COORDINATED DEVELOPMENT SPECIAL PERMIT APPLICATION

APPENDIX 4: TRANSPORTATION IMPACT STUDY AND MOBILITY MANAGEMENT PLAN

UNION SQUARE REDEVELOPMENT

Submitted to the City of Somerville

Revised — November 7, 2017

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November 2017

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Transportation Impact Study for Union Square Revitalization Project

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TRANSPORTATION IMPACT STUDY FOR UNION SQUARE

The following is based on the current Transportation Impact Study (TIS) Submittal Requirements as of September, 2017. In accordance with the City of Somerville's CDSP Development Review Application, this impact analysis evaluates the transportation impacts of the proposed project in Union Square in Somerville, Massachusetts.

A. Introduction

1. Development Overview

The proposed development is summarized by development site in the figure and tables below. Table 1 and Table 2 display residential units and gross square footage (GSF) of proposed uses for each development site and within each development phase. The total development program includes approximately 984 residential units, most of which are included in Phase 1. The D2 site, included in Phase 1, incorporates up to approximately 450 residential units.

Approximately 143,000 GSF of retail use is proposed across the entire development program. This use is spread across development sites and is largely envisioned as ground floor retail. All development sites include some retail use. Commercial office use is concentrated in the D3 site, which includes up to approximately 535,000 GSF of office. All sites except D7 include commercial office use. In addition to retail and office use, approximately 175 hotel units are proposed for the D1 site. Arts and creative space is distributed across development sites, with significant spaces dedicated in the D1 and D2 sites. It is anticipated the commercial office uses will be a mix of life sciences spaces and traditional office. For this analysis, all of these spaces were considered to be office spaces which will have a higher and more conservative population density from traffic generation standpoint.

The massing diagram below shows the concentration of development around the future Green Line extension. Denser and taller buildings are concentrated in this area, while smaller, neighborhood scale development is proposed for sites closer to the central Union Square intersection.

Figure 1: Development Massing Diagram

Source:

The tables below display the development program summary by phase. The three phases of development for the purposes of this analysis are:

- **Phase 1:** Sites D2 and D5
- **Phase 2:** Sites D1 and D3
- **Phase 3:** Sites D4, D6, and D7

Table 1: Estimated Program Summary by Phase

PHASE	PHASE 1*	PHASE 2	PHASE 3**	TOTAL
APT (UNITS)	481	332	171	984
RETAIL (GSF)	55,217	40,440	47,064	142,721
OFFICE (ESTIMATED GSF)***	190,329	752,075	216,971	1,159,375
HOTEL (UNITS)	0	175	0	175
RESTAURANT (GSF)	0	0	0	0
ARTS (GSF)	34,099	32,567	7,000	73,666

* For the purposes of this analysis, Phase 1 was considered to include all of the D5 blocks. It is more likely that only D5.1 will be developed as part of Phase 1 and therefore these projects herein are conservative for Phase 1.

** For the purposes of this analysis, Phase 2 was considered to include all of the D3 Blocks. It is more likely that only D3.1 will be developed as part of Phase 2, and therefore these projects herein are conservative for Phase 2.

*** It is anticipated the commercial office uses will be a mix of life sciences and traditional office. For this analysis, all of these spaces were considered office spaces which will have a higher and more conservative population density from traffic generation standpoint.

Table 2: Estimated Program Summary by Development Parcel

PARCEL	D1	D2	D3	D4	D5	D6	D7
APT (UNITS)	0	450	332	51	31	0	120
RETAIL (GSF)	22,442	29,207	17,998	11,721	26,010	26,359	8,984
OFFICE (GSF)***	216,519	166,057	535,556	24,699	24,272	192,272	0
HOTEL (UNITS)	175	0	0	0	0	0	0
RESTAURANT (GSF)	0	0	0	0	0	0	0
ARTS (GSF)	23,038	23,599	9,529	0	10,500	7,000	0

*** It is anticipated the commercial office uses will be a mix of life sciences and traditional office. For this analysis, all of these spaces were considered office spaces which will have a higher and more conservative population density from traffic generation standpoint.

2. Transportation Impact Study Overview

As anticipated during the Neighborhood Planning Process, the scale of the Union Square Revitalization project will produce new trips that will have significant effect on the transportation network of the Union Square area and will need to be managed proactively. The detailed description of the existing street and transit conditions of the neighborhood that this impact study provides allows for a holistic analysis of the particular impacts of the Union Square development. This transportation impact study begins with a presentation of the travel demand estimates for the proposed development, including trip generation and distribution tables and graphics. These estimates are applied to the TIS study area, described in the following section. The study area contains nearby corridors and intersections expected to be affected by the increase in traffic from the development.

The following transportation analysis covers four scenarios: existing conditions, base year built condition, base year built condition with mitigation, and future year built condition with mitigation. These analysis scenarios are studied for four transportation modes: pedestrian, transit, bicycle, and motor vehicle.

B. Travel Demand Estimates

Travel demand to and from the development sites was estimated based on the most current available development program. Trip generation rates and adjustments were taken from the ITE Trip Generation Manual, 8th edition.

1. Development Program Assumptions

The estimated development program is displayed by project phase and project site in Tables 3 and 4, below. ITE trip generation rates were applied to these values to estimate site-generated person-trips for the project. Trip generation was conducted at the site level in order to allow future analysis to discuss the impacts of individual sites as they are built out. Given the long-term, phased timeframe of the Union Square Revitalization Plan, this site level approach allows greater flexibility when planning for future impacts and mitigation.

Table 3: Estimated Program Summary by Phase

PHASE	PHASE 1*	PHASE 2	PHASE 3**	TOTAL
APT (UNITS)	481	332	171	984
RETAIL (GSF)	55,217	40,440	47,064	142,721
OFFICE (ESTIMATED GSF)***	190,329	752,075	216,971	1,159,375
HOTEL (UNITS)	0	175	0	175
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ARTS (GSF)	34,099	32,567	7,000	73,666

* For the purposes of this analysis, Phase 1 was considered to include all of the D5 blocks. It is more likely that only D5.1 will be developed as part of Phase 1 and therefore these projects herein are conservative for Phase 1.

** For the purposes of this analysis, Phase 2 was considered to include all of the D3 Blocks. It is more likely that only D3.1 will be developed as part of Phase 2, and therefore these projects herein are conservative for Phase 2.

*** It is anticipated the commercial office uses will be a mix of life sciences and traditional office. For this analysis, all of these spaces were considered office spaces which will have a higher and more conservative population density from traffic generation standpoint.

Table 4: Estimated Program Summary by Development Parcel

PARCEL	D1	D2	D3	D4	D5	D6	D7
APT (UNITS)	0	450	332	51	31	0	120
RETAIL (GSF)	22,442	29,207	17,998	11,721	26,010	26,359	8,984
OFFICE (GSF)***	216,519	166,057	535,556	24,699	24,272	192,272	0
HOTEL (UNITS)	175	0	0	0	0	0	0
RESTAURANT (GSF)	0	0	0	0	0	0	0
ARTS (GSF)	23,038	23,599	9,529	0	10,500	7,000	0

*** It is anticipated the commercial office uses will be a mix of life sciences and traditional office. For this analysis, all of these spaces were considered office spaces which will have a higher and more conservative population density from traffic generation standpoint.

2. Trip Generation

Trip generation was conducted using nationally accepted trip generation rates from the ITE Trip Generation Manual, 8th edition. Person trips generated via this manual were modified according to the

average vehicle occupancy rate observed in Union Square by the US Census. Census-based mode share data was used to distribute site-generated trips across modes, and a transportation demand management (TDM) factor was applied to reach an ultimate future non-vehicle mode share of 60%. It was assumed that 15% of trips could be removed from the vehicle analysis due to internal capture, with the remaining entering and exiting trips being distributed across the roadway network for analysis.

a. ITE Trip Generation Rates

The ITE Trip Generation Manual, 8th edition, trip generation classes and rates applied to the above program are listed in the tables below. Demand from apartment units was estimated using the ITE 220 class, demand from retail space and arts space was estimated using the ITE 820 class, demand from office space and arts space was estimated using the ITE 710 class, and demand from hotel rooms was estimated using the ITE 310 class.

Table 5: ITE Trip Generation Rates, Weekday

ITE Class	ITE Rate	Entering	Exiting
Apartment (220)	6.65 per unit	50%	50%
Shopping Center (820)	42.7 per 1000 sf	50%	50%
General Office Building (710)	11.03 per 1000 sf	50%	50%
Hotel (310)	8.92 per unit	50%	50%

Table 6: ITE Trip Generation Rates, AM Peak

ITE Class	ITE Rate	Entering	Exiting
Apartment (220)	0.51 per unit	20%	80%
Shopping Center (820)	0.96 per 1000 sf	62%	38%
General Office Building (710)	1.56 per 1000 sf	88%	12%
Hotel (310)	0.67 per unit	58%	42%

Table 7: ITE Trip Generation Rates, PM Peak

ITE Class	ITE Rate	Entering	Exiting
Apartment (220)	0.62 per unit	65%	35%
Shopping Center (820)	3.71 per 1000 sf	48%	52%
General Office Building (710)	1.49 per 1000 sf	17%	83%
Hotel (310)	0.7 per unit	49%	51%

b. Average Vehicle Occupancy

Per City guidelines, the Average Vehicle Occupancy for Union Square was used as an adjustment factor for person-trips generated via ITE Trip Generation guidelines. Based on US Census data for block groups within Union Square, the average vehicle occupancy within the study area is 1.25. Given this information, ITE estimated person trips were multiplied by 1.25 to produce the ultimate number of person trips for analysis.

c. Mode Share

Mode splits for project-generated person trips were determined using Census journey-to-work data as suggested by the City of Somerville. Existing Census non-vehicle mode shares for the Union Square Census tract were grown based on assumptions regarding proposed Transportation Demand Management (TDM) measures proposed as part of the development. These measures assume a significant positive impact on non-vehicle mode share due to the Green Line extension, improved streetscapes in the Union Square area, and ongoing citywide measures intended to increase transit, bicycle, and pedestrian activity. The table below displays the non-vehicle mode shares proposed for this analysis.

Table 8: Existing and Future Non-Vehicle Mode Shares

Non-Vehicle Mode Shares	
Existing Non-Vehicle Share (Census Data)	34%
Future Non-Vehicle Share (Existing and Proposed TDM)	60%
Future Transit Share	22%
Future Bicycle Share	15%
Future Pedestrian Share	23%

Person Trips

Person trips for the development project were calculated using ITE Trip Generation methods and adjusted using Average Vehicle Occupancy for the Union Square Census tract. Site-generated person trips were calculated for each development parcel, as summarized in the table below.

Table 9: Generated Person-Trips by Development Parcel

PARCEL	**AM Person Trips**	**PM Person Trips**	**Daily Person Trips**
D1	641	704	6,459
D2	671	817	7,768
D3	1,279	1,340	11,117
D4	95	140	1,392
D5	119	210	2,128
D6	421	494	4,159
D7	87	135	1,479
COMBINED TOTAL	3,313	3,840	34,502

Proposed Motor Vehicle Trips

Proposed motor vehicle trips were calculated using ITE trip generation methods according to the 60% non-vehicle mode share described in this document. The following tables summarize person trips, vehicle trips, alternative mode trips, and vehicle trips for analysis by AM peak, PM peak, and daily trips for each development site. Vehicle trips for analysis were generated by applying the following context variables:

- Internal Capture: An internal capture factor of 15% was applied to the overall vehicle trips.
- Pass-by Trips: No pass-by factor was applied to create a conservative approach to traffic generation. As the retail uses are not yet known, this approach conservatively assumes that the retail would generate trips of its own accord.
- Mobility Management: A suite of planned mobility management programs, as outlined in the CoS Union Square Neighborhood Plan, will be implemented to support the 60% non-auto mode share. These initiatives are detailed in the Mobility Management section of this letter.
- Within these vehicle trips for analysis, 5% are assumed to be carpool trips, and

- 4% are assumed to be heavy trucks. The remainder of vehicle trips are assumed to be drive-alone, non-heavy truck trips.

Table 10: Site-Generated Trips, AM Peak

PARCEL	Person Trips	Vehicle Trips	Transit Trips	Bicycle Trips	Ped. Trips	Vehicle Trips for Analysis	Vehicle Trips Entering	Vehicle Trips Exiting
D1	641	254	140	99	148	216	173	43
D2	671	265	147	103	155	225	130	96
D3	1,279	506	280	197	296	430	328	102
D4	95	38	21	15	22	32	19	12
D5	119	47	26	18	28	40	28	12
D6	421	166	92	65	97	141	122	20
D7	87	35	19	13	20	29	7	22
COMBINED TOTAL	3,313	1,310	725	511	767	1,113	806	307

Table 11: Site-Generated Trips, PM Peak

PARCEL	Person Trips	Vehicle Trips	Transit Trips	Bicycle Trips	Ped. Trips	Vehicle Trips for Analysis	Vehicle Trips Entering	Vehicle Trips Exiting
D1	704	278	154	109	163	237	68	169
D2	817	323	179	126	189	275	117	158
D3	1,340	530	293	207	310	450	127	323
D4	140	55	31	22	32	47	20	27
D5	210	83	46	32	49	70	28	42
D6	494	195	108	76	114	166	41	125
D7	135	53	30	21	31	45	27	18
COMBINED TOTAL	3,741	1,479	819	577	866	1,257	422	835

Table 12: Site-Generated Trips, Daily

PARCEL	Person Trips	Vehicle Trips	Transit Trips	Bicycle Trips	Ped. Trips	Vehicle Trips for Analysis	Vehicle Trips Entering	Vehicle Trips Exiting
D1	6,459	2,554	1,414	996	1,495	2,171	1,085	1,085
D2	7,768	3,072	1,701	1,198	1,797	2,611	1,305	1,305
D3	11,117	4,396	2,434	1,715	2,572	3,736	1,868	1,868
D4	1,392	550	305	215	322	468	234	234
D5	2,128	841	466	328	492	715	358	358
D6	4,159	1,645	911	642	962	1,398	699	699
D7	1,479	585	324	228	342	497	248	248
COMBINED TOTAL	34,502	13,642	7,555	5,322	7,983	11,596	5,798	5,798

Table 13: Site-Generated Trips, Saturday Midday Peak

PARCEL	Person Trips	Vehicle Trips	Transit Trips	Bicycle Trips	Ped. Trips	Vehicle Trips for Analysis	Vehicle Trips Entering	Vehicle Trips Exiting
D1	353	140	77	54	82	119	59	59
D2	489	193	107	75	113	164	82	82
D3	385	152	84	59	89	129	65	65
D4	107	42	23	16	25	36	18	18
D5	181	72	40	28	42	61	30	30
D6	181	72	40	28	42	61	30	30
D7	132	52	29	20	31	44	22	22
COMBINED TOTAL	1,828	723	400	282	423	614	307	307

3. Trip Distribution

Street Light travel behavior data requisitioned by the City was used as the basis for distribution of vehicle trips for analysis across study area roadways and intersections. This data, developed over the course of a study completed in 2016, generates origin-destination flows from selected regional zones to and from Union Square. These flows can then be routed across study area roadways in order to render impacts to individual intersections.

a. Origin-Destination Patterns

The maps on the following pages display origin-destination patterns as indicated by the Street Light study. These flows were used as the basis for distribution of site-generated trips across area roadways.

Figure 2: Union Square as Origin Travel Flows, AM Peak

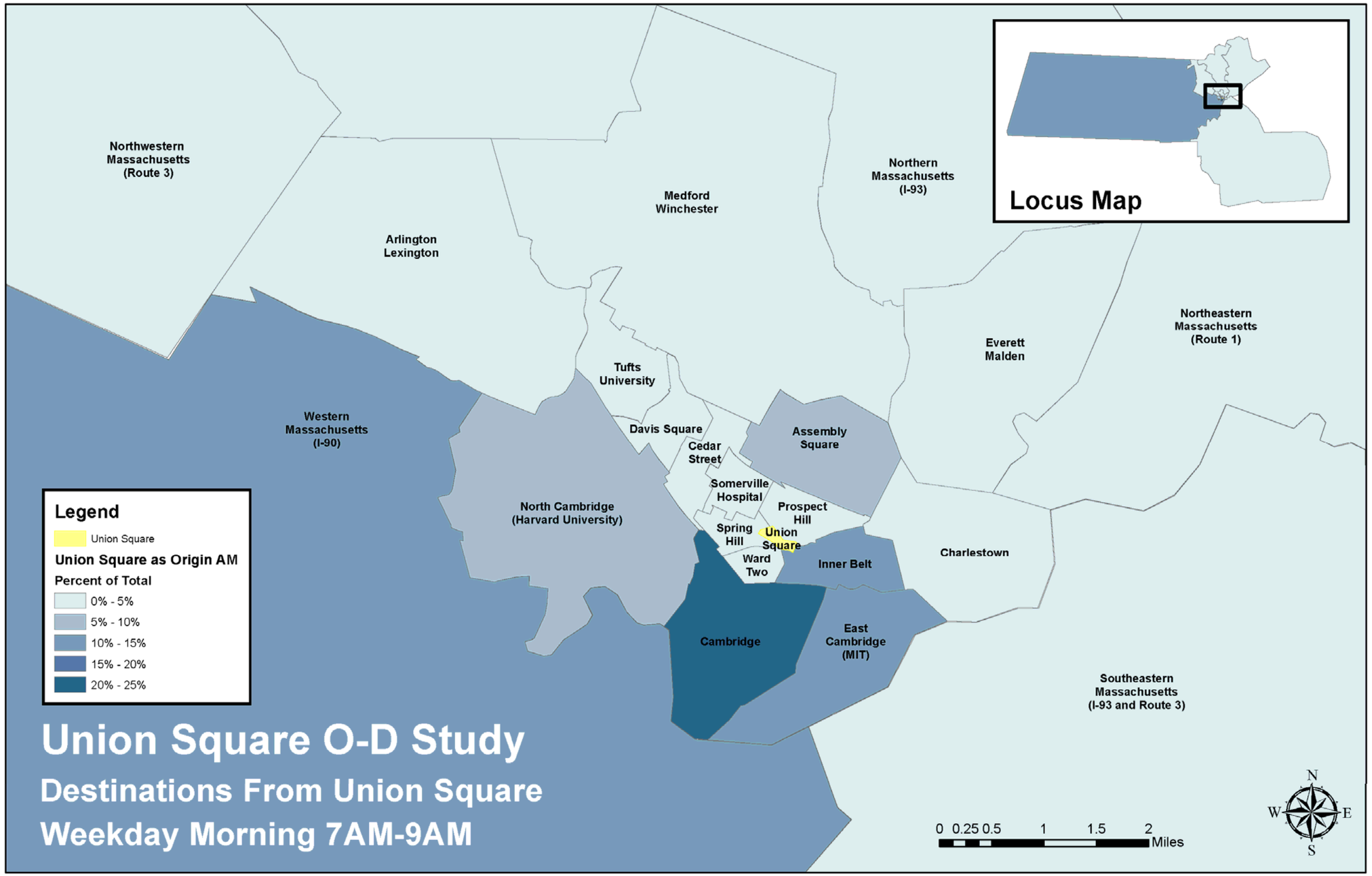


Figure 3: Union Square as Destination Travel Flows, AM Peak

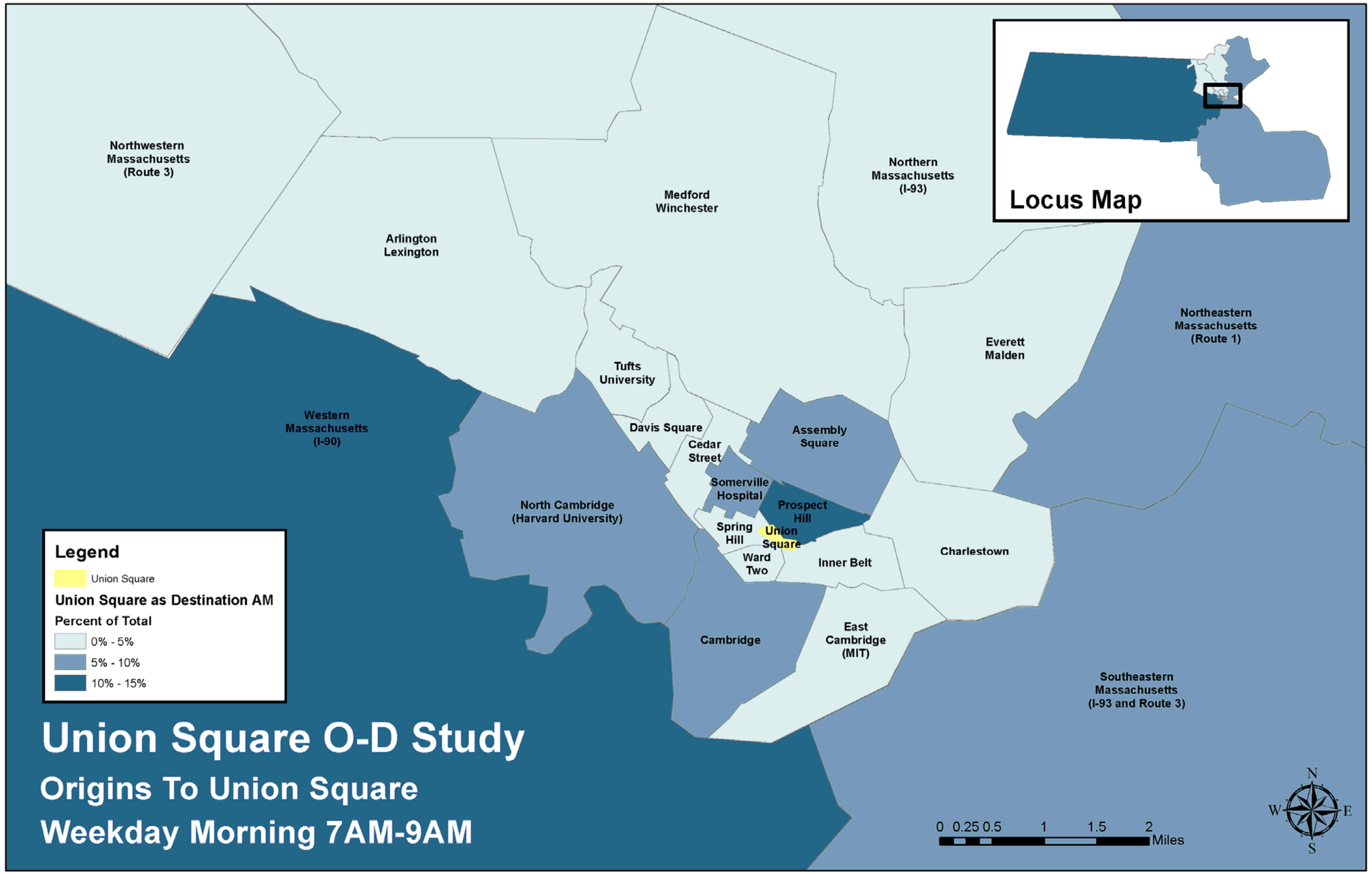


Figure 4: Union Square as Origin Travel Flows, PM Peak

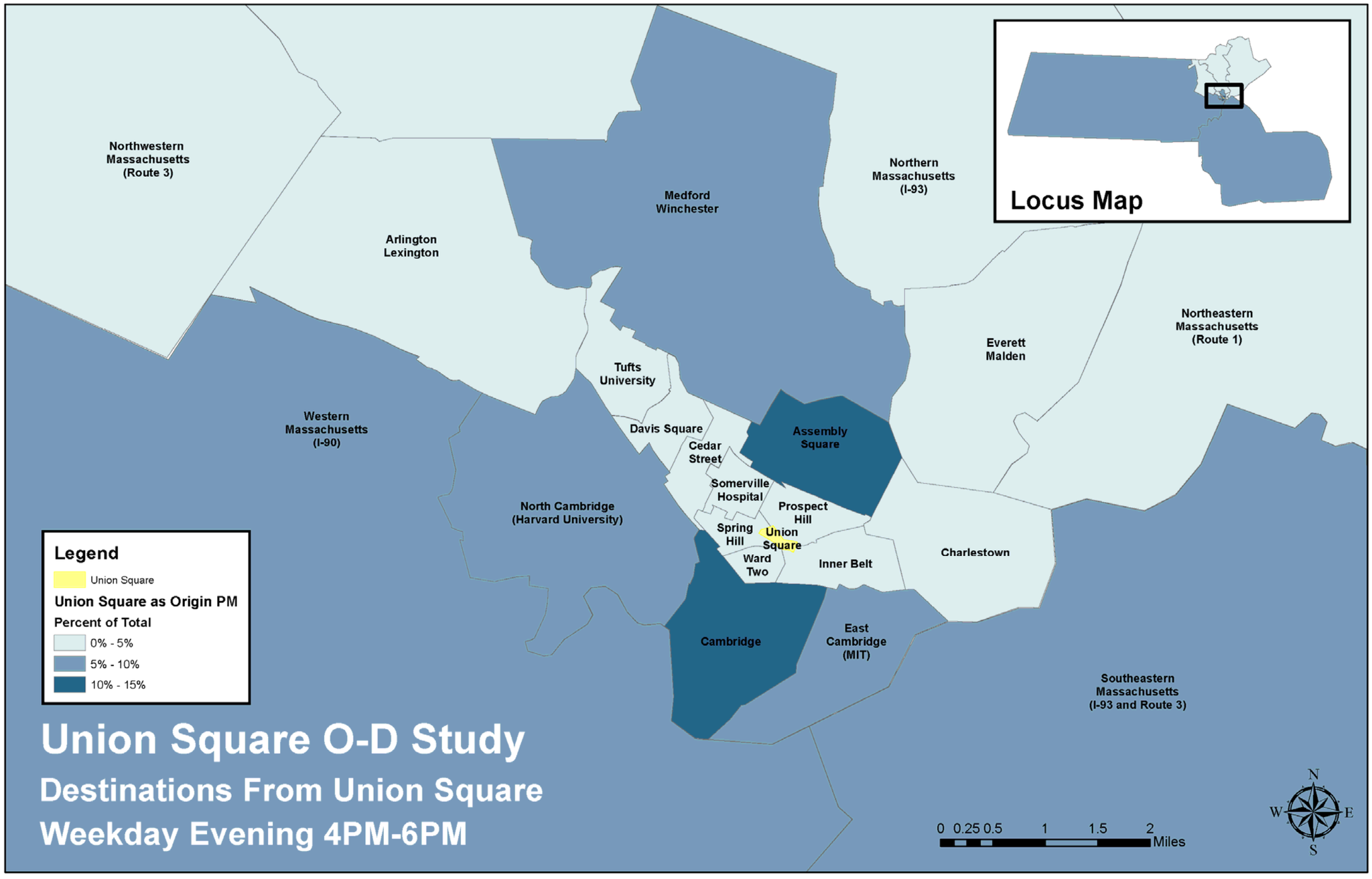
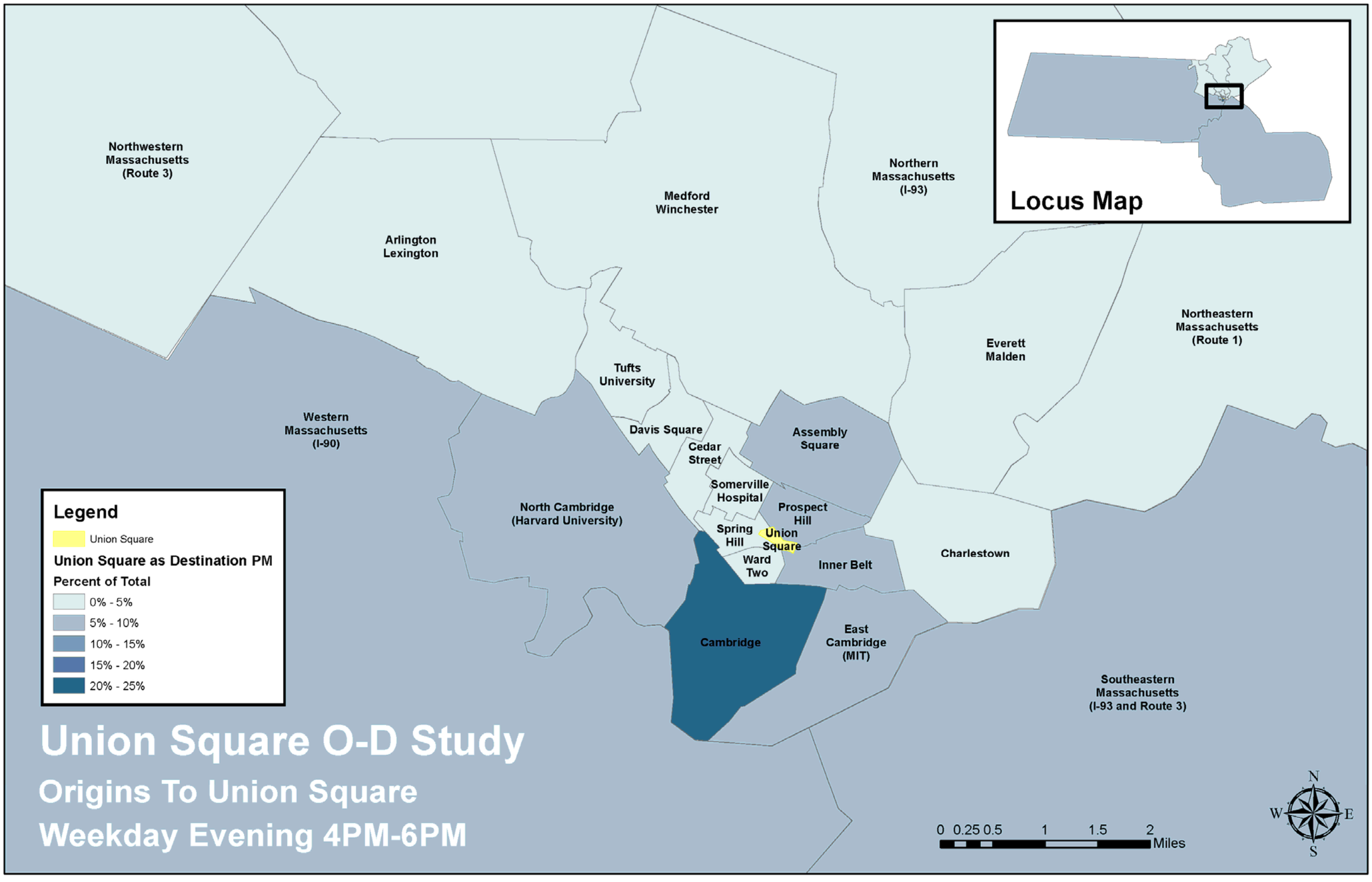


Figure 5: Union Square as Destination Travel Flows, PM Peak



b. Travel outside of Somerville

The table below lists the analysis zones selected outside the City of Somerville as part of the Street Light study, as well as the percentage of traffic entering and exiting from those zones during the AM and PM peaks.

Table 14: Travel flows to and from Union Square, Outside Somerville

Row Labels	Traffic from Union Square, PM Peak	Traffic to Union Square, PM Peak	Traffic from Union Square, AM Peak	Traffic to Union Square, AM Peak
US1 NE Area	6%	2%	3%	4%
I93 N Area	12%	4%	7%	10%
US2/3 NW Area	2%	1%	1%	5%
I93 S Area	7%	6%	7%	6%
MassPike W Area	9%	10%	11%	11%
Arlington/Lexington	1%	0%	0%	3%
Medford/Winchester	7%	3%	6%	5%
Everett/Malden	3%	2%	2%	2%
Charlestown	3%	4%	3%	3%
N Cambridge/Harvard	7%	9%	8%	8%
Central Cambridge	9%	23%	15%	10%
East Cambridge	3%	6%	10%	3%

c. Travel within Somerville

The table below lists the analysis zones selected within the City of Somerville as part of the Street Light study, as well as the percentage of traffic entering and exiting from those zones during the AM and PM peaks.

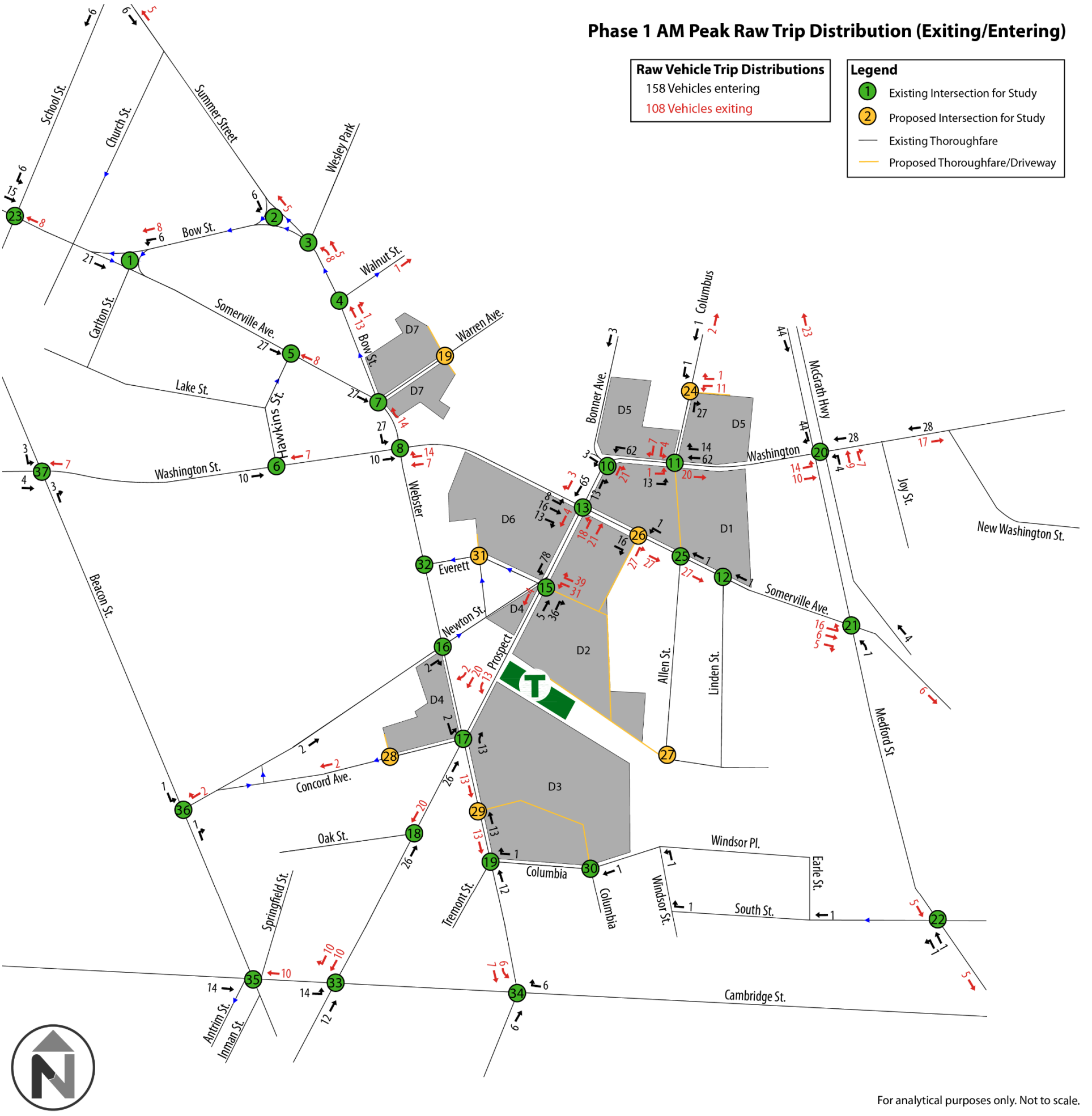
Table 15: Travel flows to and from Union Square, within Somerville

Row Labels	Traffic from Union Square, PM Peak	Traffic to Union Square, PM Peak	Traffic from Union Square, AM Peak	Traffic to Union Square, AM Peak
Tufts University	1%	1%	0%	1%
Davis Square	1%	1%	0%	1%
Cedar Street	2%	2%	1%	3%
Somerville Hospital	1%	1%	1%	2%
Spring Hill	4%	5%	4%	5%
Ward Two	4%	3%	4%	4%
Inner Belt	7%	10%	9%	6%
Prospect Hill	4%	4%	3%	6%
Assembly Square	8%	4%	5%	3%

d. Trip Distribution Map

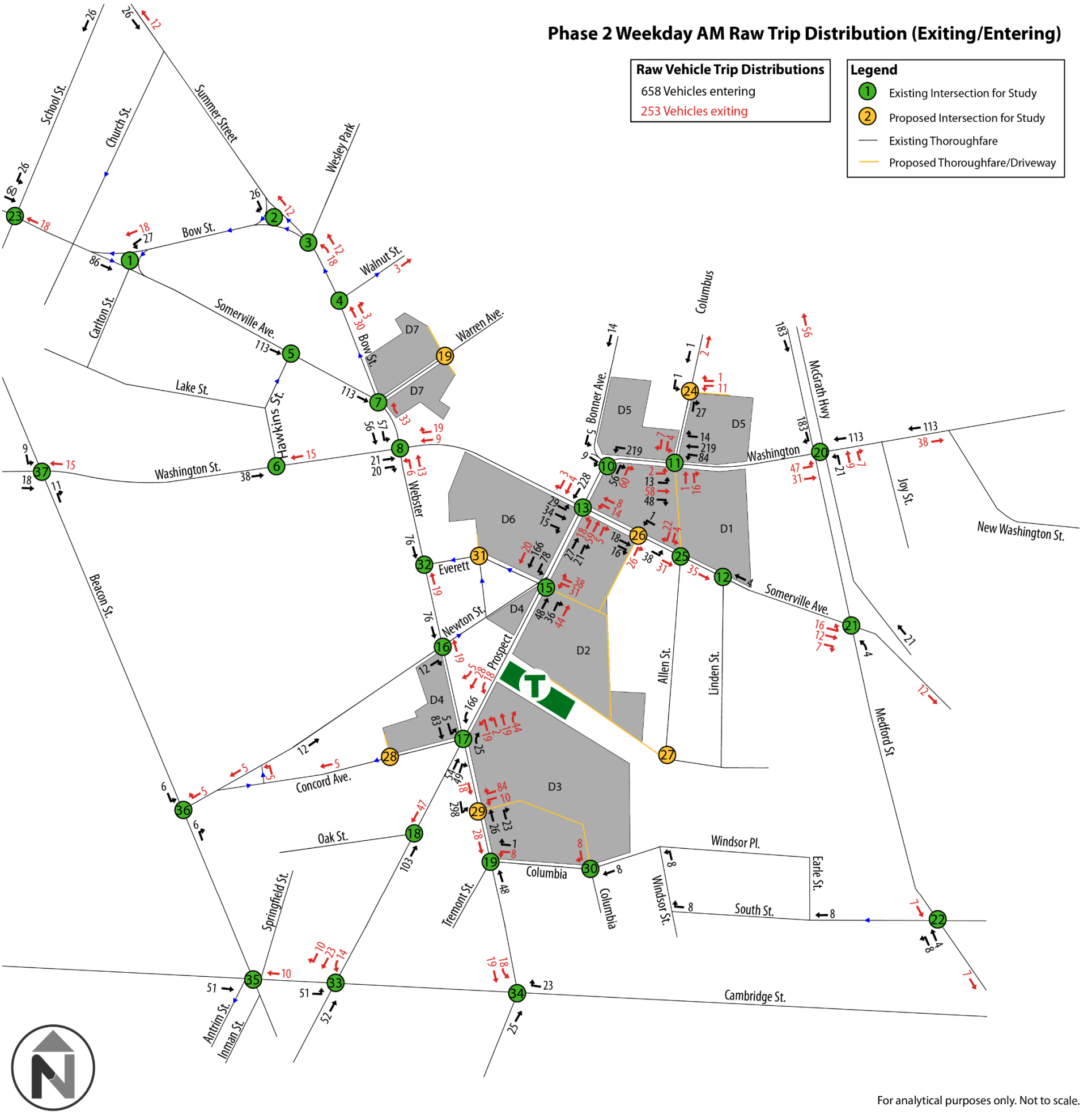
The following graphical figures illustrate the expected AM, PM, and Saturday peak motor vehicle trip distributions generated by each phase of proposed development.

Figure 6: Phase 1 AM Peak Trip Distribution



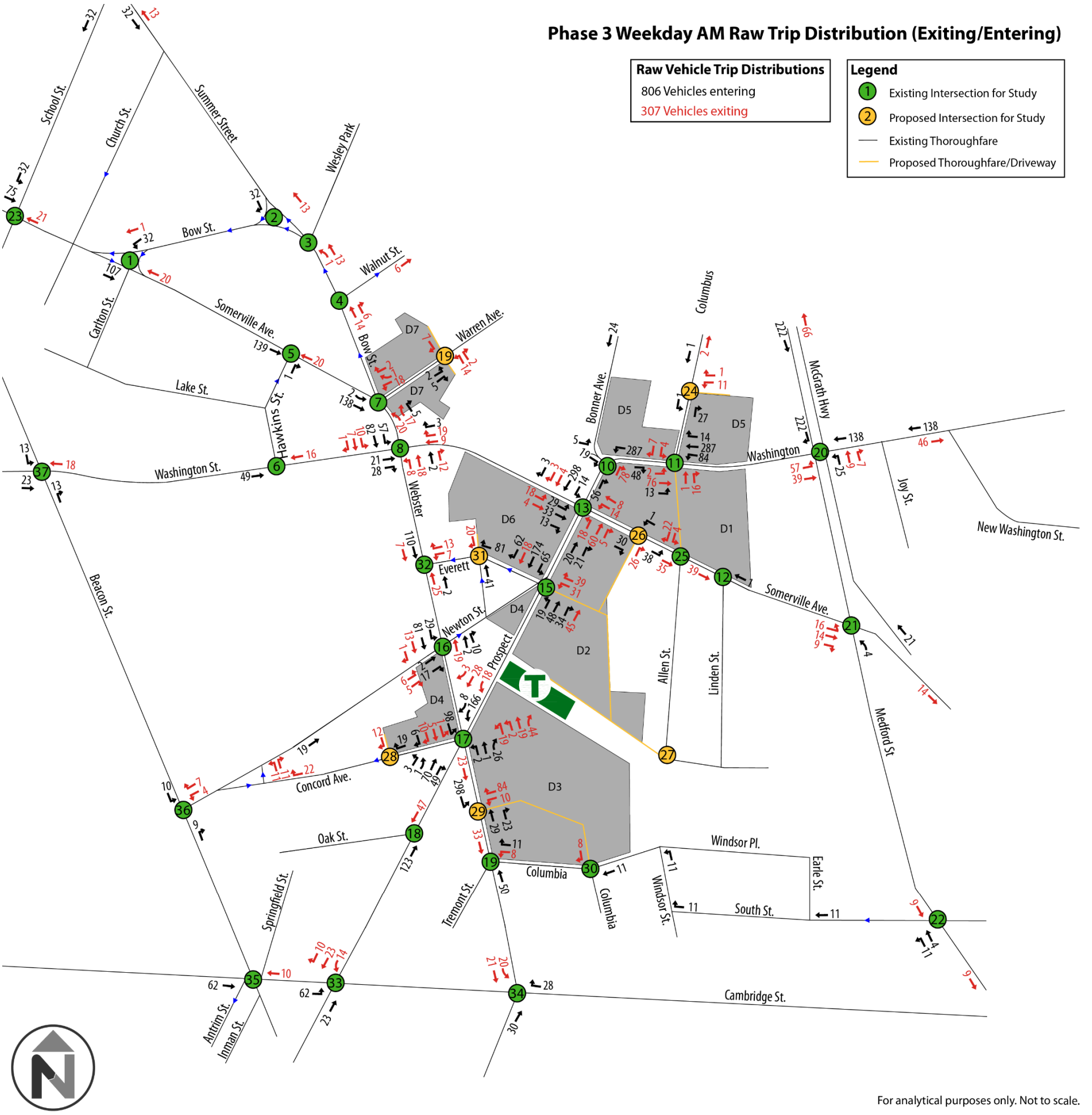
For analytical purposes only. Not to scale.

Figure 7: Phase 2 AM Peak Trip Distribution



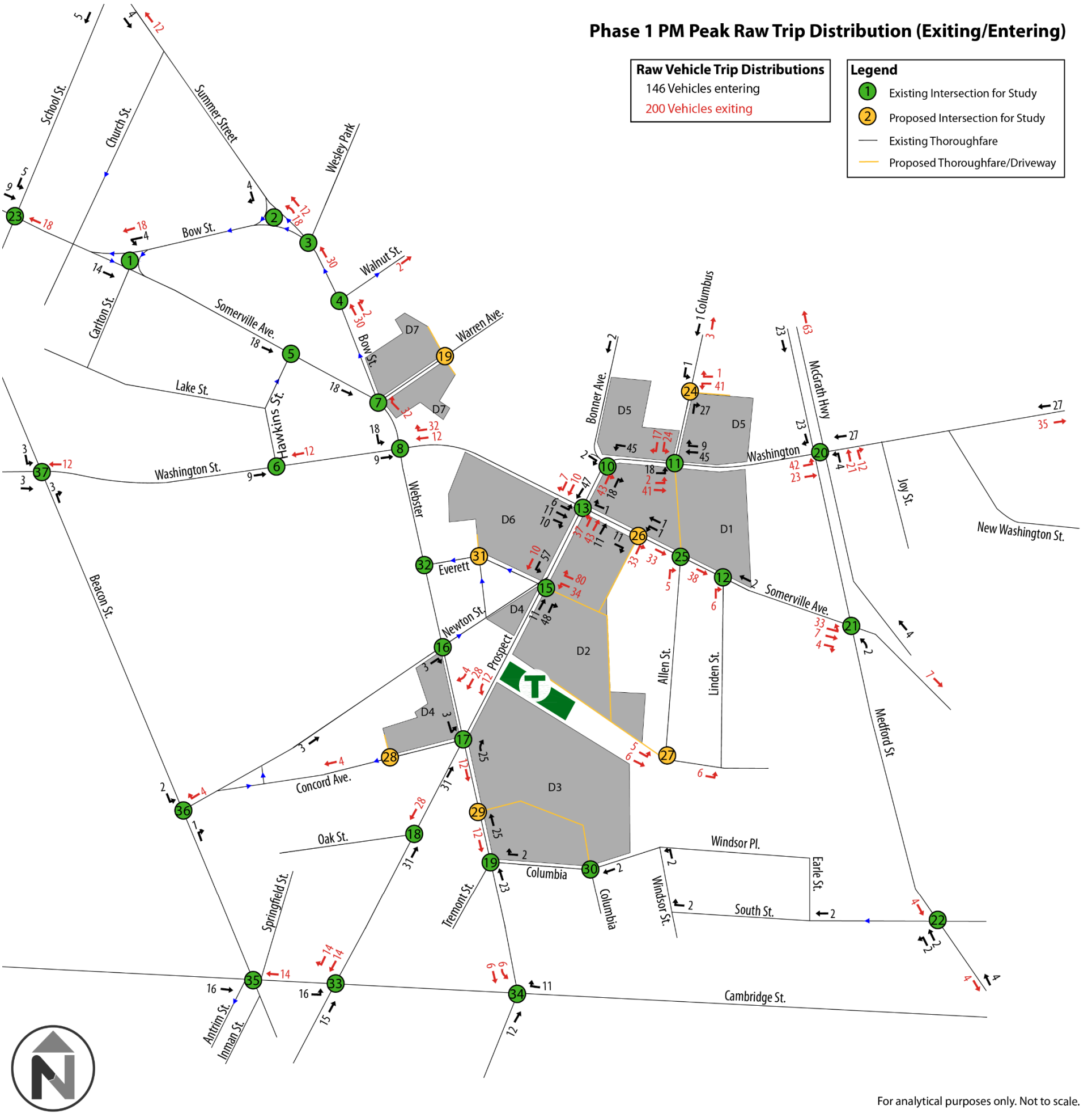
For analytical purposes only. Not to scale.

Figure 8: Phase 3 AM Peak Trip Distribution



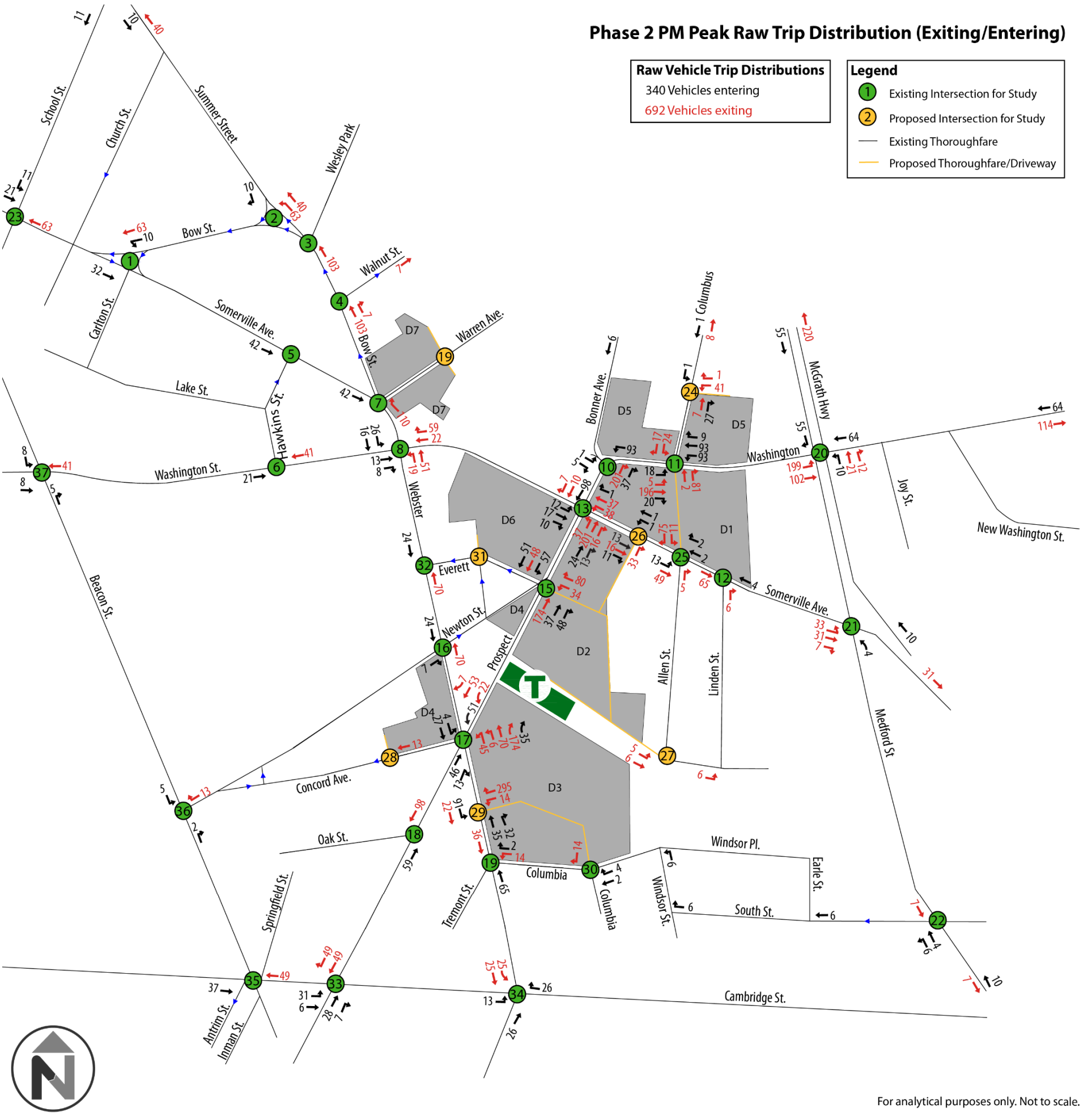
For analytical purposes only. Not to scale.

Figure 9: Phase 1 PM Peak Trip Distribution



For analytical purposes only. Not to scale.

Figure 10: Phase 2 PM Peak Trip Distribution



For analytical purposes only. Not to scale.

Figure 11: Phase 3 PM Peak Trip Distribution

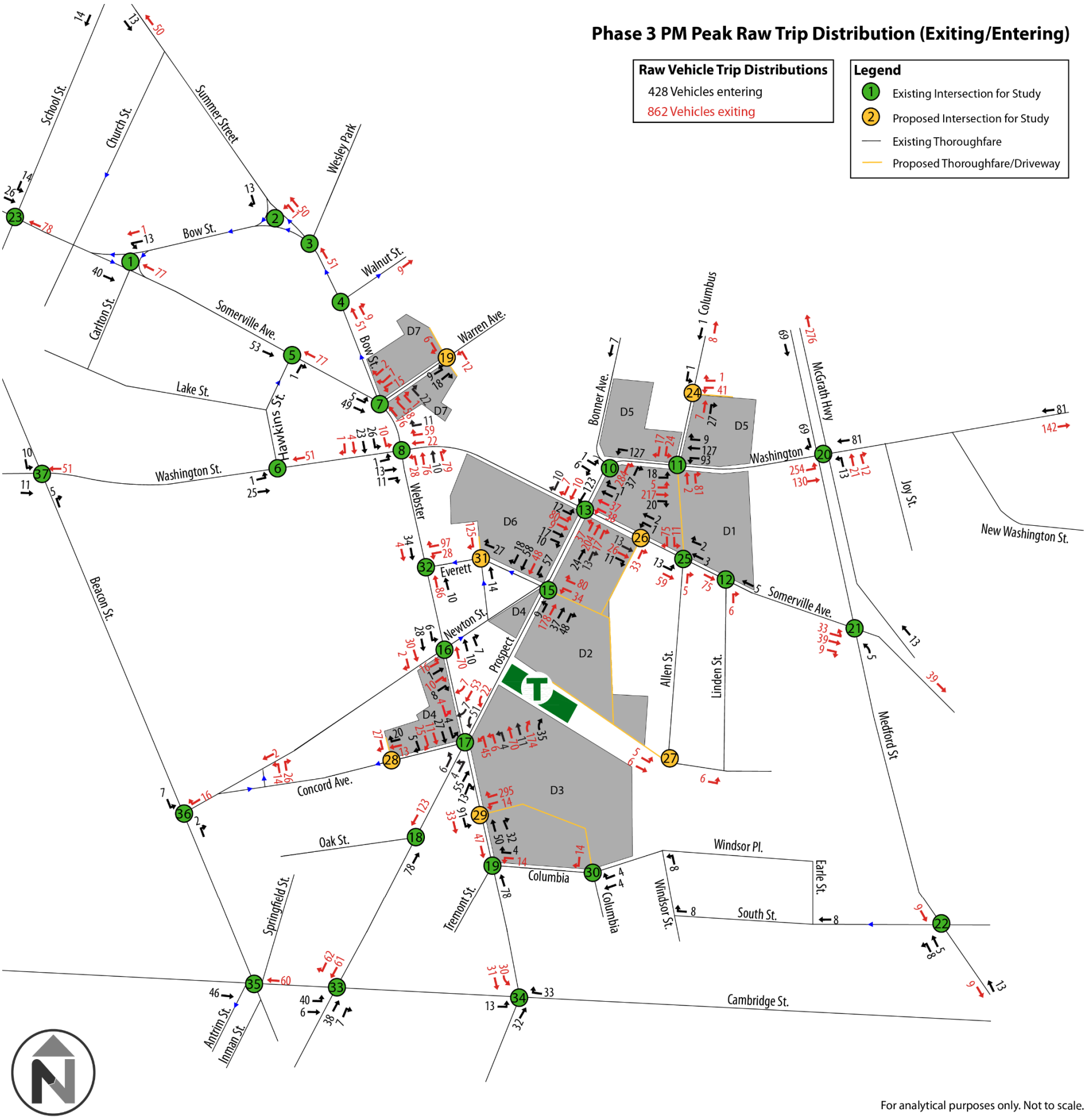
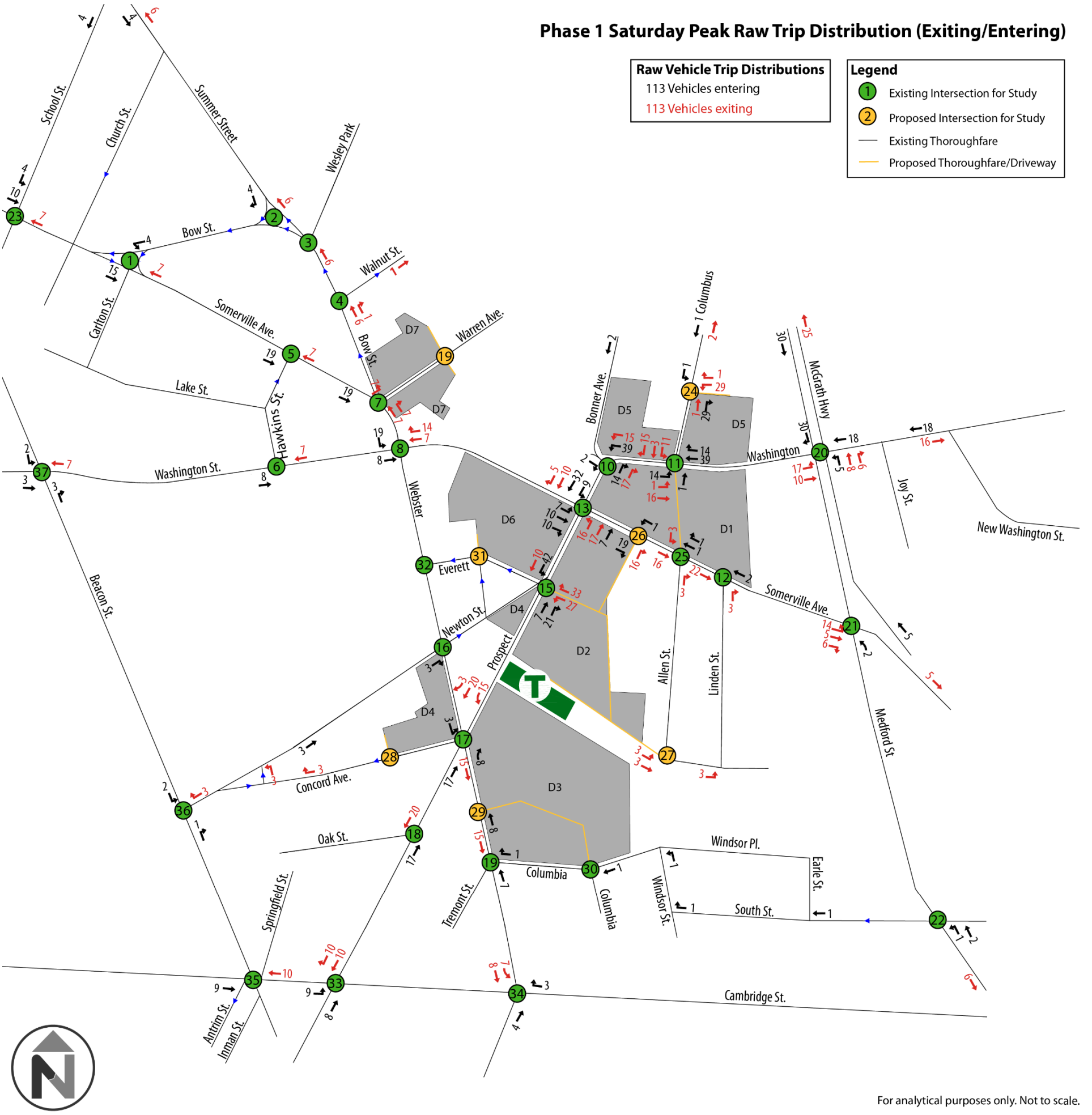
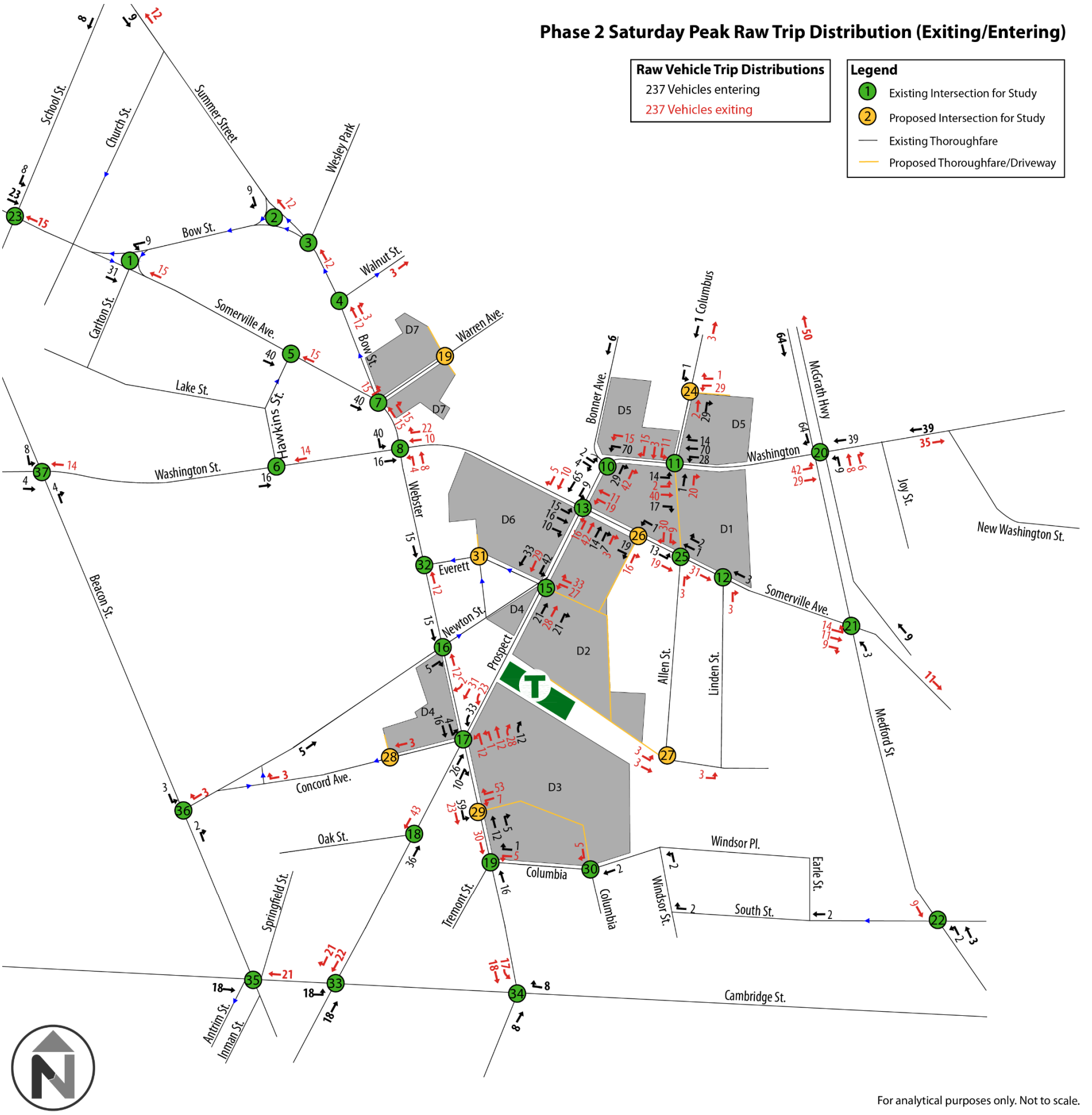


Figure 12: Phase 1 Saturday Peak Trip Distribution



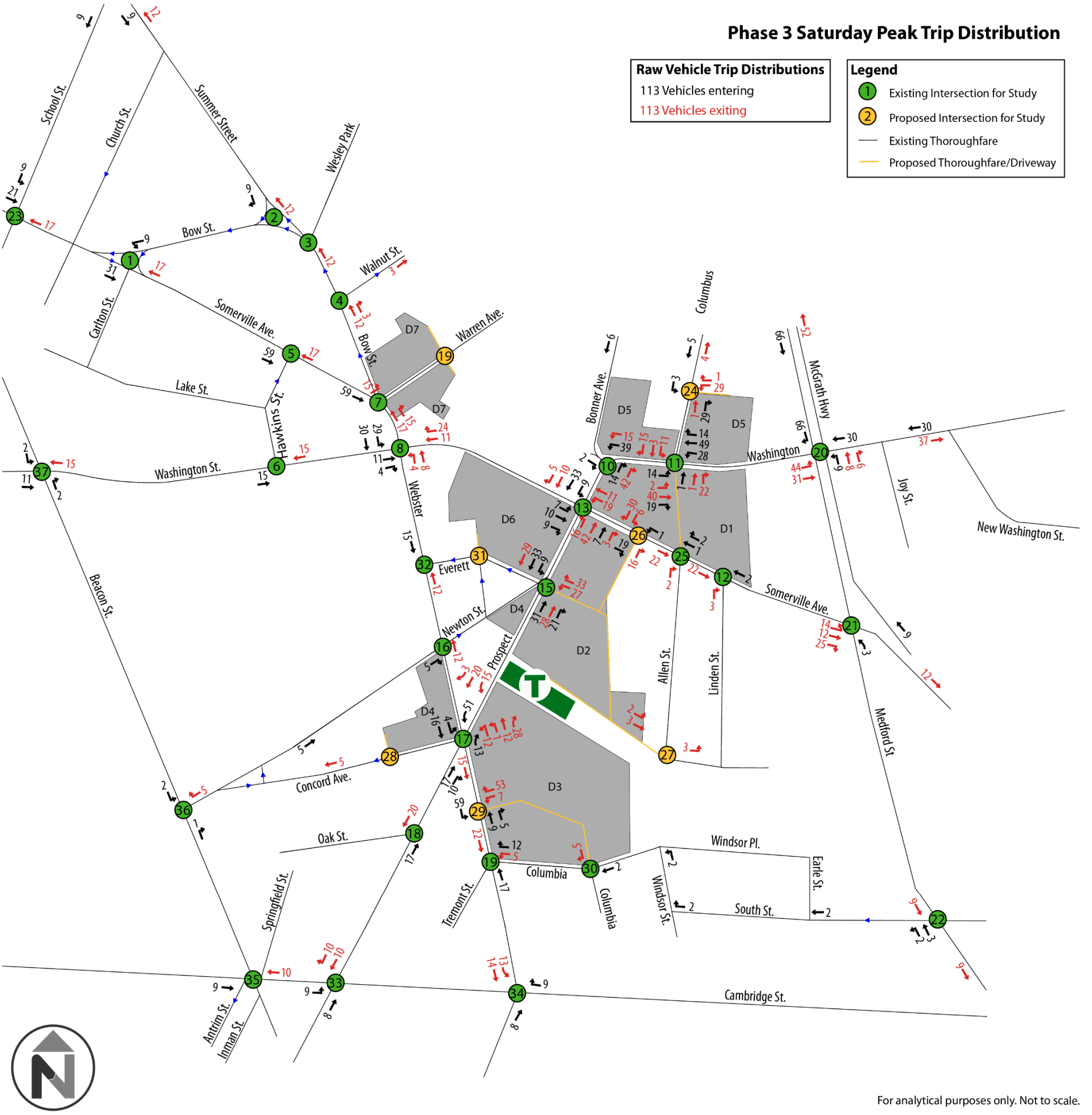
For analytical purposes only. Not to scale.

Figure 13: Phase 2 Saturday Peak Trip Distribution



For analytical purposes only. Not to scale.

Figure 14: Phase 3 Saturday Peak Trip Distribution



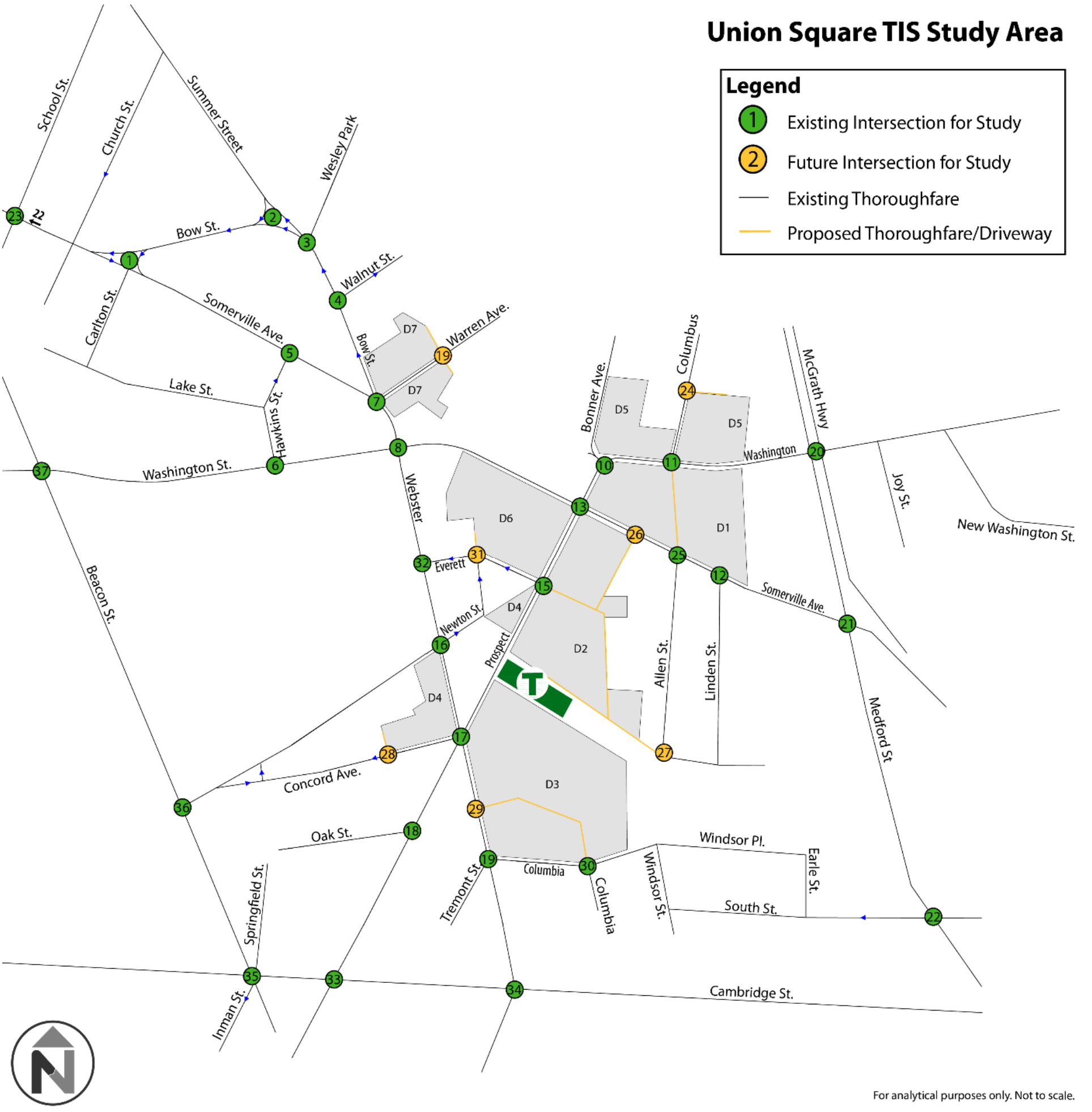
For analytical purposes only. Not to scale.

C. Study Area and Scenarios

1. Study Area Map

The study area map on the following page indicates all study area intersections, differentiating between those that already exist and those that will be modified or created by development of the project sites. Proposed thoroughfares for intra-parcel access are also indicated, as necessary.

Figure 15: Study Area and Intersections



2. Corridor Descriptions

The project sites are located along the highly trafficked thoroughfares of Prospect Street, Webster Avenue, Somerville Avenue, Washington Street, and Bow Street. Union Square already experiences high traffic loads and congestion during peak hours. A high degree of bus transit connectivity allows residents of and visitors to the mixed-use, walkable neighborhood to avoid having to drive. This impact study covers the study area in Figure 2 and all of the numbered intersections therein.

Summer Street

Summer Street is a bi-directional two-lane neighborhood street that brings some entering and exiting traffic to the study area. The road runs from west of the study area beyond School Street southeast to Bow Street in Union Square, where it terminates. Along its entire length in the study area, Summer Street has a painted bike lane for cyclists traveling westbound. There is no street parking on the westbound side. Street parking is available along the curb on the south, or eastbound, side of the street. Sharrow markings are painted along each block of Summer Street on the eastbound side. Summer Street provides two marked travel lanes with free two-hour parking except by permit from 8 am – 2:30 AM. Summer Street is for permit parking only from 2:30AM – 8 AM.

The curb-to-curb distance across Summer Street measures approximately 30 feet. Sidewalks are provided on both sides of the street, with illumination by way of lamp posts. The land uses along Summer Street here are mostly residential with some corner commercial land uses, except for along the north side of Summer Street between Putnam Street and Vinal Avenue, where the public Nunziato Field and Dog Park are located. There are no bicycle racks available along Summer Street. At Bow Street (Study Intersection #2) eastbound traffic is directed to Bow Street, a one way road that travels west to Somerville Avenue, where drivers can turn to continue driving east. Traffic enters Summer Street moving westbound from this intersection at Bow Street. MBTA Bus Route 85 travels along Summer Street.

Somerville Avenue

Somerville Avenue is a mostly two-lane regional street that serves as a major thoroughfare in Union Square and is directly adjacent to project sites D6, D1, and D2. The street is bi-directional except for the area between its intersection with Bow Street to the west of Union Square and its intersection with Washington Street in Union Square. The road runs from west of the study area beyond Summer Street to its intersection with McGrath highway at the east edge of the study intersection (Study Intersection #21), where Somerville Avenue becomes Somerville Avenue Extension, a one way, one lane eastbound road that parallels McGrath Highway before crossing under it and terminating at Linwood Street. At intersection #21 drivers can turn left to access McGrath Highway north or its northbound access road. From Somerville Avenue Extension, drivers can also access McGrath Highway southbound. Somerville Avenue has two lanes in each direction in the segment between Webster and Prospect.

Somerville Avenue is undergoing major renovations to accommodate more street users and become a thoroughfare more accommodating to cyclists, pedestrians, and transit users. The renovation plans involve constructing segregated one-way cycle tracks in each direction along the sidewalks on Somerville Avenue between Prospect Street and Webster Avenue. There will be a turning lane for vehicles to turn left from Somerville Avenue eastbound onto Prospect Street north. There is also planned bus shelters and more bicycle parking for this stretch of Somerville Avenue.

Currently, the street has on-street parking limited to two hours except by permit. The street parking between Church Street and Prospect Street is metered. There is no street parking along the north side of Somerville Ave between Prospect Street and Webster Avemie. Running along the inside of the street

parking in both directions is a painted bike lane, except along the one-way portion of Somerville Avenue where there is an eastbound bike lane along the south side of the street.

The curb-to-curb distance across Somerville Avenue is 50 feet, except between Webster Avenue and Prospect Street where it measures 60 feet curb-to-curb. Sidewalks are provided on both sides of the street, with illumination by way of lamp posts. The land uses along Somerville Avenue are mostly commercial, with some mixed use residential above street level storefronts. There are bike racks, street trees, and public benches installed periodically along Somerville Avenue. Somerville Avenue meets Washington Street and Webster Avenue at a major intersection (Study intersection #8) which anchors the Union Square neighborhood. Another major intersection is at Washington Street on the east side of Union Square (Study Intersection #13). Where Somerville Ave meets McGrath Highway south marks the eastern edge of the study area (Study Intersection #21). MBTA Bus Route 87 travels along the entirety of Somerville Avenue in the study area. Route 85 shares some of the route along Somerville Avenue's one-way section. In the central area of Union Square, between Webster Avenue and Prospect Street, most of the region's bus routes converge at the most-used stops in the neighborhood serving Routes CT2, 91, 86, and 87.

Bow Street

Bow Street is a one-way, one lane neighborhood street serving the core commercial area in Union Square. It begins at Study Intersection #8, carrying northbound traffic from Washington Street, Somerville Avenue, and Webster Avenue to Summer Street where it turns to the west and terminates at Somerville Avenue toward the western edge of the study area. It provides direct access to project site D7. Between Summer Street and Study Intersection #8, Bow Street has metered 2 hour parking. In this segment, along the right side of the street as cars travel westbound, there is angled back-in parking. Parallel parking is located on the left. There is a painted bike lane inside of the angled parking spots. Bow Street is 40 feet wide in this section. Between Summer Street and Somerville Avenue, the street parking unmetered 2-hour spots except as permit allows. All spots are parallel parking and the bike lane continues along the inside of the spots on the right side of the street, continuing onto Somerville Avenue westbound out of the study area. Bow Street is 30 feet wide in this section.

Sidewalks are provided on both sides of the street, with illumination by way of lamp posts. Land uses are primarily commercial on Bow Street. Many commercial outlets and eateries here are neighborhood institutions. Some residential uses are located between and above the retail, especially along the western segment of Bow Street. There are bike racks, street trees, trash receptacles, and bollards installed periodically along Bow Street, contributing to its pedestrian-oriented atmosphere. Bow Street has stops for both Routes 85 and 87, which continue onto Summer/Webster and Somerville Avenue, respectively.

Washington Street

Washington Street is a bi-directional, two-lane regional street that serves as one of the major thoroughfares for access to Union Square. It runs from west of the study area at Perry Street to Webster Avenue. It reemerges again as a parking lot north of Somerville Avenue between Webster Avenue and Somerville Avenue then becomes a thoroughfare from its intersection with Bonner Avenue. It provides direct acces to project sites D6, D5, and D1. In the study area it remains as a bi-directional two lane street until it intersects with McGrath Highway. Here (Study Intersection #20), it splits into two one way roads travelling in each direction after Boston/Street Mansfield Street until Joy Street east of McGrath highway. Eastbound traffic is split into three lanes where street users can go south on McGrath Highway, north on McGrath Highway, or can continue straight onto Washington Street to leave the study area. Westbound traffic also splits between Boston/Mansfield Street and Joy Street, becoming two lanes. Traffic at this intersection can go north onto McGrath Highway, south onto McGrath Highway, or can continue westbound onto Washington Street.

Where street parking exists along Washington Street, it is typically 2 hour parking or as permit allows. There are 30 minute parking spots along the eastbound lane at the western edge of the study area after Parker Street. There are also some reserved spots for school district vehicles in this area because of the nearby siting of the Albert F Argenziano School. Spaces are metered where Washington Street becomes a 50 spot lot in Union Square proper. Washington Street currently has sharrow markings for bicyclists along the length of the study area, except along its split portion near the McGrath Highway, where there are painted bike lanes and turning lanes for cyclists.

From the western boundary of the study area to Webster Avenue, the curb-to-curb distance across Washington Street is 40 feet. East of Prospect, this distance is about 50 feet. Where Washington Street splits, each one-way segment is 40 feet in width. Sidewalks are provided on both sides of the street, and illumination is provided by way of street lights. Washington Street meets other significant roads at Study Intersection #8, where the road merges with Somerville Avenue, anchoring Union Square. The land uses along Washington Street vary from primarily residential and municipal along its western routing in the study area, to institutional and retail east of the commuter rail tracks and into Union Square. East of Prospect Street, Washington Street retail becomes noticeably more automobile oriented, and some mixed-uses are sited west of McGrath Highway. MBTA Bus Route 86 travels along Washington Street during the entirety of its length in the study area. East of Prospect Street, Routes 91 and CT2 travel along Washington Street along with Route 86. Routes 80 and 88 cross Washington Street at McGrath Highway.

Webster Avenue

Webster Avenue is a bi-directional two-lane street that extends from its intersection south of the study area at Cambridge Street to Study Intersection #8, where it meets Somerville Avenue, Bow Street, and Washington Street. It provides direct access to project sites D4 and D3. Webster Avenue does not have on-street parking between Newton Street and Prospect Street. Between Study Intersection #8 and Newton Street along its northbound lanes, Webster Avenue has 2-hour parking except as permit allows. Between Prospect Avenue and Tremont Street along its southbound lane, Webster Avenue is permit parking only. South of here on both sides of the street, Webster Avenue is 2-hour parking except as permit allows. Webster Avenue was recently renovated to become bi-directional and to have more cyclist facilities. Southbound there is a painted bike lane along the curb. Northbound, there are sharrow markings for cyclists.

The curb-to-curb distance along Webster Avenue is about 30 feet. Sidewalks are provided on both sides of the street, and illumination is by way of street lights. Washington Street's most significant intersections are at its northern terminus in Union Square (Study Intersection #8), at Newton Street over the commuter railroad (Study Intersection 16), at Prospect Street (Study Intersection 17) and at Columbia Street (Study Intersection 19). The land uses along Webster Avenue vary from commercial/mixed use, to residential, to industrial. Close to Union Square, apartment buildings and institutional uses line the street. South of Newton Street, the retail uses along Webster Avenue are automobile-oriented. South of Prospect Street, there are large warehouse commercial and industrial spaces on the east side of the street. On the west side there are multifamily apartment buildings. MBTA Bus Routes 85 and CT2 travel along the entirety of Webster Avenue in the study area. Route 91 travels along Webster Avenue between Newton Street and Somerville Avenue.

Prospect Street

Prospect Street is a bi-directional two lane street that extends from south of the study area at Cambridge Street to its intersection with Washington Street in Union Square. It provides direct access to project sites D1, D6, D2, D4, and D3. The only location of on-street parking along Prospect Street used to be the 7 permit-only parking spaces along the northbound lane about a block south of Prospect Street's intersection with Webster Avenue. Recently, however, the City has restricted the parking lane using

barrels for safety reasons, creating a makeshift protected bike lane. The short-term and construction-related use of this parking lane is still being evaluated

The curb-to-curb distance along Prospect Street is about 30 feet south of Webster Avenue, about 40 feet between Webster Avenue and Somerville Avenue, and 59 feet between Somerville Avenue and Washington Street. Southbound at Study Intersection #13, there are two lanes, one to travel westbound onto Somerville Avenue and one to continue straight onto Prospect Street. Sidewalks are provided on both sides of the street, and illumination is by way of street lights. The land uses along Prospect Street are primarily residential south of Webster Avenue. Between Webster Avenue and Somerville Avenue, Prospect Street is relatively void of businesses aside from Webster Auto Body on the northern corner of Webster Avenue and Prospect street, Somerville Crossfit near the intersection of Prospect and Newton streets, and Dunkin Donuts at the intersection of Prospect Street and Somerville Avenue. At Somerville Avenue, retail/restaurant spaces predominate, with a well-known nursery/flower shop at the northeastern corner of Prospect Street/Somerville Avenue. Outbound CT2 buses travel along Prospect Street between Webster Avenue and Somerville Avenue. Between Somerville Avenue and Washington Street, MBTA Bus Routes CT2, 86, and 91 travel.

McGrath Highway (Route 28)

McGrath Highway is a major, heavily trafficked limited access state highway that travels along the eastern boundary of the study area, intersecting with Washington Street (at Study Intersection #20) and Somerville Avenue (at Study Intersection #23). McGrath Highway is composed of both its bi-directional, four lane parkway and its access roads which merge into the highway and allow access to neighborhood streets. These access roads carry much of Union Square's traffic and buses.

McGrath's core lanes travel through the study area on an elevated vehicle-only structure from Somerville Avenue to north of Washington Street. North of the study area, cars traveling southbound on McGrath can exit onto a 2-lane access road to access Washington Street or the sites along the northbound McGrath Highway access road on the other side of the highway. There is no on-street parking allowed on this section of the southbound access road. There exist sharrow markings for cyclists. At Washington Street (Study Intersection #20), cars can continue straight or access Washington Street east or westbound. South of Washington street, the 2 lane one-way access road continues southbound. Along the western edge of the street exists 2 hour or as permit allows parallel on-street parking. Sharrow markings continue here. At Somerville Avenue, three turning lanes provide access to Somerville Ave eastbound, Somerville Avenue westbound, or cars can continue straight onto Medford Street. Land uses along the southbound access road vary between multi-family residential and automobile-oriented commercial. Inbound MBTA Bus Route 80 and 88 use the northbound access roads.

Northbound, McGrath Highway drivers can exit at McGrath Highways's intersection with Medford Street (Study Intersection #8) onto an access road that allows road users to eventually turn either direction onto Washington Street. At the Washington Street intersection, the northbound access road is 2 lanes. There is no street parking along this part of the access road, but there is a painted bike lane along the eastern side of the street that is separated by a painted buffer from the one lane of traffic. After crossing Washington Street, this access road intersects with the neighborhood street of Alston St and the regional thoroughfare of Cross Street before merging back into the parkway. There is no street parking available along this segment either. Land uses along the northbound access road are primarily commercial, until north of Washington Street where there are residential uses along Alston Street. Outbound MBTA Bus Routes 80 and 88 use the northbound access road.

McGrath Highways's core 4 lanes of highway-speed traffic are 65 feet across. Each access road is about 30 feet curb-to-curb. Sidewalks are available along the outside of each access road and illumination is provided by way of street lights.

The planned McGrath Highway project will convert the McGrath viaduct to an at-grade boulevard replacement. These changes are planned to slow traffic while creating more predictable driving behaviors resulting in a safer environment for all modes and promote the use of transit, walking, and bicycling as safe and accessible modes of transportation.

Medford Street

Extending south from its intersection with Somerville Ave and the southbound McGrath Highway access road, Medford Street is a bi-directional two lane neighborhood street that continues southbound out of the study area past its intersection (Study Intersection #22) with South Street. Medford Street does not have on-street parking, except for along a short portion between Ward Street and South Street along its northbound lanes. North of the commuter rail tracks that cross Medford Street about one block south of its northern terminus, there are sharrow markings for bicycle commuters. South of the railroad, painted bike lanes on both sides of the street exist for cyclists.

The curb-to-curb distance of Medford Street is about 30 feet. There are sidewalks on both sides of the street, with illumination by way of streetlights. At Somerville Ave. (Study Intersection #21), Medford Street's northbound lanes split; drivers can use either of 2 lanes to access McGrath Highway north, McGrath Highway south, or Somerville Avenue Extension, or they can turn left onto Somerville Avenue westbound. Land uses along Medford Street are primarily commercial. There is some multi-family housing along the west side of Medford Street south of the railroad.

South Street

South Street is a 1400 ft. long road that provides important access to the union square project sites from Medford Street (Study Intersection #22). It provides connection to Windsor Street and Columbia Street from which visitors can directly access project site D3. Between its western terminus at Windsor Street and Hunting Street, South Street is a bi-directional two lane neighborhood road with on-street 2 hour or as permit allows parallel parking along its southern side. Between Hunting Street and Medford Street, South Street is one-way only in the westbound direction. There are permit-only parallel parking spots available along the southern side of the one-way portion of South Street. There is no bicycle infrastructure along South Street.

South Street measures about 30 feet curb-to-curb where it is bi-direction; it is about 20 feet across where it is one-way. There are streetlights to provide illumination and sidewalks on both sides of the street. Land uses along South Street are a mix of commercial and residential. Especially along its western routing, South Street is lined by major automobile-oriented commercial uses and yards filled with automobiles.

Columbia Street/ Windsor

The southern edge of the D3 project site is defined by Columbia and Windsor Streets, bi-directional two lane neighborhood streets that connect to Webster Ave (at Study Intersection #19), South Street and eventually south into Cambridge. There is only on-street parking available on Windsor Place at its intersection with South Street, where there are two 2-hour or as permit allows parallel parking spots. There is no bicycle infrastructure located along these streets. Their width is about 20 feet curb-to-curb. There are sidewalks along both sides of the street and streetlights provide illumination. Land uses along these streets are all warehouse or commercial, with several auto body shops and significant surface parking. Sidewalks line both sides of the street and there are streetlights for illumination.

Tremont Street

Tremont Street is a one-way, one lane neighborhood street that extends out of the study area south from Study Intersection #19 at Webster/Columbia. Both sides of Tremont Street are lined with permit-only parallel parking spots. It is a 30 ft. wide road with no bicycle infrastructure. There are sidewalks on both sides of the street. Land use is primarily residential.

Oak Street

Oak Street is a bi-directional, two lane neighborhood street that extends out of the study area southwest from Study Intersection #18 at Prospect. Both sides of Oak Street are lined with permit-only parallel parking spots. It is a 30 ft. wide road with no bicycle infrastructure. There are sidewalks on both sides of the street. Land use is primarily residential.

Concord Avenue

Concord Ave. is a neighborhood street that extends out of the study area southwest from Study Intersection #17 at Webster. Project site D4 can be directly accessed by Concord Ave. Both sides of Concord Avenue are lined with permit-only parallel parking spots. It is a 30 ft. wide road with no bicycle infrastructure. There are sidewalks on both sides of the street. Land use is primarily residential. Between Webster Avenue and Concord Square, a neighborhood park at the intersection of Newton Street and Concord Avenue, the street is one way and one lane in the westbound direction. At Concord Avenue at Concord Square, traffic is one way and one lane in the eastbound direction. At the southeast corner of Concord Square, traffic from both directions is routed north and drivers can go east or west on Newton Street.

Newton Street

Newton Street is a neighborhood street in the Union Square neighborhood that begins at Prospect Street south of Somerville Avenue (Study Intersection 15) and travels southwest until terminating at Concord Avenue. It is a bi-directional, two lane road west of Webster Avenue. East of Webster Avenue, it is one-way one lane eastbound until Emerson Street, where it becomes tw0-way and two lanes again for one block before its eastern terminus with Prospect Street. There is on-street parking available along Newton Street between Webster Avenue and Prospect Street along its southern edge; these spaces are unregulated. Newton Street does not have any bicycle infrastructure.

Curb-to-curb, Newton Street spans about 30 feet west of Webster Street. East of Webster, it narrows to about 20 feet. East of Webster Avenue, it has sidewalks on only the north side of the street and is illuminated by streetlights. West of Webster Avenue, Newton has sidewalks on both sides of the street and is illuminated by streetlights. The land uses along Newton Street are primarily residential except along its northern section, where it is primarily commercial. Newton Street carries MBTA Bus Route 91 in both directions in the study area.

Everett Street

Everett Street is a one-way, one lane neighborhood street between Prospect Street and Webster Avenue. It marks the southern boundary of the D6 project site. There is on-street parking on Everett; on its north side between Emerson and Webster there are 7 private spots, and on its south side between Emerson and Prospect there are 7 unregulated spots. Everett Street spans 20 feet curb-to-curb, has sidewalks on both sides, and is lined by residential buildings or the back end of the commercial uses that face Somerville Avenue. There exists no bicycle infrastructure on this street.

Emerson Street

Emerson Street is a 200 ft. street that spans the distance between Newton Street and Everett Street. It is a two-way, two lane road with 7 private parking spots along its eastern curb. There are sidewalks on both sides, and it is lined by residential uses.

Hawkins Street

Hawkins Street is a one-way, one lane neighborhood street that extends northbound from Washington Street to Somerville Avenue to the west of Union Square. Both sides of Hawkins Street are lined with permit-only parallel parking spots. It is a 30 ft. wide road with no bicycle infrastructure. There are sidewalks on both sides of the street. Land use is primarily commercial.

Carlton Street

Carlton Street is a bi-directional, two lane neighborhood street that starts south from Somerville Avenue at Bow Street (Study Intersection #1) to Lake Street. Both sides of Carlton Street are lined with permit-only parallel parking spots. It is a 30 ft. wide road with no bicycle infrastructure. There are sidewalks on both sides of the street. Land use is primarily residential.

Church Street

Church Street is a one-way, one lane neighborhood street that extends southbound from Summer Street to Somerville Avenue at Study Area Intersection #23. Both sides of Church Street are lined with 2-hour or as permit allows parallel parking spots. It is a 30 ft. wide road with sharrow markings for cyclists. There are sidewalks on both sides of the street. Land use is primarily commercial.

Wesley Park

Wesley Park is a bi-directional, two lane neighborhood street that starts north from Bow Street (Study Intersection #3) and ends in a cul-de-sac. Both sides of Wesley Park are lined with permit-only parallel parking spots. It is a 30 ft. wide road with no bicycle infrastructure. There are sidewalks on both sides of the street. Land use is primarily residential or institutional.

Walnut Street

Walnut Street is a one-way, one lane neighborhood street that extends northbound from Bow Street (at Study Intersection #4) out of the study area. Both sides of Walbut Street are lined with 2-hour or as permit allows parallel parking spots. It is a 30 ft. wide road with no bicycle infrastructure. There are sidewalks on both sides of the street. Land use is primarily residential. There is a neighborhood park called Walnut Street Park on the west side of Walnut about one block north of Bow Street.

Warren Avenue

Warren Avenue is a bi-directional, two lane neighborhood street that starts north from Bow Street (Study Intersection #7) and continues north out of the study area. Both sides of Wesley Park are lined with permit-only parallel parking spots north of the Goodyear Auto Service Center. South of the Goodyear, the west side of the street has 5 parallel parking spots that are two-hours or as permit allows. It is a 30 ft. wide road with no bicycle infrastructure. There are sidewalks on both sides of the street. Land use is primarily residential or commercial.

Bonner Avenue

Bonner Avenue is a bi-directional, two lane neighborhood street that starts north from Washington Street (near Study Intersection #10) and continues north out of the study area. Both sides of Wesley Park are lined with permit-only parallel parking spots. It is a 30 ft. wide road with no bicycle infrastructure. There are sidewalks on both sides of the street. Land use is primarily residential or institutional.

Columbus Avenue

Columbus Avenue is a bi-directional, two lane neighborhood street that starts north from Washington Street (at Study Intersection #11) and continues north and west out of the study area. It provides direct access to project site D5. Both sides of Columbus Street are lined with permit-only parallel parking spots. It is a 30 ft. wide road with no bicycle infrastructure. There are sidewalks on both sides of the street. Land use is primarily residential or automobile-oriented commercial.

Allen Street

Allen Street is a bi-directional, two lane neighborhood street that starts south from Somerville Ave (at Study Intersection #25) and continues south to Charlestown Street. It will provide secondary access to project site D2 at its southern end (at Study Intersection #27). There is no on-street parking on Allen

Street. It is a 20 ft. wide road with no bicycle infrastructure. There are sidewalks on both sides of the street. Land use is primarily residential.

Linden Street

Linden Street is a bi-directional, two lane neighborhood street that starts south from Somerville Ave (at Study Intersection #12) and continues south to Charlestown Street. There is permit-only on-street parking on the west side of Linden Street. It is a 25 ft. wide road with no bicycle infrastructure. There are sidewalks on both sides of the street. Land use is primarily residential.

Beacon Street

Beacon Street is a bi-directional two-lane arterial roadway that enters the study area from the South at Inman Square, and travels northwest to exit the study area north of Washington Street. Beacon Street contains dedicated bicycle lanes on both sides, two hour parking available on both sides for the duration of the street, with resident permit exemptions available for all parking spaces. There are sidewalk on both sides of the street, and the adjacent land uses are a mix of commercial and residential uses.

Cambridge Street

Cambridge Street is a bi-directional two-lane arterial roadway that enters the study area from the west at Inman Square and travels east to exit the study area east of Webster Avenue. Cambridge Street contains dedicated bicycle lanes on both sides, and metered parking on both sides of the street. Sidewalks are available on both sides of the street, and ample crosswalks are available. Land uses are primarily mixed-use commercial, with residential uses as well. Route 69 travels along Cambridge Street.

3. Intersection Descriptions

The following intersections were analyzed during the traffic analysis conducted as part of this application. The existing conditions at these intersections are summarized in the following section. They are numbered according to the study area intersections map. Future year analyses for this study incorporate proposed changes to these intersections and roadways based on improvements recommended by the City. These changes are discussed in the Future Conditions section.

Table 16: Study Area Intersections for Analysis

Intersection Number	Intersection Name	Signalized / Unsignalized	Existing / Future Driveway
1	Somerville Avenue / Bow Street	Unsignalized	Existing
2	Bow Street / Summer Street	Signalized	Existing
3	Bow Street / Wesley Park	Signalized	Existing
4	Bow Street / Walnut Street	Unsignalized	Existing
5	Somerville Avenue / Hawkins Street	Unsignalized	Existing
6	Washington Street / Hawkins Street	Unsignalized	Existing
7	Somerville Avenue / Bow Street / Warren Avenue	Signalized	Existing
8	Washington Street / Somerville Avenue / Webster Avenue	Signalized	Existing
10	Washington Street / Bonner Avenue	Unsignalized	Existing
11	Washington Street / Columbus Avenue	Unsignalized	Existing
12	Somerville Avenue / Linden Street	Signalized	Existing
13	Somerville Avenue / Washington Street / Prospect Street	Signalized	Existing
15	Prospect Street / Everett Street / D2	Unsignalized	Existing
16	Webster Avenue / Newton Street	Unsignalized	Existing
17	Webster Avenue / Prospect Street / Concord Avenue	Signalized	Existing
18	Prospect Street / Oak Street	Unsignalized	Existing
19	Webster Avenue / Tremont Street / Columbia Street	Unsignalized	Existing
20	Washington Street / McGrath Highway	Signalized	Existing
21	Somerville Avenue / Medford Street	Signalized	Existing
22	Medford Street / South Street	Unsignalized	Existing
23	Somerville Avenue / School Street	Signalized	Existing
24	Columbus Avenue / D5	Unsignalized	Future
25	Somerville Avenue / Allen Street / D1	Unsignalized	Existing
26	Somerville Avenue / D2	Unsignalized	Future
27	Allen Street / D2	Unsignalized	Future

28	Concord Avenue / D4	Unsignalized	Future
29	Webster Avenue / D3	Unsignalized	Future
30	Columbia Street / Windsor Place / D3	Unsignalized	Existing
31	Everett Street / Emerson Street	Unsignalized	Existing
32	Webster Avenue / Everett Street	Unsignalized	Existing
33	Cambridge Street / Prospect Street	Signalized	Existing
34	Cambridge Street / Webster Avenue	Signalized	Existing

#8: Bow / Somerville / Washington / Webster

The intersection of Bow Street, Somerville Avenue, Washington Street, and Webster Avenue is the central intersection for Union Square. It is signalized and contains five legs: Webster Avenue northbound, Somerville Avenue westbound, Somerville Avenue southbound which forms a one-way pair with Bow Street northbound, and Washington Street northeast-bound.

The Somerville Avenue westbound approach has three lanes: a channelized right turn lane which allows movement onto Bow Street, a through lane which allows travel westbound on Washington Street, and a left turn lane which allows southbound movement onto Webster Avenue. The northbound Webster Avenue leg has one shared left-turn/through/right-turn lane, which allows through movement onto Bow Street, eastbound movement on Somerville Avenue to the right, and westbound movement on Washington Street to the left. The Washington Street leg has one through-left lane and one through-right lane, with through movements allowing eastbound travel on Somerville Avenue, left turn allowing northbound travel on Bow Street, and right turns allowing southbound travel on Webster Avenue. The Somerville Avenue eastbound approach has one through-right lane and two left turn lanes. The right turn allows westbound movement on Washington Street, the through movement allows southbound travel on Webster Avenue, and the left turn allows eastbound movement on Somerville Avenue.

Crosswalks are present across all legs of the intersection. Sidewalks are also present along both sides of all approaches. Bicycle lanes are present westbound on Somerville Avenue, passing through the channelized right turn and moving northbound onto Bow Street. The Somerville Avenue southbound approach offers a dedicated bicycle lane, as well as a bike box that allows cyclists to queue at the front of the approach. The Webster Avenue leg provides a southbound bicycle lane, while the Washington Street leg offers sharrows in both directions.

#2: Summer / Bow / Wesley Park

The intersection of Summer Street and Bow Street is a signalized intersection. Traffic is one-way to the west on Bow Street, the primary corridor, while two-way traffic operates on Summer Street and Wesley Park. The westbound Bow Street approach has a left turn lane which allows continued westbound movement on Bow Street and a through-right lane which allows northbound through movement onto Summer Street and an eastbound right-turn movement onto Wesley Park. The Summer Street approach operates with one right-turn lane, allowing westbound movement on Bow Street. The Wesley park approach operates with one right-turn lane which allows northbound movement onto Summer Street and westbound movement onto Bow Street.

Crosswalks are present across all legs of the intersection, and sidewalks are present on both sides of all approaches.

#3: Wesley Park / Bow

Wesley Park intersects Bow Street just before it reaches its fork at Summer Street. Wesley Park extended northward two blocks before coming to a dead end. It features one lane of through traffic in either

direction with a parking lane on both sides. Traveling southbound down Wesley, there is a forced right turn onto either Bow Street, leading due west, or Summer Street, leading northwest.

The intersection is signaled, crosswalks are present across all legs of the intersection, and both sides of Wesley Park host sidewalks. While dedicated bike lanes exist on both Bow and Summer Street, no bike lanes – dedicated or shared – are present down Wesley Park.

#4: Walnut / Bow

The intersection of Walnut and Bow Street is an unsignaled intersection. Walnut extends north from Bow Street providing connection between the primary corridors of Somerville Ave to the south and Highland Ave to the north. Walnut features one-way traffic with a parking lane on either side, a shared bike lane, and sidewalks on both sides with staggered bike parking. The mouth of Walnut Street hosts a crosswalk, but the pedestrians hoping to cross Bow to access Walnut only have marked crosswalks at Bow and Somerville Ave a block southward or Bow and Wesley Park a block to the northwest.

#5: Hawkins / Somerville

Where Hawkins intersects Somerville Ave., Somerville Ave. hosts one-way traffic traveling southeastward. Somerville Ave. is two lanes of through traffic with a parking lane on either side and a dedicated bike lane. Hawkins, a one-way street with through traffic traveling north, meets Somerville Ave. at an unsignaled intersection. Hawkins traffic arrives at Somerville Ave. with a stop sign and a forced right turn, as both streets are one-ways. Crosswalks across both Somerville Ave. and Hawkins Street are present at this intersection. Additionally, sidewalks and a lane of parking are present on both sides of Hawkins. The street hosts no bike lanes – dedicated or shared.

#6: Washington / Hawkins

Where Washington Street meets Hawkins Street is an unsignaled, unsigned intersection. Washington Street is east/west travelling, features one lane of through traffic and one parking lane on both sides of the street, and hosts a shared bike lane in either direction. Hawkins is a one-way that continues for two-blocks and serves to connect the main drags of Washington and Somerville Ave. At this intersection, Hawkins features a crosswalk; as does Washington Street. Hawkins has one lane of through traffic, a sidewalk and a lane of parking on each side, no traffic signals along its two blocks, and no bike lane-shared or otherwise.

#7: Bow / Warren

Warren meets Bow Street at an intersection that is signaled for Bow traffic and signed for Warren Ave. traffic – stop sign. At this location, Bow Street traffic travels northwest along a one-way, single lane thoroughfare with a designated bike lane, and on-street parking on either side of the road. Below the traffic signals on Bow Street sits a crosswalk.

Warren Ave. meets Bow Street at a forced right turn. Warren travels northeast/southwest and hosts traffic in both directions with sidewalks on either side. The first block down Warren, away from the intersection allows parking on the left side of the street. The right side parking lane only becomes available at the second block. Warren has no bike lane in place and features a crosswalk where it opens to Bow.

#8: Washington / Somerville / Webster

Washington Street, Somerville Ave., and Webster Ave. meet at a signaled intersection at the heart of Union Square. Webster starts/stops at the intersection, as opposed to running through it on both sides, and continues southward. Webster features a lane of parking – restricted during school days – on either side with a designated bike lane, sidewalks, and two lanes of one-way southbound traffic.

Similarly, Washington Street does not continue through the intersection – it travels in the east-west direction to and from the intersection. Entering the intersection, Washington Street opens from a single

lane thoroughfare with a lane of on-street parking to a two lane road – the right lane allowing for continuation onto Somerville Ave. or a right turn down Webster, the left lane allowing for continuation onto Somerville Ave. or a left turn onward to Somerville Ave. briefly headed in the direction of Bow Street. Washington offers a shared bike lane in both directions.

Somerville Ave travels through the intersection in the northwest/southeast direction. At the intersection site, Somerville Ave. features three lanes of through traffic and a designated bike lane. The left-most lane is turn-only and continues Somerville Ave. traffic along Somerville Ave. The center lane offers a left turn or continuation straight onto Webster Ave. The right lane allows for a turn onto Washington Street or a continuation onto Webster.

All legs of the intersection feature traffic signals, crosswalks, and timed crossing signals.

#10: Washington / Bonner

Where Bonner Ave. meets Washington Street is a signed intersection with Bonner traffic arriving at a stop sign with the option to turn right into the Union Square surface parking lot, or left onto Washington Street. Bonner Street hosts north/south traveling traffic, a single lane in either direction, and a parking lane on either side. Both sides of the street feature sidewalks, no bike lane distinction exists, and a crosswalk across Bonner exists where the street meets Washington.

Washington Street hosts two through traffic lanes in either direction at this site with on-street parking not becoming available for at least one block away from the intersection. Traffic wanting to access Bonner Ave. must do so through a turning lane to the right that bends traffic away from the busy thoroughfare of Washington toward both the Union Square parking lot and Bonner Ave.

At this intersection, crosswalks exist at each leg and a shared biking lane is present down Washington Street.

#11: Washington / Columbus

Columbus Ave. meets Washington Street at a signed intersection – stop sign on Columbus. The lone crosswalk at this intersection exists at the opening of Columbus, there is no crosswalk across Washington Street here. Columbus features one lane of traffic in either direction – north/south – with a parking lane on either side, with no bike lane distinctions.

Washington Street, at this location, is a heavily trafficked thoroughfare with two lanes of traffic traveling east/west and a single parking lane on the right side of the eastward direction. It hosts a share bike lane and sidewalks on either side.

#12: Somerville / Linden

Linden Street travels north/south, meeting Somerville Ave. at its northern most end at a signaled intersection. Linden features a single lane of traffic traveling in both the north and south directions with a parking lane to the right of its northbound lane. Sidewalks exist on either side of Linden, and the street hosts no bike lane distinctions.

Somerville Ave., at its meeting point with Linden, accounts for one land of through traffic in both directions – northwest and southeast, parking lanes, bike lanes, and sidewalks on both sides of the road. Two crosswalks are present at this intersection – one crossing Linden and the other crossing Somerville Ave.

#13: Somerville / Prospect

Somerville and Ave. and Prospect Street meet at a signaled intersection. Prospect enters the intersection from the south with three one-way lanes of through traffic – the left-most accounting for a turn-only lane, the center lane allowing for both left turns and continued travel straight up Prospect, and the right-most

lane allowing for continued straight travel and right turns down Somerville Ave. Given the left-turning lane, Prospect leaves the intersection northward with two lanes of through traffic. Neither on-street parking nor bike lanes are present.

Heading westward out of the intersection, Somerville Ave. consists of two traffic lanes and a designated bike lane heading toward Union Square. Entering the intersection from the west, Somerville Ave. hosts two through traffic lanes with no parking and no bike lane. The right lane must continue straight down Somerville Ave., as no right down Prospect is permitted, while the left lane has the option to continue straight or turn left up Prospect.

Heading eastward out of the intersection, Somerville Ave. features one lane of through traffic, a designated bike lane, and a parking lane. Entering the intersection from the east, Somerville Ave. features a left lane for straight through traffic and a right lane that allows for both turning north onto Prospect and forward continuation down Somerville Ave. No bike lane is present here, nor is on-street parking.

Every leg of the intersection features a crosswalk with times signals.

#31: Newton / Everett

Everett – a one-way street traveling northwest, intersects Newton – a one-way street traveling northeast, at an intersection that is neither signaled nor signed. Both streets account for a single lane of through traffic and one lane of parking. Neither street have any bike lane distinctions or crosswalks present. Newton Street has a sidewalk on only one side – the side on which parking is not permitted. Everett Street has parking on both sides. However, Everett is signed with notice of being a "Private Way".

#15: Prospect / Newton

Newton Street intersects Prospect Street at a signed intersection at which Newton traffic is met with a stop sign. At the intersection, no parking nor bike lanes are present. Both streets are one-way travel only – Newton traveling northeast and Prospect headed in a direction more due north. Both sides of Prospect hosts sidewalks, while only the left side of Newton features pedestrian infrastructure. A crosswalk exists to cross the opening of Newton onto Prospect Street, but no crosswalk exists that allows for the crossing of Prospect.

#16: Webster / Newton

Webster and Newton intersect at a signed intersection. Webster Ave. traffic enters the intersection solely from the north, travelling southbound, with two lanes of through traffic, a designated bike lane, and a single parking lane. It exists the intersection with two lanes of southbound traffic, no bike lane distinctions, and no parking lane.

Traveling east, Newton is a single-lane one-way road with a single lane of parking. To the west of the intersection, Newton Street hosts a single lane of through traffic with a parking lane on the right of the eastbound lane.

Dual sidewalks are present everywhere except the eastbound strip of Newton Street leaving the intersection. Here, a single sidewalk is present. Crosswalks exist at both legs of Newton and the northern leg of Webster Ave.

#17: Webster / Prospect / Concord

The three-way intersection of Webster Ave., Prospect Street, and Concord Ave. is a signaled intersection. The northern side of this intersection, features a one-way Webster Ave heading southbound and a two-lane Prospect Street heading northbound. Neither street hosts parking of bike lane distinction here.

Concord leaves the intersection, travelling solely westward, consisting of a single lane of through traffic and two parking lanes. Both sides of Concord have sidewalks, and no bike land distinction exists.

The southern side of the intersection, consisting of both Webster and Prospect, features one lane of traffic entering the intersection and one lane existing the intersection on both streets. Prospect hosts a shared bike lane in both directions a single parking lane in the north-traveling direction. Webster hosts a single through lane in either direction with no parking and no bike lane distinction at the site of the intersection.

Crosswalks are present at every leg of the intersection with times signals.

#18: Prospect / Oak

Oak Street meets Prospect Street at a signed intersection. Oak travels northeast into the intersection and southwest out of the intersection; it does not extend through to cross Prospect Street. At this site, Oak features a lane of parking on either side as well as dual sidewalks, a single lane of traffic in each direction, and no bike lane distinctions. A crosswalk exists here that traverses Oak Street.

Prospect features one lane of traffic in either direction as well as a shared bike lane traveling in both directions. Sidewalks are present on both sides of the road and a parking lane exists in the northbound direction.

#19: Tremont / Webster / Columbia

This three-way intersection is neither signaled nor signed. None of the three streets involved at this site host bike lane distinctions of any kind, and crosswalk are entirely absent. Webster, traveling slightly northwest/southeast consists of one lane in either direction, a parking lane on both sides, and dual sidewalks. Tremont Street is a one-way heading southwest away from the intersection. It features a single lane of through traffic and two parking lanes. Columbia hosts one lane of travel in both directions – west toward the intersection and east away from it – with no parking allowed on either side.

#20: McGrath Hwy / Washington

Washington meets McGrath at a signaled intersection. Entering the intersection from the west, Washington Street features three lanes of through traffic and a designated bike lane. The left and center lanes must travel straight and enter what is effectively a roundabout while the right lane has the option to turn right and travel along the grounded portion of McGrath that mirrors its south traveling elevated section. Once through the roundabout, the two lanes of through traffic may continue on along Washington Street or take the last exit out of the roundabout and travel along the grounded portion of McGrath that mirrors its north traveling elevated section. This traffic pattern is exactly mirrored on the other side of Washington, entering the intersection from the east.

McGrath Hwy splits at this intersection to allow through highway traffic to continue along its elevated thoroughfare while providing access to Washington Street and other Union Square tributaries by way of its grounded lanes. This grounded section accounts for two lanes and a designated bike lane in either direction.

No parking is permitted in the vicinity of the intersection, and crosswalks are present at every leg of the roundabout.

#21: Somerville / Medford

Somerville Ave. and Medford Street meet at a signaled intersection. At this site, west of the intersection, Somerville Ave. hosts two lanes of through traffic traveling in either direction – southeast and northwest. Designated bike lanes exist of both directions and are clearly signs through all available turns. East of the intersection, Somerville Ave. leaves the intersection but does not enter it. This eastward path connects Somerville Ave. with McGrath Hwy.

Entering the intersection from the south, Medford hosts a single lane of through traffic that becomes a left-turn only lane onto Somerville Ave. It hosts a designated bike lane that mirrors this forced turn.

Existing the intersection heading southward down Medford Street are two lanes of through traffic with a shared bike lane.

Entering the intersection from the north traveling south, Medford features three traffic lanes. The left lane is a forced left turn down Somerville Ave. to join McGrath Hwy. The center line continue straight down Medford, and the right lane is an option turn to travel west toward Union Square. The right lane and the designated bike lane momentarily share a lane at the intersection.

Crosswalks exist across Medford at the south of the intersection and across Somerville Ave. at the west of the intersection.

#22: South / Medford

South Street meets Medford at an intersection that is both signed and signaled for pedestrians – neither are present for vehicular traffic. South Street is a single lane, one-way street that travels due west away from its intersection with Medford Street. It hosts a single parking lane, dual sidewalks, and no bike lane distinctions.

At this site, Medford accounts for one lane of through traffic in either direction with a single parking lane on the northbound side. It features dual sidewalks and a shared bike lane. Both legs of this intersection hosts a crosswalk.

#23: Somerville / School

School Street meets Somerville Ave. at a signaled intersection. School Street, a one-way two lane road traveling southwest, meets Somerville Ave. with a left-turning lane and a right turning lane – continuing traffic along School across Somerville Ave. is not an option as School ends in a T. School has a shared bike lane with parking on both sides. This parking ends just before the intersection. Somerville Ave. at this location hosts a designated bike lane in either direction, along with one lane of through traffic and a parking lane on either side. Crosswalks and timed signals exist for all legs of this intersection.

#33: Cambridge / Prospect

Cambridge Streets meets Prospect Street at a signaled intersection. Prospect Street features one lane of through traffic in either direction traveling north and south out of the intersection. One lane of parking exists in the northward traveling lane both entering and exiting the intersection. Both the north and southbound lanes host sidewalk both entering and existing the intersection. No bike travel distinction, neither designated nor shared lane, exists on Prospect at this site.

Cambridge Street features a single lane of through traffic, a designated bike lane, and a parking lane in both the eastbound and westbound directions both entering and existing the intersection. Sidewalks are present on both sides of the street. Crosswalks are present at all legs of the intersection.

#34: Cambridge / Webster

Cambridge Street meets Webster Avenue at a signaled intersection. Cambridge Street features a single lane of through traffic, a designated bike lane, and a parking lane in both the eastbound and westbound directions both entering and existing the intersection. Sidewalks are present on both sides of the street with staggered bike parking. Webster enters the intersection from the north heading southward. Exiting the intersection southbound Webster turns into Columbia Street, which features one lane of through traffic in either direction, no bike travel distinctions, and a single parking lane on the northbound side of the street.

At the intersection site, Webster Avenue features two lane entering from the north. The left lane is a forced turning lane while the right lane allows for both continued straight travel and a right turn for westbound travel. Exiting the intersection. Webster hosts one northbound lane of through traffic that later includes a parking lane alongside it. Crosswalks exist at all legs of the intersection.

#36: Beacon / Concord

Beacon Street meets Concord Avenue at an unsigned intersection. Both entering and exiting the intersection, Beacon features one lane of through traffic in either direction with a designated bike lane and lane of parking on both sides of the street. Concord Avenue is a one-way road exiting the intersection – it only caries traffic that has turned off of Beacon. A parking lane exists on the right side of the street and there are no bike travel distinctions. Both Beacon and Concord feature sidewalks on either side, and a crosswalk is present across the mouth of Concord as well as across Beacon.

#37: Beacon / Washington

Beacon Street meets Washington Street at a signaled intersection. Entering the intersection from the northeast, Washington features one lane of through traffic, a shared bike lane, and a parking lane in either direction. The same is true of Washington exiting to the southwest. However, here the shared bike lane signage is not present. Beacon, both entering and exiting the intersection, hosts one lane of through traffic, a designated bike lane, and a parking lane traveling in both directions. Sidewalks and crosswalks are present at all legs of the intersection.

#35: Inman Square

The Inman Square intersection is primarily comprised of Beacon Street, traveling northwest/southeast, and Cambridge Street, traveling more directly east and westward. The secondary tier of contributing streets to this intersection are Springfield Street – traveling southward into the intersection and northward out of it, Inman Street – traveling southward out of the intersection, and Antrim Street – traveling southward out of the intersection.

Beacon Street features one lane of through traffic with a designated bike lane and a parking lane on either side of the road both entering and exiting the intersection. Cambridge Street features two through traffic lanes entering the intersection from both directions, but just one through traffic lane leaving the intersection in both directions. It also features a shared bike lane and parking lane on either side of the road. Both Beacon and Cambridge have signaled crosses, sidewalks on both sides, and crosswalks on all legs on the intersection.

Springfield features one lane of through traffic in either direction, no bike travel distinctions, sidewalks, a crosswalk, and a parking lane in the southbound direction. Inman and Antrim Streets are both one-ways with one lane of through traffic, a parking lane on either side of the road, sidewalks, a crosswalk at the intersection, and no bike travel distinctions.

D. Transportation Analysis

1. Analysis Conditions/Scenarios Overview

As required by the City, four scenarios will be analyzed for each analysis section of this document. These scenarios are as follows.

Existing (Base Year) Scenario

The Existing (Base Year) scenario will provide the baseline conditions for analysis. This scenario includes recent improvements to the study area roadways, including the two-way conversion of Prospect Street and Webster Avenue. It also includes the scheduled improvements to Somerville Avenue that include the implementation of streetscaping changes and bidirectional cycle tracks between Union Square and McGrath Highway / Medford Street.

Base Year Built Condition (Phase 1, Phase 2)

The Base Year Built Condition will be split into two phases: Phase 1 (2024) will analyze the impacts of the Phase 1 development sites as described herein, while Phase 2 (2026) will add the impacts from

construction of Phase 2 of the Union Square Revitalization Project. Phase 1 includes development sites D2 and D5, while Phase 2 includes sites D1 and D3.

Base Year Built Condition (Phase 1, Phase 2) with Mitigation

This scenario adds any proposed mitigation to the Base Year scenarios.

Future Year (2030) Built Condition with Mitigation

The Future Year scenario adds the impacts from Phase 3 of the development plan, resulting in an analysis that includes all development sites, and all proposed mitigation. Phase 3 adds trips from the D4, D6, and D7 sites to the analysis.

Changes to the future year roadway network include the two way conversion of Somerville Avenue between Union Square and Bow Street, as well as the two way conversion of Hawkins Street.

2. Pedestrian Analysis

a. Context Overview

As a neighborhood commercial and recreational center, Union Square is frequented by a large number of pedestrians of all ages, genders, and backgrounds. Walkers regularly visit one, two, or more establishments for shopping, dining, and entertainment. Furthermore, the presence of multiple bus routes in the study area encourages walking to and from bus stops and hubs for commuters and other travelers. The following pedestrian analysis investigates existing pedestrian activity at key locations across the study area. These locations are analyzed for crowding on walkways, as well as pedestrian delay at crosswalks. Site-generated pedestrian trips are discussed for future scenarios, as are the impacts of proposed streetscaping changes for Somerville Avenue.

b. Base Year No Build Conditions

The base year condition includes existing conditions, plus the proposed improvements to Somerville Avenue. Existing pedestrian counts, as well as an age/gender study, were conducted to further evaluate expected conditions during the base year.

i. Pedestrian Volumes

The maps on the following pages display pedestrian volumes at each intersection for the AM peak, PM peak, and Saturday midday peak.

During the AM peak, the highest pedestrian volumes were observed at the following intersections:

- Inman Square, particularly heading east and west along Cambridge Street
- Cambridge Street at Webster Avenue
- Cambridge Street at Prospect Street
- Union Square, at all crossing locations
- Washington Street at McGrath Highway, heading both east and west
- Bow Street, between Summer Street and Somerville Avenue

During the PM peak, the highest pedestrian volumes were observed at the following intersections:

- Inman Square, particularly heading east and west along Cambridge Street
- Cambridge Street at Webster Avenue
- Cambridge Street at Prospect Street

- Union Square, at all crossing locations
- Washington Street at McGrath Highway, heading both east and west
- Bow Street, between Summer Street and Somerville Avenue
- Beacon Street at Washington Street, in all crossing directions

During the Saturday midday peak, the highest volumes were observed at the following locations:

- Inman Square, particularly heading east and west along Cambridge Street
- Cambridge Street at Webster Avenue
- Cambridge Street at Prospect Street
- Union Square, at all crossing locations
- Washington Street at McGrath Highway, heading both east and west
- Bow Street, between Summer Street and Somerville Avenue
- Beacon Street at Washington Street, in all crossing directions

Figure 16: Existing Pedestrian Counts, AM Peak

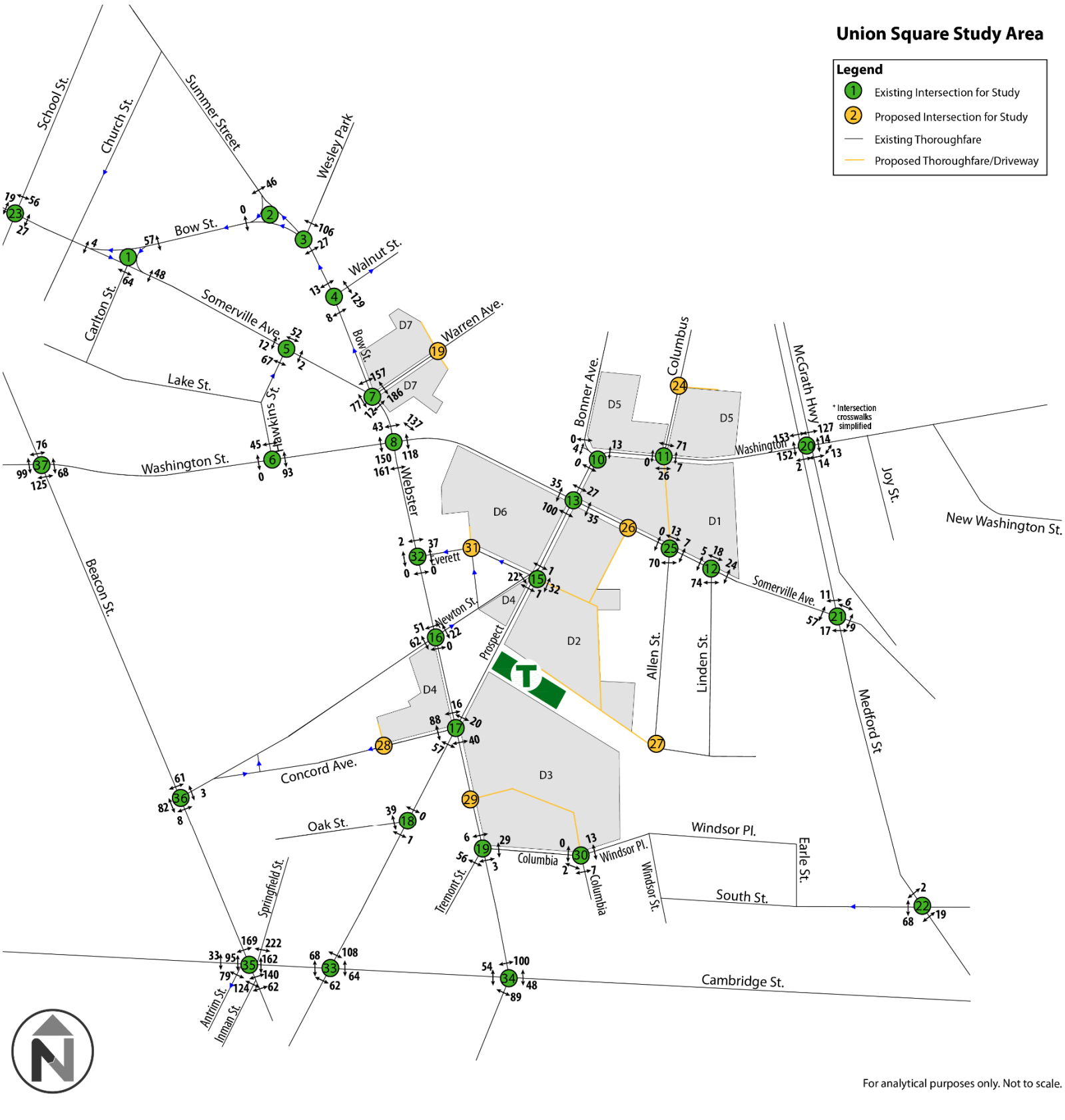


Figure 17: Existing Pedestrian Counts, PM Peak

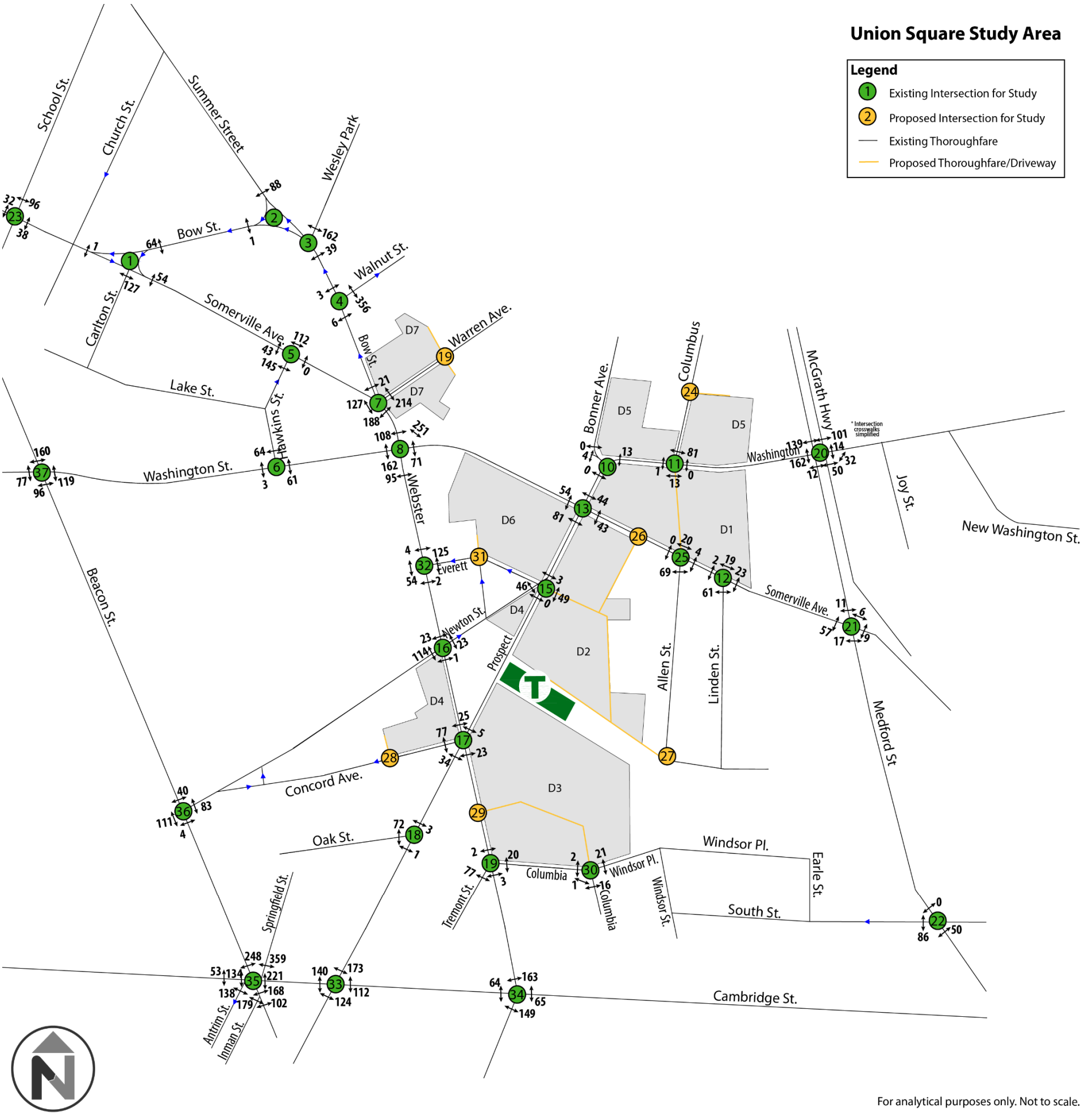
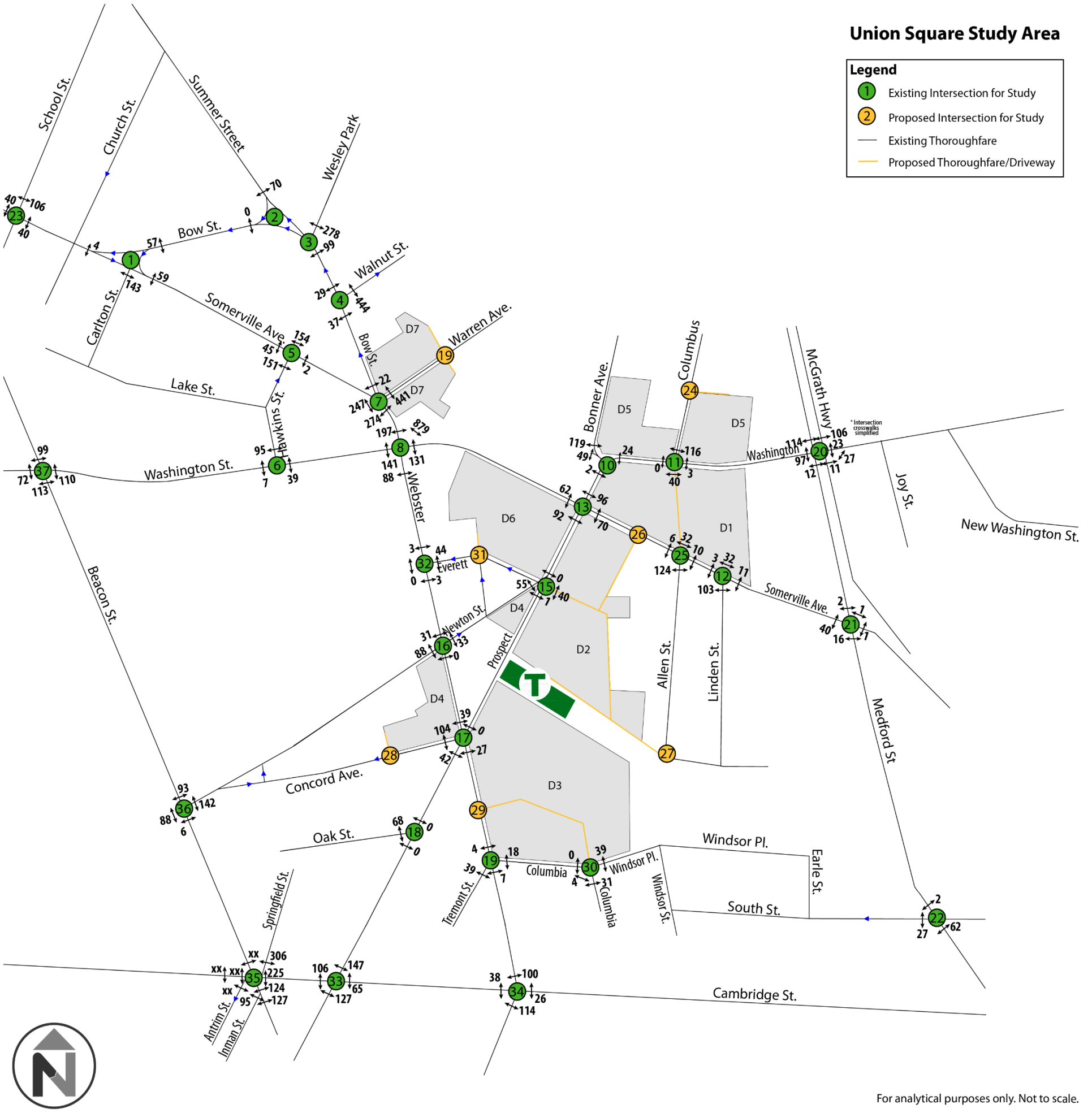


Figure 18: Existing Pedestrian Counts, Saturday Midday Peak



In addition to intersection counts, pedestrian counts were taken along key corridors throughout the day. These locations are indicated in a map on the following page. Age and gender data was recorded for all pedestrians during a ten minute observation period for each hour between 7 AM and 8 PM. These observations were used to estimate hourly pedestrian volumes at each key location. Results from this analysis are displayed in the tables below.

Table 17: Existing Pedestrian Age and Gender Counts by Hour, 7 AM - 8 PM

Webster Ave between Washington St and Everett St				**Prospect St between Somerville Ave and Newton St**			
Hour	**Hourly Volume Estimate**	**Gender Split (Females / Total)**	**Median Age**	**Hour**	**Hourly Volume Estimate**	**Gender Split (Females / Total)**	**Median Age**
7:00 AM	84	21%	15-30	**7:00 AM**	30	20%	15-30
8:00 AM	144	58%	15-30	**8:00 AM**	30	60%	15-30
9:00 AM	168	50%	15-30	**9:00 AM**	48	63%	15-30
10:00 AM	96	75%	15-30	**10:00 AM**	12	50%	31-64
11:00 AM	72	50%	15-30	**11:00 AM**	24	50%	31-64
12:00 PM	36	67%	15-30	**12:00 PM**	12	0%	31-64
1:00 PM	120	50%	31-64	**1:00 PM**	6	100%	15-30
2:00 PM	42	43%	31-64	**2:00 PM**	66	55%	15-30
3:00 PM	660	56%	15-30	**3:00 PM**	114	58%	15-30
4:00 PM	72	33%	15-30	**4:00 PM**	30	40%	15-30
5:00 PM	192	59%	15-30	**5:00 PM**	132	50%	15-30
6:00 PM	210	82%	15-30	**6:00 PM**	192	50%	15-30
7:00 PM	132	27%	15-30	**7:00 PM**	48	38%	15-30
8:00 PM	108	39%	15-30	**8:00 PM**	42	29%	15-30
Peak Hour	**660 (3 - 4 PM)**	**56%**	**15-30**	**Peak Hour**	**192 (6 - 7 PM)**	**50%**	**15-30**
Somerville Ave between Bow St and Hawkins St				**Somerville Ave between Prospect St and Allen St**			
Hour	**Hourly Volume Estimate**	**Gender Split (Females / Total)**	**Median Age**	**Hour**	**Hourly Volume Estimate**	**Gender Split (Females / Total)**	**Median Age**
7:00 AM	42	57%	15-30	**7:00 AM**	36	33%	15-30
8:00 AM	138	65%	15-30	**8:00 AM**	162	48%	31-64
9:00 AM	114	47%	15-30	**9:00 AM**	66	55%	31-64
10:00 AM	66	73%	31-64	**10:00 AM**	54	44%	15-30
11:00 AM	102	41%	15-30	**11:00 AM**	60	30%	15-30
12:00 PM	114	53%	31-64	**12:00 PM**	48	50%	31-64
1:00 PM	102	71%	15-30	**1:00 PM**	24	100%	31-64
2:00 PM	90	40%	31-64	**2:00 PM**	120	45%	15-30
3:00 PM	96	50%	15-30	**3:00 PM**	90	47%	31-64
4:00 PM	90	40%	31-64	**4:00 PM**	72	58%	31-64
5:00 PM	156	46%	15-30	**5:00 PM**	108	44%	15-30
6:00 PM	204	50%	15-30	**6:00 PM**	120	40%	31-64

7:00 PM	192	41%	15-30	**7:00 PM**	84	50%	31-64
8:00 PM	198	21%	15-30	**8:00 PM**	66	45%	15-30
Peak Hour	**204 (6 - 7 PM)**	**50%**	**15-30**	**Peak Hour**	**162 (8 - 9 AM)**	**48%**	**31-64**
Somerville Ave between Stone Ave and Prospect St				**Washington St between Prospect St and Columbus Ave**			
Hour	**Hourly Volume Estimate**	**Gender Split (Females / Total)**	**Median Age**	**Hour**	**Hourly Volume Estimate**	**Gender Split (Females / Total)**	**Median Age**
7:00 AM	66	64%	15-30	**7:00 AM**	120	55%	15-30
8:00 AM	150	48%	15-30	**8:00 AM**	126	38%	15-30
9:00 AM	90	40%	15-30	**9:00 AM**	54	22%	31-64
10:00 AM	66	64%	15-30	**10:00 AM**	72	50%	15-30
11:00 AM	54	33%	15-30	**11:00 AM**	66	45%	31-64
12:00 PM	96	56%	31-64	**12:00 PM**	24	25%	15-30
1:00 PM	108	94%	31-64	**1:00 PM**	84	57%	31-64
2:00 PM	114	63%	31-64	**2:00 PM**	90	33%	15-30
3:00 PM	168	54%	15-30	**3:00 PM**	84	36%	15-30
4:00 PM	120	35%	31-64	**4:00 PM**	36	33%	31-64
5:00 PM	156	58%	15-30	**5:00 PM**	72	58%	15-30
6:00 PM	216	47%	15-30	**6:00 PM**	132	36%	15-30
7:00 PM	186	45%	15-30	**7:00 PM**	102	47%	15-30
8:00 PM	48	25%	15-30	**8:00 PM**	84	29%	15-30
Peak Hour	**216 (6 - 7 PM)**	**47%**	**15-30**	**Peak Hour**	**132 (6 - 7 PM)**	**36%**	**15-30**
Washington St between Hawkins St and Webster Ave				**Bow St between Walnut St and Warren Ave**			
Hour	**Hourly Volume Estimate**	**Gender Split (Females / Total)**	**Median Age**	**Hour**	**Hourly Volume Estimate**	**Gender Split (Females / Total)**	**Median Age**
7:00 AM	144	50%	15-30	**7:00 AM**	126	43%	15-30
8:00 AM	492	51%	15-30	**8:00 AM**	360	50%	15-30
9:00 AM	108	39%	15-30	**9:00 AM**	240	53%	15-30
10:00 AM	72	33%	31-64	**10:00 AM**	198	61%	15-30
11:00 AM	60	70%	31-64	**11:00 AM**	390	34%	15-30
12:00 PM	558	48%	15-30	**12:00 PM**	228	47%	15-30
1:00 PM	102	35%	31-64	**1:00 PM**	270	47%	15-30
2:00 PM	66	64%	15-30	**2:00 PM**	240	43%	15-30
3:00 PM	156	50%	15-30	**3:00 PM**	276	48%	15-30
4:00 PM	60	30%	15-30	**4:00 PM**	144	67%	31-64
5:00 PM	108	39%	15-30	**5:00 PM**	204	65%	31-64
6:00 PM	138	39%	15-30	**6:00 PM**	354	53%	15-30
7:00 PM	84	29%	15-30	**7:00 PM**	240	55%	31-64
8:00 PM	66	55%	15-30	**8:00 PM**	276	50%	15-30

Peak Hour	**558 (12 - 1 PM)**	**48%**	**15-30**	**Peak Hour**	**390 (11 AM - 12 PM)**	**34%**	**15-30**

Bow St between Summer St and Bow St Pl			
Hour	**Hourly Volume Estimate**	**Gender Split (Females / Total)**	**Median Age**
7:00 AM	126	43%	31-64
8:00 AM	360	50%	31-64
9:00 AM	240	48%	15-30
10:00 AM	198	64%	15-30
11:00 AM	390	34%	31-64
12:00 PM	228	47%	15-30
1:00 PM	270	47%	15-30
2:00 PM	240	43%	15-30
3:00 PM	276	48%	15-30
4:00 PM	144	67%	31-64
5:00 PM	204	65%	31-64
6:00 PM	354	53%	15-30
7:00 PM	240	55%	31-64
8:00 PM	276	50%	15-30
Peak Hour	**390 (11 AM - 12 PM)**	**34%**	**31-64**

ii. Street Life Analysis

Street Life analysis describes the level of pedestrian activity at key corridor locations throughout the study area. This analysis evaluates the width of available walkways and the estimated pedestrians per minute to describe walkway conditions on a scale from "Calm" to "Overcrowded." The rating scale is as follows:

Table 18: Street Life Rating Parameters

Street Life Rating	Pedestrians/Minute/Foot
Calm	<5
Active	5-7
Lively	7-10
Bustling	10-15
Jammed	15-23
Overcrowded	>23

Based on these ratings, Street Life conditions were calculated for AM, PM, and midday peaks for all pedestrian corridor count locations. Results from this analysis are displayed in the following table.

Table 19: Existing Street Life Analysis Results

	AM		Mid-Day		PM	
Intersection	Ped/Min/Ft	Street Life Rating	Ped/Min/ Ft	Street Life Rating	Ped/Min/ Ft	Street Life Rating
Webster Ave between Washington St and Everett St	0.4	Calm	1.4	Calm	0.4	Calm
Prospect St between Somerville Ave and Newton St	0.1	Calm	0.2	Calm	0.4	Calm
Somerville Ave between Bow St and Hawkins St	0.2	Calm	0.2	Calm	0.3	Calm
Somerville Ave between Prospect St and Allen St	0.2	Calm	0.2	Calm	0.2	Calm
Somerville Ave / Union Square between Stone Ave and Prospect St	0.2	Calm	0.2	Calm	0.3	Calm
Washington St between Prospect St and Columbus Ave	0.2	Calm	0.1	Calm	0.2	Calm
Washington St between Hawkins St and Webster Ave	0.6	Calm	0.7	Calm	0.2	Calm
Bow St between Walnut St and Warren Ave	0.4	Calm	0.3	Calm	0.4	Calm
Bow St between Summer St and Bow St Pl	0.6	Calm	0.7	Calm	0.6	Calm

The results above indicate that all key pedestrian corridors currently operate at a “Calm” level, with ample room remaining before reaching the threshold for the “Active” rating. This indicates that pedestrian trips added by future development will not push any corridor locations into the “Active” category.

iii. Crosswalk Analysis

In addition to Street Life analysis, pedestrian level of service (PLOS) was calculated for every crossing location at each study area intersection. PLOS measures the expected delay for pedestrians attempting to cross, using a measurement of the crosswalk length and vehicular traffic flow. Results from the PLOS analysis are displayed in the tables on the following pages. Tables are separated into signalized and unsignalized intersections.

During the AM peak, the following intersections experience PLOS scores of E or F, indicating unacceptable delay with high potential for jaywalking.

- Somerville Avenue at Washington Street / Prospect Street experiences LOS E at the crossing of the eastbound approach to the intersection, across Somerville Avenue. Pedestrians can expect 40 seconds of delay at this crossing
- Somerville Avenue at Hawkins Street experiences LOS E at the crossing of Somerville Avenue across the southeast approach to the intersection. This is an unsignalized intersection with a large amount of traffic on Somerville Avenue which forces pedestrians to wait for an appropriate gap. Given the generous yielding to pedestrians exhibited by most drivers in the Union Square community, this LOS analysis likely overestimates expected delay.

- Washington Street at Hawkins Street experiences LOS F at the crossing of Washington Street at the westbound approach to the intersection. This is an unisgnalized intersections with a large amount of traffic on Washington Street which forces pedestrians to wait for an appropriate gap. Like Somerville Avenue at Hawkins Street, the generous yielding to pedestrians exhibited by most drivers in the Union Square community and ample "yield to pedestrians" signage means this LOS analysis likely overestimates expected delay at this location.
- Webster Avenue at Newton Street experiences LOS F at the crossing of Webster Avenue at the southbound approach to the intersection. This is an unsignalized intersection with a large amount of traffic on Webster Avenue. Like the previous intersections, motor vehicles are likely to yield to pedestrians waiting for a gap, meaning that the indicated LOS F may not be fully realistic due to generous driver behavior.
- Medford Street at South Street experiences LOS E at the crossing of Medford Street at the northbound approach, and LOS F at the crossing of South Street at the westbound approach. This is an uncontrolled intersections with large traffic volumes, forcing pedestrians to wait for an appropriate gap.
- Webster Avenue at Everett Street experiences LOS E at the crossing of Webster Avenue at the southbound approach to the intersection. This intersection experiences a large amount of traffic along Webster Avenue and forces pedestrians to wait for an appropriate gap. Generous yielding likely alleviates much of this delay, like the other unsignalized intersections in this list.

During the PM peak, the following intersections experience PLOS scores of E or F:

- Somerville Avenue at Washington Street / Prospect Street experiences LOS E at the crossing of the eastbound approach to the intersection, across Somerville Avenue. Pedestrians can expect 40 seconds of delay at this crossing.
- Bow Street at Walnut Street experiences LOS F at the crossing of Bow Street at the southbound approach. This location does not actually have a crosswalk, but is a site of significant pedestrian activity with a high likelihood of jaywalking.
- Somerville Avenue at Hawkins Street experiences LOS E at the crossing of Somerville Avenue across the southeast approach to the intersection. This is an unsignalized intersection with a large amount of traffic on Somerville Avenue which forces pedestrians to wait for an appropriate gap. Given the generous yielding to pedestrians exhibited by most drivers in the Union Square community, this LOS analysis likely overestimates expected delay.
- Washington Street at Hawkins Street experiences LOS F at the crossing of Washington Street at the westbound approach to the intersection. This is an unisgnalized intersections with a large amount of traffic on Washington Street which forces pedestrians to wait for an appropriate gap. Like Somerville Avenue at Hawkins Street, the generous yielding to pedestrians exhibited by most drivers in the Union Square community and ample "yield to pedestrians" signage means this LOS analysis likely overestimates expected delay at this location.
- Webster Avenue at Newton Street experiences LOS F at the crossing of Webster Avenue at the southbound approach to the intersection. This is an unsignalized intersection with a large amount of traffic on Webster Avenue. Like the previous intersections, motor vehicles are likely to yield to pedestrians waiting for a gap, meaning that the indicated LOS F may not be fully realistic due to generous driver behavior.
- Medford Street at South Street experiences LOS E at the crossing of Medford Street at the northbound approach, and LOS F at the crossing of South Street at the westbound approach. This

is an uncontrolled intersections with large traffic volumes, forcing pedestrians to wait for an appropriate gap.

- Webster Avenue at Everett Street experiences LOS E at the crossing of Webster Avenue at the southbound approach to the intersection. This intersection experiences a large amount of traffic along Webster Avenue and forces pedestrians to wait for an appropriate gap. Generous yielding likely alleviates much of this delay, like the other unsignalized intersections in this list.

Table 20: Base Year PLOS, AM Peak, Signalized Intersections

Intersection Number	Intersection Name	Crossing Direction	Walk Time	Don't Walk Time	Cycle Length	Pedestrian Delay	LOS
7A	Bow Street / Warren Avenue	EB	5	11	60	13.3	B
		WB	5	11	60	13.3	B
		NB	NA	NA	Stop Control	0.0	A
		SB	NA	NA	Stop Control	0.0	A
7B	Somerville Avenue / Warren Avenue	EB	22	9	60	5.2	A
		WB	22	9	60	5.2	A
		NB	22	9	60	5.2	A
		SB	22	9	60	5.2	A
8	Washington Street / Somerville Avenue / Webster Avenue	EB	9	15	120	35.3	D
		SB	9	14	120	36.0	D
		WB	9	11	120	38.4	D
		NB	9	13	120	36.8	D
12	Somerville Avenue / Linden Street	NB	5	11	80	22.5	C
		SB	5	11	80	22.5	C
		EB	5	11	80	22.5	C
		WB	5	11	80	22.5	C
13	Somerville Avenue / Washington Street / Prospect Street	NB	9	15	120	35.3	D
		SB	9	13	120	36.8	D
		EB	9	9	120	40.0	E
		WB	9	13	120	36.8	D
17	Webster Avenue / Prospect Street / Concord Avenue	SB	10	13	120	35.3	D
		SW	10	13	120	36.0	D
		NB	10	13	120	38.4	D
		NE	10	13	120	36.8	D
21	Somerville Avenue / Medford Street	SB	7	13	102.5	30.1	D
		EB	7	13	102.5	30.1	D
		NB	7	13	102.5	30.1	D
		NW	7	13	102.5	30.1	D
23	Somerville Avenue / School Street	EB	9	10	60	11.4	B
		WB	9	10	60	11.4	B

Intersection Number	Intersection Name	Crossing Direction	Walk Time	Don't Walk Time	Cycle Length	Pedestrian Delay	LOS
		SW	9	10	60	11.4	B

Table 21: Base Year PLOS, AM Peak Unsignalized Intersections

Intersection Number	Intersection Name	Road to Cross	Approach Direction	Vehicles /Hour	Vehicular Flow Rate	Crossing Length	Walk Speed (ft/sec)	Critical Gap	Pedestrian Delay	LOS	Note
1	Somerville Avenue / Bow Street	Bow St	WB	247	0.07	27.26	3.5	10.8	16.0	B	
		Bow St	SB	339	0.09	24.71	3.5	10.1	16.8	B	
		Somerville Ave	SE	413	0.11	31.07	3.5	11.9	25.3	C	
2	Bow Street / Summer Street	Summer St	SB	347	0.10	29.51	3.5	11.4	20.9	C	
		Summer St	WB	239	0.07	27.29	3.5	10.8	15.8	B	
3	Bow Street / Wesley Park	Bow St	WB	232	0.06	29.51	3.5	11.4	16.9	B	
		Wesley Park	SB	12	0.00	27.28	3.5	10.8	0.0	A	Stop Sign Controlled
		Summer St	NB	155	0.04	31.2	3.5	11.9	15.6	B	
4	Bow Street / Walnut Street	Bow St	SB	399	0.11	40.86	3.5	14.7	36.9	D	No X-Walk
		Walnut St	EB	185	0.05	35.64	3.5	13.2	18.9	B	One-Way Away from Int.
5	Somerville Avenue / Hawkins Street	Somerville Ave	SE	753	0.21	32.23	3.5	12.2	56.7	E	
		Hawkins St	NB	48	0.01	26.62	3.5	10.6	0.0	A	Stop Sign Controlled
6	Washington Street / Hawkins Street	Washington St	WB	633	0.18	43.33	3.5	15.4	79.3	F	
		Hawkins St	SB	18	0.01	25.41	3.5	10.3	0.0	A	Stop Sign Controlled
10	Washington Street / Bonner Avenue	Bonner Ave	SB	45	0.01	27.6	3.5	10.9	0.0	A	Stop Sign Controlled
		Washington St	EB	26	0.01	35.75	3.5	13.2	0.0	A	Stop Sign Controlled
11	Washington Street / Columbus Avenue	Columbus Ave	SB	23	0.01	27.99	3.5	11.0	0.0	A	Stop Sign Controlled

Intersection Number	Intersection Name	Road to Cross	Approach Direction	Vehicles /Hour	Vehicular Flow Rate	Crossing Length	Walk Speed (ft/sec)	Critical Gap	Pedestrian Delay	LOS	Note
15	Prospect Street / Newton Street	Newton Street	NE	10	0.00	53.48	3.5	18.3	0.0	A	Stop Sign Controlled
16	Webster Avenue / Newton Street	Webster Ave	SB	661	0.18	38.02	3.5	13.9	64.0	F	
		Newton St	EB	131	0.04	43.24	3.5	15.4	0.0	A	Stop Sign Controlled
		Newton St	WB	16	0.00	25.5	3.5	10.3	10.5	B	
18	Prospect Street / Oak Street	Oak St	EB	29	0.01	36.14	3.5	13.3	0.0	A	Stop Sign Controlled
19	Webster Avenue / Tremont Street / Columbia Street	Webster Ave	NB	250	0.07	37.27	3.5	13.6	22.8	C	No X-Walk
		Webster Ave	SB	378	0.11	39.14	3.5	14.2	32.7	D	No X-Walk
		Columbia St	WB	178	0.05	30.25	3.5	11.6	0.0	A	Stop Sign Controlled
		Tremont Street	EB	135	0.04	39.91	3.5	14.4	19.1	B	One-Way Away from Int.
22	Medford Street / South Street	Medford St	NB	686	0.19	35.77	3.5	13.2	59.9	E	
		South St	EB	564	0.16	55.6	3.5	18.9	116.6	F	One-Way Away from Int.
25	Somerville Avenue / Allen Street / D1	Allen Street	NB	78	0.02	17.81	3.5	8.1	0.0	A	Stop Sign Controlled
30	Columbia Street / Windsor Place / D3	Windsor Place	WB	51	0.01	32.7	3.5	12.3	13.5	B	
32	Webster Avenue / Everett Street	Everett St	WB	33	0.01	18.69	3.5	8.3	0.0	A	Stop Sign Controlled
		Webster Ave	SB	672	0.19	35.9	3.5	13.3	58.3	E	

Table 22: Base Year PLOS, PM Peak, Signalized Intersections

Intersection Number	Intersection Name	Crossing Direction	Walk Time	Don't Walk Time	Cycle Length	Pedestrian Delay	LOS
7A	Bow Street / Warren Avenue	EB	5	11	60	13.3	B
		WB	5	11	60	13.3	B
		NB	NA	NA	Stop Control	0.0	A
		SB	NA	NA	Stop Control	0.0	A
7B	Somerville Avenue / Warren Avenue	EB	22	9	60	5.2	A

Intersection Number	Intersection Name	Crossing Direction	Walk Time	Don't Walk Time	Cycle Length	Pedestrian Delay	LOS
		WB	22	9	60	5.2	A
		NB	22	9	60	5.2	A
		SB	22	9	60	5.2	A
8	Washington Street / Somerville Avenue / Webster Avenue	EB	9	15	120	35.3	D
		SB	9	14	120	36.0	D
		WB	9	11	120	38.4	D
		NB	9	13	120	36.8	D
12	Somerville Avenue / Linden Street	NB	5	11	100	32.0	D
		SB	5	11	100	32.0	D
		EB	5	11	100	32.0	D
		WB	5	11	100	32.0	D
13	Somerville Avenue / Washington Street / Prospect Street	NB	9	15	120	35.3	D
		SB	9	13	120	36.8	D
		EB	9	9	120	40.0	E
		WB	9	13	120	36.8	D
17	Webster Avenue / Prospect Street / Concord Avenue	SB	10	13	120	35.3	D
		SW	10	13	120	36.0	D
		NB	10	13	120	38.4	D
		NE	10	13	120	36.8	D
21	Somerville Avenue / Medford Street	SB	7	17	98.5	25.2	C
		EB	7	13	98.5	28.2	C
		NB	7	13	98.5	28.2	C
		NW	7	13	98.5	28.2	C
23	Somerville Avenue / School Street	EB	9	10	60	11.4	B
		WB	9	10	60	11.4	B
		SW	9	10	60	11.4	B

Table 23: Base Year PLOS, PM Peak, Unsignalized Intersections

Intersection Number	Intersection Name	Road to Cross	Approach Direction	Vehicles/Hour	Vehicular Flow Rate	Crossing Length	Walk Speed (ft/sec)	Critical Gap	Pedestrian Delay	LOS	Note
1	Somerville Avenue / Bow Street	Bow St	WB	332	0.09	27.26	3.5	10.8	18.5	B	
		Bow St	SB	189	0.05	24.71	3.5	10.1	13.3	B	
		Somerville Ave	SE	441	0.12	31.07	3.5	11.9	26.8	C	
2	Bow Street / Summer Street	Summer St	SB	207	0.06	29.51	3.5	11.4	16.2	B	
		Summer St	WB	313	0.09	27.29	3.5	10.8	17.9	B	
3	Bow Street / Wesley Park	Bow St	WB	317	0.09	29.51	3.5	11.4	19.7	B	
		Wesley Park	SB	13	0.00	27.28	3.5	10.8	0.0	A	Stop Sign Controlled
		Summer St	NB	313	0.09	31.2	3.5	11.9	20.9	C	
4	Bow Street / Walnut Street	Bow St	SB	640	0.18	40.86	3.5	14.7	70.8	F	No X-Walk
		Walnut St	EB	401	0.11	35.64	3.5	13.2	30.0	D	One-Way Away from Int.
5	Somerville Avenue / Hawkins Street	Somerville Ave	SE	626	0.17	32.23	3.5	12.2	42.3	E	
		Hawkins St	NB	118	0.03	26.62	3.5	10.6	0.0	A	Stop Sign Controlled
6	Washington Street / Hawkins Street	Washington St	WB	693	0.19	43.33	3.5	15.4	95.1	F	
		Hawkins St	SB	121	0.03	25.41	3.5	10.3	0.0	A	Stop Sign Controlled
10	Washington Street / Bonner Avenue	Bonner Ave	SB	34	0.01	27.6	3.5	10.9	0.0	A	Stop Sign Controlled
		Washington St	EB	66	0.02	35.75	3.5	13.2	0.0	A	Stop Sign Controlled
11	Washington Street / Columbus Avenue	Columbus Ave	SB	29	0.01	27.99	3.5	11.0	0.0	A	Stop Sign Controlled
15	Prospect Street / Newton Street	Newton Street	NE	0	0.00	53.48	3.5	18.3	0.0	A	Stop Sign Controlled
16	Webster Avenue / Newton Street	Webster Ave	SB	548	0.15	38.02	3.5	13.9	47.6	E	
		Newton St	EB	185	0.05	43.24	3.5	15.4	0.0	A	Stop Sign Controlled
		Newton St	WB	19	0.01	25.5	3.5	10.3	10.6	B	
18	Prospect Street / Oak Street	Oak St	EB	50	0.01	36.14	3.5	13.3	0.0	A	Stop Sign Controlled
19	Webster Avenue / Tremont Street / Columbia Street	Webster Ave	NB	407	0.11	37.27	3.5	13.6	32.5	D	No X-Walk

Intersection Number	Intersection Name	Road to Cross	Approach Direction	Vehicles/Hour	Vehicular Flow Rate	Crossing Length	Walk Speed (ft/sec)	Critical Gap	Pedestrian Delay	LOS	Note
		Webster Ave	SB	430	0.12	39.14	3.5	14.2	37.2	D	No X-Walk
		Columbia St	WB	206	0.06	30.25	3.5	11.6	0.0	A	Stop Sign Controlled
		Tremont Street	EB	106	0.03	39.91	3.5	14.4	17.9	B	One-Way Away from Int.
22	Medford Street / South Street	Medford St	NB	814	0.23	35.77	3.5	13.2	83.5	F	
		South St	EB	310	0.09	55.6	3.5	18.9	47.4	E	One-Way Away from Int.
25	Somerville Avenue / Allen Street / D1	Allen Street	NB	16	0.00	17.81	3.5	8.1	0.0	A	Stop Sign Controlled
30	Columbia Street / Windsor Place / D3	Windsor Place	WB	40	0.01	32.7	3.5	12.3	13.2	B	
32	Webster Avenue / Everett Street	Everett St	WB	15	0.00	18.69	3.5	8.3	0.0	A	Stop Sign Controlled
		Webster Ave	SB	612	0.17	35.9	3.5	13.3	50.1	E	

c. Base Year Built Condition

The base year built condition includes the addition of Phase 1 and Phase 2 buildout to the base year network. This adds additional pedestrian trips to the study intersections and corridors.

i. Planned Improvements

No improvements to crosswalks or sidewalk widths beyond those already included in the base year scenario are expected for the base year built condition.

ii. Pedestrian Trips

Pedestrian trips expected to be added for Phase 1 and Phase 2 of the development buildout are displayed in the following table. Given that pedestrian travel patterns do not mirror transit or motor vehicle distributions, we assume that all intersections within one quarter mile of project sites will receive new pedestrian trips.

Table 24: Base Year Site-Generated Pedestrian Trips

PHASE	AM Peak Pedestrian Trips	PM Peak Pedestrian Trips	Weekday Total Pedestrian Trips	Saturday Peak Pedestrian Trips
PHASE 1 TOTAL	183	238	2,290	155
PHASE 2 TOTAL	444	473	4,067	171
COMBINED TOTAL	627	711	6,357	326

iii. Street Life Analysis

Given the low pedestrians per minute per foot observed in the base year Street Life analysis, the pedestrian trips added by Phase 1 and Phase 2 buildout will not change the Street Life condition from "Calm" at any of the pedestrian corridor count locations.

iv. Crosswalk Analysis

Crosswalks that received a PLOS score of E or F and that fall within one quarter mile of a project site are as follows. These intersections should be targeted for mitigation in order to improve walkability and pedestrian safety near project sites.

- Somerville Avenue at Washington Street / Prospect Street experiences LOS E at the crossing of the eastbound approach to the intersection, across Somerville Avenue.
- Somerville Avenue at Hawkins Street experiences LOS E at the crossing of Somerville Avenue across the southeast approach to the intersection. This intersections is slightly removed from the core of the site area, but is nearby to site D7 and is itself a key pedestrian corridor.
- Washington Street at Hawkins Street experiences LOS F at the crossing of Washington Street at the westbound approach to the intersection. This is an unisgnalized intersections with a large amount of traffic on Washington Street which forces pedestrians to wait for an appropriate gap.
- Webster Avenue at Newton Street experiences LOS F at the crossing of Webster Avenue at the southbound approach to the intersection. This is an unsignalized intersection with a large amount of traffic on Webster Avenue.

- Webster Avenue at Everett Street experiences LOS E at the crossing of Webster Avenue at the southbound approach to the intersection. This intersection experiences a large amount of traffic along Webster Avenue and forces pedestrians to wait for an appropriate gap.
- Bow Street at Walnut Street experiences LOS F at the crossing of Bow Street at the southbound approach. This location does not actually have a crosswalk, but is a site of significant pedestrian activity with a high likelihood of jaywalking.

v. Proposed Mitigation

No pedestrian mitigation is necessary at corridor count locations for the base year built condition due to the "Calm" conditions observed at all corridor count locations. While overall pedestrian volumes are expected to increase, base year walkway capacity allows for ample room for growth as buildout takes place. However, mitigation is suggested at several key intersections to improve pedestrian delay and safety. These are listed below.

- Somerville Avenue at Washington Street / Prospect Street experiences LOS E at the crossing of the eastbound approach to the intersection, across Somerville Avenue. This intersections is directly adjacent to sites D1, D2, and D6. As such, timings should be improved however possible to preserve pedestrian priority, enhancing walkable access to these sites and promoting non-vehicular travel.
- Somerville Avenue at Hawkins Street experiences LOS E at the crossing of Somerville Avenue across the southeast approach to the intersection. This intersections is slightly removed from the core of the site area, but is nearby to site D7 and is itself a key pedestrian corridor. While HCM methods indicate LOS E at this crossing, realistic driver behavior in the neighborhood suggests that a typical driver will yield when observing pedestrians waiting to cross, meaning that pedestrian delay is likely well below LOS E levels. With this in mind, no significant mitigation is necessary, beyond enhanced "yield to pedestrians" signage.
- Washington Street at Hawkins Street experiences LOS F at the crossing of Washington Street at the westbound approach to the intersection. This is an unisgnalized intersections with a large amount of traffic on Washington Street which forces pedestrians to wait for an appropriate gap. While HCM methods indicate LOS E at this crossing, realistic driver behavior in the neighborhood suggests that a typical driver will yield when observing pedestrians waiting to cross, meaning that pedestrian delay is likely well below LOS E levels. With this in mind, no significant mitigation is necessary, beyond enhanced "yield to pedestrians" signage.
- Webster Avenue at Newton Street experiences LOS F at the crossing of Webster Avenue at the southbound approach to the intersection. This is an unsignalized intersection with a large amount of traffic on Webster Avenue. Like the previous intersections, motor vehicles are likely to yield to pedestrians waiting for a gap, meaning that the indicated LOS F may not be fully realistic due to generous driver behavior. Improved signage should be installed to encourage this yielding behavior and improve pedestrian delay.
- Webster Avenue at Everett Street experiences LOS E at the crossing of Webster Avenue at the southbound approach to the intersection. This intersection experiences a large amount of traffic along Webster Avenue and forces pedestrians to wait for an appropriate gap. Generous yielding likely alleviates much of this delay, like the other unsignalized intersections in this list. Improved signage should be installed to encourage this yielding behavior and improve pedestrian delay.
- Bow Street at Walnut Street experiences LOS F at the crossing of Bow Street at the southbound approach. This location does not actually have a crosswalk, but is a site of significant pedestrian activity with a high likelihood of jaywalking. A new crosswalk should be installed across Bow

Street at this location, with ample signage encouraging vehicles to yield to pedestrians. This area is a key pedestrian zone and should be treated as such.

- The intersection of Webster Avenue at Tremont Street / Columbia Street currently has no crosswalks. This intersection is directly adjacent to site D3 and, as such, will experience significant pedestrian activity. Crosswalks and "yield to pedestrians" signage should be installed across Columbia Street at the westbound approach, across Tremont Street at the eastbound approach, and across Webster Avenue at the southbound approach.

d. Base Year Built Condition with Mitigation

i. Planned Improvements

Planned improvements for the base year built condition with mitigation are per the mitigation outlined in the base year built analysis. These improvements will not change pedestrian delay based on HCM PLOS analysis. However, they will improve safety and walkable access at key locations adjacent to project sites. Furthermore, the introduction of "yield to pedestrians" signage at key locations will further encourage the yielding behavior that already exists and further reduce pedestrian delay at unsignalized crosswalks. HCM PLOS analysis does not fully account for this behavior.

e. Future Year Built Condition with Mitigation

The future year built conditions introduces pedestrian trips from the final phase of project buildout.

i. Planned Improvements

The future year includes the two-way conversion of Somerville Avenue between Bow Street and Union Square. While this will change traffic flows, it is not expected to significantly alter clear walkway widths at the pedestrian count locations, causing no change to the "Calm" ratings received at the Street Life analysis points. The future year scenario also assumes implementation of all mitigation proposed in the base year analysis.

ii. Pedestrian Trips

Pedestrian trips expected to be added in the final buildout phase of the development are displayed in the following table.

Table 25: Future Year Site-Generated Pedestrian Trips

PHASE	AM Peak Pedestrian Trips	PM Peak Pedestrian Trips	Weekday Total Pedestrian Trips	Saturday Peak Pedestrian Trips
PHASE 1 TOTAL	183	238	2,290	155
PHASE 2 TOTAL	444	473	4,067	171
PHASE 3 TOTAL	140	178	1,626	97
COMBINED TOTAL	767	889	7,983	423

iii. Proposed Mitigation

Given the ample room for pedestrian volume growth at the Street Life analysis locations, none of these locations are expected to change from their base year "Calm" ratings. Intersections and crosswalks identified for mitigation as part of the base year built analysis scenario should be monitored for

pedestrian activity as final buildout occurs. The mitigation proposed in the base year scenario should be adequate to account for the increase in pedestrian trips introduced by Phase 3 of the buildout in the future year.

3. Transit Analysis

a. Context Overview

The project site is located in and around the Union Square neighborhood of Somerville, abutting the highly trafficked thoroughfares of Somerville Avenue, Prospect Street, Washington Street, and Bow Street. The existing conditions portion of this impact analysis includes an analysis and description of the current transportation options available to the Union Square development site on public transit, by private automobile, and for pedestrian and bicyclists.

The Union Square area is currently well served by MBTA bus and rapid transit service and the close proximity of public transportation and neighborhood services will reduce the vehicular traffic impacts of the Union Square project. The forthcoming Green Line Extension will further enhance transit connectivity in the neighborhood, transforming it into one of the region's most transit accessible locations.

b. Existing Conditions (no build)

i. Existing Services

The project sites are adjacent to or within walking distance of robust transportation options. This access was evaluated for the area within a half mile radius of the project sites. The project sites are located within a quarter mile of 5 MBTA bus routes that directly serve Union Square: Routes 85, 86, 87, 91, and CT2. Routes 69, 80, 83, 88, and 90 serve roads within a half-mile or 10 minute walk of the project sites. Combined, these routes provide high transit frequency to the Union Square thoroughfares, as Figure 3 demonstrates. Table 4 summarizes the transit services available within the study area and describes the ridership and service details.

This discussion of the existing transit network in and around Union Square begins with a discussion of the routes and ridership of each bus route in the study area. It also includes an analysis of the transit stops located adjacent to or within a short walk of each development site, the routes accessible at each stop, and the average wait for a bus at each stop. The information provided is accurate as of September 2, 2017.

Route 69

The southern extreme of the study area is served by the MBTA's route 69 bus. On Cambridge Street there are bus stops within 3/10 of a mile of the site for D3. The route operates between Harvard Square and Lechmere Station on the Green Line via Cambridge Street. The stops closest to the project site are located on Cambridge St at Norfolk Street and Cambridge Street at Windsor Street. Route 69 operates from 5:25 AM to 1:11 AM on weekdays and has similar service windows on weekends. It operates every 10 minutes during the AM and peaks, and every 20-25 minutes at other times on weekdays. On weekends it operates every 20-30 minutes.

Route 80

The eastern extreme of the study area is served by the MBTA's route 80 bus. Along the access roads to the McGrath Highway there are bus stops within 3/10 of a mile of project sites D1 and D5. The route operates between Arlington Center and Lechmere Station on the Green Line via Medford Hillside and McGrath Highway. The stops closest to the project site are located along the McGrath Highway access roads at Washington Street and at Somerville Ave. Route 80 operates from 5 am to 1:22 am on weekdays with similar service windows on Saturdays. On Sundays the route runs one hour shorter during the morning

and late nights. It operates every 20 minutes during weekday peak periods and every 30 minutes at other times on weekdays and on weekends.

Route 83

Route 83 is included in this analysis because it falls just outside of the radius around the project sites, but is within a 15 minute walk to the D4 project site. Along Beacon Street at Concord avenue there are bus stops within a half mile of D4. The route operates between Rindge Avenue and Central Square Station via Beacon Street and Porter Street. It runs from 5:10 AM to 1:20 AM on weekdays and Saturdays. On Sundays service begins at 7:30 AM. It operates every 20-25 minutes during weekdays and every 30-50 minutes on weekends.

Route 85

Route 85 directly serves Union Square and is accessible to all project sites D1-7. The route runs between Spring Hill just northwest of Union Square and the Kendall/MIT MBTA Subway station along Summer, Webster, Hampshire, and Broadway. As the study area map shows, there are a number of stops for Route 85 within the study area. It operates between 5:45 AM and 8 PM on weekdays only. The run runs every 30 minutes during the AM peak then every 40 minutes during the rest of the day. Much of the route overlaps with the CT2 route, which also does not run on weekends. There is no direct bus connection between Union and Kendall Squares on weekend days.

Route 86

Route 86 runs along Washington Street directly serving Union Square. It runs between Sullivan Square Station on the Orange Line and Reservoir Station (Cleveland Circle) on the Green Line in Brookline via Harvard Square. The route stops at several places on Somerville Ave and Washington Street within close proximity to the project sites, especially D1, D2, D5, D6, and D7. The route runs from 5 AM to 1 AM on weekdays and Saturdays. On Sundays the route runs from 7:30 AM and 10 PM. Its frequency varies from every 8-18 minutes during weekday peak periods to every 30-60 minutes off-peak. This route provides the only direct bus connection between Union Square and Harvard Square.

Route 87

Union Square is directly served by Route 87, which runs between Arlington Center/Clarendon Hill and Lechmere Station on the Green Line via Somerville Avenue and the McGrath Highway. There are several stops along this route accessible to the Union Square project sites, 2 in each direction on Somerville Avenue east of Prospect, one in each direction on Somerville Avenue between Webster and Prospect, and one in each direction where Bow and Somerville meet at Webster. The route operates between 5:10 AM and 1 AM on weekdays and Saturdays. On Sundays the route begins operation at 6 AM. It has a frequency of every 20-22 minutes during peak periods on weekdays and every 30-40 minutes during other times of the week. This route provides the only direct bus connection between Union Square and Davis Square.

Route 88

Route 88 overlaps with Route 80 along the McGrath Highway access roads in the study area, operating between Clarendon Hill and Lechmere Station on the Green Line via Davis Square, Highland Avenue, and McGrath Highway. This route shares with Route 80 the stops along the McGrath Highway access roads at Washington Street and Somerville Avenue. Route 88 opeartes between 5:15 AM and 1 AM on Weekdays, and begins operation at 5:30 on Saturdays and 6:30 on Sundays. During peak periods it arrives every 8-18 minutes on weekdays. At other times it typically runs every 30-40 minutes.

Route 90

Route 90 is included in this study because it serves stops within a 15 minute walk of the D5 and D1 project sites. It stops along McGrath Highway at Cross Street just northeast of the study area. The route operates between Davis Square Station on the Red Line and Wellington Station via Sullivan Square Station and

Assembly Mall. It primarily uses Highland Avenue, Cross Street, and Somerville's Broadway Street. The bus does not run frequently, serving stops every 40 minutes during AM and PM peak periods on weekdays, every 40-55 minutes during off-peak hours on weekdays, and every 65-70 minutes late nights and weekends. It may serve some visitors to Union Square coming from North Somerville or the neighborhoods north of Spring Hill.

Route 91

Route 91 directly serves Union Square on its route between Central Square on the Red Line and Sullivan Square on the Orange Line. The route travels along Prospect Street north from Central until Inman Square where it travels along Hampshire Street, then Springfield, then Newton and Webster before reaching Union Square. Leaving the neighborhood, it travels east on Washington Street before terminating at Sullivan Square. This route offers the only direct connection between Union Square and Central Square. It operates every 25-40 minutes on weekdays and every 20-60 minutes on weekends and late nights. Route 91 runs from 5 AM to 1 AM on weekdays and Saturdays and from 6 AM to 1 AM on Sundays. It provides easy connection to project sites D4, D7, D6, D2, D1, and D5. It is a short walk from D3 to access this route.

Route CT2

The CT2 bus is a popular weekdays only limited stop bus route that operates between Sullivan Station on the Orange Line and Ruggles Station on the Green Line via Union Square, Kendall Square on the Red Line, Fenway Station on the Green Line, and the Longwood Medical Area. The route has 4 stops accessible to the project sites, outbound on Prospect Street just south of Somerville Avenue, inbound on Somerville Avenue between Webster and Prospect, and in both directions on Washington just west of McGrath Highway. The route operates at 20 minute headways during the AM and PM weekday peak periods and every 30-35 minutes during the weekday off-peak. Along with Route 85, CT2 offers direct connection between Union Square and Kendall/MIT, but neither route runs on weekends.

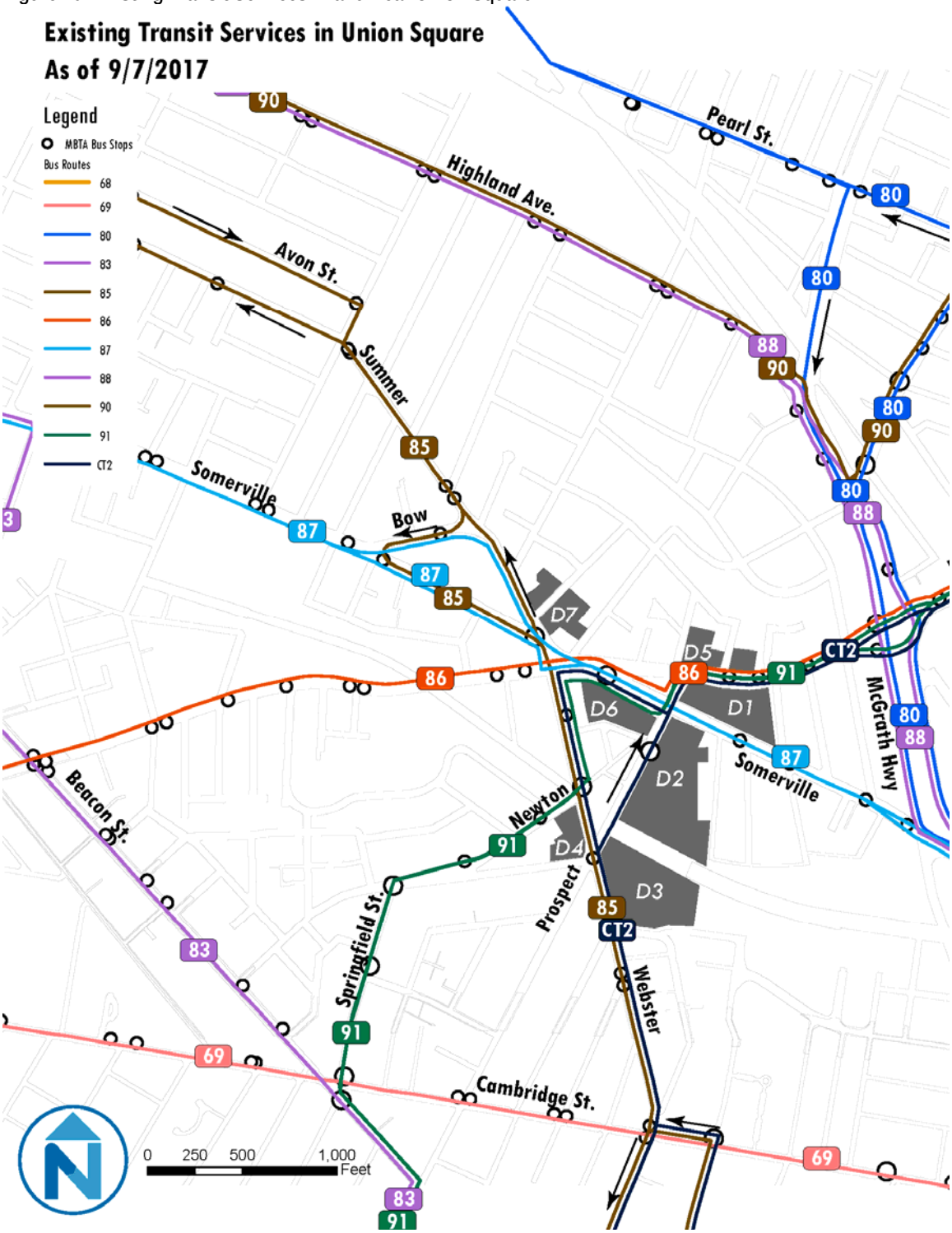
Figure 19: Weekday Peak Bus Frequency

Table 26: Summary table of the transit services available within the study area

Name	Type of Service	Origin - Destination	Ridership Statistics (for entire route from MBTA 2014 Blue Book)									Headways (in minutes, from MBTA 2017 schedules)						
			Weekdays			Saturday			Sunday			Weekdays					Weekend	
			Inbound	Outbound	Total	Inbound	Outbound	Total	Inbound	Outbound	Total	AM Peak	AM Base	PM Base	PM Peak	Late night	Saturday Peak	Sunday Peak
69	Bus	Harvard/Holyoke Gate - Lechmere Station via Cambridge Street	1,588	1,598	3,185	999	1,092	2,092	543	508	1,051	10-20	25	25	10-20	40	20-40	20-40
80	Bus	Arlington Center - Lechmere Station via Medford Hillside	1,063	995	2,058	748	667	1,415	428	398	826	20	25-35	25-35	20	60	30-60	30-60
83	Bus	Rindge Ave - Central Square Station via Porter	1,096	1,142	2,237	683	648	1,331	282	349	631	20	30	30	20	60	25-60	25-60
85	Bus	Spring Hill - Kendall/MIT Station via Summer Street & Union Square	301	288	589	--	--	--	--	--	--	30	40	40	40	--	--	--
86	Bus	Sullivan Station - Reservoir (Cleveland Circle) via Harvard	2,591	3,027	5,618	1,430	1,780	3,210	895	1,022	1,917	8-18	20	20	8-18	28-45	30-60	30-60
87	Bus	Arlington Center/Clarendon Hill - Lechmere Station via Somerville Avenue	1,943	1,853	3,796	1,436	1,422	2,858	817	925	1,742	20-22	30	30	20-22	30-35	30-40	30-40
88	Bus	Clarendon Hill - Lechmere Station via Highland Avenue	2,003	2,073	4,075	1,418	1,376	2,794	862	803	1,664	8-18	30	30	8-18	35	20-40	20-40
90	Bus	Davis Square Station - Wellington Station via Sullivan Square Station and Assembly Mall	588	593	1,182	334	350	684	230	163	393	40	40-55	40-55	40	65	70	70
91	Bus	Sullivan Square Station - Central Square Station via Washington Street	784	909	1,693	713	860	1,574	354	389	743	25-30	25-30	25-30	25-30	60-65	20-60	20-60
CT2	Bus	Sullivan Station - Ruggles Station via Kendall/MIT	1,425	1,390	2,815	--	--	--	--	--	--	20	30-35	30-35	20	--	--	--

KEY:
- Route runs directly through Union Square
- Route runs within 1/2 mile of Study Area

Figure 20: Existing Transit Services in and Near Union Square



a. Existing Capacity

Existing capacity for all transit services currently available in Union Square is listed in the tables below for both inbound and outbound directions. Total load, capacity, and V/C ratio are listed for each service during AM peak, PM peak, Weekday (total) Saturday Peak, and Sunday Peak. Assumptions for this analysis were that an MBTA bus seats 39 riders, with a total capacity of 55 riders when including standing passengers, as laid out in the MBTA Service Delivery guidelines. A V/C ratio of 100% indicates a bus with all seats filled, but no standing passengers. The MBTA considers busses loaded up to 140%, or 55 passengers, of base capacity to be safe for operation. Key findings from existing capacity analysis include:

- Routes 80, 85, 88, and CT2 nearing 100% V/C ratio during the AM peak
- Routes 80, 87, and 89 nearing 100% V/C ratio during the PM peak
- Generally ample capacity on all services during late night, Saturday peak, and Sunday peak
- No bus routes are at standing room only capacity during any period while passing through Union Square

The introduction of the Green Line Extension will likely create an influx of transit activity in the development area. However, the MBTA predicts that the load on existing bus services is not expected to increase or decrease significantly. Rather, the Green Line new riders represent new trips shifting to the transit mode from around the region.

Table 27: Existing Transit Service Capacities, Outbound Stops

Route	Outbound Stop	Value	AM Base (5-7 & 9-12)	AM Peak (Average/hour 7AM - 9AM)	PM Base (12-4 & 6-9)	PM Peak (Average/Hour 4pm-6pm)	Late night (9-End)	Weekday Total	Saturday Peak (Average/hour 11 AM - 1 PM)	Sunday All Day
69	10 - 1406 - CAMBRIDGE ST @ NORFORK ST	Load Sum	120.3	80.75	374.1	78.7	41.9	695.75	47.75	252.5
		Capacity	429	195	780	117	234	1755	117	1131
		VC	28%	41%	48%	67%	18%	40%	41%	22%
80	37 - 2690 - MEDFORD ST @ WASHINGTON	Load Sum	206.6	86.2	143.4	33.05	18.7	487.95	41.25	234.6
		Capacity	468	97.5	546	156	195	1462.5	78	624
		VC	44%	88%	26%	21%	10%	33%	53%	38%
83	20 - 2438 - BEACON ST OPP CONCORD	Load Sum	120.3	46.05	97.5	23	12.7	299.55	27.9	168.6
		Capacity	507	117	468	97.5	156	1345.5	97.5	780
		VC	24%	39%	21%	24%	8%	22%	29%	22%
85	6 - 2510 - SOMERVILLE AVE @ UNION	Load Sum	89.5	72	85	4.55		251.05		
		Capacity	312	78	312	58.5		760.5		
		VC	29%	92%	27%	8%		33%		
86	13 - 2612 - SOMERVILLE AVE @ STONE	Load Sum	300.1	125.55	247.1	49.95	31.3	754	35.9	316.2
		Capacity	585	175.5	741	156	195	1852.5	78	858
		VC	51%	72%	33%	32%	16%	41%	46%	37%
87	29 - 2510 - SOMERVILLE AVE @ UNION	Load Sum	214.6	58.55	164.5	48.15	36.8	522.6	37.1	304.9
		Capacity	507	97.5	624	136.5	273	1638	78	1092
		VC	42%	60%	26%	35%	13%	32%	48%	28%
88	25 - 2690 - MEDFORD ST @ WASHINGTON	Load Sum	224.2	136.7	189.3	31.85	18.9	600.95	56.05	278.8
		Capacity	507	136.5	741	117	312	1813.5	136.5	1092
		VC	44%	100%	26%	27%	6%	33%	41%	26%
90	15 - 2687 - HIGHLAND AVE @ WALNUT ST	Load Sum	69.3	26.95	106.6	20.75	4	227.6	8.65	64.8
		Capacity	195	58.5	351	39	39	682.5	19.5	273
		VC	36%	46%	30%	53%	10%	33%	44%	24%
91	12 - 2612 - SOMERVILLE AVE @ STONE	Load Sum	206.5	42.05	173.7	32	12.3	466.55	34.25	196.1
		Capacity	585	78	585	78	156	1482	97.5	858
		VC	35%	54%	30%	41%	8%	31%	35%	23%
CT2 (747)	4 - 2612 - SOMERVILLE AVE @ STONE	Load Sum	128.2	89.25	59.8	19.85		297.1		
		Capacity	312	117	390	97.5		916.5		
		VC	41%	76%	15%	20%		32%		

Table 28: Existing Transit Service Capacities, Inbound Stops

Route	Inbound Stop	Value	AM Base (5-7 & 9-12)	AM Peak (Average/hour 7AM - 9AM)	PM Base (12-4 & 6-9)	PM Peak (Average/Hour 4pm-6pm)	Late night (9-End)	Weekday Total	Saturday Peak (Average/hour 11 AM - 1 PM)	Sunday All Day
69	10 - 1423 - CAMBRIDGE ST @ NORFORK ST	Load Sum	131.3	102	260.5	80.55	24.1	598.45	19.975	276
		Capacity	390	195	741	136.5	234	1696.5	58.5	1170
		VC	34%	52%	35%	59%	10%	35%	34%	24%
80	6 - 2659 - MCGRATH HWY @ ALSTON ST	Load Sum	54.2	21.65	256.7	96.9	55.3	484.75	11.825	201.6
		Capacity	390	117	585	136.5	195	1423.5	39	624
		VC	14%	19%	44%	71%	28%	34%	30%	32%
83	8 - 2453 - 45 BEACON ST.	Load Sum	85.5	19	178.6	43.6	36.3	363	13.625	191.5
		Capacity	468	97.5	507	97.5	195	1365	48.75	819
		VC	18%	19%	35%	45%	19%	27%	28%	23%
85	9 - 2612 - SOMERVILLE AVE @ STONE	Load Sum	11	2.55	92	44.5		150.05		
		Capacity	273	58.5	351	58.5		741		
		VC	4%	4%	26%	76%		20%		
86	36 - 2597 - SOMERVILLE AVE @	Load Sum	169.2	82.85	349.7	95.9	100.8	798.45	14.675	325.1
		Capacity	624	175.5	624	136.5	273	1833	39	858
		VC	27%	47%	56%	70%	37%	44%	38%	38%
87	8 - 2612 - SOMERVILLE AVE @ STONE	Load Sum	102.7	28.95	271.8	93.45	54.9	551.8	24.675	328.1
		Capacity	390	97.5	663	117	273	1540.5	39	1092
		VC	26%	30%	41%	80%	20%	36%	63%	30%
88	6 - 2659 - MCGRATH HWY @ ALSTON ST	Load Sum	84.3	27.45	362.5	92	78.8	645.05	10.975	299
		Capacity	468	117	741	117	351	1794	58.5	1092
		VC	18%	23%	49%	79%	22%	36%	19%	27%
90	17 - 2661 - HIGHLAND AVE @ WALNUT ST	Load Sum	61.6	32.35	111	14.55	11.3	230.8	4.925	61.7
		Capacity	156	58.5	351	39	78	682.5	19.5	273
		VC	39%	55%	32%	37%	14%	34%	25%	23%
91	11 - 2531 - 30 PROSPECT ST	Load Sum	117.2	25.15	260.3	49.75	55.9	508.3	12.225	164.3
		Capacity	546	78	585	78	195	1482	48.75	858
		VC	21%	32%	44%	64%	29%	34%	25%	19%
CT2 (747)	16 - 2531 - 30 PROSPECT ST	Load Sum	32.1	19.1	106.3	47.65		205.15		
		Capacity	312	136.5	390	97.5		936		
		VC	10%	14%	27%	49%		22%		

ii. Existing Stops / Stations by Site

D1:

Abutting the center of Union Square the D1 project site is easily accessible by a number of transit options. Most closely, D1 is served by Routes 80, 86, 88, 91, and CT2. Washington Street sees a bus at least once every 10 minutes; Somerville is served by Route 87 at 20-25 minute headways; the McGrath Highway stops are served at least once every 10 minutes. Street access from both planned D1 buildings onto Somerville Avenue and Washington Street mean that most stops are within 2/10 of a mile of the site (see Table 5).

Figure 21: D1 Parcel Transit Access

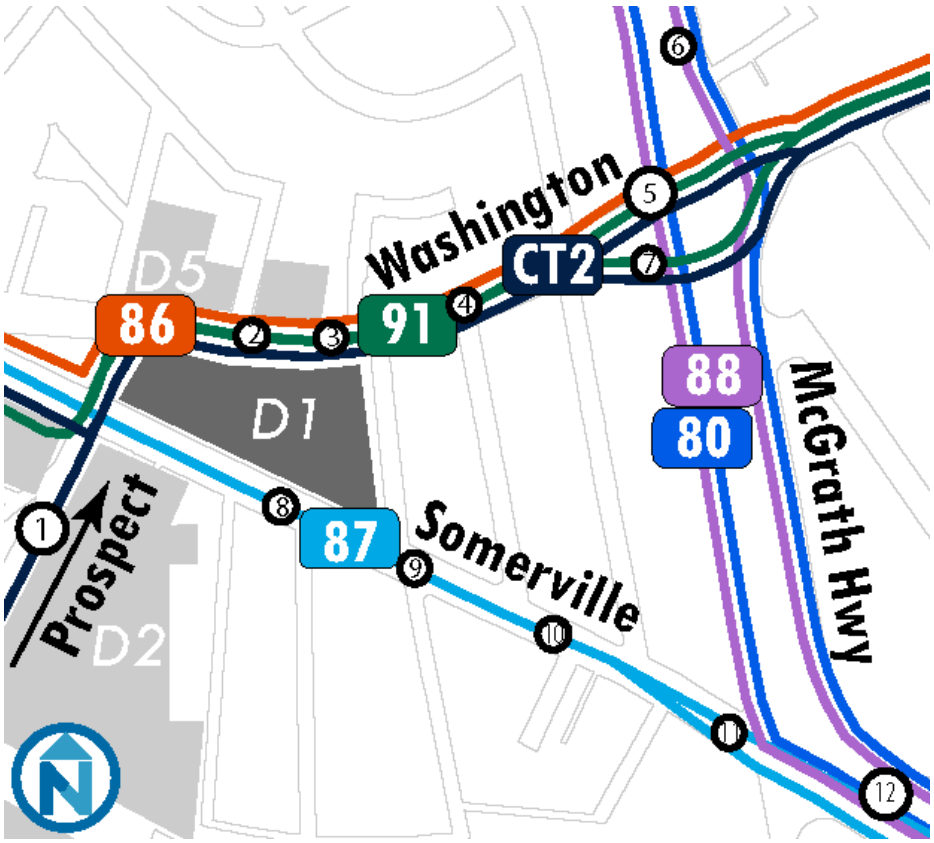


Table 29: D1 Parcel Bus Stops

D1 Transit Connectivity Summary Table				
Stop #	Walking Distance (in feet from development site)	Average walking time (in minutes from development site at 270 ft/minute)	Routes and Directions Served (ie outbound and/or inbound)	Average wait time (in minutes for each service available at stop)
1	367	1	CT2 OB	CT2: 12
2	328	1	86 IB	86: 9
3	476	2	86 OB, 91 OB	86: 9; 91: 15
4	528	2	86 IB	86: 9
5	1060	4	86 IB, 80 IB, 88 IB, CT2 IB	86: 9; 80: 14; 88: 15; CT2: 12
6	1600	6	80 OB, 88 OB	80: 14; 88: 15
7	1060	4	86 OB, 91 OB, CT2 OB	86: 9; 91: 15; CT2: 12
8	528	2	87 IB	87: 15
9	1060	4	87 OB	87: 15
10	1200	4	87 IB	87: 15
11	1600	6	87 OB	87: 15
12	2130	8	88 IB, 80IB, 87 IB, 88 OB, 80 OB, 87 OB	88: 14; 80: 14; 87: 15

Stop 1 near D1 serves outbound CT2 buses. It is a curbside stop without a shelter on the northbound side of Prospect just south of Somerville Avenue. It is a 1 minute walk from D1.

Stop 2 near D1 serves inbound Route 86 and Route 91 buses. It is a curbside stop without a shelter. It is directly across the street from D1, less than a 1 minute walk from the site.

Stop 3 serves the same routes as Stop 2 in the opposite direction. On the southwest corner of Merriam Street and Washington Street, the stop is curbside and features a bench. It is less than a 2 minute walk from D1 and users do not need to cross any streets to access.

Stop 4 serves inbound Route 86 and Route 91 buses. It is a curbside stop without a shelter about 2 minutes from D1.

Stop 5 serves inbound Route 80, 86, 88, and Ct2 buses, about a quarter mile from D1. Curbside at the intersection of McGrath Highway exit southbound and Washington Street, this stop sees buses relatively often and is the closest stop for users of the site riding Routes 80 or 88.

Stop 6 serves outbound Route 80 and Route 88 buses, about 4/10 of a mile from D1. It is curbside and does not have a shelter.

Stop 7 serves inbound routes 86, 91, and CT2 where Washington eastbound splits at McGrath Highway. D1 users will probably not use this stop, because stops closer to the site serving the same routes exist. It is curbside and does not have a shelter.

Stop 8 is the closest inbound Route 87 stop. It is adjacent to D1, less than a minute walk, and is curbside with no shelter.

Stop 9 serves Route 87 outbound riders across the street from D1 on Somerville Ave. It is across Somerville Ave. from D1 and is a curbside stop with no shelter.

Stop 10 serves D1 users travelling inbound on 87 farther east on Somerville Ave. It is curbside without shelter.

Stop 11 Serves outbound Route 87 riders on the opposite side of the street as Stop 10. It is also curbside without shelter.

Stop 11 again serves outbound Route 87 riders, about a 6 minute walk from the development site. It is a curbside stop without shelter.

Stop 12 on the map indicates the approximate location of 2 stops across McGrath highway from each other. Outbound riders on the north side of the street have a sheltered curbside stop serving routes 80, 87, and 88. Inbound riders on the south side of the street have a curbside stop without shelter serving Routes 80, 87, and 88. These stops are about a 8 minute walk to D1.

D2:

D2, directly abutting Union Square, sports easy access to all of the neighborhoods bus routes. Within 10 minutes site users can access Routes 80, 85, 86, 87, 88, and 91. Stop 1 is the most highly trafficked stop in all of Union Square. D2 can be accessed from Prospect Street directly in front of stop 2 and allows a short and safe walk to all nearby stops.

Figure 22: D2 Parcel Transit Access

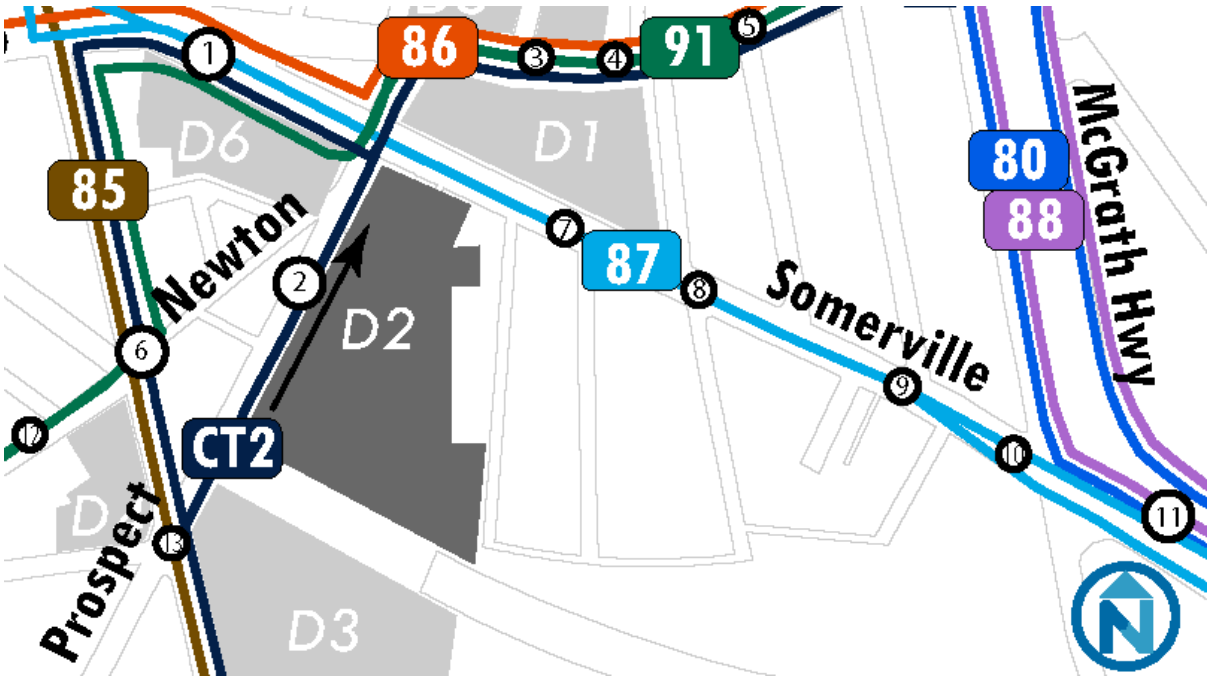


Table 30: D2 Parcel Bus Stops

D2 Transit Connectivity Summary Table				
Stop #	Walking Distance (in feet from development site)	Average walking time (in minutes from development site at 270 ft/minute)	Routes and Directions Served (ie outbound and/or inbound)	Average wait time (in minutes for each service available at stop)
1	449	2	87 OB, 87 IB, CT2 IB, 86 OB, 86 IB, 91 OB, 91 IB,	87:15; CT2 12, 86: 9; 91: 15
2	130	1	CT2 OB	CT2: 12
3	528	2	86 IB	86: 9
4	600	2	86 OB, 91 OB	86: 9; 91: 15
5	1060	4	86 IB	86: 9
6	528	2	91 OB, 91 IB, 85 IB	91: 15; 85: 18
7	528	2	87 IB	87: 15
8	1060	4	87 OB	87: 15
9	1500	6	87 IB	87: 15
10	1600	6	87 OB	87: 15
11	2130	8	88 IB, 80IB, 87 IB, 88 OB, 80 OB, 87 OB	88: 14; 80: 14; 87: 15
12	600	2	91 IB	91: 9
13	600	2	85 OB	85: 19

Stop 1 accessible to D2 is served by most of the buses serving union square: outbound and inbound Routes 87, 86, and 91. The inbound stop has a bench but no shelter. The outbound stop is curbside but does not have a bench or shelter. It is a 2 minute walk from D2. From the north side of Somerville, riders can access inbound CT2 service.

Stop 2 adjacent to D2 serves outbound CT2 service.

Stop 3 serves inbound Route 86 and 91 service.

Stop 4 serves outbound Route 86 and 91 service.

Stop 5 serves inbound Route 85 and 91 service.

Stop 6 at the corner of Newton and Webster serves Route 91 in both directions and route 85 inbound. It is a curbside stop with no shelter and sites about a 2 minute walk from D2.

Stop 7 serves inbound Route 87 buses.

Stop 8 serves outbound Route 87 buses.

Stop 9 serves inbound Route 87 buses.

Stop 10 serves outbound Route 87 buses.

Stop 11 serves outbound and inbound buses on Routes 80, 87, and 88.

Stop 12, about a 2-3 minute walk from D2, is a curbside stop with no shelter serving inbound Route 91 buses. Riders on this route are likely to use Stop 1 to access D2 instead of Stop 12.

Stop 13 serves Route 85 outbound riders at the corner of Prospect and Webster. It is a 2 minute walk from D2 and is a curbside stop with no shelter.

D3:

D3 site users have easy access to all of the stops in Union Square proper as well as the Route 69 stops along Cambridge Avenue, a 6 minute walk from the site. Access from the sites proposed buildings onto both Columbia and Webster Streets allows site users quick access to the sites 13 nearby stops.

Figure 23: D3 Parcel Transit Access

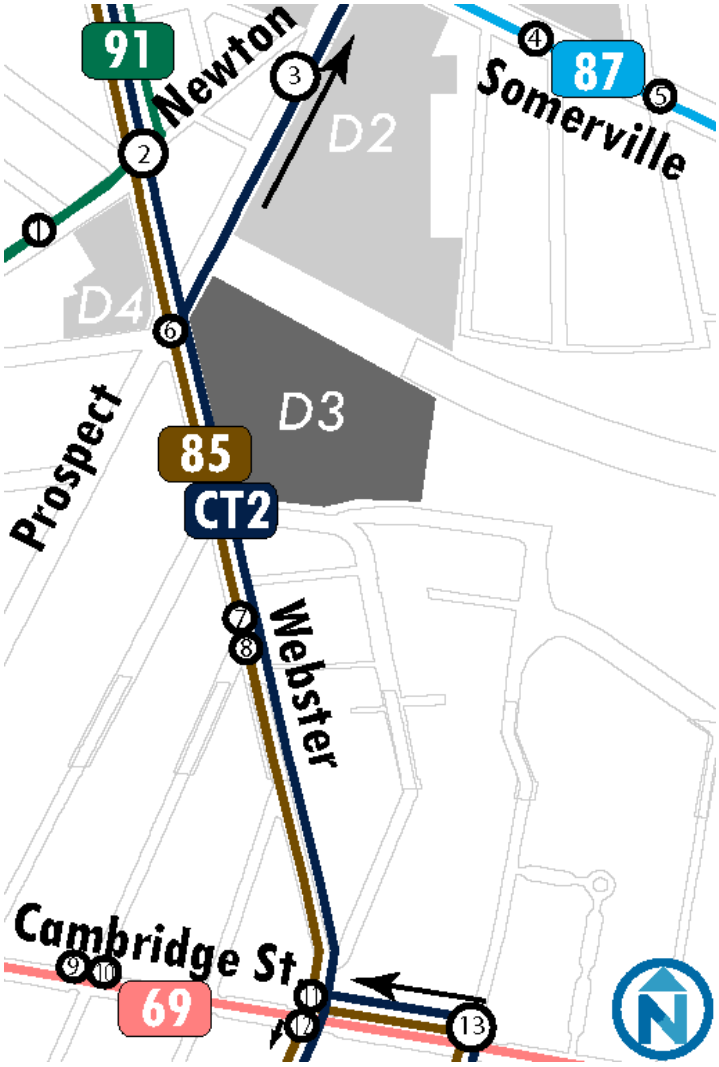


Table 31: D3 Parcel Bus Stops

D3 Transit Connectivity Summary Table				
Stop #	Walking Distance (in feet from development site)	Average walking time (in minutes from development site at 270 ft/minute)	Routes and Directions Served (ie outbound and/or inbound)	Average wait time (in minutes for each service available at stop)
1	528	2	91 IB	91: 15
2	423	2	91 OB, 91 IB, 85 IB	91: 15; 85: 19
3	528	2	CT2 OB	CT2: 12
4	1060	4	87 IB	87: 15
5	1600	6	87 OB	87: 15
6	82	1	85 OB	85: 19
7	528	2	85 IB	85: 19
8	528	2	85 OB	85: 19
9	1600	6	69 IB	69: 12
10	1600	6	69 OB	69: 12
11	1600	6	85 IB, CT2 IB	85: 19; CT2: 12
12	1600	6	85 OB, CT2 OB	85: 19; CT2: 12
13	2130	8	69 OB, 69 IB	69: 12

Stop 1 serves inbound Route 91 buses.

Stop 2 serves Route 91 buses in both directions and inbound Route 85 buses.

Stop 3 serves outbound CT2 buses.

Stop 4 serves inbound Route 87 buses.

Stop 5 serves outbound Route 87 buses.

Stop 6 serves outbound Route 85 buses.

Stop 7 serves inbound Route 85 buses about a 2 minute walk from D3. It is a curbside stop without shelter.

Stop 8 serves outbound Route 85 buses opposite the street from Stop 7. It is similarly a curbside stop without shelter.

Stop 9 serves Route 69 riders traveling inbound at the corner of Cambridge and Norfolk about a 6 minute walk from D4. It is a curbside stop without shelter.

Across the street from Stop 9 is Stop 10, a curbside stop without shelter serving outbound Route 69 riders.

Stop 11 serves inbound Route 85 and CT2 riders on Webster at Cambridge Street. It is a 6 minute walk from this stop to D3. It is curbside and has no shelter.

Stop 12 serves outbound Route 85 and CT2 riders on Cambridge Street at Webster, also a 6 minute walk from D3. It is a curbside stop without shelter.

Stop 13 shows the approximate site of 2 stops across the street from one another serving Route 69 in both directions. This stop is about 8 minutes from D3. Riders on 69 to Harvard Square have a bus shelter and benches. Across the street, riders on 69 going the opposite direction use a curbside stop without shelter or benches.

D4:

Accessed directly from Webster Avenue by pedestrians, the D4 project site sits within a few minute walk to all bus routes directly serving Union Square. It also is a 10-15 minute walk from D4 to Route 83 services along Beacon Street.

Figure 24: D4 Parcel Transit Access

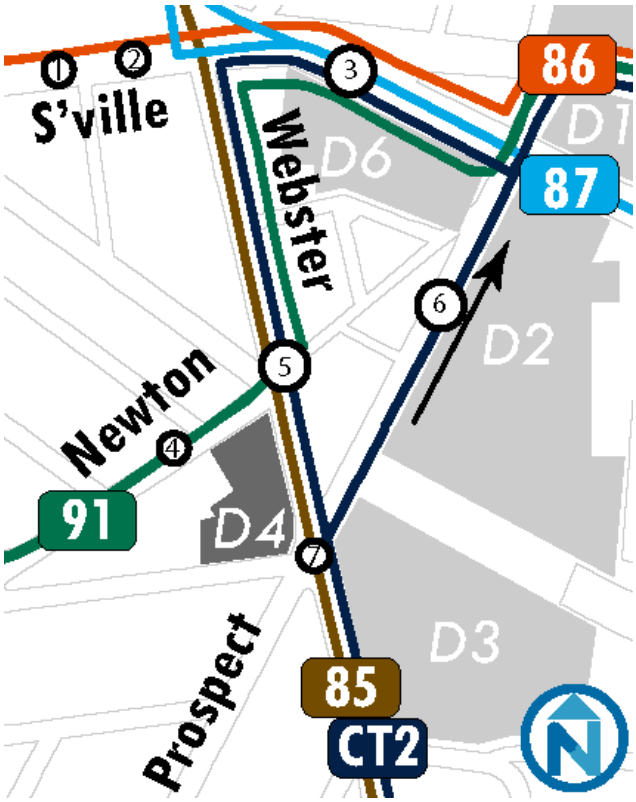


Table 32: D4 Parcel Bus Stops

D4 Transit Connectivity Summary Table				
Stop #	Walking Distance (in feet from development site)	Average walking time (in minutes from development site at 270 ft/minute)	Routes and Directions Served (ie outbound and/or inbound)	Average wait time (in minutes for each service available at stop)
1	1060	4	86 OB	86: 9
2	900	3	86 IB	86: 9
3	1000	4	87 OB, 87 IB, CT2 IB, 86 OB, 86 I	87: 15; CT2: 12; 86: 9; 91: 15
4	528	2	91 IB	91: 15
5	279	1	91 OB, 91 IB, 85 IB	91: 15; 85: 19
6	600	2	CT2 OB	CT2: 12
7	125	1	85 OB	85: 19

Stop 1 serves inbound Route 84 riders on Somerville Avenue at Hawkins Street. It is a 4 minute walk from D4, serving riders curbside with no shelter or bench.

Stop 2 serves outbound Route 86 riders on Somerville Ave west of Webster. It is a 3 minute walk from this stop to D4. It is a curbside stop with a bench.

Stop 3 serves many buses: : outbound and inbound Routes 87, 86, and 91. The inbound stop has a bench but no shelter. The outbound stop is curbside but does not have a bench or shelter. It is a 2 minute walk from D2. From the north side of Somerville, riders can access inbound CT2 service.

Stop 4 serves inbound Route 91 riders.

Stop 5 serves outbound and inbound Route 91 riders and inbound Route 85 riders.

Stop 6 serves outbound Route CT2 riders.

Stop 7 serves outbound Route 85 riders.

D5:

D5, sitting across the street from the D1 site on Washington, has direct pedestrian access to the street along Washington Avenue. As a result, catching the 86, 91, and CT2 buses is very easy for users of this site. Users can also access Routes 87, 88, and 80 within 6 minutes.

Figure 25: D5 Parcel Transit Access

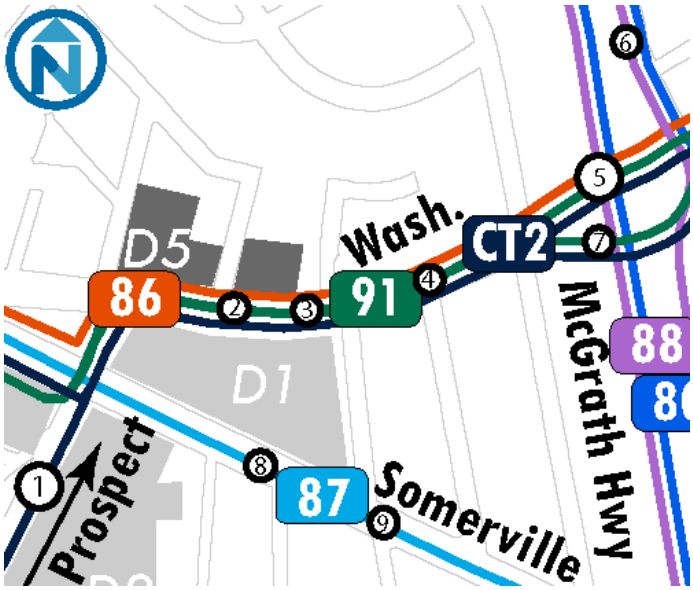


Table 33: D5 Parcel Bus Stops

D5 Transit Connectivity Summary Table				
Stop #	Walking Distance (in feet from development site)	Average walking time (in minutes from development site at 270 ft/minute)	Routes and Directions Served (ie outbound and/or inbound)	Average wait time (in minutes for each service available at stop)
1	367	1	CT2 OB	CT2: 12
2	328	1	86 IB	86: 9
3	476	2	86 OB, 91 OB	86: 9; 91: 15
4	528	2	86 IB	86: 9
5	1060	4	86 IB, 80 IB, 88 IB, CT2 IB	86: 9; 80: 14; 88: 15; CT2: 12
6	1600	6	80 OB, 88 OB	80: 14; 88: 15
7	1060	4	86 OB, 91 OB, CT2 OB	86: 9; 91: 15; CT2: 12
8	528	2	87 IB	87: 15
9	1060	4	87 OB	87: 15

Stop 1 near D5 serves outbound CT2 buses. It is a curbside stop without a shelter on the northbound side of Prospect just south of Somerville Avenue. It is a 1 minute walk from D5.

Stop 2 near D5 serves inbound Route 86 and Route 91 buses. It is a curbside stop without a shelter. It is directly adjacent to D5, less than a 1 minute walk from the site.

Stop 3 serves the same routes as Stop 2 in the opposite direction. On the southwest corner of Merriam Street and Washington Street, the stop is curbside and features a bench. It is less than a 2 minute walk from D5.

Stop 4 serves inbound Route 86 and Route 91 buses. It is a curbside stop without a shelter about 2 minutes from D5.

Stop 5 serves inbound Route 80, 86, 88, and Ct2 buses, about a quarter mile from D5. Curbside at the intersection of McGrath Highway exit southbound and Washington Street, this stop sees buses relatively often and is the closest stop for users of the site riding Routes 80 or 88.

Stop 6 serves outbound Route 80 and Route 88 buses, about 4/10 of a mile from D5. It is curbside and does not have a shelter.

Stop 7 serves inbound routes 86, 91, and CT2 where Washington eastbound splits at McGrath Highway. D5 users will probably not use this stop, because stops closer to the site serving the same routes exist. It is curbside and does not have a shelter.

Stop 8 is the closest inbound Route 87 stop. It is around the corner from D5, a couple minute walk on Somerville, and is curbside with no shelter.

Stop 9 serves Route 87 outbound riders across the street from D1 on Somerville Ave. It is across Somerville Ave. from D1 and is a curbside stop with no shelter.

D6:

D6 has the best transit connectivity of any project site, being directly on Union Square on Somerville Avenue between Webster and Prospect. As a result, its users can reach Routes 85, 86, 87, 91, and CT2 within minutes. Its location right on Somerville Ave. here allows it quick access to the most used stop in all of Union Square (Stop 4). D6 is accessible by foot from Somerville Avenue. There is also a planned pedestrian entrance from D6 back onto Everett Street.

Figure 26: D6 Parcel Transit Access

Table 34: D6 Parcel Bus Stops

D6 Transit Connectivity Summary Table				
Stop #	Walking Distance (in feet from development site)	Average walking time (in minutes from development site at 270 ft/minute)	Routes and Directions Served (ie outbound and/or inbound)	Average wait time (in minutes for each service available at stop)
1	1000	4	86 OB	86: 9
2	700	3	86 IB	86: 9
3	700	3	85 IB, 87 IB, 85 OB, 87 OB	85: 19
4	90	1	87 OB, 87 IB, CT2 IB, 86 OB, 86 I	87: 15; CT2: 12; 86: 9; 91: 15
5	1100	4	91 IB	91: 15
6	1000	4	91 OB, 91 IB, 85 IB	91: 15; 85: 19
7	490	2	CT2 OB	CT2: 12

D7:

Sited directly on Union Square, D7 also features close access to many of the neighborhood's bus routes. Site users will enter from Warren Avenue, giving them very quick access to popular bus stops around the busy Bow/Somerville/Washington/Webster intersection. From D7, users have quick access to Routes 85, 86, 87, 91, and CT2.

Figure 27: D7 Parcel Transit Access

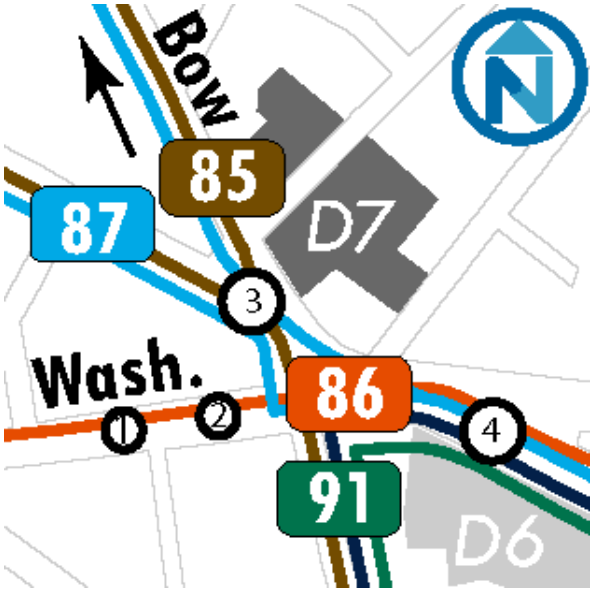


Table 35: D7 Parcel Bus Stops

D7 Transit Connectivity Summary Table				
Stop #	Walking Distance (in feet from development site)	Average walking time (in minutes from development site at 270 ft/minute)	Routes and Directions Served (ie outbound and/or inbound)	Average wait time (in minutes for each service available at stop)
1	1000	4	86 OB	86: 9
2	600	2	86 IB	86: 9
3	250	1	85 IB, 87 IB, 85 OB, 87 OB	85: 19; 87: 15
4	600	2	87 OB, 87 IB, CT2 IB, 86 OB, 86 I	87: 15; CT2: 12; 86: 9; 91: 15

Stop 1 serves outbound Route 86 buses.

Stop 2 serves inbound Route 86 buses.

Stop 3 serves inbound and outbound Route 85 and Route 87 buses. Inbound and outbound stops are across the street from each other on either Bow St (outbound) or Somerville (inbound). Both stops are curbside and do not have a shelter.

Stop 4 serves many buses: outbound and inbound Routes 87, 86, and 91. The inbound stop has a bench but no shelter. The outbound stop is curbside but does not have a bench or shelter. It is less than a 2 minute walk from D7. From the north side of Somerville, riders can access inbound CT2 service.

iii. Existing Connections

A myriad of regional transit services are available within one transfer of the development site. These include regional high speed rail services as well as commuter rail and bus services. Within one transfer of the development site, the following high speed rail services are available:

- MBTA Red Line with service to Alewife and Braintree/Ashmont
- MBTA Orange Line with service to Oak Grove and Forest Hills

- MBTA Green Line with service to Boston College, Heath Street, Cleveland Circle, and Riverside

MBTA Commuter rail service is also available as follows:

- Porter Square Station allows access to the Fitchburg Line to Wachusett

MBTA Bus Service within one transfer is available from Kendall Square, Central Square, Harvard Square, and Sullivan Square. Additional bus services available from these locations are:

- Route 95, 104, 89, 101, 105, 93, 109, and 92 are available at Sullivan Square with service to Arlington, Malden, and Downtown Boston
- Route 64 and 68 are available at Kendall Square with service to Allston, Brighton, and Harvard
- Route 1, 83, CT1, 64, 70, 47, and 68 are available at Central Square with service to Harvard, Allston, Brighton, Back Bay, the Longwood Medical Area, and other locations in Boston.
- Route 71, 77, 73, 72, 78, 96, 74, 75, 1, and 66 are available at Harvard Square with service to Arlington, Medford, Allston, Brighton, Watertown, Back Bay, the LMA area, and elsewhere in the Boston area.

c. Base Year Built Condition (Scenario A)

Base Year Built Condition, or Scenario A, for Transit Capacity analysis as required by the City of Somerville includes the transit-related impacts of Phases I and II of the proposed Union Square development. Phase I of development includes development parcels D2 and D5. Phase II of development includes development parcels D1 and D3. The transit-related impacts of this Scenario were studied in the context of expected planned improvements to the MBTA network, described below.

i. Planned Improvements (for included phases)

The Base Year built condition includes the implementation of the Green Line Extension, a major rapid transit project that will greatly improve transit connectivity for residents of the Union Square neighborhood. No major changes to existing bus services or commuter rail services are expected for the base year condition.

a. Rapid Transit

The Green Line Extension is a transformative project which will greatly enhance transit connectivity for residents of Somerville and Medford. The GLX project includes the implementation of new stations in key areas across Somerville and Medford, including the Washington Street Station and Union Square Station serving the Union Square Area. The Green Line Extension Map displays the planned extents of this project, with all new stations indicated. Details for the Green Line Extension service are summarized below. These service details are taken from the GLX Environmental Assessment completed in 2011.

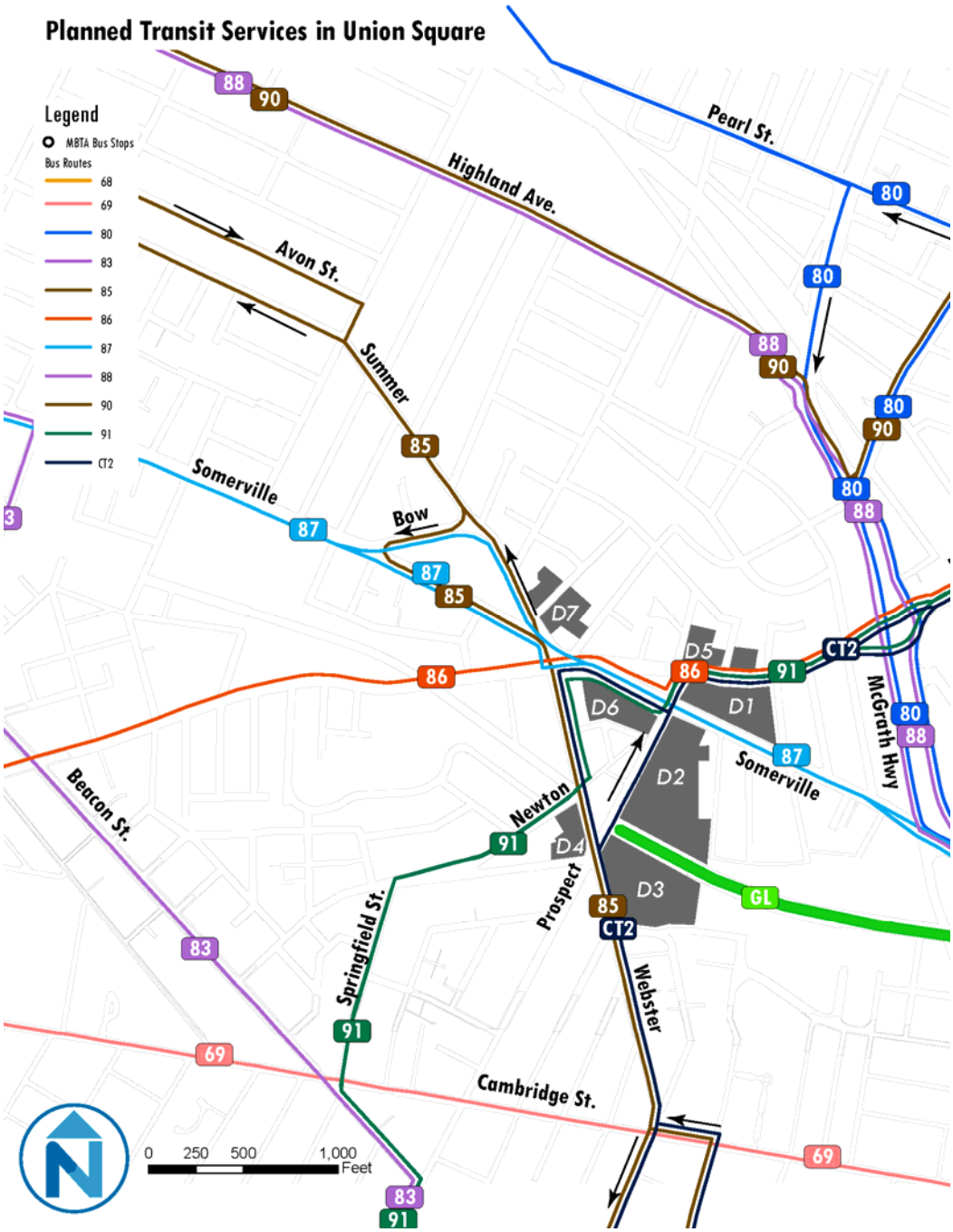
Headways:

Green Line service for the Union Square Branch will operate on headways equal to that of the existing Green Line E branch service: 6 minutes in the morning peak period, 5 minutes in the evening peak period, and between 9 and 10 minutes during off-peak periods.

Impact on Bus Transportation:

The CTPS conducted a study to evaluate the demand on existing bus routes that might be affected by the Green Line Extension project. This evaluation is inherent in the model methodology and determined that no routes would have a majority of their ridership lost due to the project to the extent that route elimination would be warranted. Although some routes would see a reduction in ridership due to the project, these same routes would experience an increase in ridership due to their function as feeder buses to new Green Line stations. An option of truncating Bus Routes 80, 87, and 88 at Green Line stations was evaluated and found to be unfavorable. Existing bus services are proposed to remain within the project study area. However, the relocation of Lechmere Station would require minor modifications to some routes.

Figure 28: Green Line Extension Map



ii. Capacity Analysis (Rapid Transit Only)

a. Base Year Capacity and Ridership

The MBTA's future capital improvement program indicates that there are no expected improvements to bus and commuter rail infrastructure or services within the Union Square study area. The sole improvement to rapid transit is the extension of the Green Line Branch E

Extension to Union Square, along with the nearby Washington Street Station. The Green Line Extension is expected to open by the end of 2021.

The table below shows the expected capacity and ridership of all public transit services in the Union Square study area before the addition of trips from Scenario A (Development Phases I and II). The sole difference between this table and the existing conditions table is the addition of the expected capacity of the Green Line Extension to the Inbound table, because this analysis does not account for any background growth in the Union Square area.

Green Line capacity was calculated using existing MBTA data for the Green Line E Branch. The E line carries 2-car trains with base capacities of 101 riders each, or crush capacities of 269, giving each train a base line capacity of about 202 riders.

Table 36: Base Year Transit Service Capacities, Outbound Stops

Route	Outbound Stop	Value	AM Base (5-7 & 9-12)	AM Peak (Average/hour 7AM - 9AM)	PM Base (12-4 & 6-9)	PM Peak (Average/Hour 4pm-6pm)	Late night (9-End)	Weekday Total	Saturday Peak (Average/hour 11 AM - 1 PM)	Sunday All Day
69	10 - 1406 - CAMBRIDGE ST @ NORFORK ST	Load Sum	120.3	80.75	374.1	78.7	41.9	695.75	47.75	252.5
		Capacity	429	195	780	117	234	1755	117	1131
		VC	28%	41%	48%	67%	18%	40%	41%	22%
80	37 - 2690 - MEDFORD ST @ WASHINGTON	Load Sum	206.6	86.2	143.4	33.05	18.7	487.95	41.25	234.6
		Capacity	468	97.5	546	156	195	1462.5	78	624
		VC	44%	88%	26%	21%	10%	33%	53%	38%
83	20 - 2438 - BEACON ST OPP CONCORD	Load Sum	120.3	46.05	97.5	23	12.7	299.55	27.9	168.6
		Capacity	507	117	468	97.5	156	1345.5	97.5	780
		VC	24%	39%	21%	24%	8%	22%	29%	22%
85	6 - 2510 - SOMERVILLE AVE @ UNION	Load Sum	89.5	72	85	4.55		251.05		
		Capacity	312	78	312	58.5		760.5		
		VC	29%	92%	27%	8%		33%		
86	13 - 2612 - SOMERVILLE AVE @ STONE	Load Sum	300.1	125.55	247.1	49.95	31.3	754	35.9	316.2
		Capacity	585	175.5	741	156	195	1852.5	78	858
		VC	51%	72%	33%	32%	16%	41%	46%	37%
87	29 - 2510 - SOMERVILLE AVE @ UNION	Load Sum	214.6	58.55	164.5	48.15	36.8	522.6	37.1	304.9
		Capacity	507	97.5	624	136.5	273	1638	78	1092
		VC	42%	60%	26%	35%	13%	32%	48%	28%
88	25 - 2690 - MEDFORD ST @ WASHINGTON	Load Sum	224.2	136.7	189.3	31.85	18.9	600.95	56.05	278.8
		Capacity	507	136.5	741	117	312	1813.5	136.5	1092
		VC	44%	100%	26%	27%	6%	33%	41%	26%
90	15 - 2687 - HIGHLAND AVE @ WALNUT ST	Load Sum	69.3	26.95	106.6	20.75	4	227.6	8.65	64.8
		Capacity	195	58.5	351	39	39	682.5	19.5	273
		VC	36%	46%	30%	53%	10%	33%	44%	24%
91	12 - 2612 - SOMERVILLE AVE @ STONE	Load Sum	206.5	42.05	173.7	32	12.3	466.55	34.25	196.1
		Capacity	585	78	585	78	156	1482	97.5	858
		VC	35%	54%	30%	41%	8%	31%	35%	23%
CT2 (747)	4 - 2612 - SOMERVILLE AVE @ STONE	Load Sum	128.2	89.25	59.8	19.85		297.1		
		Capacity	312	117	390	97.5		916.5		
		VC	41%	76%	15%	20%		32%		

Table 37: Base Year Transit Service Capacities, Inbound Stops

Route	Inbound Stop	Value	AM Base (5-7 & 9-12)	AM Peak (Average/hour 7AM - 9AM)	PM Base (12-4 & 6-9)	PM Peak (Average/Hour 4pm-6pm)	Late night (9-End)	Weekday Total	Saturday Peak (Average/hour 11 AM - 1 PM)	Sunday All Day
69	10 - 1423 - CAMBRIDGE ST @ NORFORK ST	Load Sum	131.3	102	260.5	80.55	24.1	598.45	19.975	276
		Capacity	390	195	741	136.5	234	1696.5	58.5	1170
		VC	34%	52%	35%	59%	10%	35%	34%	24%
80	6 - 2659 - MCGRATH HWY @ ALSTON ST	Load Sum	54.2	21.65	256.7	96.9	55.3	484.75	11.825	201.6
		Capacity	390	117	585	136.5	195	1423.5	39	624
		VC	14%	19%	44%	71%	28%	34%	30%	32%
83	8 - 2453 - 45 BEACON ST.	Load Sum	85.5	19	178.6	43.6	36.3	363	13.625	191.5
		Capacity	468	97.5	507	97.5	195	1365	48.75	819
		VC	18%	19%	35%	45%	19%	27%	28%	23%
85	9 - 2612 - SOMERVILLE AVE @ STONE	Load Sum	11	2.55	92	44.5		150.05		
		Capacity	273	58.5	351	58.5		741		
		VC	4%	4%	26%	76%		20%		
86	36 - 2597 - SOMERVILLE AVE @	Load Sum	169.2	82.85	349.7	95.9	100.8	798.45	14.675	325.1
		Capacity	624	175.5	624	136.5	273	1833	39	858
		VC	27%	47%	56%	70%	37%	44%	38%	38%
87	8 - 2612 - SOMERVILLE AVE @ STONE	Load Sum	102.7	28.95	271.8	93.45	54.9	551.8	24.675	328.1
		Capacity	390	97.5	663	117	273	1540.5	39	1092
		VC	26%	30%	41%	80%	20%	36%	63%	30%
88	6 - 2659 - MCGRATH HWY @ ALSTON ST	Load Sum	84.3	27.45	362.5	92	78.8	645.05	10.975	299
		Capacity	468	117	741	117	351	1794	58.5	1092
		VC	18%	23%	49%	79%	22%	36%	19%	27%
90	17 - 2661 - HIGHLAND AVE @ WALNUT ST	Load Sum	61.6	32.35	111	14.55	11.3	230.8	4.925	61.7
		Capacity	156	58.5	351	39	78	682.5	19.5	273
		VC	39%	55%	32%	37%	14%	34%	25%	23%
91	11 - 2531 - 30 PROSPECT ST	Load Sum	117.2	25.15	260.3	49.75	55.9	508.3	12.225	164.3
		Capacity	546	78	585	78	195	1482	48.75	858
		VC	21%	32%	44%	64%	29%	34%	25%	19%
CT2 (747)	16 - 2531 - 30 PROSPECT ST	Load Sum	32.1	19.1	106.3	47.65		205.15		
		Capacity	312	136.5	390	97.5		936		
		VC	10%	14%	27%	49%		22%		
Green Line	Union Square Station	Load Sum	NA	NA	NA	NA	NA	NA	NA	NA
		Capacity	5252	2020	2020	2424	4444	23230	20604	19392

b. Development Program Assumptions (for included phases)

The anticipated development program is displayed by project phase and project site in the tables, reproduced below. The first scenario for transit impact analysis, Scenario A, includes Phases 1 and 2. The Base Year Built Condition takes into account the impact of all of the completed development parcels in these 2 phases: D1, D2, D3, and D5.

Scenario B is the second scenario for transit impact analysis. It includes the addition of Phase 3 to Union Square, which completes the proposed Union Square Development with development parcels D4, D6, and D7.

The remainder of the Base Year Built Condition transit analysis will assign transit trips produced by Scenario A of development to area transit lines, distributed to individual lines based on the Motor Vehicle Origin-Destination Patterns as indicated by the Street Light study.

Table 38: Estimated Program Summary by Phase

PHASE	PHASE 1*	PHASE 2	PHASE 3**	TOTAL
APT (UNITS)	481	332	171	984
RETAIL (GSF)	55,217	40,440	47,064	142,721
OFFICE (ESTIMATED GSF)***	190,329	752,075	216,971	1,159,375
HOTEL (UNITS)	0	175	0	175
RESTAURANT (GSF)	0	0	0	0
ARTS (GSF)	34,099	32,567	7,000	73,666

* For the purposes of this analysis, Phase 1 was considered to include all of the D5 blocks. It is more likely that only D5.1 will be developed as part of Phase 1 and therefore these projects herein are conservative for Phase 1.

** For the purposes of this analysis, Phase 2 was considered to include all of the D3 Blocks. It is more likely that only D3.1 will be developed as part of Phase 2, and therefore these projects herein are conservative for Phase 2.

*** It is anticipated the commercial office uses will be a mix of life sciences and traditional office. For this analysis, all of these spaces were considered office spaces which will have a higher and more conservative population density from traffic generation standpoint.

Table 39: Estimated Program Summary by Development Parcel

PARCEL	D1	D2	D3	D4	D5	D6	D7
APT (UNITS)	0	450	332	51	31	0	120
RETAIL (GSF)	22,442	29,207	17,998	11,721	26,010	26,359	8,984
OFFICE (GSF)***	216,519	166,057	535,556	24,699	24,272	192,272	0
HOTEL (UNITS)	175	0	0	0	0	0	0
RESTAURANT (GSF)	0	0	0	0	0	0	0
ARTS (GSF)	23,038	23,599	9,529	0	10,500	7,000	0

*** It is anticipated the commercial office uses will be a mix of life sciences and traditional office. For this analysis, all of these spaces were considered office spaces which will have a higher and more conservative population density from traffic generation standpoint.

c. Trip Generation for Scenario A

The following tables show the new transit trips produced in Scenario A. It shows the addition of new transit trips from the new developments in Phases I and II during AM Peak, PM Peak, Daily, and Saturday Peak periods. Based on guidance from the City and existing and planned TDM, we established a 60% future non-vehicle mode share of the total trips we calculated using ITE trip generation rates for each development parcel. This proportion is divided among transit, bicycles, and pedestrian modes using Existing Census non-vehicle mode shares for the Union Square Census tract. Of the trips produced by the Union Square development, 22% are forecast to travel on transit, 15% to travel on bicycles, and 23% walking.

The transit trip numbers assume a 20% / 80 % AM entering / exiting split and a 65% / 35% PM entering / exiting split, the industry standard.

Table 40: Scenario A Transit Trip Generation by Phase, Transit Mode, and Travel Period

SCENARIO A								
PARCEL	**AM Entering**	**AM Exiting**	**PM Entering**	**PM Exiting**	**Daily Entering**	**Daily Exiting**	**Saturday Entering**	**Saturday Exiting**
PHASE 1 TOTAL	35	138	146	79	1083	1083	73	73
PHASE 2 TOTAL	84	336	291	157	1924	1924	81	81
SCENARIO A TOTAL	119	475	437	235	2937	2937	154	154
PHASE 1	**AM Entering**	**AM Exiting**	**PM Entering**	**PM Exiting**	**Daily Entering**	**Daily Exiting**	**Saturday Entering**	**Saturday Exiting**
Bus Transit Trips	21	83	88	47	650	650	44	44
Rapid Transit Trips (GL)	14	55	58	31	433	433	29	29
PHASE 2	**AM Entering**	**AM Exiting**	**PM Entering**	**PM Exiting**	**Daily Entering**	**Daily Exiting**	**Saturday Entering**	**Saturday Exiting**
Bus Transit Trips	50	202	175	94	1155	1155	48	48
Rapid Transit Trips (GL)	34	135	116	63	770	770	32	32
SCENARIO A TOTAL	**AM Entering**	**AM Exiting**	**PM Entering**	**PM Exiting**	**Daily Entering**	**Daily Exiting**	**Saturday Entering**	**Saturday Exiting**
Bus Transit Trips	71	285	262	141	1805	1805	92	92
Rapid Transit Trips (GL)	47	190	175	94	1203	1203	62	62

Using the raw transit trip numbers in the top table, we were able to calculate the number of transit trips by mode (bus or light rail) based on existing line ridership numbers. Existing Green Line E daily ridership is 18,166, constituting a 40% share of the total summed ridership of all transit lines in the Union Square Study area. we assumed that light rail ridership will account for 40% of all trips taken on all of the transit routes in the Union Square study area.

Table 41: Current Daily Ridership by Line in Union Square for Trip Distribution Analysis

Daily Ridership		
Green Line	18166	40.0%
69	3185	7.0%
80	2058	4.5%
83	2237	4.9%
85	589	1.3%
86	5618	12.4%
87	3796	8.4%
88	4075	9.0%
90	1182	2.6%
91	1693	3.7%
CT2	2815	6.2%
Bus Total	27248	60.0%
Total	45414	100.0%

d. Trip Assignment

Methodology

Assigning the raw trip numbers that we calculated and shown in the previous section required a study of the routing and destination of each bus line in the Union Square study area. As discussed, there are no expected changes to MBTA transit service except for the extension of the Green Line, so we used existing MBTA schedules and maps for our analysis. Below is a summary list of the routes we found would visit each of the City-defined origin-destination geographies, as well as a map showing the origin-destination geographies.

Southeastern Massachusetts: Green Line

East Cambridge: Green Line, 69, 80, 85, 87, 88, CT2

Charlestown: 86, 91, CT2, Green Line

Inner Belt: 86, 87, 91, CT2

Prospect Hill: 85, 88

Assembly Square: 86, 91, CT2

Ward 2: 91

Spring Hill: 86, 87

Somerville Hospital: 88, 90

Cedar: 80, 88, 90

Davis: 87

Tufts: 80

Northeastern Massachusetts: Green Line, 86, 91, CT2

Everett/Malden: 86, 91, CT2

Northern Massachusetts: Green Line, 86, 91, CT2

Medford: 80, 86, 91, CT2

Arlington/Lexington: 86, 87

Northwestern Massachusetts: Green Line, 87

Western Massachusetts:86, CT2, Green Line

North Cambridge/Harvard: 86, 87

Cambridge:85, 91, CT2

The following maps and tables display origin-destination patterns as indicated by the Street Light study. These flows were used as the basis for distribution of site-generated trips across area transit services.

Figure 29: Union Square as Origin Travel Flows, AM Peak

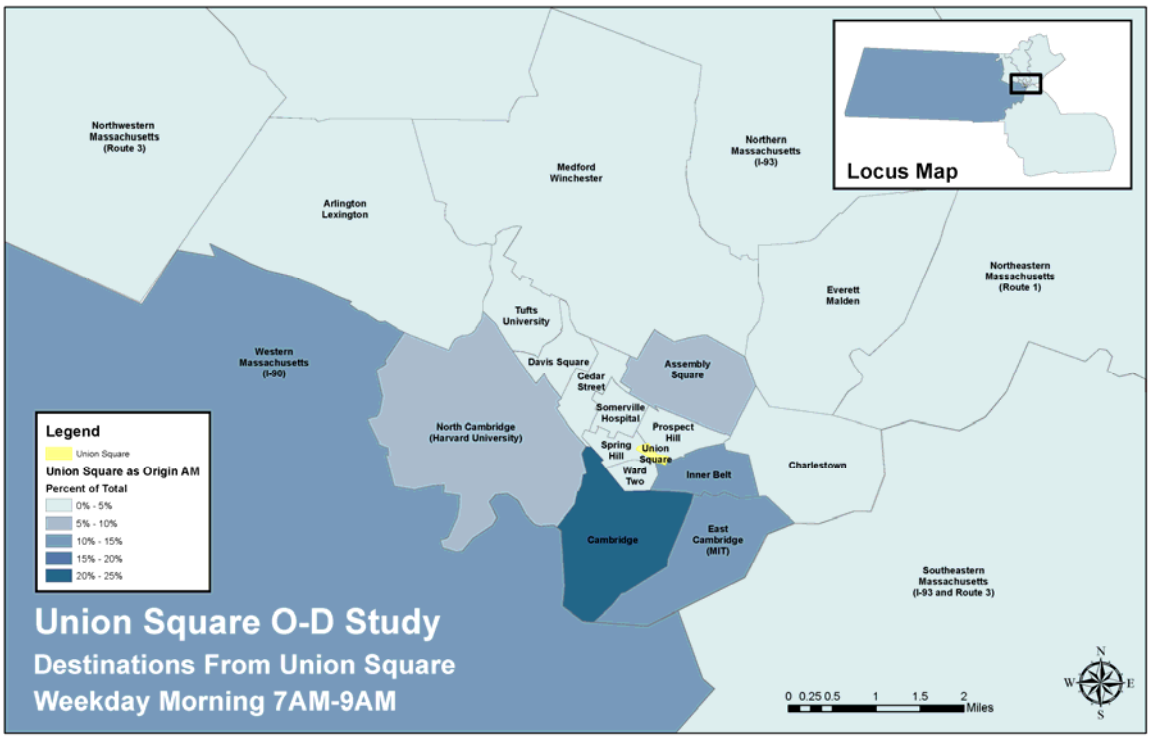


Figure 30: Union Square as Destination Travel Flows, AM Peak

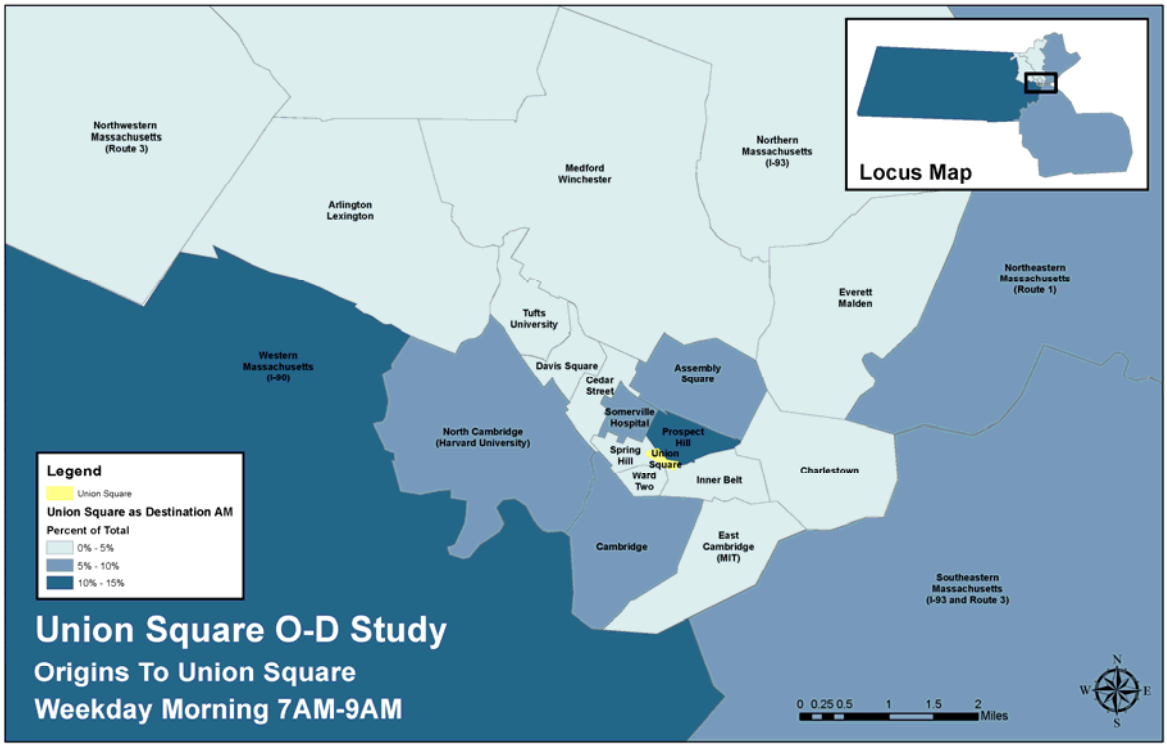


Figure 31: Union Square as Origin Travel Flows, PM Peak

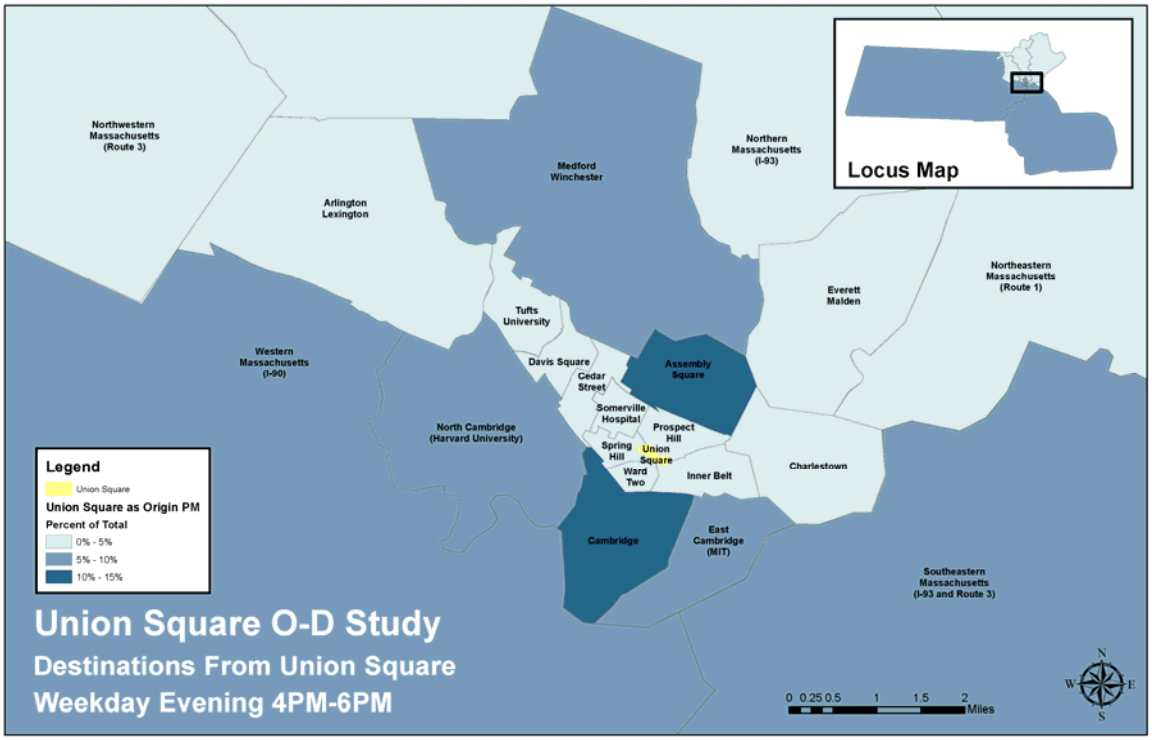
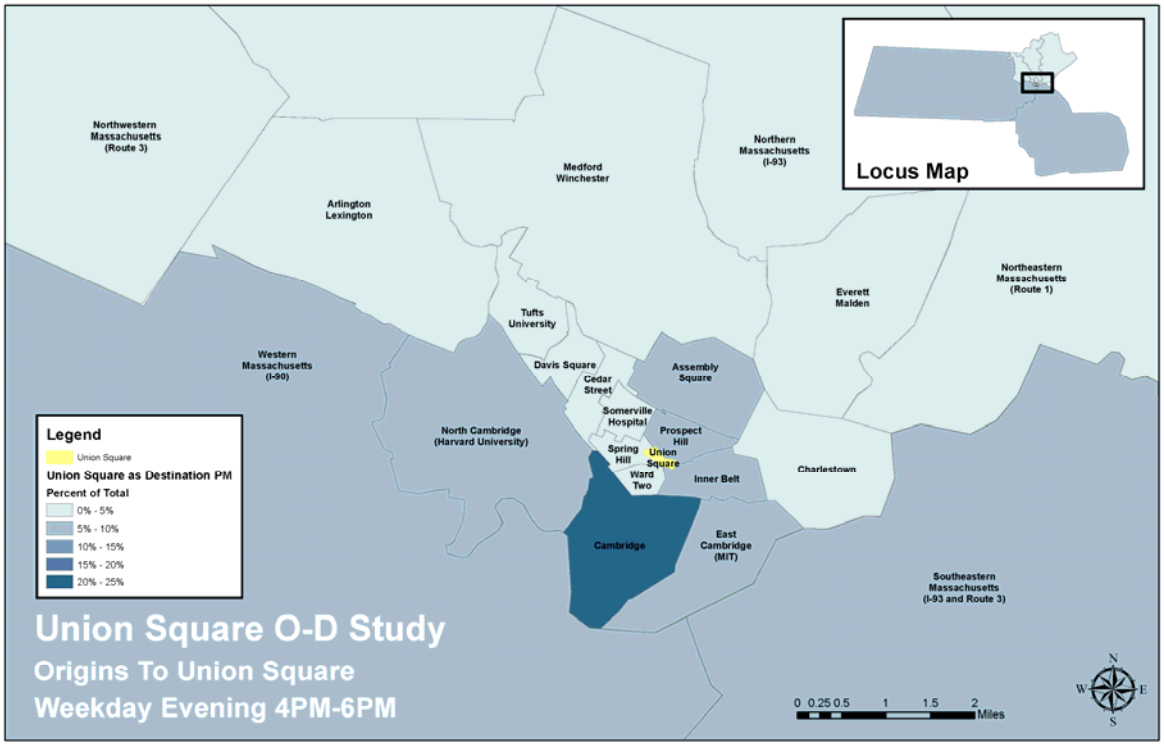


Figure 32: Union Square as Destination Travel Flows, PM Peak



The table below lists the analysis zones selected outside and inside the City of Somerville as part of the Street Light study, as well as the percentage of traffic entering and exiting from those zones during the AM and PM peaks. We used these proportions to distribute the raw transit trip numbers presented in the transit trip generation section of this analysis.

Table 42: Travel flows to and from Union Square,

Row Labels	Traffic from Union Square, PM Peak	Traffic to Union Square, PM Peak	Traffic from Union Square, AM Peak	Traffic to Union Square, AM Peak	Traffic from Union Square, Daily Exiting	Traffic to Union Square, Daily Entering	Traffic from Union Square, Saturday Exiting	Traffic to Union Square, Saturday Entering
Northeastern Mass	6%	2%	3%	4%	6%	2%	6%	2%
Northern Mass	12%	4%	7%	10%	12%	4%	12%	4%
Northwestern Mass	2%	1%	1%	5%	2%	1%	2%	1%
Southeastern Mass	7%	6%	7%	6%	7%	6%	7%	6%
Western Mass	9%	10%	11%	11%	9%	10%	9%	10%
Arlington/Lexington	1%	0%	0%	3%	1%	0%	1%	0%
Medford/Winchester	7%	3%	6%	5%	7%	3%	7%	3%
Everett/Malden	3%	2%	2%	2%	3%	2%	3%	2%
Charlestown	3%	4%	3%	3%	3%	4%	3%	4%
N Cambridge/Harvard	7%	9%	8%	8%	7%	9%	7%	9%
Central Cambridge	9%	23%	15%	10%	9%	23%	9%	23%
East Cambridge	3%	6%	10%	3%	3%	6%	3%	6%
Tufts University	1%	1%	0%	1%	1%	1%	1%	1%
Davis Square	1%	1%	0%	1%	1%	1%	1%	1%
Cedar Street	2%	2%	1%	3%	2%	2%	2%	2%
Somerville Hospital	1%	1%	1%	2%	1%	1%	1%	1%
Spring Hill	4%	5%	4%	5%	4%	5%	4%	5%
Ward Two	4%	3%	4%	4%	4%	3%	4%	3%
Inner Belt	7%	10%	9%	6%	7%	10%	7%	10%
Prospect Hill	4%	4%	3%	6%	4%	4%	4%	4%
Assembly Square	8%	4%	5%	3%	8%	4%	8%	4%

For example, of the 235 exiting PM transit trips produced under Scenario A, we found that 6%, or about 14, of these trips would travel to Northeastern Massachusetts. 12%, or about 28 of these riders would be travelling to Northern Mass, and so on. We calculated these raw transit trips by destination for AM and PM peak and Saturday Peak; see below for these calculations:

Table 43: Destination Trip Proportions for Scenario A

Scenario A Destination Trip Proportions								
Row Labels	Traffic from Union Square, PM Peak	Traffic from Union Square, PM Peak	Traffic to Union Square, PM Peak	Traffic to Union Square, PM Peak	Traffic from Union Square, AM Peak	Traffic from Union Square, AM Peak	Traffic to Union Square, AM Peak	Traffic to Union Square, AM Peak
Northeastern Mass	6%	14	2%	9	3%	14	4%	5
Northern Mass	12%	28	4%	17	7%	33	10%	12
Northwestern Mass	2%	5	1%	4	1%	5	5%	6
Southeastern Mass	7%	16	6%	26	7%	33	6%	7
Western Mass	9%	21	10%	43	11%	52	11%	13
Arlington/Lexington	1%	2	0%	0	0%	0	3%	4
Medford/Winchester	7%	16	3%	13	6%	28	5%	6
Everett/Malden	3%	7	2%	9	2%	9	2%	2
Charlestown	3%	7	4%	17	3%	14	3%	4
N Cambridge/Harvar	7%	16	9%	38	8%	38	8%	9
Central Cambridge	9%	21	23%	98	15%	71	10%	12
East Cambridge	3%	7	6%	26	10%	47	3%	4
Tufts University	1%	2	1%	4	0%	0	1%	1
Davis Square	1%	2	1%	4	0%	0	1%	1
Cedar Street	2%	5	2%	9	1%	5	3%	4
Somerville Hospital	1%	2	1%	4	1%	5	2%	2
Spring Hill	4%	9	5%	21	4%	19	5%	6
Ward Two	4%	9	3%	13	4%	19	4%	5
Inner Belt	7%	16	10%	43	9%	43	6%	7
Prospect Hill	4%	9	4%	17	3%	14	6%	7
Assembly Square	8%	18	4%	17	5%	24	3%	4

Row Labels	Traffic from Union Square, Saturday Exiting	Traffic from Union Square, Saturday Exiting	Traffic to Union Square, Saturday Entering	Traffic to Union Square, Saturday Entering
Northeastern Mass	6%	9	2%	3
Northern Mass	12%	18	4%	6
Northwestern Mass	2%	3	1%	2
Southeastern Mass	7%	11	6%	9
Western Mass	9%	14	10%	15
Arlington/Lexington	1%	2	0%	0
Medford/Winchester	7%	11	3%	5
Everett/Malden	3%	5	2%	3
Charlestown	3%	5	4%	6
N Cambridge/Harvar	7%	11	9%	14
Central Cambridge	9%	14	23%	35
East Cambridge	3%	5	6%	9
Tufts University	1%	2	1%	2
Davis Square	1%	2	1%	2
Cedar Street	2%	3	2%	3
Somerville Hospital	1%	2	1%	2
Spring Hill	4%	6	5%	8
Ward Two	4%	6	3%	5
Inner Belt	7%	11	10%	15
Prospect Hill	4%	6	4%	6
Assembly Square	8%	12	4%	6

For the next step of our transit trip assignment analysis, we took these raw transit numbers by destination and period and distributed them among the routes that visited these destinations from Union Square. These transit routes are summarized by destination in the summary list in the transit trip generation section earlier. For each destination, we summed the ridership of each line that visits it, and divided the raw number according to the ridership of each of those lines. For Northeastern Massachusetts, for example, the 14 Exiting PM trips from Union Square would have to use the Green Line, Route 86, 91, or CT2, to travel to their destination. To find the proportion of these 14 that would travel on each line, we found what proportion of the total ridership of these four lines each line is responsible for. See below for this example:

Table 44: Ridership Proportion by Line Servicing Destination Geography for Assignment Analysis

Northeastern Mass		
Green Line	18166	64.21%
86	5618	19.86%
91	1693	5.98%
CT2	2815	9.95%
Total	28292	100.00%

According to this calculation, 64% of the 14 riders would travel on the Green Line, 20% on the 86 bus, 6% on the 91, and 10% on the CT2. We distributed these riders to the respective inbound or outbound stop for each of these lines accordingly.

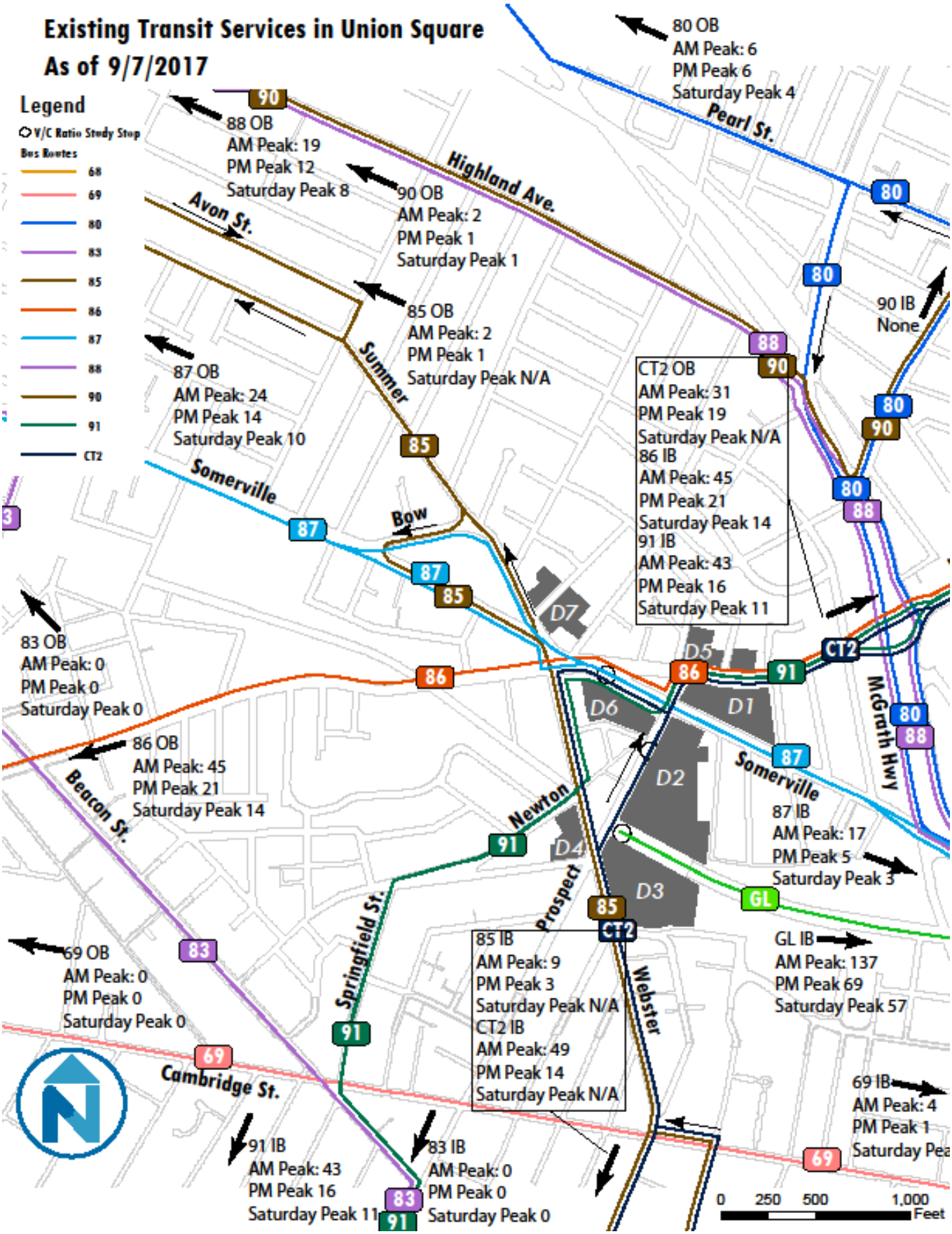
We completed this exercise for each destination for each period of the day, then summed up the new transit riders for each line, both inbound and outbound. These new transit riders by route and direction were added to the existing transit capacity numbers to see whether existing bus services could handle the addition of the new riders from Phases I and II of the Union Square Development.

The next page contains a map showing the additional expected transit riders by route and direction. It also shows the central transit stop that we used for the volume-to-capacity ratio study.

NOTE: 80 and 88 IB not shown on map.

80 IB:	88 IB
AM Peak: 3	AM Peak: 6
PM Peak: 0	PM Peak: 1
Saturday Peak: 0	Saturday Peak: 1

Figure 33: Scenario A Transit Trip Assignments



e. Volume-to-Capacity Ratio

In our analysis of the transit-related impact of Scenario A, we found that the expected MBTA transit network will be able to handle all additional passengers using its system. While the addition of the development parcels in Phases I and II will push some bus loads over baseline capacity during some peak periods, there remains more than enough standing space on these bus routes to carry passengers comfortably and well below the MBTA's max crush loads. Key findings from the Scenario A Volume-to Capacity Ratio Study:

- AM Peak Route 85 inbound V/C grows from 92% to 104%, meaning 1 or 2 people will have to stand on the bus during this period
- AM Peak Route 88 inbound V/C grows from 100% to 105%, meaning 2 or 3 people will have to stand on the bus during this period
- AM Peak Route 91 inbound V/C grows from 54% to 109%, meaning 3 or 4 people will have to stand on the bus during this period
- Saturday Peak Route 86 outbound V/C grows from 38% to 102% (there is only one bus that travels during Saturday Peak), meaning 1 person will have to stand on the bus during this period.

Some assumptions and notes related to this analysis:

- Note that outbound stop on 91 is now Somerville Ave @ Union Square. Data was collected at 30 Prospect Avenue before this change occurred during Summer 2017
- Note that VC assumes a baseline capacity of 39 passengers per bus as described in MBTA Service Delivery Policy (https://www.mbta.com/uploadedfiles/About_the_T/Board_Meetings/MBTA%20Service%20Delivery%20Policy%202017%20FINAL.pdf)
- Note that buses can safely carry passengers up to 140% of capacity (55 passengers)
- Note that inbound Saturday Green Line trips carry riders that would have gone on the 85 or CT2 inbound, because those bus routes do not operate on weekends. Outbound 85 or CT2 riders were placed on the inbound Route 91 instead, because this bus serves the same destination at Sullivan Square.

f. Base year ridership was calculated by adding transit trips generated by Phases I and II of the development on weekday days, during the weekday AM and PM peak, and on Saturdays. Combined, Phases I and II of development will be referred to as Scenario A.

Figure 34: Scenario A Transit Capacity Analysis Inbound

			AM Peak			PM Peak			Saturdays		
Route	Type	Inbound Stop	AM Peak Existing	AM Peak Trip Gen	**Scenario A**	PM Peak Existing (4-6)	PM Peak Trip Gen	**Scenario A**	Saturdays	Saturday Trip Gen	**Scenario A**
69	Load Sum	10 - 1406 - CAMBRIDGE ST @ NORFORK ST	80.75	4	84.75	78.7	1	79.7	47.75	0	47.75
	Capacity		195		195	117		117	117		117
	VC		41%		43%	67%		68%	41%		41%
80	Load Sum	37 - 2690 - MEDFORD ST @ WASHINGTON ST	86.2	3	89.2	33.05	0	33.05	41.25	0	41.25
	Capacity		97.5		97.5	156		156	78		78
	VC		88%		91%	21%		21%	53%		53%
83	Load Sum	20 - 2438 - BEACON ST OPP CONCORD AVE	46.05	0	46.05	23	0	23	27.9	0	27.9
	Capacity		117		117	97.5		97.5	97.5		97.5
	VC		39%		39%	24%		24%	29%		29%
85	Load Sum	6 - 2510 - SOMERVILLE AVE @ UNION SQUARE	72	9	81	4.55	3	7.55			
	Capacity		78		78	58.5		58.5			
	VC		92%		104%	8%		13%			
86	Load Sum	13 - 2612 - SOMERVILLE AVE @ STONE AVE	125.55	45	170.55	49.95	21	70.95	35.9	14	49.9
	Capacity		175.5		175.5	156		156	78		78
	VC		72%		97%	32%		45%	46%		64%
87	Load Sum	29 - 2510 - SOMERVILLE AVE @ UNION SQUARE	58.55	17	75.55	48.15	5	53.15	37.1	3	40.1
	Capacity		97.5		97.5	136.5		136.5	78		78
	VC		60%		77%	35%		39%	48%		51%
88	Load Sum	25 - 2690 - MEDFORD ST @ WASHINGTON ST	136.7	6	142.7	31.85	1	32.85	56.05	1	57.05
	Capacity		136.5		136.5	117		117	136.5		136.5
	VC		100%		105%	27%		28%	41%		42%
90	Load Sum	15 - 2687 - HIGHLAND AVE @ WALNUT ST	26.95	0	26.95	20.75	0	20.75	8.65	0	8.65
	Capacity		58.5		58.5	39		39	19.5		19.5
	VC		46%		46%	53%		53%	44%		44%
91	Load Sum	12 - 2612 - SOMERVILLE AVE @ STONE AVE	42.05	43	85.05	32	16	48	34.25	11	45.25
	Capacity		78		78	78		78	97.5		97.5
	VC		54%		109%	41%		62%	35%		46%
CT2 (747)	Load Sum	4 - 2612 - SOMERVILLE AVE @ STONE AVE	89.25	49	138.25	19.85	14	33.85			
	Capacity		117		117	97.5		97.5			
	VC		76%		118%	20%		35%			

Figure 35: Scenario A Transit Capacity Analysis Outbound & Green Line

			AM Peak			PM Peak			Saturdays		
Route	Type	Outbound Stop	AM Peak Existing	AM Peak Trip Gen	**Scenario A**	PM Peak Existing (4-6)	PM Peak Trip Gen	**Scenario A**	Saturdays	Saturday Trip Gen	**Scenario A**
69	Load Sum	10 - 1423 - CAMBRIDGE ST @ NORFORK ST	102	0	102	80.55	0	80.55	19.975	0	19.975
	Capacity		195		195	136.5		136.5	58.5		58.5
	VC		52%		52%	59%		59%	34%		34%
80	Load Sum	6 - 2659 - MCGRATH HWY @ ALSTON ST	21.65	6	27.65	96.9	6	102.9	11.825	4	15.825
	Capacity		117		117	136.5		136.5	39		39
	VC		19%		24%	71%		75%	30%		41%
83	Load Sum	8 - 2453 - 45 BEACON ST.	19	0	19	43.6	0	43.6	13.625	0	13.625
	Capacity		97.5		97.5	97.5		97.5	48.75		48.75
	VC		19%		19%	45%		45%	28%		28%
85	Load Sum	9 - 2612 - SOMERVILLE AVE @ STONE AVE	2.55	2	4.55	44.5	1	45.5			
	Capacity		58.5		58.5	58.5		58.5			
	VC		4%		8%	76%		78%			
86	Load Sum	36 - 2597 - SOMERVILLE AVE @ PROSPECT ST	82.85	61	143.85	95.9	37	132.9	14.675	25	39.675
	Capacity		175.5		175.5	136.5		136.5	39		39
	VC		47%		82%	70%		97%	38%		102%
87	Load Sum	8 - 2612 - SOMERVILLE AVE @ STONE AVE	28.95	24	52.95	93.45	14	107.45	24.675	10	34.675
	Capacity		97.5		97.5	117		117	39		39
	VC		30%		54%	80%		92%	63%		89%
88	Load Sum	6 - 2659 - MCGRATH HWY @ ALSTON ST	27.45	19	46.45	92	12	104	10.975	8	18.975
	Capacity		117		117	117		117	58.5		58.5
	VC		23%		40%	79%		89%	19%		32%
90	Load Sum	17 - 2661 - HIGHLAND AVE @ WALNUT ST	32.35	2	34.35	14.55	1	15.55	4.925	1	5.925
	Capacity		58.5		58.5	39		39	19.5		19.5
	VC		55%		59%	37%		40%	25%		30%
91	Load Sum	11 - 2531 - 30 PROSPECT ST	25.15	18	43.15	49.75	11	60.75	12.225	21	33.225
	Capacity		78		78	78		78	48.75		48.75
	VC		32%		55%	64%		78%	25%		68%
CT2 (747)	Load Sum	16 - 2531 - 30 PROSPECT ST	19.1	31	50.1	47.65	19	66.65			
	Capacity		136.5		136.5	97.5		97.5			
	VC		14%		37%	49%		68%			
Green Lin	Union Square Station inbound towards Park			137	137		69	69		57	57

iii. Recommended Mitigation

Because we expect that the future MBTA public transit service will be able to safely handle all additional passenger loads produced under Scenario A, no mitigation is recommended or necessary.

d. Base Year Built Condition with Mitigation

i. Capacity Analysis (Rapid Transit Only)

Since we find cause for no mitigation necessary to accommodate additional transit trips in Scenario A, a Base Year Built Condition with Mitigation study is not needed.

e. Future Year Built Condition with Mitigation

The third scenario for analysis is the Future Year Built Condition with Mitigation where development generated trips for all phases (Phases I, II, and III) of development are added to the Future Year network and any recommended improvements to mitigate the impact of development related trips are included.

i. Planned Improvements (for included phases)

As in the Base Year Built Condition analysis, no planned improvements are indicated by the MBTA in the transit network serving Union Square besides the Green Line extension.

ii. Capacity Analysis (Rapid Transit Only)

a. Base Year Capacity and Ridership

Base Year Capacity for this scenario, for brevity purposes referred to as Scenario C, is the resulting capacity of the bus lines that remained after adding trips from Scenario A to each of the Union Square area bus lines. As noted in the previous section, all bus lines during all periods of the day had at least standing room area capacity onboard even after adding all Scenario A transit trips.

b. Development Program (for included phases)

Scenario C is the addition of new transit riders from Phase III of the proposed Union Square development. Phase III will result in the completion of the Union Square development, with development parcels D4, D6, and D7 built out. The proposed development program for this phase and its associated parcels is reproduced below:

Table 45: Program Summary by Phase

PHASE	PHASE 1*	PHASE 2	PHASE 3**	TOTAL
APT (UNITS)	481	332	171	984
RETAIL (GSF)	55,217	40,440	47,064	142,721
OFFICE (GSF)***	190,329	752,075	216,971	1,159,375
HOTEL (UNITS)	0	175	0	175
RESTAURANT (GSF)	0	0	0	0
ARTS (GSF)	34,099	32,567	7,000	73,666

* For the purposes of this analysis, Phase 1 was considered to include all of the D5 blocks. It is more likely that only D5.1 will be developed as part of Phase 1 and therefore these projects herein are conservative for Phase 1.

** For the purposes of this analysis, Phase 2 was considered to include all of the D3 Blocks. It is more likely that only D3.1 will be developed as part of Phase 2, and therefore these projects herein are conservative for Phase 2.

*** It is anticipated the commercial office uses will be a mix of life sciences and traditional office. For this analysis, all of these spaces were considered office spaces which will have a higher and more conservative population density from traffic generation standpoint.

Table 46: Program Summary by Development Parcel

PARCEL	D1	D2	D3	D4	D5	D6	D7
APT (UNITS)	0	450	332	51	31	0	120
RETAIL (GSF)	22,442	29,207	17,998	11,721	26,010	26,359	8,984
OFFICE (GSF)***	216,519	166,057	535,556	24,699	24,272	192,272	0
HOTEL (UNITS)	175	0	0	0	0	0	0
RESTAURANT (GSF)	0	0	0	0	0	0	0
ARTS (GSF)	23,038	23,599	9,529	0	10,500	7,000	0

*** It is anticipated the commercial office uses will be a mix of life sciences and traditional office. For this analysis, all of these spaces were considered office spaces which will have a higher and more conservative population density from traffic generation standpoint.

c. Trip Generation (for included phases

As in the Base Year Built Condition (Scenario A) analysis, trip generation was calculated based on a 22% transit trip mode share of the total trips expected from each development parcel. The tables below show the expected additional transit trips generated in Scenario C. Development parcels in Phase 3 are of a much smaller scale; consequently, these parcels are not expected to produce as many trips as the parcels in earlier phases.

Table 47: Scenario C Transit Trip Generation

	SCENARIO C							
PARCEL	AM Entering	AM Exiting	PM Entering	PM Exiting	Daily Entering	Daily Exiting	Saturday Entering	Saturday Exiting
PHASE 1 TOTAL	35	138	146	79	1083	1083	73	73
PHASE 2 TOTAL	84	336	291	157	1924	1924	81	81
PHASE 3 TOTAL	26	106	109	59	770	770	46	46
SCENARIO C TOTAL	26	106	109	59	770	770	46	46

d. Trip Assignment

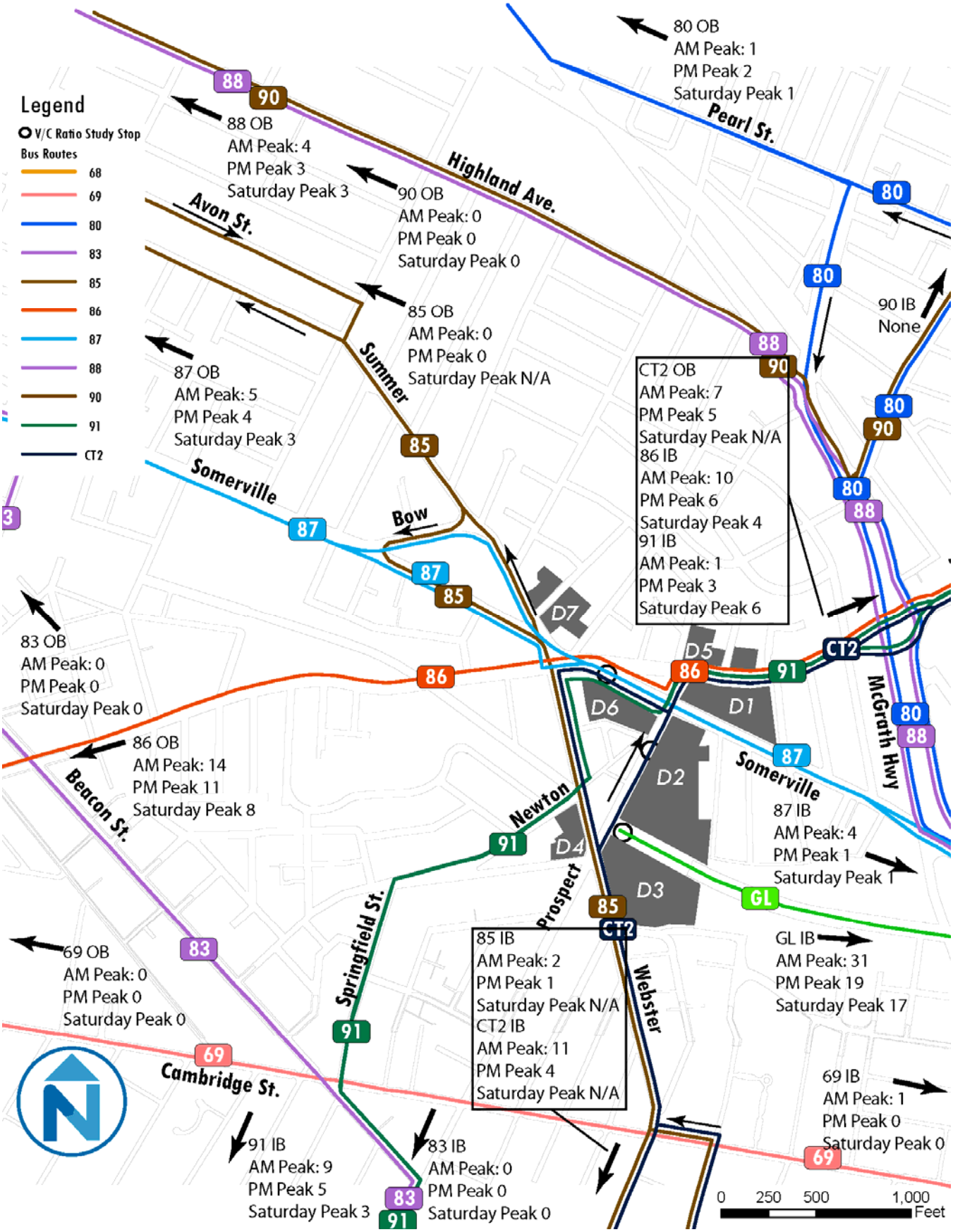
The following map displays the expected transit trip assignments by route and direction for Union Square.

NOTE: 80 and 88 IB not shown on map.

80 IB:
AM Peak: 1
PM Peak: 0
Saturday Peak: 0

88 IB
AM Peak: 1
PM Peak: 0
Saturday Peak: 0

Figure 36: Scenario C Transit Trip Assignments



e. Volume-to-Capacity Ratio

In our analysis of the transit-related impact of Scenario C, we found that the expected Future MBTA transit network will be able to handle all additional passengers using its system. While the addition of the development parcels in Phases III will push some additional bus loads over baseline capacity and others further into peak crush capacity during some peak periods, there remains more than enough standing space on these bus routes to carry passengers comfortably and well below the MBTA's max crush loads. Key findings from the Scenario C Volume-to Capacity Ratio Study:

- AM Peak Route 85 inbound V/C grows from 97% to 103%, meaning 1 or 2 people will have to stand on the bus during this period
- AM Peak Route 91 inbound V/C grows from 109% to 121%, meaning 7 or 8 people will have to stand on the bus during this period
- AM Peak Route CT2 inbound V/C grows from 118% to 128%, meaning 8 or 9 people will have to stand on the bus during this period
- Saturday Peak Route 86 outbound V/C grows from 102% to 122% (there is only one bus that travels during Saturday Peak), meaning 9 people will have to stand on the bus during this period.
- PM Peak Route 86 Outbound V/C grows from 97% to 105%, meaning 2 or 3 people will have to stand on the bus during this period
- Total Green Line inbound trips caused by this development (Scenarios A & B combined) are expected to be 168 during AM Peak, 88 during PM peak, and 74 during Saturday peak.

Some assumptions and notes related to this analysis:

- Note that outbound stop on 91 is now Somerville Ave @ Union Square. Data was collected at 30 Prospect Avenue before this change occurred during Summer 2017
- Note that VC assumes a baseline capacity of 39 passengers per bus as described in MBTA Service Delivery Policy (https://www.mbta.com/uploadedfiles/About_the_T/Board_Meetings/MBTA%20Service%20Delivery%20Policy%202017%20FINAL.pdf)
- Note that buses can safely carry passengers up to 140% of capacity (55 passengers)
- Note that inbound Saturday Green Line trips carry riders that would have gone on the 85 or CT2 inbound, because those bus routes do not operate on weekends. Outbound 85 or CT2 riders were placed on the inbound Route 91 instead, because this bus serves the same destination at Sullivan Square

Figure 37: Volume-to-Capacity Ratio Study for Scenario C Inbound

			AM Peak			PM Peak			Saturdays		
Route	Type	Inbound Stop	AM Peak Base Year Built Projected	AM Peak Trip Gen	**Scenario C**	PM Peak Base Year Built Projected	PM Peak Trip Gen	**Scenario C**	Saturdays Peak Base Year Built Projected	Saturday Trip Gen	**Scenario C**
69	Load Sum	10 - 1406 - CAMBRIDGE ST @ NORFORK ST	84.75	1	85.75	79.7	0	79.7	47.75	0	47.75
	Capacity		195		195	117		117	117		117
	VC		43%		44%	68%		68%	41%		41%
80	Load Sum	37 - 2690 - MEDFORD ST @ WASHINGTON ST	89.2	1	90.2	33.05	0	33.05	41.25	0	41.25
	Capacity		97.5		97.5	156		156	78		78
	VC		91%		93%	21%		21%	53%		53%
83	Load Sum	20 - 2438 - BEACON ST OPP CONCORD AVE	46.05	0	46.05	23	0	23	27.9	0	27.9
	Capacity		117		117	97.5		97.5	97.5		97.5
	VC		39%		39%	24%		24%	29%		29%
85	Load Sum	6 - 2510 - SOMERVILLE AVE @ UNION SQUARE	81	2	83	7.55	1	8.55			
	Capacity		78		78	58.5		58.5			
	VC		104%		106%	13%		15%			
86	Load Sum	13 - 2612 - SOMERVILLE AVE @ STONE AVE	170.55	10	180.55	70.95	6	76.95	49.9	4	53.9
	Capacity		175.5		175.5	156		156	78		78
	VC		97%		103%	45%		49%	64%		69%
87	Load Sum	29 - 2510 - SOMERVILLE AVE @ UNION SQUARE	75.55	4	79.55	53.15	1	54.15	40.1	1	41.1
	Capacity		97.5		97.5	136.5		136.5	78		78
	VC		77%		82%	39%		40%	51%		53%
88	Load Sum	25 - 2690 - MEDFORD ST @ WASHINGTON ST	142.7	1	143.7	32.85	0	32.85	57.05	0	57.05
	Capacity		136.5		136.5	117		117	136.5		136.5
	VC		105%		105%	28%		28%	42%		42%
90	Load Sum	15 - 2687 - HIGHLAND AVE @ WALNUT ST	26.95	0	26.95	20.75	0	20.75	8.65	0	8.65
	Capacity		58.5		58.5	39		39	19.5		19.5
	VC		46%		46%	53%		53%	44%		44%
91	Load Sum	12 - 2612 - SOMERVILLE AVE @ STONE AVE	85.05	9	94.05	48	5	53	45.25	3	48.25
	Capacity		78		78	78		78	97.5		97.5
	VC		109%		121%	62%		68%	46%		49%
CT2 (747)	Load Sum	4 - 2612 - SOMERVILLE AVE @ STONE AVE	138.25	11	149.25	33.85	4	37.85			
	Capacity		117		117	97.5		97.5			
	VC		118%		128%	35%		39%			

Figure 38: Volume-to-Capacity Study for Scenario C Outbound & Green Line

			AM Peak			PM Peak			Saturdays		
Route	Type	Outbound Stop	AM Peak Base Year Built Projected	AM Peak Trip Gen	**Scenario C**	PM Peak Base Year Built Projected	PM Peak Trip Gen	**Scenario C**	Saturdays Peak Base Year Built Projected	Saturday Trip Gen	**Scenario C**
69	Load Sum	10 - 1423 - CAMBRIDGE ST @ NORFORK ST	102	0	102	80.55	0	80.55	19.975	0	19.975
	Capacity		195		195	136.5		136.5	58.5		58.5
	VC		52%		52%	59%		59%	34%		34%
80	Load Sum	6 - 2659 - MCGRATH HWY @ ALSTON ST	27.65	1	28.65	102.9	2	104.9	15.825	1	16.825
	Capacity		117		117	136.5		136.5	39		39
	VC		24%		24%	75%		77%	41%		43%
83	Load Sum	8 - 2453 - 45 BEACON ST.	19	0	19	43.6	0	43.6	13.625	0	13.625
	Capacity		97.5		97.5	97.5		97.5	48.75		48.75
	VC		19%		19%	45%		45%	28%		28%
85	Load Sum	9 - 2612 - SOMERVILLE AVE @ STONE AVE	4.55	0	4.55	45.5	0	45.5		0	
	Capacity		58.5		58.5	58.5		58.5			
	VC		8%		8%	78%		78%			
86	Load Sum	36 - 2597 - SOMERVILLE AVE @ PROSPECT ST	143.85	14	157.85	132.9	11	143.9	39.675	8	47.675
	Capacity		175.5		175.5	136.5		136.5	39		39
	VC		82%		90%	97%		105%	102%		122%
87	Load Sum	8 - 2612 - SOMERVILLE AVE @ STONE AVE	52.95	5	57.95	107.45	4	111.45	34.675	3	37.675
	Capacity		97.5		97.5	117		117	39		39
	VC		54%		59%	92%		95%	89%		97%
88	Load Sum	6 - 2659 - MCGRATH HWY @ ALSTON ST	46.45	4	50.45	104	3	107	18.975	3	21.975
	Capacity		117		117	117		117	58.5		58.5
	VC		40%		43%	89%		91%	32%		38%
90	Load Sum	17 - 2661 - HIGHLAND AVE @ WALNUT ST	34.35	0	34.35	15.55	0	15.55	5.925	0	5.925
	Capacity		58.5		58.5	39		39	19.5		19.5
	VC		59%		59%	40%		40%	30%		30%
91	Load Sum	11 - 2531 - 30 PROSPECT ST	43.15	1	44.15	60.75	3	63.75	33.225	6	39.225
	Capacity		78		78	78		78	48.75		48.75
	VC		55%		57%	78%		82%	68%		80%
CT2 (747)	Load Sum	16 - 2531 - 30 PROSPECT ST	50.1	7	57.1	66.65	5.3	71.95			
	Capacity		136.5		136.5	97.5		97.5			
	VC		37%		42%	68%		74%			
Green Line	Union Square Station inbound towards Park		137	31	168	69	19	88	57	17	74

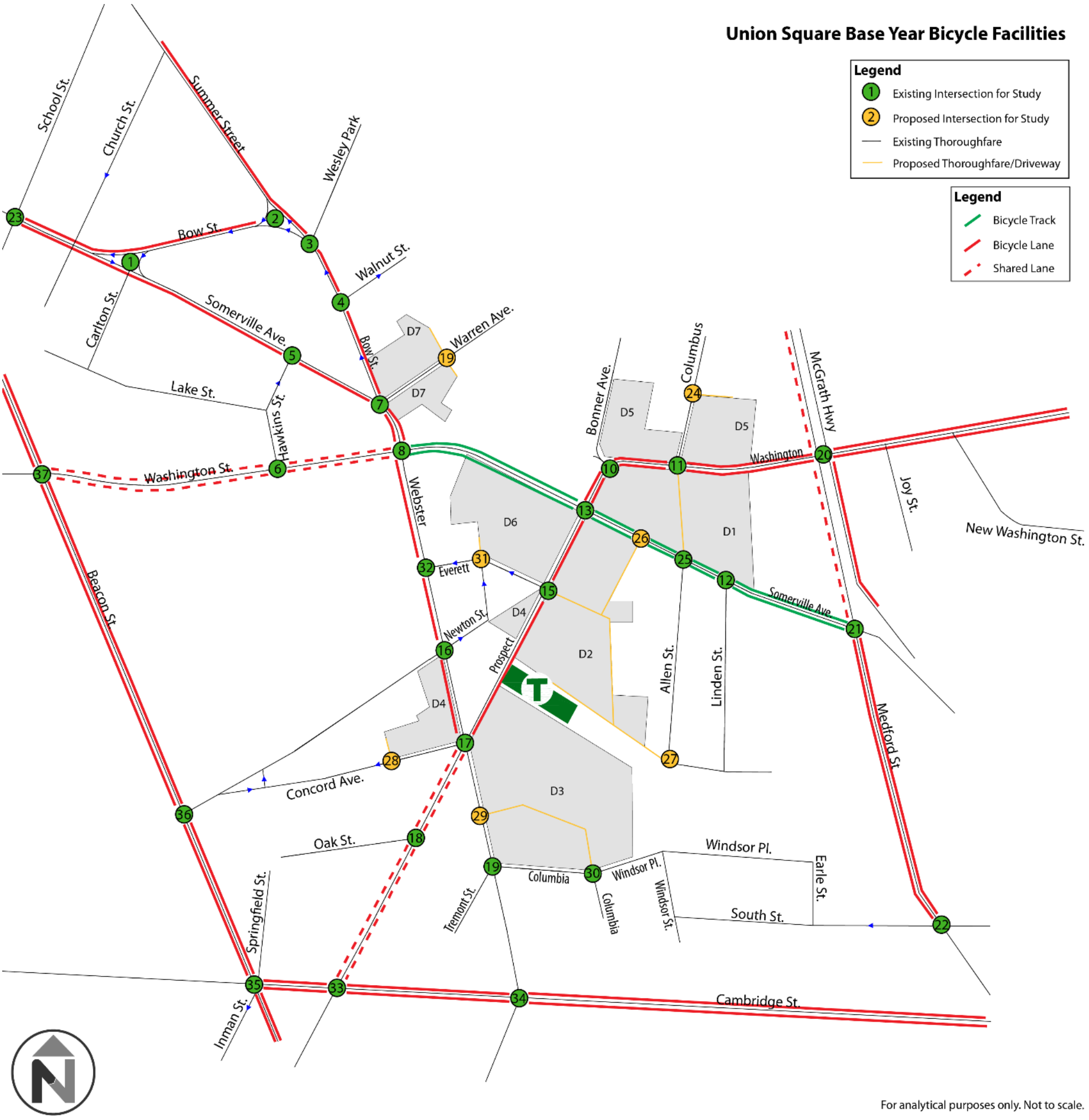
iii. Recommended Mitigation

Because we expect that the future MBTA public transit service will be able to safely handle all additional passenger loads produced under Scenario 37, no mitigation is recommended or necessary.

4. Bicycle Analysis

Union Square is a vibrant cycling community, with dedicated on-street facilities located along major corridors in the study area. These facilities are planned for expansion alongside the Union Square Revitalization Program's developments. Somerville Avenue is scheduled to receive dedicated, separated cycle track's on both sides of the street prior to the construction of the development, as laid out in the base year. The map below shows the base year network for analysis, with a cycle track on Somerville Avenue and bicycle lanes on multiple nearby corridors, including Beacon Street, Cambridge Street, and Washington Street. This analysis evaluates existing and base year conditions, including existing bicycle volumes at all intersections. Level of Traffic Stress Analysis (LTS) was used to evaluate the safety and comfort experienced by cyclists in all analysis scenarios.

Figure 39: Base Year Bicycle Facilities



a. Base Year No Build Conditions

The Base Year scenario includes existing facilities, as well as the cycle track improvements to Somerville Avenue. Existing bicycle turning movement counts, as well as an age/gender study, were conducted to further evaluate expected conditions during the base year.

i. Bicycle TMCs

Bicycle turning movement counts were collected for all study area intersections for AM peak, PM peak, and Saturday peak times. Full count results are included in an appendix to this document. Summary results are displayed in the maps on the following pages.

During the AM peak, the highest bicycle volumes were observed at the following locations:

- Inman Square, heading southeast on Hampshire Street
- Beacon Street at Washington St, heading south on Beacon Street
- Somerville Avenue, between School Street and Union Square
- Southbound on Webster Avenue between Union Square and Cambridge Street

During the PM peak, the highest bicycle volumes were observed at the following locations:

- Inman Square, primarily heading northwest on Beacon Street
- Beacon Street at Washington Street, heading north on Beacon Street
- Bow Street at Walnut Street, with approximately half of these heading further north onto Summer Street, and the other half heading west on Somerville Avenue
- Webster Avenue between Cambridge Street and Union Square, heading north

During the Saturday peak, the highest bicycle volumes were observed at the following locations:

- Somerville Avenue between Bow Street and Union Square, eastbound
- Bow Street between Union Square and Somerville avenue, westbound
- Beacon Street between Cambridge Street and Washington Street, both northbound and southbound
- Webster Avenue between Cambridge Street and Union Square, both northbound and southbound

Figure 40: Existing Bicycle Turning Movements, AM Peak

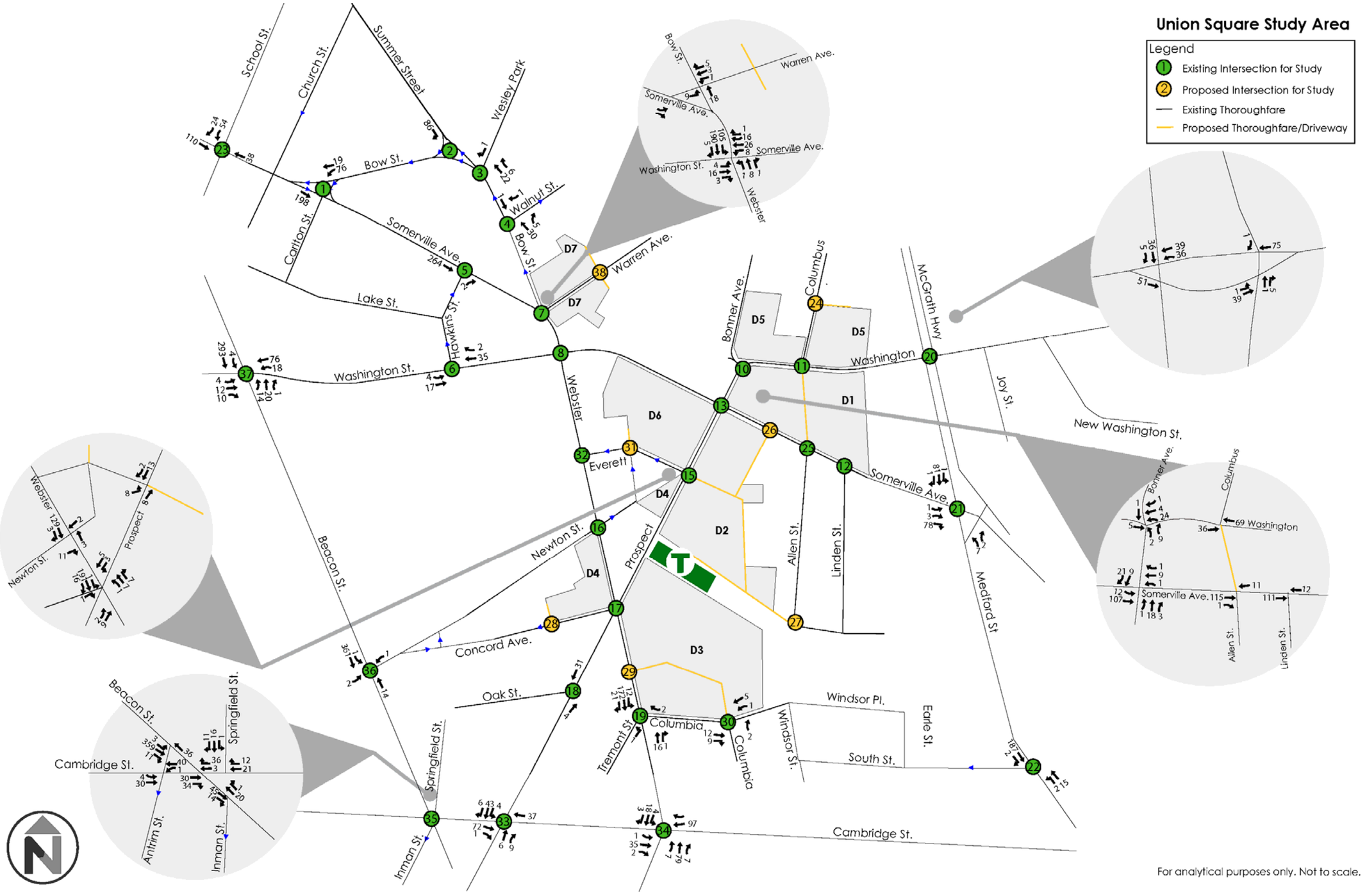
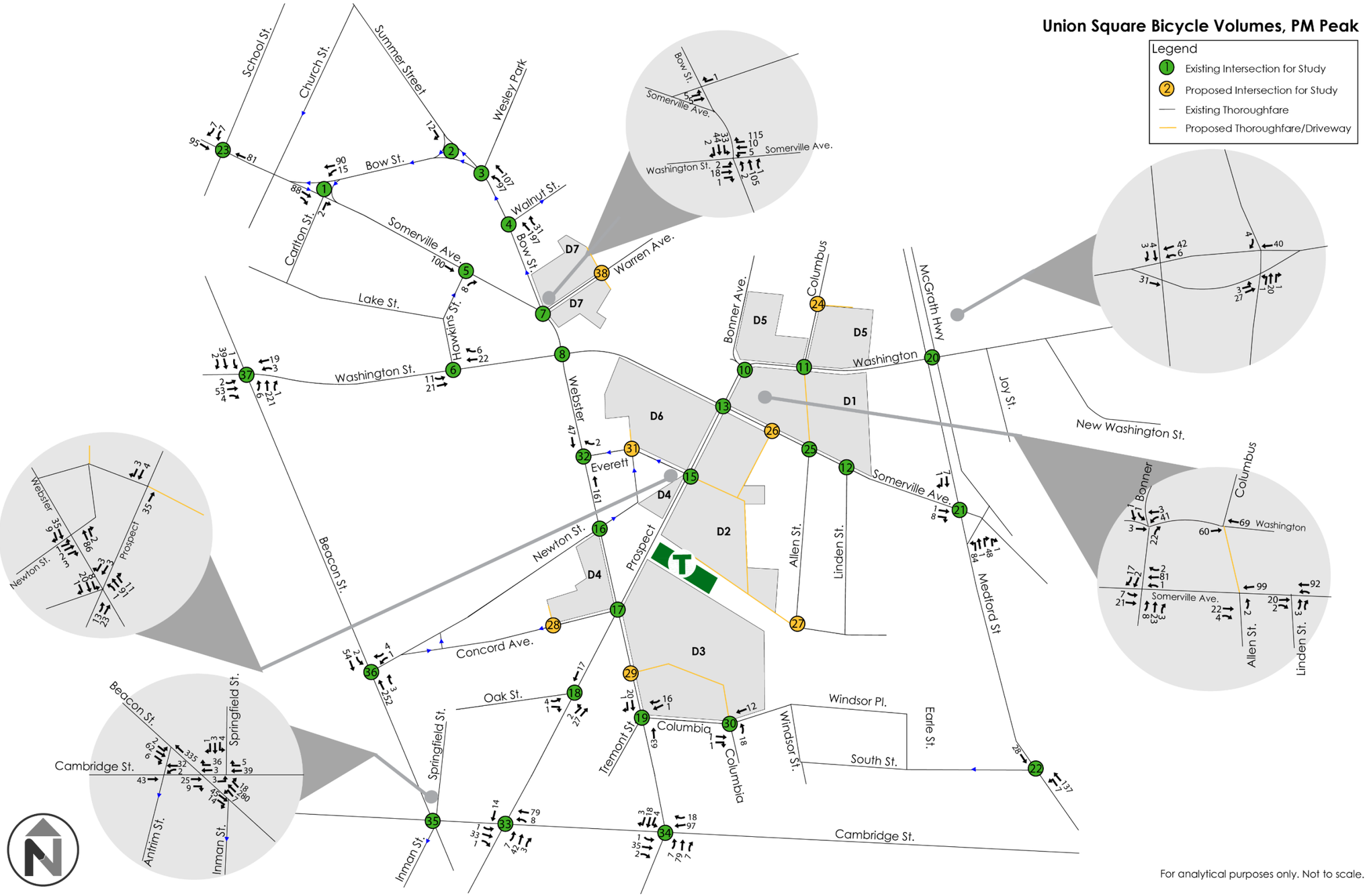
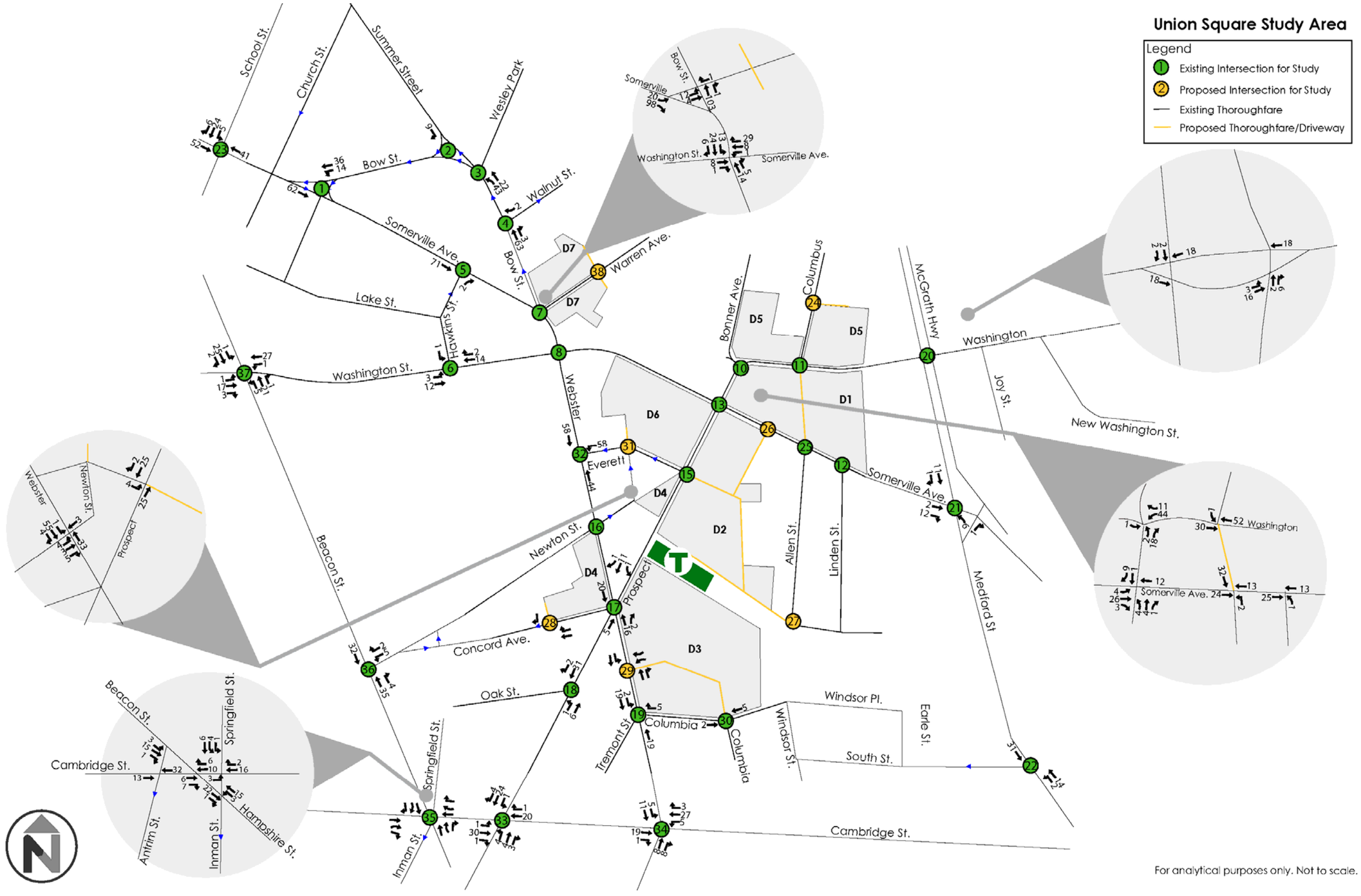


Figure 41: Existing Bicycle Turning Movements, PM Peak



For analytical purposes only. Not to scale.

Figure 42: Existing Bicycle Turning Movements, Saturday Midday Peak

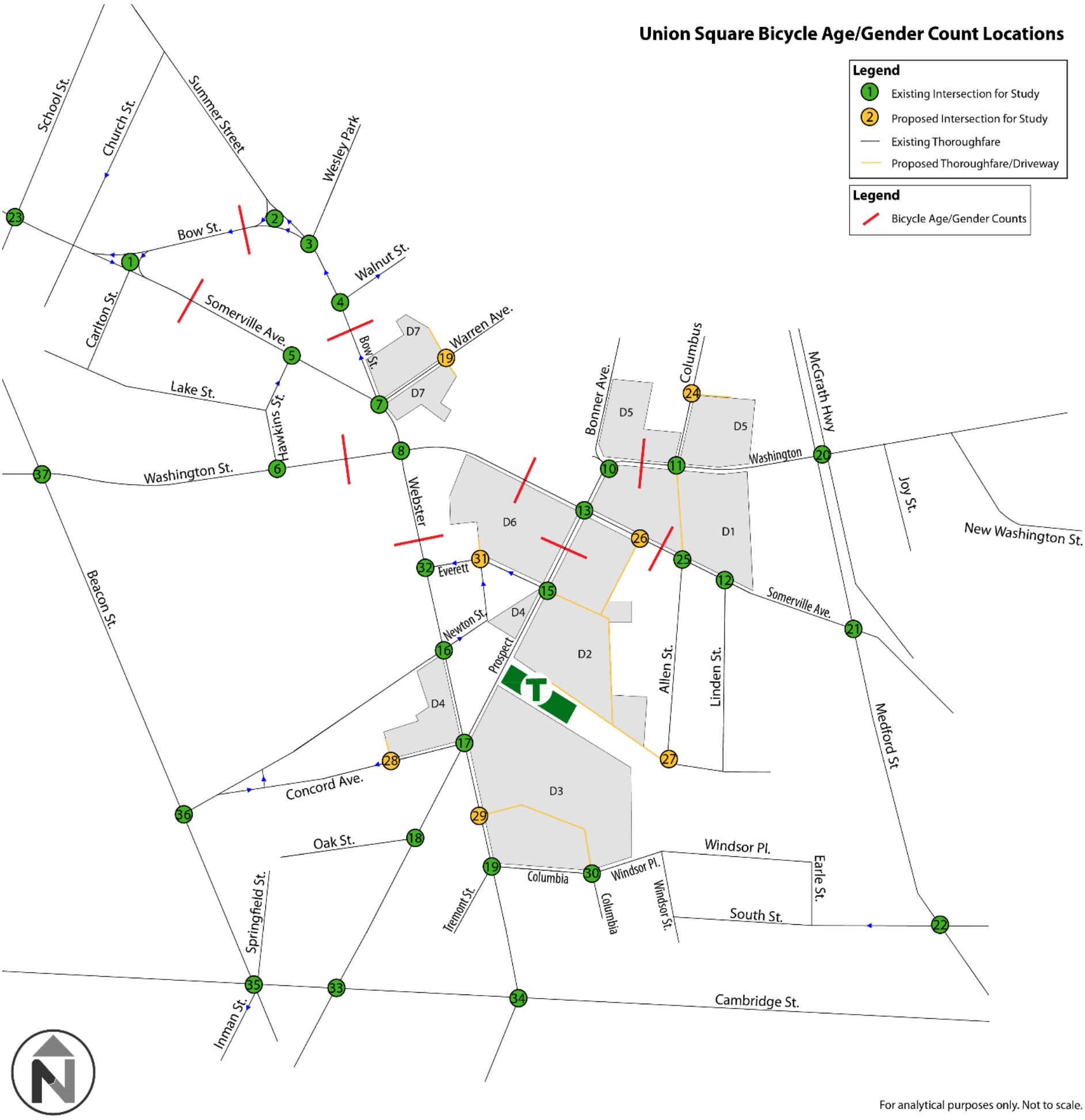


For analytical purposes only. Not to scale.

ii. Bicycle Age/Gender Counts

Bicycle counts were conducted at key locations entering and exiting the core of the study area. These counts recorded bicycle volumes and genders and ages for each cyclist for ten minutes during each hour from 7 AM to 8 PM. All counts were collected on October 4, 2017. The count locations are displayed in the figure below, and summary results are available in the following table. Full results from these counts are available as an Appendix to this document.

Figure 43: Bicycle Age/Gender Count Locations



The age and gender counts reveal the majority of the cycling population is male, with only 20-30% of cyclists being female. The vast majority of cyclists were in the 15-30 years old age range, with a significant minority of cyclists in the 31-64 age group. Peak hours were no consistent across count locations, but did tend to fall during either the AM or PM peak, with a tendency to fall somewhat later than what might be expected during a motor vehicle traffic peak (7-8 PM vs. 5-6 PM). The greatest number of cyclists was recorded on Bow Street, between Walnut Street and Warren Ave, with over 270 cyclists estimated during the peak hour of 6 – 7 PM. These numbers represent a significant and active cycling community that must be well-accommodated as Union Square continues to grow and thrive.

Table 48: Bicycle Age and Gender Count Summary

Webster Ave between Washington St and Everett St				**Prospect St between Somerville Ave and Newton St**			
Hour	**Hourly Volume Estimate**	**Gender Split (Females / Total)**	**Median Age**	**Hour**	**Hourly Volume Estimate**	**Gender Split (Females / Total)**	**Median Age**
7:00 AM	60	10%	15-30	**7:00 AM**	0	N/A	15-30
8:00 AM	138	4%	15-30	**8:00 AM**	6	0%	15-30
9:00 AM	174	21%	15-30	**9:00 AM**	18	33%	15-30
10:00 AM	114	16%	15-30	**10:00 AM**	18	0%	15-30
11:00 AM	30	20%	15-30	**11:00 AM**	24	25%	15-30
12:00 PM	30	40%	15-30	**12:00 PM**	6	100%	15-30
1:00 PM	48	0%	15-30	**1:00 PM**	0	N/A	15-30
2:00 PM	54	22%	15-30	**2:00 PM**	6	0%	15-30
3:00 PM	66	27%	15-30	**3:00 PM**	18	0%	15-30
4:00 PM	78	23%	15-30	**4:00 PM**	24	0%	15-30
5:00 PM	144	17%	15-30	**5:00 PM**	30	0%	15-30
6:00 PM	114	21%	15-30	**6:00 PM**	30	0%	15-30
7:00 PM	150	36%	15-30	**7:00 PM**	42	0%	15-30
8:00 PM	60	20%	15-30	**8:00 PM**	6	0%	15-30
Peak Hour	**174 (9 - 10 AM)**	**21%**	**15-30**	**Peak Hour**	**42 (7 - 8 PM)**	**0%**	**15-30**
Somerville Ave between Bow St and Hawkins St				**Somerville Ave between Prospect St and Allen St**			
Hour	**Hourly Volume Estimate**	**Gender Split (Females / Total)**	**Median Age**	**Hour**	**Hourly Volume Estimate**	**Gender Split (Females / Total)**	**Median Age**
7:00 AM	66	0%	15-30	**7:00 AM**	42	14%	15-30
8:00 AM	210	37%	15-30	**8:00 AM**	90	20%	15-30
9:00 AM	210	29%	15-30	**9:00 AM**	102	35%	15-30
10:00 AM	90	53%	15-30	**10:00 AM**	30	20%	15-30
11:00 AM	72	17%	15-30	**11:00 AM**	60	40%	15-30
12:00 PM	18	33%	15-30	**12:00 PM**	18	0%	15-30
1:00 PM	48	13%	15-30	**1:00 PM**	42	29%	15-30
2:00 PM	24	25%	15-30	**2:00 PM**	24	50%	15-30
3:00 PM	30	60%	15-30	**3:00 PM**	30	20%	15-30

4:00 PM	30	40%	15-30	**4:00 PM**	36	50%	15-30
5:00 PM	90	33%	15-30	**5:00 PM**	72	42%	15-30
6:00 PM	24	25%	15-30	**6:00 PM**	96	38%	15-30
7:00 PM	60	40%	15-30	**7:00 PM**	24	50%	15-30
8:00 PM	36	50%	15-30	**8:00 PM**	36	17%	15-30
Peak Hour	**210 (8 - 9 AM)**	37%	**15-30**	**Peak Hour**	**102 (9 - 10 AM)**	35%	**15-30**
Somerville Ave between Stone Ave and Prospect St				**Washington St between Prospect St and Columbus Ave**			
Hour	**Hourly Volume Estimate**	**Gender Split (Females / Total)**	**Median Age**	**Hour**	**Hourly Volume Estimate**	**Gender Split (Females / Total)**	**Median Age**
7:00 AM	30	20%	31-64	**7:00 AM**	18	0%	15-30
8:00 AM	126	10%	15-30	**8:00 AM**	66	18%	15-30
9:00 AM	102	18%	15-30	**9:00 AM**	42	0%	15-30
10:00 AM	36	67%	15-30	**10:00 AM**	12	0%	15-30
11:00 AM	78	15%	15-30	**11:00 AM**	18	33%	15-30
12:00 PM	24	25%	15-30	**12:00 PM**	42	14%	15-30
1:00 PM	42	29%	15-30	**1:00 PM**	30	0%	15-30
2:00 PM	42	29%	15-30	**2:00 PM**	48	0%	15-30
3:00 PM	72	25%	15-30	**3:00 PM**	42	29%	15-30
4:00 PM	60	40%	15-30	**4:00 PM**	42	14%	15-30
5:00 PM	126	24%	15-30	**5:00 PM**	54	0%	15-30
6:00 PM	162	15%	15-30	**6:00 PM**	42	0%	15-30
7:00 PM	108	28%	15-30	**7:00 PM**	78	8%	15-30
8:00 PM	72	8%	15-30	**8:00 PM**	24	0%	15-30
Peak Hour	**162 (6 - 7 PM)**	**15%**	**15-30**	**Peak Hour**	**78 (7 - 8 PM)**	**8%**	**15-30**
Washington St between Hawkins St and Webster Ave				**Bow St between Walnut St and Warren Ave**			
Hour	**Hourly Volume Estimate**	**Gender Split (Females / Total)**	**Median Age**	**Hour**	**Hourly Volume Estimate**	**Gender Split (Females / Total)**	**Median Age**
7:00 AM	6	100%	15-30	**7:00 AM**	24	0%	15-30
8:00 AM	48	25%	15-30	**8:00 AM**	30	40%	15-30
9:00 AM	24	0%	15-30	**9:00 AM**	72	17%	15-30
10:00 AM	18	0%	15-30	**10:00 AM**	48	25%	15-30
11:00 AM	12	0%	15-30	**11:00 AM**	0	N/A	15-30
12:00 PM	6	0%	15-30	**12:00 PM**	18	33%	15-30
1:00 PM	30	20%	15-30	**1:00 PM**	42	0%	15-30
2:00 PM	6	0%	15-30	**2:00 PM**	54	33%	15-30
3:00 PM	18	33%	15-30	**3:00 PM**	126	29%	15-30
4:00 PM	24	0%	15-30	**4:00 PM**	114	32%	15-30
5:00 PM	54	22%	15-30	**5:00 PM**	150	28%	15-30
6:00 PM	48	50%	15-30	**6:00 PM**	276	26%	15-30

7:00 PM	30	0%	15-30	**7:00 PM**	264	23%	15-30
8:00 PM	18	33%	15-30	**8:00 PM**	114	26%	15-30
Peak Hour	**54 (5 - 6 PM)**	**22%**	**15-30**	**Peak Hour**	**276 (6 - 7 PM)**	26%	**15-30**

Bow St between Summer St and Bow St Pl			
Hour	**Hourly Volume Estimate**	**Gender Split (Females / Total)**	**Median Age**
7:00 AM	36	0%	15-30
8:00 AM	90	0%	15-30
9:00 AM	78	8%	15-30
10:00 AM	54	11%	15-30
11:00 AM	12	50%	15-30
12:00 PM	6	0%	15-30
1:00 PM	30	0%	15-30
2:00 PM	60	20%	15-30
3:00 PM	54	44%	15-30
4:00 PM	18	0%	15-30
5:00 PM	60	40%	15-30
6:00 PM	42	86%	15-30
7:00 PM	84	36%	15-30
8:00 PM	18	0%	15-30
Peak Hour	**90 (8 - 9 AM)**	**0%**	**15-30**

iii. Bicycle Level of Traffic Stress

Bicycle Level of Traffic Stress (LTS) analysis uses multiple parameters related to roadway design and traffic levels to estimate the level of comfort experienced by cyclists using the roadway. LTS analysis was conducted for all roadways in the study area for the base year condition. This condition includes the implementation of the bidirectional cycle tracks planned for Somerville Avenue. The parameters used to establish LTS levels for each roadway are listed in the tables below.

Table 49: LTS Criteria for Bike Lanes Alongside a Parking Lane

	LTS ≥ 1	LTS ≥ 2	LTS ≥ 3	LTS ≥ 4
Street width (through lanes per direction)	1	(no effect)	2 or more	(no effect)
Sum of bike lane and parking lane width (includes marked buffer and paved gutter)	15 ft. or more	14 or 14.5 ft.*	13.5 ft. or less	(no effect)
Speed limit or prevailing speed	25 mph or less	30 mph	35 mph	40 mph or more
Bike lane blockage (typically applies in commercial areas)	rare	(no effect)	frequent	(no effect)
Note: (no effect) = factor does not trigger an increase to this level of traffic stress. **If speed limit < 25 mph or Class = residential, then any width is acceptable for LTS 2.*				

Table 50: LTS Criteria for Bike Lanes Not Alongside a Parking Lane

	LTS ≥ 1	LTS ≥ 2	LTS ≥ 3	LTS ≥ 4
Street width (through lanes per direction)	1	2, if directions are separated by a raised median	more than 2, or 2 without a separating median	(no effect)
Bike lane width (includes marked buffer and paved gutter)	6 ft. or more	5.5 ft. or less	(no effect)	(no effect)
Speed limit or prevailing speed	30 mph or less	(no effect)	35 mph	40 mph or more
Bike lane blockage (may apply in commercial areas)	rare	(no effect)	frequent	(no effect)
Note: (no effect) = factor does not trigger an increase to this level of traffic stress.				

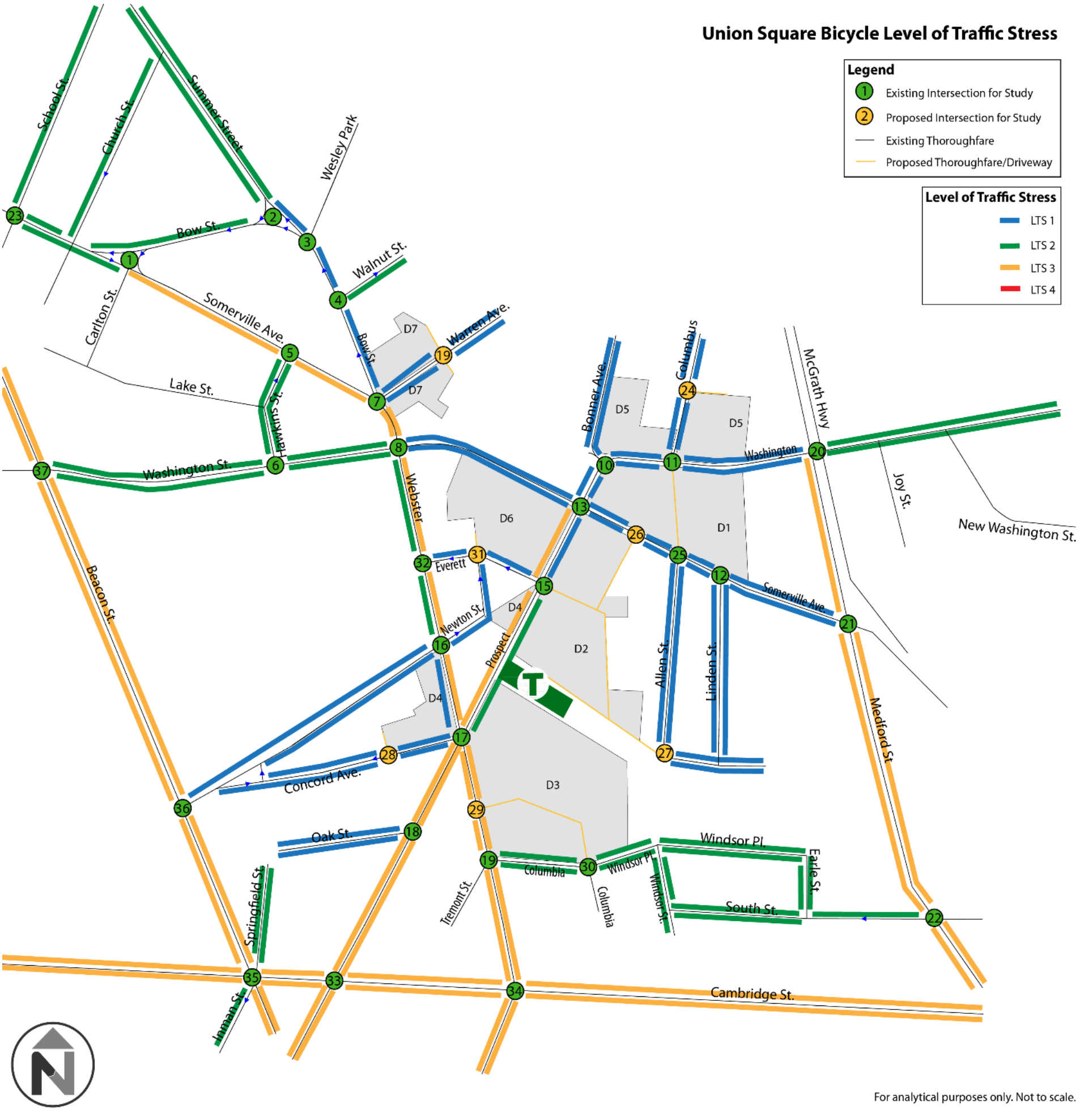
Table 51: LTS Criteria in Mixed Traffic

	Street Width		
Speed Limit	**2-3 lanes**	**4-5 lanes**	**6+ lanes**
Up to 25 mph	LTS 1*or 2*	LTS 3	LTS 4
30 mph	LTS 2* or 3*	LTS 4	LTS 4
35+ mph	LTS 4	LTS 4	LTS 4
Note: * Use lower value for streets without marked centerlines or classified as residential and with fewer than 3 lanes			

Each roadway segment was evaluated using these criteria. Street width, bike lane and parking lane width, prevailing traffic speed, and frequency of bike lane blockages were all considered in the LTS analysis. These factors together allow for a comprehensive picture of cycling conditions within the study area.

The map below uses colors to denote each bicycle level of traffic stress for each direction of every road segment. Given the significant number of bicycle facilities and quiet, neighborhood streets within the study area, most area roadways operate at LTS 1 or 2. Area roadways with high levels of motor vehicle traffic and narrow parking lanes adjacent to bicycle lanes, such as Beacon Street and Cambridge Street, operate at LTS 3. While these corridors do have bicycle lanes, the level of activity and risk of conflict with parking vehicles reduces the typical cyclists' comfort level. No area roadways operate at LTS 4.

Figure 44: Bicycle Level of Traffic Stress, Base Year No-Build



b. Base Year Built Condition

The base year built condition adds additional bicycle trips to study area roadways due to trip generation from Phase 1 and Phase 2 of the planned development. Bicycle trips for these phases are listed in the table below.

Table 52: Phase 1 and Phase 2 Bicycle Trips

Daily Bicycle Trips			
Parcel	**Bicycle Trips**	**Trips Entering**	**Trips Exiting**
Phase 1	1,526	763	763
Phase 2	2,711	1,356	1,356
Combined Total	4,238	2,119	2,119

Weekday AM Peak Bicycle Trips			
Parcel	**Bicycle Trips**	**Trips Entering**	**Trips Exiting**
Phase 1	122	24	97
Phase 2	296	59	237
Combined Total	418	84	334

Weekday PM Peak Bicycle Trips			
Parcel	**Bicycle Trips**	**Trips Entering**	**Trips Exiting**
Phase 1	158	103	55
Phase 2	315	205	110
Combined Total	474	308	166

Saturday Midday Peak Bicycle Trips			
Parcel	**Bicycle Trips**	**Trips Entering**	**Trips Exiting**
Phase 1	103	52	52
Phase 2	114	57	57
Combined Total	217	109	109

i. Planned Improvements

The base year build condition includes all proposed inprovements incorporated into the base year no-build condition. This results in a network that mirrors existing conditions, but with the implementation of

bidirectional cycle tracks along Somerville Avenue, as displayed previously in the Base Year Bicycle Facilities Map.

ii. Level of Stress Analysis

The base year built condition does not modify roadway parameters or bicycle facilities in the study area that impact LTS analysis versus the base year no-build condition. However, increased bicycle volumes may add more overall stress to the cycling network.

iii. Recommended Mitigation

Given that all roadways which provide access to the development sites already include adequate bicycle facilities, no critical mitigation is required to preserve a safe and comfortable cycling environment. Optional mitigation to further improve bicycle LTS in response to increased cycling activity is as follows:

- Implementation of northbound 6' bicycle lane on Prospect Street between Cambridge Street and Webster Avenue
- Implementation of southbound 6' bicycle lane on Webster Avenue between Prospect Street and Cambridge Street, with shared lane markings northbound

c. Base Year Built Condition with Mitigation

i. Level of Stress Analysis

Given the optional mitigation measures proposed for the base year, LTS will improve somewhat on the Prospect Street and Webster Avenue corridors, as follows:

- Prospect Street between Cambridge Street and Webster Avenue will improve to LTS 2, from LTS 3, in the northbound direction.
- Webster Avenue between Cambridge Street and Prospect Street will improve to LTS 2, from LTS 3, in the southbound direction.

d. Future Year Built Condition with Mitigation

The Future Year Built scenario adds the remainder of bicycle trips generated by Phase 3 of the development, as outlined in the table below. These trips represent the full buildout of the development sites.

Table 53: Bicycle Trips, Future Year

		Daily Bicycle Trips	
Parcel	**Bicycle Trips**	**Trips Entering**	**Trips Exiting**
Phase 1	1,526	763	763
Phase 2	2,711	1,356	1,356
Phase 3	1,084	542	542
Combined Total	5,322	2,661	2,661

Weekday AM Peak Bicycle Trips

Parcel	Bicycle Trips	Trips Entering	Trips Exiting
Phase 1	122	24	97
Phase 2	296	59	237
Phase 3	93	19	74
Combined Total	511	102	409

Weekday PM Peak Bicycle Trips

Parcel	Bicycle Trips	Trips Entering	Trips Exiting
Phase 1	158	103	55
Phase 2	315	205	110
Phase 3	119	77	42
Combined Total	593	385	207

Saturday Midday Peak Bicycle Trips

Parcel	Bicycle Trips	Trips Entering	Trips Exiting
Phase 1	103	52	52
Phase 2	114	57	57
Phase 3	65	33	33
Combined Total	282	141	141

i. Planned Improvements

The Future Year assumes the two-way conversion of Somerville Avenue between Union Square and the western intersection with Bow Street. This conversion will modify the existing roadway and improve cycling conditions via the implementation of new bicycle lanes or cycle tracks.

The analysis that follows assumes implementation of a bidirectional cycle track along this segment. Implementation of this improvement will require the removal of one side of parking along the Somerville Avenue block between Union Square and Bow Street. Removal of one side of parking will remove up to 20 parking spaces from the study area. This will allow for one through travel lane in each direction and raised and separated 6' cycle tracks on each side of the street, with sidewalks averaging 6' or more in width.

ii. Level of Stress Analysis

Implementation of cycle tracks in the future year condition along Somerville Avenue between Union Square and the western Bow Street intersection will improve cycling conditions on this block to LTS 1 from LTS 3 when compared with the base year.

iii. Recommended Mitigation

Proposed mitigation is as described in the "planned improvements" section, and includes only the implementation of bidirectional cycle tracks on Somerville Avenue between Union Square and Bow Street. No further mitigation is required.

5. Motor Vehicle Analysis

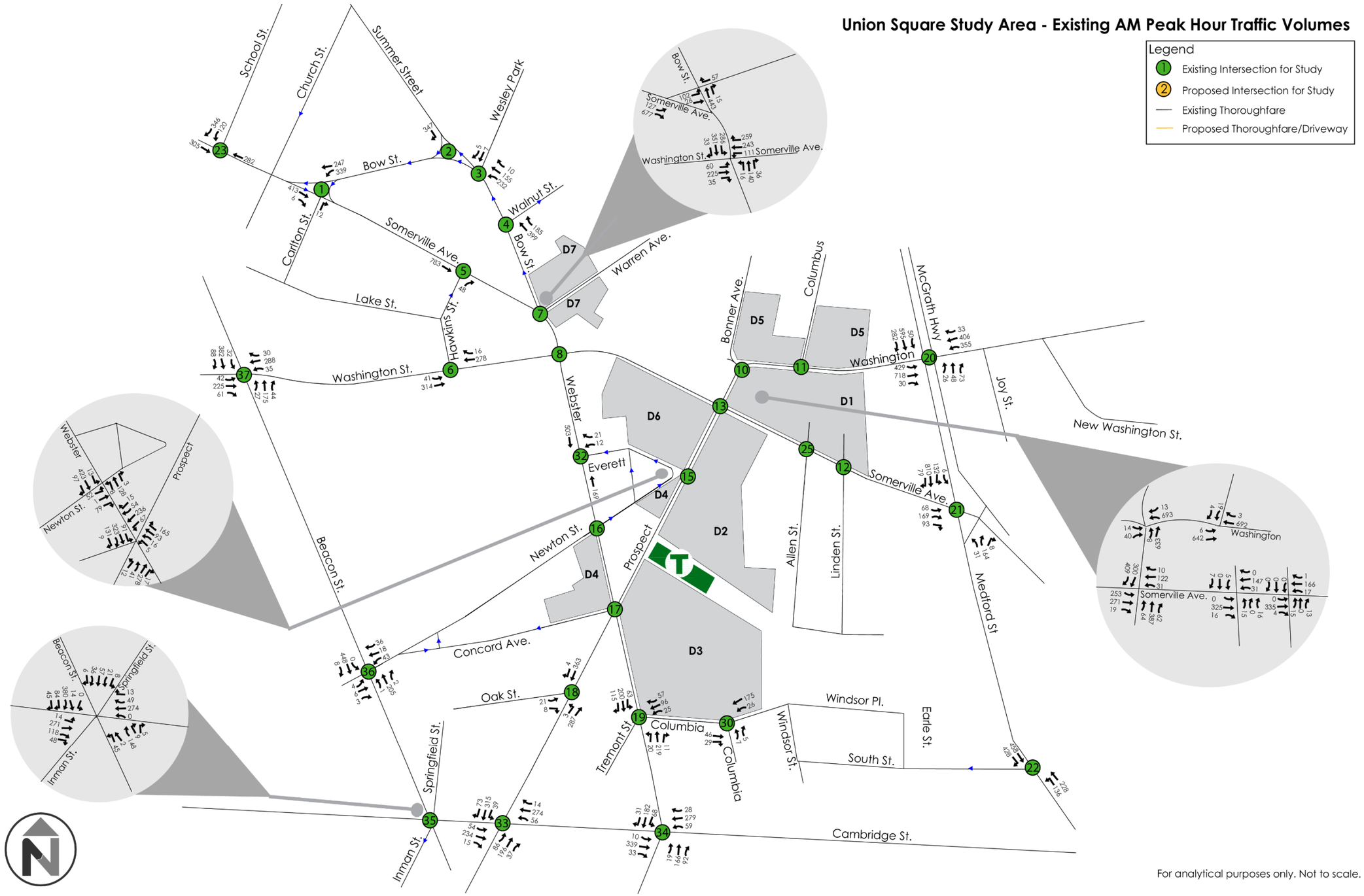
a. Base Year No Build Conditions

The base year no build scenario uses existing traffic counts taken in October 2017 to analyze intersection capacity. No background traffic growth is assumed for the base year when compared to existing conditions. This scenario includes the planned streetscaping improvements to Somerville Avenue as part of the City of Somerville's CP-1-3 program, but is otherwise congruent with existing roadway conditions.

i. Traffic Volumes

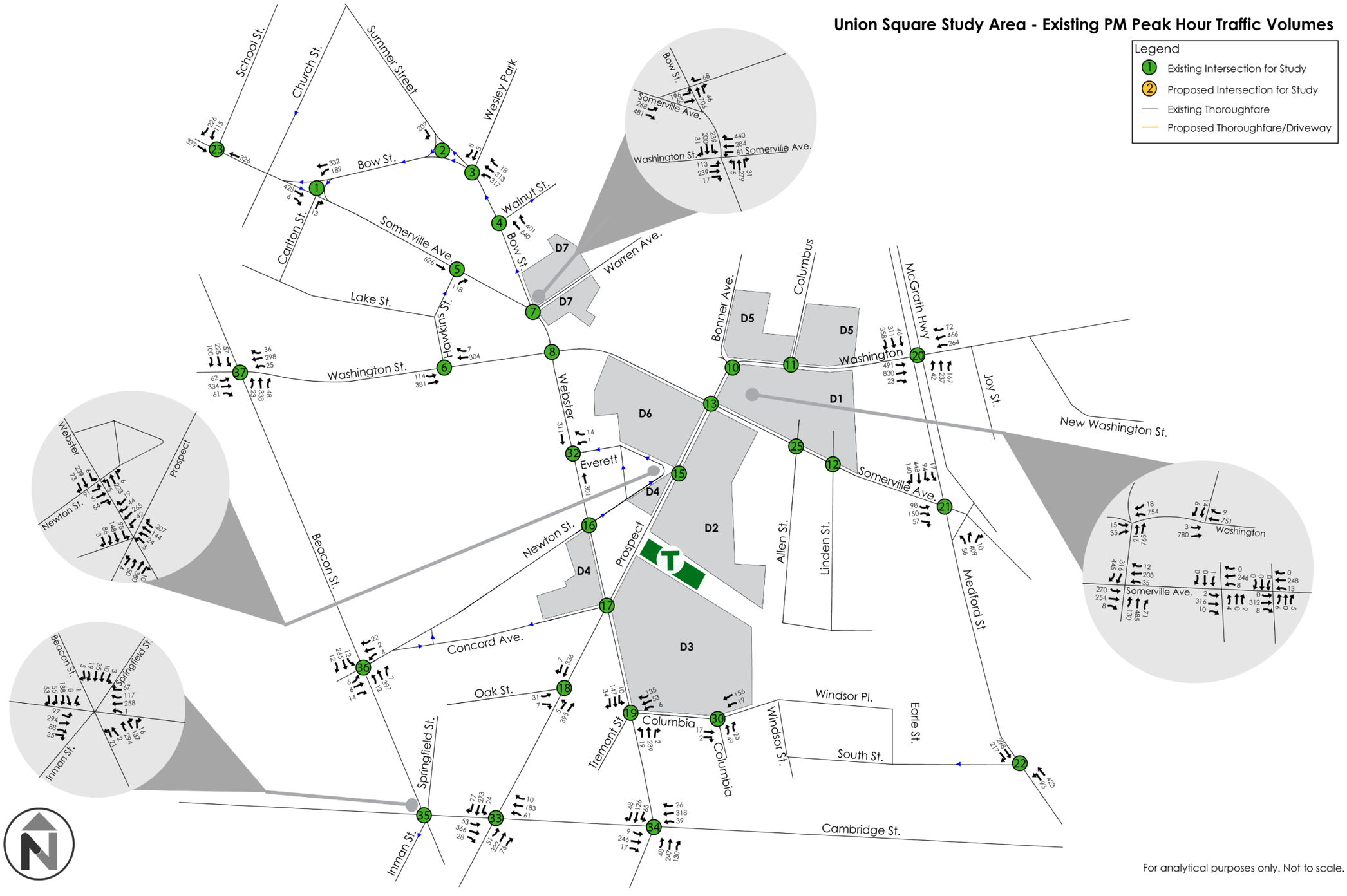
Turning movement counts were collected at all study area intersections for AM, PM, and Saturday peak periods. Corridor counts were also collected at key locations. These raw counts are included as an electronic appendix to this document. Existing volume figures for AM, PM, and Saturday peaks are displays in the following pages. Expected site-generated volumes were added to the base year observed traffic volumes for the purposes of this traffic analysis. No additional background growth in vehicular traffic was assumed.

Figure 45: Existing AM Peak Hour Traffic Volumes



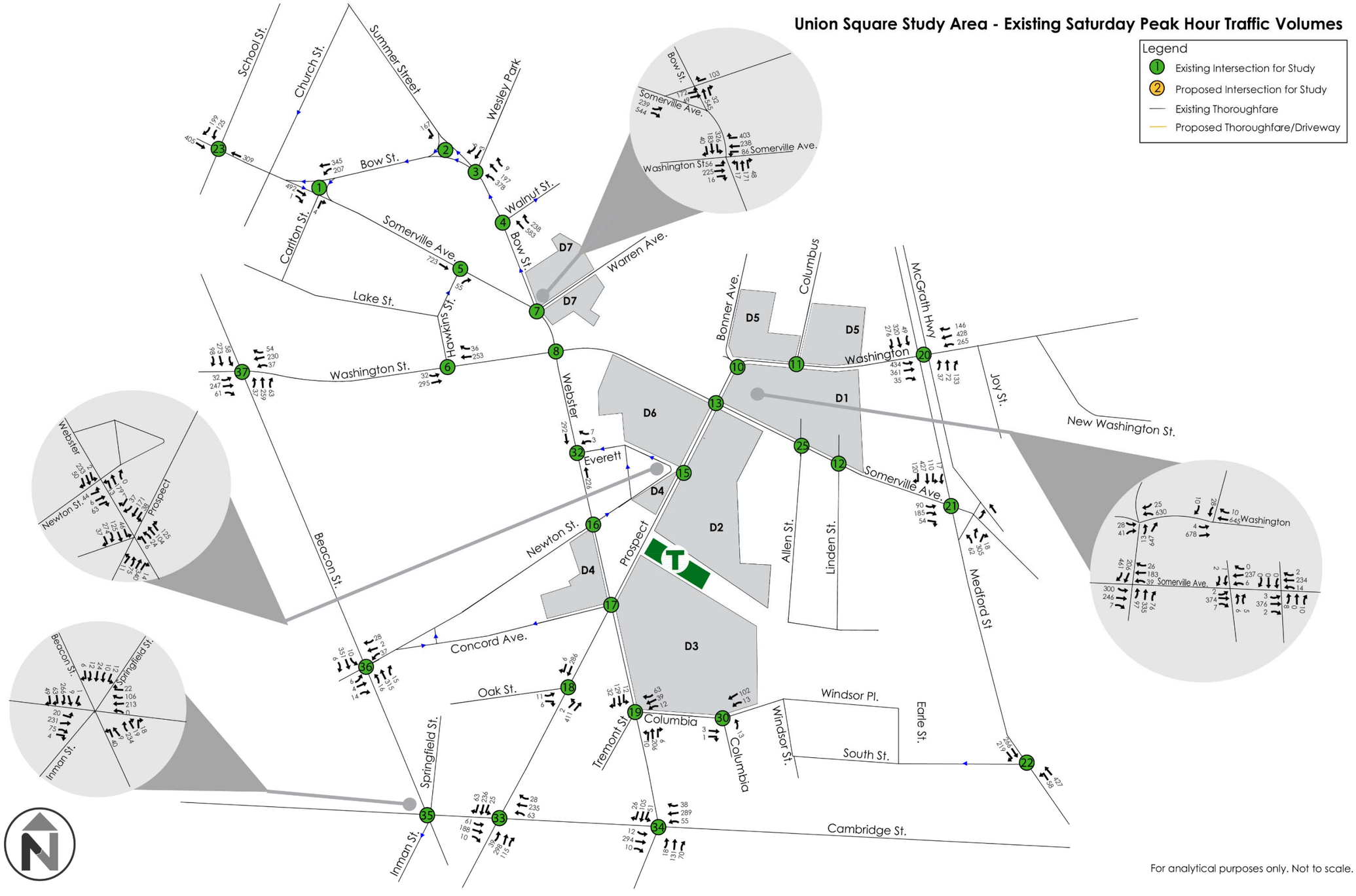
For analytical purposes only. Not to scale.

Figure 46: Existing PM Peak Hour Traffic Volumes



For analytical purposes only. Not to scale.

Figure 47: Existing Saturday Peak Hour Traffic Volumes



For analytical purposes only. Not to scale.

ii. Crash Data

Collision data has been provided by the City of Somerville Traffic and Infrastructure Division for the latest available three-year period (August 1, 2014 – August 31, 2017). According to crash records, there were 112 reported collisions during the three-year period that occurred at study area intersections.

The following summary table provides traffic crash data for the previous 3-year period by year, study area intersection, date, time, crash type, injury, involvement of trucks and or MBTA buses, involvement of pedestrians and/or bicycles, lighting, surface condition, and weather. Note that because the data provided was for Somerville only, there is no crash data for the study area intersections located in Cambridge: 33, 34, and 35. Also note that the 2-way switchover for Prospect and Webster occurred on July 29, 2017, so there is one month of crash data post-switchover, during which no crashes occurred in the immediate Union Square area.

Table 54: Intersection Crash Summary, 2014

2014														
Study Area Intersection	Address	Date	Time	Weather	Road Surface Condition	Crash Type	Type of Vehicle Involved	Ped. Involved?	Cyclist Involved?	Cyclist-involved Crash Notes (motor vehicle configuration or cyclist action)	Injury?	Type of Injury	City Vehicle Involved?	Crash Notes
1	Bow St & Somerville Ave	12/6/14	21:23	Cloudy	Wet	Angle	Passenger car	No	No		No		No	
7	27 Union Sq	11/5/14	9:07	Cloudy	Dry	Angle	Passenger car	No	No		No		No	
11	Washington St & Columbus Ave	12/13/14	11:45	Clear	Dry	Rear to rear	Light truck	No	No		No		No	
13	Prospect St & Somerville Ave	11/13/14	7:05	Clear	Dry	Head on	Passenger car	No	No		Yes	Possible	No	
	Somerville Ave & Prospect St	11/14/14	15:49	Clear	Dry	Angle	Light truck	No	No		No		No	
	Somerville Ave & Prospect St	12/10/14	9:00	Rain	Wet	Angle	Passenger car	No	No		No		No	
16	Webster Ave & Newton St	9/28/14	10:33	Clear	Dry	Single Vehicle Crash	Passenger car	No	No		No		No	
19	Webster Ave & Columbia St	9/3/14	17:15	Clear	Dry	Rear-end	Light truck	No	Yes	Right hook motorist turning	Yes	Possible	No	
	Webster Ave & Columbia St	10/6/14	18:17	Clear	Dry	Angle	Passenger car	No	No		No		No	
	Webster Ave & Tremont St	11/19/14	8:11	Clear	Dry	Single Vehicle Crash	Light truck	No	Yes	Right hook motorist turning	No		No	
20	McGrath Hwy & Washington St	10/27/14	23:49	Clear	Dry	Rear-end	Motorcycle	No	No		No		No	
30	Columbia St & Windsor Pl	11/16/14	17:48	Clear	Dry	Single Vehicle Crash	Passenger car	No	Yes	Right hook motorist turning	Yes	Non-incapacitating	No	
36	Concord Ave & Beacon St	9/19/14	19:06	Clear	Dry	Single Vehicle Crash	Passenger car	No	Yes	Right hook motorist turning	Yes	Possible	No	
37	Washington St & Beacon St	10/7/14	9:19	Cloudy	Dry	Single Vehicle Crash	Passenger car	No	Yes	Left cross motorist turning	Yes	Possible	No	
	Beacon St & Washington St	10/14/14	18:42	Clear	Dry	Single Vehicle Crash	Passenger car	Yes	Yes	Right hook motorist turning	Yes	Possible	No	
	Beacon St & Washington St	11/25/14	9:14	Clear	Dry	Rear-end	Passenger car	No	No		Yes	Possible	No	

Table 55: Intersection Crash Summary, 2015

2015														
Study Area Intersection	Address	Date	Time	Weather	Road Surface Condition	Crash Type	Type of Vehicle Involved	Pedestrian Involved?	Cyclist Involved?	Cyclist-involved Crash Notes (motor vehicle configuration or cyclist action)	Injury?	Type of Injury	City Vehicle Involved?	Crash Notes
1	Somerville Ave & Bow St	8/23/15	21:52	Cloudy	Wet	Single Vehicle Crash	Passenger car	Yes	Yes	Entering or crossing location	Yes	Possible	No	
	Bow St & Somerville Ave	1/3/15	18:14	Snow	Snow	Angle	Passenger car	No	No		No		No	
3	36 Bow St	4/20/15	19:14	Rain	Wet	Rear-end	Passenger car	No	No		No		No	
7	Bow St & Warren Ave	1/21/15	12:08	Clear	Dry	Angle	Single unit truck 3 or more axles	No	No		No		No	
	45 Union Sq	2/13/15	16:18	Clear	Snow	Rear-end	Other	No	No		No		Yes	Snow removal pushed bike rack into street; MV tried to avoid by changing lanes, sideswiping City MV
	300 Somerville Ave	4/19/15	19:19	Cloudy	Dry	Rear-end	Light truck	No	No		Yes	Possible	No	
8	Somerville Ave & Washington St	3/4/15	7:47	Cloudy	Wet	Angle	Light truck	No	No		No		No	
	Bow St & Union Sq	4/23/15	14:24	Cloudy	Dry	Rear-end	Passenger car	No	No		No		No	
	Washington St & Webster Ave	4/23/15	19:10	Clear	Dry	Rear-end	Passenger car	No	No		Yes	Non-incapacitating	No	
10	Washington St & Bonner Ave	9/10/15	11:28	Cloudy	Dry	Single Vehicle Crash	Motorcycle	No	Yes	Walking, running, cycling	Yes	Non-incapacitating	No	
11	Columbus Ave & Washington St	5/16/15	14:45	Clear	Dry	Single Vehicle Crash	Light truck	No	Yes	Right hook motorist turning	Yes	Non-incapacitating	No	
	Columbus Ave & Washington St	9/26/15	13:58	Clear	Dry	Angle	Passenger car	No	No		No		Yes	MV op thought car was in park; it rolled across Washington into lot housing Det. vehicles, striking fence & 2 unmarkeds
12	Somerville Ave & Linden St	9/30/15	16:45	Rain	Wet	Sideswipe, opposite direction	Light truck	No	No		No		Yes	SPD cruiser responding to call, exited back lot & struck stopped MV while turning
13	Somerville Ave & Prospect St	9/8/15	12:15	Clear	Dry	Sideswipe, same direction	Single unit truck 2 axles	No	No		No		No	
	Somerville Ave & Prospect St	9/15/15	10:30	Clear	Dry	Angle	Light truck	No	No		No		No	
	Prospect St & Somerville Ave	9/27/15	8:00	Clear	Dry	Angle	Passenger car	No	No		No		No	
	Somerville Ave & Prospect St	5/2/15	9:05	Clear	Dry	Sideswipe, same direction	Light truck	No	No		No		No	
	Prospect St & Somerville Ave	5/3/15	22:12	Clear	Dry	Sideswipe, same direction	Motorcycle	No	Yes	Right hook motorist turning	No		No	
	Somerville Ave & Prospect St	5/20/15	13:58	Clear	Dry	Single Vehicle Crash	Passenger car	No	No		Yes	Possible	No	
15	Prospect St & Newton St	12/3/15	14:49	Cloudy	Wet	Rear-end	Passenger car	No	No		Yes	Possible	No	
	Everett St & Newton St	2/20/15	19:26	Snow	Ice	Rear-end	Passenger car	No	No		No		No	
16	Newton St & Webster Ave	1/21/15	8:27	Clear	Dry	Single Vehicle Crash	Bus (15 or more pax)	No	No		No		No	
	Webster Ave & Newton St	6/21/15	10:15	Rain	Wet	Rear-end	Passenger car	No	No		Yes	Possible	No	
17	Prospect St & Concord Ave	9/18/15	14:56	Clear	Dry	Angle	Passenger car	No	No		Yes	Possible	No	
	Webster Ave & Prospect St	12/14/15	22:47	Rain	Wet	Single Vehicle Crash	Passenger car	No	No		No		No	
19	62 Webster Ave	11/24/15	4:45	Clear	Dry	Angle	Unknown	No	No		Yes	Non-incapacitating	No	
20	Washington St & McGrath Hwy	2/9/15	7:10	Unknown	Snow	Sideswipe, same direction	Unknown	No	No		No		No	
	Washington St & McGrath Hwy	7/31/15	11:00	Clear	Dry	Single Vehicle Crash	Light truck	Yes	Yes	Dooring	Yes	Possible	Yes	SPD Detail
	McGrath Hwy & Washington St	9/27/15	5:50	Clear	Dry	Angle	Light truck	No	No		No		No	
	Washington St & McGrath Hwy	11/12/15	9:48	Cloudy	Dry	Sideswipe, same direction	Passenger car	No	Yes	Entering or crossing location	Yes	Possible	No	
	Washington St & McGrath Hwy	12/22/15	16:00	Rain	Wet	Angle	Passenger car	No	No		No		No	refused medical treatment
21	McGrath Hwy & Somerville Ave	8/6/15	14:39	Clear	Dry	Angle	Passenger car	No	No		No	29	No	
36	Washington St & McGrath Hwy	7/31/15	11:00	Clear	Dry	Single Vehicle Crash	Light truck	Yes	No	Dooring	Yes	Possible	Yes	SPD Detail
	Beacon St & Concord St	8/29/15	14:04	Clear	Dry	Rear-end	Passenger car	No	No		No		No	
37	Washington St & Beacon St	8/15/15	18:30	Cloudy	Dry	Angle	Unknown	No	Yes	Entering or crossing location	No		No	
	Beacon St & Washington St	12/10/15	19:42	Clear	Dry	Single Vehicle Crash	Passenger car	No	Yes	Entering or crossing location	Yes	Possible	No	
	Beacon St & Washington St	12/14/15	15:48	Clear	Unknown	Single Vehicle Crash	Passenger car	No	No		Yes		No	
	Washington St & Beacon St	2/19/15	5:50	Cloudy	Wet	Head on	Passenger car	No	No		No		No	
	Washington St & Beacon St	3/14/15	18:19	Rain	Wet	Single Vehicle Crash	Passenger car	Yes	Yes	Right hook motorist turning	No		No	
	Beacon St & Washington St	6/21/15	0:01	Rain	Wet	Angle	Passenger car	No	No		No		No	

Table 56: Intersection Crash Summary, 2016

2016														
Study Area Intersection	Address	Date	Time	Weather	Road Surface Condition	Crash Type	Type of Vehicle Involved	Pedestrian Involved?	Cyclist Involved?	Cyclist-involved Crash Notes (motor vehicle configuration or cyclist action)	Injury?	Type of Injury	City Vehicle Involved?	Crash Notes
1	Somerville Ave & Bow St	6/13/16	17:06	Cloudy	Dry	Sideswipe, same direction	Tractor/semi-trailer	No	No		No		No	
3	Bow St & Wesley Park	8/4/16	8:19	Clear	Dry	Angle	Light truck	No	Yes	Walking, running, cycling	Yes	Non-incapacitating	No	
4	Bow St & Walnut St	12/3/16	16:27	Clear	Dry	Rear-end	Passenger car	No	No		Yes	Possible	No	
6	Washington St & Hawkins St	10/12/16	8:37	Clear	Dry	Rear-end	Passenger car	No	No		No		No	
8	Somerville Ave & Webster Ave	2/4/16	23:56	Unknown	Wet	Rear-end	Light truck	No	No		Yes	Non-incapacitating	Yes	D2 refused medical attention
	Washington St & Webster Ave	4/4/16	20:56	Snow	Ice	Single Vehicle Crash	Passenger car	No	No		No		No	
	Somerville Ave & Washington St &	6/25/16	16:29	Clear	Dry	Sideswipe, same direction	Tractor/semi-trailer	No	No		No		No	
	Somerville Ave & Washington St	9/11/16	2:01	Unknown	Wet	Sideswipe, same direction	Passenger car	No	No		No		No	
	Washington St & Webster Ave	10/17/16	17:57	Clear	Dry	Angle	Light truck	No	No		No		Yes	
	Washington St & Union Sq	12/16/16	17:42	Clear	Dry	Angle	Light truck	No	No		No		No	
10	Somerville Ave & Washington St &	5/6/16	17:06	Cloudy	Dry	Angle	Passenger car	No	No		No		No	
	Washington St & Bonner Ave	6/26/16	1:53	Clear	Dry	Angle	Light truck	No	No		No		No	
	Washington St & Bonner Ave	8/9/16	20:50	Clear	Dry	Rear-end	Passenger car	No	No		No		No	
	Washington St & Bonner Ave	10/19/16	9:41	Clear	Dry	Single Vehicle Crash	Light truck	No	Yes	Walking, running, cycling	Yes	Possible	No	
11	Washington St & Columbus Ave	7/26/16	16:27	Clear	Dry	Sideswipe, same direction	Motor home/recreational	No	No		Yes	Non-incapacitating	No	
13	Somerville Ave & Prospect St	8/13/16	14:45	Clear	Dry	Sideswipe, same direction	Light truck	No	No		No		Yes	
	Prospect St & Somerville Ave	10/26/16	7:50	Clear	Dry	Single Vehicle Crash	Passenger car	Yes	No	Standing	Yes	Possible	No	
	Prospect St & Somerville Ave	12/11/16	12:10	Clear	Dry	Angle	Light truck	No	No		No		Yes	
	Prospect St & Somerville Ave	12/14/16	10:00	Clear	Dry	Sideswipe, same direction	Passenger car	No	No		Yes	Non-incapacitating	No	
16	Newton St & Webster Ave	2/9/16	18:48	Clear	Wet	Angle	Passenger car	No	No		No		No	
17	Webster Ave & Prospect St	3/10/16	14:20	Unknown	Wet	Single Vehicle Crash	Passenger car	No	Yes	Walking, running, cycling	Yes	Non-incapacitating	No	
	Prospect St & Webster Ave	10/24/16	7:56	Clear	Dry	Single Vehicle Crash	Light truck	No	Yes	Entering or crossing location	No		No	
18	88 Prospect St	10/17/16	21:30	Clear	Dry	Single Vehicle Crash	Unknown	No	No		Yes	Possible	No	
19	Webster Ave & Columbia St	2/25/16	7:00	Cloudy	Wet	Angle	Passenger car	No	No		No		No	
	Webster Ave & Columbia St	7/6/16	19:30	Clear	Dry	Angle	Other	No	No		No		Yes	City of Cambridge Fire Truck
	Columbia St & Webster St	11/21/16	8:20	Clear	Dry	Angle	Single unit truck 2 axles	No	No		No		No	
20	Washington St & McGrath Hwy	3/30/16	16:11	Clear	Dry	Angle	Passenger car	No	No		No		No	
	Washington St & McGrath Hwy	4/26/16	12:00	Rain	Wet	Angle	Unknown	No	No		No		No	
	Washington St & McGrath Hwy	6/29/16	15:50	Clear	Dry	Sideswipe, same direction	Passenger car	No	No		No		No	
23	School St & Somerville Ave	5/26/16	13:05	Clear	Dry	Sideswipe, same direction	Light truck	No	No		No		No	
25	Somerville Ave & Allen St	9/6/16	7:40	Rain	Wet	Angle	Light truck	No	No		No		Yes	
36	16 Beacon St	5/26/16	22:26	Clear	Dry	Angle	Passenger car	No	Yes	Walking, running, cycling	Yes	Non-incapacitating	No	
37	Washington St & Beacon St	2/27/16	9:21	Clear	Dry	Rear-end	Passenger car	No	No		Yes	Possible	No	
	Washington St & Beacon St	5/20/16	21:08	Clear	Dry	Rear-end	Passenger car	No	Yes		No		No	
	Somerville Ave & Prospect St	9/8/15	12:15	Clear	Dry	Sideswipe, same direction	Single unit truck 2 axles	No	No		No		No	
	Beacon St & Washington St	8/26/16	14:20	Clear	Dry	Rear-end	Motor home/recreational	No	No		Yes	Unknown	No	Scooter
	Washington St & Beacon St	8/30/16	7:16	Clear	Dry	Angle	Passenger car	No	No		Yes	Possible	No	

Table 57: Intersection Crash Summary, 2017

2017														
Study Area Intersection	Address	Date	Time	Weather	Road Surface Condition	Crash Type	Type of Vehicle Involved	Pedestrian Involved?	Cyclist Involved?	Cyclist-involved Crash Notes (motor vehicle configuration or cyclist action)	Injury?	Type of Injury	City Vehicle Involved?	Crash Notes
1	Carlton St & Somerville Ave	7/27/17	9:55	Cloudy	Dry	Single Vehicle Crash	Light truck	No	No		No		No	
2	Bow St & Summer St	2/14/17	19:18	Clear	Wet	Unkown	Passenger car	No	Yes	Walking, running, cycling	Yes	Non-incapacitating	No	
	Bow St & Summer St	6/24/17	18:02	Clear	Dry	Single Vehicle Crash	Light truck	No	Yes	Walking, running, cycling	No		No	
3	Bow St & Wesley Pk	5/18/17	11:47	Clear	Dry	Unkown	Light truck	No	Yes	Walking, running, cycling	No		No	
7	26 Union Sq	5/25/17	16:34	Rain	Wet	Angle	Passenger car	No	No		No		No	
8	Union Sq & Webster Ave	3/3/17	13:12	Clear	Dry	Sideswipe, opposite direction	Passenger car	No	No		No		No	
10	Washington St & Bonner Ave	6/17/17	10:38	Unknown	Wet	Single Vehicle Crash	Passenger car	No	Yes	Walking, running, cycling	Yes	Possible	No	
13	Somerville Ave & Prospect St	4/17/17	9:06	Clear	Dry	Angle	Passenger car	No	No		Yes	Possible	No	
15	Prospect St & Newton St	4/14/17	17:32	Clear	Dry	Sideswipe, same direction	Light truck	No	No		No		No	
18	Newton St & Webster Ave	3/25/17	18:31	Clear	Dry	Sideswipe, same direction	Passenger car	No	No		No		No	
19	Columbia St & Webster Ave	5/14/17	1:36	Rain	Wet	Angle	Passenger car	No	No		Yes	Possible	No	
20	Washington St & McGrath Hwy	7/9/17	1:56	Clear	Dry	Angle	Passenger car	No	No		No		No	
	Washington St & McGrath Hwy	7/18/17	15:16	Clear	Dry	Sideswipe, same direction	Light truck	No	No		No		No	
36	Beacon St & Concord Ave	2/1/17	10:46	Clear	Wet	Angle	Passenger car	Yes	Yes	Entering or crossing location	Yes	Non-incapacitating	No	
	Beacon St & Concord Ave	3/28/17	20:34	Rain	Wet	Single Vehicle Crash	Passenger car	No	Yes	Walking, running, cycling	Yes	Non-incapacitating	No	
	Beacon St & Concord Ave	4/22/17	10:48	Cloudy	Wet	Single Vehicle Crash	Light truck	Yes	Yes	Entering or crossing location	Yes	Possible	No	
37	Washington St & Beacon St	2/15/17	12:20	Clear	Wet	Sideswipe, same direction	Tractor/semi-trailer	No	No		No		No	
	Washington St & Beacon St	3/14/17	12:58	Snow	Snow	Rear-end	Light truck	No	No		No		Yes	
	Washington St & Beacon St	6/4/17	7:17	Clear	Dry	Rear-end	Passenger car	No	No		Yes	Non-incapacitating	No	

iii. Intersection Capacity Analysis

Results from the base year no build condition intersection capacity analysis are displayed in the tables below. Signalized and unsignalized intersections are separated into different tables. Level of service, delay, volume to capacity ratio, and queue length are reported for each intersection.

Table 58: Base Year Weekday Peak Hour Intersection Level of Service (Unsignalized)

Unsignalized Intersections								
	AM Peak Hour				PM Peak Hour			
Streets	LOS	Delay [1]	v/c [2]	Queue [3] (ft)	LOS	Delay [1]	v/c [2]	Queue [3] (ft)
Somerville Avenue / Bow Street / Carlton Street								
Carlton St NB R	B	11.0	0.03	3	B	10.8	0.03	2
Bow St SB L	C	20.9	0.62	107	B	14.5	0.35	39
Somerville Avenue / Hawkins Street								
Hawkins St NB R	B	12.1	0.14	12	B	12.7	0.30	31
Washington Street / Hawkins Street								
Washington St EB LT	A	1.3	0.04	3	A	2.8	0.10	9
Hawkins St SB LR	B	13.3	0.02	1	A	0.0	0.00	0
Bow Street / Warren Avenue								
Warren Ave EB LT	C	19.6	0.37	42	F	181.5	1.24	374
Warren Ave WB R	B	12.2	0.13	11	C	16.1	0.23	21
Washington Street / Bonner Avenue								
Prospect St NB LT	A	0.3	0.01	1	A	0.8	0.03	2
Washington St EB LR	D	27.3	0.32	34	F	51.3	0.42	45
Parking Lot EB LT	A	0.0	0.00	0	A	0.5	0.00	0
Bonner Ave SB LR	A	9.0	0.06	5	A	9.0	0.04	3
Washington Street / Columbus Avenue								
Washington St EB LT	A	0.2	0.01	1	A	0.1	0.00	0
Columbus Ave SB LR	E	48.0	0.35	36	F	79.8	0.47	49
Prospect Street / Everett Street								
Prospect St NB LT	A	0.0	0.00	0	A	0.0	0.00	0
Webster Avenue / Newton Street								
Newton St EB LTR	C	16.2	0.33	36	C	17.3	0.39	45
Webster Ave NB LTR	A	0.6	0.01	1	A	0.2	0.00	0
Webster Ave SB LTR	A	0.3	0.01	1	A	0.4	0.01	1
Prospect Street / Oak Street								
Oak St EB LR	B	14.6	0.09	7	B	13.4	0.11	10
Prospect St NB LT	A	0.1	0.00	0	A	0.2	0.01	0
Webster Avenue / Tremont Street / Columbia Street								
Columbia St WB LTR	D	31.1	0.63	101	B	14.6	0.40	48
Webster Ave NB LTR	A	0.8	0.02	2	A	0.7	0.02	1
Webster Ave SB LTR	A	1.8	0.06	5	A	0.5	0.01	1
Medford Street / South Street								
Medford St NB LT	A	7.4	0.26	26	A	2.6	0.10	8
Somerville Avenue / Allen Street								
Somerville Ave EB LTR	A	0.0	0.00	0	A	0.0	0.00	0
Somerville Ave WB LTR	A	1.7	0.03	2	A	0.3	0.01	1
Allen St NB LR	B	12.0	0.11	9	B	10.7	0.02	2
Parking Lot SB LR	B	10.7	0.02	2	B	11.1	0.01	1
Columbia Street / Windsor Place								
Columbia St EB TR	A	0.0	0.08	0	A	0.0	0.02	0
Windsor Pl WB LT	A	1.1	0.02	2	A	0.9	0.01	1
Columbia Pl NB LR	B	10.1	0.03	2	B	10.2	0.13	11
Everett Street / Emerson Street								
Everett St WB LT	A	3.6	0.00	0	A	0.0	0.00	0
Emerson St NB L	A	8.6	0.01	1	A	8.6	0.00	0
Webster Avenue / Everett Street								
Everett St WB LR	B	11.8	0.13	11	B	10.4	0.04	3
Beacon Street / Concord Avenue								
Driveway EB LTR	B	13.8	0.07	6	B	14.2	0.10	8
Concord Ave WB LTR	B	14.0	0.23	22	C	16.4	0.19	17
Hampshire St NB LTR	A	0.0	0.00	0	A	0.3	0.01	1
Beacon St SB LTR	A	0.0	0.00	0	A	0.5	0.01	1

[1] Delay in seconds per vehicle

[2] v/c = volume to capacity ratio

[3] Queue Length in feet per lane

Table 59: Base Year Weekday Peak Hour Intersection Level of Service (Signalized)

Signalized Intersections										
	AM Peak Hour					PM Peak Hour				
				Queue (ft) [3]					Queue (ft) [3]	
Streets	**LOS**	**Delay [1]**	**v/c [2]**	**50th**	**95th**	**LOS**	**Delay [1]**	**v/c [2]**	**50th**	**95th**
Bow Street / Summer Street/Wesley Park										
Summer St NB LTR	A	1.5	0.37	0	36	A	1.8	0.49	0	99
Wesley Park SW TR	C	29.3	0.02	0	0	C	29.3	0.02	0	0
OVERALL	**A**	**2.6**	**0.36**			**A**	**2.7**	**0.48**		
Somerville Avenue / Bow Street / Warren Avenue										
Somerville Ave EB LT	C	20.4	0.74	128	192	B	17.5	0.62	92	148
OVERALL	**C**	**20.4**	**0.32**			**B**	**17.5**	**0.26**		
Bow Street / Pedestrian Crossing										
Bow St NB T	A	0.4	0.27	0	0	A	0.7	0.41	0	0
OVERALL	**A**	**0.4**	**0.28**			**A**	**0.7**	**0.43**		
Washington Street / Somerville Avenue / Webster Avenue										
Washington St EB LTR	D	45.7	0.68	130	193	D	37.3	0.60	130	198
Somerville Ave WB L	F	115.9	1.00	112	146	D	43.6	0.38	62	73
Somerville Ave WB T	E	70.6	0.86	240	252	D	46.1	0.53	226	258
Somerville Ave WB R	F	169.4	1.20	301	348	F	108.5	1.08	408	541
Webster Ave NB LTR	E	58.9	0.80	183	223	E	57.0	0.84	246	388
Somerville Ave SB L	C	27.7	0.34	86	123	D	38.8	0.53	91	137
Somerville Ave SB TR	D	53.4	0.89	287	474	F	100.2	1.00	195	372
OVERALL	**E**	**73.3**	**1.01**			**E**	**65.6**	**1.02**		
Somerville Avenue / Linden Street										
Somerville Ave EB LTR	B	15.0	0.70	72	133	B	13.5	0.68	63	114
Somerville Ave WB LTR	B	10.7	0.41	35	70	B	10.6	0.52	45	91
Linden St NB LTR	A	6.0	0.06	3	20	A	5.7	0.02	0	4
OVERALL	**B**	**12.9**	**0.32**			**B**	**12.0**	**0.30**		
Somerville Avenue / Washington Street / Prospect Street										
Somerville Ave EB L	E	67.0	0.96	162	330	F	89.8	1.02	180	386
Somerville Ave EB TR	F	175.9	1.28	194	445	F	123.9	1.12	177	404
Somerville Ave WB L	D	40.3	0.13	25	51	D	42.9	0.15	27	60
Somerville Ave WB TR	D	49.6	0.54	117	167	E	74.3	0.86	186	351
Prospect St NB LTR	F	148.3	1.21	516	689	F	166.0	1.26	550	769
Prospect St SB T	C	30.2	0.53	188	300	C	30.8	0.51	195	308
Prospect St SB R	F	221.0	1.35	325	631	F	126.3	1.11	308	582
OVERALL	**F**	**129.3**	**1.12**			**F**	**113.2**	**1.18**		
Webster Avenue / Prospect Street / Concord Avenue										
Webster Ave NB LTR	F	164.5	1.21	178	447	F	148.1	1.18	206	581
Webster Ave SB L	C	26.8	0.38	31	89	C	31.6	0.58	39	110
Webster Ave SB TR	F	92.2	1.05	252	630	D	38.7	0.65	121	292
Prospect St NEB LTR	C	27.4	0.62	136	357	C	34.9	0.77	188	556
Prospect St SWB LTR	D	35.4	0.78	172	458	C	31.6	0.71	160	445
OVERALL	**E**	**73.2**	**0.86**			**E**	**61.2**	**0.80**		
Washington Street WB / McGrath Highway SB										
Washington St EB TR	C	33.5	0.64	167	213	F	86.1	1.05	279	372
McGrath Highway SB LT	A	4.4	0.81	15	12	B	12.2	0.62	38	31
Washington St WB L	A	7.4	0.73	102	80	A	4.1	0.45	42	33
OVERALL	**B**	**17.8**	**0.79**			**D**	**53.2**	**0.74**		
Washington St WB T	A	4.9	0.33	48	41	A	4.2	0.33	53	42
Medford St SB TR	F	192.7	1.32	406	535	F	195.2	1.29	314	441
OVERALL	**F**	**134.2**	**0.57**			**F**	**118.3**	**0.46**		
Washington Street EB / McGrath Highway NB										
Washington St EB L	A	2.6	0.19	0	10	A	0.1	0.21	0	0
Washington St EB LT	A	0.4	0.30	0	0	A	0.1	0.39	0	1
McGrath Highway Ramp NB TR	C	22.4	0.12	18	41	C	25.1	0.41	93	140
OVERALL	**A**	**4.6**	**0.26**			**A**	**8.4**	**0.43**		
Washington St WB T	F	115.2	1.16	313	433	F	141.9	1.20	362	478
Washington St WB R	B	17.4	0.04	0	0	C	27.2	0.08	0	0
McGrath Highway Ramp NB T	A	4.5	0.38	18	30	A	9.2	0.46	88	114
OVERALL	**E**	**68.2**	**0.81**			**E**	**70.9**	**0.77**		
Somerville Avenue / Medford Street										
Somerville Ave EB LT	E	58.9	0.81	163	293	E	61.4	0.85	170	305
Somerville Ave EB R	B	15.9	0.08	5	35	B	13.9	0.05	0	22
Medford St NB L	C	34.9	0.13	21	45	C	33.8	0.19	32	69
Medford St NB R	D	36.3	0.26	32	59	E	66.1	0.92	126	235
Medford St SB L	B	18.0	0.12	14	51	B	18.3	0.09	5	39
Medford St SB TR	C	26.4	0.68	240	312	C	23.0	0.48	139	191
OVERALL	**C**	**31.6**	**0.61**			**D**	**41.6**	**0.68**		
Somerville Avenue / School Street										
Somerville Ave EB T	B	11.4	0.38	82	166	B	12.0	0.44	110	251
Somerville Ave WB T	B	11.9	0.41	88	160	B	11.5	0.41	100	222

School St SB L	C	22.6	0.43	43	79	C	29.7	0.67	49	75
School St SB R	C	21.6	0.24	0	58	C	30.0	0.00	0	82
OVERALL	**B**	**16.0**	**0.34**			**B**	**18.4**	**0.41**		
Cambridge Street / Prospect Street										
Cambridge St EB LTR	C	23.2	0.46	161	243	C	27.2	0.63	284	396
Cambridge St WB LTR	B	15.7	0.57	111	132	B	14.5	0.41	80	113
Prospect St NB LTR	C	27.5	0.56	182	279	C	29.7	0.66	294	405
Prospect St SB LTR	C	27.8	0.60	262	376	C	26.1	0.54	233	308
OVERALL	**C**	**23.5**	**0.59**			**C**	**25.6**	**0.64**		
Cambridge Street / Webster Avenue										
Cambridge St EB LTR	B	16.5	0.50	130	176	B	12.4	0.34	72	100
Cambridge St WB LTR	C	25.4	0.55	210	310	C	24.0	0.51	213	307
Columbia Ave NB LTR	C	23.4	0.41	150	211	C	28.9	0.64	274	366
Webster Ave SB LTR	C	27.2	0.56	204	232	C	27.7	0.57	185	191
OVERALL	**C**	**23.0**	**0.56**			**C**	**24.2**	**0.57**		
Inman Square										
Cambridge St EB LTR	F	183.8	1.23	707	949	F	1529.6	4.22	1058	1307
Cambridge St WB TR	E	73.0	0.84	490	508	E	75.1	0.87	529	725
Hampshire St NB LTR	F	95.0	0.91	284	416	F	120.1	1.07	734	855
Hampshire St SB LTR	F	120.1	1.07	753	1003	E	60.8	0.67	371	454
Springfield St SWB LTR	D	48.5	0.30	147	185	D	45.5	0.16	74	112
OVERALL	**F**	**116.1**	**0.86**			**F**	**479.6**	**1.81**		
Beacon Street / Washington Street										
Washington St EB L	C	24.7	0.20	21	43	C	25.2	0.28	30	58
Washington St EB TR	C	26.8	0.52	169	231	C	29.5	0.63	232	331
Washington St WB LTR	E	59.2	0.90	249	374	D	54.2	0.87	254	374
Beacon St NB LTR	B	16.4	0.36	117	195	C	24.5	0.67	213	409
Beacon St SB LTR	C	20.9	0.60	254	442	B	18.3	0.48	169	311
OVERALL	**C**	**30.5**	**0.70**			**C**	**31.0**	**0.75**		

[1] Delay in seconds per vehicle

[2] v/c = volume to capacity ratio

[3] Queue Length in feet per lane

Table 60: Base Year Saturday Peak Hour Intersection Level of Service (Unsignalized)

Unsignalized Intersections				
		Saturday Peak Hour		
Streets	LOS	Delay [1]	v/c [2]	Queue
Somerville Avenue / Bow Street / Carlton Street				
Carlton St NB R	B	12.7	0.02	1
Bow St SB L	C	18.1	0.47	62
Somerville Avenue / Hawkins Street				
Hawkins St NB R	B	11.5	0.12	10
Washington Street / Hawkins Street				
Washington St EB LT	A	2.2	0.03	2
Hawkins St SB LR	A	0.0	0.00	0
Bow Street / Warren Avenue				
Warren Ave EB LT	F	180	1.23	358
Warren Ave WB R	C	15.9	0.32	35
Washington Street / Bonner Avenue				
Prospect St NB LT	A	0.6	0.02	2
Washington St EB LR	D	31.4	0.41	46
Parking Lot EB LT	A	0.0	0.00	0
Bonner Ave SB LR	A	8.8	0.06	5
Washington Street / Columbus Avenue				
Washington St EB LT	A	0.1	0.00	0
Columbus Ave SB LR	E	42.9	0.37	38
Prospect Street / Everett Street				
Prospect St NB LT	A	0.0	0.00	0
Webster Avenue / Newton Street				
Newton St EB LTR	B	12.8	0.25	24
Webster Ave NB LTR	A	0.6	0.01	1
Webster Ave SB LTR	A	0.1	0.00	0
Prospect Street / Oak Street				
Oak St EB LR	B	14.0	0.05	4
Prospect St NB LT	A	0.1	0.00	0
Webster Avenue / Tremont Street / Columbia Street				
Columbia St WB LTR	B	12.1	0.22	21
Webster Ave NB LTR	A	0.4	0.01	1
Webster Ave SB LTR	A	0.6	0.01	1
Medford Street / South Street				
Medford St NB LT	A	1.7	0.06	5
Somerville Avenue / Allen Street				
Somerville Ave EB LTR	A	0.1	0	0
Somerville Ave WB LTR	A	0.3	0.01	1
Allen St NB LR	B	11.1	0.03	2
Parking Lot SB LR	B	10.1	0.01	0
Columbia Street / Windsor Place				
Columbia St EB TR	A	0.0	0.00	0
Windsor Pl WB LT	A	0.9	0.01	1
Columbia Pl NB LR	A	9.4	0.02	2
Everett Street / Emerson Street				
Everett St WB LT	A	0.0	0.00	0
Emerson St NB L	A	8.6	0.00	0
Webster Avenue / Everett Street				
Everett St WB LR	B	10.4	0.02	2
Beacon Street / Concord Avenue				
Driveway EB LTR	B	14.5	0.07	6
Concord Ave WB LTR	C	17.6	0.23	22
Hampshire St NB LTR	A	0.5	0.02	1
Beacon St SB LTR	A	0.3	0.01	1

[1] Delay in seconds per vehicle

[2] v/c = volume to capacity ratio

[3] Queue Length in feet per lane

Table 61: Base Year Saturday Peak Hour Intersection Level of Service (Signalized)

Signalized Intersections					
		Saturday Peak Hour			
				Queue[3]	
Streets	LOS	Delay [1]	v/c [2]	50th	95th
Bow Street / Summer Street/Wesley Park					
Summer St NB LTR	A	2.4	0.41	0	50
Wesley Park SW TR	C	29.3	0.01	0	0
OVERALL	**A**	**3.1**	**0.41**		
Somerville Avenue / Bow Street / Warren Avenue					
Somerville Ave EB LT	B	18.9	0.68	110	170
OVERALL	**B**	**18.9**	**0.29**		
Bow Street / Pedestrian Crossing					
Bow St NB T	A	0.5	0.34	0	0
OVERALL	**A**	**0.5**	**0.36**		
Washington Street / Somerville Avenue / Webster Avenue					
Washington St EB LTR	C	28.1	0.35	85	162
Somerville Ave WB L	D	36.5	0.35	72	85
Somerville Ave WB T	D	38.0	0.44	201	228
Somerville Ave WB R	E	69.6	0.97	383	534
Webster Ave NB LTR	D	48.6	0.72	187	266
Somerville Ave SB L	D	41.1	0.54	139	158
Somerville Ave SB TR	D	49.4	0.73	187	238
OVERALL	**D**	**46.9**	**0.86**		
Somerville Avenue / Linden Street					
Somerville Ave EB LTR	B	14.0	0.70	73	137
Somerville Ave WB LTR	B	10.5	0.53	50	84
Linden St NB LTR	A	6.2	0.03	2	7
OVERALL	**B**	**12.2**	**0.33**		
Somerville Avenue / Washington Street / Prospect Street					
Somerville Ave EB L	E	73.9	0.99	130	398
Somerville Ave EB TR	F	118.5	1.13	138	435
Somerville Ave WB L	D	40.6	0.81	33	61
Somerville Ave WB TR	E	65.0	0.81	198	293
Prospect St NB LTR	C	33.8	0.62	184	261
Prospect St SB T	C	27.2	0.34	114	191
Prospect St SB R	F	247.8	1.41	684	359
OVERALL	**F**	**100.7**	**0.93**		
Webster Avenue / Prospect Street / Concord Avenue					
Webster Ave NB LTR	F	185.9	1.25	155	435
Webster Ave SB L	C	26.7	0.19	16	60
Webster Ave SB TR	F	198.1	1.32	318	743
Prospect St NEB LTR	D	45.8	0.88	212	603
Prospect St SWB LTR	C	26.5	0.54	106	263
OVERALL	**F**	**110.0**	**0.99**		
Washington Street WB / McGrath Highway SB					
Washington St EB TR	C	33.6	0.65	174	220
McGrath Highway SB LT	A	7.4	0.55	25	26
Washington St WB L	C	29.2	0.52	144	226
OVERALL	**C**	**25.4**	**0.62**		
Washington St WB T	B	18.7	0.35	106	137
Medford St SB TR	E	67.0	0.98	212	282
OVERALL	**D**	**48.3**	**0.48**		
Washington Street EB / McGrath Highway NB					
Washington St EB L	A	4.3	0.20	0	16
Washington St EB LT	A	0.5	0.33	0	0
McGrath Highway Ramp NB TR	C	22.9	0.18	26	56
OVERALL	**A**	**6.6**	**0.30**		
Washington St WB T	C	22.7	0.54	177	227
Washington St WB R	B	18.7	0.16	0	19
McGrath Highway Ramp NB T	B	16.0	0.41	88	285
OVERALL	**B**	**19.6**	**0.50**		
Somerville Avenue / Medford Street					
Somerville Ave EB LT	E	72.0	0.92	190	349
Somerville Ave EB R	B	13.9	0.04	0	22
Medford St NB L	C	34.0	0.20	34	72
Medford St NB R	D	38.2	0.49	72	123
Medford St SB L	B	18.6	0.12	12	50
Medford St SB TR	C	22.6	0.46	130	179
OVERALL	**D**	**36.0**	**0.58**		
Somerville Avenue / School Street					

Somerville Ave EB T	B	13.6	0.55	135	241
Somerville Ave WB T	B	11.5	0.39	90	169
School St SB L	C	23.0	0.47	47	87
School St SB R	C	21.3	0.14	0	47
OVERALL	**B**	**15.5**	**0.43**		
Cambridge Street / Prospect Street					
Cambridge St EB LTR	C	22.7	0.43	151	210
Cambridge St WB LTR	B	13.1	0.51	74	97
Prospect St NB LTR	C	28.3	0.62	274	392
Prospect St SB LTR	C	24.3	0.46	187	261
OVERALL	**C**	**22.6**	**0.56**		
Cambridge Street / Webster Avenue					
Cambridge St EB LTR	B	17.7	0.41	132	182
Cambridge St WB LTR	C	25.2	0.55	222	323
Columbia Ave NB LTR	C	21.0	0.27	96	153
Webster Ave SB LTR	C	20.9	0.27	87	141
OVERALL	**C**	**21.5**	**0.41**		
Inman Square					
Cambridge St EB LTR	E	71.1	0.80	392	535
Cambridge St WB TR	E	60.4	0.67	383	510
Hampshire St NB LTR	E	80.0	0.87	389	577
Hampshire St SB LTR	E	65.6	0.76	448	591
Springfield St SWB LTR	D	44.9	0.12	57	102
OVERALL	**E**	**67.9**	**0.60**		
Beacon Street / Washington Street					
Washington St EB L	C	25.3	0.15	14	34
Washington St EB TR	C	27.6	0.52	159	237
Washington St WB LTR	E	55.5	0.87	229	343
Beacon St NB LTR	B	15.6	0.42	154	291
Beacon St SB LTR	B	17.5	0.52	197	372
OVERALL	**C**	**28.0**	**0.65**		

[1] Delay in seconds per vehicle

[2] v/c = volume to capacity ratio

[3] Queue Length in feet per lane

b. Base Year Built Condition

The base year built condition is split into two phases, with Phase 1 including parcels D2 and D5, and Phase 2 adding parcels D1 and D3. Both of these phases are applied to the same base roadways network as the no build condition.

i. Trip Generation

Proposed site-generated trips for the Phase 1 and Phase 2 analyses are displayed in the tables below.

Table 62: Phase 1 and Phase 2 Buildout Motor Vehicle Trips, AM Peak

PARCEL	Vehicle Trips for Analysis	Vehicle Trips Entering	Vehicle Trips Exiting
D1	216	173	43
D2	225	130	96
D3	430	328	102
D5	40	28	12
PHASE 1 TOTAL	265	158	108
PHASE 2 TOTAL	645	501	145
COMBINED TOTAL	911	658	253

Table 63: Phase 1 and Phase 2 Buildout Motor Vehicle Trips, PM Peak

PARCEL	Vehicle Trips for Analysis	Vehicle Trips Entering	Vehicle Trips Exiting
D1	237	68	169
D2	275	117	158
D3	450	127	323
D5	70	28	42
PHASE 1 TOTAL	345	146	200
PHASE 2 TOTAL	687	194	493
COMBINED TOTAL	1,032	340	692

Table 64: Phase 1 and Phase 2 Buildout Motor Vehicle Trips, Saturday Peak

PARCEL	Vehicle Trips for Analysis	Vehicle Trips Entering	Vehicle Trips Exiting
D1	119	59	59
D2	164	82	82
D3	129	65	65
D5	61	30	30
PHASE 1 TOTAL	225	113	113
PHASE 2 TOTAL	248	124	124
COMBINED TOTAL	473	237	237

The distribution of these trips across the analysis network is displayed in figures in the previous section of this report titled "Trip Distribution."

ii. Intersection Capacity Analysis

The tables on the following pages display intersection capacity results from the Phase 1 and Phase 2 built conditions for AM, PM, and Saturday peaks.

Table 65: Build 1 Weekday Peak Hour Intersection Level of Service (Unsignalized)

Unsignalized Intersections								
	AM Peak Hour				PM Peak Hour			
Streets	LOS	Delay [1]	v/c [2]	Queue	LOS	Delay [1]	v/c	Queue
Somerville Avenue / Bow Street / Carlton Street								
Carlton St NB R	B	11.2	0.03	3	B	10.9	0.03	2
Bow St SB L	C	23.0	0.66	120	B	14.9	0.37	42
Somerville Avenue / Hawkins Street								
Hawkins St NB R	B	12.5	0.14	12	B	12.9	0.30	32
Washington Street / Hawkins Street								
Washington St EB LT	A	2.9	0.10	9	A	2.8	0.10	9
Hawkins St SB LR	C	16.4	0.02	2	A	0.0	0.00	0
Bow Street / Warren Avenue								
Warren Ave EB LT	C	20.2	0.38	44	F	223.2	1.35	447
Warren Ave WB R	B	12.3	0.13	12	C	16.3	0.23	22
Washington Street / Bonner Avenue								
Prospect St NB LT	A	0.3	0.01	1	A	0.8	0.03	2
Washington St EB LR	D	34.3	0.41	46	F	61.9	0.47	52
Parking Lot EB LT	A	0.0	0.00	0	A	0.5	0.00	0
Bonner Ave SB LR	A	9.1	0.06	5	A	9.1	0.04	3
Washington Street / Columbus Avenue								
Washington St EB LT	A	0.7	0.03	2	A	0.9	0.03	2
Columbus Ave SB LR	F	78.4	0.60	73	F	632.0	2.04	292
Prospect Street / Everett Street								
Driveway 2 WB LTR	C	16.4	0.19	18	C	20.8	0.35	39
Prospect St SB LTR	A	2.0	0.07	6	A	2.1	0.07	6
Webster Avenue / Newton Street								
Newton St EB LTR	C	16.3	0.34	37	C	16.9	0.38	45
Webster Ave NB LTR	A	0.6	0.01	1	A	0.2	0.00	0
Webster Ave SB LTR	A	0.3	0.01	1	A	0.2	0.01	0
Prospect Street / Oak Street								
Oak St EB LR	C	15.3	0.09	8	B	13.0	0.11	9
Prospect St NB LT	A	0.1	0.00	0	A	0.2	0.01	0
Webster Avenue / Tremont Street / Columbia Street								
Columbia St WB LTR	D	34.2	0.66	111	C	15.2	0.42	52
Webster Ave NB LTR	A	0.8	0.02	2	A	0.7	0.02	1
Webster Ave SB LTR	A	1.8	0.06	5	A	0.5	0.01	1
Medford Street / South Street								
Medford St NB LT	A	7.5	0.26	26	A	2.6	0.10	8
Somerville Avenue / Allen Street								
Somerville Ave EB LTR	A	0.0	0.00	0	A	0.1	0.00	0
Somerville Ave WB LTR	A	1.7	0.03	3	A	0.3	0.01	1
Allen St NB LR	B	14.2	0.14	12	B	12.7	0.06	5
Parking Lot SB LR	B	11.9	0.02	2	C	16.2	0.05	4
Columbia Street / Windsor Place								
Columbia St EB TR	A	0.0	0.08	0	A	0.0	0.00	0
Windsor Pl WB LT	A	1.1	0.02	2	A	0.9	0.01	1
Columbia Pl NB LR	B	10.1	0.03	2	B	10.2	0.13	11
Everett Street / Emerson Street								
Everett St WB LT	A	3.6	0.00	0	A	0.0	0.00	0
Emerson St NB L	A	8.6	0.01	1	A	8.6	0.00	0
Webster Avenue / Everett Street								
Everett St WB LR	B	11.8	0.13	11	B	10.4	0.04	3
Beacon Street / Concord Avenue								
Driveway EB LTR	B	13.8	0.07	6	B	14.3	0.10	8
Concord Ave WB LTR	B	14.0	0.23	22	C	16.5	0.19	17
Hampshire St NB LTR	A	0.0	0.00	0	A	0.3	0.01	1
Beacon St SB LTR	A	0.0	0.00	0	A	0.5	0.01	1
Columbus Avenue/D5								
D5 WB LR	A	8.8	0.01	1	A	8.9	0.05	4
Columbus Ave SB LT	A	0.3	0.00	0	A	0.3	0.00	0
Somerville Avenue/D2								
Somerville Ave WB LT	A	0.1	0.00	0	A	0.0	0.00	0
D2 NB LR	B	10.0	0.04	3	A	10.0	0.05	4
Allen Street/D2								9
D2 EB LT	A	0.0	0.00	0	A	3.0	0.00	0
Allen St SB LR	A	8.8	0.05	4	A	8.7	0.02	2

[1] Delay in seconds per vehicle

[2] v/c = volume to capacity ratio

[3] Queue Length in feet per lane

Table 66: Build 1 Weekday Peak Hour Intersection Level of Service (Signalized)

Signalized Intersections										
	AM Peak Hour					PM Peak Hour				
				Queue (ft) [3]					Queue (ft) [3]	
Streets	**LOS**	**Delay [1]**	**v/c [2]**	**50th**	**95th**	**LOS**	**Delay [1]**	**v/c [2]**	**50th**	**95th**
Bow Street / Summer Street/Wesley Park										
Summer St NB LTR	A	1.5	0.38	0	38	A	1.9	0.52	0	110
Wesley Park SW TR	C	29.3	0.02	0	0	C	29.3	0.02	0	0
OVERALL	**A**	**2.6**	**0.38**			**A**	**2.7**	**0.51**		
Somerville Avenue / Bow Street / Warren Avenue										
Somerville Ave EB LT	C	21.2	0.77	135	202	B	17.9	0.64	98	156
OVERALL	**C**	**21.2**	**0.33**			**B**	**17.9**	**0.27**		
Bow Street / Pedestrian Crossing										
Bow St NB T	A	0.4	0.28	0	0	A	0.7	0.41	0	0
OVERALL	**A**	**0.4**	**0.29**			**A**	**0.7**	**0.43**		
Washington Street / Somerville Avenue / Webster Avenue										
Washington St EB LTR	D	46.8	0.70	135	209	D	38.0	0.62	135	205
Somerville Ave WB L	F	110.9	1.01	111	137	D	41.7	0.39	61	67
Somerville Ave WB T	E	69.3	0.88	247	244	D	44.9	0.55	232	250
Somerville Ave WB R	F	191.4	1.27	329	346	F	133.4	1.16	462	551
Webster Ave NB LTR	E	58.9	0.80	183	223	E	57.0	0.B	246	388
Somerville Ave SB L	C	28.1	0.38	95	135	D	39.7	0.57	100	146
Somerville Ave SB TR	D	53.4	0.89	287	474	F	100.2	1.00	195	372
OVERALL	**E**	**70.6**	**1.03**			**E**	**71.5**	**1.06**		
Somerville Avenue / Linden Street										
Somerville Ave EB LTR	B	15.0	0.70	72	133	B	14.2	0.71	74	130
Somerville Ave WB LTR	B	10.7	0.42	35	70	B	10.0	0.49	46	90
Linden St NB LTR	A	6.0	0.06	3	20	A	6.4	0.03	1	7
OVERALL	**B**	**12.9**	**0.32**			**B**	**12.3**	**0.34**		
Somerville Avenue / Washington Street / Prospect Street										
Somerville Ave EB L	E	72.8	0.98	163	347	F	97.2	1.04	189	401
Somerville Ave EB TR	F	239.4	1.43	330	505	F	167.4	1.23	197	452
Somerville Ave WB L	D	40.3	0.13	25	51	D	42.9	0.15	27	60
Somerville Ave WB TR	D	49.6	0.54	117	167	E	74.3	0.86	186	351
Prospect St NB LTR	F	262.8	1.47	636	801	F	287.1	1.54	698	920
Prospect St SB T	C	32.7	0.63	232	365	C	32.6	0.59	236	368
Prospect St SB R	F	243.2	1.40	344	661	F	138.0	1.15	320	605
OVERALL	**F**	**175.7**	**1.27**			**F**	**160.9**	**1.36**		
Webster Avenue / Prospect Street / Concord Avenue										
Webster Ave NB LTR	F	346.0	1.63	211	480	F	148.1	1.18	206	581
Webster Ave SB L	C	27.3	0.44	36	101	C	32.4	0.60	40	113
Webster Ave SB TR	F	130.2	1.16	313	703	D	38.7	0.65	121	292
Prospect St NEB LTR	C	28.7	0.67	150	390	D	39.1	0.83	208	619
Prospect St SWB LTR	D	42.0	0.86	198	529	C	34.7	0.77	180	509
OVERALL	**F**	**116.4**	**1.03**			**E**	**62.1**	**0.83**		
Washington Street WB / McGrath Highway SB										
Washington St EB TR	C	33.9	0.66	174	220	F	104.6	1.11	306	400
McGrath Highway SB LT	A	4.5	0.81	18	13	B	12.8	0.62	40	32
Washington St WB L	A	8.3	0.73	110	89	A	4.8	0.45	49	40
OVERALL	**B**	**18.4**	**0.80**			**E**	**65.3**	**0.76**		
Washington St WB T	A	5.5	0.35	56	47	A	4.8	0.34	63	50
Medford St SB TR	F	216.2	1.38	430	561	F	208.9	1.33	327	454
OVERALL	**F**	**149.7**	**0.59**			**F**	**125.5**	**0.47**		
Washington Street EB / McGrath Highway NB										
Washington St EB L	A	3.3	0.20	0	15	A	0.1	0.23	0	0
Washington St EB LT	A	0.4	0.31	0	0	A	0.1	0.20	0	0
McGrath Highway Ramp NB TR	C	22.6	0.14	22	46	C	25.8	0.45	107	157
OVERALL	**A**	**5.1**	**0.27**			**A**	**8.8**	**0.46**		
Washington St WB T	F	115.2	1.16	313	433	F	141.9	1.20	362	478
Washington St WB R	B	17.4	0.04	0	0	C	27.2	0.08	0	0
McGrath Highway Ramp NB T	A	5.0	0.41	22	35	A	9.1	0.47	93	118
OVERALL	**E**	**66.8**	**0.82**			**E**	**69.9**	**0.78**		
Somerville Avenue / Medford Street										
Somerville Ave EB LT	E	67.2	0.88	180	328	F	89.9	1.00	207	378
Somerville Ave EB R	B	16.0	0.09	7	38	B	13.9	0.05	0	23
Medford St NB L	C	35.0	0.13	21	46	C	33.9	0.20	34	71
Medford St NB R	D	36.3	0.26	32	59	E	66.1	0.92	126	235
Medford St SB L	B	19.1	0.21	56	98	B	18.3	0.09	5	39
Medford St SB TR	C	26.4	0.68	240	312	C	23.0	0.48	139	191
OVERALL	**C**	**33.4**	**0.63**			**D**	**47.6**	**0.72**		
Somerville Avenue / School Street										
Somerville Ave EB T	B	11.6	0.39	87	175	B	12.3	0.46	115	264
Somerville Ave WB T	B	12.1	0.42	91	164	B	11.9	0.43	108	245

School St SB L	C	22.7	0.45	45	83	C	30.7	0.69	52	77
School St SB R	C	21.6	0.24	0	58	C	30.0	0.00	0	82
OVERALL	**B**	**16.1**	**0.35**			**B**	**18.7**	**0.42**		
Cambridge Street / Prospect Street										
Cambridge St EB LTR	C	24.2	0.49	172	259	C	28.4	0.66	300	419
Cambridge St WB LTR	B	15.6	0.58	112	132	B	14.4	0.41	80	114
Prospect St NB LTR	C	28.2	0.58	191	292	C	30.8	0.69	311	428
Prospect St SB LTR	C	28.9	0.64	282	403	C	27.9	0.61	263	345
OVERALL	**C**	**24.3**	**0.61**			**C**	**26.8**	**0.67**		
Cambridge Street / Webster Avenue										
Cambridge St EB LTR	B	16.6	0.50	134	180	B	13.3	0.34	76	118
Cambridge St WB LTR	C	25.7	0.56	215	316	C	24.4	0.52	220	317
Columbia Ave NB LTR	C	23.6	0.42	156	217	C	29.5	0.65	286	381
Webster Ave SB LTR	C	28.5	0.60	219	249	C	29.6	0.62	202	207
OVERALL	**C**	**23.5**	**0.58**			**C**	**25.2**	**0.59**		
Inman Square										
Cambridge St EB LTR	F	194.6	1.25	736	978	F	1569.2	4.31	1096	1345
Cambridge St WB TR	E	73.0	0.84	490	508	E	75.1	0.87	529	725
Hampshire St NB LTR	F	95.0	0.91	284	415	F	120.1	1.07	734	855
Hampshire St SB LTR	F	118.9	1.06	750	999	E	60.8	0.67	371	454
Springfield St SWB LTR	D	48.5	0.30	147	185	D	45.5	0.16	74	112
OVERALL	**F**	**119.0**	**0.87**			**F**	**498.7**	**1.84**		
Beacon Street / Washington Street										
Washington St EB L	C	24.6	0.20	21	43	C	25.2	0.28	30	58
Washington St EB TR	C	26.7	0.52	172	235	C	29.4	0.64	235	336
Washington St WB LTR	E	59.2	0.90	256	384	E	56.1	0.88	265	388
Beacon St NB LTR	B	16.8	0.36	120	197	C	25.1	0.68	217	411
Beacon St SB LTR	C	31.6	0.61	261	446	B	18.7	0.48	175	314
OVERALL	**C**	**30.8**	**0.71**			**C**	**31.8**	**0.76**		

[1] Delay in seconds per vehicle

[2] v/c = volume to capacity ratio

[3] Queue Length in feet per lane

Table 67: Build 1 Saturday Peak Hour Intersection Level of Service (Unsignalized)

Unsignalized Intersections				
		AM Peak Hour		
Streets	LOS	Delay [1]	v/c [2]	Queue
Somerville Avenue / Bow Street / Carlton Street				
Carlton St NB R	B	11.9	0.02	1
Bow St SB L	C	19.0	0.49	67
Somerville Avenue / Hawkins Street				
Hawkins St NB R	B	11.6	0.12	10
Washington Street / Hawkins Street				
Washington St EB LT	A	2.2	0.03	2
Hawkins St SB LR	A	0.0	0.00	0
Bow Street / Warren Avenue				
Warren Ave EB LT	F	196.1	1.27	373
Warren Ave WB R	C	16.2	0.33	36
Washington Street / Bonner Avenue				
Prospect St NB LT	A	0.6	0.02	2
Washington St EB LR	E	38.2	0.47	57
Parking Lot EB LT	A	0.0	0.00	0
Bonner Ave SB LR	A	8.8	0.06	5
Washington Street / Columbus Avenue				
Washington St EB LT	A	0.7	0.03	2
Columbus Ave SB LR	F	79.2	0.71	101
Prospect Street / Everett Street				
Driveway 2 WB LTR	B	14.4	0.15	13
Prospect St SB LTR	A	2.0	0.06	5
Webster Avenue / Newton Street				
Newton St EB LTR	B	12.8	0.25	25
Webster Ave NB LTR	A	0.6	0.01	1
Webster Ave SB LTR	A	0.1	0.00	0
Prospect Street / Oak Street				
Oak St EB LR	B	14.5	0.6	5
Prospect St NB LT	A	0.1	0.00	0
Webster Avenue / Tremont Street / Columbia Street				
Columbia St WB LTR	B	12.3	0.23	22
Webster Ave NB LTR	A	0.4	0.01	1
Webster Ave SB LTR	A	0.6	0.01	1
Medford Street / South Street				
Medford St NB LT	A	1.7	0.06	5
Somerville Avenue / Allen Street				
Somerville Ave EB LTR	A	0.1	0.00	0
Somerville Ave WB LTR	A	0.3	0.01	1
Allen St NB LR	B	11.0	0.03	3
Parking Lot SB LR	B	10.1	0.01	0
Columbia Street / Windsor Place				
Columbia St EB TR	A	0.0	0.00	0
Windsor Pl WB LT	A	0.9	0.01	1
Columbia Pl NB LR	A	9.4	0.02	2
Everett Street / Emerson Street				
Everett St WB LT	A	0.0	0.00	0
Emerson St NB L	A	8.6	0.00	0
Webster Avenue / Everett Street				
Everett St WB LR	B	10.4	0.02	2
Beacon Street / Concord Avenue				
Driveway EB LTR	B	14.6	0.07	6
Concord Ave WB LTR	C	17.6	0.24	23
Hampshire St NB LTR	A	0.5	0.02	1
Beacon St SB LTR	A	0.4	0.01	1
Columbus Avenue/D5				
D5 WB LR	A	9.0	0.04	3
Columbus Ave SB LT	A	0.2	0.00	0
Somerville Avenue/D2				
Somerville Ave WB LT	A	0.0	0.00	0
D2 NB LR	B	10.3	0.02	2
Allen Street/D2				
D2 EB LT	A	3.6	0.00	0
Allen St SB LR	A	8.6	0.01	1

[1] Delay in seconds per vehicle

[2] v/c = volume to capacity ratio

[3] Queue Length in feet per lane

Table 68: Build 1 Saturday Peak Hour Intersection Level of Service (Signalized)

Signalized Intersections					
		AM Peak Hour			
				Queue (ft) [3]	
Streets	LOS	Delay [1]	v/c [2]	50th	95th
Bow Street / Summer Street/Wesley Park					
Summer St NB LTR	A	2.5	0.42	0	52
Wesley Park SW TR	C	29.3	0.01	0	0
OVERALL	**A**	**3.2**	**0.42**		
Somerville Avenue / Bow Street / Warren Avenue					
Somerville Ave EB LT	B	19.4	0.71	116	178
OVERALL	**B**	**19.4**	**0.30**		
Bow Street / Pedestrian Crossing					
Bow St NB T	A	0.5	0.34	0	0
OVERALL	**A**	**0.5**	**0.36**		
Washington Street / Somerville Avenue / Webster Avenue					
Washington St EB LTR	C	28.3	0.37	88	166
Somerville Ave WB L	D	36.4	0.36	71	82
Somerville Ave WB T	D	37.9	0.45	202	236
Somerville Ave WB R	E	75.7	1.00	390	558
Webster Ave NB LTR	D	48.6	0.72	187	266
Somerville Ave SB L	D	41.6	0.58	148	168
Somerville Ave SB TR	D	49.4	0.73	187	238
OVERALL	**D**	**48.4**	**0.88**		
Somerville Avenue / Linden Street					
Somerville Ave EB LTR	B	14.0	0.71	73	138
Somerville Ave WB LTR	B	11.1	0.57	55	90
Linden St NB LTR	A	6.3	0.04	2	8
OVERALL	**B**	**12.4**	**0.33**		
Somerville Avenue / Washington Street / Prospect Street					
Somerville Ave EB L	F	81.3	1.01	140	413
Somerville Ave EB TR	F	155.2	1.22	160	479
Somerville Ave WB L	D	40.6	0.16	33	61
Somerville Ave WB TR	E	65.6	0.82	198	294
Prospect St NB LTR	D	37.0	0.71	208	294
Prospect St SB T	C	28.4	0.43	147	240
Prospect St SB R	F	255.5	1.43	366	695
OVERALL	**F**	**107.2**	**0.98**		
Webster Avenue / Prospect Street / Concord Avenue					
Webster Ave NB LTR	F	198.9	1.28	163	447
Webster Ave SB L	C	26.8	0.21	17	63
Webster Ave SB TR	F	198.1	1.32	318	743
Prospect St NEB LTR	D	53.1	0.93	227	640
Prospect St SWB LTR	C	31.3	0.68	131	324
OVERALL	**F**	**112.6**	**1.02**		
Washington Street WB / McGrath Highway SB					
Washington St EB TR	C	34.1	0.68	182	230
McGrath Highway SB LT	A	7.3	0.55	27	27
Washington St WB L	B	12.5	0.52	155	243
OVERALL	**C**	**22.9**	**0.63**		
Washington St WB T	B	11.1	0.37	145	174
Medford St SB TR	E	76.3	1.01	226	297
OVERALL	**D**	**51.1**	**0.50**		
Washington Street EB / McGrath Highway NB					
Washington St EB L	A	4.1	0.21	0	14
Washington St EB LT	A	0.5	0.34	1	0
McGrath Highway Ramp NB TR	C	23.1	0.19	30	61
OVERALL	**A**	**6.7**	**0.32**		
Washington St WB T	C	23.0	0.55	184	234
Washington St WB R	B	18.7	0.16	0	19
McGrath Highway Ramp NB T	A	6.4	0.43	31	47
OVERALL	**B**	**15.8**	**0.52**		
Somerville Avenue / Medford Street					
Somerville Ave EB LT	F	85.7	0.99	206	381
Somerville Ave EB R	B	13.9	0.04	0	22
Medford St NB L	C	34.1	0.21	35	73
Medford St NB R	D	38.2	0.49	72	123
Medford St SB L	B	18.6	0.12	12	50
Medford St SB TR	C	22.6	0.46	131	180
OVERALL	**D**	**39.3**	**0.60**		
Somerville Avenue / School Street					
Somerville Ave EB T	B	14.0	0.56	141	269
Somerville Ave WB T	B	11.7	0.40	93	174

School St SB L	C	22.8	0.47	48	89
School St SB R	C	21.2	0.14	0	46
OVERALL	**B**	**15.7**	**0.44**		
Cambridge Street / Prospect Street					
Cambridge St EB LTR	C	23.3	0.46	158	221
Cambridge St WB LTR	B	13.1	0.51	74	97
Prospect St NB LTR	C	28.7	0.63	282	403
Prospect St SB LTR	C	24.9	0.49	202	279
OVERALL	**C**	**23.0**	**0.57**		
Cambridge Street / Webster Avenue					
Cambridge St EB LTR	B	17.6	0.41	132	182
Cambridge St WB LTR	C	25.3	0.55	224	324
Columbia Ave NB LTR	C	21.1	0.28	99	158
Webster Ave SB LTR	C	21.4	0.29	96	153
OVERALL	**C**	**21.6**	**0.42**		
Inman Square					
Cambridge St EB LTR	E	75.7	0.84	410	588
Cambridge St WB TR	E	61.3	0.69	396	526
Hampshire St NB LTR	E	80.0	0.87	389	577
Hampshire St SB LTR	E	65.6	0.76	448	591
Springfield St SWB LTR	D	44.9	0.12	57	102
OVERALL	**E**	**69.2**	**0.61**		
Beacon Street / Washington Street					
Washington St EB L	C	25.3	0.15	14	34
Washington St EB TR	C	27.6	0.52	161	239
Washington St WB LTR	E	56.4	0.88	236	351
Beacon St NB LTR	B	15.9	0.43	158	295
Beacon St SB LTR	B	17.8	0.53	202	376
OVERALL	**C**	**28.5**	**0.66**		

[1] Delay in seconds per vehicle

[2] v/c = volume to capacity ratio

[3] Queue Length in feet per lane

Table 69: Build 2 Weekday Peak Hour Intersection Level of Service (Unsignalized)

Unsignalized Intersections								
	AM Peak Hour				PM Peak Hour			
Streets	LOS	Delay [1]	v/c [2]	Queue	LOS	Delay [1]	v/c [2]	Queue
Somerville Avenue / Bow Street / Carlton Street								
Carlton St NB R	B	11.8	0.04	3	B	11.0	0.03	2
Bow St SB L	D	30.8	0.76	165	C	15.4	0.38	45
Somerville Avenue / Hawkins Street								
Hawkins St NB R	B	13.1	0.15	13	B	13.1	0.31	33
Washington Street / Hawkins Street								
Washington St EB LT	A	1.3	0.04	3	A	2.9	0.11	9
Hawkins St SB LR	B	13.7	0.02	1	A	0.0	0.00	0
Bow Street / Warren Avenue								
Warren Ave EB LT	C	21.0	0.40	46	F	321.2	1.58	531
Warren Ave WB R	B	12.6	0.14	12	C	17.9	0.25	25
Washington Street / Bonner Avenue								
Prospect St NB LT	A	0.3	0.01	1	A	0.8	0.03	2
Washington St EB LR	D	34.4	0.41	46	F	63.4	0.48	53
Parking Lot EB LT	A	0.0	0.00	0	A	0.5	0.00	0
Bonner Ave SB LR	A	9.1	0.06	5	A	9.1	0.04	3
Washington Street / Columbus Avenue								
Washington St EB LTR	A	0.9	0.03	2	A	1.3	0.04	3
Washington St WB LTR	A	3.7	0.12	10	A	2.0	0.06	5
D1 NB LTR	C	22.1	0.08	6	E	42.3	0.49	60
Columbus Ave SB LTR	F	1017.1	2.53	199	F	ERR	15.00	ERR
Prospect Street / Everett Street								
Driveway 2 WB LTR	C	22.4	0.27	26	E	36.8	0.53	71
Prospect St SB LTR	A	2.0	0.08	6	A	2.7	0.10	8
Webster Avenue / Newton Street								
Newton St EB LTR	C	19.4	0.41	50	C	19.2	0.44	54
Webster Ave NB LTR	A	0.6	0.01	1	A	0.2	0.01	0
Webster Ave SB LTR	A	0.3	0.01	1	A	0.2	0.01	0
Prospect Street / Oak Street								
Oak St EB LR	C	17.1	0.11	9	C	23.0	0.22	20
Prospect St NB LT	A	0.1	0.00	0	A	0.2	0.01	0
Webster Avenue / Tremont Street / Columbia Street								
Columbia St WB LTR	E	47.2	0.77	148	C	17.0	0.48	64
Webster Ave NB LTR	A	0.8	0.02	2	A	0.7	0.02	1
Webster Ave SB LTR	A	1.8	0.06	5	A	0.4	0.01	1
Medford Street / South Street								
Medford St NB LT	A	7.9	0.28	28	A	2.7	0.10	9
Somerville Avenue / Allen Street								
Somerville Ave EB LTR	A	0.9	0.03	2	A	0.1	0.00	0
Somerville Ave WB LTR	A	1.7	0.03	3	A	0.3	0.01	1
Allen St NB LR	B	13.4	0.13	11	B	11.3	0.05	4
Parking Lot SB LR	B	11.6	0.02	2	B	12.4	0.01	1
Columbia Street / Windsor Place								
Columbia St EB LTR	A	0.0	0.00	0	A	0.0	0.00	0
Windsor Pl WB LTR	A	1.1	0.02	2	A	0.9	0.01	1
Columbia Pl NB LTR	B	10.5	0.03	2	B	10.7	0.14	12
D3 SB LTR	A	9.3	0.01	1	A	9.3	0.02	1
Everett Street / Emerson Street								
Everett St WB LT	A	3.6	0.00	0	A	0.0	0.00	0
Emerson St NB L	A	8.6	0.01	1	A	8.6	0.00	0
Webster Avenue / Everett Street								
Everett St WB LR	B	12.7	0.14	12	B	10.9	0.04	3
Beacon Street / Concord Avenue								
Driveway EB LTR	B	14.1	0.07	6	B	14.4	0.10	9
Concord Ave WB LTR	B	14.2	0.23	23	C	16.7	0.19	17
Hampshire St NB LTR	A	0.0	0.00	0	A	0.3	0.01	1
Beacon St SB LTR	A	0.2	0.01	0	A	0.6	0.02	1
Columbus Avenue/D5								
D5 WB LR	A	8.8	0.01	1	A	8.9	0.05	4
Columbus Ave SB LT	A	0.3	0.00	0	A	0.3	0.00	0
Somerville Avenue/D2								
Somerville Ave WB LT	A	0.1	0.00	0	A	0.0	0.00	0
D2 NB LR	B	10.1	0.04	3	B	10.1	0.05	4
Allen Street/D2								
D2 EB LT	A	7.4	0.03	3	A	3.0	0.00	0
Allen St SB LR	A	0.0	0.00	0	A	8.7	0.02	2
Webster Ave/D3								
D3 WB LR	C	17.6	0.26	26	C	19.7	0.58	94

Webster Ave SB LT	A	5.8	0.27	27	A	3.6	0.10	9

[1] Delay in seconds per vehicle

[2] v/c = volume to capacity ratio

[3] Queue Length in feet per lane

Table 70: Build 2 Weekday Peak Hour Intersection Level of Service (Signalized)

Signalized Intersections										
	AM Peak Hour					PM Peak Hour				
				Queue (ft) [3]					Queue (ft) [3]	
Streets	**LOS**	**Delay [1]**	**v/c [2]**	**50th**	**95th**	**LOS**	**Delay [1]**	**v/c [2]**	**50th**	**95th**
Bow Street / Summer Street/Wesley Park										
Summer St NB LTR	A	1.6	0.40	0	41	A	2.2	0.57	0	136
Wesley Park SW TR	C	29.3	0.02	0	0	C	29.3	0.02	0	0
OVERALL	**A**	**2.6**	**0.39**			**A**	**3.0**	**0.56**		
Somerville Avenue / Bow Street / Warren Avenue										
Somerville Ave EB LT	C	25.0	0.85	158	267	B	18.6	0.67	107	168
OVERALL	**C**	**25.0**	**0.36**			**B**	**18.6**	**0.29**		
Bow Street / Pedestrian Crossing										
Bow St NB T	A	0.4	0.29	0	0	A	0.7	0.44	0	0
OVERALL	**A**	**0.4**	**0.30**			**A**	**0.7**	**0.46**		
Washington Street / Somerville Avenue / Webster Avenue										
Washington St EB LTR	E	60.7	0.86	153	251	D	43.0	0.70	142	215
Somerville Ave WB L	F	168.5	1.19	120	147	D	42.7	0.42	61	61
Somerville Ave WB T	E	76.2	0.95	248	245	D	46.3	0.61	242	242
Somerville Ave WB R	F	237.0	1.38	340	356	F	190.2	1.30	511	536
Webster Ave NB LTR	E	63.1	0.85	206	247	E	74.7	0.96	321	526
Somerville Ave SB L	C	27.7	0.40	105	148	D	40.1	0.59	103	151
Somerville Ave SB TR	E	74.6	0.99	353	580	F	120.4	1.07	231	407
OVERALL	**F**	**93.3**	**1.11**			**F**	**91.1**	**1.16**		
Somerville Avenue / Linden Street										
Somerville Ave EB LTR	B	15.6	0.72	80	145	B	14.6	0.72	76	133
Somerville Ave WB LTR	B	10.5	0.40	36	70	B	10.0	0.49	46	90
Linden St NB LTR	A	6.5	0.06	3	21	A	6.5	0.03	1	7
OVERALL	**B**	**13.3**	**0.34**			**B**	**12.5**	**0.35**		
Somerville Avenue / Washington Street / Prospect Street										
Somerville Ave EB L	F	96.5	1.07	178	287	F	101.7	1.06	194	408
Somerville Ave EB TR	F	268.2	1.50	353	541	F	175.1	1.26	202	456
Somerville Ave WB L	D	41.3	0.19	37	68	D	45.8	0.30	57	106
Somerville Ave WB TR	D	50.9	0.58	125	177	F	102.5	1.00	226	427
Prospect St NB LTR	F	551.6	2.12	851	1009	F	493.0	2.00	981	1210
Prospect St SB T	E	60.1	0.94	414	692	D	35.1	0.67	281	433
Prospect St SB R	F	224.9	1.36	328	635	F	138.0	1.15	320	605
OVERALL	**F**	**257.0**	**1.62**			**F**	**242.0**	**1.65**		
Webster Avenue / Prospect Street / Concord Avenue										
Webster Ave NB LTR	F	5402.0	12.78	429	762	F	839.7	2.75	661	1223
Webster Ave SB L	C	29.7	0.55	37	103	D	46.0	0.75	41	126
Webster Ave SB TR	F	203.4	1.34	415	851	D	42.7	0.73	145	367
Prospect St NEB LTR	D	36.0	0.81	195	555	D	49.2	0.92	240	706
Prospect St SWB LTR	F	391.9	1.78	541	980	F	179.6	1.30	368	819
OVERALL	**F**	**1191.5**	**4.81**			**F**	**335.6**	**1.54**		
Washington Street WB / McGrath Highway SB										
Washington St EB TR	D	35.1	0.71	189	238	F	239.5	1.43	471	567
McGrath Highway SB LT	A	6.9	0.81	36	25	B	13.8	0.62	43	33
Washington St WB L	B	12.2	0.73	128	115	A	6.0	0.45	60	51
OVERALL	**C**	**21.0**	**0.82**			**F**	**158.6**	**0.87**		
Washington St WB T	A	7.8	0.42	82	73	A	5.8	0.37	80	63
Medford St SB TR	F	278.1	1.52	490	624	F	231.9	1.38	346	475
OVERALL	**F**	**190.2**	**0.67**			**F**	**137.9**	**0.50**		
Washington Street EB / McGrath Highway NB										
Washington St EB L	A	3.4	0.21	0	13	A	9.5	0.29	0	0
Washington St EB LT	A	0.4	0.33	0	0	A	0.8	0.52	0	0
McGrath Highway Ramp NB TR	C	22.8	0.16	26	52	C	26.0	0.46	111	163
OVERALL	**A**	**5.3**	**0.29**			**B**	**10.1**	**0.54**		
Washington St WB T	F	115.2	1.16	313	433	F	141.9	1.20	362	478
Washington St WB R	B	17.4	0.04	0	0	C	27.2	0.08	0	0
McGrath Highway Ramp NB T	A	5.6	0.44	27	42	B	10.0	0.60	102	175
OVERALL	**E**	**65.0**	**0.84**			**E**	**63.4**	**0.87**		
Somerville Avenue / Medford Street										
Somerville Ave EB LT	F	81.2	0.96	199	368	F	109.9	1.07	246	413
Somerville Ave EB R	B	16.0	0.10	8	39	B	13.9	0.05	0	23
Medford St NB L	D	35.1	0.14	24	50	C	34.0	0.20	34	72
Medford St NB R	D	36.3	0.26	32	59	E	66.9	0.92	127	236
Medford St SB L	B	18.0	0.12	14	51	B	18.3	0.09	6	40
Medford St SB TR	C	26.4	0.68	240	312	C	23.0	0.48	139	191
OVERALL	**D**	**36.3**	**0.65**			**D**	**52.5**	**0.74**		
Somerville Avenue / School Street										
Somerville Ave EB T	B	12.6	0.45	105	204	B	12.7	0.48	121	281
Somerville Ave WB T	B	12.5	0.44	97	170	B	13.0	0.49	128	297

School St SB L	C	22.8	0.51	52	94	C	31.1	0.70	54	80
School St SB R	C	21.4	0.24	0	58	C	30.0	0.00	0	82
OVERALL	**B**	**16.4**	**0.38**			**B**	**19.0**	**0.45**		
Cambridge Street / Prospect Street										
Cambridge St EB LTR	C	33.9	0.73	244	381	C	30.6	0.71	325	457
Cambridge St WB LTR	B	15.7	0.59	112	132	B	13.9	0.41	80	109
Prospect St NB LTR	C	30.2	0.64	222	338	C	32.8	0.73	336	461
Prospect St SB LTR	C	31.5	0.70	313	450	D	39.4	0.82	361	476
OVERALL	**C**	**27.9**	**0.72**							
Cambridge Street / Webster Avenue										
Cambridge St EB LTR	B	18.7	0.52	145	238	B	14.4	0.16	86	138
Cambridge St WB LTR	C	25.9	0.57	219	322	C	24.8	0.54	230	331
Columbia Ave NB LTR	C	24.2	0.45	171	236	C	30.5	0.68	301	401
Webster Ave SB LTR	C	31.8	0.68	249	279	D	38.3	0.78	262	259
OVERALL	**C**	**25.2**	**0.63**			**C**	**28.2**	**0.66**		
Inman Square										
Cambridge St EB LTR	F	231.3	1.34	828	1075	F	1628.3	4.44	1147	1399
Cambridge St WB TR	E	73.0	0.84	490	508	E	75.1	0.87	529	725
Hampshire St NB LTR	F	95.0	0.91	284	415	F	120.1	1.07	734	855
Hampshire St SB LTR	F	118.9	1.06	750	999	E	60.8	0.67	371	454
Springfield St SWB LTR	D	48.5	0.30	147	185	D	45.5	0.16	74	112
OVERALL	**F**	**130.4**	**0.90**			**F**	**526.9**	**1.88**		
Beacon Street / Washington Street										
Washington St EB L	C	24.5	0.20	21	43	C	25.1	0.28	30	58
Washington St EB TR	C	27.1	0.54	185	251	C	28.9	0.63	241	343
Washington St WB LTR	E	59.5	0.90	263	396	E	58.5	0.90	294	427
Beacon St NB LTR	B	17.3	0.37	126	202	C	26.8	0.69	234	416
Beacon St SB LTR	C	22.5	0.63	273	458	B	19.9	0.50	188	318
OVERALL	**C**	**31.3**	**0.73**			**C**	**33.3**	**0.78**		

[1] Delay in seconds per vehicle

[2] v/c = volume to capacity ratio

[3] Queue Length in feet per lane

Table 71: Build 2 Saturday Peak Hour Intersection Level of Service (Unsignalized)

Unsignalized Intersections				
		AM Peak Hour		
Streets	LOS	Delay [1]	v/c [2]	Queue
Somerville Avenue / Bow Street / Carlton Street				
Carlton St NB R	B	13.3	0.02	1
Bow St SB L	C	20.9	0.54	78
Somerville Avenue / Hawkins Street				
Hawkins St NB R	B	11.9	0.12	10
Washington Street / Hawkins Street				
Washington St EB LT	A	2.1	0.03	2
Hawkins St SB LR	A	0.0	0.00	0
Bow Street / Warren Avenue				
Warren Ave EB LT	F	235.5	1.36	406
Warren Ave WB R	C	17.0	0.35	38
Washington Street / Bonner Avenue				
Prospect St NB LT	A	0.7	0.03	2
Washington St EB LR	F	66.9	0.67	96
Parking Lot EB LT	A	0.0	0.00	0
Bonner Ave SB LR	A	8.8	0.06	5
Washington Street / Columbus Avenue				
Washington St EB LTR	A	1.8	0.07	5
Washington St WB LTR	A	0.7	0.02	2
D1 NB LTR	C	18.9	0.08	7
Columbus Ave SB LTR	F	773.3	2.36	341
Prospect Street / Everett Street				
Driveway 2 WB LTR	C	19.9	0.35	39
Prospect St SB LTR	A	3.5	0.13	11
Webster Avenue / Newton Street				
Newton St EB LTR	B	13.1	0.27	27
Webster Ave NB LTR	A	0.6	0.01	1
Webster Ave SB LTR	A	0.1	0.00	0
Prospect Street / Oak Street				
Oak St EB LR	C	15.9	0.07	5
Prospect St NB LT	A	0.1	0.00	0
Webster Avenue / Tremont Street / Columbia Street				
Columbia St WB LTR	B	13.0	0.25	25
Webster Ave NB LTR	A	0.4	0.01	1
Webster Ave SB LTR	A	0.5	0.01	1
Medford Street / South Street				
Medford St NB LT	A	1.8	0.07	5
Somerville Avenue / Allen Street				
Somerville Ave EB LTR	A	0.4	0.01	1
Somerville Ave WB LTR	A	0.3	0.01	1
Allen St NB LR	B	11.7	0.04	3
Parking Lot SB LR	B	10.7	0.08	7
Columbia Street / Windsor Place				
Columbia St EB LTR	A	0.0	0.00	0
Windsor Pl WB LTR	A	0.9	0.01	1
Columbia Pl NB LTR	A	9.6	0.02	2
D3 SB LTR	A	8.9	0.01	0
Everett Street / Emerson Street				
Everett St WB LT	A	0.0	0.00	0
Emerson St NB L	A	8.6	0.00	0
Webster Avenue / Everett Street				
Everett St WB LR	B	10.5	0.02	2
Beacon Street / Concord Avenue				
Driveway EB LTR	B	14.8	0.07	6
Concord Ave WB LTR	C	17.6	0.24	24
Hampshire St NB LTR	A	0.5	0.02	1
Beacon St SB LTR	A	0.5	0.01	1
Columbus Avenue/D5				
D5 WB LR	A	9.3	0.07	6
Columbus Ave SB LT	A	0.4	0.00	0
Somerville Avenue/D2				
Somerville Ave WB LT	A	0.1	0.00	0
D2 NB LR	B	10.5	0.05	4
Allen Street/D2				
D2 EB LT	A	3.6	0.00	0
Allen St SB LR	A	8.7	0.01	1
Webster Ave/D3				
D3 WB LR	B	11.0	0.10	8

Webster Ave SB LT	A	2.2	0.05	4

[1] Delay in seconds per vehicle

[2] v/c = volume to capacity ratio

[3] Queue Length in feet per lane

Table 72: Build 2 Saturday Peak Hour Intersection Level of Service (Signalized)

Signalized Intersections					
		AM Peak Hour			
				Queue (ft) [3]	
Streets	LOS	Delay [1]	v/c [2]	50th	95th
Bow Street / Summer Street/Wesley Park					
Summer St NB LTR	A	2.6	0.44	0	57
Wesley Park SW TR	C	29.3	0.01	0	0
OVERALL	**A**	**3.3**	**0.44**		
Somerville Avenue / Bow Street / Warren Avenue					
Somerville Ave EB LT	C	20.7	0.75	128	195
OVERALL	**C**	**20.7**	**0.32**		
Bow Street / Pedestrian Crossing					
Bow St NB T	A	0.4	0.30	0	0
OVERALL	**A**	**0.4**	**0.31**		
Washington Street / Somerville Avenue / Webster Avenue					
Washington St EB LTR	C	30.9	0.42	96	179
Somerville Ave WB L	D	38.3	0.39	70	78
Somerville Ave WB T	D	40.1	0.49	210	234
Somerville Ave WB R	F	111.4	1.11	407	590
Webster Ave NB LTR	D	45.6	0.70	195	276
Somerville Ave SB L	D	42.9	0.64	168	187
Somerville Ave SB TR	D	48.7	0.72	187	238
OVERALL	**E**	**57.0**	**0.91**		
Somerville Avenue / Linden Street					
Somerville Ave EB LTR	B	14.5	0.73	81	151
Somerville Ave WB LTR	B	10.6	0.55	56	90
Linden St NB LTR	A	6.7	0.04	2	8
OVERALL	**B**	**12.5**	**0.36**		
Somerville Avenue / Washington Street / Prospect Street					
Somerville Ave EB L	F	97.3	1.06	160	443
Somerville Ave EB TR	F	204.9	1.34	196	535
Somerville Ave WB L	D	41.9	0.23	49	83
Somerville Ave WB TR	E	70.2	0.86	211	317
Prospect St NB LTR	D	50.2	0.90	265	411
Prospect St SB T	C	30.9	0.56	208	328
Prospect St SB R	F	261.9	1.44	376	703
OVERALL	**F**	**116.8**	**1.07**		
Webster Avenue / Prospect Street / Concord Avenue					
Webster Ave NB LTR	F	595.6	2.19	274	604
Webster Ave SB L	C	27.4	0.25	19	67
Webster Ave SB TR	F	210.9	1.35	335	771
Prospect St NEB LTR	E	74.5	1.02	259	714
Prospect St SWB LTR	F	107.1	1.11	230	588
OVERALL	**F**	**208.7**	**1.32**		
Washington Street WB / McGrath Highway SB					
Washington St EB TR	D	35.7	0.74	203	253
McGrath Highway SB LT	A	8.5	0.55	32	30
Washington St WB L	B	13.7	0.52	156	244
OVERALL	**C**	**24.9**	**0.65**		
Washington St WB T	B	12.4	0.40	158	202
Medford St SB TR	F	102.1	1.10	273	331
OVERALL	**E**	**67.5**	**0.54**		
Washington Street EB / McGrath Highway NB					
Washington St EB L	A	5.1	0.23	0	16
Washington St EB LT	A	0.6	0.37	0	0
McGrath Highway Ramp NB TR	C	23.3	0.21	34	66
OVERALL	**A**	**7.0**	**0.35**		
Washington St WB T	C	22.7	0.54	177	227
Washington St WB R	B	18.7	0.16	0	19
McGrath Highway Ramp NB T	A	6.8	0.48	36	54
OVERALL	**B**	**15.4**	**0.54**		
Somerville Avenue / Medford Street					
Somerville Ave EB LT	F	109.5	1.07	248	422
Somerville Ave EB R	B	14.0	0.05	0	24
Medford St NB L	C	34.3	0.22	37	77
Medford St NB R	D	38.2	0.49	72	123
Medford St SB L	B	18.6	0.12	12	50
Medford St SB TR	C	22.6	0.46	131	180
OVERALL	**D**	**45.3**	**0.62**		
Somerville Avenue / School Street					
Somerville Ave EB T	B	14.8	0.60	153	297
Somerville Ave WB T	B	12.1	0.43	100	186

School St SB L	C	22.8	0.49	51	93
School St SB R	C	21.0	0.14	0	46
OVERALL	**B**	**16.0**	**0.47**		
Cambridge Street / Prospect Street					
Cambridge St EB LTR	C	25.0	0.52	176	246
Cambridge St WB LTR	B	13.1	0.51	74	98
Prospect St NB LTR	C	29.6	0.66	300	426
Prospect St SB LTR	C	26.3	0.55	235	321
OVERALL	**C**	**24.1**	**0.59**		
Cambridge Street / Webster Avenue					
Cambridge St EB LTR	B	17.3	0.41	132	183
Cambridge St WB LTR	C	25.6	0.56	229	333
Columbia Ave NB LTR	C	21.2	0.29	104	164
Webster Ave SB LTR	C	22.4	0.35	119	184
OVERALL	**C**	**21.9**	**0.46**		
Inman Square					
Cambridge St EB LTR	F	91.8	0.94	449	669
Cambridge St WB TR	E	63.5	0.73	427	563
Hampshire St NB LTR	E	80.0	0.87	389	577
Hampshire St SB LTR	E	65.6	0.76	448	591
Springfield St SWB LTR	D	44.9	0.12	57	102
OVERALL	**E**	**73.5**	**0.64**		
Beacon Street / Washington Street					
Washington St EB L	C	25.2	0.15	14	34
Washington St EB TR	C	27.3	0.52	164	244
Washington St WB LTR	E	58.1	0.90	250	370
Beacon St NB LTR	B	16.5	0.44	164	298
Beacon St SB LTR	B	18.8	0.55	214	389
OVERALL	**C**	**29.4**	**0.68**		

[1] Delay in seconds per vehicle

[2] v/c = volume to capacity ratio

[3] Queue Length in feet per lane

c. Base Year Built Condition with Mitigation

i. Recommended Mitigation

The Union Square Development is a long-term multi-site development that is a significant part of the long term transformation of the Union Square area and Somerville at large. Transportation, infrastructure, policy and technology changes are all happening simultaneously and will continue to evolve throughout the buildout of Union Square. The transportation analysis included herein lays out the policy and approach of the Union Square Development.

More expansively, following the City of Somerville's requirements, the transportation analysis sets a new baseline of detailed information covering the greater Union Square area. Recent changes, including the conversion of Prospect and Webster to two-way streets, associated signal and timing changes, and other roadway layout modification have been implemented in recent weeks by the City of Somerville. The TIS includes all new counts for AM & PM peaks and Saturdays, and provide an up to the moment, calibrated baseline for over 30 intersections which is a resource for the City in its review of this project and for ongoing management as needed.

In the short term, the roadway changes made by the City are an outgrowth of a broad-based, but intensive planning effort and are not intended to be modified. Meanwhile, the Union Square development will be constructed over many years as described in the CDSP. As individual parcels build out, the roadway network will evolve with new connections built, the Green Line extension will open, and the world around Union Square will change along with it. Subsequent phases of Union Square development may show opportunities to make some further modifications to roadway layout, traffic management, or traffic signal timing. These will have to be measured at the appropriate time and development stage against the overall transportation system in Union Square, and how the predictions and expectations built into this analysis evolve. The analysis included here is a comprehensive baseline which should continue to be updated at appropriate milestones to determine if further changes to the system should be evaluated.

In the meantime, this analysis has identified some modifications which may be worthwhile at later stages, and lists them for future consideration below:

- Traffic signal timing modifications at the key intersections in closest proximity to Union Square:
    - Somerville Ave/Webster Street/Washington Street
    - Somerville Ave/Prospect Street
    - Prospect Street/Webster Street
- Coordination of traffic signal timing along the Webster Avenue corridor (Somerville Avenue, Prospect Street and Cambridge Street intersections)

d. Future Year Built Condition with Mitigation

The future year built condition introduces impacts from Phase 3 of the development program, which adds parcels D4, D6, and D7. This is the final buildout phase for the development. The roadway network for analysis also includes changes proposed by the City of Somerville, as follows:

- Two-way conversion of Somerville Avenue between Union Square and Bow Street
- Two way conversion of Hawkins Street

i. Trip Generation

Proposed site-generated trips for the final buildout phase are displayed in the tables below. Please refer to the "Trip Distribution" chapter of this document for figures displaying the vehicle distribution across the analysis network.

Table 73: Final Buildout Motor Vehicle Trips, AM Peak

PARCEL	Vehicle Trips for Analysis	Vehicle Trips Entering	Vehicle Trips Exiting
D1	216	173	43
D2	225	130	96
D3	430	328	102
D4	32	19	12
D5	40	28	12
D6	141	122	20
D7	29	7	22
PHASE 1 TOTAL	265	158	108
PHASE 2 TOTAL	645	501	145
PHASE 3 TOTAL	203	148	54
COMBINED TOTAL	1,113	806	307

Table 74: Final Buildout Motor Vehicle Trips, PM Peak

PARCEL	Vehicle Trips for Analysis	Vehicle Trips Entering	Vehicle Trips Exiting
D1	237	68	169
D2	275	117	158
D3	450	127	323
D4	47	20	27
D5	70	28	42
D6	166	41	125
D7	45	27	18
PHASE 1 TOTAL	345	146	200
PHASE 2 TOTAL	687	194	493
PHASE 3 TOTAL	258	88	170
COMBINED TOTAL	1,291	428	862

Table 75: Final Buildout Motor Vehicle Trips, Saturday Peak

PARCEL	Vehicle Trips for Analysis	Vehicle Trips Entering	Vehicle Trips Exiting
D1	119	59	59
D2	164	82	82
D3	129	65	65
D4	36	18	18
D5	61	30	30
D6	61	30	30
D7	44	22	22
PHASE 1 TOTAL	225	113	113
PHASE 2 TOTAL	248	124	124
PHASE 3 TOTAL	141	71	71
COMBINED TOTAL	614	307	307

ii. Intersection Capacity Analysis

The tables on the following pages display intersection capacity results from the final buildout phase of the development for AM, PM, and Saturday peaks.

Table 76: Build 3 Weekday Peak Hour Intersection Level of Service (Unsignalized)

Unsignalized Intersections								
	AM Peak Hour				PM Peak Hour			
Streets	LOS	Delay [1]	v/c [2]	Queue	LOS	Delay [1]	v/c [2]	Queue
Somerville Avenue / Bow Street / Carlton Street								
Carlton St NB R	B	11.9	0.04	3	B	11.1	0.03	2
Bow St SB LTR	F	278.8	1.51	604	F	74.2	0.95	244
Somerville Avenue / Hawkins Street								
Hawkins St NB R	F	60.6	0.78	143	F	111.3	1.10	360
Washington Street / Hawkins Street								
Washington St EB LT	A	3.0	0.10	9	A	5.4	0.22	21
Hawkins St SB LR	C	15.4	0.02	2	A	0.0	0.00	0
Washington Street / Bonner Avenue								
Prospect St NB LT	A	0.3	0.01	1	A	0.8	0.03	2
Washington St EB LR	D	34.3	0.41	46	F	62.6	0.48	53
Parking Lot EB LT	A	0.0	0.00	0	A	0.5	0.00	0
Bonner Ave SB LR	A	9.1	0.06	5	A	9.1	0.04	3
Washington Street / Columbus Avenue								
Washington St EB LTR	A	1.0	0.03	3	A	1.5	0.04	3
Washington St WB LTR	A	4.1	0.12	11	A	2.4	0.06	5
D1 NB LTR	C	24.3	0.09	7	F	61.3	0.61	81
Columbus Ave SB LTR	F	ERR	3.12	ERR	F	ERR	23.88	ERR
Prospect Street / Everett Street								
Driveway 2 WB LTR	D	30.8	0.35	37	E	36.8	0.53	71
Prospect St NB LTR	A	0.8	0.03	2	A	0.3	0.01	1
Prospect St SB LTR	A	2.0	0.08	6	A	2.7	0.10	8
Webster Avenue / Newton Street								
Newton St EB LTR	C	18.1	0.42	50	C	24.9	0.56	84
Webster Ave NB LTR	A	0.5	0.01	1	A	0.2	0.01	0
Webster Ave SB LTR	A	1.0	0.03	3	A	0.4	0.01	1
Prospect Street / Oak Street								
Oak St EB LR	C	17.8	0.11	10	D	25.0	0.24	23
Prospect St NB LT	A	0.1	0.00	0	A	0.2	0.01	0
Webster Avenue / Tremont Street / Columbia Street								
Columbia St WB LTR	F	51.3	0.79	158	C	18.5	0.51	71
Webster Ave NB LTR	A	0.7	0.02	2	A	0.6	0.02	1
Webster Ave SB LTR	A	1.8	0.06	5	A	0.4	0.01	1
Medford Street / South Street								
Medford St NB LT	A	8.0	0.28	29	A	2.8	0.11	9
Somerville Avenue / Allen Street								
Somerville Ave EB LTR	A	0.9	0.03	2	A	0.1	0.00	0
Somerville Ave WB LTR	A	1.7	0.03	3	A	0.3	0.01	1
Allen St NB LR	B	13.9	0.14	12	B	11.4	0.05	4
Parking Lot SB LR	B	10.9	0.06	5	B	12.6	0.01	1
Columbia Street / Windsor Place								
Columbia St EB LTR	A	0.0	0.00	0	A	0.0	0.00	0
Windsor Pl WB LTR	A	1.1	0.02	2	A	0.9	0.01	1
Columbia Pl NB LTR	B	10.5	0.03	2	B	10.7	0.14	12
D3 SB LTR	A	9.3	0.01	1	A	9.3	0.02	1
Everett Street / Emerson Street								
Everett St WB LTR	A	0.0	0.00	0	A	0.0	0.02	0
Emerson St NB LT	A	9.9	0.08	6	A	9.6	0.02	2
D5 SB R	A	8.7	0.01	0	A	8.9	0.13	11
Webster Avenue / Everett Street								
Everett St WB LR	B	12.6	0.21	19	C	16.2	0.45	58
Beacon Street / Concord Avenue								
Driveway EB LTR	B	14.2	0.08	6	B	14.5	0.10	9
Concord Ave WB LTR	B	14.4	0.25	24	C	16.7	0.20	18
Hampshire St NB LTR	A	0.0	0.00	0	A	0.3	0.01	1
Beacon St SB LTR	A	0.2	0.01	0	A	0.6	0.02	1
Columbus Avenue/D5								
D5 WB LR	A	8.8	0.01	1	A	8.9	0.05	4
Columbus Ave SB LT	A	0.3	0.00	0	A	0.3	0.00	0
Somerville Avenue/D2								
Somerville Ave WB LT	A	0.1	0.00	0	A	0.0	0.00	0
D2 NB LR	B	10.1	0.04	3	B	10.2	0.05	4
Allen Street/D2								
D2 EB LT	A	0.0	0.00	0	A	3.0	0.00	0
Allen St SB LR	A	8.8	0.05	4	A	8.7	0.02	2
Webster Ave/D3								
D3 WB LR	C	15.8	0.23	22	C	20.2	0.59	97
Webster Ave SB LT	A	5.8	0.27	28	A	3.6	0.10	9

Concord Ave/D4								
D4 SB LR	A	8.8	0.01	1	A	8.8	0.03	2
Warren Ave/D7								
Warren Ave EB LTR	A	0.3	0.00	0	A	0.5	0.01	0
Warren Ave WB LTR	A	0.0	0.00	0	A	0.0	0.00	0
D7 NB LTR	A	9.3	0.02	1	B	10.1	0.02	1
D7 SB LTR	A	8.6	0.01	1	A	8.7	0.01	1

[1] Delay in seconds per vehicle

[2] v/c = volume to capacity ratio

[3] Queue Length in feet per lane

Table 77: Build 2 Weekday Peak Hour Intersection Level of Service (Signalized)

Signalized Intersections										
	AM Peak Hour					PM Peak Hour				
				Queue (ft) [3]					Queue (ft) [3]	
Streets	LOS	Delay [1]	v/c [2]	50th	95th	LOS	Delay [1]	v/c [2]	50th	95th
Bow Street / Summer Street/Wesley Park										
Summer St NB LTR	A	1.2	0.18	0	25	A	1.4	0.33	0	64
Wesley Park SW TR	C	29.3	0.02	0	0	C	29.3	0.02	0	0
OVERALL	**A**	**3.5**	**0.17**			**A**	**2.8**	**0.33**		
Somerville Avenue / Bow Street / Warren Avenue										
Somerville Ave EB L	A	4.1	0.28	19	32	C	31.4	0.80	82	152
Somerville Ave EB T	B	11.0	0.75	283	448	A	5.1	0.49	91	119
Somerville Ave WB TR	A	7.6	0.46	130	196	A	7.8	0.83	6	21
Warren Ave SB LR	D	46.5	0.15	21	58	D	45.3	0.13	18	54
OVERALL	**B**	**10.3**	**0.68**			**B**	**11.9**	**0.71**		
Washington Street / Somerville Avenue / Webster Avenue										
Washington St EB TR	D	40.2	0.49	115	167	C	32.1	0.32	88	135
Somerville Ave WB T	E	68.5	0.95	250	237	D	46.7	0.61	243	233
Somerville Ave WB R	F	295.8	1.51	365	356	F	254.4	1.44	558	554
Webster Ave NB LTR	E	74.8	0.91	225	283	F	194.2	1.30	547	770
Somerville Ave SB L	C	27.8	0.41	108	152	D	54.5	0.61	123	171
Somerville Ave SB TR	F	92.2	1.05	420	635	F	150.2	1.30	249	429
OVERALL	**F**	**99.6**	**1.20**			**F**	**142.8**	**1.35**		
Somerville Avenue / Linden Street										
Somerville Ave EB LTR	B	15.6	0.72	81	146	B	14.5	0.72	78	136
Somerville Ave WB LTR	B	10.5	0.40	36	70	A	9.9	0.48	46	90
Linden St NB LTR	A	6.5	0.06	3	22	A	6.7	0.03	1	7
OVERALL	**B**	**13.3**	**0.35**			**B**	**12.4**	**0.35**		
Somerville Avenue / Washington Street / Prospect Street										
Somerville Ave EB L	F	123.7	1.14	193	423	F	223.5	1.37	338	526
Somerville Ave EB TR	F	280.0	1.51	362	544	F	194.9	1.29	221	438
Somerville Ave WB L	D	41.3	0.19	37	68	D	45.8	0.30	57	106
Somerville Ave WB TR	D	50.9	0.58	125	177	F	103.4	1.00	227	429
Prospect St NB LTR	F	627.2	3.38	872	1028	F	629.3	2.46	1030	1255
Prospect St SB T	F	170.6	1.27	730	1020	D	44.6	0.84	390	643
Prospect St SB R	F	228.8	1.37	331	640	F	147.4	1.17	329	622
OVERALL	**F**	**296.4**	**1.71**			**F**	**295.8**	**1.85**		
Webster Avenue / Prospect Street / Concord Avenue										
Webster Ave NB LTR	F	1282.0	3.71	415	695	F	703.3	2.45	650	1220
Webster Ave SB L	C	30.5	0.57	37	104	D	50.3	0.79	42	136
Webster Ave SB TR	F	137.9	1.18	318	708	D	40.0	0.67	118	301
Prospect St NEB LTR	D	37.4	0.82	200	568	E	58.5	0.97	256	745
Prospect St SWB LTR	F	630.5	2.32	502	996	F	370.7	1.73	519	1016
OVERALL	**F**	**497.1**	**2.46**			**F**	**348.0**	**1.69**		
Washington Street WB / McGrath Highway SB										
Washington St EB TR	D	35.6	0.73	195	245	F	284.1	1.53	523	621
McGrath Highway SB LT	A	7.5	0.81	40	26	B	13.9	0.62	44	34
Washington St WB L	B	13.3	0.73	133	122	A	6.4	0.45	62	55
OVERALL	**C**	**21.8**	**0.82**			**F**	**191.8**	**0.91**		
Washington St WB T	A	8.4	0.44	91	82	A	6.3	0.38	87	68
Medford St SB TR	F	300.8	1.57	513	647	F	240.8	1.40	353	483
OVERALL	**F**	**204.9**	**0.70**			**F**	**142.5**	**0.51**		
Washington Street EB / McGrath Highway NB										
Washington St EB L	A	3.6	0.21	0	8	B	11.3	0.34	0	0
Washington St EB LT	A	0.4	0.34	0	0	A	1.4	0.56	0	0
McGrath Highway Ramp NB TR	C	22.8	0.17	27	54	C	26.2	0.47	114	166
OVERALL	**A**	**5.4**	**0.30**			**B**	**10.6**	**0.56**		
Washington St WB T	F	115.2	1.16	313	433	F	141.9	1.20	362	478
Washington St WB R	B	17.4	0.04	0	0	C	27.2	0.08	0	0
McGrath Highway Ramp NB T	A	5.7	0.46	28	43	B	11.2	0.64	104	204
OVERALL	**E**	**64.4**	**0.85**			**E**	**62.4**	**0.89**		
Somerville Avenue / Medford Street										
Somerville Ave EB LT	F	82.6	0.96	201	370	F	118.9	1.10	258	427
Somerville Ave EB R	B	16.0	0.10	9	41	B	14.0	0.05	0	23
Medford St NB L	D	35.1	0.14	24	50	C	34.0	0.20	35	72
Medford St NB R	D	36.3	0.26	32	59	E	66.9	0.92	127	236
Medford St SB L	B	18.0	0.12	14	51	B	18.3	0.09	6	40
Medford St SB TR	C	26.4	0.68	240	312	C	23.0	0.48	139	191
OVERALL	**D**	**36.6**	**0.65**			**D**	**54.6**	**0.75**		
Somerville Avenue / School Street										
Somerville Ave EB T	B	13.0	0.48	111	240	B	12.9	0.48	123	289
Somerville Ave WB T	B	12.8	0.45	100	176	B	14.5	0.51	148	306
School St SB L	C	22.9	0.52	55	97	C	31.6	0.71	55	81

School St SB R	C	21.2	0.24	0	57	C	30.0	0.00	0	82
OVERALL	**B**	**16.5**	**0.40**			**B**	**19.5**	**0.47**		
Cambridge Street / Prospect Street										
Cambridge St EB LTR	C	30.7	0.68	225	346	C	32.0	0.74	339	477
Cambridge St WB LTR	B	15.6	0.58	112	132	B	13.8	0.41	81	108
Prospect St NB LTR	C	30.8	0.66	231	350	C	33.8	0.75	347	477
Prospect St SB LTR	C	32.5	0.72	324	466	D	50.5	0.92	408	582
OVERALL	**C**	**27.6**	**0.70**			**D**	**35.4**	**0.83**		
Cambridge Street / Webster Avenue										
Cambridge St EB LTR	B	17.9	0.52	146	224	B	14.8	0.34	88	142
Cambridge St WB LTR	C	26.2	0.58	223	328	C	25.1	0.55	235	337
Columbia Ave NB LTR	C	24.3	0.46	175	240	C	30.9	0.69	307	409
Webster Ave SB LTR	C	33.3	0.71	260	290	D	43.3	0.83	283	278
OVERALL	**C**	**25.5**	**0.64**			**C**	**29.8**	**0.69**		
Inman Square										
Cambridge St EB LTR	F	242.5	1.37	857	1106	F	1658.5	4.51	1169	1422
Cambridge St WB TR	E	73.0	0.84	490	508	E	75.1	0.87	529	725
Hampshire St NB LTR	F	95.0	0.91	284	415	F	120.1	1.07	734	855
Hampshire St SB LTR	F	118.9	1.06	750	999	E	60.8	0.67	371	454
Springfield St SWB LTR	D	48.5	0.30	147	185	D	45.5	0.16	74	112
OVERALL	**F**	**134.2**	**0.91**			**F**	**540.3**	**1.90**		
Beacon Street / Washington Street										
Washington St EB L	C	24.5	0.20	21	43	C	25.0	0.28	30	58
Washington St EB TR	C	27.1	0.55	189	255	C	28.7	0.62	243	346
Washington St WB LTR	E	59.5	0.90	267	408	E	58.5	0.91	304	463
Beacon St NB LTR	B	17.6	0.38	129	204	C	27.5	0.70	240	416
Beacon St SB LTR	C	22.9	0.63	278	462	C	20.5	0.51	194	320
OVERALL	**C**	**31.5**	**0.73**			**C**	**33.7**	**0.79**		

[1] Delay in seconds per vehicle

[2] v/c = volume to capacity ratio

[3] Queue Length in feet per lane

Table 78: Build 3 Saturday Peak Hour Intersection Level of Service (Unsignalized)

Unsignalized Intersections				
		Saturday Peak Hour		
Streets	LOS	Delay [1]	v/c [2]	Queue
Somerville Avenue / Bow Street / Carlton Street				
Carlton St NB R	B	12.5	0.02	1
Bow St SB LTR	F	219.0	1.33	399
Somerville Avenue / Hawkins Street				
Hawkins St NB R	C	22.5	0.42	50
Washington Street / Hawkins Street				
Washington St EB LT	A	4.5	0.09	7
Hawkins St SB LR	A	0.0	0.00	0
Washington Street / Bonner Avenue				
Prospect St NB LT	A	0.9	0.03	2
Washington St EB LR	F	199.3	1.11	180
Parking Lot EB LT	A	0.0	0.00	0
Bonner Ave SB LR	A	8.8	0.06	5
Washington Street / Columbus Avenue				
Washington St EB LTR	A	3.2	0.11	9
Washington St WB LTR	A	2.3	0.07	6
D1 NB LTR	C	22.5	0.18	16
Columbus Ave SB LTR	F	ERR	7.14	ERR
Prospect Street / Everett Street				
Driveway 2 WB LTR	E	38.4	0.66	110
Prospect St NB LTR	A	0.1	0.00	0
Prospect St SB LTR	A	5.0	0.21	19
Webster Avenue / Newton Street				
Newton St EB LTR	C	15.1	0.36	40
Webster Ave NB LTR	A	0.6	0.01	1
Webster Ave SB LTR	A	0.3	0.01	1
Prospect Street / Oak Street				
Oak St EB LR	C	18.3	0.08	6
Prospect St NB LT	A	0.1	0.00	0
Webster Avenue / Tremont Street / Columbia Street				
Columbia St WB LTR	B	13.9	0.29	30
Webster Ave NB LTR	A	0.4	0.01	1
Webster Ave SB LTR	A	0.4	0.01	1
Medford Street / South Street				
Medford St NB LT	A	1.9	0.07	6
Somerville Avenue / Allen Street				
Somerville Ave EB LTR	A	0.7	0.02	2
Somerville Ave WB LTR	A	0.3	0.01	1
Allen St NB LR	B	12.5	0.06	5
Parking Lot SB LR	B	11.6	0.16	15
Columbia Street / Windsor Place				
Columbia St EB LTR	A	0.0	0.00	0
Windsor Pl WB LTR	A	0.8	0.01	1
Columbia Pl NB LTR	A	9.7	0.03	2
D3 SB LTR	A	8.9	0.01	1
Everett Street / Emerson Street				
Everett St WB LTR	A	0.0	0.02	0
Emerson St NB LT	A	9.2	0.02	1
D5 SB R	A	8.5	0.03	2
Webster Avenue / Everett Street				
Everett St WB LR	B	11.5	0.09	8
Beacon Street / Concord Avenue				
Driveway EB LTR	C	15.0	0.07	6
Concord Ave WB LTR	C	17.7	0.25	25
Hampshire St NB LTR	A	0.5	0.02	1
Beacon St SB LTR	A	0.6	0.02	1
Columbus Avenue/D5				
D5 WB LR	A	9.6	0.11	9
Columbus Ave SB LT	A	0.5	0.00	0
Somerville Avenue/D2				
Somerville Ave WB LT	A	0.1	0.00	0
D2 NB LR	B	11.0	0.08	6
Allen Street/D2				
D2 EB LT	A	3.6	0.01	0
Allen St SB LR	A	8.8	0.01	1
Webster Ave/D3				
D3 WB LR	B	12.4	0.21	20
Webster Ave SB LT	A	3.5	0.10	9

Concord Ave/D4				
D4 SB LR	A	8.9	0.02	2
Warren Ave/D7				
Warren Ave EB LTR	A	0.6	0.01	0
Warren Ave WB LTR	A	0.0	0.00	0
D7 NB LTR	B	10.1	0.02	2
D7 SB LTR	A	8.9	0.01	1

[1] Delay in seconds per vehicle

[2] v/c = volume to capacity ratio

[3] Queue Length in feet per lane

Table 79: Build 3 Saturday Peak Hour Intersection Level of Service (Signalized)

Signalized Intersections					
		AM Peak Hour			
				Queue (ft) [3]	
Streets	LOS	Delay [1]	v/c [2]	50th	95th
Bow Street / Summer Street/Wesley Park					
Summer St NB LTR	A	1.6	0.19	0	35
Wesley Park SW TR	C	29.3	0.01	0	0
OVERALL	**A**	**2.9**	**0.22**		
Somerville Avenue / Bow Street / Warren Avenue					
Somerville Ave EB L	B	19.3	0.75	53	151
Somerville Ave EB T	A	7.3	0.60	175	261
Somerville Ave WB TR	B	18.6	0.73	339	619
Warren Ave SB LR	D	46.7	0.16	22	62
OVERALL	**B**	**15.2**	**0.68**		
Washington Street / Somerville Avenue / Webster Avenue					
Washington St EB TR	D	35.5	0.36	92	151
Somerville Ave WB T	D	48.8	0.64	229	210
Somerville Ave WB R	F	331.2	1.61	571	560
Webster Ave NB LTR	D	38.4	0.66	222	333
Somerville Ave SB L	D	43.9	0.70	190	208
Somerville Ave SB TR	D	49.9	0.75	201	252
OVERALL	**F**	**112.1**	**1.05**		
Somerville Avenue / Linden Street					
Somerville Ave EB LTR	B	15.3	0.75	92	167
Somerville Ave WB LTR	B	10.2	0.53	56	90
Linden St NB LTR	A	7.3	0.05	2	9
OVERALL	**B**	**12.9**	**0.39**		
Somerville Avenue / Washington Street / Prospect Street					
Somerville Ave EB L	F	168.0	1.25	195	535
Somerville Ave EB TR	F	267.5	1.48	346	601
Somerville Ave WB L	D	43.5	0.31	66	105
Somerville Ave WB TR	F	100.8	1.00	232	365
Prospect St NB LTR	F	131.5	1.18	384	534
Prospect St SB T	D	35.8	0.71	295	455
Prospect St SB R	F	303.1	1.54	427	739
OVERALL	**F**	**162.8**	**1.28**		
Webster Avenue / Prospect Street / Concord Avenue					
Webster Ave NB LTR	F	1987.2	5.26	365	740
Webster Ave SB L	C	28.2	0.32	21	73
Webster Ave SB TR	F	258.0	1.46	387	851
Prospect St NEB LTR	F	113.8	1.14	314	817
Prospect St SWB LTR	F	301.1	1.57	434	826
OVERALL	**F**	**543.8**	**2.52**		
Washington Street WB / McGrath Highway SB					
Washington St EB TR	D	38.7	0.82	233	288
McGrath Highway SB LT	A	10.0	0.55	38	34
Washington St WB L	B	15.0	0.52	156	243
OVERALL	**C**	**27.8**	**0.68**		
Washington St WB T	B	13.8	0.44	177	221
Medford St SB TR	F	142.9	1.20	318	372
OVERALL	**F**	**93.4**	**0.59**		
Washington Street EB / McGrath Highway NB					
Washington St EB L	A	6.9	0.25	0	2
Washington St EB LT	A	0.6	0.41	0	0
McGrath Highway Ramp NB TR	C	23.6	0.24	40	74
OVERALL	**A**	**7.6**	**0.38**		
Washington St WB T	C	22.7	0.54	177	227
Washington St WB R	B	18.7	0.16	0	19
McGrath Highway Ramp NB T	A	8.0	0.55	42	76
OVERALL	**B**	**15.5**	**0.57**		
Somerville Avenue / Medford Street					
Somerville Ave EB LT	F	144.4	1.17	291	472
Somerville Ave EB R	B	14.0	0.06	0	26
Medford St NB L	C	34.5	0.23	40	80
Medford St NB R	D	38.2	0.49	72	123
Medford St SB L	B	18.6	0.12	12	50
Medford St SB TR	C	22.6	0.46	131	180
OVERALL	**D**	**54.7**	**0.65**		
Somerville Avenue / School Street					
Somerville Ave EB T	B	16.0	0.64	170	333

Somerville Ave WB T	B	12.7	0.46	109	203
School St SB L	C	22.8	0.52	55	98
School St SB R	C	20.8	0.14	0	45
OVERALL	**B**	**16.6**	**0.50**		
Cambridge Street / Prospect Street					
Cambridge St EB LTR	C	27.8	0.61	202	282
Cambridge St WB LTR	B	13.1	0.52	75	98
Prospect St NB LTR	C	30.9	0.70	323	459
Prospect St SB LTR	C	28.5	0.63	282	381
OVERALL	**C**	**25.9**	**0.65**		
Cambridge Street / Webster Avenue					
Cambridge St EB LTR	B	17.0	0.41	132	185
Cambridge St WB LTR	C	25.9	0.57	235	341
Columbia Ave NB LTR	C	21.5	0.31	112	174
Webster Ave SB LTR	C	24.2	0.44	150	229
OVERALL	**C**	**22.4**	**0.51**		
Inman Square					
Cambridge St EB LTR	F	134.5	1.09	546	776
Cambridge St WB TR	E	67.0	0.78	469	614
Hampshire St NB LTR	E	80.0	0.87	389	577
Hampshire St SB LTR	E	65.6	0.76	448	591
Springfield St SWB LTR	D	44.9	0.12	57	102
OVERALL	**F**	**84.9**	**0.69**		
Beacon Street / Washington Street					
Washington St EB L	C	25.0	0.15	14	34
Washington St EB TR	C	27.0	0.52	168	249
Washington St WB LTR	E	58.7	0.90	268	394
Beacon St NB LTR	B	17.3	0.45	173	302
Beacon St SB LTR	C	20.3	0.59	233	406
OVERALL	**C**	**30.4**	**0.71**		

[1] Delay in seconds per vehicle

[2] v/c = volume to capacity ratio

[3] Queue Length in feet per lane

iii. Recommended Mitigation

Given the changes to the future roadway network and the mitigation proposed in the Base Year Built Condition, no further mitigation is proposed for the future year scenario at this time. The mitigation recommended in the base year scenario should be applied and monitored during the introduction of the Phase 3 developments. At that time, further mitigation can be studied and proposed as necessary.

MOBILITY MANAGEMENT PLAN

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Union Square CDSP Application

Mobility Management Plan

November 2017

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MOBILITY MANAGEMENT PLAN

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PROJECT INFORMATION

Project Description

The proposed project will evolve Union Square into the transit-oriented, 18-hour, mixed-use urban employment center envisioned in SomerVision and the Union Square Neighborhood Plan. At completion, the project will include an estimated 2.4 million square feet of new spaces in which to live, work, play and raise a family. Approximately 1.47 million square feet will be commercial spaces (61%) that will generate approximately 5,300 permanent jobs. The project includes 933,000 SF of residential uses (39%) or approximately 900 to 1,000 new homes which will include 180 to 200 permanently affordable homes.

In addition to this office and residential space, over 3.5 acres of new open space and 108,000 SF of new civic spaces will be created as part of the development. These spaces will include a 27,000 square foot neighborhood park, a significant plaza that connects the new Green Line station to the neighborhood and a collection of other diverse and interesting civic spaces types that can serve a wide range of community needs.

Significant transit, infrastructure and public realm improvements have been completed or are underway. Collectively these provide the foundation to make Union Square one of the most desirable places in the Greater Boston region to live and work. The new Green Line Extension, with stations at Union Square and Washington Street, will provide transit connectivity to the Boston metro area, including other employment centers and areas of interest (e.g., Government Center, Copley Place, Fenway and Longwood Medical District). Updated utility infrastructure will improve service, mitigate flooding and create the foundation for new uses. The public realm in Union Square will be significantly enhanced. Streets, roads, parks, and infrastructure will prioritize the pedestrian and cyclist over the vehicle and will endeavor to implement the exciting streetscape vision included in the Union Square Neighborhood Plan.

Build Out / Program Estimates

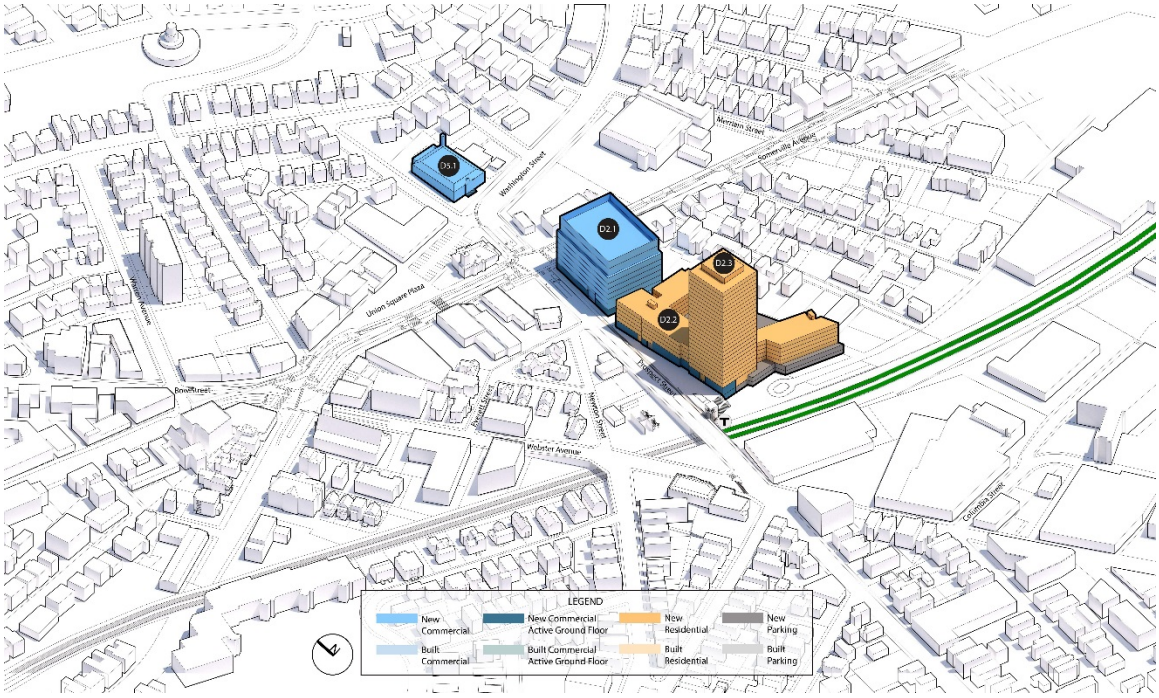
			COMMERCIAL USE DISTRIBUTION												RESIDENTIAL USE DISTRIBUTION					
PARCEL / BLOCK	TOTAL AREA	Phase	OFFICE / LAB		RETAIL		HOTEL AREA		HOTEL ROOMS		ARTS & CREATIVE		COMMERCIAL TOTAL		RESIDENTIAL TOTAL		UNITS		AFFORDABLE UNITS	
	SF		SF	% Total	SF	% Total	SF	% Total	Rooms	% Total	SF	% Total	SF	% Total	SF	% Total	Min	Max	Min	Max
D1	354,000		231,000	20%	22,000	16%	93,000	100%	175	100%	6,000	8%	354,000	24%	-	-	-	-	-	-
D1.1	105,000	2	-	-	11,000	8%	93,000	100%	175	100%	-	-	105,000	7%	-	-	-	-	-	-
D1.2	249,000	3	231,000	20%	11,000	8%	-	-	-	-	6,000	8%	249,000	17%	-	-	-		-	-
D2	619,000		166,000	14%	29,000	21%	-	-	-	-	25,000	34%	220,000	15%	399,000	43%	389	456	78	91
D2.1	178,000	1	166,000	14%	12,000	9%	-	-	-	-	-	-	178,000	12%	-	-	-		-	-
D2.2-3	429,000	1	-	0%	17,000	12%	-	-	-	-	13,000	18%	30,000	2%	399,000	43%	389	456	78	91
D2.4	12,000	1	-	0%	-	0%	-	-	-	-	12,000	16%	12,000	1%	-	-	-		-	-
D3	888,000		522,000	45%	18,000	13%	-	-	-	-	15,000	20%	555,000	38%	333,000	36%	325	381	65	76
D3.1	280,000	2	271,000	23%	9,000	6%	-	-	-	-	-	-	280,000	19%	-	-	-		-	-
D3.2	351,000	3	-	-	9,000	6%	-	-	-	-	9,000	12%	18,000	1%	333,000	36%	325	381	65	76
D3.3	257,000	3	251,000	22%	-	0%	-	-	-	-	6,000	0	257,000	18%	-	-	-		-	-
D4	90,000		25,000	2%	12,000	9%	-	-	-	-	-	-	36,000	2%	54,000	6%	53	62	11	12
D4.1	29,000	3	25,000	2%	5,000	4%	-	-	-	-	-	-	29,000	2%	-	-	-		-	-
D4.2	-	3	-	0%	-	0%	-	-	-	-	-	-	-	-	-	-	-		-	-
D4.3	61,000	3	-	0%	7,000	5%	-	-	-	-	-	-	7,000	0%	54,000	6%	53	62	11	12
D5	95,000		21,000	2%	24,000	17%	-	-	-	-	20,000	27%	65,000	4%	30,000	3%	29	34	6	7
D5.1	37,000	1	-	0%	17,000	12%	-	-	-	-	20,000	27%	37,000	3%	-	0%	-		-	-
D5.2	25,000	3	21,000	2%	4,000	3%	-	-	-	-	-	-	25,000	2%	-	0%	-		-	-
D5.3	33,000	3	-	0%	3,000	2%	-	-	-	-	-	-	3,000	0%	30,000	3%	29	34	6	7
D6	225,000		193,000	17%	26,000	19%	-	-	-	-	8,000	11%	225,000	15%	-	-	-	-	-	-
D6.1	111,000	3	96,000	8%	12,000	9%	-	-	-	-	4,000	5%	111,000	8%	-	-	-		-	-
D6.2	114,000	3	97,000	8%	14,000	10%	-	-	-	-	4,000	5%	114,000	8%	-	-	-		-	-
D7	126,000		-	0%	9,000	6%	-	-	-	-	-	-	9,000	1%	117,000	13%	114	134	23	27
D7.1	45,000	3	-	0%	5,000	4%	-	-	-	-	-	-	5,000	0%	40,000	4%	39	46	8	9
D7.2	81,000	3	-	0%	4,000	3%	-	-	-	-	-	-	4,000	0%	77,000	8%	75	88	15	18
Totals	**2,397,000**		**1,158,000**		**140,000**		**93,000**		**175**		**74,000**		**1,464,000**		**933,000**		**910**	**1,067**	**183**	**213**
as % of Total			48%		6%		4%				3%		61%		39%					
as % of Commercial			79%		10%		6%				5%									

Anticipated Phasing

It is anticipated that the phasing for the project will evolve as the development is implemented and as market conditions and user needs evolve. In any respect, project phasing will meet the minimum requirements of the Master Land Disposition Agreement (MLDA) as it relates to overall development completion as well as construction start and completion requirements for individual project buildings. In summary of Exhibit C of the executed MLDA, 50% of the total project will be delivered within 10 years of the opening of the Green Line. Subsequently, 75% will be delivered within five years after that, with the totality of the project being delivered within an additional five years.

While the project delivery is subject to the MLDA requirements, careful consideration will be given throughout the project execution to the changing nature of user needs, and the viability of specific projects as informed by the broader market. Acknowledging the difficulty in predicting these variables, US2's strategy for delivering the requisite program elements is outlined through three project phases that are directed at infilling sites with opportunities that both support and protect the existing neighborhood.

Phase 1 (D5.1, D2)

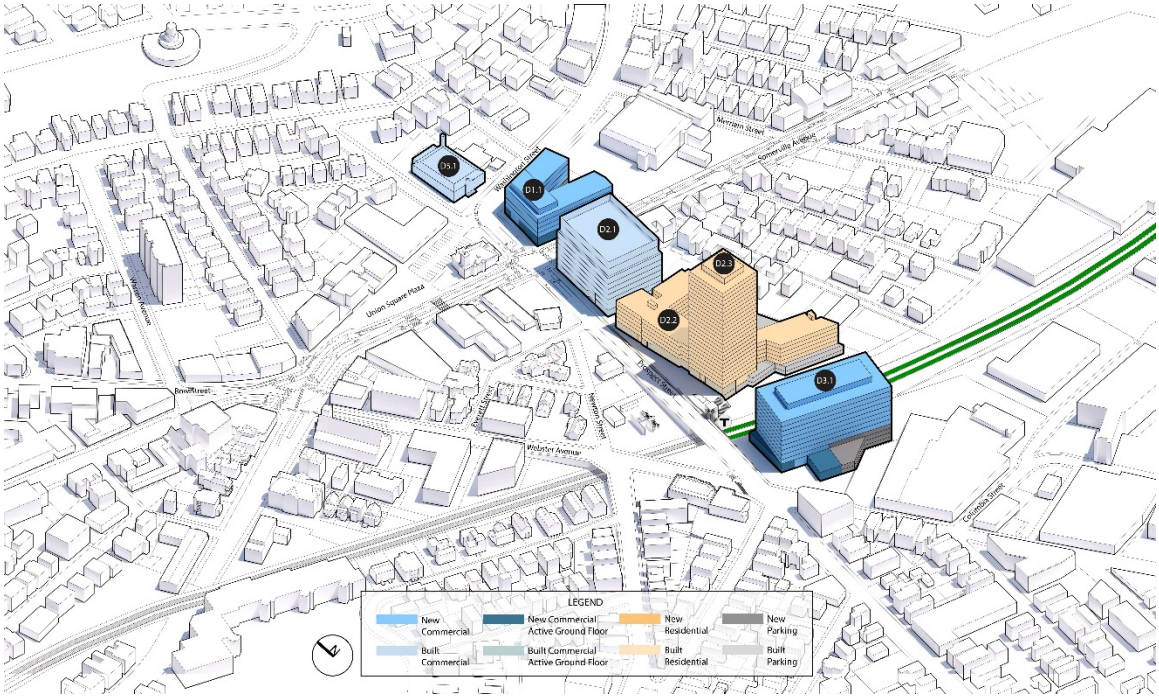


Project phase 1 will mark the beginning of the transformation of Union Square into an urban employment center. This phase understands the current and future heart of the neighborhood, Union Square Plaza, as foundational – and works to bridge access to it from the new community node that will be the Green Line Station. To that end, Phase 1 anticipates the construction of the D5.1 Block, the former Post Office, and the D2 Block simultaneously as the spaces aim to be in operation on or before the arrival of the Green Line extension. The D2 Block is anticipated to start construction in 2018 and be completed in late-2020. The D5.1 Block will be redeveloped into a mixed use commercial building that includes arts and creative uses as well as retail uses. The D2

Block will be comprised of multiple structures. Anchoring the corner of Prospect Street and Somerville Avenue, Union Square's first significant commercial building will rise on D2.1. The balance of the site will support a residential building across parcels D2.2 and D2.3, and provide access to and from the MBTA platform. As the street wall is built out along the length of the D2 Block, active ground floor uses in combination with generous civic spaces will begin to establish a strong connection between the two landmark community nodes that are Union Square Plaza and its Transit Station.

	ADDED		TOTAL	
Program	SF	%	SF	%
Commercial SF	245,000	38%	245,000	38%
Residential SF	399,000	62%	399,000	62%
CUMULATIVE TOTAL SF	**644,000**		**644,000**	
Employees	**634**		**634**	
Dwelling Units	**450**		**450**	

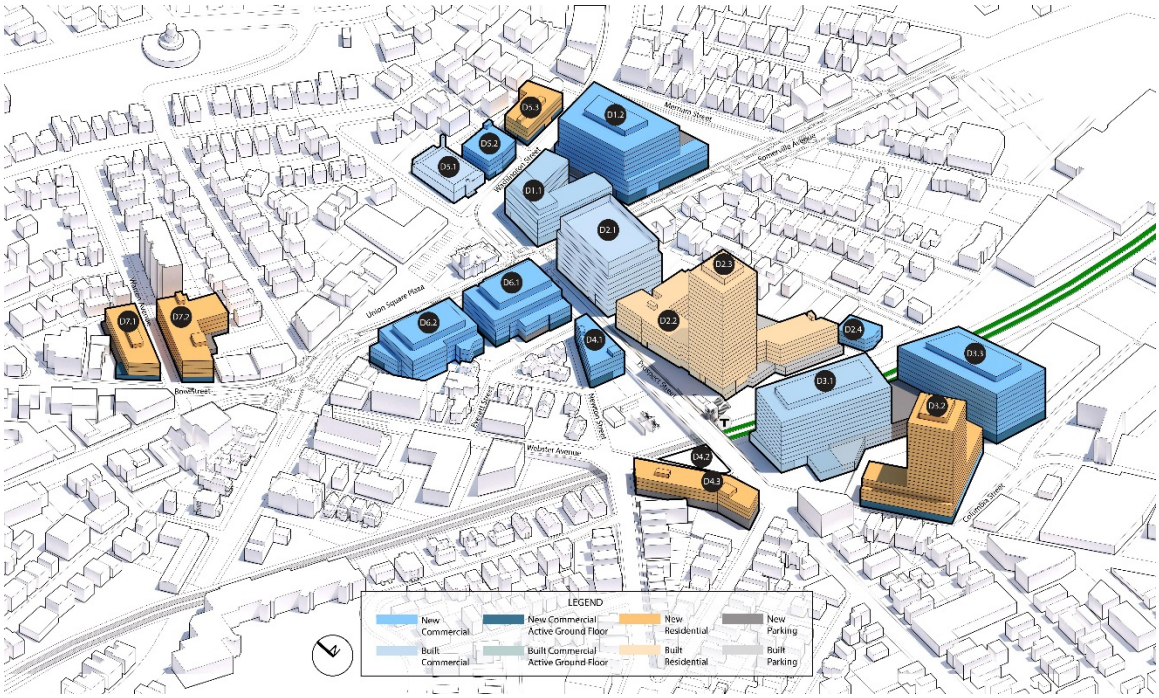
Phase 2 (Adds D1.1, D3.1)



Phase 2 is focused on completing the street wall started in Phase 1 in order to secure a strong connection between the new MBTA GLX station and Union Square plaza. South of new GLX station, D3.1 is envisioned as a 280,000 square foot commercial lab or office building. Across Somerville Avenue, facing Phase 1's commercial project, D1.1 site will be transformed into an approximately 175-room hotel, a use that will serve as a significant amenity to Union Square's increasingly commercial user base and will be a significant commercial tax producer. In total, Phase 2 will add approximately 385,000 SF of commercial space at which point it is anticipated that the project will have realized a cumulative 61% commercial and 39% residential use mix.

	ADDED		TOTAL	
Program	SF	%	SF	%
Commercial SF	385,000	100%	630,000	61%
Residential SF	-	0%	399,000	39%
CUMULATIVE TOTAL SF	**644,000**		**644,000**	
Employees	**732**		**1,366**	
Dwelling Units	**0**		**450**	

Phase 3 (Adds D1.2,D3.2-3.3, D5.2-3, D6, D7)



Phase 3 involves the build-out of the balance of the project. Considering the uncertainty of the future, each of these projects will be implemented individually as market conditions and user demands permit. Definitive plans regarding the sequencing of the individual projects that comprise Phase 3 will be further developed as Phases 1 and 2 are underway.

	ADDED		TOTAL	
Program	SF	%	SF	%
Commercial SF	834,000	61%	1,464,000	61%
Residential SF	534,000	39%	933,000	39%
CUMULATIVE TOTAL SF	**1,368,000**		**2,397,000**	
Employees	**3,934**		**5,300**	
Dwelling Units	**534**		**984**	

Parking Plan

The Union Square Redevelopment seeks to provide parking that serves the proposed development and adjacent neighborhood without incentivizing driving, and is as efficiently utilized as possible in order to meet the goals of the Union Square Neighborhood Plan. To that end, management principles for parking at the redevelopment sites include:

- **The uses in the Union Square Redevelopment will share parking to the greatest extent possible**, including between buildings. This recognizes that Union Square is a mixed use development where, for example, one parking space can serve someone who is working in an office during the day and visiting a restaurant at night.
- **Parking will generally be "unbundled,"** i.e. sold separately from any lease or sale of another use within the development. This approach makes the cost of parking visible to the potential user, and gives them the opportunity to go without.
- **Parking will be built in phases** with the project. This will help the development team monitor use and adjust management accordingly.
- **Dedicated parking will be limited.** In accordance with recently adapted zoning, reserved parking will be limited to encourage the efficient use of all parking spaces.

Total Demand Estimate

Estimates of parking demand used the detailed model developed specifically for Union Square as part of the Union Square Neighborhood Plan.[1] Based on Union Square's mixed use and accessible context, the team used an adapted shared parking model based on Urban Land Institute's (ULI) Shared Parking Manual (2nd Edition, 2005), and the Institute for Transportation Engineers (ITE)'s Parking Generation (4th Edition, 2010) to model demand. This model accounts for the sharing of uses over the course of a day.

The estimated peak demand for the Union Square development is approximately 1,454 vehicles at midday. This is an *estimate* based on a model that is described in detail below.

Estimates of parking demand used the detailed model developed specifically for Union Square as part of the Union Square Neighborhood Plan.[2]Based on Union Square's mixed use and accessible context, the team used an adapted shared parking model based on Urban Land Institute's (ULI) Shared Parking Manual (2nd Edition, 2005), and the Institute for Transportation Engineers (ITE)'s Parking Generation (4th Edition, 2010) to model demand. This model accounts for the sharing of uses over the course of a day. The model is based on the most current program as outlined below:

Table 1 Program Summary

Use	Size
Retail	140,000 sq ft
Arts and Creative Enterprise	74,800 sq ft*
Office / Lab	1,154,000 sq ft

[2] See Union Square Neighborhood Plan, Appendix B.

Hotel	175 rooms
Apartments	1,000 units

* Approximately 22,000 ft of arts and creative enterprise space is live/work and captured in the residential unit count. To avoid double-counting, the parking model accounts for the demand generated by approximately 53,000 square feet of arts and creative enterprise.

Specifically, the parking demand model includes the following inputs:

- Land use in Union Square
- Shared use by time of day
- Context variables, including:
  - Mode shares in Union Square
  - Internal capture (trips that access multiple uses without generating additional parking demand, i.e. walking from a residence to a coffee shop, or from the office to a restaurant)
  - TDM program impacts

The model assumes the following reductions, shown in Table 2:

Table 2 Contextual Reductions in Parking Demand

Reduction	% Reduction	Source	Union Square Context
Captive Market Effect: Commercial	32%	Internal capture rates for commercial land uses reported a 32% average reduction. (Trip Generation Handbook, 2nd Edition. ITE pg. 129 - Districtwide Trip Generation Study, Florida Department of Transportation, District IV, March 1995)	Union Square has an excellent mix of uses, ranging from retail to office to residential. This will only improve in the future. Thus, this model input set internal capture to the maximum.
Captive Market Effect: Residential	31%	Internal capture rates from various mixed-use studies --> 11% - 50% residential internal capture observed --> 31% - average residential internal capture (Trip Generation Handbook, 2nd Edition. ITE pg. 129 - Districtwide Trip Generation Study, Florida Department of Transportation, District IV, March 1995)	
Employee TDM Impact	24%	Transportation demand management effectiveness reducing # of commuter vehicles (Trip Generation Handbook, Second Edition. Appendix B - Page 123)	Union Square's accessibility by a mix of modes currently serves as excellent TDM for employees and residents alike. This will only improve in the future – thus the model set this input to the maximum.
Residential TDM Impact	30%	Unbundling the cost of parking from residential property sales/lease cost reduces household vehicle ownership by up to 30% (VTPI Parking Management. (2009))	Living in Union Square does not guarantee one a dedicated parking space. This has been shown to reduce parking demand by residents. The study recommends that future developments "unbundle" parking as a TDM as well as cost-mitigation mechanism.
Transit Access Impact on Retail	8%	Shopping centers with access to transit services appeared to have lower peak parking demand than those sites without	Union Square is currently well-served by MBTA bus service and will have high-quality Green Line service. Therefore, this input is set to the maximum.

		transit service. Range from 1-8% (ITE Parking Generation, 4th ed. P. 227)	
Office Employee Mode Adjustment	35%	A mode adjustment of 0.3 to 0.6 is appropriate for downtown office space in areas with paid parking and high-quality transit service (ULI Shared Parking, Second Edition, p.91)	In the future, Union Square will have both paid parking and high-quality transit service. The team used a range for this input.
Employee Parking Share (non-office)	20%	Average share of peak parking demand consumed by employees. (The True Cost of Free Parking. Shoup, Donald. Pg. 86)	Employees respond differently to transportation context changes as they commute in similar patterns daily. Thus it is important to distinguish this group from customers at non-office uses. This was assumed to be consistent across uses.
Office Visitor Parking Share	4%	Visitor parking accounts for 7-8% of office parking on a per space basis (ULI Shared Parking, Second Edition, p.91)	Visitor parking demand at offices is similarly broken out by the model as influenced by different factors than regular commuters. As the proportion of visitors to different offices varies (i.e. the difference between a call center and a lawyer who sees clients) this number was varied across scenarios.

Demand Estimates by Use

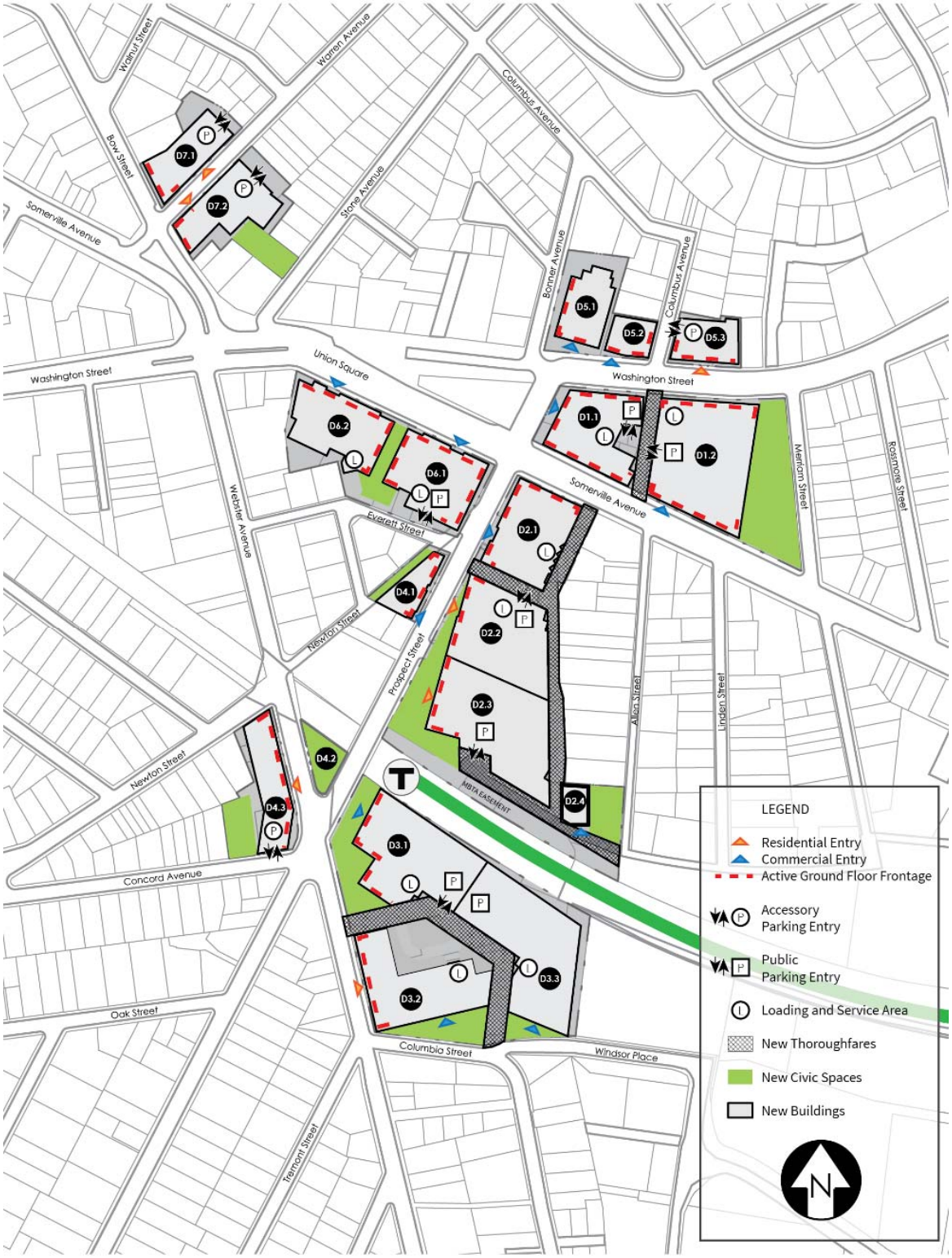
- **Employee:** The model assumes that at peak, the parking demand for employees at the office use will be 995 vehicles at midday. There will be additional parking for retail employees, which is assumed to be approximately 20% of peak parking demand for the hotel and retail, or a peak of approximately 50 employees at midday.
- **Resident:** Residential peak demand would occur at midnight, with approximately 570 parked vehicles.
- **Short- and Long-Term Visitor Parking Demand:** This demand is included in the parking generation rates by use. We note further that any proposed retail space will be primarily local servicing with limited demand or use of parking facilities.

These modeled results are close to what is happening on the ground today. As described in the CDSP, the Neighborhood Plan included a comprehensive study of parking inventory and utilization in the study area. This was compared to existing land uses in the Square. The team identified a peak parking demand ratio of 0.61 spaces per 1,000 square feet in Union Square. This proposed total of 1,500 spaces for 2.4 million square feet is providing parking at a similar rate (0.63 spaces per 1,000 square feet). Enhanced transit access, bicycle infrastructure, and Transportation Demand Management programs will support this ratio into the future.

Parking Location Map

Figure 1 shows the location of accessory and public parking. Public parking will be concentrated on D1, D2, D6, and D3, while D7, D5, and D4 provide accessory parking only. The public parking can be accessed outside of the heart of the square, on Concord Avenue, Everett Street, Webster Avenue, and Somerville Avenue, a best practice that will intercept traffic before it gets to the square's retail core.

Figure 1 Parking Location Map



Number of Spaces Provided

Applicant proposes to provide parking as outlined in Table 3 below:

Table 3 Parking Provision

Lot	Accessory	Commercial	
D1.1	50		
D1.2		385	
D2.2		290	
D3.1		270	
D3.3		300	
D4.3	25		
D5.1	5		
D5.3	15		
D6.1	55		
D6.2	55		
D7.1	20		
D7.2	30		
Total	255	1,245	1,500
Percentage	17%	83%	100%

Changes in Parking from Existing Condition

The Union Square development will add significant parking on each site with the exception of D7. In total, the project will add just over 1,000 new parking spaces to Union Square, with most spaces concentrated on D1, D2, and D3. These parcels will have commercial parking that is open to all, while other parcels will have accessory parking to serve local uses. Table 4 provides an overview of the changes in parking supply by site.

Table 4: Net Change in Parking Supply by Site

Site	Existing Parking	Proposed Parking	Net Change
D1	87	435	348
D2	17	290	273
D3	46	570	524
D4	0	25	25
D5	11	20	9
D6	48	110	62
D7	110	50	-60
TOTAL	319	1,500	1,181

Nearby Transit Services

Union Square is one of the better served neighborhoods by MBTA bus routes, and will gain frequent light rail service from the Green Line Extension in 2021. Today, high frequency bus routes and even the limited-stop CT2 crosstown route provide robust service for over 2,700 bus boardings and alightings daily in Union Square.[3] Specifically, there is direct service from Union Square to:

- Sullivan Square
- Kendall Square
- Longwood Medical Area
- Harvard Square
- Lechmere Station
- Ruggles Station
- Central Square
- Davis Square

The Green Line Extension

The MBTA is extending its Green Line light rail service to a new station at Union Square, and eventually through Somerville up to a College Avenue station in Medford (Figure 2 Green Line Extension Overview). Union Square is projected to have between 2,300 and 3,500 boardings daily.[4] The latest estimate for the opening of the Union Square station is 2021.[5]

The Green Line would provide high-capacity, frequent service on a dedicated right-of-way into downtown Boston and beyond. MassDOT estimates that service frequency would be equal to that of the Green Line E branch service – i.e. a train every six minutes in the morning peak, every five minutes in the evening, and about every ten minutes in the off-peak.[6] Connecting to the rest of the Green Line system at Lechmere, this service would drastically improve the transit access in Union Square. Further enhancing connectivity, the nearby Washington Street Station will provide an additional point of arrival and departure.

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[3] Per MBTA ridership data, 2012

[4] Low estimate as of 2009, http://greenlineextension.eot.state.ma.us/documents/about/FactSheets/GreenLineFactSheet_F_lowRes.pdf High estimate as of 2011, http://greenlineextension.eot.state.ma.us/documents/FTA_NewStarts/NewStartsSubmittal_FY2012/Attachments/Attachment_3_Combined.pdf

[5] Per Boston Globe: https://www.bostonglobe.com/metro/2016/12/07/new-green-line-stations-opening-delayed/S9Gc1c6PtbiSz7Wj3FVKkM/story.html

[6] http://greenlineextension.eot.state.ma.us/documents/FinalEIR/vol1/03_GLX_FEIR_V1_Chap1_to_9.pdf p.1-5

Figure 2 Green Line Extension Overview

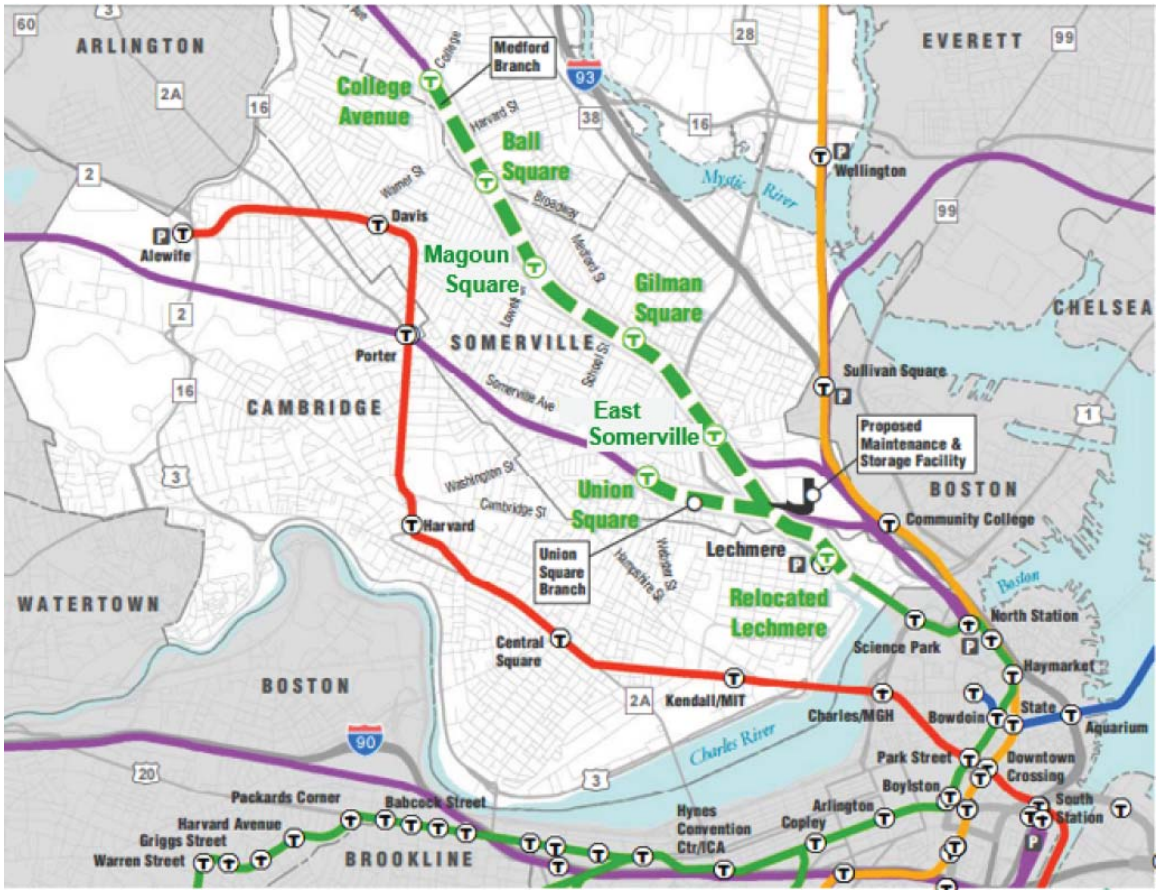


Image source: http://greenlineextension.eot.state.ma.us/documents/about/ProposedMap/projectMap_0417.pdf

The Union Square Redevelopment is committed to supporting the Green Line Extension both financially and through transit-oriented design. The team has committed $5.5 million toward the Green Line Extension and is also privately funding the construction of critical elements to the station's operation the D2 parcel (i.e. The Ride drop-off, ADA access, restrooms, and an employee lounge.). The parcels that make up the development orient around pedestrian and bicycle access to the Green Line, encouraging people to use the service to access both the redevelopment and Union Square as a whole.

Overview of Existing Transit Services

In addition to the Green Line, the project sites are adjacent to or within walking distance of robust transportation options today. This access was evaluated for the area within a half mile radius of the project sites. The project sites are located within a quarter mile of 5 MBTA bus routes that directly serve Union Square: Routes 85, 86, 87, 91, and CT2. Routes 69, 80, 83, 88, and 90 serve roads within a half-mile or 10 minute walk of the project sites. Combined, these routes provide high transit frequency to the Union Square thoroughfares, as Figure 3 demonstrates. Table 5 summarizes the transit services available within the study area and describes the ridership and service details.

This discussion of the existing transit network in and around Union Square begins with a discussion of the routes and ridership of each bus route in the study area. It also includes an analysis of the transit stops located adjacent to or within a short walk of each development site, the routes accessible at each stop, and the average wait for a bus at each stop. The information provided is accurate as of September 2, 2017.

Route 69

The southern extreme of the study area is served by the MBTA's route 69 bus. On Cambridge Street there are bus stops within 3/10 of a mile of the site for D3. The route operates between Harvard Square and Lechmere Station on the Green Line via Cambridge Street. The stops closest to the project site are located on Cambridge St at Norfolk Street and Cambridge Street at Windsor Street. Route 69 operates from 5:25 AM to 1:11 AM on weekdays and has similar service windows on weekends. It operates every 10 minutes during the AM and peaks, and every 20-25 minutes at other times on weekdays. On weekends it operates every 20-30 minutes.

Route 80

The eastern extreme of the study area is served by the MBTA's route 80 bus. Along the access roads to the McGrath Highway there are bus stops within 3/10 of a mile of project sites D1 and D5. The route operates between Arlington Center and Lechmere Station on the Green Line via Medford Hillside and McGrath Highway. The stops closest to the project site are located along the McGrath Highway access roads at Washington Street and at Somerville Ave. Route 80 operates from 5 am to 1:22 am on weekdays with similar service windows on Saturdays. On Sundays the route runs one hour shorter during the morning and late nights. It operates every 20 minutes during weekday peak periods and every 30 minutes at other times on weekdays and on weekends.

Route 83

Route 83 is included in this analysis because it falls just outside of the radius around the project sites, but is within a 15 minute walk to the D4 project site. Along Beacon Street at Concord avenue there are bus stops within a half mile of D4. The route operates between Rindge Avenue and Central Square Station via Beacon Street and Porter Street. It runs from 5:10 AM to 1:20 AM on weekdays and Saturdays. On Sundays service begins at 7:30 AM. It operates every 20-25 minutes during weekdays and every 30-50 minutes on weekends.

Route 85

Route 85 directly serves Union Square and is accessible to all project sites D1-7. The route runs between Spring Hill just northwest of Union Square and the Kendall/MIT MBTA Subway station along Summer, Webster, Hampshire, and Broadway. As the study area map shows, there are a number of stops for Route 85 within the study area. It operates between 5:45 AM and 8 PM on weekdays only. The run runs every 30 minutes during the AM peak then every 40 minutes during the rest of the day. Much of the route overlaps with the CT2 route, which also does not run on weekends. There is no direct bus connection between Union and Kendall Squares on weekend days.

Route 86

Route 86 runs along Washington Street directly serving Union Square. It runs between Sullivan Square Station on the Orange Line and Reservoir Station (Cleveland Circle) on the Green Line in Brookline via Harvard Square. The route stops at several places on Somerville Ave and Washington Street within close proximity to the project sites, especially D1, D2, D5, D6, and D7. The route runs from 5 AM to 1 AM on weekdays and Saturdays. On Sundays the route runs from

7:30 AM and 10 PM. Its frequency varies from every 8-18 minutes during weekday peak periods to every 30-60 minutes off-peak. This route provides the only direct bus connection between Union Square and Harvard Square.

Route 87

Union Square is directly served by Route 87, which runs between Arlington Center/Clarendon Hill and Lechmere Station on the Green Line via Somerville Avenue and the McGrath Highway. There are several stops along this route accessible to the Union Square project sites, 2 in each direction on Somerville Avenue east of Prospect, one in each direction on Somerville Avenue between Webster and Prospect, and one in each direction where Bow and Somerville meet at Webster. The route operates between 5:10 AM and 1 AM on weekdays and Saturdays. On Sundays the route begins operation at 6 AM. It has a frequency of every 20-22 minutes during peak periods on weekdays and every 30-40 minutes during other times of the week. This route provides the only direct bus connection between Union Square and Davis Square.

Route 88

Route 88 overlaps with Route 80 along the McGrath Highway access roads in the study area, operating between Clarendon Hill and Lechmere Station on the Green Line via Davis Square, Highland Avenue, and McGrath Highway. This route shares with Route 80 the stops along the McGrath Highway access roads at Washington Street and Somerville Avenue. Route 88 operates between 5:15 AM and 1 AM on Weekdays, and begins operation at 5:30 on Saturdays and 6:30 on Sundays. During peak periods it arrives every 8-18 minutes on weekdays. At other times it typically runs every 30-40 minutes.

Route 90

Route 90 is included in this study because it serves stops within a 15 minute walk of the D5 and D1 project sites. It stops along McGrath Highway at Cross Street just northeast of the study area. The route operates between Davis Square Station on the Red Line and Wellington Station via Sullivan Square Station and Assembly Mall. It primarily uses Highland Avenue, Cross Street, and Somerville's Broadway Street. The bus does not run frequently, serving stops every 40 minutes during AM and PM peak periods on weekdays, every 40-55 minutes during off-peak hours on weekdays, and every 65-70 minutes late nights and weekends. It may serve some visitors to Union Square coming from North Somerville or the neighborhoods north of Spring Hill.

Route 91

Route 91 directly serves Union Square on its route between Central Square on the Red Line and Sullivan Square on the Orange Line. The route travels along Prospect Street north from Central until Inman Square where it travels along Hampshire Street, then Springfield, then Newton and Webster before reaching Union Square. Leaving the neighborhood, it travels east on Washington Street before terminating at Sullivan Square. This route offers the only direct connection between Union Square and Central Square. It operates every 25-40 minutes on weekdays and every 20-60 minutes on weekends and late nights. Route 91 runs from 5 AM to 1 AM on weekdays and Saturdays and from 6 AM to 1 AM on Sundays. It provides easy connection to project sites D4, D7, D6, D2, D1, and D5. It is a short walk from D3 to access this route.

Route CT2

The CT2 bus is a popular weekdays only limited stop bus route that operates between Sullivan Station on the Orange Line and Ruggles Station on the Green Line via Union Square, Kendall Square on the Red Line, Fenway Station on the Green Line, and the Longwood Medical Area. The

route has 4 stops accessible to the project sites, outbound on Prospect Street just south of Somerville Avenue, inbound on Somerville Avenue between Webster and Prospect, and in both directions on Washington just west of McGrath Highway. The route operates at 20 minute headways during the AM and PM weekday peak periods and every 30-35 minutes during the weekday off-peak. Along with Route 85, CT2 offers direct connection between Union Square and Kendall/MIT, but neither route runs on weekends.

Figure 3: Weekday Peak Bus Frequency

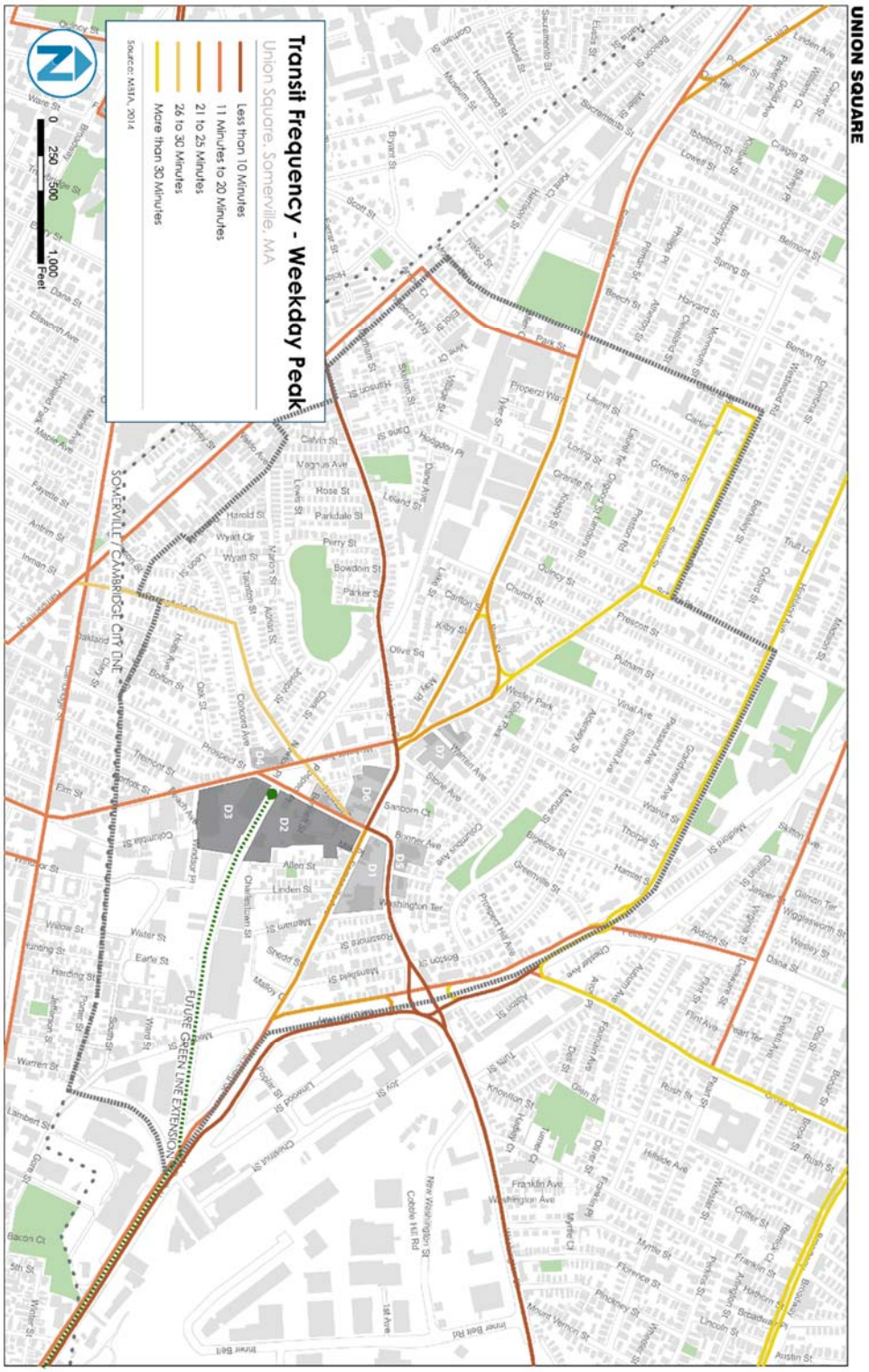
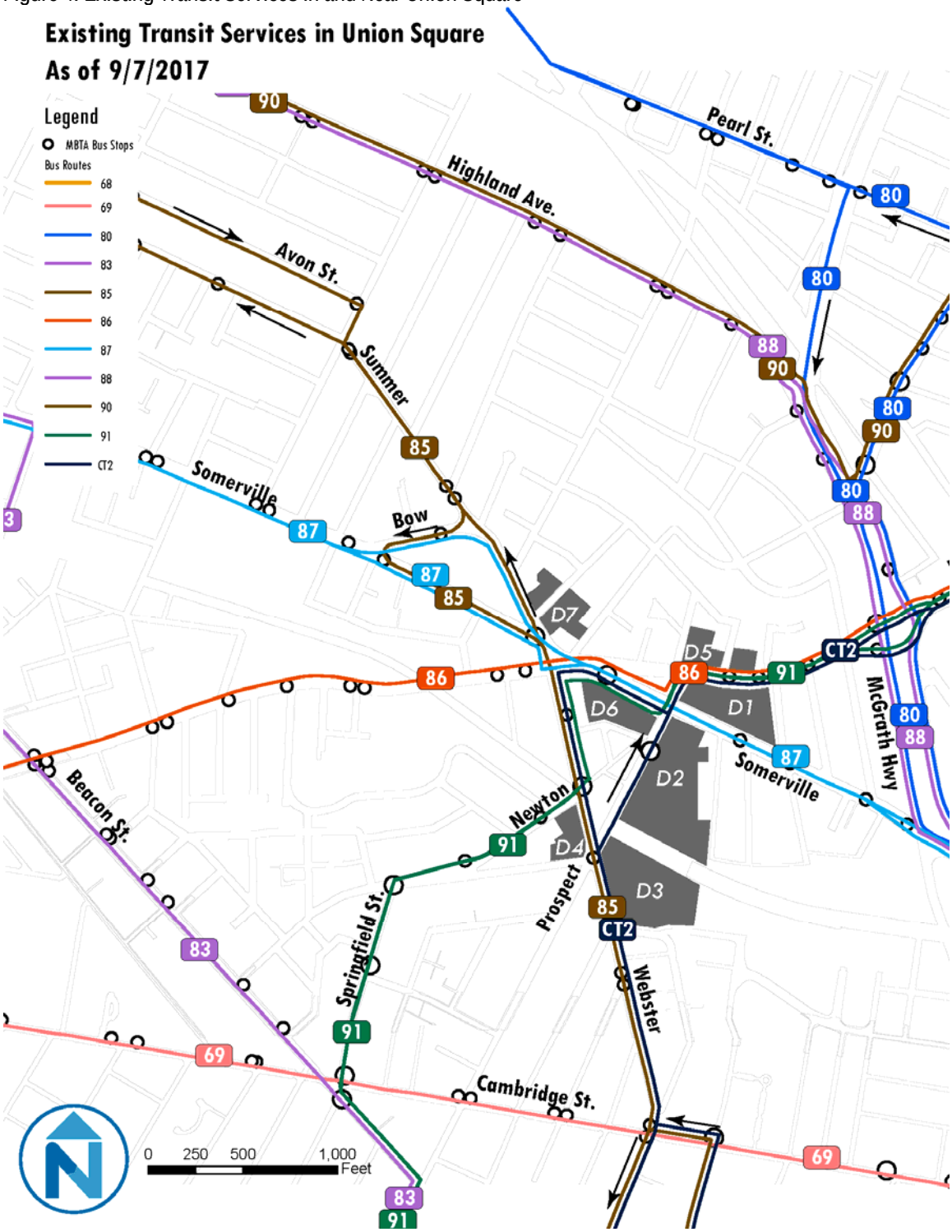


Table 5: Summary table of the transit services available within the study area

Name	Type of Service	Origin - Destination	Ridership Statistics (for entire route from MBTA 2014 Blue Book)									Headways (in minutes, from MBTA 2017 schedules)						
			Weekdays			Saturday			Sunday			Weekdays					Weekend	
			Inbound	Outbound	Total	Inbound	Outbound	Total	Inbound	Outbound	Total	AM Peak	AM Base	PM Base	PM Peak	Late night	Saturday Peak	Sunday Peak
69	Bus	Harvard/Holyoke Gate - Lechmere Station via Cambridge Street	1,588	1,598	3,185	999	1,092	2,092	543	508	1,051	10-20	25	25	10-20	40	20-40	20-40
80	Bus	Arlington Center - Lechmere Station via Medford Hillside	1,063	995	2,058	748	667	1,415	428	398	826	20	25-35	25-35	20	60	30-60	30-60
83	Bus	Rindge Ave - Central Square Station via Porter	1,096	1,142	2,237	683	648	1,331	282	349	631	20	30	30	20	60	25-60	25-60
85	Bus	Spring Hill - Kendall/MIT Station via Summer Street & Union Square	301	288	589	--	--	--	--	--	--	30	40	40	40	--	--	--
86	Bus	Sullivan Station - Reservoir (Cleveland Circle) via Harvard	2,591	3,027	5,618	1,430	1,780	3,210	895	1,022	1,917	8-18	20	20	8-18	28-45	30-60	30-60
87	Bus	Arlington Center/Clarendon Hill - Lechmere Station via Somerville Avenue	1,943	1,853	3,796	1,436	1,422	2,858	817	925	1,742	20-22	30	30	20-22	30-35	30-40	30-40
88	Bus	Clarendon Hill - Lechmere Station via Highland Avenue	2,003	2,073	4,075	1,418	1,376	2,794	862	803	1,664	8-18	30	30	8-18	35	20-40	20-40
90	Bus	Davis Square Station - Wellington Station via Sullivan Square Station and Assembly Mall	588	593	1,182	334	350	684	230	163	393	40	40-55	40-55	40	65	70	70
91	Bus	Sullivan Square Station - Central Square Station via Washington Street	784	909	1,693	713	860	1,574	354	389	743	25-30	25-30	25-30	25-30	60-65	20-60	20-60
CT2	Bus	Sullivan Station - Ruggles Station via Kendall/MIT	1,425	1,390	2,815	--	--	--	--	--	--	20	30-35	30-35	20	--	--	--

KEY:
- Route runs directly through Union Square (shaded)
- Route runs within 1/2 mile of Study Area

Figure 4: Existing Transit Services in and Near Union Square



Transit Services by Development Site

D1:

Abutting the center of Union Square the D1 project site is easily accessible by a number of transit options. Most closely, D1 is served by Routes 80, 86, 88, 91, and CT2. Washington Street sees a bus at least once every 10 minutes; Somerville is served by Route 87 at 20-25 minute headways; the McGrath Highway stops are served at least once every 10 minutes. Street access from both planned D1 buildings onto Somerville Avenue and Washington Street mean that most stops are within 2/10 of a mile of the site (see Table 5).

Figure 5: D1 Parcel Transit Access

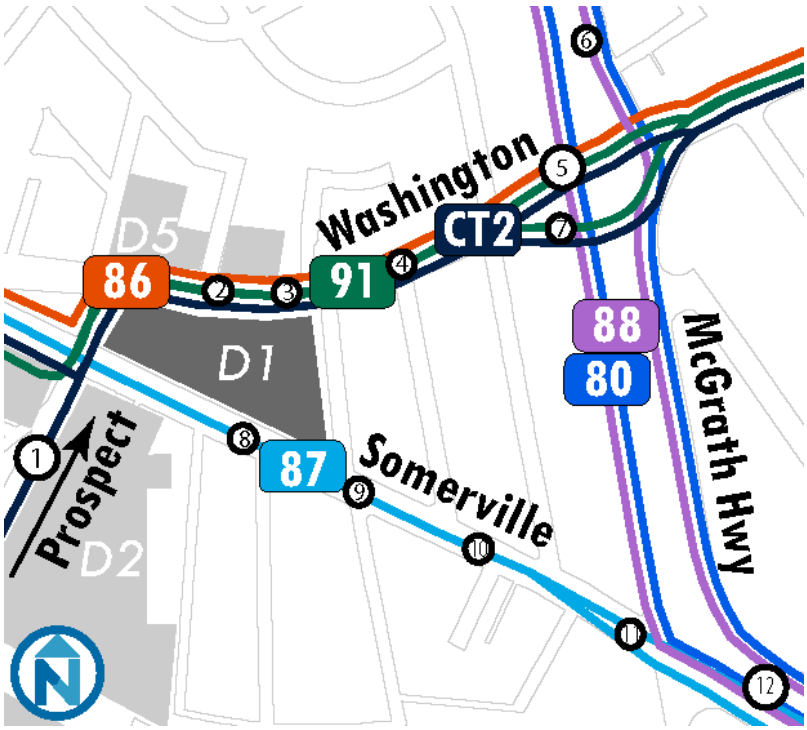


Table 6: D1 Parcel Bus Stops

D1 Transit Connectivity Summary Table				
Stop #	Walking Distance (in feet from development site)	Average walking time (in minutes from development site at 270 ft/minute)	Routes and Directions Served (ie outbound and/or inbound)	Average wait time (in minutes for each service available at stop)
1	367	1	CT2 OB	CT2: 12
2	328	1	86 IB	86: 9
3	476	2	86 OB, 91 OB	86: 9; 91: 15
4	528	2	86 IB	86: 9
5	1060	4	86 IB, 80 IB, 88 IB, CT2 IB	86: 9; 80: 14; 88: 15; CT2: 12
6	1600	6	80 OB, 88 OB	80: 14; 88: 15
7	1060	4	86 OB, 91 OB, CT2 OB	86: 9; 91: 15; CT2: 12
8	528	2	87 IB	87: 15
9	1060	4	87 OB	87: 15
10	1200	4	87 IB	87: 15
11	1600	6	87 OB	87: 15
12	2130	8	88 IB, 80IB, 87 IB, 88 OB, 80 OB, 87 OB	88: 14; 80: 14; 87: 15

Stop 1 near D1 serves outbound CT2 buses. It is a curbside stop without a shelter on the northbound side of Prospect just south of Somerville Avenue. It is a 1 minute walk from D1.

Stop 2 near D1 serves inbound Route 86 and Route 91 buses. It is a curbside stop without a shelter. It is directly across the street from D1, less than a 1 minute walk from the site.

Stop 3 serves the same routes as Stop 2 in the opposite direction. On the southwest corner of Merriam Street and Washington Street, the stop is curbside and features a bench. It is less than a 2 minute walk from D1 and users do not need to cross any streets to access.

Stop 4 serves inbound Route 86 and Route 91 buses. It is a curbside stop without a shelter about 2 minutes from D1.

Stop 5 serves inbound Route 80, 86, 88, and Ct2 buses, about a quarter mile from D1. Curbside at the intersection of McGrath Highway exit southbound and Washington Street, this stop sees buses relatively often and is the closest stop for users of the site riding Routes 80 or 88.

Stop 6 serves outbound Route 80 and Route 88 buses, about 4/10 of a mile from D1. It is curbside and does not have a shelter.

Stop 7 serves inbound routes 86, 91, and CT2 where Washington eastbound splits at McGrath Highway. D1 users will probably not use this stop, because stops closer to the site serving the same routes exist. It is curbside and does not have a shelter.

Stop 8 is the closest inbound Route 87 stop. It is adjacent to D1, less than a minute walk, and is curbside with no shelter.

Stop 9 serves Route 87 outbound riders across the street from D1 on Somerville Ave. It is across Somerville Ave. from D1 and is a curbside stop with no shelter.

Stop 10 serves D1 users travelling inbound on 87 farther east on Somerville Ave. It is curbside without shelter.

Stop 11 Serves outbound Route 87 riders on the opposite side of the street as Stop 10. It is also curbside without shelter.

Stop 11 again serves outbound Route 87 riders, about a 6 minute walk from the development site. It is a curbside stop without shelter.

Stop 12 on the map indicates the approximate location of 2 stops across McGrath highway from each other. Outbound riders on the north side of the street have a sheltered curbside stop serving routes 80, 87, and 88. Inbound riders on the south side of the street have a curbside stop without shelter serving Routes 80, 87, and 88. These stops are about a 8 minute walk to D1.

D2:

D2, directly abutting Union Square, sports easy access to all of the neighborhoods bus routes. Within 10 minutes site users can access Routes 80, 85, 86, 87, 88, and 91. Stop 1 is the most highly trafficked stop in all of Union Square. D2 can be accessed from Prospect Street directly in front of stop 2 and allows a short and safe walk to all nearby stops.

Figure 6: D2 Parcel Transit Access

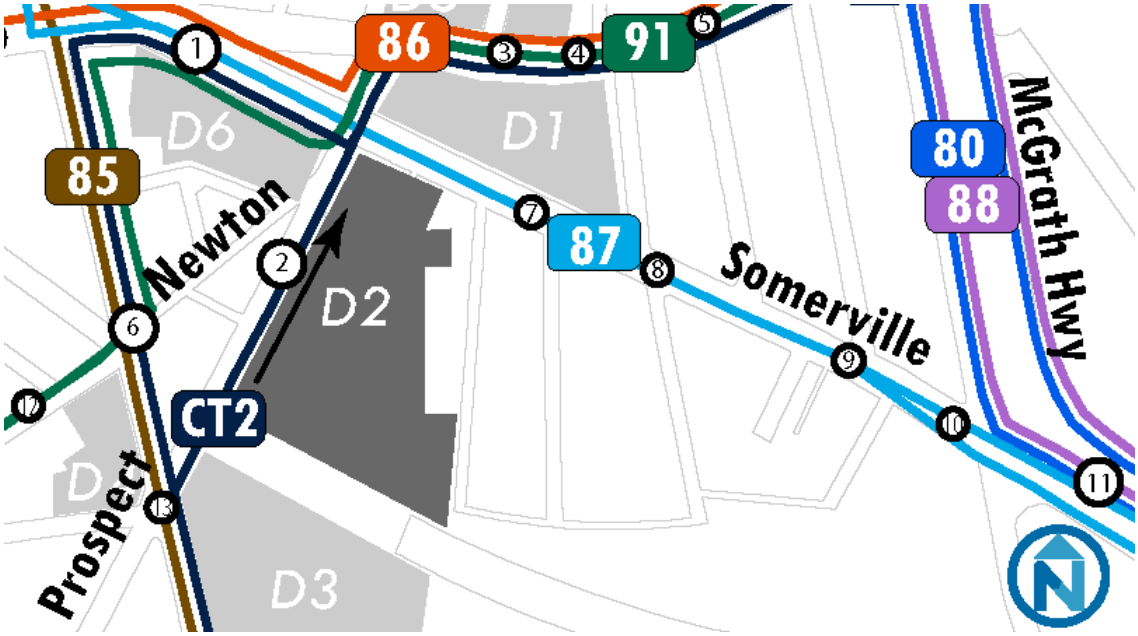


Table 7: D2 Parcel Bus Stops

D2 Transit Connectivity Summary Table				
Stop #	Walking Distance (in feet from development site)	Average walking time (in minutes from development site at 270 ft/minute)	Routes and Directions Served (ie outbound and/or inbound)	Average wait time (in minutes for each service available at stop)
1	449	2	87 OB, 87 IB, CT2 IB, 86 OB, 86 IB, 91 OB, 91 IB,	87:15; CT2 12, 86: 9; 91: 15
2	130	1	CT2 OB	CT2: 12
3	528	2	86 IB	86: 9
4	600	2	86 OB, 91 OB	86: 9; 91: 15
5	1060	4	86 IB	86: 9
6	528	2	91 OB, 91 IB, 85 IB	91: 15; 85: 18
7	528	2	87 IB	87: 15
8	1060	4	87 OB	87: 15
9	1500	6	87 IB	87: 15
10	1600	6	87 OB	87: 15
11	2130	8	88 IB, 80IB, 87 IB, 88 OB, 80 OB, 87 OB	88: 14; 80: 14; 87: 15
12	600	2	91 IB	91: 9
13	600	2	85 OB	85: 19

Stop 1 accessible to D2 is served by most of the buses serving union square: outbound and inbound Routes 87, 86, and 91. The inbound stop has a bench but no shelter. The outbound stop is curbside but does not have a bench or shelter. It is a 2 minute walk from D2. From the north side of Somerville, riders can access inbound CT2 service.

Stop 2 adjacent to D2 serves outbound CT2 service.

Stop 3 serves inbound Route 86 and 91 service.

Stop 4 serves outbound Route 86 and 91 service.

Stop 5 serves inbound Route 85 and 91 service.

Stop 6 at the corner of Newton and Webster serves Route 91 in both directions and route 85 inbound. It is a curbside stop with no shelter and sites about a 2 minute walk from D2.

Stop 7 serves inbound Route 87 buses.

Stop 8 serves outbound Route 87 buses.

Stop 9 serves inbound Route 87 buses.

Stop 10 serves outbound Route 87 buses.

Stop 11 serves outbound and inbound buses on Routes 80, 87, and 88.

Stop 12, about a 2-3 minute walk from D2, is a curbside stop with no shelter serving inbound Route 91 buses. Riders on this route are likely to use Stop 1 to access D2 instead of Stop 12.

Stop 13 serves Route 85 outbound riders at the corner of Prospect and Webster. It is a 2 minute walk from D2 and is a curbside stop with no shelter.

D3:

D3 site users have easy access to all of the stops in Union Square proper as well as the Route 69 stops along Cambridge Avenue, a 6 minute walk from the site. Access from the sites proposed buildings onto both Columbia and Webster Streets allows site users quick access to the sites 13 nearby stops.

Figure 7: D3 Parcel Transit Access

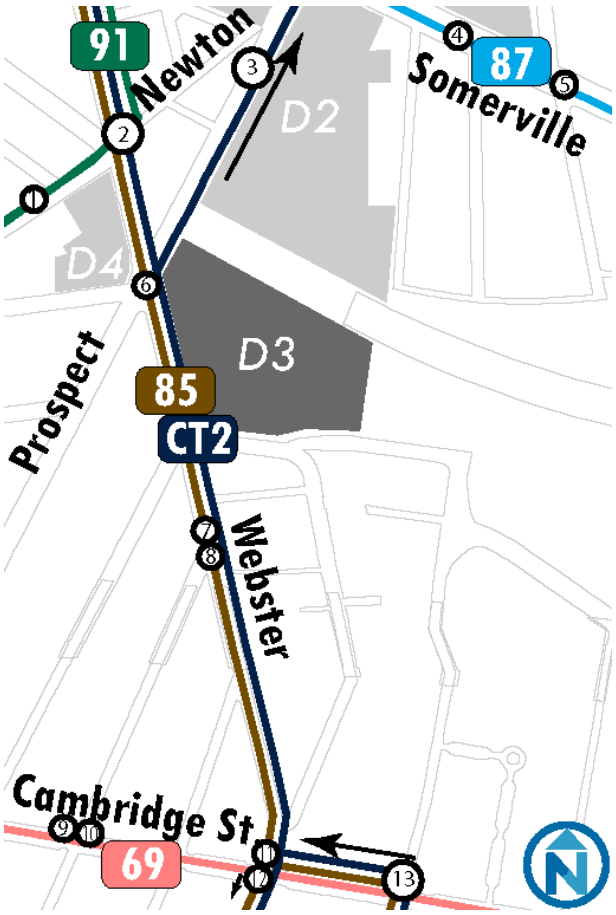


Table 8: D3 Parcel Bus Stops

D3 Transit Connectivity Summary Table				
Stop #	Walking Distance (in feet from development site)	Average walking time (in minutes from development site at 270 ft/minute)	Routes and Directions Served (ie outbound and/or inbound)	Average wait time (in minutes for each service available at stop)
1	528	2	91 IB	91: 15
2	423	2	91 OB, 91 IB, 85 IB	91: 15; 85: 19
3	528	2	CT2 OB	CT2: 12
4	1060	4	87 IB	87: 15
5	1600	6	87 OB	87: 15
6	82	1	85 OB	85: 19
7	528	2	85 IB	85: 19
8	528	2	85 OB	85: 19
9	1600	6	69 IB	69: 12
10	1600	6	69 OB	69: 12
11	1600	6	85 IB, CT2 IB	85: 19; CT2: 12
12	1600	6	85 OB, CT2 OB	85: 19; CT2: 12
13	2130	8	69 OB, 69 IB	69: 12

Stop 1 serves inbound Route 91 buses.

Stop 2 serves Route 91 buses in both directions and inbound Route 85 buses.

Stop 3 serves outbound CT2 buses.

Stop 4 serves inbound Route 87 buses.

Stop 5 serves outbound Route 87 buses.

Stop 6 serves outbound Route 85 buses.

Stop 7 serves inbound Route 85 buses about a 2 minute walk from D3. It is a curbside stop without shelter.

Stop 8 serves outbound Route 85 buses opposite the street from Stop 7. It is similarly a curbside stop without shelter.

Stop 9 serves Route 69 riders traveling inbound at the corner of Cambridge and Norfolk about a 6 minute walk from D4. It is a curbside stop without shelter.

Across the street from Stop 9 is Stop 10, a curbside stop without shelter serving outbound Route 69 riders.

Stop 11 serves inbound Route 85 and CT2 riders on Webster at Cambridge Street. It is a 6 minute walk from this stop to D3. It is curbside and has no shelter.

Stop 12 serves outbound Route 85 and CT2 riders on Cambridge Street at Webster, also a 6 minute walk from D3. It is a curbside stop without shelter.

Stop 13 shows the approximate site of 2 stops across the street from one another serving Route 69 in both directions. This stop is about 8 minutes from D3. Riders on 69 to Harvard Square have a bus shelter and benches. Across the street, riders on 69 going the opposite direction use a curbside stop without shelter or benches.

D4:

Accessed directly from Webster Avenue by pedestrians, the D4 project site sits within a few minute walk to all bus routes directly serving Union Square. It also is a 10-15 minute walk from D4 to Route 83 services along Beacon Street.

Figure 8: D4 Parcel Transit Access

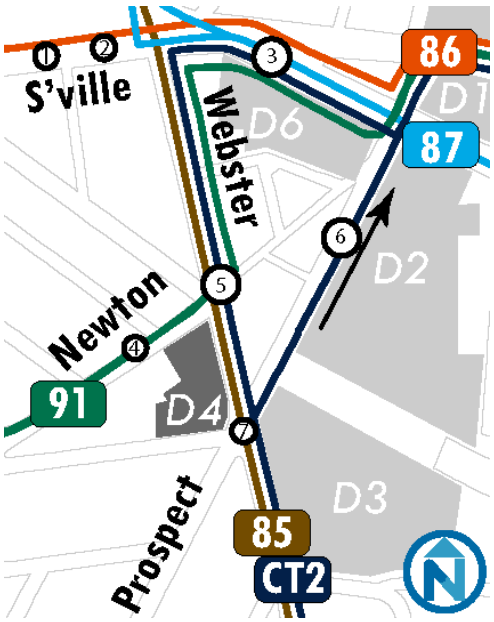


Table 9: D4 Parcel Bus Stops

D4 Transit Connectivity Summary Table				
Stop #	Walking Distance (in feet from development site)	Average walking time (in minutes from development site at 270 ft/minute)	Routes and Directions Served (ie outbound and/or inbound)	Average wait time (in minutes for each service available at stop)
1	1060	4	86 OB	86: 9
2	900	3	86 IB	86: 9
3	1000	4	87 OB, 87 IB, CT2 IB, 86 OB, 86 I	87: 15; CT2: 12; 86: 9; 91: 15
4	528	2	91 IB	91: 15
5	279	1	91 OB, 91 IB, 85 IB	91: 15; 85: 19
6	600	2	CT2 OB	CT2: 12
7	125	1	85 OB	85: 19

Stop 1 serves inbound Route 84 riders on Somerville Avenue at Hawkins Street. It is a 4 minute walk from D4, serving riders curbside with no shelter or bench.

Stop 2 serves outbound Route 86 riders on Somerville Ave west of Webster. It is a 3 minute walk from this stop to D4. It is a curbside stop with a bench.

Stop 3 serves many buses: outbound and inbound Routes 87, 86, and 91. The inbound stop has a bench but no shelter. The outbound stop is curbside but does not have a bench or shelter. It is a 2 minute walk from D2. From the north side of Somerville, riders can access inbound CT2 service.

Stop 4 serves inbound Route 91 riders.

Stop 5 serves outbound and inbound Route 91 riders and inbound Route 85 riders.

Stop 6 serves outbound Route CT2 riders.

Stop 7 serves outbound Route 85 riders.

D5:

D5, sitting across the street from the D1 site on Washington, has direct pedestrian access to the street along Washington Avenue. As a result, catching the 86, 91, and CT2 buses is very easy for users of this site. Users can also access Routes 87, 88, and 80 within 6 minutes.

Figure 9: D5 Parcel Transit Access

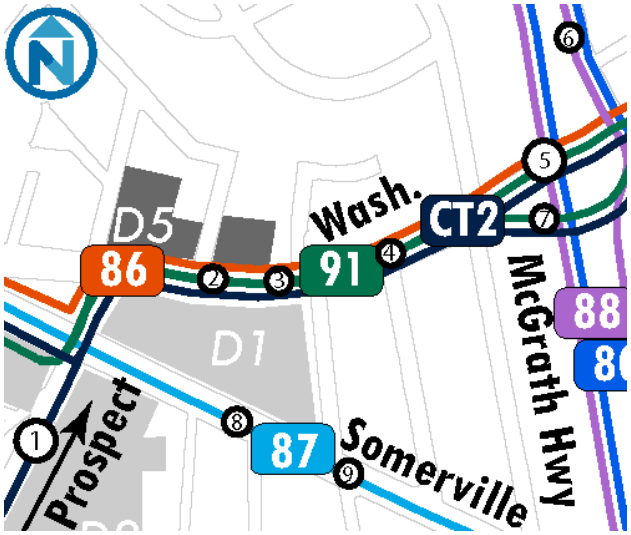


Table 10: D5 Parcel Bus Stops

D5 Transit Connectivity Summary Table				
Stop #	Walking Distance (in feet from development site)	Average walking time (in minutes from development site at 270 ft/minute)	Routes and Directions Served (ie outbound and/or inbound)	Average wait time (in minutes for each service available at stop)
1	367	1	CT2 OB	CT2: 12
2	328	1	86 IB	86: 9
3	476	2	86 OB, 91 OB	86: 9; 91: 15
4	528	2	86 IB	86: 9
5	1060	4	86 IB, 80 IB, 88 IB, CT2 IB	86: 9; 80: 14; 88: 15; CT2: 12
6	1600	6	80 OB, 88 OB	80: 14; 88: 15
7	1060	4	86 OB, 91 OB, CT2 OB	86: 9; 91: 15; CT2: 12
8	528	2	87 IB	87: 15
9	1060	4	87 OB	87: 15

Stop 1 near D5 serves outbound CT2 buses. It is a curbside stop without a shelter on the northbound side of Prospect just south of Somerville Avenue. It is a 1 minute walk from D5.

Stop 2 near D5 serves inbound Route 86 and Route 91 buses. It is a curbside stop without a shelter. It is directly adjacent to D5, less than a 1 minute walk from the site.

Stop 3 serves the same routes as Stop 2 in the opposite direction. On the southwest corner of Merriam Street and Washington Street, the stop is curbside and features a bench. It is less than a 2 minute walk from D5.

Stop 4 serves inbound Route 86 and Route 91 buses. It is a curbside stop without a shelter about 2 minutes from D5.

Stop 5 serves inbound Route 80, 86, 88, and Ct2 buses, about a quarter mile from D5. Curbside at the intersection of McGrath Highway exit southbound and Washington Street, this stop sees buses relatively often and is the closest stop for users of the site riding Routes 80 or 88.

Stop 6 serves outbound Route 80 and Route 88 buses, about 4/10 of a mile from D5. It is curbside and does not have a shelter.

Stop 7 serves inbound routes 86, 91, and CT2 where Washington eastbound splits at McGrath Highway. D5 users will probably not use this stop, because stops closer to the site serving the same routes exist. It is curbside and does not have a shelter.

Stop 8 is the closest inbound Route 87 stop. It is around the corner from D5, a couple minute walk on Somerville, and is curbside with no shelter.

Stop 9 serves Route 87 outbound riders across the street from D1 on Somerville Ave. It is across Somerville Ave. from D1 and is a curbside stop with no shelter.

D6:

D6 has the best transit connectivity of any project site, being directly on Union Square on Somerville Avenue between Webster and Prospect. As a result, its users can reach Routes 85, 86, 87, 91, and CT2 within minutes. Its location right on Somerville Ave. here allows it quick access to the most used stop in all of Union Square (Stop 4). D6 is accessible by foot from Somerville Avenue. There is also a planned pedestrian entrance from D6 back onto Everett Street.

Figure 10: D6 Parcel Transit Access

Table 11: D6 Parcel Bus Stops

D6 Transit Connectivity Summary Table				
Stop #	Walking Distance (in feet from development site)	Average walking time (in minutes from development site at 270 ft/minute)	Routes and Directions Served (ie outbound and/or inbound)	Average wait time (in minutes for each service available at stop)
1	1000	4	86 OB	86: 9
2	700	3	86 IB	86: 9
3	700	3	85 IB, 87 IB, 85 OB, 87 OB	85: 19
4	90	1	87 OB, 87 IB, CT2 IB, 86 OB, 86 I	87: 15; CT2: 12; 86: 9; 91: 15
5	1100	4	91 IB	91: 15
6	1000	4	91 OB, 91 IB, 85 IB	91: 15; 85: 19
7	490	2	CT2 OB	CT2: 12

Stop 1 serves outbound Route 86 buses.

Stop 2 serves inbound Route 86 buses.

Stop 3 serves inbound and outbound Route 85 and Route 87 buses. Inbound and outbound stops are across the street from each other on either Bow St (outbound) or Somerville (inbound). Both stops are curbside and do not have a shelter.

Stop 4 serves many buses: outbound and inbound Routes 87, 86, and 91. The inbound stop has a bench but no shelter. The outbound stop is curbside but does not have a bench or shelter. It is less than a 1 minute walk from D6. From the north side of Somerville, riders can access inbound CT2 service.

Stop 5 serves inbound Route 91 riders.

Stop 6 serves outbound and inbound Route 91 riders. It also serves inbound Route 85 riders.

Stop 7 serves outbound CT2 buses.

D7:

Sited directly on Union Square, D7 also features close access to many of the neighborhood's bus routes. Site users will enter from Warren Avenue, giving them very quick access to popular bus stops around the busy Bow/Somerville/Washington/Webster intersection. From D7, users have quick access to Routes 85, 86, 87, 91, and CT2.

Figure 11: D7 Parcel Transit Access

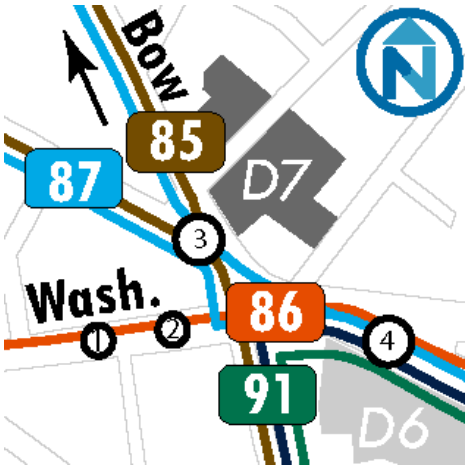


Table 12: D7 Parcel Bus Stops

D7 Transit Connectivity Summary Table				
Stop #	Walking Distance (in feet from development site)	Average walking time (in minutes from development site at 270 ft/minute)	Routes and Directions Served (ie outbound and/or inbound)	Average wait time (in minutes for each service available at stop)
1	1000	4	86 OB	86: 9
2	600	2	86 IB	86: 9
3	250	1	85 IB, 87 IB, 85 OB, 87 OB	85: 19; 87: 15
4	600	2	87 OB, 87 IB, CT2 IB, 86 OB, 86 I	87: 15; CT2: 12; 86: 9; 91: 15

Stop 1 serves outbound Route 86 buses.

Stop 2 serves inbound Route 86 buses.

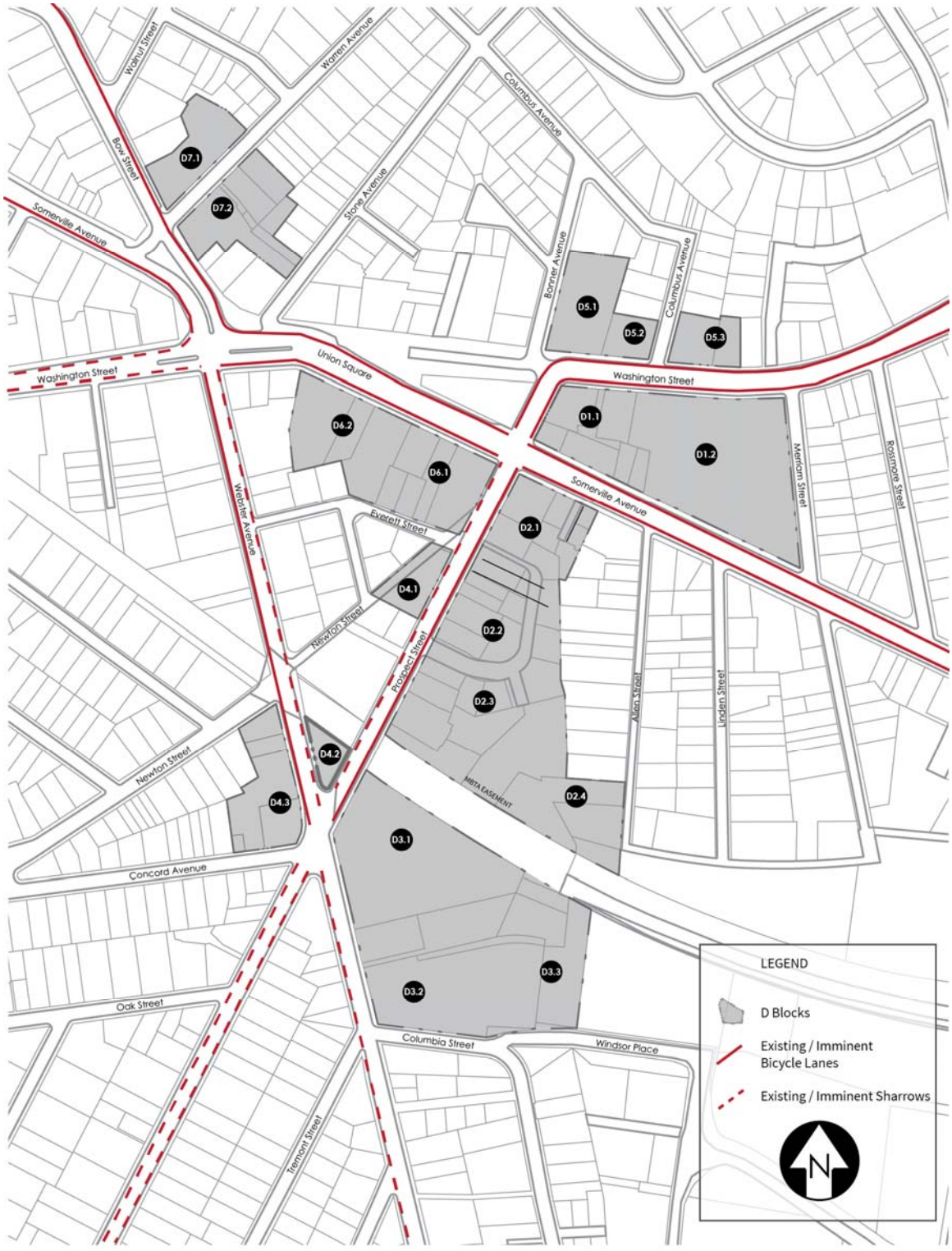
Stop 3 serves inbound and outbound Route 85 and Route 87 buses. Inbound and outbound stops are across the street from each other on either Bow St (outbound) or Somerville (inbound). Both stops are curbside and do not have a shelter.

Stop 4 serves many buses: outbound and inbound Routes 87, 86, and 91. The inbound stop has a bench but no shelter. The outbound stop is curbside but does not have a bench or shelter. It is less than a 2 minute walk from D7. From the north side of Somerville, riders can access inbound CT2 service.

Bicycle Network

Union Square is a vibrant cycling community, with dedicated on-street facilities located along major corridors in the study area. These facilities are planned for expansion alongside the Union Square Revitalization Program's developments. Somerville Avenue is scheduled to receive dedicated, separated cycle track's on both sides of the street prior to the construction of the development, as laid out in the base year. The map below shows the existing and imminent bicycle facilities, with a cycle track to be constructed on Somerville Avenue in the future and existing bicycle lanes on multiple nearby corridors, including Beacon Street, Cambridge Street, and Washington Street.

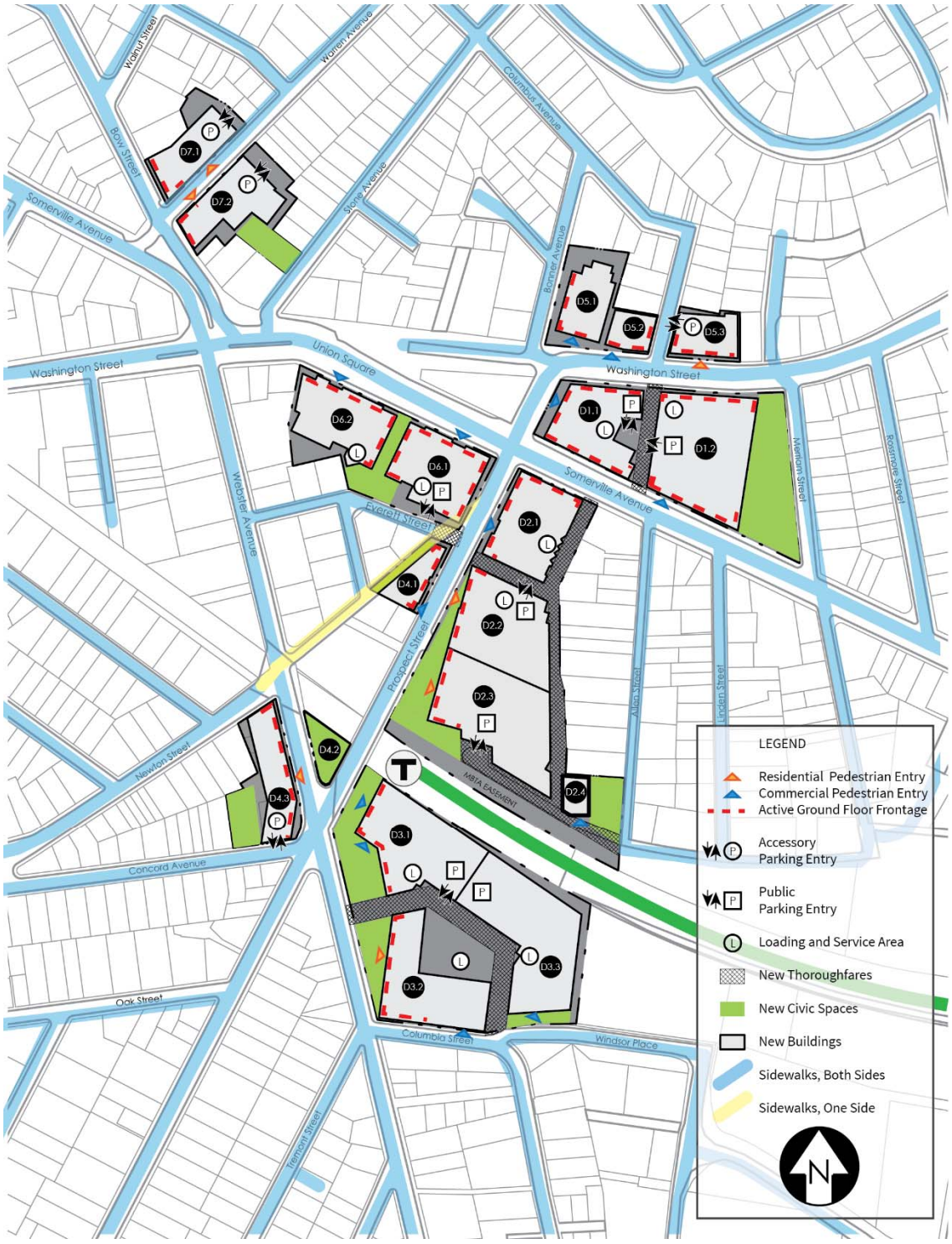
Figure 12: Existing and Imminent Bicycle Facilities



Sidewalks

As a neighborhood commercial and recreational center, Union Square is frequented by a large number of pedestrians of all ages, genders, and backgrounds. Walkers regularly visit one, two, or more establishments for shopping, dining, and entertainment. Furthermore, the presence of multiple bus routes in the study area encourages walking to and from bus stops and hubs for commuters and other travelers. The map below indicates the existing sidewalk network within the study area.

Figure 13: Existing Sidewalk Network



MODE SPLIT / TRIP GENERATION

Travel demand to and from the development sites was estimated based on the most current available development program. Trip generation rates and adjustments were taken from the ITE Trip Generation Manual, 8th edition.

1. Development Program

The estimated development program is displayed by project phase and project site in Tables 3 and 4, below. ITE trip generation rates were applied to these values to estimate site-generated person-trips for the project. Trip generation was conducted at the site level in order to allow future analysis to discuss the impacts of individual sites as they are built out. Given the long-term, phased timeframe of the Union Square Revitalization Plan, this site level approach allows greater flexibility when planning for future impacts and mitigation.

Table 13: Estimated Program Summary by Phase

PHASE	PHASE 1*	PHASE 2	PHASE 3**	TOTAL
APT (UNITS)	481	332	171	984
RETAIL (GSF)	55,217	40,440	47,064	142,721
OFFICE (ESTIMATED GSF)	190,329	752,075	216,971	1,159,375
HOTEL (UNITS)	0	175	0	175
RESTAURANT (GSF)	0	0	0	0
ARTS (GSF)	34,099	32,567	7,000	73,666

* For the purposes of this analysis, Phase 1 was considered to include all of the D5 blocks. It is more likely that only D5.1 will be developed as part of Phase 1 and therefore these projects herein are conservative for Phase 1.

** For the purposes of this analysis, Phase 2 was considered to include all of the D3 Blocks. It is more likely that only D3.1 will be developed as part of Phase 2, and therefore these projects herein are conservative for Phase 2.

Table 14: Estimated Program Summary by Development Parcel

PARCEL	D1	D2	D3	D4	D5	D6	D7
APT (UNITS)	0	450	332	51	31	0	120
RETAIL (GSF)	22,442	29,207	17,998	11,721	26,010	26,359	8,984
OFFICE (GSF)***	216,519	166,057	535,556	24,699	24,272	192,272	0
HOTEL (UNITS)	175	0	0	0	0	0	0
RESTAURANT (GSF)	0	0	0	0	0	0	0
ARTS (GSF)	23,038	23,599	9,529	0	10,500	7,000	0

*** It is anticipated the commercial office uses will be a mix of life sciences and traditional office. For this analysis, all of these spaces were considered office spaces which will have a higher and more conservative population density from traffic generation standpoint.

2. Trip Generation

Trip generation was conducted using nationally accepted trip generation rates from the ITE Trip Generation Manual, 8th edition. Person trips generated via this manual were modified according to the average vehicle occupancy rate observed in Union Square by the US Census. Census-based mode share data was used to distribute site-generated trips across modes, and a transportation demand management (TDM) factor was applied to reach an ultimate future non-vehicle mode

share of 60%. It was assumed that 15% of trips could be removed from the vehicle analysis due to internal capture, with the remaining entering and exiting trips being distributed across the roadway network for analysis.

a. ITE Trip Generation Rates

The ITE Trip Generation Manual, 8th edition, trip generation classes and rates applied to the above program are listed in the tables below. Demand from apartment units was estimated using the ITE 220 class, demand from retail space and arts space was estimated using the ITE 820 class, demand from office space and arts space was estimated using the ITE 710 class, and demand from hotel rooms was estimated using the ITE 310 class.

Table 15: ITE Trip Generation Rates, Weekday

ITE Class	ITE Rate	Entering	Exiting
Apartment (220)	6.65 per unit	50%	50%
Shopping Center (820)	42.7 per 1000 sf	50%	50%
General Office Building (710)	11.03 per 1000 sf	50%	50%
Hotel (310)	8.92 per unit	50%	50%

Table 16: ITE Trip Generation Rates, AM Peak

ITE Class	ITE Rate	Entering	Exiting
Apartment (220)	0.51 per unit	20%	80%
Shopping Center (820)	0.96 per 1000 sf	62%	38%
General Office Building (710)	1.56 per 1000 sf	88%	12%
Hotel (310)	0.67 per unit	58%	42%

Table 17: ITE Trip Generation Rates, PM Peak

ITE Class	ITE Rate	Entering	Exiting
Apartment (220)	0.62 per unit	65%	35%
Shopping Center (820)	3.71 per 1000 sf	48%	52%
General Office Building (710)	1.49 per 1000 sf	17%	83%
Hotel (310)	0.7 per unit	49%	51%

b. Average Vehicle Occupancy

Per City guidelines, the Average Vehicle Occupancy for Union Square was used as an adjustment factor for person-trips generated via ITE Trip Generation guidelines. Based on US Census data for block groups within Union Square, the average vehicle occupancy within the study area is 1.25. Given this information, ITE estimated person trips were multiplied by 1.25 to produce the ultimate number of person trips for analysis.

c. Mode Share

Mode splits for project-generated person trips were determined using Census journey-to-work data as suggested by the City of Somerville. Existing Census non-vehicle mode shares for the Union Square Census tract were grown based on assumptions regarding proposed Transportation Demand Management (TDM) measures proposed as part of the development. These measures assume a significant positive impact on non-vehicle mode share due to the Green Line extension, improved streetscapes in the Union Square area, and ongoing citywide measures intended to increase transit, bicycle, and pedestrian activity. The table below displays the non-vehicle mode shares proposed for this analysis.

Table 18: Existing and Future Non-Vehicle Mode Shares

Non-Vehicle Mode Shares	
Existing Non-Vehicle Share (Census Data)	34%
Future Non-Vehicle Share (Existing and Proposed TDM)	60%
Future Transit Share	22%
Future Bicycle Share	15%
Future Pedestrian Share	23%

Person Trips

Person trips for the development project were calculated using ITE Trip Generation methods and adjusted using Average Vehicle Occupancy for the Union Square Census tract. Site-generated person trips were calculated for each development parcel, as summarized in the table below.

Table 19: Generated Person-Trips by Development Parcel

PARCEL	**AM Person Trips**	**PM Person Trips**	**Daily Person Trips**
D1	641	704	6,459
D2	671	817	7,768
D3	1,279	1,340	11,117
D4	95	140	1,392
D5	119	210	2,128
D6	421	494	4,159
D7	87	135	1,479
COMBINED TOTAL	3,313	3,840	34,502

Proposed Motor Vehicle Trips

Proposed motor vehicle trips were calculated using ITE trip generation methods according to the 60% non-vehicle mode share described in this document. The following tables summarize person trips, vehicle trips, alternative mode trips, and vehicle trips for analysis by AM peak, PM peak,

and daily trips for each development site. Vehicle trips for analysis were generated by applying the following context variables:

- Internal Capture: An internal capture factor of 15% was applied to the overall vehicle trips.
- Pass-by Trips: No pass-by factor was applied to create a conservative approach to traffic generation. As the retail uses are not yet known, this approach conservatively assumes that the retail would generate trips of its own accord.
- Mobility Management: A suite of planned mobility management programs, as outlined in the CoS Union Square Neighborhood Plan, will be implemented to support the 60% non-auto mode share. These initiatives are detailed in the Mobility Management section of this letter.
- Within these vehicle trips for analysis, 5% are assumed to be carpool trips, and
- 4% are assumed to be heavy trucks. The remainder of vehicle trips are assumed to be drive-alone, non-heavy truck trips.

Table 20: Site-Generated Trips, AM Peak

PARCEL	Person Trips	Vehicle Trips	Transit Trips	Bicycle Trips	Ped. Trips	Vehicle Trips for Analysis	Vehicle Trips Entering	Vehicle Trips Exiting
D1	641	254	140	99	148	216	173	43
D2	671	265	147	103	155	225	130	96
D3	1,279	506	280	197	296	430	328	102
D4	95	38	21	15	22	32	19	12
D5	119	47	26	18	28	40	28	12
D6	421	166	92	65	97	141	122	20
D7	87	35	19	13	20	29	7	22
COMBINED TOTAL	3,313	1,310	725	511	767	1,113	806	307

Table 21: Site-Generated Trips, PM Peak

PARCEL	Person Trips	Vehicle Trips	Transit Trips	Bicycle Trips	Ped. Trips	Vehicle Trips for Analysis	Vehicle Trips Entering	Vehicle Trips Exiting
D1	704	278	154	109	163	237	68	169
D2	817	323	179	126	189	275	117	158
D3	1,340	530	293	207	310	450	127	323
D4	140	55	31	22	32	47	20	27
D5	210	83	46	32	49	70	28	42
D6	494	195	108	76	114	166	41	125
D7	135	53	30	21	31	45	27	18
COMBINED TOTAL	3,741	1,479	819	577	866	1,257	422	835

Table 22: Site-Generated Trips, Daily

PARCEL	Person Trips	Vehicle Trips	Transit Trips	Bicycle Trips	Ped. Trips	Vehicle Trips for Analysis	Vehicle Trips Entering	Vehicle Trips Exiting
D1	6,459	2,554	1,414	996	1,495	2,171	1,085	1,085
D2	7,768	3,072	1,701	1,198	1,797	2,611	1,305	1,305
D3	11,117	4,396	2,434	1,715	2,572	3,736	1,868	1,868
D4	1,392	550	305	215	322	468	234	234
D5	2,128	841	466	328	492	715	358	358
D6	4,159	1,645	911	642	962	1,398	699	699
D7	1,479	585	324	228	342	497	248	248
COMBINED TOTAL	34,502	13,642	7,555	5,322	7,983	11,596	5,798	5,798

Table 23: Site-Generated Trips, Saturday Midday Peak

PARCEL	Person Trips	Vehicle Trips	Transit Trips	Bicycle Trips	Ped. Trips	Vehicle Trips for Analysis	Vehicle Trips Entering	Vehicle Trips Exiting
D1	353	140	77	54	82	119	59	59
D2	489	193	107	75	113	164	82	82
D3	385	152	84	59	89	129	65	65
D4	107	42	23	16	25	36	18	18
D5	181	72	40	28	42	61	30	30
D6	181	72	40	28	42	61	30	30
D7	132	52	29	20	31	44	22	22
COMBINED TOTAL	1,828	723	400	282	423	614	307	307

MOBILITY MANAGEMENT PROGRAMS AND SERVICES

The Union Square Redevelopment is committed to achieving the City's goal of 60% non-auto transportation to the site. If monitoring and reporting shows that buildings are not meeting this goal, Mobility Management programming will be increased. This language will be included in leasing information as appropriate.

The Union Square Redevelopment is designed to form a walkable, bikeable, transit-oriented node in Union Square. This includes:

- Smaller blocks, which encourage walking and biking by providing short, direct connections
- Density around the forthcoming Green Line transit station, which will encourage ridership as more people have easy access
- Pedestrian accommodations and site through-connectivity, which prioritizes pedestrian pathways and makes walking the most convenient choice for access
- A shared parking approach, which maximizes the use of each parking space and commits more of the development to uses other than private vehicle storage.

Both SomerVision and the Union Square Neighborhood Plan, community driven planning documents, outline a priority on non-auto transit. Specifically, 60% of all trips should be from non-auto modes. The City is supporting this goal by proactively creating additional bicycle, pedestrian and transit facilities throughout Somerville, including in Union Square. The City's $50 million commitment to the Green Line Extension is a critical factor in building out this future, as are updated zoning requirements that seek to encourage density and a mix of uses at the most transit-accessible locations.

The Union Square Redevelopment Project, in keeping with the recently adopted Neighborhood Plan, seeks to create a live, work, shop and play environment with interlinked uses. Many trips will begin and end in Union Square, but for those accessing the square its unique and growing mix of multimodal infrastructure will provide excellent alternatives to the personal vehicle, and the US2 team understands that additional programming and services should be in place to encourage people to travel using sustainable modes. The US2 team has developed the Mobility Management plan below and will work with the City and/or future owners and tenants to implement these measures. These programs and services include:

- Financial Incentives
- Shared Vehicle Services
- Alternative Schedules
- Marketing & Education
- Parking Management
- On-Site Services
- Others

The proposed programs and services have been developed in service of the standards set forth in the Union Square Zoning standards as adopted June 2017.

Financial Incentives

Qualified Transportation Fringe Benefits

The Federal Commute Benefit program (as of September 2017) allows employees to receive a discount on commute costs through a pre-tax purchase program. This discount encourages employees to carefully consider transportation options, including cost rather than time. Ideally, the benefit "tips the scale" in favor of transit or bicycling by making these options even more affordable as compare to car ownership, insurance, and paying for parking.

Employees at the site will have the opportunity to enroll in federally designated Commute Benefit programs as current legislation allows.[7] In 2017, this means that employees are eligible for:

- A $20 commute benefit for those who commute by bicycle
- A pre-tax transit pass up to $255
- Pre-tax parking payment up to $255
- Vanpool fees (including UberPOOL and LyftLine up to $255)

Transit Passes

Free or discounted transit passes can increase transit ridership and in turn reduce travel by private vehicle. This is often much cheaper for administrators to provide than market rate parking in urban areas.

Employer Transit Passes: As possible, employers will be encouraged to provide a certain level of transit pass or Hubway membership as an employee benefit. This should be included in any benefits package, similar to insurance or a gym membership, and can be part of providing a competitive workplace environment to attract talent. For example, this may mean that Union Square employers subsidize a portion of all employee transit passes, or a capped base amount. The actual amount should incentivize transit use over driving and parking and should be developed along with a final parking pricing program.

Resident Transit Passes: Providing a subsidy for residents, particularly new residents who are still establishing travel patterns, can lower a barrier to taking transit (both paying for an obtaining the pass) and encourage people to choose transit over driving. With the large concentration of units at Union Square, the development team may be able to secure a bulk purchase of transit passes.[8] Passes could be provided at no cost for a set amount of time (i.e. first month for the MBTA, or the first year of Hubway) to new residents to encourage the development of sustainable transit patterns.

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[7] For more information, see: http://info.commuterbenefits.com/hubfs/Admin%20Resources%20Library/Employee_FAQ.pdf

[8] The MBTA does not at this time offer discounts for its Corporate Pass program, but does make it easy to administer group pass purchases. https://passprogram.mbta.com/Public/faqs.aspx?ecmid=6442453074#19

Shared Vehicle Services

Carpool Matching: MassDOT's MassRIDES administers NuRide, a ridematching program that helps people with similar commutes find one another. All residents and employees in Union Square will have the option to join this service. The site's user interface is relatively easy to use and helps users identify people with extremely similar commutes by crowdsourcing information.

Preferential Parking for Carpool/Vanpool: This type of "premium service" can encourage more users to pursue what may otherwise be perceived as a less convenient option. "Preferential Parking" that is more convenient (i.e. closer to the door) for carpool vehicles will be available when possible.

On-Site Car Sharing: Shared vehicles reduce parking demand by making interim vehicle trips possible (such as an employee going to a local meeting, or a resident going to the grocery store). US2 will pursue a contract with a carshare company (such as Zipcar or Enterprise) to provide shared vehicles on-site.

Alternative Schedules

Transportation demand management is about shifting the mode as well as the time that people travel to a given location. While "peak hours" of service on transit as well as roads can be very congested, often there is ample capacity at other times of day.

Flexible Hours. Employers at the Union Square site will be encouraged to offer flexible hours to their employees to ease pressure during peak times.

Telecommuting. In addition, employers will be encouraged to allow telecommuting at least once a week, which will reduce vehicle travel by an average of 20% if each person driving stays at home one day each week.

Marketing and Education

A key element of all transportation demand management programs is letting potential users know that they exist. While the specific programs have yet to be determined, the Union Square team intends to provide information through channels such as:

- Annual Mobility Education Meeting – all employees and residents in a given building will be invited to attend a Mobility Education meeting to learn about options annually. It is important to do this each year as mobility options will change.
- TDM Program information on **US2 websites** and related media
- **Posted Transportation Information,** such as maps and/or **TransitScreen** installation, particularly at larger, more commercial sites
- Residential/Employee distributed **information packet,** both paper and digital, including:
  - Carshare membership information
  - Bikeshare membership information
  - Local bicycle map
  - Local transit map
- Where practical and feasible, commercial parking in the development will incorporate **real-time availability indicators** both at the site and online. This will discourage

people from choosing to drive when parking is full, thus limiting frustration and congestion during peak times.

Parking Management

Parking management is one of the key elements to management vehicular demand. The US2 team intends to pursue the following steps to manage parking:

- **"Unbundled" Parking**. All residents and employers at the US2 site must purchase and/or lease parking separately from any office and/or residential space. This strategy ensures that users understand the true cost of parking provision and can make transportation choices accordingly. It also creates more affordable housing and office space by allowing parking to become an optional amenity rather than a required purchase.
- **Market Rate Pricing.** Parking for both residential and commercial uses will be available at local market rates. Parking pricing is one of the most effective tools to balance demand and encourage people to travel using more cost-effective modes such as transit, walking, and/or bicycling.
- **Daily Pricing.** When practical and feasible, employers will be encouraged to provide parking at daily rates rather than monthly leases. When users pay for parking each day, they are reminded of its cost which encourages choosing other modes. Moreover, avoiding monthly leases helps to avoid the mentality that parking is a "sunk cost" and instead encourages flexibility in travel options.
- **Real-Time Availability**. See above.

On-Site Services

The larger Union Square area offers significant transit service, bicycle infrastructure, and sidewalk coverage. However, there are additional services that the development could offer, including:

- **On-Site Transportation Coordinator.** As the density of the Union Square redevelopment increases, an On-Site Transportation coordinator can help organize many of the sites and services described in this Mobility Management Plan. This position(s) will be responsible for implementing and administering the programs in this Mobility Management plan, as well as serving as a contact for the City of Somerville.
- **Hubway Expansion.** Potentially incorporated with the Green Line if possible, Hubway is the Boston Region bikeshare system. Bikeshare gives users short-term access to bicycles located throughout Somerville, Cambridge, Brookline, and Boston. For members, the first half-hour is free, and bikes are available on an hourly or daily basis. The Union Square redevelopment will support expansion of this service and may provide space for a dock as necessary.
- **Bicycles at Work.** Although a public bikeshare program may be more beneficial to the general public, employers will also be encouraged to provide a few bicycles at the site that employees can use during the day.
- **Secure Bicycle Parking.** Almost half (44%) of the parking spaces at the Union Square development are for bikes. Approximately 1,166 bicycle parking spaces will be distributed across the development sites, with the greatest concentration of bike parking available at

D1.2, D2.3, and D3.2. Covered and secure bicycle parking will encourage residents and employees alike to purchase and utilize bicycles by treating the mode as a legitimate alternative to the private vehicle. Quality short-term bicycle parking will encourage people visiting residents, accessing retail, and/or attending meetings in the office space to travel by bicycle. Considerations for the final bicycle parking design to encourage its use are:

  - Clear wayfinding to bicycle parking, particularly in garage facilities
  - 24-hour access
  - Secure bicycle racks that meet Somerville-specific or national standards
  - Location close to entrances
  - Separate pedestrian entries where possible to allow people to get to/from bikes that are in the same space as car parking

- **Bicycle Repair Facilities.** Standalone facilities with heavy-duty tools, including air pumps, are a relatively low-cost way to support people who choose to bike. Where possible, the US2 development will incorporate these facilities.
- **Showers and Changing Facilities**. For people walking and bicycling to work, particularly during hot summer months or on rainy days, this type of facility can be essential. Where practical and feasible, the development will incorporate these types of facilities and/or the infrastructure for them.
- **Guaranteed Ride Home Program**. Employees in particular can use this program to get home in an emergency such as for a family illness, bicycle damage, and/or unscheduled overtime, making commuting by bicycle, on foot, or by transit more convenient and comfortable.

Others

If the need arises, the Union Square Redevelopment will take part in a local Mobility Management Association (MMA) as described in the City of Somerville Union Square Zoning.

Sample Lease Agreement Text

US2 will develop sample lease agreement text in coordination with the City of Somerville.

MONITORING AND ANNUAL REPORTING

Annual Travel Surveys

Travel surveys are a key component of understanding how residents and employees are traveling, as well as whether they are aware of the travel options that are available to them. User questions will follow City requirements as available, and should cover topics such as:

- Mode choice for commute
- Mode choice for other trips
- Work hours
- Travel distance
- Reasons for most common mode choice

- Awareness of commute options

It is likely that the survey will be digital, but if response rates are low, employers and/or property managers will be encouraged to supplement digital responses with intercept or paper surveys.

Biennial Counts of Car and Bike Parking Occupancy and Driveway ins/outs

Each building with car and bicycle parking will submit peak occupancy and driveway counts biennially as part of a Mobility Status Update (see below).

Status Update

Based on the findings from the survey and the most recent set of biennial counts, each building in the development will submit a Mobility Status update annually to the City of Somerville. The update will follow any guidelines provided by the City of Somerville and will include:

- Survey results
- Driveway counts
- Peak bicycle parking occupancy counts
- Peak vehicle parking occupancy counts
- Digital files as required
- Comparison with and review of previous trends as data is available