Appendix 9C Transit in New York City

9C.1 INTRODUCTION

The objective of the transit analysis is to determine if the Proposed Project would have the potential to result in impacts to transit facilities and services (subway and bus) in New York City. This assessment discusses existing (2019) conditions and future 2032 and 2040 conditions in the Future without the Proposed Project (No Action Alternative) and the Future with the Proposed Project. For an assessment of conditions when the temporary terminal is anticipated to be operational and the Main Terminal is under construction, please refer to **Chapter 14, "Construction."** Accessibility and compliance with the Americans with Disabilities Act (ADA) is discussed in **Chapter 4, "Socioeconomic Conditions."**

The Port Authority of New York & New Jersey (PANYNJ) proposes to replace the existing Port Authority Bus Terminal (PABT) in Manhattan, New York with a new Main Terminal, Storage and Staging Facility ('SSF'), and associated ramp infrastructure (the 'Replacement Facility'). To accommodate the new Main Terminal, a portion of West 41st Street would be permanently closed between Eighth and Ninth Avenues. Two decks over below-grade portions of Dyer Avenue and the Lincoln Tunnel Expressway would be utilized to facilitate construction-period bus operations. These "Dyer Deck-Overs" would ultimately be converted to publicly accessible open space after completion of the Replacement Facility. The Replacement Facility would be accompanied by private development, located above the Main Terminal, to assist in funding its construction. The Replacement Facility, conversion of the Dyer Deck-Overs to publicly accessible open space, and private development are collectively referred to as the Bus Terminal Replacement Project (the 'Proposed Project'). The Proposed Project is the Locally Preferred Alternative and is represented in this analysis as the Future with the Proposed Project.

As part of the Proposed Project, PANYNJ proposes two private development commercial office towers and new street-facing retail on PANYNJ property. While the Replacement Facility is not anticipated to increase the number of bus trips on the city street system due to bus operations utilizing the new ramp network to directly connect from the Lincoln Tunnel to the SSF and Main Terminal, the planned private development would generate new trips in Midtown Manhattan.

9C.2 METHODOLOGY

Planning and analysis methodologies for the Proposed Project followed New York City's *City Environmental Quality Review Technical Manual, 2020 Edition* (CEQR Technical Manual). [1]

[1] https://www.nyc.gov/site/oec/environmental-quality-review/2020-technical-manual.page

The CEQR Technical Manual identifies the procedures for this analysis to identify potential impacts on traffic, transit, and pedestrians. This process begins with trip generation for the new development to determine the total number or vehicle, transit, and pedestrian trips that would be created by the project during the peak hours. These development-generated trips are added to the forecast growth in trips to the Replacement Facility. The results of this process are used in a Level 1 screening which then determines if a Level 2 screening is necessary. A Level 2 screening is needed if the Level 1 screening shows that there would be 200 or more additional peak hour transit trips. To conduct the Level 2 assessment, the trips that were generated are distributed and assigned to specific subway lines, subway stations, and city bus routes. If this process shows there are 50 or more additional peak hour riders on any one bus line (in one direction), 200 or more additional peak hour subway riders at any station, or 200 or more additional peak hour riders on any subway line, then the project warrants further detailed analyses. The New York City Department of Transportation (NYC DOT), the Metropolitan Transportation Authority (MTA) and New York City Transit (NYCT) have reviewed and provided input on the assumptions and analyses presented below. Based on these analyses, potential impacts of the Proposed Project were determined based on criteria in the CEQR Technical Manual and are summarized later in this appendix. In coordination with NYC DOT and in accordance with the CEQR Technical Manual, the *Travel Demand Factors Technical Memorandum* (TDF Memo) was developed. The TDF Memo assesses the forecasted vehicular, transit, and pedestrian trips that would be generated by the Proposed Project and identifies the elements of the transportation system that the Proposed Project would potentially effect. See **Chapter 9**, "**Transportation.**" The full TDF Memo can be found in **Appendix 9F, "Travel Demand Factors Technical Memorandum**."

9C.2.1 Transportation Planning Assumptions

Trip Generation rates that were used for the future scenarios were developed using a combination of the CEQR Technical Manual formulas, U.S. Census data, guidance from NYC DOT and MTA/NYCT, and other approved Environmental Reviews, such as the Environmental Impact Statement (EIS) for the Pennsylvania Station Area Civic and Land Use Improvement Project,[2] as summarized in **Table 9C-1**.

The weekday daily person-trip rates that were used were based on formulas in the CEQR Technical Manual. Temporal distributions, in/out splits, and modal splits were taken from the EIS for the Pennsylvania Station Area Civic and Land Use Improvement Project for the AM, midday, and PM peak periods, with modifications, as directed by NYC DOT, and removed PATH trips from the modal split as they were relevant to the Penn Station area but not to the study area for the Proposed Project.

[2] Pennsylvania Station Civic and Land Use Project environmental review, https://esd.ny.gov/penn-station-area-environmental-review

Trips to the newly created open space, and existing passive parks were excluded from temporal distribution, in/out splits, and modal splits because it is assumed that 100% of the trips attracted to these open spaces would be pedestrian trips generated by local land uses, not by the open space itself.

Table 9C-1. Travel Demand Assumptions

Weekday Trip Generation:			
Land Use	Office		Local Retail
Daily Person Trips	18.0 per 1,000 gsf		153.75 per 1,000 gsf
Temporal Distribution:			
AM (8-9)	12.0%		5.0%
MD (12-1)	11.0%		8.0%
PM (5-6)	11.0%		11.0%
In/Out Splits:	In	Out	In / Out
AM (8-9)	96%	4%	50% / 50%
MD (12-1)	48%	52%	50% / 50%
PM (5-6)	5%	95%	50% / 50%
Modal Splits:	AM/PM	MD	ALL
Auto	4.0%	1.5%	6.0%
Taxi	3.0%	3.0%	1.0%
Bus	15.3%	6.5%	1.0%
Subway	56.7%	6.0%	1.0%
Railroad	15.0%	0.0%	0.0%
Walk	6.0%	83.0%	91.0%
Other	0.0%	0.0%	0.0%
	100.0%	100.0%	100.0%

Sources: NYC CEQR Technical Manual (2020), Pennsylvania Station Civic and Land Use Project FEIS, NYC DOT.
Notes:
"Bus" is defined as local public bus service, provided by the MTA and NYCT.
"Railroad" encompasses "regional" commuters using either regional rail service (NJ Transit, Metro-North or Long Island Rail Road) or regional "Express Bus" service.
"Walk" includes trips made by bicycle.

The proposed new Main Terminal will have capacity to accommodate increased bus operations to meet a forecasted increase in passenger demand. The incremental growth in passenger volumes at the terminal will be associated with increased activity on transit facilities providing access to and from the terminal. This increased terminal volume was added to trips generated by the commercial development in the Proposed Project.

Table 9C-2 shows the forecast incremental growth in bus terminal passenger volumes over 2019 passenger volumes, and **Table 9C-3** shows the modes of access to the terminal. As shown in **Table 9C-3**, the Proposed Project supports growth in subway trips of 1,340 in the AM peak hour and 1,296 in the PM peak hour in 2032, and 2,677 subway trips in the AM peak hour and 2,575 in the PM peak hour in 2040. The Project also supports growth in New York City bus trips of 101 in the AM peak hour and 98 in the PM peak hour in 2032, and 203 subway trips in the AM peak hour and 195 in the PM peak hour in 2040.

Table 9C-2. Incremental Trips to Bus Terminal

	2032		2040	
	AM	PM	AM	PM
Commuter*				
Arrivals	2,759	242	5,668	407
Departures	203	2,466	327	5,107
Total	**2,962**	**2,708**	**5,995**	**5,514**
Intercity				
Arrivals	76	142	122	229
Departures	131	213	212	345
Total	**207**	**355**	**334**	**574**
Total				
Arrivals	2,835	384	5,790	636
Departures	334	2,679	539	5,452
Total	**3,169**	**3,063**	**6,329**	**6,088**

* Commuter includes Jitney passengers.

Table 9C-3. Incremental Trips to Bus Terminal by Mode of Access

Access Mode	Percent	2032		2040	
		AM	PM	AM	PM
Walk (only)	**49.4%**	**1,565**	**1,513**	**3,127**	**3,007**
NYCT Subway	42.3%	1,340	1,296	2,677	2,575
NYCT Bus	3.2%	101	98	203	195
Taxi	1.1%	35	34	70	67
Pick Up / Drop Off	1.0%	32	31	63	61
Drive & Park	0.6%	19	18	38	37
Bicycle	0.1%	3	3	6	6
Other	0.5%	16	15	32	30
Other PABT Bus*	1.8%	57	55	114	110
Total	**100.0%**	**3,169**	**3,063**	**6,329**	**6,088**

* Other PABT Bus represents transfers between buses in the terminal.

9C.2.2 Transit Analysis Methodology

As specified by the CEQR Technical Manual, the first step in preparation for transit analysis is to determine the specific locations of the transit elements, subway, and bus lines to be studied. The transit analysis for this project considers stairs, escalators, and fare control arrays (turnstiles, high exits, and high entrance/exit turnstiles) in subway stations.

The transit analysis also considers effects on transit line-haul capacity on subway and bus routes. Line-haul capacity is the capacity of a transit line at its peak ridership point. These assessments are consistent with the methodologies outlined in the *CEQR Technical Manual*. The *CEQR*

Technical Manual recommends a tiered approach in evaluating a project's effects on transit ridership.

Future growth in capacity at the Replacement Facility, the private development towers, and new retail determined the Proposed Project's transit trip generation. Local transit trips generated by the commercial development or facilitated by the increased capacity of the bus terminal were assigned to area transit facilities, including bus stops, subway stations, and elements within stations based on routing developed in consultation with NYCT. Elements within subway stations where the total project-generated pedestrian trips equaled or exceeded 200 people per hour were included in the analysis.

9.2.2.1 Level I Screening

Trip Generation was performed for the private development associated with the Proposed Project as a part of the Level 1 Screening. The private development would generate 11,574 and 11,607 person trips in the AM and PM peak hours, respectively. This includes 7,792 and 7,165 subway and local bus trips in the AM and PM peak hours, respectively. In addition, the Replacement Facility would accommodate a forecast growth in ridership of 6,329 and 6,088 person trips in the AM and PM peak hours, respectively, by 2040. Of these, 2,880 are subway and local bus trips in the AM peak hour and 2,770 are subway and local bus trips in the PM peak hour. The combined development-generated trips and incremental local bus terminal trips are subsequently referred to as 'Project trips.' A summary of the trips that would be generated are shown in **Appendix 9F**. These overall volumes generated by the Proposed Project indicate that Level 2 screening is required for subways and local buses that serve the study area. Both project-generated and background volumes are much lower on transit services and facilities in the city during the midday than either the AM or PM peak periods, so analysis of midday conditions is not required for transit in the city.

9.2.2.2 Level 2 Screening

Project trips were assigned to subway lines, subway stations, and local bus routes in the surrounding area as part of the Level 2 analysis. The assignment to routes and stations was guided by a combination of outputs from the PANYNJ's trans-Hudson travel demand forecast model[3] and guidance received from NYCT regarding appropriate distribution of volumes to stations and routes. The Level 2 screening indicated that further analysis is required at two subway stations serving the area: 42nd Street/Port Authority Bus Terminal (Eighth Avenue) station and Times Square-42nd Street station. The screening indicated that detailed analyses should be performed for the 1, 2, 3, 7, A, C, E, N, Q, R, and W subway lines and for the M7, M11, M20, M34, M34A, M42, and M104 bus routes.

[3] See **Appendix 9A** for more information on the PANYNJ Trans-Hudson Travel Demand Forecast.

The percentage distribution of bus terminal passengers to subway lines is presented in **Table 9C-4** and the percent distribution to NYCT bus routes is presented in **Table 9C-5**.

Table 9C-4. PABT Distribution to Subway Lines

Line	Direction	AM Peak Period		PM Peak Period	
		On	Off	On	Off
A	Northbound	12.1%	24.5%	24.5%	12.1%
C	Northbound	4.5%	5.5%	5.5%	4.5%
E	Northbound	19.4%	10.0%	10.0%	19.4%
A	Southbound	15.1%	10.1%	10.1%	15.1%
C	Southbound	8.5%	5.5%	5.5%	8.5%
E	Southbound	14.3%	21.3%	21.3%	14.3%
N	Northbound	0.7%	0.7%	0.7%	0.7%
Q	Northbound	1.9%	0.8%	0.8%	1.9%
R	Northbound	0.8%	0.3%	0.3%	0.8%
W	Northbound	0.6%	0.2%	0.2%	0.6%
N	Southbound	0.7%	0.3%	0.3%	0.7%
Q	Southbound	1.0%	1.1%	1.1%	1.0%
R	Southbound	0.8%	0.3%	0.3%	0.8%
W	Southbound	0.5%	0.3%	0.3%	0.5%
S	Eastbound	1.0%			1.0%
S	Westbound		1.0%	1.0%	
1	Northbound	0.6%	0.5%	0.5%	0.6%
2	Northbound	1.0%	0.3%	0.3%	1.0%
3	Northbound	0.4%	0.2%	0.2%	0.4%
1	Southbound	3.6%	0.6%	0.6%	3.6%
2	Southbound	0.0%	2.1%	2.1%	0.0%
3	Southbound	0.4%	0.3%	0.3%	0.4%
7 TS	Eastbound	12.0%			12.0%
7 TS	Westbound		14.0%	14.0%	
Total		**100.0%**	**100.0%**	**100.0%**	**100.0%**

Table 9C-5. PABT Distribution to Bus Routes (AM Peak Period)

Route	Location	Direction	AM Peak Period		PM Peak Period	
			On	Off	On	Off
M7	Sixth Avenue	Northbound				
M7	Seventh Avenue	Southbound				
M11	Tenth Avenue	Northbound	6%	6%	6%	6%
M11	Ninth Avenue	Southbound	20%	20%	20%	20%
M12	Twelfth Avenue	Northbound				
M12	Eleventh Avenue	Southbound				
M20	Eighth Avenue	Northbound	20%	20%	20%	20%
M20	Seventh Avenue	Southbound	6%	6%	6%	6%
M34	West 34 Street	Eastbound				
M34	West 34 Street	Westbound				
M34A	Ninth Avenue	Eastbound (SB)	15%			15%
M34A	Eighth Avenue	Westbound (NB)		15%	15%	
M42	West 42 Street	Eastbound	25%	2%	2%	25%
M42	West 42 Street	Westbound	2%	25%	25%	2%
M104	West 42 Street	SB-WB-NB	6%	6%	6%	6%
Total			**100%**	**100%**	**100%**	**100%**

9.2.2.3 Peak Hour Determination

The peak hours for travel generated by the Proposed Project are expected to coincide with the peak hours on nearby transit facilities. The weekday morning peak hour is from 8 to 9 a.m. and the weekday evening peak hour is from 5 to 6 a.m. While the evening peak hour for passengers entering the bus terminal is from 5:00 to 6:00 p.m., the peak hour for buses departing the terminal is 5:30 to 6:30 p.m., so the forecast 5:30 to 6:30 p.m. passenger volume is used for the analysis.

9.2.2.4 Collection of Baseline Passenger Volumes Within Stations

Passenger volumes on individual station elements were collected from counts conducted in 2018 and passenger volumes provided by NYCT for the MTA's Central Business District Tolling Project (CBDTP).

9.2.2.5 Analysis of Stairs, Escalators, and Fare Arrays

The methodology for assessing station elements compares the user volume on the circulation elements (stairs, escalators, and fare control elements) with the element's design capacity, resulting in a volume/capacity (v/c) ratio for each element. Elevators are not considered in the analysis because they carry a very small part of the rider volume; the volume is assigned to the stairs and escalators elements. For stairs, the design capacity considers the effective width of a tread, which accounts for railings or other obstructions, the friction or counter-flow between upward and downward pedestrians and surging of entering and exiting pedestrians. For escalators and turnstiles, capacities are measured by the number and width of an element and the NYCT optimum capacity per element, and account for the potential for surging of entering and exiting pedestrians. In the analysis for each of these elements, volumes and capacities are

presented in 15-minute intervals. The estimated v/c ratio is compared with NYCT criteria to determine a Level of Service (LOS) for the operation of an element, LOS standards for stairs, escalators, fare arrays, and passageways as a function of volume divided by capacity are shown in **Table 9C-6**.

Table 9C-6. Stairs and Passageway LOS Standards

v/c ratio	Stairs LOS	Description
0.00 to 0.45	LOS A	Free flow
0.45 to 0.70	LOS B	Fluid flow
0.70 to 1.00	LOS C	Fluid, somewhat restricted
1.00 to 1.33	LOS D	Crowded, walking speed restricted
1.33 to 1.67	LOS E	Congested, some shuffling and queuing
Above 1.67	LOS F	Severely congested, queued

9.2.2.6 Methodology: Future without the Proposed Project

For subway and bus transit analysis purposes, NYCT was consulted for projections to represent growth in ridership at the stations and on subway and bus lines. Increased volumes of transit ridership associated with the proposed CBDTP are included.

9.2.2.7 Methodology: Future with the Proposed Project

Analysis of the Future with the Proposed Project began with trip generation, modal split, and trip assignment. Project-generated trips were added to the future baseline volumes to determine volumes of the Future with the Proposed Project. Volume/capacity and LOS analyses were conducted and compared with CEQR criteria to determine potential impacts.

9C.3 AFFECTED ENVIRONMENT

9C.3.1 Existing Conditions

The Project Area is served by the NYCT 42nd Street/PABT station served by the A, C, and E subway lines, and the Times Square/42nd Street station served by the 1, 2, 3, 7, N, Q, R, and S subway lines). Subway services at these stations connect to all other subway lines.

9.3.1.1 Transit Operations

The PABT is directly served by the A, C, and E subway lines at the 42nd Street/PABT subway station. This subway station is also connected to the Times Square/42nd Street subway station, which services the 1, 2, 3, 7, N, Q, R, W trains, and the 'S' Shuttle to Grand Central Station.

There are several MTA bus lines that stop near the PABT. The M42 operates along 42nd Street across Midtown from the United Nations to the Hudson River. The M104 and M20 operate northbound along Eighth Avenue in the PABT area, the M104 operates from West Harlem to Times Square, and the M20 operates southbound on Seventh Avenue from Lincoln Center to South Ferry in Lower Manhattan. The M11 runs southbound along Ninth Avenue in the PABT area

and runs from Riverbank Park in Upper Manhattan to the West Village. The 34A Select Bus Service also runs in a loop around the PABT on Eighth and Ninth Avenues, then to and from the East River via 34th Street.

9.3.1.2 Study Area & Elements

The analysis includes line-haul analyses for subways and bus routes plus analysis of elements in the subway stations that serve the Project Area.

The following are additional assumptions that have been made in analyzing the effects of the Proposed Project on subway facilities and operations. Passengers connecting between the Replacement Facility and the subway stations would use the north and south connections to the subway mezzanine at the N062, N063, and N063A fare control areas (see below for locations of specific fare control areas). Subway trips from the new Main Terminal would use the North Connection and South Connection to the N062, N063, and N063A fare arrays. Subway trips to and from Tower 1 would use the PABT North Connection to the Eighth Avenue subway mezzanine. Subway trips from Tower 2 would use the PABT South Connection and the street stair on the northwest corner of 40th Street and Eighth Avenue to reach the Eighth Avenue subway mezzanine. Fare arrays were not analyzed at the Times / 42nd Street station since the trips from the Proposed Project would use the North and South Connections to access the station.

In consultation with NYCT and consideration of the trip assignment results, the station elements listed below have been identified for analysis.

<u>Eighth Avenue - 42nd St / PABT Station (A/C/E lines)</u>

- N62A Control Area at the southeast corner of Eighth Avenue and West 42nd Street
- N62 Control Area at the northwest corner of Eighth Avenue and West 41st Street
- N62B Control Area at the northwest corner of Eighth Avenue and West 42nd Street
- N63 and N63A Control Areas at Eighth Avenue and West 40th Street
- Street stair at northwest corner of Eighth Avenue and 42nd Street (S8/M9)
- Street stair at southeast corner of Eighth Avenue and 42nd Street (O5/O6/O7/O8)
- Street stair at northeast corner of Eighth Avenue and 42nd Street (O9/O10/O11)
- Street stair at southeast corner of Eighth Avenue and 40th Street (S2/M2)
- Street stair at southwest corner of Eighth Avenue and 40th Street (S1/M1)
- Street stair at northwest corner of Eighth Avenue and 40th Street (S3/M3)
- Street stair at northeast corner of Eighth Avenue and 40th Street (O1/O2/O3)
- Stairs between N63 paid zone and downtown A/C/E platform (IND P1, IND P2)
- Stairs between N63A paid zone and downtown A/C/E platform (IND P3, IND P4)
- Stairs between N62 paid zone and downtown A/C/E platform (IND P5, IND P6)
- Stairs between N62B paid zone and downtown A/C/E platform (IND P7, IND P14)
- Stairs between N62A paid zone and uptown A/C/E platform (IND P8, IND P9, IND P15)

- Stairs between N61 paid zone and uptown A/C/E platform (IND P10, IND P11)
- Stairs between N60 paid zone and uptown A/C/E platform (IND P12, IND P13, IND P16)
- Corridor between Eighth Avenue / 42nd Street station and Time Square / 42nd Street station

Times Square - 42nd Street Station (1/2/3/7/N/Q/R/W/S lines)

- A21 Control Area near Broadway and West 40th Street (Eight Two-Way turnstiles, one high exit only turnstile)
- R143 Control Area near 7th Avenue and West 40th Street (Eight Two-Way turnstiles)
- R147 Control Area at southeast corner of 7th Avenue and West 42nd Street (Eight Two-Way turnstiles)
- R148 Control Area at southeast corner of Broadway and West 42nd Street (Seven Two-Way turnstiles)
- Street stair at southeast corner of Seventh Avenue and 42nd Street (M7/S14)
- Street stair at southeast corner of Broadway and 42nd Street (M10/S11)
- Street stair at northwest corner of Seventh Avenue and 42nd Street (O3/O4, M11)
- Street stair at southwest corner of Seventh Avenue and 42nd Street (O5/O6)
- Street stair at northwest corner of Seventh Avenue and 41st Street (M14/S13)
- Street stair at southwest corner of Seventh Avenue and 40th Street (O1/O2)
- Street stair at southeast corner of Seventh Avenue and 40th Street (M1/S2)
- Street stair at southwest corner of Broadway and 40th Street (M2/S2)
- Street stair at northwest corner of Broadway and 40th Street (M4/S4)
- Street stair at southeast corner of Broadway and 40th Street (M1/S1)
- Street stair at northeast corner of Broadway and 40th Street (M3/S3)
- Stairs between lower mezzanine and No. 7 platform (PL1/PL2, PL3, PL5, PL7, PL8)
- Stair between R143 paid zone and uptown 1/2/3 platform (IRT P1)
- Stair between R143 paid zone and downtown 1/2/3 platform (IRT P2)
- Stairs between R145 paid zone and downtown 1/2/3 platform (IRT P3/P5, IRT P7/P9)
- Stairs between R145 paid zone and uptown 1/2/3 platform (IRT P4/P6, IRT P8/P10)
- Stairs between lower mezzanine and downtown 1/2/3 platform (IRT ML5, IRT ML9)
- Stairs between lower mezzanine and uptown 1/2/3 platform (IRT ML6, IRT ML10)
- Stair between R151 paid zone and downtown 1/2/3 platform (IRT P11)
- Stair between R145 paid zone and uptown 1/2/3 platform (IRT P12)
- Stair between R151 paid zone and uptown 1/2/3 platform (IRT P16)
- Stairs between lower and upper mezzanine (ML13/ML14/ML15/ML16)
- Stairs between lower and upper mezzanine (ML20/ML21/ML22/ML23)
- Stairs between A21 mezzanine and downtown N/Q/R/W platform (BMT P1, BMT P3)
- Stairs between A21 mezzanine and uptown N/Q/R/W platform (BMT P2, BMT P4)
- Stairs between BMT mezzanine and downtown N/Q/R/W platform (BMT P5/P7, BMT P9)
- Stairs between BMT mezzanine and uptown N/Q/R/W platform (BMT P6/P8, BMT P10)
- Stairs between upper mezzanine and downtown N/Q/R/W platform (BMT P11, BMT P13, BMT P15/17)

- Escalators between upper mezzanine and No. 7 platform (E216, E217, E218
- Street escalators at southwest corner of Seventh Avenue and 42nd Street (E261, E262)
- Street escalators at southeast corner of Seventh Avenue and 42nd Street (E267, E268)

9.3.1.3 Counts

Volumes for most vertical circulation[4] elements in the two subway stations were obtained from NYCT in conjunction with the proposed CBDTP to be consistent with the analysis for that project. NYCT compiled baseline volumes from 2019 at the various station elements to establish the 2019 baseline. Fare array volumes were also developed in consultation with NYCT. Counts were conducted at the corridor connecting the Eighth Avenue station to Times Square station for the project.

9.3.1.4 Line-Haul Subway Analysis

Existing ridership on subway lines serving the study area were analyzed, and the results are shown in **Table 9C-7**. For each of the relevant subway lines, the subway station where the maximum load point occurs is identified for the peak morning and evening hours (as described above in **Section 9.2.2.3**) on weekdays, and the ratio of volume over design capacity (v/c) is listed. NYCT strives to operate subway lines at a v/c ratio of 1.0 or less. A v/c ratio below 1.0 indicates that the line has space available for additional passengers. A line with a v/c ratio above 1.0 indicates that the line is operating over design capacity (i.e., is overcrowded).

Table 9C-7. Existing Conditions Subway Line Haul Analysis Results

Peak Hour	Line	Direction	Maximum Load Point	V/C Ratio
Weekday AM	1	SB	103 St	0.80
	2	SB	72 St	1.05
	3	SB	72 St	0.94
	7 local	SB	40 St	0.87
	7 express	SB	Woodside - 61 St	0.86
	A	NB	Nostrand Av	0.86
	A	SB	125 St	0.85
	C	NB	Hoyt - Schermerhorn	1.17
	C	SB	72 St*	0.86
	E	SB	Court Sq	1.01
Weekday PM	1	NB	59 St - Columbus Circle	1.02
	2	NB	14 St	1.08
	3	NB	14 St	0.95
	7	NB	Queensboro Plaza	1.03
	A	NB	14 St	0.83
	A	SB	Fulton St	0.90
	C	NB	59 St - Columbus Circle*	0.58
	C	SB	Jay St - MetroTech*	0.90
	E	NB	Lexington Av - 53 St	0.79

[4] Vertical Circulation elements include stairs, escalators, and elevators; the CEQR TM only evaluates LOS for stairs and escalators.

9.3.1.5 Line-Haul Bus Analysis

Existing ridership and v/c ratios of bus routes serving the study area were analyzed, and the results are shown in **Table 9C-8**. For each of the relevant bus lines, the bus stop or route segment where the maximum load point occurs is identified for the peak morning and evening hours (as described above in **Section 9.2.2.3**) on weekdays, and the ratio of volume over capacity is listed.

Table 9C-8. Existing Conditions Bus Line Haul Analysis Results

Peak Hour	Line	Direction	Maximum Load Point	V/C Ratio
Weekday AM	M11	NB	AMSTERDAM AV-W 86 ST	0.65
	M20	NB	HARRISON ST-HUDSON ST	0.36
	M34A	EB	E 34 ST-5 AV	0.51
	M42	EB	W 42 ST-8 AV	0.57
	M104	SB	BROADWAY-W 79 ST	0.34
Weekday PM	M11	NB	AMSTERDAM AV-W 83 ST	0.74
	M20	NB	8 AV-W 34 ST	0.34
	M34A	WB	W 34 ST-5 AV	0.54
	M42	WB	W 42 ST-5 AV	0.63
	M104	NB	BROADWAY-W 86 ST	0.59

9.3.1.6 Levels of Service for Subway Station Elements

The study involved the collection of information about pedestrian counts and pedestrian LOSs for three types of circulation elements (stairs, escalators, fare control areas) at the subway stations in the study area.

For the purposes of the EIS, summary data shows the number (quantity) of each type of pedestrian circulation element that operate at each LOS (A, B, C, D, E, F). For the baseline year of 2019, the quantity of pedestrian circulation elements in the study area that operate at each pedestrian LOS are summarized in **Table 9C-9**. For example, the entry in the top left corner of the table is the number of stairs in the two study area stations that operate at LOS A, B, or C in the year 2019 in the AM peak hour.

Table 9C-9. Subway Station Elements by Existing LOS: 2019 Baseline

Element	Level of Service	Weekday AM Peak Hour		Weekday PM Peak Hour	
		42nd Street (Eighth Ave.) Station	Times Square - 42nd Street Station	42nd Street (Eighth Ave.) Station	Times Square - 42nd Street Station
Stairways	LOS A/B/C	13	8	11	7
	LOS D	1	2	2	2
	LOS E	0	5	0	7
	LOS F	0	3	0	2
	Total	**14**	**18**	**13**	**18**
Escalators	LOS A/B/C	-	3	--	3
	LOS D	-	0	--	0
	LOS E	-	0	--	0
	LOS F	-	0	--	0
	Total	**0**	**3**	**--**	**3**
Control Areas	LOS A/B/C	7	--	7	--
	LOS D	0	--	0	--
	LOS E	0	--	0	--
	LOS F	0	--	0	--
	Total	**7**	**--**	**7**	**--**

9C.3.2 Future Conditions within the Study Area

There are no proposed changes to the subway lines, service, or stations in the area of the Proposed Project within the analysis period to 2040.

9C.4 FUTURE WITHOUT THE PROPOSED PROJECT

2032 and 2040 transit conditions Without the Proposed Project were analyzed by increasing existing transit ridership levels by the expected growth in overall travel through and within the study area. As per CEQR Technical Manual guidelines, the CEQR background growth rates of 0.25% from 2020 to 2024 and 0.125% from 2025 to 2040 were applied to the existing volumes. In addition, volumes generated by specific projects were added where appropriate.

9C.4.1 2032 Conditions Without the Proposed Project

Bus and subway line-haul analysis were not conducted for 2032 because in that year the Proposed Project does not include any commercial development to generate trips and the incremental growth in trips served by the new Main Terminal is less than the 2040 volume, which results in an impact to only one bus line and no subway lines, so line-haul impacts are unlikely in 2032.

For the year 2032, the number of station circulation elements that operate at LOS A-C, D, E, or F are summarized in **Table 9C-10**.

Table 9C-10. Subway Station Elements by Future LOS: 2032 Without the Proposed Project

Element	Level of Service	Weekday AM Peak Hour	
		No Action	No Action
		42nd Street (Eighth Ave.) Station	Times Square - 42nd Street
Stairways	LOS A/B/C	13	7
	LOS D	1	2
	LOS E	0	5
	LOS F	0	4
Escalators	LOS A/B/C	--	3
	LOS D	--	0
	LOS E	--	0
	LOS F	--	0
Control Areas	LOS A/B/C	7	0
	LOS D	0	0
	LOS E	0	0
	LOS F	0	0
Element	**Level of Service**	**Weekday PM Peak Hour**	
		No Action	No Action
		42nd Street (Eighth Ave.) Station	Times Square - 42nd Street
Stairways	LOS A/B/C	13	7
	LOS D	2	2
	LOS E	0	6
	LOS F	0	3
Escalators	LOS A/B/C	--	3
	LOS D	--	0
	LOS E	--	0
	LOS F	--	0
Control Areas	LOS A/B/C	7	0
	LOS D	0	0
	LOS E	0	0
	LOS F	0	0

Notes: LOS = Level of Service; LOS A/B/C correspond with 0.00 to 1.00 v/c (volume-to-capacity) ratio; LOS D corresponds with 1.00 to 1.33 v/c ratio; LOS E corresponds with 1.33 to 1.67 v/c ratio; LOS F corresponds with above 1.67 v/c ratio; control area elements correspond with designated sets of turnstiles, high entry/exit turnstiles (HEET), and high exit turnstiles (HXT).

9C.4.2 2040 Conditions Without the Proposed Project

Ridership on subway lines serving the study area were analyzed for the year 2040, and the results are shown in **Table 9C-11**. For each of the relevant subway lines, the subway station where the maximum load point occurs is identified for the peak morning and afternoon hours on weekdays, and the ratio of volume over capacity is listed.

Table 9C-11. Subway Line Haul Analysis: 2040 Without the Proposed Project

Peak Hour	Line	Direction	Maximum Load Point	2040 No Action V/C Ratio
Weekday AM	1	SB	103 St	0.85
	2	SB	72 St	1.10
	3	SB	72 St	0.98
	7	SB	40 St	0.85
	7	SB	Woodside - 61 St	0.85
	A	NB	Nostrand Av	0.85
	A	SB	125 St	0.87
	C	NB	Hoyt - Schermerhorn Sts*	1.17
	C	SB	72 St*	0.79
	E	SB	Court Sq	1.01
Weekday PM	1	NB	59 St - Columbus Circle	1.01
	2	NB	14 St	1.08
	3	NB	14 St	0.95
	7	NB	Queensboro Plaza	1.01
	A	NB	14 St	0.75
	A	SB	Fulton St	0.90
	C	NB	59 St - Columbus Circle*	0.57
	C	SB	Jay St - MetroTech*	0.89
	E	NB	Lexington Av - 53 St	0.78

Year 2040 ridership and volume/capacity (v/c) ratios of bus routes serving the study area were analyzed, and the results are shown in **Table 9C-12**. For each of the relevant bus lines, the bus stop or route segment where the maximum load point occurs is identified for the peak morning and afternoon hours on weekdays, and the ratio of volume over capacity is listed.

Table 9C-12. Bus Line Haul Analysis: 2040 Without the Proposed Project

Peak Hour	Line	Direction	Maximum Load Point	2040 No Action V/C Ratio
Weekday AM	M11	NB	Amsterdam Ave-W 86 St	0.68
	M20	NB	Harrison St-Hudson St	0.38
	M34A	EB	E 34 St.-5 Ave.	0.54
	M42	EB	W 42 St.-8 Ave.	0.60
	M104	SB	Broadway-W 79 St.	0.36
Weekday PM	M11	NB	Amsterdam Ave-W 83 St.	0.78
	M20	NB	8 Ave.-W 34 St.	0.35
	M34A	WB	W 34 St.-5 Ave.	0.56
	M42	WB	W 42 St.-5 Ave.	0.66
	M104	NB	Broadway-W 86 St.	0.62

The Future without the Proposed Project (2040) transit volumes for subway station elements were developed following a similar methodology as described above. The CEQR background growth rates of 0.25% from 2020 to 2024 and 0.125% from 2025 to 2040 were applied to the existing volumes.

For the year 2040, the quantity of pedestrian circulation elements in the study area that operate at each pedestrian LOS are summarized in **Table 9C-13**. In the AM peak hour, one stair at each

station declines from LOS A-C to a lower LOS and the number of stairs operating at LOS F at Times Square Station remains unchanged at 4. During the PM peak hour, one stair at each station also declines from LOS A-C to a lower LOS and the number of stairs operating at LOS F at Times Square Station would increase from three to four.

Table 9C-13. Station Elements by LOS: 2040 Without the Proposed Project

Element	Level of Service	Weekday AM Peak Hour	
		No Action	No Action
		42nd Street (Eighth Ave.) Station	Times Square - 42nd Street
Stairways	LOS A/B/C	13	7
	LOS D	1	2
	LOS E	0	5
	LOS F	0	4
Escalators	LOS A/B/C	-	3
	LOS D	-	0
	LOS E	-	0
	LOS F	-	0
Control Areas	LOS A/B/C	7	0
	LOS D	0	0
	LOS E	0	0
	LOS F	0	0
Element	**Level of Service**	**Weekday PM Peak Hour**	
		No Action	No Action
		42nd Street (Eighth Ave.) Station	Times Square - 42nd Street
Stairways	LOS A/B/C	12	7
	LOS D	2	2
	LOS E	0	5
	LOS F	0	4
Escalators	LOS A/B/C	-	3
	LOS D	-	0
	LOS E	-	0
	LOS F	-	0
Control Areas	LOS A/B/C	7	0
	LOS D	0	0
	LOS E	0	0
	LOS F	0	0

Notes: LOS = Level of Service; LOS A/B/C correspond with 0.00 to 1.00 v/c (volume-to-capacity) ratio; LOS D corresponds with 1.00 to 1.33 v/c ratio; LOS E corresponds with 1.33 to 1.67 v/c ratio; LOS F corresponds with above 1.67 v/c ratio; control area elements correspond with designated sets of turnstiles, high entry/exit turnstiles (HEET), and high exit turnstiles (HXT).

9C.5 FUTURE WITH THE PROPOSED PROJECT

The analysis of the transit system was conducted for 2032 (when the Replacement Facility is anticipated to be completely operational) and 2040 (when the private development is anticipated to be fully built and occupied). For an assessment of conditions during when the temporary terminal is anticipated to be operational, and the new Main Terminal is under construction please refer to **Chapter 14**.

The 2032 Future With the Proposed Project was developed by increasing existing transit ridership levels by the expected growth in overall travel through and within the Study Area. As per CEQR Technical Manual guidelines, the CEQR background growth rates of 0.25% from 2020 to 2024 and 0.125% from 2025 to 2032 were applied to the existing volumes.[5]

9C.5.1 2032 New York City Transit Conditions With the Proposed Project

Bus and subway line-haul analysis were not conducted for 2032 because in that year the Proposed Project does not include any commercial development to generate trips and the incremental growth in trips served by the new Main Terminal is less than the 2040 volume, which results in an impact to only one bus line and no subway lines, so line-haul impacts are unlikely in 2032.

For the year 2032, the quantity of pedestrian circulation elements in the study area that operate at each pedestrian LOS are summarized in **Table 9C-14**. In 2032, the number of elements that operate at each LOS remains the same with the Proposed Project as with the No Action Alternative.

[5] Background growth is applied generally, and is in addition to any specific development projects anticipated to occur by the Analysis year regardless of the Proposed Project.

Table 9C-14. Subway Station Elements by LOS: 2032 With the Proposed Project

Element	Level of Service	42nd Street (Eighth Ave.) Station	Times Square Station
Weekday AM Peak Hour			
Stairways	LOS A/B/C	13	7
	LOS D	1	2
	LOS E	0	5
	LOS F	0	4
Escalators	LOS A/B/C	--	3
	LOS D	--	0
	LOS E	--	0
	LOS F	--	0
Control Areas	LOS A/B/C	7	0
	LOS D	0	0
	LOS E	0	0
	LOS F	0	0
Weekday PM Peak Hour			
Stairways	LOS A/B/C	12	7
	LOS D	2	2
	LOS E	0	6
	LOS F	0	3
Escalators	LOS A/B/C	--	3
	LOS D	--	0
	LOS E	--	0
	LOS F	--	0
Control Areas	LOS A/B/C	7	0
	LOS D	0	0
	LOS E	0	0
	LOS F	0	0

Notes: LOS = Level of Service; LOS A/B/C correspond with 0.00 to 1.00 v/c (volume-to-capacity) ratio; LOS D corresponds with 1.00 to 1.33 v/c ratio; LOS E corresponds with 1.33 to 1.67 v/c ratio; LOS F corresponds with above 1.67 v/c ratio; control area elements correspond with designated sets of turnstiles, high entry/exit turnstiles (HEET), and high exit turnstiles (HXT).

9C.5.2 2040 Transit Conditions With the Proposed Project

Ridership on subway lines serving the study area were analyzed for the year 2040, and the results are shown in **Table 9C-15**. For each of the relevant subway lines, the subway station where the maximum load point occurs is identified for the peak morning and afternoon hours on weekdays, and the ratio of volume over capacity is listed.

Table 9C-15. Subway Line Haul Analysis: 2040 With the Proposed Project

Peak Hour	Line	Direction	Maximum Load Point	2040 Proposed Project V/C Ratio	Impacts
Weekday AM	1	SB	103 St	0.85	No
	2	SB	72 St	1.12	No
	3	SB	72 St	1.00	No
	7	SB	40 St	0.87	No
	7	SB	Woodside - 61 St	0.86	No
	A	NB	Nostrand Av	0.86	No
	A	SB	125 St	0.87	No
	C	NB	Hoyt St.- Schermerhorn St.	1.17	No
	C	SB	72 St*	0.86	No
	E	SB	Court Sq	1.01	No
Weekday PM	1	NB	59 St - Columbus Circle	1.02	No
	2	NB	14 St	1.08	No
	3	NB	14 St	0.95	No
	7	NB	Queensboro Plaza	1.03	No
	A	NB	14 St	0.83	No
	A	SB	Fulton St	0.90	No
	C	NB	59 St - Columbus Circle*	0.58	No
	C	SB	Jay St - MetroTech*	0.90	No
	E	NB	Lexington Av - 53 St	0.79	No

While the Proposed Project would add riders to each of the subway lines serving the Study Area, those passengers would be distributed across the many trains serving the Study Area and across multiple cars on each train. The added passengers do not cause significant impacts to any of the subway lines in the AM or PM peaks.

Year 2040 ridership and volume/capacity (v/c) ratios of bus routes serving the study area were analyzed, and the results are shown in **Table 9C-16**. For each of the relevant bus lines, the bus stop or route segment where the maximum load point occurs is identified for the peak morning and afternoon hours on weekdays, and the ratio of volume over capacity is listed.

Table 9C-16. Bus Line Haul Analysis: 2040 With the Proposed Project

Peak Hour	Line	Direction	Maximum Load Point	2040 Proposed Project v/c Ratio	Impact
Weekday AM	M11	NB	Amsterdam Ave-W 86 St	0.72	No
	M20	NB	Harrison St-Hudson St	1.91	Yes
	M34A	EB	E 34 St.-5 Ave.	0.57	No
	M42	EB	W 42 St.-8 Ave.	0.64	No
	M104	SB	Broadway-W 79 St.	0.36	No
Weekday PM	M11	NB	Amsterdam Ave.-W 83 St	0.92	No
	M20	NB	8 Ave.-W 34 St.	0.57	No
	M34A	WB	W 34 St.-5 Ave.	0.61	No
	M42	WB	W 42 St.-5 Ave.	0.78	No
	M104	NB	Broadway-W 86 St.	0.62	No

The v/c ratios for each of the bus routes serving the area increase marginally. Only the M20 route which operates on Seventh and Eighth Avenues would exceed capacity as a result of the Proposed Project and result in a significant impact.

The Future with the Proposed Project (2040) transit volumes for subway station elements were developed following a similar methodology as described above. The CEQR background growth rates of 0.25% from 2020 to 2024 and 0.125% from 2025 to 2040 were applied to the existing volumes.

For the year 2040, the quantity of pedestrian circulation elements in the study area that operate at each pedestrian LOS are summarized in **Table 9C-17**. In the AM peak hour, one stair at each station declines from LOS A-C to a lower LOS and the number of stairs operating at LOS F at Times Square Station increases from 4 to 5. During the PM peak hour one stair at each station also declines from LOS A-C to a lower LOS and the number of stairs operating at LOS F at Times Square Station would increase from four to six.

ADA elevator access to the 42nd Street-Eighth Avenue subway station is currently provided both through the PABT and at 44th Street. The proposed new Main Terminal will provide a comparable route to the subway mezzanine via elevators in the terminal. Further discussion of ADA access is provided in **Chapter 4**.

Table 9C-17. Subway Station Elements by LOS: 2040 With the Proposed Project

Element	Level of Service	42nd Street (Eighth Ave.) Station	Times Square Station
Weekday AM Peak Hour			
Stairways	LOS A/B/C	12	6
	LOS D	1	3
	LOS E	1	4
	LOS F	0	5
Escalators	LOS A/B/C	-	3
	LOS D	-	0
	LOS E	-	0
	LOS F	-	0
Control Areas	LOS A/B/C	6	0
	LOS D	1	0
	LOS E	0	0
	LOS F	0	0
Weekday PM Peak Hour			
Stairways	LOS A/B/C	11	5
	LOS D	1	3
	LOS E	2	4
	LOS F	0	6
Escalators	LOS A/B/C	-	3
	LOS D	-	0
	LOS E	-	0
	LOS F	-	0
Control Areas	LOS A/B/C	6	0
	LOS D	1	0
	LOS E	0	0
	LOS F	0	0

Notes: LOS = Level of Service; LOS A/B/C correspond with 0.00 to 1.00 v/c (volume-to-capacity) ratio; LOS D corresponds with 1.00 to 1.33 v/c ratio; LOS E corresponds with 1.33 to 1.67 v/c ratio; LOS F corresponds with above 1.67 v/c ratio; control area elements correspond with designated sets of turnstiles, high entry/exit turnstiles (HEET), and high exit turnstiles (HXT).

9C.6 CONCLUSIONS

Analysis has determined that the Proposed Project would result in an impact to one bus line (the M20 northbound) as shown in **Table 9C-18**, but would not impact any subway lines.

Table 9C-18. Summary of Significant Adverse Bus Line-Haul Impacts

Bus Route	Direction of Travel	Impacted Bus Routes 2040		Impacted Bus Routes 2040	
		AM	PM	AM	PM
M20	NB	1.91	0.57	Impact	No Impact

Analysis determined that the Proposed Project would result in impacts to 12 subway stairwells, one fare array, and no escalators, as shown in **Table 9C-19** and **Table 9C-20**.

Table 9C-19. 2040 Subway Stair Impacts – Proposed Project

Station/Stair	Location	2032		2040	
Eighth Avenue - 42nd Street - PABT Station (A/C/E)		**AM**	**PM**	**AM**	**PM**
IND P8	Stair between N62A paid zone and uptown A/C/E platform	--	--	--	Impact
IND P9	Stair between N62A paid zone and uptown A/C/E platform	--	--	Impact	Impact
Times Square-42nd Street Station (1/2/3/7/N/Q/R/W/S)					
FLU PL1/PL2	Stair between lower mezzanine and No. 7 platform	--	--	Impact	Impact
FLU PL5	Stair between lower mezzanine and No. 7 platform	--	--	Impact	--
IRT ML5	Stair between lower mezzanine and downtown 1/2/3 platform	--	--	Impact	Impact
IRT ML6	Stair between lower mezzanine and uptown 1/2/3 platform	--	--	Impact	Impact
IRT ML9	Stair between lower mezzanine and downtown 1/2/3 platform	--	--	Impact	--
ML13/ML14/ ML15/ML16	Stair between lower and upper mezzanine	--	--	Impact	Impact
BMT P10	Stair between BMT mezzanine and uptown N/Q/R/W platform	--	--	Impact	Impact
BMT P11	Stair between upper mezzanine and downtown N/Q/R/W platform	--	--	Impact	Impact
BMT P13	Stair between upper mezzanine and downtown N/Q/R/W platform	--	--	Impact	--
BMT P15/P17	Stair between upper mezzanine and downtown N/Q/R/W platform	--	--	Impact	Impact

Table 9C-20. Subway Fare Array Impacts

Station/Fare Array	Location	2032		2040	
Eighth Avenue - 42nd Street - PABT Station (A/C/E)		**AM**	**PM**	**AM**	**PM**
N62B – HEET	Northwest Corner	--	--	Impact	Impact

9C.7 POTENTIAL MITIGATION

Subway stair impacts may be addressed by adding additional stairs, widening existing stairs, or changes to station configuration to redistribute volumes where feasible. Impacts to subway fare arrays may be addressed by adding additional fare gates, replacing lower capacity elements such as High Entrance Exit Turnstiles with higher capacity fare gates, or other reconfigurations of access and fare control where possible.