MIT VOLPE REDEVELOPMENT PLAN

Special Permit Volume 4

Planning Board Number - PB368

February 3, 2021

Submitted to:
City of Cambridge

Submitted by:
Massachusetts Institute of Technology (MIT)

MITIMCo
Owner/ Project Proponent

Redgate
Project Management

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Landscape Architect

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Galluccio & Watson
Legal

Graffito SP
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VHB
Transportation Engineering

VHB
Civil Engineering

Atelier Ten
Sustainability Consultant

Buro Happold
M/E/P Engineering

McPhail Associates
Geo-Techical/ Geo-Environmental

Theater Consultants Collaborative
Webb Management
Entertainment Consultant

RWDI Consulting Engineers
Wind Consultant

VHB
Surveyor

Jensen Hughes
Code Consultant

Acentech
Acoustical Engineering

John Moriarty & Associates
PreConstruction Services

Solomon McCown & Cence
Communications

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H.
TRANSPORTATION IMPACT STUDY

Volpe Exchange Parcel

Cambridge, Massachusetts

PREPARED FOR

/ Massachusetts Institute of Technology (MIT)

PREPARED BY

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October 22, 2020

UNDER THE DIRECTION OF

Selma Mandzo-Preldzic, P.E., LEED AP
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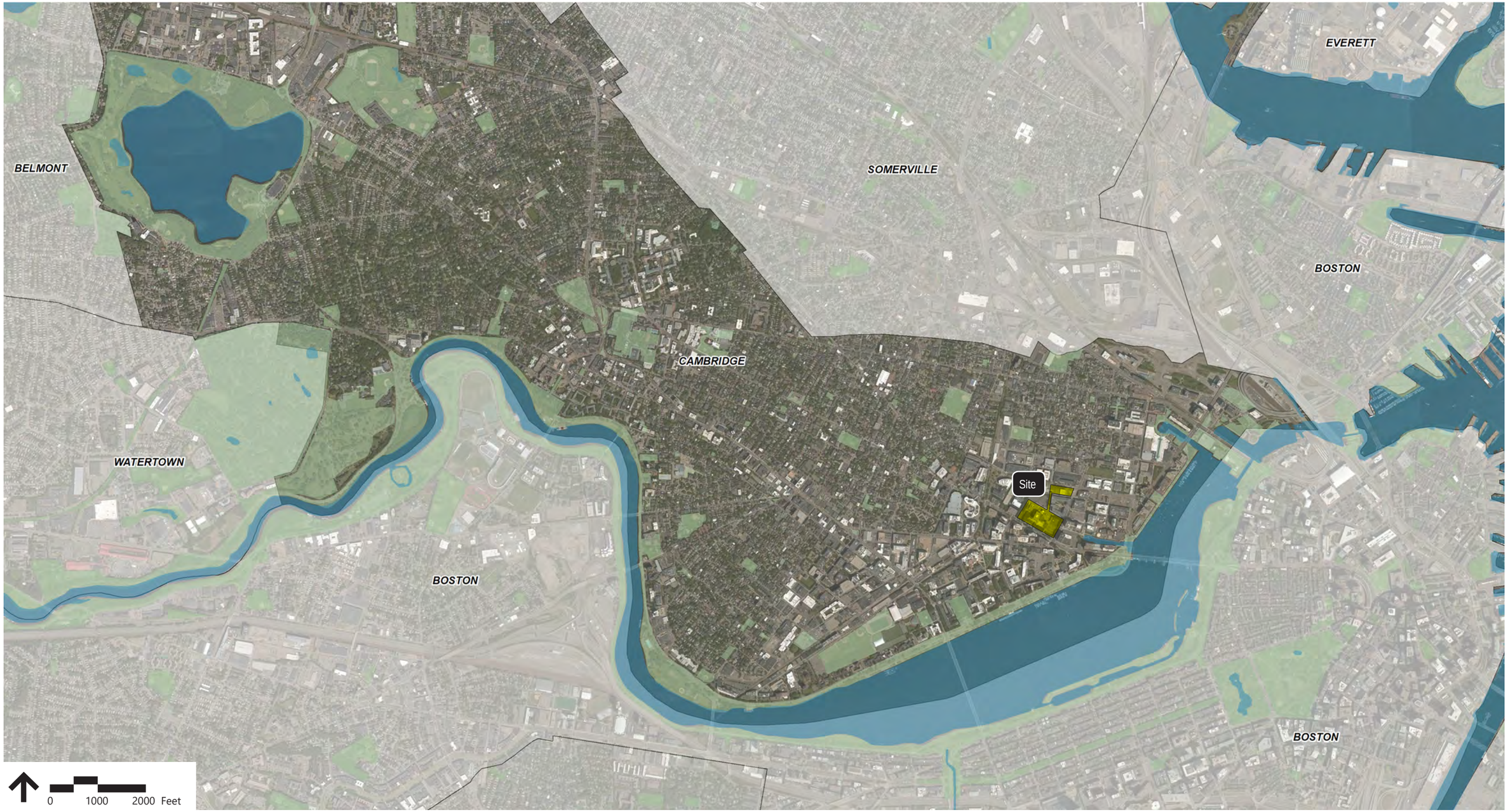
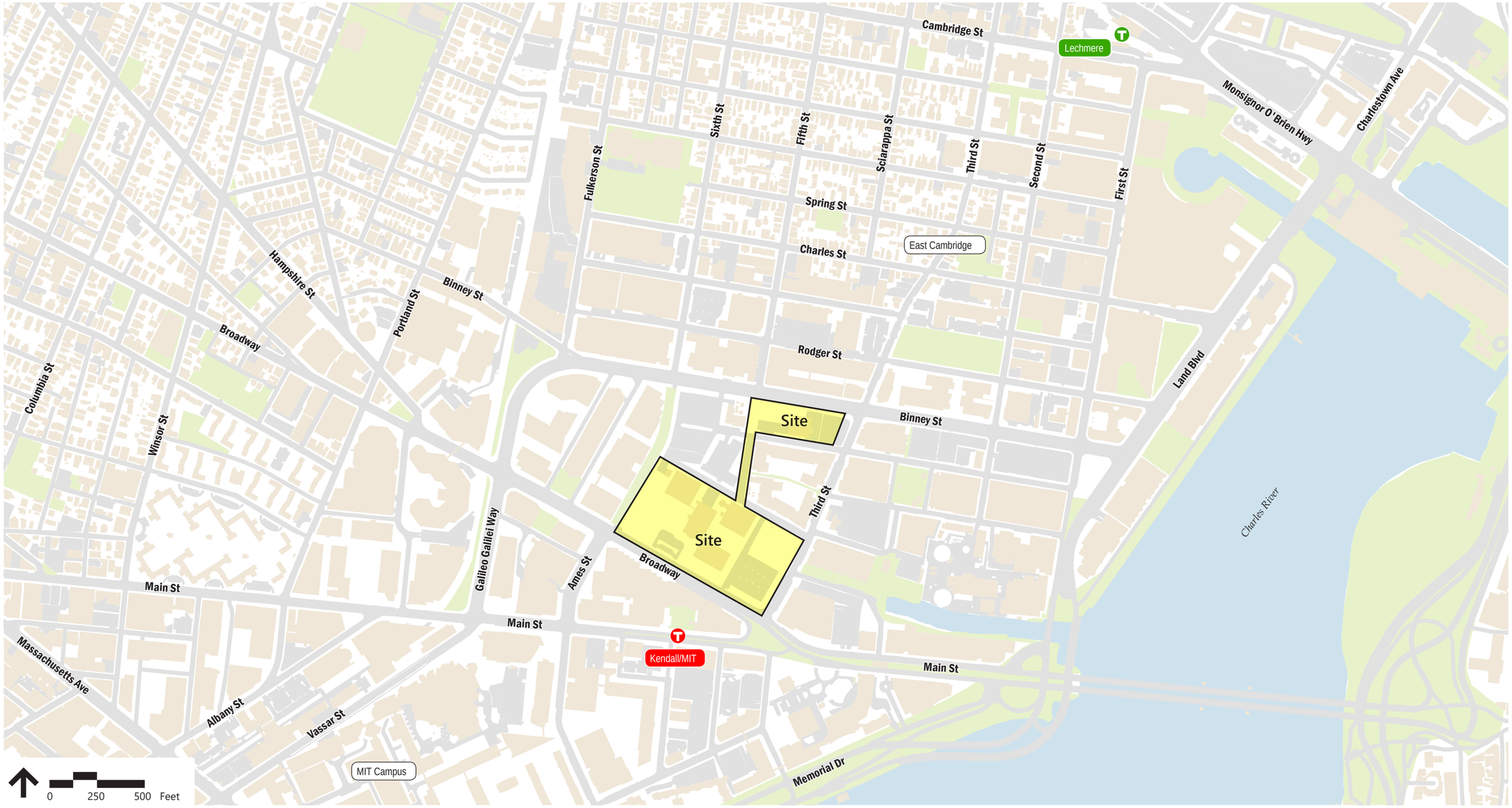


Proposed Project Component

Figure A
Site Location Map

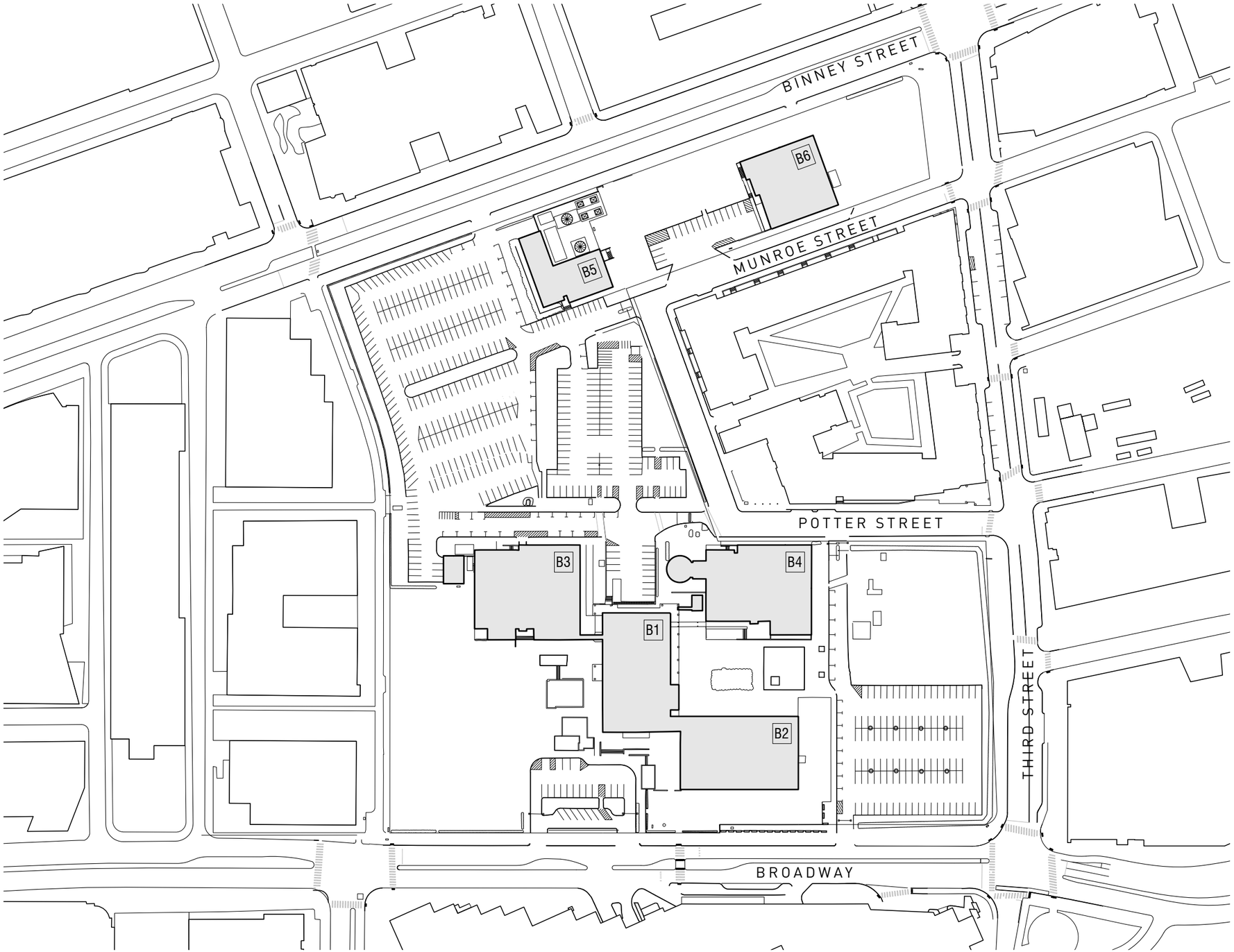
MIT Volpe Exchange Parcel
Cambridge, MA



Proposed Project Component

Figure B
Project Area Context

MIT Volpe Exchange Parcel
Cambridge, MA



0' 75' 150' 300'

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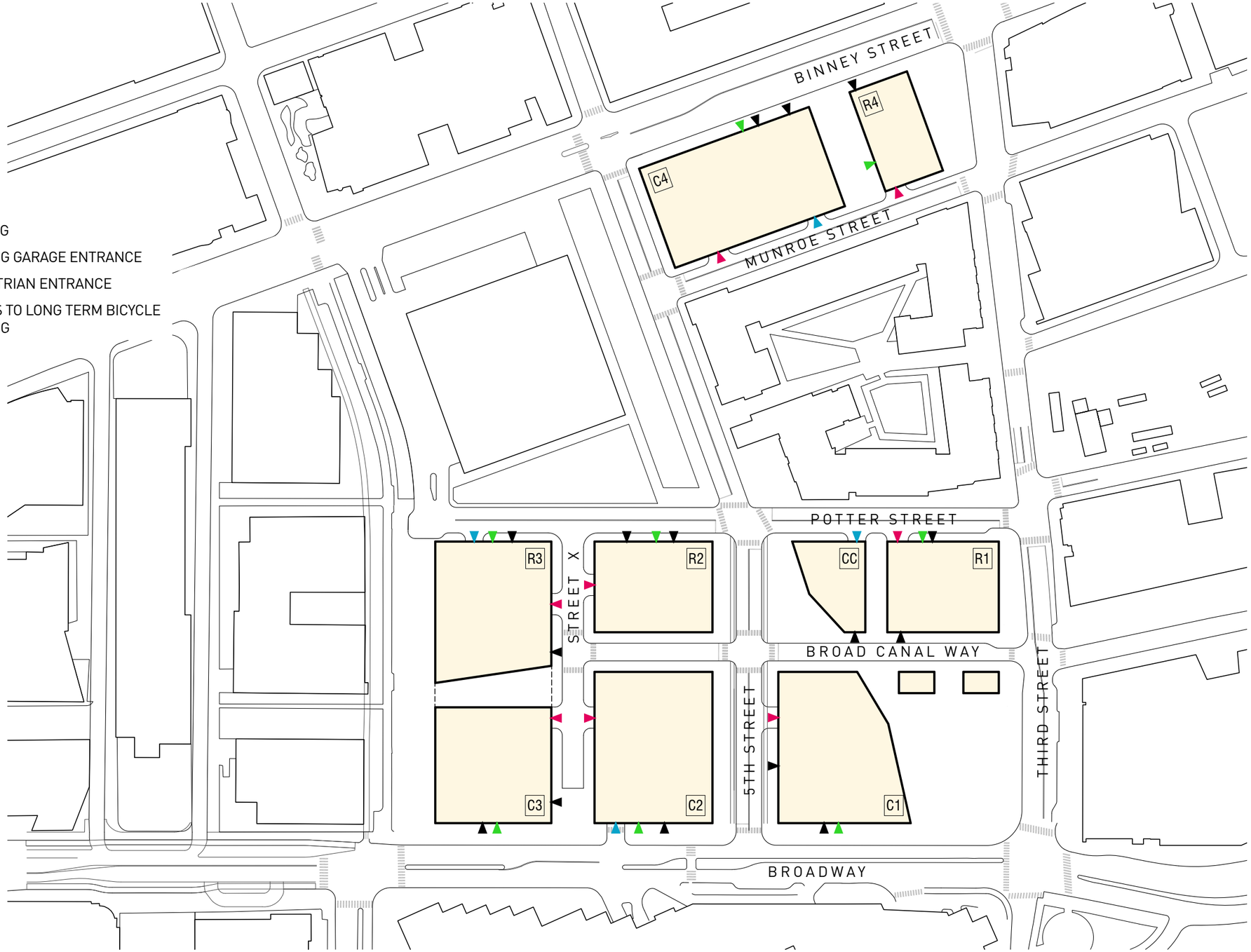
Figure C
Existing Conditions

MIT Volpe Exchange Parcel
Cambridge, MA

- LOADING
- PARKING GARAGE ENTRANCE
- PEDESTRIAN ENTRANCE
- ACCESS TO LONG TERM BICYCLE PARKING

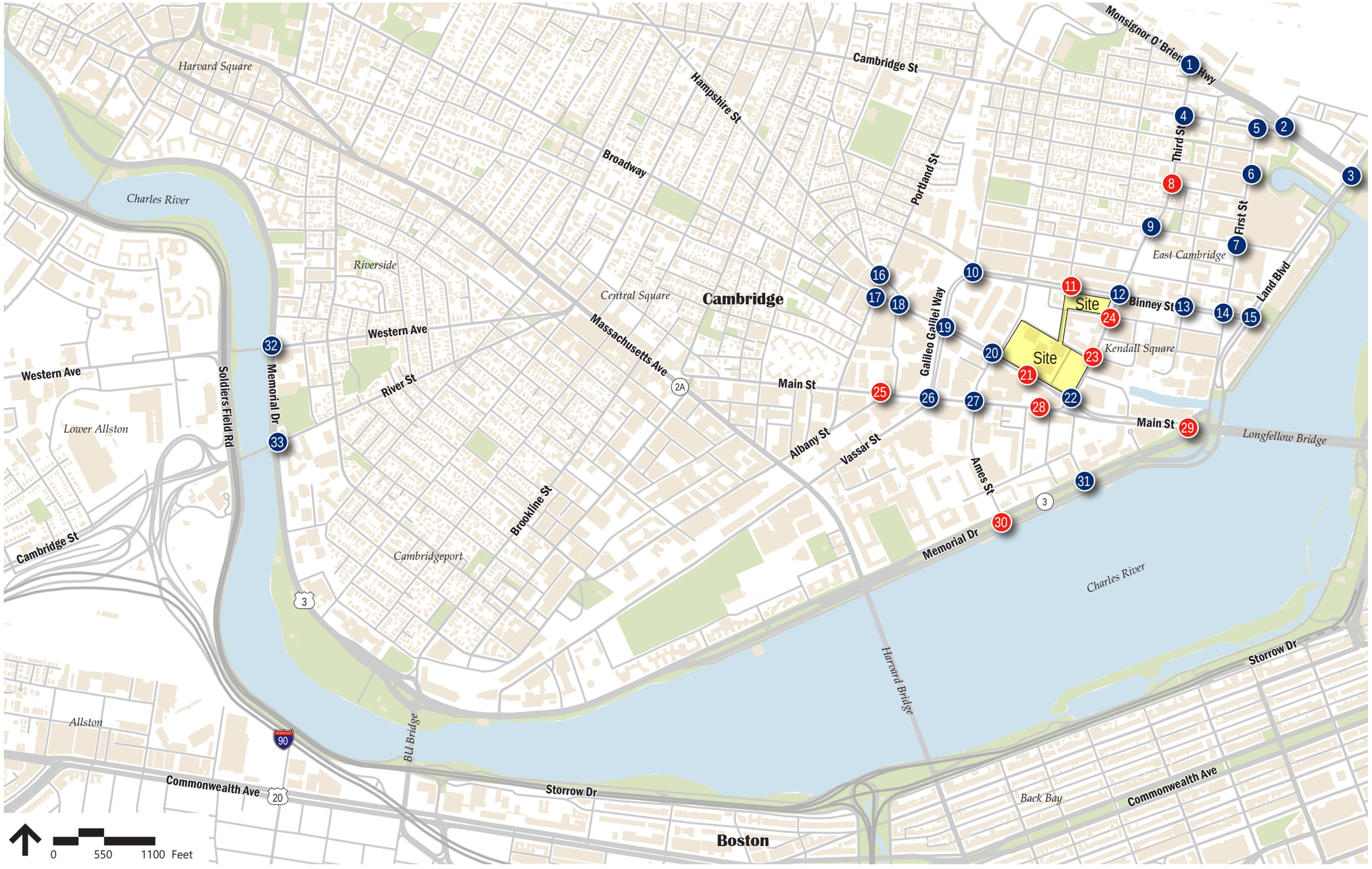


0' 75' 150' 300'

vhb ELKUS | MANFREDI ARCHITECTS

Figure D
Proposed Site Plan

MIT Volpe Exchange Parcel
Cambridge, MA



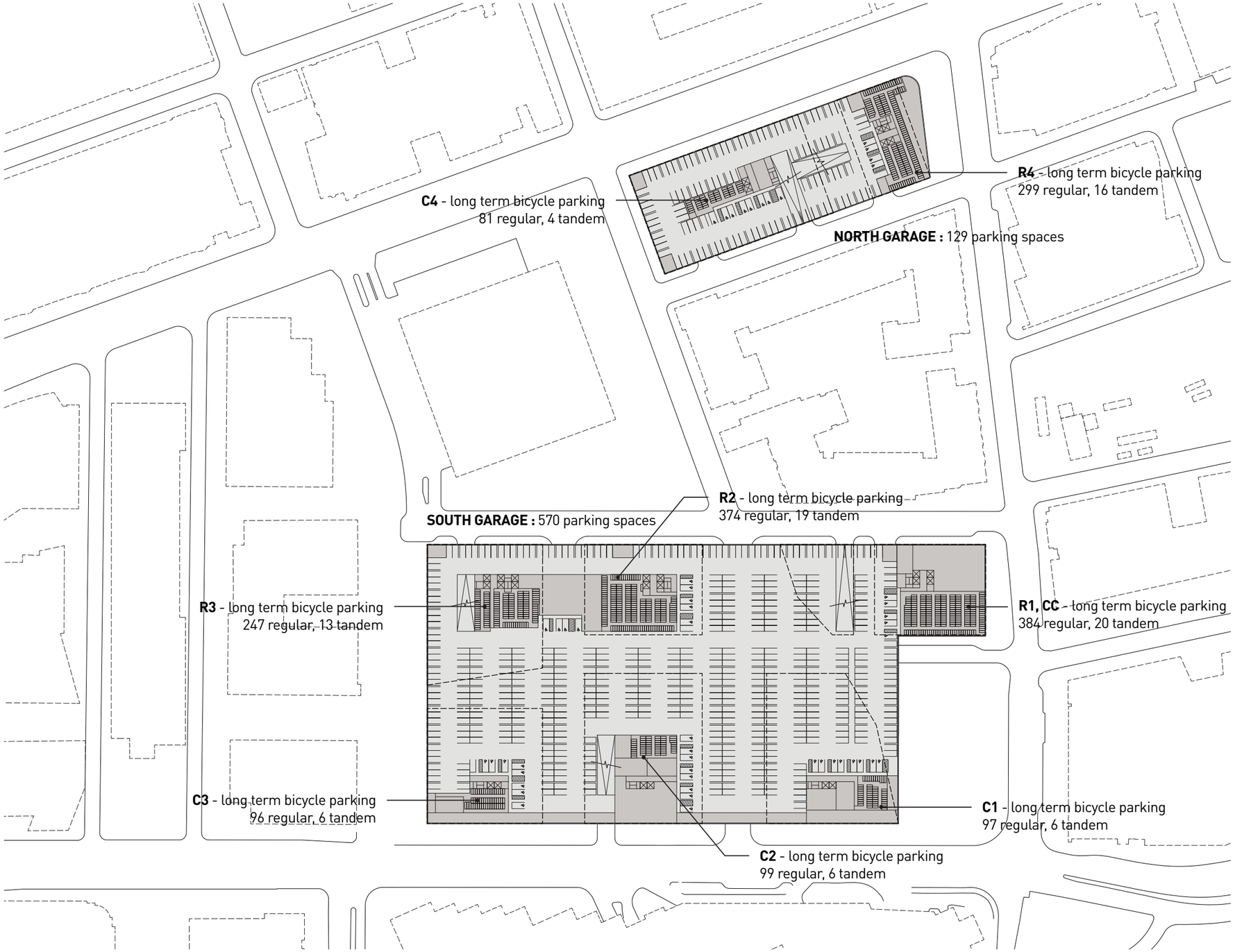
1 Monsignor O'Brien Hwy at Third St
2 Monsignor O'Brien Hwy at Cambridge St/East St
3 Monsignor O'Brien Hwy at Land Blvd
4 Cambridge Street at Third St
5 Cambridge St at First St
6 First St at Thorndike St
7 First St at Charles St
8 Third St at Spring St
9 Third St at Charles St
10 Galileo Galilei Way at Binney St/Fulkerson St
11 Binney St at Fifth St
12 Binney St at Third St
13 Binney St at Second St
14 Binney at First St
15 Binney St at Land Blvd
16 Hampshire St at Cardinal Medeiros Ave/Portland St
17 Broadway at Portland St
18 Broadway at Hampshire St
19 Broadway at Galileo Galilei Way
20 Broadway at Ames St
21 Broadway at Mid-Block
22 Broadway at Main St/Third St
23 Third St at Potter St/Kendall St
24 Third St at Munroe St/Linskey Way
25 Main St at Albany St
26 Main St at Galileo Galilei Way/Vassar St
27 Main St at Ames St
28 Main St at Kendall Station Crosswalk
29 Main St at Longfellow Bridge
30 Memorial Dr at Ames St
31 Memorial Dr at Wadsworth St
32 Memorial Dr at Western Ave
33 Memorial Dr at Cambridge St/River St

Proposed Project Component
Signalized Intersection
Unsignalized Intersection

vhb

Figure E
TIS Study Area

MIT Volpe Exchange Parcel
Cambridge, MA



NORTH GARAGE PARKING LEVEL 1

VEHICLE PARKING SPACES*	117
ACCESSIBLE (CAR)	10
ACCESSIBLE (VAN)	2
TOTAL	129

SOUTH GARAGE PARKING LEVEL 1

VEHICLE PARKING SPACES*	532
ACCESSIBLE (CAR)	32
ACCESSIBLE (VAN)	6
TOTAL	570

PARKING LEVEL 1

NORTH GARAGE	129
SOUTH GARAGE	570
TOTAL	699

*Typical vehicle parking stall dimensions align with city standard.

0' 75' 150' 300'

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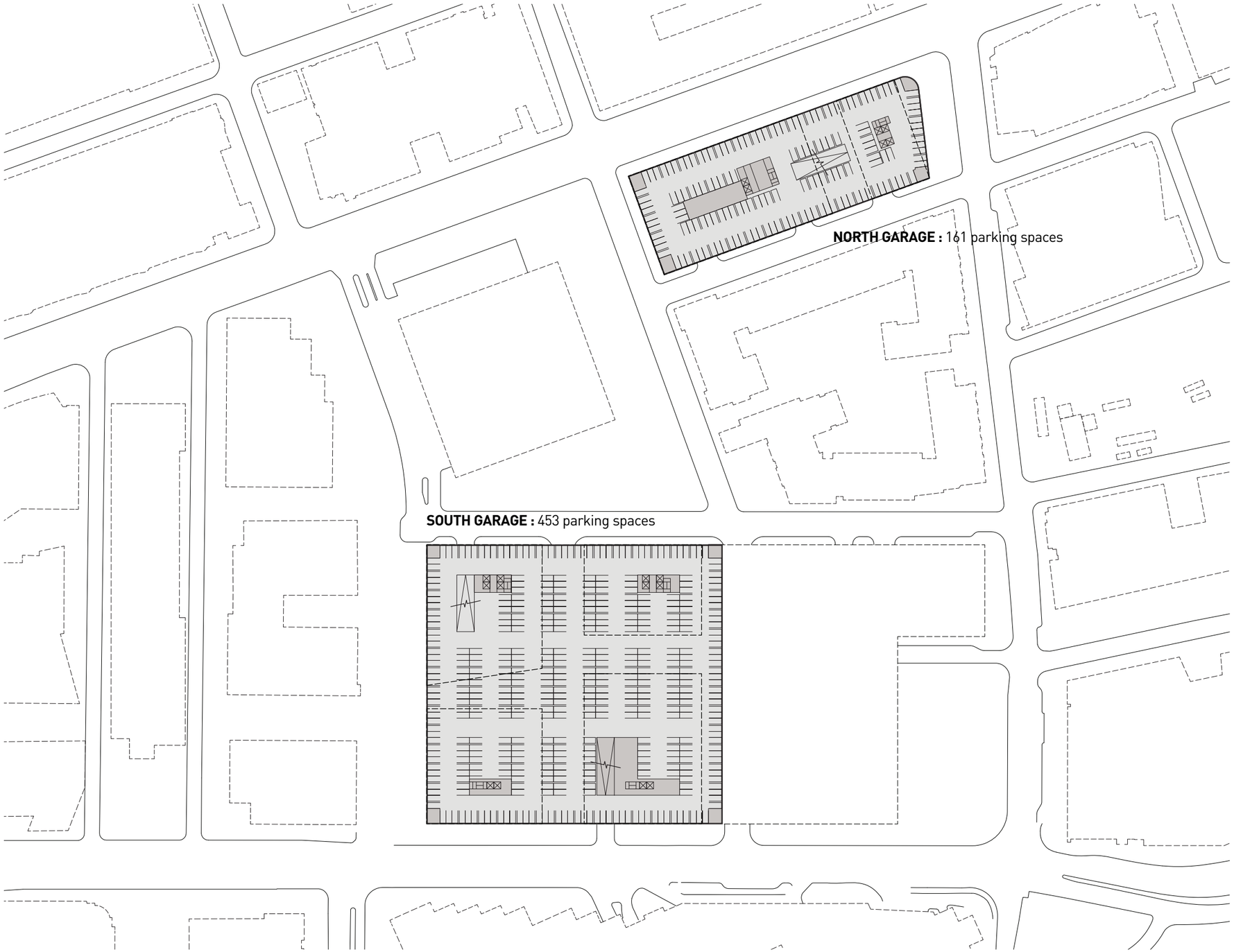
Figure F.1
Vehicle Parking - Level 1

MIT Volpe Exchange Parcel
Cambridge, MA



PARKING LEVEL 2

NORTH GARAGE	161
SOUTH GARAGE	453
TOTAL	614

0' 75' 150' 300'

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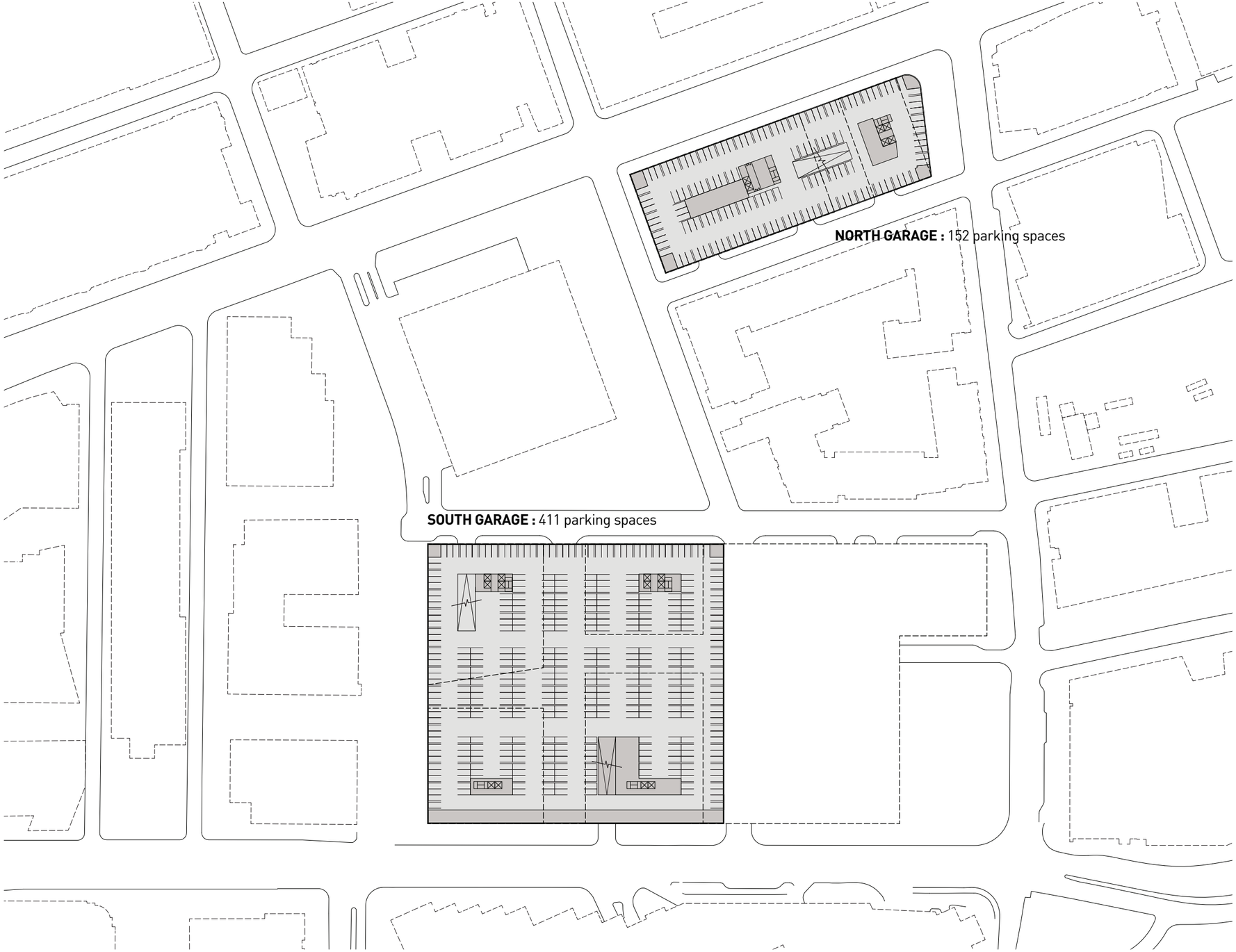
Figure F.2
Vehicle Parking - Level 2

MIT Volpe Exchange Parcel
Cambridge, MA



PARKING LEVEL 3

NORTH GARAGE	152
SOUTH GARAGE	411
TOTAL	563

TOTAL VEHICLE PARKING

PARKING LEVEL 1	699
PARKING LEVEL 2	614
PARKING LEVEL 3	563
TOTAL	1,876

0' 75' 150' 300'

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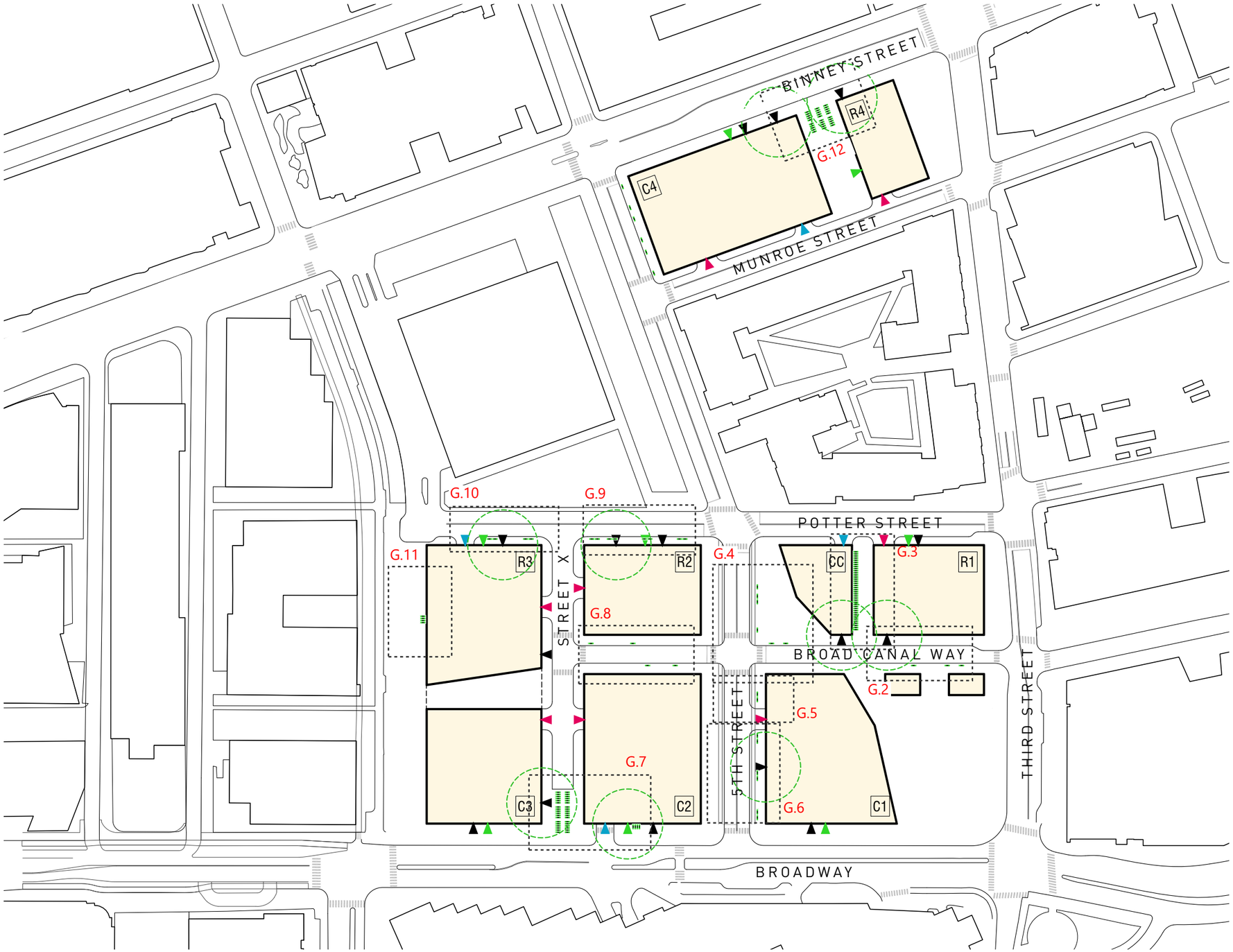
Figure F.3
Vehicle Parking - Level 3

MIT Volpe Exchange Parcel
Cambridge, MA



- LOADING
- PARKING GARAGE ENTRANCE
- PEDESTRIAN ENTRANCE
- ACCESS TO LONG TERM BICYCLE PARKING
- 50 FT FROM ENTRANCE

0' 75' 150' 300'

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Figure G.1
Short Term Bicycle Parking - Master Plan

MIT Volpe Exchange Parcel
Cambridge, MA

R1

BROAD CANAL WAY

3 FT

0' 5' 10' 20'

Figure G.2
Short Term Bike Parking - South of R1

MIT Volpe Exchange Parcel
Cambridge, MA

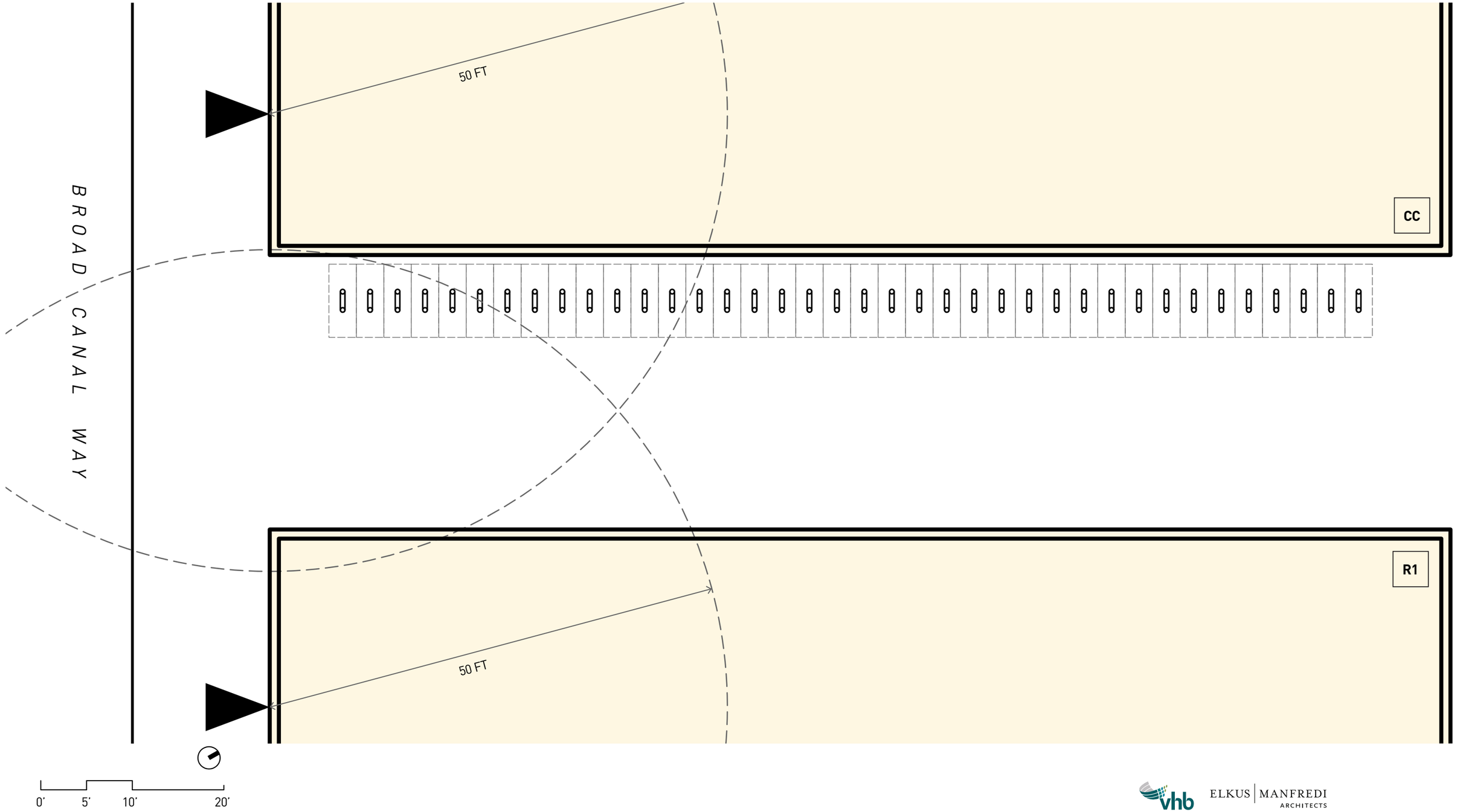


Figure G.3
Short Term Bike Parking - East of Building CC

MIT Volpe Exchange Parcel
Cambridge, MA

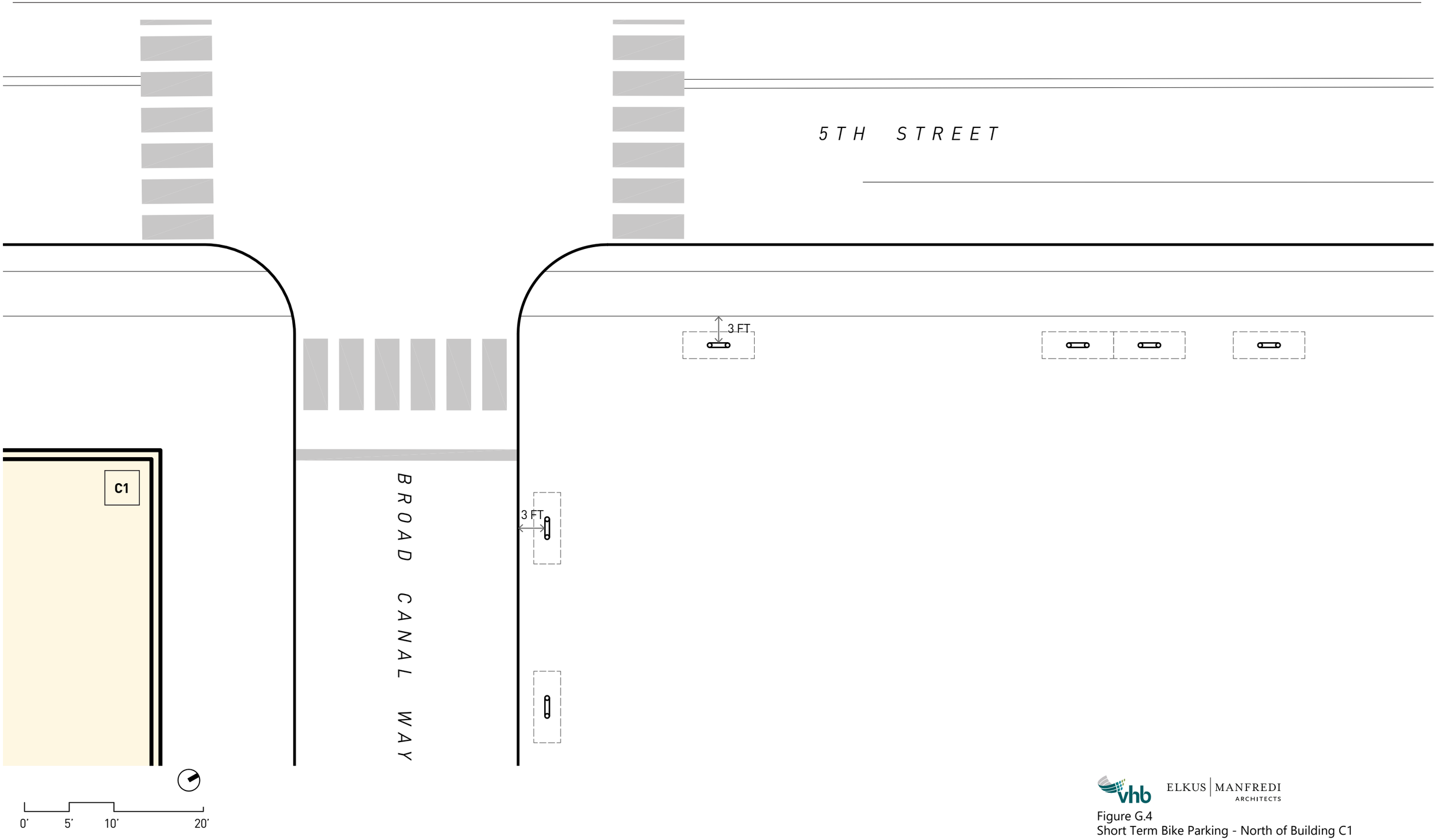


Figure G.4
Short Term Bike Parking - North of Building C1

MIT Volpe Exchange Parcel
Cambridge, MA

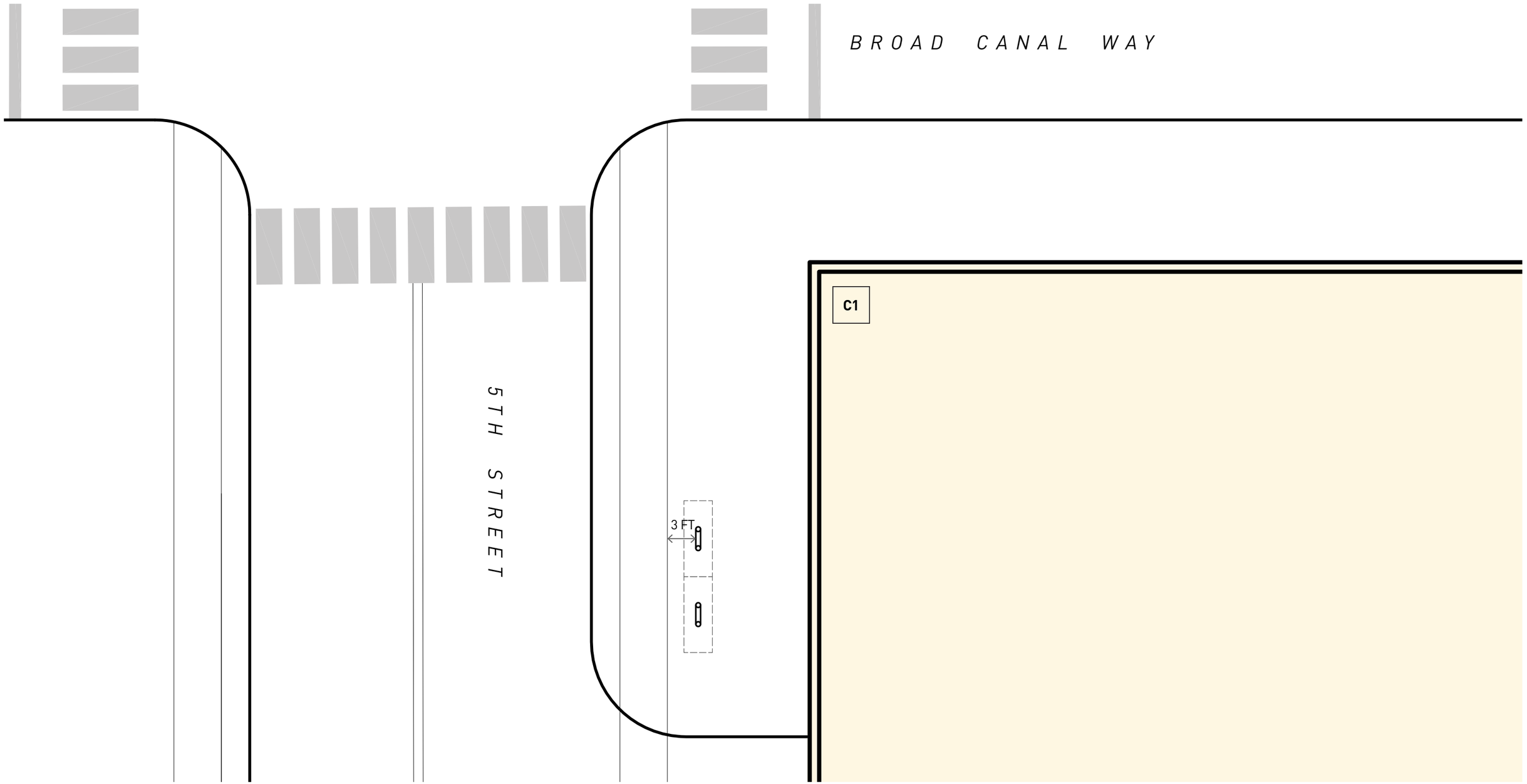
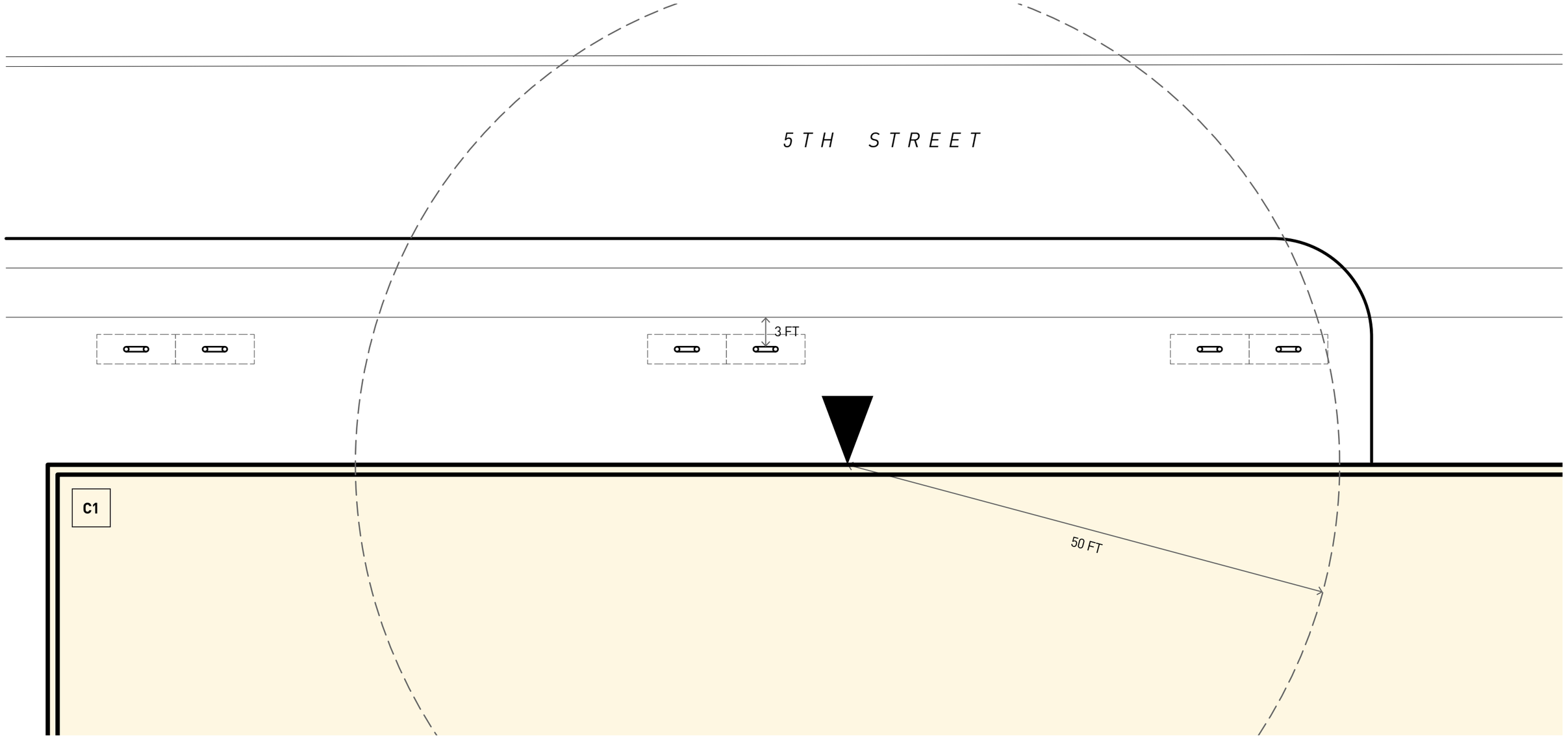


Figure G.5
Short Term Bike Parking - West of Building C1

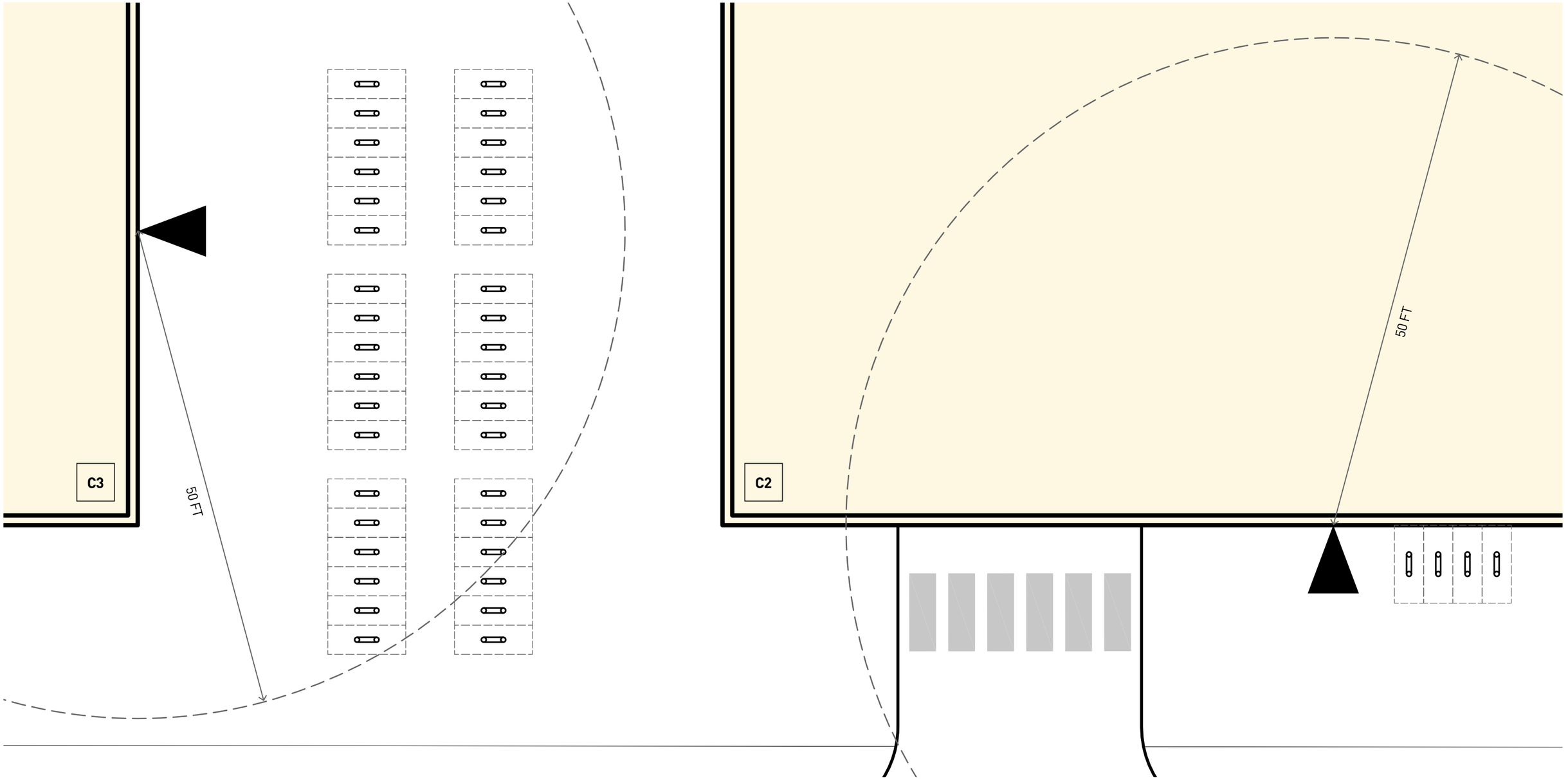
MIT Volpe Exchange Parcel
Cambridge, MA



0' 5' 10' 20'

Figure G.6
Short Term Bike Parking - West of Building C1

MIT Volpe Exchange Parcel
Cambridge, MA



0' 5' 10' 20'

Figure G.7
Short Term Bike Parking - West of Building C2

MIT Volpe Exchange Parcel
Cambridge, MA

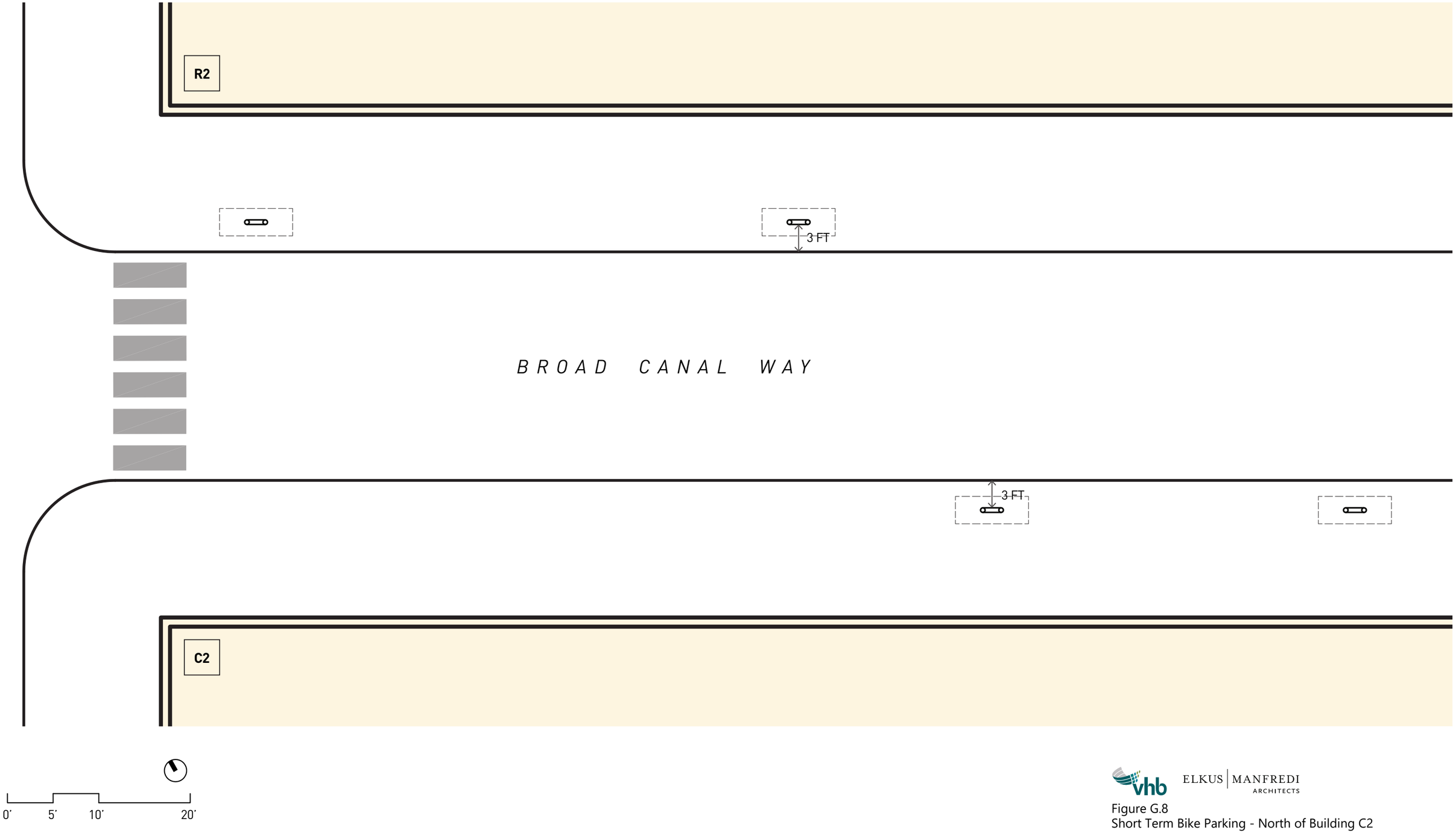
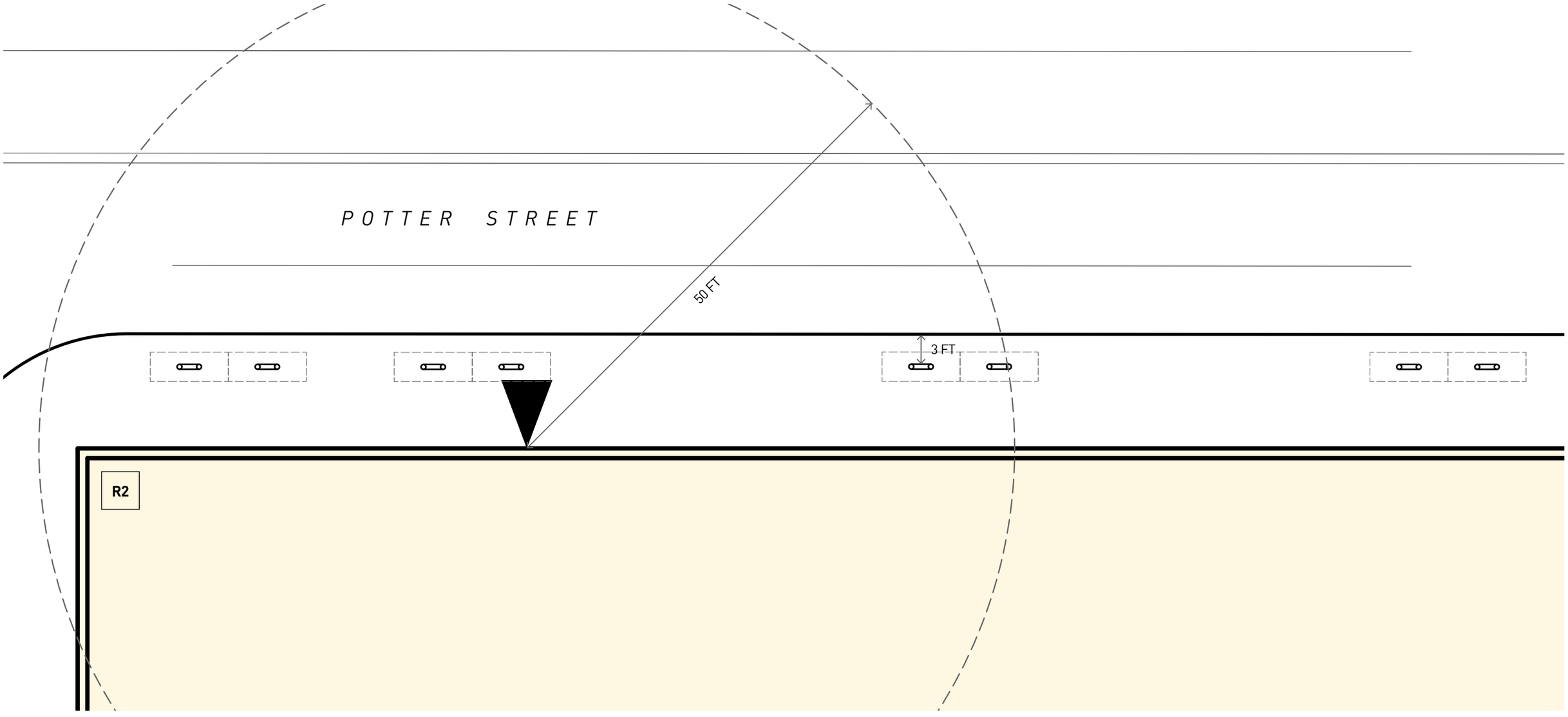


Figure G.8
Short Term Bike Parking - North of Building C2

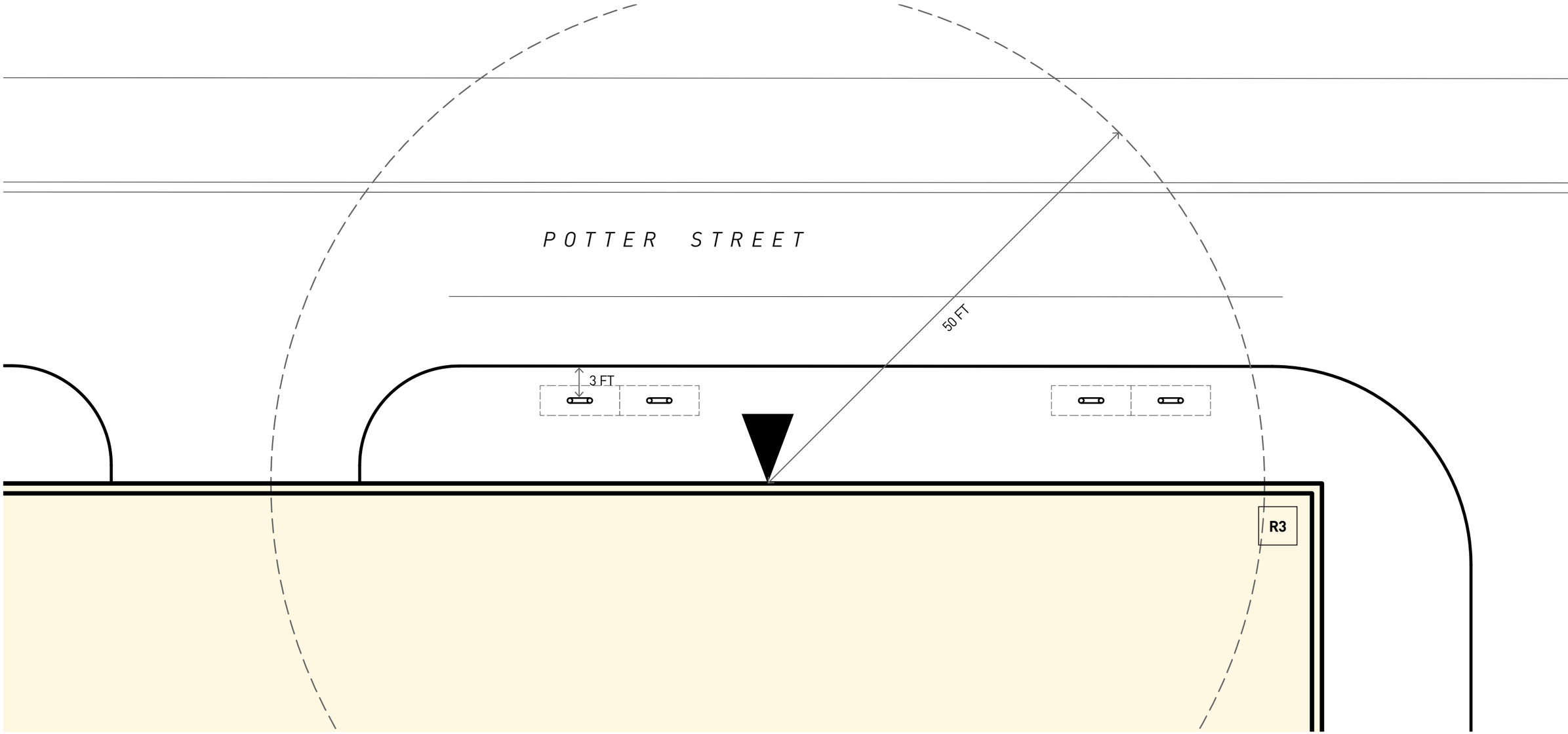
MIT Volpe Exchange Parcel
Cambridge, MA



0' 5' 10' 20'

Figure G.9
Short Term Bike Parking - North of Building R2

MIT Volpe Exchange Parcel
Cambridge, MA



0' 5' 10' 20'

Figure G.10
Short Term Bike Parking - North of Building R3

MIT Volpe Exchange Parcel
Cambridge, MA

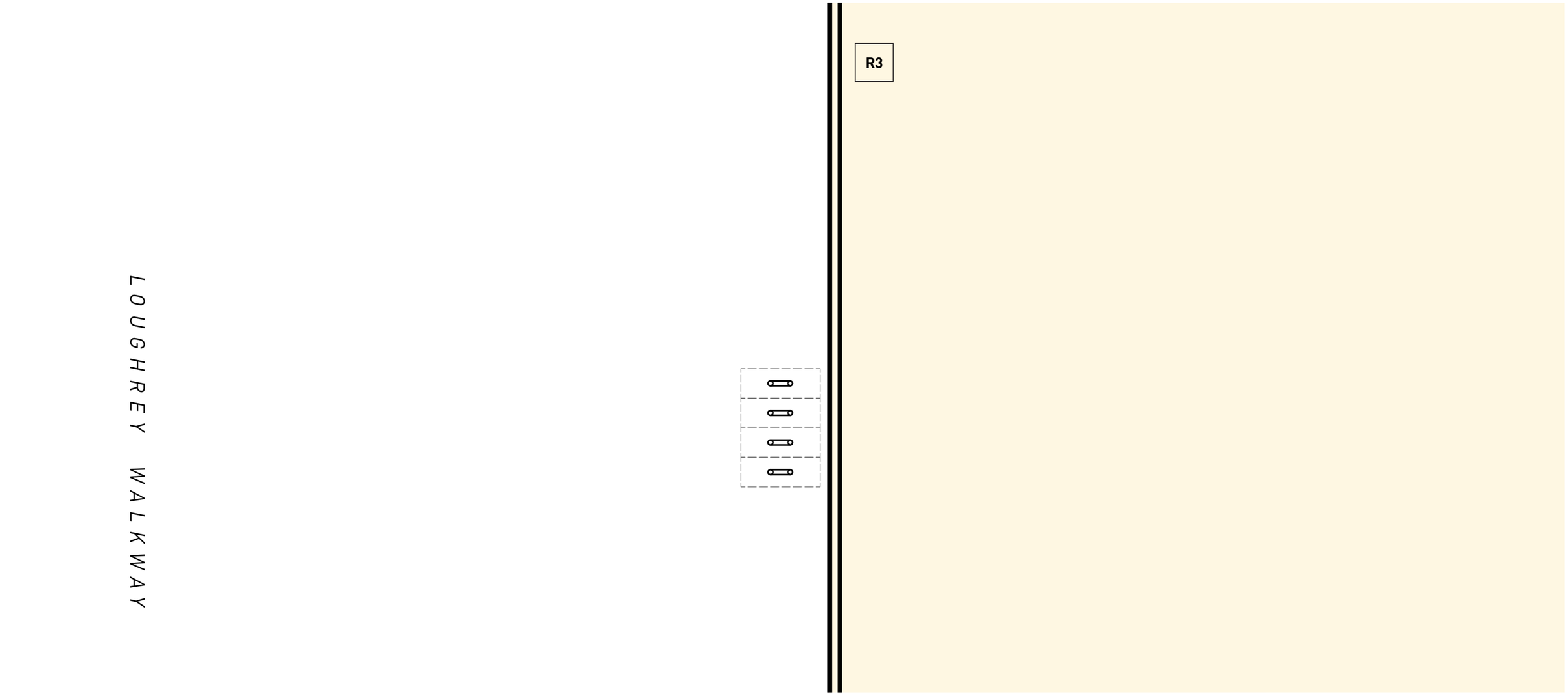


Figure G.11
Short Term Bike Parking - West of Building R3

MIT Volpe Exchange Parcel
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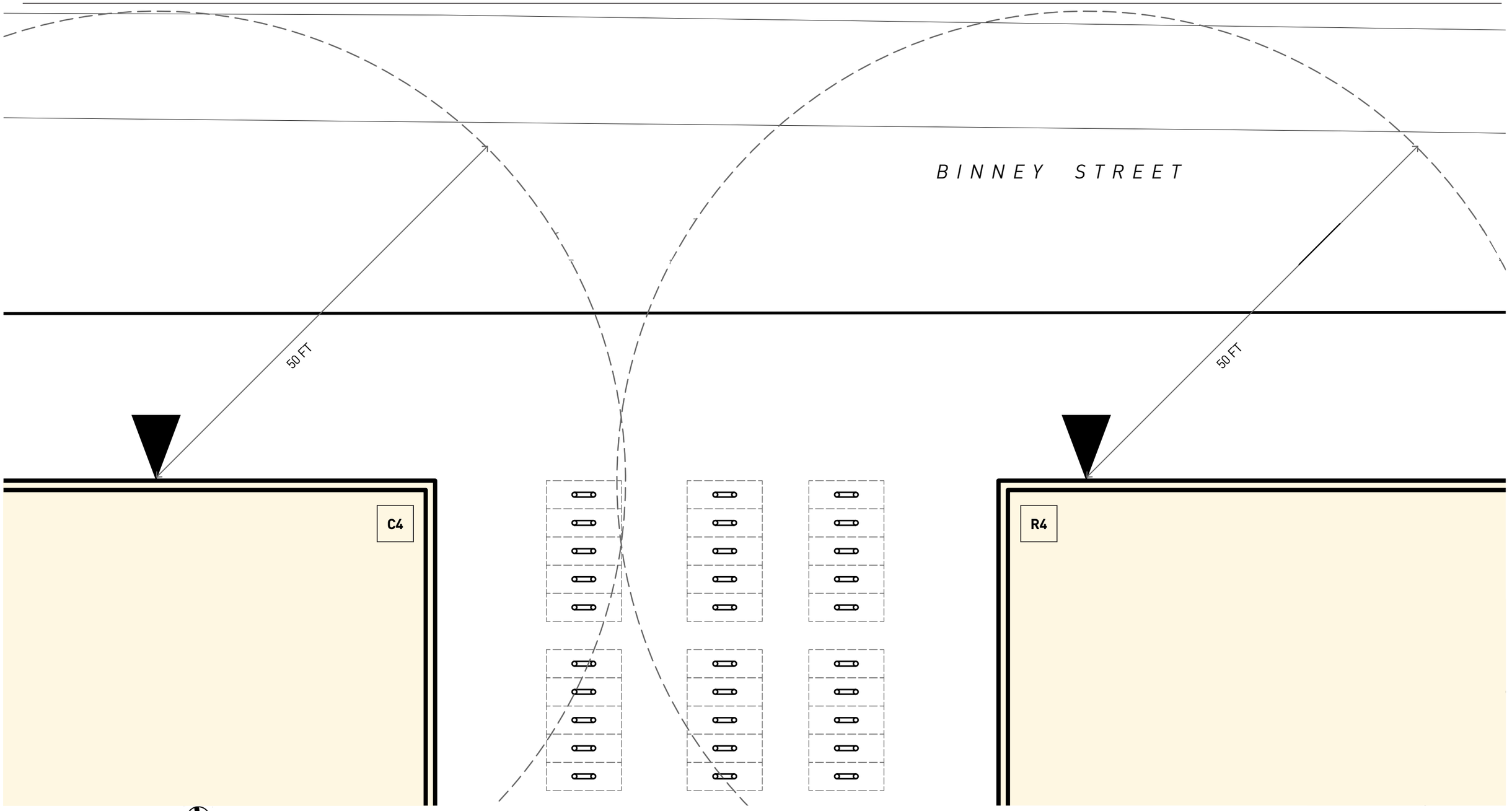

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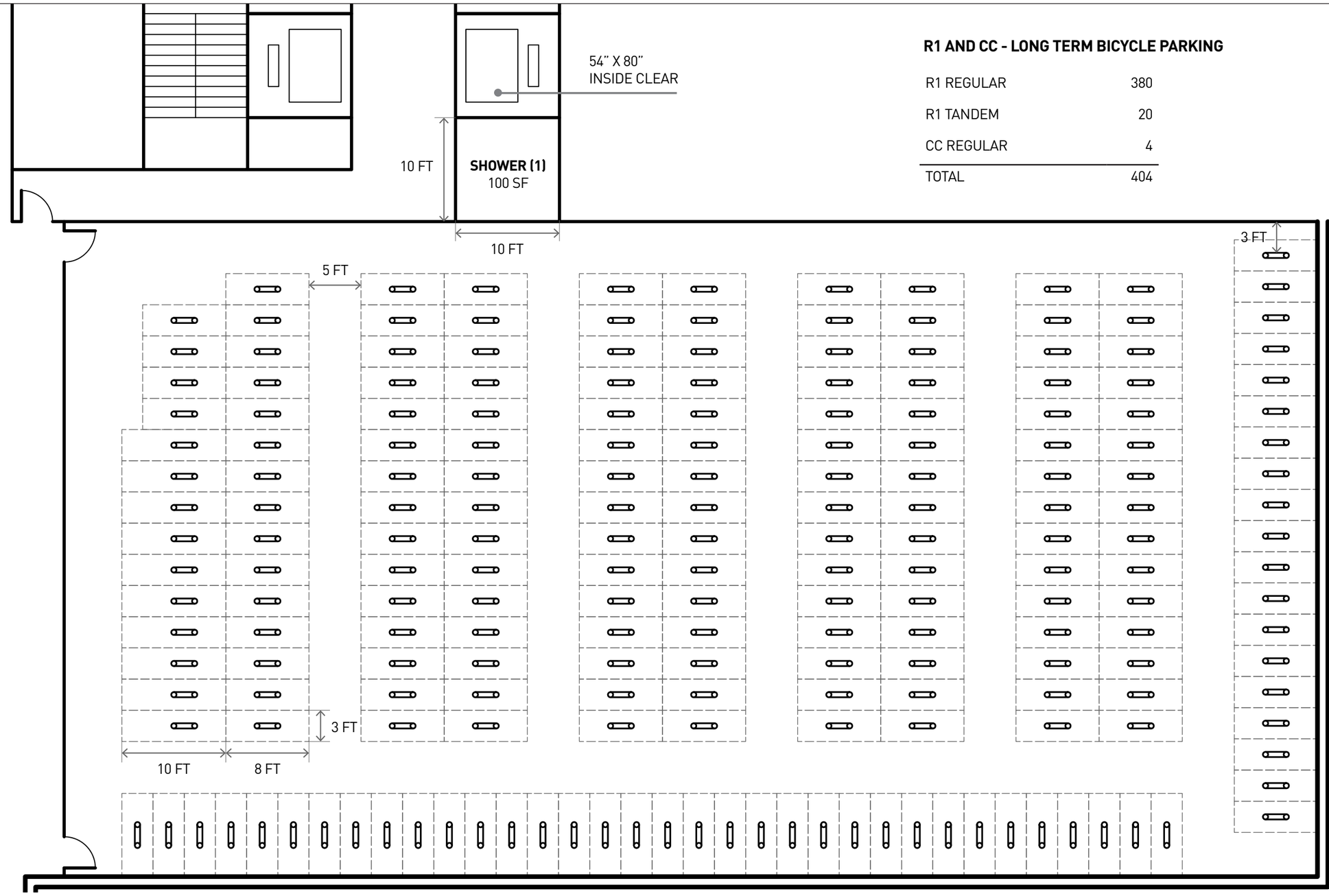
Figure G.12
Short Term Bike Parking - West of Building R4

MIT Volpe Exchange Parcel
Cambridge, MA

Figure G.13
Short Term Bike Parking - West of Building C4

MIT Volpe Exchange Parcel
Cambridge, MA



R1 AND CC - LONG TERM BICYCLE PARKING

R1 REGULAR	380
R1 TANDEM	20
CC REGULAR	4
TOTAL	404

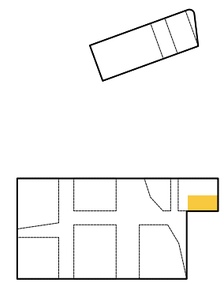


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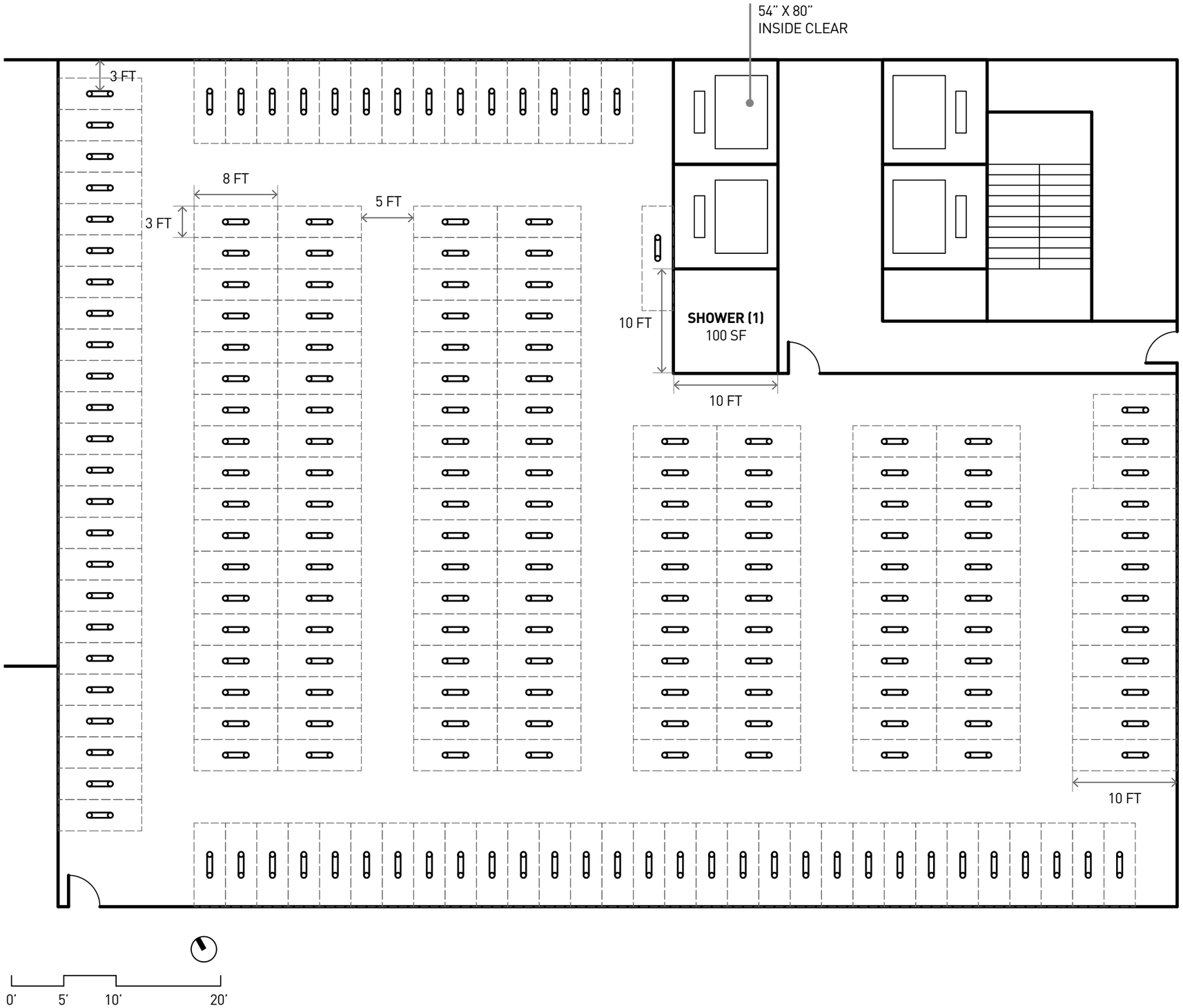
Figure G.14
Long Term Bike Parking - R1 and CC

MIT Volpe Exchange Parcel
Cambridge, MA



R2 - LONG TERM BICYCLE PARKING

REGULAR	374
TANDEM	19
TOTAL	393

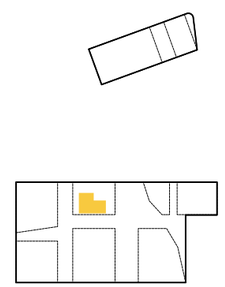


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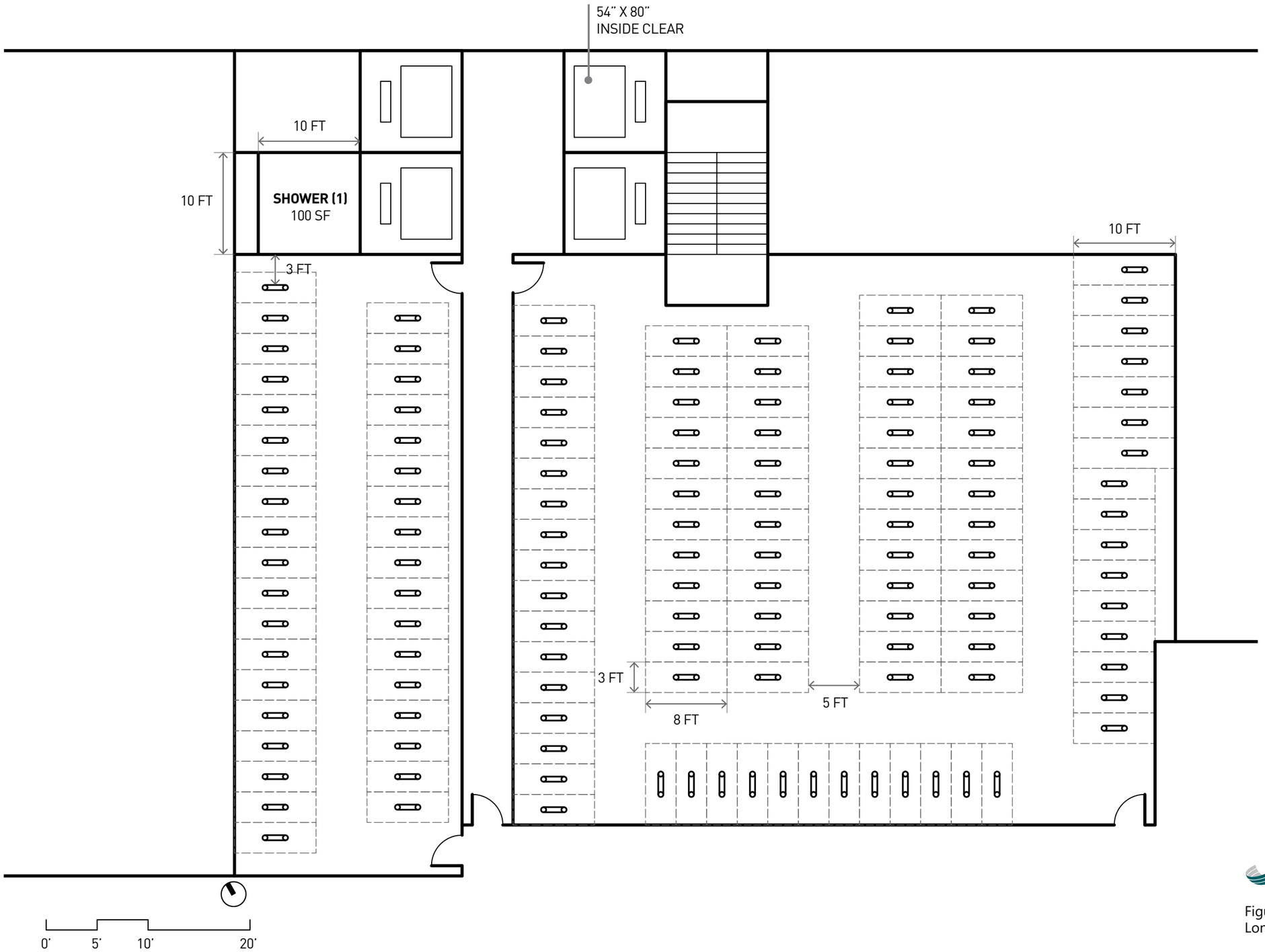
Figure G.15
Long Term Bike Parking - R2

MIT Volpe Exchange Parcel
Cambridge, MA



R3 - LONG TERM BICYCLE PARKING

REGULAR	247
TANDEM	13
TOTAL	260

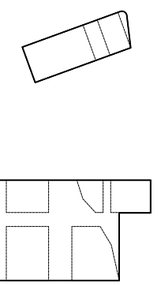


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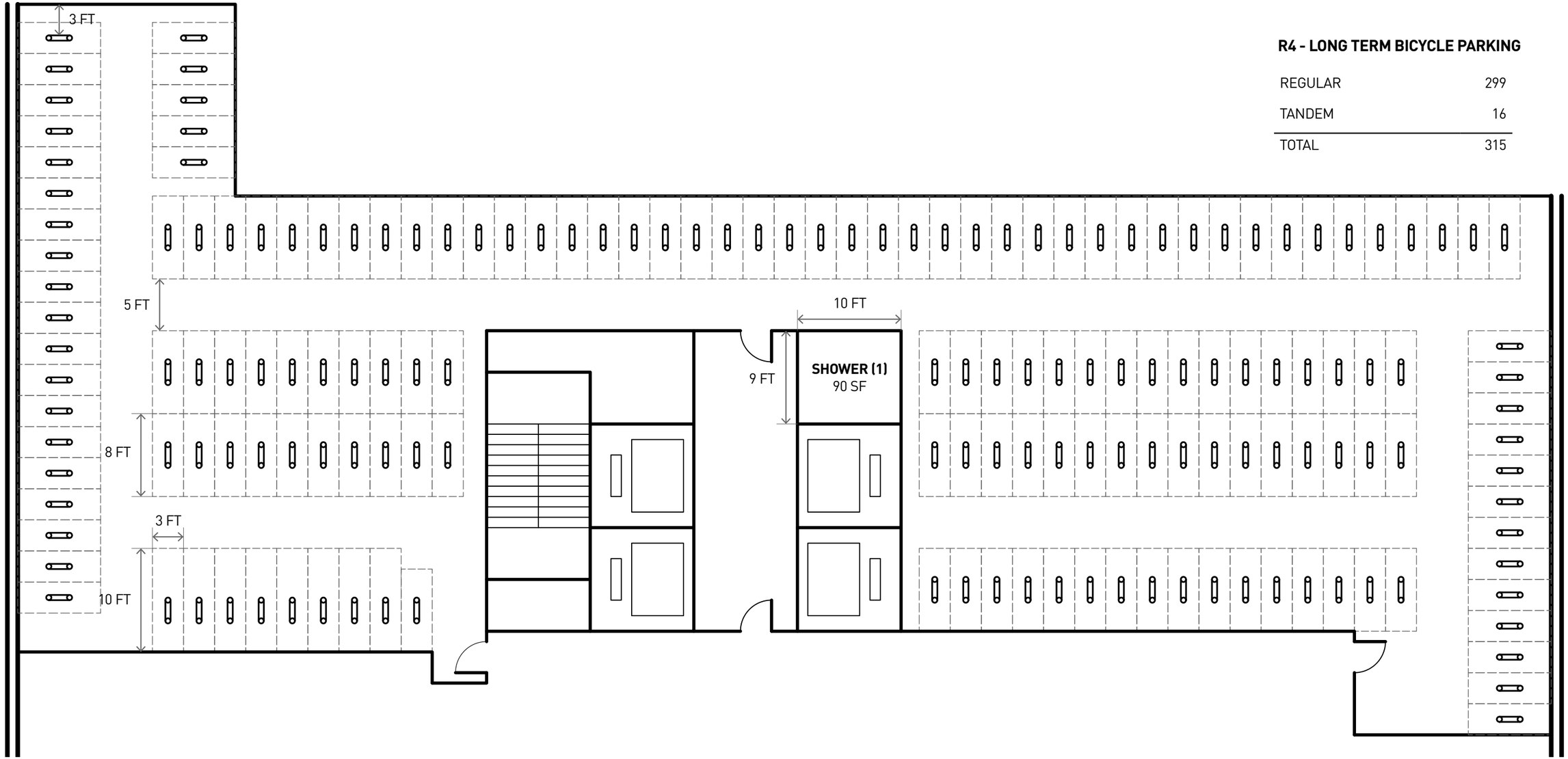
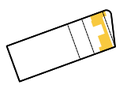
Figure G.16
Long Term Bike Parking - R3

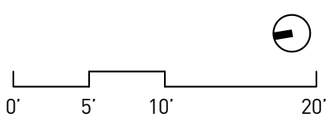
MIT Volpe Exchange Parcel
Cambridge, MA

R4 - LONG TERM BICYCLE PARKING

REGULAR	299
TANDEM	16
TOTAL	315







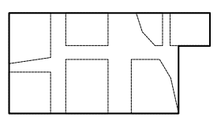


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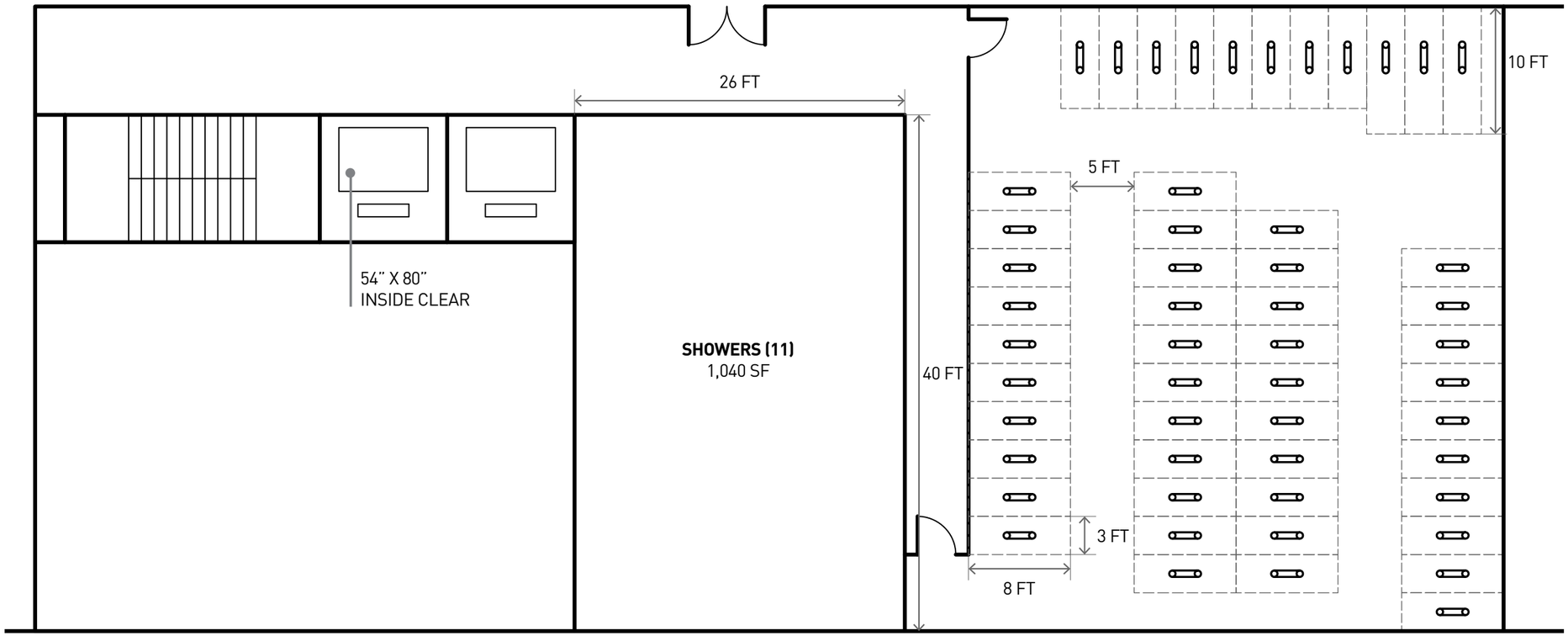
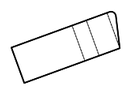
Figure G.17
Long Term Bike Parking - R4

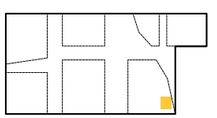
MIT Volpe Exchange Parcel
Cambridge, MA



C1 - LONG TERM BICYCLE PARKING

REGULAR	97
TANDEM	6
TOTAL	103





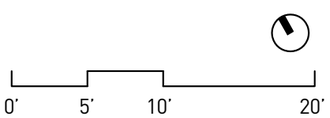


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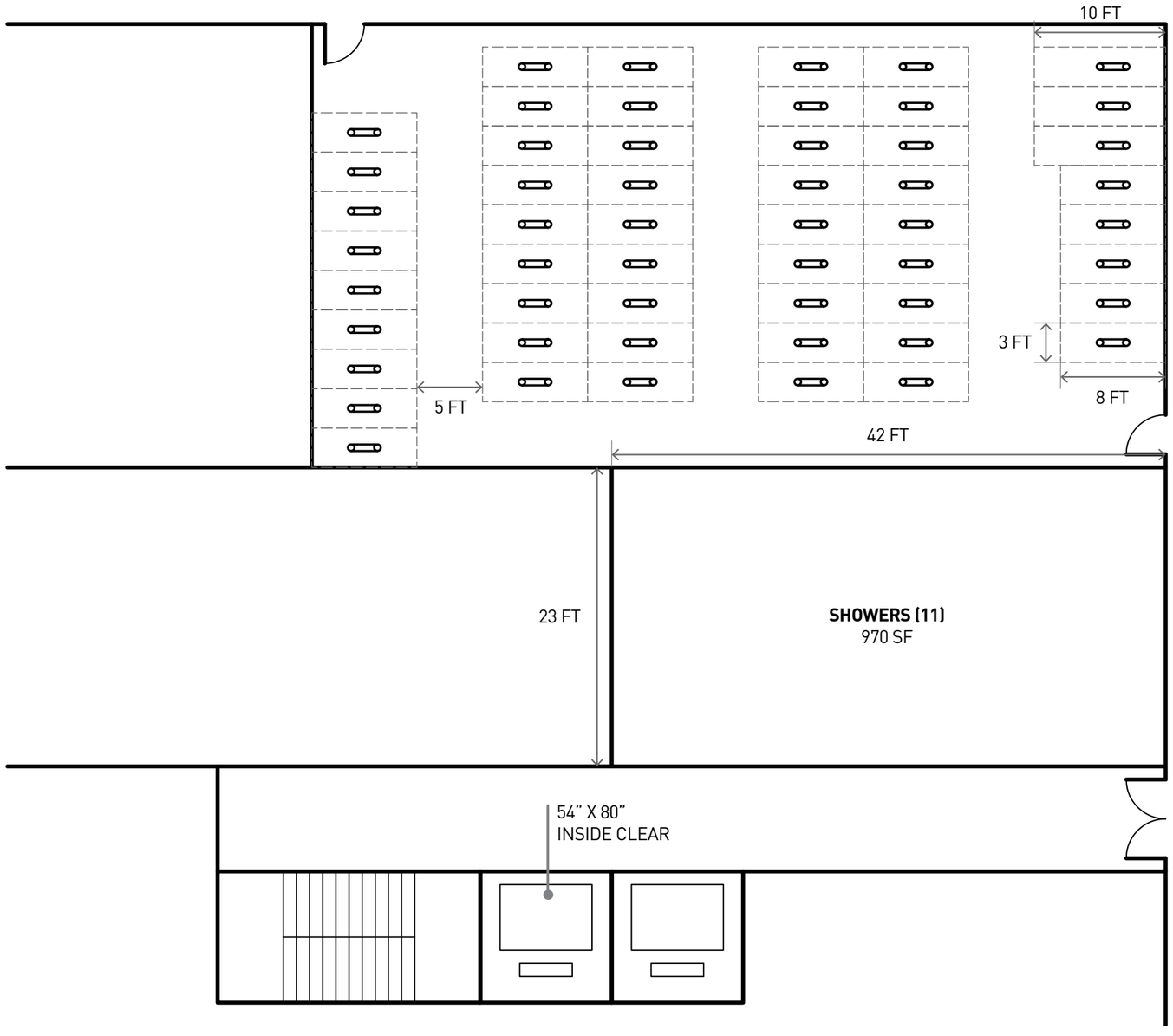
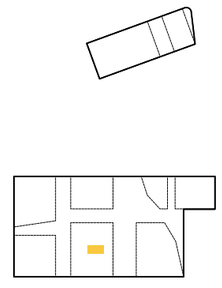
Figure G.18
Long Term Bike Parking - C1

MIT Volpe Exchange Parcel
Cambridge, MA



C2 - LONG TERM BICYCLE PARKING

REGULAR	99
TANDEM	6
TOTAL	105

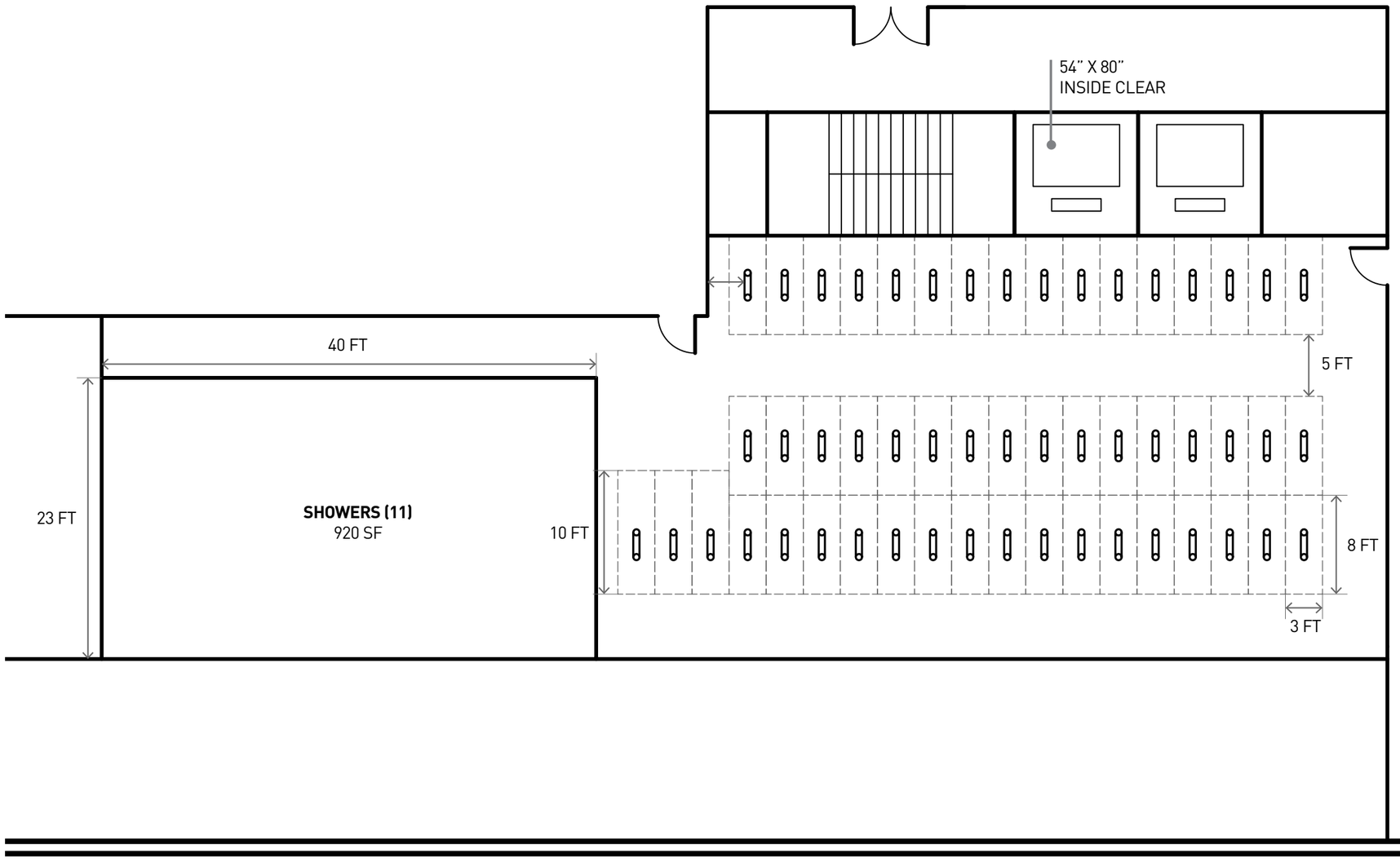


0' 5' 10' 20'

vhb ELKUS | MANFREDI ARCHITECTS

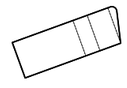
Figure G.19
Long Term Bike Parking - C2

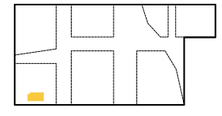
MIT Volpe Exchange Parcel
Cambridge, MA



C3 - LONG TERM BICYCLE PARKING

REGULAR	96
TANDEM	6
TOTAL	102





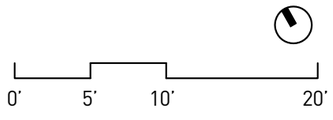


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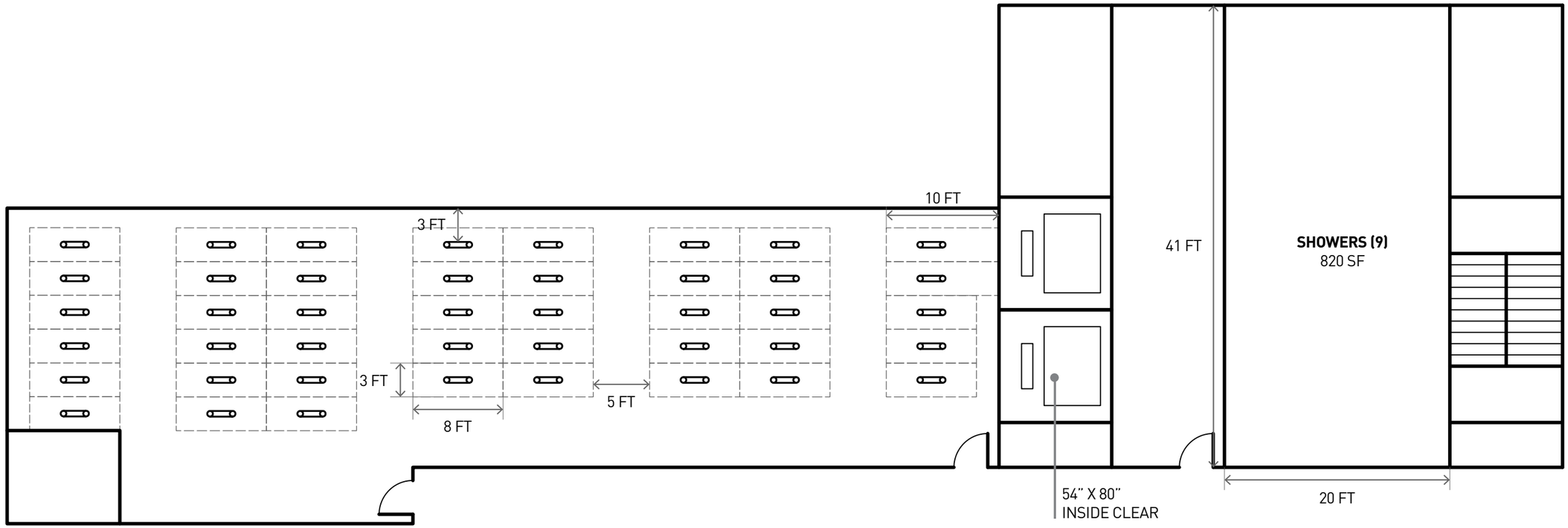
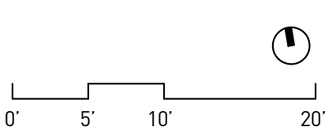
Figure G.20
Long Term Bike Parking - C3

MIT Volpe Exchange Parcel
Cambridge, MA

C4 - LONG TERM BICYCLE PARKING

REGULAR	81
TANDEM	4
TOTAL	85





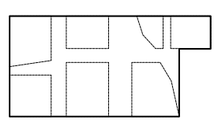


Figure G.21
Long Term Bike Parking - C4

MIT Volpe Exchange Parcel
Cambridge, MA

Introduction

On behalf of Massachusetts Institute of Technology (MIT), Vanasse Hangen Brustlin, Inc. (VHB) has conducted a Transportation Impact Study (TIS) for the proposed redevelopment of the Volpe Exchange Parcel (VEP) in Cambridge, Massachusetts. The TIS has been prepared for the full buildout of VEP, up to the zoning limit of 2.85 Mill. Square Feet of Gross Floor Area (GFA) of mixed-use (note that approximately 400,000 square feet of additional gross floor area is devoted to the Federal Government Facility and is not included as part of this Project; Furthermore 191,000 square feet of innovation and community space, while included in the analysis, are excluded from the zoning number). The development will include nine (9) buildings on approximately 10 acres of land.

The TIS responds to the scope dated October 19, 2019 defined by the City of Cambridge Traffic, Parking, and Transportation (TP&T) Department in response to VHB's Request for Scoping dated August 5, 2019, as well as additional coordination with the TP&T staff. A copy of the City's TP&T Original Scoping Determination is included in the Appendix.

The TIS has been prepared in conformance with the current City of Cambridge Guidelines (sixth revision dated 11/28/2011) for Transportation Impact Studies required under the Article 19 Special Permit Project Review.

This document comprises three components, as follows:

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

The required TIS Summary Sheets and Planning Board Criteria Performance Summary are included. Supplementary data and analysis worksheets are provided in a technical appendix. Electronic files for Automatic Traffic Recorder (ATR) counts, Turning Movement Counts (TMC), and Synchro and SimTraffic analyses are included in a separate electronic submission.

Project Overview

The Project includes the redevelopment of the approximately 10-acre Volpe Exchange Parcel, which will create a vibrant mixed-use district of high quality general and technical office, retail and recreation/entertainment activity, with significant components of residential use, open space and space for smaller innovation companies. The development will encourage strong connections between the Kendall Square areas, the East Cambridge Riverfront, and neighborhoods of eastern Cambridge including East Cambridge, Wellington-Harrington, and the Port neighborhoods. Additionally, the proposed community center and open space will transform this District into a recognizable center of activity and civic life for the Kendall Square area and surrounding neighborhoods by encouraging and fostering a sense of community, civic engagement, social interaction, economic development, and environmental sustainability.

The Project will include approximately 879,000 square feet of general office use, approximately 897,750 square feet of research and development/lab (R&D) use, approximately 1,040,000 square feet of residential use (up to 1,300 residential units), approximately 75,000 square feet of retail/active use space, approximately 25,000 square feet of flexible entertainment space and an approximately 20,000 square foot Community Center. It may include approximately 100,000 square feet of hotel use (up to 200 hotel keys), as summarized in Table 1.

In order to promote the development of active retail, community space, and innovation space, the PUD-7 rezoning language allows for up to 50% of the square footage devoted to Innovation Space (up to 5% of non-residential square footage) and all community space to be exempt from the calculation of GFA. For the purposes of the traffic analysis, the total proposed development program includes both the exempt and non-exempt square footage for a more complete and conservative analysis.

Table 1 Total Proposed Development Program by Building and Land Use (As analyzed)

Building	Office (SF)[1]	R&D (SF)[1]	Residential (SF/Units)	Hotel (SF/Keys)	Retail/Active Use (SF)[5]	Flexible Entertainment Space (SF)[2]	Community Center (SF)[3]	Total SF[4]
C1	228,800	233,200	0	0	20,000	0	0	
C2	231,600	236,600	0	0	15,000	0	0	
C3	228,900	233,850	0	0	7,000	0	0	
C4	189,700	194,100	0	0	0	0	0	
R1	0	0	304,700 / 380	0	11,000	0	0	
R2	0	0	296,300 / 370	100,000 / 200	12,000	0	0	
R3	0	0	199,000 / 250	0	0	25,000	0	
R4	0	0	240,000 / 300	0	10,000	0	0	
CC	0	0	0	0	0	0	20,000	
Total	**Up to 879,000**	**Up to 897,750**	**Up to 1,040,000 / 1,300**	**Up to 100,000 / 200**	**Up to 75,000**	**Up to 25,000**	**Up to 20,000**	**Up to 3,036,750**

[1] 171,000 SF of Innovation space is included in the Office and R&D totals

[2] The flexible entertainment space is a limited land use, with sporadic activity throughout the year and limited to evenings and weekends mostly and is therefore not expected to contribute trips during the morning peak hour. Daytime use will likely be limited to nearby employees and residents walking to the site to attend meetings or events.

[3] Community center is not expected to be a peak-hour trip generator and is therefore not included in the peak hour analysis due to its activities that are limited to the neighborhood and mostly during off-peak hours.

[4] The total development is 3,036,750 square feet; some areas included in the analysis are exempt from zoning. The total zoning GFA is 2,850,000.

[5] Retail/active space is entertainment, recreational and cultural

As shown in Figures A and B, the Project site is located in East Cambridge, within a block from Kendall Square MBTA Red Line Station. The site is generally bound by Binney Street to the north, Third Street to the east, Broadway to the south, and Loughrey Walkway/Bikeway to the west (excluding the site of the new Federal Government Facility and the residential building at 303-385 Third Street). The Site is dissected by Fifth Street, Potter Street and Munroe Street.

Currently, the site is host to the U.S. Department of Transportation Volpe National Transportation Systems Center. In 2017, MIT entered into an agreement to construct a new single, consolidated approximately 400,000 square foot Volpe Transportation Building supported by an approximate 350-space vehicular parking garage on a four-acre portion of the site, and to acquire the remaining 10-acres. As of the time of this TIS filing, construction on the new 400,000 square feet Volpe Transportation Center (referred to as the GSA building), has begun and is expected to be completed in 2023[1]. The GSA is not considered to be part of this Project. Limited, local rerouting of trips is expected but no trip credits will be taken.

[1] "Volpe Center." GSA, 29 Oct. 2019, www.gsa.gov/about-us/regions/welcome-to-the-new-england-region-1/buildings-and-facilities/development-projects/volpe-center#ProjectTimeline.

Planning Board Criteria Summary

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

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

The Project has an estimated 113 exceedances out of 653 data entries. The top three groups of exceedances pertain to trip generation, pedestrian impacts, and vehicular level of service impacts. A summary of the proposed mitigation is provided in Section 16 of the TIS.

CITY OF CAMBRIDGE
Special Permit – Transportation Impact Study (TIS)
Planning Board Criteria Performance Summary
Volpe Exchange Parcel Development Planning Board Permit Number: **TBD**

PROJECT

Project Name:	MIT Volpe Exchange Parcel
Project Address:	[Project Address TBD] Cambridge, MA 02142
Owner/Developer Name:	Massachusetts Institute of Technology (MIT)
Contact Person:	Michael K. Owu
Contact Address:	One Broadway, 9th Floor, Suite 200 Cambridge, MA 02142
Contact Phone Number:	617-258-1012

SIZE

ITE sq. ft. :	3,036,750
Land Use Type:	Mixed Use

PARKING

Existing Parking Spaces:	0 development use and 570 government use
New Parking Spaces:	1,876 development use and 350 government use *(gov. use not included as part of this study*)
Net New Parking Spaces:	+1,876 development use and -220 government use *(gov. use not included as part of this study)*

TRIP GENERATION: ** Person Trips*

	Daily	AM Peak Hour	PM Peak Hour
Total Trips*	18,562	2,125	2,409
Vehicle	6,553	757	852
Transit*	6,263	721	814
Pedestrian*	2,623	284	335
Bicycle*	1,099	138	152
Other*	1,454	165	186

MODE SPLIT (Person Trips):

	SOV	HOV	Transit	Walk	Bike	Other/ Work at Home
Office / R&D	35%	5%	36%	8%	7%	9%
Residential	27%	9%	29%	29%	6%	0%
Hotel Employees	14%	1%	41%	0%	2%	42%
Hotel Patrons	43%	7%	22%	28%	0%	0%
Active/Retail Employees	22%	6%	47%	8%	6%	11%
Active/Retail Patrons	5%	5%	3%	84%	3%	0%
Entertainment Space Employees	38%	0%	37%	13%	13%	0%
Entertainment Space Patrons	47%	16%	23%	13%	1%	0%

CITY OF CAMBRIDGE
Special Permit – Transportation Impact Study (TIS)
Planning Board Criteria Performance Summary
Volpe Exchange Parcel Development Planning Board Permit Number: ____**TBD**_____

TRANSPORTATION CONSULTANT

Company Name: VHB
Contact Name: Selma Mandzo-Preldzic, PE (Registered in MA, License # 49895)
Contact Phone Number: 617-728-7777

Date of Building Permit Approval: _____

Total Data Entries = 653 **Total Number of Criteria Exceedances = 113**

Criteria A – Project Vehicle Trip Generation

Period	Criteria (trips)	Build	Exceeds Criterion?
Weekday Daily	2,000	6,553	Yes
Weekday AM Peak Hour	240	757	Yes
Weekday PM Peak Hour	240	852	Yes

Criteria B – Vehicular LOS

	AM Peak Hour				PM Peak Hour			
Intersection	Baseline Condition	Build Condition	Traffic Increase	Exceeds Criterion?	Baseline Condition	Build Condition	Traffic Increase	Exceeds Criterion?
O'Brien Highway/ Third Street	B	C	4%	No	C	D	5%	No
O'Brien Highway/ Cambridge Street/ East Street	D	D	2%	No	C	C	2%	No
O'Brien Highway/Land Boulevard	F	F	3%	No	F	F	4%	No
Cambridge Street/ Third Street	E	E	7%	No	C	C	9%	No
Cambridge Street/ First Street	D	D	4%	No	E	E	3%	No
First Street/ Thorndike Street	B	B	9%	No	C	C	6%	No
First Street/ Charles Street	B	B	9%	No	E	F	5%	No
Third Street/ Spring Street	C	D	13%	No	B	B	18%	No

CITY OF CAMBRIDGE
Special Permit – Transportation Impact Study (TIS)
Planning Board Criteria Performance Summary
Volpe Exchange Parcel Development Planning Board Permit Number: ____**TBD**_____

	AM Peak Hour				PM Peak Hour			
Intersection	**Baseline Condition**	**Build Condition**	**Traffic Increase**	**Exceeds Criterion?**	**Baseline Condition**	**Build Condition**	**Traffic Increase**	**Exceeds Criterion?**
Third Street/ Charles Street	B	B	14%	No	B	C	15%	No
Galileo Galilei Way/ Binney Street/ Fulkerson Street	D	D	8%	Yes	F	F	5%	No
Binney Street/ 5th Street	C	C	20%	No	B	C	20%	No
Binney Street/ Third Street	D	F	15%	Yes	D	E	19%	Yes
Binney Street/ Second Street	C	D	11%	No	C	D	12%	No
Binney Street/ First Street	C	C	9%	No	D	E	12%	Yes
Binney Street/ Land Boulevard	D	D	3%	No	D	D	5%	No
Hampshire Street/ Cardinal Medeiros Avenue/ Portland Street	C	C	1%	No	C	C	2%	No
Broadway/ Portland Street	C	D	5%	No	C	C	6%	No
Broadway/ Hampshire Street	D	D	7%	No	D	D	9%	Yes
Broadway/ Galileo Galilei Way	E	E	13%	Yes	D	D	11%	Yes
Broadway/ Ames Street	D	D	29%	Yes	C	D	30%	No
Broadway/ Green Garage	B	E	32%	Yes	F	F	30%	Yes
Broadway/ Main Street/ Third Street	D	F	30%	Yes	E	F	19%	Yes
Third Street/ Potter Street/ Kendall Street	F	F	53%	Yes	F	F	45%	Yes
Third Street/ Munroe Street/ Linskey Way	D	D	15%	Yes	F	F	21%	Yes
Main Street/ Albany Street	F	F	18%	Yes	E	F	18%	Yes

CITY OF CAMBRIDGE
Special Permit – Transportation Impact Study (TIS)
Planning Board Criteria Performance Summary
Volpe Exchange Parcel Development Planning Board Permit Number: **TBD**

	AM Peak Hour				PM Peak Hour			
Intersection	**Baseline Condition**	**Build Condition**	**Traffic Increase**	**Exceeds Criterion?**	**Baseline Condition**	**Build Condition**	**Traffic Increase**	**Exceeds Criterion?**
Main Street/ Galileo Galilei Way/ Vassar Street	D	D	16%	Yes	E	F	13%	Yes
Main Street/ Ames Street	D	E	17%	Yes	F	F	18%	Yes
Main Street/ Kendall Station Crosswalk	A	A	2%	No	A	B	10%	No
Main Street/ Longfellow Bridge	E	F	11%	Yes	C	C	8%	No
Memorial Drive/ Ames Street	B	B	5%	No	E	F	5%	No
Memorial Drive/ Wadsworth Street	B	C	5%	No	B	C	3%	No
Memorial Drive/ Western Avenue	E	E	3%	No	F	F	4%	No
Memorial Drive/ Cambridge Street/ River Street	F	F	4%	No	E	E	5%	No

Criteria C – Traffic on Residential Streets

			AM Peak Hour			PM Peak Hour		
Roadway	**Reviewed Segment**	**Amount of Residential**	**Baseline**	**Project Trips**	**Exceeds Criteria?**	**Baseline**	**Project Trips**	**Exceeds Criteria?**
O'Brien Highway	Cambridge Street to Land Boulevard	1/2 or more	2,095	44	Yes	1,919	50	Yes
Cambridge Street	Second Street to First Street	1/2 or more	651	0	No	632	0	No
Spring Street	Sciarappa Street to Third Street	1/2 or more	160	0	No	155	0	No
	Third Street to Lopez Avenue	1/2 or more	102	0	No	171	0	No
Charles Street	Sciarappa Street to Third Street	1/2 or more	131	0	No	207	0	No
Binney Street	5th Street to Third Street	>1/3 but <1/2	953	120	Yes	1,049	195	Yes
Munroe Street	5th Street to Third Street	1/2 or more	74	1	No	42	15	No
Potter Street	5th Street to Third Street	1/2 or more	118	201	Yes	85	316	Yes
5th Street	Rogers Street to Binney Street	1/2 or more	122	0	No	146	0	No
Third Street	O'Brien Highway to Cambridge Street	>1/3 but <1/2	711	99	Yes	790	112	Yes
	Cambridge Street to Spring Street	>1/3 but <1/2	642	99	Yes	479	112	Yes
	Spring Street to Charles Street	1/2 or more	611	99	Yes	459	112	Yes
	Charles Street to Binney Street	>1/3 but <1/2	552	99	Yes	650	112	Yes

Criteria D – Lane Queue (for signalized intersections)

Intersection	Lane	AM Peak Hour			PM Peak Hour		
		Baseline	2019 Build	Exceeds Criterion?	Baseline	2019 Build	Exceeds Criterion?
O'Brien Highway at Third Street	O'Brien EB Left/Thru	7	16	Yes	3	3	No
	O'Brien EB Right	6	17	Yes	3	3	No
	O'Brien WB Thru/Right	1	1	No	4	4	No
	Third NB Left/Thru/Right	2	2	No	11	11	No
O'Brien Highway at North First Street	O'Brien EB Thru	10	9	No	5	11	No
	O'Brien EB Right	4	4	No	1	2	No
	O'Brien WB Thru	3	3	No	7	6	No
	O'Brien WB Right	0	0	No	0	0	No
	N. First NB Left	1	1	No	3	3	No
	N. First NB Thru/Right	1	1	No	1	1	No
	N. First SB Left/Thru	1	1	No	1	4	No
	N. First SB Right	0	1	No	1	1	No
O'Brien Highway at Cambridge Street	O'Brien EB Thru	3	3	No	5	6	No
	O'Brien WB Left/Thru	5	5	No	5	5	No
	Cambridge NB Right	6	6	No	6	6	No
	East SB Left/Thru/Right	1	1	No	1	1	No
O'Brien Highway at Land Boulevard	O'Brien EB Left	5	3	No	18	21	No
	O'Brien EB Thru	21	18	No	12	27	Yes
	O'Brien EB Right	12	8	No	0	8	No
	O'Brien WB Left	36	37	No	7	6	No
	O'Brien WB Thru	59	64	No	7	6	No
	O'Brien WB Right	3	3	No	6	4	No
	Land NB Left	2	2	No	4	7	No
	Land NB Thru	6	6	No	7	7	No
	Land NB Right	22	23	No	6	6	No
	Land SB Left/Thru/Right	41	45	No	29	31	No

CITY OF CAMBRIDGE
Special Permit – Transportation Impact Study (TIS)
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Volpe Exchange Parcel Development Planning Board Permit Number: **TBD**

Intersection	Lane	AM Peak Hour			PM Peak Hour		
		Baseline	2019 Build	Exceeds Criterion?	Baseline	2019 Build	Exceeds Criterion?
Cambridge Street at Third Street	Cambridge EB Left/Thru/Right	29	31	No	37	2	No
	Cambridge WB Left/Thru/Right	15	16	No	11	20	No
	Third NB Left/Thru/Right	5	6	No	11	10	No
	Third SB Left	2	2	No	1	20	Yes
	Third SB Thru/Right	12	15	No	6	1	No
Cambridge Street at First Street	Cambridge EB Left	5	4	No	7	8	No
	Cambridge EB Thru/Right	25	23	No	27	27	No
	Cambridge WB Left	2	2	No	3	3	No
	Cambridge WB Thru/Right	2	2	No	3	2	No
	First NB Left/Thru	3	3	No	18	18	No
	First NB Right	3	3	No	8	8	No
	N. First SB Left/Thru	1	1	No	0	0	No
	N. First SB Right	3	3	No	1	1	No
First Street at Thorndike Street	Thorndike EB Left/Thru/Right	2	2	No	7	7	No
	First NB Thru	1	1	No	17	15	No
	First SB Thru	2	2	No	2	3	No
First Street at Charles Street	Charles EB Left/Thru/Right	2	2	No	3	3	No
	Cambridgeside WB Left/Thru/Right	2	2	No	5	5	No
	First NB Thru/Right	2	2	No	14	14	No
	First SB Left/Thru	2	3	No	6	8	No
Third Street at Charles Street	Charles EB Left/Thru/Right	2	2	No	2	2	No
	Charles WB Left/Thru/Right	1	1	No	2	1	No
	Third NB Left/Thru/Right	1	1	No	4	7	No
	Third SB Left/Thru/Right	4	8	No	4	5	No

CITY OF CAMBRIDGE
Special Permit – Transportation Impact Study (TIS)
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Volpe Exchange Parcel Development Planning Board Permit Number: ____**TBD**_____

Intersection	Lane	AM Peak Hour			PM Peak Hour		
		Baseline	2019 Build	Exceeds Criterion?	Baseline	2019 Build	Exceeds Criterion?
Galileo Galilei Way/Binney Street at Fulkerson	Galileo EB Thru	7	7	No	10	10	No
	Galileo WB Thru	8	11	No	4	5	No
	Galilei WB Right	4	4	No	3	3	No
	Fulkerson SB Right/Hard Right	5	7	No	4	5	No
	Binney SEB Hard Right/Left	3	3	No	5	5	No
	Binney SEB Right	3	7	No	46	42	No
Binney Street at Third Street	Binney EB Left	2	2	No	5	7	No
	Binney EB Thru	6	5	No	7	12	No
	Binney EB Right	2	2	No	3	4	No
	Binney WB Left	5	9	No	2	2	No
	Binney WB Thru/Right	5	14	No	3	3	No
	Third NB Left/Thru	6	7	No	6	7	No
	Third NB Right	4	3	No	4	4	No
	Third SB Left/Thru/Right	12	20	Yes	10	16	No
Binney Street at Second Street	Binney EB Left	1	1	No	3	3	No
	Binney EB Thru/Right	7	6	No	7	8	No
	Binney WB Left	2	2	No	0	0	No
	Binney WB Thru/Right	4	7	No	4	4	No
	Second NB Left/Thru/Right	2	3	No	8	8	No
	Second SB Left/Thru/Right	4	6	No	4	4	No
Binney Street at First Street	Binney EB Left	1	1	No	6	5	No
	Binney EB Thru/Right	3	3	No	4	4	No
	Binney WB Left/Thru/Right	5	5	No	6	6	No
	First NB Left/Thru/Right	1	1	No	1	1	No
	First SB Left/Thru	3	3	No	5	5	No
	First SB Right	2	4	No	2	2	No

CITY OF CAMBRIDGE
Special Permit – Transportation Impact Study (TIS)
Planning Board Criteria Performance Summary
Volpe Exchange Parcel Development Planning Board Permit Number: ____**TBD**_____

Intersection	Lane	AM Peak Hour			PM Peak Hour		
		Baseline	2019 Build	Exceeds Criterion?	Baseline	2019 Build	Exceeds Criterion?
Binney Street at Land Boulevard	Binney EB Left	3	3	No	2	2	No
	Land NB Left	12	12	No	10	9	No
	Land NB Thru	13	14	No	6	3	No
	Land SB Thru	6	6	No	8	8	No
	Land SB Right	6	8	No	3	3	No
Hampshire Street at Portland Street/Cardinal Medeiros Avenue	Hampshire EB Left/Thru/Right	8	17	Yes	6	5	No
	Hampshire WB Left/Thru/Right	4	3	No	6	7	No
	Portland NB Left	1	1	No	1	2	No
	Portland NB Thru/Right	3	2	No	3	3	No
	Cardinal SB Left	1	2	No	0	0	No
	Cardinal SB Thru/Right	5	7	No	2	2	No
Broadway at Portland Street	Broadway EB Left/Thru/Right	46	48	No	6	2	No
	Broadway WB Left/Thru/Right	5	5	No	4	12	No
	Portland NB Left	1	1	No	2	4	No
	Portland NB Thru/Right	5	13	No	8	2	No
	Portland SB Left	1	2	No	0	9	No
	Portland SB Thru/Right	4	4	No	2	0	No
Broadway at Hampshire Street/Technology Square	Broadway EB Left/Thru/Right	6	6	No	3	3	No
	Broadway WB Left	2	2	No	0	0	No
	Broadway WB Thru	2	2	No	5	7	No
	Broadway WB Right	1	1	No	2	3	No
	Technology NB Left	1	1	No	7	7	No
	Technology NB Thru/Right	1	2	No	18	24	No
	Hampshire SB Left	3	3	No	2	2	No
	Hampshire SB Thru/Right	7	8	No	2	3	No

CITY OF CAMBRIDGE
Special Permit – Transportation Impact Study (TIS)
Planning Board Criteria Performance Summary
Volpe Exchange Parcel Development

Planning Board Permit Number: ____**TBD**_____

Intersection	Lane	AM Peak Hour			PM Peak Hour		
		Baseline	2019 Build	Exceeds Criterion?	Baseline	2019 Build	Exceeds Criterion?
Broadway at Galileo Galilei Way	Broadway EB Left	4	3	No	3	3	No
	Broadway EB Thru	4	10	No	5	8	No
	Broadway EB Right	1	1	No	1	1	No
	Broadway WB Left	1	1	No	2	3	No
	Broadway WB Thru	4	4	No	3	4	No
	Broadway WB Right	2	2	No	1	1	No
	Galileo NB Left	1	2	No	3	3	No
	Galileo NB Thru/Right	3	10	No	6	7	No
	Galileo SB Left	2	4	No	2	1	No
	Galileo SB Thru	7	10	No	6	12	No
	Galileo SB Right	8	7	No	5	10	No
Broadway at Ames Street	Broadway EB Thru	9	15	No	5	9	No
	Broadway EB Right	4	3	No	2	2	No
	Broadway WB Left	4	4	No	3	6	No
	Broadway WB Thru	5	5	No	5	7	No
	Ames NB Left	1	9	No	2	2	No
	Ames NB Right	3	4	No	3	3	No
Broadway/Main Street at Third Street	Broadway EB Left	3	10	No	5	9	No
	Broadway EB Thru/Right	2	6	No	3	5	No
	Main WB Thru	7	22	Yes	6	9	No
	Main WB Right	4	10	No	3	5	No
	Third SB Left/Thru	5	3	No	4	4	No
	Third SB Right	3	0	No	0	0	No
Main Street at Galileo Galilei Way/Vassar Street	Main EB Left	2	5	No	7	8	No
	Main EB Thru/Right	4	8	No	14	17	No
	Main WB Left	2	2	No	3	3	No
	Main WB Thru/Right	4	6	No	7	10	No
	Vassar NB Thru	4	10	No	8	11	No

CITY OF CAMBRIDGE
Special Permit – Transportation Impact Study (TIS)
Planning Board Criteria Performance Summary
Volpe Exchange Parcel Development Planning Board Permit Number: ____**TBD**_____

Intersection	Lane	AM Peak Hour			PM Peak Hour		
		Baseline	2019 Build	Exceeds Criterion?	Baseline	2019 Build	Exceeds Criterion?
	Vassar NB Right	2	3	No	3	4	No
	Galileo SB Left	1	1	No	2	2	No
	Galileo SB Thru	5	5	No	4	5	No
	Galileo SB Right	5	4	No	4	4	No
Main Street at Ames Street	Main EB Left/Thru/Right	4	6	No	15	16	No
	Main WB Left/Thru/Right	2	3	No	4	5	No
	Ames NB Left/Thru/Right	9	18	Yes	18	37	No
	Ames SB Left/Thru	1	2	No	3	6	Yes
	Ames SB Right	2	2	No	3	4	No
Memorial Drive at Ames Street	Memorial WB Left/Thru/Right	3	4	No	13	17	No
	Ames SB Thru/Right	3	3	No	5	6	No
	Memorial EB Thru	48	48	No	13	17	No
Memorial Drive at Wadsworth Street	Memorial WB Thru/Right	6	6	No	6	9	No
	Memorial EB U-turn	3	3	No	3	3	No
	Memorial EB Left	15	16	No	4	5	No
	Wadsworth SB Thru/Right	0	0	No	0	1	No
Memorial Drive at Western Avenue	Western WB Left/Thru/Right	25	23	No	72	71	No
	Memorial NB Left	8	8	No	15	30	Yes
	Memorial NB Thru	8	8	No	16	30	Yes
	Memorial SB Thru/Right	22	27	No	12	11	No
Memorial Dr at River St	River EB Left/Thru	9	9	No	7	8	No
	River EB Right	15	15	No	11	11	No
	Memorial NB Thru/Right	8	9	No	11	19	Yes
	Memorial SB Left/Thru	10	11	No	6	6	No

Criteria E – Pedestrian Delay

		AM Peak Hour			PM Peak Hour		
Intersection	**Crosswalk**	**Baseline**	**Build**	**Exceeds Criterion?**	**Baseline**	**Build**	**Exceeds Criterion?**
O'Brien Highway at Third St	East	D	D	No	D	D	No
	South	D	D	No	D	D	No
O'Brien Highway at Cambridge St	North	D	D	No	D	D	No
	East	D	D	No	D	D	No
	West	D	D	No	D	D	No
O'Brien Highway at Land Blvd	West	E	E	Yes	E	E	Yes
	North	E	E	Yes	E	E	Yes
	South	E	E	Yes	E	E	Yes
Cambridge St at Third St	East	B	B	No	B	B	No
	West	B	B	No	B	B	No
	North	B	B	No	B	B	No
	South	B	B	No	B	B	No
Cambridge St at First St	East	C	C	No	C	C	No
	West	C	C	No	C	C	No
	South	C	C	No	C	C	No
First St at Thorndike St	West	C	C	No	C	C	No
	North	C	C	No	C	C	No
	South	C	C	No	C	C	No
First St at Charles St	East	C	C	No	C	C	No
	West	C	C	No	C	C	No
	North	C	C	No	C	C	No
	South	C	C	No	C	C	No
Third St at Spring St	East	A	A	No	A	A	No
	West	A	A	No	A	A	No
	North	D	E	Yes	C	C	No
	South	C	D	Yes	B	C	Yes

		AM Peak Hour			PM Peak Hour		
Intersection	**Crosswalk**	**Baseline**	**Build**	**Exceeds Criterion?**	**Baseline**	**Build**	**Exceeds Criterion?**
Third St at Charles St	East	C	C	No	C	C	No
	West	C	C	No	C	C	No
	North	C	C	No	C	C	No
	South	C	C	No	C	C	No
Binney St/Galileo Galilei Way at Fulkerson St	East	D	D	No	D	D	No
	Northwest	D	D	No	D	D	No
	West	D	D	No	D	D	No
	North	D	D	No	D	D	No
Binney St at 5th Street	East	F	F	Yes	F	F	Yes
	West	F	F	Yes	F	F	Yes
	North	A	A	No	A	A	No
Binney St at Third St	East	D	D	No	D	D	No
	West	D	D	No	D	D	No
	North	D	D	No	D	D	No
	South	D	D	No	D	D	No
Binney St at Second St	East	D	D	No	D	D	No
	West	D	D	No	D	D	No
	North	D	D	No	D	D	No
	South	D	D	No	D	D	No
Binney St at First St	East	E	E	Yes	E	E	Yes
	West	E	E	Yes	E	E	Yes
	North	E	E	Yes	E	E	Yes
	South	E	E	Yes	E	E	Yes
Binney St at Land Blvd	West	E	E	Yes	E	E	Yes
	North	E	E	Yes	E	E	Yes
	South	E	E	Yes	E	E	Yes

CITY OF CAMBRIDGE
Special Permit – Transportation Impact Study (TIS)
Planning Board Criteria Performance Summary
Volpe Exchange Parcel Development Planning Board Permit Number: **TBD**

		AM Peak Hour			PM Peak Hour		
Intersection	**Crosswalk**	**Baseline**	**Build**	**Exceeds Criterion?**	**Baseline**	**Build**	**Exceeds Criterion?**
Hampshire St at Portland St/Cardinal Medeiros Ave	East	C	C	No	C	C	No
	West	C	C	No	C	C	No
	North	B	B	No	B	B	No
	South	B	B	No	B	B	No
Broadway at Portland St	East	C	C	No	C	C	No
	West	C	C	No	C	C	No
	North	B	B	No	B	B	No
	South	B	B	No	B	B	No
Broadway at Hampshire St	East	D	D	No	D	D	No
	West	D	D	No	D	D	No
	North	C	C	No	D	D	No
	South	C	C	No	D	D	No
Broadway at Galileo Galilei Way	East	D	D	No	D	D	No
	West	D	D	No	D	D	No
	North	D	D	No	D	D	No
	South	D	D	No	D	D	No
Broadway at Green Garage	East	F	F	Yes	F	F	Yes
	West	F	F	Yes	F	F	Yes
	South	B	B	No	C	C	No
Broadway at Ames St	East	D	D	No	D	D	No
	West	D	D	No	D	D	No
	South	D	D	No	D	D	No
Broadway at Main St and Third St	East	D	D	No	D	D	No
	West	D	D	No	D	D	No
	North	D	D	No	D	D	No
	South	D	D	No	D	D	No

		AM Peak Hour			PM Peak Hour		
Intersection	**Crosswalk**	**Baseline**	**Build**	**Exceeds Criterion?**	**Baseline**	**Build**	**Exceeds Criterion?**
Third St at Potter St and Kendall St	East	A	A	No	A	A	No
	West	A	D	Yes	A	D	Yes
	North	E	F	Yes	F	F	Yes
	South	F	F	Yes	F	F	Yes
Third St at Munroe St and Linskey Way	East	A	A	No	A	A	No
	West	A	A	No	A	A	No
	North	F	F	Yes	F	F	Yes
	South	E	F	Yes	E	F	Yes
Main St at Albany St	East	F	F	Yes	F	F	Yes
	West	F	F	Yes	F	F	Yes
	South	C	C	No	B	B	No
Galileo Galilei Way at Main St	East	D	D	No	D	D	No
	West	D	D	No	D	D	No
	North	D	D	No	D	D	No
	South	D	D	No	D	D	No
Main St at Ames St	East	C	C	No	C	C	No
	West	C	C	No	C	C	No
	North	D	D	No	D	D	No
	South	D	D	No	D	D	No
Main St at Kendall Station Crossing	East	C	C	No	D	E	Yes
	West	C	C	No	D	E	Yes
Memorial Dr at Longfellow Bridge	North	D	D	No	C	C	No
	South	B	B	No	D	D	No
	Southwest	A	A	No	A	A	No
Memorial Dr at Ames St	East	D	D	No	D	D	No
	West	D	D	No	D	D	No
	North	D	D	No	D	D	No

		AM Peak Hour			PM Peak Hour		
Intersection	**Crosswalk**	**Baseline**	**Build**	**Exceeds Criterion?**	**Baseline**	**Build**	**Exceeds Criterion?**
Memorial Dr at Wadsworth St	East	D	D	No	D	D	No
	North	D	D	No	D	D	No
Memorial Dr at Western Ave	East	E	E	Yes	E	E	Yes
	West	E	E	Yes	E	E	Yes
	North	E	E	Yes	E	E	Yes
Memorial Dr at Cambridge St/River St	East	E	E	Yes	E	E	Yes
	West	E	E	Yes	E	E	Yes
	North	E	E	Yes	E	E	Yes
	South	E	E	Yes	E	E	Yes

Criteria F – Pedestrian and Bicycle Facilities

Adjacent Street	Link (between)	Sidewalk or Walkway Present	Exceeds Criteria?	Bicycle Facilities or Right of Ways Present	Exceeds Criteria?
Binney Street	6th Street and 5th Street	Yes	No	Yes	No
	5th Street and Third Street	Yes	No	Yes	No
Third Street	Binney Street and Munroe Street / Linskey Way	Yes	No	Yes	No
	Munroe Street / Linskey Way and Athenaeum Street	Yes	No	Yes	No
	Athenaeum Street and Potter Street / Kendall Street	Yes	No	Yes	No
	Potter Street / Kendall Street and Broad Canal Way	Yes	No	Yes	No
	Broad Canal Way and Broadway / Main Street	Yes	No	Yes	No
Broadway	Third Street / Main Street and Green Garage Exit	Yes	No	Yes	No
	Green Garage Exit and Ames Street	Yes	No	Yes	No
Munroe Street	Third Street and 5th Street	Yes	No	No	No
5th Street	Munroe Street and Potter Street	Yes	No	No	No
Potter Street	5th Street and Third Street	Yes	No	No	No

Transportation Impact Study

This Transportation Impact Study (TIS) for the proposed MIT Volpe Exchange Parcel in Cambridge (the Project) describes the existing and future transportation conditions in the study area in accordance with the City of Cambridge Sixth Revision (November 28, 2011) of the Transportation Impact Study Guidelines.

The study area for the TIS includes 24 signalized intersections and 9 unsignalized intersections as presented in Figure E.

1. Inventory of Existing Conditions

This section includes inventories of physical and operational conditions in the study area including roadways, intersections, crosswalks, sidewalks, on-street and off-street parking, transit facilities, and land uses in the study area. The section also presents the supporting transportation data that were collected and compiled, including automatic traffic recorder counts (ATRs), intersection turning movement counts (TMCs), pedestrian and bicycle counts, vehicle crash data, and transit service data.

a. Roadways

The Project area is comprised of a ten-acre parcel generally bound by Binney Street to the north, Third Street to the east, Broadway to the south, and the Loughrey Walkway/Bikeway to the west (excluding the four-acre site of the new government facility and the residential building at 303-385 Third Street). Figure B, previously presented, shows the existing roadway network surrounding the Project Site.

Binney Street is a four-lane divided roadway running east-west from Edwin H. Land Boulevard to Galileo Galilei Way. Third Street is a two-lane roadway running north-south from Monsignor O'Brien Highway to Broadway near Kendall Square MBTA Station. Broadway runs east-west from Harvard Square to Main Street/Third Street. Along the frontage of the site, Broadway is a two-lane divided roadway with turning lanes provided at intersections. The Loughrey Walkway/Bikeway (also known as the 6th Street Walkway) is an 800-foot-long pedestrian walkway and bicycle path that connects the East Cambridge neighborhood to Kendall Square between Binney Street and Broadway.

Existing roadway plans, shown in Figures 1.a.1, 1.a.2, and 1.a.3, document the existing conditions along Broadway between Ames Street and Third Street, Third Street between Binney Street and Broadway, and Binney Street between 6th Street and Third Street. Broadway, Third Street, and Binney Street are prominent roadways used to access the Project site.

b. Intersections

The Project study area includes the following 33 study intersections which are presented in Figure E and individually illustrated in Figures 1.b.1 through 1.b.32 (Intersection Sketches).

1. Monsignor O'Brien Highway/Third Street
2. Monsignor O'Brien Highway/Cambridge Street/East Street
3. Monsignor O'Brien Highway/Land Boulevard
4. Cambridge Street/Third Street
5. Cambridge Street/First Street
6. First Street/Thorndike Street
7. First Street/Charles Street
8. Third Street/Spring Street
9. Third Street/Charles Street
10. Galileo Galilei Way/Binney Street/Fulkerson Street
11. Binney Street/5th Street
12. Binney Street/Third Street
13. Binney Street/Second Street
14. Binney Street/First Street
15. Binney Street/Land Boulevard
16. Hampshire Street/Cardinal Medeiros Avenue/Portland Street
17. Broadway/Portland Street (shown in same sketch as intersection 16)
18. Broadway/Hampshire Street
19. Broadway/Galileo Galilei Way
20. Broadway/Ames Street
21. Broadway /Green Garage
22. Broadway/Main Street/Third Street
23. Third Street/Potter Street/Kendall Street
24. Third Street/Munroe Street/Linskey Way
25. Main Street/Albany Street
26. Main Street/Galileo Galilei Way/Vassar Street
27. Main Street/Ames Street
28. Main Street/Kendall Station Crosswalk
29. Main Street/Longfellow Bridge
30. Memorial Drive/Ames Street
31. Memorial Drive/Wadsworth Street
32. Memorial Drive/Western Avenue
33. Memorial Drive/Cambridge Street/River Street

c. Parking

Existing Vehicular Parking

On-Street Vehicular Parking

Short term parking is permitted on some of the streets in the vicinity of the Project site. The majority of on-street curbside uses surrounding the study area are signed as "no parking" with some areas along Third Street designated as metered parking and private parking on Potter Street and Fifth Street.

Off-Street Vehicular Parking

Currently, there are ten employee/loading driveways to the USDOT Volpe site. Three along Broadway, one on Potter Street, two on 5th Street, two on Munroe Street and two on Broadway. The existing USDOT Volpe site has a total of approximately 570 parking spaces, which are not open to the general public.

Figure C shows the location of the existing USDOT Volpe parking lots in the Kendall Square Area.

Existing Bicycle Parking

Short-Term Bicycle Parking

There are a variety of short-term, outdoor parking racks within the study area as well as in the surrounding neighborhood. An inventory of existing bicycle parking locations and utilization was conducted on January 15, 2020. The study area included Broadway between Ames Street and Third Street, Third Street between Binney Street and Broadway, Binney Street between 6th Street and Third Street, and the Loughrey Walkway/Bikeway between Binney Street and Broadway. Bicycles that were parked in bicycle racks, versus bicycle parked on fences, signs, trees, meters, lamp posts, or other structures, were counted at 6:00 AM, 10:00 AM, and 7:00 PM. The findings are summarized below.

Table 1.c.1 Short Term Bicycle Parking Inventory

Location	Short term Bike Parking Spaces	Utilization (bike parked in rack / bike parked "illegaly"[3])		
January 15, 2020[1]		6:00 AM	10:00 AM	7:00 PM
Binney Street (between 6th Street and Third Street)	14	0/0	1/0	0/0
Third Street (between Binney Street and Broadway)	80	14/1	19/4	24/3
Broadway (between Ames Street and Third Street)	66	4/0	16/0	8/2
Loughrey Walkway/Bikeway (between Binney Street and Broadway)	6	1/0	3/0	2/0
May 6, 2015 (SOMA)[2]				
Broadway (between Galileo Galilei Way and Third Street)	64	n/a	14/2	n/a
Third Street (between Binney Street and Broadway)	50	n/a	39/4	n/a

Source: [1]VHB Observations conducted on January 15, 2020.
[2]MIT Kendall Square SOMA TIS – counted on May 6, 2015
[3]"Illegal" bike parking defined as bicycle parked onto a fence, a sign, a tree, or anything other than a bike rack

Since January is not an ideal month to observe short-term bike parking, the short-term bicycle parking observations were supplemented with data collected for the SoMa project on Tuesday May 6, 2015. Observations for the SoMa TIS that overlap with the Volpe observations were taken along Broadway between Galileo Galilei Way and Third Street and Binney Street between Binney Street and Broadway. At 10:00 AM the following was observed:

- Broadway between Galileo Galilei Way and Third Street: 14 occupied spaces out of 64 short term bike parking spaces
- Third Street between Binney Street and Broadway: 39 occupied spaces out of 50 spaces.

Existing Bike Share Stations

There are at least seven Bluebikes (formally Hubway) stations currently available in the Kendall Square area, within a quarter mile of the Project, with another two planned as part of the SoMa commitments:

- Third Street at Binney Street – 15 Docks

- Binney Street / 6th Street – 19 Docks
- Ames Street at Broadway – 19 Docks
- Kendall/MIT Station – 23 Docks
- One Broadway / Kendall Square at Main Street / Third Street – 23 Docks
- Kendall Street – 15 Docks
- Ames Street at Main Street – 18 Docks (plus valet service between 7:00 AM and 7:00 PM, Monday through Friday)

Figure 1.c.3 shows the locations of Bluebikes Stations within the Project site.

Long-Term Bicycle Parking

The TIS Scope requested that a utilization study be conducted for the long-term bicycle parking spaces within the USDOT Volpe Site. However, because it is a federal site, VHB was not granted access to the bike parking spaces within the buildings and it is unknown how many long-term bicycle parking spaces exist within the site.

d. Transit Services

The Project area is accessible by the Massachusetts Bay Transportation Authority's (MBTA) Red Line and Green Line, as well as several MBTA Bus lines and private shuttle services.

A graphical illustration of study area transit lines is presented in Figure 1.d.1 (Public Transit Services) and Figure 1.d.2 (Private Shuttle Services) and is described in more detail in the following sections.

Red Line

Kendall Square is served by the Red Line, which runs between Alewife Station to the north and Braintree Station/Ashmont Station to the south. At Ashmont, passengers can continue to Mattapan by transferring to the Mattapan high-speed trolley. The Red Line connects with the Green Line at Park Street and the Orange Line and Silver Line at Downtown Crossing. Connections to all southern commuter rail lines and the Silver Line (to South Boston, Chelsea, and Logan Airport) are made at South Station. In addition, the Fitchburg commuter rail line connects with the Red Line at Porter Square.

The Project site is located one block (less than a 3-minute walk) to the north of the Kendall/MIT Red Line Station. The Red Line runs on 9-minute headways during peak hours on each branch, which results in a combined headway of service of 4.5 minutes at Kendall/MIT Station. Service from Alewife Station is provided between 5:16 AM to 12:27 AM. Service from Braintree is provided between 5:13 AM (5:09 AM on Saturdays) to 12:17 AM, and Ashmont Service is available from 5:16 AM to 12:30 AM. The Mattapan Trolley runs from 5:05 AM to 12:53 AM. Sunday service is provided between 6:00 AM and 12:30 AM.

Green Line

The Green Line stop closest to the Project site is Lechmere Station (currently under construction and scheduled to be completed prior to any development on the proposed Project site), a 20-25-minute walk from the Site. The E Branch of the Green Line light rail runs between Lechmere Station in Cambridge and Heath Street in Jamaica Plain. The Green Line branches out at Park Street Station, where passengers have the option to connect onto the "B" Line to Boston College, "C" Line to Cleveland Circle, and the "D" Line to Riverside. Connections to the Orange Line are available at North Station, Haymarket Station, Park Street Station. The Red Line can be accessed at Park Street Station as well. A connection to the Blue Line is available at Government Center and commuter rail connection to the north is available at North Station. The E Branch Green Line service runs on 6-minute headways during peak hours with two-car trainsets during peak periods. Service at Lechmere Station is provided between 5:01 AM and 12:30 AM on weekdays and Saturdays. Sunday service is provided between 5:35 AM and 12:30 AM.

MBTA Buses

Route 1: Harvard Square to Dudley Square via Mass. Ave.

The Route 1 bus travels from Cambridge, Harvard Square Station to Dudley Station in Roxbury, via Massachusetts Avenue. The Route 1 bus is a key bus route that experiences some of the largest MBTA ridership. The stop closest to the Project site is located approximately 0.8 miles away, on MIT's campus at 84 Massachusetts Avenue. Service on the Route 1 bus is provided between 4:37 AM and 1:42 AM and runs on 8-minute headways during peak hours. Saturday service is provided from 4:40 AM to 1:42 AM. Sunday service is provided from 6:00 AM to 1:35 AM.

Route 64 Oak Square – University Park or Kendall/MIT

The Route 64 bus travels from Oak Square in Brighton to Kendall/MIT during the weekdays and from Oak Square to University park on weekends. The stop closest to the Project site is at Kendall/MIT Station on Main Street. Service is provided between 5:21 AM and 1:30 AM and runs on about half hour headways during peak hours. Saturday service is provided from 5:20 AM to 1:26 AM. Sunday service is provided from 8:18 AM to 7:07 PM.

Route 68: Harvard Square to Kendall/MIT Station

The Route 68 bus connects Harvard Square and Kendall/MIT, via Broadway. The stop closest to the Project site is at Kendall/MIT Station on Main Street. Service is provided between 6:35AM and 6:58 PM with 40-minute headways. No service is provided on the weekends.

Route 85: Spring Hill to Kendall/MIT Station

Bus Route 85 connects Spring Hill, Summer Street, and Union Square in Somerville to Kendall Square. This bus route terminates at the Kendall/MIT Red Line Station on Main Street. Service on this route is only provided during weekdays from 5:45 AM to 7:58 PM with 15-45-minute headways.

Route CT2: Sullivan Square Station to Ruggles Station

Bus Route CT2 is a limited stop, cross-town route that operates between Sullivan Square in Charlestown and Ruggles Station in Roxbury. This bus route travels to the southwest of the Project area along Broadway and stops at Ames Street and Broadway. Service on this bus route runs on 20 to 30-minute headways and is provided only on weekdays from 5:55 AM to 7:44 PM.

Privately-Operated Services

Charles River TMA EZRide Shuttle

The Charles River Transportation Management Association (TMA) operates the EZRide shuttle service between Kendall Square, East Cambridge, MIT and Cambridgeport. This shuttle provides connections to the Green Line at Lechmere Station and the MBTA commuter rail services from the north, as well as the Green Line and Orange Line, at North Station. The route traverses Binney Street (north of the site) and Main Street (south of the site), as illustrated in Figure 1.d.2. Service on the EZRide is provided at 7 to 10-minute headways during typical commuter peak period in each direction between 6:20 AM and 7:58 PM on weekdays. EZRide shuttles do not run on weekends.

MIT Tech Shuttle

MIT operates the Tech Shuttle which provides students, faculty, and staff with a free shuttle around campus starting at Kendall Square and looping around Memorial Drive and Amherst Alley turning onto Vassar Street and later to Main Street where it again reaches Kendall Square. The shuttles operate Monday through Friday from 6:15 AM to 11:00 PM. Headways are 10 minutes during the AM and PM commuter peak periods and 20 minutes all other times. No weekend service is provided.

MIT Boston Daytime Shuttle

MIT operates a shuttle between 84 Massachusetts Avenue and Commonwealth Avenue in Boston every 30 minutes between the hours of 8:00 AM to 6:00 PM on weekdays during the school year (September through May). No weekend service is provided.

MIT Campus Shuttle - Lincoln Laboratory

Lincoln Laboratory's Facilities Services Department operates a weekday shuttle service between the MIT campus (Building E23 and E39) and the main Laboratory site in Lexington. Service runs from MIT every two hours starting at 7:00 AM with the last shuttle departing from MIT at 6:00 PM.

MIT Weekend - Grocery Shuttle

The Weekend Shuttle, also called the Grocery Shuttle, is operated by MIT and it transports MIT students to and from Trader Joe's, the Whole Foods Market, Kendall Square, and Central Square. The service operates Sundays from 11:30 AM to 4:30 PM during the school year. MIT operates an additional shuttle for students to and from Costco and Target in Everett. This

service operates from 11:00 AM to 3:05 PM on select Sundays throughout the school year. No service is provided on weekdays or Saturdays for either shuttle.

MIT SafeRide Shuttle

MIT operates a safety shuttle service, known as SafeRide, providing students with safe transportation at night within and around the MIT campus and Boston neighborhoods. Service runs on a fixed route from 6:00 PM to 11:00 PM daily and then on an On-Demand mode (where students can request a ride online or through an app) from 11:00 PM to 2:30 AM Sunday to Wednesday and 11:00 PM to 3:30 PM Thursday to Saturday. The last call for the On-Demand shuttle is half an hour before the end of service.

MIT Exchange Bus - Wellesley

The Wellesley-MIT Exchange operates between Wellesley College and MIT from 7:00 AM until 12:40 PM on weekdays. No service is provided on weekends. This service is only available for Wellesley and MIT staff and students.

MASCO M2 Shuttle

The MASCO M2 shuttle runs from Harvard Square to the Longwood Medical Area and is open to the public for a fee. The M2 shuttle starts in Harvard Square and travels via Massachusetts Ave to the southwest of the Project site. The shuttle stops at the main entrance of MIT at 77 Massachusetts Avenue. This shuttle operates from 6:40 AM to 11:23 PM with 10-minute headways during the peak periods. There is limited Saturday service provided during the school year, running every hour from 8:00 AM to 10:23 PM and no service is provided on Sundays or holidays.

Cambridgeside Galleria Shuttle

Cambridgeside Galleria offers a free shuttle service between the Cambridgeside Galleria and the MBTA Kendall/MIT Station (Red Line). This shuttle stops at Main Street just south of the Project site. The shuttle operates between 9:00 AM and 8:00 PM Monday through Saturday, and between 12:00 PM and 7:00 PM on Sunday with 20-minute headways.

e. Land Use

Figure 1.e.1 illustrates land uses in the area surrounding the Volpe Exchange Parcel Project area. The neighborhood is comprised of a mixed use of land including commercial, residential, institutional, governmental, and open public space.

f. Existing USDOT Volpe Transportation Center

The existing USDOT Volpe National Transportation Systems Center is a 14-acre site owned by the United States General Services Administration (GSA) which includes six buildings dedicated to the advancement of transportation innovation, emphasizing on safety, infrastructure, innovation, and accountability. There are approximately 600 federal employees at the Volpe Center, with an additional approximately 325 on-site contractors.

In 2017, MIT entered into an agreement to construct a new single, consolidated approximately 400,000 square foot Volpe Transportation Building supported by an approximate 318-space vehicular parking garage on a four-acre portion of the site, and to acquire the remaining 10-acres. Access to the site will be provided along Potter Street Extension and through a relocated curb-cut along Binney Street. Because there is no change in the total number of employees, no trip credits will be taken in the traffic analysis presented in the TIS, even though parking is being reduced. However, in the future study scenario in this report, the existing Volpe Transportation Center vehicle trips will be re-routed through the local roadway network in order to capture the future access to the new GSA building. At the time of this filing, the GSA building is under construction and is expected to be completed in 2023.

2. Data Collection

a. ATR Counts

48-hour Automatic Traffic Recorder (ATR) counts were conducted on Wednesday, May 1, 2019 and Thursday, May 2, 2019, to capture existing daily vehicle volumes within the Project study area at the following locations:

- Binney Street, between 5th Street and 6th Street
- Broadway, east of Ames Street
- Third Street, north of Main Street
- Main Street, west of Galileo Galilei Way
- Main Street between Broad Canal Way and Longfellow Bridge

A traffic volume summary for the ATRs is presented in Tables 2.a.1 and 2.a.2; detailed count data sheets are included in the Appendix.

Table 2.a.1 Existing Traffic Volume Summary (May 2019)

		AM Peak Hour			PM Peak Hour		
Location	Daily	Volume[b]	K[c]	Peak Dir	Volume	K	Peak Dir
Binney Street *(between 5th Street and 6th Street)*	12,239	943	8%	37% WB	1,051	9%	70% EB
Broadway *(east of Ames Street)*	13,620	924	7%	57% EB	1,016	7%	64% EB
Third Street *(north of Main Street)*	10,067	713	7%	51% NB	872	9%	50% SB
Main Street *(west of Galileo Galilei Way)*	10,699	778	7%	57% EB	898	8%	51% EB
Main Street *(between Broad Canal Way and Longfellow Bridge)*	20,138	1,352	7%	56% EB	1,593	8%	75% EB

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

Table 2.a.2 Existing Average Daily Traffic Summary (May 2019)

	Binney Street *(between 5th Street and 6th Street)*		**Broadway *(east of Ames Street)***		**Third Street *(north of Main Street)***		**Main Street *(west of Galileo Galilei Way)***		**Main Street *(between Broad Canal Way and Longfellow Bridge)***	
Start Time	EB	WB	EB	WB	NB	SB	EB	WB	EB	WB
12:00 AM	37	31	59	61	29	22	49	36	123	78
1:00 AM	29	15	34	25	21	15	44	22	65	35
2:00 AM	25	13	20	17	13	8	20	22	38	24
3:00 AM	14	26	11	16	11	13	20	18	26	22
4:00 AM	28	81	39	68	37	22	33	50	54	107
5:00 AM	85	341	98	279	178	90	75	170	134	428
6:00 AM	138	396	237	323	241	209	125	254	264	439
7:00 AM	280	525	343	488	291	329	219	420	462	623
8:00 AM	331	579	389	521	352	346	290	436	568	752
9:00 AM	339	510	404	491	290	353	341	394	576	715
10:00 AM	286	339	400	386	257	295	297	290	587	487
11:00 AM	316	311	399	352	268	254	313	252	575	433
12:00 PM	308	253	383	327	268	280	268	240	574	391
1:00 PM	413	232	387	318	250	278	326	231	665	383
2:00 PM	538	254	455	328	265	381	434	215	861	370
3:00 PM	636	245	526	350	289	404	435	271	999	390
4:00 PM	636	275	543	347	325	443	482	319	1,074	404
5:00 PM	732	300	608	378	397	465	455	441	1,094	408
6:00 PM	598	297	570	355	342	363	390	339	1,011	376
7:00 PM	349	178	346	340	216	239	307	220	633	381
8:00 PM	219	125	255	264	155	175	227	154	507	313
9:00 PM	176	100	260	223	133	123	221	124	495	257
10:00 PM	109	93	172	191	119	103	162	88	334	242
11:00 PM	50	48	102	132	58	52	98	62	206	155
Total	**6,672**	**5,567**	**7,040**	**6,580**	**4,805**	**5,262**	**5,631**	**5,068**	**11,925**	**8,213**

b. Historical Count Data

Historic average daily traffic volumes were obtained from the KSURP 2018 report and other TISs in the area for each of the ATR locations. The average daily volumes have been combined and graphed to illustrate average daily traffic along Binney Street, Third Street and Main Street. It should be noted that traffic volumes from 2014 were impacted by the construction of the Longfellow Bridge.

Chart 2.b.1 shows the yearly Average Daily Traffic (ADT) for count locations along Third Street, Chart 2.b.2 shows the yearly ADT for count locations along Binney Street, and Chart 2.b.3 shows the yearly ADT for count locations along Main Street.

Chart 2.b.1 Third Street (north of Broadway) Historic Average Daily Traffic Volumes

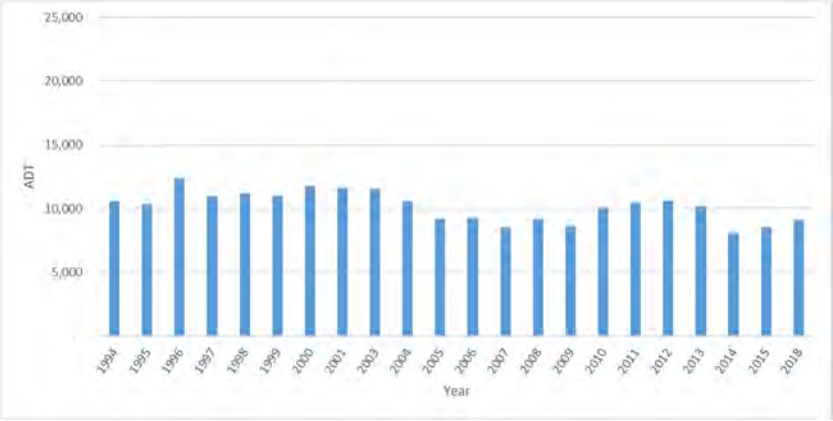


Chart 2.b.2 Broadway (east of Ames) Historic Average Daily Traffic Volumes

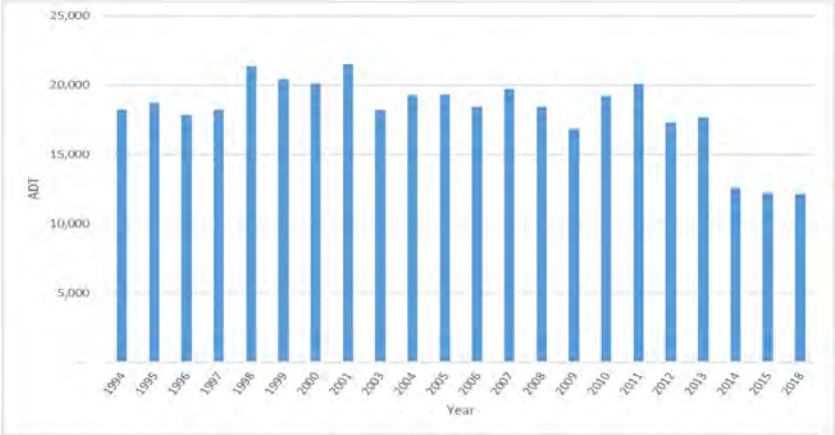
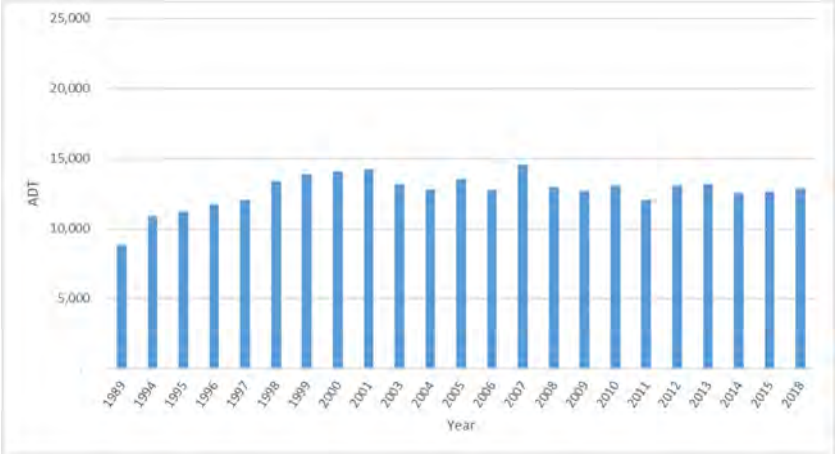


Chart 2.b.3 Binney Street (west of Third) Historic Average Daily Traffic Volumes



c. Pedestrian and Bicycle Counts

Twelve-hour pedestrian and bicycle counts were performed on Wednesday, May 1, 2019 between 7:00 AM and 7:00 PM at the following locations:

- Binney Street, between 5th Street and 6th Street
- Broadway, east of Ames Street
- Broadway Mid-Block Crossing
- Third Street, north of Main Street
- Main Street, west of Galileo Galilei Way
- Main Street, between Broad Canal Way and Longfellow Bridge

Pedestrian count data are summarized in Table 2.c.1 and bicycle count data are presented in Table 2.c.2.

Table 2.c.1 Existing 12-Hour Pedestrian Volumes (May 2019)

Hour Commencing	Binney Street *(between 5th Street and 6th Street)*				Broadway *(east of Ames Street)*				Broadway Mid-Block Crossing		Third Street *(north of Main Street)*			
	North Sidewalk		South Sidewalk		North Sidewalk		South Sidewalk		Crosswalk		East Sidewalk		West Sidewalk	
	EB	WB	EB	WB	EB	WB	EB	WB	NB	SB	NB	SB	NB	SB
7:00 AM	35	30	0	0	33	213	46	58	315	39	456	168	77	89
8:00 AM	98	74	0	0	97	303	52	61	515	65	740	298	163	161
9:00 AM	63	50	0	0	54	243	65	86	314	50	533	256	107	139
10:00 AM	35	29	0	0	46	54	36	87	79	44	223	173	52	82
11:00 AM	41	61	2	0	58	78	45	72	66	68	259	189	121	93
12:00 PM	63	118	10	0	96	65	88	156	114	84	393	325	157	168
1:00 PM	79	41	7	0	65	84	71	62	59	66	273	336	105	142
2:00 PM	17	31	2	0	56	45	45	72	40	88	287	229	82	92
3:00 PM	20	46	1	1	109	56	70	124	48	167	256	313	97	114
4:00 PM	32	94	0	0	197	72	45	108	80	297	287	484	100	146
5:00 PM	71	120	0	0	233	134	124	153	154	319	385	696	217	229
6:00 PM	71	67	0	0	95	83	74	143	67	115	307	434	171	175
Total	**625**	**761**	**22**	**1**	**1,139**	**1,430**	**761**	**1,182**	**1,851**	**1,402**	**4,399**	**3,901**	**1,449**	**1,630**

Table 2.c.1 Continued: Existing 12-Hour Pedestrian Volumes (May 2019)

Hour Commencing	Main Street *(west of Galileo Galilei Way)*				Main Street *(between Broad Canal Way and Longfellow Bridge)*			
	North Sidewalk		South Sidewalk		North Sidewalk		South Sidewalk	
	EB	WB	EB	WB	EB	WB	EB	WB
7:00 AM	180	86	113	72	21	46	42	48
8:00 AM	391	178	243	150	22	82	61	50
9:00 AM	297	164	205	202	11	48	48	48
10:00 AM	141	127	110	134	3	22	19	28
11:00 AM	247	186	178	180	19	23	29	33
12:00 PM	464	399	229	238	27	26	47	42
1:00 PM	311	281	165	230	29	27	34	31
2:00 PM	187	177	145	240	21	23	32	28
3:00 PM	148	183	152	200	29	26	30	48
4:00 PM	233	279	137	269	67	34	53	97
5:00 PM	294	363	176	280	101	44	76	127
6:00 PM	289	211	172	170	34	40	89	106
Total	**3,182**	**2,634**	**2,025**	**2,365**	**384**	**441**	**560**	**686**

Table 2.c.2 Existing 12-Hour Bicycle Volumes (May 2019)

Hour Commencing	Binney Street *(between 6th Street and 5th Street)*						Broadway *(between Ames Street and Green Garage Driveway)*						Broadway Mid-Block Crossing	
	Bike Lane		North Sidewalk		South Sidewalk		Bike Lane		North Sidewalk		South Sidewalk		Crosswalk	
	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	NB	SB
7:00 AM	16	8	0	0	0	0	99	19	0	0	2	0	1	0
8:00 AM	37	30	0	1	0	0	289	18	1	0	4	1	2	1
9:00 AM	34	20	2	0	0	0	177	14	0	2	3	0	3	0
10:00 AM	9	3	0	13	0	0	56	22	0	0	1	0	1	0
11:00 AM	5	6	0	0	0	0	54	9	0	0	1	0	0	0
12:00 PM	6	5	1	0	0	0	26	17	1	0	1	0	0	1
1:00 PM	4	10	1	1	0	0	21	21	0	0	0	1	0	0
2:00 PM	9	11	0	0	0	0	24	15	0	1	0	0	0	0
3:00 PM	4	5	0	0	0	0	16	35	0	0	0	0	0	0
4:00 PM	22	25	3	0	0	0	31	87	0	1	1	1	4	1
5:00 PM	33	44	2	0	0	0	58	239	0	0	3	0	3	0
6:00 PM	13	23	0	1	1	0	42	144	0	0	0	0	2	0
Total	**192**	**190**	**9**	**16**	**1**	**0**	**893**	**640**	**2**	**4**	**16**	**3**	**16**	**3**

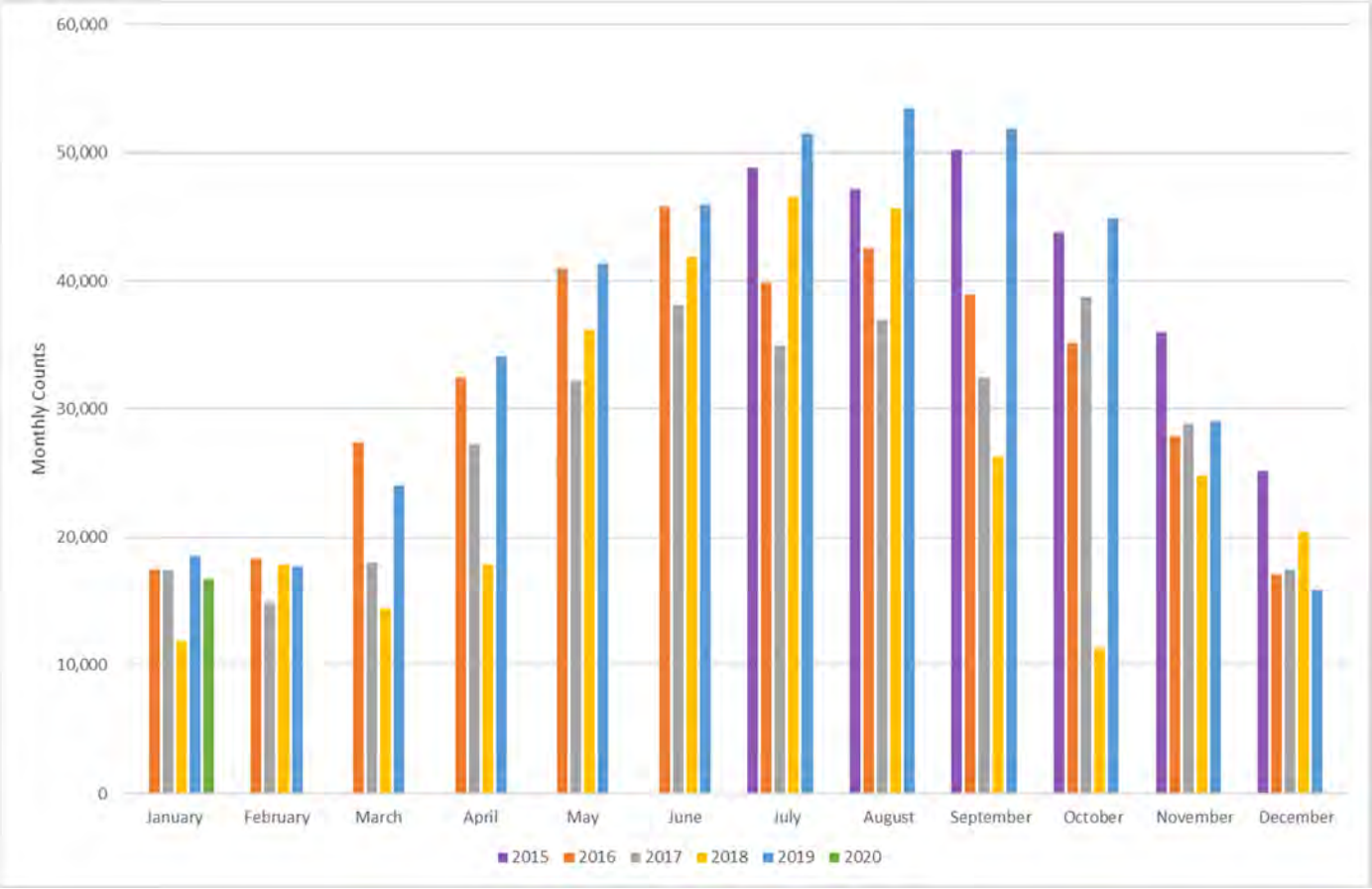
Table 2.c.2 Continued: Existing 12-Hour Bicycle Volumes (May 2019)

Hour Commencing	Third Street *(between Broad Canal Way and Main Street/Broadway)*						Main Street *(between Technology Square and Galileo Galilei Way)*						Main Street *(between Third Street and Longfellow Bridge)*					
	Bike Lane		East Sidewalk		West Sidewalk		Bike Lane		North Sidewalk		South Sidewalk		Bike Lane		North Sidewalk		South Sidewalk	
	NB	SB	NB	SB	NB	SB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB
7:00 AM	4	19	16	1	0	3	11	32	0	0	0	1	118	26	1	3	0	0
8:00 AM	20	34	39	2	0	0	28	112	0	4	5	7	241	39	0	7	0	0
9:00 AM	3	35	23	0	1	0	25	101	1	3	4	3	156	27	0	1	0	2
10:00 AM	3	21	12	1	1	0	13	64	2	0	1	5	57	21	1	2	0	1
11:00 AM	5	32	3	0	0	0	24	43	0	0	5	10	53	8	1	3	0	3
12:00 PM	5	17	8	1	0	0	21	25	1	0	0	0	29	13	1	3	0	1
1:00 PM	3	18	12	1	1	0	18	26	0	0	0	3	26	20	1	5	0	1
2:00 PM	5	9	9	1	0	0	30	19	1	0	3	2	29	17	0	4	2	1
3:00 PM	6	14	9	0	2	0	24	16	0	3	1	0	25	30	0	4	0	0
4:00 PM	11	24	24	3	0	2	43	36	0	0	4	0	47	68	1	9	0	0
5:00 PM	16	42	44	4	0	1	97	33	2	3	13	1	64	182	1	28	0	4
6:00 PM	15	38	13	1	0	0	87	34	0	0	3	4	64	104	1	13	0	1
Total	**96**	**303**	**212**	**15**	**5**	**6**	**421**	**541**	**7**	**13**	**39**	**36**	**909**	**555**	**8**	**82**	**2**	**14**

In addition to the counts collected from the TMCs, data was obtained from the City's Eco-Totem count station on Broadway located between Ames Street and Third Street. This count station was installed in 2015 and counts cyclists via an in-ground loop detector. Graph 2.c.1 shows the total monthly number of cyclists (in the eastbound and westbound directions combined) for part of 2015, all of 2016, 2017, 2018, and 2019, and January 2020.

As illustrated in Graph 2.c.1, bicycling in Kendall Square experiences a peaking during the summer months.

Graph 2.c.1 Broadway Eco-Totem Monthly Bicycle Volumes (2015-2020)



d. Intersection Turning Movement Counts

Turning movement counts (TMC), including cars, trucks, pedestrians, and bicycles, were conducted at all study area intersections during the morning and evening peak periods, 7:30 AM – 9:30 AM and 4:30 PM – 6:30 PM, on Wednesday, May 1, 2019. The results of these counts indicate that the overall weekday peak traffic hours in the study area are 7:30 AM – 8:30 AM and 5:00 PM – 6:00 PM. The existing AM and PM Peak Hour vehicle, pedestrian, and bicycle turning movement volumes are presented in Figures 2.d.1 through 2.d.6. Detailed count sheets are included in the Appendix.

VHB staff also conducted queue observations during the AM and PM Peak Hours at the signalized intersections on May 1, 2019 while TMC were being captured. Table 2.d.1 presents the average existing queue observations for the signalized study area intersections. A detailed queue analysis is provided in Section 8 of this report.

Table 2.d.1 Signalized Intersection Queue Observations (# of Cars)

Intersection	Lane	Average # of observed vehicles AM Peak Hour	Average # of observed vehicles PM Peak Hour
O'Brien Hwy at Third St	O'Brien EB Left/Thru/Right	18	4
	O'Brien WB Left/Thru/Right	1	5
	Third NB Left/Thru/Right	1	10
O'Brien Hwy at Cambridge St	O'Brien EB Left	4	1
	O'Brien EB Thru	8	3
	O'Brien EB Right	2	0
	O'Brien WB Left	4	4
	O'Brien WB Thru/Right	1	5
	Cambridge NB Left/Thru	0	6
	Cambridge NB Right	2	2
	East SB Left/Thru/Right	0	2
O'Brien Hwy at Land Blvd	O'Brien EB Left	3	28
	O'Brien EB Thru	28	5
	O'Brien EB Right	0	0
	O'Brien WB Left	12	23
	O'Brien WB Thru	9	49
	O'Brien WB Right	9	49
	Land NB Left	2	6
	Land NB Thru	4	23
	Land NB Right	4	35
	Land SB Left/Thru/Right	5	6

Intersection	Lane	Average # of observed vehicles AM Peak Hour	Average # of observed vehicles PM Peak Hour
Cambridge St at Third St	Cambridge EB Left/Thru/Right	35	37
	Cambridge WB Left/Thru/Right	11	10
	Third NB Left/Thru/Right	3	11
	Third SB Left	1	31
	Third SB Thru/Right	1	0
Cambridge St at First St	Cambridge EB Thru/Right	12	9
	Cambridge WB L	3	1
	Cambridge WB T	2	1
	First NB Left	0	1
	First NB Right	2	13
First St at Thorndike St	Thorndike EB Left/Thru/Right	1	3
	First NB Thru	2	15
	First SB Thru	0	1
First St at Charles St	Charles EB Left/Thru/Right	2	2
	Cambridgeside WB Left/Thru/Right	2	7
	First NB Thru/Right	3	7
	First SB Left/Thru	3	4
Third Street at Charles Street	Charles EB Left/Thru/Right	2	1
	Charles WB Left/Thru/Right	0	1
	Third NB Left/Thru/Right	2	5
	Third SB Left/Thru/Right	2	2
Galileo Galilei Way at Binney St	Galileo EB Thru	2	1
	Galileo WB Thru/Right	4	3
	Fulkerson SB Right/Hard Right	3	3
	Binney SEB Hard Right/Left	1	4
	Binney SEB Right	2	4
Binney St at Third St	Binney EB Left	2	4
	Binney EB Thru/Right	2	3
	Binney WB Left	5	1
	Binney WB Thru/Right	3	2
	Third NB Left/Thru	3	7
	Third NB Right	1	1
	Third SB Left/Thru/Right	8	6

Intersection	Lane	Average # of observed vehicles AM Peak Hour	Average # of observed vehicles PM Peak Hour
Binney St at Second St	Binney EB Left	1	0
	Binney EB Thru/Right	4	4
	Binney WB Left	2	2
	Binney WB Thru/Right	4	2
	Second NB Left/Thru/Right	2	6
	Second SB Left/Thru/Right	4	2
Binney St at First St	Binney EB Left	1	2
	Binney EB Thru/Right	2	3
	Binney WB Left/Thru/Right	3	1
	First NB Left/Thru/Right	0	1
	First SB Left/Thru	3	4
	First SB Right	1	1
Binney St at Land Blvd	Binney EB Left	2	3
	Land NB Left	13	10
	Land NB Thru	4	16
	Land SB Thru	6	7
	Land SB Right	2	0
Hampshire St at Portland St/Cardinal Medeiros Ave	Hampshire EB Left/Thru/Right	5	3
	Hampshire WB Left/Thru/Right	2	4
	Portland NB Left	0	0
	Portland NB Thru/Right	3	2
	Cardinal SB Left	1	0
	Cardinal SB Thru/Right	6	2
Broadway at Portland	Broadway EB Left/Thru/Right	6	6
	Broadway WB Left/Thru/Right	1	7
	Portland NB Left	1	1
	Portland NB Thru/Right	4	8
	Portland SB Left	1	0
	Portland SB Thru/Right	3	2
Broadway at Hampshire St/Technology Sq.	Broadway EB Left/Thru/Right	6	3
	Broadway WB Left	0	0
	Broadway WB Thru	3	7
	Broadway WB Right	1	5
	Technology NB Left	1	5
	Technology NB Thru/Right	1	7
	Hampshire SB Left	6	3
	Hampshire SB Thru/Right	1	0

Intersection	Lane	Average # of observed vehicles AM Peak Hour	Average # of observed vehicles PM Peak Hour
Broadway at Galileo Galilei Way	Broadway EB Left	0	0
	Broadway EB Thru	5	9
	Broadway EB Right	1	0
	Broadway WB Left	1	2
	Broadway WB Thru	8	7
	Broadway WB Right	0	0
	Galileo NB Left	1	2
	Galileo NB Thru/Right	2	3
	Galileo SB Left	1	1
	Galileo SB Thru	12	6
	Galileo SB Right	13	5
Broadway at Ames St	Broadway EB Thru	5	6
	Broadway EB Right	2	1
	Broadway WB Left	3	2
	Broadway WB Thru	3	4
	Ames NB Left	1	1
	Ames NB Right	2	1
Broadway/Main St at Third St	Broadway EB Left	3	8
	Broadway EB Thru/Right	2	4
	Main WB Thru	7	6
	Main WB Right	5	3
	Third SB Left/Thru	6	0
	Third SB Right	3	8
Main St at Galileo Galilei Way/Vassar St	Main EB Left	2	2
	Main EB Thru/Right	2	0
	Main WB Left	1	0
	Main WB Thru/Right	2	0
	Vassar NB Left/Thru/Right	3	0
	Galileo SB Left	1	4
	Galileo SB Thru	3	1
	Galileo SB Right	2	2
Main St at Ames St	Main EB Left/Thru/Right	4	3
	Main WB Left/Thru/Right	0	0
	Ames NB Left/Thru/Right	4	0
	Ames SB Left/Thru	1	0
	Ames SB Right	1	3
Memorial Dr at Wadsworth St	Memorial WB Thru/Right	11	2
	Memorial EB U-turn	4	2
	Memorial EB Left	2	2
	Wadsworth SB Thru/Right	0	0

Intersection	Lane	Average # of observed vehicles AM Peak Hour	Average # of observed vehicles PM Peak Hour
Memorial Dr at Western Ave	Western WB Left/Thru/Right	11	0
	Memorial NB Left	4	0
	Memorial NB Thru	4	10
	Memorial SB Thru/Right	13	6
Memorial Dr at River St	River EB Left/Thru	15	2
	River EB Right	15	0
	Memorial NB Thru/Right	12	13
	Memorial SB Left/Thru	28	19

e. Crash Analysis

As requested in the TP&T Scoping Determination, VHB obtained crash records from the Cambridge Police Department for the most recent three-year period available (January 2015 through December 2017) (Table 2.e.1). VHB also supplemented the CPD crash records with data from Massachusetts Department of Transportation (MassDOT). The summary table includes the calculated crash rates (number of reported crashes per million entering vehicles based on the evening peak traffic volumes). A detailed summary by crash type is presented in the Appendix.

Table 2.e.1 MassDOT and City of Cambridge Crash Analysis (2015-2017) Summary

Location	Total Crashes (3-year period)	Crashes Involving Pedestrians	Crashes Involving Bicycles	Calculated Crash Rate	Exceed MassDOT Crash Rates
1) O'Brien Hwy at Third St	10	1	0	0.34	N
2) O'Brien Hwy at Cambridge St	21	0	0	0.72	Y
3) O'Brien Hwy at Land Blvd	43	2	1	0.94	Y
4) Cambridge St at Third St	18	1	3	1.08	Y
5) Cambridge St at First St	10	0	1	0.70	N
6) First St at Thorndike St	2	0	0	0.23	N
7) First St at Charles St	6	0	2	0.58	N
8) Third St at Spring St	22	0	0	2.53	Y
9) Third St at Charles St	1	0	0	0.10	N
10) Galileo Way at Binney St and Fulkerson St	7	0	1	0.39	N
11) Binney St at 5th Street	2	1	0	0.15	N
12) Binney St at Third St	7	1	0	0.34	N
13) Binney St at Second St	9	1	1	0.62	N
14) Binney St at First St	8	1	1	0.56	N
15) Binney St at Land Blvd	13	1	2	0.53	N

Location	Total Crashes (3-year period)	Crashes Involving Pedestrians	Crashes Involving Bicycles	Calculated Crash Rate	Exceed MassDOT Crash Rates
16) Hampshire St at Cardinal Medeiros Ave and Portland St	14	3	3	0.92	Y
17) Broadway at Portland St	15	2	4	0.89	Y
18) Broadway at Hampshire St	3	0	1	0.20	N
19) Broadway at Galileo Way	20	1	1	0.86	Y
20) Broadway at Ames St	13	1	2	1.03	Y
21) Broadway at Green Garage	3	0	0	0.24	N
22) Broadway at Main St and Third St	9	1	3	0.46	N
23) Third St at Potter St and Kendall St	5	1	0	0.43	N
24) Third St at Munroe St and Linskey Way	4	1	0	0.42	N
25) Main St at Albany St	13	2	1	1.26	Y
26) Main St at Galileo Way and Vassar St	16	4	4	0.76	Y
27) Main St at Ames St	9	0	2	0.71	N
28) Main St at Kendall Station Crosswalk	0	0	0	0.00	N
29) Main St at Longfellow Bridge	3	0	0	0.11	N
30) Memorial Dr at Ames St	21	2	3	0.56	Y
31) Memorial Dr at Wadsworth St	3	0	0	0.09	N
32) Memorial Dr at Western Ave	43	1	2	1.07	Y
33) Memorial Dr at River St	54	0	2	1.49	Y

Source: MassDOT and City of Cambridge Crash Data

Cambridge falls within the District 6 area of MassDOT where the average crash rate for signalized intersections is 0.71 crashes per million entering vehicles and 0.52 crashes per million entering vehicles for unsignalized intersections.

Of the intersections with reported crashes, ten exceed the MassDOT Average Crash Rate for signalized intersections (0.71). These intersections include:

- O'Brien Highway at Cambridge Street (0.72)
- O'Brien Highway at Land Boulevard (0.94),
- Cambridge Street at Third Street (1.08),
- Hampshire Street at Portland Street and Cardinal Medeiros Avenue (0.92),
- Broadway at Portland Street (0.89),
- Broadway at Galileo Galilei Way (0.86),
- Broadway at Ames Street (1.03),
- Main Street at Galileo Galilei Way and Vassar Street (0.76),
- Memorial Drive at Western Avenue (1.07) and;
- Memorial Drive at River Street (1.49)

An additional three intersections exceed the MassDOT Average Crash Rate for unsignalized intersections (0.52). These intersections include:

- First Street at Charles Street (0.58)
- Main Street at Albany Street (1.26); and
- Third Street at Spring Street (2.53)

The intersection of Third Street at Spring Street was recently converted from a two-way stop-controlled intersection to an all-way stop controlled intersection, which should reduce the number of crashes at this location. Crash data for periods after the four-way stop control was installed is not yet available.

There were no reported fatalities at the study area intersections during the three crash analysis years.

f. Public Transit

Transit stops and stations closest to the site are shown in Figure 1.d.1. Operating hours, weekday daily ridership, and peak-hour headway data for each service line are presented in Table 2.f.1. Detailed descriptions of each service were previously presented in Section 1.d.

Table 2.f.1 Transit Services

Route	Origin - Destination	Weekday Hours of Operation	Weekday Daily Ridership (Passengers)	Peak-Hour Headways (Minutes)
1	Harvard Square – Dudley Square	4:37 AM – 1:41 AM	11,900	8
64	Oak Square – University Park or Kendall/MIT	5:21 AM – 1:30 AM	1,800	30
68	Harvard Square – Kendall/MIT Station	6:35 AM – 6:58 AM	400	40
85	Spring Hill – Kendall/MIT Station	5:45 AM – 7:58 PM	600	15-45
CT2	Sullivan Square – Ruggles Station	5:55 AM – 7:40 PM	1,800	20-30
Green Line E Branch	E-Line Heath Station	5:00 AM – 12:47 AM	19,300	6
Red Line	Alewife - Ashmont	5:16 AM – 12:27 AM	129,000	9
	Alewife - Braintree	5:24 AM – 12:20 AM	129,000	9
	Ashmont - Alewife	5:16 AM – 12:30 AM	107,100	9
	Braintree - Alewife	5:08 AM – 12:17 AM	114,800	9

Sources: MBTA Bus Routes – MBTA FY 2018 Data, Green Line – MBTA – Fall 2018 Data, Red Line – MBTA Spring 2018 Data, Schedules from Fall 2019

3. 2019 Baseline Condition (Modified Existing)

As requested in the TP&T Scoping Determination, a 2019 Baseline Condition (also referred to as Modified Existing in the TP&T Scoping Determination) was created in order to evaluate the project's specific impacts separate from the City's and Commonwealth's roadway infrastructure changes that are being considered in the near term future. The following projects have been reviewed and the geometric and signal operation changes proposed have been incorporated in the Synchro/SimTraffic model. The resulting volumes are shown in Figures 3.a.1 and Figure 3.a.2

a. CRA Streetscape Redesign for Binney/Galileo/Broadway

The Cambridge Redevelopment Authority (CRA), in collaboration with the City of Cambridge Department of Public Work (DPW), Traffic, Parking, & Transportation (TPT), and Community Development Department (CDD), is redesigning the streetscape of Binney Street (from Third Street to Fulkerson Street), Galileo Galilei Way (entire length) and Broadway (from Ames Street to Galileo Galilei Way). The goal of this redesign is to improve pedestrian and bicycle accommodations, facilitate bus travel, and enhance bus stop waiting areas within the project scope area.

In 2017, the CRA completed 25% streetscape design documents for the entire project scope with the goal that different area stakeholders complete the design to 100% construction documents and construct the improvements as part of their associated developments within the next decade. In April 2019, Boston Properties (BP) submitted 75% design plans for their portion of the project, which includes Binney Street from Galileo Galilei Way to 6th Street, Galileo Galilei Way between Binney Street and Broadway, and Broadway between Galileo Galilei Way and Ames Street. In September 2019, Boston Properties submitted 100% design plans, which are still under review. For the purpose of this TIS, the 2019 Baseline Condition model will be updated with the approved 75% design for the Boston Properties project intersections and the 25% design for the rest of the intersections. The study area intersections reconstructed by the CRA Streetscape redesign are:

- Binney Street at Third Street (CRA 25% Design)
- Binney Street at 5th Street (BP 75% Design)
- Galileo Galilei Way at Binney Street/Fulkerson Street (BP 75% Design)
- Broadway at Galileo Galilei Way (BP 75% Design)
- Main Street at Galileo Galilei Way/Vassar Street (CRA 25% Design)
- Broadway at Ames Street (BP 75% Design)

The design documents for these intersections are provided in the Appendix.

b. Monsignor O'Brien Highway Reconstruction

As part of the Planning Board Special Permit decision for the Cambridge Crossing project (formally known as North Point Development – PB-179), Divco West (project's Proponent) is re-designing and re-constructing O'Brien Highway from Land Boulevard to Third Street in collaboration with the City of Cambridge and MassDOT. With the reconstruction of Lechmere Station as part of the Green Line Extension Project, phases of the O'Brien Reconstruction Project will be phased with the Lechmere Station reconstruction.

In October 2018, Divco West submitted final design plans for Phase 2B of the Project, which includes reconstruction of O'Brien Highway between Gore Street to Land Boulevard. For this TIS, the 2019 Baseline Condition model will be updated per the October 2018 plans, except for O'Brien Highway at Land Boulevard as MassDOT recently implemented updates at this intersection (which are reflected in the Existing Conditions model for this TIS). The study area intersections impacted by the O'Brien Highway Reconstruction are:

- O'Brien Highway at Third Street
- O'Brien Highway at First Street (New Intersection)
- Cambridge Street at First Street
- O'Brien Highway at Cambridge Street/East Street

The design documents for these intersections are provided in the Appendix.

c. Ames Street Separated Bike Lane (Main St to Memorial Dr)

As part of the Planning Board Special Permit Decision for MIT's Kendall Square project (PB-303), MIT has redesigned and is reconstructing Ames Street to include a two-way separated bicycle facility, from Main Street to Memorial Drive. The project also includes updates to the Ames Street at Main Street traffic signal and reconfiguration/signalization of the Ames Street at Memorial Drive intersection to improve safety for cyclists and pedestrians crossing Memorial Drive. The project is currently in the final stages of construction. The study area intersection impacted by the redesign are:

- Memorial Drive at Ames Street
- Main Street at Ames Street

The design documents for this project are provided in the Appendix.

4. Project Traffic

a. Mode Share and Average Vehicle Occupancy

Mode shares were based on the percentages outlined in the City's scoping letter. Table 4.a.1 summarizes all the mode share assumptions used to support the development of the TIS.

Similar to the methodology used to calculate trip generation rates, mode shares and vehicle occupancy rates for the Project were developed based on average mode shares from PTDM and Planning Board Special Permit transportation monitoring reports which represent actual mode shares for similar, nearby uses. All heavy occupancy vehicle (HOV) mode shares assumed two people per vehicle.

Table 4.a.1 Project Mode Shares and AVO

Land Use	SOV	HOV	Transit	Walk	Bike	Work at Home	Other/ Out of Office	Vehicle Occupancy[8]
Office/R&D[1]	35%	5%	36%	8%	7%	5%	4%	1.07
Residential[2]	27%	9%	29%	29%	6%	0%	0%	1.14
Hotel Employees[3]	14%	1%	41%	0%	2%	3%	39%	1.03
Hotel Patrons[4]	43%	7%	22%	28%	0%	0%	0%	1.08
Active/Retail Employees[5]	22%	6%	47%	8%	6%	0%	11%	1.12
Active/Retail Patrons[6]	5%	5%	3%	84%	3%	0%	0%	1.33
Entertainment Space Employees[7]	38%	0%	37%	13%	13%	0%	0%	1.10
Entertainment Space Patrons[8]	47%	16%	23%	13%	1%	0%	0%	2.80

Sources:

[1]Office/R&D based on 2017 and 2018 PTDM and Planning Board Special Permit transportation monitoring reports from 14 projects (F4, F9, F11, F14, F15, F27, F43, F47, F51, PB65, PB125)

[2]Residential based on 2017 and 2018 Planning Board Special Permit transportation monitoring reports from PB179 (Sierra & Tango), PB179 (Twenty|20), PB189 (One First St.), and PB192 (303 Third Street).

[3]Hotel Employees based on 2017 and 2018 PTDM monitoring reports for F20 (Kendall Square Hotel). Part-time is the reason for 39% Out of Office mode share.

[4]Hotel Patrons based on 2017 and 2018 PTDM monitoring reports for F20 (Kendall Square Hotel). It includes the hotel restaurant patrons.

[5]Retail Employees based on PTDM monitoring reports from 7 projects (F2, F8, F9, F11, F15, F47, F51).

[6]Retail Patrons based on PTDM monitoring reports from F2 (Kendall Sq.) and F51 (Binney Street PUD).

[7] Source: BTD Zone 4 (from 12-28 Lansdowne Street EPNF)

[8] Source: House of Blues Survey (from 12-28 Lansdowne Street EPNF)

[9] VOR Calculated as (SOV+HOV)/(SOV+1/2HOV)

b. Vehicle Trip Generation

In accordance with the October 2019 TP&T Scoping Determination, the trip generation analysis was based on driveway/traffic counts obtained from Parking and Transportation Demand Management (PTDM) reports from nearby sites with similar land uses and did not use Institute of Transportation Engineers (ITE) data.

The PTDM review focused on Kendall Square sites for commercial components and Lechmere/Northpoint sites for residential data (as no recent residential sites were found to be reporting for PTDM in Kendall Square). The research included 14 PTDM sites, with over 30 buildings, 13,000 employees, and 1,100 residential units for the years 2017 and 2018. The 2017 and 2018 annual reports used in the trip generation rate calculation include:

- 300 Third Street (2018), Land Use: R&D
- 610-700 Main Street (2018), Land Use: R&D
- Kendall Square-BioMed (2017), Land Uses: Retail
- Kendall Square-BioMed (2018), Land Uses: Retail
- Technology Square (2018), Land Uses: R&D, Office, Retail
- Draper Labs (2018), Land Use: R&D
- 50-60 Hampshire Street (2017): Retail
- 210 Broadway (2017), Land Use: Office
- Two Canal (2017), Land Use: Office
- 7 Cambridge Center (2018), Land Use: Office
- One Rogers (2017), Land Use: Office
- Avalon North Point (2017), Land Use: Residential
- 1-2 Earhart (2018), Land Use: Residential
- Twenty | 20 (2018), Land Use: Residential

The vehicle trip rates were calculated based on the reported entering and exiting driveway data and building occupancy (square footage for commercial and units for residential). Then a statistical analysis was completed to identify trends within the multiple data point for each land use and determine the most appropriate interpretation.

Based on this PTDM research, TP&T approved use of the following trip rates for the Volpe Exchange Parcel TIS.

Table 4.b.1 Vehicle Trip Generation Rates

Land Use		Daily Enter	Daily Exit	AM Enter	AM Exit	PM Enter	PM Exit
Office[1]	KSF	1.67	1.44	0.42	0.01	0.06	0.41
R&D[1]	KSF	1.11	1.12	0.26	0.01	0.02	0.25
Residential[4]	Units	0.34	0.33	0.02	0.06	0.06	0.03
Hotel[2]	Keys	1.22	1.56	0.11	0.03	0.11	0.14
Active/Retail[1]	KSF	0.21	0.20	0.05	0.00	0.01	0.05
Entertainment Space [3]	Attendees	0.22	0.22	0.00	0.00	0.02	0.00
Entertainment Space [3]	Employees	0.34	0.34	0.00	0.00	0.18	0.00

Source: Cambridge TP&T

[1] Office/R&D based on 2017 and 2018 PTDM and Planning Board Special Permit transportation monitoring reports from 14 projects (F4, F9, F11, F14, F15, F27, F43, F47, F51, PB65, PB125).

[2] Hotel based on 2017 Kendall Square hotel driveway counts, provided by TP&T.

[3] Entertainment Space rates based on House of Blues in Boston as presented in the *Fenway Theater Expanded Project Notification Form*, submitted on February 22, 2019.

[4] Residential based on 2017 and 2018 Planning Board Special Permit transportation monitoring reports from PB179 (Sierra & Tango), PB179 (Twenty|20), PB189 (One First St.), and PB192 (303 Third Street).

The resulting Project vehicle trip generation is summarized in Table 4.b.2. which is based on Project program summarized previously in Table 1.

Table 4.b.2 Vehicle Trip Generation by Use

		Daily			AM Peak Hour			PM Peak Hour		
	Program	**Entering**	**Exiting**	**Total**	**Entering**	**Exiting**	**Total**	**Entering**	**Exiting**	**Total**
Office	879,000 SF	1,468	1,266	2,766	369	9	378	53	360	413
R&D	897,750 SF	997	1005	2,002	233	9	242	18	224	242
Residential	1,300 units	442	429	871	26	78	104	78	39	117
Hotel	200 keys	244	311	555	22	6	28	22	28	50
Active/Retail	75,000 SF	20	19	39	5	0	5	1	5	6
Entertainment Space	700 attendees 50 employees	176	176	352	0	0	0	24	0	24
Total		**3,347**	**3,206**	**6,553**	**655**	**102**	**757**	**196**	**656**	**852**

Peak hour trip generation in "trips per hour"

The Project is expected to generate a total of 6,553 Daily vehicle trips (3,347 entering, 3,206 exiting) 757 AM Peak Hour trips (655 entering, 102 exiting) and 852 PM Peak Hour trips (196 entering, 656 exiting).

The retail component is expected to include retail businesses and consumer service establishments that are generally open to the public as well as the potential for possible museums and exhibition spaces and other entertainment, education, or recreational uses.

The Community Center will serve as an auxiliary space for the residents of the Kendall Square/East Cambridge neighborhood. Events at the Community Center could include community organization meetings, exercise classes, workshops, weekend open houses, etc. The Community Center is not expected to generate traffic during peak commuting hours and is therefore not included in the trip generation table.

The entertainment component is intended to serve as another activation of the project site. While the exact layout and programing has not been fully established, it is envisioned that this space would generate activity and trips during some weekday evenings and some weekends. For the purposes of a more conservative traffic analysis, the evening peak hour has been adjusted to show impacts of the maximum utilization of this space, hosting an evening entertainment event with 700 attendees supported by approximately 50 employees.

House of Blues Observations

To assist with the entertainment space trip generation, data and observations from the House of Blues on Lansdowne Street in Boston were utilized. The full data was presented in the Fenway Theater (12-28 Lansdowne Street) Expanded Project Notification Form (PNF), as filed with the City of Boston in 2019. The House of Blues observation study showed approximately 10% of theater patrons as arriving to the area during the PM peak hour to spend time at restaurants and other retail establishments before the show. Additionally, the study notes that approx. 50% of theater employees were arriving during the PM peak hour to set up for the show.

Utilizing these data points, VHB developed a trip generation estimate for the Volpe entertainment space for an "event day" condition. Table 4.b.3 shows estimated trip generation for the entertainment space, assuming travel patterns similar to House of Blues patrons/employees. Daily and PM peak hour trips are shown, AM peak hours are not expected to have any activity related to the entertainment space.

Table 4.b.3 Estimated Vehicle Trip Generation for the Entertainment Space

	Patron Trip Generation	Employee Trip Generation	Total
Inbound	159	17	176
Outbound	159	17	176
Daily Total	**318**	**34**	**352**
Inbound	16	8	24
Outbound	0	0	0
PM Peak Hour Total	**16**	**8**	**24**

[1] TNC/Curbside Mode Share for patrons is 16.3%. VOR is 2.8. Source: House of Blues
[2] Personal Car mode share for patrons is 47.1%. VOR is 2.8. Source: House of Blues
[3] Personal Car mode share for employees is 38%. VOR is 1.1. Source: BTD Zone 4

As presented in Table 4.b.3, the entertainment space is estimated to generate approximately 24 vehicle trips during the PM peak hour on "event day". Some, if not most, of the patron share of the 24 trips can also be accounted for in the

retail/active space trip generation since these are shared trips destined to spend time at the site before the attending the entertainment space (internal capture). However, in order to account for some trips being generated by the entertainment space during the evening peak hour, the 24 vehicle trips were included in the project trip generation estimates and the capacity analysis (presented previously in Table 4.b.2).

In addition to the House of Blues Data, VHB conducted observations at the Sinclair located in Cambridge's Harvard Square. The Sinclair has a capacity of 525 seats. VHB monitored curbside drop-off and pick-up along Church Street and identified patrons and employees that entered the venue during the evening peak period between the hours of 4:00 PM and 6:00 PM on a typical weekday in early March 2020, when The Sinclair had a show. Since the Sinclair does not have a dedicated parking facility, no observations were made on the number of people who self-parked during that timeframe. The peak drop-off period was observed from 4:15 PM to 5:15 PM, where 4 people were dropped off at the venue. The 4 person trips correspond to a drop-off trip generation rate of approximately 0.008 trips per seat. Due to the cancellation of shows/concerts in mid-late March 2020, VHB was unable to gather more data points and is therefore relying on the House of Blues data for this TIS.

c. Person Trip Generation

Mode shares and vehicle occupancy rates for the Project were applied to the vehicle trip generation in order to estimate the total project generated AM and PM Peak Hour person trips. These person trips are then assigned to walking, transit, bicycle, and other modes. The resulting project person trip generation by mode is presented in Table 4.c.2.

Table 4.c.2 Project Trip Generation by Mode and Land Use

	Daily			Morning Peak			Evening Peak		
Mode	Entering	Existing	Total	Entering	Exiting	Total	Entering	Exiting	Total
SOV									
Office	1,370	1,181	2,551	345	8	353	49	336	386
R&D	930	938	1,869	218	8	226	17	209	226
Hotel	228	290	518	21	6	26	21	26	47
Retail	14	13	28	3	0	3	1	3	4
Residential	379	368	747	22	67	89	67	33	100
Entertainment Space	135	135	270	0	0	0	20	0	20
Total	3,056	2,926	5,982	609	89	698	174	609	783
HOV									
Office	98	84	182	25	1	25	4	24	28
R&D	66	67	133	16	1	16	1	15	16
Hotel	16	21	37	1	0	2	1	2	3
Retail	6	6	11	1	0	1	0	1	2
Residential	63	61	124	4	11	15	11	6	17
Entertainment Space	41	41	82	0	0	0	4	0	4
Total	290	280	570	47	13	59	22	48	70
Transit									
Office	1,409	1,215	2,624	354	8	363	51	346	397
R&D	957	965	1,922	224	9	233	17	215	233
Hotel	231	294	524	21	6	26	21	26	47
Retail	14	13	27	3	0	3	1	3	4
Residential	407	395	802	24	72	96	72	36	108
Entertainment Space	182	182	363	0	0	0	26	0	26
Total	3,199	3,064	6,263	627	95	721	187	627	814
Walk									
Office	313	270	583	79	2	81	11	77	88
R&D	213	215	427	50	2	52	4	48	52
Hotel	118	150	268	11	3	13	11	13	24
Retail	180	171	351	43	0	43	9	43	51
Residential	407	395	802	24	72	96	72	36	108
Entertainment Space	96	96	192	0	0	0	12	0	12
Total	1,326	1,297	2,623	206	78	284	118	217	335

	Daily			Morning Peak			Evening Peak		
Mode	Entering	Existing	Total	Entering	Exiting	Total	Entering	Exiting	Total
Bike									
Office	274	236	510	69	2	71	10	67	77
R&D	186	188	374	44	2	45	3	42	45
Hotel	7	9	15	1	0	1	1	1	1
Retail	7	7	14	2	0	2	0	2	2
Residential	84	82	166	5	15	20	15	7	22
Entertainment Space	10	10	20	0	0	0	3	0	3
Total	568	531	1099	120	18	138	32	119	152
Work at Home									
Office	196	169	364	49	1	50	7	48	55
R&D	133	134	267	31	1	32	2	30	32
Hotel	10	13	23	1	0	1	1	1	2
Retail	0	0	0	0	0	0	0	0	0
Residential	0	0	0	0	0	0	0	0	0
Entertainment Space	0	0	0	0	0	0	0	0	0
Total	339	316	654	81	3	84	10	79	89
Other/Out of Office									
Office	157	135	292	39	1	40	6	38	44
R&D	106	107	214	25	1	26	2	24	26
Hotel	131	167	299	12	3	15	12	15	27
Retail	2	2	3	0	0	0	0	0	1
Residential	0	0	0	0	0	0	0	0	0
Entertainment Space	0	0	0	0	0	0	0	0	0
Total	396	411	807	77	5	82	19	78	97

d. Site Access Vehicular Parking Access

Due to the layout of the Site, two garages are contemplated for the Project. One garage would be located off Broadway while a second garage would be located off Munroe Street. During the design review process, the entrances for each loading dock will be reviewed and incorporated into the final site plan.

Between the two garages, a total of up to 1,876 parking spaces are proposed for the site.

Broadway Garage

As shown in Figure D, parking for buildings R1, R2, R3, C1, C2 and C3 would be provided in an approximately 1,434 space below-grade parking garage. The below-grade parking will be accessed by two ramps along Potter Street and a third ramp along Broadway. The locations of the parking ramps were strategically placed to encourage drivers to enter the garage along the perimeter of the site to limit impact of vehicular traffic on the internal pedestrian environment that is promoted along 5th Street, Street X and Broad Canal Way.

Munroe Garage

As shown in Figure D, parking for buildings R4 and C4 would be provided in an approximately 442 space below-grade parking garage. The below-grade parking will be accessed by a single ramp on Munroe Street.

d. Trip Distribution and Assignment

Project generated vehicular traffic was distributed through the study area based on local trip distribution information. Trip distribution for the vehicles traveling to and from the site are based on the *K2C2 Plan Critical Sums Analysis* (Trip Distribution Report from August 2012 and extrapolated between intersections not in the immediate area of Kendall Square). The Critical Sums Analysis provides office and retail distribution based on City of Cambridge PTDM data and residential distribution based on the 2000 U.S. Census Journey-to-Work Survey. The K2 Plan report provides employee and residential arrival and departure distributions for sub-areas within the Kendall Square area. The proposed Project falls into sub-area 3. The distributions are presented in Table 4.d.1 and 4.d.2 and presented graphically in Figure 4.d.1 and Figure 4.d.2

VHB also reviewed the critical sums analysis that was prepared as part of the *Envision Cambridge* report and concluded that it only provided a general Kendall Square distribution which is not as specific to the Volpe Exchange Parcel site (sub-area 3). Therefore, the K2C2 distribution patterns specific for sub-area 3 are used for this analysis, as approved by TP&T.

Table 4.d.1 Vehicular Trip Distribution

Roadway	Residential /Hotel	Office/R&D/ Retail
Massachusetts Avenue	8%	10%
I-90 (East and West)	10%	7%
Vassar Street (Harvard Bridge)	14%	5%
Memorial Drive (From West)	7%	9%
Boston University Bridge	3%	1%
Land Boulevard	12%	12%
First Street	5%	6%
Third Street	9%	14%
Binney Street West (Arrival)	3%	3%
Broadway (Arrival/Departure)	15%/18%	9%/12%
Longfellow Bridge	14%	24%

Source: K2C2 Critical Sums Analysis – Trip Distribution Sub-Area 3 Maps

The resulting Project generated trips for each land use are shown in Figures 4.d.3 through 4.d.15 on the Build roadway network and in Figures 4.d.16 through 4.d.28 on the Build-Mitigated roadway network.

e. Servicing and Deliveries

This section provides an overview of the loading and services elements of the proposed Project. Loading for each of the buildings will be provided at-grade and within dedicated loading docks internal to the buildings. The location of the loading docks are shown in Figure 4.e.1. During the design review process, the sightlines for each loading dock will be reviewed and incorporated into the final site plan.

Truck Access

As shown in Figure D, the loading and service needs of the development will be accommodated within dedicated loading docks, internal to each individual building. Commercial building loading facilities will be able to accommodate up to two WB-50 size/type trucks in addition to a compactor. Residential building facilities will be able to accommodate up to a SU-40 size/type truck in addition to a compactor. Table 4.e.1 provides a brief description of the loading access for each building.

Table 4.e.1 Loading Dock Access Location

Building	Loading Dock Access
Building R1	Potter Street
Building R2	Street X, opposite Building R3 loading dock
Building R3	Street X, opposite Building R2 loading dock
Building R4	Munroe Street
Building C1	5th Street
Building C2	Street X, opposite Building C3 loading dock
Building C3	Street X, opposite Building C2 loading dock
Building C4	Munroe Street

Truck Routes

Service and delivery trucks will be directed to access the site using only designated truck routes as directed by the City of Cambridge. Regionally, trucks will use O'Brien Highway (Route 28), Massachusetts Avenue and the Longfellow Bridge while avoiding Memorial Drive (Route 3). Locally, trucks will use Binney Street and Broadway to access the Site with connections from Land Boulevard, Vassar Street, and Galileo Galilei Way. A limited amount of loading may use Third Street due to truck size and/or on-site destination.

Daily Deliveries

The proposed project has an estimated truck generation of approximately 410-480 individual deliveries per day. This is a very conservative estimate as this assumes each individual building will generate truck trips, but it is expected that a service or delivery truck will serve multiple buildings with one trip to the site. These truck trip estimates include a breakdown of smaller vans/trucks, such as parcel delivery and food catering versus larger delivery vehicles (SU-30 size+). The daily parcel delivery vehicles (USPS, UPS, FedEx, etc.) will be encouraged to use the loading dock.

Daily truck trips were estimated based on two methods. The first utilizes the Transportation Research Board's (TRB) *National Cooperative Highway Research Program (NCHRP) Synthesis 298 - Truck Trip Generation Data*. This publication estimates daily truck trip rates, by vehicle size and by land use. The second method used empirical loading/truck data collected at One Broadway and 303 Third Street in June 2017. Observation worksheets for each location are included in the Appendix. Table 4.e.2 shows the estimated daily number of trucks generated by each building, by vehicle size.

Table 4.e.2 Estimated Daily Number of Generated Truck Trips (one-way)

	Using NCHRP Method[1]			Observed Counts Method[2]		
Building	**Large Trucks**	**Small Trucks/ Vans**	**Total**	**Large Trucks**	**Small Trucks/ Vans**	**Total**
Building R1	7	74	81	14	47	61
Building R2	9	74	83	14	45	59
Building R3	2	45	47	9	31	40
Building R4	6	59	65	11	37	48
Building C1	23	20	43	15	57	72
Building C2	22	18	40	15	57	72
Building C3	19	14	33	14	55	69
Building C4	14	8	22	12	45	57
Total	**102**	**312**	**414**	**104**	**374**	**478**

1 From NCHRP Synthesis 298 Truck Trip Generation Data

2 Rates obtained from VHB observations for One Broadway and 303 Third Street, June 2017

Based on the NCHRP report, the Project will generate approximately 414 daily truck trips. Again, this is a conservative estimate as it does not consider shared truck trips. It is expected that some service and delivery trips will accommodate multiple building and therefore reduce the number of total site generated truck trips. The proposed buildings will likely have a delivery manager that will help schedule and reduce the number of trucks being generated by the project by consolidating deliveries and scheduling them outside of commuting peak hours

Existing service and delivery trips to the Volpe GSA site are expected to remain consistent but will be re-routed to the new GSA building driveways off Binney Street and Potter Street Extension.

5. Background Traffic

a. Background Growth

In accordance with the TP&T Scoping Determination, background traffic reflecting regional growth was assumed to occur at a rate of 0.2% for 5-years to the 2024 Future Conditions for east-west intersection approaches and 0.5% growth rate for 5-years to the 2024 Future Conditions for north-south intersection approaches.

b. Background Projects

In addition, trips associated with other planned projects in the area have been incorporated into the 2024 Future Conditions. These seven (7) projects include:

- MIT Kendall Square (SOMA and NOMA)
- Courthouse Redevelopment Project (40 Thorndike Street)
- Alexandria Center at Kendall Square
- 249 Third Street residential project
- Kendall Square Urban Renewal (KSURP) – Amendment 10
- North Point/Cambridge Crossing
- First Street PUD

6. Traffic Analysis Conditions

Analysis conditions were developed in accordance with the TIS Guidelines, TP&T Scoping Determination and additional discussions with TP&T Staff. The following chart illustrates the different traffic analysis conditions, followed by a description for each.

Graph 6.1 Analysis Conditions Flow Chart

a. 2019 Existing Condition

The 2019 Existing Condition analysis is based on existing (May 2019) vehicle, bicycle, and pedestrian counts at the study area intersections as previously presented in section 2.

b. 2019 Baseline Condition

The 2019 Baseline Condition was created in order to evaluate the project's specific impacts separate from area roadway infrastructure improvements that will be in-place within the near-term. The 2019 vehicle, bicycle, and pedestrian counts were analyzed at study area intersections using a model with the following infrastructure projects incorporated (as described in section 3):

- CRA Streetscape Redesign for Binney/Galileo/Broadway
- Monsignor O'Brien Highway Reconstruction
- Ames Street Separated Bike Lane Project (Main St to Memorial Dr)

c. 2019 Build Condition

The 2019 Build Condition assumed full occupancy of the Volpe Exchange Parcel Project. Project-generated traffic is added to the 2019 Baseline condition volumes to determine the 2019 Build networks. 2019 Build condition traffic volumes are presented in Figure 6.c.1 and Figure 6.c.2 for the AM and PM Peak Hours, respectively.

d. 2019 Build-Mitigated Condition

The 2019 Build-Mitigated Condition assumes the full occupancy of the Volpe Exchange Parcel Project, as described in the section above as well as specific mitigation measures, including:

1. Potter Street at Third Street

Potter Street at Third Street serves as one of the key access points for the Site and is therefore expected to be impacted by the additional vehicle trips. To alleviate impacts at this currently stop-controlled intersection, a traffic signal should be considered.

The Federal Highway Administration's (FHWA) *Manual on Uniform Traffic Control Devices* (MUTCD) 2009 Edition[2], specifies nine (9) different conditions which warrants the installation of a signal.

- Warrant 1 – Eight Hour Vehicular Volume
- Warrant 2 – Four Hour Vehicular Volume
- Warrant 3 – Peak Hour
- Warrant 4 – Pedestrian Volume
- Warrant 5 – School Crossing

[2] Federal Highway Administration. *Manual on Uniform Traffic Control Devices 2009: for Streets and Highways*. Claitors Publishing, 2010.

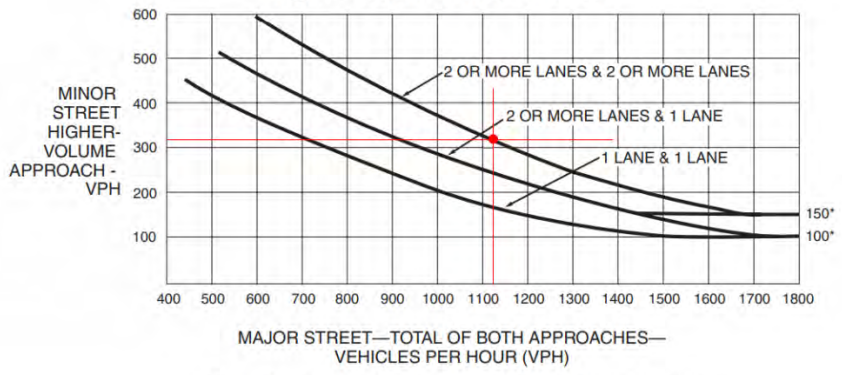
- Warrant 6 – Coordinated Signal System
- Warrant 7 – Crash Experience
- Warrant 8 – Roadway Network
- Warrant 9 – Intersection Near a Grade Crossing

For this TIS, a limited signal warrant analysis was conducted for the intersection of Potter Street at Third Street – specifically Warrant 3 – Peak Hour was reviewed. As stated in the MUTCD, the following criteria must be met to warrant a signal:

1. The total stopped time delay experienced by the traffic on one minor-street approach controlled by a STOP sign equals or exceeds 4-vehicle-hours,
2. The volume on the same minor street approach equals or exceeds 100 vehicles per hour,
3. The total entering volume serviced during the hour equals or exceeds 800 vehicles per hour and;
4. The plotted point representing the vehicles per hour on the major street (total both approaches) and the corresponding vehicles per hour on the higher-volume minor-street approach (one direction only) for 1 hour of an average day falls above the applicable curve in MUTCD Figure 4C-3.

The intersection was found to meet criteria 2, 3, and 4 above. The figure[3] below shows the plotted point representing the vehicles per hour on the major street and the minor street falling above the applicable curve (1 Lane & 1 Lane).

Figure 4C-3. Warrant 3, Peak Hour



*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

VHB will work with the TP&T to obtain guidance for further evaluation of the need for a signal at this location. Detailed worksheets are included in the Appendix of the report.

[3] Federal Highway Administration. *Manual on Uniform Traffic Control Devices 2009: for Streets and Highways*. Claitors Publishing, 2010.

In addition to proposing a full signal at this intersection, a left turn only lane in the northbound direction on Third Street is being considered to assist vehicles turning left onto Potter Street, especially during the AM Peak Hour.

2. Broadway at Volpe Garage Driveway/BP Green Garage

At this intersection, an exclusive left turn lane in the eastbound direction on Broadway is being considered in order to facilitate left turns into the site, directly to the below grade parking, from Broadway. This left turn pocket would allow project trips to enter the site at the perimeter, and thereby limiting circulation and impacts to the intersection of Broadway and Third Street. Construction of a left turn pocket would impact the layout of the existing median on Broadway.

3. Broadway at Third Street

At this intersection, an additional left turn lane in the southbound direction on Third Street is being considered in order to facilitate the left turning vehicles onto Main Street/Longfellow Bridge. The additional turn lane can be accommodated within the existing curb-to-curb dimension by eliminating the southbound 5' bicycle lane and replacing it with a separated bicycle facility along the sidewalk, outside of the existing western curb line.

4. Binney Street at 5th Street

At this intersection, a break in the Binney Street median (as illustrated in the CRA 25% design drawings) is being proposed in order to extend 5th Street and allow for left turns from Binney Street westbound onto 5th Street southbound and left turns from 5th Street northbound onto Binney Street westbound. The median will be designed in a way that will prohibit a through movement between the Site and the East Cambridge Neighborhood. This intersection is proposed to be unsignalized.

2019 Build-Mitigated condition traffic volumes are presented in Figure 6.d.1 and Figure 6.d.2 for the AM and PM Peak Hours, respectively.

e. 2024 Future Condition

The 2024 Future Condition includes the future background growth added to the 2019 Build Condition traffic volumes, which includes trips associated with other planned projects (as described in Section 5) without any mitigation that is proposed as part of the Project. 2024 Future Condition traffic volumes are presented in Figure 6.e.1 and Figure 6.e.2 for the AM and PM peak Hours, respectively.

f. 2024 Future-Mitigated Condition

The 2024 Future Mitigated Condition includes the future background growth added to the 2019 Build-Mitigated condition traffic volumes, which includes trips associated with other planned projects (as described in Section 5) plus any mitigation proposed as part of the

Project. 2024 Future Condition traffic volumes are presented in Figure 6.f.1 and Figure 6.f.2 for the AM and PM Peak Hours, respectively.

7. Vehicle Capacity Analysis

Synchro 10 software was used to determine the vehicle level of service (VLOS) for the 33 study area intersections. Synchro software has the capability of performing LOS analysis based on the *2000*[4]*,2010*[5]*,* and *6th*[6] *Edition Highway Capacity Manuals*. Given the limitations of the *2010* and *6th Edition Highway Capacity Manuals* on signalized intersections, the LOS results are based on the *2000 Highway Capacity Manual*.

Results for the 2019 Existing, 2019 Baseline, 2019 Build, 2019 Build-Mitigated, 2024 Future, and 2024 Future-Mitigated Conditions are shown in Table 7.a.1 and Table 7.a.2 for signalized intersections and Table 7.a.3 and Table 7.a.4 for unsignalized intersections for the AM and PM Peak Hours, respectively. Figure 7.a.1 and Figure 7.a.2 illustrate the overall VLOS for each intersection for the AM and PM Peak Hour respectively. A summary of the analysis results follows.

[4] *Highway Capacity Manual. Washington, D.C. :Transportation Research Board, National Research Council, 2000.*

[5] *HCM 2010 : Highway Capacity Manual. Washington, D.C. :Transportation Research Board, 2010.*

[6] *Highway Capacity Manual : A Guide for Multimodal Mobility Analysis. Washington, D.C. :Transportation Research Board, 2016.*

Table 7.a.1 Signalized Intersection Level of Service Results – AM Peak Hour

		Existing (2019)			Baseline				Build (2019)				Build-Mitigated (2019)				Future (2024)				Future-Mitigated (2024)			
Intersection	**Movement**	**v/c**	**Delay**	**VLOS**	**v/c**	**Delay**	**VLOS**	**Difference in Delay**	**v/c**	**Delay**	**VLOS**	**Difference in Delay**	**v/c**	**Delay**	**VLOS**	**Difference in Delay**	**v/c**	**Delay**	**VLOS**	**Difference in Delay**	**v/c**	**Delay**	**VLOS**	**Difference in Delay**
O'Brien Hwy/ Third St	O'Brien EB Thru/Right	0.93	31.2	C	0.73	16.0	B	-15.2	0.75	16.7	B	0.7	0.75	16.7	B	0.7	0.89	23.7	C	7.7	0.89	23.7	C	7.7
	O'Brien EB Right	-	-	-	0.78	21.8	C	n/a	0.90	33.8	C	12	0.90	33.8	C	12.0	1.14	104.8	F	83.0	1.14	104.8	F	83.0
	O'Brien WB Left/Thru	0.27	17.2	B	0.21	9.7	A	-7.5	0.21	10.1	B	0.4	0.21	10.1	B	0.4	0.28	10.6	B	0.9	0.28	10.6	B	0.9
	Third NB Left/Right	0.25	21.5	C	-	-	-	n/a	-	-	-	n/a	-	-	-	n/a	-	-	-	n/a	-	-	-	n/a
	Third NB Left	-	-	-	0.39	32.3	C	n/a	0.40	30.6	C	-1.7	0.40	30.6	C	-1.7	0.54	28.4	C	-3.9	0.54	28.4	C	-3.9
	Third NB Left/Thru/Right	-	-	-	0.36	32.0	C	n/a	0.37	30.3	C	-1.7	0.37	30.3	C	-1.7	0.48	27.8	C	-4.2	0.48	27.8	C	-4.2
	Overall	**0.58**	**28.1**	**C**	**0.74**	**17.5**	**B**	**-10.6**	**0.82**	**21.2**	**C**	**3.7**	**0.82**	**21.2**	**C**	**3.7**	**1.02**	**42.6**	**D**	**25.1**	**1.02**	**42.6**	**D**	**25.1**
O'Brien Hwy/ N. First St	O'Brien EB Thru	-	-	-	0.60	18.7	B	n/a	0.60	18.7	B	0	0.60	18.7	B	0.0	0.61	18.9	B	0.2	0.61	18.9	B	0.2
	O'Brien EB Right	-	-	-	0.28	33.4	C	n/a	0.28	33.4	C	0	0.28	33.4	C	0.0	0.32	34.5	C	1.1	0.32	34.5	C	1.1
	O'Brien WB Thru	-	-	-	0.18	23.8	C	n/a	0.18	23.8	C	0	0.18	23.8	C	0.0	0.18	20.1	C	-3.7	0.18	20.1	C	-3.7
	O'Brien WB Right	-	-	-	0.01	51.4	D	n/a	0.01	51.7	D	0.3	0.01	51.7	D	0.3	1.16	141.1	F	89.7	1.16	141.1	F	89.7
	N. First NB Left	-	-	-	0.10	20.6	C	n/a	0.10	19.3	B	-1.3	0.10	19.3	B	-1.3	0.30	17.9	B	-2.7	0.30	17.9	B	-2.7
	N. First NB Thru/Right	-	-	-	0.09	20.7	C	n/a	0.09	19.4	B	-1.3	0.09	19.4	B	-1.3	0.52	19.9	B	-0.8	0.52	19.9	B	-0.8
	N. First SB Left/Thru	-	-	-	0.09	28.0	C	n/a	0.09	28.0	C	0	0.09	28.0	C	0.0	1.46	266.1	F	238.1	1.46	266.1	F	238.1
	N. First SB Right	-	-	-	0.05	27.5	C	n/a	0.05	27.5	C	0	0.05	27.5	C	0.0	0.05	27.5	C	0.0	0.05	27.5	C	0.0
	Overall	**-**	**-**	**-**	**0.42**	**21.2**	**C**	n/a	**0.42**	**21.2**	**C**	0	**0.42**	**21.2**	**C**	**0.0**	**1.09**	**76.1**	**E**	**54.9**	**1.09**	**76.1**	**E**	**54.9**
O'Brien Hwy/ Cambridge St/ East St	O'Brien EB Left	0.29	12.1	B	-	-	-	n/a	-	-	-	n/a	-	-	-	n/a	-	-	-	n/a	-	-	-	n/a
	O'Brien EB Thru	0.81	16.5	B	0.52	14.3	B	-2.2	0.52	14.4	B	0.1	0.52	14.4	B	0.1	0.64	15.3	B	1.0	0.64	15.3	B	1.0
	O'Brien EB Right	0.30	11.9	B	-	-	-	n/a	-	-	-	n/a	-	-	-	n/a	-	-	-	n/a	-	-	-	n/a
	O'Brien WB Left	0.47	27.5	C	0.88	63.6	E	36.1	0.92	70.6	E	7	0.92	70.6	E	7.0	1.41	241.8	F	178.2	1.41	241.8	F	178.2
	O'Brien WB Thru/Right	0.35	26.4	C	0.88	54.3	D	27.9	0.91	58.4	E	4.1	0.91	58.4	E	4.1	1.42	240.3	F	186.0	1.42	240.3	F	186.0
	Cambridge NB Left/Thru	0.28	18.4	B	-	-	-	n/a	-	-	-	n/a	-	-	-	n/a	-	-	-	n/a	-	-	-	n/a
	Cambridge NB Right	0.22	2.3	A	0.30	82.3	F	80	0.32	72.1	E	-10.2	0.32	72.1	E	-10.2	0.32	0.6	A	-81.7	0.32	0.6	A	-81.7
	East SB Left/Thru/Right	0.34	29.1	C	0.16	44.2	D	15.1	0.16	44.2	D	0	0.16	44.2	D	0.0	0.17	44.2	D	0.0	0.17	44.2	D	0.0
	Overall	**0.61**	**18.2**	**B**	**0.58**	**40.8**	**D**	**22.6**	**0.59**	**41.6**	**D**	**0.8**	**0.59**	**41.6**	**D**	**0.8**	**0.83**	**114.3**	**F**	**73.5**	**0.83**	**114.3**	**F**	**73.5**
O'Brien Hwy/ Land Blvd	O'Brien EB Left	0.61	57.1	E	0.86	78.5	E	21.4	0.86	79.4	E	0.9	0.86	79.4	E	0.9	1.11	145.5	F	67.0	1.11	145.5	F	67.0
	O'Brien EB Thru	1.23	170.0	F	1.24	172.4	F	2.4	1.25	173.8	F	1.4	1.25	173.8	F	1.4	1.51	287.0	F	114.6	1.51	287.0	F	114.6
	O'Brien EB Right	0.30	0.5	A	0.33	0.1	A	-0.4	0.33	0.1	A	0	0.33	0.1	A	0.0	0.36	0.1	A	0.0	0.36	0.1	A	0.0
	O'Brien WB Left	2.25	631.0	F	2.31	655.7	F	24.7	2.41	697.8	F	42.1	2.41	697.8	F	42.1	2.67	817.9	F	162.2	2.67	817.9	F	162.2
	O'Brien WB Thru	0.72	52.7	D	0.63	39.8	D	-12.9	0.65	40.6	D	0.8	0.65	40.6	D	0.8	1.03	85.7	F	45.9	1.03	85.7	F	45.9
	O'Brien WB Right	0.43	16.0	B	0.51	19.4	B	3.4	0.51	19.4	B	0	0.51	19.4	B	0.0	0.52	19.5	B	0.1	0.52	19.5	B	0.1
	Land NB Left	0.44	52.1	D	0.48	60.1	E	8	0.48	59.3	E	-0.8	0.48	59.3	E	-0.8	1.08	151.7	F	91.6	1.08	151.7	F	91.6
	Land NB Thru	0.85	69.0	E	0.93	90.3	F	21.3	0.95	95.2	F	4.9	0.95	95.2	F	4.9	1.02	114.4	F	24.1	1.02	114.4	F	24.1
	Land NB Right	0.17	49.8	D	0.17	274.9	F	225.1	0.17	262.5	F	-12.4	0.17	262.5	F	-12.4	0.19	178.7	F	-96.2	0.19	178.7	F	-96.2
	Land SB Left	0.48	34.2	C	0.52	34.7	C	0.5	0.52	34.7	C	0	0.52	34.7	C	0.0	0.53	35.0	C	0.3	0.53	35.0	C	0.3
	Land SB Thru/Right	1.11	108.4	F	1.22	151.6	F	43.2	1.32	193.8	F	42.2	1.32	193.8	F	42.2	1.64	333.6	F	182.0	1.64	333.6	F	182.0
	Overall	**1.31**	**137.6**	**F**	**1.47**	**162.5**	**F**	**24.9**	**1.53**	**178.3**	**F**	**15.8**	**1.53**	**178.3**	**F**	**15.8**	**1.81**	**244.5**	**F**	**82.0**	**1.81**	**244.5**	**F**	**82.0**

		Existing (2019)			Baseline				Build (2019)				Build-Mitigated (2019)				Future (2024)				Future-Mitigated (2024)			
Intersection	**Movement**	**v/c**	**Delay**	**VLOS**	**v/c**	**Delay**	**VLOS**	**Difference in Delay**	**v/c**	**Delay**	**VLOS**	**Difference in Delay**	**v/c**	**Delay**	**VLOS**	**Difference in Delay**	**v/c**	**Delay**	**VLOS**	**Difference in Delay**	**v/c**	**Delay**	**VLOS**	**Difference in Delay**
Cambridge St/ Third St	Cambridge EB Left/Thru/Right	0.95	61.9	E	0.97	66.5	E	4.6	0.97	66.5	E	0	0.97	66.5	E	0.0	1.38	216.3	F	149.8	1.38	216.3	F	149.8
	Cambridge WB Left/Thru/Right	0.95	32.4	C	1.19	138.2	F	105.8	1.19	138.2	F	0	1.19	138.2	F	0.0	1.59	307.7	F	169.5	1.59	307.7	F	169.5
	Third NB Left/Thru/Right	0.33	18.3	B	0.30	17.6	B	-0.7	0.38	19.3	B	1.7	0.38	19.3	B	1.7	0.73	35.5	D	17.9	0.73	35.5	D	17.9
	Third SB Left	0.14	20.0	B	0.14	28.9	C	8.9	0.14	28.0	C	-0.9	0.14	28.0	C	-0.9	0.16	27.6	C	-1.3	0.16	27.6	C	-1.3
	Third SB Thru/Right	0.86	37.7	D	0.79	44.3	D	6.6	0.92	53.9	D	9.6	0.92	53.9	D	9.6	1.10	97.7	F	53.4	1.10	97.7	F	53.4
	Overall	**0.90**	**39.9**	**D**	**0.97**	**74.0**	**E**	**34.1**	**1.04**	**75.7**	**E**	**1.7**	**1.04**	**75.7**	**E**	**1.7**	**1.32**	**174.3**	**F**	**100.3**	**1.32**	**174.3**	**F**	**100.3**
Cambridge St/ First St	Cambridge EB Thru/Right	1.05	77.1	E	-	-	-	n/a	-	-	-	n/a	-	-	-	n/a	-	-	-	n/a	-	-	-	n/a
	Cambridge EB Left	-	-	-	0.21	34.1	C	n/a	0.21	34.1	C	0	0.21	34.1	C	0.0	0.78	52.9	D	18.8	0.78	52.9	D	18.8
	Cambridge EB Thru/Right	-	-	-	0.94	76.2	E	n/a	0.94	76.2	E	0	0.94	76.2	E	0.0	0.99	89.6	F	13.4	0.99	89.6	F	13.4
	Cambridge WB Left	0.50	16.7	B	0.49	16.9	B	0.2	0.57	20.3	C	3.4	0.57	20.3	C	3.4	0.82	22.2	C	5.3	0.82	22.2	C	5.3
	Cambridge WB Thru	0.72	23.3	C	-	-	-	n/a	-	-	-	n/a	-	-	-	n/a	-	-	-	n/a	-	-	-	n/a
	Cambridge WB Thru/Right	-	-	-	0.29	15.9	B	n/a	0.29	17.7	B	1.8	0.29	17.7	B	1.8	0.32	17.9	B	2.0	0.32	17.9	B	2.0
	First NB Left	0.19	36.7	D	-	-	-	n/a	-	-	-	n/a	-	-	-	n/a	-	-	-	n/a	-	-	-	n/a
	First NB Left/Thru	-	-	-	0.54	48.4	D	n/a	0.54	48.4	D	0	0.54	48.4	D	0.0	1.08	137.7	F	89.3	1.08	137.7	F	89.3
	First NB Right	0.38	19.3	B	0.27	19.5	B	0.2	0.29	19.6	B	0.1	0.29	19.6	B	0.1	0.40	21.6	C	2.1	0.40	21.6	C	2.1
	N. First SB Left/Thru	-	-	-	0.26	24.4	C	n/a	0.26	26.4	C	2	0.26	26.4	C	2.0	0.58	35.3	D	10.9	0.58	35.3	D	10.9
	N. First SB Right	-	-	-	0.07	43.9	D	n/a	0.07	43.9	D	0	0.07	43.9	D	0.0	0.12	107.7	F	63.8	0.12	107.7	F	63.8
	Overall	**0.67**	**36.9**	**D**	**0.60**	**35.8**	**D**	**-1.1**	**0.64**	**36.3**	**D**	**0.5**	**0.64**	**36.3**	**D**	**0.5**	**0.86**	**56.7**	**E**	**20.9**	**0.86**	**56.7**	**E**	**20.9**
First St/ Thorndike St	Thorndike EB Left/Right	0.28	23.3	C	0.28	23.3	C	0	0.28	23.3	C	0	0.28	23.3	C	0.0	0.34	21.0	C	-2.3	0.34	21.0	C	-2.3
	First NB Thru	0.17	7.3	A	0.17	7.3	A	0	0.18	7.4	A	0.1	0.18	7.4	A	0.1	0.37	10.5	B	3.2	0.37	10.5	B	3.2
	First SB Thru	0.40	9.6	A	0.40	9.6	A	0	0.46	10.4	B	0.8	0.46	10.4	B	0.8	0.80	22.2	C	12.6	0.80	22.2	C	12.6
	Overall	**0.31**	**12.6**	**B**	**0.31**	**12.6**	**B**	**0**	**0.34**	**12.8**	**B**	**0.2**	**0.34**	**12.8**	**B**	**0.2**	**0.55**	**18.6**	**B**	**6.0**	**0.55**	**18.6**	**B**	**6.0**
First St/ Charles St	Charles EB Left/Thru/Right	0.49	27.3	C	0.49	27.3	C	0	0.49	27.3	C	0	0.49	27.3	C	0.0	0.57	25.1	C	-2.2	0.57	25.1	C	-2.2
	Charles WB Left/Thru/Right	0.37	26.8	C	0.37	26.8	C	0	0.37	26.8	C	0	0.37	26.8	C	0.0	0.34	22.3	C	-4.5	0.34	22.3	C	-4.5
	First NB Thru/Right	0.32	14.2	B	0.32	14.2	B	0	0.34	14.3	B	0.1	0.34	14.3	B	0.1	0.87	38.0	D	23.8	0.87	38.0	D	23.8
	First SB Left/Thru	0.34	14.5	B	0.34	14.5	B	0	0.41	15.6	B	1.1	0.41	15.6	B	1.1	0.89	42.9	D	28.4	0.89	42.9	D	28.4
	Overall	**0.25**	**19.3**	**B**	**0.25**	**19.3**	**B**	**0**	**0.29**	**19.4**	**B**	**0.1**	**0.29**	**19.4**	**B**	**0.1**	**0.52**	**35.1**	**D**	**15.8**	**0.52**	**35.1**	**D**	**15.8**
Third St/ Charles St	Charles EB Left/Thru/Right	0.64	35.4	D	0.64	35.4	D	0	0.64	35.4	D	0	0.64	35.4	D	0.0	0.68	35.3	D	-0.1	0.68	35.3	D	-0.1
	Charles WB Left/Thru/Right	0.41	26.5	C	0.41	26.5	C	0	0.41	26.5	C	0	0.41	26.5	C	0.0	0.33	24.3	C	-2.2	0.33	24.3	C	-2.2
	Third NB Left/Thru/Right	0.23	7.0	A	0.23	7.0	A	0	0.25	7.2	A	0.2	0.25	7.2	A	0.2	0.33	9.1	A	2.1	0.33	9.1	A	2.1
	Third SB Left/Thru/Right	0.63	12.5	B	0.63	12.5	B	0	0.75	16.2	B	3.7	0.75	16.2	B	3.7	0.97	41.0	D	28.5	0.97	41.0	D	28.5
	Overall	**0.55**	**14.9**	**B**	**0.55**	**14.9**	**B**	**0**	**0.64**	**17.0**	**B**	**2.1**	**0.64**	**17.0**	**B**	**2.1**	**0.79**	**32.8**	**C**	**17.9**	**0.79**	**32.8**	**C**	**17.9**
Galileo Galilei Way/ Binney St/ Fulkerson St	Galileo EB Thru	0.24	5.4	A	0.69	28.3	C	22.9	0.83	35.8	D	7.5	0.83	35.8	D	7.5	1.17	120.5	F	92.2	1.17	120.5	F	92.2
	Galileo WB Thru/Right	0.66	32.5	C	-	-	-	n/a	-	-	-	n/a	-	-	-	n/a	-	-	-	n/a	-	-	-	n/a
	Galileo WB Thru	-	-	-	0.67	28.0	C	n/a	0.68	28.6	C	0.6	0.69	29.0	C	1.0	0.86	41.0	D	13.0	0.87	42.4	D	14.4
	Galileo WB Right/Hard Right	-	-	-	0.84	70.5	E	n/a	0.85	71.4	E	0.9	0.85	71.4	E	0.9	0.98	101.3	F	30.8	0.98	101.3	F	30.8
	Fulkerson SB Right/Hard Right	0.54	33.9	C	0.89	67.3	E	33.4	0.89	67.3	E	0	0.89	67.3	E	0.0	0.94	77.3	E	10.0	0.94	77.3	E	10.0

		Existing (2019)			Baseline				Build (2019)				Build-Mitigated (2019)				Future (2024)				Future-Mitigated (2024)			
Intersection	**Movement**	**v/c**	**Delay**	**VLOS**	**v/c**	**Delay**	**VLOS**	**Difference in Delay**	**v/c**	**Delay**	**VLOS**	**Difference in Delay**	**v/c**	**Delay**	**VLOS**	**Difference in Delay**	**v/c**	**Delay**	**VLOS**	**Difference in Delay**	**v/c**	**Delay**	**VLOS**	**Difference in Delay**
	Binney SEB Hard Left/Left	0.65	58.0	E	0.72	52.5	D	-5.5	0.72	52.5	D	0	0.72	52.5	D	0.0	0.75	54.6	D	2.1	0.75	54.6	D	2.1
	Binney SEB Right	0.74	69.0	E	0.76	57.1	E	-11.9	0.89	80.3	F	23.2	0.89	80.3	F	23.2	1.01	114.5	F	57.4	1.01	114.5	F	57.4
	Overall	**0.63**	**29.3**	**C**	**0.81**	**42.4**	**D**	**13.1**	**0.91**	**46.7**	**D**	**4.3**	**0.91**	**46.8**	**D**	**4.4**	**1.15**	**88.5**	**F**	**46.1**	**1.15**	**88.7**	**F**	**46.3**
Binney St/ Third St	Binney EB Left	0.91	107.5	F	0.91	107.5	F	0	0.79	69.4	E	-38.1	0.79	69.4	E	-38.1	0.97	117.2	F	9.7	0.97	117.2	F	9.7
	Binney EB Thru/Right	0.61	36.6	D	-	-	-	n/a	-	-	-	n/a	-	-	-	n/a	-	-	-	n/a	-	-	-	n/a
	Binney EB Thru	-	-	-	0.81	53.8	D	n/a	0.84	57.6	E	3.8	0.84	57.6	E	3.8	1.29	187.8	F	134.0	1.29	187.8	F	134.0
	Binney EB Right	-	-	-	0.33	33.2	C	n/a	0.31	32.7	C	-0.5	0.31	32.7	C	-0.5	0.38	34.4	C	1.2	0.38	34.4	C	1.2
	Binney WB Left	1.14	166.9	F	1.14	167.9	F	1	1.60	348.9	F	181	1.60	348.9	F	181.0	2.12	556.3	F	388.4	2.12	556.3	F	388.4
	Binney WB Thru/Right	0.68	34.8	C	0.68	33.3	C	-1.5	0.80	40.4	D	7.1	0.80	40.4	D	7.1	1.02	57.6	E	24.3	1.02	57.6	E	24.3
	Third NB Left/Thru	0.34	23.2	C	0.34	23.2	C	0	0.44	26.5	C	3.3	0.44	26.4	C	3.2	0.66	27.7	C	4.5	0.69	26.7	C	3.5
	Third NB Right	0.19	6.2	A	0.19	6.2	A	0	0.21	8.2	A	2	0.21	6.8	A	0.6	0.27	9.2	A	3.0	0.27	9.5	A	3.3
	Third SB Left/Thru/Right	0.81	36.0	D	0.81	36.0	D	0	0.99	61.7	E	25.7	0.99	61.7	E	25.7	1.22	141.8	F	105.8	1.22	141.8	F	105.8
	Overall	**0.86**	**48.1**	**D**	**0.88**	**50.0**	**D**	**1.9**	**1.06**	**80.9**	**F**	**30.9**	**1.06**	**80.8**	**F**	**30.8**	**1.38**	**152.2**	**F**	**102.2**	**1.38**	**152.2**	**F**	**102.2**
Binney St/ Second St	Binney EB Left	0.51	49.1	D	0.51	47.9	D	-1.2	0.51	45.5	D	-2.4	0.51	46.4	D	-1.5	0.71	39.8	D	-8.1	0.71	40.7	D	-7.2
	Binney EB Thru/Right	0.89	48.9	D	0.89	48.3	D	-0.6	0.93	54.7	D	6.4	0.93	53.5	D	5.2	1.30	169.5	F	121.2	1.30	168.9	F	120.6
	Binney WB Left	0.63	53.3	D	0.63	53.3	D	0	0.63	53.3	D	0	0.63	53.3	D	0.0	0.63	53.3	D	0.0	0.63	53.3	D	0.0
	Binney WB Thru/Right	0.58	23.7	C	0.58	23.7	C	0	0.69	26.4	C	2.7	0.69	26.4	C	2.7	0.90	37.6	D	13.9	0.90	37.6	D	13.9
	Second NB Left/Thru/Right	0.31	27.6	C	0.31	27.6	C	0	0.31	27.6	C	0	0.31	27.6	C	0.0	0.33	27.9	C	0.3	0.33	27.9	C	0.3
	Second SB Left/Thru/Right	0.55	32.1	C	0.55	32.1	C	0	0.55	32.1	C	0	0.55	32.1	C	0.0	0.59	33.4	C	1.3	0.59	33.4	C	1.3
	Overall	**0.74**	**33.6**	**C**	**0.74**	**33.4**	**C**	**-0.2**	**0.76**	**35.7**	**D**	**2.3**	**0.76**	**35.4**	**D**	**2.0**	**0.99**	**74.2**	**E**	**40.8**	**0.99**	**74.1**	**E**	**40.7**
Binney St/ First St	Binney EB Left	0.27	19.4	B	0.27	19.4	B	0	0.33	21.9	C	2.5	0.33	21.9	C	2.5	1.47	276.4	F	257.0	1.47	276.4	F	257.0
	Binney EB Thru/Right	0.27	15.8	B	0.27	15.8	B	0	0.28	15.9	B	0.1	0.28	15.9	B	0.1	0.31	16.3	B	0.5	0.31	16.3	B	0.5
	Binney WB Left/Thru/Right	0.86	27.7	C	0.86	27.8	C	0.1	0.91	25.6	C	-2.2	0.91	25.6	C	-2.2	1.03	43.5	D	15.7	1.03	43.5	D	15.7
	First NB Left/Thru/Right	0.11	41.8	D	0.11	41.8	D	0	0.11	41.8	D	0	0.11	41.8	D	0.0	0.11	41.8	D	0.0	0.11	41.8	D	0.0
	First SB Left/Thru	0.39	46.9	D	0.39	46.9	D	0	0.39	46.9	D	0	0.39	46.9	D	0.0	0.49	49.6	D	2.7	0.49	49.6	D	2.7
	First SB Right	0.35	48.7	D	0.35	48.7	D	0	0.60	61.0	E	12.3	0.60	61.0	E	12.3	1.46	285.7	F	237.0	1.46	285.7	F	237.0
	Overall	**0.81**	**27.5**	**C**	**0.81**	**27.5**	**C**	**0**	**0.91**	**27.1**	**C**	**-0.4**	**0.91**	**27.1**	**C**	**-0.4**	**1.48**	**82.5**	**F**	**55.0**	**1.48**	**82.5**	**F**	**55.0**
Binney St/ Land Blvd	Binney EB Left	0.46	27.6	C	0.46	27.5	C	-0.1	0.49	27.9	C	0.4	0.49	27.9	C	0.4	0.54	28.7	C	1.2	0.54	28.7	C	1.2
	Land NB Left	0.97	66.8	E	0.97	66.8	E	0	0.97	66.8	E	0	0.97	66.8	E	0.0	1.05	90.4	F	23.6	1.05	90.4	F	23.6
	Land NB Thru	0.22	11.5	B	0.22	11.5	B	0	0.22	11.5	B	0	0.22	11.5	B	0.0	0.27	12.0	B	0.5	0.27	12.0	B	0.5
	Land SB Thru	0.94	51.9	D	0.94	24.8	C	-27.1	0.94	24.4	C	-0.4	0.94	24.4	C	-0.4	1.07	57.5	E	32.7	1.07	57.5	E	32.7
	Land SB Right	0.99	79.5	E	0.99	64.5	E	-15	1.19	143.2	F	78.7	1.19	143.2	F	78.7	1.35	214.8	F	150.3	1.35	214.8	F	150.3
	Overall	**1.01**	**49.7**	**D**	**1.01**	**38.4**	**D**	**-11.3**	**1.08**	**51.5**	**D**	**13.1**	**1.08**	**51.5**	**D**	**13.1**	**1.21**	**78.4**	**E**	**40.0**	**1.21**	**78.4**	**E**	**40.0**
Hampshire St/ Cardinal Medeiros Ave/ Portland St	Hampshire EB Left/Thru/Right	0.83	35.6	D	0.83	35.6	D	0	0.85	37.9	D	2.3	0.85	37.9	D	2.3	0.97	56.3	E	20.7	0.97	56.3	E	20.7
	Hampshire WB Left/Thru/Right	0.32	16.0	B	0.32	30.7	C	14.7	0.32	30.9	C	0.2	0.32	30.9	C	0.2	0.41	33.3	C	2.6	0.41	31.6	C	0.9
	Portland NB Left	0.24	12.8	B	0.24	12.8	B	0	0.24	12.6	B	-0.2	0.24	12.6	B	-0.2	0.25	12.2	B	-0.6	0.25	12.2	B	-0.6
	Portland NB Thru/Right	0.51	15.1	B	0.51	15.1	B	0	0.51	14.8	B	-0.3	0.51	14.8	B	-0.3	0.59	15.1	B	0.0	0.59	15.1	B	0.0
	Cardinal Medeiros SB Left	0.14	19.7	B	0.14	19.7	B	0	0.14	19.7	B	0	0.14	19.7	B	0.0	0.17	20.3	C	0.6	0.17	20.3	C	0.6

		Existing (2019)			Baseline				Build (2019)				Build-Mitigated (2019)				Future (2024)				Future-Mitigated (2024)			
Intersection	**Movement**	**v/c**	**Delay**	**VLOS**	**v/c**	**Delay**	**VLOS**	**Difference in Delay**	**v/c**	**Delay**	**VLOS**	**Difference in Delay**	**v/c**	**Delay**	**VLOS**	**Difference in Delay**	**v/c**	**Delay**	**VLOS**	**Difference in Delay**	**v/c**	**Delay**	**VLOS**	**Difference in Delay**
	Cardinal Medeiros SB Thru/Right	0.48	24.2	C	0.48	24.2	C	0	0.48	24.2	C	0	0.48	24.2	C	0.0	0.51	24.7	C	0.5	0.51	24.7	C	0.5
	Overall	**0.69**	**23.9**	**C**	**0.69**	**25.9**	**C**	**2**	**0.70**	**26.7**	**C**	**0.8**	**0.70**	**26.7**	**C**	**0.8**	**0.80**	**33.6**	**C**	**7.7**	**0.80**	**33.4**	**C**	**7.5**
Broadway/ Portland St	Broadway EB Left/Thru/Right	0.92	46.6	D	0.92	46.6	D	0	1.01	66.3	E	19.7	1.01	66.3	E	19.7	1.29	170.7	F	124.1	1.29	170.7	F	124.1
	Broadway WB Left/Thru/Right	0.53	40.4	D	0.53	40.8	D	0.4	0.56	41.7	D	0.9	0.56	41.7	D	0.9	0.69	45.8	D	5.0	0.69	44.2	D	3.4
	Portland NB Left	0.16	19.9	B	0.16	19.9	B	0	0.16	19.9	B	0	0.16	19.9	B	0.0	0.17	20.1	C	0.2	0.17	20.1	C	0.2
	Portland NB Thru/Right	0.50	24.8	C	0.50	24.8	C	0	0.50	24.8	C	0	0.50	24.8	C	0.0	0.56	26.0	C	1.2	0.56	26.0	C	1.2
	Portland SB Left	0.18	11.7	B	0.18	11.8	B	0.1	0.18	11.7	B	-0.1	0.18	11.7	B	-0.1	0.20	11.5	B	-0.3	0.20	11.4	B	-0.4
	Portland SB Thru/Right	0.57	16.1	B	0.57	16.2	B	0.1	0.57	16.1	B	-0.1	0.57	16.1	B	-0.1	0.59	15.7	B	-0.5	0.59	15.7	B	-0.5
	Overall	**0.76**	**32.4**	**C**	**0.76**	**32.5**	**C**	**0.1**	**0.81**	**40.0**	**D**	**7.5**	**0.81**	**40.0**	**D**	**7.5**	**0.98**	**80.9**	**F**	**48.4**	**0.98**	**80.5**	**F**	**48.0**
Broadway/ Hampshire St	Broadway EB Left/Thru/Right	0.83	30.5	C	0.83	30.5	C	0	0.92	36.0	D	5.5	0.92	36.0	D	5.5	1.12	81.4	F	50.9	1.12	80.9	F	50.4
	Broadway WB Left	0.55	32.5	C	0.55	14.5	B	-18	0.64	17.6	B	3.1	0.64	17.6	B	3.1	1.01	39.6	D	25.1	1.01	39.6	D	25.1
	Broadway WB Thru	0.48	24.2	C	0.48	9.9	A	-14.3	0.51	9.8	A	-0.1	0.51	9.8	A	-0.1	0.64	9.4	A	-0.5	0.64	9.4	A	-0.5
	Broadway WB Right	0.22	12.6	B	0.22	6.8	A	-5.8	0.23	6.4	A	-0.4	0.23	6.4	A	-0.4	0.31	6.7	A	-0.1	0.31	6.7	A	-0.1
	Technology NB Left	0.38	47.3	D	0.38	47.3	D	0	0.38	47.3	D	0	0.38	47.3	D	0.0	0.39	48.5	D	1.2	0.39	48.5	D	1.2
	Technology NB Thru/Right	0.21	31.2	C	0.21	31.2	C	0	0.21	31.2	C	0	0.21	31.2	C	0.0	0.21	31.2	C	0.0	0.21	31.2	C	0.0
	Hampshire SB Left	1.06	104.1	F	1.06	104.1	F	0	1.13	126.2	F	22.1	1.13	126.2	F	22.1	1.38	224.1	F	120.0	1.38	225.3	F	121.2
	Hampshire SB Thru/Right	0.46	41.8	D	0.46	41.8	D	0	0.46	41.9	D	0.1	0.46	41.9	D	0.1	0.47	41.7	D	-0.1	0.47	42.6	D	0.8
	Overall	**0.74**	**40.9**	**D**	**0.74**	**35.9**	**D**	**-5**	**0.80**	**41.7**	**D**	**5.8**	**0.80**	**41.7**	**D**	**5.8**	**0.96**	**75.3**	**E**	**39.4**	**0.96**	**75.3**	**E**	**39.4**
Broadway/ Galileo Galilei Way	Broadway EB Left	1.06	133.3	F	0.88	69.1	E	-64.2	1.00	87.2	F	18.1	1.00	87.2	F	18.1	1.36	216.3	F	147.2	1.36	216.3	F	147.2
	Broadway EB Thru	0.61	35.7	D	0.54	22.8	C	-12.9	0.65	26.0	C	3.2	0.65	26.0	C	3.2	0.77	27.9	C	5.1	0.77	27.8	C	5.0
	Broadway EB Right	0.58	61.4	E	0.47	31.7	C	-29.7	0.47	32.4	C	0.7	0.47	32.4	C	0.7	0.82	38.9	D	7.2	0.82	38.9	D	7.2
	Broadway WB Left	0.55	55.6	E	0.47	20.2	C	-35.4	0.51	23.7	C	3.5	0.51	23.8	C	3.6	0.84	62.1	E	41.9	0.84	62.1	E	41.9
	Broadway WB Thru	0.49	37.2	D	0.45	22.9	C	-14.3	0.49	23.2	C	0.3	0.49	23.2	C	0.3	0.64	23.9	C	1.0	0.64	23.9	C	1.0
	Broadway WB Right	0.57	56.2	E	0.61	56.7	E	0.5	0.71	66.2	E	9.5	0.71	66.2	E	9.5	0.75	65.8	E	9.1	0.75	65.8	E	9.1
	Galileo Galilei NB Left	0.58	59.6	E	0.49	42.2	D	-17.4	0.49	42.2	D	0	0.49	42.2	D	0.0	0.46	41.5	D	-0.7	0.46	41.5	D	-0.7
	Galileo Galilei NB Thru	0.47	32.5	C	0.54	33.5	C	1	0.68	38.6	D	5.1	0.68	38.6	D	5.1	0.99	75.2	E	41.7	0.99	75.2	E	41.7
	Galileo Galilei NB Right	0.94	136.4	F	0.84	89.8	F	-46.6	1.30	230.6	F	140.8	1.30	230.6	F	140.8	1.33	242.4	F	152.6	1.33	242.4	F	152.6
	Galileo Galilei SB Left	0.49	50.2	D	0.54	43.7	D	-6.5	0.51	41.1	D	-2.6	0.51	41.1	D	-2.6	0.60	46.5	D	2.8	0.60	46.5	D	2.8
	Galileo Galilei SB Thru	0.81	47.7	D	0.89	54.9	D	7.2	0.89	54.4	D	-0.5	0.91	57.3	E	2.4	1.03	85.2	F	30.3	1.05	90.9	F	36.0
	Galileo Galilei SB Right	1.60	345.9	F	1.32	216.5	F	-129.4	1.34	225.3	F	8.8	1.34	225.3	F	8.8	1.63	344.8	F	128.3	1.63	344.8	F	128.3
	Overall	**0.90**	**97.2**	**F**	**0.85**	**66.9**	**E**	**-30.3**	**0.88**	**79.0**	**E**	**12.1**	**0.89**	**79.5**	**E**	**12.6**	**1.03**	**118.4**	**F**	**51.5**	**1.04**	**119.3**	**F**	**52.4**
Broadway/ Ames St	Broadway EB Thru	0.71	34.4	C	0.71	44.9	D	10.5	0.92	61.4	E	16.5	0.92	61.4	E	16.5	0.99	72.7	E	27.8	0.99	72.7	E	27.8
	Broadway EB Right	0.37	36.0	D	0.37	46.7	D	10.7	0.37	42.4	D	-4.3	0.37	42.4	D	-4.3	0.54	47.1	D	0.4	0.54	47.1	D	0.4
	Broadway WB Left	0.55	23.7	C	0.55	23.6	C	-0.1	0.61	27.3	C	3.7	0.60	27.1	C	3.5	0.93	31.1	C	7.5	0.92	30.4	C	6.8
	Broadway WB Thru	0.51	29.1	C	0.51	29.1	C	0	0.59	29.4	C	0.3	0.59	29.3	C	0.2	0.75	29.3	C	0.2	0.75	29.2	C	0.1
	Ames NB Left	0.20	25.6	C	0.20	27.8	C	2.2	0.20	29.2	C	1.4	0.20	29.2	C	1.4	0.37	32.3	C	4.5	0.37	32.4	C	4.6
	Ames NB Right	0.55	27.7	C	0.55	49.8	D	22.1	1.10	98.5	F	48.7	1.10	98.5	F	48.7	1.35	205.2	F	155.4	1.35	205.1	F	155.3

Intersection	Movement	Existing (2019)			Baseline				Build (2019)				Build-Mitigated (2019)				Future (2024)				Future-Mitigated (2024)			
		v/c	Delay	VLOS	v/c	Delay	VLOS	Difference in Delay	v/c	Delay	VLOS	Difference in Delay	v/c	Delay	VLOS	Difference in Delay	v/c	Delay	VLOS	Difference in Delay	v/c	Delay	VLOS	Difference in Delay
	Overall	**0.57**	**30.0**	**C**	**0.57**	**37.2**	**D**	**7.2**	**0.84**	**54.5**	**D**	**17.3**	**0.84**	**54.5**	**D**	**17.3**	**0.99**	**78.2**	**E**	**41.0**	**0.99**	**78.1**	**E**	**40.9**
Broadway/ Main St/ Third St	Broadway EB Left	1.12	131.9	F	1.12	131.9	F	0	2.86	880.8	F	748.9	1.19	149.5	F	17.6	3.78	1289.6	F	1157.7	1.75	384.5	F	252.6
	Broadway EB Thru/Right	0.31	24.2	C	0.31	24.3	C	0.1	0.31	24.5	C	0.2	0.31	24.5	C	0.2	0.32	24.9	C	0.6	0.32	24.9	C	0.6
	Broadway WB Thru	0.91	52.2	D	0.91	52.2	D	0	1.09	98.5	F	46.3	1.09	98.5	F	46.3	1.50	265.6	F	213.4	1.50	265.6	F	213.4
	Broadway WB Right	0.58	35.4	D	0.58	35.4	D	0	0.81	48.9	D	13.5	0.81	48.9	D	13.5	1.02	85.2	F	49.8	1.02	85.2	F	49.8
	Third SB Left	-	-	-	-	-	-	n/a	-	-	-	n/a	0.35	34.6	C	n/a	-	-	-	n/a	0.60	34.1	C	n/a
	Third SB Left/Thru	0.64	40.4	D	0.64	40.8	D	0.4	0.70	40.7	D	-0.1	0.39	35.4	D	-5.4	1.25	136.8	F	96.0	0.73	37.2	D	-3.6
	Third SB Right	0.38	31.4	C	0.38	31.7	C	0.3	0.41	33.5	C	1.8	0.39	24.4	C	-7.3	0.59	30.5	C	-1.2	0.58	21.8	C	-9.9
	Overall	**0.88**	**50.8**	**D**	**0.88**	**50.9**	**D**	**0.1**	**1.52**	**244.3**	**F**	**193.4**	**1.03**	**67.5**	**E**	**16.6**	**2.08**	**365.2**	**F**	**314.3**	**1.42**	**150.6**	**F**	**99.7**
Third St/ Potter St/ Kendall St	Potter EB Left/Thru/Right	-	-	-	-	-	-	n/a	-	-	-	n/a	0.31	36.8	D	n/a	-	-	-	n/a	0.31	36.8	D	n/a
	Kendall WB Left/Thru/Right	-	-	-	-	-	-	n/a	-	-	-	n/a	0.20	38.4	D	n/a	-	-	-	n/a	0.20	38.4	D	n/a
	Third NB Left	-	-	-	-	-	-	n/a	-	-	-	n/a	0.37	5.7	A	n/a	-	-	-	n/a	0.44	7.0	A	n/a
	Third NB Thru/Right	-	-	-	-	-	-	n/a	-	-	-	n/a	0.52	5.9	A	n/a	-	-	-	n/a	0.64	8.9	A	n/a
	Third SB Left/Thru/Right	-	-	-	-	-	-	n/a	-	-	-	n/a	1.00	31.3	C	n/a	-	-	-	n/a	1.33	165.1	F	n/a
	Overall	**-**	**-**	**-**	**-**	**-**	**-**	n/a	**-**	**-**	**-**	n/a	**0.80**	**21.8**	**C**	n/a	**-**	**-**	**-**	n/a	**1.04**	**93.0**	**F**	n/a
Main St/ Galileo Galilei Way/ Vassar St	Main EB Left	0.38	21.3	C	0.45	37.2	D	15.9	0.77	52.6	D	15.4	0.74	49.1	D	11.9	1.10	128.6	F	91.4	1.10	128.6	F	91.4
	Main EB Thru/Right	0.39	19.4	B	0.49	26.5	C	7.1	0.63	31.1	C	4.6	0.63	31.1	C	4.6	1.16	131.9	F	105.4	1.16	131.9	F	105.4
	Main WB Left	0.21	14.6	B	0.39	41.5	D	26.9	0.39	41.5	D	0	0.39	41.5	D	0.0	0.33	37.9	D	-3.6	0.33	37.9	D	-3.6
	Main WB Thru/Right	0.37	15.0	B	0.54	32.1	C	17.1	0.58	34.0	C	1.9	0.58	34.7	C	2.6	0.78	49.5	D	17.4	0.76	48.2	D	16.1
	Vassar NB Left/Thru/Right	0.55	24.2	C	-	-	-	n/a	-	-	-	n/a	-	-	-	n/a	-	-	-	n/a	-	-	-	n/a
	Vassar NB Thru	-	-	-	0.64	38.5	D	n/a	0.74	43.2	D	4.7	0.74	43.2	D	4.7	0.87	56.3	E	17.8	0.87	56.3	E	17.8
	Vassar NB Right	-	-	-	0.75	64.6	E	n/a	0.75	64.6	E	0	0.75	64.6	E	0.0	0.81	65.5	E	0.9	0.81	65.5	E	0.9
	Galileo Galilei SB Left	0.13	19.0	B	0.90	169.6	F	150.6	0.90	169.6	F	0	0.90	169.6	F	0.0	0.85	102.0	F	-67.6	0.85	102.0	F	-67.6
	Galileo Galilei SB Thru	0.43	22.7	C	0.56	30.2	C	7.5	0.58	30.3	C	0.1	0.58	30.3	C	0.1	0.60	27.5	C	-2.7	0.60	27.5	C	-2.7
	Galileo Galilei SB Right	0.44	23.8	C	0.80	57.4	E	33.6	0.83	60.5	E	3.1	0.83	59.1	E	1.7	1.02	106.8	F	49.4	1.05	115.9	F	58.5
	Overall	**0.47**	**21.1**	**C**	**0.67**	**40.8**	**D**	**19.7**	**0.78**	**43.8**	**D**	**3**	**0.78**	**43.4**	**D**	**2.6**	**1.06**	**83.5**	**F**	**42.7**	**1.06**	**84.6**	**F**	**43.8**
Main St/ Ames St	Main EB Left/Thru/Right	1.19	145.1	F	0.60	19.2	B	-125.9	0.89	41.3	D	22.1	0.89	41.3	D	22.1	1.45	237.0	F	217.8	1.45	235.4	F	216.2
	Main WB Left/Thru/Right	0.61	39.4	D	0.31	13.1	B	-26.3	0.31	13.2	B	0.1	0.31	13.1	B	0.0	0.99	71.1	E	58.0	0.99	70.4	E	57.3
	Ames NB Left/Thru/Right	0.94	66.4	E	1.04	93.7	F	27.3	1.19	143.5	F	49.8	1.19	143.5	F	49.8	1.52	280.1	F	186.4	1.52	280.1	F	186.4
	Ames SB Left/Thru	0.20	24.7	C	0.20	5.1	A	-19.6	0.23	4.8	A	-0.3	0.23	4.9	A	-0.2	0.94	36.0	D	30.9	0.94	36.6	D	31.5
	Ames SB Right	0.35	27.8	C	0.35	5.5	A	-22.3	0.39	5.1	A	-0.4	0.38	5.2	A	-0.3	0.41	4.6	A	-0.9	0.40	4.6	A	-0.9
	Overall	**0.82**	**79.1**	**E**	**0.86**	**39.7**	**D**	**-39.4**	**1.13**	**64.6**	**E**	**23.6**	**1.13**	**65.0**	**E**	**25.3**	**1.67**	**174.7**	**F**	**135.0**	**1.67**	**174.8**	**F**	**135.1**
Memorial Dr/ Ames St	Memorial WB Left/Thru/Right	-	-	-	0.70	8.7	A	n/a	0.75	11.1	B	2.4	0.75	11.1	B	2.4	0.82	11.8	B	3.1	0.82	11.8	B	3.1
	Ames SB Left/Right	-	-	-	0.76	58.6	E	n/a	0.77	60.8	E	2.2	0.77	60.8	E	2.2	0.82	67.8	E	9.2	0.82	67.8	E	9.2
	Memorial EB Thru	-	-	-	0.81	13.4	B	n/a	0.85	15.0	B	1.6	0.85	15.0	B	1.6	0.99	31.9	C	18.5	0.99	31.9	C	18.5
	Overall	-	-	-	**0.69**	**12.4**	**B**	n/a	**0.73**	**14.8**	**B**	**2.4**	**0.73**	**14.8**	**B**	**2.4**	**0.79**	**16.1**	**B**	**3.7**	**0.79**	**16.1**	**B**	**3.7**
Memorial Dr/ Wadsworth St	Memorial WB Thru/Right	0.70	15.8	B	0.70	15.8	B	0	0.70	15.8	B	0	0.70	15.8	B	0.0	0.84	20.8	C	5.0	0.84	20.8	C	5.0
	Memorial EB U-turn	0.51	34.5	C	0.60	32.1	C	-2.4	0.75	38.7	D	6.6	0.75	38.7	D	6.6	0.82	44.8	D	12.7	0.82	44.8	D	12.7
	Memorial EB Thru	0.83	20.0	B	1.81	399.0	F	379	1.81	398.4	F	-0.6	1.81	398.4	F	-0.6	2.07	514.4	F	115.4	2.07	514.4	F	115.4
	Memorial EB Left	0.19	0.4	A	0.22	0.4	A	0	0.26	0.4	A	0	0.26	0.4	A	0.0	0.32	0.4	A	0.0	0.32	0.4	A	0.0

		Existing (2019)			Baseline				Build (2019)				Build-Mitigated (2019)				Future (2024)				Future-Mitigated (2024)			
Intersection	**Movement**	**v/c**	**Delay**	**VLOS**	**v/c**	**Delay**	**VLOS**	**Difference in Delay**	**v/c**	**Delay**	**VLOS**	**Difference in Delay**	**v/c**	**Delay**	**VLOS**	**Difference in Delay**	**v/c**	**Delay**	**VLOS**	**Difference in Delay**	**v/c**	**Delay**	**VLOS**	**Difference in Delay**
	Wadsworth SB Right	0.00	0.0	A	0.00	0.0	A	0	0.00	25.9	C	25.9	0.00	25.9	C	25.9	0.01	26.0	C	26.0	0.01	26.0	C	26.0
	Overall	**0.64**	**19.0**	**B**	**0.67**	**18.9**	**B**	**-0.1**	**0.72**	**20.8**	**C**	**1.9**	**0.72**	**20.8**	**C**	**1.9**	**0.83**	**25.8**	**C**	**6.9**	**0.83**	**25.8**	**C**	**6.9**
Memorial Dr/ Western Ave	Western WB Left/Thru/Right	0.89	51.3	D	0.89	51.3	D	0	0.89	51.3	D	0	0.89	51.3	D	0.0	0.89	52.1	D	0.8	0.89	52.1	D	0.8
	Memorial NB Left	0.85	60.7	E	0.85	60.7	E	0	0.92	72.9	E	12.2	0.92	72.9	E	12.2	1.00	92.8	F	32.1	1.00	92.8	F	32.1
	Memorial NB Thru	0.62	18.8	B	0.62	18.8	B	0	0.63	19.0	B	0.2	0.63	19.0	B	0.2	0.66	20.1	C	1.3	0.66	20.1	C	1.3
	Memorial SB Thru/Right	1.09	94.1	F	1.09	94.1	F	0	1.15	116.4	F	22.3	1.15	116.4	F	22.3	1.22	147.8	F	53.7	1.22	147.8	F	53.7
	Overall	**0.97**	**61.3**	**E**	**0.97**	**61.3**	**E**	**0**	**1.01**	**71.3**	**E**	**10**	**1.01**	**71.3**	**E**	**10.0**	**1.07**	**86.0**	**F**	**24.7**	**1.07**	**86.0**	**F**	**24.7**
Memorial Dr/ Cambridge St/ River St	Cambridge EB Left/Thru	1.10	92.2	F	1.10	92.2	F	0	1.15	111.3	F	19.1	1.15	111.3	F	19.1	1.18	120.5	F	28.3	1.18	120.5	F	28.3
	Cambridge EB Right	1.64	330.5	F	1.64	330.5	F	0	1.64	329.8	F	-0.7	1.64	329.8	F	-0.7	1.76	381.4	F	50.9	1.76	381.4	F	50.9
	Memorial NB Thru/Right	0.71	39.8	D	0.71	39.8	D	0	0.72	40.4	D	0.6	0.72	40.4	D	0.6	0.78	42.8	D	3.0	0.78	42.8	D	3.0
	Memorial SB Left/Thru	1.03	76.3	E	1.03	76.3	E	0	1.10	100.1	F	23.8	1.10	100.1	F	23.8	1.22	145.0	F	68.7	1.22	145.0	F	68.7
	Overall	**1.14**	**129.9**	**F**	**1.14**	**129.9**	**F**	**0**	**1.18**	**140.3**	**F**	**10.4**	**1.18**	**140.3**	**F**	**10.4**	**1.28**	**167.7**	**F**	**37.8**	**1.28**	**167.7**	**F**	**37.8**

Table 7.a.2 Signalized Intersection Level of Service Results – PM Peak Hour

		Existing (2019)			Baseline				Build (2019)				Build with Mitigation (2019)				Future (2024)				Future with Mitigation (2024)			
Intersection	**Movement**	**v/c**	**Delay**	**VLOS**	**v/c**	**Delay**	**VLOS**	**Difference in Delay**	**v/c**	**Delay**	**VLOS**	**Difference in Delay**	**v/c**	**Delay**	**VLOS**	**Difference in Delay**	**v/c**	**Delay**	**VLOS**	**Difference in Delay**	**v/c**	**Delay**	**VLOS**	**Difference in Delay**
O'Brien Hwy/ Third St	O'Brien EB Thru/Right	0.72	34.7	C	0.35	12.2	B	-22.5	0.35	12.6	B	0.4	0.35	12.6	B	0.4	0.63	15.8	B	3.6	0.63	15.8	B	3.6
	O'Brien EB Right	-	-	-	0.45	14.7	B	n/a	0.49	15.1	B	0.4	0.49	15.1	B	0.4	0.56	16.5	B	1.8	0.56	16.5	B	1.8
	O'Brien WB Left/Thru	0.83	23.8	C	0.58	14.7	B	-9.1	0.59	15.2	B	0.5	0.59	15.2	B	0.5	0.76	18.8	B	4.1	0.76	18.8	B	4.1
	Third NB Left/Right	0.67	19.1	B	-	-	-	n/a	-	-	-	n/a	-	-	-	n/a	-	-	-	n/a	-	-	-	n/a
	Third NB Left	-	-	-	0.97	74.1	E	n/a	1.09	104.6	F	30.5	1.09	104.6	F	30.5	1.33	191.2	F	117.1	1.33	191.2	F	117.1
	Third NB Left/Thru/Right	-	-	-	0.92	62.0	E	n/a	1.02	83.1	F	21.1	1.02	83.1	F	21.1	1.27	164.3	F	102.3	1.27	164.3	F	102.3
	Overall	**0.61**	**25.9**	**C**	**0.69**	**27.5**	**C**	**1.6**	**0.74**	**36.3**	**D**	**8.8**	**0.74**	**36.3**	**D**	**8.8**	**0.93**	**57.3**	**E**	**29.8**	**0.93**	**57.3**	**E**	**29.8**
O'Brien Hwy/ N. First St	O'Brien EB Thru	-	-	-	0.30	13.8	B	n/a	0.30	13.8	B	0	0.30	13.8	B	0.0	0.30	13.9	B	0.1	0.30	13.9	B	0.1
	O'Brien EB Right	-	-	-	0.09	21.8	C	n/a	0.09	21.8	C	0	0.09	21.8	C	0.0	0.09	21.9	C	0.1	0.09	21.9	C	0.1
	O'Brien WB Thru	-	-	-	0.36	18.3	B	n/a	0.36	19.9	B	1.6	0.36	19.9	B	1.6	0.36	12.6	B	-5.7	0.36	12.6	B	-5.7
	O'Brien WB Right	-	-	-	0.03	30.2	C	n/a	0.03	30.0	C	-0.2	0.03	30.0	C	-0.2	0.48	33.9	C	3.7	0.48	33.9	C	3.7
	N. First NB Left	-	-	-	0.99	39.5	D	n/a	0.99	30.1	C	-9.4	0.99	30.1	C	-9.4	5.85	2202.3	F	2162.8	5.85	2202.3	F	2162.8
	N. First NB Thru/Right	-	-	-	0.19	15.0	B	n/a	0.19	14.8	B	-0.2	0.19	14.8	B	-0.2	0.41	15.1	B	0.1	0.41	15.1	B	0.1
	N. First SB Left/Thru	-	-	-	0.06	25.2	C	n/a	0.06	25.2	C	0	0.06	25.2	C	0.0	2.33	644.4	F	619.2	2.33	644.4	F	619.2
	N. First SB Right	-	-	-	0.09	25.5	C	n/a	0.09	25.5	C	0	0.09	25.5	C	0.0	0.09	25.6	C	0.1	0.09	25.6	C	0.1
	Overall	**-**	**-**	**-**	**0.61**	**21.8**	**C**	n/a	**0.61**	**20.4**	**C**	-1.4	**0.61**	**20.4**	**C**	**-1.4**	**2.42**	**487.7**	**F**	**465.9**	**2.42**	**487.7**	**F**	**465.9**
O'Brien Hwy/ Cambridge St/ East St	O'Brien EB Left	1.74	389.8	F	-	-	-	n/a	-	-	-	n/a	-	-	-	n/a	-	-	-	n/a	-	-	-	n/a
	O'Brien EB Thru	0.43	13.8	B	0.74	32.8	C	19	0.74	32.7	C	-0.1	0.74	32.7	C	-0.1	1.00	43.6	D	10.8	1.00	43.6	D	10.8
	O'Brien EB Right	0.12	10.2	B	-	-	-	n/a	-	-	-	n/a	-	-	-	n/a	-	-	-	n/a	-	-	-	n/a
	O'Brien WB Left	0.26	24.6	C	0.47	21.7	C	-2.9	0.48	22.1	C	0.4	0.48	22.1	C	0.4	0.62	30.4	C	8.7	0.62	30.4	C	8.7
	O'Brien WB Thru/Right	0.77	35.2	D	0.59	22.7	C	-12.5	0.60	22.7	C	0	0.60	22.7	C	0.0	0.94	45.3	D	22.6	0.94	45.3	D	22.6
	Cambridge NB Left/Thru	0.98	49.5	D	-	-	-	n/a	-	-	-	n/a	-	-	-	n/a	-	-	-	n/a	-	-	-	n/a
	Cambridge NB Right	0.38	3.6	A	0.64	15.8	B	12.2	0.57	8.4	A	-7.4	0.57	8.4	A	-7.4	0.69	21.1	C	5.3	0.69	21.1	C	5.3
	East SB Left/Thru/Right	0.23	27.2	C	0.11	38.9	D	11.7	0.11	38.9	D	0	0.11	38.9	D	0.0	0.11	39.0	D	0.1	0.11	39.0	D	0.1
	Overall	**1.16**	**43.3**	**D**	**0.57**	**23.6**	**C**	**-19.7**	**0.65**	**21.4**	**C**	**-2.2**	**0.65**	**21.4**	**C**	**-2.2**	**0.91**	**37.0**	**D**	**13.4**	**0.91**	**37.0**	**D**	**13.4**
O'Brien Hwy/ Land Blvd	O'Brien EB Left	1.16	145.7	F	1.61	342.1	F	196.4	1.67	370.3	F	28.2	1.67	370.3	F	28.2	2.16	586.7	F	244.6	2.16	586.7	F	244.6
	O'Brien EB Thru	0.58	44.9	D	0.68	51.3	D	6.4	0.71	52.6	D	1.3	0.71	52.6	D	1.3	1.26	179.7	F	128.4	1.26	179.7	F	128.4
	O'Brien EB Right	0.13	0.2	A	0.13	0.0	A	-0.2	0.13	0.0	A	0	0.13	0.0	A	0.0	0.18	0.0	A	0.0	0.18	0.0	A	0.0
	O'Brien WB Left	1.19	171.2	F	1.06	124.3	F	-46.9	1.16	159.8	F	35.5	1.16	159.8	F	35.5	1.37	242.9	F	118.6	1.37	242.9	F	118.6
	O'Brien WB Thru	0.82	54.9	D	0.71	42.9	D	-12	0.75	45.2	D	2.3	0.75	45.2	D	2.3	0.99	75.1	E	32.2	0.99	75.1	E	32.2
	O'Brien WB Right	0.60	27.0	C	0.84	48.2	D	21.2	0.86	52.5	D	4.3	0.86	52.5	D	4.3	0.89	57.8	E	9.6	0.89	57.8	E	9.6
	Land NB Left	0.53	37.3	D	0.49	29.4	C	-7.9	0.47	33.0	C	3.6	0.47	33.0	C	3.6	0.63	38.5	D	9.1	0.63	38.5	D	9.1
	Land NB Thru	0.89	52.4	D	0.84	41.1	D	-11.3	0.89	49.5	D	8.4	0.89	49.5	D	8.4	0.96	63.8	E	22.7	0.96	63.8	E	22.7
	Land NB Right	0.19	55.2	E	0.19	72.8	E	17.6	0.21	71.3	E	-1.5	0.21	71.3	E	-1.5	0.25	76.2	E	3.4	0.25	76.2	E	3.4
	Land SB Left	0.38	41.1	D	0.45	44.8	D	3.7	0.45	44.8	D	0	0.45	44.8	D	0.0	0.46	44.9	D	0.1	0.46	44.9	D	0.1

		Existing (2019)			Baseline				Build (2019)				Build with Mitigation (2019)				Future (2024)				Future with Mitigation (2024)			
Intersection	**Movement**	**v/c**	**Delay**	**VLOS**	**v/c**	**Delay**	**VLOS**	**Difference in Delay**	**v/c**	**Delay**	**VLOS**	**Difference in Delay**	**v/c**	**Delay**	**VLOS**	**Difference in Delay**	**v/c**	**Delay**	**VLOS**	**Difference in Delay**	**v/c**	**Delay**	**VLOS**	**Difference in Delay**
	Land SB Thru/Right	0.99	82.3	F	1.18	150.6	F	68.3	1.23	171.0	F	20.4	1.23	171.0	F	20.4	1.44	259.1	F	108.5	1.44	259.1	F	108.5
	Overall	**0.99**	**70.1**	**E**	**1.12**	**102.3**	**F**	**32.2**	**1.18**	**113.3**	**F**	**11**	**1.18**	**113.3**	**F**	**11.0**	**1.39**	**182.1**	**F**	**79.8**	**1.39**	**182.1**	**F**	**79.8**
Cambridge St/ Third St	Cambridge EB Left/Thru/Right	0.51	24.9	C	0.53	26.1	C	1.2	0.53	26.1	C	0	0.53	26.1	C	0.0	0.71	32.0	C	5.9	0.71	32.0	C	5.9
	Cambridge WB Left/Thru/Right	0.99	56.5	E	0.96	64.9	E	8.4	0.96	64.9	E	0	0.96	64.9	E	0.0	1.56	293.9	F	229.0	1.56	293.9	F	229.0
	Third NB Left/Thru/Right	0.67	26.2	C	0.48	20.2	C	-6	0.64	24.4	C	4.2	0.64	24.4	C	4.2	0.89	40.6	D	20.4	0.89	40.6	D	20.4
	Third SB Left	0.04	21.1	C	0.03	15.0	B	-6.1	0.04	14.9	B	-0.1	0.04	14.9	B	-0.1	0.06	14.2	B	-0.8	0.06	14.2	B	-0.8
	Third SB Thru/Right	0.49	33.3	C	0.41	22.6	C	-10.7	0.44	23.1	C	0.5	0.44	23.1	C	0.5	0.51	23.7	C	1.1	0.51	23.7	C	1.1
	Overall	**0.82**	**35.7**	**D**	**0.69**	**34.8**	**C**	**-0.9**	**0.78**	**34.8**	**C**	**0**	**0.78**	**34.8**	**C**	**0.0**	**1.19**	**107.1**	**F**	**72.3**	**1.19**	**107.1**	**F**	**72.3**
Cambridge St/ First St	Cambridge EB Thru/Right	0.93	61.1	E	-	-	-	n/a	-	-	-	n/a	-	-	-	n/a	-	-	-	n/a	-	-	-	n/a
	Cambridge EB Left	-	-	-	0.91	70.5	E	n/a	0.95	80.7	F	10.2	0.95	80.7	F	10.2	1.23	171.5	F	101.0	1.23	171.5	F	101.0
	Cambridge EB Thru/Right	-	-	-	0.45	34.1	C	n/a	0.47	35.6	D	1.5	0.47	35.6	D	1.5	0.52	37.0	D	2.9	0.52	37.0	D	2.9
	Cambridge WB Left	0.25	13.7	B	0.45	17.1	B	3.4	0.47	16.3	B	-0.8	0.47	16.3	B	-0.8	0.53	12.4	B	-4.7	0.53	12.4	B	-4.7
	Cambridge WB Thru	0.40	15.3	B	-	-	-	n/a	-	-	-	n/a	-	-	-	n/a	-	-	-	n/a	-	-	-	n/a
	Cambridge WB Thru/Right	-	-	-	0.24	15.5	B	n/a	0.24	14.3	B	-1.2	0.24	14.3	B	-1.2	0.25	8.4	A	-7.1	0.25	8.4	A	-7.1
	First NB Left	0.28	38.5	D	-	-	-	n/a	-	-	-	n/a	-	-	-	n/a	-	-	-	n/a	-	-	-	n/a
	First NB Left/Thru	-	-	-	1.07	113.3	F	n/a	1.07	113.3	F	0	1.07	113.3	F	0.0	1.92	469.7	F	356.4	1.92	469.7	F	356.4
	First NB Right	1.03	68.7	E	1.02	76.5	E	7.8	1.08	92.7	F	16.2	1.08	92.7	F	16.2	1.35	202.1	F	125.6	1.35	202.1	F	125.6
	N. First SB Left/Thru	-	-	-	0.07	26.3	C	n/a	0.07	26.3	C	0	0.07	26.3	C	0.0	0.58	23.7	C	-2.6	0.58	23.7	C	-2.6
	N. First SB Right	-	-	-	0.03	33.0	C	n/a	0.03	33.0	C	0	0.03	33.0	C	0.0	0.14	26.9	C	-6.1	0.14	26.9	C	-6.1
	Overall	**0.92**	**52.8**	**D**	**0.90**	**64.2**	**E**	**11.4**	**0.93**	**70.9**	**E**	**6.7**	**0.93**	**70.9**	**E**	**6.7**	**1.33**	**174.4**	**F**	**110.2**	**1.33**	**174.4**	**F**	**110.2**
First St/ Thorndike St	Thorndike EB Left/Right	0.77	31.5	C	0.77	31.5	C	0	0.77	31.5	C	0	0.77	31.5	C	0.0	1.17	124.5	F	93.0	1.17	124.5	F	93.0
	First NB Thru	0.59	20.1	C	0.79	28.0	C	7.9	0.87	34.5	C	6.5	0.87	34.5	C	6.5	1.18	119.5	F	91.5	1.18	119.5	F	91.5
	First SB Thru	0.33	15.6	B	0.33	15.6	B	0	0.36	16.0	B	0.4	0.36	16.0	B	0.4	0.80	32.1	C	16.5	0.80	32.1	C	16.5
	Overall	**0.52**	**23.5**	**C**	**0.61**	**26.9**	**C**	**3.4**	**0.65**	**30.2**	**C**	**3.3**	**0.65**	**30.2**	**C**	**3.3**	**0.93**	**99.3**	**F**	**72.4**	**0.93**	**99.3**	**F**	**72.4**
First St/ Charles St	Charles EB Left/Thru/Right	0.47	25.5	C	0.47	25.5	C	0	0.47	25.5	C	0	0.47	25.5	C	0.0	0.62	28.4	C	2.9	0.62	28.4	C	2.9
	Charles WB Left/Thru/Right	0.73	38.5	D	0.73	38.5	D	0	0.73	38.5	D	0	0.73	38.5	D	0.0	0.87	54.8	D	16.3	0.87	54.8	D	16.3
	First NB Thru/Right	0.78	36.1	D	1.06	84.5	F	48.4	1.17	122.7	F	38.2	1.17	122.7	F	38.2	1.53	275.4	F	190.9	1.53	275.4	F	190.9
	First SB Left/Thru	0.61	28.8	C	0.89	56.5	E	27.7	1.14	131.1	F	74.6	1.14	131.1	F	74.6	4.97	1834.1	F	1777.6	4.97	1834.1	F	1777.6
	Overall	**0.46**	**33.4**	**C**	**0.56**	**59.4**	**E**	**26**	**0.60**	**92.3**	**F**	**32.9**	**0.60**	**92.3**	**F**	**32.9**	**1.91**	**698.7**	**F**	**639.3**	**1.91**	**698.7**	**F**	**639.3**
Third St/ Charles St	Charles EB Left/Thru/Right	0.53	27.4	C	0.53	27.4	C	0	0.53	27.4	C	0	0.53	27.4	C	0.0	0.59	29.4	C	2.0	0.59	29.4	C	2.0
	Charles WB Left/Thru/Right	0.32	24.4	C	0.32	24.4	C	0	0.32	24.4	C	0	0.32	24.4	C	0.0	0.31	24.1	C	-0.3	0.31	24.1	C	-0.3
	Third NB Left/Thru/Right	0.91	33.4	C	0.75	20.4	C	-13	0.90	32.1	C	11.7	0.90	32.1	C	11.7	1.14	95.4	F	75.0	1.14	95.4	F	75.0
	Third SB Left/Thru/Right	0.33	10.5	B	0.33	10.5	B	0	0.37	10.9	B	0.4	0.37	10.9	B	0.4	0.47	12.7	B	2.2	0.47	12.7	B	2.2
	Overall	**0.66**	**26.9**	**C**	**0.57**	**18.8**	**B**	**-8.1**	**0.66**	**25.8**	**C**	**7**	**0.66**	**25.8**	**C**	**7.0**	**0.81**	**64.9**	**E**	**46.1**	**0.81**	**64.9**	**E**	**46.1**

		Existing (2019)			Baseline				Build (2019)				Build with Mitigation (2019)				Future (2024)				Future with Mitigation (2024)			
Intersection	**Movement**	**v/c**	**Delay**	**VLOS**	**v/c**	**Delay**	**VLOS**	**Difference in Delay**	**v/c**	**Delay**	**VLOS**	**Difference in Delay**	**v/c**	**Delay**	**VLOS**	**Difference in Delay**	**v/c**	**Delay**	**VLOS**	**Difference in Delay**	**v/c**	**Delay**	**VLOS**	**Difference in Delay**
Galileo Galilei Way/ Binney St/ Fulkerson St	Galileo EB Thru	0.35	7.4	A	0.94	48.5	D	41.1	0.98	56.9	E	8.4	0.98	56.9	E	8.4	1.29	166.8	F	118.3	1.29	166.8	F	118.3
	Galileo WB Thru/Right	0.47	38.7	D	-	-	-	n/a	-	-	-	n/a	-	-	-	n/a	-	-	-	n/a	-	-	-	n/a
	Galileo WB Thru	-	-	-	0.50	22.8	C	n/a	0.57	24.7	C	1.9	0.65	26.9	C	4.1	0.93	48.6	D	25.8	1.00	64.3	E	41.5
	Galileo WB Right/Hard Right	-	-	-	0.68	55.4	E	n/a	0.68	55.4	E	0	0.68	55.4	E	0.0	0.76	64.1	E	8.7	0.76	64.1	E	8.7
	Fulkerson SB Right/Hard Right	0.44	32.6	C	0.78	56.0	E	23.4	0.78	56.0	E	0	0.78	56.0	E	0.0	0.80	58.5	E	2.5	0.80	58.5	E	2.5
	Binney SEB Hard Left/Left	1.16	143.7	F	1.21	166.0	F	22.3	1.21	166.0	F	0	1.21	166.0	F	0.0	1.30	202.2	F	36.2	1.30	202.2	F	36.2
	Binney SEB Right	0.72	54.8	D	1.27	189.3	F	134.5	1.29	199.1	F	9.8	1.29	199.1	F	9.8	1.54	303.8	F	114.5	1.54	303.8	F	114.5
	Overall	**0.60**	**46.1**	**D**	**1.04**	**86.6**	**F**	**40.5**	**1.07**	**89.7**	**F**	**3.1**	**1.07**	**88.6**	**F**	**2.0**	**1.32**	**151.5**	**F**	**64.9**	**1.32**	**153.7**	**F**	**67.1**
Binney St/ Third St	Binney EB Left	1.15	133.1	F	0.95	77.1	E	-56	1.14	134.2	F	57.1	1.14	134.2	F	57.1	1.42	245.4	F	168.3	1.42	245.4	F	168.3
	Binney EB Thru/Right	0.57	35.3	D	-	-	-	n/a	-	-	-	n/a	-	-	-	n/a	-	-	-	n/a	-	-	-	n/a
	Binney EB Thru	-	-	-	0.87	49.4	D	n/a	1.05	89.6	F	40.2	1.05	89.6	F	40.2	1.42	238.0	F	188.6	1.42	238.0	F	188.6
	Binney EB Right	-	-	-	0.39	29.1	C	n/a	0.46	31.8	C	2.7	0.46	31.8	C	2.7	0.65	41.8	D	12.7	0.65	41.8	D	12.7
	Binney WB Right	0.61	47.6	D	0.54	43.0	D	-4.6	0.64	48.0	D	5	0.64	48.0	D	5.0	0.87	58.6	E	15.6	0.87	58.6	E	15.6
	Binney WB Thru/Right	0.74	38.5	D	0.74	38.2	D	-0.3	0.78	40.5	D	2.3	0.78	40.5	D	2.3	1.29	172.7	F	134.5	1.29	172.7	F	134.5
	Third NB Left/Thru	0.78	46.9	D	0.69	41.5	D	-5.4	1.03	89.6	F	48.1	1.03	80.6	F	39.1	1.28	182.4	F	140.9	1.28	172.5	F	131.0
	Third NB Right	0.15	20.1	C	0.24	20.0	C	-0.1	0.34	18.6	B	-1.4	0.34	17.4	B	-2.6	0.41	17.7	B	-2.3	0.41	15.6	B	-4.4
	Third SB Left/Thru/Right	0.65	32.4	C	0.65	32.3	C	-0.1	0.73	36.9	D	4.6	0.73	36.9	D	4.6	1.04	87.0	F	54.7	1.04	87.0	F	54.7
	Overall	**0.88**	**52.4**	**D**	**0.89**	**43.4**	**D**	**-9**	**1.15**	**67.6**	**E**	**24.2**	**1.15**	**66.1**	**E**	**22.7**	**1.43**	**158.3**	**F**	**114.9**	**1.43**	**156.8**	**F**	**113.4**
Binney St/ Second St	Binney EB Left	0.67	49.9	D	0.67	45.6	D	-4.3	0.67	42.7	D	-2.9	0.67	43.2	D	-2.4	0.63	37.0	D	-8.6	0.63	37.9	D	-7.7
	Binney EB Thru/Right	0.62	31.3	C	0.81	39.6	D	8.3	1.03	74.6	E	35	1.03	74.2	E	34.6	1.30	178.5	F	138.9	1.30	178.0	F	138.4
	Binney WB Left	0.48	49.6	D	0.48	49.6	D	0	0.48	49.6	D	0	0.48	49.6	D	0.0	0.48	49.6	D	0.0	0.48	49.6	D	0.0
	Binney WB Thru/Right	0.60	27.9	C	0.60	27.9	C	0	0.65	28.9	C	1	0.65	28.9	C	1.0	1.05	74.1	E	46.2	1.05	74.1	E	46.2
	Second NB Left/Thru/Right	0.64	35.4	D	0.64	35.4	D	0	0.64	35.4	D	0	0.64	35.4	D	0.0	0.66	36.2	D	0.8	0.66	36.2	D	0.8
	Second SB Left/Thru/Right	0.45	29.9	C	0.45	29.9	C	0	0.45	29.9	C	0	0.45	29.9	C	0.0	0.55	32.9	C	3.0	0.55	32.9	C	3.0
	Overall	**0.70**	**32.2**	**C**	**0.81**	**34.2**	**C**	**2**	**0.94**	**46.4**	**D**	**12.2**	**0.94**	**46.3**	**D**	**12.1**	**1.10**	**97.5**	**F**	**63.3**	**1.10**	**97.3**	**F**	**63.1**
Binney St/ First St	Binney EB Left	0.53	30.2	C	1.02	96.0	F	65.8	1.24	171.2	F	75.2	1.24	171.2	F	75.2	1.66	345.2	F	249.2	1.66	345.2	F	249.2
	Binney EB Thru/Right	0.27	19.1	B	0.27	19.1	B	0	0.34	20.0	B	0.9	0.34	20.0	B	0.9	0.39	20.7	C	1.6	0.39	20.7	C	1.6
	Binney WB Left/Thru/Right	0.51	38.2	D	0.51	39.5	D	1.3	0.53	38.8	D	-0.7	0.53	38.8	D	-0.7	0.61	38.9	D	-0.6	0.61	38.9	D	-0.6
	First NB Left/Thru/Right	0.08	36.4	D	0.08	36.4	D	0	0.08	36.4	D	0	0.08	36.4	D	0.0	0.08	36.4	D	0.0	0.08	36.4	D	0.0
	First SB Left/Thru	0.63	47.8	D	0.65	49.7	D	1.9	0.65	49.7	D	0	0.65	49.7	D	0.0	0.88	67.8	E	18.1	0.88	67.8	E	18.1
	First SB Right	0.32	41.6	D	0.34	42.9	D	1.3	0.41	45.2	D	2.3	0.41	45.2	D	2.3	1.70	381.5	F	338.6	1.70	381.5	F	338.6
	Overall	**0.60**	**35.7**	**D**	**0.90**	**45.5**	**D**	**9.8**	**1.04**	**56.6**	**E**	**11.1**	**1.04**	**56.6**	**E**	**11.1**	**1.63**	**135.2**	**F**	**89.7**	**1.63**	**135.2**	**F**	**89.7**
Binney St/ Land Blvd	Binney EB Left	0.33	24.3	C	0.33	24.3	C	0	0.47	25.4	C	1.1	0.47	25.4	C	1.1	0.56	26.4	C	2.1	0.56	26.4	C	2.1
	Land NB Left	0.86	54.2	D	0.86	54.2	D	0	0.86	54.2	D	0	0.86	54.2	D	0.0	0.89	55.9	E	1.7	0.89	55.9	E	1.7
	Land NB Thru	0.36	20.6	C	0.36	20.6	C	0	0.36	20.6	C	0	0.36	20.6	C	0.0	0.44	21.5	C	0.9	0.44	21.5	C	0.9
	Land SB Thru	0.56	9.4	A	0.56	40.5	D	31.1	0.56	40.1	D	-0.4	0.56	40.1	D	-0.4	0.69	44.9	D	4.4	0.69	44.9	D	4.4
	Land SB Right	0.23	21.7	C	0.23	28.1	C	6.4	0.28	30.9	C	2.8	0.28	30.9	C	2.8	0.38	34.7	C	6.6	0.38	34.7	C	6.6
	Overall	**0.60**	**26.1**	**C**	**0.60**	**35.4**	**D**	**9.3**	**0.64**	**35.1**	**D**	**-0.3**	**0.64**	**35.1**	**D**	**-0.3**	**0.74**	**37.0**	**D**	**1.6**	**0.74**	**37.0**	**D**	**1.6**

		Existing (2019)			Baseline				Build (2019)				Build with Mitigation (2019)				Future (2024)				Future with Mitigation (2024)			
Intersection	**Movement**	**v/c**	**Delay**	**VLOS**	**v/c**	**Delay**	**VLOS**	**Difference in Delay**	**v/c**	**Delay**	**VLOS**	**Difference in Delay**	**v/c**	**Delay**	**VLOS**	**Difference in Delay**	**v/c**	**Delay**	**VLOS**	**Difference in Delay**	**v/c**	**Delay**	**VLOS**	**Difference in Delay**
Hampshire St/ Cardinal Medeiros Ave/ Portland St	Hampshire EB Left/Thru/Right	0.49	22.7	C	0.49	22.7	C	0	0.50	23.0	C	0.3	0.50	23.0	C	0.3	0.55	24.1	C	1.4	0.55	24.1	C	1.4
	Hampshire WB Left/Thru/Right	0.88	30.3	C	0.88	31.1	C	0.8	0.91	35.3	D	4.2	0.91	35.4	D	4.3	1.02	54.7	D	23.6	1.02	54.7	D	23.6
	Portland NB Left	0.37	11.3	B	0.37	11.4	B	0.1	0.37	11.2	B	-0.2	0.37	11.2	B	-0.2	0.38	11.2	B	-0.2	0.38	11.2	B	-0.2
	Portland NB Thru/Right	0.64	13.7	B	0.64	13.7	B	0	0.64	13.5	B	-0.2	0.64	13.5	B	-0.2	0.67	13.6	B	-0.1	0.67	13.6	B	-0.1
	Cardinal Medeiros SB Left	0.08	16.3	B	0.08	16.3	B	0	0.08	16.3	B	0	0.08	16.3	B	0.0	0.08	16.4	B	0.1	0.08	16.4	B	0.1
	Cardinal Medeiros SB Thru/Right	0.20	17.0	B	0.20	17.0	B	0	0.20	17.0	B	0	0.20	17.0	B	0.0	0.25	17.7	B	0.7	0.25	17.7	B	0.7
	Overall	**0.76**	**20.5**	**C**	**0.76**	**20.8**	**C**	**0.3**	**0.78**	**22.3**	**C**	**1.5**	**0.78**	**22.3**	**C**	**1.5**	**0.84**	**29.5**	**C**	**8.7**	**0.84**	**29.5**	**C**	**8.7**
Broadway/ Portland St	Broadway EB Left/Thru/Right	0.45	21.4	C	0.45	21.4	C	0	0.49	22.3	C	0.9	0.49	22.3	C	0.9	0.60	25.2	C	3.8	0.60	25.2	C	3.8
	Broadway WB Left/Thru/Right	0.92	27.1	C	0.92	27.3	C	0.2	1.05	55.8	E	28.5	1.05	55.8	E	28.5	1.42	205.9	F	178.6	1.42	205.9	F	178.6
	Portland NB Left	0.23	18.2	B	0.23	18.2	B	0	0.23	18.2	B	0	0.23	18.2	B	0.0	0.23	18.4	B	0.2	0.23	18.4	B	0.2
	Portland NB Thru/Right	0.69	26.9	C	0.69	26.9	C	0	0.69	26.9	C	0	0.69	26.9	C	0.0	0.72	27.9	C	1.0	0.72	27.9	C	1.0
	Portland SB Left	0.06	13.1	B	0.06	13.1	B	0	0.06	13.0	B	-0.1	0.06	13.0	B	-0.1	0.06	12.0	B	-1.1	0.06	12.0	B	-1.1
	Portland SB Thru/Right	0.26	14.8	B	0.26	14.8	B	0	0.26	14.8	B	0	0.26	14.8	B	0.0	0.29	14.0	B	-0.8	0.29	14.0	B	-0.8
	Overall	**0.80**	**23.9**	**C**	**0.80**	**24.0**	**C**	**0.1**	**0.87**	**34.3**	**C**	**10.3**	**0.87**	**34.3**	**C**	**10.3**	**1.07**	**97.2**	**F**	**73.2**	**1.07**	**97.2**	**F**	**73.2**
Broadway/ Hampshire St	Broadway EB Left/Thru/Right	0.61	22.8	C	0.61	22.8	C	0	0.67	23.8	C	1	0.67	23.8	C	1.0	0.82	29.3	C	6.5	0.82	29.3	C	6.5
	Broadway WB Left	0.05	23.7	C	0.05	23.0	C	-0.7	0.05	24.8	C	1.8	0.05	24.7	C	1.7	0.06	25.8	C	2.8	0.06	25.8	C	2.8
	Broadway WB Thru	0.76	40.7	D	0.76	33.6	C	-7.1	0.92	50.3	D	16.7	0.92	50.5	D	16.9	1.36	200.7	F	167.1	1.36	200.8	F	167.2
	Broadway WB Right	0.42	15.2	B	0.42	6.6	A	-8.6	0.46	7.3	A	0.7	0.46	7.3	A	0.7	0.55	8.9	A	2.3	0.55	8.9	A	2.3
	Technology NB Left	0.45	34.7	C	0.45	34.7	C	0	0.45	34.7	C	0	0.45	34.7	C	0.0	0.46	34.9	C	0.2	0.46	34.9	C	0.2
	Technology NB Thru/Right	1.07	105.7	F	1.18	144.0	F	38.3	1.18	144.0	F	0	1.18	144.0	F	0.0	1.20	154.5	F	10.5	1.20	154.5	F	10.5
	Hampshire SB Left	0.36	28.0	C	0.36	28.0	C	0	0.38	28.3	C	0.3	0.38	28.3	C	0.3	0.45	29.5	C	1.5	0.45	29.5	C	1.5
	Hampshire SB Thru/Right	0.10	23.2	C	0.10	23.2	C	0	0.10	23.3	C	0.1	0.10	23.3	C	0.1	0.10	22.7	C	-0.5	0.10	22.7	C	-0.5
	Overall	**0.77**	**46.0**	**D**	**0.80**	**51.6**	**D**	**5.6**	**0.87**	**54.2**	**D**	**2.6**	**0.87**	**54.3**	**D**	**2.7**	**1.08**	**100.9**	**F**	**49.3**	**1.08**	**101.0**	**F**	**49.4**
Broadway/ Galileo Galilei Way	Broadway EB Left	0.69	52.8	D	0.69	52.1	D	-0.7	0.71	52.2	D	0.1	0.71	52.2	D	0.1	0.88	65.2	E	13.1	0.88	65.2	E	13.1
	Broadway EB Thru	0.80	48.7	D	0.61	23.5	C	-25.2	0.72	29.5	C	6	0.72	29.5	C	6.0	0.86	39.8	D	16.3	0.86	39.8	D	16.3
	Broadway EB Right	0.19	43.6	D	0.20	31.4	C	-12.2	0.20	30.1	C	-1.3	0.20	30.1	C	-1.3	0.29	29.0	C	-2.4	0.29	29.0	C	-2.4
	Broadway WB Left	0.63	52.5	D	0.59	55.5	E	3	0.76	64.0	E	8.5	0.76	64.1	E	8.6	0.97	91.1	F	35.6	0.97	91.2	F	35.7
	Broadway WB Thru	0.77	48.4	D	0.57	22.7	C	-25.7	0.66	23.2	C	0.5	0.66	22.6	C	-0.1	0.92	47.4	D	24.7	0.92	46.8	D	24.1
	Broadway WB Right	0.41	47.8	D	0.50	36.6	D	-11.2	0.53	34.0	C	-2.6	0.53	34.1	C	-2.5	0.91	106.1	F	69.5	0.91	106.2	F	69.6
	Galileo Galilei NB Left	0.64	55.0	D	0.71	56.2	E	1.2	0.71	56.2	E	0	0.71	56.2	E	0.0	0.75	62.5	E	6.3	0.75	62.5	E	6.3
	Galileo Galilei NB Thru	0.81	43.1	D	1.00	75.3	E	32.2	1.04	85.8	F	10.5	1.04	85.8	F	10.5	1.29	180.0	F	104.7	1.29	180.0	F	104.7
	Galileo Galilei NB Right	0.71	61.0	E	0.69	50.1	D	-10.9	0.65	43.1	D	-7	0.65	43.1	D	-7.0	0.59	38.4	D	-11.7	0.59	38.4	D	-11.7
	Galileo Galilei SB Left	0.45	48.2	D	0.57	48.3	D	0.1	0.57	48.3	D	0	0.57	48.3	D	0.0	0.86	100.4	F	52.1	0.86	100.4	F	52.1
	Galileo Galilei SB Thru	0.78	44.8	D	0.90	57.6	E	12.8	0.90	58.0	E	0.4	1.01	80.3	F	22.7	1.15	127.8	F	70.2	1.27	172.4	F	114.8
	Galileo Galilei SB Right	1.37	244.7	F	0.16	36.1	D	-208.6	0.19	36.2	D	0.1	0.19	36.2	D	0.1	0.29	35.8	D	-0.3	0.29	35.8	D	-0.3

Intersection	Movement	Existing (2019)			Baseline				Build (2019)				Build with Mitigation (2019)				Future (2024)				Future with Mitigation (2024)			
		v/c	Delay	VLOS	v/c	Delay	VLOS	Difference in Delay	v/c	Delay	VLOS	Difference in Delay	v/c	Delay	VLOS	Difference in Delay	v/c	Delay	VLOS	Difference in Delay	v/c	Delay	VLOS	Difference in Delay
	Overall	**0.95**	**67.5**	**E**	**0.79**	**47.2**	**D**	**-20.3**	**0.85**	**50.0**	**D**	**2.8**	**0.85**	**53.9**	**D**	**6.7**	**1.09**	**88.2**	**F**	**41.0**	**1.09**	**96.3**	**F**	**49.1**
Broadway/ Ames St	Broadway EB Thru	0.78	38.0	D	0.78	37.5	D	-0.5	0.87	44.8	D	7.3	0.87	44.8	D	7.3	0.97	58.7	E	21.2	0.97	58.7	E	21.2
	Broadway EB Right	0.26	33.3	C	0.26	18.3	B	-15	0.26	17.4	B	-0.9	0.26	17.4	B	-0.9	0.31	19.1	B	0.8	0.31	19.1	B	0.8
	Broadway WB Left	0.40	21.6	C	0.40	21.6	C	0	0.78	39.5	D	17.9	0.73	35.5	D	13.9	0.86	45.4	D	23.8	0.80	39.7	D	18.1
	Broadway WB Thru	0.44	31.7	C	0.44	31.6	C	-0.1	0.62	33.5	C	1.9	0.62	34.4	C	2.8	0.71	36.3	D	4.7	0.71	36.8	D	5.2
	Ames NB Left	0.28	30.9	C	0.28	30.9	C	0	0.28	29.4	C	-1.5	0.28	29.5	C	-1.4	0.74	37.2	D	6.3	0.74	37.2	D	6.3
	Ames NB Right	0.73	44.6	D	0.73	44.6	D	0	0.87	49.6	D	5	0.87	50.2	D	5.6	1.28	167.7	F	123.1	1.28	167.8	F	123.2
	Overall	**0.64**	**34.9**	**C**	**0.64**	**33.9**	**C**	**-1**	**0.72**	**40.0**	**D**	**6.1**	**0.72**	**39.5**	**D**	**5.6**	**1.01**	**68.8**	**E**	**34.9**	**1.01**	**68.2**	**E**	**34.3**
Broadway/ Main St/ Third St	Broadway EB Left	1.47	270.2	F	1.47	270.2	F	0	1.99	496.8	F	226.6	1.50	279.6	F	9.4	2.94	914.6	F	644.4	2.41	680.6	F	410.4
	Broadway EB Thru/Right	0.53	14.9	B	0.53	15.2	B	0.3	0.53	15.2	B	0	0.53	15.6	B	0.4	0.59	17.0	B	1.8	0.59	17.4	B	2.2
	Broadway WB Thru	0.68	34.5	C	0.68	34.5	C	0	0.72	36.4	D	1.9	0.72	36.4	D	1.9	0.84	44.6	D	10.1	0.84	44.6	D	10.1
	Broadway WB Right	0.35	27.0	C	0.35	27.0	C	0	0.40	28.0	C	1.0	0.40	28.0	C	1.0	0.52	30.9	C	3.9	0.52	30.9	C	3.9
	Third SB Left	-	-	-	-	-	-	n/a	-	-	-	n/a	0.72	32.9	C	n/a	-	-	-	n/a	0.90	40.1	D	n/a
	Third SB Left/Thru	0.98	67.2	E	0.98	67.3	E	0.1	1.38	214.8	F	147.5	0.71	32.2	C	-35.1	1.69	354.2	F	286.9	0.87	37.8	D	-29.5
	Third SB Right	0.32	32.1	C	0.32	32.4	C	0.3	0.38	33.9	C	1.5	0.31	28.5	C	-3.9	0.46	36.4	D	4.0	0.39	27.0	C	-5.4
	Overall	**1.00**	**72.4**	**E**	**1.00**	**72.5**	**E**	**0.1**	**1.29**	**163.4**	**F**	**90.9**	**0.93**	**61.9**	**E**	**-10.6**	**1.70**	**300.4**	**F**	**227.9**	**1.28**	**140.8**	**F**	**68.3**
Third St/ Potter St/ Kendall St	Potter EB Left/Thru/Right	-	-	-	-	-	-	n/a	-	-	-	n/a	1.01	80.8	F	n/a	-	-	-	n/a	1.01	80.8	F	n/a
	Kendall WB Left/Thru/Right	-	-	-	-	-	-	n/a	-	-	-	n/a	0.34	37.8	D	n/a	-	-	-	n/a	0.34	37.8	D	n/a
	Third NB Left	-	-	-	-	-	-	n/a	-	-	-	n/a	0.20	13.5	B	n/a	-	-	-	n/a	0.24	15.5	B	n/a
	Third NB Thru/Right	-	-	-	-	-	-	n/a	-	-	-	n/a	0.71	21.5	C	n/a	-	-	-	n/a	0.92	39.2	D	n/a
	Third SB Left/Thru/Right	-	-	-	-	-	-	n/a	-	-	-	n/a	0.85	32.2	C	n/a	-	-	-	n/a	1.10	86.3	F	n/a
	Overall	**-**	**-**	**-**	**-**	**-**	**-**	n/a	**-**	**-**	**-**	n/a	**0.82**	**43.7**	**D**	n/a	**-**	**-**	**-**	n/a	**0.96**	**65.6**	**E**	n/a
Main St/ Galileo Galilei Way/ Vassar St	Main EB Left	0.65	28.9	C	0.75	49.7	D	20.8	0.79	51.5	D	1.8	0.64	38.1	D	-11.6	0.75	42.7	D	-7.0	0.75	42.7	D	-7.0
	Main EB Thru/Right	0.59	21.9	C	0.91	58.9	E	37	0.95	64.9	E	6	0.95	64.9	E	6.0	1.05	92.1	F	33.2	1.05	92.1	F	33.2
	Main WB Left	0.39	12.2	B	0.59	47.1	D	34.9	0.59	47.1	D	0	0.59	47.1	D	0.0	0.76	60.0	E	12.9	0.76	60.0	E	12.9
	Main WB Thru/Right	0.50	11.0	B	0.94	70.8	E	59.8	1.25	171.4	F	100.6	1.36	221.8	F	151.0	2.17	578.9	F	508.1	2.03	515.8	F	445.0
	Vassar NB Left/Thru/Right	0.72	30.5	C	-	-	-	n/a	-	-	-	n/a	-	-	-	n/a	-	-	-	n/a	-	-	-	n/a
	Vassar NB Thru	-	-	-	1.05	94.9	F	n/a	1.11	114.6	F	19.7	1.11	114.6	F	19.7	1.21	150.2	F	55.3	1.21	150.2	F	55.3
	Vassar NB Right	-	-	-	0.74	61.1	E	n/a	0.74	61.1	E	0	0.74	61.1	E	0.0	0.80	67.0	E	5.9	0.80	67.0	E	5.9
	Galileo Galilei SB Left	0.19	22.2	C	0.55	55.2	E	33	0.55	55.2	E	0	0.55	55.2	E	0.0	0.70	75.8	E	20.6	0.70	75.8	E	20.6
	Galileo Galilei SB Thru	0.48	25.4	C	0.49	25.7	C	0.3	0.57	27.3	C	1.6	0.57	27.3	C	1.6	0.75	33.1	C	7.4	0.75	33.1	C	7.4
	Galileo Galilei SB Right	0.62	33.3	C	0.82	59.4	E	26.1	0.88	67.5	E	8.1	0.87	59.6	E	0.2	0.96	77.5	E	18.1	1.11	121.3	F	61.9
	Overall	**0.68**	**24.4**	**C**	**1.00**	**62.3**	**E**	**37.9**	**1.14**	**88.1**	**F**	**25.8**	**1.16**	**92.5**	**F**	**30.2**	**1.46**	**189.7**	**F**	**127.4**	**1.46**	**173.7**	**F**	**111.4**
Main St/ Ames St	Main EB Left/Thru/Right	1.26	165.7	F	1.26	176.4	F	10.7	1.42	244.8	F	68.4	1.41	240.0	F	63.6	1.77	399.0	F	222.6	1.74	385.7	F	209.3
	Main WB Left/Thru/Right	0.60	40.7	D	0.60	40.7	D	0	0.67	44.1	D	3.4	0.61	40.9	D	0.2	1.08	120.1	F	79.4	1.01	102.9	F	62.2
	Ames NB Left/Thru/Right	1.03	85.1	F	1.03	85.1	F	0	1.09	104.8	F	19.7	1.09	104.8	F	19.7	2.18	570.1	F	485.0	2.18	570.1	F	485.0
	Ames SB Left/Thru	0.36	11.3	B	0.36	11.3	B	0	0.57	19.0	B	7.7	0.57	18.4	B	7.1	0.74	26.6	C	15.3	0.74	26.3	C	15.0
	Ames SB Right	0.39	11.9	B	0.39	11.9	B	0	0.60	19.3	B	7.4	0.55	17.4	B	5.5	0.66	22.3	C	10.4	0.61	20.3	C	8.4
	Overall	**0.87**	**83.6**	**F**	**0.87**	**86.8**	**F**	**3.2**	**0.96**	**105.7**	**F**	**23.6**	**0.95**	**106.1**	**F**	**19.3**	**1.56**	**329.8**	**F**	**243.0**	**1.55**	**331.2**	**F**	**244.4**

		Existing (2019)			Baseline				Build (2019)				Build with Mitigation (2019)				Future (2024)				Future with Mitigation (2024)			
Intersection	**Movement**	**v/c**	**Delay**	**VLOS**	**v/c**	**Delay**	**VLOS**	**Difference in Delay**	**v/c**	**Delay**	**VLOS**	**Difference in Delay**	**v/c**	**Delay**	**VLOS**	**Difference in Delay**	**v/c**	**Delay**	**VLOS**	**Difference in Delay**	**v/c**	**Delay**	**VLOS**	**Difference in Delay**
Memorial Dr/ Ames St	Memorial WB Left/Thru/Right	-	-	-	1.07	70.7	E	n/a	1.16	109.9	F	39.2	1.16	109.9	F	39.2	1.37	201.2	F	130.5	1.37	201.2	F	130.5
	Ames SB Left/Right	-	-	-	0.89	62.6	E	n/a	0.94	71.0	E	8.4	0.94	71.0	E	8.4	1.08	105.9	F	43.3	1.08	105.9	F	43.3
	Memorial EB Thru	-	-	-	1.10	78.8	E	n/a	1.16	108.4	F	29.6	1.16	108.4	F	29.6	1.32	176.6	F	97.8	1.32	176.6	F	97.8
	Overall	-	-	-	**0.91**	**69.6**	**E**	n/a	**0.97**	**103.8**	**F**	**34.2**	**0.97**	**103.8**	**F**	**34.2**	**1.13**	**184.7**	**F**	**115.1**	**1.13**	**184.7**	**F**	**115.1**
Memorial Dr/ Wadsworth St	Memorial WB Thru/Right	0.69	9.7	A	0.72	11.8	B	2.1	0.73	12.6	B	0.8	0.73	12.6	B	0.8	0.84	17.1	B	5.3	0.84	17.1	B	5.3
	Memorial EB U-turn	0.68	45.9	D	0.73	56.2	E	10.3	0.74	56.1	E	-0.1	0.74	56.1	E	-0.1	0.75	54.3	D	-1.9	0.75	54.3	D	-1.9
	Memorial EB Thru	0.69	9.4	A	0.71	5.5	A	-3.9	0.73	4.7	A	-0.8	0.73	4.7	A	-0.8	0.82	6.6	A	1.1	0.82	6.6	A	1.1
	Memorial EB Left	0.06	0.2	A	0.23	0.2	A	0	0.24	0.2	A	0	0.24	0.2	A	0.0	0.28	0.2	A	0.0	0.28	0.2	A	0.0
	Wadsworth SB Right	0.00	0.0	A	0.01	32.3	C	32.3	0.07	31.9	C	-0.4	0.07	31.9	C	-0.4	0.30	33.3	C	1.0	0.30	33.3	C	1.0
	Overall	**0.69**	**15.2**	**B**	**0.72**	**19.3**	**B**	**4.1**	**0.73**	**20.5**	**C**	**1.2**	**0.73**	**20.5**	**C**	**1.2**	**0.82**	**24.1**	**C**	**4.8**	**0.82**	**24.1**	**C**	**4.8**
Memorial Dr/ Western Ave	Western WB Left/Thru/Right	1.15	121.9	F	1.15	121.9	F	0	1.15	121.9	F	0	1.15	121.9	F	0.0	1.16	126.4	F	4.5	1.16	126.4	F	4.5
	Memorial NB Left	1.11	114.6	F	1.11	114.6	F	0	1.25	169.8	F	55.2	1.25	169.8	F	55.2	1.40	236.4	F	121.8	1.40	236.4	F	121.8
	Memorial NB Thru	0.77	23.2	C	0.77	23.2	C	0	0.83	26.9	C	3.7	0.83	26.9	C	3.7	0.89	31.7	C	8.5	0.89	31.7	C	8.5
	Memorial SB Thru/Right	1.21	145.8	F	1.21	145.8	F	0	1.24	157.6	F	11.8	1.24	157.6	F	11.8	1.31	189.0	F	43.2	1.31	189.0	F	43.2
	Overall	**1.17**	**106.7**	**F**	**1.17**	**106.7**	**F**	**0**	**1.26**	**117.0**	**F**	**10.3**	**1.26**	**117.0**	**F**	**10.3**	**1.38**	**137.7**	**F**	**31.0**	**1.38**	**137.7**	**F**	**31.0**
Memorial Dr/ Cambridge St/ River St	Cambridge EB Left/Thru	1.01	53.1	D	0.99	48.8	D	-4.3	1.08	75.2	E	26.4	1.08	75.2	E	26.4	1.16	107.3	F	58.5	1.16	107.3	F	58.5
	Cambridge EB Right	1.11	96.0	F	1.09	89.5	F	-6.5	1.17	119.3	F	29.8	1.17	119.3	F	29.8	1.31	179.3	F	89.8	1.31	179.3	F	89.8
	Memorial NB Thru/Right	0.86	48.3	D	0.87	49.8	D	1.5	0.92	53.2	D	3.4	0.92	53.2	D	3.4	0.96	58.2	E	8.4	0.96	58.2	E	8.4
	Memorial SB Left/Thru	0.87	45.3	D	0.87	45.3	D	0	0.87	44.2	D	-1.1	0.87	44.2	D	-1.1	0.92	48.2	D	2.9	0.92	48.2	D	2.9
	Overall	**0.86**	**57.6**	**E**	**0.86**	**55.5**	**E**	**-2.1**	**0.89**	**69.2**	**E**	**13.7**	**0.89**	**69.2**	**E**	**13.7**	**0.95**	**91.1**	**F**	**35.6**	**0.95**	**91.1**	**F**	**35.6**

Table 7.a.3 Unsignalized Intersection Level of Service Results – AM Peak Hour

Intersection	Movement	Existing (2019)			Baseline				Build (2019)				Build with Mitigation (2019)				Future (2024)				Future with Mitigation (2024)			
		v/c	Delay	VLOS	v/c	Delay	VLOS	Difference in Delay	v/c	Delay	VLOS	Difference in Delay	v/c	Delay	VLOS	Difference in Delay	v/c	Delay	VLOS	Difference in Delay	v/c	Delay	VLOS	Difference in Delay
Third St/ Spring St	Spring EB Left/Thru/Right	0.15	9.2	A	0.15	9.2	A	0.0	0.15	9.6	A	0.4	0.15	9.6	A	0.4	0.15	10.2	B	1.0	0.15	10.2	B	0.6
	Spring WB Left/Thru/Right	0.20	9.8	A	0.20	9.8	A	0.0	0.20	10.2	B	0.4	0.20	10.2	B	0.4	0.21	10.8	B	1.0	0.21	10.8	B	0.6
	Third NB Left/Thru/Right	0.21	9.5	A	0.21	9.5	A	0.0	0.23	9.9	A	0.4	0.23	9.9	A	0.4	0.32	11.1	B	1.6	0.32	11.1	B	1.2
	Third SB Left/Thru/Right	0.72	18.0	C	0.72	18.0	C	0.0	1.00	27.8	D	9.8	1.00	27.8	D	9.8	1.06	70.2	F	52.2	1.06	70.2	F	42.4
Binney St/ 5th Street	5th NB Right	n/a	n/a	n/a	0.00	0.0	A	n/a	0.02	10.5	B	10.5	0.06	15.9	C	15.9	0.02	11.3	B	11.3	0.07	18.8	C	8.3
	5th SB Right	0.09	10.4	B	0.16	15.3	C	4.9	0.16	15.4	C	0.1	0.16	15.4	C	0.1	0.22	20.1	C	4.8	0.22	20.1	C	4.7
Broadway/ Green Garage	Green Garage NB Left/Right	*	11.5	B	*	14.3	B	2.8	*	70.9	E	56.6	*	49.4	D	35.1	*	157.1	F	142.8	*	97.9	D	27.0
	Volpe Garage SB Right	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.03	10.8	B	n/a	0.03	10.7	B	n/a	0.05	13.0	B	n/a	0.05	12.9	B	n/a
Third St/ Potter St/ Kendall St	Potter EB Left/Thru/Right	0.74	109.2	F	0.74	109.2	F	0	*	340.2	F	231.0	n/a	n/a	n/a	n/a	*	239.1	F	n/a	n/a	n/a	n/a	n/a
	Kendall WB Left/Thru/Right	*	31.6	C	*	24.6	C	-7.0	*	84.4	F	n/a	n/a	n/a	n/a	n/a	*	136.3	F	n/a	n/a	n/a	n/a	n/a
Third St/ Munroe St/ Linskey Way	Munroe EB Left/Thru/Right	0.20	27.5	D	0.20	27.5	D	0.0	0.26	34.7	D	7.2	0.26	34.7	D	7.2	0.56	101.6	F	74.1	0.56	101.6	F	66.9
Main St/ Albany St	Albany NB Left/Right	0.07	17.9	C	0.86	66.9	F	49.0	1.10	141.1	F	74.2	1.10	140.0	F	73.1	1.72	409.9	F	343.0	1.71	403.9	F	262.8
Mid-Block Crossing at Kendall Station	Main EB	0.38	9.9	A	0.38	9.9	A	0.0	0.39	10.0	A	0.1	0.39	10.0	A	0.1	0.61	14.1	B	4.2	0.61	14.1	B	4.1
	Main WB	0.21	8.9	A	0.21	8.9	A	0.0	0.21	9.0	A	0.1	0.21	8.9	A	0.0	0.43	11.4	B	2.5	0.42	11.3	B	2.3
Main St/ Longfellow Bridge	Memorial SB Right	0.69	37.6	E	0.69	37.6	E	0.0	0.91	78.3	F	40.7	0.91	78.3	F	40.7	1.55	322.9	F	285.3	1.55	322.9	F	244.6
	Memorial NB Right	0.63	26.0	D	0.63	26.0	D	0.0	0.64	26.9	D	0.9	0.64	26.9	D	0.9	0.72	34.0	D	8.0	0.72	34.0	D	7.1
Memorial Dr/ Ames St	Ames SB Thru/Right	0.22	14.0	B	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

* Synchro results were either unavailable or not in line with the field observations, therefore, SimTraffic Delay results were used.

Table 7.a.4 Unsignalized Intersection Level of Service Results – PM Peak Hour

Intersection	Movement	Existing (2019)			Baseline (2019)				Build (2019)				Build with Mitigation (2019)				Future (2024)				Future with Mitigation (2024)			
		v/c	Delay	VLOS	v/c	Delay	VLOS	Difference in Delay	v/c	Delay	VLOS	Difference in Delay	v/c	Delay	VLOS	Difference in Delay	v/c	Delay	VLOS	Difference in Delay	v/c	Delay	VLOS	Difference in Delay
Third St/ Spring St	Spring EB Left/Thru/Right	0.05	9.0	A	0.05	9.0	A	0.0	0.05	9.0	A	0.0	0.05	9.0	A	0.0	0.05	9.9	A	0.9	0.05	9.9	A	0.9
	Spring WB Left/Thru/Right	0.35	11.0	B	0.35	11.0	B	0.0	0.35	11.1	B	0.1	0.35	11.1	B	0.1	0.40	12.8	B	1.8	0.40	12.8	B	1.8
	Third NB Left/Thru/Right	0.56	13.6	B	0.56	13.6	B	0.0	0.55	13.4	B	-0.2	0.55	13.4	B	-0.2	0.81	25.2	D	11.6	0.81	25.2	D	11.6
	Third SB Left/Thru/Right	0.42	11.5	B	0.42	11.5	B	0.0	0.46	12.1	B	0.6	0.46	12.1	B	0.6	0.61	15.8	C	4.3	0.61	15.8	C	4.3
Binney St/ 5th Street	5th NB Right	n/a	n/a	n/a	0.00	0.0	A	n/a	0.27	17.1	C	17.1	0.49	26.9	D	26.9	0.40	26.5	D	26.5	0.90	26.5	D	26.5
	5th SB Right	0.10	11.9	B	0.12	13.4	B	1.5	0.13	14.3	B	0.9	0.13	14.3	B	0.9	0.23	21.9	C	8.5	0.23	21.9	C	8.5
Broadway/ Green Garage	Green Garage NB Left/Right	*	68.9	F	*	50.7	F	-18.2	*	90.3	F	39.6	*	605.3	F	554.6	*	615.0	F	564.3	*	938.3	F	887.6
	Volpe Garage SB Right	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.19	12.4	B	n/a	0.19	12.1	B	n/a	0.21	13.1	B	n/a	0.20	12.8	B	n/a
Third St/ Potter St/ Kendall St	Potter EB Left/Thru/Right	*	68.0	E	*	52.4	D	-15.6	*	668.8	F	616.4	n/a	n/a	n/a	n/a	*	1159.2	F	1106.8	n/a	n/a	n/a	n/a
	Kendall WB Left/Thru/Right	*	122.4	F	*	78.7	E	-43.7	*	496.5	F	417.8	n/a	n/a	n/a	n/a	*	635.8	F	557.1	n/a	n/a	n/a	n/a
Third St/ Munroe St/ Linskey Way	Munroe EB Left/Thru/Right	0.44	57.2	F	0.44	57.2	F	0.0	0.80	126.9	F	69.7	0.80	126.9	F	69.7	0.77	117.8	F	60.6	0.77	117.8	F	60.6
Main St/ Albany St	Albany NB Left/Right	0.19	15.7	C	0.67	44.5	E	28.8	0.97	113.0	F	68.5	0.93	101.6	F	57.1	1.25	219.7	F	175.2	1.25	219.7	F	175.2
Mid-Block Crossing at Kendall Station	Main EB	0.40	9.6	A	0.40	9.6	A	0.0	0.43	10.0	B	0.4	0.43	10.0	A	0.4	0.48	10.8	B	1.2	0.48	10.8	B	1.2
	Main WB	0.18	8.3	A	0.18	8.3	A	0.0	0.21	8.6	A	0.3	0.18	8.4	A	0.1	0.27	9.0	A	0.7	0.24	8.8	A	0.5
Main St/ Longfellow Bridge	Memorial SB Right	0.21	15.2	C	0.21	15.2	C	0.0	0.22	15.9	C	0.7	0.22	15.9	C	0.7	0.31	18.9	C	3.7	0.31	18.9	C	3.7
	Memorial NB Right	*	127.2	F	*	120.4	F	-6.8	*	121.0	F	0.6	*	140.9	F	20.5	*	137.2	F	16.8	*	183.6	F	63.2
Memorial Dr/ Ames St	Ames SB Thru/Right	0.58	24.6	C	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	#VALUE!	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

* Synchro results were either unavailable or not in line with the field observations, therefore, SimTraffic Delay results were used.

Many of the 33 study area intersections operate at the same overall LOS during the AM and PM Peak Hours from Baseline Conditions to Build-Mitigated Conditions except for the following locations:

a. Signalized Intersections

- O'Brien Highway at Third Street (PM Peak Hour Only) – Under Baseline Conditions the intersection operates at LOD C for the PM Peak Hour and drops to LOS D under Build-Mitigated Conditions, with the overall LOS increasing by 8.8 seconds. This is due to the increase in delay due to an increase in northbound volume from the Project.
- First Street at Charles Street (PM Peak Hour Only) – Under Baseline Conditions the intersection operates at LOS E for the PM Peak Hour and drops to LOS F under Build-Mitigated Conditions, with the overall LOS increasing by 32.9 seconds. The increase in delay is due to an increase in northbound and southbound through volume due to the Project.
- Third Street at Charles Street (PM Peak Hour Only) – Under Baseline Conditions the intersection operates at LOS B for the PM Peak Hour and drops to LOS C under Build-Mitigated Conditions, with the overall LOS increasing by 7.0 seconds. The increase in delay is due to an increase in northbound volume due to the Project.
- Binney Street at Third Street –
    - AM Peak Hour – Under Baseline Conditions the intersection operates at LOS D for the AM Peak Hour and drops to LOS F under Build-Mitigated Conditions, with the overall LOS increasing by 30.8 seconds. The increase in delay is due to the increase in volume in the southbound and westbound direction due to the Project.
    - PM Peak Hour – Under Baseline Conditions the intersection operates at LOS D for the PM Peak Hour and drops to LOS E under Build-Mitigated Conditions, with the overall LOS increasing by 22.7 seconds.
- Binney Street at Second Street
    - AM Peak Hour – Under Baseline Conditions the intersection operates at LOS C for the AM Peak Hour and drops to LOS D under Build-Mitigated Conditions, with the overall LOS increasing by 2 seconds
    - PM Peak Hour – Under Baseline Conditions the intersection operates at LOS C for the PM Peak Hour and drops to LOS D under Build-Mitigated Conditions, with the overall LOS increasing by 12.1 seconds.
- Binney Street at First Street (PM Peak Hour Only) – Under Baseline Conditions the intersection operates at LOS D for the PM Peak Hour and drops to LOS E under Build-Mitigated Conditions, with the overall LOS increasing by 11.1 seconds.
- Broadway at Portland Street (AM Peak Hour Only) – Under Baseline Conditions the intersection operates at LOS C for the AM Peak Hour and drops to LOS D under

Build-Mitigated Conditions, with the overall LOS increasing by 7.5 seconds. The increase in delay is due to the increase in southbound and eastbound volume due to the Project.

- Broadway at Ames Street (PM Peak Hour Only) – Under Baseline Conditions the intersection operates at LOS C for the PM Peak Hour and drops to LOS D under Build-Mitigated Conditions, with the overall LOS increasing by 5.6 seconds.
- Main Street at Galileo Galilei Way/Vassar Street (PM Peak Hour Only) – Under Baseline Conditions the intersection operates at LOS E for the PM Peak Hour and drops to LOS F under Build-Mitigated Conditions, with the overall LOS increasing by 30.2 seconds. This increase in delay is due to an increase in westbound volume.
- Main Street at Ames Street (AM Peak Hour Only) – Under Baseline Conditions the intersection operates at LOS D for the AM Peak Hour and drops to LOS E under Build-Mitigated Conditions, with the overall LOS increasing by 25.3 seconds. This increase in delay is due to an increase in in northbound volume from the Project.
- Memorial Drive at Ames Street (PM Peak Hour Only) – Under Baseline Conditions the intersection operates at LOS E for the PM Peak Hour and drops to LOS F under Build-Mitigated Conditions, with the overall LOS increasing by 34.2 seconds. This increase in delay is due to an increase in the southbound volume from the Project.
- Memorial Drive at Wadsworth Street
    - AM Peak Hour – Under Baseline Conditions the intersection operates at LOS B for the AM Peak Hour and drops to LOS C under Build-Mitigated Conditions, with the overall LOS increasing by 1.9 seconds.
    - PM Peak Hour – Under Baseline Conditions the intersection operates at LOS B for the PM Peak Hour and drops to LOS C under Build-Mitigated Conditions, with the overall LOS increasing by 1.2 seconds

It should be noted that a LOS D is generally considered acceptable for an urban environment such as Kendall Square.

b. Unsignalized Intersections

- Third Street at Spring Street –
    - Spring Street westbound approach (AM Peak Hour only) operates at LOS A during the AM Peak Hour under Baseline Conditions and operates at LOS B under Build-Mitigated Conditions. The Project does not add volumes to Spring Street but does add volume to the Third Street southbound movement, which causes delay to the Spring Street westbound approach.
    - Third Street southbound approach (AM Peak Hour only) operates at LOS C during the AM Peak Hour under Baseline Conditions and operates at LOS D under Build-Mitigated Conditions. The increase in delay is caused by the increase in southbound through volume.
- Binney at Fifth Street –
    - Fifth Street northbound approach operates at LOS A during the AM Peak Hour under Baseline Conditions and operates at LOS C under Build-Mitigated Conditions. The increase in delay is due to an increase in northbound volume at this approach from the Project.
    - Fifth Street northbound approach operates at LOS A during the PM Peak Hour under Baseline Conditions and operates at LOS D under Build-Mitigated Conditions. The increase in delay is due to an increase in northbound volume at this approach from the Project.
- Main Street at Albany Street (PM Peak Hour Only) – The critical movement at this unsignalized intersection is the Albany Street northbound approach. Under Baseline Conditions the approach operates at LOS E for the PM Peak Hour and drops to LOS F under Build-Mitigated Conditions, with the delay increasing by 57.1 seconds. The increase in delay is due to an increase in the northbound volume at this approach from the Project.
- Broadway at Mid-Block Ped Crossing/Green Garage
    - The Green Garage northbound approach operates at LOS B during the AM Peak Hour under Baseline Conditions and operates at LOS D under Build-Mitigated Conditions, with the delay increasing by 35.1 seconds. The increase in delay is due to an increase in through volume along Broadway from the Project.
- Main Street at Longfellow Bridge (AM Peak Hour Only) – The critical movements at this unsignalized intersection are the Memorial Drive southbound and northbound approaches. Under Baseline Conditions the Memorial Drive southbound approach operates at LOS E for the AM Peak Hour and drops to LOS F under Build-Mitigated Conditions, with the delay increasing by 40.7 seconds. This is due to an increase in westbound through vehicles conflicting with the southbound turns.

c. Delay Analysis

Figures 7.c.1 and Figure 7.c.2 graphically illustrate vehicle delay (in seconds) for all study area intersections for AM and PM peak hours, respectively. The vehicle delay maps show the impacts that the Project will have on the net change in delay (seconds).

Intersection delay maps are provided for the Build-Mitigated Condition and Future-Mitigated Condition.

Figure 7.c.3 graphically illustrates the cumulative effects of the Project and Future volumes on the network.

8. Queue Analysis

Queue analysis was performed in combination with the LOS analysis.

Tables 8.a.1 and 8.a.2 show the results of the modeled average queues (number of vehicles) for each scenario for the AM and PM Peak Hours, respectively.

As requested by TP&T, SimTraffic was used to model queue results. Furthermore, VHB staff conducted in-field queue observations during the AM and PM Peak Hours at the signalized intersections on May 1, 2019, supplemented by additional queue observations in February of 2020. SimTraffic modelled queues for the existing condition typically match the observed queues, within a reasonable margin of error. SimTraffic and Synchro limitations do not allow for exact matching of queues at all intersection approaches.

Figure 8.a.1 and Figure 8.b.2 show the queue lengths for the longest queue lane for the morning and evening peak hours, respectively.

Table 8.a.1 Signalized Intersection Queue Analysis – AM Peak Hour

	Lane / Movement	2019 Observed	2019 Modeled	2019 Baseline	2019 Build	2019 Build-Mitigated	2024 Future	2024 Future-Mitigated
O'Brien Highway at Third Street	O'Brien EB Left/Thru/Right	18	20	-	-	-	-	-
	O'Brien EB Left/Thru	-	-	7	16	11	42	43
	O'Brien EB Right	-	-	6	17	14	46	46
	O'Brien WB Left/Thru/Right	1	2	-	-	-	-	-
	O'Brien WB Thru/Right	-	-	1	1	1	1	1
	Third NB Left/Thru/Right	1	2	2	2	2	2	3
O'Brien Highway at North First Street	O'Brien EB Thru	-	-	10	9	9	20	23
	O'Brien EB Right	-	-	4	4	4	5	6
	O'Brien WB Thru	-	-	3	3	3	2	1
	O'Brien WB Right	-	-	0	0	0	6	5
	N. First NB Left	-	-	1	1	1	1	0
	N. First NB Thru/Right	-	-	1	1	1	3	2
	N. First SB Left/Thru	-	-	1	1	1	15	15
	N. First SB Right	-	-	0	1	0	6	11
O'Brien Highway at Cambridge Street	O'Brien EB Left	4	1	-	-	-	-	-
	O'Brien EB Thru	8	22	3	3	3	4	3
	O'Brien EB Right	2	6	-	-	-	-	-
	O'Brien WB Left	4	3	-	-	-	-	-
	O'Brien WB Left/Thru	-	-	5	5	5	22	21
	O'Brien WB Thru/Right	1	3	-	-	-	-	-
	Cambridge NB Left/Thru	0	2	-	-	-	-	-
	Cambridge NB Right	2	2	6	6	6	4	3
	East SB Left/Thru/Right	0	10	1	1	1	1	2
O'Brien Highway at Land Boulevard	O'Brien EB Left	3	9	5	3	4	8	5
	O'Brien EB Thru	28	26	21	18	19	25	17
	O'Brien EB Right	0	15	12	8	9	13	9
	O'Brien WB Left	12	37	36	37	37	35	36

	Lane / Movement	2019 Observed	2019 Modeled	2019 Baseline	2019 Build	2019 Build-Mitigated	2024 Future	2024 Future-Mitigated
	O'Brien WB Thru	9	64	59	64	64	64	64
	O'Brien WB Right	2	2	3	3	3	3	3
	Land NB Left	4	3	2	2	2	14	9
	Land NB Thru	4	6	6	6	7	17	11
	Land NB Right	5	18	22	23	30	28	22
	Land SB Left/Thru/Right	35	40	41	45	45	45	45
Cambridge Street at Third Street	Cambridge EB Left/Thru/Right	11	12	29	31	34	36	36
	Cambridge WB Left/Thru/Right	3	4	15	16	10	15	20
	Third NB Left/Thru/Right	1	4	5	6	8	14	12
	Third SB Left	1	2	2	2	2	2	1
	Third SB Thru/Right	16	10	12	15	16	18	16
Cambridge Street at First Street	Cambridge EB Left	-	-	5	4	4	6	6
	Cambridge EB Thru/Right	12	7	25	23	26	21	20
	Cambridge WB Left	3	3	2	2	2	5	4
	Cambridge WB Thru	2	3	-	-	-	-	-
	Cambridge WB Thru/Right	-	-	2	2	1	2	3
	First NB Left	0	1	-	-	-	-	-
	First NB Left/Thru	-	-	3	3	2	13	17
	First NB Right	2	2	3	3	3	4	4
	N. First SB Left/Thru	-	-	1	1	1	3	2
	N. First SB Right	-	-	3	3	2	3	3
First Street at Thorndike Street	Thorndike EB Left/Thru/Right	1	2	2	2	2	9	14
	First NB Thru	2	1	1	1	1	11	20
	First SB Thru	0	2	2	2	2	15	10
First Street at Charles Street	Charles EB Left/Thru/Right	2	2	2	2	2	6	9
	Cambridgeside WB Left/Thru/Right	2	2	2	2	2	6	9
	First NB Thru/Right	3	2	2	2	2	9	16
	First SB Left/Thru	3	2	2	3	3	26	17

	Lane / Movement	2019 Observed	2019 Modeled	2019 Baseline	2019 Build	2019 Build-Mitigated	2024 Future	2024 Future-Mitigated
Third Street at Charles Street	Charles EB Left/Thru/Right	2	2	2	2	2	3	6
	Charles WB Left/Thru/Right	0	1	1	1	1	1	2
	Third NB Left/Thru/Right	2	1	1	1	1	2	3
	Third SB Left/Thru/Right	2	4	4	8	9	13	13
Galileo Galilei Way/Binney Street at Fulkerson	Galileo EB Thru	2	2	7	7	8	13	17
	Galileo WB Thru/Right	4	5	-	-	-	-	-
	Galileo WB Thru	-	-	8	11	9	8	7
	Galilei WB Right	-	-	4	4	4	4	3
	Fulkerson SB Right/Hard Right	3	4	5	7	5	6	6
	Binney SEB Hard Right/Left	1	3	3	3	3	4	3
	Binney SEB Right	2	4	3	7	6	9	12
Binney Street at Third Street	Binney EB Left	2	2	2	2	2	5	4
	Binney EB Thru/Right	2	5	-	-	-	-	-
	Binney EB Thru	-	-	6	5	6	14	16
	Binney EB Right	-	-	2	2	2	5	4
	Binney WB Left	5	5	5	9	10	10	10
	Binney WB Thru/Right	3	4	5	14	13	17	16
	Third NB Left/Thru	3	3	6	7	7	4	5
	Third NB Right	1	2	4	3	3	2	4
	Third SB Left/Thru/Right	8	8	12	20	24	26	27
Binney Street at Second Street	Binney EB Left	1	1	1	1	1	1	1
	Binney EB Thru/Right	4	7	7	6	7	13	16
	Binney WB Left	2	2	2	2	2	2	1
	Binney WB Thru/Right	4	4	4	7	6	7	6
	Second NB Left/Thru/Right	2	2	2	3	2	3	4
	Second SB Left/Thru/Right	4	4	4	6	5	6	7
Binney Street at First Street	Binney EB Left	1	1	1	1	2	6	6
	Binney EB Thru/Right	2	3	3	3	3	5	6
	Binney WB Left/Thru/Right	3	5	5	5	5	5	5

	Lane / Movement	2019 Observed	2019 Modeled	2019 Baseline	2019 Build	2019 Build-Mitigated	2024 Future	2024 Future-Mitigated
	First NB Left/Thru/Right	0	0	1	1	0	1	2
	First SB Left/Thru	3	2	3	3	3	27	24
	First SB Right	1	2	2	4	4	9	9
Binney Street at Land Boulevard	Binney EB Left	2	3	3	3	4	4	3
	Land NB Left	13	13	12	12	12	13	12
	Land NB Thru	4	15	13	14	9	25	22
	Land SB Thru	6	8	6	6	6	5	14
	Land SB Right	2	6	6	8	7	9	18
Hampshire Street at Portland Street/Cardinal Medeiros Avenue	Hampshire EB Left/Thru/Right	5	7	8	17	15	26	24
	Hampshire WB Left/Thru/Right	2	3	4	3	3	3	3
	Portland NB Left	0	1	1	1	1	1	1
	Portland NB Thru/Right	3	3	3	2	3	2	2
	Cardinal SB Left	1	1	1	2	2	1	2
	Cardinal SB Thru/Right	6	5	5	7	6	5	8
Broadway at Portland Street	Broadway EB Left/Thru/Right	6	46	46	48	48	49	49
	Broadway WB Left/Thru/Right	1	5	5	5	5	6	5
	Portland NB Left	1	1	1	1	1	1	1
	Portland NB Thru/Right	4	5	5	13	7	7	10
	Portland SB Left	1	1	1	2	1	1	1
	Portland SB Thru/Right	3	4	4	4	3	3	3
Broadway at Hampshire Street/Technology Square	Broadway EB Left/Thru/Right	6	6	6	6	6	6	6
	Broadway WB Left	0	3	2	2	2	2	1
	Broadway WB Thru	3	5	2	2	2	5	2
	Broadway WB Right	1	2	1	1	1	2	1
	Technology NB Left	1	1	1	1	1	2	1
	Technology NB Thru/Right	1	1	1	2	2	2	3
	Hampshire SB Left	6	3	3	3	3	3	3
	Hampshire SB Thru/Right	1	6	7	8	9	10	10

	Lane / Movement	2019 Observed	2019 Modeled	2019 Baseline	2019 Build	2019 Build-Mitigated	2024 Future	2024 Future-Mitigated
Broadway at Galileo Galilei Way	Broadway EB Left	0	4	4	3	4	5	5
	Broadway EB Thru	5	8	4	10	7	7	11
	Broadway EB Right	1	1	1	1	1	1	1
	Broadway WB Left	1	1	1	1	1	2	2
	Broadway WB Thru	8	4	4	4	4	4	6
	Broadway WB Right	0	2	2	2	2	2	3
	Galileo NB Left	1	1	1	2	1	1	2
	Galileo NB Thru/Right	2	3	3	10	9	7	10
	Galileo SB Left	1	2	2	4	3	1	2
	Galileo SB Thru	12	7	7	10	8	9	10
	Galileo SB Right	13	14	8	7	7	9	8
Broadway at Ames Street	Broadway EB Thru	5	6	9	15	13	9	9
	Broadway EB Right	2	3	4	3	3	4	3
	Broadway WB Left	3	4	4	4	4	6	5
	Broadway WB Thru	3	5	5	5	5	9	8
	Ames NB Left	1	2	1	9	6	6	5
	Ames NB Right	2	3	3	4	4	4	4
Broadway/Main Street at Third Street	Broadway EB Left	3	3	3	10	5	8	4
	Broadway EB Thru/Right	2	2	2	6	4	4	2
	Main WB Thru	7	7	7	22	30	53	53
	Main WB Right	5	4	4	10	12	13	14
	Third SB Left	-	-	-	-	2	0	0
	Third SB Left/Thru	6	4	5	3	4	5	5
	Third SB Right	3	3	3	0	2	0	3
Third Street at Potter Street/Kendall Street	Potter EB Left/Thru/Right	-	-	-	-	3	7	4
	Kendall WB Left/Thru/Right	-	-	-	-	0	1	1
	Third NB Left	-	-	-	-	3	3	2
	Third NB Thru/Right	-	-	-	-	6	1	5
	Third SB Left/Thru/Right	-	-	-	-	9	4	6

	Lane / Movement	2019 Observed	2019 Modeled	2019 Baseline	2019 Build	2019 Build-Mitigated	2024 Future	2024 Future-Mitigated
Main Street at Galileo Galilei Way/Vassar Street	Main EB Left	2	2	2	5	5	7	8
	Main EB Thru/Right	2	4	4	8	6	11	13
	Main WB Left	1	2	2	2	2	2	2
	Main WB Thru/Right	2	4	4	6	6	6	7
	Vassar NB Left/Thru/Right	3	4	-	-	-	-	-
	Vassar NB Thru	-	-	4	10	6	7	10
	Vassar NB Right	-	-	2	3	2	3	2
	Galileo SB Left	1	1	1	1	1	2	2
	Galileo SB Thru	3	4	5	5	5	5	5
	Galileo SB Right	2	3	5	4	4	4	4
Main Street at Ames Street	Main EB Left/Thru/Right	4	10	4	6	6	11	9
	Main WB Left/Thru/Right	0	4	2	3	4	7	8
	Ames NB Left/Thru/Right	4	9	9	18	17	33	33
	Ames SB Left/Thru	1	3	1	2	1	11	11
	Ames SB Right	1	3	2	2	2	3	3
Memorial Drive at Ames Street	Memorial WB Left/Thru/Right	-	-	3	4	4	4	7
	Ames SB Thru/Right	-	-	3	3	3	3	3
	Memorial EB Thru	-	-	48	48	47	48	48
Memorial Drive at Wadsworth Street	Memorial WB Thru/Right	11	6	6	6	6	7	9
	Memorial EB U-turn	4	3	3	3	3	3	3
	Memorial EB Left	2	2	15	16	16	16	16
	Wadsworth SB Thru/Right	0	0	0	0	0	0	0
Memorial Drive at Western Avenue	Western WB Left/Thru/Right	11	27	25	23	25	22	27
	Memorial NB Left	4	8	8	8	8	10	12
	Memorial NB Thru	4	8	8	8	9	11	12
	Memorial SB Thru/Right	13	18	22	27	32	34	34

	Lane / Movement	2019 Observed	2019 Modeled	2019 Baseline	2019 Build	2019 Build-Mitigated	2024 Future	2024 Future-Mitigated
Memorial Dr at River St	River EB Left/Thru	15	8	9	9	9	9	9
	River EB Right	15	15	15	15	15	15	15
	Memorial NB Thru/Right	12	8	8	9	8	9	10
	Memorial SB Left/Thru	28	11	10	11	11	11	12

1. SimTraffic provides queue data in feet, the table presents queue data in number of vehicles. As directed by the TIS guidelines 1 vehicle = 25 ft.
2. Based on observations conducted by VHB on May 1, 2019

Table 8.a.2 Signalized Intersection Queue Analysis – PM Peak Hour

	Lane / Movement	2019 Observed	2019 Modeled	2019 Baseline	2019 Build	2019 Build-Mitigated	2024 Future	2024 Future-Mitigated
O'Brien Highway at Third Street	O'Brien EB Left/Thru/Right	4	7	-	-	-	-	-
	O'Brien EB Left/Thru	-	-	3	3	4	16	21
	O'Brien EB Right	-	-	3	3	4	20	25
	O'Brien WB Left/Thru/Right	5	5	-	-	-	-	-
	O'Brien WB Thru/Right	-	-	4	4	4	5	5
	Third NB Left/Thru/Right	10	8	11	11	11	10	9
O'Brien Highway at North First Street	O'Brien EB Thru	-	-	5	11	12	3	2
	O'Brien EB Right	-	-	1	2	2	1	1
	O'Brien WB Thru	-	-	7	6	6	6	6
	O'Brien WB Right	-	-	0	0	0	6	6
	N. First NB Left	-	-	3	3	3	3	3
	N. First NB Thru/Right	-	-	1	1	1	2	2
	N. First SB Left/Thru	-	-	1	4	2	14	14
	N. First SB Right	-	-	1	1	1	11	11
O'Brien Highway at Cambridge Street	O'Brien EB Left	1	11	-	-	-	-	-
	O'Brien EB Thru	3	20	5	6	6	5	5
	O'Brien EB Right	0	1	-	-	-	-	-
	O'Brien WB Left	4	3	-	-	-	-	-
	O'Brien WB Left/Thru	-	-	5	5	5	6	7
	O'Brien WB Thru/Right	5	7	-	-	-	-	-
	Cambridge NB Left/Thru	6	4	-	-	-	-	-
	Cambridge NB Right	2	2	6	6	6	4	5
	East SB Left/Thru/Right	2	7	1	1	1	1	1
O'Brien Highway at Land Boulevard	O'Brien EB Left	28	8	18	21	21	17	16
	O'Brien EB Thru	5	5	12	27	26	13	15
	O'Brien EB Right	0	0	0	8	8	10	11
	O'Brien WB Left	23	17	7	6	7	8	9
	O'Brien WB Thru	49	12	7	6	7	8	9

	Lane / Movement	2019 Observed	2019 Modeled	2019 Baseline	2019 Build	2019 Build-Mitigated	2024 Future	2024 Future-Mitigated
	O'Brien WB Right	6	6	6	4	4	4	4
	Land NB Left	23	5	4	7	7	7	7
	Land NB Thru	35	8	7	7	7	8	8
	Land NB Right	6	8	6	6	7	6	5
	Land SB Left/Thru/Right	37	10	29	31	31	41	40
Cambridge Street at Third Street	Cambridge EB Left/Thru/Right	10	34	37	2	2	1	1
	Cambridge WB Left/Thru/Right	11	10	11	20	24	58	57
	Third NB Left/Thru/Right	31	9	11	10	11	11	11
	Third SB Left	0	1	1	20	23	18	10
	Third SB Thru/Right	3	7	6	1	1	1	0
Cambridge Street at First Street	Cambridge EB Left	-	-	7	8	8	8	8
	Cambridge EB Thru/Right	9	26	27	27	26	14	14
	Cambridge WB Left	1	2	3	3	3	4	3
	Cambridge WB Thru	1	3	-	-	-	-	-
	Cambridge WB Thru/Right	-	-	3	2	2	3	3
	First NB Left	1	4	-	-	-	-	-
	First NB Left/Thru	-	-	18	18	18	19	19
	First NB Right	13	16	8	8	8	8	8
	N. First SB Left/Thru	-	-	0	0	0	1	1
	N. First SB Right	-	-	1	1	1	2	1
First Street at Thorndike Street	Thorndike EB Left/Thru/Right	3	5	7	7	6	15	15
	First NB Thru	15	6	17	15	14	28	28
	First SB Thru	1	2	2	3	2	7	7
First Street at Charles Street	Charles EB Left/Thru/Right	2	3	3	3	3	8	8
	Cambridgeside WB Left/Thru/Right	7	4	5	5	5	11	11
	First NB Thru/Right	7	6	14	14	12	27	27
	First SB Left/Thru	4	5	6	8	7	21	22

	Lane / Movement	2019 Observed	2019 Modeled	2019 Baseline	2019 Build	2019 Build-Mitigated	2024 Future	2024 Future-Mitigated
Third Street at Charles Street	Charles EB Left/Thru/Right	1	2	2	2	2	11	12
	Charles WB Left/Thru/Right	1	2	2	1	1	5	3
	Third NB Left/Thru/Right	5	7	4	7	7	6	4
	Third SB Left/Thru/Right	2	3	4	5	3	15	14
Galileo Galilei Way/Binney Street at Fulkerson	Galileo EB Thru	1	3	10	10	9	21	19
	Galileo WB Thru/Right	3	5	-	-	-	-	-
	Galileo WB Thru	-	-	4	5	5	19	22
	Galilei WB Right	-	-	3	3	3	3	3
	Fulkerson SB Right/Hard Right	3	3	4	5	3	14	13
	Binney SEB Hard Right/Left	4	5	5	5	5	4	3
	Binney SEB Right	4	22	46	42	51	63	64
Binney Street at Third Street	Binney EB Left	4	8	5	7	7	7	7
	Binney EB Thru/Right	3	6	-	-	-	-	-
	Binney EB Thru	-	-	7	12	10	19	17
	Binney EB Right	-	-	3	4	3	4	4
	Binney WB Left	1	2	2	2	2	3	3
	Binney WB Thru/Right	2	3	3	3	3	8	7
	Third NB Left/Thru	7	7	6	7	7	8	8
	Third NB Right	1	4	4	4	4	5	5
	Third SB Left/Thru/Right	6	8	10	16	14	26	26
Binney Street at Second Street	Binney EB Left	0	3	3	3	2	3	3
	Binney EB Thru/Right	4	4	7	8	7	22	23
	Binney WB Left	2	1	0	0	0	0	0
	Binney WB Thru/Right	2	4	4	4	4	5	5
	Second NB Left/Thru/Right	6	6	8	8	6	13	22
	Second SB Left/Thru/Right	2	3	4	4	4	16	16

	Lane / Movement	2019 Observed	2019 Modeled	2019 Baseline	2019 Build	2019 Build-Mitigated	2024 Future	2024 Future-Mitigated
Binney Street at First Street	Binney EB Left	2	3	6	5	6	7	7
	Binney EB Thru/Right	3	2	4	4	4	8	8
	Binney WB Left/Thru/Right	1	6	6	6	5	6	6
	First NB Left/Thru/Right	1	1	1	1	1	1	1
	First SB Left/Thru	4	5	5	5	5	26	25
	First SB Right	1	2	2	2	3	9	9
Binney Street at Land Boulevard	Binney EB Left	3	2	2	2	2	2	2
	Land NB Left	10	9	10	9	8	12	13
	Land NB Thru	16	4	6	3	3	13	19
	Land SB Thru	7	5	8	8	8	9	9
	Land SB Right	0	3	3	3	3	4	5
Hampshire Street at Portland Street/Cardinal Medeiros Avenue	Hampshire EB Left/Thru/Right	3	6	6	5	9	13	20
	Hampshire WB Left/Thru/Right	4	7	6	7	5	6	4
	Portland NB Left	0	2	1	2	1	1	1
	Portland NB Thru/Right	2	4	3	3	3	2	2
	Cardinal SB Left	0	1	0	0	0	1	1
	Cardinal SB Thru/Right	2	2	2	2	3	2	4
Broadway at Portland Street	Broadway EB Left/Thru/Right	6	7	6	2	1	1	1
	Broadway WB Left/Thru/Right	7	4	4	12	23	28	40
	Portland NB Left	1	2	2	4	4	4	3
	Portland NB Thru/Right	8	8	8	2	3	2	1
	Portland SB Left	0	1	0	9	20	21	29
	Portland SB Thru/Right	2	3	2	0	1	0	1
Broadway at Hampshire Street/Technology Square	Broadway EB Left/Thru/Right	3	4	3	3	5	5	6
	Broadway WB Left	0	1	0	0	0	0	0
	Broadway WB Thru	7	8	5	7	7	11	9
	Broadway WB Right	5	4	2	3	3	4	3
	Technology NB Left	5	5	7	7	5	5	3

	Lane / Movement	2019 Observed	2019 Modeled	2019 Baseline	2019 Build	2019 Build-Mitigated	2024 Future	2024 Future-Mitigated
	Technology NB Thru/Right	7	14	18	24	23	28	29
	Hampshire SB Left	3	3	2	2	2	2	2
	Hampshire SB Thru/Right	0	3	2	3	4	6	7
Broadway at Galileo Galilei Way	Broadway EB Left	0	4	3	3	3	4	3
	Broadway EB Thru	9	8	5	8	13	13	16
	Broadway EB Right	0	1	1	1	1	1	1
	Broadway WB Left	2	3	2	3	4	7	5
	Broadway WB Thru	7	6	3	4	4	14	7
	Broadway WB Right	0	1	1	1	1	5	3
	Galileo NB Left	2	3	3	3	3	3	3
	Galileo NB Thru/Right	3	6	6	7	11	12	16
	Galileo SB Left	1	2	2	1	2	2	4
	Galileo SB Thru	6	7	6	12	9	25	24
	Galileo SB Right	5	11	5	10	8	14	12
Broadway at Ames Street	Broadway EB Thru	6	8	5	9	15	9	17
	Broadway EB Right	1	3	2	2	3	2	2
	Broadway WB Left	2	3	3	6	6	6	6
	Broadway WB Thru	4	6	5	7	8	13	9
	Ames NB Left	1	3	2	2	6	4	9
	Ames NB Right	1	4	3	3	4	3	4
Broadway/Main Street at Third Street	Broadway EB Left	8	6	5	9	10	10	10
	Broadway EB Thru/Right	4	3	3	5	7	6	7
	Main WB Thru	6	6	6	9	25	22	41
	Main WB Right	3	3	3	5	11	8	13
	Third SB Left	-	-	-	-	4	0	4
	Third SB Left/Thru	8	10	4	4	5	3	4
	Third SB Right	2	4	0	0	2	0	2
Third Street at Potter	Potter EB Left/Thru/Right	-	-	-	-	14	0	15
	Kendall WB Left/Thru/Right	-	-	-	-	4	0	4

	Lane / Movement	2019 Observed	2019 Modeled	2019 Baseline	2019 Build	2019 Build-Mitigated	2024 Future	2024 Future-Mitigated
Street/Kendall Street	Third NB Left	-	-	-	-	2	0	2
	Third NB Thru/Right	-	-	-	-	8	0	8
	Third SB Left/Thru/Right	-	-	-	-	8	0	6
Main Street at Galileo Galilei Way/Vassar Street	Main EB Left	2	9	7	8	8	9	9
	Main EB Thru/Right	4	17	14	17	16	18	18
	Main WB Left	1	4	3	3	3	3	2
	Main WB Thru/Right	2	6	7	10	10	14	14
	Vassar NB Left/Thru/Right	3	7	-	-	-	-	-
	Vassar NB Thru	-	-	8	11	12	22	23
	Vassar NB Right	-	-	3	4	4	6	5
	Galileo SB Left	0	2	2	2	2	2	1
	Galileo SB Thru	3	4	4	5	5	5	5
	Galileo SB Right	2	4	4	4	5	5	4
Main Street at Ames Street	Main EB Left/Thru/Right	7	16	15	16	15	13	12
	Main WB Left/Thru/Right	0	4	4	5	5	11	12
	Ames NB Left/Thru/Right	2	19	18	37	35	43	42
	Ames SB Left/Thru	2	3	3	6	8	12	11
	Ames SB Right	2	3	3	4	4	4	4
Memorial Drive at Ames Street	Memorial WB Left/Thru/Right	-	-	13	17	18	33	35
	Ames SB Thru/Right	-	-	5	6	6	6	7
	Memorial EB Thru	-	-	13	17	15	34	39
Memorial Drive at Wadsworth Street	Memorial WB Thru/Right	10	5	6	9	7	27	32
	Memorial EB U-turn	6	3	3	3	3	3	3
	Memorial EB Left	2	1	4	5	5	11	10
	Wadsworth SB Thru/Right	0	1	0	1	1	4	3
Memorial Drive at Western Avenue	Western WB Left/Thru/Right	39	72*	72	71	72	71	71
	Memorial NB Left	19	16	15	30	29	37	36
	Memorial NB Thru	19	16	16	30	29	37	36
	Memorial SB Thru/Right	13	11	12	11	11	13	12

	Lane / Movement	2019 Observed	2019 Modeled	2019 Baseline	2019 Build	2019 Build-Mitigated	2024 Future	2024 Future-Mitigated
Memorial Dr at River St	River EB Left/Thru	15	8	7	8	8	8	8
	River EB Right	14	11	11	11	11	11	12
	Memorial NB Thru/Right	29	12	11	19	20	32	28
	Memorial SB Left/Thru	7	6	6	6	6	6	6

* Since the downstream intersection (Putnam Avenue) was not coded in the model, the modeled queue is greater than the physical distance available east of the Western Avenue approach to Memorial Drive.

3. SimTraffic provides queue data in feet, the table presents queue data in number of vehicles. As directed by the TIS guidelines 1 vehicle = 25 ft.
4. Based on observations conducted by VHB on May 1, 2019

9. Residential Street Volume Analysis

Roadway segments within the study area with residential street frontage were evaluated to understand Project impacts. The peak hour volumes (both directions) traveling the analyzed roadway segments are presented in Tables 9.a.1 and 9.a.2. For analyzed segments that are between study area intersections, the average volumes at these intersections were taken as the volume traveling along the segment. The analysis shows the percent increase in traffic along the residential roadway segments between Existing and Build (un-mitigated and mitigated) volumes and Existing and Future (un-mitigated and mitigated) volumes.

Of all the roadway segments in the study area, a total of 6 of the 80 segments identified are streets which have more than 1/3 of residential frontage, as determined by the existing first floor use. These segments are evaluated in the Planning Board Criteria for increased volume on residential streets. Roadways within the study area that will not experience an increase in traffic as a result of the Project or do not have more than 1/3 residential street frontage were not included in the Residential Street Volume Analysis.

Table 9.a.1 Traffic on Study Area Roadways – AM Peak Hour

Roadway	Reviewed Segment	Amount of Residential	2019 Existing[1]	2019 Baseline	2019 Build	Increase (to Baseline)	% Increase	Build Mitigated	Increase (Baseline)	% Increase	2024 Future[2]	Increase (to Baseline)	% Increase	Future Mitigated	Increase (Baseline)	% Increase
O'Brien Highway	Winter Street to Third Street	1/3 or less	2239	2239	2338	99	4%	2338	99	4%	2851	612	27%	2851	612	27%
	Third Street to Cambridge Street	1/3 or less	1605	1548	1548	0	0%	1548	0	0%	1757	209	13%	1757	209	13%
	Cambridge Street to Land Boulevard	1/2 or more	2055	2095	2139	44	2%	2139	44	2%	2887	793	38%	2887	793	38%
	Land Boulevard to Nashua Street	1/3 or less	2436	2436	2480	44	2%	2480	44	2%	2992	556	23%	2992	556	23%
Cambridge Street	Sciarappa Street to Third Street	1/3 or less	764	764	764	0	0%	764	0	0%	991	227	30%	991	227	30%
	Third Street to Second Street	1/3 or less	668	705	705	0	0%	705	0	0%	931	226	32%	931	226	32%
	Second Street to First Street	1/3 or less	626	651	651	0	0%	651	0	0%	877	226	35%	877	226	35%
	First Street to O'Brien Highway	1/3 or less	942	811	855	44	5%	855	44	5%	972	161	20%	972	161	20%
Thorndike Street	Second Street to First Street	1/3 or less	130	130	130	0	0%	130	0	0%	189	59	45%	189	59	45%
Spring Street	Sciarappa Street to Third Street	1/2 or more	160	160	160	0	0%	160	0	0%	162	2	1%	162	2	1%
	Third Street to Lopez Avenue	1/2 or more	102	102	102	0	0%	102	0	0%	103	1	1%	103	1	1%
Charles Street	Sciarappa Street to Third Street	1/2 or more	131	131	131	0	0%	131	0	0%	164	33	25%	164	33	25%
	Third Street to Second Street	1/3 or less	143	143	143	0	0%	143	0	0%	175	32	22%	175	32	22%
	Second Street to First Street	1/3 or less	81	81	81	0	0%	81	0	0%	131	50	62%	131	50	62%
	First Street to Land Boulevard	1/3 or less	174	174	174	0	0%	174	0	0%	224	50	29%	224	50	29%
Binney Street	Cardinal Medeiros Avenue to Fulkerson Street/ Galileo Galilei Way	1/3 or less	315	315	335	20	6%	335	20	6%	397	82	26%	397	82	26%
	Fulkerson Street/ Galileo Galilei Way to 5th Street	1/3 or less	924	950	1047	98	10%	1053	104	11%	1366	417	44%	1373	423	45%
	5th Street to Third Street	>1/3 but <1/2	953	953	1073	120	13%	1073	120	13%	1409	456	48%	1409	456	48%
	Third Street to Second Street	1/3 or less	975	975	1110	135	14%	1110	135	14%	1479	504	52%	1479	504	52%

Roadway	Reviewed Segment	Amount of Residential	2019 Existing[1]	2019 Baseline	2019 Build	Increase (to Baseline)	% Increase	Build Mitigated	Increase (Baseline)	% Increase	2024 Future[2]	Increase (to Baseline)	% Increase	Future Mitigated	Increase (Baseline)	% Increase
Munroe Street	Second Street to First Street	1/3 or less	928	928	1063	135	15%	1063	135	15%	1421	493	53%	1421	493	53%
	First Street to Land Boulevard	1/3 or less	1303	1303	1394	91	7%	1394	91	7%	1556	253	19%	1556	253	19%
	5th Street to Third Street	1/2 or more	74	74	75	1	1%	75	1	1%	76	2	2%	76	2	2%
	Third Street to West Kendall Street	1/3 or less	3	3	3	0	0%	3	0	0%	3	0	0%	3	0	0%
Potter Street	5th Street to Third Street	1/2 or more	118	118	515	397	337%	299	181	153%	517	399	338%	301	183	155%
Kendall Street	Third Street to Athenaeum Street	1/3 or less	168	168	168	0	0%	168	0	0%	173	5	3%	173	5	3%
Hampshire Street	Webster Avenue to Cardinal Medeiros Avenue	1/3 or less	553	553	569	16	3%	569	16	3%	643	90	16%	643	90	16%
	Cardinal Medeiros Avenue to Broadway	1/3 or less	412	412	428	16	4%	428	16	4%	511	99	24%	511	99	24%
Broadway	Davis Street to Portland Street	1/3 or less	721	721	784	63	9%	784	63	9%	972	251	35%	972	251	35%
	Portland Street to Hampshire Street/ Technology Square	1/3 or less	631	631	694	63	10%	694	63	10%	866	235	37%	866	235	37%
	Hampshire Street/ Technology Square to Galileo Galilei Way	1/3 or less	901	901	980	79	9%	980	79	9%	1233	332	37%	1233	332	37%
	Galileo Galilei Way to Ames Street	1/3 or less	632	632	760	128	20%	760	128	20%	921	289	46%	921	289	46%
	Ames Street to Green Garage Driveway	1/3 or less	809	809	1073	264	33%	1070	261	32%	1328	519	64%	1325	516	64%
	Green Garage Driveway to Third Street	1/3 or less	854	854	1140	286	34%	926	72	8%	1409	555	65%	1195	341	40%
	Third Street to Main Street	1/3 or less	923	923	1092	169	18%	1092	169	18%	1401	478	52%	1401	478	52%
Longfellow Bridge	Memorial Drive to Charles Street	1/3 or less	1218	1218	1387	169	14%	1387	169	14%	1722	504	41%	1722	504	41%
Main Street	Portland Street to Albany Street	1/3 or less	602	688	828	140	20%	828	140	20%	1058	370	54%	1058	370	54%
	Albany Street to Galileo Galilei Way/ Vassar Street	1/3 or less	663	620	760	140	23%	760	140	23%	991	371	60%	991	371	60%
	Galileo Galilei Way/ Vassar Street to Ames Street	1/3 or less	523	523	598	75	14%	592	69	13%	810	287	55%	804	281	54%

Roadway	Reviewed Segment	Amount of Residential	2019 Existing[1]	2019 Baseline	2019 Build	Increase (to Baseline)	% Increase	Build Mitigated	Increase (Baseline)	% Increase	2024 Future[2]	Increase (to Baseline)	% Increase	Future Mitigated	Increase (Baseline)	% Increase
Western Avenue	Ames Street to Third Street/ Broadway	1/3 or less	375	375	381	6	2%	378	3	1%	627	252	67%	624	249	66%
	Third Street/Broadway to Memorial Drive	1/3 or less	1066	1066	1235	169	16%	1235	169	16%	1549	483	45%	1549	483	45%
	Soldiers Field Road to Memorial Drive	1/3 or less	1368	1368	1378	10	1%	1378	10	1%	1417	49	4%	1417	49	4%
	Memorial Drive to Blackstone Street/ Riverside Place	1/3 or less	1079	1079	1079	0	0%	1079	0	0%	1090	11	1%	1090	11	1%
Cambridge Street (Boston)	Soldiers Field Road to Memorial Drive	1/3 or less	1778	1778	1825	47	3%	1825	47	3%	1902	124	7%	1902	124	7%
River Street	Memorial Drive to Blackstone Street	1/3 or less	964	964	1010	46	5%	1010	46	5%	1033	69	7%	1033	69	7%
Memorial Drive	Hingham Street to Western Avenue	1/3 or less	1688	1688	1754	66	4%	1754	66	4%	1862	174	10%	1862	174	10%
	Western Avenue to River Street	1/3 or less	1741	1741	1816	75	4%	1816	75	4%	1943	202	12%	1943	202	12%
	River Street to Pleasant Street Extension	1/3 or less	2351	2351	2426	75	3%	2426	75	3%	2607	256	11%	2607	256	11%
	Massachusetts Avenue to Ames Street	1/3 or less	2630	2598	2664	66	3%	2664	66	3%	3001	403	16%	3001	403	16%
	Ames Street to Wadsworth Street	1/3 or less	2803	2835	2954	119	4%	2954	119	4%	3325	490	17%	3325	490	17%
	Wadsworth Street to Main Street/ Longfellow Bridge	1/3 or less	2396	2396	2396	0	0%	2396	0	0%	2749	353	15%	2749	353	15%
Cardinal Medeiros Avenue	Lilac Court to Hampshire Street	1/3 or less	622	622	622	0	0%	622	0	0%	698	76	12%	698	76	12%
Portland Street	Hampshire Street to Broadway	1/3 or less	686	686	686	0	0%	686	0	0%	737	51	7%	737	51	7%
	Broadway to Harvard Street	1/3 or less	618	618	618	0	0%	618	0	0%	653	35	6%	653	35	6%
Technology Square	Broadway to Main Street	1/3 or less	339	339	339	0	0%	339	0	0%	345	6	2%	345	6	2%
Albany Street	Main Street to Portland Street	1/3 or less	74	189	189	0	0%	189	0	0%	192	3	2%	192	3	2%
Fulkerson Street	Rogers Street to Binney Street	1/3 or less	315	315	315	0	0%	315	0	0%	341	26	8%	341	26	8%
Galileo Galilei Way	Binney Street to Broadway	1/3 or less	952	952	1038	86	9%	1044	92	10%	1317	365	38%	1323	371	39%
	Broadway to Main Street	1/3 or less	675	675	789	114	17%	795	120	18%	1016	341	51%	1023	348	51%

Roadway	Reviewed Segment	Amount of Residential	2019 Existing[1]	2019 Baseline	2019 Build	Increase (to Baseline)	% Increase	Build Mitigated	Increase (Baseline)	% Increase	2024 Future[2]	Increase (to Baseline)	% Increase	Future Mitigated	Increase (Baseline)	% Increase
Vassar Street	Main Street to Massachusetts Avenue	1/3 or less	698	583	633	50	9%	633	50	9%	768	185	32%	768	185	32%
Ames Street	Broadway to Main Street	1/3 or less	376	376	513	137	37%	510	134	36%	724	348	93%	721	345	92%
	Main Street to Memorial Drive	1/3 or less	349	349	411	62	18%	411	62	18%	587	238	68%	587	238	68%
5th Street	Rogers Street to Binney Street	1/2 or more	122	122	122	0	0%	122	0	0%	124	2	2%	124	2	2%
Third Street	O'Brien Highway to Cambridge Street	>1/3 but <1/2	754	711	810	99	14%	810	99	14%	985	274	39%	985	274	39%
	Cambridge Street to Spring Street	>1/3 but <1/2	647	642	741	99	15%	741	99	15%	920	278	43%	920	278	43%
	Spring Street to Charles Street	1/2 or more	611	611	710	99	16%	710	99	16%	877	266	44%	877	266	44%
	Charles Street to Binney Street	>1/3 but <1/2	552	552	651	99	18%	651	99	18%	812	260	47%	812	260	47%
	Binney Street to Munroe Street/ Athenaeum Street	1/3 or less	761	761	881	120	16%	881	120	16%	1151	390	51%	1151	390	51%
	Munroe Street/ Athenaeum Street to Kendall Street/ Potter Street	>1/3 but <1/2	679	679	791	112	16%	791	112	16%	1058	379	56%	1058	379	56%
	Broad Way Canal to Broadway/ Main Street	1/3 or less	647	647	963	316	49%	746	99	15%	1257	610	94%	1040	393	61%
Wadsworth Street	Amherst Street to Memorial Drive	1/3 or less	71	71	74	3	5%	74	3	5%	222	151	213%	222	151	213%
Second Street	Rogers Street to Binney Street	1/3 or less	276	276	276	0	0%	276	0	0%	311	35	13%	311	35	13%
	Binney Street to Linskey Way	1/3 or less	301	301	301	0	0%	301	0	0%	312	11	3%	312	11	3%
East Street	Glassworks Avenue to O'Brien Highway	1/3 or less	213	56	56	0	0%	56	0	0%	57	1	2%	57	1	2%
First Street	Cambridge Street to Thorndike Street	1/3 or less	412	440	484	44	10%	484	44	10%	783	343	78%	783	343	78%
	Thorndike Street to Charles Street/ Cambridgeside Place	1/3 or less	429	429	473	44	10%	473	44	10%	822	393	92%	822	393	92%
	Charles Street/ Cambridgeside Place to Binney Street	1/3 or less	359	359	403	44	12%	403	44	12%	736	377	105%	736	377	105%
	Binney Street to Linskey Way	1/3 or less	528	528	528	0	0%	528	0	0%	565	37	7%	565	37	7%

Roadway	Reviewed Segment	Amount of Residential	2019 Existing[1]	2019 Baseline	2019 Build	Increase (to Baseline)	% Increase	Build Mitigated	Increase (Baseline)	% Increase	2024 Future[2]	Increase (to Baseline)	% Increase	Future Mitigated	Increase (Baseline)	% Increase
Gilmore Bridge	New Rutherford Avenue to Land Boulevard	1/3 or less	2064	2064	2155	91	4%	2155	91	4%	2483	419	20%	2483	419	20%
Land Blvd	O'Brien Highway to Binney Street	1/3 or less	2210	2210	2300	91	4%	2300	91	4%	2654	444	20%	2654	444	20%
	Binney Street to Longfellow Bridge	1/3 or less	2240	2240	2240	0	0%	2240	0	0%	2574	334	15%	2574	334	15%

[1]Where driveways/on-street parking created a segment inflow/outflow volume imbalance, average volumes were calculated per street direction, and added together
[2]Future accounts for area background project volumes, Project-generated volumes, and background growth

Table 9.a.2 Traffic on Study Area Roadways – PM Peak Hour

Roadway	Reviewed Segment	Amount of Residential	2019 Existing[1]	2019 Baseline	2019 Build	Increase (to Baseline)	% Increase	Build Mitigated	Increase (Baseline)	% Increase	2024 Future[2]	Increase (to Baseline)	% Increase	Future Mitigated	Increase (Baseline)	% Increase
O'Brien Highway	Winter Street to Third Street	1/3 or less	2381	2281	2393	112	5%	2393	112	5%	3245	964	42%	3245	964	42%
	Third Street to Cambridge Street	1/3 or less	1437	1498	1498	0	0%	1498	0	0%	1855	357	24%	1855	357	24%
	Cambridge Street to Land Boulevard	1/2 or more	1886	1919	1969	50	3%	1969	50	3%	2757	838	44%	2757	838	44%
	Land Boulevard to Nashua Street	1/3 or less	1844	1844	1894	50	3%	1894	50	3%	2438	594	32%	2438	594	32%
Cambridge Street	Sciarappa Street to Third Street	1/3 or less	567	567	567	0	0%	567	0	0%	796	229	40%	796	229	40%
	Third Street to Second Street	1/3 or less	564	607	607	0	0%	607	0	0%	851	244	40%	851	244	40%
	Second Street to First Street	1/3 or less	496	632	632	0	0%	632	0	0%	879	247	39%	879	247	39%
	First Street to O'Brien Highway	1/3 or less	1102	852	902	50	6%	902	50	6%	1059	207	24%	1059	207	24%
Thorndike Street	Second Street to First Street	1/3 or less	278	278	278	0	0%	278	0	0%	461	183	66%	461	183	66%
Spring Street	Sciarappa Street to Third Street	1/2 or more	155	155	155	0	0%	155	0	0%	159	4	3%	159	4	3%
	Third Street to Lopez Avenue	1/2 or more	171	171	171	0	0%	171	0	0%	177	6	3%	177	6	3%
Charles Street	Sciarappa Street to Third Street	1/2 or more	207	207	207	0	0%	207	0	0%	226	19	9%	226	19	9%
	Third Street to Second Street	1/3 or less	185	185	185	0	0%	185	0	0%	207	22	12%	207	22	12%
	Second Street to First Street	1/3 or less	131	131	131	0	0%	131	0	0%	178	47	36%	178	47	36%
	First Street to Land Boulevard	1/3 or less	433	433	433	0	0%	433	0	0%	481	48	11%	481	48	11%
Binney Street	Cardinal Medeiros Avenue to Fulkerson Street/ Galileo Galilei Way	1/3 or less	518	518	524	6	1%	524	6	1%	604	86	17%	604	86	17%
	Fulkerson Street/ Galileo Galilei Way to 5th Street	1/3 or less	949	949	1049	100	11%	1089	140	15%	1438	489	51%	1477	528	56%
	5th Street to Third Street	>1/3 but <1/2	1049	1049	1244	195	19%	1244	195	19%	1663	614	59%	1663	614	59%
	Third Street to Second Street	1/3 or less	762	862	1015	153	18%	1015	153	18%	1432	570	66%	1432	570	66%

Roadway	Reviewed Segment	Amount of Residential	2019 Existing[1]	2019 Baseline	2019 Build	Increase (to Baseline)	% Increase	Build Mitigated	Increase (Baseline)	% Increase	2024 Future[2]	Increase (to Baseline)	% Increase	Future Mitigated	Increase (Baseline)	% Increase
Munroe Street	Second Street to First Street	1/3 or less	761	861	1014	153	18%	1014	153	18%	1414	553	64%	1414	553	64%
	First Street to Land Boulevard	1/3 or less	735	735	838	103	14%	838	103	14%	967	232	32%	967	232	32%
	5th Street to Third Street	1/2 or more	42	42	57	15	37%	57	15	37%	57	15	37%	57	15	37%
	Third Street to West Kendall Street	1/3 or less	59	59	59	0	0%	59	0	0%	61	2	3%	61	2	3%
Potter Street	5th Street to Third Street	1/2 or more	85	85	500	415	488%	382	297	349%	501	416	489%	383	298	350%
Kendall Street	Third Street to Athenaeum Street	1/3 or less	69	69	69	0	0%	69	0	0%	71	2	3%	71	2	3%
Hampshire Street	Webster Avenue to Cardinal Medeiros Avenue	1/3 or less	598	598	622	24	4%	622	24	4%	715	117	20%	715	117	20%
	Cardinal Medeiros Avenue to Broadway	1/3 or less	525	525	548	24	5%	548	24	5%	627	102	20%	627	102	20%
Broadway	Davis Street to Portland Street	1/3 or less	742	742	826	84	11%	826	84	11%	1074	332	45%	1074	332	45%
	Portland Street to Hampshire Street/ Technology Square	1/3 or less	637	637	721	84	13%	721	84	13%	954	317	50%	954	317	50%
	Hampshire Street/ Technology Square to Galileo Galilei Way	1/3 or less	959	959	1067	108	11%	1067	108	11%	1376	417	44%	1376	417	44%
	Galileo Galilei Way to Ames Street	1/3 or less	763	763	907	144	19%	907	144	19%	1137	374	49%	1137	374	49%
	Ames Street to Green Garage Driveway	1/3 or less	920	920	1230	310	34%	1210	290	32%	1447	527	57%	1428	508	55%
	Green Garage Driveway to Third Street	1/3 or less	1027	1027	1186	160	16%	1088	61	6%	1438	411	40%	1339	313	30%
	Third Street to Main Street	1/3 or less	1179	1179	1369	190	16%	1369	190	16%	1615	436	37%	1615	436	37%
Longfellow Bridge	Memorial Drive to Charles Street	1/3 or less	1923	1923	2112	189	10%	2112	189	10%	2479	556	29%	2479	556	29%
Main Street	Portland Street to Albany Street	1/3 or less	787	828	988	160	19%	988	160	19%	1149	321	39%	1149	321	39%
	Albany Street to Galileo Galilei Way/ Vassar Street	1/3 or less	864	844	1004	160	19%	1004	160	19%	1207	363	43%	1207	363	43%
	Galileo Galilei Way/ Vassar Street to Ames Street	1/3 or less	651	651	769	118	18%	729	78	12%	987	336	52%	948	297	46%

Roadway	Reviewed Segment	Amount of Residential	2019 Existing[1]	2019 Baseline	2019 Build	Increase (to Baseline)	% Increase	Build Mitigated	Increase (Baseline)	% Increase	2024 Future[2]	Increase (to Baseline)	% Increase	Future Mitigated	Increase (Baseline)	% Increase
Western Avenue	Ames Street to Third Street/ Broadway	1/3 or less	440	440	485	45	10%	465	25	6%	562	122	28%	542	102	23%
	Third Street/Broadway to Memorial Drive	1/3 or less	1393	1393	1582	189	14%	1582	189	14%	1887	494	35%	1887	494	35%
	Soldiers Field Road to Memorial Drive	1/3 or less	1866	1866	1914	48	3%	1914	48	3%	1977	111	6%	1977	111	6%
	Memorial Drive to Blackstone Street/ Riverside Place	1/3 or less	1303	1303	1303	0	0%	1303	0	0%	1316	13	1%	1316	13	1%
Cambridge Street (Boston)	Soldiers Field Road to Memorial Drive	1/3 or less	1553	1553	1570	17	1%	1570	17	1%	1620	67	4%	1620	67	4%
River Street	Memorial Drive to Blackstone Street	1/3 or less	802	802	816	14	2%	816	14	2%	833	31	4%	833	31	4%
Memorial Drive	Hingham Street to Western Avenue	1/3 or less	1685	1685	1759	74	4%	1759	74	4%	1861	176	10%	1861	176	10%
	Western Avenue to River Street	1/3 or less	1726	1726	1848	122	7%	1848	122	7%	1984	258	15%	1984	258	15%
	River Street to Pleasant Street Extension	1/3 or less	1953	1953	2075	122	6%	2075	122	6%	2240	287	15%	2240	287	15%
	Massachusetts Avenue to Ames Street	1/3 or less	2844	2810	2884	74	3%	2884	74	3%	3209	399	14%	3209	399	14%
	Ames Street to Wadsworth Street	1/3 or less	2904	2938	2995	57	2%	2995	57	2%	3380	442	15%	3380	442	15%
	Wadsworth Street to Main Street/ Longfellow Bridge	1/3 or less	2570	2570	2570	0	0%	2570	0	0%	2881	311	12%	2881	311	12%
Cardinal Medeiros Avenue	Lilac Court to Hampshire Street	1/3 or less	690	690	690	0	0%	690	0	0%	740	50	7%	740	50	7%
Portland Street	Hampshire Street to Broadway	1/3 or less	692	692	692	0	0%	692	0	0%	725	33	5%	725	33	5%
	Broadway to Harvard Street	1/3 or less	689	689	689	0	0%	689	0	0%	711	22	3%	711	22	3%
Technology Square	Broadway to Main Street	1/3 or less	391	391	391	0	0%	391	0	0%	399	8	2%	399	8	2%
Albany Street	Main Street to Portland Street	1/3 or less	62	117	117	0	0%	117	0	0%	120	3	3%	120	3	3%
Fulkerson Street	Rogers Street to Binney Street	1/3 or less	417	417	417	0	0%	417	0	0%	442	25	6%	442	25	6%
Galileo Galilei Way	Binney Street to Broadway	1/3 or less	1072	1072	1138	66	6%	1177	105	10%	1536	464	43%	1575	503	47%
	Broadway to Main Street	1/3 or less	990	990	1091	101	10%	1131	141	14%	1366	376	38%	1406	416	42%

Roadway	Reviewed Segment	Amount of Residential	2019 Existing[1]	2019 Baseline	2019 Build	Increase (to Baseline)	% Increase	Build Mitigated	Increase (Baseline)	% Increase	2024 Future[2]	Increase (to Baseline)	% Increase	Future Mitigated	Increase (Baseline)	% Increase
Vassar Street	Main Street to Massachusetts Avenue	1/3 or less	903	849	908	59	7%	908	59	7%	1078	229	27%	1078	229	27%
Ames Street	Broadway to Main Street	1/3 or less	465	465	636	171	37%	617	152	33%	873	408	88%	854	389	84%
	Main Street to Memorial Drive	1/3 or less	461	461	509	48	10%	509	48	10%	739	278	60%	739	278	60%
5th Street	Rogers Street to Binney Street	1/2 or more	146	146	146	0	0%	146	0	0%	148	2	1%	148	2	1%
Third Street	O'Brien Highway to Cambridge Street	>1/3 but <1/2	1036	790	901	112	14%	901	112	14%	1098	309	39%	1098	309	39%
	Cambridge Street to Spring Street	>1/3 but <1/2	584	479	590	112	23%	590	112	23%	783	304	64%	783	304	64%
	Spring Street to Charles Street	1/2 or more	559	459	571	112	24%	571	112	24%	758	299	65%	758	299	65%
	Charles Street to Binney Street	>1/3 but <1/2	750	650	762	112	17%	762	112	17%	945	295	45%	945	295	45%
	Binney Street to Munroe Street/ Athenaeum Street	1/3 or less	743	743	922	179	24%	922	179	24%	1169	426	57%	1169	426	57%
	Munroe Street/ Athenaeum Street to Kendall Street/ Potter Street	>1/3 but <1/2	780	780	932	153	20%	933	153	20%	1181	402	52%	1182	402	52%
	Broad Way Canal to Broadway/ Main Street	1/3 or less	879	879	1170	291	33%	1052	174	20%	1461	582	66%	1343	464	53%
Wadsworth Street	Amherst Street to Memorial Drive	1/3 or less	134	134	160	26	19%	160	26	19%	258	124	92%	258	124	92%
Second Street	Rogers Street to Binney Street	1/3 or less	520	520	520	0	0%	520	0	0%	561	41	8%	561	41	8%
	Binney Street to Linskey Way	1/3 or less	333	333	333	0	0%	333	0	0%	343	10	3%	343	10	3%
East Street	Glassworks Avenue to O'Brien Highway	1/3 or less	350	63	63	0	0%	63	0	0%	65	2	3%	65	2	3%
First Street	Cambridge Street to Thorndike Street	1/3 or less	672	787	836	50	6%	836	50	6%	1211	424	54%	1211	424	54%
	Thorndike Street to Charles Street/ Cambridgeside Place	1/3 or less	567	667	717	50	7%	717	50	7%	1109	442	66%	1109	442	66%
	Charles Street/ Cambridgeside Place to Binney Street	1/3 or less	551	651	701	50	8%	701	50	8%	1110	459	70%	1110	459	70%
	Binney Street to Linskey Way	1/3 or less	355	355	355	0	0%	355	0	0%	438	83	23%	438	83	23%

Roadway	Reviewed Segment	Amount of Residential	2019 Existing[1]	2019 Baseline	2019 Build	Increase (to Baseline)	% Increase	Build Mitigated	Increase (Baseline)	% Increase	2024 Future[2]	Increase (to Baseline)	% Increase	Future Mitigated	Increase (Baseline)	% Increase
Gilmore Bridge	New Rutherford Avenue to Land Boulevard	1/3 or less	2030	2030	2133	103	5%	2133	103	5%	2450	420	21%	2450	420	21%
Land Blvd	O'Brien Highway to Binney Street	1/3 or less	1651	1651	1754	103	6%	1754	103	6%	2078	428	26%	2078	428	26%
	Binney Street to Longfellow Bridge	1/3 or less	1706	1706	1706	0	0%	1706	0	0%	1992	286	17%	1992	286	17%

[1]Where driveways/on-street parking created a segment inflow/outflow volume imbalance, average volumes were calculated per street direction, and added together
[2]Future accounts for area background project volumes, Project-generated volumes, and background growth

10. Parking Analysis

VHB developed parking calculations based on three different methodologies (a) zoning calculation (b) employee density demand calculation, and (c) shared parking analysis based on observed demand.

a. Parking Supply per PUD-7 Zoning

The PUD-7 District Zoning approved a set of parking ratios for the Volpe Exchange Parcel Project. Table 10.a.1 presents the resulting minimum and maximum parking supply requirements set forth in the City Council's final adoption of the zoning.

Table 10.a.1 Parking Supply per Zoning

Land Use	Development Program	Minimum Zoning Ratio	Maximum Zoning Ratio	Minimum Number of Parking Spaces	Maximum Number of Parking Spaces
Office	879,000 sf	0 spaces per ksf	0.80 spaces per ksf	0	703
R&D	897,750 sf	0 spaces per ksf	0.80 spaces per ksf	0	718
Residential	1,300 units	0 spaces per ksf	0.75 spaces per unit	0	975
Hotel	200 keys	0 spaces per ksf	1 space per 4 sleeping rooms	0	50
Retail/Active Use	75,000 sf	0 spaces per ksf	0.50 spaces per ksf	0	38
Total Spaces		**0**		**0**	**2,484**

Source: PUD-7 Zoning Ordinance

The minimum and maximum zoning ratios are presented for information purposes only. The Project proposes to use shared parking within the site in order to reduce the number of parking spaces built as part of this Project.

As written in the PUD-7 zoning language: *"The Planning Board may approve arrangements for shared parking of such residential parking spaces with commercial spaces. The Planning Board shall specify a minimum parking requirement for a PUD Final Development Plan based on review and analysis of Transportation Impact Studies and other relevant information on parking demand provided in application documents, including the Shared Parking Study."*

b. Parking Demand by Employee Density

One way to calculate the office and R&D parking demand is based on employee density. The calculation includes the expected number of employees multiplied by their single occupancy vehicle (SOV) mode share plus ½ high occupancy vehicle (HOV) mode share, as described in the TP&T Scoping Determination. We investigated Cambridge data for properties of similar use to the project for determining reasonable estimates for the number of employees that would occupy the office/R&D portion of the Volpe Exchange Project. Based on PTDM monitoring reports from 2018, we found that Kendall Square area properties (with technical office or research and development/laboratory space) have about 2.46 employees per 1,000 square feet of space shown in Table 10.b.1.

Table 10.b.1 Employees Per 1,000 Square Feet (Kendall Square Area Technical/R&D Properties)

Property	Ratio (Employees/KSF)	Sample Size
7 Cambridge Center (7 CC)/BP	2.74	10
610 Main/MITIMCO	2.46	7
Tech Square/ARE	2.16	27
Binney PUD/ARE	2.51	17
Weighted Total	**2.46**	**61**

Source: Calculations by VHB based on 2018 PTDM Monitoring Reports provided by the City of Cambridge

Notes: 7 CC tends to have more space allocated to technical office rather than R&D; the other properties lean toward R&D

Ratio is weighted by total number of employees (not number of employers/tenants)

In addition, according to the LEED Reference Guide for Green Building Design and Construction, when final project occupancy counts are unavailable, default occupancy counts must be utilized. The default occupancy for R&D or laboratory buildings is one employee per 400 square feet, or 2.5 employees per KSF. To be conservative, an employee density ratio of 2.5 will be used for this parking demand analysis. Table 10.b.2 shows the expected number of employees and the calculated office parking demand.

Table 10.b.2 Parking Demand based on Expected Employees

Garage	Program	Expected Employee Density	Estimated Employees	Automobile Use Percentage	Office Parking Demand
South of Potter Street Garage	1,392,950 SF (Office/R&D)	2.5 employees per KSF	3,480	35% SOV + (1/2)(5% HOV) = 37.5%	1,305
North of Potter Street Garage	383,800 SF (Office/R&D)	2.5 employees per KSF	960	35% SOV + (1/2)(5% HOV) = 37.5%	360
				Total	**1,665**

The density-based demand methodology yields a parking ratio of 0.94 spaces per KSF (1,665 spaces / 1,776.75 KSF), which is higher than the maximum allowed parking ratio per the PUD-7 zoning. As noted previously, the Project proposes to use shared parking within the site in order to reduce the number of parking spaces built as part of this Project.

c. Observed Demand Ratios

Another method used to calculate the Project's expected parking demand is based on existing parking patterns and activity at other nearby sites. The maximum observed demand ratios for seven commercial buildings and five residential buildings in the Kendall Square/East Cambridge area were calculated using the most recent PTDM and TDM Monitoring reports available, by dividing the vehicle occupancy in the associated garage by the total number of leased/occupied square footage (or residential units). In each PTDM report, a certain percentage of responders indicated that when they drive to work, they do not park on-site. In order to account for these off-site parkers, the hour-by-hour occupancies at each of the sites were adjusted to show what the maximum occupancy would be if all employees park on-site. The primary goal of this exercise was to estimate parking demand rates at these nearby sites, that if applied to the Volpe Project would accommodate all parkers on-site.

Table 10.c.1 shows the observed maximum office/lab demand ratios calculated using PTDM reports, while Table 10.b.2 shows the maximum residential demand ratios calculated using PTDM reports.

Table 10.c.1 Office/Lab Observed Demand Ratio

PTDM Site	Garage Capacity (#spaces)	Total Office/Lab KSF	Occupied Office/Lab KSF	Parking Supply Ratio[1]	Maximum Observed Parking Demand (# spaces)	Maximum Demand Ratio[2]
50-60 Hampshire	222	243.61	242.52	0.91	129	0.53
210 Broadway	70	64.81	64.81	1.08	64	0.99
BioMed	503	650.99	552.45	0.77	396	0.72
350 Kendall Garage	1,409	1,397.08	1,397.08	1.54	1,686	1.21
650 East Kendall Garage	738					
One Rogers	656	372.23	351.02	1.76	347	0.99
Two Canal	177	206.31	138.49	0.86	109	0.79
300 Third	146	131.55	131.55	1.11	69	0.52
610 Main Street	650	677.10	677.10	0.96	444	0.66
Draper	945	823	823	1.15	842	1.02
Technology Square	1,593	1,181.64	1,179.14	1.35	1,151	0.98
				Average Parking Demand per KSF		**0.84**

Source: City of Cambridge PTDM reports years 2018 and 2017

[1] Parking Supply Ratio (parking spaces per KSF) = Garage Capacity/Total KSF

[2]Maximum Demand Ratio (parking spaces per KSF) = Maximum Parking Demand/Occupied KSF

Table 10.c.2 Residential Maximum Demand Ratio

PTDM Site	Garage Capacity	Total Residential Units	Leased Residential Units	Parking Supply Ratio[1]	Maximum Observed Parking Demand	Maximum Demand Ratio[2]
Avalon North Point (2017 TDM Report)	434	521	498	0.83	242	0.49
195 Binney Street[3]	194	186	186	1.04	101	0.54
285/303 Third Street[3]	527	482	482	1.09	256	0.54
1/2 Earhart (2018 TDM Report)	329	329	329	1.00	185	0.56
Twenty|20 (2018 TDM Report)	184	355	326	0.52	108	0.33
					Average Parking Demand per Unit	**0.49**

[1] Parking Supply Ratio (spaces per unit) = Garage Capacity/Total Units

[2] Maximum Demand Ratio (spaces per unit) = Maximum Parking Demand/Leased Units

[2] Data provided in the 249 Third Street TIS (Submitted to TP&T December 22, 2014. Project approved by the Planning Board on November 16, 2015)

For office/lab parking demand - the average observed demand ratio from Table 10.c.1 is higher than the maximum allowed parking ratio per PUD-7 zoning (Table 10.a.1), therefore the **ratio of 0.8 spaces per KSF was used for office/R&D parking demand calculations.**

For residential parking demand - the average observed demand ratio from Table 10.b.2, for residential buildings in the Kendall Square/East Cambridge area is 0.49 spaces per unit, which is below the maximum allowed parking ratio per PUD-7 zoning of 0.75 spaces per unit, therefore the lower ratio of **0.49 spaces per unit was used for residential parking demand calculations**.

For the hotel land use, the maximum allowed parking ratio per PUD-7 zoning **of 0.25 spaces per sleeping room(key) was used for parking demand calculations**, due to the lack of PTDM data for hotel sites.

Since no specific parking occupancy is reported for the retail component of PTDM sites, in order to calculate the parking demand ratio, the total number of parking spaces dedicated to retail land use in the Kendall Square area (as reported in the PTDM reports) was divided by the total retail KSF in the Kendall Square area. Table 10.c.3 shows the parking capacity ratios for retail land uses, which averages out to 0.25 spaces per KSF of retail. The observed rate is below the maximum allowed parking ratio per PUD-7 zoning of 0.50 spaces per KSF, therefore **a parking ratio of 0.25 spaces per KSF was used for retail parking demand calculations**.

Table 10.c.3 Retail Parking Capacity Ratio

PTDM Site	Parking Supply	Retail KSF	Parking Supply Ratio[1]
50-60 Hampshire	8	8.606	0.93
300 Third Street	2	2.215	0.90
610 Main Street	7	8.682	0.81
75/125 Binney	2	2.159	0.93
215 First Street	3	33.898	0.09
50/60 Binney Street	0	2.097	0.00
Cambridge Center	0	46.524	0.00
Kendall Square	0	33.187	0.00
1 Rogers	23	13.314	1.73
Technology Square	9	62.299	0.14
Total	54	212.948	**0.25**

[1] Parking Capacity Ratio (spaces per KSF) = Parking Capacity/Retail KSF

d. Shared Parking Analysis

The concept of shared parking recognizes that peaking for different land uses occur at different times. Instead of building parking to support each individual land use's peak demand, the site supplies enough parking to support the entire site's peak parking demand, assuming that each land use will draw from a common parking supply. Shared parking leverages the peaking characteristics of its land uses, taking advantage of parking demand synergies. Due to parking demand issues, the shared parking concept is often viewed as most applicable to large mixed-use developments that have a large physically sharable parking supply that can serve multiple users rather than one individual building with a limited parking supply.

MIT is committed in supporting the City's goal of lowering single occupant vehicle (SOV) trips to/from the Cambridge area, by not overbuilding parking and taking advantage of exceptional transit and walking/biking options around the Project. A shared parking analysis was conducted to understand the Project's ability to share new parking spaces and possibly reduce the overall number of spaces built.

As requested in the TP&T Scoping Determination a shared parking analysis was conducted using actual observed peak parking utilization rates by land use from PTDM transportation monitoring reports.

Time of Day Distribution

A time of day distribution for the office/lab and residential components was calculated using the hourly garage occupancy for the PTDM sites described in the above section. For the retail and hotel land uses, where time of day distribution could not be calculated, the time of day distributions provided in the Urban Land Institute (ULI) Shared Parking Manual, Second Edition were used.

Table 10.d.4 shows the time of day distribution for key times throughout the day (6:00AM, 9:00AM, 12:00PM, 3:00PM, 6:00PM, and 10:00PM). For an hour-by-hour parking demand, refer to the Appendix.

The parking calculation was developed separately for the North of Munroe Street Garage (servicing sites C4 and R4) and the South of Potter Street Garage (servicing C1, C2, C3, R1, R2, R2 and Community Center).

As shown in Table 10.d.4, the peak shared parking demand for the project is calculated at 1,876 parking spaces, with 1,475 spaces in the South of Potter Garage and 401 spaces in the North of Munroe Garage. The calculated shared demand of 1,876 spaces is 252 spaces less than if the parking was not shared between uses (unshared demand 2,128 spaces).

In addition to a shared parking strategy within the Volpe site, MIT is open to negotiations with abutters around opportunities to absorb any currently underutilized parking spaces near the Project.

Table 10.d.4 Shared Parking - Time of Day Distribution

Use	Program	Parking Ratio	Unadjusted Parking Demand	6:00AM		9:00AM		Noon		3:00PM		6:00PM		10:00PM	
				Peak Hour Adjmt.	Shared Parking Demand	Peak Hour Adjmt.	Shared Parking Demand	Peak Hour Adjmt.	Shared Parking Demand	Peak Hour Adjmt.	Shared Parking Demand	Peak Hour Adjmt.	Shared Parking Demand	Peak Hour Adjmt.	Shared Parking Demand
South of Potter Street Garage															
Office/R&D	1392.95 KSF	0.80	1,114	17%	189	86%	953	99%	1,098	81%	899	23%	261	8%	93
Residential	1000 Units	0.49	492	97%	475	69%	340	64%	316	55%	270	70%	346	95%	465
Retail (Employee)	65 KSF	0.25	3	10%	1	75%	10	100%	13	100%	13	95%	12	40%	5
Retail (Patron)			13	1%	0	35%	5	95%	12	90%	12	95%	12	30%	4
Hotel (Employee)	200 Keys	0.25	11	5%	1	90%	10	100%	11	100%	11	40%	4	20%	2
Hotel (Patron)			39	95%	37	80%	31	65%	25	70%	27	85%	33	95%	37
Total			**1,672**		**703**		**1,349**		**1,475**		**1,232**		**668**		**606**
North of Munroe Street Garage															
Office/R&D	383.8 KSF	0.80	307	17%	52	86%	263	99%	303	81%	248	23%	72	8%	26
Residential	300 Units	0.49	147	97%	142	69%	102	64%	94	55%	81	70%	103	95%	139
Retail (Employee)	10 KSF	0.25	0	10%	0	75%	2	100%	2	100%	2	95%	2	40%	1
Retail (Patron)			2	1%	0	35%	1	95%	2	90%	2	95%	2	30%	1
Total			**456**		**194**		**368**		**401**		**333**		**179**		**167**
Grand Total			**2,128**		**897**		**1,717**		**1,876**		**1,565**		**847**		**773**

e. Parking Management

Due to the long buildout time of the project, no detailed parking management system can be proposed at this time, however the intent is to manage both garages with state-of-the-art access technology.

The office/R&D and retail/active use will be provided a fixed number of permits. If the garage reaches capacity for either user group, the gate system will alert the driver that they are not permitted to park in the garage. Market parking rates will be charged for commercial users and determined at a later date. Residential parking will be leased separately from each residential unit.

It is anticipated that a number of short-term on-street parking spaces will be made available as part of the construction of 5th Street, and Potter, allowing for an adjustment in number of parking spaces to be constructed within the garages. An exact count of on-street parking spaces is not available at this time.

Additionally, flexible curb space is being proposed on Broadway between Ames Street and Third Street, Fifth Street between Potter Street and Broadway, and on Broad Canal Way between Street X and Third Street in order to provide space for transportation network companies (TNCs) to drop off/pick up passengers and for short term loading. The exact location of such zones and appropriate signage will be coordinated with TP&T at a later date.

11. Transit Analysis

In accordance with the TIS Guidelines, and as requested in the TP&T Scoping Determination, a transit analysis has been conducted to support this Project. The analysis took an in-depth look at existing Red Line, Green Line and bus operations and assessed the impacts of the project-generated transit trips. In addition, the transit analysis also includes a review of capacity constraints for stairways and escalators at the Kendall Square Station.

The following sections summarize existing transit service availability in the study area and provide an assessment of transit utilization and capacity for transit lines that are expected to be used by the proposed Project. These services include the Red Line accessed at Kendall/MIT Station, Green Line accessed at Lechmere Station, MBTA Bus Lines 1, 64, 68, 85, CT2 and the EZ Ride.

The analysis was based on the following 8-step method:

1. Quantify the existing transit system capacity
2. Quantify the existing system ridership
3. Report on existing transit system utilizations (ridership/capacity) – Existing Conditions
4. Develop and assign project-generated transit trips to the existing transit system
5. Report on project impacts to the transit system utilization – 2019 Build Conditions
6. Grow 2019 existing transit system ridership to year 2024
7. Compile area background project transit trips and assign to transit system network
8. Report on future transit system utilization (impacts from project as well as other background projects and general system growth) – 2024 Future Conditions

The V/C ratio (Volume to Capacity) is the resulting metric that, for the purposes of this study, is used to reflect the level of utilization for each transit service line. The V/C ratios (or utilization rates) are presented for the Existing Condition (2019), Build Condition (Existing + Project trips), and Future Condition (Existing + Project trips + background growth).

In addition to transit service capacity analyses, an analysis of the stairways at Kendall/MIT Station were completed, as requested in the TIS Scoping Determination.

a. Existing Transit System Capacity – STEP 1

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

The study period for this analysis includes the AM and PM transit peak hours defined as 7:45 AM to 8:45 AM and 5:00 PM to 6:00 PM, respectively.

Train and bus frequencies were compiled from the latest published MBTA schedules[7] and MBTA Bus Ridecheck data from Winter 2020, as reported in Table 11.a.1.

[7] MBTA schedules, Winter 2020

For the purposes of this study, the vehicle load standards (i.e. number of people safely and comfortably riding on a train car or bus) are based on the MBTA's Service Delivery Policy[8] and the *MBTA Blue Book 14th Edition* data (Red Line policy capacity of 167 passengers per car, with a standard operation of 6-car trains; Green Line policy capacity of 101 passengers per car, with a standard operation of 2 cars; MBTA Bus policy capacity was determined for each bus route separately, and summarized in Table 11.a.1.

The average on-time performance (OTP) was adjusted for each route based on the 2019 average (January 2019-December 2019) reliability factors provided by the MBTA Performance Dashboard. The on-time performance adjustment reduces the number of available trains or buses during the peak hour to account for schedule irregularities and resulting wait times experienced by the passengers.

Table 11.a.1 shows the resulting system capacities for the Red Line, Green Line and Bus Lines based on MBTA provided data.

Table 11.a.1 System Peak Hour Capacity (per MBTA Data)

Mode	Frequency	OTP Factor	# Passengers / Vehicle	# Cars / Train	Resulting Capacity (# Passengers / Peak Hour)
Red Line at Kendall/MIT Station					
Inbound (SB)	13	0.88	167	6	11,463
Outbound (NB)	13	0.88	167	6	11,463
Green Line at Lechmere Station					
Inbound (EB)	10	0.83	101	2	1,679
Outbound (WB)	10	0.83	101	2	1,679
MBTA Bus					
Route 1 Inbound	7.50	0.75	50.4*	n/a	284
Route 1 Outbound	7.00	0.75	50.4*	n/a	265
Route 64 Inbound	3.00	0.55	50.7+	n/a	83
Route 64 Outbound	3.00	0.55	50.7+	n/a	83
Route 68 Inbound	1.00	0.48	50.7+	n/a	24
Route 68 Outbound	1.00	0.48	50.7+	n/a	24
Route 85 Inbound	2.00	0.57	50.7+	n/a	58
Route 85 Outbound	2.00	0.57	50.7+	n/a	58
Route CT2 Inbound	2.50	0.49	50.4*	n/a	62
Route CT2 Outbound	2.50	0.49	50.4*	n/a	62

*The policy capacity for the Route 1 and CT2 routes is based on the weighted average capacity for buses that are stored in the Cabot Garage.
+ The policy capacity for Routes 64, 68, and 85 is based on the weighted average capacity for buses stored in the Charlestown-Bennet/Somerville district garage.

[8] MBTA Service Delivery Policy, approved by the Board of Directors in June 2010

Over the next several years (between 2020 and 2023) 252 new Red Line cars are scheduled to be introduced along with improvements in signal equipment which will significantly increase capacity and address overcrowding at some stations along the Red Line. The *MBTA Red / Orange Line New Vehicle Technical Provisions* (May 2014) report indicates that capacity increase will allow a decrease in the existing headway from 4.5 minutes to 3 minutes for an approximately additional 7,000 transit riders per hour.

Table 11.a.2 shows the resulting system capacities for the Red Line based on MBTA provided data and technical provisions. Step 5 is performed considering both existing Red Line capacity as well as this future condition.

Table 11.a.2 Future Red Line Peak Hour Capacity (per MBTA Data)

Mode	Frequency	OTP Factor	# Passengers / Vehicle	# Cars / Train	Resulting Capacity (# Passengers / Peak Hour)
Red Line at Kendall/MIT Station					
Inbound (SB)	20	0.88	175	6	18,480
Outbound (NB)	20	0.88	175	6	18,480

b. Existing Transit System Ridership – STEP 2

Adjusted MBTA Ridership data from Spring and Fall 2018 was used to obtain peak hour passenger loads for transit routes in 2019 that are expected to be utilized by the future Project employees, residents, retail and hotel employees and patrons.

The resulting adjusted ridership numbers (which are representative of 2019 Existing Conditions), as used for analyzing the utilization of services, are presented in Table 11.b.1 below.

Table 11.b.1 Adjusted Ridership Levels (Year 2019)

	AM Peak Hour				PM Peak Hour			
Mode	**Pax Load Entering Station**	**# Pax Boarding**	**# Pax Alighting**	**Pax Load Exiting Station**	**Pax Load Entering Station**	**# Pax Boarding**	**# Pax Alighting**	**Pax Load Exiting Station**
Red Line at Kendall/MIT Station								
Inbound (SB)	9,313	445	1,639	8,118	3,814	2,298	221	5,892
Outbound (NB)	5,725	100	2,726	3,099	7,455	1,539	624	8,369
Green Line at Lechmere Station								
Inbound (EB)	0	688	0	688	0	728	0	728
Outbound (WB)	487	0	487	0	583	0	583	0
MBTA Bus								
Route 1 Inbound	307	10	12	305	213	51	6	258
Route 1 Outbound	250	5	68	188	270	11	8	274
Route 64 Inbound	33	0	33	0	7	0	5	2
Route 64 Outbound	0	13	0	13	0	48	0	48
Route 68 Inbound	5	0	5	0	4	0	4	0
Route 68 Outbound	0	2	0	2	0	10	0	10
Route 85 Inbound	68	0	68	0	6	0	6	0
Route 85 Outbound	0	3	0	3	0	39	0	39
Route CT2 Inbound	101	12	27	86	22	12	3	31
Route CT2 Outbound	38	3	17	25	66	18	15	69

c. Existing Transit System Utilization – STEP 3

By combining system capacity developed in Step 1 and system ridership from Step 2, we obtain system utilization rates.

Table 11.c.1 presents existing utilization levels in terms of V/C (Volume to capacity) ratios using MBTA data and Table 11.c.2 presents resulting utilization.

Table 11.c.1 Existing Transit Service Utilization (per MBTA Data)

Route and Direction	Capacity Policy	AM Peak Hour Ridership	PM Peak Hour Ridership	AM Peak Hour V/C	PM Peak Hour V/C
Red Line at Kendall/MIT Station					
Inbound (SB) Entering	11,463	9,313	3,814	0.81	0.33
Inbound (SB) Exiting	11,463	8,118	5,892	0.71	0.51
Outbound (NB) Entering	11,463	5,725	7,455	0.50	0.65
Outbound (NB) Exiting	11,463	3,099	8,369	0.27	0.73
Green Line at Lechmere Station					
Inbound (EB) Entering	1,679	0	0	0.00	0.00
Inbound (EB) Exiting	1,679	688	728	0.41	0.43
Outbound (WB) Entering	1,679	487	583	0.29	0.35
Outbound (WB) Exiting	1,679	0	0	0.00	0.00
Bus Routes					
Route 1 Inbound Entering	284	307	213	1.16	0.70
Route 1 Inbound Exiting	284	305	258	1.15	0.85
Route 1 Outbound Entering	265	250	270	0.94	1.02
Route 1 Outbound Exiting	265	188	274	0.71	1.03
Route 64 Inbound Entering	83	33	7	0.29	0.12
Route 64 Inbound Exiting	83	0	2	0.00	0.03
Route 64 Outbound Entering	83	0	0	0.00	0.00
Route 64 Outbound Exiting	83	13	48	0.16	0.58
Route 68 Inbound Entering	24	5	4	0.22	0.16
Route 68 Inbound Exiting	24	0	0	0.00	0.00
Route 68 Outbound Entering	24	0	0	0.00	0.00
Route 68 Outbound Exiting	24	2	10	0.09	0.41
Route 85 Inbound Entering	58	68	6	1.16	0.10
Route 85 Inbound Exiting	58	0	0	0.00	0.00
Route 85 Outbound Entering	58	0	0	0.00	0.00
Route 85 Outbound Exiting	58	3	39	0.05	0.68
Route CT2 Inbound Entering	62	101	22	1.36	0.45
Route CT2 Inbound Exiting	62	86	31	1.16	0.63
Route CT2 Outbound Entering	62	38	66	0.51	1.33
Route CT2 Outbound Exiting	62	25	69	0.33	1.38

d. Development of Transit Project Trips – STEP 4

As discussed previously in Section 4, the transit mode share for the Project is 36% for Office/R&D, 3% for Retail Patrons, 47% for Retail Employees, 29% for Residential, 22% for Hotel Patrons, and 41% for Hotel Employees.

The Project is expected to generate 656 new transit trips (545 entering, 111 exiting) during the AM Peak Hour and 686 new transit trips (151 entering, 535 exiting) during the PM Peak Hour as shown in Table 11.d.1.

Table 11.d.1 Project-Generate Transit Trips

	AM Peak Hour			PM Peak Hour		
Use	**In**	**Out**	**Total**	**In**	**Out**	**Total**
R&D	224	9	233	17	215	232
Office	354	8	362	51	346	397
Retail Patrons	2	0	2	0	2	2
Retail Employees	2	0	2	0	2	2
Residential	24	72	96	72	36	108
Hotel Patrons	8	2	10	8	11	19
Hotel Employees	12	3	15	12	16	28
Entertainment Space – Patron	0	0	0	16	0	16
Entertainment Space - Employee	0	0	0	9	0	9
Total	**626**	**94**	**720**	**185**	**628**	**813**

Project trip distribution was used to assign trips to transit routes. Distributions between the Red Line. Green Line, Bus, and EZ Ride were based on PTDM survey data for each land use. It is assumed that the distribution by transit mode for each land use is the same for the AM and PM Peak Hours. Trips were distributed directionally along each route based on existing travel patterns observed from MBTA data.

The EZ Ride transit analysis is discussed later in this section as it does not follow the same methodology as the MBTA Red and Green Lines and Bus analyses.

A detailed transit distribution by line and land use is presented in Table 11.d.2. Distribution is based on PTDM survey data and was coordinated with TP&T staff.

Table 11.d.2 Transit Distribution by Mode and Land Use

Use	**Red Line**	**Green Line**	**Bus**
R&D	73%	8%	19%
Office	66%	8%	26%
Retail/Hotel/Entertainment	72%	8%	20%
Residential	63%	8%	29%

Transit distribution is then applied to the Project generated trips presented previously in Table 11.d.1 in order to determine Project-generated transit trips by line or route, as presented in Tables 11.d.3 and 11.d.4 below.

Table 11.d.3 AM Peak Hour Project-Generated Trips by Line

Route and Direction	Trips OUT (Boardings)	Trips IN (Alightings)	Trips Total
Red Line			
Inbound	50	161	211
Outbound	11	267	278
Green Line			
Inbound	8	0	8
Outbound	0	50	50
Bus Routes			
Route 1 Inbound	5	8	13
Route 1 Outbound	3	45	48
Route 64 Inbound	0	21	21
Route 64 Outbound	7	0	7
Route 68 Inbound	0	3	3
Route 68 Outbound	1	0	1
Route 85 Inbound	0	43	43
Route 85 Outbound	1	0	1
Route CT2 Inbound	6	17	23
Route CT2 Outbound	2	11	13
Total	94	626	720

Table 11.d.4 PM Peak Hour Project-Generated Trips by Line

Route and Direction	Trips OUT (Boardings)	Trips IN (Alightings)	Trips Total
Red Line			
Inbound	258	31	289
Outbound	173	91	264
Green Line			
Inbound	50	0	50
Outbound	0	15	15
Bus Routes			
Route 1 Inbound	39	6	45
Route 1 Outbound	9	8	17
Route 64 Inbound	0	5	5
Route 64 Outbound	38	0	38
Route 68 Inbound	0	4	4
Route 68 Outbound	8	0	8
Route 85 Inbound	0	7	7
Route 85 Outbound	30	0	30
Route CT2 Inbound	9	3	12
Route CT2 Outbound	14	15	29
Total	628	185	813

e. Build Transit System Utilization – STEP 5

The Project-generated transit trips by line or route from detailed above were then added to existing route volumes to development the "Build Condition" utilization scenario, where Existing + Project trips are assumed to be on the transit lines. Resulting V/C ratios are presented in Table 11.e.1.

Table 11.e.1 2019 Build Condition Transit Service Utilization

Route and Direction	Policy Capacity	AM Peak Hour Ridership	PM Peak Hour Ridership	AM Peak Hour V/C	PM Peak Hour V/C
Red Line					
Inbound (SB) Entering Kendall	11,463	9,474	3,847	0.83	0.34
Inbound (SB) Exiting Kendall	11,463	8,168	6,149	0.71	0.54
Outbound (NB) Entering Kendall	11,463	5,993	7,547	0.52	0.66
Outbound (NB) Exiting Kendall	11,463	3,110	8,542	0.27	0.75
Green Line					
Inbound (EB) Entering Lechmere	1,679	0	0	0.00	0.00
Inbound (EB) Exiting Lechmere	1,679	696	778	0.41	0.46

Outbound (WB) Entering Lechmere	1,679	538	598	0.32	0.36
Outbound (WB) Exiting Lechmere	1,679	0	0	0.00	0.00
Bus Routes					
Route 1 Inbound Entering	284	315	219	1.19	0.72
Route 1 Inbound Exiting	284	310	297	1.17	0.98
Route 1 Outbound Entering	265	295	278	1.11	1.05
Route 1 Outbound Exiting	265	191	283	0.72	1.06
Route 64 Inbound Entering	83	54	12	0.48	0.21
Route 64 Inbound Exiting	83	0	2	0.00	0.03
Route 64 Outbound Entering	83	0	0	0.00	0.00
Route 64 Outbound Exiting	83	20	86	0.24	1.04
Route 68 Inbound Entering	24	8	8	0.34	0.32
Route 68 Inbound Exiting	24	0	0	0.00	0.00
Route 68 Outbound Entering	24	0	0	0.00	0.00
Route 68 Outbound Exiting	24	3	18	0.13	0.73
Route 85 Inbound Entering	58	111	13	1.90	0.22
Route 85 Inbound Exiting	58	0	0	0.00	0.00
Route 85 Outbound Entering	58	0	0	0.00	0.00
Route 85 Outbound Exiting	58	4	69	0.07	1.19
Route CT2 Inbound Entering	62	118	25	1.59	0.51
Route CT2 Inbound Exiting	62	92	40	1.24	0.81
Route CT2 Outbound Entering	62	49	81	0.66	1.64
Route CT2 Outbound Exiting	62	27	83	0.36	1.67

As presented in table 11.e.1, the Red Line, Green Line and most Bus Routes are expected to operate within MBTA policy capacity (with V/C ratios below 1.0) in the Build Condition, except for Route 1, Route 64, Route 85 and Route C2.

A V/C ratio over 1.0 does not necessarily translate to passengers not able to board a bus, instead the ratio indicates the number of passengers riding above the MBTA's policy levels of 50-51 passengers per bus. Note that the MBTA's crush capacity ranges between 72 and 104 passengers per bus, depending on bus model. This crush capacity definition (source MBTA Blue Book 14th edition) assumes a 1.5 square foot area per passenger.

f. Development of Future Transit Trips – STEP 6

To analyze the 2024 Future Condition for transit, the MBTA existing ridership was grown to year 2024 based on a 1.89% growth rate for the Red Line as presented in the Boston Metropolitan Planning Organization/Central Transportation Planning Staff (CTPS) study of the impact of planned large developments in the Boston metropolitan area. An estimated average annual growth rate of 0.68% was applied for buses based on system wide MBTA growth projections for local buses prepared by CTPS for the Boston Metropolitan Planning Organizations' Long-Range Transportation Plan.

The 2024 Future Ridership, which excludes the trips generated by the Project, is presented in Table 11.f.1.

Table 11.f.1 2024 Future Growth Transit Service Utilization (per MBTA Data)

Route and Direction	Policy Capacity	AM Peak Hour Ridership	PM Peak Hour Ridership	AM Peak Hour V/C	PM Peak Hour V/C
Red Line					
Inbound (SB) Entering Kendall	11,463	10,364	4,245	0.90	0.37
Inbound (SB) Exiting Kendall	11,463	9,035	6,557	0.79	0.57
Outbound (NB) Entering Kendall	11,463	6,371	8,296	0.56	0.72
Outbound (NB) Exiting Kendall	11,463	3,449	9,314	0.30	0.81
Bus Routes					
Route 1 Inbound Entering	284	311	216	1.17	0.71
Route 1 Inbound Exiting	284	309	261	1.16	0.86
Route 1 Outbound Entering	265	253	273	0.95	1.03
Route 1 Outbound Exiting	265	189	276	0.71	1.04
Route 64 Inbound Entering	83	33	7	0.30	0.13
Route 64 Inbound Exiting	83	0	2	0.00	0.04
Route 64 Outbound Entering	83	0	0	0.00	0.00
Route 64 Outbound Exiting	83	13	49	0.16	0.59
Route 68 Inbound Entering	24	5	4	0.20	0.16
Route 68 Inbound Exiting	24	0	0	0.00	0.00
Route 68 Outbound Entering	24	0	0	0.00	0.00
Route 68 Outbound Exiting	24	2	10	0.08	0.41
Route 85 Inbound Entering	58	68	6	1.17	0.10
Route 85 Inbound Exiting	58	0	0	0.00	0.00
Route 85 Outbound Entering	58	0	0	0.00	0.00
Route 85 Outbound Exiting	58	3	40	0.05	0.69
Route CT2 Inbound Entering	62	102	23	1.37	0.46
Route CT2 Inbound Exiting	62	87	32	1.17	0.65
Route CT2 Outbound Entering	62	39	67	0.52	1.35
Route CT2 Outbound Exiting	62	25	69	0.34	1.39

All future ridership numbers were developed with the assumption that the bus routes would remain at current (Winter 2020) capacity levels, and that no additional buses would be added to the fleet. Future Red Line improvements were not included in the future capacity assumptions.

g. Future Transit System Background Project Transit Trips (2024 Future Conditions) – STEP 7

In addition to growing the transit trips to 2024 Future Conditions, it is necessary to add transit trips from area projects that have not yet come on-line. The same projects listed in the traffic analysis. Table 11.g.1 and 11.g.2 below include a summary of total transit trips that

these developments will generate during the AM and PM Peak Hours as noted by their respective TISs. Please note that several of the projects are included as part of the percent background growth (as noted) since transit impacts were not noted in its project documents.

Table 11.g.1 AM Peak Hour Background Project-Generated Trips by Line

Route and Direction	Trips OUT (Boardings)	Trips IN (Alightings)	Trips Total
Red Line			
Inbound (SB)	176	294	470
Outbound (NB)	38	447	485
Bus Routes			
Route 1 Inbound	3	8	11
Route 1 Outbound	3	22	25
Route 64 Inbound	0	0	0
Route 64 Outbound	8	0	8
Route 68 Inbound	0	9	9
Route 68 Outbound	9	0	9
Route 85 Inbound	0	42	42
Route 85 Outbound	6	0	6
Route CT2 Inbound	13	21	34
Route CT2 Outbound	4	33	37

Table 11.g.2 PM Peak Hour Background Project-Generated Trips by Line

Route and Direction	Trips OUT (Boardings)	Trips IN (Alightings)	Trips Total
Red Line			
Inbound (SB)	315	236	550
Outbound (NB)	470	75	545
Bus Routes			
Route 1 Inbound	31	3	34
Route 1 Outbound	14	6	20
Route 64 Inbound	1	0	1
Route 64 Outbound	29	0	29
Route 68 Inbound	0	4	4
Route 68 Outbound	22	0	22
Route 85 Inbound	0	5	5
Route 85 Outbound	17	37	54
Route CT2 Inbound	24	4	28
Route CT2 Outbound	19	40	59

h. Future Transit System Utilization – STEP 8

The 2024 Future Condition transit scenario is based on grown ridership levels, combined with background project transit trips and Project-generated transit trips. The resulting transit ridership and calculated V/C ratios for AM and PM Peak Hours for the 2024 Future Condition is shown in table 11.h.1. In addition to analyzing the 2024 Future Condition based on existing Red Line capacity, future capacity as previously discussed is presented in Table 11.h.2.

Table 11.h.1 2024 Future Transit Service Utilization

Route and Direction	Capacity Policy	AM Peak Hour Ridership	PM Peak Hour Ridership	AM Peak Hour V/C	PM Peak Hour V/C
Red Line					
Inbound (SB) Entering Kendall	11,463	10,820	4,513	0.94	0.39
Inbound (SB) Exiting Kendall	11,463	9,261	7,129	0.81	0.62
Outbound (NB) Entering Kendall	11,463	7,086	8,464	0.62	0.74
Outbound (NB) Exiting Kendall	11,463	3,498	9,956	0.31	0.87
Bus Routes					
Route 1 Inbound Entering	284	521	286	1.96	0.94
Route 1 Inbound Exiting	284	314	300	1.18	0.99
Route 1 Outbound Entering	265	299	284	1.13	1.07
Route 1 Outbound Exiting	265	194	287	0.73	1.08
Route 64 Inbound Entering	83	62	15	0.56	0.27
Route 64 Inbound Exiting	83	3	33	0.03	0.59
Route 64 Outbound Entering	83	22	6	0.26	0.07
Route 64 Outbound Exiting	83	23	101	0.28	1.21
Route 68 Inbound Entering	24	8	8	0.33	0.33
Route 68 Inbound Exiting	24	0	1	0.00	0.04
Route 68 Outbound Entering	24	0	0	0.00	0.00
Route 68 Outbound Exiting	24	11	47	0.45	1.92
Route 85 Inbound Entering	58	120	17	2.06	0.29
Route 85 Inbound Exiting	58	0	0	0.00	0.00
Route 85 Outbound Entering	58	0	0	0.00	0.00
Route 85 Outbound Exiting	58	13	92	0.23	1.58
Route CT2 Inbound Entering	62	161	31	2.16	0.63
Route CT2 Inbound Exiting	62	93	41	1.25	0.83
Route CT2 Outbound Entering	62	50	119	0.67	2.40
Route CT2 Outbound Exiting	62	33	100	0.45	2.02

Table 11.h.2 2024 Future Transit Service Utilization Based on Future Red Line Peak Hour Capacity

Route and Direction	Capacity Policy	AM Peak Hour Ridership	PM Peak Hour Ridership	AM Peak Hour V/C	PM Peak Hour V/C
Red Line					
Inbound (SB) Entering Kendall	18,480	10,820	4,513	0.59	0.24
Inbound (SB) Exiting Kendall	18,480	9,261	7,129	0.50	0.39
Outbound (NB) Entering Kendall	18,480	7,086	8,464	0.38	0.46
Outbound (NB) Exiting Kendall	18,480	3,498	9,956	0.19	0.54

As noted previously, future ridership numbers were developed with the assumption that the bus routes would remain at current (Winter 2020) capacity levels, and that no additional buses would be added to the fleet. The Red Line 2024 Future Condition with the proposed increased capacity also operates within the MBTA policy capacity.

i. Private Transit Analysis

As requested in the TP&T Scoping Determination, a utilization of the private transit services has also been conducted to support this Project. The analysis used existing Charles River TMA EZRide shuttle monthly ridership data, as included in the Appendix to this report.

The current site area is served by the Charles River TMA EZRide shuttle with the closet stops at the intersection Binney Street and 6th Street and at Kendall Square, as illustrated in Figure 1.d.2. Inbound shuttles are destined to North Station in Boston, and outbound shuttles are destined to MIT in Cambridge. Table 11.i.1 shows the existing system peak hour capacity. The same peak hours used for the Red Line and MBTA Bus Route analysis were used for the EZRide analysis (7:45 AM to 8:45 AM and 5:00 PM to 6:00 PM).

Table 11.i.1 Charles River TMA EZRide Peak Hour Capacity (per Charles River TMA Data)

Direction	Frequency	OTP Factor*	# Passengers/ Vehicle	Resulting Capacity (# Passengers / Peak Hour)
Outbound toward Cambridge	8	0.69	53	293
Inbound toward North Station	7	0.74	53	275

* OTP Factor for the EZ Ride provided by the CRTMA for the month of February 2019

The Charles River TMA data from June 2019 was used to obtain daily ridership and the peak hour passenger loads for the EZ Ride shuttle. Boarding data was reviewed, and the resulting daily ridership and the corresponding shuttle service utilization is shown in Table 11.i.2.

Table 11.i.2 Existing EZRide Shuttle Service Utilization

Direction	Capacity Policy	AM Peak Hour Ridership	PM Peak Hour Ridership	AM Peak Hour V/C	PM Peak Hour V/C
Outbound toward Cambridge	293	388	-	1.32	-
Inbound toward North Station	275	-	185	-	0.67

Source: Charles River TMA Boarding Data

j. Stairway and Escalator Capacity Analysis

Stairways

As requested in the TP&T Scoping Determination, the width and capacity of the stairways at all headhouses of the Kendall/MIT Station were evaluated to assess passenger flows, following the New York City's 2014 City Environmental Quality Review (CEQR) Technical Manual for Transit Analysis.

This method examines the entering and exiting peak 15-minute pedestrian flows. The peak 15-minute ridership volume is obtained by taking 31.25 percent of the peak hour volume, as recommended by the NYC 2014 CEQR Manual. A friction factor of 0.90 may be applied if there is flow in both directions of the stairway. A surging factor may also be used during the analysis to account for concentrated passenger flows exiting the Red Line trains to the transit station elements. For this analysis, the friction factor was applied for both directions of passenger flow, but the surging factor was applied to the exiting passenger flows only, due to a regular flow of entering passengers.

Existing conditions were evaluated using current passenger inflow and outflow rates at all four headhouses. Passenger flow was developed from MBTA gate data from the same day as the vehicle TMCs (May 1, 2019).

The Main Street western headhouse inbound and outbound stairways are 7 feet wide wall-to-wall, therefore the effective stairway width was determined to be 6 feet (a reduction of 1 foot for shy distance with the sidewalls). The Main Street eastern headhouse inbound and outbound stairways are 8 feet wide wall-to-wall with a center railing, therefore the effective stairway with was determined to be 6.75 feet (one-foot shy distance from the sidewall, and three-inch buffer from the center railing).

Exit passenger count data from the MBTA is lower than actual passenger volumes, due to exit-only doors/turnstiles and multiple passengers being able to exit through wider gates. This has been accounted for by increasing the exit volume proportionally using a comparative analysis of field observations and gate count data completed on another day.

This methodology was used to analyze the 2019 Existing Conditions, 2019 Build Conditions, and 2024 Future Conditions using the same volumes as used in the Red Line analysis previously described. The results of NYC stairway capacity analysis for the AM and PM Peak Hours for all conditions (2019 Existing, 2019 Build, and 2024 Future) are presented below in Table 11.f.1. Based on the results of the above presented staircase analysis, we can conclude that there is sufficient stairway capacity for the noted conditions.

Table 11.j.1 Kendall Station Stairway Analysis

Headhouse Location	Existing				Build				Future			
	Peak 15-Min Pax Entering	Peak 15-Min Pax Exiting	V/C	LOS	Peak 15-Min Pax Entering	Peak 15-Min Pax Exiting	V/C	LOS	Peak 15-Min Pax Entering	Peak 15-Min Pax Exiting	V/C	LOS
AM Peak Hour												
Western Outbound	26	560	0.81	C	26	569	0.82	C	26	595	0.85	C
Western Inbound	11	159	0.23	A	11	160	0.26	A	13	165	0.27	A
Eastern Outbound	100	375	0.63	B	101	381	0.63	B	103	398	0.66	B
Western Outbound	26	560	0.81	C	47	203	0.33	A	52	209	0.34	A
PM Peak Hour												
Western Outbound	338	125	0.61	B	341	128	0.62	B	354	133	0.64	B
Western Inbound	287	78	0.47	B	291	79	0.48	B	300	84	0.50	B
Eastern Outbound	498	45	0.61	B	503	46	0.62	B	521	48	0.64	B
Western Outbound	338	125	0.61	B	235	38	0.31	A	242	41	0.32	A

Escalators

Escalators are present at the two western headhouses at Kendall/MIT Station. An escalator analysis using the NYC CEQR methodology was conducted to assess passenger flow capacity. The tread speed for the escalators at Kendall/MIT Station is unknown, and therefore a slower speed is used to be conservative. For this analysis, the surging factor of 0.80 was applied for passengers exiting the platform, resulting in an escalator capacity of 756 passengers per 15-minutes. The exact number of passengers using the escalators to exit the western Kendall/MIT Station headhouses cannot be determined using the MBTA gate data. However, the number of passengers using the escalators was estimated using the same field observations used to determine the number of exits not captured by the gates.

The results of NYC escalator capacity analysis for the AM and PM Peak Hours for all conditions (2019 Existing, 2019 Build, and 2024 Future) are presented below in Table 11.j.2. Based on this escalator analysis, there is availability in the escalator capacity for all conditions.

Table 11.j.2 Kendall Station Escalator Analysis

	2019 Existing		2019 Build		2024 Future	
Headhouse Location	**V/C**	**LOS**	**V/C**	**LOS**	**V/C**	**LOS**
AM Peak Hour						
Western Outbound	0.46	B	0.46	B	0.48	B
Western Inbound	0.09	A	0.09	A	0.09	A
PM Peak Hour						
Western Outbound	0.12	A	0.12	A	0.13	A
Western Inbound	0.05	A	0.05	A	0.06	A

k. Future Transit Service Improvements

MBTA Red Line Transformation Program

The MBTA's Capital Investment Program (CIP) has rolled out a five (5) year plan which includes an investment of $8 billion over 400 unique capital projects in order to upgrade the MBTA system to a state of good repair. Part of the CIP includes re-building key Red Line infrastructure to improve operations and reliability, including signal upgrades, a new test track and vehicle testing facility, and an upgraded yard and maintenance facility. These improvements will result in more frequent, more reliable, and more comfortable trips on the Red Line with added passenger capacity, as well as less crowding on platforms and stations.[9] The MBTA is working towards reducing the headways on the Red Line from 4.5 minutes to 3 minutes.

The preliminary design for the signal upgrades has been completed, with the intermediate system design currently ongoing and expected to be completed in 2020, with project completion expected in January 2022. In addition to new signals, the Red Line fleet will be completely replaced with 252 modern, more efficient, more spacious vehicles by year 2023. The first fleet of Red Line pilot cars has been delivered to Cabot Yard in Fall 2019 for testing and assembly work has begun in the Springfield Factory.

MBTA Better Bus Project

The Better Bus Project, which is also a part of the CIP, is intended to rethink how the MBTA delivers bus service in response to the evolving needs of the Greater Boston area and aligns the MBTA's service with the expectations of today's riders.[10] The project aims to conduct a comprehensive network redesign of the MBTA bus system by taking into account the shift in population and employment demand.

[9] Massachusetts Bay Transportation Authority. "Red Line Transformation Program." MBTA, www.mbta.com/projects/red-line-transformation-program

[10] Massachusetts Bay Transportation Authority. "State of the Bus System 2018" MBTA, cdn.mbta.com/sites/default/files/projects/betterbus/documents/mbta-better-bus-project-state-of-the-bus-system-2018-v2.pdf

Near term changes that have been implemented in September 2019 and December 2019 on 36 bus routes, two of which are in the vicinity of the Project site, included the following changes:

- Routes 1 and CT1 combined into a single route for more frequent, reliable service
- Route 64 provides faster service between Kendall Square and Allston/Brighton by running all day on weekdays between Central Square and Kendall Square (previously this connection was only provided during peak hours).

Planning efforts are underway for longer term changes. After investigating the bus system as a whole, the MBTA will recommend a new network that better serves the needs of the region. Recommendations are expected in 2021.

Other changes associated with the Better Bus Service Project include:

- Bus transit priority (including the South Massachusetts Avenue Corridor Safety Improvements Project)
- Mobile dispatching for bus officials
- Bus stop accessibility improvements
- Bus facility modernization
- Bus stop e-ink signs (currently a pilot program)

MBTA AFC 2.0 (Automated Fare Collection)

The MBTA is transforming the fare payment process across all modes on the MBTA. The new fare collection system will allow passengers to pay with a Charlie Card, smartphones, and, contactless credit and debit cards. Digital fare readers will be provided at all vehicle doors for faster boarding, which may speed up boarding by up to 10% according to the MBTA. Currently, the MBTA is in the process of addressing customer concerns about the existing system and begin upgrades to improve reliability of existing subway gates. It is expected that all-door boarding will be available in 2023 with expansion to the Commuter Rail expected in 2024.

Kendall Square Red Line Headhouse Improvements

To compliment MIT's SoMa project, MIT will be constructing a completely new and modern MBTA Red Line headhouse on the south side of Main Street that will reflect the uniqueness of Kendall Square and Cambridge. The updated headhouse is expected to maintain the same functionality for the MBTA Red Line but will open access to the proposed SoMa open space and the MIT campus from Main Street. A modern design has the opportunity to provide a new aesthetic to Red Line service in Kendall but also provide the opportunity to upgrade MBTA access and egress to current standards and code.

Additionally, as part of the KSURP Infill Development, Boston Properties committed to providing up to $400,000 in improvements to the MBTA Red Line outbound headhouse on the north side of Main Street.

Both projects are on-going.

Grand Junction Multi-Use Path

The Grand Junction Multi-Use Path is a proposed pedestrian/bicycle path that is planned to be built adjacent to the railroad tracks in the Grand Junction corridor, from the Boston University Bridge, through MIT and towards the Twin City Plaza. The path is currently in design with 25% design documents expected to be released later in 2020 and construction commencing in the Fall of 2021.

As part of MIT's Commitment Letter to the City related to Kendall Square PUD-5 rezoning in 2013, MIT has agreed to provide $500,000 in construction funds to the CRA for the construction of the Grand Junction between Binney Street and Main Street. Construction of this section of the path was completed in 2016. Additionally, as part of MIT's Commitment Letter to the City related to the Volpe re-zoning in 2017, MIT committed $8.5 million and the land for the multi-use path on the MIT-owned portion of the right-of-way.

12. Pedestrian Analysis

a. Pedestrian Level of Service Analysis

Pedestrian crossing volumes at study area intersections are presented in Figures 2.c.3 and 2.c.4. The results of pedestrian level of service (PLOS) analysis at intersection crosswalks are presented in Table 12.a.1 for signalized intersections and Table 12.a.2 for unsignalized intersections, as well as graphically illustrated in Figures 12.a.1 and 12.a.2.

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

For unsignalized intersections, the PLOS is calculated using the crosswalk length and the conflicting vehicle flow rates for AM and PM Peak Hours.

Two intersections show slight changes in PLOS with the addition of Project trips in the Build-Mitigated Condition. The south crosswalk at the intersection of Third Street at Munroe Street and Linskey Way changes from PLOS E to F in the PM Peak Hour. The north crosswalk at the intersection of Third Street at Spring Street changes from PLOS D to E during the AM Peak Hour of the Build-Mitigated Condition. The increase in vehicles travelling north and south along Third Street conflict with the pedestrian movements as the vehicles pass through the north and south crosswalks at these unsignalized intersections.

Multiple intersections experience a change in PLOS from the Build-Mitigated Condition to the 2024 Future-Mitigated Condition. The north crosswalk at the intersection of Third Street at Spring Street changes from a PLOS E to F in the AM Peak Hour. The south crosswalk at this intersection changes from PLOS D to E in the AM Peak Hour. The north crosswalk at the intersection of Main Street at the Longfellow Bridge changes from PLOS D to F in the AM Peak Hour. The north crosswalk at the intersection of Third Street at Kendall Street and Potter Street changes from PLOS C to D in the PM Peak Hour. The crosswalks at the Main Street and Kendall Station Crosswalk change from LOS C to F during the AM Peak Hour and from LOS D to E during the PM Peak Hour.

All other intersections show no change in PLOS with the addition of Project trips, background growth or background project trips. It should be noted that the PLOS for unsignalized intersections does not account for the Massachusetts State Law which required vehicles to yield to pedestrians at unsignalized intersections.

Figures 12.a.1 and 12.a.2 show the PLOS for the various conditions for the AM and PM Peak Hours.

Table 12.a.1 Signalized Intersection – Pedestrian LOS Summary

		AM Peak Hour						PM Peak Hour					
	Crosswalk	2019 Existing	2019 Baseline	2019 Build	2019 Build Mitigated	2024 Future	2024 Future Mitigated	2019 Existing	2019 Baseline	2019 Build	2019 Build Mitigated	2024 Future	2024 Future Mitigated
O'Brien Highway at Third St	East	D	D	D	D	D	D	D	D	D	D	D	D
	South	D	D	D	D	D	D	D	D	D	D	D	D
O'Brien Highway at Cambridge St	North	D	D	D	D	D	D	D	D	D	D	D	D
	East	D	D	D	D	D	D	D	D	D	D	D	D
	West	D	D	D	D	D	D	D	D	D	D	D	D
O'Brien Highway at Land Blvd	West	E	E	E	E	E	E	E	E	E	E	E	E
	North	E	E	E	E	E	E	E	E	E	E	E	E
	South	E	E	E	E	E	E	E	E	E	E	E	E
Cambridge St at Third St	East	B	B	B	B	B	B	B	B	B	B	B	B
	West	B	B	B	B	B	B	B	B	B	B	B	B
	North	B	B	B	B	B	B	B	B	B	B	B	B
	South	B	B	B	B	B	B	B	B	B	B	B	B
Cambridge St at First St	East	C	C	C	C	C	C	C	C	C	C	C	C
	West	C	C	C	C	C	C	C	C	C	C	C	C
	South	C	C	C	C	C	C	C	C	C	C	C	C
First St at Thorndike St	West	C	C	C	C	C	C	C	C	C	C	C	C
	North	C	C	C	C	C	C	C	C	C	C	C	C
	South	C	C	C	C	C	C	C	C	C	C	C	C
First St at Charles St	East	C	C	C	C	C	C	C	C	C	C	C	C
	West	C	C	C	C	C	C	C	C	C	C	C	C
	North	C	C	C	C	C	C	C	C	C	C	C	C
	South	C	C	C	C	C	C	C	C	C	C	C	C

		AM Peak Hour						PM Peak Hour					
	Crosswalk	2019 Existing	2019 Baseline	2019 Build	2019 Build Mitigated	2024 Future	2024 Future Mitigated	2019 Existing	2019 Baseline	2019 Build	2019 Build Mitigated	2024 Future	2024 Future Mitigated
Third St at Charles St	East	C	C	C	C	C	C	C	C	C	C	C	C
	West	C	C	C	C	C	C	C	C	C	C	C	C
	North	C	C	C	C	C	C	C	C	C	C	C	C
	South	C	C	C	C	C	C	C	C	C	C	C	C
Binney St/Galileo Galilei Way at Fulkerson St	East	D	D	D	D	D	D	D	D	D	D	D	D
	Northwest	D	D	D	D	D	D	D	D	D	D	D	D
	West	E	D	D	D	D	D	D	D	D	D	D	D
	North	C	D	D	D	D	D	B	D	D	D	D	D
Binney St at Third St	East	D	D	D	D	D	D	D	D	D	D	D	D
	West	D	D	D	D	D	D	D	D	D	D	D	D
	North	D	D	D	D	D	D	D	D	D	D	D	D
	South	D	D	D	D	D	D	D	D	D	D	D	D
Binney St at Second St	East	D	D	D	D	D	D	D	D	D	D	D	D
	West	D	D	D	D	D	D	D	D	D	D	D	D
	North	D	D	D	D	D	D	D	D	D	D	D	D
	South	D	D	D	D	D	D	D	D	D	D	D	D
Binney St at First St	East	E	E	E	E	E	E	E	E	E	E	E	E
	West	E	E	E	E	E	E	E	E	E	E	E	E
	North	E	E	E	E	E	E	E	E	E	E	E	E
	South	E	E	E	E	E	E	E	E	E	E	E	E
Binney St at Land Blvd	West	E	E	E	E	E	E	E	E	E	E	E	E
	North	E	E	E	E	E	E	E	E	E	E	E	E
	South	E	E	E	E	E	E	E	E	E	E	E	E

		AM Peak Hour						PM Peak Hour					
	Crosswalk	2019 Existing	2019 Baseline	2019 Build	2019 Build Mitigated	2024 Future	2024 Future Mitigated	2019 Existing	2019 Baseline	2019 Build	2019 Build Mitigated	2024 Future	2024 Future Mitigated
Hampshire St at Portland St/Cardinal Medeiros Ave	East	C	C	C	C	C	C	C	C	C	C	C	C
	West	C	C	C	C	C	C	C	C	C	C	C	C
	North	B	B	B	B	B	B	B	B	B	B	B	B
	South	B	B	B	B	B	B	B	B	B	B	B	B
Broadway at Portland St	East	C	C	C	C	C	C	C	C	C	C	C	C
	West	C	C	C	C	C	C	C	C	C	C	C	C
	North	B	B	B	B	B	B	B	B	B	B	B	B
	South	B	B	B	B	B	B	B	B	B	B	B	B
Broadway at Hampshire St	East	D	D	D	D	D	D	D	D	D	D	D	D
	West	D	D	D	D	D	D	D	D	D	D	D	D
	North	C	C	C	C	C	C	D	D	D	D	D	D
	South	C	C	C	C	C	C	D	D	D	D	D	D
Broadway at Galileo Galilei Way	East	-	D	D	D	D	D	-	D	D	D	D	D
	West	E	D	D	D	D	D	D	D	D	D	D	D
	North	E	D	D	D	D	D	E	D	D	D	D	D
	South	-	D	D	D	D	D	-	D	D	D	D	D
Broadway at Ames St	East	D	D	D	D	D	D	D	D	D	D	D	D
	West	D	D	D	D	D	D	D	D	D	D	D	D
	South	D	D	D	D	D	D	D	D	D	D	D	D
Broadway at Main St and Third St	East	D	D	D	D	D	D	D	D	D	D	D	D
	West	D	D	D	D	D	D	D	D	D	D	D	D
	North	D	D	D	D	D	D	D	D	D	D	D	D
	South	D	D	D	D	D	D	D	D	D	D	D	D

		AM Peak Hour						PM Peak Hour					
	Crosswalk	2019 Existing	2019 Baseline	2019 Build	2019 Build Mitigated	2024 Future	2024 Future Mitigated	2019 Existing	2019 Baseline	2019 Build	2019 Build Mitigated	2024 Future	2024 Future Mitigated
Third St at Potter St/Kendall St	East	-	-	-	D	-	D	-	-	-	D	-	D
	West	-	-	-	D	-	D	-	-	-	D	-	D
	North	-	-	-	D	-	D	-	-	-	D	-	D
	South	-	-	-	D	-	D	-	-	-	D	-	D
Galileo Galilei Way at Main St	East	C	D	D	D	D	D	C	D	D	D	D	D
	West	C	D	D	D	D	D	C	D	D	D	D	D
	North	C	D	D	D	D	D	C	D	D	D	D	D
	South	C	D	D	D	D	D	C	D	D	D	D	D
Main St at Ames St	East	C	C	C	C	C	C	C	C	C	C	C	C
	West	C	C	C	C	C	C	C	C	C	C	C	C
	North	D	D	D	D	D	D	D	D	D	D	D	D
	South	D	D	D	D	D	D	D	D	D	D	D	D
Memorial Dr at Ames St	East	-	D	D	D	D	D	-	D	D	D	D	D
	West	-	D	D	D	D	D	-	D	D	D	D	D
	North	-	D	D	D	D	D	-	D	D	D	D	D
Memorial Dr at Wadsworth St	East	D	D	D	D	D	D	D	D	D	D	D	D
	North	D	D	D	D	D	D	D	D	D	D	D	D
Memorial Dr at Western Ave	East	E	E	E	E	E	E	E	E	E	E	E	E
	West	E	E	E	E	E	E	E	E	E	E	E	E
	North	E	E	E	E	E	E	E	E	E	E	E	E
Memorial Dr at Cambridge St/River St	East	E	E	E	E	E	E	E	E	E	E	E	E
	West	E	E	E	E	E	E	E	E	E	E	E	E
	North	E	E	E	E	E	E	E	E	E	E	E	E
	South	E	E	E	E	E	E	E	E	E	E	E	E

Table 12.a.2 Unsignalized Intersection – Pedestrian LOS Summary

		AM Peak Hour						PM Peak Hour					
Intersection	Crosswalk	2019 Existing	Baseline	2019 Build	2019 Build Mitigated	2024 Future	2024 Future Mitigated	2019 Existing	Baseline	2019 Build	2019 Build Mitigated	2024 Future	2024 Future Mitigated
Third St at Spring St	North	D	D	E	E	F	F	C	C	C	C	E	E
	East	A	A	A	A	A	A	A	A	A	A	A	A
	South	C	C	D	D	E	E	C	B	C	C	D	D
	West	A	A	A	A	A	A	A	A	A	A	A	A
Binney St at 5th Street	North	A	A	A	A	A	A	A	A	A	A	A	A
	East	F	F	F	F	F	F	F	F	F	F	F	F
	West	F	F	F	F	F	F	F	F	F	F	F	F
Broadway at Green Garage	East	F	F	F	F	F	F	F	F	F	F	F	F
	South	B	B	B	B	C	C	C	C	C	C	C	C
	West	F	F	F	F	F	F	F	F	F	F	F	F
Third St at Kendall St/Potter St	North	E	E	F	-	F	-	F	F	F	-	F	-
	East	A	A	A	-	A	-	A	A	A	-	A	-
	South	F	F	F	-	F	-	F	F	F	-	F	-
	West	A	A	D	-	D	-	A	A	D	-	D	-
Third St at Munroe St/Linskey Way	North	F	F	F	F	F	F	F	F	F	F	F	F
	East	A	A	A	A	A	A	A	A	A	A	A	A
	South	E	E	F	E	F	F	E	E	F	F	F	F
	West	A	A	A	B	A	B	A	A	A	B	A	B
Main St at Albany St	East	F	F	F	F	F	F	F	F	F	F	F	F
	South	A	C	C	C	C	C	A	B	B	B	B	B
	West	F	F	F	F	F	F	F	F	F	F	F	F
Main St at Kendall Station	East	C	C	C	C	F	F	D	D	E	D	E	E
	West	C	C	C	C	F	F	D	D	E	D	E	E
Main St at Longfellow Bridge	North	D	D	D	D	F	F	C	C	C	C	C	C
	South	B	B	B	B	B	B	D	D	D	D	D	D
	Southwest	A	A	A	A	A	A	A	A	A	A	A	A

Memorial Dr at Ames St	North	C	-	-	-	-	-	E	-	-	-	-	-
	East	F	-	-	-	-	-	F	-	-	-	-	-
	West	F	-	-	-	-	-	F	-	-	-	-	-

b. Pedestrian Access

The Project will build out a robust pedestrian circulation network with generous sidewalks and walkways along internal roadways and will connect to the existing pedestrian realm along Binney Street, Third Street, Broadway and Loughrey Walkway.

Connections between the site and neighborhood to the north of Binney Street will be provided via crosswalks at 5th Street, Third Street and 6th Street. Points east will be accessed by several crossing opportunities along Third Street. Pedestrians walking between the site and Kendall Square MBTA Red Line Station will have three connections available to them, including crosswalks at intersection of Broadway at Third Street, crosswalks at intersection of Broadway at Ames Street and mid-block crossing at the future 5th Street/Broadway intersection (utilizing the pedestrian easement connecting through the Marriott Hotel lobby, to gain access to Main Street).

Pedestrian circulation and proposed routing is illustrated in Figure 12.b.1

13. Bicycle Analysis

a. Conflicting Movements

Conflicting bicycle turning movements at the study area intersections are presented in Figures 2.d.5 and 2.d.6 and are summarized in Table 13.a.1 for analysis scenarios.

Table 13.a.1 Conflicting Bicycle/Vehicle Movements at Study Area Intersections

				Conflicting Vehicle Movements											
			Existing Peak Hour	Existing 2019		Baseline		Build 2019		Build Mitigated 2019		Future		Future Mitigated 2024	
Intersection	Time Period	Bicycle Direction	Bicycle Volume	Right Turn[a]	Left Turn[b]	Right Turn[a]	Left Turn[b]	Right Turn[a]	Left Turn[b]	Right Turn[a]	Left Turn[b]	Right Turn[a]	Left Turn[b]	Right Turn[a]	Left Turn[b]
O'Brien Highway at Third Street	Morning	EB	4	537	48	537	0	626	0	626	0	745	0	745	0
	Evening	EB	1	289	51	289	0	311	0	311	0	356	0	356	0
O'Brien Highway at Cambridge Street/East Street	Morning	SB	18	36	35	18	0	18	0	18	0	18	0	18	0
		WB	2	4	50	0	0	0	0	0	0	0	0	0	0
		NB	33	301	28	301	14	306	14	306	14	344	14	344	14
		EB	7	105	406	0	486	0	525	0	525	0	606	0	606
	Evening	SB	54	70	162	35	0	35	0	35	0	36	2	36	2
		WB	24	14	119	0	0	0	0	0	0	0	0	0	0
		NB	18	567	15	567	8	606	8	606	8	732	8	732	8
		EB	4	41	200	0	265	0	276	0	276	0	304	0	304
O'Brien Highway at Land Boulevard	Morning	SB	22	205	84	205	84	225	84	225	84	345	188	345	188
		WB	8	338	193	338	193	338	196	338	196	341	253	341	253
		NB	1	214	247	214	247	217	247	217	247	237	253	237	253
		EB	56	434	475	434	475	434	495	434	495	473	550	473	550
	Evening	SB	3	167	156	167	156	173	156	173	156	231	213	231	213
		WB	41	355	487	355	487	355	507	355	507	359	658	359	658
		NB	11	243	118	243	118	263	118	263	118	321	121	321	121
		EB	14	191	243	191	243	191	249	191	249	264	280	264	280
Cambridge Street at Third Street	Morning	SB	1	83	27	83	27	83	27	83	27	90	31	90	31
		WB	10	43	50	53	50	53	50	53	50	58	52	58	52
		NB	0	26	53	26	53	26	53	26	53	29	63	29	63
		EB	95	35	19	35	57	35	57	35	57	49	66	49	66
	Evening	SB	3	66	5	66	5	66	5	66	5	69	9	69	9
		WB	122	210	85	120	85	120	85	120	85	137	90	137	90

				Conflicting Vehicle Movements											
			Existing Peak Hour	Existing 2019		Baseline		Build 2019		Build Mitigated 2019		Future		Future Mitigated 2024	
Intersection	Time Period	Bicycle Direction	Bicycle Volume	Right Turn[a]	Left Turn[b]	Right Turn[a]	Left Turn[b]	Right Turn[a]	Left Turn[b]	Right Turn[a]	Left Turn[b]	Right Turn[a]	Left Turn[b]	Right Turn[a]	Left Turn[b]
		NB	6	5	11	5	11	5	11	5	11	11	14	11	14
		EB	18	15	9	15	50	15	50	15	50	25	58	25	58
Cambridge Street at First Street	Morning	WB	19	n/a	127	n/a	41	n/a	41	n/a	41	n/a	161.416	n/a	161.416
		EB	73	28	242	28	254	28	293	28	293	47	363	47	363
	Evening	WB	81	n/a	0	n/a	227	n/a	227	n/a	227	n/a	291	n/a	291
		EB	1	14	111	14	120	14	131	14	131	19	148	19	148
First Street at Thorndike Street	Morning	SB	15	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Evening	SB	10	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
First Street at Charles Street	Morning	SB	16	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		WB	0	68	18	68	18	68	18	68	18	111	45	111	45
		NB	4	14	24	14	24	14	24	14	24	14	25	14	25
		EB	1	26	31	26	31	26	31	26	31	44	33	44	33
	Evening	SB	11	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		WB	2	174	37	174	37	174	37	174	37	204	51	204	51
		NB	1	75	33	75	33	75	33	75	33	77	34	77	34
		EB	6	20	77	20	77	20	77	20	77	46	86	46	86
Third Street at Spring Street	Morning	SB	12	25	12	25	12	25	12	25	12	26	12	26	12
		WB	1	31	17	31	17	31	17	31	17	31	17	31	17
		NB	1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		EB	0	47	12	47	12	47	12	47	12	47	12	47	12
	Evening	SB	2	7	16	7	16	7	16	7	16	7	16	7	16
		WB	2	42	3	42	3	42	3	42	3	42	3	42	3
		NB	7	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		EB	2	10	10	10	10	10	10	10	10	10	12	10	12
	Morning	SB	14	31	8	31	8	31	8	31	8	35	8	35	8

Intersection	Time Period	Bicycle Direction	Existing Peak Hour Bicycle Volume	Conflicting Vehicle Movements											
				Existing 2019		Baseline		Build 2019		Build Mitigated 2019		Future		Future Mitigated 2024	
				Right Turn[a]	Left Turn[b]	Right Turn[a]	Left Turn[b]	Right Turn[a]	Left Turn[b]	Right Turn[a]	Left Turn[b]	Right Turn[a]	Left Turn[b]	Right Turn[a]	Left Turn[b]
Third Street at Charles Street	Evening	WB	0	12	16	12	16	12	16	12	16	12	25	12	25
		NB	1	31	41	31	41	31	41	31	41	36	47	36	47
		EB	3	24	7	24	7	24	7	24	7	24	7	24	7
		SB	4	6	92	6	92	6	92	6	92	11	94	11	94
		WB	4	10	16	10	16	10	16	10	16	10	20	10	20
		NB	10	74	18	74	18	74	18	74	18	80	26	80	26
		EB	4	16	6	16	6	16	6	16	6	16	6	16	6
Galileo Galilei Way at Binney Street/Fulkerson Street	Morning	SB	8	19	93	19	103	19	103	19	103	34	108	34	108
		WB	20	129	103	129	n/a	129	n/a	129	n/a	158	n/a	158	n/a
		SEB	15	29	360	29	n/a	29	n/a	29	n/a	39	n/a	39	n/a
	Evening	SB	9	13	25	13	25	13	25	13	25	16	36	16	36
		WB	40	72	240	72	n/a	72	n/a	72	n/a	84	n/a	84	n/a
		SEB	4	154	266	154	n/a	154	n/a	154	n/a	193	n/a	193	n/a
Binney Street at 5th Street	Morning	SB	1	51	n/a	71	n/a	71	n/a	71	n/a	72	n/a	72	n/a
		WB	18	71	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Evening	SB	0	36	n/a	110	n/a	110	n/a	110	n/a	111	n/a	111	n/a
		WB	43	110	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Binney Street at Third Street	Morning	SB	11	94	69	94	69	138	76	138	76	155	92	155	92
		WB	21	20	57	20	57	20	62	20	62	21	84	21	84
		NB	7	119	19	119	34	128	34	128	34	167	36	167	36
		EB	11	70	149	70	149	66	208	66	208	81	276	81	276
	Evening	SB	6	35	86	35	86	45	129	45	129	59	134	59	134
		WB	43	40	263	40	213	40	260	40	260	43	327	43	327
		NB	20	78	13	128	29	184	29	184	29	238	31	238	31
		EB	2	102	57	57	102	75	117	75	117	122	153	122	153
	Morning	SB	4	40	34	40	34	40	34	40	34	44	35	44	35

				Conflicting Vehicle Movements											
			Existing Peak Hour	Existing 2019		Baseline		Build 2019		Build Mitigated 2019		Future		Future Mitigated 2024	
Intersection	Time Period	Bicycle Direction	Bicycle Volume	Right Turn[a]	Left Turn[b]	Right Turn[a]	Left Turn[b]	Right Turn[a]	Left Turn[b]	Right Turn[a]	Left Turn[b]	Right Turn[a]	Left Turn[b]	Right Turn[a]	Left Turn[b]
Binney Street at Second Street	Evening	WB	22	44	33	44	33	44	33	44	33	51	47	51	47
		NB	4	19	21	19	21	19	21	19	21	19	23	19	23
		EB	33	67	43	67	43	67	43	67	43	68	43	68	43
		SB	1	39	49	39	49	39	49	39	49	52	50	52	50
		WB	13	126	101	126	101	126	101	126	101	129	113	129	113
		NB	7	38	37	38	37	38	37	38	37	39	43	39	43
		EB	28	21	8	21	8	21	8	21	8	21	8	21	8
Binney Street at First Street	Morning	SB	7	52	7	52	7	91	7	91	7	220	7	220	7
		WB	12	167	39	167	39	167	44	167	44	220	169	220	169
		NB	3	2	11	2	11	2	11	2	11	2	11	2	11
		EB	4	59	352	59	352	59	352	59	352	61	356	61	356
	Evening	SB	6	55	2	55	2	66	2	66	2	276	2	276	2
		WB	5	181	107	181	207	181	246	181	246	216	342	216	342
		NB	15	8	5	8	5	8	5	8	5	8	5	8	5
		EB	28	90	34	90	34	90	34	90	34	96	34	96	34
Binney Street at Land Boulevard	Morning	SB	15	383	683	383	683	462	683	462	683	520	757	520	757
	Evening	SB	3	126	421	126	421	150	421	150	421	186	463	186	463
Hampshire Street at Cardinal Medeiros Avenue/Portland Street	Morning	SB	28	18	54	18	54	18	54	18	54	20	55	20	55
		WB	0	34	34	34	34	34	34	34	34	51	42	51	42
		NB	5	9	33	9	33	9	33	9	33	9	34	9	34
		EB	215	111	9	111	9	111	9	111	9	112	9	112	9
	Evening	SB	11	20	121	20	121	20	121	20	121	35	124	35	124
		WB	274	123	27	123	27	123	27	123	27	127	28	127	28
		NB	25	0	16	0	16	0	16	0	16	0	16	0	16
		EB	15	58	9	58	9	58	9	58	9	59	9	59	9
	Morning	SB	38	42	34	42	34	42	34	42	34	45	35	45	35

Intersection	Time Period	Bicycle Direction	Existing Peak Hour Bicycle Volume	Conflicting Vehicle Movements											
				Existing 2019		Baseline		Build 2019		Build Mitigated 2019		Future		Future Mitigated 2024	
				Right Turn[a]	Left Turn[b]	Right Turn[a]	Left Turn[b]	Right Turn[a]	Left Turn[b]	Right Turn[a]	Left Turn[b]	Right Turn[a]	Left Turn[b]	Right Turn[a]	Left Turn[b]
Broadway at Portland Street	Evening	WB	11	19	95	19	95	19	95	19	95	19	108	19	108
		NB	11	38	48	38	48	38	48	38	48	39	49	39	49
		EB	91	44	20	44	20	44	20	44	20	44	20	44	20
		SB	21	26	68	26	68	26	68	26	68	38	70	38	70
		WB	111	41	82	41	82	41	82	41	82	41	85	41	85
		NB	41	33	12	33	12	33	12	33	12	34	12	34	12
		EB	18	36	21	36	21	36	21	36	21	36	21	36	21
Broadway at Hampshire Street	Morning	SB	17	10	20	10	20	10	20	10	20	10	21	10	21
		WB	14	107	0	107	0	110	0	110	0	147	0	147	0
		NB	4	18	191	18	191	18	204	18	204	18	250	18	250
		EB	95	111	95	111	95	111	95	111	95	112	96	112	96
	Evening	SB	5	8	99	8	99	8	99	8	99	8	101	8	101
		WB	139	227	4	227	4	247	4	247	4	301	4	301	4
		NB	20	97	110	97	110	97	114	97	114	99	136	99	136
		EB	20	8	7	8	7	8	7	8	7	8	7	8	7
Broadway at Galileo Galilei Way	Morning	SB	8	203	38	203	38	207	38	207	38	250	39	250	39
		WB	19	45	172	45	172	55	197	55	197	59	266	59	266
		NB	10	59	39	59	39	113	39	113	39	116	46	116	46
		EB	188	32	41	32	41	32	55	32	55	62	91	62	91
	Evening	SB	22	184	73	184	73	226	73	226	73	341	78	341	78
		WB	287	31	108	31	108	33	112	33	112	58	154	58	154
		NB	43	86	34	86	34	109	34	109	34	113	54	113	54
		EB	30	19	83	19	83	19	143	19	143	27	209	27	209
Broadway at Ames Street	Morning	NB	120	120	n/a	120	n/a	238	n/a	238	n/a	292	n/a	292	n/a
		EB	69	69	170	69	170	69	189	69	186	101	287	101	284
	Evening	NB	21	174	n/a	174	n/a	208	n/a	208	n/a	305	n/a	305	n/a

				Conflicting Vehicle Movements											
			Existing Peak Hour	Existing 2019		Baseline		Build 2019		Build Mitigated 2019		Future		Future Mitigated 2024	
Intersection	Time Period	Bicycle Direction	Bicycle Volume	Right Turn[a]	Left Turn[b]	Right Turn[a]	Left Turn[b]	Right Turn[a]	Left Turn[b]	Right Turn[a]	Left Turn[b]	Right Turn[a]	Left Turn[b]	Right Turn[a]	Left Turn[b]
		EB	272	52	146	52	146	52	283	52	263	62	310	62	290
Broadway at Green Garage	Morning	EB	197	68	51	68	51	68	51	68	51	114	109	114	109
	Evening	EB	54	19	13	19	13	19	13	19	13	26	22	26	22
Broadway at Main Street/Third Street	Morning	SB	19	109	n/a	109	n/a	115	n/a	112	n/a	168	n/a	165	n/a
		WB	27	178	152	178	152	250	360	250	149	313	394	313	183
		NB	15	n/a	160	n/a	160	n/a	177	n/a	177	n/a	242	n/a	242
		EB	154	32	n/a	32	n/a	32	n/a	32	n/a	32	n/a	32	n/a
	Evening	SB	31	93	n/a	93	n/a	108	n/a	89	n/a	131	n/a	112	n/a
		WB	210	128	232	128	232	146	311	146	232	191	436	191	357
		NB	31	n/a	365	n/a	365	n/a	518	n/a	518	n/a	620	n/a	620
		EB	28	42	n/a	42	n/a	42	n/a	42	n/a	42	n/a	42	n/a
Third Street at Potter Street/Kendall Street	Morning	SB	24	26	36	26	36	99	319	99	108	100	320	100	109
		WB	0	1	15	1	15	1	34	1	34	1	34	1	34
		NB	15	65	102	65	102	65	102	65	102	67	105	67	105
		EB	0	39	9	39	9	62	9	55	9	62	9	55	9
	Evening	SB	41	14	23	14	23	20	119	20	41	20	120	20	42
		WB	0	38	14	38	14	38	143	38	143	38	143	38	143
		NB	47	42	25	42	25	42	25	42	25	43	26	43	26
		EB	0	32	47	32	47	216	47	176	47	216	47	176	47
Third Street at Munroe Street/Linskey Way	Morning	SB	33	46	8	46	8	48	6	48	6	49	6	49	6
		NB	12	0	2	0	2	0	2	0	2	0	2	0	2
		EB	1	9	n/a	9	n/a	8	n/a	8	n/a	8	n/a	8	n/a
	Evening	SB	18	4	3	4	3	7	3	7	3	7	3	7	3
		NB	30	31	22	31	22	31	22	31	22	32	23	32	23
		EB	0	9	n/a	9	n/a	8	n/a	8	n/a	8	n/a	8	n/a
	Morning	EB	67	24	39	24	39	24	39	24	39	24	39	24	39

Intersection	Time Period	Bicycle Direction	Existing Peak Hour Bicycle Volume	Conflicting Vehicle Movements											
				Existing 2019		Baseline		Build 2019		Build Mitigated 2019		Future		Future Mitigated 2024	
				Right Turn[a]	Left Turn[b]	Right Turn[a]	Left Turn[b]	Right Turn[a]	Left Turn[b]	Right Turn[a]	Left Turn[b]	Right Turn[a]	Left Turn[b]	Right Turn[a]	Left Turn[b]
Main Street at Albany Street	Evening	EB	18	3	13	3	13	3	13	3	13	3	13	3	13
Main Street at Galileo Galilei Way/Vassar Street	Morning	SB	41	150	115	150	0	155	0	161	0	191	0	197	0
		WB	21	32	82	32	82	32	142	32	142	36	203	36	203
		NB	34	85	23	85	23	85	23	85	23	118	54	118	54
		EB	60	39	59	39	59	39	59	39	59	39	66	39	66
	Evening	SB	51	157	54	157	0	180	0	219	0	250	0	289	0
		WB	94	62	173	62	173	62	193	62	193	88	232	88	232
		NB	53	88	29	88	29	88	29	88	29	100	38	100	38
		EB	26	103	75	103	75	103	75	103	75	104	103	104	103
Main Street/Ames Street	Morning	SB	9	116	76	116	76	129	76	126	76	135	101	132	101
		WB	25	21	36	21	36	21	95	21	95	21	121	21	121
		NB	10	80	16	80	16	80	19	80	19	82	79	82	79
		EB	72	45	8	45	8	45	8	45	8	117	108	117	108
	Evening	SB	7	147	106	147	106	226	106	206	106	248	248	228	248
		WB	67	27	40	27	40	27	59	27	59	27	70	27	70
		NB	34	64	25	64	25	64	50	64	50	66	66	66	66
		EB	37	48	14	48	14	48	14	48	14	66	39	66	39
Main Street at Longfellow Bridge	Morning	WB	50	94	n/a	94	n/a	94	n/a	94	n/a	156	n/a	156	n/a
		EB	194	124	n/a	124	n/a	124	n/a	124	n/a	136	n/a	136	n/a
	Evening	WB	209	64	n/a	64	n/a	64	n/a	64	n/a	86	n/a	86	n/a
		EB	2	219	n/a	219	n/a	219	n/a	219	n/a	229	n/a	229	n/a
Memorial Drive at Ames Street	Morning	SB	0	74	n/a	74	n/a	78	n/a	78	n/a	80	n/a	80	n/a
		WB	8	230	32	230	0	288	0	288	0	313	0	313	0
		NB	9	n/a	17	n/a	17	n/a	17	n/a	17	n/a	27	n/a	27
	Evening	SB	19	195	n/a	195	n/a	228	n/a	228	n/a	240	n/a	240	n/a
		WB	15	225	34	225	0	240	0	240	0	252	0	252	0

				Conflicting Vehicle Movements											
			Existing Peak Hour	Existing 2019		Baseline		Build 2019		Build Mitigated 2019		Future		Future Mitigated 2024	
Intersection	**Time Period**	**Bicycle Direction**	**Bicycle Volume**	**Right Turn[a]**	**Left Turn[b]**	**Right Turn[a]**	**Left Turn[b]**	**Right Turn[a]**	**Left Turn[b]**	**Right Turn[a]**	**Left Turn[b]**	**Right Turn[a]**	**Left Turn[b]**	**Right Turn[a]**	**Left Turn[b]**
		NB	0	n/a	16	n/a	16	n/a	16	n/a	16	n/a	76	n/a	76
Memorial Drive at Wadsworth Street	Morning	SB	2	0	197	0	229	3	287	3	287	10	312	10	312
		WB	6	29	42	29	42	29	42	29	42	119	93	119	93
	Evening	SB	6	5	157	5	191	31	206	31	206	76	218	76	218
		WB	4	57	72	57	72	57	72	57	72	81	101	81	101
Memorial Drive at Western Avenue	Morning	SB	81	228	262	228	262	228	272	228	272	234	296	234	296
		WB	44	91	n/a	91	n/a	91	n/a	91	n/a	92	n/a	92	n/a
		EB	10	n/a	110	n/a	110	n/a	110	n/a	110	n/a	111	n/a	111
	Evening	SB	23	353	413	353	413	353	461	353	461	362	504	362	504
		WB	43	111	n/a	111	n/a	111	n/a	111	n/a	112	n/a	112	n/a
		EB	12	n/a	92	n/a	92	n/a	92	n/a	92	n/a	93	n/a	93
Memorial Drive at Cambridge Street/River Street	Morning	WB	4	n/a	177	n/a	177	n/a	177	n/a	177	n/a	179	n/a	179
		NB	19	75	61	75	61	75	61	75	61	77	63	77	63
		EB	24	773	n/a	773	n/a	773	n/a	773	n/a	828	n/a	828	n/a
	Evening	WB	4	n/a	301	n/a	301	n/a	301	n/a	301	n/a	304	n/a	304
		NB	87	39	64	39	64	39	64	39	64	40	66	40	66
		EB	10	553	n/a	553	n/a	553	n/a	553	n/a	586	n/a	586	n/a

b. Bicycle Parking

The Kendall Square area is well serviced by many different bicycle facilities including bike lanes, separated bicycle facilities and off-street shared paths, as illustrated in Figure 13. The City's 2020 Bicycle Plan is currently being developed and expected to be published in 2020.

The Site will provide short-term and long-term bicycle parking per the City of Cambridge Bicycle Parking Zoning requirements. As shown in Figures G.1-G.15 bicycle parking is an integral part of the site and long-term bicycle parking has been designed per the City of Cambridge's guidelines. Elevators sized to accommodate bicycles are being provided for each bicycle parking site.

Bicycle circulation, parking and locations of Bluebikes stations are illustrated in Figure 13.b.1.

The ratios by land use and building are summarized in Tables 13.b.1 and 13.b.2.

Table 13.b.1 Minimum Required Project Bicycle Parking Ratios

Land Use	Minimum Required Bicycle Parking	
	Long-Term	Short-Term
Office	0.22 spaces per ksf	0.06 spaces per ksf
R&D	0.22 spaces per ksf	0.06 spaces per ksf
Residential	1.00 spaces per unit for first 20 units per building and 1.05 spaces per unit for additional units	0.10 spaces per unit
Hotel	0.02 spaces per sleeping room	0.05 spaces per sleeping room
Active/Retail	0.10 spaces per ksf	0.60 spaces per ksf
Community Center	0.08 spaces per ksf	0.50 spaces per ksf

Source: City of Cambridge Article 6 Zoning

Table 13.b.2 Project Bicycle Parking Supply by Land Use and Building

			Number of Bicycle Parking Spaces Required and Provided		
Building	**Program**		Long Term Regular	Long Term Tandem	Short Term
C1	228.8 ksf	Office	47	3	14
	233.2 ksf	R&D	48	3	14
	20 ksf	Retail	2	0	12
C2	231.6 ksf	Office	48	3	14
	236.6 ksf	R&D	49	3	14
	15 ksf	Retail	2	0	9
C3	228.9 ksf	Office	47	3	14
	233.85 ksf	R&D	48	3	14
	7 ksf	Retail	1	0	4
C4	189.7 ksf	Office	40	2	11
	194.1 ksf	R&D	41	2	12
Commercial Total			**373**	**22**	**132**
R1	381	Units	379	20	38
	11 ksf	Retail	1	0	7
R2	370	Units	369	19	37
	200	Keys	4	0	10
	12 ksf	Retail	1	0	7
R3	249	Units	247	13	25
R4	300	Units	298	16	30
	10 ksf	Retail	1	0	6
Residential Total			**1,300**	**68**	**160**
Community Center	20 ksf		2	0	10
Project Total			**1,675**	**90**	**302**

Source: Based on parking rates outline sin the City of Cambridge Bicycle Parking Guidelines

14. Transportation Demand Management (TDM)

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

The proponent will work with tenants of the new buildings to join the Charles River Transportation Management Association and implement effective TDM strategies that will be incorporated in a **Parking and Transportation Demand Management (PTDM) Plan to be approved by the City of Cambridge PTDM Officer.**

The following are examples of TDM programs that the proponent anticipates will be part of their PTDM Plan which will be submitted to the PTDM officer for approval:

- On-Site Transportation Coordinator
- Charles River Transportation Management Association
    - EZRide Shuttle Service
    - Market EZRide shuttle bus schedule and services
    - Ridematching and Guaranteed Ride Home programs
    - TMA promotional events and support service
- Carsharing (example ZipCar)
    - Reduced membership fees
    - Parking space allocation
- Parking
    - Carsharing parking spaces
    - Preferential carpool/vanpool spaces
    - Market rate parking
    - Parking supply management
- Transit
    - T pass subsidies
    - Employer pre-tax benefit programs
    - On-site marketing of T services
- Bicycle
    - Bicycle parking facilities, short and long-term
    - Lockers and showers
    - "Fix-it" station
    - Bluebikes membership program
    - Bluebikes station sponsorship
    - Annual "Bike to Work" event
- Pedestrian
    - Pedestrian pathways and streetscape
    - Lighting for pedestrian pathways
    - Enhanced pedestrian connections
- Encouragement for Tenant Commuter Programs

    - Alternative Work Hours
    - Staggered Work Hours
    - Telecommuting
- Marketing and Promotion
    - New/relocating employee information packets
    - Website
    - Transportation Fairs/Events
- Lease Language
    - Tenant participation in PTDM monitoring surveys
    - TDM employee programs through tenants
    - Large tenant participation in TMAs
    - Tenant job notices provided to the Cambridge Office of Workforce Development

15. Consistency with Other Area Plans

The following section describes other relevant transportation plans that are active for the area and notes how the proposed Project's transportation plan is consistent with each.

a. Envision Cambridge

In May of 2019, the City of Cambridge shared the *Envision Cambridge* citywide plan that provided a blueprint for the City's growth and change through 2030. The *Envision Cambridge* plan recommends 55 strategies and 183 new, expanded, or modified actions related to climate and environment, community wellbeing, economy, housing, mobility, and urban form. In the document, Kendall Square is identified as an "Evolving Mixed-Use Area" which continues to experience the most significant growth in the City.

Below are key transportation action items referenced in the *Envision* document:

Climate and Environment Plan

The document outlines climate and environment action items to reduce the transportation related greenhouse gas emissions. MIT is committed to following the City's initiatives to promote a reduction in emissions due to vehicles. The Project will include spaces for electric vehicle parking, high-visibility electric vehicle charging stations at publicly accessible locations and promote a shift to electric/clean emissions vehicles and other sustainable forms of transportation.

Mobility Plan

The Mobility Plan chapter outlines key mobility goals to promote safe, reliable, efficient, and sustainable modes of transportation. The Project will be consistent with the Mobility plan by:

- Providing access to sustainable transportation infrastructure including bicycle infrastructure through and around the Site, and wide sidewalks.
- Including a robust TDM plan that will promote the use of transit, walking, and biking by enhancing and expanding safe infrastructure for all users and will discourage single occupancy vehicle trips.
- Preparing the transportation infrastructure (including mechanical and electrical equipment within the buildings) within the site to be resilient to periodic flooding due to the effects associated with climate change.
- Better managing freight and delivery movement within the site in an efficient and safe manor.
- Enhancing public information on how to safely and efficiently move within and around the site by displaying real-time information to promote the use of transit, bike share, and car share services and by implementing a comprehensive wayfinding plan.
- Preparing for the introduction of autonomous vehicles and motorized micro mobility devices.

- Creating space for flexible curb regulations to accommodate loading, bike and scooter parking, shared ride or autonomous vehicle loading in the future.

Urban Form Plan

The document outlines an urban form plan which balances the preservation of the City's urban character and growth to accommodate new residents and activities with an equitable distribution throughout the City. The Project will be consistent with the Urban Form Plan by designing and implementing clear wayfinding within the site, reducing the total amount of parking that needs to be built, and limiting the number of curb cuts along the street corridors.

b. 2013 Kendall Square Report

Between 2011 and 2013, a comprehensive planning study was conducted to develop a vision for Kendall Square and a report was released in 2013 outlying specific recommendations for a wide range of issues concerning future growth as well as the opportunities for improvement that appear to be desirable. Specific transportation recommendations that the Project is consistent with include:

- **Engage buildings and streets to create lively public spaces**. Roadways are increasingly being thought of as "shared streets" and pedestrians and bicyclists are given as much attention as the car when designing streets and sidewalks. Much emphasis will be placed upon how well the buildings meet the sidewalk and help continue the activation of Kendall Square.
- **Enhance connections to the Charles River, especially at Broad Canal Way**. One of the most important existing connections to the river is the Broad Canal walk. As the Canal has finally started to become lively, it will be important to keep this positive momentum in the future.
- **Develop wayfinding strategy to help orient people to the Square and its surroundings**. Each project should put forward with an awareness of the need to provide better signals about address and connections to neighboring uses. The Kendall Square Association, of which MIT is an active member, has installed wayfinding signs throughout the square.
- **Support open space needs of a growing neighborhood**. There is a general sense that there needs to be a more diverse, energetic, and connected set of parks, plazas, and pathways creating a "pearl necklace" of well designed, well programmed spaces.
- **Shared parking is encouraged in the US-DOT Volpe Center PUD**
- **Enhanced TDM: priority recommendations for reducing drive-alone rates.** Key strategies to achieve this relevant to Kendall Square that were outlined in the 2013 Kendall Square Report and that the Proponent is considering, include:
    - For Employees:
        - Appropriate pricing of parking
        - Transportation/transit subsidies

        - Access to EZRide shuttles
        - Bicycle parking
        - Bluebikes membership
    - For Residents:
        - Trial transit pass for adult member of the household upon move-in
        - Car-share parking spaces nearby
        - Nearby Bluebikes stations

- **Parking strategies.** For mixed use developments, require shared parking when peak daytime use is matched with peak nighttime use, such as Office/R&D with Residential.
- **Enhance Pedestrian and Bicycle Pathway Network**
    - Create safe pedestrian crossings through the study area
    - Install bike share stations at key areas
    - Develop a wayfinding and signage strategy including assigning regular street addresses for all buildings.
- **Enhancing transit options**
    - Working with the MBTA and property owners to have "next bus" information displayed at the bus stops and/or in nearby stores
    - Encouraging walking and biking, including Bluebikes system expansion, for short trips

c. 2015 Cambridge Transit Strategic Plan

In 2013, the City of Cambridge began a two-year public transit strategic planning process. The purpose of the study was to develop an action plan for how Cambridge will take a stronger leadership role to improve the quality and expand the capacity of the transit system. The report outlines seven goals, which are mostly under the jurisdiction of the City or State. The Project will help the responsible parties in implementing a good wayfinding plan and display real-time service information within the site, as found appropriate.

d. Kendall Square Mobility Task Force

In 2019, the Kendall Square Association in partnership with the City of Cambridge and the Cambridge Redevelopment Authority released the Transport Kendall Report: Actions to Transform Mobility. This report builds on the work of the Kendall Square Mobility Task Force and outlines priority transportation projects for the Kendall. The focus areas include the Grand Junction, MBTA Red Line, and Bus Service. The proponent will work with the City to address recommendations, as appropriate, from the Transport Kendall Report.

e. Cambridge Bicycle Plan

In 2015, Cambridge published the Cambridge Bicycle Plan: Toward a Bikeable Future. The plan provides the framework for developing a network of Complete Streets and supporting programs and policies that will help meet this goal. The City is currently updating their Bicycle Plan, but initiatives identified in the 2015 Bicycle Plan include:

- Grand Junction rail-with-trail
- Add additional public bicycle parking throughout the city, particularly in business districts
- Install additional public sheltered public bike parking in key locations
- Add new Bluebikes stations throughout Cambridge
- Enhance targeted outreach to underrepresented communities
- Develop a strategy to enhance wayfinding

The Proponent is committed to working on several areas that directly serve the outlined initiatives of the 2015 Bicycle Plan.

16. Transportation Mitigation

The proposed Project exceeds 113 out of 653 possible data entries, resulting in an exceedance rate of approx. 17%. This section outlines existing and proposed transportation mitigation measures that aim to mitigate the Project Exceedances.

MIT continues to support the City through its development process by committing to means of mitigating vehicular impacts and providing safer infrastructure for pedestrians and bicyclists traveling to/from the Project Site, or other locations in the City. In addition to the list of TDM measures proposed in Section 14 of this report, the Proponent has also committed to several other mitigation measures, for different development projects, which will directly benefit the proposed Volpe Exchange Parcel site.

Special Permit #302 (NoMa) mitigation commitments:

- Redesign and construction of a raised cycle track on Third Street and Main Street adjacent to the One Broadway site.
- Financing and installation of (1) Bluebikes (formerly Hubway) station along Broad Canal Way.
- Addition of new bikes to the existing Bluebikes station at Kendall on Main Street.
- Payment of annual operations and maintenance fees to the City for the Bluebikes station.
- Implementation of a Residential Transportation Demand Management Plan that aims to reduce reliance on single occupancy vehicles.
- Provision of a bike station at 165 Main Street prior to obtaining the Certification of Occupancy in 2022.

Special Permit #303 (SoMa) mitigation commitments:

- Redesign and reconstruction of Ames Street between Main Street and Memorial Drive, including an at-grade cycle track on the east side of the street.
- Redesign and construction of a crossing at Memorial Drive and Ames Street to accommodate pedestrians and cyclists.
- Update of traffic signal equipment at Ames Street and Main Street to accommodate the new cycle track.
- Finance installation of two (2) Bluebikes (formerly Hubway) Stations, to be located at the intersections of Amherst Street and Carleton Street, and Amherst Street and Hayward Street.
- Pay ongoing annual operations and maintenance fees to the City for the (2) Bluebikes stations.
- Contribution of $175,000 to the City for Transit and Mobility Studies in Kendall Square.

- Contribution of $75,000 to the City to advance the design of the Grand Junction multi-use path.
- Contribution of $250,000 to the City for transit investments, such as contributions to shuttle or MBTA bus capacity or operations in Kendall Square, bus priority signals, signal changes that could shorten train headways, or other MBTA or publicly accessible private transit capital improvements that support transit.
- Reconstruction of Amherst Street between Ames Street and Wadsworth Street.
- Reconstruction of Wadsworth Street between Main Street and Amherst Street with widened sidewalks, raised crosswalk and pavement marking.
- Improvements to Memorial Drive Crossing at Wadsworth Street, subject to DCR approval.
- Commitment to a transportation monitoring program for the SoMa development sites.
- Design and construction of a cycle track extension along Vassar Street to Main Street.
- Contribution of $250,000 to the City for future traffic signal improvements at the intersection of Main Street/Vassar Street/Galileo Way to allow for flexibility, and coordination of future streetscape redesign, as planned by the City – this amended mitigation item was approved by the Planning Board on June 16, 2020.

PUD-7 Zoning:

- Following adoption of the PUD-7 Zoning, MIT is contributing $500,000 to the City for the development of the design for the Grand Junction Path.
- Within 30 days of the completion of the design of the Grand Junction Path MIT will either deliver to the City $8,000,000 for the design and construction of the Grand Junction Path or commence construction of the portion of the Grand Junction Path located on the MIT Property.
- MIT agrees that it shall include or cause to be included a covenant that the unit tenants shall not apply to the City of Cambridge Traffic, Parking & Transportation Department for a Residential Parking Permit in 30 of the residential leases for the residential innovation housing.

Other developers and partners:

In addition to MIT' s contributions to an improved transportation system, other developers and partners in the neighborhood have made commitments that have a direct impact on the Volpe Exchange Parcel site:

- Redesign and construction of Binney Street between Third Street and Land Boulevard, with raised cycle tracks in both directions.
- Real-time counting station installed at Binney Street at Third Street, Binney Street at Second Street and Binney Street at First Street to assist the City in monitoring traffic levels.

- Real-time counting station installed at Binney Street at Fulkerson Avenue to assist the City in monitoring traffic levels.
- Real-time counting station installed at the intersection of Portland Street / Cardinal Medeiros Ave at Hampshire Street to assist the City in monitoring traffic levels.
- Upgraded signal infrastructure, in the form of a new signal cabinet, at the intersection of Portland Street / Cardinal Medeiros Ave at Hampshire Street.
- Significant contribution to the Grand Junction Fund that will expedite the design of the northern sections of the Grand Junction Path (specifically sections between the "Pork Chop Park" and Cambridge Street).
- Redesign and construction of Galileo Galilei Way/Binney Street between Main Street and 6th Street to include raised cycle track in both directions.
- Redesign and constriction of Broadway between Galileo Galilei Way and Ames Street.

These items are each critical in helping to alleviate the impacts of the proposed Project as well as other development in the area.

In addition to the above outlined mitigation, the Proponent is committing to the following transportation mitigation to support the development of the Project:

- Construction of 5th Street between Binney Street and Broadway, to provide for additional circulation opportunities for pedestrians, bicyclists as well as vehicles.
- Construction of Broad Canal Way extension, envisioned as a shared-street on-site that prioritizes access for pedestrians and cyclists, with curb cut off Third Street that is proving one-way westbound circulation between Third Street and 5th Street, limited to TNCs and short-term servicing/deliveries.
- Signalization of the intersection of Third Street at Potter Street and addition of an exclusive left-turn lane on Third Street northbound, for more efficient access to Potter Street.
- Installation of an additional left-turn lane in the southbound direction on Third Street at Broadway intersection, in order to facilitate left turning vehicles onto Main Street/Longfellow Bridge.
- Construction of an exclusive left-turn lane in the eastbound direction at the intersection of Broadway and Green Garage in order to facilitate left turns into the site, directly to the below grade parking entrance at the C2 building. This left-turn pocket would allow project trips to enter the site at the perimeter, and thereby limit circulation and impacts to the intersection of Broadway and Third Street and Third Street at Potter Street.
- Installation of one (1) Bluebikes Station, and
- Development of a PTDM Plan.

Planning Board Special Permit Criteria

Criterion A – Project Vehicle Trip Generation

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

Table A-1 CRITERION – Project Vehicle Trip Generation

Period	Criteria (trips)	Build	Exceeds Criterion?
Weekday Daily	2,000	6,553	Yes
Weekday AM Peak Hour	240	757	Yes
Weekday PM Peak Hour	240	852	Yes

The Project is expected to exceed the Planning Board Criteria for daily, morning peak, and evening peak Project vehicle trip generation under the Build program.

Criterion B – Vehicle LOS

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

Table B-1 CRITERION - Vehicular Level of Service

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

Table B-2 CRITERION – Vehicular LOS

	AM Peak Hour				PM Peak Hour			
Intersection	**Baseline Condition**	**Build Condition**	**Traffic Increase**	**Exceeds Criterion?**	**Baseline Condition**	**Build Condition**	**Traffic Increase**	**Exceeds Criterion?**
O'Brien Highway/ Third Street	B	B	14%	No	B	C	15%	No
O'Brien Highway/ Cambridge Street/ East Street	D	D	8%	Yes	F	F	5%	No
O'Brien Highway/Land Boulevard	C	C	20%	No	B	C	20%	No
Cambridge Street/ Third Street	D	F	15%	Yes	D	E	19%	Yes
Cambridge Street/ First Street	C	D	11%	No	C	D	12%	No
First Street/ Thorndike Street	C	C	9%	No	]D	E	12%	Yes
First Street/ Charles Street	D	D	3%	No	D	D	5%	No
Third Street/ Spring Street	C	C	1%	No	C	C	2%	No
Third Street/ Charles Street	C	D	5%	No	C	C	6%	No
Galileo Galilei Way/ Binney Street/Fulkerson Street	D	D	7%	No	D	D	9%	Yes
Binney Street/ 5th Street	E	E	13%	Yes	D	D	11%	Yes
Binney Street/ Third Street	D	D	29%	Yes	C	D	30%	No
Binney Street/ Second Street	B	E	32%	Yes	F	F	30%	Yes
Binney Street/ First Street	D	F	30%	Yes	E	F	19%	Yes
Binney Street/ Land Boulevard	F	F	53%	Yes	F	F	45%	Yes
Hampshire Street/ Cardinal Medeiros Avenue/ Portland Street	D	D	15%	Yes	F	F	21%	Yes

	AM Peak Hour				PM Peak Hour			
Intersection	**Baseline Condition**	**Build Condition**	**Traffic Increase**	**Exceeds Criterion?**	**Baseline Condition**	**Build Condition**	**Traffic Increase**	**Exceeds Criterion?**
Broadway/ Portland Street	F	F	18%	Yes	E	F	18%	Yes
Broadway/ Hampshire Street	D	D	16%	Yes	E	F	13%	Yes
Broadway/ Galileo Galilei Way	D	E	17%	Yes	F	F	18%	Yes
Broadway/ Ames Street	A	A	2%	No	A	B	10%	No
Broadway/ Green Garage	E	F	11%	Yes	C	C	8%	No
Broadway/ Main Street/ Third Street	B	B	5%	No	E	F	5%	No
Third Street/ Potter Street/ Kendall Street	B	C	5%	No	B	C	3%	No
Third Street/ Munroe Street/ Linskey Way	E	E	3%	No	F	F	4%	No
Main Street/ Albany Street	F	F	4%	No	E	E	5%	No
Main Street/ Galileo Galilei Way/ Vassar Street	B	B	14%	No	B	C	15%	No
Main Street/ Ames Street	D	D	8%	Yes	F	F	5%	No
Main Street/ Kendall Station Crosswalk	C	C	20%	No	B	C	20%	No
Main Street/ Longfellow Bridge	D	F	15%	Yes	D	E	19%	Yes
Memorial Drive/ Ames Street	C	D	11%	No	C	D	12%	No
Memorial Drive/ Wadsworth Street	C	C	9%	No	D	E	12%	Yes
Memorial Drive/ Western Avenue	D	D	3%	No	D	D	5%	No
Memorial Drive/ Cambridge Street/ River Street	C	C	1%	No	C	C	2%	No

Criterion C – Traffic on Residential Streets

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

Table C-1 CRITERION – Traffic on Residential Streets

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

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

6 of the 80 roadway segments in the study area identified as street segments which have more than 1/3 of residential frontage and are therefore evaluated against the traffic volume criteria. The results are presented in Table C-2.

Table C-2 Criteria C – Traffic on Residential Streets

			AM Peak Hour			PM Peak Hour		
Roadway	Reviewed Segment	Amount of Residential	Baseline	Project Trips	Exceeds Criteria?	Baseline	Project Trips	Exceeds Criteria?
O'Brien Highway	Cambridge Street to Land Boulevard	1/2 or more	2,095	44	Yes	1,919	50	Yes
Cambridge Street	Second Street to First Street	1/2 or more	651	0	No	632	0	No
Spring Street	Sciarappa Street to Third Street	1/2 or more	160	0	No	155	0	No
	Third Street to Lopez Avenue	1/2 or more	102	0	No	171	0	No
Charles Street	Sciarappa Street to Third Street	1/2 or more	131	0	No	207	0	No
Binney Street	5th Street to Third Street	>1/3 but <1/2	953	120	Yes	1,049	195	Yes
Munroe Street	5th Street to Third Street	1/2 or more	74	1	No	42	15	No

			AM Peak Hour			PM Peak Hour		
Roadway	**Reviewed Segment**	**Amount of Residential**	**Baseline**	**Project Trips**	**Exceeds Criteria?**	**Baseline**	**Project Trips**	**Exceeds Criteria?**
Potter Street	5th Street to Third Street	1/2 or more	118	201	Yes	85	316	Yes
5th Street	Rogers Street to Binney Street	1/2 or more	122	0	No	146	0	No
Third Street	O'Brien Highway to Cambridge Street	>1/3 but <1/2	711	99	Yes	790	112	Yes
	Cambridge Street to Spring Street	>1/3 but <1/2	642	99	Yes	479	112	Yes
	Spring Street to Charles Street	1/2 or more	611	99	Yes	459	112	Yes
	Charles Street to Binney Street	>1/3 but <1/2	552	99	Yes	650	112	Yes

Criterion D – Lane Queue

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

Table D-1 CRITERION – Vehicular Queues at Signalized Intersections

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

Table D-2 Criteria D – Lane Queue (for signalized intersections)

Intersection	Lane	AM Peak Hour			PM Peak Hour		
		Baseline	2019 Build Mitigated	Exceeds Criterion?	Baseline	2019 Build Mitigated	Exceeds Criterion?
O'Brien Highway at Third Street	O'Brien EB Left/Thru	7	16	Yes	3	3	No
	O'Brien EB Right	6	17	Yes	3	3	No
	O'Brien WB Thru/Right	1	1	No	4	4	No
	Third NB Left/Thru/Right	2	2	No	11	11	No
O'Brien Highway at North First Street	O'Brien EB Thru	10	9	No	5	11	No
	O'Brien EB Right	4	4	No	1	2	No
	O'Brien WB Thru	3	3	No	7	6	No
	O'Brien WB Right	0	0	No	0	0	No
	N. First NB Left	1	1	No	3	3	No
	N. First NB Thru/Right	1	1	No	1	1	No
	N. First SB Left/Thru	1	1	No	1	4	No
	N. First SB Right	0	1	No	1	1	No
O'Brien Highway at Cambridge Street	O'Brien EB Thru	3	3	No	5	6	No
	O'Brien WB Left/Thru	5	5	No	5	5	No
	Cambridge NB Right	6	6	No	6	6	No
	East SB Left/Thru/Right	1	1	No	1	1	No
O'Brien Highway at Land Boulevard	O'Brien EB Left	5	3	No	18	21	No
	O'Brien EB Thru	21	18	No	12	27	Yes

Intersection	Lane	AM Peak Hour			PM Peak Hour		
		Baseline	2019 Build Mitigated	Exceeds Criterion?	Baseline	2019 Build Mitigated	Exceeds Criterion?
	O'Brien EB Right	12	8	No	0	8	No
	O'Brien WB Left	36	37	No	7	6	No
	O'Brien WB Thru	59	64	No	7	6	No
	O'Brien WB Right	3	3	No	6	4	No
	Land NB Left	2	2	No	4	7	No
	Land NB Thru	6	6	No	7	7	No
	Land NB Right	22	23	No	6	6	No
	Land SB Left/Thru/Right	41	45	No	29	31	No
Cambridge Street at Third Street	Cambridge EB Left/Thru/Right	29	31	No	37	2	No
	Cambridge WB Left/Thru/Right	15	16	No	11	20	No
	Third NB Left/Thru/Right	5	6	No	11	10	No
	Third SB Left	2	2	No	1	20	Yes
	Third SB Thru/Right	12	15	No	6	1	No
Cambridge Street at First Street	Cambridge EB Left	5	4	No	7	8	No
	Cambridge EB Thru/Right	25	23	No	27	27	No
	Cambridge WB Left	2	2	No	3	3	No
	Cambridge WB Thru/Right	2	2	No	3	2	No
	First NB Left/Thru	3	3	No	18	18	No
	First NB Right	3	3	No	8	8	No
	N. First SB Left/Thru	1	1	No	0	0	No
	N. First SB Right	3	3	No	1	1	No
First Street at Thorndike Street	Thorndike EB Left/Thru/Right	2	2	No	7	7	No
	First NB Thru	1	1	No	17	15	No
	First SB Thru	2	2	No	2	3	No
First Street at Charles Street	Charles EB Left/Thru/Right	2	2	No	3	3	No
	Cambridgeside WB Left/Thru/Right	2	2	No	5	5	No
	First NB Thru/Right	2	2	No	14	14	No
	First SB Left/Thru	2	3	No	6	8	No

Intersection	Lane	AM Peak Hour			PM Peak Hour		
		Baseline	2019 Build Mitigated	Exceeds Criterion?	Baseline	2019 Build Mitigated	Exceeds Criterion?
Third Street at Charles Street	Charles EB Left/Thru/Right	2	2	No	2	2	No
	Charles WB Left/Thru/Right	1	1	No	2	1	No
	Third NB Left/Thru/Right	1	1	No	4	7	No
	Third SB Left/Thru/Right	4	8	No	4	5	No
Galileo Galilei Way/Binney Street at Fulkerson	Galileo EB Thru	7	7	No	10	10	No
	Galileo WB Thru	8	11	No	4	5	No
	Galilei WB Right	4	4	No	3	3	No
	Fulkerson SB Right/Hard Right	5	7	No	4	5	No
	Binney SEB Hard Right/Left	3	3	No	5	5	No
	Binney SEB Right	3	7	No	46	42	No
Binney Street at Third Street	Binney EB Left	2	2	No	5	7	No
	Binney EB Thru	6	5	No	7	12	No
	Binney EB Right	2	2	No	3	4	No
	Binney WB Left	5	9	No	2	2	No
	Binney WB Thru/Right	5	14	No	3	3	No
	Third NB Left/Thru	6	7	No	6	7	No
	Third NB Right	4	3	No	4	4	No
	Third SB Left/Thru/Right	12	20	Yes	10	16	No
Binney Street at Second Street	Binney EB Left	1	1	No	3	3	No
	Binney EB Thru/Right	7	6	No	7	8	No
	Binney WB Left	2	2	No	0	0	No
	Binney WB Thru/Right	4	7	No	4	4	No
	Second NB Left/Thru/Right	2	3	No	8	8	No
	Second SB Left/Thru/Right	4	6	No	4	4	No
Binney Street at First Street	Binney EB Left	1	1	No	6	5	No
	Binney EB Thru/Right	3	3	No	4	4	No
	Binney WB Left/Thru/Right	5	5	No	6	6	No
	First NB Left/Thru/Right	1	1	No	1	1	No

Intersection	Lane	AM Peak Hour			PM Peak Hour		
		Baseline	2019 Build Mitigated	Exceeds Criterion?	Baseline	2019 Build Mitigated	Exceeds Criterion?
	First SB Left/Thru	3	3	No	5	5	No
	First SB Right	2	4	No	2	2	No
Binney Street at Land Boulevard	Binney EB Left	3	3	No	2	2	No
	Land NB Left	12	12	No	10	9	No
	Land NB Thru	13	14	No	6	3	No
	Land SB Thru	6	6	No	8	8	No
	Land SB Right	6	8	No	3	3	No
Hampshire Street at Portland Street/Cardinal Medeiros Avenue	Hampshire EB Left/Thru/Right	8	17	Yes	6	5	No
	Hampshire WB Left/Thru/Right	4	3	No	6	7	No
	Portland NB Left	1	1	No	1	2	No
	Portland NB Thru/Right	3	2	No	3	3	No
	Cardinal SB Left	1	2	No	0	0	No
	Cardinal SB Thru/Right	5	7	No	2	2	No
Broadway at Portland Street	Broadway EB Left/Thru/Right	46	48	No	6	2	No
	Broadway WB Left/Thru/Right	5	5	No	4	12	No
	Portland NB Left	1	1	No	2	4	No
	Portland NB Thru/Right	5	13	No	8	2	No
	Portland SB Left	1	2	No	0	9	No
	Portland SB Thru/Right	4	4	No	2	0	No
Broadway at Hampshire Street/Technology Square	Broadway EB Left/Thru/Right	6	6	No	3	3	No
	Broadway WB Left	2	2	No	0	0	No
	Broadway WB Thru	2	2	No	5	7	No
	Broadway WB Right	1	1	No	2	3	No
	Technology NB Left	1	1	No	7	7	No
	Technology NB Thru/Right	1	2	No	18	24	No
	Hampshire SB Left	3	3	No	2	2	No
	Hampshire SB Thru/Right	7	8	No	2	3	No
	Broadway EB Left	4	3	No	3	3	No

Intersection	Lane	AM Peak Hour			PM Peak Hour		
		Baseline	2019 Build Mitigated	Exceeds Criterion?	Baseline	2019 Build Mitigated	Exceeds Criterion?
Broadway at Galileo Galilei Way	Broadway EB Thru	4	10	No	5	8	No
	Broadway EB Right	1	1	No	1	1	No
	Broadway WB Left	1	1	No	2	3	No
	Broadway WB Thru	4	4	No	3	4	No
	Broadway WB Right	2	2	No	1	1	No
	Galileo NB Left	1	2	No	3	3	No
	Galileo NB Thru/Right	3	10	No	6	7	No
	Galileo SB Left	2	4	No	2	1	No
	Galileo SB Thru	7	10	No	6	12	No
	Galileo SB Right	8	7	No	5	10	No
Broadway at Ames Street	Broadway EB Thru	9	15	No	5	9	No
	Broadway EB Right	4	3	No	2	2	No
	Broadway WB Left	4	4	No	3	6	No
	Broadway WB Thru	5	5	No	5	7	No
	Ames NB Left	1	9	No	2	2	No
	Ames NB Right	3	4	No	3	3	No
Broadway/Main Street at Third Street	Broadway EB Left	3	10	No	5	9	No
	Broadway EB Thru/Right	2	6	No	3	5	No
	Main WB Thru	7	22	Yes	6	9	No
	Main WB Right	4	10	No	3	5	No
	Third SB Left/Thru	5	3	No	4	4	No
	Third SB Right	3	0	No	0	0	No
Main Street at Galileo Galilei Way/Vassar Street	Main EB Left	2	5	No	7	8	No
	Main EB Thru/Right	4	8	No	14	17	No
	Main WB Left	2	2	No	3	3	No
	Main WB Thru/Right	4	6	No	7	10	No
	Vassar NB Thru	4	10	No	8	11	No
	Vassar NB Right	2	3	No	3	4	No
	Galileo SB Left	1	1	No	2	2	No
	Galileo SB Thru	5	5	No	4	5	No

Intersection	Lane	AM Peak Hour			PM Peak Hour		
		Baseline	2019 Build Mitigated	Exceeds Criterion?	Baseline	2019 Build Mitigated	Exceeds Criterion?
	Galileo SB Right	5	4	No	4	4	No
Main Street at Ames Street	Main EB Left/Thru/Right	4	6	No	15	16	No
	Main WB Left/Thru/Right	2	3	No	4	5	No
	Ames NB Left/Thru/Right	9	18	Yes	18	37	No
	Ames SB Left/Thru	1	2	No	3	6	Yes
	Ames SB Right	2	2	No	3	4	No
Memorial Drive at Ames Street	Memorial WB Left/Thru/Right	3	4	No	13	17	No
	Ames SB Thru/Right	3	3	No	5	6	No
	Memorial EB Thru	48	48	No	13	17	No
Memorial Drive at Wadsworth Street	Memorial WB Thru/Right	6	6	No	6	9	No
	Memorial EB U-turn	3	3	No	3	3	No
	Memorial EB Left	15	16	No	4	5	No
	Wadsworth SB Thru/Right	0	0	No	0	1	No
Memorial Drive at Western Avenue	Western WB Left/Thru/Right	25	23	No	72	71	No
	Memorial NB Left	8	8	No	15	30	Yes
	Memorial NB Thru	8	8	No	16	30	Yes
	Memorial SB Thru/Right	22	27	No	12	11	No
Memorial Dr at River St	River EB Left/Thru	9	9	No	7	8	No
	River EB Right	15	15	No	11	11	No
	Memorial NB Thru/Right	8	9	No	11	19	Yes
	Memorial SB Left/Thru	10	11	No	6	6	No

Criterion E – Pedestrian and Bicycle Facilities

Criteria 1: Pedestrian Delay

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

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

Table E-1 CRITERION – PLOS Indicators

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

Table E-2 CRITERION– Pedestrian Delay

		AM Peak Hour			PM Peak Hour		
Intersection	**Crosswalk**	**Existing**	**Build**	**Exceeds Criterion?**	**Existing**	**Build**	**Exceeds Criterion?**
O'Brien Highway at Third St	East	D	D	No	D	D	No
	South	D	D	No	D	D	No
O'Brien Highway at Cambridge St	North	D	D	No	D	D	No
	East	D	D	No	D	D	No
	West	D	D	No	D	D	No
O'Brien Highway at Land Blvd	West	E	E	Yes	E	E	Yes
	North	E	E	Yes	E	E	Yes
	South	E	E	Yes	E	E	Yes
Cambridge St at Third St	East	B	B	No	B	B	No
	West	B	B	No	B	B	No
	North	B	B	No	B	B	No
	South	B	B	No	B	B	No
Cambridge St at First St	East	C	C	No	C	C	No

Intersection	Crosswalk	AM Peak Hour			PM Peak Hour		
		Existing	Build	Exceeds Criterion?	Existing	Build	Exceeds Criterion?
	West	C	C	No	C	C	No
	South	C	C	No	C	C	No
First St at Thorndike St	West	C	C	No	C	C	No
	North	C	C	No	C	C	No
	South	C	C	No	C	C	No
First St at Charles St	East	C	C	No	C	C	No
	West	C	C	No	C	C	No
	North	C	C	No	C	C	No
	South	C	C	No	C	C	No
Third St at Spring St	East	A	A	No	A	A	No
	West	A	A	No	A	A	No
	North	D	E	Yes	C	C	No
	South	C	D	Yes	B	C	Yes
Third St at Charles St	East	C	C	No	C	C	No
	West	C	C	No	C	C	No
	North	C	C	No	C	C	No
	South	C	C	No	C	C	No
Binney St/Galileo Galilei Way at Fulkerson St	East	D	D	No	D	D	No
	Northwest	D	D	No	D	D	No
	West	D	D	No	D	D	No
	North	D	D	No	D	D	No
Binney St at 5th Street	East	F	F	Yes	F	F	Yes
	West	F	F	Yes	F	F	Yes
	North	A	A	No	A	A	No
Binney St at Third St	East	D	D	No	D	D	No
	West	D	D	No	D	D	No
	North	D	D	No	D	D	No
	South	D	D	No	D	D	No
Binney St at Second St	East	D	D	No	D	D	No
	West	D	D	No	D	D	No

Intersection	Crosswalk	AM Peak Hour			PM Peak Hour		
		Existing	Build	Exceeds Criterion?	Existing	Build	Exceeds Criterion?
	North	D	D	No	D	D	No
	South	D	D	No	D	D	No
Binney St at First St	East	E	E	Yes	E	E	Yes
	West	E	E	Yes	E	E	Yes
	North	E	E	Yes	E	E	Yes
	South	E	E	Yes	E	E	Yes
Binney St at Land Blvd	West	E	E	Yes	E	E	Yes
	North	E	E	Yes	E	E	Yes
	South	E	E	Yes	E	E	Yes
Hampshire St at Portland St/Cardinal Medeiros Ave	East	C	C	No	C	C	No
	West	C	C	No	C	C	No
	North	B	B	No	B	B	No
	South	B	B	No	B	B	No
Broadway at Portland St	East	C	C	No	C	C	No
	West	C	C	No	C	C	No
	North	B	B	No	B	B	No
	South	B	B	No	B	B	No
Broadway at Hampshire St	East	D	D	No	D	D	No
	West	D	D	No	D	D	No
	North	C	C	No	D	D	No
	South	C	C	No	D	D	No
Broadway at Galileo Galilei Way	East	D	D	No	D	D	No
	West	D	D	No	D	D	No
	North	D	D	No	D	D	No
	South	D	D	No	D	D	No
Broadway at Green Garage	East	F	F	Yes	F	F	Yes
	West	F	F	Yes	F	F	Yes
	South	B	B	No	C	C	No
Broadway at Ames St	East	D	D	No	D	D	No
	West	D	D	No	D	D	No

Intersection	Crosswalk	AM Peak Hour			PM Peak Hour		
		Existing	Build	Exceeds Criterion?	Existing	Build	Exceeds Criterion?
	South	D	D	No	D	D	No
Broadway at Main St and Third St	East	D	D	No	D	D	No
	West	D	D	No	D	D	No
	North	D	D	No	D	D	No
	South	D	D	No	D	D	No
Third St at Potter St and Kendall St	East	A	A	No	A	A	No
	West	A	D	Yes	A	D	Yes
	North	E	F	Yes	F	F	Yes
	South	F	F	Yes	F	F	Yes
Third St at Munroe St and Linskey Way	East	A	A	No	A	A	No
	West	A	A	No	A	A	No
	North	F	F	Yes	F	F	Yes
	South	E	F	Yes	E	F	Yes
Main St at Albany St	East	F	F	Yes	F	F	Yes
	West	F	F	Yes	F	F	Yes
	South	C	C	No	B	B	No
Galileo Galilei Way at Main St	East	D	D	No	D	D	No
	West	D	D	No	D	D	No
	North	D	D	No	D	D	No
	South	D	D	No	D	D	No
Main St at Ames St	East	C	C	No	C	C	No
	West	C	C	No	C	C	No
	North	D	D	No	D	D	No
	South	D	D	No	D	D	No
Main St at Kendall Station Crossing	East	C	C	No	D	E	Yes
	West	C	C	No	D	E	Yes
Memorial Dr at Longfellow Bridge	North	D	D	No	C	C	No
	South	B	B	No	D	D	No
	Southwest	A	A	No	A	A	No
Memorial Dr at Ames St	East	D	D	No	D	D	No

Intersection	Crosswalk	AM Peak Hour			PM Peak Hour		
		Existing	Build	Exceeds Criterion?	Existing	Build	Exceeds Criterion?
	West	D	D	No	D	D	No
	North	D	D	No	D	D	No
Memorial Dr at Wadsworth St	East	D	D	No	D	D	No
	North	D	D	No	D	D	No
Memorial Dr at Western Ave	East	E	E	Yes	E	E	Yes
	West	E	E	Yes	E	E	Yes
	North	E	E	Yes	E	E	Yes
Memorial Dr at Cambridge St/River St	East	E	E	Yes	E	E	Yes
	West	E	E	Yes	E	E	Yes
	North	E	E	Yes	E	E	Yes
	South	E	E	Yes	E	E	Yes

Criteria 2 & 3: Safe Pedestrian and Bicycle Facilities

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

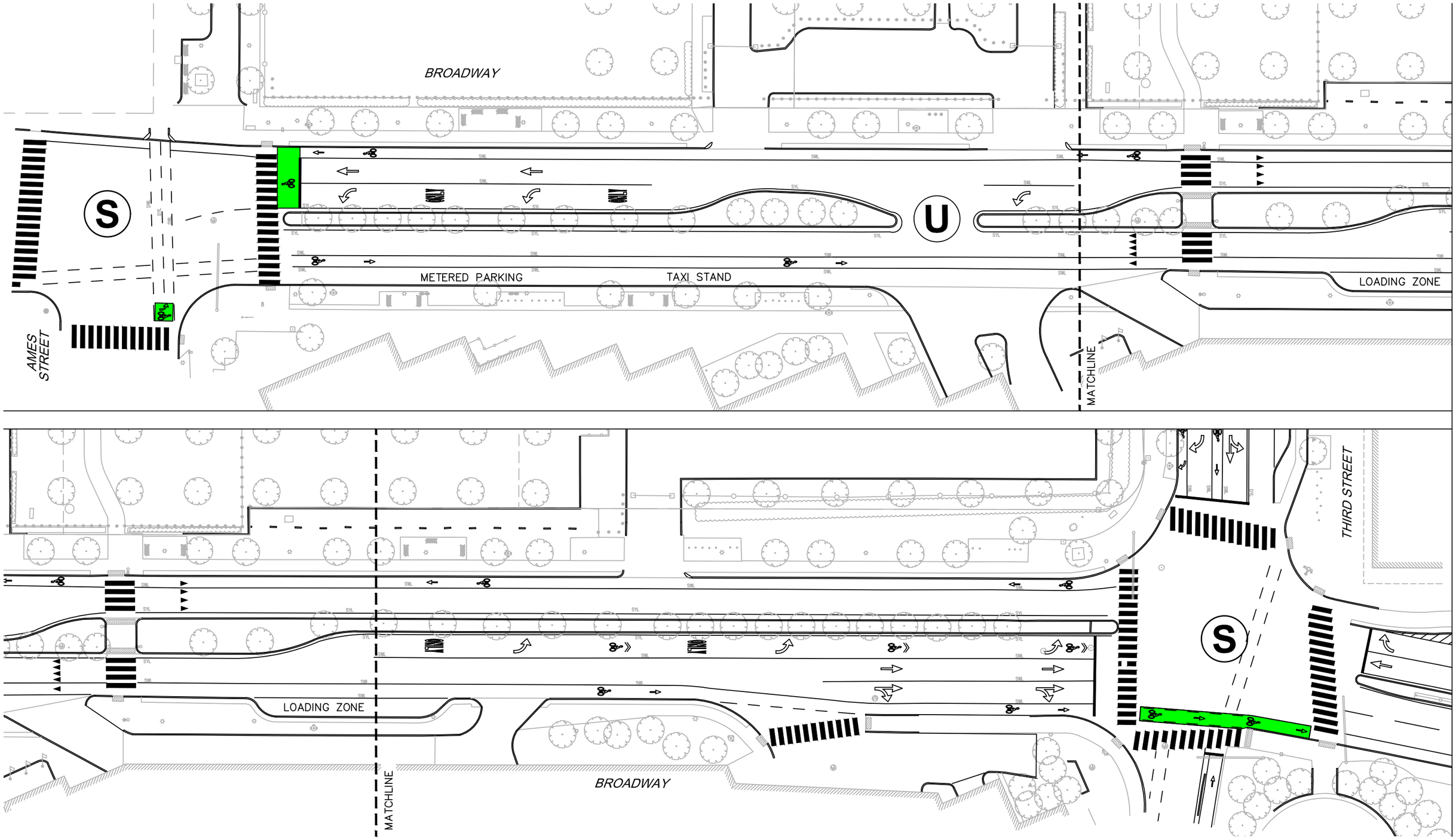
Table F-1 presents the indicators for this criterion. The evaluation of sidewalks or walkways and bicycle facilities are displayed.

Table F-1 Criteria F – Pedestrian and Bicycle Facilities

Adjacent Street	Link (between)	Sidewalk or Walkway Present	Exceeds Criteria?	Bicycle Facilities or Right of Ways Present	Exceeds Criteria?
Binney Street	6th Street and 5th Street	Yes	No	Yes	No
	5th Street and Third Street	Yes	No	Yes	No
Third Street	Binney Street and Munroe Street / Linskey Way	Yes	No	Yes	No
	Munroe Street / Linskey Way and Athenaeum Street	Yes	No	Yes	No
	Athenaeum Street and Potter Street / Kendall Street	Yes	No	Yes	No
	Potter Street / Kendall Street and Broad Canal Way	Yes	No	Yes	No

	Broad Canal Way and Broadway / Main Street	Yes	No	Yes	No
Broadway	Third Street / Main Street and Green Garage Exit	Yes	No	Yes	No
	Green Garage Exit and Ames Street	Yes	No	Yes	No
Munroe Street	Third Street and 5th Street	Yes	No	No	No
5th Street	Munroe Street and Potter Street	Yes	No	No	No
Potter Street	5th Street and Third Street	Yes	No	No	No

\\vhb\gbl\proj\Boston\14570.00 Volpe Exchange Parcel\Graphics\FIGURES\Existing Roadways.dwg



0 20 40 Feet

Figure 1.a.1
Broadway between Ames Street and Third Street

MIT Volpe Exchange Parcel
Camrbidge, MA

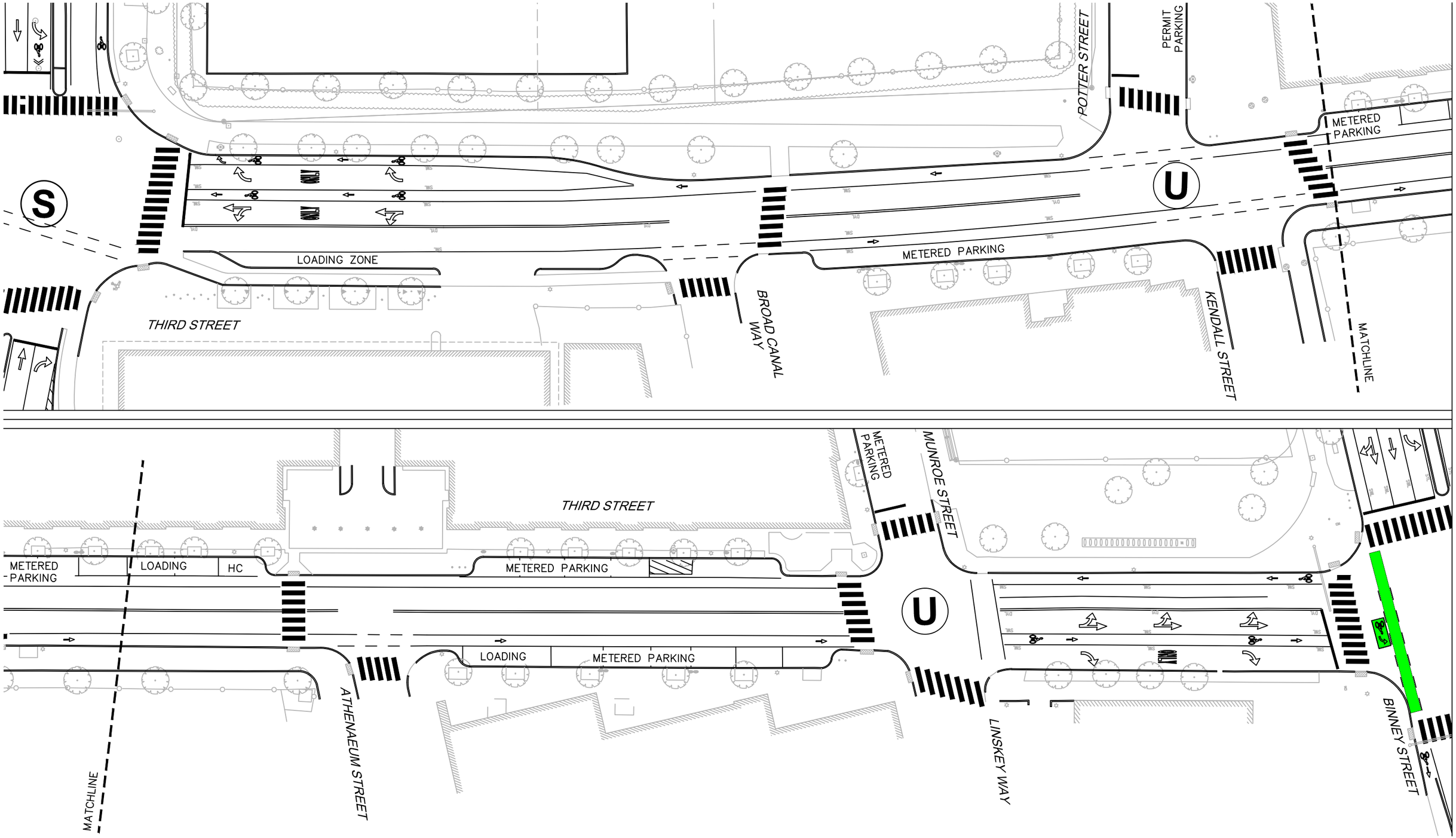
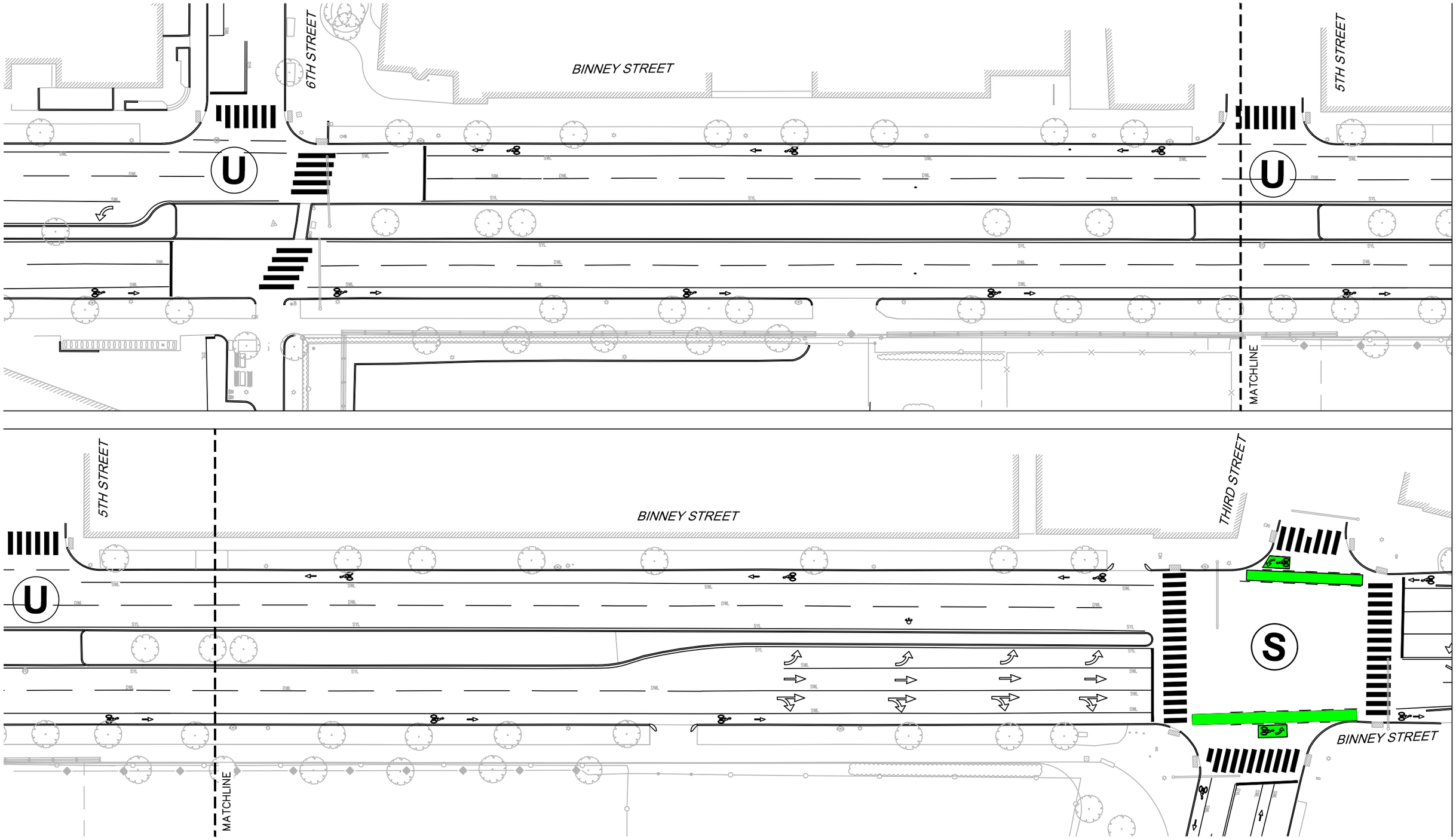


Figure 1.a.2
Third Street between Broadway and Binney Street

MIT Volpe Exchange Parcel
Camrbidge, MA

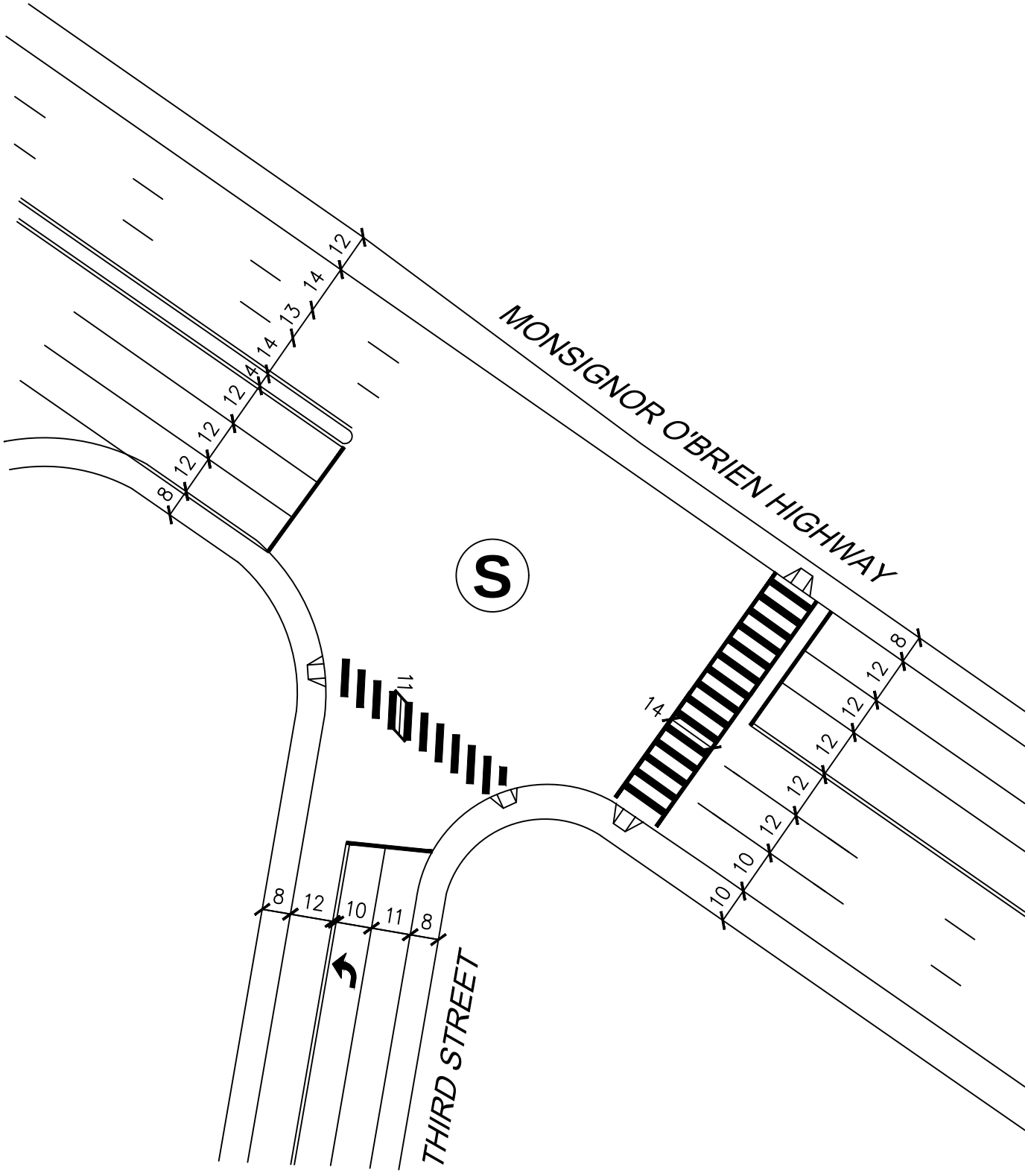
\\vhb\gbl\proj\Boston\14570.00 Volpe Exchange Parcel\Graphics\FIGURES\Existing Roadways.dwg



0 20 40 Feet

Figure 1.a.3
Binney Street between Sixth Street and Third Street

MIT Volpe Exchange Parcel
Camrbidge, MA



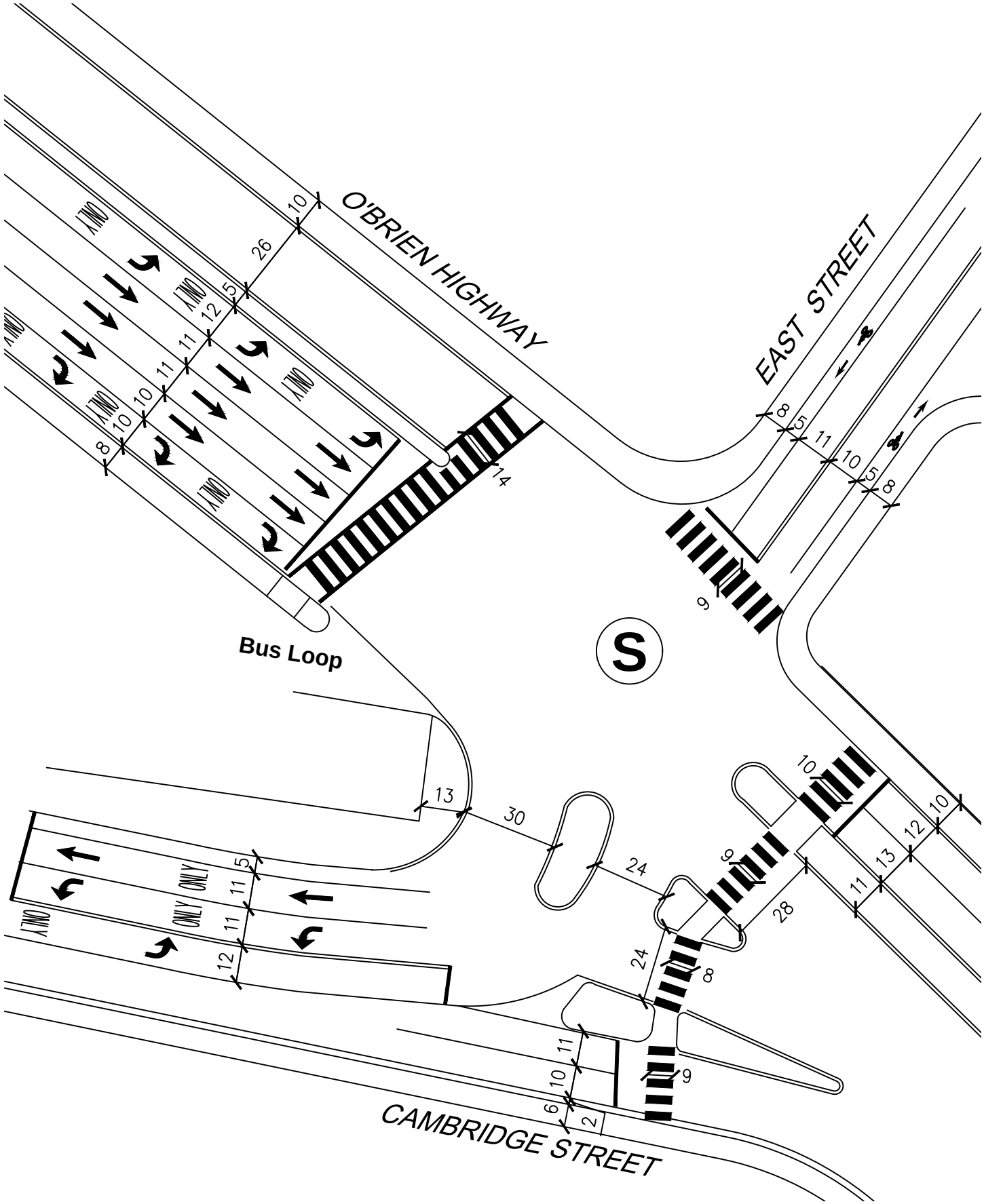
0 20 40 80 Feet

Existing Condition Intersection Sketch
O'Brien Highway at Third Street

Cambridge, MA

Figure 1.b.1

March 2020

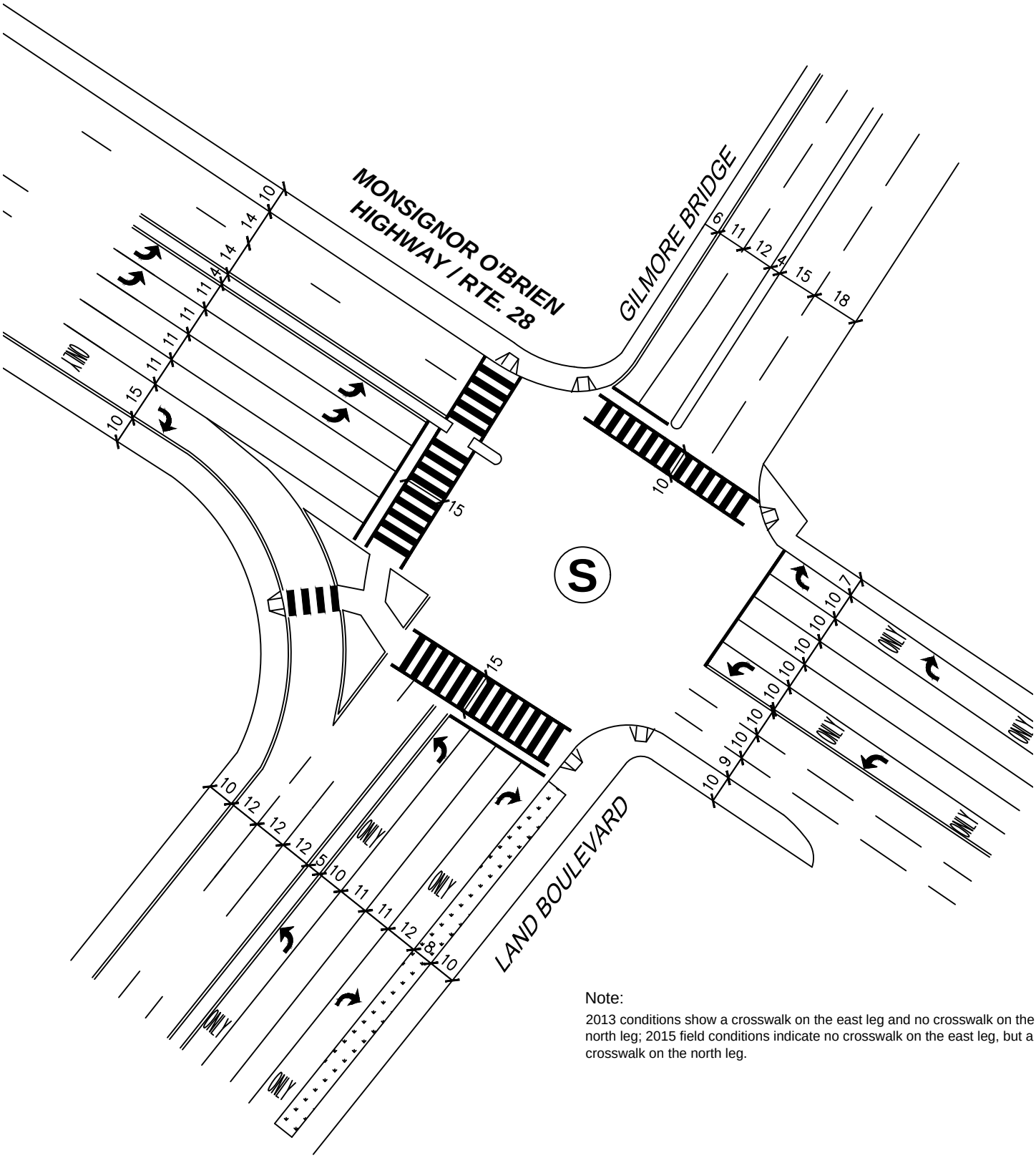


0 20 40 80 Feet

Existing Condition Intersection Sketch
O'Brien Highway at Cambridge Street
and East Street
Cambridge, MA

Figure 1.b.2

March 2020



Note:

2013 conditions show a crosswalk on the east leg and no crosswalk on the north leg; 2015 field conditions indicate no crosswalk on the east leg, but a crosswalk on the north leg.

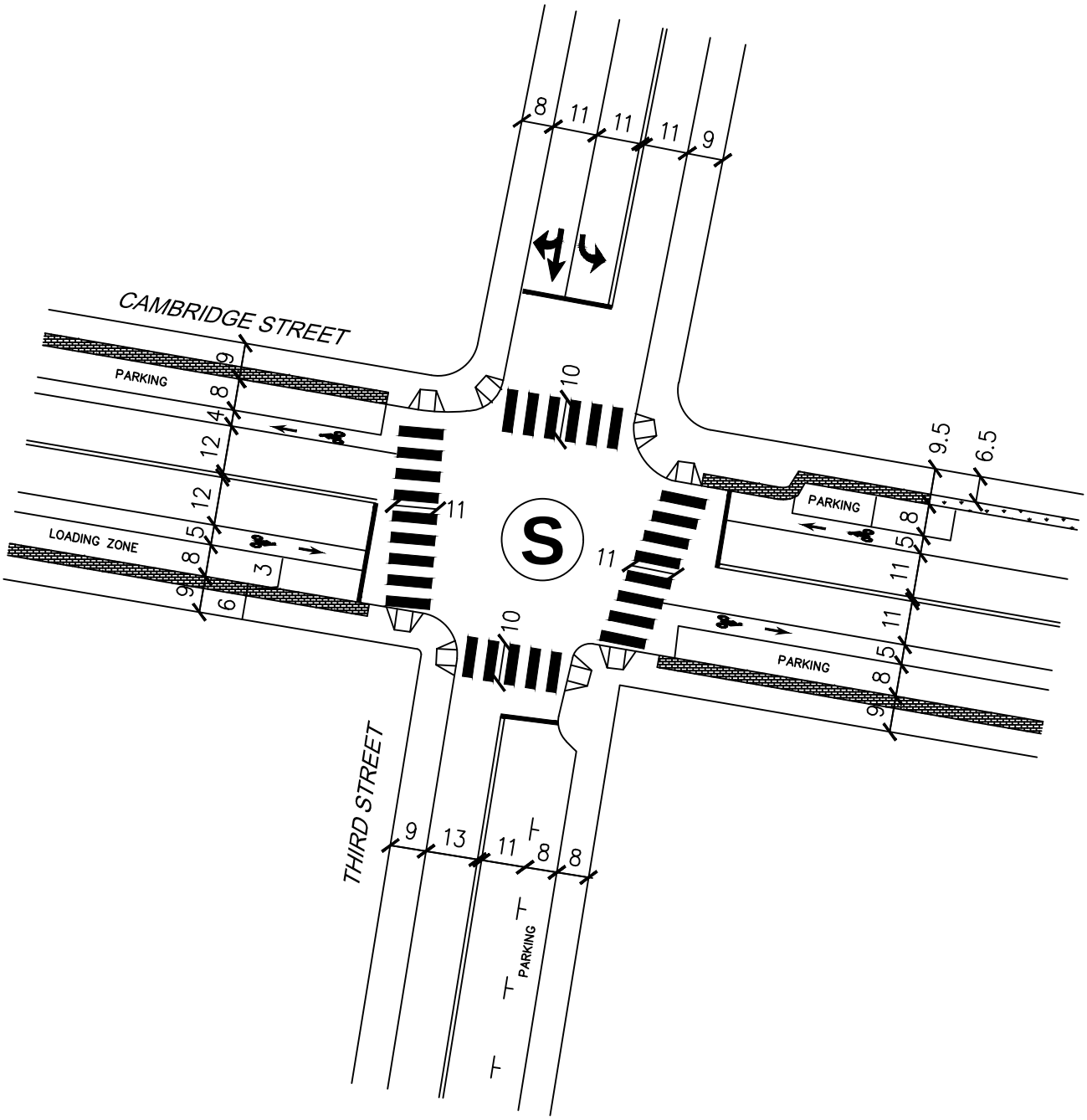
0 25 50 100 Feet

Existing Condition Intersection Sketch
O'Brien Highway at Land Boulevard

Figure 1.b.3

March 2020

Cambridge, MA



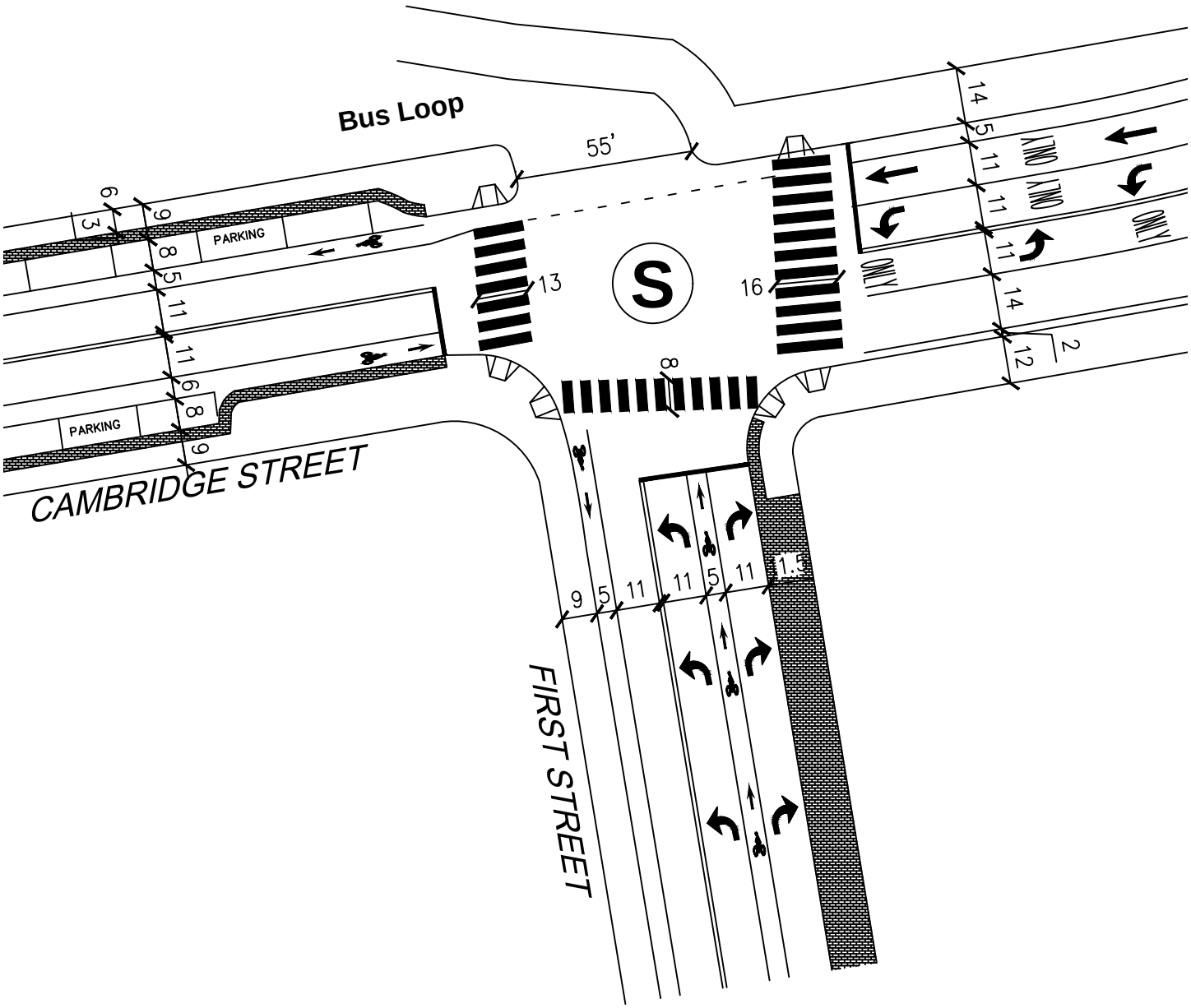
0 20 40 80 Feet

Existing Condition Intersection Sketch
Cambridge Street at Third Street

Cambridge, MA

Figure 1.b.4

March 2020



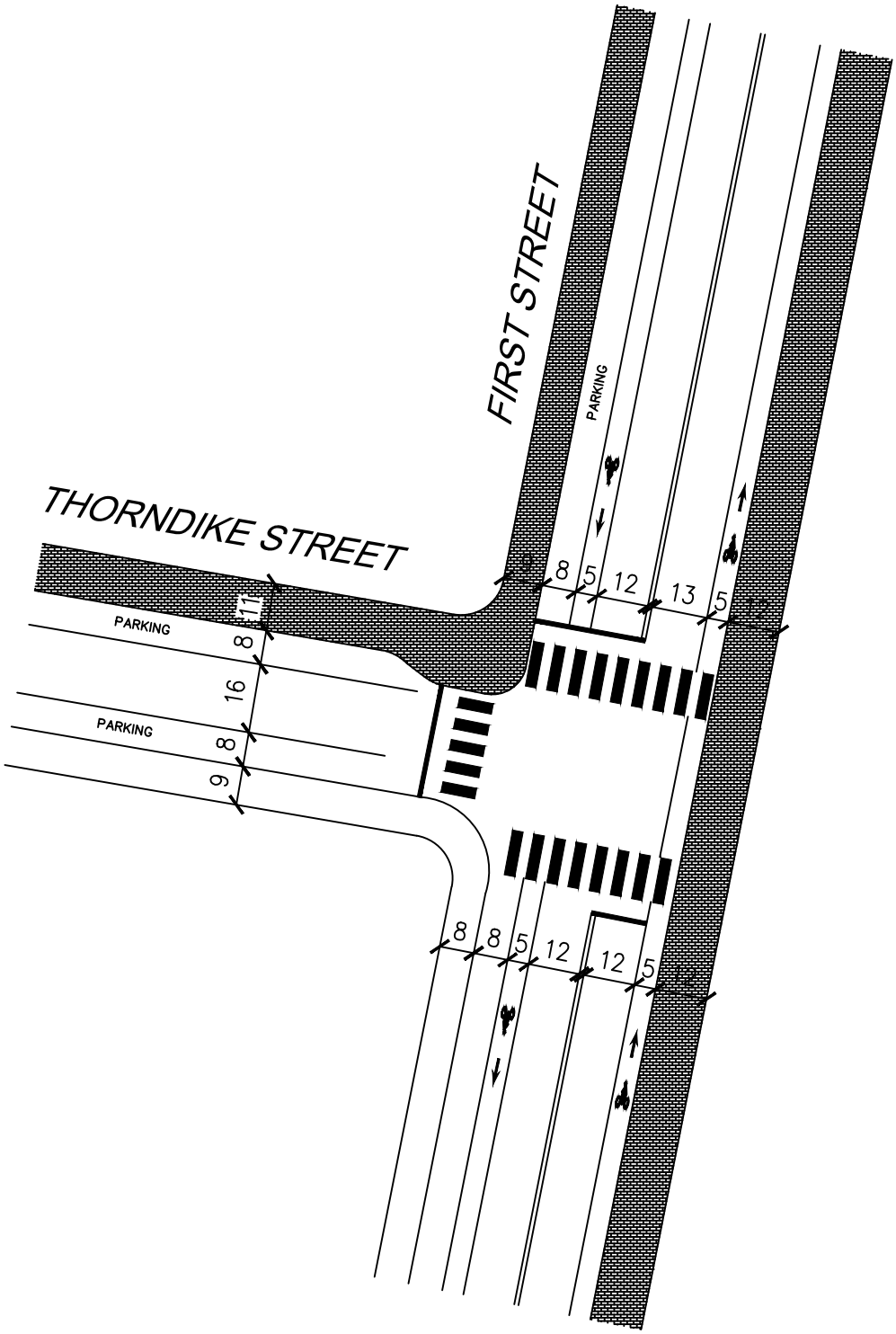
0 20 40 80 Feet

Existing Condition Intersection Sketch
Cambridge Street at First Street

Cambridge, MA

Figure 1.b.5

March 2020



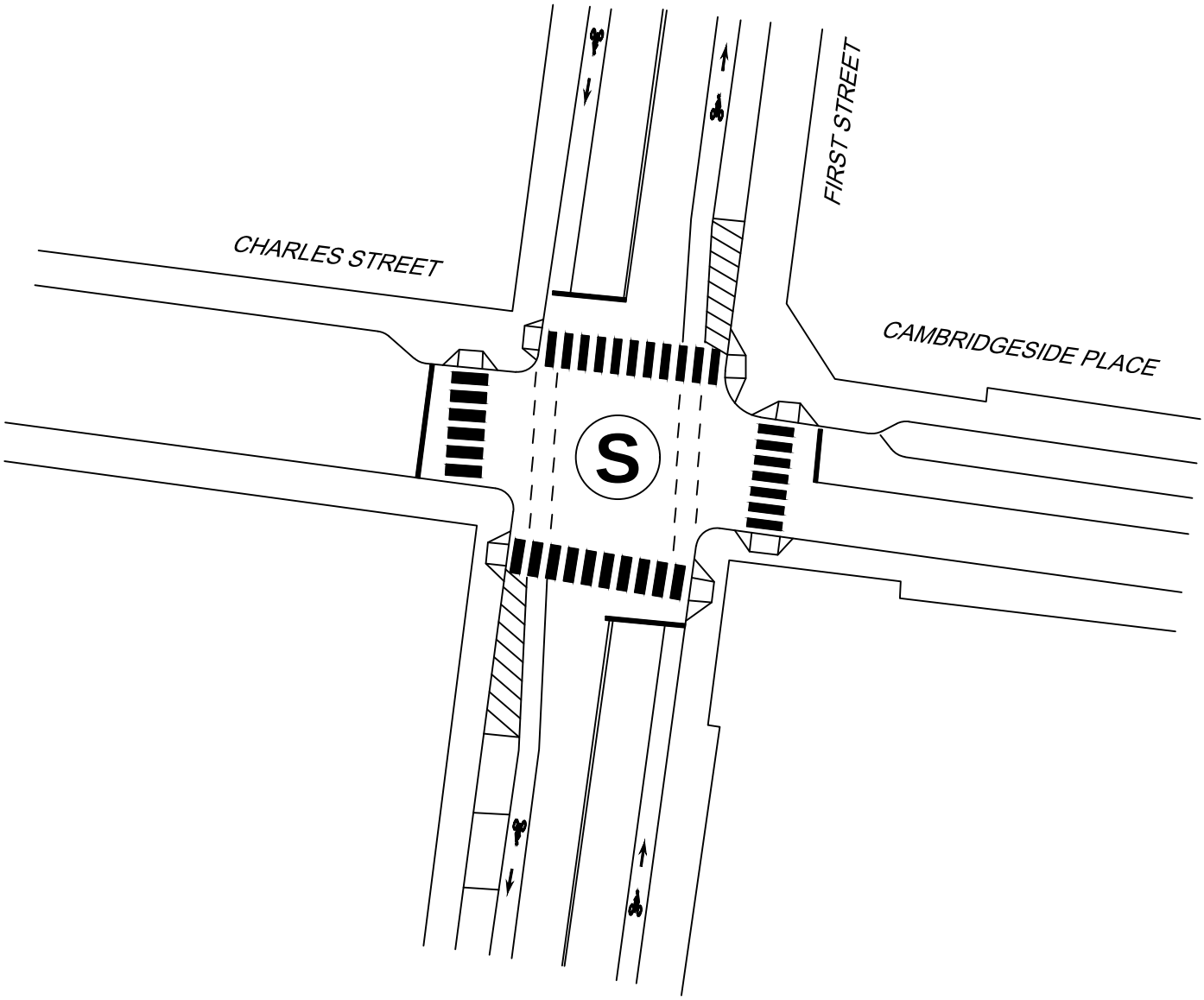
0 20 40 80 Feet

Existing Condition Intersection Sketch
First Street at Thorndike Street

Cambridge, MA

Figure 1.b.6

March 2020



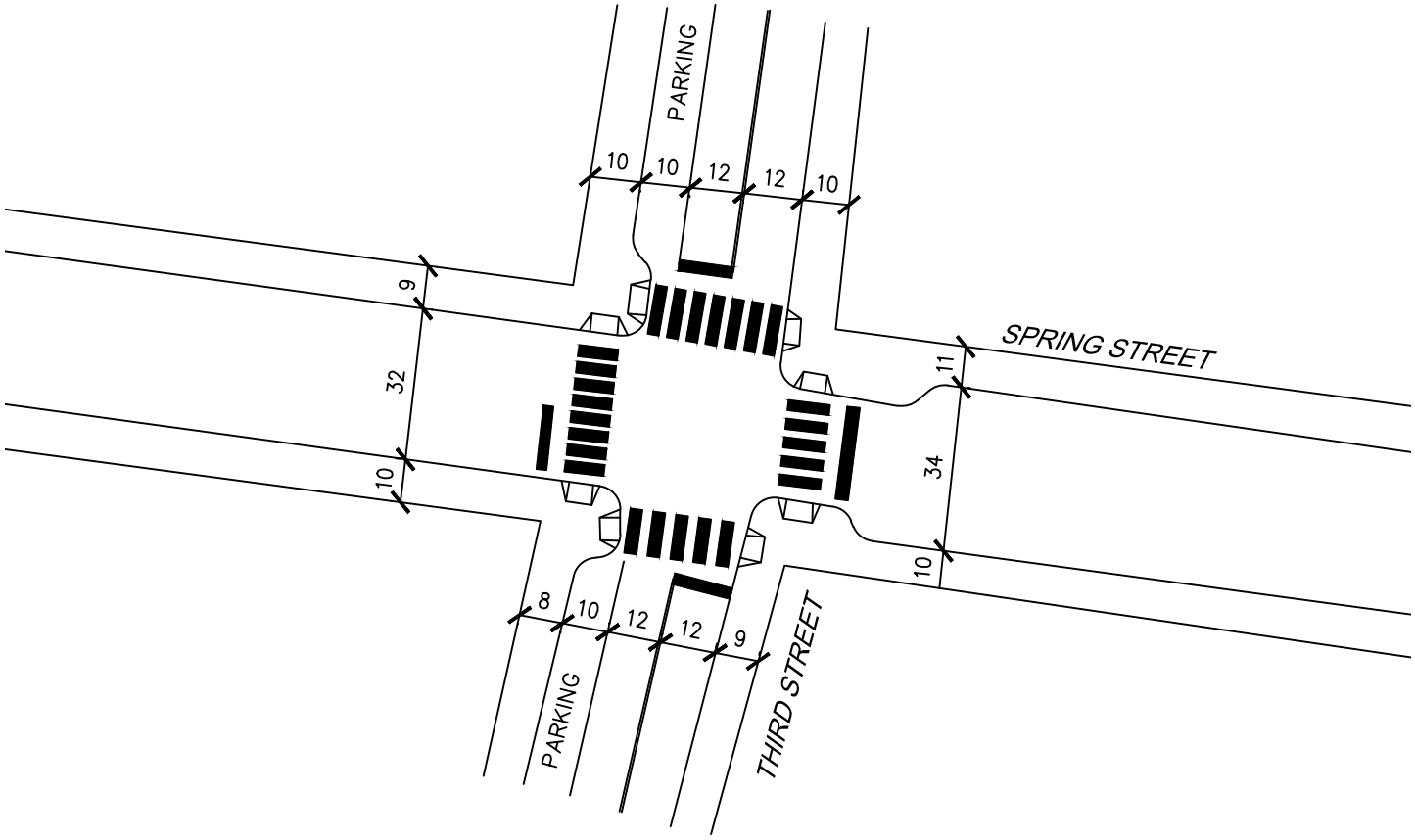
0 20 40 80 Feet

Existing Condition Intersection Sketch
First Street at Charles Street

Cambridge, MA

Figure 1.b.7

March 2020



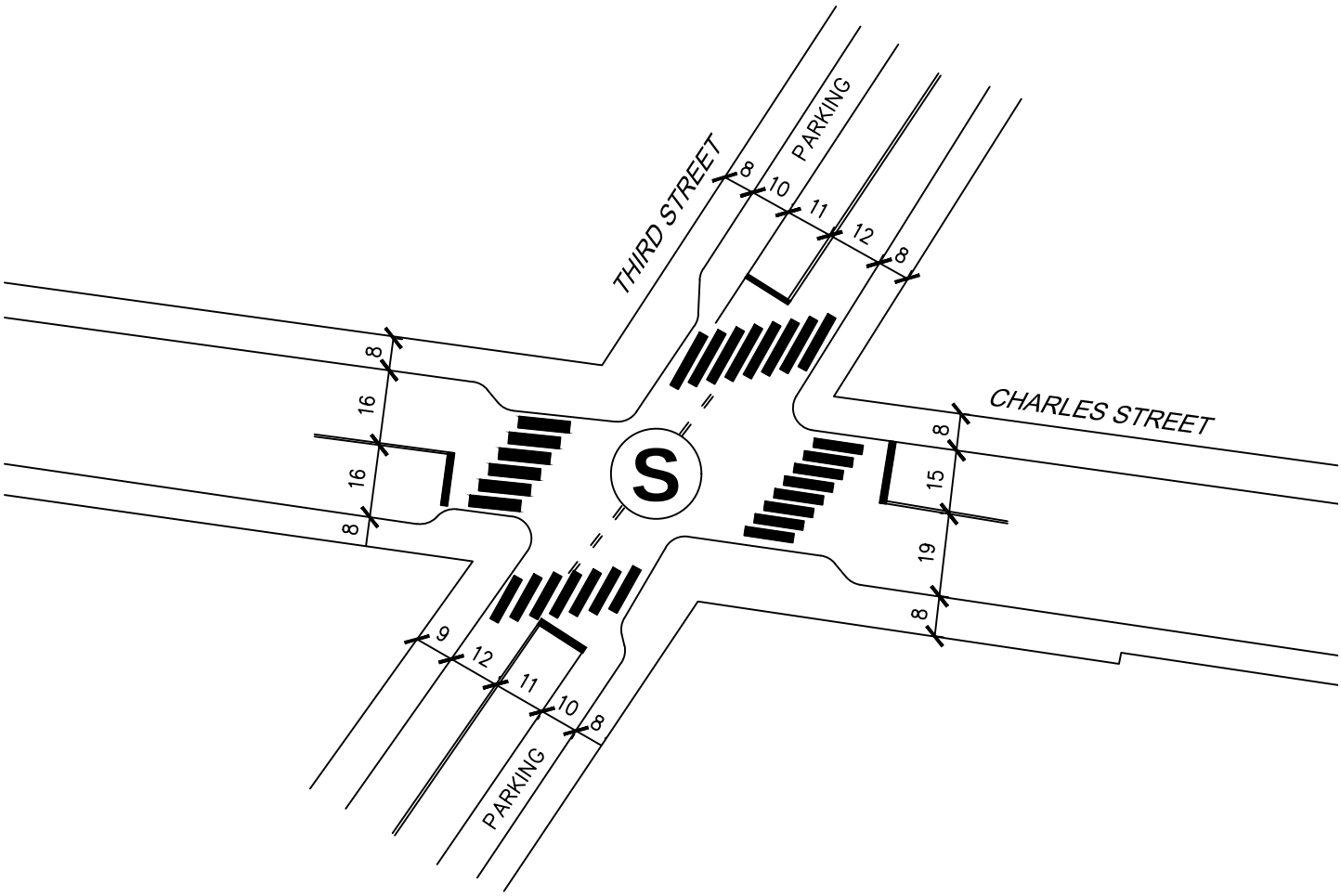
0 20 40 80 Feet

Existing Condition Intersection Sketch
Third Street at Spring Street

Cambridge, MA

Figure 1.b.8

March 2020



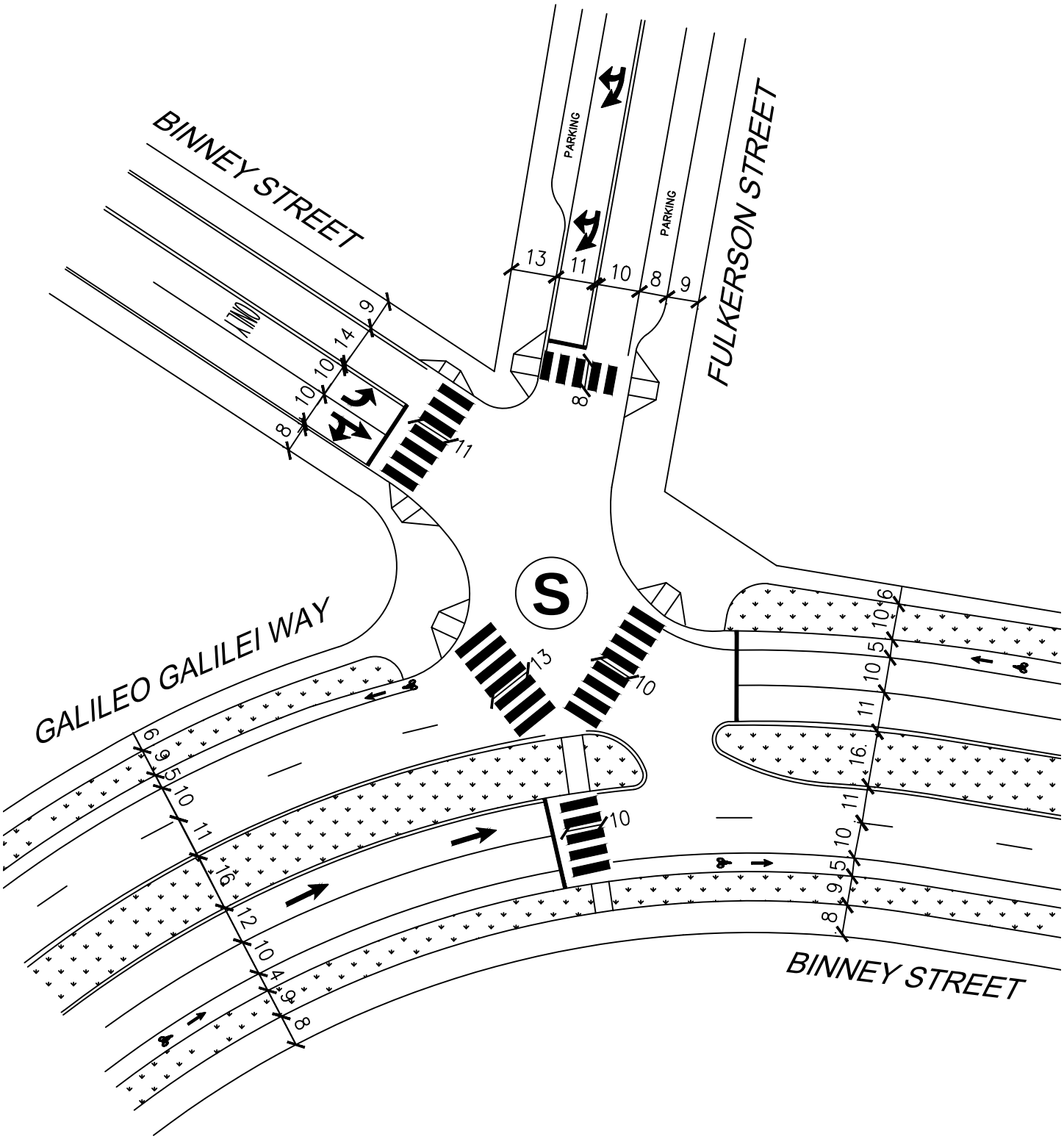
0 20 40 80 Feet

Existing Condition Intersection Sketch
Third Street at Charles Street

Cambridge, MA

Figure 1.b.9

March 2020

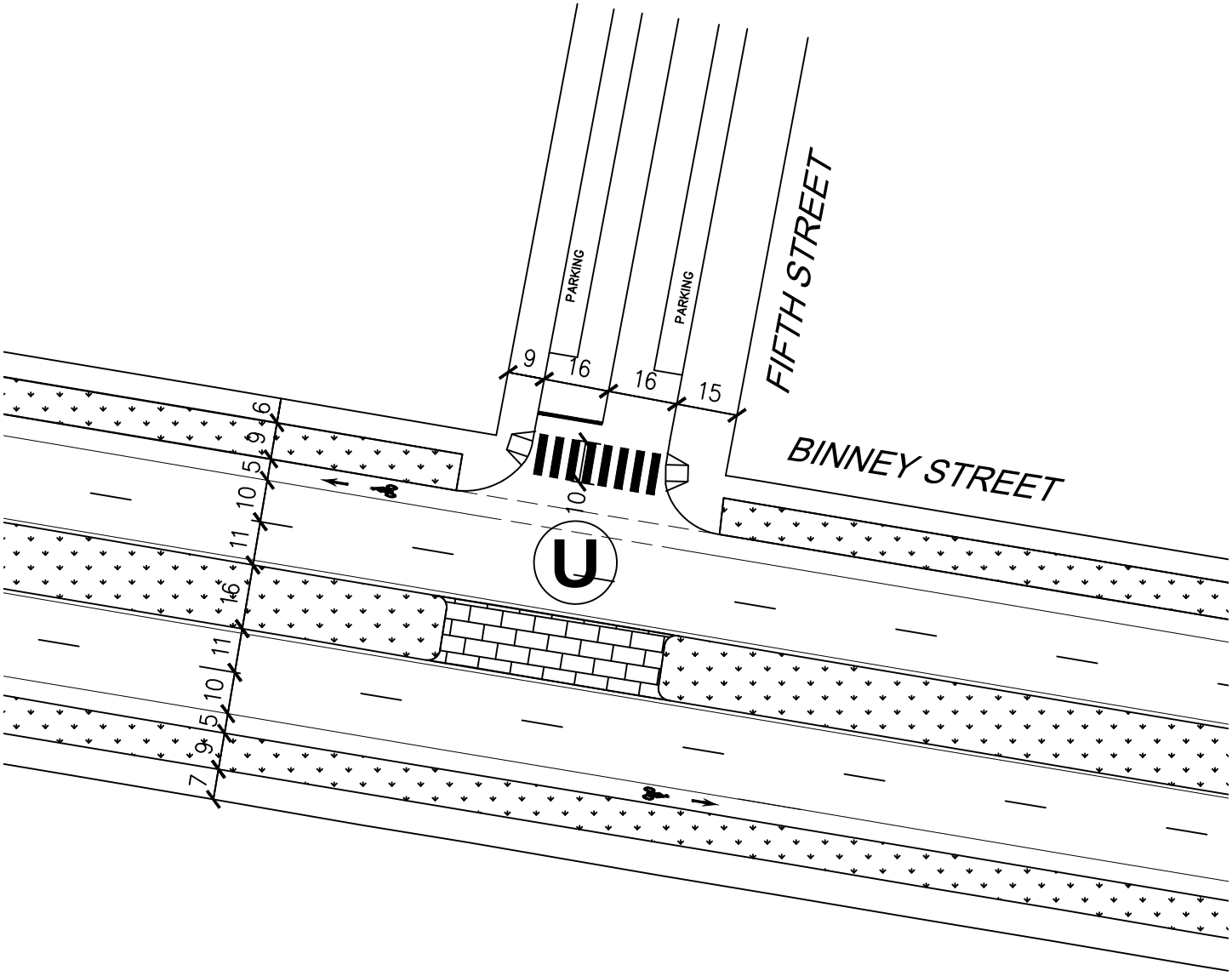


0 20 40 80 Feet

Existing Condition Intersection Sketch
Galileo Galilei Way at Binney Street
and Fulkerson Street
Cambridge, MA

Figure 1.b.10

March 2020

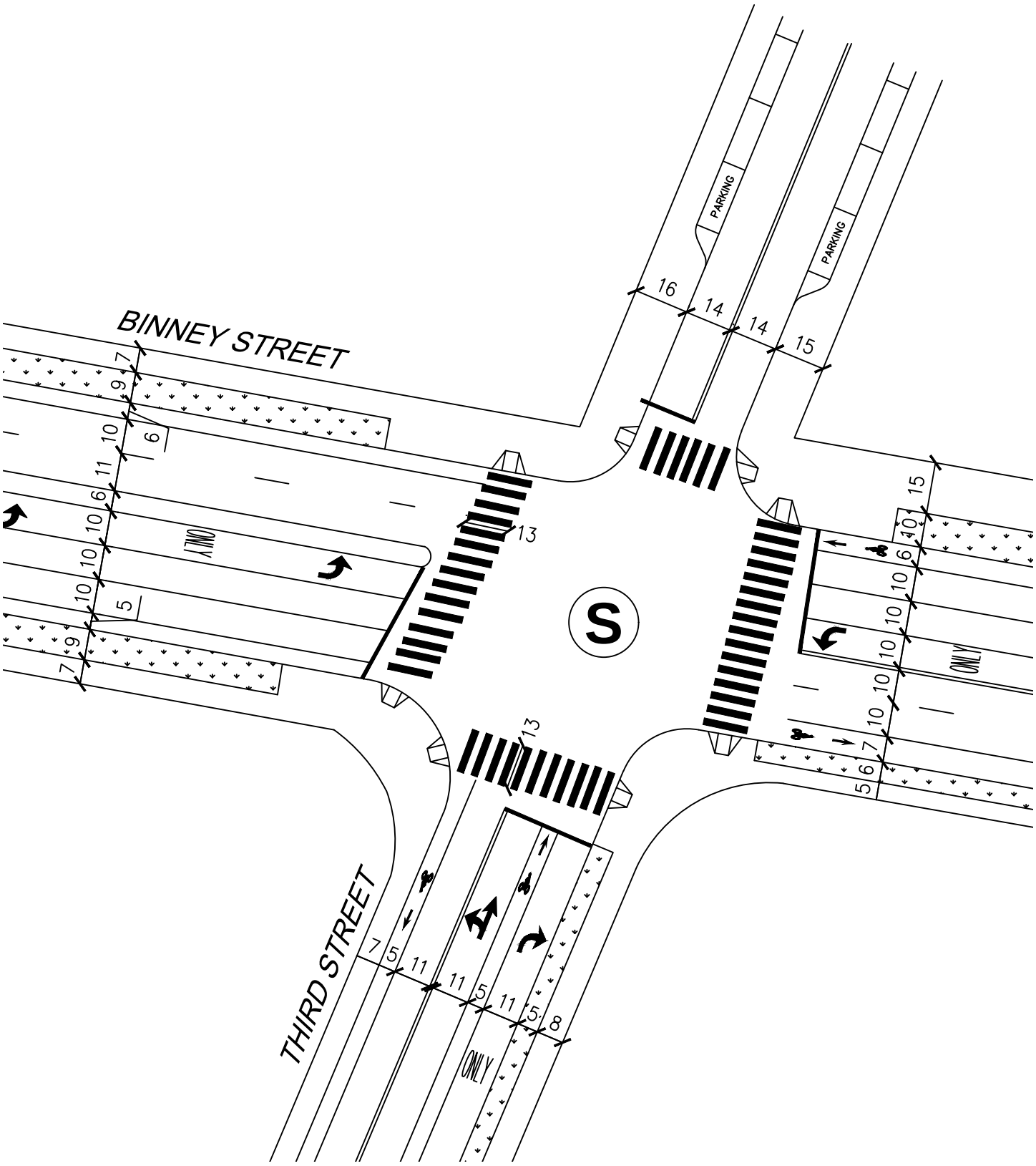


0 20 40 80 Feet

Existing Condition Intersection Sketch
Galileo Galilei Way at Binney Street
and Fulkerson Street
Cambridge, MA

Figure 1.b.11

March 2020

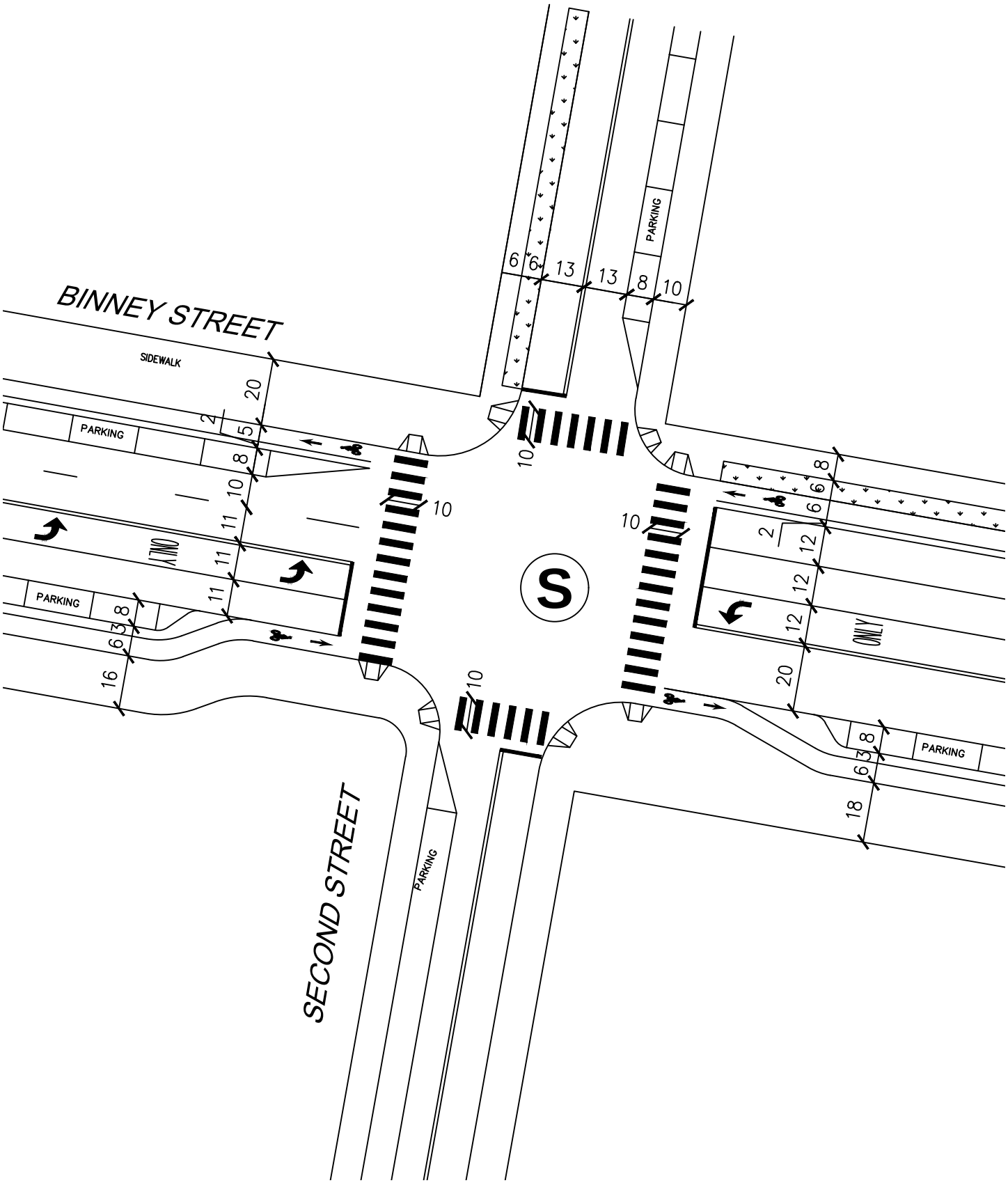


Existing Condition Intersection Sketch
Binney Street at Third Street

Cambridge, MA

Figure 1.b.12

March 2020



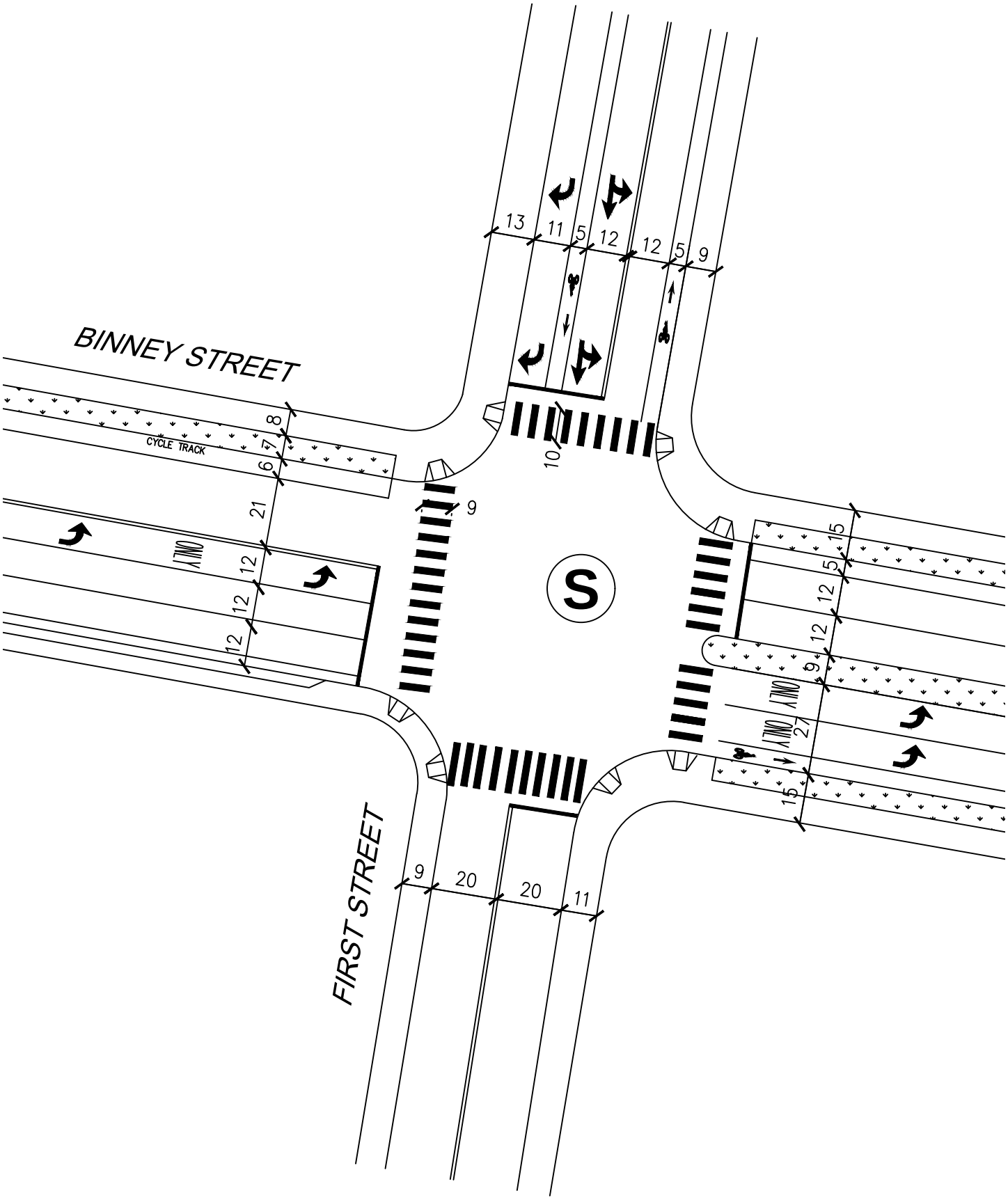
0 20 40 80 Feet

Existing Condition Intersection Sketch
Binney Street at Second Street

Cambridge, MA

Figure 1.b.13

March 2020



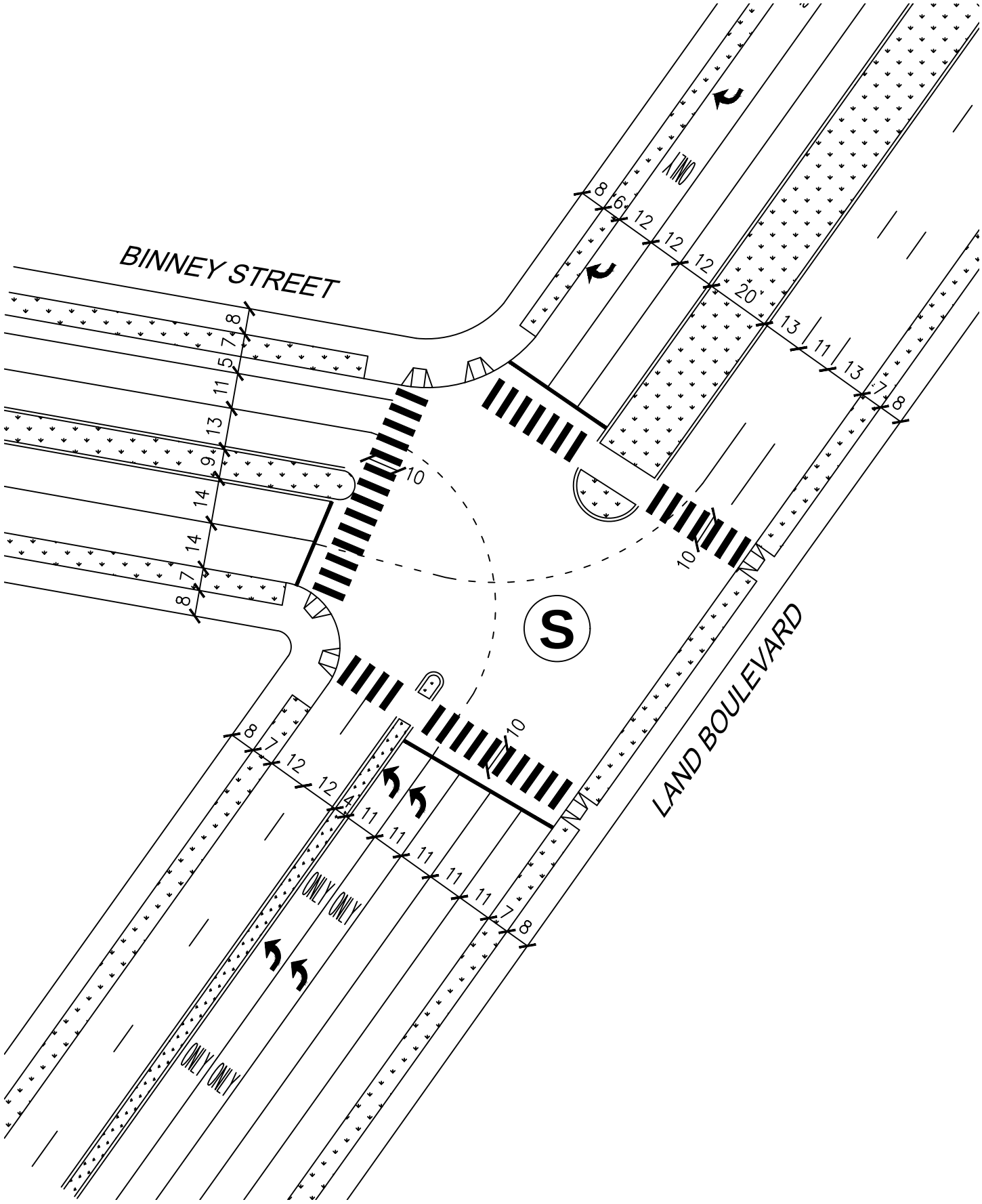
0 20 40 80 Feet

Existing Condition Intersection Sketch
Binney Street at First Street

Cambridge, MA

Figure 1.b.14

March 2020



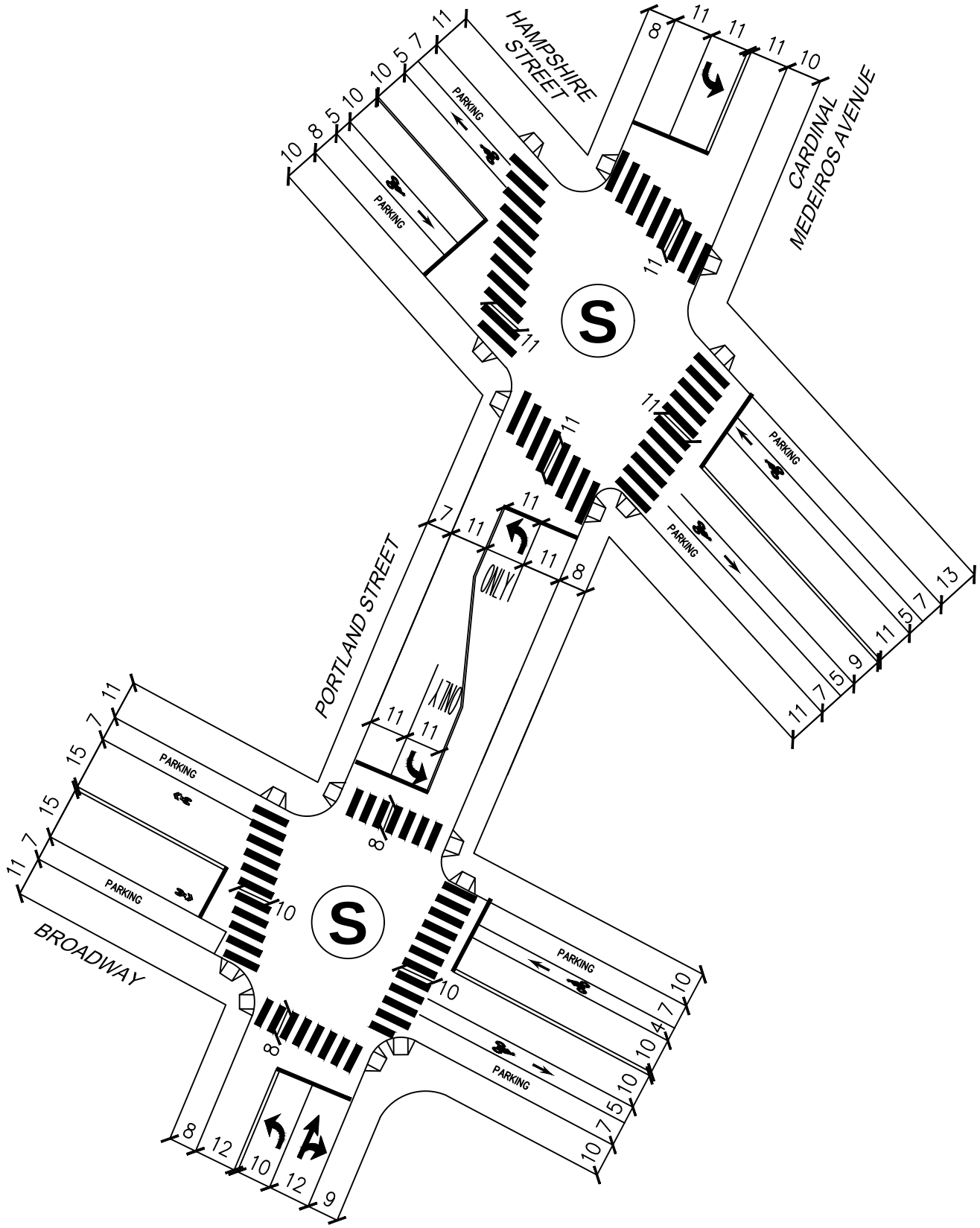
0 20 40 80 Feet

Existing Condition Intersection Sketch
Binney Street at Land Boulevard

Cambridge, MA

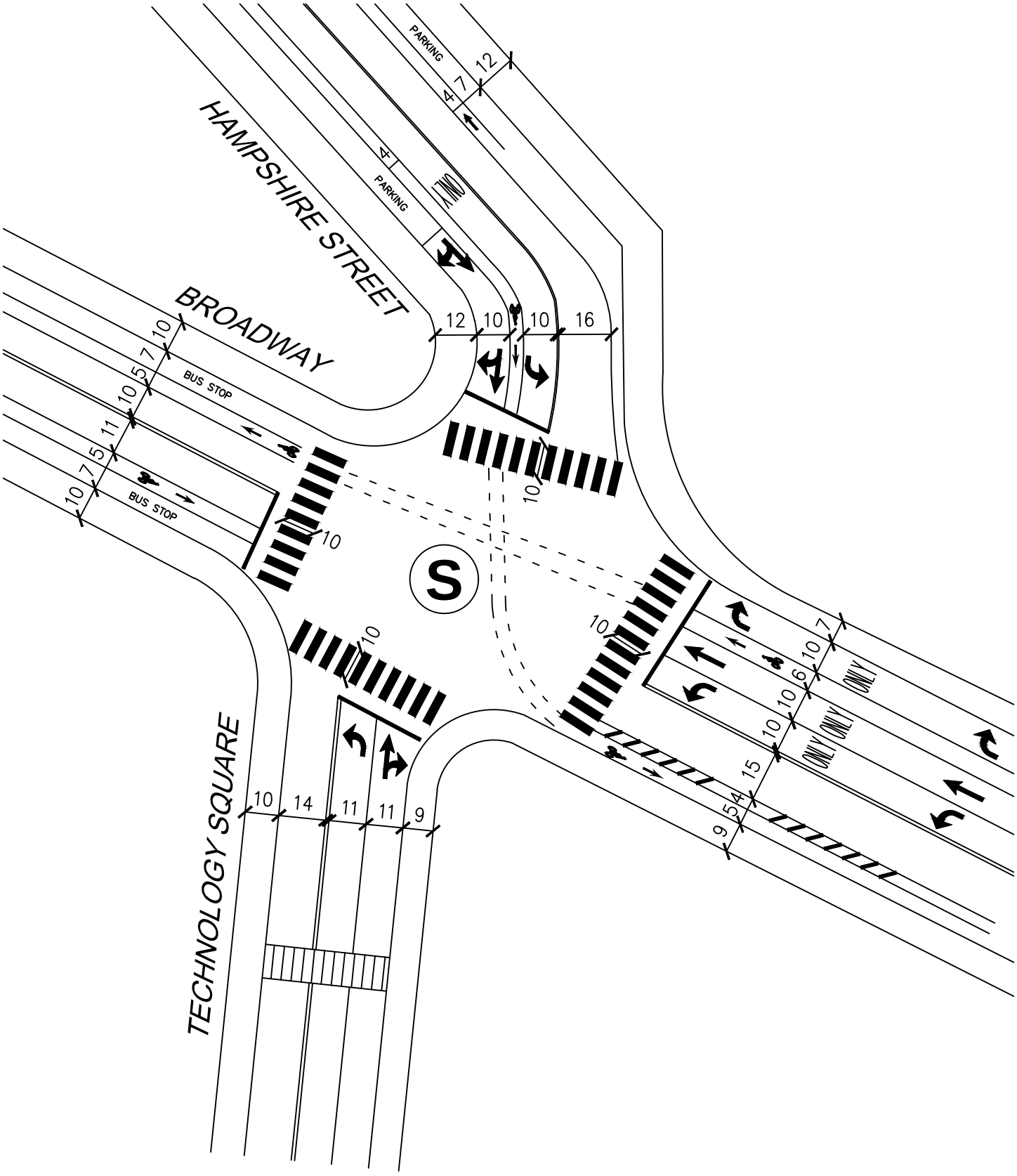
Figure 1.b.15

March 2020



0 20 40 80 Feet

Existing Condition Intersection Sketch **Figure 1.b.16**
Hampshire St at Cardinal Medeiros Ave and
Portland St & Broadway at Portland St March 2020
Cambridge, MA



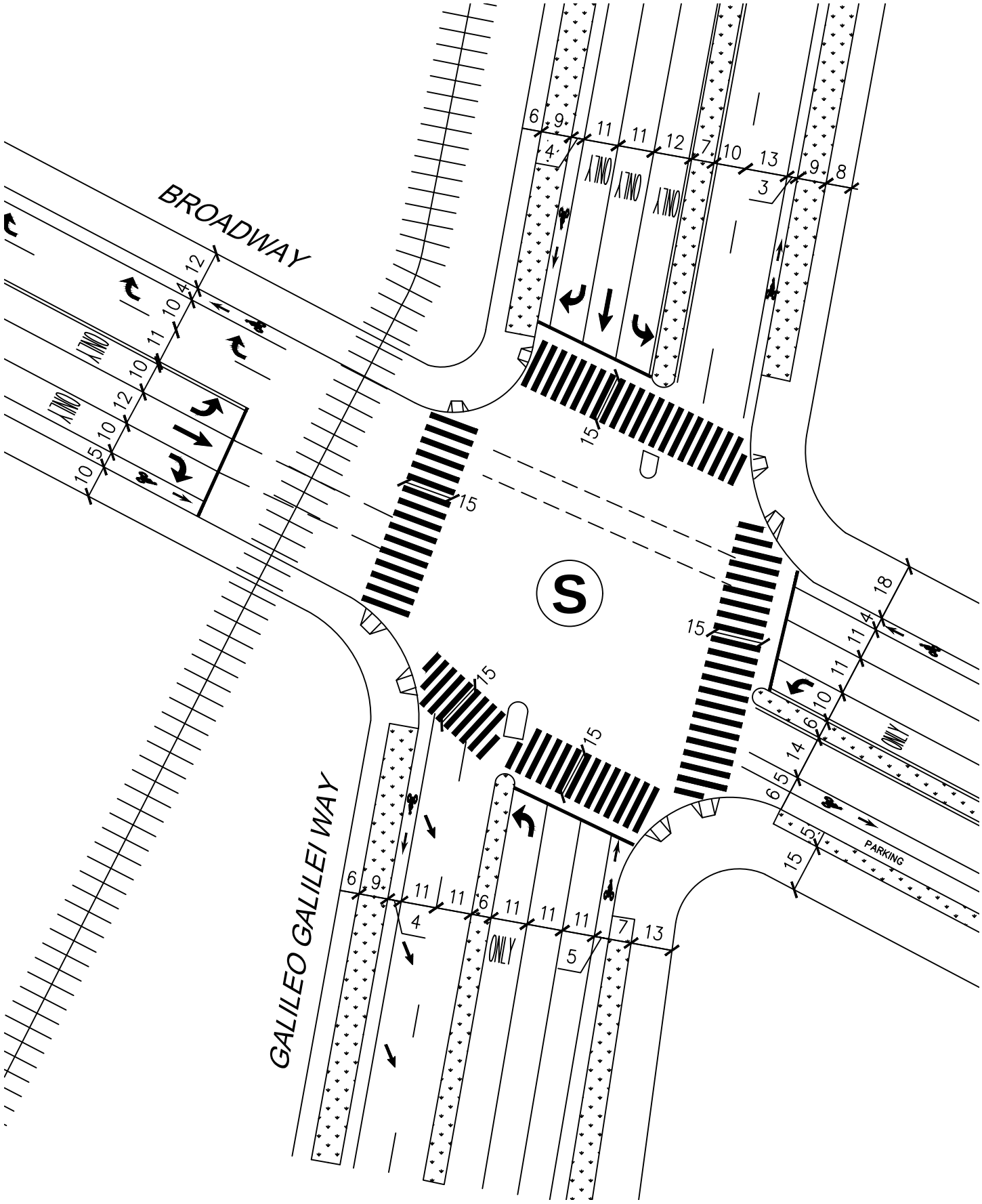
0 20 40 80 Feet

Existing Condition Intersection Sketch
Hampshire Street at Broadway

Cambridge, MA

Figure 1.b.17

March 2020



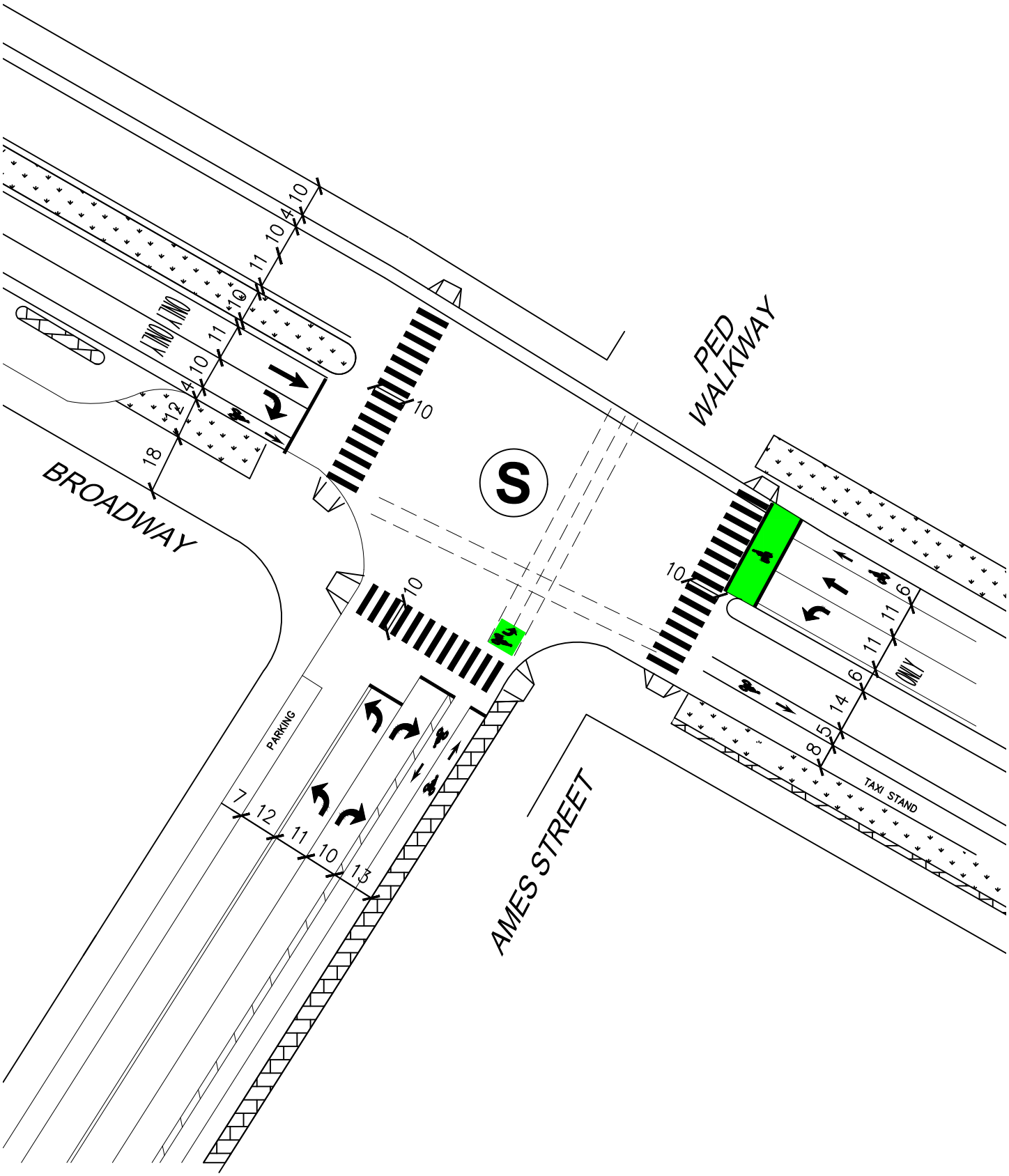
0 20 40 80 Feet

Existing Condition Intersection Sketch
Broadway at Galileo Galilei Way

Cambridge, MA

Figure 1.b.18

March 2020

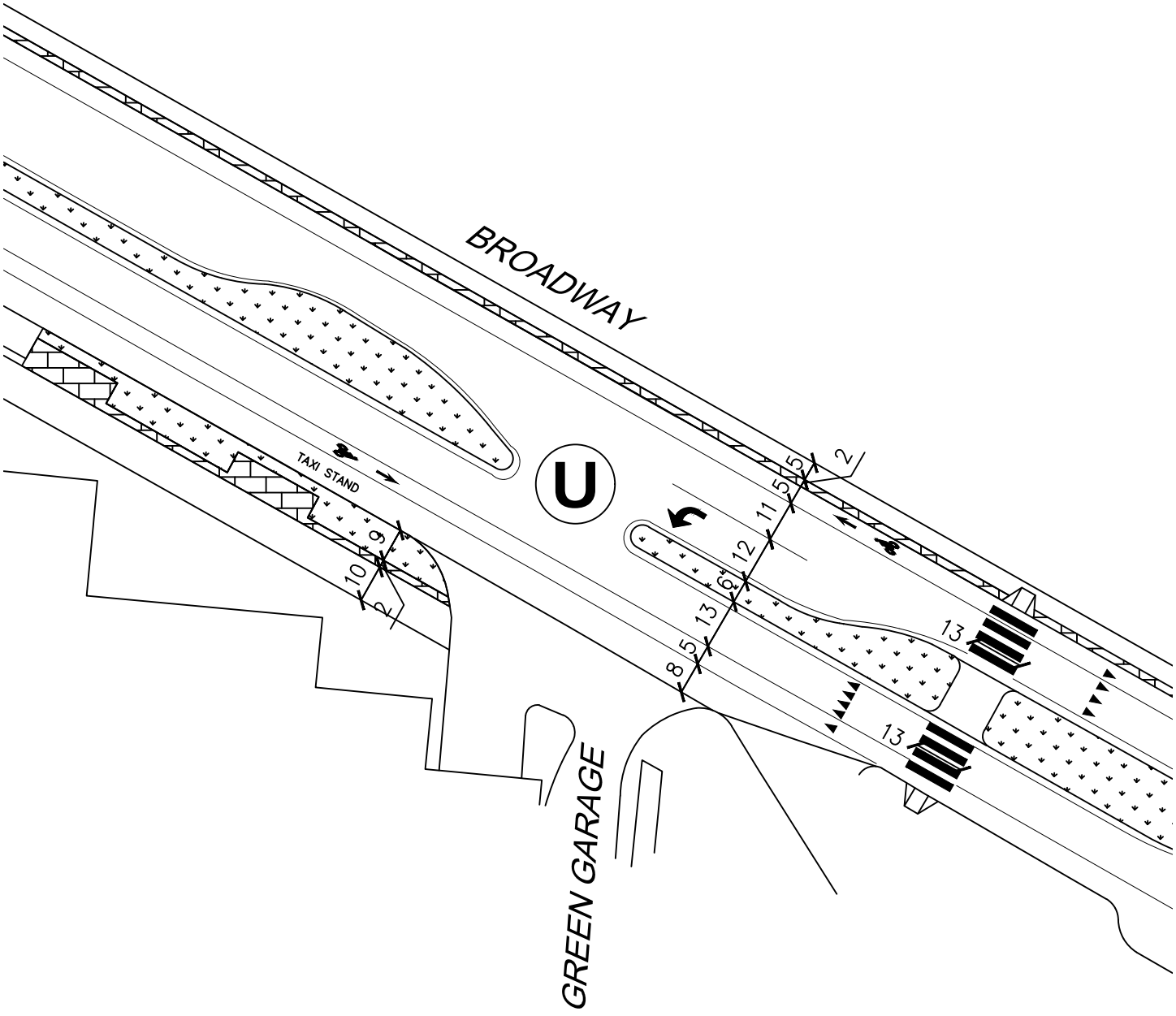


Existing Condition Intersection Sketch
Broadway at Ames Street

Cambridge, MA

Figure 1.b.19

March 2020



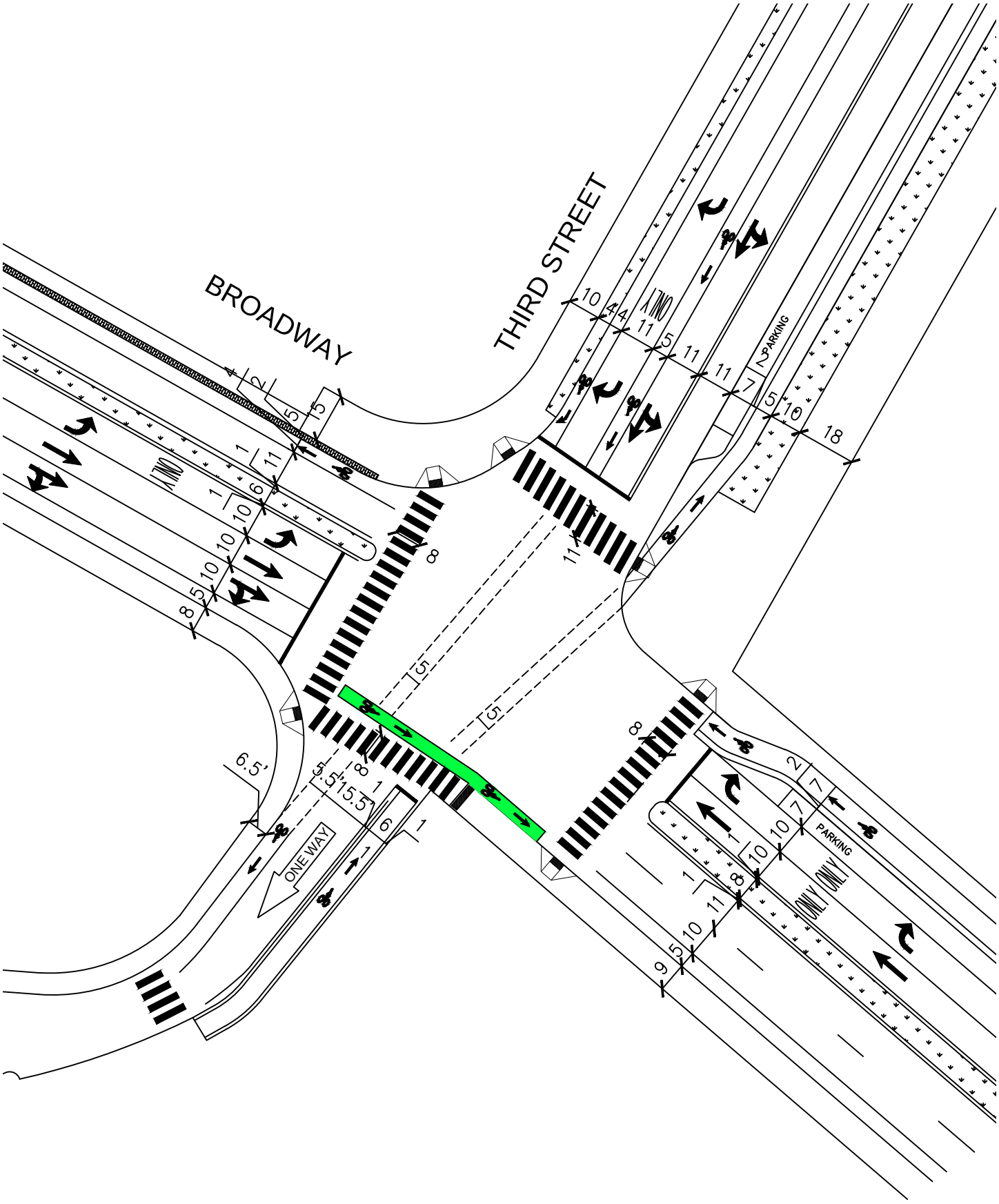
0 20 40 80 Feet

Existing Condition Intersection Sketch
Broadway at Green Garage

Cambridge, MA

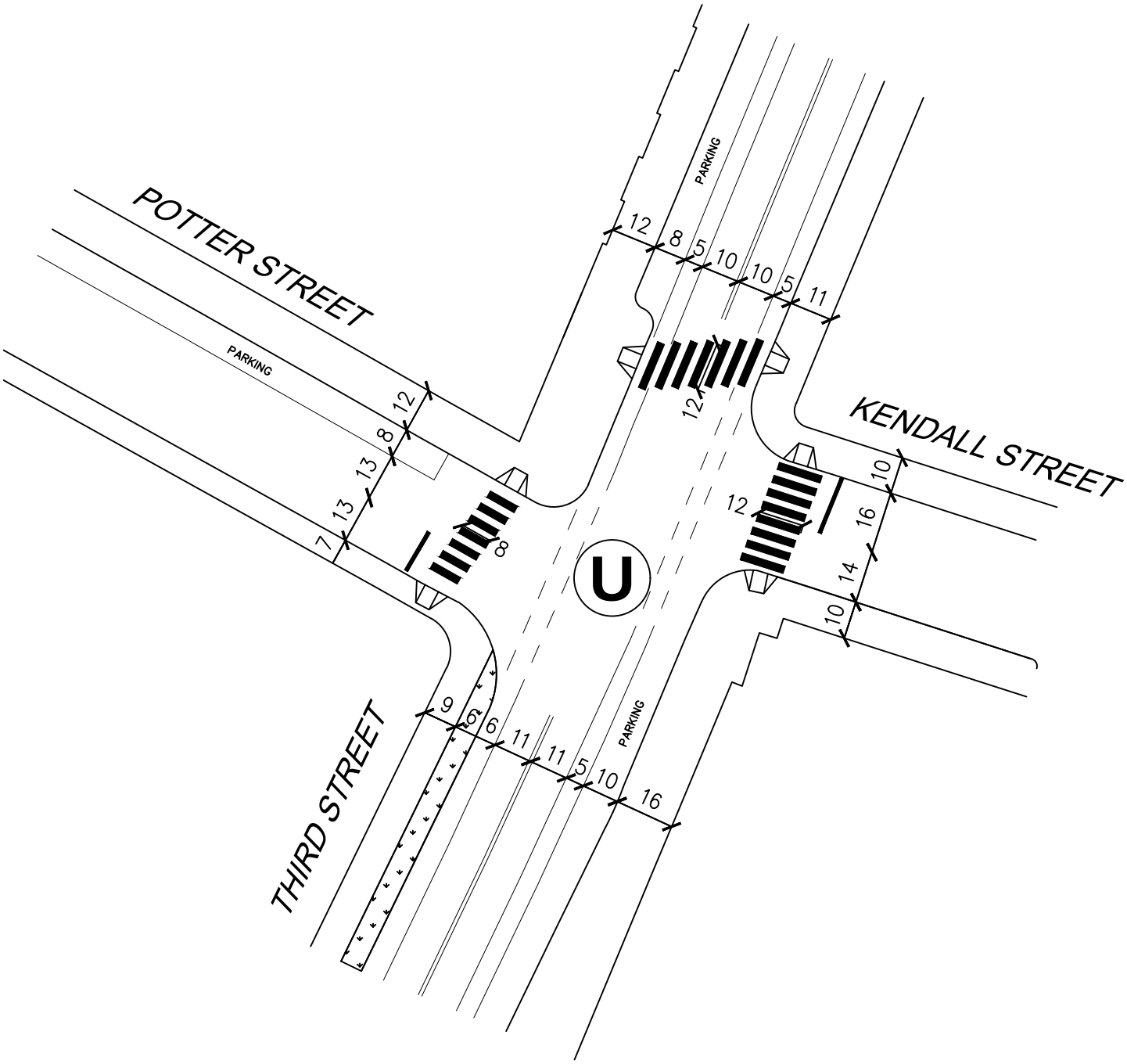
Figure 1.b.20

March 2020



0 20 40 80 Feet

Existing Condition Intersection Sketch **Figure 1.b.21**
Broadway at Main Street and Third Street
March 2020
Cambridge, MA

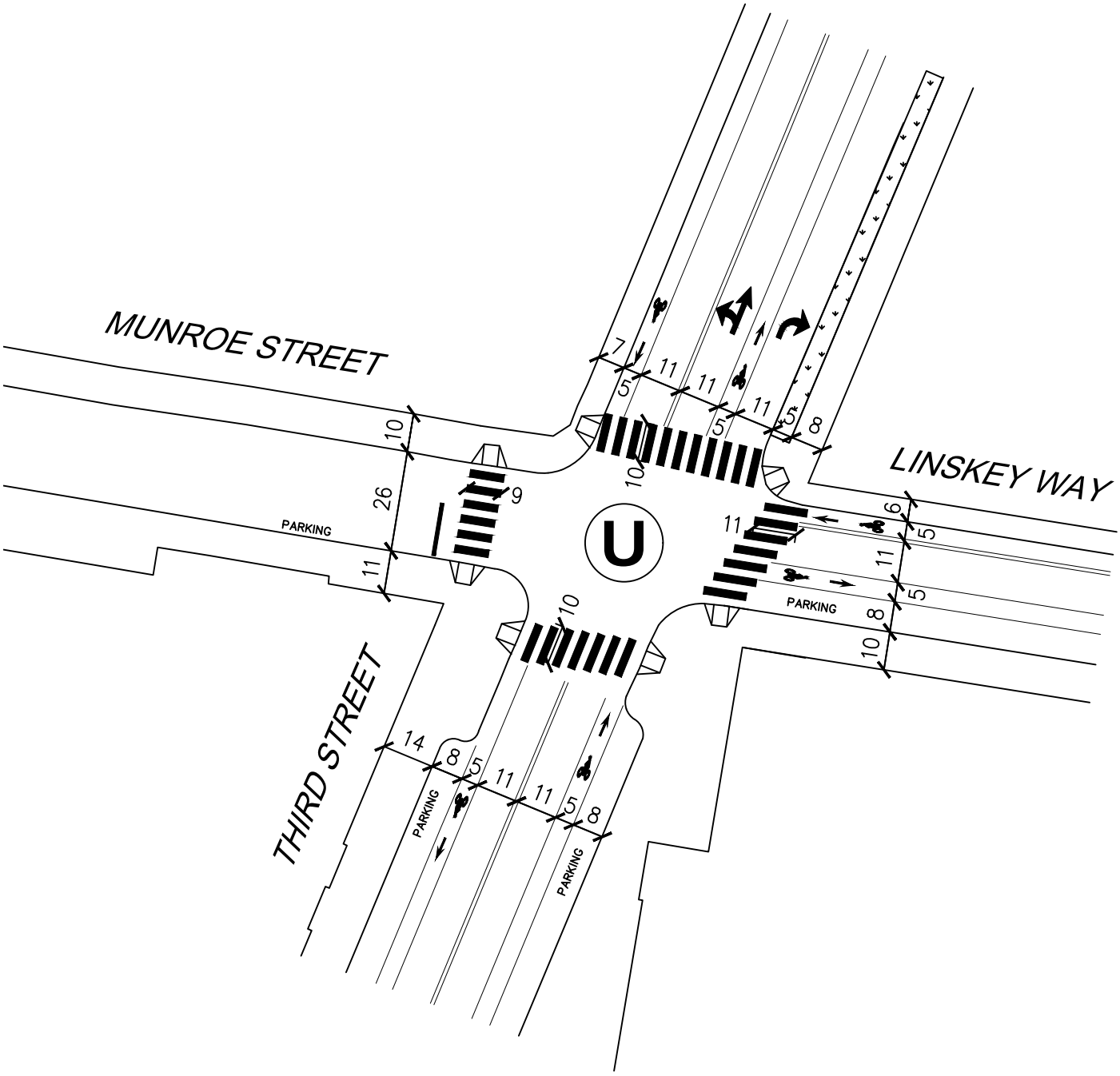


0 20 40 80 Feet

Existing Condition Intersection Sketch
Third Street at Potter Street and
Kendall Street
Cambridge, MA

Figure 1.b.22

March 2020

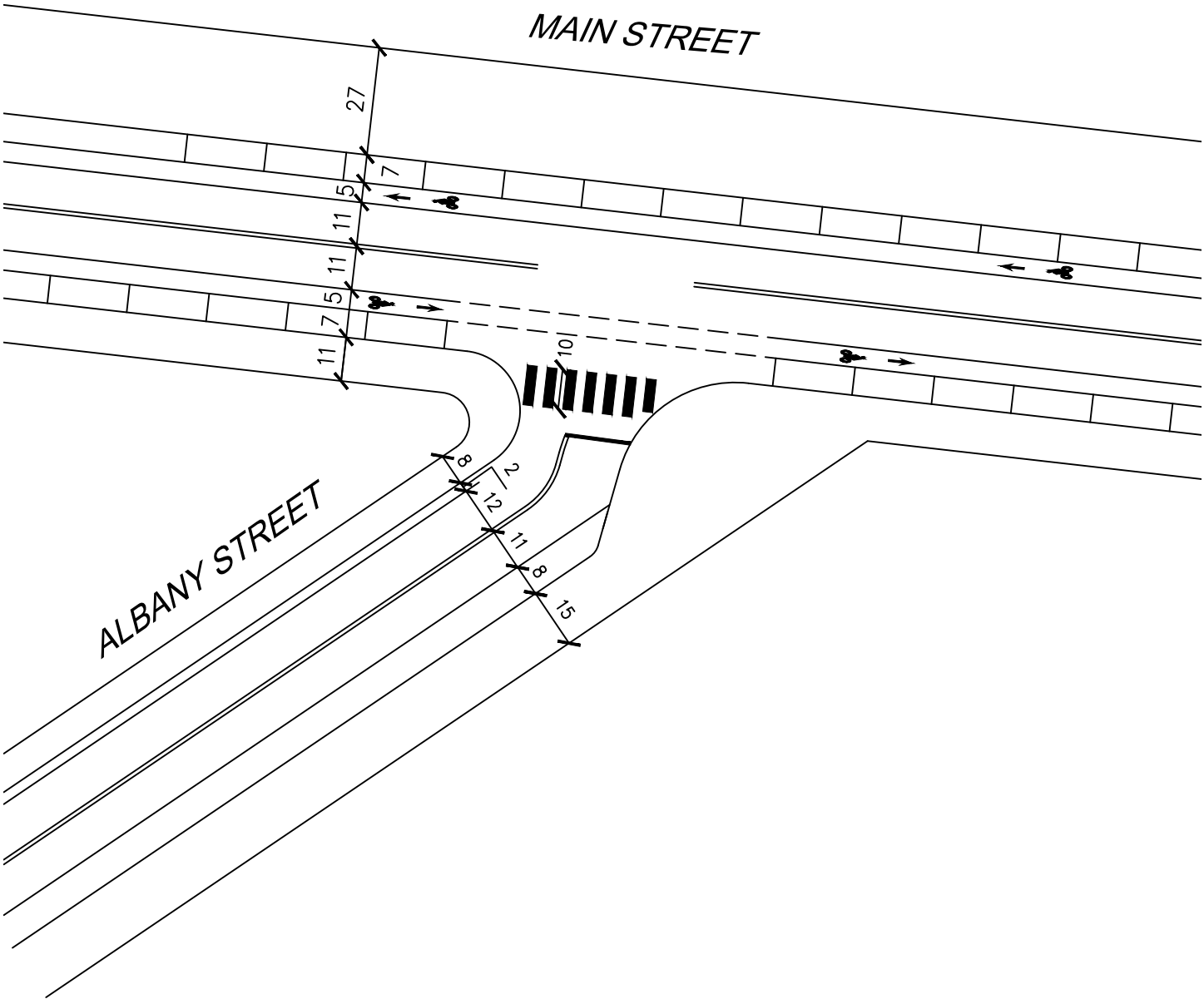


0 20 40 80 Feet

Existing Condition Intersection Sketch
Third Street at Munroe Street and
Linskey Way
Cambridge, MA

Figure 1.b.23

March 2020



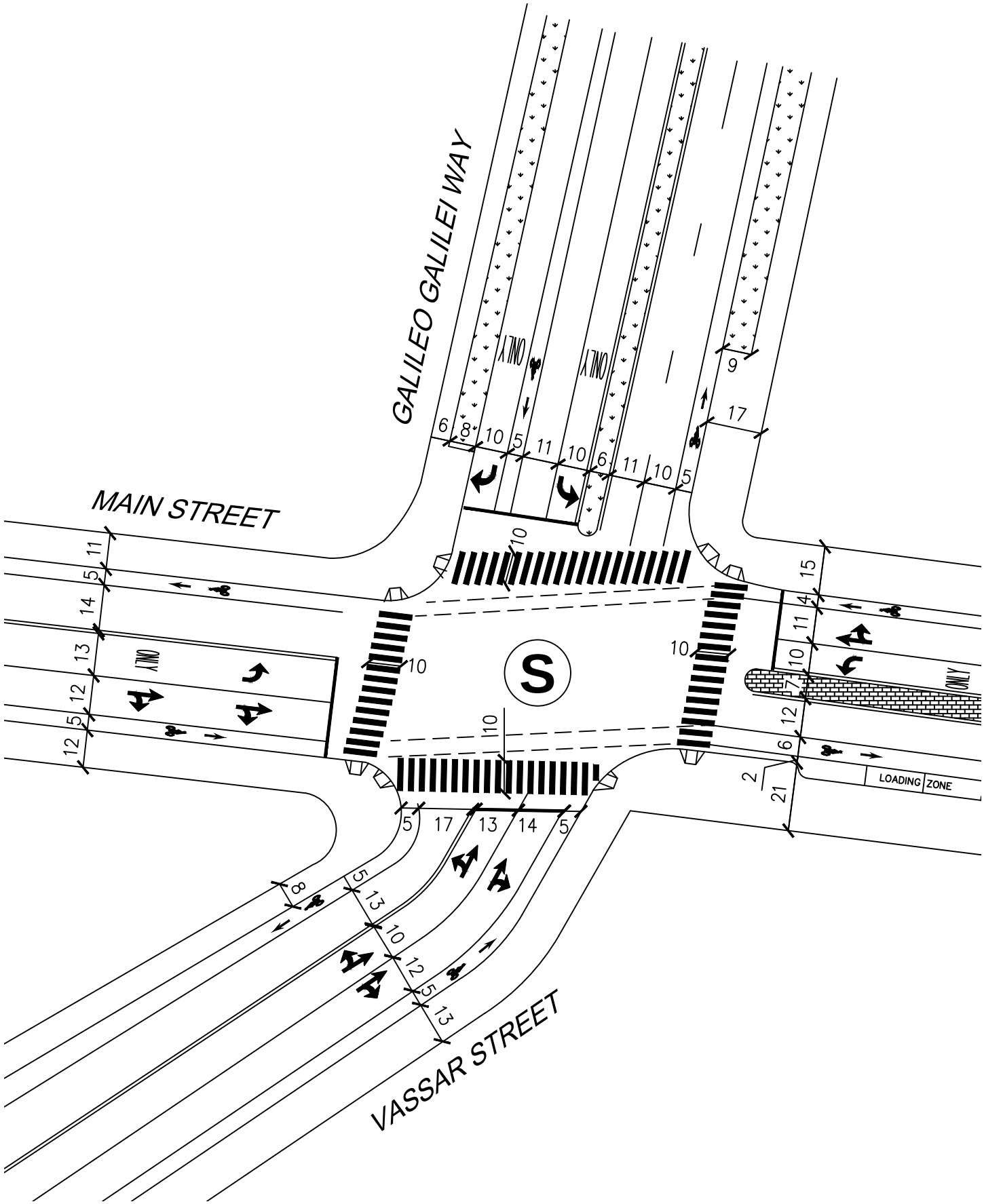
0 20 40 80 Feet

Existing Condition Intersection Sketch
Main Street at Albany Street

Cambridge, MA

Figure 1.b.24

March 2020

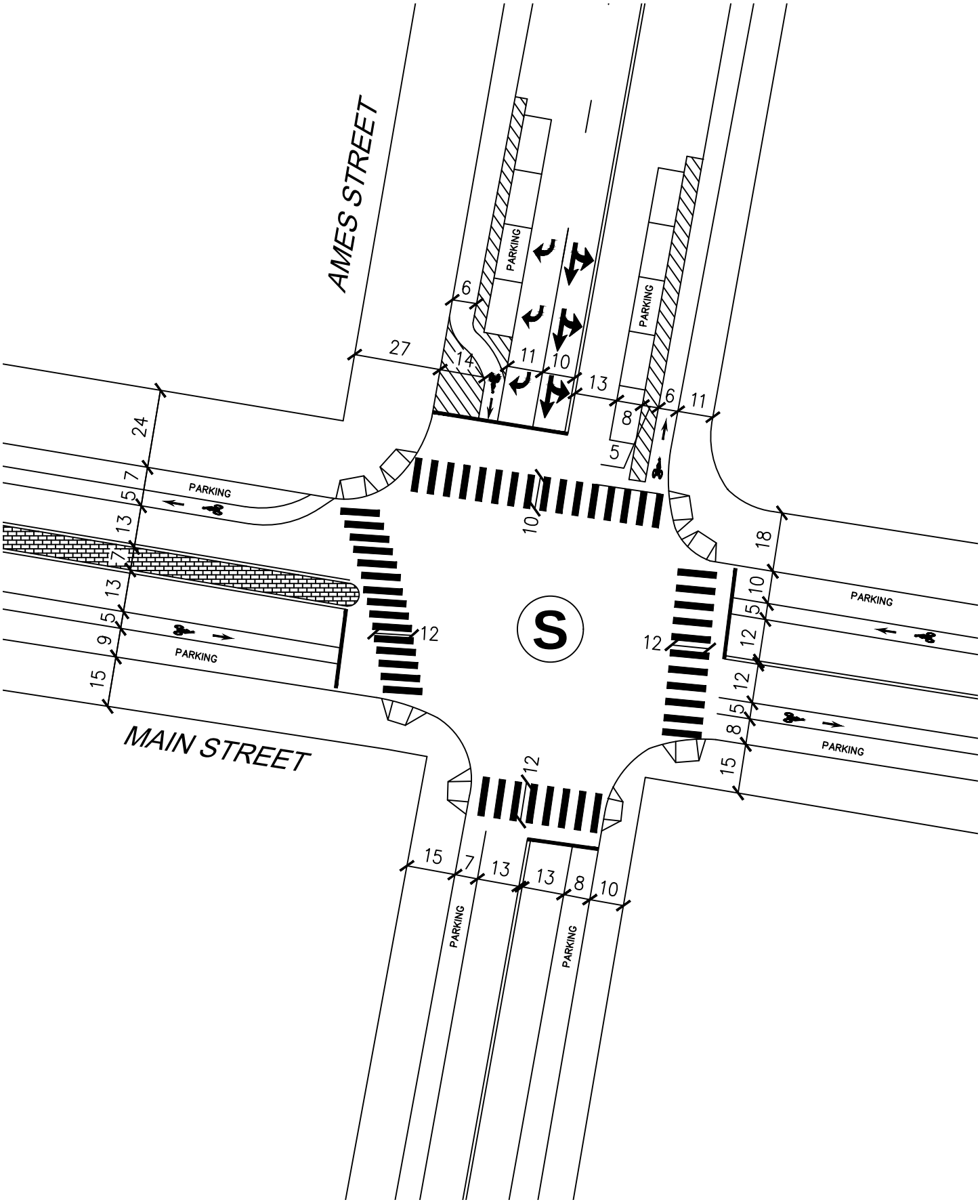


0 20 40 80 Feet

Existing Condition Intersection Sketch
Main Street at Galileo Galilei Way
and Vassar Street
Cambridge, MA

Figure 1.b.25

March 2020



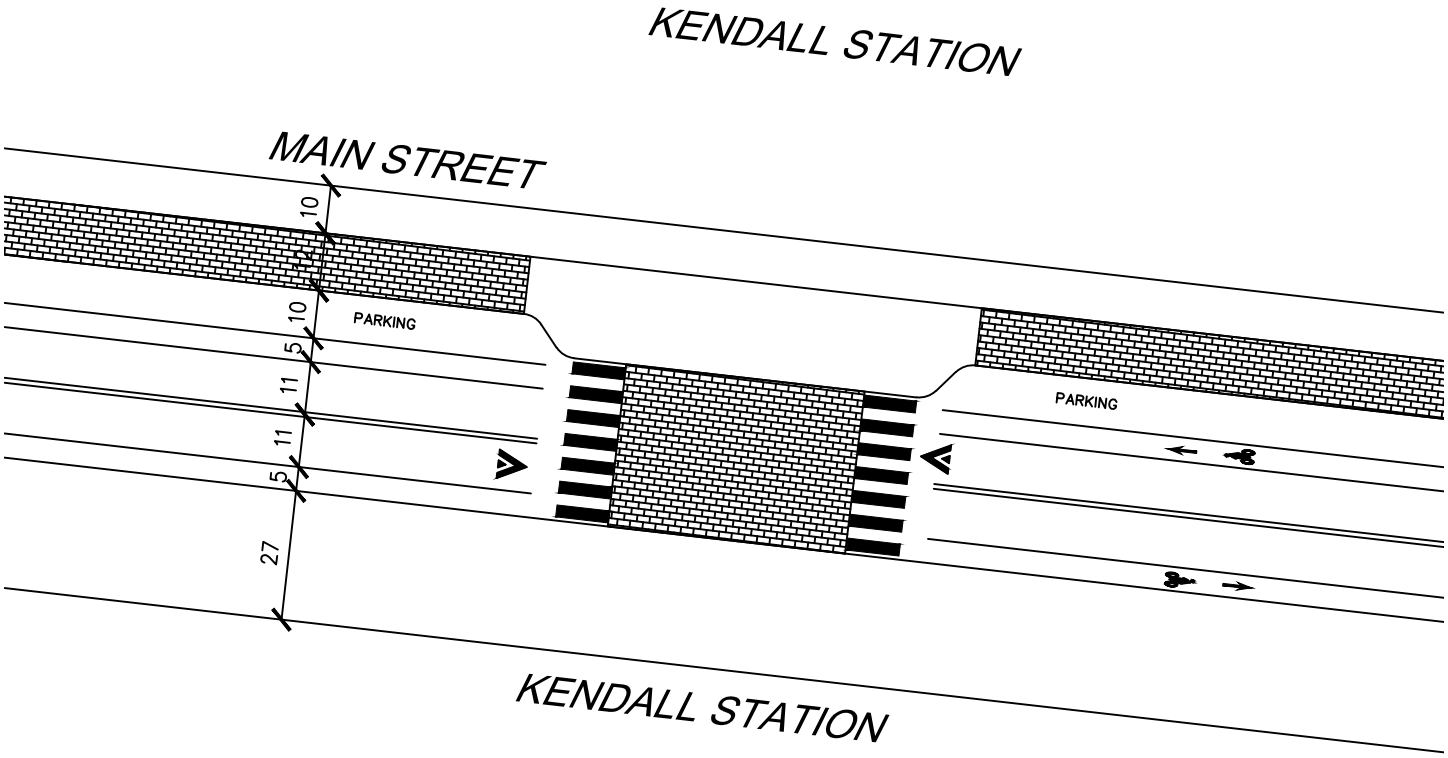
0 20 40 80 Feet

Existing Condition Intersection Sketch
Main Street at Ames Street

Cambridge, MA

Figure 1.b.26

March 2020



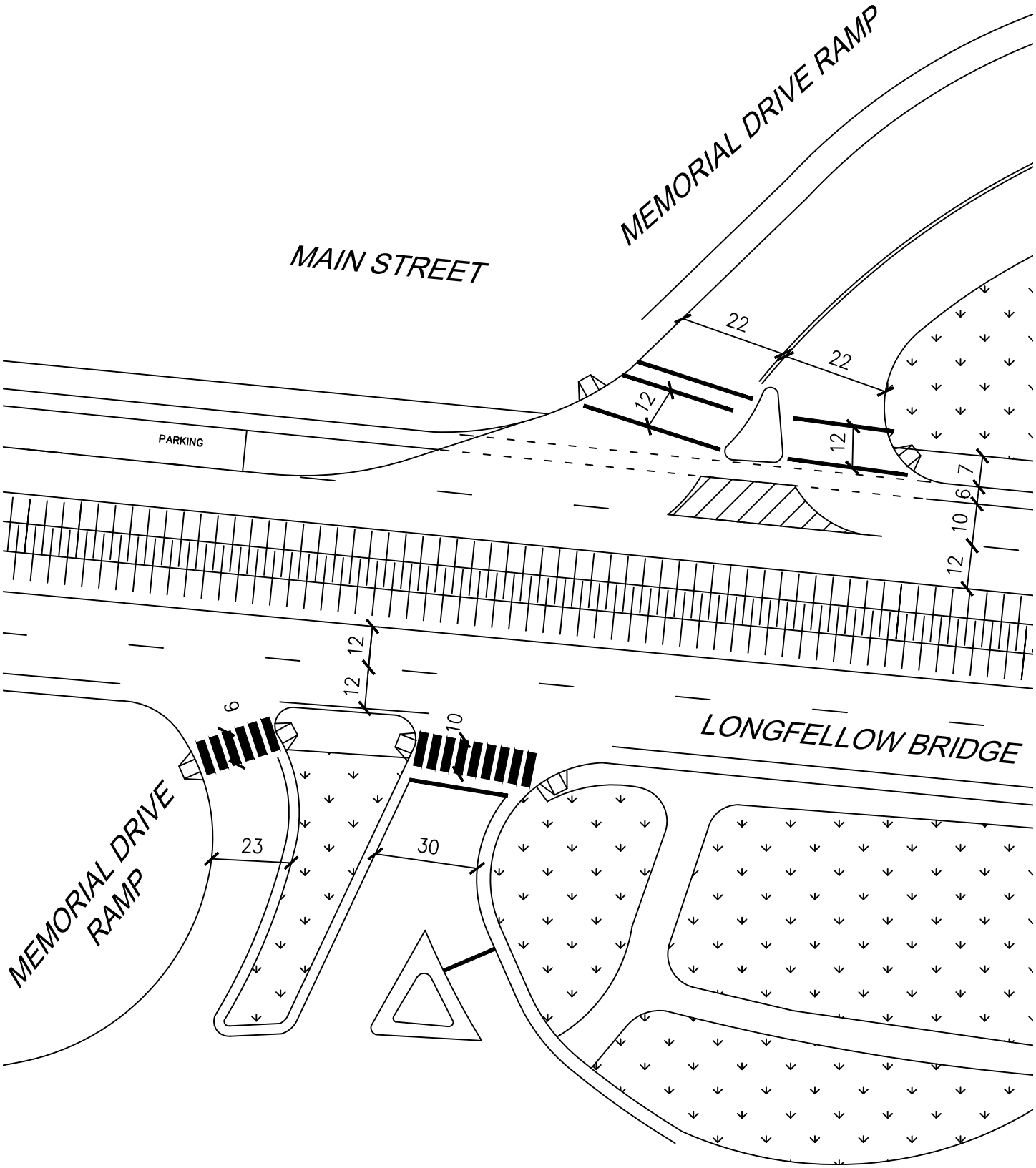
0 20 40 80 Feet

Existing Condition Intersection Sketch
Main Street at Kendall Station

Cambridge, MA

Figure 1.b.27

March 2020



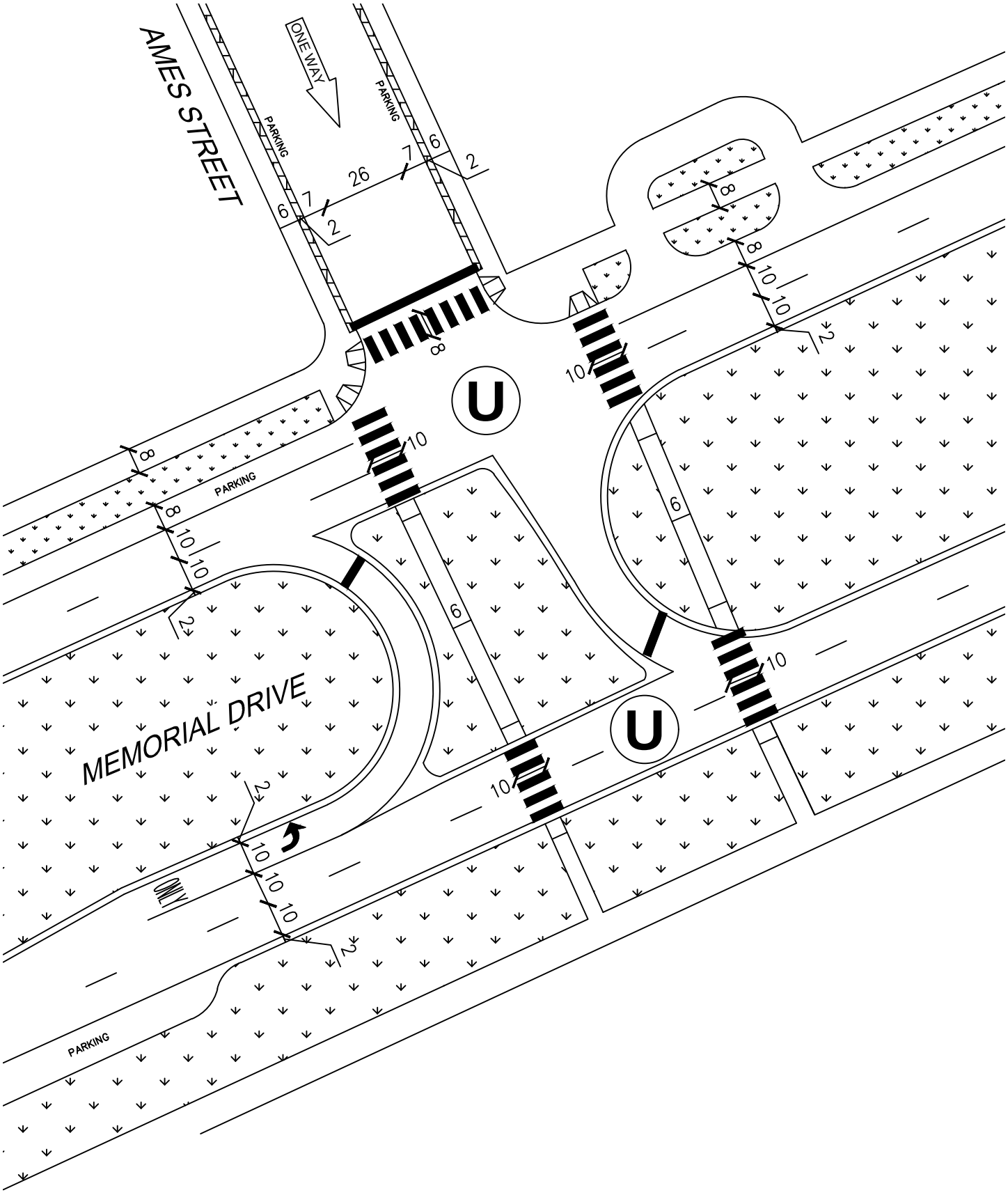
0 20 40 80 Feet

Existing Condition Intersection Sketch
Main Street at the Longfellow Bridge

Cambridge, MA

Figure 1.b.28

March 2020



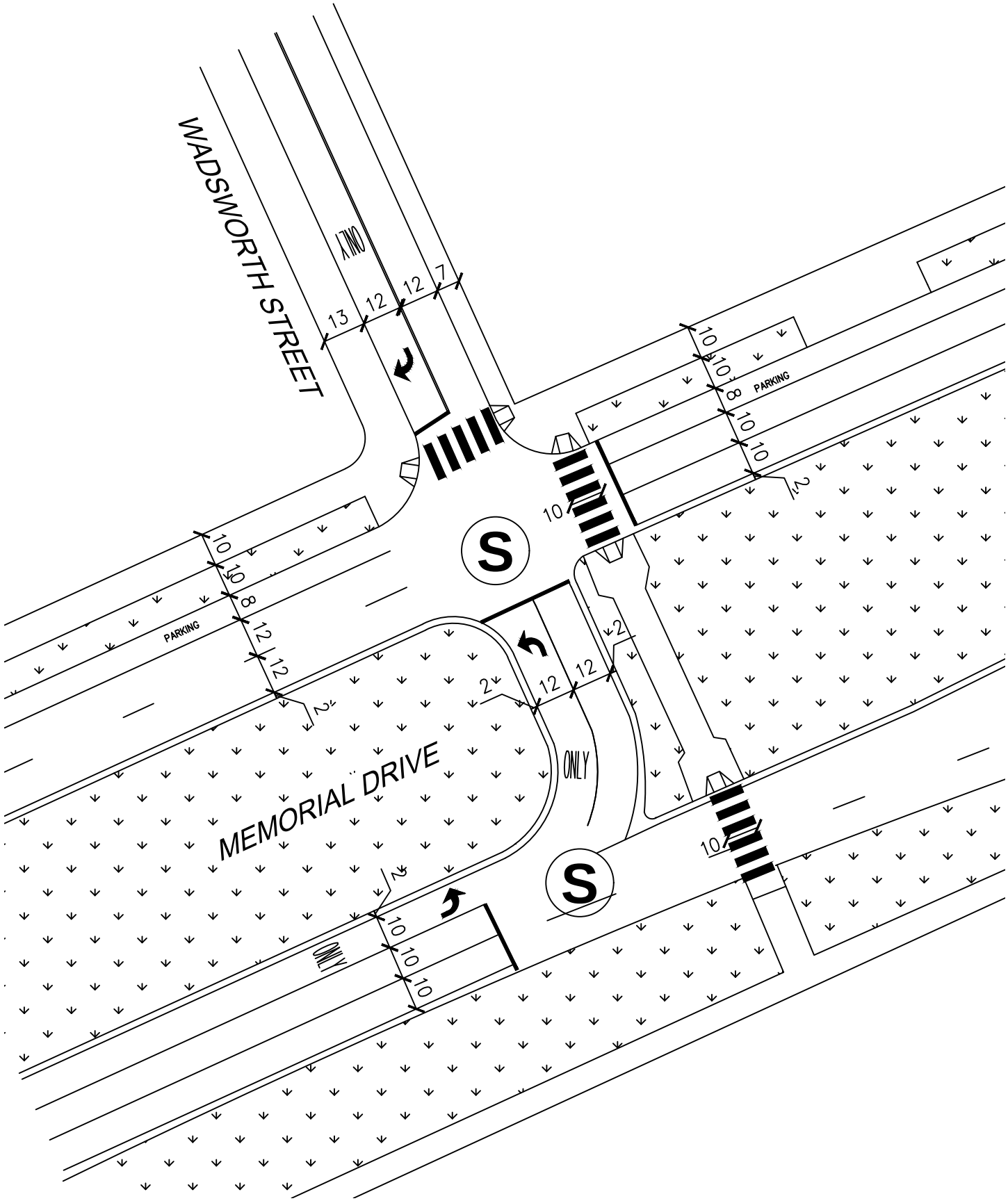
0 20 40 80 Feet

Existing Condition Intersection Sketch
Memorial Drive at Ames Street

Cambridge, MA

Figure 1.b.29

March 2020



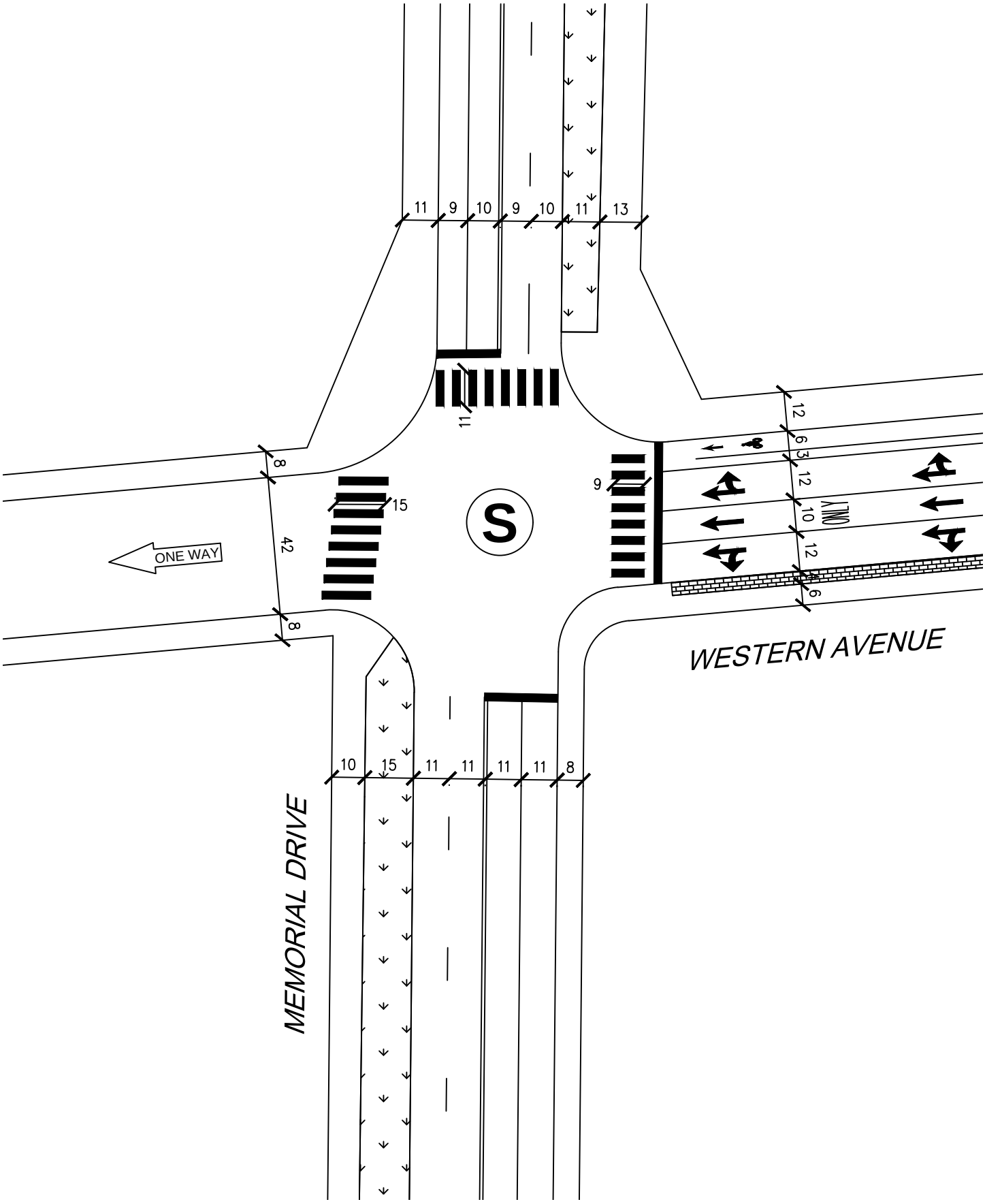
0 20 40 80 Feet

Existing Condition Intersection Sketch
Memorial Drive at Wadsworth Street

Cambridge, MA

Figure 1.b.30

March 2020



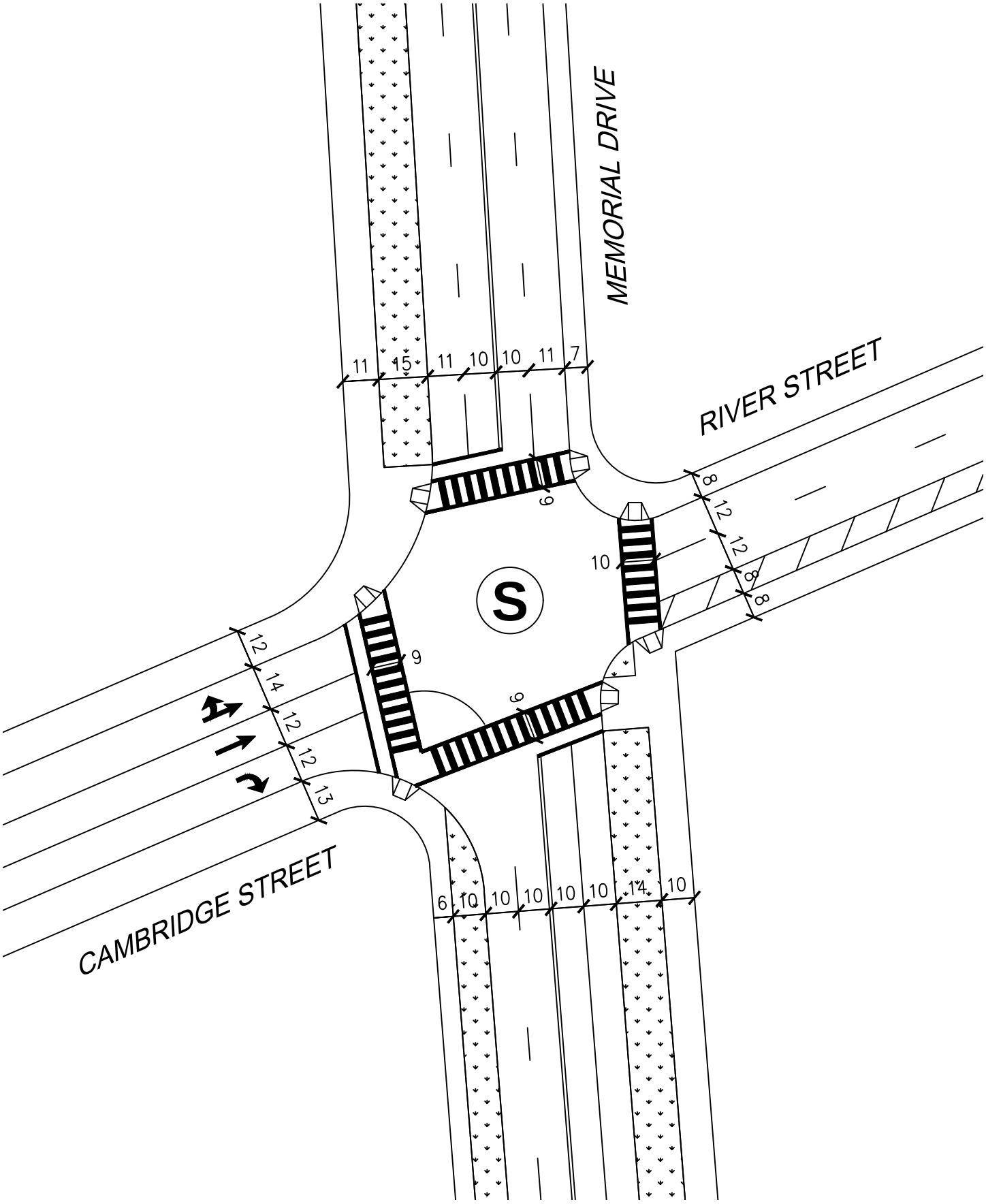
0 20 40 80 Feet

Existing Condition Intersection Sketch
Memorial Drive at Western Avenue

Cambridge, MA

Figure 1.b.31

March 2020

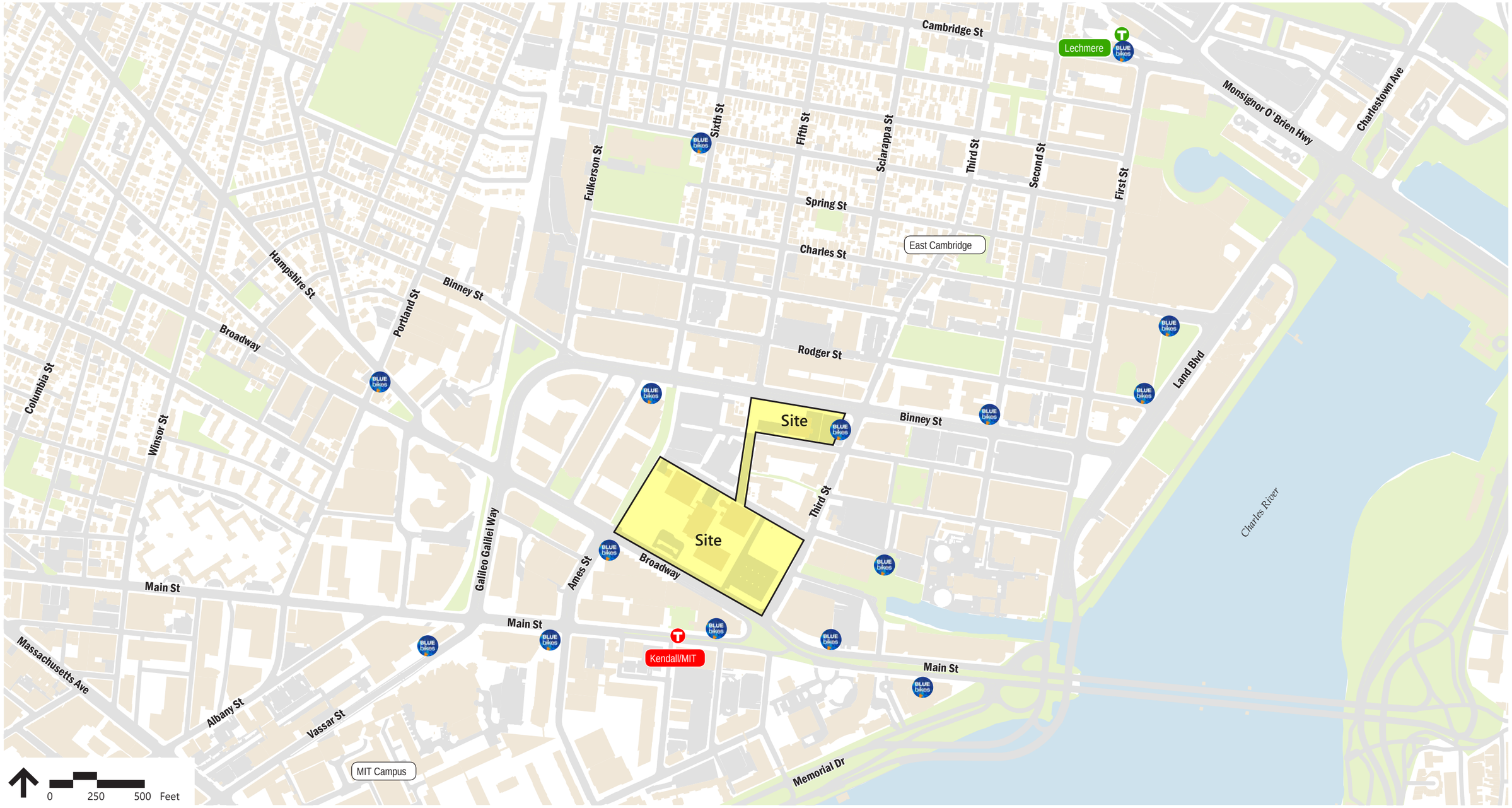


0 20 40 80 Feet

Existing Condition Intersection Sketch
Memorial Drive at River Street and
Cambridge Street
Cambridge, MA

Figure 1.b.32

March 2020



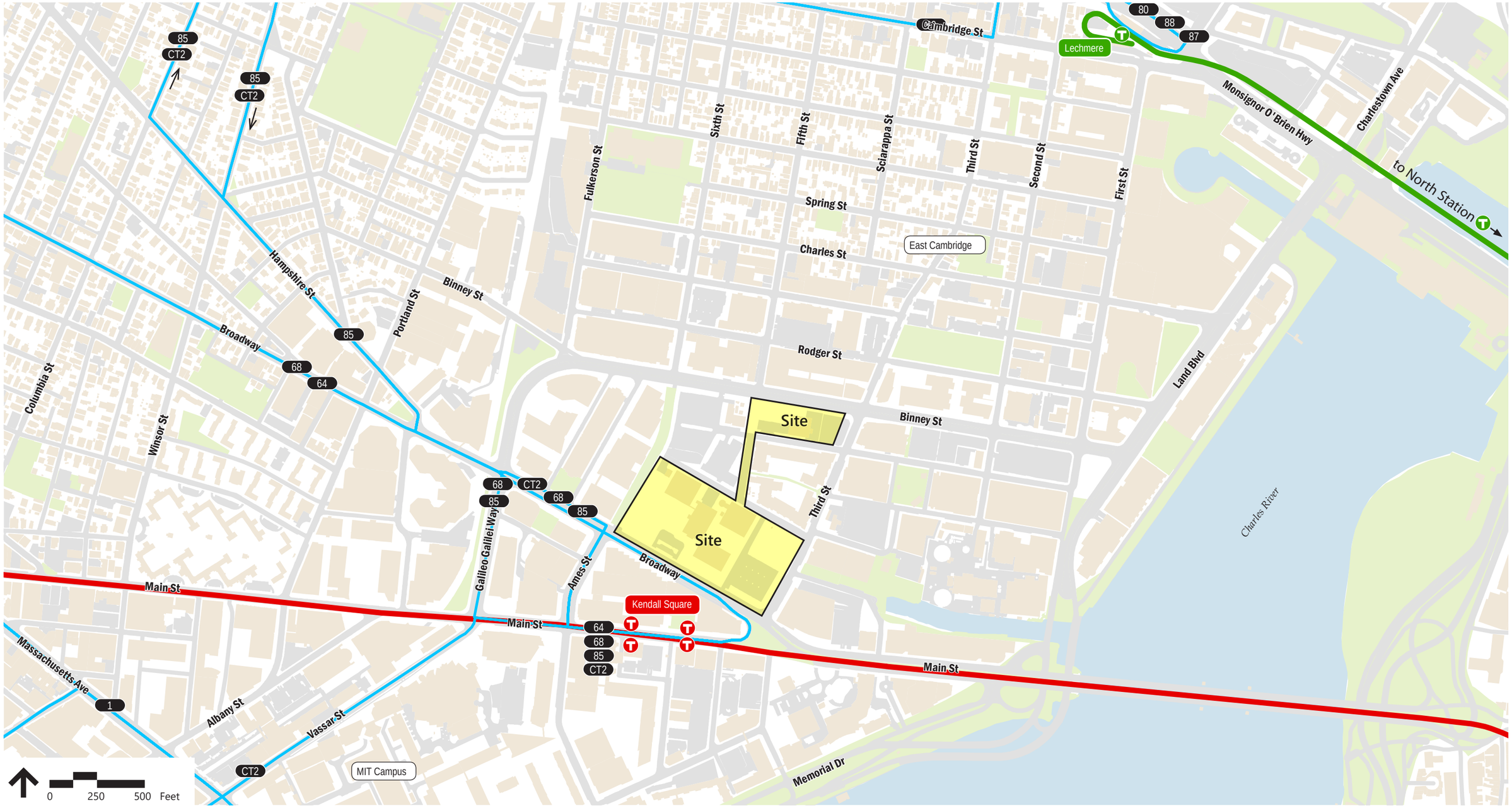
Proposed Project Component

BlueBikes Station

vhb

Figure 1.c.3
Existing Bike Sharing Services

MIT Volpe Exchange Parcel
Cambridge, MA



Proposed Project Component

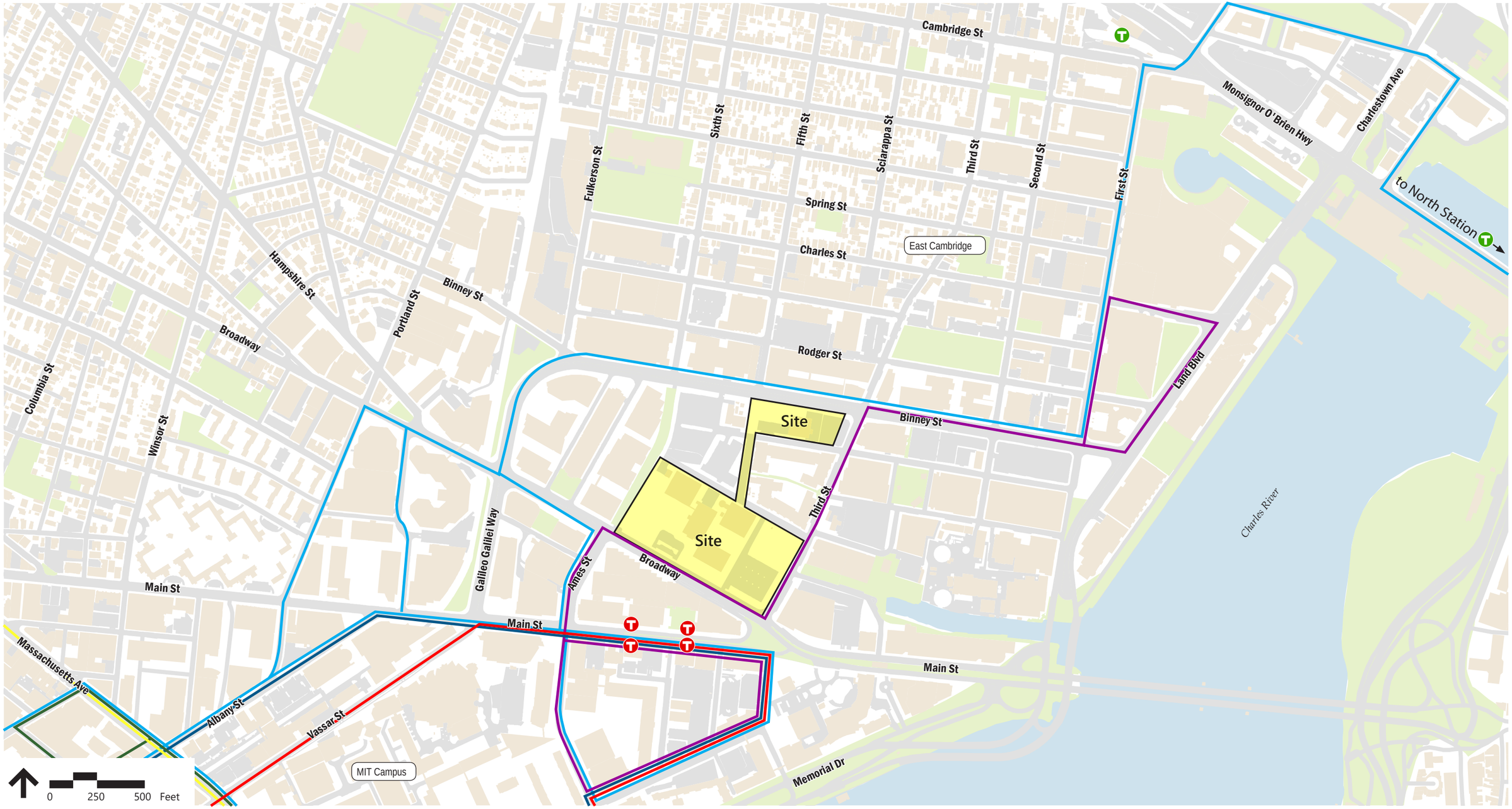
MBTA Bus Routes

MBTA Red Line

MBTA Green Line

Figure 1.d.1
Public Transportation Map

MIT Volpe Exchange Parcel
Cambridge, MA



Proposed Project Component

- MIT Shuttle TECH
- Boston Daytime
- Weekend Shuttle
- M2 Shuttle
- EZ Ride
- Kendall to Charles Park

vhb

Figure 1.d.2
Private Shuttle Service

MIT Volpe Exchange Parcel
Cambridge, MA

Proposed Project Component

- Commercial / Office
- Residential
- Education / Institutional
- Government / Health
- Open Space
- Plaza / Sidewalk
- Transportation / Parking

vhb

Figure 1.e.1
Existing Land Use

MIT Volpe Exchange Parcel
Cambridge, MA

Ⓢ Signalized Intersection
Ⓤ Unsignalized Intersection
P Existing On-site Parking
Project Site

Notes:

1. Existing curb cut functions as emergency egress, no access permitted

Not to Scale

Internal Roadway Network

MIT Volpe Exchange Parcel

Figure 2.d.1
2019 Existing Condition AM Peak Hour Traffic Volumes 7:30 AM-8:30 AM Counts Collected May 2019

Ⓢ Signalized Intersection
Ⓤ Unsignalized Intersection
P Existing On-site Parking
Project Site

Notes:

1. Existing curb cut functions as emergency egress, no access permitted

Not to Scale

Internal Roadway Network

MIT Volpe Exchange Parcel

Figure 2.d.2
2019 Existing Condition PM Peak Hour Traffic Volumes 5:00 PM-6:00 PM Counts Collected May 2019

Ⓢ Signalized Intersection
Ⓤ Unsignalized Intersection
Ⓟ Existing On-site Parking
Project Site

Not to Scale

MIT Volpe Exchange Parcel

Figure 2.d.3
2019 Existing Condition AM Peak Hour Pedestrian Volumes 7:30 AM-8:30 AM Counts Collected May 2019

Ⓢ Signalized Intersection
Ⓤ Unsignalized Intersection
Ⓟ Existing On-site Parking
Project Site

Not to Scale

MIT Volpe Exchange Parcel

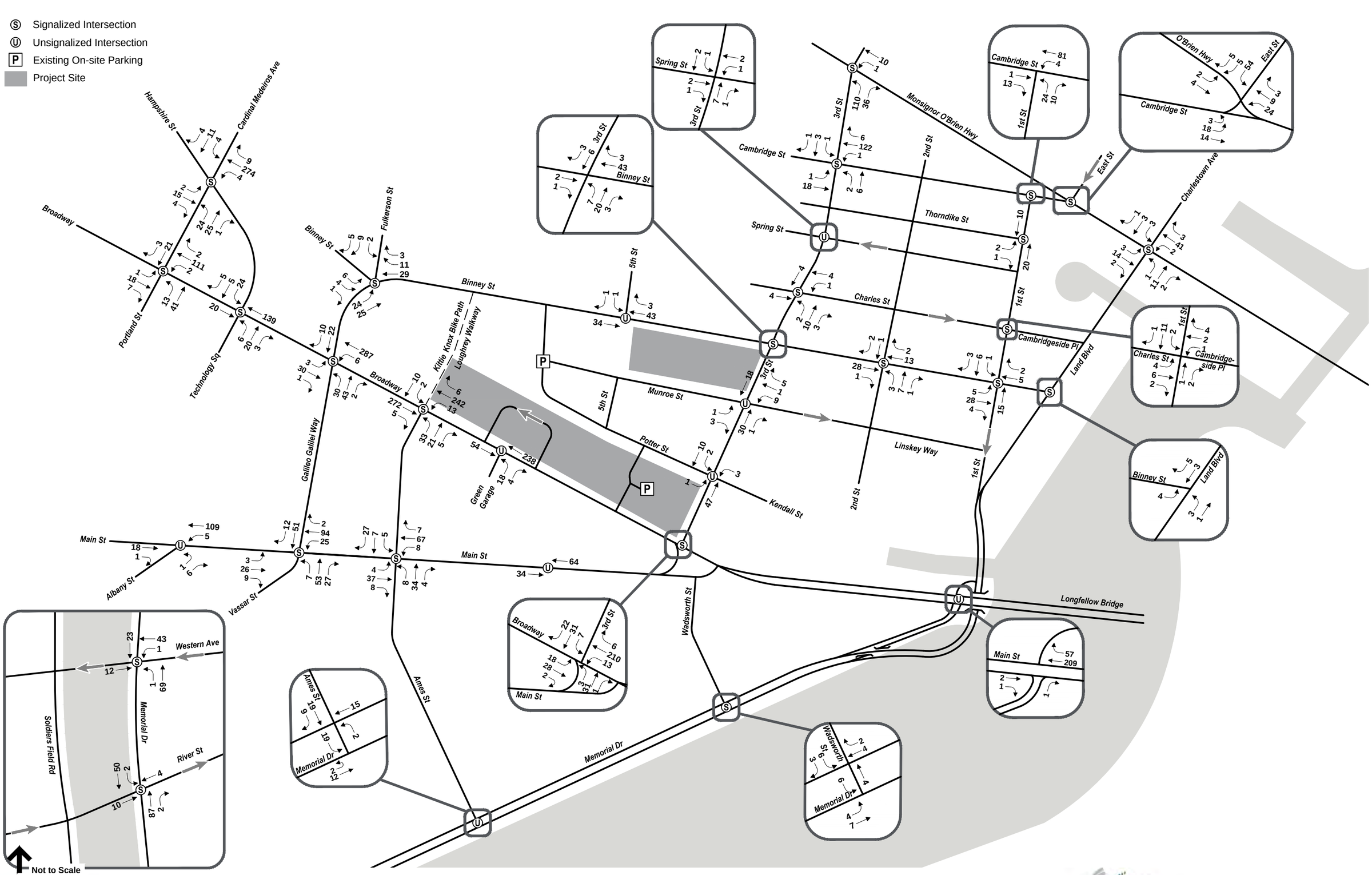
Figure 2.d.4
2019 Existing Condition PM Peak Hour Pedestrian Volumes 5:00 PM-6:00 PM Counts Collected May 2019

Ⓢ Signalized Intersection
Ⓤ Unsignalized Intersection
P Existing On-site Parking
Project Site

Not to Scale

MIT Volpe Exchange Parcel

Figure 2.d.5
2019 Existing Condition AM Peak Hour
Bicycle Volumes 7:30 AM-8:30 AM
Counts Collected May 2019


Signalized Intersection
Unsignalized Intersection
Existing On-site Parking
Project Site
Broadway
Hampshire St
Cardinal Medeiros Ave
Portland St
Technology Sq
Binney St
Fulkerson St
Kiffie Knox Bike Path / Loughrey Walkway
Galileo Galilei Way
Green Garage
Kendall St
Potter St
Munroe St
5th St
3rd St
Spring St
Cambridge St
Monsignor O'Brien Hwy
2nd St
East St
Thorndike St
Charles St
1st St
Cambridgeside Pl
Land Blvd
Linskey Way
Charlestown Ave
O'Brien Hwy
Main St
Albany St
Vassar St
Wadsworth St
Longfellow Bridge
Ames St
Memorial Dr
Western Ave
River St
Soldiers Field Rd
Not to Scale
MIT Volpe Exchange Parcel
Figure 2.d.6
2019 Existing Condition PM Peak Hour
Bicycle Volumes 5:00 PM-6:00 PM
Counts Collected May 2019

Ⓢ Signalized Intersection
Ⓤ Unsignalized Intersection
P Existing On-site Parking
Project Site

Notes:

1. Existing curb cut functions as emergency egress, no access permitted

Not to Scale

Internal Roadway Network

MIT Volpe Exchange Parcel

Figure 3.a.1
Baseline Condition AM Peak Hour
Traffic Volumes 7:30 AM-8:30 AM
Counts Collected May 2019

Ⓢ Signalized Intersection
Ⓤ Unsignalized Intersection
P Existing On-site Parking
Project Site

Notes:

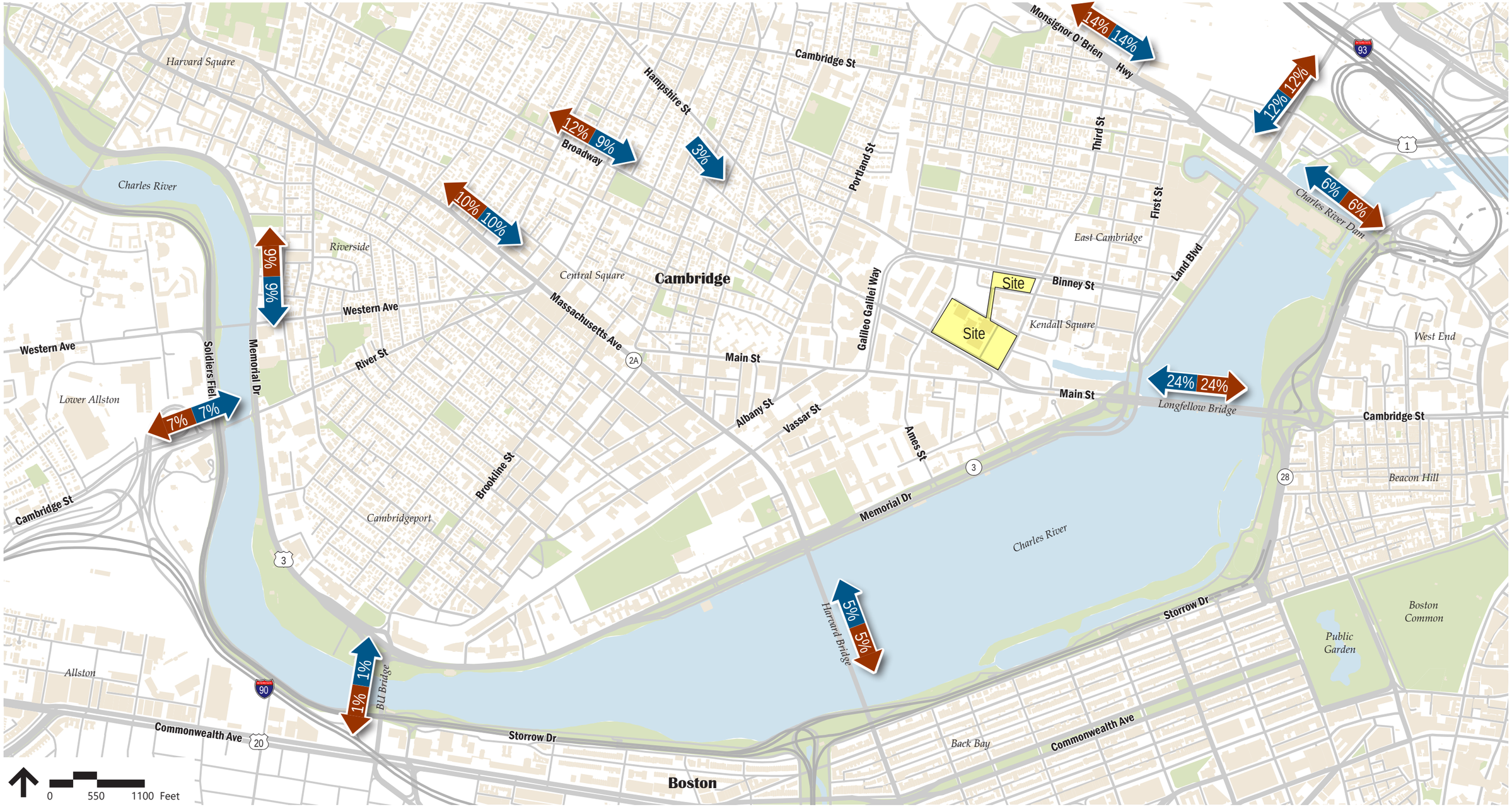
1. Existing curb cut functions as emergency egress, no access permitted

Not to Scale

Internal Roadway Network

MIT Volpe Exchange Parcel

Figure 3.a.2
Baseline Condition PM Peak Hour Traffic Volumes 5:00 PM-6:00 PM Counts Collected May 2019



Proposed Project Component

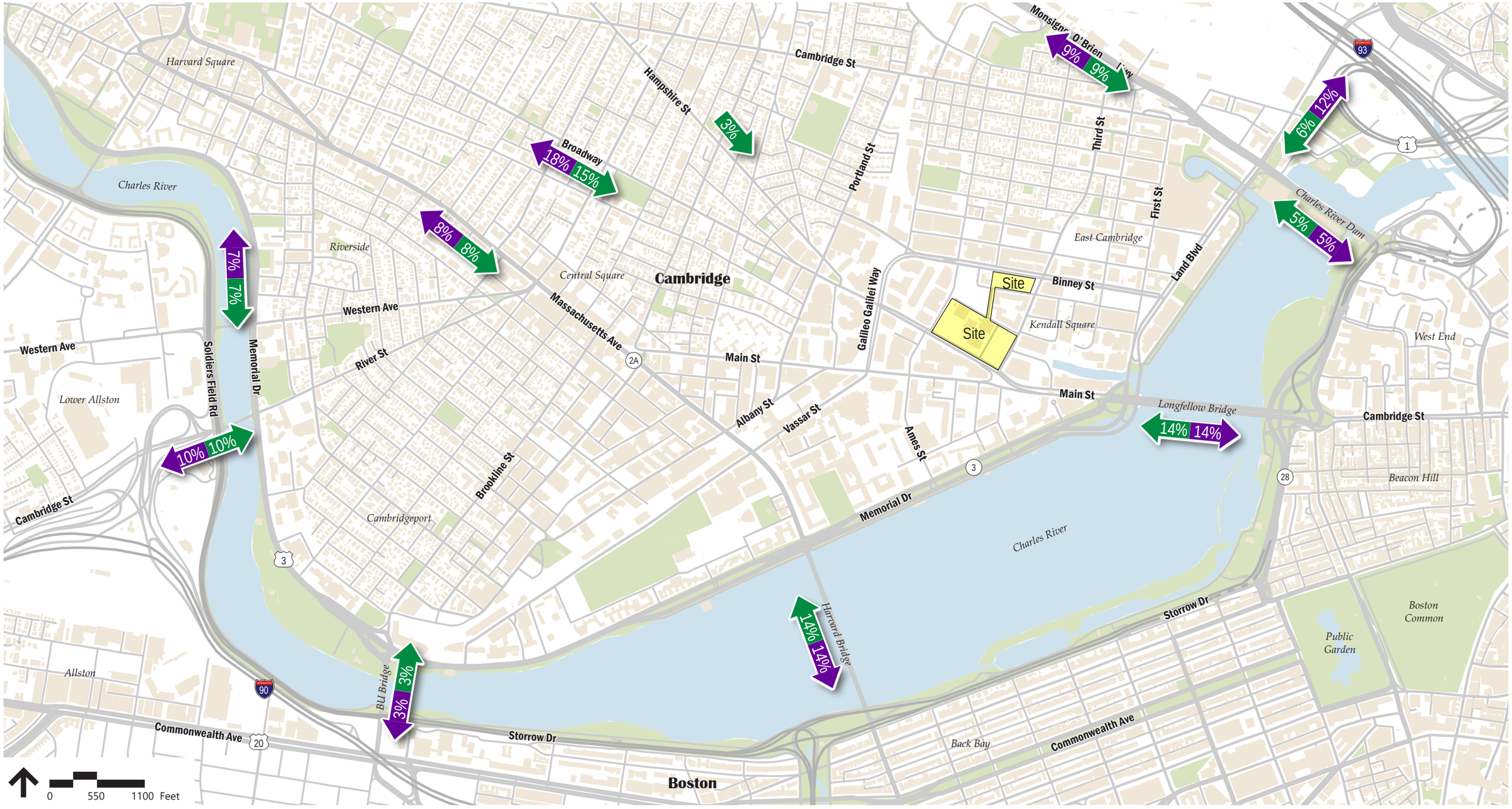
#% R & D/Office/Retail Arrival

#% R & D/Office/Retail Departure

Base Map Source: MassGIS
Data Source: City of Cambridge K2C2 Study Sub-Area 3 Distribution

Figure 4.d.1
R & D/Office etail Employees and Patrons

MIT Volpe Exchange Parcel
Cambridge, MA



Proposed Project Component

#% Residential/Hotel Arrival

#% Residential/Hotel Departure

Base Map Source: MassGIS
Data Source: City of Cambridge K2C2 Study Sub-Area 3 Distribution

Figure 4.d.2
Residential/Hotel Employees and Patrons

MIT Volpe Exchange Parcel
Cambridge, MA