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Barney S. Heath
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PUBLIC HEARING/WORKING SESSION MEMORANDUM

DATE: May 29, 2020

MEETING DATE: June 2, 2020

TO: Land Use Committee of the City Council

FROM: Barney Heath, Director of Planning and Development
Neil Cronin, Chief Planner for Current Planning

CC: Petitioner

In response to questions raised at the City Council public hearing, the Planning Department is providing the following information for the upcoming public hearing/working session. This information is supplemental to staff analysis previously provided at the Land Use Committee public hearing.

PETITIONS #26-20 & #27-20 — 355 and 399 Grove Street

Petition #26-20 for a change of zone to Mixed Use 3/Transit Oriented District for portions of land located at 355 Grove Street (currently zoned BU-2) and 399 Grove Street (currently zoned BU-5), also identified as Section 42, Block 11, Lots 3 and 4

Petition #27-20 for a SPECIAL PERMIT/SITE PLAN APPROVAL construct a mixed use, transit-oriented development of residential units, office, retail, personal services, restaurant, hotel, and related commercial uses not to exceed 1,025,000 square feet of gross floor area, with residential uses comprising not less than 60% of the total gross floor area with a residential density of not less than 800 square feet per unit with not less than 560 units nor more than 620 units with special permit relief and/or waivers as follows: a development of more than 20,000 square feet of gross floor area, building height of up to 170 feet, buildings up to 11 stories, Floor Area Ratio of up to 2.5, beneficial open space of not less than 15%, increase of height of certain buildings with the Grove Street Area Corridor (to the extent necessary), and reduction in setback from Grove Street for certain buildings within the Grove Street Corridor Area (to the extent necessary); waiver of the sustainable development design standards and placement of a retaining wall greater than 4 feet in height within a setback; for-profit educational use, retail sales of over 5,000 square feet, restaurant with more than 50 seats, personal service use of over 5,000 square feet, place of amusement, health club on ground floor, animal services, hotel, bank up to and over 5,000 square feet, theatre/hall, laboratory/research facility, parking facility, accessory, multi-level, parking facility, non-accessory, single level; reduction of the residential parking requirement to 1.25 stalls per unit, reduction of the overall parking requirement by 1/3, and waiver of

parking stalls not to exceed 685 stall; and waivers to the requirements of parking facilities containing more than five stalls; waiver of the number, size, type, location, and design requirements, all at 355 and 399 GROVE STREET on land known as Section 42, Block 11, Lots 3, 4 and 4A, containing approximately 13.05 acres of land in districts zoned Mixed Use 3 Transit Oriented (MU3), BU2 (a portion to be rezoned to MU3), BU5 (to be rezoned to MU3). Ref: Sec. 4.2.2.B, 4.2.3, 4.2.4, 4.2.4.A.4, 4.2.4.B.3, 4.2.4.G.2, 4.4.1, 5.1.4, 5.1.4.A, 5.1.4.C, 5.1.8.B.1, 5.1.8.B.2, 5.1.8.B.4, 5.1.8.B.6, 5.1.8.D.1, 5.1.8.D.2, 5.1.9.B, 5.1.10.A.1, 5.1.10.B.3, 5.1.10.B.5, 5.1.12, 5.1.12.B.4, 5.1.13, 5.2, 5.2.13, 5.4.2.B, 5.12, 6.4.29.C.5, 7.3.3, 7.3.5, 7.4 of the City of Newton Revised Zoning Ordinance, 2017. Additionally, as to infiltration and inflow mitigation, an abatement of the infiltration/inflow mitigation fee pursuant to Section 29-170 of the City of Newton Revised Zoning Ordinance, 2017.

The Land Use Committee (the "Committee") opened the public hearings on these petitions on January 28, 2020; both public hearings remain open. A tentative schedule for future Committee public hearings is included as an attachment to this report (**Attachment A)**. This memorandum is focused on the transportation aspects of the so-called "Riverside Development" proposed for the subject parcels.

Background

The petitioners are requesting a change of zone for a portion of 355 Grove Street, currently the Massachusetts Bay Transportation Authority (the "MBTA") rail yard, and all of 399 Grove Street, currently the Hotel Indigo, to the Mixed Use 3/Transit Oriented Zone (the "MU-3/TOD zone"). The petitioners are also seeking special permits to allow a ten-building development on site. The petitioners filed revised plans which result in a development of 582 dwelling units, 253,827 square feet of office space, of which 7,500 square feet will be dedicated to the MBTA, 150 hotel rooms, and 38,895 square feet of ground floor commercial space (the "Project").

Overview

The petitioners engaged Vanasse Hangen Brustlin, Inc. ("Vhb") to develop the transportation related aspects of the Project and the Planning Department retained Green International Affiliates, Inc. ("Green") to peer review VHB's analysis.

The petitioners propose to create a general south-north path of travel through the site beginning with a new exit ramp from I-95 northbound. The exit ramp would terminate at the approximate location of the current hotel use at 399 Grove Street at a new traffic signal. Shortly after entering the site, driveways at the western and eastern boundaries of a new road ("Main Street") would provide access to an office building, and to a hotel, respectively. Farther north, a western driveway provides access to a structured parking garage, containing 1,971 stalls for all users, i.e. commuters, residents, employees, and patrons. The existing driveway directly opposite the garage with access to Grove Street is maintained, with a new signal at the intersection of this driveway and Grove Street. Main Street terminates at the transit station in a loop referred to as the "transit plaza". Throughout its length, Main Street is flanked on the west and east by buildings, open spaces, and by on-street parallel parking.

Trip Generation

Vhb submitted a memorandum dated April 9, 2020 outlining the changes to the trip generation as a result of the programmatic changes to the Project **(Attachment B)**. Vhb noted that due to the minor changes, a full revision to the traffic analysis and the traffic volume networks was not necessary. Green reviewed the memorandum and agreed that a revised Transportation Impact and Access Study (the

"TIAS") is not necessary; Green also agreed with the revised trip generation **(Attachment C)**. The chart below details the revised trip generation for the Project without a pass-by credit taken for the retail portion of the Project as required by the MU-3/TOD zone. Such credit typically discounts a trip that was traveling on the road network and stopped by the Project to visit a retail store. An example may include a vehicle traveling from Lower Falls to Auburndale that stops at the Project before continuing onto Auburndale. For reference, the site (the transit station and the hotel) currently generate 465, 470, and 375 trips during the weekday morning, weekday evening, and Saturday midday peak hours, respectively.

Table I: Trip Generation

Time Period	Residential	Office	Hotel	Retail	Total
Weekday Morning	146	230	62	154	592
Weekday Evening	120	241	75	97	633
Saturday Midday	125	108	95	220	548

Parking

As stated above, the Project entails 582 dwelling units, 150 hotel rooms, 253,827 square feet of office space, and 38,895 square feet of ground floor commercial space. Based on the above uses, the petitioners are required to construct 2,520 parking stalls per the Newton Zoning Ordinance (the "Ordinance"). The Ordinance allows a special permit to decrease the number of parking stalls to 1.25 stalls per dwelling unit (from two stalls) and to reduce the number of stalls allowed by one-third if there are three or more uses on site. The petitioners have requested these special permits, thereby reducing the number of stalls required by special permit to 1,632. The petitioners have requested a third special permit to reduce parking by no more than 725 stalls, reducing the parking requirement to 997 stalls. Per the petitioners' agreement with the MBTA, the petitioners must construct an additional 1,000 stalls which will be dedicated to users of the MBTA. Overall, the petitioners are proposing to construct 2,013 parking stalls within the Project 1,971 of which will be located within the garage of Buildings 9 and 10, while the remaining 42 will be on-street, parallel stalls.

The MU-3/TOD zone requires that the petitioners submit a shared parking analysis to illustrate the site has enough parking to support the different uses on site, considering that each use has a different peak parking demand. For example, the office use demands parking stalls during the daytime on weekdays, while the retail uses demand parking stalls at night and on the weekend. Additionally, the site is used by commuters and by people using the transit station to attend events in Boston, such as Boston Red Sox games. This shared parking concept is critical to harnessing the mix of uses to create a development that promotes transit and relies less on vehicles and parking; therefore, sharing parking stalls is paramount to the Project's ability to be a true transit-oriented development.

The petitioners' analysis uses data from the ITE *Parking Generation Manual* to estimate the parking demand based on the proposed uses. Using this tool, the petitioner's analysis indicates that the site's peak parking demand occurs at 10:00 a.m. on a weekday with a total demand of 2,108 stalls, resulting in a deficit of 95 parking stalls on site. However, akin to how the mixed-use nature of the site affects the number of vehicle trips generated by the project, the number of parking stalls is also affected. As a result, the number of parking stalls required at 10 a.m. was adjusted, arriving at 1,962 parking stalls,

resulting in a surplus of 51 parking stalls. As stated in their memorandum, Green believes that the number of parking stalls is sufficient to meet the demands of the Project.

Transportation Demand Management

In accordance with the MU-3/TOD zone, the petitioners submitted a Transportation Demand Management Plan (the "TDM Plan"), dated December 9, 2019. The goal of the plan is to limit the amount of vehicle trips generated by the Project, while increasing the number of trips taken via transit and other alternative modes of transportation. The Planning Department as well as members of the Transportation Division of Public Works, believe that a well-developed TDM Plan provides the best approach to reinforce the site's connection to transit and to achieve the goal of reducing vehicle trips to the site. Below are several measures included in the TDM Plan:

- Unbundle the cost of parking for both office and dwelling units from the cost of rent;
- Share parking among uses;
- Improve bicycle and pedestrian infrastructure, including connections to nearby open spaces;
- Partner with a Transportation Management Association ("TMA") and designate an on-site Transportation Coordinator; and
- Commit to working with the Massachusetts Department of Transportation to create a wayfinding program that directs vehicles to regional roadways rather than to local roads.

The petitioners are also proposing to create a fund in the amount of $500,000 to reimburse dwelling units who park zero or one car on site. Dwelling units who do not park a car on site would be eligible for up to $200 per month, while dwelling units with one car would be eligible for up to $75 per month. This reimbursement could be used towards the MBTA subway, the commuter rail, MBTA bus, ride share, bike share, or another alternative method of transportation. The Planning Department reviewed this program with the Transportation Division of Public Works and with Green and believes that the reimbursement should be restructured to decrease it and to create a flat reimbursement rather than a tiered system dependent upon car ownership. Similar to the petitioners' program, the reimbursement could be used towards the subway, commuter rail, bus, rideshare or bikeshare. Staff suggests that the reimbursement be equal to 80% of the cost of a monthly LinkPass (resulting in a reimbursement of $72 per month); a LinkPass allows for unlimited travel on the subway, local bus lines, and the silver line. Staff believes this restructuring will make the reimbursement available to more dwelling units and will ensure that the program is capturing residents who would use the Green Line as their primary form of transportation.

In addition to the measures outlined above, the petitioners will conduct surveys to create a better understanding of the modes of transportation utilized by residents, patrons, employees and to identify barriers to alternative methods of transportation. The data can then be used to tailor TDM measures to the site and will be helpful in determining the most effective post-construction mitigation measures, if required. The Planning Department believes this is a strong TDM Plan and suggests that the petitioners be required to submit a more refined plan prior to the issuance of a certificate of occupancy. Such refinements would include the fee structure for the parking associated with the dwelling units, the identification of the selected TMA, and the designation of the on-site Transportation Coordinator.

Post-Construction Monitoring

To ensure the Project complies with the number of trips projected in the TIAS, the MU-3/TOD zone requires post-construction monitoring to determine consistency between the projected and the actual number of weekday morning, weekday evening, weekday daily, and Saturday midday peak hour vehicle trips to and from the mixed-use development. The MU-3/TOD zone requires this monitoring to occur annually for two years, beginning within 12 months of full occupancy or if earlier as requested by the Commissioner of Public Works and the Director of Planning and Development. The monitoring will be performed by a traffic engineering firm retained by the City yet paid for the petitioners or their successor(s). If the actual trips exceed more than 110% of the projected trips during the weekday evening peak hour, the petitioners must implement mitigation measures to reduce the actual trips to less than or equal to 110% of the projected trips. The MU-3/TOD zone requires this monitoring period for two years, but the petitioners have agreed to extend the period to five years.

An important consideration of the post-construction monitoring is the presence of the transit station. The transit station is a regional amenity and therefore the trips associated with the transit station should not be included in the trips measured as part of the post-construction monitoring. The logistics in differentiating between the vehicles using the transit station and the vehicles accessing the mixed-use development are difficult due to the different points of access of the Project and the different ways by which a vehicle can be associated with the transit station i.e. a vehicle dropping a passenger off at the station may either use the transit plaza, or short-term parking within the garage. As such, Green applied a growth rate of 1.29% to the existing peak hour counts of the transit station which are 375, 385, and 320 during the weekday morning, weekday evening, and Saturday midday peaks, respectively. This growth rate was determined by the Central Planning Transportation Staff of the Boston Region Municipal Planners Organization and can be found in the "MBTA Green Line and Route 558 Capacity Evaluation" **(Attachment D)**. The chart below details the Project trips during the weekday evening peak hour from the year 2025 (when the project is expected to come online) to the year 2032 (the years 2031 and 2032 are only for illustration purposes in the event the Project takes longer to construct or to occupy). The weekday evening peak hour is shown because that is the time period stated in the MU-3/TOD zone by which to determine whether mitigation is necessary. As such, the Project can never exceed 696 trips in the weekday evening peak hour. The weekday morning and Saturday midday trips, are included in Green's memorandum.

Table II: Total Trips for the Weekday Evening Peak

Trip Type	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**
Project	696	696	696	696	696	696	696	696
Transit	421	427	432	438	443	449	455	461
Total	1117	1123	1128	1134	1149	1145	1151	1157

Post-Construction Mitigation

The petitioners have included several measures that could be implemented should the measured trips exceed 696 trips during the weekday evening peak hour, at a cost not to exceed $750,000. Some of those measures include:

- Increasing the transit reimbursement by improved marketing and/or increasing the level of subsidy.
- Expanding transit subsidy participation beyond the dwelling units.
- Adding a shuttle to connect to other transportation hubs or other points of interest, to be determined through the site-specific surveying practices.
- Increasing the cost of daily parking for non-MBTA daily or weekly users.

The MU-3/TOD zone requires mitigation measures to be implemented within six months of notification of the overage and that any measures be approved by the Commissioner of Public Works and the Director of Planning and Development prior to implementation. The Planning Department and the Transportation Division of Public Works believe that the above measures are appropriate because the best methods to reduce trips are to increase the transit subsidy and to increase the cost of parking. However, staff believes that the mitigation measures should be flexible to account for changes in transportation from when the Project is approved to when the Project is occupied in 2025, at the earliest. Another reason for flexibility, is that staff would use data from the petitioners' surveys to inform which mitigations measures to implement.

The Planning Department suggests that the petitioners increase the $750,000 commitment to post-construction mitigation to $1,000,000. Such increase would allow for greater flexibility for mitigation measures to account for increases in the cost of the MBTA LinkPass and could also increase flexibility for establishing a shuttle to connect the Project with other transit hubs or other points of interest. For example, $1,00,000 could be used to provide two additional years of the transit reimbursement for dwelling units who park zero or one car on site. Alternatively, the reimbursement could be increased from one reimbursement per dwelling unit to two per dwelling unit for one year.

The Planning Department believes that the Project will result in a transit-oriented development that will rely less on driving and parking and more on transit and alternative modes of transportation. Staff believes petitioner's TDM Plan, combined with the suggested restructuring of the transit reimbursement will reinforce the site's transit identity and will direct vehicles to regional roadways. Should the Project exceed 696 trips during the weekday evening peak hour, staff believes that the petitioners' commitment of $1,000,000 will be sufficient to implement mitigation measures to reduce the overage.

ATTACHMENTS

Attachment A: Tentative Land Use Committee Schedule, dated May 29, 2020
Attachment B: Vhb Memorandum, dated March 20, 2020
Attachment C: Green International Memorandum, dated May 29, 2020
Attachment D: MBTA Green Line and Route 558 Capacity Evaluation, Revised February 13, 2020

Attachment A

TENTATIVE LAND USE COMMITTEE SCHEDULE

May 2, 2020

355 AND 399 GROVE STREET "RIVERSIDE"

*This schedule is tentative. The Land Use Committee is scheduled to meet on the below dates; however, the topics are subject to change.

Meeting Date	Topic	Description
6.2.20	Transportation	Review of Traffic Impacts, Shared Parking Analysis, and Transportation Demand Management Plan
6.9.20	Civil Engineering, Sustainability, and Construction Management Plan	Review of Utilities, Sustainable Design, and Construction Management

DRAFT

Attachment B

Memorandum

To: Neil Cronin
City of Newton

Date: April 9, 2020

Project #: 10865.03

From: Randall C. Hart, Principal

Matthew Duranleau, EIT

Re: Riverside Redevelopment
Program Modification Traffic Generation
Newton, Massachusetts

VHB, on behalf of Mark Development (The Proponent) has prepared a traffic generation memorandum to reflect some minor changes to the development program of the proposed redevelopment project at Riverside Station. While the size of the overall project has not changed, the breakdown of uses has shifted slightly as the interior design of of each building has become more defined.

VHB submitted a full Traffic Impact and Access Study for the proposed project in December 2019 analyzing the project-related impacts at all study area intersections and identifying proposed mitigation measures. On February 6, 2020, a follow-up memorandum by VHB titled "Project Modification Traffic Generation/Analysis (Key Locations)" was submitted to the City of Newton summarizing the changes in trip generation, build condition traffic volume networks, and intersection capacity analyses at key locations due to a change in the building program. Since that time, the building program has again changed slightly as the plans have become more defined and this April 9, 2020 Program Modification Traffic Generation memorandum will supersede the February 6, 2020 Program Modification Traffic Generation memorandum.

The proposed Project will include approximately 1,025,000 square feet (sf) of new development on the existing site of the MBTA Riverside station parking lot and the Hotel Indigo. The total size of the development has not changed since the December 2019 TIAS or the February 6, 2020 memorandum. The Project as of February 2020 was to consist of approximately 243,388 sf of new office space, 617 residential units, 43,241 sf of retail/restaurant, and a 150-key hotel. Since that time, the site buildings have been refined and now includes 246,328 sf of new office space, 582 residential units, 38,895 sf of retail/restaurant space, and a 150-key hotel. It should be noted that the office square footages do not include an addition 7,500 sf of office space to be used by the MBTA that will replace existing MBTA office space that is on-site today.

Since the overall size of the development is not changing and since the changes in the breakdown of different uses is relatively minor and reflects the continued developed of the interior building designs, a full update of the TIAS is not warranted and therefore the analyses and traffic volume networks presented in the December 2019 TIAS and the February 6, 2020 memorandum are not being updated. However, for the benefit of understanding the magnitude of the building program modifications, this supplemental memorandum has been prepared summarizing the anticipated traffic generation characteristics of the revised building program.

The proposed changes in the building program are summarized in Table 1.

Table 1 Riverside Redevelopment Changes in Building Program

Land Use	Existing Site	December 2019 TIAS Building Program [a]	February 6, 2020 Memo Building Program [b]	April 2020 Updated Building Program	Change in Building Program (Dec 2019 TIAS to Memo)
Hotel	194 rooms	150 rooms	150 rooms	**150 rooms**	**n/a**
Office [c]	n/a	280,000 sf	243,388 sf	**246,328 sf**	**+ 2,940 sf**
Residential	n/a	600 units	617 units	**582 units**	**- 35 units**
Retail/Restaurant	n/a	52,000 sf	43,241 sf	**38,895 sf**	**- 4,346 sf**
Parking Spaces	960 [d]	2,038 spaces	2,038 spaces	**2,030 spaces**	**- 8 spaces**

a Building Program as outlined in December 2019 TIAS for the Station at Riverside Development.
b Building Program as outlined in February 6, 2020 Program Modification Traffic Generation memo for the Station at Riverside Development.
c Does not include approximately 10,000 sf of office space for MBTA uses on-site today and 7,500 sf of office space for MBTA uses included in the future development.
d Existing parking space count only includes MBTA parking spaces.

As shown in Table 1, the revised building program results in approximately 2,940 more square feet of total proposed office space, 35 fewer proposed residential units, and 4,346 less square feet of proposed retail/restaurant space on-Site than previously proposed in the February 6, 2020 memorandum.

An analysis of the revised program is presented below:

Trip Generation Summary

To assess the changes that would be expected as a result of the program modifications, traffic generation projections have been prepared for the revised program. The rate at which any development generates traffic is dependent upon the size, location, and concentration of surrounding developments. As mentioned previously, the Project is comprised of office, residential, hotel, and retail use. The ITE *Trip Generation Manual*[1] categorizes these land uses and provides weekday daily, weekday morning peak hour, weekday evening peak hour, Saturday daily, and Saturday midday peak hour unadjusted vehicle trip generation estimates for each use. The trip generation estimates for the proposed uses were projected using Land Use Code (LUC) 221 (Mid-Rise Residential), LUC 310 (Hotel), LUC 710 (General Office Building), and LUC 820 (Shopping Center).

The change in total site-generated vehicle trips with the building program is summarized below in Table 2 and a breakdown of the detailed trip generation analyses for the revised building program as requested by the City of Newton Planning Department is described in the following sections.

1 Trip Generation Manual, 10th Edition, Institute of Transportation Engineers, Washington, D.C., 2017.

Table 2 Total Site-Generated Vehicle Trip Generation Comparison

		Building Program in February 6, 2020 memo		Revised Building Program		
Time Period	Direction	Total Unadjusted Trips [a]	Total Net New Trips [b]	Total Unadjusted Trips [c]	Total Net New Trips [d]	Total Net New Trip Difference
Weekday Morning	Enter	421	**313**	419	**314**	+ 1
Peak Hour	Exit	281	**154**	272	**149**	- 5
	Total	702	**467**	691	**463**	- 4
Weekday Evening	Enter	382	**163**	364	**158**	- 5
Peak Hour	Exit	516	**327**	501	**324**	- 3
	Total	898	**490**	865	**482**	- 8
Saturday Midday	Enter	426	**240**	406	**230**	- 10
Peak Hour	Exit	396	**217**	376	**205**	- 12
	Total	822	**457**	782	**435**	- 22

a Unadjusted trip generation estimates based on ITE Trip Generation Manual; from Table 2 in the February 6, 2020 Program Modification Traffic Generation memorandum (does not included MBTA-generated or trips).

b Total Net New trip generation estimate including credits for mode share, internal capture, pass-by, and existing trips; from Table 2 in the February 6, 2020 Program Modification Traffic Generation memorandum.

c Unadjusted trip generation estimates based on ITE Trip Generation Manual; as described in Table 4 in this memorandum (does not include MBTA-generated trips but does include Hotel-generated trips).

d Total Net New trip generation estimate for entire building program and including credits for mode share, internal capture, pass-by, and existing trips; as described in Table 6 in this memorandum.

As shown in Table 2, the revised building program as compared to the previous building program will result in 4 fewer new vehicle trips (+1 entering / -5 exiting) during the weekday morning peak hour, 8 fewer new vehicle trips (-5 entering / -3 exiting) during the weekday evening peak hour, and 22 fewer new vehicle trips (-10 entering / -12 exiting) during the Saturday midday peak hour. The weekday morning peak hour will see one additional trip entering the Site due to the slight increase in office spare footage while the Saturday midday peak period will see the biggest reduction in Site-generated trips due to the slight decrease in retail square footage.

Project-Generated Trips

Estimating future conditions volumes for the Site involved a review of the existing development on those parcels, along with the additional trip generation expected from the Project development.

Existing Site-Generated Traffic

The planned development parcels currently are occupied by the Hotel Indigo, which features 194 hotel rooms and an on-site restaurant, and a commuter park and ride, kiss and ride, and pick-up / drop-off loop for the MBTA Riverside Station featuring approximately 960 parking spaces. The vehicular Site trip generation for the weekday morning and

weekday evening peak hours under existing conditions was estimated based on turning movement counts conducted at the two Site driveways. Table 3 summarizes the Project-related trips for the existing uses on Site.

Table 3 Existing Site Trip Generation

	Hotel	MBTA Station	Total Vehicle Trips
Weekday Morning Peak Hour			
Enter	45	250	**295**
Exit	45	125	**170**
Total	90	375	**465**
Weekday Evening Peak Hour			
Enter	50	150	**200**
Exit	35	235	**270**
Total	85	385	**470**
Saturday Midday Peak Hour [c]			
Enter	30	225	**255**
Exit	25	95	**120**
Total	55	320	**375**

Based on turning movement counts conducted by VHB in June 2018, October 2018, and September 2019.

As shown in Table 3, the Site under existing conditions currently generates approximately 465 vehicular trips (295 entering / 170 exiting) during the weekday morning peak hour, 470 vehicular trips (200 entering / 270 exiting) during the weekday evening peak hour, and 375 vehicular trips (255 entering / 120 exiting) during the Saturday midday peak hour. It should be noted that the existing Site also contains the Riverside MBTA maintenance yard and supporting facilities, but it was assumed that the maintenance yard generated negligible trips during the weekday morning, weekday evening, and Saturday midday peak hours.

It is expected that the existing MBTA Station-generated vehicular trips will continue to be generated by the Site under future conditions. A parking garage with approximately 960 parking spaces for commuters and designated pick-up and drop-off areas near the station entrance will be provided on Site to accommodate the commuters that use the Riverside MBTA Station today. Thus, the existing MBTA Station-generated vehicle trips presented in Table 3 have been included in all future total Project-generated vehicular trip calculations.

While the site under existing conditions contains a 194-room hotel, the proposed building program includes a 150-room hotel, which is 44-rooms fewer than the existing hotel. Therefore, it is expected that the proposed hotel will generate a different number of peak hour trips than the existing hotel. To be consistent with the analysis for the rest of the proposed building program, ITE data was used to project the future number of hotel trips as opposed to the existing driveway counts.

Unadjusted Project-Generated Traffic

The proposed development will consist of a mixture of residential, office, hotel, and supporting retail uses. Specifically, the Site is proposed to include approximately 582 residential units, 246,328 sf of new office space, a 150-room hotel, 38,895 sf of supporting restaurant/retail uses, and 2,030 parking spaces on-Site to accommodate the proposed development and the commuters using the Riverside MBTA Station. Traffic associated with the residential units was estimated using ITE LUC 221 (Mid-Rise Residential), traffic associated with the hotel was estimated using ITE LUC 310 (Hotel), traffic associated with the office space was estimated using ITE LUC 710 (General Office Building), and traffic

associated with the retail uses was estimated with ITE LUC 820 (Shopping Center). As noted previously, traffic associated with the MBTA station was estimated based on the observed existing Site-generated vehicular trips.

Approximately 7,500 sf of additional office space will also be built and be dedicated office space for the Riverside MBTA. This space will replace existing office space that is currently housed within the rail yard. Those buildings will be eliminated. As this small portion of office space will not be considered a new use and will replace existing office on-Site, it is not included in the 246,328 sf of office space and is not reflected in the proposed Site-generated volumes.

It should be noted that the retail uses are expected to be smaller, Main Street style businesses catering to the residential and office space on-Site and the adjacent neighborhoods as opposed to large big-box style retail stores. Potential uses will may include eating establishments, coffee shops, pharmacies, convenience stores, or gallery uses. The service style retail that would serve the uses on site are not expected to draw heavily from the community like a shopping center would. While these do not fit the exact description of a traditional ITE "Shopping Center", retail traffic was estimated using this land use code, which results in an overly conservative analysis.

The unadjusted new vehicle trip estimates are presented in Table 4 and trip generation worksheets are included in the Attachments.

Table 4 Project Trip Generation – New Unadjusted Vehicle Trips

	Hotel [a]	Residential [b]	Office [c]	Retail [d]	Total New Unadjusted Vehicle Trips [e]
Weekday Daily					
Enter	633	1,585	1,272	1,582	**5,072**
Exit	633	1,585	1,272	1,582	**5,072**
Total	1,266	3,170	2,544	3,164	**10,144**
Weekday Morning Peak Hour					
Enter	41	50	222	106	**419**
Exit	29	142	36	65	**272**
Total	70	192	258	171	**691**
Weekday Evening Peak Hour					
Enter	44	147	43	130	**364**
Exit	42	94	225	140	**501**
Total	86	241	268	270	**865**
Saturday Daily					
Enter	574	1,093	272	2,481	**4,420**
Exit	574	1,093	272	2,481	**4,420**
Total	1,148	2,186	544	4,962	**8,840**
Saturday Midday Peak Hour					
Enter	60	123	70	153	**406**
Exit	47	128	60	141	**376**
Total	107	251	130	294	**782**

a Based on ITE LUC 310 (Hotel) for 150 rooms.
b Based on ITE LUC 221 (Mid-Rise Residential) for 582 residential units.
c Based on ITE LUC 710 (General Office Building) for 246,328 sf.
d Based on ITE LUC 820 (Shopping Center) for 38,895 sf.
e Sum of unadjusted hotel, residential, office, and retail trips. While hotel-generated trips are already generated under existing conditions and therefore are not "new" trips to the Site, the hotel trips are included in the sum to be conservative.

Note: MBTA Station generated trips are already generated under existing conditions and therefore are not included as "new" trips to the Site.

Person Trips

The unadjusted vehicle trips are converted into person trips by applying the average vehicle occupancy (AVO) of 1.18 for residential and office trips and of 1.82 for retail and hotel trips, as outlined by the U.S. Department of Transportation[2]. The unadjusted vehicle trips were converted into person trips in order to apply internal capture credits and applicable mode share credits, as described below. Applying these credits to person trips allows for estimates to be made for the total number of Site-generated transit users, walkers, and bicyclists in addition to the total number of Site-generated vehicles.

2 Summary of Travel Trends: 2017 National Household Survey, US Department of Transportation, Federal Highway Administration, Washington D.C., 2017. The 2017 survey was used to be consistent with the trip generation volumes presented in the December 2019 TIAS and the February 6, 2020 memorandum.

Internal Capture Trips

Since the proposed development is a mixed-use project, the trip generation characteristics of the Site will be different from a single-use project. Some of the traffic to be generated by the proposed development will be contained on site as "internal" or "shared vehicle" trips. For example, workers at the office space on Site may patron the retail shops after work, or residents who live in the development may also work in the office on Site. While these shared trips represent new traffic to the individual uses, they would not show up as new vehicle trips on the surrounding roadway network.

As described in the ITE Trip Generation Handbook[3] "because of the complementary nature of these land uses, some trips are made among the on-site uses. This capture of trips internal to the site has the net effect of reducing vehicle trip generation between the overall development site and the external street system (compared to the total number of trips generated by comparable land uses developed individually on stand-alone sites) an internal capture rate can generally be defined as the percentage of total person trips generated by a site that are made entirely within the site. The trip origin, destination, and travel path are all within the site."

Based on the methodology outlined in the ITE Trip Generation Handbook, internal capture rates were applied to the gross person trips. Internal capture worksheets are included in the Attachments to this memorandum.

Mode Share

The Project is conveniently located at the Riverside MBTA Station, providing direct access to both the MBTA Green Line and several MBTA bus routes, local shuttles, etc. and making it a true Transit Oriented Development. Mode shares for the proposed development were assigned in the December 2019 TIAS based on research and previously submitted traffic studies. Table 5 provides a summary of the projected mode shares by land use.

Table 5 Project Mode Share

Use	Vehicle	Transit	Walk/Bike
Residential	75%	25%	0%
Office	95%	5%	0%
Retail	100%	0%	0%

The mode shares discussed above were applied to the net-new person trips to generate the adjusted Project trips by mode. The local average vehicle occupancy, based US Census data for each primary use, was then applied to the vehicle mode to reflect the number of vehicle trips generated by the Site. The trip generation calculations are included in the Attachments to this memorandum.

It should be noted again that the vehicle mode shares were applied in order to present a conservative assessment of future traffic impacts. The use of the high vehicle mode shares and low transit and walk/bike mode shares was a directive of MassDOT as part of the former approval process to be conservative in assessing project impacts and potential improvements.

Overall, the following conservative assumptions were made throughout the trip generation process to evaluate the traffic impacts on the regional roadway network:

- Use of LUC 820 (Shopping Center) for retail when service style is primarily what will be present.

3 Trip Generation Handbook, 3rd Edition, Institute of Transportation Engineers, Washington, D.C., 2017.

- High vehicle mode share assumptions for Office
- High vehicle mode share assumption for Residential
- No non-vehicular mode share application for Retail
- No mode share for bicycles and pedestrians

In the December 2019 TIAS, a transit analysis was introduced that discusses the impact the project will have on transit operations in the vicinity. The transit analysis has been conducted using both the mode shares shown above and a second set of mode shares (more realistic) that would be considered more conservative from a transit-analysis viewpoint. Application of a more realistic mode shares that are likely to be realized will better assess the potential impacts to the MBTA.

Pass-By Trips

While the ITE rates provide estimates for all the traffic associated with each land use, not all of the traffic generated by the Project will be new to the area roadways. A portion of the vehicle-trips generated by the retail land use will likely be drawn from the traffic volume roadways adjacent to the Project Site. For example, someone traveling on Grove Street may choose to deviate from their original travel path to visit the site retail, before heading back to continue to their final destination. For this evaluation, ITE pass-by rates for LUC 820 (Shopping Center) were utilized for the retail trip generation and applied to existing trips on Grove Street. Specifically, 34-percent and 26-percent of the retail trip generation was assumed to be drawn from the surrounding roadway network during the weekday evening and Saturday midday peak hours, respectively, as outlined in the ITE Trip Generation Handbook. For all other time periods studied, a 25-percent pass-by rate was assumed.

Project-Generated Trips

As described above, internal capture credit, mode share credit, and pass-by credit for the retail portion of the Project was applied to the unadjusted new vehicle trips presented in Table 4 to develop the net new trips expected to be generated by the Site. Table 6 presents the Project-generated net new vehicle peak hour trips by land use and Table 7 presents the Project-generated net new peak hour trips by mode.

Table 6 Project-Generated Peak-Hour Vehicle Trips by Use

	Hotel [b]	Residential [a]	Office [c]	Retail [d]	Total Net Vehicle Trips [e]	Existing Hotel Trips [f]	Total Net New Vehicle Trips [g]	Pass-By [h]	Existing MBTA Trips [i]	Total Site-Generated Vehicle Trips [j]
Weekday Morning										
Enter	41	38	204	76	**359**	-45	**314**	19	250	**628**
Exit	20	108	26	40	**194**	-45	**149**	19	125	**338**
Total	61	146	230	116	**553**	-90	**463**	38	375	**966**
Weekday Evening										
Enter	35	67	36	70	**208**	-50	**158**	33	150	**391**
Exit	40	53	205	61	**359**	-35	**324**	33	235	**627**
Total	75	120	241	131	**567**	-85	**482**	66	385	**1,018**
Saturday Midday										
Enter	51	51	61	97	**260**	-30	**230**	29	225	**514**
Exit	44	74	47	65	**230**	-25	**205**	29	95	**354**
Total	95	125	108	162	**490**	-55	**435**	58	320	**868**

a Hotel vehicle trips with internal capture and mode share credits applied (does not include removal of existing hotel trips).
b Residential vehicle trips with internal capture and mode share credits applied.
c Office vehicle trips with internal capture and more share credits applied.
d Retail vehicle trips with internal capture, mode share credits, and pass-by credits applied.
e Sum of columns a through d.
f Existing Hotel Indigo trips based on traffic counts conducted by VHB in October 2018 and September 2019.
g Sum of columns e and f.
h Pass-by Credits of 25%, 34%, and 26% applied to weekday morning, weekday evening, and Saturday midday peak hour retail trip generation, respectively.
i MBTA Station trips based on traffic counts conducted by VHB in June 2018 and September 2019.
j Sum of columns e, h, and i.

As shown in Table 6, the Site is expected to generate a total of 966 vehicle trips (628 entering / 338 exiting) during the weekday morning peak hour, 1,018 vehicle trips (391 entering / 627 exiting) during the weekday evening peak hour, and 868 vehicle trips (514 entering / 354 exiting) during the Saturday midday peak hour. However, these totals include traffic already generated on-Site by the hotel and the MBTA station and pass-by trips that will not be added as new trips to the roadway. After considering the existing traffic generation and the pass-by trips, the Project will result in an additional 463 vehicle trips (314 entering / 149 exiting) to the roadway network during the weekday morning peak hour, 482 vehicle trips (158 entering / 324 exiting) during the weekday evening peak hour, and 435 vehicle trips (230 entering / 205 exiting) during the Saturday midday peak hour.

As discussed previously, the Site currently contains a 194-room hotel and the proposed revised building program includes a 150-room hotel (which is a reduction of 44 rooms from existing). The trip generation analyses summarized above include this reduction of hotel rooms on-Site, as the proposed hotel is expected to generate trips at a different rate than the existing hotel. The proposed hotel trip generation is based on ITE data to be consistent with the rest of the development trip generation while the existing hotel trip generation is based on driveway counts conducted by VHB in October 2018 and September 2019.

Table 7 below summarizes the Project-generated net new peak hour trips by mode.

Table 7 Net New Project-Generated Peak-Hour Trips by Mode

	Net New Vehicle Trips [a]	Net New Transit Trips
Weekday Morning Peak Hour		
Enter	314	27
Exit	149	43
Total	463	70
Weekday Evening Peak Hour		
Enter	158	27
Exit	324	32
Total	482	59
Saturday Midday Peak Hour		
Enter	230	23
Exit	205	31
Total	435	54

a Net vehicle trips not including pass-by trips associated with the retail.
Note: Hotel and MBTA Station generated trips are already generated on-Site under existing conditions and therefore are not included as "new" trips to the Site.

As shown in Table 7, the Project is expected to generate between 54 and 70 new transit trips during the weekday morning, weekday evening, and Saturday midday peak hours and between 435 and 482 net new vehicular trips during the same peak hours. As stated in the TIAS, while the Project is likely to generate walk/bike trips in line with existing office and residential uses in the City of Newton, to provide a conservative analysis and to be consistent with the 2015 MEPA filing for the previous iteration of the Project, no credit was applied for walk/bike trips to and from the Site.

Conclusion

VHB has developed a memorandum to supplement the trip generation presented in the December 2019 TIAS and in the February 6, 2020 memorandum. As presented in this memorandum, the slight change in building program is expected to have a very minimal impact on the Project trip generation. As compared to the trip generation presented in February 2020, the new building program is expected to generate approximately 4 fewer trips during the weekday morning peak hour, 8 fewer trips during the weekday evening peak hour, and 22 fewer trips during the Saturday midday peak hour.

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MEMORANDUM

To:	Neil Cronin, Planning and Development Department, City of Newton
From:	Green International Affiliates, Inc. (Green)
Date:	May 29, 2020
Project Name:	Riverside Station
Project Number:	Green No. 18078
Subject:	Transportation Peer Review Response Letter

On behalf of the City of Newton (the City), Green International Affiliates, Inc. (Green) is submitting this memorandum of the findings from our review of the revised trip generation memorandum and parking program reflecting some minor changes to the development program for the proposed "The Station at Riverside Redevelopment" adjacent to Riverside Station, in Newton, MA. This review included a review of the following documents submitted in support of the proposed project, as it related to traffic and transportation impacts:

- Memorandum titled "Riverside Redevelopment Program Modification Traffic Generation", prepared by VHB, dated April 9,2020.
- Report titled "Riverside Masterplan Parking Program", prepared for Mark Development, dated April 21, 2020.

Green offers the following takeaways resulting from our review of the above documents:

<u>Riverside Redevelopment Program Modification Traffic Generation:</u>

1. The Traffic Generation memorandum was generally prepared in a professional manner, consistent with industry standards for trip generation of mixed-use developments.

2. The size of the overall project remains the same at 1,025,000 square feet (SF), the only changes were minor shifts in the breakdown of uses.

3. The revised development program results in an increase in office space of approximately 2,940 SF and a decrease of 35 residential units and 4,346 SF of retail/restaurant space relative to the previously proposed development program that the February 6, 2020 "Project Modification Traffic Generation/Analysis (Key Locations)" was based on.

4. Green concurs that a full update of the TIAS and updated analysis at the key locations completed in the February 6, 2020 memorandum are not necessary at this stage as the changes in the breakdown of different uses are relatively minor and result in slight decreases in the number of net new trips expected to be generated by the proposed development during the weekday AM, PM and Saturday Midday peak hours. As a result, the intersection and transit capacity analyses completed as part of the December 2019 TIAS and updated analysis completed at the key

locations as part of the February 6, 2020 memorandum are expected to provide conservative analyses.

Riverside Masterplan Parking Program:

5. The minor shifts in the breakdown of uses within the proposed development had minimal impacts on the peak parking demand of the site (demand only decreased by 1 parking space).

6. While the revised development program only resulted in a decrease in the peak parking demand of 1 parking space relative to the December 2019 parking program, the new parking program proposes 17 less parking spaces relative to the December 2019 parking program. This results in a slight decrease in the current surplus in proposed parking spaces during the peak parking demand relative to the previous December 2019 Parking Program. The December 2019 Parking Program resulted in a surplus of 67 parking spaces during the peak parking demand (non-MBTA parking would be 93.2% full). The current April 21, 2020 Parking Program results in a surplus of 51 parking spaces during the peak parking demand (non-MBTA parking would be 95.0% full). Although there is a slight decrease in the surplus of parking spaces during the peak parking demand, Green concurs that the current parking program still provides a sufficient number of parking spaces to serve the demands of the proposed development.

Riverside TDM Monitoring:

In addition to the above comments, we have prepared an estimate for the total number of site trips that will be allowed under the City of Newton TDM ordinance before mitigative actions are required by the developer. This number reflects 110% of project trips on a weekday daily, weekday peak hour, and Saturday peak hour basis. It should be noted that this number is based on the trip generation provided in the latest memorandum and includes reductions for internal capture and mode split but does not include pass-by credits as those volumes will be present on the internal roadway network. The total project trips allowed are as follows:

- Weekday Daily = 8,355
- Weekday AM Peak Hour = 650
- Weekday PM Peak Hour = 696
- Saturday Peak Hour = 603

In order to measure the number of trips generated by the proposed site, traffic counts will be taken along Main Street prior to the intersection with the Grove Street Extension, and along Road B, between Main Street and Grove Street. To reflect the presence of the Riverside MBTA facility along this roadway, the developer will be allowed a credit equal to the number of trips generated by outside vehicles utilizing the MBTA. These trips were calculated by applying the growth rate described in the "MBTA GL and Route 558 Capacity Evaluation" document of 1.29% per year to the volumes included at the MBTA Driveway in "The Station at Riverside Redevelopment, Transportation Impact and Access Study". As those volumes were only collected for the AM, PM, and SAT peak hours, a daily MBTA credit could not be provided based on the turning movement counts. For daily volumes, the developer should provide the number of daily trips to the MBTA parking facility. This can be used as a credit against the daily trip volumes listed above. For the AM, PM, and SAT peak hours, the following can be utilized to determine the total number of trips allowed:

Trips Allowed Under Ordinance	**Weekday AM Peak Hour - Count Year**							
	2025	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**
Project Trips	650	650	650	650	650	650	650	650
Transit Credit	410	415	421	426	432	437	443	449
Total Trips	**1060**	**1066**	**1071**	**1076**	**1082**	**1087**	**1093**	**1099**

Trips Allowed Under Ordinance	**Weekday PM Peak Hour - Count Year**							
	2025	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**
Project Trips	696	696	696	696	696	696	696	696
Transit Credit	421	427	432	438	443	449	455	461
Total Trips	**1117**	**1123**	**1128**	**1134**	**1140**	**1145**	**1151**	**1157**

Trips Allowed Under Ordinance	**Saturday Peak Hour - Count Year**							
	2025	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**
Project Trips	603	603	603	603	603	603	603	603
Transit Credit	346	350	355	359	364	368	373	378
Total Trips	**948**	**953**	**957**	**962**	**967**	**971**	**976**	**981**

If either the City staff or the Applicant's engineer would like to discuss any of these comments further, please feel free to contact me at ctobias@greenintl.com.

Sincerely,
Green International Affiliates, Inc.

Corinne Tobias, P.E., PTOE
Transportation Planning Group

cc: W. Wong, Green
W. Scully, Green

Transit Capacity Evaluation

Because the project site will be integrated with the existing transit station, public transit plays an important role in how people will get to and from the site. As such, an in-depth analysis of the existing transit system and its ability to accommodate future passenger demands was prepared. This section contains the following information:

- Methodolgy
- Existing MBTA Green (D) Line Capacity
  - Planned MBTA Green Line (D) Improvements
- Existing MBTA Bus Service Capacity
- Current and Future Transit Operations
- Projected Ridership and Distribution of Project Generated Transit Trips
- Future Transit Service Capacity Analysis

Methodolgy

In an effort to understand the potential for additional ridership, available capacity was estimated on transit lines that could be utilized for access to and from the site. For this study, the MBTA Green Line rapid transit (subway) line and the MBTA Route 558 bus service were evaluated for project impacts on passenger capacity.

The capacity analysis results in a comparison of the expected demand for transit to the planned capacity of the service. Thus, for the subway and bus lines, we first identify the service segments that are expected to be used by riders generated by the proposed development project. For each service, we identify the peak passenger load point – the service segment that is most crowded, based on existing ridership, by time of day (for buses it's by trip; for subway, it's by 30-minute service period). These passenger loads are compared against the service's capacity.

The capacity of the transit services is based on the MBTA's *Service Delivery Policy.*[1] For the passenger comfort standard, which is based on vehicle capacity and riders, the standard sets the level of passenger crowding that is acceptable by transit mode and time period (or trip). Generally, the vehicle load assumes all seats on the vehicle will be occupied and some passengers may stand as well, before the condition is determined to be "over crowded." The standard varies by service period: generally, high-volume (peak periods) have a higher threshold than low-volume (off-peak periods).

The intent of applying this method is to identify segments in the MBTA system that need additional service to address overcrowding. These transit capacity analyses are performed consistent with MassDOT and MBTA analysis methods.

To estimate the expected growth in transit ridership between the Existing Condition and the future No-Build Condition, we apply an average annual passenger growth rate based on the

[1] Service Delivery Policy; Massachusetts Bay Transportation Authority; January 23, 2017.

Boston MPO's CTPS Regional Travel Demand Model projections for daily ridership by transit service. (These are reported in the Boston MPO's long-range regional transportation plan.) The calculated average annual growth rates are applied to existing ridership (data[2] provided by the MBTA). These are detailed in the future condition analysis sections.

Existing MBTA Green (D) Line Capacity

The capacity of the Green Line service is determined by the number, type, and frequency of trains in service during each service period. As shown in Table 1, at a peak service time, the D Line is expected to handle 1,000 passengers per each 30-minute period during the peak periods, when trains are scheduled to run 6-minute headways. During the midday and evening periods, those capacity loads are lower as a result of fewer trains in service.

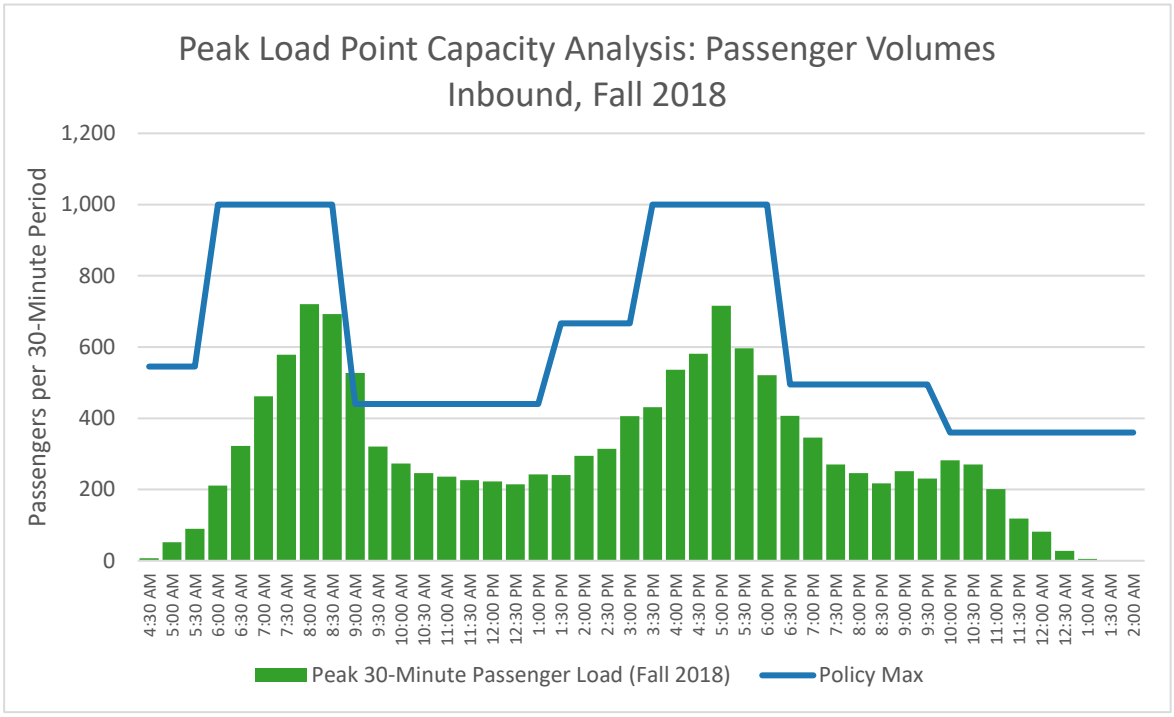
Table 1 MBTA D Line Capacity by Service Period

Period	Time	MBTA Policy Max Passenger Load/Car[1]	Cars/ Train	MBTA Policy Max Passenger Load/Train	Train Headways (minutes)[2]	Trains per 30 Minutes	MBTA Policy Max Load/30-Minute
Sunrise	3:00 AM - 5:59 AM	100	2	200	11	2.7	545
Early AM	6:00 AM - 6:29 AM	100	2	200	6	5.0	1,000
Early AM (Rush Hr)	6:30 AM - 6:59 AM	100	2	200	6	5.0	1,000
AM Peak	7:00 AM - 8:59 AM	100	2	200	6	5.0	1,000
Midday Base	9:00 AM - 1:29 PM	66	2	132	9	3.3	440
Midday School	1:30 PM - 3:29 PM	100	2	200	9	3.3	667
Midday School (Rush Hr)	3:30 PM - 3:59 PM	100	2	200	6	5.0	1,000
PM Peak	4:00 PM - 6:30 PM	100	2	200	6	5.0	1,000
Evening	6:30 PM - 9:59 PM	66	2	132	8	3.8	495
Late Evening	10:00 PM - 11:59 PM	66	2	132	11	2.7	360
Night	12:00 AM - 2:59 AM	66	2	132	11	2.7	360

Sources:
1. For Green Line vehicle Type 7/Type 8, per MBTA Service Delivery Policy (2017), Table B2 "Vehicle Load On Light Rail, Heavy Rail"
2. MBTA Rapid Transit Schedule, Effective September 3, 2017 - December 30, 2017. Peak period frequencies based on FMCB Presentation on 11/20/17.

VHB reviewed the MBTA's data reflecting Fall 2018 Green Line Load Profiles to perform a transit capacity (line haul) analysis. The capacity analysis is based on the maximum load point on the entire line; the maximum load point is defined as the point along the line that carries the greatest number of passengers. (See figures below.)

[2] Green Line Load Profile (aka Rail flow data), Weekday, September 2018, representing the most recently available fall activity data; provided by the MBTA Service Planning Department.


Peak Load Point Capacity Analysis: Passenger Volumes Inbound, Fall 2018
Passengers per 30-Minute Period
1,200
1,000
800
600
400
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0
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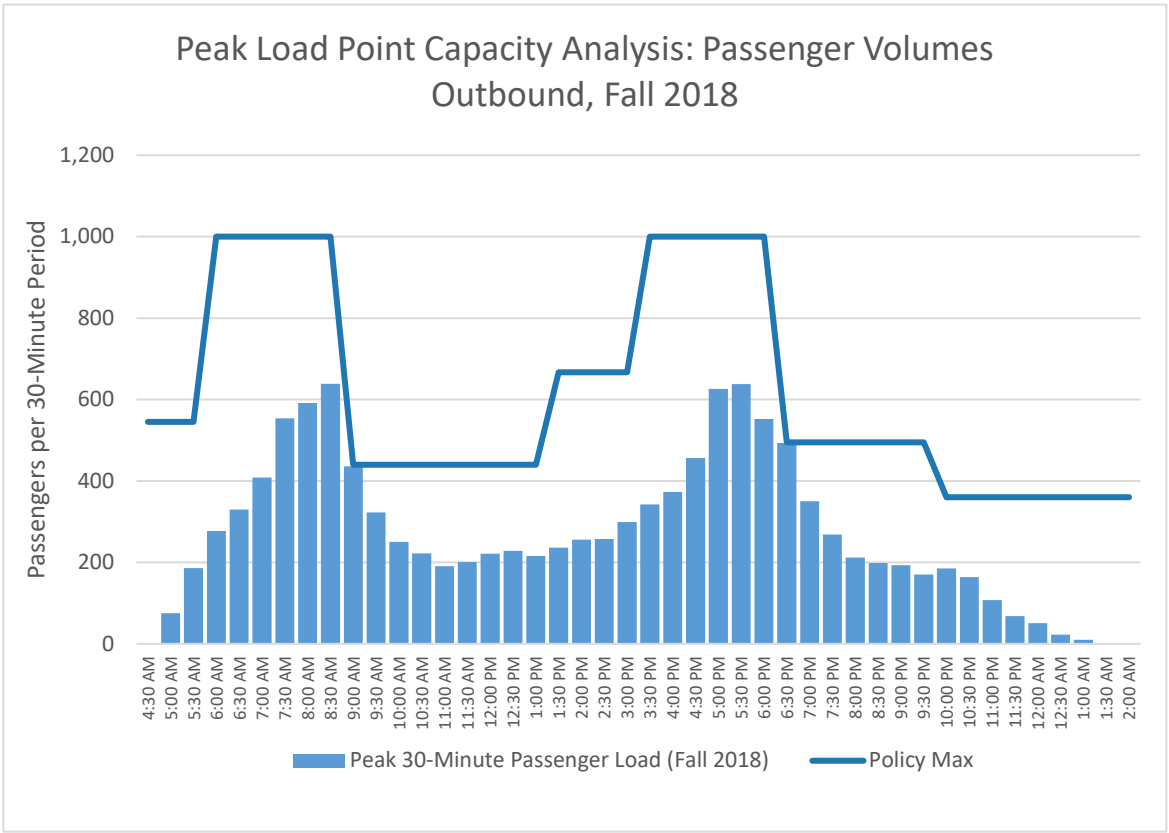
Peak 30-Minute Passenger Load (Fall 2018)
Policy Max


Peak Load Point Capacity Analysis: Passenger Volumes Outbound, Fall 2018
Passengers per 30-Minute Period
1,200
1,000
800
600
400
200
0
4:30 AM
5:00 AM
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Peak 30-Minute Passenger Load (Fall 2018)
Policy Max

Based on existing conditions, on the Inbound direction, MBTA is not meeting their current Policy Max thresholds. From 9 AM to 9:30 AM, Green Line (D) ridership exceeds policy max levels by 20%.

Planned MBTA Green Line (D) Improvements

The MBTA has plans for substantial investment in the MBTA system in the next ten-to-twenty years, including enhancements to the Green Line and the Riverside Station D trains. These initiatives are outlined in the MBTA's *Focus40 Plan*[3]. The the Focus40 plan calls for up-to a 50 percent increase in capacity along the Green Line's central subway core by 2040 with redesigned larger vehicles and modernized infrastructure. The plan identifies a host of improvements to get there, including several phases of improvements. Phase I State of Good Repair (SGR) projects are geared toward Green Line track, signals and power infrastructure upgrades. Phase II Planning and Early Action; Fleet Procurement includes new Type 9 vehicles, which are currently arriving to the D Line, and by 2030 new Type 10 vehicles will replace the existing cars on the Green Line. Phase III improvements will expand capacity on D and E Branches via additional infrastructure changes. The aim of this phase is to operate new, larger trains as single cars on B and C Branches and as two-car sets on D (Riverside) and E Branches to achieve a Green Line capacity gain of approximately 50 percent.

As detailed in the Green Line Transformation project materials, the Type 10 "Supercar" vehicles will have more capacity per vehicle than the older vehicles (about 80 percent more), which will accommodate growth needs on the line (and, according to the MBTA's materials, will provide a 10-15 percent more peak core capacity in the central subway).[4]

In the short term there are 24 new trolleys (Type 9 cars) that are being deployed to the Riverside D branch. The first one was deployed in December of 2018 and the remaining 23 will be deployed periodically through 2019. These are supporting the Green Line Extension project.

The impact of how the replacement of Green Line train cars with the Type 10 "Supercar" will have on passenger capacity are explored later under the future conditions evaluation.

[3] *Focus40, Positioning the MBTA to Meet the Needs of the Region in 2040*; MBTA; March 2019.

[4] Source: MBTA presentation on the *Green Line Transformation* (Public Meeting, September 2019), slide 17, available at https://cdn.mbta.com/sites/default/files/2019-09/GLT-public-meeting-presentation-accessible-v2.pdf

Existing MBTA Bus Service Capacity

The Route 558 bus is the only MBTA bus route serving the Project Site. Route 558 operates only on weekdays and provides irregular and infrequent service.

In the inbound direction:

- AM inbound service departs from Riverside at 6:25 AM, 7:35 AM, 8:00 AM, and 9:05 AM.
- There is then a gap in service until 1:15 PM, when six trips operate approximately 70 minutes apart until the last departure at 7:12 PM. The first three of these trips operate to Newton Corner, and the last three operate to downtown Boston.

In the outbound direction:

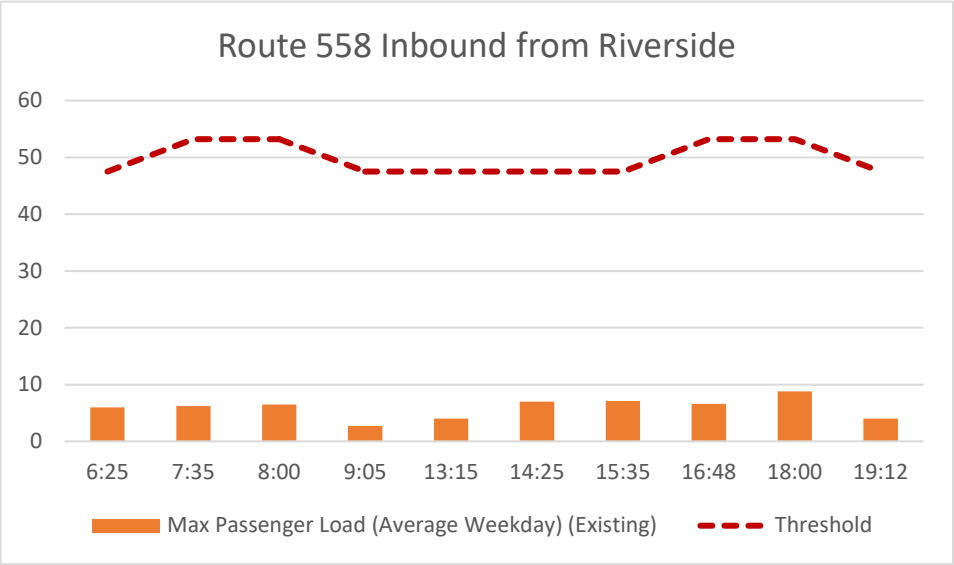
- Three outbound trips serve Riverside in the morning: 7:00 AM (from Newton Corner), 7:05 AM and 8:10 AM from downtown Boston.
- In the early to mid afternoon, four trips serve Riverside, with frequencies roughly every 70 minutes. In the late afternoon, three additional trips serve Riverside, with the final trip arriving at Riverside around 7:00 PM

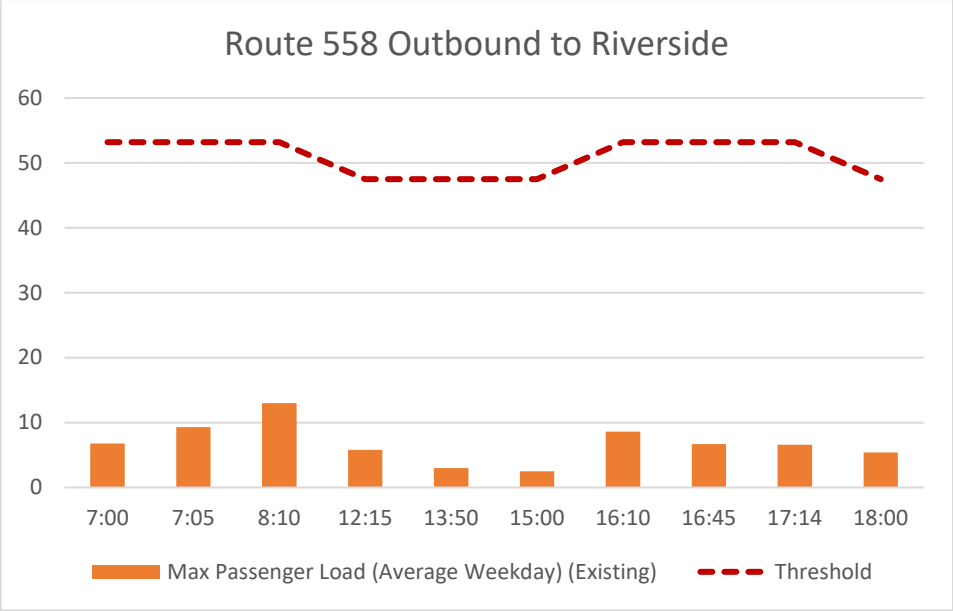
The buses serving this route each have a seated capacity of 38 passengers and, using the vehicle load standard dictated by MBTA Service Delivery Policy[5], have an average policy capacity (hereafter referred to as the recommended passenger crowding threshold) equal to 53 passengers during the peak periods and equal to 47 passengers during off-peak periods.[6]

[5] MBTA, *Service Delivery Policy, 2017 Update*, Approved January 23, 2017.

[6] MBTA, Average Fleet Seating – CY2017. Note that the capacities displayed are rounded down to the nearest whole number and maximum loads displayed are rounded to the nearest whole number. All calculations (including sums) do not round maximum loads so may differ from the numbers displayed.

An investigation of average weekday passenger loads (Fall 2018 ridership data) at the peak load point for the bus Route 558 (for the analysis segment connecting Riverside and the Waltham Center and commuter rail station) indicates that none of its trips in the inbound or outbound service exceed the passenger crowding threshold. (See figures below.)





Futhermore, the MBTA *Service Delivery Policy* (SDP) defines a passenger comfort standard for the percent of passenger travel time experienced in comfortable conditions that includes a minimum of 92 percent of travel time per bus passenger and target of 96 percent of travel

time per bus passenger experienced in comfortable conditions.[7] In Fall 2018, Route 558 had an SDP metric of 98.52% comfortable this metric is based on weekday service.[8] This route exceeds (meets) the MBTA's standard for this metric; in other words, this route is deemed to be in an acceptable range for passenger comfort conditions.

Transit Ridership: Future Projections

Future transit service projections have been developed in order to evaluate the likely impacts and the transit needs of the Riverside Redevelopment Project. This section examines the potential impact of expected transit ridership generated by employees and residents of the Project.

Transit Trip Generation

For the traffic impact analysis, the future projections for Site-generated trips assume that 5 percent of the office-generated person trips and 25 percent of the residential-generated person trips will arrive to the Site via transit modes. (These mode share assumptions and traffic trip generation are presented in the *Future Conditions* chapter of this report.) It was assumed that no retail traffic will arrive to the Site via transit modes. These are conservative assumptions from a traffic perspective, as discussed previously.

However, we expect that the actual mode splits will likely reflect a higher reliance on transit than what those assumptions indicate. Using the expected trip distribution for the project-generated trips, geographically it indicates that no more than 15 percent of the office-generated person trips would be via transit and no more than 35 percent of the residential-generated person trips would be via transit.

Therefore, we applied two different sets of transit mode share assumptions to use for the transit capacity analyses: (1) a *conservative* assumption, under which we apply the same mode splits used in the traffic analyses, and (2) a *realistic* assumption, to reflect a more likely mode share expected for a transit-oriented development at this site, which also serves as an upper level of transit activity. We assume that retail uses will not generate transit trips. These assumptions are presented in the table below.

Table 2 Applied Transit Mode Shares for Capacity Analysis

Land Use	Conservative[1]	Realistic[2]
Office	5%	15%
Residential	25%	35%

Notes: 1. These reflect the transit mode share applied to the traffic impact analysis. 2. These reflect the transit mode share applied to the upper bound of transit trip generation.

This results in setting an upper and lower bound of transit use. Furthermore, for simplicity as a conservative approach (i.e., higher project-generated ridership level), we assume that 100

[7] MBTA, *Service Delivery Policy, 2017 Update*, Approved January 23, 2017.

[8] Metric provided by MassDOT OPMI; calculations as of September 4, 2019.

percent of site-generated transit trips take the Green Line and that an additional five percent of site transit trips use the Route 558 bus (allocating 105% of projected transit generated trips to the network).

The transit trips generated by the different uses are likely to be complimentary: Office trips using public transportation to access the Site will be a reverse commute (e.g., travelling outbound in the morning and inbound in the evening) relative to the residential trips. Riverside is the terminus for both the Green (D) Line and bus Route 558; thus, all trips entering the Site will travel outbound on each of the two transit lines while all trips exiting the Site will travel inbound on each of the two transit lines.

The resulting transit trip generation under the two mode share scenarios are as follows:

Table 3 Weekday Daily Transit Trips by Trip Generator

	Residential	**Office**	**Retail**	**Total**
Direction	Trips	Trips	Trips	Trips
Conservative (5% Office - 25% Residential)				
Enter (to Site)	377	83	0	460
Exit (from Site)	403	77	0	480
Total	780	160	0	940
Realistic (15% Office - 35% Residential)				
Enter (to Site)	527	248	0	775
Exit (from Site)	564	232	0	796
Total	1091	480	0	1571

The daily transit trips are distributed by time of day to each of the transit modes. For the Green Line, trips are distributed by 30-minute period throughout a weekday service period, following the ridership pattern that closely matches current boarding levels. For the Route 558, the daily transit trips are distributed to each of the scheduled bus trips.

Future Transit Service Capacity

To estimate the impacts of the additional Site-generated transit trips on the Green Line and MBTA bus route 558 and identify any potential capacity constraints in the existing public transportation system serving the Project site, future transit capacity analyses were conducted. The analysis requires estimating future passenger activity and establishing assumptions for future transit service levels.

Future Transit Passenger Activity

The future condition transit analyses are based on the Build year 2029. The analysis applies a Green Line growth in passengers of approximately 1.29 percent annually between now and 2029 and a bus Route 558 growth in passengers of approximately 0.68 percent annually, based on the projections expressed by the Boston Region Metropolitan Planning

Organization (MPO) regional travel demand model maintained by CTPS.[9] (Note that the projected growth rate for the local bus system was applied to bus Route 558 instead of projected growth rate for the express bus system in order to provide a more conservative, i.e., higher ridership, estimate.) These growth rates were applied to the Fall 2018 passenger volumes to create a future 2029 No-Build condition. For the 2029 Build condition, the project's Site-generated transit trips were added to the future expected riders of the Green (D) Line and MBTA bus Route 558. (The estimated project-generated transit trips are presented in the section *Transit Trip Generation*).

To assign project trips on the MBTA Green (D) Line, *residential* trips departing the site in the morning were proportionally distributed amongst all 30-minute time periods in the AM whereas all *residential* trips arriving at the site were proportionally distributed amongst all 30-minute time periods in the PM. Opposite to residential, *office* trips entering the site were assigned proportionally during AM time periods and *office* trips departing the site were assigned proportionally during PM time periods. To estimate a worst-case scenario for bus, all estimated trips were assigned to the single highest trip in the AM and PM.

Future Transit Service Levels

For future service conditions, VHB assumed that the existing transit routes serving the site would continue to operate the same service:

- The Route 558 would continue service based on today's trip schedule and using the same type of bus.
- The Green Line's D Branch would operate at the same frequency of service (train headways) by period as today's service; however, with the planned replacement of the train cars with the Type 10 "Supercar" trains by the year 2030, each Green Line train will provide 80 percent additional capacity.[10] (For comparison in the analysis, both today's capacity and the expected future capacity are shown. The resulting capacity by service period is shown in Table 4.)

[9] Annual average growth rate for the Green Line was calculated based on weekday ridership growth forecasted by the regional travel demand model, as reported in the report *Core-Capacity Constraints: Accommodating Growth on Greater Boston's Congested Roads and Crowded Transit System*, Central Transportation Planning Staff (CTPS) of the Boston Region MPO, 2016. The conditions used in that study investigated the impacts of intensifying development in the metropolitan region's urban core. This rate is higher than the expected 1.01 percent annual growth rate presented in the more recent *Destination 2040: Long-Range Transportation Plan*: Model Results (2019). Annualized growth rate for bus was calculated from *Charting Progress to 2040: The Long-Range Transportation Plan of the Boston Region Metropolitan Planning Organization*; Central Transportation Planning Staff (CTPS); July 2015. This rate is higher than the expected 0.22 percent annual growth rate for local bus presented in the more recent *Destination 2040: Long-Range Transportation Plan*: Model Results (2019).

[10] Source: MBTA presentation on the *Green Line Transformation* (Public Meeting, September 2019), slide 17, available at https://cdn.mbta.com/sites/default/files/2019-09/GLT-public-meeting-presentation-accessible-v2.pdf

Table 4 MBTA Green Line D Branch Capacity by Service Period: Existing and Expected Future with Type 10 Train Cars in Operation

		Today's Green Line Operations				*Operations with Supercar Trains*
Weekday Service Period	Time	MBTA Policy Max Passenger Load/Train[1]	Train Headways (minutes)[2]	Trains per 30 Minutes	**Policy Max Passenger Load per 30-Minute**	**Policy Max Passenger Load per 30-Minute[3]**
Sunrise	3:00 AM - 5:59 AM	200	11	2.7	545	982
Early AM	6:00 AM - 6:29 AM	200	6	5.0	1,000	1,800
Early AM (Rush Hr)	6:30 AM - 6:59 AM	200	6	5.0	1,000	1,800
AM Peak	**7:00 AM - 8:59 AM**	200	6	5.0	**1,000**	**1,800**
Midday Base	9:00 AM - 1:29 PM	132	9	3.3	440	792
Midday School	1:30 PM - 3:29 PM	200	9	3.3	667	1,200
Midday School (Rush Hr)	3:30 PM - 3:59 PM	200	6	5.0	1,000	1,800
PM Peak	**4:00 PM - 6:30 PM**	**200**	**6**	**5.0**	**1,000**	**1,800**
Evening	6:30 PM - 9:59 PM	132	8	3.8	495	891
Late Evening	10:00 PM - 11:59 PM	132	11	2.7	360	648
Night	12:00 AM - 2:59 AM	132	11	2.7	360	648

Sources:
1. For Green Line vehicle Type 7/Type 8, per MBTA Service Delivery Policy (2017), Table B2 "Vehicle Load On Light Rail, Heavy Rail". Assumes 2-car operation.
2. MBTA Rapid Transit Schedule, Effective September 3, 2017 - December 30, 2017. Peak period frequencies based on an FMCB presentation on 11/20/17.
3. MBTA presentation on the *Green Line Transformation* (Public Meeting, September 2019), slide 17: Although it states "running two-Supercar trains would effectively double the Green Line capacity", the max passenger loads noted are 200 for today's operation using Type 7, 8, 9 cars and 360 for Type 10 Supercars, which corresponds to an 80-percent increase. Capacity assumes same train headways and use of 2-car trains as applied to today's operations.

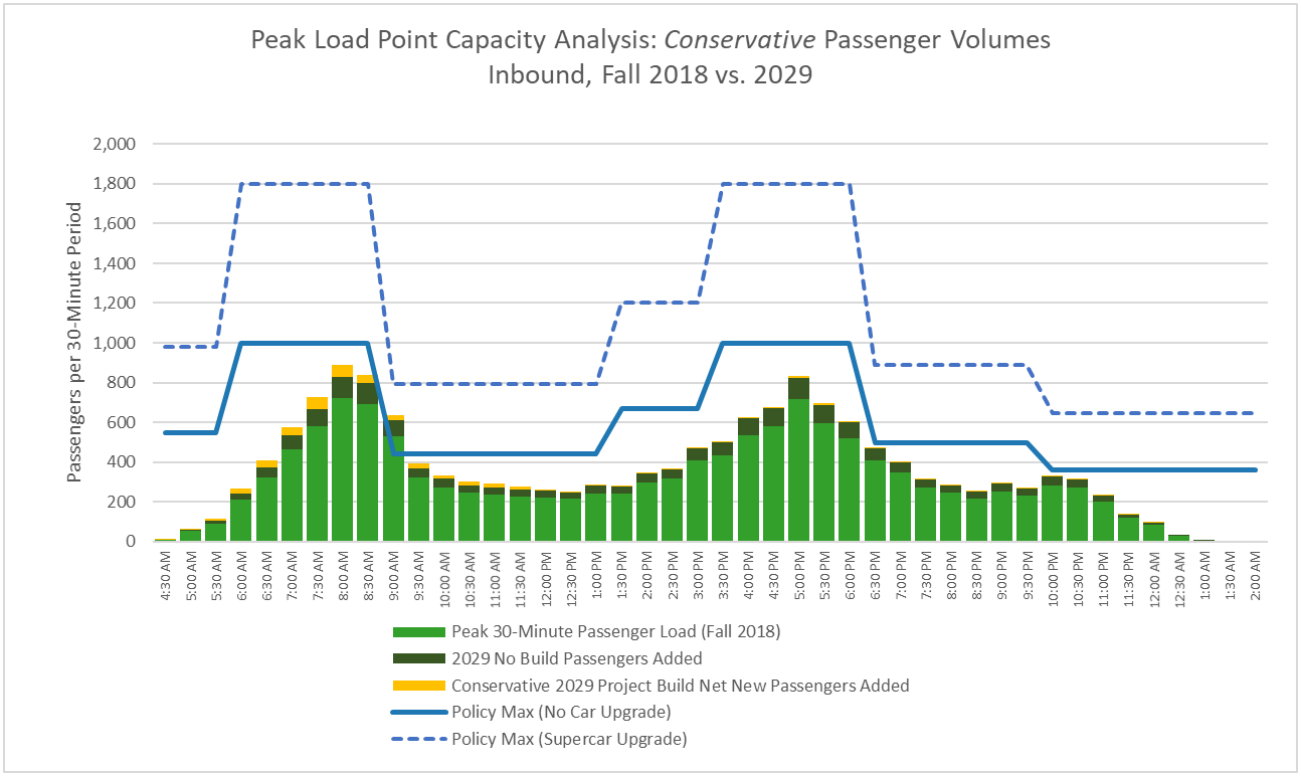
Future Transit Capacity Analysis: Green Line (D Branch)

The charts below illustrate the expected future passenger loads at the peak load point relative to the planned service capacity for the Green Line's D Branch.[11] The charts present both project-generated transit trips under a *conservative* and a *realistic* mode-choice scenario.

At future ridership levels with the project-generated growth the MBTA Green Line (D) does not trigger any new exceedances above the MBTA's policy capacity thresholds than what is experienced today. At future ridership levels and the capacity enhancements gained with the Type 10 train cars, the MBTA Green Line (D) is expected to be in compliance with the MBTA's policy capacity thresholds.

[11] The peak load point on the Green Line varies by time period. For the D Line, Inbound, the peak load point is most often occurs between Fenway and Kenmore in the mornings, and at varying points between Hynes and Park Street in the afternoon. Outbound, the peak load point occurs at varying points between Government Center and Arlington in the mornings and early afternoon, and between Hynes and Kenmore in the mid-afternoon and evening periods.

Figure Inbound Green Line Service: Average Peak Load Point Capacity Analysis, Future Condition, Under Two Growth Scenarios



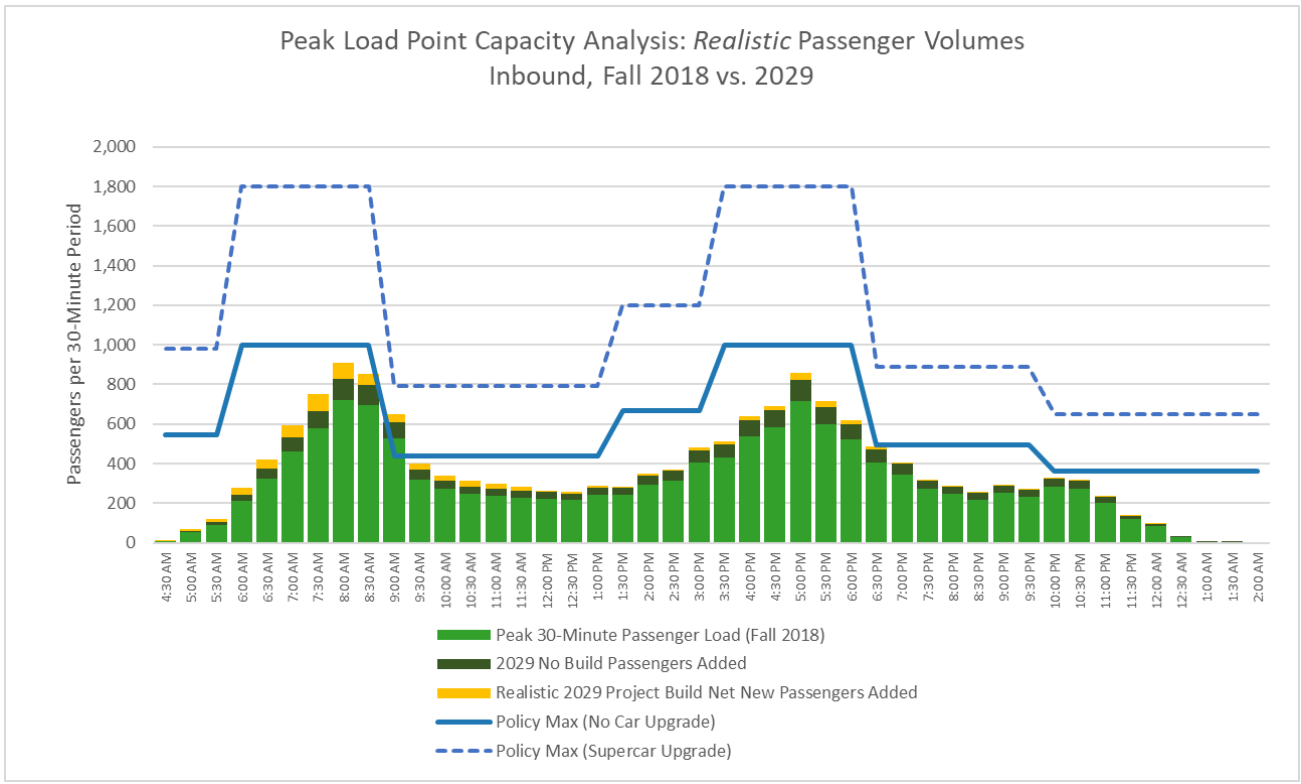
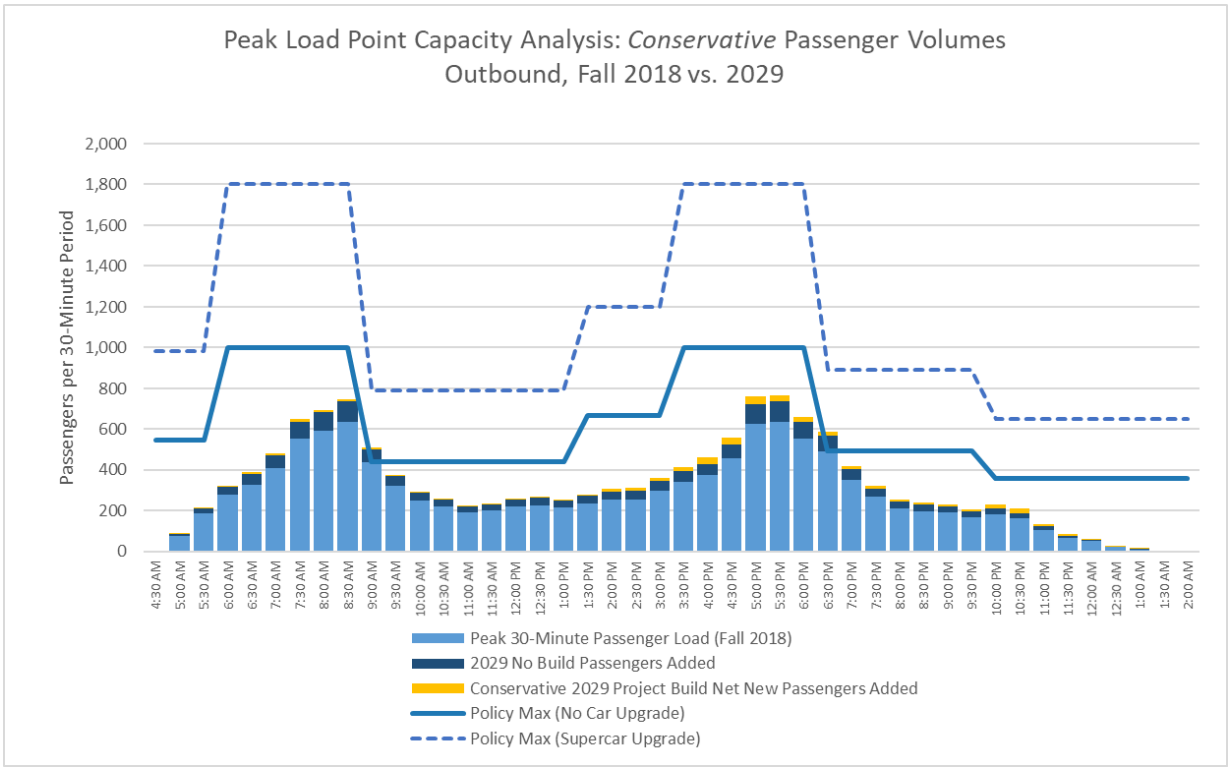
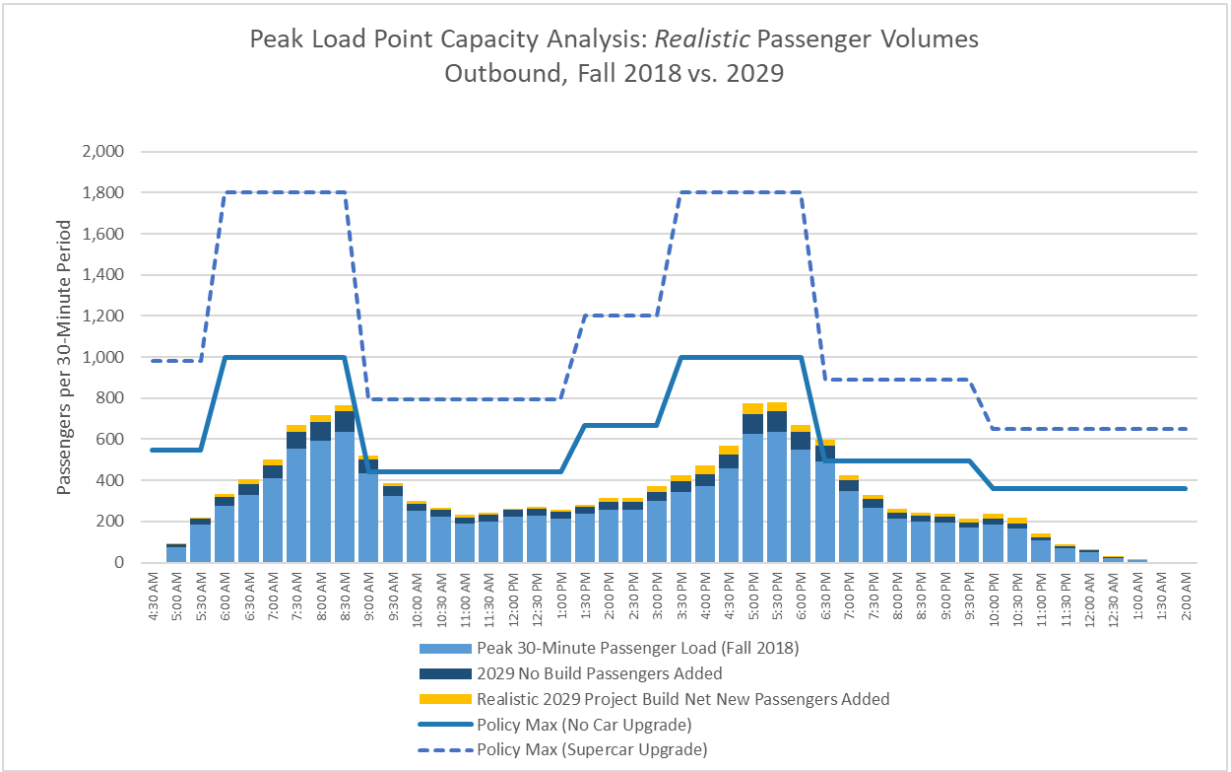


Figure Outbound Green Line Service: Average Peak Load Point Capacity Analysis, Future Condition, Under Two Growth Scenarios





Future Transit Capacity Analysis: MBTA Route 558

The charts below illustrate the expected future passenger loads relative to the expected transit service capacity for the Route 558 bus. Both project-generated transit trips under a *conservative* and a *realistic* scenario is presented.

At future ridership levels and expected service levels, the MBTA Route 558 bus service is expected to be in compliance with the MBTA's policy capacity thresholds.

Route 558 Passenger Loads vs. Policy Capacity