



65 Glenn Street 169 Ocean Blvd.
Lawrence, MA 01843 Unit 101, PO Box 249
Hampton, NH 03842
T:978.794.1792

TheEngineeringCorp.com

MEMORANDUM

TO: Ms. Sarah Barnat
Barnat Beverly LLC
30 Rowes Wharf, Suite 600
Boston, MA 02110

DATE: September 23, 2016

FROM: Samuel W. Gregorio, P.E., PTOE, Project Engineer
Eric R. Paquette, E.I.T., Project Engineer

PROJECT NO.: T0664

RE: #112 Rantoul Street Development – Beverly, Massachusetts
Traffic Impact, Access, and Parking Study

INTRODUCTION

TEC, Inc. (TEC) has been retained by Barnat Beverly LLC (the "Applicant") to prepare a Traffic Impact, Access, and Parking Study (TIAPS) for the development of the vacant pad site located at #112 Rantoul Street in Beverly, Massachusetts (the "Project"). The site directly abuts the Massachusetts Bay Transportation Authority (MBTA) Beverly Depot parking garage. The project consists of constructing a mixed-use development containing up to 70 residential apartment units (67 units currently planned), $\pm 3,000$ square feet (SF) of specialty retail space and a $\pm 1,500$ SF restaurant use. The Applicant has assumed the restaurant space will be operated as a coffee shop to provide a conservative traffic analysis condition.

The development site is served by both Massachusetts Bay Transportation Authority (MBTA) and Cape Ann Transportation Operating Company (CATOC) bus routes along Rantoul Street, and by MBTA Commuter Rail service at the Beverly Depot MBTA Station. Based on its proximity to the Beverly Depot MBTA Station, the Applicant is committed to market the development as a transit-oriented development (TOD).

Residential parking for the proposed project will be available within the existing MBTA parking garage through agreement between the Applicant and the MBTA. In addition, the site accommodates seven (7) surface parking spaces, as well as seven (7) on-street parking spaces along Rantoul Street abutting the parcel frontage. Additional restaurant and retail parking is expected to occur on-street or within the nearby public parking availability. Access and egress for the MBTA parking facility will be maintained along the westerly side of Rantoul Street (Route 1A) and at the terminus of Court Street. Access/egress from the surface parking field will be maintained along the westerly side of Rantoul Street, north of the Beverly Depot MBTA Parking Garage Driveway. The two curb cuts along Rantoul Street will be reconstructed as part of the MassDOT-funded roadway improvement project.

TEC has evaluated the traffic operations for the site driveways and study area intersections under existing and future conditions. The future year planning horizon examines traffic operations under existing conditions (2016) as well as a 7-year design horizon (2023) for traffic-

volume projections, which includes an evaluation of the No-Build conditions (without the proposed project) and Build conditions (with site traffic added). These conditions are compared to determine what, if any, additional off-site mitigation is necessary to provide reasonable traffic operations in the area after the project is complete.

EXISTING CONDITIONS

Study Area

The study area was selected to contain the major roadways providing local access to the project site. The following intersections were included in the study area:

1. Rantoul Street (Route 1A) / Beverly Depot MBTA Parking Garage Driveway
2. Rantoul Street (Route 1A) / Pleasant Street
3. Pleasant Street / Park Street / Court Street
4. Rantoul Street (Route 1A) / Railroad Avenue

The study area intersections are shown graphically in Figure 1.

Geometry

A comprehensive field inventory of existing traffic conditions at the study area intersections was conducted by TEC staff in between April 2015 and September 2016 to obtain information related to intersection geometry and lane usage. The field investigation consisted of an inventory of existing roadway geometrics, operating characteristics, and safety characteristics. A description of the existing roadway and intersection inventory is provided below.

Roadways

Rantoul Street (Route 1A)

Rantoul Street, signed as Massachusetts Route 1A, is a two-lane north-south principal arterial roadway maintained by the City of Beverly. Rantoul Street (Route 1A) provides local connection between Sergeant James Ayube Memorial Drive and the City of Salem to the south, and Downtown Beverly to the north. Rantoul Street is generally ±44-feet wide in the vicinity of the project with one travel lane in each direction and on-street parking provided on both sides of the roadway. Directional flow along the roadway within the study area is separated by a marked centerline. The posted speed limit along Rantoul Street is 25 miles per hour (MPH). Land uses along Rantoul Street include retail, commercial, and residential uses.



1" = 30'

#112 Rantoul Street Development - Beverly, Massachusetts

Traffic Impact, Access, and Parking Study



Figure 1

Project Location Map & Study Area Intersections



Pleasant Street

Pleasant Street is an east-west urban collector roadway maintained by the City of Beverly. Pleasant Street is one-way westbound between Cabot Street (Route 22) and Park Street and provides two-way flow between Park Street and River Street. As part of the adjacent #131 Rantoul Street Redevelopment Project, Pleasant Street between Hardy Street and Rantoul Street is to be converted to two-way flow. Directional flow along Pleasant Street is unmarked between Park Street and River Street. On-street parking is permitted along both sides of the roadway between Cabot Street and Rantoul Street. A speed limit is not posted along the roadway. Land uses along Pleasant Street are primarily residential and commercial.

Park Street

Park Street is a two-lane, north-south collector roadway maintained by the City of Beverly. The roadway provides a local connection between Pleasant Street to the south and Elliot Street to the north and serves as access to the Beverly Depot MBTA Station. Directional flow along Park Street is unmarked. Head-in parking is provided along the westerly side of Park Street near the Beverly Depot MBTA Station. Vehicles were observed double and triple parking behind the head-in spaces for commuter pick-up and drop-off. A taxi stand is provided on the easterly side of Park Street between Railroad Avenue and Broadway, which is utilized for on-street parking. On-street parking is not permitted along Park Street north of Railroad Avenue. South of Railroad Avenue, on-street parking is permitted along the westerly side of the roadway. A speed limit is not posted along Park Street. Land uses along Park Street consist of the Beverly Depot MBTA Station and primarily commercial land uses.

Railroad Avenue

Railroad Avenue is an east-west urban collector roadway maintained by the City of Beverly. Railroad Avenue provides two-way flow between Cabot Street and Rantoul Street and is one-way eastbound between Rantoul Street and Park Street. Directional flow along Railroad Avenue is unmarked. On-street parking is permitted along the northerly side of the roadway for its entire length. There is no posted speed limit along Railroad Avenue. Land uses along Railroad Avenue are primarily residential and commercial.

Intersections

Rantoul Street (Route 1A) / MBTA Parking Garage Driveway

The Beverly Depot MBTA Parking Garage Driveway intersects Rantoul Street to form a three-legged, unsignalized intersection. The Rantoul Street northbound approach consists of a shared left/through lane and the southbound approach consists of a shared through/right-turn lane. Directional flow along Rantoul Street is separated by a marked centerline and on-street parking available on both sides of the roadway. The Beverly Depot MBTA Parking Garage Driveway eastbound approach consists of three travel lanes; including: an exclusive access lane, an exclusive egress lane, and a fluctuating access/egress lane which varies based on the commute hours. Directional flow along each lane is separated by a marked lane line. Sidewalks are present on both sides of each approach with a crosswalk located across the Beverly Depot MBTA Parking Garage Driveway.



Rantoul Street (Route 1A) / Pleasant Street

Pleasant Street intersects Rantoul Street to form a four-legged, unsignalized intersection. Pleasant Street provides one-way flow westbound through the intersection. The Pleasant Street westbound approach operates under STOP control while the Rantoul Street approaches are free-flowing. The Pleasant Street westbound approach consists of a general-purpose travel lane with on-street parking permitted along both sides of the roadway. Both the northbound and southbound Rantoul Street approaches consist of a general-purpose travel lane with on-street parking along both sides of the roadway. Directional flow along Rantoul Street is separated by a marked centerline. Sidewalks are provided along both sides of the roadway on all approaches except the eastbound approach, which only provides sidewalk along the northerly side. A crosswalk is striped across Rantoul Street south of the intersection. As part of the adjacent #131 Rantoul Street Redevelopment Project, Pleasant Street between Hardy Street and Rantoul Street is to be converted to two-way flow.

Pleasant Street / Park Street / Court Street

Park Street and Court Street intersect Pleasant Street to form a four-way, offset, unsignalized intersection. The Court Street northbound, Park Street southbound, and Pleasant Street westbound approaches operate under STOP-control while the Pleasant Street eastbound approach is free-flowing. The Pleasant Street westbound approach is one-way flow entering the intersection. All four approaches consist of a single general-purpose travel lane. Sidewalks are provided on both sides of all approaches except the southerly side of the Pleasant Street westbound approach. A crosswalk is provided across the westbound intersection approach.

Rantoul Street (Route 1A) / Railroad Avenue

Railroad Avenue intersects Rantoul Street to form a four-way unsignalized intersection. Both the Railroad Avenue approaches operate under STOP-control while the Rantoul Street approaches are free-flowing. The Railroad Avenue eastbound approach is one-way flow entering the intersection. Although Railroad Avenue is striped for a single general purpose travel lane, the approach is utilized as up to three travel lanes during periods of heavy traffic congestion. The Railroad Avenue westbound approach consists of a single general purpose travel lane with directional flow unmarked and on-street parking permitted along the northerly side of the roadway. Both the northbound and southbound Rantoul Street approaches consist of a general purpose travel lane with on-street parking along both sides of the roadway. Directional flow along Rantoul Street is separated by a marked centerline. Sidewalks are provided along both sides of all approaches to the intersection. Crosswalks are provided across all approaches except across Rantoul Street south of the intersection. As part of the Route 1A (Rantoul Street and Cabot Street) Reconstruction Project (MassDOT Project #600220), traffic signal control is currently being implemented at this intersection.

Existing Traffic Volumes

In order to establish existing traffic-volume conditions at the study area intersections, manual Turning Movements Counts (TMCs) were conducted at the Rantoul Street / MBTA Parking Garage Driveway intersection during the weekday morning (7:00 AM – 9:00 AM) and weekday evening (4:00 PM – 6:00 PM) peak periods on Thursday, September 8, 2016. This data showed



the general effect of Route 1A construction on the traffic volumes entering and exiting the parking garage. Therefore, to assess the total vehicles entering the exiting the garage for a typical weekday and non-construction condition, the City of Beverly Planning Department supplied TEC with parking garage occupancy and ticket information from Monday, May 16, 2016. To provide a conservative scenario, TEC analyzed the greater entering and exiting volumes during the weekday morning and weekday evening between the garage occupancy report and the TMCs. For other study area intersections, TMCs were compiled from the #131 Rantoul Street Redevelopment TIA¹ as conducted during the weekday morning and weekday evening peak periods on Tuesday, April 14, 2015. The 2015 traffic volumes were upwardly increased to reflect a 1.0 percent annual growth in traffic. A detailed summary of the TMCs, partitioned into 15-minute intervals, is provided within Attachment A.

Seasonal Adjustment

In accordance with the Massachusetts Department of Transportation (MassDOT) standards, traffic volumes are typically adjusted to average-month conditions. Based on a review of historic traffic-volume counts collected by MassDOT at a permanent count station along Route 128 in Beverly², traffic volumes in April are 0.7 percent lower than average-month conditions while traffic volumes in September are 3.7 percent greater than average-month conditions. Therefore, the April 2015 traffic volumes were upwardly adjusted by 0.7 percent to reflect average month conditions while the September 2016 traffic volumes were left unadjusted to represent a more conservative estimate. The compiled seasonal adjustment data is provided in Attachment B.

The resulting 2016 Existing Conditions weekday morning and weekday evening peak hour traffic-volume networks are illustrated in Figure 2.

¹ *131 Rantoul Street Redevelopment – Beverly, Massachusetts*; Traffic Impact, Access, and Parking Study; TEC, Inc.; April 30, 2015

² MassDOT Permanent Count Station 35 – Beverly – Route 128 – North of Brimble Avenue

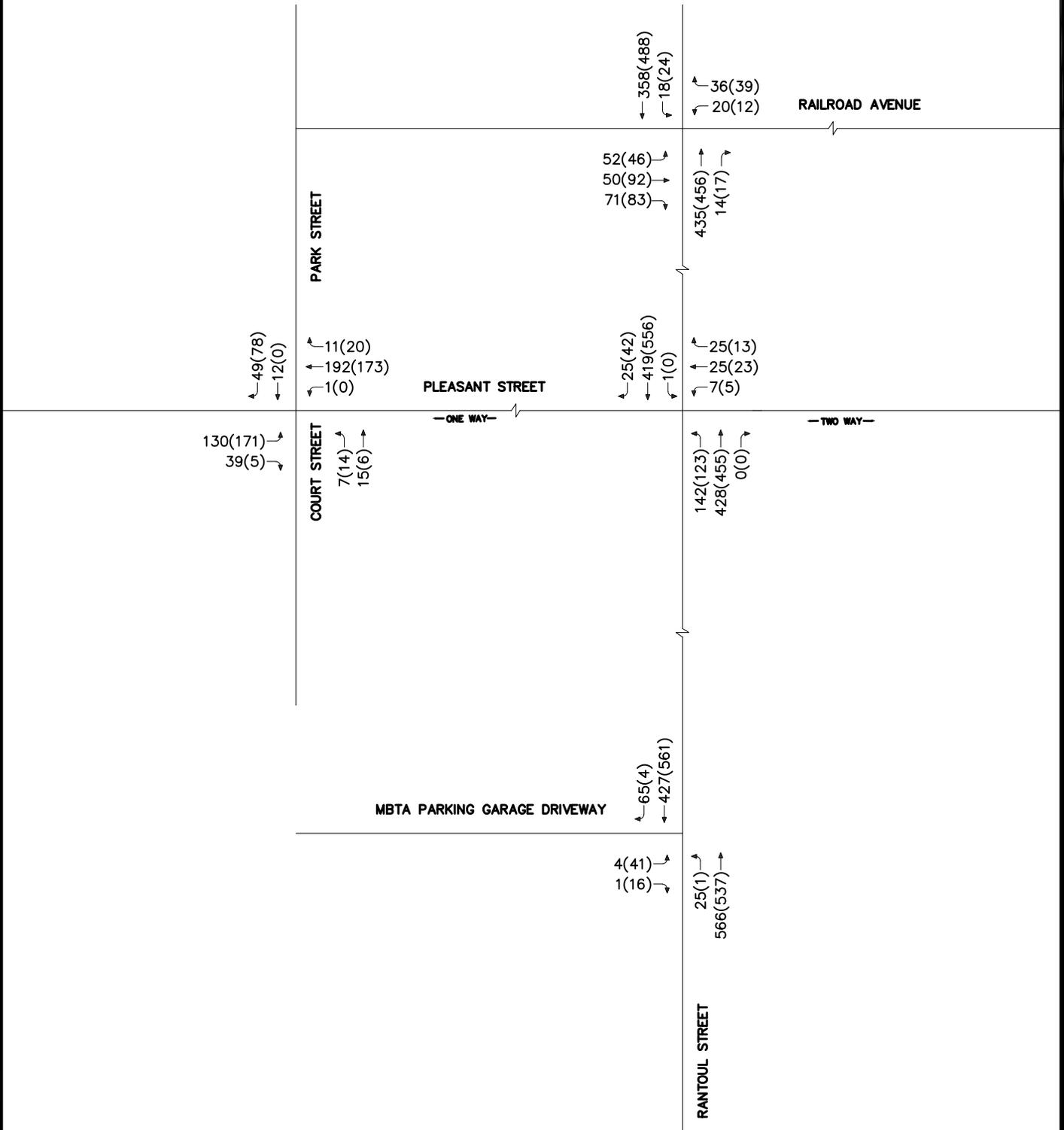




Not to Scale

#112 Rantoul Street Development - Beverly, Massachusetts

Traffic Impact, Access, and Parking Study



XX(XX) = WEEKDAY MORNING PEAK HOUR(WEEKDAY EVENING PEAK HOUR)

Figure 2

2016 Existing Conditions
Weekday Morning, and
Weekday Evening
Peak Hour Traffic Volumes



Public Transportation

MBTA Commuter Rail service is provided to the City of Beverly via the Newburyport / Rockport Line. Commuter rail route and schedule data are included in Attachment C, and a summary of the route is provided below:

- *Newburyport / Rockport Commuter Rail Line* - The MBTA commuter rail provides connections from North Station in Boston with stations at Chelsea, River Works, Lynn, Swampscott, Salem, and Beverly before branching off to North Beverly, Hamilton / Wenham, Ipswich, Rowley, and Newburyport on the Newburyport Branch and to Montserrat, Prides Crossing, Beverly Farms, Manchester, West Gloucester, Gloucester, and Rockport on the Rockport Branch. Inbound service from Beverly Depot to North Station runs between 5:33 AM and 11:30 PM, and outbound service to Beverly Depot from North Station runs between 6:26 AM and 12:15 AM. Outbound service from Beverly Depot to Newburyport or Rockport runs between 6:56 AM and 12:51 AM, while inbound service from Newburyport or Rockport to Beverly Depot runs between 4:55 AM and 12:30 AM. Typical headways to/from Boston during the commuter peak periods at Beverly Depot Station are 9 to 26 minutes during the weekday morning (12 trains from 5:33 AM to 8:54 AM) to Boston and 7 to 38 minutes during the weekday evening (11 trains from 4:15 PM to 7:23 PM) from Boston. On Saturdays and Sundays, inbound service from Beverly Depot to North Station runs between 7:36 AM and 10:36 PM, and outbound service to Beverly Depot from North Station runs between 8:30 AM and 11:30 AM. Outbound service from Beverly Depot to Newburyport or Rockport runs between 9:05 AM and 12:05 AM, while inbound service from Newburyport or Rockport to Beverly Depot runs between 7:00 AM and 10:00 AM. The Beverly Depot Station is located at 100 Rantoul Street, approximately 0.1 miles north of the project site.

MBTA Bus service is provided to the City of Beverly via Route 451 – North Beverly – Salem Depot via Cabot Street or Tozer Road. Bus route and schedule data are included in Attachment C, and a summary of the route is provided below:

- *Route 451 – North Beverly – Salem Depot via Cabot Street or Tozer Road* – MBTA Route 451 provides weekday bus service between the Salem Depot Commuter Rail Station, the Cummings Center, and the North Beverly Commuter Rail Station. Weekday service runs between 5:50 AM and 9:32 AM in the morning and between 2:30 PM and 7:39 PM in the evening. Numerous bus stops are available within walking distance on Cabot Street (Route 22).

Under contract with the City of Beverly and the MBTA, CATOC provides shuttle bus service throughout the City of Beverly via the Yellow Line - Beverly Shuttle Bus Route. Bus route and schedule data are included in Attachment C, and a summary of the route is provided below:

- *Yellow Line – Beverly Shuttle Bus Route* – CATOC provides weekday and Saturday bus service to major destinations throughout the City of Beverly, including the Bridge Street Variety Store, the Beverly Depot Commuter Rail Station, City Hall, the North Beverly Plaza, Beverly Hospital, the Montserrat

Commuter Rail Station, Cedar Street Apartments, and the Cummings Center. Weekday service runs between 6:45 AM and 5:00 PM, with headways of approximately 60 minutes to 120 minutes. Saturday service runs between 7:00 AM and 4:30 PM, with headways of approximately 60 minutes to 120 minutes. A bus stop is conveniently located at the Beverly Depot Commuter Rail Station, and the bus route passes directly in front of the project site.

The City of Beverly provides curb-to-curb transportation services for senior citizens and persons with disabilities in cooperation with the Beverly Council on Aging (BCOA). This shuttle service runs between 8:00 AM and 3:00 PM Monday-Wednesday, 8:00 AM and 6:00 PM Thursday, and 8:00 AM and 1:00 PM Friday. This service operates on an as needed basis by appointment only.

Crash History Analysis

Collision data for the study area intersections was compiled and analyzed for the most recent consecutive five-year period (2010-2014) on file with MassDOT. The motor vehicle crash data was reviewed to determine if any collision trends exist within the study area. A summary of the vehicle collision data and intersection crash rates are provided in Table 1.

Crash Rate Worksheets

In addition to examining the number of collisions at the study area intersections, a crash rate was calculated to compare occurrence of collisions to the volume of traffic passing through the intersection. The crash rate per million entering vehicles (MEV) was calculated using the weekday evening peak hour volumes from the TMCs and a calculated K-factor obtained from the MassDOT standards. The crash rates at each of the study area intersections were compared to the statewide and district-wide averages published by MassDOT in February 2016 to determine the significance of the crash occurrence. The statewide average for signalized and unsignalized intersections is 0.77 and 0.58, respectively. The District 4 average for signalized and unsignalized intersections is 0.73 and 0.56, respectively. A compilation of the MEV rate calculation worksheets are provided in Attachment D.

Collision Data Summary

The Rantoul Street / Railroad Avenue intersection experienced less than three (3) crashes per year over the five-year study period. The crash rate for this intersection was lower than the statewide and District-wide averages. Of these crashes, approximately 57 percent of the collisions (8 of 14) were angled collisions which may be a result of the two Railroad Avenue approaches being slightly offset from one another creating a longer path of travel. Improvements are proposed at this intersection as part of the Route 1A Improvement Project (MassDOT Project #600220), which include installation of a traffic signal, and are anticipated to reduce the number of angled crashes at this intersection.

The Rantoul Street / Pleasant Street intersection experienced less than two (2) crashes per year over the five-year study period. The crash rate for this intersection was lower than the statewide and District-wide averages. Of these crashes, approximately 80 percent of the



collisions (4 of 5) were angled collisions which may be a result of limited sight lines from vehicles parked too close to the intersection.

All other intersections within the study area experienced one or less collision per year during the five-year study period, indicating no noticeable crash trends exist.

Table 1 – Intersection Collision History Summary

Parameter		Rantoul St / MBTA Driveway	Rantoul St / Pleasant St	Pleasant St / Park St / Court St	Rantoul St / Railroad Ave
Crash Year	2010	0	3	0	5
	2011	3	0	0	1
	2012	0	2	2	3
	2013	2	3	0	2
	2014	0	1	2	3
	TOTAL	5	9	4	14
Average Annual		1.00	1.80	0.80	2.8
Rate per MEV		0.21	0.37	0.43	0.55
Manner of Collision	Angled	1	4	1	8
	Rear-end	1	2	1	3
	Sideswipe	0	1	0	0
	Single Vehicle	2	2	2	2
	Head-On	1	0	0	0
	Ped / Bike	0	0	0	0
	Not Reported	0	0	0	1
	TOTAL	5	9	4	14
Road Surface Conditions	Dry	4	6	3	11
	Wet	1	3	1	1
	Snow / Ice	0	0	0	2
	Other / Unknown	0	0	0	0
	TOTAL	5	9	4	14
Injury Status (Crash Severity)	Prop Damage	3	5	4	8
	Non-Fatal Injury	2	3	0	6
	Fatal Injury	0	0	0	0
	Not Reported	0	1	0	0
	TOTAL	5	9	4	14
Day of Week	Monday-Friday	4	6	4	11
	Saturday-Sunday	1	3	0	3
	TOTAL	5	9	4	14
Time of Day	6:00AM-9:00AM	1	0	0	2
	9:00AM-3:00PM	0	3	1	8
	3:00PM-6:00PM	3	5	2	4
	6:00PM-6:00AM	1	1	1	0
	TOTAL	5	9	4	14

FUTURE CONDITIONS

Traffic volumes in the study area were projected to the year 2023, which reflects a seven-year planning horizon per MassDOT standards. The traffic conditions for the year 2023, under No-Build conditions, were developed to document the operating conditions independent of the proposed project, including all existing traffic, new traffic resulting from background growth, and traffic from specific development projects expected to be completed by 2023. Anticipated site-generated traffic volumes for the proposed residential development were superimposed upon the No-Build traffic networks to reflect the Build conditions with the proposed project.

Background Traffic Growth

Traffic growth is a function of the expected land development in the immediate area and the surrounding region. Several methods can be used to estimate this growth. Traffic engineers frequently employ an annual percentage increase in traffic growth, which is applied to all traffic volumes under study. The drawback to such a procedure is that some turning volumes may actually grow at either a higher or a lower rate at particular intersections.

An alternative procedure identifies the location and type of planned development, estimates the traffic to be generated, and assigns it to the area roadway network. This procedure produces a more realistic estimate of growth for local traffic. However, the drawback of this procedure is that the potential growth in population and development external to the study area would not be accounted for in the traffic projections.

To provide a conservative analysis framework, both procedures were considered.

General Background Growth

Traffic-volume data compiled by MassDOT from permanent count stations and historic traffic counts in Beverly^{3,4,5,6} along local roadways within the vicinity of the project were reviewed in order to determine traffic growth trends. Based on the MassDOT traffic volume data, traffic volumes in the area have been decreasing at a rate of 2.3 percent per year since 2004. Therefore, to provide a conservative (worse-case) analysis scenario, a 1.0 percent per year compounded annual background traffic growth rate was used to account for potential future traffic growth external to the study area and presently unforeseen development. Count station data have been included in Attachment E.

Specific Developments by Others

TEC coordinated with the City of Beverly Planning Department to identify nearby private / public development projects in the vicinity of the study area that are either in the planning process or were recently approved but not yet occupied. Based on these discussions, the City of Beverly identified four (4) projects that could contribute traffic volumes to the study area:

³ MassDOT Temporary Count Station 5072 – Beverly – Essex Street at Wenham Town Line

⁴ MassDOT Temporary Count Station 5076 – Beverly – Route 127 east of Haskell Street

⁵ MassDOT Temporary Count Station 5100 – Beverly – Kernwood Street at Beverly Town Line

⁶ MassDOT Temporary Count Station 5632 – Beverly – Cabot Street south of County Way



- *#201 Elliott Street* – The proposed project consists of constructing a six-story residential building and parking facilities within a mixed-use development known as the Cummings Center. The current proposal includes the construction of 73 dwelling units. A *Traffic Impact Access Study*, prepared by Jacobs Engineering and dated April 1, 2015, identifies the impacts on neighboring roads resulting from the proposed site-generated traffic. Due to the low traffic volumes expected to pass through the study area intersections, the site-generated traffic for this development was assumed to be included as part of the 1.0 percent background growth rate.
- *#131 Rantoul Street* – The proposed project consists of constructing a four-story multi-use building with approximately 8,500 SF of ground floor retail / commercial space, 72 residential apartment units, and 72 parking spaces. This project, which is currently under construction, is directly diagonal across Rantoul Street from the #112 Rantoul Street Project. Traffic to be generated from this project was superimposed along the traffic network as forecasted in the *Traffic Impact, Access, and Parking Study*, prepared by TEC, Inc. and dated April 30, 2015.
- *#10-12-16 Congress Street* – The proposed project consists of constructing 72 residential condominiums along Congress Street adjacent to the Essex Bridge. A *Traffic Impact Assessment*, prepared by Abend Engineering and dated January 8, 2007, identifies the impacts on neighboring roads resulting from the proposed site-generated traffic. Due to the proximity of the development to other commuter routes, it is unlikely that a significant number of site generated trips would traverse through the study area intersections. As a result, the site-generated traffic for this development was assumed to be included as part of the 1.0 percent background growth rate.
- *#480-482 Rantoul Street* – The proposed project consists of redeveloping the existing properties located at #480-#482 Rantoul Street and constructing 90 residential apartment units and 1,900 square feet (SF) of specialty retail space. Traffic to be generated from this project was superimposed along the traffic network as forecasted in the *Traffic Impact, Access, and Parking Study*, prepared by TEC, Inc. and dated March 28, 2016.

A compilation of the specific developments by others traffic studies is provided in Attachment F. The resulting specific developments by others traffic-volume networks during the weekday morning and weekday evening peak periods are graphically depicted in Figure F-1 and Figure F-2 respectively.

Route 1A (Rantoul Street and Cabot Street) Reconstruction

MassDOT and Middlesex Construction are currently in the construction stage of the Route 1A (Rantoul Street and Cabot Street) Reconstruction Project (MassDOT Project #600220), which consists of approximately 5,750 feet of pavement rehabilitation along Route 1A from Cabot Street (South) to 440 Feet North of Blain Avenue to improve safety, traffic flow, and roadway drainage. The existing roadway width will remain approximately the same, however, turning lanes will be added at the Rantoul Street (Route 1A) / Elliot Street intersection and the existing traffic signals at School Street, Federal Street and Elliott Street will be upgraded to meet current standards.



Within the development study area, travel lanes along Rantoul Street will be restriped with 11-foot travel lanes and 5-foot bicycle lanes in both the northbound and southbound directions. Additional improvements include reconstructed sidewalks with curb bump-outs to define on-street parking limits, new granite curbing, and reconstructed accessible wheelchair ramps. The project proposes to construct a new fully-actuated traffic signal at the intersection of Rantoul Street / Railroad Avenue.

TEC Inc. has included all geometric and traffic improvements provided in the Functional Design Report by Dewberry-Goodkind, Inc. (Dewberry) "*Reconstruction of Route 1A (Rantoul Street and Cabot Street)*" submitted in 2009.

No-Build Traffic Volumes

The 2023 No-Build weekday morning and weekday evening peak-hour traffic-volume networks were developed by applying the 1.0 percent per year compounded annual background traffic growth rate on the 2016 Existing peak-hour traffic volumes over the seven-year design horizon and adding traffic to be generated by the specific developments by others. The resulting 2023 No-Build weekday morning and weekday evening peak-hour traffic-volume networks are illustrated in Figure 3.

Site-Generated Traffic

The TOD project consists of redeveloping the existing vacant pad-site and constructing a mixed-use development with up to 70 residential apartment units, ±3,000 SF of specialty retail, and a ±1,500 SF restaurant use. The proposed restaurant may be tenanted as a higher-intensity generator; therefore, the Applicant has assumed the space to operate as a coffee shop to provide a high-intensity analysis condition. The site-generated traffic volumes for the project were estimated based on standard trip rates published in the Institute of Transportation Engineers (ITE) publication *Trip Generation, 9th Edition* for Land Use Code (LUC) 220 – Apartment, LUC 826 – Specialty Retail Center, and LUC 936 – Coffee/Donut Shop without Drive-Through Window.

Internal Capture

It is reasonable to expect that some trips generated by the proposed development will be shared between multiple tenants within the site. For example, someone living in the apartments may choose to shop in the retail and coffee/donut shop. Therefore, a reduction in the overall trips experienced on the adjacent roadways can be anticipated as a result of multi-use trips that include stops at more than one use on site. However, to provide a conservative analysis condition, no credit was taken for trips that may be shared between the apartments and retail on site.

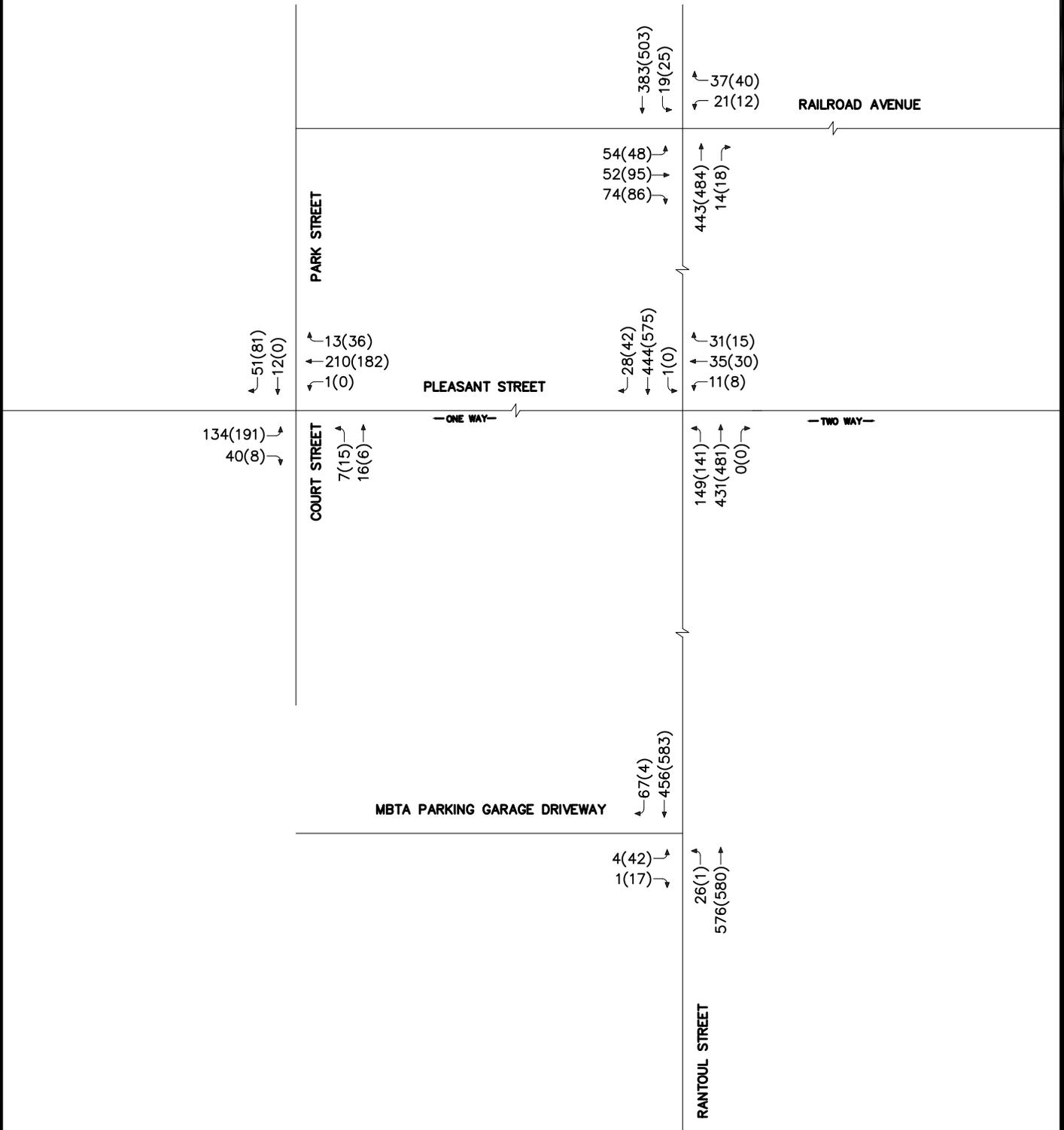




Not to Scale

#112 Rantoul Street Development - Beverly, Massachusetts

Traffic Impact, Access, and Parking Study



XX(XX) = WEEKDAY MORNING PEAK HOUR(WEEKDAY EVENING PEAK HOUR)

Figure 3

2023 No-Build Conditions
Weekday Morning, and
Weekday Evening
Peak Hour Traffic Volumes



Transit Trips

The MBTA and CATOC provide bus service along the site frontage with a stop directly adjacent to the site. In addition, the proposed development project is located within 0.1 miles to the Beverly Depot MBTA Commuter Rail Station to the north and within 0.9 miles to the Montserrat MBTA Commuter Rail Station to the north. The availability of public transportation for access to the site will result in a reduction in the trips generated by passenger vehicles traveling to and from the site. The Proponent has committed to marketing the development to transit users, and will post transit maps and schedules on site and provide this information to new tenants upon move-in. There is an existing enclosed, pedestrian foot bridge that connects the Beverly Depot Parking Garage with the Beverly Depot Platform.

Based on information contained in the ITE *Trip Generation Handbook, 2nd Edition* on trip reduction for residential-oriented mixed-use developments located near transit centers or along bus transit corridors, approximately 15 percent of the total vehicle trips to/from the site are anticipated to utilize public transportation. In addition, TEC has researched mode splits at other TODs throughout the United States based on information contained in the Assembly Square Transit Mode Share Study⁷ prepared by Vanasse Hangen Brustlin, Inc. (VHB) as part of the permitting and design of Assembly Square. The study indicated that home-based transit trips for TODs in the metro-Boston area ranged from 10 to 47 percent.

Based on information provided in the Assembly Square Transit Mode Share Study, within similar TOD and in the ITE *Trip Generation Handbook, 2nd Edition*, TEC applied a 25 percent transit credit to the residential trips and a 5 percent transit credit to the retail trips.

The *Trip Generation Handbook* has limited information for the use of coffee/donut shop uses. However, given that the shop is adjacent to a transit oriented development (TOD), the coffee shop is anticipated operate during peak commute hours and is anticipated to see use from those commuter residents. As the restaurant use is anticipated to be a high-intensity coffee shop use, it is reasonable to believe that the transit credit for the restaurant will be closer to 25 percent, similar to the residential mode share. This is due to the close proximity of the Beverly Depot MBTA Station and the expectation that the restaurant will significantly utilized by commuter rail uses as they walk and bike to the MBTA station along Rantoul Street.

Walking and Bicycling Trips

The redevelopment project is located in a densely populated section of Beverly, within close proximity to multiple retail, restaurant, office, and commercial establishments. Sidewalks are provided along both sides of the majority of the streets in the surrounding area. Additional bicycle and pedestrian improvements are proposed as part of MassDOT's Route 1A Improvement project, including installation of pedestrian signals and push-buttons at crosswalks, as well as bicycle lanes and detection at signals. As a result, it is reasonable to expect that several of the trips to/from the site will be walking and bicyclist trips. In order to provide a conservative analysis of traffic operations, no vehicle trip reduction credit was applied for walking and bicycling trips.

⁷ Assembly Square Transit Mode Share Study; Vanasse Hangen Brustlin, Inc.; September 8, 2006.

Pass-by Traffic

Not all trips generated by the project will be new to the study area. Many of the trips generated by the proposed specialty retail are already present in the existing traffic flow passing by the site. For example, some vehicles which are already on the roadways may decide to visit the site on their way to another destination. These vehicle trips are known as “pass-by” trips and are subtracted from the total trips to calculate the total primary (or “new”) trips that affect the volume of traffic within the study area away from the site. Based on information contained in the ITE publication *Trip Generation Handbook, 3rd Edition*, for LUC 820 – Shopping Center, approximately 34 percent for weekday evening and approximately 26 percent for all other time periods of specialty retail traffic is expected to be pass-by traffic⁸. There is no information contained in the ITE publication *Trip Generation Handbook, 3rd Edition*, for LUC – Coffee/Donut Shop without Drive-Through Window. However, due to the lack of drive-through window, a coffee shop is anticipated to operate in a similar manner to LUC 932 – High Turnover Sit-Down Restaurant. Based on information contained in the ITE publication *Trip Generation Handbook, 3rd Edition*, for LUC 932, approximately 43 percent of all traffic is expected to be pass-by traffic⁹ and has therefore been applied.

Table 2 provides a summary of the resulting trip generation estimate. The detailed trip generation calculation worksheets are provided in Attachment G.

⁸ Source: *Trip Generation Handbook, 3rd Edition*; Institute of Traffic Engineers; Washington D.C.; 2014

⁹ Source: *Trip Generation Handbook, 3rd Edition*; Institute of Traffic Engineers; Washington D.C.; 2014

Table 2 - Trip Generation Summary

Time Period / Direction	Apartment	Specialty Retail	Coffee Shop	Total Trips	Multi-Use Trips	Transit Trips^a	Pass-by Trips^{b,c}	New Trips
<i>Weekday Daily</i>	466	132	1,228	1,826	424	430	346	626
<i>Weekday Morning Peak Hour</i>								
Enter	7	1	83	91	9	23	24	35
Exit	<u>29</u>	<u>1</u>	<u>79</u>	109	<u>9</u>	<u>27</u>	<u>24</u>	49
Total	36	2	162	200	18	50	48	84
<i>Weekday Evening Peak Hour</i>								
Enter	28	4	31	63	11	15	9	28
Exit	<u>15</u>	<u>4</u>	<u>31</u>	50	<u>11</u>	<u>12</u>	<u>9</u>	18
Total	43	8	62	113	22	27	18	46
<i>Saturday Daily</i>	448	126	1,084	1,658	480392	390	304	572
<i>Saturday Midday Peak Hour</i>								
Enter	18	6	51	71	14	17	15	25
Exit	<u>18</u>	<u>6</u>	<u>47</u>	75	<u>14</u>	<u>18</u>	<u>15</u>	28
Total	36	12	98	146	28	35	30	53

^a25% of residential/coffee shop trips and 5% of specialty retail trips.

^bPass-by trips represent 34 percent of specialty retail trips during evening peak, 26 percent during all other periods.

^cPass-by trips represent 43 percent of coffee/donut shop trips during all time periods.

Trip Distribution

The distribution of site-generated traffic volumes for the apartments was based upon a gravity model using 2000 U.S. Census Journey-to-Work for residents residing in the City of Beverly, as this is the most recent year in which journey-to-work information was collected as part of the U.S. Census. The distribution of site-generated traffic-volumes for the specialty retail / coffee shop was based on a gravity model using 2010 U.S. Census population data for the surrounding municipalities that would exhibit direct access to utilizing the commercial uses of the development. The resulting primary trip distribution is shown in Table 3, and the gravity model is included in Attachment H.

Table 3 – Trip Distribution Summary

Direction	Residential Distribution		Retail Distribution	
	Entering %	Exiting %	Entering %	Exiting %
Pleasant Street to/from West	45%	45%	25%	25%
Route 1A to/from North	30%	30%	25%	25%
Route 1A to/from South	25%	25%	50%	50%
Total	100%	100%	100%	100%

The resulting site-generated traffic volume networks for the apartments during the weekday morning and weekday evening peak periods are presented in Figures 4 and 5 respectively. The resulting site-generated traffic volume networks for the specialty retail, and coffee/donut shop during the weekday morning and weekday evening peak periods are presented in Figures 6 and 7 respectively.

Build Traffic Volumes

The 2023 Build Condition traffic-volume networks consist of the 2023 No-Build traffic volumes with the addition of the site-generated traffic. The resulting 2023 Build weekday morning and weekday evening peak-hour traffic-volume networks are presented in Figure 8.

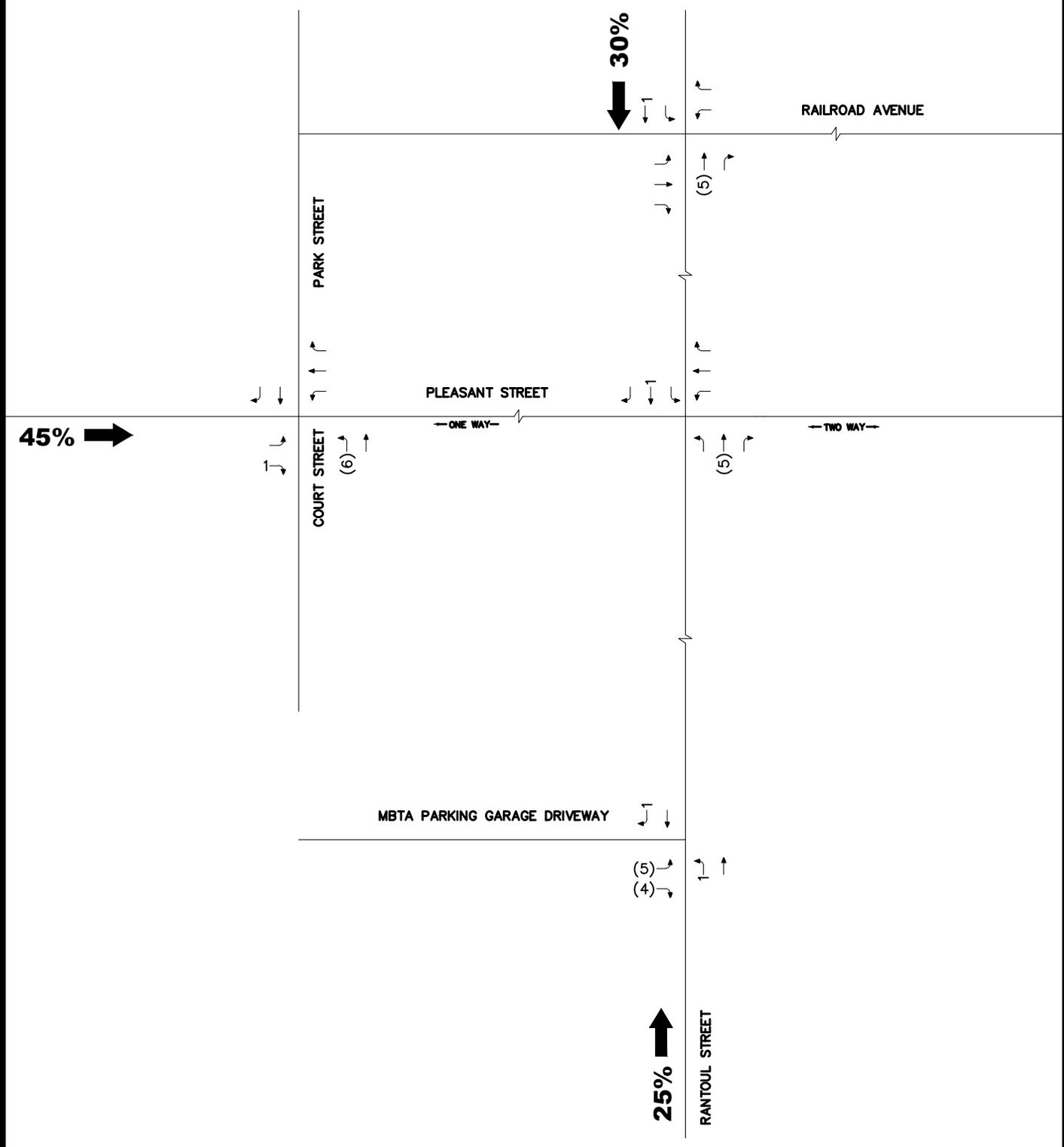




Not to Scale

#112 Rantoul Street Development - Beverly, Massachusetts

Traffic Impact, Access, and Parking Study



XX(XX) = Entering(Exiting)

Figure 4

Site Generated - Residential
Weekday Morning
Peak Hour Traffic Volumes



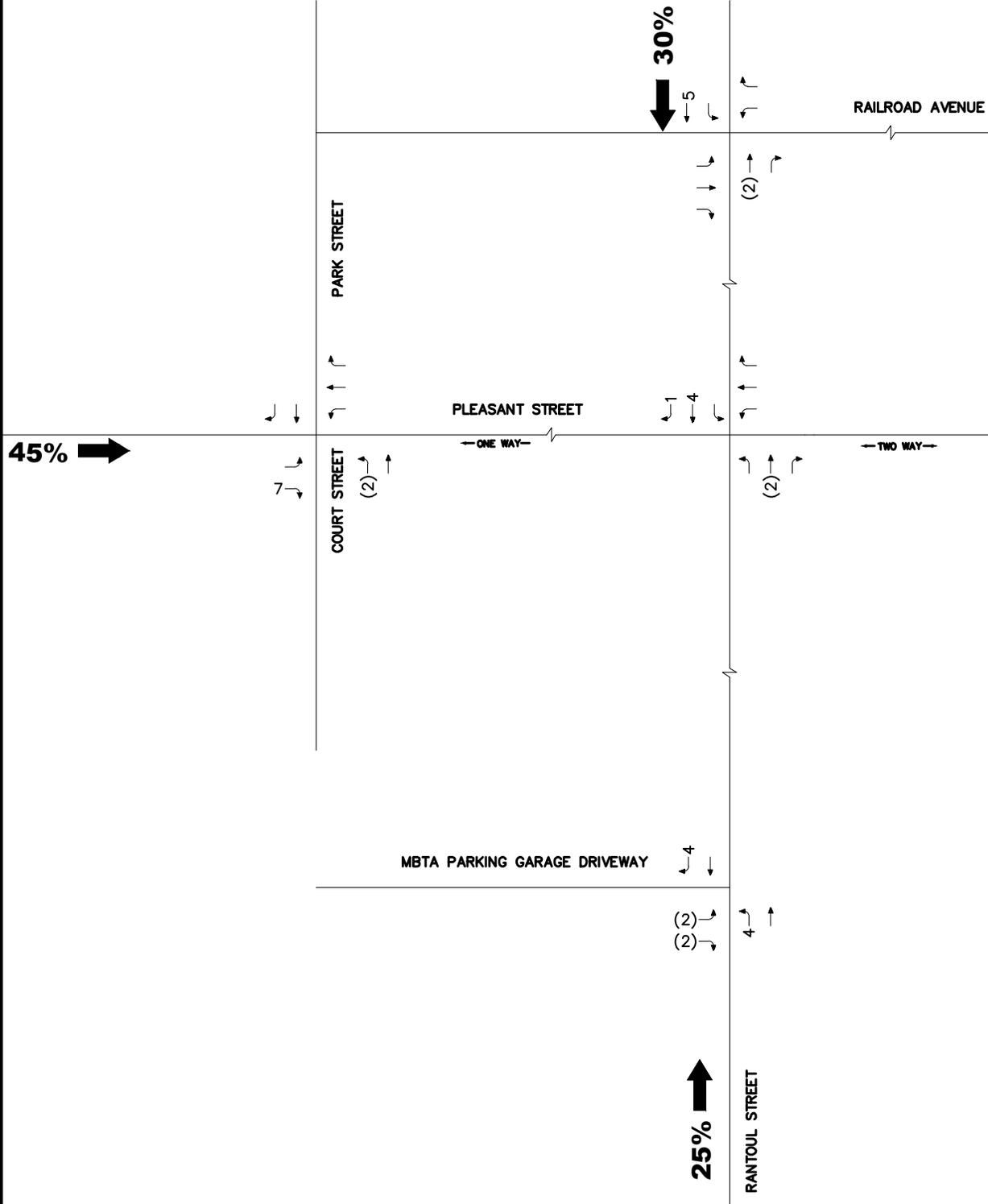
T:\T0664\CAD\Highway\Graphics\T0664_Traffic Networks.dwg 9/23/2016 11:23:29 AM



Not to Scale

#112 Rantoul Street Development - Beverly, Massachusetts

Traffic Impact, Access, and Parking Study



XX(XX) = Entering(Exiting)

Figure 5

Site Generated - Residential
Weekday Evening
Peak Hour Traffic Volumes

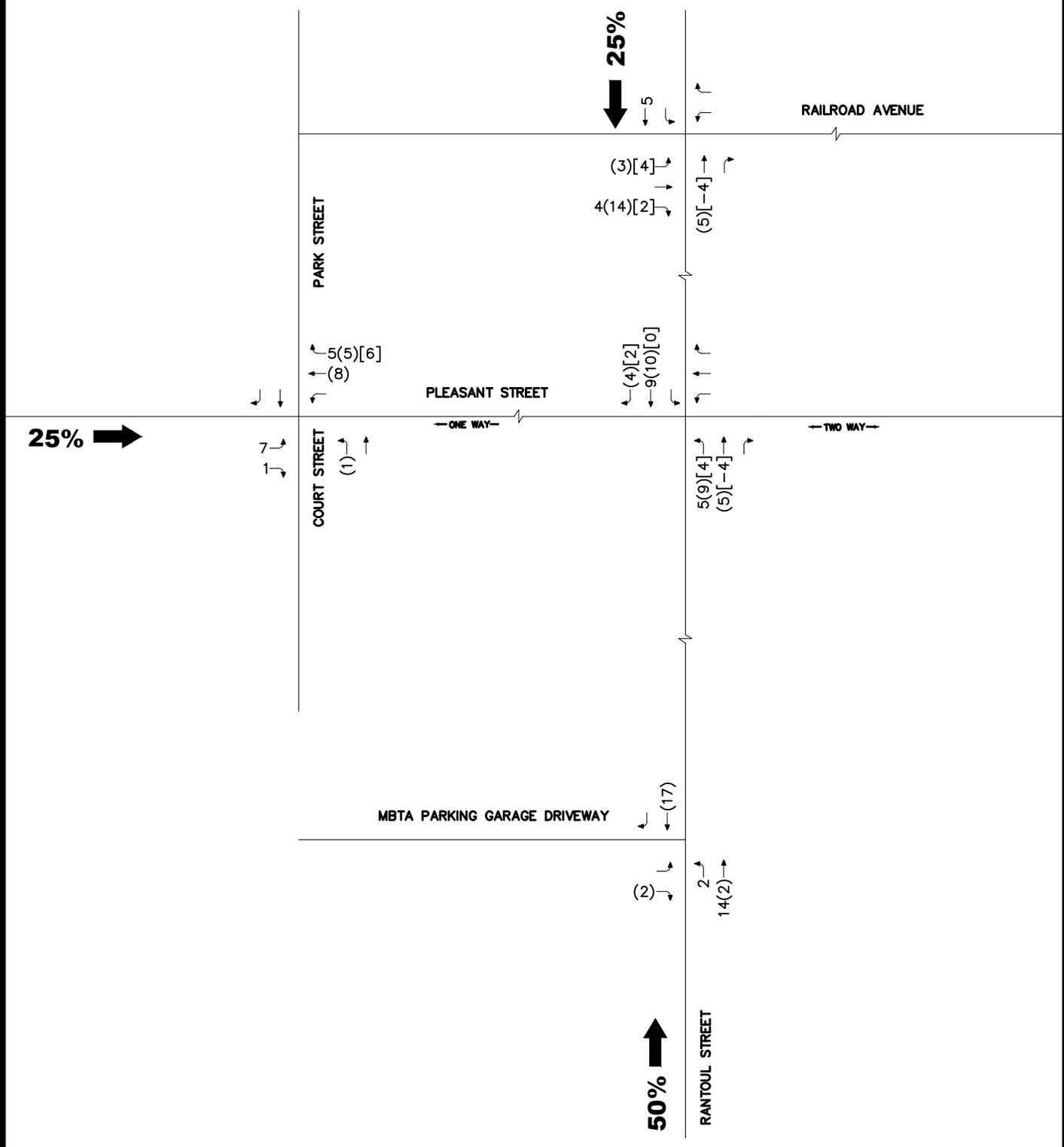




Not to Scale

#112 Rantoul Street Development - Beverly, Massachusetts

Traffic Impact, Access, and Parking Study



XX(XX) = Entering(Exiting)[Passby]

Figure 6

Site Generated - Commercial
Weekday Morning
Peak Hour Traffic Volumes

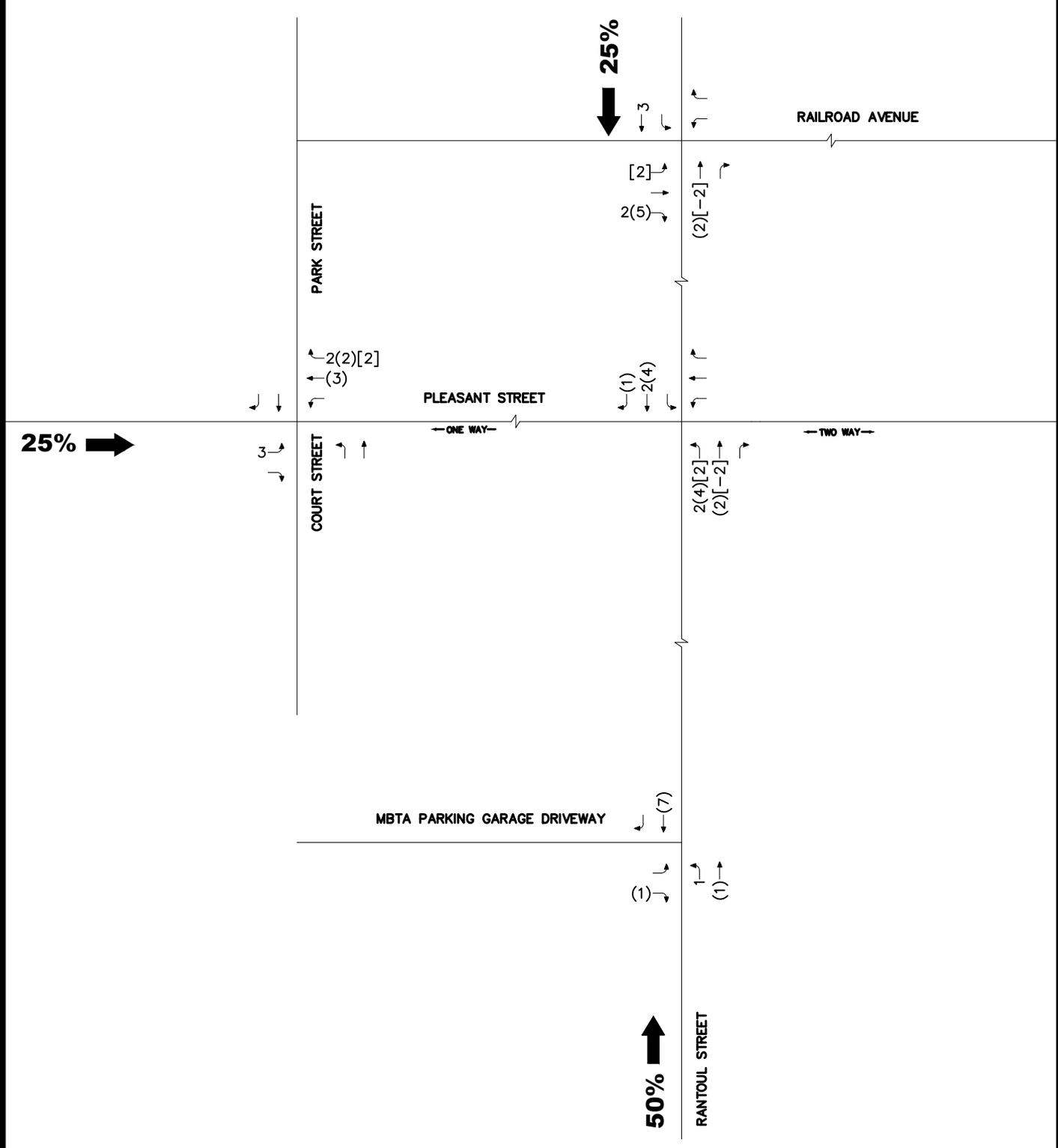




Not to Scale

#112 Rantoul Street Development - Beverly, Massachusetts

Traffic Impact, Access, and Parking Study



XX(XX) = Entering(Exiting)[Passby]

Figure 7

Site Generated - Commercial
Weekday Evening
Peak Hour Traffic Volumes



TRAFFIC OPERATIONS ANALYSIS

Measuring existing and future traffic volumes quantifies traffic flow within the study area. To assess quality of flow, roadway capacity and vehicle queue analyses were conducted under Existing, No-Build, and Build traffic-volume conditions. Capacity analyses provide an indication of how well the roadway facilities serve the traffic demands placed upon them, with vehicle queue analyses providing a secondary measure of the operational characteristics of an intersection or section of roadway under study.

Methodology for Analyzing Traffic Operations

Levels of Service

A primary result of capacity analyses is the assignment of level-of-service to traffic facilities under various traffic-flow conditions.¹⁰ The concept of level-of-service is defined as a qualitative measure describing operational conditions within a traffic stream and their perception by motorists and/or passengers. A level-of-service definition provides an index to quality of traffic flow in terms of such factors as speed, travel time, freedom to maneuver, traffic interruptions, comfort, convenience, and safety.

Six levels of service are defined for each type of facility. They are given letter designations from A to F, with level-of-service (LOS) A representing the best operating conditions and LOS F representing the worst. Since the level of service of a traffic facility is a function of the traffic flows placed upon it, such a facility may operate at a wide range of levels of service, depending on the time of day, day of week, or period of year.

Queue Length Analysis

Vehicle queue analyses are a direct measurement of an intersections ability to process vehicles under various traffic control and volume scenarios and lane use arrangements.

The vehicle queue analysis was performed using the Synchro 8.0™ intersection capacity analysis software which is also based upon the methodology and procedures presented in the *Highway Capacity Manual 2010 (HCM 2010)*. Synchro reports the 95th percentile queues for unsignalized intersections and both the 50th (average) and 95th percentile vehicle queues for signalized intersections, which are based on the number of vehicles that experience a delay of six seconds or more at an intersection and is a function of the traffic signal timing; vehicle arrival patterns during the analysis period; and the saturation flow rate. The 50th percentile or average vehicle queue is the average number of vehicles that are projected to be delayed by six seconds or more at the intersection under study during the analysis period. The 95th percentile vehicle queue is the vehicle queue length that will be exceeded only 5 percent of the time; or approximately three minutes out of sixty minutes during the peak one hour of the day. During the remaining fifty-seven minutes, the vehicle queue length will be less than the 95th percentile queue length.

¹⁰The capacity analysis methodology is based on the concepts and procedures presented in the *Highway Capacity Manual 2000*, Transportation Research Board; Washington, DC; 2000 and *Highway Capacity Manual 2010*, Transportation Research Board; Washington, DC; 2010.

Parameters for Traffic Impact Analyses

Unsignalized Intersections

The levels of service of unsignalized intersections are determined by application of a procedure described in the *HCM 2010*. Level of service is measured in terms of average control delay. Mathematically, control delay is a function of the capacity and degree of saturation of the lane group and/or approach under study and is a quantification of motorist delay associated with traffic control devices such as traffic signals and STOP signs. Control delay includes the effects of initial deceleration delay approaching a STOP sign, stopped delay, queue move-up time, and final acceleration delay from a stopped condition. Definitions for level of service at unsignalized intersections are also given in the *HCM 2010*.

Sidra Intersection v5.1

The unsignalized intersection capacity and queue analysis for the intersection of Pleasant Street / Park Street / Court Street was conducted using Sidra Intersection v5.1™ software due to the restrictions posed on unsignalized intersection analysis using Synchro 8.0™ or Highway Capacity Software 2010 (HCS 2010). This includes unsignalized intersections with STOP control on three approaches or an unsignalized intersection without any intersection control.

Table 4 summarizes the relationship between level of service and average control delay for unsignalized intersections.

Table 4 – Level-of-Service Criteria for Unsignalized Intersections^(a)

Level of Service V/C <1.00	Level of Service V/C ≥1.00	Average Control Delay (seconds per vehicle)	Description
A	F	≤10.0	LOS A represents a condition with little or no control delay to minor street traffic.
B	F	10.1 to 15.0	LOS B represents a condition with short control delays to minor street traffic.
C	F	15.1 to 25.0	LOS C represents a condition with average control delays to minor street traffic.
D	F	25.1 to 35.0	LOS D represents a condition with long control delays to minor street traffic.
E	F	35.1 to 50.0	LOS E represents operating conditions at or near capacity level, with very long control delays to minor street traffic.
F	F	>50.0	LOS F represents a condition where minor street demand volume exceeds capacity of an approach lane, with excessive control delays resulting.

^a Source: *Highway Capacity Manual 2010*; Transportation Research Board; Washington D.C.; 2010

Signalized Intersections

LOS for signalized intersections is calculated using the operational analysis methodology of the *HCM 2010*. This method assesses the effects of signal type, timing, phasing, progression; vehicle mix; and geometrics on delay. LOS designations are based on the criterion of control or signal delay per vehicle. Control or signal delay can be related to driver discomfort, frustration, and fuel consumption, and includes initial deceleration delay approaching the traffic signal,



queue move-up time, stopped delay and final acceleration delay. Table 5 summarizes the relationship between LOS and control delay. The tabulated control delay criterion may be applied in assigning LOS designations to individual lane groups, to individual intersection approaches, or to entire intersections.

Table 5 – Level-of-Service Criteria for Signalized Intersections^(a)

Level of Service (v/c ≤ 1.0)	Level of Service (v/c > 1.0)	Average Control Delay (seconds per vehicle)	Description
A	F	≤10.0	LOS A describes operations with very low control delay; most vehicles do not stop at all.
B	F	10.1 to 20.0	LOS B describes operations with relatively low control delay. However, more vehicles stop than LOS A.
C	F	20.1 to 35.0	LOS C describes operations with higher control delays. Individual cycle failures may begin to appear. The number of vehicles stopping is significant at this level, although many still pass through the intersection without stopping.
D	F	35.1 to 55.0	LOS D describes operations with control delay in the range where the influence of congestion becomes more noticeable. Many vehicles stop and individual cycle failures are noticeable, whereby motorists are not able to get through the signal on one cycle.
E	F	55.1 to 80.0	LOS E describes operations with high control delay values. Individual cycle failures are frequent occurrences.
F	F	>80.0	LOS F describes operations with high control delay values that often occur with over-saturation. Poor progression and long cycle lengths may also be major contributing causes to such delay levels.

^a Source: *Highway Capacity Manual 2010*; Transportation Research Board; Washington D.C.; 2010; page 18-6

Intersection Capacity and Queue Analysis Results

Level-of-service and queue analyses were conducted for 2016 Existing, 2023 No-Build, and 2023 Build conditions for the unsignalized and signalized intersections within the study area. The results of the intersection capacity and queue analysis are summarized in Table 6. The intersection capacity and queue analysis worksheets are provided in Attachment I. The 2023 No-Build and 2023 Build conditions assume the complete construction of the Route 1A (Rantoul Street and Cabot Street) Reconstruction Project (MassDOT Project #600220) with all traffic signal equipment and travel lane improvements in place.

Rantoul Street / Beverly Depot MBTA Parking Garage Driveway

Under both 2023 No-Build and 2023 Build conditions, the exiting movement from the Beverly Depot MBTA Parking Garage Driveway is anticipated to operate at LOE E. The additional traffic generated by the Project is not expected to have a significant impact on the operations of the approach. All other movements at the Rantoul Street / Beverly Depot MBTA Parking Garage Driveway intersection are anticipated to operate at acceptable levels of service (LOS C or better) under all analysis conditions. In addition, the volume-to-capacity (v/c) ratio will be well below 1.00, indicating there will be adequate capacity to accommodate the anticipated traffic volumes. Queues along the Beverly Depot MBTA Parking Garage Driveway are not expected to exceed two vehicles.



Rantoul Street (Route 1A) / Pleasant Street

All movements at the Rantoul Street / Pleasant Street intersection are anticipated to operate at acceptable levels of service (LOS D or better) under all analysis conditions. In addition, the volume-to-capacity (v/c) ratio will be well below 1.00, indicating there will be adequate capacity to accommodate the anticipated traffic volumes. The Project is not expected to increase the delay by more than two seconds per vehicle, or the queues by more than one vehicle, on any intersection movement.

Rantoul Street (Route 1A) / Railroad Avenue

Under 2023 No-Build and 2023 Build Conditions, the intersection of Rantoul Street / Railroad Avenue is anticipated to operate at overall LOS B or better during all analysis periods with the proposed signalized control conditions proposed in the Route 1A (Rantoul Street and Cabot Street) Reconstruction Project (MassDOT Project #600220). All movements at the intersection are anticipated to operate at acceptable levels of service (LOS D or better) under all analysis conditions. In addition, the volume-to-capacity (v/c) ratios on each movement are expected to be well below 1.00, indicating there will be adequate capacity to accommodate the anticipated traffic. Queues on each approach are not expected to increase by more than one (1) vehicle as a result of the Project.

Other Study Area Intersections

All movements at all other study intersections are expected to operate at acceptable levels of service (LOS B or better) and queues not exceeding two vehicles under all analysis scenarios.

Table 6 – Intersection Capacity and Queue Analysis Summary

Intersection / Lane Group	2016 Existing			2023 No-Build			2023 Build					
	V/C ^(a)	Delay ^(b)	LOS ^(c)	Queue ^(d)	V/C	Delay	LOS	Queue	V/C	Delay	LOS	Queue
Rantoul Street / MBTA Driveway												
<i>Weekday Morning Peak Period</i>												
MBTA Driveway EBL	-	-	-	-	-	-	-	-	-	-	-	-
MBTA Driveway EBR	-	-	-	-	-	-	-	-	-	-	-	-
MBTA Driveway EB Approach	0.03	25.0	D	<25	0.03	26.5	D	<25	0.08	24.8	C	<25
Rantoul Street NB Approach	0.03	8.9	A	<25	0.03	9.0	A	<25	0.04	9.1	A	<25
<i>Weekday Evening Peak Period</i>												
MBTA Driveway EBL	0.24	30.7	D	<25	0.35	47.5	E	35	0.30	36.8	E	30
MBTA Driveway EBR	0.04	13.3	B	<25	0.04	13.6	B	<25	0.05	13.8	B	<25
MBTA Driveway EB Approach	-	-	-	-	-	-	-	-	-	-	-	-
Rantoul Street NB Approach	0.00	8.8	A	<25	0.00	8.9	A	<25	0.01	9.0	A	<25
Rantoul Street / Pleasant Street												
<i>Weekday Morning Peak Period</i>												
Pleasant Street WB Approach	0.16	16.2	C	<25	0.24	18.8	C	<25	0.26	20.4	C	25
Rantoul Street NB Approach	0.14	8.9	A	<25	0.15	9.0	A	<25	0.17	9.2	A	<25
<i>Weekday Evening Peak Period</i>												
Pleasant Street WB Approach	0.14	18.8	C	<25	0.23	24.4	D	<25	0.24	25.6	D	<25
Rantoul Street NB Approach	0.14	9.5	A	<25	0.16	9.7	A	<25	0.17	9.8	A	<25

^a Volume-to-capacity ratio

^b Delay expressed in seconds per vehicle (average)

^c Level-of-Service

^d 50th / 95th Percentile Queue (feet) [only 95th Percentile Queue expressed for unsignalized intersections]



Table 6 – Intersection Capacity and Queue Analysis Summary (Continued)

Intersection / Lane Group	2016 Existing				2023 No-Build				2023 Build			
	V/C ^(a)	Delay ^(b)	LOS ^(c)	Queue ^(d)	V/C	Delay	LOS	Queue	V/C	Delay	LOS	Queue
Pleasant Street / Park Street / Court Street												
<i>Weekday Morning Peak Period</i>												
Pleasant Street EB Approach	0.14	0.0	A	<25	0.15	0.0	A	<25	0.16	0.0	A	<25
Pleasant Street WB Approach	0.12	7.2	A	<25	0.13	7.2	A	<25	0.15	7.3	A	<25
Court Street NB Approach	0.08	11.0	B	<25	0.09	11.1	B	<25	0.12	11.6	B	<25
Park Street SB Approach	0.08	8.2	A	<25	0.08	8.2	A	<25	0.08	8.3	A	<25
<i>Weekday Evening Peak Period</i>												
Pleasant Street EB Approach	0.11	0.0	A	<25	0.13	0.0	A	<25	0.13	0.0	A	<25
Pleasant Street WB Approach	0.14	7.3	A	<25	0.16	7.4	A	<25	0.17	7.5	A	26
Court Street NB Approach	0.06	10.8	B	<25	0.07	11.1	B	<25	0.07	11.3	B	<25
Park Street SB Approach	0.06	7.5	A	<25	0.06	7.5	A	<25	0.06	7.5	A	<25
Rantoul Street / Railroad Avenue												
<i>Weekday Morning Peak Period</i>												
Railroad Avenue EB Approach	0.60	32.4	D	90	0.71	46.3	D	97/159	0.75	48.1	D	111/177
Railroad Avenue WB Approach	0.21	21.4	C	<25	0.25	37.7	D	<25/46	0.23	35.9	D	<25/44
Rantoul Street NB Approach	-	-	-	-	0.40	5.6	A	97/196	0.41	6.5	A	107/215
Rantoul Street SB Approach	0.02	8.7	A	<25	0.31	4.8	A	82/166	0.32	5.6	A	91/183
Overall Intersection	-	-	-	-	0.37	13.7	B	-	0.39	15.2	B	-
<i>Weekday Evening Peak Period</i>												
Railroad Avenue EB Approach	0.93	81.9	F	205	0.74	44.5	D	128/196	0.75	44.8	D	132/201
Railroad Avenue WB Approach	0.24	26.2	D	<25	0.19	35.2	D	<25/37	0.18	34.7	C	<25/37
Rantoul Street NB Approach	-	-	-	-	0.43	6.9	A	117/231	0.44	7.2	A	121/237
Rantoul Street SB Approach	0.03	8.7	A	<25	0.40	6.4	A	129/253	0.41	6.8	A	135/264
Overall Intersection	-	-	-	-	0.43	14.4	B	-	0.44	14.8	B	-

^a Volume-to-capacity ratio

^b Delay expressed in seconds per vehicle (average)

^c Level-of-Service

^d 50th / 95th Percentile Queue (feet) [only 95th Percentile Queue expressed for unsignalized intersections]



SENSITIVITY ANALYSES

Construction Phase Traffic Impact

The proposed site plan depicts a multi-story building structure which includes a building extension directly above the existing Beverly Depot MBTA Parking Garage Driveway. It will therefore be necessary to temporarily close the existing Beverly Depot MBTA Parking Garage Driveway along Rantoul Street during the construction phase of the proposed #112 Rantoul Street Project. Access/egress to the parking facility will be rerouted to the Court Street entrance as a result of this closure. This rerouting of traffic will temporarily increase traffic volumes along specific movements at the surrounding study area intersections.

To simulate this temporary closure condition, TEC conducted a sensitivity analysis to estimate the effects of the rerouted traffic on the surrounding study area intersections. As this condition will occur in the existing conditions scenario, this analysis projected a redistribution of the existing parking garage entering and exiting traffic superimposed on the 2016 Existing conditions traffic volumes with trips to be generated by specific developments by others. The results of the analysis are presented in Table 7. The intersection capacity and queue analysis worksheets are provided in Attachment J. The resulting Construction Phase Redistribution traffic-volume network is depicted in Figure J-1. The 2016 Construction Phase traffic-volumes are graphically depicted in Figure J-2.

TEC and Middlesex Corporation have recently discussed the timing for the installation of the traffic signal at the intersection of Rantoul Street / Railroad Avenue. Based on these discussions, the installation of the traffic signal is anticipated to occur prior the end of the 2016 construction season. Therefore, it was assumed that the traffic signal would be in-place during construction of the #112 Rantoul Street Project. The results of the construction period sensitivity analysis show that the redistribution of garage trips is anticipated to have a negligible effect on most of the study area intersections. All movements at the study area intersections are anticipated to continue operating at acceptable levels of service (LOS D or better) during the temporary construction condition.

Table 7 – Sensitivity Analysis – Construction Condition Summary

Intersection / Lane Group	2016 Construction Condition			
	V/C^(a)	Delay^(b)	LOS^(c)	Queue^(d)
Rantoul Street / MBTA Driveway				
<i>Weekday Morning Peak Period</i>				
MBTA Driveway EBL	-	-	-	-
MBTA Driveway EBR	-	-	-	-
MBTA Driveway EB Approach	-	-	-	-
Rantoul Street NB Approach	-	-	-	-
<i>Weekday Evening Peak Period</i>				
MBTA Driveway EBL	-	-	-	-
MBTA Driveway EBR	-	-	-	-
MBTA Driveway EB Approach	-	-	-	-
Rantoul Street NB Approach	-	-	-	-
Rantoul Street / Pleasant Street				
<i>Weekday Morning Peak Period</i>				
Pleasant Street WB Approach	0.16	16.4	C	<25
Rantoul Street NB Approach	0.16	8.9	A	<25
<i>Weekday Evening Peak Period</i>				
Pleasant Street WB Approach	0.13	17.9	C	<25
Rantoul Street NB Approach	0.13	9.5	A	<25
Pleasant Street / Park Street / Court Street				
<i>Weekday Morning Peak Period</i>				
Pleasant Street EB Approach	0.15	0.0	A	<25
Pleasant Street WB Approach	0.17	7.5	A	<25
Court Street NB Approach	0.10	11.0	B	<25
Park Street SB Approach	0.08	8.2	A	<25
<i>Weekday Evening Peak Period</i>				
Pleasant Street EB Approach	0.11	0.0	A	<25
Pleasant Street WB Approach	0.14	7.3	A	<25
Court Street NB Approach	0.23	11.8	B	25
Park Street SB Approach	0.06	7.5	A	<25

^a Volume-to-capacity ratio

^b Delay expressed in seconds per vehicle (average)

^c Level-of-Service

^d 50th / 95th Percentile Queue (feet) [only 95th Percentile Queue expressed for unsignalized intersections]

**Table 7 – Sensitivity Analysis – Construction Condition Summary
 (Continued)**

<u>Intersection / Lane Group</u>	<u>2016 Construction Condition</u>			
	<u>V/C^(a)</u>	<u>Delay^(b)</u>	<u>LOS^(c)</u>	<u>Queue^(d)</u>
Rantoul Street / Railroad Avenue				
<i>Weekday Morning Peak Period</i>				
Railroad Avenue EB Approach	0.68	45.2	D	90/150
Railroad Avenue WB Approach	0.29	39.3	D	<25/53
Rantoul Street NB Approach	0.38	5.0	A	90/182
Rantoul Street SB Approach	0.28	4.2	A	72/147
Overall Intersection	0.35	13.0	B	-
<i>Weekday Evening Peak Period</i>				
Railroad Avenue EB Approach	0.78	45.9	D	152/224
Railroad Avenue WB Approach	0.17	32.8	C	<25/35
Rantoul Street NB Approach	0.40	7.5	A	111/216
Rantoul Street SB Approach	0.40	7.5	A	139/269
Overall Intersection	0.42	16.6	B	-

^a Volume-to-capacity ratio

^b Delay expressed in seconds per vehicle (average)

^c Level-of-Service

^d 50th / 95th Percentile Queue (feet) [only 95th Percentile Queue expressed for unsignalized intersections]

Beverly Depot MBTA Parking Garage Driveway Lane Reduction

As part of the Project, the Applicant has recommended condensing the existing Beverly Depot MBTA Parking Garage Driveway along Rantoul Street to consist of one entrance and one exit lane. This has been proposed to accommodate specific site related features. The Beverly Depot MBTA Parking Garage Driveway eastbound approach consists of three travel lanes; including: an exclusive access lane, an exclusive egress lane, and a fluctuating access/egress lane which varies based on the commute hours. Directional flow along each lane is separated by a marked lane line. By condensing the driveway cross-section, the fluctuating access/egress lane would be removed.

As part of the project, the Applicant has proposed the removal of the fluctuating access/egress lane for both operational and safety reasons; including:

- One 'entrance' lane will offer a safer driveway during the weekday morning with the new building in-place overhead. Currently, the two 'entrance' lanes are highlighted by overhead green indications. These indications may not be visible with the future building overhead. Therefore, providing one 'entrance' lane will assist with leading vehicles into the correct lane similar to a more standardized travel way;
- Two lanes (bi-directional) of traffic will provide additional space for pedestrians passage adjacent to the building frontage; and
- Two-lanes (bi-directional) will allow space for pull-over / drop-off for residents to directly access the lobby prior to entering the parking garage.



To simulate the condensed cross-section, TEC conducted a sensitivity analysis which utilized the 2023 Build Condition traffic volumes along the Beverly Depot MBTA Parking Garage Driveway. Synchro traffic analysis software does not directly simulate a ticket gate as a traffic scenario; therefore, to simulate the ticket gate, TEC included a STOP-controlled condition approximately 80-feet from the Rantoul Street curb-line. This STOP-controlled condition will generally resemble a motorist stopping to take a ticket and proceeding to enter the garage. The results of the sensitivity analysis are presented in Table 8. The intersection capacity and queue analysis worksheets are provided in Attachment K.

Upon review, the reduction from two entering lanes to one entering lane during the weekday morning peak period resulted in not effective change in queue entering the parking garage. The current driveway layout generally allows for up to three vehicles to queue per entrance lane prior to extending onto Rantoul Street. The simulation analysis shows that the queue will generally not exceed more than one vehicle. In addition, as depicted in Table 8, the operations at the intersection of Rantoul Street / Beverly Depot MBTA Parking Garage Driveway will not substantially change as a result of the reduction in lanes. Therefore, it is TEC’s conclusion that the removal of the fluctuating access/egress lane along the Beverly Depot MBTA Parking Garage Driveway will not significantly alter the ability of this driveway to provide adequate vehicle stacking without extending onto Rantoul Street.

Table 8 – Sensitivity Analysis – 3-Lane vs. 2-Lane Garage Driveway Summary

Intersection / Lane Group	2023 Build Condition 3 Lane Driveway				2023 Build Condition 2 Lane Driveway			
	V/C ^(a)	Delay ^(b)	LOS ^(c)	Queue ^(d)	V/C	Delay	LOS	Queue
Rantoul Street / MBTA Driveway								
<i>Weekday Morning Peak Period</i>								
MBTA Driveway EBL	-	-	-	-	-	-	-	-
MBTA Driveway EBR	-	-	-	-	-	-	-	-
MBTA Driveway EB Approach	0.03	25.0	D	<25	0.03	25.0	D	<25
Rantoul Street NB Approach	0.03	8.9	A	<25	0.03	8.9	A	<25
<i>Weekday Evening Peak Period</i>								
MBTA Driveway EBL	0.24	30.7	D	<25	-	-	-	-
MBTA Driveway EBR	0.04	13.3	B	<25	-	-	-	-
MBTA Driveway EB Approach	-	-	-	-	0.35	32.3	D	<25
Rantoul Street NB Approach	0.00	8.8	A	<25	0.01	9.0	A	<25

^a Volume-to-capacity ratio

^b Delay expressed in seconds per vehicle (average)

^c Level-of-Service

^d only 95th Percentile Queue expressed for unsignalized intersections

PARKING

Existing Parking Supply

Both on-street and off-street parking is available in the vicinity of the proposed development. TEC performed an inventory of available parking and existing parking regulations on Thursday, April 24, 2015. The inventoried sections of on-street/head-in parking include:



1. Rantoul Street (between MBTA Garage Entrance and Pleasant Street)
2. Rantoul Street (between Pleasant Street and Railroad Avenue)
3. Rantoul Street (between Railroad Avenue and Broadway)
4. Pleasant Street (between Rantoul Street and Hardy Street)
5. Railroad Avenue (between Park Street and Rantoul Street)
6. Railroad Avenue (between Rantoul Street and Hardy Street)
7. Broadway (Between Park Street and Rantoul Street)
8. Park Street (between Pleasant Street and Railroad Avenue)
9. Park Street (between Railroad Avenue and Broadway)

Within one block of the site, there are currently 67 parallel and 35 head-in, public, on-street parking spaces. In addition, there are 29 on-street parking spaces (non-permit spaces), near the Beverly Depot MBTA Station, that are readily available for use and within walking distance of the site. Although not included in the inventory, a significant number of additional on-street parking spaces are present along Rantoul Street both north and south of the site, in addition to approximately 500 structured spaces recently constructed within the MBTA Beverly Depot Parking Garage.

Table 9 provides a summary of the available on-street parking spaces in the area immediately surrounding the site. It should be noted that for areas where parking is allowed but spaces are not striped, TEC estimated the total number of spaces in each segment based on the number of vehicles that could theoretically fit assuming on an average length of parking space of 22 feet. For example, most of the parallel on-street parking spaces do not provide sufficient striping to determine the total number of legal parking spaces provided.

Existing Parking Demand

TEC, Inc. performed parking utilization counts to estimate the existing parking demand immediately surrounding the site during the weekday evening peak conditions. The counts were performed from 3:30 PM to 7:00 PM on Thursday, April 24, 2015. The total number of vehicles parked in each particular on-street zone was recorded every 30 minutes during the study period. Parking spaces south of the MBTA parking garage were not included as they appear to be accommodating to adjacent residential buildings. Table 9 provides a summary of the resulting parking utilization counts, and the detailed parking demand count sheets are included in Attachment L.

Table 9 – Existing Parking Demand Summary

Parking Area	Total Spaces	Time Period						
		3:30 PM	4:00 PM	4:30 PM	5:00 PM	5:30 PM	6:00 PM	6:30 PM
Rantoul Street (Segment 1)	9	8	8	8	5	5	8	8
Rantoul Street (Segment 2)	10	7	6	1	4	5	1	3
Rantoul Street (Segment 3)	19	5	2	4	1	0	1	0
Pleasant Street (Segment 4)	20	10	10	8	9	8	9	8
Railroad Avenue (Segment 5)	35	3	4	4	4	4	7	6
Railroad Avenue (Segment 6)	9	9	9	9	9	8	5	4
Broadway (Segment 7)	13	12	11	10	8	7	6	5
Park Street (Segment 8)	7	7	6	6	6	6	4	4
<u>Park Street (Segment 9)</u>	<u>9</u>	<u>7</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>5</u>	<u>2</u>	<u>2</u>
Total	102	68	59	54	51	48	43	40

As shown in Table 9, a total of 102 public on-street public parking spaces are currently provided in the immediate area surrounding the site. These spaces experienced a maximum occupancy of 67 percent (68 occupied spaces) over the three-hour study period. During this time period, many of the spaces were occupied by vehicles parked temporarily for MBTA passenger pick-up.

Proposed Alteration to Existing Parking Facilities

Improvements to Rantoul Street as part of the Route 1A Reconstruction Project (MassDOT Project #600220) are not anticipated to decrease the number of on-street parking spaces. As part of the #112 Rantoul Street Project, up to seven (7) legal parking spaces can be accommodated in a section that currently does not permit on-street parking. Therefore, the #112 Rantoul Street Project will result in a net gain in on-street parking of up to seven spaces in the vicinity of the site.

Proposed Parking Demand

City of Beverly Zoning Ordinances

The City of Beverly Zoning Ordinances contains off-street parking supply requirements for residential and retail land uses as defined in Section 300-40E(2). For residential land uses within the Depot Parking Overlay District, the zoning ordinance requires that 1 space per residential unit be provided. For retail land uses, 1 space per 275 SF is required. For restaurants uses, 1 parking space for every four seats is required.

As part of the project, the Proponent proposes to lease 70 parking spaces on-site within the MBTA Beverly Depot Parking Garage to accommodate the residential apartment units. A total of 67 apartment units will be provided, requiring a total of 67 parking spaces to satisfy City of Beverly Zoning Ordinances. Therefore, the proposed parking supply will satisfy City of Beverly Zoning Ordinance for the residential apartments on site. At the present build-out, an additional 3 spaces will be available for retail/restaurant employee parking.

Retail and restaurant parking is expected to occur on-street. The ±3,000 SF of retail space will require 11 parking spaces (1 space per 275 SF). The number of seats in the restaurant is



dependent on the type of restaurant. Generally, the ±1,500 SF of restaurant space correlates to approximately 35 seats per ITE LUE 932 – High-Turnover Sit-Down Restaurant, a high-intensity use in relation to parking needs. Estimating seating at 35 seats, the ±1,500 SF of restaurant space will require 9 parking spaces (1 per 4 seats). As a result, the site will need to provide 20 total parking spaces for the retail and restaurant use.

Under Section 38-25(A)(2)(b) of the City of Beverly Zoning Ordinances, the parking spaces for non-residential uses may be provided off-site in a public parking facility located within 500 feet or within any on-street parking spaces located within the frontage of the property. A total of seven (7) surface spaces on-site (proposed to be shared with neighboring condo association) and seven (7) on-street spaces will be available along the immediate Rantoul Street southbound site frontage to be shared for short-term retail parking. As noted in the previous section, the on-street and public parking availability around the site is only 68 percent occupied. It is reasonable to assume that the available public parking around the site can accommodate the retail and restaurant use parking. In addition, the additional parking supply in the MBTA Beverly Depot Parking Garage is available for those customers that prefer covered parking and does not require a dedicated or reserved allocation.

Combining the surface parking spaces and on-site parking immediately on the site frontage, the additional availability of public parking along the surrounding streets, and the availability of the MBTA Beverly Depot Parking Garage, the parking supply will be more than adequate to satisfy City of Beverly Zoning Ordinances for the proposed retail and restaurant space.

PEDESTRIAN, BICYCLIST, AND TRANSIT ACCOMMODATIONS

Pedestrian Amenities

The Applicant is committed to creating a more pedestrian-friendly on-site area with streetscape improvements along Rantoul Street. In addition, the Applicant is committed to maintaining sidewalk access on the ground level (under-podium) along the MBTA Beverly Depot Parking Garage and to/from the parking garage stairwell. This will allow for pedestrians to pass through the parking garage to continue their access to the pedestrian fly-over walkway to the MBTA Commuter Rail Station. Trees and landscaping treatments will create aesthetically-pleasing and pedestrian-friendly areas.

Bicycle Amenities

The Proponent has committed to additional bicycle-related TDM measures, such as bicycle racks outside the residential building.

Transit Amenities

The Proponent has committed to market the development as a TOD. To increase transit use by residents, the Proponent will post public transportation schedules with transit maps for all nearby routes in the building and provided this information to residents.



CONCLUSIONS AND RECOMMENDATIONS

TEC has examined the potential traffic impacts associated with the proposed redevelopment of the property located at the currently vacant property located at the MBTA Beverly Depot site in Beverly, Massachusetts on the study area roadways. The following is a summary of the results and conclusions of this effort:

- The transit-oriented development (TOD) project consists of constructing a mixed-use development containing up to 70 residential apartment units (67 unit currently planned), ±3,000 SF of specialty retail space, and a ±1,500 SF restaurant use;
- The Middlesex Corporation, under contract with MassDOT, is currently in the construction phase of the Rantoul Street and Cabot Street Reconstruction Project (MassDOT Project #600220). The project includes approximately 5,750 feet of pavement rehabilitation on Rantoul Street from Cabot Street to the south to 440 feet north of Blaine Avenue to the north. The width of the existing roadway will remain approximately the same. Turning lanes will be added at the Elliott Street intersection and the existing traffic signals at School Street, Federal Street and Elliott Street will be upgraded to meet current standards;

Within the development study area, travel lanes along Rantoul Street (Route 1A) will be restriped with 11-foot travel lanes and 5-foot bicycle lanes in both the northbound and southbound directions. Additional improvements include reconstructed sidewalks with curb bump-outs to define on-street parking limits, new granite curbing, and reconstructed accessible wheelchair ramps. The project proposes to construct a new fully-actuated traffic signal at the intersection of Rantoul Street (Route 1A) / Railroad Avenue. Construction is expected to be completed in late-2017;

- Public transportation is provided in the vicinity of the site, including MBTA Commuter Rail Service, MBTA bus service, and CATOC bus service. The site is located within 0.1 miles of MBTA Commuter Rail Service, and both MBTA and CATOC provide bus service along Rantoul Street (Route 1A), with stops immediately adjacent to the site. Based on mode share information, a 25 percent transit credit to the residential and coffee shop trips and a 5 percent transit credit to the retail trips;
- The project site is expected to generate 84 new vehicle trips (35 entering and 49 exiting) during the weekday morning peak hour and 46 new vehicle trips (28 entering and 18 exiting) during the weekday evening peak hour.
- Under both 2023 No-Build and 2023 Build conditions, the exiting movement from the Beverly Depot MBTA Parking Garage Driveway is anticipated to operate at LOE E. The additional traffic generated by the Project is not expected to have a significant impact on the operations of the approach. All other movements at the Rantoul Street / Beverly Depot MBTA Parking Garage Driveway intersection are anticipated to operate at acceptable levels of service (LOS C or better) under all analysis conditions;
- All movements at the Rantoul Street / Pleasant Street intersection are anticipated

to operate at acceptable levels of service (LOS D or better) under all analysis conditions. The Project is not expected to increase the delay by more than two seconds per vehicle, or the queues by more than one vehicle, on any intersection movement;

- All movements at the intersection are anticipated to operate at acceptable levels of service (LOS D or better) under all analysis conditions. Queues on each approach are not expected to increase by more than one (1) vehicle as a result of the Project;
- The Beverly Depot MBTA Parking Garage Driveway will be temporarily closed during construction of the project. All movements at the study area intersections are anticipated to continue operating at acceptable levels of service (LOS D or better) during the temporary construction condition;
- The reduction from two entering lanes to one entering lane during the weekday morning peak period will result in no effective change to queuing for vehicles entering the parking garage. Therefore, the removal of the fluctuating access/egress lane along the Beverly Depot MBTA Parking Garage Driveway will not significantly alter the ability of this driveway to provide adequate vehicle stacking without extending onto Rantoul Street;
- As part of the project, the Proponent proposes to lease 70 parking spaces on-site within the Beverly Depot Garage to accommodate the residential apartment units. A total of 67 apartment units will be provided, requiring a total of 67 parking spaces to satisfy City of Beverly Zoning Ordinances. Combining the surface parking spaces and on-site parking immediately on the site frontage, the additional availability of public parking along the surrounding streets, and the availability of the MBTA Beverly Depot Parking Garage, the parking supply will be adequate to satisfy City of Beverly Zoning Ordinances for the proposed retail and restaurant space;
- The Applicant is committed to provide pedestrian accommodations to maintain access to the MBTA parking garage to/from Rantoul Street, is committed to providing bicycle racks on-site, and is committed to increase transit ridership by posting and providing schedule and map information to all residents; and
- The Applicant will work with MassDOT and the Middlesex Corporation to modify the on-street parking in front of the site to accommodate up to seven on-street parking spaces.

In conclusion, the traffic generated by the proposed #112 Rantoul Street Project can be safely and efficiently accommodated along the existing street system. The minor increases in delay at study area intersections resulting from this multi-modal, mixed-use development do not warrant any additional project-specific mitigation.

Attachment A

Turning Movement Counts (TMCs)



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INDUSTRIES, LLC

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

File Name : 165262 A
Site Code : TBA
Start Date : 9/8/2016
Page No : 1

N/S: Rantoul Street
W: MBTA Garage Driveway
City, State: Beverly, MA
Client: TEC/ S. Gregorio

Groups Printed- Cars - Heavy Vehicles

Start Time	Rantoul Street From North			Rantoul Street From South			MBTA Garage Driveway From West			Int. Total
	Right	Thru	U-Turn	Thru	Left	U-Turn	Right	Left	U-Turn	
07:00 AM	7	52	0	44	2	0	0	0	0	105
07:15 AM	5	47	0	32	0	0	0	0	0	84
07:30 AM	15	89	0	0	0	0	0	0	0	104
07:45 AM	8	63	0	0	0	0	1	0	0	72
Total	35	251	0	76	2	0	1	0	0	365
08:00 AM	8	48	0	0	0	0	1	0	0	57
08:15 AM	10	80	0	0	0	0	0	0	0	90
08:30 AM	3	64	0	0	0	0	1	0	0	68
08:45 AM	2	56	0	1	0	0	0	0	0	59
Total	23	248	0	1	0	0	2	0	0	274
Grand Total	58	499	0	77	2	0	3	0	0	639
Apprch %	10.4	89.6	0	97.5	2.5	0	100	0	0	
Total %	9.1	78.1	0	12.1	0.3	0	0.5	0	0	
Cars	58	470	0	71	2	0	3	0	0	604
% Cars	100	94.2	0	92.2	100	0	100	0	0	94.5
Heavy Vehicles	0	29	0	6	0	0	0	0	0	35
% Heavy Vehicles	0	5.8	0	7.8	0	0	0	0	0	5.5

Start Time	Rantoul Street From North				Rantoul Street From South				MBTA Garage Driveway From West				Int. Total
	Right	Thru	U-Turn	App. Total	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 07:00 AM													
07:00 AM	7	52	0	59	44	2	0	46	0	0	0	0	105
07:15 AM	5	47	0	52	32	0	0	32	0	0	0	0	84
07:30 AM	15	89	0	104	0	0	0	0	0	0	0	0	104
07:45 AM	8	63	0	71	0	0	0	0	1	0	0	1	72
Total Volume	35	251	0	286	76	2	0	78	1	0	0	1	365
% App. Total	12.2	87.8	0		97.4	2.6	0		100	0	0		
PHF	.583	.705	.000	.688	.432	.250	.000	.424	.250	.000	.000	.250	.869
Cars	35	235	0	270	71	2	0	73	1	0	0	1	344
% Cars	100	93.6	0	94.4	93.4	100	0	93.6	100	0	0	100	94.2
Heavy Vehicles	0	16	0	16	5	0	0	5	0	0	0	0	21
% Heavy Vehicles	0	6.4	0	5.6	6.6	0	0	6.4	0	0	0	0	5.8



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City, State: Beverly, MA
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Groups Printed- Cars

Start Time	Rantoul Street From North			Rantoul Street From South			MBTA Garage Driveway From West			Int. Total
	Right	Thru	U-Turn	Thru	Left	U-Turn	Right	Left	U-Turn	
07:00 AM	7	49	0	42	2	0	0	0	0	100
07:15 AM	5	41	0	29	0	0	0	0	0	75
07:30 AM	15	84	0	0	0	0	0	0	0	99
07:45 AM	8	61	0	0	0	0	1	0	0	70
Total	35	235	0	71	2	0	1	0	0	344
08:00 AM	8	45	0	0	0	0	1	0	0	54
08:15 AM	10	78	0	0	0	0	0	0	0	88
08:30 AM	3	62	0	0	0	0	1	0	0	66
08:45 AM	2	50	0	0	0	0	0	0	0	52
Total	23	235	0	0	0	0	2	0	0	260
Grand Total	58	470	0	71	2	0	3	0	0	604
Apprch %	11	89	0	97.3	2.7	0	100	0	0	
Total %	9.6	77.8	0	11.8	0.3	0	0.5	0	0	

Start Time	Rantoul Street From North				Rantoul Street From South				MBTA Garage Driveway From West				Int. Total
	Right	Thru	U-Turn	App. Total	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 07:00 AM													
07:00 AM	7	49	0	56	42	2	0	44	0	0	0	0	100
07:15 AM	5	41	0	46	29	0	0	29	0	0	0	0	75
07:30 AM	15	84	0	99	0	0	0	0	0	0	0	0	99
07:45 AM	8	61	0	69	0	0	0	0	1	0	0	1	70
Total Volume	35	235	0	270	71	2	0	73	1	0	0	1	344
% App. Total	13	87	0		97.3	2.7	0		100	0	0		
PHF	.583	.699	.000	.682	.423	.250	.000	.415	.250	.000	.000	.250	.860



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N/S: Rantoul Street
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Groups Printed- Heavy Vehicles

Start Time	Rantoul Street From North			Rantoul Street From South			MBTA Garage Driveway From West			Int. Total
	Right	Thru	U-Turn	Thru	Left	U-Turn	Right	Left	U-Turn	
07:00 AM	0	3	0	2	0	0	0	0	0	5
07:15 AM	0	6	0	3	0	0	0	0	0	9
07:30 AM	0	5	0	0	0	0	0	0	0	5
07:45 AM	0	2	0	0	0	0	0	0	0	2
Total	0	16	0	5	0	0	0	0	0	21
08:00 AM	0	3	0	0	0	0	0	0	0	3
08:15 AM	0	2	0	0	0	0	0	0	0	2
08:30 AM	0	2	0	0	0	0	0	0	0	2
08:45 AM	0	6	0	1	0	0	0	0	0	7
Total	0	13	0	1	0	0	0	0	0	14
Grand Total	0	29	0	6	0	0	0	0	0	35
Apprch %	0	100	0	100	0	0	0	0	0	
Total %	0	82.9	0	17.1	0	0	0	0	0	

Start Time	Rantoul Street From North				Rantoul Street From South				MBTA Garage Driveway From West				Int. Total
	Right	Thru	U-Turn	App. Total	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	
07:00 AM	0	3	0	3	2	0	0	2	0	0	0	0	5
07:15 AM	0	6	0	6	3	0	0	3	0	0	0	0	9
07:30 AM	0	5	0	5	0	0	0	0	0	0	0	0	5
07:45 AM	0	2	0	2	0	0	0	0	0	0	0	0	2
Total Volume	0	16	0	16	5	0	0	5	0	0	0	0	21
% App. Total	0	100	0	100	100	0	0	100	0	0	0	0	
PHF	.000	.667	.000	.667	.417	.000	.000	.417	.000	.000	.000	.000	.583

Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 07:00 AM



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46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
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N/S: Rantoul Street
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Client: TEC/ S. Gregorio

Groups Printed- Peds and Bikes

Start Time	Rantoul Street From North				Rantoul Street From South				MBTA Garage Driveway From West				Int. Total
	Right	Thru	Peds EB	Peds WB	Thru	Left	Peds WB	Peds EB	Right	Left	Peds NB	Peds SB	
07:00 AM	0	0	0	1	0	0	2	0	0	0	9	1	13
07:15 AM	0	0	0	0	0	0	0	0	0	0	6	1	7
07:30 AM	0	0	1	0	0	0	0	0	0	0	3	3	7
07:45 AM	0	0	0	0	0	0	0	0	0	0	7	2	9
Total	0	0	1	1	0	0	2	0	0	0	25	7	36
08:00 AM	0	0	0	0	0	0	1	0	0	0	4	2	7
08:15 AM	0	0	0	0	0	0	0	0	0	0	6	0	6
08:30 AM	0	0	0	0	0	0	0	0	0	0	2	2	4
08:45 AM	0	1	0	0	0	0	0	0	0	0	3	0	4
Total	0	1	0	0	0	0	1	0	0	0	15	4	21
Grand Total	0	1	1	1	0	0	3	0	0	0	40	11	57
Apprch %	0	33.3	33.3	33.3	0	0	100	0	0	0	78.4	21.6	
Total %	0	1.8	1.8	1.8	0	0	5.3	0	0	0	70.2	19.3	

Start Time	Rantoul Street From North					Rantoul Street From South					MBTA Garage Driveway From West					Int. Total
	Right	Thru	Peds EB	Peds WB	App. Total	Thru	Left	Peds WB	Peds EB	App. Total	Right	Left	Peds NB	Peds SB	App. Total	
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																
Peak Hour for Entire Intersection Begins at 07:00 AM																
07:00 AM	0	0	0	1	1	0	0	2	0	2	0	0	9	1	10	13
07:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	6	1	7	7
07:30 AM	0	0	1	0	1	0	0	0	0	0	0	0	3	3	6	7
07:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	7	2	9	9
Total Volume	0	0	1	1	2	0	0	2	0	2	0	0	25	7	32	36
% App. Total	0	0	50	50		0	0	100	0		0	0	78.1	21.9		
PHF	.000	.000	.250	.250	.500	.000	.000	.250	.000	.250	.000	.000	.694	.583	.800	.692



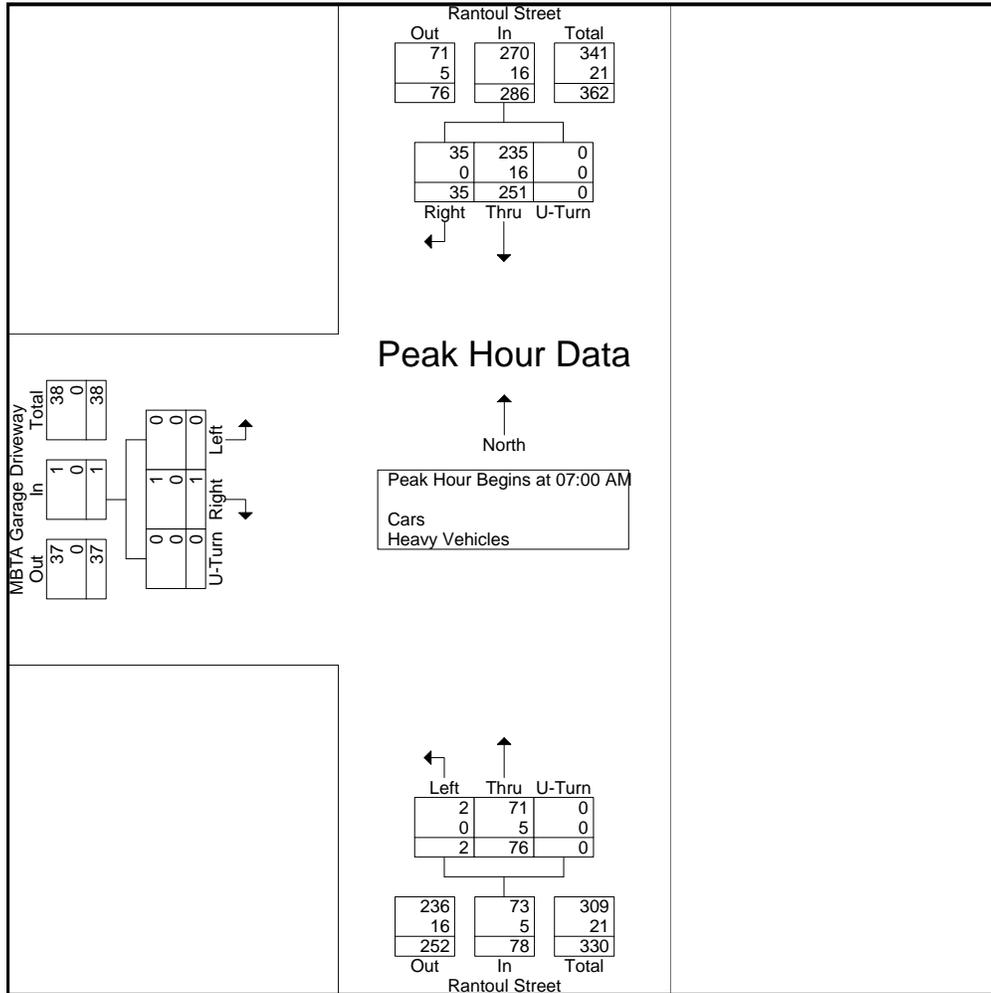
PRECISION
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46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

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City, State: Beverly, MA
Client: TEC/ S. Gregorio

Start Time	Rantoul Street From North				Rantoul Street From South				MBTA Garage Driveway From West				Int. Total
	Right	Thru	U-Turn	App. Total	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 07:00 AM													
07:00 AM	7	52	0	59	44	2	0	46	0	0	0	0	105
07:15 AM	5	47	0	52	32	0	0	32	0	0	0	0	84
07:30 AM	15	89	0	104	0	0	0	0	0	0	0	0	104
07:45 AM	8	63	0	71	0	0	0	0	1	0	0	1	72
Total Volume	35	251	0	286	76	2	0	78	1	0	0	1	365
% App. Total	12.2	87.8	0		97.4	2.6	0		100	0	0		
PHF	.583	.705	.000	.688	.432	.250	.000	.424	.250	.000	.000	.250	.869
Cars	35	235	0	270	71	2	0	73	1	0	0	1	344
% Cars	100	93.6	0	94.4	93.4	100	0	93.6	100	0	0	100	94.2
Heavy Vehicles	0	16	0	16	5	0	0	5	0	0	0	0	21
% Heavy Vehicles	0	6.4	0	5.6	6.6	0	0	6.4	0	0	0	0	5.8





PRECISION
D A T A
INDUSTRIES, LLC

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

File Name : 165262 AA
Site Code : TBA
Start Date : 9/8/2016
Page No : 1

N/S: Rantoul Street
W: MBTA Garage Driveway
City, State: Beverly, MA
Client: TEC/ S. Gregorio

Groups Printed- Cars - Heavy Vehicles

Start Time	Rantoul Street From North			Rantoul Street From South			MBTA Garage Driveway From West			Int. Total
	Right	Thru	U-Turn	Thru	Left	U-Turn	Right	Left	U-Turn	
04:00 PM	0	90	0	124	0	0	2	8	0	224
04:15 PM	0	98	1	128	0	0	0	1	0	228
04:30 PM	0	109	0	92	1	0	0	0	0	202
04:45 PM	0	102	0	115	0	1	0	1	0	219
Total	0	399	1	459	1	1	2	10	0	873
05:00 PM	0	120	0	109	0	1	5	12	0	247
05:15 PM	0	143	0	111	0	0	1	8	0	263
05:30 PM	2	108	0	113	0	0	2	12	0	237
05:45 PM	2	111	0	97	1	0	6	4	0	221
Total	4	482	0	430	1	1	14	36	0	968
Grand Total	4	881	1	889	2	2	16	46	0	1841
Apprch %	0.5	99.4	0.1	99.6	0.2	0.2	25.8	74.2	0	
Total %	0.2	47.9	0.1	48.3	0.1	0.1	0.9	2.5	0	
Cars	4	869	1	877	2	2	16	46	0	1817
% Cars	100	98.6	100	98.7	100	100	100	100	0	98.7
Heavy Vehicles	0	12	0	12	0	0	0	0	0	24
% Heavy Vehicles	0	1.4	0	1.3	0	0	0	0	0	1.3

Start Time	Rantoul Street From North				Rantoul Street From South				MBTA Garage Driveway From West				Int. Total
	Right	Thru	U-Turn	App. Total	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 05:00 PM													
05:00 PM	0	120	0	120	109	0	1	110	5	12	0	17	247
05:15 PM	0	143	0	143	111	0	0	111	1	8	0	9	263
05:30 PM	2	108	0	110	113	0	0	113	2	12	0	14	237
05:45 PM	2	111	0	113	97	1	0	98	6	4	0	10	221
Total Volume	4	482	0	486	430	1	1	432	14	36	0	50	968
% App. Total	0.8	99.2	0		99.5	0.2	0.2		28	72	0		
PHF	.500	.843	.000	.850	.951	.250	.250	.956	.583	.750	.000	.735	.920
Cars	4	475	0	479	427	1	1	429	14	36	0	50	958
% Cars	100	98.5	0	98.6	99.3	100	100	99.3	100	100	0	100	99.0
Heavy Vehicles	0	7	0	7	3	0	0	3	0	0	0	0	10
% Heavy Vehicles	0	1.5	0	1.4	0.7	0	0	0.7	0	0	0	0	1.0



PRECISION
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INDUSTRIES, LLC

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

File Name : 165262 AA
Site Code : TBA
Start Date : 9/8/2016
Page No : 1

N/S: Rantoul Street
W: MBTA Garage Driveway
City, State: Beverly, MA
Client: TEC/ S. Gregorio

Groups Printed- Cars

Start Time	Rantoul Street From North			Rantoul Street From South			MBTA Garage Driveway From West			Int. Total
	Right	Thru	U-Turn	Thru	Left	U-Turn	Right	Left	U-Turn	
04:00 PM	0	90	0	122	0	0	2	8	0	222
04:15 PM	0	97	1	127	0	0	0	1	0	226
04:30 PM	0	106	0	90	1	0	0	0	0	197
04:45 PM	0	101	0	111	0	1	0	1	0	214
Total	0	394	1	450	1	1	2	10	0	859
05:00 PM	0	119	0	108	0	1	5	12	0	245
05:15 PM	0	141	0	111	0	0	1	8	0	261
05:30 PM	2	105	0	111	0	0	2	12	0	232
05:45 PM	2	110	0	97	1	0	6	4	0	220
Total	4	475	0	427	1	1	14	36	0	958
Grand Total	4	869	1	877	2	2	16	46	0	1817
Apprch %	0.5	99.4	0.1	99.5	0.2	0.2	25.8	74.2	0	
Total %	0.2	47.8	0.1	48.3	0.1	0.1	0.9	2.5	0	

Start Time	Rantoul Street From North				Rantoul Street From South				MBTA Garage Driveway From West				Int. Total
	Right	Thru	U-Turn	App. Total	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 05:00 PM													
05:00 PM	0	119	0	119	108	0	1	109	5	12	0	17	245
05:15 PM	0	141	0	141	111	0	0	111	1	8	0	9	261
05:30 PM	2	105	0	107	111	0	0	111	2	12	0	14	232
05:45 PM	2	110	0	112	97	1	0	98	6	4	0	10	220
Total Volume	4	475	0	479	427	1	1	429	14	36	0	50	958
% App. Total	0.8	99.2	0		99.5	0.2	0.2		28	72	0		
PHF	.500	.842	.000	.849	.962	.250	.250	.966	.583	.750	.000	.735	.918



PRECISION
D A T A
INDUSTRIES, LLC

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

File Name : 165262 AA
Site Code : TBA
Start Date : 9/8/2016
Page No : 1

N/S: Rantoul Street
W: MBTA Garage Driveway
City, State: Beverly, MA
Client: TEC/ S. Gregorio

Groups Printed- Heavy Vehicles

Start Time	Rantoul Street From North			Rantoul Street From South			MBTA Garage Driveway From West			Int. Total
	Right	Thru	U-Turn	Thru	Left	U-Turn	Right	Left	U-Turn	
04:00 PM	0	0	0	2	0	0	0	0	0	2
04:15 PM	0	1	0	1	0	0	0	0	0	2
04:30 PM	0	3	0	2	0	0	0	0	0	5
04:45 PM	0	1	0	4	0	0	0	0	0	5
Total	0	5	0	9	0	0	0	0	0	14
05:00 PM	0	1	0	1	0	0	0	0	0	2
05:15 PM	0	2	0	0	0	0	0	0	0	2
05:30 PM	0	3	0	2	0	0	0	0	0	5
05:45 PM	0	1	0	0	0	0	0	0	0	1
Total	0	7	0	3	0	0	0	0	0	10
Grand Total	0	12	0	12	0	0	0	0	0	24
Apprch %	0	100	0	100	0	0	0	0	0	
Total %	0	50	0	50	0	0	0	0	0	

Start Time	Rantoul Street From North				Rantoul Street From South				MBTA Garage Driveway From West				Int. Total
	Right	Thru	U-Turn	App. Total	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 04:00 PM													
04:00 PM	0	0	0	0	2	0	0	2	0	0	0	0	2
04:15 PM	0	1	0	1	1	0	0	1	0	0	0	0	2
04:30 PM	0	3	0	3	2	0	0	2	0	0	0	0	5
04:45 PM	0	1	0	1	4	0	0	4	0	0	0	0	5
Total Volume	0	5	0	5	9	0	0	9	0	0	0	0	14
% App. Total	0	100	0	100	100	0	0	100	0	0	0	0	
PHF	.000	.417	.000	.417	.563	.000	.000	.563	.000	.000	.000	.000	.700



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

File Name : 165262 AA
Site Code : TBA
Start Date : 9/8/2016
Page No : 1

N/S: Rantoul Street
W: MBTA Garage Driveway
City, State: Beverly, MA
Client: TEC/ S. Gregorio

Groups Printed- Peds and Bikes

Start Time	Rantoul Street From North				Rantoul Street From South				MBTA Garage Driveway From West				Int. Total
	Right	Thru	Peds EB	Peds WB	Thru	Left	Peds WB	Peds EB	Right	Left	Peds NB	Peds SB	
04:00 PM	0	0	0	0	0	0	1	2	0	0	2	2	7
04:15 PM	0	0	0	0	0	0	0	1	0	0	3	1	5
04:30 PM	0	0	1	0	0	0	0	0	0	0	0	1	2
04:45 PM	0	0	0	0	0	0	0	0	0	0	1	2	3
Total	0	0	1	0	0	0	1	3	0	0	6	6	17
05:00 PM	0	0	1	3	0	0	1	0	0	0	1	2	8
05:15 PM	0	0	1	1	0	0	0	0	0	0	1	7	10
05:30 PM	0	0	3	1	0	0	0	0	0	0	0	2	6
05:45 PM	0	0	0	0	1	0	0	1	0	0	1	2	5
Total	0	0	5	5	1	0	1	1	0	0	3	13	29
Grand Total	0	0	6	5	1	0	2	4	0	0	9	19	46
Apprch %	0	0	54.5	45.5	14.3	0	28.6	57.1	0	0	32.1	67.9	
Total %	0	0	13	10.9	2.2	0	4.3	8.7	0	0	19.6	41.3	

Start Time	Rantoul Street From North					Rantoul Street From South					MBTA Garage Driveway From West					Int. Total
	Right	Thru	Peds EB	Peds WB	App. Total	Thru	Left	Peds WB	Peds EB	App. Total	Right	Left	Peds NB	Peds SB	App. Total	
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																
Peak Hour for Entire Intersection Begins at 05:00 PM																
05:00 PM	0	0	1	3	4	0	0	1	0	1	0	0	1	2	3	8
05:15 PM	0	0	1	1	2	0	0	0	0	0	0	0	1	7	8	10
05:30 PM	0	0	3	1	4	0	0	0	0	0	0	0	0	2	2	6
05:45 PM	0	0	0	0	0	1	0	0	1	2	0	0	1	2	3	5
Total Volume	0	0	5	5	10	1	0	1	1	3	0	0	3	13	16	29
% App. Total	0	0	50	50		33.3	0	33.3	33.3		0	0	18.8	81.2		
PHF	.000	.000	.417	.417	.625	.250	.000	.250	.250	.375	.000	.000	.750	.464	.500	.725



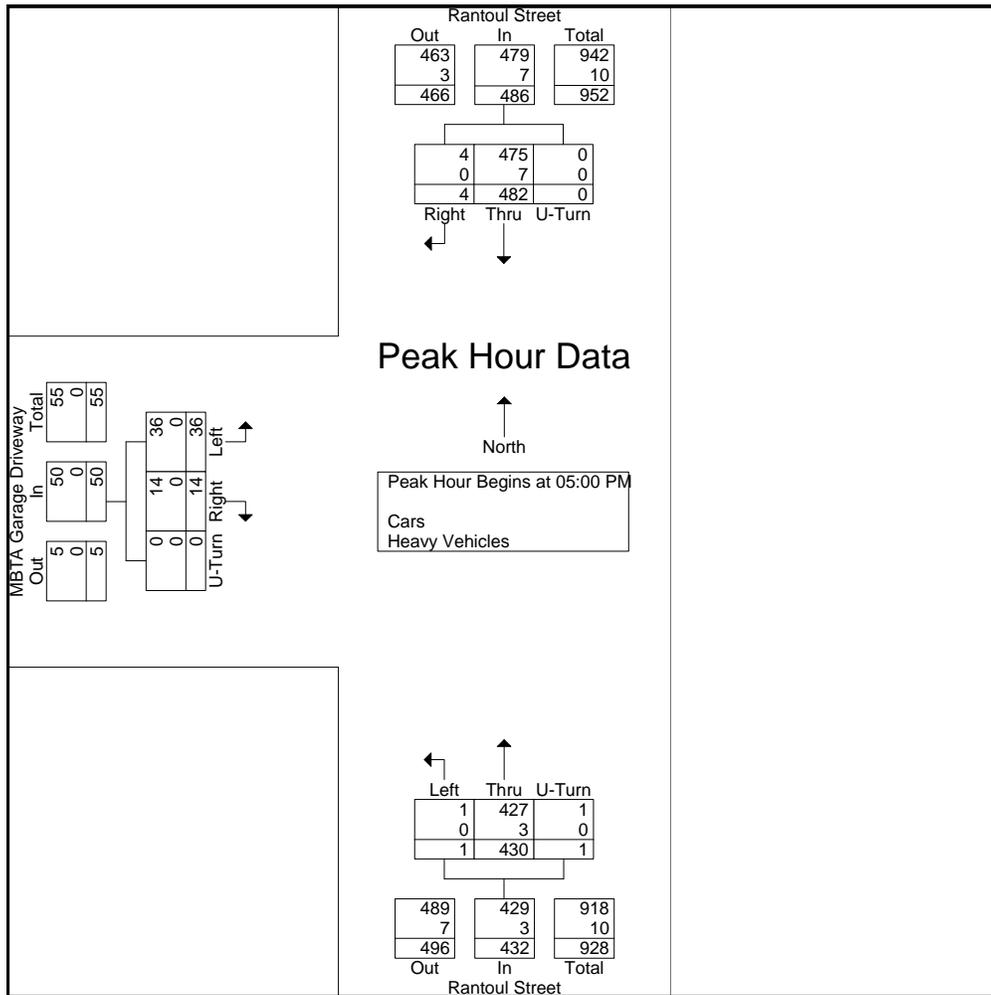
PRECISION
D A T A
INDUSTRIES, LLC

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

File Name : 165262 AA
Site Code : TBA
Start Date : 9/8/2016
Page No : 1

N/S: Rantoul Street
W: MBTA Garage Driveway
City, State: Beverly, MA
Client: TEC/ S. Gregorio

Start Time	Rantoul Street From North				Rantoul Street From South				MBTA Garage Driveway From West				Int. Total
	Right	Thru	U-Turn	App. Total	Thru	Left	U-Turn	App. Total	Right	Left	U-Turn	App. Total	
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 05:00 PM													
05:00 PM	0	120	0	120	109	0	1	110	5	12	0	17	247
05:15 PM	0	143	0	143	111	0	0	111	1	8	0	9	263
05:30 PM	2	108	0	110	113	0	0	113	2	12	0	14	237
05:45 PM	2	111	0	113	97	1	0	98	6	4	0	10	221
Total Volume	4	482	0	486	430	1	1	432	14	36	0	50	968
% App. Total	0.8	99.2	0		99.5	0.2	0.2		28	72	0		
PHF	.500	.843	.000	.850	.951	.250	.250	.956	.583	.750	.000	.735	.920
Cars	4	475	0	479	427	1	1	429	14	36	0	50	958
% Cars	100	98.5	0	98.6	99.3	100	100	99.3	100	100	0	100	99.0
Heavy Vehicles	0	7	0	7	3	0	0	3	0	0	0	0	10
% Heavy Vehicles	0	1.5	0	1.4	0.7	0	0	0.7	0	0	0	0	1.0



Occupancy report

Report Lane(s): 0..13, 63.

From 5/12/2016 at 00:00:00 To 5/13/2016 at 00:00:59

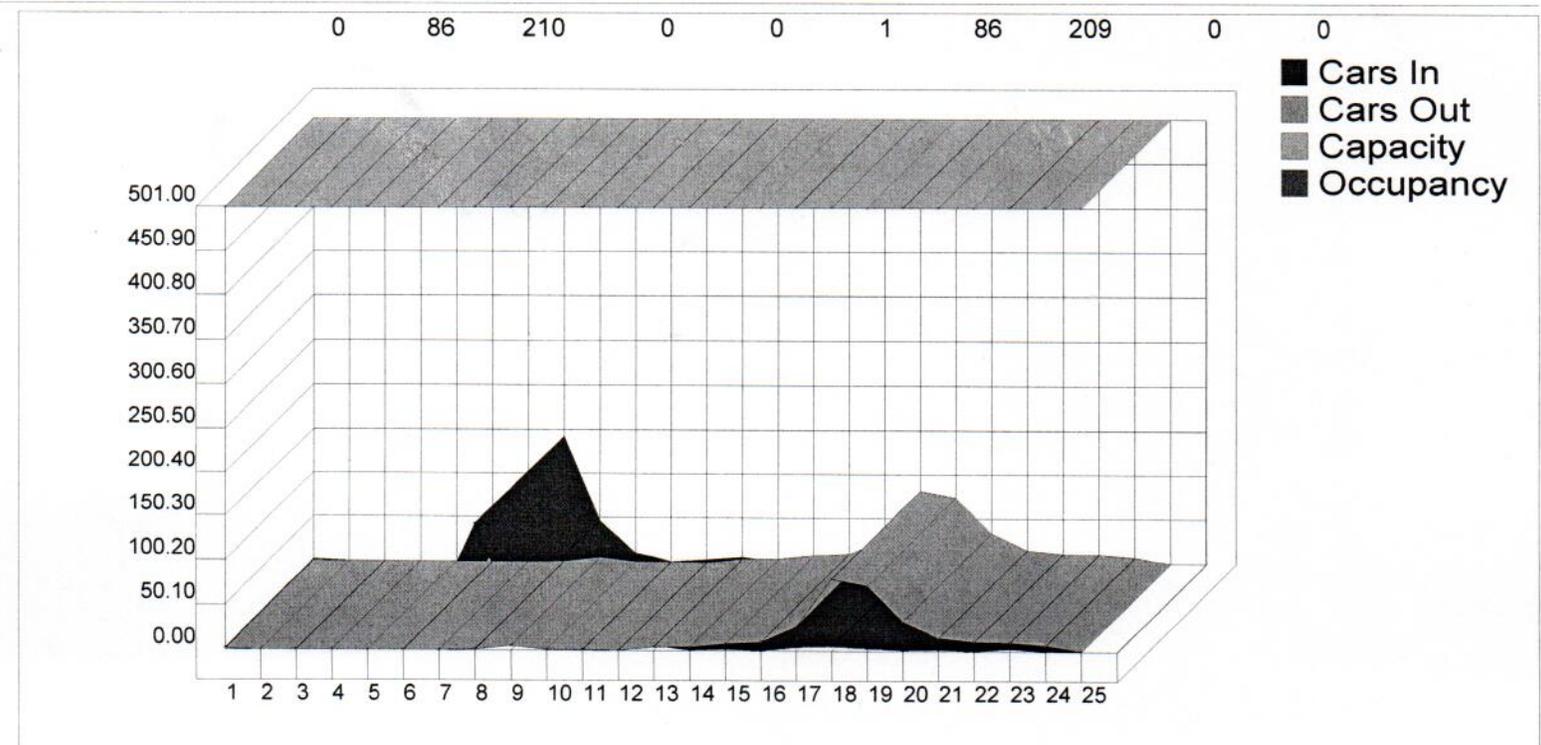
Generated on 5/16/2016 at 10:13:02

Version 2.9

Counter Configuration # 0 Day Change Time 00:00:00 % Occupied based on 500

Report Started for : Tickets Monthly BarCodes Hotel Credit

	Tickets	Monthly	BarCodes	Hotel	Credit	Tickets	Monthly	BarCodes	Hotel	Credit	Occup./ Vacancy	
			tickets					tickets				
C'Over	0	0	-8020	0	0							
05/12/2016 01:00	0	2	0	0	0	0	0	1	0	0	-8019604%	8519
05/12/2016 02:00	0	0	0	0	0	0	0	0	0	0	-8019604%	8519
05/12/2016 03:00	0	0	0	0	0	0	0	0	0	0	-8019604%	8519
05/12/2016 04:00	0	0	0	0	0	0	0	0	0	0	-8019604%	8519
05/12/2016 05:00	0	0	0	0	0	0	0	0	0	0	-8019604%	8519
05/12/2016 06:00	0	1	6	0	0	0	0	0	0	0	-8012602%	8512
05/12/2016 07:00	0	11	44	0	0	0	0	0	0	0	-7957591%	8457
05/12/2016 08:00	0	53	90	0	0	0	1	0	0	0	-7815563%	8315
05/12/2016 09:00	0	11	36	0	0	1	2	2	0	0	-7773555%	8273
05/12/2016 10:00	0	1	10	0	0	0	0	1	0	0	-7763553%	8263
05/12/2016 11:00	0	0	1	0	0	0	0	1	0	0	-7763553%	8263
05/12/2016 12:00	0	1	2	0	0	0	0	0	0	0	-7760552%	8260
05/12/2016 13:00	0	0	6	0	0	0	1	3	0	0	-7758552%	8258
05/12/2016 14:00	0	1	0	0	0	0	2	2	0	0	-7761552%	8261
05/12/2016 15:00	0	1	1	0	0	0	3	5	0	0	-7767553%	8267
05/12/2016 16:00	0	0	0	0	0	0	3	7	0	0	-7777555%	8277
05/12/2016 17:00	0	0	4	0	0	0	5	23	0	0	-7801560%	8301
05/12/2016 18:00	0	2	3	0	0	0	25	57	0	0	-7878576%	8378
05/12/2016 19:00	0	0	3	0	0	0	30	44	0	0	-7949590%	8449
05/12/2016 20:00	0	0	1	0	0	0	8	26	0	0	-7982596%	8482
05/12/2016 21:00	0	0	2	0	0	0	1	14	0	0	-7995599%	8495
05/12/2016 22:00	0	0	0	0	0	0	1	10	0	0	-8006601%	8506
05/12/2016 23:00	0	2	1	0	0	0	4	6	0	0	-8013603%	8513
05/13/2016 00:00	0	0	0	0	0	0	0	7	0	0	-8020604%	8520
05/13/2016 01:00	0	0	0	0	0	0	0	0	0	0	-8020604%	8520



Occupancy report

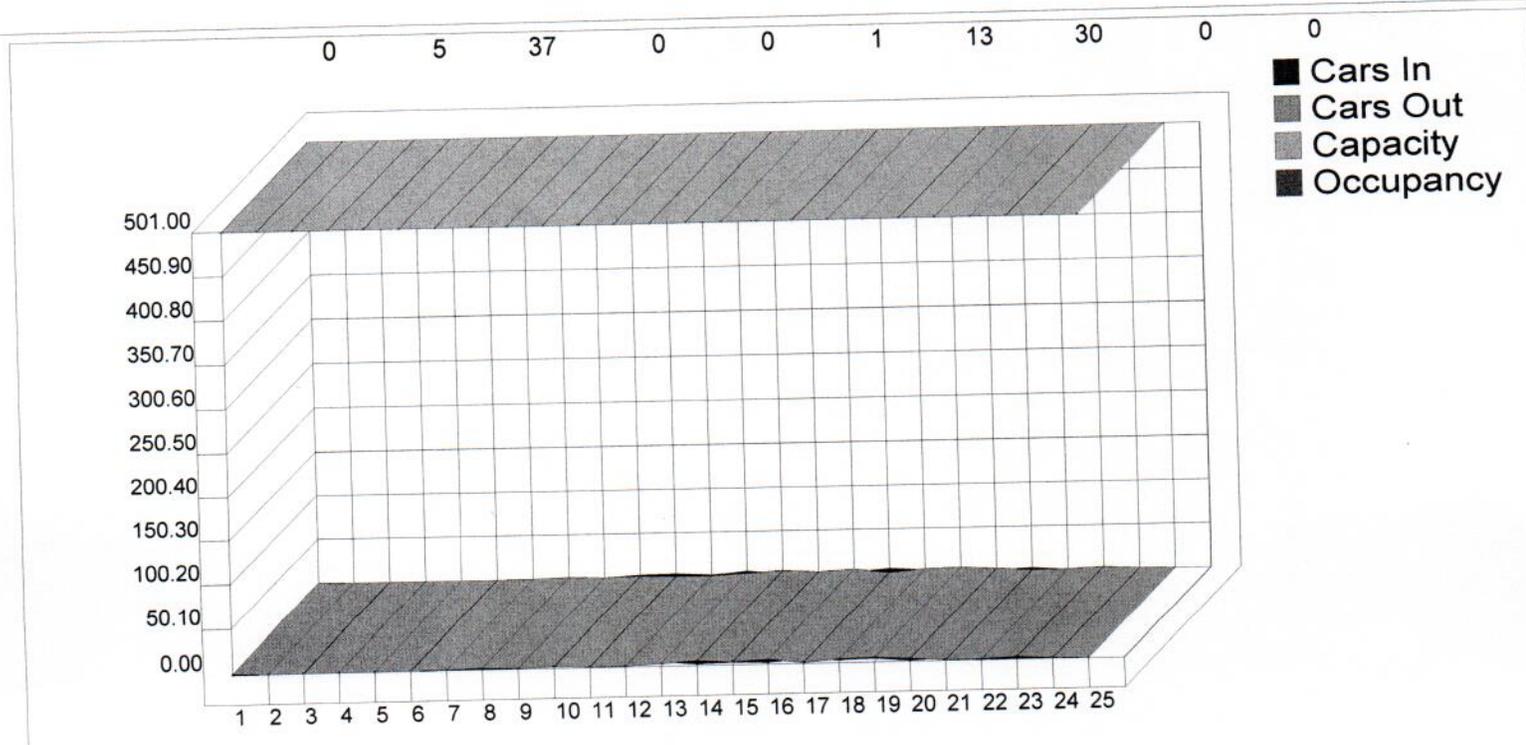
Report Lane(s): 0..13, 63.
 From 5/14/2016 at 00:00:00 To 5/15/2016 at 00:00:59
 Generated on 5/16/2016 at 10:12:47

Counter Configuration # 0 Day Change Time 00:00:00 % Occupied based on 500

Version 2.9

Report Started for : Tickets Monthly BarCodes Hotel Credit

	Tickets	Monthly	BarCodes	Hotel	Credit	Tickets	Monthly	BarCodes	Hotel	Credit	Occup./ Vacancy
C'Over	0	0	-8082	0	0						
05/14/2016 01:00	0	0	0	0	0	0	1	0	0	0	-8083 617% 8583
05/14/2016 02:00	0	0	0	0	0	0	0	0	0	0	-8083 617% 8583
05/14/2016 03:00	0	0	0	0	0	0	0	0	0	0	-8083 617% 8583
05/14/2016 04:00	0	0	0	0	0	0	0	0	0	0	-8083 617% 8583
05/14/2016 05:00	0	0	0	0	0	0	0	0	0	0	-8083 617% 8583
05/14/2016 06:00	0	0	0	0	0	0	0	1	0	0	-8083 617% 8583
05/14/2016 07:00	0	0	1	0	0	0	1	1	0	0	-8084 617% 8584
05/14/2016 08:00	0	0	1	0	0	0	1	0	0	0	-8084 617% 8584
05/14/2016 09:00	0	0	3	0	0	0	1	1	0	0	-8083 617% 8583
05/14/2016 10:00	0	0	3	0	0	0	1	1	0	0	-8080 616% 8580
05/14/2016 11:00	0	1	2	0	0	1	0	0	0	0	-8079 616% 8579
05/14/2016 12:00	0	0	4	0	0	0	0	3	0	0	-8077 615% 8577
05/14/2016 13:00	0	1	2	0	0	0	2	3	0	0	-8080 616% 8580
05/14/2016 14:00	0	0	2	0	0	0	1	2	0	0	-8080 616% 8580
05/14/2016 15:00	0	1	2	0	0	0	2	3	0	0	-8083 617% 8583
05/14/2016 16:00	0	0	2	0	0	0	0	1	0	0	-8079 616% 8579
05/14/2016 17:00	0	0	5	0	0	0	0	1	0	0	-8080 616% 8580
05/14/2016 18:00	0	0	3	0	0	0	1	3	0	0	-8081 616% 8581
05/14/2016 19:00	0	1	3	0	0	0	1	4	0	0	-8083 617% 8583
05/14/2016 20:00	0	1	0	0	0	0	0	3	0	0	-8081 616% 8581
05/14/2016 21:00	0	0	3	0	0	0	0	1	0	0	-8082 616% 8582
05/14/2016 22:00	0	0	0	0	0	0	0	1	0	0	-8084 617% 8584
05/14/2016 23:00	0	0	1	0	0	0	1	2	0	0	-8084 617% 8584
05/15/2016 00:00	0	0	1	0	0	0	0	1	0	0	-8084 617% 8584
05/15/2016 01:00	0	0	0	0	0	0	0	0	0	0	-8084 617% 8584





PRECISION
D A T A
INDUSTRIES, LLC

P.O. Box 301 Berlin, MA 01503
Office: 508.481.3999 Fax: 508.545.1234
Email: datarequests@pdillc.com

File Name : 154390 AA
Site Code : P2015
Start Date : 4/14/2015
Page No : 1

N/S: Rantoul Street (Route 1A)
E/W: Railroad Avenue
City, State: Beverly, MA
Client: TEC/ R. Brown

Groups Printed- Cars - Heavy Vehicles

Start Time	Rantoul Street (Route 1A) From North				Railroad Avenue From East				Rantoul Street (Route 1A) From South				Railroad Avenue From West				Int. Total
	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	
07:00 AM	0	81	0	1	7	0	4	0	1	56	0	0	11	5	8	0	174
07:15 AM	0	88	0	0	3	0	7	0	3	78	0	0	12	9	10	0	210
07:30 AM	0	90	2	0	8	0	7	0	4	104	0	0	14	10	9	0	248
07:45 AM	0	85	5	0	7	0	5	0	4	111	0	0	15	16	14	0	262
Total	0	344	7	1	25	0	23	0	12	349	0	0	52	40	41	0	894
08:00 AM	3	89	6	0	15	0	4	0	5	98	0	0	25	15	18	0	278
08:15 AM	0	90	5	0	6	0	4	0	1	117	0	0	17	9	11	0	260
08:30 AM	0	88	6	0	7	0	2	0	4	90	0	0	13	6	6	0	222
08:45 AM	0	79	6	1	11	0	4	0	2	111	0	0	16	16	10	0	256
Total	3	346	23	1	39	0	14	0	12	416	0	0	71	46	45	0	1016
Grand Total	3	690	30	2	64	0	37	0	24	765	0	0	123	86	86	0	1910
Apprch %	0.4	95.2	4.1	0.3	63.4	0	36.6	0	3	97	0	0	41.7	29.2	29.2	0	
Total %	0.2	36.1	1.6	0.1	3.4	0	1.9	0	1.3	40.1	0	0	6.4	4.5	4.5	0	
Cars	3	660	29	2	61	0	37	0	20	741	0	0	115	81	83	0	1832
% Cars	100	95.7	96.7	100	95.3	0	100	0	83.3	96.9	0	0	93.5	94.2	96.5	0	95.9
Heavy Vehicles	0	30	1	0	3	0	0	0	4	24	0	0	8	5	3	0	78
% Heavy Vehicles	0	4.3	3.3	0	4.7	0	0	0	16.7	3.1	0	0	6.5	5.8	3.5	0	4.1

Start Time	Rantoul Street (Route 1A) From North					Railroad Avenue From East					Rantoul Street (Route 1A) From South					Railroad Avenue From West					Int. Total
	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:30 AM																					
07:30 AM	0	90	2	0	92	8	0	7	0	15	4	104	0	0	108	14	10	9	0	33	248
07:45 AM	0	85	5	0	90	7	0	5	0	12	4	111	0	0	115	15	16	14	0	45	262
08:00 AM	3	89	6	0	98	15	0	4	0	19	5	98	0	0	103	25	15	18	0	58	278
08:15 AM	0	90	5	0	95	6	0	4	0	10	1	117	0	0	118	17	9	11	0	37	260
Total Volume	3	354	18	0	375	36	0	20	0	56	14	430	0	0	444	71	50	52	0	173	1048
% App. Total	0.8	94.4	4.8	0		64.3	0	35.7	0		3.2	96.8	0	0		41	28.9	30.1	0		
PHF	.250	.983	.750	.000	.957	.600	.000	.714	.000	.737	.700	.919	.000	.000	.941	.710	.781	.722	.000	.746	.942
Cars	3	347	17	0	367	34	0	20	0	54	12	417	0	0	429	66	45	50	0	161	1011
% Cars	100	98.0	94.4	0	97.9	94.4	0	100	0	96.4	85.7	97.0	0	0	96.6	93.0	90.0	96.2	0	93.1	96.5
Heavy Vehicles	0	7	1	0	8	2	0	0	0	2	2	13	0	0	15	5	5	2	0	12	37
% Heavy Vehicles	0	2.0	5.6	0	2.1	5.6	0	0	0	3.6	14.3	3.0	0	0	3.4	7.0	10.0	3.8	0	6.9	3.5



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Office: 508.481.3999 Fax: 508.545.1234
Email: datarequests@pdillc.com

File Name : 154390 AA
Site Code : P2015
Start Date : 4/14/2015
Page No : 1

N/S: Rantoul Street (Route 1A)
E/W: Railroad Avenue
City, State: Beverly, MA
Client: TEC/ R. Brown

Groups Printed- Cars

Start Time	Rantoul Street (Route 1A) From North				Railroad Avenue From East				Rantoul Street (Route 1A) From South				Railroad Avenue From West				Int. Total
	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	
07:00 AM	0	76	0	1	7	0	4	0	1	54	0	0	11	5	8	0	167
07:15 AM	0	84	0	0	3	0	7	0	1	76	0	0	12	9	9	0	201
07:30 AM	0	89	2	0	7	0	7	0	3	102	0	0	12	8	8	0	238
07:45 AM	0	83	5	0	6	0	5	0	4	108	0	0	13	15	13	0	252
Total	0	332	7	1	23	0	23	0	9	340	0	0	48	37	38	0	858
08:00 AM	3	88	6	0	15	0	4	0	5	95	0	0	25	14	18	0	273
08:15 AM	0	87	4	0	6	0	4	0	0	112	0	0	16	8	11	0	248
08:30 AM	0	81	6	0	7	0	2	0	4	85	0	0	12	6	6	0	209
08:45 AM	0	72	6	1	10	0	4	0	2	109	0	0	14	16	10	0	244
Total	3	328	22	1	38	0	14	0	11	401	0	0	67	44	45	0	974
Grand Total	3	660	29	2	61	0	37	0	20	741	0	0	115	81	83	0	1832
Apprch %	0.4	95.1	4.2	0.3	62.2	0	37.8	0	2.6	97.4	0	0	41.2	29	29.7	0	
Total %	0.2	36	1.6	0.1	3.3	0	2	0	1.1	40.4	0	0	6.3	4.4	4.5	0	

Start Time	Rantoul Street (Route 1A) From North					Railroad Avenue From East					Rantoul Street (Route 1A) From South					Railroad Avenue From West					Int. Total
	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:30 AM																					
07:30 AM	0	89	2	0	91	7	0	7	0	14	3	102	0	0	105	12	8	8	0	28	238
07:45 AM	0	83	5	0	88	6	0	5	0	11	4	108	0	0	112	13	15	13	0	41	252
08:00 AM	3	88	6	0	97	15	0	4	0	19	5	95	0	0	100	25	14	18	0	57	273
08:15 AM	0	87	4	0	91	6	0	4	0	10	0	112	0	0	112	16	8	11	0	35	248
Total Volume	3	347	17	0	367	34	0	20	0	54	12	417	0	0	429	66	45	50	0	161	1011
% App. Total	0.8	94.6	4.6	0		63	0	37	0		2.8	97.2	0	0		41	28	31.1	0		
PHF	.250	.975	.708	.000	.946	.567	.000	.714	.000	.711	.600	.931	.000	.000	.958	.660	.750	.694	.000	.706	.926



PRECISION
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Office: 508.481.3999 Fax: 508.545.1234
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File Name : 154390 AA
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Page No : 1

N/S: Rantoul Street (Route 1A)
E/W: Railroad Avenue
City, State: Beverly, MA
Client: TEC/ R. Brown

Groups Printed- Heavy Vehicles

Start Time	Rantoul Street (Route 1A) From North				Railroad Avenue From East				Rantoul Street (Route 1A) From South				Railroad Avenue From West				Int. Total	
	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn		
07:00 AM	0	5	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	7
07:15 AM	0	4	0	0	0	0	0	0	2	2	0	0	0	0	1	0	0	9
07:30 AM	0	1	0	0	1	0	0	0	1	2	0	0	2	2	1	0	0	10
07:45 AM	0	2	0	0	1	0	0	0	0	3	0	0	2	1	1	0	0	10
Total	0	12	0	0	2	0	0	0	3	9	0	0	4	3	3	0	0	36
08:00 AM	0	1	0	0	0	0	0	0	0	3	0	0	0	1	0	0	0	5
08:15 AM	0	3	1	0	0	0	0	0	1	5	0	0	1	1	0	0	0	12
08:30 AM	0	7	0	0	0	0	0	0	0	5	0	0	1	0	0	0	0	13
08:45 AM	0	7	0	0	1	0	0	0	0	2	0	0	2	0	0	0	0	12
Total	0	18	1	0	1	0	0	0	1	15	0	0	4	2	0	0	0	42
Grand Total	0	30	1	0	3	0	0	0	4	24	0	0	8	5	3	0	0	78
Apprch %	0	96.8	3.2	0	100	0	0	0	14.3	85.7	0	0	50	31.2	18.8	0	0	
Total %	0	38.5	1.3	0	3.8	0	0	0	5.1	30.8	0	0	10.3	6.4	3.8	0	0	

Start Time	Rantoul Street (Route 1A) From North					Railroad Avenue From East					Rantoul Street (Route 1A) From South					Railroad Avenue From West					Int. Total
	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 08:00 AM																					
08:00 AM	0	1	0	0	1	0	0	0	0	0	0	3	0	0	3	0	1	0	0	1	5
08:15 AM	0	3	1	0	4	0	0	0	0	0	1	5	0	0	6	1	1	0	0	2	12
08:30 AM	0	7	0	0	7	0	0	0	0	0	0	5	0	0	5	1	0	0	0	1	13
08:45 AM	0	7	0	0	7	1	0	0	0	1	0	2	0	0	2	2	0	0	0	2	12
Total Volume	0	18	1	0	19	1	0	0	0	1	1	15	0	0	16	4	2	0	0	6	42
% App. Total	0	94.7	5.3	0		100	0	0	0		6.2	93.8	0	0		66.7	33.3	0	0		
PHF	.000	.643	.250	.000	.679	.250	.000	.000	.000	.250	.250	.750	.000	.000	.667	.500	.500	.000	.000	.750	.808



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File Name : 154390 AA
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Page No : 1

N/S: Rantoul Street (Route 1A)
E/W: Railroad Avenue
City, State: Beverly, MA
Client: TEC/ R. Brown

Groups Printed- Peds and Bikes

Start Time	Rantoul Street (Route 1A) From North					Railroad Avenue From East					Rantoul Street (Route 1A) From South					Railroad Avenue From West					Int. Total
	Right	Thru	Left	Peds EB	Peds WB	Right	Thru	Left	Peds SB	Peds NB	Right	Thru	Left	Peds WB	Peds EB	Right	Thru	Left	Peds NB	Peds SB	
07:00 AM	0	0	0	2	3	0	0	0	3	7	0	0	0	0	1	0	0	0	1	0	17
07:15 AM	0	0	0	2	16	0	0	0	3	5	0	0	0	2	0	0	0	0	1	1	30
07:30 AM	0	0	0	0	3	0	0	0	1	1	0	0	0	1	0	0	0	0	1	2	9
07:45 AM	0	0	0	1	5	0	0	0	3	0	0	0	0	2	0	0	0	0	0	0	11
Total	0	0	0	5	27	0	0	0	10	13	0	0	0	5	1	0	0	0	3	3	67
08:00 AM	0	0	0	0	3	0	0	0	1	4	0	0	0	1	0	0	0	0	0	1	10
08:15 AM	0	0	0	1	4	0	0	0	1	3	0	0	0	0	0	0	0	0	1	1	11
08:30 AM	0	0	0	0	1	0	0	0	2	4	0	0	0	0	0	0	0	0	0	0	7
08:45 AM	0	0	0	1	0	0	0	0	4	3	0	0	0	2	1	0	0	0	1	1	13
Total	0	0	0	2	8	0	0	0	8	14	0	0	0	3	1	0	0	0	2	3	41
Grand Total	0	0	0	7	35	0	0	0	18	27	0	0	0	8	2	0	0	0	5	6	108
Apprch %	0	0	0	16.7	83.3	0	0	0	40	60	0	0	0	80	20	0	0	0	45.5	54.5	
Total %	0	0	0	6.5	32.4	0	0	0	16.7	25	0	0	0	7.4	1.9	0	0	0	4.6	5.6	

Start Time	Rantoul Street (Route 1A) From North						Railroad Avenue From East						Rantoul Street (Route 1A) From South						Railroad Avenue From West						Int. Total						
	Right	Thru	Left	Peds EB	Peds WB	App. Total	Right	Thru	Left	Peds SB	Peds NB	App. Total	Right	Thru	Left	Peds WB	Peds EB	App. Total	Right	Thru	Left	Peds NB	Peds SB	App. Total							
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																															
Peak Hour for Entire Intersection Begins at 07:00 AM																															
07:00 AM	0	0	0	2	3	5	0	0	0	3	7	10	0	0	0	0	1	1	0	0	0	1	0	1	0	0	0	1	0	1	17
07:15 AM	0	0	0	2	16	18	0	0	0	3	5	8	0	0	0	2	0	2	0	0	0	1	1	2	0	0	0	1	1	2	30
07:30 AM	0	0	0	0	3	3	0	0	0	1	1	2	0	0	0	1	0	1	0	0	0	1	2	3	0	0	0	1	2	3	9
07:45 AM	0	0	0	1	5	6	0	0	0	3	0	3	0	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	11
Total Volume	0	0	0	5	27	32	0	0	0	10	13	23	0	0	0	5	1	6	0	0	0	3	3	6	0	0	0	3	3	6	67
% App. Total	0	0	0	15.6	84.4		0	0	0	43.5	56.5		0	0	0	83.3	16.7		0	0	0	50	50		0	0	0	50	50		
PHF	.000	.000	.000	.625	.422	.444	.000	.000	.000	.833	.464	.575	.000	.000	.000	.625	.250	.750	.000	.000	.000	.750	.375	.500	.000	.000	.000	.750	.375	.500	.558



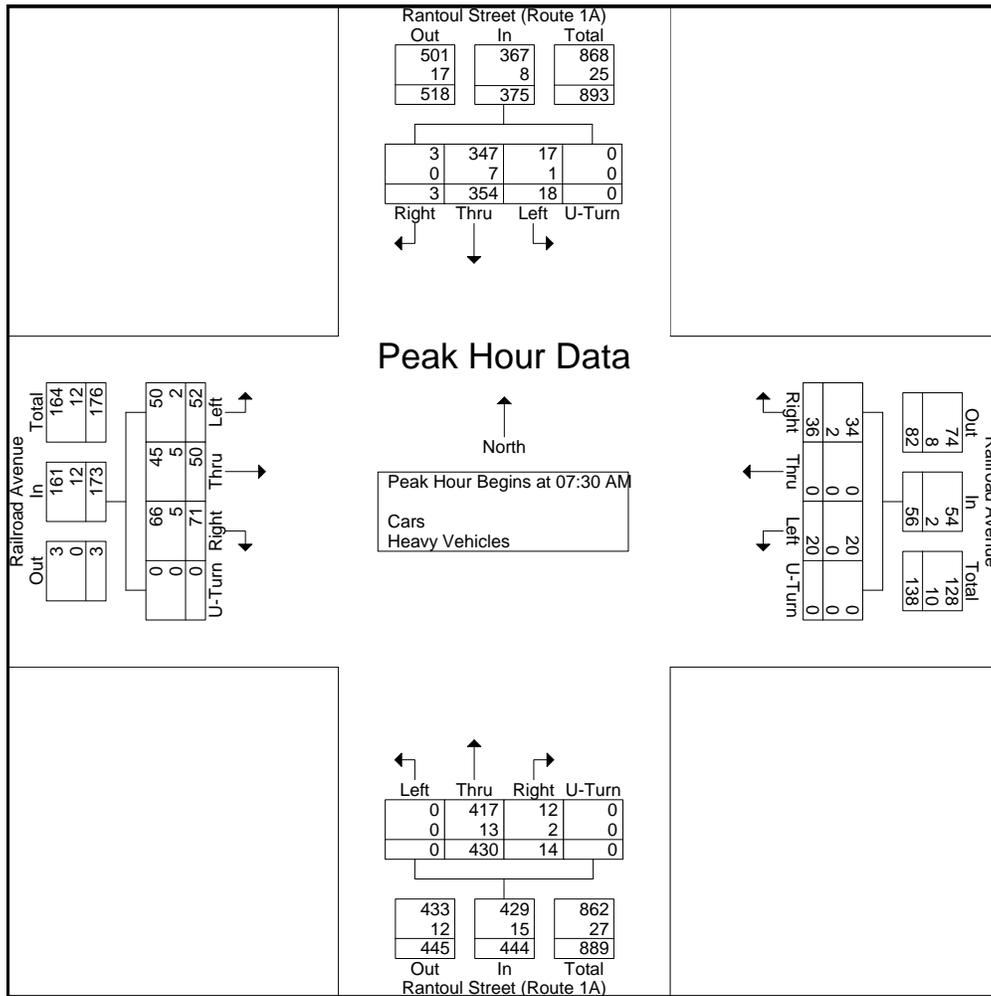
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Office: 508.481.3999 Fax: 508.545.1234
Email: datarequests@pdillc.com

N/S: Rantoul Street (Route 1A)
E/W: Railroad Avenue
City, State: Beverly, MA
Client: TEC/ R. Brown

File Name : 154390 AA
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Page No : 1

Start Time	Rantoul Street (Route 1A) From North					Railroad Avenue From East					Rantoul Street (Route 1A) From South					Railroad Avenue From West					Int. Total
	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:30 AM																					
07:30 AM	0	90	2	0	92	8	0	7	0	15	4	104	0	0	108	14	10	9	0	33	248
07:45 AM	0	85	5	0	90	7	0	5	0	12	4	111	0	0	115	15	16	14	0	45	262
08:00 AM	3	89	6	0	98	15	0	4	0	19	5	98	0	0	103	25	15	18	0	58	278
08:15 AM	0	90	5	0	95	6	0	4	0	10	1	117	0	0	118	17	9	11	0	37	260
Total Volume	3	354	18	0	375	36	0	20	0	56	14	430	0	0	444	71	50	52	0	173	1048
% App. Total	0.8	94.4	4.8	0		64.3	0	35.7	0		3.2	96.8	0	0		41	28.9	30.1	0		
PHF	.250	.983	.750	.000	.957	.600	.000	.714	.000	.737	.700	.919	.000	.000	.941	.710	.781	.722	.000	.746	.942
Cars	3	347	17	0	367	34	0	20	0	54	12	417	0	0	429	66	45	50	0	161	1011
% Cars	100	98.0	94.4	0	97.9	94.4	0	100	0	96.4	85.7	97.0	0	0	96.6	93.0	90.0	96.2	0	93.1	96.5
Heavy Vehicles	0	7	1	0	8	2	0	0	0	2	2	13	0	0	15	5	5	2	0	12	37
% Heavy Vehicles	0	2.0	5.6	0	2.1	5.6	0	0	0	3.6	14.3	3.0	0	0	3.4	7.0	10.0	3.8	0	6.9	3.5





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File Name : 154390 AAA
Site Code : P2015
Start Date : 4/14/2015
Page No : 1

Groups Printed- Cars - Heavy Vehicles

Start Time	Rantoul Street (Route 1A) From North				Railroad Avenue From East				Rantoul Street (Route 1A) From South				Railroad Avenue From West				Int. Total
	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	
04:00 PM	0	114	5	0	3	0	4	0	3	102	0	0	26	22	19	0	298
04:15 PM	0	107	3	0	9	0	5	0	2	111	0	0	26	31	7	0	301
04:30 PM	0	91	7	1	10	0	3	0	8	108	0	0	20	21	12	0	281
04:45 PM	0	117	4	0	5	0	6	0	2	115	0	0	20	20	13	0	302
Total	0	429	19	1	27	0	18	0	15	436	0	0	92	94	51	0	1182
05:00 PM	0	125	7	0	13	0	3	0	5	108	0	0	23	23	16	0	323
05:15 PM	0	114	8	0	11	0	2	0	5	109	0	0	24	22	8	0	303
05:30 PM	0	127	5	0	10	0	1	0	5	119	0	0	15	26	9	0	317
05:45 PM	0	136	9	0	8	0	1	0	6	89	0	0	30	24	11	0	314
Total	0	502	29	0	42	0	7	0	21	425	0	0	92	95	44	0	1257
Grand Total	0	931	48	1	69	0	25	0	36	861	0	0	184	189	95	0	2439
Apprch %	0	95	4.9	0.1	73.4	0	26.6	0	4	96	0	0	39.3	40.4	20.3	0	
Total %	0	38.2	2	0	2.8	0	1	0	1.5	35.3	0	0	7.5	7.7	3.9	0	
Cars	0	917	48	1	68	0	25	0	36	854	0	0	180	189	92	0	2410
% Cars	0	98.5	100	100	98.6	0	100	0	100	99.2	0	0	97.8	100	96.8	0	98.8
Heavy Vehicles	0	14	0	0	1	0	0	0	0	7	0	0	4	0	3	0	29
% Heavy Vehicles	0	1.5	0	0	1.4	0	0	0	0	0.8	0	0	2.2	0	3.2	0	1.2

Start Time	Rantoul Street (Route 1A) From North					Railroad Avenue From East					Rantoul Street (Route 1A) From South					Railroad Avenue From West					Int. Total
	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 05:00 PM																					
05:00 PM	0	125	7	0	132	13	0	3	0	16	5	108	0	0	113	23	23	16	0	62	323
05:15 PM	0	114	8	0	122	11	0	2	0	13	5	109	0	0	114	24	22	8	0	54	303
05:30 PM	0	127	5	0	132	10	0	1	0	11	5	119	0	0	124	15	26	9	0	50	317
05:45 PM	0	136	9	0	145	8	0	1	0	9	6	89	0	0	95	30	24	11	0	65	314
Total Volume	0	502	29	0	531	42	0	7	0	49	21	425	0	0	446	92	95	44	0	231	1257
% App. Total	0	94.5	5.5	0		85.7	0	14.3	0		4.7	95.3	0	0		39.8	41.1	19	0		
PHF	.000	.923	.806	.000	.916	.808	.000	.583	.000	.766	.875	.893	.000	.000	.899	.767	.913	.688	.000	.888	.973
Cars	0	497	29	0	526	41	0	7	0	48	21	423	0	0	444	90	95	43	0	228	1246
% Cars	0	99.0	100	0	99.1	97.6	0	100	0	98.0	100	99.5	0	0	99.6	97.8	100	97.7	0	98.7	99.1
Heavy Vehicles	0	5	0	0	5	1	0	0	0	1	0	2	0	0	2	2	0	1	0	3	11
% Heavy Vehicles	0	1.0	0	0	0.9	2.4	0	0	0	2.0	0	0.5	0	0	0.4	2.2	0	2.3	0	1.3	0.9



PRECISION
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File Name : 154390 AAA
Site Code : P2015
Start Date : 4/14/2015
Page No : 1

N/S: Rantoul Street (Route 1A)
E/W: Railroad Avenue
City, State: Beverly, MA
Client: TEC/ R. Brown

Groups Printed- Cars

Start Time	Rantoul Street (Route 1A) From North				Railroad Avenue From East				Rantoul Street (Route 1A) From South				Railroad Avenue From West				Int. Total
	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	
04:00 PM	0	109	5	0	3	0	4	0	3	100	0	0	25	22	19	0	290
04:15 PM	0	105	3	0	9	0	5	0	2	111	0	0	26	31	6	0	298
04:30 PM	0	89	7	1	10	0	3	0	8	106	0	0	19	21	12	0	276
04:45 PM	0	117	4	0	5	0	6	0	2	114	0	0	20	20	12	0	300
Total	0	420	19	1	27	0	18	0	15	431	0	0	90	94	49	0	1164
05:00 PM	0	122	7	0	13	0	3	0	5	106	0	0	21	23	16	0	316
05:15 PM	0	113	8	0	11	0	2	0	5	109	0	0	24	22	8	0	302
05:30 PM	0	127	5	0	9	0	1	0	5	119	0	0	15	26	9	0	316
05:45 PM	0	135	9	0	8	0	1	0	6	89	0	0	30	24	10	0	312
Total	0	497	29	0	41	0	7	0	21	423	0	0	90	95	43	0	1246
Grand Total	0	917	48	1	68	0	25	0	36	854	0	0	180	189	92	0	2410
Apprch %	0	94.9	5	0.1	73.1	0	26.9	0	4	96	0	0	39	41	20	0	
Total %	0	38	2	0	2.8	0	1	0	1.5	35.4	0	0	7.5	7.8	3.8	0	

Start Time	Rantoul Street (Route 1A) From North					Railroad Avenue From East					Rantoul Street (Route 1A) From South					Railroad Avenue From West					Int. Total
	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 05:00 PM																					
05:00 PM	0	122	7	0	129	13	0	3	0	16	5	106	0	0	111	21	23	16	0	60	316
05:15 PM	0	113	8	0	121	11	0	2	0	13	5	109	0	0	114	24	22	8	0	54	302
05:30 PM	0	127	5	0	132	9	0	1	0	10	5	119	0	0	124	15	26	9	0	50	316
05:45 PM	0	135	9	0	144	8	0	1	0	9	6	89	0	0	95	30	24	10	0	64	312
Total Volume	0	497	29	0	526	41	0	7	0	48	21	423	0	0	444	90	95	43	0	228	1246
% App. Total	0	94.5	5.5	0		85.4	0	14.6	0		4.7	95.3	0	0		39.5	41.7	18.9	0		
PHF	.000	.920	.806	.000	.913	.788	.000	.583	.000	.750	.875	.889	.000	.000	.895	.750	.913	.672	.000	.891	.986



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Office: 508.481.3999 Fax: 508.545.1234
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File Name : 154390 AAA
Site Code : P2015
Start Date : 4/14/2015
Page No : 1

N/S: Rantoul Street (Route 1A)
E/W: Railroad Avenue
City, State: Beverly, MA
Client: TEC/ R. Brown

Groups Printed- Heavy Vehicles

Start Time	Rantoul Street (Route 1A) From North				Railroad Avenue From East				Rantoul Street (Route 1A) From South				Railroad Avenue From West				Int. Total
	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	
04:00 PM	0	5	0	0	0	0	0	0	0	2	0	0	1	0	0	0	8
04:15 PM	0	2	0	0	0	0	0	0	0	0	0	0	0	0	1	0	3
04:30 PM	0	2	0	0	0	0	0	0	0	2	0	0	1	0	0	0	5
04:45 PM	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	2
Total	0	9	0	0	0	0	0	0	0	5	0	0	2	0	2	0	18
05:00 PM	0	3	0	0	0	0	0	0	0	2	0	0	2	0	0	0	7
05:15 PM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
05:30 PM	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
05:45 PM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2
Total	0	5	0	0	1	0	0	0	0	2	0	0	2	0	1	0	11
Grand Total	0	14	0	0	1	0	0	0	0	7	0	0	4	0	3	0	29
Apprch %	0	100	0	0	100	0	0	0	0	100	0	0	57.1	0	42.9	0	
Total %	0	48.3	0	0	3.4	0	0	0	0	24.1	0	0	13.8	0	10.3	0	

Start Time	Rantoul Street (Route 1A) From North					Railroad Avenue From East					Rantoul Street (Route 1A) From South					Railroad Avenue From West					Int. Total
	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:00 PM																					
04:00 PM	0	5	0	0	5	0	0	0	0	0	0	2	0	0	2	1	0	0	0	1	8
04:15 PM	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	3
04:30 PM	0	2	0	0	2	0	0	0	0	0	0	2	0	0	2	1	0	0	0	1	5
04:45 PM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	0	1	2
Total Volume	0	9	0	0	9	0	0	0	0	0	0	5	0	0	5	2	0	2	0	4	18
% App. Total	0	100	0	0		0	0	0	0		0	100	0	0		50	0	50	0		
PHF	.000	.450	.000	.000	.450	.000	.000	.000	.000	.000	.000	.625	.000	.000	.625	.500	.000	.500	.000	1.00	.563



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File Name : 154390 AAA
Site Code : P2015
Start Date : 4/14/2015
Page No : 1

N/S: Rantoul Street (Route 1A)
E/W: Railroad Avenue
City, State: Beverly, MA
Client: TEC/ R. Brown

Groups Printed- Peds and Bikes

Start Time	Rantoul Street (Route 1A) From North					Railroad Avenue From East					Rantoul Street (Route 1A) From South					Railroad Avenue From West					Int. Total
	Right	Thru	Left	Peds EB	Peds WB	Right	Thru	Left	Peds SB	Peds NB	Right	Thru	Left	Peds WB	Peds EB	Right	Thru	Left	Peds NB	Peds SB	
04:00 PM	0	1	0	6	1	0	0	0	5	2	0	1	0	0	0	0	0	0	4	2	22
04:15 PM	0	0	0	0	3	1	0	0	6	2	0	0	0	0	0	0	0	0	1	2	15
04:30 PM	0	0	0	1	0	0	0	0	2	3	0	0	0	0	1	0	0	0	0	4	11
04:45 PM	0	1	0	9	3	0	0	0	3	4	0	1	0	0	2	0	0	0	2	4	29
Total	0	2	0	16	7	1	0	0	16	11	0	2	0	0	3	0	0	0	7	12	77
05:00 PM	0	0	0	0	0	0	0	0	6	4	0	0	0	0	0	0	0	0	0	2	12
05:15 PM	0	0	0	0	0	0	0	0	1	3	0	0	0	1	0	0	0	0	0	1	6
05:30 PM	0	1	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	2	5	12
05:45 PM	0	0	0	0	0	0	0	0	3	0	0	0	0	0	1	0	0	0	0	5	9
Total	0	1	0	0	0	0	0	0	10	11	0	0	0	1	1	0	0	0	2	13	39
Grand Total	0	3	0	16	7	1	0	0	26	22	0	2	0	1	4	0	0	0	9	25	116
Apprch %	0	11.5	0	61.5	26.9	2	0	0	53.1	44.9	0	28.6	0	14.3	57.1	0	0	0	26.5	73.5	
Total %	0	2.6	0	13.8	6	0.9	0	0	22.4	19	0	1.7	0	0.9	3.4	0	0	0	7.8	21.6	

Start Time	Rantoul Street (Route 1A) From North						Railroad Avenue From East						Rantoul Street (Route 1A) From South						Railroad Avenue From West						Int. Total
	Right	Thru	Left	Peds EB	Peds WB	App. Total	Right	Thru	Left	Peds SB	Peds NB	App. Total	Right	Thru	Left	Peds WB	Peds EB	App. Total	Right	Thru	Left	Peds NB	Peds SB	App. Total	
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 04:00 PM																									
04:00 PM	0	1	0	6	1	8	0	0	0	5	2	7	0	1	0	0	0	1	0	0	0	4	2	6	22
04:15 PM	0	0	0	0	3	3	1	0	0	6	2	9	0	0	0	0	0	0	0	0	0	1	2	3	15
04:30 PM	0	0	0	1	0	1	0	0	0	2	3	5	0	0	0	0	1	1	0	0	0	0	4	4	11
04:45 PM	0	1	0	9	3	13	0	0	0	3	4	7	0	1	0	0	2	3	0	0	0	2	4	6	29
Total Volume	0	2	0	16	7	25	1	0	0	16	11	28	0	2	0	0	3	5	0	0	0	7	12	19	77
% App. Total	0	8	0	64	28		3.6	0	0	57.1	39.3		0	40	0	0	60		0	0	0	36.8	63.2		
PHF	.000	.500	.000	.444	.583	.481	.250	.000	.000	.667	.688	.778	.000	.500	.000	.000	.375	.417	.000	.000	.000	.438	.750	.792	.664



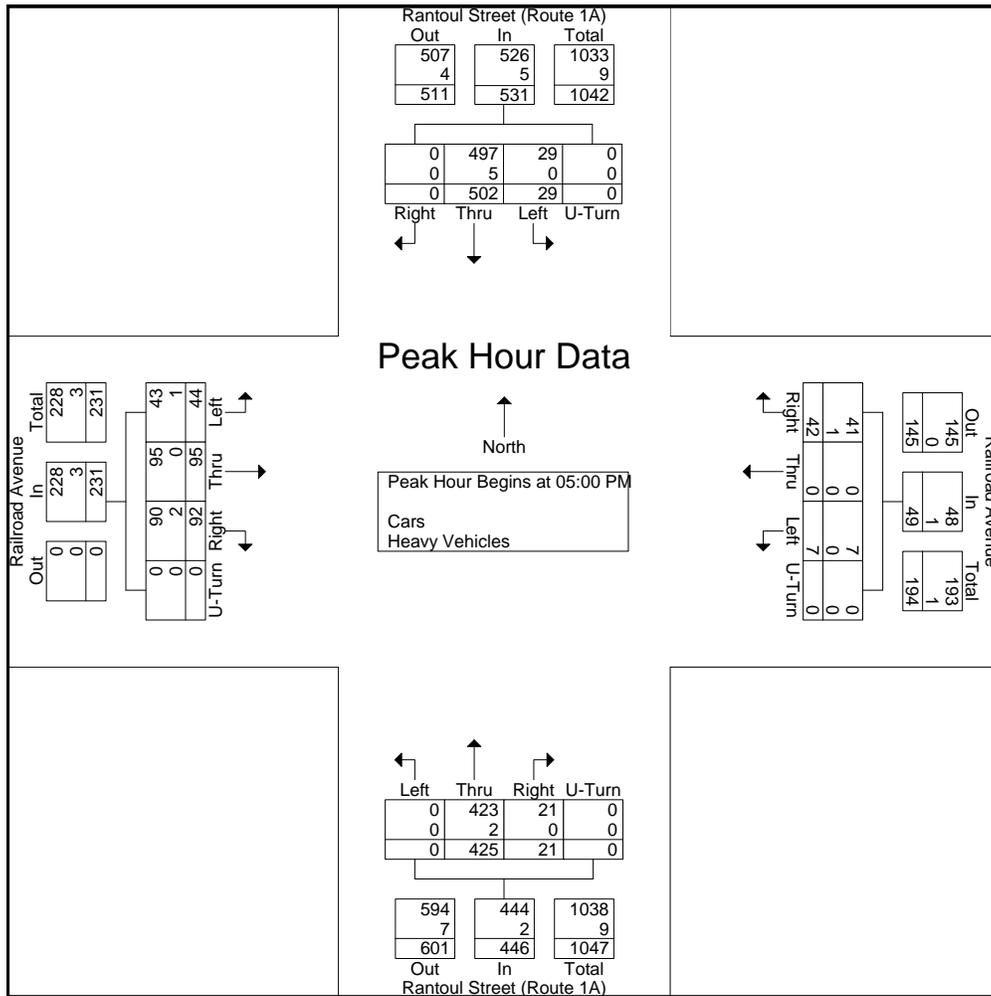
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Office: 508.481.3999 Fax: 508.545.1234
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N/S: Rantoul Street (Route 1A)
E/W: Railroad Avenue
City, State: Beverly, MA
Client: TEC/ R. Brown

File Name : 154390 AAA
Site Code : P2015
Start Date : 4/14/2015
Page No : 1

Start Time	Rantoul Street (Route 1A) From North					Railroad Avenue From East					Rantoul Street (Route 1A) From South					Railroad Avenue From West					Int. Total
	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 05:00 PM																					
05:00 PM	0	125	7	0	132	13	0	3	0	16	5	108	0	0	113	23	23	16	0	62	323
05:15 PM	0	114	8	0	122	11	0	2	0	13	5	109	0	0	114	24	22	8	0	54	303
05:30 PM	0	127	5	0	132	10	0	1	0	11	5	119	0	0	124	15	26	9	0	50	317
05:45 PM	0	136	9	0	145	8	0	1	0	9	6	89	0	0	95	30	24	11	0	65	314
Total Volume	0	502	29	0	531	42	0	7	0	49	21	425	0	0	446	92	95	44	0	231	1257
% App. Total	0	94.5	5.5	0		85.7	0	14.3	0		4.7	95.3	0	0		39.8	41.1	19	0		
PHF	.000	.923	.806	.000	.916	.808	.000	.583	.000	.766	.875	.893	.000	.000	.899	.767	.913	.688	.000	.888	.973
Cars	0	497	29	0	526	41	0	7	0	48	21	423	0	0	444	90	95	43	0	228	1246
% Cars	0	99.0	100	0	99.1	97.6	0	100	0	98.0	100	99.5	0	0	99.6	97.8	100	97.7	0	98.7	99.1
Heavy Vehicles	0	5	0	0	5	1	0	0	0	1	0	2	0	0	2	2	0	1	0	3	11
% Heavy Vehicles	0	1.0	0	0	0.9	2.4	0	0	0	2.0	0	0.5	0	0	0.4	2.2	0	2.3	0	1.3	0.9





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File Name : 154390 BB
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Start Date : 4/14/2015
Page No : 1

N/S: Rantoul Street (Route 1A)
E/W: Pleasant Street
City, State: Beverly, MA
Client: TEC/ R. Brown

Groups Printed- Cars - Heavy Vehicles

Start Time	Rantoul Street (Route 1A) From North				Pleasant Street From East				Rantoul Street (Route 1A) From South				Pleasant Street From West				Int. Total
	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	
07:00 AM	4	90	0	0	2	6	3	0	0	52	25	0	0	0	0	0	182
07:15 AM	8	96	0	0	4	8	2	0	0	79	22	0	0	0	0	0	219
07:30 AM	10	101	1	0	9	2	0	0	0	99	40	0	0	0	0	0	262
07:45 AM	3	100	0	0	6	8	0	0	0	111	33	0	1	0	0	0	262
Total	25	387	1	0	21	24	5	0	0	341	120	0	1	0	0	0	925
08:00 AM	4	112	0	0	7	6	3	0	0	97	32	0	0	0	0	0	261
08:15 AM	8	101	0	0	3	9	4	0	0	116	35	0	0	0	0	0	276
08:30 AM	2	99	0	0	6	3	1	0	0	87	28	0	0	0	0	0	226
08:45 AM	5	88	0	0	2	11	5	0	0	115	31	0	0	0	0	0	257
Total	19	400	0	0	18	29	13	0	0	415	126	0	0	0	0	0	1020
Grand Total	44	787	1	0	39	53	18	0	0	756	246	0	1	0	0	0	1945
Apprch %	5.3	94.6	0.1	0	35.5	48.2	16.4	0	0	75.4	24.6	0	100	0	0	0	
Total %	2.3	40.5	0.1	0	2	2.7	0.9	0	0	38.9	12.6	0	0.1	0	0	0	
Cars	42	749	1	0	38	52	16	0	0	726	245	0	1	0	0	0	1870
% Cars	95.5	95.2	100	0	97.4	98.1	88.9	0	0	96	99.6	0	100	0	0	0	96.1
Heavy Vehicles	2	38	0	0	1	1	2	0	0	30	1	0	0	0	0	0	75
% Heavy Vehicles	4.5	4.8	0	0	2.6	1.9	11.1	0	0	4	0.4	0	0	0	0	0	3.9

Start Time	Rantoul Street (Route 1A) From North					Pleasant Street From East					Rantoul Street (Route 1A) From South					Pleasant Street From West					Int. Total
	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:30 AM																					
07:30 AM	10	101	1	0	112	9	2	0	0	11	0	99	40	0	139	0	0	0	0	0	262
07:45 AM	3	100	0	0	103	6	8	0	0	14	0	111	33	0	144	1	0	0	0	1	262
08:00 AM	4	112	0	0	116	7	6	3	0	16	0	97	32	0	129	0	0	0	0	0	261
08:15 AM	8	101	0	0	109	3	9	4	0	16	0	116	35	0	151	0	0	0	0	0	276
Total Volume	25	414	1	0	440	25	25	7	0	57	0	423	140	0	563	1	0	0	0	1	1061
% App. Total	5.7	94.1	0.2	0		43.9	43.9	12.3	0		0	75.1	24.9	0		100	0	0	0		
PHF	.625	.924	.250	.000	.948	.694	.694	.438	.000	.891	.000	.912	.875	.000	.932	.250	.000	.000	.000	.250	.961
Cars	24	399	1	0	424	25	25	7	0	57	0	409	140	0	549	1	0	0	0	1	1031
% Cars	96.0	96.4	100	0	96.4	100	100	100	0	100	0	96.7	100	0	97.5	100	0	0	0	100	97.2
Heavy Vehicles	1	15	0	0	16	0	0	0	0	0	0	14	0	0	14	0	0	0	0	0	30
% Heavy Vehicles	4.0	3.6	0	0	3.6	0	0	0	0	0	0	3.3	0	0	2.5	0	0	0	0	0	2.8



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N/S: Rantoul Street (Route 1A)
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City, State: Beverly, MA
Client: TEC/ R. Brown

Groups Printed- Cars

Start Time	Rantoul Street (Route 1A) From North				Pleasant Street From East				Rantoul Street (Route 1A) From South				Pleasant Street From West				Int. Total
	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	
07:00 AM	3	85	0	0	2	6	2	0	0	49	25	0	0	0	0	0	172
07:15 AM	8	92	0	0	4	8	1	0	0	76	22	0	0	0	0	0	211
07:30 AM	10	98	1	0	9	2	0	0	0	96	40	0	0	0	0	0	256
07:45 AM	3	96	0	0	6	8	0	0	0	111	33	0	1	0	0	0	258
Total	24	371	1	0	21	24	3	0	0	332	120	0	1	0	0	0	897
08:00 AM	3	109	0	0	7	6	3	0	0	94	32	0	0	0	0	0	254
08:15 AM	8	96	0	0	3	9	4	0	0	108	35	0	0	0	0	0	263
08:30 AM	2	93	0	0	5	3	1	0	0	81	28	0	0	0	0	0	213
08:45 AM	5	80	0	0	2	10	5	0	0	111	30	0	0	0	0	0	243
Total	18	378	0	0	17	28	13	0	0	394	125	0	0	0	0	0	973
Grand Total	42	749	1	0	38	52	16	0	0	726	245	0	1	0	0	0	1870
Apprch %	5.3	94.6	0.1	0	35.8	49.1	15.1	0	0	74.8	25.2	0	100	0	0	0	
Total %	2.2	40.1	0.1	0	2	2.8	0.9	0	0	38.8	13.1	0	0.1	0	0	0	

Start Time	Rantoul Street (Route 1A) From North					Pleasant Street From East					Rantoul Street (Route 1A) From South					Pleasant Street From West					Int. Total
	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:30 AM																					
07:30 AM	10	98	1	0	109	9	2	0	0	11	0	96	40	0	136	0	0	0	0	0	256
07:45 AM	3	96	0	0	99	6	8	0	0	14	0	111	33	0	144	1	0	0	0	1	258
08:00 AM	3	109	0	0	112	7	6	3	0	16	0	94	32	0	126	0	0	0	0	0	254
08:15 AM	8	96	0	0	104	3	9	4	0	16	0	108	35	0	143	0	0	0	0	0	263
Total Volume	24	399	1	0	424	25	25	7	0	57	0	409	140	0	549	1	0	0	0	1	1031
% App. Total	5.7	94.1	0.2	0		43.9	43.9	12.3	0		0	74.5	25.5	0		100	0	0	0		
PHF	.600	.915	.250	.000	.946	.694	.694	.438	.000	.891	.000	.921	.875	.000	.953	.250	.000	.000	.000	.250	.980



PRECISION
D A T A
INDUSTRIES, LLC

P.O. Box 301 Berlin, MA 01503
Office: 508.481.3999 Fax: 508.545.1234
Email: datarequests@pdillc.com

File Name : 154390 BB
Site Code : P2015
Start Date : 4/14/2015
Page No : 1

N/S: Rantoul Street (Route 1A)
E/W: Pleasant Street
City, State: Beverly, MA
Client: TEC/ R. Brown

Groups Printed- Peds and Bikes

Start Time	Rantoul Street (Route 1A) From North					Pleasant Street From East					Rantoul Street (Route 1A) From South					Pleasant Street From West					Int. Total
	Right	Thru	Left	Peds EB	Peds WB	Right	Thru	Left	Peds SB	Peds NB	Right	Thru	Left	Peds WB	Peds EB	Right	Thru	Left	Peds NB	Peds SB	
07:00 AM	0	0	0	0	0	0	0	0	5	5	0	0	0	2	0	0	0	0	5	0	17
07:15 AM	0	0	0	0	0	0	0	0	3	1	0	0	0	1	1	0	0	0	7	1	14
07:30 AM	0	0	0	0	0	0	0	0	0	1	0	0	0	2	0	0	0	0	3	5	11
07:45 AM	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	8	2	12
Total	0	0	0	0	0	0	0	0	9	8	0	0	0	5	1	0	0	0	23	8	54
08:00 AM	0	0	0	0	0	0	0	0	0	2	0	0	0	1	1	0	0	0	2	2	8
08:15 AM	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	2	1	7
08:30 AM	0	0	0	0	0	0	0	0	1	3	0	0	0	0	1	0	0	0	1	0	6
08:45 AM	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	3	4	8
Total	0	0	0	0	0	0	0	0	1	10	0	0	0	1	2	0	0	0	8	7	29
Grand Total	0	0	0	0	0	0	0	0	10	18	0	0	0	6	3	0	0	0	31	15	83
Apprch %	0	0	0	0	0	0	0	0	35.7	64.3	0	0	0	66.7	33.3	0	0	0	67.4	32.6	
Total %	0	0	0	0	0	0	0	0	12	21.7	0	0	0	7.2	3.6	0	0	0	37.3	18.1	

Start Time	Rantoul Street (Route 1A) From North						Pleasant Street From East						Rantoul Street (Route 1A) From South						Pleasant Street From West						Int. Total
	Right	Thru	Left	Peds EB	Peds WB	App. Total	Right	Thru	Left	Peds SB	Peds NB	App. Total	Right	Thru	Left	Peds WB	Peds EB	App. Total	Right	Thru	Left	Peds NB	Peds SB	App. Total	
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 07:00 AM																									
07:00 AM	0	0	0	0	0	0	0	0	0	5	5	10	0	0	0	2	0	2	0	0	0	5	0	5	17
07:15 AM	0	0	0	0	0	0	0	0	0	3	1	4	0	0	0	1	1	2	0	0	0	7	1	8	14
07:30 AM	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	2	0	2	0	0	0	3	5	8	11
07:45 AM	0	0	0	0	0	0	0	0	0	1	1	2	0	0	0	0	0	0	0	0	0	8	2	10	12
Total Volume	0	0	0	0	0	0	0	0	0	9	8	17	0	0	0	5	1	6	0	0	0	23	8	31	54
% App. Total	0	0	0	0	0	0	0	0	0	52.9	47.1		0	0	0	83.3	16.7		0	0	0	74.2	25.8		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.450	.400	.425	.000	.000	.000	.625	.250	.750	.000	.000	.000	.719	.400	.775	.794



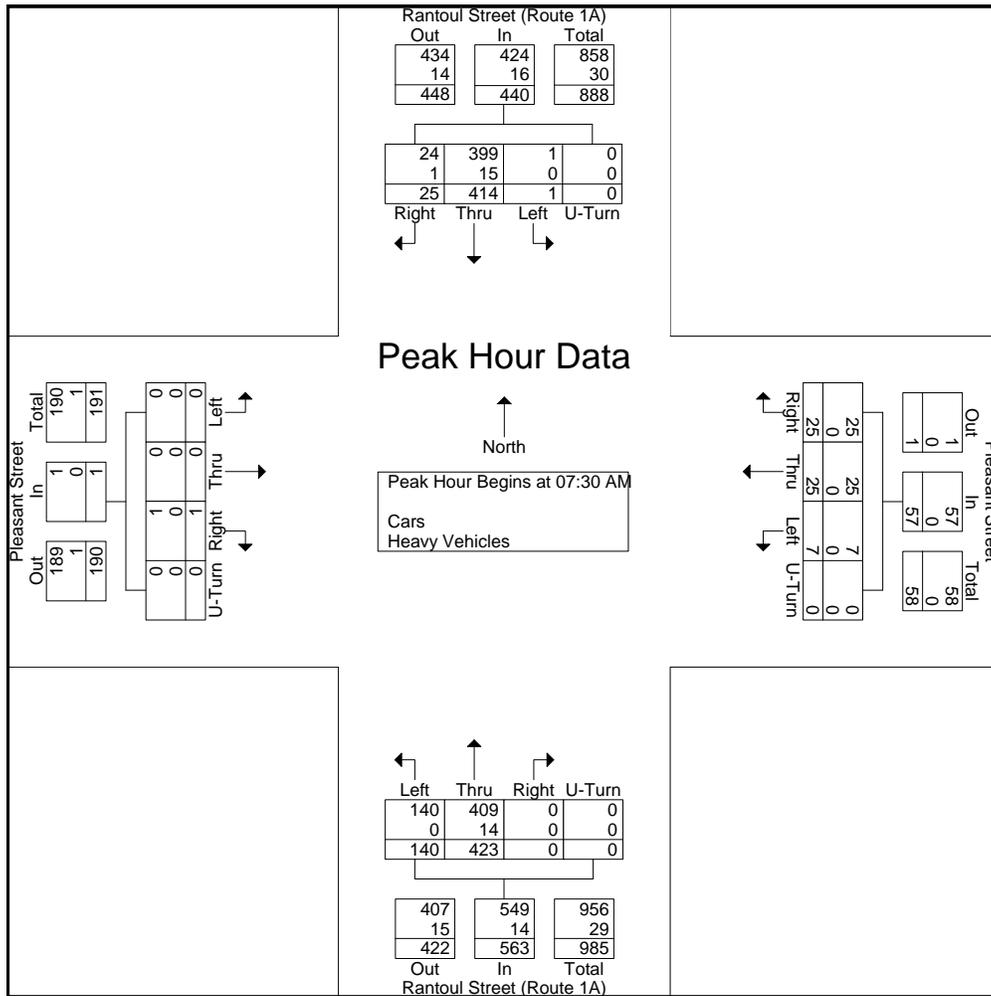
PRECISION
DATA
INDUSTRIES, LLC

P.O. Box 301 Berlin, MA 01503
Office: 508.481.3999 Fax: 508.545.1234
Email: datarequests@pdillc.com

N/S: Rantoul Street (Route 1A)
E/W: Pleasant Street
City, State: Beverly, MA
Client: TEC/ R. Brown

File Name : 154390 BB
Site Code : P2015
Start Date : 4/14/2015
Page No : 1

Start Time	Rantoul Street (Route 1A) From North					Pleasant Street From East					Rantoul Street (Route 1A) From South					Pleasant Street From West					Int. Total
	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:30 AM																					
07:30 AM	10	101	1	0	112	9	2	0	0	11	0	99	40	0	139	0	0	0	0	0	262
07:45 AM	3	100	0	0	103	6	8	0	0	14	0	111	33	0	144	1	0	0	0	1	262
08:00 AM	4	112	0	0	116	7	6	3	0	16	0	97	32	0	129	0	0	0	0	0	261
08:15 AM	8	101	0	0	109	3	9	4	0	16	0	116	35	0	151	0	0	0	0	0	276
Total Volume	25	414	1	0	440	25	25	7	0	57	0	423	140	0	563	1	0	0	0	1	1061
% App. Total	5.7	94.1	0.2	0		43.9	43.9	12.3	0		0	75.1	24.9	0		100	0	0	0		
PHF	.625	.924	.250	.000	.948	.694	.694	.438	.000	.891	.000	.912	.875	.000	.932	.250	.000	.000	.000	.250	.961
Cars	24	399	1	0	424	25	25	7	0	57	0	409	140	0	549	1	0	0	0	1	1031
% Cars	96.0	96.4	100	0	96.4	100	100	100	0	100	0	96.7	100	0	97.5	100	0	0	0	100	97.2
Heavy Vehicles	1	15	0	0	16	0	0	0	0	0	0	14	0	0	14	0	0	0	0	0	30
% Heavy Vehicles	4.0	3.6	0	0	3.6	0	0	0	0	0	0	3.3	0	0	2.5	0	0	0	0	0	2.8





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N/S: Rantoul Street (Route 1A)
E/W: Pleasant Street
City, State: Beverly, MA
Client: TEC/ R. Brown

File Name : 154390 BBB
Site Code : P2015
Start Date : 4/14/2015
Page No : 1

Groups Printed- Cars - Heavy Vehicles

Start Time	Rantoul Street (Route 1A) From North				Pleasant Street From East				Rantoul Street (Route 1A) From South				Pleasant Street From West				Int. Total
	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	
04:00 PM	8	139	0	0	3	1	3	0	0	100	28	0	0	0	0	0	282
04:15 PM	8	130	0	0	4	6	0	0	0	109	26	0	0	0	0	0	283
04:30 PM	7	113	0	0	5	6	1	0	0	104	18	0	0	0	0	0	254
04:45 PM	12	133	0	0	2	6	1	0	0	114	22	0	0	0	0	0	290
Total	35	515	0	0	14	19	5	0	0	427	94	0	0	0	0	0	1109
05:00 PM	11	151	0	0	5	6	1	0	0	106	30	0	0	0	0	0	310
05:15 PM	6	136	0	0	5	9	2	0	0	110	43	0	0	0	0	0	311
05:30 PM	13	129	0	0	1	2	1	0	0	120	26	0	0	0	0	0	292
05:45 PM	9	158	0	0	6	2	1	0	0	87	24	0	0	0	0	0	287
Total	39	574	0	0	17	19	5	0	0	423	123	0	0	0	0	0	1200
Grand Total	74	1089	0	0	31	38	10	0	0	850	217	0	0	0	0	0	2309
Apprch %	6.4	93.6	0	0	39.2	48.1	12.7	0	0	79.7	20.3	0	0	0	0	0	
Total %	3.2	47.2	0	0	1.3	1.6	0.4	0	0	36.8	9.4	0	0	0	0	0	
Cars	73	1073	0	0	31	37	10	0	0	843	213	0	0	0	0	0	2280
% Cars	98.6	98.5	0	0	100	97.4	100	0	0	99.2	98.2	0	0	0	0	0	98.7
Heavy Vehicles	1	16	0	0	0	1	0	0	0	7	4	0	0	0	0	0	29
% Heavy Vehicles	1.4	1.5	0	0	0	2.6	0	0	0	0.8	1.8	0	0	0	0	0	1.3

Start Time	Rantoul Street (Route 1A) From North					Pleasant Street From East					Rantoul Street (Route 1A) From South					Pleasant Street From West					Int. Total
	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:45 PM																					
04:45 PM	12	133	0	0	145	2	6	1	0	9	0	114	22	0	136	0	0	0	0	0	290
05:00 PM	11	151	0	0	162	5	6	1	0	12	0	106	30	0	136	0	0	0	0	0	310
05:15 PM	6	136	0	0	142	5	9	2	0	16	0	110	43	0	153	0	0	0	0	0	311
05:30 PM	13	129	0	0	142	1	2	1	0	4	0	120	26	0	146	0	0	0	0	0	292
Total Volume	42	549	0	0	591	13	23	5	0	41	0	450	121	0	571	0	0	0	0	0	1203
% App. Total	7.1	92.9	0	0		31.7	56.1	12.2	0		0	78.8	21.2	0		0	0	0	0	0	
PHF	.808	.909	.000	.000	.912	.650	.639	.625	.000	.641	.000	.938	.703	.000	.933	.000	.000	.000	.000	.000	.967
Cars	41	544	0	0	585	13	23	5	0	41	0	446	119	0	565	0	0	0	0	0	1191
% Cars	97.6	99.1	0	0	99.0	100	100	100	0	100	0	99.1	98.3	0	98.9	0	0	0	0	0	99.0
Heavy Vehicles	1	5	0	0	6	0	0	0	0	0	0	4	2	0	6	0	0	0	0	0	12
% Heavy Vehicles	2.4	0.9	0	0	1.0	0	0	0	0	0	0	0.9	1.7	0	1.1	0	0	0	0	0	1.0



PRECISION
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INDUSTRIES, LLC

P.O. Box 301 Berlin, MA 01503
Office: 508.481.3999 Fax: 508.545.1234
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File Name : 154390 BBB
Site Code : P2015
Start Date : 4/14/2015
Page No : 1

N/S: Rantoul Street (Route 1A)
E/W: Pleasant Street
City, State: Beverly, MA
Client: TEC/ R. Brown

Groups Printed- Peds and Bikes

Start Time	Rantoul Street (Route 1A) From North					Pleasant Street From East					Rantoul Street (Route 1A) From South					Pleasant Street From West					Int. Total
	Right	Thru	Left	Peds EB	Peds WB	Right	Thru	Left	Peds SB	Peds NB	Right	Thru	Left	Peds WB	Peds EB	Right	Thru	Left	Peds NB	Peds SB	
04:00 PM	0	1	0	0	0	0	0	0	5	0	0	1	0	0	2	1	0	0	5	4	19
04:15 PM	0	0	0	0	0	0	0	0	5	2	0	1	0	1	0	0	0	0	1	1	11
04:30 PM	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	3	5
04:45 PM	0	1	0	0	0	0	0	0	3	2	0	0	0	0	0	0	0	0	1	1	8
Total	0	2	0	0	0	0	0	0	13	5	0	3	0	1	2	1	0	0	7	9	43
05:00 PM	0	0	0	0	0	0	0	0	3	3	0	0	0	0	1	0	0	0	1	3	11
05:15 PM	0	0	0	0	0	0	1	0	1	1	0	0	0	1	2	0	0	0	2	4	12
05:30 PM	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	1	5	10
05:45 PM	0	0	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	4
Total	0	0	0	0	0	0	1	0	6	10	0	0	0	1	3	0	0	0	4	12	37
Grand Total	0	2	0	0	0	0	1	0	19	15	0	3	0	2	5	1	0	0	11	21	80
Apprch %	0	100	0	0	0	0	2.9	0	54.3	42.9	0	30	0	20	50	3	0	0	33.3	63.6	
Total %	0	2.5	0	0	0	0	1.2	0	23.8	18.8	0	3.8	0	2.5	6.2	1.2	0	0	13.8	26.2	

Start Time	Rantoul Street (Route 1A) From North						Pleasant Street From East						Rantoul Street (Route 1A) From South						Pleasant Street From West						Int. Total
	Right	Thru	Left	Peds EB	Peds WB	App. Total	Right	Thru	Left	Peds SB	Peds NB	App. Total	Right	Thru	Left	Peds WB	Peds EB	App. Total	Right	Thru	Left	Peds NB	Peds SB	App. Total	
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																									
Peak Hour for Entire Intersection Begins at 04:00 PM																									
04:00 PM	0	1	0	0	0	1	0	0	0	5	0	5	0	1	0	0	2	3	1	0	0	5	4	10	19
04:15 PM	0	0	0	0	0	0	0	0	0	5	2	7	0	1	0	1	0	2	0	0	0	1	1	2	11
04:30 PM	0	0	0	0	0	0	0	0	0	0	1	1	0	1	0	0	0	1	0	0	0	0	3	3	5
04:45 PM	0	1	0	0	0	1	0	0	0	3	2	5	0	0	0	0	0	0	0	0	0	1	1	2	8
Total Volume	0	2	0	0	0	2	0	0	0	13	5	18	0	3	0	1	2	6	1	0	0	7	9	17	43
% App. Total	0	100	0	0	0		0	0	0	72.2	27.8		0	50	0	16.7	33.3		5.9	0	0	41.2	52.9		
PHF	.000	.500	.000	.000	.000	.500	.000	.000	.000	.650	.625	.643	.000	.750	.000	.250	.250	.500	.250	.000	.000	.350	.563	.425	.566



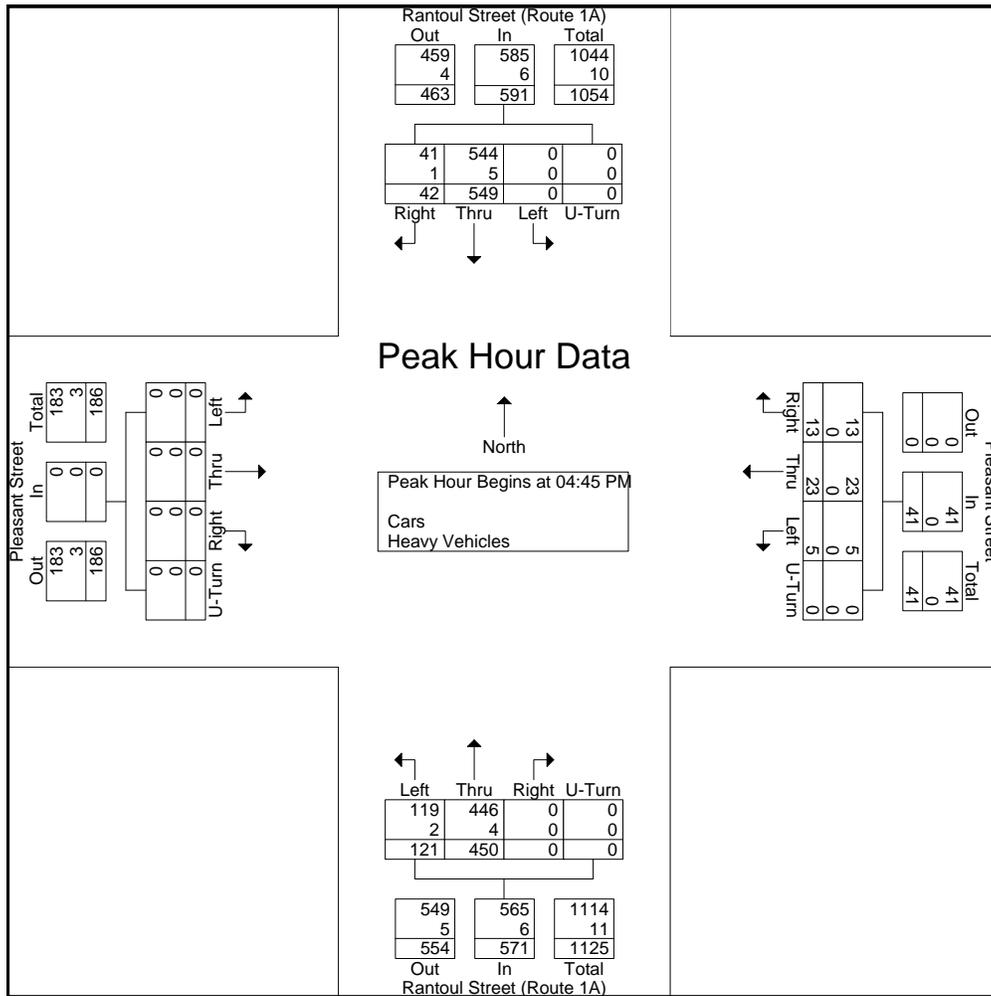
PRECISION
D A T A
INDUSTRIES, LLC

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N/S: Rantoul Street (Route 1A)
E/W: Pleasant Street
City, State: Beverly, MA
Client: TEC/ R. Brown

File Name : 154390 BBB
Site Code : P2015
Start Date : 4/14/2015
Page No : 1

Start Time	Rantoul Street (Route 1A) From North					Pleasant Street From East					Rantoul Street (Route 1A) From South					Pleasant Street From West					Int. Total
	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:45 PM																					
04:45 PM	12	133	0	0	145	2	6	1	0	9	0	114	22	0	136	0	0	0	0	0	290
05:00 PM	11	151	0	0	162	5	6	1	0	12	0	106	30	0	136	0	0	0	0	0	310
05:15 PM	6	136	0	0	142	5	9	2	0	16	0	110	43	0	153	0	0	0	0	0	311
05:30 PM	13	129	0	0	142	1	2	1	0	4	0	120	26	0	146	0	0	0	0	0	292
Total Volume	42	549	0	0	591	13	23	5	0	41	0	450	121	0	571	0	0	0	0	0	1203
% App. Total	7.1	92.9	0	0		31.7	56.1	12.2	0		0	78.8	21.2	0		0	0	0	0		
PHF	.808	.909	.000	.000	.912	.650	.639	.625	.000	.641	.000	.938	.703	.000	.933	.000	.000	.000	.000	.000	.967
Cars	41	544	0	0	585	13	23	5	0	41	0	446	119	0	565	0	0	0	0	0	1191
% Cars	97.6	99.1	0	0	99.0	100	100	100	0	100	0	99.1	98.3	0	98.9	0	0	0	0	0	99.0
Heavy Vehicles	1	5	0	0	6	0	0	0	0	0	0	4	2	0	6	0	0	0	0	0	12
% Heavy Vehicles	2.4	0.9	0	0	1.0	0	0	0	0	0	0	0.9	1.7	0	1.1	0	0	0	0	0	1.0





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File Name : 154390 DD
Site Code : P2015
Start Date : 4/14/2015
Page No : 1

N/S: Park Street/ Court Street
E/W: Pleasant Street
City, State: Beverly, MA
Client: TEC/ R. Brown

Groups Printed- Cars - Heavy Vehicles

Start Time	Park Street From North				Pleasant Street From East				Court Street From South				Pleasant Street From West				Int. Total
	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	
07:00 AM	14	1	0	0	1	34	0	0	0	0	0	0	12	0	20	0	82
07:15 AM	17	2	0	0	0	38	1	0	0	0	2	0	11	0	19	0	90
07:30 AM	9	0	0	0	3	50	1	0	0	1	0	0	11	0	18	0	93
07:45 AM	14	3	0	0	3	46	0	0	1	3	3	0	17	0	42	0	132
Total	54	6	0	0	7	168	2	0	1	4	5	0	51	0	99	0	397
08:00 AM	16	7	0	0	2	45	0	0	0	11	3	0	9	0	41	0	134
08:15 AM	10	2	0	0	3	49	0	0	0	0	1	0	2	0	27	0	94
08:30 AM	11	0	0	0	0	34	0	0	0	0	0	0	0	0	15	0	60
08:45 AM	9	0	0	0	9	42	0	0	0	0	1	0	1	0	28	0	90
Total	46	9	0	0	14	170	0	0	0	11	5	0	12	0	111	0	378
Grand Total	100	15	0	0	21	338	2	0	1	15	10	0	63	0	210	0	775
Apprch %	87	13	0	0	5.8	93.6	0.6	0	3.8	57.7	38.5	0	23.1	0	76.9	0	
Total %	12.9	1.9	0	0	2.7	43.6	0.3	0	0.1	1.9	1.3	0	8.1	0	27.1	0	
Cars	92	15	0	0	20	336	2	0	1	15	10	0	63	0	194	0	748
% Cars	92	100	0	0	95.2	99.4	100	0	100	100	100	0	100	0	92.4	0	96.5
Heavy Vehicles	8	0	0	0	1	2	0	0	0	0	0	0	0	0	16	0	27
% Heavy Vehicles	8	0	0	0	4.8	0.6	0	0	0	0	0	0	0	0	7.6	0	3.5

Start Time	Park Street From North					Pleasant Street From East					Court Street From South					Pleasant Street From West					Int. Total
	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:30 AM																					
07:30 AM	9	0	0	0	9	3	50	1	0	54	0	1	0	0	1	11	0	18	0	29	93
07:45 AM	14	3	0	0	17	3	46	0	0	49	1	3	3	0	7	17	0	42	0	59	132
08:00 AM	16	7	0	0	23	2	45	0	0	47	0	11	3	0	14	9	0	41	0	50	134
08:15 AM	10	2	0	0	12	3	49	0	0	52	0	0	1	0	1	2	0	27	0	29	94
Total Volume	49	12	0	0	61	11	190	1	0	202	1	15	7	0	23	39	0	128	0	167	453
% App. Total	80.3	19.7	0	0		5.4	94.1	0.5	0		4.3	65.2	30.4	0		23.4	0	76.6	0		
PHF	.766	.429	.000	.000	.663	.917	.950	.250	.000	.935	.250	.341	.583	.000	.411	.574	.000	.762	.000	.708	.845
Cars	45	12	0	0	57	11	190	1	0	202	1	15	7	0	23	39	0	115	0	154	436
% Cars	91.8	100	0	0	93.4	100	100	100	0	100	100	100	100	0	100	100	0	89.8	0	92.2	96.2
Heavy Vehicles	4	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	13	0	13	17
% Heavy Vehicles	8.2	0	0	0	6.6	0	0	0	0	0	0	0	0	0	0	0	0	10.2	0	7.8	3.8



PRECISION
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INDUSTRIES, LLC

P.O. Box 301 Berlin, MA 01503
Office: 508.481.3999 Fax: 508.545.1234
Email: datarequests@pdillc.com

File Name : 154390 DD
Site Code : P2015
Start Date : 4/14/2015
Page No : 1

N/S: Park Street/ Court Street
E/W: Pleasant Street
City, State: Beverly, MA
Client: TEC/ R. Brown

Groups Printed- Cars

Start Time	Park Street From North				Pleasant Street From East				Court Street From South				Pleasant Street From West				Int. Total
	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	
07:00 AM	14	1	0	0	1	33	0	0	0	0	0	0	12	0	19	0	80
07:15 AM	15	2	0	0	0	38	1	0	0	0	2	0	11	0	18	0	87
07:30 AM	9	0	0	0	3	50	1	0	0	1	0	0	11	0	15	0	90
07:45 AM	12	3	0	0	3	46	0	0	1	3	3	0	17	0	38	0	126
Total	50	6	0	0	7	167	2	0	1	4	5	0	51	0	90	0	383
08:00 AM	14	7	0	0	2	45	0	0	0	11	3	0	9	0	39	0	130
08:15 AM	10	2	0	0	3	49	0	0	0	0	1	0	2	0	23	0	90
08:30 AM	10	0	0	0	0	34	0	0	0	0	0	0	0	0	15	0	59
08:45 AM	8	0	0	0	8	41	0	0	0	0	1	0	1	0	27	0	86
Total	42	9	0	0	13	169	0	0	0	11	5	0	12	0	104	0	365
Grand Total	92	15	0	0	20	336	2	0	1	15	10	0	63	0	194	0	748
Apprch %	86	14	0	0	5.6	93.9	0.6	0	3.8	57.7	38.5	0	24.5	0	75.5	0	
Total %	12.3	2	0	0	2.7	44.9	0.3	0	0.1	2	1.3	0	8.4	0	25.9	0	

Start Time	Park Street From North					Pleasant Street From East					Court Street From South					Pleasant Street From West					Int. Total
	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:30 AM																					
07:30 AM	9	0	0	0	9	3	50	1	0	54	0	1	0	0	1	11	0	15	0	26	90
07:45 AM	12	3	0	0	15	3	46	0	0	49	1	3	3	0	7	17	0	38	0	55	126
08:00 AM	14	7	0	0	21	2	45	0	0	47	0	11	3	0	14	9	0	39	0	48	130
08:15 AM	10	2	0	0	12	3	49	0	0	52	0	0	1	0	1	2	0	23	0	25	90
Total Volume	45	12	0	0	57	11	190	1	0	202	1	15	7	0	23	39	0	115	0	154	436
% App. Total	78.9	21.1	0	0		5.4	94.1	0.5	0		4.3	65.2	30.4	0		25.3	0	74.7	0		
PHF	.804	.429	.000	.000	.679	.917	.950	.250	.000	.935	.250	.341	.583	.000	.411	.574	.000	.737	.000	.700	.838



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File Name : 154390 DD
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Page No : 1

N/S: Park Street/ Court Street
E/W: Pleasant Street
City, State: Beverly, MA
Client: TEC/ R. Brown

Groups Printed- Heavy Vehicles

Start Time	Park Street From North				Pleasant Street From East				Court Street From South				Pleasant Street From West				Int. Total
	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	
07:00 AM	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	2
07:15 AM	2	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	3
07:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	3
07:45 AM	2	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	6
Total	4	0	0	0	0	1	0	0	0	0	0	0	0	0	9	0	14
08:00 AM	2	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	4
08:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	4
08:30 AM	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
08:45 AM	1	0	0	0	1	1	0	0	0	0	0	0	0	0	1	0	4
Total	4	0	0	0	1	1	0	0	0	0	0	0	0	0	7	0	13
Grand Total	8	0	0	0	1	2	0	0	0	0	0	0	0	0	16	0	27
Apprch %	100	0	0	0	33.3	66.7	0	0	0	0	0	0	0	0	100	0	
Total %	29.6	0	0	0	3.7	7.4	0	0	0	0	0	0	0	0	59.3	0	

Start Time	Park Street From North					Pleasant Street From East					Court Street From South					Pleasant Street From West					Int. Total
	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:30 AM																					
07:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	3	3
07:45 AM	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	4	0	4	6
08:00 AM	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	4
08:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	4	4
Total Volume	4	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	13	0	13	17
% App. Total	100	0	0	0		0	0	0	0		0	0	0	0		0	0	100	0		
PHF	.500	.000	.000	.000	.500	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.813	.000	.813	.708



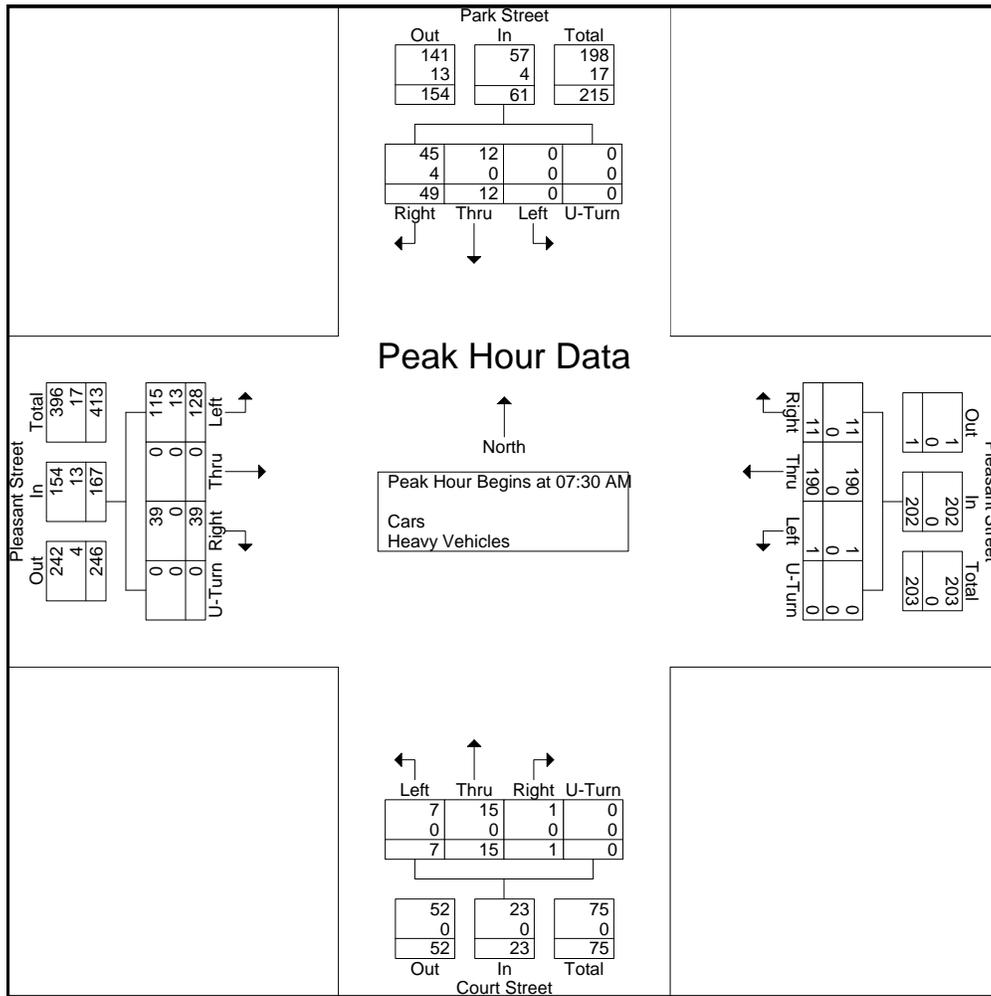
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Office: 508.481.3999 Fax: 508.545.1234
Email: datarequests@pdillc.com

N/S: Park Street/ Court Street
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File Name : 154390 DD
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Page No : 1

Start Time	Park Street From North					Pleasant Street From East					Court Street From South					Pleasant Street From West					Int. Total
	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:30 AM																					
07:30 AM	9	0	0	0	9	3	50	1	0	54	0	1	0	0	1	11	0	18	0	29	93
07:45 AM	14	3	0	0	17	3	46	0	0	49	1	3	3	0	7	17	0	42	0	59	132
08:00 AM	16	7	0	0	23	2	45	0	0	47	0	11	3	0	14	9	0	41	0	50	134
08:15 AM	10	2	0	0	12	3	49	0	0	52	0	0	1	0	1	2	0	27	0	29	94
Total Volume	49	12	0	0	61	11	190	1	0	202	1	15	7	0	23	39	0	128	0	167	453
% App. Total	80.3	19.7	0	0		5.4	94.1	0.5	0		4.3	65.2	30.4	0		23.4	0	76.6	0		
PHF	.766	.429	.000	.000	.663	.917	.950	.250	.000	.935	.250	.341	.583	.000	.411	.574	.000	.762	.000	.708	.845
Cars	45	12	0	0	57	11	190	1	0	202	1	15	7	0	23	39	0	115	0	154	436
% Cars	91.8	100	0	0	93.4	100	100	100	0	100	100	100	100	0	100	100	0	89.8	0	92.2	96.2
Heavy Vehicles	4	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	13	0	13	17
% Heavy Vehicles	8.2	0	0	0	6.6	0	0	0	0	0	0	0	0	0	0	0	0	10.2	0	7.8	3.8





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File Name : 154390 DDD
Site Code : P2015
Start Date : 4/14/2015
Page No : 1

Groups Printed- Cars - Heavy Vehicles

Start Time	Park Street From North				Pleasant Street From East				Court Street From South				Pleasant Street From West				Int. Total
	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	
04:00 PM	12	0	1	0	3	34	0	0	0	2	1	0	0	0	43	0	96
04:15 PM	12	0	0	0	1	37	0	0	0	0	0	0	1	0	51	0	102
04:30 PM	17	0	0	0	2	27	2	0	0	3	1	0	0	0	47	0	99
04:45 PM	22	0	0	0	2	37	0	0	0	0	0	0	2	0	48	0	111
Total	63	0	1	0	8	135	2	0	0	5	2	0	3	0	189	0	408
05:00 PM	20	0	0	0	6	43	0	0	0	2	6	0	0	0	39	0	116
05:15 PM	17	0	0	0	6	55	0	0	0	1	1	0	2	0	45	0	127
05:30 PM	18	0	0	0	6	36	0	0	0	3	7	0	1	0	37	0	108
05:45 PM	22	0	0	0	1	31	1	0	0	1	4	0	0	0	39	0	99
Total	77	0	0	0	19	165	1	0	0	7	18	0	3	0	160	0	450
Grand Total	140	0	1	0	27	300	3	0	0	12	20	0	6	0	349	0	858
Apprch %	99.3	0	0.7	0	8.2	90.9	0.9	0	0	37.5	62.5	0	1.7	0	98.3	0	
Total %	16.3	0	0.1	0	3.1	35	0.3	0	0	1.4	2.3	0	0.7	0	40.7	0	
Cars	138	0	1	0	27	297	3	0	0	12	20	0	6	0	346	0	850
% Cars	98.6	0	100	0	100	99	100	0	0	100	100	0	100	0	99.1	0	99.1
Heavy Vehicles	2	0	0	0	0	3	0	0	0	0	0	0	0	0	3	0	8
% Heavy Vehicles	1.4	0	0	0	0	1	0	0	0	0	0	0	0	0	0.9	0	0.9

Start Time	Park Street From North					Pleasant Street From East					Court Street From South					Pleasant Street From West					Int. Total
	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:45 PM																					
04:45 PM	22	0	0	0	22	2	37	0	0	39	0	0	0	0	0	2	0	48	0	50	111
05:00 PM	20	0	0	0	20	6	43	0	0	49	0	2	6	0	8	0	0	39	0	39	116
05:15 PM	17	0	0	0	17	6	55	0	0	61	0	1	1	0	2	2	0	45	0	47	127
05:30 PM	18	0	0	0	18	6	36	0	0	42	0	3	7	0	10	1	0	37	0	38	108
Total Volume	77	0	0	0	77	20	171	0	0	191	0	6	14	0	20	5	0	169	0	174	462
% App. Total	100	0	0	0		10.5	89.5	0	0		0	30	70	0		2.9	0	97.1	0		
PHF	.875	.000	.000	.000	.875	.833	.777	.000	.000	.783	.000	.500	.500	.000	.500	.625	.000	.880	.000	.870	.909
Cars	75	0	0	0	75	20	170	0	0	190	0	6	14	0	20	5	0	168	0	173	458
% Cars	97.4	0	0	0	97.4	100	99.4	0	0	99.5	0	100	100	0	100	100	0	99.4	0	99.4	99.1
Heavy Vehicles	2	0	0	0	2	0	1	0	0	1	0	0	0	0	0	0	0	1	0	1	4
% Heavy Vehicles	2.6	0	0	0	2.6	0	0.6	0	0	0.5	0	0	0	0	0	0	0	0.6	0	0.6	0.9



PRECISION
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File Name : 154390 DDD
Site Code : P2015
Start Date : 4/14/2015
Page No : 1

N/S: Park Street/ Court Street
E/W: Pleasant Street
City, State: Beverly, MA
Client: TEC/ R. Brown

Groups Printed- Cars

Start Time	Park Street From North				Pleasant Street From East				Court Street From South				Pleasant Street From West				Int. Total
	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	
04:00 PM	12	0	1	0	3	32	0	0	0	2	1	0	0	0	43	0	94
04:15 PM	12	0	0	0	1	37	0	0	0	0	0	0	1	0	50	0	101
04:30 PM	17	0	0	0	2	27	2	0	0	3	1	0	0	0	47	0	99
04:45 PM	21	0	0	0	2	37	0	0	0	0	0	0	2	0	47	0	109
Total	62	0	1	0	8	133	2	0	0	5	2	0	3	0	187	0	403
05:00 PM	19	0	0	0	6	43	0	0	0	2	6	0	0	0	39	0	115
05:15 PM	17	0	0	0	6	54	0	0	0	1	1	0	2	0	45	0	126
05:30 PM	18	0	0	0	6	36	0	0	0	3	7	0	1	0	37	0	108
05:45 PM	22	0	0	0	1	31	1	0	0	1	4	0	0	0	38	0	98
Total	76	0	0	0	19	164	1	0	0	7	18	0	3	0	159	0	447
Grand Total	138	0	1	0	27	297	3	0	0	12	20	0	6	0	346	0	850
Apprch %	99.3	0	0.7	0	8.3	90.8	0.9	0	0	37.5	62.5	0	1.7	0	98.3	0	
Total %	16.2	0	0.1	0	3.2	34.9	0.4	0	0	1.4	2.4	0	0.7	0	40.7	0	

Start Time	Park Street From North					Pleasant Street From East					Court Street From South					Pleasant Street From West					Int. Total
	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:45 PM																					
04:45 PM	21	0	0	0	21	2	37	0	0	39	0	0	0	0	0	2	0	47	0	49	109
05:00 PM	19	0	0	0	19	6	43	0	0	49	0	2	6	0	8	0	0	39	0	39	115
05:15 PM	17	0	0	0	17	6	54	0	0	60	0	1	1	0	2	2	0	45	0	47	126
05:30 PM	18	0	0	0	18	6	36	0	0	42	0	3	7	0	10	1	0	37	0	38	108
Total Volume	75	0	0	0	75	20	170	0	0	190	0	6	14	0	20	5	0	168	0	173	458
% App. Total	100	0	0	0		10.5	89.5	0	0		0	30	70	0		2.9	0	97.1	0		
PHF	.893	.000	.000	.000	.893	.833	.787	.000	.000	.792	.000	.500	.500	.000	.500	.625	.000	.894	.000	.883	.909



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Groups Printed- Heavy Vehicles

Start Time	Park Street From North				Pleasant Street From East				Court Street From South				Pleasant Street From West				Int. Total
	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	Right	Thru	Left	U-Turn	
04:00 PM	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	2
04:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
04:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:45 PM	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2
Total	1	0	0	0	0	2	0	0	0	0	0	0	0	0	2	0	5
05:00 PM	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
05:15 PM	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
05:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
Total	1	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	3
Grand Total	2	0	0	0	0	3	0	0	0	0	0	0	0	0	3	0	8
Apprch %	100	0	0	0	0	100	0	0	0	0	0	0	0	0	100	0	
Total %	25	0	0	0	0	37.5	0	0	0	0	0	0	0	0	37.5	0	

Start Time	Park Street From North					Pleasant Street From East					Court Street From South					Pleasant Street From West					Int. Total
	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	
04:00 PM	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	2
04:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
04:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:45 PM	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	2
Total Volume	1	0	0	0	1	0	2	0	0	2	0	0	0	0	0	0	0	2	0	2	5
% App. Total	100	0	0	0		0	100	0	0		0	0	0	0		0	0	100	0		
PHF	.250	.000	.000	.000	.250	.000	.250	.000	.000	.250	.000	.000	.000	.000	.000	.000	.000	.500	.000	.500	.625

Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 04:00 PM



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INDUSTRIES, LLC

P.O. Box 301 Berlin, MA 01503
Office: 508.481.3999 Fax: 508.545.1234
Email: datarequests@pdillc.com

File Name : 154390 DDD
Site Code : P2015
Start Date : 4/14/2015
Page No : 1

N/S: Park Street/ Court Street
E/W: Pleasant Street
City, State: Beverly, MA
Client: TEC/ R. Brown

Groups Printed- Peds and Bikes

Start Time	Park Street From North					Pleasant Street From East					Court Street From South					Pleasant Street From West					Int. Total
	Right	Thru	Left	Peds EB	Peds WB	Right	Thru	Left	Peds SB	Peds NB	Right	Thru	Left	Peds WB	Peds EB	Right	Thru	Left	Peds NB	Peds SB	
04:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:30 PM	0	0	0	1	0	0	0	0	2	0	0	0	0	0	2	0	0	0	0	0	5
04:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	1	0	0	0	0	2	0	0	0	0	0	2	0	0	0	0	0	5
05:00 PM	0	0	0	2	1	0	0	0	2	1	0	0	0	2	1	0	0	0	0	0	9
05:15 PM	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1	0	0	0	0	0	3
05:30 PM	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
05:45 PM	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
Total	0	0	0	3	1	0	0	0	3	2	0	0	0	3	2	0	0	0	0	0	14
Grand Total	0	0	0	4	1	0	0	0	5	2	0	0	0	3	4	0	0	0	0	0	19
Apprch %	0	0	0	80	20	0	0	0	71.4	28.6	0	0	0	42.9	57.1	0	0	0	0	0	
Total %	0	0	0	21.1	5.3	0	0	0	26.3	10.5	0	0	0	15.8	21.1	0	0	0	0	0	

Start Time	Park Street From North						Pleasant Street From East						Court Street From South						Pleasant Street From West						Int. Total						
	Right	Thru	Left	Peds EB	Peds WB	App. Total	Right	Thru	Left	Peds SB	Peds NB	App. Total	Right	Thru	Left	Peds WB	Peds EB	App. Total	Right	Thru	Left	Peds NB	Peds SB	App. Total							
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																															
Peak Hour for Entire Intersection Begins at 04:30 PM																															
04:30 PM	0	0	0	1	0	1	0	0	0	2	0	2	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	5
04:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:00 PM	0	0	0	2	1	3	0	0	0	2	1	3	0	0	0	2	1	3	0	0	0	0	0	0	0	0	0	0	0	0	9
05:15 PM	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	1	1	2	0	0	0	0	0	0	0	0	0	0	0	0	3
Total Volume	0	0	0	3	1	4	0	0	0	4	2	6	0	0	0	3	4	7	0	0	0	0	0	0	0	0	0	0	0	0	17
% App. Total	0	0	0	75	25		0	0	0	66.7	33.3		0	0	0	42.9	57.1		0	0	0	0	0		0	0	0	0	0		
PHF	.000	.000	.000	.375	.250	.333	.000	.000	.000	.500	.500	.500	.000	.000	.000	.375	.500	.583	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.472	



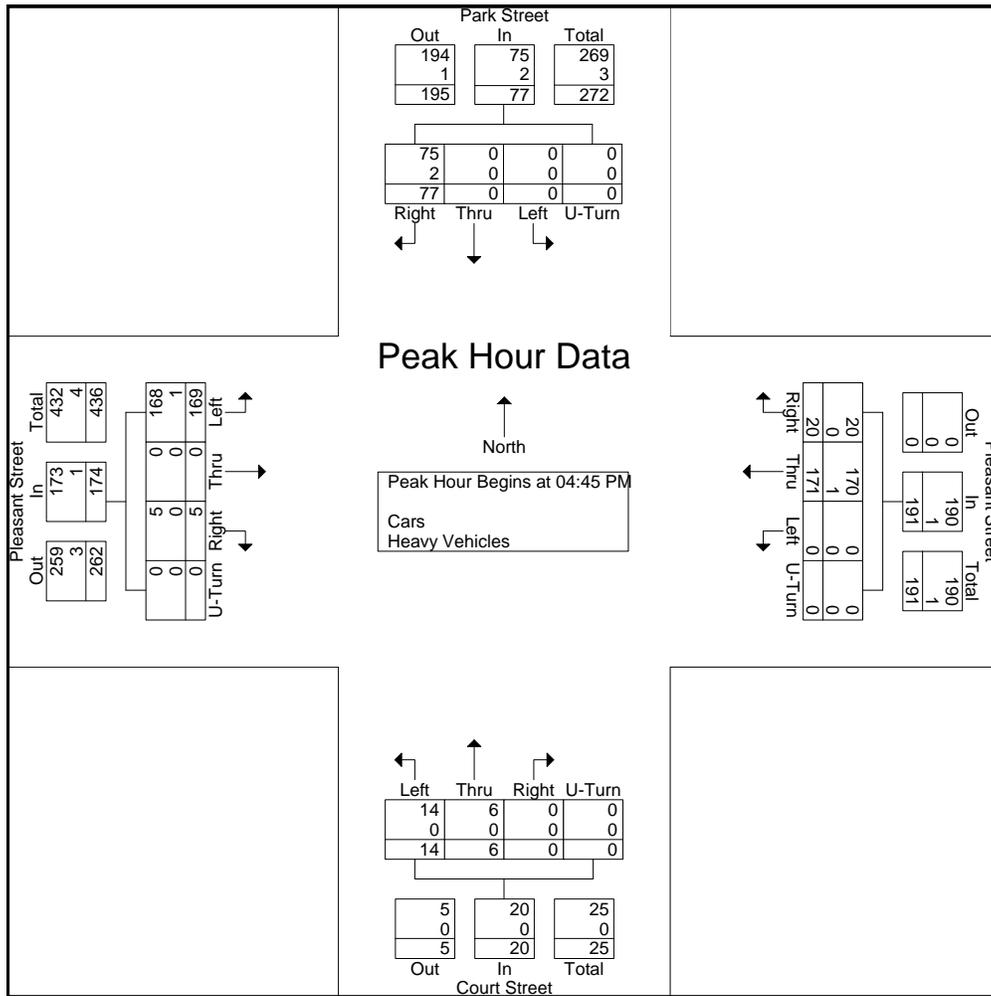
PRECISION
D A T A
INDUSTRIES, LLC

P.O. Box 301 Berlin, MA 01503
Office: 508.481.3999 Fax: 508.545.1234
Email: datarequests@pdillc.com

N/S: Park Street/ Court Street
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City, State: Beverly, MA
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Start Date : 4/14/2015
Page No : 1

Start Time	Park Street From North					Pleasant Street From East					Court Street From South					Pleasant Street From West					Int. Total
	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	U-Turn	App. Total	
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:45 PM																					
04:45 PM	22	0	0	0	22	2	37	0	0	39	0	0	0	0	0	2	0	48	0	50	111
05:00 PM	20	0	0	0	20	6	43	0	0	49	0	2	6	0	8	0	0	39	0	39	116
05:15 PM	17	0	0	0	17	6	55	0	0	61	0	1	1	0	2	2	0	45	0	47	127
05:30 PM	18	0	0	0	18	6	36	0	0	42	0	3	7	0	10	1	0	37	0	38	108
Total Volume	77	0	0	0	77	20	171	0	0	191	0	6	14	0	20	5	0	169	0	174	462
% App. Total	100	0	0	0		10.5	89.5	0	0		0	30	70	0		2.9	0	97.1	0		
PHF	.875	.000	.000	.000	.875	.833	.777	.000	.000	.783	.000	.500	.500	.000	.500	.625	.000	.880	.000	.870	.909
Cars	75	0	0	0	75	20	170	0	0	190	0	6	14	0	20	5	0	168	0	173	458
% Cars	97.4	0	0	0	97.4	100	99.4	0	0	99.5	0	100	100	0	100	100	0	99.4	0	99.4	99.1
Heavy Vehicles	2	0	0	0	2	0	1	0	0	1	0	0	0	0	0	0	0	1	0	1	4
% Heavy Vehicles	2.6	0	0	0	2.6	0	0.6	0	0	0.5	0	0	0	0	0	0	0	0.6	0	0.6	0.9



Attachment B

Seasonal Adjustment Data

Seasonal Adjustment

Project: MBTA Development - Beverly, Massachusetts
 Date: September 1, 2016
 Analyst: TEC, Inc. / Eindra (Elena) Aung, E.I.T.
 Source: MassDOT Temporary Count Station 35

STATION 35 - BEVERLY - RTE.128 - NORTH OF BRIMBLE AVENUE

YR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR	April Seasonal Adjustment	September Seasonal Adjustment
05	40,000	42,720	43,414	47,496	49,010	55,111	54,830	54,453	49,541	46,632	46,086	44,140	47,786	0.6%	-3.7%
06	40,160	40,405	45,147	46,084	50,124	52,245	53,561	54,000	49,983	48,920	46,034	44,596	47,605	3.2%	-5.0%
07	42,000	42,541	44,243	45,757	50,896	49,531	53,663	54,422	50,516	49,004	45,465	41,565	47,467	3.6%	-6.4%
08	42,261	41,630	42,213	46,145	48,637	50,306	50,358	50,045	46,660	41,991	39,012	40,257	44,960	-2.6%	-3.8%
09	39,011	41,648	46,000	46,511	48,741	49,470	51,273	48,153	45,721	48,212	43,754	41,813	45,859	-1.4%	0.3%
Seasonal Average =													0.7%	-3.7%	



Attachment C

Public Transportation



NEWBURYPORT/ROCKPORT LINE Train Schedule Effective May 23, 2016

Monday to Friday

Inbound to Boston

ZONE	STATION	TRAIN #	100	150	152	102	154	104	156	106	158	160	192	108	162	110	164	112	166	114	168	116	170	118	172	174	176	124	178	126	180	128	182
Bikes Allowed	8 Rockport	6	45:5	6:30	7:10	7:50	8:30	9:10	9:50	10:30	11:10	11:50	12:30	13:10	13:50	14:30	15:10	15:50	16:30	17:10	17:50	18:30	19:10	19:50	20:30	21:10	21:50	22:30	23:10	23:50	24:30	25:10	25:50
	7 Gloucester	6	5:02	6:37	7:17	7:57	8:37	9:17	9:57	10:37	11:17	11:57	12:37	13:17	13:57	14:37	15:17	15:57	16:37	17:17	17:57	18:37	19:17	19:57	20:37	21:17	21:57	22:37	23:17	23:57	24:37	25:17	25:57
	6 Manchester	6	5:08	6:43	7:23	8:03	8:43	9:23	10:03	10:43	11:23	12:03	12:43	13:23	14:03	14:43	15:23	16:03	16:43	17:23	18:03	18:43	19:23	20:03	20:43	21:23	22:03	22:43	23:23	24:03	24:43	25:23	26:03
	5 Beverly Farms	6	5:15	6:50	7:30	8:10	8:50	9:30	10:10	10:50	11:30	12:10	12:50	13:30	14:10	14:50	15:30	16:10	16:50	17:30	18:10	18:50	19:30	20:10	20:50	21:30	22:10	22:50	23:30	24:10	24:50	25:30	26:10
	5 Prides Crossing	6	5:22	6:57	7:37	8:17	8:57	9:37	10:17	10:57	11:37	12:17	12:57	13:37	14:17	14:57	15:37	16:17	16:57	17:37	18:17	18:57	19:37	20:17	20:57	21:37	22:17	22:57	23:37	24:17	24:57	25:37	26:17
	4 Montserrat	6	5:30	7:05	7:45	8:25	9:05	9:45	10:25	11:05	11:45	12:25	13:05	13:45	14:25	15:05	15:45	16:25	17:05	17:45	18:25	19:05	19:45	20:25	21:05	21:45	22:25	23:05	23:45	24:25	25:05	25:45	26:25
	3 Swampscott	6	5:37	7:12	7:52	8:32	9:12	9:52	10:32	11:12	11:52	12:32	13:12	13:52	14:32	15:12	15:52	16:32	17:12	17:52	18:32	19:12	19:52	20:32	21:12	21:52	22:32	23:12	23:52	24:32	25:12	25:52	26:32
	2 River Works	6	5:49	7:24	8:04	8:44	9:24	10:04	10:44	11:24	12:04	12:44	13:24	14:04	14:44	15:24	16:04	16:44	17:24	18:04	18:44	19:24	20:04	20:44	21:24	22:04	22:44	23:24	24:04	24:44	25:24	26:04	
	1A Chelsea	6	5:59	7:34	8:14	8:54	9:34	10:14	10:54	11:34	12:14	12:54	13:34	14:14	14:54	15:34	16:14	16:54	17:34	18:14	18:54	19:34	20:14	20:54	21:34	22:14	22:54	23:34	24:14	24:54	25:34	26:14	
	1A North Station	6	6:11	7:46	8:26	9:06	9:46	10:26	11:06	11:46	12:26	13:06	13:46	14:26	15:06	15:46	16:26	17:06	17:46	18:26	19:06	19:46	20:26	21:06	21:46	22:26	23:06	23:46	24:26	25:06	25:46	26:26	

Times in purple box indicate peak period trains.

Monday to Friday

Outbound from Boston

ZONE	STATION	TRAIN #	153	101	191	155	103	157	105	159	107	161	163	111	165	113	115	167	193	117	169	119	171	173	121	175	123	177	125	179	127	181	129	183
Bikes Allowed	1A North Station	6	6:26	6:39	7:08	7:37	8:06	8:35	9:04	9:33	10:02	10:31	11:00	11:29	11:58	12:27	12:56	13:25	13:54	14:23	14:52	15:21	15:50	16:19	16:48	17:17	17:46	18:15	18:44	19:13	19:42	20:11	20:40	21:09
	1A Chelsea	6	6:50	7:19	7:49	8:18	8:47	9:16	9:45	10:14	10:43	11:12	11:41	12:10	12:39	13:08	13:37	14:06	14:35	15:04	15:33	16:02	16:31	17:00	17:29	17:58	18:27	18:56	19:25	19:54	20:23	20:52	21:21	
	2 River Works	6	7:28	7:57	8:26	8:55	9:24	9:53	10:22	10:51	11:20	11:49	12:18	12:47	13:16	13:45	14:14	14:43	15:12	15:41	16:10	16:39	17:08	17:37	18:06	18:35	19:04	19:33	20:02	20:31	21:00	21:29	21:58	
	3 Swampscott	6	7:33	8:02	8:31	9:00	9:29	9:58	10:27	10:56	11:25	11:54	12:23	12:52	13:21	13:50	14:19	14:48	15:17	15:46	16:15	16:44	17:13	17:42	18:11	18:40	19:09	19:38	20:07	20:36	21:05	21:34	22:03	
	3 Salem	6	7:40	8:09	8:38	9:07	9:36	10:05	10:34	11:03	11:32	12:01	12:30	12:59	13:28	13:57	14:26	14:55	15:24	15:53	16:22	16:51	17:20	17:49	18:18	18:47	19:16	19:45	20:14	20:43	21:12	21:41	22:10	
	4 Beverly	6	7:44	8:13	8:42	9:11	9:40	10:09	10:38	11:07	11:36	12:05	12:34	13:03	13:32	14:01	14:30	14:59	15:28	15:57	16:26	16:55	17:24	17:53	18:22	18:51	19:20	19:49	20:18	20:47	21:16	21:45	22:14	
	5 North Beverly	6	7:50	8:19	8:48	9:17	9:46	10:15	10:44	11:13	11:42	12:11	12:40	13:09	13:38	14:07	14:36	15:05	15:34	16:03	16:32	17:01	17:30	17:59	18:28	18:57	19:26	19:55	20:24	20:53	21:22	21:51	22:20	
	5 Hamilton/Wenham	6	7:54	8:23	8:52	9:21	9:50	10:19	10:48	11:17	11:46	12:15	12:44	13:13	13:42	14:11	14:40	15:09	15:38	16:07	16:36	17:05	17:34	18:03	18:32	19:01	19:30	19:59	20:28	20:57	21:26	21:55	22:24	
	5 Ipswich	6	8:01	8:30	8:59	9:28	9:57	10:26	10:55	11:24	11:53	12:22	12:51	13:20	13:49	14:18	14:47	15:16	15:45	16:14	16:43	17:12	17:41	18:10	18:39	19:08	19:37	20:06	20:35	21:04	21:33	22:02	22:31	
	7 Rowley	6	8:07	8:36	9:05	9:34	10:03	10:32	11:01	11:30	11:59	12:28	12:57	13:26	13:55	14:24	14:53	15:22	15:51	16:20	16:49	17:18	17:47	18:16	18:45	19:14	19:43	20:12	20:41	21:10	21:39	22:08	22:37	
	8 Newburyport	6	8:15	8:44	9:13	9:42	10:11	10:40	11:09	11:38	12:07	12:36	13:05	13:34	14:03	14:32	15:01	15:30	15:59	16:28	16:57	17:26	17:55	18:24	18:53	19:22	19:51	20:20	20:49	21:18	21:47	22:16	22:45	
	5 Prides Crossing	6	8:21	8:50	9:19	9:48	10:17	10:46	11:15	11:44	12:13	12:42	13:11	13:40	14:09	14:38	15:07	15:36	16:05	16:34	17:03	17:32	18:01	18:30	18:59	19:28	19:57	20:26	20:55	21:24	21:53	22:22	22:51	
	5 Beverly Farms	6	8:26	8:55	9:24	9:53	10:22	10:51	11:20	11:49	12:18	12:47	13:16	13:45	14:14	14:43	15:12	15:41	16:10	16:39	17:08	17:37	18:06	18:35	19:04	19:33	20:02	20:31	21:00	21:29	21:58	22:27	22:56	
	6 Manchester	6	8:32	9:01	9:30	9:59	10:28	10:57	11:26	11:55	12:24	12:53	13:22	13:51	14:20	14:49	15:18	15:47	16:16	16:45	17:14	17:43	18:12	18:41	19:10	19:39	20:08	20:37	21:06	21:35	22:04	22:33	23:02	
	7 West Gloucester	6	8:38	9:07	9:36	10:05	10:34	11:03	11:32	12:01	12:30	12:59	13:28	13:57	14:26	14:55	15:24	15:53	16:22	16:51	17:20	17:49	18:18	18:47	19:16	19:45	20:14	20:43	21:12	21:41	22:10	22:39	23:08	
	8 Rockport	6	8:47	9:16	9:45	10:14	10:43	11:12	11:41	12:10	12:39	13:08	13:37	14:06	14:35	15:04	15:33	16:02	16:31	17:00	17:29	17:58	18:27	18:56	19:25	19:54	20:23	20:52	21:21	21:50	22:19	22:48	23:17	

Trains in purple box indicate peak period trains.

Saturday & Sunday

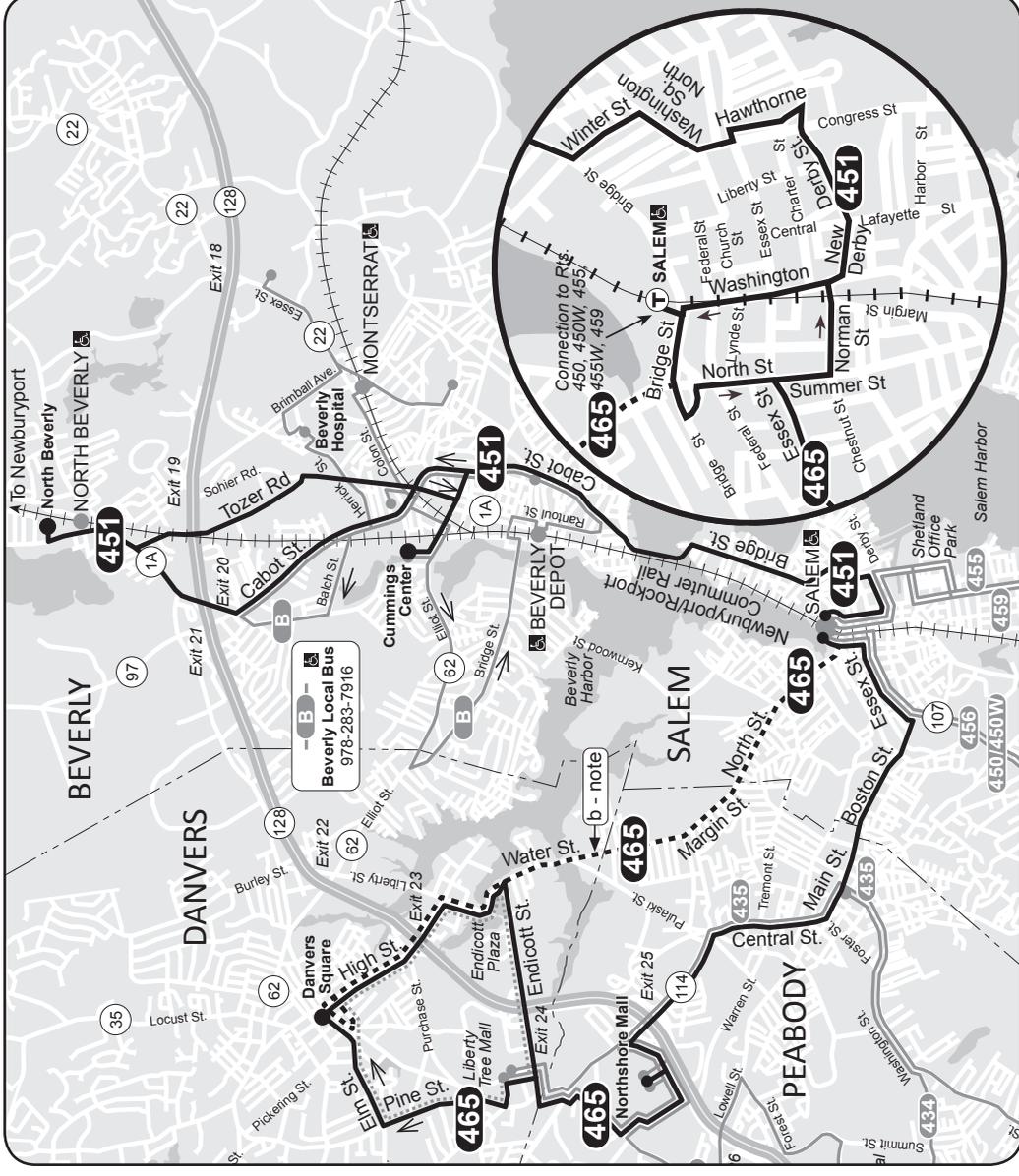
Inbound to Boston

ZONE	STATION	TRAIN #	200	150	102	152	104	154	106	156	108	158	110	160	112
Bikes Allowed	8 Rockport	6	7:00	7:30	8:00	8:30	9:00	9:30	10:00	10:30	11:00	11:30	12:00	12:30	13:00
	7 Gloucester	6	7:07	7:37	8:07	8:37	9:07	9:37	10:07	10:37	11:07	11:37	12:07	12:37	13:07
	6 Manchester	6	7:13	7:43	8:13	8:43	9:13	9:43	10:13	10:43	11:13	11:43	12:13	12:43	13:13
	5 Beverly Farms	6	7:25	7:55	8:25	8:55	9:25	9:55	10:25	10:55	11:25	11:55	12:25	12:55	13:25
	4 Montserrat	6	7:31	8:01	8:31	9:01	9:31	10:01	10:31	11:01	11:31	12:01	12:31	13:01	13:31
	3 Swampscott	6	7:36	8:06	8:36	9:06	9:36	10:06	10:36	11:06	11:36	12:06	12:36	13:06	13:36
	2 River Works	6	7:46	8:16	8:46	9:16	9:46	10:16	10:46	11:16	11:46	12:16	12:46	13:16	13:46
	1A Chelsea	6	7:59	8:29	8:59	9:29	9:59	10:29	10:59	11:29	11:59	12:29	12:59	13:29	13:59
	1A North Station	6	8:11	8:41	9:11	9:41	10:11	10:41	11:11	11:41	12:11	12:41	13:11	13:41	14:11



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Route 451 North Beverly - Salem Depot
Route 465 Danvers Square - Salem Depot



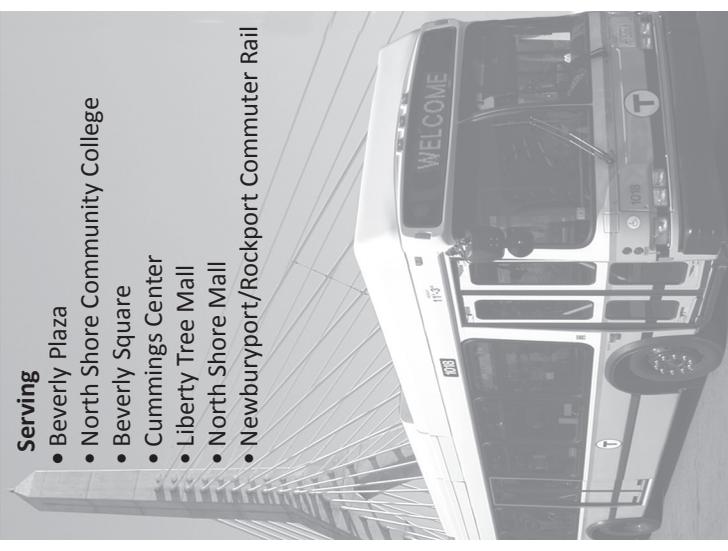
451•465

Fall September 3, 2016 - December 30, 2016

451 North Beverly-Salem Depot
465 Danvers Square-Salem Depot

Serving

- Beverly Plaza
- North Shore Community College
- Beverly Square
- Cummings Center
- Liberty Tree Mall
- North Shore Mall
- Newburyport/Rockport Commuter Rail



Massachusetts Bay
 Transportation Authority

massDOT
 Massachusetts Department of Transportation

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

451

Weekday

Inbound		Outbound	
Leave North Beverly	Arrive Cummings Center	Leave Salem Depot	Arrive Cummings Center
6:40A	6:49A	7:09A	6:14A
8:00	8:12	8:35	7:36
9:00	9:11	9:32	8:41
a 3:20P	3:31P	3:53P	2:55P
a 4:30	4:40	5:03	3:57
a 5:20	5:31	5:55	4:46
a 6:15	6:25	6:43	5:47
a 7:10	7:18	7:39	6:48

a - Via Tozer Road.

No Route 451 Service on Saturday or Sunday.

465

Weekday

Inbound		Outbound	
Leave Danvers Square	Arrive Liberty Tree	Arrive Peabody Square	Arrive N. Shore Mall
b 6:50A	7:04A	7:15A
b 8:00	8:18	8:40
9:35	9:46A	10:03A	10:18
10:35	10:46	11:03	11:18
11:25	11:36	11:53	12:08P
12:25P	12:36P	12:47P	1:12P
1:25	1:36	1:49	2:12
2:25	2:37	2:52	3:19
3:25	3:37	3:50	4:15
4:25	4:37	4:50	5:15
5:35	5:47	6:00	6:19
6:25	6:39	6:51	7:07
7:15	7:29	7:42	7:56

b - Via Water, Margin and North Streets
 m - Passengers may remain on bus at Danvers Sq. for service to malls.

465

Saturday

Inbound		Outbound	
Leave Danvers Square	Arrive Liberty Tree	Arrive N. Shore Mall	Arrive Peabody Square
9:00A	9:08A	9:18A	9:23A
11:00	11:10	11:22	11:43
1:00P	1:13P	1:25P	1:31P
3:00	3:13	3:26	3:49
5:00	5:12	5:24	5:46
7:00	7:10	7:22	7:39

No Route 465 service on Sunday

All buses are accessible to persons with disabilities

Fare	Local Bus	Bus + Bus	Rapid Transit	Bus + Rapid Transit
CharlieCard	\$1.70	\$1.70	\$2.25	\$2.25
CharlieTicket	\$2.00	\$2.00	\$2.75	\$4.75
Cash-on-Board	\$2.00	\$4.00	\$2.75	\$4.75
Student*	\$0.85	\$0.85	\$1.10	\$1.10
Senior/TAP**	\$0.85	\$0.85	\$1.10	\$1.10

VALID PASSES: LinkPass (\$84.50/mo.); Local Bus (\$55/mo.); *Student LinkPass (\$30.00/mo.); **Senior/TAP LinkPass (\$30/mo.); and express bus, commuter rail, and boat passes.
FREE FARES: Children 11 and under ride free when accompanied by an adult; Blind Access CharlieCard holders ride free and if using a guide, the guide rides free.
 * Requires Student CharlieCard, available to students through participating middle schools and high schools.
 ** Requires Senior/TAP CharlieCard, available to Medicare cardholders, seniors 65+, and persons with disabilities.

Route 451
 North Beverly-Salem Depot

Route 465
 Danvers Square-Salem Depot

Fall 2016 Holidays
 October 10 & November 11: see Weekday
 September 5, November 24 & December 26: see Sunday

Note: For weekday service to Danvers Square after 7:00 PM please refer to Route 435 schedule card.

BEVERLY SHUTTLE BUS ROUTE



Beverly Fares

\$0.50	regular
.25	seniors, 60 and over
.25	persons with disabilities
8.00	monthly pass (sold at City Hall)

A maximum of two (2) parcels or bags are allowed on bus, due to limited seating.

Passengers are limited to two (2) consecutive round trips daily.

Holidays

Shuttle operates on:

- Martin Luther King Day
- Presidents' Day
- Patriot's Day

MONDAY-FRIDAY	AM
Bridge Street Variety Store	6 45
Bridge St. & Kernwood Ave.	6 47
Commuter Rail Station	6 55
Pleasant & Cabot Streets	7 07
Beverly City Hall	7 10
Elliott & Cabot Streets	7 13
Rantoul Street & Broadway	7 15
Commuter Rail Station	7 18
Bridge St. & County Way	7 28
County Way & Elliott St.	7 29
Elliott & Beckford Streets	7 32
Herrick St. & Sohier Road	7 35
Gloucester Crossing	7 36
Rantoul & Elliott Streets	7 40
Elliott & Bridge Streets	7 45

MBTA Newburyport / Rockport Commuter Rail Line

Inbound BEVERLY · North Station / BOSTON

(Local service from Beverly only)

	MONDAY THROUGH FRIDAY										
Beverly	6 58	7 20	7 30	7 45	8 01	8 10	8 23	9 20	9 44	9 58	10 40

Beverly	11 35	12 34	1 34	2 34	3 13	4 32	5 03	5 40	5 59	6 21	—
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	SATURDAY & SUNDAY								
Beverly	9 16	10 34	11 16	12 34	1 16	2 35	3 16	5 45	6 16

Outbound North Station / BOSTON · BEVERLY

	MONDAY THROUGH FRIDAY										
Beverly	7 12	7 47	8 13	8 45	9 00	9 08	10 13	10 53	11 53	12 53	1 53

Beverly	2 55	3 55	4 37	4 56	5 19	5 29	5 50	6 01	6 17	6 30	—
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	SATURDAY & SUNDAY								
Beverly	9 03	10 03	10 48	12 03	12 48	2 03	2 48	5 03	6 03

Times in **bold type** indicate a flag stop. Trains stop only on prearrangement or signal to discharge or pick up passengers.

City of BEVERLY Shuttle

Provided by the City of Beverly with financial assistance from the MBTA

MONDAY THROUGH FRIDAY									
Bridge Street Variety Store	7 45	8 45	9 45	10 45	11 45	12 45	2 45	3 45	4 45
Federal Street	7 50	8 50	9 50	10 50	11 50	12 50	2 50	3 50	4 50
Commuter Rail Station	7 52	8 52	9 52	10 52	11 52	12 52	2 52	3 52	4 52
Rantoul & Edwards Sts.	7 54	8 54	9 54	10 54	11 54	12 54	2 54	3 54	4 54
Cabot St. & Highland Ave.	7 57	8 57	9 57	10 57	11 57	12 57	2 57	3 57	4 57
City Hall	8 00	9 00	10 00	11 00	12 00	1 00	3 00	4 00	5 00
arrive North Beverly Plaza	—	—	—	—	—	1 15	—	—	—
depart North Beverly Plaza	—	—	—	—	—	2 00	—	—	—
Cabot & Elliott Streets	8 02	9 02	10 02	11 02	12 02	—	3 02	4 02	—
Cabot & Rantoul Streets	8 04	9 04	10 04	11 04	12 04	—	3 04	4 04	—
Garden City Apartments	8 07	9 07	10 07	11 07	12 07	—	3 07	4 07	—
Cabot & Simon Streets	8 09	9 09	10 09	11 09	12 09	—	3 09	4 09	—
Balch Street Apartments	8 12	9 12	10 12	11 12	12 12	2 12	3 12	4 12	—
Beverly Hospital	8 20	9 20	10 20	11 20	12 20	2 20	3 20	4 20	—
Herrick St. & Brimbal Ave.	8 21	9 21	10 21	11 21	12 21	2 21	3 21	4 21	—
Essex St. & Kelleher Apts.	8 22	9 22	10 22	11 22	12 22	2 22	3 22	4 22	—
Turtle Creek Apartments	8 24	9 24	10 24	11 24	12 24	2 24	3 24	4 24	—
Centerville Woods Apts.	8 25	9 25	10 25	11 25	12 25	2 25	3 25	4 25	—
YMCA	8 26	9 26	10 26	11 26	12 26	2 26	3 26	4 26	—
Cedar Street Apartments	8 30	9 30	10 30	11 30	12 30	2 30	3 30	4 30	—
Council on Aging	8 34	9 34	10 34	11 34	12 34	2 34	3 34	4 34	—
Gloucester Crossing	8 35	9 35	10 35	11 35	12 35	2 35	3 35	4 35	—
Rantoul & Elliott Streets	8 37	9 37	10 37	11 37	12 37	2 37	3 37	4 37	—
Cummings Center	8 39	9 39	10 39	11 39	12 39	2 39	3 39	4 39	—
Stop & Shop Supermarket	8 41	9 41	10 41	11 41	12 41	2 41	3 41	4 41	—
Elliott St. & Goldsmith Ave.	8 43	9 43	10 43	11 43	12 43	2 43	3 43	4 43	—
Bridge Street Variety Store	8 45	9 45	10 45	11 45	12 45	2 45	3 45	4 45	—

SATURDAY									
City Hall	7 00	8 30	10 00	12 00	1 00	2 10	3 20	—	—
Cabot & Elliott Streets	7 02	8 32	10 02	12 02	1 02	2 12	3 22	—	—
Cummings Center	7 04	8 34	10 04	12 04	1 04	2 14	3 24	—	—
Stop & Shop Supermarket	7 06	8 36	10 06	12 06	1 06	2 16	3 26	—	—
Elliott & McKay Streets	7 08	8 38	10 08	12 08	1 08	2 18	3 28	—	—
Elliott St. & County Way	7 10	8 40	10 10	12 10	1 10	2 20	3 30	—	—
County Way & Bridge St.	7 11	8 41	10 11	12 11	1 11	2 21	3 31	—	—
Bridge St. & Western Ave.	7 12	8 42	10 12	12 12	1 12	2 22	3 32	—	—
Apple Village/Manor Road	7 18	8 48	10 18	—	—	—	—	—	—
Shaw's/N. Beverly Plaza	7 24	8 54	10 24	12 17	1 24	2 34	3 44	—	—
Cabot St. & County Way	7 27	8 57	10 27	12 20	1 27	2 37	3 47	—	—
McKay & Balch Streets	7 29	8 59	10 29	12 22	1 29	2 39	3 49	—	—
Balch Street Apartments	7 30	9 00	10 30	12 23	1 30	2 40	3 50	—	—
Herrick Street Apartments	7 32	9 02	10 32	12 25	1 32	2 42	3 52	—	—
Beverly Hospital	7 34	9 04	10 34	12 27	1 34	2 44	3 54	—	—
Herrick St. & Brimbal Ave.	7 36	9 06	10 36	12 29	1 36	2 46	3 56	—	—
Mediplex	7 38	9 08	10 38	12 31	1 38	2 48	3 58	—	—
Turtle Creek Apartments	7 41	9 11	10 41	12 34	1 41	2 51	4 01	—	—
Centerville Woods Apts.	7 44	9 14	10 44	12 37	1 44	2 54	4 04	—	—
Hale & Hart Streets	7 55	9 25	10 55	—	—	—	—	—	—
Hale & West Streets	7 59	9 29	10 59	—	—	—	—	—	—
Hale & Corning Streets	8 03	9 33	11 03	—	—	—	—	—	—
Corning & Essex Streets	8 06	9 36	11 06	—	—	—	—	—	—
Cedar Street Apartments	8 10	9 40	11 10	12 40	1 47	2 57	4 07	—	—
Essex & Dane Streets	8 13	9 43	11 13	12 43	1 50	3 00	4 10	—	—
Dane & Cabot Streets	8 14	9 44	11 14	12 45	1 52	3 02	4 12	—	—
Garden City Apartments	8 17	9 47	11 17	12 47	1 54	3 04	4 14	—	—
Glou. Crossing / Rite Aid	8 20	9 50	11 20	12 50	1 57	3 07	4 17	—	—
527 Rantoul & Elliott/CVS	8 22	9 52	11 22	12 52	2 00	3 10	4 20	—	—
Rantoul & Federal Streets	8 24	9 54	11 24	12 54	2 02	3 12	4 22	—	—
Commuter Rail Station	8 26	9 56	11 26	12 56	2 05	3 15	4 25	—	—
Cabot & Edwards Streets	8 28	9 58	11 28	12 58	2 07	3 17	4 27	—	—
City Hall	8 30	10 00	11 30	1 00	2 10	3 20	4 30	—	—

City of Beverly Shuttle

Attachment D

MassDOT Crash Data (2010-2014)

Crash Data Summary Tables
 Parking Garage @ Pleasant Street - Beverly, Massachusetts
 1/1/2010 - 12/31/2014

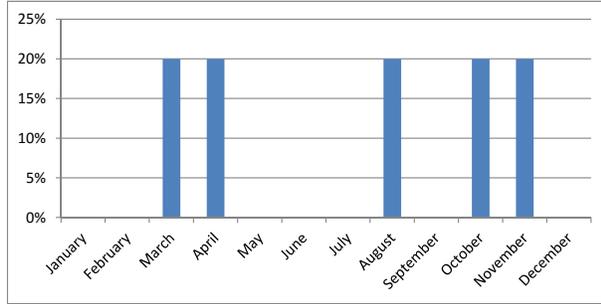
Crash Number	Crash Date	Crash Time	Ambient Light	Weather Condition	Road Surface	Number of Vehicles	Crash Severity	Number of NonFatal Injuries	Manner of Collision	Driver Contributing Codes
2714358	3/27/2011	8:40 PM	Dark - Lighted	Cloudy	Dry	2	Property Damage Only	0	Angled	Not Reported
2716086	4/14/2011	6:12 AM	Daylight	Cloudy	Wet	3	Non-fatal Injury	3	Head-on	Failure to Yield Right-of-Way
2751353	8/12/2011	11:30 PM	Dark - Lighted	Clear	Dry	2	Property Damage Only	0	Rear-end	Followed Too Closely
3606004	10/7/2013	4:00 PM	Daylight	Clear	Dry	1	Property Damage Only	0	Single Vehicle	No Improper Driving
3659721	11/20/2013	8:30 PM	Dark - Lighted	Clear	Dry	1	Non-fatal Injury	1	Single Vehicle	No Improper Driving

Crash Data Summary Charts
 Parking Garage @ Rantoul Street (Route 1A) - Beverly, Massachusetts
 1/1/2010 - 12/31/2014

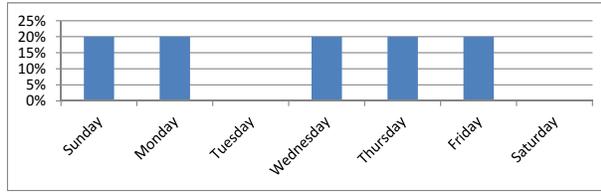
Parking Garage @ Rantoul Street (Route 1A)

5

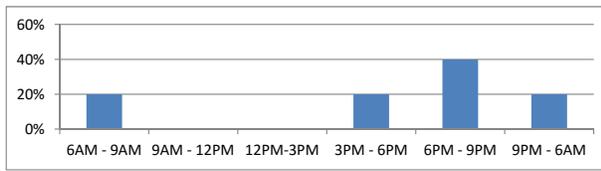
Month	#	%
January	0	0%
February	0	0%
March	1	20%
April	1	20%
May	0	0%
June	0	0%
July	0	0%
August	1	20%
September	0	0%
October	1	20%
November	1	20%
December	0	0%



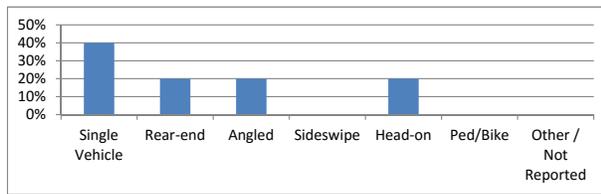
Day of Week	#	%
Sunday	1	20%
Monday	1	20%
Tuesday	0	0%
Wednesday	1	20%
Thursday	1	20%
Friday	1	20%
Saturday	0	0%



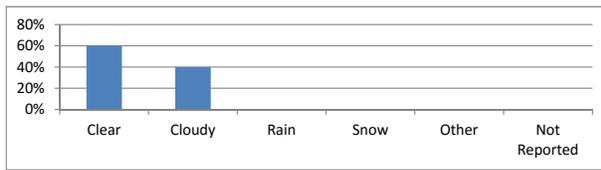
Time of Day	#	%
6AM - 9AM	1	20%
9AM - 12PM	0	0%
12PM-3PM	0	0%
3PM - 6PM	1	20%
6PM - 9PM	2	40%
9PM - 6AM	1	20%



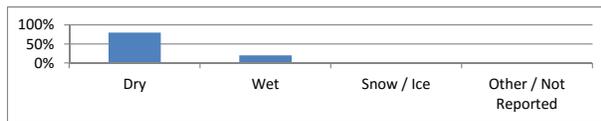
Manner of Collision	#	%
Single Vehicle	2	40%
Rear-end	1	20%
Angled	1	20%
Sideswipe	0	0%
Head-on	1	20%
Ped/Bike	0	0%
Other / Not Reported	0	0%



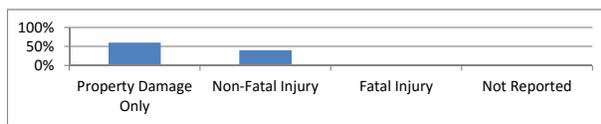
Weather Conditions	#	%
Clear	3	60%
Cloudy	2	40%
Rain	0	0%
Snow	0	0%
Other	0	0%
Not Reported	0	0%



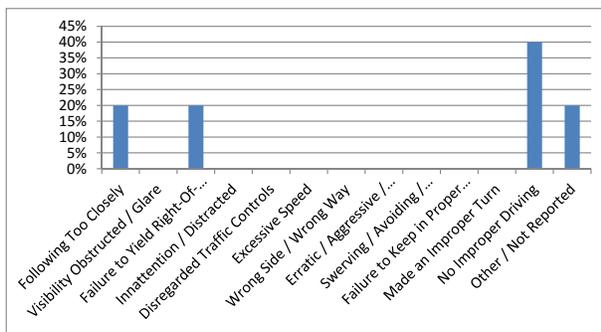
Road Surface	#	%
Dry	4	80%
Wet	1	20%
Snow / Ice	0	0%
Other / Not Reported	0	0%



Crash Severity	#	%
Property Damage Only	3	60%
Non-Fatal Injury	2	40%
Fatal Injury	0	0%
Not Reported	0	0%



Main Contributing Factor from Narrative	#	%
Following Too Closely	1	20%
Visibility Obstructed / Glare	0	0%
Failure to Yield Right-Of-Way	1	20%
Innattention / Distracted	0	0%
Disregarded Traffic Controls	0	0%
Excessive Speed	0	0%
Wrong Side / Wrong Way	0	0%
Erratic / Aggressive / Reckless Driving	0	0%
Swerving / Avoiding / Over-Steering / Over-Correcting	0	0%
Failure to Keep in Proper Lane	0	0%
Made an Improper Turn	0	0%
No Improper Driving	2	40%
Other / Not Reported	1	20%



Crash Data Summary Tables

Pleasant Street @ Rantoul Street (Route 1A) - Beverly, Massachusetts
1/1/2010 - 12/31/2014

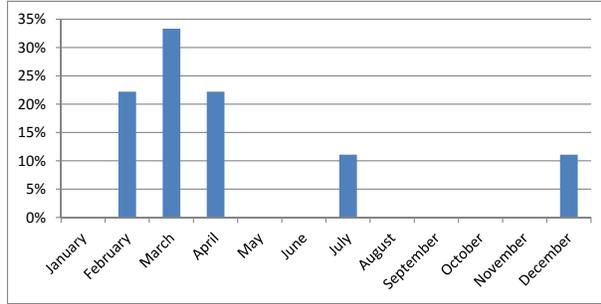
Crash Number	Crash Date	Crash Time	Ambient Light	Weather Condition	Road Surface	Number of Vehicles	Crash Severity	Number of NonFatal Injuries	Manner of Collision	Driver Contributing Codes
2581333	2/8/2010	6:46 PM	Dark - Lighted	Clear	Dry	2	Property Damage Only	0	Angled	Failure to Yield Right-of-Way
2587765	3/22/2010	3:42 PM	Daylight	Cloudy	Wet	2	Property Damage Only	0	Rear-end	Followed Too Closely
2587745	3/23/2010	4:20 PM	Daylight	Rain	Wet	1	Property Damage Only	0	Single Vehicle	Disregarded Traffic Controls
3047859	4/25/2012	3:00 PM	Daylight	Clear	Dry	2	Non-fatal Injury	1	Angled	Failure to Yield Right-of-Way
3199922	7/21/2012	4:41 PM	Daylight	Clear	Dry	2	Non-fatal Injury	2	Angled	Failure to Yield Right-of-Way
3373561	3/22/2013	1:30 PM	Daylight	Clear	Dry	1	Not Reported	0	Single Vehicle	Not Reported
3386300	4/9/2013	2:20 PM	Daylight	Clear	Dry	2	Non-fatal Injury	1	Rear-end	Followed Too Closely
3665637	12/1/2013	1:00 PM	Daylight	Rain	Wet	2	Property Damage Only	0	Sideswipe	Not Reported
3748783	2/28/2014	3:46 PM	Daylight	Clear	Dry	2	Property Damage Only	0	Angled	No Improper Driving

Crash Data Summary Charts
 Pleasant Street @ Rantoul Street (Route 1A) - Beverly, Massachusetts
 1/1/2010 - 12/31/2014

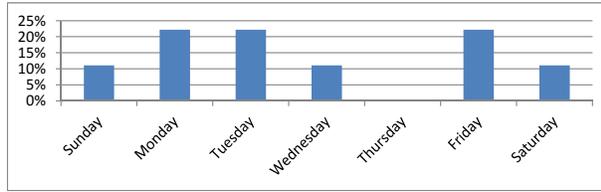
Pleasant Street @ Rantoul Street (Route 1A)

9

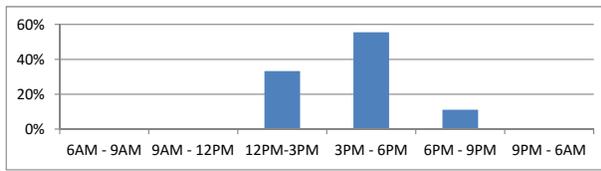
Month	#	%
January	0	0%
February	2	22%
March	3	33%
April	2	22%
May	0	0%
June	0	0%
July	1	11%
August	0	0%
September	0	0%
October	0	0%
November	0	0%
December	1	11%



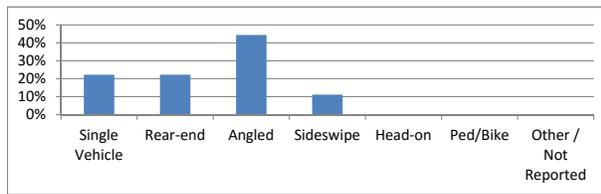
Day of Week	#	%
Sunday	1	11%
Monday	2	22%
Tuesday	2	22%
Wednesday	1	11%
Thursday	0	0%
Friday	2	22%
Saturday	1	11%



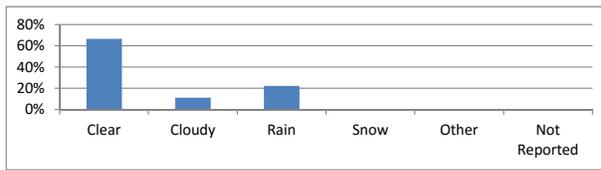
Time of Day	#	%
6AM - 9AM	0	0%
9AM - 12PM	0	0%
12PM-3PM	3	33%
3PM - 6PM	5	56%
6PM - 9PM	1	11%
9PM - 6AM	0	0%



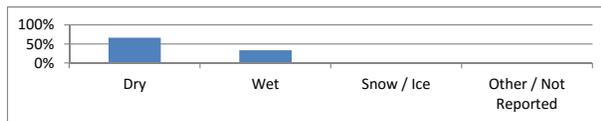
Manner of Collision	#	%
Single Vehicle	2	22%
Rear-end	2	22%
Angled	4	44%
Sideswipe	1	11%
Head-on	0	0%
Ped/Bike	0	0%
Other / Not Reported	0	0%



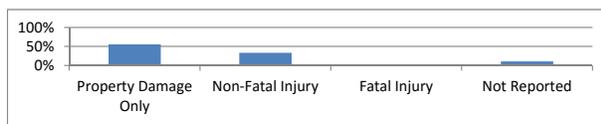
Weather Conditions	#	%
Clear	6	67%
Cloudy	1	11%
Rain	2	22%
Snow	0	0%
Other	0	0%
Not Reported	0	0%



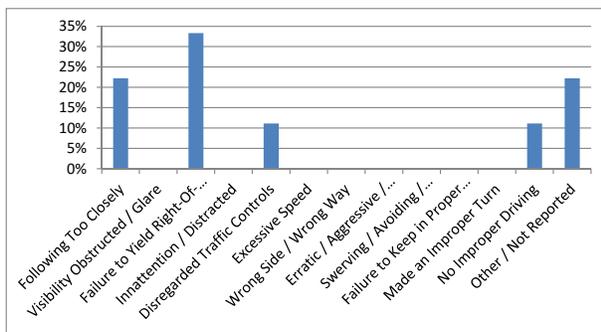
Road Surface	#	%
Dry	6	67%
Wet	3	33%
Snow / Ice	0	0%
Other / Not Reported	0	0%



Crash Severity	#	%
Property Damage Only	5	56%
Non-Fatal Injury	3	33%
Fatal Injury	0	0%
Not Reported	1	11%



Main Contributing Factor from Narrative	#	%
Following Too Closely	2	22%
Visibility Obstructed / Glare	0	0%
Failure to Yield Right-Of-Way	3	33%
Innattention / Distracted	0	0%
Disregarded Traffic Controls	1	11%
Excessive Speed	0	0%
Wrong Side / Wrong Way	0	0%
Erratic / Aggressive / Reckless Driving	0	0%
Swerving / Avoiding / Over-Steering / Over-Correcting	0	0%
Failure to Keep in Proper Lane	0	0%
Made an Improper Turn	0	0%
No Improper Driving	1	11%
Other / Not Reported	2	22%



Crash Data Summary Tables

Park Street / Court Street @ Pleasant Street - Beverly, Massachusetts
1/1/2010 - 12/31/2014

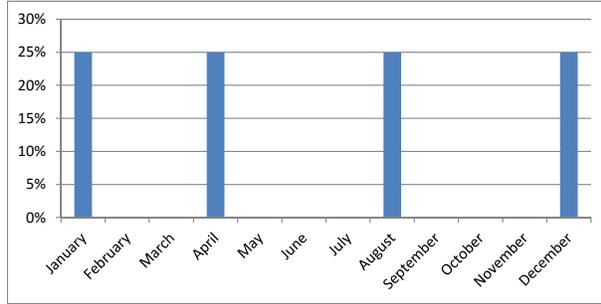
Crash Number	Crash Date	Crash Time	Ambient Light	Weather Condition	Road Surface	Number of Vehicles	Crash Severity	Number of NonFatal Injuries	Manner of Collision	Driver Contributing Codes
3033037	4/17/2012	3:20 PM	Daylight	Clear	Dry	2	Property Damage Only	0	Angled	Failure to Yield Right-of-Way
3316187	12/18/2012	4:33 PM	Dark - Lighted	Cloudy	Wet	1	Property Damage Only	0	Single Vehicle	Disregarded Traffic Controls
3725692	1/27/2014	1:00 PM	Daylight	Cloudy	Dry	1	Property Damage Only	0	Single Vehicle	Disregarded Traffic Controls
3923366	8/25/2014	12:00 AM	Dark - Lighted	Clear	Dry	2	Property Damage Only	0	Rear-end	Failure to Keep in Proper Lane

Crash Data Summary Charts
 Park Street / Court Street @ Pleasant Street - Beverly, Massachusetts
 1/1/2010 - 12/31/2014

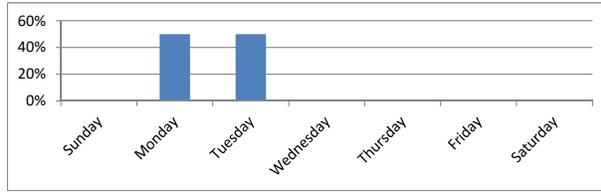
Park Street / Court Street @ Pleasant Street

4

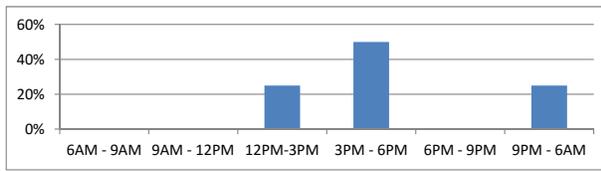
Month	#	%
January	1	25%
February	0	0%
March	0	0%
April	1	25%
May	0	0%
June	0	0%
July	0	0%
August	1	25%
September	0	0%
October	0	0%
November	0	0%
December	1	25%



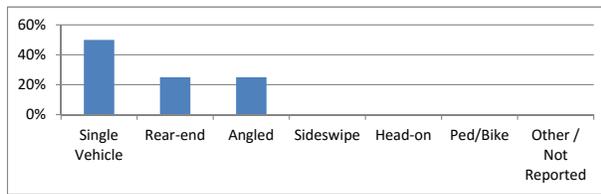
Day of Week	#	%
Sunday	0	0%
Monday	2	50%
Tuesday	2	50%
Wednesday	0	0%
Thursday	0	0%
Friday	0	0%
Saturday	0	0%



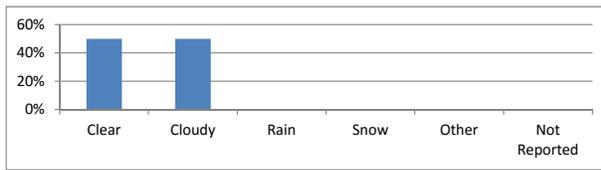
Time of Day	#	%
6AM - 9AM	0	0%
9AM - 12PM	0	0%
12PM-3PM	1	25%
3PM - 6PM	2	50%
6PM - 9PM	0	0%
9PM - 6AM	1	25%



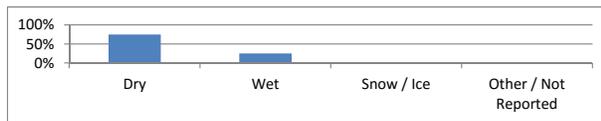
Manner of Collision	#	%
Single Vehicle	2	50%
Rear-end	1	25%
Angled	1	25%
Sideswipe	0	0%
Head-on	0	0%
Ped/Bike	0	0%
Other / Not Reported	0	0%



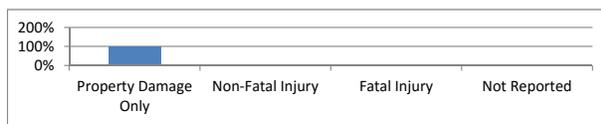
Weather Conditions	#	%
Clear	2	50%
Cloudy	2	50%
Rain	0	0%
Snow	0	0%
Other	0	0%
Not Reported	0	0%



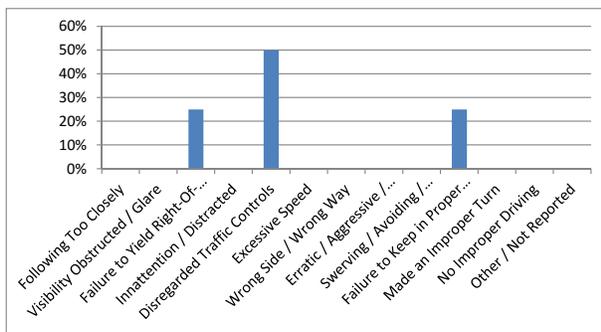
Road Surface	#	%
Dry	3	75%
Wet	1	25%
Snow / Ice	0	0%
Other / Not Reported	0	0%



Crash Severity	#	%
Property Damage Only	4	100%
Non-Fatal Injury	0	0%
Fatal Injury	0	0%
Not Reported	0	0%



Main Contributing Factor from Narrative	#	%
Following Too Closely	0	0%
Visibility Obstructed / Glare	0	0%
Failure to Yield Right-Of-Way	1	25%
Innattention / Distracted	0	0%
Disregarded Traffic Controls	2	50%
Excessive Speed	0	0%
Wrong Side / Wrong Way	0	0%
Erratic / Aggressive / Reckless Driving	0	0%
Swerving / Avoiding / Over-Steering / Over-Correcting	0	0%
Failure to Keep in Proper Lane	1	25%
Made an Improper Turn	0	0%
No Improper Driving	0	0%
Other / Not Reported	0	0%



Crash Data Summary Tables

Railroad Avenue @ Rantoul Street (Route 1A) - Beverly, Massachusetts
1/1/2010 - 12/31/2014

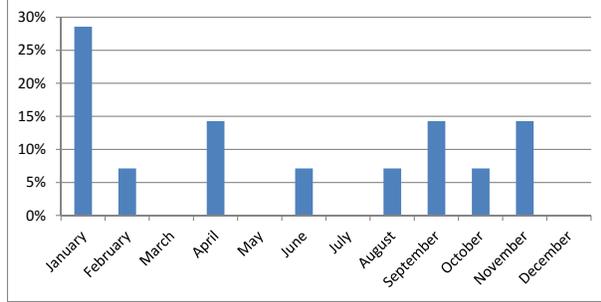
Crash Number	Crash Date	Crash Time	Ambient Light	Weather Condition	Road Surface	Number of Vehicles	Crash Severity	Number of NonFatal Injuries	Manner of Collision	Driver Contributing Codes
2565997	1/10/2010	10:47 AM	Daylight	Clear	Dry	2	Non-fatal Injury	2	Angled	Failure to Yield Right-of-Way
2587864	4/19/2010	5:10 PM	Daylight	Cloudy	Dry	2	Property Damage Only	0	Rear-end	Followed Too Closely
2611915	6/22/2010	8:49 AM	Daylight	Clear	Dry	2	Property Damage Only	0	Angled	Failure to Yield Right-of-Way
2645646	9/28/2010	2:02 PM	Daylight	Rain	Wet	2	Property Damage Only	0	Angled	Failure to Yield Right-of-Way
2733734	11/7/2010	8:45 AM	Daylight	Clear	Dry	2	Property Damage Only	0	Rear-end	Not Reported
2757649	4/6/2011	11:15 AM	Daylight	Clear	Dry	1	Non-fatal Injury	1	Other	Failure to Yield Right-of-Way
2879634	1/24/2012	12:15 PM	Daylight	Clear	Dry	2	Property Damage Only	1	Angled	Disregarded Traffic Controls
3293825	10/25/2012	7:00 PM	Dark - Lighted	Clear	Dry	2	Non-fatal Injury	1	Angled	Disregarded Traffic Controls
3584067	11/15/2012	5:45 PM	Dark - Lighted	Clear	Dry	2	Property Damage Only	0	Rear-end	Other
3351191	2/5/2013	9:00 AM	Dark - Lighted	Clear	Dry	1	Non-fatal Injury	0	Single Vehicle	Failure to Yield Right-of-Way
3589153	9/16/2013	4:00 PM	Dark - Lighted	Clear	Dry	2	Property Damage Only	0	Angled	Failure to Yield Right-of-Way
3711041	1/2/2014	10:00 AM	Dark - Lighted	Snow	Snow	2	Property Damage Only	0	Angled	No Improper Driving
3718271	1/18/2014	2:28 PM	Dark - Lighted	Snow	Snow	1	Non-fatal Injury	0	Single Vehicle	Erratic / Aggressive / Reckless Driving
3900378	8/1/2014	2:50 PM	Dark - Lighted	Clear	Dry	2	Non-fatal Injury	0	Angled	Failure to Yield Right-of-Way

Crash Data Summary Charts
 Railroad Avenue @ Rantoul Street (Route 1A) - Beverly, Massachusetts
 1/1/2010 - 12/31/2014

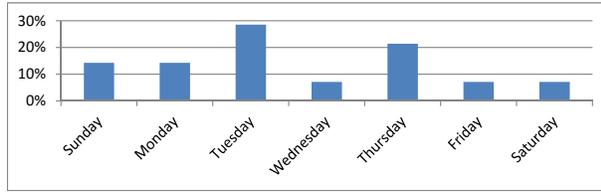
Pleasant Street @ Rantoul Street (Route 1A)

14

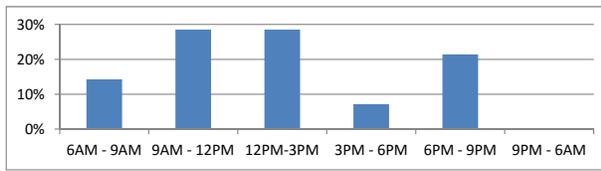
Month	#	%
January	4	29%
February	1	7%
March	0	0%
April	2	14%
May	0	0%
June	1	7%
July	0	0%
August	1	7%
September	2	14%
October	1	7%
November	2	14%
December	0	0%



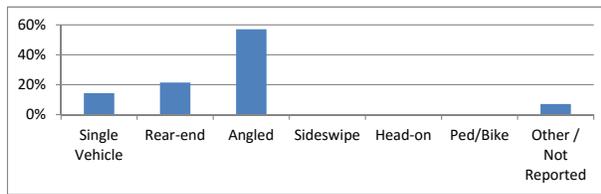
Day of Week	#	%
Sunday	2	14%
Monday	2	14%
Tuesday	4	29%
Wednesday	1	7%
Thursday	3	21%
Friday	1	7%
Saturday	1	7%



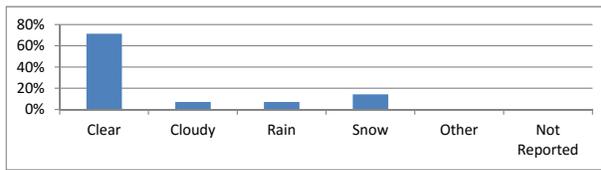
Time of Day	#	%
6AM - 9AM	2	14%
9AM - 12PM	4	29%
12PM-3PM	4	29%
3PM - 6PM	1	7%
6PM - 9PM	3	21%
9PM - 6AM	0	0%



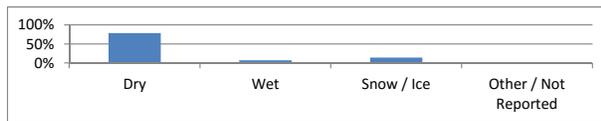
Manner of Collision	#	%
Single Vehicle	2	14%
Rear-end	3	21%
Angled	8	57%
Sideswipe	0	0%
Head-on	0	0%
Ped/Bike	0	0%
Other / Not Reported	1	7%



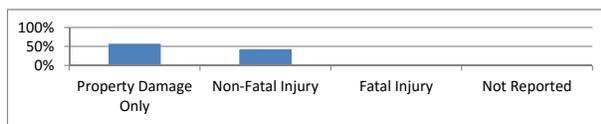
Weather Conditions	#	%
Clear	10	71%
Cloudy	1	7%
Rain	1	7%
Snow	2	14%
Other	0	0%
Not Reported	0	0%



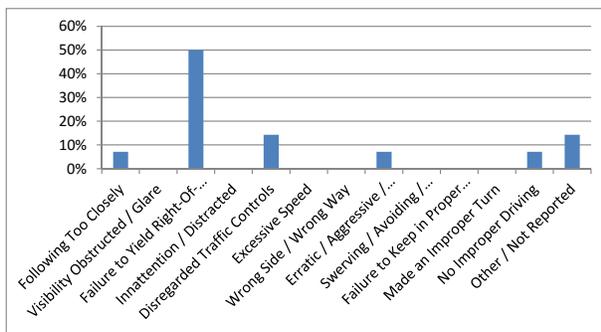
Road Surface	#	%
Dry	11	79%
Wet	1	7%
Snow / Ice	2	14%
Other / Not Reported	0	0%



Crash Severity	#	%
Property Damage Only	8	57%
Non-Fatal Injury	6	43%
Fatal Injury	0	0%
Not Reported	0	0%



Main Contributing Factor from Narrative	#	%
Following Too Closely	1	7%
Visibility Obstructed / Glare	0	0%
Failure to Yield Right-Of-Way	7	50%
Innattention / Distracted	0	0%
Disregarded Traffic Controls	2	14%
Excessive Speed	0	0%
Wrong Side / Wrong Way	0	0%
Erratic / Aggressive / Reckless Driving	1	7%
Swerving / Avoiding / Over-Steering / Over-Correcting	0	0%
Failure to Keep in Proper Lane	0	0%
Made an Improper Turn	0	0%
No Improper Driving	1	7%
Other / Not Reported	2	14%



Attachment E

Ambient Growth Calculations

Average Daily Traffic Summary Table

Project: MBTA Beverly Depot Site Redevelopment - Beverly, Massachusetts
 Date: September 1, 2016
 Analyst: TEC, Inc. / Eindra (Elena) Aung, E.I.T.
 Source: MassDOT Permanent Count Station 5076, 5632, 5072, 5100

STA.	TOWN	ROUTE/STREET	LOCATION	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Amb. Growth
5076	BEVERLY	RTE.127	EAST OF HASKELL ST.	5,296	4,400	4,367	4,205	4,800	4,783	4,742	4,218	3,991	4,004	4,375	4,476	-1.18%
5632	BEVERLY	CABOT STREET	SOUTH OF COUNTY WAY	16,200						15,900						-0.31%
5072	BEVERLY	ESSEX ST.	AT WENHAM T.L.	4,600	4,598	4,531	4,700	4,582	4,667	4,400	4,399	4,199	4,083	4,210	4,307	-0.55%
5100	BEVERLY	KERNWOOD STREET	AT BEVERLY T.L.	7,100	7,098	6,993	7,300	7,117	7,249	6,300	6,432	6,543	6,023	6,210	6,353	-0.87%

Average =

-0.7%

Assume 0.5% Ambient Growth.



Attachment F

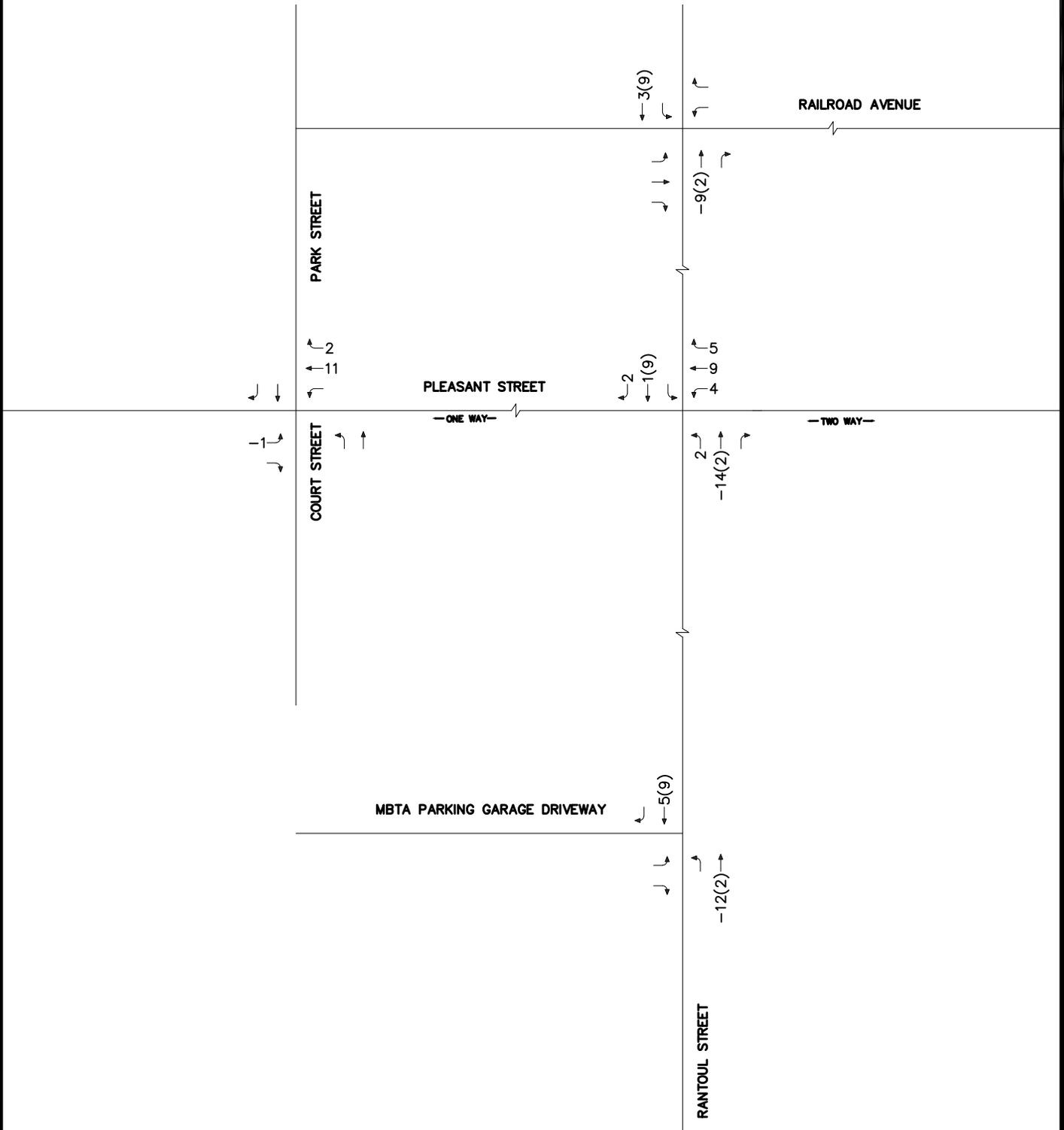
Specific Development by Others



Not to Scale

#112 Rantoul Street Development - Beverly, Massachusetts

Traffic Impact, Access, and Parking Study



XX(XX) = 131 Rantoul(480 Rantoul)

Figure F-1

Specific Development by Others
Weekday Morning
Peak Hour Traffic Volumes

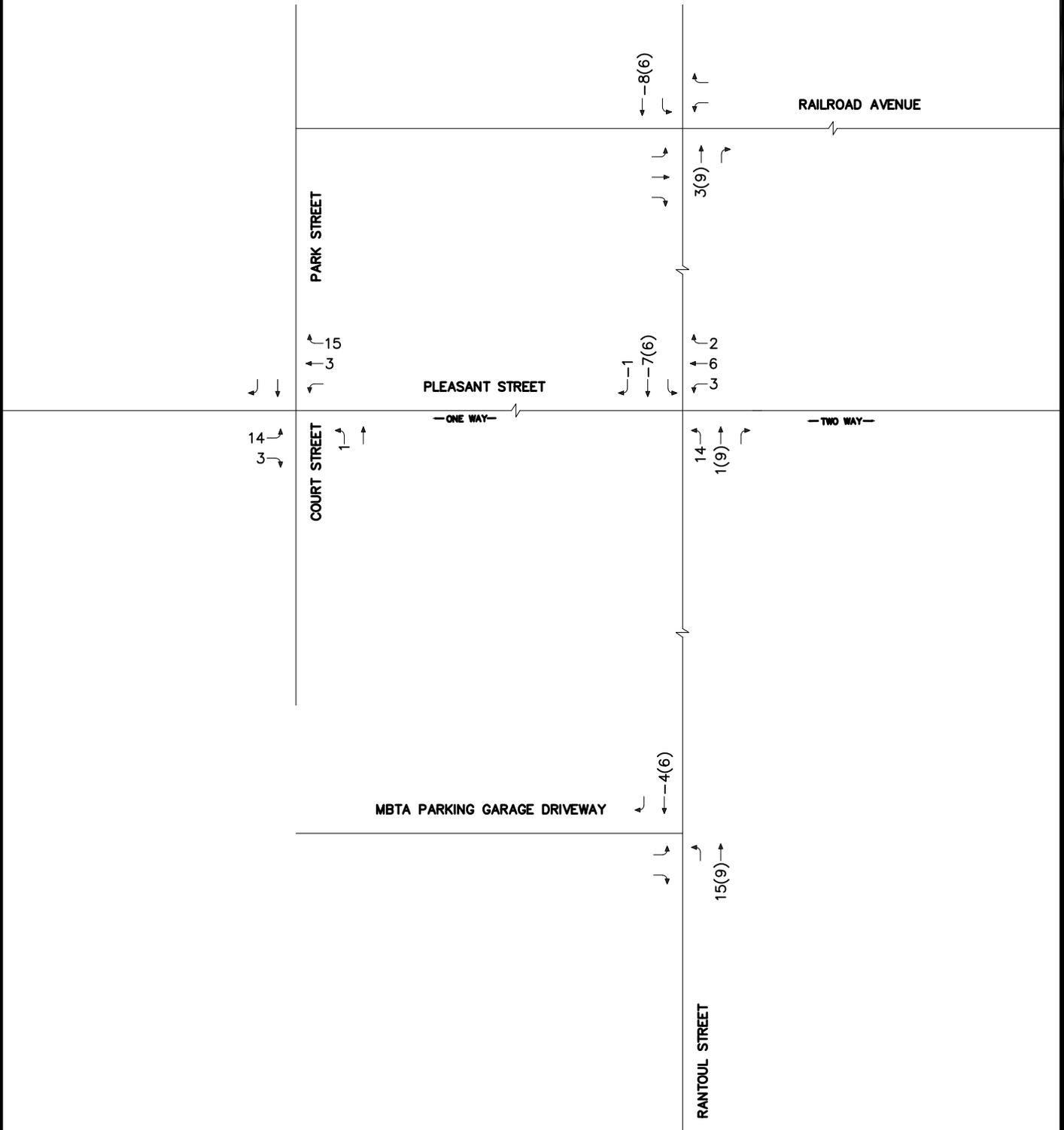




Not to Scale

#112 Rantoul Street Development - Beverly, Massachusetts

Traffic Impact, Access, and Parking Study



XX(XX) = 131 Rantoul(480 Rantoul)

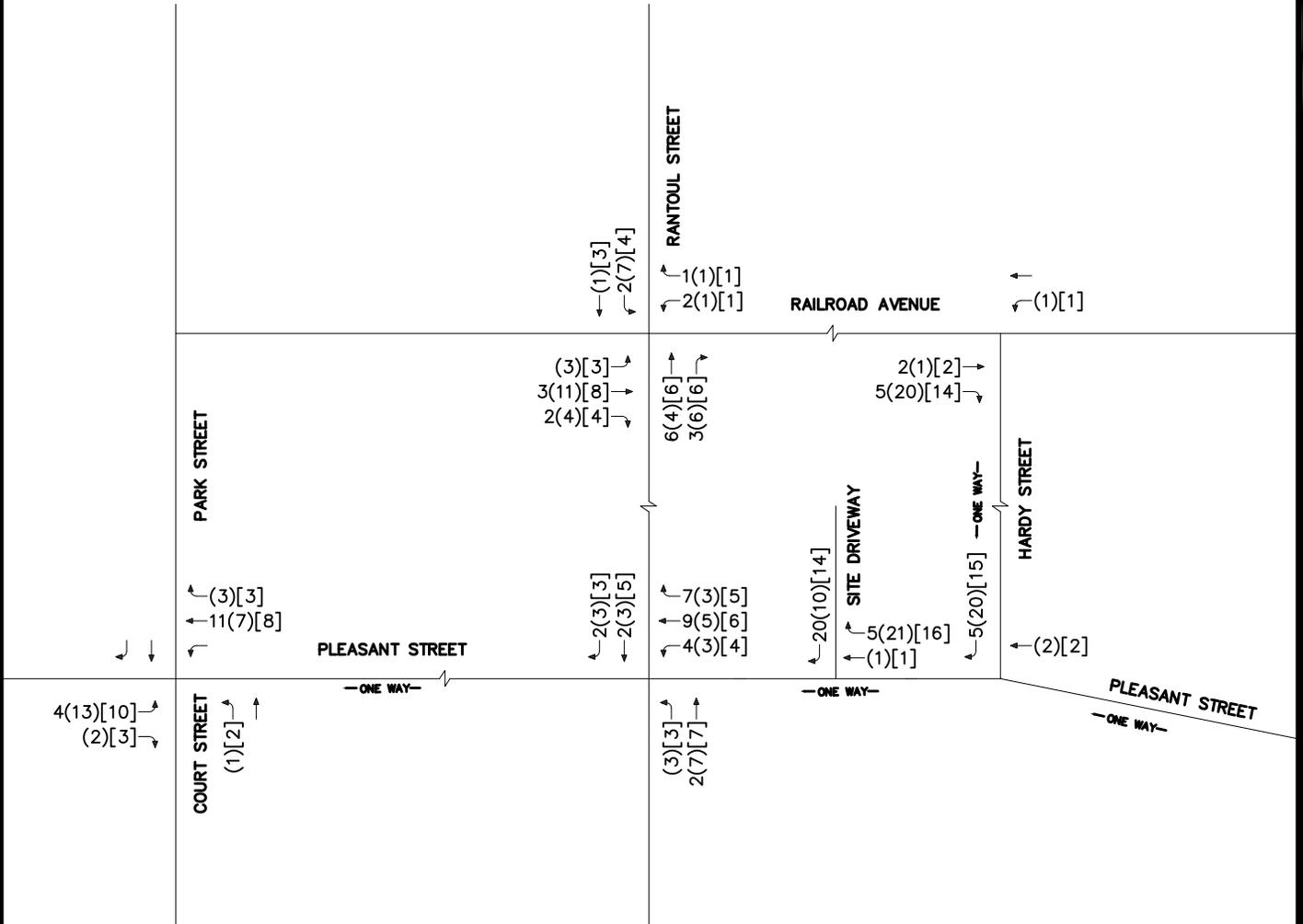
Figure F-2

Specific Development by Others
Weekday Evening
Peak Hour Traffic Volumes





Not to Scale



NOTE:
 RESTAURANT AND RETAIL PRIMARY AND
 PASS-BY TRIPS DIRECTED TO LOCATIONS OF
 AVAILABLE ON-STREET AND STRUCTURED
 PARKING IN THE VICINITY AND MAY NOT APPEAR
 WITHIN SHOWN TRAFFIC NETWORK.

XX(XX)[XX] = WEEKDAY MORNING PEAK HOUR(WEEKDAY EVENING PEAK HOUR)[SATURDAY MIDDAY PEAK HOUR]

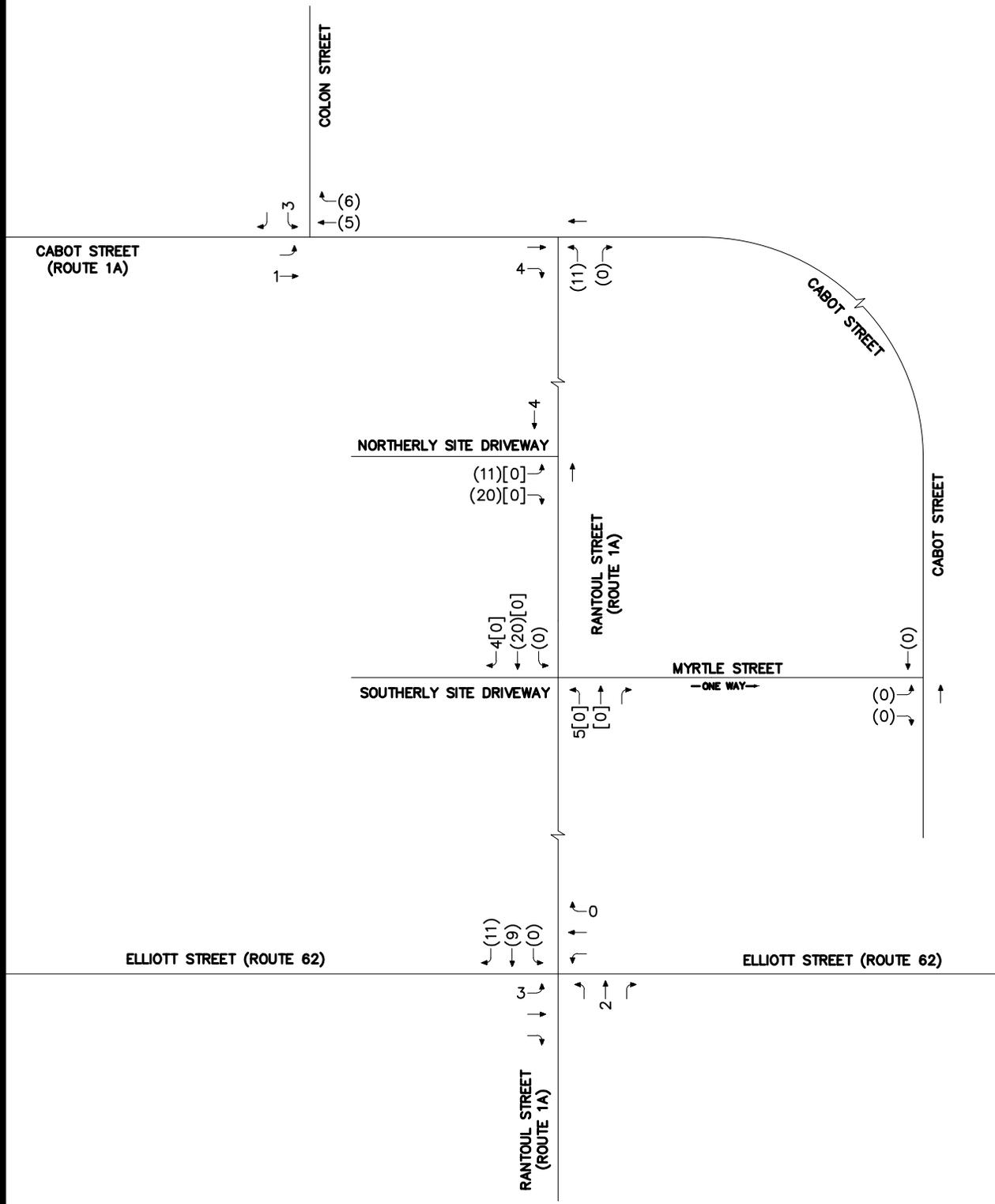
Figure F-3

**Net Site Generated Trip Assignment
 Weekday Morning,
 Weekday Evening, and
 Saturday Midday
 Peak Hour Traffic Volumes**





Not to Scale



XX(XX)[XX] = ENTERING(EXITING)[PASS-BY]

Figure F-4

Site Generated Trip Distribution
Weekday Morning
Peak Hour Traffic Volumes

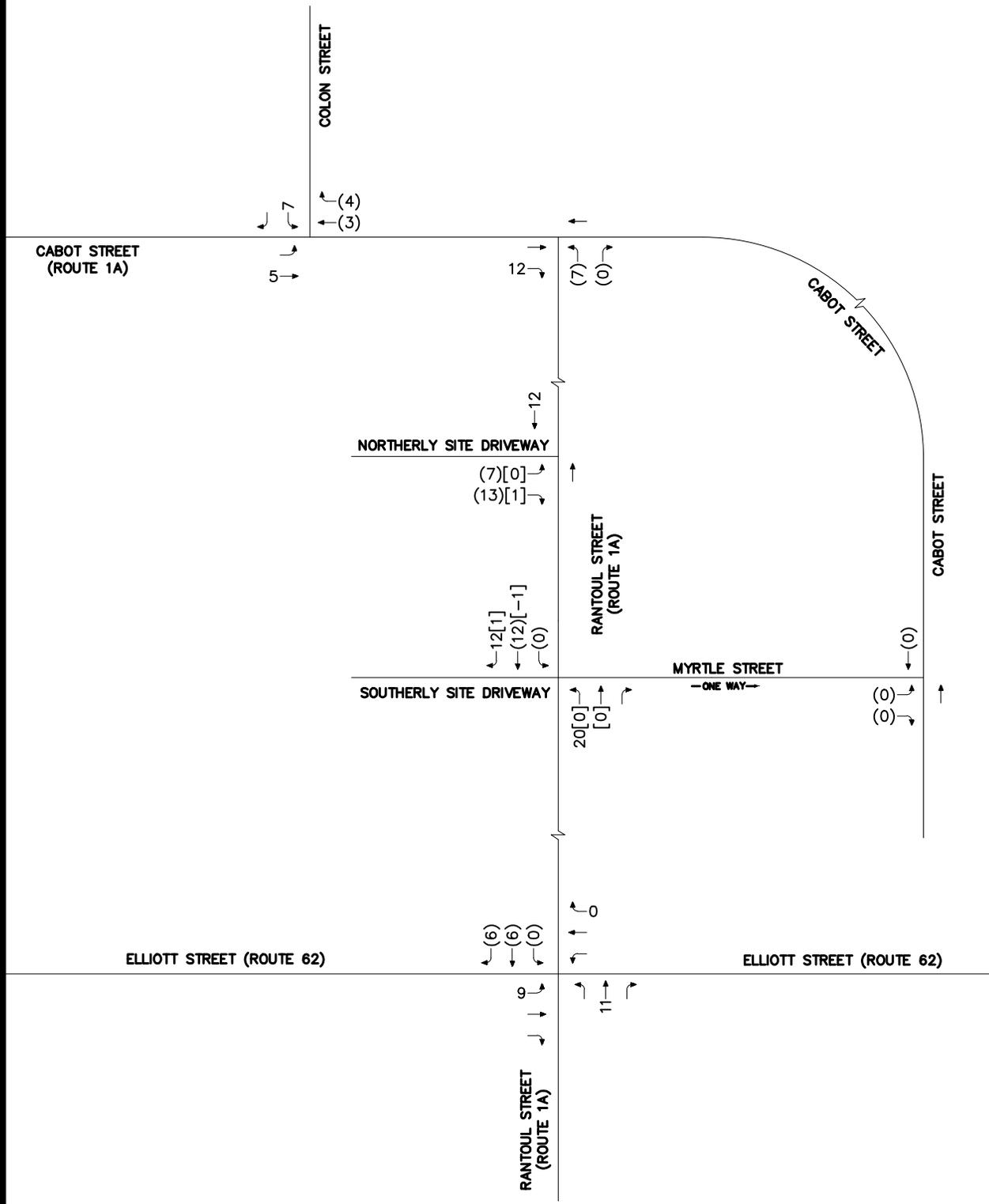


TEC, Inc.
 65 Glenn Street | 169 Ocean Blvd, Unit 101
 Lawrence, MA 01843 | Hampton, NH 03842
 (978) 794.1792 | (603) 601.8154
 www.TheEngineeringCorp.com

T:\T063\CAD\Highway\Graphics\T063_Traffic Networks.dwg 3/24/2016 2:46:50 PM



Not to Scale



XX(XX)[XX] = ENTERING(EXITING)[PASS-BY]

Figure F-5

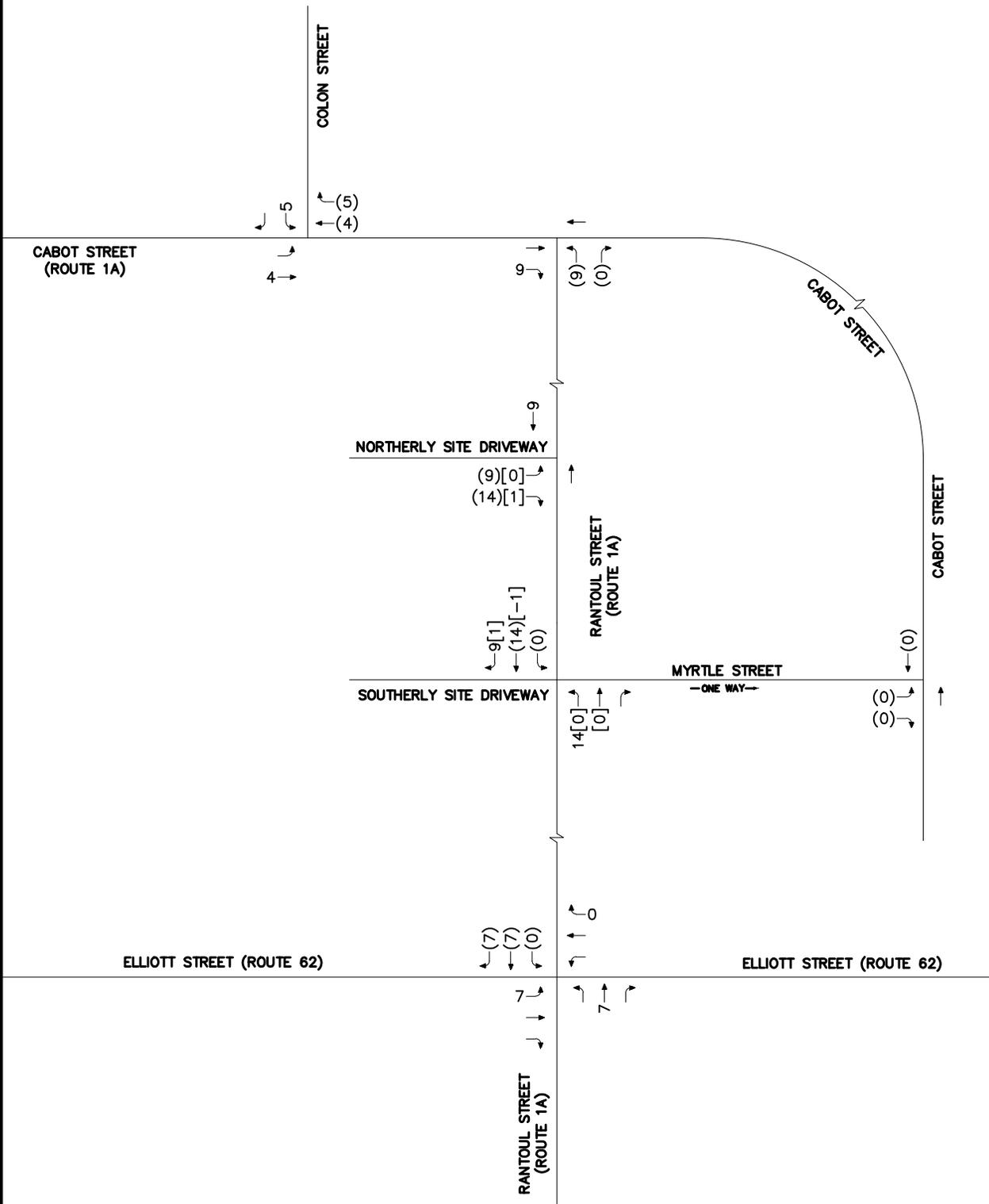
Site Generated Trip Distribution
Weekday Evening
Peak Hour Traffic Volumes



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Not to Scale



XX(XX)[XX] = ENTERING(EXITING)[PASS-BY]

Figure F-6

Site Generated Trip Distribution
Saturday Midday
Peak Hour Traffic Volumes



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Attachment G

Site Generated Trip Calculations

Trip Generation Assessment - MBTA Site Development

Project: MBTA Development - Beverly, MA
 Date: September 1, 2016
 Analyst: TEC, Inc. / Eindra (Elena) Aung, E.I.T.
 Source: Institute of Transportation Engineers - Trip Generation - 9th Ed.

Proposed Development

70 Unit Apartment (ITE LUC 220)

Units:	70 Units		Total Trips		% Distribution		# New Trips		Multi-Use Trips		Transit Trips		Total New Pass-by Trips		Total New Primary Trips		# Passby Trips		# Primary Trips		
	Avg. Rates	Fitted Curve	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	
Weekday Daily	466		50%	50%	233	233	113	99	58	58	0	0	138	0	0	62	76	0	0	62	76
Weekday AM PH	36		20%	80%	7	29	2	7	2	7	0	0	18	0	0	3	15	0	0	3	15
Weekday PM PH	43		65%	35%	28	15	6	5	7	4	0	0	21	0	0	15	6	0	0	15	6
Saturday Daily	448		50%	50%	224	224	104	92	56	56	0	0	140	0	0	64	76	0	0	64	76
Sat Midday PH	36		50%	50%	18	18	8	6	5	5	0	0	12	0	0	5	7	0	0	5	7

Assumed 25% transit credit

3,000 SF Specialty Retail Center (ITE LUC 826)

Units:	3 KSF		Total Trips		% Distribution		# New Trips		Multi-Use Trips		Transit Trips		Total New Pass-by Trips		Total New Primary Trips		# Passby Trips		# Primary Trips		
	Avg. Rates	Fitted Curve	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	
Weekday Daily	132		50%	50%	66	66	24	27	3	3	0	0	55	10	10	29	26	0	0	29	26
Weekday AM PH	2		62%	38%	1	1	0	0	0	0	0	0	2	0	0	1	1	0	0	1	1
Weekday PM PH	8		44%	56%	4	4	1	1	0	0	0	0	4	1	1	2	2	0	0	2	2
Saturday Daily	126		50%	50%	63	63	24	26	3	3	0	0	52	9	9	27	25	0	0	27	25
Sat Midday PH	12		52%	48%	6	6	2	2	0	0	0	0	6	1	1	3	3	0	0	3	3

Interpolated Weekday AM PH from Weekday AM PH LUC 820 - Shopping Center

Assumed 34% pass-by rate for weekday PM and 26% pass-by rate for all others (LUC 820 - Shopping Center - Trip Generation Handbook, 2nd Edition).

Assumed 5% transit credit

1,500 SF Coffee / Donut Shop without Drive-Through Window (ITE LUC 936)

Units:	1.5 KSF		Total Trips		% Distribution		# New Trips		Multi-Use Trips		Transit Trips		Total New Pass-by Trips		Total New Primary Trips		# Passby Trips		# Primary Trips		
	Avg. Rates	Fitted Curve	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	
Weekday Daily	1228		50%	50%	614	614	75	86	154	154	0	0	433	163	163	222	211	0	0	222	211
Weekday AM PH	162		51%	49%	83	79	7	2	21	20	0	0	64	24	24	31	33	0	0	31	33
Weekday PM PH	62		50%	50%	31	31	4	5	8	8	0	0	21	8	8	11	10	0	0	11	10
Saturday Daily	1084		50%	50%	542	542	68	78	136	136	0	0	380	143	143	195	185	0	0	195	185
Sat Midday PH	98		48%	52%	47	51	4	6	12	13	0	0	35	14	14	17	18	0	0	17	18

Assumed 43% passby rate (Trip Generation Handbook, 3rd Edition).

Assumed 25% transit credit

TOTAL PROPOSED USES

Units:	70 Units		Total Trips		% Distribution		# New Trips		Multi-Use Trips		Transit Trips		Total New Pass-by Trips		Total New Primary Trips		# Passby Trips		# Primary Trips		
	Avg. Rates	Fitted Curve	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	
Weekday Daily	1826		50%	50%	913	913	212	212	215	215	0	0	626	173	173	313	313	0	0	313	313
Weekday AM PH	200		62%	38%	91	109	9	9	23	27	0	0	84	24	24	35	49	0	0	35	49
Weekday PM PH	113		50%	50%	63	50	11	11	15	12	0	0	46	9	9	28	18	0	0	28	18
Saturday Daily	1658		50%	50%	829	829	196	196	195	195	0	0	572	152	152	286	286	0	0	286	286
Sat Midday PH	146		48%	52%	71	75	14	14	17	18	0	0	53	15	15	25	28	0	0	25	28

Site Generated Trip Assessment - Proposed

Project: MBTA Development - Beverly, MA
Date: September 1, 2016
Analyst: TEC, Inc. / Eindra (Elena) Aung, E.I.T.
Source: Institute of Transportation Engineers - Trip Generation - 9th Ed.

ITE Land Use Code (LUC) 220 - Apartment

Average Vehicle Trips vs: Dwelling Units
Independent Variable (X): 70

AVERAGE WEEKDAY DAILY

$T = 6.65 * (X)$
 $T = 6.65 * 70$
 $T = \boxed{466}$ vehicle trips
with 50% (233 vpd) entering and 50% (233 vpd) exiting.

WEEKDAY MORNING PEAK HOUR OF ADJACENT STREET TRAFFIC

$T = 0.51 * (X)$
 $T = 0.51 * 70$
 $T = \boxed{36}$ vehicle trips
with 20% (7 vph) entering and 80% (29 vph) exiting.

WEEKDAY EVENING PEAK HOUR OF ADJACENT STREET TRAFFIC

$T = 0.62 * (X)$
 $T = 0.62 * 70$
 $T = \boxed{43}$ vehicle trips
with 65% (28 vph) entering and 35% (15 vph) exiting.

SATURDAY DAILY

$T = 6.39 * (X)$
 $T = 6.39 * 70$
 $T = \boxed{448}$ vehicle trips
with 50% (224 vpd) entering and 50% (224 vpd) exiting.

SATURDAY MIDDAY PEAK HOUR OF GENERATOR

$T = 0.52 * (X)$
 $T = 0.41 * 70$
 $T = \boxed{36}$ vehicle trips
with 50% (18 vph) entering and 50% (18 vph) exiting.

Site Generated Trip Assessment - Proposed

Project: MBTA Development - Beverly, MA
Date: September 1, 2016
Analyst: TEC, Inc. / Eindra (Elena) Aung, E.I.T.
Source: Institute of Transportation Engineers - Trip Generation - 9th Ed.

ITE Land Use Code (LUC) 826 - Specialty Retail Center

Average Vehicle Trips vs: 1,000 Sq. Feet Gross Leasable Area
Independent Variable (X): 3.0 ksf

AVERAGE WEEKDAY DAILY

$$T = 44.32 * (X)$$

$$T = 44.32 * 3.0$$

$$T = \boxed{132} \text{ vehicle trips}$$

with 50% (66 vpd) entering and 50% (66 vpd) exiting.

WEEKDAY MORNING PEAK HOUR OF ADJACENT STREET TRAFFIC

$$\frac{\text{ITE LUC 820 Weekday Morning Trip Rate}}{\text{ITE LUC 820 Weekday Evening Trip Rate}} = \frac{\text{ITE LUC 814 Weekday Morning Trip Rate}}{\text{ITE LUC 814 Weekday Evening Trip Rate}}$$

$$\frac{0.96}{3.71} = \frac{(Y)}{2.71} \quad Y = 0.7012399$$

$$T = Y * 3.0$$

$$T = \boxed{2} \text{ vehicle trips}$$

with 62% (1 vph) entering and 38% (1 vph) exiting.

(same distribution split as ITE LUC 820 during the weekday morning peak hour of adjacent street traffic)

WEEKDAY EVENING PEAK HOUR OF ADJACENT STREET TRAFFIC

$$T = 2.71 * (X)$$

$$T = 2.71 * 3.0$$

$$T = \boxed{8} \text{ vehicle trips}$$

with 44% (4 vph) entering and 56% (4 vph) exiting.

SATURDAY DAILY

$$T = 42.04 * (X)$$

$$T = 42.04 * 3.0$$

$$T = \boxed{126} \text{ vehicle trips}$$

with 50% (63 vpd) entering and 50% (63 vpd) exiting.

SATURDAY MIDDAY PEAK HOUR

$$\frac{\text{ITE LUC 820 Saturday Midday Trip Rate}}{\text{ITE LUC 820 Saturday Daily Trip Rate}} = \frac{\text{ITE LUC 814 Saturday Midday Trip Rate}}{\text{ITE LUC 814 Saturday Daily Trip Rate}}$$

$$\frac{4.82}{49.97} = \frac{(Y)}{42.04} \quad Y = 4.0550891$$

$$T = Y * 3.0$$

$$T = \boxed{12} \text{ vehicle trips}$$

with 52% (6 vph) entering and 48% (6 vph) exiting.

(same distribution split as ITE LUC 820 during the Saturday midday peak hour of generator)

Site Generated Trip Assessment - Proposed

Project: MBTA Development - Beverly, MA
Date: September 1, 2016
Analyst: TEC, Inc. / Eindra (Elena) Aung, E.I.T.
Source: Institute of Transportation Engineers - Trip Generation - 9th Ed.

Institute of Transportation Engineers (ITE)

ITE Land Use Code (LUC) 936 - Coffee / Donut Shop without Drive-Through Window

Average Vehicle Trips Ends vs: 1,000 Sq. Feet Gross Floor Area
Independent Variable (X): 1.50 ksf

AVERAGE WEEKDAY DAILY *

$$T = 818.58 * X$$
$$T = 818.58 * 1.50$$
$$T = \boxed{1,228} \text{ vehicle trips}$$

with 50% (614 vpd) entering and 50% (614 vpd) exiting.

WEEKDAY MORNING PEAK HOUR OF ADJACENT STREET TRAFFIC

$$T = 108.38 * X$$
$$T = 108.38 * 1.50$$
$$T = \boxed{162} \text{ vehicle trips}$$

with 51% (83 vpd) entering and 49% (79 vpd) exiting.

WEEKDAY EVENING PEAK HOUR OF ADJACENT STREET TRAFFIC

$$T = 40.75 * X$$
$$T = 40.75 * 1.50$$
$$T = \boxed{62} \text{ vehicle trips}$$

with 50% (31 vpd) entering and 50% (31 vpd) exiting.

SATURDAY DAILY **

$$T = 722.03 * X$$
$$T = 722.03 * 1.50$$
$$T = \boxed{1,084} \text{ vehicle trips}$$

with 50% (542 vpd) entering and 50% (542 vpd) exiting.

SATURDAY MIDDAY PEAK HOUR OF GENERATOR

$$T = 65.96 * X$$
$$T = 65.96 * 1.50$$
$$T = \boxed{98} \text{ vehicle trips}$$

with 48% (47 vpd) entering and 52% (51 vpd) exiting.

* Data obtained from LUC 937 - Coffee / Donut Shop with Drive-Through Window

** Data obtained from LUC 934 - Fast-Food Restaurant with Drive-Through Window

Assumed pass-by rate of 43% obtained from LUC 932 - High Turnover (Sit-Down) Restaurant

Land Use Description	Land Use	A	B	C	D
	Land Use Name	Retail	Residential	Restaurant	
	Land Use Type	Retail	Residential	Retail	None
	ITE LUC	826	220	936	
	Size	4500	70	1500	
New Trips	<i>Weekday Daily</i>				
	Enter	66	233	614	
	Exit	66	233	614	
	<i>Weekday AM</i>				
	Enter	1	7	83	
	Exit	1	29	79	
	<i>Weekday PM</i>				
	Enter	4	28	31	
	Exit	4	15	31	
	<i>Saturday Daily</i>				
	Enter	63	224	542	
	Exit	63	224	542	
	<i>Saturday Midday</i>				
	Enter	6	18	47	
Exit	6	18	51		

Project Name: MBTA Site Development

Analyst: EA

Date: 9/7/2016

KEY: Entry Cells

INSTRUCTIONS:

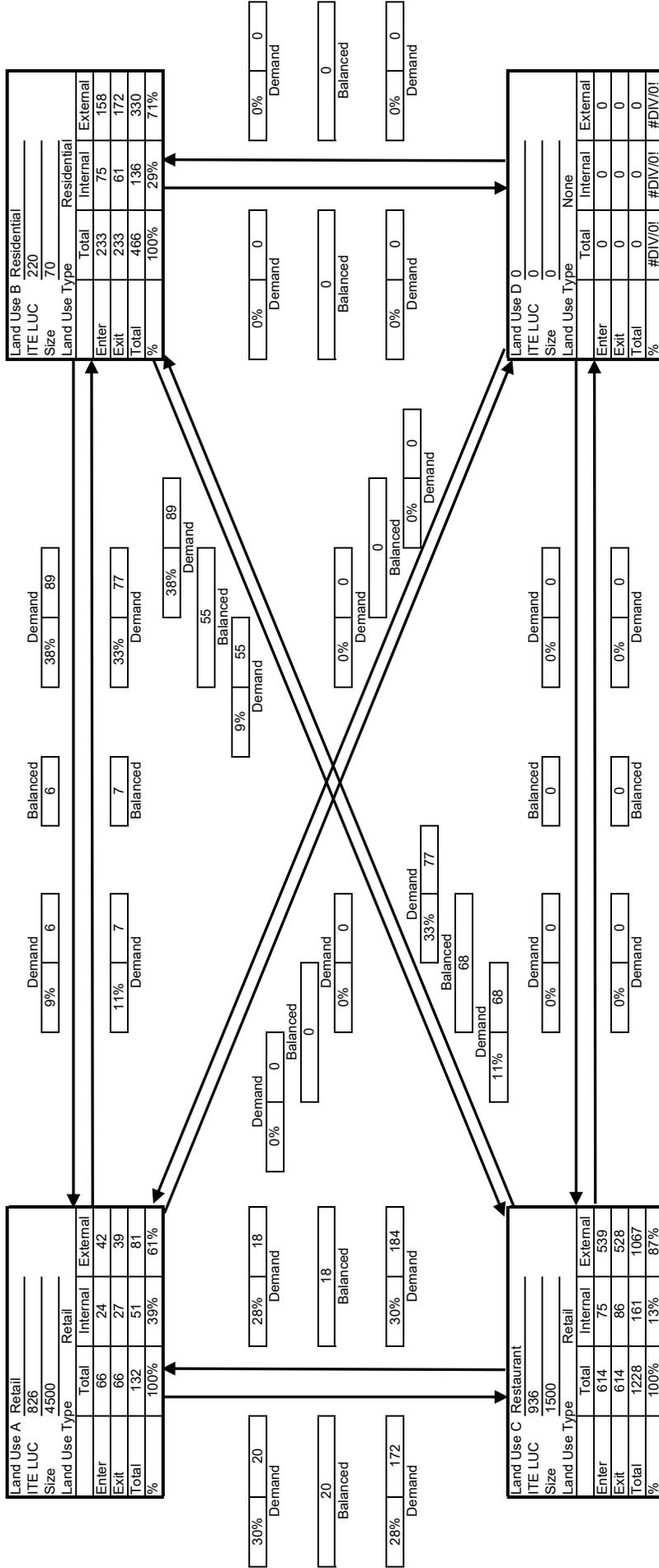
- 1.) Enter the Land Use Name for each land use in table above.
- 2.) Select from the drop down menu in the table above which Land Use Type to use.
- 3.) Enter the ITE LUC for each land use in the table above.
- 4.) Enter the Size of each land use in the table above.
- 5.) Fill in the NEW TRIPS for each land use in the table above (Note: This is the total of primary and pass-by trips).
- 6.) Enter the Project Name above.
- 7.) Enter you initials for the Analyst above.
- 8.) Enter the Date above.
- 9.)

Print the Multi-Use Trip Generation Calculation Sheet for each time period.

Multi-Use Trip Generation Calculation

Analyst: EA
Date: 9/7/2016

Project Name: MBTA Site Development
Time Period: Weekday Daily

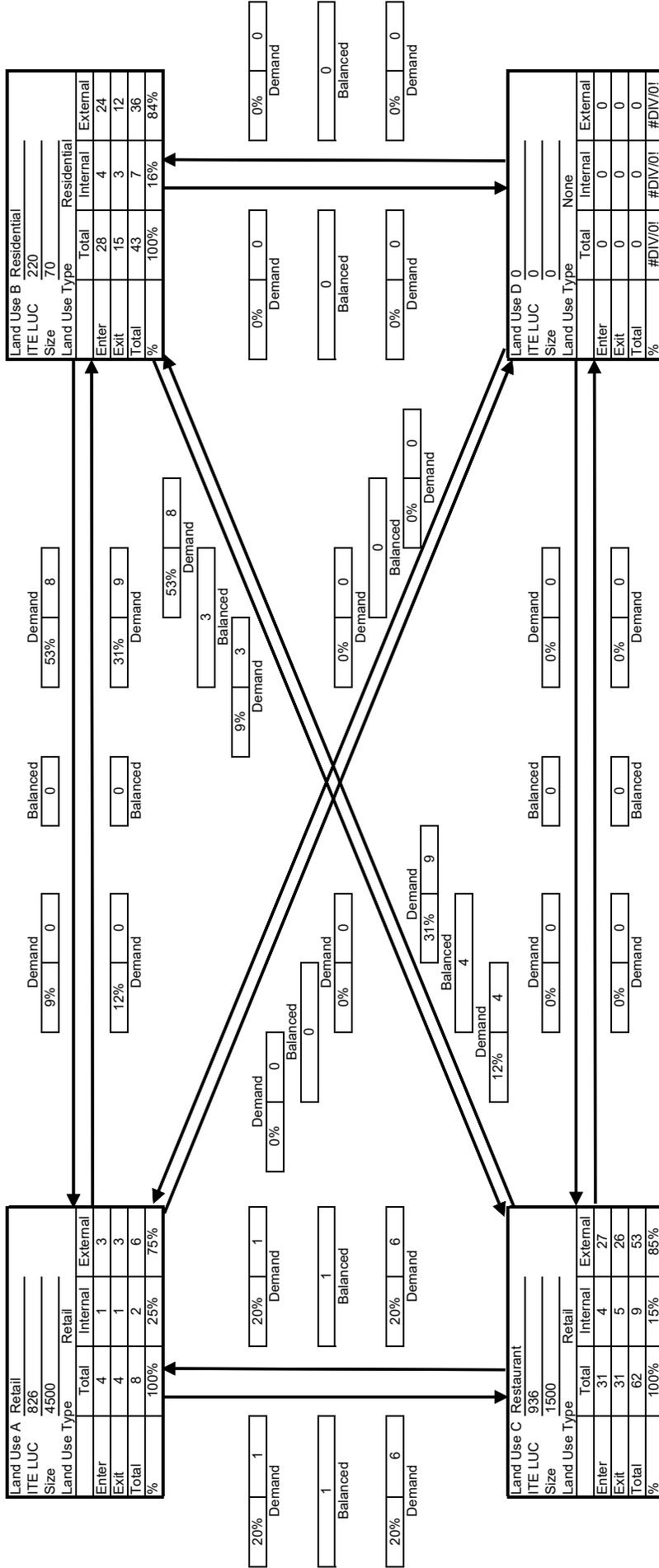


Net External Trips for Multi-Use Development					
Land Use	A	B	C	D	Total
Enter	42	158	539	0	739
Exit	39	172	528	0	739
Total External Trips	81	330	1067	0	1478
Single-Use Trip Gen. Est.	132	466	1228	0	1826
Net Internal Trips	51	136	161	0	348
					19%

Multi-Use Trip Generation Calculation

Analyst: EA
Date: 9/7/2016

Project Name: MBTA Site Development
Time Period: Weekday PM Peak Hour



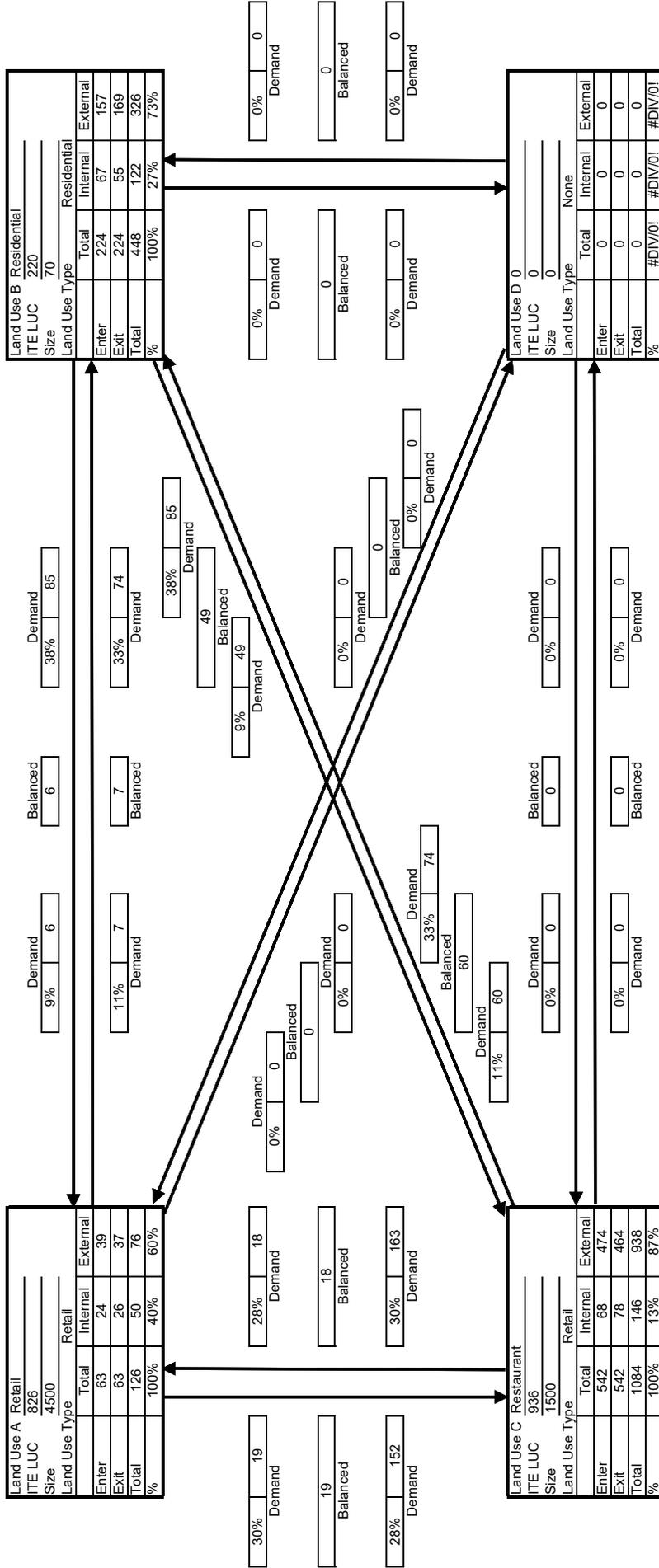
Net External Trips for Multi-Use Development					
Land Use	A	B	C	D	Total
Enter	3	24	27	0	54
Exit	3	12	26	0	41
Total External Trips	6	36	53	0	95
Single-Use Trip Gen. Est.	8	43	62	0	113
Net Internal Trips	2	7	9	0	18
					Internal Capture 16%



Multi-Use Trip Generation Calculation

Analyst: EA
Date: 9/7/2016

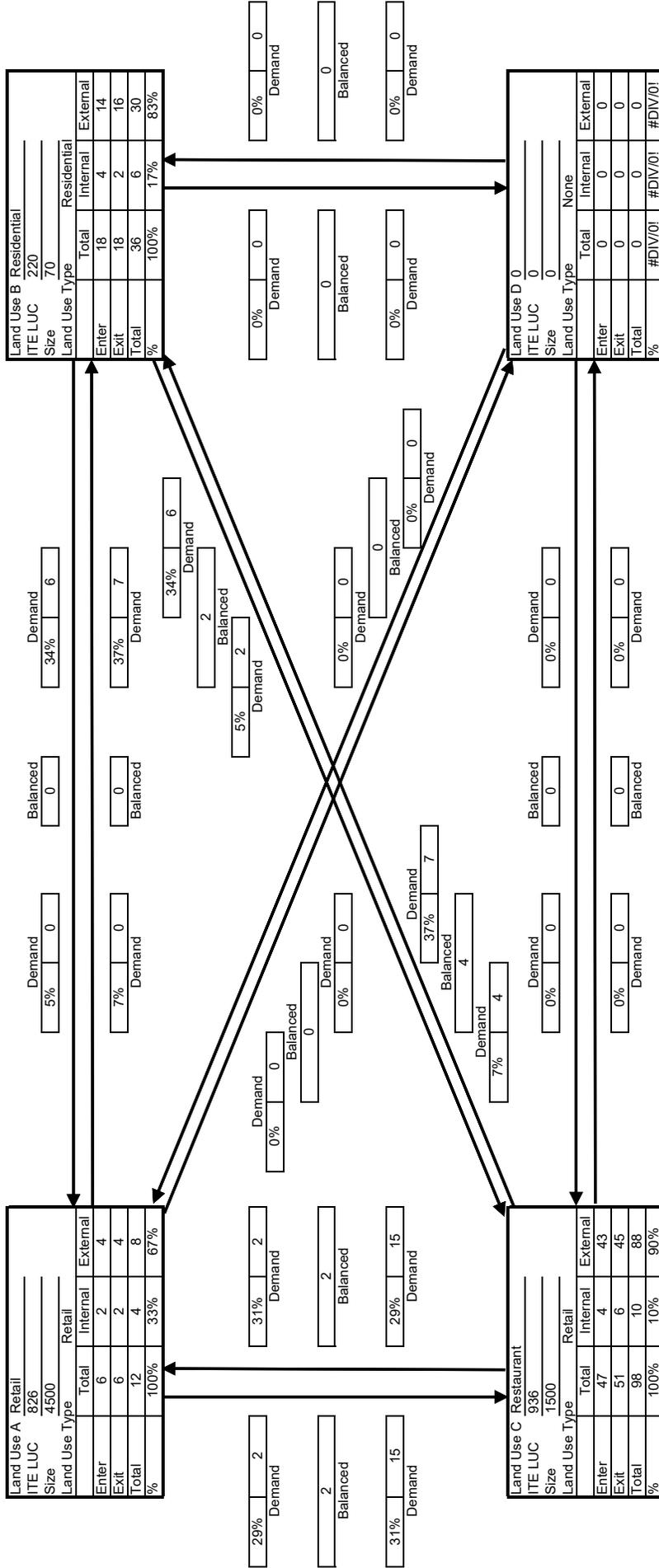
Project Name: MBTA Site Development
Time Period: Saturday Daily



Multi-Use Trip Generation Calculation

Analyst: EA
 Date: 9/7/2016

Project Name: MBTA Site Development
 Time Period: Saturday Midday



Net External Trips for Multi-Use Development					
Land Use	A	B	C	D	Total
Enter	4	14	43	0	61
Exit	4	16	45	0	65
Total External Trips	8	30	88	0	126
Single-Use Trip Gen. Est.	12	36	98	0	146
Net Internal Trips	4	6	10	0	20
					14% Internal Capture

Assembly Square Mode Share Memo



Memorandum

To: Pat Dunford
Ana Fill

Date: September 8, 2006

Project No.: 08518.03

From: Susan Sloan-Rossiter
Luis Mejias
David Black

Re: Assembly Square Transit Mode Share

This memorandum summarizes the research conducted by VHB to estimate the transit mode share for the Assembly Square Transit-Oriented Development. The information gathered includes empirical data from the U.S. 2000 Census Transportation Planning Package, research on transit-oriented development, and mode share information for comparable large projects. The accumulated data was used to develop estimated public transit mode share for the Assembly Square site, both before and after a new Orange Line Station is constructed.

U.S. Census 2000 Data

2000 Census transit mode shares (bus and rail) were analyzed for home-based and work-based trips for a range of metropolitan Boston locations including Wellington, Alewife, the City of Medford, Kendall Square and Lechmere, as well as Assembly Square itself. Existing mode shares for Assembly Square were documented, and review of the other locations was performed as a basis for what may be expected at the new Assembly Square development.

Home-based Trips

Home-based mode shares for the selected Census areas are presented in Table 1 below.

Table 1
Summary of Home-Based Mode Shares for Selected Areas in Metropolitan Boston

	Drove Alone	Carpool	Transit	Walk/Bike	Other/Home
Assembly Sq ¹	47.6%	21.3%	21.9%	6.5%	2.7%
Wellington ²	66.3%	9.6%	18.9%	3.3%	1.9%
Alewife Station ³	31.5%	6.9%	46.5%	11.2%	4.0%
City of Medford	63.5%	9.0%	9.7%	16.1%	1.7%
Kendall Square ⁴	4.1%	1.4%	11.2%	74.8%	8.5%
Lechmere ⁵	28.4%	4.8%	31.3%	29.5%	6.0%

1 - Census tract 3501
2 - Census tract 3398
3 - Census tract 3549
4 - Census tract 3524, 3531
5 - Census tract 3521

Source:
US Census 2000

Home-based transit mode shares range from approximately 10% for the City of Medford to 47% for the area surrounding the Alewife Red Line station. The existing transit mode share for the Census tract containing Assembly Square is 22% for home-based trips. Nearby, the Wellington Station area has a transit mode share for home-based trips of 19%. The Kendall Square area has an 11% transit share for home-based trips, but is complimented by a 75% walk/bike share and.

There are several location and service-related factors to consider when evaluating the Census data mode shares. Key observations include the following:

- The Assembly Square Census tract includes the neighborhood to the south, across I-93, which is relatively close to the Sullivan Square Orange Line station, and is served by buses.
- Transit and walk/bike mode shares combined make up 85% of home-based trips at Kendall Square and 61% of trips at Lechmere, but just 22% at Wellington at Alewife.
- Kendall home-based walk mode share is relatively high (75%), likely reflecting the fact that many residents in the immediate area are college students.
- Alewife is about a 22 minute ride to Downtown Crossing, while Sullivan Square is about an 8 minute ride to Downtown Crossing, yet Alewife experiences a higher home-based transit mode share. The higher transit mode share at Alewife may reflect the fact that direct bus service is also available to Harvard Square, and that there is convenient transfer between Red Line and Commuter Rail at Porter Square. Also, the pedestrian connections to Sullivan Square are poor.
- The Alewife example indicates how access to a rapid transit station as well as bus services can influence transit ridership by residents in the area. It should also be noted that there are a number of high-density apartment towers located in that Census tract.
- Walk/bike mode share for the Assembly Square Census tract is 7% for home-based trips.

Work-based Trips

Work-based mode shares for the selected Census areas are presented in Table 2, below, representing trips to work places in the Census area.

Table 2
Summary of Work-Based Mode Shares for Selected Areas in Metropolitan Boston

	Drive Alone	Carpool	Transit	Walk/Bike	Other/Home
Assembly Sq ¹	55.6%	16.2%	13.0%	8.1%	7.1%
Wellington ²	65.6%	10.8%	14.3%	6.8%	2.5%
Alewife Station ³	63.9%	9.5%	17.9%	7.8%	0.9%
City of Medford	67.8%	8.3%	9.8%	10.3%	3.8%
Kendall Square ⁴	41.9%	7.4%	26.9%	21.9%	1.9%
Lechmere ⁵	43.9%	10.4%	31.7%	11.4%	2.6%

1 - Census tract 3501

2 - Census tract 3398

3 - Census tract 3549

4 - Census tract 3524, 3531

5 - Census tract 3521

Source:
 US Census 2000

Work-based transit mode shares range from approximately 10% for Medford to 32% for the Census tract containing Lechmere station, on the Green Line. The existing work-based transit mode share for the Census tract (3501) containing Assembly Square is 13%. Wellington Station has a transit mode share of 14% for work-based trips, while Alewife Station experiences an 18% transit share. Finally, the Kendall Station area has a 27% transit share for work-trips.

Again, there are several location and service-related factors to consider when evaluating the Census data mode shares for work-based trips. Key observations include the following:

- There is a relatively low work-based transit mode share at Assembly Square, reflecting the ample parking available for workers, including Assembly Square Mall and other employment in the area.
- In other locations, where parking is heavily restricted and priced, but where transit accessibility is high, transit mode shares are significantly higher (Lechmere 32% and Kendall Square 27%).
- Locations with good transit accessibility, but less-restricted parking, have much lower transit mode shares for work-based trips (Alewife 18%, Wellington 14%).
- Transit and walk/bike mode shares combined make up 49% of work-based trips at Kendall Square and 43% of trips at Lechmere, but just 21% at Wellington and 26% in the tract containing Alewife Station.
- Transit mode shares for work trips in areas further away from Downtown Boston typically are lower because they draw on employees who live in more outlying areas. This, coupled with Boston's radial transit system, makes transit travel to work comparatively less accessible in outer areas.
- Walk/bike work-based mode share for the Assembly Square tract is 8%.

Conclusions from Census Data for Home- and Work-based Mode Shares

The U.S. Census data clearly provide a reliable basis for existing transit mode shares in the Assembly Square area for home- and work-based trips. In addition, the Census data for other locations provide key insight as to what can be expected for the transit-oriented development at Assembly Square in the future. It should be noted, however, that Census data does not provide direct guidance for retail land use mode shares.

The data suggest that, in the near term, assuming that transit service is maintained at a level equivalent to the existing service in the neighborhood, a 22% transit mode share can be expected for home-based trips. Assuming that ample parking is available for employees, the work-based transit mode share can be expected to be similar to the existing 13% in the area.

With a new Orange Line station on-site, transit mode shares for home-based trips could be expected to increase, at least to over 30% (as at Lechmere) and possibly as high as 47% (as at Alewife) if the project is designed and marketed as being transit-oriented. However, for the work-based transit mode-share, it may be difficult to effectively constrain parking availability, and levels exceeding the 18% experienced at Alewife. A 20% transit mode share might reasonably be achieved, but to accomplish 25% will require implementation of aggressive incentives, such as a parking cash-out scheme for employees, significant transit subsidies, and effective restrictions on parking in the area.

The walk/bike mode share for Assembly Square is unlikely to reach or exceed the existing 7-8%, and indeed could potentially be much lower due to the physical barriers in accessing the site by foot/bike. Potential mitigating measures could include bicycle-friendly measures such as bike lanes, paths and showers/lockers for employees. Well-designed pedestrian crossings to the existing neighborhood could help increase the walk mode share.

Retail Trips

In the absence of specific Census data, existing bus ridership data was collected at Assembly Square, to better understand the potential transit mode share for retail uses, both now and in the future.

MBTA bus routes 90 and 92 directly serve the site, providing service between Wellington Station and Sullivan Station. Route 90 connects Wellington with Sullivan Station and Davis Square in Somerville. Route 92 serves Assembly Square, Sullivan Square, Charlestown and Downtown Boston.

Table 3 presents the existing bus ridership figures collected during the morning, evening and Saturday peak hours, as well as daily data provided by the MBTA. Existing trips by bus were compared to ITE generated peak hour and daily vehicle trips to indicate an order-of-magnitude transit mode share for the existing retail at the Assembly Square Mall.

Table 3
Summary of Bus Ridership at Assembly Square Mall

		<u>Route 90</u>		<u>Route 92</u>	<u>Total</u>	<u>Total</u>	<u>Bus</u>
		<u>Inbound</u>	<u>Outbound</u>	<u>Total</u>	<u>Bus Trips</u>	<u>Trips³</u>	<u>Share</u>
Daily¹	On	2	30	44	76	7,361	1.03%
	Off	17	9	16	42	7,361	0.57%
<u>Weekday Peak²</u>							
AM	On	0	0	*	0	195	0.00%
	Off	1	2	*	3	125	2.40%
PM	On	5	3	*	8	659	1.18%
	Off	6	1	*	7	714	1.01%
<u>Saturday</u>							
Daily¹	On	11	22	70	103	9,779	1.05%
	Off	24	12	70	106	9,779	1.08%
Midday²	On	11	2	7	20	976	2.09%
	Off	2	7	2	11	901	1.27%

* Does not operate during the morning and evening peak hours

1 Source: MBTA

2 Source: Peak hour derived from 2-hour peak period counts conducted by VHB

3 Source: ITE Vehicle Trips estimated for existing Assembly Square Mall by SF.

As can be seen from Table 3, the calculated bus ridership at Assembly Square is very low, reflecting the "big-box" nature of the existing retail. Estimated peak hour bus mode share ranges from about 1% to 2.4% during peak hours and is just over 1% on a daily basis. It should be noted that there may also be a small contribution of Orange Line trips from Sullivan Square that would contribute to the overall transit mode share. In addition, it should be borne in mind that the transit share may vary between customers and employees.

Conclusions Regarding Retail Transit Mode Share

The bus ridership data indicate that the existing transit mode share for retail trips at Assembly Square is relatively low. The data suggest that, in the near term, assuming that transit service is maintained at a level equivalent to existing conditions, a 1% transit mode share can be relied upon for retail trips, possibly approaching 3% if retail employee transit-use incentives are implemented. With a new Orange Line station on-site, transit mode shares for retail could be expected to increase to about 5%, although again retail employee transit use may be higher if appropriate measures such as providing transit passes are implemented by employers.

Comparable Projects

VHB was asked to review transit mode shares for other comparable developments, in particular North Point and the Prudential Centre. Actual measured data for Transit Oriented Development in metropolitan Boston is somewhat limited, although a number of major projects are currently in planning and/or under construction, including North Point and the expansion of the Prudential Center. The former includes transit mode share projections developed in close coordination with the City of Cambridge during the planning phase for North Point, while the latter includes mode share data used in the 2002 PNF for the Boylston Street Mixed Use Project that reflects conditions at the Prudential Center.

Table 4 presents the projections for North Point, where relatively high transit mode shares are expected - 43% for office, 23% for residential and 15% for retail.

Table 4
Projected North Point Mode Shares

	Transit	Walk	Bike	Auto
Office	43%	15%	2%	40%
Residential	23%	20%	5%	52%
Retail	15%	73%	2%	10%

Source: North Point Environmental Impact Report 2002

Parking at North Point will be restricted, thereby constraining auto travel. Additionally, the developer is building a re-located Green Line station on the site. Transit access is also available at Community College (2-10 minute walk) on the Orange Line, and the proponent has committed to shuttle service connecting to the Red Line at Kendall Square. All of these measures encourage a high transit mode share particularly for employees that would need to be replicated at Assembly Square to accomplish similar transit use at that location.

The projected walk and bike shares are also high, reflecting good connectivity to the existing street network of East Cambridge and the Minuteman bike path, as well as the riverfront walk/bike facilities.

Table 5 presents the data for the Prudential Center that were adopted for projecting transit and non-transit trips for the Boylston Street Mixed Use project.

Table 5
Prudential Center - Boylston St Mixed Use Project Center

		Transit	Walk/Bike	Auto
<u>Work</u>	Retail	54%	15%	31%
	Residential	n/a	n/a	n/a
<u>Non-Work</u>	Retail	23%	55%	22%
	Residential	32%	36%	32%

Source: Prudential Center Redevelopment - Boylston Street Mixed Use Project PNF 2002

Office use is not included in the project, but the mode shares for retail was established separately for work and non-work trips, thereby also providing some indication of peak hour office mode shares.

As expected, transit mode shares at the Prudential Center are high - 54% for retail-work trips, 23% for retail non-work trips, and 32% for residential trips. These transit shares are significantly higher than projected for North Point, reflecting the high level of transit service and the constraints on parking supply.

The Prudential Center has a very high walk/bike mode shares for both retail (non-work trips 55%), as well as for residential trips (36%). The high walk/bike share is likely due to the immediate proximity of the dense, well-connected neighborhoods of Back Bay and the South End. While Assembly Square has a significant residential catchment, its level of connectivity is very poor.

Although much further out of the Boston core, a substantial transit oriented development is currently being planned in the vicinity of the Westwood Station development at the Route 128 MBTA Commuter Rail Station. To help establish mode shares, the proponent observed transit use at two other similar transit-oriented locations, one in Canton and one in Salem, suggesting residential transit mode shares in excess of 45%. It is interesting to note that, based on that study¹, residential transit shares of 33% were projected for the Westwood development, while office transit shares were expected to be extremely low. This reflects the fact that, while the study indicated that the majority of the condominium owners were influenced by transit access in their decision to live there, the service limitations of a single CommuterRail station are not expected to support high office transit mode shares.

Finally, other literature research was performed to inform likely transit mode shares for Assembly Square, in particular research carried out by Robert Cervero. Writing about the Pleasant Hill BART station in the East Bay area of the San Francisco Bay Area in *The Transit Metropolis*, Cervero found that residential transit mode share is 46% and that about half of the residents work in downtown San Francisco.

Cervero's research² also determined that the mix and amount of retail/commercial space located near office space can influence office space transit share. He found that for every 20% share of retail/commercial space provided relative to office space, there is a resultant 4.5% increase in office transit mode share. Application of this relationship to the estimated 1.2 million square feet of office and 1.1 million square feet of retail/commercial at Assembly Square, the office transit mode share could be expected to well exceed at least 20% in the future.

Recommendations

Based on the research findings summarized above, VHB has concluded the following in relation to transit mode shares for Assembly square:

- For the early phases of the program (pre-Orange Line station), existing Census data is the most reliable basis for transit mode share for residential and office uses, i.e. 22% and 13%, respectively.
- For retail uses, a nominal 1-2% transit share should be assumed for existing and near-term conditions.
- With a new MBTA station, residential transit shares similar to Alewife (47%) could be expected in the longer term. It is expected that Alewife's office mode share (18%) can reasonably be achieved, but with incentives to discourage driving and promote transit use, transit shares of 20-25% can reasonably be expected.

¹ *Development of Transit Share for Westwood Station*, Oak Square Resources, LLC, March 31, 2006

² Cervero, Robert, *The Transit Metropolis*, Island Press, 1998, pg 77.

- For future retail uses, some improvement beyond existing transit use levels are likely to be accomplished. A minimum 5% transit share seems reasonable, and possibly higher if incentives for employees are implemented.
- For other non-auto modes, it is unlikely that the Census area's existing walk/bike shares (6-8%) can be accomplished for Assembly Square itself in the near-term, and a more conservative 3-4% is appropriate for new development to reflect Assembly Square's current lack of connectivity and its poor environment for non-auto users.
- Bicycle and pedestrian improvements would be essential to exceed these levels in the longer term and accomplish the relatively high 7-8% walk/bike experienced at present in the entire Census area.

Finally, the recommended transit mode shares are summarized in Table 6 below:

Table 6
Recommended Transit Mode Shares for Assembly Square

	Residential	Office	Retail
Existing/Near-Term	22%	13%	1-2%
Future with Orange Line Station	47%	25%	5%

NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM

NCHRP Report 365

**Travel Estimation Techniques
for Urban Planning**

Transportation Research Board
National Research Council

TABLE 37 Average daily auto-occupancy rates by urbanized area population and purpose

Urban Area Size	Trip Purpose					
	HBW	HBSHOP	HBSOC	HBOther	NHB	All
Updated Parameters	<i>office</i>	<i>retil</i>				<i>residential</i>
50,000 to 199,999	1.11	1.44	1.66	1.67	1.66	1.49
200,000 to 499,999	1.12	1.48	1.72	1.65	1.68	1.51
500,000 to 999,999	1.13	1.45	1.66	1.65	1.66	1.48
1,000,000+	1.11	1.48	1.69	1.66	1.64	1.49

Source: NPTS, 1990

Urbanized Area Population	Trip Purpose						
	HBW	HBSHOP	HBSOC	HBOther	HBNW	NHB	All
Parameters From NCHRP 187							
50,000 to 100,000	1.38	1.57	2.31	1.52	1.82	1.43	1.50
100,000 to 250,000	1.37	1.57	2.31	1.52	1.81	1.43	1.50
250,000 to 750,000	1.35	1.57	2.30	1.52	1.77	1.43	1.50
750,000 to 2,000,000	1.33	1.58	2.29	1.51	1.74	1.43	1.51

TABLE 38 Auto-occupancy rate adjustment factors by time of day

	HBW	HBSHOP	HBSOC	HBO	NHB
12:00 Midnight to 5:00 a.m.	—	—	—	—	—
5:00 a.m. to 6:00 a.m.	0.08	-0.30	-0.63	0.09	-0.24
6:00 a.m. to 7:00 a.m.	0.03	-0.23	-0.29	0.11	-0.13
7:00 a.m. to 8:00 a.m.	0.06	0.11	-0.03	0.27	0.19
8:00 a.m. to 9:00 a.m.	0.03	-0.17	-0.03	0.21	-0.02
9:00 a.m. to 10:00 a.m.	-0.07	-0.08	-0.09	-0.30	-0.24
10:00 a.m. to 11:00 a.m.	-0.04	-0.15	-0.01	-0.09	-0.06
11:00 a.m. to 12:00 Noon	-0.11	-0.01	-0.14	-0.15	-0.07
12:00 p.m. to 1:00 p.m.	-0.07	0.00	-0.11	-0.16	-0.12
1:00 p.m. to 2:00 p.m.	0.04	-0.03	0.13	-0.10	-0.18
2:00 p.m. to 3:00 p.m.	0.09	-0.10	0.00	0.22	0.03
3:00 p.m. to 4:00 p.m.	0.07	-0.06	0.09	0.22	0.06
4:00 p.m. to 5:00 p.m.	0.02	0.01	0.07	0.06	-0.05
5:00 p.m. to 6:00 p.m.	-0.04	0.09	0.05	-0.05	-0.08
6:00 p.m. to 7:00 p.m.	-0.01	-0.22	0.03	0.14	0.37
7:00 p.m. to 8:00 p.m.	-0.01	0.34	0.28	0.06	0.41
8:00 p.m. to 9:00 p.m.	0.07	0.25	0.02	0.17	0.31
9:00 p.m. to 10:00 p.m.	-0.07	0.19	-0.18	-0.20	0.17
10:00 p.m. to 11:00 p.m.	-0.10	-0.03	-0.01	-0.16	0.01
11:00 p.m. to 12:00 Midnight	-0.03	0.02	-0.20	-0.22	0.08

Source: NPTS, 1990.

78 AM PM
 1.11 1.17 1.13
 1.87 1.94 1.23
 1.66 1.85 1.66
 AM ↓ PM
 1.11 1.11
 1.78 1.68
 1.61 1.61

Attachment H

Trip Distribution Calculations

**Trip Distribution Gravity Model
Residence Distribution**

Project: T0664 - MBTA Beverly Depot Site Redevelopment - Beverly, Massachusetts
 Date: September 12, 2015
 Analyst: TEC, Inc. / Eindra (Elena) Aung, E.I.T
 Source: United States Census Bureau, 2000

Residence State-County-MCD Name	Workplace State-County-MCD Name	Count	% of Total Beverly Residents who Work	% of Distributed Workforce	Major Route Entering					Major Route Exiting					Major Route Entering				Major Route Exiting			
					Route 1A To/From North	Route 1A To/From South	Pleasant Street [To West]	Railroad Avenue [To East]	Check	Route 1A To/From North	Route 1A To/From South	Pleasant Street [To West]	Railroad Avenue [To East]	Check	Route 1A To/From North	Route 1A To/From South	Pleasant Street [To West]	Railroad Avenue [To East]	Route 1A To/From North	Route 1A To/From South	Pleasant Street [To West]	Railroad Avenue [To East]
Beverly city Essex Co. MA	Beverly city Essex Co. MA	6341	31.1%	38.8%	60%	20%	20%		100%	60%	20%	20%		100%	0.2330	0.0777	0.0777	0.0000	0.2330	0.0777	0.0777	0.0000
Beverly city Essex Co. MA	Boston city Suffolk Co. MA	2229	10.9%	13.7%				100%	100%				100%	100%	0.0000	0.0000	0.1365	0.0000	0.0000	0.0000	0.1365	0.0000
Beverly city Essex Co. MA	Danvers town Essex Co. MA	1871	9.2%	11.5%	25%		75%		100%	25%		75%		100%	0.0287	0.0000	0.0860	0.0000	0.0287	0.0000	0.0860	0.0000
Beverly city Essex Co. MA	Peabody city Essex Co. MA	1282	6.3%	7.9%		50%	50%		100%		50%	50%		100%	0.0000	0.0393	0.0393	0.0000	0.0000	0.0393	0.0393	0.0000
Beverly city Essex Co. MA	Salem city Essex Co. MA	1187	5.8%	7.3%		75%	25%		100%		75%	25%		100%	0.0000	0.0545	0.0182	0.0000	0.0000	0.0545	0.0182	0.0000
Beverly city Essex Co. MA	Lynn city Essex Co. MA	593	2.9%	3.6%		100%			100%		100%			100%	0.0000	0.0363	0.0000	0.0000	0.0000	0.0363	0.0000	0.0000
Beverly city Essex Co. MA	Gloucester city Essex Co. MA	424	2.1%	2.6%	100%				100%	100%				100%	0.0260	0.0000	0.0000	0.0000	0.0260	0.0000	0.0000	0.0000
Beverly city Essex Co. MA	Cambridge city Middlesex Co. MA	368	1.8%	2.3%				100%	100%				100%	100%	0.0000	0.0000	0.0225	0.0000	0.0000	0.0000	0.0225	0.0000
Beverly city Essex Co. MA	Andover town Essex Co. MA	298	1.5%	1.8%			100%		100%			100%		100%	0.0000	0.0000	0.0183	0.0000	0.0000	0.0000	0.0183	0.0000
Beverly city Essex Co. MA	Marblehead town Essex Co. MA	260	1.3%	1.6%		100%			100%		100%			100%	0.0000	0.0159	0.0000	0.0000	0.0000	0.0159	0.0000	0.0000
Beverly city Essex Co. MA	Burlington town Middlesex Co. MA	249	1.2%	1.5%			100%		100%			100%		100%	0.0000	0.0000	0.0153	0.0000	0.0000	0.0000	0.0153	0.0000
Beverly city Essex Co. MA	Ipswich town Essex Co. MA	245	1.2%	1.5%	50%		50%		100%	50%		50%		100%	0.0075	0.0000	0.0075	0.0000	0.0075	0.0000	0.0075	0.0000
Beverly city Essex Co. MA	Woburn city Middlesex Co. MA	239	1.2%	1.5%			100%		100%			100%		100%	0.0000	0.0000	0.0146	0.0000	0.0000	0.0000	0.0146	0.0000
Beverly city Essex Co. MA	Saugus town Essex Co. MA	193	0.9%	1.2%			100%		100%			100%		100%	0.0000	0.0000	0.0118	0.0000	0.0000	0.0000	0.0118	0.0000
Beverly city Essex Co. MA	Topsfield town Essex Co. MA	191	0.9%	1.2%	50%		50%		100%	50%		50%		100%	0.0058	0.0000	0.0058	0.0000	0.0058	0.0000	0.0058	0.0000
Beverly city Essex Co. MA	Haverhill city Essex Co. MA	179	0.9%	1.1%	50%		50%		100%	50%		50%		100%	0.0055	0.0000	0.0055	0.0000	0.0055	0.0000	0.0055	0.0000
Beverly city Essex Co. MA	Wenham town Essex Co. MA	177	0.9%	1.1%	100%				100%	100%				100%	0.0108	0.0000	0.0000	0.0000	0.0108	0.0000	0.0000	0.0000
TOTAL		20409	80.0%	100.0%											31.7%	22.4%	45.9%	0.0%	31.7%	22.4%	45.9%	0.0%
										SAY	30%	25%	45%	0.0%	30%	25%	45%	0.0%	30%	25%	45%	0.0%

**Trip Distribution Gravity Model
Commercial Distribution**

Project: T0664 - MBTA Beverly Depot Site Redevelopment - Beverly, Massachusetts
 Date: September 12, 2015
 Analyst: TEC, Inc. / Eindra (Elena) Aung, E.I.T
 Source: United States Census Bureau, 2010

Residence State-County-MCD Name	Workplace State-County-MCD Name	Count	% of Distributed Population	Major Route Entering					Major Route Exiting					Major Route Entering				Major Route Exiting			
				Route 1A To/From North	Route 1A To/From South	Pleasant Street [To West]	Railroad Avenue [To East]	Check	Route 1A To/From North	Route 1A To/From South	Pleasant Street [To West]	Railroad Avenue [To East]	Check	Route 1A To/From North	Route 1A To/From South	Pleasant Street [To West]	Railroad Avenue [To East]	Route 1A To/From North	Route 1A To/From South	Pleasant Street [To West]	Railroad Avenue [To East]
Beverly city Essex Co. MA	Beverly city Essex Co. MA	39502	18.81%	70%	10%	20%		100%	70%	10%	20%		100%	0.132	0.019	0.038	0.000	0.132	0.019	0.038	0.000
Beverly city Essex Co. MA	Danvers town Essex Co. MA	26493	12.62%	25%		75%		100%	25%		75%		100%	0.032	0.000	0.095	0.000	0.032	0.000	0.095	0.000
Beverly city Essex Co. MA	Hamilton town Essex Co. MA	7764	3.70%	100%				100%	100%				100%	0.037	0.000	0.000	0.000	0.037	0.000	0.000	0.000
Beverly city Essex Co. MA	Manchester-by-the-Sea town Essex Co. MA	5136	2.45%	100%				100%	100%				100%	0.024	0.000	0.000	0.000	0.024	0.000	0.000	0.000
Beverly city Essex Co. MA	Marblehead town Essex Co. MA	19808	9.43%		100%			100%		100%			100%	0.000	0.094	0.000	0.000	0.000	0.094	0.000	0.000
Beverly city Essex Co. MA	Peabody city Essex Co. MA	51251	24.41%		75%	25%		100%		75%	25%		100%	0.000	0.183	0.061	0.000	0.000	0.183	0.061	0.000
Beverly city Essex Co. MA	Salem city Essex Co. MA	41340	19.69%		75%	25%		100%		75%	25%		100%	0.000	0.148	0.049	0.000	0.000	0.148	0.049	0.000
Beverly city Essex Co. MA	Swampscott town Essex Co. MA	13787	6.57%		100%			100%		100%			100%	0.000	0.066	0.000	0.000	0.000	0.066	0.000	0.000
Beverly city Essex Co. MA	Wenham town Essex Co. MA	4875	2.32%	100%				100%	100%				100%	0.023	0.000	0.000	0.000	0.023	0.000	0.000	0.000
TOTAL		209956	100.00%											24.8%	51.0%	24.3%	0.0%	24.8%	51.0%	24.3%	0.0%
													SAY	25%	50%	25%	0.0%	25%	50%	25%	0.0%

Attachment I

Intersection Capacity and Queue Analyses

2016 Existing Conditions

Lanes, Volumes, Timings
 1: Rantoul Street (Route 1A) & MBTA Garage

2016 Existing Conditions
 Weekday Morning

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	4	1	25	566	427	65
Future Volume (vph)	4	1	25	566	427	65
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.977				0.982	
Flt Protected	0.960			0.998		
Satd. Flow (prot)	1782	0	0	1777	1759	0
Flt Permitted	0.960			0.998		
Satd. Flow (perm)	1782	0	0	1777	1759	0
Link Speed (mph)	30			30	30	
Link Distance (ft)	150			500	340	
Travel Time (s)	3.4			11.4	7.7	
Confl. Peds. (#/hr)	34	34	34			34
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87
Heavy Vehicles (%)	0%	0%	0%	7%	7%	0%
Shared Lane Traffic (%)						
Sign Control	Stop			Free	Free	

Intersection Summary

Area Type: Other
 Control Type: Unsignalized

HCM 2010 TWSC
 1: Rantoul Street (Route 1A) & MBTA Garage

2016 Existing Conditions
 Weekday Morning

Intersection

Int Delay, s/veh 0.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	4	1	25	566	427	65
Future Vol, veh/h	4	1	25	566	427	65
Conflicting Peds, #/hr	34	34	34	0	0	34
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	87	87	87	87	87	87
Heavy Vehicles, %	0	0	0	7	7	0
Mvmt Flow	5	1	29	651	491	75

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1304	596	600	0	-	0
Stage 1	562	-	-	-	-	-
Stage 2	742	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	179	507	987	-	-	-
Stage 1	575	-	-	-	-	-
Stage 2	474	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	161	479	959	-	-	-
Mov Cap-2 Maneuver	161	-	-	-	-	-
Stage 1	559	-	-	-	-	-
Stage 2	439	-	-	-	-	-

Approach	EB		NB		SB
HCM Control Delay, s	25		0.4		0
HCM LOS	D				

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	959	-	186	-	-
HCM Lane V/C Ratio	0.03	-	0.031	-	-
HCM Control Delay (s)	8.9	0	25	-	-
HCM Lane LOS	A	A	D	-	-
HCM 95th %tile Q(veh)	0.1	-	0.1	-	-

Lanes, Volumes, Timings
 2: Rantoul Street (Route 1A) & Pleasant Street

2016 Existing Conditions
 Weekday Morning

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	7	25	25	142	428	0	0	419	25
Future Volume (vph)	0	0	0	7	25	25	142	428	0	0	419	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	16	16	16	16	16	16	14	14	14	14	14	14
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt					0.941						0.992	
Flt Protected					0.994			0.988				
Satd. Flow (prot)	0	0	0	0	1813	0	0	1762	0	0	1740	0
Flt Permitted					0.994			0.988				
Satd. Flow (perm)	0	0	0	0	1813	0	0	1762	0	0	1740	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		215			147			340			250	
Travel Time (s)		4.9			3.3			7.7			5.7	
Confl. Peds. (#/hr)	25		29	13		9	29		13	9		25
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	2%	2%	2%	0%	0%	0%	0%	3%	0%	0%	4%	4%
Parking (#/hr)				0	0	0	0	0	0	0	0	0
Shared Lane Traffic (%)												
Sign Control		Stop			Stop			Free			Free	

Intersection Summary

Area Type: Other
 Control Type: Unsignalized

HCM 2010 TWSC
 2: Rantoul Street (Route 1A) & Pleasant Street

2016 Existing Conditions
 Weekday Morning

Intersection												
Int Delay, s/veh	2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↕			↕			↕	
Traffic Vol, veh/h	0	0	0	7	25	25	142	428	0	0	419	25
Future Vol, veh/h	0	0	0	7	25	25	142	428	0	0	419	25
Conflicting Peds, #/hr	25	0	29	13	0	9	29	0	13	9	0	25
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None									
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	-	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	2	2	2	0	0	0	0	3	0	0	4	4
Mvmt Flow	0	0	0	7	26	26	148	446	0	0	436	26

Major/Minor	Minor1			Major1			Major2		
Conflicting Flow All	1204	1234	455	492	0	-	-	-	0
Stage 1	742	742	-	-	-	-	-	-	-
Stage 2	462	492	-	-	-	-	-	-	-
Critical Hdwy	6.4	6.5	6.2	4.1	-	-	-	-	-
Critical Hdwy Stg 1	5.4	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	5.4	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	2.2	-	-	-	-	-
Pot Cap-1 Maneuver	205	178	609	1082	-	0	0	-	-
Stage 1	474	425	-	-	-	0	0	-	-
Stage 2	638	551	-	-	-	0	0	-	-
Platoon blocked, %									
Mov Cap-1 Maneuver	165	0	604	1068	-	-	-	-	-
Mov Cap-2 Maneuver	165	0	-	-	-	-	-	-	-
Stage 1	387	0	-	-	-	-	-	-	-
Stage 2	630	0	-	-	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	16.2	2.2	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBTWBLn1	SBT	SBR
Capacity (veh/h)	1068	-	382	-
HCM Lane V/C Ratio	0.138	-	0.155	-
HCM Control Delay (s)	8.9	0	16.2	-
HCM Lane LOS	A	A	C	-
HCM 95th %tile Q(veh)	0.5	-	0.5	-

Lanes, Volumes, Timings
 3: Court Street/Park Street & Pleasant Street

2016 Existing Conditions
 Weekday Morning

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	130	0	39	1	192	11	7	15	0	0	12	49
Future Volume (vph)	130	0	39	1	192	11	7	15	0	0	12	49
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	16	16	16	16	16	16	16	16	16	16	16	16
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.969			0.993						0.891	
Flt Protected		0.963						0.985				
Satd. Flow (prot)	0	1866	0	0	2138	0	0	2121	0	0	1622	0
Flt Permitted		0.963						0.985				
Satd. Flow (perm)	0	1866	0	0	2138	0	0	2121	0	0	1622	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		285			215			500			200	
Travel Time (s)		6.5			4.9			11.4			4.5	
Confl. Peds. (#/hr)	1		1	1		1	1		1	1		1
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Heavy Vehicles (%)	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	8%
Parking (#/hr)										0	0	0
Shared Lane Traffic (%)												
Sign Control		Free			Stop			Stop			Stop	

Intersection Summary

Area Type: Other
 Control Type: Unsignalized

Lanes, Volumes, Timings
 4: Rantoul Street (Route 1A) & Railroad Avenue

2016 Existing Conditions
 Weekday Morning

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	52	50	71	20	0	36	0	435	14	18	358	0
Future Volume (vph)	52	50	71	20	0	36	0	435	14	18	358	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	16	16	16	13	13	13	14	14	14	14	14	14
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.944			0.913			0.996				
Flt Protected		0.985			0.983						0.998	
Satd. Flow (prot)	0	1685	0	0	1527	0	0	1758	0	0	1781	0
Flt Permitted		0.985			0.983						0.998	
Satd. Flow (perm)	0	1685	0	0	1527	0	0	1758	0	0	1781	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		200			400			250			500	
Travel Time (s)		4.5			9.1			5.7			11.4	
Confl. Peds. (#/hr)	23		10	18		31	10		18	31		23
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	4%	10%	7%	0%	0%	6%	0%	3%	14%	6%	2%	0%
Parking (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Shared Lane Traffic (%)												
Sign Control		Stop			Stop			Free			Free	

Intersection Summary

Area Type: Other
 Control Type: Unsignalized

HCM 2010 TWSC
 4: Rantoul Street (Route 1A) & Railroad Avenue

2016 Existing Conditions
 Weekday Morning

Intersection												
Int Delay, s/veh	6.6											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Traffic Vol, veh/h	52	50	71	20	0	36	0	435	14	18	358	0
Future Vol, veh/h	52	50	71	20	0	36	0	435	14	18	358	0
Conflicting Peds, #/hr	23	0	10	18	0	31	10	0	18	31	0	23
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None									
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	94	94	94	94	94	94	94	94	94	94	94
Heavy Vehicles, %	4	10	7	0	0	6	0	3	14	6	2	0
Mvmt Flow	55	53	76	21	0	38	0	463	15	19	381	0

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	939	928	399	1003	920	532	-	0	0	509	0	0
Stage 1	419	419	-	501	501	-	-	-	-	-	-	-
Stage 2	520	509	-	502	419	-	-	-	-	-	-	-
Critical Hdwy	7.14	6.6	6.27	7.1	6.5	6.26	-	-	-	4.16	-	-
Critical Hdwy Stg 1	6.14	5.6	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.14	5.6	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.536	4.09	3.363	3.5	4	3.354	-	-	-	2.254	-	-
Pot Cap-1 Maneuver	242	260	640	223	273	540	0	-	-	1036	-	0
Stage 1	608	576	-	556	546	-	0	-	-	-	-	0
Stage 2	536	525	-	555	593	-	0	-	-	-	-	0
Platoon blocked, %												
Mov Cap-1 Maneuver	213	247	629	154	259	509	-	-	-	1005	-	-
Mov Cap-2 Maneuver	213	247	-	154	259	-	-	-	-	-	-	-
Stage 1	608	562	-	556	531	-	-	-	-	-	-	-
Stage 2	481	510	-	424	579	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	32.4	21.4	0	0.4
HCM LOS	D	C		

Minor Lane/Major Mvmt	NBT	NBR	EBLn1WBLn1	SBL	SBT
Capacity (veh/h)	-	-	309	279	1005
HCM Lane V/C Ratio	-	-	0.596	0.214	0.019
HCM Control Delay (s)	-	-	32.4	21.4	8.7
HCM Lane LOS	-	-	D	C	A
HCM 95th %tile Q(veh)	-	-	3.6	0.8	0.1

MOVEMENT SUMMARY

Site: MBTA Beverly Depot
Development

Pleasant Street / Park Street / Court Street
Stop (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: Court Street											
3	L	17	0.0	0.082	11.0	LOS B	0.3	8.1	0.42	0.92	18.2
8	T	37	0.0	0.082	11.0	LOS B	0.3	8.1	0.42	0.87	18.3
Approach		54	0.0	0.082	11.0	LOS B	0.3	8.1	0.42	0.89	18.3
East: Pleasant Street											
1	L	1	0.0	0.117	7.2	LOS A	0.7	17.6	0.43	0.76	19.4
6	T	204	0.0	0.117	7.2	LOS A	0.7	17.6	0.43	0.57	19.4
16	R	12	0.0	0.117	7.2	LOS A	0.7	17.6	0.43	0.81	19.4
Approach		217	0.0	0.117	7.2	LOS A	0.7	17.6	0.43	0.58	19.4
North: Park Street											
4	T	18	0.0	0.077	8.2	LOS A	0.5	13.5	0.44	0.89	19.1
14	R	74	8.0	0.077	8.2	LOS A	0.5	13.5	0.44	0.56	19.0
Approach		92	6.4	0.077	8.2	LOS A	0.5	13.5	0.44	0.63	19.1
West: Pleasant Street											
5	L	183	10.0	0.144	0.0	LOS A	0.0	0.0	0.00	0.56	22.7
12	R	55	0.0	0.144	0.0	LOS A	0.0	0.0	0.00	0.51	22.9
Approach		238	7.7	0.144	0.0	NA	0.0	0.0	0.00	0.55	22.8
All Vehicles		601	4.0	0.144	4.8	NA	0.7	17.6	0.26	0.60	20.4

Level of Service (LOS) Method: Delay & v/c (HCM 2010).

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Minor Road Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

HCM Delay Model used. Geometric Delay not included.

Lanes, Volumes, Timings
1: Rantoul Street (Route 1A)

2016 Existing Conditions
Weekday Evening

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	41	16	1	537	561	4
Future Volume (vph)	41	16	1	537	561	4
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt		0.850			0.999	
Flt Protected	0.950					
Satd. Flow (prot)	1805	1615	0	1881	1861	0
Flt Permitted	0.950					
Satd. Flow (perm)	1805	1615	0	1881	1861	0
Link Speed (mph)	30			30	30	
Link Distance (ft)	150			500	340	
Travel Time (s)	3.4			11.4	7.7	
Confl. Peds. (#/hr)	26	18	18			26
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	1%	2%	0%
Shared Lane Traffic (%)						
Sign Control	Stop			Free	Free	

Intersection Summary

Area Type: Other
Control Type: Unsignalized

HCM 2010 TWSC
1: Rantoul Street (Route 1A)

2016 Existing Conditions
Weekday Evening

Intersection

Int Delay, s/veh 1.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	41	16	1	537	561	4
Future Vol, veh/h	41	16	1	537	561	4
Conflicting Peds, #/hr	26	18	18	0	0	26
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	0	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	1	2	0
Mvmt Flow	45	17	1	584	610	4

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1250	656	640	0	-	0
Stage 1	638	-	-	-	-	-
Stage 2	612	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	193	469	954	-	-	-
Stage 1	530	-	-	-	-	-
Stage 2	545	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	184	452	940	-	-	-
Mov Cap-2 Maneuver	184	-	-	-	-	-
Stage 1	519	-	-	-	-	-
Stage 2	532	-	-	-	-	-

Approach	EB		NB		SB
HCM Control Delay, s	25.8		0		0
HCM LOS	D				

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	940	-	184	452	-	-
HCM Lane V/C Ratio	0.001	-	0.242	0.038	-	-
HCM Control Delay (s)	8.8	0	30.7	13.3	-	-
HCM Lane LOS	A	A	D	B	-	-
HCM 95th %tile Q(veh)	0	-	0.9	0.1	-	-

Lanes, Volumes, Timings
 2: Rantoul Street (Route 1A) & Pleasant Street

2016 Existing Conditions
 Weekday Evening

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	5	23	13	123	455	0	0	556	42
Future Volume (vph)	0	0	0	5	23	13	123	455	0	0	556	42
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	16	16	16	16	16	16	14	14	14	14	14	14
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt					0.958						0.991	
Flt Protected					0.994			0.989				
Satd. Flow (prot)	0	0	0	0	1845	0	0	1782	0	0	1788	0
Flt Permitted					0.994			0.989				
Satd. Flow (perm)	0	0	0	0	1845	0	0	1782	0	0	1788	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		215			147			340			250	
Travel Time (s)		4.9			3.3			7.7			5.7	
Confl. Peds. (#/hr)	18		22	21		17	22		21	17		18
Confl. Bikes (#/hr)			1									1
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	2%	2%	2%	0%	0%	0%	2%	1%	0%	0%	1%	2%
Parking (#/hr)				0	0	0	0	0	0	0	0	0
Shared Lane Traffic (%)												
Sign Control		Stop			Stop			Free			Free	

Intersection Summary

Area Type: Other
 Control Type: Unsignalized

HCM 2010 TWSC
2: Rantoul Street (Route 1A) & Pleasant Street

2016 Existing Conditions
Weekday Evening

Intersection												
Int Delay, s/veh	1.6											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↕			↕			↕	
Traffic Vol, veh/h	0	0	0	5	23	13	123	455	0	0	556	42
Future Vol, veh/h	0	0	0	5	23	13	123	455	0	0	556	42
Conflicting Peds, #/hr	18	0	22	21	0	17	22	0	21	17	0	18
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None									
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	-	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	97	97	97	97	97	97	97	97	97	97	97	97
Heavy Vehicles, %	2	2	2	0	0	0	2	1	0	0	1	2
Mvmt Flow	0	0	0	5	24	13	127	469	0	0	573	43

Major/Minor	Minor1			Major1			Major2		
Conflicting Flow All	1339	1361	486	638	0	-	-	-	0
Stage 1	723	723	-	-	-	-	-	-	-
Stage 2	616	638	-	-	-	-	-	-	-
Critical Hdwy	6.4	6.5	6.2	4.12	-	-	-	-	-
Critical Hdwy Stg 1	5.4	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	5.4	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	2.218	-	-	-	-	-
Pot Cap-1 Maneuver	170	150	585	946	-	0	0	-	-
Stage 1	484	434	-	-	-	0	0	-	-
Stage 2	543	474	-	-	-	0	0	-	-
Platoon blocked, %									
Mov Cap-1 Maneuver	136	0	575	927	-	-	-	-	-
Mov Cap-2 Maneuver	136	0	-	-	-	-	-	-	-
Stage 1	394	0	-	-	-	-	-	-	-
Stage 2	532	0	-	-	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	18.8	2	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBTWBLn1	SBT	SBR
Capacity (veh/h)	927	-	303	-
HCM Lane V/C Ratio	0.137	-	0.139	-
HCM Control Delay (s)	9.5	0	18.8	-
HCM Lane LOS	A	A	C	-
HCM 95th %tile Q(veh)	0.5	-	0.5	-

Lanes, Volumes, Timings
3: Court Street/Park Street & Pleasant Street

2016 Existing Conditions
Weekday Evening

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	171	0	5	0	173	20	14	6	0	0	0	78
Future Volume (vph)	171	0	5	0	173	20	14	6	0	0	0	78
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	16	16	16	16	16	16	16	16	16	16	16	16
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.997			0.986						0.865	
Flt Protected		0.954						0.967				
Satd. Flow (prot)	0	2028	0	0	2104	0	0	2082	0	0	1628	0
Flt Permitted		0.954						0.967				
Satd. Flow (perm)	0	2028	0	0	2104	0	0	2082	0	0	1628	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		285			215			500			200	
Travel Time (s)		6.5			4.9			11.4			4.5	
Confl. Peds. (#/hr)	4		5	9		8	5		9	8		4
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	1%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	3%
Parking (#/hr)										0	0	0
Shared Lane Traffic (%)												
Sign Control		Free			Stop			Stop			Stop	

Intersection Summary

Area Type: Other
Control Type: Unsignalized

Lanes, Volumes, Timings
 4: Rantoul Street (Route 1A) & Railroad Avenue

2016 Existing Conditions
 Weekday Evening

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	46	92	83	12	0	39	0	456	17	24	488	0
Future Volume (vph)	46	92	83	12	0	39	0	456	17	24	488	0
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	16	16	16	13	13	13	14	14	14	14	14	14
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.950			0.897			0.995				
Flt Protected		0.990			0.988						0.998	
Satd. Flow (prot)	0	1802	0	0	1531	0	0	1798	0	0	1820	0
Flt Permitted		0.990			0.988						0.998	
Satd. Flow (perm)	0	1802	0	0	1531	0	0	1798	0	0	1820	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		303			423			250			465	
Travel Time (s)		6.9			9.6			5.7			10.6	
Confl. Peds. (#/hr)	28		19	28		37	19		28	37		28
Confl. Bikes (#/hr)			2			1			1			2
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	2%	0%	2%	0%	0%	3%	0%	1%	0%	0%	0%	0%
Parking (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Shared Lane Traffic (%)												
Sign Control		Stop			Stop			Free			Free	

Intersection Summary

Area Type: Other
 Control Type: Unsignalized

HCM 2010 TWSC
 4: Rantoul Street (Route 1A) & Railroad Avenue

2016 Existing Conditions
 Weekday Evening

Intersection

Int Delay, s/veh 15.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Traffic Vol, veh/h	46	92	83	12	0	39	0	456	17	24	488	0
Future Vol, veh/h	46	92	83	12	0	39	0	456	17	24	488	0
Conflicting Peds, #/hr	28	0	19	28	0	37	19	0	28	37	0	28
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None									
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	2	0	2	0	0	3	0	1	0	0	0	0
Mvmt Flow	48	96	86	13	0	41	0	475	18	25	508	0

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1099	1088	536	1198	1079	558	-	0	0	530	0	0
Stage 1	558	558	-	521	521	-	-	-	-	-	-	-
Stage 2	541	530	-	677	558	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.5	6.22	7.1	6.5	6.23	-	-	-	4.1	-	-
Critical Hdwy Stg 1	6.12	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4	3.318	3.5	4	3.327	-	-	-	2.2	-	-
Pot Cap-1 Maneuver	190	218	545	164	220	527	0	-	-	1048	-	0
Stage 1	514	515	-	542	535	-	0	-	-	-	-	0
Stage 2	525	530	-	446	515	-	0	-	-	-	-	0
Platoon blocked, %												
Mov Cap-1 Maneuver	164	204	530	80	205	491	-	-	-	1010	-	-
Mov Cap-2 Maneuver	164	204	-	80	205	-	-	-	-	-	-	-
Stage 1	514	497	-	542	517	-	-	-	-	-	-	-
Stage 2	464	512	-	283	497	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	81.9	26.2	0	0.4
HCM LOS	F	D		

Minor Lane/Major Mvmt	NBT	NBR	EBLn1WBLn1	SBL	SBT
Capacity (veh/h)	-	-	249 222	1010	-
HCM Lane V/C Ratio	-	-	0.925 0.239	0.025	-
HCM Control Delay (s)	-	-	81.9 26.2	8.7	0
HCM Lane LOS	-	-	F D	A	A
HCM 95th %tile Q(veh)	-	-	8.2 0.9	0.1	-

MOVEMENT SUMMARY

Site: MBTA Beverly Depot
Development

Pleasant Street / Park Street / Court Street
Stop (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: Court Street											
3	L	28	0.0	0.061	10.8	LOS B	0.3	6.6	0.46	0.88	18.3
8	T	12	0.0	0.061	10.8	LOS B	0.3	6.6	0.46	0.83	18.3
Approach		40	0.0	0.061	10.8	LOS B	0.3	6.6	0.46	0.86	18.3
East: Pleasant Street											
1	L	1	0.0	0.137	7.3	LOS A	0.8	20.8	0.32	0.79	19.3
6	T	222	1.0	0.137	7.3	LOS A	0.8	20.8	0.32	0.68	19.3
16	R	26	0.0	0.137	7.3	LOS A	0.8	20.8	0.32	0.86	19.2
Approach		249	0.9	0.137	7.3	LOS A	0.8	20.8	0.32	0.70	19.3
North: Park Street											
4	T	1	0.0	0.058	7.5	LOS A	0.5	11.8	0.44	0.86	19.3
14	R	89	3.0	0.058	7.5	LOS A	0.5	11.8	0.44	0.56	19.3
Approach		90	3.0	0.058	7.5	LOS A	0.5	11.8	0.44	0.57	19.3
West: Pleasant Street											
5	L	197	1.0	0.113	0.0	LOS A	0.0	0.0	0.00	0.56	22.7
12	R	6	0.0	0.113	0.0	LOS A	0.0	0.0	0.00	0.50	22.9
Approach		202	1.0	0.113	0.0	NA	0.0	0.0	0.00	0.56	22.7
All Vehicles		581	1.2	0.137	5.0	NA	0.8	20.8	0.23	0.64	20.3

Level of Service (LOS) Method: Delay & v/c (HCM 2010).

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Minor Road Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

HCM Delay Model used. Geometric Delay not included.

2023 No-Build Conditions

Lanes, Volumes, Timings
 1: Rantoul Street (Route 1A) & MBTA Garage

2023 No-Build Conditions
 Weekday Morning

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	4	1	26	576	456	67
Future Volume (vph)	4	1	26	576	456	67
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.977				0.983	
Flt Protected	0.960			0.998		
Satd. Flow (prot)	1782	0	0	1777	1760	0
Flt Permitted	0.960			0.998		
Satd. Flow (perm)	1782	0	0	1777	1760	0
Link Speed (mph)	30			30	30	
Link Distance (ft)	150			500	340	
Travel Time (s)	3.4			11.4	7.7	
Confl. Peds. (#/hr)	34	34	34			34
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87
Heavy Vehicles (%)	0%	0%	0%	7%	7%	0%
Shared Lane Traffic (%)						
Sign Control	Stop			Free	Free	

Intersection Summary

Area Type: Other
 Control Type: Unsignalized

HCM 2010 TWSC
 1: Rantoul Street (Route 1A) & MBTA Garage

2023 No-Build Conditions
 Weekday Morning

Intersection

Int Delay, s/veh 0.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	4	1	26	576	456	67
Future Vol, veh/h	4	1	26	576	456	67
Conflicting Peds, #/hr	34	34	34	0	0	34
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	87	87	87	87	87	87
Heavy Vehicles, %	0	0	0	7	7	0
Mvmt Flow	5	1	30	662	524	77

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1353	631	635	0	-	0
Stage 1	597	-	-	-	-	-
Stage 2	756	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	167	485	958	-	-	-
Stage 1	554	-	-	-	-	-
Stage 2	467	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	150	458	931	-	-	-
Mov Cap-2 Maneuver	150	-	-	-	-	-
Stage 1	538	-	-	-	-	-
Stage 2	431	-	-	-	-	-

Approach	EB		NB		SB
HCM Control Delay, s	26.5		0.4		0
HCM LOS	D				

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	931	-	173	-	-
HCM Lane V/C Ratio	0.032	-	0.033	-	-
HCM Control Delay (s)	9	0	26.5	-	-
HCM Lane LOS	A	A	D	-	-
HCM 95th %tile Q(veh)	0.1	-	0.1	-	-

Lanes, Volumes, Timings
2: Rantoul Street (Route 1A) & Pleasant Street

2023 No-Build Conditions
Weekday Morning

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	11	35	31	149	431	0	0	444	28
Future Volume (vph)	0	0	0	11	35	31	149	431	0	0	444	28
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	16	16	16	16	16	16	11	11	11	11	11	11
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt					0.945						0.992	
Flt Protected					0.993			0.987				
Satd. Flow (prot)	0	0	0	0	1819	0	0	1596	0	0	1577	0
Flt Permitted					0.993			0.987				
Satd. Flow (perm)	0	0	0	0	1819	0	0	1596	0	0	1577	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		215			147			340			250	
Travel Time (s)		4.9			3.3			7.7			5.7	
Confl. Peds. (#/hr)	25		29	13		9	29		13	9		25
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	2%	2%	2%	0%	0%	0%	0%	3%	0%	0%	4%	4%
Parking (#/hr)				0	0	0	0	0	0	0	0	0
Shared Lane Traffic (%)												
Sign Control		Stop			Stop			Free			Free	

Intersection Summary

Area Type: Other
Control Type: Unsignalized

HCM 2010 TWSC
 2: Rantoul Street (Route 1A) & Pleasant Street

2023 No-Build Conditions
 Weekday Morning

Intersection												
Int Delay, s/veh	3.7											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↕			↕			↕	
Traffic Vol, veh/h	0	0	0	11	35	31	149	431	0	0	444	28
Future Vol, veh/h	0	0	0	11	35	31	149	431	0	0	444	28
Conflicting Peds, #/hr	25	0	29	13	0	9	29	0	13	9	0	25
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None									
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	-	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	2	2	2	0	0	0	0	3	0	0	4	4
Mvmt Flow	0	0	0	11	36	32	155	449	0	0	463	29

Major/Minor	Minor1			Major1			Major2		
Conflicting Flow All	1249	1280	458	521	0	-	-	-	0
Stage 1	759	759	-	-	-	-	-	-	-
Stage 2	490	521	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	4.1	-	-	-	-	-
Critical Hdwy Stg 1	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	2.2	-	-	-	-	-
Pot Cap-1 Maneuver	151	167	607	1056	-	0	0	-	-
Stage 1	402	418	-	-	-	0	0	-	-
Stage 2	564	535	-	-	-	0	0	-	-
Platoon blocked, %									
Mov Cap-1 Maneuver	127	134	603	1046	-	-	-	-	-
Mov Cap-2 Maneuver	127	134	-	-	-	-	-	-	-
Stage 1	323	336	-	-	-	-	-	-	-
Stage 2	558	535	-	-	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	36.3	2.3	0
HCM LOS	E		

Minor Lane/Major Mvmt	NBL	NBTWBLn1	SBT	SBR
Capacity (veh/h)	1046	-	193	-
HCM Lane V/C Ratio	0.148	-	0.416	-
HCM Control Delay (s)	9	0	36.3	-
HCM Lane LOS	A	A	E	-
HCM 95th %tile Q(veh)	0.5	-	1.9	-

Lanes, Volumes, Timings
3: Court Street/Park Street & Pleasant Street

2023 No-Build Conditions
Weekday Morning

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	134	0	40	1	210	13	7	16	0	0	12	51
Future Volume (vph)	134	0	40	1	210	13	7	16	0	0	12	51
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	16	16	16	16	16	16	16	16	16	16	16	16
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.969			0.992						0.890	
Flt Protected		0.963						0.985				
Satd. Flow (prot)	0	1866	0	0	2136	0	0	2121	0	0	1619	0
Flt Permitted		0.963						0.985				
Satd. Flow (perm)	0	1866	0	0	2136	0	0	2121	0	0	1619	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		285			215			500			200	
Travel Time (s)		6.5			4.9			11.4			4.5	
Confl. Peds. (#/hr)	1		1	1		1	1		1	1		1
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Heavy Vehicles (%)	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	8%
Parking (#/hr)										0	0	0
Shared Lane Traffic (%)												
Sign Control		Free			Stop			Stop			Stop	

Intersection Summary

Area Type: Other
Control Type: Unsignalized

Lanes, Volumes, Timings
4: Rantoul Street (Route 1A) & Railroad Avenue

2023 No-Build Conditions

Weekday Morning

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	54	52	74	21	0	37	0	443	14	19	383	0
Future Volume (vph)	54	52	74	21	0	37	0	443	14	19	383	0
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	16	16	16	10	10	10	11	11	11	11	11	11
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		0.99			0.95			1.00				
Frt		0.944			0.914			0.996				
Flt Protected		0.985			0.982						0.998	
Satd. Flow (prot)	0	1660	0	0	1305	0	0	1590	0	0	1614	0
Flt Permitted		0.896			0.804						0.971	
Satd. Flow (perm)	0	1510	0	0	1069	0	0	1590	0	0	1571	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		32			39			4				
Link Speed (mph)		30			30			30				30
Link Distance (ft)		200			400			250				500
Travel Time (s)		4.5			9.1			5.7				11.4
Confl. Peds. (#/hr)			4			17			14			6
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	4%	10%	7%	0%	0%	6%	0%	3%	14%	6%	2%	0%
Parking (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Shared Lane Traffic (%)												
Turn Type	Perm	NA		Perm	NA			NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8						6		
Detector Phase	4	4		8	8			2		6	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0			7.0		7.0	7.0	
Minimum Split (s)	18.0	18.0		18.0	18.0			18.0		18.0	18.0	
Total Split (s)	25.0	25.0		25.0	25.0			75.0		75.0	75.0	
Total Split (%)	25.0%	25.0%		25.0%	25.0%			75.0%		75.0%	75.0%	
Maximum Green (s)	20.0	20.0		20.0	20.0			70.0		70.0	70.0	
Yellow Time (s)	4.0	4.0		4.0	4.0			4.0		4.0	4.0	
All-Red Time (s)	1.0	1.0		1.0	1.0			1.0		1.0	1.0	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		5.0			5.0			5.0			5.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0		3.0	3.0	
Recall Mode	None	None		None	None			C-Min		C-Min	C-Min	
Walk Time (s)	7.0	7.0		7.0	7.0			7.0		7.0	7.0	
Flash Dont Walk (s)	6.0	6.0		6.0	6.0			6.0		6.0	6.0	
Pedestrian Calls (#/hr)	10	10		10	10			10		10	10	

Intersection Summary

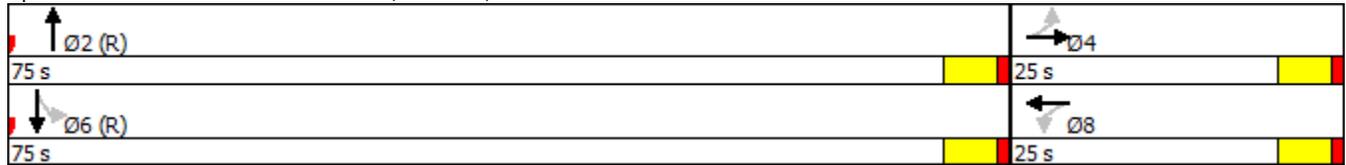
Area Type: Other
 Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 75 (75%), Referenced to phase 2:NBT and 6:SBTL, Start of Green

Lanes, Volumes, Timings
4: Rantoul Street (Route 1A) & Railroad Avenue

2023 No-Build Conditions
Weekday Morning

Natural Cycle: 40
Control Type: Actuated-Coordinated

Splits and Phases: 4: Rantoul Street (Route 1A) & Railroad Avenue



Queues

2023 No-Build Conditions

4: Rantoul Street (Route 1A) & Railroad Avenue

Weekday Morning

	→	←	↑	↓
Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	191	61	486	427
v/c Ratio	0.71	0.30	0.41	0.37
Control Delay	46.9	20.3	6.9	6.5
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	46.9	20.3	6.9	6.5
Queue Length 50th (ft)	97	12	97	82
Queue Length 95th (ft)	159	46	196	166
Internal Link Dist (ft)	120	320	170	420
Turn Bay Length (ft)				
Base Capacity (vph)	336	251	1186	1171
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.57	0.24	0.41	0.36
Intersection Summary				

HCM 2010 Signalized Intersection Summary
 4: Rantoul Street (Route 1A) & Railroad Avenue

2023 No-Build Conditions
 Weekday Morning

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	54	52	74	21	0	37	0	443	14	19	383	0
Future Volume (veh/h)	54	52	74	21	0	37	0	443	14	19	383	0
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.96		0.99	1.00		0.95	1.00		0.99	1.00		1.00
Parking Bus, Adj	1.00	1.00	0.90	1.00	1.00	0.90	1.00	1.00	0.90	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1976	1847	1976	1900	1830	1900	0	1839	1900	1900	1859	0
Adj Flow Rate, veh/h	57	55	79	22	0	39	0	471	15	20	407	0
Adj No. of Lanes	0	1	0	0	1	0	0	1	0	0	1	0
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	10	10	10	0	0	0	0	3	3	2	2	0
Cap, veh/h	99	77	92	102	18	125	0	1186	38	71	1314	0
Arrive On Green	0.16	0.16	0.16	0.16	0.00	0.16	0.00	0.74	0.74	0.74	0.74	0.00
Sat Flow, veh/h	338	497	588	339	113	801	0	1594	51	45	1766	0
Grp Volume(v), veh/h	191	0	0	61	0	0	0	0	486	427	0	0
Grp Sat Flow(s),veh/h/ln	1423	0	0	1253	0	0	0	0	1645	1812	0	0
Q Serve(g_s), s	9.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.7	0.0	0.0	0.0
Cycle Q Clear(g_c), s	13.0	0.0	0.0	3.8	0.0	0.0	0.0	0.0	10.7	7.6	0.0	0.0
Prop In Lane	0.30		0.41	0.36		0.64	0.00		0.03	0.05		0.00
Lane Grp Cap(c), veh/h	269	0	0	245	0	0	0	0	1224	1385	0	0
V/C Ratio(X)	0.71	0.00	0.00	0.25	0.00	0.00	0.00	0.00	0.40	0.31	0.00	0.00
Avail Cap(c_a), veh/h	329	0	0	299	0	0	0	0	1224	1385	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	40.9	0.0	0.0	37.2	0.0	0.0	0.0	0.0	4.7	4.3	0.0	0.0
Incr Delay (d2), s/veh	5.4	0.0	0.0	0.5	0.0	0.0	0.0	0.0	1.0	0.6	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.5	0.0	0.0	1.5	0.0	0.0	0.0	0.0	5.2	4.1	0.0	0.0
LnGrp Delay(d),s/veh	46.3	0.0	0.0	37.7	0.0	0.0	0.0	0.0	5.6	4.8	0.0	0.0
LnGrp LOS	D			D					A	A		
Approach Vol, veh/h		191			61			486			427	
Approach Delay, s/veh		46.3			37.7			5.6			4.8	
Approach LOS		D			D			A			A	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		79.4		20.6		79.4		20.6				
Change Period (Y+Rc), s		5.0		5.0		5.0		5.0				
Max Green Setting (Gmax), s		70.0		20.0		70.0		20.0				
Max Q Clear Time (g_c+I1), s		12.7		15.0		9.6		5.8				
Green Ext Time (p_c), s		7.4		0.6		7.4		1.3				
Intersection Summary												
HCM 2010 Ctrl Delay			13.7									
HCM 2010 LOS			B									

MOVEMENT SUMMARY

Site: MBTA Beverly Depot
Development

Pleasant Street / Park Street / Court Street
Stop (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: Court Street											
3	L	17	0.0	0.087	11.1	LOS B	0.3	8.5	0.42	0.92	18.2
8	T	39	0.0	0.087	11.1	LOS B	0.3	8.5	0.42	0.87	18.2
Approach		56	0.0	0.087	11.1	LOS B	0.3	8.5	0.42	0.89	18.2
East: Pleasant Street											
1	L	1	0.0	0.128	7.2	LOS A	0.8	19.7	0.45	0.75	19.4
6	T	223	0.0	0.128	7.2	LOS A	0.8	19.7	0.45	0.55	19.4
16	R	14	0.0	0.128	7.2	LOS A	0.8	19.7	0.45	0.80	19.4
Approach		238	0.0	0.128	7.2	LOS A	0.8	19.7	0.45	0.56	19.4
North: Park Street											
4	T	18	0.0	0.079	8.2	LOS A	0.5	14.2	0.45	0.89	19.1
14	R	77	8.0	0.079	8.2	LOS A	0.5	14.2	0.45	0.55	19.0
Approach		95	6.5	0.079	8.2	LOS A	0.5	14.2	0.45	0.62	19.1
West: Pleasant Street											
5	L	189	10.0	0.149	0.0	LOS A	0.0	0.0	0.00	0.56	22.7
12	R	56	0.0	0.149	0.0	LOS A	0.0	0.0	0.00	0.51	22.9
Approach		245	7.7	0.149	0.0	NA	0.0	0.0	0.00	0.55	22.8
All Vehicles		635	3.9	0.149	4.9	NA	0.8	19.7	0.27	0.60	20.4

Level of Service (LOS) Method: Delay & v/c (HCM 2010).

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Minor Road Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

HCM Delay Model used. Geometric Delay not included.

Lanes, Volumes, Timings
1: Rantoul Street (Route 1A)

2023 No-Build Conditions
Weekday Evening

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	42	17	1	580	583	4
Future Volume (vph)	42	17	1	580	583	4
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt		0.850			0.999	
Flt Protected	0.950					
Satd. Flow (prot)	1805	1615	0	1881	1861	0
Flt Permitted	0.950					
Satd. Flow (perm)	1805	1615	0	1881	1861	0
Link Speed (mph)	30			30	30	
Link Distance (ft)	150			500	340	
Travel Time (s)	3.4			11.4	7.7	
Confl. Peds. (#/hr)	26	18	18			26
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	1%	2%	0%
Shared Lane Traffic (%)						
Sign Control	Stop			Free	Free	

Intersection Summary

Area Type: Other
Control Type: Unsignalized

Intersection

Int Delay, s/veh 1.8

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	42	17	1	580	583	4
Future Vol, veh/h	42	17	1	580	583	4
Conflicting Peds, #/hr	26	18	18	0	0	26
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	0	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	1	2	0
Mvmt Flow	46	18	1	630	634	4

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1321	680	664	0	-	0
Stage 1	662	-	-	-	-	-
Stage 2	659	-	-	-	-	-
Critical Hdwy	7.1	6.2	4.1	-	-	-
Critical Hdwy Stg 1	6.1	-	-	-	-	-
Critical Hdwy Stg 2	6.1	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	135	454	935	-	-	-
Stage 1	454	-	-	-	-	-
Stage 2	456	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	129	438	921	-	-	-
Mov Cap-2 Maneuver	129	-	-	-	-	-
Stage 1	443	-	-	-	-	-
Stage 2	445	-	-	-	-	-

Approach	EB		NB		SB
HCM Control Delay, s	37.7		0		0
HCM LOS	E				

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	921	-	129	438	-	-
HCM Lane V/C Ratio	0.001	-	0.354	0.042	-	-
HCM Control Delay (s)	8.9	0	47.5	13.6	-	-
HCM Lane LOS	A	A	E	B	-	-
HCM 95th %tile Q(veh)	0	-	1.4	0.1	-	-

Lanes, Volumes, Timings
2: Rantoul Street (Route 1A) & Pleasant Street

2023 No-Build Conditions
Weekday Evening

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	8	30	15	141	481	0	0	575	42
Future Volume (vph)	0	0	0	8	30	15	141	481	0	0	575	42
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	16	16	16	16	16	16	14	14	14	14	14	14
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt					0.962						0.991	
Flt Protected					0.993			0.989				
Satd. Flow (prot)	0	0	0	0	1851	0	0	1782	0	0	1788	0
Flt Permitted					0.993			0.989				
Satd. Flow (perm)	0	0	0	0	1851	0	0	1782	0	0	1788	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		215			147			340			250	
Travel Time (s)		4.9			3.3			7.7			5.7	
Confl. Peds. (#/hr)	18		22	21		17	22		21	17		18
Confl. Bikes (#/hr)			1									1
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	2%	2%	2%	0%	0%	0%	2%	1%	0%	0%	1%	2%
Parking (#/hr)				0	0	0	0	0	0	0	0	0
Shared Lane Traffic (%)												
Sign Control		Stop			Stop			Free			Free	

Intersection Summary

Area Type: Other
Control Type: Unsignalized

HCM 2010 TWSC
 2: Rantoul Street (Route 1A) & Pleasant Street

2023 No-Build Conditions
 Weekday Evening

Intersection												
Int Delay, s/veh	2.1											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↕			↕			↕	
Traffic Vol, veh/h	0	0	0	8	30	15	141	481	0	0	575	42
Future Vol, veh/h	0	0	0	8	30	15	141	481	0	0	575	42
Conflicting Peds, #/hr	18	0	22	21	0	17	22	0	21	17	0	18
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None									
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	-	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	97	97	97	97	97	97	97	97	97	97	97	97
Heavy Vehicles, %	2	2	2	0	0	0	2	1	0	0	1	2
Mvmt Flow	0	0	0	8	31	15	145	496	0	0	593	43

Major/Minor	Minor1			Major1			Major2		
Conflicting Flow All	1422	1445	513	658	0	-	-	-	0
Stage 1	787	787	-	-	-	-	-	-	-
Stage 2	635	658	-	-	-	-	-	-	-
Critical Hdwy	6.4	6.5	6.2	4.12	-	-	-	-	-
Critical Hdwy Stg 1	5.4	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	5.4	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	2.218	-	-	-	-	-
Pot Cap-1 Maneuver	152	133	565	930	-	0	0	-	-
Stage 1	452	406	-	-	-	0	0	-	-
Stage 2	532	464	-	-	-	0	0	-	-
Platoon blocked, %									
Mov Cap-1 Maneuver	116	0	556	911	-	-	-	-	-
Mov Cap-2 Maneuver	116	0	-	-	-	-	-	-	-
Stage 1	353	0	-	-	-	-	-	-	-
Stage 2	521	0	-	-	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	24.4	2.2	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBTWBLn1	SBT	SBR
Capacity (veh/h)	911	-	240	-
HCM Lane V/C Ratio	0.16	-	0.228	-
HCM Control Delay (s)	9.7	0	24.4	-
HCM Lane LOS	A	A	C	-
HCM 95th %tile Q(veh)	0.6	-	0.9	-

Lanes, Volumes, Timings
 3: Court Street/Park Street & Pleasant Street

2023 No-Build Conditions
 Weekday Evening

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	191	0	8	0	182	36	15	6	0	0	0	81
Future Volume (vph)	191	0	8	0	182	36	15	6	0	0	0	81
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	16	16	16	16	16	16	16	16	16	16	16	16
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.994			0.977						0.865	
Flt Protected		0.954						0.966				
Satd. Flow (prot)	0	2023	0	0	2086	0	0	2080	0	0	1628	0
Flt Permitted		0.954						0.966				
Satd. Flow (perm)	0	2023	0	0	2086	0	0	2080	0	0	1628	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		285			215			500			200	
Travel Time (s)		6.5			4.9			11.4			4.5	
Confl. Peds. (#/hr)	4		5	9		8	5		9	8		4
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	1%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	3%
Parking (#/hr)										0	0	0
Shared Lane Traffic (%)												
Sign Control		Free			Stop			Stop			Stop	

Intersection Summary

Area Type: Other
 Control Type: Unsignalized

Lanes, Volumes, Timings
4: Rantoul Street (Route 1A) & Railroad Avenue

2023 No-Build Conditions
Weekday Evening

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	48	95	86	12	0	40	0	484	18	25	503	0
Future Volume (vph)	48	95	86	12	0	40	0	484	18	25	503	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	16	16	16	10	10	10	11	11	11	11	11	11
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		0.99			0.95			1.00				
Frt		0.949			0.897			0.995				
Flt Protected		0.990			0.988						0.998	
Satd. Flow (prot)	0	1776	0	0	1312	0	0	1622	0	0	1650	0
Flt Permitted		0.919			0.878						0.966	
Satd. Flow (perm)	0	1649	0	0	1166	0	0	1622	0	0	1597	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		29			42			4				
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		303			423			250			465	
Travel Time (s)		6.9			9.6			5.7			10.6	
Confl. Peds. (#/hr)			3			12			25			16
Confl. Bikes (#/hr)			2			1			2			1
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	2%	0%	2%	0%	0%	3%	0%	1%	0%	0%	0%	0%
Parking (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Shared Lane Traffic (%)												
Turn Type	Perm	NA		Perm	NA			NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8						6		
Detector Phase	4	4		8	8			2		6	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0			7.0		7.0	7.0	
Minimum Split (s)	18.0	18.0		18.0	18.0			18.0		18.0	18.0	
Total Split (s)	30.0	30.0		30.0	30.0			70.0		70.0	70.0	
Total Split (%)	30.0%	30.0%		30.0%	30.0%			70.0%		70.0%	70.0%	
Maximum Green (s)	25.0	25.0		25.0	25.0			65.0		65.0	65.0	
Yellow Time (s)	4.0	4.0		4.0	4.0			4.0		4.0	4.0	
All-Red Time (s)	1.0	1.0		1.0	1.0			1.0		1.0	1.0	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		5.0			5.0			5.0			5.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0		3.0	3.0	
Recall Mode	None	None		None	None			C-Min		C-Min	C-Min	
Walk Time (s)	7.0	7.0		7.0	7.0			7.0		7.0	7.0	
Flash Dont Walk (s)	6.0	6.0		6.0	6.0			6.0		6.0	6.0	
Pedestrian Calls (#/hr)	10	10		10	10			10		10	10	

Intersection Summary

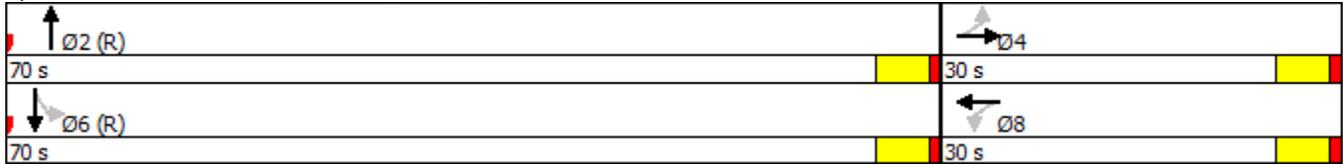
Area Type: Other
 Cycle Length: 100
 Actuated Cycle Length: 100

Lanes, Volumes, Timings
4: Rantoul Street (Route 1A) & Railroad Avenue

2023 No-Build Conditions
Weekday Evening

Offset: 62 (62%), Referenced to phase 2:NBT and 6:SBTL, Start of Green
Natural Cycle: 45
Control Type: Actuated-Coordinated

Splits and Phases: 4: Rantoul Street (Route 1A) & Railroad Avenue



Queues

2023 No-Build Conditions

4: Rantoul Street (Route 1A) & Railroad Avenue

Weekday Evening

	→	←	↑	↓
Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	239	55	523	550
v/c Ratio	0.74	0.23	0.45	0.48
Control Delay	47.6	15.5	8.1	8.6
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	47.6	15.5	8.1	8.6
Queue Length 50th (ft)	128	7	117	129
Queue Length 95th (ft)	196	37	231	253
Internal Link Dist (ft)	223	343	170	385
Turn Bay Length (ft)				
Base Capacity (vph)	434	323	1168	1149
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.55	0.17	0.45	0.48
Intersection Summary				

HCM 2010 Signalized Intersection Summary
 4: Rantoul Street (Route 1A) & Railroad Avenue

2023 No-Build Conditions
 Weekday Evening

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	48	95	86	12	0	40	0	484	18	25	503	0
Future Volume (veh/h)	48	95	86	12	0	40	0	484	18	25	503	0
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.98		0.97	1.00		0.95	1.00		0.96	1.00		1.00
Parking Bus, Adj	1.00	1.00	0.90	1.00	1.00	0.90	1.00	1.00	0.90	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1976	1953	1976	1900	1857	1900	0	1882	1900	1900	1900	0
Adj Flow Rate, veh/h	50	99	90	12	0	42	0	504	19	26	524	0
Adj No. of Lanes	0	1	0	0	1	0	0	1	0	0	1	0
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	0	0	0	0	0	0	0	1	1	0	0	0
Cap, veh/h	87	130	105	79	20	191	0	1164	44	71	1296	0
Arrive On Green	0.18	0.18	0.18	0.18	0.00	0.18	0.00	0.72	0.72	0.72	0.72	0.00
Sat Flow, veh/h	241	717	578	193	108	1054	0	1619	61	46	1802	0
Grp Volume(v), veh/h	239	0	0	54	0	0	0	0	523	550	0	0
Grp Sat Flow(s),veh/h/ln	1536	0	0	1355	0	0	0	0	1680	1848	0	0
Q Serve(g_s), s	10.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12.7	0.0	0.0	0.0
Cycle Q Clear(g_c), s	15.0	0.0	0.0	3.3	0.0	0.0	0.0	0.0	12.7	11.4	0.0	0.0
Prop In Lane	0.21		0.38	0.22		0.78	0.00		0.04	0.05		0.00
Lane Grp Cap(c), veh/h	321	0	0	289	0	0	0	0	1208	1367	0	0
V/C Ratio(X)	0.74	0.00	0.00	0.19	0.00	0.00	0.00	0.00	0.43	0.40	0.00	0.00
Avail Cap(c_a), veh/h	425	0	0	377	0	0	0	0	1208	1367	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	39.6	0.0	0.0	34.9	0.0	0.0	0.0	0.0	5.7	5.6	0.0	0.0
Incr Delay (d2), s/veh	4.9	0.0	0.0	0.3	0.0	0.0	0.0	0.0	1.1	0.9	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.8	0.0	0.0	1.3	0.0	0.0	0.0	0.0	6.2	6.3	0.0	0.0
LnGrp Delay(d),s/veh	44.5	0.0	0.0	35.2	0.0	0.0	0.0	0.0	6.9	6.4	0.0	0.0
LnGrp LOS	D			D					A	A		
Approach Vol, veh/h		239			54			523			550	
Approach Delay, s/veh		44.5			35.2			6.9			6.4	
Approach LOS		D			D			A			A	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		76.9		23.1		76.9		23.1				
Change Period (Y+Rc), s		5.0		5.0		5.0		5.0				
Max Green Setting (Gmax), s		65.0		25.0		65.0		25.0				
Max Q Clear Time (g_c+I1), s		14.7		17.0		13.4		5.3				
Green Ext Time (p_c), s		9.4		1.1		9.4		1.7				
Intersection Summary												
HCM 2010 Ctrl Delay			14.4									
HCM 2010 LOS			B									

MOVEMENT SUMMARY

Site: MBTA Beverly Depot
Development

Pleasant Street / Park Street / Court Street
Stop (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: Court Street											
3	L	30	0.0	0.067	11.1	LOS B	0.3	7.2	0.48	0.88	18.2
8	T	12	0.0	0.067	11.1	LOS B	0.3	7.2	0.48	0.84	18.3
Approach		42	0.0	0.067	11.1	LOS B	0.3	7.2	0.48	0.87	18.2
East: Pleasant Street											
1	L	1	0.0	0.159	7.4	LOS A	1.0	24.6	0.44	0.68	19.3
6	T	233	1.0	0.159	7.4	LOS A	1.0	24.6	0.44	0.56	19.4
16	R	46	0.0	0.159	7.4	LOS A	1.0	24.6	0.44	0.82	19.3
Approach		281	0.8	0.159	7.4	LOS A	1.0	24.6	0.44	0.60	19.3
North: Park Street											
4	T	1	0.0	0.060	7.5	LOS A	0.5	12.9	0.47	0.87	19.4
14	R	92	3.0	0.060	7.5	LOS A	0.5	12.9	0.47	0.53	19.3
Approach		93	3.0	0.060	7.5	LOS A	0.5	12.9	0.47	0.53	19.3
West: Pleasant Street											
5	L	220	1.0	0.128	0.0	LOS A	0.0	0.0	0.00	0.56	22.7
12	R	9	0.0	0.128	0.0	LOS A	0.0	0.0	0.00	0.51	22.9
Approach		229	1.0	0.128	0.0	NA	0.0	0.0	0.00	0.56	22.7
All Vehicles		645	1.1	0.159	5.0	NA	1.0	24.6	0.29	0.59	20.3

Level of Service (LOS) Method: Delay & v/c (HCM 2010).

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Minor Road Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

HCM Delay Model used. Geometric Delay not included.

2023 Build Conditions

Lanes, Volumes, Timings
 1: Rantoul Street (Route 1A) & MBTA Garage

2023 Build Conditions
 Weekday Morning

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	9	7	29	592	473	68
Future Volume (vph)	9	7	29	592	473	68
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.940				0.983	
Flt Protected	0.973			0.998		
Satd. Flow (prot)	1738	0	0	1778	1760	0
Flt Permitted	0.973			0.998		
Satd. Flow (perm)	1738	0	0	1778	1760	0
Link Speed (mph)	30			30	30	
Link Distance (ft)	90			500	340	
Travel Time (s)	2.0			11.4	7.7	
Confl. Peds. (#/hr)	34	34	34			34
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87
Heavy Vehicles (%)	0%	0%	0%	7%	7%	0%
Shared Lane Traffic (%)						
Sign Control	Stop			Free	Free	

Intersection Summary

Area Type: Other
 Control Type: Unsignalized

HCM 2010 TWSC
 1: Rantoul Street (Route 1A) & MBTA Garage

2023 Build Conditions
 Weekday Morning

Intersection

Int Delay, s/veh 0.5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	9	7	29	592	473	68
Future Vol, veh/h	9	7	29	592	473	68
Conflicting Peds, #/hr	34	34	34	0	0	34
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	87	87	87	87	87	87
Heavy Vehicles, %	0	0	0	7	7	0
Mvmt Flow	10	8	33	680	544	78

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1398	651	656	0	-	0
Stage 1	617	-	-	-	-	-
Stage 2	781	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	157	472	941	-	-	-
Stage 1	542	-	-	-	-	-
Stage 2	455	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	140	446	914	-	-	-
Mov Cap-2 Maneuver	140	-	-	-	-	-
Stage 1	527	-	-	-	-	-
Stage 2	416	-	-	-	-	-

Approach	EB		NB		SB
HCM Control Delay, s	24.8		0.4		0
HCM LOS	C				

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	914	-	200	-	-
HCM Lane V/C Ratio	0.036	-	0.092	-	-
HCM Control Delay (s)	9.1	0	24.8	-	-
HCM Lane LOS	A	A	C	-	-
HCM 95th %tile Q(veh)	0.1	-	0.3	-	-

Lanes, Volumes, Timings
 2: Rantoul Street (Route 1A) & Pleasant Street

2023 Build Conditions
 Weekday Morning

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	11	35	31	167	437	0	0	464	34
Future Volume (vph)	0	0	0	11	35	31	167	437	0	0	464	34
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	16	16	16	16	16	16	11	11	11	11	11	11
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt					0.945						0.991	
Flt Protected					0.993			0.986				
Satd. Flow (prot)	0	0	0	0	1819	0	0	1595	0	0	1575	0
Flt Permitted					0.993			0.986				
Satd. Flow (perm)	0	0	0	0	1819	0	0	1595	0	0	1575	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		215			147			340			250	
Travel Time (s)		4.9			3.3			7.7			5.7	
Confl. Peds. (#/hr)	25		29	13		9	29		13	9		25
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	2%	2%	2%	0%	0%	0%	0%	3%	0%	0%	4%	4%
Parking (#/hr)				0	0	0	0	0	0	0	0	0
Shared Lane Traffic (%)												
Sign Control		Stop			Stop			Free			Free	

Intersection Summary

Area Type: Other
 Control Type: Unsignalized

HCM 2010 TWSC
 2: Rantoul Street (Route 1A) & Pleasant Street

2023 Build Conditions
 Weekday Morning

Intersection												
Int Delay, s/veh	2.7											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↕			↕			↕	
Traffic Vol, veh/h	0	0	0	11	35	31	167	437	0	0	464	34
Future Vol, veh/h	0	0	0	11	35	31	167	437	0	0	464	34
Conflicting Peds, #/hr	25	0	29	13	0	9	29	0	13	9	0	25
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None									
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	-	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	2	2	2	0	0	0	0	3	0	0	4	4
Mvmt Flow	0	0	0	11	36	32	174	455	0	0	483	35

Major/Minor	Minor1			Major1			Major2		
Conflicting Flow All	1317	1351	464	548	0	-	-	-	0
Stage 1	803	803	-	-	-	-	-	-	-
Stage 2	514	548	-	-	-	-	-	-	-
Critical Hdwy	6.4	6.5	6.2	4.1	-	-	-	-	-
Critical Hdwy Stg 1	5.4	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	5.4	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	2.2	-	-	-	-	-
Pot Cap-1 Maneuver	175	152	602	1032	-	0	0	-	-
Stage 1	444	399	-	-	-	0	0	-	-
Stage 2	605	520	-	-	-	0	0	-	-
Platoon blocked, %									
Mov Cap-1 Maneuver	134	0	598	1022	-	-	-	-	-
Mov Cap-2 Maneuver	134	0	-	-	-	-	-	-	-
Stage 1	343	0	-	-	-	-	-	-	-
Stage 2	599	0	-	-	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	20.4	2.6	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBTWBLn1	SBT	SBR
Capacity (veh/h)	1022	-	314	-
HCM Lane V/C Ratio	0.17	-	0.255	-
HCM Control Delay (s)	9.2	0	20.4	-
HCM Lane LOS	A	A	C	-
HCM 95th %tile Q(veh)	0.6	-	1	-

Lanes, Volumes, Timings
4: Rantoul Street (Route 1A) & Railroad Avenue

2023 Build Conditions

Weekday Morning

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	61	52	94	21	0	37	0	449	14	19	389	0
Future Volume (vph)	61	52	94	21	0	37	0	449	14	19	389	0
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	16	16	16	10	10	10	11	11	11	11	11	11
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		0.98			0.95			1.00				
Frt		0.939			0.914			0.996				
Flt Protected		0.985			0.982						0.998	
Satd. Flow (prot)	0	1651	0	0	1305	0	0	1590	0	0	1614	0
Flt Permitted		0.894			0.802						0.971	
Satd. Flow (perm)	0	1498	0	0	1066	0	0	1590	0	0	1571	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		38			39			4				
Link Speed (mph)		30			30			30				30
Link Distance (ft)		200			400			250				500
Travel Time (s)		4.5			9.1			5.7				11.4
Confl. Peds. (#/hr)			4			17			14			6
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	4%	10%	7%	0%	0%	6%	0%	3%	14%	6%	2%	0%
Parking (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Shared Lane Traffic (%)												
Turn Type	Perm	NA		Perm	NA			NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8						6		
Detector Phase	4	4		8	8			2		6	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0			7.0		7.0	7.0	
Minimum Split (s)	18.0	18.0		18.0	18.0			18.0		18.0	18.0	
Total Split (s)	25.0	25.0		25.0	25.0			75.0		75.0	75.0	
Total Split (%)	25.0%	25.0%		25.0%	25.0%			75.0%		75.0%	75.0%	
Maximum Green (s)	20.0	20.0		20.0	20.0			70.0		70.0	70.0	
Yellow Time (s)	4.0	4.0		4.0	4.0			4.0		4.0	4.0	
All-Red Time (s)	1.0	1.0		1.0	1.0			1.0		1.0	1.0	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		5.0			5.0			5.0			5.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0		3.0	3.0	
Recall Mode	None	None		None	None			C-Min		C-Min	C-Min	
Walk Time (s)	7.0	7.0		7.0	7.0			7.0		7.0	7.0	
Flash Dont Walk (s)	6.0	6.0		6.0	6.0			6.0		6.0	6.0	
Pedestrian Calls (#/hr)	10	10		10	10			10		10	10	

Intersection Summary

Area Type: Other
 Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 75 (75%), Referenced to phase 2:NBT and 6:SBTL, Start of Green

Lanes, Volumes, Timings
4: Rantoul Street (Route 1A) & Railroad Avenue

2023 Build Conditions
Weekday Morning

Natural Cycle: 40
Control Type: Actuated-Coordinated

Splits and Phases: 4: Rantoul Street (Route 1A) & Railroad Avenue

Ø2 (R) 75 s	Ø4 25 s
Ø6 (R) 75 s	Ø8 25 s

Queues

2023 Build Conditions

4: Rantoul Street (Route 1A) & Railroad Avenue

Weekday Morning

	→	←	↑	↓
Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	220	61	493	434
v/c Ratio	0.74	0.28	0.43	0.38
Control Delay	46.6	18.9	7.8	7.3
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	46.6	18.9	7.8	7.3
Queue Length 50th (ft)	111	12	107	91
Queue Length 95th (ft)	177	44	215	183
Internal Link Dist (ft)	120	320	170	420
Turn Bay Length (ft)				
Base Capacity (vph)	347	256	1169	1153
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.63	0.24	0.42	0.38
Intersection Summary				

HCM 2010 Signalized Intersection Summary
 4: Rantoul Street (Route 1A) & Railroad Avenue

2023 Build Conditions
 Weekday Morning

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	61	52	94	21	0	37	0	449	14	19	389	0
Future Volume (veh/h)	61	52	94	21	0	37	0	449	14	19	389	0
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.96		0.99	1.00		0.95	1.00		0.99	1.00		1.00
Parking Bus, Adj	1.00	1.00	0.90	1.00	1.00	0.90	1.00	1.00	0.90	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1976	1849	1976	1900	1830	1900	0	1839	1900	1900	1859	0
Adj Flow Rate, veh/h	65	55	100	22	0	39	0	478	15	20	414	0
Adj No. of Lanes	0	1	0	0	1	0	0	1	0	0	1	0
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	10	10	10	0	0	0	0	3	3	2	2	0
Cap, veh/h	106	76	113	107	18	135	0	1155	36	69	1282	0
Arrive On Green	0.18	0.18	0.18	0.18	0.00	0.18	0.00	0.72	0.72	0.72	0.72	0.00
Sat Flow, veh/h	339	432	642	330	102	766	0	1595	50	43	1769	0
Grp Volume(v), veh/h	220	0	0	61	0	0	0	0	493	434	0	0
Grp Sat Flow(s),veh/h/ln	1412	0	0	1198	0	0	0	0	1645	1813	0	0
Q Serve(g_s), s	11.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11.8	0.0	0.0	0.0
Cycle Q Clear(g_c), s	15.1	0.0	0.0	3.7	0.0	0.0	0.0	0.0	11.8	8.4	0.0	0.0
Prop In Lane	0.30		0.45	0.36		0.64	0.00		0.03	0.05		0.00
Lane Grp Cap(c), veh/h	295	0	0	260	0	0	0	0	1192	1351	0	0
V/C Ratio(X)	0.75	0.00	0.00	0.23	0.00	0.00	0.00	0.00	0.41	0.32	0.00	0.00
Avail Cap(c_a), veh/h	328	0	0	289	0	0	0	0	1192	1351	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	40.0	0.0	0.0	35.5	0.0	0.0	0.0	0.0	5.4	5.0	0.0	0.0
Incr Delay (d2), s/veh	8.1	0.0	0.0	0.5	0.0	0.0	0.0	0.0	1.1	0.6	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.6	0.0	0.0	1.5	0.0	0.0	0.0	0.0	5.6	4.5	0.0	0.0
LnGrp Delay(d),s/veh	48.1	0.0	0.0	35.9	0.0	0.0	0.0	0.0	6.5	5.6	0.0	0.0
LnGrp LOS	D			D					A	A		
Approach Vol, veh/h		220			61			493			434	
Approach Delay, s/veh		48.1			35.9			6.5			5.6	
Approach LOS		D			D			A			A	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		77.4		22.6		77.4		22.6				
Change Period (Y+Rc), s		5.0		5.0		5.0		5.0				
Max Green Setting (Gmax), s		70.0		20.0		70.0		20.0				
Max Q Clear Time (g_c+I1), s		13.8		17.1		10.4		5.7				
Green Ext Time (p_c), s		7.5		0.4		7.6		1.4				
Intersection Summary												
HCM 2010 Ctrl Delay			15.2									
HCM 2010 LOS			B									

MOVEMENT SUMMARY

Site: MBTA Beverly Depot
Development

Pleasant Street / Park Street / Court Street
Stop (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph	
South: Court Street												
3	L	34	0.0	0.118	11.6	LOS B	0.5	12.3	0.47	0.92	18.1	
8	T	39	0.0	0.118	11.6	LOS B	0.5	12.3	0.47	0.88	18.1	
Approach		73	0.0	0.118	11.6	LOS B	0.5	12.3	0.47	0.90	18.1	
East: Pleasant Street												
1	L	1	0.0	0.145	7.3	LOS A	0.9	22.5	0.48	0.74	19.4	
6	T	232	0.0	0.145	7.3	LOS A	0.9	22.5	0.48	0.52	19.4	
16	R	31	0.0	0.145	7.3	LOS A	0.9	22.5	0.48	0.80	19.3	
Approach		264	0.0	0.145	7.3	LOS A	0.9	22.5	0.48	0.55	19.4	
North: Park Street												
4	T	18	0.0	0.080	8.3	LOS A	0.6	14.6	0.46	0.90	19.1	
14	R	77	8.0	0.080	8.3	LOS A	0.6	14.6	0.46	0.54	19.0	
Approach		95	6.5	0.080	8.3	LOS A	0.6	14.6	0.46	0.61	19.1	
West: Pleasant Street												
5	L	199	10.0	0.156	0.0	LOS A	0.0	0.0	0.00	0.56	22.7	
12	R	59	0.0	0.156	0.0	LOS A	0.0	0.0	0.00	0.51	22.9	
Approach		258	7.7	0.156	0.0	NA	0.0	0.0	0.00	0.55	22.8	
All Vehicles		690	3.8	0.156	5.2	NA	0.9	22.5	0.30	0.60	20.3	

Level of Service (LOS) Method: Delay & v/c (HCM 2010).

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Minor Road Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

HCM Delay Model used. Geometric Delay not included.

Lanes, Volumes, Timings
1: Rantoul Street (Route 1A)

2023 Build Conditions
Weekday Evening

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	44	20	6	581	590	8
Future Volume (vph)	44	20	6	581	590	8
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt		0.850			0.998	
Flt Protected	0.950			0.999		
Satd. Flow (prot)	1805	1615	0	1880	1860	0
Flt Permitted	0.950			0.999		
Satd. Flow (perm)	1805	1615	0	1880	1860	0
Link Speed (mph)	30			30	30	
Link Distance (ft)	90			500	340	
Travel Time (s)	2.0			11.4	7.7	
Confl. Peds. (#/hr)	26	18	18			26
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	1%	2%	0%
Shared Lane Traffic (%)						
Sign Control	Stop			Free	Free	

Intersection Summary

Area Type: Other
Control Type: Unsignalized

Intersection							
Int Delay, s/veh	1.6						
Movement	EBL	EBR	NBL	NBT	SBT	SBR	
Lane Configurations							
Traffic Vol, veh/h	44	20	6	581	590	8	
Future Vol, veh/h	44	20	6	581	590	8	
Conflicting Peds, #/hr	26	18	18	0	0	26	
Sign Control	Stop	Stop	Free	Free	Free	Free	
RT Channelized	-	None	-	None	-	None	
Storage Length	0	0	-	-	-	-	
Veh in Median Storage, #	0	-	-	0	0	-	
Grade, %	0	-	-	0	0	-	
Peak Hour Factor	92	92	92	92	92	92	
Heavy Vehicles, %	0	0	0	1	2	0	
Mvmt Flow	48	22	7	632	641	9	

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1343	690	676	0	-	0
Stage 1	672	-	-	-	-	-
Stage 2	671	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	169	449	925	-	-	-
Stage 1	511	-	-	-	-	-
Stage 2	512	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	160	433	911	-	-	-
Mov Cap-2 Maneuver	160	-	-	-	-	-
Stage 1	500	-	-	-	-	-
Stage 2	495	-	-	-	-	-

Approach	EB		NB		SB
HCM Control Delay, s	29.6		0.1		0
HCM LOS	D				

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	911	-	160	433	-	-
HCM Lane V/C Ratio	0.007	-	0.299	0.05	-	-
HCM Control Delay (s)	9	0	36.8	13.8	-	-
HCM Lane LOS	A	A	E	B	-	-
HCM 95th %tile Q(veh)	0	-	1.2	0.2	-	-

Lanes, Volumes, Timings
2: Rantoul Street (Route 1A) & Pleasant Street

2023 Build Conditions
Weekday Evening

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	8	30	15	149	483	0	0	585	44
Future Volume (vph)	0	0	0	8	30	15	149	483	0	0	585	44
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	16	16	16	16	16	16	14	14	14	14	14	14
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt					0.962						0.991	
Flt Protected					0.993			0.988				
Satd. Flow (prot)	0	0	0	0	1851	0	0	1780	0	0	1788	0
Flt Permitted					0.993			0.988				
Satd. Flow (perm)	0	0	0	0	1851	0	0	1780	0	0	1788	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		215			147			340			250	
Travel Time (s)		4.9			3.3			7.7			5.7	
Confl. Peds. (#/hr)	18		22	21		17	22		21	17		18
Confl. Bikes (#/hr)			1									1
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	2%	2%	2%	0%	0%	0%	2%	1%	0%	0%	1%	2%
Parking (#/hr)				0	0	0	0	0	0	0	0	0
Shared Lane Traffic (%)												
Sign Control		Stop			Stop			Free			Free	

Intersection Summary

Area Type: Other
Control Type: Unsignalized

HCM 2010 TWSC
 2: Rantoul Street (Route 1A) & Pleasant Street

2023 Build Conditions
 Weekday Evening

Intersection												
Int Delay, s/veh	2.1											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↔			↔			↔	
Traffic Vol, veh/h	0	0	0	8	30	15	149	483	0	0	585	44
Future Vol, veh/h	0	0	0	8	30	15	149	483	0	0	585	44
Conflicting Peds, #/hr	18	0	22	21	0	17	22	0	21	17	0	18
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None									
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	-	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	97	97	97	97	97	97	97	97	97	97	97	97
Heavy Vehicles, %	2	2	2	0	0	0	2	1	0	0	1	2
Mvmt Flow	0	0	0	8	31	15	154	498	0	0	603	45

Major/Minor	Minor1			Major1			Major2		
Conflicting Flow All	1452	1475	515	670	0	-	-	-	0
Stage 1	805	805	-	-	-	-	-	-	-
Stage 2	647	670	-	-	-	-	-	-	-
Critical Hdwy	6.4	6.5	6.2	4.12	-	-	-	-	-
Critical Hdwy Stg 1	5.4	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	5.4	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	2.218	-	-	-	-	-
Pot Cap-1 Maneuver	145	128	564	920	-	0	0	-	-
Stage 1	443	398	-	-	-	0	0	-	-
Stage 2	525	459	-	-	-	0	0	-	-
Platoon blocked, %									
Mov Cap-1 Maneuver	109	0	555	901	-	-	-	-	-
Mov Cap-2 Maneuver	109	0	-	-	-	-	-	-	-
Stage 1	338	0	-	-	-	-	-	-	-
Stage 2	514	0	-	-	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	25.6	2.3	0
HCM LOS	D		

Minor Lane/Major Mvmt	NBL	NBTWBLn1	SBT	SBR
Capacity (veh/h)	901	-	229	-
HCM Lane V/C Ratio	0.17	-	0.239	-
HCM Control Delay (s)	9.8	0	25.6	-
HCM Lane LOS	A	A	D	-
HCM 95th %tile Q(veh)	0.6	-	0.9	-

Lanes, Volumes, Timings
4: Rantoul Street (Route 1A) & Railroad Avenue

2023 Build Conditions

Weekday Evening

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	50	95	93	12	0	40	0	486	18	25	511	0
Future Volume (vph)	50	95	93	12	0	40	0	486	18	25	511	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	16	16	16	10	10	10	11	11	11	11	11	11
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		0.99			0.95			1.00				
Frt		0.947			0.897			0.995				
Flt Protected		0.990			0.988						0.998	
Satd. Flow (prot)	0	1771	0	0	1312	0	0	1622	0	0	1650	0
Flt Permitted		0.918			0.878						0.966	
Satd. Flow (perm)	0	1642	0	0	1166	0	0	1622	0	0	1597	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		31			42			4				
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		303			423			250			465	
Travel Time (s)		6.9			9.6			5.7			10.6	
Confl. Peds. (#/hr)			3			12			25			16
Confl. Bikes (#/hr)			2			1			2			1
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	2%	0%	2%	0%	0%	3%	0%	1%	0%	0%	0%	0%
Parking (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Shared Lane Traffic (%)												
Turn Type	Perm	NA		Perm	NA			NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8						6		
Detector Phase	4	4		8	8			2		6	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0			7.0		7.0	7.0	
Minimum Split (s)	18.0	18.0		18.0	18.0			18.0		18.0	18.0	
Total Split (s)	30.0	30.0		30.0	30.0			70.0		70.0	70.0	
Total Split (%)	30.0%	30.0%		30.0%	30.0%			70.0%		70.0%	70.0%	
Maximum Green (s)	25.0	25.0		25.0	25.0			65.0		65.0	65.0	
Yellow Time (s)	4.0	4.0		4.0	4.0			4.0		4.0	4.0	
All-Red Time (s)	1.0	1.0		1.0	1.0			1.0		1.0	1.0	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		5.0			5.0			5.0			5.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0		3.0	3.0	
Recall Mode	None	None		None	None			C-Min		C-Min	C-Min	
Walk Time (s)	7.0	7.0		7.0	7.0			7.0		7.0	7.0	
Flash Dont Walk (s)	6.0	6.0		6.0	6.0			6.0		6.0	6.0	
Pedestrian Calls (#/hr)	10	10		10	10			10		10	10	

Intersection Summary

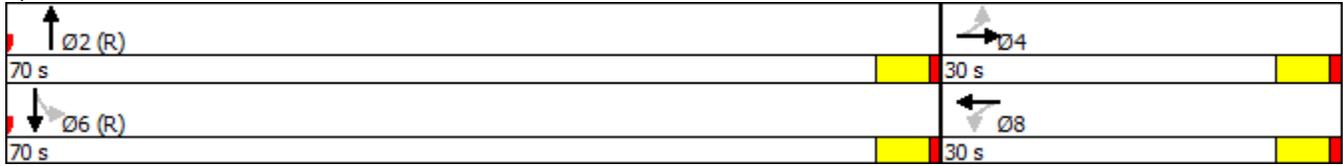
Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100

Lanes, Volumes, Timings
4: Rantoul Street (Route 1A) & Railroad Avenue

2023 Build Conditions
 Weekday Evening

Offset: 62 (62%), Referenced to phase 2:NBT and 6:SBTL, Start of Green
 Natural Cycle: 45
 Control Type: Actuated-Coordinated

Splits and Phases: 4: Rantoul Street (Route 1A) & Railroad Avenue



Queues
 4: Rantoul Street (Route 1A) & Railroad Avenue

2023 Build Conditions
 Weekday Evening

	→	←	↑	↓
Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	248	55	525	558
v/c Ratio	0.75	0.22	0.45	0.49
Control Delay	47.5	15.2	8.4	9.0
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	47.5	15.2	8.4	9.0
Queue Length 50th (ft)	132	7	121	135
Queue Length 95th (ft)	201	37	237	264
Internal Link Dist (ft)	223	343	170	385
Turn Bay Length (ft)				
Base Capacity (vph)	435	324	1162	1143
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.57	0.17	0.45	0.49
Intersection Summary				

HCM 2010 Signalized Intersection Summary
 4: Rantoul Street (Route 1A) & Railroad Avenue

2023 Build Conditions
 Weekday Evening

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	50	95	93	12	0	40	0	486	18	25	511	0
Future Volume (veh/h)	50	95	93	12	0	40	0	486	18	25	511	0
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.98		0.97	1.00		0.95	1.00		0.96	1.00		1.00
Parking Bus, Adj	1.00	1.00	0.90	1.00	1.00	0.90	1.00	1.00	0.90	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1976	1953	1976	1900	1857	1900	0	1882	1900	1900	1900	0
Adj Flow Rate, veh/h	52	99	97	12	0	42	0	506	19	26	532	0
Adj No. of Lanes	0	1	0	0	1	0	0	1	0	0	1	0
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	0	0	0	0	0	0	0	1	1	0	0	0
Cap, veh/h	89	129	112	80	20	195	0	1155	43	70	1287	0
Arrive On Green	0.19	0.19	0.19	0.19	0.00	0.19	0.00	0.71	0.71	0.71	0.71	0.00
Sat Flow, veh/h	242	690	599	193	106	1045	0	1619	61	45	1805	0
Grp Volume(v), veh/h	248	0	0	54	0	0	0	0	525	558	0	0
Grp Sat Flow(s),veh/h/ln	1531	0	0	1344	0	0	0	0	1680	1849	0	0
Q Serve(g_s), s	11.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	13.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	15.7	0.0	0.0	3.2	0.0	0.0	0.0	0.0	13.0	11.9	0.0	0.0
Prop In Lane	0.21		0.39	0.22		0.78	0.00		0.04	0.05		0.00
Lane Grp Cap(c), veh/h	330	0	0	295	0	0	0	0	1198	1356	0	0
V/C Ratio(X)	0.75	0.00	0.00	0.18	0.00	0.00	0.00	0.00	0.44	0.41	0.00	0.00
Avail Cap(c_a), veh/h	424	0	0	375	0	0	0	0	1198	1356	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	39.3	0.0	0.0	34.4	0.0	0.0	0.0	0.0	6.0	5.8	0.0	0.0
Incr Delay (d2), s/veh	5.5	0.0	0.0	0.3	0.0	0.0	0.0	0.0	1.2	0.9	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.1	0.0	0.0	1.3	0.0	0.0	0.0	0.0	6.4	6.5	0.0	0.0
LnGrp Delay(d),s/veh	44.8	0.0	0.0	34.7	0.0	0.0	0.0	0.0	7.2	6.8	0.0	0.0
LnGrp LOS	D			C					A	A		
Approach Vol, veh/h		248			54			525			558	
Approach Delay, s/veh		44.8			34.7			7.2			6.8	
Approach LOS		D			C			A			A	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		76.3		23.7		76.3		23.7				
Change Period (Y+Rc), s		5.0		5.0		5.0		5.0				
Max Green Setting (Gmax), s		65.0		25.0		65.0		25.0				
Max Q Clear Time (g_c+I1), s		15.0		17.7		13.9		5.2				
Green Ext Time (p_c), s		9.5		1.0		9.5		1.8				
Intersection Summary												
HCM 2010 Ctrl Delay				14.8								
HCM 2010 LOS				B								

MOVEMENT SUMMARY

Site: MBTA Beverly Depot Development

Pleasant Street / Park Street / Court Street Stop (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: Court Street											
3	L	34	0.0	0.074	11.3	LOS B	0.3	8.1	0.49	0.89	18.2
8	T	12	0.0	0.074	11.3	LOS B	0.3	8.1	0.49	0.84	18.2
Approach		46	0.0	0.074	11.3	LOS B	0.3	8.1	0.49	0.88	18.2
East: Pleasant Street											
1	L	1	0.0	0.167	7.5	LOS A	1.0	25.9	0.50	0.65	19.4
6	T	237	1.0	0.167	7.5	LOS A	1.0	25.9	0.50	0.50	19.4
16	R	54	0.0	0.167	7.5	LOS A	1.0	25.9	0.50	0.80	19.3
Approach		292	0.8	0.167	7.5	LOS A	1.0	25.9	0.50	0.55	19.4
North: Park Street											
4	T	1	0.0	0.060	7.5	LOS A	0.5	13.1	0.49	0.87	19.4
14	R	92	3.0	0.060	7.5	LOS A	0.5	13.1	0.49	0.51	19.3
Approach		93	3.0	0.060	7.5	LOS A	0.5	13.1	0.49	0.52	19.3
West: Pleasant Street											
5	L	223	1.0	0.135	0.0	LOS A	0.0	0.0	0.00	0.56	22.7
12	R	17	0.0	0.135	0.0	LOS A	0.0	0.0	0.00	0.51	22.9
Approach		240	0.9	0.135	0.0	NA	0.0	0.0	0.00	0.55	22.8
All Vehicles		672	1.1	0.167	5.1	NA	1.0	25.9	0.32	0.57	20.4

Level of Service (LOS) Method: Delay & v/c (HCM 2010).

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Minor Road Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

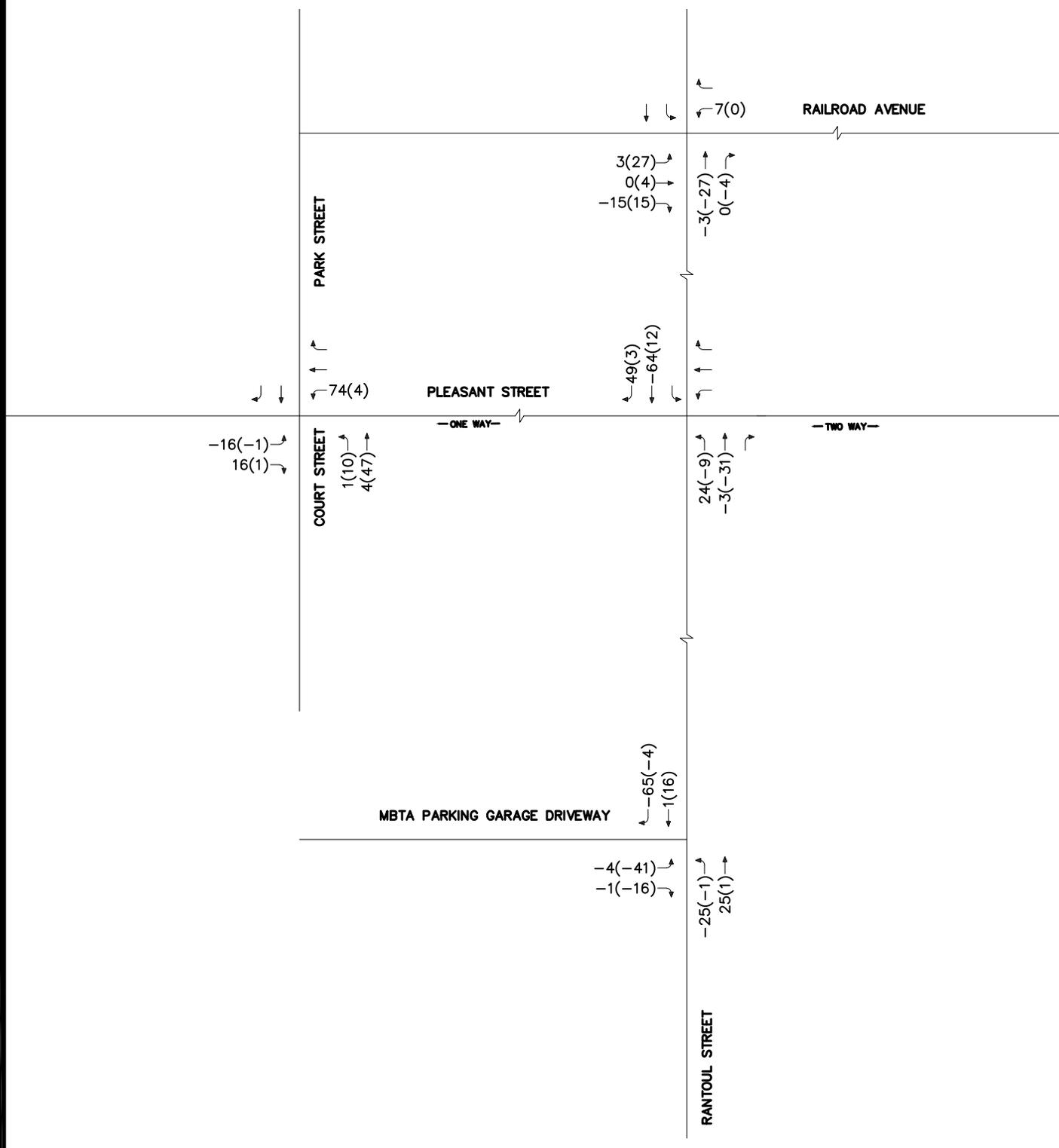
HCM Delay Model used. Geometric Delay not included.

Attachment J

2016 Construction Phase Analyses



Not to Scale



XX(XX) = WEEKDAY MORNING PEAK HOUR(WEEKDAY EVENING PEAK HOUR)

Figure J-1

Construction Phase Redistribution
Weekday Morning, and
Weekday Evening
Peak Hour Traffic Volumes

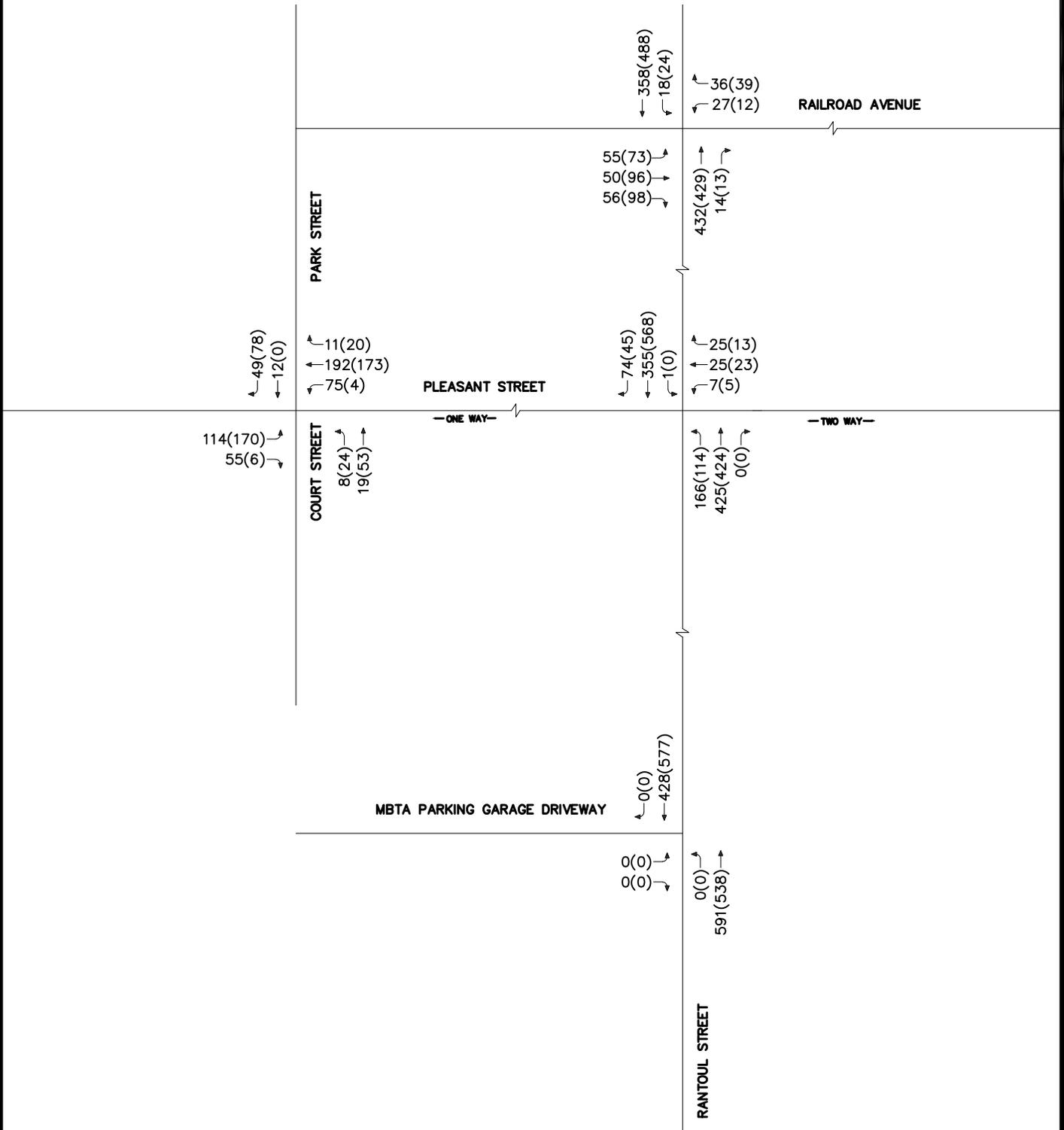




Not to Scale

MBTA Beverly Depot Site - Beverly, Massachusetts

Traffic Impact Assessment



XX(XX) = WEEKDAY MORNING PEAK HOUR(WEEKDAY EVENING PEAK HOUR)

Figure J-2

2016 Construction Phase Build Conditions
Weekday Morning, and
Weekday Evening
Peak Hour Traffic Volumes



Lanes, Volumes, Timings
 2: Rantoul Street (Route 1A) & Pleasant Street

2016 Build Construction Conditions

Weekday Morning

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	7	25	25	166	425	0	0	355	74
Future Volume (vph)	0	0	0	7	25	25	166	425	0	0	355	74
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	16	16	16	16	16	16	11	11	11	11	11	11
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt					0.941						0.977	
Flt Protected					0.994			0.986				
Satd. Flow (prot)	0	0	0	0	1813	0	0	1595	0	0	1553	0
Flt Permitted					0.994			0.986				
Satd. Flow (perm)	0	0	0	0	1813	0	0	1595	0	0	1553	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		215			147			340			250	
Travel Time (s)		4.9			3.3			7.7			5.7	
Confl. Peds. (#/hr)	25		29	13		9	29		13	9		25
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	2%	2%	2%	0%	0%	0%	0%	3%	0%	0%	4%	4%
Parking (#/hr)				0	0	0	0	0	0	0	0	0
Shared Lane Traffic (%)												
Sign Control		Stop			Stop			Free			Free	

Intersection Summary

Area Type: Other
 Control Type: Unsignalized

HCM 2010 TWSC
 2: Rantoul Street (Route 1A) & Pleasant Street

2016 Build Construction Conditions
 Weekday Morning

Intersection												
Int Delay, s/veh	2.2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↕			↕			↕	
Traffic Vol, veh/h	0	0	0	7	25	25	166	425	0	0	355	74
Future Vol, veh/h	0	0	0	7	25	25	166	425	0	0	355	74
Conflicting Peds, #/hr	25	0	29	13	0	9	29	0	13	9	0	25
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None									
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	-	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	2	2	2	0	0	0	0	3	0	0	4	4
Mvmt Flow	0	0	0	7	26	26	173	443	0	0	370	77

Major/Minor	Minor1			Major1			Major2		
Conflicting Flow All	1210	1265	452	476	0	-	-	-	0
Stage 1	789	789	-	-	-	-	-	-	-
Stage 2	421	476	-	-	-	-	-	-	-
Critical Hdwy	6.4	6.5	6.2	4.1	-	-	-	-	-
Critical Hdwy Stg 1	5.4	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	5.4	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	2.2	-	-	-	-	-
Pot Cap-1 Maneuver	204	171	612	1097	-	0	0	-	-
Stage 1	451	405	-	-	-	0	0	-	-
Stage 2	667	560	-	-	-	0	0	-	-
Platoon blocked, %									
Mov Cap-1 Maneuver	159	0	608	1086	-	-	-	-	-
Mov Cap-2 Maneuver	159	0	-	-	-	-	-	-	-
Stage 1	356	0	-	-	-	-	-	-	-
Stage 2	660	0	-	-	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	16.4	2.5	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBTWBLn1	SBT	SBR
Capacity (veh/h)	1086	-	376	-
HCM Lane V/C Ratio	0.159	-	0.158	-
HCM Control Delay (s)	8.9	0	16.4	-
HCM Lane LOS	A	A	C	-
HCM 95th %tile Q(veh)	0.6	-	0.6	-

Lanes, Volumes, Timings
3: Court Street/Park Street & Pleasant Street

2016 Build Construction Conditions
Weekday Morning

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	114	0	55	75	192	11	8	19	0	0	12	49
Future Volume (vph)	114	0	55	75	192	11	8	19	0	0	12	49
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	16	16	16	16	16	16	16	16	16	16	16	16
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.956			0.995						0.891	
Flt Protected		0.967			0.987			0.985				
Satd. Flow (prot)	0	1864	0	0	2115	0	0	2121	0	0	1622	0
Flt Permitted		0.967			0.987			0.985				
Satd. Flow (perm)	0	1864	0	0	2115	0	0	2121	0	0	1622	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		285			215			500			200	
Travel Time (s)		6.5			4.9			11.4			4.5	
Confl. Peds. (#/hr)	1		1	1		1	1		1	1		1
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Heavy Vehicles (%)	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	8%
Parking (#/hr)										0	0	0
Shared Lane Traffic (%)												
Sign Control		Free			Stop			Stop			Stop	

Intersection Summary

Area Type: Other
Control Type: Unsignalized

MOVEMENT SUMMARY

Site: MBTA Beverly Depot
Development

Pleasant Street / Park Street / Court Street
Stop (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph	
South: Court Street												
3	L	20	0.0	0.103	11.0	LOS B	0.4	10.2	0.41	0.92	18.2	
8	T	49	0.0	0.103	11.0	LOS B	0.4	10.2	0.41	0.87	18.3	
Approach		68	0.0	0.103	11.0	LOS B	0.4	10.2	0.41	0.89	18.3	
East: Pleasant Street												
1	L	80	0.0	0.168	7.5	LOS A	0.9	23.7	0.21	0.92	19.1	
6	T	204	0.0	0.168	7.5	LOS A	0.9	23.7	0.21	0.77	19.2	
16	R	12	0.0	0.168	7.5	LOS A	0.9	23.7	0.21	0.89	19.1	
Approach		296	0.0	0.168	7.5	LOS A	0.9	23.7	0.21	0.82	19.2	
North: Park Street												
4	T	18	0.0	0.077	8.2	LOS A	0.5	13.5	0.43	0.89	19.1	
14	R	74	8.0	0.077	8.2	LOS A	0.5	13.5	0.43	0.57	19.0	
Approach		92	6.4	0.077	8.2	LOS A	0.5	13.5	0.43	0.63	19.1	
West: Pleasant Street												
5	L	161	10.0	0.145	0.0	LOS A	0.0	0.0	0.00	0.56	22.7	
12	R	77	0.0	0.145	0.0	LOS A	0.0	0.0	0.00	0.51	22.9	
Approach		238	6.7	0.145	0.0	NA	0.0	0.0	0.00	0.55	22.8	
All Vehicles		694	3.2	0.168	5.4	NA	0.9	23.7	0.19	0.71	20.2	

Level of Service (LOS) Method: Delay & v/c (HCM 2010).

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Minor Road Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

HCM Delay Model used. Geometric Delay not included.

Lanes, Volumes, Timings
4: Rantoul Street (Route 1A) & Railroad Avenue

2016 Build Construction Conditions

Weekday Morning

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	55	50	56	27	0	36	0	432	14	18	358	0
Future Volume (vph)	55	50	56	27	0	36	0	432	14	18	358	0
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	16	16	16	10	10	10	11	11	11	11	11	11
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		0.99			0.95			1.00				
Frt		0.953			0.923			0.996				
Flt Protected		0.983			0.979						0.998	
Satd. Flow (prot)	0	1678	0	0	1328	0	0	1589	0	0	1614	0
Flt Permitted		0.880			0.764						0.972	
Satd. Flow (perm)	0	1502	0	0	1037	0	0	1589	0	0	1572	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		24			38			4				
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		200			400			250			500	
Travel Time (s)		4.5			9.1			5.7			11.4	
Confl. Peds. (#/hr)			4			17			14			6
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	4%	10%	7%	0%	0%	6%	0%	3%	14%	6%	2%	0%
Parking (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Shared Lane Traffic (%)												
Turn Type	Perm	NA		Perm	NA			NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8						6		
Detector Phase	4	4		8	8			2		6	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0			7.0		7.0	7.0	
Minimum Split (s)	18.0	18.0		18.0	18.0			18.0		18.0	18.0	
Total Split (s)	25.0	25.0		25.0	25.0			75.0		75.0	75.0	
Total Split (%)	25.0%	25.0%		25.0%	25.0%			75.0%		75.0%	75.0%	
Maximum Green (s)	20.0	20.0		20.0	20.0			70.0		70.0	70.0	
Yellow Time (s)	4.0	4.0		4.0	4.0			4.0		4.0	4.0	
All-Red Time (s)	1.0	1.0		1.0	1.0			1.0		1.0	1.0	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		5.0			5.0			5.0			5.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0		3.0	3.0	
Recall Mode	None	None		None	None			C-Min		C-Min	C-Min	
Walk Time (s)	7.0	7.0		7.0	7.0			7.0		7.0	7.0	
Flash Dont Walk (s)	6.0	6.0		6.0	6.0			6.0		6.0	6.0	
Pedestrian Calls (#/hr)	10	10		10	10			10		10	10	

Intersection Summary

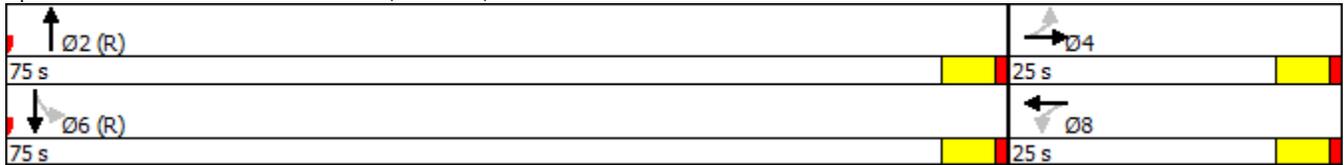
Area Type: Other
 Cycle Length: 100
 Actuated Cycle Length: 100
 Offset: 75 (75%), Referenced to phase 2:NBT and 6:SBTL, Start of Green

Lanes, Volumes, Timings
 4: Rantoul Street (Route 1A) & Railroad Avenue

2016 Build Construction Conditions
 Weekday Morning

Natural Cycle: 40
 Control Type: Actuated-Coordinated

Splits and Phases: 4: Rantoul Street (Route 1A) & Railroad Avenue



Queues
 4: Rantoul Street (Route 1A) & Railroad Avenue

2016 Build Construction Conditions
 Weekday Morning

	→	←	↑	↓
Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	172	67	475	400
v/c Ratio	0.69	0.35	0.40	0.34
Control Delay	47.8	23.7	6.4	5.9
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	47.8	23.7	6.4	5.9
Queue Length 50th (ft)	90	16	90	72
Queue Length 95th (ft)	150	53	182	147
Internal Link Dist (ft)	120	320	170	420
Turn Bay Length (ft)				
Base Capacity (vph)	325	241	1193	1180
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.53	0.28	0.40	0.34
Intersection Summary				

HCM 2010 Signalized Intersection Summary
 4: Rantoul Street (Route 1A) & Railroad Avenue

2016 Build Construction Conditions
 Weekday Morning

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	55	50	56	27	0	36	0	432	14	18	358	0
Future Volume (veh/h)	55	50	56	27	0	36	0	432	14	18	358	0
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.96		0.99	1.00		0.94	1.00		0.99	1.00		1.00
Parking Bus, Adj	1.00	1.00	0.90	1.00	1.00	0.90	1.00	1.00	0.90	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1976	1849	1976	1900	1837	1900	0	1838	1900	1900	1859	0
Adj Flow Rate, veh/h	59	53	60	29	0	38	0	460	15	19	381	0
Adj No. of Lanes	0	1	0	0	1	0	0	1	0	0	1	0
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	10	10	10	0	0	0	0	3	3	2	2	0
Cap, veh/h	106	76	71	112	16	100	0	1207	39	73	1337	0
Arrive On Green	0.14	0.14	0.14	0.14	0.00	0.14	0.00	0.76	0.76	0.76	0.76	0.00
Sat Flow, veh/h	403	533	501	425	113	706	0	1593	52	47	1764	0
Grp Volume(v), veh/h	172	0	0	67	0	0	0	0	475	400	0	0
Grp Sat Flow(s),veh/h/ln	1437	0	0	1245	0	0	0	0	1645	1811	0	0
Q Serve(g_s), s	7.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.8	0.0	0.0	0.0
Cycle Q Clear(g_c), s	11.5	0.0	0.0	4.5	0.0	0.0	0.0	0.0	9.8	6.6	0.0	0.0
Prop In Lane	0.34		0.35	0.43		0.57	0.00		0.03	0.05		0.00
Lane Grp Cap(c), veh/h	253	0	0	229	0	0	0	0	1247	1410	0	0
V/C Ratio(X)	0.68	0.00	0.00	0.29	0.00	0.00	0.00	0.00	0.38	0.28	0.00	0.00
Avail Cap(c_a), veh/h	332	0	0	300	0	0	0	0	1247	1410	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	41.6	0.0	0.0	38.6	0.0	0.0	0.0	0.0	4.1	3.7	0.0	0.0
Incr Delay (d2), s/veh	3.6	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.9	0.5	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.9	0.0	0.0	1.7	0.0	0.0	0.0	0.0	4.7	3.5	0.0	0.0
LnGrp Delay(d),s/veh	45.2	0.0	0.0	39.3	0.0	0.0	0.0	0.0	5.0	4.2	0.0	0.0
LnGrp LOS	D			D					A	A		
Approach Vol, veh/h		172			67			475			400	
Approach Delay, s/veh		45.2			39.3			5.0			4.2	
Approach LOS		D			D			A			A	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		80.8		19.2		80.8		19.2				
Change Period (Y+Rc), s		5.0		5.0		5.0		5.0				
Max Green Setting (Gmax), s		70.0		20.0		70.0		20.0				
Max Q Clear Time (g_c+I1), s		11.8		13.5		8.6		6.5				
Green Ext Time (p_c), s		7.0		0.7		7.0		1.1				
Intersection Summary												
HCM 2010 Ctrl Delay			13.0									
HCM 2010 LOS			B									

Lanes, Volumes, Timings
2: Rantoul Street (Route 1A) & Pleasant Street

2016 Build Construction Conditions

Weekday Evening

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	5	23	13	114	424	0	0	568	45
Future Volume (vph)	0	0	0	5	23	13	114	424	0	0	568	45
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	16	16	16	16	16	16	14	14	14	14	14	14
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt					0.958						0.990	
Flt Protected					0.994			0.989				
Satd. Flow (prot)	0	0	0	0	1845	0	0	1782	0	0	1787	0
Flt Permitted					0.994			0.989				
Satd. Flow (perm)	0	0	0	0	1845	0	0	1782	0	0	1787	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		215			147			340			250	
Travel Time (s)		4.9			3.3			7.7			5.7	
Confl. Peds. (#/hr)	18		22	21		17	22		21	17		18
Confl. Bikes (#/hr)			1									1
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	2%	2%	2%	0%	0%	0%	2%	1%	0%	0%	1%	2%
Parking (#/hr)				0	0	0	0	0	0	0	0	0
Shared Lane Traffic (%)												
Sign Control		Stop			Stop			Free			Free	

Intersection Summary

Area Type: Other
Control Type: Unsignalized

HCM 2010 TWSC
 2: Rantoul Street (Route 1A) & Pleasant Street

2016 Build Construction Conditions
 Weekday Evening

Intersection												
Int Delay, s/veh	1.5											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↔			↔			↔	
Traffic Vol, veh/h	0	0	0	5	23	13	114	424	0	0	568	45
Future Vol, veh/h	0	0	0	5	23	13	114	424	0	0	568	45
Conflicting Peds, #/hr	18	0	22	21	0	17	22	0	21	17	0	18
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None									
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	-	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	97	97	97	97	97	97	97	97	97	97	97	97
Heavy Vehicles, %	2	2	2	0	0	0	2	1	0	0	1	2
Mvmt Flow	0	0	0	5	24	13	118	437	0	0	586	46

Major/Minor	Minor1			Major1			Major2		
Conflicting Flow All	1302	1326	454	654	0	-	-	-	0
Stage 1	672	672	-	-	-	-	-	-	-
Stage 2	630	654	-	-	-	-	-	-	-
Critical Hdwy	6.4	6.5	6.2	4.12	-	-	-	-	-
Critical Hdwy Stg 1	5.4	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	5.4	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	2.218	-	-	-	-	-
Pot Cap-1 Maneuver	179	157	610	933	-	0	0	-	-
Stage 1	511	458	-	-	-	0	0	-	-
Stage 2	535	466	-	-	-	0	0	-	-
Platoon blocked, %									
Mov Cap-1 Maneuver	145	0	600	914	-	-	-	-	-
Mov Cap-2 Maneuver	145	0	-	-	-	-	-	-	-
Stage 1	424	0	-	-	-	-	-	-	-
Stage 2	524	0	-	-	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	17.9	2	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBTWBLn1	SBT	SBR
Capacity (veh/h)	914	-	321	-
HCM Lane V/C Ratio	0.129	-	0.132	-
HCM Control Delay (s)	9.5	0	17.9	-
HCM Lane LOS	A	A	C	-
HCM 95th %tile Q(veh)	0.4	-	0.4	-

Lanes, Volumes, Timings
3: Court Street/Park Street & Pleasant Street

2016 Build Construction Conditions

Weekday Evening

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	170	0	6	4	173	20	24	53	0	0	0	78
Future Volume (vph)	170	0	6	4	173	20	24	53	0	0	0	78
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	16	16	16	16	16	16	16	16	16	16	16	16
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.995			0.986						0.865	
Flt Protected		0.954			0.999			0.985				
Satd. Flow (prot)	0	2024	0	0	2103	0	0	2121	0	0	1628	0
Flt Permitted		0.954			0.999			0.985				
Satd. Flow (perm)	0	2024	0	0	2103	0	0	2121	0	0	1628	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		285			215			500			200	
Travel Time (s)		6.5			4.9			11.4			4.5	
Confl. Peds. (#/hr)	4		5	9		8	5		9	8		4
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	1%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	3%
Parking (#/hr)										0	0	0
Shared Lane Traffic (%)												
Sign Control		Free			Stop			Stop			Stop	

Intersection Summary

Area Type: Other
Control Type: Unsignalized

MOVEMENT SUMMARY

Site: MBTA Beverly Depot
Development

Pleasant Street / Park Street / Court Street
Stop (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph	
South: Court Street												
3	L	48	0.0	0.226	11.8	LOS B	1.0	25.1	0.44	0.93	18.0	
8	T	106	0.0	0.226	11.8	LOS B	1.0	25.1	0.44	0.88	18.1	
Approach		154	0.0	0.226	11.8	LOS B	1.0	25.1	0.44	0.90	18.0	
East: Pleasant Street												
1	L	5	0.0	0.140	7.3	LOS A	0.8	20.8	0.15	0.95	19.2	
6	T	222	1.0	0.140	7.3	LOS A	0.8	20.8	0.15	0.85	19.2	
16	R	26	0.0	0.140	7.3	LOS A	0.8	20.8	0.15	0.93	19.1	
Approach		253	0.9	0.140	7.3	LOS A	0.8	20.8	0.15	0.86	19.2	
North: Park Street												
4	T	1	0.0	0.058	7.5	LOS A	0.5	11.8	0.44	0.86	19.3	
14	R	89	3.0	0.058	7.5	LOS A	0.5	11.8	0.44	0.56	19.3	
Approach		90	3.0	0.058	7.5	LOS A	0.5	11.8	0.44	0.57	19.3	
West: Pleasant Street												
5	L	195	1.0	0.113	0.0	LOS A	0.0	0.0	0.00	0.56	22.7	
12	R	7	0.0	0.113	0.0	LOS A	0.0	0.0	0.00	0.50	22.9	
Approach		202	1.0	0.113	0.0	NA	0.0	0.0	0.00	0.56	22.7	
All Vehicles		699	1.0	0.226	6.2	NA	1.0	25.1	0.21	0.74	19.8	

Level of Service (LOS) Method: Delay & v/c (HCM 2010).

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Minor Road Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

HCM Delay Model used. Geometric Delay not included.

Lanes, Volumes, Timings
4: Rantoul Street (Route 1A) & Railroad Avenue

2016 Build Construction Conditions

Weekday Evening

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	73	96	98	12	0	39	0	429	13	24	488	0
Future Volume (vph)	73	96	98	12	0	39	0	429	13	24	488	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	16	16	16	10	10	10	11	11	11	11	11	11
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		0.99			0.95			1.00				
Frt		0.950			0.897			0.996				
Flt Protected		0.987			0.988						0.998	
Satd. Flow (prot)	0	1772	0	0	1313	0	0	1625	0	0	1650	0
Flt Permitted		0.890			0.890						0.969	
Satd. Flow (perm)	0	1598	0	0	1183	0	0	1625	0	0	1602	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		28			41			3				
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		303			423			250			465	
Travel Time (s)		6.9			9.6			5.7			10.6	
Confl. Peds. (#/hr)			3			12			25			16
Confl. Bikes (#/hr)			2			1			2			1
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	2%	0%	2%	0%	0%	3%	0%	1%	0%	0%	0%	0%
Parking (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Shared Lane Traffic (%)												
Turn Type	Perm	NA		Perm	NA			NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8						6		
Detector Phase	4	4		8	8			2		6	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0			7.0		7.0	7.0	
Minimum Split (s)	18.0	18.0		18.0	18.0			18.0		18.0	18.0	
Total Split (s)	30.0	30.0		30.0	30.0			70.0		70.0	70.0	
Total Split (%)	30.0%	30.0%		30.0%	30.0%			70.0%		70.0%	70.0%	
Maximum Green (s)	25.0	25.0		25.0	25.0			65.0		65.0	65.0	
Yellow Time (s)	4.0	4.0		4.0	4.0			4.0		4.0	4.0	
All-Red Time (s)	1.0	1.0		1.0	1.0			1.0		1.0	1.0	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		5.0			5.0			5.0			5.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0		3.0	3.0	
Recall Mode	None	None		None	None			C-Min		C-Min	C-Min	
Walk Time (s)	7.0	7.0		7.0	7.0			7.0		7.0	7.0	
Flash Dont Walk (s)	6.0	6.0		6.0	6.0			6.0		6.0	6.0	
Pedestrian Calls (#/hr)	10	10		10	10			10		10	10	

Intersection Summary

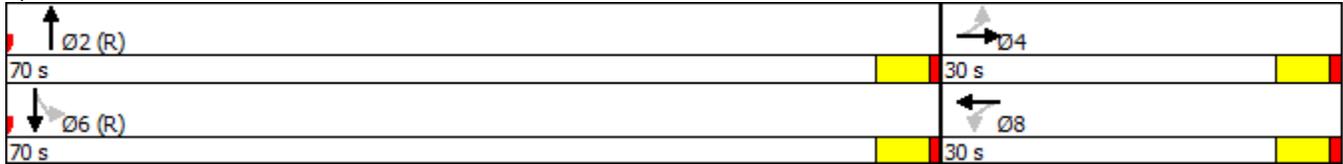
Area Type: Other
 Cycle Length: 100
 Actuated Cycle Length: 100

Lanes, Volumes, Timings
4: Rantoul Street (Route 1A) & Railroad Avenue

2016 Build Construction Conditions
 Weekday Evening

Offset: 62 (62%), Referenced to phase 2:NBT and 6:SBTL, Start of Green
 Natural Cycle: 50
 Control Type: Actuated-Coordinated

Splits and Phases: 4: Rantoul Street (Route 1A) & Railroad Avenue



Queues
 4: Rantoul Street (Route 1A) & Railroad Avenue

2016 Build Construction Conditions
 Weekday Evening

	→	←	↑	↓
Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	278	54	461	533
v/c Ratio	0.79	0.19	0.41	0.48
Control Delay	48.6	14.0	8.9	10.0
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	48.6	14.0	8.9	10.0
Queue Length 50th (ft)	152	7	111	139
Queue Length 95th (ft)	224	35	216	269
Internal Link Dist (ft)	223	343	170	385
Turn Bay Length (ft)				
Base Capacity (vph)	430	334	1135	1118
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.65	0.16	0.41	0.48
Intersection Summary				

HCM 2010 Signalized Intersection Summary
4: Rantoul Street (Route 1A) & Railroad Avenue

2016 Build Construction Conditions
Weekday Evening

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	73	96	98	12	0	39	0	429	13	24	488	0
Future Volume (veh/h)	73	96	98	12	0	39	0	429	13	24	488	0
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.98		0.97	1.00		0.95	1.00		0.96	1.00		1.00
Parking Bus, Adj	1.00	1.00	0.90	1.00	1.00	0.90	1.00	1.00	0.90	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1976	1951	1976	1900	1858	1900	0	1882	1900	1900	1900	0
Adj Flow Rate, veh/h	76	100	102	12	0	41	0	447	14	25	508	0
Adj No. of Lanes	0	1	0	0	1	0	0	1	0	0	1	0
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	0	0	0	0	0	0	0	1	1	0	0	0
Cap, veh/h	117	127	115	86	20	212	0	1129	35	69	1253	0
Arrive On Green	0.21	0.21	0.21	0.21	0.00	0.21	0.00	0.69	0.69	0.69	0.69	0.00
Sat Flow, veh/h	341	610	551	201	98	1021	0	1631	51	45	1810	0
Grp Volume(v), veh/h	278	0	0	53	0	0	0	0	461	533	0	0
Grp Sat Flow(s),veh/h/ln	1502	0	0	1319	0	0	0	0	1682	1855	0	0
Q Serve(g_s), s	14.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11.6	0.0	0.0	0.0
Cycle Q Clear(g_c), s	17.9	0.0	0.0	3.1	0.0	0.0	0.0	0.0	11.6	12.0	0.0	0.0
Prop In Lane	0.27		0.37	0.23		0.77	0.00		0.03	0.05		0.00
Lane Grp Cap(c), veh/h	358	0	0	319	0	0	0	0	1164	1321	0	0
V/C Ratio(X)	0.78	0.00	0.00	0.17	0.00	0.00	0.00	0.00	0.40	0.40	0.00	0.00
Avail Cap(c_a), veh/h	420	0	0	372	0	0	0	0	1164	1321	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	38.3	0.0	0.0	32.6	0.0	0.0	0.0	0.0	6.5	6.6	0.0	0.0
Incr Delay (d2), s/veh	7.6	0.0	0.0	0.2	0.0	0.0	0.0	0.0	1.0	0.9	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.2	0.0	0.0	1.2	0.0	0.0	0.0	0.0	5.7	6.6	0.0	0.0
LnGrp Delay(d),s/veh	45.9	0.0	0.0	32.8	0.0	0.0	0.0	0.0	7.5	7.5	0.0	0.0
LnGrp LOS	D			C					A	A		
Approach Vol, veh/h		278			53			461			533	
Approach Delay, s/veh		45.9			32.8			7.5			7.5	
Approach LOS		D			C			A			A	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		74.2		25.8		74.2		25.8				
Change Period (Y+Rc), s		5.0		5.0		5.0		5.0				
Max Green Setting (Gmax), s		65.0		25.0		65.0		25.0				
Max Q Clear Time (g_c+I1), s		13.6		19.9		14.0		5.1				
Green Ext Time (p_c), s		8.3		0.9		8.3		2.0				
Intersection Summary												
HCM 2010 Ctrl Delay			16.6									
HCM 2010 LOS			B									

Attachment K

2023 Build Conditions 3-Lane vs. 2-Lane Garage Driveway

Lanes, Volumes, Timings
5: MBTA Garage

2023 Build Conditions
Weekday Morning

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	16	0	0	97	0	0	1	0	0	1	0
Future Volume (vph)	0	16	0	0	97	0	0	1	0	0	1	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt												
Flt Protected												
Satd. Flow (prot)	0	1900	0	0	1900	0	0	1863	0	0	1863	0
Flt Permitted												
Satd. Flow (perm)	0	1900	0	0	1900	0	0	1863	0	0	1863	0
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		69			90			85			57	
Travel Time (s)		1.6			2.0			1.9			1.3	
Peak Hour Factor	0.25	0.25	0.25	0.93	0.93	0.93	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	2%	2%	2%	2%	2%	2%
Shared Lane Traffic (%)												
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary

Area Type: Other
Control Type: Unsignalized

Intersection

Intersection Delay, s/veh	7.4
Intersection LOS	A

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Lane Configurations			↔				↔				↔	
Traffic Vol, veh/h	0	0	16	0	0	0	97	0	0	0	1	0
Future Vol, veh/h	0	0	16	0	0	0	97	0	0	0	1	0
Peak Hour Factor	0.92	0.25	0.25	0.25	0.92	0.93	0.93	0.93	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	0	0	0	2	0	0	0	2	2	2	2
Mvmt Flow	0	0	64	0	0	0	104	0	0	0	1	0
Number of Lanes	0	0	1	0	0	0	1	0	0	0	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	1	1	1
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	1	1	1
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	1	1	1
HCM Control Delay	7.3	7.5	7.3
HCM LOS	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	0%	0%	0%	0%
Vol Thru, %	100%	100%	100%	100%
Vol Right, %	0%	0%	0%	0%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	1	16	97	1
LT Vol	0	0	0	0
Through Vol	1	16	97	1
RT Vol	0	0	0	0
Lane Flow Rate	1	64	104	1
Geometry Grp	1	1	1	1
Degree of Util (X)	0.001	0.071	0.114	0.001
Departure Headway (Hd)	4.225	3.981	3.951	4.225
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	839	901	910	839
Service Time	2.292	1.999	1.963	2.292
HCM Lane V/C Ratio	0.001	0.071	0.114	0.001
HCM Control Delay	7.3	7.3	7.5	7.3
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0	0.2	0.4	0

Intersection

Intersection Delay, s/veh
Intersection LOS

Movement	SBU	SBL	SBT	SBR
Lane Configurations			↔	
Traffic Vol, veh/h	0	0	1	0
Future Vol, veh/h	0	0	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2
Mvmt Flow	0	0	1	0
Number of Lanes	0	0	1	0
Approach	SB			
Opposing Approach	NB			
Opposing Lanes	1			
Conflicting Approach Left	WB			
Conflicting Lanes Left	1			
Conflicting Approach Right	EB			
Conflicting Lanes Right	1			
HCM Control Delay	7.3			
HCM LOS	A			

Lanes, Volumes, Timings
 1: Rantoul Street (Route 1A) & MBTA Garage

2023 Build Conditions w/ 1 Lane Egress
 Weekday Evening

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	44	20	5	582	591	7
Future Volume (vph)	44	20	5	582	591	7
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.958				0.998	
Flt Protected	0.967					
Satd. Flow (prot)	1760	0	0	1881	1859	0
Flt Permitted	0.967					
Satd. Flow (perm)	1760	0	0	1881	1859	0
Link Speed (mph)	30			30	30	
Link Distance (ft)	90			500	340	
Travel Time (s)	2.0			11.4	7.7	
Confl. Peds. (#/hr)	26	18	18			26
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	1%	2%	0%
Shared Lane Traffic (%)						
Sign Control	Stop			Free	Free	

Intersection Summary

Area Type: Other
 Control Type: Unsignalized

HCM 2010 TWSC
 1: Rantoul Street (Route 1A) & MBTA Garage

2023 Build Conditions w/ 1 Lane Egress
 Weekday Evening

Intersection

Int Delay, s/veh 1.7

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	44	20	5	582	591	7
Future Vol, veh/h	44	20	5	582	591	7
Conflicting Peds, #/hr	26	18	18	0	0	26
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	1	2	0
Mvmt Flow	48	22	5	633	642	8

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1341	690	676	0	-	0
Stage 1	672	-	-	-	-	-
Stage 2	669	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	170	449	925	-	-	-
Stage 1	511	-	-	-	-	-
Stage 2	513	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	161	433	911	-	-	-
Mov Cap-2 Maneuver	161	-	-	-	-	-
Stage 1	500	-	-	-	-	-
Stage 2	498	-	-	-	-	-

Approach	EB		NB		SB
HCM Control Delay, s	32.3		0.1		0
HCM LOS	D				

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	911	-	200	-	-
HCM Lane V/C Ratio	0.006	-	0.348	-	-
HCM Control Delay (s)	9	0	32.3	-	-
HCM Lane LOS	A	A	D	-	-
HCM 95th %tile Q(veh)	0	-	1.5	-	-

Attachment L

Parking Supply and Demand

Occupancy report

Report Lane(s): 0..13, 63.

From 5/12/2016 at 00:00:00 To 5/13/2016 at 00:00:59

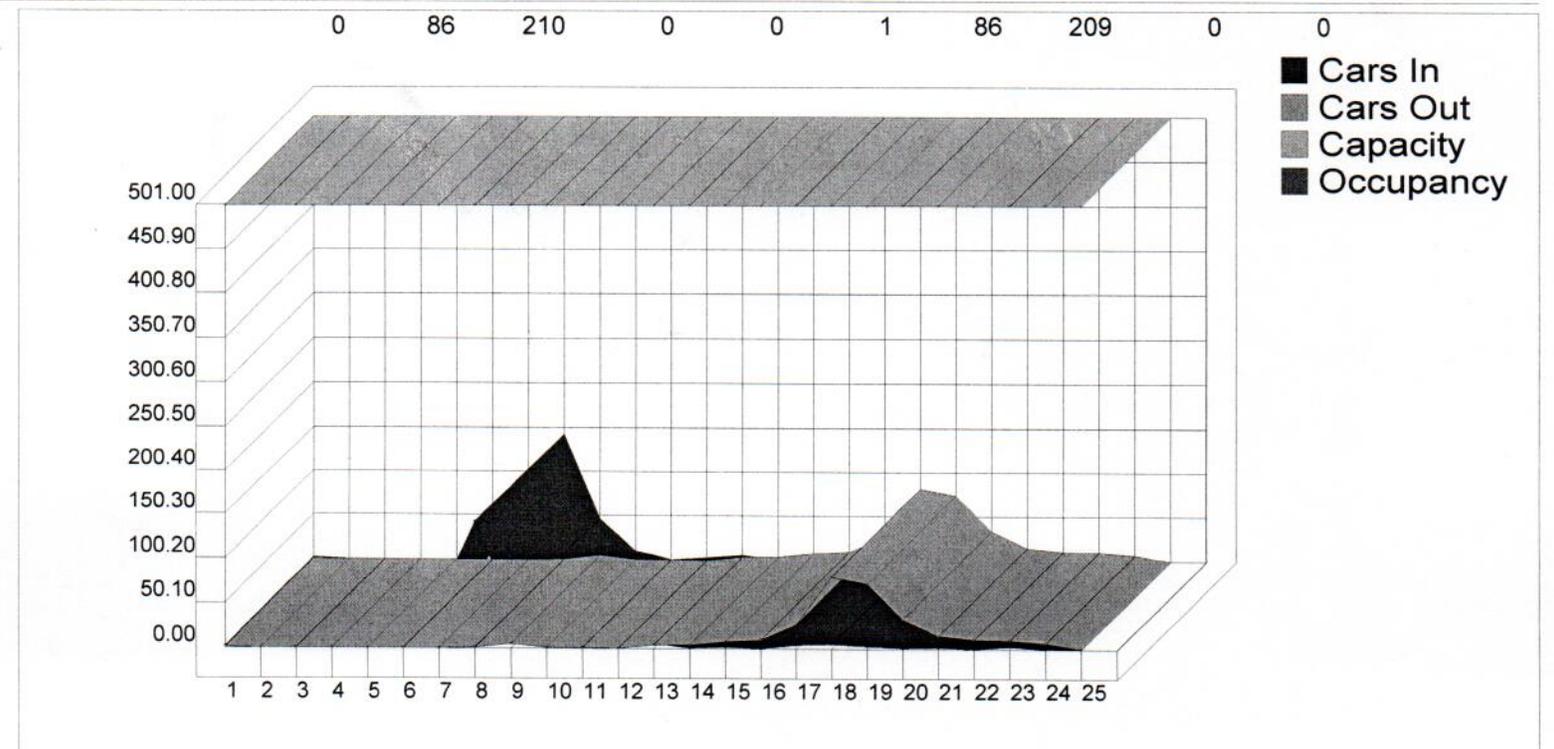
Generated on 5/16/2016 at 10:13:02

Version 2.9

Counter Configuration # 0 Day Change Time 00:00:00 % Occupied based on 500

Report Started for : Tickets Monthly BarCodes Hotel Credit

	Tickets	Monthly	BarCodes	Hotel	Credit	Tickets	Monthly	BarCodes	Hotel	Credit	Occup./ Vacancy
C'Over	0	0	-8020	0	0						
05/12/2016 01:00	0	2	0	0	0	0	0	1	0	0	-8019604% 8519
05/12/2016 02:00	0	0	0	0	0	0	0	0	0	0	-8019604% 8519
05/12/2016 03:00	0	0	0	0	0	0	0	0	0	0	-8019604% 8519
05/12/2016 04:00	0	0	0	0	0	0	0	0	0	0	-8019604% 8519
05/12/2016 05:00	0	0	0	0	0	0	0	0	0	0	-8019604% 8519
05/12/2016 06:00	0	1	6	0	0	0	0	0	0	0	-8012602% 8512
05/12/2016 07:00	0	11	44	0	0	0	0	0	0	0	-7957591% 8457
05/12/2016 08:00	0	53	90	0	0	0	1	0	0	0	-7815563% 8315
05/12/2016 09:00	0	11	36	0	0	1	2	2	0	0	-7773555% 8273
05/12/2016 10:00	0	1	10	0	0	0	0	1	0	0	-7763553% 8263
05/12/2016 11:00	0	0	1	0	0	0	0	1	0	0	-7763553% 8263
05/12/2016 12:00	0	1	2	0	0	0	0	0	0	0	-7760552% 8260
05/12/2016 13:00	0	0	6	0	0	0	1	3	0	0	-7758552% 8258
05/12/2016 14:00	0	1	0	0	0	0	2	2	0	0	-7761552% 8261
05/12/2016 15:00	0	1	1	0	0	0	3	5	0	0	-7767553% 8267
05/12/2016 16:00	0	0	0	0	0	0	3	7	0	0	-7777555% 8277
05/12/2016 17:00	0	0	4	0	0	0	5	23	0	0	-7801560% 8301
05/12/2016 18:00	0	2	3	0	0	0	25	57	0	0	-7878576% 8378
05/12/2016 19:00	0	0	3	0	0	0	30	44	0	0	-7949590% 8449
05/12/2016 20:00	0	0	1	0	0	0	8	26	0	0	-7982596% 8482
05/12/2016 21:00	0	0	2	0	0	0	1	14	0	0	-7995599% 8495
05/12/2016 22:00	0	0	0	0	0	0	1	10	0	0	-8006601% 8506
05/12/2016 23:00	0	2	1	0	0	0	4	6	0	0	-8013603% 8513
05/13/2016 00:00	0	0	0	0	0	0	0	7	0	0	-8020604% 8520
05/13/2016 01:00	0	0	0	0	0	0	0	0	0	0	-8020604% 8520



Occupancy report

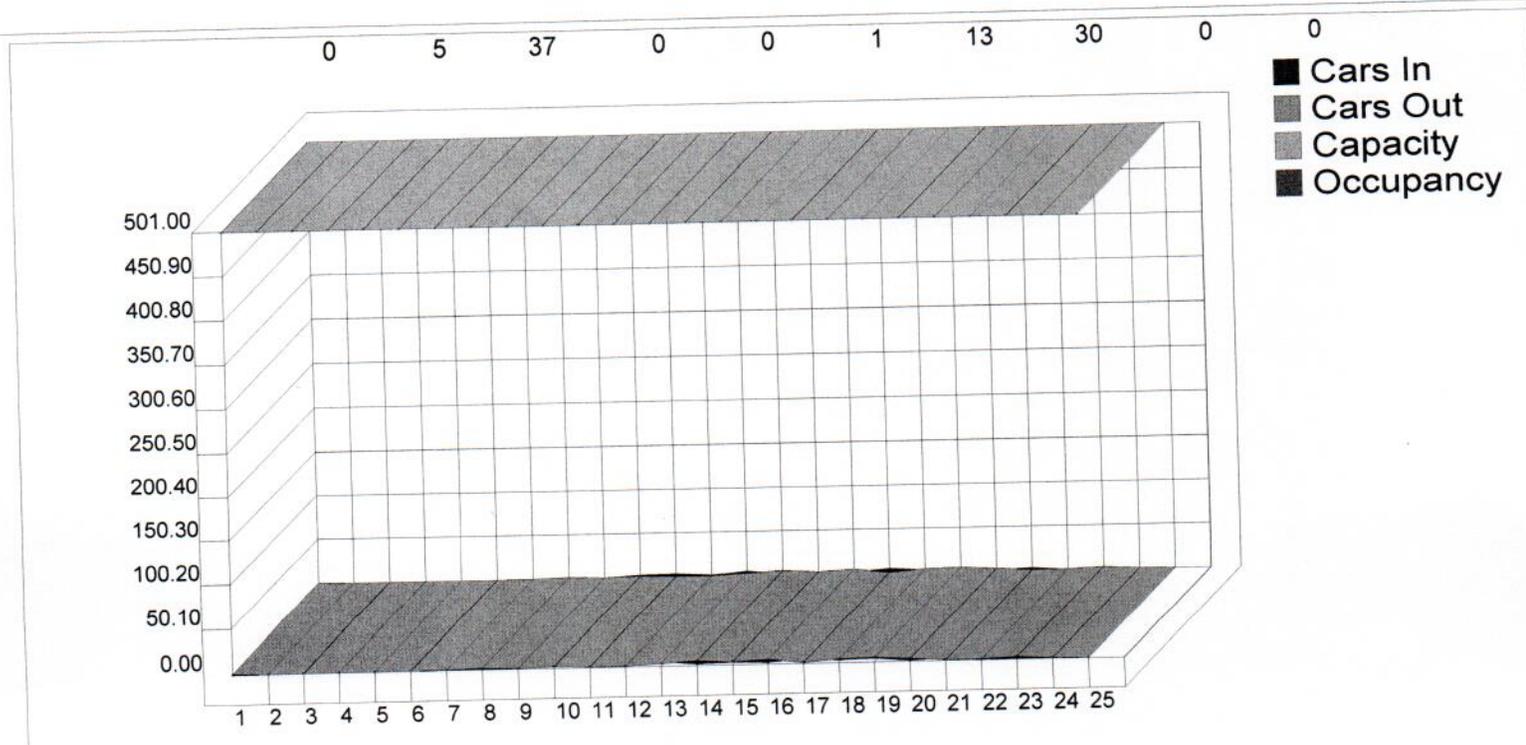
Report Lane(s): 0..13, 63.
 From 5/14/2016 at 00:00:00 To 5/15/2016 at 00:00:59
 Generated on 5/16/2016 at 10:12:47

Counter Configuration # 0 Day Change Time 00:00:00 % Occupied based on 500

Version 2.9

Report Started for : Tickets Monthly BarCodes Hotel Credit

	Tickets	Monthly	BarCodes	Hotel	Credit	Tickets	Monthly	BarCodes	Hotel	Credit	Occup./ Vacancy
C'Over	0	0	-8082	0	0						
05/14/2016 01:00	0	0	0	0	0	0	1	0	0	0	-8083 617% 8583
05/14/2016 02:00	0	0	0	0	0	0	0	0	0	0	-8083 617% 8583
05/14/2016 03:00	0	0	0	0	0	0	0	0	0	0	-8083 617% 8583
05/14/2016 04:00	0	0	0	0	0	0	0	0	0	0	-8083 617% 8583
05/14/2016 05:00	0	0	0	0	0	0	0	0	0	0	-8083 617% 8583
05/14/2016 06:00	0	0	0	0	0	0	0	1	0	0	-8083 617% 8583
05/14/2016 07:00	0	0	1	0	0	0	1	1	0	0	-8084 617% 8584
05/14/2016 08:00	0	0	1	0	0	0	1	0	0	0	-8084 617% 8584
05/14/2016 09:00	0	0	3	0	0	0	1	1	0	0	-8083 617% 8583
05/14/2016 10:00	0	0	3	0	0	0	1	0	0	0	-8080 616% 8580
05/14/2016 11:00	0	1	2	0	0	1	0	0	0	0	-8079 616% 8579
05/14/2016 12:00	0	0	4	0	0	0	0	3	0	0	-8077 615% 8577
05/14/2016 13:00	0	1	2	0	0	0	2	3	0	0	-8080 616% 8580
05/14/2016 14:00	0	0	2	0	0	0	1	2	0	0	-8080 616% 8580
05/14/2016 15:00	0	1	2	0	0	0	2	3	0	0	-8083 617% 8583
05/14/2016 16:00	0	0	2	0	0	0	0	1	0	0	-8079 616% 8579
05/14/2016 17:00	0	0	5	0	0	0	0	3	0	0	-8080 616% 8580
05/14/2016 18:00	0	0	3	0	0	0	1	4	0	0	-8081 616% 8581
05/14/2016 19:00	0	1	3	0	0	0	1	3	0	0	-8083 617% 8583
05/14/2016 20:00	0	1	0	0	0	0	0	1	0	0	-8081 616% 8581
05/14/2016 21:00	0	0	3	0	0	0	0	1	0	0	-8082 616% 8582
05/14/2016 22:00	0	0	0	0	0	0	0	2	0	0	-8084 617% 8584
05/14/2016 23:00	0	0	1	0	0	0	0	1	0	0	-8084 617% 8584
05/15/2016 00:00	0	0	1	0	0	0	0	0	0	0	-8084 617% 8584
05/15/2016 01:00	0	0	0	0	0	0	0	0	0	0	



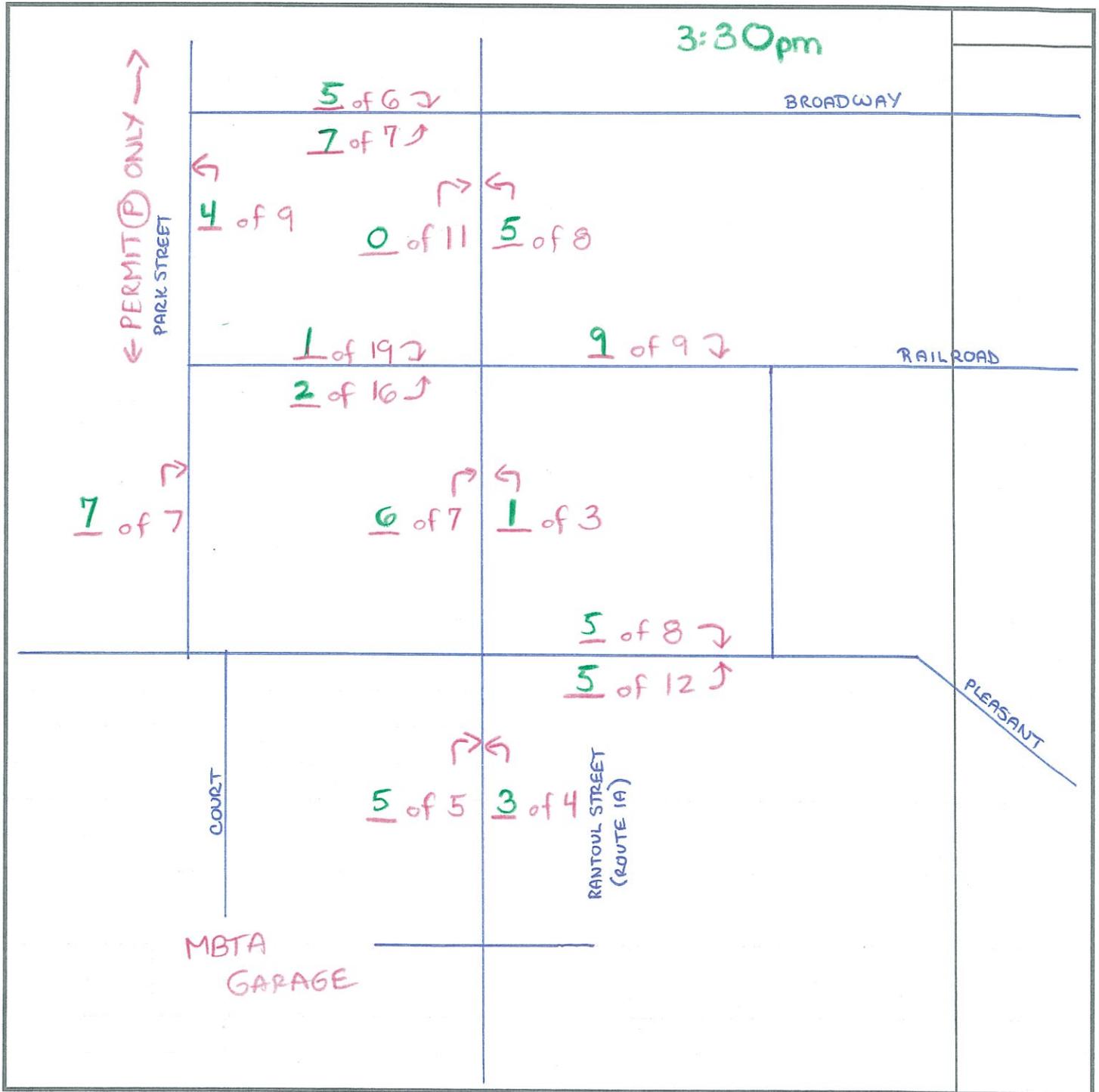


CALCULATIONS

65 GLENN STREET, LAWRENCE, MA 01843
TEL 978.794.1792 | FAX 978.794.1793 | TECMASS.COM

JOB: 131 Rantoul Street Redevelopment
LOCATION: Beverly, Massachusetts
TITLE: Parking Demand Count Sheet
CALCULATED BY: SWG

JOB NUMBER: T0589
DATE: Thursday April 24, 2015
SHEET: 1 OF 7
CHECKED BY: _____



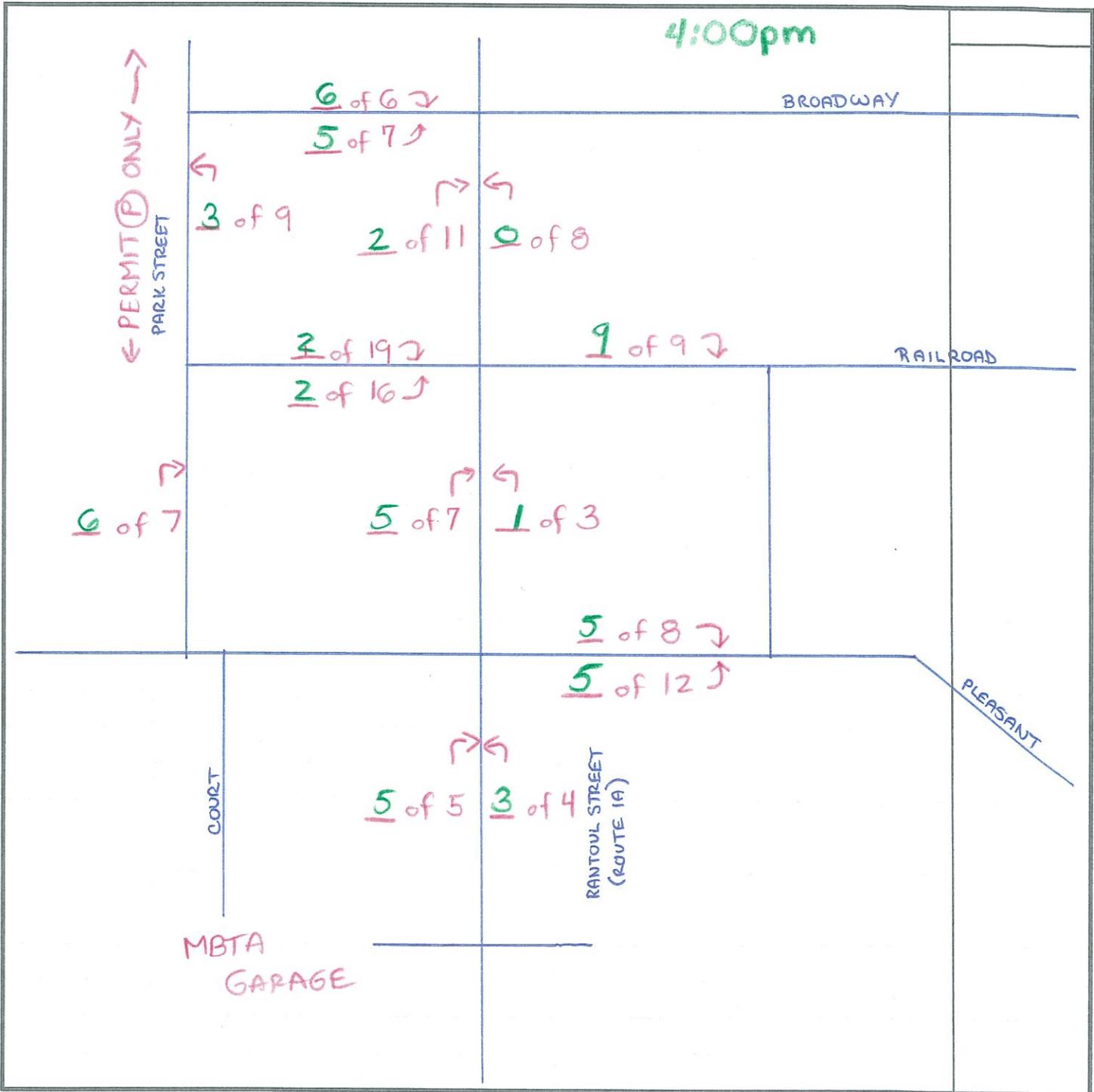


Calculations

65 GLENN STREET, LAWRENCE, MA 01843
TEL 978.794.1792 | FAX 978.794.1793 | TECMASS.COM

JOB: 131 Rantoul Street Redevelopment
LOCATION: Beverly, Massachusetts
TITLE: Parking Demand Count Sheet
CALCULATED BY: SWG

JOB NUMBER: T0589
DATE: Thursday April 24, 2015
SHEET: 2 OF 7
CHECKED BY: _____



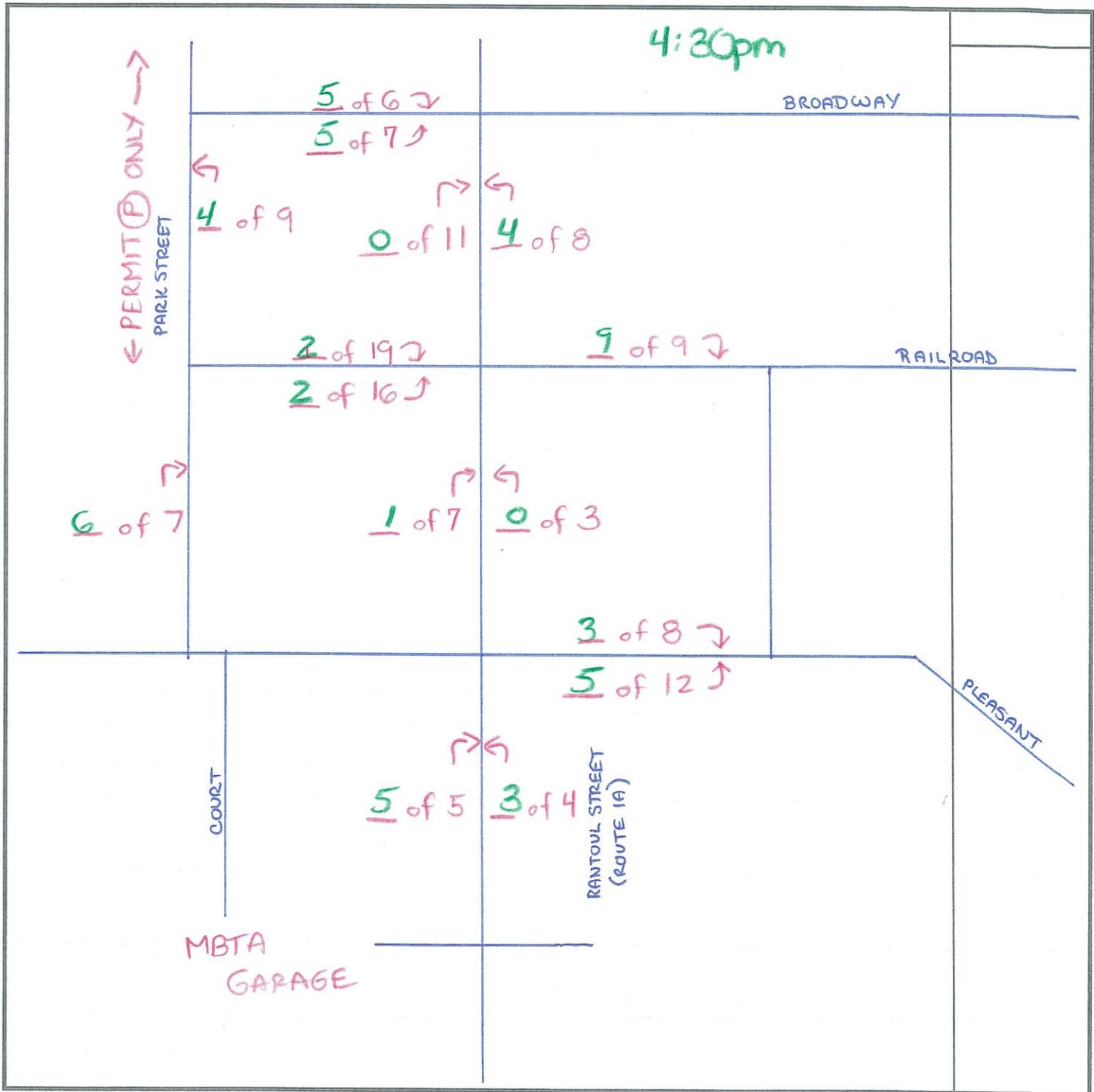


CALCULATIONS

65 GLENN STREET, LAWRENCE, MA 01843
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JOB: 131 Rantoul Street Redevelopment
LOCATION: Beverly, Massachusetts
TITLE: Parking Demand Count Sheet
CALCULATED BY: SWG

JOB NUMBER: T0589
DATE: Thursday April 24, 2015
SHEET: 3 OF 7
CHECKED BY: _____



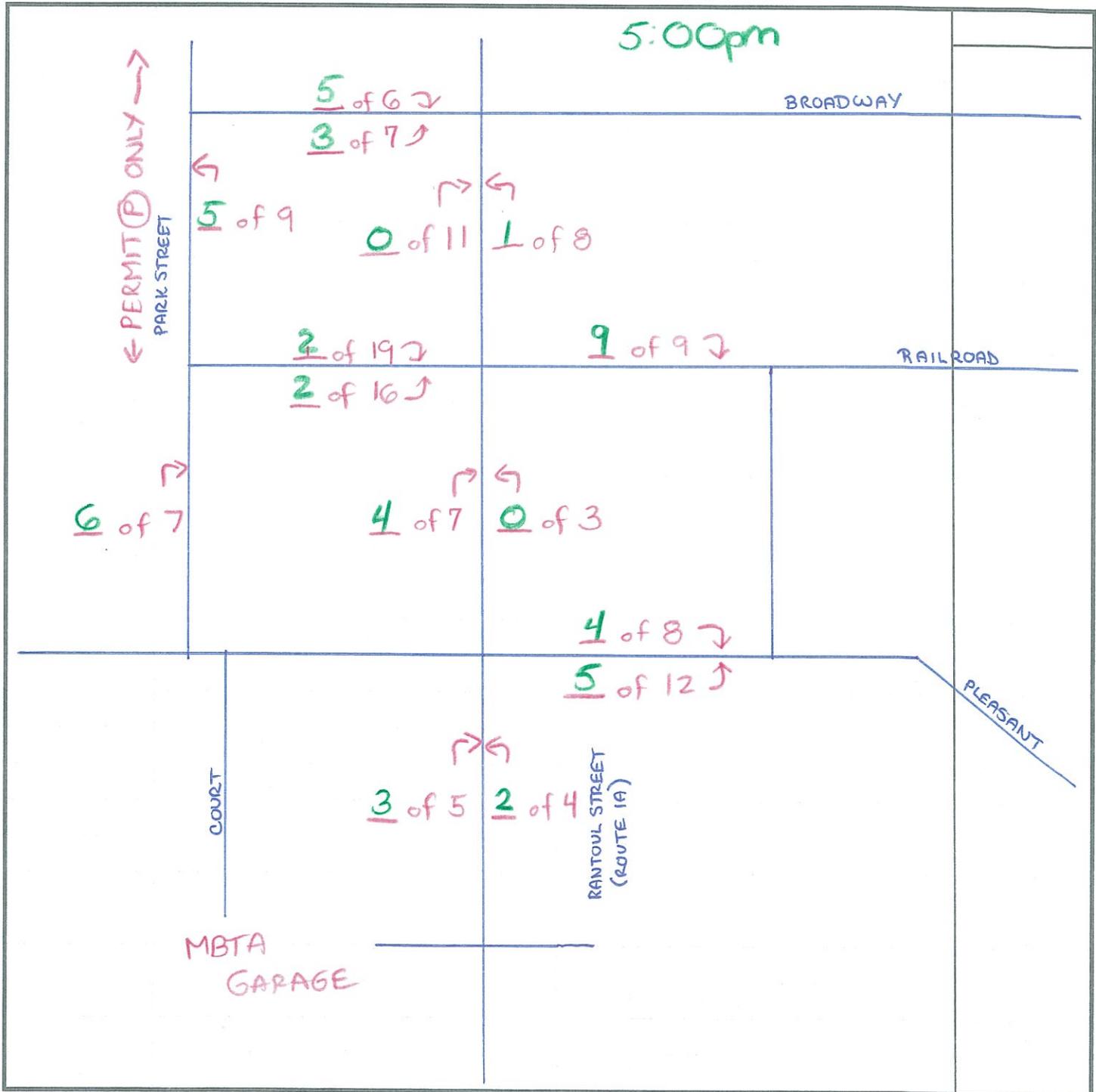


CALCULATIONS

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CALCULATED BY: SWG

JOB NUMBER: T0589
DATE: Thursday April 24, 2015
SHEET: 4 OF 7
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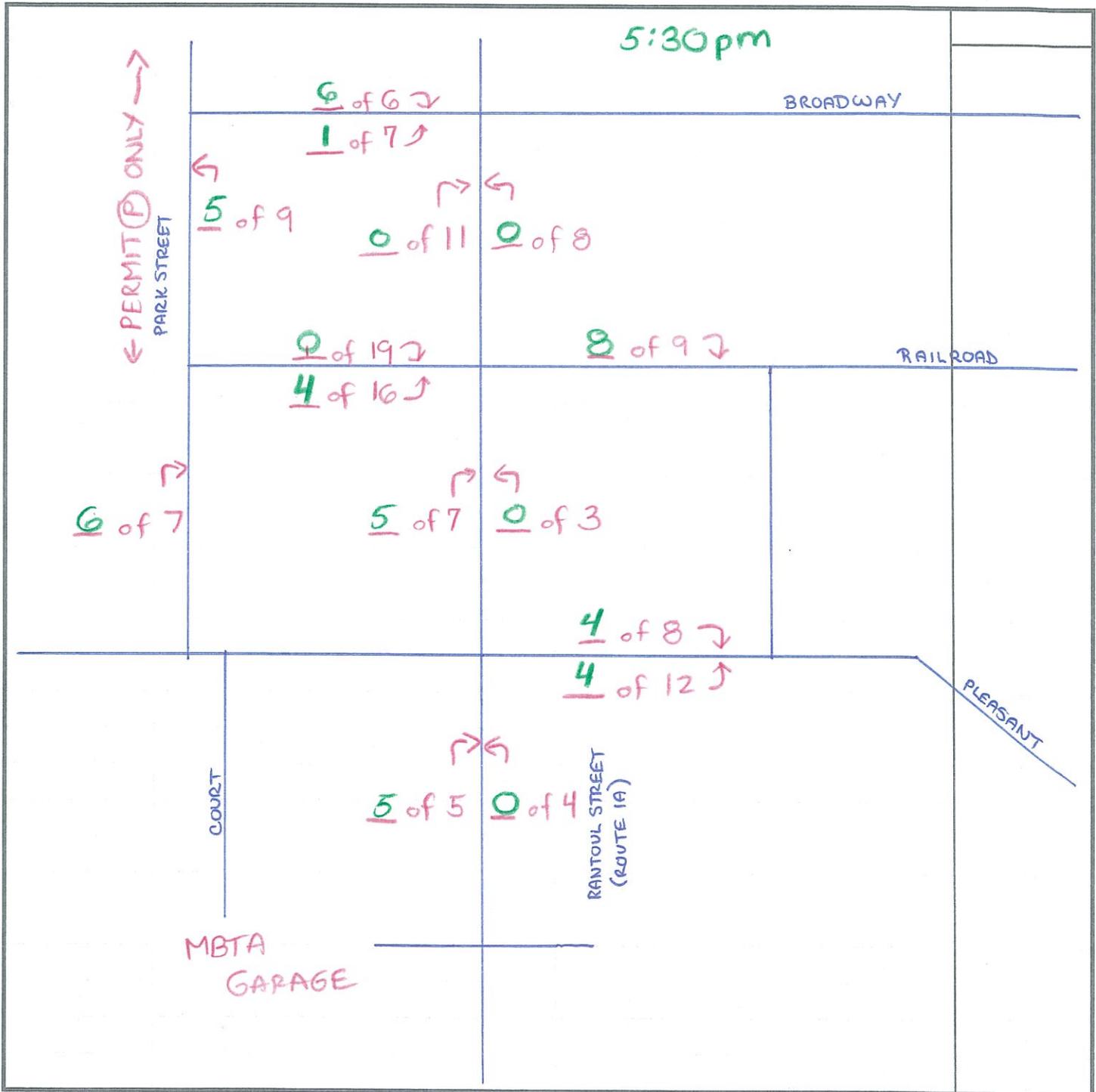


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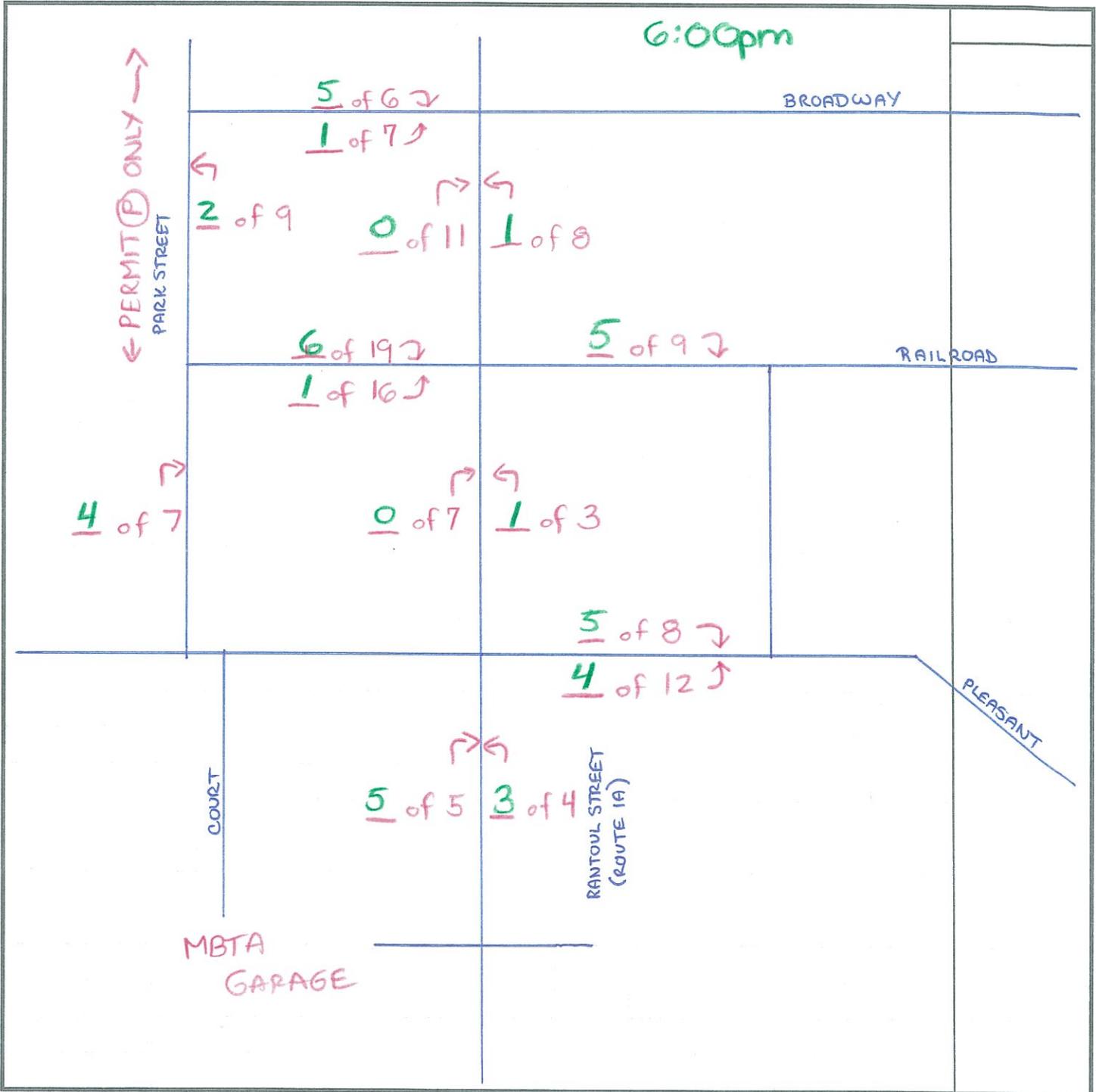


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