

LGA Airport Access Improvement Project
Purpose and Objectives and
Analysis of Alternatives Report

OCTOBER 2018

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CHAPTER 1

PROJECT PURPOSE AND OBJECTIVES

1.1 INTRODUCTION

The Port Authority of New York and New Jersey (PANYNJ), the operator of LaGuardia Airport (LGA or the Airport) in Queens County, New York, is seeking to improve access to the Airport (see **Figure 1-1**). The PANYNJ is investigating options for a fixed route, off-road transit connection to the region's rail and subway network, which is referred to as the LGA Airport Access Improvement Project or the Project. The proposed Project also includes the provision of employee parking with access to the Airport by way of the new transit service. The PANYNJ may seek to use Passenger Facility Charges (PFCs) to fund the Project and obtain approval from the Federal Aviation Administration (FAA) for a change to the Airport Layout Plan (ALP) to include the new fixed-route transit, its terminal station, and potentially an employee parking lot. The PANYNJ has prepared this document to identify the need for the Project and objectives to guide the development and evaluation of Project alternatives. The PANYNJ requests that FAA consider this document in developing its environmental documentation pursuant to the National Environmental Policy Act of 1969 (NEPA).

This chapter states the purpose of the Project (**Section 1.2**) and describes the context and setting for the Project. It also includes descriptions of LGA's facilities, current operations, and modes of access (**Section 1.3**), and ongoing efforts to redevelop LGA (**Section 1.4**) as well as prior studies for enhanced access to the Airport (**Section 1.5**). **Section 1.6** describes the current need for improved Airport access, which is addressed by the objectives and proposed actions laid out in **Sections 1.7 and 1.8**, respectively. **Section 1.9** describes the anticipated approvals needed for Project implementation.

1.2 PROJECT PURPOSE

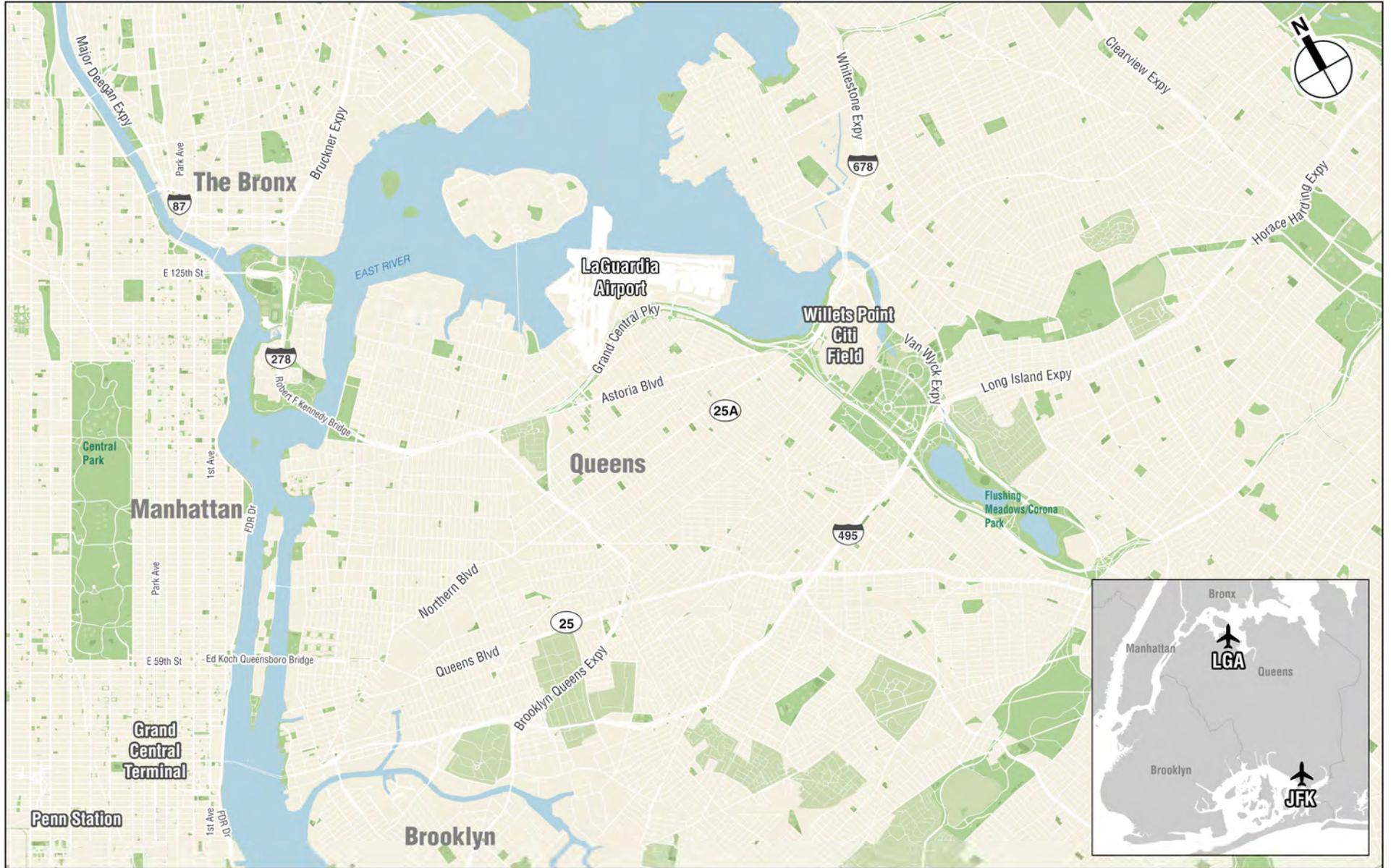
The primary purpose of the LGA Airport Access Improvement Project is to provide convenient, predictable, and reliable access to the Airport for its customers and employees that complements existing mass transit services and does not contribute to roadway congestion. In addition, the proposed Project includes off-Airport employee parking with convenient access by way of the new transportation service to the Airport.

1.3 CURRENT LGA FACILITIES AND ACCESS

This section describes the LGA facilities, recent aviation and passenger activity, and the various transportation modes used and travel options available to access the Airport. This section provides context and background for **Section 1.6**, which describes the constraints and needs associated with Airport access.

1.3.1 FACILITIES

LGA is part of the system of five airports in the New York metropolitan region operated by the PANYNJ. It is located about eight miles east of Midtown Manhattan on the East River and Bowery



and Flushing Bays. In 2017, LGA ranked as the 21st busiest airport in the U.S. and 68th busiest in the world for passenger volume.¹

1.3.1.1 Facility Characteristics

LGA covers 680 acres. The Bowery Bay, East River, and Flushing Bay border the Airport property to the north and east, the Grand Central Parkway (GCP) is to the Airport's south, and 81st and 82nd Streets to the west. LGA has two runways, Runway 04/22 and Runway 13/31. Each is 7,000 feet long and 150 feet wide. LGA has four passenger terminals, known as the Marine Air Terminal (Terminal A), Central Terminal Building (Terminal B, also referred to as the CTB), Terminal C, and Terminal D. The four passenger terminals at LGA provide a combined capacity of 78 gates.

The Airport's internal roadway system that connects the terminals and parking areas consists of two primary roads, LaGuardia Road and Central Terminal Drive, and several secondary roads that provide access to the Marine Air Terminal and Terminal D (including East End Road and Marine Terminal Road). **Figure 1-2** shows the roadway system and facilities.

Passenger drop-off and pick-up at LGA is available using the Airport's internal roadway system. There are cell phone lots/wait areas on the west side of the Airport. LGA has multiple taxi holding areas as well as dedicated pick-up areas for use by For Hire Vehicles (e.g., limousine services, livery cabs, and app-based, on demand services).

The area between the terminals and primary road network (i.e., Central Terminal Drive and LaGuardia Road) contains parking lots and garages that serve Terminals B, C, and D. The area within the loop created by Marine Terminal Drive contains a parking lot that serves Terminal A. There are short-term and daily parking facilities at Terminal A (surface lot) and Terminals B, C, and D (East and West Garages and surface lot). The Airport has approximately 3,500 public parking spaces and the ongoing redevelopment program will add more spaces (discussed in **Section 1.4**). The PANYNJ operates buses that connect all LGA terminals and parking lots.

LGA's rental car facilities are located both on and off the Airport property. Ten rental car companies serve LGA. Two rental car companies are located on the western side of the Airport property. The other companies are located off-site to the west and south of the Airport property. Customers must use one or more shuttle buses to travel between the rental car facilities and the Airport terminals.

1.3.1.2 Airport Operations

In 2017, LGA served 29.6 million passengers with nearly 353,000 commercial flights.² There were 12 major carriers providing domestic and international service at LGA in 2017, with Delta Air Lines, American Airlines, and Southwest Airlines ranking as the three most used, respectively.³

¹ Port Authority of New York and New Jersey. *2017 Airport Traffic Report*. April 2018.

² Total passenger figure includes enplanements and deplanements. Port Authority of New York and New Jersey. *2017 Airport Traffic Report*. April 2018.

³ Port Authority of New York and New Jersey. *2017 Airport Traffic Report*. April 2018. For reporting purposes, the mainline carrier and regional affiliates have been combined such that Delta Air Lines and American Airlines include their regional operators and subsidiaries. The airline count also includes Miami Air International, which is a commercial charter airline.



Notes: Existing LaGuardia Airport Roadway Network and Terminal Configuration as of March 13, 2018.

LGA's air traffic is predominantly domestic. In 2017, about 83.4 percent of passengers traveled domestically, while about 16.6 percent traveled to Canada, Bermuda, and the Caribbean.⁴ Domestic travelers include those who travel to another U.S. airport to connect to an international flight.

Since 1968, FAA has imposed operational limits, or slot controls, at LGA. As a way to avoid extreme congestion at the Airport, FAA issued an order placing an hourly limitation on the number of takeoffs and landings (operations) for most of the week (Monday through Friday, 6 AM to 9:59 PM, and Sunday from 12 PM to 9:59 PM). FAA recently extended the order, limiting operations at LGA through October 27, 2018.⁵

To combat overcrowding at LGA, the PANYNJ instituted a Sunday-through-Friday "Perimeter Rule" in 1984 that prohibits non-stop flights from LGA to cities more than 1,500 statute miles away, with the exception of flights to Denver, Colorado.⁶ Due to its limited amount of property, including airfield space and a busy flight schedule, LGA must operate efficiently to move aircraft between gates and runways as well as around the airfield.

1.3.2 AIRPORT ACCESS

Today, access to LGA is by roadway only, with both private vehicle (including For Hire Vehicles) and public transit options to reach the Airport. Presently, 87.1 percent of passengers travel to the Airport by automobile (personal vehicle, For Hire Vehicle, rental car, and taxi), 6.2 percent by public bus, and 5.6 percent by shuttle bus (see **Table 1-2** in **Section 1.3.4** below).

The GCP provides direct highway access to LGA (see **Figure 1-1**). It runs east and west between the Robert F. Kennedy (RFK) Bridge (which connects to Manhattan and the Bronx) and the Queens and Nassau County border, where it continues into Nassau County as the Northern State Parkway. Vehicles can access the Marine Air Terminal (Terminal A) using GCP Interchange 5 and Terminals B, C, and D using GCP Interchanges 6 and 7. In Queens, the GCP has connections with several of the region's highways, including the Brooklyn-Queens Expressway/I-278, the Long Island Expressway/I-495, the Whitestone and Van Wyck Expressway/I-678, and the Clearview Expressway/I-295. The New York City and New York State Departments of Transportation (NYCDOT and NYSDOT) restrict certain commercial vehicles from using the GCP. Buses may use the GCP only with consent. Vehicles may also access the Airport via 82nd, 94th, and 102nd Streets.

The Metropolitan Transportation Authority (MTA) New York City Transit (NYCT) and MTA Bus Company operate five bus routes to and from LGA (see **Figure 1-3**).

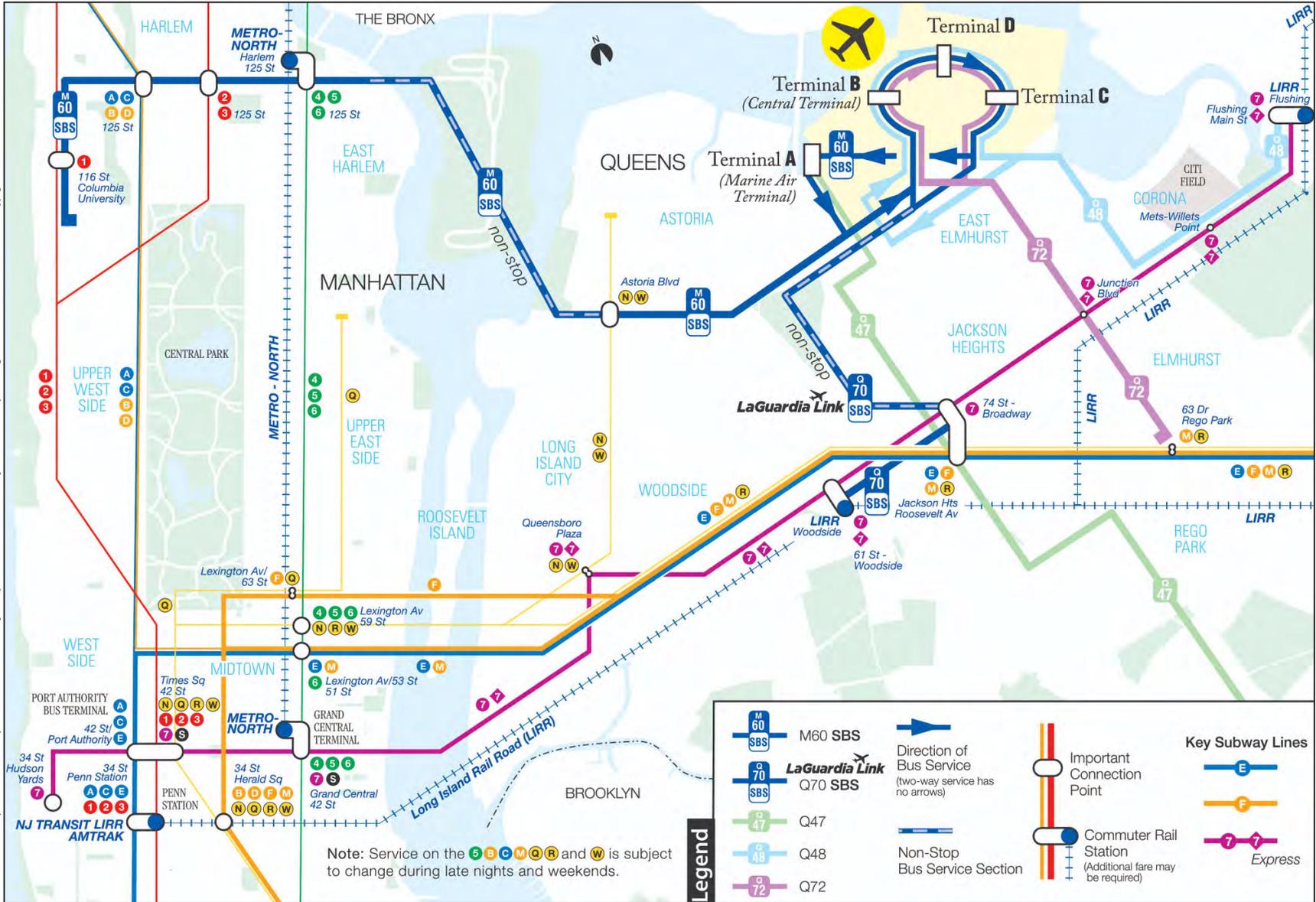
- The M60 Select Bus Service (SBS) operates between LGA and 106th Street and Broadway in Manhattan via Astoria Boulevard, the RFK Bridge, and 125th Street. It connects with subway stations in Queens at Astoria Boulevard and 31st Street (N,W Lines), and in

⁴ Port Authority of New York and New Jersey. *2017 Airport Traffic Report*. April 2018.

⁵ The FAA may impose slot coordination or schedule facilitation with carriers at constrained airports to improve or make more efficient use of the airspace consistent with the FAA's authority in 49 U.S.C. § 40103(b). Federal Aviation Administration. www.faa.gov. Accessed April 5, 2018.

⁶ Flights to Denver International Airport (DEN) are exempt from this rule because when the Perimeter Rule was established, Denver was the only city more than 1,500 miles away served by nonstop flights to and from LGA on weekdays.

Source: Metropolitan Transportation Authority <http://web.mta.info/nyct/service/pdf/la Guardia-November-2017.jpg>



Note: The locations of the terminals represent the route that buses take on-Airport, which is to stop at Terminal B, Terminal D, and Terminal C, respectively. This routing follows the design of the Airport's roadway network as shown in Figure 1-2.

Manhattan at 125th Street and Lexington Avenue (4,5,6 Lines), 125th Street and Lenox Avenue (2,3 Lines), 125th Street and Saint Nicholas Avenue (A,B,C,D Lines), and 116th Street and Broadway (1 Line). Customers may also connect to Metro-North Railroad at 125th Street and Park Avenue in Manhattan. NYCT recommends the M60 for customers traveling to or from Upper Manhattan, the Bronx, and Metro-North Railroad.

- The Q47 operates along several local streets on its route between Cooper Avenue and 81st Street in Glendale, Queens and the Marine Air Terminal (Terminal A). It primarily serves as a local bus route for customers in Glendale, Elmhurst, Jackson Heights, and East Elmhurst, in Queens. The Q47 provides a transfer to subway service at the 74th Street (7 Line)/Jackson Heights-Roosevelt Avenue (E,F,M,R Lines) subway station. NYCT recommends the Q47 for customers traveling to the Marine Air Terminal.
- The Q48 operates along Roosevelt Avenue and 108th Street between the Flushing-Main Street (7 Line) subway station in Queens and LGA. Customers may also transfer to the Long Island Rail Road (LIRR) Port Washington Branch at the LIRR Willets Point Station, but this station is only open when there are events at Citi Field (home of the New York Mets) or the U.S. Tennis Center. NYCT recommends the Q48 for customers traveling to or from Flushing and Corona.
- The Q70 Select Bus Service (SBS), also known as the LaGuardia Link, operates between LGA and the 61 Street-Woodside (7 Line) subway station/LIRR Woodside Station in Queens with an intermediate stop at the 74th Street (7 Line)/Jackson Heights-Roosevelt Avenue (E,F,M,R Lines) subway station. NYCT recommends the Q70 for customers traveling to or from Lower Manhattan, Midtown Manhattan, Brooklyn, Queens (except Astoria, Elmhurst, Rego Park, Corona, and Flushing), and LIRR.
- The Q72 operates along Junction Boulevard between LGA and Queens Boulevard at 63rd Drive in Queens. It serves as a local route for the Junction Boulevard commercial corridor and serves residents of Corona, Elmhurst, East Elmhurst, and Rego Park. The Q72 provides connections to the Junction Boulevard (7 Line) subway station and the 63rd Drive-Rego Park (M,R Lines) subway station.

The M60 SBS serves all LGA terminals (Marine Air Terminal, B, C, and D). The Q47 serves only the Marine Air Terminal. The Q48, Q70 SBS, and Q72 serve Terminals B, C, and D, and do not serve the Marine Air Terminal.

New York Airporter (recently renamed NYC Express Bus) is a private company that operates fixed-route services from Grand Central Terminal and the Port Authority Bus Terminal in Midtown Manhattan to LGA. New York Airporter also provides a van service to transport customers from the major stops to their hotel. New York Airporter also provides bus and van service between LGA and Newark Liberty International Airport (EWR) and John F. Kennedy International Airport (JFK).

There are also shared-ride and van services that provide door-to-door service (e.g., Super Shuttle and Airlink New York) between the Airport, hotels, and transportations hubs. Customers arrange for these services directly with the operators.

1.3.3 PASSENGER CHARACTERISTICS AND TRAVEL PATTERNS

In 2017, LGA served an estimated 29.6 million passengers. Most air passengers are beginning or ending their trip at LGA (85.8 percent), with only 14.2 percent connecting between flights.⁷

Table 1-1 and **Figures 1-4 and 1-5** show the local origins and destinations for LGA passengers. Approximately 77 percent of LGA passengers are arriving at the Airport from New York City or leaving the Airport for destinations within New York City. Of these 77 percent of customers, 48.6 percent are traveling to or from Manhattan, 10.4 percent to or from Brooklyn, 11.6 percent to or from Queens, 5.6 percent to or from the Bronx, and 1.0 percent to or from Staten Island. For Manhattan origins and destinations, Midtown (Manhattan between 23rd and 60th Streets) represents the largest share of passengers (26.3 percent). Lower Manhattan (below 23rd Street) is the origin or destination for about 8.9 percent of passengers, and Upper Manhattan (above 60th Street) is the origin or destination for about 13.4 percent.⁸

Figure 1-6 shows the purpose for passenger trips to or from LGA and the residency of LGA passengers. About 71 percent of trips are for personal or leisure purposes and 29 percent are business trips. As shown, an estimated 67 percent of LGA passengers were visitors to New York City and 33 percent were residents.⁹

Table 1-2 and **Figure 1-7** show the local mode of travel to and from LGA. As shown, 87.1 percent of passengers arrive by vehicle (private vehicle, rental car, taxi/For Hire Vehicle), 5.6 percent arrive by shuttle bus/van (shared ride services and hotel shuttles), and 6.2 percent arrive by public transportation. Overall, 98.9 percent of passengers rely on some form of roadway-based transportation.

1.3.4 EMPLOYEE CHARACTERISTICS AND TRAVEL PATTERNS

In 2017, 12,870 staff worked at LGA.^{10,11} **Table 1-3** and **Figure 1-8** show the local origins of LGA employees. The largest portion of employees commute to work from Queens (47.2 percent). **Table 1-3** demonstrates that 78.8 percent of employees travel between the Airport and the boroughs of New York City, primarily Queens and Brooklyn.

⁷ Port Authority of New York and New Jersey. *2017 Airport Traffic Report*. April 2018.

⁸ Port Authority of New York and New Jersey. LGA Ground Access Survey 2017, weighted using Customer Satisfaction Survey data from 2014-2016.

⁹ Port Authority of New York and New Jersey. LGA Ground Access Survey 2017, weighted using Customer Satisfaction Survey data from 2014-2016.

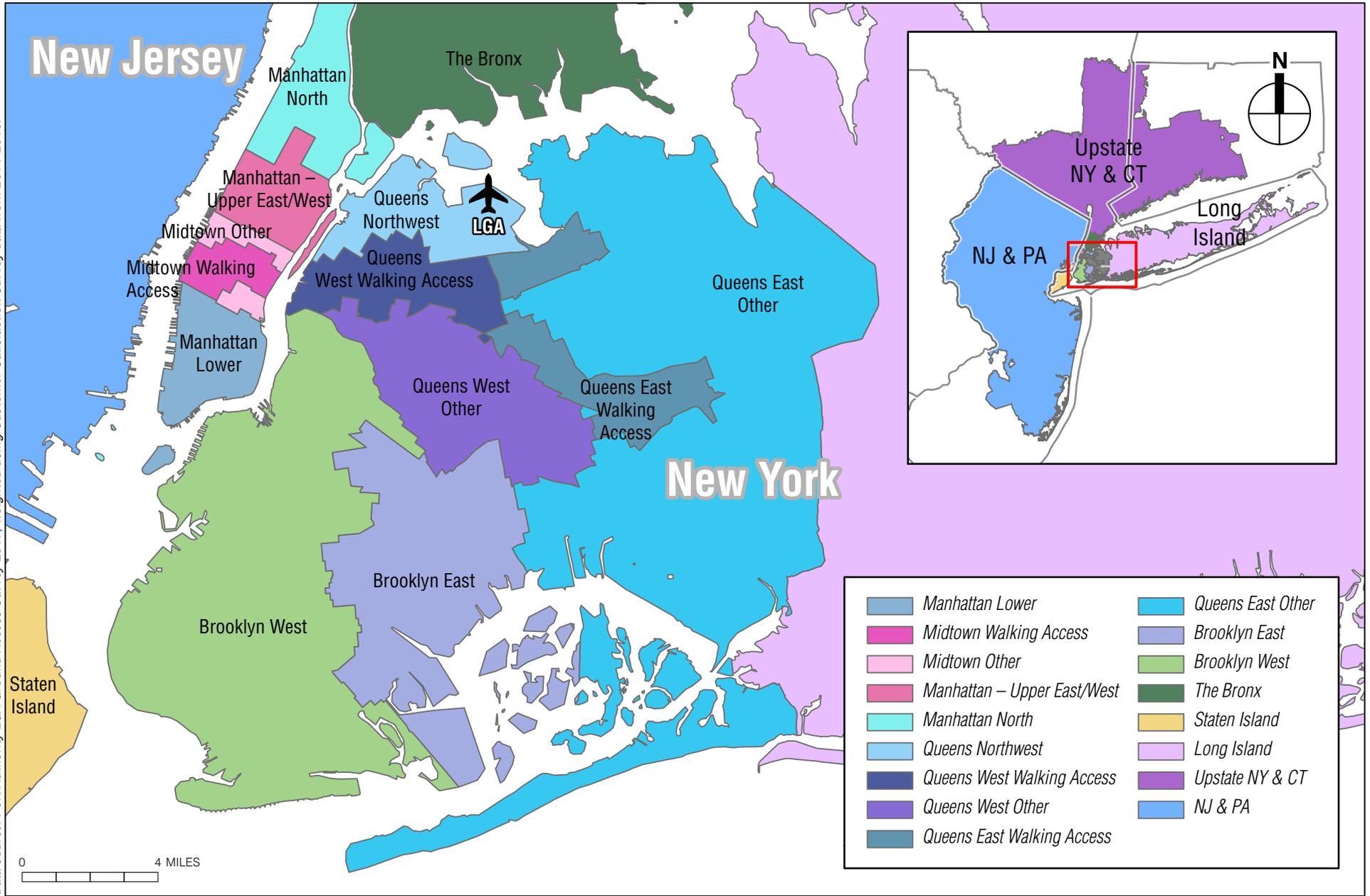
¹⁰ Port Authority of New York and New Jersey. *2017 Airport Traffic Report*. April 2018.

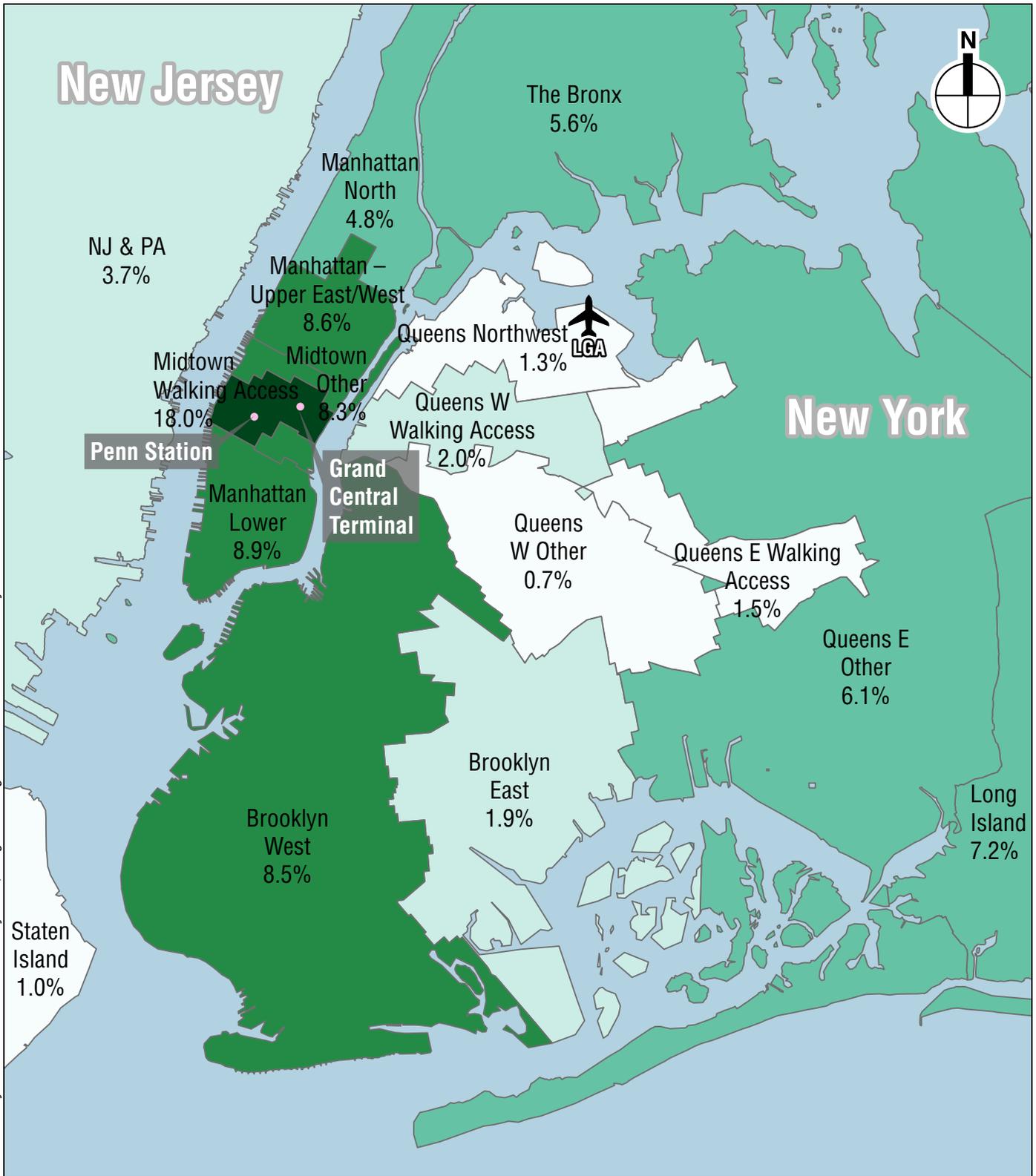
¹¹ Employee totals account for those individuals who are required to have airport security badges.

Table 1-1
Trip Origin/Destination of LGA Passengers

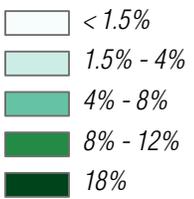
Origin / Destination	Percent	Notes
New York City	77.2%	
Manhattan	48.6%	
Manhattan Lower	8.9%	Below 23rd Street
Manhattan Midtown	26.3%	Between 23rd and 60th Streets
Midtown Walking Access	18.0%	Within 0.5 mile of Grand Central Terminal, Penn Station, or any 7 Line subway station
Midtown Other	8.3%	
Manhattan – Upper East/West	8.6%	Between 60th and 96th Streets
Manhattan North	4.8%	Above 96th Street
Queens	11.6%	
Queens Northwest	1.3%	
Queens West	2.7%	
Queens W Walking Access	2.0%	Within 0.5 mile of any LIRR station or 7 Line subway station
Queens W Other	0.7%	
Queens East	7.6%	
Queens E Walking Access	1.5%	Within 0.5 mile of any subway station
Queens E Other	6.1%	
Brooklyn	10.4%	
Brooklyn West	8.5%	
Brooklyn East	1.9%	
Staten Island	1.0%	
The Bronx	5.6%	
Long Island	7.2%	Nassau and Suffolk Counties
Other New York State / Connecticut	11.8%	
New Jersey and Pennsylvania	3.7%	
Source: Port Authority of New York and New Jersey. LGA Ground Access Survey 2017, weighted using Customer Satisfaction Survey data from 2014-2016. Refer to <i>AirTrain LGA: LGA Ground Access Mode Choice Model and AirTrain Ridership Forecast 2025-2045</i> , which provides more detail regarding the projected travel times for more information.		

Data source: Port Authority LGA Ground Access Survey 2017, weighted using Customer Satisfaction Survey data from 2014-2016.



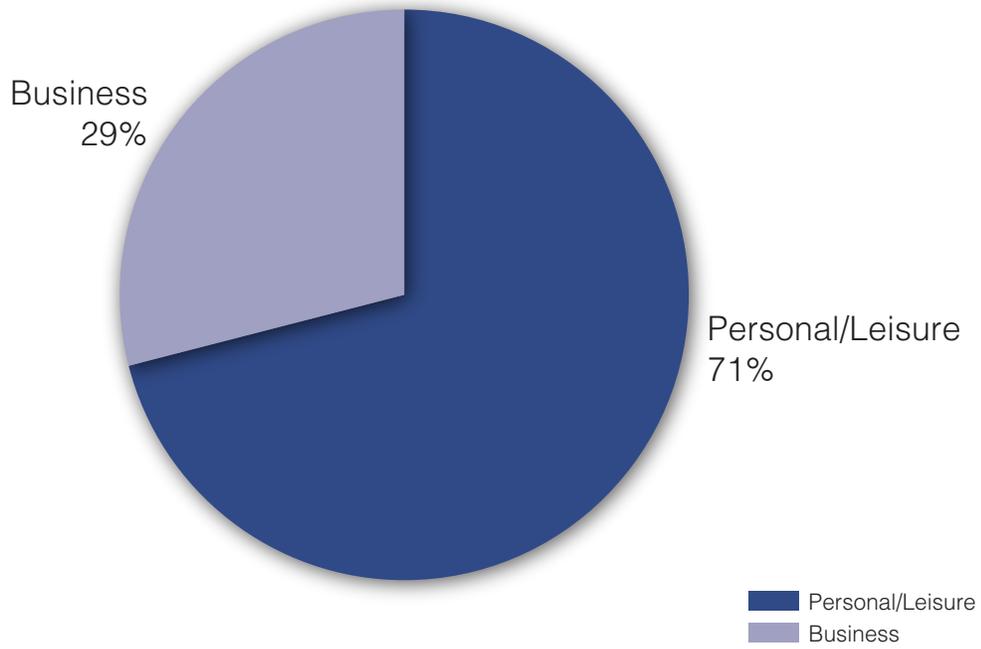


Passenger Share, by Percentage



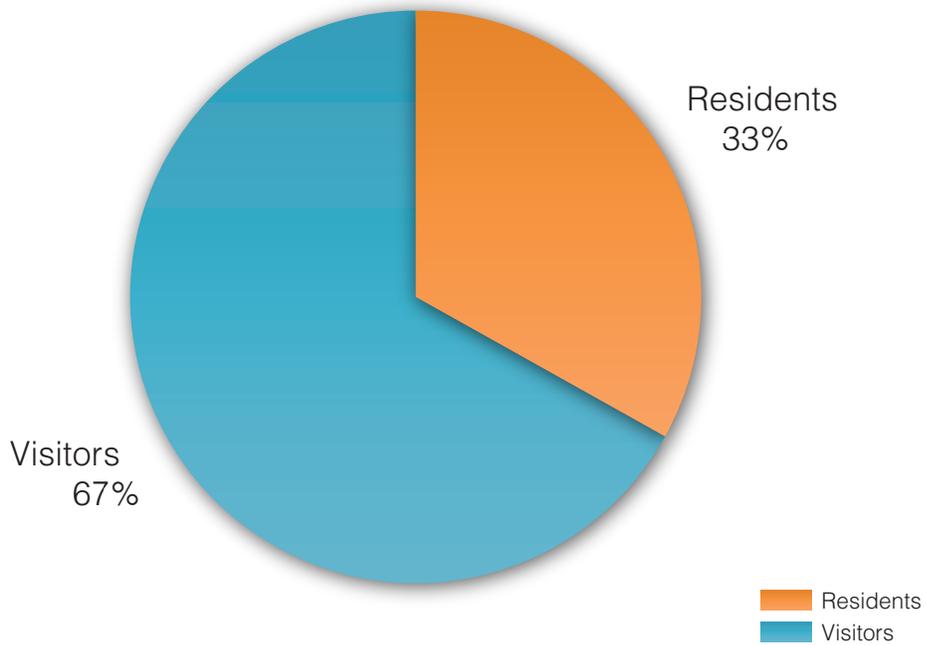
LaGuardia Airport Passenger Share by Trip Origin/Destination **Figure 1-5**

Source: Port Authority LGA Ground Access Survey 2017, weighted using Customer Satisfaction Survey data from 2014-2016.



Trip Purpose

Source: Port Authority LGA Ground Access Survey 2017, weighted using Customer Satisfaction Survey data from 2014-2016.



Residency of LaGuardia Airport Passengers

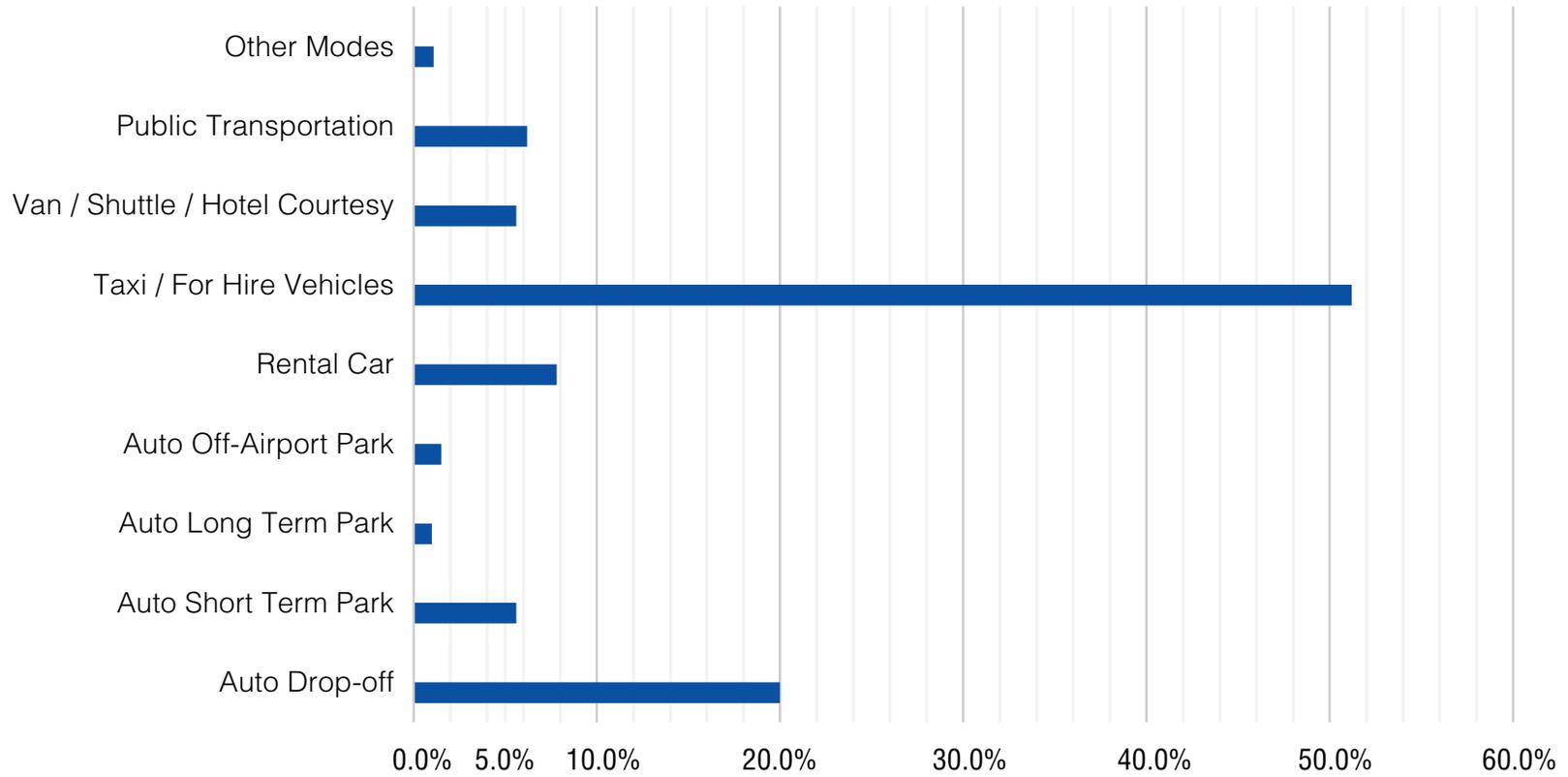
LaGuardia Passengers
Trip Purpose and Residency

Figure 1-6

Table 1-2
Mode of Travel of LGA Passengers

Mode	Percent
Private automobile and self-park	8.1%
Short-term parking	5.6%
Long-term parking	1.0%
Off-Airport parking	1.5%
Dropped off or picked up by family or friend	20.0%
Rental car	7.8%
Taxi/For Hire Vehicles	51.2%
Public transportation	6.2%
Shared ride service (van, shuttle, hotel courtesy)	5.6%
Other modes	1.1%
<p>Source: Port Authority of New York and New Jersey, LGA Ground Access Survey 2017, weighted using Customer Satisfaction Survey data from 2014-2016. Refer to <i>AirTrain LGA: LGA Ground Access Mode Choice Model and AirTrain Ridership Forecast 2025-2045</i>, which provides more detail regarding the projected travel times for more information.</p>	

Source: Port Authority LGA Ground Access Survey 2017, weighted using Customer Satisfaction Survey data from 2014-2016.

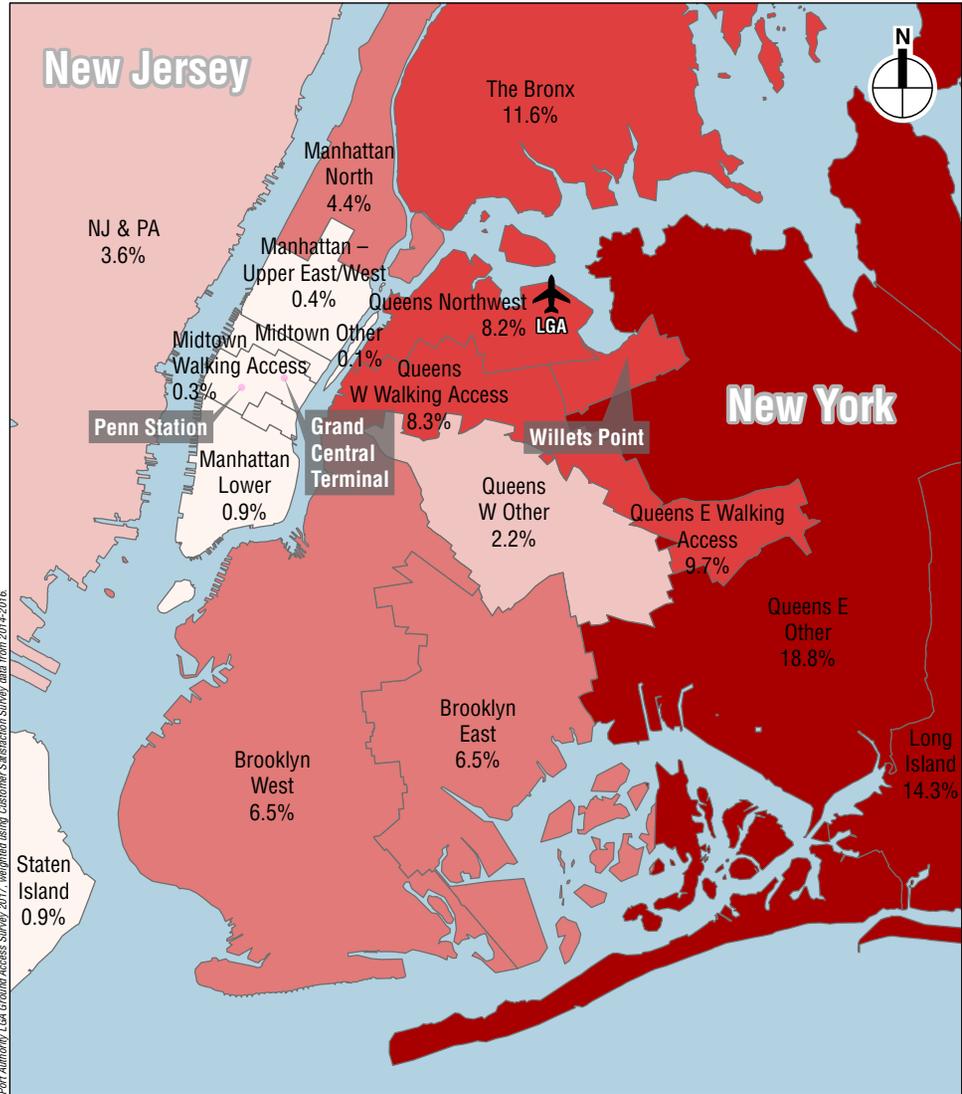


Mode of Travel for Passengers to and from LaGuardia Airport

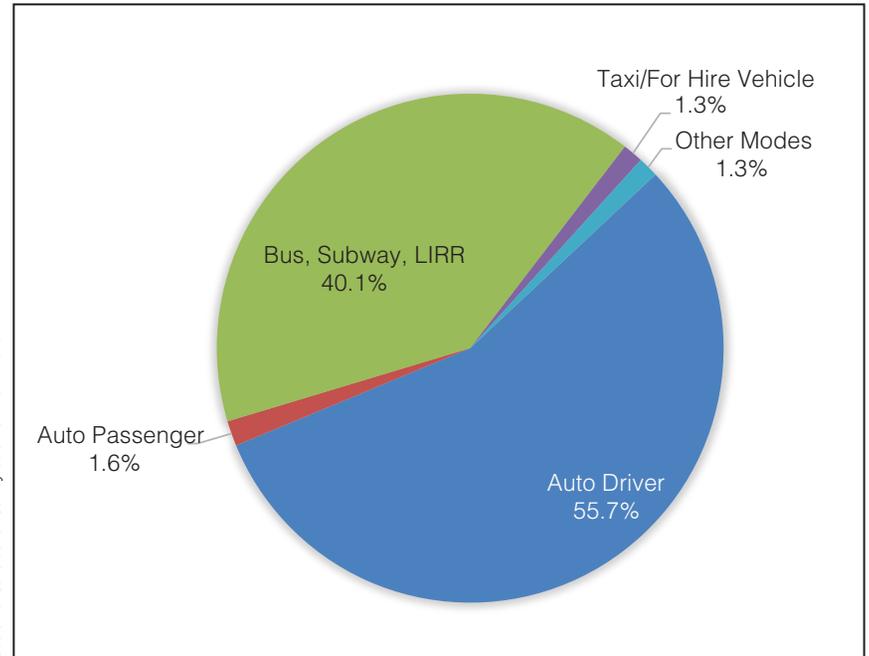
Figure 1-7

Table 1-3
Trip Origin/Destination of LGA Employees

Origin / Destination	Percent	Notes
New York City	78.8%	
Manhattan	6.1%	
Manhattan Lower	0.9%	Below 23rd Street
Manhattan Midtown	0.4%	Between 23rd and 60th Streets
Midtown Walking Access	0.3%	Within 0.5 mile of Grand Central Terminal, Penn Station, or any 7 Line subway station
Midtown Other	0.1%	
Manhattan – Upper East/West	0.4%	Between 60th and 96th Streets
Manhattan North	4.4%	Above 96th Street
Queens	47.2%	
Queens Northwest	8.2%	
Queens West	10.5%	
Queens W Walking Access	8.3%	
Queens W Other	2.2%	Within 0.5 mile of any LIRR station or 7 Line subway station
Queens East	28.5%	
Queens E Walking Access	9.7%	
Queens E Other	18.8%	Within 0.5 mile of any subway station
Brooklyn	13.0%	
Brooklyn West	6.5%	
Brooklyn East	6.5%	
Staten Island	0.9%	
The Bronx	11.6%	
Long Island	14.3%	Nassau and Suffolk Counties
Other New York State / Connecticut	3.3%	
New Jersey and Pennsylvania	3.6%	
<p>Source: Port Authority of New York and New Jersey. LGA Ground Access Survey 2017, weighted using Customer Satisfaction Survey data from 2014-2016. Refer to <i>AirTrain LGA: LGA Ground Access Mode Choice Model and AirTrain Ridership Forecast 2025-2045</i>, which provides more detail regarding the projected travel times for more information.</p>		



Source: Port Authority LGA Ground Access Survey 2017, weighted using Customer Satisfaction Survey data from 2014-2016.



LaGuardia Airport Employee Share by Trip Origin/Destination and Mode of Travel
Figure 1-8

Table 1-4 and **Figure 1-8** show the local mode of transportation that employees use for their commutes.¹² The majority (55.7 percent) of Airport employees drive themselves to work, and the PANYNJ provides 1,500 parking spaces at LGA for Airport employees. About 40 percent of employees commute by transit. Employees who live in East Elmhurst, Jackson Heights, Woodside, Rego Park, Corona, or Flushing can reach the Airport with a single bus route. Other employees use a combination of bus routes or travel by LIRR or subway with a bus connection to reach the Airport. The remaining 4.2 percent of employees are dropped off at the Airport or commute by another mode (e.g., bicycle or walk).

Table 1-4
Ground Access Mode of Travel of LGA Employees

Mode of Transportation to LGA	Employees
Auto driver	55.7%
Auto passenger	1.6%
Bus, subway, LIRR	40.1%
Taxi/For Hire Vehicles	1.3%
Other modes	1.3%
Source: Port Authority of New York and New Jersey. LGA Ground Access Survey 2017, weighted using Customer Satisfaction Survey data from 2014-2016. Refer to <i>AirTrain LGA: LGA Ground Access Mode Choice Model and AirTrain Ridership Forecast 2025-2045</i> , which provides more detail regarding the projected travel times for more information.	

1.4 LGA REDEVELOPMENT PROGRAM

The PANYNJ is currently undertaking a major redevelopment of LGA, to reorganize and upgrade the terminals, roadways, parking areas, and airside areas to allow more efficient airline and passenger operations, accommodate future growth, and provide improved level of service.

In 2015, New York Governor Andrew Cuomo announced the recommendations of an advisory panel to address the deficiencies of LGA as a major transportation facility. Supporting the need for the LGA Redevelopment Program and other improvements at the Airport, a report prepared by New York State Governor Cuomo’s Airport Advisory Panel in July 2015, *A 21st Century Airport for the State of New York: The New LaGuardia, Guiding Principles for a Comprehensive Airport Master Plan* (the Report to the Governor) called for modernizing and revitalizing LGA for the 21st century.¹³ The Report to the Governor recommended improvements on-Airport that include the changes to redevelop Terminals B, C, and D to create a unified Airport terminal; shifting the terminals closer to the GCP to create additional taxiway space; improving the architectural and aesthetic qualities of the Airport; implementing a rail connection to the Airport; improving

¹² Port Authority of New York and New Jersey. LGA Ground Access Survey 2017, weighted using Customer Satisfaction Survey data from 2014-2016.

¹³ Tishman, Dan et al. “A 21st Century Airport for the State of New York: The New LaGuardia, Guiding Principles for a Comprehensive Airport Master Plan.” Report by the Governor’s Airport Advisory Panel. July 27, 2015. www.governor.ny.gov/sites/governor.ny.gov/files/atoms/files/Airport_Advisory_Panel_Final_Report_LGA.pdf. Accessed April 4, 2018.

customer parking capacity to limit the amount of Airport-related parking that occurs in surrounding neighborhoods; and creating a consolidated rental car facility at or near the Airport.

These recommendations addressed distinct aspirations, each with its own independent purpose, functionality, and timeframe. Moreover, each would accomplish stand-alone benefits whether or not the others moved forward. As described below, some of these recommendations are already complete, and others are underway.

The redevelopment allows the Airport to continue to serve air travelers into the future. The recommendations of the advisory panel include the following major elements:

- Construction of a new substation and East Garage immediately in front of the existing Terminal C (complete)
- Demolition of Hangars 1, 2, and 4 (complete for Hangars 2 and 4; planned for Hangar 1)
- Replacement of the P2 parking garage with a new West Garage (complete)
- Reconstruction of the Central Terminal Building (Terminal B) to include a headhouse and two island concourses (under way)¹⁴
- Consolidation of Terminals C and D into a new East Terminal (Terminal C) with a headhouse and four concourses (under way)¹⁵
- Expansion of the East Garage (planned)
- Reconfigured on-Airport roadway systems serving both new terminals (under way)

Parking for the reconfigured Terminals B and C will be at the West and East Garages. The on-Airport roadways serving the central and east terminal areas are being reconfigured to integrate with the redeveloped Terminals B and C. Construction of the planned and approved elements have staggered start and completion dates. Construction of Terminal B (the former Central Terminal Building) will end in 2022. The new Terminal C (the combined Terminals C and D) will be completed in phases with two new concourses opening in 2021 and full completion in 2026. The terminal and roadway redevelopment projects included in this program have been the subjects of environmental analyses, and construction is currently under way.

Several potential components of the program, such as a hotel, consolidated rental car facility, and ferry terminal on the west side of the Airport near Terminal A are under consideration by the PANYNJ; however, planning has not advanced past the preliminary stage nor has funding been identified. If any of these components become ripe for decision, it would be subject to its own appropriate NEPA review that would consider the cumulative impacts of that component and any concurrent project.

¹⁴ Also referred to as "The Central Terminal Building Redevelopment Program at LaGuardia Airport" for its environmental review document. Refer to: U.S. Department of Transportation, Federal Aviation Administration. "Written Reevaluation and Record of Decision for the Environmental Assessment for the Central Terminal Redevelopment Program at LaGuardia Airport." December 2015.

¹⁵ Also referred to as "East Side Reconfiguration at LaGuardia Airport" for its environmental review document. Refer to: U.S. Department of Transportation, Federal Aviation Administration. *Final Environmental Assessment: East Side Reconfiguration at LaGuardia Airport*. May 2017.

1.5 RECENT STUDIES TO IMPROVE TRANSIT ACCESS TO LGA

Over the past 30 years, there have been multiple studies to improve transit access to LGA. In the early 1990s, FAA and the PANYNJ studied a new transit link with service between Midtown Manhattan, LGA, and JFK. That proposed project, the Airport Access Program, consisted of an automated guideway transit line that would have begun at an underground station near East 59th Street and Lexington Avenue. Trains would travel across the lower, outer roadways of the Queensboro Bridge and would use a combination of railroad and highway right-of-way through western Queens to LGA. Trains would stop at LGA and then travel via the GCP and Van Wyck Expressway to JFK Airport. In addition to LGA, JFK, and 59th Street, there would have been stops at Queens Plaza in Long Island City, Willets Point, Jamaica Station, and Howard Beach, Queens.^{16,17} A Draft Environmental Impact Statement (DEIS) was prepared for the Airport Access Program in accordance with NEPA in 1994, with the PANYNJ as local sponsor, FAA as lead federal agency, and NYSDOT as joint lead agency. After publication of the DEIS, the PANYNJ concluded that due to issues raised during the NEPA review process as well as financial constraints, construction of the entire proposed project was infeasible. The PANYNJ then proposed to build only the portion of the project connecting JFK to the LIRR and subway system at Jamaica Station and the Howard Beach (A Line) subway station. This project, the AirTrain JFK, was completed in 2003.

In 1998, MTA initiated the LaGuardia Airport Subway Access (LASA) Study, which considered 19 transit alternatives for access to LGA, including subway extensions of the 7, N, R, and E Lines as well as LIRR spurs from the Port Washington Branch at Willets Point and from the Main Line at Sunnyside and Woodside. The LASA Study also evaluated new "people mover" alternatives and a bus transit alternative. However, major obstacles arose during this study, including concern over community impacts and challenges in integrating subway service that would be compatible with both NYCT system operating requirements and on-Airport constraints. Efforts to resolve these issues were terminated after the 9/11 terrorists' attacks at the World Trade Center, which focused the attention and resources of the City of New York, the MTA, and the PANYNJ on the Lower Manhattan recovery and redevelopment. Therefore, the LASA Study was discontinued without confirming a constructible or operable alternative.¹⁸

Between 2011 and 2014, NYCDOT, in collaboration with NYCT and the PANYNJ, prepared the LaGuardia Airport Access Alternatives Analysis, which examined options to improve transit access to LGA in the near term. The study considered various modes, markets (logical termini), and alignments for direct connections between major transportation hubs and the terminals. The NYCDOT study only examined options that were implementable in the near term and with costs that fell within the capital funding available at that time.

The NYCDOT study considered eight modal alternatives. The study concluded that the Transportation System Management (TSM) and Bus Rapid Transit (BRT) alternatives would meet that study's goals and objectives. NYCDOT found that ferry service was a viable option from some

¹⁶ Herszenhorn, David M. (August 20, 1995). "Neighborhood Report: Howard Beach: Rethinking Plans for Those Trains to the Planes." *The New York Times*. August 20, 1995. Accessed April 4, 2018.

¹⁷ Dao, James. "Dream Train to Airports Takes Step Nearer Reality." *The New York Times*. December 21, 1992. Accessed April 4, 2018.

¹⁸ Metropolitan Transportation Authority.

perspectives, but NYCDOT dismissed it because it could not directly serve regional transportation hubs. NYCDOT's study found the streetcar, light rail, automated guideway transit, and heavy rail alternatives were inconsistent with its goals and objectives because their implementation would not meet NYCDOT's timeframe and adequate funding for these modes was not available at that time.

The NYCDOT study examined 42 different alignments for new or enhanced bus service using an alternatives evaluation process. Among the recommended routes/alignments for new or enhanced bus service were Harlem/Northern Queens Corridor and Woodside, Queens (via Highway) Corridor.¹⁹

Before the study was completed, NYCT implemented new service between Woodside and Jackson Heights, Queens and LGA. In 2013, NYCT and MTA Bus reconfigured the Q33 route, which was a local service between 74th Street (7 Line)/Jackson Heights-Roosevelt Avenue (E,F,M,R Lines) subway station and the Airport. NYCT shortened the Q33 route to end just outside the Airport property, and NYCT created a new Q70 SBS (LaGuardia Link) route to serve the Airport (see **Section 1.3.2**). The Q70 is an express route that operates between Woodside and Jackson Heights and Terminals B, C, and D. Between Jackson Heights and LGA, the Q70 travels via the Brooklyn-Queens Expressway (BQE) and GCP. Recently, NYCT implemented off-board fare collection, purchased new buses, and rebranded the route as LaGuardia Link.

Following the study, NYCT converted the M60 bus from a local route to an SBS route in 2014. To create the SBS route, NYCT eliminated or combined stops, implemented off-board fare collection, and purchased new, larger buses with luggage racks. **Section 1.3.2** describes the M60 route.

There has been ferry service to LGA in the past. Most recently, Delta Airlines operated a ferry service between Lower Manhattan and the Marine Air Terminal between 1988 and 2000, which catered to Delta passengers using Terminal A, but it was not well used. In 2013, the New York City Economic Development Corporation (NYCEDC) prepared its Citywide Ferry Study, which concluded, "Ferry service to LaGuardia Airport holds considerable promise, offering travelers reliable and convenient access, particularly during peak periods."²⁰ The study considered several alternatives with regard to service frequency and landing sites. **Chapter 2, "Project Alternatives,"** describes a potential ferry service for the LGA Access Improvement Project based on the information presented in the Citywide Ferry Study.

The results of these studies, however, have not obviated the need for improved access to LGA. The 2015 Report to the Governor highlighted that LGA is the only major airport in the New York City region that is not accessible by a high-capacity transit service on dedicated right-of-way and

¹⁹ New York City Department of Transportation, "LaGuardia Airport Access Alternatives Analysis Report." January 2014.

²⁰ New York City Economic Development Corporation, "Citywide Ferry Study Final Report." 2013. https://www.nycedc.com/sites/default/files/filemanager/Resources/Studies/2013_Citywide_Ferry_Study/Citywide_Ferry_Study_-_Final_Report.pdf

recommended further evaluation and planning to determine the best method and route for introducing transit service between LGA and Willets Point.²¹

1.6 THE NEED FOR THE PROJECT

The LGA Airport Access Improvement Project is intended to address four identified needs for improved non-road, transit access to LGA: (1) the need for convenient access to New York City origins and destinations, which accounts for more than 75 percent of LGA air passengers (non-connecting) and employees (2) the need for shorter and more reliable travel times to and from the Airport; (3) the need for redundant access; and (4) the need to accommodate provision of an off-Airport parking site for employees.

1.6.1 THE NEED FOR CONVENIENT ACCESS TO NEW YORK CITY

Combined, the three primary New York area airports (LGA, JFK, and EWR) served about 132.1 million passengers in 2017.²² The Report to the Governor highlights the need for the region's airports to serve as modern access points to New York City. The report states:

The Empire State is often defined by its rich history of construction, and the infrastructure built in the last century has served as a foundation for the success that New York enjoys today. . . New York's airports, particularly LaGuardia and John F. Kennedy International Airport ("JFK"), are no exception. Both airports play a critical role for the State of New York, but these facilities are unable to meet the demands of today, much less the needs of the future. . . In order for New York and the region to remain competitive, we must rebuild and revitalize these critical international gateways for the 21st century economy.²³

The existing fixed rail connections to JFK and EWR are very successful. The AirTrain JFK served 20.3 million passengers, of whom 7.7 million were fare-paying riders in 2017. The EWR AirTrain

²¹ Tishman, Dan et al. "A 21st Century Airport for the State of New York: The New LaGuardia, Guiding Principles for a Comprehensive Airport Master Plan." Report by the Governor's Airport Advisory Panel. July 27, 2015.
www.governor.ny.gov/sites/governor.ny.gov/files/atoms/files/Airport_Advisory_Panel_Final_Report_LGA.pdf. Accessed April 4, 2018.

²² Port Authority of New York and New Jersey. 2017 *Airport Traffic Report*. April 2018.

²³ Tishman, Dan et al. "A 21st Century Airport for the State of New York: The New LaGuardia, Guiding Principles for a Comprehensive Airport Master Plan." Report by the Governor's Airport Advisory Panel. July 27, 2015. p. 3.
www.governor.ny.gov/sites/governor.ny.gov/files/atoms/files/Airport_Advisory_Panel_Final_Report_LGA.pdf. Accessed April 4, 2018.

served 10.8 million passengers, of whom 2.7 million were fare-paying riders in 2017.^{24,25} Both airports have seen improvements in customer satisfaction because of their rail connections.

Despite New York City's robust transit network, LGA lacks a reliable and convenient fixed-route connection. As shown in **Figure 1-9**, many passengers and employees are coming from or headed to origins and destinations served by subway, bus, and commuter rail, but they can only reach the Airport by transferring to buses that run in mixed traffic.

A 2016 survey by the Partnership for New York City found that local travel to and from LGA is a factor in making travel choices.

- The survey found that 12 percent of LGA's non-resident business travelers have avoided flying to a meeting in the New York metropolitan region because of delays or difficulty getting to and from LGA.
- Over half of the respondents at LGA (54 percent) indicated that the time it takes to get to and from the Airport affects their decision to fly to the region.
- Of the LGA customers that had been delayed getting in or out of New York City airports in the previous year, 35 percent said one of the main reasons for the delay was the length of time spent traveling to or from the Airport.²⁶

While the ongoing LGA Redevelopment Program will address deficiencies of the Airport itself, LGA needs a dedicated, fixed-route connection to enhance the customer experience and help maintain the economic competitiveness of the New York region.

1.6.2 THE NEED FOR MORE RELIABLE TRAVEL TIMES TO AND FROM THE AIRPORT

Roadway congestion is a widely recognized issue for the New York region, and it has been getting worse over time.

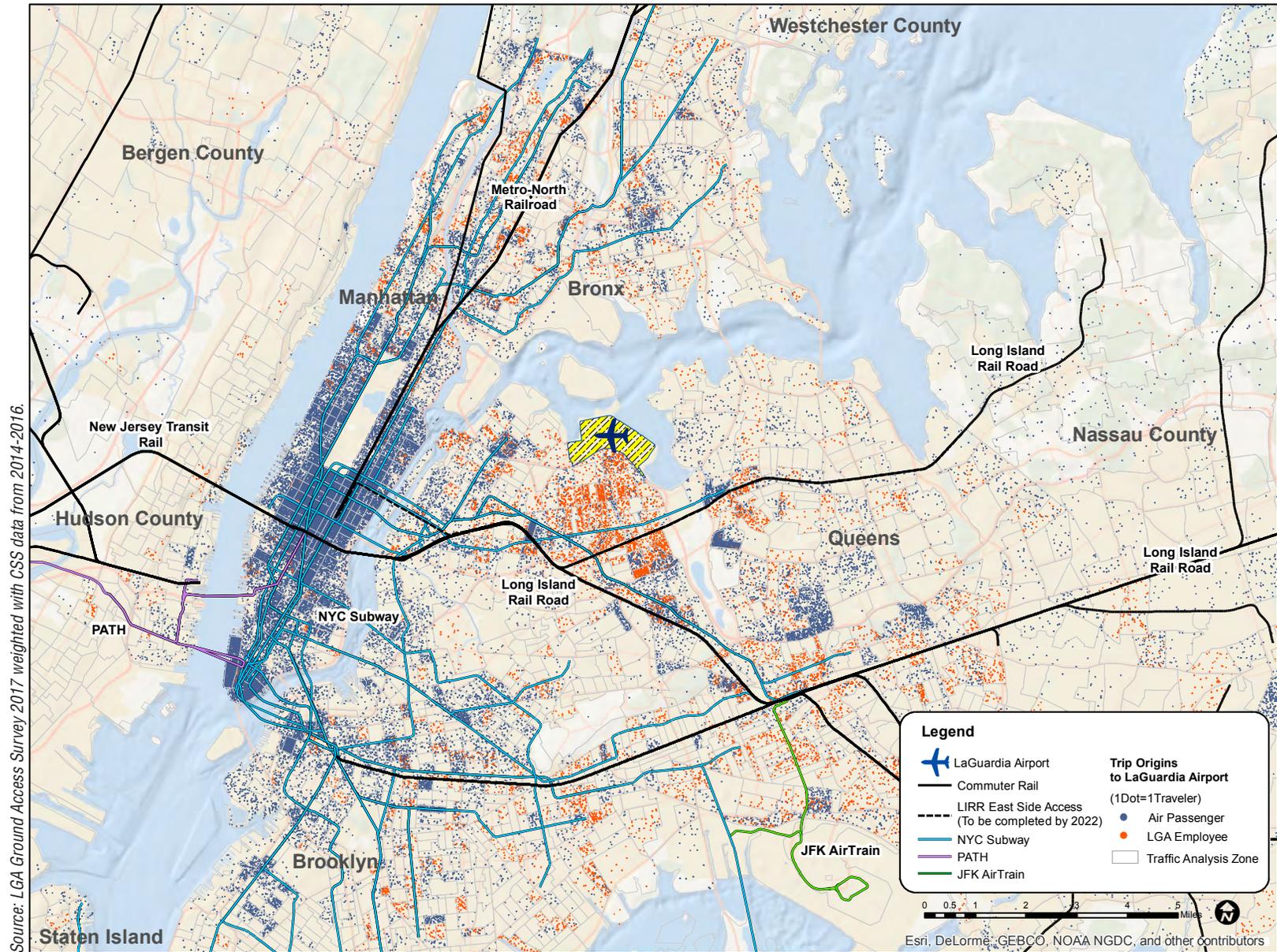
The mode use of passengers and employees (see **Tables 1-2 and 1-4**) show that LGA passengers and employees depend almost exclusively on roadway-based vehicles for part of or the entire trip (the nominal exception being employees walking or bicycling to work). Even current mass transit options serving LGA include a connection via bus or shuttle that uses local and regional roadways.

Because of congestion, travel times are unpredictable for automobiles, taxis, and buses and vary between peak and non-peak periods of the day. Based on readily available internet searches, travel times from Midtown Manhattan for morning peak periods (6 AM to 10 AM) and evening periods (4 PM to 8 PM) can vary between 22 and 65 minutes for automobiles and up to 60 minutes

²⁴ Fare-paying customers at JFK (7.7 million) are traveling off-airport to the Howard Beach or Jamaica Stations. Total AirTrain JFK riders (20.3 million) includes passengers traveling off-airport and passengers that are connecting between airport terminals.

²⁵ Port Authority of New York and New Jersey. *2017 Airport Traffic Report*. April 2018.

²⁶ Partnership for New York City, *Clear for Takeoff: A Better Future for New York Metro Airports*, 2016, <http://pfny.org/wp-content/uploads/2017/01/Clear-for-Takeoff-NY-Airports-Partnership-for-New-York-City-01-27-2017.pdf>. The survey was conducted before major construction activities commenced at LGA.



Local Origins/Destinations of LGA Passengers and Employees and Existing and Proposed Transit Services in the Metropolitan Area

for buses.²⁷ The Partnership for New York City survey of passengers corroborates this information, with passengers estimating travel times to and from LGA at up to 60 minutes.²⁸

Congestion in the New York City region has increased and airport travelers (passengers and employees) must adjust their travel patterns accordingly. Average traffic speeds in Midtown Manhattan, where over 26.3 percent of LGA passengers originate or terminate, have decreased from 6.5 miles per hour (mph) to 4.7 mph between 2012 and 2017.²⁹ Data from the annual customer satisfaction surveys at LGA show that between 2006 and 2016, passengers increased the amount of time allotted to get to the Airport and through security by 12 percent.³⁰

There is wide variation in vehicular travel times between Midtown Manhattan and LGA. **Figure 1-10** shows travel times for taxi trips to LGA from Midtown and vice versa.³¹ The graphs show the variation in travel time by month over a four-year period. These plots reveal important considerations in planning for an Airport trip. The plots show that travel time varies widely by day, and typically ranges between 35 and 80 minutes, which is a range of 45 minutes. Additionally, on some dates in 2015, 2016, and 2017, the time was greater than 100 minutes. These plots indicate that travel time has increased from year to year, which is a trend that will likely continue. Travel times have increased for the complete trip between Midtown Manhattan and LGA as follows:

- For trips from Times Square to LGA from 2014-2017:
 - The annual average travel time increased from 31 to 35 minutes;
 - The annual average daily maximum travel time (the longest single trip on any given day) increased from 47 to 54 minutes; and
 - The number of extreme travel days (with at least one trip taking 70 minutes or more) increased from 4 to 17, more than four-fold.
- For trips from LGA to Times Square from 2014-2017:
 - The annual average travel time increased from 36 to 43 minutes;
 - The annual average daily maximum travel time increased from 54 to 65 minutes; and
 - The number of extreme travel days increased from 21 to 114, more than five-fold.³²

²⁷ Data collected from Google Maps on March 30, 2018; April 3, 2018; and April 4, 2018.

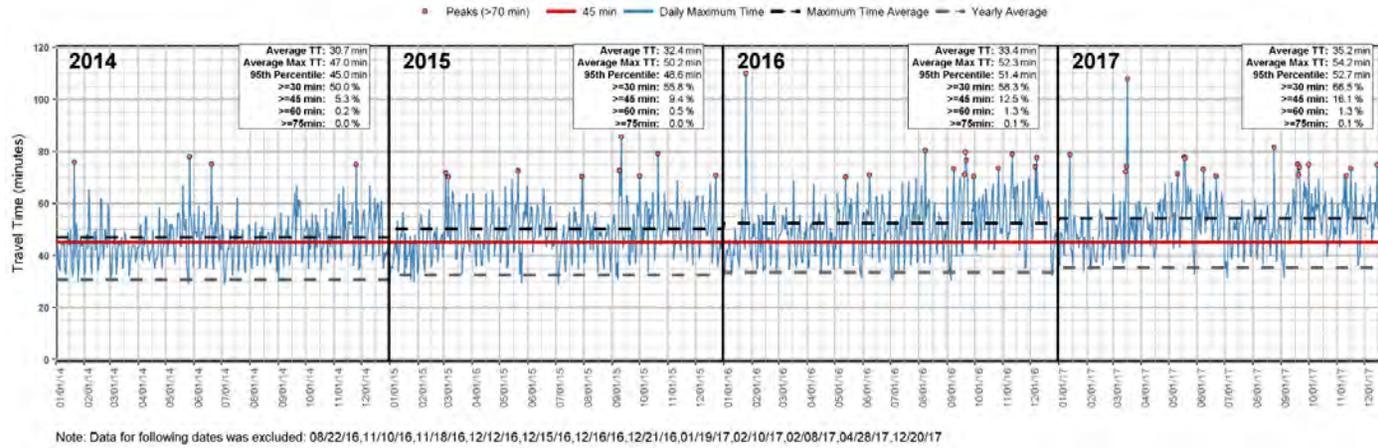
²⁸ Partnership for New York City, *Clear for Takeoff: A Better Future for New York Metro Airports*, 2016, <http://pfnyc.org/wp-content/uploads/2017/01/Clear-for-Takeoff-NY-Airports-Partnership-for-New-York-City-01-27-2017.pdf>.

²⁹ New York City Department of Transportation. Presentation on the Mayor's Congestion Action Plan. January 2018. <http://www.nyc.gov/html/dot/downloads/pdf/congestion-industry-briefings.pdf>. Accessed September 10, 2018.

³⁰ Port Authority of New York and New Jersey, *Customer Satisfaction Survey. 2006 and 2016*.

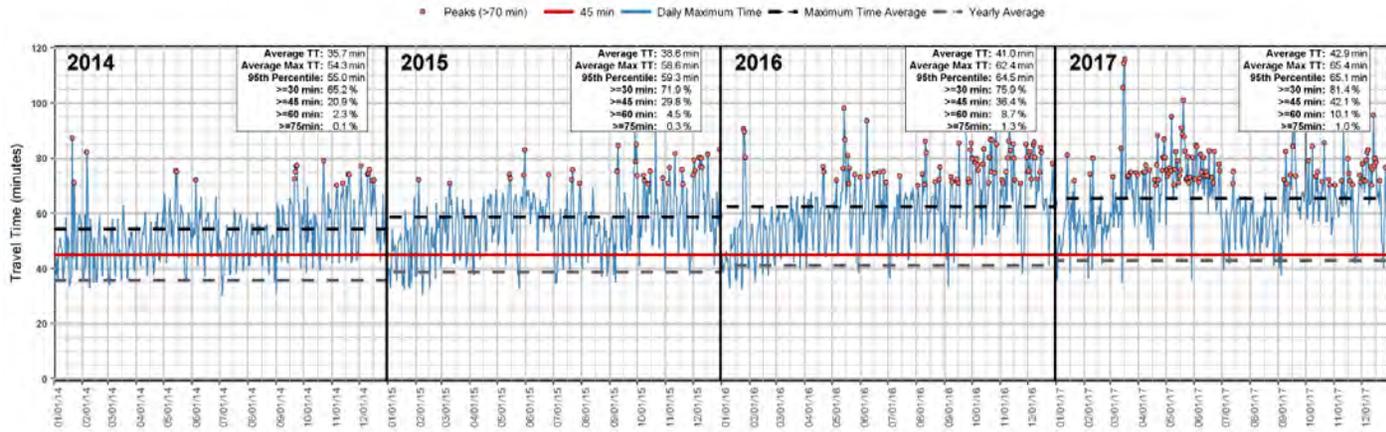
³¹ The graphs reflect "normal" conditions on LGA roadways. Certain dates were removed from the dataset because ongoing construction activities resulted in spillback congestion on the GCP and surrounding local streets.

³² NYC Taxi and Limousine Commission. *Taxi GPS Datasets. 2017*. Data cleaned to remove any days during which on-Airport traffic conditions led to delays on the off-Airport roadway network.



Note: Data cleaned to remove any days during which on-airport traffic conditions led to delays on the off-airport roadway network. Data for following dates was excluded: 08/22/16, 11/10/16, 11/18/16, 12/12/16, 12/15/16, 12/16/16, 12/21/16, 01/19/17, 02/10/17, 02/08/17, 04/28/17, 12/20/17

Maximum Travel Time to LaGuardia Airport from Times Square



Maximum Travel Time from LaGuardia Airport to Times Square

To plan accordingly for a flight, customers must account for the potential for longer than average vehicular travel times in addition to the overall increase in average travel times.

Despite the numerous bus service improvements made to date, 93 percent of travel to LGA is still by private vehicle or private shuttles, and buses still often fail to achieve their scheduled travel times. Roadway congestion and the resultant effect on travel time adversely affect bus service to LGA. The M60 SBS and Q70 SBS, the primary bus routes serving LGA, operate throughout the day and night. There is frequent service from 6 AM to 10 PM (up to nine buses per hour in each direction on the M60 SBS and up to seven buses per hour in each direction on the Q70 SBS). During overnight hours (10 PM to 6 AM), the routes operate with two or three buses per hour in each direction.³³

The approximately eight-mile trip on the M60 SBS from Columbia University to LGA is scheduled to take an average of about 54 minutes. From Lexington Avenue at 125th Street in Manhattan, the scheduled travel time for the six-mile trip on the M60 SBS is an average of about 34 minutes. On the Q70, the scheduled travel time for the 3.7-mile full route (Woodside to LGA) is an average of 15 minutes, and the partial 3.1-mile route between Jackson Heights and LGA is scheduled to take about 9½ minutes.³⁴

The scheduled M60 SBS and Q70 SBS travel times do account for some roadway congestion, so that peak period (6 AM to 9 AM and 4 PM to 7 PM) trips generally have longer posted trip times than at other times of the day. However, the scheduled travel time does not account for extreme congestion or traffic incidents. Therefore, NYCT tracks the on-time performance of its bus routes. NYCT provided on-time performance data for May 2017, July 2017, and October 2017 (see **Table 1-5**). For the M60 SBS, the data show that the actual travel time exceeds the scheduled travel time on 94 to 98 percent of the eastbound (to LGA) M60 SBS runs and on 17 to 63 percent or more of the westbound (from LGA) runs. In many cases, the actual travel time exceeds the scheduled travel time by more than five minutes. For the Q70 SBS, the actual travel time exceeded the scheduled travel time on 63 to 77 percent of northbound the bus trips (to LGA) and on 58 to 75 percent of the Q70 southbound (from LGA) trips.

The scheduled and on-time performance data demonstrate that the bus service is unreliable for Airport passengers and employees. On the Q70 SBS route, more than half of the buses are late in reaching the Airport, and in the case of the M60, nearly all buses arrive late to the Airport. Passengers needing to catch a flight or employees needing to start a shift cannot rely on the bus to reach the Airport on time, so they must give themselves additional travel time to accommodate the frequent delays.

³³ M60 SBS and Q70 SBS bus schedules from August 2018. Schedules can be accessed at www.mta.info.

³⁴ M60 SBS and Q70 SBS bus schedules from August 2018. Schedules can be accessed at www.mta.info.

Table 1-5
Weekday On-Time Performance Data
for the M60 SBS and Q70 SBS Bus Routes

Route / Direction	Month / Year	Minimum Scheduled Travel Time (minutes)	Maximum Scheduled Travel Time (minutes)	Number of ½-hour Time Periods that the Average Travel Time Exceeded the Scheduled Travel Time
M60 SBS Eastbound (To LGA) ¹	May 2017	24	34	47 of 48 (97.9%)
	July 2017	24	34	45 of 48 (93.8%)
	October 2017	24	34	45 of 45 (93.8%)
M60 SBS Westbound (From LGA) ¹	May 2017	20	37	30 of 48 (62.5%)
	July 2017	20	37	8 of 48 (16.7%)
	October 2017	20	37	11 of 48 (22.9%)
Q70 Northbound (To LGA) ²	May 2017	8	12	36 of 48 (75.0%)
	July 2017	8	12	30 of 48 (62.5%)
	October 2017	8	12	37 of 48 (77.1%)
Q70 Southbound (From LGA) ²	May 2017	16	28	36 of 48 (75.0%)
	July 2017	16	28	30 of 48 (62.5%)
	October 2017	16	28	28 of 48 (58.3%)

Note:
¹ M60 travels times are between Lexington Avenue at 125th Street and LGA.
² Q70 SBS travel times are between Roosevelt Avenue—Jackson Heights / 74 Street Subway station and LGA Terminal B.
Source: New York City Transit (August 2018).

Traffic congestion and travel times will worsen in the future. Based on the New York Metropolitan Transportation Council’s *Best Practice Model*, congestion on the highway systems near the Airport will increase by a daily average of 10 percent from 2017 through 2045, and local road congestion will increase by a daily average of 11 percent (see **Table 1-6**).^{35,36} Based on the Bureau of Public Roads Volume-Delay Function used in the *Best Practices Model*, an increase of 5 to 10 percent in volume on an already congested road can result in 10 to 50 percent increase in travel times without an alternative travel mode option. Based on the foregoing, the projected growth in traffic volumes on the already congested highways and local roadways around the Airport would result in an increase in travel times to LGA.

³⁵ www.nymtc.org/Data-and-Modeling/New-York-Best-Practice-Model-NYBPM. Accessed April 6, 2018.

³⁶ Assuming growth rates consistent with those described in the *New York City Environmental Quality Review (CEQR) Technical Manual*.

Table 1-6
Cumulative Traffic Growth Rates for Study Area

Functional Class	Time Period*	2017-2025	2025-2045	2017-2045
Highways	Off-Peak	6%	5%	11%
Highways	Peak	5%	3%	9%
Highways	Daily	6%	4%	10%
Local Roadways	Off-Peak	5%	8%	13%
Local Roadways	Peak	2%	6%	8%
Local Roadways	Daily	4%	7%	11%
<p>Note: * Peak refers to 6:00 AM to 9:59 AM and 4:00 PM to 7:59 PM. All other times are Off-Peak.</p> <p>Source: NY Best Practice Model (growth rates are consistent with those described in CEQR Technical Manual).</p>				

The PANYNJ developed a ridership model for this study, and the *AirTrain LGA: LGA Ground Access Mode Choice Model and AirTrain Ridership Forecast 2025-2045* report documents the results. The model demonstrates that a more consistent travel time from Manhattan, Brooklyn, and Queens to LGA can be achieved using a transit mode to or from the Willets Point (7 Line) subway station and LIRR station, with an AirTrain LGA connection, than by on-road vehicles (automobile, taxi/For Hire Vehicle, or bus).

For an LIRR–AirTrain LGA combination, the ridership model projects a consistent transit ride times of 27 minutes from Grand Central Terminal and Penn Station in 2025 and 2045 (see **Tables 1-7 and 1-8**).³⁷ This travel time reflects the total trip from the platform at Grand Central Terminal or Penn Station to the Airport and includes the time on the LIRR train or subway, walk and wait time for AirTrain LGA, the ride to LGA terminals, and additional walk and wait time if the trip involves additional transfers. In 2025, the mean peak period, peak direction travel time by automobile is longer (41 to 44 minutes from Grand Central Terminal and 50 to 51 minutes from Penn Station).^{38,39} By 2045, the mean travel time by automobile is much longer (44 to 56 minutes from Grand Central Terminal and 54 to 56 minutes from Penn Station). Automobile travel times would also be longer than transit travel times from the Financial District and Union Square. *AirTrain LGA: LGA Ground Access Mode Choice Model and AirTrain Ridership Forecast 2025-2045* provides more detail regarding the projected travel times.

³⁷ Based on its current project schedule, the East Side Access Project is assumed to be complete by 2025, allowing for LIRR service between Grand Central Terminal and Willets Point.

³⁸ In the morning (AM) peak hour, the peak direction travel time is from LGA to Grand Central Terminal or Penn Station. In the evening (PM) peak hour, the peak direction travel time is from Grand Central Terminal or Penn Station and LGA.

³⁹ http://web.mta.info/capital/esa_alt.html. Accessed July 23, 2018.

Table 1-7
Comparisons of Auto and Transit Travel Times
to LGA from Selected Locations in 2025 and 2045 in the PM Peak

Reference Location	Mean Auto Travel Time (min)	95th Percentile Auto Time (min) ¹	Transit Travel Time (min) ²	Transit Mode
2025				
Grand Central Terminal	41	64	27	LIRR, AirTrain
Penn Station	50	78	27	LIRR, AirTrain
Financial District	51	79	47	Subway, LIRR, AirTrain
Union Square	47	79	40	Subway, LIRR, AirTrain
Downtown Brooklyn	45	70	54	Subway, LIRR, AirTrain
Long Island City	35	62	33	Subway, AirTrain
2045				
Grand Central Terminal	44	75	27	LIRR, AirTrain
Penn Station	54	92	27	LIRR, AirTrain
Financial District	55	91	47	Subway, LIRR, AirTrain
Union Square	50	90	43	Subway, LIRR, AirTrain
Downtown Brooklyn	49	84	54	Subway, LIRR, AirTrain
Long Island City	37	71	34	Subway, AirTrain
Notes:				
¹ The value below which 95 percent of the observations can be found.				
² Transit travel time above includes in-vehicle time on LIRR and the subway, walk and wait time for AirTrain LGA, the ride to LGA terminals, and additional walk and wait time if the trip involves additional transfers. The initial walk and wait time for transit is not included above. A description of the travel time components, and how the model incorporates each of them, is provided in Chapter 7 and Appendix G of the AirTrain LGA, LGA Ground Access Mode Choice Model and AirTrain Ridership Forecast, 2025-2045.				

Table 1-8
Comparisons of Auto and Transit Travel Times
From LGA to Selected Locations in 2025 and 2045 in the AM Peak

Reference Location	Mean Auto Travel Time (min)	95th Percentile Auto Time (min) ¹	Transit Travel Time (min) ²	Transit Mode
2025				
Grand Central Terminal	44	63	33	LIRR, AirTrain
Penn Station	51	71	33	LIRR, AirTrain
Financial District	49	68	46	Subway, LIRR, AirTrain
Union Square	47	69	39	Subway, LIRR, AirTrain
Downtown Brooklyn	48	69	53	Subway, LIRR, AirTrain
Long Island City	32	49	38	Subway, AirTrain
2045				
Grand Central Terminal	56	104	33	LIRR, AirTrain
Penn Station	56	87	33	LIRR, AirTrain
Financial District	53	81	46	Subway, LIRR, AirTrain
Union Square	50	79	42	Subway, LIRR, AirTrain
Downtown Brooklyn	52	84	53	Subway, LIRR, AirTrain
Long Island City	34	56	38	Subway, AirTrain
Notes:				
¹ The value below which 95 percent of the observations can be found.				
² Transit travel time above includes in-vehicle time on LIRR and the subway, walk and wait time for AirTrain LGA, the ride to LGA terminals, and additional walk and wait time if the trip involves additional transfers. The initial walk and wait time for transit is not included above. A description of the travel time components, and how the model incorporates each of them, is provided in Chapter 7 and Appendix G of the AirTrain LGA, LGA Ground Access Mode Choice Model and AirTrain Ridership Forecast, 2025-2045.				

It is important to reiterate that automobile travel times vary widely, and their volatility is projected to increase in future years. To account for this volatility, **Tables 1-7 and 1-8** show a 95th percentile, which reflects the upper threshold of travel time for 95 percent of trips between LGA and a particular destination. In other words, for 45 percent of the PM peak hour trips between Grand Central Terminal and LGA (i.e., the difference between the 95th percentile and the mean [50 percent]), the travel time is more than 41 minutes.

Tables 1-7 and 1-8 demonstrate that auto travel times will increase in the future. In 2045, mean auto travel times will range from 44 to 56 minutes to and from Grand Central Terminal and the 95th percentile travel time reaches as high as 104 minutes. For all of the origins and destinations shown in **Tables 1-7 and 1-8**, the transit travel time is between 30 percent and 189 percent shorter than the 95th percentile automobile travel time in 2025. By 2045, transit travel would be 47 to 285 percent shorter than the 95th percentile automobile travel time.

While the existing transportation mode share to and from LGA demonstrates a dependence on personal vehicles, taxis, and For Hire Vehicles, the Partnership for New York City survey showed

that passengers would prefer a fixed-route, rail link between the airports and Manhattan if one were available.⁴⁰

1.6.3 THE NEED FOR REDUNDANT ACCESS

LGA and New York City's other airports are critical components of the region's transportation network. Accordingly, it is very important that reliable access to LGA be available whenever it is in operation. With only roadway connections to LGA, its access is dependent on very unreliable traffic conditions as described in **Section 1.6.2**.

Without alternative modes and routes of access, there is no redundancy in the landside operation of LGA. Redundancy is important in maintaining reliability under normal conditions, and it is critical for ongoing operations and safety during extreme weather, life safety, or homeland security events. LGA needs alternative modes and routes of access to establish redundancy and ensure the safe and efficient operation of this critical component of New York's transportation infrastructure.

1.6.4 THE NEED TO ACCOMMODATE PROVISION OF AN OFF-AIRPORT PARKING SITE FOR EMPLOYEES

As shown in **Table 1-4**, 57.3 percent of employees use personal automobiles for their commute. However, parking opportunities are limited on and near the Airport. The 1,500 spaces currently available for employees on-site are located in Lot P10 on the west side of the Airport and directly adjacent to the Airport Operations Area (AOA). Because of the ongoing LGA Redevelopment Program, the PANYNJ has sometimes temporarily relocated employee parking to a site known as "Ingraham's Mountain," a portion of Airport property located west of the main Airport area near the intersection of 19th Avenue and Hazen Street in Queens. Ingraham's Mountain does not have convenient highway access, requiring Airport employees to travel several local streets to reach it. They must then take a shuttle bus that uses the same local streets to reach the Airport property. The PANYNJ seeks a better solution to accommodate LGA employee parking.

LGA is a highly constrained site with a small footprint and limited opportunities to expand airside and landside support facilities. Therefore, the PANYNJ continually seeks the highest and best use of Airport property, which includes the functions that directly support safe and efficient airside operations. The LGA Redevelopment Program will shift Airport facilities southward to make room for gate upgauging and taxiway improvements at the back ends of the terminals, resulting in less space for non-aeronautical uses in front of the terminals. Thus, the need to convert non-essential uses to airside space will increase.

The demolition and reconstruction of the Central Terminal Building (Terminal B) made it necessary to remove and replace the Airport's aging East Field Lighting Vault. The East Field Lighting Vault was relocated from Terminal B to an Airport equipment and material storage area on the east end of the airfield. Due to this relocation, coupled with the construction of the new Terminal C, these equipment and material storage functions can no longer be accommodated in the current location. This has

⁴⁰ Partnership for New York City, *Clear for Takeoff: A Better Future for New York Metro Airports*, 2016, <http://pfnyc.org/wp-content/uploads/2017/01/Clear-for-Takeoff-NY-Airports-Partnership-for-New-York-City-01-27-2017.pdf>.

resulted in storing material and equipment around the perimeter of aircraft parking areas, putting them in an undesirable location, close to current aircraft operations and the future Terminal C.

There is a need to address a shortage of space for the storage of snow equipment and state-of-good-repair construction equipment and material. Due to LGA's limited footprint and spatial constraints, relocating approximately 500 employee parking spaces would clear a large amount of space in Lot P10 that could be used for staging and equipment storage in a location that is directly adjacent to the AOA and is well situated for use for airside purposes.

The highest and best use of the Airport property is a major component of the LGA Redevelopment Program, leading the PANYNJ to investigate off-site options for employee parking. In addition, there is a need to provide LGA employees with off-Airport parking options that will allow a reliable commute time as well as provide safe and convenient parking opportunities. The potential to provide parking at an off-Airport location that is within walking distance of a rail or AirTrain station would increase the use of/ridership for the rail link to the Airport, possibly increase transit use by employees, and increase the reliability of commute times for all employees, regardless of mode.

1.7 PROJECT OBJECTIVES

The primary purpose of the LGA Airport Access Improvement Project is to provide convenient, predictable, and reliable access to the Airport for its customers and employees that complements existing mass transit services and does not contribute to roadway congestion. In addition, the proposed Project includes off-Airport employee parking with convenient access by way of the new transportation service to the Airport.

The PANYNJ identified the following objectives to guide its Project planning:

- Provide a new or enhanced transportation option to LGA with reliable and predictable travel time from Midtown Manhattan, Queens, and other areas of the region (less than 30 minutes from Penn Station or Grand Central Terminal).
- Enhance the passenger experience by providing a transportation option tailored to air travel customers that is convenient and easily navigable for customers with baggage and travelers that may not know the area.
- Improve travel options to the Airport by providing convenient, direct connections between the Airport and existing transit systems.
- Reduce the use of on-road vehicles to move passengers to, from, and within the Airport.
- Accommodate the provision of off-site employee parking with convenient access by way of the new transportation service to the Airport.
- Provide a new or enhanced transportation service that accommodates the highest and best use of the Airport property.
- Provide a transportation option that provides access to new Terminals B and C, used by at least 90 percent of the LGA passengers.⁴¹

⁴¹ PANYNJ seeks not to preclude future service to Terminal A, and the PANYNJ intends to require the contractor responsible for construction of the Project to demonstrate the ability to provide potential future service Terminal A.

- Design and construct a project that avoids substantial disruption to the neighborhoods where it is located.

1.8 DESCRIPTION OF THE PANYNJ'S PROPOSED PROJECT

As described in **Chapter 2, "Project Alternatives,"** the PANYNJ proposes to construct a fixed-guideway, transit system between the Airport and the existing LIRR and NYCT subway stations at Willets Point, which is about two miles southeast of the Airport. The Project would also accommodate a potential off-site employee parking facility.⁴² At the same time, the Project would be consistent with current and future LGA development plans.

1.9 ANTICIPATED ACTIONS

The federal actions associated with the Project include decisions by FAA regarding the proposed updates of LGA's ALP and for the use of PFC funding, should the PANYNJ pursue imposing and using PFC funding for the Project. Since Project components involve highways and transit systems, FAA may seek involvement by the Federal Highway Administration (FHWA) and/or the Federal Transit Administration (FTA). In addition, the PANYNJ may require approvals by NYSDOT, NYCDOT, and MTA.

⁴² With the approval of the proposed Airport Layout Plan (ALP) change by the FAA and several other steps, the new AirTrain LGA system, its terminal station, and potentially the associated employee parking lot would become part of the Airport property.

CHAPTER 2 PROJECT ALTERNATIVES

2.1 INTRODUCTION

The purpose of the LaGuardia Airport Access Improvement Project (the Project) is to provide convenient, predictable, and reliable access to the Airport for its customers and employees that complements existing mass transit services and does not contribute to roadway congestion. To support development of a Preferred Alternative for improving access to LaGuardia Airport (LGA or the Airport), the Port Authority of New York and New Jersey (PANYNJ or the Sponsor) conducted an alternatives analysis. To maximize the utility of the planning information, the Sponsor's analysis was conducted to be consistent with the requirements of the National Environmental Policy Act (NEPA). The alternatives analysis considers a range of options for enhancing access to LGA to identify the alternative that best meets the Sponsor's objectives for the Project.

This chapter describes the range of alternatives for the Project and sets forth the evaluation criteria and process used to identify and evaluate those alternatives. **Section 2.2** provides an overview of the alternatives development and evaluation process, including the long list of alternatives considered; **Section 2.3** describes the Level 1 evaluation of alternatives; **Section 2.4** describes the Level 2 evaluation of alternatives; **Section 2.5** identifies the alternatives recommended for further study; and **Section 2.6** identifies and describes the Sponsor's Preferred Alternative.

2.2 OVERVIEW OF ALTERNATIVES DEVELOPMENT AND EVALUATION PROCESS

2.2.1 REQUIREMENTS FOR ALTERNATIVES ANALYSIS

The PANYNJ, as the Project Sponsor, has considered a wide range of alternatives to identify those that address the PANYNJ's purpose and objectives for the Project. This document presents the process that the PANYNJ used to consider and evaluate alternatives in developing the plan that resulted in the Project.

Federal law and regulations governing the environmental review process require that a reasonable range of alternatives that might accomplish the purpose and objectives of the project be identified and considered, including those not within the jurisdiction of the lead agency. The Council on Environmental Quality's (CEQ) regulations that implement NEPA (40 Code of Federal Regulations (CFR) Parts 1500-1508) require evaluation of any reasonable alternatives, as well as a No Action Alternative.

Under NEPA, "reasonable" is generally understood to mean those technically and economically feasible project alternatives that would satisfy the primary objectives of the project so as to meet

the purpose and need for the project.¹ CEQ's "Forty Questions" guidance adds that "reasonable alternatives include those that are practical or feasible from the technical and economic standpoint and using common sense, rather than simply desirable from the standpoint of the applicant."²

Thus, this analysis was performed to document the PANYNJ's consideration of alternatives to meet its Project objectives and to provide information to the FAA as it embarks on the NEPA process.

2.2.2 ALTERNATIVES EVALUATION PROCESS

The PANYNJ undertook the alternatives evaluation process to identify reasonable alternatives that meet the Project objectives identified in the previous chapter. To identify alternatives that, at an initial concept level, would meet the objectives of the Project, the Sponsor undertook a two-step evaluation process.

- **Level 1:** In the first-level evaluation, a long list of alternatives was developed and evaluated based on the alternatives' ability to meet the Project objectives. In this evaluation, the PANYNJ advanced alternatives that met the Project objectives to Level 2 for further consideration. The PANYNJ did not advance alternatives that did not meet the Project objectives for further consideration beyond Level 1. The Level 1 evaluation includes options for mode of transportation and the management of existing transportation assets.
- **Level 2:** The alternatives that advanced from Level 1 were then further developed and evaluated in a Level 2 assessment, which considered the alternatives' reasonableness in terms of operations, constructability, property/right-of-way factors, and community impacts. For the fixed-route options that passed the Level 1 assessment, Level 2 evaluated the location of off-Airport terminal stations and potential alignments to the Airport. The Level 2 assessment identifies the Sponsor's preferred alternative.

This alternatives evaluation was designed to first identify the type of transportation system that could satisfy the Sponsor's Project objectives and then, once that system was identified, to further refine the alternatives to identify any critical concerns regarding its constructability or implementation that would make an alternative unreasonable. The process was conducted in steps to allow the Sponsor to narrow its field of alternatives before more details were developed on the reasonableness of the alternatives that would meet the Project objectives.

In preparing the Level 1 and Level 2 evaluations, the location of employee parking and ancillary facilities was only generally considered. The Level 1 and Level 2 evaluations identify whether the placement of these facilities is feasible, but they do not identify the specific locations for such facilities. A detailed consideration of the location and configuration of these elements is provided at the end of this study for the alternatives that advanced beyond the Level 2 evaluation.

¹ Federal Highway Administration Office of the Chief Counsel, "Alternatives Analyses White Paper." September 22, 2010.

² Council on Environmental Quality, Memorandum to Agencies: "Forty Most Asked Questions Concerning CEQ's National Environmental Policy Act Regulations." March 23, 1981.

2.2.2.1 Level 1 Alternatives Evaluation Criteria

The Level 1 assessment considered whether alternatives would achieve the PANYNJ's Project objectives, intended to provide convenient, predictable, and reliable access to LGA for its customers and employees that complements existing mass transit services and does not contribute to roadway congestion. The development of these objectives is discussed in **Chapter 1, "Project Purpose and Objectives" (Chapter 1)**, which provides detailed background information on the existing conditions and need for improved access to LGA. The PANYNJ evaluated alternatives with respect to the following:

- Objective 1: Provide a new or enhanced transportation option to LGA with reliable and predictable travel time from Midtown Manhattan, Queens, and other areas of the region (less than 30 minutes from Penn Station or Grand Central Terminal):** *Will the ride time be reliable and predictable? Will the ride time be less than 30 minutes from Grand Central Terminal and Penn Station, which is consistent with transit travel to other area airports? Can the travel time be consistently achieved throughout the year?*
- Objective 2: Enhance the passenger experience by providing a transportation option tailored to air travel customers that is convenient and easily navigable for customers with baggage and travelers that may not know the area:** *Would the transfers be easy for those with luggage and/or those that are not familiar with New York City's transit system (direct access, minimal stairs for baggage, minimal connections)?*
- Objective 3: Improve travel options to the Airport by providing convenient, direct connections between the Airport and existing transit systems:** *Would passengers be able to access through direct connections to the Long Island Rail Road (LIRR) commuter rail and/or the subway system?*
- Objective 4: Reduce the use of on-road vehicles to move passengers to, from, and within the Airport:** *Would the system be desirable, convenient, and reliable so that passengers would use it and a lower percentage of passengers would access the Airport via on-road vehicles?*
- Objective 5: Accommodate the provision of off-site employee parking with convenient access by way of the new transportation service to the Airport:** *Is there sufficient space to accommodate employee parking facilities within walking distance of the new service?*
- Objective 6: Provide a new or enhanced transportation service that accommodates the highest and best use of the Airport property:** *Can the alternatives' spatial needs be accommodated within an efficient footprint to allow for the highest and best use of Airport property?*

Objective 7: Provide a transportation option that provides access to new Terminals B and C, used by at least 90 percent of LGA passengers:³ Can the alternative directly serve Terminals B and C?

Objective 8: Design and construct a project that avoids substantial disruption to the neighborhoods where it is located: Could the alternative result in substantial disruption to residents? Would construction activities substantially disrupt business activities?

2.2.2.2 Level 2 Alternatives Evaluation Criteria

As the alternatives were further developed and refined for the Level 2 evaluation, the PANYNJ examined whether the refined concepts of the alternatives met the Project objectives that were used for evaluation in Level 1. In addition, the Level 2 evaluation considered the reasonableness of the alternatives based on four criteria:

- **Operational Factors (Operations).** Alignment characteristics that would result in positive or negative effects on the operating conditions associated with the specific alternative (e.g., increased or decreased travel time, difficulties in maintaining the system, or high or low operations and maintenance costs). This criterion also considered other existing functions that occur in the transportation right-of-way, such as other rail or subway service for which an alternative may cause operational problems.
- **Constructability Factors (Constructability).** Alignment characteristics that could increase the complexity, duration, or uncertainties that increase the difficulty or risk during construction. This would include the ability to accommodate laydown, staging, and construction areas and to avoid problematic site conditions such as water table and soil conditions that would cause serious construction-related effects. A viable alternative would avoid or minimize conflicts with existing infrastructure (highway ramps, pedestrian bridges, railroads, or subway lines) to require less complex design and construction techniques. An alternative with fewer complexities, shorter duration of construction, or fewer/less severe construction effects than other alternatives would be considered to have fewer negative effects.
- **Right-of-Way Factors.** The need for private right-of-way and/or occupied lands. This factor considered the extent to which an alternative would incorporate existing public right-of-way and avoid impacts to private property.
- **Community Impacts.** While the FAA's NEPA process will include a comprehensive review of social, economic, and environmental impacts, the PANYNJ examined the alternatives and options in Level 2 to identify any substantial disruptions to the community that would render an alternative to be impractical. As alternatives would be constructed in or near existing neighborhoods, the potential effects on residents, businesses, and overall community character were considered for the Project's construction and operation. Some examples of these community impacts are extensive displacement of residences or

³ PANYNJ seeks not to preclude future service to Terminal A and the PANYNJ intends to require the contractor responsible for construction of the Project to demonstrate the ability to provide potential future service Terminal A.

businesses, effects on parklands and historic structures, visual impacts, and construction noise.

2.2.3 RANGE OF ALTERNATIVES

The PANYNJ assessed the following range of alternatives (see **Figure 2-1**):

- **No Action Alternative**, in which none of the improvements proposed as part of the Project would occur. The No Action Alternative includes independent planned and funded projects (i.e., LGA redevelopment) likely to be implemented by the Project's analysis year.
- **Transportation Systems Management (TSM)**, consisting of improvements to the existing transportation system that require less capital investment than the development of new systems or substantial enhancement of existing systems. For example, a TSM Alternative might include new bus routes or changes in the frequency or operation of existing bus routes.
- **Transportation Demand Management (TDM)**, which would include measures to reduce single-occupant car use to LGA, particularly by employees.
- **Use of Other Airports**, consisting of measures to shift Airport patronage to the other New York City airports that already have direct rail access, such as John F. Kennedy International Airport (JFK) and Newark Liberty International Airport (EWR).
- **Off-Airport Roadway Expansion**, in which roadway capacity to LGA would be expanded.
- **Bus (Exclusive Roadway)**, which would provide dedicated or exclusive bus lanes along existing or new bus routes to and from the Airport.
- **Ferry Service** between LGA and Brooklyn, Queens, and Manhattan along the East River.
- **Rail or Subway Extensions**, which would involve commuter rail or subway extensions from existing routes that serve Queens.
- **Fixed Guideway**, with a new fixed route system connecting from an existing public transit station to LGA. This could be an automated guideway rail transit system like the Automated People Mover (APM) systems of AirTrain JFK or AirTrain EWR, Connected Automated Vehicles (CAVs), or other applicable systems.
- **Emerging Transportation Technologies**, such as Transportation Network Companies (TNCs) or CAVs on roads mixed with other traffic. New tunneling technologies associated with transit projects are also considered emerging transportation technologies.



No Action Alternative

- No improvements proposed as part of the Project
- Maintain existing conditions



Ferry Service

- Increase service between LGA and Brooklyn, Queens, and Manhattan along the East River



Transportation Systems Management (TSM)

- Improve the existing system
- Requires less capital investment
- Example: Enhanced bus service



Bus (Exclusive Roadway)

- Create exclusive bus lanes
- Enhance bus service to LGA



Transportation Demand Management (TDM)

- Include measures to reduce Single-Occupant car use to LGA



Rail or Subway Extensions

- Commuter rail or subway extensions from existing routes that serve Queens



Use of Other Airports

- Shift airport patronage to other NYC Airports that already have direct rail access
- Example: John F. Kennedy International Airport (JFK) and Newark Liberty International Airport (EWR)



Fixed Guideway

- Create a new fixed route system connecting public transit systems to LGA
- Example: Guided busway, AirTrains similar to JFK and EWR



Off-Airport Roadway Expansion

- Expand roadway capacity to LGA
- Example: Add lanes on Grand Central Parkway



Emerging Transportation Technologies

- Transportation Network Companies (TNCs)
- Autonomous vehicles
- New tunneling technologies

2.3 LEVEL 1 ALTERNATIVES EVALUATION

2.3.1 DESCRIPTION OF THE LEVEL 1 EVALUATION

2.3.1.1 No Action Alternative

NEPA requires examination of a No Action Alternative (sometimes referred to as a “No Build Alternative”), which is an alternative to examine the future conditions that would exist if the proposed action were not implemented.

The No Action Alternative includes reasonably foreseeable, independently planned and funded projects. Thus, in the No Action Alternative, the redevelopment that is currently under way at LGA would be completed. As discussed in **Chapter 1**, this would include reconstruction and consolidation of terminal buildings, expansion of parking areas and garages, and reconfiguration of on-Airport roadway systems. It also includes improvements to be undertaken by the Metropolitan Transportation Authority (MTA) for nearby public transportation systems such as improvements to the New York City Transit (NYCT) 7 Line signal system and Mets–Willets Point station, reconstruction of the LIRR station at Mets–Willets Point, and the LIRR East Side Access Project, which will bring LIRR service to Grand Central Terminal in addition to Penn Station in Manhattan. Additionally, the completion of the East Side Access Project would enable the MTA to provide regular service to Willets Point (from both Penn Station and Grand Central Terminal), which currently has service only during events (e.g., Mets games, U.S. Open, etc.), subject to the approval of the MTA Board. The No Action Alternative also includes completion of development projects currently planned and approved near LGA, such as the New York City Economic Development Corporation’s (NYCEDC) large-scale development plan for the Willets Point neighborhood in Queens. The No Action Alternative would be expected to include additional TSM and TDM actions as congestion in the region increases in the future. As is shown later, few TSM/TDM actions remain that would have a sizeable effect on reducing congestion and improving predictability for air travelers to and from LGA (see **Sections 2.3.1.2** and **2.3.1.3**).

With the No Action Alternative, air passengers and employees would continue to access LGA using the same modes as they do today, which include automobile (personal vehicle, For Hire Vehicle, rental car, and taxi), public bus, and shuttle bus. Overall traffic volumes on roadways near LGA would increase over time, resulting in more traffic congestion. This, in turn, would result in longer travel times to LGA and increase the volatility and unpredictability of travel times for LGA passengers and employees. Employee parking would likely remain in the same location on-Airport.

The No Action Alternative would not meet the Project objectives but was retained to serve as a baseline against which the potential benefits and impacts of other reasonable alternative(s) would be compared.

2.3.1.2 Transportation Systems Management (TSM)

A TSM Alternative consists of improvements to the existing transportation system that require no or limited capital investment but may require additional operating expenditures, and typically focus on enhancements to the operation of existing facilities or services. For this Project, these could include small-scale improvements that together would be designed to optimize the existing transportation system.

As described in **Chapter 1 (Section 1.5)**, the New York City Department of Transportation (NYCDOT) recently studied options to provide improved transit to LGA with short-term improvements. Before the study was completed, NYCT implemented new bus service between Woodside and Jackson Heights, Queens, and LGA. This included creation of the Q70 Select Bus Service (SBS), a limited stop service that begins at the Woodside LIRR station, stops at the 74th Street-Broadway/Jackson Heights-Roosevelt Avenue subway station in Jackson Heights, and then travels by way of the Brooklyn-Queens Expressway (BQE/I-278) and Grand Central Parkway (GCP) to serve Terminals B, C, and D at the Airport. Recently, NYCT implemented off-board fare collection to improve boarding times, purchased new buses that have luggage racks, and rebranded the route as LaGuardia Link. Buses operate in mixed traffic for the full route.

The NYCDOT study also resulted in improvements to the M60 bus route. NYCT converted this route from a local route to a Select Bus Service (SBS) route, eliminating or combining stops, implementing off-board fare collection, and purchasing new, larger buses with luggage racks. The M60 SBS route operates between Upper Manhattan and the Airport by way of the Robert F. Kennedy (RFK) Bridge (formerly known as the Triborough Bridge), GCP, and Astoria Boulevard. The M60 SBS has dedicated bus lanes on 125th Street in Manhattan.

There could be additional strategies to improve travel time on the Q70 and M60 SBS routes. For the TSM Alternative, improvements to these routes could likely include increased bus frequency, use of bus “queue jumpers” at select traffic signals (i.e., short bus lane segments that have traffic signal priority, so that buses can bypass waiting queues of traffic), additional sections of dedicated bus lanes, if feasible, and express service for some of the buses on the M60 SBS route on the portion of its route in Queens. The TSM Alternative could also include improvements to other bus service, such as increased frequency on routes from Corona and Flushing, new routes, or improved transfers.

Individual TSM strategies could improve or enhance ground travel for some Airport customers, and measures could be implemented in conjunction with or independent of the LGA Airport Access Improvement Project. However, the TSM Alternative overall would not be able to achieve results that would sufficiently meet Project objectives. The local transportation agencies have already implemented TSM measures. Further TSM measures, which are described below, would be incremental in nature, with limited ability to further optimize the existing transportation system substantially, and there are few additional incremental measures that can be implemented to greatly enhance service reliability and travel times.

The ability to provide dedicated bus lanes is limited by the existing roadway capacity. For example, Roosevelt Avenue, which is the Q70 SBS route between Woodside and Jackson Heights, is a two-lane, two-way street with curbside parking. It is a very busy commercial street, running beneath the elevated subway tracks of the No. 7 Line. The conversion of general-purpose traffic lanes to restricted bus lanes would substantially reduce vehicular volume along this corridor and eliminate parking, which would negatively affect businesses and likely be opposed by local businesses and residents. Dedicated bus infrastructure on the BQE, GCP, or RFK Bridge would substantially reduce these roadways’ capacities for general traffic, exacerbating delays on these already congested roadways. It is also unlikely that dedicated lanes could be implemented on these highways without capital enhancements to manage traffic flow and safety. The other types of bus enhancements, such as signal priority, have limited utility without dedicated bus lanes.

Increasing the frequency of service or number of routes would not address the reliability of bus service and the unpredictability of travel times in mixed traffic. Buses are subject to the same roadway conditions as taxis and private vehicles, meaning that Airport passengers and employees must add buffer time to account for frequent, but unpredictable, delays (see **Section 1.6.2** in **Chapter 1**). Also, adding more buses to the road would increase the congestion, and therefore traffic delays, near the Airport.

Despite the numerous bus service improvements made to date, 93 percent of travel to LGA is still by private vehicle or private shuttles, and buses still often fail to achieve their scheduled travel times (see **Chapter 1**). The TSM strategies are unlikely to substantially improve bus service or increase the use of transit for access to LGA.

In terms of Project objectives, this alternative would not meet Objective 1 (reliable travel time to LGA), Objective 2 (enhanced passenger experience), or Objective 4 (reduce the use of on-road vehicles). **Since this alternative would not meet these Project objectives, the PANYNJ did not advance this alternative for further consideration.** Individual TSM strategies could improve or enhance ground travel for some Airport customers, and such measures could be implemented in conjunction with or independent of the LGA Airport Access Improvement Project.

2.3.1.3 Transportation Demand Management (TDM)

A TDM Alternative consists of measures to reduce travel demand and therefore congestion. For this Project, it could include a combination of strategies to reduce private automobile travel to and from LGA. This could include measures to promote the use of public transit, walking or bicycling, and using car pools or van pools to LGA. Such measures could include the elimination of the fare for LGA bus routes, the provision of secured bicycle parking, and priority and/or reduced-fee parking for car or van pools. Other strategies could reduce demand for, or encourage the more efficient use of, taxis and other on-demand car services. For example, these could include measures such as promoting mobile apps that encourage shared rides at Airport taxi stands and for on-demand car service; better promotion of shared-ride services; and better promotion of bus and shuttle services. Another TDM option would be an increase in parking rates. None of these measures are likely to substantially reduce the number of vehicle trips to/from the Airport in a way that would reduce congestion and result in lower travel times and increased reliability for the travelers to and from the Airport, who would still arrive via rubber-tire vehicle using roadways.

TDM strategies could also include options to reduce private vehicle travel closer to the Airport property (i.e., shuttles from remote parking areas). However, shuttles from remote parking lots are already in use and have not substantially reduced private vehicle travel on Airport property.

TDM strategies that reduce vehicle use to and from the Airport would contribute to meeting the Sponsor's Project objective of reducing the use of on-road vehicles (Objective 4) and increasing reliability for other travelers using area roadways to reach the Airport, but given the heavy traffic volumes on roadways leading the Airport, they would not result in a large improvement in traffic conditions to meet the Project objectives.

A TDM Alternative on its own would not meet the Project objectives. This alternative would not meet Objective 1 (reliable travel time to LGA), Objective 2 (enhanced passenger experience), Objective 3 (improved travel options), Objective 6 (new or enhanced transit service), or Objective

7 (enhanced access to Terminals B and C). **Since this alternative would not meet most of the Project objectives, the PANYNJ did not advance this alternative for further consideration.**

2.3.1.4 Use of Other Airports

This alternative would involve implementing measures to shift Airport patronage to the other New York metropolitan area airports that already have direct rail access: JFK and EWR. Measures could include express trains, pricing incentives, or adjustments in air service.

This alternative would not meet the basic purpose for the Project of providing convenient and reliable access to LGA for its customers and employees. Shifting patrons to other airports is not an improvement of service and access to LGA. Moreover, diverting passengers to other airports would be difficult given that passengers are already making a choice between New York City's three major airports that accounts for all the factors that might influence such a decision, including available travel modes to the Airport, travel time, and airline schedule and cost. Neither FAA nor the PANYNJ has the authority to require passengers to use one airport over another, and any material diversion in demand from LGA would require airline strategic decisions that are not anticipated and cannot be predicted.

New York City's two other major airports (JFK and EWR) already have AirTrain service that provides convenient public transit access to those airports; any modifications to transit service would not change that service to the extent that additional passengers who prefer transit would select those airports rather than LGA. It is unlikely that additional passengers would be diverted that have not already chosen to do so. Moreover, the roadway congestion that delays trips to LGA includes many other vehicles in addition to those of travelers to and from LGA. Therefore, it is unlikely that this alternative would result in a reduction of congestion on roadways near LGA to benefit the Airport employees and remaining passengers; LGA would still be operational.

This alternative would not meet Objective 1 (reliable travel time to LGA), Objective 2 (enhanced passenger experience), Objective 3 (improved travel options), Objective 6 (new or enhanced transit service), or Objective 7 (enhanced access to Terminals B and C). **Since this alternative would not meet most of the Project objectives, the PANYNJ did not advance this alternative for further consideration.**

2.3.1.5 Off-Airport Roadway Expansion

This alternative would increase the capacity of a roadway route between Manhattan and LGA, for example, the three-mile-long route in Queens along the GCP from the RFK Bridge to LGA.

The GCP runs through Astoria and East Elmhurst past the southern boundary of the LGA property. The GCP is flanked to the north and south by two streets, one westbound and the other eastbound, that operate as a pair and together serve as a major arterial route for local traffic. West of 32nd Street, the pair of streets is named Hoyt Avenue. East of 32nd Street, the pair of streets is named Astoria Boulevard. North-south streets cross over the GCP on bridges or, in a few cases, under it through underpasses. Most of the local streets intersect with Hoyt Avenue or Astoria Boulevard at signalized intersections. Residential and commercial uses front Hoyt Avenue and Astoria Boulevard with primary access (pedestrian entrances and vehicular driveways) from these two streets. The Astoria Line (N) subway crosses over the GCP and Hoyt Avenue at 31st

Street, and the Hell Gate rail trestle, which is used by Amtrak and freight railroads, crosses over the GCP and Astoria Boulevard at about Steinway Street.

As is described more fully in **Section 2.4.1.1.4**, the neighborhood surrounding the GCP is developed with single- and multi-family residential buildings, with commercial uses along most east-west avenues and certain north-south streets. An office complex (Bulova Corporate Center), big-box retail uses, and light industrial and warehouse buildings are located near the interchange between the GCP and the BQE. A large cemetery (the 88-acre Saint Michael's Cemetery, established in 1852) is located within the triangle of roadways at the BQE and GCP interchange.

Given the development density along the GCP corridor, an at-grade expansion would require the acquisition of an extensive amount of property to widen the roadway to accommodate additional lanes. If the road were expanded by construction of a viaduct above the existing road on which additional lanes could run, this would be a complex undertaking with the need for reconstruction of multiple existing roadway bridges that cross the GCP, including the Amtrak Hell Gate rail trestle carrying Amtrak and freight rail service (refer to **Section 2.4.1.1.4** for a more detailed description of the Hell Gate trestle). This alternative would have substantial constructability considerations, a long timeframe for planning and implementation, and extensive community impacts. In addition, increasing capacity along this corridor may not substantially reduce travel times and reliability since it would not address congestion on the routes to and from the GCP.

Increasing roadway capacity in Queens would not address congestion near the Manhattan portals (i.e., RFK Bridge, Queensboro Bridge, and Queens-Midtown Tunnel) that lead to Queens. The limited capacity of the river crossings contributes greatly to travel times between Manhattan and LGA. It would be extremely disruptive to increase roadway capacity near and through the portals, with the need to acquire substantial property that is densely developed as well as impacts along, within, and adjacent to the East River.

This alternative would have the potential for substantial impacts along the route of the roadway expansion in Queens. The GCP between the RFK Bridge and LGA runs through densely developed neighborhoods. It is largely below the grade of the surrounding neighborhoods and flanked on either side by Hoyt Avenue/Astoria Boulevard, a pair of streets that together serve as a major local artery in western Queens and that are at the grade of the neighborhoods. Roadway widening would result in extensive community impacts, because it would require acquisition of many private residential and commercial properties along the route and a shift in the alignment of Astoria Boulevard to accommodate the widened roadway.

A new roadway viaduct would have lengthy construction-related impacts on traffic conditions and would result in major constructability issues because of the many local roadways that already cross over the GCP. In addition, a roadway widening project for the GCP would require modifications to the N Line Astoria Boulevard subway station, which spans the below-grade highway, and the Amtrak Hell Gate rail trestle approaching the Hell Gate Bridge, which crosses over the highway (refer to further discussion of the Hell Gate rail trestle in **Section 2.4.1.1.4**). Moreover, even with such an expansion, the RFK Bridge and Queens-Midtown Tunnel and roadways in Manhattan would not be expanded, and therefore, would remain prone to congestion, so this alternative would not improve travel time reliability between Manhattan and LGA.

Therefore, in terms of Project objectives, this alternative would not meet Objective 1 (reliable travel time to LGA), Objective 2 (enhanced passenger experience), Objective 3 (improved travel options), Objective 4 (reduce on-road vehicles), Objective 6 (new or enhanced transit service), Objective 7 (enhanced access to Terminals B and C), or Objective 8 (avoid substantial community disruption).

Since this alternative would not meet most of the Project objectives, the PANYNJ did not advance this alternative for further consideration.

2.3.1.6 Bus (Exclusive Roadway)

This alternative would provide dedicated infrastructure (i.e., bus lanes) between major transit hubs (i.e., commuter rail stations and/or subway stations) and the Airport. The bus lanes would be created by converting existing traffic lanes, parking lanes, or roadway shoulders to exclusive bus use. Existing roadways, such as the GCP, could also be expanded to add bus lanes. Typically, emergency vehicles are also permitted in exclusive bus lanes.

The connections from the busway to other transit options could be the same as existing bus connections or new and additional connections could be provided. At the Airport, the buses could directly serve the terminals. Bus stations or stops could be provided at some locations and passing lanes or breakdown lanes could be built to improve incident management.

Bus lanes could be exclusive to certain bus routes or could be for the use of all public buses. Existing bus routes and/or new routes could serve the busway. The routes could be served by the region's existing fleet, such as the vehicles used for the M60 or Q70 routes, or new types of buses could be purchased that include even more amenities for air passengers.

Construction of a new lane or the conversion of existing traffic lanes would require reconfiguration of the roadway, including shoulders and parking lanes, and would likely affect surrounding properties in the densely populated neighborhoods between Manhattan and LGA, as additional right-of-way would be required. Depending on the selected route or routes, acquisition could include high, medium, and low-density residential buildings, commercial and industrial buildings, and possibly open space and parklands. This acquisition would require condemnation of the properties and the relocation of current residents and businesses.

Given the limited roadway capacity in Manhattan, parts of Queens, and on the East River crossings, it is unlikely that buses could operate in exclusive right-of-way for the full route between the major transit hubs and the Airport. The M60 SBS route, for example, operates in exclusive bus lanes for a portion of its route, but dedicated lanes are not provided at several congested locations. Furthermore, where bus lanes are provided, prohibited or unprohibited use by taxis, delivery vehicles, and private vehicles often restricts the efficient flow of buses, and on local streets, buses would still encounter intersections and intersection controls (stop lights and stop signs). Since the exclusive bus lanes would likely not be feasible for the full route, buses would still be subject to traffic congestion and its unreliable travel times. Furthermore, buses in mixed traffic would not reduce the reliance on on-road vehicles for Airport access.

This alternative would not meet Objective 1 (reliable travel time to LGA), Objective 4 (reduce the use of on-road vehicles), or Objective 8 (avoid substantial community disruption).

Since this alternative would not meet three of the Project objectives, the PANYNJ did not advance this alternative for further consideration.

2.3.1.7 Ferry Service

A ferry to LGA could provide connections to Brooklyn, Queens, and/or Manhattan along the East River. Existing ferry routes or new ferry routes could operate between several existing landings (i.e., Pier 11, East 34th Street, Williamsburg, Long Island City, etc.) and the Airport (potential ferry routes shown in **Figure 2-2**). A new ferry landing could be constructed on the west side of the Airport adjacent to Terminal A. There could also be a landing on the east side of the Airport to service Terminals B and C. There could be direct pedestrian access between the ferry landing and Terminal A, but passengers destined for Terminals B and C, which serve more than 90 percent of LGA passengers, would likely connect via an Airport bus due to the distance.

The Citywide Ferry Study conducted in 2013 by the New York City Economic Development Corporation (NYCEDC) considered potential landings at both the east and west ends of the Airport (Flushing Bay landing and Bowery Bay landing, respectively).⁴ The study's analysis considered a two-vessel and four-vessel operating schedule for hourly and 30-minute service. Using a ridership model and financial analysis, a two-vessel service was determined the best option for LGA service. A Bowery Bay landing was determined the better landing option, as it would have shorter travel times. In general, a four-vessel service providing trips every 30 minutes would provide better travel times but would require subsidies. In addition, as noted in the Citywide Ferry Study, any ferry service would need to include an inter-terminal bus service at LGA to provide access to multiple terminals, including Terminal B (which is between the outer Terminals A and D).

Using the landings evaluated in the Citywide Ferry Study, a trip from Midtown Manhattan (East 34th Street) to the Bowery Bay landing would result in a 28-minute trip to the Airport. This travel time does not include any transfers from the Bowery Bay loading dock to the terminals via inter-terminal connected buses, which in all cases would result in more than two minutes of travel time. Therefore, a ferry option would exceed the 30-minute travel time in Objective 1. A trip to the Flushing Bay landing would be approximately 12 minutes longer than the trip to the Bowery Bay landing. In addition, the ferry landings would not provide direct access to the terminals, and a new bus system from the landings would be required, so that the ferry service on its own would not fully meet Objective 7 (provide a transportation option that provides access to new Terminals B and C, used by at least 90 percent of LGA passengers).

Because the ferry would involve multiple transfers between different transportation modes, especially for customers destined to Terminals B and C, it would not be convenient for passengers with bags/luggage. This was also considered in the Citywide Ferry Study; travelers with more than two bags traveling to the Airport were excluded from the ridership analysis, due to the cumbersome nature of carrying those bags on and off ferry service (Objective 2). Furthermore, there would be periods during winter months when ferry service may be disrupted by inclement weather (such as wind, snow, etc.), which would force passengers to rely on other existing

⁴ New York City Economic Development Corporation. Citywide Ferry Study Final Report. 2013. https://www.nycedc.com/sites/default/files/filemanager/Resources/Studies/2013_Citywide_Ferry_Study/Citywide_Ferry_Study_-_Final_Report.pdf.



— Study Routes

Site Condition

- Operational Landing
- Requires New Infrastructure

transportation modes to reach LGA. Based on historic ferry ridership (2012-2013), ridership peaked in better weather and dropped by 50 percent or more than half in the winter months.

This alternative would not meet Objective 1 (reliable travel time to LGA) and Objective 2 (enhanced passenger experience). It would also not meet Objective 7 (direct access to Airport terminals). While at some point in time in the future ferry service to LGA could be initiated, it would not address the goals and objectives of this Project. **Since this alternative did not meet these three Project objectives, the PANYNJ did not advance this alternative for further consideration.**

2.3.1.8 Rail or Subway Extensions

There have been several proposals for extending existing subway and LIRR service to LGA. In 1998, MTA, with support from the PANYNJ, initiated the LaGuardia Airport Subway Access (LASA) Study, which considered 19 transit alternatives for access to LGA, including subway extensions of the 7, N, R, and E Lines as well as LIRR spurs from the LIRR Port Washington Branch at Willets Point and from the LIRR Main Line at Sunnyside and Woodside. The LASA Study also evaluated new “people mover” alternatives and a bus transit alternative. However, major obstacles arose during this study, including concern over community impacts and challenges in integrating subway service that would be compatible with both NYCT system operating requirements and on-Airport constraints. Efforts to resolve these issues were terminated after the 9/11 terrorists’ attacks at the World Trade Center, which focused the attention and resources of the City of New York, the MTA, and the PANYNJ on the Lower Manhattan recovery and redevelopment. Thus, the LASA Study was terminated without confirming a constructible or operable alternative.

During the LASA Study, MTA concluded that many of the transit alternatives could not provide convenient and reliable access to LGA. This was because the existing and planned transit network did not have sufficient capacity to accommodate an additional service that could provide the appropriate minimum frequency of service for LGA in the peak hour (a minimum of six trains per hour), alternatives would require multiple transfers between modes, and/or alternatives would not reduce travel times from Lower or Midtown Manhattan to LGA. Some alternatives also had the potential for substantial social, economic, or community impacts during construction and/or permanently.

Based on the evaluations conducted for the LASA Study, three subway extension alternatives were selected for further evaluation before the study was discontinued. All three were extensions or branches of the Astoria Line subway service (currently N,W Lines, which operated with only N Line service when the LASA Study was conducted): 1) a new, elevated branch line from the Astoria Boulevard station, via the GCP to LGA; 2) an extension from the Astoria–Ditmars Boulevard station to LGA that would operate above-ground via 19th Avenue; and 3) an extension from the Astoria–Ditmars Boulevard station to LGA through a tunnel beneath 19th Avenue.

The MTA’s three alternatives for extension of Astoria Line subway service that were being evaluated in the LASA Study could potentially meet the PANYNJ’s objectives for the LGA Airport Access Improvement Project.

Another consideration for a potential subway extension to the Airport relates to funding for the Project. Funding using a Passenger Facility Charge (PFC) and/or airline contributions is necessary for this Project, and therefore, the selected alternative would have to comply with the FAA’s

requirements for the use of such funding sources. To comply, the extension would need to be designed exclusively for people going to or from the Airport, and any portion of the right-of-way that is funded with PFCs would need to be under the control of the Airport Sponsor. Any equipment, structures, facilities, control systems, or other components purchased with PFC funds would need to be used exclusively for the Airport service and operate fully within the Airport property. If the facilities or service are outside the control of the Sponsor or are not exclusively used for Airport purposes, then the PANYNJ would have to forgo PFCs or airline contributions to fund this Project.

With successful resolution of funding requirements and further investigation of alignments, a subway extension may meet the Project objectives. Therefore, the PANYNJ advanced the Rail or Subway Extension Alternative for further development and evaluation.

2.3.1.9 Fixed Guideway

The Fixed Guideway Alternative would result in a new transit system that would operate between an off-Airport station with connections to the New York City subway and/or commuter rail and the Airport on a dedicated alignment. The system would be independent of the existing MTA subway, rail, and bus systems. The Fixed Guideway Alternative would need to include a yard for vehicle storage and a facility to maintain and repair vehicles. The type of technology could include rubber-tire APM, steel wheel-steel rail APM, or CAV. These technologies may include varied design specifications (e.g., maximum vertical grades and turning radii, required support facilities, station size). A fixed guideway for the Project would be designed with the appropriate dimensions so that it would accommodate the range of technologies.

At the off-Airport terminal station, passengers would connect between the new fixed guideway system and existing subway, bus, or commuter rail trains for the remainder of their trips. Pedestrian bridges and vertical circulation would be provided to ensure a convenient transfer between the modes. Employee parking could potentially be provided at the off-Airport station.

The Fixed Guideway Alternative would meet the Project objectives, ensuring a reliable trip between the Airport and existing transit modes, and it would result in a system that has no dependency on existing roadways. **Therefore, the PANYNJ advanced the Fixed Guideway Alternative for further development and evaluation.**

2.3.1.10 Emerging Transportation Technologies

There are technologies that continue to evolve and may offer new transportation options in the future. Examples include CAVs in mixed traffic and personal transport systems. Others include new developments in underground high-speed rail technologies. Some of these technologies would require modifications to existing infrastructure, but others can be made available using existing roadways or another right-of-way. Emerging technologies could occur in the same fashion as other alternatives discussed earlier. For example, CAVs or personal transport systems could be placed on a fixed guideway.

There are technologies under development for high-speed underground rail systems that use autonomous electric vehicles that can carry passengers and travel through tunnels to be constructed using Tunnel Boring Machines (TBMs). Both the passenger vehicles and the

construction methods, including TBMs, would use new technology that may potentially enable faster, less costly construction and operation than standard underground rail systems in the future.

Since these types of technologies are in various stages of development, there is no certain timeframe for their implementation as a reliable and safe means for passengers and the public. Furthermore, New York City has limited availability of space for new infrastructure to support these technologies, so they would likely require an extended period and a substantial public investment to realize them. For example, the Boring Company, an underground high-speed rail company, has only one completed test tunnel (approximately two miles in length), and it is not in operation as a transportation system (as of August 2018). While that company is pursuing opportunities to construct multiple tunnels for transit projects around the country, there is not a working system operational at this time. Therefore, the operational and construction complexities, as well as the risk, are unknown and the technology is still considered speculative. For purposes of this Project, these technologies can be embraced in the consideration of a fixed guideway.

Since there is considerable uncertainty with the practical development and implementation of an Emerging Technologies Alternative, it is too speculative to assume this alternative would satisfy the Project objectives. In addition, due to this technical uncertainty, the PANYNJ did not consider Emerging Technologies reasonable at this time and did not advance this alternative for further evaluation.

However, the LGA Airport Access Improvement Project or the Sponsor would not preclude a future implementation of emerging technologies for Airport ground access if technologies became more certain over time. Some technologies, such as CAV, could be incorporated into a Fixed Guideway Alternative.

2.3.2 SUMMARY OF LEVEL 1 EVALUATION

Table 2-1 shows each alternative in terms of its ability to meet each of the PANYNJ's Project objectives. As shown, eight alternatives would not meet one or more Project objectives. Two alternatives could meet the objectives and the PANYNJ retained them for further development—the Rail or Subway Extension Alternative and the Fixed Guideway Alternative. Although the TSM and TDM Alternatives may provide incremental improvements, these methods would not create measurable benefits to achieve the PANYNJ's Project objectives. In addition, even in combination with other alternatives, these strategies would not modify the Level 1 results for any alternatives. The results of the Level 1 evaluation are summarized in **Table 2-2**.

Table 2-2
Level 1 Evaluation of Alternatives

Project Objective	Alternative									
	No Action Alternative	Transportation System Management (TSM)	Transportation Demand Management (TDM)	Use of Other Airports	Off-Airport Roadway Expansion	Bus (Exclusive Busway)	Ferry Service	Rail or Subway Extensions ¹	Fixed Guideway ¹	Emerging Transportation Technologies
1: Provide a new or enhanced transportation option to LGA with reliable and predictable travel time from Midtown Manhattan, Queens, and other areas of the region (less than 30 minutes from Penn Station or Grand Central Terminal).	Does not meet objective	Does not meet objective	Does not meet objective	Does not meet objective	Does not meet objective	Does not meet objective	Does not meet objective	Meets objective	Meets objective	Alternative cannot be defined at this time
2: Enhance the passenger experience by providing a transportation option tailored to air travel customers that is convenient and easily navigable for customers with baggage and travelers that may not know the area.	Does not meet objective	Does not meet objective	Does not meet objective	Does not meet objective	Does not meet objective	Meets objective	Does not meet objective	Meets objective	Meets objective	Alternative cannot be defined at this time
3: Improve travel options to the Airport by providing convenient, direct connections between the Airport and existing transit systems.	Does not meet objective	Meets objective	Does not meet objective	Does not meet objective	Does not meet objective	Meets objective	Meets objective	Meets objective	Meets objective	Alternative cannot be defined at this time
4: Reduce the use of on-road vehicles to move passengers to, from, and within the Airport.	Does not meet objective	Does not meet objective	Meets objective	Meets objective	Does not meet objective	Does not meet objective	Meets objective	Meets objective	Meets objective	Alternative cannot be defined at this time
5: Accommodate the provision of off-site employee parking with convenient access by way of the new transportation service to the Airport. ²	Does not meet objective	Meets objective	Meets objective	Meets objective	Meets objective	Meets objective	Meets objective	Meets objective	Meets objective	Alternative cannot be defined at this time
6: Provide a new or enhanced transportation service that accommodates the highest and best use of the Airport property.	Does not meet objective	Meets objective	Meets objective	Does not meet objective.	Meets objective	Meets objective	Meets objective	Meets objective	Meets objective	Alternative cannot be defined at this time
7: Provide a transportation option that provides access to new Terminals B and C, used by at least 90 percent of the LGA passengers.	Does not meet objective	Meets objective	Does not meet objective	Does not meet objective	Does not meet objective	Meets objective	Does not meet objective	Meets objective	Meets objective	Alternative cannot be defined at this time
8: Design and construct a project that avoids substantial disruption to the neighborhoods where it is located.	Meets objective	Meets objective	Meets objective	Meets objective	Does not meet objective	Does not meet objective	Meets objective	Meets objective	Meets objective	Alternative cannot be defined at this time
Evaluation Result	NOT RECOMMENDED	NOT RECOMMENDED	NOT RECOMMENDED	NOT RECOMMENDED	NOT RECOMMENDED	NOT RECOMMENDED	NOT RECOMMENDED	RECOMMENDED	RECOMMENDED	NOT RECOMMENDED
Note:										
1. Results are based on preliminary evaluation conducted for Level 1. These two alternatives were further developed in Level 2 and then re-evaluated for their ability to meet Project objectives.										
2. In preparing the Level 1 and Level 2 evaluations, the location of employee parking and ancillary facilities was only generally considered. The Level 1 and Level 2 evaluations identify whether the placement of these facilities is feasible, but they do not identify the specific locations for such facilities. A detailed consideration of the location and configuration of these elements is provided at the end of this study for the alternatives that advanced beyond the Level 2 evaluation.										

Table 2-2
Level 1 Evaluation Results

Alternative	Evaluation		Result
	Meet Project Purpose?	Meet Project Objectives?	
No Action Alternative	X	X	Retained as required by CEQ regulations
Transportation Systems Management	X	X	Not considered further as a standalone alternative. May be implemented as part of Preferred Alternative or as separate initiatives
Transportation Demand Management	X	X	Not considered further as a standalone alternative. May be implemented as part of Preferred Alternative or as separate initiatives
Use of Other Airports	X	X	Not considered further
Off-Airport Roadway Expansion	X	X	Not considered further
Bus (Exclusive Roadway)	X	X	Not considered further
Ferry Service	X	X	Not considered further as a standalone alternative. May be implemented as a separate initiative
Rail or Subway Extension	✓	✓	Retained for further development and evaluation
Fixed Guideway	✓	✓	Retained for further development and evaluation
Emerging Transportation Technologies	X	X	Too speculative to measure fulfillment of objectives, however, the fixed guideway alternative captures several technologies in development.

2.4 LEVEL 2 ALTERNATIVES EVALUATION

At the end of the Level 1 evaluation, the PANYNJ carried forward the alternatives that would meet the Sponsor's objectives for the Project for further development and evaluation in Level 2. In addition, the PANYNJ retained the No Action Alternative for comparative purposes in Project planning. As described in the previous section, the following alternatives remained for Level 2:

- No Action Alternative (retained to comply with NEPA requirements);
- Rail or Subway Extension Alternative; and
- Fixed Guideway Alternative.

In the Level 2 evaluation, the PANYNJ further developed and evaluated the Rail and Subway Extension Alternative and Fixed Guideway Alternative to determine whether they would still meet the Project objectives and whether they would be reasonable in terms of operations, constructability, right-of-way, and community impacts. These four criteria were considered the most critical to the decision to advance or not advance alternatives and alignment options and were given equal consideration for all alternatives at Level 2. At Level 2, the alternatives meet purpose and need so these criteria were intended to highlight any complexities or disadvantages that would make an alternative unreasonable and unfavorable relative to the PANYNJ's Project objectives.

For the Fixed Guideway Alternative, in the Level 2 evaluation the PANYNJ considered potential off-Airport terminal stations from which new service would connect to the Airport and potential routes for the service. Once an off-Airport terminal station was identified, the evaluation considered alignments options between the off-Airport terminal station and the Airport as well as locations for stations on-Airport; locations for an Operations, Maintenance, and Storage Facility (OMSF); and potential locations for an approximately 500-space, off-Airport employee parking lot.

2.4.1 LEVEL 2 EVALUATION OF THE RAIL OR SUBWAY EXTENSION ALTERNATIVE

Based on the Level 1 evaluation, a Rail or Subway Extension Alternative was carried forward for further development and was evaluated in Level 2. During the LASA Study, three subway extension alternatives were identified for further evaluation before the study was discontinued. The MTA's three alternatives for extension of Astoria Line subway service that were being evaluated in the LASA Study could potentially meet the PANYNJ's objectives for the LGA Airport Access Improvement Project. The PANYNJ considered the MTA's three potential alignments for the extension of subway service on the Astoria Line (N, W lines):

- 1) A new branch from close to the Astoria Boulevard station, via elevated tracks above the GCP to LGA;
- 2) An extension from the Astoria–Ditmars Boulevard station to LGA via an elevated structure above 31st Street and 19th Avenue; and
- 3) An extension from Astoria–Ditmars Boulevard station to LGA with a transition from the elevated section to a tunnel on 31st Street and then within a tunnel beneath 19th Avenue.

With any of these alignments, subway service on the Astoria Line would continue to the Airport via a new extension of the existing route. No new off-Airport subway stations would be created since the Astoria Line already has existing off-Airport subway stations. At the Airport, new subway stations would be added to serve LGA terminals. This alternative would be served by subway vehicles operating on the entire N/W Line. This service would be operated by NYCT, with storage and maintenance of rail vehicles at existing NYCT rail yards. Off-Airport parking for LGA employees could potentially be accommodated in a new parking lot or structure near one of the N and W Line subway stations in Queens.

2.4.1.1 Project Setting

2.4.1.1.1 N and W Lines

The N Line subway route operates 24 hours a day between Coney Island in southern Brooklyn and Astoria in Queens.⁵ In Manhattan, the N Line operates with express service from Lower Manhattan through Midtown on weekdays and with local service during late-night hours (approximately 10 PM–6:30 AM) and on weekends.⁶ The W Line subway route operates between Lower Manhattan and Astoria with local service. It operates on weekdays only, from approximately 6 AM–10 PM.⁷ In Manhattan, these routes serve Midtown on the East Side (59th Street and Lexington Avenue) and West Side (with stops at 57th Street and Seventh Avenue, 49th Street and Seventh Avenue, Times Square at 42nd Street and Broadway, and Herald Square at 34th Street and Broadway, continuing to Lower Manhattan).

N and W Line subway service runs from Manhattan to Queens via the 60th Street Tunnel beneath the East River, and then continues northward as an elevated train above 31st Street through Astoria to a terminus at the Astoria–Ditmars Boulevard station. Both the N and W Lines make seven stops in Queens. The existing elevated rail structure has three tracks—the two outer tracks provide local service and the inner track allows crossovers for trains to turn around. It also allows for bypasses during construction events. The line ends in a two-track terminal station at Astoria–Ditmars Boulevard station.

N Line service operates with trains every 15 to 20 minutes from approximately 10 PM to approximately 6 AM) and every 10 minutes or less during the daytime. W service operates between approximately 6 AM and 10 PM with trains every 10 minutes. The scheduled ride time from Midtown Manhattan (Times Square) to Astoria–Ditmars Boulevard station is approximately 22 to 25 minutes, depending on the time of day.

In Astoria, the elevated subway structure is within and above 31st Street, with the steel structure occupying much of the street width and the rail deck above the road and traffic. The Astoria Boulevard subway station is above 31st Street between Astoria Boulevard and 24th Avenue and spans the GCP as the highway ramps down from the RFK Bridge (to and from Manhattan and the Bronx) to a below-grade, open cut section east of 31st Street. The subway tracks are about 20 feet above the street and the station building's roof is about 15 to 20 feet higher than that.

⁵ See mta.info for a map of the New York City subway system.

⁶ The N Line schedule as of June 2018 is available at: <http://web.mta.info/nyct/service/pdf/tncur.pdf>.

⁷ The W line schedule as of June 2018 is available at: <http://web.mta.info/nyct/service/pdf/twcur.pdf>.

2.4.1.1.2 31st Street Corridor

The elevated subway structure above 31st Street passes through a densely developed residential neighborhood with local retail and commercial uses as well as community facilities that serve residents (i.e., Public School (P.S.) 85Q and New York City Police Department (NYPD) 114th Precinct), and parkland (Hoyt Playground and Columbus Triangle). Nearby streets are lined with attached residential buildings generally ranging in height from 3 to 10 stories, with some taller buildings. Retail uses are located at the ground-floor level along major streets, including beneath the subway structure on 31st Street. **Figures 2-3** and **2-4** illustrate the densely developed land use and urban character of the area around the Astoria Boulevard station (**Figure 2-3**) and Astoria–Ditmars Boulevard station (**Figure 2-4**).

Continuing north beyond the Astoria–Ditmars Boulevard station, 31st Street is a local retail corridor serving the surrounding residential neighborhood. On the block north of the Astoria–Ditmars Boulevard station (between Ditmars Boulevard and 21st Avenue), buildings are generally two to six stories with a continuous ground-floor retail presence of local businesses. A church and library branch on this block serve the Astoria community. Farther north, the block between 21st Avenue and 20th Avenue is lined with a continuous row of three- and four-story apartment buildings.

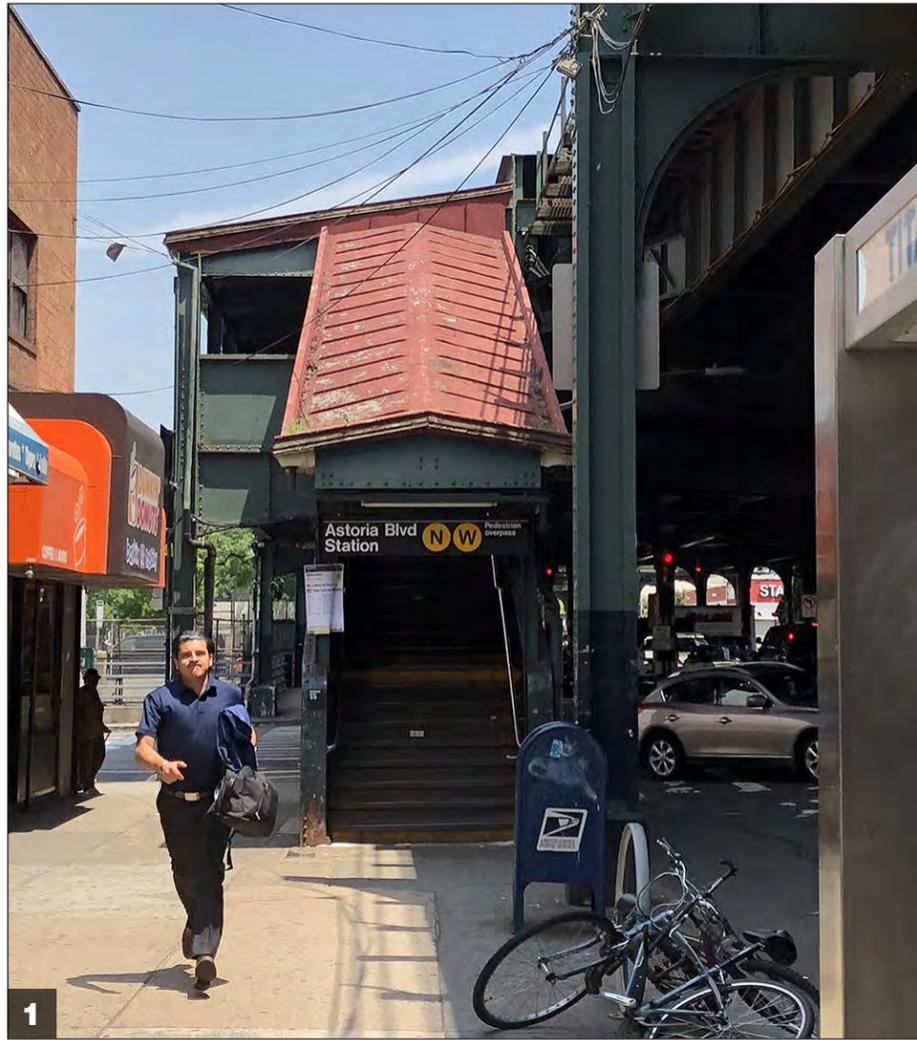
North of 20th Avenue, 31st Street continues into the Consolidated Edison Astoria Generating Station, where it is no longer a public street.

2.4.1.1.3 19th Avenue

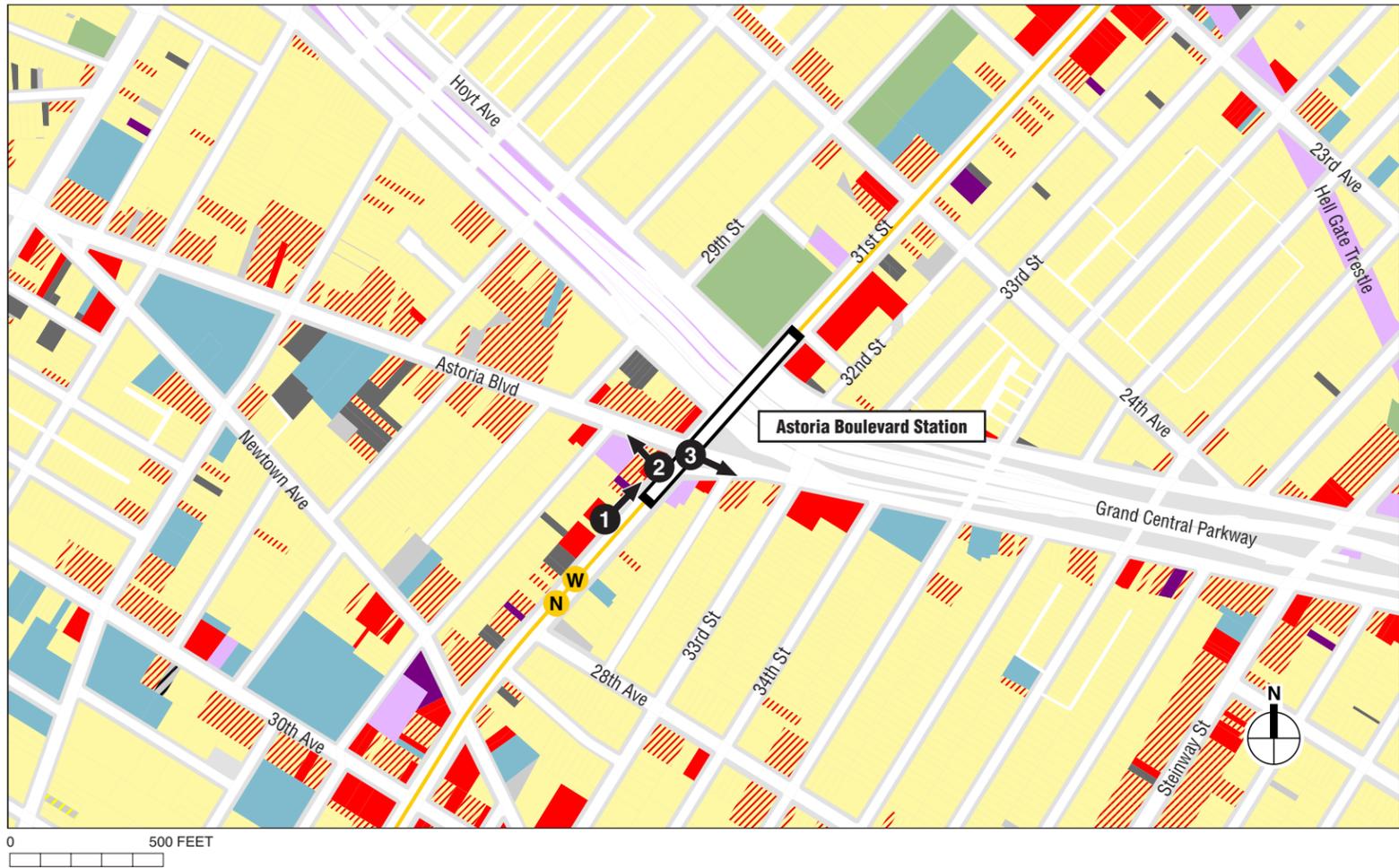
19th Avenue extends from behind the generating station property to LGA. 19th Avenue is generally industrial in character between the power property and Hazen Street, which is the access point for the large New York City correctional facility on Rikers Island. The block between Hazen Street and 81st Street is residential on the south side of 19th Avenue, including a multiple apartment houses and the Riker Rapelye-Lent house, a New York City Landmark that is the oldest house in Queens. A privately-owned complex of baseball diamonds used by the ElmJack Little League is on the north side of the street. The Airport property occupies the area beyond 81st Street.

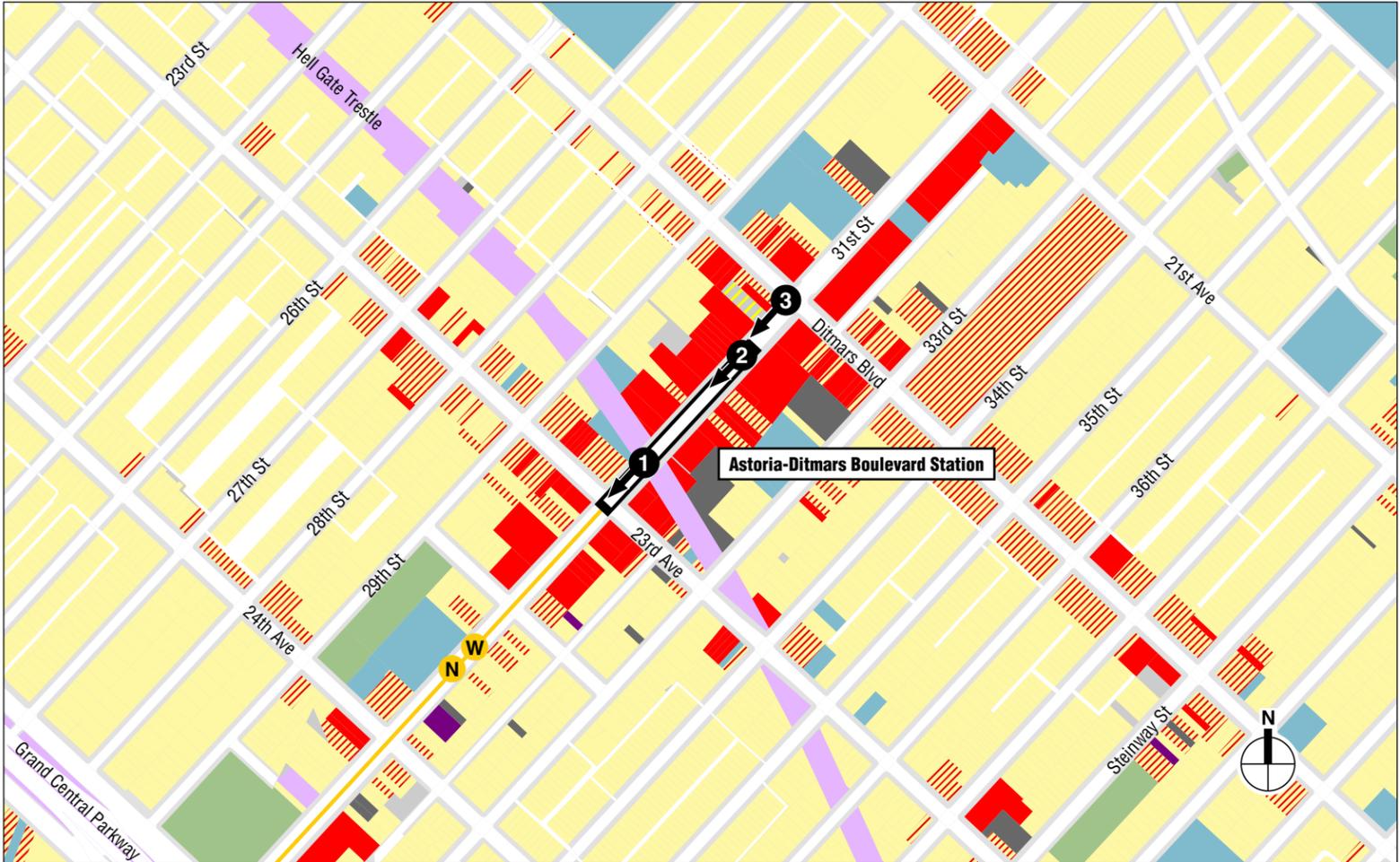
2.4.1.1.4 GCP/Astoria Boulevard Corridor

Eastward from 31st Street, the GCP travels in an open cut and then at grade through residential and commercial areas before reaching a major interchange with the BQE. The GCP has three lanes in each direction and is flanked by Astoria Boulevard on both sides, with eastbound traffic on Astoria Boulevard South on the south side of the GCP and westbound traffic on Astoria Boulevard North on the north side of the GCP. Astoria Boulevard North and South are above the grade of the GCP and at the grade of the nearby neighborhood streets. North- and southbound traffic on neighborhood streets crosses the GCP on bridges. Blocks north of the GCP are generally single-family houses with some commercial structures facing Astoria Boulevard. There are more dense uses south of the BQE with multi-story apartment buildings, hotels, and neighborhood retail on the ground floors of the multi-story buildings. Steinway Street crosses the GCP and is a heavily traveled commercial corridor for Astoria.



- Photograph View Direction and Reference Number
- Subway Route
- Transit Station
- Residential
- Residential with Commercial Below
- Hotels
- Commercial and Office Buildings
- Industrial and Manufacturing
- Transportation and Utility
- Public Facilities and Institutions
- Open Space and Outdoor Recreation
- Parking Facilities
- Vacant Land
- Vacant Building
- Under Construction





- Photograph View Direction and Reference Number
- Subway Route
- Transit Station
- Residential
- Residential with Commercial Below
- Hotels
- Commercial and Office Buildings
- Industrial and Manufacturing
- Transportation and Utility
- Public Facilities and Institutions
- Open Space and Outdoor Recreation
- Parking Facilities
- Vacant Land
- Vacant Building
- Under Construction

0 500 FEET

Near Steinway Street, the Hell Gate trestle also crosses over the GCP. The Hell Gate trestle is a rail bridge that carries passenger (Amtrak) and freight trains between Queens and Randall's Island (Manhattan) via the Hell Gate Bridge. The regional rail network in the context of the Hell Gate trestle is shown in **Figure 2-5**. The trestle's superstructure consists of a structure of steel girders supporting the track level with three tracks on top. The bottom of the superstructure is about 15 feet (about 1½ stories) above Astoria Boulevard and about 30 feet (three stories) above the GCP, and the track level is about 45 feet above Astoria Boulevard and 60 feet above the GCP. Catenary poles and cables that provide electric power to the trains run about 20 feet above the track level, for a total height of 65 feet above Astoria Boulevard and 80 feet above the GCP. The same structures that support the catenary cables also support transmission wires that are approximately 80 feet above Astoria Boulevard and 95 feet above the GCP. The Hell Gate trestle is a critical link in Amtrak's Northeast Corridor service between New York City and points north to Boston, and is the only rail freight crossing between Queens, Brooklyn, and Long Island and points west.

East of the Hell Gate trestle, the interchange of the six-lane GCP and four-lane BQE consists of many ramps and overpasses to allow traffic to move between these two major arteries and to continue Astoria Boulevard North and South through the interchange. The BQE splits so that it meets the GCP eastbound and westbound in two separate interchanges, and these two locations form a triangle around Saint Michael's Cemetery, a very large (88-acre) cemetery that is accessed from 49th Street. At the eastern interchange, the City of New York is proposing a reconstruction to create a new flyover ramp connecting Astoria Boulevard North and the BQE. Astoria Boulevard continues to flank the GCP through this section with its westbound lanes north of the GCP and its eastbound lanes south of the GCP.

Immediately east of the GCP and BQE interchange the westbound lanes of Astoria Boulevard cross the GCP, and it becomes a two-way arterial through East Elmhurst. Single-family homes, small apartment buildings, and low-density commercial uses occupy the blocks north of the GCP from Steinway Street to the Airport at 82nd Street. East of Saint Michael's Cemetery, a shopping center and the Bulova Corporate Center occupy the blocks south of the GCP. There are several blocks of open space and parkland along the south side of the GCP between the Bulova Center and the Airport, and then Airport-related commercial uses (hotels and car rental centers) as well as the Vaughn College of Aeronautics border the GCP to the south as it passes LGA.

In each of the three potential alignments for the Subway Extension Alternative, a subway structure to support heavy rail subway operations would extend from the existing Astoria Line elevated subway structure in Astoria, Queens to LGA.

2.4.1.2 Astoria Line Extension above GCP

2.4.1.2.1 Potential Alignment

In this alternative, a new elevated subway structure would extend eastward from the Astoria Line near the Astoria Boulevard station. It would cross Astoria Boulevard and the small public plaza, Columbus Triangle, where the current subway station stairs reach street level, to the GCP. It would then run above the GCP to LGA. **Figure 2-6** illustrates the potential route for the subway extension to LGA for this alternative. In this alternative, subway service on the Astoria Line would operate with two different routes. About half of existing Astoria Line (N and W) service would continue to the current terminus at Astoria–Ditmars Boulevard station, and the remaining trains



1. Hell Gate Bridge



2. Hell Gate Trestle at Astoria Ditmars, 31st Street



3. Hell Gate Trestle from Steinway Overpass of GCP



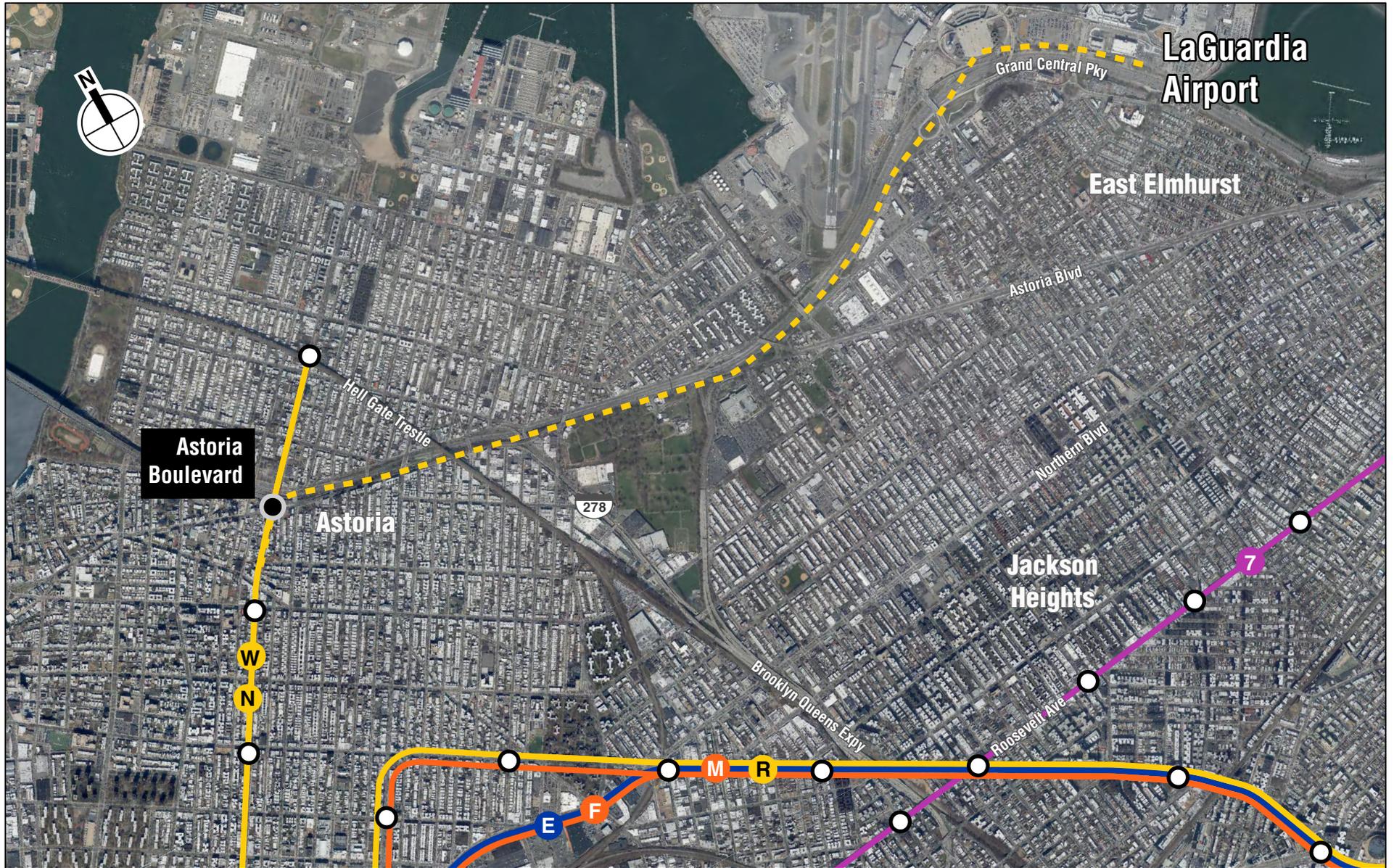
4. Amtrak Embankment on 57th Street between 30th and 31st Avenues



5. Hell Gate Trestle at Broadway and Northern Boulevard



6. Sunnyside Yard



- N/W Train Extension
- Subway/Fixed Guideway Transfer Station
- Subway Station

N/W Train Extension via Grand Central Parkway
Figure 2-6

would branch off in the vicinity of Astoria Boulevard station and continue to the Airport. This service would be operated by NYCT, with storage and maintenance of rail vehicles at existing NYCT rail yards. The final service plan would be subject to MTA Board approval.

This alternative would require extensive, complex construction on the Astoria Line and within and directly adjacent to a residential neighborhood and the GCP. The new elevated subway structure to GCP would need two tracks to allow for frequent bi-directional service. These new tracks would connect to the existing northbound track (i.e., the local track for northbound service) and the central track. The connection to the center track might be via an interlocking or a flyover to limit interference with continuing northbound service. The merge location would be south of the Astoria Boulevard station, which may have to be reconstructed and shifted northward to accommodate this new junction. The last station on the Astoria Line to serve the Airport route would be the station before the junction point, the 30th Avenue station. New crossovers would have to be constructed south of the Astoria Boulevard station to allow subway trains to move between tracks and may have to be constructed at the Astoria–Ditmars Boulevard station.

From 31st Street, the two tracks would be on an elevated structure that would use the GCP right-of-way to reach the Airport. The elevated subway structure would be predominantly in the south buffer area of the GCP, about 30 feet above the existing grade of neighborhood streets (and well above the GCP, which is in a cut below the neighborhood).

East of Steinway Street, the Hell Gate railroad trestle that crosses over the GCP would have to be modified for this alternative. Preliminary analysis assumed that long-term, full closures would not be permitted by Amtrak due to the critical freight and passenger service provided by this structure. The Hell Gate rail trestle currently has three tracks. Any work that replaces or impacts the superstructure spans would require a combination of temporary structures, partial closures, and full closures. Full closures of the three tracks would be limited to a narrow window of overnight work hours. Partial closures of two tracks at a time would likely be used in combination with temporary track and structure to avoid full closures. The duration of the partial closures could range from six months to three years, depending on the selected modification option. During these partial closures, the active tracks would likely have speed restrictions near or close to 5 miles per hour through the construction zone. Each of these options would result in substantial impacts to train service using the trestle, including Amtrak's Northeast Corridor, impacting the movement of thousands of people and tons of freight each day. Furthermore, the work would need to be scheduled in coordination with ongoing construction that also affects Amtrak service, including East Side Access, East River Tunnel repairs, the Gateway Program, and the Penn Station Access project). In addition, this alignment would require a permanent easement agreement with Amtrak to protect their infrastructure. In summary, the impacts to the Hell Gate railroad trestle would pose substantial constructability, logistical, and operational challenges both to Amtrak and overall project delivery.

Amtrak's Northeast Corridor is an essential artery serving the northeast region, connecting Washington, D.C. to Boston. More than 260 million trips per year are made on the Northeast Corridor of which more than 17 million are Amtrak. The remaining trips are provided by eight commuter railroads that share the Northeast Corridor with Amtrak. Overall, 2,100 passenger

trains and 60 freight trains operate on the Northeast Corridor every day.⁸ The majority of impacts on Amtrak's Northeast Corridor service and operations would be experienced along the segment from New York Penn Station to points north.

An option to span over the Hell Gate trestle would require the elevated subway structure to be about 80 to 95 feet above Astoria Boulevard and 95 to 110 feet above the GCP in order to provide adequate clearance above the catenary cables. At this height, the structure would be among the tallest in the neighborhood. It would also require modification of the existing transmission wires that provide electricity to the Northeast Corridor trains operating over the trestle. Modifications of the electrical system would require similar service disruptions previously described for the options that would modify the trestle structure.

Farther east, the new subway structure would pass Saint Michael's Cemetery, a large cemetery on the south side of the GCP. In this area the new subway structure might need to cantilever over the cemetery because of the limited space that could accommodate subway columns in the existing roadway right-of-way. In addition, Astoria Boulevard South would have to be reconfigured to reduce lane widths so that the sidewalk could be increased to a width that could accommodate the support structures for the elevated subway.

Beyond Saint Michael's Cemetery, several bridges, including a pedestrian bridge and two roadway bridges, would have to be reconstructed to accommodate the new subway structure as it descends into a tunnel in order to get below the Runway-04 approach surface. Approximately one-half mile of the alignment would be within the Airport approach surface, which would require special precautions during construction. The subway structure would need to be constructed in an open cut to pass beneath the bridges and overpasses in the approach surface. Several bridges in this area would need to be raised or reconstructed in order to accommodate the subway structure. The new structure would have to be designed in a manner that meets the existing line and grade of both Astoria Boulevard North and Astoria Boulevard South to prevent disturbance to the abutting properties and the existing adjacent roadways. Farther east, the subway would descend into a depressed cut, which would require a large existing sewer to be underpinned to allow construction to go underneath it. After leaving the approach surface near 90th Street, the subway structure would ascend, transitioning from a depressed cut section to an elevated structure and entering Airport property. The restrictions associated with the approach surface would substantially constrain and alter means and methods of construction, require alternate equipment, and lead to a longer construction duration. Off-peak lane closures of the GCP would be required near the Airport with the potential for a full closure of the GCP at Ditmars Boulevard during construction of this alternative.

At the Airport, this alternative could provide one or more on-Airport subway stations. These would require platforms approximately 615 feet long to accommodate 10-car (600-foot-long) subway trains. NYCT currently operates 10-car trains on the Astoria Line and would require that an LGA station accommodate 10-car trains. Subway trains have weight, power needs, security requirements, braking distances, emergency egress and turn-around operational requirements that exceed those of other types of transit vehicle types (i.e., APM). These requirements would add complexity to the station's construction as compared to a fixed guideway station. The width

⁸ Amtrak, "The Northeast Corridor Fact Sheet." <https://nec.amtrak.com/resource/the-northeast-corridor-fact-sheet/>. Web. Accessed July 24, 2018.

of the platforms would be similar to a fixed guideway station. While no changes to vertical circulation would likely be required to meet result of operational needs, there may be design adjustments needed to accommodate safety requirements for egress length and other factors as a result of longer station platforms. In addition to potentially adding more complexity to on-Airport construction, these differences may also limit the on-Airport engineering flexibility that would allow for more efficient design solutions.

Private property near an existing subway station on the N and W Lines in Queens would be required to accommodate off-Airport employee parking. The specific site would need to be determined with more advanced planning and design.

2.4.1.2.2 Evaluation of Alternative

- **Project Objectives.** An elevated subway extension via the GCP would meet most Project objectives. To meet Objective 5 (provision of off-site employee parking), this alignment would require acquisition of property near one of the existing subway stations on the Astoria Line in Queens sufficient to accommodate a 500-space parking lot or structured parking. However, this alternative would not be consistent with Objective 8 (avoid substantial community disruption) as described below.
- **Operations.** With this alternative, NYCT would operate the new subway service to the Airport. This alternative would operate as one branch of the Astoria Line subway service. NYCT might need to add subway service in the overnight period to provide adequate service for passengers and employees traveling to and from LGA.
- **Constructability.** Extension of an elevated subway structure to the Airport would require the necessary supporting structures and facilities to accommodate heavy rail subway operations. This would add complexity to construction and may also limit the engineering flexibility that would allow for more efficient design solutions. The subway extension would require relocation and reconfiguration of the Astoria Boulevard station, and the approximately 3.2-mile-long subway extension would require extensive, complex construction on the Astoria Line and within and adjacent to a densely populated residential neighborhood and the GCP/Astoria Boulevard corridor. This would include modifications to an existing subway station and to the Amtrak Hell Gate trestle as well as reconstruction of a pedestrian bridge and at least three roadway bridges. Construction of this alternative would result in substantial disruption to Amtrak's Northeast Corridor service due to the required modifications to the Hell Gate trestle and/or its power system. About one-half mile of the alignment would fall within an Airport approach surface, adding substantial complexity to the alignment's design and construction. There would be the relocation of a major sewer line and there would be partial and full closures of segments of the GCP. The restrictions associated with the approach surface would substantially alter means and methods of construction, require alternate equipment, and lead to a longer construction duration. Overall, these issues would introduce engineering difficulties and substantial risk to the construction of the Project.
- **Right-of-Way Factors.** While this alignment would be constructed predominantly within the public right-of-way of the GCP or other roadways and sidewalks and would require minimal or no private property for the stations and alignment. It would require a potential

cantilever over Saint Michael’s Cemetery. In addition, property would need to be acquired to accommodate new off-Airport employee parking near an existing Astoria Line subway station in Queens.

- **Community Impacts.** Construction of this alternative would require extensive and lengthy disruption directly within and near a densely developed residential neighborhood. Given the scope of the construction, this is likely to result in substantial disruption to the nearby community that would last over multiple years. Construction-related disruption impacts would also occur for subway service on the Astoria Line, traffic using the local roadways where bridges over the GCP must be reconstructed, and periodic disruption of Amtrak’s Northeast Corridor service between New York and destinations to the north and freight service from Long Island, Brooklyn and Queens to destinations to the west. The new subway structure, approximately 30 feet above the GCP, would adversely affect views from residential areas located directly along this route, and a cantilevered elevated subway structure over Saint Michael’s Cemetery would substantially alter views within the cemetery.

Extension of the Astoria Line subway via the GCP would not meet Objective 8 (avoid substantial community disruption), would pose substantial engineering challenges, and would disrupt service for trains using the Hell Gate railroad trestle. **For these reasons, the PANYNJ did not consider this alternative reasonable and did not advance it for further evaluation.**

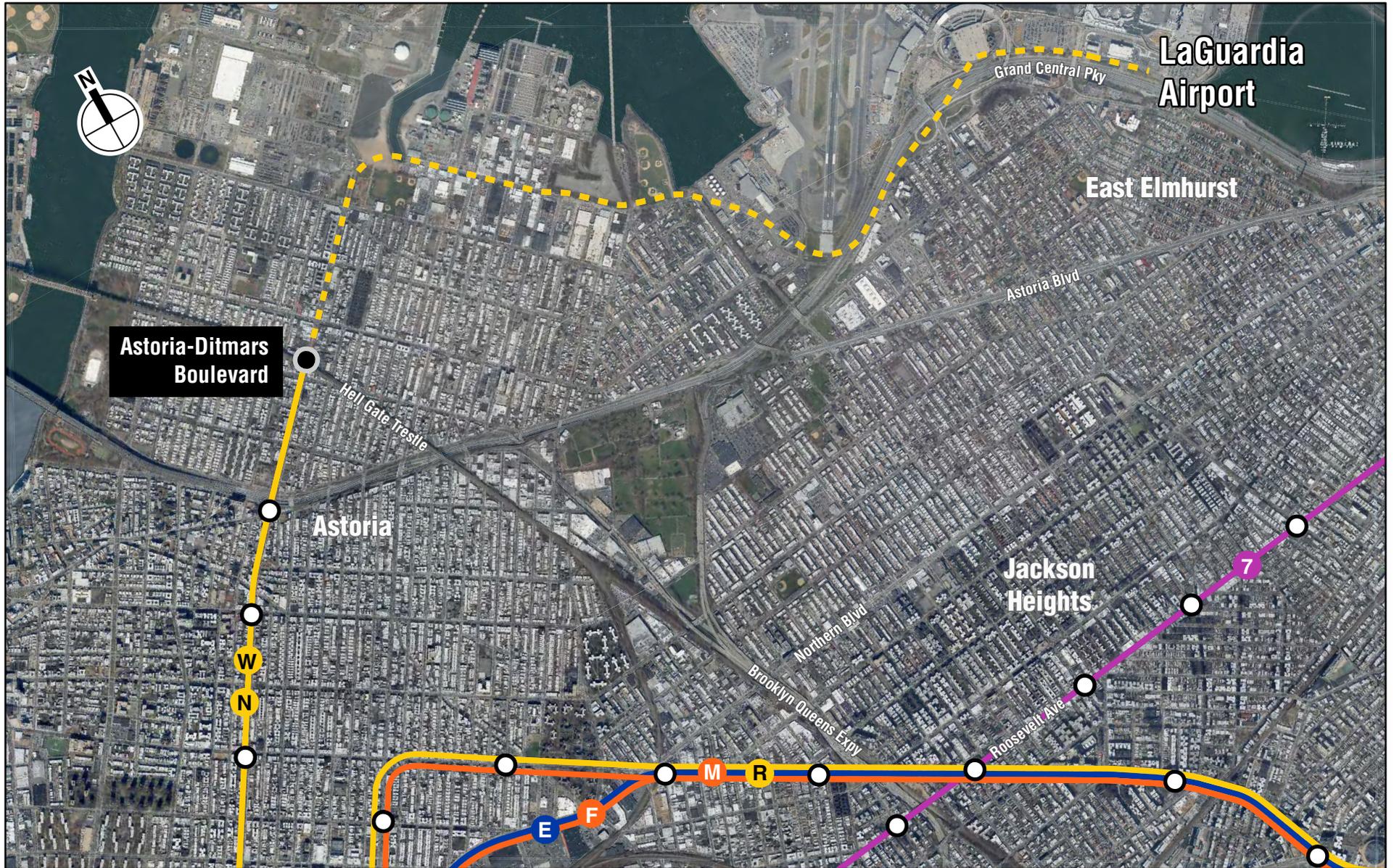
2.4.1.3 Elevated Astoria Line Extension via 19th Avenue

2.4.1.3.1 Potential Alignment

This alternative would extend the elevated N and W Line subway beyond its final stop at Astoria–Ditmars Boulevard station, continuing within and above 31st Street approximately 0.5 mile and then turning east and continuing above 19th Avenue approximately 2.5 miles farther to the Airport. **Figure 2-7** illustrates the potential route for the subway extension to LGA for this alternative. With this extension, all N and W trains would continue to the Airport. This service would continue to be operated by NYCT, with storage and maintenance of rail vehicles at existing NYCT rail yards. The final service plan would be subject to MTA Board approval.

The new elevated subway train structure in this alternative would be supported by columns in the street and/or sidewalks of 31st Street and 19th Avenue for its entire route. This would require construction of large support structures through a densely developed residential neighborhood, including a local commercial corridor serving the surrounding community. A residential and commercial corridor runs from the existing Astoria–Ditmars Boulevard station on 31st Street between 23rd Avenue and Ditmars Boulevard to the intersection of 31st Street and 20th Avenue. It is approximately one-half mile long and includes 25 single- and two-family and 13 multifamily residential properties and 16 commercial properties. Six of the 13 multifamily properties also include retail at the street level. The corridor also includes a public library, Queens Library at Steinway, and a church, Church of the Immaculate Conception. For approximately one-half mile, the new subway structure would be in the immediate vicinity (potentially 30 feet or less on each side) of multi-family residential properties, local retailers, and institutions.

The elevated train tracks would continue past 20th Avenue onto Consolidated Edison property that is not currently open to the public, and then would curve behind the power plant property



--- N/W Train Extension

● Subway/Fixed Guideway Transfer Station

○ Subway Station

0 2,000 FEET

to meet 19th Avenue. At the curve from 31st Street to 19th Avenue, the elevated tracks would be on an approximately 200-foot-long bridge above Luyster Creek, an inlet of the East River. Along 19th Avenue between 37th and 42nd Streets, several major utilities are below ground that would have to be accommodated by the pier placement supporting the elevated line, including an approximately 500 feet of a 66-inch-diameter combined sewer, 600 feet of a 27-kilovolt power distribution feeder, and 300 feet of a 48-inch-diameter water main. Accommodating these large utilities without disrupting service or adversely affecting their functionality would complicate the construction activities.

At 46th Street, the subway extension would shift to the north side of 19th Avenue and continue parallel to 19th Avenue via a 1.2-mile-long tunneled section to reach the Airport property. The alignment would enter an 800-foot-long depressed (open cut) section between approximately 47th and Hazen Streets, in the area known as Ingraham's Mountain, transitioning to an 800-foot-long cut-and-cover segment past Hazen Street and through the southern edge of the ElmJack Little League baseball fields on the north side of 19th Avenue. From the edge of the ballfield fields, the rest of the tunnel would be constructed using a TBM. The bored tunnel section would consist of two tunnels approximately 20 feet in diameter separated by approximately 25 feet. At 19th Avenue, the tunnel construction would require establishing a staging area from which soil excavated from the tunnel could be removed and construction materials needed for the tunneling could be delivered. This would involve heavy trucking activity and other noisy and disruptive construction activities close to multiple apartment buildings and the baseball fields.

At the end of 19th Avenue, the bored tunnel alignment would enter the west end of the Airport just south of the existing fuel farm. As the alignment enters the Airport, the tunnel would be approximately 60 feet deep. It would turn south and continue underground to the end of Runway LGA Runway 04. It would then cross beneath the GCP and run along the south side of the GCP where it would rise again to an elevated structure. Large utilities, including a 12-inch diameter high pressure fuel line and several large sewers (one 9- by 9-foot combined sewer and a 14-foot, 7-inch by 9-foot, 9-inch sewer), would have to be relocated to accommodate the tunnel alignment. Accommodating these large utilities without disrupting service would complicate construction. Moreover, the relocation work would have to be performed at night to avoid impacts to Airport operations. In addition, the existing GCP eastbound slip ramp to Ditmars Boulevard at 90th Street would have to be relocated farther east. This work might also need to be performed over a series of nights to limit traffic impacts. Lane closures would be needed off-peak on the GCP and Ditmars Boulevard during construction.

The alignment would ascend and cross over 94th Street and the GCP and continue on structure to new elevated subway stations on Airport property. The new on-Airport subway stations would have to be approximately 615 feet long to accommodate 10-car trains. NYCT currently operates 10-car trains on the Astoria Line and would require that an LGA station accommodate 10-car trains. Subway trains have weight, power needs, security requirements, braking distances, emergency egress and turn-around operational requirements that exceed those of the JFK and EWR AirTrain and similar vehicle types. These more robust requirements for subway vehicles would add complexity to the station's construction as compared to a fixed guideway station. The width of the platforms would be similar to a fixed guideway station. While no changes to vertical circulation would likely be required to meet operational needs, there may be design adjustments needed to accommodate safety requirements for egress length and other factors as a result of

longer station platforms. In addition to potentially adding more complexity to on-Airport construction, these differences may also limit the on-Airport engineering flexibility that would allow for more efficient design solutions.

Along 31st Street and 19th Avenue, the subway extension's construction would occur directly within neighborhood streets lined with residential, commercial, and institutional structures. Heavy construction would occur over a long period of time, with activities such as pile driving, jack hammering, the placement of beams and ties, and welding. Throughout construction, these activities would result in restricted access through the construction zones and the associated need for construction support vehicles and staging in residential areas.

Private property near the existing subway station on the N and W Lines in Queens would be required to accommodate off-Airport employee parking. The specific site would need to be determined with more advanced planning and design.

2.4.1.3.2 Evaluation of Alternative

- **Project Objectives.** A subway extension via 19th Avenue would meet most Project objectives. To meet Objective 5 (provision of off-site Airport employee parking), this alignment would require acquisition of property near one of the existing subway stations on the Astoria Line in Queens sufficient to accommodate a 500-space parking lot or structured parking. However, this alternative would not be consistent with Objective 8 (avoid substantial community disruption) as described below.
- **Operations.** With this alternative, NYCT would operate all N and W Line service to the Airport. NYCT might need to add subway service in the overnight period to provide adequate service for passengers and employees traveling to and from LGA.
- **Constructability.** Extension of an elevated subway structure to the Airport would require the necessary supporting structures and facilities to accommodate heavy rail subway operations. These would add complexity to construction and may also limit the engineering flexibility that would allow for more efficient design solutions. The approximately 3-mile-long subway extension would require extensive, complex construction. Construction activities, such as pile driving, would occur directly within neighborhood streets lined with residential, commercial, and institutional properties. This would include disruptive construction immediately adjacent to residences and local commercial and institutional uses on 31st Street and tunneling activities along 19th Avenue through baseball fields and beside multiple apartment buildings.

This alternative would have an approximately 1.5-mile-long tunnel beneath baseball fields and beside a block occupied by multiple apartment buildings, continuing close to and beneath Airport property, including near the end of a runway. The soil near the Airport has a high level of organic materials (extending to 80 feet below ground surface in some cases). Tunneling within organic materials can cause difficulties during tunnel boring, including issues related to steering and maintaining soil pressure, and may lead to excessive ground settlements. Tunneling would have to be relatively deep to avoid the organic materials, adding to the complexity of the construction. In addition, given the high ground water table in the area, any tunnel segments would require active removal of

water from the excavation area (i.e., dewatering). This would require ventilation plants/buildings as well as pumping stations for a below-grade option.

Overall, these issues would introduce engineering difficulties and substantial risk to the construction of the Project.

- **Right-of-Way Factors.** This alternative would require acquisition of portions of five privately owned commercial properties with a total area of about 20 acres; thus. However, only part of these properties would be needed for the right-of-way, so only partial property acquisition is needed. In addition, this alternative would require acquisition of the southern edge of the ElmJack Little League fields. Furthermore, additional property acquisition would be required to accommodate new off-Airport employee parking near an existing Astoria Line subway station in Queens.
- **Community Impacts.** Construction of this alternative would require extensive and lengthy disruption directly within and near a densely developed residential neighborhood along 31st Street. Heavy construction would occur over a long period of time, with activities such as pile driving, jack hammering, the placement of beams and ties, and welding. Given the scope of the construction, this is likely to result in substantial disruption to the nearby community that would last over multiple years. Reconstruction of the GCP ramps would require lengthy closures to roadways and diversions of traffic during construction and would also affect the nearby residential neighborhoods. In addition, for one-half mile, the new elevated subway structure would be in the immediate vicinity (potentially 30 feet or less on each side) of multi-family residential properties, local retailers, and institutions located along a corridor which runs from the existing Astoria–Ditmars Boulevard station on 31st Street between 23rd Avenue and Ditmars Boulevard to the intersection of 31st Street and 20th Avenue.

Extension of the elevated Astoria Line subway via 31st Street and 19th Avenue would not meet Objective 8 (avoid substantial community disruption) both during construction and as a result of the permanent elevated structure and would pose substantial engineering challenges. **For these reasons, the PANYNJ did not consider the alternative reasonable and did not advance it for further evaluation.**

2.4.1.4 Astoria Line Extension in Tunnel beneath 19th Avenue

2.4.1.4.1 Potential Alignment

This alternative would extend the N and W Line subway beyond its final stop following approximately the same route as the 19th Avenue elevated extension discussed in the preceding section. Beginning north of the Astoria Boulevard station, the subway structure would ramp down in 31st Street from an elevated section to a subway. It would be below ground before it reaches Ditmars Boulevard to enter a tunnel, with the Astoria–Ditmars Boulevard station moved to underground. The subway would then continue in a tunnel along the same route as the 19th Avenue alternative. **Figure 2-7** illustrates the potential route for the subway extension to LGA for this alternative. This service would continue to be operated by NYCT, with storage and maintenance of rail vehicles at an existing rail yard. The final service plan would be subject to MTA Board approval.

Where the train structure would ramp down into a depressed cut before entering the fully covered tunnel, major construction activities would be required to excavate the new cut section in 31st Street. This would result in substantial construction impacts in the middle of a local residential and neighborhood commercial street, which includes local retail uses, a church, and a branch of the Queens Library. Pedestrian access between the two sides of the street would also be adversely affected during construction.

Construction activities for the new 3-mile-long tunnel would involve establishing a staging area or several staging areas from which soil excavated from the tunnel could be removed and construction materials needed for the tunneling could be delivered. The staging areas would be in place for the duration of the multi-year construction period and would involve heavy trucking activity and other noisy and disruptive construction activities.

For the length of the tunnel, utilities located along the route would have to be relocated or supported in place. Where very large utilities are present, such as along 19th Avenue, accommodating them without disrupting service would complicate construction.

Near the Airport, this alternative would follow the same alignment as the 19th Avenue elevated subway alternative discussed in **Section 2.4.1.3.1**. The tunnel alignment, which would be approximately 60 feet deep, would enter the west end of the Airport just south of the existing fuel farm. As the alignment enters the Airport it would turn south and continue underground to the end of Runway-04. It would then cross beneath the GCP and run along the south side of the GCP where it would rise again to an elevated structure. Large utilities, including a 12-inch diameter high pressure fuel line and several large sewers (one 9- by 9-foot combined sewer and a 14-foot, 7-inch by 9-foot, 9-inch sewer) would have to be relocated to accommodate the tunnel alignment. Accommodating these large utilities without disrupting service would complicate construction. Moreover, the relocation work would have to be performed at night to avoid impacts to Airport operations. In addition, the existing GCP eastbound slip ramp to Ditmars Boulevard at 90th Street would have to be relocated farther east. This work might also need to be performed over a series of nights to limit traffic impacts. Lane closures would be needed off-peak on the GCP and Ditmars Boulevard.

The alignment would ascend and cross over 94th Street and the GCP and continue on structure to new elevated subway stations on Airport property. The new on-Airport subway stations would have to be approximately 615 feet long to accommodate 10-car subway trains. NYCT currently operates 10-car trains on the Astoria Line and would require that an LGA station accommodate 10-car trains. Subway trains have weight, power needs, security requirements, braking distances, emergency egress and turn-around operational requirements that exceed those of the JFK and EWR AirTrain and similar vehicle types. However, the width of the platforms would be similar to existing AirTrain stations at JFK and EWR. While no changes to vertical circulation would likely be required to meet operational needs, there may be design adjustments needed to accommodate safety requirements for egress length and other factors as a result of longer station platforms. In addition to potentially adding more complexity to on-Airport construction, these differences may also limit the on-Airport engineering flexibility that would allow for more efficient design solutions.

Once the construction is complete, much of the alignment would be below grade and would not be visible from the surrounding neighborhoods. The new Astoria–Ditmars Boulevard station would be below-ground, removing the elevated structure from 31st Street. However, where the train

structure would ramp down into a depressed cut in 31st Street before entering the fully covered tunnel, several local cross streets would have to be permanently truncated at 31st Street, since they could not cut through the sloping subway structure. Thus, traffic would not be able to use those streets to continue east-west across 31st Street and would have to divert to other local streets. Pedestrian access between the two sides of the street would also be adversely affected. This would adversely affect the character of the local residential and neighborhood commercial corridor, particularly during construction. The corridor runs from the existing Astoria–Ditmars Boulevard station on 31st Street between 23rd Avenue and Ditmars Boulevard to the intersection of 31st Street and 20th Avenue. This corridor is approximately one-half mile long and includes 25 single/double family and 13 multifamily residential properties and 16 commercial properties. Six of the 13 multifamily properties also include retail at the street level. The corridor also includes a public library, Queens Library at Steinway, and a church, Church of the Immaculate Conception.

In addition, the 3-mile-long tunnel would require several structures to house ventilation equipment and emergency egress. These would be located along the route and, based on recent tunneling activities in New York City such as the new Second Avenue Subway, they might be as much as 75 feet tall, in many cases notably taller than nearby development. Private property would have to be acquired for these new ventilation structures. Private property near the existing subway station on the N and W Lines in Queens would be required to accommodate off-Airport employee parking. The specific sites for these property acquisitions would need to be determined with more advanced planning and design.

2.4.1.4.2 Evaluation of Alternative

- **Project Objectives.** A below-grade subway extension via a tunnel beneath 31st Street and 19th Avenue would meet most Project objectives. To meet Objective 5 (provision of off-site employee parking), this alignment would require acquisition of property near one of the existing subway stations on the Astoria Line in Queens sufficient to accommodate a 500-space parking lot or structured parking. However, this alternative would not be consistent with Objective 8 (avoid substantial community disruption) as described below.
- **Operations.** With this alternative, NYCT would operate all N and W Line service to the Airport. NYCT might need to add subway service in the overnight period to provide adequate service for passengers and employees traveling to and from LGA.
- **Constructability.** Extension of a subway structure to the Airport would require the necessary supporting structures and facilities to accommodate heavy rail subway operations. These would complicate construction and may also limit the engineering flexibility that would allow for more efficient design solutions. The approximately 3-mile-long subway extension would require extensive and complex construction. This would involve disruptive construction activities directly adjacent to residences and local commercial and institutional uses on 31st Street.

This alternative would have an approximately 3-mile-long tunnel including a segment close to and beneath Airport property, and near the end of a runway. The soil near the Airport has a high level of organic materials (extending to 80 feet below ground surface in some cases). Tunneling within organic materials can cause difficulties during tunnel boring,

including issues related to steering and maintaining soil pressure, and may lead to excessive ground settlements. Tunneling would have to be relatively deep to avoid the organic materials, adding to the complexity of the construction. In addition, given the high ground water table in the area, any tunnel segments would require active removal of water from the excavation area (i.e., dewatering). This would require ventilation plants/buildings as well as pumping stations for a below-grade option.

Overall, these issues would introduce engineering difficulties and substantial risk to the construction of the Project.

- **Right-of-Way Factors.** No or minimal private property acquisition would be required for the tunnel and station, but property acquisition would be required to accommodate new ventilation structures and off-Airport employee parking near an existing Astoria Line subway station in Queens.
- **Community Impacts.** Construction of this alternative would require extensive and lengthy disruption directly within and near a densely developed residential neighborhood along 31st Street. This includes 25 single/double family and 13 multifamily residential properties and 16 commercial properties. Six of the 13 multifamily properties also include retail at the street level. The corridor also includes a public library, Queens Library at Steinway, and a church, Church of the Immaculate Conception. Given the scope of the construction, this is likely to result in substantial disruption to the nearby community that would last over multiple years. Reconstruction of the GCP ramps near the Airport would require lengthy closures to roadways and diversions of traffic during construction and would also affect the nearby residential neighborhoods. Once completed, this alternative would have substantial adverse effects on the character of the residential and commercial area along 31st Street where the structure would ramp via an open cut down to its tunnel, with permanently truncated neighborhood streets and curtailed pedestrian activity. In addition, large new ventilation structures (in many cases taller than the nearby development) would need to be placed along the route, including in the residential area at the beginning of the tunnel, which could be incongruous with the surrounding neighborhood character.

Extension of the Astoria Line subway via a tunnel beneath 31st Street and 19th Avenue would not meet Objective 8 (avoid substantial community disruption), including impacts associated with construction as well as permanent disruptions to the neighborhood, and would pose substantial engineering challenges. **For these reasons, the PANYNJ did not consider the alternative reasonable and did not advance it for further evaluation.**

2.4.1.5 Summary of Evaluation of Rail or Subway Extension Alternative

Table 2-3 summarizes the evaluation results for the Subway or Rail Extension Alternative. As shown, the three subway extension options would each not satisfy one or more of the evaluation criteria.

Table 2-3
Level 2 Evaluation of Rail or Subway Extension Alternatives

Evaluation Criteria	Rail or Subway Extension Alternative		
	Astoria Line above GCP	Astoria Line above 19th Avenue	Astoria Line below 19th Avenue
Project Objectives	Does not meet Objective 8 (Design and construct a project that avoids substantial disruption to the neighborhoods where it is located).	Does not meet Objective 8 (Design and construct a project that avoids substantial disruption to the neighborhoods where it is located).	Does not meet Objective 8 (Design and construct a project that avoids substantial disruption to the neighborhoods where it is located).
Operations	No substantial operational concerns.	No substantial operational concerns.	No substantial operational concerns.
Constructability	<p>Would require modification of the Astoria subway line, including the potential relocation of the Astoria Boulevard station and alteration of the existing track configuration, resulting in multiple weekend closures of the Astoria Line.</p> <p>Would result in substantial disruption to Amtrak's Northeast Corridor service due to the required modifications to the Hell Gate trestle and/or its power system.</p> <p>Would require modification of two roadway bridges and one pedestrian bridge over the GCP.</p> <p>About one-half mile of the alignment would fall within an Airport approach surface, adding substantial complexity to the alignment's design and construction.</p> <p>Would require relocation of a major sewer line.</p>	<p>Would create a 1.5-mile-long tunnel beneath the ElmJack Little League fields, beside a block occupied by multiple apartment buildings, and continuing close to and beneath Airport property.</p> <p>Soil near the Airport has a high level of organic materials, which can cause related to steering the tunnel boring machine and maintaining soil pressure, and may lead to excessive ground settlements. Any tunnel segments would require active removal of water from the excavation area (i.e., dewatering).</p>	<p>Would result in a tunnel close to and beneath Airport property, and near the end of a runway. The soil near the Airport has a high level of organic materials. Tunneling within organic materials can cause difficulties during tunnel boring, including issues related to steering and maintaining soil pressure, and may lead to excessive ground settlements. Tunneling would have to be relatively deep to avoid the organic materials.</p> <p>Tunnel segments would require active removal of water from the excavation area (i.e., dewatering). This would require ventilation plants/buildings as well as pumping stations.</p>
Right-of-way Factors	Minimal private property acquisition for station and alignment, but acquisition of property would be required for an employee parking facility.	Would require acquisition of part of 20 acres of commercial property for alignment. Additional private property would be needed for an employee parking facility.	Minimal private property acquisition for station and alignment, but acquisition of property would be required for an employee parking facility.
Community Impacts	<p>Construction would require extensive and lengthy disruption, including pile driving and other heavy construction activities, directly within and near a densely developed residential neighborhood.</p> <p>Construction activities would disrupt subway service on the Astoria Line, traffic using the local roadways where bridges over the GCP must be reconstructed, and Amtrak and freight rail operations over the Hell Gate trestle.</p> <p>The elevated structure would adversely affect views from residential areas located directly along this route, and a cantilevered elevated subway structure over Saint Michael's Cemetery would substantially alter views within the cemetery.</p>	<p>Construction would require extensive and lengthy disruption, including pile driving and other heavy construction activities, directly within and near a densely developed residential neighborhood along 31st Street.</p> <p>Reconstruction of the GCP ramps would require lengthy closures to roadways and diversions of traffic during construction.</p> <p>The new elevated subway structure would be in the immediate vicinity (potentially 30 feet or less on each side) of multi-family residential properties, local retailers, and institutions along 31st Street.</p>	<p>Construction would require extensive and lengthy disruption, including pile driving and other heavy construction activities, directly within and near a densely developed residential neighborhood along 31st Street.</p> <p>Reconstruction of the GCP ramps near the Airport would require lengthy closures to roadways and diversions of traffic during construction and would also affect the nearby residential neighborhoods.</p> <p>Once completed, this alternative would have substantial adverse effects on 31st Street where the structure would ramp via an open cut down to a tunnel, with permanently truncated neighborhood streets and curtailed pedestrian activity.</p> <p>New ventilation structures would be located along the route, including in the residential area at the beginning of the tunnel, which could be incongruous with the surrounding neighborhood character.</p>
Evaluation Result	NOT RECOMMENDED	NOT RECOMMENDED	NOT RECOMMENDED

2.4.2 LEVEL 2 EVALUATION OF FIXED GUIDEWAY ALTERNATIVE

The Fixed Guideway Alternative would consist of a transit vehicle operating on a fixed route from a terminal station accessible via New York City's public transit system to on-Airport stations serving LGA's terminals. To meet Project Objective 1 (reliable travel time), the system would operate with regular frequency and at a reliable speed, to move people between the transit system and LGA without long waits or lengthy travel times. The specific technology for the alternative has not been finalized, and could include rubber-tire APM, steel wheel-steel rail APM, or CAVs, but the operations and constructability considerations, right-of-way factors, and community impacts of a Fixed Guideway Alternative to LGA would be similar for the range of possible vehicle technologies.

The Fixed Guideway Alternative was refined in Level 2 to define its off-Airport terminal station and routing options. A fixed guideway would be routed between an off-Airport station and the Airport on its own dedicated alignment that would not be incorporated as part of the current roadway network or transit system.

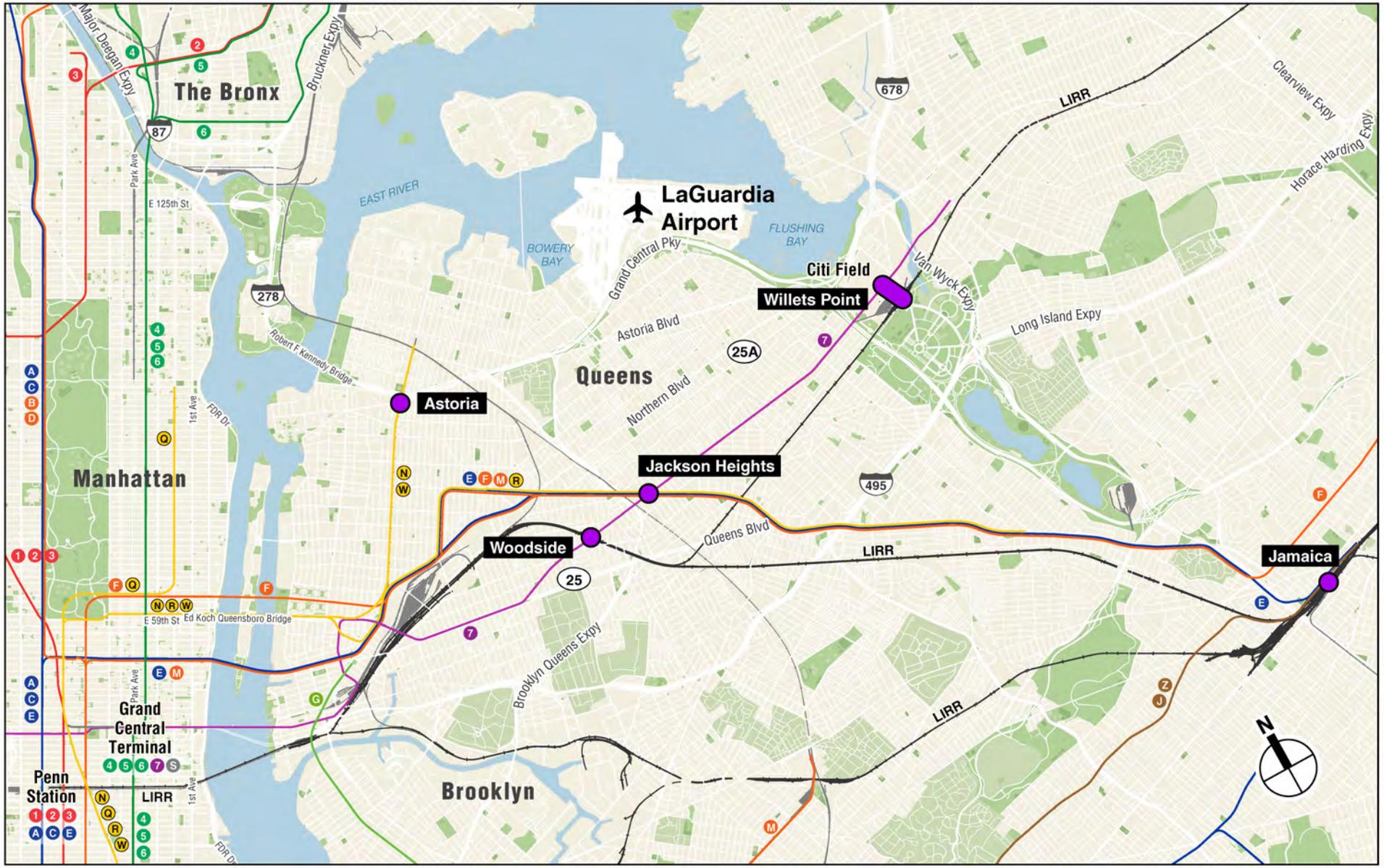
Therefore, the off-Airport station would be in a location that provides direct access to existing transportation systems (commuter rail, subway, and/or bus). As part of the Level 2 evaluation, alternative off-Airport stations were considered, as well as alternate alignments.

All options for a new fixed guideway system to serve the Airport would require an off-Airport terminal station. To meet the Sponsor's Project objectives, the off-Airport terminal station would provide connections to existing transit (commuter rail, subway, and/or local buses) as well as proximity to a site or sites that allow for the potential to construct a parking facility for employees (approximately 500 spaces) and an OMSF (approximately 87,000 to 107,000 square feet) to support the system's operations. As proposed, with the Fixed Guideway Alternative the Project would include the off-Airport terminal station, associated alignment, OMSF, and employee parking facility as part of the Airport Layout Plan (ALP).

Based on prior studies and a review of existing NYCT subway and LIRR commuter rail stations in Queens, the PANYNJ identified five potential off-Airport terminal station locations. These were selected based on their proximity to LGA and their connections to existing transit systems. All locations are transit hubs within the borough of Queens, no more than six miles from LGA; most are within three miles of the Airport (see **Figure 2-8**).

As discussed below, the PANYNJ considered the following transit hubs as potential off-Airport terminal stations for the Fixed Guideway Alternative: Astoria, Woodside, Jackson Heights, Jamaica, and Willets Point. For each of those locations, the PANYNJ considered whether an off-Airport terminal station at that location would meet the Project objectives and would be reasonable based on the four criteria related to operations, constructability, right-of-way factors, and community impacts.

The PANYNJ considered five off-Airport terminal station locations and determined that one of those stations would meet its Project objectives and be reasonable. For the reasonable off-Airport terminal station location, the PANYNJ then refined the Fixed Guideway Alternative to identify the preferred alignment (i.e., routing) for the guideway. The siting of the OMSF and employee parking lot were also considered for that terminal station location.



- Potential Station Locations for Fixed Guideway
- LIRR
- Subway Routes

Potential Off-Airport Terminal Station Locations for Fixed Guideway

Figure 2-8

2.4.2.1 Fixed Guideway Alternative from Astoria

2.4.2.1.1 Project Setting and Potential Station Concept

An Astoria off-Airport terminal for the Fixed Guideway Alternative would be located at the existing Astoria Boulevard (N,W Lines) subway station, a subway station approximately 2.4 miles west of LGA in the Astoria neighborhood of Queens. Two subway routes (N and W Lines) serve this station, and the station operates 24 hours a day, seven days a week. The M60 SBS and local bus routes also serve this station. There is no commuter rail service at this station. The travel time from Midtown Manhattan (Times Square) to the Astoria Boulevard station on the N and W Lines is approximately 20 to 23 minutes, depending on the time of day.

In Astoria, the elevated subway structure is within and above 31st Street, with the steel structure occupying much of the street width and the guideway deck above the road and traffic. The Astoria Boulevard subway station is above 31st Street between Astoria Boulevard and 24th Avenue and spans the GCP as the highway ramps down from the RFK Bridge to a below-grade section east of 31st Street. The subway tracks are about 20 feet above the street and the station building's roof is about 15 to 20 feet higher than that.

The area surrounding the Astoria Boulevard subway station is a densely developed residential neighborhood with local retail and commercial uses as well as community facilities that serve residents (i.e., P.S. 85Q and NYPD 114th Precinct), and parkland (Hoyt Playground and Columbus Triangle). Nearby streets are lined with attached residential buildings generally ranging in height from 3 to 10 stories, with some taller buildings. Retail uses are located at the ground-floor level along major streets, including beneath the subway structure on 31st Street. **Figure 2-3 in Section 2.4.1** illustrates the land use and neighborhood context around this station. The elevated subway structure is a dominant presence on 31st Street. There is also substantial highway infrastructure leading to and from the RFK Bridge, including bridge ramps to the west of 31st Street and the wide below-grade cut of the GCP to the east, as well as an interchange between the GCP and 31st Street.

Eastward from 31st Street, the GCP travels in an open cut and then at grade through residential and commercial areas before reaching a major interchange with the BQE. The GCP has three lanes in each direction and is flanked by Astoria Boulevard on both sides, with eastbound traffic on Astoria Boulevard South on the south side of the GCP and westbound traffic on Astoria Boulevard North on the north side of the GCP. Astoria Boulevard North and South are above the grade of the GCP, at the grade of the nearby neighborhood streets. North- and southbound traffic on neighborhood streets crosses the GCP on bridges. Blocks north of the GCP are generally single-family houses with some commercial structures facing Astoria Boulevard. There are more dense uses south of the BQE with multi-story apartment buildings, hotels, and neighborhood retail on the ground floors of the multi-story buildings. Steinway Street crosses the GCP and is a heavily traveled commercial corridor for Astoria.

Near Steinway Street, the Hell Gate trestle also crosses over the GCP. The Hell Gate trestle is a rail bridge that carries passenger (Amtrak) and freight trains between Queens and Randall's Island (Manhattan) via the Hell Gate Bridge. The trestle's superstructure consists of a structure of steel girders supporting the track level with three tracks on top. The bottom of the superstructure is about 15 feet (about 1½ stories) above Astoria Boulevard and about 30 feet (three stories) above

the GCP, and the track level is about 45 feet above Astoria Boulevard and 60 feet above the GCP. Catenary poles and cables that provide electric power to the trains run about 20 feet above the track level, for a total height of 65 feet above Astoria Boulevard and 80 feet above the GCP. The same structures that support the catenary cables also support transmission wires that are approximately 80 feet above Astoria Boulevard and 95 feet above the GCP. The Hell Gate trestle is a critical link in Amtrak's Northeast Corridor service between New York City and points north to Boston, and is the only rail freight crossing between Queens, Brooklyn, and Long Island and points west.

East of the Hell Gate trestle, the interchange of the six-lane GCP and four-lane BQE consists of many ramps and overpasses to allow traffic to move between these two major arteries and to continue on Astoria Boulevard North and South through the interchange. The BQE splits so that it meets the GCP in two separate interchanges, and these two locations form a triangle around Saint Michael's Cemetery, a very large cemetery that is accessed from 49th Street. At the eastern interchange, the City of New York is proposing a reconstruction to create a new flyover ramp connecting Astoria Boulevard North and the BQE. Astoria Boulevard continues to flank the GCP through this section with its westbound lanes north of the GCP and its eastbound lanes south of the GCP. Astoria Boulevard continues to flank the GCP through this section with its westbound lanes north of the GCP and its eastbound lanes south of the GCP.

Immediately east of the GCP and BQE interchange the westbound lanes of Astoria Boulevard cross the GCP, and it becomes a two-way arterial through East Elmhurst. Single-family homes, small apartment buildings, and low-density commercial uses comprise the blocks north of the GCP from Steinway Street to the Airport at 82nd Street. East of Saint Michael's Cemetery, a shopping center and the Bulova Corporate Center comprise the blocks south of the GCP. There are several blocks of open space and parkland along the south side of the GCP between the Bulova Center and the Airport, and then Airport-related commercial uses (hotels and car rental centers) as well as the Vaughn College of Aeronautics border the GCP to the south as it travels through LGA.

To provide simple passenger transfers between the new Airport service and the subway, a new off-Airport terminal station for the Fixed Guideway Alternative at the Astoria Boulevard subway station would most likely be located above and perpendicular to the subway station. Given the height of the existing station above grade, this would mean that the new fixed guideway station would be about 60 feet (six stories) above street level. Assuming the station was centered over the GCP, the northern and southern limits would be about 100 feet from the nearest property line. The station would be above Astoria Boulevard at that height between approximately 29th Street and 31st Street. The new fixed guideway station would have stairs and an elevator connecting to the subway station platform and stairs and elevators connecting to street level within Astoria Boulevard or a small public plaza nearby, Columbus Triangle. Columns supporting the new station would be in the street and sidewalks, like the existing subway tracks above 31st Street.

From the terminal station to the Airport, the fixed guideway would follow a similar alignment to that discussed for the Subway Extension Alternative, using the GCP right-of-way to reach the Airport. The guideway would be predominantly in the south buffer area of the GCP and would be about 30 feet above the existing grade of neighborhood streets (and well above the GCP, which

is in a cut below the neighborhood). **Figure 2-9** illustrates the potential routing for a fixed guideway alignment from Astoria to LGA.

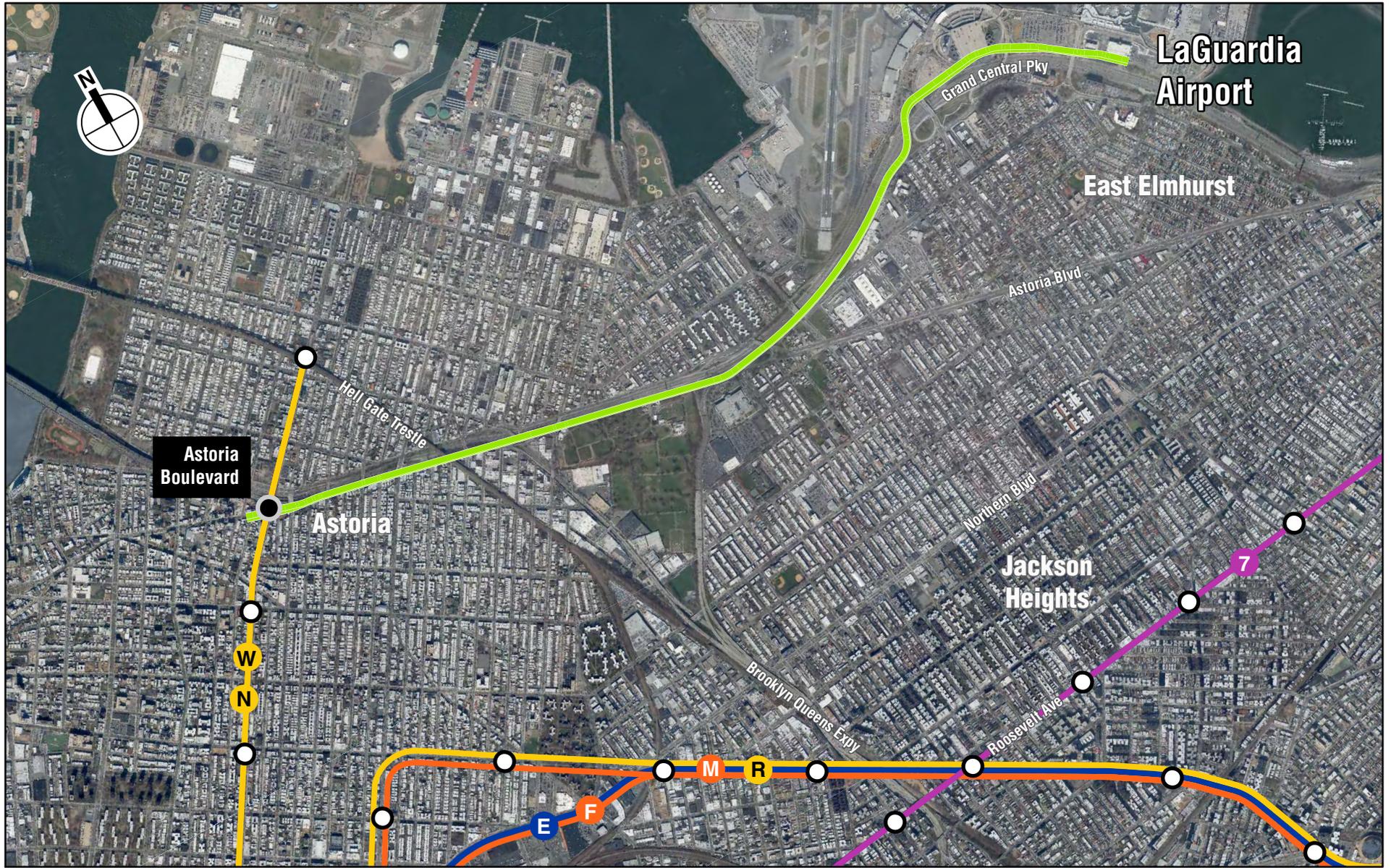
East of Steinway Street, the Hell Gate railroad trestle that crosses over the GCP would have to be modified for this alternative. Preliminary analysis assumed that long-term, full closures would not be permitted by Amtrak due to the critical freight and passenger service provided by this structure. The Hell Gate rail trestle currently has three tracks. Any work that replaces or impacts the superstructure spans would require a combination of temporary structures, partial closures, and full closures. Full closures of the three tracks would likely be limited to overnight durations. Partial closures of two tracks at a time would likely be used in combination with temporary track and structure to avoid full closures. The duration of the partial closures could range from six months to three years, depending on the selected modification option. During these partial closures, the active tracks would likely have speed restrictions near or close to 5 miles per hour through the construction zone. Each of these options would result in substantial impacts to train service using the trestle, including Amtrak's Northeast Corridor, impacting the movement of thousands of people and tons of freight each day. Furthermore, the work would need to be scheduled in coordination with ongoing construction that also affects Amtrak service, including East Side Access, East River Tunnel repairs, the Gateway Program, and the Penn Station Access project). In addition, this alignment would require a permanent easement agreement with Amtrak to protect their infrastructure. In summary, the impacts to the Hell Gate railroad trestle would pose substantial constructability, logistical, and operational challenges both to Amtrak and overall project delivery.

Amtrak's Northeast Corridor is an essential artery serving the northeast region, connecting Washington, D.C. to Boston. More than 260 million trips per year are made on the Northeast Corridor of which more than 17 million are Amtrak. The remaining trips are provided by eight commuter railroads that share the Northeast Corridor with Amtrak. Overall, 2,100 passenger trains and 60 freight trains operate on the Northeast Corridor every day.⁹ The majority of impacts on Amtrak's Northeast Corridor service and operations would be experienced along the segment from New York Penn Station to points north.

An option to span over the Hell Gate trestle would require the elevated subway structure to be about 80 to 95 feet above Astoria Boulevard and 95 to 110 feet above the GCP in order to provide adequate clearance above the catenary cables. At this height, the structure would be among the tallest in the neighborhood. It would also require modification of the existing transmission wires that provide electricity to the Northeast Corridor trains operating over the trestle. Modifications of the electrical system would require similar service disruptions previously described for the options that would modify the trestle structure.

Farther east, the new fixed guideway would pass Saint Michael's Cemetery, a large (88-acre) cemetery on the south side of the GCP. In this area, the new fixed guideway structure might need to cantilever over the cemetery because of the limited space that could accommodate support columns in the existing roadway right-of-way. In addition, Astoria Boulevard South would have to be reconfigured to reduce lane widths so that the sidewalk could be increased to a width that could accommodate the guideway columns. Beyond the cemetery, several bridges, including a

⁹ Amtrak, "The Northeast Corridor Fact Sheet." <https://nec.amtrak.com/resource/the-northeast-corridor-fact-sheet/>. Web. Accessed July 24, 2018.



- Fixed Guideway Routing
- Subway/Fixed Guideway Transfer Station
- Subway Station

Fixed Guideway Routing from Astoria
Figure 2-9

pedestrian bridge and two roadway bridges, would have to be reconstructed to accommodate the new guideway. In addition, approximately one-half mile of the alignment would be within the Airport approach surface, which would require special precautions during construction. The guideway would need to be constructed in an open cut to pass beneath the bridges and overpasses in the approach surface. Several bridges in this area would need to be raised or reconstructed to accommodate the train. The new structure would have to be designed in a manner that meets the existing line and grade of both Astoria Boulevard North and Astoria Boulevard South to prevent disturbance to the abutting properties and the existing adjacent roadways. Farther east, the guideway would descend into a depressed cut, which would require a large existing sewer to be underpinned to allow construction to go underneath it. After leaving the approach surface and near 90th Street, the guideway would ascend, transitioning from a depressed cut section to an elevated structure and entering the Airport. The restrictions associated with the approach surface would substantially constrain and alter means and methods of construction, require alternate equipment, and lead to a longer construction duration. Off-peak lane closures of the GCP would be required near the Airport with the potential for a full closure of the GCP at Ditmars Boulevard.

Private property along the route would need to be acquired to accommodate an approximately 87,000- to 107,000-square-foot OMSF to support a fixed guideway system's operation. Private property near the terminal would also be required to accommodate off-Airport employee parking. The specific sites would need to be determined with more advanced planning and design.

2.4.2.1.2 Evaluation of Off-Airport Terminal Station Concept

- **Project Objectives.** An off-Airport terminal station at Astoria with a fixed guideway to LGA via the GCP would meet most Project objectives. To meet Objective 5 (provision of off-site employee parking), this alignment would require acquisition of property in Astoria near the terminal station sufficient to accommodate a 500-space parking lot or structured parking. However, this alternative would not be consistent with Objective 8 (avoid substantial community disruption) as described below.
- **Operations.** The assessment did not identify any substantial operational concerns.
- **Constructability.** The approximately 3.2-mile-long fixed guideway would require extensive, complex construction within and adjacent to a densely populated residential neighborhood and the GCP/Astoria Boulevard corridor. This would include construction of a new fixed guideway station and modifications to an existing subway station within the residential neighborhood. It would also include modifications to the Amtrak Hell Gate railroad trestle and reconstruction of a pedestrian bridge and at least two roadway bridges. Construction of this alternative would result in disruptions to traffic using the local roadways where bridges over the GCP must be reconstructed, periodic disruption of Amtrak's Northeast Corridor service between New York and destinations to the north, and of freight service from Long Island, Brooklyn and Queens to destinations to the west. About one-half mile of the alignment would fall within an Airport approach surface, adding substantial complexity to the alignment's design and construction. There would be the relocation of a major sewer line, and there would be partial and full closures of segments of the GCP during construction. The restrictions associated with the approach surface would substantially alter means and methods of construction, require alternate

equipment, and lead to a longer construction duration. Overall, these issues would introduce engineering difficulties and substantial risk to the construction of the Project.

- **Right-of-Way Factors.** This alignment would be constructed predominantly within the public right-of-way of the GCP or other roadways and sidewalks and would require minimal or no private property for the stations and alignment. However, it would include a potential cantilever above Saint Michael's Cemetery. In addition, there would be acquisition of right-of-way for the OMSF, and additional property near the off-Airport terminal station would need to be acquired for the development of Airport employee parking.
- **Community Impacts.** Construction of this alternative would require extensive and lengthy disruption in and near a residential neighborhood. Given the scope of the construction, this is likely to result in substantial disruption to the nearby community over multiple years. Construction impacts would also occur for traffic using the local roadways where bridges over the GCP must be reconstructed, and periodic disruption of Amtrak's Northeast Corridor service between New York and destinations to the north. The new terminal station at Astoria Boulevard and the new guideway structure approximately 30 feet above the GCP would adversely affect views from residential areas located directly along this route, and a cantilevered guideway structure over Saint Michael's Cemetery would substantially alter views within the cemetery.

An off-Airport terminal station at Astoria and associated fixed guideway alignment would not meet Objective 8 (avoid substantial community disruption) and would introduce substantial engineering challenges. **For these reasons, the PANYNJ did not consider this off-Airport terminal station alternative reasonable and did not advance it for further evaluation.**

2.4.2.2 Fixed Guideway Alternative from Woodside

2.4.2.2.1 Project Setting and Potential Station Concept

A Woodside off-Airport terminal would be located at the Woodside LIRR station, which is also the location of the 61st Street-Woodside (7 Line) subway station. The fixed guideway alignment would follow existing railroad right-of-way and then parallel the BQE and GCP to reach the Airport.

The Woodside LIRR and subway station are at the intersection of Roosevelt Avenue and 61st Street in the Woodside neighborhood of Queens, about 2.5 miles southwest of LGA. One subway route (7 Line) serves this station, and the station operates 24 hours per day, seven days per week. There is local subway service at all times and peak-direction express service on weekdays. Woodside is served by all branches of the LIRR that operate between Penn Station and Queens, Suffolk, and Nassau Counties. There is frequent LIRR service with multiple trains each hour stopping at this station on weekdays and weekends; however, some trains bypass this station, particularly during the weekday morning and afternoon peak periods. The Q70 SBS (LaGuardia Link) and local bus routes also serve this station. The travel time from Midtown Manhattan to this station is about 16 minutes on the 7 Line express and 18 minutes on the 7 Line local subway from Grand Central Terminal. It is about 11 minutes on the LIRR from Penn Station to Woodside. Once the East Side Access Project is complete, there will be new LIRR service between Grand Central Terminal and Woodside.

In Woodside, the tracks for LIRR's Main Line run through the neighborhood on a berm about 15 feet above street level. The right-of-way is six tracks wide. The Main Line is askew relative to the street grid and crosses local streets on railroad bridges. The 7 Line is on an elevated subway structure above Roosevelt Avenue, with the structure's supports in the street and sidewalk of the avenue and the track bed about 20 feet above. At the Woodside station, the subway station for the 7 Line is above and diagonal to the LIRR station at an elevation of about four stories above the street.

The area around the Woodside station is a busy commercial center for the Woodside community. Residential buildings include a mix of two- to three-story rowhouses mixed with four- to eight-story apartment buildings. **Figure 2-10** illustrates the land use and urban character of this area. Roosevelt Avenue is a busy commercial street and the intersection of Roosevelt Avenue and 61st Street, where the two elevated rail structures meet is a very busy intersection with high vehicle and pedestrian volumes.

The LIRR travels on a mix of viaduct and berm as it continues northwesterly through Woodside and Sunnyside toward Manhattan. The tracks are about 20 feet above street level. Several streets pass beneath the right-of-way, but many streets dead-end at the railroad right-of-way. The adjacent blocks are generally developed with two- or three-story detached or duplex houses and one- or two-story commercial and light-industrial uses. West of 58th Street, 38th Avenue runs directly north of the LIRR berm and private property borders the berm to the south.

Just west of Woodside Avenue, there is a major railroad interlocking.¹⁰ West of the interlocking, tracks lead to the Sunnyside Yard (a major storage yard for Amtrak, LIRR, and NJ TRANSIT trains) and the East River tunnels to Manhattan. At the interlocking, the passenger rail lines split into the LIRR Mainline toward Woodside and Jamaica, and Amtrak's Northeast Corridor toward the Hell Gate Bridge and Boston.

The Northeast Corridor travels northeasterly from the interlocking at Woodside Boulevard in the direction of the BQE. It continues on viaduct, crossing Broadway and Northern Boulevard. It bisects multiple city blocks and then continues along 57th Street to its junction with a freight rail trestle near the intersection of 50th Street and Borough Place. This section of the Northeast Corridor travels through the busy Northern Boulevard commercial corridor, consisting of big box national retail chains and large automobile dealerships. The tracks then bisect multiple blocks of two- and three-story rowhouses. North of 31st Avenue, the Northeast Corridor is immediately east of the Boulevard Gardens, a 960-unit cooperative apartment complex.

31st Avenue crosses the BQE just south of Saint Michael's Cemetery and the BQE interchange with the GCP. Near the cemetery there are several large, single- or two-story commercial and industrial buildings. East of the BQE, 31st Avenue traverses a residential neighborhood of two- and three-story attached and detached houses.

Boody Street parallels the connecting ramp between the BQE and GCP. Boody Street passes through a residential community of two- and three-story rowhouses and then a shopping center. It merges with Astoria Boulevard just west of the Bulova Corporate Center.

¹⁰ A railroad interlocking is a system of switches and signals that allows trains to make connections from one track to another.



1



2



3



4



- Photograph View Direction and Reference Number
- Subway Route
- Transit Station
- Residential
- Residential with Commercial Below
- Hotels
- Commercial and Office Buildings
- Industrial and Manufacturing
- Transportation and Utility
- Public Facilities and Institutions
- Open Space and Outdoor Recreation
- Parking Facilities
- Vacant Land
- Vacant Building
- Under Construction

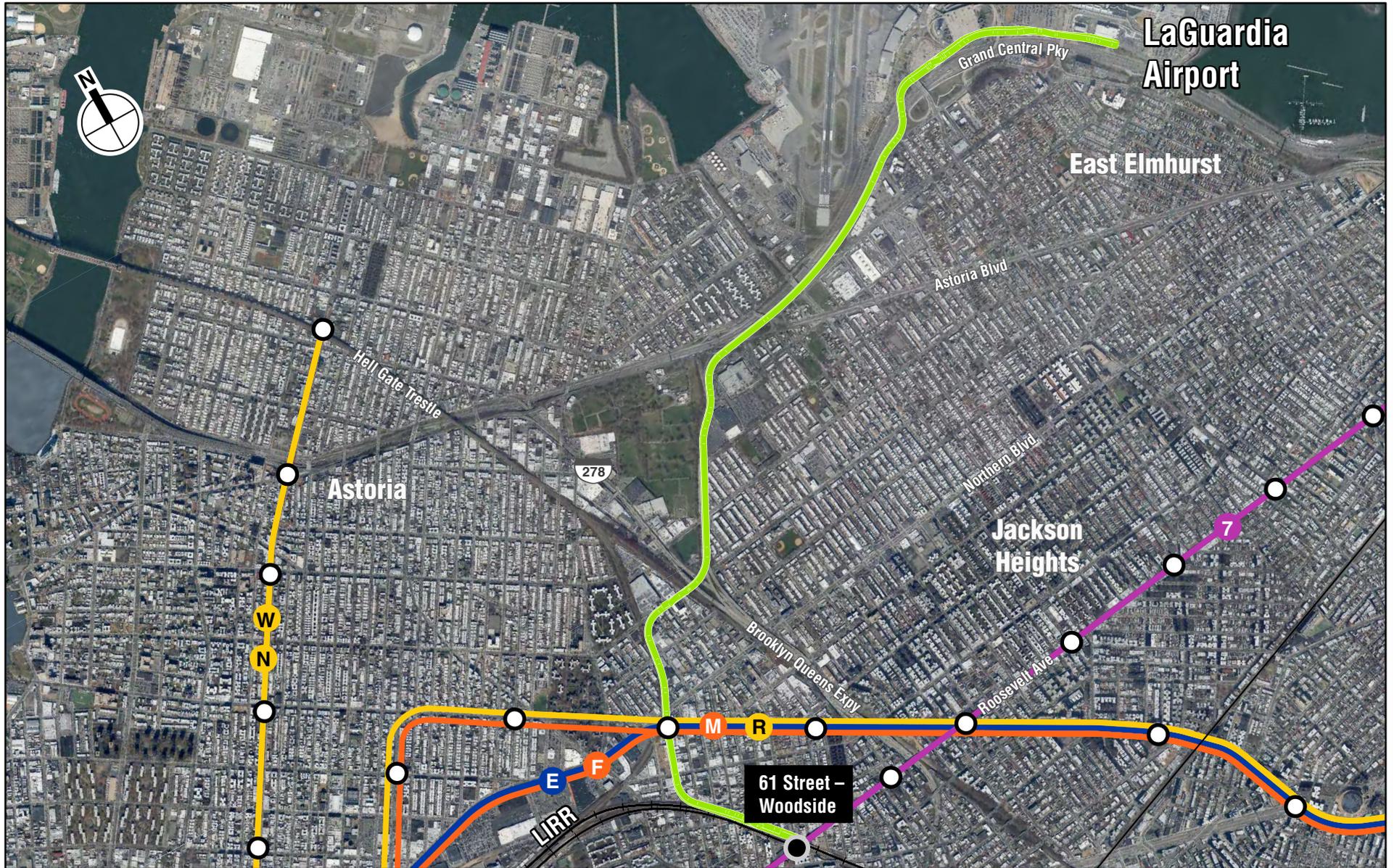
Figure 2-11 illustrates the potential route for the new fixed guideway from Woodside to LGA. A new fixed guideway station at Woodside would be beside the elevated LIRR tracks from about 61st Street to 59th Street. The platform would be at about the same height as the LIRR platform and supported by columns in streets and sidewalks. More than a dozen private properties northeast of the LIRR tracks would have to be acquired to create the space for the new station. Access to the station would be from either Roosevelt Avenue or 61st Street and through a connector to the subway station platform via a set of stairs and elevator.

From the off-Airport terminal station to the Airport, the new fixed guideway would include elevated sections and sections within a depressed cut. Beginning at the new Woodside station, the alignment would run adjacent to the LIRR rail structure for about 1,200 feet, requiring the acquisition of residential and commercial properties adjacent to the existing LIRR right-of-way. In addition, heavy construction activities, such as pile driving, would occur in direct proximity to residential and commercial properties. Near 56th Street, the alignment would curve through commercial property until it reached 55th Street. It would continue in 55th Street to an existing freight rail right-of-way, then would follow the freight tracks to about 31st Avenue, again curving through private property. The alignment would run along 31st Avenue, cutting through a portion of a public park (Saint Michael's Playground) and across the elevated BQE, which would necessitate partial and off-peak closures during construction. It would follow then turn north and follow the BQE to the GCP and continue to the Airport. Also, in one area of the GCP, there is an existing large combined sewer, which must be underpinned to allow construction to go underneath it.

In the portion of the alignment from the BQE interchange with the GCP northward to the Airport, extensive bridge and roadway reconstruction would be required. This would include realignment of Boody Street (including using a portion of the parking lot at the Bulova Corporate Center, reconstruction of the Astoria Boulevard South and Astoria Boulevard North bridges, the ramp from Astoria Boulevard South to the eastbound GCP, and the 82nd Street bridge. The Astoria Boulevard North bridge is located within the approach surface of LGA Runway 04/22 and may not be able to be raised from its current elevation; this would need further study.

Farther east, the guideway would descend into a depressed cut, which would require a large existing sewer to be underpinned to allow construction to go underneath it. After leaving the approach surface and near 90th Street, the guideway would ascend, transitioning from a depressed cut section to an elevated structure and entering the Airport. The restrictions associated with the approach surface would substantially constrain and alter means and methods of construction, require alternate equipment, and lead to a longer construction duration. Off-peak lane closures of the GCP would be required near the Airport with the potential for a full closure of the GCP at Ditmars Boulevard.

It is estimated that this alternative would require the acquisition of approximately 15 residential properties and 25 commercial properties for the terminal station and guideway. In addition to the private property required for the terminal station and guideway, private property along the route would need to be acquired to accommodate an OMSF. Private property near the off-Airport terminal would also be required for employee parking. The specific sites would need to be determined with more advanced planning and design.



Fixed Guideway Routing

● Subway/Fixed Guideway Transfer Station

○ Subway Station

0 2,000 FEET

Fixed Guideway Routing from Woodside

Figure 2-11

2.4.2.2.2 Evaluation of Off-Airport Terminal Station Concept

- **Project Objectives.** An off-Airport terminal station at Woodside with a fixed guideway to LGA would meet most Project objectives. To meet Objective 5 (accommodate provision of off-site employee parking), this alignment would require acquisition of property in Woodside near the terminal station. However, this alternative would not be consistent with Objective 8 (avoid substantial community disruption) as described below.
- **Operations.** The assessment did not identify any substantial operational concerns.
- **Constructability.** The approximately 3.4-mile-long fixed guideway would require extensive, complex construction in Woodside and within and adjacent to the GCP. This would include realignment of streets, and reconstruction of multiple bridges and ramps. About one-half mile of the alignment would fall within an Airport approach surface, adding complexity to the alignments design and construction. Near the Airport, there would be difficult utility relocation and a complex alignment to weave the right-of-way through the approach surface and existing highway infrastructure. Overall, these issues would introduce complexity and substantial risk to the construction of the Project.
- **Right-of-Way Factors.** It is estimated that this alternative would require the acquisition of 6 to 6½ acres of property, including approximately 15 residential properties and 25 commercial properties, for the terminal station and guideway. In addition, it would require the acquisition of private property for the OMSF and additional property near the off-Airport terminal station would need to be acquired for the development of Airport employee parking to meet the Project objective of accommodating employee parking off-Airport.
- **Community Impacts.** Construction of this alternative would require extensive and lengthy disruption in and near an established and active residential neighborhood. Pile driving and other heavy construction activities would occur in very close proximity to residential buildings and a public park. This and other construction impacts are likely to result in substantial disruption to the nearby community that would last for many years. Furthermore, the acquisition of approximately 40 private properties, including several linear stretches of contiguous parcels, to create new right-of-way for the off-Airport terminal station and alignment has the potential to substantially alter the character of adjacent blocks by removing the existing uses and the buffering of the existing railroad rights-of-way. The new terminal station and the new guideway structure approximately 30 feet in the air would adversely affect views in the residential neighborhoods it passes. Overall, this alternative would adversely impact neighborhood character along a substantial portion of the fixed-guideway right-of-way.

Near the GCP interchange with the BQE, the construction of the new fixed guideway would require partial acquisition of Saint Michael's Playground, which is a park and playground owned and operated by NYC Parks. Thus, this alternative would adversely impact parklands.

Construction impacts would also occur for traffic using the local roadways where bridges over the GCP must be reconstructed. In addition, the introduction of a new transportation

facility and employee parking in Woodside would increase traffic in a congested area, and therefore, this alternative is likely to result in adverse impacts on traffic operations.

An off-Airport terminal station at Woodside would not meet Objective 8 (avoid substantial community disruption), would raise substantial constructability issues, and require the acquisition of commercial and residential properties. **For these reasons, the PANYNJ did not consider this off-Airport terminal station alternative reasonable and did not advance it for further evaluation.**

2.4.2.3 Fixed Guideway Alternative from Jackson Heights

2.4.2.3.1 Project Setting and Potential Station Concept

A Jackson Heights off-Airport terminal would be located at the Roosevelt Avenue–Jackson Heights (E,F,M,R,7 Lines) subway station at the intersection of Broadway and Roosevelt Avenue in the Jackson Heights neighborhood of Queens. The fixed guideway alignment would follow Broadway to the BQE and then parallel the east side of the BQE to the GCP. It would then use the same alignment as the Woodside terminal station alternative.

This station is about two miles south of LGA. Five subway routes serve this station, including express and local service, and the station operates 24 hours a day, seven days a week. It is a major transit hub in Queens with connections between the Queens Boulevard Line (E,F,M,R Lines) and the Flushing Line (7 Line). The station also has a bus depot with service on more than a dozen bus routes. The Q70 SBS also serves this station. There is no commuter rail service at the Jackson Heights transit hub. The travel time from Midtown Manhattan to this station is about 18 to 22 minutes via express subway or 45 minutes using local subway service.

The Jackson Heights transit hub consists of an underground subway station serving the Queens Boulevard Line and an above-ground station serving the 7 Line. The 7 Line is on an elevated subway structure above Roosevelt Avenue, with the structure's supports in the street and sidewalk of the avenue and the track bed about 20 feet above.

The area around the Jackson Heights–Roosevelt Avenue subway station is a very developed and busy residential neighborhood. Commercial uses front Roosevelt Avenue, Broadway, 37th Road, 73rd Street, and 74th Street. Roosevelt Avenue, 37th Road, 73rd Street, and 74th Street are all very busy commercial corridors. Broadway is also a commercial corridor but with less intensive development than along Roosevelt Avenue. Behind the commercial structures are 2- to 3-story houses mixed with 8- to 10-story apartment buildings and several new high-rise buildings. 37th Road between Broadway and 74th Street was recently permanently closed to traffic and converted to a public plaza—Diversity Plaza. It is a hub of pedestrian activity for the busy commercial blocks that surround it.

Much of the Jackson Heights neighborhood is designated as a historic district. The New York City Landmarks Preservation Commission established the New York City Jackson Heights Historic District in 1993, which encompasses several blocks between 76th and 88th Streets and between Roosevelt Avenue and Northern Boulevard.¹¹ In 1999, a much larger area of the neighborhood between Broadway/70th Street and 91st Street and between Roosevelt Avenue and Northern

¹¹ New York City Landmarks Preservation Commission. Jackson Heights Historic District. October 1993.

Boulevard was listed on the National Register of Historic Places as a Historic District. The National Register Historic District includes 81 city blocks and 2,225 contributing resources. It is notable for its large collection of garden-style apartment buildings constructed from the 1920s to the 1940s.¹²

Figure 2-12 illustrates the land use and urban character of this area. Close to the subway station, 74th Street is lined with stores featuring products from the Indian subcontinent and attract customers from far beyond the neighborhood. Roosevelt Avenue features restaurants and business specializing in Central and South American cuisine and products and is a nightlife district with several discos and clubs.

Elmhurst Hospital is located southeast of the subway station. It is a very large medical complex serving much of western Queens, and its emergency room is one of the busiest in New York City. As such, emergency vehicles use the surrounding streets very frequently.

The BQE is about three blocks west of the subway station. The BQE has a very busy interchange at the intersection of 37th Avenue and Broadway. East of the BQE between Broadway and Northern Boulevard are several six- to seven-story rental and cooperative apartment buildings. North of Northern Boulevard, the residential structures are of lower density, ranging in height from two to three stories. Many of the residential buildings between Broadway and Astoria Boulevard are listed or have been determined eligible for listing on the National Register of Historic Places, either as part of a historic district or as individual structures.

At 34th Avenue, there is an entertainment complex consisting of a bowling alley and pool hall, and a new public school is being built at that location. Near Northern Boulevard and Astoria Boulevard are commercial uses, consisting of national retail chains, fast food restaurants, and gas stations.

A new fixed guideway station at Jackson Heights would be adjacent to the existing transit hub above Broadway. The new platform would be at a similar elevation as the 7 Line platform at the adjacent station. The fixed guideway station would be supported on a steel structure like the 7 Line structure, with supports in the Broadway sidewalks. Heavy construction activities, such as pile driving, would occur directly within neighborhood streets lined with both residential and commercial properties. Access to the new fixed guideway station would be from the existing subway platform and via new stairs and an elevator to Broadway. An elevated structure along Broadway above the subway tunnel that runs below that street is possible but would need to be designed to accommodate the existing subway structures below.

From the terminal station to the Airport, the new fixed guideway would include elevated sections and sections within a depressed cut. **Figure 2-13** illustrates the potential route for a new fixed guideway from Jackson Heights to LGA. Beginning at the new Jackson Heights station, the alignment would continue above Broadway on an elevated structure, then curve through private property, requiring acquisition and demolition of a large apartment building, to follow the right-of-way of 69th Street to 35th Avenue. From 35th Avenue to about 31st Avenue, the new guideway would run beside the BQE. This would require acquisition of commercial and multi-story residential properties between 34th and 31st Avenues and construction above the BQE interchange with Northern Boulevard. From 31st Avenue northward, the alignment would be the same as described

¹² National Register of Historic Places, Jackson Heights Historic District, Jackson Heights, Queens County, New York, National Register #10240018.



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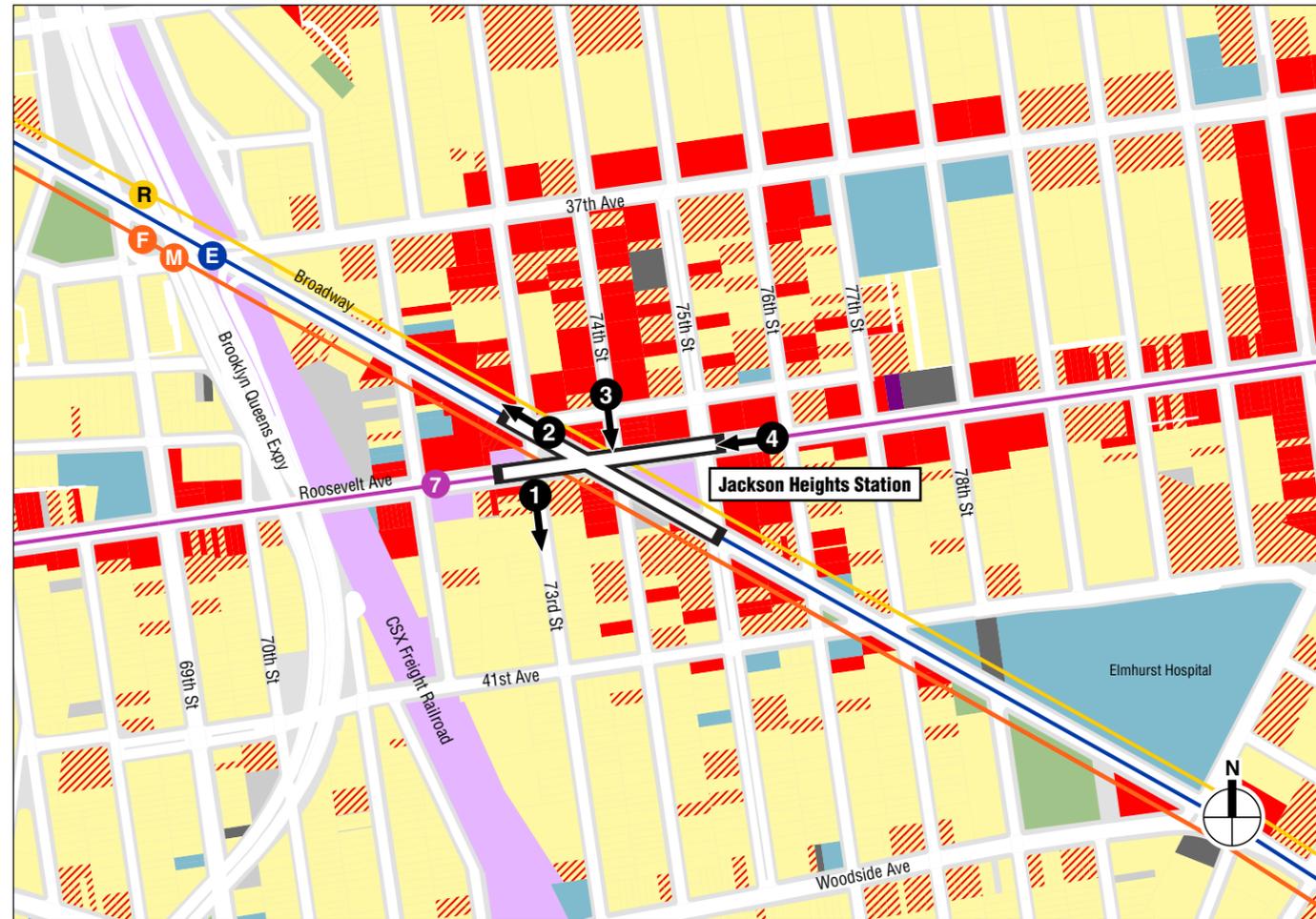
2



3



4



0 500 FEET

- Photograph View Direction and Reference Number
- Subway Route
- Transit Station
- Residential
- Residential with Commercial Below
- Hotels
- Commercial and Office Buildings
- Industrial and Manufacturing
- Transportation and Utility
- Public Facilities and Institutions
- Open Space and Outdoor Recreation
- Parking Facilities
- Vacant Land
- Vacant Building
- Under Construction



- Fixed Guideway Routing
- Subway/Fixed Guideway Transfer Station
- Subway Station

Fixed Guideway Routing from Jackson Heights
Figure 2-13

above for Woodside. Overall, the station and alignment would require the acquisition of approximately 35 residential properties and 5 commercial properties. These properties include several large apartment buildings along Broadway and 69th Street.

In the portion of the alignment from the BQE interchange with the GCP northward to the Airport, extensive bridge and roadway reconstruction would be required. This would include realignment of Boody Street (including using a portion of the parking lot at the Bulova Corporate Center, reconstruction of the Astoria Boulevard South and Astoria Boulevard North bridges, the ramp from Astoria Boulevard South to the eastbound GCP, and the 82nd Street bridge). The Astoria Boulevard North bridge is located within the approach surface of LGA Runway 04/22 and may not be able to be raised from its current elevation; this would need further study.

Farther east, the guideway would descend into a depressed cut, which would require the existing large sewer to be underpinned to allow construction to go underneath it. After leaving the approach surface and near 90th Street, the guideway would ascend, transitioning from a depressed cut section to an elevated structure and entering the Airport. The restrictions associated with the approach surface would substantially constrain and alter means and methods of construction, require alternate equipment, and lead to a longer construction duration. Off-peak lane closures of the GCP would be required near the Airport with the potential for a full closure of the GCP at Ditmars Boulevard.

In addition to the private property required for the terminal station and guideway, private property along the route would need to be acquired to accommodate an OMSF. Private property near the off-Airport terminal would also be required for employee parking. The specific sites would need to be determined with more advanced planning and design.

2.4.2.3.2 Evaluation of Off-Airport Terminal Station Concept

- **Project Objectives.** An off-Airport terminal station at Jackson Heights with a fixed guideway to LGA via the GCP would meet most Project objectives. To meet Objective 5 (accommodate provision of off-site employee parking), this alignment would require acquisition of property in Jackson Heights near the terminal station. However, this alternative would not be consistent with Objective 8 (avoid substantial community disruption) as described below.
- **Operations.** The assessment did not identify any substantial operational concerns.
- **Constructability.** The approximately 3.2-mile-long fixed guideway would require extensive, complex construction above an active subway tunnel, through a densely developed residential neighborhood, across the BQE interchange with Northern Boulevard, and within and adjacent to the GCP. The alternative would involve realignment of streets and utilities as well as the reconstruction of multiple bridges and ramps. About one-half mile of the alignment would fall within an Airport approach surface, adding complexity to the alignments design and construction. Near the Airport, there would be difficult utility relocation and a complex alignment to weave the right-of-way through approach surface and existing highway infrastructure. Overall, these issues would introduce complexity and substantial risk to the construction of the Project.
- **Right-of-Way Factors.** The station and alignment would require the acquisition of approximately 6 to 6¼ acres of land, including approximately 35 residential properties

and 5 commercial properties. Additional properties would be needed for construction of the off-Airport employee parking facility and OMSF.

- **Community Impacts.** Construction of this alternative would require extensive and lengthy disruption in and near a densely populated residential neighborhood and busy commercial center. Heavy construction activities, such as pile driving, would occur directly within neighborhood streets lined with both residential and commercial properties, a school, and a park. This and other construction impacts are likely to result in substantial disruption to the nearby community that would last for many years. Furthermore, the acquisition of approximately 40 private properties, including several linear stretches of contiguous parcels, to create new right-of-way for the off-Airport terminal station and alignment, has the potential to substantially alter the character of adjacent blocks by removing the existing uses and the buffering of the BQE. The alternative would remove historic structures, including portions of National Register-listed Jackson Heights Historic District. The new terminal station and the new guideway structure approximately 30 feet in the air would adversely affect views in the residential neighborhoods it passes. Overall, this alternative would adversely impact neighborhood character along a substantial portion of the fixed-guideway right-of-way.

In addition, the introduction of a new transportation facility and employee parking in Jackson Heights would increase traffic in a heavily congested area, and therefore, this alternative is likely to result in adverse impacts on traffic operations. Any substantial increases in private vehicle traffic or degradation in intersection operations would also negatively affect travel times for emergency vehicles accessing Elmhurst Hospital.

An off-Airport terminal station at Jackson Heights would not meet Objective 8 (avoid substantial community disruption), would raise substantial constructability issues, and would require the acquisition of commercial and residential properties. **For these reasons, the PANYNJ did not consider this off-Airport terminal station alternative reasonable and did not advance it for further evaluation.**

2.4.2.4 Fixed Guideway Alternative from Jamaica

2.4.2.4.1 Project Setting and Potential Station Concept

A potential off-Airport terminal at Jamaica would be at the existing Jamaica Station transportation hub in Jamaica, Queens, approximately six miles southeast of LGA. For the Jamaica Station, the fixed-guideway would head west over city streets or transportation right-of-way to the Van Wyck Expressway. It would continue northwesterly along the Van Wyck Expressway and GCP to the Airport.

At Jamaica Station, there is a major LIRR commuter rail station and the Sutphin Boulevard (E,J,Z Lines) subway station. Several local bus routes serving Queens and Nassau County stop at this station, and it is a terminal for AirTrain JFK. The station operates 24 hours a day, seven days a week although services or routes is limited or suspended overnight and on weekends. The travel time from Midtown Manhattan (Penn Station) to this station is about 21 minutes on the LIRR or about 45 minutes via local subway.

THE PORT AUTHORITY OF NEW YORK & NEW JERSEY

The Jamaica Station transportation hub is at the intersection of Sutphin Boulevard and Archer Avenue in the Jamaica neighborhood of Queens. This is a very busy, congested area because of the LIRR station. It is also a major transfer point for numerous buses that serve eastern Queens and Nassau County and the LIRR and subway. The blocks surrounding the station are a retail hub for the Jamaica neighborhood, and the Supreme Court of Queens County and New York City Civil Court are major tenants of this area. Several new residential and commercial structures are under construction.

The Van Wyck Expressway (I-678) is located about 1,500 feet west of the LIRR station. It is a primary north-south route through Queens, providing access between the Bronx-Whitestone Bridge and JFK Airport. The Van Wyck is generally three lanes in each direction, although there is a study under way to increase its capacity.

About 1.5 miles north of the LIRR Mainline tracks, the Van Wyck Expressway enters the Kew Gardens Interchange. The Kew Gardens Interchange is the complex intersection of the GCP, the Van Wyck Expressway, the Jackie Robinson Parkway, and Union Turnpike, and it serves nearly 600,000 vehicles daily. A major reconstruction project is under way to improve the safety and capacity of this interchange.

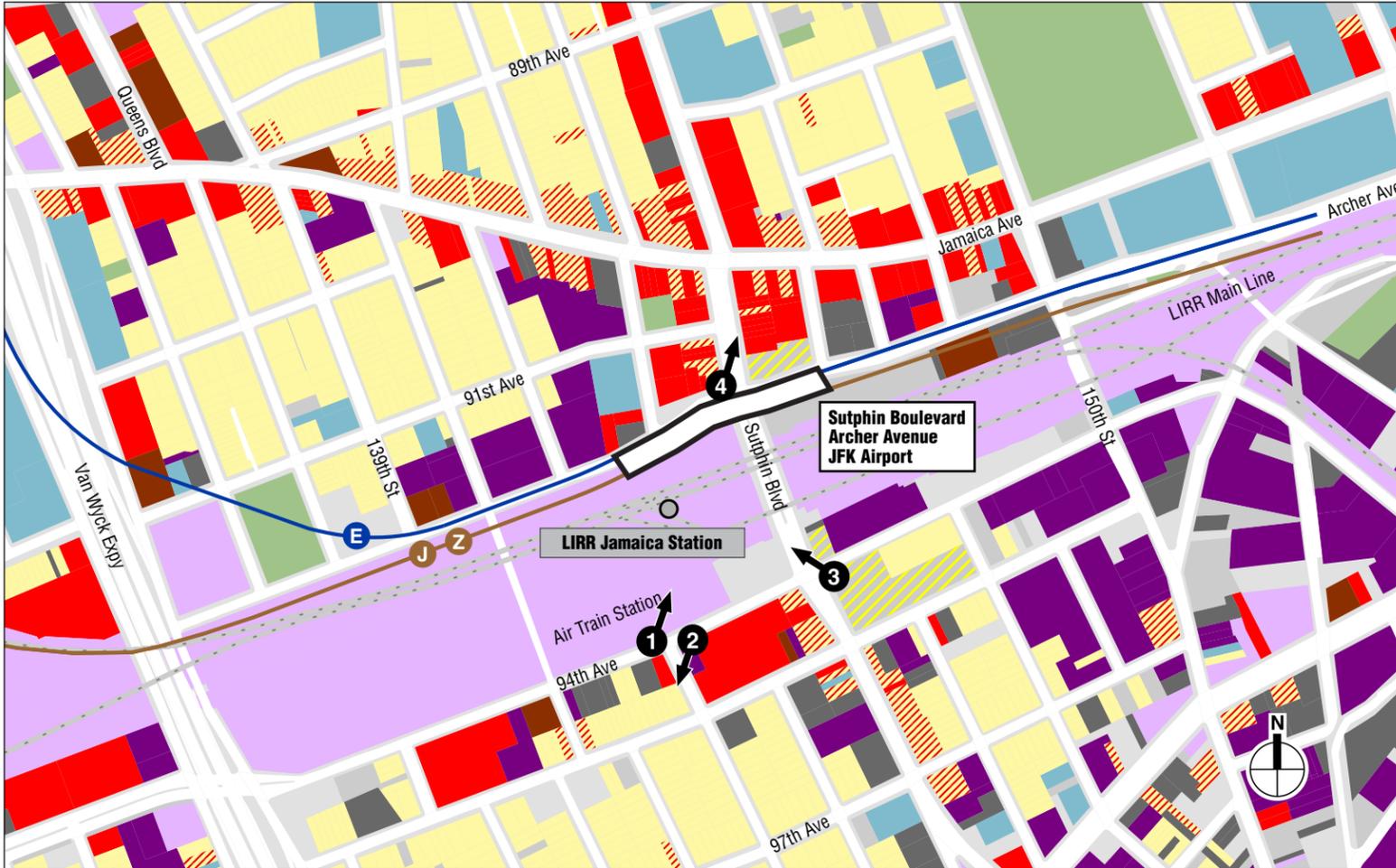
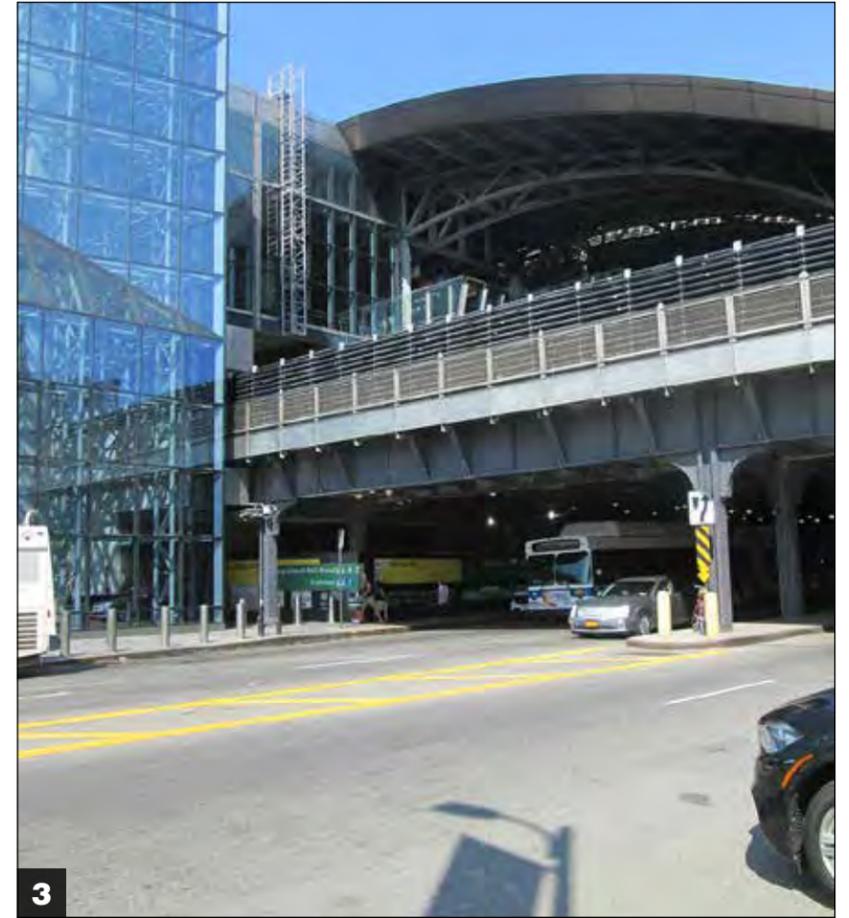
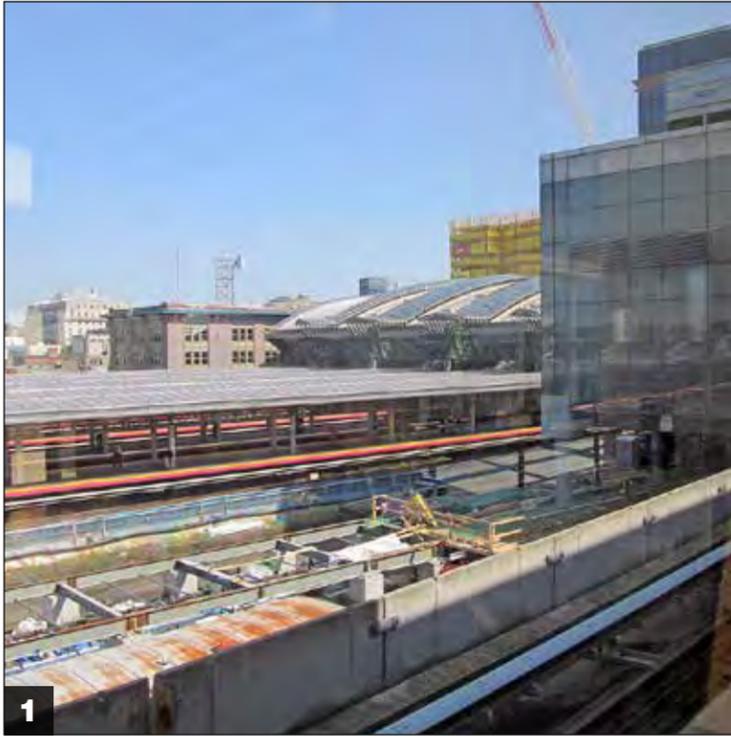
From the Kew Gardens Interchange, the GCP continues northwesterly along the western boundary of Flushing Meadows-Corona Park. About two miles north of the Kew Gardens Interchange, the GCP has a major interchange with the Long Island Expressway (LIE or I-495). Continuing north, the GCP passes the Queens Museum, U.S. Tennis Association Billie Jean King National Tennis Center (U.S. Tennis Center), and Citi Field to its east, and the Queens Zoo, New York Hall of Science, and the Corona neighborhood to its west. In this area, there is a wide landscape buffer between the southbound lanes of the highway and the adjacent neighborhood.

At Northern Boulevard, the GCP takes a sharp curve westerly, and there is a major interchange with Northern Boulevard, Astoria Boulevard, and the Whitestone Expressway. West of this interchange, the GCP hugs Flushing Bay. South of the GCP are single-family residences set back from and above the eight-lane highway overlooking the bay. North of the GCP, a parking lot serves the adjacent Flushing Bay Promenade and marina. A gas station with direct access from the GCP is located immediately east of the Airport property near this parking lot.

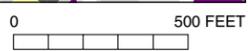
The GCP from the Kew Gardens Interchange to LGA is four lanes in each direction. There are shoulders on both sides, but they are very narrow as the GCP passes Flushing Bay. The median consists of a barrier between lanes. Local streets pass over the highway.

Within the past decade, the City of New York rezoned this area of downtown Jamaica to encourage development, and as a result, multiple sites near the transit station are under construction with large new buildings. In addition, the City of New York is pursuing development of new plazas and other congestion management and traffic calming measures near the train station to help alleviate congestion. **Figure 2-14** illustrates the land use and neighborhood context around this station.

In September 2007, the New York City Council established a Special Downtown Jamaica District. To create that district, 368 blocks in Community Boards 8 and 12 were rezoned to take advantage of Jamaica's role as a transportation hub. The rezoning was adopted with the goals to respect and enhance Jamaica's unique character; provide a mix of residential, business, and community



- Photograph View Direction and Reference Number
- Subway Route
- Transit Station
- Residential
- Residential with Commercial Below
- Hotels
- Commercial and Office Buildings
- Industrial and Manufacturing
- Transportation and Utility
- Public Facilities and Institutions
- Open Space and Outdoor Recreation
- Parking Facilities
- Vacant Land
- Vacant Building
- Under Construction



activities in the downtown area; protect the low-scale, neighborhood feel of residential areas in the surrounding community; encourage the provision of affordable housing; and create a new gateway at the Jamaica Station transportation hub. The objective of the rezoning was to create new economic growth and housing through mixed-use, transit-oriented development in Downtown Jamaica. With the rezoning, permitted density increased, which has resulted in new residential development and is facilitating the expansion of residential and local and regional commercial land uses.

A new fixed guideway AirTrain service between Jamaica and LGA could either share the same AirTrain station that already exists at Jamaica Station (which serves JFK) although the station (and possibly the AirTrain JFK system) would need to be modified, or it could use a new station that would become part of the existing LIRR, subway, and AirTrain station complex. For its terminal station, the LGA AirTrain in this alternative would continue northward in the Van Wyck Expressway to the GCP and then onward to LGA. Approximately between Northern Boulevard and LGA, the Jamaica alignment would be the same as the Willets Point terminal station alternative, which is described in **Section 2.4.2.5.4. Figure 2-15** illustrates the potential route for a new fixed guideway from Jamaica to LGA.

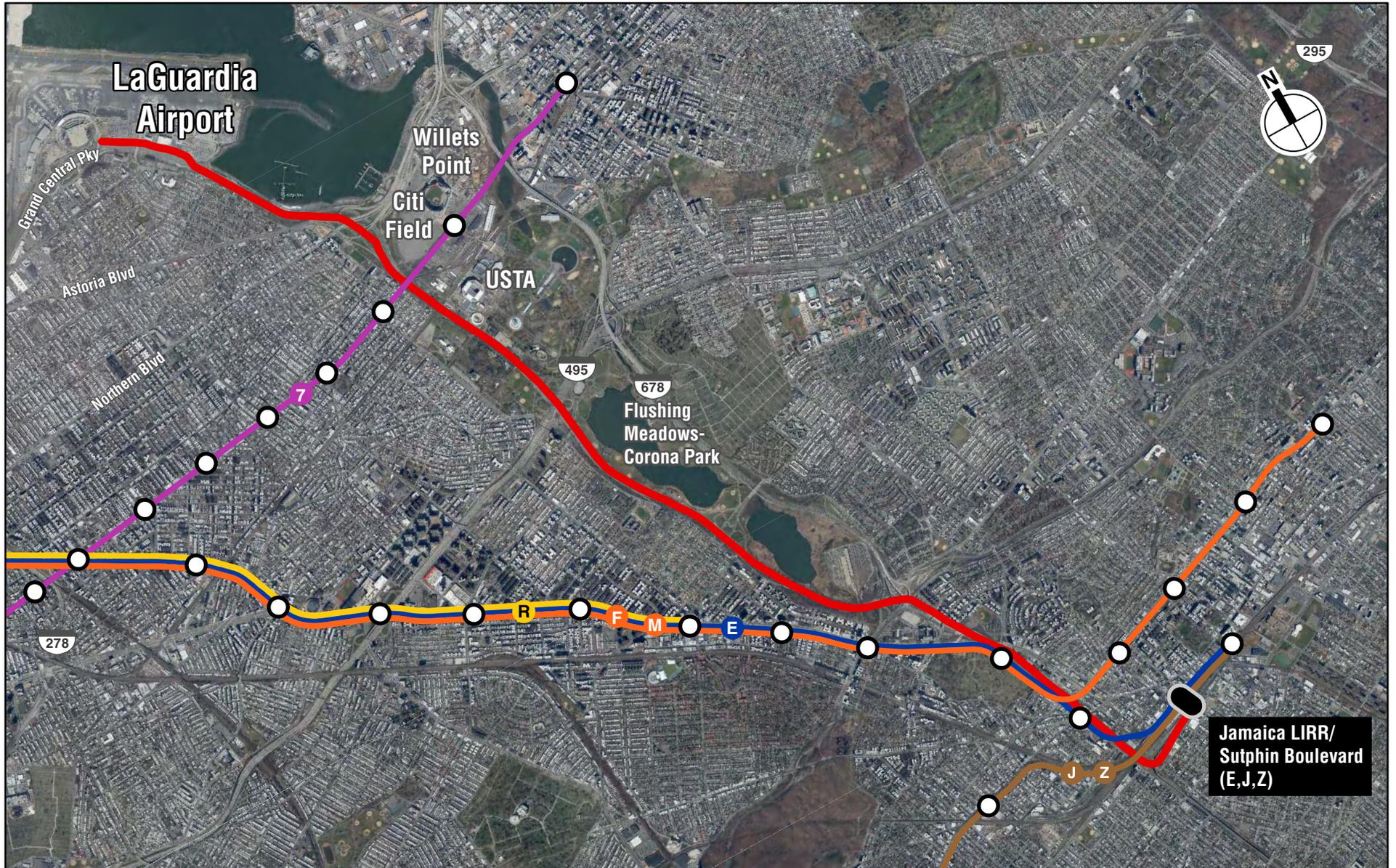
This alignment would be about 6.2 miles long, about twice as far as the AirTrain JFK route. The AirTrain JFK OMSF could be used to service the new vehicles, assuming the same technology is used for the LGA service. However, the JFK OMSF would need to be expanded, impacting on-airport employee parking at JFK. Private property near Jamaica Station would be required to accommodate provision of employee parking. If different technology is used for the new AirTrain to LGA, then it would not be feasible to share the AirTrain JFK terminal station and OMSF.

2.4.2.4.2 Evaluation of Off-Airport Terminal Station Concept

- **Project Objectives.** An off-Airport terminal station at Jamaica with a fixed guideway to LGA via the Van Wyck Expressway and GCP would not meet Project Objective 1, because it would not achieve a travel time of less than 30 minutes from Midtown Manhattan. Travel time to Jamaica Station from Manhattan via the fastest mode, LIRR, is about 21 minutes. If vehicles could operate at the same speed as AirTrain JFK, it would take approximately 16 minutes for the new fixed guideway service to reach LGA (double the 8-minute trip of AirTrain JFK to JFK). Thus, the total time not including the wait for the transfer would be at least 37 minutes.
- **Operations.** This alternative would not meet the Project objective related to travel time.
- **Constructability.** Since this alternative would not meet the Project objective related to travel time, a specific alignment was not evaluated. The alignment would require more than six miles of guideway, which is twice as long as the other Level 2 alignment alternatives, to be constructed through a heavily congested corridor.

Jamaica Station is a busy transportation hub with service on the LIRR, subways, and the AirTrain JFK, and several bus routes. Weaving new infrastructure through the existing transportation hub would pose constructability challenges. The construction would also likely involve disruption to one or more existing transportation services at Jamaica.

Construction of an elevated fixed guideway structure to LGA from Jamaica would require extensive disruption to the highway system and would be particularly challenging in the



-  Fixed Guideway Routing
-  Subway/Fixed Guideway Transfer Station
-  Subway Station

LGA AIRPORT ACCESS IMPROVEMENT PROJECT

Fixed Guideway Routing from Jamaica
Figure 2-15

areas of the Kew Gardens Interchange and LIE. Additionally, the implementation of this alternative may conflict with recently completed or planned improvements for the Kew Gardens Interchange of the GCP, the Van Wyck Expressway, the Jackie Robinson Parkway, and Union Turnpike.

The New York State Department of Transportation is undertaking a project to add a fourth travel lane/Managed Use Lane in each direction on the Van Wyck Expressway between the Kew Gardens interchange and JFK. The proposed widening will use all or most available existing open space within the transportation right-of-way and will reduce roadway shoulders to the minimum allowed in most locations. Widening of this section of the Van Wyck Expressway is also limited by the NYCT subway line (the E Line) located under and adjacent to the southbound service road. This limits widening to the west. On the northbound service road there are existing private properties that limit widening to the east. Therefore, the new lanes would make it extremely challenging to accommodate permanent columns down the center of the Van Wyck Expressway to support the fixed guideway without permanent impacts to the subway and to adjacent private properties. Construction of the fixed guideway would also reduce the number of traffic lanes that could be open during construction.

Closer to the Airport and north of the LIRR Port Washington Branch, any alignment would have to cross the GCP and potentially the Whitestone Expressway, requiring construction staging to manage traffic.

- **Right-of-Way Factors.** This alignment would be constructed predominantly in highway right-of-way and would require minimal or no private property for the alignment. Property may need to be acquired for the station and would need to be acquired for an employee parking facility.
- **Community Impacts.** Construction through the Kew Gardens Interchange would likely adversely impact traffic operations over multiple months. Constructing the guideway along the Van Wyck Expressway would have adverse impacts on Van Wyck Expressway traffic as partial and full lane closures would likely be required. In addition, the expansion of a new transportation facility and construction of employee parking in Jamaica would increase traffic in a heavily congested area, and therefore, this alternative is likely to result in adverse impacts on local traffic operations.

Closer to the Airport and north of the LIRR Port Washington Branch, an alignment from Willets Point to LGA would not result in substantial construction or permanent disruption to residential neighborhoods. There are some residences south of the GCP near the Airport, separated from the Airport by the eight-lane GCP.

This alternative would result in constructability concerns and potential community disruptions as it would impact major highway interchanges, local streets, local redevelopment and potentially conflict with ongoing and planned highway improvements. Additionally, an off-Airport terminal station at Jamaica would not meet Objective 1 of providing a travel time to the Airport of less than 30 minutes. **Therefore, the PANYNJ did not advance this off-Airport terminal station for further evaluation.**

2.4.2.5 Fixed Guideway Alternative from Willets Point

2.4.2.5.1 Project Setting and Potential Station Concept

An off-Airport new terminal station at Willets Point would be constructed between the Mets–Willets Point (7 Line) subway station and the Mets–Willets Point LIRR station on the Port Washington Branch. There are multiple options for the proposed alignment, but it would eventually meet the GCP, and then follow the GCP to the Airport.

These Willets Point stations are about two miles southeast of LGA. Both these stations are situated near Citi Field, the home stadium of the New York Mets Major League Baseball team (Mets). The subway station operates 24 hours a day, seven days a week, but it is lightly used except during special events. The completion of the East Side Access Project would enable the MTA to provide regular service to Willets Point (from both Penn Station and Grand Central Terminal), which currently has service only during events (e.g., Mets games, U.S. Open, etc.), subject to the approval of the MTA Board. The Q48 local bus service along Roosevelt Avenue between Flushing, Queens, and LGA also stops at this station. The travel time from Midtown Manhattan to this station is about 24-28 minutes on the 7 Line (depending on the time of day) and 16 minutes on the LIRR.

The LIRR Port Washington Branch tracks and Mets–Willets Point station are at the same grade as the surrounding neighborhood, but the 7 Line and its station are elevated about 20 feet above the street grid. The elevated 7 Line subway track structure runs above Roosevelt Avenue with the columns supporting the structure in the street and sidewalk. An 800-foot-long walkway connects the two stations and provides access over the LIRR tracks to Flushing-Meadows Corona Park and the U.S. Tennis Center to the south. This walkway is known as the Passerelle. NYCT is planning a major renovation of the LIRR station, and NYC Parks is planning to reconstruct the Passerelle.

Figure 2-16 illustrates the land use and neighborhood context around these stations. There are several options for the alignment between Willets Point and LGA, which are described in **Sections 2.4.2.5.3 and 2.4.2.5.4**, including figures that show these alignments.

North of the 7 Line and LIRR station complex is Citi Field, leased to the Mets by the City of New York. This complex includes the large surface parking lots that serve it. The stadium and parking lots (Mets parking) are on land owned by the City of New York (technically mapped as parkland but alienated for such use in 1961).

East of the stadium, 126th Street marks the boundary between the stadium and an industrial area to its east. The City of New York has plans to redevelop this area with a mix of commercial and residential uses. The Whitestone Expressway is north of the stadium and the GCP is west of the stadium parking lot.

South of the 7 Line and LIRR station complex is Flushing Meadows-Corona Park. This is a very a large, regional park that includes the U.S. Tennis Center, Queens Museum, New York Hall of Science, and other attractions. The GCP and Van Wyck Expressway flank the park's west and east sides, respectively.

Between the 7 Line subway station and the LIRR Port Washington Branch tracks are additional parking lots for the Mets stadium. To the south of the parking lots is a large complex of storage



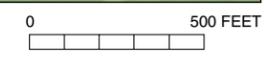
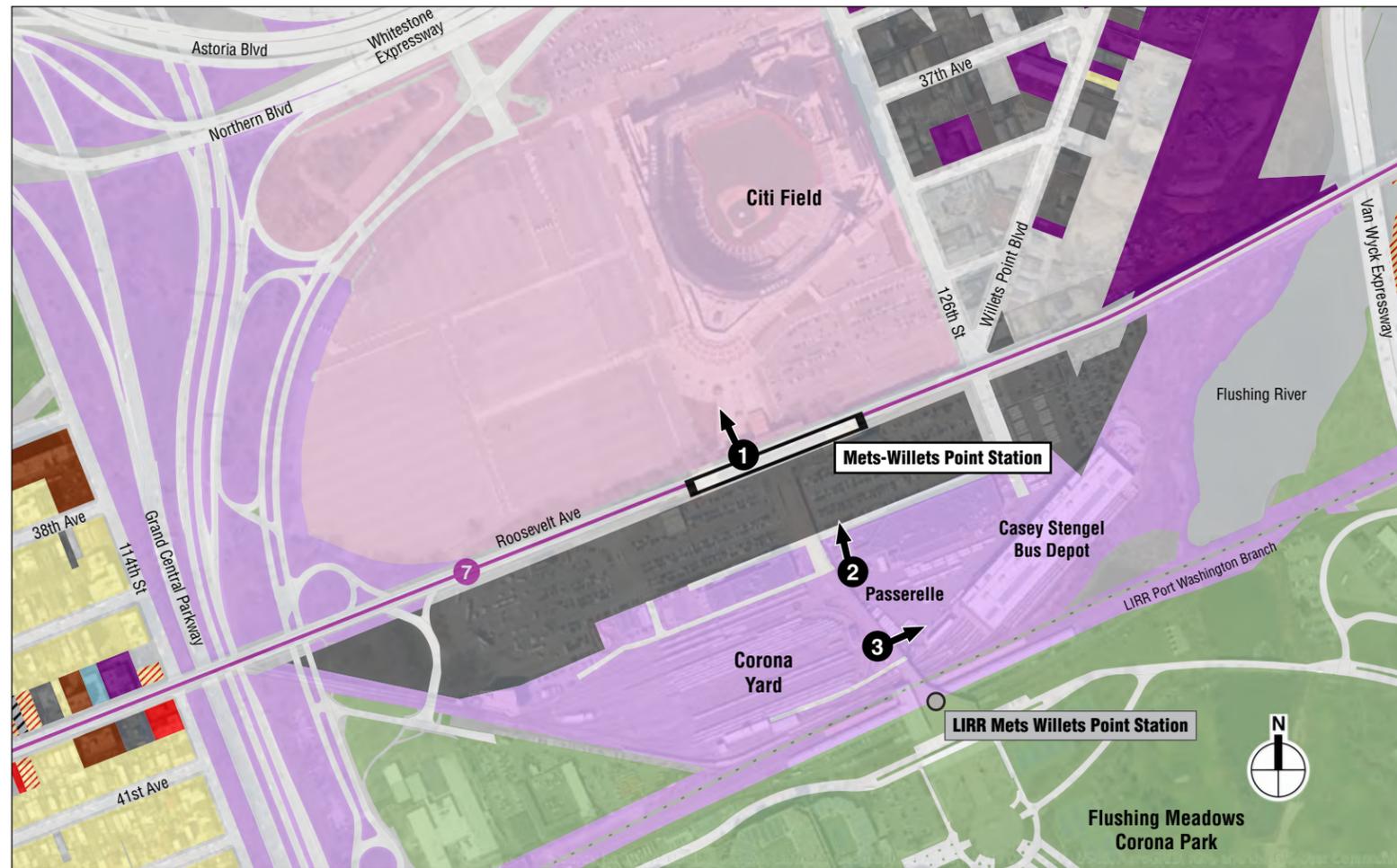
1



2



3



- Photograph View Direction and Reference Number
- Subway Route
- Transit Station
- Residential
- Residential with Commercial Below
- Hotels
- Commercial and Office Buildings
- Industrial and Manufacturing
- Transportation and Utility
- Public Facilities and Institutions
- Open Space and Outdoor Recreation
- Parking Facilities
- Vacant Land
- Vacant Building
- Under Construction
- Entertainment

and maintenance facilities for NYCT and MTA Bus Company. NYCT's Corona Yard, which is the storage yard for the 7 Line (Corona Yard) is west of the Passerelle, and the Corona Yard subway maintenance building and NYCT's Casey Stengel Bus Depot are east of the Passerelle. The GCP passes west of Citi Field and its parking lots. At Northern Boulevard, the GCP takes a sharp curve westerly, and there is a major interchange with Northern Boulevard, Astoria Boulevard, and the Whitestone Expressway. West of this interchange, the GCP hugs Flushing Bay. South of the GCP are single-family residences set back from and above the eight-lane highway overlooking the Flushing Bay. North of the GCP, a parking lot serves the adjacent Flushing Bay Promenade and marina. A gas station with direct access from the GCP is located immediately east of the Airport property near this parking lot.

A new fixed guideway station at Willets Point could be located perpendicular or parallel to the LIRR and 7 Line subway stations with direct connections to both. There are options to locate employee parking and an OMSF near the proposed terminal station (see **Section 2.4.4**).

From the new terminal, the fixed guideway would extend north and west to LGA past Citi Field and along or near the GCP. A few potential alignment routes are available for the fixed guideway (discussed in more detail later in this chapter). The alignment would be about two miles long, with some variation depending on the specific route it follows.

2.4.2.5.2 Evaluation of Off-Airport Terminal Station Concept

- **Project Objectives.** An off-Airport terminal station at Willets Point with a fixed guideway to LGA would meet the Project objectives.
- **Operations.** The assessment did not identify any substantial operational concerns.
- **Constructability.** Any alignment would have to cross the GCP and potentially the Whitestone Expressway, requiring construction staging to manage traffic, and construction activities might require the limited suspension of 7 Line and LIRR service through the area. However, there are feasible options to minimize these constructability considerations, which are described in more detail in **Section 2.4.2.5.4**.
- **Right-of-Way Factors.** An alignment from Willets Point to LGA would not require acquisition of private property for the fixed guideway or station, OMSF, or employee parking. Property under the jurisdiction of the MTA and City of New York would need to be acquired.
- **Community Impacts.** An alignment from Willets Point to LGA would not result in substantial construction or permanent disruption to residential neighborhoods, with the exception of some visual impacts to some residences south of the GCP near the Airport, which are separated from the Airport by the eight-lane GCP. The alignment and station would be primarily within transportation right-of-way and parking lots. The station, OMSF, and employee parking could be accommodated within the publicly owned land at Willets Point. Depending on the selected alignment, parts of the guideway associated with the Willets Point off-Airport terminal station may be located within the Mets parking and/or on land located immediately adjacent to the eight-lane GCP that is used for park purposes.

An off-Airport terminal station at Willets Point would meet Project objectives. As described below, there are various alignment options between Willets Point and LGA, and the operations, constructability, right-of-way factors, and community impacts of each option are considered. The Willets Point location offers connections to both the subway and the LIRR. There is adequate space to site the PANYNJ's Project needs (off-Airport station, an OMSF, an employee parking facility), and there is convenient highway access. **For these reasons, the PANYNJ considered the Willets Point location for an off-Airport terminal station alternative reasonable and advanced it for further evaluation.**

As the location was determined reasonable, the PANYNJ further explored options for the vertical alignment between the terminal station and the Airport.

2.4.2.5.3 Evaluation of Potential Vertical Alignments

Based upon the prior analysis, the Willets Point location was carried forward for further analysis from a vertical alignment perspective. The PANYNJ examined whether the alignment between Willets Point and LGA should be below-grade in a tunnel, at-grade on the surface, or elevated.

Below-Grade Alignment Option

The below-grade option would link Willets Point and LGA via a cut-and-cover tunnel for much of the corridor. Certain sections would be at grade or above grade to accommodate connections at Willets Point and LGA, as well as to weave the alignment through existing infrastructure.

- **Operations.** There are few operational issues associated with this alignment. Since infrastructure would be below-grade, it would be protected from rain and snow, potentially reducing ongoing operations and maintenance costs as compared to exposed structures. If the Airport and Willets Point stations were elevated, there would be multiple grade changes associated with this alignment, which would result in less efficient operations because of acceleration and braking, which would not be required for an alignment with no or more modest grade changes.
- **Constructability.** Piles from existing, active structures, such as from the 7 Line along Roosevelt Avenue and the Whitestone Expressway, would need to be avoided and utilities would need to be relocated. If the active piles cannot be avoided, they would have to be removed and rebuilt with the tunnel being designed to accommodate those loads. This would add to construction complexity. Abandoned or inactive piles, such as the pilings for the former Shea Stadium, would need to be removed, adding construction complexity, or tunneled under. Subsurface investigation is required to identify the location of these piles. Additionally, an extensive network of pilings has been installed for the LGA Central Terminal Improvement project. These pilings would have to be avoided or the new tunnels would have to be very deep to avoid all the existing piles, which is not practical. Otherwise, the tunnel alignment would need to maneuver around those piles, while accommodating the wide turning radius needed for a TBM.

To accommodate above-grade on-Airport stations, the alignment would need to transition from the below-grade tunnel to the above-grade stations. If the Airport station(s) were located underground, there would be negative effects associated with either the impact to or avoidance of existing support structures, pilings, and utilities as described above. An underground station at Willets Point would require vertical connections to the LIRR

platforms at the Willets Point station, complicating construction by being under the LIRR right-of-way, which would require periods of single tracking and track outages, typically on weekends.

A cut-and-cover method for construction of the tunnel would have adverse effects to existing roadways and bridges, potentially including the 7 Line, the GCP, highway ramps, and local roadways. It would negatively affect several at-grade roadways and structures between Willets Point and the Airport, which may include the GCP, Whitestone Expressway, Northern Boulevard, Roosevelt Avenue, and parking lots near Citi Field. In the case of the GCP and other ramps and highways, construction below grade and below these structures would require lengthy closures to roadways and diversions of traffic onto temporary roadways, which would result in reduced speeds and increased traffic congestion. An alignment along the GCP would require nighttime and weekend lane closures on the GCP. For the Whitestone Expressway area, tunnel construction would result in reduced ramp traffic during construction due to traffic diversions around the tunnel construction areas, which would be several months.

There is an existing combined sewer tunnel that would have to be avoided or relocated between the Airport and Willets Point, as it would conflict with the below grade alignment. The existing combined sewer is very large and consists of two chambers, one on top of the other with each roughly 25 feet wide by 10 feet high. The sewer is approximately 100 years old and there would be additional concern of disrupting the area around the tunnel, requiring some reconstruction of the sewer. The sewer runs within an embankment west and parallel to the GCP from Roosevelt Avenue to an outfall in Flushing Bay. Constructing the tunnel beneath the existing sewer would require coordination with the New York City Department of Environmental Protection (NYCDEP) to determine the viability of a temporary diversion of the sewer flow, demolition of the existing sewer, land acquisition or property rights, tunnel construction, and the reconstruction of the sewer over the tunnel. Relocation and/or reconstruction of the sewer tunnel would be very costly and add complexity and duration to construction. Sewer construction would also require lane closures overnight.

The subsurface conditions along the right-of-way, particularly the soils near the Airport, have a high level of organic materials (extending to 80 feet below ground surface in some cases). This would constrain the tunneling methods that could be used. Tunneling within organic materials can present difficulties during tunnel boring, including issues related to steering and maintaining soil pressure, and may lead to excessive ground settlements. With these subsurface conditions, the use of the NATM (New Austrian Tunneling Method)¹³ approach would not be appropriate. With the high groundwater level, the glacial sands/organic soils would likely flow/squeeze into the tunnel during the brief period of time when they are exposed for application of the shotcrete initial lining. This could cause large ground settlement and possible instability of the tunnel opening. TBM tunneling (using either an earth-pressure balance or slurry shield machine) is generally feasible,

¹³ The New Austrian Tunneling Method, also referred to as the Sequential Excavation Method (SEM), is a tunneling technique in which a tunnel is sequentially excavated in phases, through conventional mining methods rather than by TBM, and supported in a controlled manner.

even within organic soils. However, the issues related to squeezing ground, TBM steering problems, and potential ground settlement would need to be further evaluated. Regardless of the method, to avoid the organic materials, tunneling would have to be relatively deep, adding to the complexity and duration of the construction.

For tunnel sections that may be constructed beneath at-grade roadways and ramps, decking and deep foundations must temporarily support the roadways to allow for the construction of the cut-and-cover tunnels beneath the decking. This would also cause traffic detours and lane closures at grade. Given the high water table in the area, any tunnel segments would require active removal of water occurring naturally in the ground from the excavation area (dewatering), which would also add difficulty and time to this alternative's construction.

The high-water level would also require ventilation plants/buildings as well as pumping stations for a below-grade option.

- **Right-of-Way Factors.** Tunnel construction could occur within public right-of-way.
- **Community Impacts.** Construction would cause temporary closures or diversions along roadways around the work areas anticipated between Willets Point and the Airport. This would require night and weekend closures or traffic diversions for one or more lanes during each stage of this work for various roadways. Reconstruction or modification of one or both pedestrian bridges that cross GCP may be necessary, depending on the alignment. At Willets Point, the below-grade option may result in temporary closures of LIRR tracks and the Passerelle.

The below-grade option has substantial concerns related to constructability, making it far more difficult to build than the other vertical alignment options. **Therefore, the PANYNJ did not consider a below-grade vertical alignment reasonable and did not advance it for further evaluation.**

At-Grade Alignment Option

The at-grade option would link Willets Point and LGA at ground level for much of the corridor. Certain sections would be above grade to accommodate connections at Willets Point and LGA, as well as to weave the alignment through existing infrastructure.

- **Operations.** Public safety and security are potential concerns because the public would have easier access to at-grade tracks and other infrastructure components, compared to below-grade or above-grade alignments. The at-grade alignment would require fencing or other measures to ensure the public cannot access the right-of-way. An at-grade alignment would also experience snow drifts on the right-of-way and require additional snow removal during those events.
- **Constructability.** An at-grade alignment would require an average 40-foot-wide area for the length the alignment, which would limit its horizontal alignment options. Any at-grade alignment under an elevated subway or LIRR bridge would be restricted by those existing columns. Alignments at grade would also affect existing facilities, including structural columns for the 7 Line, the GCP lanes, highway ramps, and local roadways. The impacts would vary based on the alignment, but it would not be possible to completely avoid these structures. For example, a new structure would be required beneath Roosevelt Avenue to

support the street above the at-grade alignment and any alignment that would cross the 7 Line alignment would require stabilization of the 7 Line's structure. Some nighttime roadway closures would be required to install the fixed guideway infrastructure within and adjacent to transportation right-of-way. The frequency of these closures would vary depending on the vertical alignment.

In likely horizontal alignments, existing roads would need to be realigned, which would impact the Project's cost and schedule. Reconstruction of roadways, ramps, or part of the mainline GCP would require lengthy closures to roadways and diversions of traffic during construction. Multiple combined sewer lines and other utilities would be likely to conflict with the alignment both horizontally and vertically.

The combined sewer tunnel described for the below-grade option would also be a conflict for an at-grade alignment. For example, a fixed guideway could not be located above the combined sewer tunnel and be located under Roosevelt Avenue due to elevation of combined sewer, and it is not viable to build over the combined sewer in the at-grade corridor from Roosevelt to 34th Street.

The on-Airport roadways would not allow for at-grade stations; therefore, the alignment would need to be elevated on-Airport and then slowly decline down to ground elevation. Constructing the grade changes due to the elevated stations would also add to the complexity and cost of construction.

- **Right-of-Way Factors.** The at-grade option could be constructed within public right-of-way.
- **Community Impacts.** Construction activities would cause temporary closures or diversions along roadways around the work area. This would require night and weekend closures or traffic diversions for one or more lanes during each stage of this work. The resulting alignment would require a permanently fenced right-of-way at grade. Reconstruction or modification of one or both pedestrian bridges that cross GCP may be necessary, depending on the alignment.

At-grade options would result in more operational concerns than the other vertical alignments. The at-grade option would also have constructability considerations that make it less desirable to build than the other vertical alignment options. **Therefore, the PANYNJ did not consider an at-grade vertical alignment reasonable and did not advance it for further evaluation.**

Above-Grade Alignment Option

The above-grade alignment option would link Willets Point and LGA on an elevated structure for much of the corridor.

- **Operations.** An above-grade alignment would have few public safety and security concerns since elevated tracks would be difficult to access. There would be some operational issues due to climate and weather, such as snow removal, but snow drift is unlikely. This alignment would be more favorable with respect to energy efficiency, as there would be no substantial changes in grade, as Airport stations and Willets Point station would also be elevated. An above-grade alignment could be designed with an efficient route, minimizing travel time.

- **Constructability.** An above-grade alignment would cross over major structures such as highway ramps, bridges, subway lines. High structures such as the 7 Line and the wide expanses of certain highway features such as the Northern Boulevard Interchange would pose some constructability concerns to avoid conflicts with other elevated structures. An above-grade alignment would need to weave above or below existing elevated structures to not conflict with them. Some nighttime roadway closures would be required to install the fixed guideway infrastructure over and adjacent to transportation right-of-way. The frequency of these closures would vary depending on the vertical alignment.
- **Right-of-Way Factors.** The above-grade alignment option can be constructed within public right-of-way
- **Community Impacts.** Short-term, off-peak lane closures and traffic diversions would occur during construction. Reconstruction or modification of one or both pedestrian bridges that cross GCP may be necessary, depending on the alignment. Construction of the elevated alignment would require installation of columns to support the elevated tracks.

There are no residences or commercial properties at Willets Point, an area currently occupied by Citi Field and its parking lots, as well as the NYCT Corona Yard and the NYCT Casey Stengel Bus Depot. As the 7 Line is elevated above Roosevelt Avenue and is already a prominent feature in Willets Point, the introduction of a new fixed guideway there would not substantially alter visual character. Closer to the Airport, the PANYNJ would explore options for an above-grade alignment to minimize the height and mass of the guideway so that views of Flushing Bay would not be substantially obstructed. Depending on the selected horizontal alignment, parts of the guideway associated with the Willets Point off-Airport terminal station may be located within existing parking lots and on land immediately adjacent to the eight-lane GCP that is used for park purposes.

An above-grade alignment option would avoid difficult construction issues such as change in grade/elevation, large earth-moving activities, and infrastructure and utility conflicts. **Therefore, the PANYNJ considered an above-grade alignment reasonable and advanced it for further evaluation.**

Evaluation Results for the Vertical Alignment Options

In comparison to the above-grade alignment option, the below-grade and at-grade options would result in more negative effects such as more maintenance and safety concerns, and both would encounter more constructability issues (i.e., dewatering, interference with existing utilities, infrastructure columns, rail and subway facilities, combined sewer outfall, traffic lane closures during construction, etc.). An above-grade alignment would eliminate direct conflicts with these existing crossings. Furthermore, an above-grade alignment would minimize the closure of the crossings during construction. The above-grade alignment option would avoid most conflicts with other existing infrastructure as well as minimize operations and safety concerns. Therefore, the PANYNJ advanced the above-grade vertical alignment for further evaluation.

With the above-grade option established as the preferred vertical alignment, the PANYNJ explored options for the horizontal alignment between the off-Airport terminal station at Willets Point and the Airport.

2.4.2.5.4 Evaluation of Potential Horizontal Alignments

Potential horizontal alignments between Willets Point and LGA were evaluated in three separate geographic segments:

- **Segment 1:** Between the Willets Point terminal and the Northern Boulevard/GCP interchange;
- **Segment 2:** Between the Northern Boulevard/GCP interchange and the Airport property; and
- **Segment 3:** Between the Airport boundary and Airport terminals.

Multiple options were evaluated in each segment. These are illustrated in **Figure 2-17**.

Generally, the options for Segments 1, 2, and 3 can be combined to result in up to 30 possible horizontal alignments. Rather than examine the benefits and detriments of each of the 30 options, since portions of the potential alignments overlap one another, the evaluation for horizontal alignments considered the options by segment.

Segment 1: Willets Point Terminal to Northern Boulevard/GCP Interchange

There are five alignment options from the Willets Point 7 Line subway and LIRR station area to the Northern Boulevard interchange with the GCP (see **Figure 2-18**).

Alignment over LIRR

From a new off-Airport terminal station for the fixed guideway at Willets Point, this alignment option would run southwest directly above the LIRR right-of-way and then turn west and cross the 7 Line at Roosevelt Avenue. It would then move into the median of the GCP to the Northern Boulevard interchange, where it would connect with Segment 2 of the horizontal alignment.

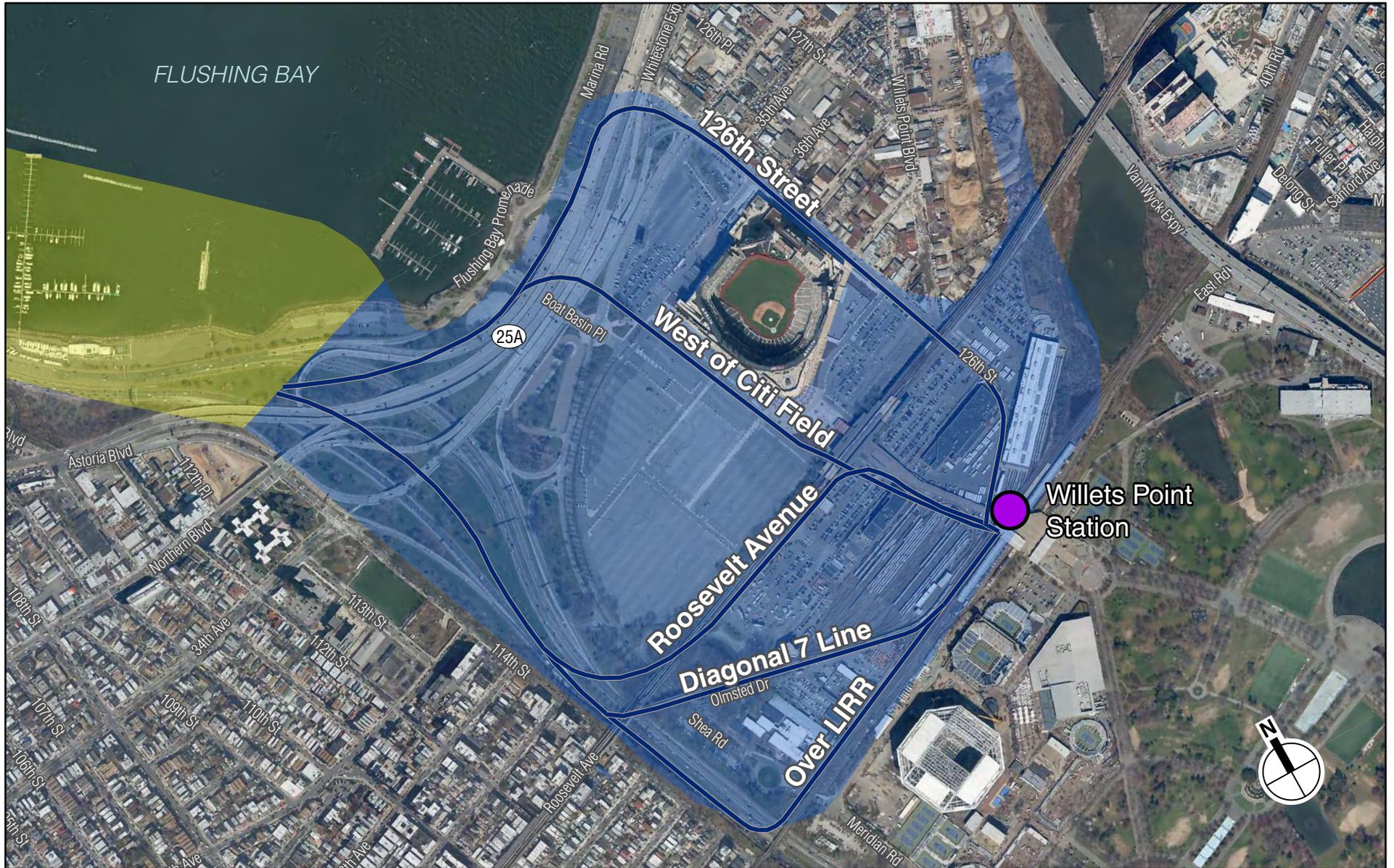
- **Operations.** Because it would be located over LIRR active right-of-way, maintenance of the guideway would be more complex than if it were located over a street, parking lot, or dedicated right-of-way. In addition, this alignment would require a sharp turn from the LIRR right-of-way to the GCP, which would restrict speeds and increase travel time (vehicles on the guideway would have to travel more slowly to safely execute the turn).
- **Constructability.** This alignment option would cross the 7 Line at the highest point of all alternatives. This would require additional coordination with the NYCT to install the guideway and support columns, which would also add to the complexity and difficulty of this alignment's construction. This alignment would require five nighttime closures of the 7 Line during construction. Construction of this alignment over the LIRR right-of-way would impact rail operations, requiring approximately 34 full and 20 partial weekend closures of the LIRR Port Washington Branch during construction. In addition, this segment's construction would be longer in duration than for other options due to the complexities of working near the LIRR and the location of construction laydown areas near this alignment. To construct the portion over the GCP, there would be short-term lane closures.
- **Right-of-Way Factors.** The alignment would be located within publicly owned transportation right-of-way, including the LIRR's Port Washington branch right-of-way.



Date of orthoimagery: 2016

- Segment 1
- Segment 2
- Segment 3

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- Segment 1
- Segment 2
- Potential Alignment Options



Fixed Guideway, Segment 1 Alignment Options
Figure 2-18

- **Community Impacts.** This alignment would run directly adjacent to parkland and the U.S. Tennis Center and could potentially create visual impacts on these properties and/or disruption during construction.

Diagonal 7 Line Alignment

This alignment option would run southwest directly above the LIRR track and would turn westward and follow the 7 Line tracks that connect to NYCT's Corona Yard¹⁴ diagonally to the GCP. It would then travel in the median of the GCP to the Northern Boulevard interchange, where it would connect with Segment 2.

- **Operations.** The assessment did not identify any substantial operational effects.
- **Constructability.** This alignment option would cross the 7 Line at the highest point of all alternatives. This would require additional coordination with the NYCT to install the guideway and support columns, which would also add to the complexity and difficulty of this alignment's construction. Construction would require approximately five nighttime shutdowns of the 7 Line and 43 nighttime closures of the lead track to the Corona Yard. These suspensions would last about five hours each. The suspension of the mainline service would impact subway riders and would require a shuttle bus, or another means to transport them through this area, but NYCT must implement similar closures for its own work efforts. The more frequent suspension of the lead track would have extensive effects on 7 Line service as trains would not be able to enter or leave the yard during the suspensions. NYCT would need an alternative service plan to accommodate these closures, which may impact the patterns or frequency of service throughout the 7 Line. The construction of this alignment would also impact LIRR operations, activities in the Casey Stengel Bus Depot, and activities in NYCT's Corona Yard to construct the connector to the LIRR station from the fixed guideway station.
- **Right-of-Way Factors.** A linear corridor through land owned by the City of New York would need to be acquired. Preliminary design indicates that a portion of it would be located within Flushing Meadows–Corona Park adjacent to NYCT's Corona Yard. Approximately 15 columns would occupy an estimated 0.014 acres and an aerial guideway would be approximately 35 feet wide and would extend approximately 400 yards along the alignment.
- **Community Impacts Factors.** The assessment did not identify any substantial community impacts. A portion of the alignment would be within Flushing Meadows–Corona Park adjacent to NYCT's Corona Yard.

Roosevelt Avenue Alignment

This alignment option would extend westward from the new terminal station parallel to the existing Passerelle walkway and then southward along Roosevelt Avenue and the elevated 7 Line tracks to the median of the GCP. It would then run in the median of the GCP to the Northern Boulevard Interchange, where it would connect with Segment 2.

- **Operations.** The assessment did not identify any extraordinary operational effects.

¹⁴ The Corona Yard is a storage and maintenance yard serving the 7 Line.

- **Constructability.** This alignment's construction would require five nighttime closures of the 7 Line to install the fixed guideway and supports over its tracks. The construction of this alignment would require coordination with the Passerelle reconstruction being undertaken by NYC Parks.
- **Right-of-Way Factors.** The alignment would require acquisition of a linear corridor in land comprised of Mets parking, which is owned by the City of New York. Approximately 30 columns would occupy an estimated 0.024 acres and an aerial guideway would be approximately 35 feet wide and would extend approximately 1,000 yards along the alignment. Approximately 50 parking spaces would be displaced.
- **Community Impacts.** The assessment did not identify any substantial community impacts. A portion of the alignment would be within the existing Mets parking.

West of Citi Field Alignment

This alignment option would continue directly northwest from the new off-Airport terminal station parallel to the Passerelle, then cross above the elevated 7 Line tracks, and continue immediately west of Citi Field. It would cross the span of highway lanes and ramps west of the stadium (including Northern Boulevard and the Whitestone Expressway) and then continue west through the ramps of the GCP/Whitestone Expressway Interchange, where it would join the Segment 2 alignment near the Northern Boulevard Interchange.

- **Operations.** The assessment did not identify any substantial operations effects.
- **Constructability.** The alignment would require a crossing over the Northern Boulevard Interchange with the GCP and Whitestone Expressway as well as the 7 Line. This would result in major impacts for constructing the foundations and guideway elevated structure over the Whitestone Expressway, as well as 20 nighttime suspensions of the 7 Line subway service. Construction would require the relocation of the Whitestone Expressway's entrance ramp from Marina Road as well as cause the removal of portions of its bridge structure. This would result in long-term, lane closures on the Whitestone Expressway throughout the day and night (approximately two months in duration at two locations). In addition to these closures, the construction of the fixed guideway columns and spans would require approximately five nighttime closures of various sections of the Whitestone Expressway. This alignment may also conflict with plans for the proposed Passerelle reconstruction.
- **Right-of-Way Factors.** The alignment would require acquisition of a linear corridor within land owned by the City of New York in the existing Mets parking and the World's Fair Marina (the Marina). Approximately 45 columns would occupy an estimated 0.41 acres and an aerial guideway would be approximately 35 feet wide and would extend approximately 1,800 yards along the alignment.
- **Community Impacts.** The assessment did not identify any substantial community impacts. Construction of the fixed guideway would have short-term, but extensive, impacts on the Whitestone Expressway due to partial and full closures of the highway. It would also require about 20 nighttime closures of the 7 Line subway. A portion of the alignment would span the existing Mets parking, resulting in the removal of 70 parking spaces, and land north of the Whitestone Expressway that is part of mapped parkland.

126th Street Alignment

From the new terminal station, this alignment option would head north through NYCT's Casey Stengel Bus Depot and pass a maintenance building in NYCT's Corona Yard. It would then run northwest, elevated above 126th Street and crossing above the 7 Line at Roosevelt Avenue. Then, the alignment would continue to the Whitestone Expressway, cross the Whitestone Expressway, and run along its northern edge to the GCP/Whitestone Expressway Interchange, where it would join Segment 2.

- **Operations.** Two curves within this alignment would require a slower approach speed, resulting in a minor increase in trip travel time between the Airport and the Willets Point station as compared to other options.
- **Constructability.** The alignment option would require a crossing over the Northern Boulevard Interchange with the GCP and Whitestone Expressway as well as the 7 Line. This would result in major impacts for constructing the foundations and guideway elevated structure over the Whitestone Expressway, as well as five nighttime suspensions of the 7 Line subway service. The eastbound exit ramps to 126th Street may need to be realigned. The guideway span installation would require closure of multiple roadway sections of the Whitestone Expressway at different times during construction. Approximately five nighttime closures would be required for each section. Five nighttime closures would also be required to place the guideway span above the 7 Line. The section along 126th Street (a four-lane road with no median) would require shifting of lanes to accommodate the guideway's elevated structure. This alignment would also restrict access to Citi Field and Casey Stengel Bus Depot during construction, and it may conflict with proposed construction activities that would occur east of 126th Street as part of New York City's Willets Point development.
- **Right-of-Way Factors.** This alternative would require acquisition of a linear corridor within land owned by the City of New York in the Marina. Approximately 10 columns would occupy an estimated 0.013 acres and an aerial guideway would be approximately 35 feet wide and would extend approximately 500 yards along the alignment.
- **Community Impacts.** The assessment did not identify any substantial community impacts. A portion of the alignment would span the Mets parking, resulting in the displacement of 10 spaces, and land north of the Whitestone Expressway that is part of mapped parkland.

Segment 1 Evaluation Results

Most Segment 1 alignments would affect the 7 Line and LIRR operations and stations during construction, but Diagonal 7 Line and West of Citi Field options would have far greater impacts to the subway operations than the other three. Multiple alignment options would acquire land within the Mets parking. The Diagonal 7 Line, West of Citi Field, and 126th Street options have additional complications that would temporarily shut down either access to the Corona Yard or portions of the Whitestone Expressway during construction. Since the Over LIRR and Roosevelt Avenue alignment options would have far less extensive construction impacts, the PANYNJ advanced these two alignment options for Segment 1.

Segment 2: Northern Boulevard Interchange to Airport Boundary

Three alignment options were considered in Segment 2 (see **Figure 2-19**):

GCP Median Alignment Option

From the Northern Boulevard Interchange to the Airport boundary, the alignment for this option would be in the GCP median. This would require widening the existing median and shifting the eastbound GCP lanes about 8 feet closer to the adjacent residential properties. The guideway would need to be above the existing pedestrian bridges that connect the residential community to the Flushing Bay Promenade.

- **Operations.** The assessment did not identify any substantial operational effects.
- **Constructability.** The alignment would temporarily impact the GCP eastbound and have minor impacts to GCP westbound. The GCP eastbound lanes would need to be shifted up to eight feet. The shift would impact existing structures and streets including an existing gas station, pedestrian bridges over the GCP in this segment (27th Avenue and 31st Drive), and the entrance to the GCP eastbound off-ramp to Ditmars Boulevard. These modifications would affect GCP traffic. Multiple short-term lane closures would be required during off-peak hours and a few nighttime closures to complete the work on pedestrian bridges and overhead sign structures, as well as to install the fixed guideway over existing roadways. Closures for the GCP would be consistent with the NYCDOT standard closures, which include multiple one and two-lane closures in non-peak hours, but daytime work would be necessary to conduct noisy work such as pile driving.
- **Right-of-Way Factors.** The alignment utilizes an existing right-of-way, which minimizes the negative effects to other properties. However, easements or another ownership mechanism would be required for the fixed guideway alignment. Right-of-way acquisition would be required due to shifting the GCP eastbound lanes.
- **Community Impacts.** The GCP Median alignment option would require the GCP to be shifted 8 feet south, moving traffic closer to the existing residential structures that border the highway. The guideway would be elevated (at approximately 50 feet) above the GCP and the existing pedestrian bridges, and it would obstruct viewsheds from the residences, located about 100 feet away and south of the GCP.

Promenade Alignment Option

From the Northern Boulevard Interchange to the Airport boundary, the Promenade alignment option would be along a narrow corridor of property owned by the City of New York that is immediately adjacent to the GCP. It would run along the southern edge of the Flushing Bay Promenade and the northern boundary of the GCP, an eight-lane expressway. The Flushing Bay Promenade is a public waterfront walkway that is owned by New York City and used for park purposes. This alignment option would be situated along the northern edge of the GCP and southern edge of the Promenade property to minimize potential impacts to the Promenade and the shoreline. The guideway would be located immediately north of the GCP where there is a parking lot and gas station, but the gas station would remain.



- Segment 1
- Segment 2
- Segment 3
- Potential Alignment Options

0 500 FEET

Fixed Guideway, Segment 2 Alignment Options
Figure 2-19

- **Operations.** The assessment did not identify any substantial operational effects.
- **Constructability.** The assessment did not identify any substantial construction effects along the edge of the Flushing Bay Promenade. There is the potential need to modify the existing pedestrian bridges to change the egress points, and there would be temporary impacts to the parking lot during construction.
- **Right-of-Way Factors.** The alignment would require the acquisition of a linear corridor within property owned by the City of New York. Approximately 20 columns would occupy an estimated 0.014 acres and an aerial guideway would be approximately 35 feet wide and would extend approximately 700 yards along the alignment.
- **Community Impacts.** This alignment option may be partially located within land along a narrow corridor of property owned by the City of New York that is immediately adjacent to the GCP. This corridor is part of an area that serves park purposes but is adjacent to the highway and a surface parking lot. Columns might be located near the access road for the Marina and may impact the boat lift due to the height of that lift and the guideway structure. The alignment would be at a lower elevation (at approximately 30 feet above grade) than the GCP Median option and farther from the residences south of the GCP, thereby minimizing viewshed impacts. The residences would be separated from the alignment by the eight-lane GCP, thereby avoiding or reducing impacts on the residents.

Flushing Bay Alignment Option

From the Northern Boulevard Interchange to the Airport boundary, this alignment option would be within the water of Flushing Bay, hugging its southern shoreline. It would cross through an existing in-water marina facility, part of the Marina. The alignment would be on an elevated structure above the water.

- **Operations.** Salt water can erode piers and guideways, and the location over water would increase operations and maintenance efforts and costs as compared to over-land options.
- **Constructability.** There may be minor impacts to GCP, depending on the alignment connection to Segment 3, which may require selected nighttime roadway closures with detours due to installing guideway at that connection point. The construction of the guideway would likely utilize barges, which may need permits to operate. Constructing over water would add complexity and difficulty to the Project.
- **Right-of-Way Factors.** The alignment would require the acquisition of a linear corridor within City-owned property in Flushing Bay and the Marina. Approximately 25 columns would occupy an estimated 0.25 acres and an aerial guideway would be approximately 35 feet wide and would extend approximately 1,000 yards along the alignment.
- **Community Impacts.** This alternative would have to span over one of the two primary piers of the Marina and it would affect water resources and biological resources. This alignment would require major permitting efforts and impacts to regulated wetlands. Due to the length and extent of the segment over water and constructing columns in the water, it is likely substantial agency coordination and mitigation would be required, adding time and cost to the Project. A linear corridor of property owned by the City of New York that is currently used for park purposes would be affected by the installation of columns and guideway for this alignment. The final alignment may also affect boating, as well as

viewsheds from residences south of the GCP, due to the locations of columns and the final vertical clearance of the guideway from the water.

Segment 2 Evaluation Results

The GCP Median alignment option would require construction and shifting of the GCP roadway, with the potential for adverse effects to traffic, but it would avoid City-owned property north of the GCP that is used for park purposes. The alignment option along the southern edge of the Promenade would be located in part of an area that serves park purposes but is adjacent to the highway and a surface parking lot; it would have only minor constructability issues. The Flushing Bay alignment option would have the most extensive constructability issues and community impacts, due to its construction in the water, including wetlands, and anticipated lengthy and complicated permitting process. Therefore, the PANYNJ did not consider the Flushing Bay alignment option reasonable and did not advance it for further consideration. The PANYNJ advanced two alignment options for this segment, the GCP Median and the edge of the Promenade alignments.

Segment 3: Airport Boundary to Airport Terminal(s)

Two alignment options were considered for Segment 3 (see **Figure 2-20**). The LGA Redevelopment Program could accommodate either option.

On-Airport Stations Alignment Option

The alignment would be on-Airport property along with any associated stations.

- **Operations.** Station(s) would be located on-Airport adjacent to the passenger terminals, thereby minimizing passenger walk time from the new fixed-guideway stations to the Airport terminals. Depending on the number of stations developed, the walking time would be between 3 and 7½ minutes.
- **Constructability.** Coordination would be required with ongoing Airport projects and construction. Some relocation would be required of minor utilities needed for placement of structural supports.
- **Right-of-Way Factors.** No impacts to the off-Airport right-of-way would occur.
- **Community Impacts.** The assessment did not identify any extraordinary community impacts.

GCP Median Stations Alignment Option

The alignment would be within the GCP median. Stations would be in the median with passenger connections over the westbound GCP from the eastern boundary of the Airport to the Airport terminals.

- **Operations.** Station(s) would be in the GCP median rather than on-Airport. Therefore, the stations would be farther from the passenger terminals, resulting in between 5 and 16 minutes of walking time for passengers to get from the stations to the terminals, depending on the number and locations of these stations.
- **Constructability.** There would be major impacts to the GCP due to the construction of the station(s), alignment, and the connector bridges in the GCP right of way. The GCP



- Segment 2
- Segment 3
- Potential Alignment Options



eastbound lanes would be shifted approximately 10 feet south to accommodate new columns within the median of the GCP. This would require complex and lengthy construction because it would occur in a compound curved section of the highway. Shifting would also have negative effects and require reconstruction of several ramps or bridges and substructures including, but not limited to, 90th, 94th, 99th, and 102nd Streets. The shift would also require the reconstruction of the fueling station near 25th Avenue.

The top of the rail would vary between 64 and 70 feet above 102nd Street, adding to the construction's complexity. Construction would require single and dual lane closures of the GCP in both directions. Full lane closures of short duration (15-30 minutes) would be necessary for several evenings to install the pedestrian superstructures. Full closure of 102nd Street and the ramp near 99th Street would be required to replace the impacted substructure in those areas. Overnight closures at the at-grade ramp connections would be required for several weeks for reconstruction of the shifted highway. Daytime closures would be necessary to conduct noisy work such as pile driving and would be consistent with NYCDOT standards.

- **Right-of-Way Factors.** Right-of-way would be needed south of the GCP to widen it. This would affect property outside of the GCP right-of-way.
- **Community Impacts.** The assessment did not identify any extraordinary community impacts.

Segment 3 Evaluation Results

The On-Airport option for Segment 3 would provide more convenient passenger connections to the passenger terminals than the GCP option and would avoid multi-year construction impacts along this segment of the GCP that would occur with the GCP option. For this reason, the PANYNJ advanced the On-Airport option for further consideration and did not advance the GCP option.

Summary of Horizontal Alignment Evaluation

Based on the results of the horizontal alignment evaluation, the PANYNJ found two alignments in Segment 1, two alignments in Segment 2, and one alignment in Segment 3 to be reasonable, resulting in a total of four alternatives for further study (see **Figure 2-21** for a summary of the evaluation process).

2.4.2.6 Summary of Evaluation of Fixed Guideway Alternative

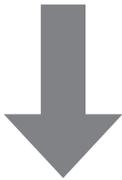
Table 2-4 summarizes the evaluation results for the Fixed Guideway Alternative. As shown, Willets Point is the only terminal location that would satisfy the evaluation criteria. The other terminal locations (Astoria, Woodside, Jackson Heights, and Jamaica), would not satisfy one or more of the evaluation criteria.

SEGMENT 1
Willels Point Station to Interchange

SEGMENT 2
Interchange to Airport Boundary

SEGMENT 3
Airport Boundary to Airport Terminals

RANGE OF OPTIONS

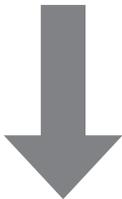


- 1. Over LIRR
- 2. Diagonal 7 Line
- 3. Roosevelt Avenue
- 4. West of Citi Field
- 5. 126th Street

- 1. GCP Median
- 2. Promenade
- 3. Flushing Bay

- 1. GCP (Off-airport)
- 2. On-airport

EVALUATION OF OPTIONS

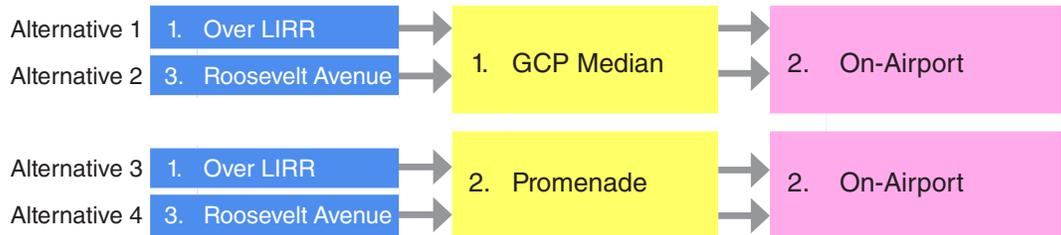
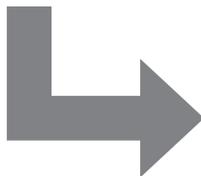


- ~~1. Over LIRR~~
- ~~2. Diagonal 7 Line~~
- 3. Roosevelt Avenue
- ~~4. West of Citi Field~~
- ~~5. 126th Street~~

- 1. GCP Median
- 2. Promenade
- ~~3. Flushing Bay~~

- ~~1. GCP (Off-airport)~~
- 2. On-Airport

OPTIONS FOR FURTHER STUDY



Evaluation Results for Fixed Guideway Alignments
Figure 2-21

Table 2-4
Level 2 Evaluation of Fixed Guideway Alternatives

Evaluation Criteria	Fixed Guideway Alternative Option				
	Astoria	Woodside	Jackson Heights	Jamaica	Willets Point
Project Objectives	Does not meet Objective 8 (Design and construct a project that avoids substantial disruption to the neighborhoods where it is located).	Does not meet Objective 8 (Design and construct a project that avoids substantial disruption to the neighborhoods where it is located).	Does not meet Objective 8 (Design and construct a project that avoids substantial disruption to the neighborhoods where it is located).	Does not meet Objective 1 (Provide a new or enhanced transportation option to LGA with reliable and predictable travel time from Midtown Manhattan, Queens, and other areas of the region).	Meets Project objectives.
Operations	No substantial operational concerns.	No substantial operational concerns.	No substantial operational concerns.	Does not provide a travel time from Grand Central Terminal or Penn Station of less than 30 minutes.	No substantial operational concerns.
Constructability	Would result in substantial disruption to Amtrak's Northeast Corridor service due to the required modifications to the Hell Gate trestle and/or its power system. Would require modification two vehicle bridges and one pedestrian bridge over the GCP. Would require relocation of a major sewer line.	Requires realignment of streets and reconstruction of GCP bridges and ramps. Near the Airport, there would be difficult utility relocation and a complex alignment to weave the right-of-way through the approach surface and highway infrastructure.	Would involve complex construction above a subway tunnel, through a dense neighborhood, across the BQE Northern Boulevard interchange, and in and next to the GCP. Would involve realignment of streets and reconstruction of GCP bridges and ramps. Near the Airport, there would be utility relocation and a complex alignment to weave the right-of-way through the Airport approach surface and highway infrastructure.	Would require more than six miles of guideway, which is at least twice as long as other alternatives, through a heavily congested highway corridor, including major highway interchanges (Kew Gardens interchange and LIE interchange). The construction of a new terminal station at Jamaica would be challenging given the complex arrangement of the existing transportation hub. May conflict with recently completed improvements for the Kew Gardens Interchange. The right-of-way requirements for the Van Wyck Expressway project may not allow the placement of guideway in the median without impacts to the service roadways or the NYCT E Line subway.	Any alignment would have to cross the GCP and potentially the Whitestone Expressway, requiring construction staging to manage traffic. Construction activities might require the limited suspension of 7 Line and LIRR service through the area. There are feasible options to minimize these constructability considerations, which are described in Section 2.4.2.5.4 .
Right-of-way Factors	No or minimal private property acquisition for station and alignment. Property acquisition would be required for the employee parking facility and OMSF.	Would require acquisition of 6-6½ acres of private property for the station and alignment. Additional property would be acquired for the employee parking facility and OMSF.	Would require acquisition of 6-6¼ acres of private property for the station and alignment. Additional property would be acquired for the employee parking facility and OMSF.	No or minimal private property acquisition for station and alignment. Property acquisition would be required for the employee parking facility and OMSF.	No private property acquisition for station and alignment. Acquisition of publicly owned property would be required for the employee parking facility and OMSF.
Community Impacts	Construction would require extensive and lengthy disruption directly within and near a densely developed residential neighborhood. Construction activities would disrupt traffic using the local roadways where bridges over the GCP must be reconstructed, and Amtrak and freight rail operations over the Hell Gate trestle. The elevated structure would adversely affect views from residential areas located directly along this route, and a cantilevered elevated subway structure over Saint Michael's Cemetery would substantially alter views within the cemetery.	Construction would result in extensive and lengthy disruption in and near established and active residential neighborhood. Acquisition of properties, including linear stretches of contiguous parcels, could substantially alter the character of adjacent blocks by removing the existing uses and the buffering of the existing railroad rights-of-way. The terminal station and guideway structure approximately 30 feet in the air would adversely affect views in the neighborhoods where it is located. Construction would require partial acquisition of Saint Michael's Playground. Construction would impact traffic on local roadways where bridges over the GCP must be reconstructed. The transportation facility and employee parking would increase traffic in a congested area.	Construction would result in extensive and lengthy disruption in and near established and active residential neighborhood. Acquisition of properties, including linear stretches of contiguous parcels, could substantially alter the character of adjacent blocks by removing the existing uses and the buffering of the BQE. Would remove historic structures, including portions of the National Register Jackson Heights Historic District. The terminal station and guideway structure approximately 30 feet in the air would adversely affect views in the neighborhoods where it is located. Construction would impact traffic on local roadways where bridges over the GCP must be reconstructed. The transportation facility and employee parking would increase traffic in a congested area.	Construction through the Kew Gardens Interchange would likely adversely impact traffic operations over multiple months. Constructing the guideway along the Van Wyck Expressway would have adverse impacts on Van Wyck Expressway traffic as partial and full lane closures would be required. The expansion of a new transportation facility and construction of employee parking in Jamaica would increase traffic in a heavily congested area.	Would not result in substantial construction or permanent impacts to residential neighborhoods, with the exception of some visual impacts to some residences south of the GCP near the Airport, which are separated from the Airport by the eight-lane GCP. The alignment and station would be primarily within transportation right-of-way and parking lots. The station, OMSF, and employee parking could be accommodated within the publicly owned land at Willets Point. Depending on the selected alignment, parts of the guideway may be located within the Mets parking and/or on land located immediately adjacent to the eight-lane GCP that is used for park purposes.
Evaluation Result	NOT RECOMMENDED	NOT RECOMMENDED	NOT RECOMMENDED	NOT RECOMMENDED	RECOMMENDED

2.4.3 AIRPORT STATIONS AND ANCILLARY FACILITIES

As part of the Level 2 alternatives evaluation, the PANYNJ also considered ancillary facilities. The PANYNJ conducted evaluations for the siting of on-Airport stations, employee parking, and an OMSF at Willets Point station.

2.4.3.1 On-Airport Stations

2.4.3.1.1 Siting Criteria for On-Airport Station(s)

Based on Project objectives, the Project would serve the new Terminals B and C, with the future ability to serve all Airport terminals (see **Figure 2-22**). The primary factor for siting of on-Airport stations was walking distance and passenger convenience. Airport passengers often have luggage and may be traveling with small children, so walking distance and travel time affects each passenger's experience.

Walking distance is measured from the fixed guideway station to the ticketing areas of each terminal. Based on the results of Segment 3's evaluation, station locations were determined to be on-Airport. Therefore, to minimize walking distance, it would be ideal to assume one station per terminal. However, this evaluation considers whether stations at all terminals are necessary to achieve the Project objective while still minimizing constructability issues. Therefore, the PANYNJ used providing convenient access to Terminals B and C and minimizing constructability issues as the criteria for determining the number and location of on-Airport fixed guideway stations.

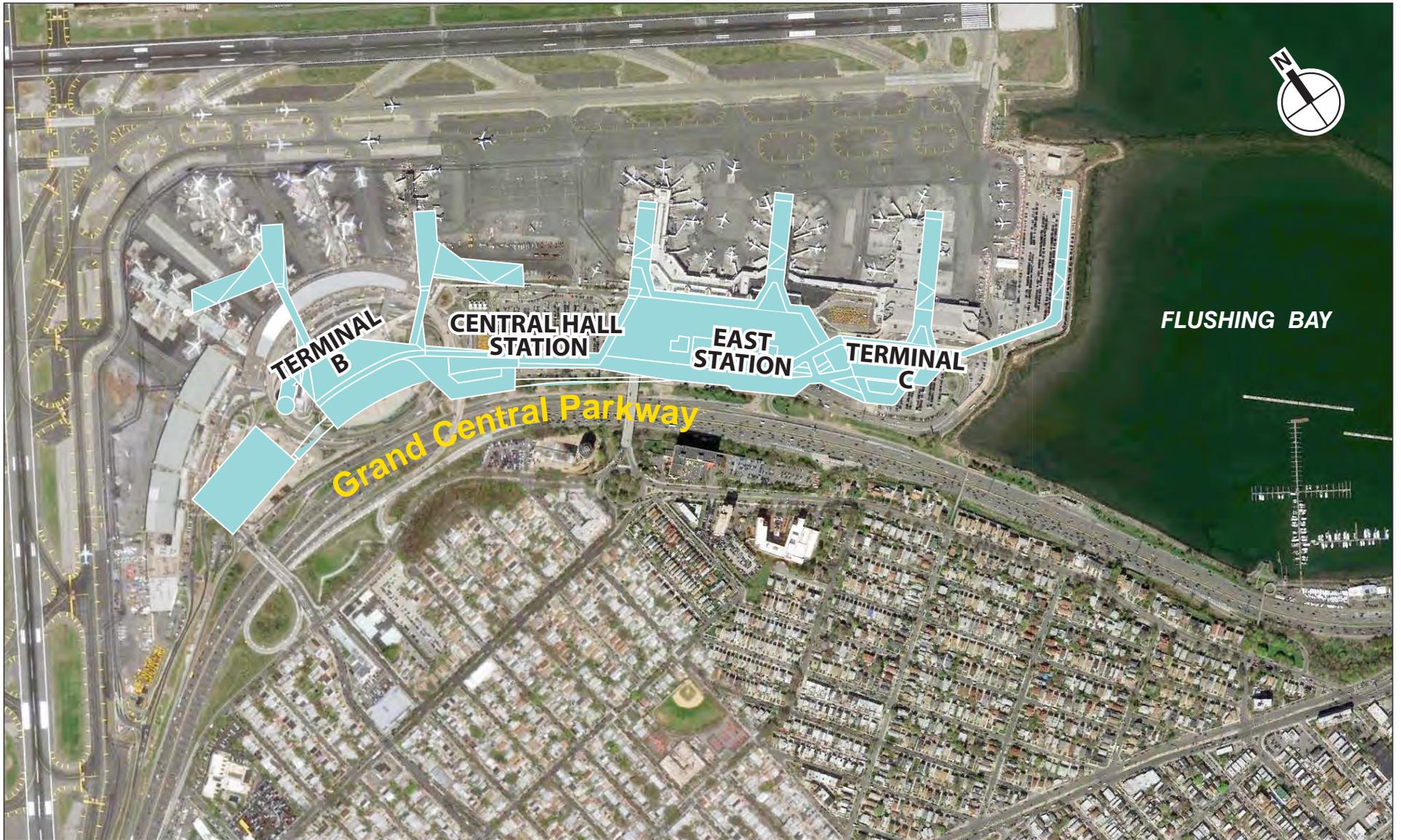
2.4.3.1.2 On-Airport Station(s) Evaluation

Several options were considered when determining which and how many Airport stations would be constructed. Therefore, the analysis includes an evaluation of options that serve multiple terminals.

While serving all airport passenger terminals would be ideal, serving two terminals could also be effective in achieving Project objectives and passenger convenience. Three stations at LGA (Terminal A, Terminal B, and Terminal C) would meet the criterion of providing convenient access to Terminals B and C, but it would also have substantial constructability issues.

Access from a station at Terminal A to other terminals would require constructing a tunnel between them. Due to existing Airport characteristics and surrounding infrastructure, including the GCP, a dedicated rail fixed guideway would require the construction of a tunnel below Runway 04/22 between Terminal A and Terminal B. Although having a station at each terminal would minimize walking distance for passengers to their associated ticketing areas, the constructability issue associated with Terminal A makes this alternative not reasonable at this time, as serving this terminal would not be necessary to fulfill the Project objectives. Therefore, a station at Terminal A is not included in the Project, but it could be built later.

Serving the passengers that use the Terminals B and C would satisfy the Project objective of providing convenient access to those terminals and therefore serving 90 percent of passengers. Two stations, one at each of these terminals, would maximize the convenience of passengers by minimizing walking distance to their respective ticketing areas. One station located between the



two terminals would result in longer corridors between the station and the two terminals' ticketing areas, and longer walking times. Accordingly, the PANYNJ determined that having two on-Airport stations would be favorable.

2.4.3.1.3 Summary of On-Airport Station(s) Evaluation

Constructing stations at the Terminals B and C would not have major constructability issues and would provide convenient access for 90 percent of the on-Airport passengers. Two stations, one to serve each terminal, would result in shorter walk times for passengers compared to one station that served both terminals. Therefore, an alternative with two stations, one at the Terminal B and one at Terminal C, was advanced as the reasonable alternative for further study.

2.4.4 OPERATIONS, MAINTENANCE, AND STORAGE FACILITY (OMSF) LOCATION

2.4.4.1 Siting Criteria for OMSF

An OMSF is required to provide space for train storage and for regular and periodic maintenance, such as light and heavy equipment repair, wheel truing, car washing, and interior cleaning. The facility must include office space and parking for several employees. The exact size varies for this type of facility, generally dependent on the fleet size and anticipated ridership. For this Project, it is assumed that an 87,000- to 107,000-square-foot facility would be sufficient, regardless of eventual guideway technology. The facility would include an OMSF building of approximately 43,000 square feet, outdoor space for train storage, an OMSF employee parking lot, and appropriate provisions for the curb cuts and emergency/fire lane. The proposed facility would also include an Operations and Control Center (OCC) that supports the driverless operations and security of the system. For location, the site of the facility should be close to a station to reduce the need for additional tracks/track length.

2.4.4.2 OMSF Location Alternatives Evaluation

Since the OMSF needs to be located along the fixed guideway alignment with direct connections to it, areas at the Airport, along the alignment, and at the Willets Point station were considered.

2.4.4.2.1 On-Airport OMSF

There is no space on-Airport that could accommodate an OMSF.

2.4.4.2.2 OMSF between Willets Point Station and Airport

Between Willets Point and the Airport, the only potential area for an OMSF would be in the landscaped area next to GCP, south of the GCP interchange with Northern Boulevard. An at-grade option across from Hinton Park on 114th Street was evaluated. However, with an elevated alignment for the rail, this would cause complex constructability issues due to the change in grade between the elevated structure and the at-grade facility. Within that landscaped area, a new access ramp (limited to OMSF employees) would also be required (disruptive to existing traffic). Due to construction complexity of an OMSF at grade with an above-grade alignment, this option was not considered reasonable.

2.4.4.2.3 OMSF at Willets Point Station

At Willets Point, two siting options were identified for the OMSF (see **Figure 2-23**).

Above-Grade Option 1 – Casey Stengel Bus Depot Site

Under this option, the OMSF site would be located within the Casey Stengel Bus Depot, within City-owned property that is leased to MTA, and property that is owned by MTA. The site is close to the Willets Point subway and LIRR stations, minimizing the additional track required. The lead tracks from the fixed guideway to the OMSF would be designed to avoid any conflicts with the bus depot activities. The tracks would pass close to wetlands associated with Flushing Creek and might impact the wetlands or wetlands adjacent area.

Above-Grade Option 2 – LIRR Site

The LIRR Site (Queens Block 1833 Lots 1 and 250), a portion of former LIRR Whitestone Branch¹⁵ right-of-way is north of the 7 Line tracks along Flushing Creek (east of Willets Point Boulevard). MTA owns this site, and it is currently in use by a private contractor. If the OMSF were located within the LIRR Site, it would be a substantial distance (approximately 2,000 feet) from the fixed guideway station, requiring additional track and cost to construct relative to other locations. The location would require the fixed guideway to cross the 7 Line tracks, which would add construction complications and costs. The tracks would pass close to wetlands associated with the Flushing Creek, which may result in impacts to the wetlands or wetlands adjacent area. In addition, the site has historic contamination that would require remediation, and the site may be used by MTA at some future date for its bus operations.

2.4.4.3 Summary of OMSF Location(s) Evaluation

Based on the longer track length, interference with the 7 Line, and potential for future use by the MTA, the PANYNJ did not advance the LIRR Site for further consideration for the OMSF. The PANYNJ identified the Casey Stengel Bus Depot Site as a more favorable location for the OMSF and advanced it for further evaluation.

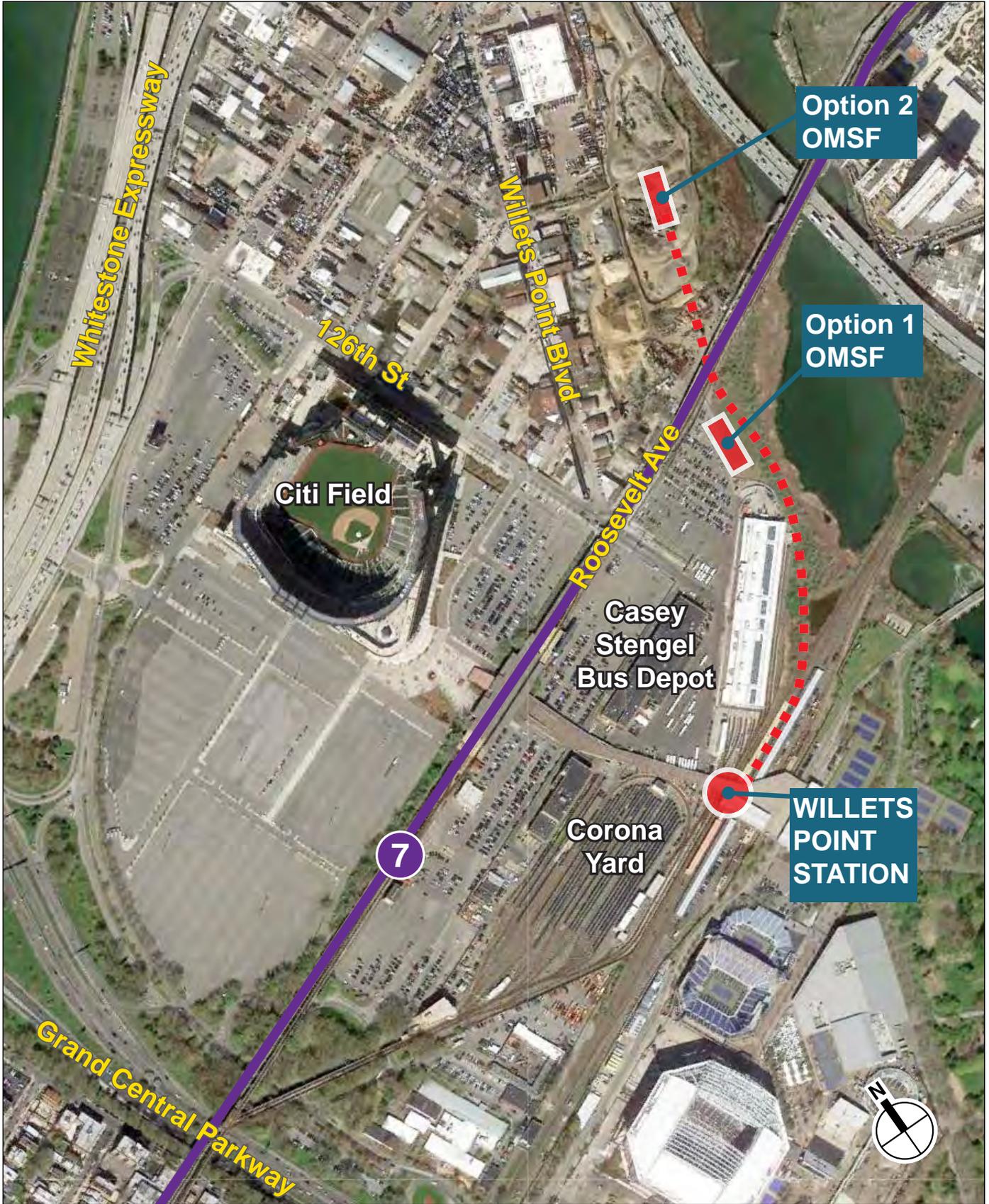
2.4.5 EMPLOYEE PARKING LOT SITING

2.4.5.1 Siting Criteria for Employee Parking Lot

The primary factor in siting employee parking is a need for 500 employee spots within walking distance of the fixed guideway station at Willets Point. Based on an average of 180 square feet per space, the lot would need to be at least 90,000 square feet in size.¹⁶ For this analysis, the PANYNJ assumed the 500 spots would be in a surface lot to conservatively identify the sites that would be adequate for the parking lot. A decked structure would allow for a smaller site that could generally be in the same area as the identified sites for surface lots. While the evaluation includes potential sites to potentially accommodate employee parking, this aspect of the Project is not yet fully designed and therefore only considered at the conceptual level.

¹⁵ This former LIRR branch ran along the west bank of Flushing Creek.

¹⁶ University of Tennessee Institute of Agricultural, "Estimating the Number of Parking Spots per Acre." <https://ag.tennessee.edu/cpa/Information%20Sheets/CPA%20222.pdf>. Web. Accessed July 26, 2018.



2.4.5.2 Employee Parking Lot Alternatives Evaluation

The PANYNJ considered three sites for the potential development of employee parking around the Willets Point station that could meet the size criteria and requirements for a reasonable walking distance (e.g., within about one-quarter mile if possible) to the fixed guideway station. The sites considered were the existing parking at 126th Street; the existing parking at South Field Lot East; and the LIRR Site, which was considered for both the OMSF and an employee parking lot (see **Figure 2-24**).

2.4.5.2.1 126th Street Site

The existing parking across from 126th Street (south of Roosevelt Avenue) would be within one-quarter mile distance to the fixed guideway entrance and is directly adjacent to the South Field Lot East parking lot. If this site were used for employee parking, it would displace regularly used employee and bus parking for the Casey Stengel Bus Depot.

2.4.5.2.1 South Field Lot East Site

The South Field Lot East is an existing parking lot south of Roosevelt Ave and north of the Casey Stengel Bus Depot station. It is owned by NYC Parks. It is used for commuter parking as well as overflow parking for Mets games. The lot is near the Willets Point fixed guideway station and is considered reasonable for further evaluation. An agreement with the PANYNJ, New York City, and the Mets would be required for any impacts associated with using this site for employee parking.

2.4.5.2.2 LIRR Site

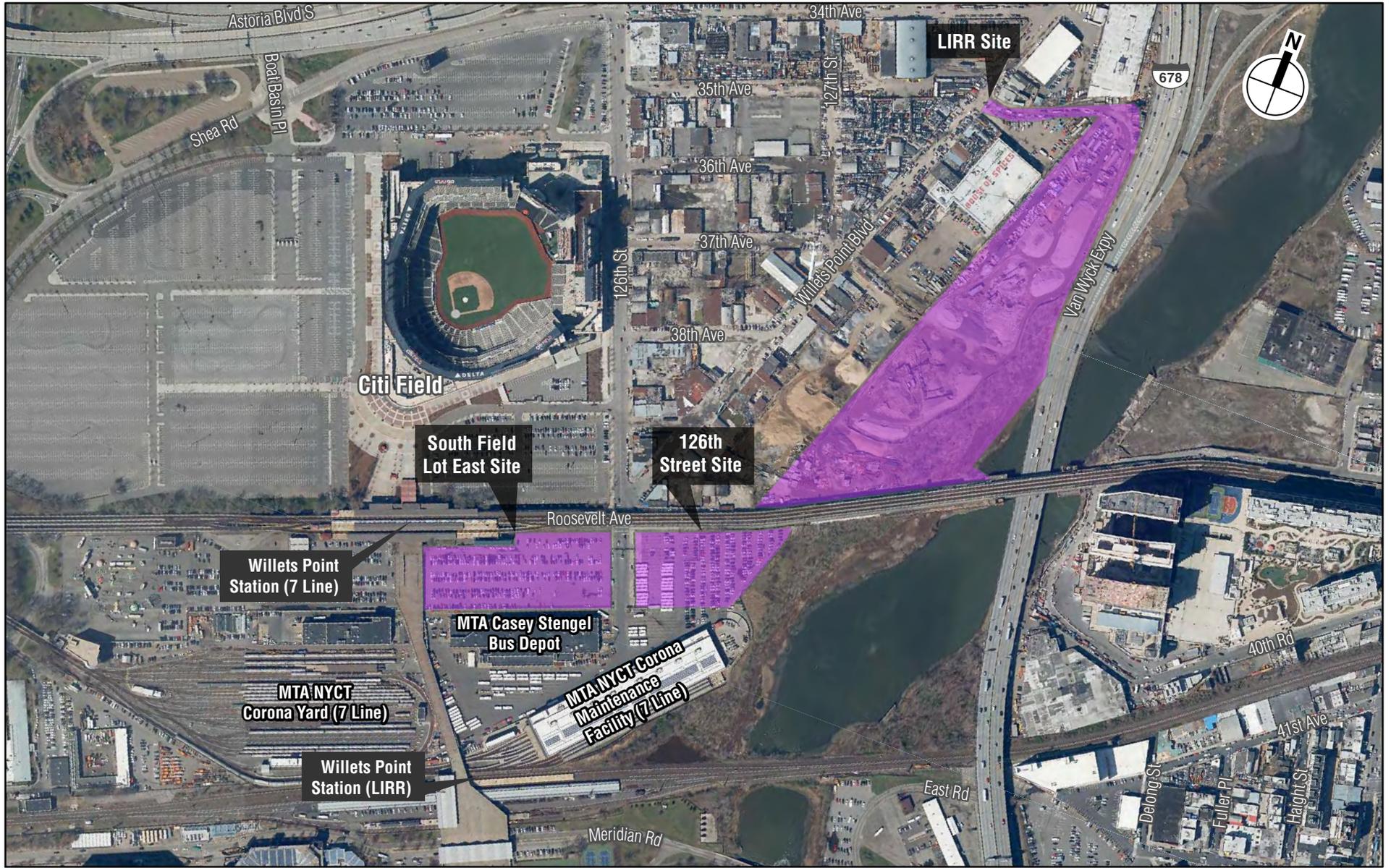
The LIRR Site is about a one-half mile walk from the Willets Point station using existing roadways, which is farther than the criterion for a reasonable walking distance and the other two sites considered. An employee parking lot at this location would either require an extension of the fixed guideway with an additional off-Airport station for employees or a shuttle to the Willets Point fixed guideway station. Therefore, the PANYNJ did not advance this site for further consideration.

2.4.5.3 Summary of Employee Parking Lot Evaluation

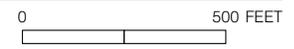
The South Field Lot East is currently set aside for parking use but used as overflow parking during Mets games. It is within walking distance to the Willets Point fixed guideway station location. The 126th Street parking lot is located directly adjacent to the South Field Lot East and within the reasonable walking distance criteria. Therefore, both sites were advanced for further evaluation to be developed as employee parking. The LIRR Site's distance would require additional infrastructure or transportation services and therefore the PANYNJ did not advance the LIRR Site for further evaluation.

2.5 ALTERNATIVES RECOMMENDED FOR FURTHER EVALUATION

The Sponsor has taken a hard look at a wide range of alternatives to meet the Project objectives. The Sponsor considered modal alternatives (Level 1). The Sponsor carefully considered the consistency of the modal alternatives with the Project objectives and determined that the Rail or Subway Extension Alternative and the Fixed Guideway Alternative were appropriate to carry forward to a Level 2 evaluation.



 Potential Employee Parking



Potential Employee Parking Locations
Figure 2-24

In the Level 2 evaluation, the Sponsor examined the operational, constructability, right-of-way, and community impacts relevant to the Rail or Subway Extension Alternative and Fixed Guideway Alternative, including multiple options for the off-Airport terminal stations. After careful consideration of the range of options, the Sponsor determined that the Rail or Subway Extension Alternative was not reasonable and would not be advanced, but the Fixed Guideway Alternative with a Willets Point terminal station was reasonable and was advanced.

The Sponsor then evaluated vertical and horizontal alignments between Willets Point and the Airport. The Sponsor determined that an above-grade (elevated) alignment was reasonable, and that below-grade (tunnel) and at-grade alignments were not reasonable due to constructability complexities and difficulties. The Sponsor also evaluated various alignment options for three segments of the horizontal alignment between Willets Point and the Airport and determined the four possible routes that may be reasonable are:

- **Alternative 1:** A fixed guideway with a terminal at Willets Point and on-Airport stations. The alignment would follow the Over LIRR option for Segment 1, the GCP median option for Segment 2, and the on-Airport option for Segment 3.
- **Alternative 2:** A fixed guideway with a terminal at Willets Point and on-Airport stations. The alignment would follow the Roosevelt Avenue option for Segment 1, the GCP median option for Segment 2, and the on-Airport option for Segment 3.
- **Alternative 3:** A fixed guideway with a terminal at Willets Point and on-Airport stations. The alignment would follow the Over LIRR option for Segment 1, the Promenade option for Segment 2, and the on-Airport option for Segment 3.
- **Alternative 4:** A fixed guideway with a terminal at Willets Point and on-Airport stations. The alignment would follow the Roosevelt Avenue option for Segment 1, the Promenade option for Segment 2, and the on-Airport option for Segment 3.

In June 2018, the New York State enacted legislation related to an airport mass transit project at LaGuardia Airport.¹⁷ This legislation authorizes the acquisition of property, by eminent domain by the New York State Department of Transportation for the construction of infrastructure, ancillary facilities, parking, and temporary laydown and staging areas associated with the Project within a specified corridor. The legislation further states that the acquisition of land may include property rights or interest, air rights and subsurface rights, whether designated as parkland or property that may be used for park purposes for public use.

The legislation also describes the physical boundaries for areas in Queens where this property acquisition may occur, but the legislation does not predetermine any particular alignment. The areas included in the legislation embrace Segment 1 alignment for Roosevelt Avenue and the Promenade and Flushing Bay alignment options in Segment 2. The acquisition of this land, including Mets parking and land immediately adjacent to the GCP that is used for park purposes, is enabled by this legislation.

¹⁷ State of New York. 11158 Assembly. June 11, 2018.
<https://www.nysenate.gov/legislation/bills/2017/a11158>. Accessed July 19, 2018.

2.6 PREFERRED ALTERNATIVE

The Sponsor identified its Preferred Alternative based on the review of the information presented in this analysis, including readily available information from local, state, and federal resource agencies, and with consideration of the input from the public. This alternative will be submitted to the FAA as the Sponsor's proposed Project upon which the NEPA process will be conducted. In the NEPA process, the FAA will independently consider alternatives to the Sponsor's proposed Project. The Sponsor's proposed Project may or may not be the environmentally preferred alternative.¹⁸

The PANYNJ's Preferred Alternative is the Fixed Guideway Alternative from a new Willets Point off-Airport terminal station to LGA with two on-Airport stations. The alignment for the fixed guideway would be elevated, following the Roosevelt Avenue option for Segment 1 (between Willets Point station and the GCP/Northern Boulevard interchange), the Promenade option for Segment 2 (between the GCP/Northern Boulevard interchange and the Airport boundary), and the on-Airport option for Segment 3 (from the Airport boundary to the terminals). **Figure 2-25** illustrates the PANYNJ's Preferred Alternative. The PANYNJ's rationale for selecting that alignment for the Preferred Alternative is in **Table 2-5**.

The two potential alignments for Segment 1 include the Over the LIRR and Roosevelt Avenue. The Over the LIRR alignment option has much greater constructability issues than the Roosevelt Avenue option. Its construction would also be complex due to the fixed guideway's proximity to the LIRR right-of-way, which would require frequent closing of one or both tracks of the LIRR during construction and would affect the maintenance of both the fixed guideway and the LIRR Port Washington branch tracks in the future. The complexity of construction would result in a greater construction cost and duration for the Over the LIRR alignment. The Roosevelt Avenue alignment's construction would be much less complex. There would be minor impacts to a paved parking lot, which is designated as parkland and was previously alienated for stadium purposes, but the recent legislation would permit the acquisition of this small amount of mapped parkland. Based on its potential to result in fewer impacts and less complex construction, the Sponsor has determined the Roosevelt Avenue alignment is the preferred alignment for Segment 1.

The two potential alignments for Segment 2 are the GCP Median and Promenade options. The GCP Median alignment would shift the GCP about eight feet closer to the residential properties south of it and would require partial acquisition of a City-owned property used as a gas station. The Promenade alignment option would be located along a narrow corridor of property owned by the City of New York that is directly adjacent to the eight-lane GCP. It would not shift the GCP and would avoid or reduce impacts to the residents. The Promenade alignment option along the edge of the GCP would involve a small strip of land owned by the City of New York that is used for park purposes but is adjacent to the highway and a surface parking lot. Much of this land is a parking lot that serves the Flushing Bay Promenade and the marina. As the Promenade alignment would not shift the GCP, it would involve fewer impacts to the GCP during construction. The Promenade alignment would also result in a lower guideway of approximately 30 feet above grade, as compared to approximately 50 feet above grade for the GCP Median option, which

¹⁸ Federal Aviation Administration. Order 5050.4B, National Environmental Policy Act (NEPA) Implementing Instructions for Airport Actions, Section 1007(e)(7), April 28, 2006.



Date of orthoimagery: 2016

- Preferred Alternative
- Potential Employee Parking
- On Airport Station

0 1,000 FEET

would minimize visual impacts that may result from the GCP Median option. For these reasons, the Sponsor determined the alignment along the narrow corridor of property owned by the City of New York that is directly adjacent to the eight-lane GCP is the preferred alignment for this segment.

The four alternatives share the same alignment for Segment 3, the On-Airport alignment.

Based on this analysis, the Sponsor's Preferred Alignment is Alternative 4: A fixed guideway with an off-Airport terminal at Willets Point and on-Airport stations. The alignment would follow the Roosevelt Avenue option for Segment 1, the Promenade option for Segment 2, and the on-Airport option for Segment 3. As the planning and design process moves forward, the PANYNJ will continue to investigate appropriate measures and strategies to mitigate any significant community impacts of the Project, which would include areas adjacent to the guideway.

Table 2-5
Alternative Evaluation Results: Fixed Guideway Alignment

Segment	Alternative 1	Alternative 2:	Alternative 3	Alternative 4
Segment 1 Willets Point Terminal to Northern Boulevard/GCP Interchange	<p>Over LIRR</p> <p>Crosses 7 Line at the highest point, creating more complex construction activities</p> <p>Minimal disruption of 7 service; requires only 5 nighttime closures to lift structures over 7 Line</p> <p>Substantial impacts on LIRR from 34 full and 20 partial weekend track closures during construction</p> <p>Long-term operational difficulties to maintain guideway over active LIRR tracks</p> <p>Requires coordination with NYC Parks Passerelle reconstruction</p> <p>Alignment is within transportation right-of-way</p>	<p>Roosevelt Avenue</p> <p>Minimal disruption of 7 service; requires only 5 nighttime closures to lift structures over 7 Line</p> <p>No anticipated disruption of LIRR service</p> <p>Requires coordination with NYC Parks Passerelle reconstruction</p> <p>Approved legislation allows for acquisition of existing paved parking lots that is designated as parkland; displaces only 50 parking spaces</p>	<p>Over LIRR</p> <p>Crosses 7 Line at the highest point, creating more complex construction activities</p> <p>Minimal disruption of 7 service; requires only 5 nighttime closures to lift structures over 7 Line</p> <p>Substantial impacts on LIRR from 34 full and 20 partial weekend track closures during construction</p> <p>Long-term operational difficulties to maintain guideway over active LIRR tracks</p> <p>Requires coordination with NYC Parks Passerelle reconstruction</p> <p>Alignment is within transportation right-of-way</p>	<p>Roosevelt Avenue</p> <p>Minimal disruption of 7 service; requires only 5 nighttime closures to lift structures over 7 Line</p> <p>No anticipated disruption of LIRR service</p> <p>Requires coordination with NYC Parks Passerelle reconstruction</p> <p>Legislation allows for acquisition of existing paved parking lots that designated as parkland; displaces only 50 parking spaces</p>
Segment 2 Northern Boulevard Interchange to Airport Boundary	<p>GCP Median</p> <p>Shifting GCP southward by 8 feet would adversely impact the residences south of the GCP</p> <p>Shifting the GCP would require the reconstruction of two pedestrian bridges and removal of the Ditmars Boulevard exit ramp</p> <p>Guideway would be closer to residences on the south side of the GCP than other options</p> <p>Guideway height of approximately 50 feet</p> <p>Requires partial acquisition of a City-owned parcel adjacent to the eastbound GCP, but the gas station on that site would remain</p>	<p>GCP Median</p> <p>Shifting GCP southward by 8 feet would adversely impact the residences south of the GCP</p> <p>Shifting the GCP would require the reconstruction of two pedestrian bridges and removal of the Ditmars Boulevard exit ramp</p> <p>Guideway would be closer to residences on the south side of the GCP than other options</p> <p>Guideway height of approximately 50 feet</p> <p>Requires partial acquisition of a City-owned parcel adjacent to the eastbound GCP, but the gas station on that site would remain</p>	<p>Promenade</p> <p>Guideway would be along southern edge of City-owned property adjacent to westbound lanes of GCP, minimizing effects on the Promenade</p> <p>Would not shift GCP closer to residences</p> <p>Legislation allows for acquisition of a linear corridor within City-owned land used for park purposes</p> <p>Guideway height of approximately 30 feet</p> <p>Potentially requires a portion of a City-owned gas station property adjacent to the westbound GCP, but the gas station on that site would remain</p>	<p>Promenade</p> <p>Guideway would be along southern edge of City-owned property adjacent to westbound lanes of GCP, minimizing effects on the Promenade</p> <p>Would not shift GCP closer to residences</p> <p>Legislation allows for acquisition of a linear corridor within City-owned land used for park purposes</p> <p>Guideway height of approximately 30 feet</p> <p>Potentially requires a portion of a City-owned gas station property adjacent to the westbound GCP, but the gas station on that site would remain</p>
Segment 3 Airport Boundary to Airport Terminal(s)	<p>On-Airport</p> <p>Short walking distances between station and terminal</p> <p>Requires no alterations to GCP and the properties south of the GCP</p>	<p>On-Airport</p> <p>Short walking distances between station and terminal</p> <p>Requires no alterations to GCP and the properties south of the GCP</p>	<p>On-Airport</p> <p>Short walking distances between station and terminal</p> <p>Requires no alterations to GCP and the properties south of the GCP</p>	<p>On-Airport</p> <p>Short walking distances between station and terminal</p> <p>Requires no alterations to GCP and the properties south of the GCP</p>
Note: The yellow shading identifies the Sponsor's Preferred Alternative. Refer to Section 2.4.2.5.4 for more information.				