

Extending

# PATH

to

# Newark Airport



An assessment prepared by Regional Plan Association for  
the Downtown-Lower Manhattan Association

September 2013



DOWNTOWN  
LOWER  
MANHATTAN  
ASSOCIATION



Regional Plan Association

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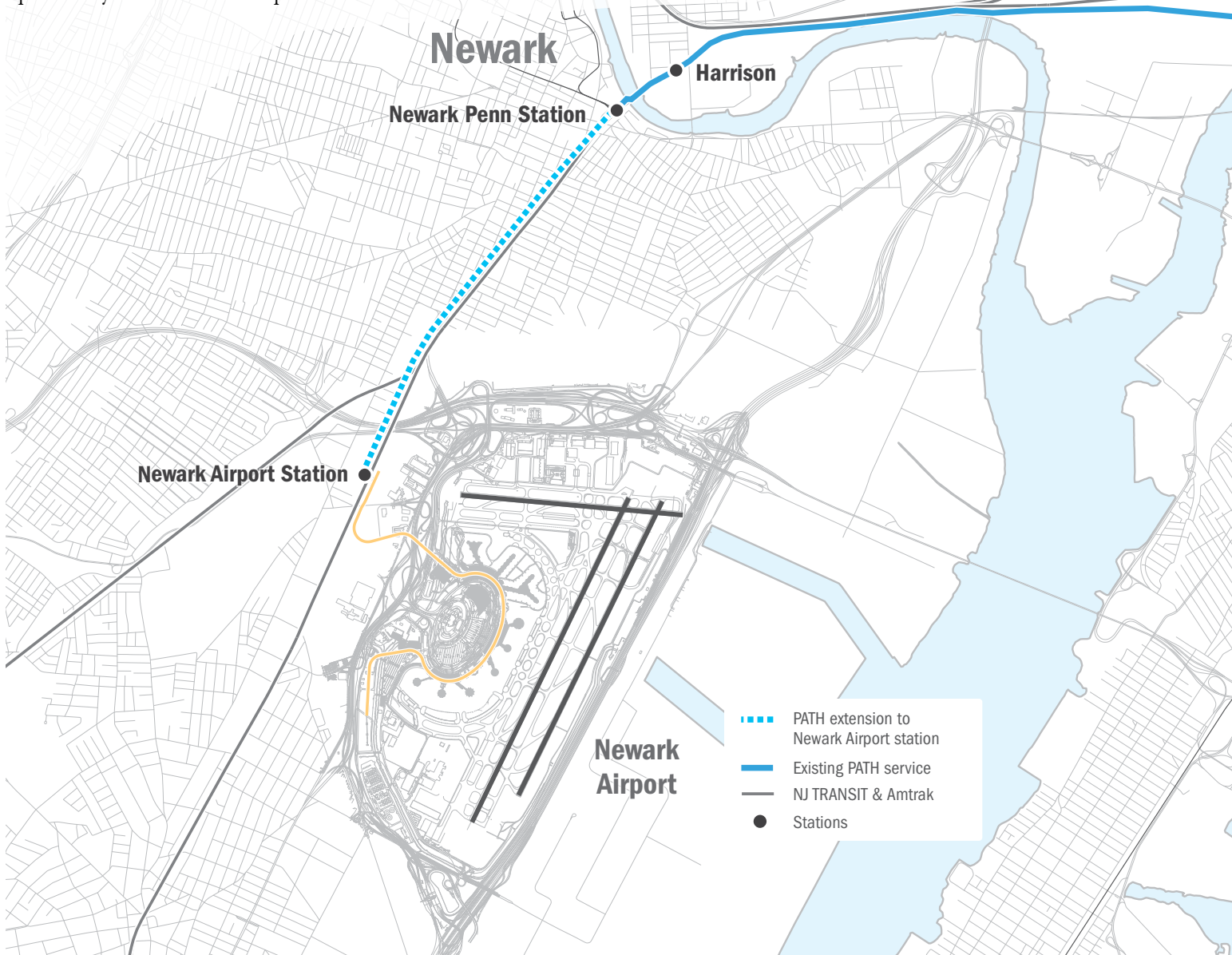
# Executive Summary

World cities across the globe are physically connected to each other by their airports. To remain economically competitive and support continued economic growth, they need to sustain and improve these connections. Nowhere is this as true as it is in the New York-New Jersey-Connecticut region, where the leading economic sectors—financial and business services, tourism, media and communications, higher education, pharmaceuticals, research and development—all rely on frequent air travel to multiple destinations. In the global competition for these high-value economic activities, the experience of business travelers, tourists and other frequent fliers makes a difference in where firms choose to concentrate employees and how much business they attract.

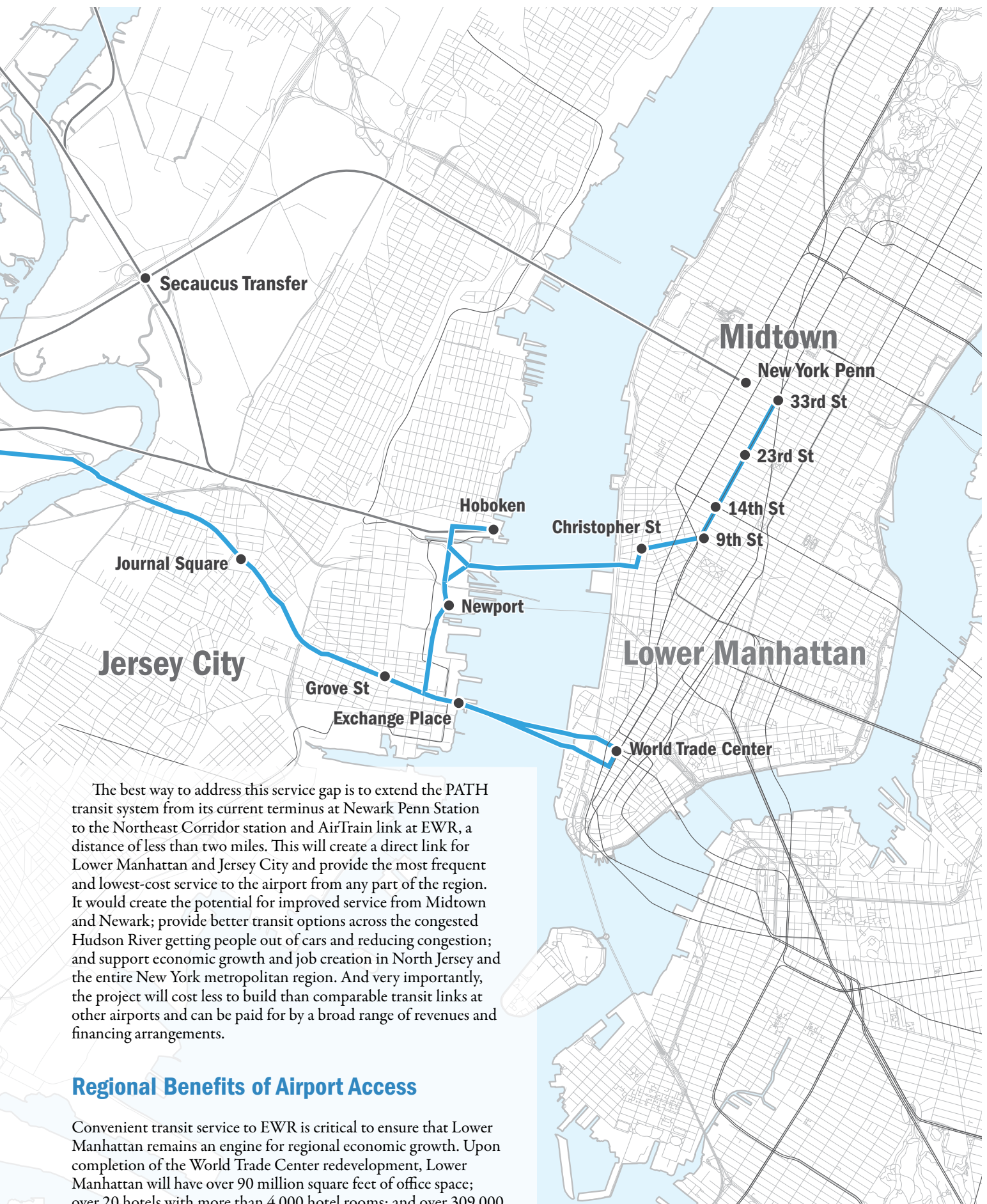
A key part of the air travel experience is how fast and easy it is to get to and from the airport. Ironically, the transit-rich New York metropolitan region lags behind many of its global competitors in offering convenient transit connections to its airports. This is particularly true relative to European and Asian cities. The share

of air passengers using transit to get to the airport ranged from 22 to 64 percent in 19 international regions studied for this report, compared with just 15 percent for the New York region and only 12 percent at Newark. While Europe and Asia benefit from a greater tendency to use transit of all kinds, the higher quality of the air transit services is also a contributing factor. In New York, existing transit systems offer a two-seat ride from Midtown Manhattan to Newark Liberty (EWR) and John F. Kennedy (JFK) airports, while getting to EWR from Lower Manhattan or Jersey City by rail requires a three-seat ride.

Meanwhile, demand for air travel in this region continues to grow. RPA estimates that the number of passengers traveling through EWR will grow from 34 million annual passengers in 2012 to a projected 37 million in 2018; 41 million in 2026; and 48 million in 2037.







The best way to address this service gap is to extend the PATH transit system from its current terminus at Newark Penn Station to the Northeast Corridor station and AirTrain link at EWR, a distance of less than two miles. This will create a direct link for Lower Manhattan and Jersey City and provide the most frequent and lowest-cost service to the airport from any part of the region. It would create the potential for improved service from Midtown and Newark; provide better transit options across the congested Hudson River getting people out of cars and reducing congestion; and support economic growth and job creation in North Jersey and the entire New York metropolitan region. And very importantly, the project will cost less to build than comparable transit links at other airports and can be paid for by a broad range of revenues and financing arrangements.

### Regional Benefits of Airport Access

Convenient transit service to EWR is critical to ensure that Lower Manhattan remains an engine for regional economic growth. Upon completion of the World Trade Center redevelopment, Lower Manhattan will have over 90 million square feet of office space; over 20 hotels with more than 4,000 hotel rooms; and over 309,000

daily workers. The district's traditional core of finance, law and business services is diversifying to include media, information services, technology and tourism—all of which are heavily reliant on air travel. International firms will be central to the district's identity and future growth. Investment in PATH service to EWR will bring a larger economic return on the billions of dollars of public investments that have been made in Lower Manhattan and give the region a competitive asset that it currently lacks.

This link will also benefit New Jersey communities. PATH stations in New Jersey have strong potential for redevelopment—especially if they have a quick transit connection to the airport. These communities have the capacity to accommodate approximately 70,000 new jobs and 40,000 new housing units in close proximity to PATH. A direct link to EWR will help catalyze these development opportunities.

## Benefits to Air Travelers

RPA estimates that the extension of PATH to the NEC station would generate 2.5 million riders annually if it is built by the late 2010s. This represents nearly 40 percent of the air passengers to Newark Liberty Airport from the area served by PATH and almost 20 percent of airport employees who live in the service area. Many of these riders will be high-income business and residential passengers who have a disproportionate impact on the regional economy. This traffic volume would grow to as many as 3.6 or 4.3 million riders over the next 30 years as the number of air passengers grows and businesses and residents respond to the benefits provided by the new service.

The new service is well positioned to attract riders for many reasons:

- It will create a direct ride to the Newark AirTrain from the iconic new Calatrava PATH terminal built at the site of the reconstructed World Trade Center.
- Airport travelers from Manhattan, both those living and working there, will be able to reach the airport without the need to use an expensive and unreliable taxi or auto trip to get through congested Trans-Hudson tunnels. Companies with high volumes of business travelers may require their employees to take advantage of a fast, inexpensive and high-quality transit option instead of hiring expensive taxis and car services.
- Some travelers who currently use other airports, but have options in their flight choices, will shift to EWR and the PATH service to take advantage of the better ground connections.
- Lower Manhattan cultural destinations, including the 9/11 Memorial, which opened September 2011, attract over 9 million visitors annually, some of whom will be entering the region from EWR and will ride the new service.
- Residents and business travelers in New Jersey, especially in Hudson County and Newark, will have a fast and reliable transit option to the airport.
- The possible emergence of new low-cost service at EWR, either from a new carrier or more discounted flights from existing carriers, would generate fliers who would be attracted to a low-cost way to reach the airport.

In addition, ridership on the PATH connection may come from a number of other sources that have not been included in RPA's ridership projections because there is less confidence in the accuracy of the estimates. These include:

- A Park-and-Ride facility at the PATH terminus could result in still more use of PATH by non-airport travelers. RPA estimates that a Park-and-Ride could generate 32,000 new riders annually and attract an estimated 700,000 current PATH riders who would switch from other stations to take advantage of the improved service.
- New development near PATH stations and a shift in location decisions by residents and business to take advantage of the PATH service to the airport would lead to more ridership along the entire system.

The timing and magnitude of these factors are difficult to predict. Over time, however, use of the new transit service should see steady growth. Air travel from the region's three major airports is expected to increase from 109 million annual passengers in 2012 to 150 million annual passengers by the mid-2030's. An improved transit link to EWR will support this growth and generate more demand for air travel in and out of the airport.

## Benefits of the Western Alignment

There are several possible track alignments to consider for the PATH extension from Newark Penn Station to the NEC station. Of these, the western alignment is the most feasible and cost-effective. This alignment would extend PATH's World Trade Center (WTC) service from Newark's Penn Station along the western side of the Northeast Corridor (NEC) to the NEC station that is currently served by the AirTrain connection to EWR's terminals. The western alignment is compatible with future redevelopment options for EWR and provides the greatest flexibility for an expanded second phase.

This connection would have several advantages over other alternatives:

- **High frequency of service:** All WTC trains could terminate at the station, allowing trains to run as often as once every 2.5 minutes during peak periods, compared to once every 12-15 minutes if PATH were extended to the airport terminals.
- **Lower cost:** With an estimated cost of \$1 billion, the alignment would be less expensive than an alignment along the eastern side of the NEC and as little as one-third the cost of extending PATH directly to the airport terminals.
- **Better service for existing PATH riders:** The new PATH terminal and yard at the NEC station would allow for quicker train turnaround and greater flexibility to place additional trains in service when needed. In addition, the extension of PATH to EWR would eliminate a major physical constraint that currently prevents a one-seat ride from midtown/33rd Street to Newark—the inefficient bi-level terminal at Newark Penn Station.
- **Greater long-term flexibility:** There would be fewer conflicts with existing or future airport operations, and it would be compatible with various options for further improvements in connecting PATH onto the airport.
- **Fewer negative impacts:** Neighborhood and environmental impacts will be substantially lower than with alternative alignments.

As shown in the chart on the right, connecting PATH to the airport at the NEC station would provide more reliable and less expensive service than a taxi ride, which can vary greatly in length depending on congestion at the Holland Tunnel, on Manhattan streets and New Jersey highways. Assuming that PATH charges a \$7.25 for airport-bound passengers (equivalent to the cost of



the subway and AirTrain to JFK), it would be faster, easier and less expensive than rail service from Midtown to the airport.

## Project Costs & Funding Options

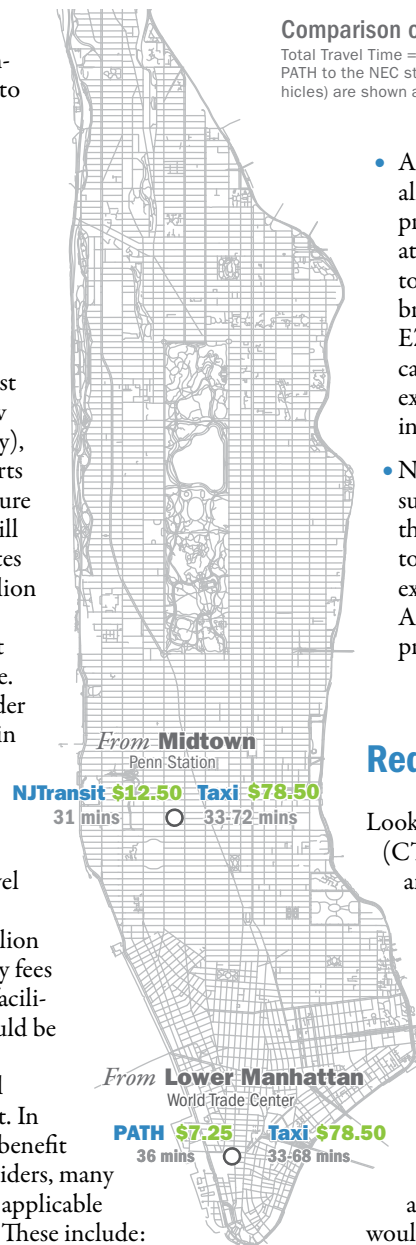
One important benchmark of any transportation investment's cost effectiveness is the ratio of capital cost per rider. The Port Authority of New York and New Jersey (Port Authority), which operates all three major airports and many other port and infrastructure systems, estimates that the project will cost \$1 billion to build. RPA estimates that the system will generate 2.5 million annual riders if it opens in 2018 and a cost per rider of \$353 within about eight years after the service is in place. This is comparable to the cost per rider ratio for the existing Newark AirTrain and the Heathrow Express in London and less than the \$407 ratio for the JFK AirTrain, which has seen its ridership double in the past seven years while overall air travel only increased by 20 percent.

The Port Authority has a \$3.7 billion capital budget for 2012 supported by fees generated at the airports and other facilities. While the PATH extension would be a strong candidate for funding from the capital program, there are several options for financing this investment. In particular, since the transit link will benefit multiple communities and types of riders, many different financing sources might be applicable for both capital and operating costs. These include:

- Riders will pay a portion of the costs of the service directly through fares, which have been projected at \$4.50 to \$11.75. At this rate, the project would generate approximately \$16 to \$22 million annually in additional revenues for the Port Authority. These fares may be set higher or lower, depending on whether the priority is to attract riders or cover a larger percentage of the costs.
- An increase in the Federally-legislated Passenger Finance Charge (PFC), a surcharge on airline tickets, from the current \$4.50 to \$7.00 would generate an additional \$112 million annually, some of which could be dedicated to financing the PATH extension.
- The PATH extension would be eligible for Federal capital assistance, such as the Federal Transit Administration's New Starts program or the Federal Railroad Administration's \$35 billion Railroad Rehabilitation and Improvement Financing (RRIF). Securing Federal funds would require strong, united advocacy from elected officials in New York and New Jersey.

## Comparison of Cost & Travel Times to Newark Liberty Airport

Total Travel Time = the transit time estimates include in-vehicle travel times for NJT/PATH to the NEC station and EWR AirTrain to the terminals. Auto times (taxis and private vehicles) are shown as a range - from free flowing to congested roadway conditions.



- An airport access toll could be levied on the 56 percent of all passengers at EWR who are dropped off or picked up by private automobiles, taxis or liveries, similar to systems in place at Dallas-Fort Worth and Dulles International Airport. A \$1 toll would generate over \$12 million annually; a \$2 toll would bring in an estimated \$25 million. The Port Authority could use EZ-Pass transponders and/or License Plate Recognition (LPR) cameras to bill motorists at both the airport entrances and exits, which would not create chokepoints or slow traffic on the internal roadways.
- New development in the neighborhood of PATH stations could support a Tax Increment Financing (TIF) structure, similar to the sale of development rights on Manhattan's Far West Side to finance \$2 billion in construction costs for the #7 subway expansion. New Jersey has enabling legislation to create Revenue Allocation Districts (RADs) which dedicate a portion of new property taxes to finance critical infrastructure projects.

## Redevelopment of Newark Liberty Airport

Looking forward, Newark Liberty Airport's Central Terminal Area (CTA) needs to be redeveloped to handle additional passengers and keep pace with the evolving needs of the aviation industry.

RPA's previous research and other reports have concluded that the region's airports will experience robust growth in the future – if they have the capacity to handle this demand.

This redevelopment will probably take the form of additional runways and reconfiguration of the CTA. This provides an excellent opportunity to extend a second expansion of the PATH system, providing a seamless, convenient ride to a more efficient airport with expanded capacity. This could be accomplished in a number of ways, depending on the type of airport redevelopment that eventually takes place. Extending PATH to the airport terminals would provide a one-seat ride, but will be more expensive than other options.

Locating airport terminal functions at the NEC station would create the possibility for a world-class gateway to the airport, but would need to resolve a number of siting and operational constraints. An improved AirTrain service could reduce walking and travel time from PATH considerably, but also has complex implementation challenges at both the station and terminal ends. Whatever the eventual decision, the western alignment for extending PATH to the NEC is compatible with all of these options and provides the greatest flexibility for an expanded second phase as part of Newark Liberty Airport's CTA redevelopment.

## Conclusion

Connecting PATH to the NEC station and Newark Liberty Airport is a cost effective way to promote connectivity, sustainability and economic development in the tri-state metropolitan region. This project should be a high priority for the business, civic and political leadership of New York and New Jersey.

A growing number of air passengers and the increasing importance of air service to the region's economy increase the overall benefits of this project. Experience with existing AirTrain service at both Kennedy and Newark airports demonstrates strong demand and the probability of rapid ridership growth once the service is in place. The redevelopment of the World Trade Center site, including the 9/11 Memorial and the Calatrava terminal, will provide an international gateway to one of the largest concentrations of commercial and civic activities in the nation. And the service will add to the momentum of redevelopment in Newark and Jersey City, reinforcing one of the nation's most important urban corridors extending from Lower Manhattan into northern New Jersey.



# Introduction

World cities across the globe are physically connected to each other by their airports. To remain economically competitive and support continued economic growth, they need to sustain and improve these connections. Nowhere is this as true as it is in the New York-New Jersey-Connecticut region, where the leading economic sectors—financial and business services, tourism, media and communications, higher education, pharmaceuticals, research and development—all rely on frequent air travel to multiple destinations. In the global competition for these high-value economic activities, the experience of business travelers, tourists and other frequent flyers makes a difference in where firms choose to concentrate employees and how much business they attract.

A key part of the air travel experience is how fast and easy it is to get to and from the airport. Ironically, the transit-rich New York metropolitan region lags behind many of its global competitors in offering convenient transit connections to its airports. This is particularly true relative to European and Asian cities. The share of air passengers using transit to get to the airport ranged from 22 to 64 percent in 19 international regions studied for this report, compared with 15 percent for the New York region. While Europe and Asia benefit from a greater tendency to use transit of all kinds, the higher quality of the air transit services is also a contributing factor. In New York, existing transit systems offer a two-seat ride

from Midtown Manhattan to Newark Liberty (EWR) and John F. Kennedy (JFK) airports. Getting to EWR from Lower Manhattan or Jersey City by rail requires an arduous three-seat ride.

Based on an evaluation of Port Authority studies and independent data developed by Regional Plan Association and the Downtown-Lower Manhattan Association, the best way to address this gap is to extend the PATH transit system<sup>1</sup> from its current terminus at Newark Penn Station to the NEC station and AirTrain link at EWR, a distance of less than two miles. This will create a direct link for Lower Manhattan and Jersey City and provide the most frequent and lowest-cost service to the airport from any part of the region. The new PATH terminal at World Trade Center, currently being rebuilt for more than \$3 billion, will be well suited – by virtue of its location, size and capacity – for an airport link to EWR. The terminal is immediately adjacent to more than 13 million square feet of new Class A office space, the largest concentration of modern office buildings in the tri-state region. A direct PATH connection to EWR would also create the potential for improved service from Midtown and Newark, provide better transit options across the congested Hudson River, and support economic growth in North Jersey and the entire New York metropolitan region.

Lower Manhattan's success is crucial to the continued prosperity of the entire New York-New Jersey-Connecticut metropolitan region. With the completion of the redevelopment of the World Trade Center site in 2014, Lower Manhattan, one of the nation's largest Central Business Districts, will have over 90 million square feet office space; 60,000 residents; and over 309,000 daily workers. The World Trade Center site will include the 9/11 Memorial attracting over 5 million visitors a year; 4 acres of new parkland; and over a half-million square feet of new retail space in addition to over 8 million square feet of environmentally-friendly Class A office space.

**Figure 1: Redevelopment of Lower Manhattan and World Trade Center site**



<sup>1</sup> See Appendix A for more background on the existing PATH system





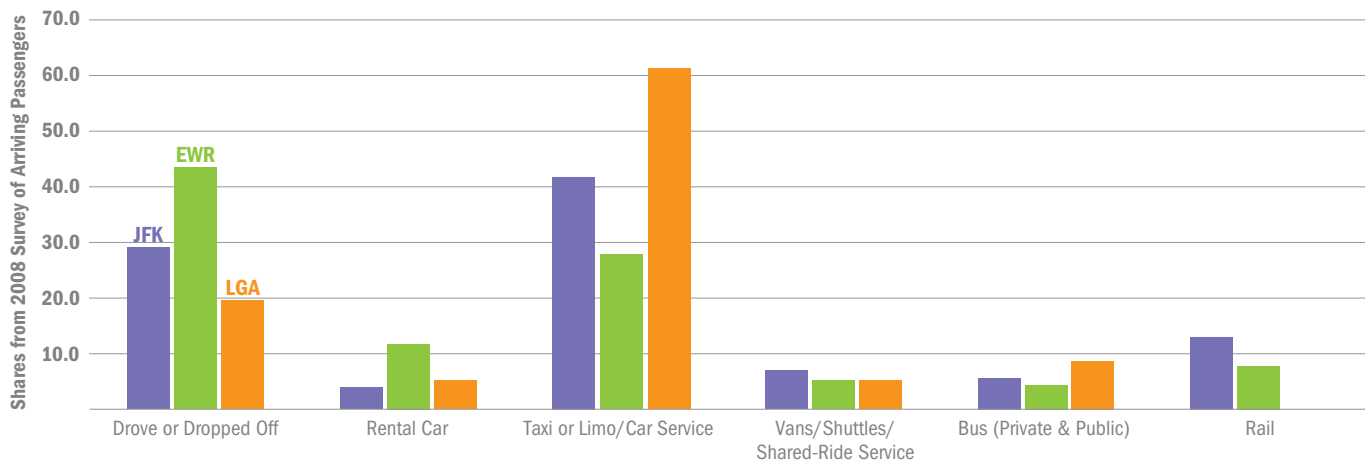
United Airlines Terminal C at Newark Liberty International Airport

Source: Port Authority of New York and New Jersey



# Access to Newark Liberty Airport Today

**Figure 2: Percentage of Arriving Air Passengers at Three New York-New Jersey Airports by Means of Arrival**



Of the 34,100 trips made by air passengers to EWR daily, almost 27,000 get to the airport by car. More than 80 percent of the air passengers coming from the Bronx, Brooklyn, Queens, Staten Island and other suburban counties access EWR by car. Even for air passengers coming from Manhattan, only about a third reach EWR by rail or bus. As shown in Figure 2, the transit share from all origins to EWR is 12 percent (excluding the local shuttles from hotels and remote parking lots). This includes rail (8 percent) and bus (4 percent). This is significantly lower than JFK, which has 18.6 percent of its passengers arriving via transit (13 percent by rail), and much less than many international cities.

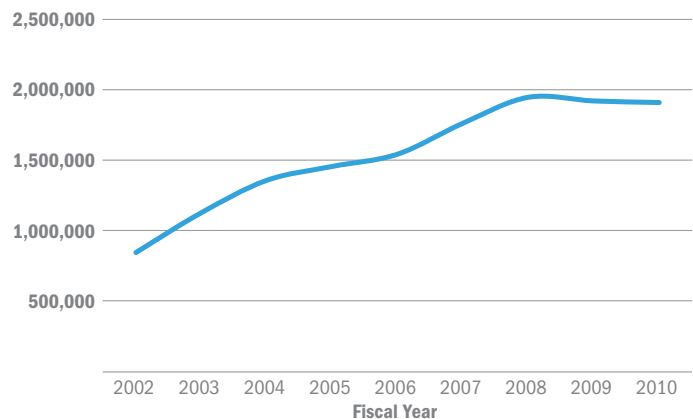
## Highway Access

A robust regional highway network provides access to EWR and handles 88 percent of air passengers. The New Jersey Turnpike is 12 lanes wide, while Interstate 78, US 1/9 and Route 21 all provide additional connections. However, these highways are often congested and will become even more crowded in the future, particularly as a result of truck traffic entering and leaving the Port of Newark and Elizabeth. Retail developments adjacent to the airport and port – the Jersey Gardens Outlet Mall and Elizabeth Center (IKEA) – also attract increasing numbers of automobiles that are competing for limited roadway capacity. Over time, growing congestion issues, largely from non-airport traffic, must be addressed. Creating improved transit links to the airports will help to deal with the growing traffic congestion on the highways.

## Rail Access

Today, the 8 percent of air passengers who use rail to get to or from the airport can ride NJ TRANSIT or Amtrak on the Northeast Corridor line to connect to the EWR AirTrain at NEC. (Prior to construction of the NEC station in 2001, the AirTrain only served as an internal circulator within the airport.) Eighty-two NJ TRANSIT trains a day stop at the NEC stations during weekdays,

**Figure 3: Ridership at Newark Liberty Station – 2002 to 2010**



Source: NJ TRANSIT

but only nine Amtrak trains make that stop, limiting its usefulness for intercity passengers. The station makes it possible to connect directly to Midtown Manhattan at Penn Station, to Downtown Newark, and to many central New Jersey communities, including New Brunswick, Princeton and Trenton. However, rail passengers must transfer at Newark Penn Station to PATH to get to Jersey City or Lower Manhattan. Figure 3 shows the annual ridership volumes for the connections to NJ TRANSIT trains, which grew rapidly until the economic recession in 2009.

The AirTrain that connects the rail station on the NEC to the terminals and parking facilities is relatively slow and limited in capacity, threatening its ability to function acceptably as traffic at the airport grows. The system is almost 20 years old and at the point when mid-life rehabilitation is required. The current steel-beam monorail has proven to be unreliable and service is frequently disrupted during poor weather. Even at this level of service, the system capacity is inadequate to serve the anticipated growth at EWR. For all of these reasons, the Port Authority is exploring options to replace the monorail system.

Despite these problems with the existing monorail system, the NEC station is a good terminal. It has convenient escalator and elevator access from the commuter/intercity rail platforms to a pedestrian bridge that crosses over the corridor, connecting air passengers directly to the AirTrain concourse. The transfer is relatively straightforward, with passengers exiting the NJ TRANSIT/Amtrak fare control area after crossing the corridor and then taking another escalator or elevator down to the AirTrain platform to await the next monorail to the terminals that arrive every four minutes. Throughout the station there are screens displaying real-time train and aircraft arrivals and departures.

## Bus Access

Four percent of air passengers at EWR use buses to get to or from the airport. NJ TRANSIT provides bus service to Manhattan's Port Authority Bus Terminal at Eighth Avenue and 41st Street<sup>1</sup>. This service is susceptible to roadway delays at the Lincoln Tunnel and its use has declined since the advent of the rail connection in 2001. NJ TRANSIT also provides local bus service to Newark and surrounding communities, which are mostly used by airport employees.

## National and International Comparisons

The share of passengers currently using transit to get to EWR may be in line with shares of transit to other airports in the United States, but substantially below those of European and Asian airports, the New York and New Jersey region's direct competition in key employment sectors such as financial and professional services, media, fashion and technology.

A compilation of data for 27 U.S. airports<sup>2</sup> indicates that the transit shares vary from 6 percent to 23 percent. Of those with rail service to the airport, the average transit share (rail and bus) was just under 13 percent. At airports without rail, the transit share was 10 percent. The rail shares alone varied from 13 percent at Reagan National Airport in Washington, D.C. to just 2 percent in Cleveland, with an average of 6 percent. The airports with the higher than average rail shares were those that had frequent service and a one-seat ride (Washington, D.C., Atlanta, and San Francisco) or a two-seat ride with frequent service (Oakland, JFK and Boston). The two airports with the highest share of transit ridership are Washington, D.C. and Atlanta – both of which provide direct service to the terminal, not even requiring a transfer to an internal circulator.

The U.S. transit shares are much lower when compared with systems overseas. The 19 foreign airports studied range from 22 percent to 64 percent transit use, all higher than the U.S. airports. In general, transit services to international airports are far superior to U.S. airports. However, other factors also play a role, including greater transit usage overall, more compact land development patterns, and higher prices for gasoline.

While not always easy to distinguish because of the variety of idiosyncratic features of the airport access options in each city, the data both in the United States and overseas suggest that many features play a role in attracting air passengers to transit. These include:

- **Short travel times** that are competitive with highway access modes.

- **A one-seat ride**, making the trip more convenient and easy to negotiate.
- **A ride directly into the air terminal**, with no more than moving walkways required.
- **Reliable service** that is not at the mercy of road delays.
- **Service that connects to a regional transit network** to draw from a wider area.
- **Frequent service** reducing waiting time and the need for consulting a schedule.
- **Availability of weekend, late night and "reverse" commute service.**
- **Few stops** between boarding point and the airport, which create both the perception and reality of a faster trip.
- **Ease of use** including ticketing and way-finding.
- **Easy baggage handling** with vehicles, grade changes (elevators and escalators), platforms, and walkways that are "baggage friendly."

Surprisingly, there is little evidence to show that low transit fares will consistently generate high ridership. However, research such as the Airport Cooperative Research Program: Report 4 – *Ground Access to Major Airports by Public Transportation*, cited above, has shown that higher taxi fares do appear to contribute to greater transit market shares. The international airports with the highest market shares have taxi rates more than four times as high as the average taxi fare between EWR and New York City's Central Business District.

<sup>1</sup> <http://www.panynj.gov/airports/ewr-public-transportation.html>

<sup>2</sup> Airport Cooperative Research Program: Report 4 – *Ground Access to Major Airports by Public Transportation* by Coogan, M, et al. 2008.



**Table 1: Fare and Service Comparisons for International Airport Rail Transit Service**

City	Airport Service	Fare (US \$)	Travel Time (mins)	Distance from Core (miles)	Air Passenger Amenities	Taxi Fare (US \$)	Market Share (Rail)
<b>Kennedy</b>	LIRR (New York Penn) to AirTrain	14.50-12.00*	35	15	No	60 - 70.00	13%
<b>Newark</b>	NJT (New York Penn) to AirTrain	12.50	42	8.9	No	60 - 70.00	7%
<b>London</b>	Heathrow Express	30.00	18	15	Yes	100 - 125.00	10%
	Piccadilly Line	10.00	40	15	No	100 - 125.00	15%
<b>Shanghai**</b>	Line 2 (Pudong International)	1.40	58	18	No	23.00	7%
	Maglev & Line 2	7.00	23	""	""	""	""
<b>Hong Kong</b>	Airport Express	13.00	24	21	Yes	50 or more	23%
<b>Tokyo</b>	Narita Express	30.00	55	40	Yes	270.00	36%
<b>Oslo</b>	Oslo Airport Express	30.50	19	30	Yes	-	36%
<b>Zurich</b>	Glattalbahn tram (line 10)	7.00	37	7	No	35.00	2%
	Swiss National Railways	10.00	10	7	Yes	""	41%
<b>Munich</b>	S-Bahn S1 and S8	11.00	40	17	No	60.00	33%
<b>San Francisco</b>	BART	8.10	30	14	No	50 - 75.00	7%
<b>Chicago</b>	Blue Line	2.25	40	18.5	No	35 - 40.00	5%
<b>Atlanta</b>	MARTA	2.00	15	10	No	30.00	10%
<b>Washington DC</b>	Blue and Yellow Lines	2.25	15	4	No	15 - 20.00	13%
<b>Philadelphia</b>	SEPTA	7.00	30	7.2	Yes	30.00	3%

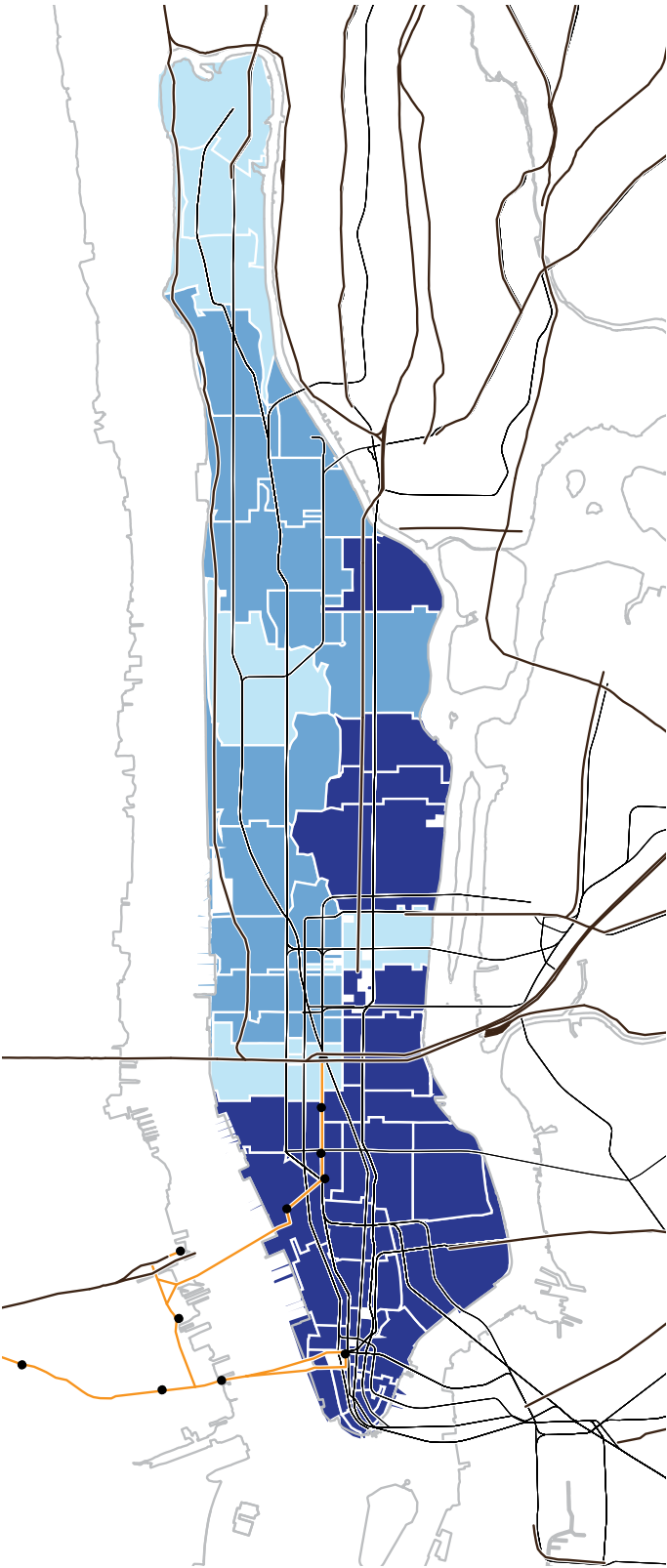
Source: Various Transit Agencies

\* LIRR peak and off-peak fares from NYPS to Jamaica, NJT does not have off-peak fares.

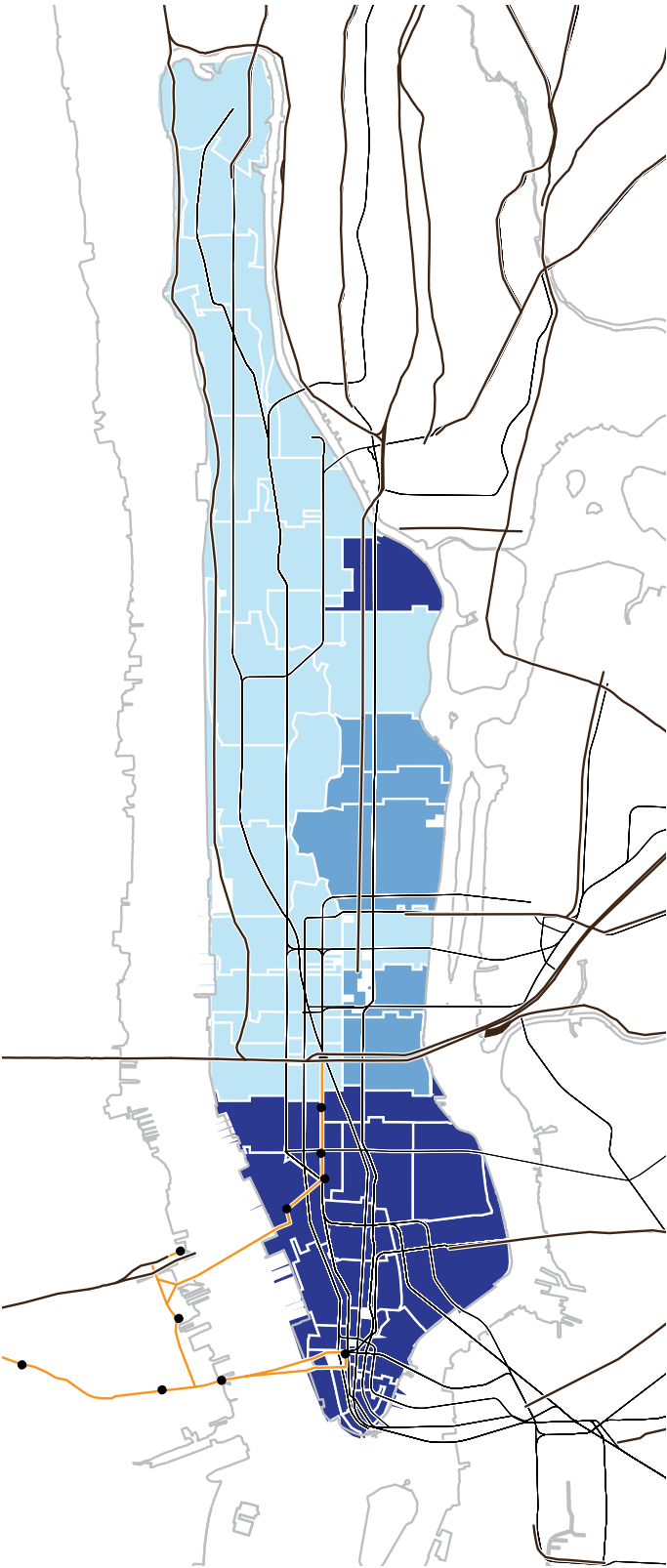
\*\* The maglev service does not connect the airport to the CBD, requires a transfer to the metro.

Figure 4: Likely Preferences for Transit-Users to Newark Liberty Airport

Personal Travelers



Business Travelers



◀ Ridership Preference ▶  
PATH    Penn Station or Bus Terminal  
PATH    Passenger Rail    Subway

Source: RPA Analysis

# Ridership Estimates

**Table 2: Air Passengers by Residents, Trip Purpose, Mode of Access and Origin**

	Residents				Non-residents				Total Passengers	
	Business		Personal		Business		Personal			
	Total Trips	% Transit	Total Trips	% Transit	Total Trips	% Transit	Total Trips	% Transit	Total Trips	% Transit
Manhattan	634	15.9	1,307	45.6	997	27.1	2,026	48.9	4,964	39.4
Brooklyn	46	16.7	178	47.8	8	0.0	101	46.2	332	41.9
Hudson	356	8.7	920	10.1	309	5.0	410	20.8	1,995	11.2
Essex	131	5.9	402	9.6	464	13.3	356	26.1	1,353	14.9
Union	294	2.6	371	6.3	70	22.2	155	15.0	889	7.8
Bergen	8	0.0	0	NA	8	0.0	8	0.0	23	0.0
TOTAL	1,469	10.5	3,178	26.3	1,856	19.6	3,054	40.5	9,557	27.1

Source: Port Authority of New York and New Jersey

Extending PATH to the EWR AirTrain connection on the NEC will attract ridership from both airport passengers and employees. The PATH extension will make it possible for anyone able to reach the existing PATH system to reach the airport. These locations include Downtown Newark, much of Jersey City, and Lower Manhattan. The objective of this analysis is to estimate the expected ridership and determine if it is likely to be sufficient to justify the cost of the extension.

Any ridership forecast requires a number of assumptions about the choices that different types of travelers will make under different circumstances. The analysis presented here is based on three sets of assumptions that RPA judged to be most reasonable:

- **2009 Base Ridership** estimates the number of passengers who would have used the PATH extension if it had been in place in 2009. These include airport employees and business and personal travelers who currently drive, take a taxi, or ride a bus or New Jersey Transit to EWR. It also includes travelers who now fly out of Kennedy or LaGuardia Airports who might have chosen Newark because of the new PATH service.
- **Future Growth Assumptions** estimates the number of PATH riders that could be added to the base estimates over time in response to the increase in transit accessibility and to changing economic and market conditions. These include growth in the number of passengers using EWR, increased highway congestion, changes in travel reimbursement policies, the introduction of low-cost airline service at EWR, and the growth of visitors to the World Trade Center memorial. While all of these are likely to increase ridership, the timing and magnitude are more difficult to predict.
- **Policy and Development Scenarios** address public policy and market issues external to any potential extension of PATH. These include the type and extent of development that will occur around the PATH stations, including the new NEC station, whether to open a Park-and-Ride facility at the NEC station, changes in the cost of automobile access to the airport, and what type of terminal redevelopment could occur on EWR. These are the most speculative assumptions, and possible scenarios are presented to illustrate the types of ridership changes that could occur.

## 2009 Base Ridership with PATH Extension

The analysis is based on data from a number of sources, most notably a comprehensive survey conducted by the Port Authority and its consultants (Louis Berger and Associates) in 2009 and generously shared by the Port Authority for this report. The survey asked a sample of departing air passengers and employees (both flight crew and ground crew) a series of questions about their trip. These questions asked about the current mode of access to EWR, the purpose of the trip (business or personal), whether the person was a resident or non-resident of the metropolitan area, how many persons were in the party, how many bags were carried, whether the trip's cost was reimbursed, as well as other highly relevant data. The Port Authority's internal ridership projections also helped to inform this analysis.

The usable sample in the air passenger survey totaled 1,236 respondents, sorted into four residence/purpose categories: Resident Business, Resident Personal, Non-Resident Business, and Non-Resident Personal. The sample was expanded by the Port Authority to the universe of all passengers with an origin or destination in the PATH service area, representing 9,557 air passenger trips, 5,147 trips by ground crew employees and 394 trips by flight crews.

As Table 2 shows, overall, personal travelers and non-residents are more likely to use transit. Among residents traveling for business, only about 10 percent use transit; non-residents on business trips are double that share. Trips for non-business purposes are higher still, with 26 percent of residents and 41 percent of non-residents riding transit. These shares depend in part on the mix of origin locations. About 40 percent of all Manhattan and Brooklyn trips use transit compared to less than 15 percent of trips originating in New Jersey, depending on county of origin.

Table 3 shows similar data for airport employees. Their trips predominately originate in New Jersey. As with air passengers, a significantly higher share of those who begin their trips in New York City use transit. New Jersey-originating employees have larger transit shares than air passengers originating in New Jersey. Most of the ground crew use local buses to reach the airport, while many of the flight crew relies on hotel shuttle buses.

### **Trips Diverted from Buses and Commuter Rail**

For current transit users, travel time is the primary factor in determining which mode they would use. For those air passenger trips currently using transit, any decision to shift from existing transit services will depend on whether the time via the new PATH extension is shorter than their current trip. For those beginning their trip in New Jersey this most often involves a local bus trip. For those beginning in New York City the current trip is either from Penn Station on NJ TRANSIT's Northeast Corridor commuter rail line or by express bus from the Port Authority Bus Terminal. For this analysis, travel time from the World Trade Center via the PATH extension to the NEC station was assumed to be 27 minutes, compared to travel times of 22 minutes from Penn Station to the NEC station. Waiting time for the trains was set at half the headways, or three minutes for PATH (average during the day), and nine minutes for the NEC service (average headways are 18 minutes over the entire day). The times for access to Penn Station and to the WTC from each Manhattan and Brooklyn zip code by public transit were determined by querying Google Earth, which indicated the fastest transit time between points.

Whether a passenger currently using transit would take PATH depends largely on the origin of the trip and how long it would take to get to Penn Station, the WTC or the Port Authority Bus Terminal. Any trip that was five or more minutes faster on one mode was assigned to that mode—PATH, NJ TRANSIT or express bus. If the times were the same, then trips were split evenly between the two modes. When time differences were less than five minutes, trips were split based on a curve that extrapolated the difference between a 50-50 and 0-100 percent split.

Since the fare for traveling to EWR via Penn Station New York is higher than the fare assumed via PATH, any advantage that Penn Station might have in travel times had to be adjusted to account for the price difference. Assuming today's fares, and a \$5.00 surcharge to use PATH at the airport, the Penn Station option would be \$5.00 more expensive. A value of time of \$50 per hour for air travelers was used to convert the fare difference, converting to a six-minute penalty for using Penn Station relative to the extended PATH service. Since most business travelers have their fares reimbursed, only a two minute penalty was added for them.

Based on these assumptions, Figure 4 displays the areas of Manhattan where PATH is a more attractive option. The left side of the figure shows areas where resident business travelers would choose PATH over services from Penn Station (or the Port Authority Bus Terminal), and the right side shows the same for personal travelers. All areas below 14th Street would find PATH more attractive. While most of the areas to the north would find Penn Station or the Bus Terminal more attractive, the layout of the subway system, favors many of the neighborhoods on the east side where the Lexington Avenue subway express to Lower Manhattan is available for fast access to the World Trade Center area and PATH.

### **Trips Diverted to PATH from Autos and Taxis**

For auto trips and taxi riders, the modal choice analysis was more complex. Auto users have a number of reasons for choosing a car or taxi over a train or bus, and individuals will make different choices based on how they prioritize speed, reliability, cost, convenience and comfort. Therefore, estimates for how many current auto users will choose PATH can cover a wide range depending on assumptions for how different types of travelers will perceive and prioritize these factors.

A starting assumption is that no one who is not already taking transit will have an incentive to take PATH unless PATH offers a faster trip than current transit options. Accordingly, no trips from zip codes from which the extended PATH service would take longer

than the existing transit were considered for diversion to PATH. In addition, any trips by a party of three or more or carrying five or more bags were excluded from consideration on the assumption that any transit option would be too inconvenient.

Among those remaining, the diversion curve assumed that 50 percent of business passengers would take PATH if the trip were ten or more minutes faster than using auto or taxis. Twenty five percent would use transit if trip times were the same; none would use transit if transit were slower by ten minutes or more. For personal trips, less reliant on autos and taxis than business trips, the diversion to transit was set at 5 percent more than business trips for the same time differences.<sup>1</sup> These curves are shown in Figure 5.

Trips to and from the airport by employees were also estimated using these diversion curves, but with two important differences. Flight crews using auto or taxis were assigned the same curve of business trips shown in Figure 9 and ground employees were assigned the personal air passenger trip diversion curve. More significant was the assumption that employees would be charged less to use the PATH extension. This is currently done for the JFK AirTrain. The impact of this assumption on PATH ridership was estimated by the Port Authority's consultants. This report applies the same proportional impact to ridership on the PATH extension.

### **Trips from an Expanded Market Shed**

The base ridership for 2009 was adjusted to account for a larger market shed than the Port Authority measured in its survey or included in its ridership projections. The respondents to the survey were selected to include only those travelers who the survey team believed would be candidates to use the PATH extension. This market shed included all of Manhattan, inner portions of Brooklyn as far as Prospect Park, all of Hudson County, most of Essex County and parts of Union and Bergen counties. A larger shed can be defined by including more remote areas where using PATH would still take less time than traveling via Penn Station or the Bus Terminal. A careful review of the transit network in New York City and northern New Jersey concluded that the only areas that so qualified are parts of Brooklyn south and east of Prospect Park. All of Queens and the Bronx are closer to Penn Station, as are the Hudson Valley and Long Island.

To estimate the potential unsampled trips, several assumptions were made:

- eighty percent of these outer Brooklyn trips are currently made by auto,
- three-quarters of the trips by residents are personal,
- a hundred percent of the trips by non-residents are personal, and
- the same mode shifts used in this report for the inner portion of Brooklyn was applied to their respective categories;

These assumptions resulted in an estimate of only 22 additional one-way air passenger trips on the PATH extension generated in the outer parts of Brooklyn. However, even with different assumptions than those above, trips from this expanded market shed would make only a marginal difference in the total number of PATH trips.

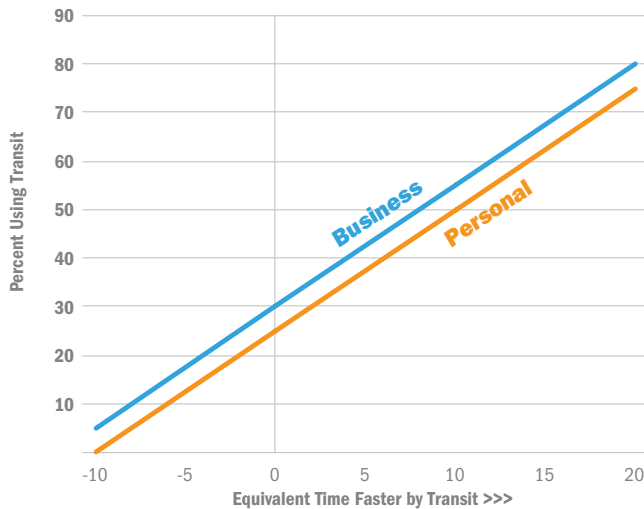
### **Trips Diverted from Other Airports**

With improved access to EWR provided by the PATH extension, some travelers now booking flights to and from JFK and LGA airports may choose to shift to EWR. The most likely candidates would be those now making trips to and from those portions of Manhattan where the transit trip to EWR via PATH would be preferred over the trip via Penn Station and the Northeast Corridor.

1



**Figure 5: Share of Auto Users Shift to Transit as Function of Equivalent Travel Times**



Source: RPA Analysis

Earlier Port Authority ground access surveys at the three major airports provide some assistance, but their lack of geographic detail somewhat limits their value. The data from these surveys are reported at a county level, except that Manhattan data are reported by three geographic divisions, the southernmost from 14th Street south.

These surveys indicate that on a daily basis 3,467 passengers travel to JFK and 1,783 passengers travel to LGA from points south of 14th Street. Some of these travelers would reject using EWR despite improved access because of the limited flight choices available to them. Based on current service, 47 percent of all flights from JFK and 50 percent of flights from LGA did not have a comparable flight at EWR. Thus, the eligible passengers for shifting to EWR were lowered by these proportions, bringing the possible volume for shifting from JFK to 1,629 trips and for LGA to 892 trips.

The Port Authority surveys indicate that approximately 80 percent of the JFK passengers and 95 percent of the LGA passengers originating below 14th Street use autos to reach the airport. Applying these modal shares, the eligible current transit users who might shift to EWR from JFK would be 326 trips, and from LGA 45 trips. The pool of auto users, mostly in taxis, that might switch would be 1,303 air passengers for JFK and 847 for LGA.

It is reasonable to expect that most of those within a half-mile walk of the PATH World Trade Center station would shift to EWR, while few of those outside of this walking distance would do so. Among all the zip codes below 14th Street recorded in the survey, approximately 21 percent of transit users and 11 percent of auto users originate within the five zip codes meeting that walking distance criterion.<sup>2</sup> Applying these shares to the eligible “shifter” yields a one-way daily trip shift of 216 from JFK and 104 from LGA, or 640 daily two-way trips in 2009. As shown in Table 4, about six percent (320 of 5,250) starting today from points below 14th Street are estimated to shift if PATH were extended.

### Summary of 2009 Base Ridership Estimates

Tables 5 and 6 summarize the results from applying the above assumptions about shifting travel patterns. These include personal and business travelers and airport employees shifting to PATH from other types of transit modes or auto, potential PATH users from

<sup>2</sup> These include zip codes 10004, 10005, 10006, 10007, and 10038.

**Table 3: Origin & Mode of Access for Airport Employees**

	Ground Crew		Flight Crew	
	Number	% Transit	Number	% Transit
<b>Manhattan and Brooklyn</b>	141	50.0	48	71.4
<b>New Jersey</b>	5,007	38.3	346	25.2

Source: RPA Analysis

**Table 4: Potential Shift of Air Passengers to EWR If PATH Extension Were in Place in 2009**

	JFK	LGA	Total
Current One-way Trips Below 14th Street	3,467	1,783	5,250
Share Not Eligible Because Air Service Absent	0.47	0.50	-
Remaining Eligible	1,629	892	2,521
Share by Transit	0.20	0.05	-
Share by Auto (Taxi)	0.80	0.95	-
Number Eligible Now Using Transit	326	45	370
Number Eligible Now Using Auto	1,304	847	2,151
Share Transit Users Below 14th Street within Walk of WTC	0.21	0.21	-
Share Auto Users Below 14th Street within Walk of WTC	0.11	0.11	-
Transit Riders Who Might Switch to Newark	69	9	78
Auto Users Who Might Switch to Newark	147	95	242
Total Daily Newark Shift - One-way	216	105	320
Total Daily Shift - Two-way	431	210	641

Total Daily Shift 2018	476	257	733
2026	546	287	833
2037	637	324	961

Source: RPA Analysis

outside the primary market shed, and those now using JFK or LGA who would shift to EWR. The data are shown on a daily (two-way) basis in Table 5 and on an annual basis in Table 6.

These results indicate that approximately 5,000 riders per day, or 1.7 million riders per year, would have used PATH in 2009 to get to EWR if it connected to the EWR AirTrain. This represents nearly a third of all EWR air passengers and employees in the PATH service area, with the highest shares in Lower Manhattan within walking distance of the World Trade Center and the future Calatrava terminal. The largest numbers are from personal travelers who currently take a different form of transit. This is reasonable since personal travelers make up two-thirds of air passengers, and those already taking transit would be most inclined to switch to a faster, more convenient service.<sup>3</sup> Auto users, business travelers and airport employees also represent significant shares of the expected PATH riders.

## Future Growth Assumptions

The 2009 base estimates were made assuming the PATH extension had been in place in 2009. However, in future years there are likely to be several trends that would result in additional ridership. These sources of added ridership, with varying levels of certainty, include:

1. The number of passengers traveling through EWR will experience robust growth over the next 25 years, from 33 million annual passengers in 2009 to a projected 37 million in 2018; 41 million in 2026; and 48 million in 2037.<sup>4</sup>

<sup>3</sup> See Appendix B for detail of how modal shifts for the PATH extension compare to other past transit improvements in the region

<sup>4</sup> This is based on the estimates in the Regional Plan Association report, *Upgrading to World Class: The Future of the New York Region's Airports*. (<http://bit.ly/qw1TOW>)

2. The 9/11 Memorial, which opened in September 2011, will attract between 5 and 6 million visitors annually, some of whom will be entering the region from EWR and will ride the new service.
3. Airport travelers from Manhattan, both those living and working there, will be able to reach the airport without the need to use an expensive and unreliable taxi or auto trip to get through congested Trans-Hudson tunnels. Companies with high volumes of business travelers may require their employees to take advantage of a fast, inexpensive and high-quality transit option instead of hiring expensive taxis and livery cabs.
4. Some travelers who currently use other airports, but have options in their flight choices, will shift to EWR and the PATH service to take advantage of the better ground connections.
5. The possible emergence of new low-cost service at EWR, either from a new carrier or more discounted flights from existing carriers, would generate fliers who would be attracted to a low-cost way to reach the airport.
6. A Park-and-Ride facility at the PATH terminus could result in still more use of PATH by non-airport travelers.
7. New development near PATH stations, spurred in part by the airport link, would lead to more ridership along the entire system.
8. Residents and businesses, encouraged by the convenience of PATH service to the airport, would relocate closer to PATH.

The following sections describe ridership estimates for the first six of these possibilities. The last two are more speculative and dependent on future policy and investment decisions and are discussed further in Section IV, Policy and Development Scenarios.

### Growth in the Number of Newark Liberty Airport Passengers

The demand for air travel has grown exponentially since World War II, driven by advances in aviation technology, population growth and income growth. Although air travel growth has been slower and more uneven in the last few decades than in the immediate postwar period, the number of air passengers has still increased considerably faster than population. All indications are that growth will continue as air travel becomes increasingly important in an interconnected global economy.

In its recent study of the future needs of the region's airports, RPA examined several alternative methodologies for projecting the number of air passengers. Based on this analysis, air passengers in the region are projected to grow from 109 million passengers in 2012 to 150 million sometime in the 2030s. The growth in PATH ridership is projected for three future years – 2018, 2026 and 2037, when the volume of air passengers is expected to reach 115 million, 130 million and 150 million, respectively.<sup>5</sup> In these years, EWR is projected to have 37.1 million, 41.6 million and 48 million air passengers,<sup>6</sup> respectively corresponding to 9.1 percent, 22.3 percent and 41.2 percent growth over the 2012 volume of 34 million. When applied to the 2009 base-year estimates for PATH ridership, the annual number of riders increases from 1.7 million in 2009 to 2.5 million in 2037.

<sup>5</sup> These benchmark years were the foundation of the analysis in Upgrading to World Class: the Future of the New York Region's Airports.

<sup>6</sup> *ibid*

**Table 5: Daily PATH Extension Base Ridership if In Place in 2009**

Trip Purpose and Type	Extension to NEC Station Diverted from:		
	Transit	Auto	Total
Resident Business	134	113	247
Resident Personal	1,199	127	1,326
Resident Sub-total	1,333	240	1,573
Non-resident business	151	78	229
Non-resident personal	1,378	96	1,474
Non-resident Sub-total	1,529	173	1,703
Total Air Passengers	2,862	414	3,276
Ground Employees	906	23	928
Flight Crew	121	14	135
Expanded Market Shed	22	22	44
<b>Shift from JFK and LGA</b>	<b>156</b>	<b>484</b>	<b>640</b>
<b>TOTAL</b>	<b>4,067</b>	<b>956</b>	<b>5,023</b>

Source: RPA Analysis

**Table 6: Annual PATH Extension Base Ridership if In Place in 2009**

Trip Purpose and Type	Extension to NEC Station Diverted from:		
	Transit	Auto	Total
Resident Business	45,587	38,434	84,021
Resident Personal	407,633	43,200	450,833
Resident Sub-total	453,220	81,634	534,854
Non-resident business	51,415	26,370	77,785
Non-resident personal	468,588	32,599	501,187
Non-resident Sub-total	520,003	58,970	578,972
Total Air Passengers	973,223	140,604	1,113,826
Ground Employees	307,897	7,752	315,649
Flight Crew	41,120	4,794	45,914
Expanded Market Shed	7,480	7,480	14,960
<b>Shift from JFK and LGA</b>	<b>53,040</b>	<b>164,560</b>	<b>217,600</b>
<b>TOTAL</b>	<b>1,382,760</b>	<b>325,190</b>	<b>1,707,949</b>

Source: RPA Analysis

**Table 7: Added PATH Extension Trips Because of Highway Congestion, Three Projection Years**

		2018	2026	2037	2037 Trip Increment with Added Congestion
<b>Residents</b>	Business	17	90	189	166
	Personal	48	184	317	415
	Sub-total	65	274	506	582
<b>Non residents</b>	Business	22	55	117	127
	Personal	75	124	386	506
	Sub-total	97	179	503	633
	Non-flight crew	32	48	66	24
	Flight crew	17	21	30	20
<b>TOTAL</b>		<b>211</b>	<b>523</b>	<b>1,106</b>	<b>1,258</b>

Source: RPA Analysis

### Visitors to the World Trade Center Memorial

The opening of the 9/11 Memorial this year at the site of the World Trade Center will generate additional tourist trips to New York that would not otherwise have occurred. The PATH extension will appeal to a portion of the visitors who arrive by air from EWR. They might combine a visit to the Memorial with a stay at a nearby hotel in either Lower Manhattan or Downtown Newark, both located near PATH stations.

The Port Authority has estimated that the memorial is expected to have more than seven million visitors a year initially, leveling off to between five and six million thereafter. To determine how many of them will use the PATH extension, a series of assumptions were made:

**Table 8: PATH Extension Ridership Resulting from Change in Expense Reimbursement Policy**

	Residential	Non-residential	Total One-Way	Two-Way Adjusted for Late Hours	Full Employer Participation	50 Percent Em- ployer Participation
<b>2009</b>	302	279	581	523	1,046	523
<b>2018</b>	326	275	601	541	1,081	541
<b>2026</b>	316	288	604	544	1,088	544
<b>2037</b>	323	306	629	566	1,133	566

Source: RPA Analysis

- Six million visitors to the memorial each year.
- Twenty-five percent of tourists to New York arrive by air (current percentage).
- 28.35 percent of out-of-town non-business visitors arriving by air to the region use EWR.
- Since their destination is the World Trade Center site, forty percent of the visitors to New York would stay in Lower Manhattan or Downtown Newark (double the current share).
- Eighty percent of this group would use PATH.

Applying these assumptions produces 746 daily two-way additional trips on PATH per day, or 272,000 annually.

### Impact of Increased Highway Congestion

Growing traffic congestion will almost certainly increase the relative attractiveness of options that do not depend on the highway network. With much of the market shed for the PATH extension across the Hudson River in Manhattan, increased delays and a less reliable travel by motor vehicle to EWR are likely. Delays within New Jersey must also be taken into account. In the absence of official estimates of added travel times or delays, this analysis estimates how much congestion will increase and tests the sensitivity of these assumptions.

The initial assumptions included the following:

#### Traffic times in New Jersey

- In 2018: travel times same as 2009
- In 2026: travel times will grow by 5 percent over 2009 times
- In 2037: travel times will grow by 10 percent over 2009 times

#### For trans-Hudson trips:

- 2018 – 3 minutes more than 2009
- 2026 – 8 minutes more than 2009
- 2037 – 13 minutes more than 2009

These increases in travel times were used to calculate new diversion shares for auto trips in the same manner as was done for the base diversions. Table 7 shows the results of these assumptions on two-way daily trips for the three projection years. By 2037 the daily two-way trips diverted to PATH from the assumed congestion levels would be approximately 1,100 trips.

To test the sensitivity of these results to congestion levels, the 2037 estimates were repeated for a higher congestion level – 20 minutes more instead of 13 minutes to cross the Hudson and a 20 percent increase in travel times for New Jersey trips. This produced more than 1,250 additional daily trips on PATH. This large impact would occur because many more air passengers would find the auto times too onerous and switch to transit, including PATH. Most of the increased ridership with the higher congestion assumptions results from adding the seven minutes at the Hudson River crossings.

These results suggest that estimates of diversion from highway congestion are very sensitive to the assumptions made. For example, large increases in congestion on the approaches to the Hudson River crossings could result in the substantially higher ridership on the PATH extension.

### Change in Expense Reimbursement Policy

Business travelers are often reimbursed for the cost of traveling to and from airports, whether by taxi, hired car, or transit. Currently, the cost of taxis and others cars for hire, especially between Manhattan and EWR is very high, exceeding \$70 per trip in many cases. Employers must pay these fares when transit options are inferior, but in many other cities, they have policies that require employees to use high quality transit.

Anticipating that major firms in Lower Manhattan would follow the same course, RPA estimated the potential for new PATH trips resulting from a change in reimbursement policies. Using data from the passenger survey, which asked business travelers whether expenses for their trip were reimbursed, an estimate was made of the number of air passenger trips that might use PATH if there were no reimbursement. It was assumed that business travelers who lost their reimbursement would switch to PATH if:

- they would have a faster trip via PATH than via the NEC and Penn Station / Bus Terminal;
- the trip via PATH was no more than ten minutes longer than using a motor vehicle; and
- they did not travel during late night or early morning hours.

The 2009 base estimate for these trips diverted to PATH, assuming total participation by employers of all travelers making business trips, would have been 1,046 daily two-way trips. If only 50 percent of employee trips were subject to the new reimbursement policy, then half or 523 additional trips would be made on PATH. The estimates for future years and for both full and 50 percent participation are presented in Table 8.

The lack of growth in these diversions reflects the assumption that mounting congestion will result in a declining pool of auto users who might shift because of a change in reimbursement policy. It is possible that the reimbursement changes could precede the rise in congestion, suggesting the two effects should be considered in tandem.

### Low Cost Service at EWR

A relatively recent phenomenon in aviation is the advent of lower cost carriers in many markets. These carriers attempt to gain a foothold by charging less, thereby tapping the latent demand for air travel that might be limited today by its cost. There are no low cost carriers at EWR today. If one or more were to gain foothold there, or if existing carriers provided lower cost service, it could have two related effects on PATH ridership – a bump in the volume of traffic at EWR, and in the share of that traffic likely to be attracted to a lower cost transit access option such as PATH.

## The JetBlue Experience

At JFK, JetBlue was successful in introducing lower cost air service in 2000. Since 2002 JFK air passenger traffic has grown by 55.5 percent, substantially outpacing the growth at EWR and LGA. If the three airports had had the same growth rate in that period, then JFK would have only reached 38.2 million by 2010, 8.3 million less than the actual 2010 level of 46.5 million. The high rate of air passenger growth that ensued coincided with even higher growth in the JFK AirTrain system. The success of JetBlue can be attributed to a number of favorable factors. When it initiated service at JFK, the airline was able to move into Terminals 5 and 6, unused at that time. During the early part of the decade, there was available runway capacity at JFK; now there is FAA-imposed hourly aircraft capacity limits at each the three major airports, inhibiting the introduction of new carriers.

While the conditions for low cost carrier entry at EWR are not as favorable as they were for JetBlue at JFK a decade ago (mainly due to capacity concerns), existing air carriers could make a business decision to provide lower cost service in the future. It is also possible that they could decrease service, freeing up space for low cost carrier(s) to backfill the newly available capacity. This could result in higher use of the PATH system for that portion of the added air passenger volumes as were more inclined to use a low cost transit option such as the PATH extension. If 10 percent of the 37.1 million air passengers projected at EWR by 2018 shifted to low cost service, and if these price-sensitive passengers were twenty-five percent more inclined to use transit, then PATH ridership would increase by 121 two-way daily trips, or about 41,000 trips per year.

The prospects for low cost service would grow if capacity at EWR were expanded. This could happen as early as the 2020s, and is still more likely by 2037. If by 2026 the introduction of low cost service at EWR had only one-third the impact that JetBlue had at JFK, and if the added passengers were 25 percent more inclined to use transit to reach the airport, then it would add 600 more daily two-way riders to the PATH extension ridership. Annually, the addition would be 204,000. The 2037 increment, assuming half the effect of JetBlue, would be 900 two-way trips per day, 306,000 per year. These estimates are shown in Table 9.

## PATH Extension Ridership – All Sources

Tables 10 and 11 show the average daily two-way and annual PATH extension ridership for the base year (2009) and for the three future benchmark years. These include the base ridership increased for future increases in EWR passengers and employees, the impact of congestion, introduction of low cost service, changes in reimbursement policies and the added riders generated by the 9/11 Memorial.

With all these sources of additional ridership included, it is projected that by 2037 approximately 10,600 two-way trips will be taken on the PATH extension on an average weekday. This would be double the 5,000 base ridership estimates for 2009. By 2018, a feasible opening date for the PATH extension to the NEC station, about 2.5 million riders could be expected to take PATH to EWR. By 2037, this would rise to approximately 3.6 million riders.

## Sensitivities of Assumptions

Throughout this report, the assumptions have been spelled out so that the impact of alternative assumptions can be assessed. As with any long-term forecast, these are subject to any number of estimation errors or unforeseen contingencies that could lead to ridership that exceeds or falls short of projections. The sensitivities of the leading assumptions are described below.

**Table 9: Estimated PATH Ridership – Low Cost Service**

	Daily Two-Way	Annual
<b>2018</b>	121	40,987
<b>2026</b>	600	203,906
<b>2037</b>	900	305,890

Source: RPA Analysis

**Table 10: Daily Two-Way PATH Extension Ridership**

Source	2009	2018	2026	2037
Air Passengers - Base	3,960	4,445	4,984	5,751
Employees	1,063	1,194	1,339	1,554
Congestion	0	212	522	1,106
Reimbursement Policy	0	541	544	566
Low Cost Carriers	0	121	600	900
Memorial	0	746	746	746
<b>TOTAL</b>	<b>5,023</b>	<b>7,259</b>	<b>8,735</b>	<b>10,623</b>

Source: RPA Analysis

**Table 11: Annual PATH Extension Ridership**

Source	2009	2018	2026	2037
Air Passengers - Base	1,346,400	1,511,300	1,694,560	1,955,340
Employees	361,420	405,960	455,260	528,360
Congestion	0	72,080	177,480	376,040
Reimbursement Policy	0	183,940	184,960	192,440
Low Cost Carriers	0	41,140	204,000	306,000
Memorial	0	272,290	272,290	272,290
<b>TOTAL</b>	<b>1,707,820</b>	<b>2,486,710</b>	<b>2,988,550</b>	<b>3,630,470</b>

Source: RPA Analysis

The base estimates assume that the projected air traffic growth will materialize. However, growth could be constrained by the absence of enough airside capacity at EWR. For the capacity to be realized, the NextGen air traffic control improvements planned by the Federal Aviation Administration would have to be in place by 2018. Presently, the FAA is looking toward these improvements to reduce delays rather than add capacity. Beyond, 2018 the growth rates that are assumed in this analysis depend on future airport expansion, including the construction of at least one new runway. If EWR does not increase capacity to handle additional passengers, then the additional PATH trips projected beyond 2018 in this section of the report will not be generated.

The increase in congestion on the region's highways will certainly encourage more air passengers and airport employees to consider using PATH when traveling to and from places in the region that are accessible by PATH. This report postulates how travel times over the road network might increase, and consequently the effects on PATH ridership. The sensitivity analysis performed herein shows that the resulting estimates could vary greatly, depending on these assumptions. The added ridership estimated and reported in Tables 11 and 12 could be considerably under- or overestimated.

The added ridership estimated from the introduction of low cost service is another area of uncertainty. Any projections of the behavior of air carriers 20 or more years from now are fraught with uncertainty in an industry as volatile as the aviation industry. The JetBlue experience at JFK could turn out to be difficult to match.

Reimbursement policy changes by employers will require a change in pervasive business practices. Today, there are no instances in the United States of a widespread policy by employers to not reimburse expenses for taxis or other for hire vehicles. There are a limited number of airports in the world where taxis and for-hire vehicles are not reimbursed, notably at Heathrow in London and Narita in Tokyo where the transit options are of high quality and



the taxi costs extremely high. The PATH system extended to the airport must offer a comparable level of service to justify a similar policy.

Other possible influences on PATH ridership, some of which could have considerable impact, are not included in these estimates. The potential effects of these factors are described in the following section.

## Policy and Development Scenarios

Among the more difficult contingencies to predict are those that involve policy changes that will be driven by factors not related to PATH or airport redevelopment, such as changes in development patterns or the location of residents and businesses. The introduction of PATH service to EWR represents a significant change in the region's transportation network and should affect future development patterns and other transportation policies. However, these trends are driven by a number of other factors that are unrelated to airport access. Described below are analyses of three of these possibilities: the impact of rising costs of automobile access, the potential for new commercial or residential development around the PATH stations, and a possible Park-and-Ride facility at the NEC station that would attract additional commuters to PATH.

### Higher Cost of Automobile Access to the Airport

Higher prices to use automobiles could encourage more air passengers and airport employees to use the PATH extension. This could come in the form of higher gasoline prices, higher parking charges at the airport, and higher tolls.

The cost of gasoline is unlikely to generate much additional transit ridership to EWR. A twelve-mile trip between Manhattan and EWR in a vehicle performing at today's average of 24 miles per gallon, will consume a half gallon of gasoline. At a price of \$4.00 per gallon, the cost in gasoline to reach EWR from Manhattan is \$2. If the price of a gallon of gas doubled (in today's dollars) to \$8 per gallon, the efficiency of motor vehicles would likely climb as well. If a conservative estimate of 36 mpg is used, the cost of the trip rises to \$2.67, or an increase of 67 cents. For shorter trips within New Jersey the increase would be even less. It is not expected that a change of this size would have a significant impact on PATH use.

While the cost of parking a car at EWR (\$18 a day in long-range parking) is substantially higher than the cost of the gasoline used in driving to the airport, only a small portion of air passengers park their cars there. Most are dropped off or picked up by a family member or friend, hire a car or taxi, or rent a car. Therefore, increasing parking fees will not have a substantial impact on transit ridership, either.

Since all drivers coming from Manhattan must pay to cross the Hudson River, toll increases, particularly on the Trans-Hudson crossings, would have greater impacts than gasoline prices or parking fees on mode choice to EWR. While recently enacted toll increases at the Hudson River crossings (Holland Tunnel, Lincoln Tunnel and George Washington Bridge) increased PATH use, further out this will be partially offset by the concurrent increases in the PATH fare. The incremental cost of tolls is small compared to the full cost of taxi and for hire vehicles and car rentals and therefore can be expected to have only a minor impact on PATH use.

### New Development Near PATH Stations

As described in Section VI below, it is possible that the PATH extension will encourage development near existing PATH stations. This development, in turn, would generate additional trips on the PATH extension. There are three major categories of additional

trips possible. The first would be by new residents living near PATH stations who would use PATH to fly from EWR. This would also include those flying into the region to visit the new residents living near the PATH stations. A second category would consist of out-of-town air passengers who would use PATH to reach jobs newly located near PATH stations. Finally, there would be residents near PATH station who would be employed at EWR who would use PATH to reach their jobs at the airport.

The estimate of the PATH trips generated by new residents near the stations involved the following steps for each of station areas:

- The ratio of existing air trips accessing EWR by transit near each station was estimated using the Port Authority survey data and the existing population. The air trips included were only those associated with population – by local residents for business or personal purposes, and by non-residents of the region making personal trips.
- The share of trips to EWR via transit by the existing population was increased by 20 percent of the population.
- Since residents and employees moving into areas served by the new PATH service are presumably attracted in part by the PATH service, we doubled the ratio of ridership for this additional population.
- The results of three scenarios were calculated – full build-out and half build-out of the development potential estimated in Section VI, and growth equal to the projected population growth for the counties in which each station was located.

The additional PATH trips generated by new employment near the stations were estimated in a similar manner. The ratio of current air trips by transit to the number of jobs was calculated using business-related air trips by both residents and non-residents. Twenty percent of this ratio was applied to the existing jobs and two times the ratio was applied to the new jobs located near the stations. As with population, three growth scenarios were assumed. For the trips generated by employment, the small sample from the Port Authority survey necessitated using the combined trip generating ratios for all stations, rather than for each one separately.

The results are presented in Table 12.

The trips made on an extended PATH by employees at the airport were calculated using the following steps:

- The additional resident labor force located near PATH stations was estimated assuming a household size of 2.73 and 1.5 workers per household.
- The existing ratio of airport employees per capita near stations was doubled and applied to the new labor force estimates. This assumed that there would be a large number of airport employees who would, over time, move into neighborhoods near PATH stations if the extension were to be built.
- The existing transit shares were increased by twenty percent and all transit users were assumed to travel on PATH.
- These steps were applied to the three growth scenarios.

Table 13 shows the resulting EWR airport employees trips that would be made on the PATH extension.

### Potential Ridership from Development Near New NEC Station

If the area near the existing NEC station were developed in concert with the extension of PATH to that site, development there could generate significant new trips on PATH.

To estimate this trip volume, the following assumptions were made:

- Each employee at the site would require 400 square feet of floor space.
- One-third of the jobs would be held by workers living in the PATH catchment areas in Hudson, Essex, Union and Bergen counties.
- The modal share using PATH would be double the existing transit share of 9 percent by airport employees living in the PATH catchment area today.
- There would be no residential development near the EWR PATH station area.

Using these assumptions, the trip volumes were determined for the full build-out assumption of nine million square feet of non-residential floor space discussed elsewhere in this report, and a lower half build-out estimate. The results are shown in Table 14.

Combined, development at the existing and new PATH stations could generate up to a million additional riders per year. A more likely outcome would be in the range of 200-500,000 trips by 2037. This assumes existing stations would approach half the potential build-out and that development at the new NEC station would be much closer to four million than nine million square feet.

### Park-and-Ride Facility at EWR

A Park-and-Ride facility at the new NEC station could add significantly to PATH ridership. However, the decision on whether to construct such a facility transcends its impact on PATH. A Park-and-Ride facility can have a far-reaching effect on the transportation network in New Jersey, shifting both modes and trip lengths. The decision to construct a facility should be considered in a broader context that includes the discussion of other trans-Hudson projects, including the potential extension of the #7 Flushing line subway to Secaucus and the proposed Amtrak Gateway high-speed rail project; its impact on vehicle miles traveled and auto diversions throughout the highway network; the impact on the existing transit system; and its relationship to other types of development that could occur around the station.

The following provides some perspective on how it might affect PATH ridership, with the caveat that is based on limited data and numerous assumptions.

There are three groups of potential Park-and-Ride users from which PATH extension ridership would be drawn:

- Those now driving into Lower Manhattan, Newark, or Jersey City who might prefer the option of driving only as far as the EWR station on the NEC and then using PATH to complete their trip;
- Those who now use NJ TRANSIT rail to travel to Lower Manhattan, who now transfer in Newark to PATH but who might transfer at the EWR station instead; and
- Those who now drive and park in Downtown Newark and transfer to PATH to complete their trip now, who might find it more convenient and less costly to use the EWR Park-and-Ride.

Other customers might drive to the EWR Park-and-Ride facility and reach other transit services there, including NJ TRANSIT rail and Amtrak. While they are of interest in evaluating the Park-and-Ride, they would not add to PATH ridership and are of less direct interest here.

**Table 12: PATH Extension Air Passenger Trips Generated by Development**

	Full Build Out	Half Build Out	County Level Growth
One way generated by added population	201	108	42
One-way generated by added jobs	41	23	13
Total one-way	242	131	55
Two-way	484	262	110
Annual	164,560	89,181	37,530

Source: RPA Analysis

**Table 13: Additional PATH Extension Trips by Airport Employees Generated by New Development Near PATH Stations**

	Full Build Out	Half Build Out	County Level Growth
Total one-way	744	372	135
Two-way	1,487	744	271
Annual	371,805	185,902	67,701

Source: RPA Analysis

**Table 14: Additional Ridership from Development at Newark Liberty PATH Station**

Non-residential development	Full Build Out	Half Build Out
Total one-way	1,346	673
Two-way	2,692	1,346
Annual	673,059	336,530

Source: RPA Analysis

**Table 15: PATH Extension Ridership Generated by Newark Liberty Park-and-Ride**

From	Daily Two-way	Annual
NJT Rail	74	25,160
Auto to New York	20	6,800
Parking in Newark	2,000	680,000
<b>TOTAL</b>	<b>2,094</b>	<b>711,960</b>

Source: RPA Analysis

A number of recent surveys and studies in this corridor are relevant here. In 2010, Edison Properties commissioned a survey of customers at its Park-and-Ride lot at the Secaucus Junction station. This facility opened in 2009. It is intended to intercept those who formerly traveled to midtown either by car or by transit (train or bus). It functions in much the same way as the Park-and-Ride at EWR would function, which instead of targeting those destined for midtown Manhattan would target travelers destined for Lower Manhattan and Jersey City.<sup>7</sup>

A second source of information that is helpful in understanding how the travel choices would be affected by the EWR Park-and-Ride are three reports from surveys of NJ TRANSIT riders.<sup>8</sup> These surveys detailed the use of these three lines, most importantly where their customers were destined and what combination of services they used to get there.

A third source is an unpublished spreadsheet from NJ TRANSIT, which shows the number of people originating from each municipality and their mode of access to each of the stations on the Northeast Corridor, including at Newark Penn Station.

The pool of potential users of the EWR Park-and-Ride and PATH will mostly come from points south and to some degree west of EWR. The two NJ TRANSIT rail lines from the south, the Northeast Corridor and the North Jersey Coast lines carry

<sup>7</sup> Two reports have been prepared discussing and detailing the survey results: "Secaucus Junction Parking Facility Report" by Martin E. Robins and "Secaucus Junction Parking Survey Results" prepared by Bloustein Center for Survey Research.

<sup>8</sup> NJ TRANSIT Rail Origin and Destination Customer Satisfaction Surveys for the Northeast Corridor, North Jersey Coast Line, and the Raritan Valley Line. – 2007 – by ORC Macro.

approximately 51,900 passengers a day who travel in the direction of Newark and New York on a daily basis (as of 2007). The NJ TRANSIT reports cited here indicate that all but 6,400 reach Newark, and of these 45,500, 33,000 continue on to Penn Station. The remaining 12,500 riders leave trains at Newark. Of those who disembark at Newark, 6,700 board PATH trains, about 2/3 of these take PATH to New York City and the other one-third travel to destinations within New Jersey.

The survey at the Secaucus Park-and-Ride provides some insight into how many of these 6,700 rail riders might change their mode of access to PATH. There are 966 users of the Park-and-Ride on an average weekday, of which 24 percent, or 232 originate in the corridors served by the Northeast Corridor and North Jersey Coast lines. For 78 percent of this group, or 181 people, the train was the mode they used prior to the opening of the Park-and-Ride. The other 51 previously drove into midtown Manhattan. Applying these relationships to the 6,700 on these lines who transfer to PATH at Newark suggests that 37 people would drive to EWR to transfer to the extended PATH service and ride it to Jersey City and lower Manhattan. Using the same logic for the former drivers to Manhattan who park at Secaucus indicates that ten drivers in these two categories would park at EWR if PATH were extended.

NJ TRANSIT estimates that as many as 2,000 people a day park in Downtown Newark and transfer to PATH. Based on NJ TRANSIT's data, currently more than 1,600 people drive to and park in Downtown Newark and board trains at Newark Penn Station. Of these, about half, 809, originate in towns to the south and west and would have reasonable access if they were to shift to the EWR station. Applying that same proportion – about half – to the park and transfer to PATH group, then approximately 1,000 riders a day – 2,000 in both directions -- would be added to the EWR Park-and-Ride facility.

Other groups might use the EWR Park-and-Ride but not add to PATH ridership. These may bring other benefits, such as reducing parking and freeing development options in Downtown Newark, but are not pertinent to this ridership analysis.

Table 15 estimates the maximum number of riders who would have been added to the PATH extension ridership if the Park-and-Ride and the PATH extension had been in place in 2009. Growth in commuting to Lower Manhattan and Jersey City would expand these volumes for the benchmark years of 2018, 2026, and 2037. By 2037, the PATH riders who board at EWR for non-airport purposes could reach 2,700 a day, or nearly 1 million passengers per year.

### Ridership Potential with Station Area Development

While not included in the baseline forecast, some new development can be expected near the PATH stations over the forecast period. Combined with existing redevelopment plans, the value added from both planned improvements to the PATH system and an extension to the EWR station is likely to result in station area growth that is higher than growth in other parts of Hudson and Essex counties. An aggressive forecast assumes that these areas would achieve half of their full build-out potential over the next 25 years.

Table 16 above shows the increase in PATH ridership assuming 50% of the full build-out near all the New Jersey PATH stations by 2037, plus the construction of a Park and Ride facility at the EWR station. This would result in approximately 640,000 new PATH riders in addition to the 3,630,000 new riders in the baseline forecast, or a total of 4,270,000 new riders. Over half of the 640,000 comes from new development near the EWR station. Most of the remainder is from air passengers and employees near the other PATH stations. 30,000 is generated from riders using a new Park and Ride facility. This is far less than the 710,000 riders estimated

**Table 16: High Ridership Projection, 2037**

Source	2037
Air Passengers - Base	1,955,340
Employees	528,360
Congestion	376,040
Reimbursement Policy	192,440
Low Cost Carriers	306,000
Memorial	272,290
<b>Subtotal Base</b>	<b>3,630,470</b>
Dev - NJ - Air Passengers	89,181
Dev - NJ - Employees	185,902
Dev - EWR Station	336,530
Park and Ride	31,960
<b>Subtotal Speculative</b>	<b>643,573</b>
<b>TOTAL</b>	<b>4,274,043</b>

Source: RPA Analysis

to use the facility and board PATH at the EWR station. However, most of these riders already use PATH, mostly by parking near the Newark Penn Station. While these would not be new riders to the system, they would still benefit from having a more convenient transfer location, and parking spaces in downtown Newark would be freed up for other uses.



Figure 6: The Challenges to Extending PATH from Newark to the Airport



Source: Port Authority of New York and New Jersey



# Challenges and Options

Extending PATH to EWR has long been a goal for many civic, business and transportation constituencies. The Port Authority has studied the concept on numerous occasions since taking over responsibility for the railroad in the 1960's, and in recent years it has surfaced as an investment both in the recovery of Lower Manhattan and for a growing aviation industry.

The attractiveness of the project is partially due to the relatively short distance of the extension. The NEC station is just 1.85 miles from Newark Penn Station, the PATH's current terminus. Travel time between Downtown Newark and EWR airport is estimated to be between 5 and 10 minutes, based on the number of stops and the location of a new terminus. With a current travel time of 22 minutes from the WTC to Newark Penn Station, the travel time from Lower Manhattan to the NEC could be as little as 27 minutes with the PATH extension in place.

While the extension would require only two miles of tracks to an existing station, these tracks would have to traverse a corridor with a number of complex logistical and engineering challenges. These impediments and the options for addressing them are described below.

## The Challenges of Extending PATH

Since 2000, the Port Authority has undertaken three detailed analyses of a PATH extension. Two examined extending PATH to the NEC station that is currently served by New Jersey Transit commuter trains and Amtrak, and the third detailed alignments onto the airport to directly serve one or more air passenger terminals. The first study, completed in 2001, examined options for extending PATH to the NEC station. Twenty-two alignments were analyzed and some initial thought was given to extending PATH to EWR's Central Terminal Area (CTA). The second study focused on a single alignment running west of the Northeast Corridor, with two station schemes - one parallel to the existing NEC station platforms and another perpendicular on the adjacent site of an existing waste transfer station. The most recent study, started in 2008, examined eight alignment options both west and east of NEC that all terminated on the airport. Based on lessons learned in the earlier studies, options that involved tunneling under the NEC were eliminated and instead flyovers/viaducts were used to cross over the rail corridor.

The following section covers the challenges of extending PATH and the recent alignments that were detailed in the 2008 study.

Alternatives for extending PATH were designed to address several complex issues:

- The impact of shadows and noise on surrounding neighborhoods if a viaduct was constructed for PATH;
- The cost of commercial and residential property acquisitions;
- Operational conflicts with existing Amtrak and freight rail yards that abut the eastern side of the NEC;
- The higher costs of constructing viaducts for PATH;

- Crossing over NJT's Raritan Valley Line (RVL);
- The City of Newark's fragile sewer main that crosses under the NEC;
- Vertical conflicts with airport operations; and
- The ability to incrementally construct the extension.

The right-of-way for the extension and these challenges are graphically shown in Figure 6.

The 2008 study examined eight different alignments: the first five alternatives looked at shifting the PATH to the eastern side of the NEC when it exited Newark Penn Station, two alternatives examined crossing over the corridor before the NEC station by Route 21 and one alternative kept the alignment on the west side of the NEC to the airport station, with a second phase possibly crossing over the NEC just after Haynes Avenue.

### Eastern Alignments

PATH extension alternatives examined two ways of moving to the east side of the NEC right after exiting Newark Penn Station: swapping tracks with other operators (NJ TRANSIT and Amtrak) or constructing a flyover and a new viaduct that would run parallel to the NEC through the City of Newark. Swapping tracks was not an operationally attractive option for Amtrak since it would require it to make additional moves, crossing over, as trains depart and approach Newark Penn Station. The new viaduct would be approximately 5,600 feet long and require extensive residential and commercial takings in the Ironbound neighborhood of Newark. It would also generate significant shadows and noise. Additionally, based on current PATH standards, the structure would have to be built to Federal Railroad Administration (FRA) "Cooper E80" freight locomotive specifications, making it very costly.

The eastern alignments would abut Amtrak's Oak Island yards, which are used for freight, and PATH would need to be either grade-separated from this facility or experience system delays as crossing trains enter/exit the yards. The alignment might also conflict with a proposed flyover of NJT's Raritan Valley Line (RVL). Taken in combination, these constraints and impacts served to eliminate all five of the east of NEC options from further consideration.

### Western Alignments

West of NEC there is enough space between the NEC embankment and the McCarter Highway to cantilever and extend two tracks south to the NEC airport station. The cantilevered structure would be approximately 2,700 feet long after which the tracks would be at-grade for the remainder of the two-mile alignment. PATH would have to tunnel below the RVL (or through the RVL embankment if the flyover is constructed), which would be the most complicated and costly part of the route to construct. Many of the properties along the west side are abandoned sidings and other railroad properties, and most are owned by Conrail, which should result in a less complicated and costly process than for an eastern alignment. The area due west of the existing NEC station is also the site of a waste

transfer station that would be the preferred site to construct new yards for PATH to store up to 13 trains (10 cars each). This extension would also include three tail-end tracks that extend beyond the station to allow for quickly turning back trains.

The new terminal would be a major improvement over the PATH's existing terminus at Newark Penn Station, increasing the operational efficiency of the system. This, combined with a proposed \$5.50 fare surcharge for those destined to the airport, would have a net positive effect on the fare box recovery ratio. The Port Authority would terminate all WTC trains at the new terminal, creating a very frequent service to the NEC station – a train approximately every three minutes or less in the peak.

A second phase of this alignment could extend the PATH further south along the NEC, under Haynes Avenue where it would cross over the NEC to the east side just south of the existing AirTrain right of way. The extension would pass through the corner of the Budweiser property, requiring takings of its truck and employee parking lots. The viaduct would continue over US Routes 1 & 9 and Brewster Road where it would enter the airport property in close proximity to the daily parking garage.

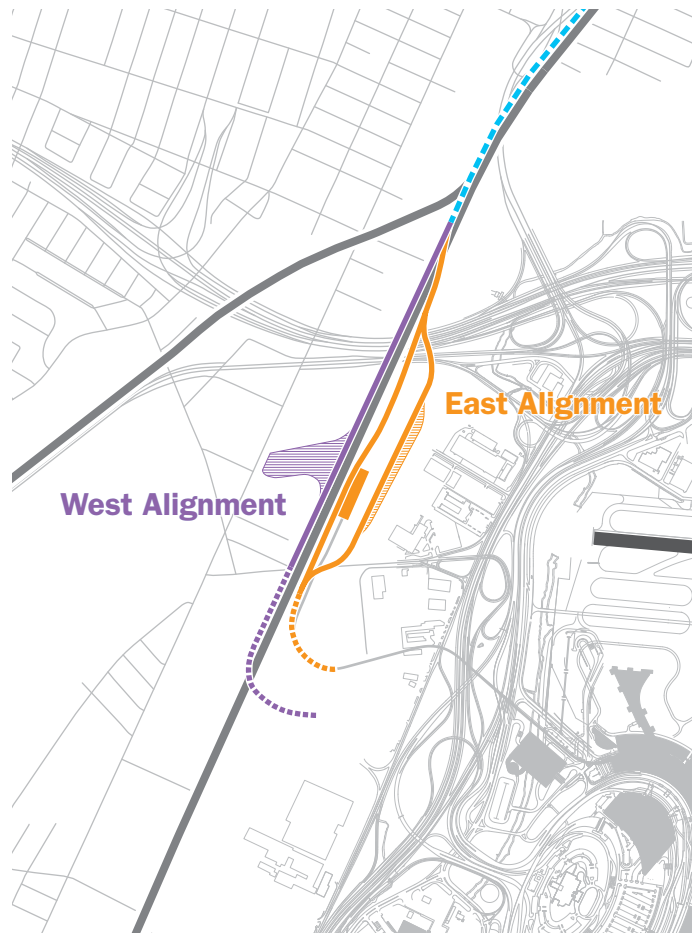
After reaching the parking deck, all on-airport options would use the same alignment. Once the PATH enters the airport property it would make a stop at Terminal C and then hug the air traffic control tower before straightening out to connect to the planned replacement for Terminal A. This second phase is described in greater detail in Section VII: Options for Long Term Improvements.

Two other alternatives were examined that would extend PATH along the west side until the RVL (see Figure 6), where a flyover would raise it over the NJ TRANSIT commuter tracks and the NEC, weaving below the various elevated highways that span the NEC (U.S. Routes 21 and 22 and Interstate 78) and existing freight rail bridge. The viaduct would require a four percent grade at both ends – the PATH's maximum – potentially creating a “roller coaster” experience for passengers. The structure would need to be built to FRA freight locomotive “Cooper E80” standards, making it expensive: over 75 percent of the extension would be on elevated structures.

Both alternatives would construct a new storage yard on the site of the former Waverly Yards. One would conflict with the safe operation of runway 11/29, eliminating this option as a possible alternative, and both would be considerably more expensive than the first western alignment alternative described above.

As shown in Figure 7, the final two alignment alternatives include the western option to the NEC station and the eastern option which crosses the corridor at US Route 21 to stop at the eastern side of the NEC station. Both options are designed for a possible two-phase implementation and provide new yards for PATH, greatly improving its terminal capacity and operational efficiency (at least during the first phase). The eastern alignment crosses the corridor as part of its first phase and therefore costs more than the initial phase of the western alignment. The benefit of crossing over as part of the first phase is obvious; one of the most difficult parts of the on-airport extension is complete, increasing the probability that the on-airport extension will materialize. However, the challenges and cost of the currently planned on-airport alignment makes the next phase uncertain based on the lack of additional operational benefits, disproportionate construction costs and unknowns associated with the redevelopment of EWR's Central Terminal Area.

**Figure 7: The Final Two Alternative Alignments**



Source: Port Authority of New York and New Jersey

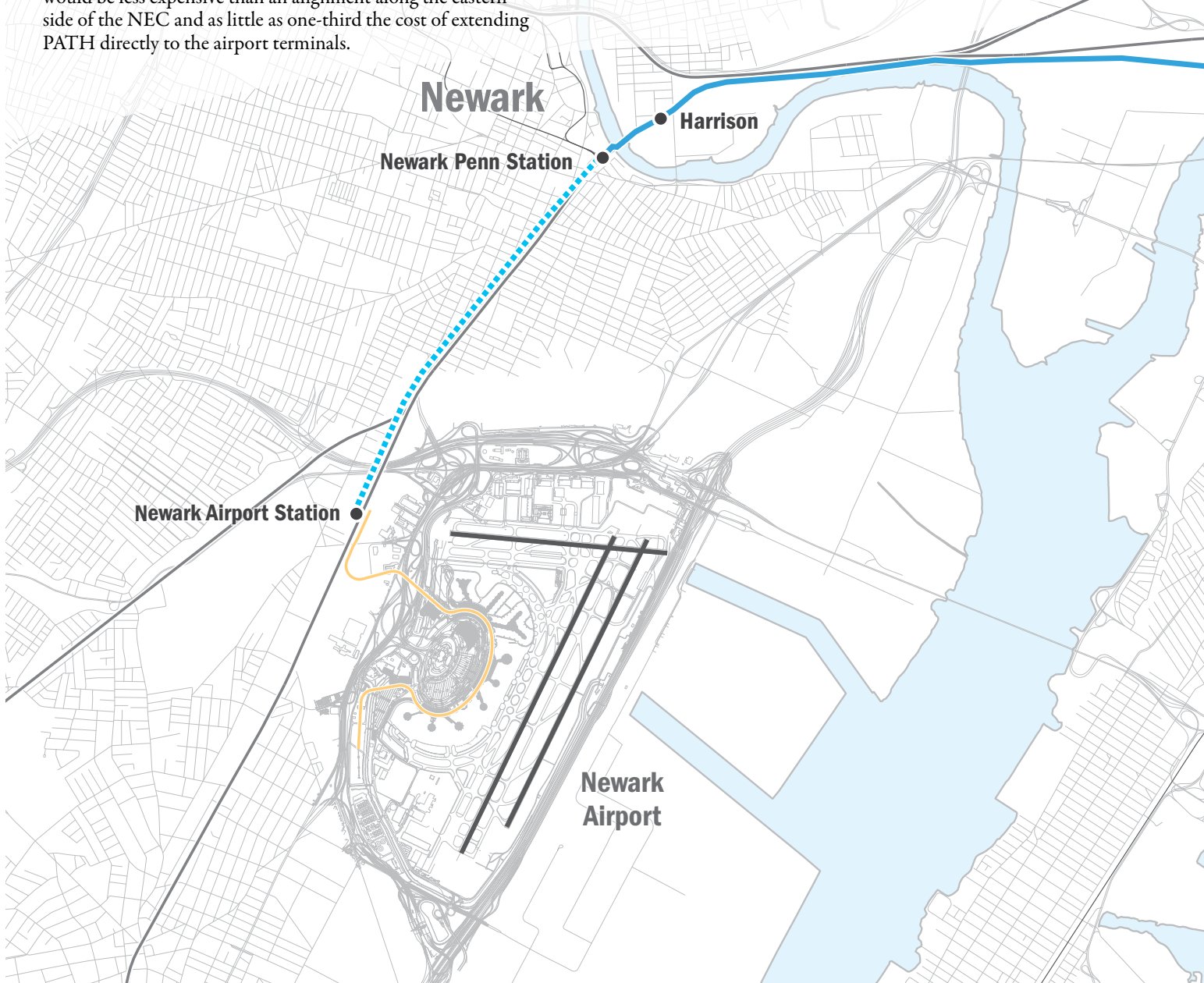


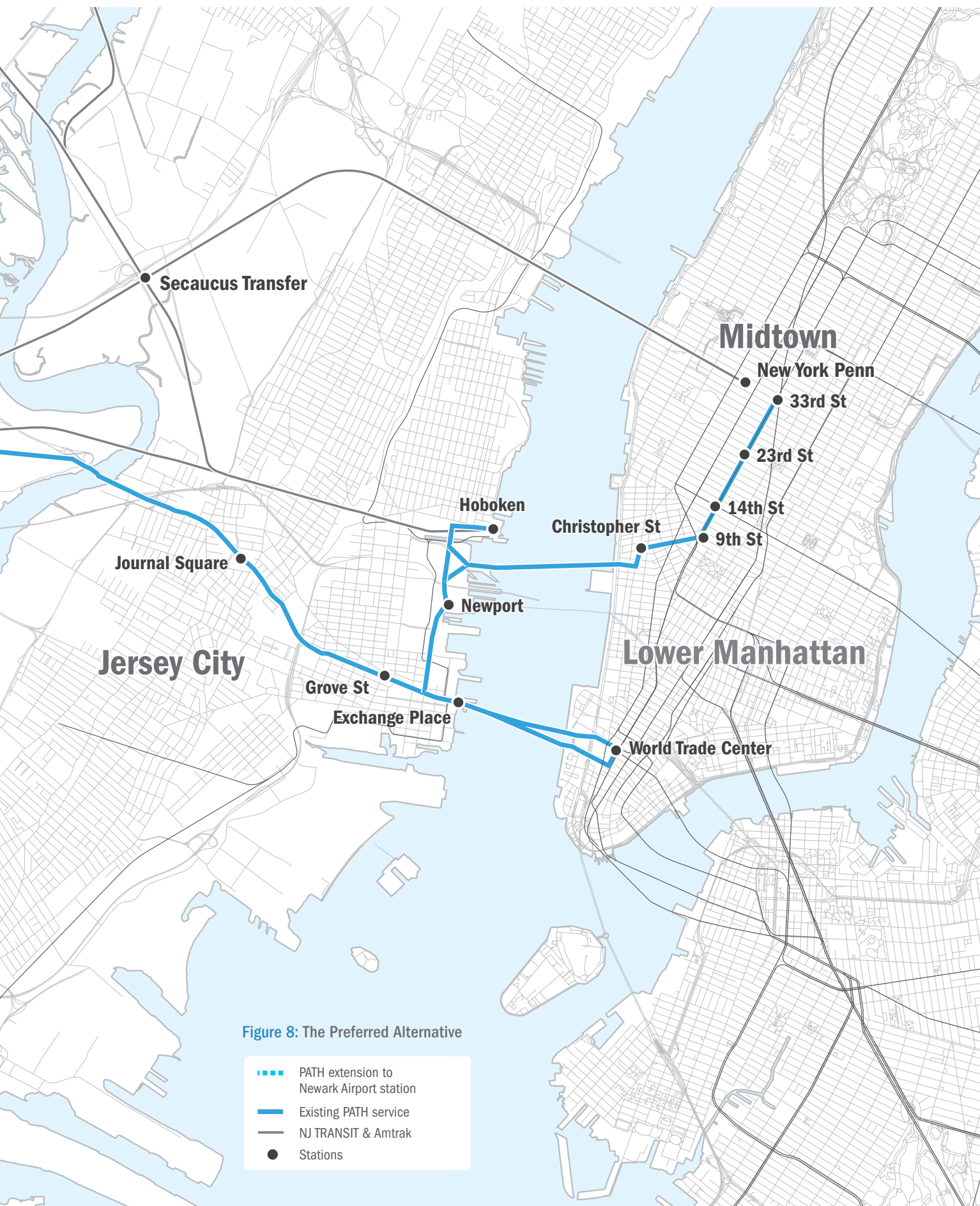


# Preferred Alternative: Western Alignment to Northeast Corridor Station

The most feasible and cost-effective alignment would extend PATH's World Trade Center (WTC) service from Newark's Penn Station along the western side of the Northeast Corridor to the NEC station that is currently served by the AirTrain connection to EWR's terminals. This connection would have several advantages over other alternatives:

- **High frequency of service:** All WTC trains could terminate at the station, allowing trains to run as often as once every 2.5 minutes during peak periods, compared to once every 12-15 minutes if PATH were extended to the airport terminals.
- **Lower cost:** With an estimated cost of \$1 billion, the alignment would be less expensive than an alignment along the eastern side of the NEC and as little as one-third the cost of extending PATH directly to the airport terminals.
- **Fewer negative impacts:** Neighborhood and environmental impacts will be substantially lower than with alternative alignments.
- **Greater flexibility:** There would be fewer conflicts with existing or future airport operations, and it would be compatible with options for further improvements in connecting PATH onto the airport.
- **Better service for existing PATH riders:** The new PATH terminal and yard at the NEC station would allow for quicker train turn-around and greater flexibility to place additional trains in service when needed.









Northeast Corridor Newark Liberty Airport Station

Source: Port Authority of New York and New Jersey



# Benefits, Costs and Funding

Extending PATH to the NEC station would generate a range of economic and transportation benefits for the tri-state metropolitan region. These include increasing our global competitiveness, reducing traffic congestion, supporting commuters, and promoting development around transit stops. Each of these groups of benefits is discussed in this section.

These benefits need to be weighed against the capital costs of constructing the extension and the additional operating and maintenance costs of service to the new station. One important benchmark of any transportation investment's cost effectiveness is the ratio of capital cost per rider. With the ridership and cost estimates in this report, the cost per rider would be \$353 within about eight years after the service is in place. This is comparable to the cost per rider ratio for the existing Newark AirTrain and the Heathrow Express in London and less than the \$407 ratio for the JFK AirTrain, which has seen its ridership double in the past seven years while overall air travel only rose by 20 percent.

Extending PATH to the NEC station is estimated to cost \$1 billion in capital investment. There are several options for financing this investment. The Port Authority of New York and New Jersey, which operates all three major airports and many other port infrastructure, has a \$3.7 billion capital budget for 2012 supported by fees generated at the airports and other facilities. The PATH extension would be a strong candidate for funding from the capital program. In addition, since the transit link will benefit multiple communities and types of riders, many different financing sources might be applicable for both capital and operating costs. These include:

- Riders will pay a portion of the costs of the service directly through fares, which have been projected at \$5.50. These fares may be set higher or lower, depending on whether the priority is to attract riders or cover a larger percentage of the costs.
- Federal transit aid, federal loans, and fees generated by the airport Passenger Facilities Charge could support a portion of the capital costs.
- New development in the neighborhood of PATH stations could support a Tax Increment Financing (TIF) structure, similar to the sale of development rights on Manhattan's Far West Side to finance construction of the #7 subway expansion. New Jersey has enabling legislation to create Revenue Allocation Districts (RADs) which dedicate a portion of new property taxes to finance critical infrastructure projects.
- The Port Authority could toll the airport access roads to generate additional revenues, this would also help to reduce cruising and encourage air travelers to use transit.
- The Port Authority could charge a surcharge for short and long-term parking at the airport, as suggested in a supplemental report<sup>1</sup> completed by Mercator Advisors on PATH funding and financing.

## Region-wide Benefits

### Global Competitiveness

Connecting PATH to EWR will bring the region closer to the airport access service that international travelers have come to expect in world class cities. It will provide the fastest, least expensive rail trip to one of the three major airports in the New York region, saving significant time and money for both business and residential travelers and supporting a wide range of high-value industries in the region's commercial core, the top five industries being administrative and support, professional and technical services, information, finance and insurance and public administration.<sup>2</sup>

The new PATH service would help make the region more competitive in these industries and more attractive to companies looking to relocate. Both employees and customers will have a more convenient option for getting to and from the airport. Visitors will begin and end their trip with an easier, less expensive ride. If the demand for air travel grows as expected both here and worldwide, the value of this asset will increase proportionately.

### Job Creation

Based on an estimated cost of \$1 billion, the project will create 16,000 construction-related jobs in New York and New Jersey. This includes direct construction jobs, and jobs created from material purchases, support activities and economic activity created by wages and other income. Over the long-term, the PATH extension will make airport users more productive by making travel faster and more reliable, by supporting business retention and expansion from industries whose workers and clients are frequent airport users, and strengthening the region's large and growing aviation industries. All of these will translate into additional jobs for the region as a whole.

### Congestion Reduction Benefits

The increase in PATH use will be accompanied by a decline in the number of trips taken by automobiles to EWR. The diversions from auto travel to and from EWR by 2018 would come to about 1,200 trips; by 2026 it would rise to about 1,700, and by 2037 to 2,400 auto trips not taken. About 90 percent of these trips would cross the Hudson via the Holland Tunnel. The daily two-way vehicular volume at the Holland Tunnel today is approximately 90,000. Even if that volume were to grow somewhat, by 2037 the extension of PATH and diversion of drivers to transit would lower Holland Tunnel volumes by only about two percent. This would not result in a dramatic decrease in congestion, but would provide some marginal relief on Trans-Hudson travel.

### Commuter Benefits

Seventy-three million riders used PATH in 2012, and all of them would benefit from the service improvements that would result from the PATH extension. The extension will improve service frequency and reliability for thousands of daily PATH commuters. The new terminal and yards at EWR will permit more efficient

<sup>1</sup> Assessment of Funding and Financing Options for Potential PATH Extension to Liberty-Newark International Airport, Mercator Advisors, April 2, 2012

<sup>2</sup> Based on air transportation expenditures as a percent of industry output reported by the United States Bureau of Economic Analysis.

turnarounds supporting an upgraded signaling system that will enable headways of 2.5 minutes or less, down from four minutes today. This will increase system-wide capacity, reducing crowding on trains and platforms and also reducing wait times for commuters. The new terminal should also improve the reliability of PATH service, allowing the Port Authority to queue additional trains at the terminus to more quickly respond to spikes in demand (events) or incidents.

### Strengthening Central Business Districts

Retaining a healthy urban core is critical to the economic and environmental functioning of the region. A thriving second business district in Lower Manhattan and a healthy urban core in northern New Jersey provide the region with multiple locations for businesses with different needs and cost requirements. The PATH extension would leverage the substantial investments already made in these districts, including the World Trade Center redevelopment and Calatrava terminal in Lower Manhattan, and redevelopment in both the Jersey City waterfront and downtown Newark. The following section describes some of the specific benefits that could accrue to areas near the PATH stations.

## Station-Area Development Benefits

Increasingly, world cities are looking at their airports as economic development hubs in addition to transportation facilities. Paris, Amsterdam, Beijing, Shanghai, Hong Kong, Seoul, Dubai and Dallas are all examples of cities that developed office towers, hotels, retail malls, logistics facilities and even housing in and near their airports, capitalizing on the increased importance of air travel to the economy. Situated between EWR and Downtown Newark, and with rail access to both Lower Manhattan and Midtown Manhattan, the NEC station could be a promising location for this type of “airport city.”

The PATH extension would link the fourth largest central business district in the United States and the two largest downtown office districts in northern New Jersey to the 14th busiest international airport in the nation. Along this corridor are five current PATH stations and the NEC station that already serves NJ TRANSIT which would become the new PATH terminus. These

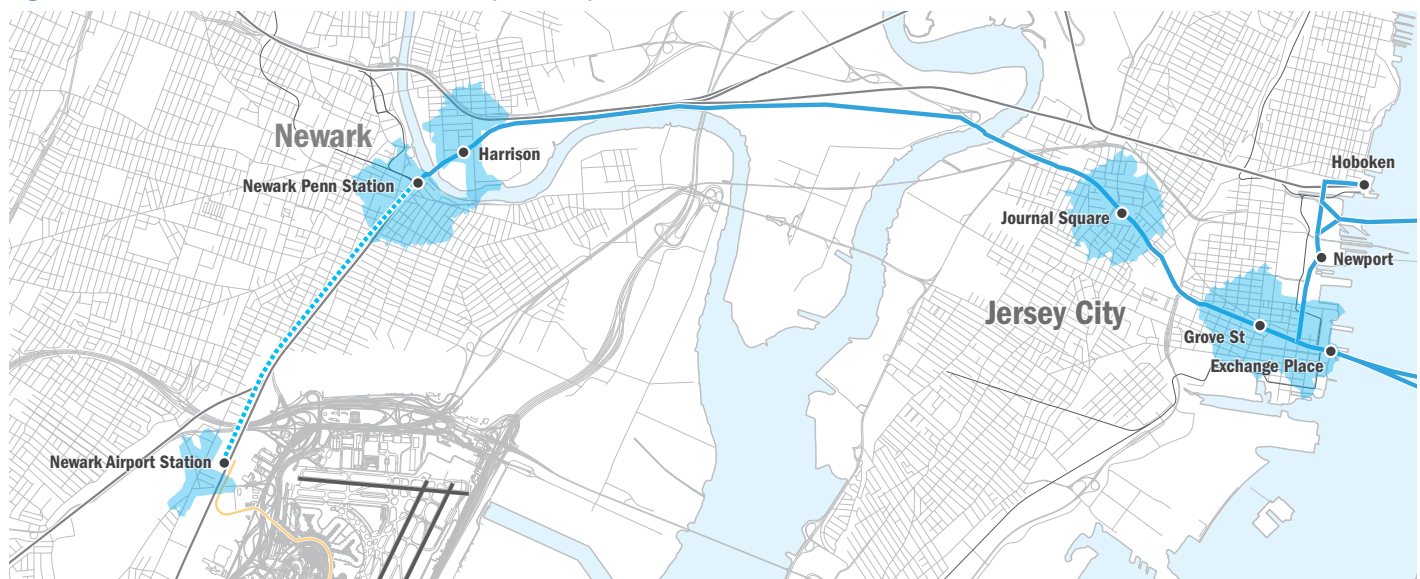
six station areas are likely to attract new jobs and population even without the PATH extension. Several of these locations have been the center of new development in the last two decades, with several additional plans in development. Adding direct transit service to the airport will make it more likely for existing plans to succeed, and could be the catalyst for additional development that targets employers and residents who make frequent use of the airport.

The new Calatrava terminal will anchor over 10 million square feet of new office space to be built on the World Trade Center site over the next several years, along with the World Trade Center Memorial and over 60 million square feet of existing office space within walking distance of the terminal. However, Lower Manhattan will compete for office tenants, and these tenants will compete for business with London, Paris, Shanghai and any number of international and domestic business centers.

Reliable, low-cost and attractive direct public transit service to EWR will make Lower Manhattan more competitive in the global marketplace and an engine for regional economic growth. The district’s traditional core of finance, law and business services is diversifying to include media, information services, technology and tourism—all of which are heavily reliant on air travel. International firms also appear to be central to the district’s identity and future growth. Investment in PATH service to EWR would help bring a larger economic return on the billions of dollars of public investments that have been made in Lower Manhattan, and give the region a competitive asset that it currently lacks.

The New Jersey station areas each have a distinct profile and development potential that could be unlocked with new transit service. In some cases, extending PATH to the airport would likely make the areas marginally more attractive. However, in areas that are ready for redevelopment and where businesses that have a connection to the airports or air travel might locate, the impact could be more substantial. To assess the potential for existing areas, the following analysis compares existing conditions in these station areas to benchmarks for vibrant downtowns throughout the United States, and evaluates the potential impact of the PATH extension as part of broader redevelopment strategies.

Figure 9: PATH-EWR Extension Economic Development Impact Areas



Source: RPA Analysis



## Benchmarking Methodology

To develop residential and job benchmark densities that can quantify the growth potential of areas around train stations, RPA assessed the different general urban land use types around rail stations under a grant from the Lincoln Institute of Land Policy. Areas around existing train stations along the Northeast Corridor and vibrant downtowns elsewhere in the country were analyzed at the block group level to obtain population and job densities for different land use types in different cities. Block group boundaries were overlaid on top of aerials, and each block group was categorized into one of the following land use types based on aerial analysis and checks on population and job numbers from Census data: Downtown Core, Downtown Transition (the transition area between the Core and low density commercial and industrial or between the Core and wholly residential areas), Office, Industrial, and Multi-family Residential. Exceptionally large urban areas like Manhattan and Boston were excluded since their extreme densities make them outliers when compared with most other cities. To account for the fact that small-city downtown block groups would not be expected to reach the same level of intensity in population and jobs as much as large-city downtowns would, the Core and Transition land use types were divided into large- and small- Core and Transition types based on their existing job densities. Each type was assigned an average job and household density per acre based on a subset of vibrant downtown areas.

To pick the benchmark – or target future density – the high end cluster of block groups for residential and employment densities for each land use type among all of the block groups studied was identified and set as the target density. The difference between the existing on the ground conditions and these target densities demonstrate the growth potential for analyzed urban areas.

Applying this methodology to the PATH station areas yielded the following results.

## Exchange-Grove Stations

These two stations are in close proximity extending from the intensely developed Jersey City waterfront to the edge of Jersey City's residential core. The area within a half-mile of these two stations has 24,000 jobs and 24,000 residents. Of the 18.9 million square feet of land, 22 percent of the area is public property, 20 percent is vacant land, 13 percent is commercial, and 12 percent is residential. All other land uses or property types, including industrial, are below 5 percent. At full build-out at benchmark densities, an increase of 23,000 jobs and 26,000 persons could be accommodated. This translates to about 9 million square feet of commercial space and 14 million square feet of residential space, or 9,390 housing units.

While it is unlikely that this area will double in population and employment over the next two decades, PATH service to the airport would help to strengthen the existing commercial core and encourage further office and residential development for businesses and households that make frequent trips to the airport—airport employees, hotel patrons, financial and business service employees.

## Journal Square Station

The Journal Square Station is a transportation hub with extensive surface parking in a largely residential area. This station area currently has 12,000 jobs and 21,000 persons. Out of a total of 10.2 million square feet of land, 27 percent is residential, 15 percent is commercial, 9 percent is vacant, 7 percent is public property and 23 percent is unclassified. Other properties represent 5 percent or less each of total area. At benchmark densities, jobs would increase by 7,000 and population by 6,000. This growth corresponds to 2.8 million square feet of commercial space and 3.1 million square feet

of residential space or 2,121 housing units. As a transfer point for different branches of the PATH system, an increase in the number of PATH riders and service to the airport could help encourage additional retail, office and residential development, particularly in areas immediately adjacent to the station.

## Harrison Station

Set in a largely industrial area, the station area currently has 2,100 jobs and 1,200 persons. The land use for 43 percent of the combined parcels in the area is unclassified, while 32 percent of the land area is industrial and 14 percent is vacant. Classified primarily as a Transitional Area, at full build-out jobs would increase by 10,700 and persons by 16,500. This growth would amount to 4.2 million commercial square feet and 9.0 million residential square feet, or 6,058 housing units. This type of transformation could only occur with a substantial, effective redevelopment strategy. The extended PATH service would not likely be a catalyst, but could marginally improve prospects for success.

## Newark Penn Station

Within a half mile of Newark Penn Station there are currently 19,000 jobs and 7,300 residents. Of the 9.1 million of square feet of land, 43 percent is commercial, 16 percent public property, 11 percent residential, 9 percent unknown and 8 percent vacant land. At full build-out at densities indicated by the benchmark analysis, 5,000 jobs and 13,000 persons would be added. This translates to 1.8 million commercial square feet and 7.1 million residential square feet or 4,754 housing units. Newark is already developing its downtown, in part by leveraging Penn Station as a transit hub. While NJ TRANSIT's Northeast Corridor and North Jersey Coast lines already connect Newark Penn Station to the NEC station, the PATH extension would provide a much more frequent and potentially lower-cost alternative that could encourage development of hotels and other services catering to frequent business travelers.

## NEC Station

As the station most directly affected by the new PATH service, and as an area with significant redevelopment potential, this station area has the greatest potential to change as a result of new service. Upon expansion, ridership to the station would increase substantially, and the station would connect to a larger number of destinations. Currently, this station area has 4,600 jobs and 3,200 residents. Of the 20.1 million square feet of land, 60 percent is public property (mostly transportation-related), 16 percent is vacant land, 11 percent is industrial and all other uses are below 5 percent. At full build-out it could support 23,000 new jobs and 43,000 new residents. This amounts to 9.0 million square feet of commercial development and 23.8 million residential square feet or 15,907 housing units. While this is currently more development than most developers or public officials are considering, it points to the extraordinary potential that exists if a range of impediments can be overcome.

Developing the station area will require substantial public and private investment, as well as a number of policy choices. For example, bringing more terminal functions to the station could limit the land available for other development, as would creation of a Park-and-Ride facility at the station. The same physical, engineering and ownership issue that challenge the preferred alignment for extending PATH also challenge new development.

## Station-Area Development Summary

Three development scenarios were calculated to estimate potential growth – full build-out, half build-out of the development and growth equal to the projected growth for the counties in which

each station is located. The preferred scenario assumes existing stations would approach half the potential build-out since they will attract as a result of improved accessibility more than the underlying growth rates for the area but won't develop to the area's full capacity by 2037. This preferred scenario would absorb by 2037 23 percent of forecasted jobs and 21 percent of the county's projected population growth, reflecting that the station areas would attract a fifth of development in Hudson and Essex counties combined. The projected growth rate uses as a benchmark NYMTC's forecast with jobs growing by 18 percent or 146,000 and population by 17 percent or 245,000 between 2010 and 2035 in Hudson and Essex combined. The three scenarios are detailed in Table 17 and described as follows:

- The full built-out assumes an extra 68,000 jobs or about 27 million square feet of commercial development – equivalent to a 108 percent increase and an extra 104,000 persons or 38,000 housing units or about 57 million square feet of residential development – equivalent to a 182 percent increase.
- The half build-out of the development assumes an extra 34,000 jobs or about 13.5 million square feet of commercial development equivalent to a 54 percent increase and an extra 52,000 persons or 19,000 housing units or about 29 million square feet of residential development – equivalent to a 91 percent increase.
- The projected growth scenario assumes an extra 11,000 jobs or about 4.4 million square feet of commercial development equivalent to an 18 percent increase and an extra 10,000 persons or 3,500 housing units or about 5.3 million square feet of residential development – equivalent to a 17 percent increase.

## Capital and Operating Costs

### Capital Costs

The Port Authority estimates that the capital cost for the extension of PATH from Newark Penn Station to the NEC airport station is just over one billion dollars. This includes just over \$800 million for construction, property acquisition, design/engineering and rolling stock, and a significant 20 percent "contingency" estimate. The actual "hard costs" for constructing the extension are estimated at \$422 million, which includes the guideway, tracks, systems, station and other related infrastructure costs. There is the potential for some capital cost savings if the cantilevered section of the PATH that will run from South to Poinier Streets, parallel to the MacArthur Highway, is reengineered to a lower weight standard. Currently this structure is designed to accommodate the weight of a freight locomotive even though the PATH vehicles are substantially lighter. The guideway costs are approximately \$88 million, making the possible savings in the tens of millions of dollars.

### Operating and Maintenance Costs

The current PATH fare box recovery ratio is 45 percent, which is calculated by dividing fare revenues by operating costs. This is lower than the MTA's subway division, which is 59 percent (2011 estimate)<sup>3</sup>, but higher than the nationwide average of 35 percent. By adding more riders and revenues to the system and supporting operational efficiencies, the PATH extension would improve the fare box recovery ratio for the entire PATH system.

**Table 17: Maximum Build-out Potential Based on Benchmark Densities**

	Added Jobs	Added Persons	Added Housing	Commercial Sq. Ft.	Residential Sq. Ft.
<b>PATH-EWR Build-out</b>					
Exchange-Grove	22,529.95	25,634.81	9,390.04	9,011,978.10	14,085,061.14
Journal Sq	7,093.82	5,791.17	2,121.31	2,837,527.33	3,181,960.14
Harrison	10,700.86	16,540.31	6,058.72	4,280,345.20	9,088,083.83
Newark Penn	4,578.51	12,979.31	4,754.33	1,831,404.55	7,131,489.30
NEC	22,705.31	43,427.21	15,907.40	9,082,122.45	23,861,104.29
<b>Total</b>	<b>67,608.44</b>	<b>104,372.81</b>	<b>38,231.80</b>	<b>27,043,377.62</b>	<b>57,347,698.70</b>
<b>PATH-EWR Half Build-out</b>					
Exchange-Grove	11,264.97	12,817.41	4,695.02	4,505,989.05	7,042,530.57
Journal Sq	3,546.91	2,895.58	1,060.65	1,418,763.66	1,590,980.07
Harrison	5,350.43	8,270.16	3,029.36	2,140,172.60	4,544,041.91
Newark Penn	2,289.26	6,489.66	2,377.16	915,702.28	3,565,744.65
NEC	11,352.65	21,713.60	7,953.70	4,541,061.22	11,930,552.14
<b>Total</b>	<b>33,804.22</b>	<b>52,186.41</b>	<b>19,115.90</b>	<b>13,521,688.81</b>	<b>28,673,849.35</b>
<b>PATH-EWR County Growth Rates</b>					
Exchange-Grove	4,315.50	4,158.37	1,523.21	1,726,200.00	2,284,818.68
Journal Sq	2,241.00	3,600.60	1,318.90	896,400.00	1,978,351.65
Harrison	390.60	197.88	72.48	156,240.00	108,725.27
Newark Penn	3,429.00	1,242.87	455.26	1,371,600.00	682,895.60
NEC	828.90	539.07	197.46	331,560.00	296,192.31
<b>Total</b>	<b>11,205.00</b>	<b>9,738.79</b>	<b>3,567.32</b>	<b>4,482,000.00</b>	<b>5,350,983.52</b>

Source: RPA Analysis

## Cost Effectiveness

There is no single benchmark for establishing whether the benefits of the proposed service exceed the cost. Different funding streams have varying criteria and methodology for determining whether a project should be funded, and a full cost-benefit analysis is beyond the scope of this analysis. However, any calculation of cost effectiveness starts with an estimate of expected ridership and the benefits that accrue to them from improved access, time savings and convenience. A good indicator of whether the PATH extension is likely to meet the thresholds for different programs is to compare estimates of the capital cost per rider for the proposed PATH extension with similar airport access services.

Table 18 compares the Port Authority's estimates of capital cost and RPA's estimates of ridership for the proposed PATH extension to the NEC station alone, as well as for a continued extension to the EWR terminals, to the existing EWR AirTrain, the JFK AirTrain and the London-Heathrow Express. Since the ridership numbers for the comparison services are within 6-8 years after service was initiated, ridership estimates for the PATH extension in 2026 are used, assuming service is initiated around the year 2018.

While there are a number of factors to consider, the cost per rider for PATH extension to the NEC station is similar to the three benchmark services. The \$353 cost per rider is virtually the same as the existing EWR AirTrain and the Heathrow Express, and considerably less than the \$407 cost/rider ratio for the JFK AirTrain. By contrast, bringing PATH directly onto the airport would triple the cost but only modestly improve ridership; at \$821, the cost per rider would be more than twice that of any of the existing services.

When calculating cost per rider, there are many factors which should be taken into consideration.<sup>4</sup> The value per rider varies considerably for different services. The calculations do not include the annual operating and maintenance costs for the services, which typically are only partially covered by fare revenues. In addition, the calculations do not account for how many riders were shifted from

<sup>3</sup> <http://www.mta.info/mta/budget/feb2011/Master.pdf>

<sup>4</sup> Appendix C details the assumptions that RPA made when calculating the capital cost per rider and includes additional information on other international comparatives

**Table 18: Cost and Ridership Comparisons for Airport Transit Services**

Existing JFK & EWR Airport Services	Construction Costs (in 2010 dollars)	Year Completed	Type of Service	Annual Ridership (Actual & Estimated)	Ridership Year	Ratio - Cost per Rider
JFK AirTrain	2,133,156,522	2003	Circulator/Connector	5,236,404	2009	\$407
EWR NEC Station & AirTrain	672,695,979	1996/2001	Circulator/Connector	1,924,200	2009	\$350
<b>Proposed EWR Service</b>						
PATH - NEC Station	1,048,568,000	?	Urban Transit/Extension	2,969,900	2026	\$353
<b>International Comparable</b>						
London - Heathrow Express	2,006,650,307	1998	Commuter Rail/Extension (Non-Stop Service)	5,440,000	2010	\$369

Source: Port Authority of New York and New Jersey, British Airports Authority, RPA Analysis

other transit services, the quality of the service or the income of the riders. For example, some of the projected riders for the PATH service would come from passengers already using transit to EWR, just as some of the other services may have shifted passengers from other bus or rail options. At a minimum, these capital cost per rider comparisons indicate that the PATH extension to the NEC station meets a threshold for comparison to the JFK AirTrain and London Heathrow Express, even without considering system-wide benefits for commuters.

## Funding and Financing Options

As the operator of both the PATH system and EWR, the Port Authority would be the agency responsible for building and operating the PATH extension. The Port Authority has a \$3.7 billion capital budget for 2012 supported by fees generated at the airports and other facilities. The PATH extension would be a strong candidate for funding from the capital program. However, the Port Authority's capital program is not the only potential funding source for the project. In fact, considering the many projects competing for funding under the Port Authority capital program and the many beneficiaries of the PATH extension, it is appropriate to consider alternative funding sources as a supplement to cross-subsidies from other Port Authority facilities. Annual debt service costs at current interest rates would be approximately \$65 million.

Mercator Advisors completed a separate examination of possible funding and financing options for PATH<sup>5</sup>, the study includes an exhaustive analysis of the various federal financing strategies and fleshes out several of the funding options recommended by RPA. An airport parking surcharge was also suggested by Mercator, but is not detailed in this report. However, several of their recommendations were incorporated as part of the following list of potential funding and financing sources:

### Fare Revenues

The ridership and cost revenues used in this analysis assumed a \$4.50 to 11.75 surcharge for passengers taking PATH to the airport and a \$2.75 base PATH fare (assuming full implementation of the recent \$1 increase by 2014). The combined \$7.25 fare, which the Port Authority used in its analyses of a PATH extension, would make the PATH fare to Newark Airport comparable to a subway-AirTrain fare to JFK Airport and could generate \$16 million in annual revenues. This proposed fare is low compared to many other comparable international services, and it is possible to charge a higher fare to offset operating costs or debt service for the capital expenditures. Increasing the surcharge to \$9.75, would make the cost comparable to NJ TRANSIT fares to Newark Airport from Midtown, and still leave the fare well below many European and Asian cities. While this increase would reduce ridership by an

estimated 20 percent, it could generate as much as an additional \$6million per year or \$22 million in revenue in its first full year of operation.<sup>6</sup> Revenues would increase over time with projected increases in ridership.

### Strengths

The fare would be paid directly by users, and the price could be adjusted to respond to market or policy considerations. It is also one of the few potential revenue sources that is entirely within the Port Authority's power to collect.

### Weaknesses

Even if set at very high levels, fare revenues would still pay for only a portion of operating and capital costs. Higher fares would also reduce ridership to some degree by reducing the cost differential with taxi fares and other options. As indicated in Section II, this impact may be relatively modest. The legal status of the fare surcharge under the Port Authority's bond resolution might also be problematic and requires further research<sup>7</sup>

### Passenger Facility Charges (PFC)

Airport improvements can be funded through a surcharge on airline tickets called a Passenger Facility Charge. The PFC can only be used for facilities that are solely for airport passengers or employees, so use of this fee could prevent the NEC station from being used as a Park-and-Ride or commuter station. The extension would also have to compete with other projects that could be funded from the PFC.

The current PFC of \$4.50 per passenger raised \$215 million in revenue in 2012. Increases are dependent on federal authorizing legislation. The PFC increase that was proposed in the most recent FAA reauthorization was rejected, the rate is currently still at 4.50. However, Obama's 2014 proposed budget recommends increasing the PFC to \$8.00 while, at the same time, reducing the Airport Improvement Program by \$450M. If we assume that passenger volumes are constant (they are actually more likely to increase, resulting in even greater revenues), this increase would generate an additional \$57 million in PFC revenues if enacted.

### Strengths

If there is an increase in the PFC, it could potentially fund the full capital cost of the PATH extension without impacting the Port Authority's current capital program. This would be an appropriate use of PFC funds for a high-priority project that would benefit passengers and improve air travel.

<sup>6</sup> Appendix D describes the method used for calculating the impact of higher fares on projected ridership to generate the annual revenue estimates.

<sup>7</sup> Assessment of Funding and Financing Options for Potential PATH Extension to Liberty-Newark International Airport, Mercator Advisors, April 2, 2012

<sup>5</sup> Assessment of Funding and Financing Options for Potential PATH Extension to Liberty-Newark International Airport, Mercator Advisors, April 2, 2012



### Weaknesses

The Congress recently passed the FAA Reauthorization Act of 2012, which maintains the current \$4.50 PFC through 2015. If there is an increase enacted as part of the 2016 reauthorization, other stakeholders may argue for a different use of funds.

### Federal Transit Programs

The PATH extension might be eligible for Federal capital assistance, such as the Federal Transit Administration's New Starts program, particularly if the station provides commuter as well as airport benefits. The likelihood of funding under this competitive program is small under the current outlook for federal transportation funding, but with strong political support the project could secure discretionary funding from this or other federal sources, such as TIFIA<sup>8</sup> and the RRIF program, which is described below.

The Federal Railroad Administration's (FRA) \$35 billion Railroad Rehabilitation and Improvement Financing (RRIF) authorization was established in TEA-21 and later expanded under SAFTEA-LU. It provides low-interest loans at rates that are equal to the cost paid by the federal government to assist railroads with capital intensive improvements. These RRIF loans have 35-year repayment schedules that typically do not begin until after the project enters revenue service. The authorizing legislation specially mentions that developing or expanding intermodal facilities (passenger and freight) are the preferred projects for this funding source. The PATH extension would expand an existing intermodal hub, connecting PATH to an international airport and intercity and commuter rail networks. The MTA has submitted an application for a \$3 billion RRIF loan to complete the Long Island Railroad's East Side Access project, more than three times the cost of the PATH extension.

### Strengths

New Start funding, RRIF loans and other federal funding would bring new revenue to a region that is the nation's leading gateway to other global finance and service centers. Potentially, federal funding could provide all or most of the capital costs without requiring new taxes or fees.

### Weaknesses

The current fiscal outlook for the federal government and the political gridlock over transportation funding indicate that the environment will be even more competitive for states and localities than the recent past. Strong, unified advocacy from elected officials in New York and New Jersey would be essential to securing funds.

### Development Fees

New development in the neighborhood of PATH stations in New Jersey could use a structure similar to the one used on Manhattan's Far West Side to finance construction of the #7 subway expansion through the sale of development rights. This project paid for \$2 billion in construction costs through a zoning bonus purchase to increase the as-of-right square feet potential of parcels within an impact area of the new subway line.

The PATH extension project could support a similar Tax Increment Financing (TIF) structure that captures future revenues of new development resulting from this investment. A TIF district sets a base assessed value that remains as a contribution to the general funds of a municipality, while increases in this value are allocated to the TIF authority to pay for project costs and debt financing. The TIF life cycle is usually between 20 to 30 years, and when bonds are repaid the TIF district is terminated, and the whole assessed value reverts to the municipality. New Jersey has enabling legisla-

tion to create Revenue Allocation Districts (RADs) which dedicate a portion of new property taxes to finance critical infrastructure projects within the district and work as TIFs.

### Strengths

A TIF program channels resources toward improvements in distressed or underdeveloped areas where development might not otherwise occur and provides new infrastructure. A RAD around the NEC station, and possibly some of the other PATH station areas, could capture a portion of the new value created without raising tolls or taxes or competing with other capital funding sources.

### Weaknesses

While the amount of revenue that could be generated by development fees may be substantial in largely undeveloped areas such as the NEC station area, these fees depend on factors other than the completion of the PATH extension. The real estate market responds to larger economic trends and cycles. Furthermore, several legal and political hurdles would need to be overcome to establish a RAD. Property owners could either be supporters or opponents, depending on how they perceive the district affects their property values and taxes.

### Tolling Airport Access Roads

Fifty-six percent of all passengers at EWR are dropped off or picked up by private automobiles, taxis or liveries. While transit riders and people parking in the lots pay a fee to access EWR, these 19 million annual passengers are not helping pay for the infrastructure to access the airport. Charging a fee to use the airport access roads – as Dallas-Fort Worth and Dulles International Airport are doing – would generate significant funding for infrastructure improvements, including the PATH extension. Instituting tolls to access EWR by automobile would also have the benefit of further encouraging air travelers who could use transit to switch modes.<sup>9</sup>

Instituting an airport tolling system at Newark airport could involve installing gantry systems at both the airport entrances and exits, and would not create chokepoints or slow traffic on the internal roadways. It could use EZ-Pass transponders and/or License Plate Recognition (LPR) cameras to bill motorists. Estimated revenues from such a system would generate between \$12.7 million annually (for a \$1 toll, similar to Dallas-Fort Worth) and \$25 million annually (for a \$2 toll, similar to Dulles International).

### Strengths

A toll to drive to EWR would generate significant revenues, reduce cruising, and divert some air travelers to use transit. The toll would be paid directly by users of the roadway network, and the price could be adjusted to respond to congestion or other policy considerations. It is a substantial revenue source that is entirely within the Port Authority's power to collect.

### Weaknesses

Currently, over 80 percent of air travelers using EWR reside in New Jersey. Many of these travelers have limited viable transit alternatives to access the airport. Unlike established fees for parking, transit or highways, a toll would be both highly-visible and new, and likely to generate public backlash. A toll would require political support, and could potentially reduce discretionary air travel.

<sup>9</sup> For analysis of Dallas and Dulles tolls and applications for Newark Airport, see "Tolling Airport Access Roads" in the Appendix E.

<sup>8</sup> See discussion in the Mercator study, starting on page 14, for additional details on TIFIA

# Options for Long-Term Improvements

Looking forward, Newark Liberty Airport’s Central Terminal Area (CTA) needs to be redeveloped to handle additional passengers and keep pace with the evolving needs of the aviation industry. RPA’s previous research and other reports have concluded that the region’s airports will experience robust growth in the future – if they have the capacity to handle this demand.

This redevelopment, which will most likely take the form of additional runways and reconfiguration of the CTA, provides an excellent opportunity to extend a second expansion of the PATH system, providing a seamless, convenient ride to a more efficient airport with expanded capacity. This could be accomplished in a number of ways, depending on the type of airport redevelopment that eventually takes place.

There are three fundamental options for future expansion, each with different benefits and potential challenges:

- Extending PATH to the airport terminals would provide a one-seat ride but is the most expensive.
- Locating terminal functions at the NEC station would create the possibility for a world-class gateway to the airport, but would need to resolve a number of siting and operational constraints.
- A new AirTrain could reduce walking and travel time from PATH considerably, but also has complex implementation challenges at both the station and terminal ends.

The following analysis describes these options, along with their benefits and implementation barriers. The primary objective of the analysis was to determine if the proposed alignment of the PATH extension to the NEC station could connect to all of the feasible long-term options. After studying the possible variations of the three fundamental choices—extending PATH to the airport terminals, locating a new terminal at the NEC station or providing an improved connection from the station to a reconfigured Central Terminal Area (CTA)—it was concluded that the preferred alignment for extending PATH to the Northeast Corridor is also the alignment that provides the greatest flexibility for a second phase.

The analysis illuminates the full potential of extending PATH to the airport, as well as the larger public policy issues that would need to be resolved before an optimum solution can be selected. These issues include when and how to expand capacity at EWR, and whether and how to develop the area surrounding the NEC station.

## AirTrain Capacity and Congestion

As stated earlier, the AirTrain that the PATH extension would connect to at the NEC station is in need of replacement. Its deficiencies will grow as it ages and as the number of air passengers at EWR increases, regardless of whether PATH is extended. Based on the following analysis, there should be adequate capacity to handle the additional passengers from a PATH extension initially. However, it will worsen crowding on the platforms and terminal entrances and will hasten the day when the AirTrain will reach its capacity limits.

**Table 19: Peak-Hour (4 to 5pm) Projections of AirTrain Trips & Capacity to/from the NEC Station**

Year	NEC (NJT/Amtrak)	V/C	NEC (NJT/Amtrak + PATH)	V/C
2004 (base)	652	0.21	NA	-
2015	728	0.23	NA	-
2025/2026	825	0.26	1,725	0.553

Source: Regional Air Service Demand Study, 2007

In 2007, the Federal Aviation Administration (FAA)’s Regional Air Service Demand Study (RASDS) examined the capacity of the existing AirTrain<sup>1</sup> at EWR to determine whether it would be able to continue to adequately serve as a circulator between the terminals and the NEC station. The RASDS projections only include increases in NJ TRANSIT and Amtrak trips along the corridor. Table 19 shows the combined trips to and from the NEC station and the resulting volume over capacity (VOC) ratio. The VOC is an indicator of system congestion. Typically, a VOC over .80 indicates the beginning of a problem requiring actions to manage demand or increase capacity.

The VOC for the existing services at the NEC station would be .20 for arriving passengers and .33 for departing passengers by 2025, indicating that there is sufficient AirTrain capacity to serve the intercity and commuter services that exist today. The PATH extension would potentially add an additional 727 arriving/departing passengers per hour by 2026. If this was added to the projected NJ TRANSIT and Amtrak trips at the NEC it would result in a combined total of 1,552 trips per hour, which is roughly half of the existing AirTrain’s hourly capacity. It would be higher for departing passengers and lower for arriving passengers. This estimate is somewhat overstated as some PATH trips will be diversions from the existing commuter service, which would reduce the number of trips projected in the RASDS and lowering the overall VOC.

While this analysis indicates that vehicle capacity should be sufficient to accommodate the extension of PATH, it does not completely capture the impacts of the increased PATH frequencies on queuing and reliability of the existing AirTrain service, which already experiences periods of crowding on the platforms. The PATH will operate on frequencies of 2.5 to 5 minutes per train, compared to the 20 to 40 minute frequencies of the existing commuter services. While this might even out the flow of riders on the platform at some times, it has the potential to fill the AirTrain platform more quickly at others. As PATH ridership grows, this will likely create crowding on the limited platform queuing space at the NEC station and at the existing terminal stations. Additionally, circulation at the terminal stations could be problematic due to limited ingress and egress elements. Many of these problems could be addressed by extending the existing AirTrain from six to seven cars, as recommended by RASDS, and by improvements in station circulation and the fare control area at the NEC station.

<sup>1</sup> The AirTrain is a six car monorail with a capacity of 78 passengers per train and headways of approximately three minutes

## Newark Liberty Airport Redevelopment Options & the Second Phase of the PATH Extension

At some point in the future, the EWR CTA will need to be redeveloped, both to handle additional passengers and to keep pace with the evolving needs of the aviation industry. RPA's recent study on the region's airports entitled *Upgrading to World Class: The Future of the New York Region's Airports* recommended the expansion of EWR to accommodate a 45- percent increase in regional air passenger demand by the 2030's.

Several airport expansion options to increase EWR's runway capacity were developed and then evaluated. Two options focused on improving the airport's "crosswind" runway capacity (runway 11/29) by extending and/or changing its current orientation. A third option proposed a new runway parallel to the existing two 4/22 runways, the primary operating direction of the airport. The evaluation process eliminated the crosswind options due to their modest capacity benefits and extensive off-airport environmental and community impacts. The new third parallel runway would serve 50 percent more operations per hour than the crosswind options and would have no physical off-airport impacts. However, this new runway would require the demolition of a large part of the existing CTA and internal roadway network, referred to as the "bulb." While the study recommended that a new third parallel runway be built at EWR sometime in the next 20 to 30 years, it did not address the question of how the airport might be redeveloped.

Investments to improve public transportation at EWR will be critical in serving this new air passenger demand. Not only will transit service relieve the increased congestion from cars entering and circulating within the airport, but it will also provide an important amenity for keeping the airport competitive with other world cities.

There are three basic options for connecting PATH service at the NEC station to the airport terminals. Each option has different types of benefits, costs and implementation issues. The latter two options, developing a terminal at the NEC station or implementing an improved AirTrain service, also have a number of variations to consider. Each of these is described below.

### Option 1: Extending PATH to the EWR Terminals

Extending PATH along the west side of the NEC does not preclude the option of bringing it on to the airport to serve the terminals directly. The Port Authority PATH and Aviation departments developed an on-airport option to bring PATH to the airfield terminals. This on-airport alignment would extend the PATH tracks past the NEC station where they would cross over the NEC to the east side just south of the existing AirTrain right-of-way. The viaduct would continue over US Routes 1 & 9 and Brewster Road where it would enter the airport property close to the existing daily parking garage. PATH would make a stop at Terminal C and then hug the air traffic control tower before straightening out to connect to the planned replacement for Terminal A. It's unlikely that an additional stop would be created for Terminal B because this station would be along the curve.

PATH would be carried above-grade on a robust viaduct structure for its entire length, starting at the crossing of the NEC. The at-grade level of the viaduct would consist of the arrival/departure

roadways with PATH stacked above them. There would also be a provision to construct another level above PATH to allow for the future separation of departure and arrival traffic. The structure would be built to comply with Federal Railroad Administration (FRA) regulations to handle the weight of a diesel locomotive.

Additional tracks on the viaduct would be provisioned for an internal circulator service that could be run using smaller PATH train sets. However, the Port Authority has determined that it would not be cost effective to construct additional spurs to serve outlying parking garages/lots. PATH is not designed to traverse tighter turns and is limited to 800-foot turning radii and a 4 percent grade, preventing it from negotiating the obstacles on the airport. Therefore, the parking areas would need to be moved closer to the terminals or served by buses or some form of internal people mover. Additionally, the lack of space at Terminal A would dictate a three track stub-end track design similar to PATH's 33rd Street terminal, limiting the number of trains that it could serve per hour. The on-airport PATH service plan would call for every fourth train from WTC to stop at Terminals A and C, a frequency of one train every 12 to 15 minutes. The PA estimated that the total cost of extending PATH to the two terminals would be approximately \$2.3 billion dollars.

#### Strengths

- Direct "one-seat" ride to airfield terminals for PATH, reduces travel time and distance between transit and aircraft gates.
- Would allow the closing and redevelopment of the NEC station site.

#### Weaknesses

- Would reduce frequency of PATH service to the airport from every 2.5 minutes to 12-15 minutes during peak hours.
- Extending the PATH onto the airport would be expensive and limit CTA redevelopment.
- PATH would not be able to act as an efficient circulator; a second AirTrain might also be required.
- The system-wide operational benefits associated with the NEC station as a terminal for PATH would be negated.

### Option 2: Locating an Airport Terminal at the NEC Station

Locating an airport terminal at the NEC Station would bring some of the airport services closer to the PATH terminus on the NEC. The new terminal would bridge the NEC, potentially replacing the existing station if sited in the same location<sup>2</sup>. This terminal would provide passenger check-in, security screening and baggage handling for transit riders, with new AirTrain service connecting to gates. It might also be possible to capture auto trips at the NEC terminal if arrival and departure roadways are constructed along with short and long-term parking facilities.

<sup>2</sup> If the NEC terminal is moved further south the construction of a new station might require the tracks to be spread to create enough space for the island platforms. This would likely require the acquisition of additional right-of-way along the corridor. Additionally, a new interlocking on the NEC would need to be constructed to serve the station, since the existing interlocking configuration is optimized for the current location. Modifications to the NEC track alignments might also force additional upgrades to other proximate freight and passenger rail connections.



The dimensions of the NEC terminal would be comparable to the main terminals at Atlanta Hartsfield and Madrid Barajas airports, approximately 1,200 feet by 425 feet, or over one million square feet for a two story structure. Over 88 million passengers pass through Atlanta each year, twice as many passengers as EWR does today. Madrid handles 50 million passengers annually, with considerable excess capacity to accommodate future growth. A terminal of this size would therefore provide EWR additional terminal capacity beyond the passenger demand projected in RPA's airport study.

A terminal at the NEC station would need to address two sets of service and development issues. The provision of support services—parking, ground access and baggage handling—raises implementation challenges. The possible development sites for the terminal also have their own set of complex issues that would need to be resolved.

### **Parking, Ground Access and Baggage Issues**

If all on-airport parking relocated to this terminal then over 5.6 million square feet of structure parking would be required just to maintain the current 20,000 parking spaces at the airport. Additionally, RPA has projected that another 5,000 spaces or 1.4 million square feet of structured parking might be required by the 2030s. Today, only a third of EWR's parking is structured, which are mostly short-term spaces located closer to the terminals. If most of the long-term surface parking lots were maintained then it should be possible to cut the space needed for structure parking in half. While this option does reduce the size and cost of the structure, it would require some form of transit service to connect these lots to the main terminal.

Duplicative services could be eliminated by consolidating the arrival and departure roadways for passengers being dropped off by private automobiles, taxis, buses and shuttles/vans. If ground access to the existing or future airfield terminals was maintained as well, then check-in, security and baggage handling would also be required at those facilities. The complexity and cost of reorganizing the internal roadway network must also be considered. New ramps from I-78 and U.S. Route 1 & 9 would need to be constructed to serve the new facility. The NEC terminal would need to have a significant amount of frontage to support all of the arrival and departure traffic.

Today, over 70 percent of all air passengers arriving at the airport are dropped off directly at their terminal by cars, buses and other "rubber tired" vehicles. This is the final leg of the trip; no additional transit trip is required to reach the gate.

The NEC Terminal's baggage claim would be located anywhere between 2,500 and 5,000 feet from aircraft on the apron compared to about 1,000 feet today. This could impact the efficiency and speed of baggage handling at the airport, and the solution could be costly and complex. Other airports, like Denver International, have spent hundreds of millions of dollars on intricate solutions that have yielded imperfect results.<sup>3</sup> Some form of baggage train or shuttle would likely be required to span the distance between the NEC terminal and airfield, which would add to the cost of the internal circulator.

### **Terminal Location**

The exact location of the terminal would depend on resolving a number of issues that are tied to airport redesign and competing uses near the terminal. There are three potential locations, each with its own set of development challenges. All three options would be compatible with the western alignment recommended for extending PATH to the NEC.

**1. Existing NEC Station:** If the terminal was constructed adjacent to the existing NEC station it would force the closure of crosswind runway (Runway 11/29) because it would be within the runway protection zone (RPZ)<sup>4</sup>. Uses that encourage public gatherings within the RPZ are not permitted, which by definition includes a train station or intermodal facility. Surface lots and other auxiliary airport uses are allowed, but no structure can be higher than one to three stories based on distance from runway. The Port Authority is not supportive of this option because it limits the operational flexibility of the airport. A wind analysis done during RPA's airport study found that EWR would still have over 99 percent wind coverage without the crosswind runway, similar to its operational performance today. Further analysis is needed to definitively determine how critical the crosswind runway is to EWR's operation.

**2. Budweiser Brewery:** The Anheuser-Busch Brewery located roughly 2,000 feet from the current NEC station is another possible site for the NEC terminal. This is a large parcel that is centrally located directly along the east/west axis of the current CTA and airfield. This option would require the construction of a new NEC station, but would allow for sizeable frontage and space for parking. However, redeveloping this site would require relocating Anheuser-Busch, a major employer and source of tax revenue for the City of Newark. A site would need to be found within the municipality of Newark to relocate the business. Relocation would be difficult and costly under any circumstances, and there are few sites of this size with rail access, a requirement for this rail-dependent business.

**3. Haynes Avenue:** A final option would site the NEC terminal between the Anheuser-Busch Brewery and existing NEC terminal, possibly resulting in the relocation or closure of Haynes Avenue. In this configuration, the terminal would lie outside of the RPZ, preserving the crosswind runway and would not require the taking of the Anheuser-Busch property. The existing NEC station would need to be moved approximately 1,000 feet south of its current location, resulting in a terminal that would be considerably smaller than in the existing NEC station and Budweiser Brewery options. This would also preclude the possibility of consolidating parking at the terminal. Frontage would also be limited, reducing the amount of drop-off traffic that could be captured by the NEC terminal. Figure 10 shows a preliminary rendering of this option, showing how the terminal might fit on this site and where airfield terminals<sup>5</sup> might be located. This option has the fewest development impediments to overcome, but also has fewer service benefits.

The following section summarizes the strengths and weakness of the NEC terminal option.

### **Strengths**

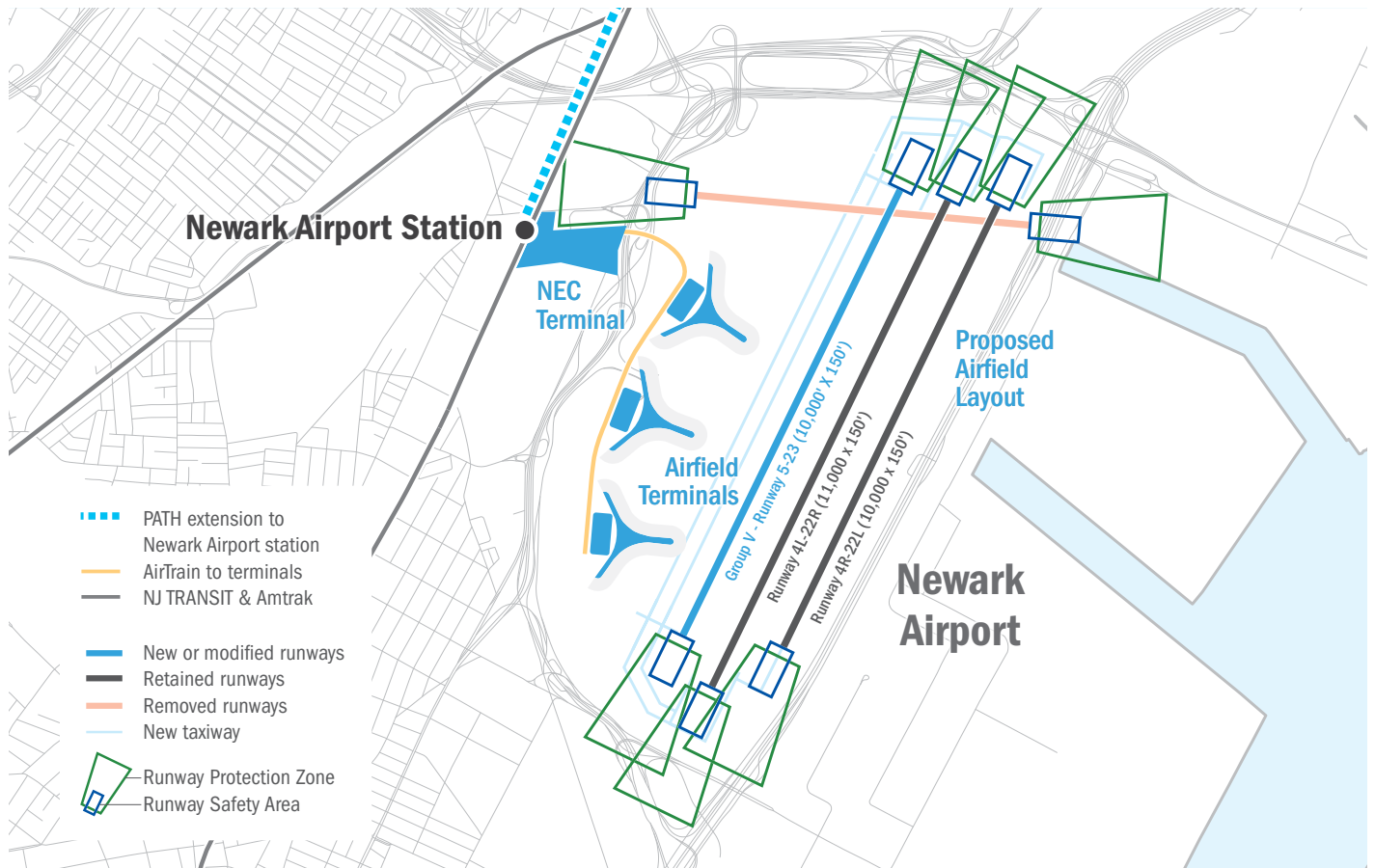
- The AirTrain would be physically closer to the airfield and offer a shorter journey to the terminal.
- Brings the airport experience closer to transit riders, allowing them to check their bags and go through security.
- Raises the profile of transit riders and makes their access to the airport an even higher priority than autos.

<sup>4</sup> The standard RPZ dimensions are 2,500ft by 1,000/1,700ft (trapezoidal shape), which extend out from the runway safety line just before the runway safety zone creating a 1,000 foot physical extension of the runway.

<sup>5</sup> A rendering of the new Terminal A, provided by the Port Authority, was used as a template for the airfield facilities.

<sup>3</sup> [http://calteam.com/WTPF/?page\\_id=2086](http://calteam.com/WTPF/?page_id=2086)

**Figure 10: Preliminary Rendering of EWR with NEC Terminal (New Station) and Airside Expansion**



Source: RPA

- Consolidates currently dispersed terminal frontage and parking facilities.
- Provides an opportunity to construct a world-class gateway to EWR airport.

#### Weaknesses

- Moves baggage handling further away from the aircraft, complicating baggage circulation, and likely requiring a baggage train or shuttle between the main terminal and remote airfield concourses.
- Inconveniences the majority of existing EWR customers who drive to the airport. Under the NEC Terminal scheme they would all be required to transfer to the AirTrain to connect to their gate, increasing their overall trip time.
- Requires a new AirTrain service to be constructed. To the extent that this is more costly than an anticipated replacement of the existing monorail, it will add to the overall cost of this option.
- Each of the three potential terminal locations presents substantial development challenges that would need to be overcome.

### Option 3: New AirTrain from NEC Station to Reconfigured Central Terminal Area

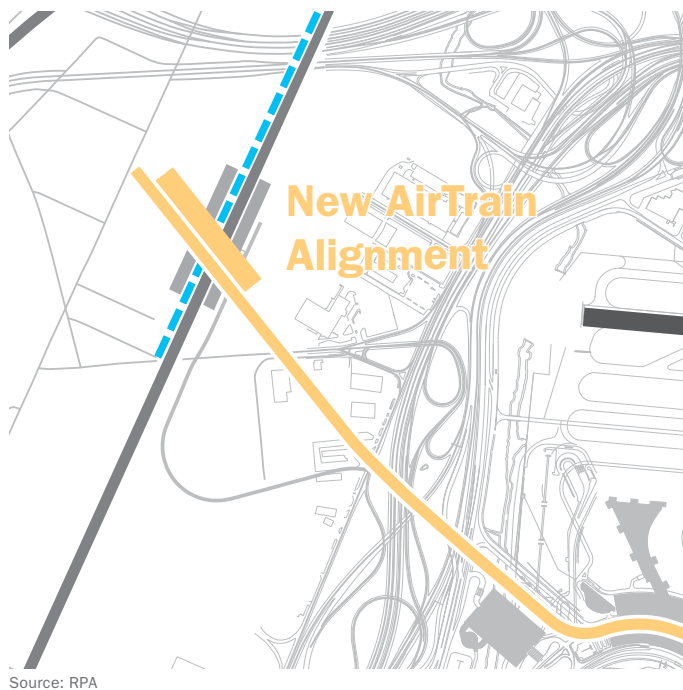
The first two options would provide the PATH rider with check-in and other terminal services immediately disembarking from the train. A third option would still require a transfer to the terminals, but with a higher level of convenience and service than exists today.

The current AirTrain system is constrained by the limited space available at the existing terminals for the right-of-way and stations. The existing station easements were part of the 1970s plan for the new Central Terminal Area, where it was assumed that the circulator would be used only to move passengers between the three buildings, not to and from the NEC or the several parking facilities as it does today. The space constraints did not allow for standard gauge light-rail (LR) or heavy rail (HR) vehicles, limiting the capacity of the system.

Today's steel-beamed monorail system, with narrow cars and short trains, is the direct result of these constraints, limiting passenger capacity and the capability to expand as passenger demand increases. Additionally, the system is prone to mechanical failures, very slow due to the various curves in the right-of-way and sensitive to inclement weather. As shown in Table 20, EWR's monorail has an average speed of just 9 mph between the NEC station and Terminal C, compared to that of JFK's AirTrain, at almost 30 mph between Jamaica station and Terminal 8.

The redevelopment of the CTA provides an opportunity to rectify these deficiencies, replacing the existing AirTrain with a more robust LR (steel or rubber-tired) system that would be able to carry a greater number of passengers per car and have the capability

**Figure 11: New AirTrain Alignment and Station at NEC Corridor**



of adding cars if needed - similar to JFK's AirTrain. A new AirTrain service with a straighter alignment, combined with more robust equipment should result in a significant increase in performance. RPA estimated that this new service, covering roughly the same distance, could attain an average speed of 20 mph and travel time of 5 minutes, saving passengers approximately four minutes on average compared to the existing service (also shown in Table 20).

The new service could also improve transfers at both ends of the AirTrain. The existing terminal stations have inadequate space for vertical circulation elements (escalators, elevators and stairs) and are located on the upper-most level, approximately two stories above the gates and three from the baggage claim. The new AirTrain stations would be better integrated into the terminals, reduce walking distances and have a greater number of elevators and escalators.

At the NEC station, the existing AirTrain service is at the eastern end, almost 300 feet from where the PATH platforms will be located. The transfer would require air passengers to make two vertical movements, one up from the PATH platforms to cross the NEC and another back down to the AirTrain platforms. One potential solution would be to run the new AirTrain over the NEC, perpendicular to the rail platforms. Escalators and elevators would connect the PATH/NEC corridor platforms to the AirTrain island platform with just one vertical movement. PATH/NEC riders could directly transfer to the AirTrain. The AirTrain platform could also serve as a circulator among all NEC transit services.

The redevelopment of the CTA could also impact the performance of the new AirTrain. Under one scenario, two or three terminals could be constructed within the footprint of the existing CTA. The internal "bulb" roadway that fronts all of the terminals today would be demolished to make room for the third runway. Constructing two terminals instead of three would reduce the average AirTrain travel time by almost one minute.

The new right-of-way and NEC station would likely cost in the hundreds of millions of dollars, possibly close to \$1B. Costs would be minimized if constructed in tandem with CTA redevelopment. Costs could be greater if temporary stations were required in the event that the new AirTrain was constructed before the CTA was

**Table 20: Existing & Proposed AirTrain Performance Metrics**

Existing Services	Avg Speed (mph) to First Terminal	Distance (miles)	
		from Transit to First Terminal	AvgTT (mins) from Transit Connection
EWR	9	1	9
JFK	29	5	15
<b>Proposed Services</b>			
New EWR AirTrain Service	20	1	5

Source: Regional Air Service Demand Study & RPA Analysis

redeveloped. However, the existing AirTrain is outmoded and will need to be replaced even without extending PATH. Replacing it with a monorail service similar to the existing service would be less costly, but without the benefits cited above. By comparison, the adjusted cost of the existing monorail system is \$673 million in today's dollars, and the JFK AirTrain cost over \$2 billion.

The following section summarizes the strengths and weakness of the new AirTrain option.

#### Strengths:

1. Improves transfer to the AirTrain from all NEC services, including PATH.
2. Reduces walking and AirTrain travel times considerably.
3. Increases capacity of the system and terminal stations could accommodate much greater loads.
4. Less costly to construct, compared to the NEC Terminal, and would require less property takings.
5. Allows the CTA to be redeveloped overtime and does not constrain how it might operate.

#### Weaknesses:

1. Access to the terminals would remain as a two seat ride, and PATH customers will not feel like they have arrived at the airport when they get off the train. .
2. Requires addressing complex implementation issues, including crossing the NEC, vertical clearances, and ensuring that NEC operations are not disrupted during construction.
3. May require construction of temporary stations, raising overall costs.
4. Results in less available space for the expansion of the airfield, since this option would not relocate parking and roadways further west and offsite as the NEC Terminal would.





Lower Manhattan



# Conclusion

Several converging factors make the first phase of connecting PATH to the NEC station a high priority for New York and New Jersey. A growing number of air passengers and the increasing importance of air service to the region's economy increase the overall benefits of the project. Experience with existing AirTrain service at both Kennedy and Newark airports demonstrates an existing demand and the probability of rapid ridership growth once the service is in place. The redevelopment of the World Trade Center site, including the 9/11 Memorial and the Calatrava terminal, will provide an international gateway at one of the largest concentrations of commercial and civic activities in the nation. And the service will add to the momentum of redevelopment in Newark and Jersey City, reinforcing one of the nation's most important urban corridors extending from Lower Manhattan into northern New Jersey.

Political leaders, business organizations, civic groups and citizens should support a PATH extension to the Northeast Corridor Station and a more sustainable and prosperous future for the New York and New Jersey metropolitan region.

## PATH Extension At a Glance

### Project Description

**Extend PATH 1.85 miles** from Newark Penn Station to the Northeast Corridor Airport Station

### Travel Time

**36 minutes** running time from World Trade Center to Newark Airport

### Service

**24 trains an hour**

### Annual Ridership

**2.5 million**, growing to **3.6 - 4.3 million** over 20 years

### Fare Options (one-way to airport)

**\$7.25** (same as transit fare to JFK)  
**\$12.50** (same as NJT fare to EWR)  
**\$14.50** (double JFK fare)

### Construction Cost

**\$1 billion** includes extension, trains, station expansion and new yard costs

### Possible Funding Sources

Fare Revenues, Federal Transit Programs, Airport Roadway Tolls and Development Fees



# Regional Plan Association

Regional Plan Association is America's oldest and most distinguished independent urban research and advocacy organization. RPA works to improve the infrastructure, economic competitiveness and sustainability of the New York-New Jersey-Connecticut metropolitan region. A cornerstone of our work is the development of long-range plans and policies to guide the growth of the region. Through our America 2050 program, RPA also provides leadership in the Northeast and across the U.S. on a broad range of transportation and economic-development issues. RPA enjoys broad support from the business, philanthropic, civic and planning communities. For more information about Regional Plan Association, please visit our website, [www.rpa.org](http://www.rpa.org).

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