



**RAGON INSTITUTE 2.0**  
600-624 Main St, Cambridge MA 02139

# **APPLICATION FOR PROJECT REVIEW SPECIAL PERMIT**

January 29, 2021

**VOLUME THREE**  
Transportation Impact Study

**PAYETTE**



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## **TABLE OF CONTENTS**

### **VOLUME ONE - NARRATIVE MATERIALS**

#### **1 - Introduction**

1.1 - Project Team	3
1.2 - Cover Letter	5
1.3 - Application Forms	7

#### **2 - Project Narratives**

2.1 - Project Overview	11
2.2 - Special Permits Requested	15
2.3 - Special Permit Compliance Narrative	15
2.4 - Urban Design Objectives Narrative	17
2.5 - K2C2 Central Sq. Design Guidelines Narrative	29
2.6 - Summary of Community Engagement	35
2.7 - Noise Ordinance Compliance Narrative	39
2.8 - Utilities and Infrastructure Narratives	43

#### **3 - Project Reports**

3.1 - Certified Tree Study	49
3.2 - Green Building Report	57
3.3 - Truck Turning Diagrams	97

### **VOLUME TWO - GRAPHIC MATERIALS**

### **VOLUME THREE - TRANSPORTATION IMPACT STUDY**



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# CITY OF CAMBRIDGE

# TRAFFIC, PARKING, + TRANSPORTATION

Joseph E. Barr, Director  
344 Broadway, Suite 102  
Cambridge, MA 02139

October 29, 2020

Scott Thornton, P. E  
Vanasse & Associates, Inc.  
35 New England Development Center Drive, Suite 140  
Andover, MA 01810-1066

Ms. Corrie Martin  
Chief Operating Officer  
Ragon Institute of MGH, MIT and Harvard  
400 Tech Square,  
Cambridge MA 02139

Mr. Ahin Handa  
Massachusetts General Hospital  
Real Estate  
100 Cambridge Street  
Boston, MA 02110

RE: 600-604 Main Street Transportation Impact Study (TIS) Scope

Dear Scott, Corrie, and Ahin:

The Cambridge Traffic, Parking, and Transportation Department (TP+T) received the Transportation Impact Study (TIS) on October 9, 2020 for a proposed 186,000 gross square foot (gsf) research and development project at 600-604 Main Street by the Ragon Institute of Massachusetts General Hospital, Massachusetts Institute of Technology, and Harvard University (Ragon).

Based on staff review, there were a few items in the TIS that did not fully address the requirements noted in the TIS Scope. However, we believe they did not significantly impact the findings in the TIS and we are therefore able to certify the TIS as accurate and complete. The items that were deficient included utilizing observed on-time performance measure for the transit analysis, justifying why all delivery truck movements cannot occur on-site without backing into the site, showing short-term bicycle parking spaces that do not meet the City's zoning dimensional requirements, and missing footnotes in Table 9.b.1.

Going forward, we look forward to continuing to work with you on this project. Ideally the following items should be completed prior to you submitting your Special Permit Application and certainly in advance of your hearing date. We believe that completing

these steps prior to the Planning Board hearing would help make the Planning Board process more efficient and successful.

- There needs to be more work on the site plan and particularly the bicycle lanes on Main Street. The TIS stated that it is not clear how separated bicycle lanes can be accommodated, so the City will be happy to work with Project team on advancing that layout.
- The TIS did not have clear plans showing the widths and cross sections for all abutting streets including Portland Street and Albany Street (i.e., curb to curb and travel lane widths, sidewalk widths, parking lanes, etc.) We look forward to working with your design team on refining the property lines and final site plan relative to the streets adjacent to the Project.
- It will be important to fully understand the delivery and loading operations needs for the Project and if a loading zone that will accommodate up to WB-30 size trucks will be sufficient. Also, we need to understand whether there will be any flammable liquid or gas deliveries that will not be able to use the loading dock.
- The TIS implied that it is not feasible to use parking owned by Alexandria or Draper Labs, but we believe that this could be possible for property owners, through Planning Board special permits, to share parking spaces as well as other measures such as a reduction in zoning required parking spaces. TPT will want to work with you to better understand the parking plan, including the proposed number of parking spaces (for example, why is 0.65/1,000 sf parking ratio proposed for the Project when the TIS indicated that the maximum parking demand at the current Ragon site is 0.5 spaces/1,000 sf?). Also, we would like to better understand who the Ragon “non-employees” are and where they park.
- Lastly, TP+T looks forward to working with you on a final transportation mitigation package.

Thank you again for working with us and please contact Adam Shulman of my staff to discuss in more detail and set up a meeting on these next steps.

Very truly yours,

A handwritten signature in black ink, appearing to read 'J. Barr', written over a horizontal line.

Joseph E. Barr, Director

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

# Transportation Impact Study

600-604 Main Street  
Cambridge, Massachusetts

*Prepared for:*



Cambridge, Massachusetts

October 2020

*Prepared by:*



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

**CITY OF CAMBRIDGE**  
**Special Permit Transportation Impact Study (TIS)**

**Summary Sheet**

Planning Board Permit Number: \_\_\_\_\_

Project Name: 600-604 Main Street Redevelopment

Address: 600-604 Main Street, Cambridge, MA

Owner/Developer Name: Ragon Institute of MGH, MIT and Harvard

Contact Person: Corrie Martin

Contact Address: 400 Technology Square

Cambridge, MA 02139

Contact Phone: 857-268-7074

ITE sq. ft.: 186,000 sf of research and development space, 40 person child daycare.

Zoning sq. ft.: 186,000

Land Use Type: Research and Development

Existing Parking Spaces: 38 Use: Manufacturing (Vacant)

New Parking Spaces: 120 Use: Research and Development

Date of Parking Registration Approval: \_\_\_\_\_

Trip Generation:	Daily	AM Peak Hour	PM Peak Hour
Total Trips	978	161	164
Vehicle	464	79	80
Transit	308	50	51
Pedestrian	68	11	11
Bicycle	60	9	10
Other	78	12	12

**R&D**

Mode Split (person trips):

- Vehicle: 40 %
- Transit: 36 %
- Pedestrian: 8 %
- Bicycle: 7 %
- Other: 9 %

Transportation Consultant: Vanasse and Associates, Inc.

Contact Name: Scott W. Thornton, P.E.

Phone: 978-474-8800

Date of Building Permit Approval: \_\_\_\_\_





**CITY OF CAMBRIDGE**  
**Special Permit Transportation Impact Study (TIS)**

**Planning Board Criteria Performance Summary**  
**Page 1**

Planning Board Permit Number: \_\_\_\_\_

Project Name: 600-604 Main Street

Total Data Entries = 127

Total Number of Criteria Exceedances = 6

**1. Project Vehicle Trip Generation**

Weekday = 442 AM Peak Hour = 75 PM Peak Hour = 77 Exceeds Criteria? [Y/N] N/N/N

**2. Level of Service (LOS)**

Intersection	Weekday Morning Peak Hour			Weekday Evening Peak Hour		
	2020 Baseline	With Project	Exceeds Criteria?	2020 Baseline	With Project	Exceeds Criteria?
Massachusetts Avenue at Sidney Street	C	D	N	D	D	N
Main Street/Columbia Street at Sidney Street	D	D	N	C	D	N
Main Street at Windsor Street	B	B	N	B	B	N
Main Street at Portland Street	B	B	N	B	C	N
Main Street at Vassar Street/Galileo Galilei Way	B	C	N	B	C	N
Main Street at Albany Street NB LT/RT	A	A	N	B	B	N
Portland Street at Albany Street WB LH/RT	A	A	N	B	B	N
Albany Street at Parking Garage Driveway EB LT/RT	--	A	--	--	A	--
Portland Street at Daycare Drop-off/Pick-up WB RT	--	A	--	--	A	--



3. Traffic on Residential Streets

Street Segment	Weekday Morning Peak Hour			Weekday Evening Peak Hour		
	2020 Baseline Volume	With Project	Exceeds Criteria?	2020 Baseline Volume	With Project	Exceeds Criteria?
Portland Street, Main Street to Broadway (Amount of residential = >1/3 but <1/2)	674	686	N	640	652	N
Windsor Street, Main Street to Broadway (Amount of residential = 1/2 or more)	308	310	N	374	377	N
Columbia Street, Main Street to Broadway (Amount of residential = 1/2 or more)	332	336	N	326	328	N



4. Lane Queue (for Signalized Intersections Critical Lane)

Intersection	No. of	Weekday Morning Peak Hour			Weekday Evening Peak Hour		
	Lanes Analyzed	2020 Baseline	With Project	Exceeds Criteria?	2020 Baseline	With Project	Exceeds Criteria?
<b>Massachusetts Avenue at Sidney Street:</b>	7						
Massachusetts Avenue EB LT		3	4	N	4	4	N
Massachusetts Avenue EB TH/RT		11	17	N	13	15	N
Massachusetts Avenue WB LT		3	3	N	4	4	N
Massachusetts Avenue WB TH/RT		6	7	N	9	9	N
Sidney Street NB RT		2	2	N	3	2	N
Sidney Street SB LT/HT		4	4	N	4	4	N
Sidney Street SB RT	1	1	N	1	1	N	
<b>Main Street/Columbia Street at Sidney Street:</b>	4						
Columbia Street EB TH		1	1	N	1	1	N
Columbia Street EB RT		6	6	N	4	4	N
Main Street WB LT/TH		10	12	N	7	10	N
Sidney Street NB LT/RT	3	4	N	4	4	N	
<b>Main Street at Windsor Street:</b>	4						
Main Street EB LT/TH/RT		4	4	N	3	3	N
Main Street WB LT/TH/RT		4	4	N	5	6	N
Windsor Street NB LT/TH/RT		2	2	N	3	4	N
Windsor Street SB LT/TH/RT	3	3	N	3	3	N	
<b>Main Street at Portland Street:</b>	4						
Main Street EB LT/TH/RT		6	6	N	6	8	N
Main Street WB LT/TH/RT		4	4	N	5	5	N
Portland Street NB LT/TH/RT		3	4	N	4	4	N
Portland Street SB LT/TH/RT	5	5	N	4	5	N	
<b>Main Street at Vassar Street/Galileo Galilei Way:</b>	9						
Main Street EB LT		5	5	N	5	5	N
Main Street EB TH/RT		5	5	N	5	5	N
Main Street WB LT		2	2	N	2	2	N
Main Street WB TH/RT		4	3	N	3	3	N
Vassar Street NB LT/TH		3	3	N	3	3	N
Vassar Street NB TH/RT		6	5	N	6	6	N
Galileo Galilei Way SB LT		3	3	N	2	2	N
Galileo Galilei Way SB TH		6	7	N	6	5	N
Galileo Galilei Way SB RT	3	3	N	2	2	N	



5. Pedestrian and Bicycle Facilities (for Critical Pedestrian Crossing)

Pedestrian LOS

Intersection	Weekday Morning Peak Hour			Weekday Evening Peak Hour		
	2020 Baseline PLOS	With Project	Exceeds Criteria?	2020 Baseline PLOS	With Project	Exceeds Criteria?
<b>Massachusetts Avenue at Sidney Street:</b>						
Crossing Massachusetts Avenue (East)	C	C	N	C	C	N
Crossing Massachusetts Avenue (West)	C	C	N	C	C	N
Crossing Sidney Street (North)	B	B	N	B	B	N
Crossing Sidney Street (South)	B	B	N	B	B	N
<b>Main Street/Columbia Street at Sidney Street:</b>						
Crossing Main Street (East)	B	B	N	B	B	N
Crossing Columbia Street (West)	B	B	N	B	B	N
<b>Main Street at Windsor Street:</b>						
Crossing Main Street (East)	B	B	N	B	B	N
Crossing Main Street (West)	B	B	N	B	B	N
Crossing Windsor Street (North)	B	B	N	B	B	N
Crossing Windsor Street (South)	B	B	N	B	B	N
<b>Main Street at Portland Street:</b>						
Crossing Main Street (East)	B	B	N	B	B	N
Crossing Main Street (West)	B	B	N	B	B	N
Crossing Portland Street (North)	B	B	N	B	B	N
Crossing Portland Street (South)	B	B	N	B	B	N
<b>Main Street at Albany Street:</b>						
Crossing Main Street (East)	F	F	Y	F	F	Y
Crossing Albany Street (North)	E	F	Y	F	F	Y
<b>Main Street at Vassar Street/ Galileo Galilei Way:</b>						
Crossing Main Street (East)	B	B	N	B	B	N
Crossing Main Street (West)	B	B	N	B	B	N
Crossing Galileo Galilei Way (North)	B	B	N	B	B	N
Crossing Vassar Street (South)	B	B	N	B	B	N
<b>Portland Street at Albany Street:</b>						
Crossing Albany Street (East)	A	A	N	C	C	N
Crossing Portland Street (North) <sup>a</sup>	--	--	--	--	--	--
Crossing Portland Street (South) <sup>a</sup>	--	--	--	--	--	--

<sup>a</sup>The pedestrian crossings on Portland Street are controlled by Rectangular Rapid Flash Beacon (RRFB) and therefore are signalized crossings.



Safe Pedestrian and Bicycle Facilities

Adjacent Street or Public Right-of-Way	Sidewalks or Walkways Present?	Exceeds Criteria?	Bicycle Facilities or Right-of-Ways Present?	Exceeds Criteria?
Main Street	Y	N	Y	N
Portland Street	Y	N	N	Y
Albany Street	Y	N	N	Y



# CONTENTS

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EXECUTIVE SUMMARY .....	1
Introduction .....	1
Project Description .....	1
Existing Conditions .....	1
Consistency With Planning Studies.....	2
Project-Generated Traffic.....	2
Article 19 Project Review Special Permit Criteria Analysis .....	2
Traffic Operations Analysis .....	3
Parking Analysis.....	3
Transportation Demand Management Measures.....	3
Conclusion.....	4
INTRODUCTION.....	5
1.0 EXISTING CONDITIONS .....	7
1.1 Existing Traffic Conditions .....	7
1.2 Description Of Project Study Area.....	7
1.3 Parking And Loading Facilities.....	8
1.4 Transit Services .....	8
1.5 Land Use .....	8
1.6 Ragon Institute At Technology Square .....	8
2.0 DATA COLLECTION.....	10
2.1 Intersection Turning Movement Counts.....	10
2.2 Motor Vehicle Crash Data.....	10
2.3 Existing Public Transit System .....	14
3.0 PROJECT TRAFFIC.....	17
3.1 Trip Generation .....	17
3.2 Trip Distribution.....	20
3.3 Daycare Drop-Off/Pick-Up Operations.....	21
3.4 Site Access .....	21

## **CONTENTS (Continued)**

---

3.5 Project Service And Loading.....	21
4.0 BACKGROUND TRAFFIC .....	22
4.1 Roadway Improvement Projects.....	22
5.0 TRAFFIC ANALYSIS.....	23
5.1 Site Assignment.....	23
6.0 CAPACITY ANALYSIS .....	24
6.1 Vehicle Level-Of-Service Analysis.....	24
7.0 QUEUE ANALYSIS.....	28
8.0 RESIDENTIAL STREET VOLUME ANALYSIS.....	30
9.0 PARKING ANALYSIS.....	31
9.1 Introduction .....	31
9.2 Project Parking Demand.....	31
9.3 Parking Management.....	32
9.4 Sight Lines To Pedestrians From Parking Garage/Loading Dock .....	32
9.5 Loading Dock Autoturn.....	32
9.6 Unused Parking In The Area.....	32
9.7 Bicycle Parking .....	33
10.0 TRANSIT ANALYSIS .....	34
10.1 Project Transit Distribution .....	34
10.2 Summary Of Analysis Results.....	37
10.3 Future Public Transit Conditions.....	37
11.0 PEDESTRIAN ANALYSIS .....	39

## **CONTENTS (Continued)**

---

12.0 BICYCLE ANALYSIS .....	43
12.1 Vehicle Turning Volume Conflicts .....	43
12.2 Short-Term And Long-Term Bicycle Parking.....	45
12.3 City’s Bicycle Network Plan.....	45
13.0 ARTICLE 19 SPECIAL PERMIT CRITERIA ANALYSIS .....	46
14.0 PROJECT MITIGATION .....	56
14.1 Project Mitigation.....	56
14.2 Consistency With Other Planning Studies .....	56
14.3 Transportation Demand Management Measures .....	56
15.0 CONCLUSION .....	58
TECHNICAL APPENDIX	



## TABLES

---

Number	Title
1.a.1	Project Building Area Characteristics
1.a.2	Project Parking Characteristics
1.b.1	Proposed Study Area and Data Source
1.f.1	Ragon Institute Mode-Split Data
2.b.1	Vehicle Crash Data Summary
2.c.1	MBTA Red Line Service Summary
2.c.2	MBTA Bus Service Summary
3.a.1	East Cambridge Area Mode-Splits
3.a.2	Empirical Trip Generation Rates
3.a.3	ITE Trip Generation
3.a.4	R&D Trip Generation by Mode
3.a.5	Total Project vehicle Trip Generation
3.b.1	Trip Distribution Summary
3.d.1	Portland Street vs Albany Street Volumes
6.a.1	Vehicle Level-Of-Service Summary – Signalized Intersections
6.a.2	Vehicle Level-Of-Service Summary – Unsignalized Intersections
7	Queue Analysis Results
8	Traffic on Residential Streets
9.b.1	Project Parking Demand
9.g.1	Bicycle Parking Demand Analysis
10.a.1	Transit System Trip Distribution
10.a.2	MBTA Red Line Subway Peak Hour Ridership Impacts
10.a.3	MBTA Bus Route Peak Hour Ridership Impacts
11.1	Pedestrian Level-Of-Service Summary – Signalized Intersections
11.2	Pedestrian Level-Of-Service Summary – Unsignalized Intersections
12.a.1	Bicycle-Vehicle Volume Conflicts
13.a	Indicator 1 – Project Vehicle Trip Generation
13.b	Indicator 2 – Project Vehicle LOS

## **TABLES (Continued)**

---

<u>Number</u>	<u>Title</u>
13.c	Indicator 3 – Traffic on Residential Streets
13.d	Indicator 4 – Lane Queue
13.e.1	Indicator 5a – Pedestrian LOS
13.e.2	Indicator 5b and 5c – Pedestrian and Bicycle Facilities

## FIGURES

---

Number	Title
1.a.1	Ground Floor Plan with Vehicle and Pedestrian Access
1.a.2	Existing Conditions Survey
1.b.1	Intersection Inventories – Massachusetts Avenue at Sidney Street
1.b.2	Intersection Inventories – Main Street at Columbia Street and Sidney Street
1.b.3	Intersection Inventories – Main Street at Windsor Street
1.b.4	Intersection Inventories – Main Street at Portland Street
1.b.5	Intersection Inventories – Main Street at Albany Street
1.b.6	Intersection Inventories – Main Street at Galileo Galilei Way and Vassar Street
1.b.7	Intersection Inventories – Portland Street at Albany Street
1.d.1	Transit Map
1.d.2	Car Sharing Services Map
1.d.3	Bike Sharing Station Map
1.d.4	Existing Bicycle Lanes/Paths Map.
1.e.1	Land Use Map
2.a.1	Count Location Map
2.c.1	2020 Baseline Weekday Morning Peak Hour Traffic Volumes
2.c.2	2020 Baseline Weekday Evening Peak Hour Traffic Volumes
2.c.3	2020 Baseline Weekday Morning Peak Hour Pedestrian Volumes
2.c.4	2020 Baseline Weekday Evening Peak Hour Pedestrian Volumes
2.c.5	2020 Baseline Weekday Morning Peak Hour Bicycle Volumes
2.c.6	2020 Baseline Weekday Evening Peak Hour Bicycle Volumes
3.b.1	Research and Development Trip Distribution Map
3.b.2	Daycare Trip Distribution Map
3.c.1	Research and Development Trips Weekday Morning Peak Hour Traffic Volumes
3.c.2	Research and Development Trips Weekday Evening Peak Hour Traffic Volumes
3.c.3	Daycare Trips Weekday Morning Peak Hour Traffic Volumes
3.c.4	Daycare Trips Weekday Evening Peak Hour Traffic Volumes
3.c.5	Site Generated Weekday Morning Peak Hour Traffic Volumes

## FIGURES (Continued)

---

Number	Title
3.c.6	Site Generated Weekday Evening Peak Hour Traffic Volumes
5.b.1	2020 Build Weekday Morning Peak Hour Traffic Volumes
5.b.2	2020 Build Weekday Evening Peak Hour Traffic Volumes
5.b.3	2020 Build Weekday Morning Peak Hour Pedestrian Volumes
5.b.4	2020 Build Weekday Evening Peak Hour Pedestrian Volumes
5.d.1	2025 Future Weekday Morning Peak Hour Traffic Volumes
5.d.2	2025 Future Weekday Evening Peak Hour Traffic Volumes
5.d.3	Cumulative Area Developments Impact – Weekday Morning Peak Hour Traffic Volumes
5.d.4	Cumulative Area Developments Impact – Weekday Evening Peak Hour Traffic Volumes
6.a.1	Vehicle LOS Map – Weekday Morning Peak Hour
6.a.2	Vehicle LOS Map – Weekday Evening Peak Hour
6.a.3	Vehicle Delay Change Map – Weekday Morning Peak Hour
6.a.4	Vehicle Delay Change Map – Weekday Evening Peak Hour
9.d.1	Parking Garage Level 1 Floor Plan
9.d.2	Parking Garage Level 2 Floor Plan
9.d.3	Service Entrance/Loading Dock
9.d.4	Parking Garage Site Lines for Pedestrians
9.d.5	Loading Dock Site Lines for Pedestrians
9.e.1	Autoturn Diagram WB-30 Entering Loading Dock from North Bay 1 and 2
9.e.2	Autoturn Diagram WB-30 Exiting Loading Dock to South Bay 1 and 2
9.e.3	Autoturn Diagram WB-30 Entering Loading Dock from South Bay 1 and 2
9.e.4	Autoturn Diagram WB-30 Exiting Loading Dock to North Bay 1 and 2
9.e.5	Autoturn Diagram WB-30 Entering Loading Dock from South Bay 3 and 4
9.e.6	Autoturn Diagram WB-30 Exiting Loading Dock to North Bay 3 and 4
9.e.7	Autoturn Diagram WB-40 Entering Loading Dock from North Bay 3 and 4
9.e.8	Autoturn Diagram WB-40 Exiting Loading Dock to South Bay 3 and 4

## **FIGURES (Continued)**

---

<u>Number</u>	<u>Title</u>
10.a.1	Future Transit/Pedestrian/Bicycle Facilities
11.a.1	Pedestrian Level of Service Map Weekday Morning Peak Hour
11.a.2	Pedestrian Level of Service Map Weekday Evening Peak Hour
11.a.3	Pedestrian Desire Lines to Key Transit Facilities
12.b.1	Short-Term Bicycle Parking Main Street
12.b.2	Short-Term Bicycle Parking Albany Street
12.b.3	Short-Term Bicycle Parking Portland Street
12.b.4	Long-Term Bicycle Parking
12.c.1	Protected Bicycle Lanes on Main Street

# **EXECUTIVE SUMMARY**

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## **INTRODUCTION**

Vanasse & Associates (VAI) has prepared this Transportation Impact Study (TIS) on behalf of the Ragon Institute of Massachusetts General Hospital, Massachusetts Institute of Technology, and Harvard University (Ragon) for a proposed 186,000 gross square foot (gsf) research and development (R&D) facility with a child daycare component that can accommodate up to 40 students and a 120-space below grade parking garage to be located at 600-604 Main Street in Cambridge, Massachusetts (the “Project”). This study reviews the potential transportation impacts, defines site access requirements, and identifies strategies to reduce traffic impacts associated with the Project. The study also reviews the Project with respect to the City of Cambridge Special Permit Criteria regarding traffic impacts, is in accordance with the City’s guidelines for TIS, and follows the scoping determination issued by the Cambridge Traffic, Parking & Transportation (TP&T) and dated September 30, 2020.

## **PROJECT DESCRIPTION**

The Project involves the construction of a 186,000 gross square foot (gsf) research and development (R&D) building, with a child daycare facility that can accommodate up to 40 students, and a 120 space below grade parking garage. The Project will have approximately 550 Ragon Institute staff at the facility divided into two categories: employees (300) and non-employees (250). Access for the parking garage and loading will be from Albany Street. The daycare will have drop-off/pick-up operations on Portland Street for families not affiliated with the Ragon Institute. Three short-term parking spaces will be supplied for this operation. In addition, the parking garage will have three parking spaces for daycare staff.

## **EXISTING CONDITIONS**

A field inventory of existing study area roadways was conducted to document traffic conditions in the current 2020 analysis year. Items collected regarding the study area roadways and intersections include roadway geometrics, traffic control devices, traffic signal timing plans, and safety data for the roadways in the vicinity of the Site. Due to the COVID-19 pandemic, traffic volumes, pedestrian crossing volumes, and bicycle volumes were gathered from previous TIS reports that had been conducted in the area. These studies range in date from 2008 to 2016. Adjustments to traffic volumes were discussed and coordinated with the Cambridge TP&T and Community

Development departments. Other transportation-related data inventoried include on-street parking regulations, transit services, and provision of bicycle and pedestrian facilities.

### **CONSISTENCY WITH PLANNING STUDIES**

The Project has been designed to be consistent with the City's transportation planning efforts and projects to improve mobility in the surrounding area and region, including the Kendall Square Mobility Task Force, 2013 Kendall Square Report, 2015 Transit Strategic Plan, Vision Zero Plan, and Cambridge Bicycle and Pedestrian Plans, with a particular focus on initiatives to improve Main Street operations. The Project also aligns with the Envision Cambridge Vision and Core Values, Mobility Chapter.

### **PROJECT-GENERATED TRAFFIC**

The Project involves the redevelopment of the existing building on-site into an 186,000 gsf Research & Development (R&D) use with a daycare that can accommodate up to 40 students. Trip generation rates for the R&D use were empirically-derived from monitoring reports for other R&D facilities in the Kendall Square area. These rates were developed by the TP&T Department, due to recognition of observed driveway counts and resulting trip-generation rates that are considerably lower in Cambridge than those suggested by the Institute of Transportation Engineers (ITE) Trip Generation Manual. The daycare trips were determined using ITE Land Use Code (LUC) 565 – Day Care Center.

Empirically-derived trip rates were used with mode split data from area R&D developments to calculate person trips among the various transport modes. This was combined with vehicle trips for the daycare facility derived from ITE Land Use Code (LUC) 565 – Day Care Center to determine the total site generated traffic. When the day care opens, it is conservatively expected that 25 percent of the 40 students would be from Ragon employees and the other 75 percent (or 30 students) would be from outside of the organization. Over time, most of the families using the daycare are expected to be Ragon employees.

The Project is expected to generate 442 vehicle trips (221 in and 221 out) on an average weekday. On an hourly basis, the site is expected to generate 75 vehicle trips (62 in and 13 out) during the weekday morning peak hour and 77 vehicle trips (17 in and 60 out) during the weekday evening peak hour.

As compared with existing conditions, the Project results in a minimal increase in trip generation during an average weekday, weekday morning peak hour, and weekday evening peak hour time periods.

### **ARTICLE 19 PROJECT REVIEW SPECIAL PERMIT CRITERIA ANALYSIS**

As required by Section 19.20 of the City of Cambridge Zoning Ordinance (the "Ordinance"), the Project has been evaluated against the five Project Review Special Permit Criteria indicators as measurements of the Project's expected impact on City traffic. Of the 127 measurements analyzed in connection with the five indicators, none were exceeded as a direct result of the Project. A total of 6 measurements are exceeded under existing conditions and would be considered exceedances of the measurements with or without the Project. The Applicant is committed to the implementation of the Project mitigation strategies described in this TIS to lessen any potential impact of the Project

on City traffic. Accordingly, the Project is not expected to have a significant adverse impact on City traffic and issuance of a Project Review Special Permit is appropriate with respect to potential traffic impacts.

### **TRAFFIC OPERATIONS ANALYSIS**

To assess the impact of the Project on the roadway network, traffic operations and vehicle queue analyses were performed at the study intersections under 2020 Baseline, 2020 Build, and 2025 Future conditions. The analysis indicates that the Project will not have a significant effect on operating conditions at the area intersections.

### **PARKING ANALYSIS**

The potential number of parking spaces needed for the Project was calculated based on the estimated number of employees multiplied by the automobile mode split (SOV plus ½ HOV, or 37.5 percent). This calculation resulted in a parking demand of 113 spaces. The Project is proposing a 120-space below grade parking garage that can accommodate the parking demand, resulting in a rate of 0.65 spaces/1,000 sf. This parking rate is less than the parking rate that was identified in the K2C2 Final Report for R&D space of 0.8 spaces/1,000 sf, and is also less than the minimum rates under current zoning. This is intended to constrain parking supply for the site. In addition, bicycle parking demand calculations were performed in accordance with the City of Cambridge Zoning Ordinance 6.100. The calculations determined the site needs 41 long-term bicycle spaces and 11 short term bicycle spaces. The Project is providing 41 long-term spaces and 12 short-term spaces.

### **TRANSPORTATION DEMAND MANAGEMENT MEASURES**

Ragon currently provides Transportation Demand Management (TDM) measures that were intended to reduce SOV travel and encourage the use of alternative modes of transportation. The same measures will be implemented at the proposed site. These measures are listed below.

- The Project will provide Bluebikes memberships that are fully subsidized by the Ragon Institute.
- Accurate real-time information for the shuttles will be provided on-site in a central location.
- A total of ten (10) dedicated HOV parking spaces and three (3) Electric Vehicle (EV) parking spaces will be placed in the garage at preferential locations.
- A 30 percent discount for an MBTA pass will be provided via a pre-tax deduction program. The pass covers bus, subway, and commuter rail services.
- Employees will continue to be charged \$120 per month to park on site.
- Carpools will be informally organized by individual teams and lab groups.
- Showers, lockers, and secure bike parking will be provided on-site to encourage biking to work.



- A number of Zipcars are located near the site. Ragon will provide a 50 percent discount on annual membership.
- Ragon, through their affiliation with MGH, is permitted to use the Charles River Transportation Management Association (CRTMA) EZ Ride shuttle services at no charge.
- Ragon will provide flexible work schedules to help alleviate all employees accessing the site during peak hours.
- Ragon will provide teleworking (working from home) options to further reduce vehicle traffic to the site.

## CONCLUSION

As described throughout this TIS, the Project consists of the construction of a 186,000 gsf research and development facility with a child daycare that can accommodate 40 students and a 120-space below grade parking garage.

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

The proposed Project will not result in a public hazard due to significantly increased vehicular traffic or parking in this area of Cambridge. Specifically, the Project is not anticipated to have a significant adverse impact on motorist delays in the area, and adequate parking supply will exist at the site to support the Project. **Accordingly, this TIS finds that the Project can be accommodated within the existing area infrastructure and on the roadway network with minimal effects, resulting in the ability to implement the Project with the appropriate mitigation measures.**

# INTRODUCTION

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Vanasse & Associates, Inc. (VAI) has conducted a TIS for the Project as described above. This study reviews the potential transportation impacts, defines site access requirements, and identifies strategies to reduce traffic impacts associated with the Project. The study also reviews the Project with respect to the City of Cambridge Special Permit Criteria regarding traffic impacts, is in accordance with the City's guidelines for a TIS, and follows the scoping determination dated September 30, 2020. Table 1.a.1 outlines the existing and proposed building area characteristics of the Project.

**Table 1.a.1**  
**PROJECT BUILDING AREA CHARACTERISTICS**

Characteristics	Existing	Proposed
Manufacturing (vacant), sf	54,000	--
Research and Development, sf	--	186,000
Daycare, number of students	--	40

Table 1.a.2 outlines the existing and proposed vehicle and bicycle parking characteristics of the Project.

**Table 1.a.2**  
**PROJECT PARKING CHARACTERISTICS**

Parking Characteristics	Existing Site	Proposed Project	Net Change
Vehicle:			
Surface Parking	38	0	(38)
Below Grade Garage	--	120	120
Bicycle:			
Short Term	0	41	41
Long Term	0	12	12

The Project preliminary ground floor plan with points of vehicle access are shown on Figure 1.a.1, while the preliminary ground floor plan with points of pedestrian access is depicted in Figure 1.a.2. A survey plan is shown in Figure 1.a.3 including property lines, abutting parcels, and property ownership, with easements also depicted.

## **1.0 EXISTING CONDITIONS**

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### **1.1 EXISTING TRAFFIC CONDITIONS**

A field inventory of existing study area roadways was conducted to document traffic conditions in the current 2020 analysis year. Items collected regarding the study area roadways and intersections include roadway geometrics, traffic control devices, traffic signal timing plans, and safety data for the roadways in the vicinity of the site. Due to the COVID-19 pandemic, traffic volumes, pedestrian crossing volumes, and bicycle volumes were not able to be collected. This information was gathered from a number of TIS reports conducted in the area ranging from 2008 to 2016.

### **1.2 DESCRIPTION OF PROJECT STUDY AREA**

The Project study area was determined in consultation with City transportation officials and was confirmed in the September 30, 2020 Scoping Determination from the City to VAI. The study area is listed in Table 1.a.3 along with the TIS from which data was gathered for each intersection

**Table 1.b.1**  
**STUDY AREA AND DATA SOURCES**

<u>No.</u>	<u>Location</u>	<u>Data Source</u>	<u>Data Date</u>
1	Massachusetts Avenue at Sidney Street	Mass & Main TIS	May 2016
2	Main Street at Sidney Street/Columbia Street	Mass & Main TIS	May 2016
3	Main Street at Windsor Street	Novartis TIS	May 2011
4	Main Street at Portland Street	Novartis TIS	May 2011
5	Main Street at Albany Street	650 Main Street	May 2008
6	Main Street at Vassar Street/Galileo Galilei Way	302-303 Kendall Sq. TIS	May 2013
7	Portland Street at Albany Street	650 Main Street	May 2008

### **Transportation Network**

Local access to the area is provided via Vassar Street, Galileo Galilei Way, Albany Street, Portland Street, Windsor Street, and Sidney Street. These local roadways provide connections to Main Street and Massachusetts Avenue which eventually provide connections to the regional roadways such as

Massachusetts Turnpike and Interstate 93 (I-93), as well as connections into downtown Cambridge and Boston.

### **Geometric and Traffic Control**

Existing intersection geometry and lane usage was obtained from field inventory and observations conducted by VAI in August 2020. A graphical depiction of intersection inventories for the study area intersections are provided in Figure 1.b.1 through Figure 1.b.7. Sidewalks and wheelchair ramps along Main Street are in fair to good condition. Bike lanes currently exist on Sidney Street, Vassar Street, Galileo Galilei Way, Main Street, and Massachusetts Avenue.

### **1.3 PARKING AND LOADING FACILITIES**

Figure 1.a.2 depicts the existing on-site vehicle parking and loading facility. Currently there are no short-term or long-term bicycle parking accommodations on-site.

### **1.4 TRANSIT SERVICES**

Existing transit and bike facilities have been researched and inventoried in August 2020. Figure 1.d.1 provides a graphical depiction of the regional public and private transportation services available in the area. Figure 1.d.2 provides a Carsharing and Ridesharing Services Map highlighting nearby locations of carsharing services such as Zipcar. Figure 1.d.3 provides a Bikeshearing Station Map that identifies locations of BLUEbikes stations in the area. Figure 1.d.4 shows the existing bicycle lanes and pathways in the area.

### **1.5 LAND USE**

Land uses in the vicinity of the site were researched and inventoried in 2020 and are shown in Figure 1.e.1.

### **1.6 RAGON INSTITUTE AT TECHNOLOGY SQUARE**

The Ragon Institute is currently located at 400 Technology Square in Cambridge and occupies 75,226 sf of that facility. Ragon has 325 institute staff and employees divided into two categories: employees (175) and non-employees (150). At the facility, there are 57 parking spaces leased where the employee pays \$120 per month through payroll pre-tax deduction. Prior to COVID, there were typically 250 personnel on-site, and the average parking utilization was 40 percent with peaks up to 65 percent.

Ragon provided mode split data shown in Table 1.f.1 from the 2019 employee monitoring study conducted by Technology Square. These mode splits are provided for illustration purposes only, as the TP&T department required the use of other mode splits and therefore these Ragon data were not used for analysis.

**Table 1.f.1**  
**RAGON INSTITUTE MODE-SPLIT DATA<sup>a</sup>**

Mode Split	Ragon Institute
<b><u>Mode Split Characteristics</u></b>	
Single Occupancy Vehicle (SOV)	11
High Occupancy Vehicle (HOV)	8
Transit	45
Pedestrian	17
Bicycle	16
<u>Other</u>	<u>3</u>
<b>TOTAL</b>	<b>100</b>

<sup>a</sup>Based on Ragon Institute 2019 PTDM and Planning Board Special Permit transportation monitoring report.

## **2.0 DATA COLLECTION**

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### **2.1 INTERSECTION TURNING MOVEMENT COUNTS**

Due to the COVID-19 pandemic, traffic volumes, pedestrian crossing volumes, and bicycle volumes were not able to be collected. Instead, as directed by TP&T, this information was gathered from a number of TIS reports conducted in the area ranging in dates from 2008 to 2016. The vehicle volumes were then adjusted by 0.5 percent per year up to 2020 Baseline conditions. The pedestrian volumes were adjusted using U.S. census data from the three census tracts that encompass the study area. These include census tract 3524, tract 3531.01, and tract 3531.02. The census data is provided up to 2018, and therefore the percent change from the year of the count to 2018 was used to further adjust pedestrian volumes to 2020 baseline conditions. The pedestrian volumes were grown by approximately 12 to 26 percent to 2020 Baseline conditions depending on the year the counts were conducted. The bicycle volume were grown based on count data provided from the Cambridge Community Development Department. They provided weekday morning and weekday evening peak hour bicycle volume from 2002 to 2018 on a biannual basis as well as data from 2019. Percent increases to the 2019 volume were calculated and applied to the bicycle volumes. The bicycle volumes were grown by approximately 17 to 86 percent to 2020 Baseline conditions depending on the year the counts were conducted. These calculations are provided in the appendix. The 2020 Baseline weekday morning and weekday evening peak-hour traffic-volume networks are depicted on Figure 2.c.1 through Figure 2.c.2. The pedestrian volumes are depicted in Figure 2.c.3 through Figure 2.c.4 for the weekday morning and weekday evening peak-hour periods. Bicycle volumes are provided in Figure 2.c.5 through Figure 2.c.6 for the weekday morning and weekday evening peak-hour periods.

### **2.2 MOTOR VEHICLE CRASH DATA**

Motor vehicle crash data was obtained from the MassDOT Safety Management/Traffic Operations Unit for the most recent three-year period available (2015-2017) in order to examine motor vehicle crash trends occurring within the study area. In addition, the Cambridge Police Department (CPD) was contacted to obtain crash records from 2015-2017 at the study area intersections. The CPD provided 19 crashes from 2015-2017 that occurred at the study area intersections, all but two of which were included in the MassDOT online database. The two additional crashes occurred at the intersection of Main Street/Columbia Street at Sidney Street and were included in the crash summary. This data is summarized in Table 2.b.1. Separate tables are provided that identify summaries of crashes between vehicles and pedestrians in Table 2.b.2 and crashes between vehicles and bicyclists in Table 2.b.3. Intersections where no pedestrian or bicyclist involvement with vehicles were recorded are not included in Table 2.b.2 or Table 2.b.3.

**Table 2.b.1**  
**VEHICLE CRASH DATA SUMMARY<sup>a</sup>**

	Massachusetts Avenue at Sidney Street	Main Street at Sidney Street/ Columbia Street	Main Street at Windsor Street	Main Street at Portland Street	Main Street at Albany Street	Main Street at Vassar Street/ Galileo Galilei Way	Portland Street at Albany Street
<i>Year:</i>							
2015	4	1	6	6	1	5	2
2016	6	0	8	5	4	5	1
<u>2017</u>	<u>4</u>	<u>3</u>	<u>3</u>	<u>6</u>	<u>0</u>	<u>6</u>	<u>0</u>
Total	14	4	17	17	5	16	3
Average <sup>b</sup>	4.67	1.33	5.67	5.67	1.67	5.33	1.00
Crash Rate <sup>c</sup>	0.86	0.54	1.41	1.17	0.42	0.72	0.31
Significant <sup>d</sup>	Yes	No	Yes	Yes	No	Yes	No
<i>Type:</i>							
Angle	2	2	6	7	0	2	0
Rear-End	2	1	2	2	1	0	0
Head-On	1	0	0	1	0	0	1
Sideswipe	2	0	4	1	3	4	0
Fixed Object	0	0	2	1	0	1	0
Pedestrian	1	0	1	3	1	4	0
Bicyclist	7	1	1	2	0	4	2
<u>Unknown/Other</u>	<u>0</u>	<u>0</u>	<u>1</u>	<u>0</u>	<u>0</u>	<u>1</u>	<u>0</u>
Total	14	4	17	17	5	16	3
<i>Weather Conditions:</i>							
Clear	9	1	10	12	4	10	2
Cloudy/Rain	5	2	6	3	1	4	0
Snow/Ice	0	1	0	0	0	2	1
Fog	0	0	0	0	0	0	0
<u>Unknown/Other</u>	<u>0</u>	<u>0</u>	<u>1</u>	<u>2</u>	<u>0</u>	<u>0</u>	<u>0</u>
Total	14	4	17	17	5	16	3
<i>Lighting Conditions:</i>							
Daylight	10	3	8	8	4	11	2
Dawn/Dusk	2	0	4	3	0	0	1
Dark (lit)	2	1	5	5	1	5	0
Dark (unlit)	0	0	0	0	0	0	0
<u>Unknown/Other</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>1</u>	<u>0</u>	<u>0</u>	<u>0</u>
Total	14	4	17	17	5	16	3
<i>Pavement Conditions:</i>							
Dry	11	2	12	14	4	11	2
Wet	3	2	4	1	1	4	0
Snow/Ice	0	0	0	0	0	1	1
<u>Unknown/Other</u>	<u>0</u>	<u>0</u>	<u>1</u>	<u>2</u>	<u>0</u>	<u>0</u>	<u>0</u>
Total	14	4	17	17	5	16	3
<i>Severity:</i>							
Property Damage Only	6	4	8	7	4	5	1
Personal Injury	5	0	5	6	1	7	1
Fatality	0	0	0	0	0	0	0
<u>Unknown/Other</u>	<u>3</u>	<u>0</u>	<u>4</u>	<u>4</u>	<u>0</u>	<u>4</u>	<u>1</u>
Total	14	4	17	17	5	16	3

<sup>a</sup>Source: MassDOT and Cambridge Police Department Crash Data

<sup>b</sup>Average crashes over three-year period.

<sup>c</sup>Crash Rate in crashes per million entering vehicles (mev).

<sup>d</sup>Crash Rate noted as significant if rate exceeds 2018 MassDOT District 6 averages of 0.71 and 0.52 for signalized and unsignalized intersections, respectively.



**Table 2.b.2**  
**CRASH DATA SUMMARY: VEHICLE TO PEDESTRIAN<sup>a</sup>**

	Massachusetts Avenue at Sidney Street	Main Street at Windsor Street	Main Street at Portland Street	Main Street at Albany Street	Main Street at Vassar Street/ Galileo Galilei Way
<i>Year:</i>					
2015	0	0	0	0	1
2016	1	0	1	1	1
<u>2017</u>	<u>0</u>	<u>1</u>	<u>2</u>	<u>0</u>	<u>2</u>
Total	1	1	3	1	4
Average <sup>a</sup>	0.33	0.33	1.00	0.33	1.33
<i>Time:</i>					
Weekday 7 to 9 AM	0	1	0	1	0
Weekday 4 to 6 PM	0	0	0	0	1
<u>Remainder of Day</u>	<u>1</u>	<u>0</u>	<u>3</u>	<u>0</u>	<u>3</u>
Total	1	1	3	1	4
<i>Pavement Conditions:</i>					
Dry	0	0	2	1	2
Wet	1	1	1	0	2
Snow	0	0	0	0	0
Icy	0	0	0	0	0
Other	0	0	0	0	0
<u>Unknown</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
Total	1	1	3	1	4
<i>Day of Week:</i>					
Monday through Friday	1	1	3	1	3
<u>Saturday and Sunday</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>1</u>
Total	1	1	3	1	4
<i>Severity:</i>					
Property Damage Only	1	0	1	1	0
Personal Injury	0	0	1	0	4
Fatal Crashes	0	0	0	0	0
<u>Other/Unknown</u>	<u>0</u>	<u>1</u>	<u>1</u>	<u>0</u>	<u>0</u>
Total	1	1	3	1	4

<sup>a</sup>Source: MassDOT and Cambridge Police Department Crash Data

<sup>b</sup>Average crashes over three-year period.

**Table 2.b.3**  
**CRASH DATA SUMMARY: VEHICLE TO BICYCLIST<sup>a</sup>**

	Massachusetts Avenue at Sidney Street	Main Street at Sidney Street/ Columbia Street	Main Street at Windsor Street	Main Street at Portland Street	Main Street at Vassar Street/ Galileo Galilei Way	Portland Street at Albany Street
<i>Year:</i>						
2015	2	0	0	2	2	1
2016	4	0	0	0	2	1
<u>2017</u>	<u>1</u>	<u>1</u>	<u>1</u>	<u>0</u>	<u>0</u>	<u>0</u>
Total	7	1	1	2	4	2
Average <sup>b</sup>	2.33	0.33	0.33	0.67	1.33	0.67
<i>Time:</i>						
Weekday 7 to 9 AM	1	0	0	0	2	0
Weekday 4 to 6 PM	0	0	1	0	0	1
<u>Remainder of Day</u>	<u>6</u>	<u>1</u>	<u>0</u>	<u>2</u>	<u>2</u>	<u>1</u>
Total	7	1	1	2	4	2
<i>Pavement Conditions:</i>						
Dry	6	0	1	1	3	2
Wet	1	1	0	0	1	0
Snow	0	0	0	0	0	0
Icy	0	0	0	0	0	0
Other	0	0	0	0	0	0
<u>Unknown</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>1</u>	<u>0</u>	<u>0</u>
Total	7	1	1	2	4	2
<i>Day of Week:</i>						
Monday through Friday	6	1	1	2	3	2
<u>Saturday and Sunday</u>	<u>1</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>1</u>	<u>0</u>
Total	7	1	1	2	4	2
<i>Severity:</i>						
Property Damage Only	2	1	0	0	1	1
Personal Injury	4	0	1	2	2	0
Fatal Crashes	0	0	0	0	0	0
<u>Other/Unknown</u>	<u>1</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>1</u>	<u>1</u>
Total	7	1	1	2	4	2

<sup>a</sup>Source: MassDOT and Cambridge Police Department Crash Data.

<sup>b</sup>Average crashes over three-year period.

The crash summary indicates the intersection of Massachusetts Avenue at Sidney Street experienced an average of 4.67 crashes per year over the three-year study period. The involvement of one pedestrian and seven bicyclists was noted in the crash data at this location. The seven bicycle crashes account for 50 percent of the crashes at this location. The intersection of Main Street/Columbia Street at Sidney Street experienced an average of 1.33 crashes per year over the three-year study period. The involvement of one bicyclist was noted in the crash data at this location. Angle crashes account for 50 percent of the crashes at this location. The intersection of Main Street at Windsor Street experienced an average of 5.67 crashes per year over the three-year study period. The involvement of one pedestrian and one bicyclist was noted in the crash data at this location. The majority of crashes are angle crashes which account for 35 percent of the crashes at this location. The intersection of Main Street at Portland Street experienced an average of 5.67 crashes per year over the three-year study period. The involvement of three pedestrian and two bicyclists was noted in the crash data at this location. The majority of crashes are angle crashes which account for 41 percent of the crashes at this location. The intersection of Main Street at Albany Street experienced an average of 1.67 crashes per year over the three-year study period. The involvement of one pedestrian was noted in the crash data at this location. The majority of

crashes are sideswipe crashes which account for 60 percent of the crashes at this location. The intersection of Main Street at Vassar Street/Galileo Galilei Way experienced an average of 5.33 crashes per year over the three-year study period. The involvement of four pedestrians and four bicyclists was noted in the crash data at this location. The majority of crashes are sideswipe, pedestrian, and bicycle crashes which each account for 25 percent of the crashes at this location. The intersection of Portland Street at Albany Street experienced an average of 1.00 crash per year over the three-year study period. The involvement of two bicyclists was noted in the crash data at this location. The majority of crashes are bicycle crashes which each account for 67 percent of the crashes at this location.

No fatalities were reported over the three-year study period. As noted in Table 2.d.1 above, four of the intersections exceeded the MassDOT District 6 average crash rate for intersections, currently noted at 0.71 crashes per million entering vehicles (mev) for signalized intersections and 0.52 crashes per mev for unsignalized intersections. These intersections include Massachusetts Avenue at Sidney Street, Main Street at Windsor Street, Main Street at Portland Street, and Main Street at Vassar Street/Galileo Galilei Way. The intersection of Main Street at Vassar Street/Galileo Galilei Way appears on the high crash location database and are included on MassDOT’s Highway Safety Improvement Program (HSIP) listing as a high crash location for 2015-2017. The intersections of Massachusetts Avenue at Sidney Street and Main Street/Columbia Street at Sidney Street are both listed on the HSIP as a 2008-2017 pedestrian cluster. All of the intersections in the study area except for Main Street at Portland Street are listed on the HSIP as a 2008-2017 bicycle cluster. Designation as a HSIP location allows for MassDOT to prioritize funding for safety-related improvements in a specific region of the state. According to the MassDOT Road Safety Audit (RSA) database, no RSAs have been conducted at any of the study area intersections.

### **2.3 EXISTING PUBLIC TRANSIT SYSTEM**

The site is located near Kendall/MIT Station on the MBTA Red Line subway system. The Red Line runs from the Alewife Station to either the Braintree Station or the Ashmont Station. MBTA Bus Route 64, 68, and 85 all also stop on Main Street at the Kendall/MIT Station. Table 2.c.1 summarizes the most recent Red Line headway and boarding data for the Kendall/MIT Station available from the MBTA.

**Table 2.c.1  
MBTA RED LINE SERVICE SUMMARY**

Station	Rush Hour Headways (minutes) <sup>b</sup>	Daily Line Flow	Boarding Counts <sup>a</sup>			
			Weekday Morning Peak Hour		Weekday Evening Peak Hour	
			Boarding	Alighting	Boarding	Alighting
Kendall/MIT	2-6	99,345	600	3,490	3,946	766

<sup>a</sup>Source: MBTA composite of station passenger entry and ridership data, 2017 to 2019.

<sup>b</sup>Based on MBTA schedule.

Table 2.c.2 summarizes the peak-hour headways and capacity information for the three bus routes servicing the Kendall/MIT Station supplied by the MBTA.

**Table 2.c.2  
MBTA BUS SERVICE SUMMARY<sup>a</sup>**

Route No.	Route	Hours of Operation	Peak-Hour Headway (minutes)	Peak-Hour Peak-Direction Planning Capacity <sup>b</sup>	Daily Ridership	Estimated Daily Capacity
64	Oak Square – University Park or Kendall/MIT Station	5:30 AM to 1:05 AM	15-30	120-240	1,689	3,780
68	Harvard Square – Kendall/MIT Station	6:35 AM to 6:45 PM	40	90	405	2,280
85	Spring Hill – Kendall/MIT Station	5:45 AM to 7:45 PM	40-50	72-90	592	2,460

<sup>a</sup>Source: MBTA composite of station entry and ridership data, 2019.

<sup>b</sup>Planning capacity is 60 passengers per bus.

### **EZ Ride Shuttle Bus**

In addition to the MBTA, the Charles River Transportation Management Association (CRTMA) provides the EZRide Shuttle Bus that circulates between Cambridgeport and North Station in Boston via the Kendall Square Red Line station. Prior to COVID, the EZRide Shuttle operated on weekdays between 6:20 AM and 10:54 AM during the morning time period on an 8 to 15-minute frequency with an 8-minute frequency target during the peak hours. During the midday time period, the EZRide Shuttle operates between 10:45 AM and 2:55 PM on a 15-minute frequency and operates between Pacific Street and Kendall Square only during this time. During the evening time period, the EZRide Shuttle operates between 2:55 PM and 7:58 PM on a 6 to 20-minute frequency with an 8-minute frequency target during the peak hour. During the weekday morning, weekday midday, and weekday evening time periods, the bus stops directly in front of the site at the intersection of Main Street at Albany Street. The EZride Shuttle does not operate on weekends.

Due to COVID, the EZRide Shuttle has implemented reduced service. The shuttle currently operates on weekdays between 6:20 AM and 10:42 AM during the morning time period on an 8 to 15-minute frequency with an 8-minute frequency target during the peak hours. During the midday time period, the EZRide Shuttle operates between 10:45 AM and 2:55 PM on a 15-minute frequency and operates between Pacific Street and Kendall Square only during this time. During the evening time period, the EZRide Shuttle operates between 2:55 PM and 7:36 PM on a 6 to 20-minute frequency with an 8-minute frequency target during the peak hour. The shuttle route and schedule is provided in the Appendix.

Public access to the shuttle is permitted for a \$1.00 fee for adults and \$0.50 for children ages 5 to 11. Children younger than 5 ride for no charge.

### **MIT Shuttle Bus**

MIT provides a shuttle bus service in the area. The shuttle operates from 6:15 AM to 7:45 PM on weekdays, with headways of 10-20 minutes. The shuttle does not operate on weekends or MIT holidays. The shuttle is free and is available to all members of the MIT community. The shuttle has two schedules. The morning schedule operates from 6:15 AM to 2:30 PM and includes 11 stops around the MIT campus. The afternoon schedule runs from 2:35 PM to 7:45 PM with 9 stop around the MIT campus. The shuttle routes and schedules are provided in the Appendix.

### **Alexandria Shuttle Bus**

The Alexandria Shuttle runs a loop from North Station to Kendall Square from 6:30 AM to 9:40 AM and from 3:30 PM to 6:40 PM.

## **3.0 PROJECT TRAFFIC**

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### **3.1 TRIP GENERATION**

The Project involves the redevelopment of the existing building on-site into a 186,000 sf Research & Development (R&D) use with a child daycare that can accommodate up to 40 students. Trip generation rates for the R&D use were empirically-derived from monitoring reports for other R&D facilities in the Cambridge area. These rates were developed by the Cambridge TP&T Department, due to recognition of observed driveway counts and resulting trip-generation rates that are considerably lower in Cambridge than those suggested by the Institute of Transportation Engineers (ITE) *Trip Generation Manual*<sup>1</sup>. The daycare trips were determined using ITE Land Use Code (LUC) 565 – Day Care Center.

#### **Empirical Trip Generation**

Parking and Transportation Demand Management (PTDM) studies from 2017 through 2018 for five R&D buildings in the vicinity of the Project were used to determine an empirical trip generation rate for R&D uses in this area of Cambridge. The resulting empirical rates were approved by the TP&T Department in their Scoping Letter of September 30, 2020, which also contained combined mode-split data for fourteen office/R&D developments in this area of Cambridge obtained from PTDM reports. These mode split values are provided in Table 3.a.1. Table 3.a.2 provides the empirically-derived trip rates for the R&D developments. Spreadsheets documenting these calculations are provided in the Appendix.

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<sup>1</sup> *Trip Generation Manual, 10<sup>th</sup> Edition*; Institute of Transportation Engineers; Washington, D.C.; 2017.

**Table 3.a.1  
EAST CAMBRIDGE AREA MODE-SPLITS**

Characteristics/Mode Split	R&D <sup>a</sup>
<b><u>Mode Split Characteristics</u></b>	
Single Occupancy Vehicle (SOV)	35
High Occupancy Vehicle (HOV)	5
Transit	36
Pedestrian	8
Bicycle	7
Work at Home	5
<u>Other</u>	<u>4</u>
TOTAL	100

<sup>a</sup>Based on 2017-2018 PTDM reports from 14 projects (F2, F4, F8, F9, F11, F14, F15, F27, F43, F47, F51, PB65, PB125, PB150).

**Table 3.a.2  
EMPIRICAL TRIP GENERATION RATES**

Time Period	Empirical <sup>a</sup> R&D Vehicle Trip Rates
<i>Weekday Daily:</i>	
Entering	0.86
<u>Exiting</u>	<u>0.86</u>
Total	1.72
<i>Weekday Morning Peak Hour:</i>	
Entering	0.27
<u>Exiting</u>	<u>0.01</u>
Total	0.28
<i>Weekday Evening Peak Hour:</i>	
Entering	0.03
<u>Exiting</u>	<u>0.25</u>
Total	0.28

<sup>a</sup>Based on 2017-2018 PTDM reports from 5 projects ( F11, F14, F27, F43, F47)

**ITE Trip Generation**

The daycare trips were determined based on the assumption that to start, 25 percent of the 40 students would be from Ragon employees and 75 percent (or 30 students) would be from non-Ragon employees. The independent variable of 30 students was then applied to ITE LUC 565 – Day Care Center with no mode split assumptions to determine the number of trips. Table 3.a.3 summarizes the expected trip generation for the daycare.

**Table 3.a.3  
ITE TRIP GENERATION**

Time Period	ITE LUC 565
<i>Weekday Daily:</i>	
Entering	61
<u>Exiting</u>	<u>61</u>
Total	122
<i>Weekday Morning Peak Hour:</i>	
Entering	12
<u>Exiting</u>	<u>11</u>
Total	23
<i>Weekday Evening Peak Hour:</i>	
Entering	11
<u>Exiting</u>	<u>13</u>
Total	24

<sup>a</sup>Based on ITE LUC 565 – Day Care Center; 30 students.

**Person Vehicle Trip Generation**

Trip rates from Table 3.a.2 were used to calculate vehicle trips for the R&D land use, and the mode splits from Table 3.a.1 were used to calculate a Vehicle Occupancy Ratio (VOR) as suggested by TP&T staff, which was then used to develop person trip generation. The person trips were then applied to the mode split data to calculate the appropriate share for each transportation mode. The vehicle trips associated with the proposed land use are shown in Table 3.a.4. Spreadsheets documenting these calculations are provided in the Appendix.

**Table 3.a.4  
R&D TRIP GENERATION BY MODE**

Use	Size	VOR	MODE SPLIT PERCENTAGES							
			SOV	HOV	TRANSIT	PED	BIKE	OTHER		
R&D	186 ksf	1.07	35%	5%	36%	8%	7%	9%		
Daily	Trip Rate	Total Vehicle Trips	Person Vehicle Trips	Total Person Trips	SOV Person Trips	HOV Person Trips	Transit Person Trips	Ped Person Trips	Bike Person Trips	Other Person Trips
Enter	0.86	160	171	428	150	21	154	34	30	39
Exit	0.86	160	171	428	150	21	154	34	30	39
Total	1.72	320	342	856	300	42	308	68	60	78
Weekday Morning										
Enter	0.27	50	53	133	47	7	48	11	9	11
Exit	0.01	2	2	5	2	0	2	0	0	1
Total	0.28	52	55	138	49	7	50	11	9	12
Weekday Evening										
Enter	0.03	6	6	15	5	1	6	1	1	1
Exit	0.25	47	50	125	44	6	45	10	9	11
Total	0.28	53	56	140	49	7	51	11	10	12



## **Total Project Trip Generation**

The total Project trip generation includes the trips for R&D based on the empirical trip rates and the trips for the daycare based on the ITE trip rates. Table 3.a.5 summarizes the total vehicle trip generation for the Project.

**Table 3.a.5  
TOTAL PROJECT VEHICLE TRIP GENERATION**

<u>Time Period/ Directional Distribution</u>	<u>Daycare Vehicle Trips<sup>a</sup></u>	<u>R&amp;D Vehicle Trips<sup>b</sup></u>	<u>Total Project Vehicle Trips<sup>c</sup></u>
<i>Weekday:</i>			
Entering	61	160	221
<u>Exiting</u>	<u>61</u>	<u>160</u>	<u>221</u>
Total	122	320	442
<i>Weekday Morning Peak Hour:</i>			
Entering	12	50	62
<u>Exiting</u>	<u>11</u>	<u>2</u>	<u>13</u>
Total	23	52	75
<i>Weekday Evening Peak Hour:</i>			
Entering	11	6	17
<u>Exiting</u>	<u>13</u>	<u>47</u>	<u>60</u>
Total	24	53	77

<sup>a</sup>From Table 3.a.3.

<sup>b</sup>From Table 3.a.4.

## **3.2 TRIP DISTRIBUTION**

Project trips were distributed using the Kendall Square Central Square (K2C2) plans R&D trip distribution assumptions. The R&D trips were distributed to and from the parking garage which has access onto Albany Street, while the daycare trips were distributed to and from the drop-off/pick-up area in front of the site on Portland Street. The R&D trip distribution is shown on Figure 3.b.1 while the daycare trip distribution is shown on Figure 3.b.2. Table 3.b.1 summarizes the trip distribution for both uses.

**Table 3.b.1  
TRIP-DISTRIBUTION SUMMARY**

<u>Use</u>	<u>Route</u>	<u>Direction</u>	<u>Percentage From Direction to Site</u>	<u>Percentage To Direction from Site</u>
R&D/Daycare	Massachusetts Avenue	West	22	25
	Columbia Street	West	6	3
	Windsor Street	North	4	4
	Portland Street	North	15	15
	Galileo Galilei Way	North	18	18
	Main Street	East	4	4
	Albany Street	South	<u>31</u>	<u>31</u>
	TOTAL		100	100

### **3.3 DAYCARE DROP-OFF/PICK-UP OPERATIONS**

The drop-off/pick-up operations for families not affiliated with Ragon will be on Portland Street. The curb and sidewalk will be recessed to provide the drop-off area. Three short-term parking spaces will be provided for this operation. In addition, the parking garage will have three parking spaces for daycare staff.

### **3.4 SITE ACCESS**

The site has pedestrian access from all three sides of the building, with vehicle access to the garage provided from Albany Street and the daycare drop-off/pick-up operations on Portland Street. Most pedestrians will be coming to the site via Main Street, and the front lobby of the building is appropriately placed facing Main Street. The location of the garage access was determined factoring in the vehicle, pedestrian, and bicycle activity at the intersections of Main Street with Portland Street and with Albany Street. Fewer pedestrians, bicyclists, and motorists utilize the segment of Albany Street between Portland Street and Main Street than the corresponding segment of Portland Street. This indicates fewer conflicts would be present with garage and loading dock access via Albany Street. Table 3.d.1 summarizes the vehicle, pedestrian, and bicycle volumes at the two intersections.

**Table 3.d.1  
PORTLAND STREET VS ALBANY STREET VOLUMES**

Mode	Main Street at Portland Street		Main Street at Albany Street	
	Weekday Morning Peak Hour	Weekday Evening Peak Hour	Weekday Morning Peak Hour	Weekday Evening Peak Hour
Vehicles	1128	1237	913	1024
Pedestrians	295	321	150	212
Bicycles	217	160	103	79

As shown in Table 3.d.1, the vehicle, pedestrian, and bicycle volumes are all higher at the intersection of Main Street with Portland Street during both the weekday morning and weekday evening peak hours. In addition, the analysis indicates that operations at the intersection of Main Street with Albany Street function better than at the intersection of Main Street with Portland Street under 2020 Baseline and 2020 Build conditions. The maximum queue length northbound on Portland Street was 155 feet while the maximum queue length on Albany Street northbound was 131 feet.

### **3.5 PROJECT SERVICE AND LOADING**

The Project service and loading area is proposed off of Albany Street. The loading dock contains 4 bays. The largest trucks expected on-site are WB-30s. Daily office truck trips are typically limited to package pickup and delivery carried out using single-unit trucks or delivery vans. These trips are expected to total less than ten vehicles per day (less than 20 daily truck trips), accounting for the various courier and delivery services expected.

## **4.0 BACKGROUND TRAFFIC**

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Traffic volumes in the study area were projected to the year 2025, which reflects a five-year planning horizon consistent with City traffic study guidelines and the traffic study scope issued by the City TP&T Department. Traffic volume conditions would include increases due to development projects approved or under construction and not yet occupied and increases to general background traffic levels, assumed to increase at 0.5 percent per year.

As indicated in the Scoping Letter, the following projects were identified for inclusion in the Future 2025 condition:

- *MIT Kendall Square Redevelopment Project*
- *Courthouse Redevelopment Project*
- *Alexandrian Center at Kendall Square*
- *249 Third Street Residential Project*
- *Kendall Square Urban Renewal (KSURP) Infill Development Concept Plan*
- *North Point/Cambridge Crossing*
- *First Street PUD Project*
- *Cambridgeside Redevelopment (Phase I and II)*
- *The Foundry Building Project*
- *325 Binney Street Project*
- *Vople Center Redevelopment Project*

### **4.1 ROADWAY IMPROVEMENT PROJECTS**

Improvements associated with the Cambridge Redevelopment Authority (CRA) Kendall Square Streetscape Redesign were incorporated into future condition analysis. The 100 percent design plans were obtained from the TP&T department for this analysis.

## **5.0 TRAFFIC ANALYSIS**

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### **5.1 SITE ASSIGNMENT**

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

The Future 2025 traffic volume condition includes the traffic volumes from the identified background developments, the increases resulting from the 0.5 percent per year annual growth rate that were applied to the 2020 Baseline conditions traffic volumes, and the Site Generated traffic associated with the Project. These traffic volume networks are shown on Figure 5.d.1 and Figure 5.d.2 for the weekday morning and weekday evening peak-hour traffic volumes.

## 6.0 CAPACITY ANALYSIS

### 6.1 VEHICLE LEVEL-OF-SERVICE ANALYSIS

Using the 2020-year and 2025-year traffic-volume networks, Vehicle Level-of-Service (LOS) analyses were conducted for the 2020 Baseline, 2020 Build, and 2025 Future conditions with the results shown in Tables 6.a.1 and 6.a.2 for signalized and unsignalized intersections, respectively. As required in the City of Cambridge Supplemental/Updated TIS Guidelines, these analyses were conducted using SimTraffic analysis software. The analysis worksheets are contained in the Appendix.

**Table 6.a.1**  
**VEHICLE LEVEL-OF-SERVICE SUMMARY – SIGNALIZED INTERSECTIONS**

Intersection/Peak Hour/Movement	2020 Baseline		2020 Build		Delay Increase	2025 Future	
	Delay <sup>a</sup>	LOS <sup>b</sup>	Delay	LOS		Delay	LOS
<i>Massachusetts Avenue at Sidney Street</i>							
<i>Weekday Morning Peak Hour:</i>							
Massachusetts Avenue EB LT	54	D	69	E	15	90	F
Massachusetts Avenue EB TH/RT	49	D	88	F	39	535	F
Massachusetts Avenue WB LT	36	D	35	D	-1	33	C
Massachusetts Avenue WB TH/RT	24	C	26	C	2	25	C
Sidney Street NB RT	32	C	31	C	-1	31	C
Sidney Street SB LT/HT	27	C	26	C	-1	29	C
Sidney Street SB RT	6	A	6	A	0	10	B
<b>Overall</b>	<b>34</b>	<b>C</b>	<b>46</b>	<b>D</b>	<b>12</b>	<b>87</b>	<b>F</b>
<i>Weekday Evening Peak Hour:</i>							
Massachusetts Avenue EB LT	86	F	81	F	-5	144	F
Massachusetts Avenue EB TH/RT	95	F	117	F	22	657	F
Massachusetts Avenue WB LT	35	D	36	D	1	37	D
Massachusetts Avenue WB TH/RT	33	C	36	D	3	116	F
Sidney Street NB RT	34	C	35	D	1	33	C
Sidney Street SB LT/HT	31	C	32	C	1	36	D
Sidney Street SB RT	11	B	10	A	-1	14	B
<b>Overall</b>	<b>49</b>	<b>D</b>	<b>53</b>	<b>D</b>	<b>4</b>	<b>129</b>	<b>F</b>

\*See notes at end of table.

**Table 6.a.1 (Continued)**

**VEHICLE LEVEL-OF-SERVICE SUMMARY – SIGNALIZED INTERSECTIONS**

Intersection/Peak Hour/Movement	2020 Baseline		2020 Build		Delay Increase	2025 Future	
	Delay <sup>a</sup>	LOS <sup>b</sup>	Delay	LOS		Delay	LOS
<b>Main Street/Columbia Street at Sidney Street</b>							
<i>Weekday Morning Peak Hour:</i>							
Columbia Street EB TH	14	B	26	C	12	24	C
Columbia Street EB RT	25	C	26	C	1	28	C
Main Street WB LT/TH	116	F	122	F	6	270	F
Sidney Street NB LT/RT	8	A	8	A	0	7	A
<b>Overall</b>	<b>52</b>	<b>D</b>	<b>55</b>	<b>D</b>	<b>3</b>	<b>115</b>	<b>F</b>
<i>Weekday Evening Peak Hour:</i>							
Columbia Street EB TH	28	C	23	C	-5	103	F
Columbia Street EB RT	18	B	19	B	1	21	C
Main Street WB LT/TH	36	D	64	E	28	198	F
Sidney Street NB LT/RT	13	B	12	B	-1	30	C
<b>Overall</b>	<b>25</b>	<b>C</b>	<b>39</b>	<b>D</b>	<b>14</b>	<b>101</b>	<b>F</b>
<b>Main Street at Windsor Street</b>							
<i>Weekday Morning Peak Hour:</i>							
Main Street EB LT/TH/RT	14	B	13	B	-1	13	B
Main Street WB LT/TH/RT	13	B	15	B	2	181	F
Windsor Street NB LT/TH/RT	11	B	11	B	0	57	E
Windsor Street SB LT/TH/RT	12	B	12	B	0	43	D
<b>Overall</b>	<b>13</b>	<b>B</b>	<b>13</b>	<b>B</b>	<b>0</b>	<b>81</b>	<b>F</b>
<i>Weekday Evening Peak Hour:</i>							
Main Street EB LT/TH/RT	14	B	14	B	0	193	F
Main Street WB LT/TH/RT	15	B	21	C	6	264	F
Windsor Street NB LT/TH/RT	14	B	17	B	3	252	F
Windsor Street SB LT/TH/RT	15	B	16	B	1	183	F
<b>Overall</b>	<b>14</b>	<b>B</b>	<b>17</b>	<b>B</b>	<b>3</b>	<b>224</b>	<b>F</b>
<b>Main Street at Portland Street</b>							
<i>Weekday Morning Peak Hour:</i>							
Main Street EB LT/TH/RT	27	C	25	C	-2	26	C
Main Street WB LT/TH/RT	14	B	15	B	1	45	D
Portland Street NB LT/TH/RT	13	B	15	B	2	15	B
Portland Street SB LT/TH/RT	20	B	20	C	0	33	C
<b>Overall</b>	<b>19</b>	<b>B</b>	<b>20</b>	<b>B</b>	<b>1</b>	<b>30</b>	<b>C</b>
<i>Weekday Evening Peak Hour:</i>							
Main Street EB LT/TH/RT	27	C	43	D	16	227	F
Main Street WB LT/TH/RT	17	B	18	B	1	360	F
Portland Street NB LT/TH/RT	14	B	16	B	2	27	C
Portland Street SB LT/TH/RT	16	B	19	B	3	444	F
<b>Overall</b>	<b>19</b>	<b>B</b>	<b>25</b>	<b>C</b>	<b>6</b>	<b>299</b>	<b>F</b>

\*See notes at end of table.

**Table 6.a.1 (Continued)**  
**VEHICLE LEVEL-OF-SERVICE SUMMARY – SIGNALIZED INTERSECTIONS**

Intersection/Peak Hour/Movement	2020 Baseline		2020 Build		Delay Increase	2025 Future	
	Delay <sup>a</sup>	LOS <sup>b</sup>	Delay	LOS		Delay	LOS
<i>Main Street at Vassar Street/ Galileo Galilei Way</i>							
<i>Weekday Morning Peak Hour:</i>							
Main Street EB LT	23	C	25	C	2	41	D
Main Street EB TH/RT	18	B	17	B	-1	31	C
Main Street WB LT	28	C	27	C	-1	36	D
Main Street WB TH/RT	14	B	14	B	0	49	D
Vassar Street NB LT/TH	33	C	40	D	7	57	E
Vassar Street NB TH/RT	20	C	19	B	-1	45	D
Galileo Galilei Way SB LT	65	E	70	E	5	626	F
Galileo Galilei Way SB TH	21	C	24	C	3	198	F
Galileo Galilei Way SB RT	5	A	5	A	0	28	C
<b>Overall</b>	<b>20</b>	<b>B</b>	<b>21</b>	<b>C</b>	<b>1</b>	<b>71</b>	<b>E</b>
<i>Weekday Evening Peak Hour:</i>							
Main Street EB LT	25	C	26	C	1	33	C
Main Street EB TH/RT	18	B	18	B	0	14	B
Main Street WB LT	30	C	37	D	7	21	C
Main Street WB TH/RT	15	B	14	B	-1	854	F
Vassar Street NB LT/TH	20	C	19	D	-1	1435	F
Vassar Street NB TH/RT	21	C	22	C	1	110	F
Galileo Galilei Way SB LT	37	D	79	E	42	187	F
Galileo Galilei Way SB TH	19	B	18	B	-1	506	F
Galileo Galilei Way SB RT	5	A	5	A	0	449	F
<b>Overall</b>	<b>20</b>	<b>B</b>	<b>21</b>	<b>C</b>	<b>1</b>	<b>295</b>	<b>F</b>

<sup>a</sup>Average delay per vehicle (in seconds).

<sup>b</sup>Level of service.

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

**Table 6.a.2**  
**VEHICLE LEVEL-OF-SERVICE SUMMARY - UNSIGNALIZED INTERSECTIONS**

Unsignalized Intersection/ Critical Movement/Peak Hour	2020 Baseline			2020 Build			Delay	2025 Future		
	Demand <sup>a</sup>	Delay <sup>b</sup>	LOS <sup>c</sup>	Demand	Delay	LOS	Increase	Demand	Delay	LOS
<b>Main Street at Albany Street</b>										
Weekday Morning Peak Hour:										
Main Street EB TH/RT	312	2	A	348	3	A	1	703	5	A
Main Street WB LT/TH	385	5	A	398	6	A	1	570	26	D
Albany Street NB LT/RT	166	4	A	167	5	A	1	171	18	C
Weekday Evening Peak Hour:										
Main Street EB TH/RT	289	2	A	304	3	A	1	485	2	A
Main Street WB LT/TH	381	3	A	384	3	A	0	779	382	F
Albany Street NB LT/RT	304	11	B	336	12	B	1	344	655	F
<b>Portland Street at Albany Street</b>										
Weekday Morning Peak Hour:										
Albany Street WB LT/RT	144	9	A	157	9	A	0	160	10	A
Portland Street NB TH/RT	416	2	A	435	2	A	0	448	4	A
Portland Street SB LT/TH	210	3	A	210	1	A	-2	215	3	A
Weekday Evening Peak Hour:										
Albany Street WB LT/RT	134	12	B	160	15	B	3	163	5	A
Portland Street NB TH/RT	481	2	A	487	2	A	0	522	1052	F
Portland Street SB LT/TH	180	2	A	180	1	A	-1	184	290	F
<b>Albany Street at Parking Garage Driveway</b>										
Weekday Morning Peak Hour:										
Garage Driveway EB LT/RT				2	2	A	--	2	2	A
Albany Street NB LT/TH				181	1	A	--	185	15	B
Albany Street SB TH/RT				246	1	A	--	251	1	A
Weekday Evening Peak Hour:										
Garage Driveway EB LT/RT				47	8	A	--	47	1264	F
Albany Street NB LT/TH				306	2	A	--	314	1314	F
Albany Street SB TH/RT				90	1	A	--	92	1	A
<b>Portland Street at Daycare Drop-off/Pick-up</b>										
Weekday Morning Peak Hour:										
Drop-off/Pick-up WB RT				11	2	A	--	11	3	A
Portland Street NB TH/RT				210	1	A	--	217	1	A
Portland Street SB TH				210	2	A	--	215	3	A
Weekday Evening Peak Hour:										
Drop-off/Pick-up WB RT				13	3	A	--	13	6	A
Portland Street NB TH/RT				247	1	A	--	263	5	A
Portland Street SB TH				180	2	A	--	184	379	F

<sup>a</sup>Demand (in vehicles per hour) for the critical movements.

<sup>b</sup>Average delay per vehicle (in seconds) for the critical movements.

<sup>c</sup>Level of service.

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

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



## **7.0 QUEUE ANALYSIS**

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Vehicle queues were calculated for each approach of the signalized study area intersections using SimTraffic simulation software. Table 7 summarizes the 2020 Baseline, 2020 Build, and 2025 Future vehicle queues.

**Table 7**  
**QUEUE ANALYSIS RESULTS<sup>a</sup>**

Intersection/Lane	Weekday Morning Peak Hour				Weekday Evening Peak Hour			
	2020		2025		2020		2025	
	Baseline	Build	Increase	Future	Baseline	Build	Increase	Future
<b>Massachusetts Avenue at Sidney Street:</b>								
Massachusetts Avenue EB LT	3	4	1	4	4	4	0	4
Massachusetts Avenue EB TH/RT	11	17	6	27	13	15	2	26
Massachusetts Avenue WB LT	3	3	0	3	4	4	0	3
Massachusetts Avenue WB TH/RT	6	7	1	6	9	9	0	16
Sidney Street NB RT	2	2	0	2	3	2	-1	3
Sidney Street SB LT/HT	4	4	0	4	4	4	0	3
Sidney Street SB RT	1	1	0	2	1	1	0	3
<b>Main Street/Columbia Street at Sidney Street:</b>								
Columbia Street EB TH	1	1	0	1	1	1	0	1
Columbia Street EB RT	6	6	0	7	4	4	0	4
Main Street WB LT/TH	10	12	2	27	7	10	3	19
Sidney Street NB LT/RT	3	4	1	4	4	4	0	4
<b>Main Street at Windsor Street:</b>								
Main Street EB LT/TH/RT	4	4	0	5	3	3	0	13
Main Street WB LT/TH/RT	4	4	0	21	5	6	1	17
Windsor Street NB LT/TH/RT	2	2	0	3	3	4	1	12
Windsor Street SB LT/TH/RT	3	3	0	5	3	3	0	9
<b>Main Street at Portland Street:</b>								
Main Street EB LT/TH/RT	6	6	0	7	6	8	2	21
Main Street WB LT/TH/RT	4	4	0	7	5	5	0	16
Portland Street NB LT/TH/RT	3	4	1	3	4	4	0	2
Portland Street SB LT/TH/RT	5	5	0	7	4	5	1	13
<b>Main Street at Vassar Street/Galileo Galilei Way:</b>								
Main Street EB LT	5	5	0	8	5	5	0	4
Main Street EB TH/RT	5	5	0	9	5	5	0	3
Main Street WB LT	2	2	0	2	2	2	0	2
Main Street WB TH/RT	4	3	-1	8	3	3	0	30
Vassar Street NB LT/TH	3	3	0	8	3	3	0	10
Vassar Street NB TH/RT	6	5	-1	12	6	6	0	16
Galileo Galilei Way SB LT	3	3	0	8	2	2	0	1
Galileo Galilei Way SB TH	6	7	1	23	6	5	-1	22
Galileo Galilei Way SB RT	3	3	0	5	2	2	0	9

<sup>a</sup>All queues calculated using SimTraffic methodology. Queue in vehicles per lane.

## 8.0 RESIDENTIAL STREET VOLUME ANALYSIS

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

**Table 8**  
**TRAFFIC ON RESIDENTIAL STREETS**

Roadway	Peak Period	Reviewed Segment	Amount of Residential	2020 Baseline Two-Way Traffic	Increase due to Project
Portland Street	Morning Peak Hour	Main Street to Broadway	>1/3 but <1/2	674	12
	Evening Peak Hour	Main Street to Broadway	>1/3 but <1/2	640	12
Windsor Street	Morning Peak Hour	Main Street to Broadway	=1/2 or more	308	2
	Evening Peak Hour	Main Street to Broadway	=1/2 or more	374	3
Columbia Street	Morning Peak Hour	Main Street to Broadway	=1/2 or more	332	4
	Evening Peak Hour	Main Street to Broadway	=1/2 or more	326	2

## 9.0 PARKING ANALYSIS

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### 9.1 INTRODUCTION

The Project includes a 120 space below grade parking garage. The proposed building is 186,000 gsf which is a ratio of 0.65 spaces per 1000 sf. For comparison, the existing Ragon Institute in Technology Square has 75,226 sf of leased space and provides 57 parking spaces for a ratio of 0.76 spaces per unit. Average parking utilization at the existing Technology Square facility is approximately 40 percent with peaks up to 65 percent or between 23 and 39 spaces. It is expected that the Project would have similar commuting characteristics to the Technology Square facility indicating that a parking ratio of 0.65 would be able to accommodate the anticipated peak demand for the Project.

### 9.2 PROJECT PARKING ANALYSIS

As required in the Scoping Determination, the potential number of parking spaces needed for the Project was calculated based on the estimated number of employees multiplied by the automobile mode split (SOV plus ½ HOV, or 37.5 percent). Table 9.b.1 summarizes the parking analysis for the Project, including parking requirements based on the IB zone the site is located in.

**Table 9.b.1  
PARKING ANALYSIS**

Analysis Type	Use	Size	Zoning Rate		Required Spaces	
			Maximum	Minimum	Maximum	Minimum`
Zoning <sup>a</sup>	Technical Office	186,000 sf	1.0/670 sf	1.0/1,340 sf	278	139
	Use	Size	Zoning Rate		Required Spaces	
K2C2 Maximum	Technical Office	186,000 sf	0.8 spaces/1,000 sf		149	
	Use	Size	Mode Split Rate		Space Demand	
Demand	Expected Population <sup>b</sup>	300 emp.	37.5 <sup>c</sup>		113	

As shown in Table 9.b.1, while the Cambridge Zoning Ordinance indicates a parking total of between 139 and 270 spaces could be provided and the K2C2 recommendations for maximum parking indicate a parking total of 149 spaces could be provided, the expected parking demand for the R&D component is 113 spaces. The parking garage is proposed to provide 120 spaces. This leaves an additional seven spaces for daycare demands and indicates the parking garage can accommodate the anticipated demand from the Project. The proposed parking supply is below both current zoning requirements and the K2C2 recommended maximum parking rate for the area.

### **9.3 PARKING MANAGEMENT**

The parking garage will be operated by gate and key-card. As such, only employees or authorized visitors of the Ragon Institute will be able to access the garage. The garage is not open to the public.

### **9.4 SIGHT LINES TO PEDESTRIANS FROM PARKING GARAGE/LOADING DOCK**

The Project parking garage and service/loading area is proposed off of Albany Street. The loading dock contains 4 bays. Figure 9.d.1 and Figure 9.d.2 depict the floor plan for level 1 and level 2 of the parking garage while Figure 9.d.3 depicts the service/loading area.

Figure 9.d.2 and 9.d.3 depict driver's lines of sight to pedestrians when exiting the parking garage and loading dock, respectively. As can be seen in Figure 9.d.2 and Figure 9.d.3, sufficient sight distance is available for drivers to see pedestrians on Albany Street when exiting the loading dock and parking garage.

### **9.5 LOADING DOCK AUTOTURN**

AutoTURN analysis was conducted for a WB-30 truck entering and exiting the two straight bays. The analysis was also conducted for a truck traveling southbound on Albany Street to enter and then exit traveling southbound on Albany Street, and for a truck heading northbound to enter and then exit northbound.

In addition, an analysis was run for a WB-30 truck traveling northbound on Albany Street and entering the two angled bays in the loading dock and then exiting traveling northbound on Albany Street. An analysis was also run for a WB-40 truck traveling southbound on Albany Street and entering the two angled bays in loading dock and then exiting traveling southbound on Albany Street.

Figures 9.e.1 through 9.e.8 depict the AutoTURN analyses. As can be seen from the AutoTURN diagrams, a WB-40 truck can access the diagonal bays traveling southbound on Albany Street without conflict. The WB-30 truck can access all 4 sets of docks traveling southbound or northbound on Albany Street without conflict.

### **9.6 REMOTE PARKING**

Pursuant to the Cambridge Zoning Ordinance, the parking facilities in Technology Square owned by Alexandria and Draper Lab are authorized only as accessory parking for the buildings on that site. Moreover, in cases where the use of an off-site parking facility is proposed to satisfy a building's parking requirement, such a use is regulated by the provisions of Sec. 6.23 of the Zoning

Ordinance. Specifically, leases for such purpose must evidence that “the off street parking will continue to be available for the period during which the use or uses that parking serves may be expected to be in existence.

**9.7 BICYCLE PARKING**

The bicycle parking requirements for the Project were reviewed per the City of Cambridge Zoning Ordinance 6.100. As identified in Section 6.103.1, the bicycle parking requirement shall apply to the following types of projects:

- a) The construction of a new building or establishment of a new open-air use on a lot.
- b) An increase of at least fifteen percent (15%) in the number of residential dwelling units on a lot or in the amount of non-residential Gross Floor Area on a lot from the time of adoption of Section 6.100.
- c) The conversion of existing Gross Floor Area to a new category of non-residential use, where such conversion results in at least a fifteen percent (15%) increase in the total number of bicycle parking spaces that would be required for the entire building by Section 6.100.

The required bicycle parking for the Project has been calculated as shown in Table 9.g.1.

**Table 9.g.1  
BICYCLE PARKING DEMAND ANALYSIS<sup>a</sup>**

<u>Use</u>	<u>GFA for Building</u>	<u>Long Term Rate</u>	<u>Long Term Spaces</u>	<u>Short Term Rate</u>	<u>Short Term Spaces</u>	<u>Total Spaces</u>
R&D	186,000 sf	0.22 space/1000sf	41	0.06 spaces/1000sf	11	52

<sup>a</sup>Source: City of Cambridge Zoning Ordinance Article 6 – Off Street Parking and Loading Requirements and Nighttime Curfew on Large Commercial Though Trucks.

As seen in Table 9.g.1, the bicycle parking demand for the Project is 52 spaces (41 long-term and 11 short-term). The project is proposing 41 long-term spaces and 12 short-term spaces for a total of 53 bicycle spaces.

## 10.0 TRANSIT ANALYSIS

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### 10.1 PROJECT TRANSIT DISTRIBUTION

An analysis of transit usage was conducted to determine impacts that might be recognized under Build conditions. There are a total of three bus routes and one subway line that are available for employees at the Site. The distribution on the transit routes is shown in Table 10.a.1.

**Table 10.a.1  
TRANSIT SYSTEM TRIP DISTRIBUTION**

Time Period/Directional Distribution	Project Transit Trips	Red Line Distribution <sup>a</sup>	Kendall Square Bus Distribution <sup>b</sup>
<i>Weekday Daily:</i>			
Entering	154	146	8
<u>Exiting</u>	<u>154</u>	<u>146</u>	<u>8</u>
Total	308	292	16
Peak Hour Headways (Minutes)	--	4.5	15-50
<i>Weekday Morning:</i>			
Entering	48	46	2
<u>Exiting</u>	<u>2</u>	<u>2</u>	<u>0</u>
Total	50	48	2
<i>Weekday Evening:</i>			
Entering	6	6	0
<u>Exiting</u>	<u>45</u>	<u>43</u>	<u>2</u>
Total	51	49	2

<sup>a</sup>95 percent assignment.

<sup>b</sup>5 percent assignment, distributed among all 3 bus routes.

The peak-hour headways listed in Table 10.a.1 indicate approximately ten trains arrive/depart the Kendall Square station during the peak hours. The peak-hour directional passenger loading from the proposed project of 48 to 49 peak-hour person trips directed towards the Red Line can be accommodated without a noticeable increase in operating characteristics. Detailed analysis of transit ridership impacts due to the project is provided in Table 10.a.2 for the Red Line subway loadings and Table 10.a.3 for the bus loadings, respectively. Relevant capacity information was obtained from the MBTA for the Red Line and Bus Routes 64, 68, and 85.

**Table 10.a.2  
MBTA RED LINE SUBWAY PEAK HOUR RIDERSHIP IMPACTS**

Train Line	Time Period	Directional Flow	Existing						Future				Proposed with Project		Ridership Increase			
			No. of Trains <sup>a</sup>	No. of Cars per Train	Max. Load per Car <sup>b</sup>	Hourly Capacity <sup>c</sup>	Line Flow <sup>d</sup>	V/C <sup>e</sup>	No. of Trains <sup>f</sup>	No. of Cars per Train	Max. Load per Car	Hourly Capacity	Line Flow <sup>g</sup>	V/C	Line Flow	V/C	Percent	V/C
Red Line	Morning Peak Hour	Outbound	13	6	167	13,026	2,903	0.22	20	6	167	20,040	4,467	0.22	4,480	0.22	0.3	0.00
		Inbound	13	6	167	13,026	7,823	0.60	20	6	167	20,040	12,036	0.60	12,071	0.60	0.3	0.00
	Evening Peak Hour	Outbound	13	6	167	13,026	8,001	0.61	20	6	167	20,040	12,310	0.61	12,339	0.62	0.2	0.01
		Inbound	13	6	167	13,026	5,450	0.42	20	6	167	20,040	8,385	0.42	8,405	0.42	0.2	0.00

<sup>a</sup>Based on average headway of 4.5 minutes over one hour.

<sup>b</sup>Defined on the basis of MBTA design standards.

<sup>c</sup>Based on standard passenger load per car, number of cars per trains, and number of trains per hour.

<sup>d</sup>From MBTA ridership count results.

<sup>e</sup>Volume-to-capacity ratio.

<sup>f</sup>Based on average headway of 3 minutes over one hour.

<sup>g</sup>Increased proportionally to the increase in capacity.



**Table 10.a.3  
MBTA BUS ROUTE PEAK HOUR RIDERSHIP IMPACTS**

<i>Weekday Morning Peak Hour:</i>									
Route No.	Route Headway <sup>a</sup>	Maximum Load <sup>b</sup>	Hourly Capacity	Existing		Proposed with Project			
				Ridership <sup>c</sup>	V/C <sup>d</sup>	Ridership	V/C	Percent	Ridership Increase V/C
64	15 minutes	60	420 <sup>e</sup>	57	0.14	58	0.14	1.8	0.00
68	40 minutes	60	180 <sup>f</sup>	14	0.08	14	0.08	0.0	0.00
85	40 minutes	60	180 <sup>g</sup>	67	0.37	68	0.38	1.5	0.01

<i>Weekday Evening Peak Hour:</i>									
Route No.	Route Headway <sup>a</sup>	Maximum Load <sup>b</sup>	Hourly Capacity	Existing		Proposed with Project		Ridership Increase	
				Ridership <sup>c</sup>	V/C <sup>d</sup>	Ridership	V/C	Percent	V/C
64	30 minutes	60	240 <sup>h</sup>	41	0.17	42	0.18	2.4	0.01
68	40 minutes	60	180 <sup>i</sup>	13	0.07	13	0.07	0.0	0.00
85	40 minutes	60	180 <sup>j</sup>	25	0.14	26	0.14	4.0	0.00

<sup>a</sup>Based on current MBTA schedule.

<sup>b</sup>Defined on the basis of MBTA design standards.

<sup>c</sup>Based on MBTA Ridership Data for composite year 2019.

<sup>d</sup>Volume-to-capacity ratio.

<sup>e</sup>Capacity calculated based on 4 inbound buses and 3 outbound buses in the peak hour.

<sup>f</sup>Capacity calculated based on 2 inbound buses and 1 outbound buses in the peak hour.

<sup>g</sup>Capacity calculated based on 2 inbound buses and 1 outbound buses in the peak hour.

<sup>h</sup>Capacity calculated based on 2 inbound buses and 2 outbound buses in the peak hour.

<sup>i</sup>Capacity calculated based on 1 inbound buses and 2 outbound buses in the peak hour.

<sup>j</sup>Capacity calculated based on 1 inbound buses and 2 outbound buses in the peak hour.

## **10.2 SUMMARY OF ANALYSIS RESULTS**

Tables 10.2 through 10.4 demonstrate that sufficient capacity exists on the bus routes and subway lines to accommodate the expected ridership increases due to the Project. Increases in volume-to-capacity (v/c) ratios pertaining to line volume are between 0.0 and 0.01 for all affected bus routes and the Red Line subway system. Seating and lighted shelters are available at the Kendall Square station.

## **10.3 FUTURE PUBLIC TRANSIT CONDITIONS**

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

### **Red Line**

The MBTA is also in the process of replacing the cars on the Red Line, with plans to replace all cars by 2023. It should be noted that occupancy of the proposed facility will not occur before late 2023. This is expected to increase overall capacity by 50 percent by raising the current number of trains per hour from 13 to 20 and allowing a three-minute headway for trains, which is a reduction from the current four-and-a-half minute headway. It should be noted that the ridership data from the MBTA are based on aggregated counts from Fall of 2017 and from the entire year of 2019 which may not reflect peak train ridership occurring during one or two specific hours of one day.

### **Proposed Transit Services**

Additional transit improvements were identified in the Kendall Square Mobility Task Force Report<sup>2</sup>. These include the potential for bus priority lanes on First Street, Binney Street, and Third Street, as well as the possible implementation of a new CT4 bus. This would connect Sullivan Square and Kenmore Square via Lechmere and Kendall Square through the Inner Belt Road proposed through Cambridge Crossing. These are noted as potential options, as MBTA has stated that no funding has been identified for the CT4 bus, and the Report notes that more work is needed to understand the impacts of the bus priority lanes.

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

### **Proposed Grand Junction Rail with Trail**

Future rail service noted in the KSMTF Report may include the establishment of the Grand Junction Rail with a Trail design, a proposed multi-use path serving pedestrians and bicyclists alongside a future rail transit corridor. The Grand Junction section refers to a railroad right of way (ROW) between the Boston University Bridge and where the rail meets the Somerville border past Cambridge Street. The rail is currently used for MBTA commuter rail and some Amtrak 'equipment moves' between North and South Station. This is a vital link between the north and south 'sides' of MBTA commuter and Amtrak services, indicating service will have to be retained. A portion of the multi-use path has been constructed between Main Street and Broadway with an additional portion of the path funded at \$10M for the segment between Broadway and Cambridge Street. The path is not funded south of Main Street. There has also been study

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<sup>2</sup> *Kendall Square Mobility Task Force Final Report*; City of Cambridge; Cambridge, MA; 2017.

of Bus Rapid Transit (BRT) and rail service on the ROW, with extensions to Sullivan Square to the north and to Longwood Medical Area to the south. As noted in the Technical Report: Grand Junction Feasibility Review<sup>3</sup> there are technical and monetary funding challenges to provide connections to other transit systems.

Should the multi-use path become constructed and/or rail service be available, visitors to the Project site would be able to utilize this facility, located less than 500 feet from the site. Some of the other services, such as the CT4 bus, the Lechmere-Kendall Shuttle, and the EZRide shuttle would have stops at Kendall Station or other intersections such as Main Street at Albany Street which are near the site. Funding for these items is also unclear, as discussed above and further below with respect to the EZRide shuttle.

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<sup>3</sup> *Technical Report: Grand Junction Feasibility Review*; IBI Group; Boston, MA; December 2016.

## 11.0 PEDESTRIAN ANALYSIS

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A pedestrian impact analysis was conducted at the study area intersections under 2020 Baseline, 2020 Modified Baseline, 2020 Build, and 2025 Future conditions, as required in the Scoping Determination. For signalized intersections, the pedestrian level-of-service (PLOS) calculations measure the adequacy of the pedestrian phases (exclusive or concurrent) for sufficient time to cross major or minor streets. The unsignalized analysis relies on a critical gap procedure. The analysis methodology was based on procedures outlined in the 2000 HCM for signalized and unsignalized intersections and is provided in the Appendix. Table 11.1 summarizes the results of the pedestrian analysis at the signalized intersections, while Table 11.2 presents a summary of the pedestrian analysis at the unsignalized intersections. The PLOS ratings for the intersections are shown graphically on Figure 11.a.1 for the weekday morning peak hour and on Figure 11.a.2 for the weekday evening peak hour. Figure 11.a.3 depicts pedestrian desire lines between the site and key public transit destinations.

The Project does not change the PLOS of any of the crosswalks studied except for the Albany Street crosswalk at the intersection with Main Street during the weekday morning peak hour, which decreases from a PLOS E to PLOS F with the addition of the Project vehicle and pedestrian traffic. Delay is also added to the Albany Street crosswalk during the weekday evening peak hour and at the Main Street crosswalk during the weekday morning and weekday evening peak hours. The Albany Street crosswalk at the Portland Street intersection experiences a 2 second increase in delay during the weekday evening peak hour.

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

Intersection/Time Period/Crossing Path	2020 Baseline			2020 Build			2025 Future			
	Demand <sup>a</sup>	Delay <sup>b</sup>	LOS <sup>c</sup>	Demand	Delay	LOS	Delay Increase	Demand	Delay	LOS
<b>Massachusetts Avenue at Sidney Street:</b>										
<i>Weekday Morning:</i>										
Crossing Massachusetts Avenue (East)	152	24	C	152	24	C	0	152	24	C
Crossing Massachusetts Avenue (West)	71	24	C	71	24	C	0	71	24	C
Crossing Sidney Street (North)	178	19	B	178	19	B	0	178	19	B
Crossing Sidney Street (South)	311	19	B	311	19	B	0	311	19	B
<i>Weekday Evening:</i>										
Crossing Massachusetts Avenue (East)	262	24	C	252	24	C	0	252	24	C
Crossing Massachusetts Avenue (West)	132	24	C	132	24	C	0	132	24	C
Crossing Sidney Street (North)	611	19	B	611	19	B	0	611	19	B
Crossing Sidney Street (South)	183	19	B	183	19	B	0	183	19	B
<b>Main Street/Columbia Street at Sidney Street:</b>										
<i>Weekday Morning:</i>										
Crossing Main Street (East)	47	19	B	49	19	B	0	49	19	B
Crossing Columbia Street (West)	4	19	B	4	19	B	0	4	19	B
<i>Weekday Evening:</i>										
Crossing Main Street (East)	156	19	B	160	19	B	0	160	19	B
Crossing Columbia Street (West)	7	19	B	7	19	B	0	7	19	B
<b>Main Street at Windsor Street:</b>										
<i>Weekday Morning:</i>										
Crossing Main Street (East)	29	16	B	31	16	B	0	31	16	B
Crossing Main Street (West)	29	16	B	30	16	B	0	30	16	B
Crossing Windsor Street (North)	70	10	B	72	10	B	0	72	10	B
Crossing Windsor Street (South)	34	10	B	37	10	B	0	37	10	B
<i>Weekday Evening:</i>										
Crossing Main Street (East)	44	16	B	46	16	B	0	46	16	B
Crossing Main Street (West)	115	16	B	116	16	B	0	116	16	B
Crossing Windsor Street (North)	42	10	B	44	10	B	0	44	10	B
Crossing Windsor Street (South)	39	10	B	44	10	B	0	44	10	B

<sup>a</sup>See notes at end of table.

**Table 11.1 (Continued)**  
**PEDESTRIAN LEVEL-OF-SERVICE SUMMARY – SIGNALIZED INTERSECTIONS**

Intersection/Time Period/Crossing Path	2020 Baseline				2020 Build				2025 Future			
	Demand <sup>a</sup>	Delay <sup>b</sup>	LOS <sup>c</sup>	Demand	Delay	LOS	Delay Increase	Demand	Delay	LOS		
<b>Main Street at Portland Street:</b>												
<i>Weekday Morning:</i>												
Crossing Main Street (East)	69	15	B	72	15	B	0	72	15	B		
Crossing Main Street (West)	88	15	B	91	15	B	0	91	15	B		
Crossing Portland Street (North)	62	13	B	65	13	B	0	65	13	B		
Crossing Portland Street (South)	59	13	B	67	13	B	0	67	13	B		
<i>Weekday Evening:</i>												
Crossing Main Street (East)	64	15	B	66	15	B	0	66	15	B		
Crossing Main Street (West)	122	15	B	124	15	B	0	124	15	B		
Crossing Portland Street (North)	78	13	B	80	13	B	0	80	13	B		
Crossing Portland Street (South)	42	13	B	51	13	B	0	51	13	B		
<b>Main Street at Vassar Street/Galileo Galilei Way:</b>												
<i>Weekday Morning:</i>												
Crossing Main Street (East)	146	16	B	150	16	B	0	150	16	B		
Crossing Main Street (West)	85	16	B	115	16	B	0	115	16	B		
Crossing Galileo Galilei Way (North)	453	12	B	482	12	B	0	482	12	B		
Crossing Vassar Street (South)	239	12	B	260	12	B	0	260	12	B		
<i>Weekday Evening:</i>												
Crossing Main Street (East)	202	16	B	214	16	B	0	214	16	B		
Crossing Main Street (West)	229	16	B	248	16	B	0	248	16	B		
Crossing Galileo Galilei Way (North)	717	12	B	736	12	B	0	736	12	B		
Crossing Vassar Street (South)	393	12	B	425	12	B	0	425	12	B		

<sup>a</sup>Demand in pedestrians per hour.

<sup>b</sup>Average delay per pedestrian (in seconds).

<sup>c</sup>Pedestrian Level of Service.

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

Intersection/Time Period/Crossing Path	2020 Baseline			2020 Build			2025 Future		
	Demand <sup>b</sup>	Delay <sup>c</sup>	LOS <sup>d</sup>	Demand	Delay	LOS	Demand	Delay	LOS
<b>Main Street at Albany Street:</b>									
<i>Weekday Morning:</i>									
Crossing Main Street (East)	29	72	F	29	75	F	29	8363	F
Crossing Albany Street (North)	59	37	E	109	64	F	109	91	F
<i>Weekday Evening:</i>									
Crossing Main Street (East)	14	99	F	14	104	F	14	8082	F
Crossing Albany Street (North)	128	54	F	179	124	F	179	132	F
<b>Portland Street at Albany Street:</b>									
<i>Weekday Morning:</i>									
Crossing Albany Street (East)	0	0	A	0	0	A	0	0	A
Crossing Portland Street (North) <sup>d</sup>	0	0	A	0	0	A	0	0	A
Crossing Portland Street (South) <sup>d</sup>	0	0	A	0	0	A	0	0	A
<i>Weekday Evening:</i>									
Crossing Albany Street (East)	16	17	C	16	19	C	16	20	C
Crossing Portland Street (North) <sup>d</sup>	46	--	--	46	--	--	46	--	--
Crossing Portland Street (South) <sup>d</sup>	12	--	--	12	--	--	12	--	--

<sup>a</sup>Demand in pedestrians per hour.

<sup>b</sup>Average delay per pedestrian (in seconds).

<sup>c</sup>Pedestrian Level of service.

<sup>d</sup>The pedestrian crossings on Portland Street are controlled by Rectangular Rapid Flash Beacon (RRFB) and therefore are signalized crossings.

## **12.0 BICYCLE ANALYSIS**

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A review of bicycle conditions was conducted at the affected intersections and street segments. Massachusetts Avenue, Sidney Street, Main Street, and Galileo, Galilei Way all provide dedicated on-street lanes for bicyclists. The bike lanes on Massachusetts Avenue are separated from the travel lane by parking. In addition, Vassar Street provides raised separated bicycle lanes.

### **12.1 VEHICLE TURNING VOLUME CONFLICTS**

City guidelines require identification of conflicting vehicle-turning volumes at intersections impacted by the Project where bicycle facilities are present or where peak-hour bicycle volumes exceed 10 bicycles on any approach. The locations meeting these criteria are listed in Table 12.a.1 for 2020 Baseline and 2020 Build conditions.



**Table 12.a.1**  
**BICYCLE-VEHICLE VOLUME CONFLICTS**

Roadway/Intersecting Street/Time Period	Approach Bicycle Volume	Conflicting Vehicles Turning Volume			
		2020 Baseline		2020 Build	
		Advancing Volume	Opposing Volume	Advancing Volume	Opposing Volume
<b><i>Massachusetts Avenue at Sidney Street:</i></b>					
Weekday Morning	EB – 163	433	632	447	632
	WB – 33	370	632	378	632
	NB -- 9	66	0	66	0
	SB -- 81	388	235	391	235
Weekday Evening	EB – 109	393	704	397	704
	WB – 224	515	704	515	704
	NB -- 4	87	0	87	0
	SB -- 72	347	184	362	184
<b><i>Main Street/Columbia Street at Sidney Street:</i></b>					
Weekday Morning	EB – 122	281	276	285	276
	WB – 13	127	15	131	15
	NB -- 69	153	117	167	131
Weekday Evening	EB – 28	194	179	195	179
	WB – 76	183	15	199	16
	NB -- 71	229	112	233	116
<b><i>Main Street at Windsor Street:</i></b>					
Weekday Morning	EB – 72	224	439	242	461
	WB – 5	222	36	226	36
	NB -- 11	114	54	114	56
	SB – 50	206	296	208	296
Weekday Evening	EB – 22	196	55	201	55
	WB – 84	352	516	371	540
	NB -- 63	236	111	236	11
	SB – 22	209	417	209	417
<b><i>Main Street at Portland Street:</i></b>					
Weekday Morning	EB – 121	297	435	318	456
	WB – 7	210	102	211	102
	NB -- 18	198	92	209	108
	SB – 71	381	492	391	503
Weekday Evening	EB – 32	326	588	334	615
	WB – 82	334	120	356	127
	NB -- 14	224	39	237	48
	SB – 32	307	496	310	509

\*See notes at end of table.

**Table 12.a.1 (Continued)**  
**BICYCLE-VEHICLE VOLUME CONFLICTS**

Roadway/Intersecting Street/Time Period	Approach Bicycle Volume	Conflicting Vehicles Turning Volume			
		2020 Baseline		2020 Build	
		Advancing Volume	Opposing Volume	Advancing Volume	Opposing Volume
<b><i>Main Street at Albany Street:</i></b>					
Weekday Morning	EB – 82	312	365	348	413
	WB – 8	385	522	398	559
	NB -- 11	166	0	167	0
Weekday Evening	EB – 19	289	379	304	426
	WB – 54	381	623	384	660
	NB -- 6	304	0	336	0
<b><i>Main Street at Vassar Street/ Galileo Galilei Way:</i></b>					
Weekday Morning	EB – 127	491	562	493	564
	WB – 10	272	316	274	318
	NB -- 71	477	1,044	477	1,055
	SB – 92	640	1,058	651	1,069
Weekday Evening	EB – 39	612	130	625	130
	WB – 59	209	768	209	781
	NB -- 59	457	967	457	970
	SB – 56	549	201	552	204
<b><i>Portland Street at Albany Street:</i></b>					
Weekday Morning	WB – 4	144	408	157	420
	NB – 48	416	375	435	403
	SB – 52	210	764	210	781
Weekday Evening	WB – 33	134	404	160	415
	NB -- 41	481	411	487	439
	SB – 46	180	0	180	0

NOTE: NB = Northbound; SB = Southbound; EB = Eastbound; WB = Westbound; LT = Left Turn movement; TH = Through movement; RT = Right Turn movement.

## **12.2 SHORT-TERM AND LONG-TERM BICYCLE PARKING**

Figures 12.b.1-12.b.4 show the proposed short-term and long-term bicycle parking on-site. As required in the scoping letter these figures are at a linch equals 10 feet scale and show access to the public right-of-way.

## **12.3 CITY'S BICYCLE NETWORK PLAN**

Currently Main Street provides standard bicycle lanes, located between the travel lanes and the parking lanes. A review of the available roadway width on Main Street indicates a curb to curb width of 47.5 feet. While the 2015 City's Bicycle Network Plan references upgrading the bicycle lanes on Main Street to separated bicycle lanes, it is not clear how this would be accommodated along the length of Main Street, since many of the properties have been redeveloped within the past decade and stepping back the buildings to provide additional separation between bicycle lanes and other features may not be possible. Accordingly, Figure 12.c.1 depicts protected bicycle lanes in front of the site on Main Street, which can be accommodated within the existing pavement width.

## **13.0 ARTICLE 19 SPECIAL PERMIT CRITERIA ANALYSIS**

Under Section 19.25.1, the Planning Board shall only grant a Section 19.20 Project Review Special Permit upon finding that the Project will have no substantial adverse impact on City traffic within the study area analyzed in the TIS. Substantial adverse impact is measured by reference to the Special Permit Criteria, which consist of five traffic impact indicators used to evaluate Project impacts. The indicators are: (1) project vehicle trip generation weekdays and weekends for a twenty-four hour period and AM and PM peak vehicle trips generated; (2) change in level of service at identified signalized intersections; (3) increased volume of trips on residential streets; (4) increase of length of vehicle queues at identified signalized intersections; and (5) lack of sufficient pedestrian and bicycle facilities. The methodology for the analysis of the traffic impact indicators is from the Cambridge “Guidelines for Presenting Information to the Planning Board”, approved November 27, 2001, and revised in 2004. Referenced in the guidelines are capacity analysis procedures presented in the *Highway Capacity Manual* (HCM) and summarized in the Appendix. Exceedance of one or more indicators suggests a potentially substantial adverse impact on City traffic; however, the Planning Board should also consider proposed Project mitigation in making its finding. The following section summarizes the 127 measurements analyzed in applying the five indicators to the proposed Project and the proposed Project mitigation. No exceedances were triggered due to the Project, however, a total of 6 measurements are exceeded under existing conditions, with or without the Project.

### **Indicator 1: Project Vehicle – Trip Generation**

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

### **Indicator 2: Project Vehicle – Level-Of-Service**

The Project satisfies 14 of 14 City standards for Indicator 2 regarding vehicle LOS as demonstrated by the measurements detailed in Table 13.b.

### **Indicator 3: Traffic on Residential Streets**

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

#### **Indicator 4: Lane Queue**

The Project satisfies 56 of 56 City standards for Indicator 4 regarding lane queues as demonstrated by the measurements detailed in Table 13.d.

#### **Indicator 5: Lack of Sufficient Pedestrian and Bicycle Facilities**

The Project satisfies 42 of 48 City standards for Indicator 5A, 5B, and 5C regarding pedestrian and bicycle facilities as demonstrated by the measurements detailed in Table 13.e.1 and Table 13.e.2. Of the 48 measurements analyzed in connection with Criteria 5, none were exceeded as a result of the Project. A total of 6 measurements are exceeded under existing conditions, with or without the Project.

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

Weekday =	442	AM Peak Hour =	75	PM Peak Hour =	77	Exceeds Criteria? [Y/N]	N/N/N
-----------	-----	----------------	----	----------------	----	-------------------------	-------

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

Intersection	Weekday Morning Peak Hour		Weekday Evening Peak Hour	
	2020 Baseline	With Project	2020 Baseline	With Project
Massachusetts Avenue at Sidney Street	C	D	D	D
Main Street/Columbia Street at Sidney Street	D	D	C	D
Main Street at Windsor Street	B	B	B	B
Main Street at Portland Street	B	B	B	C
Main Street at Vassar Street/Galileo Galilei Way	B	C	B	C
Main Street at Albany Street	A	A	B	B
Portland Street at Albany Street	A	A	B	B
Albany Street at Parking Garage Driveway	--	A	--	A
Portland Street at Daycare Drop-off/Pick-up	--	A	--	A



**Table 13.d**  
**INDICATOR 4 – LANE QUEUE**

Intersection	No. of Lanes Analyzed	Weekday Morning Peak Hour			Weekday Evening Peak Hour		
		2020 Baseline	With Project	Exceeds Criteria?	2020 Baseline	With Project	Exceeds Criteria?
<b>Massachusetts Avenue at Sidney Street:</b> Massachusetts Avenue EB LT Massachusetts Avenue EB TH/RT Massachusetts Avenue WB LT Massachusetts Avenue WB TH/RT Sidney Street NB RT Sidney Street SB LT/HT Sidney Street SB RT	7	3	4	N	4	4	N
		11	17	N	13	15	N
		3	3	N	4	4	N
		6	7	N	9	9	N
		2	2	N	3	2	N
		4	4	N	4	4	N
		1	1	N	1	1	N
<b>Main Street/Columbia Street at Sidney Street:</b> Columbia Street EB TH Columbia Street EB RT Main Street WB LT/TH Sidney Street NB LT/RT	4	1	1	N	1	1	N
		6	6	N	4	4	N
		10	12	N	7	10	N
		3	4	N	4	4	N
<b>Main Street at Windsor Street:</b> Main Street EB LT/TH/RT Main Street WB LT/TH/RT Windsor Street NB LT/TH/RT Windsor Street SB LT/TH/RT	4	4	4	N	3	3	N
		4	4	N	5	6	N
		2	2	N	3	4	N
		3	3	N	3	3	N
<b>Main Street at Portland Street:</b> Main Street EB LT/TH/RT Main Street WB LT/TH/RT Portland Street NB LT/TH/RT Portland Street SB LT/TH/RT	4	6	6	N	6	8	N
		4	4	N	5	5	N
		3	4	N	4	4	N
		5	5	N	4	5	N



**Table 13.d  
INDICATOR 4 – LANE QUEUE (Continued)**

Intersection	No. of Lanes Analyzed	Weekday Morning Peak Hour			Weekday Evening Peak Hour		
		2020 Baseline	With Project	Exceeds Criteria?	2020 Baseline	With Project	Exceeds Criteria?
<b>Main Street at Vassar Street/Galileo Galilei Way:</b> Main Street EB LT Main Street EB TH/RT Main Street WB LT Main Street WB TH/RT Vassar Street NB LT/TH Vassar Street NB TH/RT Galileo Galilei Way SB LT Galileo Galilei Way SB TH Galileo Galilei Way SB RT	9	5	5	N	5	5	N
		5	5	N	5	5	N
		2	2	N	2	2	N
		4	3	N	3	3	N
		3	3	N	3	3	N
		6	5	N	6	6	N
		3	3	N	2	2	N
		6	7	N	6	5	N
		3	3	N	2	2	N



**Table 13.e.1 (Continued)  
INDICATOR 5A – PEDESTRIAN LEVEL OF SERVICE**

Intersection	Weekday Morning Peak Hour		Weekday Evening Peak Hour	
	2020 Baseline PLOS	With Project	2020 Baseline PLOS	With Project
<b>Main Street at Vassar Street/ Galileo Galilei Way:</b> Crossing Main Street (East) Crossing Main Street (West) Crossing Galileo Galilei Way (North) Crossing Vassar Street (South)	B	B	B	B
	B	B	B	B
	B	B	B	B
	B	B	B	B
<b>Portland Street at Albany Street:</b> Crossing Albany Street (East) Crossing Portland Street (North) <sup>a</sup> Crossing Portland Street (South) <sup>a</sup>	A	A	C	C
	--	--	--	--
	--	--	--	--

<sup>a</sup>The pedestrian crossings on Portland Street are controlled by Rectangular Rapid Flash Beacon (RRFB) and therefore are signalized crossings.

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

Adjacent Street or Public Right-of-Way	Sidewalks or Walkways Present?	Exceeds Criteria?	Bicycle Facilities or Right-of-Ways Present?	Exceeds Criteria?
Main Street	Y	N	Y	N
Portland Street	Y	N	N	Y
Albany Street	Y	N	N	Y

## **14.0 PROJECT MITIGATION**

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### **14.1 PROJECT MITIGATION**

Generally, the Project's location near transit facilities such as Kendall Station as well as the area shuttle services significantly encourages transit use by employees of the proposed Project. Mitigation measures as set forth in section 4.3 below are therefore geared towards measures to encourage Project employees towards alternative transportation that would result in a low single occupant vehicle (SOV) rate for the Project. The Project proposes implementation of a TDM Plan as described in section 4.3 below that outweigh any potential adverse impacts of the Project on the surrounding street network.

### **14.2 CONSISTENCY WITH OTHER PLANNING STUDIES**

The Project has also been designed to be consistent with the City's transportation planning efforts and projects to improve mobility in the surrounding area and region, including the Kendall Square Mobility Task Force, 2013 Kendall Square Report, 2015 Transit Strategic Plan, Vision Zero Plan, and Cambridge Bicycle and Pedestrian Plans, with a particular focus on initiatives to improve Main Street operations. The Project also aligns with the Envision Cambridge's Vision and Core Values and Mobility Chapters.

### **14.3 TRANSPORTATION DEMAND MANAGEMENT MEASURES**

The current Ragon Institute at Technology Square provides Transportation Demand Management (TDM) measures that were intended to reduce SOV travel and encourage the use of alternative modes of transportation. The same measures will be implemented at the proposed site. These measures are listed below.

- The Project will provide Bluebikes memberships that are fully subsidized by the Ragon Institute.
- Accurate real-time information for the shuttles will be provided on-site in a central location.
- A total of ten (10) dedicated HOV parking spaces and three (3) Electric Vehicle (EV) parking spaces will be placed in the garage at preferential locations.
- A 30 percent discount for an MBTA pass will be provided via a pre-tax deduction program. The pass covers bus, subway, and commuter rail services.

- Employees will continue to be charged \$120 per month to park on site.
- Carpools will be informally organized by individual teams and lab groups.
- Showers, lockers, and secure bike parking will be provided on-site to encourage biking to work.
- A number of Zipcars are located near the site. Ragon will provide a 50 percent discount on annual membership.
- Ragon, through their affiliation with MGH, is permitted to use the Charles River Transportation Management Association (CRTMA) EZ Ride shuttle services at no charge.
- Ragon will provide flexible work schedules to help alleviate all employees accessing the site during peak hours.
- Ragon will provide teleworking (working from home) options to further reduce vehicle traffic to the site.

## 15.0 CONCLUSION

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As described throughout this TIS, the Project consists of the construction of a 186,000 gsf research and development facility with a child daycare that can accommodate 40 students and a 120 space below grade parking garage.

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

The proposed Project will not result in a public hazard due to significantly increased vehicular traffic or parking in this area of Cambridge. Specifically, the Project is not anticipated to have a significant adverse impact on motorist delays in the area, and adequate parking supply will exist at the site to support the Project. **Accordingly, this TIS finds that the Project can be accommodated within the existing area infrastructure and on the roadway network with minimal effects, resulting in the ability to implement the Project with the appropriate mitigation measures.**

# Transportation Impact Study

## Supporting Graphics

600-604 Main Street  
Cambridge, Massachusetts

*Prepared for:*



October 2020

*Prepared by:*



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



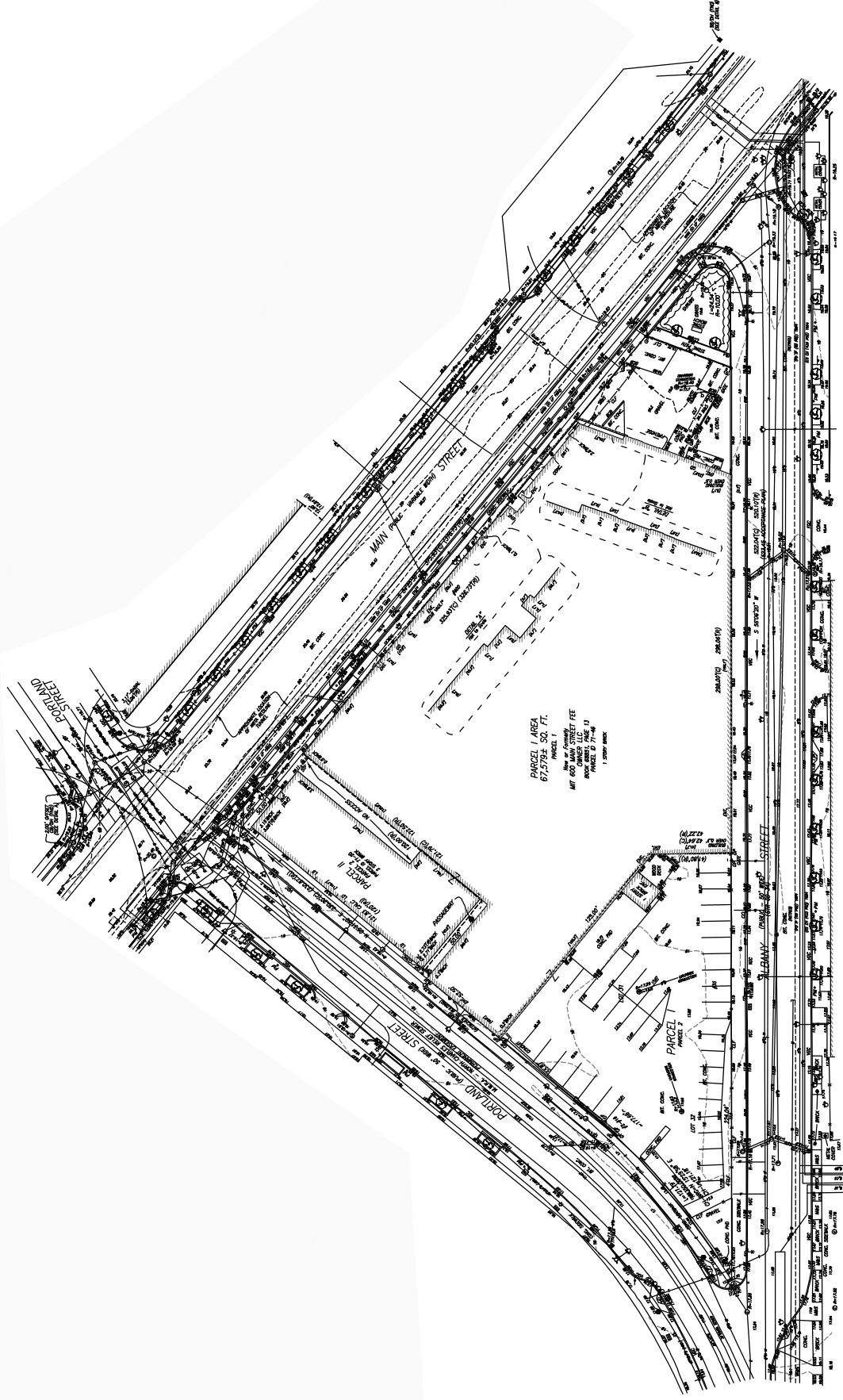


Source: Payette.

0 40 80 Scale in Feet



Figure 1.a.1  
Ground Floor Plan with  
Vehicle and Pedestrian Access

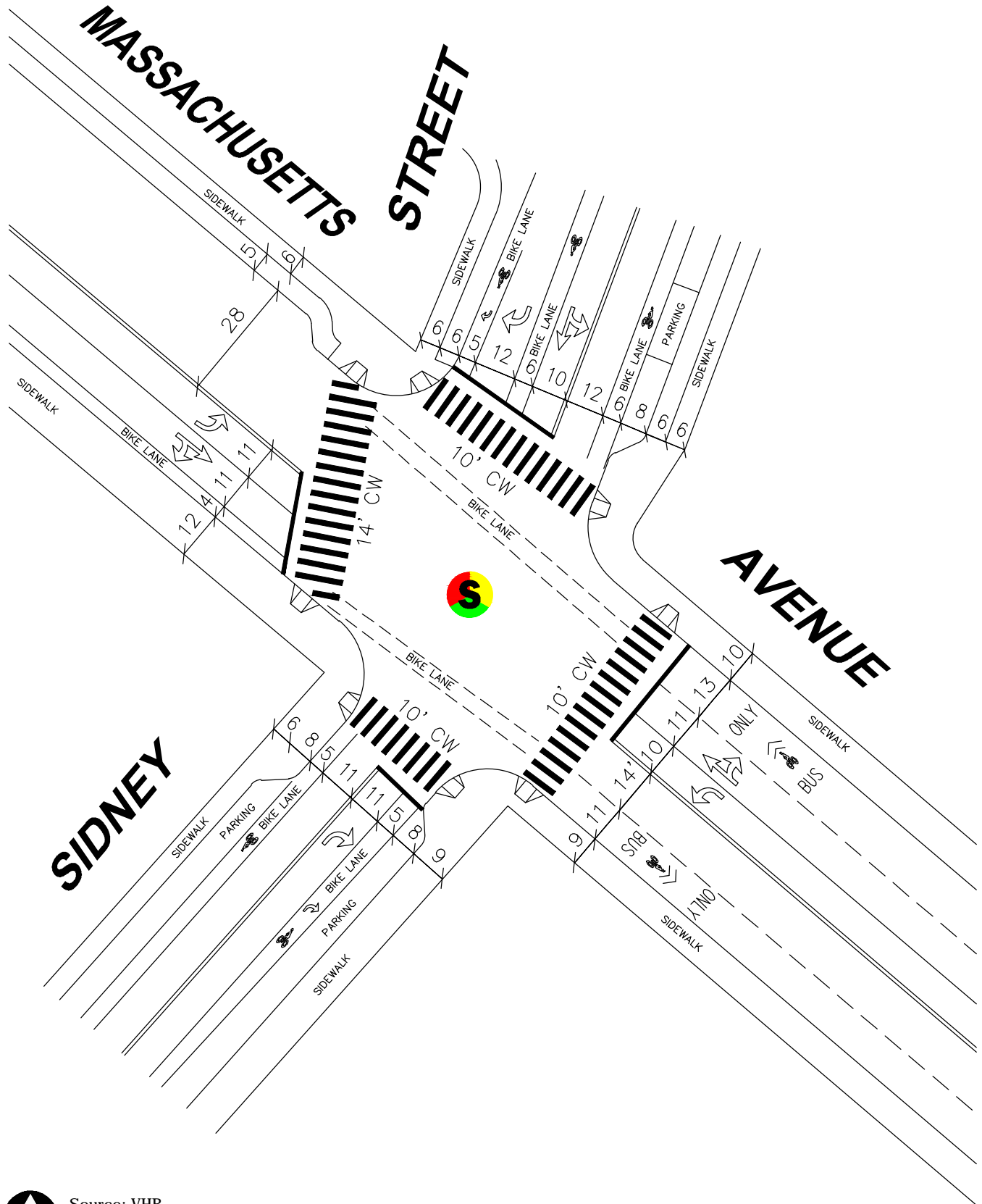


Source: Fieldman Land Surveyors  
0 40 80 Scale in Feet



Figure 1.a.2

Existing Conditions Survey



Source: VHB.  
 0 20 40 Scale in Feet

Figure 1.b.1



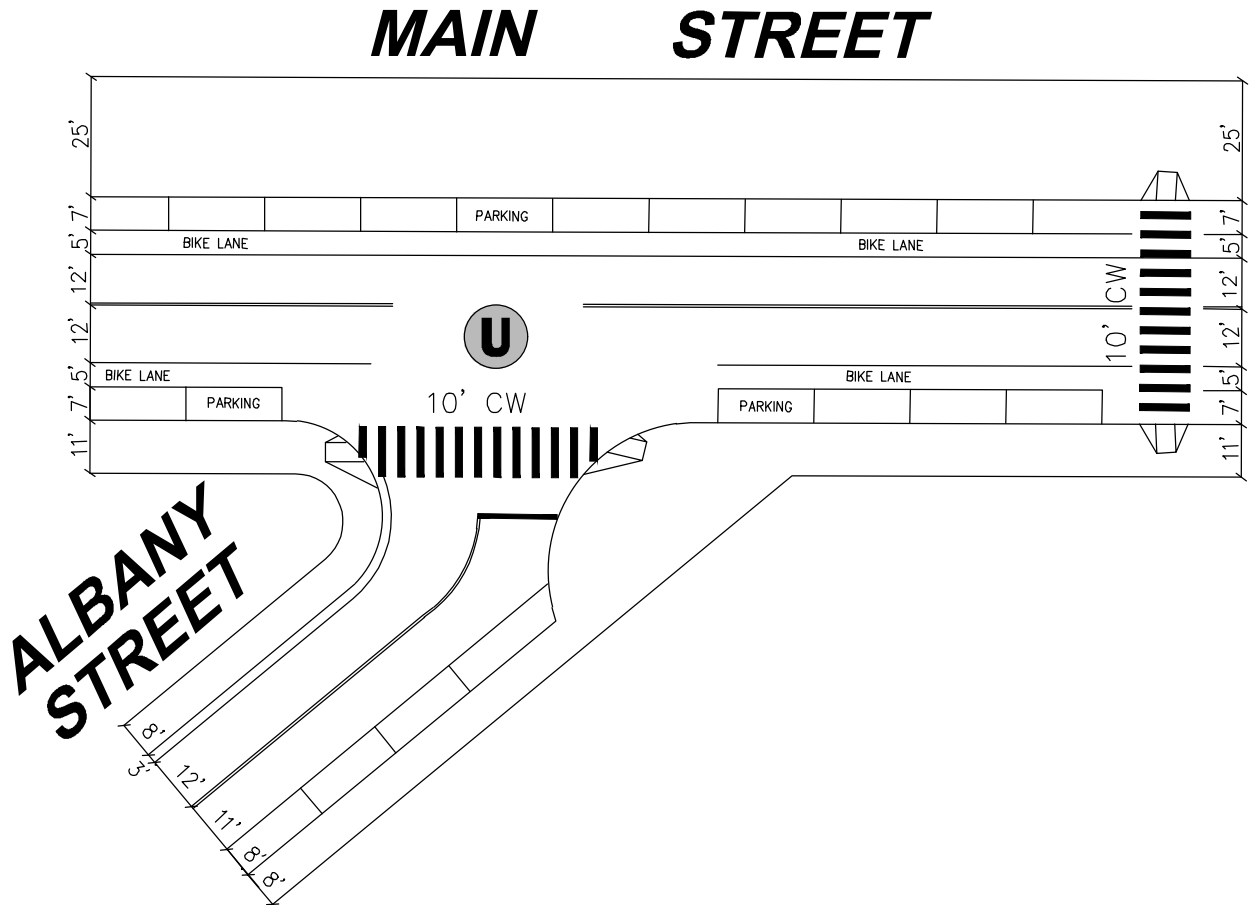
**Intersection Inventory  
 Massachusetts Avenue at  
 Sidney Street**

R:\8622\September 2020\8622inventory1.dwg, 8/31/2020 5:06:54 PM









Source: VHB.

0 20 40 Scale in Feet

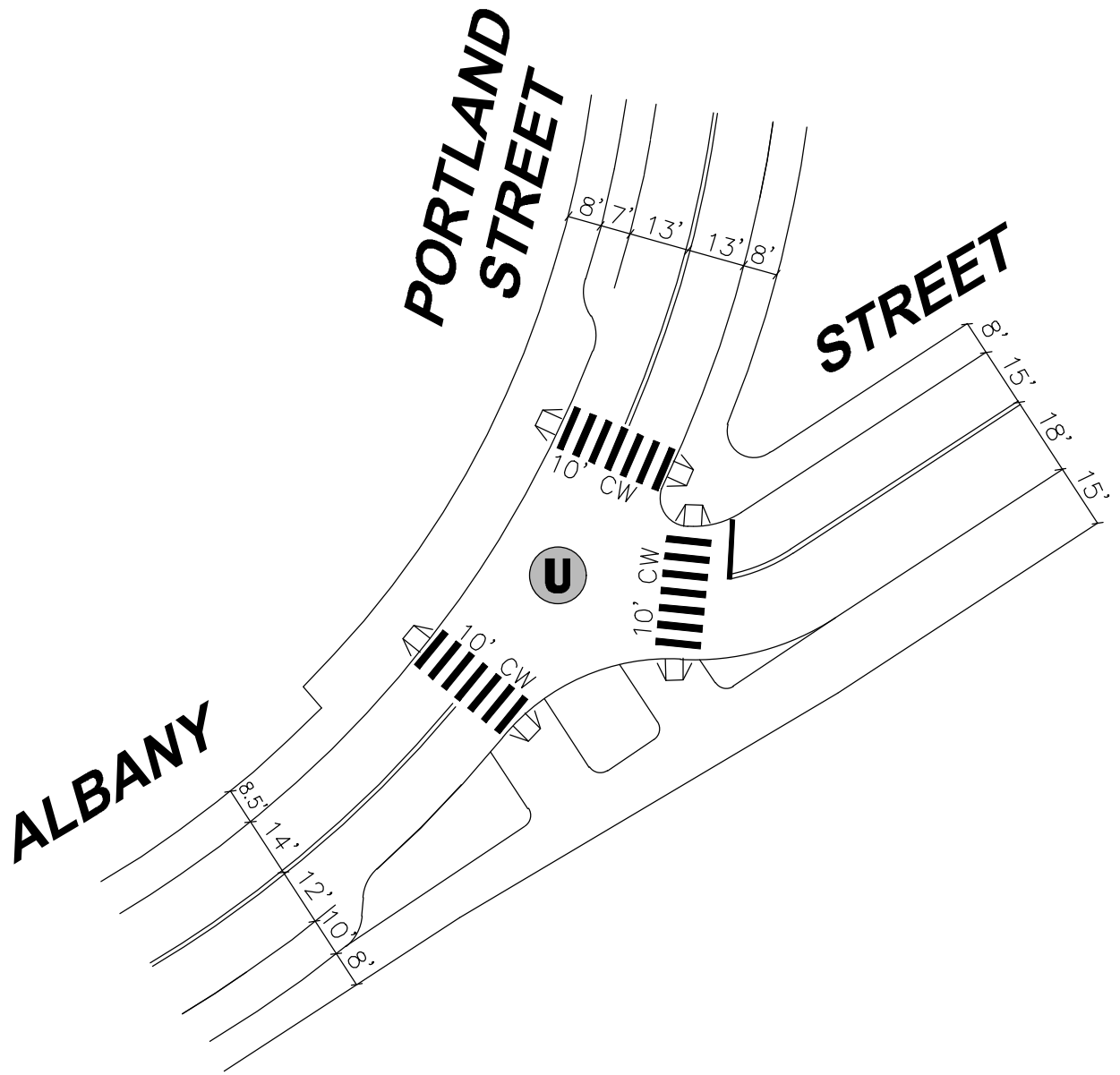
**Figure 1.b.5**



**Intersection Inventory  
Main Street at Albany Street**







Source: VHB.

0 20 40 Scale in Feet



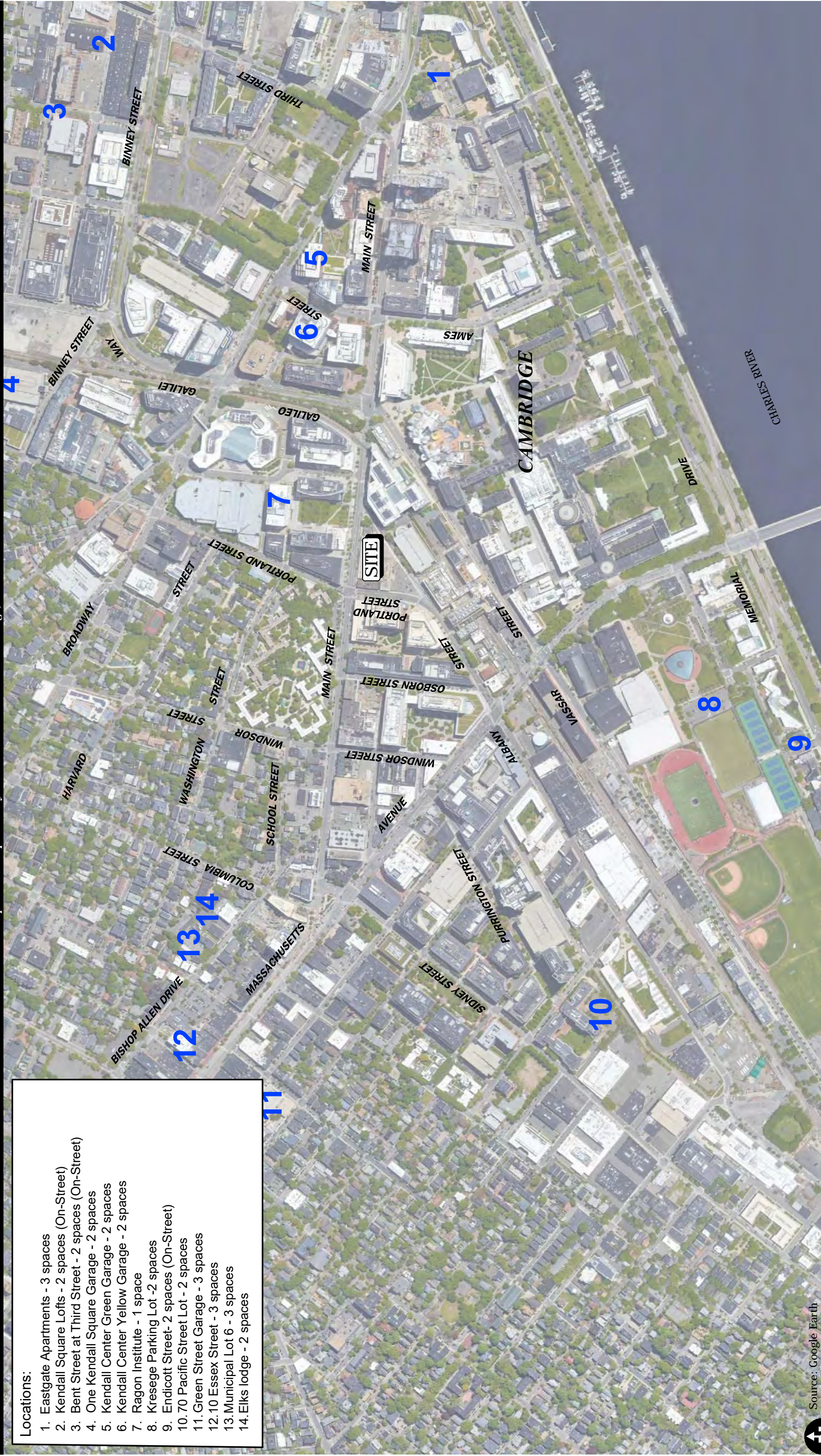
Figure 1.b.7

Intersection Inventory  
Portland Street at Albany Street



Locations:

1. Eastgate Apartments - 3 spaces
2. Kendall Square Lofts - 2 spaces (On-Street)
3. Bent Street at Third Street - 2 spaces (On-Street)
4. One Kendall Square Garage - 2 spaces
5. Kendall Center Green Garage - 2 spaces
6. Kendall Center Yellow Garage - 2 spaces
7. Ragon Institute - 1 space
8. Kresege Parking Lot - 2 spaces
9. Endicott Street - 2 spaces (On-Street)
10. 70 Pacific Street Lot - 2 spaces
11. Green Street Garage - 3 spaces
12. 10 Essex Street - 3 spaces
13. Municipal Lot 6 - 3 spaces
14. Elks lodge - 2 spaces



Source: Google Earth

0 250 500 Scale in Feet



Source: Payette.

0 10 20 Scale in Feet

Figure 9.d.3

Service Entrance and Loading Dock



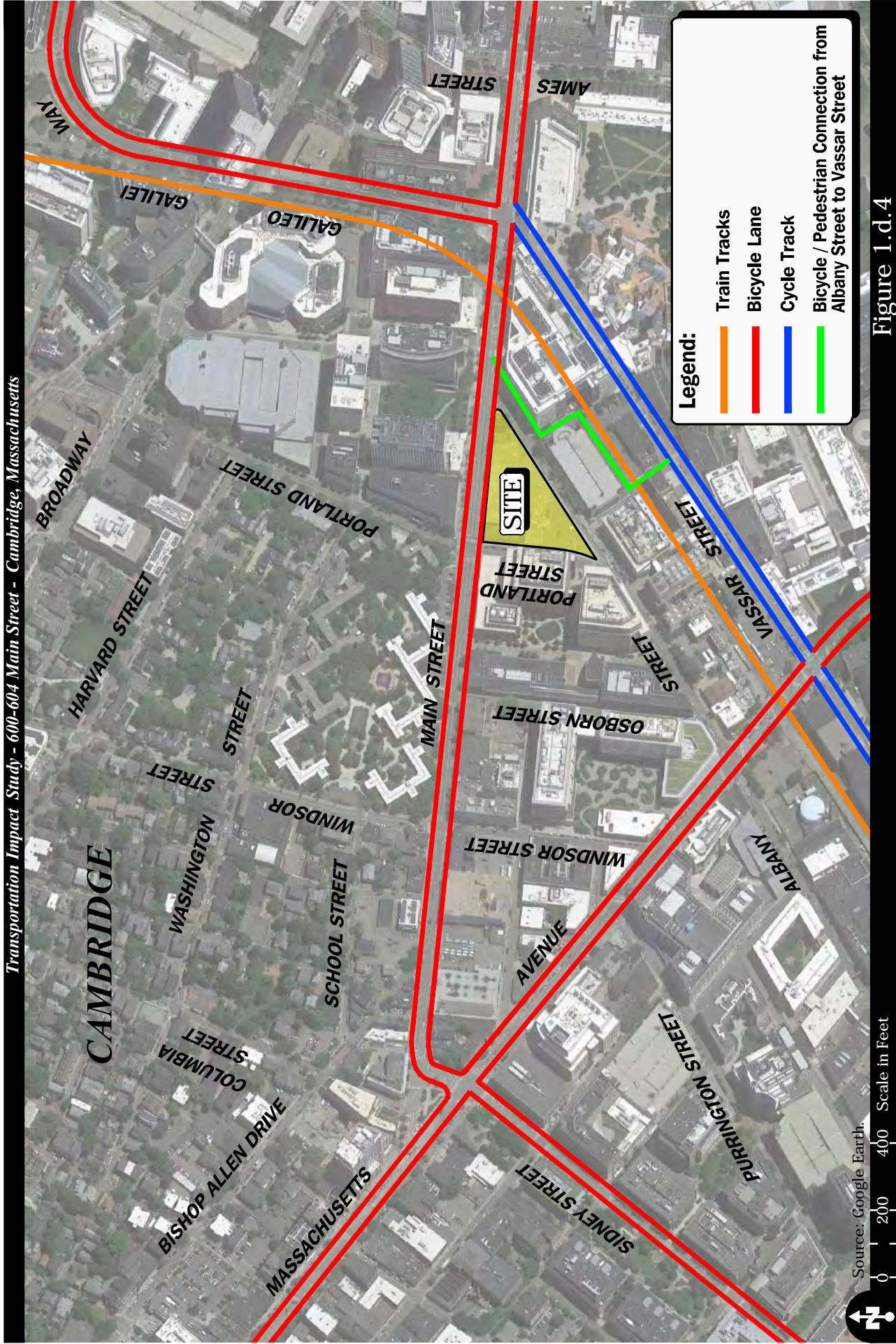


Figure 1.d.4

Existing Bicycle Lanes / Path Map

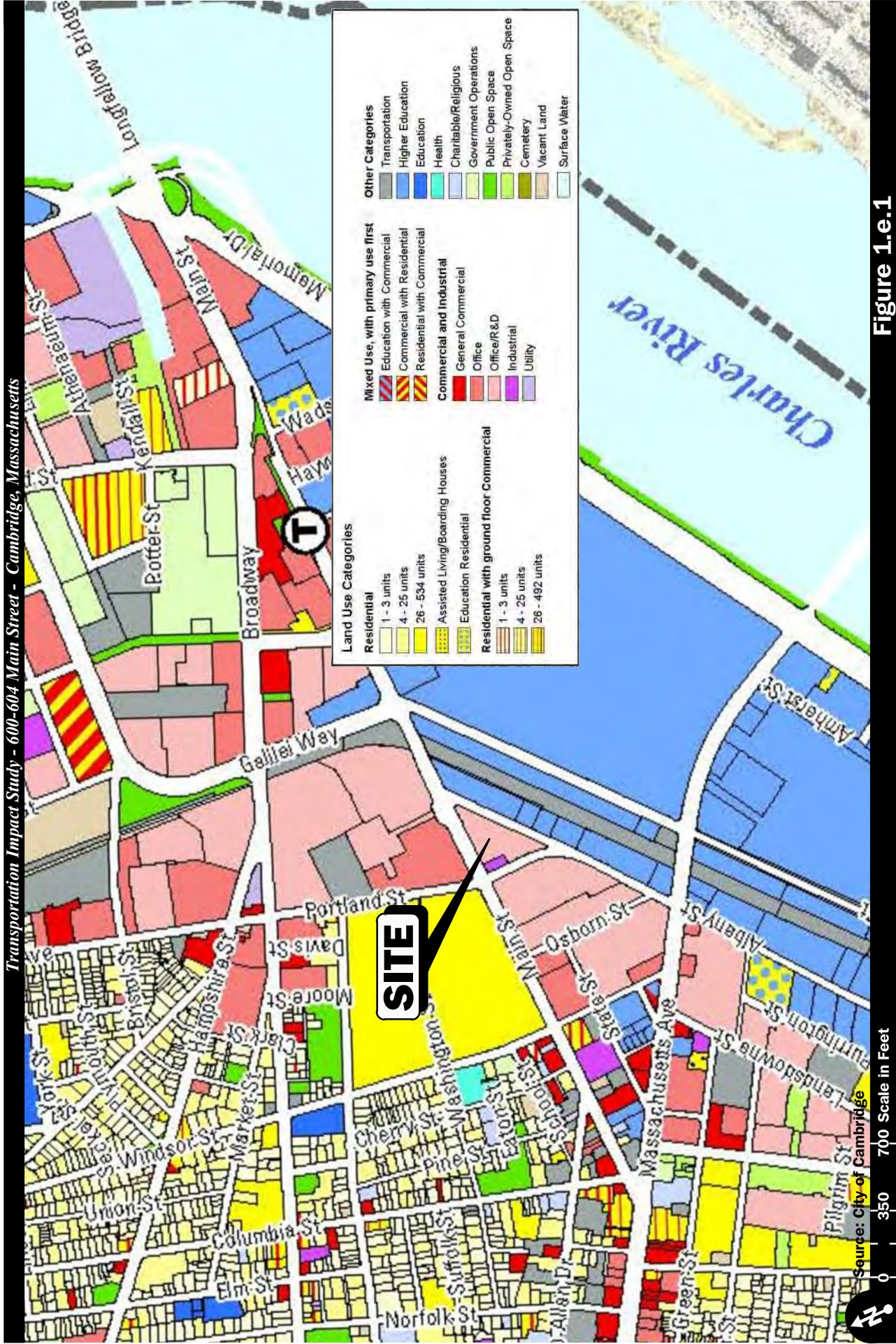
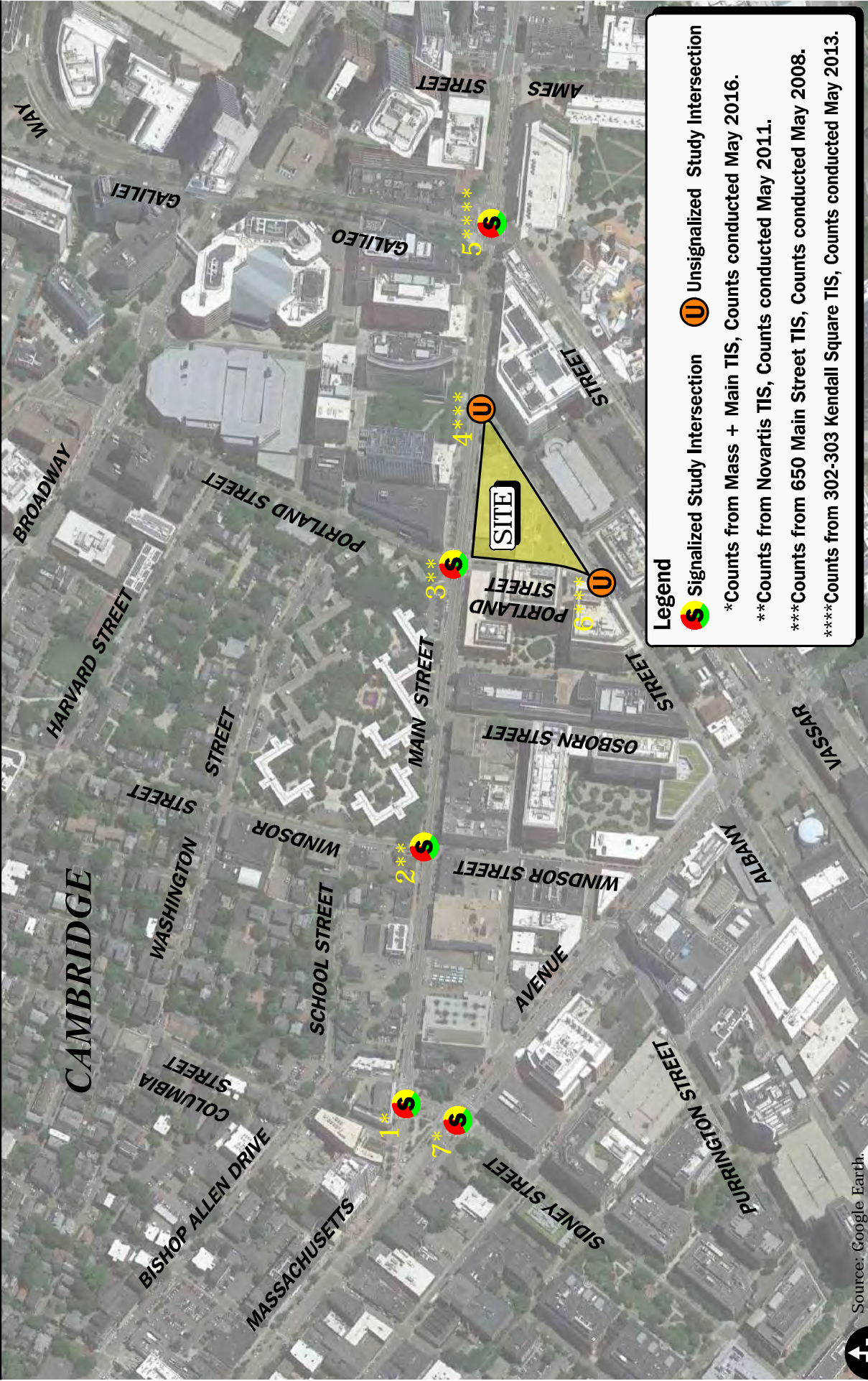


Figure 1.e.1

Land Use Map



**Legend**

- Signalized Study Intersection
- Unsignalized Study Intersection

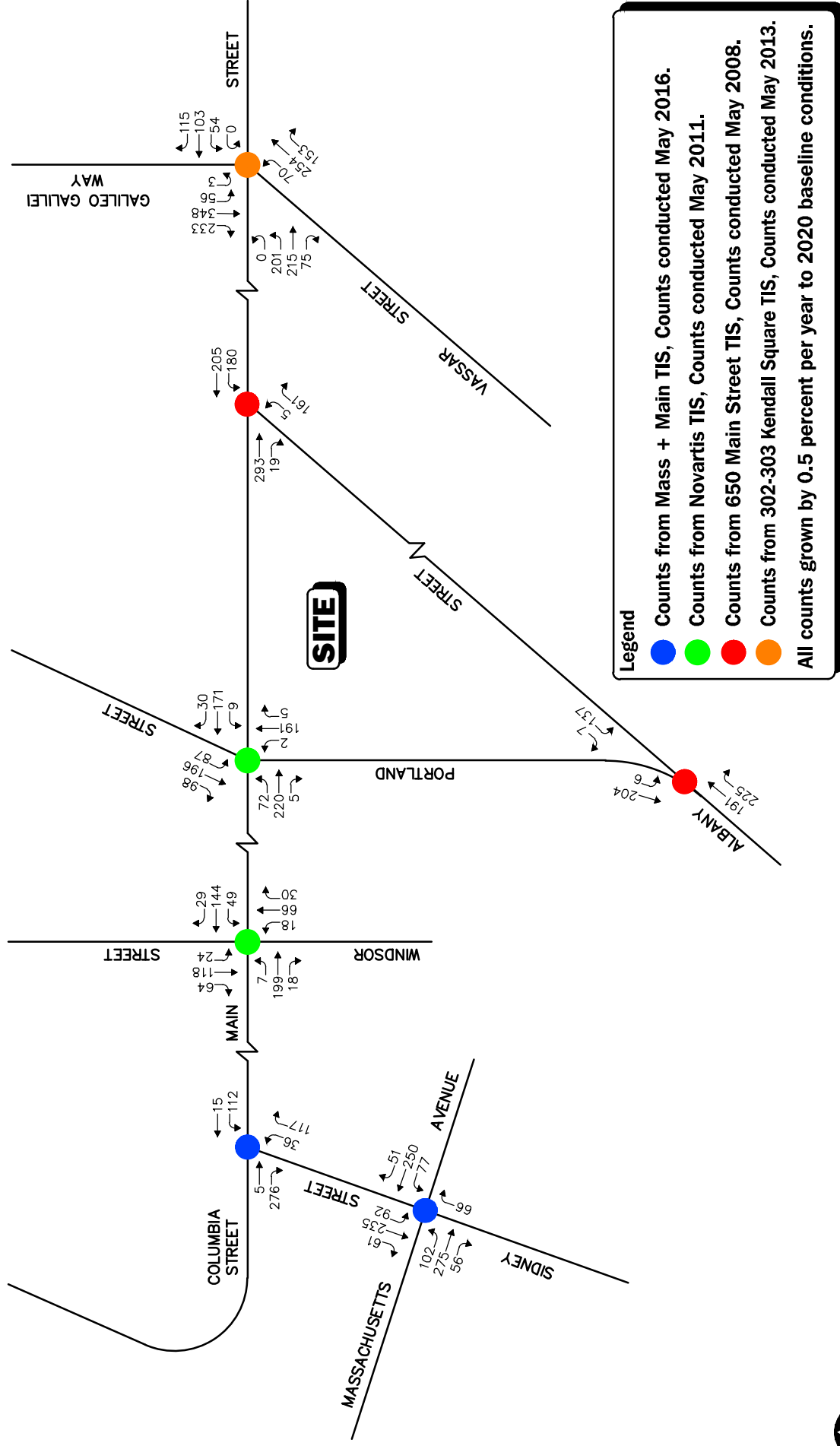
\*Counts from Mass + Main TIS, Counts conducted May 2016.  
 \*\*Counts from Novartis TIS, Counts conducted May 2011.  
 \*\*\*Counts from 650 Main Street TIS, Counts conducted May 2008.  
 \*\*\*\*\*Counts from 302-303 Kendall Square TIS, Counts conducted May 2013.

Source: Google Earth.  
 0 200 400 Scale in Feet

Figure 2.a.1

Count Location Map





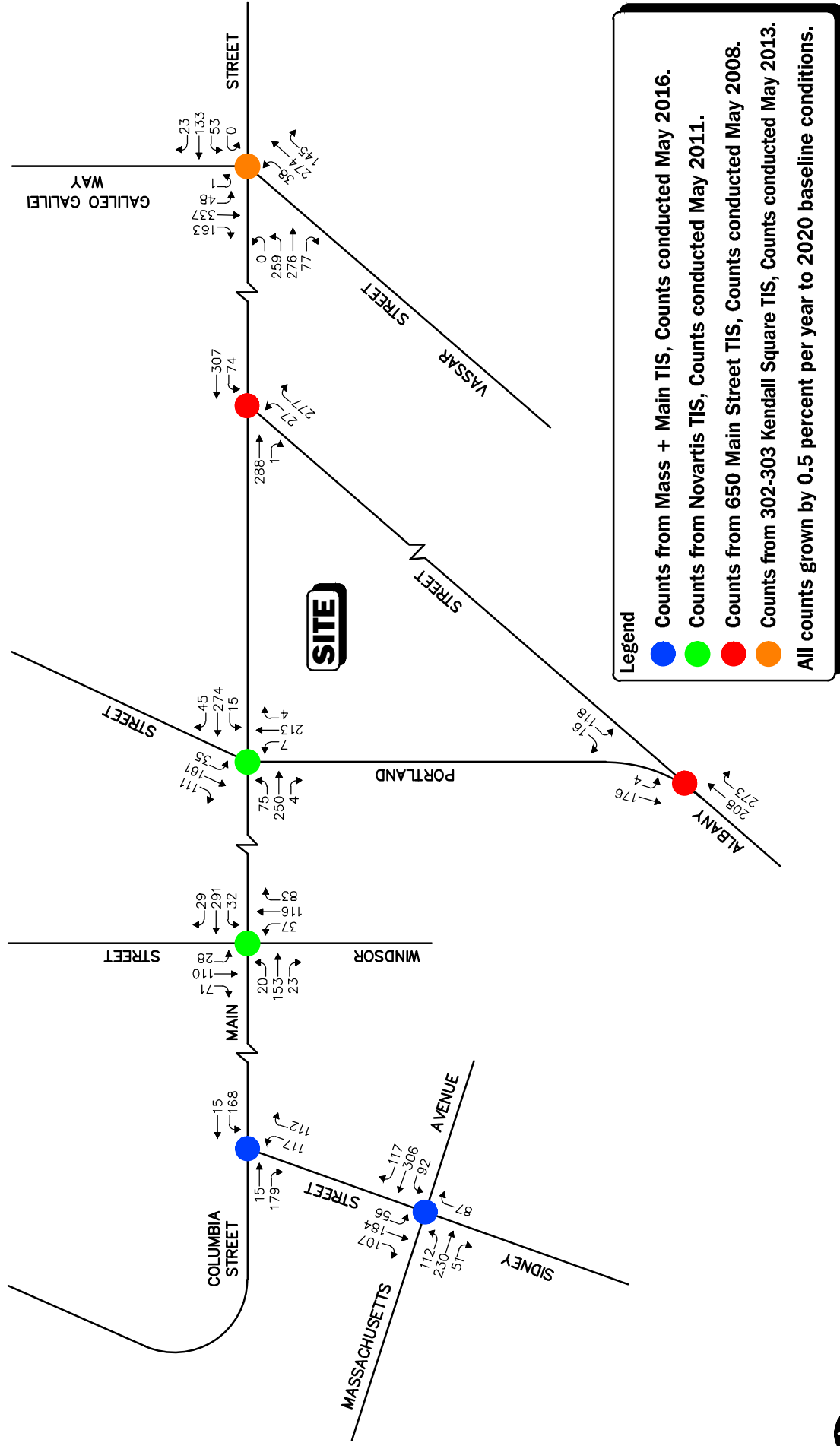
Note: Imbalances exist due to numerous curb cuts and side streets that are not shown.  
Not To Scale

Figure 2.c.1

2020 Baseline  
Weekday Morning  
Peak Hour Traffic Volumes







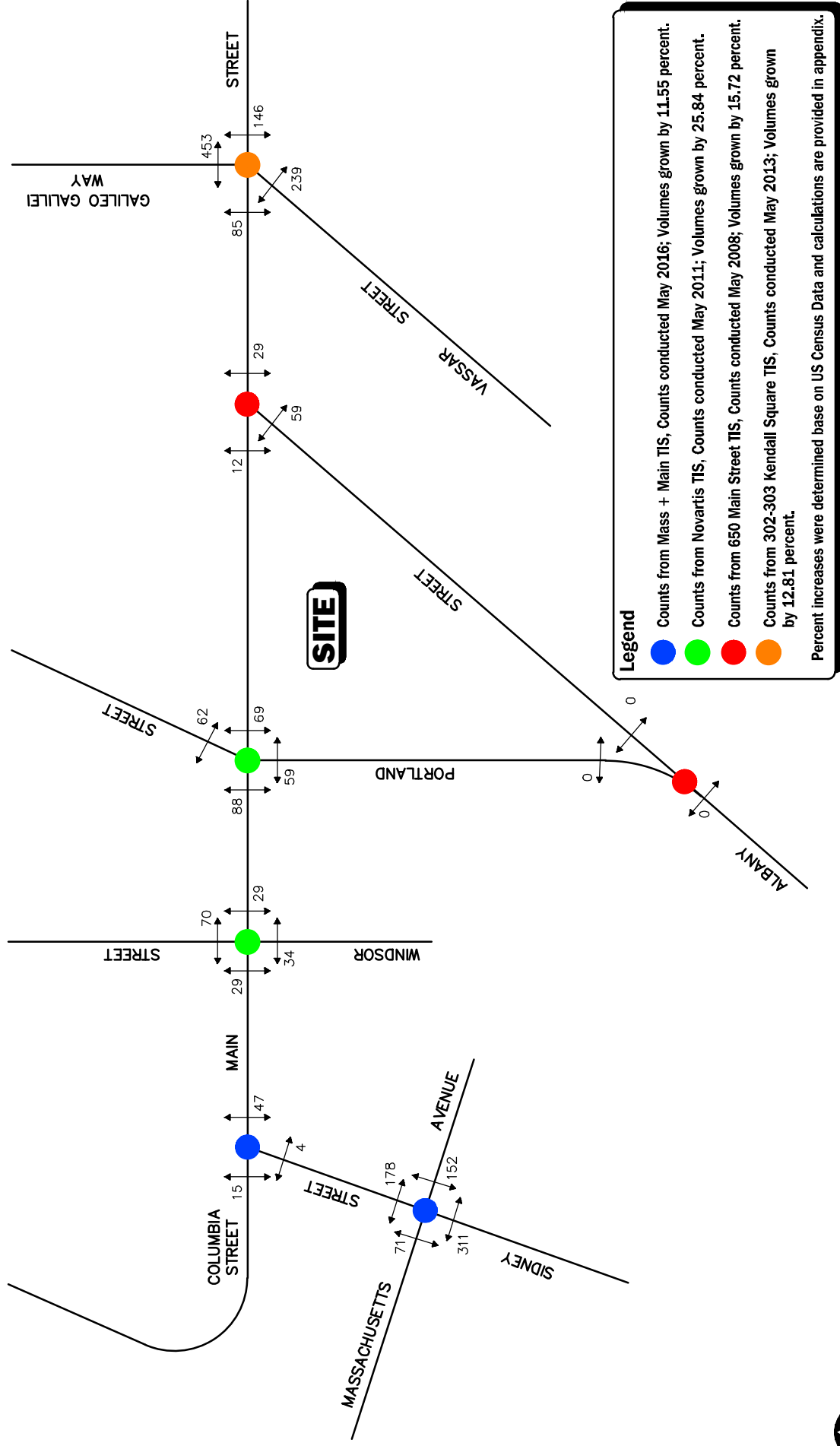
Note: Imbalances exist due to numerous curb cuts and side streets that are not shown.

Not To Scale

Figure 2.c.2

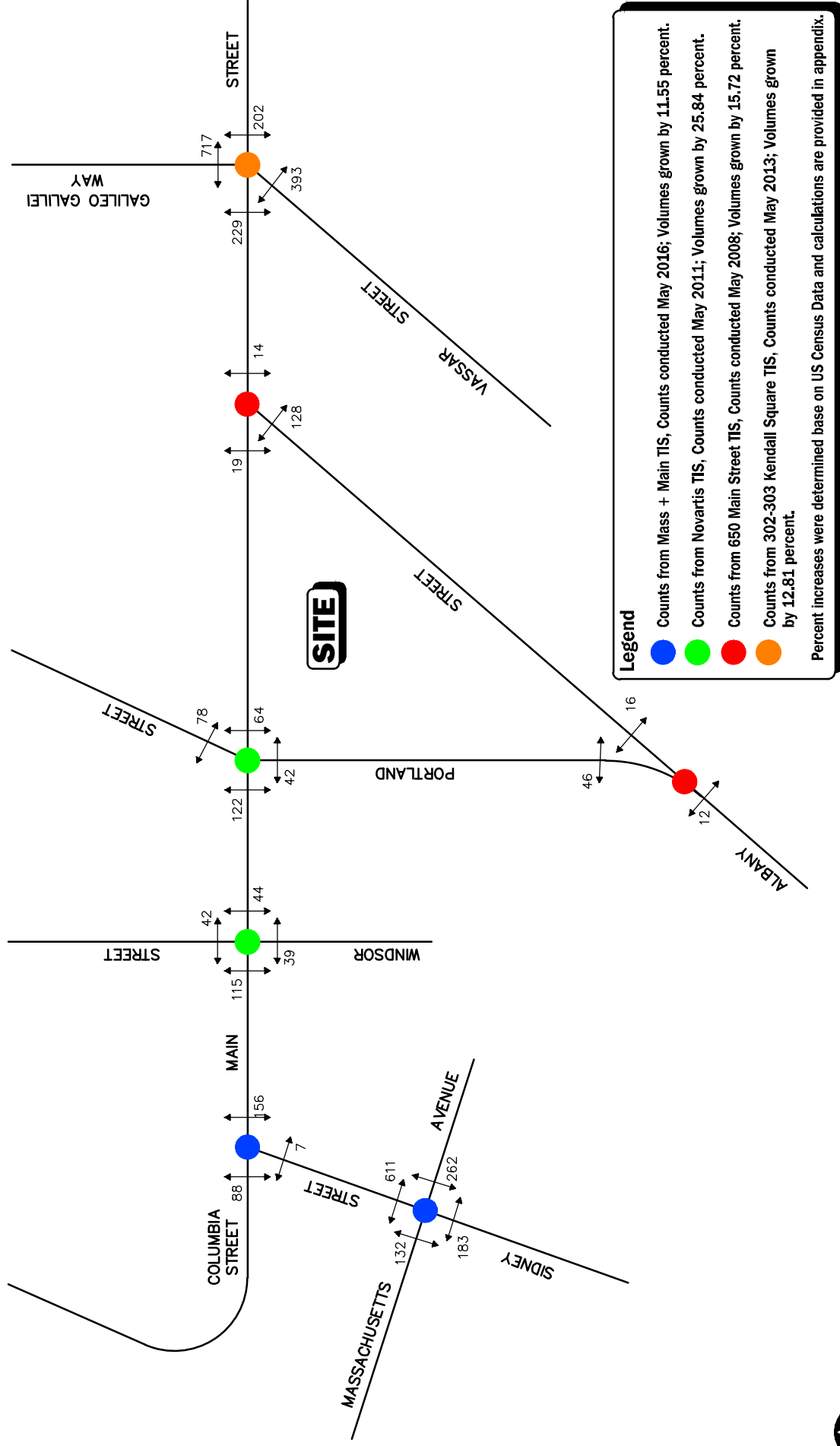


2020 Baseline  
Weekday Evening  
Peak Hour Traffic Volumes



Not To Scale

Figure 2.c.3

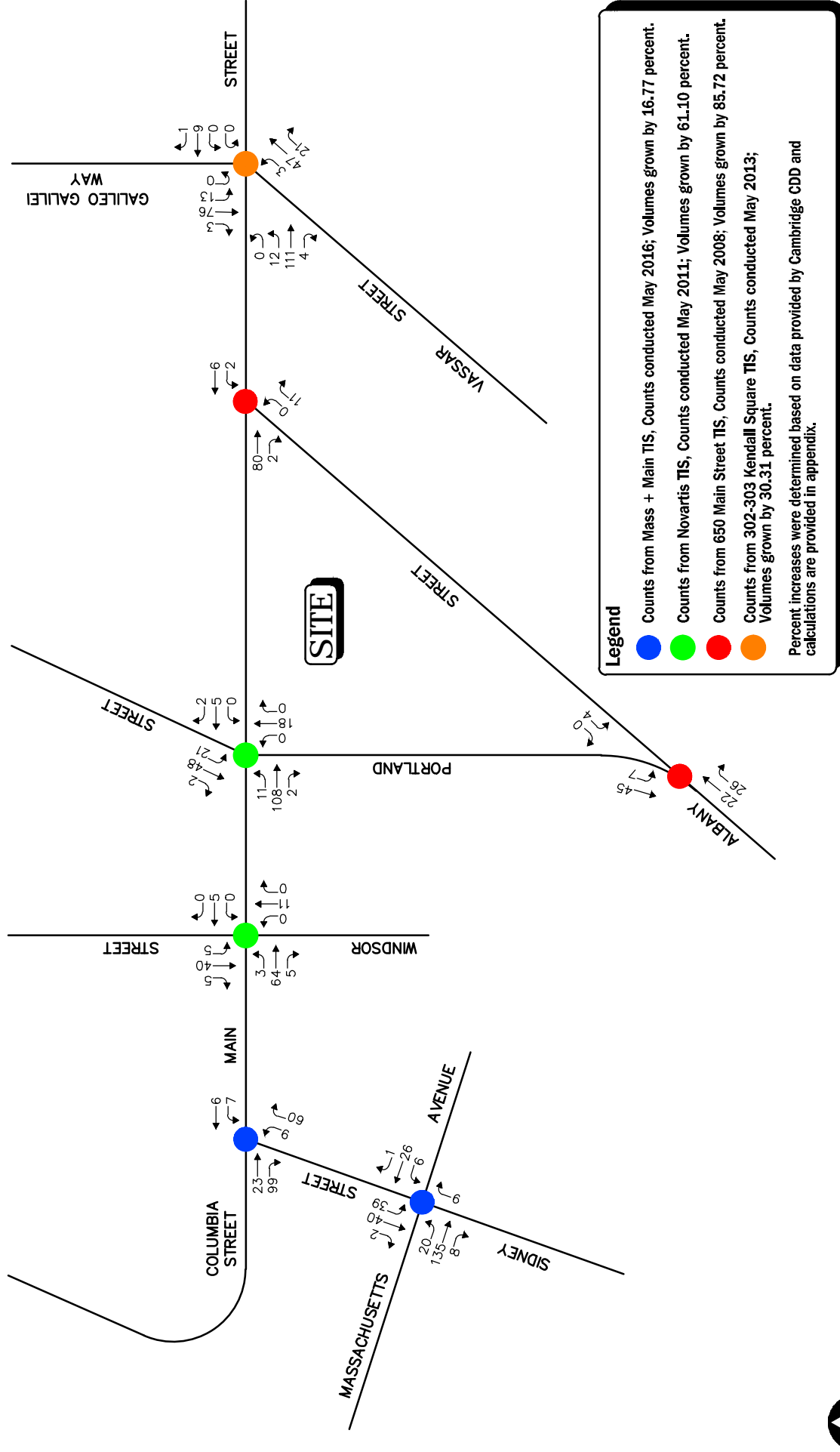


Not To Scale

Figure 2.c.4

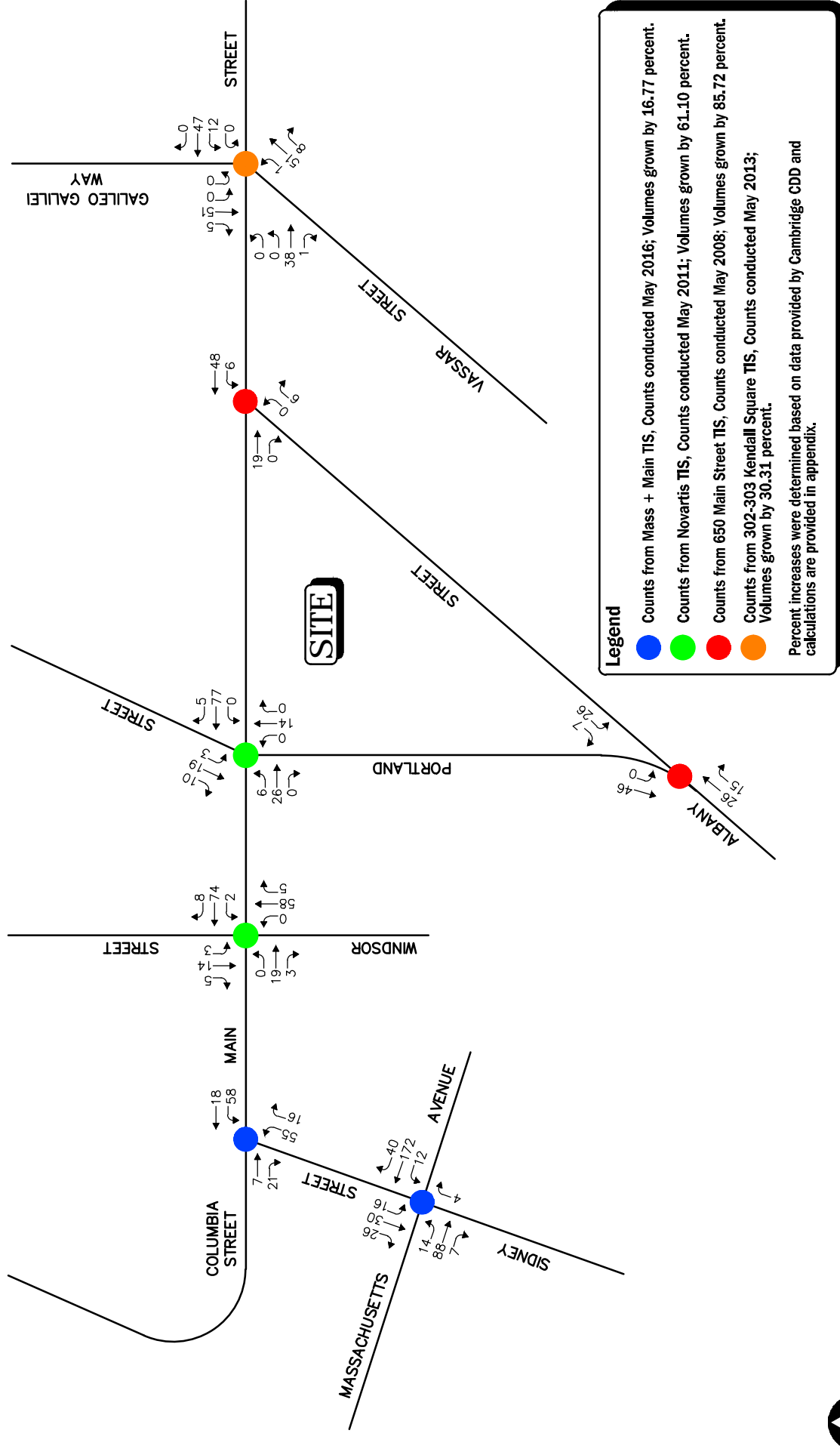


2020 Baseline  
Weekday Evening  
Peak Hour Pedestrian Volumes



Not To Scale

Figure 2.c.5

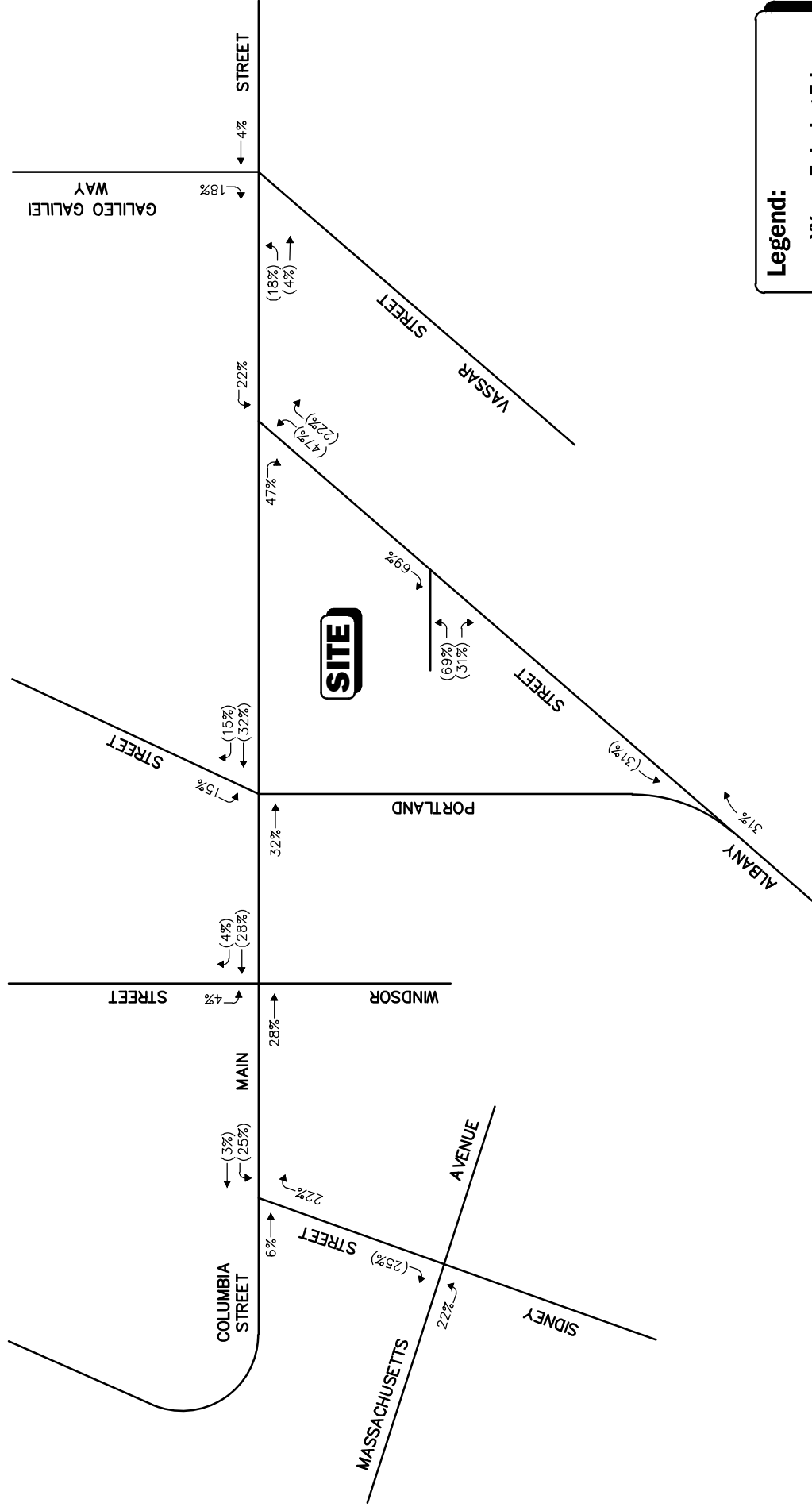


Not To Scale



Figure 2.c.6

2020 Baseline  
Weekday Evening  
Peak Hour Bicycle Volumes



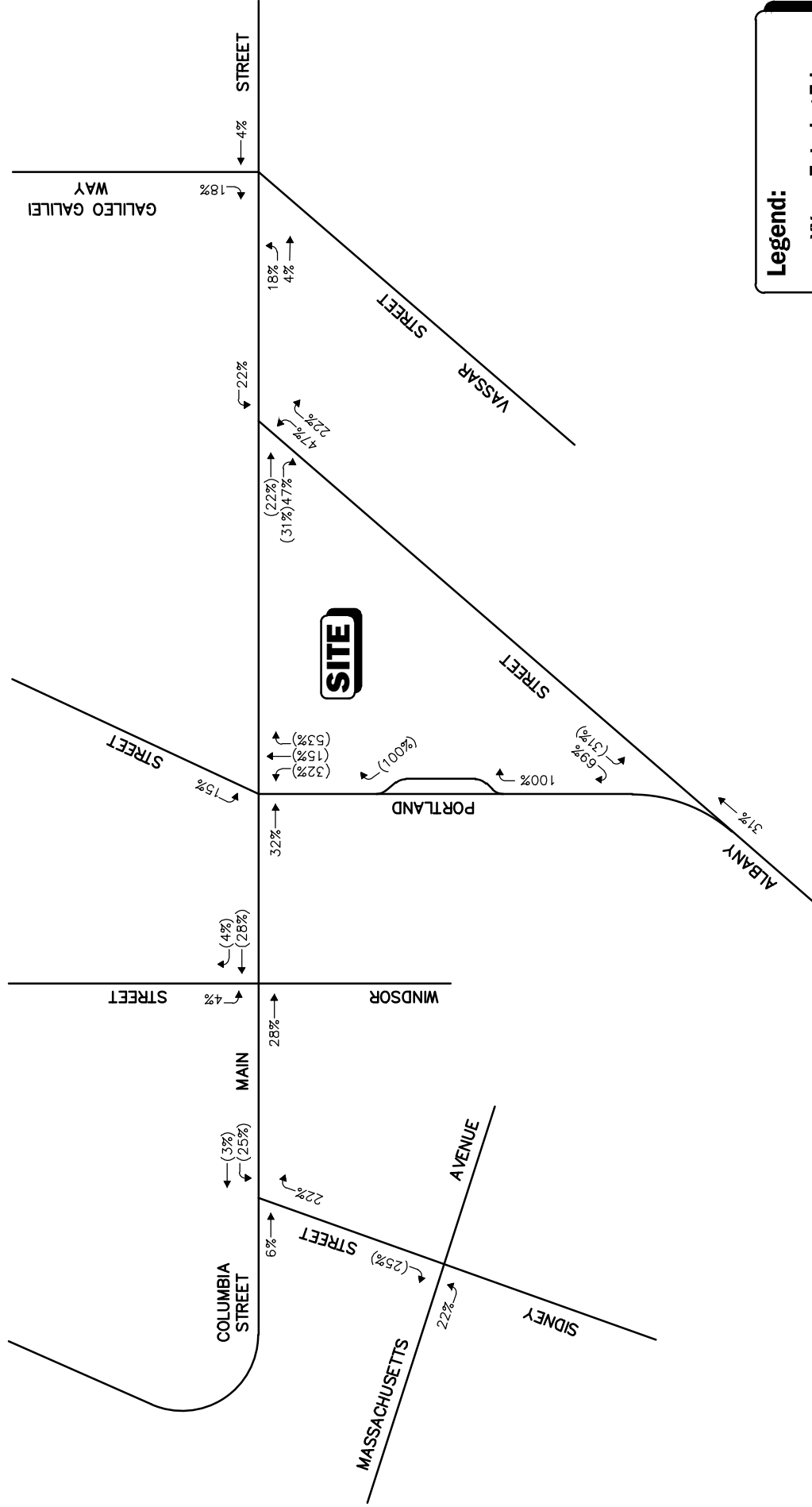
**Legend:**

- XX Entering Trips
- (XX) Exiting Trips



Figure 3.b.1

Research and Development  
Trip Distribution Map



**Legend:**

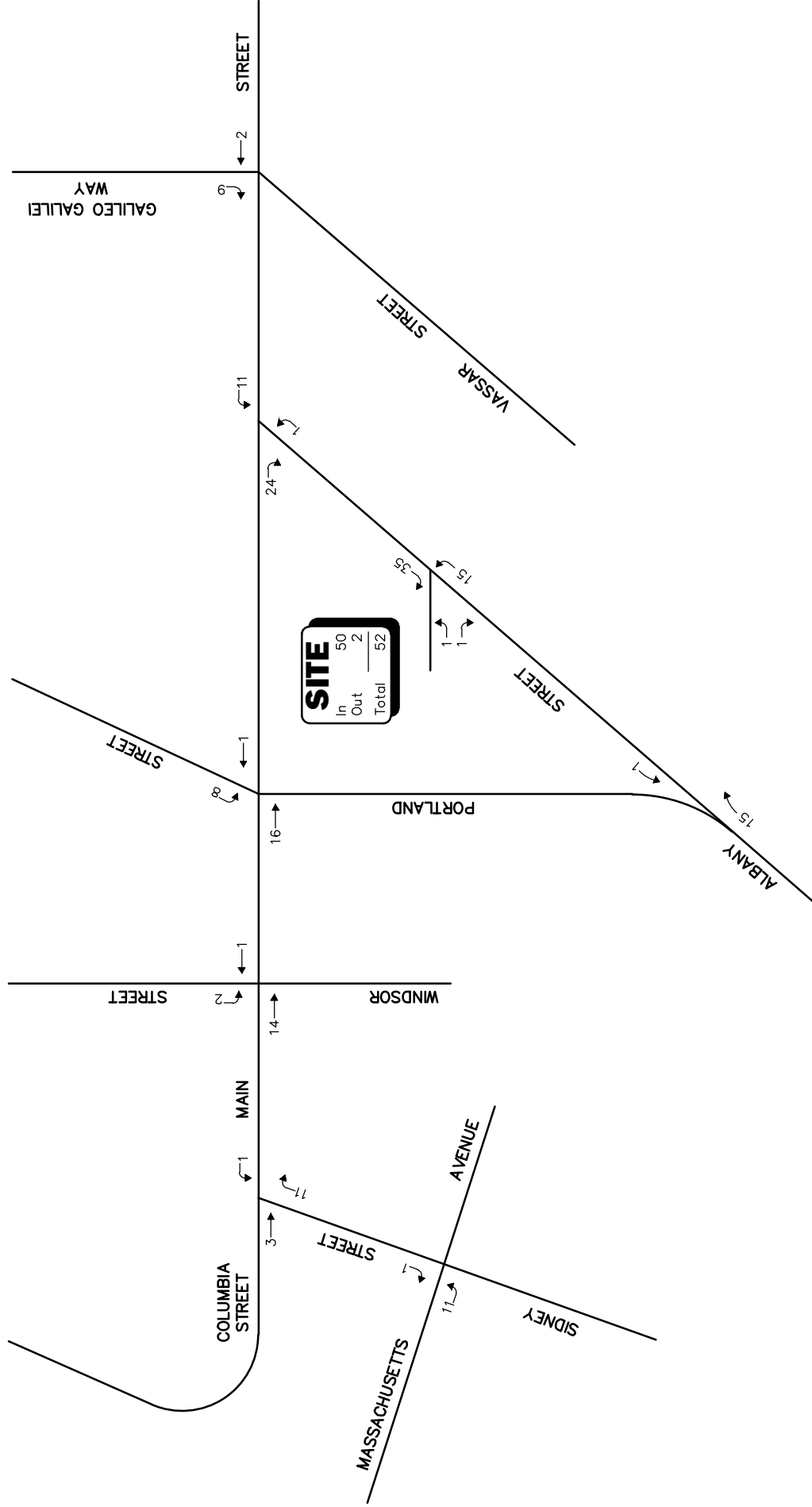
- XX Entering Trips
- (XX) Exiting Trips



**VAI** Vanasse & Associates inc

Figure 3.b.2

Daycare Trip Distribution Map



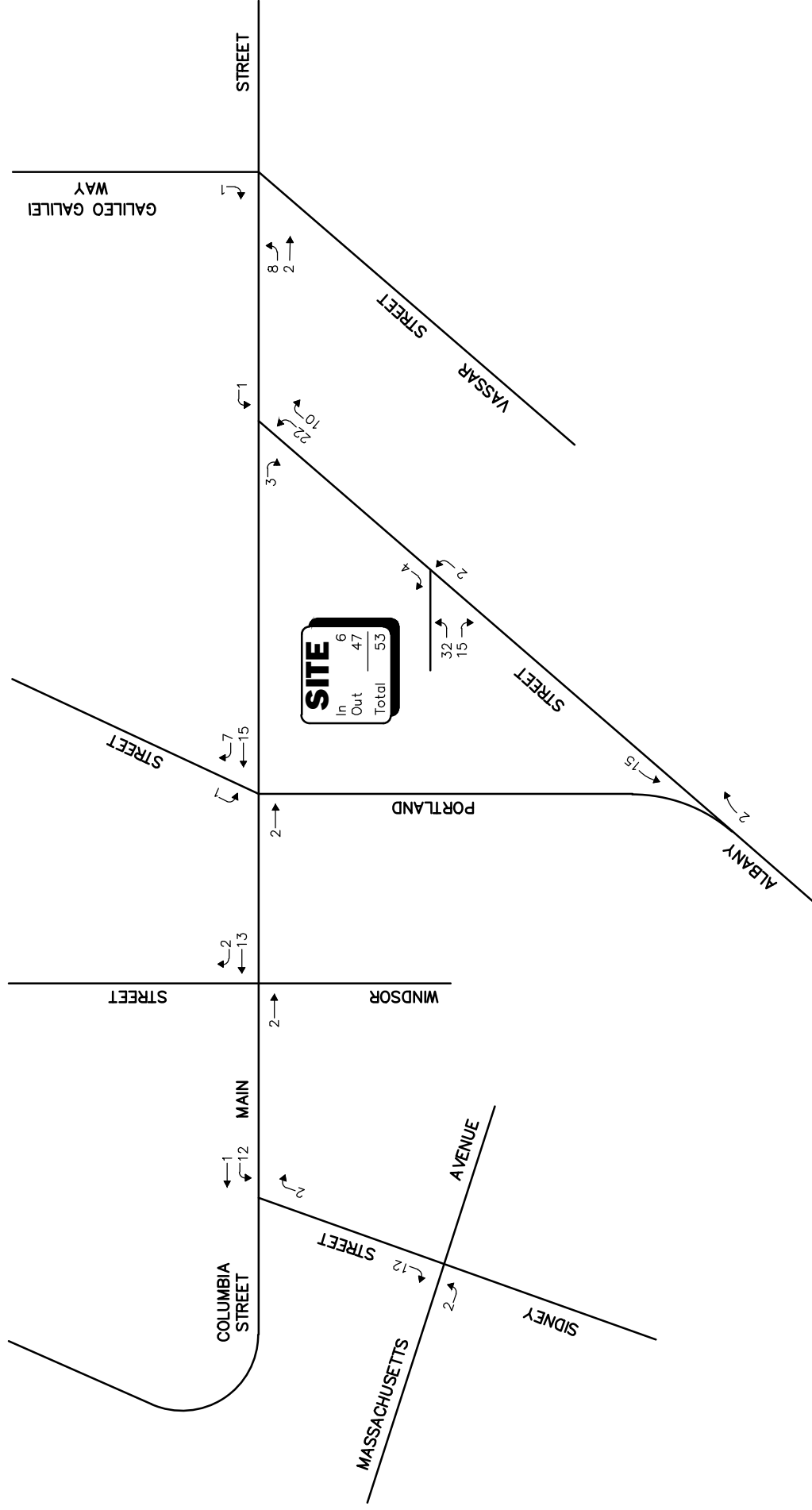
Not To Scale



Figure 3.c.1

Research and Development Trips  
 Weekday Morning  
 Peak Hour Traffic Volumes





**VAI** Vanasse & Associates inc

Figure 3.c.2

Research and Development Trips  
Weekday Evening  
Peak Hour Traffic Volumes

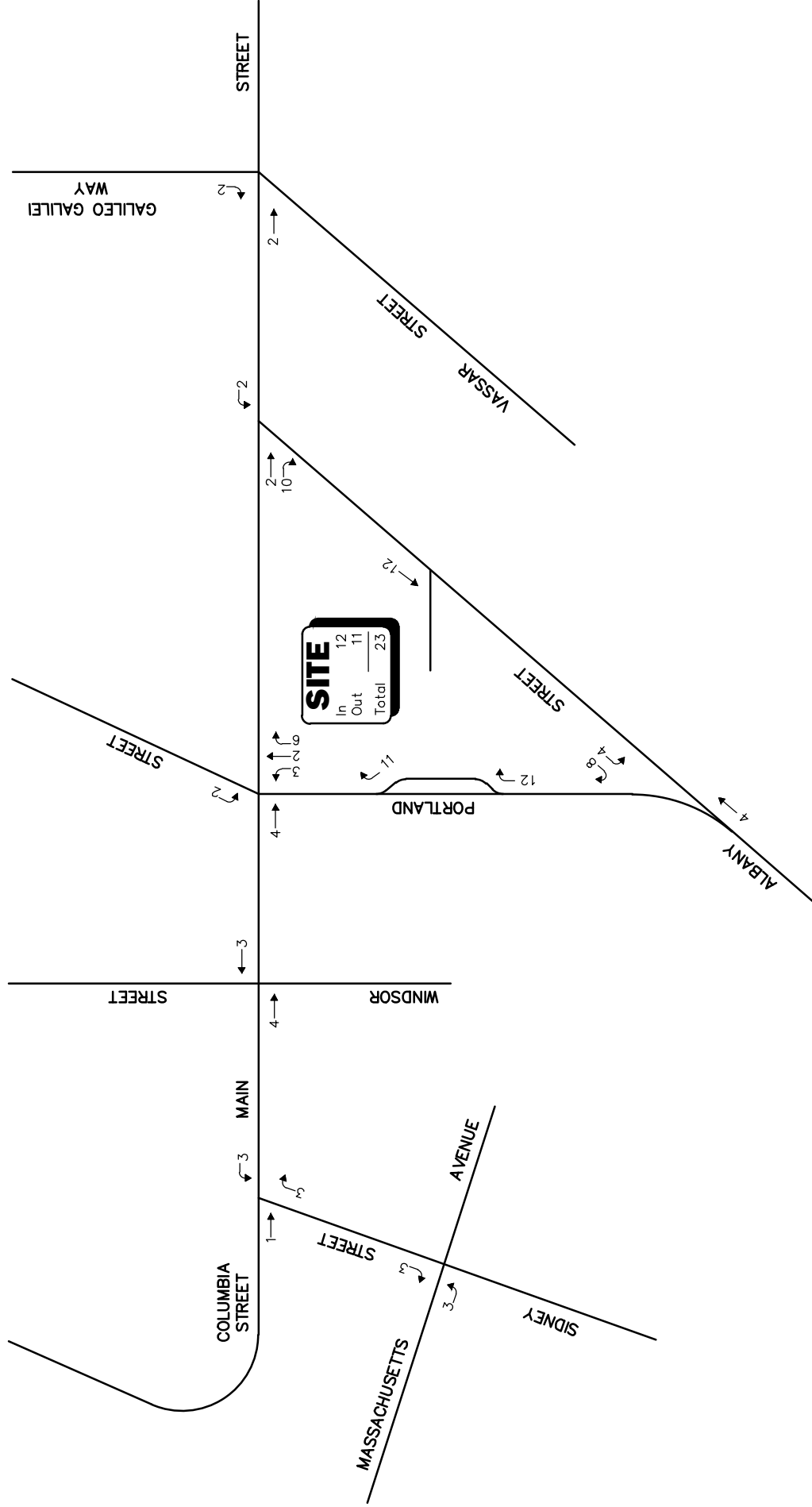
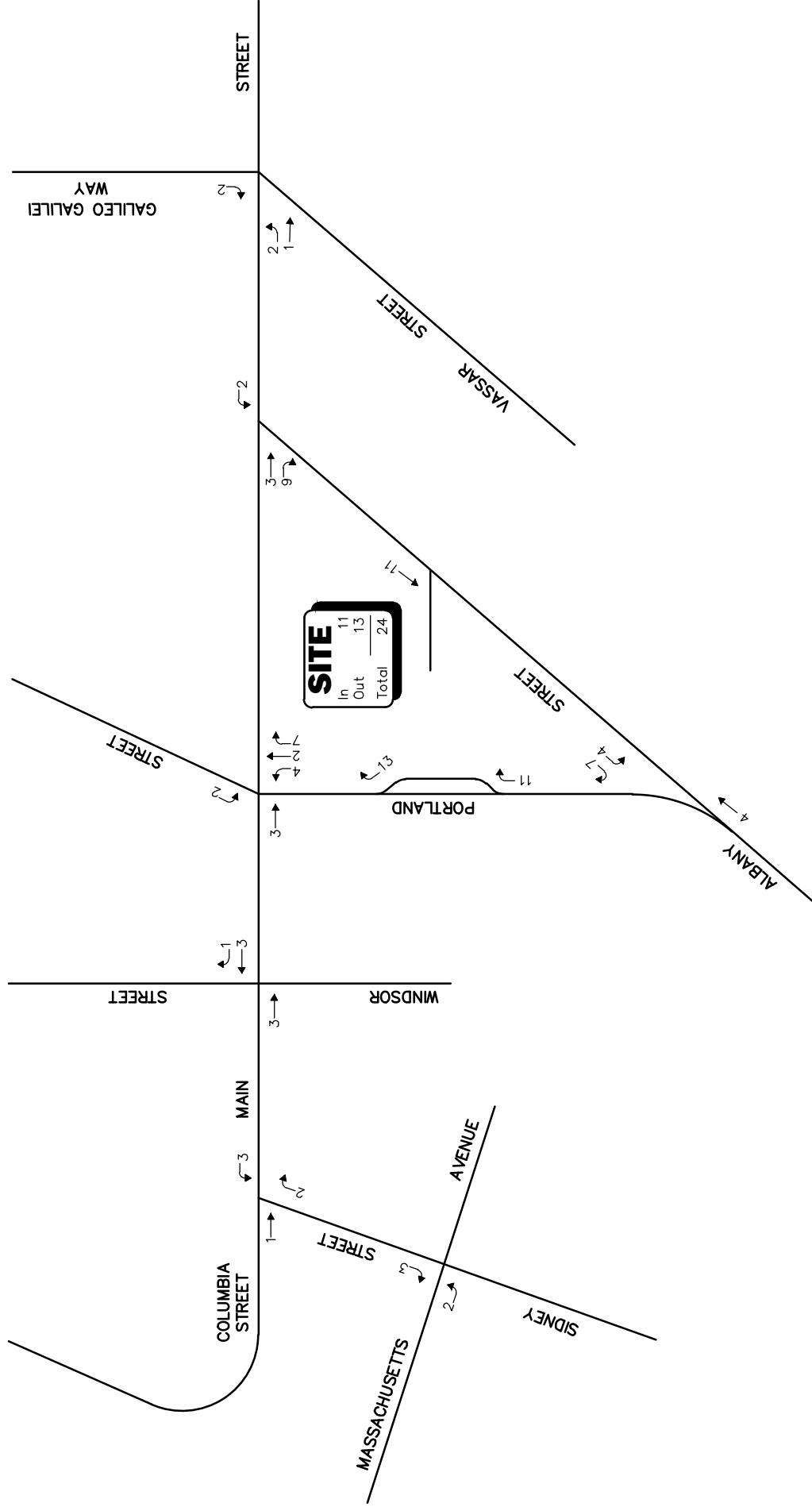


Figure 3.c.3

Day Care Trips  
 Weekday Morning  
 Peak Hour Traffic Volumes

Not To Scale





Not To Scale



Figure 3.c.4

Day Care Trips  
 Weekday Evening  
 Peak Hour Traffic Volumes

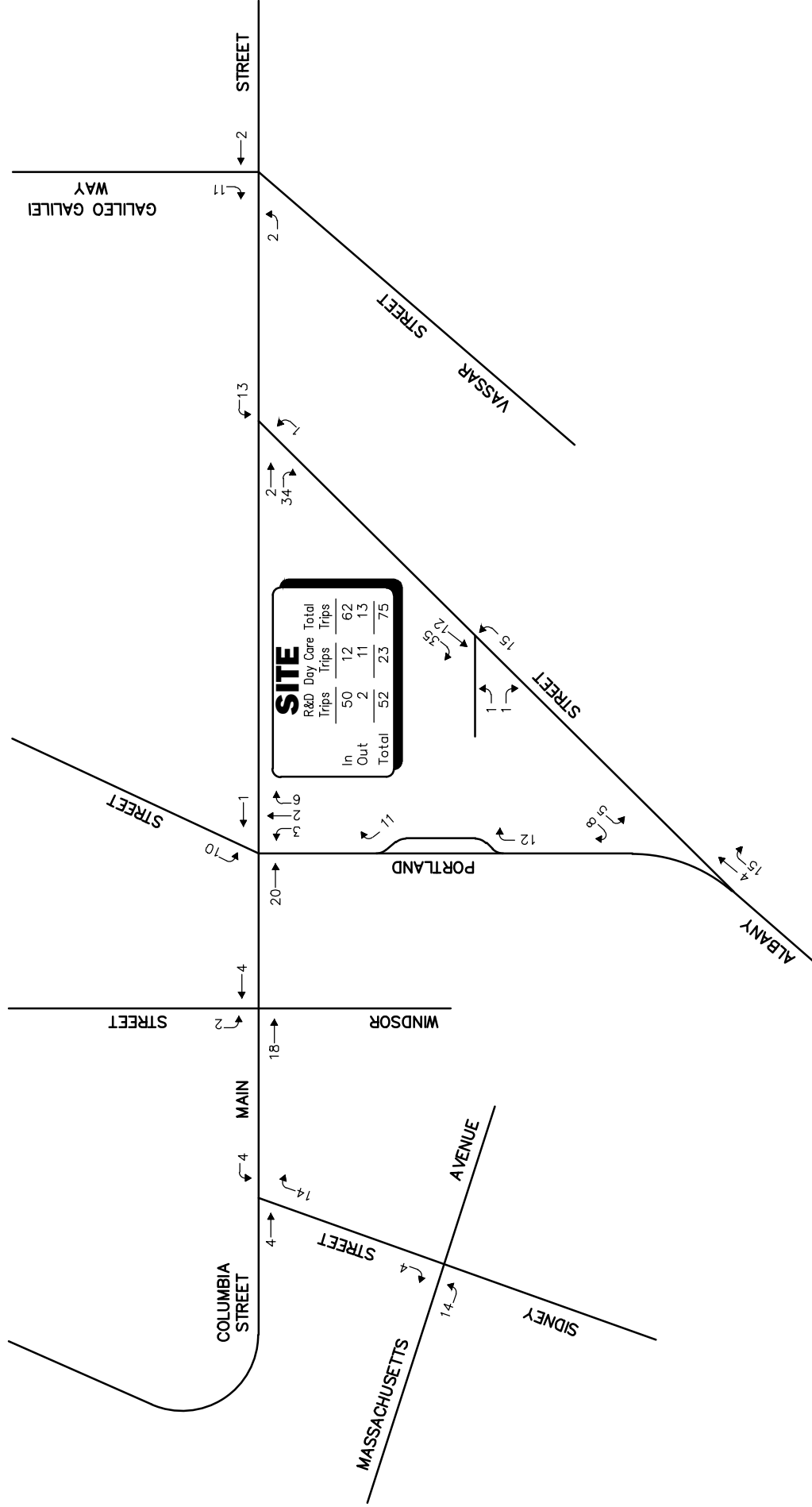


Figure 3.c.5

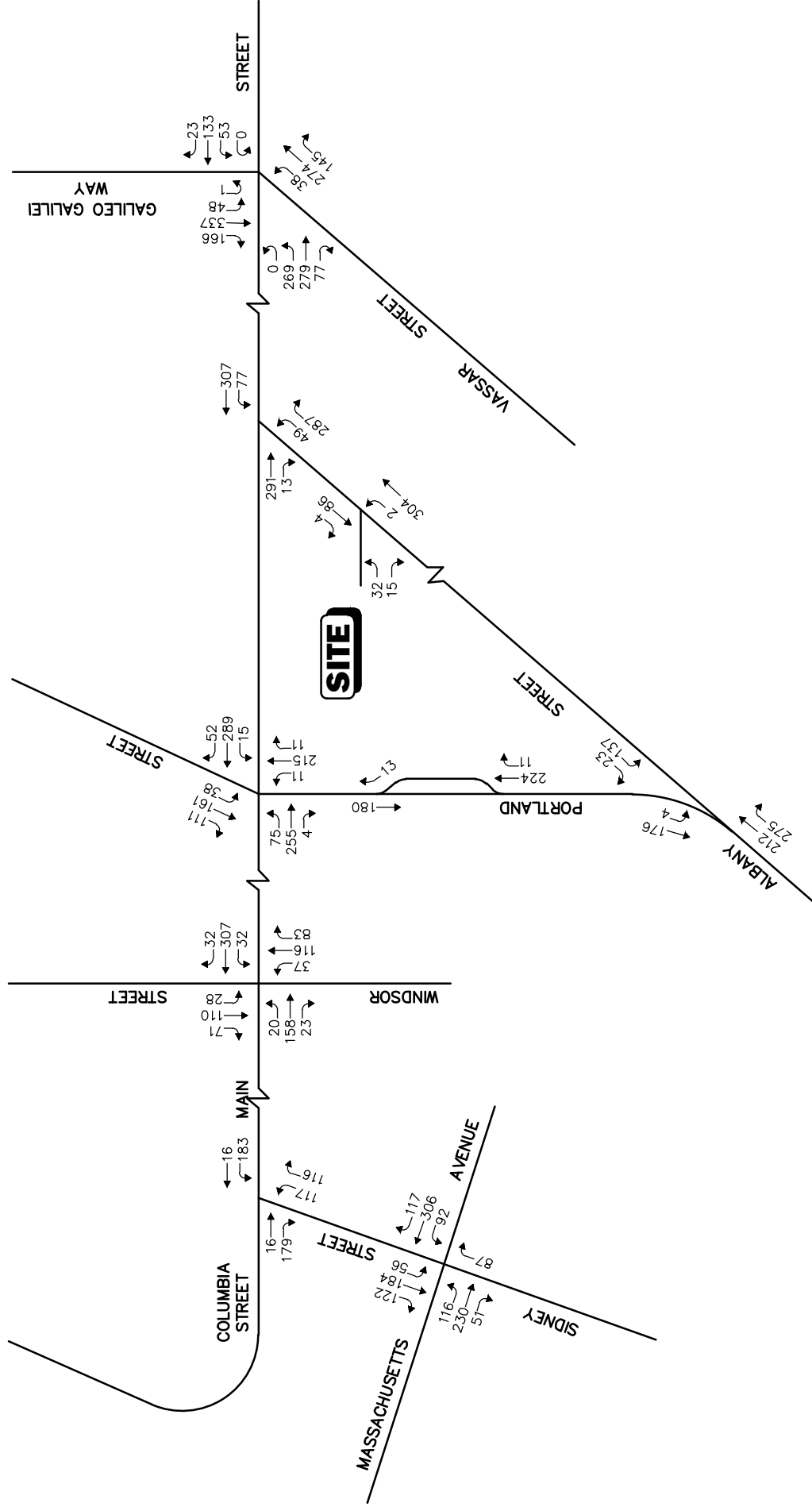
Site Generated  
Weekday Morning  
Peak Hour Traffic Volumes



**VAI** Vanasse &  
Associates inc





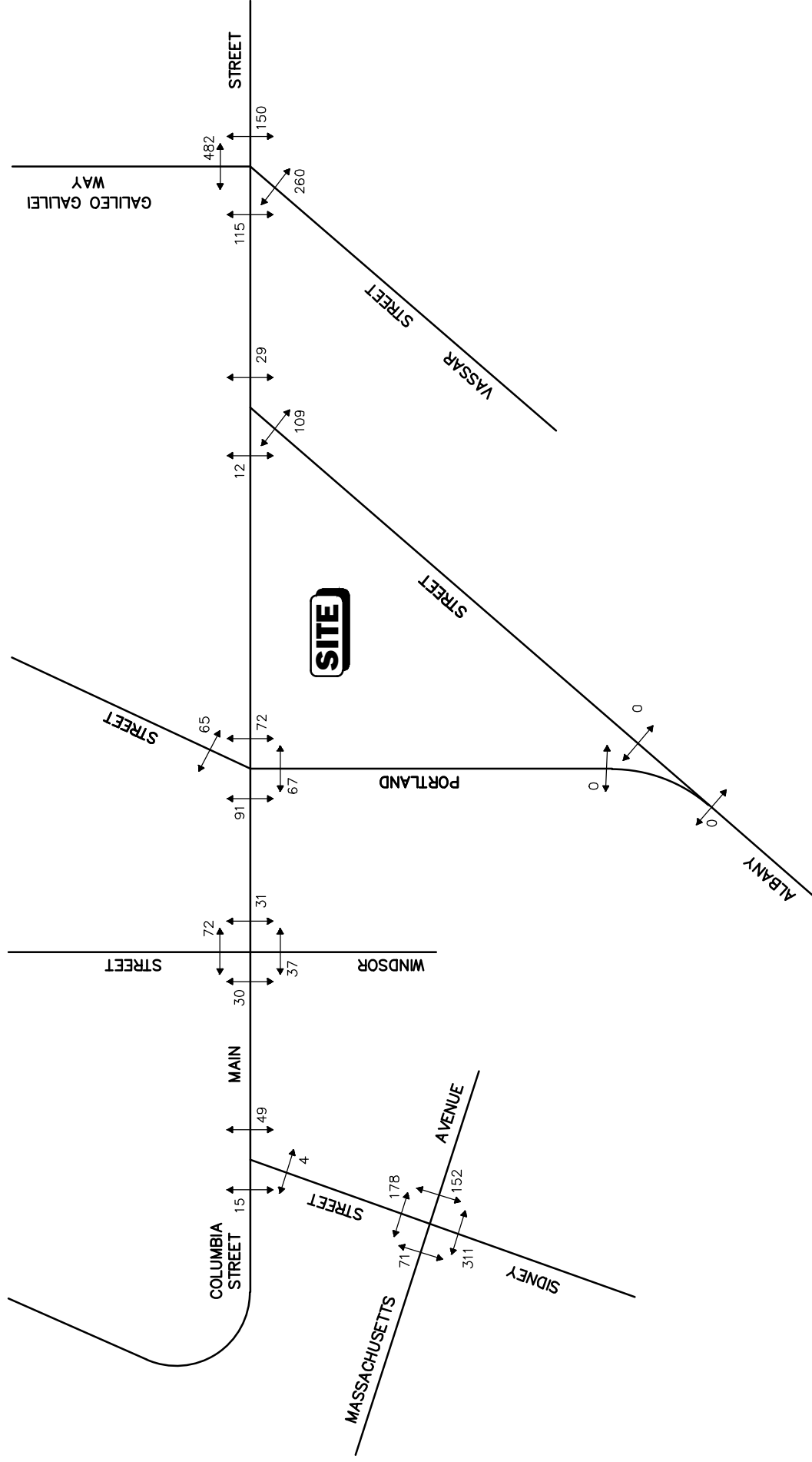


Note: Imbalances exist due to numerous curb cuts and side streets that are not shown.  
Not To Scale

Figure 5.b.2

2020 Build  
Weekday Evening  
Peak Hour Traffic Volumes





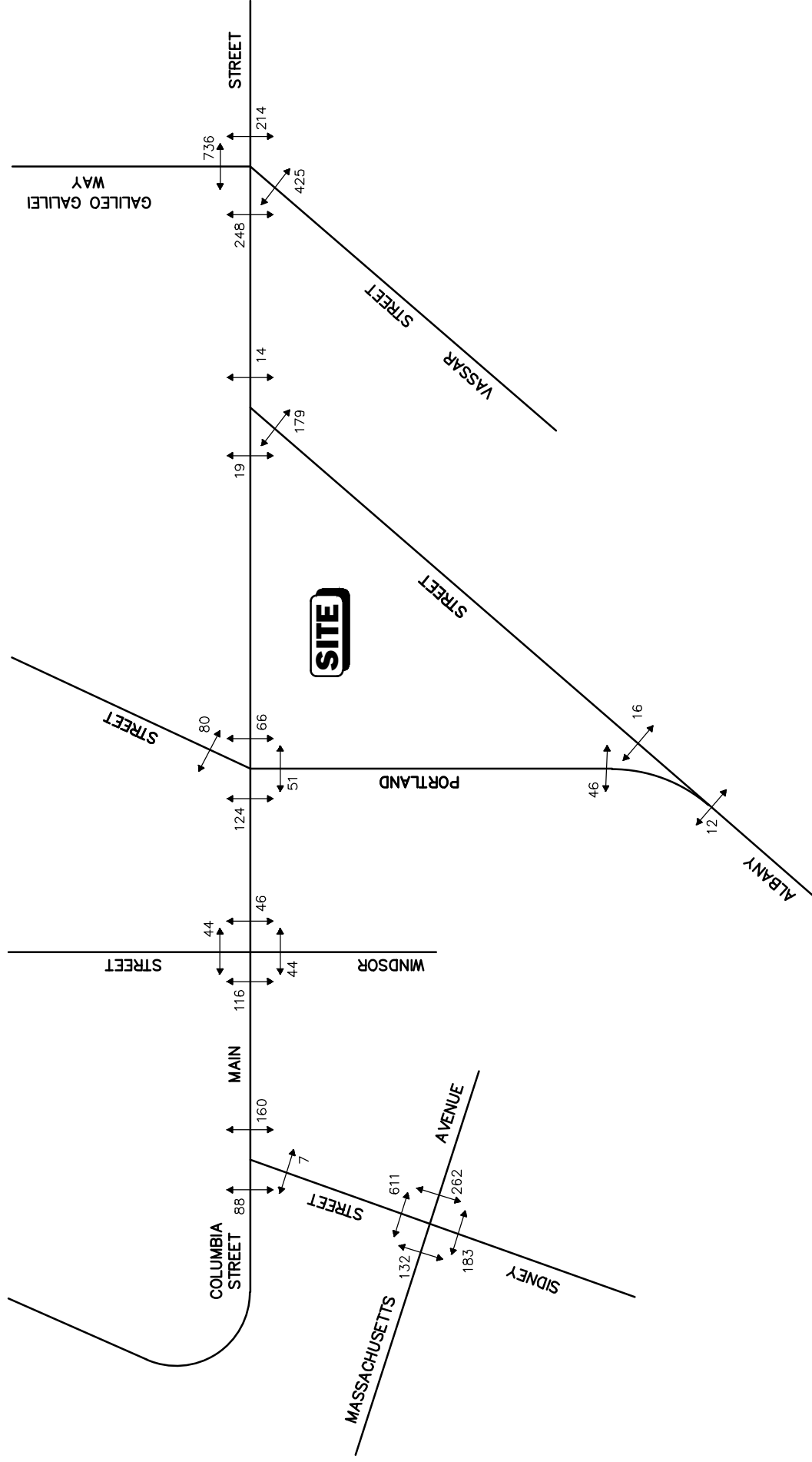
Note: Imbalances exist due to numerous curb cuts and side streets that are not shown.  
Not To Scale

Figure 5.b.3



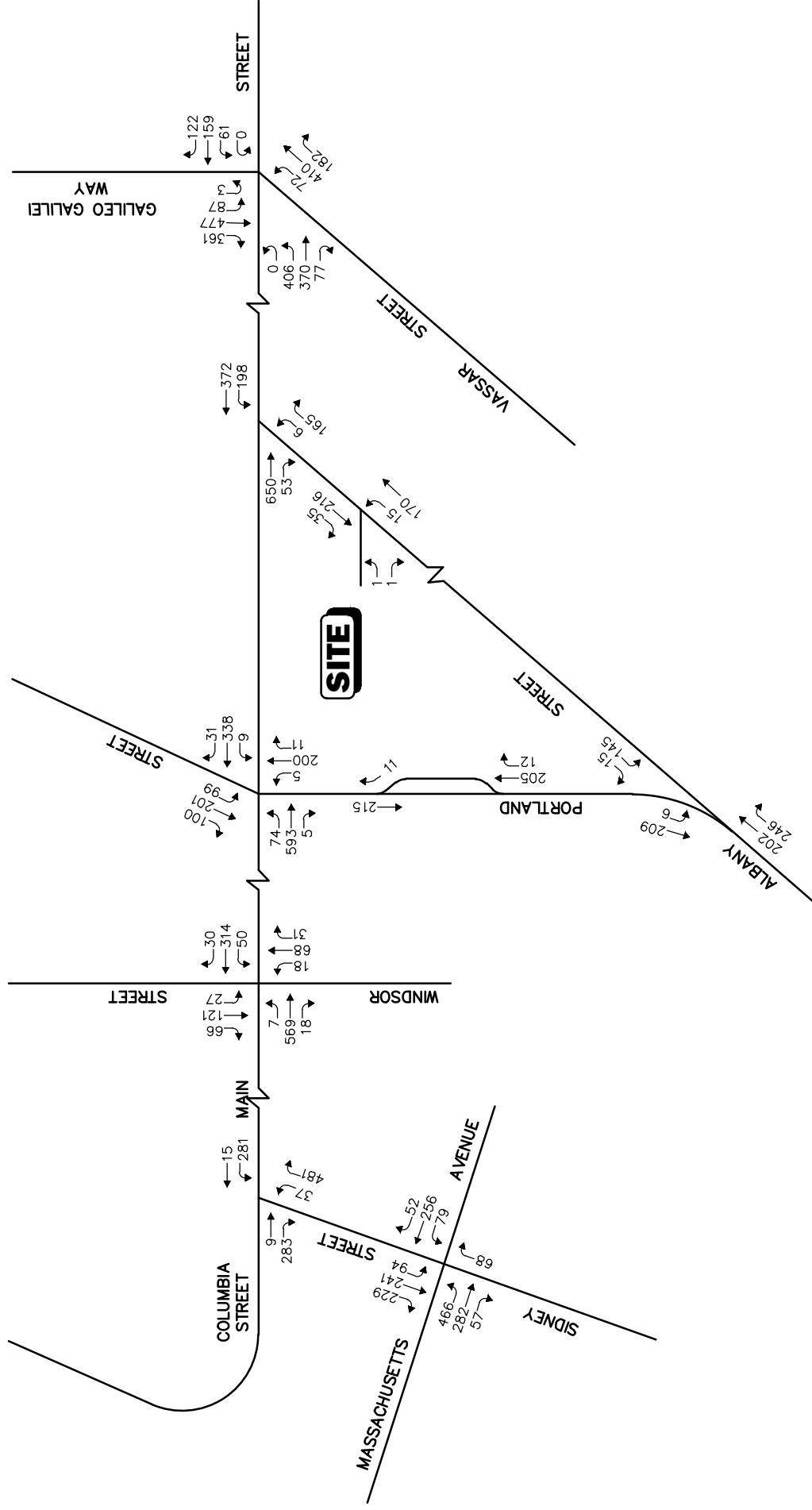
2020 Build  
Weekday Morning  
Peak Hour Pedestrian Volumes





Note: Imbalances exist due to numerous curb cuts and side streets that are not shown.  
Not To Scale

Figure 5.b.4

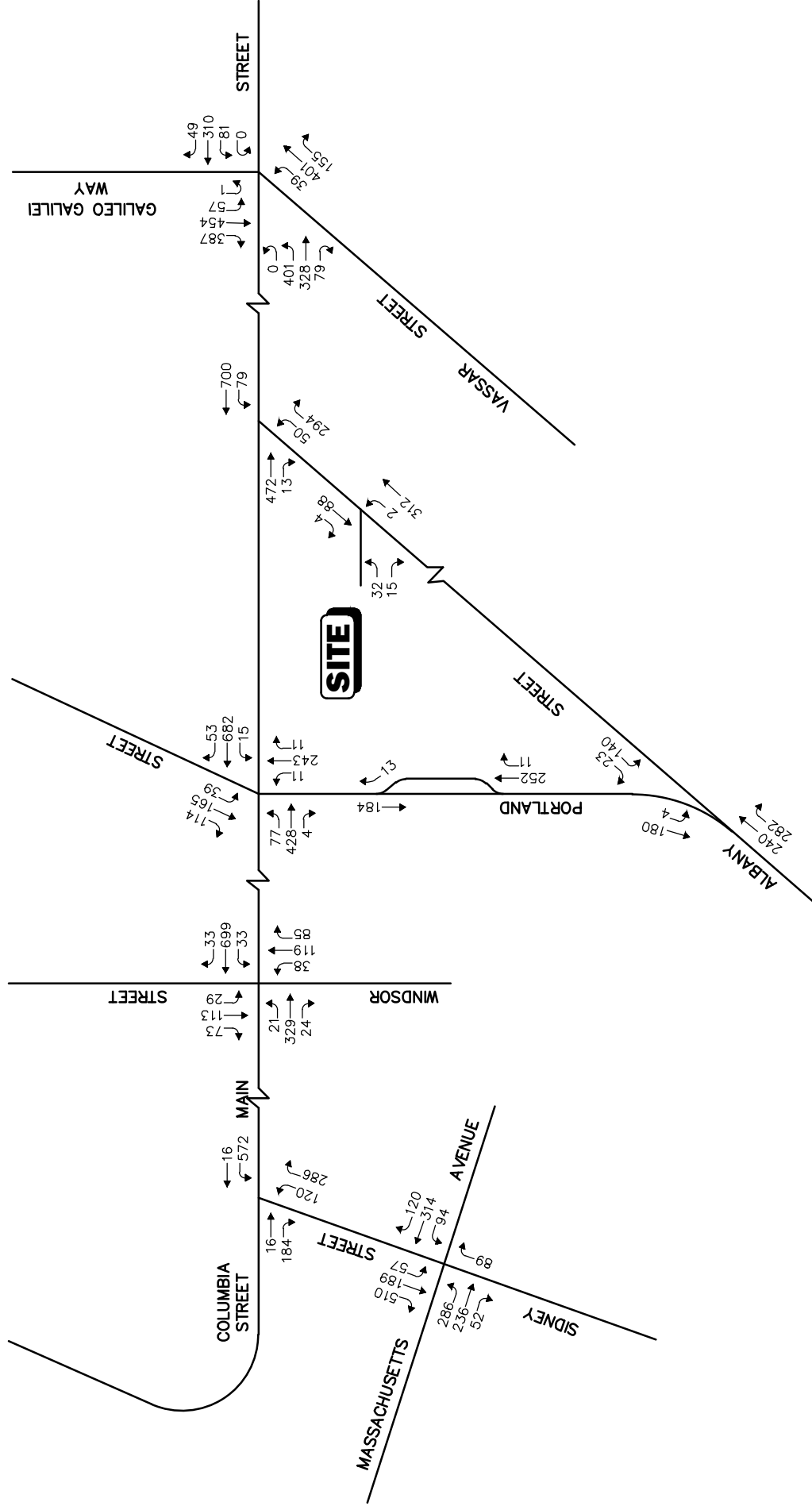


Note: Imbalances exist due to numerous curb cuts and side streets that are not shown.  
Not To Scale

Figure 5.d.1

2025 Future  
Weekday Morning  
Peak Hour Traffic Volumes





Note: Imbalances exist due to numerous curb cuts and side streets that are not shown.  
Not To Scale

Figure 5.d.2

2025 Future  
Weekday Evening  
Peak Hour Traffic Volumes



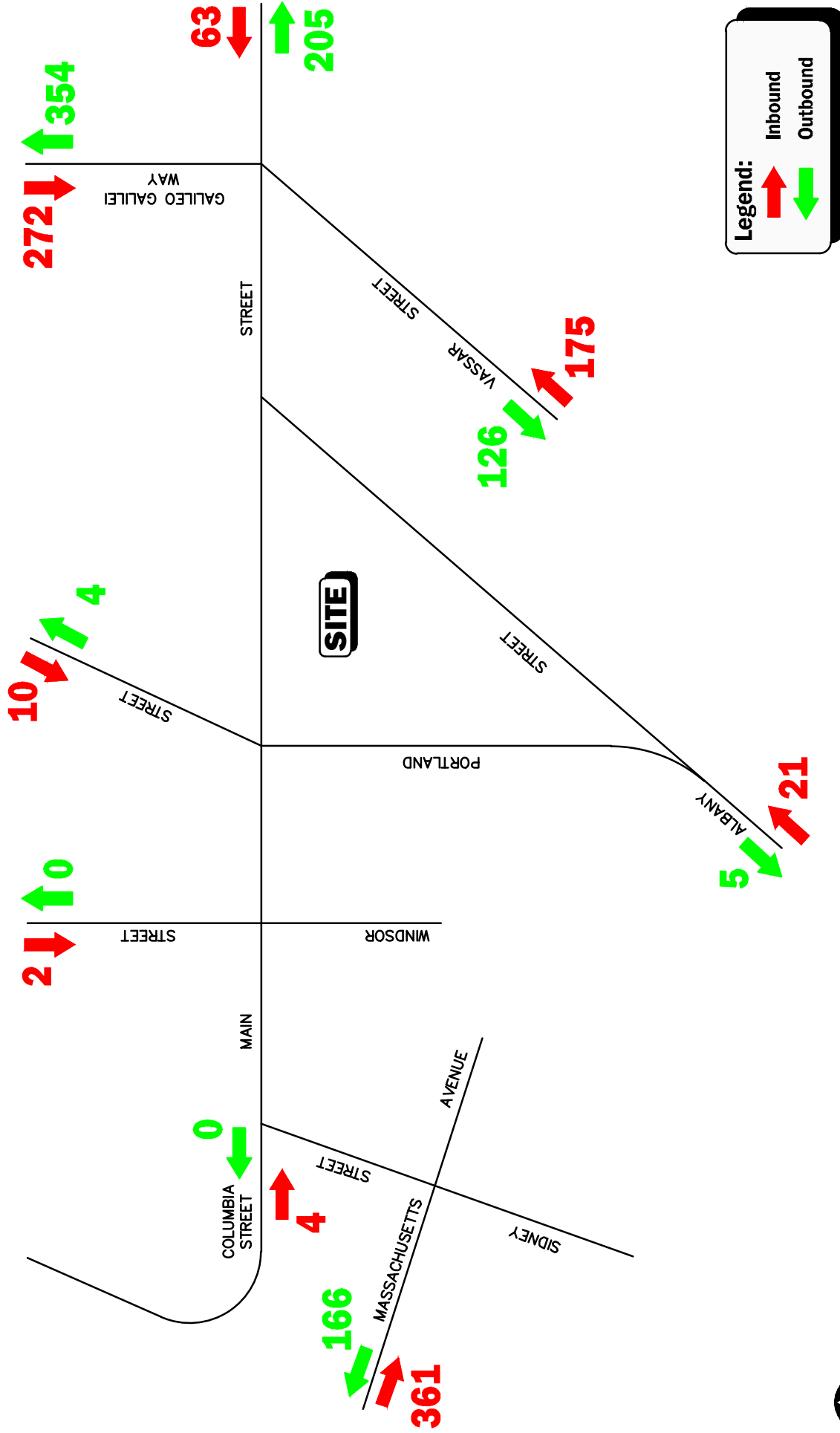


Figure 5.d.3

Cumulative Area  
 Development Impact  
 Weekday Morning  
 Peak Hour Traffic Volumes

Not To Scale

**VAI** Vanasse &  
 Associates inc

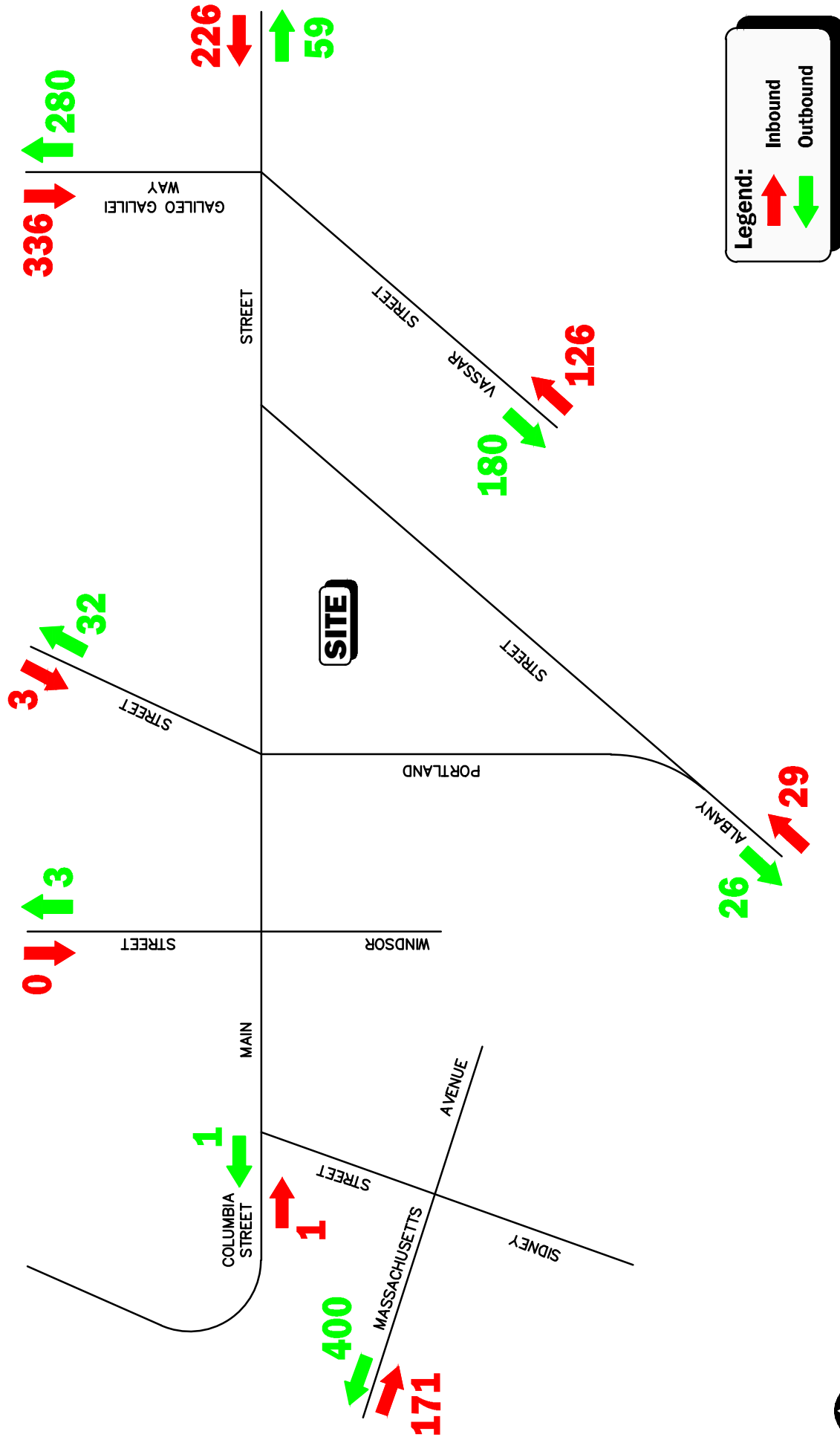


Figure 5.d.4

Cumulative Area  
 Development Impact  
 Weekday Evening  
 Peak Hour Traffic Volumes



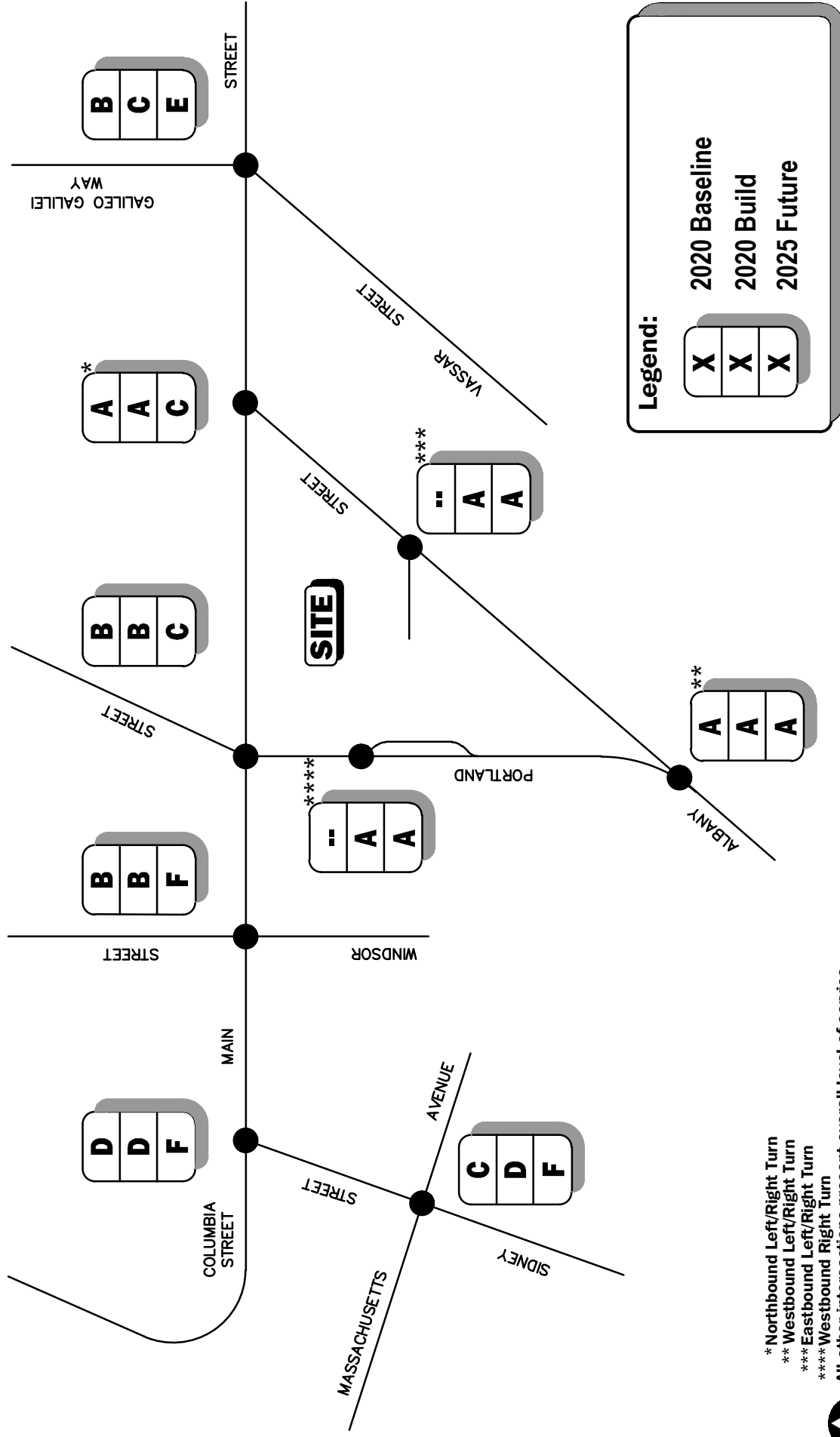


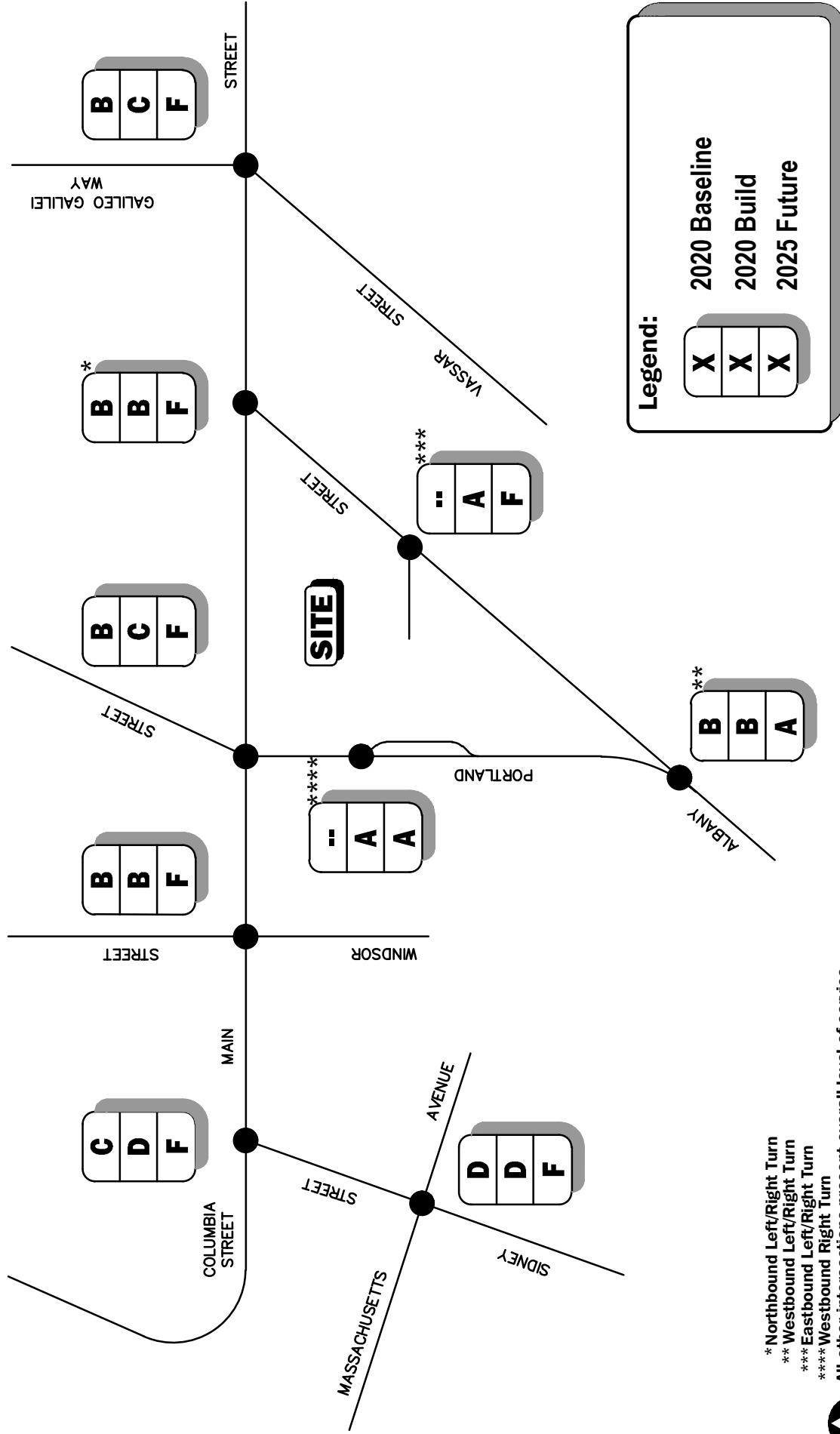
Figure 6.a.1

Vehicle Level of Service Map  
Weekday Morning Peak Hour

\* Northbound Left/Right Turn  
 \*\* Westbound Left/Right Turn  
 \*\*\* Eastbound Left/Right Turn  
 \*\*\*\* Westbound Right Turn  
 All other intersections present overall level of service.

Not To Scale





\* Northbound Left/Right Turn  
 \*\* Westbound Left/Right Turn  
 \*\*\* Eastbound Left/Right Turn  
 \*\*\*\* Westbound Right Turn

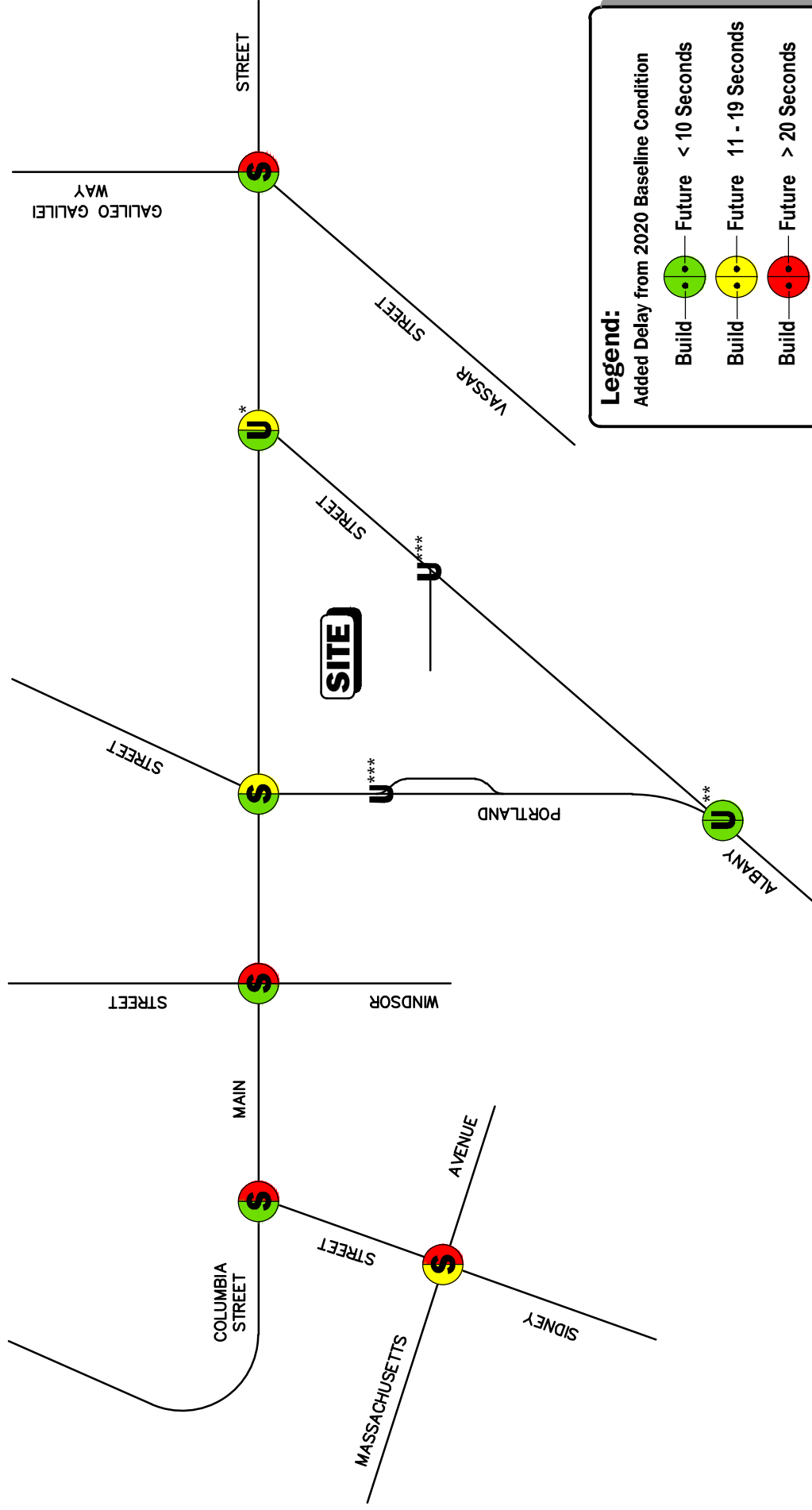
All other intersections present overall level of service.

Not To Scale

Figure 6.a.2

Vehicle Level of Service Map  
 Weekday Evening Peak Hour





**Legend:**  
 Added Delay from 2020 Baseline Condition

Build	Future < 10 Seconds
Build	Future 11 - 19 Seconds
Build	Future > 20 Seconds

**S** = Signalized    **U** = Signalized

\* Northbound Left/Right Turn  
 \*\* Westbound Left/Right Turn  
 \*\*\* Intersection does not exist under 2020 Baseline conditions.  
 All other intersections present overall level of service.

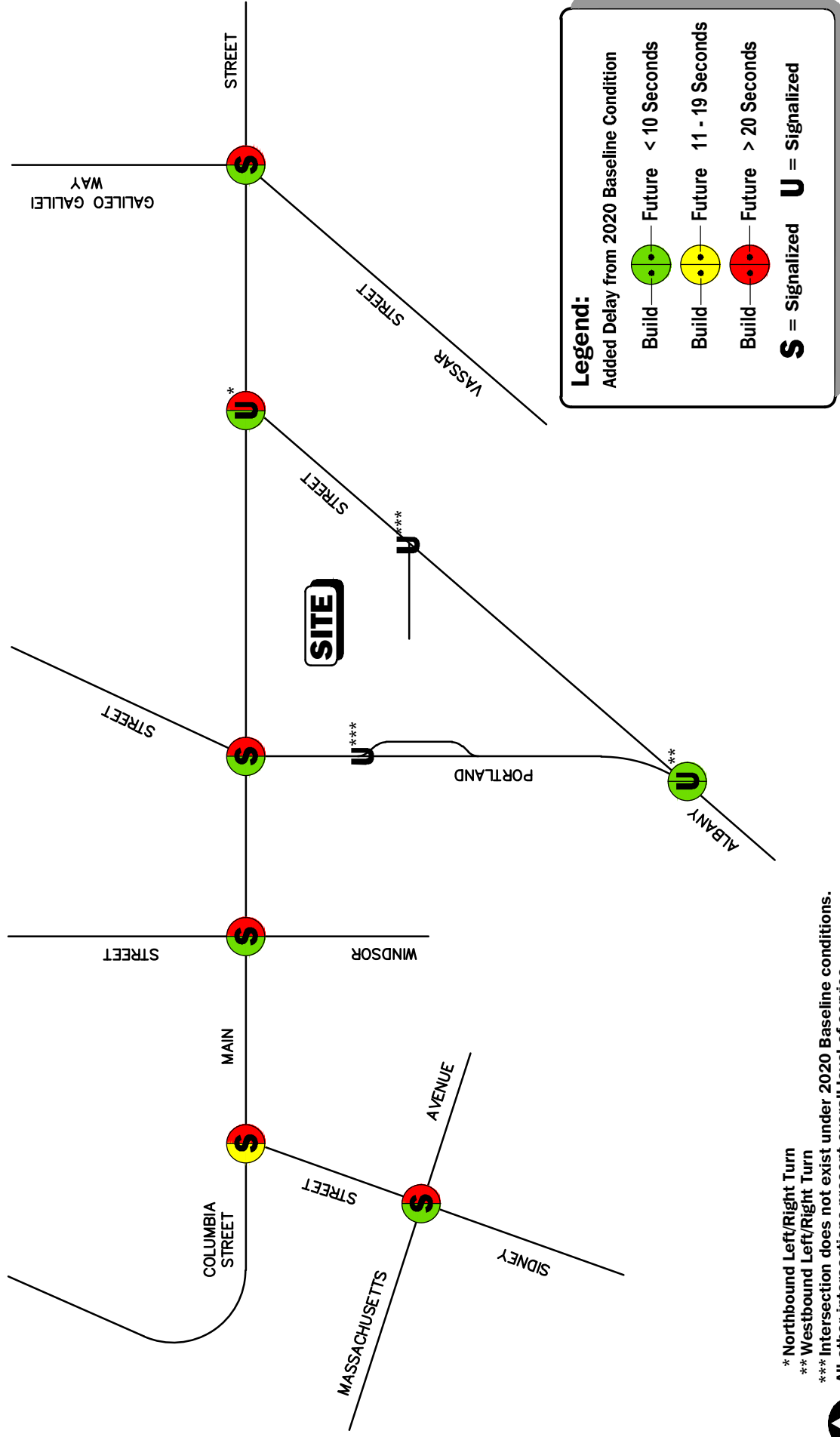
Not To Scale

Figure 6.a.3



Vehicle Delay Change Map  
 Weekday Morning Peak Hour





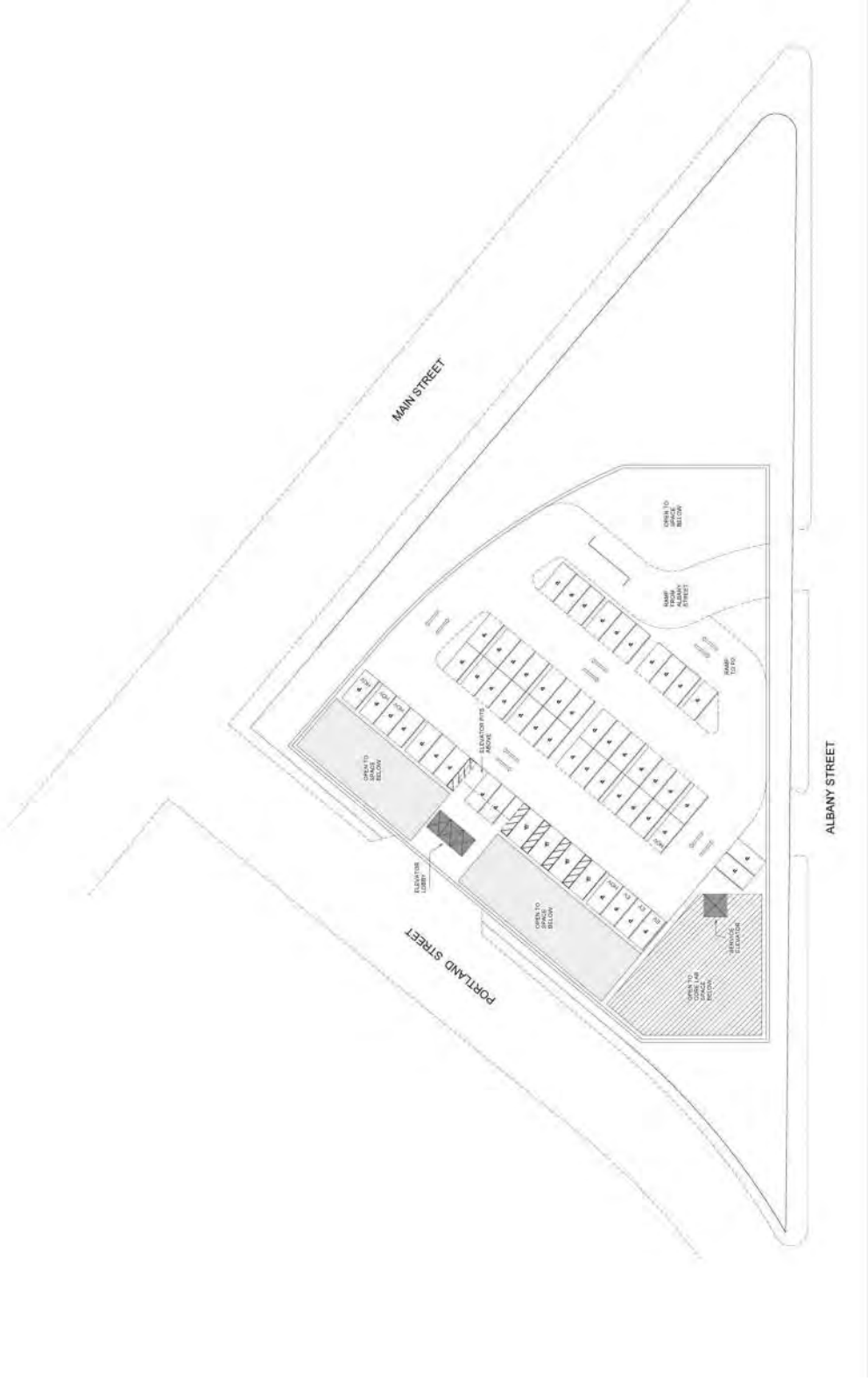
\* Northbound Left/Right Turn  
 \*\* Westbound Left/Right Turn  
 \*\*\* Intersection does not exist under 2020 Baseline conditions.  
 All other intersections present overall level of service.

Not To Scale

Figure 6.a.4

Vehicle Delay Change Map  
 Weekday Evening Peak Hour





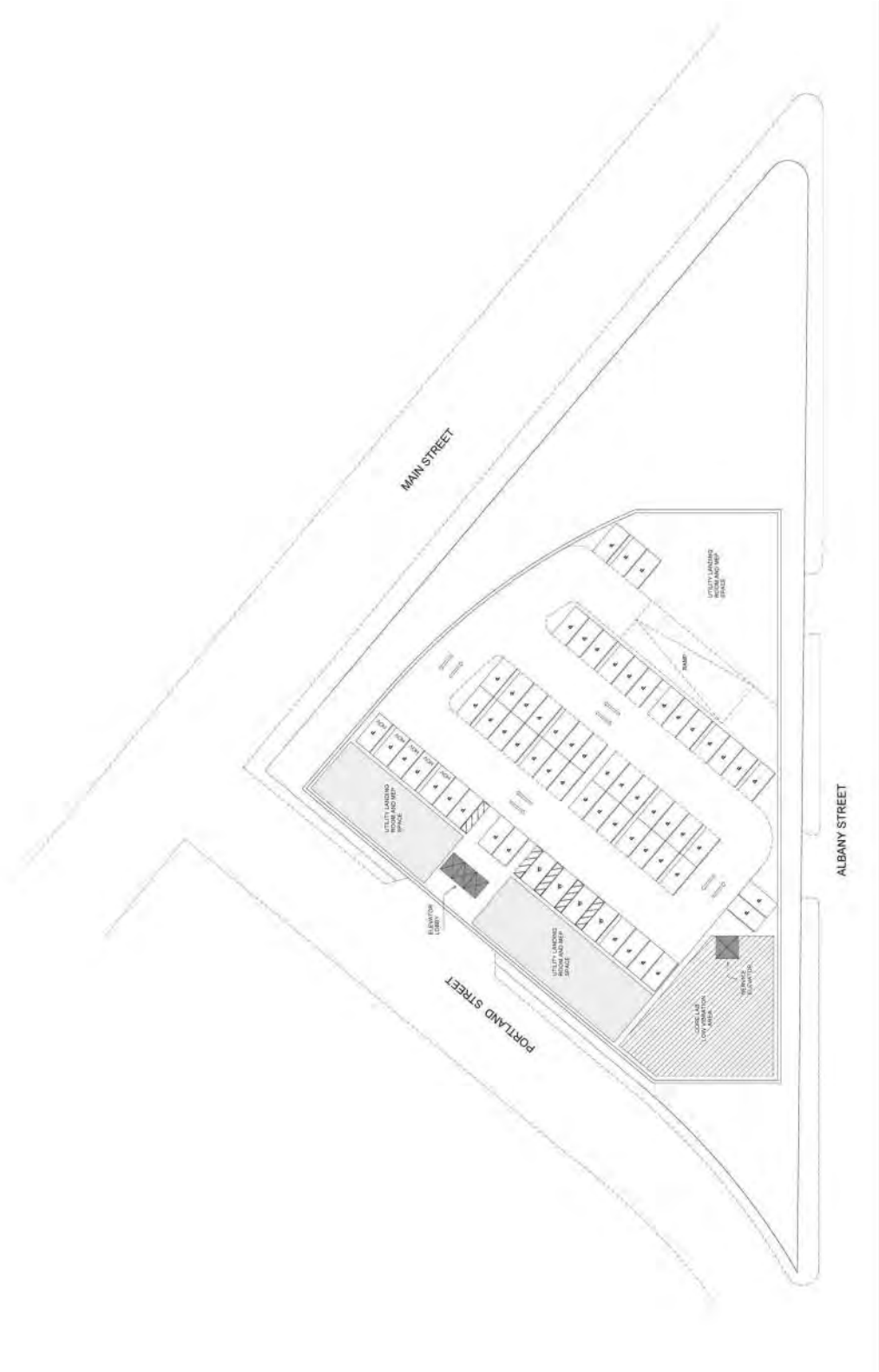
Source: Payette.

0 40 80 Scale in Feet

**VA** Vanasse & Associates inc

Figure 9.d.1

**Parking garage Level 1  
Floor Plan**



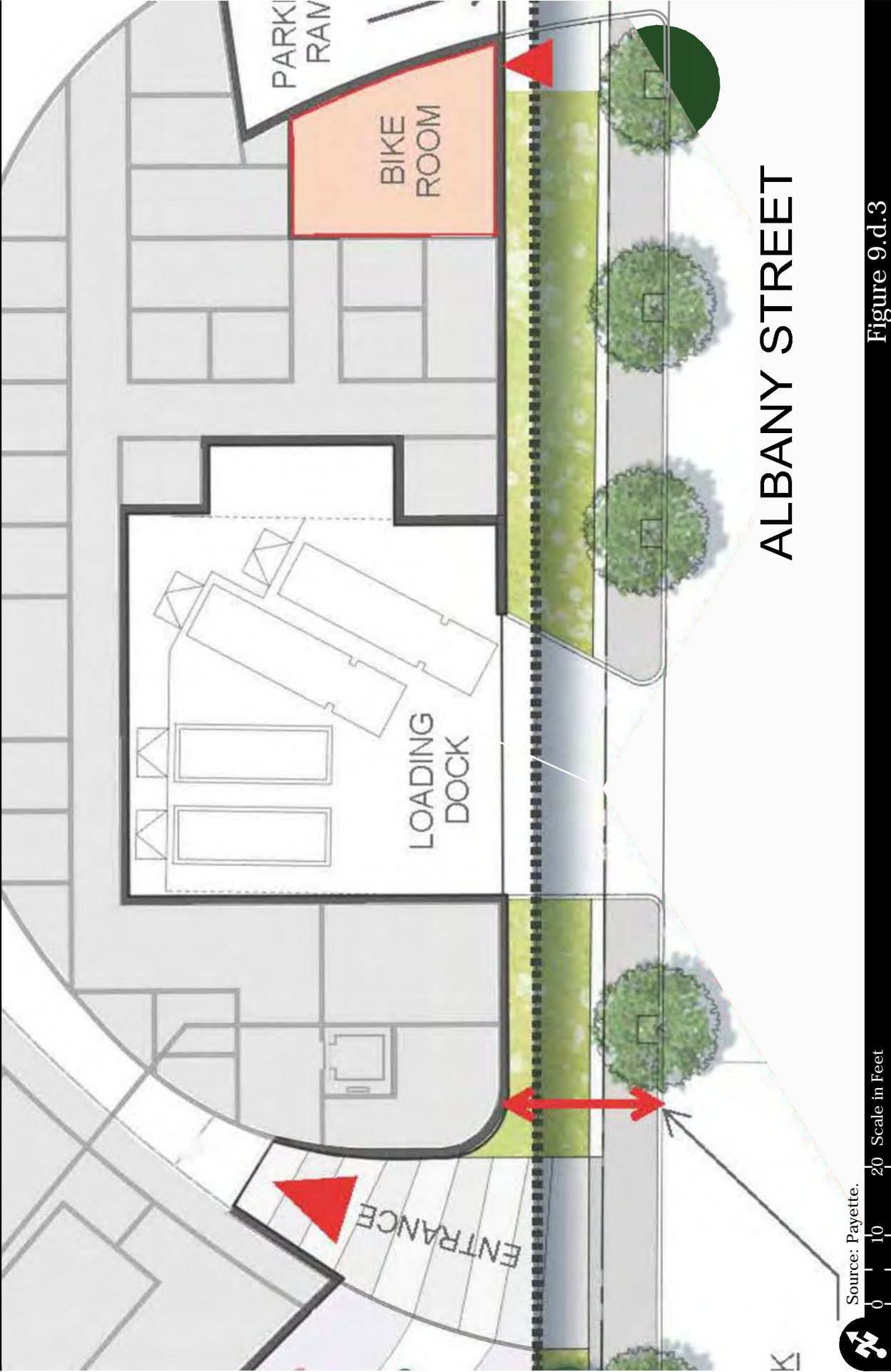
Source: Payette.

0 40 80 Scale in Feet

**VA** Vanasse & Associates inc

Figure 9.d.2

**Parking garage Level 2  
Floor Plan**



# ALBANY STREET

Source: Payette.

Scale in Feet

Figure 9.d.3



Service Entrance and Loading Dock



Source: Payette.

0 40 80 Scale in Feet



Figure 9.d.4

Parking Garage Sight Lines for Pedestrians



Source: Payette.

0 40 80 Scale in Feet

Figure 9.d.5



Loading Dock Sight Lines for Pedestrians

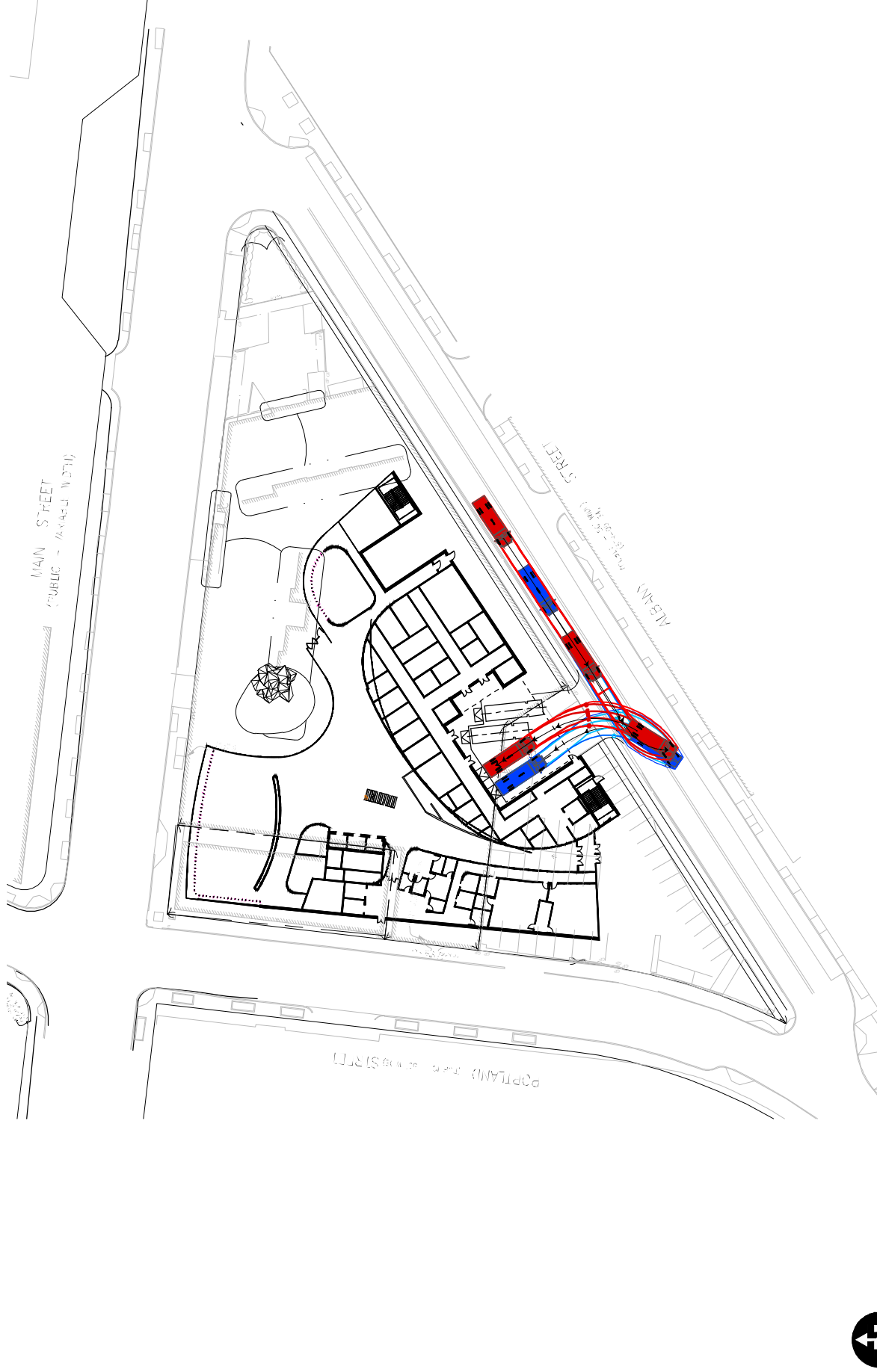


Figure 9.e.1

Autoturn Diagram  
WB-30 Entering Loading Dock  
From North Bay 1 & 2



**V**anasse &  
Associates inc

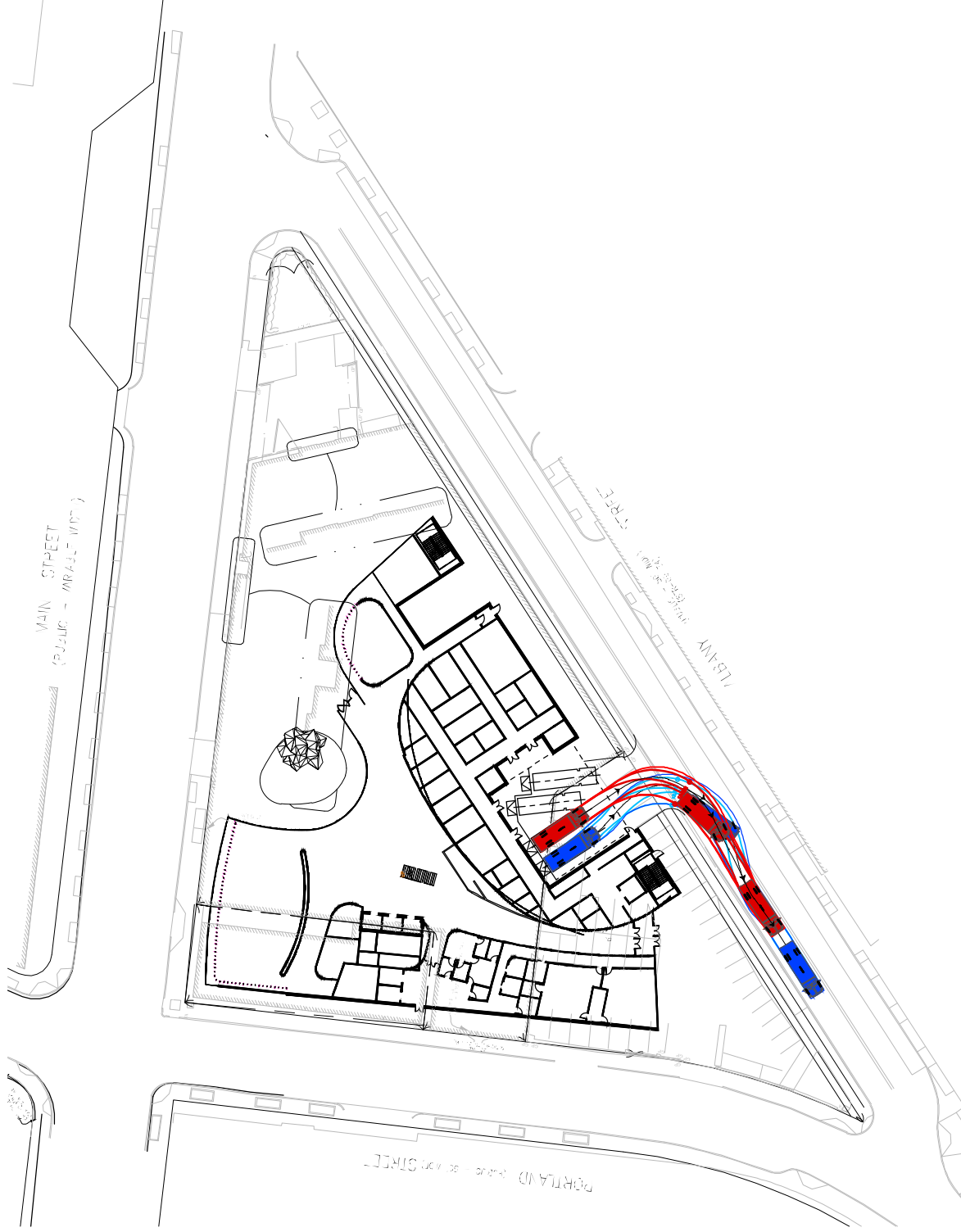


Figure 9.e.2

Autoturn Diagram  
WB-30 Exiting Loading Dock  
To South Bay 1 & 2

0 40 80 Scale in Feet





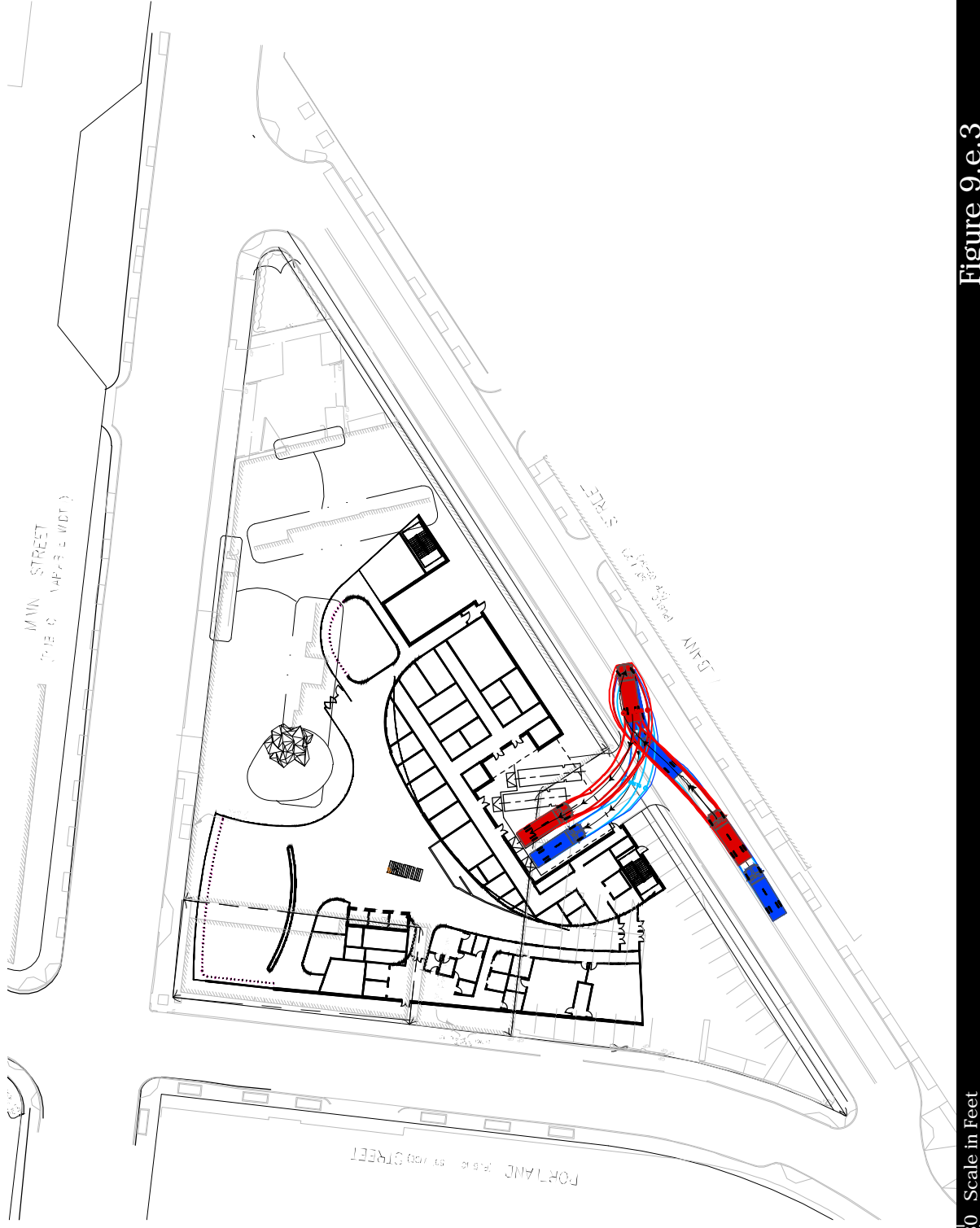
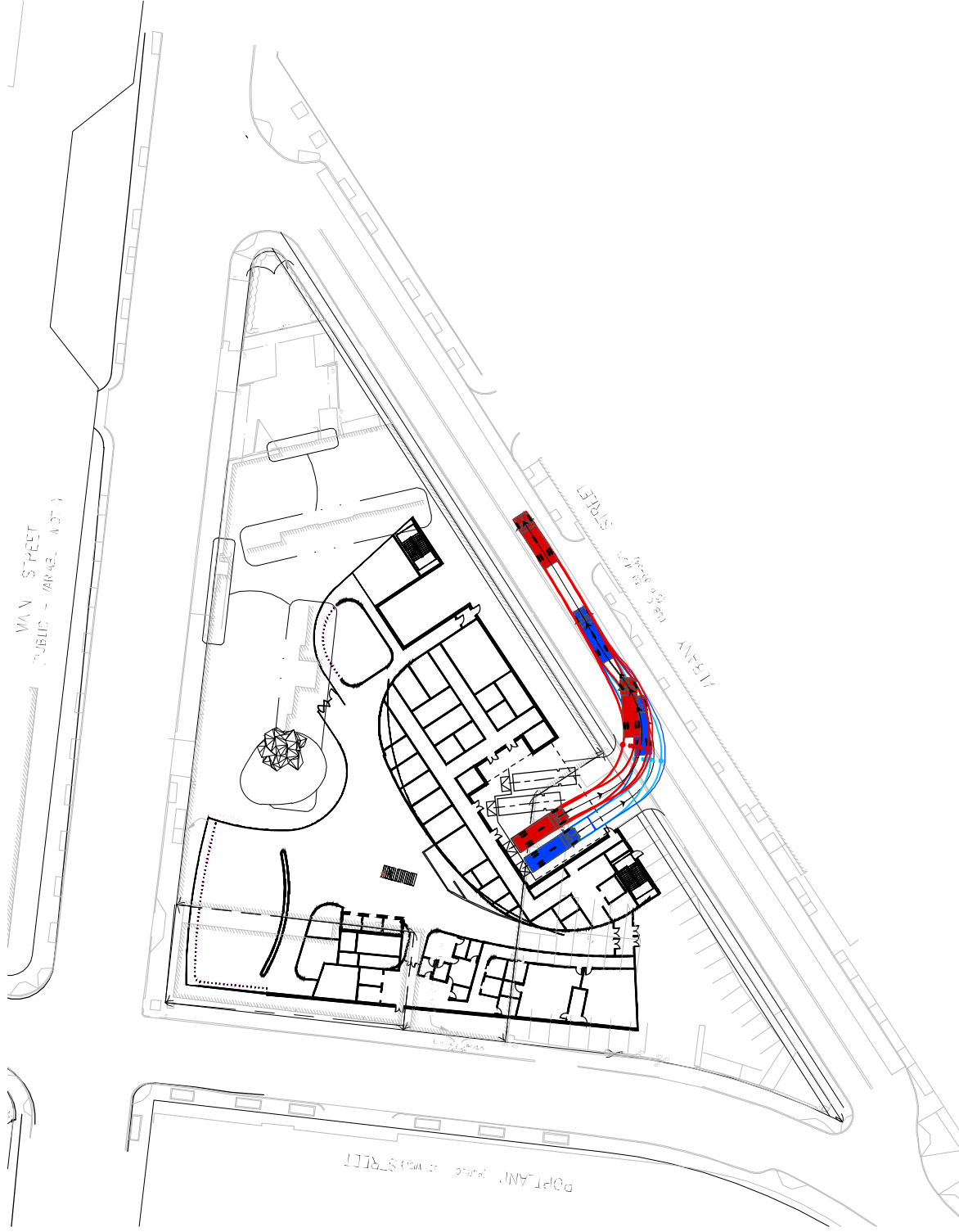


Figure 9.e.3

Autoturn Diagram  
WB-30 Entering Loading Dock  
From South Bay 1 & 2



0 40 80 Scale in Feet

Figure 9.e.4

Autoturn Diagram  
WB-30 Exiting Loading Dock  
To North Bay 1 & 2

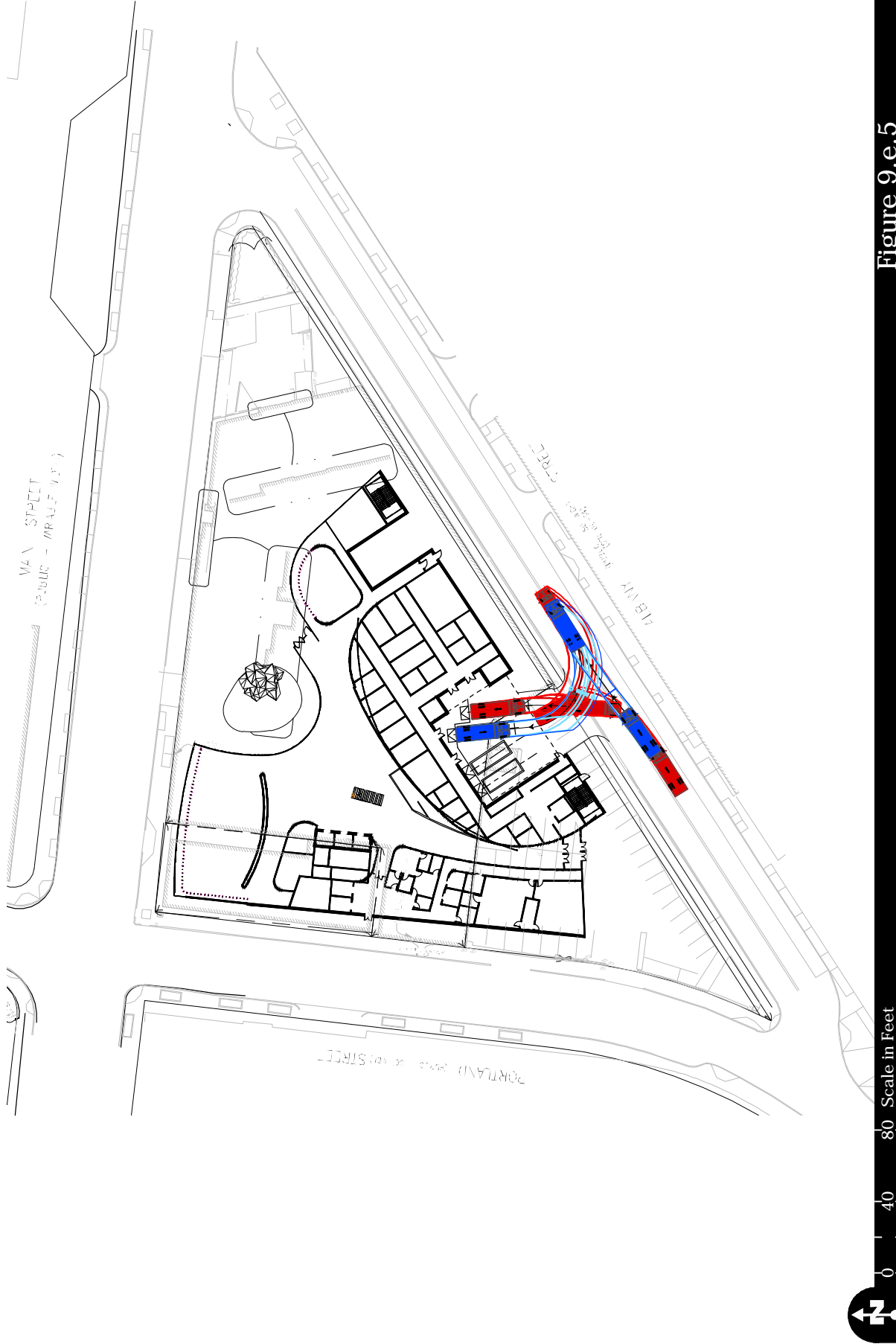


Figure 9.e.5

Autoturn Diagram  
WB-30 Entering Loading Dock  
From South Bay 3 & 4

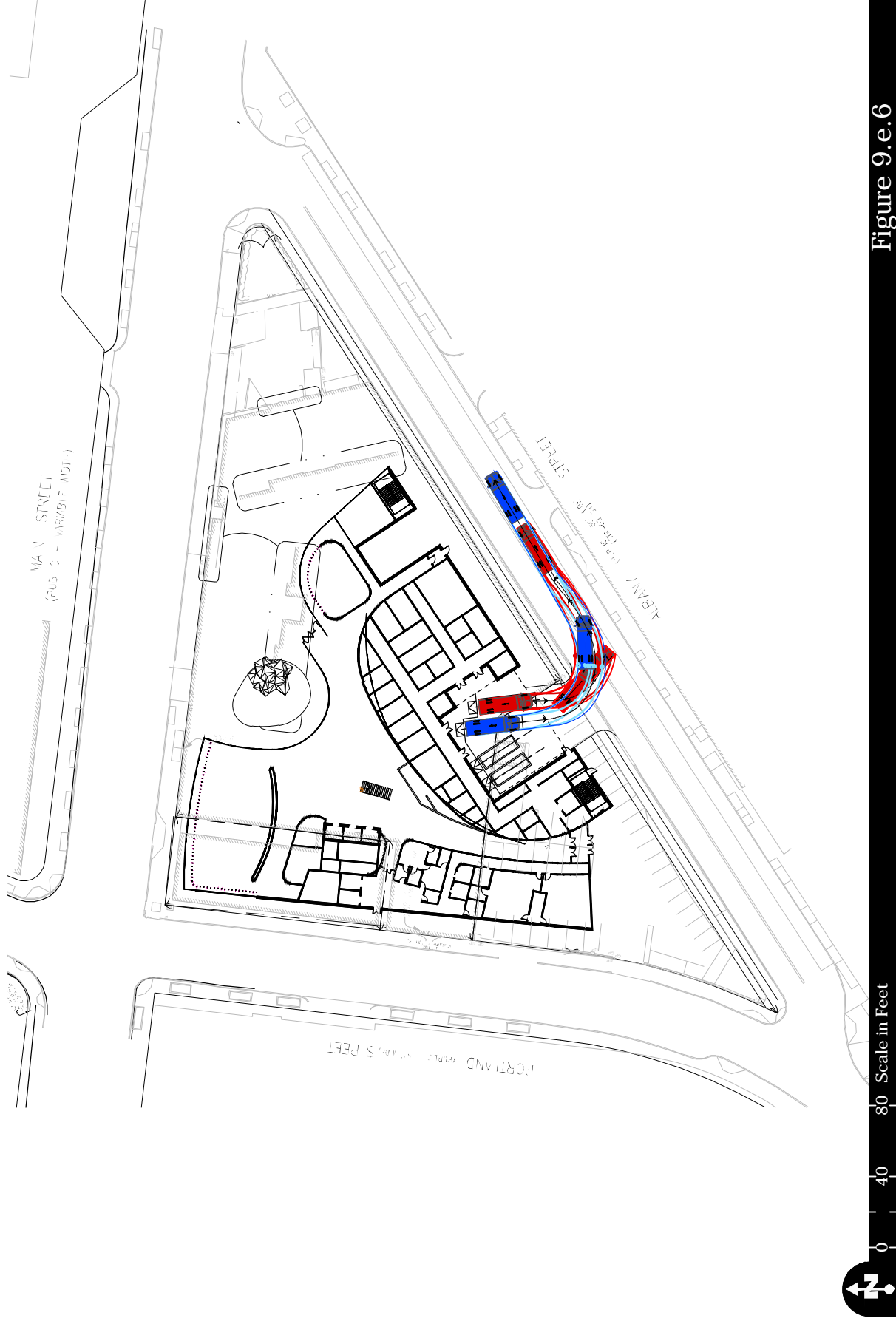


Figure 9.e.6

Autoturn Diagram  
WB-30 Exiting Loading Dock  
To North Bay 3 & 4



Figure 9.e.7

Autoturn Diagram  
WB-40 Entering Loading Dock  
From North Bay 3 & 4

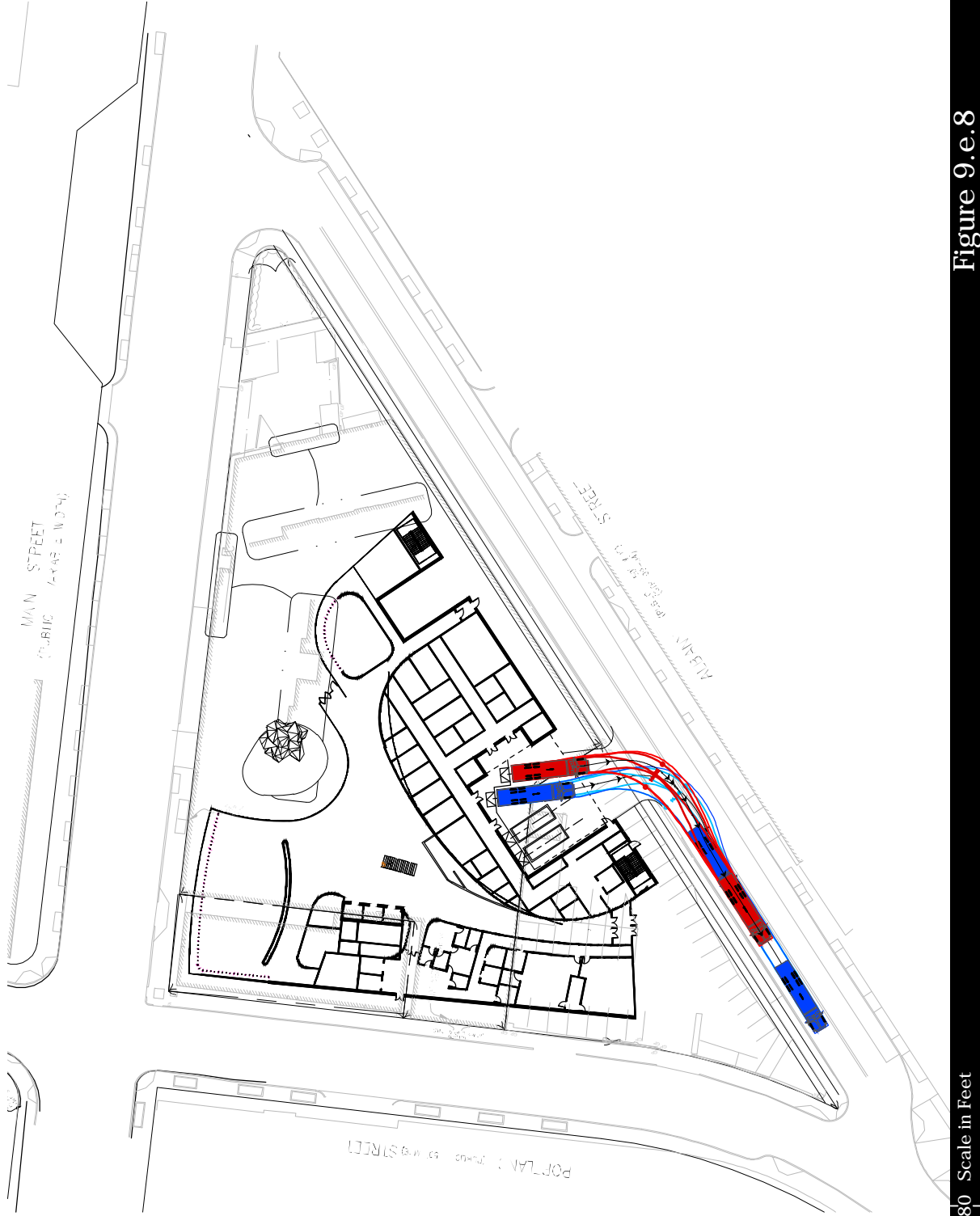


Figure 9.e.8

Autoturn Diagram  
WB-40 Exiting Loading Dock  
To South Bay 3 & 4

0 40 80 Scale in Feet

**VAI** Vanasse & Associates inc

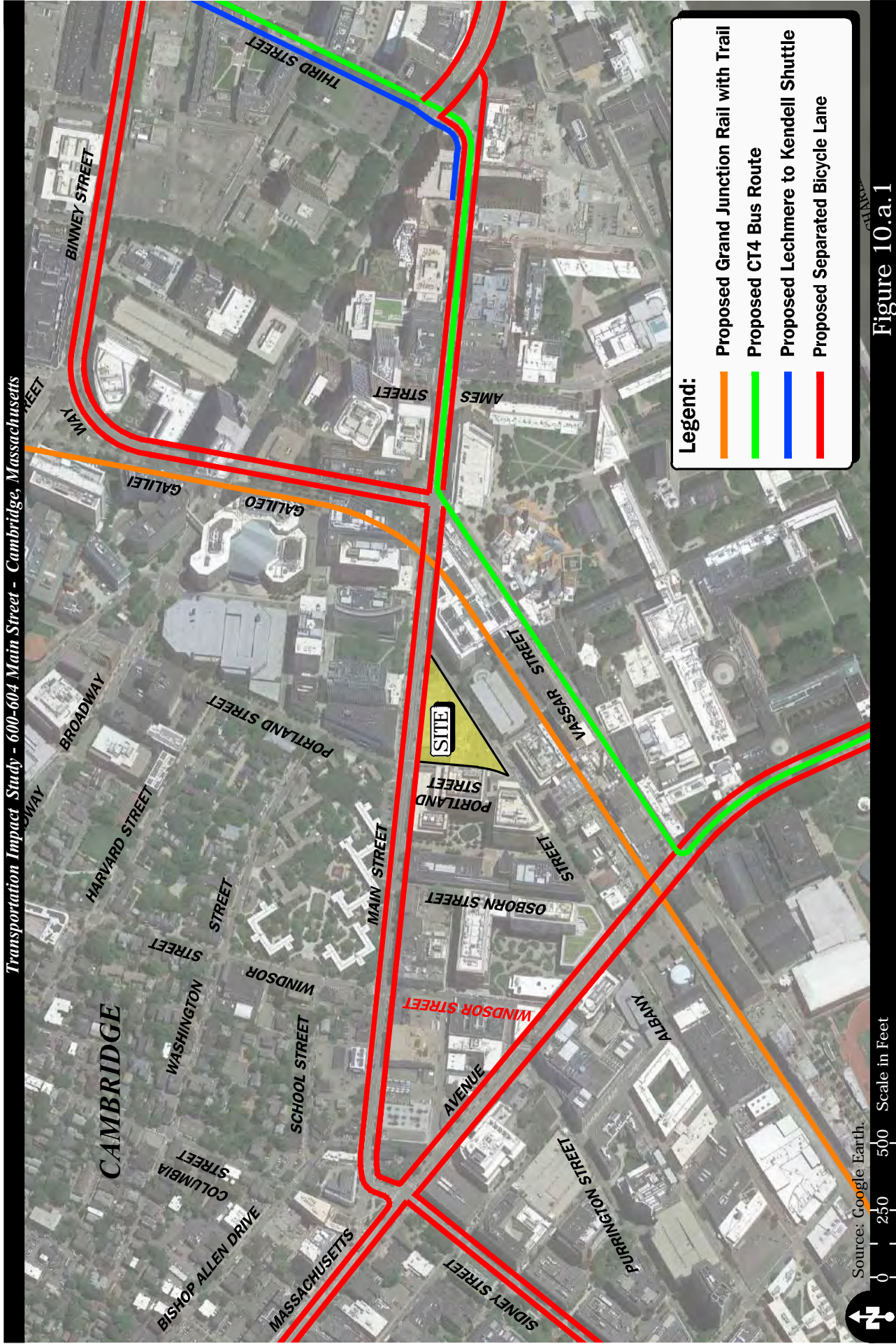


Figure 10.a.1

Future Transit / Pedestrian / Bicycle Facilities



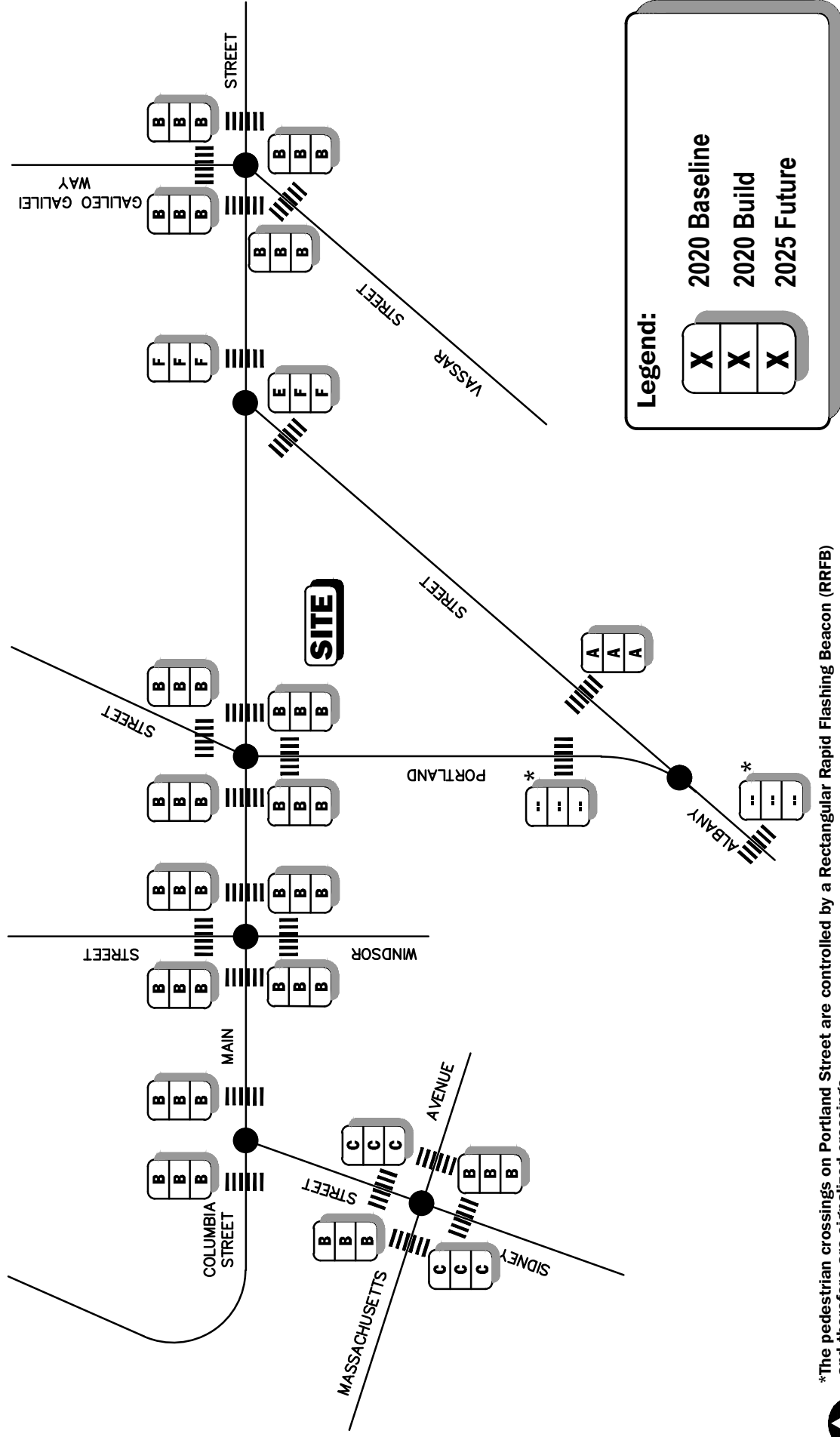
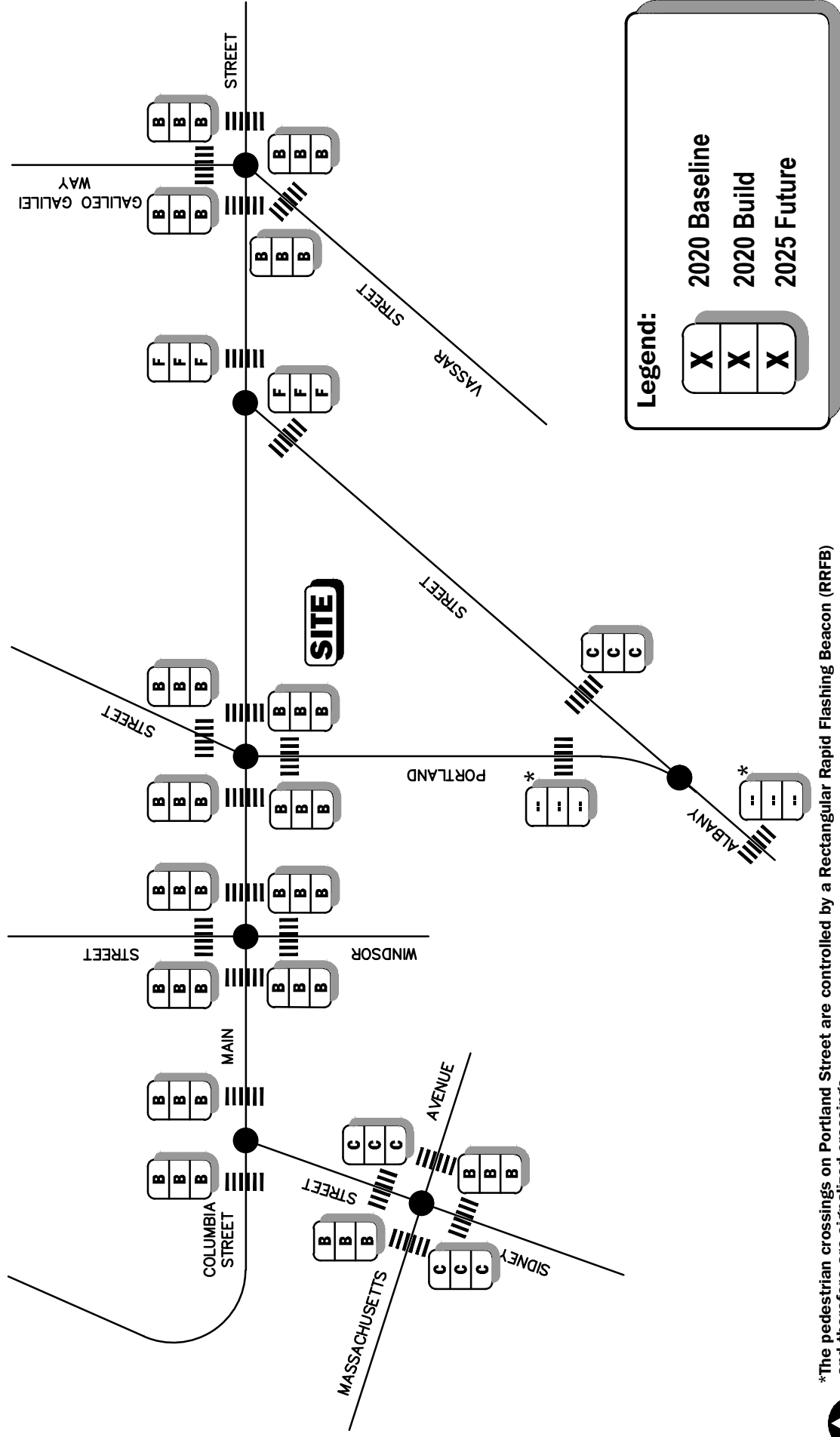


Figure 11.a.1

Pedestrian Level of Service Map  
Weekday Morning Peak Hour





\*The pedestrian crossings on Portland Street are controlled by a Rectangular Rapid Flashing Beacon (RRFB) and therefore are signalized crossings.

Not To Scale

Figure 11.a.2

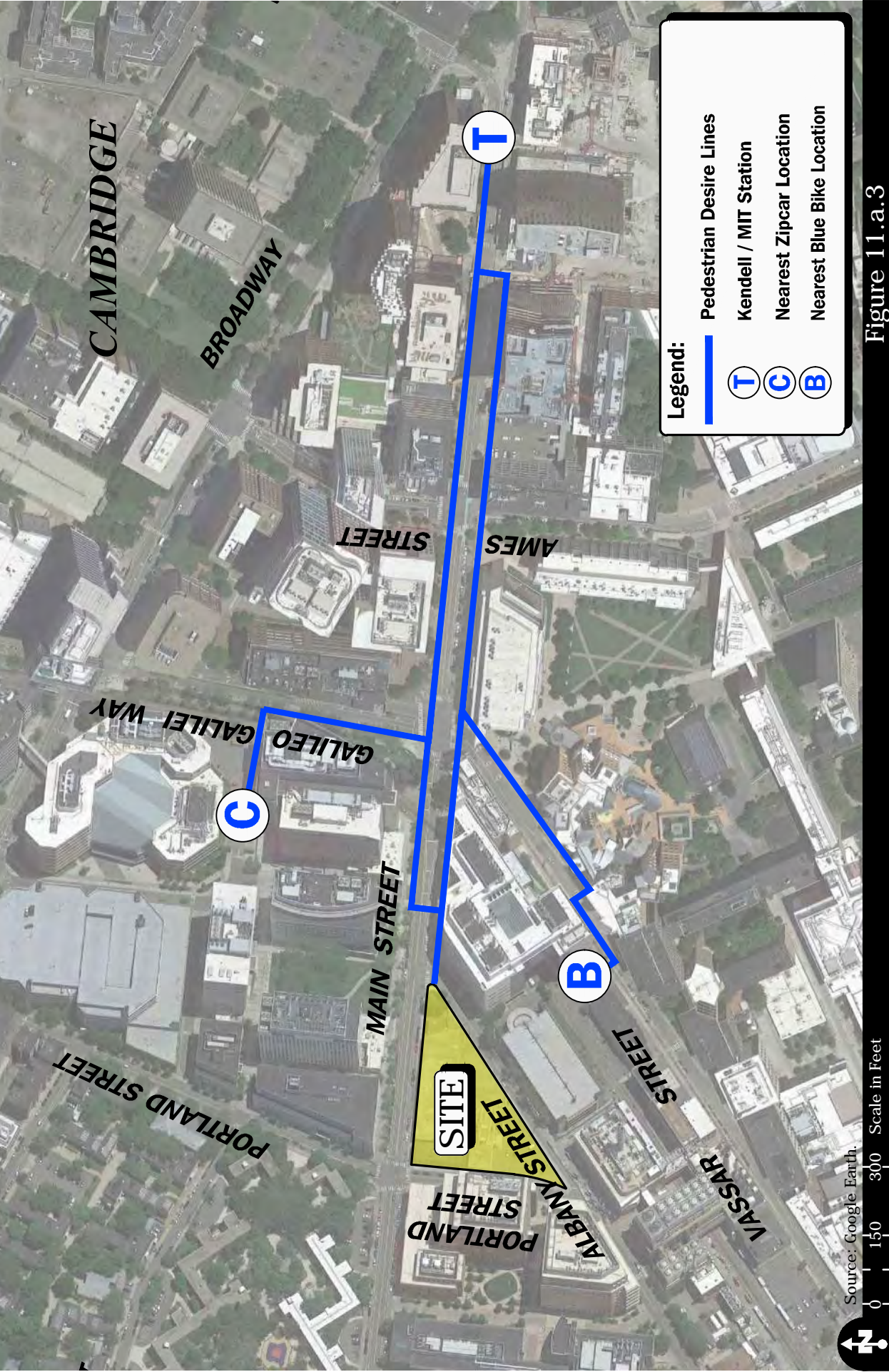
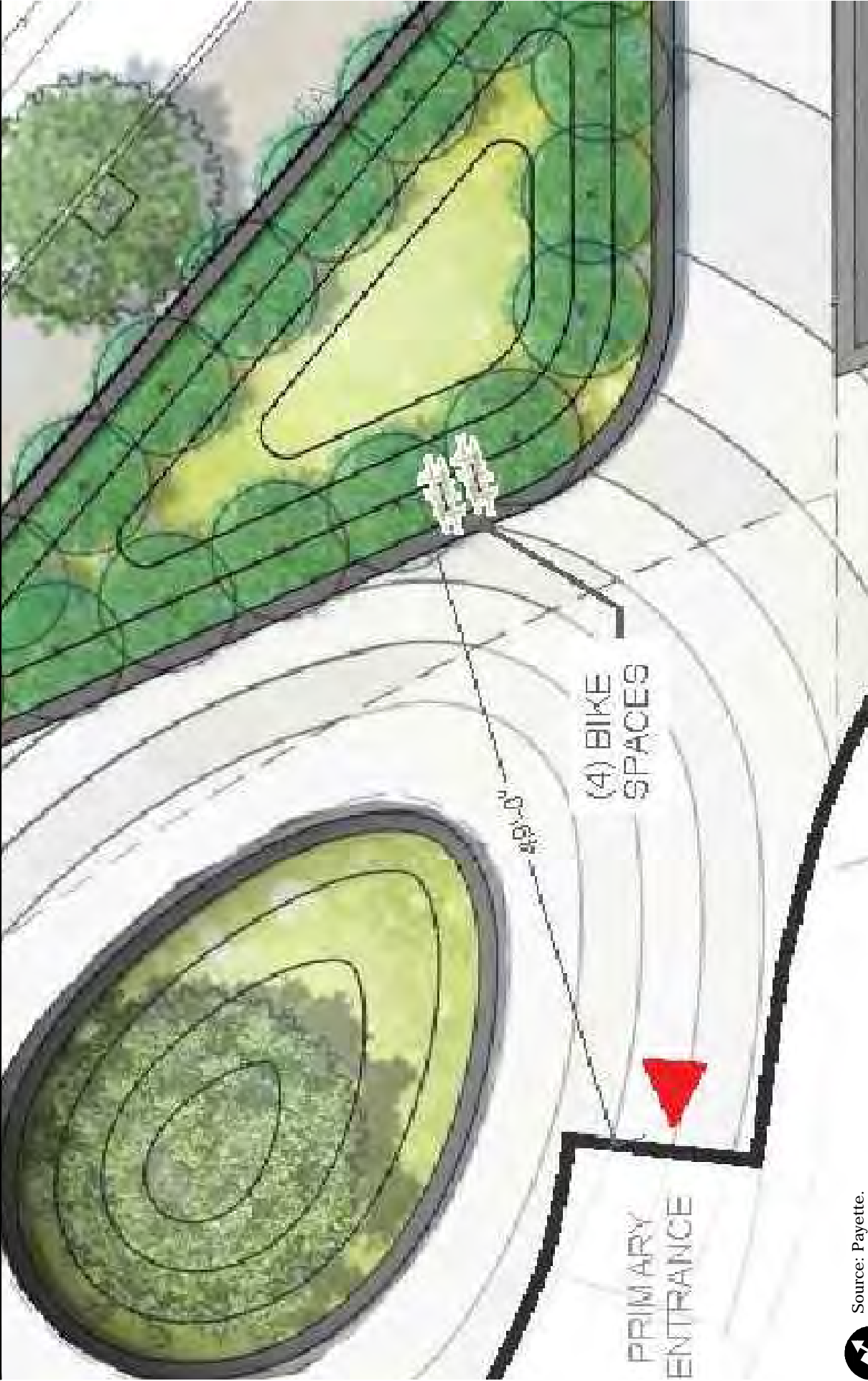


Figure 11.a.3

Pedestrian Desire Lines to Key Transit Facilities



Source: Payette.

0 5 10 Scale in Feet



Figure 12.b.1

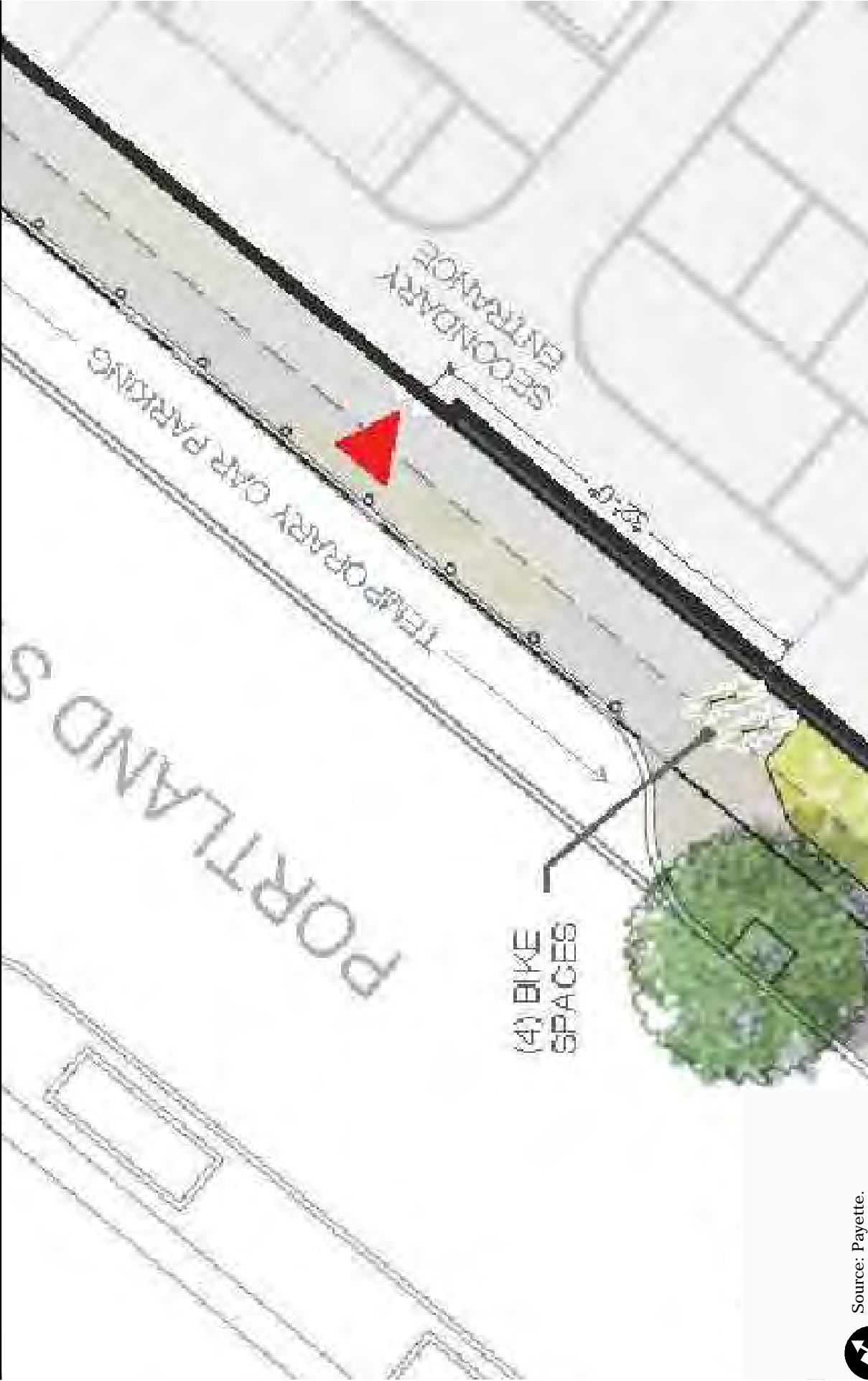
Short term Bicycle Parking:  
Main Street



Figure 12.b.2

Short term Bicycle Parking:  
Albany Street





Source: Payette.

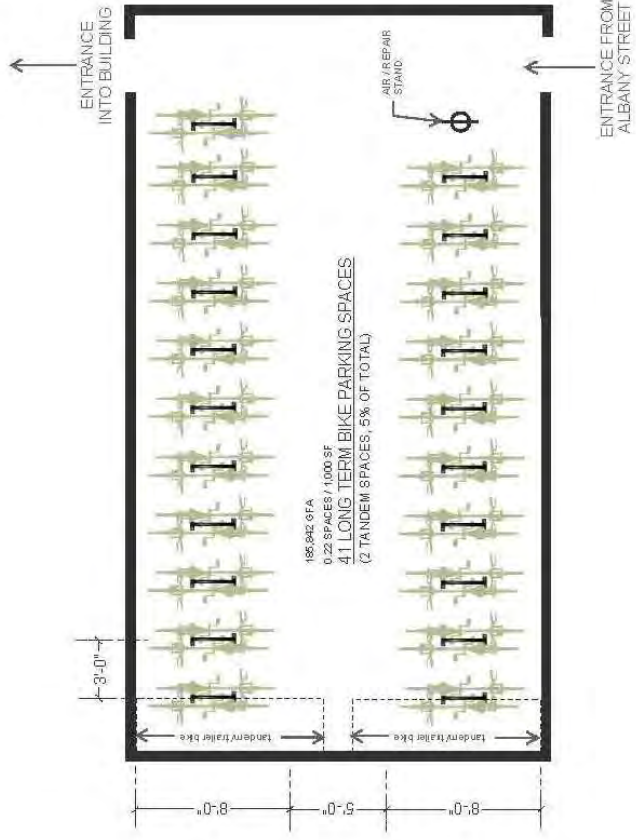


0 5 10 Scale in Feet



Figure 12.b.3

Short term Bicycle Parking:  
Portland Street



Source: Payette.

0 5 10 Scale in Feet



Figure 12.b.4

Long-Term Bicycle Parking

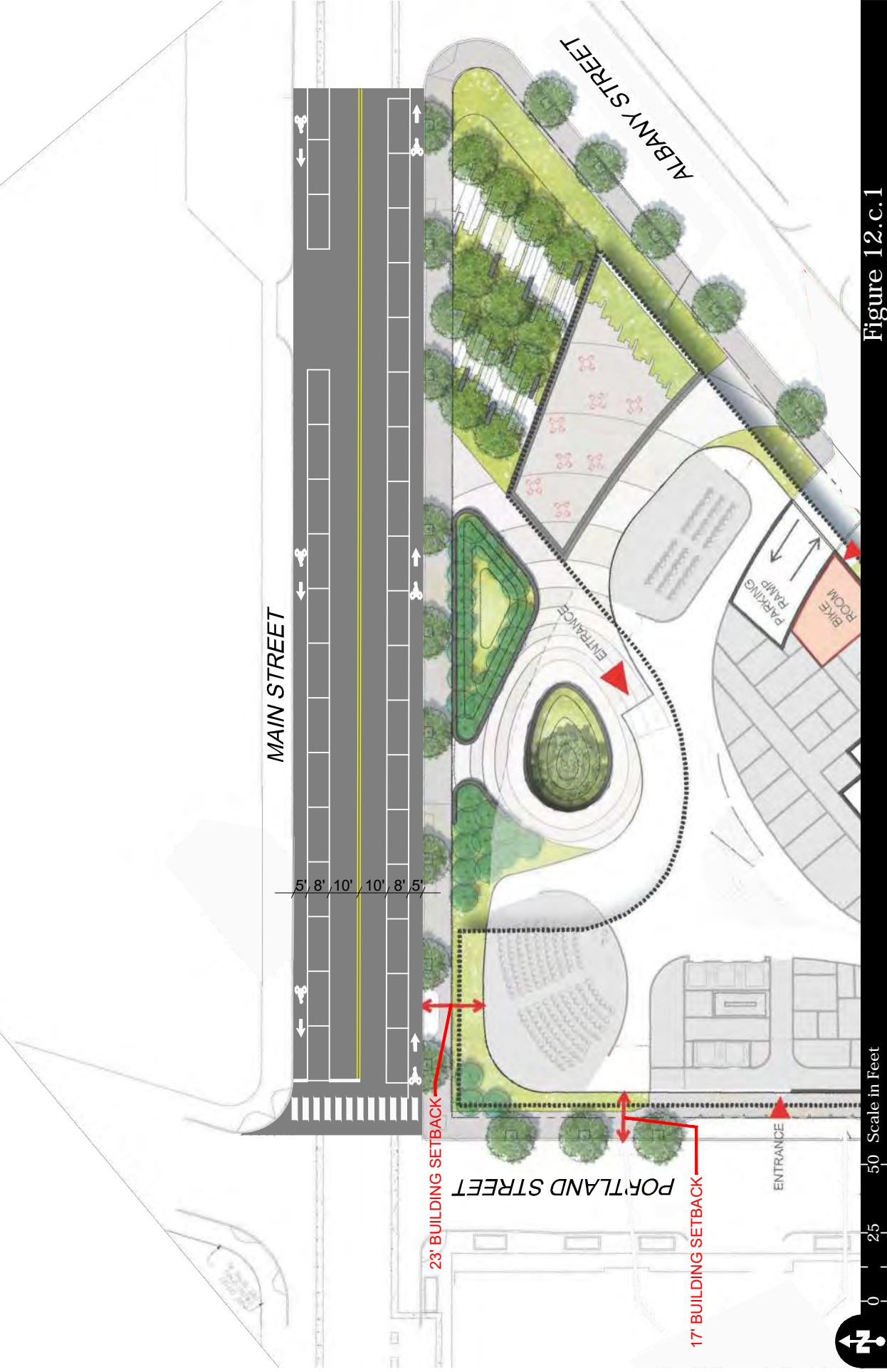


Figure 12.c.1

Protected Bicycle Lanes on Main Street





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# Transportation Impact Study

## Appendix

600-604 Main Street  
Cambridge, Massachusetts

*Prepared for:*

Massachusetts General Hospital  
Real Estate

Cambridge, Massachusetts

October 2020

*Prepared by:*

 **Vanasse &  
Associates inc**  
Transportation Engineers & Planners

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

## APPENDIX

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CITY OF CAMBRIDGE SCOPING DETERMINATION

TRAFFIC COUNT DATA

PUBLIC AND PRIVATE TRANSIT DATA

TRIP GENERATION DATA

CAPACITY ANALYSIS METHODOLOGY

SIMTRAFFIC ANALYSIS

BICYCLE PARKING DEMAND CALCULATIONS

PEDESTRIAN ANALYSIS

**CITY OF CAMBRIDGE SCOPING DETERMINATION**

---



# CITY OF CAMBRIDGE

# TRAFFIC, PARKING, + TRANSPORTATION

Joseph E. Barr, Director  
344 Broadway, Suite 102  
Cambridge, MA 02139

September 30, 2020

Scott Thornton, P. E.  
Vanasse & Associates, Inc.  
35 New England Development Center Drive, Suite 140  
Andover, MA 0810-1066

Ms. Corrie Martin  
Chief Operating Officer  
Ragon Institute of MGH, MIT and Harvard  
400 Tech Square,  
Cambridge MA 02139

Mr. Ahin Handa  
Massachusetts General Hospital  
Real Estate  
100 Cambridge Street  
Boston, MA 02110

RE: 600-604 Main Street Transportation Impact Study (TIS) Scope

Dear Scott, Corrie, and Ahin:

The Cambridge Traffic, Parking, and Transportation Department (TP+T) received your June 26, 2020 request for a Transportation Impact Study (TIS) scope, updated scope request on August 19, 2020, and your further changes to the Project size on September 17, 2020 for a proposed development project at 600-604 Main Street (the "Project").

## Project Overview

The Project includes a 186,000 square feet (sf) Research and Development (R&D) facility with a below-grade 120-space parking garage, 41 long-term bicycle parking spaces and 12 short-term bicycle parking spaces. The Project also includes a daycare facility on-site that can accommodate up to approximately 40 students.

The site was previously used for manufacturing/light industry use (approximately 54,000 sf) but has been vacant for several years. Based on TP+T staff review, the TIS scope is approved as follows:

## TIS Guidelines

- Notwithstanding this TIS scope, the TIS shall comply with the Cambridge TIS Guidelines and the attached Supplemental/Updated TIS Guidelines.
- Due to the COVID-19 pandemic, new traffic counts and queue observations may not accurately reflect typical conditions. Therefore, in coordination with TP+T, VAI may use previously collected traffic counts (i.e., prior to the COVID-19 outbreak) and make reasonable adjustments to establish a 2020 baseline traffic network. Any adjustments or assumptions to establish the baseline 2020 traffic network must be approved by TP+T and should be clearly documented in the TIS, including labeled on the 2020 Traffic Network Figures.
- The TIS may be provided electronically to TP+T, unless hard copies are requested.

## Existing and Proposed Conditions

- The TIS should document the Project's existing site transportation conditions (i.e., driveways/curb cut locations and widths, curb regulations, etc.). A site plan should show the property lines and label street and sidewalk widths (including showing sidewalks on both sides of the street).
- The TIS should document the existing conditions at the Ragon Institute currently located at Technology Square, including, the amount of space leased (sf), the number of full-time and part-time employees, the peak number of employees at the site on a typical day, number of parking spaces leased, average and peak parking utilization, monthly employee parking space fees, and employee mode shares.
- The TIS should describe the expected future number of Ragon Institute employees at the proposed Project and describe any other employees expected to be working at the proposed Project site including number of staff and students at the daycare facility.

## Site Plan, Driveways and Loading and Service Deliveries Analysis

- The TIS should describe in detail the rationale for the locations of the site's pedestrian doorways, parking garage driveway and loading and service delivery area. The TIS should evaluate the pros and cons of locating the parking ramp and loading area on Portland Street versus Albany Street and include the number of vehicles, pedestrians, and cyclists on each street and sidewalk during peak hours for comparison. The TIS should also provide a site plan showing the driver's sight lines for exiting the parking garage and loading area (i.e., for drivers to see pedestrians on the sidewalk).
- The TIS should show truck turning movements plotted on a site plan for the loading and service deliveries operations. Ideally all truck turning movements should occur on the Project's site and not require a truck backing into the site off a public street. If trucks need to back into the loading area, the TIS should justify why truck movements cannot occur on-site.
- The site plan in the TIS should show the existing and proposed roadway and sidewalk widths, curb regulations, utility poles, signs, traffic signals, traffic control cabinets, parking meters, bike racks, street trees, street furniture and any other items on the sidewalk.

- The TIS should show any existing bicycle lanes and bicycle/pedestrian pathways or connections, including the bicycle and pedestrian connection across the rail-road tracks south of the MIT Brain and Cognitive Science building which provided a connection between Albany Street to Vassar Street.

## Traffic Data Collection

- As stated above, due to the COVID-19 outbreak, new traffic counts would not be valid at this time, therefore previously collected counts may be used as approved by TP+T. The study area intersections should include the following intersections:
  1. Main Street at Sidney Street/Columbia Street
  2. Main Street at Windsor Street
  3. Main Street at Portland Street
  4. Main Street at Albany Street
  5. Main Street at Vassar Street/Galileo Galilei Way
  6. Portland Street at Albany Street
  7. Massachusetts Avenue at Sidney Street (because it is linked to the Main Street at Sidney Street/Columbia Street traffic signal)
- The source data and adjustments for the vehicle, pedestrian and bicycle Traffic Network Figures shall be well documented in the TIS. VAI should provide TP+T an Excel spreadsheet showing each intersection turning movement, volumes, date and source of the traffic count, and show the calculations used to adjust the volumes to a 2020 baseline condition. Careful attention should be made to ensure that any previously collected counts consider any construction activity in the area at that time, such as when the Longfellow Bridge was under construction.

## Trip Generation Analysis

- As suggested in your TIS scope request letter, TP+T believes that empirical trip rates should be used (instead of ITE trip rates) based on observed driveway/traffic counts from nearby sites with similar land uses, based on recent PTDM and Planning Board Special Permit transportation monitoring reports.
- Below are the trip rates you may use for the TIS, subject to any requested changes by TP+T. The trip rates shown below are per 1,000 square feet. Vehicle trip rates will need to be converted to total person trip rates based on mode shares. VAI should calculate the daily trip rates based on the same data sources, unless daily trip rates are provided by TP+T. An Excel spreadsheet of the trip generation shall be provided to TP+T for approval.

Land Use	AM Enter	AM Exit	PM Enter	PM Exit
R&D	0.27	0.01	0.03	0.25

Sources: 2018 driveway counts divided by occupied square feet from PTDM monitoring reports (F11, F27, F43, F47).and 2017 driveway counts for PTDM monitoring report F14.

- You may use ITE LUC 565 – Day Care Center trip rates for the day care portion of the Project as proposed in your scoping request letter. The assumption is that for the

40 expected students, 25% will be associated with the Ragon Institute employees and 75% will be non-Ragon Institute employees.

- The TIS should clearly show in a site plan and explain the operational plan for daycare student drop-off/pick up activities.
- The TIS mode split assumptions should be as shown below or as otherwise approved by TP+T.

Land Use	SOV	HOV	Transit	Walk	Bike	Work at Home	Other/ Out of Office
Office/R&D	35%	5%	36%	8%	7%	5%	4%

Sources: Based on 2017 and 2018 PTDM and Planning Board Special Permit transportation monitoring reports from 14 projects (F2, F4, F8, F9, F11, F15, F27, F43, F47, F51, PB65, PB125, PB150).

- The TIS may use the Kendall Square Central Square (K2C2) plan’s R&D trip distribution assumptions as suggested in your TIS scope request letter, with any modifications or changes approved by TP+T.

## Traffic Analysis Scenarios

- The TIS should include the following traffic analysis scenarios for the morning and evening peak hours:
  - 2020 Baseline Condition for vehicle, pedestrian and bicycles. A 2020 Baseline Condition may be determined as discussed above and approved by TP+T.
  - 2020 Build Condition. The Project generated trips at full occupancy added to the baseline 2020 Existing condition.
  - 2025 Future Condition. 2020 Build Condition plus 0.5% background traffic growth rate per year for 5-years, plus other projects under construction, permitted or proposed, including the following projects:
    - MIT Kendall Square Redevelopment project
    - Courthouse redevelopment project
    - Alexandria Center at Kendall Square (unoccupied portion of the project)
    - 249 Third Street residential project
    - Kendall Square Urban Renewal (KSURP) infill Development Concept Plan
    - North Point/Cambridge Crossing
    - First Street PUD project
    - Cambridgeside Redevelopment (Phase I and II)
    - The Foundry Building project
    - 325 Binney Street project
    - Volpe Exchange Parcel Redevelopment project
  - The 2025 Future Condition should include the 100% construction package for the CRA/Kendall Square Streetscape redesign project.

## Public and Private Transit Analysis

- The TIS should study the impacts of the Project's increased demand on the public and private transportation services in East Cambridge (i.e. EZRide shuttle, Alexandria Shuttle, MIT shuttle, etc.).
- The TIS shall include graphics and description of the development's relationship to future regional rail, bus, pedestrian, bicycle, and other transportation system connections in the area, including the Grand Junction Rail with Trail project.
- Capacity analysis for buses including private shuttles (i.e. EZRide) shall use an On-Time Performance Measure to adjust the capacity to actual observed capacity based on information from the MBTA web site and EZRide (prior to the COVID-19 outbreak) and as approved by TP+T.

## Automobile Parking Analysis

- According to the TP+T's records, 44 parking spaces were shown on the 1977 parking inventory map at the site, but no parking spaces were shown on the 1990 parking inventory map for the site. The proposed 120-parking spaces will trigger the City's Parking and Transportation Demand Management (PTDM) Ordinance. The Applicant must contact the City's PTDM Planning Officer and complete a PTDM plan prior to submitting an Application for a Special Permit.
- TP+T believes that unused parking spaces in an area should be used before building new parking spaces. For example, instead of building new parking spaces at the site, the Applicant should consider an arrangement to have the site's parking needs accommodated at existing unused parking spaces in the area, such as the Technology Square or Draper Labs parking garages. This can be pursued through a Planning Board Special Permit or other City approved mechanism. The TIS should explain the feasibility of such an arrangement, and if no arrangement is feasible or proposed, the TIS should explain why not. If no new parking spaces are constructed then the Project will not trigger the City's PTDM Ordinance.
- The TIS should explain in detail why the proposed parking ratio will be appropriate for the Ragon Institute and justify any assumptions behind this analysis.
- The TIS should calculate the potential number of parking spaces needed for the Project based on the estimated number of employees in the building and their auto mode shares (e.g., number of employees x (SOV + ½ HOV)).
- The TIS scope request letter indicated that based on the Ragon Massachusetts General Hospital 2019 PTDM and Planning Board Special Permit transportation monitoring report, employees reported mode shares of 11% single occupancy vehicle, 8% high occupancy vehicle, 45% transit, 17% pedestrian, 16% bicycle, and 3% other. The TIS should verify the employee's mode shares (pre-COVID-19 outbreak), either from another employee survey or another methodology approved by TP+T and CDD. Notwithstanding those results, the TIS shall use the mode shares indicated in this scope unless approved by TP+T because we believe the future employee mode shares for this Project are likely to be similar to other R&D facilities in Kendall Square unless there is strong evidence as to why the proposed Project's mode shares will have a significantly lower auto use.
- The TIS should explain in detail exactly how the parking spaces will be managed, monitored and enforced.



## Bicycle Analysis

- The TIS should provide a bicycle parking plan for the short-term and long-term bicycle parking spaces at a 1 inch = 10 feet scale plan (on letter size paper). The access to the bicycle parking must also be shown from the public right of way.
- The TIS should describe how the Project supports the City's Bicycle Network Plan, including the proposed separated bicycle lanes on Main Street as shown in the City's 2015 Bicycle Plan, including the property line setback needed to accommodate a separated bicycle lane on both sides of Main Street, in the area of the Project's site.

## Pedestrian Analysis

- The TIS should clearly show and label the existing and proposed pedestrian conditions for the site (i.e., sidewalk widths, doorways, street trees, crosswalks, etc.).
- The TIS should show pedestrian desire lines between the site and key public transit destinations (i.e., Kendall Square station, local bus stops, shuttle bus stops, etc.).
- The TIS should provide morning and evening peak hour pedestrian level-of-service analysis at study area intersections and crossings according to the methodologies in the TIS Guidelines.

## Consistency with Other Plans

- The TIS should describe how the proposed Project's transportation plan (i.e., public transit access, street network connections and circulation, automobile parking, bicycle parking and bike lane facilities, transportation mitigation, TDM measures, etc.), are consistent with other plans and designs for the area including, but not limited to, [Envision Cambridge Plan](#), [2013 Kendall Square Report](#), [2015 Cambridge Transit Strategic Plan](#), [2017 Kendall Square Mobility Task Force Report](#), [2015 Cambridge Bicycle Plan](#), and other relevant transportation plans for the Kendall Square area.

## Transportation Mitigation Measures

- The TIS should describe in detail proposed transportation mitigation, including Transportation Demand Management (TDM) measures. TDM measures should be in line with expectations set forth in the K2C2 and Envision Plans, as well as recently approved development projects in the adjacent vicinity.
- Because the Project triggers the PTDM ordinance, it is expected that many of the TDM measures will be incorporated as part of the approved PTDM plan. The TDM measures described in the TIS should be consistent with the PTDM plan which must be approved by the City's PTDM Planning Officer.

If you have any questions, please contact Adam Shulman of my staff at 617-349-4745.

Very truly yours,



Joseph E. Barr, Director

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

## TRAFFIC COUNT DATA

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Turning Movement Count Data

Vehicle Growth Calculations

Pedestrian Growth Calculations

Bicycle Growth Calculations

## Turning Movement Count Data

---



PRECISION  
D A T A  
INDUSTRIES, LLC  
P.O. Box 331 Berlin, MA 01509  
Office: 508-881-3997 Fax: 508-545-1234  
Email: datarequest@precision.com

File Name : 81585G  
Site Code : 10480.00  
Start Date : 5/8/2008  
Page No : 1

S: Albany Street  
E/W: Main Street  
City, State: Cambridge, MA  
Client: VHB/R. Raveendran

Start Time	Main Street From East			Albany Street From South			Main Street From West			Intr. Total
	Thru	Left	Right	Thru	Left	Right	Thru	Left	Right	
07:30 AM	47	40	1	40	38	1	2	38	1	168
07:45 AM	61	54	2	56	57	8	8	57	198	198
Total	108	74	3	76	95	10	10	95	366	366
08:00 AM	67	39	2	48	46	2	2	46	204	204
08:15 AM	64	40	4	44	68	2	2	68	221	221
08:30 AM	58	39	3	38	74	5	5	74	214	214
08:45 AM	61	39	0	42	78	6	6	78	226	226
Total	250	157	5	172	266	15	15	266	865	865
09:00 AM	43	52	2	28	98	8	8	98	231	231
09:15 AM	68	37	2	39	74	4	4	74	224	224
Grand Total	469	320	12	315	533	37	37	533	1686	1686
Approach %	59.4	40.6	96.3	3.7	6.5	93.5	2.2	31.6		
Total %	27.8	19	18.7	0.7	2.2	2.2	2.2	31.6		
Cars	409	302	254	10	37	501	94	1513		
% Cars	87.2	94.4	80.6	83.3	100	94	94	89.7		
Heavy Vehicles	60	18	61	2	32	0	0	173		
% Heavy Vehicles	12.8	5.6	19.4	1.67	6	6	6	10.3		

Start Time	Main Street From East			Albany Street From South			Main Street From West			Intr. Total
	Thru	Left	Right	Thru	Left	Right	Thru	Left	Right	
08:30 AM	97	38	0	38	79	5	74	79	214	214
08:45 AM	100	42	0	42	84	6	78	84	226	226
09:00 AM	95	28	2	30	106	8	98	106	231	231
09:15 AM	68	37	2	41	78	4	74	78	224	224
Total Volume	230	167	397	147	324	23	324	347	895	895
% App. Total	57.9	42.1	97.4	2.6	6.6	93.4	6.6	93.4		
PHF	846	803	945	500	899	719	827	818	969	969
Cars	203	157	360	116	4	23	302	325	805	805
% Cars	88.3	94.0	90.7	100	79.5	100	93.2	93.7	89.9	89.9
Heavy Vehicles	27	10	37	31	22	0	22	22	90	90
% Heavy Vehicles	11.7	6.0	9.3	2.1	6.8	0	6.8	6.3	10.1	10.1



PRECISION  
D A T A  
INDUSTRIES, LLC  
P.O. Box 331 Berlin, MA 01509  
Office: 508-881-3997 Fax: 508-545-1234  
Email: datarequest@precision.com

File Name : 81585G  
Site Code : 10480.00  
Start Date : 5/8/2008  
Page No : 1

S: Albany Street  
E/W: Main Street  
City, State: Cambridge, MA  
Client: VHB/R. Raveendran

Start Time	Main Street From East			Albany Street From South			Main Street From West			Intr. Total
	Thru	Left	Right	Thru	Left	Right	Thru	Left	Right	
07:30 AM	36	40	2	30	34	1	2	34	143	143
07:45 AM	56	31	3	30	54	1	8	54	180	180
Total	92	71	5	60	88	2	10	88	323	323
08:00 AM	58	36	2	41	45	2	2	45	184	184
08:15 AM	56	38	2	37	66	2	2	66	201	201
08:30 AM	53	36	3	32	70	5	5	70	196	196
08:45 AM	54	36	3	31	74	6	6	74	201	201
Total	221	146	141	141	225	15	15	225	782	782
09:00 AM	37	50	22	22	91	8	8	91	210	210
09:15 AM	59	35	31	31	67	4	4	67	198	198
Grand Total	409	302	254	10	37	501	94	1513		
Approach %	57.5	42.5	96.2	3.8	6.9	93.1	2.4	33.1		
Total %	27	20	16.8	0.7	2.4	2.4	2.4	33.1		

Start Time	Main Street From East			Albany Street From South			Main Street From West			Intr. Total
	Thru	Left	Right	Thru	Left	Right	Thru	Left	Right	
08:15 AM	56	38	94	37	2	39	2	66	68	201
08:30 AM	53	36	89	32	0	32	5	70	75	196
08:45 AM	54	36	80	31	0	31	6	74	80	201
09:00 AM	37	50	87	22	2	24	8	91	99	210
Total Volume	200	160	360	122	4	126	21	301	322	808
% App. Total	55.6	48.4	96.8	3.2	4	6.5	93.5	93.5		
PHF	893	800	957	500	500	808	656	813	962	962



PO Box 301 Berlin, MA 01501  
 413-236-1314  
 Email: datarequest@pdic.com

File Name : 81585G  
 Site Code : 10480.00  
 Start Date : 5/8/2008  
 Page No : 1

S: Albany Street  
 E/W: Main Street  
 City, State: Cambridge, MA  
 Client: VHB/R. Raveendran

Start Time	Main Street From East		Albany Street From South		Main Street From West		Thru	Int. Total
	Thru	Left	Right	Left	Right			
07:30 AM	11	0	10	0	0	4	25	
07:45 AM	5	3	6	1	0	3	18	
Total	16	3	16	1	0	7	43	
08:00 AM	9	3	7	0	0	1	20	
08:15 AM	8	2	7	1	0	2	20	
08:30 AM	5	3	6	0	0	4	18	
08:45 AM	7	3	11	0	0	4	25	
Total	29	11	31	1	0	11	83	
09:00 AM	6	2	6	0	0	7	21	
09:15 AM	9	2	8	0	0	7	26	
09:30 AM	60	18	61	2	0	32	173	
Grand Total	76.9	23.1	96.8	3.2	0	100	347	
Approach %	1.2		1.2		0		18.5	
Total %	34.7		35.3		0		18.5	



PO Box 301 Berlin, MA 01501  
 413-236-1314  
 Email: datarequest@pdic.com

File Name : 81585G  
 Site Code : 10480.00  
 Start Date : 5/8/2008  
 Page No : 1

S: Albany Street  
 E/W: Main Street  
 City, State: Cambridge, MA  
 Client: VHB/R. Raveendran

Start Time	Main Street From East		Albany Street From South		Main Street From West		Thru	Int. Total
	Thru	Left	Right	Left	Right			
07:30 AM	2	0	4	3	0	5	25	
07:45 AM	3	1	10	1	12	0	34	
Total	5	1	14	4	20	0	59	
08:00 AM	0	0	3	1	0	9	27	
08:15 AM	0	0	1	0	0	13	24	
08:30 AM	2	1	5	1	0	16	44	
08:45 AM	0	0	15	0	0	19	49	
Total	2	1	24	3	0	52	144	
09:00 AM	1	0	4	4	0	6	23	
09:15 AM	0	0	4	1	0	3	23	
09:30 AM	8	2	46	12	1	64	249	
Grand Total	14.3	3.6	82.1	11.4	1	72.7	261	
Approach %	0.8		4.8		0.4		36.9	
Total %	18.5		18.5		0.4		9.2	

Start Time	Main Street From East		Albany Street From South		Main Street From West		Thru	Int. Total
	Thru	Left	Right	Left	Right			
08:30 AM	3	8	6	0	0	4	18	
08:45 AM	7	10	11	0	0	4	25	
09:00 AM	6	8	6	0	0	7	21	
09:15 AM	9	2	8	0	0	7	26	
Total Volume	27	10	37	0	0	22	90	
% App. Total	73	27	100	0	0	100	365	
PHF	.750		.833		.841		.786	
Total	.750		.833		.841		.786	

Start Time	Main Street From East		Albany Street From South		Main Street From West		Thru	Int. Total
	Thru	Left	Right	Left	Right			
08:00 AM	0	0	3	1	0	9	14	
08:15 AM	0	0	1	1	0	13	24	
08:30 AM	2	1	5	1	0	16	44	
08:45 AM	0	0	15	0	0	19	49	
Total Volume	2	1	24	3	0	52	144	
% App. Total	74	3.7	88.9	5.5	0	94.5	62	
PHF	.250		.450		.724		.730	
Total	.250		.450		.724		.730	

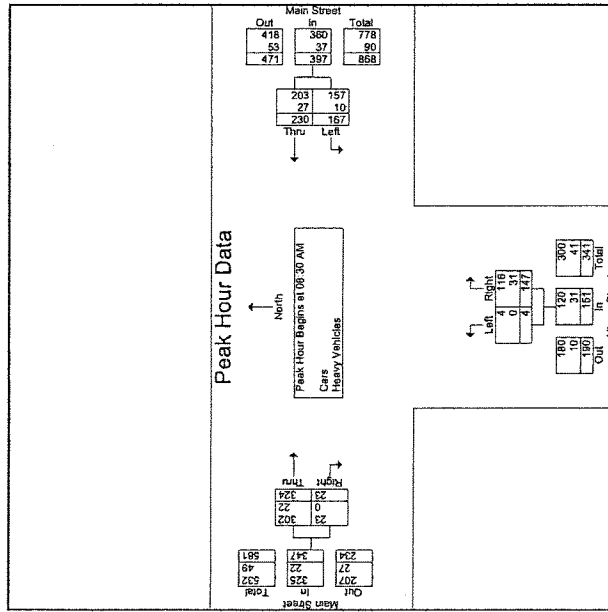


File Name : 81585GG  
 Site Code : 10480.00  
 Start Date : 5/8/2008  
 Page No : 1

S: Albany Street  
 E/W: Main Street  
 City, State: Cambridge, MA  
 Client: VHB/R. Raveendran

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Start Time	Main Street From East			Albany Street From South			Main Street From West			Int. Total
	Thru	Left	Right	Thru	Left	Right	Thru	Left	Right	
Peak Hour Analysis From 07:30 AM to 08:15 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 08:30 AM										
08:30 AM	39	0	38	0	0	5	74	79		214
08:45 AM	58	0	42	0	0	6	78	84		226
09:00 AM	43	2	28	2	2	8	98	106		231
09:15 AM	68	3	39	2	4	4	74	78		224
Total Volume	230	167	147	4	23	23	324	347		895
% App. Total	57.9	42.1	97.4	2.6	6.6	6.6	93.4			
% App. P.H.F.	846	803	875	500	899	719	827	818		909
Cats	203	157	112	4	23	23	302	325		805
% Cats	88.3	94.0	90.7	100	79.5	100	93.2	93.7		89.9
Heavy Vehicles	27	10	31	0	22	0	22	22		90
% Heavy Vehicles	11.7	6.0	21.1	0	20.5	0	6.8	6.3		10.1



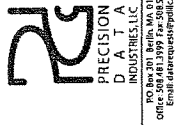
File Name : 81585GG  
 Site Code : 10480.00  
 Start Date : 5/8/2008  
 Page No : 1

S: Albany Street  
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 DATA  
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Start Time	Main Street From East			Albany Street From South			Main Street From West			Int. Total
	Thru	Left	Right	Thru	Left	Right	Thru	Left	Right	
Group Filtered: Cars - Heavy Vehicles										
04:30 PM	07	16	3	02	08	3	1	64		213
04:45 PM	63	27	58	58	5	1	1	67		221
Total	130	43	120	8	131					434
05:00 PM	72	15	89	6	72					254
05:15 PM	80	14	67	5	80					246
05:30 PM	80	23	54	9	69					236
05:45 PM	18	18	51	7	70					223
Total	309	70	261	27	291					959
06:00 PM	62	27	69	6	54					218
06:15 PM	53	17	55	5	69					199
Grand Total	554	157	505	46	545					1810
Approach %	77.9	22.1	91.7	8.3	90.5					
Total %	30.6	8.7	27.9	2.5	30.1					
Cats	533	154	491	44	529					1754
% Cats	96.2	98.1	97.2	95.7	97.1					96.9
Heavy Vehicles	21	3	14	2	16					56
% Heavy Vehicles	3.8	1.9	2.8	4.3	2.9					3.1

Start Time	Main Street From East			Albany Street From South			Main Street From West			Int. Total
	Thru	Left	Right	Thru	Left	Right	Thru	Left	Right	
Peak Hour Analysis From 05:30 PM to 06:15 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 05:00 PM										
05:00 PM	15	87	89	6	95					254
05:15 PM	80	14	94	5	72					246
05:30 PM	80	23	103	9	63					236
05:45 PM	77	18	95	51	7	58	70			223
Total Volume	309	70	379	27	288					959
% App. Total	81.5	18.5	90.6	9.4	0.3	96.7				
% App. P.H.F.	966	761	920	733	750	758	250	909	913	944
Cats	297	70	367	26	282					933
% Cats	96.1	100	96.8	96.3	97.9					97.3
Heavy Vehicles	12	0	12	5	6					26
% Heavy Vehicles	3.9	0	3.2	1.9	2.1					2.7



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File Name : 81585GG  
Site Code : 10480.00  
Start Date : 5/8/2008  
Page No : 1

S: Albany Street  
E/W: Main Street  
City, State: Cambridge, MA  
Client: VHB/R. Raveendran

Start Time	Main Street From East		Albany Street From South		Main Street From West		Thru	Int. Total
	Thru	Left	Right	Left	Right	Thru		
04:30 PM	65	16	59	3	1	61	205	
04:45 PM	58	25	54	5	1	62	205	
Total	123	41	113	8	2	123	410	
05:00 PM	66	15	87	5	0	70	243	
05:15 PM	77	14	66	5	0	78	240	
05:30 PM	77	23	53	9	1	68	231	
05:45 PM	77	18	50	7	0	67	219	
Total	297	70	256	26	1	283	933	
06:00 PM	62	26	67	6	0	54	215	
06:15 PM	51	17	55	4	0	69	196	
Grand Total	533	154	491	44	3	529	1754	
Approach %	77.6	22.4	91.8	8.2	0.6	99.4		
Total %	30.4	8.8	28	2.5	0.2	30.2		

Start Time	Main Street From East		Albany Street From South		Main Street From West		Thru	Int. Total
	Thru	Left	Right	Left	Right	Thru		
04:30 PM	65	16	59	3	1	61	205	
04:45 PM	58	25	54	5	1	62	205	
Total	123	41	113	8	2	123	410	
05:00 PM	66	15	87	5	0	70	243	
05:15 PM	77	14	66	5	0	78	240	
05:30 PM	77	23	53	9	1	68	231	
05:45 PM	77	18	50	7	0	67	219	
Total Volume	297	70	256	26	1	283	933	
% App. Total	80.9	19.1	90.8	9.2	0.4	99.6	910	
PHF	.964	.761	.736	.722	.250	.907	.910	



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File Name : 81585GG  
Site Code : 10480.00  
Start Date : 5/8/2008  
Page No : 1

S: Albany Street  
E/W: Main Street  
City, State: Cambridge, MA  
Client: VHB/R. Raveendran

Start Time	Main Street From East		Albany Street From South		Main Street From West		Thru	Int. Total
	Thru	Left	Right	Left	Right	Thru		
04:30 PM	2	0	5	0	0	3	8	
04:45 PM	5	2	4	4	0	5	16	
Total	7	2	7	7	0	8	24	
05:00 PM	6	0	2	2	0	2	11	
05:15 PM	3	0	1	1	0	2	6	
05:30 PM	3	0	1	0	0	1	5	
05:45 PM	0	0	1	0	0	3	4	
Total	12	0	5	1	0	8	26	
06:00 PM	0	1	2	0	0	0	3	
06:15 PM	2	0	0	1	0	0	3	
Grand Total	21	3	14	3	0	16	56	
Approach %	87.5	12.5	87.5	12.5	0	100		
Total %	37.5	5.4	25	3.6	0	28.6		

Start Time	Main Street From East		Albany Street From South		Main Street From West		Thru	Int. Total
	Thru	Left	Right	Left	Right	Thru		
04:30 PM	2	0	3	0	0	3	8	
04:45 PM	5	2	4	4	0	5	16	
05:00 PM	6	0	2	1	0	2	11	
05:15 PM	3	0	1	0	0	2	6	
Total Volume	16	2	10	1	0	12	41	
% App. Total	88.9	11.1	90.9	9.1	0	100	600	
PHF	.667	.250	.643	.625	.000	.600	.641	



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File Name : 81585GG  
Site Code : 10480.00  
Start Date : 5/8/2008  
Page No : 1

S: Albany Street  
E/W: Main Street  
City, State: Cambridge, MA  
Client: VHB/R. Raveendran

Start Time	Main Street From East		Albany Street From South		Main Street From West		Peds	Bicycles	Int. Total
	Thru	Left	Right	Left	Thru	Right			
04:30 PM	5	1	4	0	0	0	25	0	38
04:45 PM	7	0	6	0	0	0	19	3	37
Total	12	1	10	0	0	0	44	3	75
05:00 PM	4	1	3	0	0	0	33	0	46
05:15 PM	7	1	2	0	0	0	28	3	49
05:30 PM	7	1	4	0	0	0	26	2	44
05:45 PM	8	0	3	0	0	0	24	2	42
Total	26	3	12	0	0	0	111	10	181
06:00 PM	12	2	0	0	0	0	21	5	41
06:15 PM	13	2	0	0	0	0	23	2	41
Grand Total	63	8	19	0	0	0	199	20	338
Approach %	70	89	21.1	3.4	0.5	0	96.1	48.8	51.2
Total %	18.6	2.4	5.6	0	0	0	58.9	5.9	6.2

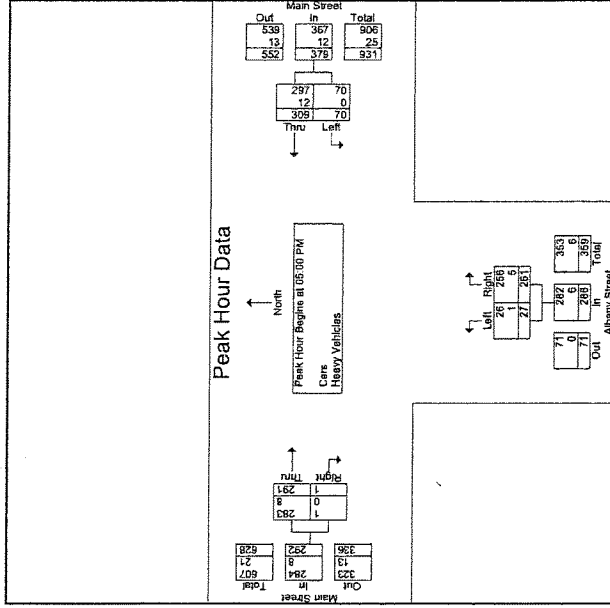


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File Name : 81585GG  
Site Code : 10480.00  
Start Date : 5/8/2008  
Page No : 1

Start Time	Main Street From East		Albany Street From South		Main Street From West		Peds	Bicycles	Int. Total
	Thru	Left	Right	Left	Thru	Right			
04:30 PM	72	15	87	6	0	0	95	0	72
04:45 PM	80	14	94	5	0	0	72	0	80
05:00 PM	80	23	103	9	0	0	63	1	69
05:15 PM	77	18	95	7	0	0	58	0	70
05:30 PM	309	70	379	27	1	0	288	1	291
05:45 PM	81.5	18.5	100	9.4	0.3	0	75.8	0.3	76.1
Total	966	761	1727	750	250	0	1000	1	913
% App. Total	297	70	367	26	282	1	283	284	933
Cars	96.1	100	96.8	96.3	97.9	0	97.9	97.3	97.3
% Heavy Vehicles	12	0	12	5	6	0	6	8	8
% Heavy Vehicles	3.9	0	3.2	1.9	2.1	0	2.1	2.7	2.7





**Accurate Counts**  
978-664-2565

N/S Street : Portland Street  
E/W Street: Main Street  
City/State : Cambridge, MA  
Weather : Cloudy

File Name : 58290006  
Site Code : 58290006  
Start Date : 5/12/2011  
Page No : 1

Groups Printed- Buses

Start Time	Portland St From North			Main St From East			Portland St From South			Main St From West			Int. Total
	Left	Thru	Rght	Left	Thru	Rght	Left	Thru	Rght	Left	Thru	Rght	
07:30	0	1	0	0	0	0	0	0	0	0	1	0	2
07:45	0	1	0	0	0	0	0	1	0	0	0	0	2
Total	0	2	0	0	0	0	0	1	0	0	1	0	4
08:00	0	1	0	0	0	0	0	3	0	0	0	0	4
08:15	0	1	0	0	0	0	0	1	0	0	0	0	2
08:30	0	3	0	0	0	1	0	1	0	0	0	0	5
08:45	0	1	0	0	1	0	0	1	0	0	0	0	3
Total	0	6	0	0	1	1	0	6	0	0	0	0	14
09:00	0	1	0	0	0	0	0	0	0	0	2	0	3
09:15	0	3	0	0	0	0	0	0	0	0	1	0	4
Grand Total	0	12	0	0	1	1	0	7	0	0	4	0	25
Apprch %	0	100	0	0	50	50	0	100	0	0	100	0	
Total %	0	48	0	0	4	4	0	28	0	0	16	0	

Start Time	Portland St From North				Main St From East				Portland St From South				Main St From West				Int. Total
	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	
Peak Hour Analysis From 07:30 to 09:15 - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 08:30																	
08:30	0	3	0	3	0	0	1	1	0	1	0	1	0	0	0	0	5
08:45	0	1	0	1	0	1	0	1	0	1	0	1	0	0	0	0	3
09:00	0	1	0	1	0	0	0	0	0	0	0	0	0	2	0	2	3
09:15	0	3	0	3	0	0	0	0	0	0	0	0	0	1	0	1	4
Total Volume	0	8	0	8	0	1	1	2	0	2	0	2	0	3	0	3	15
% App. Total	0	100	0		0	50	50		0	100	0		0	100	0		
PHF	.000	.667	.000	.667	.000	.250	.250	.500	.000	.500	.000	.500	.000	.375	.000	.375	.750

# Accurate Counts

978-664-2565

N/S Street : Portland Street  
 E/W Street: Main Street  
 City/State : Cambridge, MA  
 Weather : Cloudy

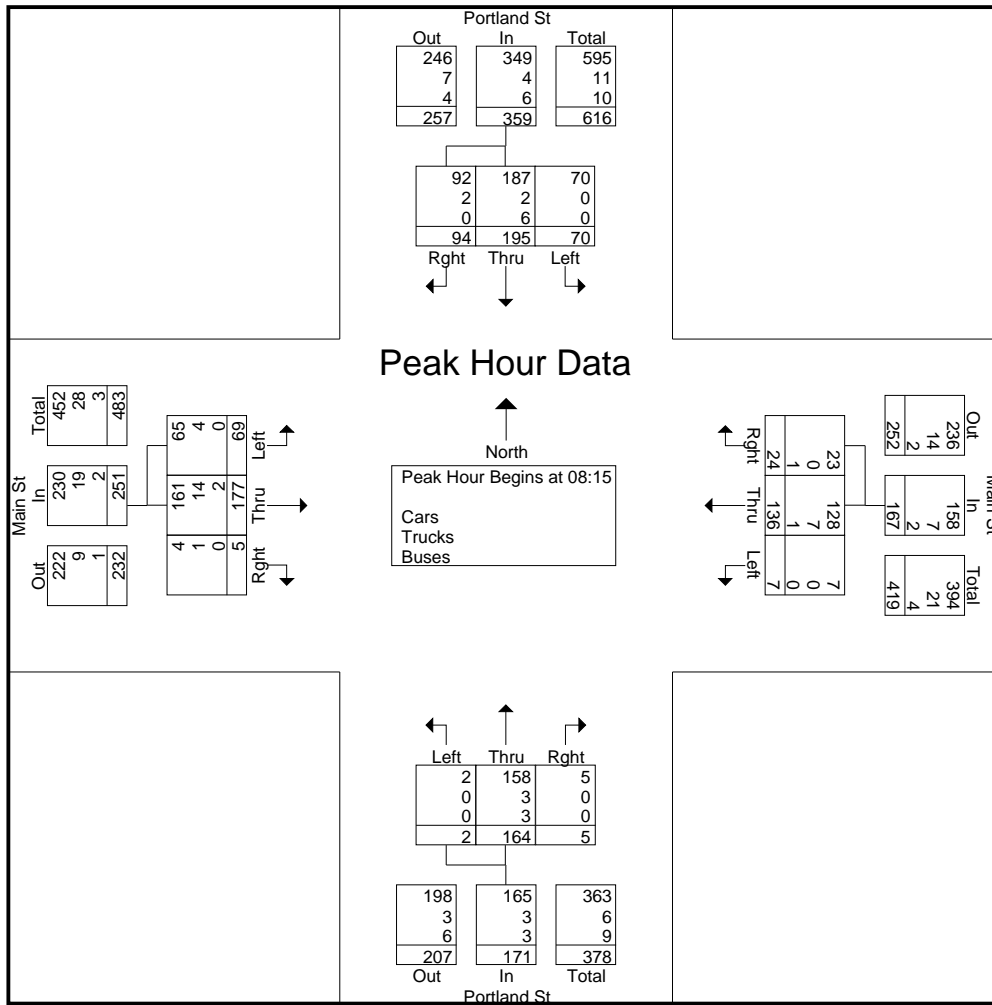
File Name : 58290006  
 Site Code : 58290006  
 Start Date : 5/12/2011  
 Page No : 1

### Groups Printed- Cars - Trucks - Buses

Start Time	Portland St From North			Main St From East			Portland St From South			Main St From West			Int. Total
	Left	Thru	Rght	Left	Thru	Rght	Left	Thru	Rght	Left	Thru	Rght	
07:30	8	43	27	2	30	2	0	38	2	19	29	0	200
07:45	8	52	20	3	39	5	0	41	0	21	43	1	233
<b>Total</b>	<b>16</b>	<b>95</b>	<b>47</b>	<b>5</b>	<b>69</b>	<b>7</b>	<b>0</b>	<b>79</b>	<b>2</b>	<b>40</b>	<b>72</b>	<b>1</b>	<b>433</b>
08:00	20	44	24	2	25	4	0	49	1	17	30	1	217
08:15	16	55	24	1	32	3	0	47	1	18	50	3	250
08:30	24	52	25	3	29	11	0	37	2	18	34	1	236
08:45	17	41	19	0	47	5	0	40	1	17	52	1	240
<b>Total</b>	<b>77</b>	<b>192</b>	<b>92</b>	<b>6</b>	<b>133</b>	<b>23</b>	<b>0</b>	<b>173</b>	<b>5</b>	<b>70</b>	<b>166</b>	<b>6</b>	<b>943</b>
09:00	13	47	26	3	28	5	2	40	1	16	41	0	222
09:15	15	45	24	3	31	7	0	33	1	7	43	3	212
<b>Grand Total</b>	<b>121</b>	<b>379</b>	<b>189</b>	<b>17</b>	<b>261</b>	<b>42</b>	<b>2</b>	<b>325</b>	<b>9</b>	<b>133</b>	<b>322</b>	<b>10</b>	<b>1810</b>
Apprch %	17.6	55	27.4	5.3	81.6	13.1	0.6	96.7	2.7	28.6	69.2	2.2	
Total %	6.7	20.9	10.4	0.9	14.4	2.3	0.1	18	0.5	7.3	17.8	0.6	
Cars	121	360	183	17	245	41	2	310	9	128	294	8	1718
% Cars	100	95	96.8	100	93.9	97.6	100	95.4	100	96.2	91.3	80	94.9
Trucks	0	7	6	0	15	0	0	8	0	5	24	2	67
% Trucks	0	1.8	3.2	0	5.7	0	0	2.5	0	3.8	7.5	20	3.7
Buses	0	12	0	0	1	1	0	7	0	0	4	0	25
% Buses	0	3.2	0	0	0.4	2.4	0	2.2	0	0	1.2	0	1.4

Start Time	Portland St From North				Main St From East				Portland St From South				Main St From West				Int. Total
	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	
<b>Peak Hour Analysis From 07:30 to 09:15 - Peak 1 of 1</b>																	
<b>Peak Hour for Entire Intersection Begins at 08:15</b>																	
08:15	16	55	24	95	1	32	3	36	0	47	1	48	18	50	3	71	250
08:30	24	52	25	101	3	29	11	43	0	37	2	39	18	34	1	53	236
08:45	17	41	19	77	0	47	5	52	0	40	1	41	17	52	1	70	240
09:00	13	47	26	86	3	28	5	36	2	40	1	43	16	41	0	57	222
<b>Total Volume</b>	<b>70</b>	<b>195</b>	<b>94</b>	<b>359</b>	<b>7</b>	<b>136</b>	<b>24</b>	<b>167</b>	<b>2</b>	<b>164</b>	<b>5</b>	<b>171</b>	<b>69</b>	<b>177</b>	<b>5</b>	<b>251</b>	<b>948</b>
% App. Total	19.5	54.3	26.2		4.2	81.4	14.4		1.2	95.9	2.9		27.5	70.5	2		
PHF	.729	.886	.904	.889	.583	.723	.545	.803	.250	.872	.625	.891	.958	.851	.417	.884	.948
Cars	70	187	92	349	7	128	23	158	2	158	5	165	65	161	4	230	902
% Cars	100	95.9	97.9	97.2	100	94.1	95.8	94.6	100	96.3	100	96.5	94.2	91.0	80.0	91.6	95.1
Trucks	0	2	2	4	0	7	0	7	0	3	0	3	4	14	1	19	33
% Trucks	0	1.0	2.1	1.1	0	5.1	0	4.2	0	1.8	0	1.8	5.8	7.9	20.0	7.6	3.5
Buses	0	6	0	6	0	1	1	2	0	3	0	3	0	2	0	2	13
% Buses	0	3.1	0	1.7	0	0.7	4.2	1.2	0	1.8	0	1.8	0	1.1	0	0.8	1.4

N/S Street : Portland Street  
E/W Street: Main Street  
City/State : Cambridge, MA  
Weather : Cloudy



Peak Hour Analysis From 07:30 to 09:15 - Peak 1 of 1  
Peak Hour for Each Approach Begins at:

	07:45				08:30				07:30				08:15			
+0 mins.	8	52	20	80	3	29	11	43	0	38	2	40	18	50	3	71
+15 mins.	20	44	24	88	0	47	5	52	0	41	0	41	18	34	1	53
+30 mins.	16	55	24	95	3	28	5	36	0	49	1	50	17	52	1	70
+45 mins.	24	52	25	101	3	31	7	41	0	47	1	48	16	41	0	57
Total Volume	68	203	93	364	9	135	28	172	0	175	4	179	69	177	5	251
% App. Total	18.7	55.8	25.5		5.2	78.5	16.3		0	97.8	2.2		27.5	70.5	2	
PHF	.708	.923	.930	.901	.750	.718	.636	.827	.000	.893	.500	.895	.958	.851	.417	.884
Cars	68	192	91	351	9	126	27	162	0	165	4	169	65	161	4	230
% Cars	100	94.6	97.8	96.4	100	93.3	96.4	94.2	0	94.3	100	94.4	94.2	91	80	91.6
Trucks	0	5	2	7	0	8	0	8	0	5	0	5	4	14	1	19
% Trucks	0	2.5	2.2	1.9	0	5.9	0	4.7	0	2.9	0	2.8	5.8	7.9	20	7.6
Buses	0	6	0	6	0	1	1	2	0	5	0	5	0	2	0	2
% Buses	0	3	0	1.6	0	0.7	3.6	1.2	0	2.9	0	2.8	0	1.1	0	0.8

# Accurate Counts

978-664-2565

N/S Street : Portland Street  
 E/W Street: Main Street  
 City/State : Cambridge, MA  
 Weather : Cloudy

File Name : 58290006  
 Site Code : 58290006  
 Start Date : 5/12/2011  
 Page No : 1

### Groups Printed- Bikes ST

Start Time	Portland St From North			Main St From East			Portland St From South			Main St From West			Int. Total
	Left	Thru	Rght	Left	Thru	Rght	Left	Thru	Rght	Left	Thru	Rght	
07:30	0	2	1	0	1	0	0	1	0	0	10	0	15
07:45	1	3	3	0	1	0	0	6	0	0	7	0	21
<b>Total</b>	<b>1</b>	<b>5</b>	<b>4</b>	<b>0</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>7</b>	<b>0</b>	<b>0</b>	<b>17</b>	<b>0</b>	<b>36</b>
08:00	2	4	0	0	0	0	0	0	1	0	6	0	13
08:15	0	3	0	0	1	0	0	2	0	4	13	0	23
08:30	1	4	0	0	0	0	0	4	0	1	13	0	23
08:45	3	15	0	0	1	0	0	1	0	1	25	0	46
<b>Total</b>	<b>6</b>	<b>26</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>7</b>	<b>1</b>	<b>6</b>	<b>57</b>	<b>0</b>	<b>105</b>
09:00	9	8	1	0	1	1	0	4	0	1	16	1	42
09:15	2	1	0	0	1	1	0	0	1	2	6	0	14
<b>Grand Total</b>	<b>18</b>	<b>40</b>	<b>5</b>	<b>0</b>	<b>6</b>	<b>2</b>	<b>0</b>	<b>18</b>	<b>2</b>	<b>9</b>	<b>96</b>	<b>1</b>	<b>197</b>
Apprch %	28.6	63.5	7.9	0	75	25	0	90	10	8.5	90.6	0.9	
Total %	9.1	20.3	2.5	0	3	1	0	9.1	1	4.6	48.7	0.5	

Start Time	Portland St From North				Main St From East				Portland St From South				Main St From West				Int. Total
	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	
Peak Hour Analysis From 07:30 to 09:15 - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 08:15																	
08:15	0	3	0	3	0	1	0	1	0	2	0	2	4	13	0	17	23
08:30	1	4	0	5	0	0	0	0	0	4	0	4	1	13	0	14	23
08:45	3	15	0	18	0	1	0	1	0	1	0	1	1	25	0	26	46
09:00	9	8	1	18	0	1	1	2	0	4	0	4	1	16	1	18	42
<b>Total Volume</b>	<b>13</b>	<b>30</b>	<b>1</b>	<b>44</b>	<b>0</b>	<b>3</b>	<b>1</b>	<b>4</b>	<b>0</b>	<b>11</b>	<b>0</b>	<b>11</b>	<b>7</b>	<b>67</b>	<b>1</b>	<b>75</b>	<b>134</b>
% App. Total	29.5	68.2	2.3		0	75	25		0	100	0		9.3	89.3	1.3		
PHF	.361	.500	.250	.611	.000	.750	.250	.500	.000	.688	.000	.688	.438	.670	.250	.721	.728



# Accurate Counts

978-664-2565

N/S Street : Portland Street  
 E/W Street: Main Street  
 City/State : Cambridge, MA  
 Weather : Cloudy

File Name : 58290006  
 Site Code : 58290006  
 Start Date : 5/12/2011  
 Page No : 1

### Groups Printed- Trucks

Start Time	Portland St From North			Main St From East			Portland St From South			Main St From West			Int. Total
	Left	Thru	Rght	Left	Thru	Rght	Left	Thru	Rght	Left	Thru	Rght	
07:30	0	1	2	0	3	0	0	1	0	0	1	0	8
07:45	0	1	2	0	1	0	0	1	0	1	6	0	12
<b>Total</b>	<b>0</b>	<b>2</b>	<b>4</b>	<b>0</b>	<b>4</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>0</b>	<b>1</b>	<b>7</b>	<b>0</b>	<b>20</b>
08:00	0	2	0	0	1	0	0	2	0	0	0	0	5
08:15	0	1	0	0	2	0	0	1	0	2	5	1	12
08:30	0	1	0	0	3	0	0	0	0	0	7	0	11
08:45	0	0	1	0	1	0	0	2	0	1	0	0	5
<b>Total</b>	<b>0</b>	<b>4</b>	<b>1</b>	<b>0</b>	<b>7</b>	<b>0</b>	<b>0</b>	<b>5</b>	<b>0</b>	<b>3</b>	<b>12</b>	<b>1</b>	<b>33</b>
09:00	0	0	1	0	1	0	0	0	0	1	2	0	5
09:15	0	1	0	0	3	0	0	1	0	0	3	1	9
<b>Grand Total</b>	<b>0</b>	<b>7</b>	<b>6</b>	<b>0</b>	<b>15</b>	<b>0</b>	<b>0</b>	<b>8</b>	<b>0</b>	<b>5</b>	<b>24</b>	<b>2</b>	<b>67</b>
Apprch %	0	53.8	46.2	0	100	0	0	100	0	16.1	77.4	6.5	
Total %	0	10.4	9	0	22.4	0	0	11.9	0	7.5	35.8	3	

Start Time	Portland St From North				Main St From East				Portland St From South				Main St From West				Int. Total
	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	
Peak Hour Analysis From 07:30 to 09:15 - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:45																	
07:45	0	1	2	3	0	1	0	1	0	1	0	1	1	6	0	7	12
08:00	0	2	0	2	0	1	0	1	0	2	0	2	0	0	0	0	5
08:15	0	1	0	1	0	2	0	2	0	1	0	1	2	5	1	8	12
08:30	0	1	0	1	0	3	0	3	0	0	0	0	0	7	0	7	11
<b>Total Volume</b>	<b>0</b>	<b>5</b>	<b>2</b>	<b>7</b>	<b>0</b>	<b>7</b>	<b>0</b>	<b>7</b>	<b>0</b>	<b>4</b>	<b>0</b>	<b>4</b>	<b>3</b>	<b>18</b>	<b>1</b>	<b>22</b>	<b>40</b>
% App. Total	0	71.4	28.6		0	100	0		0	100	0		13.6	81.8	4.5		
PHF	.000	.625	.250	.583	.000	.583	.000	.583	.000	.500	.000	.500	.375	.643	.250	.688	.833

Accurate Counts  
978-664-2565

N/S Street : Portland Street  
E/W Street: Main Street  
City/State : Cambridge, MA  
Weather : Cloudy

File Name : 58290006  
Site Code : 58290006  
Start Date : 5/12/2011  
Page No : 1

Groups Printed- Peds

Start Time	Portland St From North				Main St From East				Portland St From South				Main St From West				Int. Total
	EB			WB	NB			SB	EB			WB	NB			SB	
07:30	4	0	0	3	8	0	0	5	1	0	0	1	0	0	0	1	23
07:45	12	0	0	4	6	0	0	5	5	0	0	2	2	0	0	1	37
Total	16	0	0	7	14	0	0	10	6	0	0	3	2	0	0	2	60
08:00	4	0	0	2	9	0	0	4	7	0	0	2	4	0	0	10	42
08:15	7	0	0	3	10	0	0	5	6	0	0	2	5	0	0	12	50
08:30	15	0	0	3	4	0	0	5	8	0	0	8	3	0	0	5	51
08:45	7	0	0	3	8	0	0	8	6	0	0	3	11	0	0	17	63
Total	33	0	0	11	31	0	0	22	27	0	0	15	23	0	0	44	206
09:00	8	0	0	3	9	0	0	6	7	0	0	7	9	0	0	8	57
09:15	6	0	0	0	5	0	0	5	5	0	0	3	4	0	0	14	42
Grand Total	63	0	0	21	59	0	0	43	45	0	0	28	38	0	0	68	365
Apprch %	75	0	0	25	57.8	0	0	42.2	61.6	0	0	38.4	35.8	0	0	64.2	
Total %	17.3	0	0	5.8	16.2	0	0	11.8	12.3	0	0	7.7	10.4	0	0	18.6	

Start Time	Portland St From North				Main St From East				Portland St From South				Main St From West				Int. Total				
	EB			WB	App. Total	NB			SB	App. Total	EB			WB	App. Total	NB				SB	App. Total
Peak Hour Analysis From 07:30 to 09:15 - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 08:15																					
08:15	7	0	0	3	10	10	0	0	5	15	6	0	0	2	8	5	0	0	12	17	50
08:30	15	0	0	3	18	4	0	0	5	9	8	0	0	8	16	3	0	0	5	8	51
08:45	7	0	0	3	10	8	0	0	8	16	6	0	0	3	9	11	0	0	17	28	63
09:00	8	0	0	3	11	9	0	0	6	15	7	0	0	7	14	9	0	0	8	17	57
Total Volume	37	0	0	12	49	31	0	0	24	55	27	0	0	20	47	28	0	0	42	70	221
% App. Total																					
PHF	.617	.000	.000	1.000	.681	.775	.000	.000	.750	.859	.844	.000	.000	.625	.734	.636	.000	.000	.618	.625	.877

Accurate Counts  
978-664-2565

N/S Street : Portland Street  
E/W Street: Main Street  
City/State : Cambridge, MA  
Weather : Cloudy

File Name : 58290006  
Site Code : 58290006  
Start Date : 5/12/2011  
Page No : 1

Groups Printed- Buses

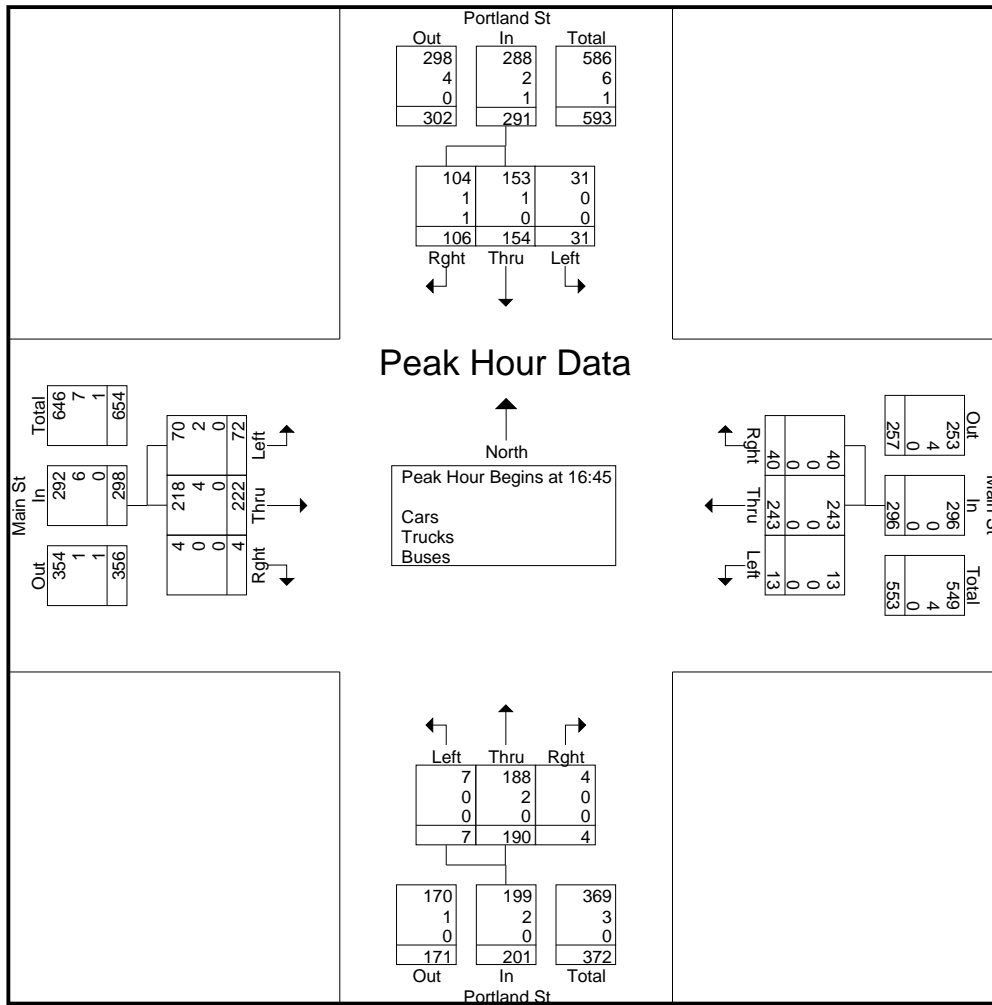
Start Time	Portland St From North			Main St From East			Portland St From South			Main St From West			Int. Total
	Left	Thru	Rght	Left	Thru	Rght	Left	Thru	Rght	Left	Thru	Rght	
16:30	0	0	0	0	0	0	0	0	0	0	0	0	0
16:45	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0
17:00	0	0	0	0	0	0	0	0	0	0	0	0	0
17:15	0	0	1	0	0	0	0	0	0	0	0	0	1
17:30	0	0	0	0	0	0	0	0	0	0	0	0	0
17:45	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	1	0	0	0	0	0	0	0	0	0	1
18:00	0	0	0	0	0	0	0	0	0	0	0	0	0
18:15	0	0	0	0	0	0	0	0	0	0	0	0	0
18:30	0	0	0	0	0	0	0	0	0	0	0	0	0
18:45	0	0	0	0	1	0	0	0	0	0	0	0	1
Total	0	0	0	0	1	0	0	0	0	0	0	0	1
19:00	0	0	0	0	0	0	0	1	0	0	0	0	1
19:15	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	1	0	1	0	0	1	0	0	0	0	3
Apprch %	0	0	100	0	100	0	0	100	0	0	0	0	
Total %	0	0	33.3	0	33.3	0	0	33.3	0	0	0	0	

Start Time	Portland St From North				Main St From East				Portland St From South				Main St From West				Int. Total
	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	
Peak Hour Analysis From 16:30 to 19:15 - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 18:15																	
18:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18:45	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	1
19:00	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	1
Total Volume	0	0	0	0	0	1	0	1	0	1	0	1	0	0	0	0	2
% App. Total	0	0	0		0	100	0		0	100	0		0	0	0		
PHF	.000	.000	.000	.000	.000	.250	.000	.250	.000	.250	.000	.250	.000	.000	.000	.000	.500





N/S Street : Portland Street  
E/W Street: Main Street  
City/State : Cambridge, MA  
Weather : Cloudy



Peak Hour Analysis From 16:30 to 19:15 - Peak 1 of 1  
Peak Hour for Each Approach Begins at:

	16:45				17:00				16:45				16:45			
+0 mins.	10	36	23	69	3	60	17	80	2	57	1	60	17	51	0	68
+15 mins.	9	38	21	68	6	60	6	72	2	26	1	29	15	66	3	84
+30 mins.	7	33	29	69	2	69	13	84	1	48	1	50	16	59	1	76
+45 mins.	5	47	33	85	3	57	6	66	2	59	1	62	24	46	0	70
Total Volume	31	154	106	291	14	246	42	302	7	190	4	201	72	222	4	298
% App. Total	10.7	52.9	36.4		4.6	81.5	13.9		3.5	94.5	2		24.2	74.5	1.3	
PHF	.775	.819	.803	.856	.583	.891	.618	.899	.875	.805	1.000	.810	.750	.841	.333	.887
Cars	31	153	104	288	14	246	42	302	7	188	4	199	70	218	4	292
% Cars	100	99.4	98.1	99	100	100	100	100	100	98.9	100	99	97.2	98.2	100	98
Trucks	0	1	1	2	0	0	0	0	0	2	0	2	2	4	0	6
% Trucks	0	0.6	0.9	0.7	0	0	0	0	0	1.1	0	1	2.8	1.8	0	2
Buses	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0
% Buses	0	0	0.9	0.3	0	0	0	0	0	0	0	0	0	0	0	0

# Accurate Counts

978-664-2565

N/S Street : Portland Street  
 E/W Street: Main Street  
 City/State : Cambridge, MA  
 Weather : Cloudy

File Name : 58290006  
 Site Code : 58290006  
 Start Date : 5/12/2011  
 Page No : 1

### Groups Printed- Bikes ST

Start Time	Portland St From North			Main St From East			Portland St From South			Main St From West			Int. Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
16:30	1	7	1	0	11	0	0	4	0	1	1	0	26
16:45	0	4	1	0	10	0	0	1	0	2	5	0	23
<b>Total</b>	<b>1</b>	<b>11</b>	<b>2</b>	<b>0</b>	<b>21</b>	<b>0</b>	<b>0</b>	<b>5</b>	<b>0</b>	<b>3</b>	<b>6</b>	<b>0</b>	<b>49</b>
17:00	0	3	1	0	12	2	0	3	0	1	3	0	25
17:15	1	4	3	0	13	1	0	0	0	0	3	0	25
17:30	0	1	1	0	13	0	0	5	0	1	5	0	26
17:45	0	7	1	0	12	1	0	6	0	0	3	0	30
<b>Total</b>	<b>1</b>	<b>15</b>	<b>6</b>	<b>0</b>	<b>50</b>	<b>4</b>	<b>0</b>	<b>14</b>	<b>0</b>	<b>2</b>	<b>14</b>	<b>0</b>	<b>106</b>
18:00	1	5	1	0	12	1	0	6	0	1	5	1	33
18:15	1	7	1	0	14	1	0	6	1	1	2	0	34
18:30	0	5	0	0	14	0	0	3	1	0	6	0	29
18:45	0	3	0	0	15	0	0	5	0	1	4	0	28
<b>Total</b>	<b>2</b>	<b>20</b>	<b>2</b>	<b>0</b>	<b>55</b>	<b>2</b>	<b>0</b>	<b>20</b>	<b>2</b>	<b>3</b>	<b>17</b>	<b>1</b>	<b>124</b>
19:00	0	4	2	0	8	1	0	6	0	3	3	0	27
19:15	1	0	0	0	4	0	0	7	0	0	2	0	14
<b>Grand Total</b>	<b>5</b>	<b>50</b>	<b>12</b>	<b>0</b>	<b>138</b>	<b>7</b>	<b>0</b>	<b>52</b>	<b>2</b>	<b>11</b>	<b>42</b>	<b>1</b>	<b>320</b>
Apprch %	7.5	74.6	17.9	0	95.2	4.8	0	96.3	3.7	20.4	77.8	1.9	
Total %	1.6	15.6	3.8	0	43.1	2.2	0	16.2	0.6	3.4	13.1	0.3	

Start Time	Portland St From North				Main St From East				Portland St From South				Main St From West				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
Peak Hour Analysis From 16:30 to 19:15 - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 17:45																	
17:45	0	7	1	8	0	12	1	13	0	6	0	6	0	3	0	3	30
18:00	1	5	1	7	0	12	1	13	0	6	0	6	1	5	1	7	33
18:15	1	7	1	9	0	14	1	15	0	6	1	7	1	2	0	3	34
18:30	0	5	0	5	0	14	0	14	0	3	1	4	0	6	0	6	29
<b>Total Volume</b>	<b>2</b>	<b>24</b>	<b>3</b>	<b>29</b>	<b>0</b>	<b>52</b>	<b>3</b>	<b>55</b>	<b>0</b>	<b>21</b>	<b>2</b>	<b>23</b>	<b>2</b>	<b>16</b>	<b>1</b>	<b>19</b>	<b>126</b>
<b>% App. Total</b>	<b>6.9</b>	<b>82.8</b>	<b>10.3</b>		<b>0</b>	<b>94.5</b>	<b>5.5</b>		<b>0</b>	<b>91.3</b>	<b>8.7</b>		<b>10.5</b>	<b>84.2</b>	<b>5.3</b>		
PHF	.500	.857	.750	.806	.000	.929	.750	.917	.000	.875	.500	.821	.500	.667	.250	.679	.926

# Accurate Counts

978-664-2565

N/S Street : Portland Street  
 E/W Street: Main Street  
 City/State : Cambridge, MA  
 Weather : Cloudy

File Name : 58290006  
 Site Code : 58290006  
 Start Date : 5/12/2011  
 Page No : 1

### Groups Printed- Bikes SW

Start Time	Portland St From North			Main St From East			Portland St From South			Main St From West			Int. Total
	Left	Thru	Rght	Left	Thru	Rght	Left	Thru	Rght	Left	Thru	Rght	
16:30	0	0	0	0	0	0	0	0	0	0	0	0	0
16:45	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0
17:00	0	0	0	0	0	0	0	0	0	0	0	0	0
17:15	0	0	0	0	0	0	0	0	0	0	0	0	0
17:30	0	0	0	0	0	0	0	0	0	0	0	0	0
17:45	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0
18:00	0	0	0	0	0	0	0	0	0	0	0	0	0
18:15	0	0	0	0	0	0	0	0	0	0	0	0	0
18:30	0	0	0	0	0	0	0	0	0	0	0	0	0
18:45	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0
19:00	0	0	0	0	0	0	0	0	0	0	0	0	0
19:15	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0	0
Apprch %	0	0	0	0	0	0	0	0	0	0	0	0	0
Total %													

Start Time	Portland St From North				Main St From East				Portland St From South				Main St From West				Int. Total
	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	
Peak Hour Analysis From 16:30 to 19:15 - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 16:30																	
16:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Volume	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% App. Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000

# Accurate Counts

978-664-2565

N/S Street : Portland Street  
 E/W Street: Main Street  
 City/State : Cambridge, MA  
 Weather : Cloudy

File Name : 58290006  
 Site Code : 58290006  
 Start Date : 5/12/2011  
 Page No : 1

### Groups Printed- Trucks

Start Time	Portland St From North			Main St From East			Portland St From South			Main St From West			Int. Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
16:30	1	1	0	0	0	0	0	0	0	0	1	0	3
16:45	0	0	0	0	0	0	0	1	0	1	1	0	3
<b>Total</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>0</b>	<b>6</b>
17:00	0	1	1	0	0	0	0	0	0	0	1	0	3
17:15	0	0	0	0	0	0	0	0	0	0	1	0	1
17:30	0	0	0	0	0	0	0	1	0	1	1	0	3
17:45	0	0	0	0	0	0	0	1	0	0	0	0	1
<b>Total</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>0</b>	<b>1</b>	<b>3</b>	<b>0</b>	<b>8</b>
18:00	0	0	0	0	0	0	0	0	0	0	0	0	0
18:15	0	0	0	0	0	0	0	0	0	0	0	0	0
18:30	0	0	0	0	0	0	0	0	0	0	2	0	2
18:45	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>0</b>	<b>2</b>
19:00	0	0	1	0	0	0	0	0	0	1	0	0	2
19:15	0	0	0	0	0	0	0	0	0	0	1	0	1
<b>Grand Total</b>	<b>1</b>	<b>2</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>0</b>	<b>3</b>	<b>8</b>	<b>0</b>	<b>19</b>
Apprch %	20	40	40	0	0	0	0	100	0	27.3	72.7	0	
Total %	5.3	10.5	10.5	0	0	0	0	15.8	0	15.8	42.1	0	

Start Time	Portland St From North				Main St From East				Portland St From South				Main St From West				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
Peak Hour Analysis From 16:30 to 19:15 - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 16:30																	
16:30	1	1	0	2	0	0	0	0	0	0	0	0	0	1	0	1	3
16:45	0	0	0	0	0	0	0	0	0	1	0	1	1	1	0	2	3
17:00	0	1	1	2	0	0	0	0	0	0	0	0	0	1	0	1	3
17:15	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
<b>Total Volume</b>	<b>1</b>	<b>2</b>	<b>1</b>	<b>4</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>4</b>	<b>0</b>	<b>5</b>	<b>10</b>
<b>% App. Total</b>	<b>25</b>	<b>50</b>	<b>25</b>		<b>0</b>	<b>0</b>	<b>0</b>		<b>0</b>	<b>100</b>	<b>0</b>		<b>20</b>	<b>80</b>	<b>0</b>		
PHF	.250	.500	.250	.500	.000	.000	.000	.000	.000	.250	.000	.250	.250	1.000	.000	.625	.833

Accurate Counts  
978-664-2565

N/S Street : Portland Street  
E/W Street: Main Street  
City/State : Cambridge, MA  
Weather : Cloudy

File Name : 58290006  
Site Code : 58290006  
Start Date : 5/12/2011  
Page No : 1

Groups Printed- Peds

Start Time	Portland St From North				Main St From East				Portland St From South				Main St From West				Int. Total
	EB		WB		NB		SB		EB		WB		NB		SB		
16:30	0	0	0	0	2	0	0	10	1	0	0	1	5	0	0	0	19
16:45	0	0	0	0	8	0	0	0	5	0	0	2	4	0	0	0	19
Total	0	0	0	0	10	0	0	10	6	0	0	3	9	0	0	0	38
17:00	0	0	0	0	9	0	0	7	0	0	0	4	7	0	0	0	27
17:15	0	0	0	0	5	0	0	7	1	0	0	5	8	0	0	0	26
17:30	0	0	0	0	5	0	0	10	8	0	0	8	4	0	0	0	35
17:45	0	0	0	0	5	0	0	5	4	0	0	6	3	0	0	0	23
Total	0	0	0	0	24	0	0	29	13	0	0	23	22	0	0	0	111
18:00	0	0	0	0	4	0	0	8	4	0	0	13	3	0	0	0	32
18:15	0	0	0	0	7	0	0	4	11	0	0	18	19	0	0	0	59
18:30	0	0	0	0	4	0	0	1	4	0	0	8	6	0	0	0	23
18:45	0	0	0	0	5	0	0	7	11	0	0	20	7	0	0	0	50
Total	0	0	0	0	20	0	0	20	30	0	0	59	35	0	0	0	164
19:00	0	0	0	0	2	0	0	3	3	0	0	3	3	0	0	0	14
19:15	0	0	0	0	4	0	0	1	0	0	0	8	6	0	0	0	19
Grand Total	0	0	0	0	60	0	0	63	52	0	0	96	75	0	0	0	346
Apprch %	0	0	0	0	48.8	0	0	51.2	35.1	0	0	64.9	100	0	0	0	
Total %	0	0	0	0	17.3	0	0	18.2	15	0	0	27.7	21.7	0	0	0	

Start Time	Portland St From North				Main St From East				Portland St From South				Main St From West				Int. Total			
	EB		WB	App. Total	NB		SB	App. Total	EB		WB	App. Total	NB		SB	App. Total				
Peak Hour Analysis From 16:30 to 19:15 - Peak 1 of 1																				
Peak Hour for Entire Intersection Begins at 18:00																				
18:00	0	0	0	0	4	0	0	8	12	4	0	0	13	17	3	0	0	3	32	
18:15	0	0	0	0	7	0	0	4	11	11	0	0	18	29	19	0	0	0	19	59
18:30	0	0	0	0	4	0	0	1	5	4	0	0	8	12	6	0	0	0	6	23
18:45	0	0	0	0	5	0	0	7	12	11	0	0	20	31	7	0	0	0	7	50
Total Volume	0	0	0	0	20	0	0	20	40	30	0	0	59	89	35	0	0	0	35	164
% App. Total																				
PHF	.000	.000	.000	.000	.714	.000	.000	.625	.833	.682	.000	.000	.738	.718	.461	.000	.000	.000	.461	.695



PRECISION  
D A T A  
INDUSTRIES, LLC

46 Morton Street, Framingham, MA 01702  
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S: Sydne Street  
E/W: Main Street/ Columbia Street  
City, State: Cambridge, MA  
Client: VHB/ C. Dube

File Name : 165082 C  
Site Code : TBA  
Start Date : 5/18/2016  
Page No : 1

Groups Printed- Cars - Heavy Vehicles

Start Time	Main Street From East			Sydney Street From South			Columbia Street From West			Int. Total
	Thru	Left	U-Turn	Right	Left	U-Turn	Right	Thru	U-Turn	
07:30 AM	2	31	0	31	7	0	52	1	0	124
07:45 AM	5	31	0	29	6	0	69	3	0	143
Total	7	62	0	60	13	0	121	4	0	267
08:00 AM	4	27	0	27	8	0	68	2	0	136
08:15 AM	0	27	0	33	8	0	63	1	0	132
08:30 AM	6	27	0	24	14	0	72	0	0	143
08:45 AM	1	23	0	24	9	0	54	3	0	114
Total	11	104	0	108	39	0	257	6	0	525
09:00 AM	4	21	0	30	12	0	60	0	0	127
09:15 AM	1	21	0	33	13	0	57	1	0	126
Grand Total	23	208	0	231	77	0	495	11	0	1045
Apprch %	10	90	0	75	25	0	97.8	2.2	0	
Total %	2.2	19.9	0	22.1	7.4	0	47.4	1.1	0	
Cars	22	177	0	192	74	0	485	8	0	958
% Cars	95.7	85.1	0	83.1	96.1	0	98	72.7	0	91.7
Heavy Vehicles	1	31	0	39	3	0	10	3	0	87
% Heavy Vehicles	4.3	14.9	0	16.9	3.9	0	2	27.3	0	8.3

Start Time	Main Street From East				Sydney Street From South				Columbia Street From West				Int. Total
	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Right	Thru	U-Turn	App. Total	
Peak Hour Analysis From 07:30 AM to 09:15 AM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 07:45 AM													
07:45 AM	5	31	0	36	29	6	0	35	69	3	0	72	143
08:00 AM	4	27	0	31	27	8	0	35	68	2	0	70	136
08:15 AM	0	27	0	27	33	8	0	41	63	1	0	64	132
08:30 AM	6	27	0	33	24	14	0	38	72	0	0	72	143
Total Volume	15	112	0	127	113	36	0	149	272	6	0	278	554
% App. Total	11.8	88.2	0		75.8	24.2	0		97.8	2.2	0		
PHF	.625	.903	.000	.882	.856	.643	.000	.909	.944	.500	.000	.965	.969
Cars	14	94	0	108	97	35	0	132	268	3	0	271	511
% Cars	93.3	83.9	0	85.0	85.8	97.2	0	88.6	98.5	50.0	0	97.5	92.2
Heavy Vehicles	1	18	0	19	16	1	0	17	4	3	0	7	43
% Heavy Vehicles	6.7	16.1	0	15.0	14.2	2.8	0	11.4	1.5	50.0	0	2.5	7.8



PRECISION  
D A T A  
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S: Sydne Street  
E/W: Main Street/ Columbia Street  
City, State: Cambridge, MA  
Client: VHB/ C. Dube

File Name : 165082 C  
Site Code : TBA  
Start Date : 5/18/2016  
Page No : 1

Groups Printed- Cars

Start Time	Main Street From East			Sydney Street From South			Columbia Street From West			Int. Total
	Thru	Left	U-Turn	Right	Left	U-Turn	Right	Thru	U-Turn	
07:30 AM	2	29	0	24	7	0	51	1	0	114
07:45 AM	5	26	0	26	6	0	68	1	0	132
Total	7	55	0	50	13	0	119	2	0	246
08:00 AM	4	22	0	23	7	0	68	2	0	126
08:15 AM	0	21	0	28	8	0	63	0	0	120
08:30 AM	5	25	0	20	14	0	69	0	0	133
08:45 AM	1	19	0	20	9	0	54	3	0	106
Total	10	87	0	91	38	0	254	5	0	485
09:00 AM	4	19	0	27	10	0	59	0	0	119
09:15 AM	1	16	0	24	13	0	53	1	0	108
Grand Total	22	177	0	192	74	0	485	8	0	958
Apprch %	11.1	88.9	0	72.2	27.8	0	98.4	1.6	0	
Total %	2.3	18.5	0	20	7.7	0	50.6	0.8	0	

Start Time	Main Street From East				Sydney Street From South				Columbia Street From West				Int. Total
	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Right	Thru	U-Turn	App. Total	
Peak Hour Analysis From 07:30 AM to 09:15 AM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 07:45 AM													
07:45 AM	5	26	0	31	26	6	0	32	68	1	0	69	132
08:00 AM	4	22	0	26	23	7	0	30	68	2	0	70	126
08:15 AM	0	21	0	21	28	8	0	36	63	0	0	63	120
08:30 AM	5	25	0	30	20	14	0	34	69	0	0	69	133
Total Volume	14	94	0	108	97	35	0	132	268	3	0	271	511
% App. Total	13	87	0		73.5	26.5	0		98.9	1.1	0		
PHF	.700	.904	.000	.871	.866	.625	.000	.917	.971	.375	.000	.968	.961





PRECISION  
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S: Sydne Street  
E/W: Main Street/ Columbia Street  
City, State: Cambridge, MA  
Client: VHB/ C. Dube

File Name : 165082 C  
Site Code : TBA  
Start Date : 5/18/2016  
Page No : 1

Groups Printed- Heavy Vehicles

Start Time	Main Street From East			Sydney Street From South			Columbia Street From West			Int. Total
	Thru	Left	U-Turn	Right	Left	U-Turn	Right	Thru	U-Turn	
07:30 AM	0	2	0	7	0	0	1	0	0	10
07:45 AM	0	5	0	3	0	0	1	2	0	11
Total	0	7	0	10	0	0	2	2	0	21
08:00 AM	0	5	0	4	1	0	0	0	0	10
08:15 AM	0	6	0	5	0	0	0	1	0	12
08:30 AM	1	2	0	4	0	0	3	0	0	10
08:45 AM	0	4	0	4	0	0	0	0	0	8
Total	1	17	0	17	1	0	3	1	0	40
09:00 AM	0	2	0	3	2	0	1	0	0	8
09:15 AM	0	5	0	9	0	0	4	0	0	18
Grand Total	1	31	0	39	3	0	10	3	0	87
Apprch %	3.1	96.9	0	92.9	7.1	0	76.9	23.1	0	
Total %	1.1	35.6	0	44.8	3.4	0	11.5	3.4	0	

Start Time	Main Street From East				Sydney Street From South				Columbia Street From West				Int. Total
	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Right	Thru	U-Turn	App. Total	
Peak Hour Analysis From 07:30 AM to 09:15 AM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 08:30 AM													
08:30 AM	1	2	0	3	4	0	0	4	3	0	0	3	10
08:45 AM	0	4	0	4	4	0	0	4	0	0	0	0	8
09:00 AM	0	2	0	2	3	2	0	5	1	0	0	1	8
09:15 AM	0	5	0	5	9	0	0	9	4	0	0	4	18
Total Volume	1	13	0	14	20	2	0	22	8	0	0	8	44
% App. Total	7.1	92.9	0		90.9	9.1	0		100	0	0		
PHF	.250	.650	.000	.700	.556	.250	.000	.611	.500	.000	.000	.500	.611



PRECISION  
D A T A  
INDUSTRIES, LLC

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S: Sydne Street  
E/W: Main Street/ Columbia Street  
City, State: Cambridge, MA  
Client: VHB/ C. Dube

File Name : 165082 C  
Site Code : TBA  
Start Date : 5/18/2016  
Page No : 1

Groups Printed- Peds and Bikes

Start Time	Main Street From East				Sydney Street From South				Columbia Street From West				Int. Total
	Thru	Left	Peds SB	Peds NB	Right	Left	Peds WB	Peds EB	Right	Thru	Peds NB	Peds SB	
07:30 AM	0	2	4	0	6	2	3	0	10	2	0	0	29
07:45 AM	1	0	1	3	6	3	0	1	16	3	2	0	36
Total	1	2	5	3	12	5	3	1	26	5	2	0	65
08:00 AM	0	2	10	9	12	1	0	1	18	2	3	1	59
08:15 AM	3	2	9	2	17	2	1	1	26	7	5	2	77
08:30 AM	1	2	3	5	16	2	0	0	25	8	0	0	62
08:45 AM	3	4	5	4	18	0	1	0	35	7	1	0	78
Total	7	10	27	20	63	5	2	2	104	24	9	3	276
09:00 AM	0	3	9	4	12	2	1	0	31	9	5	1	77
09:15 AM	1	3	3	4	5	3	0	1	14	7	0	1	42
Grand Total	9	18	44	31	92	15	6	4	175	45	16	5	460
Apprch %	8.8	17.6	43.1	30.4	78.6	12.8	5.1	3.4	72.6	18.7	6.6	2.1	
Total %	2	3.9	9.6	6.7	20	3.3	1.3	0.9	38	9.8	3.5	1.1	

Start Time	Main Street From East					Sydney Street From South					Columbia Street From West					Int. Total
	Thru	Left	Peds SB	Peds NB	App. Total	Right	Left	Peds WB	Peds EB	App. Total	Right	Thru	Peds NB	Peds SB	App. Total	
Peak Hour Analysis From 07:30 AM to 09:15 AM - Peak 1 of 1																
Peak Hour for Entire Intersection Begins at 08:15 AM																
08:15 AM	3	2	9	2	16	17	2	1	1	21	26	7	5	2	40	77
08:30 AM	1	2	3	5	11	16	2	0	0	18	25	8	0	0	33	62
08:45 AM	3	4	5	4	16	18	0	1	0	19	35	7	1	0	43	78
09:00 AM	0	3	9	4	16	12	2	1	0	15	31	9	5	1	46	77
Total Volume	7	11	26	15	59	63	6	3	1	73	117	31	11	3	162	294
% App. Total	11.9	18.6	44.1	25.4		86.3	8.2	4.1	1.4		72.2	19.1	6.8	1.9		
PHF	.583	.688	.722	.750	.922	.875	.750	.750	.250	.869	.836	.861	.550	.375	.880	.942



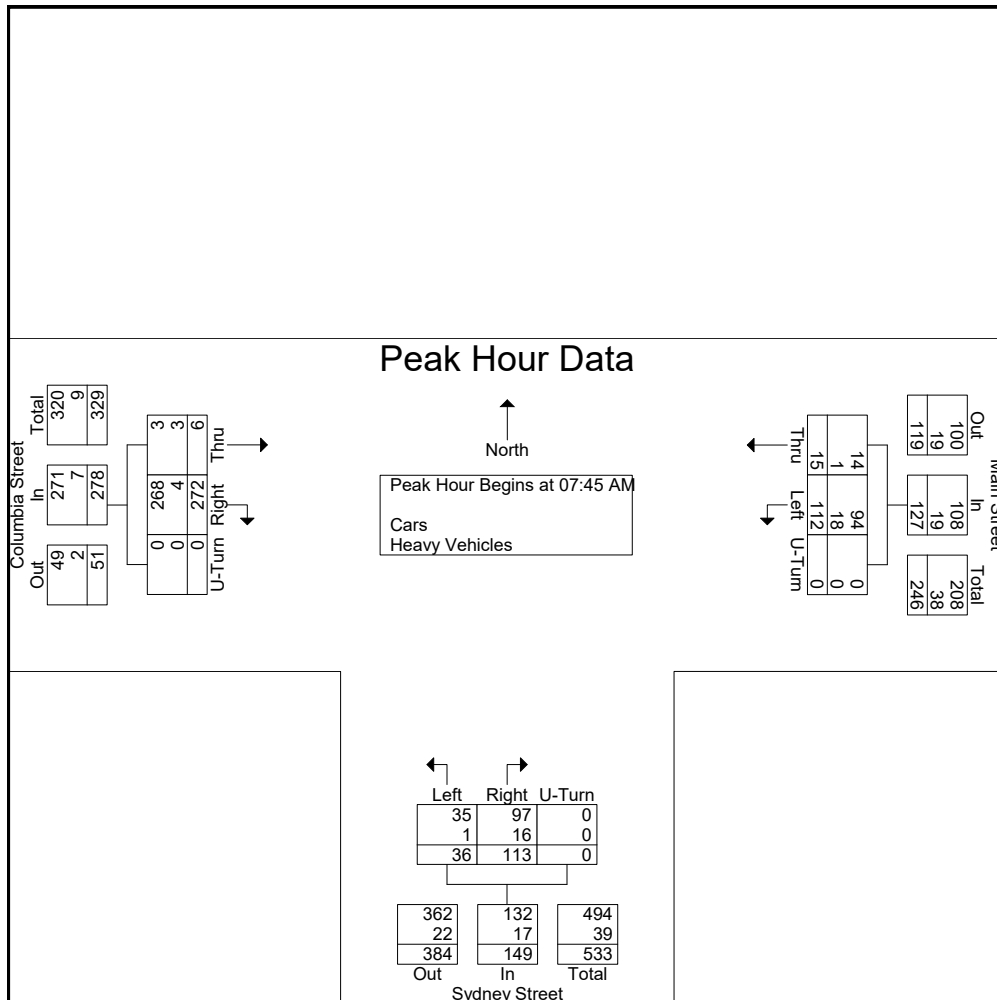
PRECISION  
D A T A  
INDUSTRIES, LLC

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S: Sydne Street  
E/W: Main Street/ Columbia Street  
City, State: Cambridge, MA  
Client: VHB/ C. Dube

File Name : 165082 C  
Site Code : TBA  
Start Date : 5/18/2016  
Page No : 1

Start Time	Main Street From East				Sydney Street From South				Columbia Street From West				Int. Total
	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Right	Thru	U-Turn	App. Total	
Peak Hour Analysis From 07:30 AM to 09:15 AM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 07:45 AM													
07:45 AM	5	31	0	36	29	6	0	35	69	3	0	72	143
08:00 AM	4	27	0	31	27	8	0	35	68	2	0	70	136
08:15 AM	0	27	0	27	33	8	0	41	63	1	0	64	132
08:30 AM	6	27	0	33	24	14	0	38	72	0	0	72	143
Total Volume	15	112	0	127	113	36	0	149	272	6	0	278	554
% App. Total	11.8	88.2	0		75.8	24.2	0		97.8	2.2	0		
PHF	.625	.903	.000	.882	.856	.643	.000	.909	.944	.500	.000	.965	.969
Cars	14	94	0	108	97	35	0	132	268	3	0	271	511
% Cars	93.3	83.9	0	85.0	85.8	97.2	0	88.6	98.5	50.0	0	97.5	92.2
Heavy Vehicles	1	18	0	19	16	1	0	17	4	3	0	7	43
% Heavy Vehicles	6.7	16.1	0	15.0	14.2	2.8	0	11.4	1.5	50.0	0	2.5	7.8





PRECISION  
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INDUSTRIES, LLC

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S: Sydne Street  
E/W: Main Street/ Columbia Street  
City, State: Cambridge, MA  
Client: VHB/ C. Dube

File Name : 165082 CC  
Site Code : TBA  
Start Date : 5/18/2016  
Page No : 1

Groups Printed- Cars - Heavy Vehicles

Start Time	Main Street From East			Sydney Street From South			Columbia Street From West			Int. Total
	Thru	Left	U-Turn	Right	Left	U-Turn	Right	Thru	U-Turn	
04:30 PM	2	31	0	34	29	0	30	1	0	127
04:45 PM	1	42	0	22	25	0	38	3	0	131
Total	3	73	0	56	54	0	68	4	0	258
05:00 PM	5	37	0	32	27	0	45	3	0	149
05:15 PM	7	54	0	35	24	0	47	4	0	171
05:30 PM	4	40	0	22	35	0	34	6	0	141
05:45 PM	1	46	0	25	24	0	49	2	0	147
Total	17	177	0	114	110	0	175	15	0	608
06:00 PM	14	34	0	31	31	0	37	6	0	153
06:15 PM	8	34	0	38	27	0	40	5	0	152
Grand Total	42	318	0	239	222	0	320	30	0	1171
Apprch %	11.7	88.3	0	51.8	48.2	0	91.4	8.6	0	
Total %	3.6	27.2	0	20.4	19	0	27.3	2.6	0	
Cars	41	309	0	224	212	0	315	29	0	1130
% Cars	97.6	97.2	0	93.7	95.5	0	98.4	96.7	0	96.5
Heavy Vehicles	1	9	0	15	10	0	5	1	0	41
% Heavy Vehicles	2.4	2.8	0	6.3	4.5	0	1.6	3.3	0	3.5

Start Time	Main Street From East				Sydney Street From South				Columbia Street From West				Int. Total
	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Right	Thru	U-Turn	App. Total	
Peak Hour Analysis From 04:30 PM to 06:15 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 05:15 PM													
05:15 PM	7	54	0	61	35	24	0	59	47	4	0	51	171
05:30 PM	4	40	0	44	22	35	0	57	34	6	0	40	141
05:45 PM	1	46	0	47	25	24	0	49	49	2	0	51	147
06:00 PM	14	34	0	48	31	31	0	62	37	6	0	43	153
Total Volume	26	174	0	200	113	114	0	227	167	18	0	185	612
% App. Total	13	87	0		49.8	50.2	0		90.3	9.7	0		
PHF	.464	.806	.000	.820	.807	.814	.000	.915	.852	.750	.000	.907	.895
Cars	26	167	0	193	107	108	0	215	165	18	0	183	591
% Cars	100	96.0	0	96.5	94.7	94.7	0	94.7	98.8	100	0	98.9	96.6
Heavy Vehicles	0	7	0	7	6	6	0	12	2	0	0	2	21
% Heavy Vehicles	0	4.0	0	3.5	5.3	5.3	0	5.3	1.2	0	0	1.1	3.4



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City, State: Cambridge, MA  
Client: VHB/ C. Dube

File Name : 165082 CC  
Site Code : TBA  
Start Date : 5/18/2016  
Page No : 1

Groups Printed- Cars

Start Time	Main Street From East			Sydney Street From South			Columbia Street From West			Int. Total
	Thru	Left	U-Turn	Right	Left	U-Turn	Right	Thru	U-Turn	
04:30 PM	2	30	0	30	29	0	30	1	0	122
04:45 PM	1	41	0	19	23	0	37	3	0	124
Total	3	71	0	49	52	0	67	4	0	246
05:00 PM	5	37	0	31	26	0	44	3	0	146
05:15 PM	7	53	0	33	24	0	46	4	0	167
05:30 PM	4	37	0	21	34	0	33	6	0	135
05:45 PM	1	45	0	23	23	0	49	2	0	143
Total	17	172	0	108	107	0	172	15	0	591
06:00 PM	14	32	0	30	27	0	37	6	0	146
06:15 PM	7	34	0	37	26	0	39	4	0	147
Grand Total	41	309	0	224	212	0	315	29	0	1130
Apprch %	11.7	88.3	0	51.4	48.6	0	91.6	8.4	0	
Total %	3.6	27.3	0	19.8	18.8	0	27.9	2.6	0	

Start Time	Main Street From East				Sydney Street From South				Columbia Street From West				Int. Total
	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Right	Thru	U-Turn	App. Total	
Peak Hour Analysis From 04:30 PM to 06:15 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 05:00 PM													
05:00 PM	5	37	0	42	31	26	0	57	44	3	0	47	146
05:15 PM	7	53	0	60	33	24	0	57	46	4	0	50	167
05:30 PM	4	37	0	41	21	34	0	55	33	6	0	39	135
05:45 PM	1	45	0	46	23	23	0	46	49	2	0	51	143
Total Volume	17	172	0	189	108	107	0	215	172	15	0	187	591
% App. Total	9	91	0		50.2	49.8	0		92	8	0		
PHF	.607	.811	.000	.788	.818	.787	.000	.943	.878	.625	.000	.917	.885



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City, State: Cambridge, MA  
Client: VHB/ C. Dube

File Name : 165082 CC  
Site Code : TBA  
Start Date : 5/18/2016  
Page No : 1

Groups Printed- Heavy Vehicles

Start Time	Main Street From East			Sydney Street From South			Columbia Street From West			Int. Total
	Thru	Left	U-Turn	Right	Left	U-Turn	Right	Thru	U-Turn	
04:30 PM	0	1	0	4	0	0	0	0	0	5
04:45 PM	0	1	0	3	2	0	1	0	0	7
Total	0	2	0	7	2	0	1	0	0	12
05:00 PM	0	0	0	1	1	0	1	0	0	3
05:15 PM	0	1	0	2	0	0	1	0	0	4
05:30 PM	0	3	0	1	1	0	1	0	0	6
05:45 PM	0	1	0	2	1	0	0	0	0	4
Total	0	5	0	6	3	0	3	0	0	17
06:00 PM	0	2	0	1	4	0	0	0	0	7
06:15 PM	1	0	0	1	1	0	1	1	0	5
Grand Total	1	9	0	15	10	0	5	1	0	41
Apprch %	10	90	0	60	40	0	83.3	16.7	0	
Total %	2.4	22	0	36.6	24.4	0	12.2	2.4	0	

Start Time	Main Street From East				Sydney Street From South				Columbia Street From West				Int. Total
	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Right	Thru	U-Turn	App. Total	
Peak Hour Analysis From 04:30 PM to 06:15 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 05:30 PM													
05:30 PM	0	3	0	3	1	1	0	2	1	0	0	1	6
05:45 PM	0	1	0	1	2	1	0	3	0	0	0	0	4
06:00 PM	0	2	0	2	1	4	0	5	0	0	0	0	7
06:15 PM	1	0	0	1	1	1	0	2	1	1	0	2	5
Total Volume	1	6	0	7	5	7	0	12	2	1	0	3	22
% App. Total	14.3	85.7	0		41.7	58.3	0		66.7	33.3	0		
PHF	.250	.500	.000	.583	.625	.438	.000	.600	.500	.250	.000	.375	.786



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Client: VHB/ C. Dube

File Name : 165082 CC  
Site Code : TBA  
Start Date : 5/18/2016  
Page No : 1

Groups Printed- Peds and Bikes

Start Time	Main Street From East				Sydney Street From South				Columbia Street From West				Int. Total
	Thru	Left	Peds SB	Peds NB	Right	Left	Peds WB	Peds EB	Right	Thru	Peds NB	Peds SB	
04:30 PM	0	5	5	14	1	2	0	2	2	0	2	2	35
04:45 PM	0	9	11	22	2	12	3	2	10	1	5	7	84
Total	0	14	16	36	3	14	3	4	12	1	7	9	119
05:00 PM	3	14	20	17	3	14	1	1	3	0	5	4	85
05:15 PM	3	10	18	26	5	15	0	0	7	0	11	10	105
05:30 PM	5	9	7	27	1	12	2	0	3	0	9	9	84
05:45 PM	4	17	8	17	5	6	2	0	5	6	20	11	101
Total	15	50	53	87	14	47	5	1	18	6	45	34	375
06:00 PM	6	14	14	27	2	10	6	0	7	0	8	0	94
06:15 PM	5	15	9	19	5	9	0	1	5	0	12	10	90
Grand Total	26	93	92	169	24	80	14	6	42	7	72	53	678
Apprch %	6.8	24.5	24.2	44.5	19.4	64.5	11.3	4.8	24.1	4	41.4	30.5	
Total %	3.8	13.7	13.6	24.9	3.5	11.8	2.1	0.9	6.2	1	10.6	7.8	

Start Time	Main Street From East					Sydney Street From South					Columbia Street From West					Int. Total
	Thru	Left	Peds SB	Peds NB	App. Total	Right	Left	Peds WB	Peds EB	App. Total	Right	Thru	Peds NB	Peds SB	App. Total	
Peak Hour Analysis From 04:30 PM to 06:15 PM - Peak 1 of 1																
Peak Hour for Entire Intersection Begins at 05:15 PM																
05:15 PM	3	10	18	26	57	5	15	0	0	20	7	0	11	10	28	105
05:30 PM	5	9	7	27	48	1	12	2	0	15	3	0	9	9	21	84
05:45 PM	4	17	8	17	46	5	6	2	0	13	5	6	20	11	42	101
06:00 PM	6	14	14	27	61	2	10	6	0	18	7	0	8	0	15	94
Total Volume	18	50	47	97	212	13	43	10	0	66	22	6	48	30	106	384
% App. Total	8.5	23.6	22.2	45.8		19.7	65.2	15.2	0		20.8	5.7	45.3	28.3		
PHF	.750	.735	.653	.898	.869	.650	.717	.417	.000	.825	.786	.250	.600	.682	.631	.914



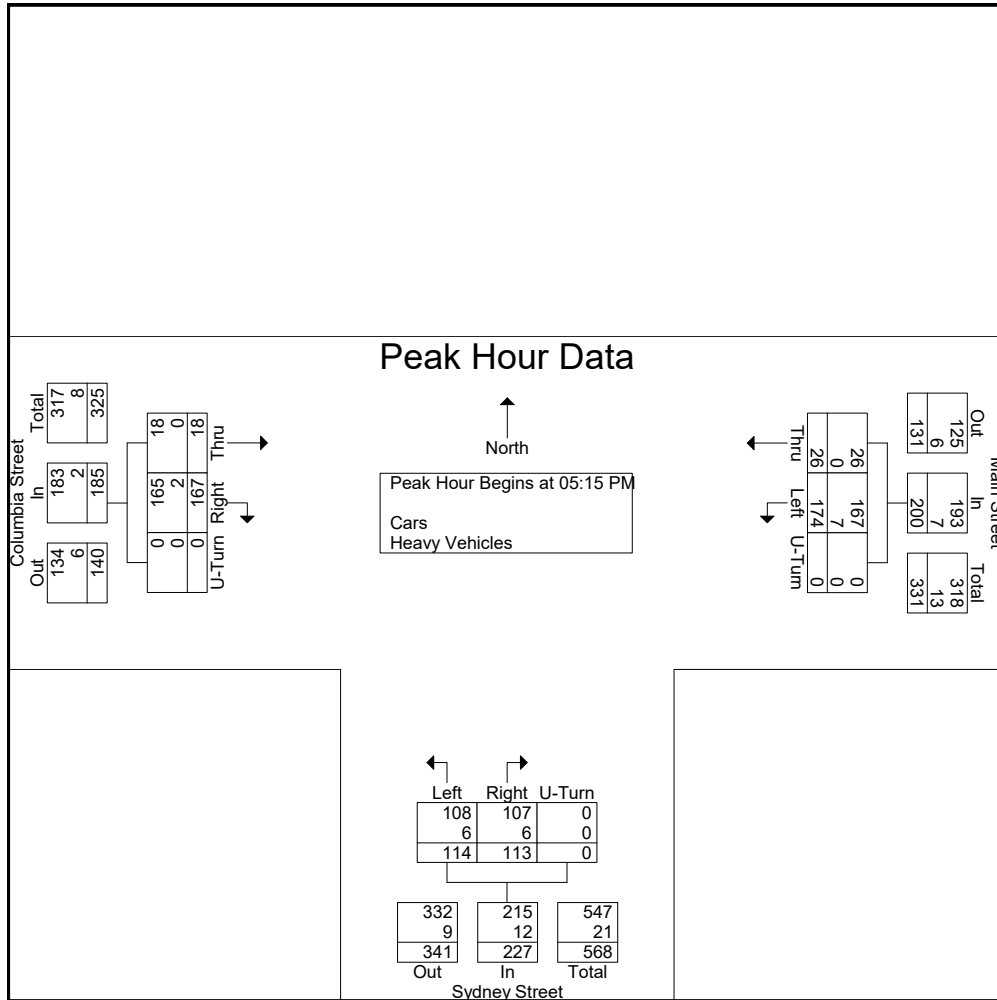
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City, State: Cambridge, MA  
Client: VHB/ C. Dube

File Name : 165082 CC  
Site Code : TBA  
Start Date : 5/18/2016  
Page No : 1

Start Time	Main Street From East				Sydney Street From South				Columbia Street From West				Int. Total
	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	Right	Thru	U-Turn	App. Total	
Peak Hour Analysis From 04:30 PM to 06:15 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 05:15 PM													
05:15 PM	7	54	0	61	35	24	0	59	47	4	0	51	171
05:30 PM	4	40	0	44	22	35	0	57	34	6	0	40	141
05:45 PM	1	46	0	47	25	24	0	49	49	2	0	51	147
06:00 PM	14	34	0	48	31	31	0	62	37	6	0	43	153
Total Volume	26	174	0	200	113	114	0	227	167	18	0	185	612
% App. Total	13	87	0		49.8	50.2	0		90.3	9.7	0		
PHF	.464	.806	.000	.820	.807	.814	.000	.915	.852	.750	.000	.907	.895
Cars	26	167	0	193	107	108	0	215	165	18	0	183	591
% Cars	100	96.0	0	96.5	94.7	94.7	0	94.7	98.8	100	0	98.9	96.6
Heavy Vehicles	0	7	0	7	6	6	0	12	2	0	0	2	21
% Heavy Vehicles	0	4.0	0	3.5	5.3	5.3	0	5.3	1.2	0	0	1.1	3.4







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File Name : 133347 Q  
Site Code : TBA  
Start Date : 5/16/2013  
Page No : 1

N/S:Galileo Galilei Way/ Vassar Street  
E/W: Main Street  
City, State: Cambridge, MA  
Client: VHB/ M. Houdlette

Groups Printed- Cars - Heavy Vehicles - Buses

Start Time	Galileo Galilei Way From North				Main Street From East				Vassar Street From South				Main Street From West				Int. Total
	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	
07:30 AM	43	73	11	0	21	31	13	0	21	48	19	0	9	40	18	0	347
07:45 AM	50	77	10	2	21	18	22	1	22	47	15	0	16	40	25	0	366
<b>Total</b>	<b>93</b>	<b>150</b>	<b>21</b>	<b>2</b>	<b>42</b>	<b>49</b>	<b>35</b>	<b>1</b>	<b>43</b>	<b>95</b>	<b>34</b>	<b>0</b>	<b>25</b>	<b>80</b>	<b>43</b>	<b>0</b>	<b>713</b>
08:00 AM	56	84	14	2	20	28	15	0	46	65	15	0	17	43	39	0	444
08:15 AM	58	75	13	1	25	24	13	0	36	53	14	0	12	50	40	0	414
08:30 AM	65	88	10	0	29	21	10	0	33	63	19	0	23	58	57	0	476
08:45 AM	46	87	17	0	31	20	14	0	33	65	19	0	20	57	58	0	467
<b>Total</b>	<b>225</b>	<b>334</b>	<b>54</b>	<b>3</b>	<b>105</b>	<b>93</b>	<b>52</b>	<b>0</b>	<b>148</b>	<b>246</b>	<b>67</b>	<b>0</b>	<b>72</b>	<b>208</b>	<b>194</b>	<b>0</b>	<b>1801</b>
09:00 AM	50	92	12	3	31	24	17	0	33	67	9	0	24	30	42	0	434
09:15 AM	35	71	14	0	43	18	15	0	49	50	13	0	22	43	32	0	405
<b>Grand Total</b>	<b>403</b>	<b>647</b>	<b>101</b>	<b>8</b>	<b>221</b>	<b>184</b>	<b>119</b>	<b>1</b>	<b>273</b>	<b>458</b>	<b>123</b>	<b>0</b>	<b>143</b>	<b>361</b>	<b>311</b>	<b>0</b>	<b>3353</b>
Apprch %	34.8	55.8	8.7	0.7	42.1	35	22.7	0.2	32	53.6	14.4	0	17.5	44.3	38.2	0	
Total %	12	19.3	3	0.2	6.6	5.5	3.5	0	8.1	13.7	3.7	0	4.3	10.8	9.3	0	
Cars	352	549	90	8	203	160	99	1	212	400	118	0	129	333	268	0	2922
% Cars	87.3	84.9	89.1	100	91.9	87	83.2	100	77.7	87.3	95.9	0	90.2	92.2	86.2	0	87.1
Heavy Vehicles	50	93	9	0	13	22	8	0	23	52	4	0	13	23	43	0	353
% Heavy Vehicles	12.4	14.4	8.9	0	5.9	12	6.7	0	8.4	11.4	3.3	0	9.1	6.4	13.8	0	10.5
Buses	1	5	2	0	5	2	12	0	38	6	1	0	1	5	0	0	78
% Buses	0.2	0.8	2	0	2.3	1.1	10.1	0	13.9	1.3	0.8	0	0.7	1.4	0	0	2.3

Start Time	Galileo Galilei Way From North					Main Street From East					Vassar Street From South					Main Street From West					Int. Total
	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	
Peak Hour Analysis From 07:30 AM to 09:15 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 08:00 AM																					
08:00 AM	56	84	14	2	156	20	28	15	0	63	46	65	15	0	126	17	43	39	0	99	444
08:15 AM	58	75	13	1	147	25	24	13	0	62	36	53	14	0	103	12	50	40	0	102	414
08:30 AM	65	88	10	0	163	29	21	10	0	60	33	63	19	0	115	23	58	57	0	138	476
08:45 AM	46	87	17	0	150	31	20	14	0	65	33	65	19	0	117	20	57	58	0	135	467
Total Volume	225	334	54	3	616	105	93	52	0	250	148	246	67	0	461	72	208	194	0	474	1801
% App. Total	36.5	54.2	8.8	0.5		42	37.2	20.8	0		32.1	53.4	14.5	0		15.2	43.9	40.9	0		
PHF	.865	.949	.794	.375	.945	.847	.830	.867	.000	.962	.804	.946	.882	.000	.915	.783	.897	.836	.000	.859	.946
Cars	195	278	48	3	524	93	81	44	0	218	113	213	65	0	391	63	193	169	0	425	1558
% Cars	86.7	83.2	88.9	100	85.1	88.6	87.1	84.6	0	87.2	76.4	86.6	97.0	0	84.8	87.5	92.8	87.1	0	89.7	86.5
Heavy Vehicles	30	55	6	0	91	10	12	3	0	25	15	29	2	0	46	8	15	25	0	48	210
% Heavy Vehicles	13.3	16.5	11.1	0	14.8	9.5	12.9	5.8	0	10.0	10.1	11.8	3.0	0	10.0	11.1	7.2	12.9	0	10.1	11.7
Buses	0	1	0	0	1	2	0	5	0	7	20	4	0	0	24	1	0	0	0	1	33
% Buses	0	0.3	0	0	0.2	1.9	0	9.6	0	2.8	13.5	1.6	0	0	5.2	1.4	0	0	0	0.2	1.8



PRECISION  
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E/W: Main Street  
City, State: Cambridge, MA  
Client: VHB/ M. Houdlette

File Name : 133347 Q  
Site Code : TBA  
Start Date : 5/16/2013  
Page No : 1

Groups Printed- Cars

Start Time	Galileo Galilei Way From North				Main Street From East				Vassar Street From South				Main Street From West				Int. Total
	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	
07:30 AM	39	64	10	0	20	27	9	0	19	44	19	0	8	35	16	0	310
07:45 AM	44	66	9	2	19	18	21	1	15	42	15	0	16	35	21	0	324
Total	83	130	19	2	39	45	30	1	34	86	34	0	24	70	37	0	634
08:00 AM	48	68	11	2	19	26	10	0	40	53	14	0	15	40	32	0	378
08:15 AM	50	64	12	1	20	22	13	0	25	44	14	0	9	48	35	0	357
08:30 AM	56	73	10	0	26	16	7	0	22	55	18	0	22	52	52	0	409
08:45 AM	41	73	15	0	28	17	14	0	26	61	19	0	17	53	50	0	414
Total	195	278	48	3	93	81	44	0	113	213	65	0	63	193	169	0	1558
09:00 AM	44	81	10	3	30	18	13	0	24	55	7	0	23	28	33	0	369
09:15 AM	30	60	13	0	41	16	12	0	41	46	12	0	19	42	29	0	361
Grand Total	352	549	90	8	203	160	99	1	212	400	118	0	129	333	268	0	2922
Apprch %	35.2	55	9	0.8	43.8	34.6	21.4	0.2	29	54.8	16.2	0	17.7	45.6	36.7	0	
Total %	12	18.8	3.1	0.3	6.9	5.5	3.4	0	7.3	13.7	4	0	4.4	11.4	9.2	0	

Start Time	Galileo Galilei Way From North					Main Street From East					Vassar Street From South					Main Street From West					Int. Total
	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	
Peak Hour Analysis From 07:30 AM to 09:15 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 08:00 AM																					
08:00 AM	48	68	11	2	129	19	26	10	0	55	40	53	14	0	107	15	40	32	0	87	378
08:15 AM	50	64	12	1	127	20	22	13	0	55	25	44	14	0	83	9	48	35	0	92	357
08:30 AM	56	73	10	0	139	26	16	7	0	49	22	55	18	0	95	22	52	52	0	126	409
08:45 AM	41	73	15	0	129	28	17	14	0	59	26	61	19	0	106	17	53	50	0	120	414
Total Volume	195	278	48	3	524	93	81	44	0	218	113	213	65	0	391	63	193	169	0	425	1558
% App. Total	37.2	53.1	9.2	0.6		42.7	37.2	20.2	0		28.9	54.5	16.6	0		14.8	45.4	39.8	0		
PHF	.871	.952	.800	.375	.942	.830	.779	.786	.000	.924	.706	.873	.855	.000	.914	.716	.910	.813	.000	.843	.941



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N/S: Galileo Galilei Way/ Vassar Street  
E/W: Main Street  
City, State: Cambridge, MA  
Client: VHB/ M. Houdlette

File Name : 133347 Q  
Site Code : TBA  
Start Date : 5/16/2013  
Page No : 1

Groups Printed- Heavy Vehicles

Start Time	Galileo Galilei Way From North				Main Street From East				Vassar Street From South				Main Street From West				Int. Total
	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	
07:30 AM	4	9	1	0	1	4	1	0	1	4	0	0	1	3	2	0	31
07:45 AM	6	11	0	0	2	0	1	0	2	4	0	0	0	3	4	0	33
Total	10	20	1	0	3	4	2	0	3	8	0	0	1	6	6	0	64
08:00 AM	8	16	3	0	1	2	1	0	0	10	1	0	2	3	7	0	54
08:15 AM	8	11	1	0	5	2	0	0	6	8	0	0	2	2	5	0	50
08:30 AM	9	15	0	0	2	5	2	0	4	7	1	0	1	6	5	0	57
08:45 AM	5	13	2	0	2	3	0	0	5	4	0	0	3	4	8	0	49
Total	30	55	6	0	10	12	3	0	15	29	2	0	8	15	25	0	210
09:00 AM	5	9	2	0	0	4	1	0	5	11	1	0	1	1	9	0	49
09:15 AM	5	9	0	0	0	2	2	0	0	4	1	0	3	1	3	0	30
Grand Total	50	93	9	0	13	22	8	0	23	52	4	0	13	23	43	0	353
Apprch %	32.9	61.2	5.9	0	30.2	51.2	18.6	0	29.1	65.8	5.1	0	16.5	29.1	54.4	0	
Total %	14.2	26.3	2.5	0	3.7	6.2	2.3	0	6.5	14.7	1.1	0	3.7	6.5	12.2	0	

Start Time	Galileo Galilei Way From North					Main Street From East					Vassar Street From South					Main Street From West					Int. Total
	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	
08:00 AM	8	16	3	0	27	1	2	1	0	4	0	10	1	0	11	2	3	7	0	12	54
08:15 AM	8	11	1	0	20	5	2	0	0	7	6	8	0	0	14	2	2	5	0	9	50
08:30 AM	9	15	0	0	24	2	5	2	0	9	4	7	1	0	12	1	6	5	0	12	57
08:45 AM	5	13	2	0	20	2	3	0	0	5	5	4	0	0	9	3	4	8	0	15	49
Total Volume	30	55	6	0	91	10	12	3	0	25	15	29	2	0	46	8	15	25	0	48	210
% App. Total	33	60.4	6.6	0		40	48	12	0		32.6	63	4.3	0		16.7	31.2	52.1	0		
PHF	.833	.859	.500	.000	.843	.500	.600	.375	.000	.694	.625	.725	.500	.000	.821	.667	.625	.781	.000	.800	.921

Peak Hour Analysis From 07:30 AM to 09:15 AM - Peak 1 of 1  
Peak Hour for Entire Intersection Begins at 08:00 AM



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E/W: Main Street  
City, State: Cambridge, MA  
Client: VHB/ M. Houdlette

File Name : 133347 Q  
Site Code : TBA  
Start Date : 5/16/2013  
Page No : 1

Groups Printed- Buses

Start Time	Galileo Galilei Way From North				Main Street From East				Vassar Street From South				Main Street From West				Int. Total
	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	
07:30 AM	0	0	0	0	0	0	3	0	1	0	0	0	0	2	0	0	6
07:45 AM	0	0	1	0	0	0	0	0	5	1	0	0	0	2	0	0	9
Total	0	0	1	0	0	0	3	0	6	1	0	0	0	4	0	0	15
08:00 AM	0	0	0	0	0	0	4	0	6	2	0	0	0	0	0	0	12
08:15 AM	0	0	0	0	0	0	0	0	5	1	0	0	1	0	0	0	7
08:30 AM	0	0	0	0	1	0	1	0	7	1	0	0	0	0	0	0	10
08:45 AM	0	1	0	0	1	0	0	0	2	0	0	0	0	0	0	0	4
Total	0	1	0	0	2	0	5	0	20	4	0	0	1	0	0	0	33
09:00 AM	1	2	0	0	1	2	3	0	4	1	1	0	0	1	0	0	16
09:15 AM	0	2	1	0	2	0	1	0	8	0	0	0	0	0	0	0	14
Grand Total	1	5	2	0	5	2	12	0	38	6	1	0	1	5	0	0	78
Apprch %	12.5	62.5	25	0	26.3	10.5	63.2	0	84.4	13.3	2.2	0	16.7	83.3	0	0	
Total %	1.3	6.4	2.6	0	6.4	2.6	15.4	0	48.7	7.7	1.3	0	1.3	6.4	0	0	

Start Time	Galileo Galilei Way From North					Main Street From East					Vassar Street From South					Main Street From West					Int. Total
	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	
08:30 AM	0	0	0	0	0	1	0	1	0	2	7	1	0	0	8	0	0	0	0	0	10
08:45 AM	0	1	0	0	1	1	0	0	0	1	2	0	0	0	2	0	0	0	0	0	4
09:00 AM	1	2	0	0	3	1	2	3	0	6	4	1	1	0	6	0	1	0	0	1	16
09:15 AM	0	2	1	0	3	2	0	1	0	3	8	0	0	0	8	0	0	0	0	0	14
Total Volume	1	5	1	0	7	5	2	5	0	12	21	2	1	0	24	0	1	0	0	1	44
% App. Total	14.3	71.4	14.3	0		41.7	16.7	41.7	0		87.5	8.3	4.2	0		0	100	0	0		
PHF	.250	.625	.250	.000	.583	.625	.250	.417	.000	.500	.656	.500	.250	.000	.750	.000	.250	.000	.000	.250	.688

Peak Hour Analysis From 07:30 AM to 09:15 AM - Peak 1 of 1  
Peak Hour for Entire Intersection Begins at 08:30 AM



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File Name : 133347 Q  
Site Code : TBA  
Start Date : 5/16/2013  
Page No : 1

N/S:Galileo Galilei Way/ Vassar Street  
E/W: Main Street  
City, State: Cambridge, MA  
Client: VHB/ M. Houdlette

Groups Printed- Peds and Bicycles

Start Time	Galileo Galilei Way From North					Main Street From East					Vassar Street From South					Main Street From West					Int. Total
	Right	Thru	Left	Peds EB	Peds WB	Right	Thru	Left	Peds SB	Peds NB	Right	Thru	Left	Peds WB	Peds EB	Right	Thru	Left	Peds NB	Peds SB	
07:30 AM	1	2	0	13	57	2	1	0	8	1	8	4	0	8	6	0	13	0	3	7	134
07:45 AM	0	5	0	16	57	0	0	2	16	12	3	6	1	23	9	0	12	0	9	5	176
Total	1	7	0	29	114	2	1	2	24	13	11	10	1	31	15	0	25	0	12	12	310
08:00 AM	0	10	3	36	40	1	0	0	13	6	1	4	1	16	20	1	14	0	7	6	179
08:15 AM	0	7	2	22	98	0	2	0	26	11	3	10	0	28	24	1	18	3	5	10	270
08:30 AM	1	22	3	28	70	0	2	0	14	16	4	14	1	15	35	0	31	2	6	15	279
08:45 AM	1	18	2	32	72	0	3	0	24	17	8	8	0	32	40	1	21	4	11	16	310
Total	2	57	10	118	280	1	7	0	77	50	16	36	2	91	119	3	84	9	29	47	1038
09:00 AM	2	16	1	34	73	0	4	0	24	19	4	7	1	26	30	2	17	6	8	16	290
09:15 AM	0	16	2	30	62	0	4	0	20	33	8	6	0	21	17	3	19	0	6	11	258
Grand Total	5	96	13	211	529	3	16	2	145	115	39	59	4	169	181	8	145	15	55	86	1896
Apprch %	0.6	11.2	1.5	24.7	61.9	1.1	5.7	0.7	51.6	40.9	8.6	13.1	0.9	37.4	40	2.6	46.9	4.9	17.8	27.8	
Total %	0.3	5.1	0.7	11.1	27.9	0.2	0.8	0.1	7.6	6.1	2.1	3.1	0.2	8.9	9.5	0.4	7.6	0.8	2.9	4.5	

Start Time	Galileo Galilei Way From North						Main Street From East						Vassar Street From South						Main Street From West						Int. Total
	Right	Thru	Left	Peds EB	Peds WB	App. Total	Right	Thru	Left	Peds SB	Peds NB	App. Total	Right	Thru	Left	Peds WB	Peds EB	App. Total	Right	Thru	Left	Peds NB	Peds SB	App. Total	
Peak Hour Analysis From 07:30 AM to 09:15 AM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 08:15 AM																									
08:15 AM	0	7	2	22	98	129	0	2	0	26	11	39	3	10	0	28	24	65	1	18	3	5	10	37	270
08:30 AM	1	22	3	28	70	124	0	2	0	14	16	32	4	14	1	15	35	69	0	31	2	6	15	54	279
08:45 AM	1	18	2	32	72	125	0	3	0	24	17	44	8	8	0	32	40	88	1	21	4	11	16	53	310
09:00 AM	2	16	1	34	73	126	0	4	0	24	19	47	4	7	1	26	30	68	2	17	6	8	16	49	290
Total Volume	4	63	8	116	313	504	0	11	0	88	63	162	19	39	2	101	129	290	4	87	15	30	57	193	1149
% App. Total	0.8	12.5	1.6	23	62.1		0	6.8	0	54.3	38.9		6.6	13.4	0.7	34.8	44.5		2.1	45.1	7.8	15.5	29.5		
PHF	.500	.716	.667	.853	.798	.977	.000	.688	.000	.846	.829	.862	.594	.696	.500	.789	.806	.824	.500	.702	.625	.682	.891	.894	.927



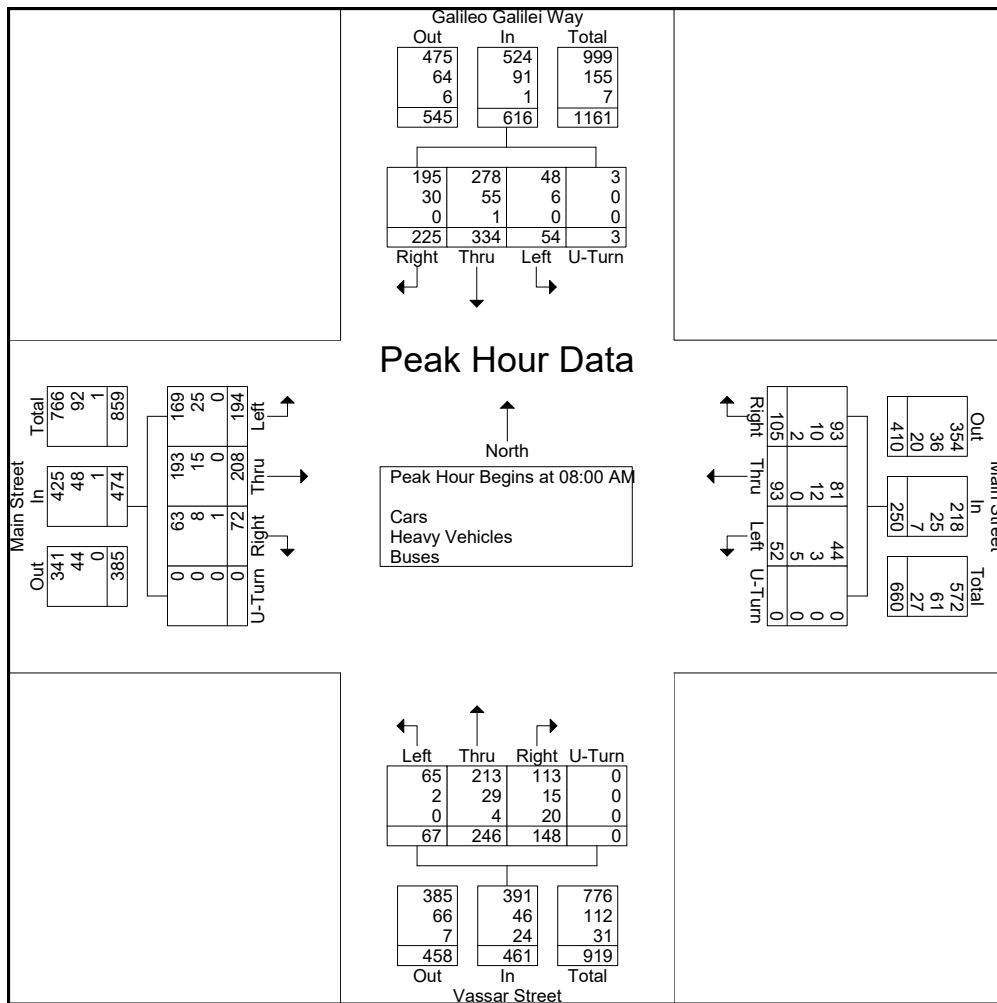
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Start Time	Galileo Galilei Way From North					Main Street From East					Vassar Street From South					Main Street From West					Int. Total
	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	
Peak Hour Analysis From 07:30 AM to 09:15 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 08:00 AM																					
08:00 AM	56	84	14	2	156	20	28	15	0	63	46	65	15	0	126	17	43	39	0	99	444
08:15 AM	58	75	13	1	147	25	24	13	0	62	36	53	14	0	103	12	50	40	0	102	414
08:30 AM	65	88	10	0	163	29	21	10	0	60	33	63	19	0	115	23	58	57	0	138	476
08:45 AM	46	87	17	0	150	31	20	14	0	65	33	65	19	0	117	20	57	58	0	135	467
Total Volume	225	334	54	3	616	105	93	52	0	250	148	246	67	0	461	72	208	194	0	474	1801
% App. Total	36.5	54.2	8.8	0.5		42	37.2	20.8	0		32.1	53.4	14.5	0		15.2	43.9	40.9	0		
PHF	.865	.949	.794	.375	.945	.847	.830	.867	.000	.962	.804	.946	.882	.000	.915	.783	.897	.836	.000	.859	.946
Cars	195	278	48	3	524	93	81	44	0	218	113	213	65	0	391	63	193	169	0	425	1558
% Cars	86.7	83.2	88.9	100	85.1	88.6	87.1	84.6	0	87.2	76.4	86.6	97.0	0	84.8	87.5	92.8	87.1	0	89.7	86.5
Heavy Vehicles	30	55	6	0	91	10	12	3	0	25	15	29	2	0	46	8	15	25	0	48	210
% Heavy Vehicles	13.3	16.5	11.1	0	14.8	9.5	12.9	5.8	0	10.0	10.1	11.8	3.0	0	10.0	11.1	7.2	12.9	0	10.1	11.7
Buses	0	1	0	0	1	2	0	5	0	7	20	4	0	0	24	1	0	0	0	1	33
% Buses	0	0.3	0	0	0.2	1.9	0	9.6	0	2.8	13.5	1.6	0	0	5.2	1.4	0	0	0	0.2	1.8





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File Name : 133347 QQ  
Site Code : TBA  
Start Date : 5/16/2013  
Page No : 1

Groups Printed- Cars - Heavy Vehicles - Buses

Start Time	Galileo Galilei Way From North				Main Street From East				Vassar Street From South				Main Street From West				Int. Total
	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	
04:30 PM	32	66	9	0	2	32	11	0	31	69	12	0	10	56	55	0	385
04:45 PM	38	88	9	0	6	22	4	0	32	62	9	0	16	77	60	0	423
Total	70	154	18	0	8	54	15	0	63	131	21	0	26	133	115	0	808
05:00 PM	38	78	17	1	3	34	17	0	30	57	10	0	16	66	71	0	438
05:15 PM	36	81	12	0	8	35	14	0	34	95	7	0	24	60	63	0	469
05:30 PM	41	64	9	0	5	30	14	0	42	50	11	0	18	58	56	0	398
05:45 PM	30	58	9	0	10	35	14	0	38	74	7	0	19	65	52	0	411
Total	145	281	47	1	26	134	59	0	144	276	35	0	77	249	242	0	1716
06:00 PM	46	49	6	0	3	23	14	0	34	78	13	0	13	54	52	0	385
06:15 PM	32	61	11	1	4	16	6	0	28	60	12	0	17	73	56	0	377
Grand Total	293	545	82	2	41	227	94	0	269	545	81	0	133	509	465	0	3286
Apprch %	31.8	59.1	8.9	0.2	11.3	62.7	26	0	30.1	60.9	9.1	0	12	46	42	0	
Total %	8.9	16.6	2.5	0.1	1.2	6.9	2.9	0	8.2	16.6	2.5	0	4	15.5	14.2	0	
Cars	284	533	76	2	40	224	86	0	243	518	80	0	133	503	446	0	3168
% Cars	96.9	97.8	92.7	100	97.6	98.7	91.5	0	90.3	95	98.8	0	100	98.8	95.9	0	96.4
Heavy Vehicles	6	10	3	0	1	2	2	0	4	18	1	0	0	5	12	0	64
% Heavy Vehicles	2	1.8	3.7	0	2.4	0.9	2.1	0	1.5	3.3	1.2	0	0	1	2.6	0	1.9
Buses	3	2	3	0	0	1	6	0	22	9	0	0	0	1	7	0	54
% Buses	1	0.4	3.7	0	0	0.4	6.4	0	8.2	1.7	0	0	0	0.2	1.5	0	1.6

Start Time	Galileo Galilei Way From North					Main Street From East					Vassar Street From South					Main Street From West					Int. Total
	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	
Peak Hour Analysis From 04:30 PM to 06:15 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:45 PM																					
04:45 PM	38	88	9	0	135	6	22	4	0	32	32	62	9	0	103	16	77	60	0	153	423
05:00 PM	38	78	17	1	134	3	34	17	0	54	30	57	10	0	97	16	66	71	0	153	438
05:15 PM	36	81	12	0	129	8	35	14	0	57	34	95	7	0	136	24	60	63	0	147	469
05:30 PM	41	64	9	0	114	5	30	14	0	49	42	50	11	0	103	18	58	56	0	132	398
Total Volume	153	311	47	1	512	22	121	49	0	192	138	264	37	0	439	74	261	250	0	585	1728
% App. Total	29.9	60.7	9.2	0.2		11.5	63	25.5	0		31.4	60.1	8.4	0		12.6	44.6	42.7	0		
PHF	.933	.884	.691	.250	.948	.688	.864	.721	.000	.842	.821	.695	.841	.000	.807	.771	.847	.880	.000	.956	.921
Cars	148	303	45	1	497	21	120	45	0	186	123	248	37	0	408	74	259	235	0	568	1659
% Cars	96.7	97.4	95.7	100	97.1	95.5	99.2	91.8	0	96.9	89.1	93.9	100	0	92.9	100	99.2	94.0	0	97.1	96.0
Heavy Vehicles	2	7	2	0	11	1	1	1	0	3	2	12	0	0	14	0	2	9	0	11	39
% Heavy Vehicles	1.3	2.3	4.3	0	2.1	4.5	0.8	2.0	0	1.6	1.4	4.5	0	0	3.2	0	0.8	3.6	0	1.9	2.3
Buses	3	1	0	0	4	0	0	3	0	3	13	4	0	0	17	0	0	6	0	6	30
% Buses	2.0	0.3	0	0	0.8	0	0	6.1	0	1.6	9.4	1.5	0	0	3.9	0	0	2.4	0	1.0	1.7



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N/S:Galileo Galilei Way/ Vassar Street  
E/W: Main Street  
City, State: Cambridge, MA  
Client: VHB/ M. Houdlette

File Name : 133347 QQ  
Site Code : TBA  
Start Date : 5/16/2013  
Page No : 1

Groups Printed- Cars

Start Time	Galileo Galilei Way From North				Main Street From East				Vassar Street From South				Main Street From West				Int. Total
	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	
04:30 PM	32	65	9	0	2	32	11	0	28	67	12	0	10	55	53	0	376
04:45 PM	38	83	9	0	6	22	3	0	25	56	9	0	16	77	55	0	399
Total	70	148	18	0	8	54	14	0	53	123	21	0	26	132	108	0	775
05:00 PM	37	77	16	1	3	33	16	0	29	53	10	0	16	65	66	0	422
05:15 PM	34	79	11	0	8	35	12	0	31	92	7	0	24	59	62	0	454
05:30 PM	39	64	9	0	4	30	14	0	38	47	11	0	18	58	52	0	384
05:45 PM	30	56	8	0	10	34	12	0	34	73	7	0	19	65	52	0	400
Total	140	276	44	1	25	132	54	0	132	265	35	0	77	247	232	0	1660
06:00 PM	43	49	5	0	3	22	13	0	31	77	12	0	13	52	52	0	372
06:15 PM	31	60	9	1	4	16	5	0	27	53	12	0	17	72	54	0	361
Grand Total	284	533	76	2	40	224	86	0	243	518	80	0	133	503	446	0	3168
Apprch %	31.7	59.6	8.5	0.2	11.4	64	24.6	0	28.9	61.6	9.5	0	12.3	46.5	41.2	0	
Total %	9	16.8	2.4	0.1	1.3	7.1	2.7	0	7.7	16.4	2.5	0	4.2	15.9	14.1	0	

Start Time	Galileo Galilei Way From North					Main Street From East					Vassar Street From South					Main Street From West					Int. Total
	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	
05:00 PM	37	77	16	1	131	3	33	16	0	52	29	53	10	0	92	16	65	66	0	147	422
05:15 PM	34	79	11	0	124	8	35	12	0	55	31	92	7	0	130	24	59	62	0	145	454
05:30 PM	39	64	9	0	112	4	30	14	0	48	38	47	11	0	96	18	58	52	0	128	384
05:45 PM	30	56	8	0	94	10	34	12	0	56	34	73	7	0	114	19	65	52	0	136	400
Total Volume	140	276	44	1	461	25	132	54	0	211	132	265	35	0	432	77	247	232	0	556	1660
% App. Total	30.4	59.9	9.5	0.2		11.8	62.6	25.6	0		30.6	61.3	8.1	0		13.8	44.4	41.7	0		
PHF	.897	.873	.688	.250	.880	.625	.943	.844	.000	.942	.868	.720	.795	.000	.831	.802	.950	.879	.000	.946	.914

Peak Hour Analysis From 04:30 PM to 06:15 PM - Peak 1 of 1  
Peak Hour for Entire Intersection Begins at 05:00 PM





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N/S: Galileo Galilei Way/ Vassar Street  
E/W: Main Street  
City, State: Cambridge, MA  
Client: VHB/ M. Houdlette

File Name : 133347 QQ  
Site Code : TBA  
Start Date : 5/16/2013  
Page No : 1

Groups Printed- Heavy Vehicles

Start Time	Galileo Galilei Way From North				Main Street From East				Vassar Street From South				Main Street From West				Int. Total	
	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn		
04:30 PM	0	1	0	0	0	0	0	0	1	1	0	0	0	1	1	0	0	5
04:45 PM	0	5	0	0	0	0	0	0	0	4	0	0	0	0	0	3	0	12
Total	0	6	0	0	0	0	0	0	1	5	0	0	0	1	4	0	0	17
05:00 PM	0	0	1	0	0	1	0	0	0	4	0	0	0	0	1	3	0	10
05:15 PM	2	2	1	0	0	0	1	0	1	2	0	0	0	0	1	1	0	11
05:30 PM	0	0	0	0	1	0	0	0	1	2	0	0	0	0	0	2	0	6
05:45 PM	0	1	1	0	0	1	1	0	0	1	0	0	0	0	0	0	0	5
Total	2	3	3	0	1	2	2	0	2	9	0	0	0	0	2	6	0	32
06:00 PM	3	0	0	0	0	0	0	0	0	1	1	0	0	0	2	0	0	7
06:15 PM	1	1	0	0	0	0	0	0	1	3	0	0	0	0	0	2	0	8
Grand Total	6	10	3	0	1	2	2	0	4	18	1	0	0	0	5	12	0	64
Apprch %	31.6	52.6	15.8	0	20	40	40	0	17.4	78.3	4.3	0	0	29.4	70.6	0	0	
Total %	9.4	15.6	4.7	0	1.6	3.1	3.1	0	6.2	28.1	1.6	0	0	7.8	18.8	0	0	

Start Time	Galileo Galilei Way From North					Main Street From East					Vassar Street From South					Main Street From West					Int. Total
	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	
04:45 PM	0	5	0	0	5	0	0	0	0	0	0	4	0	0	4	0	0	3	0	3	12
05:00 PM	0	0	1	0	1	0	1	0	0	1	0	4	0	0	4	0	1	3	0	4	10
05:15 PM	2	2	1	0	5	0	0	1	0	1	1	2	0	0	3	0	1	1	0	2	11
05:30 PM	0	0	0	0	0	1	0	0	0	1	1	2	0	0	3	0	0	2	0	2	6
Total Volume	2	7	2	0	11	1	1	1	0	3	2	12	0	0	14	0	2	9	0	11	39
% App. Total	18.2	63.6	18.2	0		33.3	33.3	33.3	0		14.3	85.7	0	0		0	18.2	81.8	0		
PHF	.250	.350	.500	.000	.550	.250	.250	.250	.000	.750	.500	.750	.000	.000	.875	.000	.500	.750	.000	.688	.813

Peak Hour Analysis From 04:30 PM to 06:15 PM - Peak 1 of 1  
Peak Hour for Entire Intersection Begins at 04:45 PM



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E/W: Main Street  
City, State: Cambridge, MA  
Client: VHB/ M. Houdlette

File Name : 133347 QQ  
Site Code : TBA  
Start Date : 5/16/2013  
Page No : 1

Groups Printed- Buses

Start Time	Galileo Galilei Way From North				Main Street From East				Vassar Street From South				Main Street From West				Int. Total
	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	
04:30 PM	0	0	0	0	0	0	0	0	2	1	0	0	0	0	1	0	4
04:45 PM	0	0	0	0	0	0	1	0	7	2	0	0	0	0	2	0	12
Total	0	0	0	0	0	0	1	0	9	3	0	0	0	0	3	0	16
05:00 PM	1	1	0	0	0	0	1	0	1	0	0	0	0	0	2	0	6
05:15 PM	0	0	0	0	0	0	1	0	2	1	0	0	0	0	0	0	4
05:30 PM	2	0	0	0	0	0	0	0	3	1	0	0	0	0	2	0	8
05:45 PM	0	1	0	0	0	0	1	0	4	0	0	0	0	0	0	0	6
Total	3	2	0	0	0	0	3	0	10	2	0	0	0	0	4	0	24
06:00 PM	0	0	1	0	0	1	1	0	3	0	0	0	0	0	0	0	6
06:15 PM	0	0	2	0	0	0	1	0	0	4	0	0	0	1	0	0	8
Grand Total	3	2	3	0	0	1	6	0	22	9	0	0	0	1	7	0	54
Apprch %	37.5	25	37.5	0	0	14.3	85.7	0	71	29	0	0	0	12.5	87.5	0	
Total %	5.6	3.7	5.6	0	0	1.9	11.1	0	40.7	16.7	0	0	0	1.9	13	0	

Start Time	Galileo Galilei Way From North					Main Street From East					Vassar Street From South					Main Street From West					Int. Total
	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	
04:45 PM	0	0	0	0	0	0	0	1	0	1	7	2	0	0	9	0	0	2	0	2	12
05:00 PM	1	1	0	0	2	0	0	1	0	1	1	0	0	0	1	0	0	2	0	2	6
05:15 PM	0	0	0	0	0	0	0	1	0	1	2	1	0	0	3	0	0	0	0	0	4
05:30 PM	2	0	0	0	2	0	0	0	0	0	3	1	0	0	4	0	0	2	0	2	8
Total Volume	3	1	0	0	4	0	0	3	0	3	13	4	0	0	17	0	0	6	0	6	30
% App. Total	75	25	0	0		0	0	100	0		76.5	23.5	0	0		0	0	100	0		
PHF	.375	.250	.000	.000	.500	.000	.000	.750	.000	.750	.464	.500	.000	.000	.472	.000	.000	.750	.000	.750	.625

Peak Hour Analysis From 04:30 PM to 06:15 PM - Peak 1 of 1  
Peak Hour for Entire Intersection Begins at 04:45 PM



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E/W: Main Street  
City, State: Cambridge, MA  
Client: VHB/ M. Houdlette

File Name : 133347 QQ  
Site Code : TBA  
Start Date : 5/16/2013  
Page No : 1

Groups Printed- Peds and Bicycles

Start Time	Galileo Galilei Way From North					Main Street From East					Vassar Street From South					Main Street From West					Int. Total
	Right	Thru	Left	Peds EB	Peds WB	Right	Thru	Left	Peds SB	Peds NB	Right	Thru	Left	Peds WB	Peds EB	Right	Thru	Left	Peds NB	Peds SB	
04:30 PM	1	3	1	104	64	0	6	1	18	22	6	4	1	21	32	0	5	1	10	19	319
04:45 PM	2	7	0	68	45	0	5	1	22	11	3	6	0	31	28	0	6	0	13	13	261
Total	3	10	1	172	109	0	11	2	40	33	9	10	1	52	60	0	11	1	23	32	580
05:00 PM	0	11	0	91	60	0	6	3	14	37	2	10	0	53	59	1	10	0	25	29	411
05:15 PM	1	12	0	92	45	0	14	3	26	16	1	15	1	46	43	0	7	0	34	20	376
05:30 PM	1	9	0	126	102	0	11	2	27	24	0	8	0	40	44	0	6	0	46	21	467
05:45 PM	4	18	0	56	74	0	13	4	18	15	3	13	0	26	30	1	6	1	22	17	321
Total	6	50	0	365	281	0	44	12	85	92	6	46	1	165	176	2	29	1	127	87	1575
06:00 PM	5	12	0	53	85	0	20	3	10	23	2	11	0	46	28	2	5	3	21	23	352
06:15 PM	3	6	0	37	77	0	14	5	9	16	3	11	2	34	28	1	2	2	8	13	271
Grand Total	17	78	1	627	552	0	89	22	144	164	20	78	4	297	292	5	47	7	179	155	2778
Apprch %	1.3	6.1	0.1	49.2	43.3	0	21.2	5.3	34.4	39.1	2.9	11.3	0.6	43	42.3	1.3	12	1.8	45.5	39.4	
Total %	0.6	2.8	0	22.6	19.9	0	3.2	0.8	5.2	5.9	0.7	2.8	0.1	10.7	10.5	0.2	1.7	0.3	6.4	5.6	

Start Time	Galileo Galilei Way From North						Main Street From East						Vassar Street From South						Main Street From West						Int. Total
	Right	Thru	Left	Peds EB	Peds WB	App. Total	Right	Thru	Left	Peds SB	Peds NB	App. Total	Right	Thru	Left	Peds WB	Peds EB	App. Total	Right	Thru	Left	Peds NB	Peds SB	App. Total	
Peak Hour Analysis From 04:30 PM to 06:15 PM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 05:00 PM																									
05:00 PM	0	11	0	91	60	162	0	6	3	14	37	60	2	10	0	53	59	124	1	10	0	25	29	65	411
05:15 PM	1	12	0	92	45	150	0	14	3	26	16	59	1	15	1	46	43	106	0	7	0	34	20	61	376
05:30 PM	1	9	0	126	102	238	0	11	2	27	24	64	0	8	0	40	44	92	0	6	0	46	21	73	467
05:45 PM	4	18	0	56	74	152	0	13	4	18	15	50	3	13	0	26	30	72	1	6	1	22	17	47	321
Total Volume	6	50	0	365	281	702	0	44	12	85	92	233	6	46	1	165	176	394	2	29	1	127	87	246	1575
% App. Total	0.9	7.1	0	52	40		0	18.9	5.2	36.5	39.5		1.5	11.7	0.3	41.9	44.7		0.8	11.8	0.4	51.6	35.4		
PHF	.375	.694	.000	.724	.689	.737	.000	.786	.750	.787	.622	.910	.500	.767	.250	.778	.746	.794	.500	.725	.250	.690	.750	.842	.843



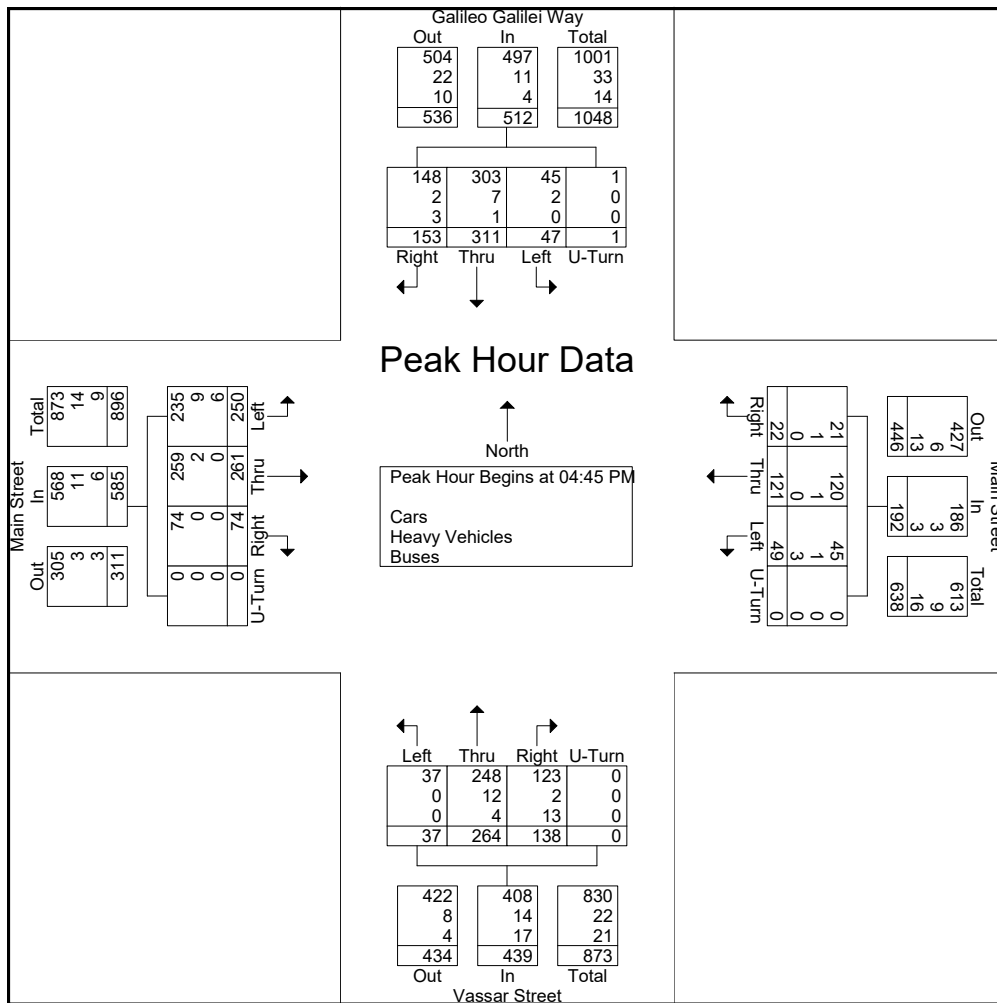
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N/S: Galileo Galilei Way/ Vassar Street  
E/W: Main Street  
City, State: Cambridge, MA  
Client: VHB/ M. Houdlette

File Name : 133347 QQ  
Site Code : TBA  
Start Date : 5/16/2013  
Page No : 1

Start Time	Galileo Galilei Way From North					Main Street From East					Vassar Street From South					Main Street From West					Int. Total
	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	
Peak Hour Analysis From 04:30 PM to 06:15 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:45 PM																					
04:45 PM	38	88	9	0	135	6	22	4	0	32	32	62	9	0	103	16	77	60	0	153	423
05:00 PM	38	78	17	1	134	3	34	17	0	54	30	57	10	0	97	16	66	71	0	153	438
05:15 PM	36	81	12	0	129	8	35	14	0	57	34	95	7	0	136	24	60	63	0	147	469
05:30 PM	41	64	9	0	114	5	30	14	0	49	42	50	11	0	103	18	58	56	0	132	398
Total Volume	153	311	47	1	512	22	121	49	0	192	138	264	37	0	439	74	261	250	0	585	1728
% App. Total	29.9	60.7	9.2	0.2		11.5	63	25.5	0		31.4	60.1	8.4	0		12.6	44.6	42.7	0		
PHF	.933	.884	.691	.250	.948	.688	.864	.721	.000	.842	.821	.695	.841	.000	.807	.771	.847	.880	.000	.956	.921
Cars	148	303	45	1	497	21	120	45	0	186	123	248	37	0	408	74	259	235	0	568	1659
% Cars	96.7	97.4	95.7	100	97.1	95.5	99.2	91.8	0	96.9	89.1	93.9	100	0	92.9	100	99.2	94.0	0	97.1	96.0
Heavy Vehicles	2	7	2	0	11	1	1	1	0	3	2	12	0	0	14	0	2	9	0	11	39
% Heavy Vehicles	1.3	2.3	4.3	0	2.1	4.5	0.8	2.0	0	1.6	1.4	4.5	0	0	3.2	0	0.8	3.6	0	1.9	2.3
Buses	3	1	0	0	4	0	0	3	0	3	13	4	0	0	17	0	0	6	0	6	30
% Buses	2.0	0.3	0	0	0.8	0	0	6.1	0	1.6	9.4	1.5	0	0	3.9	0	0	2.4	0	1.0	1.7



**Accurate Counts**  
978-664-2565

N/S Street : Windsor Street  
E/W Street: Main Street  
City/State : Cambridge, MA  
Weather : Cloudy

File Name : 58290005  
Site Code : 58290005  
Start Date : 5/12/2011  
Page No : 1

Groups Printed- Buses

Start Time	Windsor St From North			Main St From East			Windsor St From South			Main St From West			Int. Total
	Left	Thru	Rght	Left	Thru	Rght	Left	Thru	Rght	Left	Thru	Rght	
07:30	0	0	2	0	0	0	0	0	0	0	1	0	3
07:45	0	1	1	0	0	0	0	0	0	0	0	0	2
Total	0	1	3	0	0	0	0	0	0	0	1	0	5
08:00	0	0	2	0	0	0	0	1	0	0	1	0	4
08:15	0	0	0	0	0	0	0	0	0	0	0	0	0
08:30	0	0	1	0	1	0	0	0	0	0	1	0	3
08:45	0	0	0	0	1	0	0	0	0	0	0	0	1
Total	0	0	3	0	2	0	0	1	0	0	2	0	8
09:00	0	0	0	0	0	0	0	0	1	0	0	0	1
09:15	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	1	6	0	2	0	0	1	1	0	3	0	14
Apprch %	0	14.3	85.7	0	100	0	0	50	50	0	100	0	
Total %	0	7.1	42.9	0	14.3	0	0	7.1	7.1	0	21.4	0	

Start Time	Windsor St From North				Main St From East				Windsor St From South				Main St From West				Int. Total	
	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total		
Peak Hour Analysis From 07:30 to 09:15 - Peak 1 of 1																		
Peak Hour for Entire Intersection Begins at 07:30																		
07:30	0	0	2	2	0	0	0	0	0	0	0	0	0	0	1	0	1	3
07:45	0	1	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	2
08:00	0	0	2	2	0	0	0	0	0	1	0	1	0	1	0	0	1	4
08:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Volume	0	1	5	6	0	0	0	0	0	1	0	1	0	2	0	0	2	9
% App. Total	0	16.7	83.3		0	0	0		0	100	0		0	100	0			
PHF	.000	.250	.625	.750	.000	.000	.000	.000	.000	.250	.000	.250	.000	.500	.000	.500		.563

# Accurate Counts

978-664-2565

N/S Street : Windsor Street  
 E/W Street: Main Street  
 City/State : Cambridge, MA  
 Weather : Cloudy

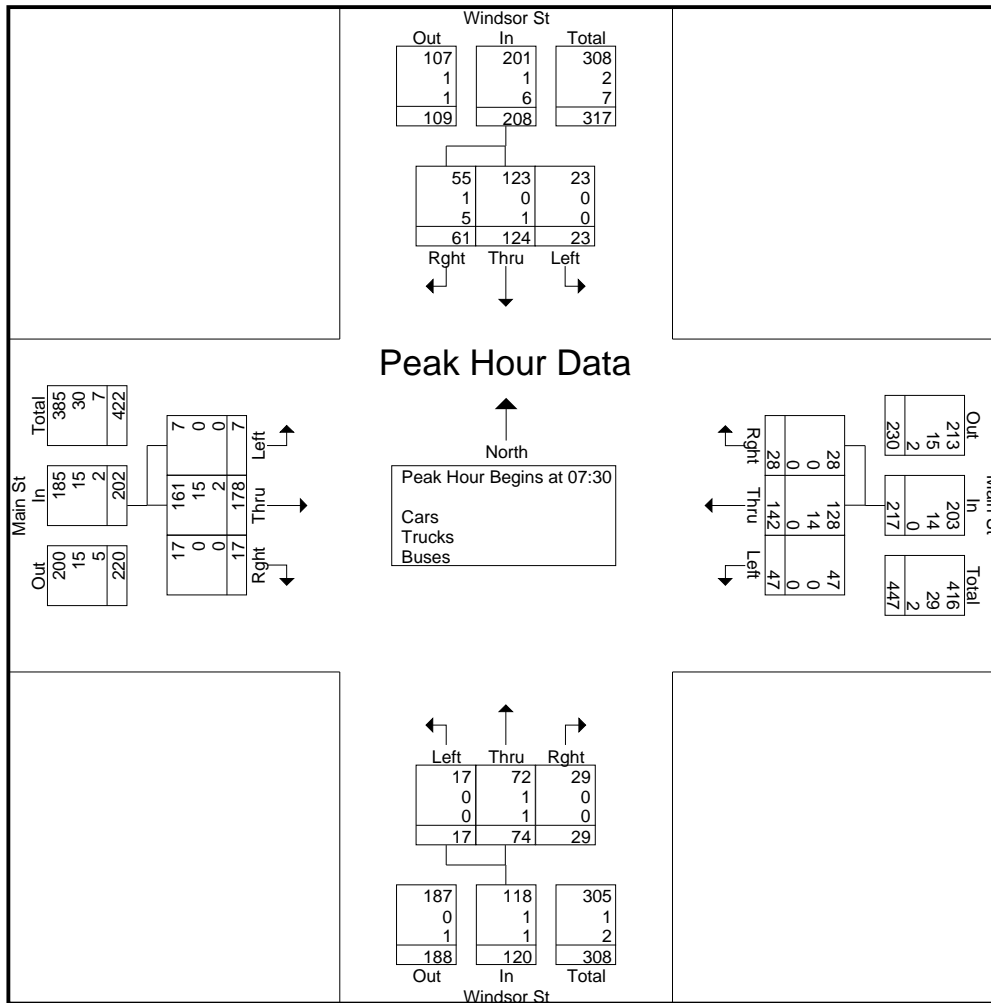
File Name : 58290005  
 Site Code : 58290005  
 Start Date : 5/12/2011  
 Page No : 1

### Groups Printed- Cars - Trucks - Buses

Start Time	Windsor St From North			Main St From East			Windsor St From South			Main St From West			Int. Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
07:30	6	24	16	13	39	8	4	17	7	2	34	6	176
07:45	4	30	15	11	33	9	3	19	4	3	50	3	184
<b>Total</b>	<b>10</b>	<b>54</b>	<b>31</b>	<b>24</b>	<b>72</b>	<b>17</b>	<b>7</b>	<b>36</b>	<b>11</b>	<b>5</b>	<b>84</b>	<b>9</b>	<b>360</b>
08:00	3	32	14	9	31	7	7	14	11	1	41	4	174
08:15	10	38	16	14	39	4	3	24	7	1	53	4	213
08:30	2	28	12	15	27	4	0	4	8	3	43	2	148
08:45	6	35	9	13	40	8	1	16	6	4	48	3	189
<b>Total</b>	<b>21</b>	<b>133</b>	<b>51</b>	<b>51</b>	<b>137</b>	<b>23</b>	<b>11</b>	<b>58</b>	<b>32</b>	<b>9</b>	<b>185</b>	<b>13</b>	<b>724</b>
09:00	8	25	11	9	29	7	5	17	11	1	44	5	172
09:15	4	29	14	13	26	5	1	8	5	2	45	5	157
<b>Grand Total</b>	<b>43</b>	<b>241</b>	<b>107</b>	<b>97</b>	<b>264</b>	<b>52</b>	<b>24</b>	<b>119</b>	<b>59</b>	<b>17</b>	<b>358</b>	<b>32</b>	<b>1413</b>
Apprch %	11	61.6	27.4	23.5	63.9	12.6	11.9	58.9	29.2	4.2	88	7.9	
Total %	3	17.1	7.6	6.9	18.7	3.7	1.7	8.4	4.2	1.2	25.3	2.3	
Cars	42	238	98	97	239	52	24	117	58	16	327	32	1340
% Cars	97.7	98.8	91.6	100	90.5	100	100	98.3	98.3	94.1	91.3	100	94.8
Trucks	1	2	3	0	23	0	0	1	0	1	28	0	59
% Trucks	2.3	0.8	2.8	0	8.7	0	0	0.8	0	5.9	7.8	0	4.2
Buses	0	1	6	0	2	0	0	1	1	0	3	0	14
% Buses	0	0.4	5.6	0	0.8	0	0	0.8	1.7	0	0.8	0	1

Start Time	Windsor St From North				Main St From East				Windsor St From South				Main St From West				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
<b>Peak Hour Analysis From 07:30 to 09:15 - Peak 1 of 1</b>																	
<b>Peak Hour for Entire Intersection Begins at 07:30</b>																	
07:30	6	24	16	46	13	39	8	60	4	17	7	28	2	34	6	42	176
07:45	4	30	15	49	11	33	9	53	3	19	4	26	3	50	3	56	184
08:00	3	32	14	49	9	31	7	47	7	14	11	32	1	41	4	46	174
08:15	10	38	16	64	14	39	4	57	3	24	7	34	1	53	4	58	213
<b>Total Volume</b>	<b>23</b>	<b>124</b>	<b>61</b>	<b>208</b>	<b>47</b>	<b>142</b>	<b>28</b>	<b>217</b>	<b>17</b>	<b>74</b>	<b>29</b>	<b>120</b>	<b>7</b>	<b>178</b>	<b>17</b>	<b>202</b>	<b>747</b>
% App. Total	11.1	59.6	29.3		21.7	65.4	12.9		14.2	61.7	24.2		3.5	88.1	8.4		
PHF	.575	.816	.953	.813	.839	.910	.778	.904	.607	.771	.659	.882	.583	.840	.708	.871	.877
Cars	23	123	55	201	47	128	28	203	17	72	29	118	7	161	17	185	707
% Cars	100	99.2	90.2	96.6	100	90.1	100	93.5	100	97.3	100	98.3	100	90.4	100	91.6	94.6
Trucks	0	0	1	1	0	14	0	14	0	1	0	1	0	15	0	15	31
% Trucks	0	0	1.6	0.5	0	9.9	0	6.5	0	1.4	0	0.8	0	8.4	0	7.4	4.1
Buses	0	1	5	6	0	0	0	0	0	1	0	1	0	2	0	2	9
% Buses	0	0.8	8.2	2.9	0	0	0	0	0	1.4	0	0.8	0	1.1	0	1.0	1.2

N/S Street : Windsor Street  
E/W Street: Main Street  
City/State : Cambridge, MA  
Weather : Cloudy



Peak Hour Analysis From 07:30 to 09:15 - Peak 1 of 1  
Peak Hour for Each Approach Begins at:

	07:30				07:30				07:30				08:15			
+0 mins.	6	24	16	46	13	39	8	60	4	17	7	28	1	53	4	58
+15 mins.	4	30	15	49	11	33	9	53	3	19	4	26	3	43	2	48
+30 mins.	3	32	14	49	9	31	7	47	7	14	11	32	4	48	3	55
+45 mins.	10	38	16	64	14	39	4	57	3	24	7	34	1	44	5	50
Total Volume	23	124	61	208	47	142	28	217	17	74	29	120	9	188	14	211
% App. Total	11.1	59.6	29.3		21.7	65.4	12.9		14.2	61.7	24.2		4.3	89.1	6.6	
PHF	.575	.816	.953	.813	.839	.910	.778	.904	.607	.771	.659	.882	.563	.887	.700	.909
Cars	23	123	55	201	47	128	28	203	17	72	29	118	9	170	14	193
% Cars	100	99.2	90.2	96.6	100	90.1	100	93.5	100	97.3	100	98.3	100	90.4	100	91.5
Trucks	0	0	1	1	0	14	0	14	0	1	0	1	0	17	0	17
% Trucks	0	0	1.6	0.5	0	9.9	0	6.5	0	1.4	0	0.8	0	9	0	8.1
Buses	0	1	5	6	0	0	0	0	0	1	0	1	0	1	0	1
% Buses	0	0.8	8.2	2.9	0	0	0	0	0	1.4	0	0.8	0	0.5	0	0.5

# Accurate Counts

978-664-2565

N/S Street : Windsor Street  
 E/W Street: Main Street  
 City/State : Cambridge, MA  
 Weather : Cloudy

File Name : 58290005  
 Site Code : 58290005  
 Start Date : 5/12/2011  
 Page No : 1

### Groups Printed- Bikes ST

Start Time	Windsor St From North			Main St From East			Windsor St From South			Main St From West			Int. Total
	Left	Thru	Rght	Left	Thru	Rght	Left	Thru	Rght	Left	Thru	Rght	
07:30	3	4	0	0	1	0	0	1	0	0	7	0	16
07:45	0	2	1	0	0	0	0	4	0	0	12	1	20
<b>Total</b>	<b>3</b>	<b>6</b>	<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>5</b>	<b>0</b>	<b>0</b>	<b>19</b>	<b>1</b>	<b>36</b>
08:00	0	6	1	0	0	0	0	1	0	1	10	1	20
08:15	0	13	1	0	1	0	0	1	0	0	10	1	27
08:30	1	8	0	1	1	0	0	1	0	0	17	0	29
08:45	1	8	3	0	2	0	0	1	0	1	24	1	41
<b>Total</b>	<b>2</b>	<b>35</b>	<b>5</b>	<b>1</b>	<b>4</b>	<b>0</b>	<b>0</b>	<b>4</b>	<b>0</b>	<b>2</b>	<b>61</b>	<b>3</b>	<b>117</b>
09:00	0	9	5	0	3	0	0	0	0	0	13	2	32
09:15	1	16	0	0	4	0	1	0	0	0	10	0	32
<b>Grand Total</b>	<b>6</b>	<b>66</b>	<b>11</b>	<b>1</b>	<b>12</b>	<b>0</b>	<b>1</b>	<b>9</b>	<b>0</b>	<b>2</b>	<b>103</b>	<b>6</b>	<b>217</b>
Apprch %	7.2	79.5	13.3	7.7	92.3	0	10	90	0	1.8	92.8	5.4	
Total %	2.8	30.4	5.1	0.5	5.5	0	0.5	4.1	0	0.9	47.5	2.8	

Start Time	Windsor St From North				Main St From East				Windsor St From South				Main St From West				Int. Total
	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	
Peak Hour Analysis From 07:30 to 09:15 - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 08:30																	
08:30	1	8	0	9	1	1	0	2	0	1	0	1	0	17	0	17	29
08:45	1	8	3	12	0	2	0	2	0	1	0	1	1	24	1	26	41
09:00	0	9	5	14	0	3	0	3	0	0	0	0	0	13	2	15	32
09:15	1	16	0	17	0	4	0	4	1	0	0	1	0	10	0	10	32
<b>Total Volume</b>	<b>3</b>	<b>41</b>	<b>8</b>	<b>52</b>	<b>1</b>	<b>10</b>	<b>0</b>	<b>11</b>	<b>1</b>	<b>2</b>	<b>0</b>	<b>3</b>	<b>1</b>	<b>64</b>	<b>3</b>	<b>68</b>	<b>134</b>
% App. Total	5.8	78.8	15.4		9.1	90.9	0		33.3	66.7	0		1.5	94.1	4.4		
PHF	.750	.641	.400	.765	.250	.625	.000	.688	.250	.500	.000	.750	.250	.667	.375	.654	.817



Accurate Counts  
978-664-2565

N/S Street : Windsor Street  
E/W Street: Main Street  
City/State : Cambridge, MA  
Weather : Cloudy

File Name : 58290005  
Site Code : 58290005  
Start Date : 5/12/2011  
Page No : 1

Groups Printed- Bikes SW

Start Time	Windsor St From North			Main St From East			Windsor St From South			Main St From West			Int. Total
	Left	Thru	Rght	Left	Thru	Rght	Left	Thru	Rght	Left	Thru	Rght	
07:30	0	0	0	0	1	0	0	0	0	0	0	0	1
07:45	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	1	0	0	0	0	0	0	0	1
08:00	0	0	0	0	0	0	0	0	0	1	0	0	1
08:15	0	0	0	0	0	0	0	0	0	0	1	0	1
08:30	0	0	0	0	0	0	1	0	0	0	0	0	1
08:45	0	0	0	0	0	0	0	0	0	0	0	1	1
Total	0	0	0	0	0	0	1	0	0	1	1	1	4
09:00	0	0	0	0	0	0	0	0	0	0	1	0	1
09:15	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	0	1	0	1	0	0	1	2	1	6
Apprch %	0	0	0	0	100	0	100	0	0	25	50	25	
Total %	0	0	0	0	16.7	0	16.7	0	0	16.7	33.3	16.7	

Start Time	Windsor St From North				Main St From East				Windsor St From South				Main St From West				Int. Total	
	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total		
Peak Hour Analysis From 07:30 to 09:15 - Peak 1 of 1																		
Peak Hour for Entire Intersection Begins at 08:00																		
08:00	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
08:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
08:30	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	1
08:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1
Total Volume	0	0	0	0	0	0	0	0	0	1	0	0	1	1	1	1	3	4
% App. Total	0	0	0	0	0	0	0	0	0	100	0	0	0	33.3	33.3	33.3		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.250	.000	.000	.250	.250	.250	.250	.750	1.000

Accurate Counts  
978-664-2565

N/S Street : Windsor Street  
E/W Street: Main Street  
City/State : Cambridge, MA  
Weather : Cloudy

File Name : 58290005  
Site Code : 58290005  
Start Date : 5/12/2011  
Page No : 1

Groups Printed- Trucks

Start Time	Windsor St From North			Main St From East			Windsor St From South			Main St From West			Int. Total
	Left	Thru	Rght	Left	Thru	Rght	Left	Thru	Rght	Left	Thru	Rght	
07:30	0	0	1	0	7	0	0	0	0	0	1	0	9
07:45	0	0	0	0	3	0	0	1	0	0	7	0	11
Total	0	0	1	0	10	0	0	1	0	0	8	0	20
08:00	0	0	0	0	2	0	0	0	0	0	0	0	2
08:15	0	0	0	0	2	0	0	0	0	0	7	0	9
08:30	0	1	0	0	3	0	0	0	0	0	7	0	11
08:45	1	1	1	0	3	0	0	0	0	0	0	0	6
Total	1	2	1	0	10	0	0	0	0	0	14	0	28
09:00	0	0	0	0	2	0	0	0	0	0	3	0	5
09:15	0	0	1	0	1	0	0	0	0	1	3	0	6
Grand Total	1	2	3	0	23	0	0	1	0	1	28	0	59
Apprch %	16.7	33.3	50	0	100	0	0	100	0	3.4	96.6	0	
Total %	1.7	3.4	5.1	0	39	0	0	1.7	0	1.7	47.5	0	

Start Time	Windsor St From North				Main St From East				Windsor St From South				Main St From West				Int. Total
	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	
Peak Hour Analysis From 07:30 to 09:15 - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:45																	
07:45	0	0	0	0	0	3	0	3	0	1	0	1	0	7	0	7	11
08:00	0	0	0	0	0	2	0	2	0	0	0	0	0	0	0	0	2
08:15	0	0	0	0	0	2	0	2	0	0	0	0	0	7	0	7	9
08:30	0	1	0	1	0	3	0	3	0	0	0	0	0	7	0	7	11
Total Volume	0	1	0	1	0	10	0	10	0	1	0	1	0	21	0	21	33
% App. Total	0	100	0		0	100	0		0	100	0		0	100	0		
PHF	.000	.250	.000	.250	.000	.833	.000	.833	.000	.250	.000	.250	.000	.750	.000	.750	.750

# Accurate Counts

978-664-2565

N/S Street : Windsor Street  
 E/W Street: Main Street  
 City/State : Cambridge, MA  
 Weather : Cloudy

File Name : 58290005  
 Site Code : 58290005  
 Start Date : 5/12/2011  
 Page No : 1

## Groups Printed- Peds

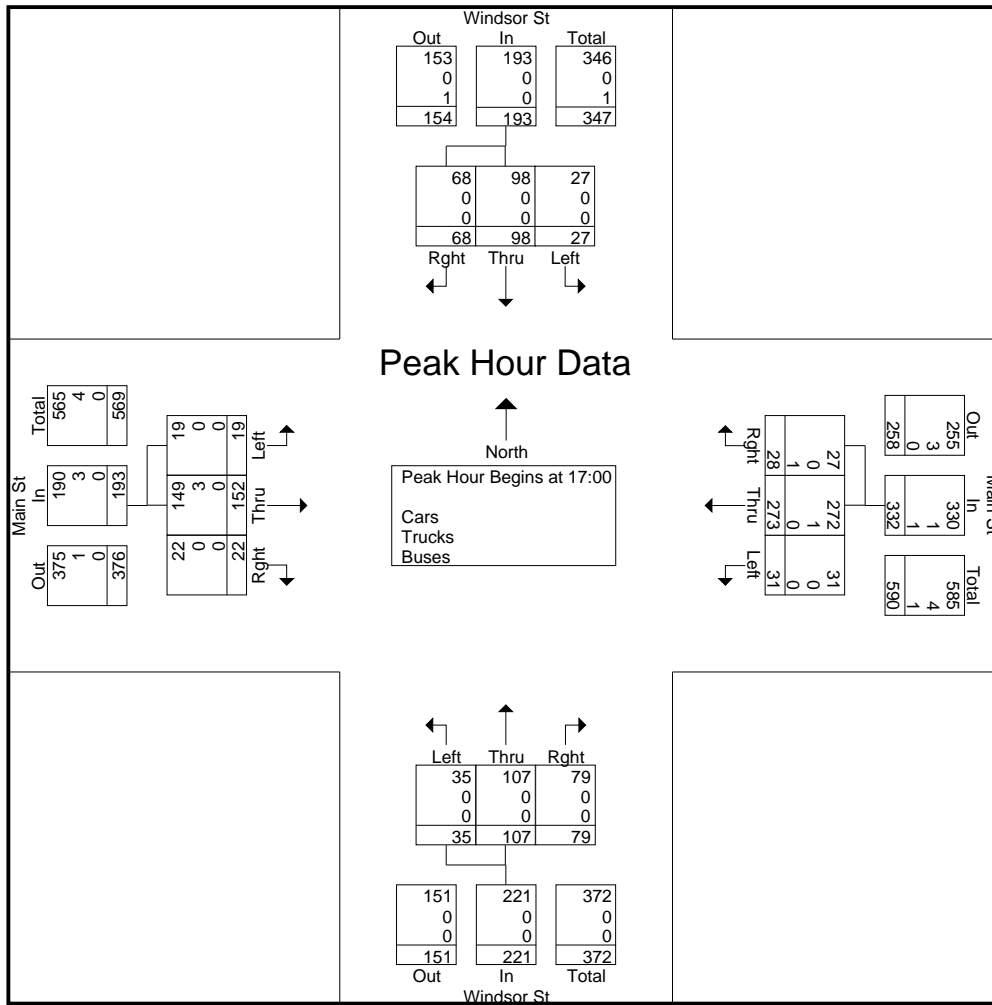
Start Time	Windsor St From North				Main St From East				Windsor St From South				Main St From West				Int. Total
	EB			WB	NB			SB	EB			WB	NB			SB	
07:30	5	0	0	2	5	0	0	1	2	0	0	4	2	0	0	1	22
07:45	15	0	0	1	7	0	0	2	2	0	0	9	0	0	0	7	43
<b>Total</b>	<b>20</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>12</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>4</b>	<b>0</b>	<b>0</b>	<b>13</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>8</b>	<b>65</b>
08:00	11	0	0	3	3	0	0	0	3	0	0	3	2	0	0	4	29
08:15	17	0	0	2	4	0	0	1	1	0	0	3	0	0	0	7	35
08:30	25	0	0	8	8	0	0	2	0	0	0	8	3	0	0	10	64
08:45	23	0	0	2	3	0	0	1	6	0	0	7	1	0	0	7	50
<b>Total</b>	<b>76</b>	<b>0</b>	<b>0</b>	<b>15</b>	<b>18</b>	<b>0</b>	<b>0</b>	<b>4</b>	<b>10</b>	<b>0</b>	<b>0</b>	<b>21</b>	<b>6</b>	<b>0</b>	<b>0</b>	<b>28</b>	<b>178</b>
09:00	22	0	0	6	24	0	0	0	2	0	0	5	0	0	0	7	66
09:15	14	0	0	2	6	0	0	0	5	0	0	8	0	0	0	6	41
<b>Grand Total</b>	<b>132</b>	<b>0</b>	<b>0</b>	<b>26</b>	<b>60</b>	<b>0</b>	<b>0</b>	<b>7</b>	<b>21</b>	<b>0</b>	<b>0</b>	<b>47</b>	<b>8</b>	<b>0</b>	<b>0</b>	<b>49</b>	<b>350</b>
Apprch %	83.5	0	0	16.5	89.6	0	0	10.4	30.9	0	0	69.1	14	0	0	86	
Total %	37.7	0	0	7.4	17.1	0	0	2	6	0	0	13.4	2.3	0	0	14	

Start Time	Windsor St From North				Main St From East				Windsor St From South				Main St From West				Int. Total				
	EB			WB	App. Total	NB			SB	App. Total	EB			WB	App. Total	NB				SB	App. Total
Peak Hour Analysis From 07:30 to 09:15 - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 08:30																					
08:30	<b>25</b>	0	0	<b>8</b>	<b>33</b>	8	0	0	<b>2</b>	<b>10</b>	0	0	0	<b>8</b>	<b>8</b>	<b>3</b>	0	0	<b>10</b>	<b>13</b>	64
08:45	23	0	0	2	25	3	0	0	1	4	6	0	0	7	13	1	0	0	7	8	50
09:00	22	0	0	6	28	<b>24</b>	0	0	0	<b>24</b>	2	0	0	5	7	0	0	0	7	7	<b>66</b>
09:15	14	0	0	2	16	6	0	0	0	6	5	0	0	8	13	0	0	0	6	6	41
Total Volume	84	0	0	18	102	41	0	0	3	44	13	0	0	28	41	4	0	0	30	34	221
% App. Total																					
PHF	.840	.000	.000	.563	.773	.427	.000	.000	.375	.458	.542	.000	.000	.875	.788	.333	.000	.000	.750	.654	.837





N/S Street : Windsor Street  
E/W Street: Main Street  
City/State : Cambridge, MA  
Weather : Cloudy



Peak Hour Analysis From 16:30 to 19:15 - Peak 1 of 1  
Peak Hour for Each Approach Begins at:

	17:00				16:45				16:30				17:00			
+0 mins.	12	21	18	51	11	59	7	77	6	26	20	52	2	37	5	44
+15 mins.	3	22	14	39	7	65	5	77	10	29	16	55	5	32	8	45
+30 mins.	6	24	11	41	10	74	9	93	9	29	31	69	4	38	3	45
+45 mins.	6	31	25	62	7	81	10	98	7	28	25	60	8	45	6	59
Total Volume	27	98	68	193	35	279	31	345	32	112	92	236	19	152	22	193
% App. Total	14	50.8	35.2		10.1	80.9	9		13.6	47.5	39		9.8	78.8	11.4	
PHF	.563	.790	.680	.778	.795	.861	.775	.880	.800	.966	.742	.855	.594	.844	.688	.818
Cars	27	98	68	193	35	279	30	344	32	111	92	235	19	149	22	190
% Cars	100	100	100	100	100	100	96.8	99.7	100	99.1	100	99.6	100	98	100	98.4
Trucks	0	0	0	0	0	0	0	0	0	1	0	1	0	3	0	3
% Trucks	0	0	0	0	0	0	0	0	0	0.9	0	0.4	0	2	0	1.6
Buses	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
% Buses	0	0	0	0	0	0	3.2	0.3	0	0	0	0	0	0	0	0

# Accurate Counts

978-664-2565

N/S Street : Windsor Street  
 E/W Street: Main Street  
 City/State : Cambridge, MA  
 Weather : Cloudy

File Name : 58290005  
 Site Code : 58290005  
 Start Date : 5/12/2011  
 Page No : 1

### Groups Printed- Bikes ST

Start Time	Windsor St From North			Main St From East			Windsor St From South			Main St From West			Int. Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
16:30	0	1	0	1	7	1	0	4	1	1	0	0	16
16:45	1	1	0	1	10	0	0	2	1	0	3	0	19
<b>Total</b>	<b>1</b>	<b>2</b>	<b>0</b>	<b>2</b>	<b>17</b>	<b>1</b>	<b>0</b>	<b>6</b>	<b>2</b>	<b>1</b>	<b>3</b>	<b>0</b>	<b>35</b>
17:00	0	2	1	1	10	0	0	5	1	0	0	0	20
17:15	0	0	1	0	14	1	0	16	1	0	3	1	37
17:30	1	3	1	0	12	3	0	4	0	0	4	1	29
17:45	1	4	0	0	10	1	0	11	1	0	5	0	33
<b>Total</b>	<b>2</b>	<b>9</b>	<b>3</b>	<b>1</b>	<b>46</b>	<b>5</b>	<b>0</b>	<b>36</b>	<b>3</b>	<b>0</b>	<b>12</b>	<b>2</b>	<b>119</b>
18:00	0	4	1	1	15	0	0	5	1	0	3	1	31
18:15	0	1	0	1	12	2	0	3	0	0	5	0	24
18:30	0	2	2	1	13	0	0	7	0	0	6	1	32
18:45	0	1	0	0	11	0	0	3	1	0	7	0	23
<b>Total</b>	<b>0</b>	<b>8</b>	<b>3</b>	<b>3</b>	<b>51</b>	<b>2</b>	<b>0</b>	<b>18</b>	<b>2</b>	<b>0</b>	<b>21</b>	<b>2</b>	<b>110</b>
19:00	0	0	0	0	7	1	0	2	2	0	4	0	16
19:15	0	0	0	0	6	0	0	1	0	1	0	0	8
<b>Grand Total</b>	<b>3</b>	<b>19</b>	<b>6</b>	<b>6</b>	<b>127</b>	<b>9</b>	<b>0</b>	<b>63</b>	<b>9</b>	<b>2</b>	<b>40</b>	<b>4</b>	<b>288</b>
Apprch %	10.7	67.9	21.4	4.2	89.4	6.3	0	87.5	12.5	4.3	87	8.7	
Total %	1	6.6	2.1	2.1	44.1	3.1	0	21.9	3.1	0.7	13.9	1.4	

Start Time	Windsor St From North				Main St From East				Windsor St From South				Main St From West				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
Peak Hour Analysis From 16:30 to 19:15 - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 17:15																	
17:15	0	0	1	1	0	14	1	15	0	<b>16</b>	1	17	0	3	1	4	37
17:30	1	3	1	5	0	12	3	15	0	4	0	4	0	4	1	5	29
17:45	1	4	0	5	0	10	1	11	0	11	1	12	0	5	0	5	33
18:00	0	4	1	5	1	15	0	16	0	5	1	6	0	3	1	4	31
<b>Total Volume</b>	<b>2</b>	<b>11</b>	<b>3</b>	<b>16</b>	<b>1</b>	<b>51</b>	<b>5</b>	<b>57</b>	<b>0</b>	<b>36</b>	<b>3</b>	<b>39</b>	<b>0</b>	<b>15</b>	<b>3</b>	<b>18</b>	<b>130</b>
<b>% App. Total</b>	<b>12.5</b>	<b>68.8</b>	<b>18.8</b>		<b>1.8</b>	<b>89.5</b>	<b>8.8</b>		<b>0</b>	<b>92.3</b>	<b>7.7</b>		<b>0</b>	<b>83.3</b>	<b>16.7</b>		
PHF	.500	.688	.750	.800	.250	.850	.417	.891	.000	.563	.750	.574	.000	.750	.750	.900	.878





# Accurate Counts

978-664-2565

N/S Street : Windsor Street  
 E/W Street: Main Street  
 City/State : Cambridge, MA  
 Weather : Cloudy

File Name : 58290005  
 Site Code : 58290005  
 Start Date : 5/12/2011  
 Page No : 1

### Groups Printed- Trucks

Start Time	Windsor St From North			Main St From East			Windsor St From South			Main St From West			Int. Total
	Left	Thru	Rght	Left	Thru	Rght	Left	Thru	Rght	Left	Thru	Rght	
16:30	0	1	0	0	0	1	0	1	0	0	1	0	4
16:45	0	0	0	0	0	0	0	0	0	1	1	0	2
<b>Total</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>0</b>	<b>6</b>
17:00	0	0	0	0	0	0	0	0	0	0	0	0	0
17:15	0	0	0	0	0	0	0	0	0	0	1	0	1
17:30	0	0	0	0	0	0	0	0	0	0	2	0	2
17:45	0	0	0	0	1	0	0	0	0	0	0	0	1
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>0</b>	<b>4</b>
18:00	0	0	0	0	0	0	0	0	0	0	0	0	0
18:15	0	0	0	0	0	0	0	0	0	0	0	0	0
18:30	0	0	0	0	0	0	0	0	0	0	2	0	2
18:45	0	0	0	0	2	0	0	0	0	0	0	0	2
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>0</b>	<b>4</b>
19:00	0	0	0	0	0	0	0	0	0	0	1	0	1
19:15	0	1	0	0	0	0	0	0	0	0	0	0	1
<b>Grand Total</b>	<b>0</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>1</b>	<b>8</b>	<b>0</b>	<b>16</b>
Apprch %	0	100	0	0	75	25	0	100	0	11.1	88.9	0	
Total %	0	12.5	0	0	18.8	6.2	0	6.2	0	6.2	50	0	

Start Time	Windsor St From North				Main St From East				Windsor St From South				Main St From West				Int. Total
	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	
Peak Hour Analysis From 16:30 to 19:15 - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 16:30																	
16:30	0	1	0	1	0	0	1	1	0	1	0	1	0	1	0	1	4
16:45	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	2	2
17:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:15	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
<b>Total Volume</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>3</b>	<b>0</b>	<b>4</b>	<b>7</b>
<b>% App. Total</b>	<b>0</b>	<b>100</b>	<b>0</b>	<b></b>	<b>0</b>	<b>0</b>	<b>100</b>	<b></b>	<b>0</b>	<b>100</b>	<b>0</b>	<b></b>	<b>25</b>	<b>75</b>	<b>0</b>	<b></b>	<b></b>
PHF	.000	.250	.000	.250	.000	.000	.250	.250	.000	.250	.000	.250	.250	.750	.000	.500	.438

**Accurate Counts**  
978-664-2565

N/S Street : Windsor Street  
E/W Street: Main Street  
City/State : Cambridge, MA  
Weather : Cloudy

File Name : 58290005  
Site Code : 58290005  
Start Date : 5/12/2011  
Page No : 1

Groups Printed- Peds

Start Time	Windsor St From North				Main St From East				Windsor St From South				Main St From West				Int. Total
	EB		WB		NB		SB		EB		WB		NB		SB		
16:30	2	0	0	1	4	0	0	6	0	0	0	0	8	0	0	7	28
16:45	7	0	0	1	1	0	0	1	1	0	0	1	4	0	0	2	18
<b>Total</b>	<b>9</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>5</b>	<b>0</b>	<b>0</b>	<b>7</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>12</b>	<b>0</b>	<b>0</b>	<b>9</b>	<b>46</b>
17:00	2	0	0	9	7	0	0	1	0	0	0	2	18	0	0	12	51
17:15	4	0	0	3	6	0	0	1	0	0	0	0	18	0	0	1	33
17:30	0	0	0	8	3	0	0	3	5	0	0	8	22	0	0	8	57
17:45	1	0	0	6	5	0	0	9	6	0	0	10	8	0	0	4	49
<b>Total</b>	<b>7</b>	<b>0</b>	<b>0</b>	<b>26</b>	<b>21</b>	<b>0</b>	<b>0</b>	<b>14</b>	<b>11</b>	<b>0</b>	<b>0</b>	<b>20</b>	<b>66</b>	<b>0</b>	<b>0</b>	<b>25</b>	<b>190</b>
18:00	0	0	0	11	4	0	0	3	1	0	0	11	9	0	0	5	44
18:15	2	0	0	14	3	0	0	7	1	0	0	9	8	0	0	5	49
18:30	2	0	0	6	6	0	0	2	5	0	0	7	7	0	0	8	43
18:45	3	0	0	1	3	0	0	2	3	0	0	5	8	0	0	5	30
<b>Total</b>	<b>7</b>	<b>0</b>	<b>0</b>	<b>32</b>	<b>16</b>	<b>0</b>	<b>0</b>	<b>14</b>	<b>10</b>	<b>0</b>	<b>0</b>	<b>32</b>	<b>32</b>	<b>0</b>	<b>0</b>	<b>23</b>	<b>166</b>
19:00	4	0	0	2	3	0	0	3	4	0	0	1	5	0	0	6	28
19:15	0	0	0	3	3	0	0	1	0	0	0	0	2	0	0	3	12
<b>Grand Total</b>	<b>27</b>	<b>0</b>	<b>0</b>	<b>65</b>	<b>48</b>	<b>0</b>	<b>0</b>	<b>39</b>	<b>26</b>	<b>0</b>	<b>0</b>	<b>54</b>	<b>117</b>	<b>0</b>	<b>0</b>	<b>66</b>	<b>442</b>
Apprch %	29.3	0	0	70.7	55.2	0	0	44.8	32.5	0	0	67.5	63.9	0	0	36.1	
Total %	6.1	0	0	14.7	10.9	0	0	8.8	5.9	0	0	12.2	26.5	0	0	14.9	

Start Time	Windsor St From North				Main St From East				Windsor St From South				Main St From West				Int. Total				
	EB		WB	App. Total	NB		SB	App. Total	EB		WB	App. Total	NB		SB	App. Total					
Peak Hour Analysis From 16:30 to 19:15 - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 17:30																					
17:30	0	0	0	8	8	3	0	0	3	6	5	0	0	8	13	22	0	0	8	30	57
17:45	1	0	0	6	7	5	0	0	9	14	6	0	0	10	16	8	0	0	4	12	49
18:00	0	0	0	11	11	4	0	0	3	7	1	0	0	11	12	9	0	0	5	14	44
18:15	2	0	0	14	16	3	0	0	7	10	1	0	0	9	10	8	0	0	5	13	49
Total Volume	3	0	0	39	42	15	0	0	22	37	13	0	0	38	51	47	0	0	22	69	199
% App. Total																					
PHF	.375	.000	.000	.696	.656	.750	.000	.000	.611	.661	.542	.000	.000	.864	.797	.534	.000	.000	.688	.575	.873



PRECISION  
D A T A  
INDUSTRIES, LLC

46 Morton Street, Framingham, MA 01702  
Office: 508-875-0100 Fax: 508-875-0118  
Email: datarequests@pdillc.com

N/S: Sydney Street  
E/W: Massachusetts Avenue (Route 2A)  
City, State: Cambridge, MA  
Client: VHB/ C. Dube

File Name : 165082 D  
Site Code : TBA  
Start Date : 5/18/2016  
Page No : 1

Groups Printed- Cars - Heavy Vehicles

Start Time	Sidney Street From North				Massachusetts Avenue (Route 2A) From East				Sidney Street From South				Massachusetts Avenue (Route 2A) From West				Int. Total
	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	
07:30 AM	19	49	13	0	12	57	15	0	13	0	0	0	17	73	24	0	292
07:45 AM	17	57	24	0	12	55	23	0	11	0	0	0	10	70	23	0	302
Total	36	106	37	0	24	112	38	0	24	0	0	0	27	143	47	0	594
08:00 AM	17	61	21	0	7	70	17	0	16	0	0	0	17	69	26	0	321
08:15 AM	13	53	19	0	11	56	18	0	17	0	0	0	11	53	27	0	278
08:30 AM	13	57	24	0	16	56	19	1	20	0	0	0	16	66	22	0	310
08:45 AM	8	54	17	0	10	58	20	0	19	0	0	0	19	59	22	0	286
Total	51	225	81	0	44	240	74	1	72	0	0	0	63	247	97	0	1195
09:00 AM	13	53	13	0	15	66	24	0	14	0	0	0	10	62	31	0	301
09:15 AM	11	53	15	0	15	49	15	0	14	1	0	0	16	57	27	0	273
Grand Total	111	437	146	0	98	467	151	1	124	1	0	0	116	509	202	0	2363
Apprch %	16	63	21	0	13.7	65.1	21.1	0.1	99.2	0.8	0	0	14	61.5	24.4	0	
Total %	4.7	18.5	6.2	0	4.1	19.8	6.4	0	5.2	0	0	0	4.9	21.5	8.5	0	
Cars	96	421	141	0	88	376	144	1	115	1	0	0	99	410	169	0	2061
% Cars	86.5	96.3	96.6	0	89.8	80.5	95.4	100	92.7	100	0	0	85.3	80.6	83.7	0	87.2
Heavy Vehicles	15	16	5	0	10	91	7	0	9	0	0	0	17	99	33	0	302
% Heavy Vehicles	13.5	3.7	3.4	0	10.2	19.5	4.6	0	7.3	0	0	0	14.7	19.4	16.3	0	12.8

Start Time	Sidney Street From North					Massachusetts Avenue (Route 2A) From East					Sidney Street From South					Massachusetts Avenue (Route 2A) From West					Int. Total
	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	
Peak Hour Analysis From 07:30 AM to 09:15 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:45 AM																					
07:45 AM	17	57	24	0	98	12	55	23	0	90	11	0	0	0	11	10	70	23	0	103	302
08:00 AM	17	61	21	0	99	7	70	17	0	94	16	0	0	0	16	17	69	26	0	112	321
08:15 AM	13	53	19	0	85	11	56	18	0	85	17	0	0	0	17	11	53	27	0	91	278
08:30 AM	13	57	24	0	94	16	56	19	1	92	20	0	0	0	20	16	66	22	0	104	310
Total Volume	60	228	88	0	376	46	237	77	1	361	64	0	0	0	64	54	258	98	0	410	1211
% App. Total	16	60.6	23.4	0		12.7	65.7	21.3	0.3		100	0	0	0		13.2	62.9	23.9	0		
PHF	.882	.934	.917	.000	.949	.719	.846	.837	.250	.960	.800	.000	.000	.000	.800	.794	.921	.907	.000	.915	.943
Cars	49	222	87	0	358	45	199	73	1	318	59	0	0	0	59	45	207	83	0	335	1070
% Cars	81.7	97.4	98.9	0	95.2	97.8	84.0	94.8	100	88.1	92.2	0	0	0	92.2	83.3	80.2	84.7	0	81.7	88.4
Heavy Vehicles	11	6	1	0	18	1	38	4	0	43	5	0	0	0	5	9	51	15	0	75	141
% Heavy Vehicles	18.3	2.6	1.1	0	4.8	2.2	16.0	5.2	0	11.9	7.8	0	0	0	7.8	16.7	19.8	15.3	0	18.3	11.6



PRECISION  
D A T A  
INDUSTRIES, LLC

46 Morton Street, Framingham, MA 01702  
Office: 508-875-0100 Fax: 508-875-0118  
Email: datarequests@pdillc.com

N/S: Sydney Street  
E/W: Massachusetts Avenue (Route 2A)  
City, State: Cambridge, MA  
Client: VHB/ C. Dube

File Name : 165082 D  
Site Code : TBA  
Start Date : 5/18/2016  
Page No : 1

Groups Printed- Cars

Start Time	Sidney Street From North				Massachusetts Avenue (Route 2A) From East				Sidney Street From South				Massachusetts Avenue (Route 2A) From West				Int. Total
	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	
07:30 AM	18	47	12	0	9	44	14	0	13	0	0	0	14	61	19	0	251
07:45 AM	14	55	24	0	12	50	21	0	10	0	0	0	7	56	21	0	270
Total	32	102	36	0	21	94	35	0	23	0	0	0	21	117	40	0	521
08:00 AM	12	61	20	0	7	57	15	0	15	0	0	0	12	53	21	0	273
08:15 AM	10	53	19	0	10	46	18	0	17	0	0	0	11	43	23	0	250
08:30 AM	13	53	24	0	16	46	19	1	17	0	0	0	15	55	18	0	277
08:45 AM	6	52	17	0	7	45	19	0	18	0	0	0	16	44	21	0	245
Total	41	219	80	0	40	194	71	1	67	0	0	0	54	195	83	0	1045
09:00 AM	13	51	13	0	13	48	24	0	14	0	0	0	9	52	28	0	265
09:15 AM	10	49	12	0	14	40	14	0	11	1	0	0	15	46	18	0	230
Grand Total	96	421	141	0	88	376	144	1	115	1	0	0	99	410	169	0	2061
Apprch %	14.6	64	21.4	0	14.4	61.7	23.6	0.2	99.1	0.9	0	0	14.6	60.5	24.9	0	
Total %	4.7	20.4	6.8	0	4.3	18.2	7	0	5.6	0	0	0	4.8	19.9	8.2	0	

Start Time	Sidney Street From North					Massachusetts Avenue (Route 2A) From East					Sidney Street From South					Massachusetts Avenue (Route 2A) From West					Int. Total
	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	
Peak Hour Analysis From 07:30 AM to 09:15 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:45 AM																					
07:45 AM	14	55	24	0	93	12	50	21	0	83	10	0	0	0	10	7	56	21	0	84	270
08:00 AM	12	61	20	0	93	7	57	15	0	79	15	0	0	0	15	12	53	21	0	86	273
08:15 AM	10	53	19	0	82	10	46	18	0	74	17	0	0	0	17	11	43	23	0	77	250
08:30 AM	13	53	24	0	90	16	46	19	1	82	17	0	0	0	17	15	55	18	0	88	277
Total Volume	49	222	87	0	358	45	199	73	1	318	59	0	0	0	59	45	207	83	0	335	1070
% App. Total	13.7	62	24.3	0		14.2	62.6	23	0.3		100	0	0	0		13.4	61.8	24.8	0		
PHF	.875	.910	.906	.000	.962	.703	.873	.869	.250	.958	.868	.000	.000	.000	.868	.750	.924	.902	.000	.952	.966



PRECISION  
D A T A  
INDUSTRIES, LLC

46 Morton Street, Framingham, MA 01702  
Office: 508-875-0100 Fax: 508-875-0118  
Email: datarequests@pdillc.com

N/S: Sydney Street  
E/W: Massachusetts Avenue (Route 2A)  
City, State: Cambridge, MA  
Client: VHB/ C. Dube

File Name : 165082 D  
Site Code : TBA  
Start Date : 5/18/2016  
Page No : 1

Groups Printed- Heavy Vehicles

Start Time	Sidney Street From North				Massachusetts Avenue (Route 2A) From East				Sidney Street From South				Massachusetts Avenue (Route 2A) From West				Int. Total
	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	
07:30 AM	1	2	1	0	3	13	1	0	0	0	0	0	3	12	5	0	41
07:45 AM	3	2	0	0	0	5	2	0	1	0	0	0	3	14	2	0	32
Total	4	4	1	0	3	18	3	0	1	0	0	0	6	26	7	0	73
08:00 AM	5	0	1	0	0	13	2	0	1	0	0	0	5	16	5	0	48
08:15 AM	3	0	0	0	1	10	0	0	0	0	0	0	0	10	4	0	28
08:30 AM	0	4	0	0	0	10	0	0	3	0	0	0	1	11	4	0	33
08:45 AM	2	2	0	0	3	13	1	0	1	0	0	0	3	15	1	0	41
Total	10	6	1	0	4	46	3	0	5	0	0	0	9	52	14	0	150
09:00 AM	0	2	0	0	2	18	0	0	0	0	0	0	1	10	3	0	36
09:15 AM	1	4	3	0	1	9	1	0	3	0	0	0	1	11	9	0	43
Grand Total	15	16	5	0	10	91	7	0	9	0	0	0	17	99	33	0	302
Apprch %	41.7	44.4	13.9	0	9.3	84.3	6.5	0	100	0	0	0	11.4	66.4	22.1	0	
Total %	5	5.3	1.7	0	3.3	30.1	2.3	0	3	0	0	0	5.6	32.8	10.9	0	

Start Time	Sidney Street From North					Massachusetts Avenue (Route 2A) From East					Sidney Street From South					Massachusetts Avenue (Route 2A) From West					Int. Total
	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	
Peak Hour Analysis From 07:30 AM to 09:15 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 08:30 AM																					
08:30 AM	0	4	0	0	4	0	10	0	0	10	3	0	0	0	3	1	11	4	0	16	33
08:45 AM	2	2	0	0	4	3	13	1	0	17	1	0	0	0	1	3	15	1	0	19	41
09:00 AM	0	2	0	0	2	2	18	0	0	20	0	0	0	0	0	1	10	3	0	14	36
09:15 AM	1	4	3	0	8	1	9	1	0	11	3	0	0	0	3	1	11	9	0	21	43
Total Volume	3	12	3	0	18	6	50	2	0	58	7	0	0	0	7	6	47	17	0	70	153
% App. Total	16.7	66.7	16.7	0		10.3	86.2	3.4	0		100	0	0	0		8.6	67.1	24.3	0		
PHF	.375	.750	.250	.000	.563	.500	.694	.500	.000	.725	.583	.000	.000	.000	.583	.500	.783	.472	.000	.833	.890



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Site Code : TBA  
Start Date : 5/18/2016  
Page No : 1

Groups Printed- Peds and Bikes

Start Time	Sidney Street From North					Massachusetts Avenue (Route 2A) From East					Sidney Street From South					Massachusetts Avenue (Route 2A) From West					Int. Total
	Right	Thru	Left	Peds EB	Peds WB	Right	Thru	Left	Peds SB	Peds NB	Right	Thru	Left	Peds WB	Peds EB	Right	Thru	Left	Peds NB	Peds SB	
07:30 AM	0	8	3	21	6	0	7	0	21	14	0	0	0	4	54	0	17	3	4	4	166
07:45 AM	0	6	9	32	6	0	7	1	12	6	1	2	0	7	48	3	24	0	2	3	169
Total	0	14	12	53	12	0	14	1	33	20	1	2	0	11	102	3	41	3	6	7	335
08:00 AM	0	3	11	21	10	0	6	0	33	19	2	5	0	19	52	2	21	4	6	5	219
08:15 AM	0	12	4	32	10	1	3	3	19	9	2	0	0	11	63	0	32	5	7	10	223
08:30 AM	2	13	9	40	9	0	6	1	16	22	3	1	0	14	65	2	39	8	16	15	281
08:45 AM	1	18	16	45	6	1	11	0	19	14	6	4	0	14	63	4	31	10	7	10	280
Total	3	46	40	138	35	2	26	4	87	64	13	10	0	58	243	8	123	27	36	40	1003
09:00 AM	1	22	11	32	15	1	9	2	11	14	1	2	0	10	64	1	19	8	14	14	251
09:15 AM	0	7	8	50	9	1	3	0	19	15	1	0	0	14	45	0	26	4	4	7	213
Grand Total	4	89	71	273	71	4	52	7	150	113	16	14	0	93	454	12	209	42	60	68	1802
Apprch %	0.8	17.5	14	53.7	14	1.2	16	2.1	46	34.7	2.8	2.4	0	16.1	78.7	3.1	53.5	10.7	15.3	17.4	
Total %	0.2	4.9	3.9	15.1	3.9	0.2	2.9	0.4	8.3	6.3	0.9	0.8	0	5.2	25.2	0.7	11.6	2.3	3.3	3.8	

Start Time	Sidney Street From North						Massachusetts Avenue (Route 2A) From East						Sidney Street From South						Massachusetts Avenue (Route 2A) From West						Int. Total
	Right	Thru	Left	Peds EB	Peds WB	App. Total	Right	Thru	Left	Peds SB	Peds NB	App. Total	Right	Thru	Left	Peds WB	Peds EB	App. Total	Right	Thru	Left	Peds NB	Peds SB	App. Total	
Peak Hour Analysis From 07:30 AM to 09:15 AM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 08:15 AM																									
08:15 AM	0	12	4	32	10	58	1	3	3	19	9	35	2	0	0	11	63	76	0	32	5	7	10	54	223
08:30 AM	2	13	9	40	9	73	0	6	1	16	22	45	3	1	0	14	65	83	2	39	8	16	15	80	281
08:45 AM	1	18	16	45	6	86	1	11	0	19	14	45	6	4	0	14	63	87	4	31	10	7	10	62	280
09:00 AM	1	22	11	32	15	81	1	9	2	11	14	37	1	2	0	10	64	77	1	19	8	14	14	56	251
Total Volume	4	65	40	149	40	298	3	29	6	65	59	162	12	7	0	49	255	323	7	121	31	44	49	252	1035
% App. Total	1.3	21.8	13.4	50	13.4	1.9	17.9	3.7	40.1	36.4	3.7	2.2	0	15.2	78.9	2.8	48	12.3	17.5	19.4					
PHF	.500	.739	.625	.828	.667	.866	.750	.659	.500	.855	.670	.900	.500	.438	.000	.875	.981	.928	.438	.776	.775	.688	.817	.788	.921



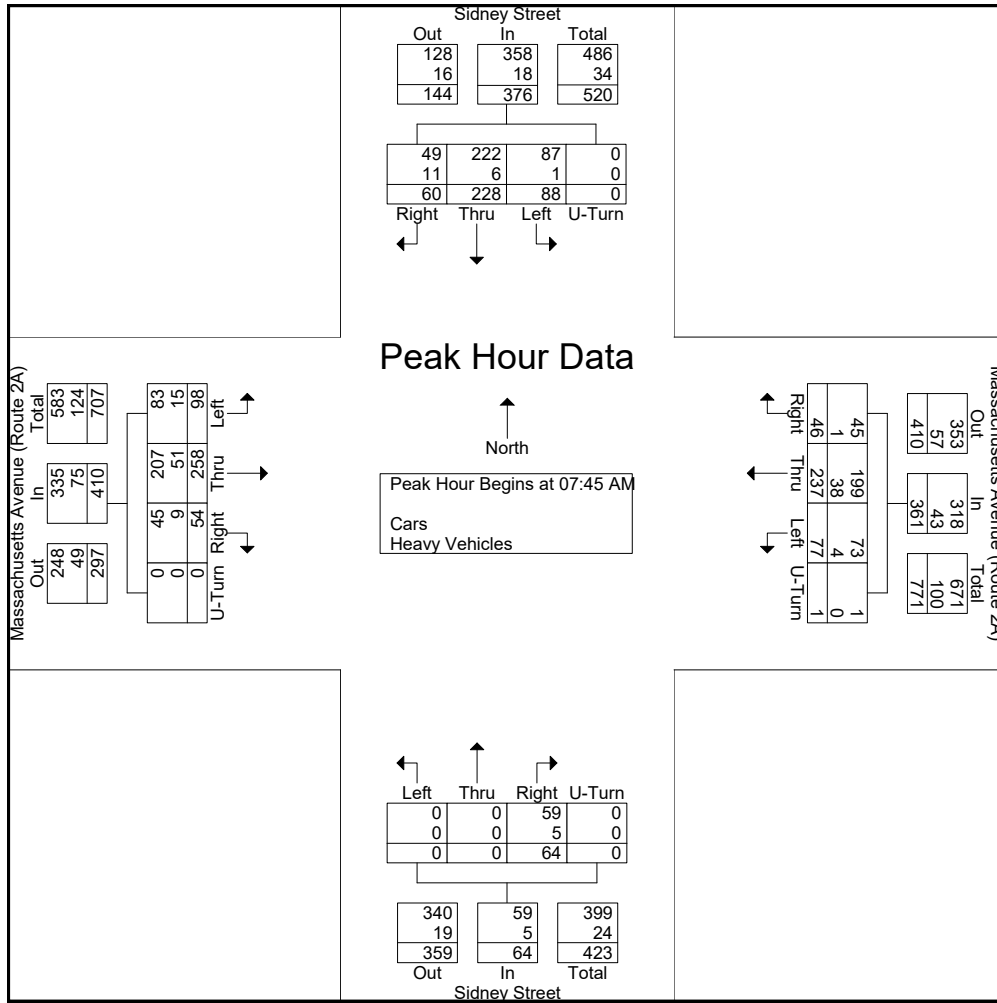
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Start Time	Sidney Street From North					Massachusetts Avenue (Route 2A) From East					Sidney Street From South					Massachusetts Avenue (Route 2A) From West					Int. Total
	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	
Peak Hour Analysis From 07:30 AM to 09:15 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:45 AM																					
07:45 AM	17	57	24	0	98	12	55	23	0	90	11	0	0	0	11	10	70	23	0	103	302
08:00 AM	17	61	21	0	99	7	70	17	0	94	16	0	0	0	16	17	69	26	0	112	321
08:15 AM	13	53	19	0	85	11	56	18	0	85	17	0	0	0	17	11	53	27	0	91	278
08:30 AM	13	57	24	0	94	16	56	19	1	92	20	0	0	0	20	16	66	22	0	104	310
Total Volume	60	228	88	0	376	46	237	77	1	361	64	0	0	0	64	54	258	98	0	410	1211
% App. Total	16	60.6	23.4	0		12.7	65.7	21.3	0.3		100	0	0	0		13.2	62.9	23.9	0		
PHF	.882	.934	.917	.000	.949	.719	.846	.837	.250	.960	.800	.000	.000	.800	.800	.794	.921	.907	.000	.915	.943
Cars	49	222	87	0	358	45	199	73	1	318	59	0	0	0	59	45	207	83	0	335	1070
% Cars	81.7	97.4	98.9	0	95.2	97.8	84.0	94.8	100	88.1	92.2	0	0	0	92.2	83.3	80.2	84.7	0	81.7	88.4
Heavy Vehicles	11	6	1	0	18	1	38	4	0	43	5	0	0	0	5	9	51	15	0	75	141
% Heavy Vehicles	18.3	2.6	1.1	0	4.8	2.2	16.0	5.2	0	11.9	7.8	0	0	0	7.8	16.7	19.8	15.3	0	18.3	11.6





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File Name : 165082 DD  
Site Code : TBA  
Start Date : 5/18/2016  
Page No : 1

Groups Printed- Cars - Heavy Vehicles

Start Time	Sidney Street From North				Massachusetts Avenue (Route 2A) From East				Sidney Street From South				Massachusetts Avenue (Route 2A) From West				Int. Total
	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	
04:30 PM	23	25	11	0	28	87	15	0	30	0	0	0	22	50	34	0	325
04:45 PM	22	44	13	0	27	102	20	0	20	0	0	0	7	51	22	0	328
Total	45	69	24	0	55	189	35	0	50	0	0	0	29	101	56	0	653
05:00 PM	24	39	15	0	27	76	16	0	24	0	0	0	11	70	31	0	333
05:15 PM	33	52	13	0	28	61	23	0	21	0	0	0	11	52	30	0	324
05:30 PM	27	39	11	0	33	90	27	0	24	0	0	0	10	57	23	0	341
05:45 PM	19	46	18	0	25	80	23	0	16	1	0	0	18	51	27	1	325
Total	103	176	57	0	113	307	89	0	85	1	0	0	50	230	111	1	1323
06:00 PM	22	46	8	0	28	59	18	0	24	1	0	0	14	52	29	0	301
06:15 PM	23	35	19	0	25	77	12	0	17	0	0	0	13	44	34	0	299
Grand Total	193	326	108	0	221	632	154	0	176	2	0	0	106	427	230	1	2576
Apprch %	30.8	52	17.2	0	21.9	62.8	15.3	0	98.9	1.1	0	0	13.9	55.9	30.1	0.1	
Total %	7.5	12.7	4.2	0	8.6	24.5	6	0	6.8	0.1	0	0	4.1	16.6	8.9	0	
Cars	184	322	106	0	217	589	152	0	172	1	0	0	102	365	215	1	2426
% Cars	95.3	98.8	98.1	0	98.2	93.2	98.7	0	97.7	50	0	0	96.2	85.5	93.5	100	94.2
Heavy Vehicles	9	4	2	0	4	43	2	0	4	1	0	0	4	62	15	0	150
% Heavy Vehicles	4.7	1.2	1.9	0	1.8	6.8	1.3	0	2.3	50	0	0	3.8	14.5	6.5	0	5.8

Start Time	Sidney Street From North					Massachusetts Avenue (Route 2A) From East					Sidney Street From South					Massachusetts Avenue (Route 2A) From West					Int. Total
	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	
Peak Hour Analysis From 04:30 PM to 06:15 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:45 PM																					
04:45 PM	22	44	13	0	79	27	102	20	0	149	20	0	0	0	20	7	51	22	0	80	328
05:00 PM	24	39	15	0	78	27	76	16	0	119	24	0	0	0	24	11	70	31	0	112	333
05:15 PM	33	52	13	0	98	28	61	23	0	112	21	0	0	0	21	11	52	30	0	93	324
05:30 PM	27	39	11	0	77	33	90	27	0	150	24	0	0	0	24	10	57	23	0	90	341
Total Volume	106	174	52	0	332	115	329	86	0	530	89	0	0	0	89	39	230	106	0	375	1326
% App. Total	31.9	52.4	15.7	0		21.7	62.1	16.2	0		100	0	0	0		10.4	61.3	28.3	0		
PHF	.803	.837	.867	.000	.847	.871	.806	.796	.000	.883	.927	.000	.000	.000	.927	.886	.821	.855	.000	.837	.972
Cars	102	171	51	0	324	112	313	85	0	510	87	0	0	0	87	36	202	99	0	337	1258
% Cars	96.2	98.3	98.1	0	97.6	97.4	95.1	98.8	0	96.2	97.8	0	0	0	97.8	92.3	87.8	93.4	0	89.9	94.9
Heavy Vehicles	4	3	1	0	8	3	16	1	0	20	2	0	0	0	2	3	28	7	0	38	68
% Heavy Vehicles	3.8	1.7	1.9	0	2.4	2.6	4.9	1.2	0	3.8	2.2	0	0	0	2.2	7.7	12.2	6.6	0	10.1	5.1





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Page No : 1

Groups Printed- Cars

Start Time	Sidney Street From North				Massachusetts Avenue (Route 2A) From East				Sidney Street From South				Massachusetts Avenue (Route 2A) From West				Int. Total
	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	
04:30 PM	22	24	11	0	28	78	15	0	29	0	0	0	22	44	30	0	303
04:45 PM	21	43	13	0	27	97	20	0	20	0	0	0	7	44	17	0	309
Total	43	67	24	0	55	175	35	0	49	0	0	0	29	88	47	0	612
05:00 PM	24	38	15	0	26	71	16	0	24	0	0	0	11	62	30	0	317
05:15 PM	32	52	12	0	27	59	22	0	21	0	0	0	10	49	29	0	313
05:30 PM	25	38	11	0	32	86	27	0	22	0	0	0	8	47	23	0	319
05:45 PM	17	46	18	0	24	74	22	0	15	1	0	0	18	44	25	1	305
Total	98	174	56	0	109	290	87	0	82	1	0	0	47	202	107	1	1254
06:00 PM	20	46	8	0	28	54	18	0	24	0	0	0	14	42	28	0	282
06:15 PM	23	35	18	0	25	70	12	0	17	0	0	0	12	33	33	0	278
Grand Total	184	322	106	0	217	589	152	0	172	1	0	0	102	365	215	1	2426
Apprch %	30.1	52.6	17.3	0	22.7	61.5	15.9	0	99.4	0.6	0	0	14.9	53.4	31.5	0.1	
Total %	7.6	13.3	4.4	0	8.9	24.3	6.3	0	7.1	0	0	0	4.2	15	8.9	0	

Start Time	Sidney Street From North					Massachusetts Avenue (Route 2A) From East					Sidney Street From South					Massachusetts Avenue (Route 2A) From West					Int. Total
	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	
Peak Hour Analysis From 04:30 PM to 06:15 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:45 PM																					
04:45 PM	21	43	13	0	77	27	97	20	0	144	20	0	0	0	20	7	44	17	0	68	309
05:00 PM	24	38	15	0	77	26	71	16	0	113	24	0	0	0	24	11	62	30	0	103	317
05:15 PM	32	52	12	0	96	27	59	22	0	108	21	0	0	0	21	10	49	29	0	88	313
05:30 PM	25	38	11	0	74	32	86	27	0	145	22	0	0	0	22	8	47	23	0	78	319
Total Volume	102	171	51	0	324	112	313	85	0	510	87	0	0	0	87	36	202	99	0	337	1258
% App. Total	31.5	52.8	15.7	0		22	61.4	16.7	0		100	0	0	0		10.7	59.9	29.4	0		
PHF	.797	.822	.850	.000	.844	.875	.807	.787	.000	.879	.906	.000	.000	.000	.906	.818	.815	.825	.000	.818	.986



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	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	
04:30 PM	1	1	0	0	0	9	0	0	1	0	0	0	0	6	4	0	22
04:45 PM	1	1	0	0	0	5	0	0	0	0	0	0	0	7	5	0	19
Total	2	2	0	0	0	14	0	0	1	0	0	0	0	13	9	0	41
05:00 PM	0	1	0	0	1	5	0	0	0	0	0	0	0	8	1	0	16
05:15 PM	1	0	1	0	1	2	1	0	0	0	0	0	1	3	1	0	11
05:30 PM	2	1	0	0	1	4	0	0	2	0	0	0	2	10	0	0	22
05:45 PM	2	0	0	0	1	6	1	0	1	0	0	0	0	7	2	0	20
Total	5	2	1	0	4	17	2	0	3	0	0	0	3	28	4	0	69
06:00 PM	2	0	0	0	0	5	0	0	0	1	0	0	0	10	1	0	19
06:15 PM	0	0	1	0	0	7	0	0	0	0	0	0	1	11	1	0	21
Grand Total	9	4	2	0	4	43	2	0	4	1	0	0	4	62	15	0	150
Apprch %	60	26.7	13.3	0	8.2	87.8	4.1	0	80	20	0	0	4.9	76.5	18.5	0	
Total %	6	2.7	1.3	0	2.7	28.7	1.3	0	2.7	0.7	0	0	2.7	41.3	10	0	

Start Time	Sidney Street From North					Massachusetts Avenue (Route 2A) From East					Sidney Street From South					Massachusetts Avenue (Route 2A) From West					Int. Total
	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	
Peak Hour Analysis From 04:30 PM to 06:15 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 05:30 PM																					
05:30 PM	2	1	0	0	3	1	4	0	0	5	2	0	0	0	2	2	10	0	0	12	22
05:45 PM	2	0	0	0	2	1	6	1	0	8	1	0	0	0	1	0	7	2	0	9	20
06:00 PM	2	0	0	0	2	0	5	0	0	5	0	1	0	0	1	0	10	1	0	11	19
06:15 PM	0	0	1	0	1	0	7	0	0	7	0	0	0	0	0	1	11	1	0	13	21
Total Volume	6	1	1	0	8	2	22	1	0	25	3	1	0	0	4	3	38	4	0	45	82
% App. Total	75	12.5	12.5	0		8	88	4	0		75	25	0	0		6.7	84.4	8.9	0		
PHF	.750	.250	.250	.000	.667	.500	.786	.250	.000	.781	.375	.250	.000	.000	.500	.375	.864	.500	.000	.865	.932



PRECISION  
D A T A  
INDUSTRIES, LLC

46 Morton Street, Framingham, MA 01702  
Office: 508-875-0100 Fax: 508-875-0118  
Email: datarequests@pdillc.com

N/S: Sydney Street  
E/W: Massachusetts Avenue (Route 2A)  
City, State: Cambridge, MA  
Client: VHB/ C. Dube

File Name : 165082 DD  
Site Code : TBA  
Start Date : 5/18/2016  
Page No : 1

Groups Printed- Peds and Bikes

Start Time	Sidney Street From North					Massachusetts Avenue (Route 2A) From East					Sidney Street From South					Massachusetts Avenue (Route 2A) From West					Int. Total
	Right	Thru	Left	Peds EB	Peds WB	Right	Thru	Left	Peds SB	Peds NB	Right	Thru	Left	Peds WB	Peds EB	Right	Thru	Left	Peds NB	Peds SB	
04:30 PM	6	0	0	28	67	1	22	0	10	13	0	0	0	46	37	2	12	1	13	19	277
04:45 PM	6	6	3	27	72	9	33	3	22	17	4	1	0	79	27	2	15	2	23	21	372
Total	12	6	3	55	139	10	55	3	32	30	4	1	0	125	64	4	27	3	36	40	649
05:00 PM	10	8	3	31	98	14	24	2	40	19	0	1	0	69	29	1	14	3	21	9	396
05:15 PM	5	7	7	27	89	12	45	4	36	30	2	2	0	69	30	4	30	6	23	16	444
05:30 PM	3	3	1	34	124	6	40	2	31	13	0	0	0	49	31	1	20	1	17	7	383
05:45 PM	4	8	3	42	103	2	38	2	25	41	1	0	0	56	50	0	11	2	11	14	413
Total	22	26	14	134	414	34	147	10	132	103	3	3	0	243	140	6	75	12	72	46	1636
06:00 PM	0	6	3	55	97	7	42	4	35	20	3	2	0	44	42	3	21	3	15	6	408
06:15 PM	8	6	4	23	107	3	31	3	26	22	1	2	0	63	29	1	13	4	15	10	371
Grand Total	42	44	24	267	757	54	275	20	225	175	11	8	0	475	275	14	136	22	138	102	3064
Apprch %	3.7	3.9	2.1	23.5	66.8	7.2	36.7	2.7	30	23.4	1.4	1	0	61.8	35.8	3.4	33	5.3	33.5	24.8	
Total %	1.4	1.4	0.8	8.7	24.7	1.8	9	0.7	7.3	5.7	0.4	0.3	0	15.5	9	0.5	4.4	0.7	4.5	3.3	

Start Time	Sidney Street From North						Massachusetts Avenue (Route 2A) From East						Sidney Street From South						Massachusetts Avenue (Route 2A) From West						Int. Total
	Right	Thru	Left	Peds EB	Peds WB	App. Total	Right	Thru	Left	Peds SB	Peds NB	App. Total	Right	Thru	Left	Peds WB	Peds EB	App. Total	Right	Thru	Left	Peds NB	Peds SB	App. Total	
Peak Hour Analysis From 04:30 PM to 06:15 PM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 05:15 PM																									
05:15 PM	5	7	7	27	89	135	12	45	4	36	30	127	2	2	0	69	30	103	4	30	6	23	16	79	444
05:30 PM	3	3	1	34	124	165	6	40	2	31	13	92	0	0	0	49	31	80	1	20	1	17	7	46	383
05:45 PM	4	8	3	42	103	160	2	38	2	25	41	108	1	0	0	56	50	107	0	11	2	11	14	38	413
06:00 PM	0	6	3	55	97	161	7	42	4	35	20	108	3	2	0	44	42	91	3	21	3	15	6	48	408
Total Volume	12	24	14	158	413	621	27	165	12	127	104	435	6	4	0	218	153	381	8	82	12	66	43	211	1648
% App. Total	1.9	3.9	2.3	25.4	66.5		6.2	37.9	2.8	29.2	23.9		1.6	1	0	57.2	40.2		3.8	38.9	5.7	31.3	20.4		
PHF	.600	.750	.500	.718	.833	.941	.563	.917	.750	.882	.634	.856	.500	.500	.000	.790	.765	.890	.500	.683	.500	.717	.672	.668	.928



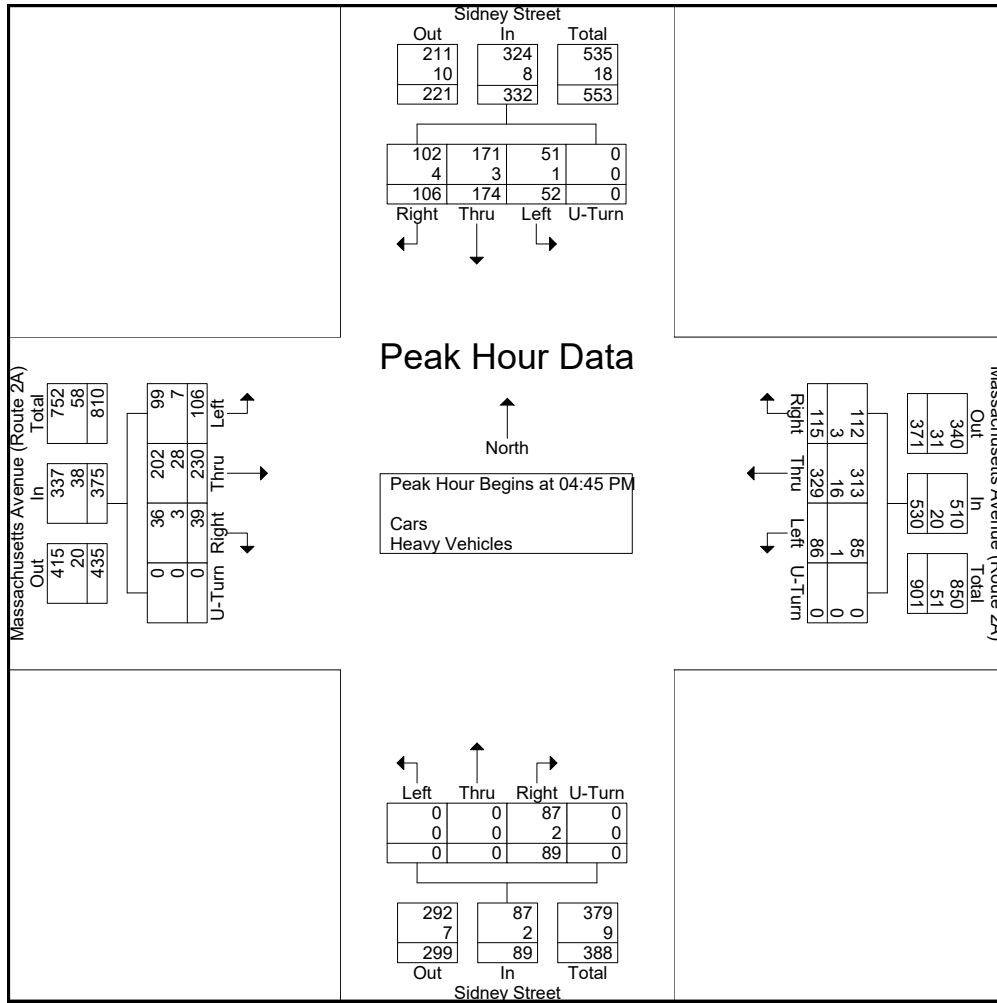
PRECISION  
D A T A  
INDUSTRIES, LLC

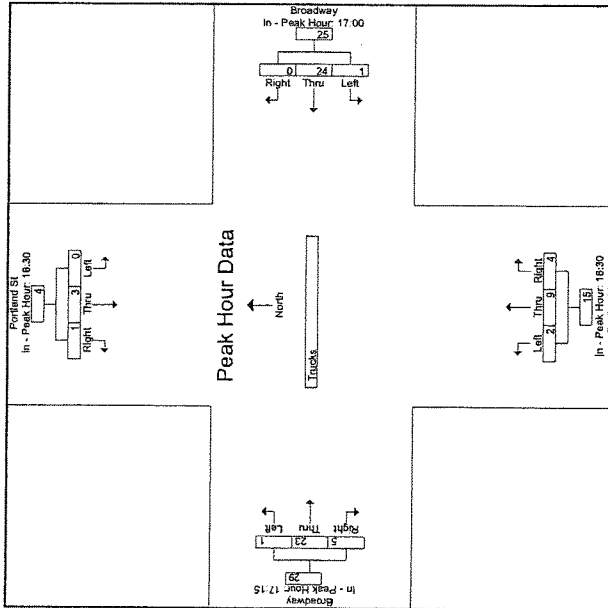
46 Morton Street, Framingham, MA 01702  
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Start Date : 5/18/2016  
Page No : 1

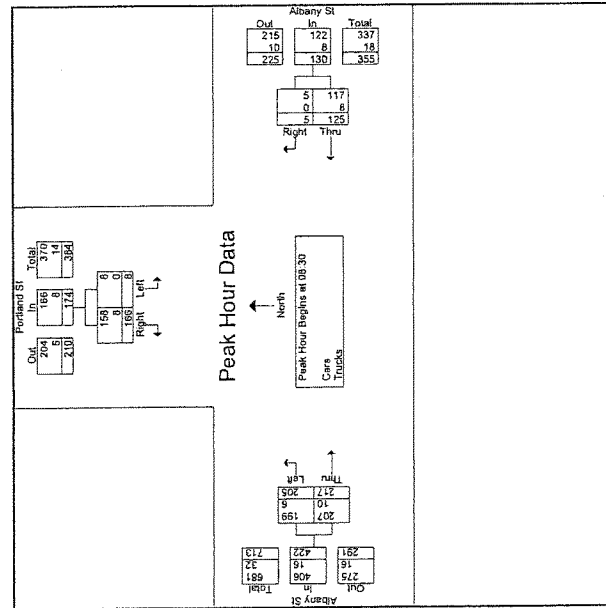
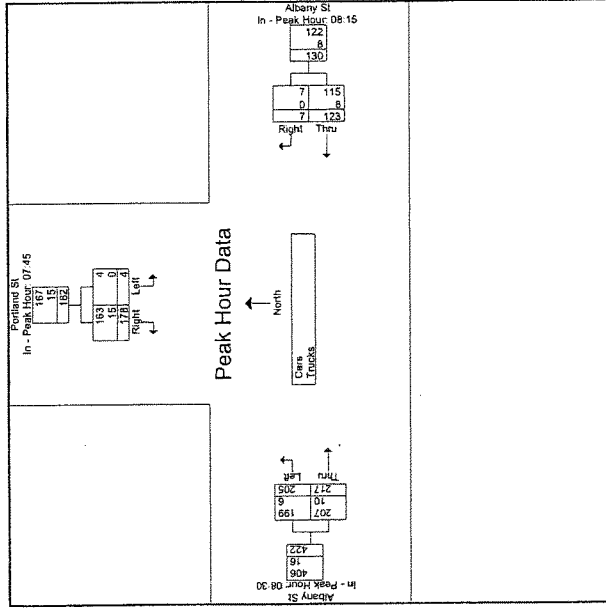
Start Time	Sidney Street From North					Massachusetts Avenue (Route 2A) From East					Sidney Street From South					Massachusetts Avenue (Route 2A) From West					Int. Total
	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	
Peak Hour Analysis From 04:30 PM to 06:15 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:45 PM																					
04:45 PM	22	44	13	0	79	27	102	20	0	149	20	0	0	0	20	7	51	22	0	80	328
05:00 PM	24	39	15	0	78	27	76	16	0	119	24	0	0	0	24	11	70	31	0	112	333
05:15 PM	33	52	13	0	98	28	61	23	0	112	21	0	0	0	21	11	52	30	0	93	324
05:30 PM	27	39	11	0	77	33	90	27	0	150	24	0	0	0	24	10	57	23	0	90	341
Total Volume	106	174	52	0	332	115	329	86	0	530	89	0	0	0	89	39	230	106	0	375	1326
% App. Total	31.9	52.4	15.7	0		21.7	62.1	16.2	0		100	0	0	0		10.4	61.3	28.3	0		
PHF	.803	.837	.867	.000	.847	.871	.806	.796	.000	.883	.927	.000	.000	.000	.927	.886	.821	.855	.000	.837	.972
Cars	102	171	51	0	324	112	313	85	0	510	87	0	0	0	87	36	202	99	0	337	1258
% Cars	96.2	98.3	98.1	0	97.6	97.4	95.1	98.8	0	96.2	97.8	0	0	0	97.8	92.3	87.8	93.4	0	89.9	94.9
Heavy Vehicles	4	3	1	0	8	3	16	1	0	20	2	0	0	0	2	3	28	7	0	38	68
% Heavy Vehicles	3.8	1.7	1.9	0	2.4	2.6	4.9	1.2	0	3.8	2.2	0	0	0	2.2	7.7	12.2	6.6	0	10.1	5.1





Start Time	Portland St From North			Albany St From East			Albany St From West			Albany St From West			Incl. Total
	Left	Right	Peds	Thru	Right	Peds	Left	Thru	Peds	Exclu. Total	Inclu. Total	Incl. Total	
07:30	0	33	2	25	0	2	33	32	0	4	123	127	
07:45	0	75	3	29	0	0	30	32	0	3	144	147	
Total	0	76	5	54	0	2	71	64	0	7	267	274	
08:00	3	42	7	28	0	0	48	30	3	10	151	161	
08:15	0	53	6	26	3	1	43	43	2	9	179	179	
08:30	1	38	6	25	4	1	47	55	6	13	170	183	
08:45	2	41	2	37	0	2	53	59	1	5	187	192	
Total	6	174	21	118	7	4	181	182	12	37	678	715	
09:00	3	43	10	33	0	0	46	50	4	14	175	189	
09:15	2	44	15	30	1	0	59	50	3	18	184	194	
Grand Total	11	339	51	235	8	6	367	354	19	76	1314	1380	
Approach %	3.1	96.8	96.7	3.3	6	50.9	48.1						
Total %	0.8	25.8	17.9	0.6	21.9	26.9				5.5	84.5		
% Cars	11	319	222	8	359	327				0	1322		
% Trucks	100	94.1	100	94.5	100	100	97.8	92.4	100	0	85.1		
% Trucks	0	5.9	0	5.5	0	0	2.2	7.6	0	0	4.9		

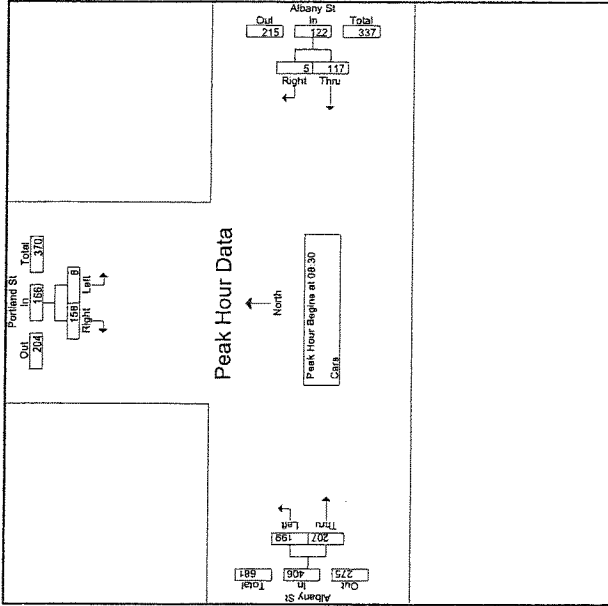
Start Time	Portland St From North			Albany St From East			Albany St From West			Albany St From West			Incl. Total
	Left	Right	Peds	Thru	Right	Peds	Left	Thru	Peds	Exclu. Total	Inclu. Total	Incl. Total	
08:30	1	38	3	25	4	0	29	37	47	55	102	170	
08:45	2	41	4	37	0	0	37	53	54	107	187	170	
09:00	3	43	4	46	3	0	33	46	50	96	175	175	
09:15	2	44	4	46	3	1	31	59	58	117	194	194	
Total Volume	8	166	174	125	5	5	130	205	217	422	726	726	
% Appr. Total	4.6	95.4	94.6	96.2	3.8	3.8	87.8	48.6	51.4		902	936	
% Cars	697	343	166	117	5	5	122	189	207	406	694	694	
% Trucks	100	95.2	95.4	93.6	100	100	93.8	97.1	95.4	96.2	85.6	85.6	
% Trucks	0	4.8	4.6	6.4	0	0	6.2	2.9	4.6	3.8	4.4	4.4	



Peak Hour Analysis From 07:30 to 09:15 - Peak 1 of 1

Peak Hour for Each Approach Begins at:	07:45	08:15	08:30	08:45	09:00	09:15
+0 mins.	0	45	28	31	47	55
+15 mins.	3	42	25	4	29	53
+30 mins.	0	53	37	0	37	46
+45 mins.	1	38	33	0	33	59
Total Volume	4	178	123	7	205	217
% App. Total	2.2	97.8	68.6	5.4	48.6	51.4
PHF	333	840	831	498	378	869
Cars	4	163	115	7	122	199
% Cars	100	91.6	93.5	100	93.6	97.1
Trucks	0	15	0	0	0	10
% Trucks	0	8.4	6.5	0	2.9	4.0

Accurate Counts  
 978-664-2565



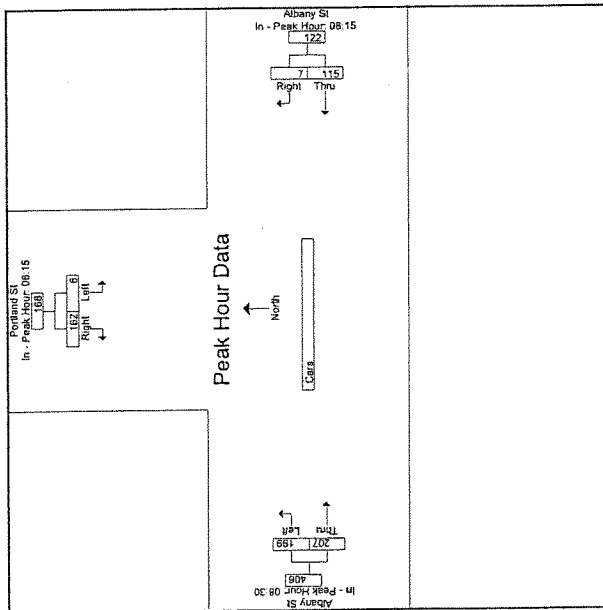
Accurate Counts  
 978-664-2565

Start Time	Portland St From North			Albany St From East			Albany St From West			Groups Printed - Counts			
	Left	Right	Peds	Thru	Right	Peds	Left	Thru	Peds	Exclu.	Total	Incl.	Total
07:45	0	32	2	24	0	2	32	27	0	4	115	4	119
07:46	0	42	3	28	0	0	37	29	0	3	136	3	139
07:47	0	74	5	52	0	2	69	56	0	7	251	7	258
08:00	3	40	7	27	0	0	48	28	3	10	146	10	156
08:15	0	47	6	26	3	1	43	26	3	19	165	19	185
08:30	1	34	6	24	4	1	46	53	6	18	182	18	200
08:45	2	40	2	34	0	2	51	53	1	5	182	5	187
Total	6	161	21	111	7	4	188	170	12	37	643	37	680
09:00	3	41	10	31	0	0	45	48	4	14	168	14	182
09:15	2	43	15	28	1	0	57	53	3	18	184	18	202
Grand Total	11	319	51	222	8	6	359	327	19	76	1246	76	1322
Approach %	3.3	96.7		96.5	3.5		52.3	47.7					
Total %	0.9	25.6		17.8	0.6		28.8	26.2		5.7	84.3	5.7	84.3

Start Time	Portland St From North			Albany St From East			Albany St From West		
	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. Total
08:30	1	34	35	24	4	28	46	53	99
08:45	2	34	42	34	0	34	51	53	104
09:00	3	41	44	31	0	31	45	48	93
09:15	2	43	45	28	1	29	57	53	110
Total Volume	8	156	166	117	5	122	199	207	406
% App. Total	4.8	95.2		95.9	4.1		49	51	97.3
PHE	667	919	922	890	313	897	873	876	923

Peak Hour Analysis From 07:30 to 09:15 - Peak 1 of 1  
 Peak Hour for Entire Approach Begins at:

	08:15	08:30	08:45	09:00	09:15	09:30
0 mins	0	47	47	26	3	29
+15 mins	1	34	35	24	4	28
+30 mins	2	40	42	34	0	34
+45 mins	3	41	44	31	0	31
Total Volume	6	62	68	85	7	122
% App. Total	3.6	95.4		94.3	5.7	199
PHE	500	862	894	846	438	873
						976

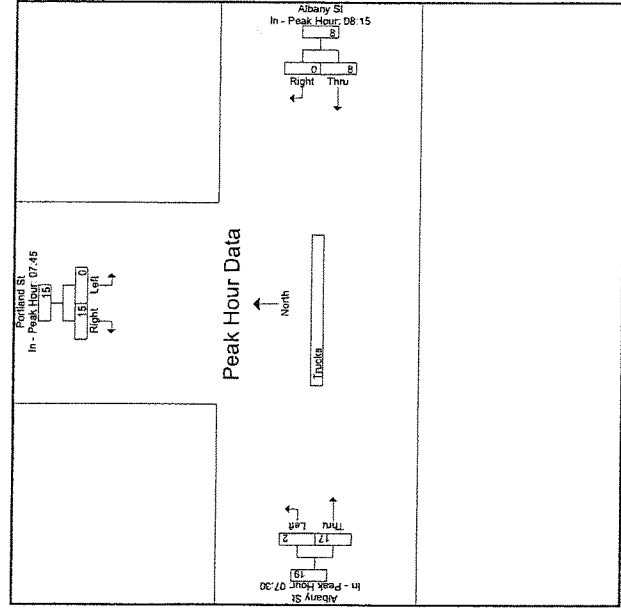
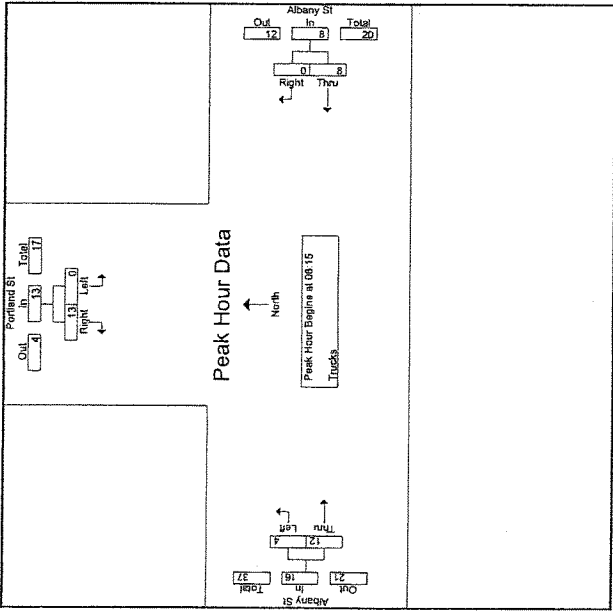
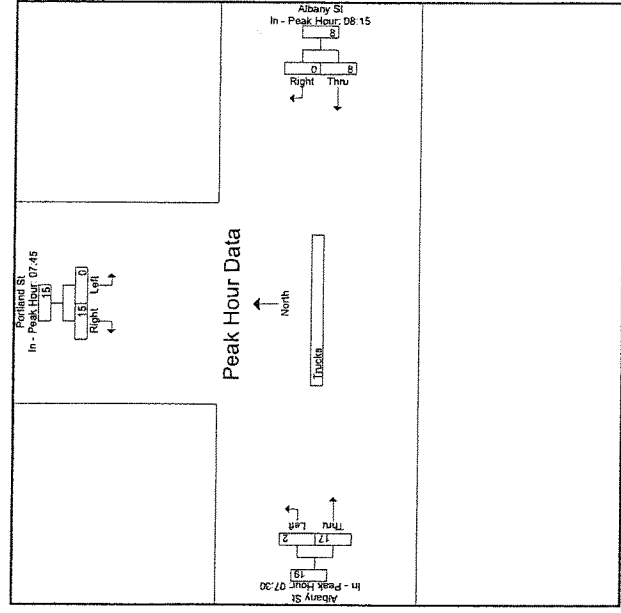
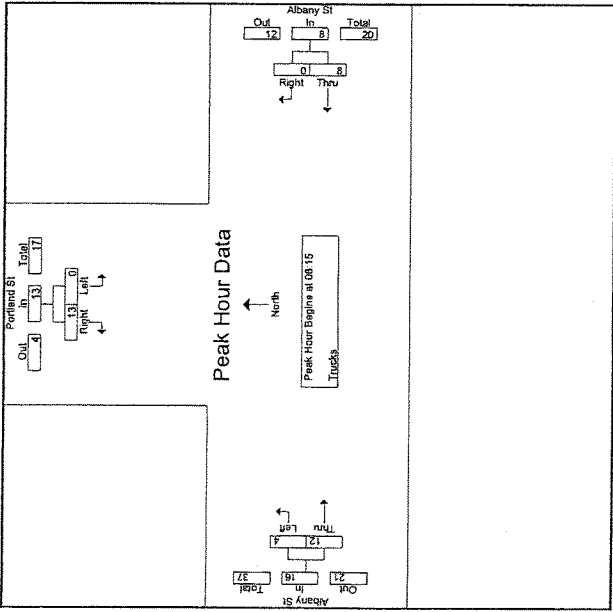


Start Time	Portland St From North				Albany St From East				Albany St From West				Exclu. Total	Inclu. Total	Int. Total	
	Left		Right		Left		Right		Left		Right					
	Thru	Peds	Thru	Peds	Thru	Peds	Thru	Peds	Thru	Peds	Thru	Peds				
07:30	0	0	3	0	0	0	0	0	0	1	3	0	0	0	0	0
07:45	0	0	4	0	0	0	0	0	0	2	8	0	0	0	0	0
Total	0	0	7	0	0	0	0	0	0	3	11	0	0	0	0	0
08:00	0	0	2	0	1	0	0	0	0	0	2	0	0	0	0	0
08:15	0	0	6	0	2	0	0	0	0	0	7	0	0	0	0	0
08:30	0	0	4	0	1	0	0	0	0	1	2	0	0	0	0	0
08:45	0	0	1	0	3	0	0	0	0	2	1	0	0	0	0	0
Total	0	0	13	0	7	0	0	0	0	3	12	0	0	0	0	0
09:00	0	0	2	0	2	0	0	0	0	1	2	0	0	0	0	0
09:15	0	0	1	0	2	0	0	0	0	2	5	0	0	0	0	0
Grand Total	0	0	20	0	13	0	0	0	0	8	27	0	0	0	0	0
Approach %	0	0	400	0	100	0	0	0	0	22.9	77.1	0	0	0	0	0
Total %	0	0	29.4	0	19.1	0	0	0	0	11.8	39.7	0	0	0	0	0

Start Time	Portland St From North				Albany St From East				Albany St From West				Exclu. Total	Inclu. Total	Int. Total	
	Left		Right		Left		Right		Left		Right					
	Thru	Peds	Thru	Peds	Thru	Peds	Thru	Peds	Thru	Peds	Thru	Peds				
08:15	0	0	6	0	2	0	0	0	0	2	0	0	0	0	0	0
08:30	0	0	4	0	4	1	0	0	0	1	1	2	0	0	0	0
08:45	0	0	1	0	2	0	0	0	0	2	2	0	0	0	0	0
09:00	0	0	13	0	6	0	0	0	0	2	4	0	0	0	0	0
Total	0	0	24	0	14	1	0	0	0	7	7	2	0	0	0	0
% Thru	0	0	100	0	100	0	0	0	0	68.7	75	0	0	0	0	0
PHF	0.000	0.000	0.542	0.000	0.542	0.000	0.000	0.000	0.000	0.687	0.500	0.429	0.571	0.617	0.517	0.617

Peak Hour Analysis From 07:30 to 09:15 - Peak 1 of 1  
Peak Hour for Entire Intersection Begins at 08:15





Peak Hour Analysis From 07:30 to 09:15 - Peak 1 of 1  
 Peak Hour for East Approach Begins at:

	07:45	08:15	07:30	08:15	07:30	08:15
+0 mins.	0	3	2	0	2	1
+15 mins.	0	2	1	0	1	1
+30 mins.	0	4	3	0	3	4
+45 mins.	0	4	2	0	2	2
Total Volume	0	15	8	0	8	7
% App. Total	0.000	100.000	66.7	0.000	100.000	88.9
PHF	.000	.625	.667	.000	.667	.673

Accurate Counts  
 978-664-2565

N/S Street : Portland Street  
 E/W Street : Albany Street  
 City/State : Cambridge, MA  
 Weather : Clear

Start Time	Groups Printed - Cars - Trucks											
	Portland St				Albany St				Albany St			
	From North	From East	From West	From South	From North	From East	From West	From South	From North	From East	From West	From South
16:30	0	39	7	0	45	44	3	0	45	44	3	0
16:45	0	30	2	0	47	51	3	0	47	51	3	0
Total	0	69	9	0	92	95	6	0	92	95	6	0
17:00	2	35	9	14	52	63	2	14	52	63	2	14
17:15	1	37	8	31	46	53	7	5	46	53	7	5
17:30	0	46	9	28	51	60	3	17	51	60	3	17
17:45	1	35	14	29	42	45	0	19	42	45	0	19
Total	4	153	40	106	198	245	10	64	198	245	10	64
18:00	2	36	7	18	37	46	1	8	37	46	1	8
18:15	0	37	3	24	40	43	0	5	40	43	0	5
Grand Total	6	295	65	191	457	549	17	100	457	549	17	100
Approach %	2	98	11.6	68.4	27.3	33.2	7.1	92.9	27.3	33.2	7.1	92.9
Total %	0.5	14.6	2.5	14.6	2.5	34.9	42.5	0	2.5	34.9	42.5	0
% Cars	8	268	100	99.5	100	97.8	100	0	99.5	97.8	100	0
% Trucks	0	2.4	0	0.5	2.2	2.3	0	0	0.5	2.2	2.3	0

Accurate Counts  
 978-664-2565

N/S Street : Portland Street  
 E/W Street : Albany Street  
 City/State : Cambridge, MA  
 Weather : Clear

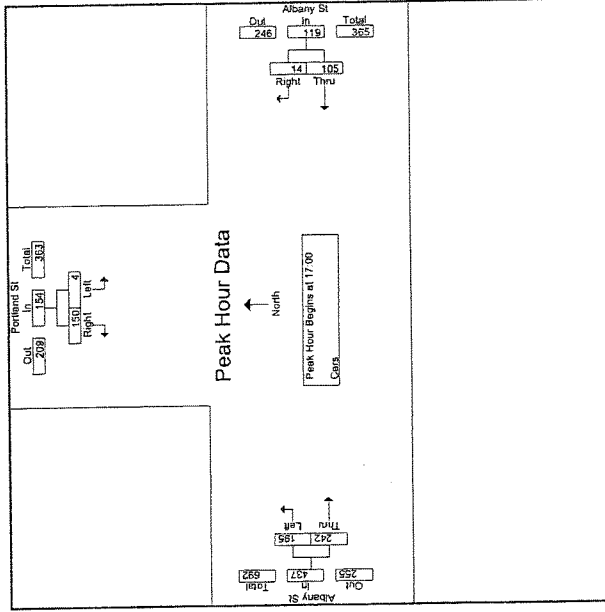
Start Time	Groups Printed - Bikes											
	Portland St				Albany St				Albany St			
	From North	From East	From West	From South	From North	From East	From West	From South	From North	From East	From West	From South
07:30	1	0	0	0	1	2	3	0	1	2	3	0
07:45	0	0	0	0	0	0	0	0	0	0	0	0
Total	1	0	0	0	1	2	3	0	1	2	3	0
08:00	1	6	4	4	4	4	4	15	4	4	4	15
08:15	1	5	1	0	2	2	2	11	2	2	2	11
08:30	2	8	4	4	4	4	4	18	4	4	4	18
08:45	0	6	0	0	4	4	2	12	4	4	2	12
Total	4	25	9	8	14	12	12	56	14	12	12	56
09:00	1	5	1	0	2	2	6	15	2	2	6	15
09:15	1	7	0	1	5	5	2	16	5	5	2	16
Grand Total	7	42	2	1	24	24	24	100	24	24	24	100
Approach %	7	85.7	66.7	33.3	33.3	33.3	33.3	61	33.3	33.3	33.3	61
Total %	7	42	2	1	24	24	24	100	24	24	24	100

Start Time	Peak Hour Analysis From 16:30 to 18:15 - Peak 1 of 1											
	Portland St				Albany St				Albany St			
	From North	From East	From West	From South	From North	From East	From West	From South	From North	From East	From West	From South
17:00	1	37	3	35	4	4	4	22	10	35	30	52
17:15	0	46	9	28	2	2	2	30	3	30	51	60
17:30	0	46	9	28	2	2	2	30	3	30	51	60
17:45	1	35	14	29	4	4	4	33	4	45	45	87
Total	2	164	45	120	12	12	12	117	17	117	157	242
% App. Total	2.5	85.3	11.7	85.3	11.7	11.7	11.7	85.3	11.7	11.7	11.7	85.3
% Cars	50	150	100	98.1	100	98.1	100	98.1	100	98.1	100	98.1
% Trucks	0	0	0	0	0	0	0	0	0	0	0	0
% Trucks	0	2.0	0	0.9	0	0	0	0.6	0	0	0	0.6

Start Time	Peak Hour Analysis From 07:30 to 09:15 - Peak 1 of 1											
	Portland St				Albany St				Albany St			
	From North	From East	From West	From South	From North	From East	From West	From South	From North	From East	From West	From South
08:30	2	10	0	0	4	4	4	8	0	0	0	0
08:45	0	6	0	0	2	2	2	6	0	0	0	0
09:00	1	5	0	1	2	2	2	6	1	1	1	6
09:15	1	7	0	1	5	5	2	7	0	0	0	7
Total	4	28	0	2	15	14	29	29	1	1	1	29
% App. Total	13.3	86.7	0	2	51.7	48.3	500	906	0	0	0	906
% App. Total	500	813	750	500	750	583	906	906	500	500	583	906
% App. Total	500	813	750	500	750	583	906	906	500	500	583	906



Accurate Counts  
 978-664-2565

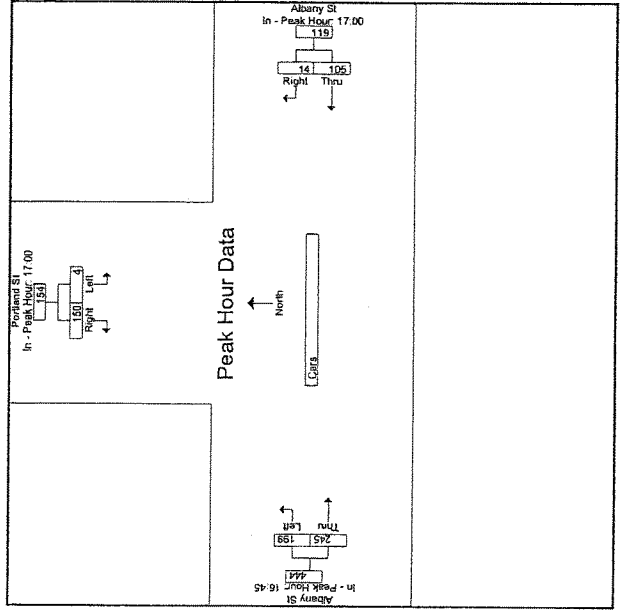


Accurate Counts  
 978-664-2565

Start Time	Portland St From North				Albany St From West				Albany St From East				Portland St From South			
	Left	Right	Thru	Peds	Left	Right	Thru	Peds	Left	Right	Thru	Peds	Left	Right	Thru	Peds
16:30	0	39	6	23	1	43	41	3	11	146	157	0	29	6	20	14
16:45	0	39	6	20	3	45	47	3	12	144	155	0	29	6	14	14
Total	0	67	15	43	4	88	88	6	23	280	313	0	58	12	34	28
17:00	2	35	9	18	4	51	62	2	14	172	186	0	29	6	14	14
17:15	1	36	8	31	4	52	76	5	15	200	215	0	29	6	14	14
17:30	0	46	9	28	2	51	60	3	17	187	199	0	29	6	14	14
17:45	1	33	14	28	4	41	44	0	16	150	164	0	29	6	14	14
Total	4	150	40	105	14	195	242	10	64	710	774	0	116	24	56	56
18:00	2	34	7	18	3	37	46	1	8	140	148	0	29	6	14	14
18:15	2	37	3	24	4	29	49	0	5	143	148	0	29	6	14	14
Grand Total	8	288	65	190	25	349	425	17	100	1283	1383	0	116	24	56	56
Approach %	2	88.4	11.6	45.1	54.9	27.2	33.1	7.2	92.8							
Total %	0.5	22.4	14.8	14.8	1.9	27.2	33.1	7.2	92.8							

Peak Hour Analysis From 16:30 to 18:15 - Peak 1 of 1  
 Peak Hour for Entire Intersection Begins at 17:00

Start Time	Portland St From North	Portland St From South	Albany St From West	Albany St From East	Albany St From West	Albany St From East
17:00	2	35	37	18	4	4
17:15	1	36	37	31	4	4
17:30	0	46	46	28	2	30
17:45	1	33	34	28	2	32
Total Volume	4	150	154	105	14	119
% App. Total	2.6	87.4	89.2	89.2	11.8	44.8
PHF	.500	.815	.837	.847	.875	.850



Start Time	Portland St From North			Albany St From East			Albany St From West			Exclu. Total	Inclu. Total	Int. Total
	Left	Right	Peds	Thru	Right	Left	Thru	Right	Left			
16:30	0	1	0	0	0	0	2	3	0	0	6	6
16:45	0	2	0	0	0	0	4	7	0	0	13	13
Total	0	3	0	0	0	0	6	14	0	0	26	26
17:00	0	0	0	0	0	0	1	1	0	0	2	2
17:15	0	1	0	0	0	0	1	1	0	0	3	3
17:30	0	0	0	0	0	0	0	0	0	0	0	0
17:45	0	2	0	1	0	0	1	1	0	0	5	5
Total	0	3	0	1	0	0	3	3	0	0	10	10
18:00	0	2	0	0	0	0	0	0	0	0	2	2
18:15	0	7	0	0	0	0	0	0	0	0	7	7
Grand Total	0	100	0	100	0	0	44	56	0	0	26	26
Approach %	0	28.9	0	3.8	0	0	30.0	38.5	0	0	100	100

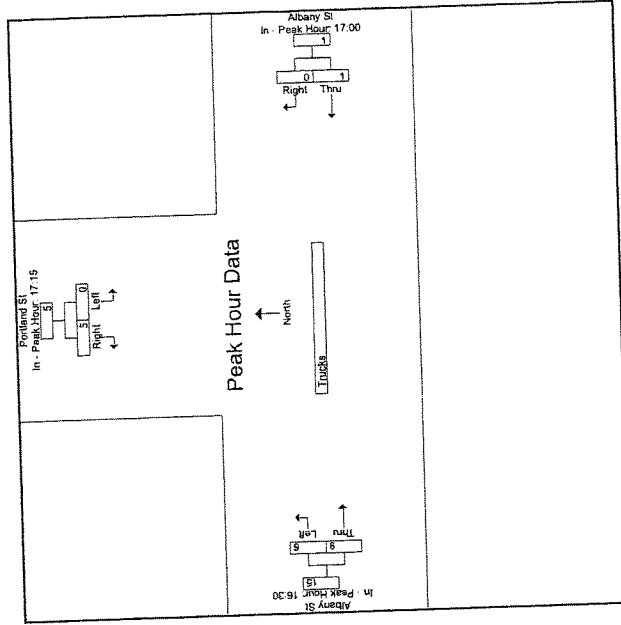
Start Time	Portland St From North			Albany St From East			Albany St From West			Exclu. Total	Inclu. Total	Int. Total
	Left	Right	Peds	Thru	Right	Left	Thru	Right	Left			
16:30	0	1	0	1	0	0	0	0	0	0	2	2
16:45	0	2	0	1	0	0	0	0	0	0	3	3
Total	0	3	0	2	0	0	0	0	0	0	5	5
17:00	0	0	0	0	0	0	0	0	0	0	0	0
17:15	0	1	0	0	0	0	0	0	0	0	1	1
17:30	0	0	0	0	0	0	0	0	0	0	0	0
17:45	0	2	0	1	0	0	1	1	0	0	5	5
Total	0	3	0	2	0	0	2	2	0	0	7	7
18:00	0	7	0	0	0	0	0	0	0	0	7	7
Grand Total	0	100	0	100	0	0	44	56	0	0	26	26
Approach %	0	28.9	0	3.8	0	0	30.0	38.5	0	0	100	100

Start Time	Portland St From North			Albany St From East			Albany St From West			Exclu. Total	Inclu. Total	Int. Total
	Left	Right	Peds	Thru	Right	Left	Thru	Right	Left			
16:30	0	1	0	1	0	0	0	0	0	0	2	2
16:45	0	2	0	1	0	0	0	0	0	0	3	3
Total	0	3	0	2	0	0	0	0	0	0	5	5
17:00	0	0	0	0	0	0	0	0	0	0	0	0
17:15	0	1	0	0	0	0	0	0	0	0	1	1
17:30	0	0	0	0	0	0	0	0	0	0	0	0
17:45	0	2	0	1	0	0	1	1	0	0	5	5
Total	0	3	0	2	0	0	2	2	0	0	7	7
18:00	0	7	0	0	0	0	0	0	0	0	7	7
Grand Total	0	100	0	100	0	0	44	56	0	0	26	26
Approach %	0	28.9	0	3.8	0	0	30.0	38.5	0	0	100	100

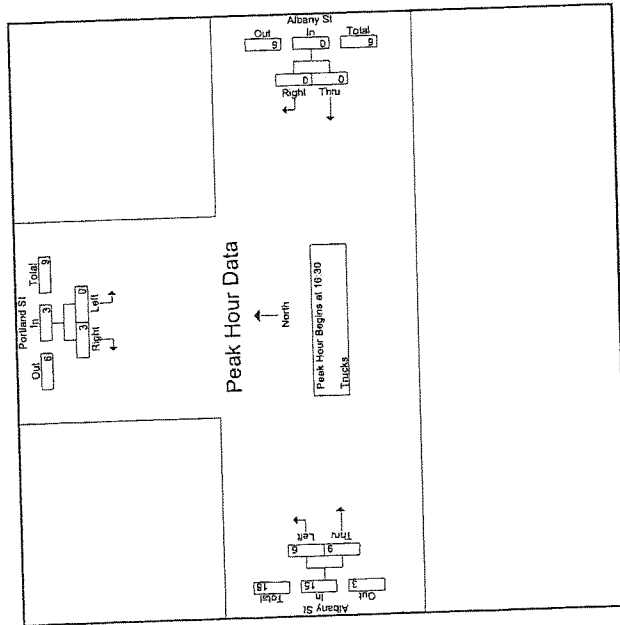
  

Start Time	Portland St From North			Albany St From East			Albany St From West			Exclu. Total	Inclu. Total	Int. Total
	Left	Right	Peds	Thru	Right	Left	Thru	Right	Left			
16:30	0	1	0	1	0	0	0	0	0	0	2	2
16:45	0	2	0	1	0	0	0	0	0	0	3	3
Total	0	3	0	2	0	0	0	0	0	0	5	5
17:00	0	0	0	0	0	0	0	0	0	0	0	0
17:15	0	1	0	0	0	0	0	0	0	0	1	1
17:30	0	0	0	0	0	0	0	0	0	0	0	0
17:45	0	2	0	1	0	0	1	1	0	0	5	5
Total	0	3	0	2	0	0	2	2	0	0	7	7
18:00	0	7	0	0	0	0	0	0	0	0	7	7
Grand Total	0	100	0	100	0	0	44	56	0	0	26	26
Approach %	0	28.9	0	3.8	0	0	30.0	38.5	0	0	100	100

Accurate Counts  
 978-664-2565



Accurate Counts  
 978-664-2565



Peak Hour Analysis from 16:30 to 18:15 - Peak 1 of 1  
 Peak Hour for Each Approach Begins at:

	17:15	17:00	16:30	16:30	5
+0 mins.	0	1	0	0	0
+15 mins.	0	0	0	0	4
+30 mins.	0	2	0	0	1
+45 mins.	0	2	1	1	9
Total Volume	0	5	1	1	15
% App. Total	0	100	0	0	60
PHF	0.00	0.25	0.00	0.25	0.583

Accurate Counts  
 978-664-2365

N/S Street : Portland Street @  
 E/W Street : ATR  
 City/State : Cambridge, MA  
 Weather : Clear

Start Time	Portland St From North				Portland St From South				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
07:30	0	2	0	2	0	1	0	1	6
07:45	0	2	0	2	0	1	0	1	7
Total	0	4	0	4	0	2	0	2	13
08:00	0	7	0	7	0	4	0	4	11
08:15	0	4	0	4	0	2	0	2	7
08:30	0	9	0	9	0	4	0	4	13
08:45	0	5	0	5	0	4	0	4	9
Total	0	25	0	25	0	14	0	14	40
09:00	0	4	1	5	0	3	1	4	9
09:15	0	9	0	9	0	4	0	4	13
09:30	0	2	0	2	0	4	0	4	6
09:45	0	16	1	17	0	12	1	13	30
Total	0	8	1	9	0	3	1	4	11
10:00	0	5	0	5	0	3	0	3	8
10:15	0	2	0	2	0	2	0	2	4
10:30	0	3	0	3	0	2	0	2	5
10:45	0	18	0	18	0	11	0	11	29
Total	0	4	0	4	0	0	0	0	4
11:00	0	4	0	4	0	0	0	0	4
11:15	0	2	0	2	0	1	0	1	3
11:30	0	2	0	2	0	0	0	0	2
11:45	0	1	0	1	0	0	0	0	1
Total	0	11	0	11	0	2	0	2	13
12:00	0	4	0	4	0	1	1	2	6
12:15	0	2	0	2	0	2	0	2	4
12:30	0	2	0	2	0	1	0	1	3
12:45	0	2	0	2	0	1	0	1	3
Total	0	8	0	8	0	5	1	6	14
13:00	0	1	0	1	0	2	0	2	3
13:15	0	3	0	3	0	1	0	1	4
13:30	0	1	0	1	0	0	0	0	1
13:45	0	2	0	2	0	0	0	0	2
Total	0	7	0	7	0	3	0	3	10
14:00	0	3	0	3	0	3	0	3	6
14:15	0	1	0	1	0	2	0	2	3
14:30	0	0	0	0	0	0	0	0	0
14:45	0	5	0	5	0	6	0	6	11
Total	0	9	0	9	0	11	0	11	17
15:00	0	0	0	0	0	1	0	1	1
15:15	0	3	0	3	0	2	0	2	5
15:30	0	0	0	0	0	2	0	2	2
15:45	0	4	0	4	0	5	0	5	9
Total	0	7	0	7	0	10	0	10	17
16:00	0	1	0	1	0	3	0	3	4
16:15	0	2	0	2	0	4	0	4	6
16:30	0	2	0	2	0	3	0	3	5
16:45	0	1	0	1	0	1	0	1	2
Total	0	6	0	6	0	11	0	11	17
17:00	0	5	0	5	0	1	0	1	6
17:15	0	4	0	4	0	3	0	3	7
17:30	0	4	0	4	0	10	0	10	14
17:45	0	2	0	2	0	14	0	14	16
Total	0	15	0	15	0	14	0	14	29

Accurate Counts  
 978-664-2365

N/S Street : Portland Street @  
 E/W Street : Albany Street  
 City/State : Cambridge, MA  
 Weather : Clear

Start Time	Portland St From North				Albany St From West				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
16:30	0	2	0	2	6	1	0	7	9
16:45	0	2	0	2	5	0	0	5	8
Total	0	4	0	4	11	1	0	12	17
17:00	0	4	1	5	3	2	0	5	12
17:15	0	9	2	11	4	3	0	7	24
17:30	0	6	4	10	7	2	0	9	19
17:45	0	6	3	9	7	2	0	9	19
Total	0	25	14	39	33	11	0	44	83
18:00	0	2	1	3	6	2	0	8	11
18:15	0	3	0	3	3	0	0	3	6
18:30	0	33	5	38	7	11	0	18	56
18:45	0	100	20	120	75	24	0	99	119
Total	0	138	26	164	107	37	0	144	183
Grand Total	0	163	26	189	114	48	0	162	251
Approach %									
Total %									
% App. Total									
PHF									

Start Time	Portland St From North				Albany St From West				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
17:00	0	4	0	4	3	2	0	5	9
17:15	0	6	0	6	4	3	0	7	13
17:30	0	6	0	6	7	2	0	9	15
17:45	0	6	0	6	7	2	0	9	15
Total	0	22	0	22	21	7	0	28	50
PHF									

Start Time	Portland St From North				Albany St From West				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
17:00	0	4	0	4	3	2	0	5	9
17:15	0	9	2	11	4	3	0	7	18
17:30	0	6	0	6	7	2	0	9	15
17:45	0	6	0	6	7	2	0	9	15
Total	0	25	2	27	21	7	0	28	55
PHF									

Peak Hour Analysis From 16:30 to 18:15 - Peak 1 of 1  
 Peak Hour for Entire Intersection Begins at 17:00

Start Time	Portland St From North	Albany St From West	Int. Total
17:00	4	5	9
17:15	11	7	18
17:30	6	9	15
17:45	6	9	15
Total	27	30	57
% App. Total	27	30	57
PHF	0.677	0.667	0.672

Peak Hour Analysis From 17:00 to 18:45 - Peak 1 of 1  
 Peak Hour for Each Approach Begins at:

Start Time	Portland St From North	Albany St From West	Int. Total
17:00	4	5	9
17:15	11	7	18
17:30	6	9	15
17:45	6	9	15
Total	27	30	57
% App. Total	27	30	57
PHF	0.677	0.667	0.672

## Vehicle Growth Calculations

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**Traffic Volume Worksheet - Proposed R&D Development - Cambridge MA**

Study Duration Years 5  
 Annual Growth Rate 0.5%  
 Volumes grown by 0.5 percent per year to 2020 Baseline Conditions.

Intersection	M/MT	2008 Raw		2011 Raw		2013 Raw		2015 Raw		2016 Raw		2020 Baseline		2020 Baseline Balanced		
		AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	
1 Main Street/Columbia Street at Sidney Street (May 18, 2016)	EB T															
	EB R															
	WB L															
	WB T															
	NB L															
	NB R															
TOTAL																
2 Main Street at Windsor Street (May 2011)	EB L			0	0	0	0	0	0	0	0	550	595	560	606	
	EB T			7	19									7	20	
	EB R			190	146									199	153	
	WB L			17	22									18	23	
	WB T			47	31									49	32	
	NB L			138	278									144	291	
	NB R			28	28									29	29	
	TOTAL			17	35									18	37	
	EB L			63	111										66	116
	EB T			29	79										30	83
	WB L			23	27										24	28
	WB T			113	105										118	110
NB L			61	68										64	71	
NB R			733	949	0	0	0	0	0	0	0	766	993	766	993	
TOTAL			69	72										72	75	
3 Main Street at Portland Street (May 2011)	EB L			177	222									185	232	
	EB T			5	4									5	4	
	EB R			7	13									7	14	
	WB L			136	243									142	254	
	WB T			24	40									25	42	
	NB L			2	7									2	7	
	NB R			164	190									172	199	
	TOTAL			5	4									5	4	
	EB L			70	31									73	32	
	EB T			195	154									204	161	
	WB L			94	106									98	111	
	WB T			948	1086	0	0	0	0	0	0	0	990	1135	1086	1194
TOTAL			0	0									338	309		
4 Main Street at Albany Street May-08	EB T			318	291									22	1	
	EB R			21	1									180	74	
	WB L			170	70									240	328	
	WB T			226	309									5	29	
	NB L			5	27									161	277	
	NB R			152	261									946	1018	
	TOTAL			892	959	0	0	0	0	0	0	0	946	1018	863	974
	5 Main Street at Vassar Street and Galileo Galler Way (May 16 2013 adjusted 0.5 Percent per year for 2 years)	EB U													0	0
		EB L								196	233				201	259
		EB T								210	269				215	276
		EB R								73	75				77	75
		WB U								0	0				0	0
WB L									53	52				54	53	
WB T									100	130				103	133	
WB R									112	22				115	23	
NB L									68	37				70	38	
NB T									248	267				254	274	
NB R									149	141				153	145	
SB U									3	1				3	1	
SB L								55	47				56	48		
SB T								339	329				348	337		
SB R								227	159				233	163		
TOTAL					0	0	0	1833	1782	0	0	1880	1827	1880	1827	

**Traffic Volume Worksheet - Proposed R&D Development - Cambridge MA**

Study Duration Years 5  
 Annual Growth Rate 0.5%  
 Volumes grown by 0.5 percent per year to 2020 Baseline Conditions.

Intersection	M/MT	2008 Raw		2011 Raw		2013 Raw		2015 Raw		2016 Raw		2020 Baseline		2020 Baseline Balanced		
		AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	
6 Portland Street at Albany Street May-08	WB L	129	111									137	118	137	118	
	WB R	7	15									7	16	7	16	
	NB T	198	208									210	221	191	208	
	NB R	212	257									225	273	225	273	
	SB L	6	4									6	4	6	4	
	SB T	184	161									195	171	204	176	
	TOTAL	600	630	0	0	0	0	0	0	0	0	636	669	626	661	
	EB L											100	110	102	102	
7 Massachusetts Avenue at Sidney Street (May 18, 2016)	EB T										270	225	275	230	230	
	EB R										55	50	56	51	51	
	WB L										75	90	77	92	92	
	WB T										245	300	250	306	250	306
	WB R										50	115	51	117	51	117
	NB R										65	85	66	87	66	87
	SB L										90	55	92	56	92	56
	SB T										230	180	235	184	235	184
	SB R										60	105	61	107	61	107
	TOTAL	0	0	0	0	0	0	0	0	0	1240	1315	1265	1342	1265	1342
	EB L														0	0
	EB R														0	0
	NB L														0	0
	NB T														166	304
	SB T													199	75	
	SB R													0	0	
TOTAL	0	0	0	0	0	0	0	0	0	0	0	0	0	365	379	

## Pedestrian Growth Calculations

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Intersection	Approach	Raw		2020 Baseline	
		AM	PM	AM	PM
Main Street/Columbia Street at Sidney Street	EB	13	79	15	88
	WB	42	140	47	156
Main Street at Windsor Street	NB	4	6	4	7
	EB	23	91	29	115
Main Street at Portland Street	WB	23	35	29	44
	NB	27	31	34	39
Main Street at Vassar Street/Galileo Gallilei Way	SB	56	33	70	42
	EB	70	97	88	122
Main Street at Albany Street	WB	55	51	69	64
	NB	47	33	59	42
Main Street at Vassar Street/Galileo Gallilei Way	SB	49	62	62	78
	EB	76	203	86	229
Main Street at Albany Street	WB	129	179	146	202
	NB	212	348	239	393
Main Street at Albany Street	SB	402	636	453	717
	EB	64	118	71	132
Main Street at Albany Street	WB	136	235	152	262
	NB	279	164	311	183
Main Street at Albany Street	SB	160	548	178	611
	EB	10	16	12	19
Main Street at Albany Street	WB	25	12	29	14
	NB	51	111	59	128
Main Street at Albany Street	WB	0	14	0	16
	NB	0	10	0	12
Main Street at Albany Street	WB	0	40	0	46
	SB	0	0	0	0

Census Tract	Year	Workers 16 Years and Over	Pedestrian Mode Split	Number of Pedestrians		Percent Increase
				Total Pedestrians	2010 to 2018	
3524	2010	928	0.289	268	1978	15.72
	2011	850	0.354	301	1819	25.84
	2015	1074	0.224	241	2029	12.81
	2016	1052	0.200	210	2052	11.55
3531.01	2010	1650	0.448	739	2010	
	2011	1530	0.365	558	2011	
	2015	1616	0.367	593	2015	
	2016	1606	0.361	580	2016	
3531.02	2010	1504	0.294	442	2010	
	2011	1674	0.580	971	2011	
	2015	1840	0.522	960	2015	
	2016	2079	0.575	1195	2016	
3531.02	2018	2198	0.574	1262	2018	
	2018	2451	0.643	1576	2018	

## Bicycle Growth Calculations

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Volumes grown to 2020 Baseline Conditions using AM and PM Peak Hour bicycle data provided from Cambridge CDD

Intersction	Movment	Bicycle Volume				From Cambridge CDD			
		Raw		2020 Baseline		Year	AM + PM Bicycle Counts	Increase to 2019	
		AM	PM	AM	PM				
Main Street/Columbia Street at Sidney Street	EB TH	20	6	23	7	2008	6296	85.72	
	2016	EB RT	85	18	99	21	2010	7258	61.1
	16.77 percent	WB LT	6	50	7	58	2012	10228	14.32
	WB TH	5	15	6	18	2014	8973	30.31	
	NB LT	8	47	9	55	2016	10014	16.77	
	NB RT	51	14	60	16	2018	9420	24.13	
Main Street at Windsor Street	EB LT	2	0	3	0	2019	11693	0	
	2011	EB TH	40	12	64	19			
	61.1 percent	EB RT	3	2	5	3			
	WB LT	0	1	0	2				
	WB TH	3	46	5	74				
	WB RT	0	5	0	8				
	NB LT	0	0	0	0				
	NB TH	7	36	11	58				
	NB RT	0	3	0	5				
	SB LT	3	2	5	3				
	SB TH	25	9	40	14				
	SB RT	3	3	5	5				
	Main Street at Portland Street	EB LT	7	4	11	6			
		2011	EB TH	67	16	108	26		
61.1 percent		EB RT	1	0	2	0			
WB LT		0	0	0	0				
WB TH		3	48	5	77				
WB RT		1	3	2	5				
NB LT		0	0	0	0				
NB TH		11	9	18	14				
NB RT		0	0	0	0				
SB LT		13	2	21	3				
SB TH		30	12	48	19				
SB RT		1	6	2	10				
Main Street at Vassar Street/Gallileo Gallilei Way		EB LT	9	0	12	0			
		2015	EB TH	85	29	111	38		
	30.31 percent	EB RT	3	1	4	1			
	WB LT	0	9	0	12				
	WB TH	7	36	9	47				
	WB RT	1	0	1	0				
	NB LT	2	1	3	1				
	NB TH	36	39	47	51				
	NB RT	16	6	21	8				
	SB LT	10	0	13	0				
	SB TH	58	39	76	51				
	SB RT	2	4	3	5				
	Massachusetts Avenue at Sidney Street	EB LT	17	12	20	14			
		2016	EB TH	116	75	135	88		
16.77 percent		EB RT	7	6	8	7			
WB LT		5	10	6	12				
WB TH		22	147	26	172				
WB RT		1	34	1	40				
NB RT		8	3	9	4				
SB LT		33	14	39	16				
SB TH		34	26	40	30				
SB RT		2	22	2	26				
Main Steet at Albany Street		EB TH	43	10	80	19			
		2008	EB RT	1	0	2	0		
		85.72 percent	WB LT	1	3	2	6		
		WB TH	3	26	6	48			
	NB LT	0	0	0	0				
	NB RT	6	3	11	6				
Albany Street at Portalnd Street	WB LT	2	14	4	26				
	2008	WB RT	0	4	0	7			
	85.72 percent	NB TH	12	14	22	26			
	NB RT	14	8	26	15				
	SB LT	4	0	7	0				
	SB TH	24	25	45	46				

**PUBLIC AND PRIVATE TRANSIT DATA**

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T Fares		Local Bus	Bus + Bus	Rapid Transit	Bus + Rapid Transit
<b>PRICE PER TRIP</b>					
CharlieCard	\$1.70	\$1.70	\$2.40	\$2.40	\$2.40
CharlieTicket	\$2.00	\$2.00	\$2.90	\$4.90***	\$4.90***
Cash-on-Board	\$2.00	\$4.00	\$2.90	\$4.90***	\$4.90***
Student/Youth*	\$0.85	\$0.85	\$1.10	\$1.10	\$1.10
Senior/TAP**	\$0.85	\$0.85	\$1.10	\$1.10	\$1.10
<b>UNLIMITED TRIP PASSES</b>					
1-Day	\$12.75	\$12.75	\$12.75	\$12.75	\$12.75
7-Day	\$22.50	\$22.50	\$22.50	\$22.50	\$22.50
Monthly	\$55.00	\$55.00	\$90.00	\$90.00	\$90.00
Senior/TAP Monthly	\$30.00/month	for unlimited travel on Local Bus and Rapid Transit			

**VALID PASSES:** LinkPass (\$84.50/mo.); Student /Youth LinkPass\* (\$30/mo.); Senior/TAP LinkPass\*\* (\$30/mo.); and express bus, commuter rail, and boat passes.

**FREE FARES:** Children 11 and under ride free when accompanied by an adult; Blind Access CharlieCard holders ride free; if using a guide, the guide rides free \* Requires Student CharlieCard or Youth CharlieCard. Student CharlieCards are available to students through participating middle schools and high schools. Youth CharlieCards are available through community partners in the Boston metro area. Visit [www.mbta.com/youthpass](http://www.mbta.com/youthpass) for details.

\*\* Requires Senior/TAP CharlieCard, available to Medicare cardholders, seniors 65+, and persons with disabilities

\*\*\* For Silver Line SL4 or SL5 pay \$2.75. Also see "transfers."

**TRANSFERS**

If paying with a CharlieTicket or CharlieCard, discounted transfers that are available are automatic — just use the same ticket or card throughout your trip. If paying with cash onboard a vehicle, free transfers are only allowed between rapid transit lines and inside paid platform areas at gated stations

**SCHEDULES**

Schedules are available at the following stations: Park Street, Airport, Malden, Harvard, Haymarket (Green Line Level), Back Bay and Downtown Crossing (Orange Line Level) or see station personnel. Schedules also available at the Transportation Building (10 Park Plaza), 45 High St, and online at [mbta.com](http://mbta.com).

For real-time subway and bus tracking, download the Transit app on any smartphone.

# Rapid Transit

Effective August 30, 2020



Blue Line



Green Line



Orange Line



Red Line

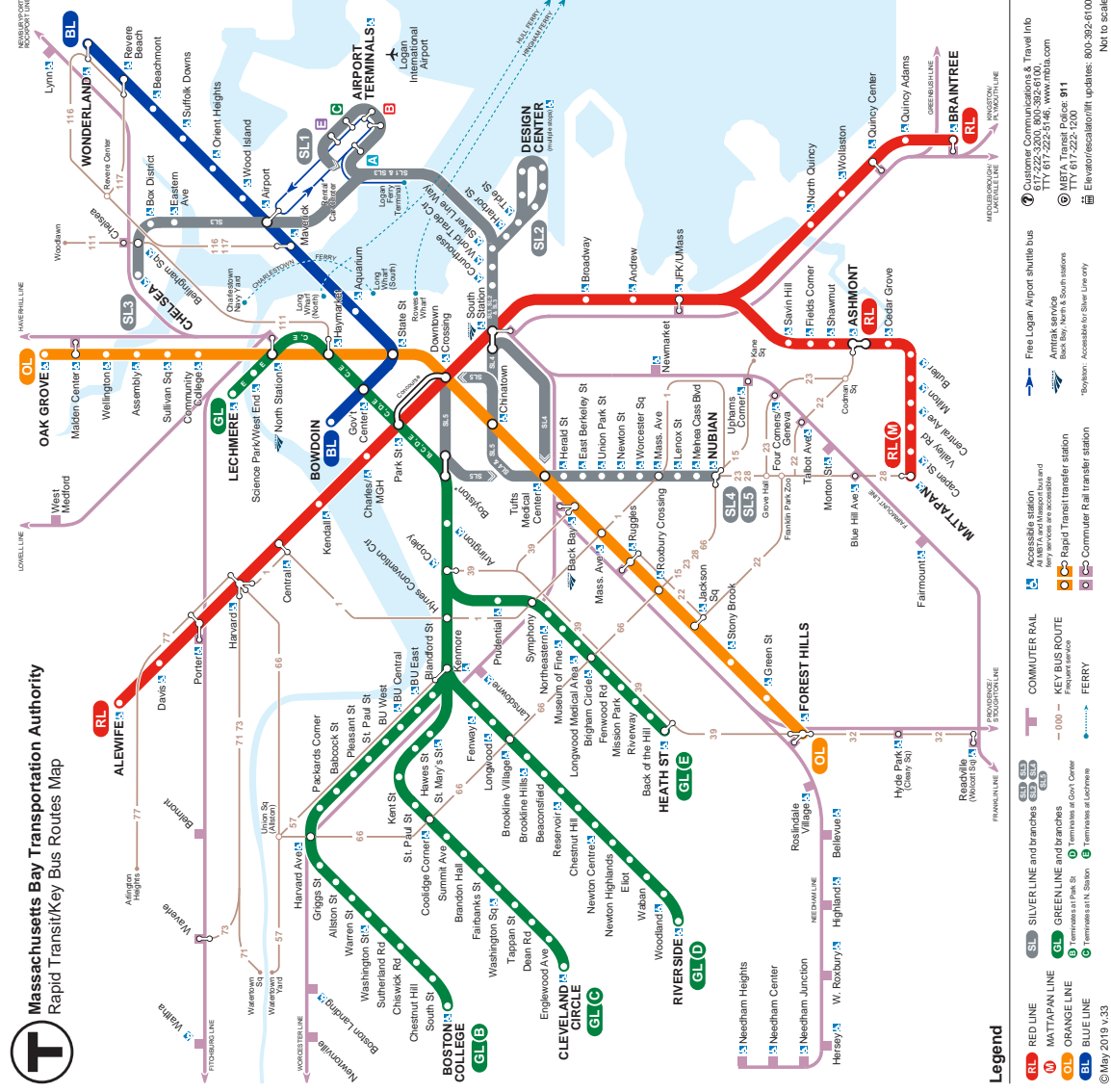


Silver Line



Massachusetts Bay Transportation Authority **massDOT** Massachusetts Department of Transportation

Information 617-222-3200 • 1-800-392-6100 (TTY) 617-222-5146 • [www.mbta.com](http://www.mbta.com)



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Not to scale



		Weekday				Saturday				Sunday				
		First Trip	Peak	Off Peak	Last Trip	First Trip	Arriving Every	Last Trip	First Trip	Arriving Every	Last Trip			
<b>Rapid Transit Line</b>														
<b>Red Line</b>														
Alewife Braintree		5:24 AM 5:08 AM	9 mins	12-16 mins	12:20 AM 12:17 AM	5:24 AM 5:09 AM	12-16 mins	12:20 AM 12:17 AM	6:08 AM 6:00 AM	12-16 mins	12:20 AM 12:17 AM	6:08 AM 6:00 AM	12-16 mins	12:20 AM 12:17 AM
Alewife Ashmont		5:16 AM 5:16 AM	9 mins	12-16 mins	w 12:27 AM w 12:30 AM	5:16 AM 5:16 AM	12-16 mins	w 12:27 AM w 12:30 AM	6:00 AM 6:00 AM	12-16 mins	w 12:27 AM w 12:30 AM	6:00 AM 6:00 AM	12-16 mins	w 12:27 AM w 12:30 AM
"M" Ashmont Mattapan		5:17 AM 5:05 AM	5 mins	8-12 Day 26 Late	w 1:05 AM 12:53 AM	5:15 AM 5:05 AM	8-12 Day 26 Early/Late	w 1:05 AM 12:53 AM	6:03 AM 5:51 AM	8-12 Day 26 Early/Late	w 1:05 AM 12:53 AM	6:03 AM 5:51 AM	8-12 Day 26 Early/Late	w 1:05 AM 12:53 AM
<b>Blue Line</b>														
Wonderland Orient Heights Bowdoin		5:13 AM 5:14 AM 5:30 AM	5 mins	9-13 mins	12:28 AM 12:33 AM w 1:00 AM	5:25 AM 5:13 AM 5:29 AM	9-13 mins	12:28 AM 12:33 AM w 1:00 AM	5:58 AM 6:03 AM 6:21 AM	9-13 mins	12:28 AM 12:33 AM w 1:00 AM	5:58 AM 6:03 AM 6:21 AM	9-13 mins	12:28 AM 12:33 AM w 1:00 AM
<b>Orange Line</b>														
Oak Grove Forest Hills		5:16 AM 5:16 AM	6 mins	9-11 mins	w 12:30 AM w 12:28 AM	5:16 AM 5:16 AM	9-11 mins	w 12:30 AM w 12:28 AM	6:00 AM 6:00 AM	9-11 mins	w 12:30 AM w 12:28 AM	6:00 AM 6:00 AM	9-11 mins	w 12:30 AM w 12:28 AM
<b>Green Line*</b>														
B Boston College Park Street		5:01 AM 5:45 AM	5-6 mins	7-9 mins	12:10 AM w 12:52 AM	4:45 AM <sup>2</sup> 5:40 AM	7-8 mins	12:09 AM w 12:52 AM	5:20 AM <sup>2</sup> 6:12 AM	9 mins	12:10 AM w 12:52 AM	5:20 AM <sup>2</sup> 6:12 AM	9 mins	12:10 AM w 12:52 AM
C Cleveland Circle North Station		4:57 AM <sup>1</sup> 5:48 AM	6-8 mins	9-11 mins	12:07 AM w 12:46 AM	4:50 AM <sup>2</sup> 5:30 AM	9-10 mins	12:10 AM w 12:46 AM	5:30 AM <sup>2</sup> 6:06 AM	10 mins	12:10 AM w 12:46 AM	5:30 AM <sup>2</sup> 6:06 AM	10 mins	12:10 AM w 12:46 AM
D Riverside Government Ctr.		4:56 AM 5:45 AM	6 mins	8-11 mins	12:05 AM w 12:49 AM	4:55 AM 5:38 AM	8-9 mins	12:02 AM w 12:49 AM	5:25 AM 6:10 AM	11-12 mins	12:05 AM w 12:49 AM	5:25 AM 6:10 AM	11-12 mins	12:05 AM w 12:49 AM
E Lechmere* Heath Street		5:00 AM <sup>4</sup> 5:45 AM	6-7 mins	8-10 mins	12:30 AM 12:47 AM <sup>3</sup>	5:01 AM 5:39 AM	10 mins	12:30 AM 12:47 AM <sup>3</sup>	5:35 AM 6:15 AM	12 mins	12:30 AM 12:47 AM <sup>3</sup>	5:35 AM 6:15 AM	12 mins	12:30 AM 12:47 AM <sup>3</sup>
<b>Silver Line</b>														
SL1 Logan Airport South Station		5:38 AM 5:40 AM	7-12 mins	10-12 mins	f 1:03 AM w 1:02 AM	5:48 AM 5:45 AM	10-12 mins	1:15 AM w 12:59 AM	5:50 AM 6:12 AM	10-12 mins	f 1:12 AM w 1:00 AM	5:50 AM 6:12 AM	10-12 mins	f 1:12 AM w 1:00 AM
SL2 Design Center South Station		6:07 AM 5:44 AM	6 mins	14-16 mins	12:37 AM 12:50 AM	6:03 AM 5:47 AM	14-16 mins	12:35 AM 12:45 AM	6:51 AM 6:35 AM	14-16 mins	12:51 AM 12:36 AM	6:51 AM 6:35 AM	14-16 mins	12:51 AM 12:36 AM
SL3 Chelsea Station South Station		4:55 AM 4:20 AM	6-11 mins	8-13 mins	f 1:05 AM w 12:35 AM	5:30 AM 4:56 AM	8-13 mins	1:22 AM w 12:55 AM	6:26 AM 5:53 AM	8-13 mins	f 1:25 AM w 12:55 AM	6:26 AM 5:53 AM	8-13 mins	f 1:25 AM w 12:55 AM
SL4 Nubian Station South Station		5:20 AM 5:38 AM	6-11 mins	6-11 mins	12:20 AM 12:37 AM	5:23 AM 5:40 AM	13-20 mins	12:20 AM 12:40 AM	6:02 AM 6:20 AM	13-20 mins	12:20 AM 12:40 AM	6:02 AM 6:20 AM	13-20 mins	12:20 AM 12:40 AM
SL5 Nubian Station Downtown Xing		5:15 AM 5:32 AM	11-14 mins	13-20 mins	12:51 AM w 1:07 AM	5:19 AM 5:34 AM	6-11 mins	12:43 AM w 1:00 AM	6:00 AM 6:16 AM	6-11 mins	12:25 AM w 12:47 AM	6:00 AM 6:16 AM	6-11 mins	12:25 AM w 12:47 AM

**Peak Service:**  
Weekdays 7 AM - 9 AM, 4 PM - 6:30 PM

**Green Line Notes:**  
New and ongoing infrastructure projects may result in diversions on some branches at various times.  
**See GL service changes at [mbta.com/GLwork](http://mbta.com/GLwork)**  
**View service alerts at [mbta.com/alerts](http://mbta.com/alerts)**

\* E trains start/end at North Station for Green Line Extension work – shuttles provided between North Station and Lechmere.  
**More: [mbta.com/GLEwork](http://mbta.com/GLEwork)**

1 - The first two C train AM northbound trips run through to Lechmere Station on weekdays.

2 - The first B and second C train AM northbound trips run through to Lechmere Station on weekends.

3 - On weekdays the 12:27 AM trip (weekends the 12:32 AM trip) from Heath St is the last connecting train to other lines downtown. The 12:37 AM and 12:47 AM trips (weekends the 12:47 AM trip) from Heath St. runs in service to Lechmere with no guaranteed connections.

4 - Early morning service from Lechmere to Riverside departs Lechmere at 5:00 AM.

f - After exiting Ted Williams Tunnel bus will only service World Trade Center and South Station stops.

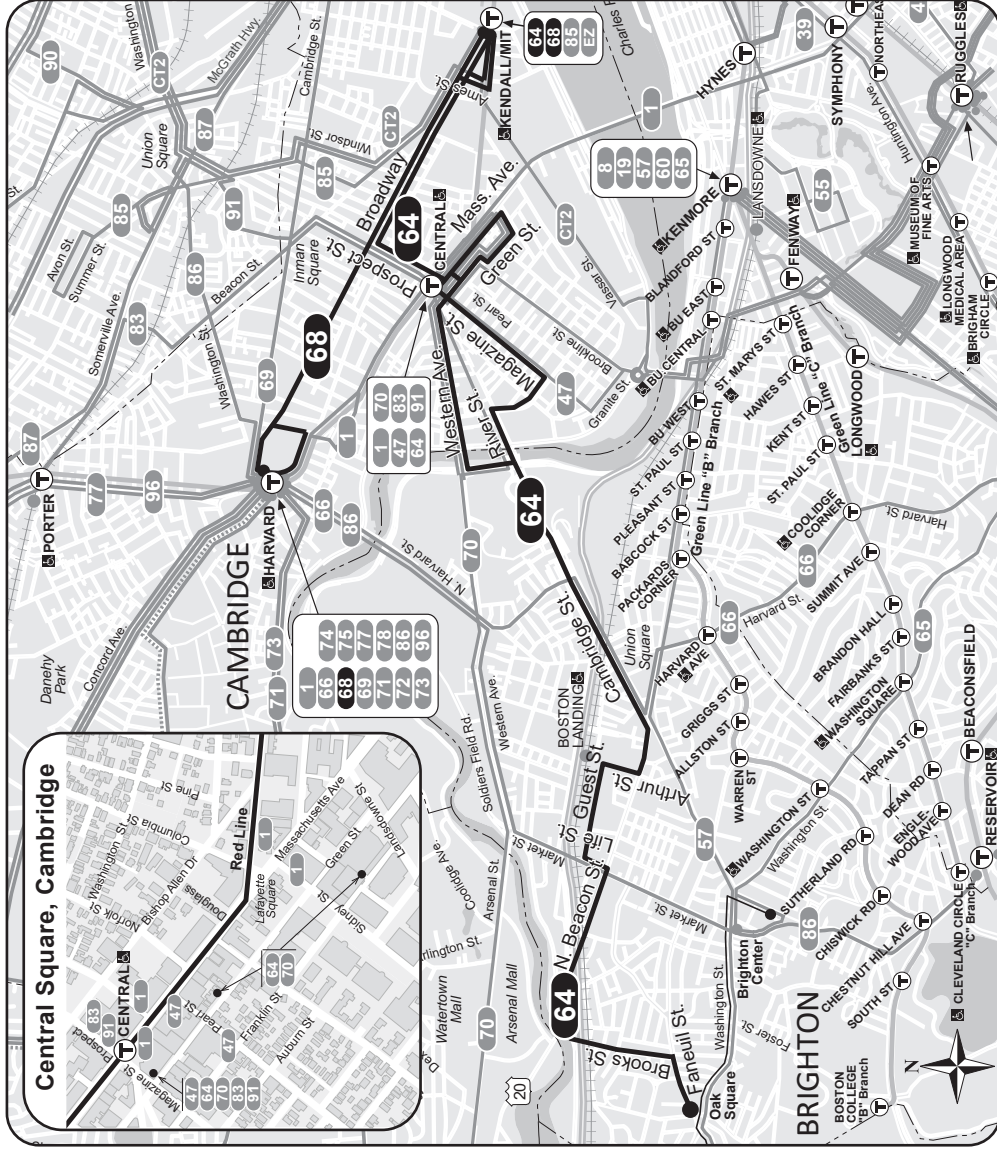
w - Last trips wait at some stations, primarily in the Downtown area, for connecting service. Departure times are approximate.

Fall 2020 & Winter 2021 Holidays  
9/7/20; Sunday, 10/12/20 & 11/17/20; Weekday 11/26/20, 12/25/20, & 1/1/21; Sun; 1/18/21 & 2/15/21; Sat

## Kendall Station

Start Time	Average Daily Entries	Average Daily Exits	Total	Average Flow
3:00 AM	2.1	2.5	4.6	
4:00 AM	3	3.6	6.6	0.0
5:00 AM	30.8	217.8	248.6	819.7
6:00 AM	115.1	901.5	1016.6	3347.8
7:00 AM	344.2	1846.3	2190.5	7674.0
8:00 AM	600	3490	4090	10724.7
9:00 AM	413.9	2764.6	3178.5	5474.5
10:00 AM	319.4	1154.3	1473.7	3149.0
11:00 AM	410.9	620.2	1031.1	2958.1
12:00 PM	513	528.3	1041.3	3303.0
1:00 PM	645.2	486.3	1131.5	3536.0
2:00 PM	1008.3	463.9	1472.2	4414.7
3:00 PM	1652	494.5	2146.5	6213.1
4:00 PM	3133.9	557.8	3691.7	9746.9
5:00 PM	3946	765.9	4711.9	13450.2
6:00 PM	2193.7	610.9	2804.6	9094.7
7:00 PM	1113.1	341.2	1454.3	5081.4
8:00 PM	648.7	232.1	880.8	3301.2
9:00 PM	471.8	201.1	672.9	2866.1
10:00 PM	320	157.2	477.2	2342.5
11:00 PM	194.2	89.4	283.6	1377.1
12:00 AM	73.2	34.9	108.1	456.5
1:00 AM	5.8	6.2	12	13.3
2:00 AM	2.3	2.7	5	
<b>Total</b>	<b>18160.6</b>	<b>15973.2</b>	<b>34133.8</b>	<b>99344.6</b>

**Route 64 Oak Square - University Park or Kendall/MIT Station**  
**Route 68 Harvard Square - Kendall/MIT Station**



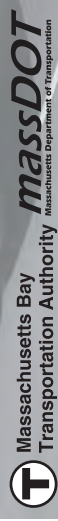
# 64•68

**Effective August 30, 2020**

**64 Oak Square-University Park or Kendall/MIT Station**  
**68 Harvard Square-Kendall/MIT Station**

**Serving**

- Kendall Square
- Central Square, Cambridge
- Union Square, Allston
- Boston Landing, Brighton
- Framingham/Worcester CR
- Harvard University
- Red Line



**Information 617-222-3200 • 1-800-392-6100**  
**(TTY) 617-222-5146 • www.mbta.com**

64 Weekday				64 Saturday				68 Weekday			
Inbound		Outbound		Inbound		Outbound		Inbound		Outbound	
Leave Oak Square	Arrive Union Square	Leave Kendall/MIT	Arrive Union Square	Leave University Park	Arrive University Park	Leave Oak Square	Arrive Oak Square	Leave Harvard Square	Arrive Kendall/MIT	Leave Harvard Square	Arrive Harvard Square
5:21A	5:31A	6:06A	6:20A	5:45A	6:11A	5:20A	5:29A	6:35A	6:46A	6:53A	7:06A
5:49	5:59	6:35	6:49	6:45	7:11	6:20	6:29	7:15	7:26	7:33	7:47
6:18	6:28	7:03	7:21	7:50	8:16	7:30	7:42	7:55	8:08	8:13	8:27
6:41	6:54	7:29	7:47	8:50	9:16	8:20	8:30	8:35	8:50	8:58	9:12
7:00	7:13	7:49	8:07	9:50	10:19	9:20	9:31	9:15	9:29	9:33	9:47
7:19	7:32	8:18	8:39	11:00	11:30	10:25	10:38	9:55	10:09	10:13	10:25
7:37	7:50	8:45	9:06	12:10P	12:40P	11:35	11:48	10:35	10:49	10:53	11:05
7:53	8:06	8:44	9:52	1:20	1:50	12:45P	12:58P	11:15	11:27	11:33	11:45
8:09	8:22	9:00	10:39	2:30	3:00	1:55	2:08	11:55	12:07P	12:13P	12:26P
8:32	8:45	9:16	11:45	3:40	4:10	3:05	3:18	12:35P	12:47P	12:53	1:06
9:02	9:13	9:39	12:30P	4:50	5:20	4:15	4:28	1:15	1:27	1:33	1:46
9:34	9:45	10:11		6:05	6:35	5:25	5:38	1:55	2:07	2:13	2:26
10:20	10:31	10:57	1:15	7:15	7:45	6:40	6:52	2:35	2:47	2:53	3:07
11:07	11:18	11:44	2:00	8:25	8:51	7:55	8:07	3:15	3:28	3:33	3:50
11:52	12:03P	12:29P	2:45	9:30	9:54	9:00	9:12	3:55	4:08	4:13	4:30
			3:30	10:30	10:52	10:00	10:12	4:35	4:48	4:53	5:10
12:37P	12:48	1:14	3:56	11:35	11:57	11:00	11:12	5:15	5:28	5:38	5:51
1:22	1:33	1:59	4:36	12:40A	1:02A	12:05A	12:17A	5:55	6:07	6:11	6:24
2:07	2:18	2:44	5:05			fw 1:05	1:13	6:29	6:41	6:45	6:58
2:54	3:05	3:31	5:40	<b>Route 68</b>							
3:41	3:52	4:18	6:05	<b>Harvard/Holyoke Street-Kendall/MIT</b>							
4:28	4:44	5:16	6:27	<b>No service on weekends.</b>							
5:08	5:24	5:56	6:32	<b>Fare</b>							
5:43	5:59	6:25	7:01	Local Bus \$1.70 Bus + Bus \$1.70 Rapid Transit \$2.40 Bus + Rapid Transit \$2.40							
6:16	6:27	6:53	7:29	CharlieCard \$1.70 \$1.70 \$2.40 \$2.40 \$2.40							
6:41	6:52	7:17	8:10	CharlieTicket \$2.00 \$2.00 \$2.00 \$2.90 \$2.90 \$4.90							
7:09	7:18	7:42	9:32	Cash-on-Board \$2.00 \$4.00 \$2.90 \$2.90 \$4.90							
8:35	8:44	9:08	10:51	Student/Youth* \$0.85 \$0.85 \$1.10 \$1.10 \$1.10							
10:01	10:09	10:31	12:04A	Senior/TAP** \$0.85 \$0.85 \$1.10 \$1.10 \$1.10							
11:13	11:21	11:43	1:30	VALID PASSENGER: Pass /no.Local Bus /no.tuden /no.Senior/1 Alin ass /no and e rr ess bus, commuter rail, and /outh Lin ass							
12:26A	12:33A	12:55A	1:30	FREE FARE SCHOLAR: en and under rder es hen acc ompanied b y an adult/Blind Access CharlieCard holders rder es and using a guide the guide rder es							
				** Requires Student CharlieCard or outh CharlieCard Student CharlieCards are available to students through participating middle schools and high schools. Youth CharlieCards are available through community partner s in the Boston metro area list www.mbta.com/youthpass or details							
				Requires Senior/ ACharlieCard, available to dic are cardholders, seniors and persons with disabilities.							
				Fall 2020 & Winter 2021 Holidays							
				9/17/20, Sunday, 10/12/20 & 11/11/20: Weekday							
				11/26/20, 12/25/20, & 1/1/21: Sun; 1/18/21 & 2/15/21: Sat							

All buses are accessible to persons with disabilities

### Route 64 Oak Square-University Park, Cambridge or Kendall/MIT Station

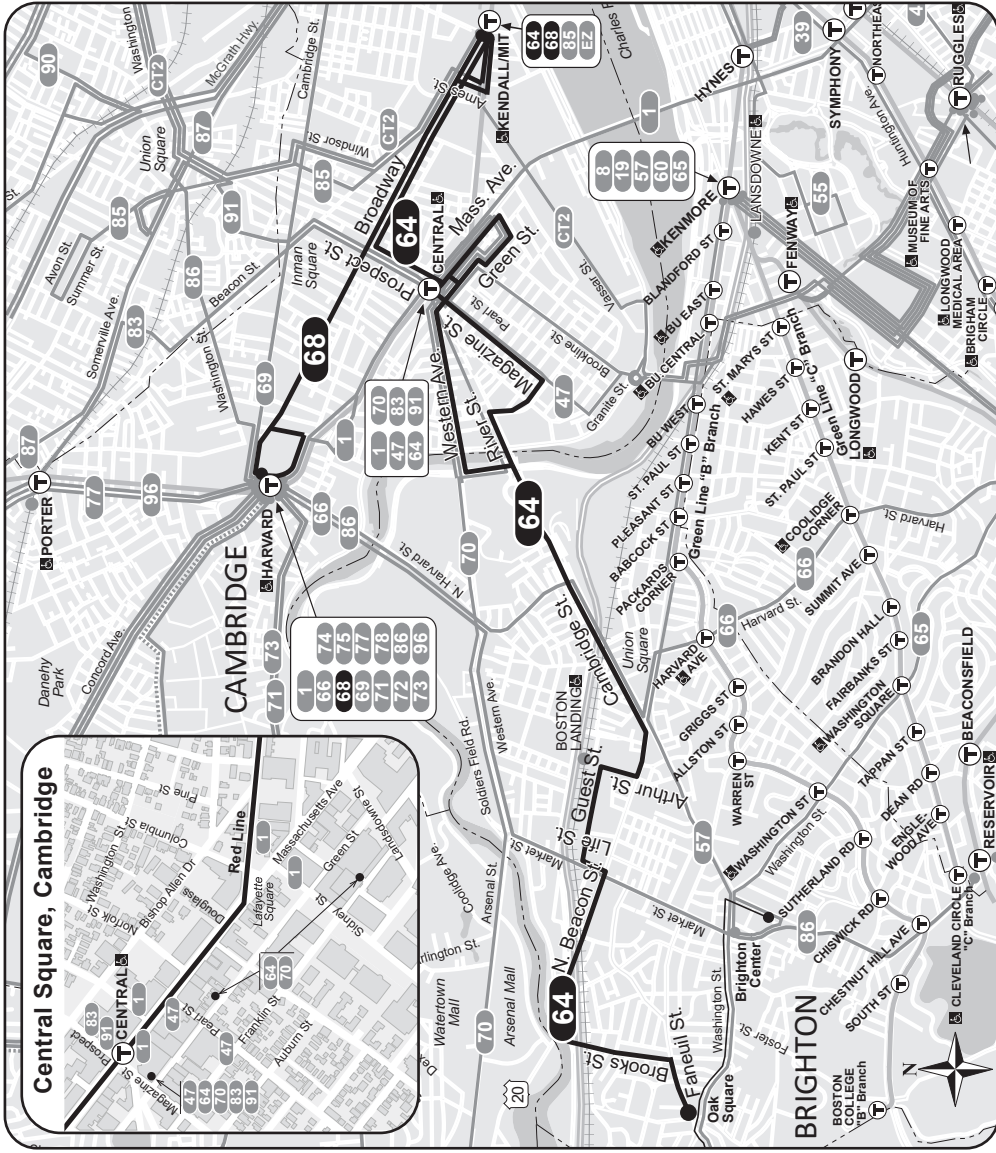
f - From Central Square to Oak Square.  
w - Waits for last train to arrive at Central Square Station.  
x - Waits for last train to arrive at Kendall/MIT Station.

Bus Route 64 - Weekday							
Inbound				Outbound			
1	05:30 (64.0)(B009) [ 3] {FA19}	On	.	1	<b>06:05 (64.0)(B010) [ 2] {WI19}</b>	On	.
		Off	.			Off	.
		Load	.			Load	.
2	05:50 (64.0)(B011) [ 7] {FA19}	On	.	2	06:24 (64.0)(B011) [ 3] {FA19}	On	.
		Off	.			Off	.
		Load	.			Load	.
3	06:20 (64.6)(B016) [ 3] {FA19}	On	0	3	06:36 (64.6)(B013) [ 9] {FA19}	On	2.2
		Off	4			Off	0
		Load	0			Load	2.2
4	<b>06:40 (64.6)(B010) [ 2] {WI19}</b>	On	0	4	07:10 (64.6)(B016) [ 2] {FA19}	On	3
		Off	1.5			Off	0
		Load	0.5			Load	3
5	07:00 (64.6)(B011) [ 3] {FA19}	On	0	5	07:31 (64.6)(B009) [ 1] {FA19}	On	9
		Off	8			Off	0
		Load	0			Load	9
6	07:20 (64.6)(B013) [ 9] {FA19}	On	0	6	07:55 (64.6)(B011) [ 4] {FA19}	On	4.3
		Off	13.2			Off	0
		Load	0			Load	4.3
7	07:40 (64.6)(B015) [37] {FA19}	On	0	7	08:20 (64.6)(B013) [ 5] {FA19}	On	4
		Off	11.1			Off	0
		Load	0.2			Load	4
8	07:55 (64.6)(B016) [ 2] {FA19}	On	0	8	08:41 (64.6)(B015) [12] {FA19}	On	2.9
		Off	8			Off	0
		Load	0			Load	3
9	08:15 (64.6)(B009) [ 1] {FA19}	On	0	9	09:13 (64.6)(B012) [ 1] {FA19}	On	5
		Off	4			Off	0
		Load	0			Load	5
10	08:40 (64.6)(B011) [ 5] {FA19}	On	0	10	09:45 (64.0)(B013) [ 8] {FA19}	On	.
		Off	4.8			Off	.
		Load	0			Load	.
11	09:05 (64.0)(B013) [ 5] {FA19}	On	.	11	10:33 (64.0)(B012) [ 3] {FA19}	On	.
		Off	.			Off	.
		Load	.			Load	.
12	09:25 (64.0)(B015) [11] {FA19}	On	.	12	11:12 (64.0)(B013) [ 2] {FA19}	On	.
		Off	.			Off	.
		Load	.			Load	.
13	09:55 (64.0)(B012) [ 1] {FA19}	On	.	13	11:51 (64.0)(B012) [ 4] {FA19}	On	.
		Off	.			Off	.
		Load	.			Load	.
14	10:30 (64.0)(B013) [ 8] {FA19}	On	.	14	12:30 (64.0)(B013) [ 2] {FA19}	On	.
		Off	.			Off	.
		Load	.			Load	.
15	11:15 (64.0)(B012) [ 6] {FA19}	On	.	15	13:09 (64.0)(B012) [ 3] {FA19}	On	.
		Off	.			Off	.
		Load	.			Load	.
16	11:50 (64.0)(B013) [ 4] {FA19}	On	.	16	13:48 (64.0)(B013) [ 3] {FA19}	On	.
		Off	.			Off	.
		Load	.			Load	.
17	12:30 (64.0)(B012) [ 3] {FA19}	On	.	17	14:28 (64.0)(B012) [ 4] {FA19}	On	.
		Off	.			Off	.

Bus Route 64 - Weekday							
Inbound					Outbound		
	Load			Load			
18	13:10 (64.0)(B013) [ 1] {FA19}	On	.	18	15:08 (64.0)(B013) [ 7] {FA19}	On	.
		Off	.			Off	.
		Load	.			Load	.
19	13:50 (64.0)(B012) [ 4] {FA19}	On	.	19	15:56 (64.0)(B012) [ 3] {FA19}	On	.
		Off	.			Off	.
		Load	.			Load	.
20	14:30 (64.0)(B013) [ 3] {FA19}	On	.	20	16:35 (64.6)(B008) [18] {FA19}	On	13.1
		Off	.			Off	0
		Load	.			Load	13.1
21	15:15 (64.0)(B012) [ 4] {FA19}	On	.	21	17:05 (64.6)(B010) [ 3] {FA19}	On	17
		Off	.			Off	0
		Load	.			Load	17
22	16:00 (64.6)(B013) [ 6] {FA19}	On	0	22	17:35 (64.6)(B014) [13] {FA19}	On	15.1
		Off	4.2			Off	0
		Load	0			Load	21.5
23	16:30 (64.6)(B014) [51] {FA19}	On	0	23	18:05 (64.6)(B012) [ 5] {FA19}	On	17
		Off	4.7			Off	0
		Load	0.3			Load	17
24	17:00 (64.6)(B012) [ 6] {FA19}	On	0	24	18:35 (64.6)(B008) [ 1] {FA19}	On	15
		Off	4.3			Off	0
		Load	0			Load	15
25	17:34 (64.6)(B008) [20] {FA19}	On	0	25	19:10 (64.6)(B010) [ 1] {FA19}	On	8
		Off	3.8			Off	0
		Load	0			Load	8
26	18:09 (64.6)(B010) [ 3] {FA19}	On	0	26	20:35 (64.0)(B043) [ 7] {FA19}	On	.
		Off	1.3			Off	.
		Load	0			Load	.
27	18:30 (64.6)(B014) [14] {FA19}	On	0	27	21:45 (64.0)(B043) [13] {FA19}	On	.
		Off	1.1			Off	.
		Load	0			Load	.
28	19:00 (64.0)( ) [ 6] {FA19}	On	.	28	22:55 (64.0)(B017) [ 1] {FA19}	On	.
		Off	.			Off	.
		Load	.			Load	.
29	20:00 (64.0)(B010) [ 1] {FA19}	On	.	29	24:00 (64.0)(B017) [ 2] {FA19}	On	.
		Off	.			Off	.
		Load	.			Load	.
30	21:10 (64.0)(B043) [ 7] {FA19}	On	.	30	25:05 (64.3)(B017) [ 2] {FA19}	On	.
		Off	.			Off	.
		Load	.			Load	.
31	22:20 (64.0)(B043) [ 1] {FA19}	On	.		Total	On	0
		Off	.			Off	0
		Load	.			Load	0
32	23:30 (64.0)(B017) [ 2] {FA19}	On	.				
		Off	.				
		Load	.				
33	24:35 (64.0)(B017) [ 2] {FA19}	On	.				
		Off	.				
		Load	.				
		On	0				

Bus Route 64 - Weekday			
Inbound			Outbound
Total	Off	1	
	Load	0	

**Route 64 Oak Square - University Park or Kendall/MIT Station**  
**Route 68 Harvard Square - Kendall/MIT Station**



# 64•68

**Effective August 30, 2020**

**64 Oak Square-University Park or Kendall/MIT Station**  
**68 Harvard Square-Kendall/MIT Station**

**Serving**

- Kendall Square
- Central Square, Cambridge
- Union Square, Allston
- Boston Landing, Brighton
- Framingham/Worcester CR
- Harvard University
- Red Line



**MassDOT**  
 Massachusetts Bay Transportation Authority  
Massachusetts Department of Transportation

**Information 617-222-3200 • 1-800-392-6100**  
**(TTY) 617-222-5146 • www.mbta.com**



64 Weekday				64 Saturday				68 Weekday			
Inbound		Outbound		Inbound		Outbound		Inbound		Outbound	
Leave Oak Square	Arrive Union Square	Leave Kendall/ MIT	Arrive Kendall/ MIT	Leave Oak Square	Arrive University Park	Leave University Park	Arrive Union Square	Leave Harvard Square	Arrive Kendall/ MIT	Leave Harvard Square	Arrive Harvard Square
5:21A	5:31A	6:06A	6:36A	5:45A	6:11A	5:20A	5:29A	6:35A	6:46A	6:53A	7:06A
5:49	5:59	6:35	7:06	6:45	7:11	6:20	6:29	7:15	7:26	7:33	7:47
6:18	6:28	7:03	7:34	7:21	7:47	7:20	7:30	7:55	8:08	8:13	8:27
6:41	6:54	7:29	8:05	8:50	9:16	8:20	8:30	8:35	8:50	8:58	9:12
7:00	7:13	7:49	8:26	9:50	10:19	9:20	9:31	9:15	9:29	9:33	9:47
7:19	7:32	8:18	8:58	11:00	11:30	10:25	10:38	9:55	10:09	10:13	10:25
7:37	7:50	8:45	9:25	12:10P	12:40P	11:35	11:48	10:35	10:49	10:53	11:05
7:53	8:06	8:44	10:11	1:20	1:50	12:45P	12:58P	11:15	11:27	11:33	11:45
8:09	8:22	9:00	10:58	2:30	3:00	1:55	2:08	11:55	12:07P	12:13P	12:26P
8:32	8:45	9:16	11:45	3:40	4:10	3:05	3:18	12:35P	12:47P	12:53	1:06
9:02	9:13	9:39	12:30P	4:50	5:20	4:15	4:28	1:15	1:27	1:33	1:46
9:34	9:45	10:11		6:05	6:35	5:25	5:38	1:55	2:07	2:13	2:26
10:20	10:31	10:57	1:15	7:15	7:45	6:40	6:52	2:35	2:47	2:53	3:07
11:07	11:18	11:44	2:00	8:25	8:51	7:55	8:07	3:15	3:28	3:33	3:50
11:52	12:03P	12:29P	3:30	9:30	9:54	9:00	9:12	3:55	4:08	4:13	4:30
12:37P	12:48	1:14	4:19	10:30	10:52	10:00	10:12	4:35	4:48	4:53	5:10
1:22	1:33	1:59	5:00	11:35	11:57	11:00	11:12	5:15	5:28	5:38	5:51
2:07	2:18	2:44	5:33	12:40A	1:02A	12:05A	12:17A	5:55	6:07	6:11	6:24
2:54	3:05	3:31	6:05			fw 1:05	1:13	6:29	6:41	6:45	6:58
3:41	3:52	4:18	6:27	<b>64 Sunday</b>				<b>Route 68</b>			
4:28	4:44	5:16	6:57	Inbound				Harvard/Holyoke Street-Kendall/MIT			
5:08	5:24	5:56	7:19	Leave Oak Square	Arrive University Park	Leave University Park	Arrive Union Square	No service on weekends.			
5:43	5:59	6:25	7:47	8:47A	9:13A	8:18A	8:27A	Fare			
6:16	6:27	6:53	8:05	9:45	10:12	9:16	9:25	Local Bus	Bus + Bus	Rapid Transit	Bus + Rapid Transit
6:41	6:52	7:17	8:28	10:49	11:18	10:18	10:30	\$1.70	\$1.70	\$2.40	\$2.40
7:09	7:18	7:42	9:50	11:55	12:24P	11:24	11:36	\$2.00	\$2.00	\$2.90	\$4.90
8:35	8:44	9:08	11:05	12:05P	12:42P	12:30P	12:44P	\$4.00	\$4.00	\$2.90	\$4.90
10:01	10:09	10:31	12:18A	1:03P	1:32P	12:44P	12:58P	\$0.85	\$0.85	\$1.10	\$1.10
11:13	11:21	11:43	1:30	2:11	2:40	1:38	1:52	\$0.85	\$0.85	\$1.10	\$1.10
12:26A	12:33A	12:55A		3:20	3:49	2:46	3:00	Senior/TAP** \$0.85 \$0.85 \$1.10 \$1.10			
				4:28	4:58	3:55	4:07	VALID PASSENGER: Local Bus, Rapid Transit, Commuter Rail, and MBTA Bus			
				5:37	6:06	5:05	5:17	Senior/Youth* \$0.85 \$1.10 \$1.10 \$1.10			
				6:42	7:07	6:10	6:22	Senior/TAP** \$0.85 \$0.85 \$1.10 \$1.10			

All buses are accessible to persons with disabilities

f - From Central Square to Oak Square.  
w - Waits for last train to arrive at Central Square Station.  
x - Waits for last train to arrive at Kendall/MIT Station.

## Route 64 Oak Square-University Park, Cambridge or Kendall/MIT Station

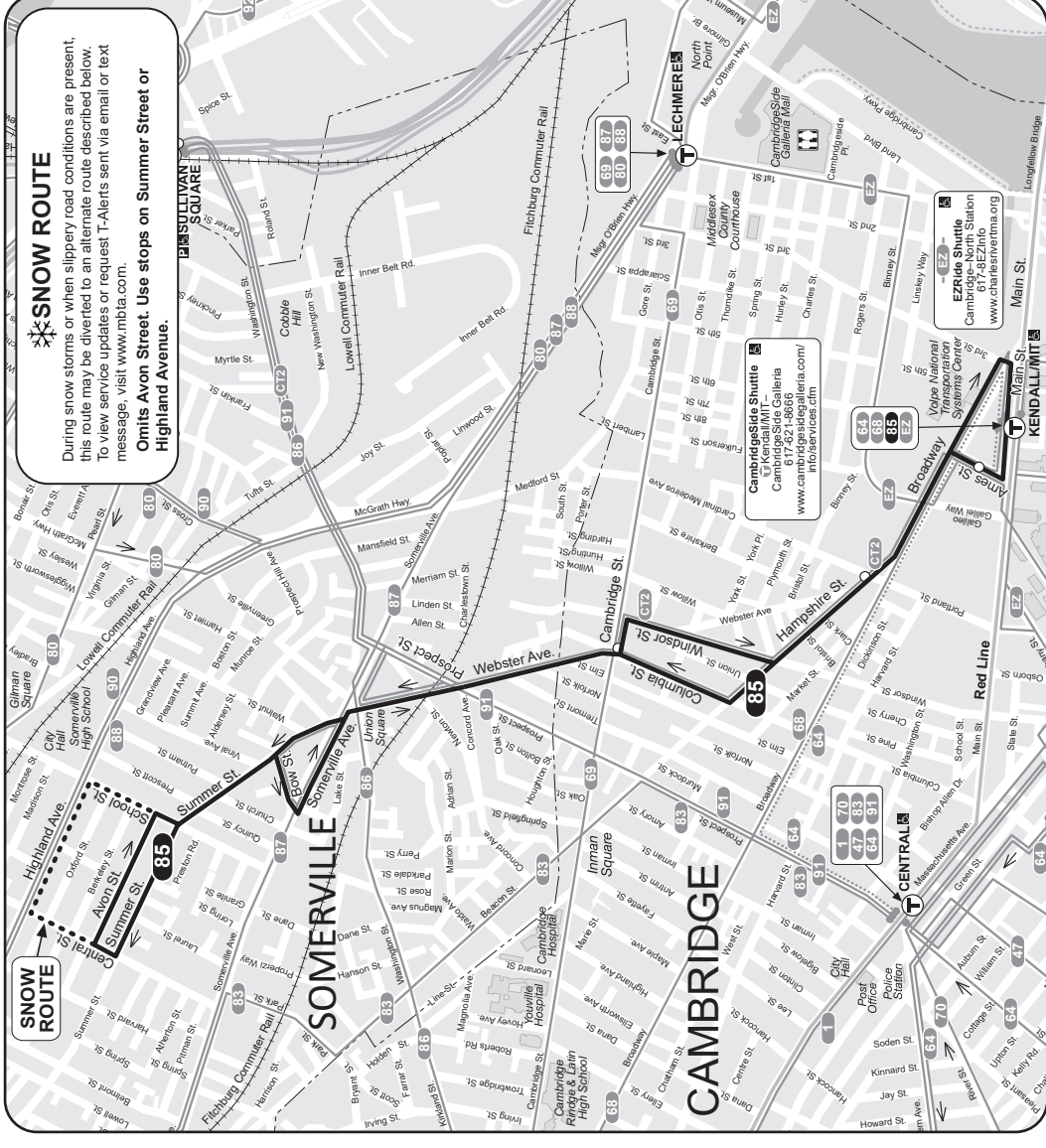
Fall 2020 & Winter 2021 Holidays  
9/17/20, Sunday, 10/12/20 & 11/11/20: Weekday  
11/26/20, 12/25/20, & 1/1/21: Sun; 1/18/21 & 2/15/21: Sat

All buses are accessible to persons with disabilities

Bus Route 68 - Weekday							
Inbound				Outbound			
1	06:35 (68.0)(B024) [ 1] {FA19}	On	0	1	06:53 (68.0)(B024) [ 1] {FA19}	On	4
		Off	3			Off	0
		Load	0			Load	4
2	07:15 (68.0)(B024) [ 1] {FA19}	On	0	2	07:33 (68.0)(B024) [ 1] {FA19}	On	2
		Off	7			Off	0
		Load	0			Load	2
3	07:55 (68.0)(B022) [ 6] {FA19}	On	0	3	08:13 (68.0)(B022) [ 7] {FA19}	On	1.9
		Off	4.2			Off	0
		Load	0			Load	2
4	08:35 (68.0)(B022) [ 7] {FA19}	On	0	4	08:58 (68.0)(B022) [ 8] {FA19}	On	1.3
		Off	5.4			Off	0
		Load	0			Load	1.3
5	09:15 (68.0)(B022) [ 8] {FA19}	On	0	5	09:33 (68.0)(B022) [ 7] {FA19}	On	0.9
		Off	3.8			Off	0
		Load	0.4			Load	0.9
6	09:55 (68.0)(B022) [ 7] {FA19}	On	0	6	10:13 (68.0)(B022) [ 7] {FA19}	On	3.3
		Off	2.9			Off	0
		Load	0			Load	3.3
7	10:35 (68.0)(B022) [ 7] {FA19}	On	0	7	10:53 (68.0)(B022) [ 7] {FA19}	On	2.7
		Off	4.4			Off	0
		Load	0			Load	2.7
8	11:15 (68.0)(B022) [ 8] {FA19}	On	0	8	11:33 (68.0)(B022) [ 8] {FA19}	On	1.8
		Off	4.4			Off	0
		Load	0			Load	2.1
9	11:55 (68.0)(B022) [ 8] {FA19}	On	0	9	12:13 (68.0)(B022) [ 7] {FA19}	On	2.4
		Off	2.4			Off	0
		Load	0			Load	2.4
10	12:35 (68.0)(B022) [ 8] {FA19}	On	0	10	12:53 (68.0)(B022) [ 8] {FA19}	On	2.3
		Off	2.5			Off	0
		Load	0.1			Load	2.3
11	13:15 (68.0)(B022) [ 8] {FA19}	On	0	11	13:33 (68.0)(B023) [ 6] {FA19}	On	1.9
		Off	3.8			Off	0
		Load	0			Load	1.9
12	13:55 (68.0)(B023) [ 7] {FA19}	On	0	12	14:13 (68.0)(B023) [ 7] {FA19}	On	2.4
		Off	5.4			Off	0
		Load	0			Load	2.4
13	14:35 (68.0)(B023) [ 7] {FA19}	On	0	13	14:53 (68.0)(B023) [ 7] {FA19}	On	2
		Off	8.1			Off	0
		Load	0			Load	2
14	15:15 (68.0)(B023) [ 7] {FA19}	On	0	14	15:33 (68.0)(B023) [ 7] {FA19}	On	3.3
		Off	3.1			Off	0
		Load	0			Load	3.3
15	15:55 (68.0)(B023) [ 7] {FA19}	On	0	15	16:13 (68.0)(B023) [ 6] {FA19}	On	4.3
		Off	3.1			Off	0
		Load	0.1			Load	4.3
16	16:35 (68.0)(B023) [ 6] {FA19}	On	0	16	16:53 (68.0)(B023) [ 6] {FA19}	On	6
		Off	2.3			Off	0
		Load	0			Load	6
17	17:15 (68.0)(B023) [ 6] {FA19}	On	0	17	17:38 (68.0)(B023) [ 5] {FA19}	On	4.2
		Off	4.5			Off	0

Bus Route 68 - Weekday						
Inbound				Outbound		
	Load	0			Load	4.2
18	On	0	18	18:11 (68.0)(B023) [ 8] {FA19}	On	3.6
	Off	2.9			Off	0
	Load	0			Load	4
19	On	0	19	18:45 (68.0)(B023) [ 8] {FA19}	On	3.6
	Off	1.6			Off	0
	Load	0.1			Load	3.6
Total	On	0	Total	On	53.9	
	Off	5		Off	0	
	Load	0		Load	54.7	

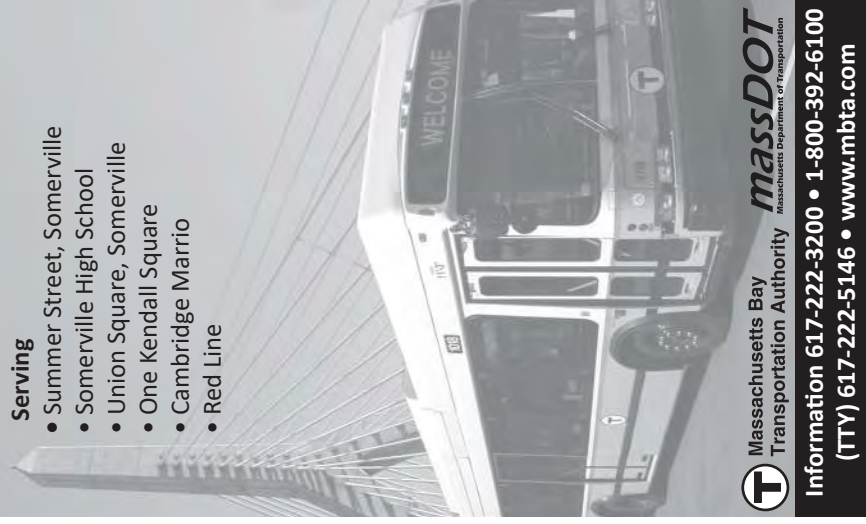
# Route 85 Spring Hill- Kendall/MIT Station



# 85

**Effective August 30, 2020**  
**Spring Hill- Kendall/MIT Station**

- Serving**
- Summer Street, Somerville
  - Somerville High School
  - Union Square, Somerville
  - One Kendall Square
  - Cambridge Marrio
  - Red Line



**MassDOT**  
 Massachusetts Department of Transportation  
**Massachusetts Bay Transportation Authority**  
 Information 617-222-3200 • 1-800-392-6100  
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**85**

**Weekday**

Inbound		Outbound	
Leave Spring Hill	Arrive Union Square	Leave Kendall/MIT Sta.	Arrive Union Square
5:45A	5:53A	6:05A	6:13A
6:25	6:33	6:45	6:53
7:05	7:13	7:25	7:32
7:45	7:53	8:15	8:22
8:20	8:30	9:00	9:07
8:35	8:45	9:45	9:52
9:20	9:28	10:25	10:31
10:05	10:13	11:02	11:08
10:40	10:48	11:42	11:48
11:20	11:28		
		<b>12:22P</b>	<b>12:28P</b>
<b>12:00N</b>	<b>12:08P</b>	<b>1:02</b>	<b>1:08</b>
<b>12:40P</b>	<b>12:48</b>	<b>1:42</b>	<b>1:48</b>
<b>1:20</b>	<b>1:28</b>	<b>2:22</b>	<b>2:28</b>
<b>2:00</b>	<b>2:08</b>	<b>3:02</b>	<b>3:09</b>
<b>2:40</b>	<b>2:48</b>	<b>3:45</b>	<b>3:52</b>
<b>3:20</b>	<b>3:28</b>	<b>4:30</b>	<b>4:39</b>
<b>4:05</b>	<b>4:13</b>	<b>5:20</b>	<b>5:29</b>
<b>4:55</b>	<b>5:03</b>	<b>6:10</b>	<b>6:18</b>
<b>5:45</b>	<b>5:53</b>	<b>6:55</b>	<b>7:02</b>
<b>6:30</b>	<b>6:38</b>	<b>7:45</b>	<b>7:51</b>
<b>7:20</b>	<b>7:28</b>		

Arrive Spring Hill

Arrive Union Square

Arrive Kendall/MIT Sta.

Arrive Union Square

**No service on weekends.**

**Route 85  
Spring Hill-Kendall/MIT Station**

All buses are accessible to persons with disabilities

Fare	Local Bus	Bus + Bus	Rapid Transit	Bus + Rapid Transit
CharlieCard	\$1.70	\$1.70	\$2.40	\$2.40
Charlie Ticket	\$2.00	\$2.00	\$2.90	\$4.90
Cash-on-Board	\$2.00	\$4.00	\$2.90	\$4.90
Student/Youth*	\$0.85	\$0.85	\$1.10	\$1.10
Senior/TAP**	\$0.85	\$0.85	\$1.10	\$1.10

**VALID PASSES:** Local Bus (\$55/mo.); \*Student Youth Lin (as \$30.00/mo.); \*\*Senior/Youth Lin (as \$30/mo.); and err e u, c ommuter rail, and

**FREE FARES:** Senior and under ride fee on acc. omanied an adult ind ce anler d holder ride fee and using a guide, the guide ride fee ee \* Require Student or Youth Lin d Student after d are available to students through participating middle schools and high schools. Youth CharlieCards are available through community partner in the ton metro area it www.mbta.com outha or detail Require Senior, after d, available to edic are cardholder, seniors 65+, and persons with disabilities.

Fall 2020 & Winter 2021 Holidays  
9/7/20; Sunday, 10/12/20 & 11/17/20; Weekday  
11/26/20, 12/25/20, & 1/1/21; Sun; 1/18/21 & 2/15/21; Sat

Bus Route 85 - Weekday							
Inbound			Outbound				
1	05:45 (85.0)(B012) [ 3] {FA19}	On	0	1	06:05 (85.0)(B012) [ 2] {FA19}	On	4
		Off	7.3			Off	0
		Load	0			Load	4
2	06:25 (85.0)(B012) [ 2] {FA19}	On	0	2	06:45 (85.0)(B012) [ 2] {FA19}	On	4.5
		Off	15.5			Off	0
		Load	0			Load	4.5
3	07:05 (85.0)(B012) [ 2] {FA19}	On	0	3	07:25 (85.0)(B130) [ 5] {WI20}	On	2
		Off	20.5			Off	0
		Load	0			Load	2
4	07:45 (85.0)(B130) [ 5] {WI20}	On	0	4	08:15 (85.0)(B012) [ 2] {FA19}	On	2.5
		Off	43.6			Off	0
		Load	0			Load	3
5	08:20 (85.0)(B018) [ 8] {FA19}	On	0	5	09:00 (85.0)(B025) [ 8] {FA19}	On	3
		Off	20.6			Off	0
		Load	0.3			Load	3
6	08:35 (85.0)(B012) [ 3] {FA19}	On	0	6	09:45 (85.0)(B025) [ 8] {FA19}	On	1.8
		Off	29.7			Off	0
		Load	0			Load	1.9
7	09:20 (85.0)(B025) [ 8] {FA19}	On	0	7	10:25 (85.0)(B116) [ 4] {FA19}	On	0.6
		Off	16.5			Off	0
		Load	0			Load	0.8
8	10:05 (85.0)(B025) [ 9] {FA19}	On	0	8	11:02 (85.0)(B116) [ 4] {FA19}	On	0.8
		Off	8.6			Off	0
		Load	0			Load	0.8
9	10:40 (85.0)(B116) [ 6] {FA19}	On	0	9	11:42 (85.0)(B116) [ 4] {FA19}	On	2.5
		Off	5.2			Off	0
		Load	0			Load	3.5
10	11:20 (85.0)(B116) [ 6] {FA19}	On	0	10	12:22 (85.0)(B116) [ 4] {FA19}	On	3
		Off	8.8			Off	0
		Load	0			Load	3.3
11	12:00 (85.0)(B116) [ 5] {FA19}	On	0	11	13:02 (85.0)(B115) [ 2] {FA19}	On	3.5
		Off	4.2			Off	0
		Load	0			Load	3.5
12	12:40 (85.0)(B116) [ 4] {FA19}	On	0	12	13:42 (85.0)(B115) [ 1] {FA19}	On	3
		Off	4			Off	0
		Load	0			Load	3
13	13:20 (85.0)(B115) [ 2] {FA19}	On	0	13	14:22 (85.0)(B046) [15] {WI20}	On	3.2
		Off	3			Off	0
		Load	0			Load	3.2
14	14:00 (85.0)(B115) [ 1] {FA19}	On	0	14	15:02 (85.0)(B046) [10] {WI20}	On	5.3
		Off	7			Off	0
		Load	0			Load	5.3
15	14:40 (85.0)(B115) [ 1] {FA19}	On	0	15	15:45 (85.0)(B131) [12] {WI20}	On	6.7
		Off	2			Off	0
		Load	0			Load	6.7
16	15:20 (85.0)(B115) [ 1] {FA19}	On	0	16	16:30 (85.0)(B131) [ 9] {WI20}	On	14.3
		Off	2			Off	0
		Load	0			Load	14.3
17	16:05 (85.0)(B131) [12] {WI20}	On	0	17	17:20 (85.0)(B115) [ 1] {FA19}	On	20
		Off	2.4			Off	0
		Load	0			Load	20

Bus Route 85 - Weekday							
Inbound			Outbound				
18	16:55 (85.0)(B131) [ 9] {WI20}	On	0	18	18:10 (85.0)(B178) [ 2] {FA19}	On	8
		Off	4.4			Off	0
		Load	0			Load	8
19	17:45 (85.0)(B115) [ 2] {FA19}	On	0	19	18:55 (85.0)(B178) [ 1] {FA19}	On	14
		Off	4			Off	0
		Load	12			Load	14
20	18:30 (85.0)(B178) [ 2] {FA19}	On	0	20	19:45 (85.0)(B178) [ 3] {FA19}	On	7.3
		Off	2.5			Off	0
		Load	0			Load	7.3
21	19:20 (85.0)(B178) [ 1] {FA19}	On	0	Total	On	110	
		Off	1		Off	0	
		Load	0		Load	112.1	
Total		On	0			Off	0
		Off	5			Load	112.1
		Load	0				



Map of the North Carolina coast showing major cities, transportation routes, and geographical features. Major cities include Raleigh, Durham, Charlotte, and Wilmington. The map shows a network of roads, highways, and rail lines connecting these cities. The Atlantic Ocean is to the east, and the Pamlico River is visible in the southern part of the map. A compass rose is located in the bottom right corner.





Service Plentiful Square - Pacific St.

# MORNING

## OUTBOUND

## INBOUND

Depart North Station	*Depart Kendall Outbound	Arrive Erie	Depart Erie	*Depart Kendall Inbound	Arrive North Station
6:20	6:30	6:42	6:46	6:56	7:11
6:30	6:40	6:52	6:56	7:06	7:21
6:45	6:55	7:07	7:11	7:21	7:36
7:00	7:10	7:22	7:26	7:36	7:51
7:15	7:25	7:37	7:41	7:51	8:06
7:30	7:40	7:52	7:56	8:06	8:21
7:42	7:52	8:04	8:08	8:18	8:33
7:54	8:04	8:16	8:20	8:30	8:45
8:06	8:16	8:28	8:32	8:42	8:57
8:18	8:28	8:40	8:44	8:54	9:09
8:30	8:40	8:52	8:56	9:06	9:21
8:42	8:52	9:04	9:08	9:18	9:33
8:54	9:04	9:16	9:20	9:30	9:45
9:06	9:16	9:28	9:32	9:42	9:57
9:18	9:28	9:40	9:44	9:54	10:09
9:30	9:40	9:52	9:56	10:06	10:21
9:45	9:55	10:07	10:11	10:21	
10:00	10:10	10:22	10:26	10:36	
10:20	10:30	10:42			

# MIDDAY

## SERVICE BETWEEN KENDALL SQUARE & PACIFIC ST.

Depart Kendall

10:45

11:00

11:15

11:30

11:45

12:00

12:15

12:30

12:45

1:00

1:15

1:30

1:45

2:00

2:15

2:30

2:45

Depart Pacific St.

10:52

11:07

11:22

11:37

11:52

12:07

12:22

12:37

12:52

1:07

1:22

1:37

1:52

2:07

2:22

2:37

2:55

# EVENING

## OUTBOUND

## INBOUND

Depart North Station	Depart Kendall Outbound	Arrive Erie	Depart Erie	Depart Kendall Inbound	Arrive North Station
			2:55	3:05	3:25
			3:10	3:20	3:40
	3:04	3:18	3:22	3:32	3:52
			3:34	3:44	4:04
	3:28	3:42	3:46	3:56	4:16
3:30	3:42	3:56	4:00	4:10	4:30
3:42	3:54	4:08	4:12	4:22	4:42
3:54	4:06	4:20	4:24	4:34	4:54
4:06	4:18	4:32	4:36	4:46	5:06
4:18	4:30	4:44	4:48	4:58	5:18
4:30	4:42	4:56	5:00	5:10	5:30
4:42	4:54	5:08	5:12	5:22	5:42
4:54	5:06	5:20	5:24	5:34	5:54
5:06	5:18	5:32	5:36	5:46	6:06
5:18	5:30	5:44	5:48	5:58	6:18
5:30	5:42	5:56	6:00	6:10	6:30
5:45	5:57	6:11	6:15	6:25	6:45
6:00	6:12	6:26	6:30	6:40	7:00
6:15	6:27	6:41	6:45	6:55	7:15
6:30	6:42	6:56	7:00	7:10	7:30
6:45	6:57	7:11	7:15	7:25	7:45
7:00	7:12	7:26	7:30	7:40	8:00
7:10	7:22	7:36			

# Tech Shuttle Morning Schedule

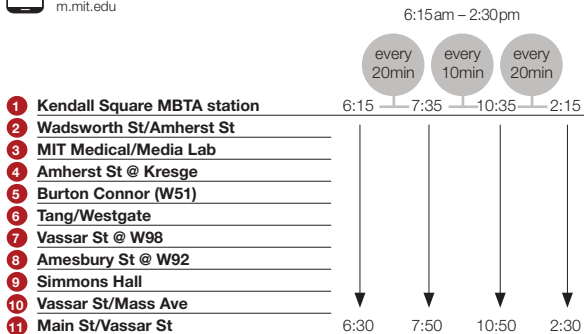


All times are approximate.

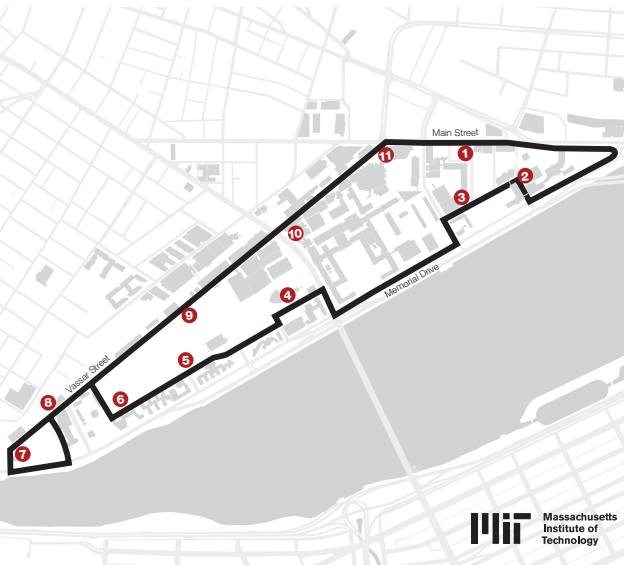
For realtime info, please use mobile web services.

[nextbus.com](http://nextbus.com)

[m.mit.edu](http://m.mit.edu)



RUNS 2019-2020



Massachusetts  
Institute of  
Technology

# Tech Shuttle Afternoon Schedule



All times are approximate.

For realtime info, please use mobile web services.

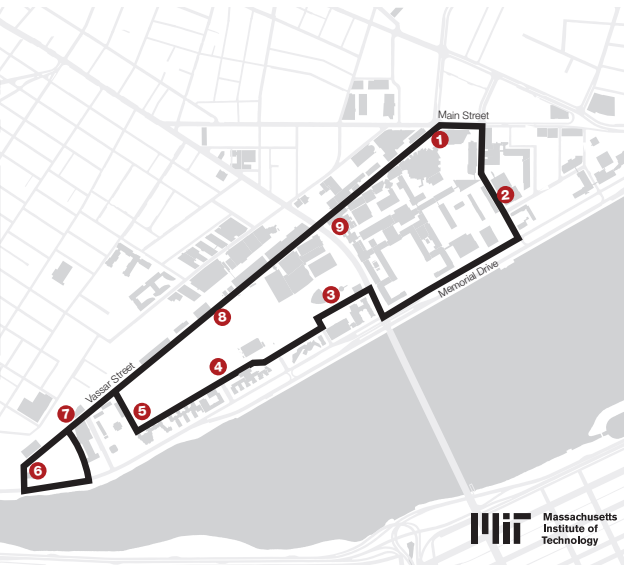
[nextbus.com](http://nextbus.com)

[m.mit.edu](http://m.mit.edu)

2:30pm – 7:45pm

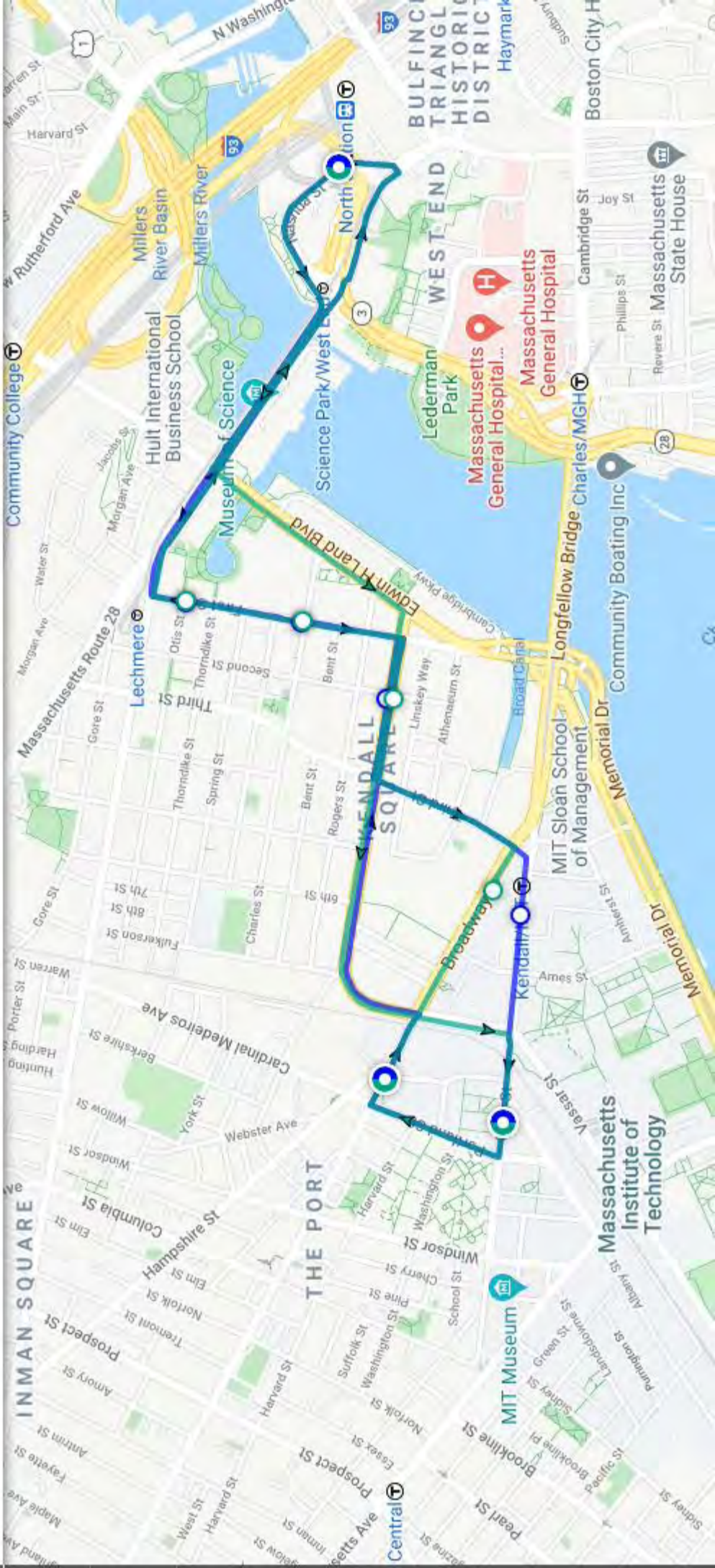
	every 20min	every 10min	every 20min	
1 Main St/Vassar St	2:35	4:05	5:55	7:30
2 Media Lab				
3 Amherst St @ Kresge				
4 Burton Connor (W51)				
5 Tang/Westgate				
6 Vassar St @ W98				
7 Amesbury St @ W92				
8 Simmons Hall				
9 Vassar St/Mass Ave	2:50	4:20	6:10	7:45

RUNS 2019-2020



Massachusetts  
Institute of  
Technology

# ALEXANDRIA EXPRESS TRACKER



ACTIVE ALL

ROUTES



Morning  
One-way shuttle service



DETAILS



Evening  
One-way shuttle service



DETAILS



## ALEXANDRIA EXPRESS TRACKER

### Morning

Bus	531	532	533	534
First Pick Up @ North Station	6:30am	6:40am	6:50am	7:00am
Last Pick Up @ North Station	9:50am	10:00am	9:30am	9:40am

### Evening

Bus	531	532	533	534
First Pick Up @ Tech Square	3:30pm	3:40pm	3:50pm	4:00pm
Last Pick Up @ Tech Square	6:50pm	7:00pm	6:30pm	6:40pm



**TRIP GENERATION DATA**

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Daily Trip Rate Calculations Based on PTDM Reports and Driveway Counts of R&D Facilities in Cambridge

Facility	Year	SF	Daily Enter	Daily Exit	Daily Total	Daily Enter trip rate	Daily Exit trip rate	Daily Total trip rate
150 Second Street	2018	123210	135	133	268	1.096	1.079	2.175
Draper	2018	823000	849	921	1770	1.032	1.119	2.151
300 Thrid Street	2018	131547	113	113	226	0.859	0.859	1.718
301 Binney	2017	650990	471	437	908	0.724	0.671	1.395
610-700 Main Street	2018	677100	503	451	954	0.743	0.666	1.409
Total		2405847	2071	2055	4126	0.861	0.854	1.715

R&D Summary Table

Proposed R&D Trip Generation - Ragon Institute

Size **186** Use ksf of R&D **186** SOV **35%** HOV **5%** AUTO **40%** NON AUTO **60%** VOR **1.07** TRANSIT **36%** PED **8%** BIKE **7%** OTHER **9%** TOTAL **100%**

VOR Calcs  
SOV **40.0%** HOV **37.5%** VOR **1.07**

Daily	Trip Rate	VEHICLE TRIPS				NON VEHICLE TRIPS				Total Person	Total Trips	
		SOV Person Trips	HOV Person Trips	AUTO Person Trips	NON AUTO Person Trips	Transit Person Trips	PED Person Trips	BIKE Person Trips	OTHER Person Trips			
Enter	0.86	160	171	428	150	21	154	34	30	39	428	428
Exit	0.86	160	171	428	150	21	154	34	30	39	428	428
<b>Total</b>	<b>1.72</b>	<b>320</b>	<b>342</b>	<b>856</b>	<b>300</b>	<b>42</b>	<b>308</b>	<b>68</b>	<b>60</b>	<b>78</b>	<b>856</b>	<b>856</b>

Weekday Morning	Trip Rate	VEHICLE TRIPS				NON VEHICLE TRIPS				Total Person	Total Trips	
		SOV Person Trips	HOV Person Trips	AUTO Person Trips	NON AUTO Person Trips	Transit Person Trips	PED Person Trips	BIKE Person Trips	OTHER Person Trips			
Enter	0.27	50	53	133	47	7	48	11	9	11	133	133
Exit	0.01	2	2	5	2	0	2	0	0	1	5	5
<b>Total</b>	<b>0.28</b>	<b>52</b>	<b>55</b>	<b>138</b>	<b>49</b>	<b>7</b>	<b>50</b>	<b>11</b>	<b>9</b>	<b>12</b>	<b>138</b>	<b>138</b>

Weekday Evening	Trip Rate	VEHICLE TRIPS				NON VEHICLE TRIPS				Total Person	Total Trips	
		SOV Person Trips	HOV Person Trips	AUTO Person Trips	NON AUTO Person Trips	Transit Person Trips	PED Person Trips	BIKE Person Trips	OTHER Person Trips			
Enter	0.03	6	6	15	5	1	6	1	1	1	15	15
Exit	0.25	47	50	125	44	6	45	10	9	11	125	125
<b>Total</b>	<b>0.28</b>	<b>53</b>	<b>56</b>	<b>140</b>	<b>49</b>	<b>7</b>	<b>51</b>	<b>11</b>	<b>10</b>	<b>12</b>	<b>140</b>	<b>140</b>

**Institute of Transportation Engineers (ITE)  
Trip Generation, 10th Edition  
Land Use Code (LUC) 565 - Day Care Center**

Average Vehicle Trips Ends vs: number of students  
Independent Variable (X): 30 non-Ragon employees students

**AVERAGE WEEKDAY DAILY**

$T = 4.09 * (X)$   
 $T = 4.09 * 30$   
 $T = 122.70$   
 $T = 122$  vehicle trips  
with 50% ( 61 vpd) entering and 50% ( 61 vpd) exiting.

**WEEKDAY MORNING PEAK HOUR OF ADJACENT STREET TRAFFIC**

$T = 0.78 * (X)$   
 $T = 0.78 * 30$   
 $T = 23.40$   
 $T = 23$  vehicle trips  
with 53% ( 12 vph) entering and 47% ( 11 vph) exiting.

**WEEKDAY EVENING PEAK HOUR OF ADJACENT STREET TRAFFIC**

$T = 0.79 * (X)$   
 $T = 0.79 * 30$   
 $T = 23.70$   
 $T = 24$  vehicle trips  
with 47% ( 11 vph) entering and 53% ( 13 vph) exiting.

## CAPACITY ANALYSIS METHODOLOGY

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# **CAPACITY ANALYSIS METHODOLOGY**

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## **LEVELS OF SERVICE**

A primary result of capacity analyses is the assignment of level of service to traffic facilities under various traffic-flow conditions.<sup>1</sup> The concept of level of service is defined as a qualitative measure describing operational conditions within a traffic stream and their perception by motorists and/or passengers. A level-of-service definition provides an index to quality of traffic flow in terms of such factors as speed, travel time, freedom to maneuver, traffic interruptions, comfort, convenience, and safety.

Six levels of service are defined for each type of facility. They are given letter designations from A to F, with level-of-service (LOS) A representing the best operating conditions and LOS F representing congested or constrained operating conditions.

Since the level of service of a traffic facility is a function of the traffic flows placed upon it, such a facility may operate at a wide range of levels of service, depending on the time of day, day of week, or period of year.

## **Unsignalized Intersections**

The six levels of service for unsignalized intersections may be described as follows:

- *LOS A* represents a condition with little or no control delay to minor street traffic.
- *LOS B* represents a condition with short control delays to minor street traffic.
- *LOS C* represents a condition with average control delays to minor street traffic.
- *LOS D* represents a condition with long control delays to minor street traffic.
- *LOS E* represents operating conditions at or near capacity level, with very long control delays to minor street traffic.

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<sup>1</sup>The capacity analysis methodology is based on the concepts and procedures presented in the *Highway Capacity Manual 6<sup>th</sup> Edition*; Transportation Research Board; Washington, DC; 2016.

- *LOS F* represents a condition where minor street demand volume exceeds capacity of an approach lane, with extreme control delays resulting.

The levels of service of unsignalized intersections are determined by application of a procedure described in the *Highway Capacity Manual 6<sup>th</sup> Edition*.<sup>2</sup> Level of service is measured in terms of average control delay. Mathematically, control delay is a function of the capacity and degree of saturation of the lane group and/or approach under study and is a quantification of motorist delay associated with traffic control devices such as traffic signals and STOP signs. Control delay includes the effects of initial deceleration delay approaching a STOP sign, stopped delay, queue move-up time, and final acceleration delay from a stopped condition. Definitions for level of service at unsignalized intersections are also given in the *Highway Capacity Manual 6<sup>th</sup> Edition*. Table 13 summarizes the relationship between level of service and average control delay for two-way stop controlled and all-way stop controlled intersections.

### LEVEL-OF-SERVICE CRITERIA FOR UNSIGNALIZED INTERSECTIONS<sup>a</sup>

Level-Of-Service by Volume-to-Capacity Ratio		Average Control Delay (Seconds Per Vehicle)
$v/c \leq 1.0$	$v/c > 1.0$	
A	F	$\leq 10.0$
B	F	10.1 to 15.0
C	F	15.1 to 25.0
D	F	25.1 to 35.0
E	F	35.1 to 50.0
F	F	$> 50.0$

<sup>a</sup>Source: *Highway Capacity Manual 6<sup>th</sup> Edition*; Transportation Research Board; Washington, DC; 2016; page 20-6.

### Signalized Intersections

The six levels of service for signalized intersections may be described as follows:

- \* *LOS A* describes operations with very low control delay; most vehicles do not stop at all.
- \* *LOS B* describes operations with relatively low control delay. However, more vehicles stop than *LOS A*.
- \* *LOS C* describes operations with higher control delays. Individual cycle failures may begin to appear. The number of vehicles stopping is significant at this level, although many still pass through the intersection without stopping.
- \* *LOS D* describes operations with control delay in the range where the influence of congestion becomes more noticeable. Many vehicles stop and individual cycle failures are noticeable.
- \* *LOS E* describes operations with high control delay values. Individual cycle failures are frequent occurrences.

<sup>2</sup>*Highway Capacity Manual 6<sup>th</sup> Edition*; Transportation Research Board; Washington, DC; 2016.

- \* *LOS F* describes operations with high control delay values that often occur with over-saturation. Poor progression and long cycle lengths may also be major contributing causes to such delay levels.

Levels of service for signalized intersections are calculated using the operational analysis methodology of the *Highway Capacity Manual 6<sup>th</sup> Edition*. This method assesses the effects of signal type, timing, phasing, and progression; vehicle mix; and geometrics on delay. Level-of-service designations are based on the criterion of control or signal delay per vehicle. Control or signal delay is a measure of driver discomfort, frustration, and fuel consumption, and includes initial deceleration delay approaching the traffic signal, queue move-up time, stopped delay and final acceleration delay. Table 14 summarizes the relationship between level-of-service and control delay. The tabulated control delay criterion may be applied in assigning level-of-service designations to individual lane groups, to individual intersection approaches, or to entire intersections.

**LEVEL-OF-SERVICE CRITERIA  
FOR SIGNALIZED INTERSECTIONS<sup>a</sup>**

Level-Of-Service by Volume-to-Capacity Ratio		Average Control Delay (Seconds Per Vehicle)
$v/c \leq 1.0$	$v/c > 1.0$	
A	F	$\leq 10.0$
B	F	10.1 to 20.0
C	F	20.1 to 35.0
D	F	35.1 to 55.0
E	F	55.1 to 80.0
F	F	$> 80.0$

<sup>a</sup>Source: *Highway Capacity Manual 6<sup>th</sup> Edition*; Transportation Research Board; Washington, DC; 2016; page 19-16.

**PEDESTRIAN ANALYSIS**

The six pedestrian levels of service may be described as follows:

- \* *LOS A*: Pedestrians basically move in desired paths without altering their movements in response to other pedestrians. Walking speeds are freely selected, and conflicts between pedestrians are unlikely.
- \* *LOS B*: Sufficient area is provided to allow pedestrians to freely select walking speeds, to bypass other pedestrians, and to avoid crossing conflicts with others.
- \* *LOS C*: Sufficient space is available to select normal walking speeds, and to bypass other pedestrians in primarily unidirectional streams.
- \* *LOS D*: Freedom to select individual walking speed and to bypass other pedestrians is restricted.
- \* *LOS E*: Virtually all pedestrians would have their normal walking speed restricted, requiring frequent adjustment of gait. At the lower range of this level of service, forward movement is possible only by “shuffling.” Insufficient space is provided for passing of slower pedestrians.



- \* *LOS F*: All walking speeds are severely restricted, and forward progress is made only by “shuffling.” There is frequent, unavoidable contact with other pedestrians. Flow is sporadic and unstable.

**PEDESTRIAN LEVEL-OF-SERVICE CRITERIA  
AT SIGNALIZED INTERSECTIONS<sup>a</sup>**

Level of Service	Average Delay Per Pedestrian (Seconds)
A	<10
B	≥10 to 20
C	>20 to 30
D	>30 to 40
E	>40 to 60
F	>60

<sup>a</sup>Source: *Highway Capacity Manual*; Transportation Research Board; Washington, DC; 2000; Exhibit 18-9.

**PEDESTRIAN LEVEL-OF-SERVICE CRITERIA  
AT UNSIGNALIZED INTERSECTIONS<sup>a</sup>**

Level of Service	Average Delay Per Pedestrian (Seconds)
A	≤5
B	≥5 to 10
C	>10 to 20
D	>20 to 30
E	>30 to 45
F	>45

<sup>a</sup>Source: *Highway Capacity Manual*; Transportation Research Board; Washington, DC; 2000; Exhibit 18-13.

## **SIMTRAFFIC METHODOLOGY**

SimTraffic is designed to model networks of signalized and unsignalized intersections, including roundabouts. SimTraffic can provide a number of measures of effectiveness for evaluating networks. One such measure is delay per vehicle which is calculated by dividing the total delay by the number of vehicles. The delay values were then used to determine level-of-service characteristics based on the HCM methodology previously described. Queue lengths are another output that SimTraffic generates. A vehicle is considered queued whenever it is traveling at less than 10 ft/sec. SimTraffic presents delays and queues by each individual lane and not by lane group.

## SIMTRAFFIC ANALYSIS

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2020 Baseline Weekday Morning Peak Hour

2020 Baseline Weekday Evening Peak Hour

2020 Build Weekday Morning Peak Hour

2020 Build Weekday Evening Peak Hour

2025 Future Weekday Morning Peak Hour

2025 Future Weekday Evening Peak Hour

2020 Baseline Weekday Morning Peak Hour

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**3: Sidney Street & Columbia Street /Mian Street Performance by lane**

Lane	EB	EB	WB	NB	All
Movements Served	T	R	LT	LR	
Denied Del/Veh (s)					0.2
Total Del/Veh (s)	13.5	25.2	115.5	8.3	51.9

**5: Sidney Street & Massachusetts Avenue Performance by lane**

Lane	NB	SB	SB	SE	SE	NW	NW	All
Movements Served	R	LT	R	L	TR	L	TR	
Denied Del/Veh (s)								3.5
Total Del/Veh (s)	31.8	26.5	6.4	53.8	49.3	35.6	24.3	34.3

**8: Portland Street & Main Street /Mian Street Performance by lane**

Lane	EB	WB	NB	SB	All
Movements Served	LTR	LTR	LTR	LTR	
Denied Del/Veh (s)					0.2
Total Del/Veh (s)	26.7	14.1	12.5	19.5	19.2

**10: Albany Street & Mian Street /Main Street Performance by lane**

Lane	EB	WB	NE	All
Movements Served	TR	LT	LR	
Denied Del/Veh (s)				0.0
Total Del/Veh (s)	2.3	4.8	4.3	3.8

**12: Albany Street & Portland Street Performance by lane**

Lane	WB	SB	NE	All
Movements Served	LR	LR	LR	
Denied Del/Veh (s)				0.2
Total Del/Veh (s)	9.0	2.6	1.7	3.7

**13: Windsor Street & Mian Street /Main Street Performance by lane**

Lane	EB	WB	NB	SB	All
Movements Served	LTR	LTR	LTR	LTR	
Denied Del/Veh (s)					0.1
Total Del/Veh (s)	13.5	12.9	11.3	12.3	12.7

**16: Vassar Street /Galileo Galilei Way & Main Street Performance by lane**

Lane	EB	EB	WB	WB	NB	NB	SB	SB	SB	All
Movements Served	L	TR	L	TR	LT	TR	L	T	R	
Denied Del/Veh (s)										1.2
Total Del/Veh (s)	22.8	17.9	27.6	14.3	32.7	20.3	65.2	21.4	5.3	19.9

**Total Network Performance**

Denied Del/Veh (s)	1.9
Total Del/Veh (s)	39.9

**Intersection: 3: Sidney Street & Columbia Street /Mian Street**

Movement	EB	EB	B1	WB	NB
Directions Served	T	R	T	LT	LR
Maximum Queue (ft)	49	145	126	513	105
Average Queue (ft)	4	110	36	254	73
95th Queue (ft)	27	160	107	517	115
Link Distance (ft)	47	47	107	675	70
Upstream Blk Time (%)	2	44	2	0	7
Queuing Penalty (veh)	0	0	0	1	11
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

**Intersection: 5: Sidney Street & Massachusetts Avenue**

Movement	NB	SB	SB	SE	SE	NW	NW
Directions Served	R	LT	R	L	TR	L	TR
Maximum Queue (ft)	100	90	75	100	580	124	297
Average Queue (ft)	44	84	15	78	260	65	152
95th Queue (ft)	88	90	50	119	561	126	257
Link Distance (ft)	480	70	70		620		755
Upstream Blk Time (%)		55	1		8		
Queuing Penalty (veh)		108	1		0		
Storage Bay Dist (ft)				75		100	
Storage Blk Time (%)				22	27	1	18
Queuing Penalty (veh)				74	28	3	14

**Intersection: 8: Portland Street & Main Street /Mian Street**

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	288	200	150	248
Average Queue (ft)	142	81	71	127
95th Queue (ft)	242	150	127	224
Link Distance (ft)	775	384	340	394
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

**Intersection: 10: Albany Street & Mian Street /Main Street**

Movement	EB	WB	NE
Directions Served	TR	LT	LR
Maximum Queue (ft)	20	169	122
Average Queue (ft)	1	57	35
95th Queue (ft)	8	117	81
Link Distance (ft)	384	451	514
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

**Intersection: 12: Albany Street & Portland Street**

Movement	WB	SB	NE
Directions Served	LR	LR	LR
Maximum Queue (ft)	110	51	14
Average Queue (ft)	56	2	0
95th Queue (ft)	97	22	6
Link Distance (ft)	514	340	458
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

**Intersection: 13: Windsor Street & Mian Street /Main Street**

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	157	189	107	129
Average Queue (ft)	81	82	46	65
95th Queue (ft)	135	159	85	114
Link Distance (ft)	675	775	424	367
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				



**Intersection: 16: Vassar Street /Galileo Galilei Way & Main Street**

Movement	EB	EB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	TR	LT	TR	L	T	R
Maximum Queue (ft)	224	270	104	150	253	318	181	358	225
Average Queue (ft)	112	122	34	82	78	149	56	153	71
95th Queue (ft)	202	227	72	139	182	269	128	273	154
Link Distance (ft)		451		750		412		533	
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)	200		150		250		200		200
Storage Blk Time (%)	1	1		0	0	1		2	0
Queuing Penalty (veh)	3	3		0	0	3		7	0

**Network Summary**

Network wide Queuing Penalty: 255

2020 Baseline Weekday Evening Peak Hour

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**3: Sidney Street & Columbia Street /Mian Street Performance by lane**

Lane	EB	EB	WB	NB	All
Movements Served	T	R	LT	LR	
Denied Del/Veh (s)					0.0
Total Del/Veh (s)	27.6	17.9	35.9	12.5	25.2

**5: Sidney Street & Massachusetts Avenue Performance by lane**

Lane	NB	SB	SB	SE	SE	NW	NW	All
Movements Served	R	LT	R	L	TR	L	TR	
Denied Del/Veh (s)								12.0
Total Del/Veh (s)	34.3	31.3	11.2	85.6	95.0	35.3	32.7	48.9

**8: Portland Street & Main Street /Mian Street Performance by lane**

Lane	EB	WB	NB	SB	All
Movements Served	LTR	LTR	LTR	LTR	
Denied Del/Veh (s)					0.1
Total Del/Veh (s)	27.0	16.9	14.4	16.4	19.0

**10: Albany Street & Mian Street /Main Street Performance by lane**

Lane	EB	WB	NE	All
Movements Served	TR	LT	LR	
Denied Del/Veh (s)				0.0
Total Del/Veh (s)	2.2	2.8	11.4	5.4

**12: Albany Street & Portland Street Performance by lane**

Lane	WB	SB	NE	All
Movements Served	LR	LR	LR	
Denied Del/Veh (s)				0.3
Total Del/Veh (s)	12.1	2.3	1.8	3.6

**13: Windsor Street & Mian Street /Main Street Performance by lane**

Lane	EB	WB	NB	SB	All
Movements Served	LTR	LTR	LTR	LTR	
Denied Del/Veh (s)					0.1
Total Del/Veh (s)	14.2	14.9	13.6	14.6	14.4

**16: Vassar Street /Galileo Galilei Way & Main Street Performance by lane**

Lane	EB	EB	WB	WB	NB	NB	SB	SB	SB	All
Movements Served	L	TR	L	TR	LT	TR	L	T	R	
Denied Del/Veh (s)										1.0
Total Del/Veh (s)	25.1	18.4	30.4	14.5	20.3	20.6	37.2	19.3	4.7	19.5

**Total Network Performance**

Denied Del/Veh (s)	4.6
Total Del/Veh (s)	42.7

**Intersection: 3: Sidney Street & Columbia Street /Mian Street**

Movement	EB	EB	B1	WB	NB
Directions Served	T	R	T	LT	LR
Maximum Queue (ft)	39	130	83	398	112
Average Queue (ft)	10	74	7	163	88
95th Queue (ft)	34	125	38	329	116
Link Distance (ft)	47	47	107	675	70
Upstream Blk Time (%)	0	24	0		16
Queuing Penalty (veh)	0	0	0		38
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

**Intersection: 5: Sidney Street & Massachusetts Avenue**

Movement	NB	SB	SB	SE	SE	NW	NW
Directions Served	R	LT	R	L	TR	L	TR
Maximum Queue (ft)	139	90	77	100	576	124	445
Average Queue (ft)	59	83	28	87	323	83	209
95th Queue (ft)	114	92	66	123	693	145	355
Link Distance (ft)	480	70	70		620		755
Upstream Blk Time (%)		44	3		20		
Queuing Penalty (veh)		77	5		0		
Storage Bay Dist (ft)				75		100	
Storage Blk Time (%)				51	16	2	31
Queuing Penalty (veh)				146	19	8	29

**Intersection: 8: Portland Street & Main Street /Mian Street**

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	300	234	151	215
Average Queue (ft)	145	114	83	94
95th Queue (ft)	242	190	133	164
Link Distance (ft)	775	384	340	394
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

**Intersection: 10: Albany Street & Mian Street /Main Street**

Movement	WB	NE
Directions Served	LT	LR
Maximum Queue (ft)	112	214
Average Queue (ft)	31	55
95th Queue (ft)	87	143
Link Distance (ft)	451	514
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

**Intersection: 12: Albany Street & Portland Street**

Movement	WB	SB	NE
Directions Served	LR	LR	LR
Maximum Queue (ft)	136	33	10
Average Queue (ft)	53	2	0
95th Queue (ft)	98	17	5
Link Distance (ft)	514	340	458
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

**Intersection: 13: Windsor Street & Mian Street /Main Street**

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	160	266	159	132
Average Queue (ft)	66	115	75	70
95th Queue (ft)	117	208	131	125
Link Distance (ft)	675	775	424	367
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

**Intersection: 16: Vassar Street /Galileo Galilei Way & Main Street**

Movement	EB	EB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	TR	LT	TR	L	T	R
Maximum Queue (ft)	224	297	115	119	225	303	86	290	222
Average Queue (ft)	126	129	41	56	56	142	35	121	44
95th Queue (ft)	210	243	92	98	163	253	70	210	108
Link Distance (ft)		451		750		412		533	
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)	200		150		250		200		200
Storage Blk Time (%)	2	1	0		0	1		1	0
Queuing Penalty (veh)	6	3	0		0	1		3	0

**Network Summary**

Network wide Queuing Penalty: 338

2020 Build Weekday Morning Peak Hour

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**3: Sidney Street & Columbia Street /Mian Street Performance by lane**

Lane	EB	EB	WB	NB	All
Movements Served	T	R	LT	LR	
Denied Del/Veh (s)					0.2
Total Del/Veh (s)	26.3	25.5	122.1	8.2	54.9

**5: Sidney Street & Massachusetts Avenue Performance by lane**

Lane	NB	SB	SB	SE	SE	NW	NW	All
Movements Served	R	LT	R	L	TR	L	TR	
Denied Del/Veh (s)								4.5
Total Del/Veh (s)	30.7	26.3	5.9	69.3	87.8	35.4	25.5	46.1

**8: Portland Street & Main Street /Mian Street Performance by lane**

Lane	EB	WB	NB	SB	All
Movements Served	LTR	LTR	LTR	LTR	
Denied Del/Veh (s)					0.1
Total Del/Veh (s)	25.0	15.4	14.5	20.4	19.5

**10: Albany Street & Mian Street /Main Street Performance by lane**

Lane	EB	WB	NE	All
Movements Served	TR	LT	LR	
Denied Del/Veh (s)				0.0
Total Del/Veh (s)	2.5	5.7	5.2	4.4

**12: Albany Street & Portland Street Performance by lane**

Lane	WB	SB	NE	All
Movements Served	LR	LR	LR	
Denied Del/Veh (s)				0.2
Total Del/Veh (s)	8.8	0.8	1.7	3.0

**13: Windsor Street & Mian Street /Main Street Performance by lane**

Lane	EB	WB	NB	SB	All
Movements Served	LTR	LTR	LTR	LTR	
Denied Del/Veh (s)					0.1
Total Del/Veh (s)	12.8	15.4	11.0	11.9	13.2

**16: Vassar Street /Galileo Galilei Way & Main Street Performance by lane**

Lane	EB	EB	WB	WB	NB	NB	SB	SB	SB	All
Movements Served	L	TR	L	TR	LT	TR	L	T	R	
Denied Del/Veh (s)										1.4
Total Del/Veh (s)	24.9	16.9	27.0	13.9	40.1	19.0	69.5	23.6	5.3	20.8

**20: Albany Street & Parking Garage Driveway Performance by lane**

Lane	EB	WB	SE	All
Movements Served	LT	TR	LR	
Denied Del/Veh (s)				0.0
Total Del/Veh (s)	0.8	0.5	1.6	0.6

**22: Portland Street & Daycare Drop-off/Pick-up Performance by lane**

Lane	WB	NB	SB	All
Movements Served	LR	TR	LT	
Denied Del/Veh (s)				0.0
Total Del/Veh (s)	2.3	0.6	1.9	1.3

**Total Network Performance**

Denied Del/Veh (s)	2.3
Total Del/Veh (s)	45.4

**Intersection: 3: Sidney Street & Columbia Street /Mian Street**

Movement	EB	EB	B1	WB	NB
Directions Served	T	R	T	LT	LR
Maximum Queue (ft)	66	161	129	669	98
Average Queue (ft)	6	110	39	282	80
95th Queue (ft)	35	163	115	566	115
Link Distance (ft)	47	47	107	675	70
Upstream Blk Time (%)	2	46	3	1	9
Queuing Penalty (veh)	0	0	0	1	15
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

**Intersection: 5: Sidney Street & Massachusetts Avenue**

Movement	NB	SB	SB	SE	SE	NW	NW
Directions Served	R	LT	R	L	TR	L	TR
Maximum Queue (ft)	100	91	72	100	564	124	334
Average Queue (ft)	47	85	15	88	408	66	164
95th Queue (ft)	93	90	53	121	761	122	282
Link Distance (ft)	480	70	70		620		755
Upstream Blk Time (%)		56	2		20		
Queuing Penalty (veh)		110	3		0		
Storage Bay Dist (ft)				75		100	
Storage Blk Time (%)				48	25	1	21
Queuing Penalty (veh)				158	30	4	16

**Intersection: 8: Portland Street & Main Street /Mian Street**

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	248	183	166	308
Average Queue (ft)	141	83	83	124
95th Queue (ft)	219	149	152	231
Link Distance (ft)	774	385	170	394
Upstream Blk Time (%)			1	
Queuing Penalty (veh)			2	
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

**Intersection: 10: Albany Street & Mian Street /Main Street**

Movement	EB	WB	NE
Directions Served	TR	LT	LR
Maximum Queue (ft)	17	181	107
Average Queue (ft)	1	67	33
95th Queue (ft)	7	134	75
Link Distance (ft)	385	451	94
Upstream Blk Time (%)			1
Queuing Penalty (veh)			1
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

**Intersection: 12: Albany Street & Portland Street**

Movement	WB	SB	NE
Directions Served	LR	LR	LR
Maximum Queue (ft)	103	61	10
Average Queue (ft)	54	4	1
95th Queue (ft)	88	26	8
Link Distance (ft)	356	112	458
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

**Intersection: 13: Windsor Street & Mian Street /Main Street**

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	172	210	103	140
Average Queue (ft)	86	92	45	61
95th Queue (ft)	152	169	86	110
Link Distance (ft)	675	774	424	367
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

**Intersection: 16: Vassar Street /Galileo Galilei Way & Main Street**

Movement	EB	EB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	TR	LT	TR	L	T	R
Maximum Queue (ft)	213	237	120	182	249	270	183	421	225
Average Queue (ft)	109	112	41	79	70	128	63	159	74
95th Queue (ft)	184	197	85	142	164	217	157	317	165
Link Distance (ft)		451		750		412		533	
Upstream Blk Time (%)								1	
Queuing Penalty (veh)								0	
Storage Bay Dist (ft)	200		150		250		200		200
Storage Blk Time (%)	1	1		1	0	0	2	3	0
Queuing Penalty (veh)	2	1		0	0	1	11	10	0

**Intersection: 20: Albany Street & Parking Garage Driveway**

Movement	EB	SE
Directions Served	LT	LR
Maximum Queue (ft)	53	27
Average Queue (ft)	6	2
95th Queue (ft)	30	12
Link Distance (ft)	356	36
Upstream Blk Time (%)		0
Queuing Penalty (veh)		0
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

**Intersection: 22: Portland Street & Daycare Drop-off/Pick-up**

Movement	WB	NB
Directions Served	LR	TR
Maximum Queue (ft)	37	56
Average Queue (ft)	11	2
95th Queue (ft)	35	24
Link Distance (ft)	47	112
Upstream Blk Time (%)	0	0
Queuing Penalty (veh)	0	0
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

**Network Summary**

Network wide Queuing Penalty: 366

2020 Build Weekday Evening Peak Hour

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**3: Sidney Street & Columbia Street /Mian Street Performance by lane**

Lane	EB	EB	WB	NB	All
Movements Served	T	R	LT	LR	
Denied Del/Veh (s)					0.4
Total Del/Veh (s)	23.0	19.2	64.4	12.4	39.4

**5: Sidney Street & Massachusetts Avenue Performance by lane**

Lane	NB	SB	SB	SE	SE	NW	NW	All
Movements Served	R	LT	R	L	TR	L	TR	
Denied Del/Veh (s)								28.5
Total Del/Veh (s)	35.1	31.7	9.9	81.2	117.4	36.4	35.5	53.4

**8: Portland Street & Main Street /Mian Street Performance by lane**

Lane	EB	WB	NB	SB	All
Movements Served	LTR	LTR	LTR	LTR	
Denied Del/Veh (s)					0.2
Total Del/Veh (s)	43.4	17.7	16.4	18.8	24.6

**10: Albany Street & Mian Street /Main Street Performance by lane**

Lane	EB	WB	NE	All
Movements Served	TR	LT	LR	
Denied Del/Veh (s)				1.1
Total Del/Veh (s)	2.5	2.7	12.1	5.8

**12: Albany Street & Portland Street Performance by lane**

Lane	WB	SB	NE	All
Movements Served	LR	LR	LR	
Denied Del/Veh (s)				0.3
Total Del/Veh (s)	14.6	0.6	1.8	4.0

**13: Windsor Street & Mian Street /Main Street Performance by lane**

Lane	EB	WB	NB	SB	All
Movements Served	LTR	LTR	LTR	LTR	
Denied Del/Veh (s)					0.1
Total Del/Veh (s)	13.8	20.5	16.9	15.7	17.4

**16: Vassar Street /Galileo Galilei Way & Main Street Performance by lane**

Lane	EB	EB	WB	WB	NB	NB	SB	SB	SB	All
Movements Served	L	TR	L	TR	LT	TR	L	T	R	
Denied Del/Veh (s)										1.0
Total Del/Veh (s)	25.5	17.9	37.2	14.3	19.4	21.9	78.9	17.8	4.6	20.5

**20: Albany Street & Parking Garage Driveway Performance by lane**

Lane	EB	WB	SE	All
Movements Served	LT	TR	LR	
Denied Del/Veh (s)				0.1
Total Del/Veh (s)	2.0	0.4	8.2	2.4

**22: Portland Street & Daycare Drop-off/Pick-up Performance by lane**

Lane	WB	NB	SB	All
Movements Served	LR	TR	LT	
Denied Del/Veh (s)				0.0
Total Del/Veh (s)	2.5	0.4	2.0	1.1

**Total Network Performance**

Denied Del/Veh (s)		10.2
Total Del/Veh (s)		50.1



**Intersection: 3: Sidney Street & Columbia Street /Mian Street**

Movement	EB	EB	B1	WB	NB
Directions Served	T	R	T	LT	LR
Maximum Queue (ft)	46	130	73	487	109
Average Queue (ft)	9	80	8	245	90
95th Queue (ft)	33	138	39	541	111
Link Distance (ft)	47	47	107	675	70
Upstream Blk Time (%)	1	27		3	17
Queuing Penalty (veh)	0	0		13	40
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

**Intersection: 5: Sidney Street & Massachusetts Avenue**

Movement	NB	SB	SB	SE	SE	NW	NW
Directions Served	R	LT	R	L	TR	L	TR
Maximum Queue (ft)	129	91	73	100	602	124	470
Average Queue (ft)	57	82	29	88	377	80	221
95th Queue (ft)	107	98	67	122	765	143	409
Link Distance (ft)	480	70	70		620		755
Upstream Blk Time (%)		46	4		31		
Queuing Penalty (veh)		85	7		0		
Storage Bay Dist (ft)				75		100	
Storage Blk Time (%)				54	18	3	32
Queuing Penalty (veh)				152	22	15	30

**Intersection: 8: Portland Street & Main Street /Mian Street**

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	459	224	164	237
Average Queue (ft)	199	122	94	112
95th Queue (ft)	377	194	155	208
Link Distance (ft)	775	388	181	394
Upstream Blk Time (%)			0	
Queuing Penalty (veh)			0	
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

**Intersection: 10: Albany Street & Mian Street /Main Street**

Movement	WB	NE
Directions Served	LT	LR
Maximum Queue (ft)	114	127
Average Queue (ft)	30	67
95th Queue (ft)	80	131
Link Distance (ft)	451	122
Upstream Blk Time (%)		3
Queuing Penalty (veh)		9
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

**Intersection: 12: Albany Street & Portland Street**

Movement	WB	SB	NE
Directions Served	LR	LR	LR
Maximum Queue (ft)	151	38	20
Average Queue (ft)	60	2	1
95th Queue (ft)	118	14	9
Link Distance (ft)	338	103	458
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

**Intersection: 13: Windsor Street & Mian Street /Main Street**

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	170	354	258	150
Average Queue (ft)	69	138	81	71
95th Queue (ft)	130	269	166	127
Link Distance (ft)	675	775	424	367
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

**Intersection: 16: Vassar Street /Galileo Galilei Way & Main Street**

Movement	EB	EB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	TR	LT	TR	L	T	R
Maximum Queue (ft)	225	277	141	150	221	297	151	246	223
Average Queue (ft)	123	125	47	60	65	147	48	117	44
95th Queue (ft)	198	216	107	121	183	257	111	200	108
Link Distance (ft)		451		750		412		533	
Upstream Blk Time (%)						0			
Queuing Penalty (veh)						0			
Storage Bay Dist (ft)	200		150		250		200		200
Storage Blk Time (%)	1	1	0	0	0	1		1	0
Queuing Penalty (veh)	4	3	0	0	0	3		1	0

**Intersection: 20: Albany Street & Parking Garage Driveway**

Movement	EB	WB	SE
Directions Served	LT	TR	LR
Maximum Queue (ft)	129	20	68
Average Queue (ft)	10	0	27
95th Queue (ft)	64	0	52
Link Distance (ft)	338	122	64
Upstream Blk Time (%)			1
Queuing Penalty (veh)			0
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

**Intersection: 22: Portland Street & Daycare Drop-off/Pick-up**

Movement	WB
Directions Served	LR
Maximum Queue (ft)	29
Average Queue (ft)	11
95th Queue (ft)	34
Link Distance (ft)	47
Upstream Blk Time (%)	0
Queuing Penalty (veh)	0
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

**Network Summary**

Network wide Queuing Penalty: 385

2025 Future Weekday Morning Peak Hour

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**3: Sidney Street & Columbia Street /Mian Street Performance by lane**

Lane	EB	EB	WB	NB	All
Movements Served	T	R	LT	LR	
Denied Del/Veh (s)					22.8
Total Del/Veh (s)	24.2	27.5	270.0	7.3	115.3

**5: Sidney Street & Massachusetts Avenue Performance by lane**

Lane	NB	SB	SB	SE	SE	NW	NW	All
Movements Served	R	LT	R	L	TR	L	TR	
Denied Del/Veh (s)								765.0
Total Del/Veh (s)	30.5	29.3	10.1	90.3	535.1	32.8	24.7	87.0

**8: Portland Street & Main Street /Mian Street Performance by lane**

Lane	EB	WB	NB	SB	All
Movements Served	LTR	LTR	LTR	LTR	
Denied Del/Veh (s)					0.5
Total Del/Veh (s)	25.8	45.2	14.9	32.5	30.4

**10: Albany Street & Mian Street /Main Street Performance by lane**

Lane	EB	WB	NE	All
Movements Served	TR	LT	LR	
Denied Del/Veh (s)				0.6
Total Del/Veh (s)	5.1	25.5	17.5	14.7

**12: Albany Street & Portland Street Performance by lane**

Lane	WB	SB	NE	All
Movements Served	LR	LR	LR	
Denied Del/Veh (s)				0.2
Total Del/Veh (s)	10.0	2.9	4.3	4.9

**13: Windsor Street & Mian Street /Main Street Performance by lane**

Lane	EB	WB	NB	SB	All
Movements Served	LTR	LTR	LTR	LTR	
Denied Del/Veh (s)					4.2
Total Del/Veh (s)	13.1	181.1	56.5	42.7	81.0

**16: Vassar Street /Galileo Galilei Way & Main Street Performance by lane**

Lane	EB	EB	WB	WB	NB	NB	SB	SB	SB	All
Movements Served	L	TR	L	TR	LT	TR	L	T	R	
Denied Del/Veh (s)										438.5
Total Del/Veh (s)	40.9	30.7	35.8	49.1	56.6	45.4	626.2	198.1	27.8	70.9

**20: Albany Street & Parking Garage Driveway Performance by lane**

Lane	EB	WB	SE	All
Movements Served	LT	TR	LR	
Denied Del/Veh (s)				0.0
Total Del/Veh (s)	14.9	0.5	1.8	9.4

**22: Portland Street & Daycare Drop-off/Pick-up Performance by lane**

Lane	WB	NB	SB	All
Movements Served	LR	TR	LT	
Denied Del/Veh (s)				0.0
Total Del/Veh (s)	2.8	0.4	3.2	1.9

**Total Network Performance**

Denied Del/Veh (s)	504.2
Total Del/Veh (s)	123.2

**Intersection: 3: Sidney Street & Columbia Street /Mian Street**

Movement	EB	EB	B1	WB	NB
Directions Served	T	R	T	LT	LR
Maximum Queue (ft)	53	161	135	696	98
Average Queue (ft)	8	119	50	665	91
95th Queue (ft)	37	163	130	745	104
Link Distance (ft)	47	47	107	675	70
Upstream Blk Time (%)	2	52	5	39	10
Queuing Penalty (veh)	0	0	0	156	51
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

**Intersection: 5: Sidney Street & Massachusetts Avenue**

Movement	NB	SB	SB	SE	SE	NW	NW
Directions Served	R	LT	R	L	TR	L	TR
Maximum Queue (ft)	116	90	111	100	683	124	289
Average Queue (ft)	46	85	47	98	655	60	144
95th Queue (ft)	98	91	95	104	678	122	243
Link Distance (ft)	480	70	70		620		755
Upstream Blk Time (%)		54	11		98		
Queuing Penalty (veh)		154	32		0		
Storage Bay Dist (ft)				75		100	
Storage Blk Time (%)				91	7	0	20
Queuing Penalty (veh)				309	31	1	16

**Intersection: 8: Portland Street & Main Street /Mian Street**

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	354	337	176	409
Average Queue (ft)	164	167	78	172
95th Queue (ft)	270	364	145	329
Link Distance (ft)	774	385	170	394
Upstream Blk Time (%)		9	0	1
Queuing Penalty (veh)		34	1	0
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

**Intersection: 10: Albany Street & Mian Street /Main Street**

Movement	EB	WB	NE
Directions Served	TR	LT	LR
Maximum Queue (ft)	232	355	128
Average Queue (ft)	25	126	51
95th Queue (ft)	143	367	110
Link Distance (ft)	385	451	94
Upstream Blk Time (%)	0	7	10
Queuing Penalty (veh)	1	42	17
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

**Intersection: 12: Albany Street & Portland Street**

Movement	WB	SB	NE
Directions Served	LR	LR	LR
Maximum Queue (ft)	104	83	250
Average Queue (ft)	45	8	15
95th Queue (ft)	83	47	113
Link Distance (ft)	356	112	458
Upstream Blk Time (%)		1	0
Queuing Penalty (veh)		3	0
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

**Intersection: 13: Windsor Street & Mian Street /Main Street**

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	194	761	254	321
Average Queue (ft)	105	521	75	128
95th Queue (ft)	163	907	225	262
Link Distance (ft)	675	774	424	367
Upstream Blk Time (%)		10	1	2
Queuing Penalty (veh)		42	0	0
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				



**Intersection: 16: Vassar Street /Galileo Galilei Way & Main Street**

Movement	EB	EB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	TR	LT	TR	L	T	R
Maximum Queue (ft)	225	459	175	528	274	456	225	596	225
Average Queue (ft)	180	212	51	180	188	299	200	559	116
95th Queue (ft)	262	433	141	494	319	482	283	590	287
Link Distance (ft)		451		750		412		533	
Upstream Blk Time (%)		3		5		9		79	
Queuing Penalty (veh)		26		0		0		0	
Storage Bay Dist (ft)	200		150		250		200		200
Storage Blk Time (%)	20	4	1	14	1	20	76	8	11
Queuing Penalty (veh)	92	18	3	8	4	57	646	38	63

**Intersection: 20: Albany Street & Parking Garage Driveway**

Movement	EB	SE
Directions Served	LT	LR
Maximum Queue (ft)	253	9
Average Queue (ft)	38	1
95th Queue (ft)	195	9
Link Distance (ft)	356	36
Upstream Blk Time (%)	3	0
Queuing Penalty (veh)	9	0
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

**Intersection: 22: Portland Street & Daycare Drop-off/Pick-up**

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (ft)	36	10	78
Average Queue (ft)	7	0	4
95th Queue (ft)	26	5	46
Link Distance (ft)	47	112	170
Upstream Blk Time (%)	0		0
Queuing Penalty (veh)	0		1
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

**Network Summary**

Network wide Queuing Penalty: 1856
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2025 Future Weekday Evening Peak Hour

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**3: Sidney Street & Columbia Street /Mian Street Performance by lane**

Lane	EB	EB	WB	NB	All
Movements Served	T	R	LT	LR	
Denied Del/Veh (s)					21.0
Total Del/Veh (s)	102.5	20.5	197.6	30.4	100.8

**5: Sidney Street & Massachusetts Avenue Performance by lane**

Lane	NB	SB	SB	SE	SE	NW	NW	All
Movements Served	R	LT	R	L	TR	L	TR	
Denied Del/Veh (s)								547.1
Total Del/Veh (s)	33.1	35.6	14.0	143.6	657.1	36.9	115.8	129.3

**8: Portland Street & Main Street /Mian Street Performance by lane**

Lane	EB	WB	NB	SB	All
Movements Served	LTR	LTR	LTR	LTR	
Denied Del/Veh (s)					406.3
Total Del/Veh (s)	266.5	360.0	26.6	444.0	298.9

**10: Albany Street & Mian Street /Main Street Performance by lane**

Lane	EB	WB	NE	All
Movements Served	TR	LT	LR	
Denied Del/Veh (s)				247.1
Total Del/Veh (s)	2.0	382.3	654.7	213.5

**12: Albany Street & Portland Street Performance by lane**

Lane	WB	SB	NE	All
Movements Served	LR	LR	LR	
Denied Del/Veh (s)				1254.0
Total Del/Veh (s)	5.4	290.2	1051.5	420.6

**13: Windsor Street & Mian Street /Main Street Performance by lane**

Lane	EB	WB	NB	SB	All
Movements Served	LTR	LTR	LTR	LTR	
Denied Del/Veh (s)					132.0
Total Del/Veh (s)	193.3	263.5	252.0	183.2	224.1

**16: Vassar Street /Galileo Galilei Way & Main Street Performance by lane**

Lane	EB	EB	WB	WB	NB	NB	SB	SB	SB	All
Movements Served	L	TR	L	TR	LT	TR	L	T	R	
Denied Del/Veh (s)										925.2
Total Del/Veh (s)	33.2	13.9	20.5	854.0	1435.3	109.8	187.3	505.8	448.7	295.0

**20: Albany Street & Parking Garage Driveway Performance by lane**

Lane	EB	WB	SE	All
Movements Served	LT	TR	LR	
Denied Del/Veh (s)				842.9
Total Del/Veh (s)	1313.7	0.6	1264.2	895.3

**22: Portland Street & Daycare Drop-off/Pick-up Performance by lane**

Lane	WB	NB	SB	All
Movements Served	LR	TR	LT	
Denied Del/Veh (s)				7.7
Total Del/Veh (s)	5.5	5.2	379.2	194.0

**Total Network Performance**

Denied Del/Veh (s)	861.1
Total Del/Veh (s)	433.4

**Intersection: 3: Sidney Street & Columbia Street /Mian Street**

Movement	EB	EB	B1	WB	NB
Directions Served	T	R	T	LT	LR
Maximum Queue (ft)	81	137	120	693	98
Average Queue (ft)	19	78	16	473	89
95th Queue (ft)	59	142	72	921	103
Link Distance (ft)	47	47	107	675	70
Upstream Blk Time (%)	9	24	5	23	39
Queuing Penalty (veh)	0	0	0	198	153
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

**Intersection: 5: Sidney Street & Massachusetts Avenue**

Movement	NB	SB	SB	SE	SE	NW	NW
Directions Served	R	LT	R	L	TR	L	TR
Maximum Queue (ft)	109	91	105	100	676	124	762
Average Queue (ft)	58	60	64	95	645	67	393
95th Queue (ft)	101	105	102	106	671	150	765
Link Distance (ft)	480	70	70		620		755
Upstream Blk Time (%)		20	26		99		20
Queuing Penalty (veh)		78	102		0		0
Storage Bay Dist (ft)				75		100	
Storage Blk Time (%)				93	4	3	56
Queuing Penalty (veh)				272	13	12	53

**Intersection: 8: Portland Street & Main Street /Mian Street**

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	780	401	155	401
Average Queue (ft)	525	392	37	319
95th Queue (ft)	955	400	106	499
Link Distance (ft)	775	388	181	394
Upstream Blk Time (%)	40	82	1	66
Queuing Penalty (veh)	162	618	2	0
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

**Intersection: 10: Albany Street & Mian Street /Main Street**

Movement	EB	WB	NE
Directions Served	TR	LT	LR
Maximum Queue (ft)	7	470	134
Average Queue (ft)	0	456	123
95th Queue (ft)	4	467	129
Link Distance (ft)	388	451	122
Upstream Blk Time (%)		80	97
Queuing Penalty (veh)		589	335
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

**Intersection: 12: Albany Street & Portland Street**

Movement	WB	SB	NE
Directions Served	LR	LR	LR
Maximum Queue (ft)	82	103	490
Average Queue (ft)	34	80	453
95th Queue (ft)	62	149	537
Link Distance (ft)	338	103	458
Upstream Blk Time (%)		73	95
Queuing Penalty (veh)		136	0
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

**Intersection: 13: Windsor Street & Mian Street /Main Street**

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	676	794	432	381
Average Queue (ft)	306	411	301	223
95th Queue (ft)	745	1026	548	446
Link Distance (ft)	675	775	424	367
Upstream Blk Time (%)	28	18	48	34
Queuing Penalty (veh)	81	151	0	0
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

**Intersection: 16: Vassar Street /Galileo Galilei Way & Main Street**

Movement	EB	EB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	TR	LT	TR	L	T	R
Maximum Queue (ft)	224	334	175	794	274	446	100	556	225
Average Queue (ft)	80	59	52	738	251	396	17	539	218
95th Queue (ft)	191	196	181	906	319	517	90	588	231
Link Distance (ft)		451		750		412		533	
Upstream Blk Time (%)				91		75		94	
Queuing Penalty (veh)				0		0		0	
Storage Bay Dist (ft)	200		150		250		200		200
Storage Blk Time (%)	4	0	0	95	65	25	0	3	94
Queuing Penalty (veh)	14	2	0	78	234	63	0	14	484

**Intersection: 20: Albany Street & Parking Garage Driveway**

Movement	EB	SE
Directions Served	LT	LR
Maximum Queue (ft)	355	77
Average Queue (ft)	339	58
95th Queue (ft)	345	77
Link Distance (ft)	338	64
Upstream Blk Time (%)	95	91
Queuing Penalty (veh)	276	0
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

**Intersection: 22: Portland Street & Daycare Drop-off/Pick-up**

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (ft)	37	40	184
Average Queue (ft)	11	3	131
95th Queue (ft)	35	32	261
Link Distance (ft)	47	103	181
Upstream Blk Time (%)	0	1	68
Queuing Penalty (veh)	0	2	124
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

**Network Summary**

Network wide Queuing Penalty: 4248

## BICYCLE PARKING DEMAND CALCULATIONS

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**Bicycle Demand Calculations**

Use	Size (GFA, ksf)	Long Term Rate	Long Term Spaces	Short Term Rate	Short Term Spaces	Total Spaces	Tandem Spaces
Technical Office	186	0.22	41	0.06	11.16	52	2
<b>TOTAL</b>			41		11	52	2

## PEDESTRIAN ANALYSIS

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# PEDESTRIAN WORKSHEET

General Information		Site Information	
Analyst	DIR	Facility	Main Street at Portland Street
Agency or Company	VAI	Jurisdiction	Cambridge, MA
Date Performed	9/15/2020	Analysis Year	2020 Build
Analysis Time Period	PM		
<input type="checkbox"/> Operational (LOS)		<input type="checkbox"/> Planning (LOS)	
<input type="checkbox"/> Design (W <sub>E</sub> )		<input type="checkbox"/> Planning (W <sub>E</sub> )	

### Crossings at Signalized Intersections

Pedestrian Delay at Signalized Intersections	1	2		
Cycle length, C (s)	75	75		
Effective green time for pedestrians, g (s)	28	31		
Average delay, d <sub>p</sub>	14.7	12.9		
LOS at signalized intersections (Exhibit 18-9)	B	B		

### Signalized Intersection Identification

Intersection #	Major Street at Minor Street	
1	Main Street*	at Portland Street
2	Main Street at Portland Street*	

\* - Street which pedestrians are crossing



## PEDESTRIAN WORKSHEET

General Information		Site Information		
Analyst	DIR _____	Facility	Main Street at Portland Street	
Agency or Company	VAI _____	Jurisdiction	Cambridge, MA	
Date Performed	9/15/2020	Analysis Year	2025 Future	
Analysis Time Period	PM	<input type="checkbox"/> Operational (LOS) <input type="checkbox"/> Design (W <sub>E</sub> ) <input type="checkbox"/> Planning (LOS) <input type="checkbox"/> Planning (W <sub>E</sub> )		
<b>Crossings at Signalized Intersections</b>				
Pedestrian Delay at Signalized Intersections	1	2		
Cycle length, C (s)	75	75		
Effective green time for pedestrians, g (s)	28	31		
Average delay, d <sub>p</sub>	14.7	12.9		
LOS at signalized intersections (Exhibit 18-9)	B	B		
<b>Signalized Intersection Identification</b>				
Intersection #	Major Street at Minor Street			
1	Main Street* at Portland Street			
2	Main Street at Portland Street*			

\* - Street which pedestrians are crossing





























# PEDESTRIAN WORKSHEET

General Information		Site Information	
Analyst	DIR	Facility	Main Street at Windsor Street
Agency or Company	VAI	Jurisdiction	Cambridge, MA
Date Performed	9/15/2020	Analysis Year	2020 Baseline
Analysis Time Period	AM		
<input type="checkbox"/> Operational (LOS) <input type="checkbox"/> Design (W <sub>E</sub> )		<input type="checkbox"/> Planning (LOS) <input type="checkbox"/> Planning (W <sub>E</sub> )	

**Crossings at Signalized Intersections**

Intersection #	1	2
Pedestrian Delay at Signalized Intersections	60	60
Cycle length, C (s)	16	25
Effective green time for pedestrians, g (s)	16.1	10.2
Average delay, d <sub>p</sub>	B	B
LOS at signalized intersections (Exhibit 18-9)		

**Signalized Intersection Identification**

Intersection #	Major Street at Minor Street
1	Main Street* at Windsor Street
2	Main Street at Windsor Street*

\* - Street which pedestrians are crossing

# PEDESTRIAN WORKSHEET

General Information		Site Information	
Analyst	DIR _____	Facility	Main Street at Windsor Street
Agency or Company	VAI _____	Jurisdiction	Cambridge, MA
Date Performed	9/15/2020	Analysis Year	2020 Baseline
Analysis Time Period	PM		
<input type="checkbox"/> Operational (LOS)		<input type="checkbox"/> Planning (LOS)	
<input type="checkbox"/> Design (W <sub>E</sub> )		<input type="checkbox"/> Planning (W <sub>E</sub> )	

Crossings at Signalized Intersections			
Pedestrian Delay at Signalized Intersections	1	2	
Cycle length, C (s)	60	60	
Effective green time for pedestrians, g (s)	16	25	
Average delay, d <sub>p</sub>	16.1	10.2	
LOS at signalized intersections (Exhibit 18-9)	B	B	

Signalized Intersection Identification	
Intersection #	Major Street at Minor Street
1	Main Street* at Windsor Street
2	Main Street at Windsor Street*

\* - Street which pedestrians are crossing











## PEDESTRIAN WORKSHEET

General Information		Site Information	
Analyst	DIR	Facility	Massachusetts Avenue at Sidney Street
Agency or Company	VAI	Jurisdiction	Cambridge, MA
Date Performed	9/15/2020	Analysis Year	2020 Baseline
Analysis Time Period	AM		
<input type="checkbox"/> Operational (LOS) <input type="checkbox"/> Design (W <sub>E</sub> )		<input type="checkbox"/> Planning (LOS) <input type="checkbox"/> Planning (W <sub>E</sub> )	
Crossings at Signalized Intersections			
Pedestrian Delay at Signalized Intersections	1	2	
Cycle length, C (s)	90	90	
Effective green time for pedestrians, g (s)	25	32	
Average delay, d <sub>p</sub>	23.5	18.7	
LOS at signalized intersections (Exhibit 18-9)	C	B	
Signalized Intersection Identification			
Intersection #	Major Street at Minor Street		
1	Massachusetts Avenue* at Sindey Street		
2	Massachusetts Avenue at Sindey Street*		

\* - Street which pedestrians are crossing



# PEDESTRIAN WORKSHEET

General Information		Site Information	
Analyst _____	Facility _____	Massachusetts Avenue at Sidney Street	
Agency or Company _____	Jurisdiction _____	Cambridge, MA	
Date Performed _____	Analysis Year _____	2020 Build	
Analysis Time Period _____	AM		
<input type="checkbox"/> Operational (LOS)	<input type="checkbox"/> Design (W <sub>E</sub> )	<input type="checkbox"/> Planning (LOS)	<input type="checkbox"/> Planning (W <sub>E</sub> )

Crossings at Signalized Intersections			
Pedestrian Delay at Signalized Intersections	1	2	
Cycle length, C (s)	90	90	
Effective green time for pedestrians, g (s)	25	32	
Average delay, d <sub>p</sub>	23.5	18.7	
LOS at signalized intersections (Exhibit 18-9)	C	B	

Signalized Intersection Identification	
Intersection #	Major Street at Minor Street
1	Massachusetts Avenue* at Sindey Street
2	Massachusetts Avenue at Sindey Street*

\* - Street which pedestrians are crossing

## PEDESTRIAN WORKSHEET

General Information		Site Information	
Analyst	DIR	Facility	Massachusetts Avenue at Sidney Street
Agency or Company	VAI	Jurisdiction	Cambridge, MA
Date Performed	9/15/2020	Analysis Year	2020 Build
Analysis Time Period	PM		
<input type="checkbox"/> Operational (LOS)		<input type="checkbox"/> Planning (LOS)	
<input type="checkbox"/> Design (W <sub>E</sub> )		<input type="checkbox"/> Planning (W <sub>E</sub> )	

### Crossings at Signalized Intersections

Pedestrian Delay at Signalized Intersections	1	2		
Cycle length, C (s)	90	90		
Effective green time for pedestrians, g (s)	25	32		
Average delay, d <sub>p</sub>	23.5	18.7		
LOS at signalized intersections (Exhibit 18-9)	C	B		

### Signalized Intersection Identification

Intersection #	Major Street at Minor Street
1	Massachusetts Avenue* at Sidney Street
2	Massachusetts Avenue at Sidney Street*

\* - Street which pedestrians are crossing



## PEDESTRIAN WORKSHEET

General Information		Site Information	
Analyst	DIR	Facility	Massachusetts Avenue at Sidney Street
Agency or Company	VAI	Jurisdiction	Cambridge, MA
Date Performed	9/15/2020	Analysis Year	2025 Future
Analysis Time Period	PM		
<input type="checkbox"/> Operational (LOS)		<input type="checkbox"/> Planning (LOS)	
<input type="checkbox"/> Design (W <sub>E</sub> )		<input type="checkbox"/> Planning (W <sub>E</sub> )	
Crossings at Signalized Intersections			
Pedestrian Delay at Signalized Intersections	1	2	
Cycle length, C (s)	90	90	
Effective green time for pedestrians, g (s)	25	32	
Average delay, d <sub>p</sub>	23.5	18.7	
LOS at signalized intersections (Exhibit 18-9)	C	B	
Signalized Intersection Identification			
Intersection #	Major Street at Minor Street		
1	Massachusetts Avenue* at Sidney Street		
2	Massachusetts Avenue at Sidney Street*		

\* - Street which pedestrians are crossing



## PEDESTRIANS WORKSHEET<sup>a</sup>

General Information		Site Information	
Analyst	DIR	Facility	Portland Street at Albany Street
Company	VAI	Jurisdiction	Cambridge, MA
Date Performed	9/15/2020	Analysis Year	2020 Baseline
Analysis Time Period	AM		
<input checked="" type="checkbox"/> Operational (LOS) <input type="checkbox"/> Design (W <sub>E</sub> )		<input type="checkbox"/> Planning (LOS) <input type="checkbox"/> Planning (W <sub>E</sub> )	

Walkways and Sidewalk Pedestrian Facilities	
Total Width of crosswalks (ft), W <sub>T</sub>	1
Sum of obstructions width and/or shy distances (ft), <sup>1</sup> W <sub>o</sub>	2
Effective crosswalk width, W <sub>E</sub> (ft) W <sub>E</sub> = W <sub>T</sub> -W <sub>o</sub>	5
Peak 15-min flow rate (both directions), v <sub>15</sub> (p/15-min)	5
Pedestrian unit flow rate, v <sub>p</sub> (p/min/ft), v <sub>p</sub> = v <sub>15</sub> /15*W <sub>E</sub>	
LOS (Exhibits 18-3, 18-4, 18-5, 18-6, or 18-7)	

Crossings at Signalized Intersection, Unsignalized Intersections, and Urban Street Facilities								
Pedestrian Delay at Signalized Intersections	1	2	3	4	5	6	7	8
Cycle Length, C (s)								
Effective green time for pedestrians, g (s)								
Average delay, d <sub>p</sub> = 0.5(C-g) <sup>2</sup> /C								
LOS at Signalized Intersections (Exhibit 18-9)								

	Portland St North Leg	Portland St South Leg	Albany St
Pedestrian Delay at TWSC Intersections			
Peak 60-min pedestrian flow rate (both directions)	0	0	0
Pedestrian Flow Rate, v <sub>p</sub> = 60 min ped flow rate/3600 sec	0	0	0
Vehicular flow rate, veh/h	410	757	375
Pedestrian walking speed, S <sub>p</sub> (ft/s)	3.5	3.5	3.5
Pedestrian start-up time, t <sub>s</sub> (s)	3	3	3
Length of crosswalk, L (ft)	28	28	35
Single pedestrian critical gap, t <sub>c</sub> = (L*S <sub>p</sub> ) + t <sub>s</sub>	11	11	13
Typical pedestrian number in crossing platoon, N <sub>c</sub> <sup>3</sup>	1	1	1
Spatial pedestrian distribution, <sup>2</sup> N <sub>p</sub> (p), N <sub>p</sub> = INT [(8.0 (N <sub>c</sub> -1)/W <sub>E</sub> )+1]	1	1	1
Group critical gap, t <sub>G</sub> (s), t <sub>G</sub> = t <sub>c</sub> + 2(N <sub>p</sub> -1)	11	11	13
Vehicular flow rate, v (veh/s)	0.113888889	0.210277778	0.104166667
Average pedestrian delay, d <sub>p</sub> (s), d <sub>p</sub> = (1/v)(e <sup>v*t<sub>G</sub></sup> - v*t <sub>G</sub> - 1)	0.0	0.0	0.0
LOS at unsignalized intersections (Exhibit 18-13)	A	A	A

**Notes**

<sup>a</sup>Based on Pedestrians Worksheet from HCM 2000, Chapter 18, Appendix A

<sup>1</sup> Includes curb width, street furniture, window shops, building protrusions, inside clearance, and all other field-observed obstructions.

<sup>2</sup> If there is no platoon crossing, assume N<sub>p</sub> = 1.

$N_c = (v_p e^{v_p t_c} + v e^{-v t_c}) / (v_p + v) e^{(v_p + v) t_c}$

**Paths:**

1. Crossing Spring Street

## PEDESTRIANS WORKSHEET<sup>a</sup>

General Information		Site Information	
Analyst	DIR	Facility	Portland Street at Albany Street
Company	VAI	Jurisdiction	Cambridge, MA
Date Performed	9/15/2020	Analysis Year	2020 Baseline
Analysis Time Period	PM		
<input checked="" type="checkbox"/> Operational (LOS) <input type="checkbox"/> Design (W <sub>E</sub> )		<input type="checkbox"/> Planning (LOS) <input type="checkbox"/> Planning (W <sub>E</sub> )	

Walkways and Sidewalk Pedestrian Facilities		1	2
Total Width of crosswalks (ft), W <sub>T</sub>			
Sum of obstructions width and/or shy distances (ft), <sup>1</sup> W <sub>o</sub>			
Effective crosswalk width, W <sub>E</sub> (ft) W <sub>E</sub> = W <sub>T</sub> - W <sub>o</sub>	5		5
Peak 15-min flow rate (both directions), v <sub>15</sub> (p/15-min)			
Pedestrian unit flow rate, v <sub>p</sub> (p/min/ft), v <sub>p</sub> = v <sub>15</sub> /15*W <sub>E</sub>			
LOS (Exhibits 18-3, 18-4, 18-5, 18-6, or 18-7)			

Crossings at Signalized Intersection, Unsignalized Intersections, and Urban Street Facilities		1	2	3	4	5	6	7	8
Pedestrian Delay at Signalized Intersections									
Cycle Length, C (s)									
Effective green time for pedestrians, g (s)									
Average delay, d <sub>p</sub> = 0.5(C-g) <sup>2</sup> /C									
LOS at Signalized Intersections (Exhibit 18-9)									

	Portland St North Leg	Portland St South Leg	Albany St
Pedestrian Delay at TWSC Intersections			
Peak 60-min pedestrian flow rate (both directions)	46	12	16
Pedestrian Flow Rate, v <sub>p</sub> = 60 min ped flow rate/3600 sec	0.01277778	0.003333333	0.004444444
Vehicular flow rate, veh/h	404	775	411
Pedestrian walking speed, S <sub>p</sub> (ft/s)	3.5	3.5	3.5
Pedestrian start-up time, t <sub>s</sub> (s)	3	3	3
Length of crosswalk, L (ft)	28	28	35
Single pedestrian critical gap, t <sub>c</sub> = (L*S <sub>p</sub> ) + t <sub>s</sub>	11	11	13
Typical pedestrian number in crossing platoon, N <sub>c</sub> <sup>3</sup>	1.13	1.11	1.07
Spatial pedestrian distribution, <sup>2</sup> N <sub>p</sub> (p), N <sub>p</sub> = INT [(8.0 (N <sub>c</sub> -1)/W <sub>E</sub> )+1]	1	1	1
Group critical gap, t <sub>G</sub> (s), t <sub>G</sub> = t <sub>c</sub> + 2(N <sub>p</sub> -1)	11	11	13
Vehicular flow rate, v (veh/s)	0.11222222	0.21527778	0.114166667
Average pedestrian delay, d <sub>p</sub> (s), d <sub>p</sub> = (1/v)(e <sup>v*t<sub>G</sub></sup> - v*t <sub>G</sub> - 1)	10.7	34.0	16.9
LOS at unsignalized intersections (Exhibit 18-13)	C	E	C

**Notes**

<sup>a</sup>Based on Pedestrians Worksheet from HCM 2000, Chapter 18, Appendix A

<sup>1</sup> Includes curb width, street furniture, window shops, building protrusions, inside clearance, and all other field-observed obstructions.

<sup>2</sup> If there is no platoon crossing, assume N<sub>p</sub> = 1.

$$N_c = (v_p e^{v_p t_c} + v e^{-v t_c}) / (v_p + v) e^{(v_p + v) t_c}$$

**Paths:**

1. Crossing Spring Street

## PEDESTRIANS WORKSHEET<sup>a</sup>

General Information		Site Information	
Analyst	DIR	Facility	Portland Street at Albany Street
Company	VAI	Jurisdiction	Cambridge, MA
Date Performed	9/15/2020	Analysis Year	2020 Build
Analysis Time Period	AM		
<input checked="" type="checkbox"/> Operational (LOS) <input type="checkbox"/> Design (W <sub>E</sub> )		<input type="checkbox"/> Planning (LOS) <input type="checkbox"/> Planning (W <sub>E</sub> )	

Walkways and Sidewalk Pedestrian Facilities	
Total Width of crosswalks (ft), W <sub>T</sub>	1
Sum of obstructions width and/or shy distances (ft), <sup>1</sup> W <sub>o</sub>	2
Effective crosswalk width, W <sub>E</sub> (ft) W <sub>E</sub> = W <sub>T</sub> -W <sub>o</sub>	5
Peak 15-min flow rate (both directions), v <sub>15</sub> (p/15-min)	5
Pedestrian unit flow rate, v <sub>p</sub> (p/min/ft), v <sub>p</sub> = v <sub>15</sub> /15*W <sub>E</sub>	
LOS (Exhibits 18-3, 18-4, 18-5, 18-6, or 18-7)	

Crossings at Signalized Intersection, Unsignalized Intersections, and Urban Street Facilities								
Pedestrian Delay at Signalized Intersections	1	2	3	4	5	6	7	8
Cycle Length, C (s)								
Effective green time for pedestrians, g (s)								
Average delay, d <sub>p</sub> = 0.5(C-g) <sup>2</sup> /C								
LOS at Signalized Intersections (Exhibit 18-9)								

	Portland St North Leg	Portland St South Leg	Albany St
Pedestrian Delay at TWSC Intersections			
Peak 60-min pedestrian flow rate (both directions)	0	0	0
Pedestrian Flow Rate, v <sub>p</sub> = 60 min ped flow rate/3600 sec	0	0	0
Vehicular flow rate, veh/h	420	781	403
Pedestrian walking speed, S <sub>p</sub> (ft/s)	3.5	3.5	3.5
Pedestrian start-up time, t <sub>s</sub> (s)	3	3	3
Length of crosswalk, L (ft)	28	28	35
Single pedestrian critical gap, t <sub>c</sub> = (L*S <sub>p</sub> ) + t <sub>s</sub>	11	11	13
Typical pedestrian number in crossing platoon, N <sub>c</sub> <sup>3</sup>	1	1	1
Spatial pedestrian distribution, <sup>2</sup> N <sub>p</sub> (p), N <sub>p</sub> = INT [(8.0 (N <sub>c</sub> -1)/W <sub>E</sub> )+1]	1	1	1
Group critical gap, t <sub>G</sub> (s), t <sub>G</sub> = t <sub>c</sub> + 2(N <sub>p</sub> -1)	11	11	13
Vehicular flow rate, v (veh/s)	0.116666667	0.216944444	0.111944444
Average pedestrian delay, d <sub>p</sub> (s), d <sub>p</sub> = (1/v)(e <sup>v*t<sub>G</sub></sup> - v*t <sub>G</sub> - 1)	0.0	0.0	0.0
LOS at unsignalized intersections (Exhibit 18-13)	A	A	A

**Notes**

<sup>a</sup>Based on Pedestrians Worksheet from HCM 2000, Chapter 18, Appendix A

<sup>1</sup> Includes curb width, street furniture, window shops, building protrusions, inside clearance, and all other field-observed obstructions.

<sup>2</sup> If there is no platoon crossing, assume N<sub>p</sub> = 1.

$N_c = (v_p e^{v_p t_c} + v e^{-v t_c}) / (v_p + v) e^{(v_p + v) t_c}$

**Paths:**

1. Crossing Spring Street

**PEDESTRIANS WORKSHEET\***

<b>General Information</b>		<b>Site Information</b>	
Analyst	DIR	Facility	Portland Street at Albany Street
Company	VAI	Jurisdiction	Cambridge, MA
Date Performed	9/15/2020	Analysis Year	2020 Build
Analysis Time Period	PM		
	<input type="checkbox"/> Design (W <sub>E</sub> )		<input type="checkbox"/> Planning (LOS)
	<input checked="" type="checkbox"/> Operational (LOS)		<input type="checkbox"/> Planning (W <sub>E</sub> )

<b>Walkways and Sidewalk Pedestrian Facilities</b>		1	2
Total Width of crosswalks (ft), W <sub>T</sub>			
Sum of obstructions width and/or shy distances (ft), <sup>1</sup> W <sub>O</sub>			
Effective crosswalk width, W <sub>E</sub> (ft) W <sub>E</sub> = W <sub>T</sub> -W <sub>O</sub>	5		5
Peak 15-min flow rate (both directions), v <sub>15</sub> (p/15-min)			
Pedestrian unit flow rate, v <sub>p</sub> (p/min/ft), v <sub>p</sub> = v <sub>15</sub> /15*W <sub>E</sub>			
LOS (Exhibits 18-3, 18-4, 18-5, 18-6, or 18-7)			

<b>Crossings at Signalized Intersection, Unsignalized Intersections, and Urban Street Facilities</b>		1	2	3	4	5	6	7	8
Pedestrian Delay at Signalized Intersections									
Cycle Length, C (s)									
Effective green time for pedestrians, g (s)									
Average delay, d <sub>p</sub> = 0.5(C-g) <sup>2</sup> /C									
LOS at Signalized Intersections (Exhibit 18-9)									

	Portland St North Leg	Portland St South Leg	Albany St
Pedestrian Delay at TWSC Intersections			
Peak 60-min pedestrian flow rate (both directions)	46	12	16
Pedestrian Flow Rate, v <sub>p</sub> = 60 min ped flow rate/3600 sec	0.012777778	0.003333333	0.004444444
Vehicular flow rate, veh/h	415	800	439
Pedestrian walking speed, S <sub>p</sub> (ft/s)	3.5	3.5	3.5
Pedestrian start-up time, t <sub>s</sub> (s)	3	3	3
Length of crosswalk, L (ft)	28	28	35
Single pedestrian critical gap, t <sub>c</sub> = (L*S <sub>p</sub> ) + t <sub>s</sub>	11	11	13
Typical pedestrian number in crossing platoon, N <sub>c</sub> <sup>3</sup>	1.14	1.12	1.08
Spatial pedestrian distribution, <sup>2</sup> N <sub>p</sub> (p), N <sub>p</sub> = INT [(8.0 (N <sub>c</sub> -1)/W <sub>E</sub> )+1]	1	1	1
Group critical gap, t <sub>G</sub> (s), t <sub>G</sub> = t <sub>c</sub> + 2(N <sub>p</sub> -1)	11	11	13
Vehicular flow rate, v (veh/s)	0.115277778	0.222222222	0.121944444
Average pedestrian delay, d <sub>p</sub> (s), d <sub>p</sub> = (1/v)(e <sup>v*t<sub>G</sub></sup> - v*t <sub>G</sub> - 1)	11.2	36.4	18.8
LOS at unsignalized intersections (Exhibit 18-13)	C	E	C

Notes  
<sup>a</sup>Based on Pedestrians Worksheet from HCM 2000, Chapter 18, Appendix A  
<sup>1</sup> Includes curb width, street furniture, window shops, building protrusions, inside clearance, and all other field-observed obstructions.  
<sup>2</sup> If there is no platoon crossing, assume N<sub>p</sub> = 1.  
 N<sub>c</sub> = (v<sub>p</sub>e<sup>v\*t<sub>G</sub></sup> + ve<sup>v\*t<sub>G</sub></sup>)/(v<sub>p</sub>+v)e<sup>(v\*t<sub>G</sub>)/v<sub>p</sub></sup>

Paths:  
 1. Crossing Spring Street

## PEDESTRIANS WORKSHEET<sup>a</sup>

General Information		Site Information	
Analyst	DIR	Facility	Portland Street at Albany Street
Company	VAI	Jurisdiction	Cambridge, MA
Date Performed	9/15/2020	Analysis Year	2025 Future
Analysis Time Period	AM		
<input checked="" type="checkbox"/> Operational (LOS) <input type="checkbox"/> Design (W <sub>E</sub> )		<input type="checkbox"/> Planning (LOS) <input type="checkbox"/> Planning (W <sub>E</sub> )	

Walkways and Sidewalk Pedestrian Facilities	
Total Width of crosswalks (ft), W <sub>T</sub>	1
Sum of obstructions width and/or shy distances (ft), <sup>1</sup> W <sub>O</sub>	2
Effective crosswalk width, W <sub>E</sub> (ft) W <sub>E</sub> = W <sub>T</sub> - W <sub>O</sub>	5
Peak 15-min flow rate (both directions), v <sub>15</sub> (p/15-min)	5
Pedestrian unit flow rate, v <sub>p</sub> (p/min/ft), v <sub>p</sub> = v <sub>15</sub> /15*W <sub>E</sub>	
LOS (Exhibits 18-3, 18-4, 18-5, 18-6, or 18-7)	

Crossings at Signalized Intersection, Unsignalized Intersections, and Urban Street Facilities								
Pedestrian Delay at Signalized Intersections	1	2	3	4	5	6	7	8
Cycle Length, C (s)								
Effective green time for pedestrians, g (s)								
Average delay, d <sub>p</sub> = 0.5(C-g) <sup>2</sup> /C								
LOS at Signalized Intersections (Exhibit 18-9)								

	Portland St North Leg	Portland St South Leg	Albany St
Pedestrian Delay at TWSC Intersections			
Peak 60-min pedestrian flow rate (both directions)	0	0	0
Pedestrian Flow Rate, v <sub>p</sub> = 60 min ped flow rate/3600 sec	0	0	0
Vehicular flow rate, veh/h	432	802	412
Pedestrian walking speed, S <sub>p</sub> (ft/s)	3.5	3.5	3.5
Pedestrian start-up time, t <sub>s</sub> (s)	3	3	3
Length of crosswalk, L (ft)	28	28	35
Single pedestrian critical gap, t <sub>c</sub> = (L*S <sub>p</sub> ) + t <sub>s</sub>	11	11	13
Typical pedestrian number in crossing platoon, N <sub>c</sub> <sup>3</sup>	1	1	1
Spatial pedestrian distribution, <sup>2</sup> N <sub>p</sub> (p), N <sub>p</sub> = INT [(8.0 (N <sub>c</sub> -1)/W <sub>E</sub> )+1]	1	1	1
Group critical gap, t <sub>G</sub> (s), t <sub>G</sub> = t <sub>c</sub> + 2(N <sub>p</sub> -1)	11	11	13
Vehicular flow rate, v (veh/s)	0.12	0.22277778	0.11444444
Average pedestrian delay, d <sub>p</sub> (s), d <sub>p</sub> = (1/v)(e <sup>v*t<sub>G</sub></sup> - v*t <sub>G</sub> - 1)	0.0	0.0	0.0
LOS at unsignalized intersections (Exhibit 18-13)	A	A	A

**Notes**

<sup>a</sup>Based on Pedestrians Worksheet from HCM 2000, Chapter 18, Appendix A

<sup>1</sup> Includes curb width, street furniture, window shops, building protrusions, inside clearance, and all other field-observed obstructions.

<sup>2</sup> If there is no platoon crossing, assume N<sub>p</sub> = 1.

$$N_c = (v_p e^{v_p t_c} + v e^{-v t_c}) / (v_p + v) e^{(v_p + v) t_c}$$

**Paths:**

- Crossing Spring Street

**PEDESTRIANS WORKSHEET<sup>a</sup>**

General Information		Site Information	
Analyst	DIR	Facility	Portland Street at Albany Street
Company	VAI	Jurisdiction	Cambridge, MA
Date Performed	9/15/2020	Analysis Year	2025 Future
Analysis Time Period	PM		
	<input checked="" type="checkbox"/> Operational (LOS)		<input type="checkbox"/> Planning (LOS)
	<input type="checkbox"/> Design (W <sub>E</sub> )		<input type="checkbox"/> Planning (W <sub>E</sub> )

Walkways and Sidewalk Pedestrian Facilities	1	2
Total Width of crosswalks (ft), W <sub>T</sub>		
Sum of obstructions width and/or shy distances (ft), <sup>1</sup> W <sub>O</sub>		
Effective crosswalk width, W <sub>E</sub> (ft) W <sub>E</sub> = W <sub>T</sub> -W <sub>O</sub>	5	5
Peak 15-min flow rate (both directions), v <sub>15</sub> (p/15-min)		
Pedestrian unit flow rate, v <sub>p</sub> (p/min/ft), v <sub>p</sub> = v <sub>15</sub> /15*W <sub>E</sub>		
LOS (Exhibits 18-3, 18-4, 18-5, 18-6, or 18-7)		

Crossings at Signalized Intersection, Unsignalized Intersections, and Urban Street Facilities	1	2	3	4	5	6	7	8
Pedestrian Delay at Signalized Intersections								
Cycle Length, C (s)								
Effective green time for pedestrians, g (s)								
Average delay, d <sub>p</sub> = 0.5(C-g) <sup>2</sup> /C								
LOS at Signalized Intersections (Exhibit 18-9)								

	Portland St North Leg	Portland St South Leg	Albany St
Pedestrian Delay at TWSC Intersections			
Peak 60-min pedestrian flow rate (both directions)	46	12	16
Pedestrian Flow Rate, v <sub>p</sub> = 60 min ped flow rate/3600 sec	0.012777778	0.003333333	0.004444444
Vehicular flow rate, veh/h	447	842	449
Pedestrian walking speed, S <sub>p</sub> (ft/s)	3.5	3.5	3.5
Pedestrian start-up time, t <sub>s</sub> (s)	3	3	3
Length of crosswalk, L (ft)	28	28	35
Single pedestrian critical gap, t <sub>c</sub> = (L*S <sub>p</sub> ) + t <sub>s</sub>	11	11	13
Typical pedestrian number in crossing platoon, N <sub>c</sub> <sup>3</sup>	1.15	1.13	1.09
Spatial pedestrian distribution, <sup>2</sup> N <sub>p</sub> (p), N <sub>p</sub> = INT [(8.0 (N <sub>c</sub> -1)/W <sub>E</sub> )+1]	1	1	1
Group critical gap, t <sub>G</sub> (s), t <sub>G</sub> = t <sub>c</sub> + 2(N <sub>p</sub> -1)	11	11	13
Vehicular flow rate, v (veh/s)	0.124166667	0.233888889	0.124722222
Average pedestrian delay, d <sub>p</sub> (s), d <sub>p</sub> = (1/v)(e <sup>v*t<sub>G</sub></sup> - v*t <sub>G</sub> - 1)	12.5	40.7	19.6
LOS at unsignalized intersections (Exhibit 18-13)	C	E	C

Notes

<sup>a</sup>Based on Pedestrians Worksheet from HCM 2000, Chapter 18, Appendix A

<sup>1</sup> Includes curb width, street furniture, window shops, building protrusions, inside clearance, and all other field-observed obstructions.

<sup>2</sup> If there is no platoon crossing, assume N<sub>p</sub> = 1.

N<sub>c</sub> = (v<sub>p</sub>e<sup>v\*t<sub>G</sub></sup> + ve<sup>v\*t<sub>G</sub></sup>)/(v<sub>p</sub>+v)e<sup>(v\*t<sub>G</sub>)/t<sub>s</sub></sup>

Paths:

1. Crossing Spring Street



## PEDESTRIANS WORKSHEET<sup>®</sup>

General Information		Site Information	
Analyst	DIR	Facility	Main Street at Albany Street
Company	VAI	Jurisdiction	Cambridge, MA
Date Performed	9/15/2020	Analysis Year	2020 Baseline
Analysis Time Period	PM		
<input checked="" type="checkbox"/> Operational (LOS) <input type="checkbox"/> Design (W <sub>E</sub> )		<input type="checkbox"/> Planning (LOS) <input type="checkbox"/> Planning (W <sub>E</sub> )	

Walkways and Sidewalk Pedestrian Facilities	
Total Width of crosswalks (ft), W <sub>T</sub>	1
Sum of obstructions width and/or shy distances (ft), <sup>1</sup> W <sub>o</sub>	2
Effective crosswalk width, W <sub>E</sub> (ft) W <sub>E</sub> = W <sub>T</sub> -W <sub>o</sub>	5
Peak 15-min flow rate (both directions), v <sub>15</sub> (p/15-min)	5
Pedestrian unit flow rate, v <sub>p</sub> (p/min/ft), v <sub>p</sub> = v <sub>15</sub> /15*W <sub>E</sub>	
LOS (Exhibits 18-3, 18-4, 18-5, 18-6, or 18-7)	

Crossings at Signalized Intersection, Unsignalized Intersections, and Urban Street Facilities								
Pedestrian Delay at Signalized Intersections	1	2	3	4	5	6	7	8
Cycle Length, C (s)								
Effective green time for pedestrians, g (s)								
Average delay, d <sub>p</sub> = 0.5(C-g) <sup>2</sup> /C								
LOS at Signalized Intersections (Exhibit 18-9)								

	Main Street	Albany Street
Pedestrian Delay at TWSC Intersections		
Peak 60-min pedestrian flow rate (both directions)	14	128
Pedestrian Flow Rate, v <sub>p</sub> = 60 min ped flow rate/3600 sec	<b>0.00388889</b>	<b>0.0355555556</b>
Vehicular flow rate, veh/h	946	379
Pedestrian walking speed, S <sub>p</sub> (ft/s)	<b>3.5</b>	<b>3.5</b>
Pedestrian start-up time, t <sub>s</sub> (s)	<b>3</b>	<b>3</b>
Length of crosswalk, L (ft)	35	55
Single pedestrian critical gap, t <sub>c</sub> = (L*S <sub>p</sub> ) + t <sub>s</sub>	<b>13</b>	<b>18.71428571</b>
Typical pedestrian number in crossing platoon, N <sub>c</sub> <sup>3</sup>	<b>1.38</b>	<b>2.19</b>
Spatial pedestrian distribution, <sup>2</sup> N <sub>p</sub> (p), N <sub>p</sub> = INT [(8.0 (N <sub>c</sub> -1)/W <sub>E</sub> )+1]	<b>1</b>	<b>2</b>
Group critical gap, t <sub>g</sub> (s), t <sub>g</sub> = t <sub>c</sub> + 2(N <sub>p</sub> -1)	<b>13</b>	<b>20.71428571</b>
Vehicular flow rate, v (veh/s)	<b>0.26277778</b>	<b>0.10527778</b>
Average pedestrian delay, d <sub>p</sub> (s), d <sub>p</sub> = (1/v)(e <sup>v/t<sub>g</sub></sup> - v/t <sub>g</sub> - 1)	<b>99.1</b>	<b>53.9</b>
LOS at unsignalized intersections (Exhibit 18-13)	<b>F</b>	<b>F</b>

**Notes**

- <sup>a</sup>Based on Pedestrians Worksheet from HCM 2000, Chapter 18, Appendix A
- <sup>1</sup> Includes curb width, street furniture, window shops, building protrusions, inside clearance, and all other field-observed obstructions.
- <sup>2</sup> If there is no platoon crossing, assume N<sub>p</sub> = 1.

$$N_c = (v_p e^{v/t_g} + v e^{-v/t_g}) / (v_p + v) e^{(v_p + v)/t_g}$$

**Paths:**

1. Crossing CambridgeSide Place



## PEDESTRIANS WORKSHEET<sup>®</sup>

General Information		Site Information	
Analyst	DIR	Facility	Main Street at Albany Street
Company	VAI	Jurisdiction	Cambridge, MA
Date Performed	9/15/2020	Analysis Year	2020 Build
Analysis Time Period	AM		
<input checked="" type="checkbox"/> Operational (LOS) <input type="checkbox"/> Design (W <sub>E</sub> )		<input type="checkbox"/> Planning (LOS) <input type="checkbox"/> Planning (W <sub>E</sub> )	

Walkways and Sidewalk Pedestrian Facilities	1	2
Total Width of crosswalks (ft), W <sub>T</sub>		
Sum of obstructions width and/or shy distances (ft), <sup>1</sup> W <sub>o</sub>		
Effective crosswalk width, W <sub>E</sub> (ft) W <sub>E</sub> = W <sub>T</sub> -W <sub>o</sub>	5	5
Peak 15-min flow rate (both directions), v <sub>15</sub> (p/15-min)		
Pedestrian unit flow rate, v <sub>p</sub> (p/min/ft), v <sub>p</sub> = v <sub>15</sub> /15*W <sub>E</sub>		
LOS (Exhibits 18-3, 18-4, 18-5, 18-6, or 18-7)		

Crossings at Signalized Intersection, Unsignalized Intersections, and Urban Street Facilities	1	2	3	4	5	6	7	8
Pedestrian Delay at Signalized Intersections								
Cycle Length, C (s)								
Effective green time for pedestrians, g (s)								
Average delay, d <sub>p</sub> = 0.5(C-g) <sup>2</sup> /C								
LOS at Signalized Intersections (Exhibit 18-9)								

	Main Street	Albany Street
Pedestrian Delay at TWSC Intersections		
Peak 60-min pedestrian flow rate (both directions)	29	109
Pedestrian Flow Rate, v <sub>p</sub> = 60 min ped flow rate/3600 sec	<b>0.00805556</b>	<b>0.03027778</b>
Vehicular flow rate, veh/h	854	413
Pedestrian walking speed, S <sub>p</sub> (ft/s)	<b>3.5</b>	<b>3.5</b>
Pedestrian start-up time, t <sub>s</sub> (s)	<b>3</b>	<b>3</b>
Length of crosswalk, L (ft)	35	55
Single pedestrian critical gap, t <sub>c</sub> = (L/S <sub>p</sub> ) + t <sub>s</sub>	<b>13</b>	<b>18.71428571</b>
Typical pedestrian number in crossing platoon, N <sub>c</sub> <sup>3</sup>	<b>1.59</b>	<b>2.24</b>
Spatial pedestrian distribution, <sup>2</sup> N <sub>p</sub> (p), N <sub>p</sub> = INT [8.0 (N <sub>c</sub> -1)/W <sub>E</sub> ]+1	<b>1</b>	<b>2</b>
Group critical gap, t <sub>g</sub> (s), t <sub>g</sub> = t <sub>c</sub> + 2(N <sub>p</sub> -1)	<b>13</b>	<b>20.71428571</b>
Vehicular flow rate, v (veh/s)	<b>0.23722222</b>	<b>0.11472222</b>
Average pedestrian delay, d <sub>p</sub> (s), d <sub>p</sub> = (1/v)(e <sup>v/t<sub>g</sub></sup> - v/t <sub>g</sub> - 1)	<b>74.9</b>	<b>64.4</b>
LOS at unsignalized intersections (Exhibit 18-13)	<b>F</b>	<b>F</b>

**Notes**

- <sup>a</sup>Based on Pedestrians Worksheet from HCM 2000, Chapter 18, Appendix A
- <sup>1</sup> Includes curb width, street furniture, window shops, building protrusions, inside clearance, and all other field-observed obstructions.
- <sup>2</sup> If there is no platoon crossing, assume N<sub>p</sub> = 1.

$$N_c = (v_p e^{v/t_g} + v e^{-v/t_g}) / (v_p + v) e^{(v_p + v)/t_g}$$

**Paths:**

1. Crossing CambridgeSide Place

## PEDESTRIANS WORKSHEET<sup>®</sup>

General Information		Site Information	
Analyst	DIR	Facility	Main Street at Albany Street
Company	VAI	Jurisdiction	Cambridge, MA
Date Performed	9/15/2020	Analysis Year	2020 Build
Analysis Time Period	PM		
<input checked="" type="checkbox"/> Operational (LOS) <input type="checkbox"/> Design (W <sub>E</sub> )		<input type="checkbox"/> Planning (LOS) <input type="checkbox"/> Planning (W <sub>E</sub> )	

Walkways and Sidewalk Pedestrian Facilities	1	2
Total Width of crosswalks (ft), W <sub>T</sub>		
Sum of obstructions width and/or shy distances (ft), <sup>1</sup> W <sub>o</sub>		
Effective crosswalk width, W <sub>E</sub> (ft) W <sub>E</sub> = W <sub>T</sub> -W <sub>o</sub>	5	5
Peak 15-min flow rate (both directions), v <sub>15</sub> (p/15-min)		
Pedestrian unit flow rate, v <sub>p</sub> (p/min/ft), v <sub>p</sub> = v <sub>15</sub> /15*W <sub>E</sub>		
LOS (Exhibits 18-3, 18-4, 18-5, 18-6, or 18-7)		

Crossings at Signalized Intersection, Unsignalized Intersections, and Urban Street Facilities	1	2	3	4	5	6	7	8
Pedestrian Delay at Signalized Intersections								
Cycle Length, C (s)								
Effective green time for pedestrians, g (s)								
Average delay, d <sub>p</sub> = 0.5(C-g) <sup>2</sup> /C								
LOS at Signalized Intersections (Exhibit 18-9)								

	Main Street	Albany Street
Pedestrian Delay at TWSC Intersections		
Peak 60-min pedestrian flow rate (both directions)	14	179
Pedestrian Flow Rate, v <sub>p</sub> = 60 min ped flow rate/3600 sec	<b>0.00388889</b>	<b>0.04972222</b>
Vehicular flow rate, veh/h	962	426
Pedestrian walking speed, S <sub>p</sub> (ft/s)	<b>3.5</b>	<b>3.5</b>
Pedestrian start-up time, t <sub>s</sub> (s)	<b>3</b>	<b>3</b>
Length of crosswalk, L (ft)	35	55
Single pedestrian critical gap, t <sub>c</sub> = (L*S <sub>p</sub> ) + t <sub>s</sub>	<b>13</b>	<b>18.7142857</b>
Typical pedestrian number in crossing platoon, N <sub>c</sub> <sup>3</sup>	<b>1.4</b>	<b>2.99</b>
Spatial pedestrian distribution, <sup>2</sup> N <sub>p</sub> (p), N <sub>p</sub> = INT [8.0 (N <sub>c</sub> -1)/W <sub>E</sub> ]+1	<b>1</b>	<b>4</b>
Group critical gap, t <sub>g</sub> (s), t <sub>g</sub> = t <sub>c</sub> + 2(N <sub>p</sub> -1)	<b>13</b>	<b>24.7142857</b>
Vehicular flow rate, v (veh/s)	<b>0.26722222</b>	<b>0.11833333</b>
Average pedestrian delay, d <sub>p</sub> (s), d <sub>p</sub> = (1/v)(e <sup>v*t<sub>g</sub></sup> - v*t <sub>g</sub> - 1)	<b>104.0</b>	<b>124.2</b>
LOS at unsignalized intersections (Exhibit 18-13)	<b>F</b>	<b>F</b>

Notes

<sup>a</sup>Based on Pedestrians Worksheet from HCM 2000, Chapter 18, Appendix A

<sup>1</sup> Includes curb width, street furniture, window shops, building protrusions, inside clearance, and all other field-observed obstructions.

<sup>2</sup> If there is no platoon crossing, assume N<sub>p</sub> = 1.

N<sub>c</sub> = (v<sub>p</sub>e<sup>v\*t<sub>g</sub></sup> + ve<sup>-v\*t<sub>g</sub></sup>)/(v<sub>p</sub>+v)e<sup>(v\*t<sub>g</sub>)/v<sub>p</sub></sup>

- Paths:
- Crossing CambridgeSide Place

## PEDESTRIANS WORKSHEET<sup>®</sup>

General Information		Site Information	
Analyst	DIR	Facility	Main Street at Albany Street
Company	VAI	Jurisdiction	Cambridge, MA
Date Performed	9/15/2020	Analysis Year	2025 Future
Analysis Time Period	AM		
<input checked="" type="checkbox"/> Operational (LOS) <input type="checkbox"/> Design (W <sub>E</sub> )		<input type="checkbox"/> Planning (LOS) <input type="checkbox"/> Planning (W <sub>E</sub> )	

### Walkways and Sidewalk Pedestrian Facilities

	1	2
Total Width of crosswalks (ft), W <sub>T</sub>		2
Sum of obstructions width and/or shy distances (ft), <sup>1</sup> W <sub>o</sub>		
Effective crosswalk width, W <sub>E</sub> (ft) W <sub>E</sub> = W <sub>T</sub> -W <sub>o</sub>	5	5
Peak 15-min flow rate (both directions), v <sub>15</sub> (p/15-min)		
Pedestrian unit flow rate, v <sub>p</sub> (p/min/ft), v <sub>p</sub> = v <sub>15</sub> /15*W <sub>E</sub>		
LOS (Exhibits 18-3, 18-4, 18-5, 18-6, or 18-7)		

### Crossings at Signalized Intersection, Unsignalized Intersections, and Urban Street Facilities

	1	2	3	4	5	6	7	8
Pedestrian Delay at Signalized Intersections								
Cycle Length, C (s)								
Effective green time for pedestrians, g (s)								
Average delay, d <sub>p</sub> = 0.5(C-g) <sup>2</sup> /C								
LOS at Signalized Intersections (Exhibit 18-9)								
Pedestrian Delay at TWSC Intersections								
Peak 60-min pedestrian flow rate (both directions)	29	109						
Pedestrian Flow Rate, v <sub>p</sub> = 60 min ped flow rate/3600 sec	0.00805556	0.03027778						
Vehicular flow rate, veh/h	1385	422						
Pedestrian walking speed, S <sub>p</sub> (ft/s)	3.5	3.5						
Pedestrian start-up time, t <sub>s</sub> (s)	3	3						
Length of crosswalk, L (ft)	35	55						
Single pedestrian critical gap, t <sub>c</sub> = (L*S <sub>p</sub> ) + t <sub>s</sub>	13	18.71428571						
Typical pedestrian number in crossing platoon, N <sub>c</sub> <sup>3</sup>	3.93	2.29						
Spatial pedestrian distribution, <sup>2</sup> N <sub>p</sub> (p), N <sub>p</sub> = INT [(N <sub>c</sub> -1)/W <sub>E</sub> ]+1	5	3						
Group critical gap, t <sub>g</sub> (s), t <sub>g</sub> = t <sub>c</sub> + 2(N <sub>p</sub> -1)	21	22.71428571						
Vehicular flow rate, v (veh/s)	0.38472222	0.11722222						
Average pedestrian delay, d <sub>p</sub> (s), d <sub>p</sub> = (1/v)(e <sup>v*t<sub>g</sub></sup> - v*t <sub>g</sub> - 1)	8363.1	91.0						
LOS at unsignalized intersections (Exhibit 18-13)	F	F						

#### Notes

<sup>a</sup>Based on Pedestrians Worksheet from HCM 2000, Chapter 18, Appendix A

<sup>1</sup> Includes curb width, street furniture, window shops, building protrusions, inside clearance, and all other field-observed obstructions.

<sup>2</sup> If there is no platoon crossing, assume N<sub>p</sub> = 1.

$$N_c = (v_p e^{v_p t_c} + v e^{-v t_c}) / (v_p + v) e^{(v_p + v) t_c}$$

#### Paths:

- Crossing CambridgeSide Place

## PEDESTRIANS WORKSHEET<sup>®</sup>

General Information		Site Information	
Analyst	DIR	Facility	Main Street at Albany Street
Company	VAI	Jurisdiction	Cambridge, MA
Date Performed	9/15/2020	Analysis Year	2025 Future
Analysis Time Period	PM		
<input checked="" type="checkbox"/> Operational (LOS) <input type="checkbox"/> Design (W <sub>E</sub> )		<input type="checkbox"/> Planning (LOS) <input type="checkbox"/> Planning (W <sub>E</sub> )	

Walkways and Sidewalk Pedestrian Facilities	1	2
Total Width of crosswalks (ft), W <sub>T</sub>		
Sum of obstructions width and/or shy distances (ft), <sup>1</sup> W <sub>o</sub>		
Effective crosswalk width, W <sub>E</sub> (ft) W <sub>E</sub> = W <sub>T</sub> -W <sub>o</sub>	5	5
Peak 15-min flow rate (both directions), v <sub>15</sub> (p/15-min)		
Pedestrian unit flow rate, v <sub>p</sub> (p/min/ft), v <sub>p</sub> = v <sub>15</sub> /15*W <sub>E</sub>		
LOS (Exhibits 18-3, 18-4, 18-5, 18-6, or 18-7)		

Crossings at Signalized Intersection, Unsignalized Intersections, and Urban Street Facilities	1	2	3	4	5	6	7	8
Pedestrian Delay at Signalized Intersections								
Cycle Length, C (s)								
Effective green time for pedestrians, g (s)								
Average delay, d <sub>p</sub> = 0.5(C-g) <sup>2</sup> /C								
LOS at Signalized Intersections (Exhibit 18-9)								

	Main Street	Albany Street
Pedestrian Delay at TWSC Intersections		
Peak 60-min pedestrian flow rate (both directions)	14	179
Pedestrian Flow Rate, v <sub>p</sub> = 60 min ped flow rate/3600 sec	<b>0.00388889</b>	<b>0.04972222</b>
Vehicular flow rate, veh/h	1545	436
Pedestrian walking speed, S <sub>p</sub> (ft/s)	<b>3.5</b>	<b>3.5</b>
Pedestrian start-up time, t <sub>s</sub> (s)	<b>3</b>	<b>3</b>
Length of crosswalk, L (ft)	35	55
Single pedestrian critical gap, t <sub>c</sub> = (L*S <sub>p</sub> ) + t <sub>s</sub>	<b>13</b>	<b>18.7142857</b>
Typical pedestrian number in crossing platoon, N <sub>c</sub> <sup>3</sup>	<b>3.32</b>	<b>3.09</b>
Spatial pedestrian distribution, <sup>2</sup> N <sub>p</sub> (p), N <sub>p</sub> = INT [8.0 (N <sub>c</sub> -1)/W <sub>E</sub> ]+1	<b>4</b>	<b>4</b>
Group critical gap, t <sub>g</sub> (s), t <sub>g</sub> = t <sub>c</sub> + 2(N <sub>p</sub> -1)	<b>19</b>	<b>24.7142857</b>
Vehicular flow rate, v (veh/s)	<b>0.42916667</b>	<b>0.12111111</b>
Average pedestrian delay, d <sub>p</sub> (s), d <sub>p</sub> = (1/v)(e <sup>v*t<sub>g</sub></sup> - v*t <sub>g</sub> - 1)	<b>8082.4</b>	<b>131.7</b>
LOS at unsignalized intersections (Exhibit 18-13)	<b>F</b>	<b>F</b>

Notes

<sup>a</sup>Based on Pedestrians Worksheet from HCM 2000, Chapter 18, Appendix A

<sup>1</sup> Includes curb width, street furniture, window shops, building protrusions, inside clearance, and all other field-observed obstructions.

<sup>2</sup> If there is no platoon crossing, assume N<sub>p</sub> = 1.

N<sub>c</sub> = (v<sub>p</sub>e<sup>v\*t<sub>g</sub></sup> + ve<sup>v\*t<sub>c</sub></sup>)/(v<sub>p</sub>+v)e<sup>(v\*t<sub>c</sub>)/t<sub>s</sub></sup>

- Paths:
- Crossing CambridgeSide Place