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April 16, 2020

BY EMAIL

Ms. Adrianna Henriquez Olmsted
Zoning Board of Appeals
1000 Commonwealth Avenue
Newton, MA 02459-1449

Re: #09-19/Comprehensive Permit Application Under M.G.L. Chapter 40B, Sections 20-23/Dunstan East, LLC

Dear Ms. Olmsted,

In accordance with Horsley Witten's March 10, 2020 Peer Review and the Planning Department's report dated March 12, 2020 relative to the above entitled application, I am emailing the following documents to you for distribution to the Zoning Board of Appeals.

1. Retail Loading Plan dated April 16, 2020 by Elkus Manfredi Architects.
2. Residential Move-in and Move-Out Plan dated April 16, 2020 by Elkus Manfredi Architects.
3. Trash Management Plan dated April 16, 2020 by Elkus Manfredi Architects.
4. Residential Pick-up/Drop-off Plan dated April 16, 2020 by Elkus Manfredi Architects.
5. Garage Parking Plan and Matrix dated April 16, 2020 by Elkus Manfredi Architects.
6. Courtyard Division of Space Diagram dated April 16, 2020 by Elkus Manfredi Architects.
7. Bike Parking Matrix dated April 16, 2020 by Elkus Manfredi Architects.
8. Transit Capacity Analysis with Appendix dated April, 2020 by Vanasse Hangen Brustlin, Inc.

Please feel free to contact me if you have any questions or require further information.

Sincerely,

Katherine Braucher Adams

Katherine Braucher Adams

Enclosures

cc: (By Email, w/enclosures)
Mr. Michael Gleba, Senior Planner
(By Email, w/out enclosures)
Mr. Robert Korff
Mr. Damien Chaviano
Mr. Scott Lombardi

Loading Diagram Level 1

Retail Loading

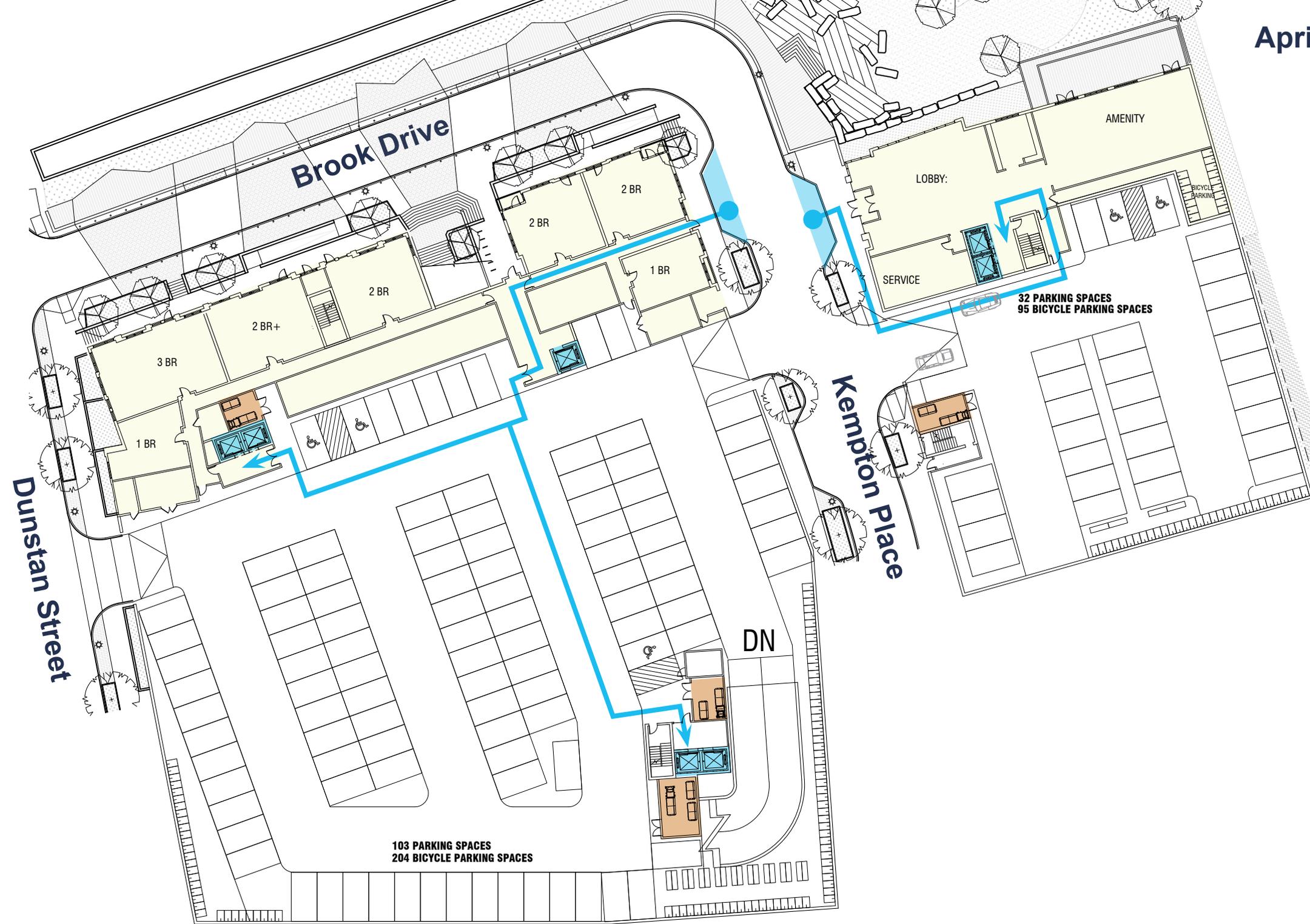
April 16, 2020



Loading Diagram Level P1

Residential Loading
(Move-in / Move-out)

April 16, 2020



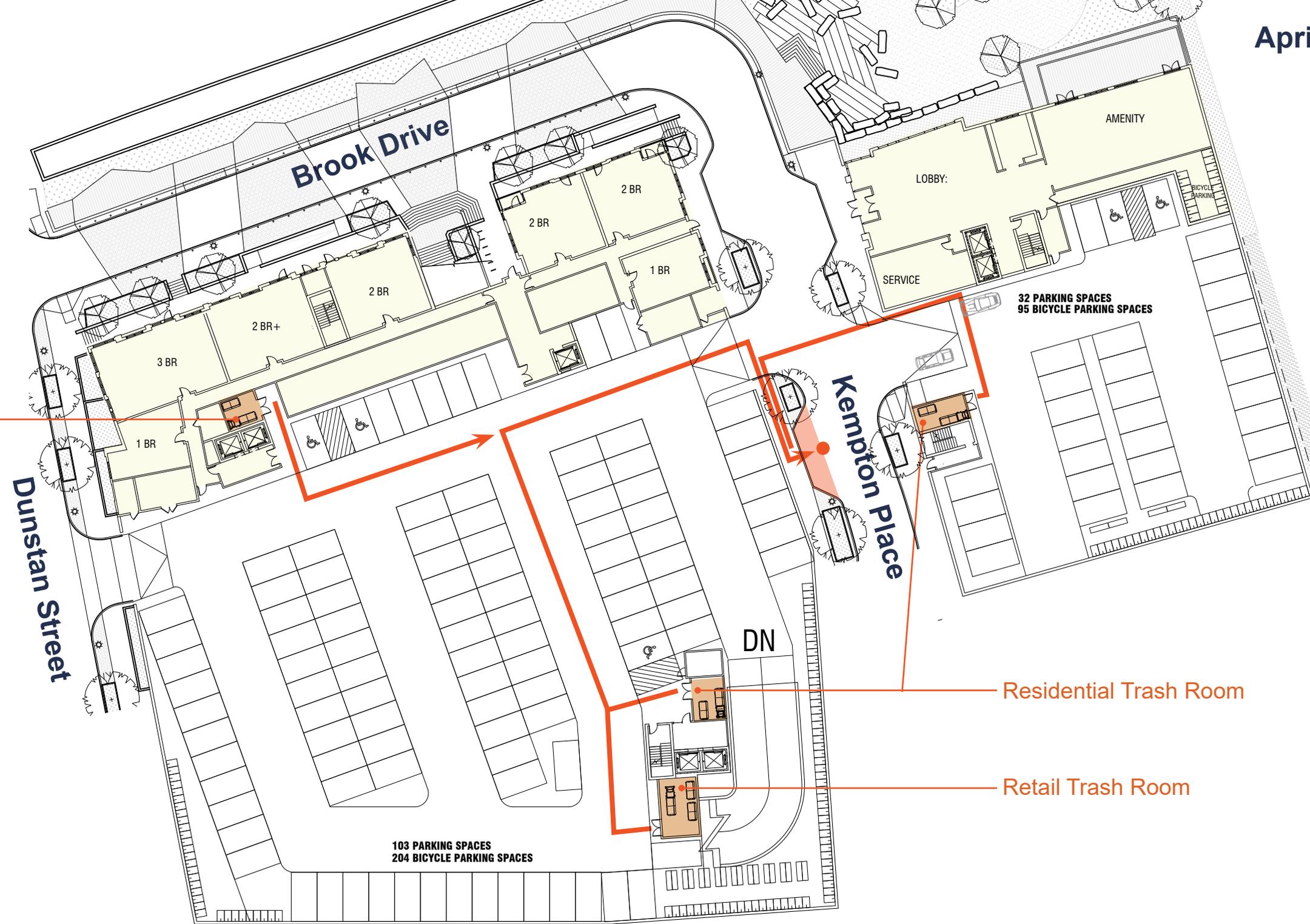
Washington Street

Trash Diagram Level P1

April 16, 2020

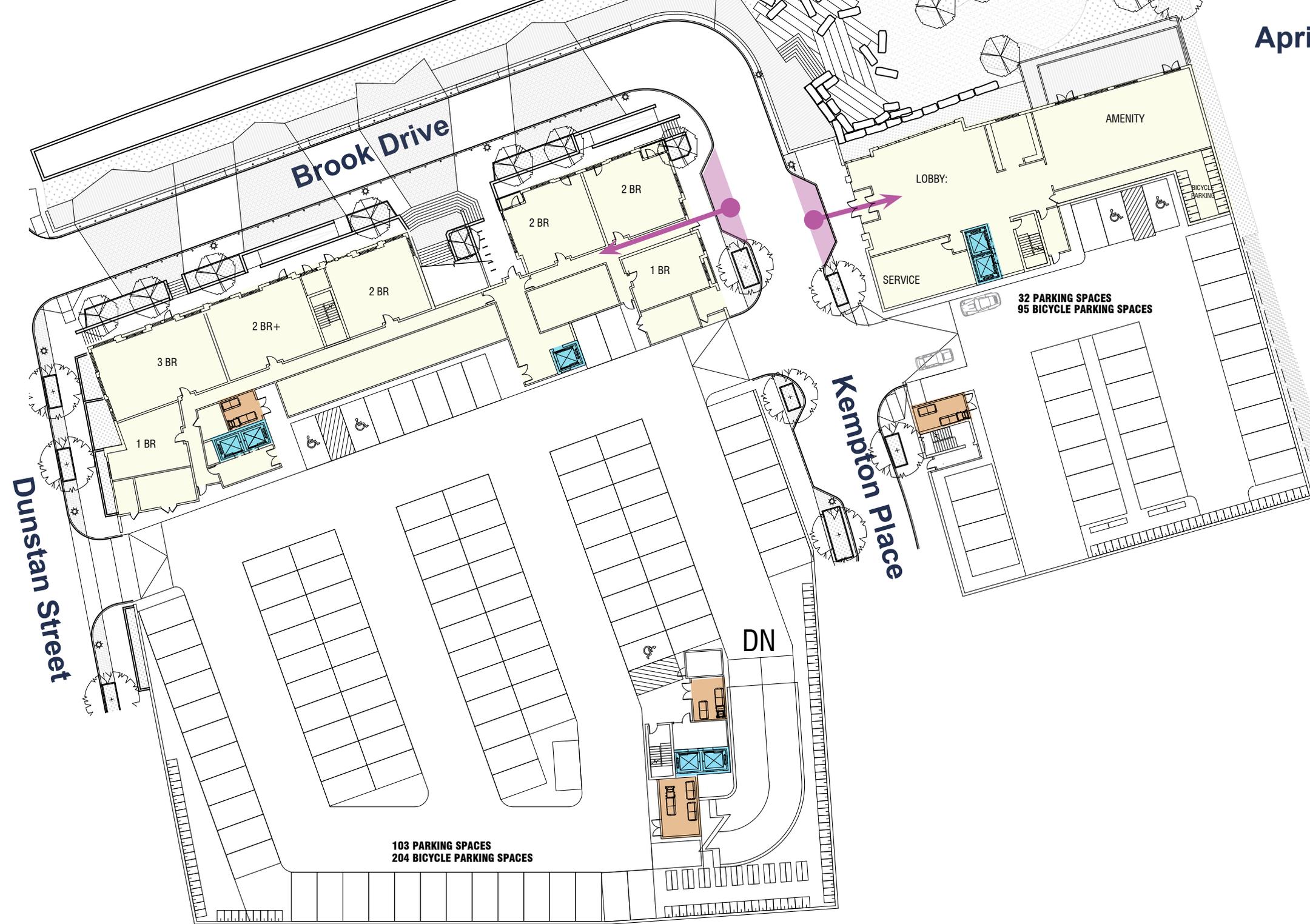
Residential Trash Room

- Recycling and trash to be hand-carted from all buildings to the Kempton Place garage exits for regularly scheduled pick-up by contracted waste hauler



Loading Diagram Level P1

April 16, 2020



Washington Street

Dunstan East - Vehicular Parking

	Residential Units	Residential Parking	Parking/Unit Ratio	Retail Sq. Ft.	Commerical Parking	Total Parking
Buildings 1 and 2	171	212	-	11,563	40	252
Building 3	73	32	-	-	-	32
Total	244	244	1.00	11,563	40 *	284

* Includes parking for 1149 Washington Street, as needed.

1149 Washington Street

	Office Sq. Ft.	Total Parking
Existing	7,986	19
Proposed	7,986	5
Delta	0	-14

Dunstan East - Vehicular Parking

		Parking Count
Building 1 & 2	Level P1	103
	Level P2	149
Building 3	Level P1	32
Total Parking		284
Residential Units		244
Commercial Parking Stalls		40

* Includes parking for 1149 Washington Street, as needed.

Commercial Parking Level P1

April 16, 2020



Washington Street

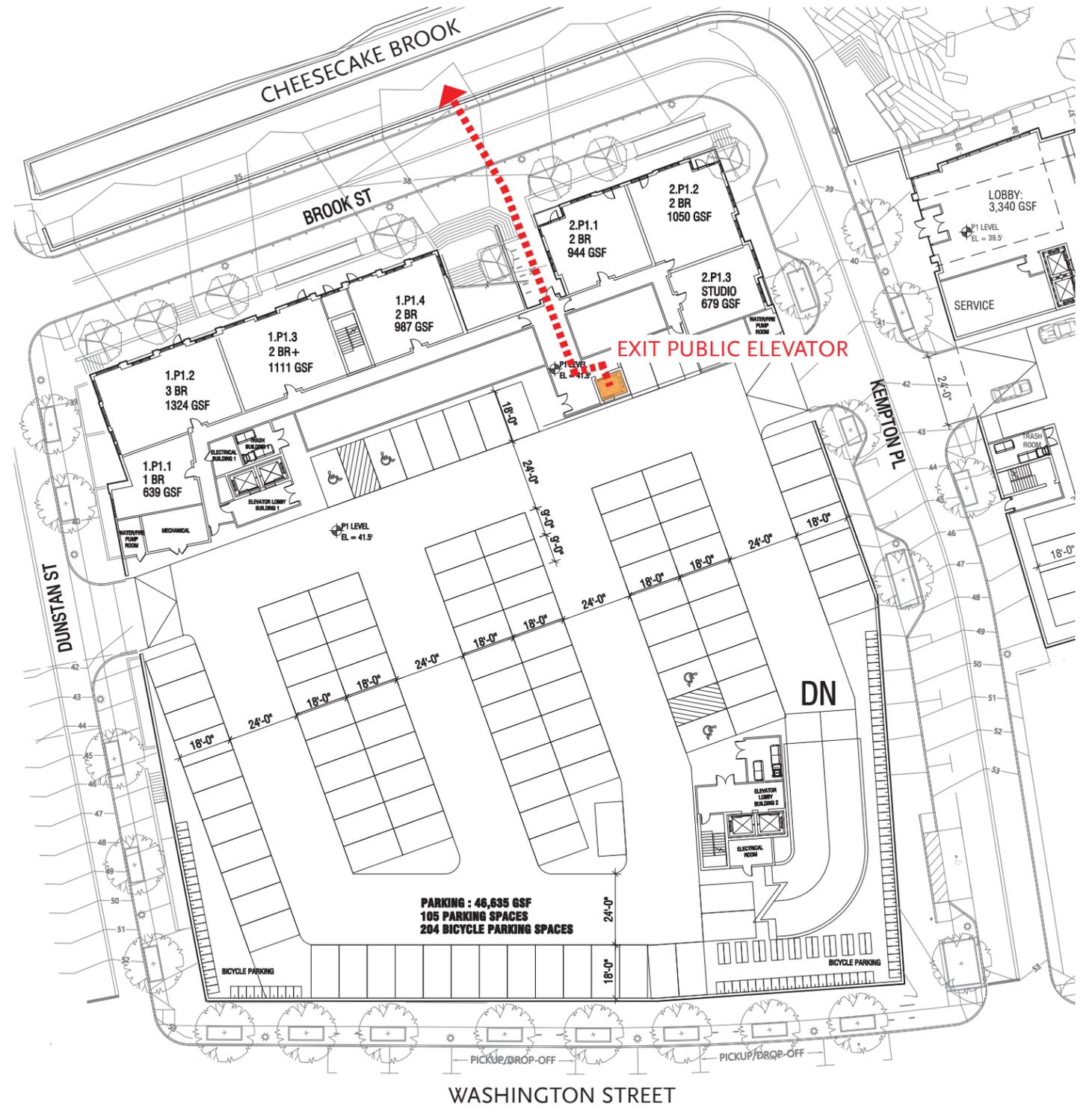
LEGEND

- PUBLIC AND RETAIL TERRACE** 
- PRIVATE RESIDENTIAL AMENITY TERRACE** 
- PRIVATE RESIDENTIAL UNIT PATIO** 





LEVEL 1 PLAN



PARKING LEVEL PLAN

Dunstan East - Bicycle Parking

	Residential Units	Residential Bicycle Parking	Parking/Unit Ratio	Retail Bicycle Parking	Total
Building 1	80	170	2.13	-	170
Building 2	91	190	2.09	-	190
Building 3	73	94	1.29	-	94
Total Interior	244	454	1.86	0	454
Outdoor / Short-term	-	-	-	32	32
Total	244	454	1.86	32	486

Transit Capacity Evaluation

The project site is near express bus service to Downtown Boston, and thus, 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 Commuter Rail (Framingham/Worcester line) Capacity
- › 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 Commuter Rail (Framingham/Worcester line) and MBTA Route 553 and Route 554 bus service were evaluated for project impacts on passenger capacity. (The analysis excludes the Route 170 commuter route that provides reverse commute service (AM outbound and PM inbound) between Roxbury and Waltham via Copley Square/Back Bay. This service only provides two trips in each AM and PM period and does not experience passenger crowding, according to the MBTA's Better Bus Profile (2018) for the route.)

The capacity analysis results in a comparison of the expected demand for transit to the planned capacity of the service. Thus, for the commuter rail 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 trip. 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 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.

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

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 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 These are detailed in the future condition analysis sections.

Existing Commuter Rail (Framingham/Worcester Line) Capacity

The West Newton Station, serving the Framingham/Worcester Line of the Commuter Rail, which connects Union Station in Worcester and South Station in Boston provides service from the Project Site to and from downtown Boston, as well as destinations to the west. Only select trains operating on the line serve West Newton Station throughout daily operation. Schedule information varies according to the time of day, day of the week, and destination.

The 2018 counts show trends related to demand on the Framingham/Worcester Line and at West Newton Station. The Framingham/Worcester Line has defined peak activity periods, with the heaviest inbound demands on trains serving West Newton Station on trains 586 and 588 (departing West Newton at 7:45 AM and 8:19 AM, respectively), and the heaviest outbound demands on trains serving West Newton on trains 593 and 595 (serving West Newton at 5:35 PM and 6:15 PM, respectively). These trains also have the highest levels of ridership to/from West Newton Station and the greatest load throughout the day; the 588 inbound train carries a maximum load of 918 riders with 948 capacity (97 percent occupancy) and the 593 outbound train carries a maximum 836 passengers with 948 capacity (88 percent occupancy). Most of the existing ridership at West Newton travels to/from the east (i.e., riders typically board trains at West Newton Station in the inbound direction and alight at West Newton in the outbound direction); peak loads on the line are typically experienced in the Boston service segments. In total, 243 passengers boarded, and 13 passengers alighted at West Newton in the inbound direction. In the outbound direction, 13 passengers boarded, and 252 passengers alighted at West Newton.

Ridership capacity was determined on a train-by-train basis using information provided in the MBTA equipment cycles, which assign specific trainset consists to each trip.³ Since the MBTA measures capacity on a commuter rail train based on number of available seats, the seated capacity of all the coach cars in a train is added up to determine a given train's capacity. An evaluation of the available capacity on each train revealed that all inbound and outbound trains currently have maximum loads (the maximum number of people on the train at any given point along the route) that do not exceed seated capacity. Train-level boardings, alightings, maximum loads, and capacities are included for inbound and outbound trains in Table 1 and Table 2.

² MBTA Worcester Line Weekly Boardings, Alightings, and Loads by Train and Station, Spring/Fall 2018 Commuter Rail Passenger Counts, conducted by Central Transportation Planning Staff (CTPS) for the MBTA.

³ MBTA, *South Side Weekday Equipment Cycle, Seating Requirements*, Effective April 15, 2019.

Table 1: Existing Demand (Passenger Load) on Inbound Commuter Rail Trains Serving West Newton Station

Train	Time at		West Newton		Line-Level	
	West Newton	South Station	Boardings	Alightings	Maximum Load	Capacity
500	5:56 AM	6:18 AM	2	1	151	948
582	6:24	6:58	10	2	186	570
584	7:09	7:33	43	—	507	702
586	7:45	8:10	70	2	765	948
588	8:19	8:44	83	4	918	948
590	9:15	9:39	27	2	446	702
512	<i>f</i> 10:01	10:24	3	—	349	570
514	<i>f</i> 11:45	12:06 PM	4	—	156	948
516	<i>f</i> 1:15 PM	1:36	1	—	128	702
596	<i>f</i> 7:34	7:57	—	1	19	702
534	<i>f</i> 12:30 AM	12:53 AM	—	—	6	1080
536	<i>f</i> 1:30	1:51	—	1	4	834*

Table 2: Existing Demand (Passenger Load) on Outbound Commuter Rail Trains Serving West Newton Station

Train	Time at		West Newton		Line-Level	
	South Station	West Newton	Boardings	Alightings	Maximum Load	Capacity
581	4:57 AM	<i>f</i> 5:20 AM	—	—	3	834*
511	10:15	<i>f</i> 10:39	—	2	68	702
513	11:55	<i>f</i> 12:19 PM	—	3	106	1080
515	2:00 PM	<i>f</i> 2:24	5	7	194	702
517	3:30	3:55	—	13	574	948
591	4:30	4:55	2	49	473	702
593	5:10	5:35	2	79	836	948
595	5:50	6:15	—	58	612	702
527	6:45	7:10	1	26	407	834
529	7:45	<i>f</i> 8:10	2	5	218	948
531	8:35	<i>f</i> 9:00	—	3	204	948
533	9:35	<i>f</i> 10:00	1	3	105	1080
535	10:30	<i>f</i> 10:55	—	12	188	834
537	11:30	<i>f</i> 11:55	—	2	83	948

Source: CTPS Commuter Rail Counts for the MBTA, 2018.

*Estimated based on median train capacity.

f before time indicates train stops only on request.

Existing MBTA Bus Service Capacity

The Route 553 and Route 554 MBTA buses both serve the Project Site at the Washington Street and Armory Street stop in service between Waltham and Boston. Route 553 operates from Monday to Saturday with 30 to 60 minute headways during peak periods. Route 554 operates only on the weekdays with 30 to 60 minute headways during peak periods. (The Route 170 bus runs near the project site but with a stop at Elm Street further from the project site than the Washington Street/Armory Street stop for Routes 553 and 554. The infrequent service of the Route 170—two AM trips and two PM trips—is primarily for reverse commuters traveling from Boston to Waltham. The route does not experience passenger crowding, according to the MBTA’s Better Bus Profile⁴ and isn’t expected to draw any significant ridership from the Project.)

During a typical morning peak period, the Route 553 gains about 27 passengers at the Washington/Armory Street stop on inbound service to Boston and has about 4 passengers alight from the outbound service to Waltham. The Route 554 typically gains about 19 passengers who board the inbound service and gains 1 passenger on the outbound service. The evening peak period the Route 553 typically has about 2 passengers alight at the site stop on inbound service and 21 passengers alight at the site’s stop on outbound service. The Route 554 has about 1 passenger alight on inbound service and 34 passengers alight at the stop on outbound service. (These are from the composite day ridership profiles for the bus services, representing typical fall 2018 conditions.)

The buses serving this route each have a seated capacity of 38 passengers and, using the vehicle load standard dictated by MBTA Service Delivery Policy⁵, 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

Furthermore, 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, the Route 553 passenger comfort metric was 100 percent, based on weekday service.⁸ This route 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. The SDP metric was not provided in the Route 554 profile.

The passenger crowding investigation is based on average weekday passenger loads (Fall 2018 ridership data) at peak load points between segments connecting: (1) Waltham Center and commuter rail station and the project site and (2) the project site and downtown Boston.

⁴ MBTA *Better Bus Project, Route 170 Profile* (2018), <https://cdn.mbta.com/sites/default/files/projects/betterbus/route-profiles/170.pdf>

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

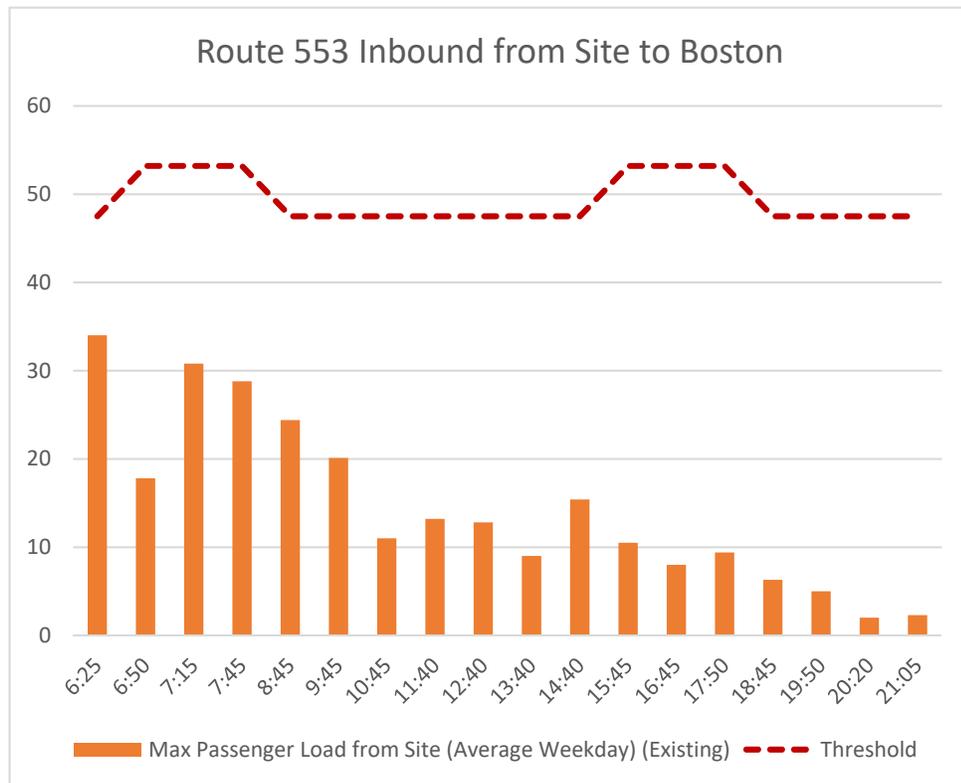
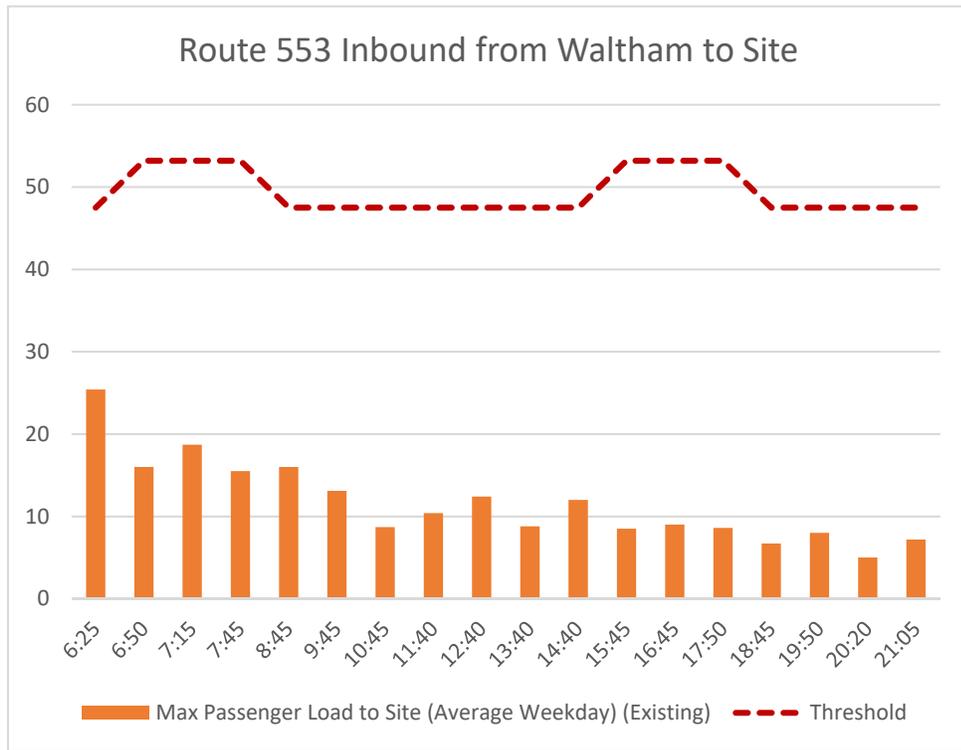
⁶ MBTA, *Average Fleet Seating – CY2017*. Note that the capacities displayed are rounded down to the nearest whole number and maximum loads displayed are rounded to the nearest whole number. All calculations (including sums) do not round maximum loads so may differ from the numbers displayed.

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

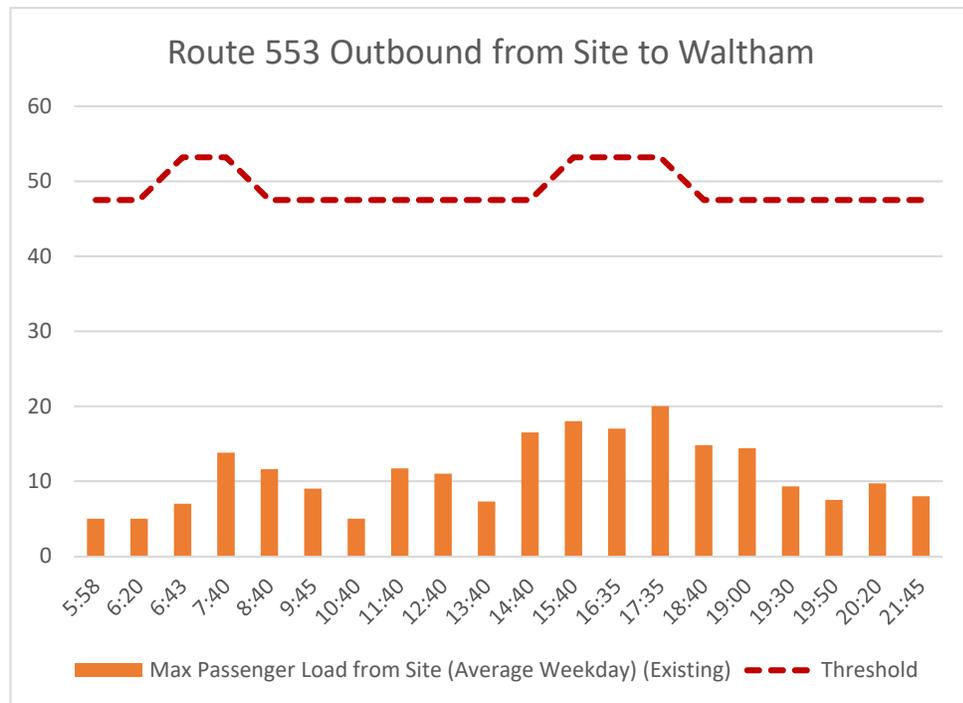
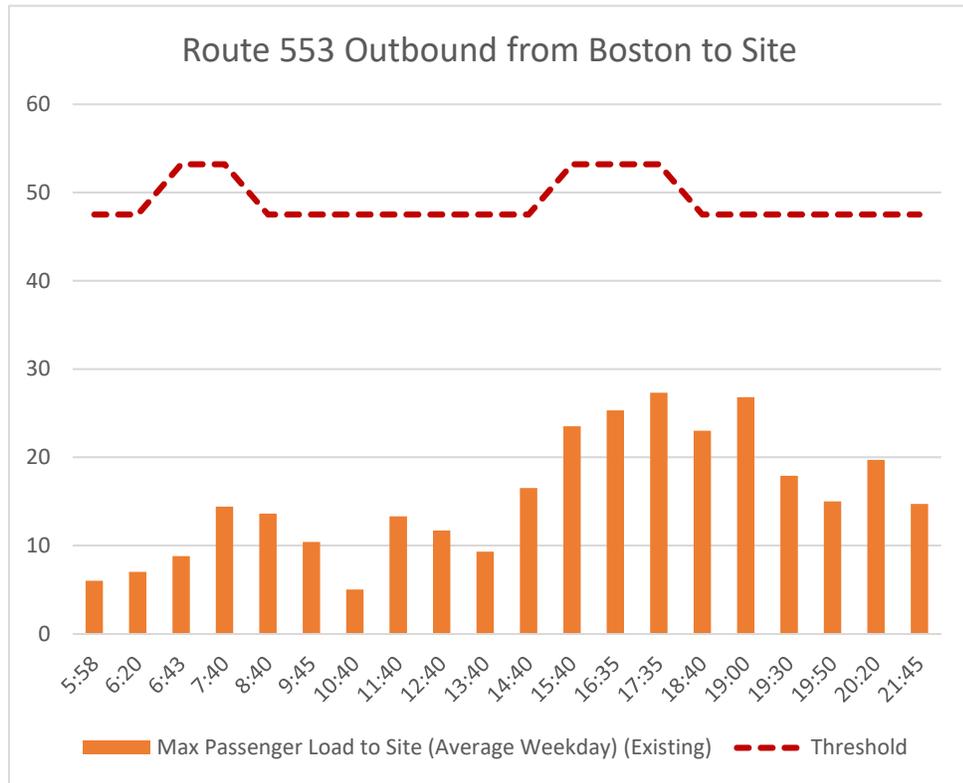
⁸ MBTA *Better Bus Project - Route 553 and Route 554 Bus Profiles* (2018), www.mbta.com/projects/better-bus-project/update/bus-route-profiles-now-available

The review of the latest ridership data found that no trips in the inbound or outbound weekday service exceed the passenger crowding threshold. (See figures below.)

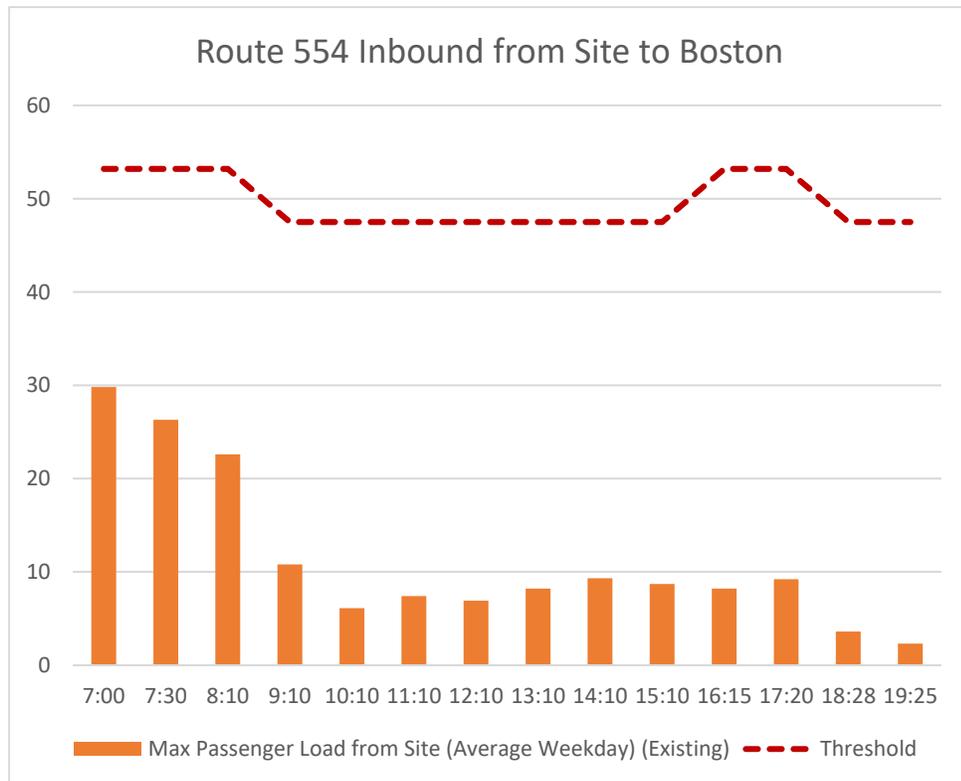
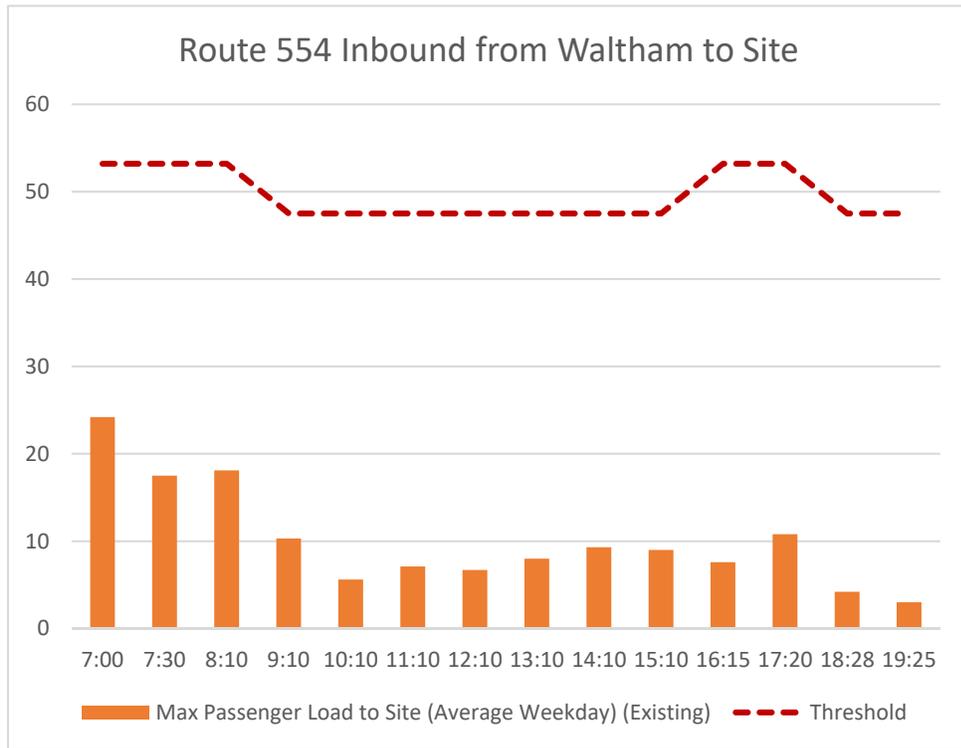
Route 553 Existing Inbound Passenger Loads vs. Policy Capacity



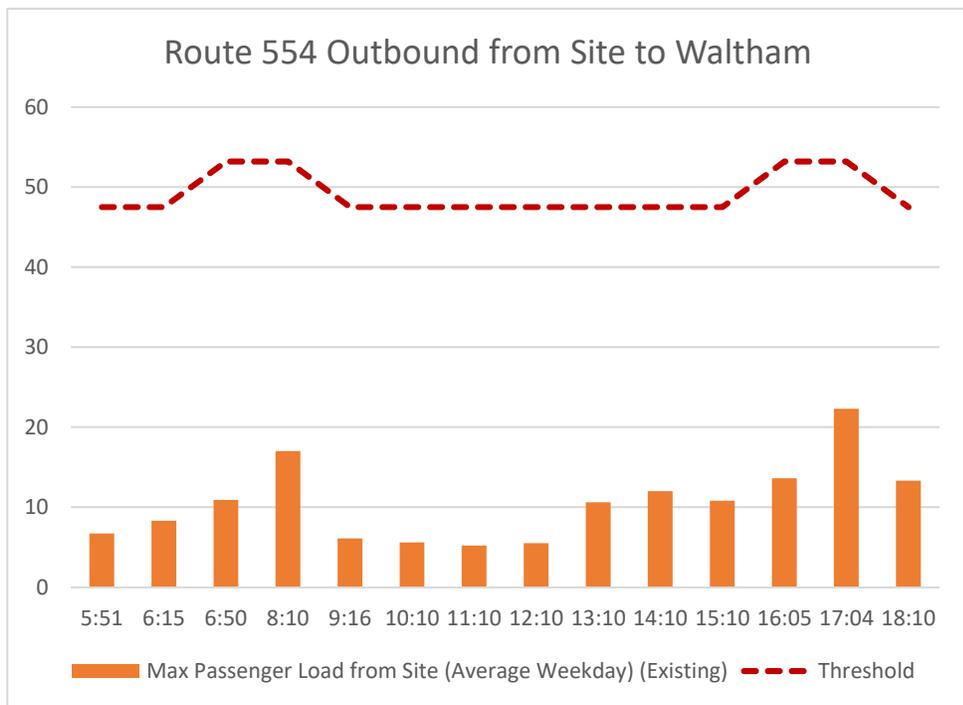
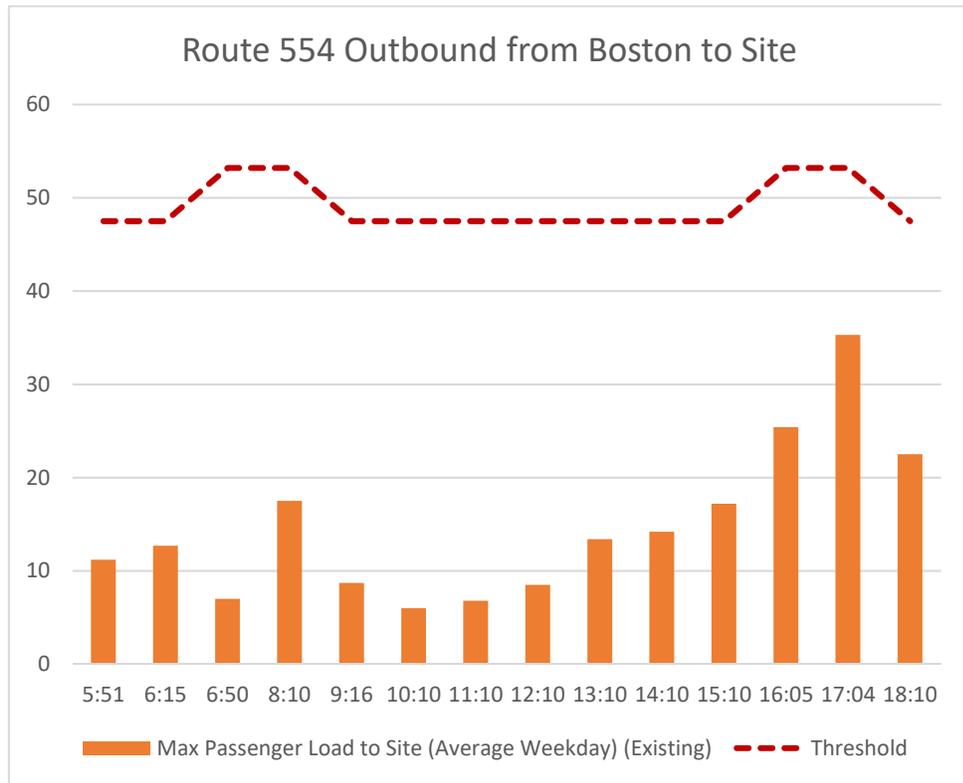
Route 553 Existing Outbound Passenger Loads vs. Policy Capacity



Route 554 Existing Inbound Passenger Loads vs. Policy Capacity



Route 554 Existing Outbound Passenger Loads vs. Policy Capacity



Transit Ridership: Future Projections

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

Future Transit Passenger Activity

The future condition transit analyses are based on the Project Build year 2026. To represent changes in the background ridership the analysis first applies a growth in Commuter Rail passengers of approximately 0.84 percent annually between now and 2026 and a growth in bus passengers of approximately 0.25 percent annually to the Route 553 and 554, based on the projections expressed by the Boston Region Metropolitan Planning Organization (MPO) regional travel demand model maintained by CTPS.⁹ These growth rates were applied to the Fall 2018 passenger volumes to create a future 2026 No-Build condition. For the 2026 Build condition with the Project, the project's site-generated transit trips (riders) were added to the future expected riders of the Commuter Rail (Framingham/Worcester line) and MBTA bus Routes 553 and 554. (The estimated project-generated transit trips are presented in the section *Transit Trip Generation*).

Project's Transit Trip Generation

The future projections for site-generated trips assume that 13 percent of the residential-generated person trips and 5 percent of the retail-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.) The Project is estimated to generate 287 additional transit trips (riders) per weekday (Table 3).

Table 3 Weekday Daily Transit Trips by Trip Generator

	Residential	Retail	Total
Direction	Trips	Trips	Trips
Enter (to Site)	83	59	142
Exit (from Site)	87	58	145
Total	170	117	287

The total number of Project trips were distributed across the nearby transit services/routes based on existing boarding and alightings at stops near the Project Site within approximately 0.25 miles (the closest stop on a route to the Project Site) in conjunction with recent Census data¹⁰. For the residential land use, 70 percent of riders would use MBTA bus routes and 30 percent of riders would use the Commuter Rail (Framingham/Worcester line). For the retail

⁹ *Destination 2040, Long-Range Transportation Plan of the Boston Region Metropolitan Planning Organization*, prepared by the Central Transportation Planning Staff (CTPS), August 201; rate calculated using the model results in the *Daily Transit Trip Activity* table.

¹⁰ U.S. Census Bureau, American Community Survey (ACS) 5-Year Estimates, Special Tabulation: Census Transportation Planning Products (CTPP) Program – Census Tract 3745, Middlesex County, Massachusetts

land use, 85 percent of riders would use MBTA bus routes and 15 percent of riders would use the Commuter Rail (Framingham/Worcester line).

The total Project transit trips (daily transit riders) were split based on a temporal distribution to each of the scheduled bus or train trips to evaluate passenger crowding.

Future Transit Service Capacity

To estimate the impacts of the additional Site-generated transit trips on the Commuter Rail and MBTA bus routes 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.

Applying the method accepted by the MassDOT's Office of Performance Management and Innovation (OPMI) for conducting passenger capacity analysis, ridership was distributed to the Commuter Rail and bus routes by each trip provided on a weekday, based on whether riders were anticipated to be boarding or alighting at the Project Site (i.e. transit trips to the Project Site were distributed based on existing alightings at stops near the Project Site). All trips were distributed proportionally to the existing condition ridership levels, across trips in both directions on all routes. This distribution further distinguishes between riders traveling inbound and outbound, and whether the Project Site was an origin or destination point.

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 553 and Route 554 would continue service based on today's trip schedule and using the same type of bus.
- The Commuter Rail's Framingham/Worcester line trains would operate at the same times of service (while serving the same stations) by train as today's service.

Future Transit Capacity Analysis: Commuter Rail (Framingham/Worcester line)

To analyze demand and capacity on the MBTA's Framingham/Worcester Line for the 2026 condition, the highest projected passenger loading volumes traveling to and from the site in the existing conditions were used to determine a directional maximum (peak) load point on the line. The maximum passenger load point was determined using the CTPS data for boarding, alightings, and load by train. In the inbound direction, the peak load point was between Boston Landing and Lansdowne.¹¹ In the outbound direction, the peak load point was between Lansdowne and Boston Landing.

The analysis of 2026 transit conditions compares MBTA's Framingham/Worcester Line passenger demand at the peak load point, including projected background ridership growth and estimated Project-generated ridership, against the capacity of the trip-specific trainset.

¹¹ Yawkey Station was renamed as Lansdowne Station effective April 8, 2019.

Ridership capacity was determined on a train-by-train basis using information provided in the MBTA Commuter Rail equipment cycles, which assigns specific trainset consists and consequently specific, variable capacities to each trip.¹² The analysis assumes that service patterns in the 2026 No Build condition would remain the same as existing.

The analysis considers passenger loading volumes directionally as trains travel to or from the Project Site at the West Newton stop, at the train-level.

2026 No Build

Under 2026 No-Build conditions, the Framingham/Worcester Line is projected to operate within its available capacity during the weekday peaks, except for one inbound morning train, as illustrated in Table 4 and Table 5. The train departing West Newton at 8:19 AM in the inbound direction is projected to exceed capacity by 34 passengers.

2026 Build

Under 2026 Build conditions (Table 6 and Table 7), the Framingham/Worcester Line is projected to operate within its recommended passenger crowding threshold during the weekday peaks, except for one inbound morning train. This train is the same one identified in the 2026 No-Build condition as being over capacity. In the Build Condition, it is anticipated that this train would have 11 additional passengers over available capacity compared to the No-Build condition. Although the Project is anticipated to generate 12 passengers on this inbound trip, 1 of these passengers is projected to alight at the Site, before the maximum load point, in a segment where there is available capacity. The other 11 passengers would board the train prior-to and occupy the train during the segment already exceeding capacity.

No additional trains would reach capacity through the project generated trips. The project adds minimal riders, which would retain the same single train from the No-Build analysis exceeding capacity, but by a total of 45 passengers.

¹² MBTA, *South Side Weekday Equipment Cycle, Seating Requirements*, effective April 15, 2019.

Table 4: 2026 No-Build Demand (Passenger Load) on Inbound Commuter Rail Trains Serving West Newton Station

Train	Time at		Line-Level			
	West Newton	South Station	Existing Maximum Load	Change in Maximum Load	No-Build Maximum Load	Capacity
500	5:56 AM	6:18 AM	151	+10	161	948
582	6:24	6:58	186	+13	199	570
584	7:09	7:33	507	+35	542	702
586	7:45	8:10	765	+53	818	948
588	8:19	8:44	918	+64	982	948
590	9:15	9:39	446	+31	477	702
512	<i>f</i> 10:01	10:24	349	+24	373	570
514	<i>f</i> 11:45	12:06 PM	156	+11	167	948
516	<i>f</i> 1:15 PM	1:36	128	+9	137	702
596	<i>f</i> 7:34	7:57	19	+1	20	702
534	<i>f</i> 12:30 AM	12:53 AM	6	0	6	1080
536	<i>f</i> 1:30	1:51	4	0	4	834*

Table 5: 2026 No-Build Demand (Passenger Load) on Outbound Commuter Rail Trains Serving West Newton Station

Train	Time at		Line-Level			
	South Station	West Newton	Existing Maximum Load	Change in Maximum Load	No-Build Maximum Load	Capacity
581	4:57 AM	<i>f</i> 5:20 AM	3	0	3	834*
511	10:15	<i>f</i> 10:39	68	+5	73	702
513	11:55	<i>f</i> 12:19 PM	106	+7	113	1080
515	2:00 PM	<i>f</i> 2:24	194	+13	207	702
517	3:30	3:55	574	+40	614	948
591	4:30	4:55	473	+33	506	702
593	5:10	5:35	836	+58	894	948
595	5:50	6:15	612	+42	654	702
527	6:45	7:10	407	+28	435	834
529	7:45	<i>f</i> 8:10	218	+15	233	948
531	8:35	<i>f</i> 9:00	204	+14	218	948
533	9:35	<i>f</i> 10:00	105	+7	112	1080
535	10:30	<i>f</i> 10:55	188	+13	201	834
537	11:30	<i>f</i> 11:55	83	+6	89	948

Note: Yellow shading indicates trips exceeding capacity. *Estimated based on median train capacity.

"*f*" before time indicates train stops only on request.

Sources: CTPS Commuter Rail Counts, 2018.

Table 6: 2026 Build Demand (Passenger Load) on Inbound Commuter Rail Trains Serving West Newton Station

Train	Time at		No-Build Maximum Load		Build Added Load		Build Maximum Load		Capacity
	West Newton	South Station	To West Newton	From West Newton	To West Newton	From West Newton	To West Newton	From West Newton	
500	5:56	6:18	148	161	0	0	148	161	948
582	6:24	6:58	142	199	0	+1	142	200	570
584	7:09	7:33	384	542	0	+6	384	548	702
586	7:45	8:10	549	818	+1	+9	550	827	948
588	8:19	8:44	643	982	+1	+11	644	993	948
590	9:15	9:39	396	477	0	+3	396	480	702
512	f 10:01	10:24	342	373	0	0	342	373	570
514	f 11:45	12:06	163	167	0	+1	163	168	948
516	f 1:15	1:36	128	137	0	0	128	137	702
596	f 7:34	7:57	20	19	0	0	20	19	702
534	f 12:30	12:53	6	3	0	0	6	3	1080
536	f 1:30	1:51	4	3	0	0	4	3	834*

Table 7: 2026 Build Demand (Passenger Load) on Outbound Commuter Rail Trains Serving West Newton Station

Train	Time at		No-Build Maximum Load		Build Added Load		Build Maximum Load		Capacity
	South Station	West Newton	To West Newton	From West Newton	To West Newton	From West Newton	To West Newton	From West Newton	
581	4:57	5:07	2	3	0	0	2	3	834*
511	10:15	10:26	73	69	0	0	73	69	702
513	11:55	12:06	113	105	0	0	113	105	1080
515	2:00	2:11	207	207	+1	+1	208	208	702
517	3:30	3:41	614	565	+2	0	616	565	948
591	4:30	4:41	506	360	+7	+1	513	361	702
593	5:10	5:21	894	597	+11	0	905	597	948
595	5:50	6:01	654	416	+8	0	662	416	702
527	6:45	6:56	435	354	+4	0	439	354	834
529	7:45	7:56	233	206	+1	0	234	206	948
531	8:35	8:46	218	190	0	0	218	190	948
533	9:35	9:46	112	91	0	0	112	91	1080
535	10:30	10:41	201	177	0	0	201	177	834
537	11:30	11:41	89	82	0	0	89	82	948

Note: Blue shading indicates the segment with the maximum load.

*Estimated based on median train capacity.

Sources: CTPS Commuter Rail Counts for the MBTA, 2018.

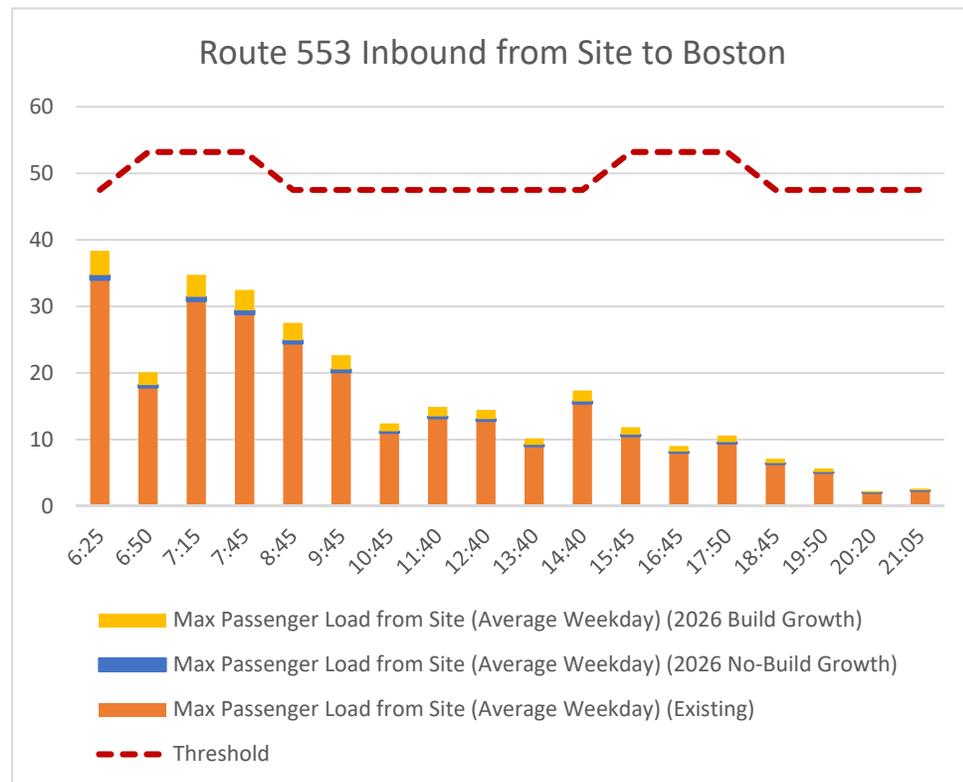
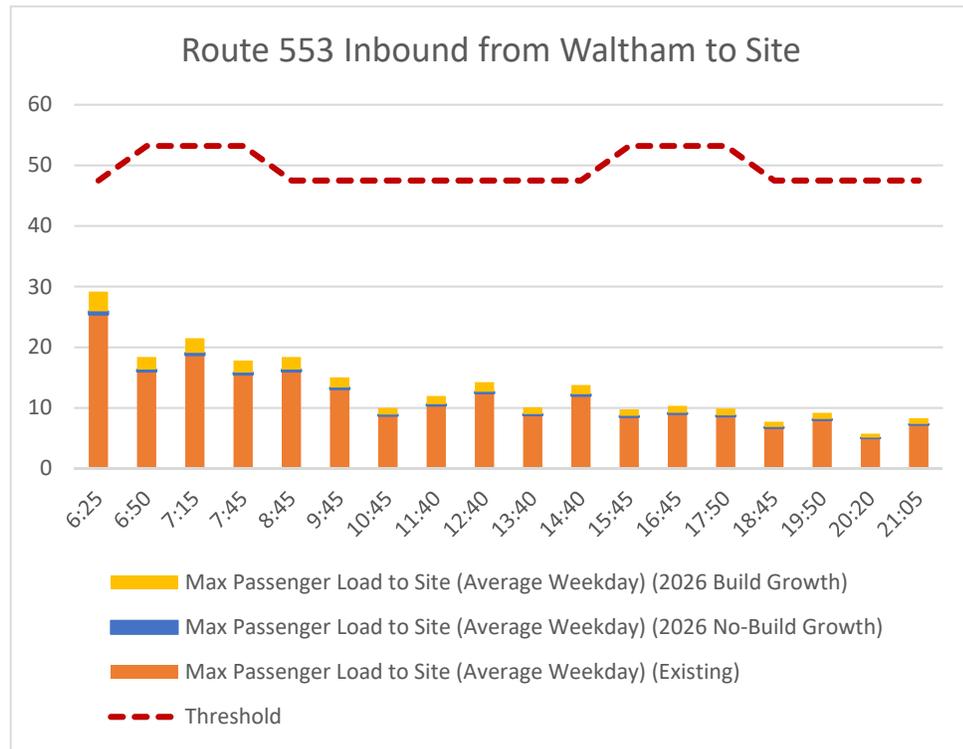
Future Transit Capacity Analysis: MBTA Route 553 and Route 554

The charts below illustrate the expected future passenger loads relative to the expected transit service capacity for the Route 553 and 554 buses. Build-generated daily weekday trips were split evenly between the two bus routes and distributed to each scheduled bus based on ridership for each bus.

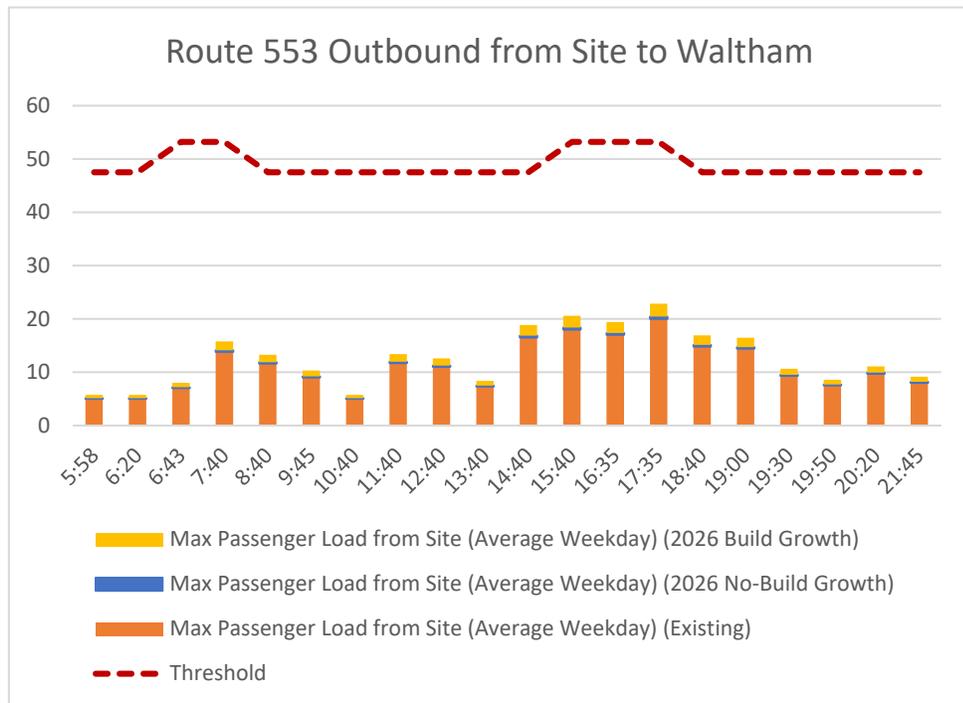
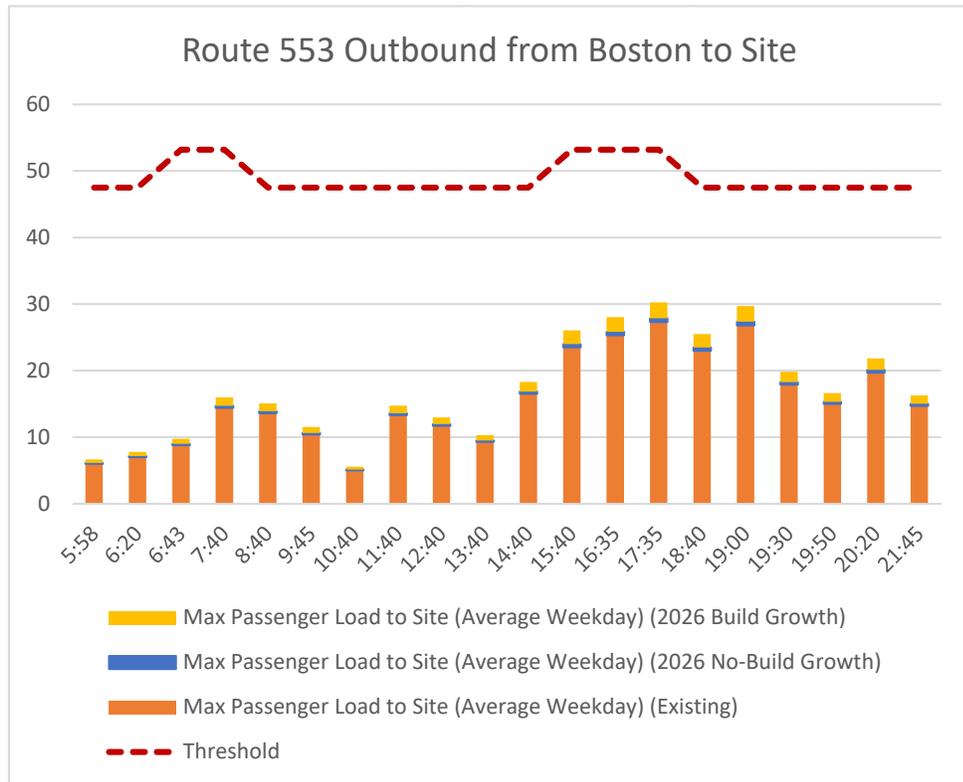
Both routes gain a few riders from background growth, but the majority of added riders at the Washington/Armory Street stop are project generated in the 2026 estimate. During the morning peak period, on the Route 553 inbound service the project generates 6 bus riders traveling to the site and 8 riders from the site, and on outbound service the project generates 3 riders traveling to the site and 4 riders from the site. On the inbound Route 554 service the project adds 11 bus riders traveling to the site and 14 riders from the site, and on outbound service the project generates 4 bus riders traveling to the site and 6 riders from the site. In the evening, on the Route 553 inbound, the project adds 3 bus riders traveling to the site and 3 riders from the site, and on outbound service, the project generates 7 bus riders traveling to the site and 7 riders from the site. On inbound Route 554, the project adds 5 bus riders traveling to the site and 5 riders from the site, and on outbound service, the project generates 11 bus riders traveling to the site and 9 riders from the site.

At future ridership levels and expected service levels, the MBTA Route 553 and Route 554 bus service are expected to be in compliance with the MBTA's policy capacity thresholds; no trips exceed the passenger crowding threshold, under either the future No-Build or the Build condition.

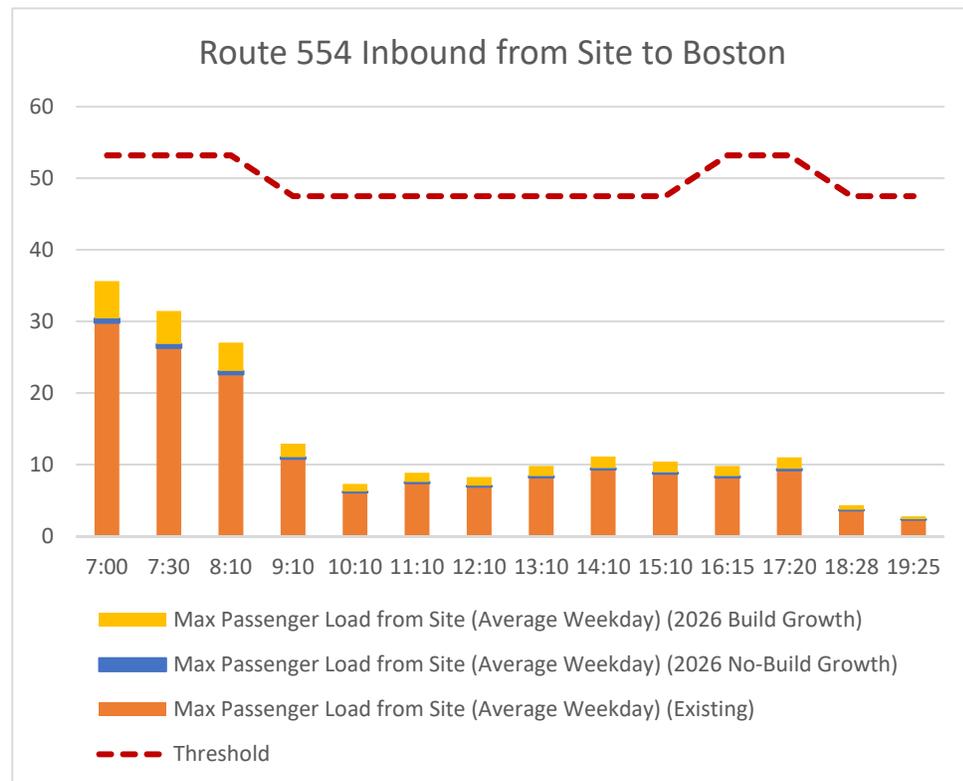
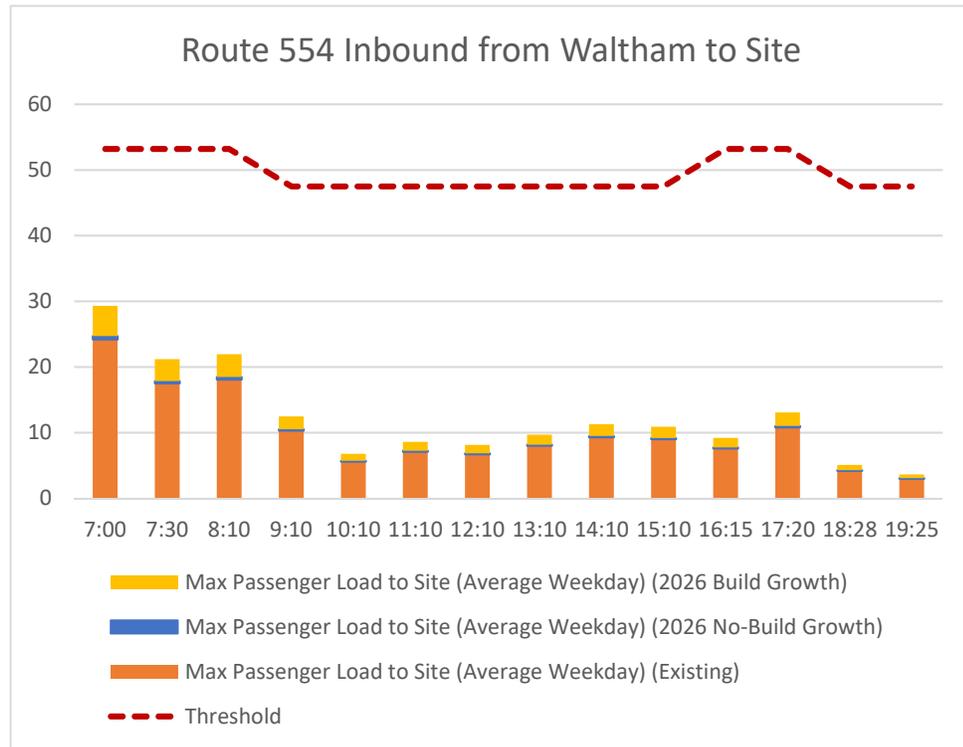
Route 553 Inbound Future Passenger Loads vs. Policy Capacity



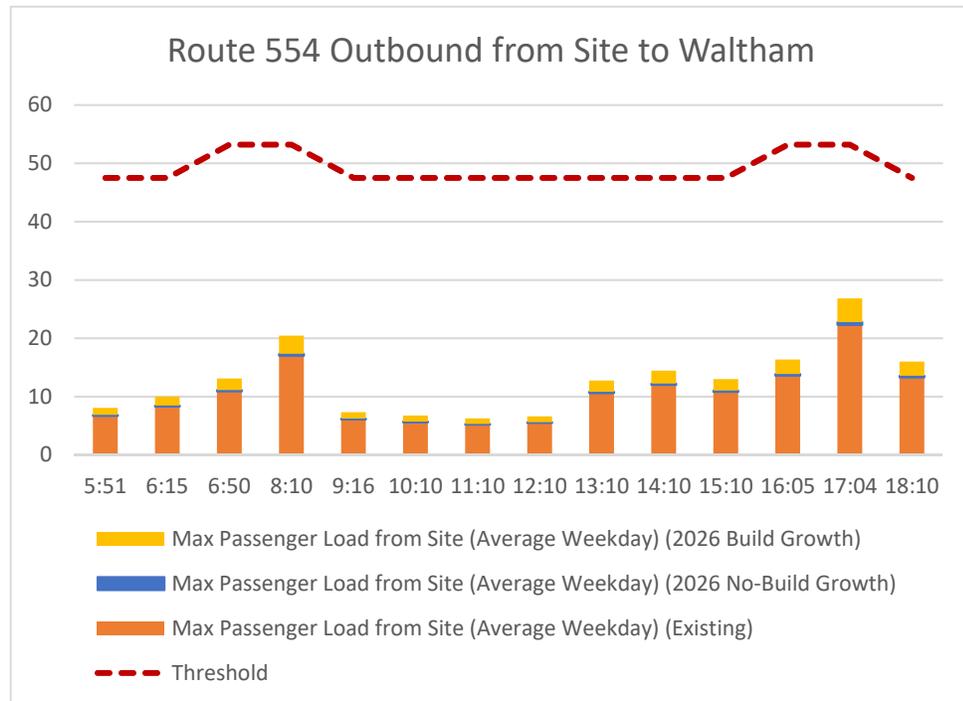
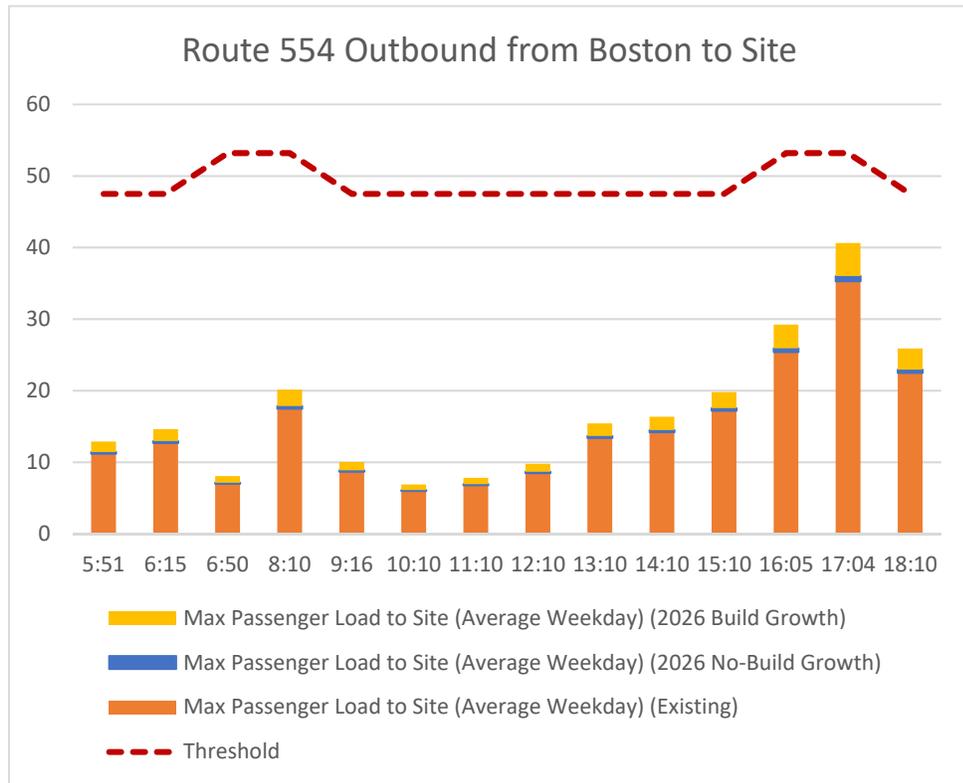
Route 553 Outbound Future Passenger Loads vs. Policy Capacity



Route 554 Inbound Future Passenger Loads vs. Policy Capacity



Route 554 Outbound Future Passenger Loads vs. Policy Capacity



Appendix

GTFS.rout e_id	GTFS.dire ction_id	Trip.Start. Day.Type	Route_Va riant	Threshold	Time.At.Si te	Existing.T o.Site	Growth.T o.Site	Existing. To.Site.		Existing. From.Site.		New. Riders. To.Site	New. Riders. From.Site	Total.To.S ite	Total.Fro m.Site	Exceedan ce.To.Site	Exceedan ce.From.S ite
								W.Growth	Existing.Fr om.Site	Growth.Fr om.Site	W.Growth						
1	553 Inbound	Weekday	6:25	553	47.5	6:49	25.4	0.51	25.91	34	0.69	34.69	3.27	3.65	29	38	
2	553 Inbound	Weekday	6:50	553.7	53.2	7:14	16	0.32	16.32	17.8	0.36	18.16	2.06	1.91	18	20	
3	553 Inbound	Weekday	7:15	553	53.2	7:41	18.7	0.38	19.08	30.8	0.62	31.42	2.4	3.31	21	35	
4	553 Inbound	Weekday	7:45	553	53.2	8:11	15.5	0.31	15.81	28.8	0.58	29.38	1.99	3.09	18	32	
5	553 Inbound	Weekday	8:45	553	47.5	9:12	16	0.32	16.32	24.4	0.49	24.89	2.06	2.62	18	28	
6	553 Inbound	Weekday	9:45	553	47.5	10:09	13.1	0.26	13.36	20.1	0.41	20.51	1.68	2.16	15	23	
7	553 Inbound	Weekday	10:45	553	47.5	11:09	8.7	0.18	8.88	11	0.22	11.22	1.12	1.18	10	12	
8	553 Inbound	Weekday	11:40	553	47.5	12:09	10.4	0.21	10.61	13.2	0.27	13.47	1.34	1.42	12	15	
9	553 Inbound	Weekday	12:40	553	47.5	13:09	12.4	0.25	12.65	12.8	0.26	13.06	1.59	1.37	14	14	
10	553 Inbound	Weekday	13:40	553	47.5	14:08	8.8	0.18	8.98	9	0.18	9.18	1.13	0.97	10	10	
11	553 Inbound	Weekday	14:40	553	47.5	15:08	12	0.24	12.24	15.4	0.31	15.71	1.54	1.65	14	17	
12	553 Inbound	Weekday	15:45	553	53.2	16:13	8.5	0.17	8.67	10.5	0.21	10.71	1.09	1.13	10	12	
13	553 Inbound	Weekday	16:45	553	53.2	17:13	9	0.18	9.18	8	0.16	8.16	1.16	0.86	10	9	
14	553 Inbound	Weekday	17:50	553	53.2	18:18	8.6	0.17	8.77	9.4	0.19	9.59	1.11	1.01	10	11	
15	553 Inbound	Weekday	18:45	553	47.5	19:08	6.7	0.14	6.84	6.3	0.13	6.43	0.86	0.68	8	7	
16	553 Inbound	Weekday	19:50	553.1	47.5	20:17	8	0.16	8.16	5	0.1	5.1	1.03	0.54	9	6	
17	553 Inbound	Weekday	20:20	553.1	47.5	20:47	5	0.1	5.1	2	0.04	2.04	0.64	0.21	6	2	
18	553 Inbound	Weekday	21:05	553.1	47.5	21:31	7.2	0.15	7.35	2.3	0.05	2.35	0.93	0.25	8	3	

GTFS.route_id	GTFS.direction_id	Day.Type	Trip.Start Time	Route_Variant	Threshold	Time.At.Site	Existing.T		Existing.T		Existing.Fr		Existing.Fr		New.Ride		Total.To.Site	Total.From.Site	Exceedance.To.Site	Exceedance.From.Site
							o.Site	o.Site	o.Site	o.Site	om.Site	om.Site	rs.To.Site	rs.To.Site						
1	553	Outbound Weekday	5:58	553	47.5	6:19	6	0.12	6.12	5	0.1	5.1	0.52	0.61	7	6				
2	553	Outbound Weekday	6:20	553	47.5	6:41	7	0.14	7.14	5	0.1	5.1	0.61	0.61	8	6				
3	553	Outbound Weekday	6:43	553	53.2	7:04	8.8	0.18	8.98	7	0.14	7.14	0.77	0.85	10	8				
4	553	Outbound Weekday	7:40	553	53.2	8:05	14.4	0.29	14.69	13.8	0.28	14.08	1.26	1.68	16	16				
5	553	Outbound Weekday	8:40	553	47.5	9:04	13.6	0.27	13.87	11.6	0.23	11.83	1.19	1.41	15	13				
6	553	Outbound Weekday	9:45	553	47.5	10:09	10.4	0.21	10.61	9	0.18	9.18	0.91	1.1	12	10				
7	553	Outbound Weekday	10:40	553	47.5	11:04	5	0.1	5.1	5	0.1	5.1	0.44	0.61	6	6				
8	553	Outbound Weekday	11:40	553	47.5	12:05	13.3	0.27	13.57	11.7	0.24	11.94	1.16	1.43	15	13				
9	553	Outbound Weekday	12:40	553	47.5	13:06	11.7	0.24	11.94	11	0.22	11.22	1.02	1.34	13	13				
10	553	Outbound Weekday	13:40	553	47.5	14:06	9.3	0.19	9.49	7.3	0.15	7.45	0.81	0.89	10	8				
11	553	Outbound Weekday	14:40	553	47.5	15:08	16.5	0.33	16.83	16.5	0.33	16.83	1.44	2.01	18	19				
12	553	Outbound Weekday	15:40	553	53.2	16:08	23.5	0.47	23.97	18	0.36	18.36	2.05	2.19	26	21				
13	553	Outbound Weekday	16:35	553	53.2	17:03	25.3	0.51	25.81	17	0.34	17.34	2.21	2.07	28	19				
14	553	Outbound Weekday	17:35	553	53.2	18:13	27.3	0.55	27.85	20	0.4	20.4	2.38	2.44	30	23				
15	553	Outbound Weekday	18:40	553	47.5	19:08	23	0.46	23.46	14.8	0.3	15.1	2.01	1.8	25	17				
16	553	Outbound Weekday	19:00	553.1	47.5	19:27	26.8	0.54	27.34	14.4	0.29	14.69	2.34	1.75	30	16				
17	553	Outbound Weekday	19:30	553.1	47.5	19:57	17.9	0.36	18.26	9.3	0.19	9.49	1.56	1.13	20	11				
18	553	Outbound Weekday	19:50	553.1	47.5	20:17	15	0.3	15.3	7.5	0.15	7.65	1.31	0.91	17	9				
19	553	Outbound Weekday	20:20	553.1	47.5	20:47	19.7	0.4	20.1	9.7	0.2	9.9	1.72	1.18	22	11				
20	553	Outbound Weekday	21:45	553.1	47.5	22:11	14.7	0.3	15	8	0.16	8.16	1.28	0.97	16	9				

GTFS.route	GTFS.dir	Day.Type	Start.Time	te_Variant	Threshold	me.At.Site	ing.To.Site	th.To.Site	W.Growth	From.Site	From.Site	W.Growth	ers.To.Site	From.Site	tal.To.Site	l.From.Site	nce.To.Site	From.Site
1	554	Inbound	Weekday	7:00	554	53.2	7:28	24.2	0.49	24.69	29.8	0.6	30.4	4.62	5.23	29	36	
2	554	Inbound	Weekday	7:30	554	53.2	7:58	17.5	0.35	17.85	26.3	0.53	26.83	3.34	4.62	21	31	0.8
3	554	Inbound	Weekday	8:10	554	53.2	8:38	18.1	0.37	18.47	22.6	0.46	23.06	3.46	3.97	22	27	
4	554	Inbound	Weekday	9:10	554	47.5	9:34	10.3	0.21	10.51	10.8	0.22	11.02	1.97	1.9	12	13	
5	554	Inbound	Weekday	10:10	554	47.5	10:34	5.6	0.11	5.71	6.1	0.12	6.22	1.07	1.07	7	7	
6	554	Inbound	Weekday	11:10	554	47.5	11:34	7.1	0.14	7.24	7.4	0.15	7.55	1.36	1.3	9	9	
7	554	Inbound	Weekday	12:10	554	47.5	12:34	6.7	0.14	6.84	6.9	0.14	7.04	1.28	1.21	8	8	
8	554	Inbound	Weekday	13:10	554	47.5	13:34	8	0.16	8.16	8.2	0.17	8.37	1.53	1.44	10	10	
9	554	Inbound	Weekday	14:10	554	47.5	14:34	9.3	0.19	9.49	9.3	0.19	9.49	1.78	1.63	11	11	
10	554	Inbound	Weekday	15:10	554	47.5	15:37	9	0.18	9.18	8.7	0.18	8.88	1.72	1.53	11	10	
11	554	Inbound	Weekday	16:15	554	53.2	16:43	7.6	0.15	7.75	8.2	0.17	8.37	1.45	1.44	9	10	
12	554	Inbound	Weekday	17:20	554.2	53.2	17:43	10.8	0.22	11.02	9.2	0.19	9.39	2.06	1.62	13	11	
13	554	Inbound	Weekday	18:28	554.2	47.5	18:51	4.2	0.08	4.28	3.6	0.07	3.67	0.8	0.63	5	4	
14	554	Inbound	Weekday	19:25	554.2	47.5	19:47	3	0.06	3.06	2.3	0.05	2.35	0.57	0.4	4	3	

GTFS.route	GTFS.dir	Day.Type	Start.Time	te_Variant	Threshold	me.At.Site	ing.To.Site	th.To.Site	W.Growth	;From.Site	From.Site	W.Growth	ers.To.Site	:From.Site	tal.To.Site	l.From.Site	nce.To.Site	:From.Site
1	554	Outbound	Weekday	5:51	554.2	47.5	6:11	11.2	0.23	11.43	6.7	0.14	6.84	1.47	1.22	13	8	
2	554	Outbound	Weekday	6:15	554.2	47.5	6:36	12.7	0.26	12.96	8.3	0.17	8.47	1.66	1.52	15	10	
3	554	Outbound	Weekday	6:50	554.2	53.2	7:11	7	0.14	7.14	10.9	0.22	11.12	0.92	1.99	8	13	
4	554	Outbound	Weekday	8:10	554	53.2	8:37	17.5	0.35	17.85	17	0.34	17.34	2.29	3.1	20	20	
5	554	Outbound	Weekday	9:16	554	47.5	9:41	8.7	0.18	8.88	6.1	0.12	6.22	1.14	1.11	10	7	
6	554	Outbound	Weekday	10:10	554	47.5	10:33	6	0.12	6.12	5.6	0.11	5.71	0.78	1.02	7	7	
7	554	Outbound	Weekday	11:10	554	47.5	11:33	6.8	0.14	6.94	5.2	0.1	5.3	0.89	0.95	8	6	
8	554	Outbound	Weekday	12:10	554	47.5	12:33	8.5	0.17	8.67	5.5	0.11	5.61	1.11	1	10	7	
9	554	Outbound	Weekday	13:10	554	47.5	13:33	13.4	0.27	13.67	10.6	0.21	10.81	1.75	1.94	15	13	
10	554	Outbound	Weekday	14:10	554	47.5	14:37	14.2	0.29	14.49	12	0.24	12.24	1.86	2.19	16	14	
11	554	Outbound	Weekday	15:10	554	47.5	15:39	17.2	0.35	17.55	10.8	0.22	11.02	2.25	1.97	20	13	
12	554	Outbound	Weekday	16:05	554	53.2	16:37	25.4	0.51	25.91	13.6	0.27	13.87	3.32	2.48	29	16	
13	554	Outbound	Weekday	17:04	554	53.2	17:50	35.3	0.71	36.01	22.3	0.45	22.75	4.62	4.07	41	27	
14	554	Outbound	Weekday	18:10	554	47.5	18:50	22.5	0.45	22.95	13.3	0.27	13.57	2.94	2.43	26	16	

Growth Rate 0.84% **Inbound**
years 8 1.069209222 (2018 Data, 2026 Build Year)

Existing Conditions												
Train	West Newton	Newtonville	Lansdov S. Station	Load Prior to Station	at West Newton				Max Load			
					Board	Alight	Activity	Load	Prior (to W)	Preceding (to E)		
500	5:56	5:59	6:07	6:18	138	2	1	3	139	138	151	
582	6:34	6:37	6:47	6:58	133	10	2	12	141	133	186	
584	7:09	7:12	7:22	7:33	359	43	0	43	402	359	507	
586	7:45	7:48	7:59	8:10	513	70	2	72	581	513	765	
588	8:19	8:22	8:33	8:44	601	83	4	87	680	601	918	
590	9:15	9:18	9:28	9:39	370	27	2	29	395	370	446	
512	10:01	10:04	10:14	10:24	320	3	0	3	323	320	349	
514	11:45	11:48	11:56	12:06	152	4	0	4	156	152	156	
516	1:15	1:18	1:26	1:36	120	1	0	1	121	120	128	
596	7:34	7:37	7:47	7:57	19	0	1	1	18	19	18	
534	12:30	12:33	12:43	12:53	3	0	0	0	3	6	3	
536	1:30	1:33	1:41	1:51	4	0	1	1	3	4	3	

No Build						
Train	Change in NB Max Load	Approach ing West	Leaving West	Max Load		
				Prior (to W)	Preceding (to E)	
500	10	161	148	149	148	161
582	13	199	142	151	142	199
584	35	542	384	430	384	542
586	53	818	549	621	549	818
588	64	982	643	727	643	982
590	31	477	396	422	396	477
512	24	373	342	345	342	373
514	11	167	163	167	163	167
516	9	137	128	129	128	137
596	1	20	20	19	20	19
534	0	6	3	3	6	3
536	0	4	4	3	4	3

Build									
Train	Build Added			Change in Max Load	Capacity	Build Max Load			
	Alight To W	Board From W	Leaving W			Prior (to W)	Preceding (to E)		
500	0	0	149	0	161	948	148	161	
582	0	1	152	1	200	570	142	200	
584	0	6	436	6	548	702	384	548	
586	1	9	629	9	827	948	550	827	
588	1	11	737	11	993	948	644	993	
590	0	3	425	3	480	702	396	480	
512	0	0	345	0	373	570	342	373	
514	0	1	168	1	168	948	163	168	
516	0	0	129	0	137	702	128	137	
596	0	0	19	0	20	702	20	19	
534	0	0	3	0	6	1080	6	3	
536	0	0	3	0	4	834	4	3	

Growth Rate 0.84%
years 8 1.0692092

Outbound
(2018 Data, 2026 Build Year)

Existing Conditions												
Train	S. Station	Lansdowne	Newtonville	West Newton	Load Prior to	at West Newton				Max Load		
					Station	Board	Alight	Activity	Load	Prior (to E)	Preceding (to W)	
581	4:57	5:07	5:16	5:20	2	0	0	0	2	2	3	
511	10:15	10:26	10:35	10:39	67	0	2	2	65	68	65	
513	11:55	12:06	12:15	12:19	101	0	3	3	98	106	98	
515	2:00	2:11	2:20	2:24	194	5	7	12	192	194	194	
517	3:30	3:41	3:51	3:55	541	0	13	13	528	574	528	
591	4:30	4:41	4:51	4:55	384	2	49	51	337	473	337	
593	5:10	5:21	5:31	5:35	635	2	79	81	558	836	558	
595	5:50	6:01	6:11	6:15	447	0	58	58	389	612	389	
527	6:45	6:56	7:06	7:10	350	1	26	27	325	407	331	
529	7:45	7:56	8:06	8:10	196	2	5	7	193	218	193	
531	8:35	8:46	8:56	9:00	181	0	3	3	178	204	178	
533	9:35	9:46	9:56	10:00	87	1	3	4	85	105	85	
535	10:30	10:41	10:51	10:55	168	0	2	2	166	188	166	
537	11:30	11:41	11:51	11:55	79	0	2	2	77	83	77	

No Build							
Train	Change in	NB Max Load	Approach	Leaving	Max Load		
			ing West	West	Prior (to E)	Preceding (to W)	
581	0	3	2	2	2	3	
511	5	73	72	69	73	69	
513	7	113	108	105	113	105	
515	13	207	207	205	207	207	
517	40	614	578	565	614	565	
591	33	506	411	360	506	360	
593	58	894	679	597	894	597	
595	42	654	478	416	654	416	
527	28	435	374	347	435	354	
529	15	233	210	206	233	206	
531	14	218	194	190	218	190	
533	7	112	93	91	112	91	
535	13	201	180	177	201	177	
537	6	89	84	82	89	82	

Build									
Train	Build Added			Leaving W Newt	Change in	Max Load	Capacity	Build Max Load	
	Alight	Board						Prior (to E)	Preceding (to W)
	To W Newton	From W Newton						To W Newton	From W Newton
581	0	0	2	0	3	834	2	3	
511	0	0	72	0	73	702	73	69	
513	0	0	108	0	113	1080	113	105	
515	1	1	207	1	208	702	208	208	
517	2	0	576	2	616	948	616	565	
591	7	1	405	7	513	702	513	361	
593	11	0	668	11	905	948	905	597	
595	8	0	470	8	662	702	662	416	
527	4	0	370	4	439	834	439	354	
529	1	0	209	1	234	948	234	206	
531	0	0	194	0	218	948	218	190	
533	0	0	93	0	112	1080	112	91	
535	0	0	180	0	201	834	201	177	
537	0	0	84	0	89	948	89	82	