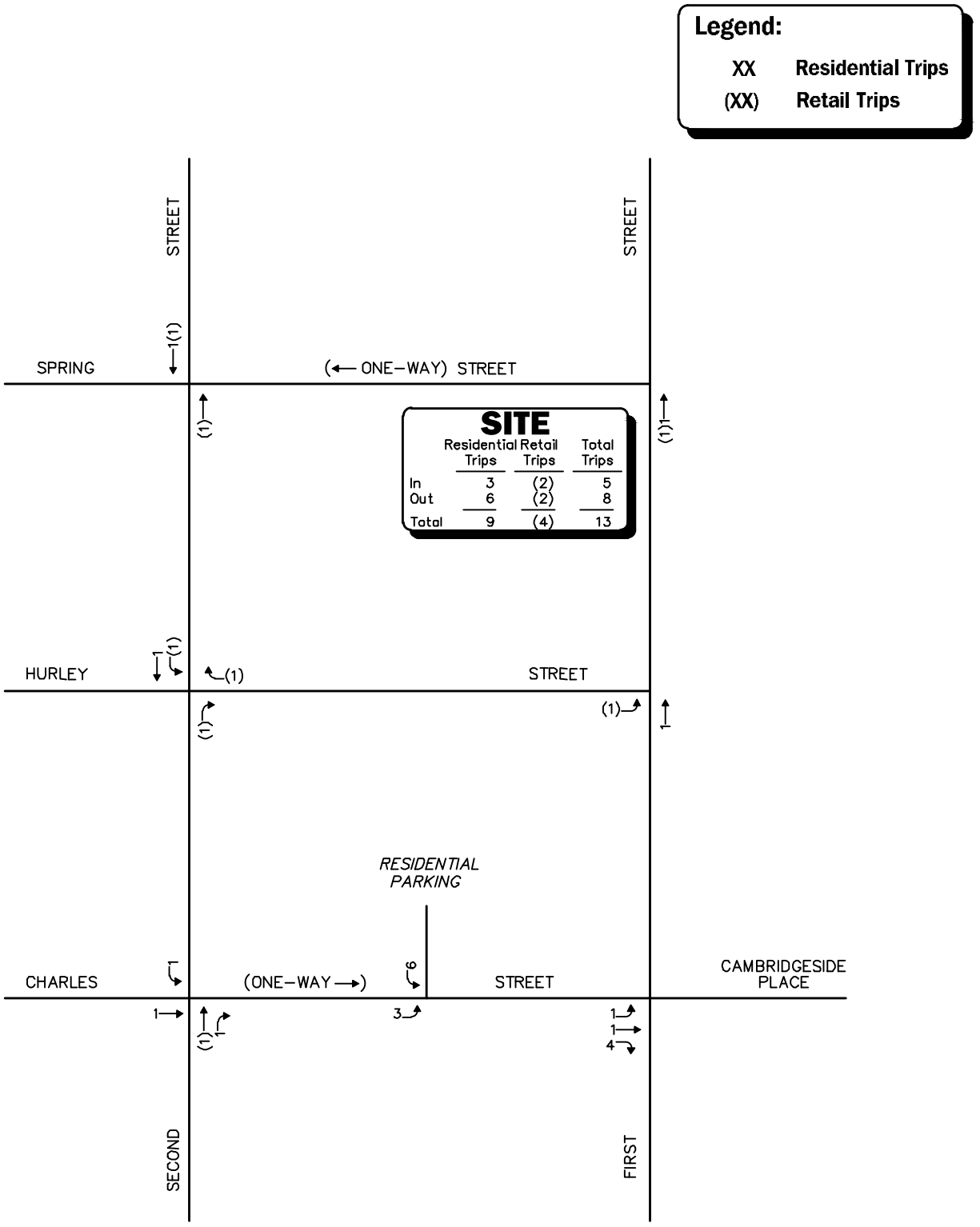
Note: Retail patrons are expected to use on-street parking.

Not To Scale

Figure 3.b.1

Trip Distribution Map

Vanasse & Associates inc



Note: Retail patrons are expected to use on-street parking.

Not To Scale

Figure 3.c.1

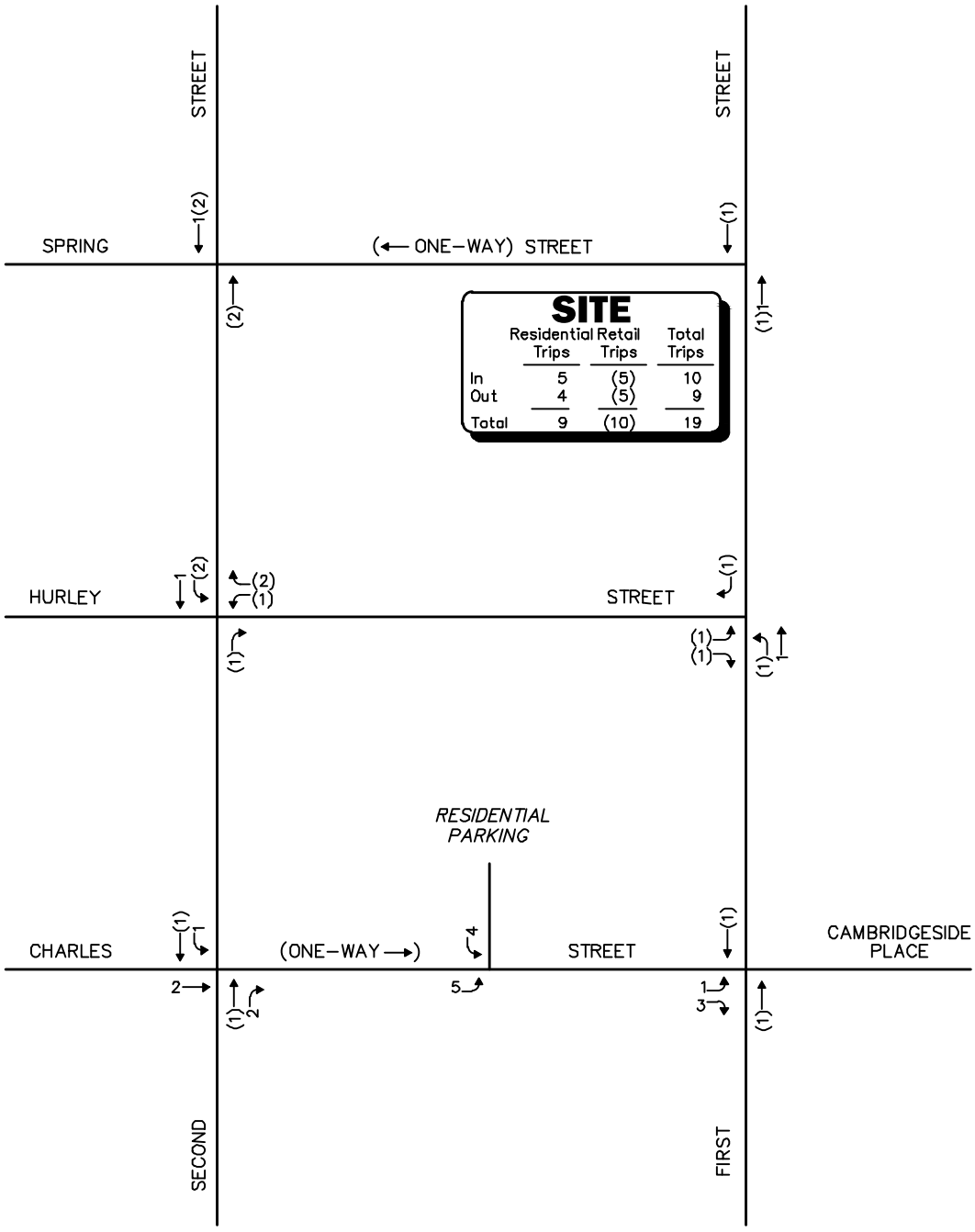
Project-Generated Weekday Morning Peak-Hour Traffic Volumes

Vanasse & Associates inc

Legend:

XX Residential Trips

(XX) Retail Trips



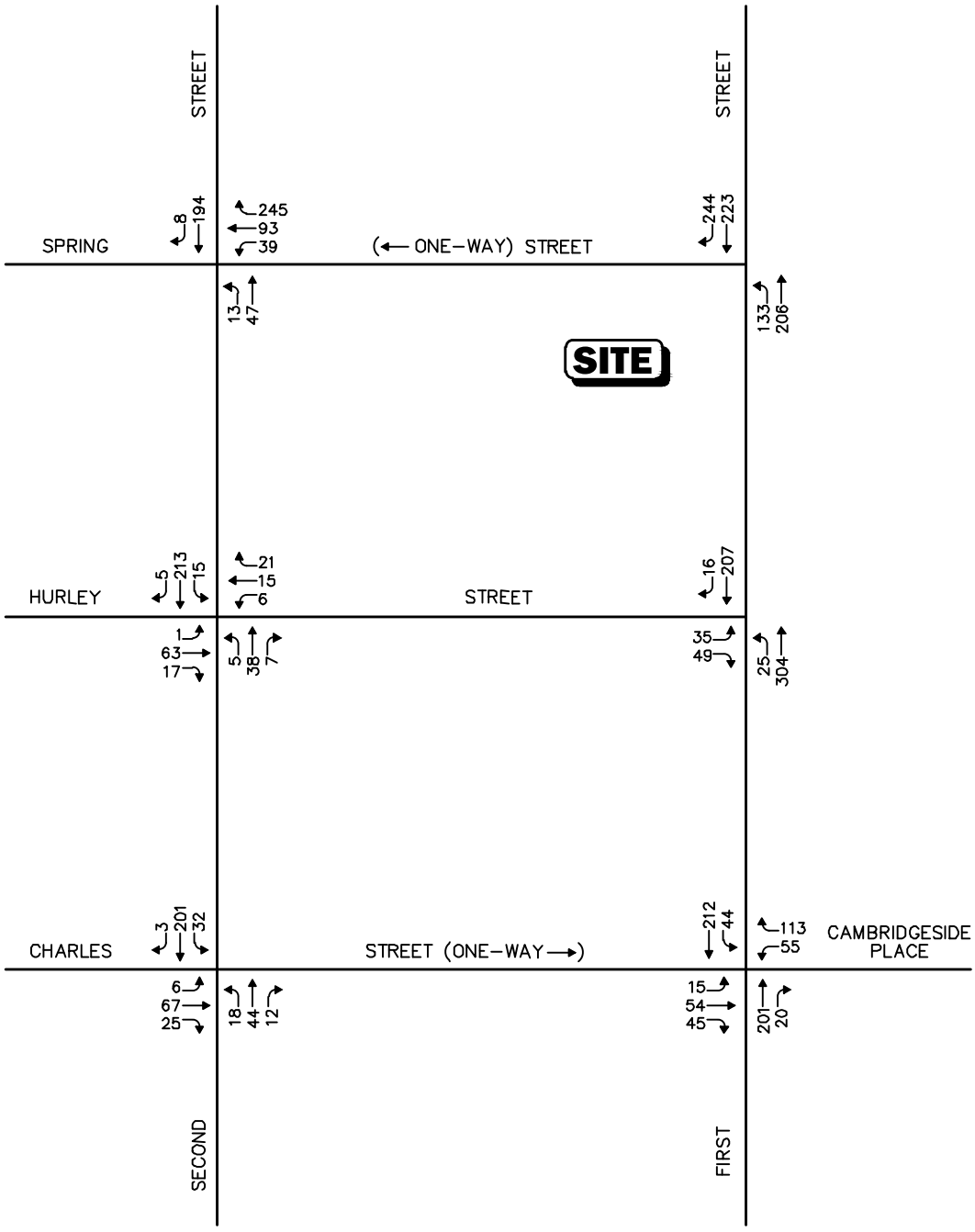
*These retail patrons are expected to use on-street parking.

Not To Scale

Figure 3.c.2

Project-Generated Weekday Evening Peak-Hour Traffic Volumes

Vanasse & Associates inc

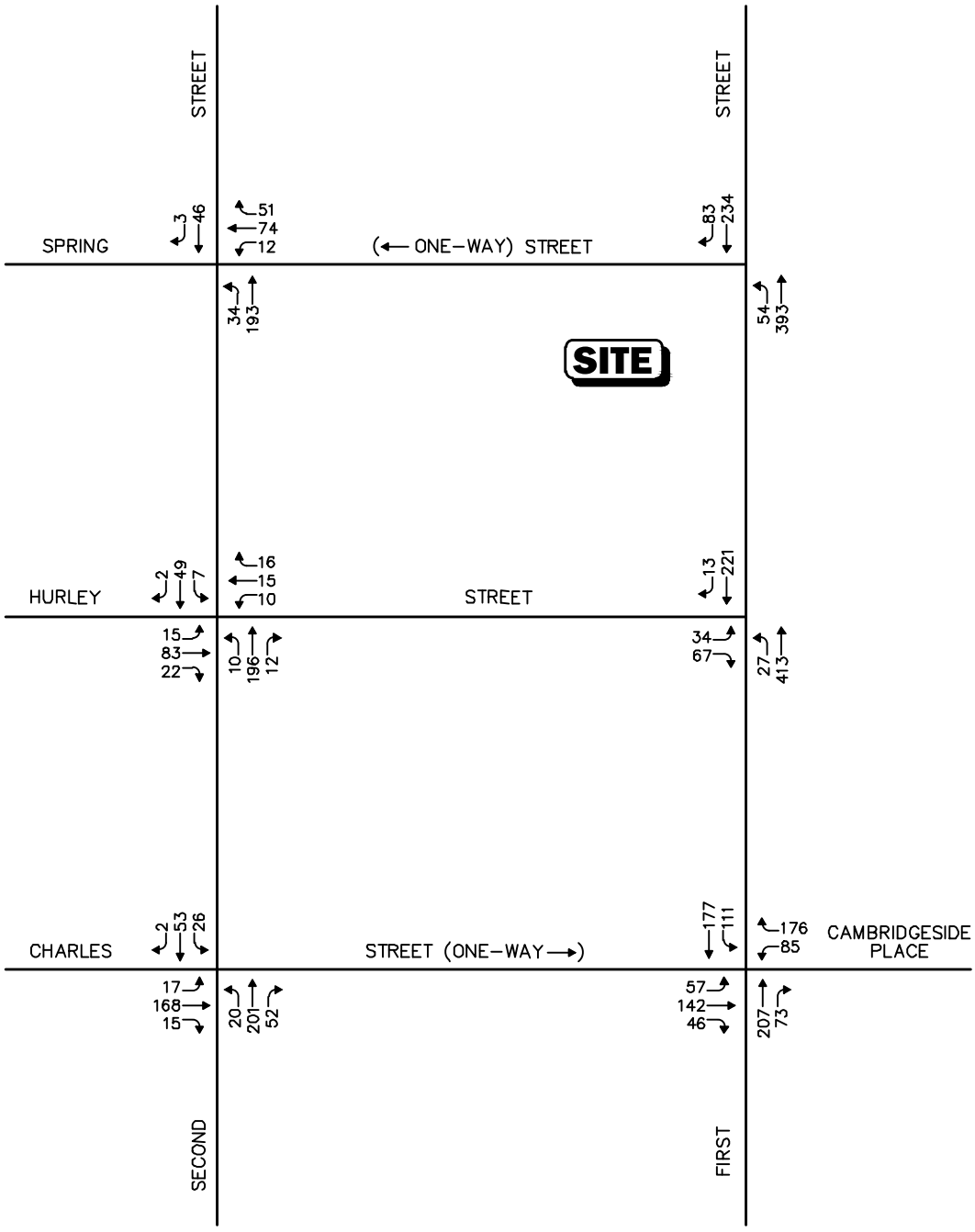


Not To Scale

Figure 5.b.1

2022 Build
Weekday Morning
Peak-Hour Traffic Volumes

Vanasse & Associates inc

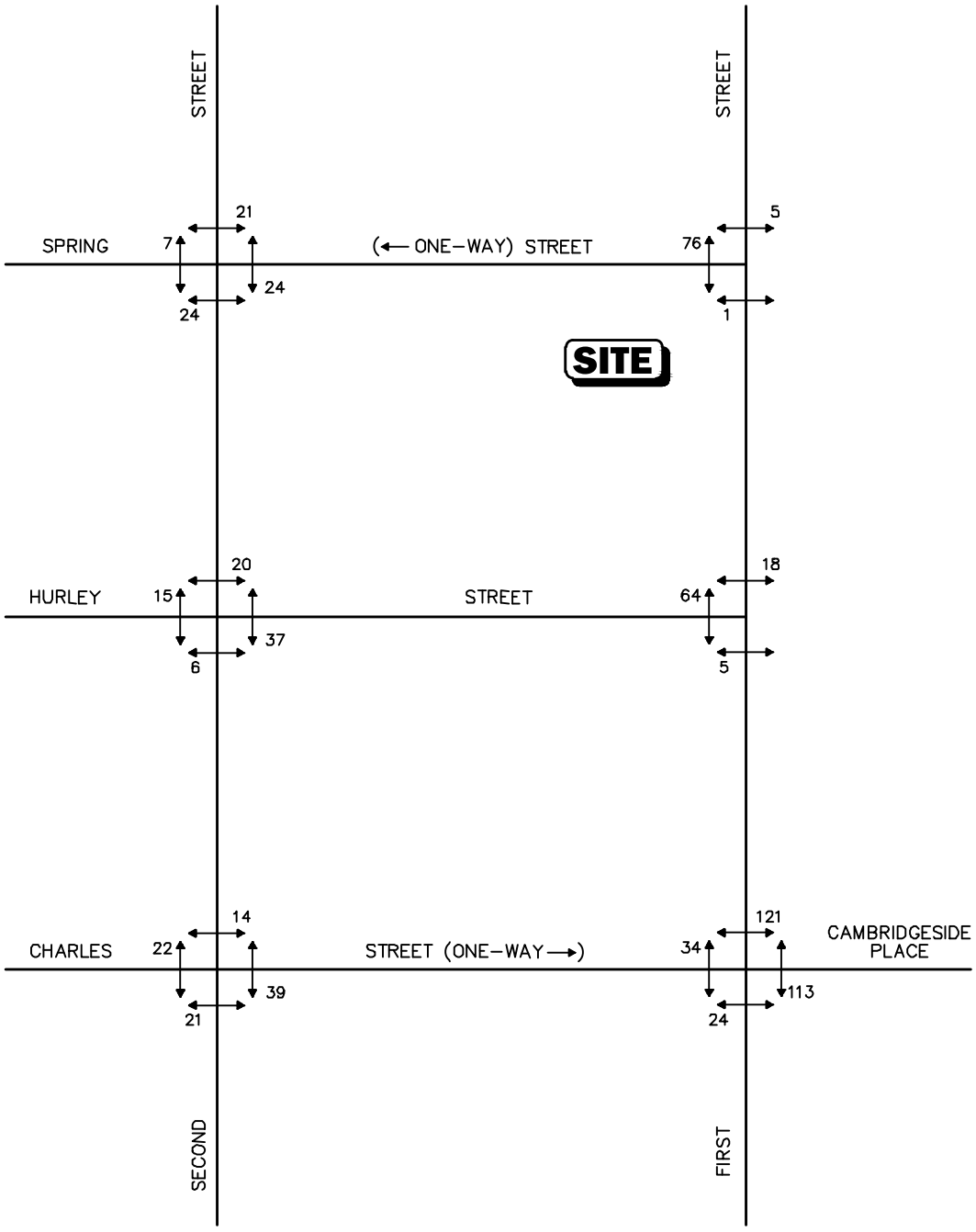


Not To Scale

Figure 5.b.2

2022 Build
Weekday Evening
Peak-Hour Traffic Volumes

Vanasse & Associates inc

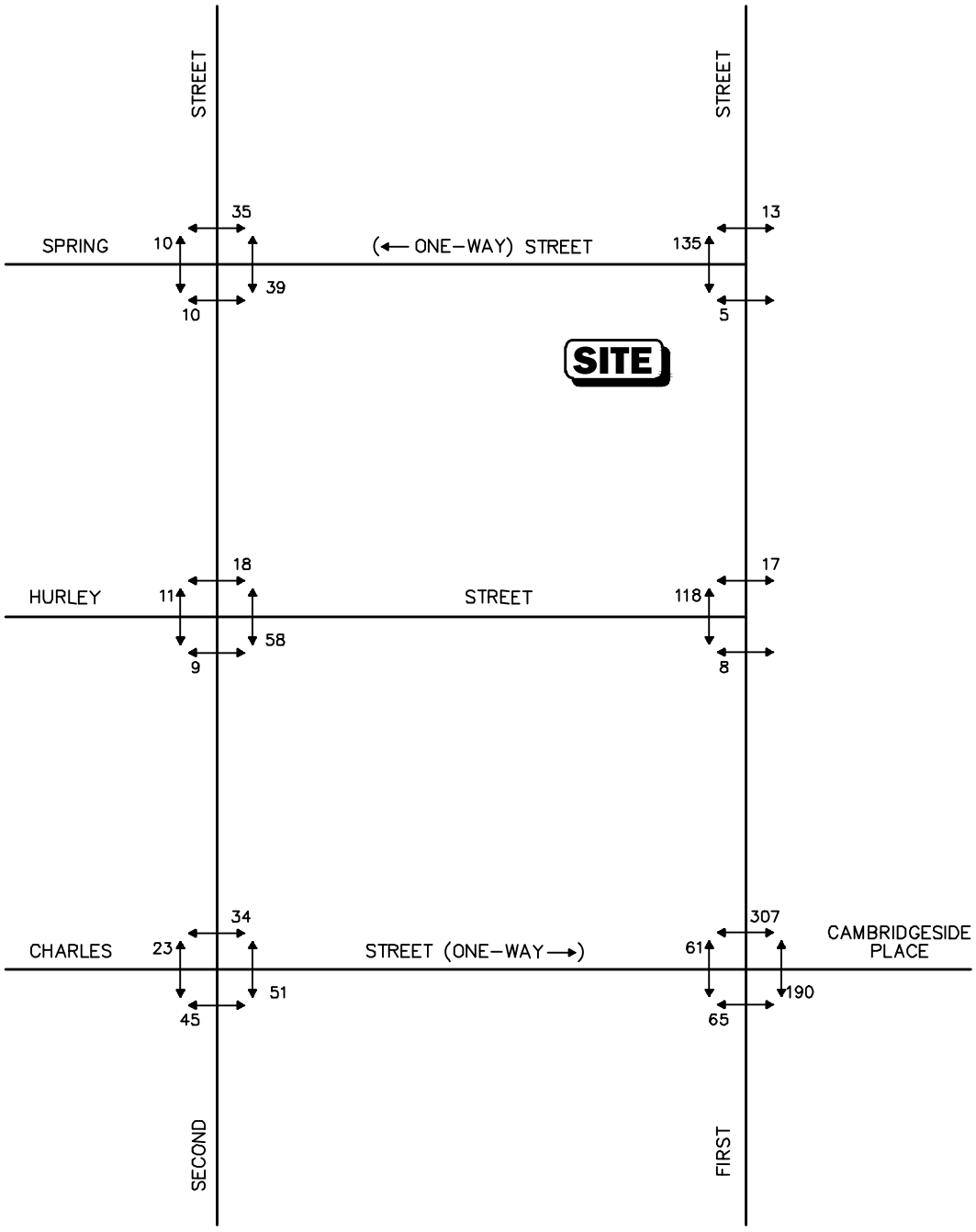


Not To Scale

Figure 5.b.3

2022 Build
Weekday Morning
Peak-Hour Pedestrian Volumes

Vanasse & Associates inc

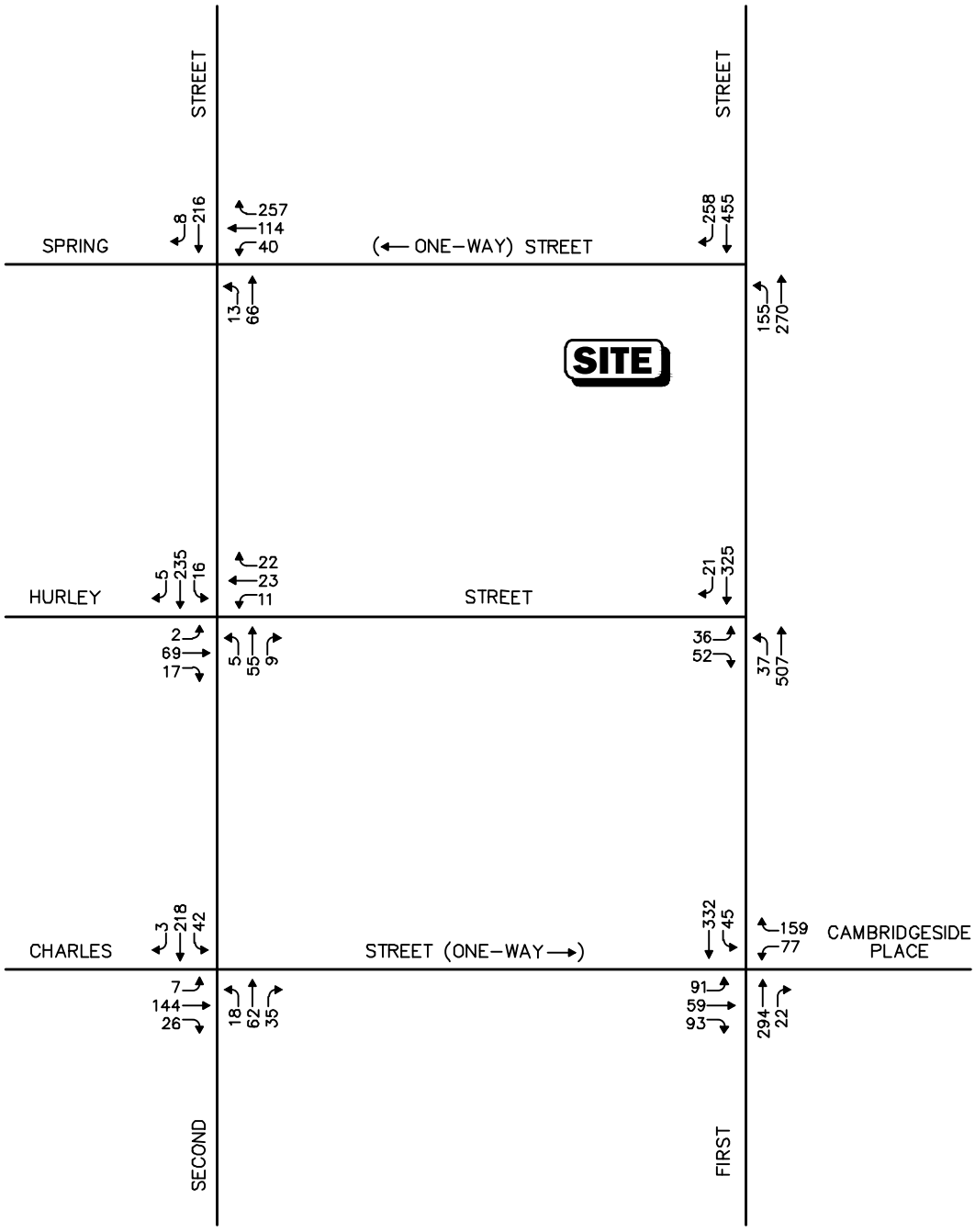


Not To Scale

Figure 5.b.4

2022 Build
Weekday Evening
Peak-Hour Pedestrian Volumes

Vanasse & Associates inc

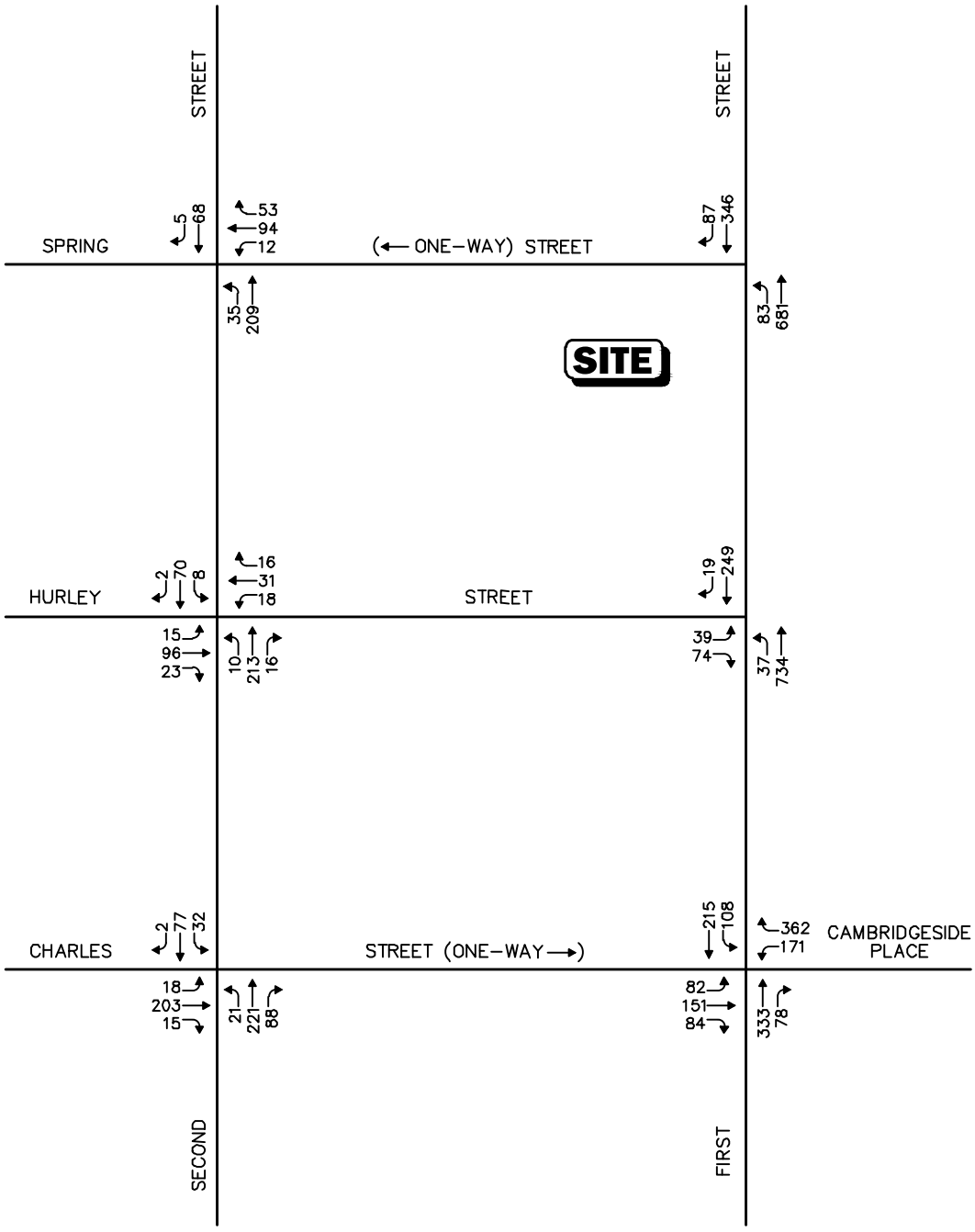


Not To Scale

Figure 5.d.1

2027 Future Weekday Morning Peak-Hour Traffic Volumes

Vanasse & Associates inc

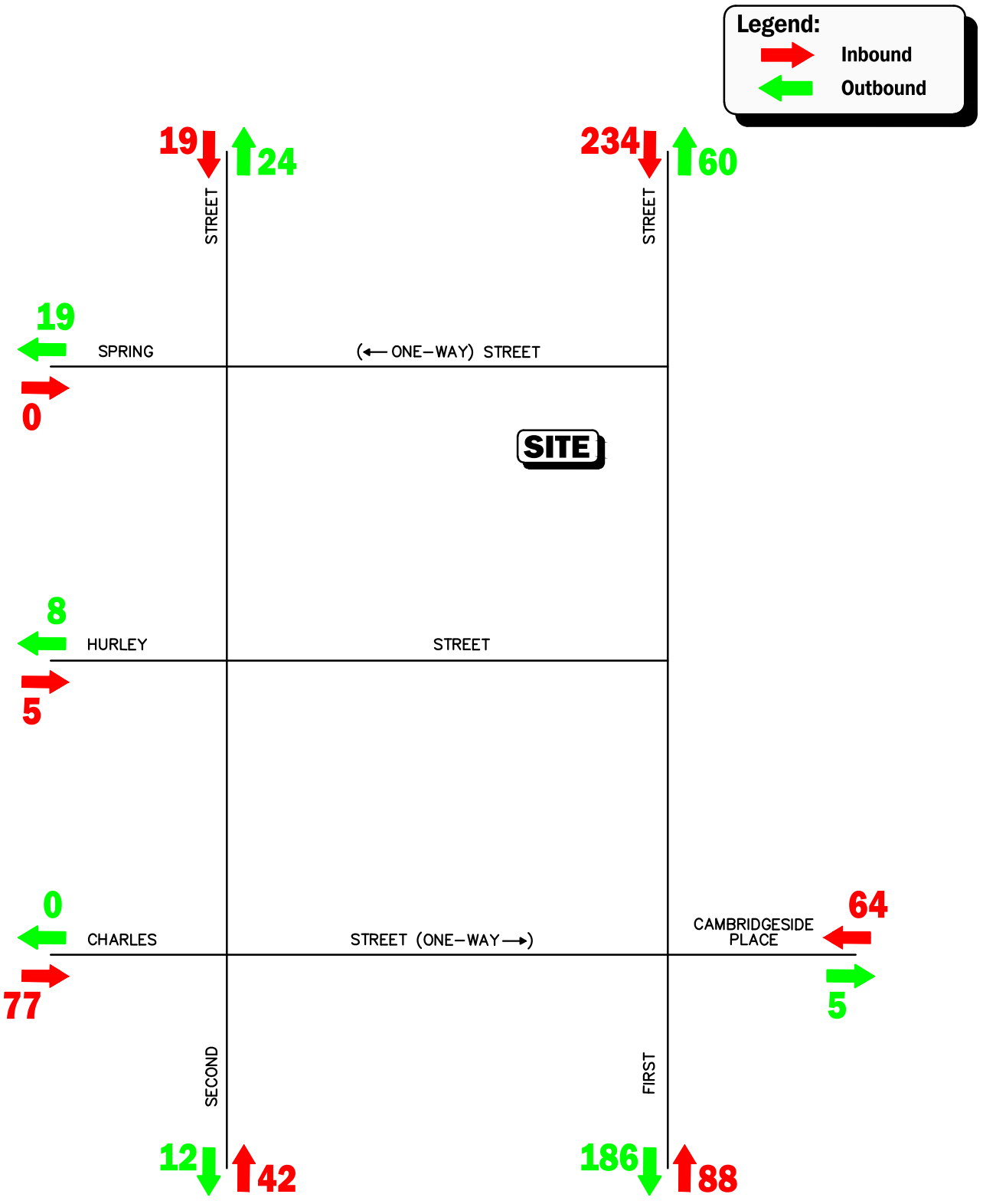


Not To Scale

Figure 5.d.2

2027 Future Weekday Evening Peak-Hour Traffic Volumes

Vanasse & Associates inc

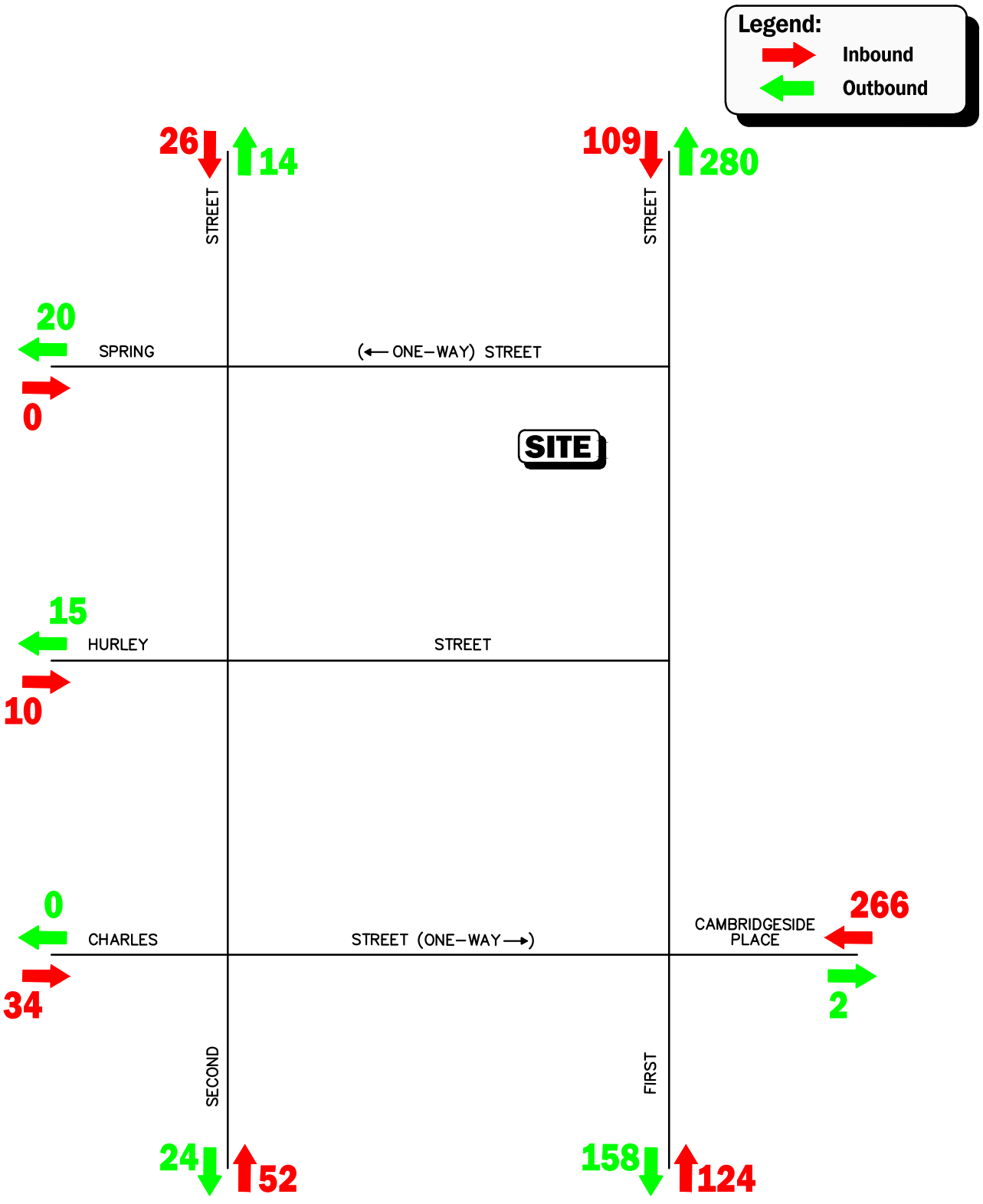


Not To Scale

Figure 5.d.3

Cumulative Area Development Impact Weekday Morning Peak-Hour Traffic Volumes

Vanasse & Associates inc

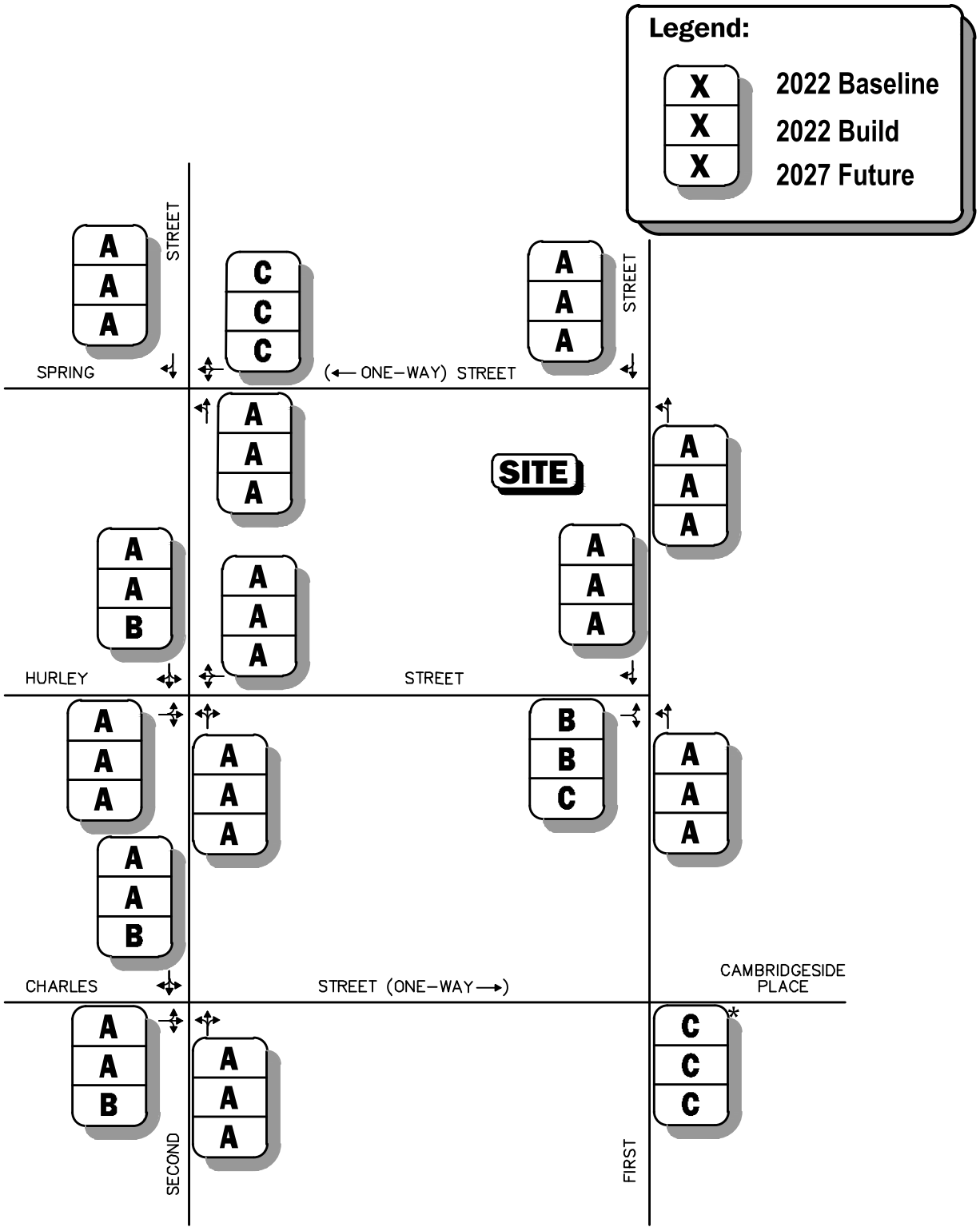


Not To Scale

Figure 5.d.4

Cumulative Area Development Impact
Weekday Evening Peak-Hour Traffic Volumes

Vanasse & Associates inc



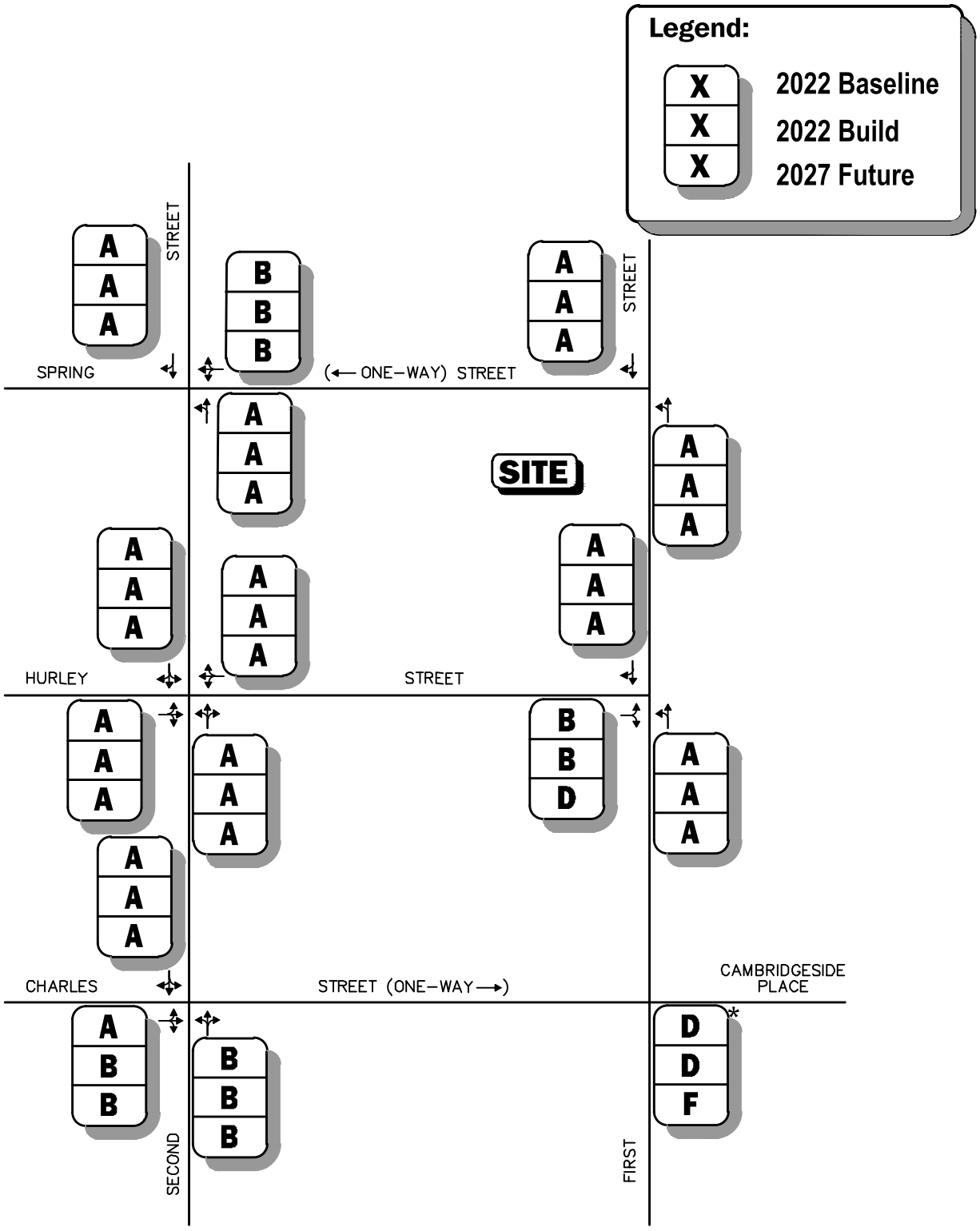
*Overall intersection level of service.

Not To Scale

Figure 6.a.1

Vehicle Level-of-Service Map
Weekday Morning
Peak-Hour Traffic Volumes

Vanasse & Associates inc



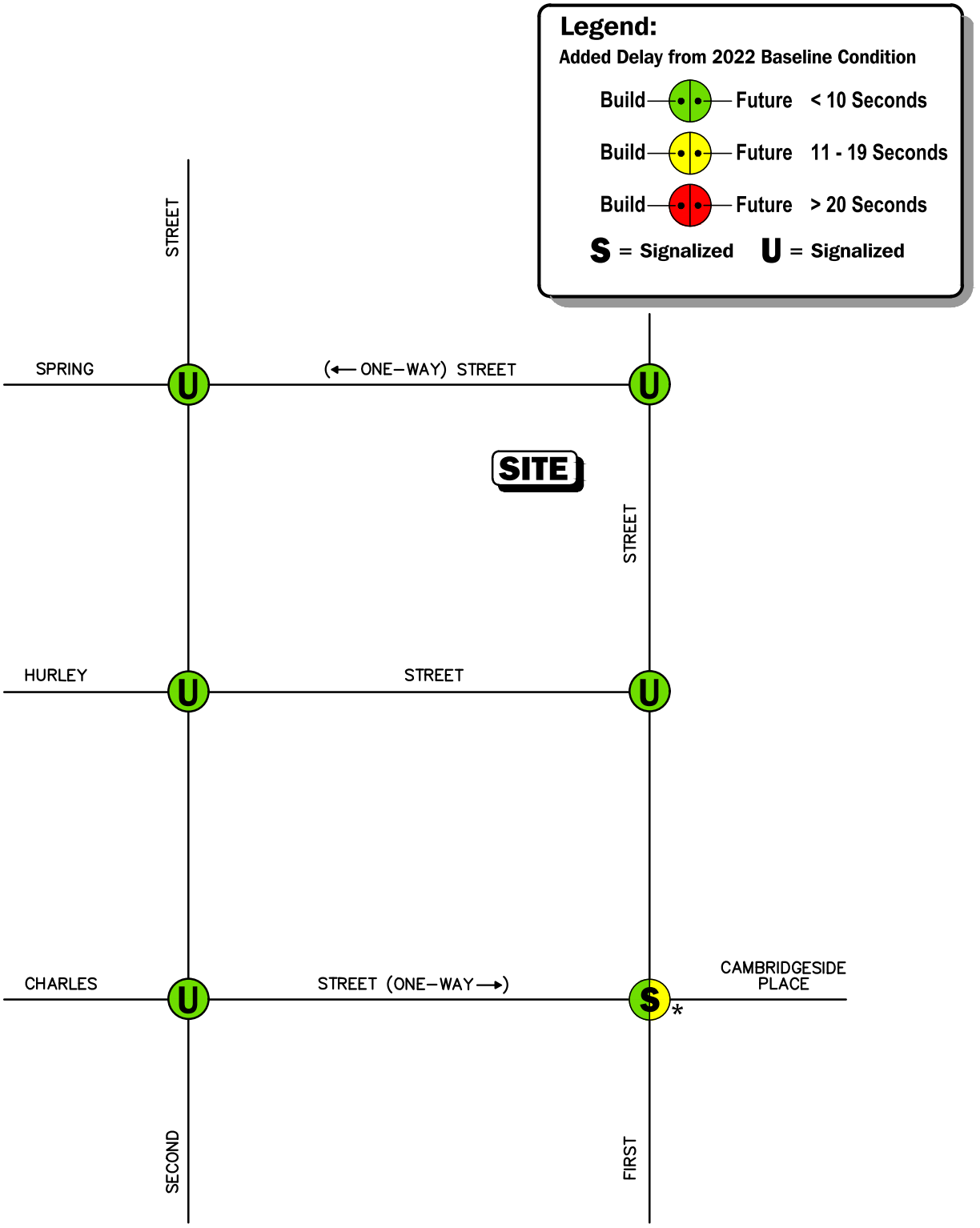
*Overall intersection level of service.

Not To Scale

Figure 6.a.2

Vehicle Level-of-Service Map
Weekday Evening
Peak-Hour Traffic Volumes

Vanasse & Associates inc



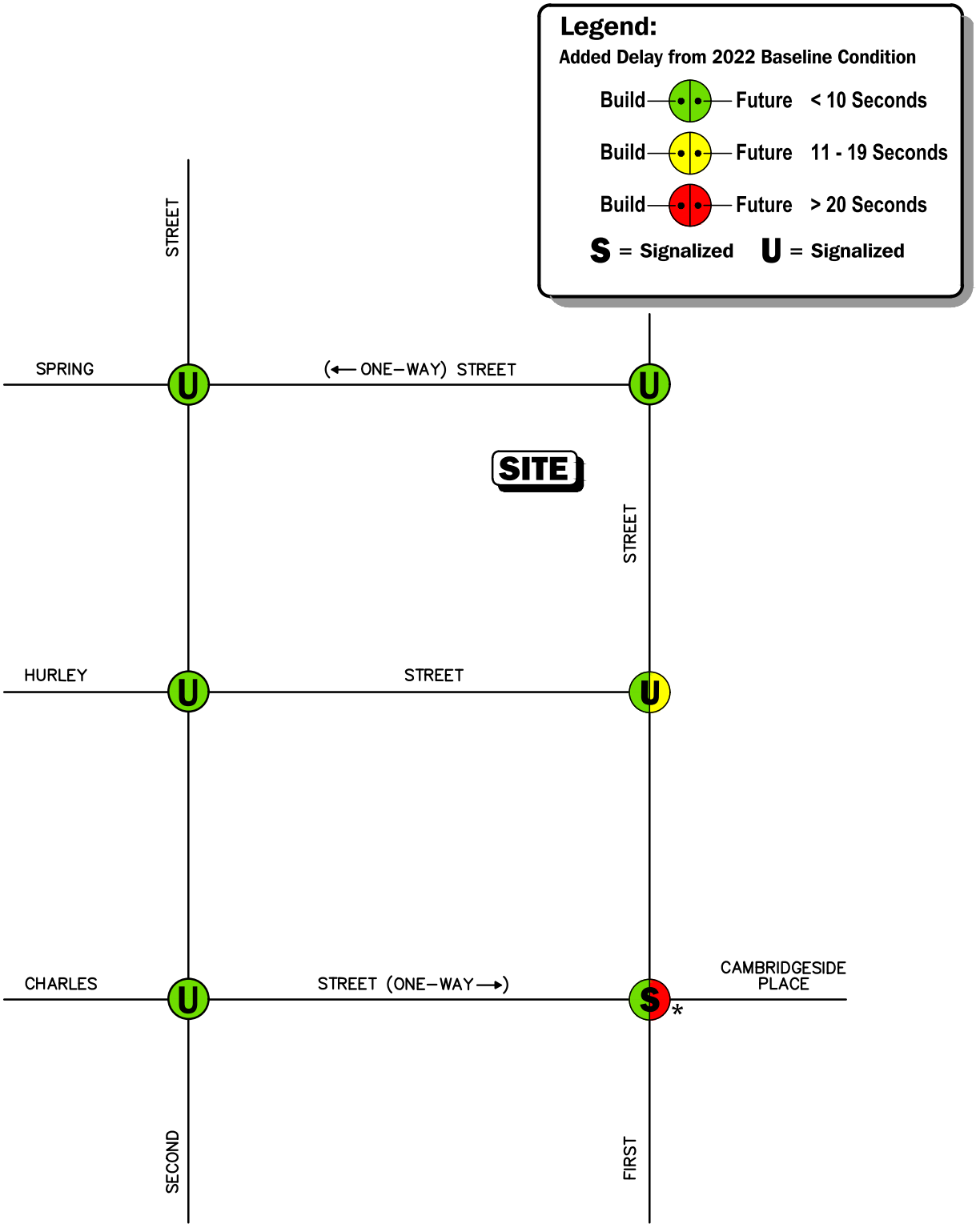
*Shows overall intersection delay increases. All other intersections show critical movement delay increases.

Not To Scale

Figure 6.a.3

Vanasse & Associates inc

Vehicle Delay Change Map
Weekday Morning
Peak-Hour Traffic Volumes



*Shows overall intersection delay increases. All other intersections show critical movement delay increases.

Not To Scale

Figure 6.a.4

Vanasse & Associates inc

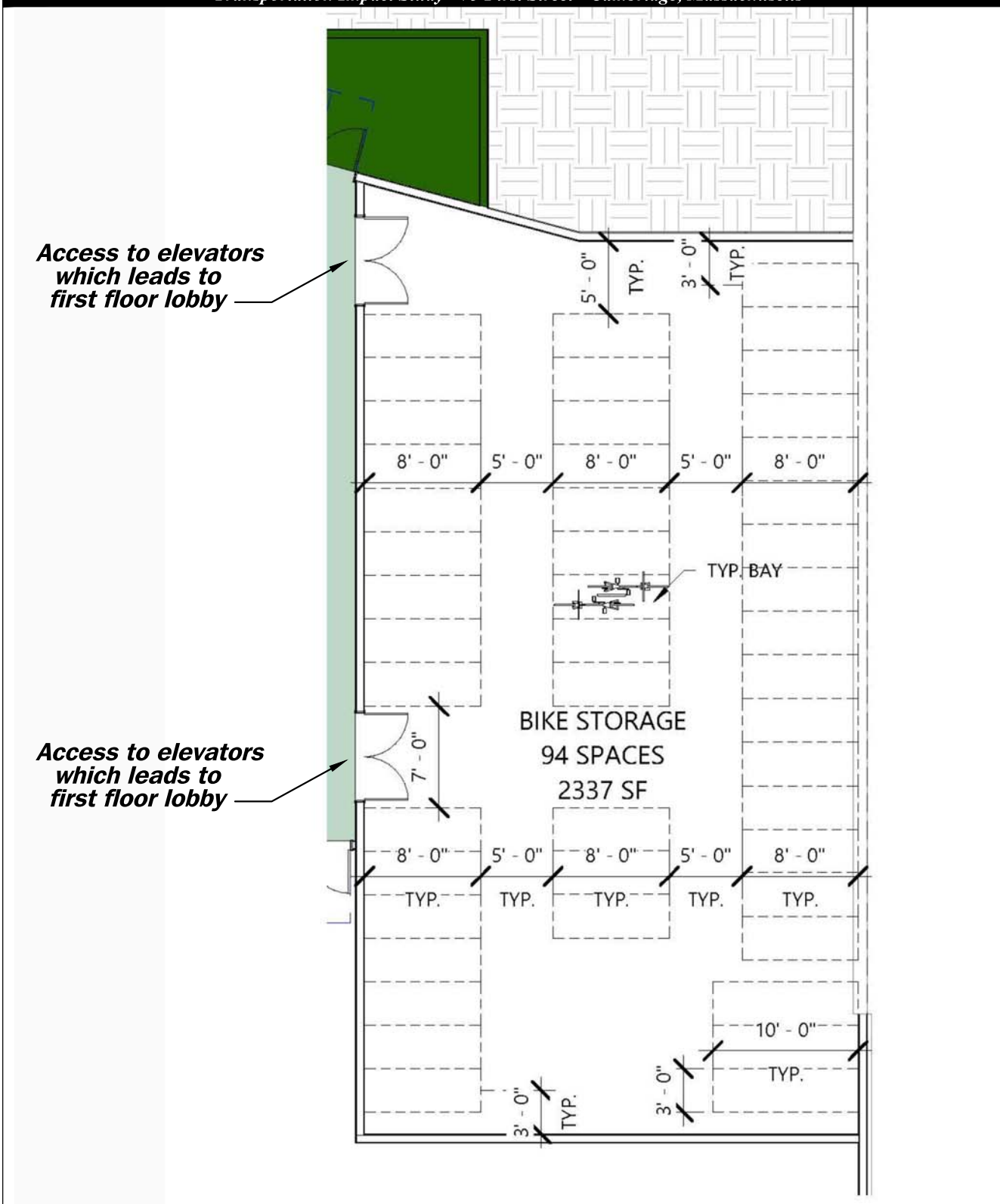
Vehicle Delay Change Map
Weekday Evening
Peak-Hour Traffic Volumes

Figure 9.a.1

Pedestrian Path from 107 First Street Garage to Project Site

Vanasse & Associates inc

R:\9180\September 2022\9180PEDPATH.dwg, 9/21/2022 9:57:10 AM



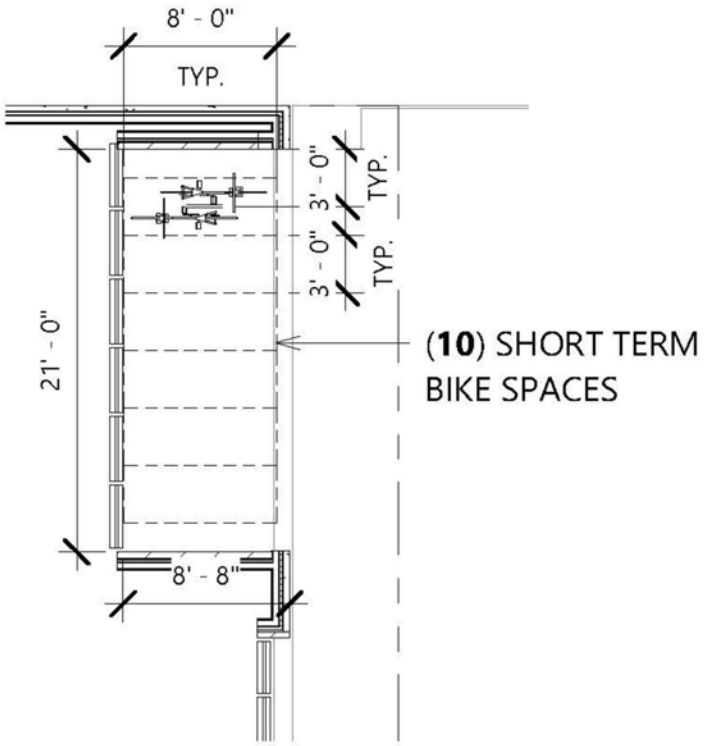
Source: DMS Design, LLC

0 5 10 Scale in Feet

Figure 9.d.1

Long-Term Bicycle Storage

Vanasse & Associates inc



2 FIRST FLOOR - SHORT TERM BIKE
1" = 10'-0"

Source: DMS Design, LLC

0 5 10 Scale in Feet

Figure 9.d.2

Short-Term Bicycle Storage

Vanasse & Associates inc

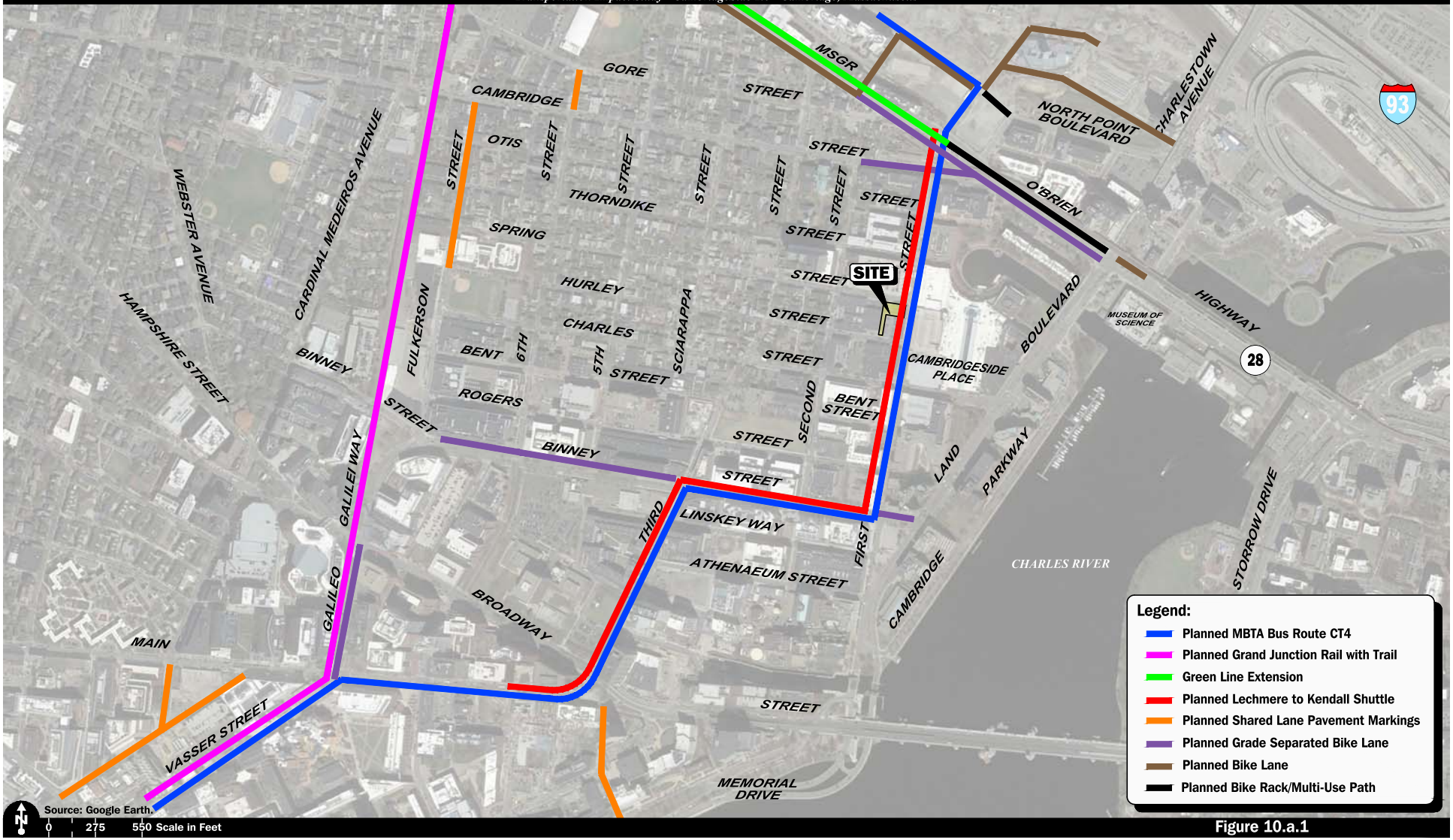
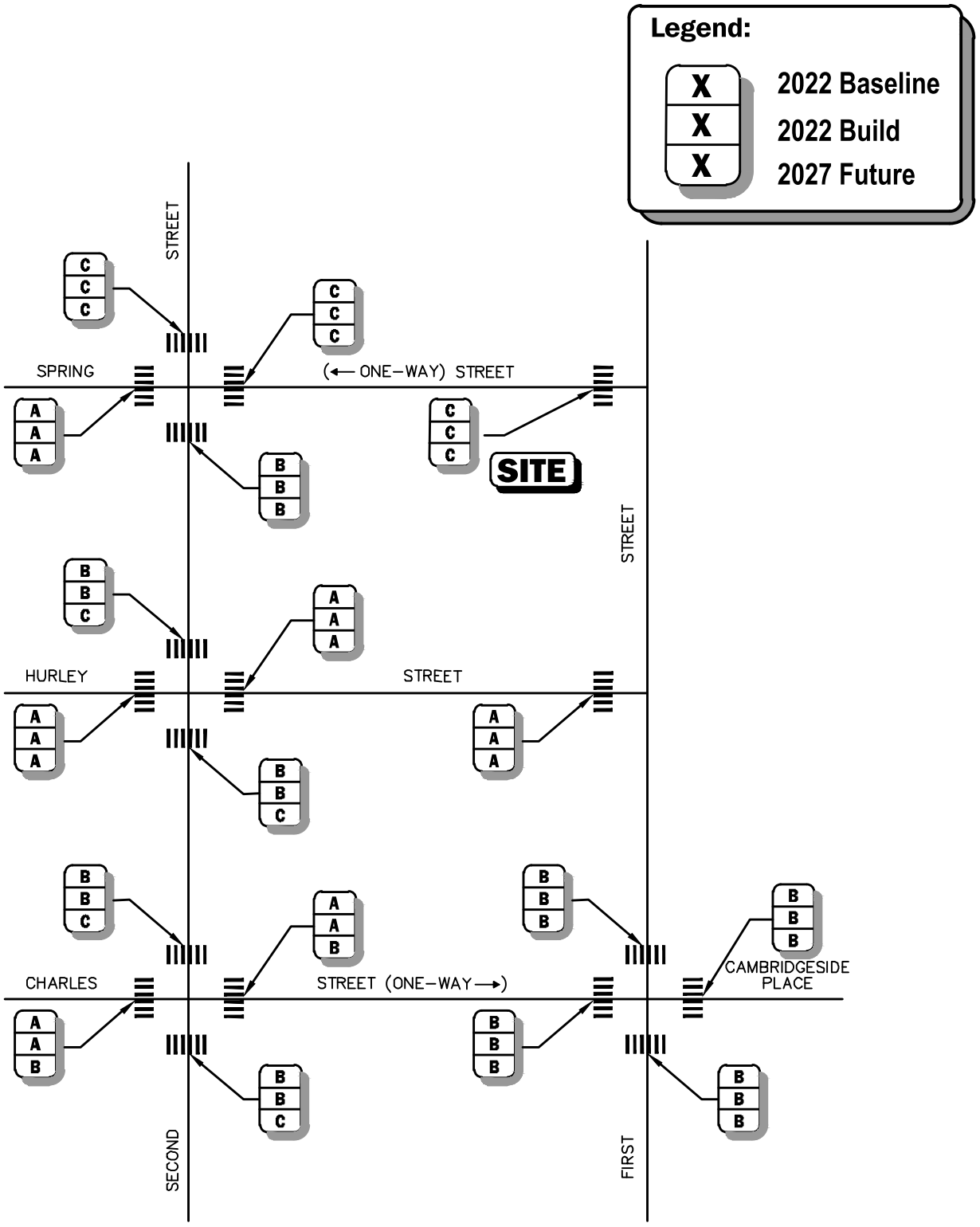


Figure 10.a.1

Future Transit, Pedestrian, and Bicycle Facilities

Vanasse & Associates inc

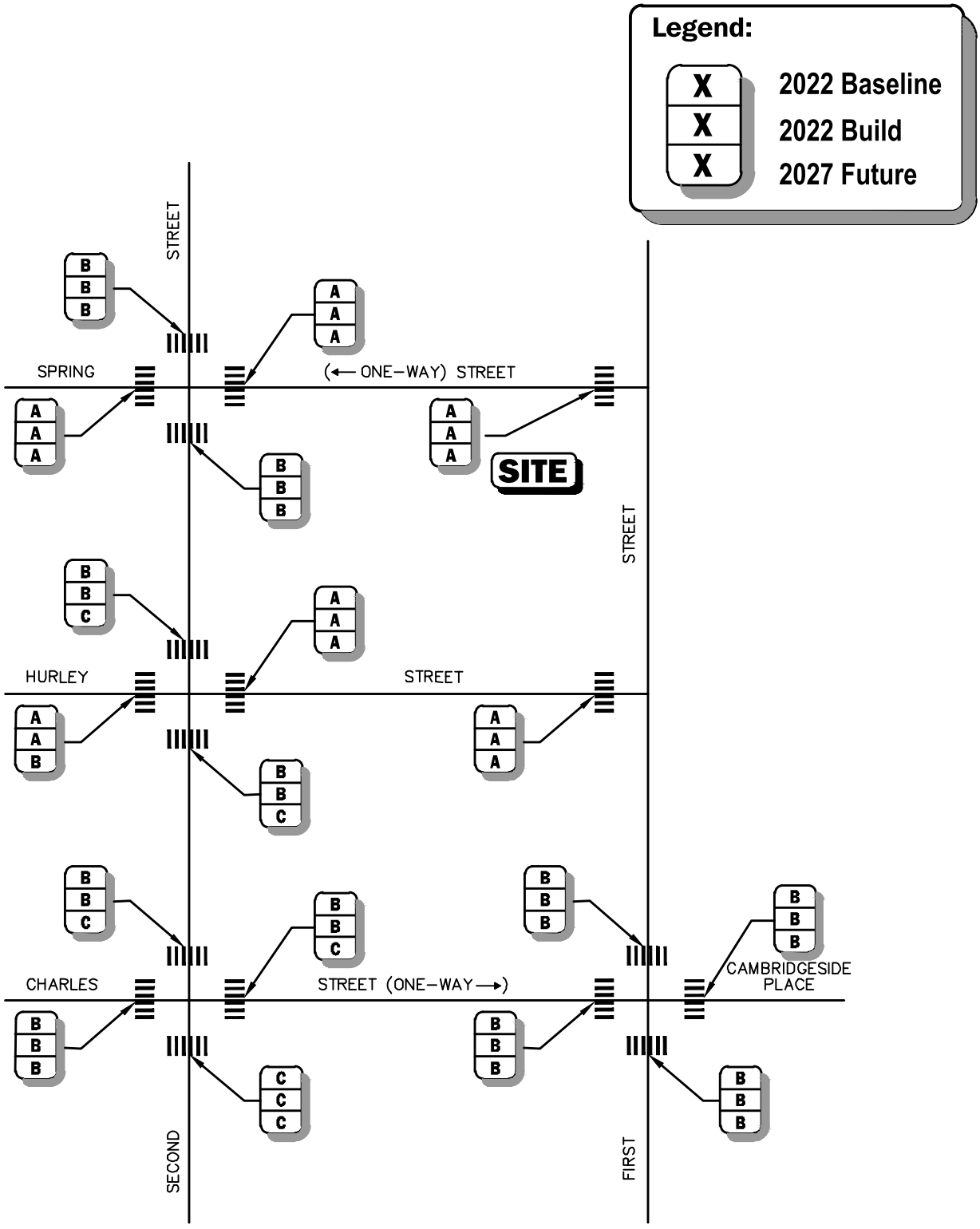


Not To Scale

Figure 11.a.1

Pedestrian Level-of-Service Map
Weekday Morning
Peak-Hour Traffic Volumes

Vanasse & Associates inc



Not To Scale

Figure 11.a.2

Pedestrian Level-of-Service Map
Weekday Evening
Peak-Hour Traffic Volumes

Vanasse & Associates inc