Appendix 9A Bus Services

9A.1 INTRODUCTION

The Port Authority of New York and 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; also referred to as the West Adjunct in the Final National Environmental Policy Act Scoping Information Packet), and associated ramp infrastructure (the Replacement Facility), accompanied by private development to assist in funding its construction. The Replacement Facility, construction of the Dyer Deck-Overs and their conversion to publicly accessible open space, and the private development are collectively referred to as the Bus Terminal Replacement Project (the Proposed Project).

The Proposed Project is necessary as the existing PABT has significant spatial and operational constraints that prevent it from accommodating existing and future bus size, weight, and technology, resulting in the inability to provide an efficient operating condition and to meet forecasted increases in demand. Further, the PABT is an aging building structure with systems that require expensive recurrent maintenance and short-term fixes.

The objective of the analysis of commuter and intercity transit in this appendix is to evaluate how the No Action Alternative and the Proposed Project would be expected to function in terms of accommodating projected bus demand, facility capacities, and potential impacts on the local street network within the study area of such operations. The appendix assesses the pre-pandemic base year (2019) and projected (2028, 2032, and 2040) conditions with and without the Proposed Project within the study area, including the "ultimate" operation in 2040 of the No Action Alternative (existing PABT following completion of major structural repair efforts) and the Proposed Project.

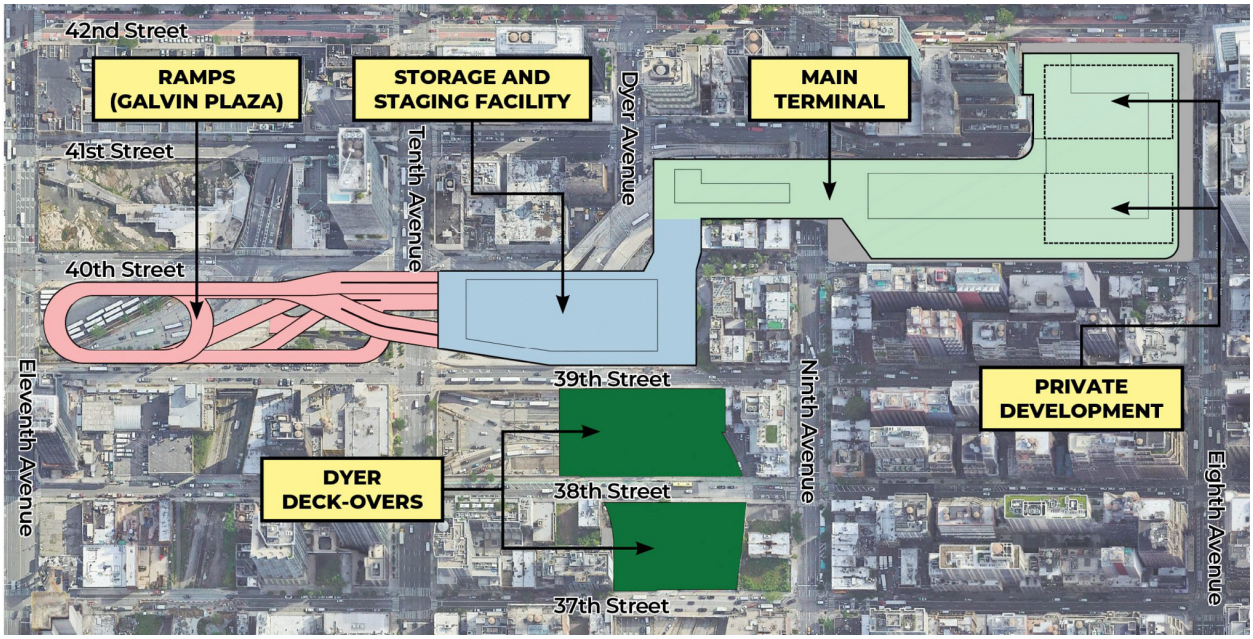
9A.1.1 Project Description

This appendix provides a detailed description of bus operations for the Proposed Project, which is depicted on **Figure 9A-1**. **Chapter 2, Project Alternatives,** describes the Proposed Project in its entirety.

While the Replacement Facility offers numerous enhancements intended to improve sustainability, support zero- or low-emission (*e.g.*, electric) buses, improve the passenger experience and enhance the adjacent public realm, this assessment focuses exclusively on bus services associated with the Replacement Facility.

The Replacement Facility would provide enhanced connections from the Lincoln Tunnel to the Main Terminal, improve circulation for bus operations, and reduce buses on nearby city streets.

Figure 9A-1. Bus Terminal Replacement Project



Source: WSP (2023)

The ramps offer direct connections to and from the Lincoln Tunnel. As detailed in **Table 9A-1**, the new ramps in the Replacement Facility are significantly longer and wider when compared to the existing ramps. This additional space would allow for longer bus queuing and allowing one bus to maneuver around another bus on the ramp. In the event of terminal congestion or delays, the improvements of the Replacement Facility would reduce bus congestion backing-up into the Lincoln Tunnel or onto city streets.

Table 9A-1. Comparison of Ramp Length, Width

	Ramp Area (sf)	Ramp Length (lf)
Existing PABT	~111,000	~5,000
Proposed Project	~428,000	~12,400

Once the Main Terminal is completed, the SSF would offer both additional bus circulation space and flexibility for operations, as well as space for approximately 300 to 350 buses to park (storage) or wait for revenue service scheduled to start within approximately 20 minutes (staging). Under existing conditions, both storage and staging functions regularly use nearby streets as buses move between a nearby parking lot (where they may park for up to several hours) and the Main Terminal. Other buses that do not leave the terminal with passengers return to their home garage for midday parking and return to the PABT later in the day.

The new Main Terminal would accommodate more buses and would operate with greater efficiency compared to the existing PABT. This is essential to accommodate the forecasted increased demand for bus service. The design additionally reserves space for intercity bus service (and their specific operational requirements to accommodate longer bus dwell times

necessary to board passengers with luggage, as well as less frequent service). The intercity bus level planned for the new Main Terminal would offer more gate capacity for long-distance bus carriers than the existing terminal. This additional capacity could shift some intercity bus service from curbside locations along nearby streets into the terminal. Gate designs would offer flexibility to best accommodate anticipated fleet configurations (including newer types of buses which may be larger, longer, or higher). The circulation network of the Main Terminal, similar to the design of the ramps, provides sufficient space for a bus to bypass another bus which may be blocking the travel lane. Additionally, shallow sawtooth gates would be configured to allow for buses to arrive and depart independently, avoiding queuing behind other buses that currently occurs at pull-through gates in the existing terminal, the configuration of which does not allow for buses to depart until the lane ahead is clear. Unlike the existing PABT, the new Main Terminal gates would be configured so that a bus can depart from a gate as soon as passengers are aboard, even if an adjacent bus is continuing to load or is immobile. The improvements would both accommodate buses not easily served by the existing PABT (due to height or length) and improve the efficiency and throughput for general operations.

9A.2 METHODOLOGY

Assessment of future needs of bus terminal operations is based on forecasted year 2040 bus ridership for trans-Hudson commuters and intercity bus passengers for services operating within and around the PABT. Information on bus forecasts can be found in **Appendix 1A.**

The COVID-19 pandemic accelerated trends already underway in the workplace and enabled more employees to work remotely at least some of the time. Based on surveys of office employers and data on Manhattan's occupational mix, the "new normal" for commuting to Manhattan workplaces is anticipated to be roughly 16% lower than it was before the pandemic.[1] While this is a meaningful reduction in commuting activity, it does not alter the need for a facility with significant additional capacity to absorb demand growth and accommodate peak activity days.[2]

This assessment describes how PANYNJ and bus carriers would operate in both the No Action Alternative and the Proposed Project, based upon existing operations, coordination with

[1] Based on review of American Community Survey 2015-2019 for the 18-county core region; "How Many Jobs Can be Done at Home?" Jonathan I. Dingel and Brent Neiman (June 2020). https://bfi.uchicago.edu/wp-content/uploads/BFI_White-Paper_Dingel_Neiman_3.2020.pdf; Partnership for New York City, "Survey of Employers," February 2023. https://pfnyc.org/wp-content/uploads/2023/02/2023-02-RTO-Survey.pdf.

[2] NYMTC adopted its 2055 Socioeconomic and demographic (SED) forecasts on October 22, 2020. The report on the forecast acknowledges the onset of the COVID-19 pandemic but notes: "While the highly unusual nature of the pandemic and economic crisis may result in as-yet unforeseen changes, there is a stronger basis for the long-term projections and the use of 20-30 year change increments for analytic purposes" (NYMTC, Technical Memorandum 4: 2055 SED Forecasts Executive Summary and Public Comments (page 3)). Further, NYMTC states: "As new data emerges about the full scope of the impact of the pandemic and economic shock on regional employment and population trends, that information will be incorporated into the next vintage of forecasts" (page 3).

PANYNJ and NJ TRANSIT, and representative operating plans developed as "test fits" to match projected demand to available capacity.

9A.2.1 Transportation Planning Principles

Based on existing practices, several planning principles and guiding assumptions have been established for the design of the Replacement Facility as it pertains to bus operations. These apply to both operations in the SSF while it functions as a temporary terminal as well as for the new Main Terminal. Due to the designed flexibility of the Proposed Project, actual operating conditions may somewhat vary from what is represented here. However, the operating plans presented in this assessment are representative of a typical plan reflective of PABT bus carrier operations and constraints. The plans reflect a conservative condition that does not account for additional operational efficiencies that bus carriers may achieve in the future (*e.g.*, modifications to traditional routing and scheduling of buses). The Proposed Project is designed to fully accommodate projected bus demand in 2032 and 2040, based on PANYNJ forecasts, without requiring curbside operations on nearby city streets.

Planning guidelines for such operating plans include:

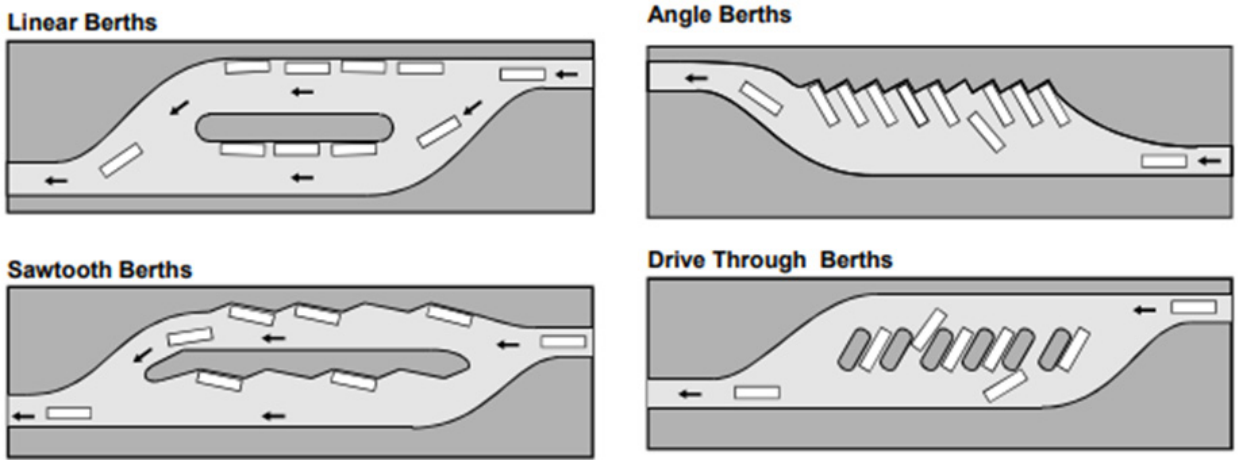
- Organizing bus routes by type within the facility (*e.g.*, commuter, intercity, and jitney services).
- Locating each bus carrier's operations together to consolidate services and related support functions.
- Grouping bus routes at gates according to bus dispatch locations (garages) and customer destinations (geographies) to allow for operational flexibility and a coherent location of similar services within the terminal.
- Matching carriers and routes to gates which meet specific vehicle requirements (*e.g.*, longer gates which can accommodate longer or articulated buses).
- Assigning carriers and routes in sample operating plans based on target throughputs, referred to as turns[3], per bus gate, per hour.
  - Typical "shallow sawtooth"[4] bus gates are expected to process six bus turns per hour in the Replacement Terminal when associated storage and staging are available in the SSF. **Figure 9A-2** depicts typical bus gate types.
  - Shallow sawtooth gates are expected to process five bus turns per hour in the SSF, and the Dyer Deck-Overs.

[3] A "turn" is a measure of the number of buses that can arrive and depart at one gate within a given hour. The number of turns is a function of a gate's physical design, bus size, carrier schedule, availability of staging, and passenger loading and unloading accommodations.

[4] A "sawtooth gate" differs from a straight curb line by creating an angled entry for the bus (resembling, in plan, the blade of a saw). This configuration facilitates bus movements into and out of the gate and increases operational efficiency of multiple buses arriving and departing adjacent gates.

- Deep sawtooth gates, typically envisioned for intercity bus operations, are expected to handle an average of 2.4 departure turns per hour and up to four arrival turns per hour. The term "deep sawtooth" is interchangeable with "angle berths in **Figure 9A-2**.
- When commuter gates are assigned for bus arrivals (passenger drop-off) only, throughput is expected to be at least 10 turns per hour for shallow sawtooth gates.

Figure 9A-2. Bus Gate Types Illustrated



Source: Transportation Research Board; Transit Capacity and Quality of Service Manual
Note: The terms "berth" and "gate" are used interchangeably

The analyses of the No Action Alternative and Proposed Project terminal operations are based on representative operating plans informed by these planning principles for bus carrier operations. There is no single operating plan assumed for the potential enaction of each condition; ultimately, bus carriers would respond by refining their own operating plans to fit their prescribed space.

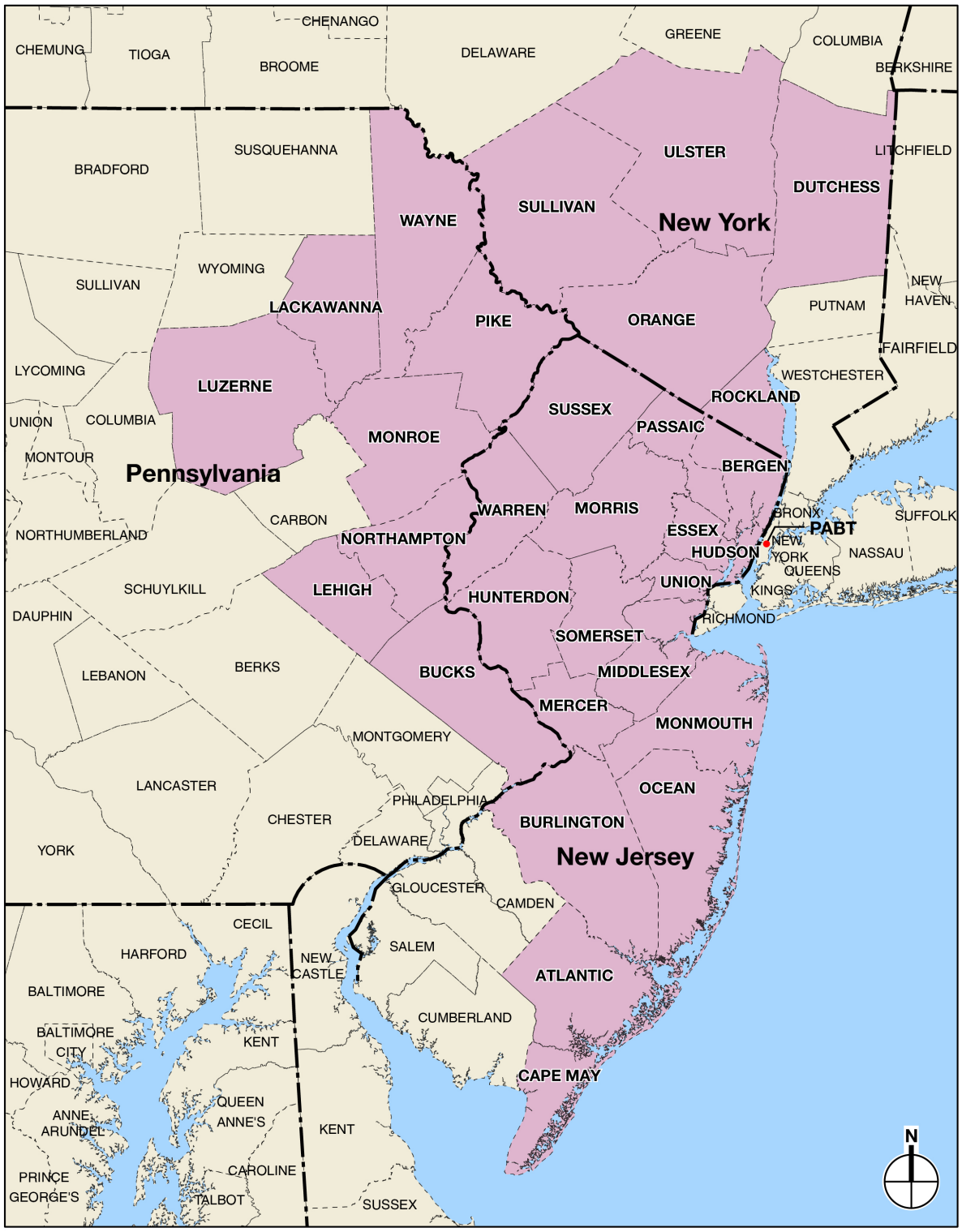
9A.3 AFFECTED ENVIRONMENT

9A.3.1 Existing Conditions (Commuter, Intercity and Jitney Buses)

The PABT serves as a destination point for commuter, intercity, and jitney bus services from New Jersey, New York, Pennsylvania, and the region. Commuter services include local and express routes, predominantly from origins west of the Hudson River, and terminating at the PABT (**Figure 9A-3**).

Commuter services operate on regular schedules typically with higher trip frequencies and ridership during the morning and evening peak periods. NJ TRANSIT operates a robust network of routes from northern and central New Jersey, while several private carriers operate in New Jersey, southern New York (Orange and Rockland Counties) and eastern Pennsylvania. Commuter routes typically operate 40-foot transit-style buses (i.e., typical city buses), including 60-foot articulated buses, as well as 45-foot coach-style buses for longer-distance and highway express services.

Figure 9A-3. Counties with Commuter Bus Service to PABT



Source: WSP (2023)

NJ TRANSIT is the largest operator of commuter bus service to the PABT, responsible for approximately 60% of total bus service pre-pandemic and closer to 80% at present. Approximately 10 private bus companies provide additional commuter bus services. Commuter jitney routes from northern New Jersey are also operated within the terminal. These services follow set routes but operate in an owner-operator business model based more on frequency of service driven by real-time customer demand rather than set schedules. Intercity bus services are offered by several carriers with regional and long-distance routes.

Jitney services are operated by private companies and typically mirror NJ TRANSIT bus routes. Jitneys do not operate on set schedules. A mix of carrier companies, fleet managers, and independent drivers typically combine to provide service on key corridors. Within the PABT, departures are typically made on a "load and go" basis, filling vehicles and cycling in the next to depart when ridership is sufficient. Jitney vehicle sizes range from 16-passenger mini-buses to full-size buses.

Intercity services operate larger buses over longer, regional routes. Traditional intercity coaches typically feature 47 to 55 seats, while double-decker buses may include approximately 80 seats. The existing PABT cannot accommodate double-decker buses due to height and clearance constraints. Intercity buses are typically coach-style vehicles designed to accommodate luggage and comfort for longer travel distances. Intercity services cater to less frequent customers with luggage and thus typically have longer layover times and boarding processes within the PABT (or at off-site locations – some on-street, some in off-street lots), reflected in less turnover of trips at their departure gates. Commuter carriers serving eastern Pennsylvania and southern New York State often serve dual-purpose of long-distance commuting and intercity service for occasional travelers.

Buses arrive and depart on three levels of the PABT: the Lower Level, Level 3, and Level 4. Intercity, some commuter, and jitney services are accommodated in the Lower Level. The upper levels host higher-frequency commuter bus routes. Departure gates are numbered and assigned to bus carriers; each carrier coordinates with PANYNJ to assign specific routes to gates according to customer demand and corresponding bus frequencies. There are a total of 68 gates on the Lower Level, 58 gates on Level 3 and 36 gates on Level 4 in the existing PABT.

At present, while some intercity bus carriers operate from within the PABT a significant market for "curbside," intercity operations has grown in Midtown Manhattan. Carriers such as MegaBus, FlixBus, and others coordinate on-street stop locations with the New York City Department of Transportation (NYC DOT) and service customers without any facility. A portion of this curbside intercity market in the vicinity of the existing terminal is expected to be accommodated within the Replacement Facility.

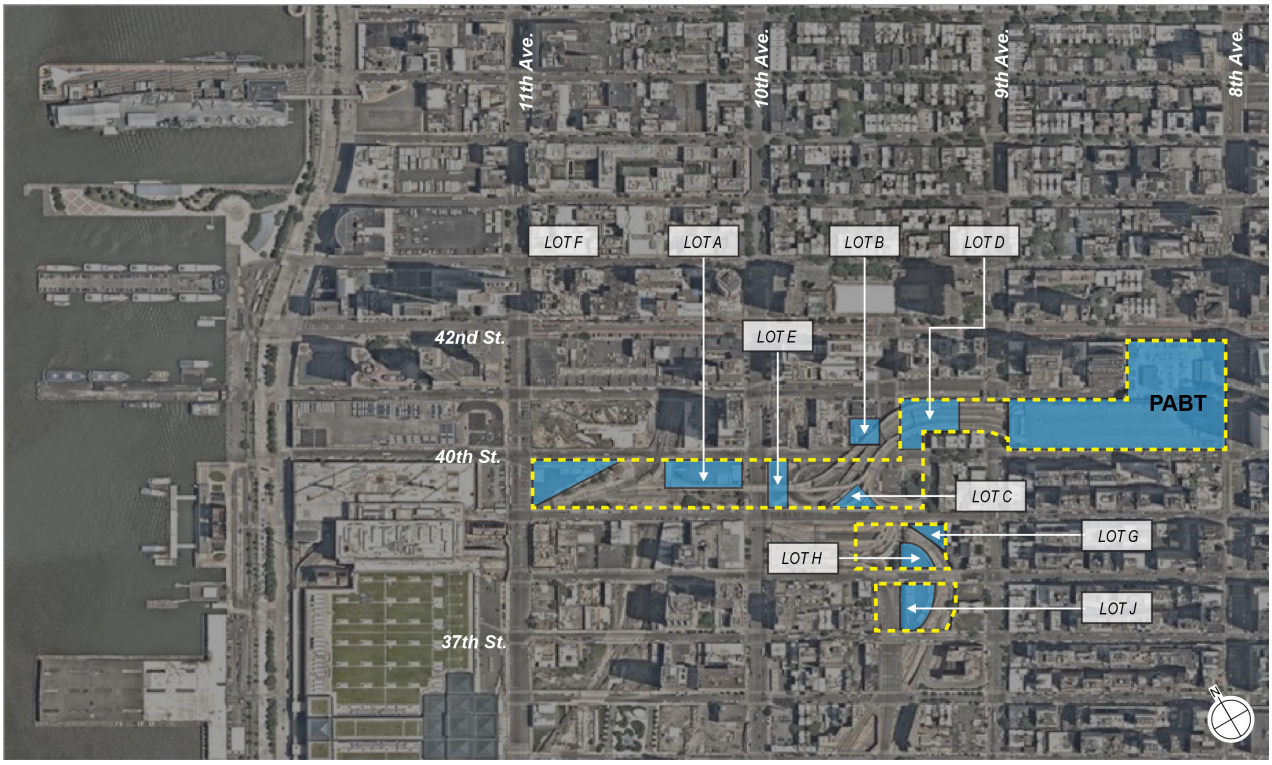
Buses operate at the PABT 24 hours a day, seven days a week. In the overnight/early morning hours, PANYNJ consolidates operations to the Lower Level.

Integral to the operation of the PABT are related bus storage and staging elements. The imbalance between peak period and off-peak bus demand requires significantly higher levels of service to be operated in the AM and PM peaks relative to midday and evening. Therefore, carriers schedule trips differently for each time period with varying bus volumes throughout the day. During the morning peak period, some buses discharge passengers before "deadheading" (traveling without passengers) to carrier garages or surface parking lots, either in Midtown Manhattan or New Jersey. These buses are not needed for midday service and thus do not remain in operation after a select number of AM peak trips to the PABT. Non-revenue[5], deadhead buses returning to New Jersey to park during the midday period add traffic to the Lincoln Tunnel and regional network as they leave Manhattan and commonly return to Manhattan empty to begin PM peak revenue service.

PANYNJ owns several surface parking lots in the vicinity of the PABT, including space under the existing ramp structure, on Galvin Plaza, and various parcels in the Dyer Avenue and Lincoln Tunnel Expressway corridor extending south to West 30th Street. These lots are leased to NJ TRANSIT and private carriers for midday parking of buses near the PABT. Bus carriers using these lots for midday bus storage operate on local streets for some period of time for access to and egress from these lots. See **Figure 9A-4**, below.

[5] "Revenue Service is the operation of a transit vehicle during the period which passengers can board and ride on the vehicle. Revenue service includes the carriage of passengers who do not pay a cash fare for a specific trip as well as those who do pay a cash fare; the meaning of the phrase does not relate specifically to the collection of revenue." – From the American Public Transportation Association.

Figure 9A-4. Existing Bus Storage and Staging Lots Adjacent to PABT



Source: PANYNJ (2023)

On-street bus operations in the vicinity of the PABT include jitney carriers and curbside intercity carriers, as well as the express service to Newark Liberty International Airport. These carriers pick up and discharge customers at bus stops permitted and regulated by NYC DOT. Peter Pan, which operates intercity service from inside the existing terminal, also uses a curbside stop outside the terminal on West 42nd Street.

PANYNJ tracks bus volumes at the PABT by service type, including "commuter-NJ TRANSIT," "commuter-Private," "jitney," and "intercity."

Table 9A-2 summarizes 2019 baseline typical weekday bus and customer volumes by category.[6]

[6] Bus and customer volumes are shown for 2019 as that is the year used for existing conditions, for purposes of analysis.

Table 9A-2. 2019 Typical PABT Weekday Bus and Customer Volumes

Travel Market	Bus Arrivals			Bus Departures			Total Buses
	AM Peak Hour	PM Peak Hour	Daily Total	AM Peak Hour	PM Peak Hour	Daily Total	
Port Authority Bus Terminal	**774**	**144**	**4,238**	**170**	**620**	**3,977**	**8,215**
Commuter - NJ TRANSIT	577	101	2,700	87	402	2,421	5,121
Commuter – Private	151	23	794	30	164	844	1,638
Jitney	33	8	411	35	27	340	751
Intercity	13	12	333	18	27	372	705
Travel Market	**Passenger Arrivals**			**Passenger Departures**			
	AM Peak Hour	PM Peak Hour	Daily Total	AM Peak Hour	PM Peak Hour	Daily Total	Total Psgrs
Port Authority Bus Terminal	**30,965**	**2,332**	**130,591**	**2,497**	**27,608**	**136,125**	**266,716**
Commuter – NJ TRANSIT	24,282	1,645	90,107	1,299	18,573	87,796	177,903
Commuter – Private	5,599	305	25,287	535	7,043	28,233	53,520
Jitney	720	116	5,404	31	882	5,608	11,012
Intercity	364	266	9,793	632	1,110	14,488	24,281

Source: PANYNJ (2022)
Note: Columns may not total exactly due to rounding.
PABT peak hours are 7:00 a.m. - 8:00 a.m. and 5:30 p.m. - 6:30 p.m.

9A.3.2 Projected PABT Bus Demand by Alternative and Analysis Year

Table 9A-3 outlines the projected bus demand (arrivals and departures) in the PM peak hour for the three analysis years (2028, 2032, 2040) and the associated facility capacities available in each. The approaches to accommodating bus demand are described below for each scenario.

This analysis considers the unconstrained demand for 829, 869, and 907 peak-hour bus throughput in 2028, 2032, and 2040, respectively. Terminal capacity numbers are a function of existing PABT operational constraints (wherein 764 peak buses are considered the maximum throughput, including both arriving and departing buses) and the anticipated reduction in capacity through the No Action terminal repairs (due to Americans with Disabilities Act ('ADA) accessibility improvements and other structural impacts).

Table 9A-3. Summary of Projected PM Peak Bus Arrivals and Departures and Facility Capacities by Alternative

	Measure	Construction Peak		2040
No Action	Peak Hour Bus Forecast	764[1]		907
	Peak Hour Terminal Capacity	417		556
	Unaccommodated Buses	**347**		**351**
	Dyer Deck-overs	-		-
	Diversions	46		-
	Curbside	90		90
	West 30th Street	55		55
	Remain unaccommodated	**156**		**206**
	Measure	**2028**	**2032**	**2040**
With Action	Peak Hour Bus Forecast	764	869	907
	Peak Hour Terminal Capacity	460[2]	1,030	1,030
	Unaccommodated Buses	**304**	**(161)**	**(123)**
	Dyer Deck-overs	115	-	-
	Diversions	46	-	-
	Curbside	90	-	-
	West 30th Street	55	-	-
	Remain unaccommodated	**(2)**	**(161)**	**(123)**

(1) Existing PABT terminal capacity is 764 buses in the PM peak hour; bus carriers are not permitted to operate additional buses, thus reflecting a cap on current capacity.

(2) In 2028 under the With Action Alternative the SSF is used as a temporary terminal during construction of the Main Terminal.

9A.4 NO ACTION ALTERNATIVE

9A.4.1 Modification to Operations

Under the No Action Alternative, PANYNJ would retain the existing PABT but would undertake extensive repairs of the terminal and its ramps over an approximately 10- to 13-year period to continue its safe use. Repair efforts would require the replacement of existing floor slabs throughout the PABT and substantial work to make the terminal compliant with the ADA. Replacement of floor slabs may require temporary closure of 25% to 100% of bus gates on any one floor on a rolling basis.

PANYNJ estimates that, upon completion of the PABT repair efforts, capacity and associated operations would be reduced from the present 764 peak-hour bus trips to approximately 556 peak-hour trips (inclusive of both commuter and intercity), necessitating major modifications to

commuter and intercity bus schedules and operations.[7] Additional details on how the existing PABT would be repaired under the No Action Alternative can be found in **Appendix 14A**.

Given the reduced capacity of the terminal during the repair process, and its inability to accommodate anticipated future bus volumes, options were developed looking at alternate operating locations, methods of diverting terminal-bound buses to other transit modes, use of higher-capacity buses, and relocating bus operations to curbside locations around the terminal. Collectively, West 30th Street (see **Section 9A.4.1.1** below) would be anticipated to accommodate 55 intercity peak-hour bus trips, up to 46 additional peak-hour bus trips diverted to another mode of transit, and up to 90 peak-hour bus trips accommodated "on-street" at curbside locations.

9A.4.1.1 West 30th Street Off-Street Operations

Intercity buses currently using the PABT would be expected to operate from a temporary location on PANYNJ property at West 30th Street between Ninth and Tenth Avenues. This site would accommodate 55 intercity bus movements during the PM peak period and associated demand outside of the peak hours. The West 30th Street location is currently used for midday parking and two customer bus stops for some PABT buses with spaces leased to private bus carriers. The permanent use of this location for intercity bus operations is expected only in the No Action Alternative; it does not constitute part of the Proposed Project (though this location would be used for temporary bus operations during construction of the Replacement Facility, as described below).

9A.4.1.2 Bus Diversions

In coordination with NJ TRANSIT, several diversions (terminal-bound bus trips operating west of the Hudson River that collect passengers and bring them to a location where the trip into Manhattan is completed via a second mode of transit, or that brings passengers to another Manhattan, but outside of Midtown) were developed and are presented below. Similar modifications to other commuter service providers or intercity operators may also be required. During the 10- to 13-year construction period required to repair the PABT, conditions within the terminal would further restrict operating capacity, resulting in greater volumes of buses needing to be diverted or operating outside of the terminal.

Several potential opportunities to divert buses to other locations, or divert passengers to other modes through transfers, were evaluated and are discussed below in order of preference by NJ TRANSIT. The number of bus trips that could be expected to be diverted was determined by assessing available capacity of the alternate mode of travel (i.e., Port Authority Trans-Hudson [PATH], rail, ferry), and the availability of space for bus operations surrounding that transfer point.

[7] Bringing the repaired existing PABT into ADA compliance would reduce capacity with the introduction of additional elevators and wider bus circulation lanes (allowing for wheelchair lifts to be deployed from a bus and creating sufficient space for another bus to drive around the bus using the lift). These improvements would require more space per gate compared to the current non-ADA bus gates.

Many of the options below are two-seat rides which would be expected to add commute time and potential cost to riders or service operators.[8] Use of the George Washington Bridge Bus Station (GWBBS), Secaucus Junction, and ferry connections are included in summary calculations shown in **Table 9A-3** and would divert up to approximately 46 peak-hour buses otherwise heading directly to the terminal. In all cases, the number of buses added to regional or local roadway networks as a result of these diversions would be minimal and was not analyzed as part of this EIS.

George Washington Bridge Bus Station Diversion

- It is possible to divert some existing PABT service to the GWBBS, due to available capacity at that terminal. The GWBBS could potentially accommodate six turns per hour, thereby providing an option to possibly divert up to 18 additional peak-hour buses to this location.
- There are several bus routes operating from NJ TRANSIT's Oradell Garage that are potential candidates for a diversion to the GWBBS, due to their relatively longer headways, which are suitable for the GWBBS sawtooth gates.
- With this diversion, a one-seat ride to Midtown Manhattan would become a two-seat ride, as customers would need to transfer to the A train at the GWBBS to reach Midtown Manhattan, their assumed ultimate destination. Additional subway transfers may be required depending on customer destinations.

Diversion to NJ TRANSIT Rail at Secaucus Junction

- Buses could be diverted to NJ TRANSIT rail service at Secaucus Junction for rail service to New York Penn Station.
- The bus plaza at Secaucus Junction has limited capacity during PM peak hours. It is projected that a maximum of three bus loading platforms could be available for commuter bus diversion. At six turns per hour, this could accommodate 18 peak-hour buses.
- A Secaucus Junction diversion would result in single-seat bus rides becoming a two-seat (bus/rail) commute, and potentially a three-seat ride should the commuter require using the subway to reach their ultimate destination in Manhattan.
- Prior to the COVID-19 pandemic there was insufficient rail capacity to absorb additional peak-hour diverted customers between Secaucus Junction and New York Penn Station. As described in **Section 9A.2, Methodology**, these conditions are assumed to resume, and demand is expected to continue to grow, within the next few years.
- Available peak-hour capacity on NJ TRANSIT rail would have to be evaluated based on future ridership and the status of other planned trans-Hudson rail system investments. Therefore, additional review to determine the feasibility of this option would be required.

[8] Historically, in response to significant service disruptions, fare incentives have been offered by NJ TRANSIT to minimize the impacts of additional commuting costs associated with transfers to ferry, rail or other services. Any fare incentives that would be implemented in association with service disruption related to the No Action or Proposed Project have not been determined.

Bus to Ferry

- Diverting selected NJ TRANSIT bus routes to connect with existing ferry services creates both customer impacts and logistic issues. Ferry terminals and existing ferry fleets have limited capacity during peak hours and could absorb only a minimal number of diverted bus riders. Any diversion would likely result in no more than approximately 10 diverted buses during the peak hour.
- Diverted bus riders would be required to transfer from the bus to a ferry, and then a third-seat movement between the ferry landing and their ultimate destination.

Additional diversions were considered but not determined to be feasible, including the following.

PATH Diversion

- Any diversion to PATH from NJ TRANSIT bus service would require significant bus operations at Newark Penn Station, which has limited capacity for growth in the existing bus lanes on Raymond Boulevard and Market Street. NJ TRANSIT's "New Bus Newark" bus redesign plan calls for expanded use of the Newark Penn bus lanes to increase local service frequency. Bus diversions to PATH involving transfers at the Hoboken Terminal and Journal Square (Jersey City) were determined not to be viable.

Lower Manhattan Diversion

- NJ TRANSIT operates a single bus route to Lower Manhattan (the #120 from Bayonne). Lower Manhattan has limited space for bus stops and bus staging room and NYC DOT strictly manages curb space in the area. Given the limited street capacity available to accommodate any significant diversion of PABT-based service to Lower Manhattan, this option is not considered desirable.

Use of High-Capacity Buses

- NJ TRANSIT has previously added and deployed 25 articulated buses[9] to expand passenger capacity on selected commuter routes serving the PABT, including Routes 126 (Hoboken), 107 (South Orange/Irvington), and 156/158/159 (River Road corridor in Bergen and Hudson Counties).
- NJ TRANSIT plans to replace a significant percentage of the northern New Jersey transit bus fleet with articulated buses, to expand customer capacity. The longer (60-foot vs. 40-foot) articulated buses can only be used on pull-through gates at the PABT, as they are too long to operate from sawtooth gates.

Higher-capacity buses such as double-decker buses (precluded from using the existing terminal due to height restrictions) may allow more passengers to be transported on the same number of scheduled trips, but this analysis has not assumed any additional changes to future bus fleet

[9] An "articulated bus" is a higher capacity bus, utilizing two vehicle sections joined by a pivoting joint.

composition beyond those changes already anticipated. The analysis represents a reasonable worst-case scenario regarding fleet capacities. NJ TRANSIT views the addition of articulated buses to its fleet as necessary to meet existing demand, but not in and of itself a solution to terminal capacity shortfalls in Manhattan.

On-Street Operations

- Understanding that the rehabilitated PABT would have a reduced bus capacity, relocating selected bus services from the PABT and transferring them to on-street locations proximate to the PABT is the option with the least impact upon NJ TRANSIT's customers. Adjacent on-street operation would enable customers to maintain their current single-seat ride to the PABT and current subway connections. However, it would also present significant logistical problems and localized impacts to local streets.
- To address a terminal shortfall, up to 90 buses not accommodated in the terminal may be relocated to curbside boarding positions across nine locations, each with two bus stops, in the study area. A typical north-south Midtown Manhattan block can accommodate two bus positions for conventional 40- to 45-foot transit buses. Each position can be expected to process up to five buses per hour (turns/hour), for a total of 90 buses processed across the 18 curbside locations. Each of the locations identified below (and depicted in **Figure 9A-5**) is intended to accommodate two bus positions. Dyer Avenue is a PANYNJ-owned roadway; other locations would require coordination with NYC DOT.
  - 1a – Dyer Avenue between West 34th and West 35th Streets
  - 1b- Dyer Avenue between West 35th and West 36th Streets
  - 2a – Hudson Blvd East between West 33rd and West 34th Streets
  - 2b – Hudson Blvd East between West 34th and West 35th Streets
  - 3 – West 35th Street between Hudson Boulevard East and Eleventh Avenue
  - 4 – Eleventh Avenue between West 35th and West 36th Streets
  - 5 – West 34th Street between Ninth and Dyer Avenues
  - 6a – West 33rd Street between Ninth Avenue and Lincoln Tunnel Expressway
  - 6b – West 33rd Street between Lincoln Tunnel Expressway and Tenth Avenue

Figure 9A-5. Curbside Operating Positions (Arrivals and Departures)

Source: WSP and FHI Studio (2023)

Buses Remaining Unaccommodated

- Assuming the relocation of some intercity buses to an off-street location at West 30th Street, approximately 46 buses diverted from direct travel to the terminal and another approximately 90 buses relocated to curbside locations adjacent to the PABT, a deficit of 156 buses remains (forecast service without an identified location, or alternate, for revenue service).
- At this time, the locations of these operations are not known. Discussions between the operators and the City of New York would be required to permit these operations along city streets. It is assumed, for analysis purposes, that such operations would likely result in significant impacts including those to traffic and pedestrian impacts. However, the extent and location of such impacts is not known at this time. Bus carriers would be required to make operational decisions based on the availability of negotiated curbside spaces.

9A.4.2 2028 Analysis Year

Transportation (Commuter Service/curbside intercity/jitney)

The 2028 analysis year for the No Action Alternative would be expected to correspond with significant repair of the existing PABT, including structural slab replacements between building levels. This structural work, along with terminal design changes to address ADA accessibility in currently inaccessible areas, would result in decreased bus and passenger capacity.

Whereas the existing PABT capacity allows for the maximum throughput of 764 PM peak-hour bus trips the terminal capacity anticipated during the peak repair activity is 417 buses, resulting in 347 unaccommodated peak buses. Three operational adjustments would be expected during this period to accommodate a greater number of buses. Storage and staging capacity at existing surface bus parking lots would remain intact. However, storage and staging spaces within the terminal would be impacted during structural repairs.

First, NJ TRANSIT would be expected to divert as many buses as possible to alternative facilities in Manhattan and truncate some services at rail and ferry facilities in New Jersey. As described above in **Section 9A.4.1**, Modification to Operations, a conceptual planning exercise with NJ TRANSIT determined a maximum diversion of 46 PM peak-hour buses, including up to 18 to the GWBBS in Manhattan, up to 18 to the Secaucus Junction rail station, and up to 10 buses to various ferry terminals in New Jersey. This represents the total number of diversions planned for in the No Action Alternative.

Second, intercity buses currently using the PABT would operate from a temporary off-street facility on Port Authority property at West 30th Street between Ninth and Tenth Avenues. This property would accommodate the 55 intercity bus movements during the PM peak period and associated demand outside of the peak hours. The West 30th Street location is currently used for midday parking of some PABT buses, with spaces leased to private bus carriers, along with two bus stop locations. The use of this location for intercity bus operations is expected only in the No Action Alternative; it does not constitute part of the Proposed Project (though this location would be used for temporary bus operations during construction of the Replacement Facility).

Third, up to 90 commuter bus departures would have to be accommodated at on-street, curbside locations. Nine locations were identified, each accommodating two 45-foot commuter buses or jitneys. At a target throughput of five bus turns per hour, per location, these nine locations (totaling 18 bus positions) would accommodate the 90 PM peak hour trips necessary, along with the limited volume of anticipated bus arrivals (with passengers) during the peak. Locations were selected on New York City block faces offering reasonably close proximity to both the Lincoln Tunnel, for bus circulation, and the New York City Subway at 34th Street-Hudson Yards on the No. 7 train subway and West 34 Street on the A/C/E subway lines.

Not all PM peak buses can be accommodated within the PABT, the identified curbside locations, or through the diversions described above. The remainder of unaccommodated

buses are assumed to be routed from the Lincoln Tunnel to additional curbside locations yet to be identified. The potential impacts would include additional bus traffic on local Manhattan streets, increased travel time and inconvenience for bus customers, and potential air quality and noise impacts associated with this additional bus traffic. Bus carriers would have to coordinate with NYC DOT to identify suitable bus stop locations to minimize disruptions and potential impacts. It is assumed, for analysis purposes, that such operations would likely result in significant traffic and pedestrian impacts. However, the extent and location of such impacts is not known at this time.

9A.4.3 2032 Analysis Year

The 2032 analysis year for the No Action Alternative continues to assume significant construction and related operational constraints associated with the repair work of the existing PABT. Bus demand remains effectively capped at 764 buses in the PM peak hour with the same strategies in place to accommodate this demand amid reduced terminal capacity. A deficit of 156 PM peak buses remains for commuter, jitney, and intercity services, consistent with the 2028 No Action scenario. The potential impacts associated with this deficit would include additional bus traffic on local Manhattan streets, increased travel time and inconvenience for bus customers, and potential air quality and noise impacts associated with the additional bus traffic. Bus carriers would have to coordinate with NYC DOT to identify suitable bus stop locations to minimize disruptions and potential impacts. It is assumed, for analysis purposes, that such operations would likely result in significant traffic and pedestrian impacts. However, the extent and location of such impacts is not known at this time.

9A.4.4 2040 Analysis Year

Structural repairs of the existing terminal are anticipated to be complete by 2040, and based on the 2040 Bus Ridership Forecast, bus demand would rise to 907 PM peak hour trips.[10] After construction is completed, the repaired PABT is expected to have a capacity of 556 buses in the PM peak, a net reduction of 208 buses (27%) when compared to the existing (pre-repair) PABT capacity of 764. Thus, the number of buses which cannot be accommodated by the terminal rises to 351 buses, of which 90 commuter trips are expected to be accommodated on the 18 identified curbside locations and 55 intercity trips are accommodated at West 30th Street. NJ TRANSIT would not continue service diversions indefinitely. Therefore, the diverted 46 trips accounted for in 2028 and 2032 are added to the anticipated shortfall in 2040. The result is 206 PM peak-hour bus trips that require identification of additional curbside locations for permanent operations due to the reduced capacity of the rehabilitated PABT in 2040.

The potential impacts associated with this deficit would include additional bus traffic on local Manhattan streets, increased travel time and inconvenience for bus customers, and potential air

[10] As noted in Appendix 1A and Chapter 9, the 907 PM peak hour bus trips is derived from a 2022 transportation forecast, reflecting the most current demographic and economic trends available. This updates the initial forecast from 2015 used during the Scoping Process.

quality and noise impacts associated with the additional bus traffic. Bus carriers would have to coordinate with NYC DOT to identify suitable bus stop locations to minimize disruptions and impacts. It is assumed, for analysis purposes, that such operations would likely result in significant traffic and pedestrian impacts. However, the extent and location of such impacts is not known at this time.

9A.5 PROPOSED PROJECT

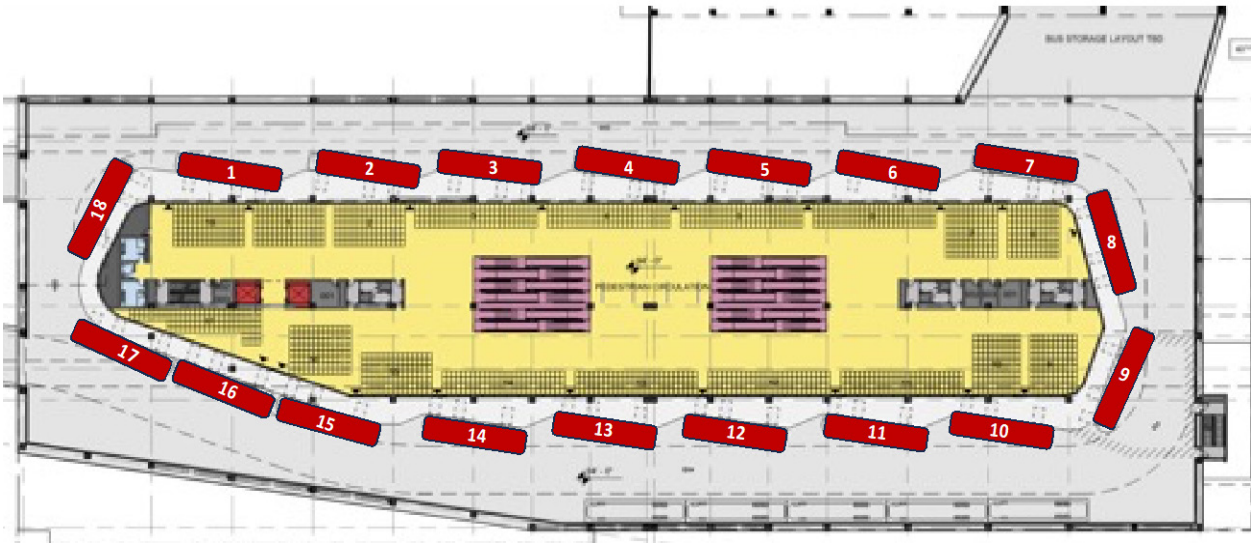
9A.5.1 2028 Analysis Year

For the Proposed Project, the 2028 analysis year offers additional capacity to manage bus volumes relative to the No Action Alternative. Construction of the Dyer Deck-Overs, ramp structures and the SSF are anticipated to be underway from 2024 to 2028. When completed, the SSF would initially be operated as a temporary terminal, allowing the existing PABT to be demolished and cleared for the construction of the new Main Terminal. Following the completion of the Main Terminal in 2032. The SSF would convert to its long-term use as a storage and staging facility for buses serving the terminal.

The operation of the SSF as a temporary bus terminal affords an anticipated throughput of approximately 460 buses in the PM peak hour. A typical bus level of the SSF would feature 18 shallow sawtooth gates that would be used for bus arrivals and departures. This gate configuration represents the design standard for the SSF while operating as a temporary terminal and for the Main Terminal. Each gate in the SSF would have a target throughput of five turns per hour, per departure gate for departures, and up to 10 turns per hour, per gate, if used only for arrivals.

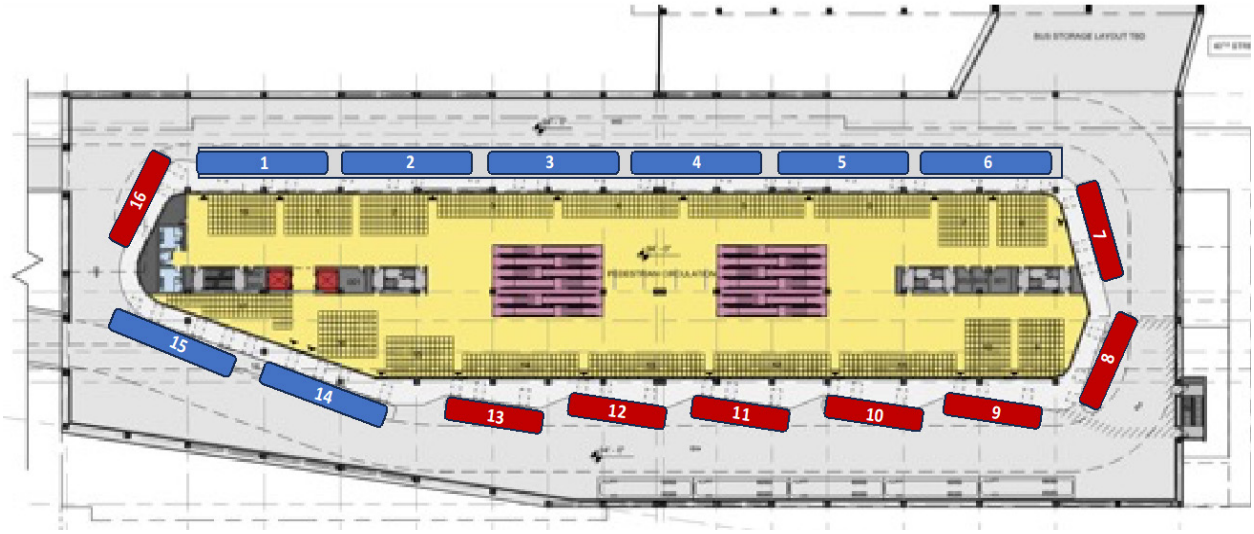
A representative operating plan for the SSF assumes 16 departure gates and two gates for bus arrivals on three typical bus levels. Standard bus gates in the SSF would accommodate 40- to 45-foot commuter buses. NJ TRANSIT also operates 60-foot high-capacity, articulated buses as part of its fleet, which would be accommodated on floors with a floorplate including straight curbs to accommodate up to eight articulated buses along with six 40- to 45-foot buses at conventional gates. Curb positions for two 60-foot articulated buses would require about the same space as three shallow sawtooth gates for 40- to 45-foot buses. As bus carriers develop and refine their own operating plans for these scenarios, the design of the SSF bus levels may evolve. The concept analyzed in this scenario includes a total of 76 departure bus gates and 10 arrival-only bus gates (two per level) for a throughput of 460 buses per hour.

Figure 9A-6. SSF Temporary Operations Typical Floor Plan (Commuter, 40- to 45-foot Buses)



Source: FHI Studio (2023)

Figure 9A-7. SSF Temporary Operations Typical Floor Plan (Commuter, 40- to 45-foot, and 60-foot Buses)

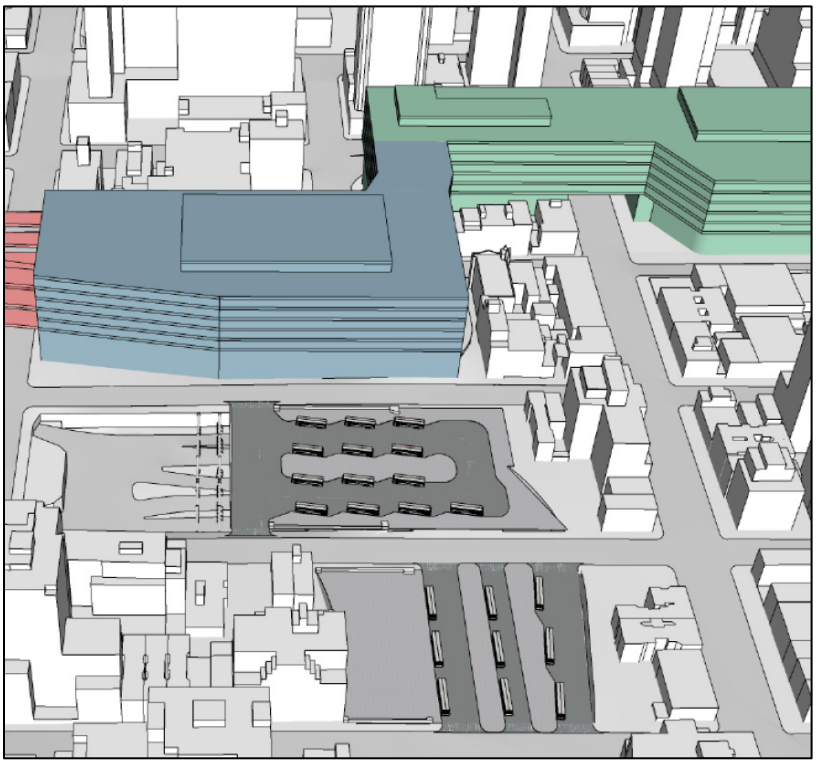


Source: FHI Studio (2023)

In 2028 the Proposed Project, like the No Action Alternative, assumes a capped total PM peak bus demand of 764 buses, which reflects the present-day maximum capacity of the PABT and does not afford any additional bus volume. The SSF would accommodate 460 of these buses. Diversions to the GWBBS or multimodal transfer points in New Jersey would accommodate 46 buses, while the West 30th Street intercity facility would accommodate 55 bus trips during this construction period. The construction period for the Proposed Project assumes the same use of 18 curbside locations to accommodate 90 bus movements in the PM peak hour.

Under the Proposed Project, PANYNJ would construct the Dyer Deck-Overs (north and south) between West 37th and 39th Streets to accommodate an estimated 115 additional buses with 19 gates as shown in **Figure 9A-8**. The anticipated operating plan includes a mix of shallow sawtooth gates on the north deck (10) and straight curb platforms (9 positions) on the south deck to accommodate 60-foot articulated buses. The representative operating plan factors in a limited number of PM peak bus arrivals alongside departures to derive the stated capacity. These bus arrivals occur on routes that are well-suited to operating on the decks, such as those using compressed natural gas buses or articulated buses.

Figure 9A-8. Interim Bus Operations during construction on Dyer Deck-Overs



Source: PANYNJ (2023)

In total, the combination of the SSF, the Dyer Deck-Overs, curbside operating locations, and the intercity operations envisioned for PANYNJ-owned space on West 30th Street effectively provides the capacity necessary to accommodate the capped 764 bus PM peak demand in 2028. The representative operating plan used for analysis is an approach that follows typical best practices such as grouping bus routes by customer destinations and carrier garage locations to maximize reliability and operational flexibility. This approach could be slightly modified by carriers, but such changes would not be expected to reduce capacity and thus the ability to meet projected demand.

9A.5.2 2032 Analysis Year

For the Proposed Project in 2032, the Replacement Facility would be open and fully operational, while PM peak bus demand is projected to increase to 869 buses. With four bus levels for commuter services and one for intercity services, along with the North Wing of the Lower Level for select commuter and jitney carriers, the Replacement Facility would provide approximately 181 bus gates. Two bus levels would accommodate a mix of 40- to 45-foot transit buses and 60-foot articulated buses with 30 gates per level. Two levels would only accommodate 40- to 45-foot buses with 33 gates per level. The intercity bus level would feature 40 bus gates for a mix of arrivals and departures. The Lower Level (North Wing) would include 15 gates for both jitneys and commuter services (arrivals and departures).

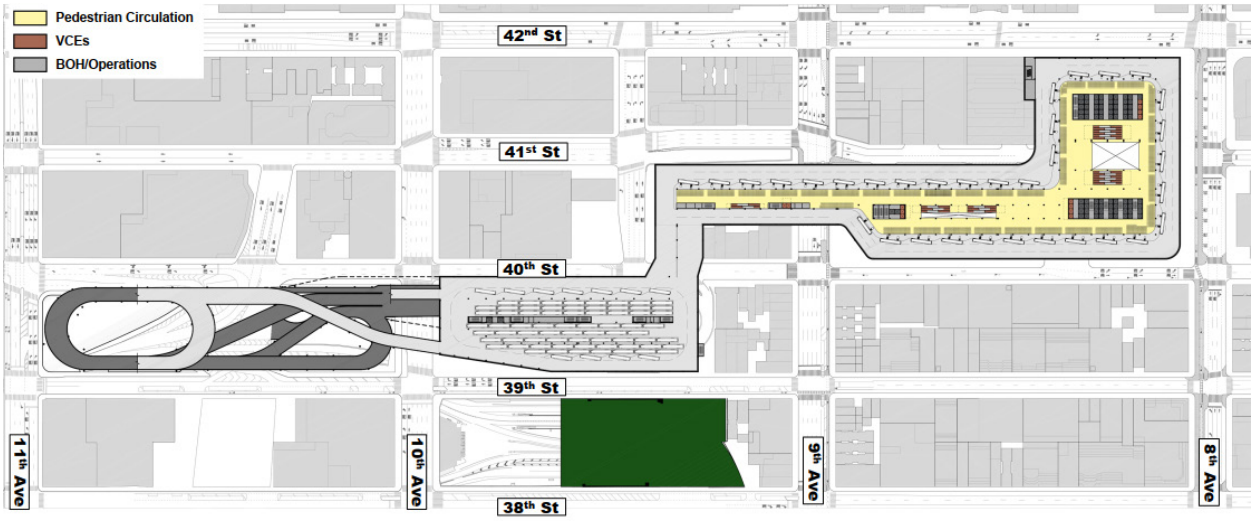
Based on an operational target of six bus departures per hour, per gate, and 10 bus arrivals per hour, per gate, on arrival-only gates, the approximately 181 gates in the Replacement Facility would be anticipated to process an estimated 1,030 buses in the PM peak hour. This capacity significantly exceeds the projected 869 bus demand in 2032, with considerable flexibility for a variety of bus carrier operating plans within the Replacement Facility as well as storage and staging space while the SSF is converted into its permanent storage and staging function.

9A.5.3 2040 Analysis Year

For the Proposed Project in 2040, the Replacement Facility would be open and fully operational, while PM peak bus demand is projected to further increase to 907 buses. With four bus levels for commuter services and one for intercity services, along with the North Wing of the Lower Level for select commuter and jitney carriers, the Replacement Facility is assumed to provide approximately 181 bus gates. Two bus levels would accommodate a mix of 40- to 45-foot transit buses and 60-foot articulated buses with 30 gates per level. Two levels would only accommodate 40- to 45-foot buses with 33 gates per level. The intercity bus level would feature 40 bus gates for a mix of arrivals and departures. The Lower Level (North Wing) would include 15 gates for both jitneys and commuter services (arrivals and departures).

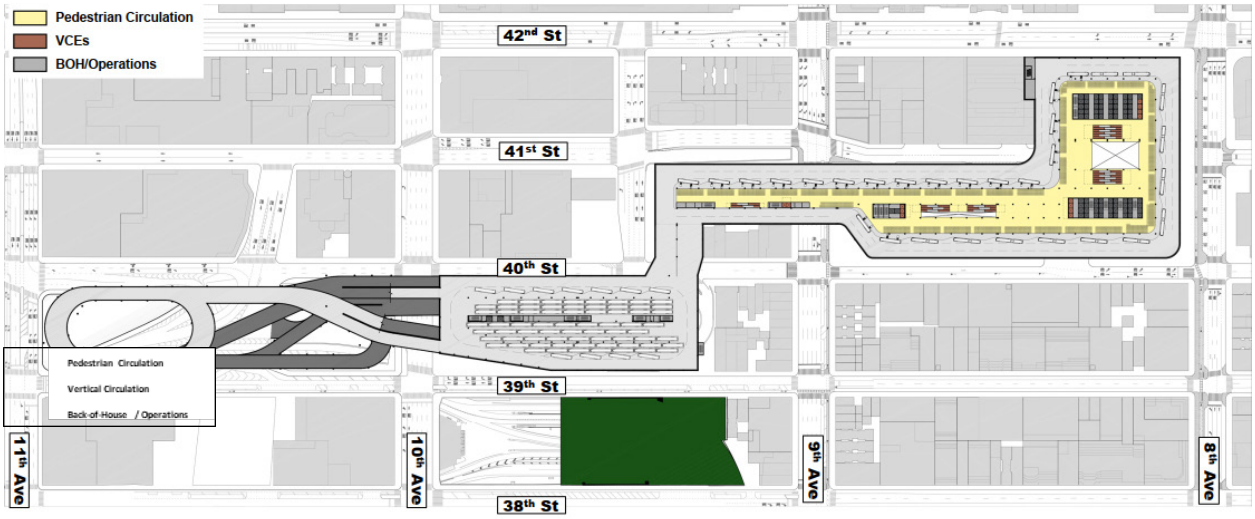
Based on an operational target of six bus departures per hour, per departure gate, and 10 bus arrivals per hour, per gate, on gates designated for arriving buses only, the 181 gates in the Replacement Facility can process an estimated 1,030 buses in the PM peak hour. This capacity continues to exceed the projected 907 bus demand in 2040 with flexibility for a variety of bus carrier operating plans within the Replacement Facility and future demand.

Figure 9A-9. Main Terminal Third and Fourth Level Floor Plan (Commuter, 40- to 45-foot Buses)



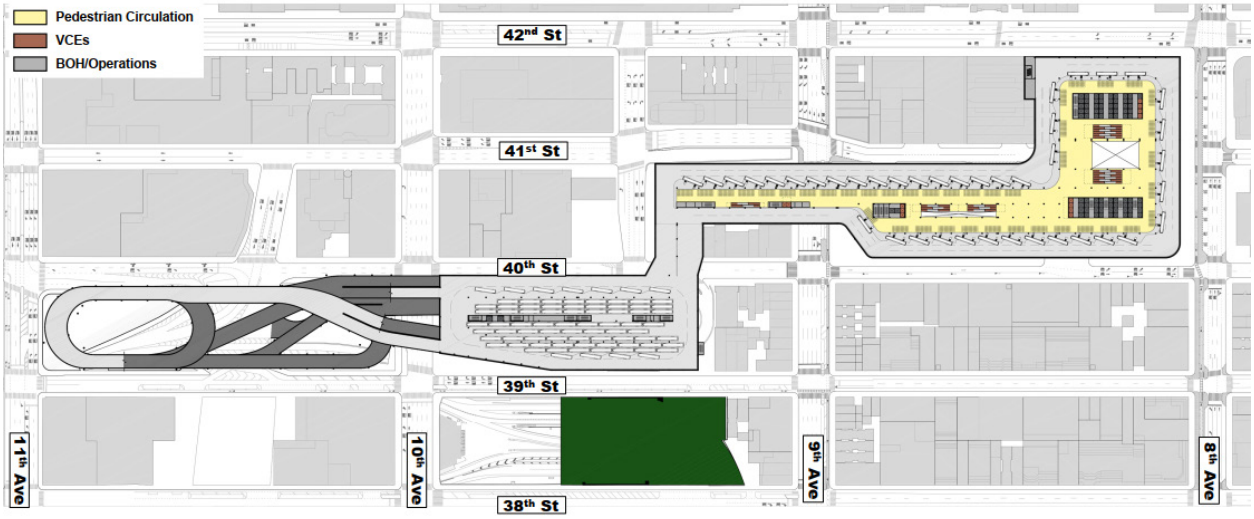
Source: PANYNJ (2023)

Figure 9A-10. Main Terminal Fifth and Sixth Level Floor Plan (Commuter, 40- to 45-foot, and 60-foot Buses)



Source: PANYNJ (2023)

Figure 9A-11. Main Terminal Seventh Level Floor Plan (Intercity)



Source: PANYNJ (2023)

9A.6 COMPARISON AND CONCLUSIONS

There is a material difference between the No Action Alternative and the Proposed Project in terms of the ability to accommodate near-term and future projected bus demand within PANYNJ's facilities.

The No Action Alternative assumes considerable operational constraints during the repair of the existing PABT and a long-term reduction in capacity associated with structural changes and modifications to meet ADA requirements. The result is a large shortfall in the number of buses accommodated within the terminal and an associated potential impact through a combination of peak-hour bus diversions to other facilities and curbside locations within and outside the study area. The shortfall in accommodation would be anticipated to result in significant impacts, including those to traffic and pedestrians within and outside of the study area. However, the extent and location of such impacts is not known at this time.

The Proposed Project offers additional opportunities, including the SSF (operating as a temporary terminal) and the Dyer Deck-Overs to accommodate projected bus demand during construction and, even with conversion of the Deck-Overs to publicly accessible open space, upon completion of the new Main Terminal. The Replacement Facility is expected to provide sufficient capacity to meet projected future demand in 2032 and 2040, as well as operational flexibility to accommodate changing operations of service providers and future demand.