Chapter 9: Evaluation of Alternatives

A. INTRODUCTION

The ARC No Build Alternative and the Build Alternative for the 2030 analysis year are evaluated in this FEIS. Chapter 2 reviews the range of alternatives studied, and the recommendation of the Build Alternative, which includes two new rail tunnels under the Palisades in New Jersey and the Hudson River, and tunnels leading to NYPSE between Eighth and Sixth Avenues in Manhattan.

This chapter presents the National Environmental Policy Act (NEPA) and the Federal Transit Administration (FTA) Section 5309 New Starts evaluation processes. As demonstrated in this chapter, the Build Alternative would benefit the region compared to the No Build Alternative, as it would satisfy the established goals and objectives and purpose and need. The evaluation includes quantitative and qualitative assessments of the degree to which the Build Alternative addresses the goals and objectives. **Table 9-1** provides a link between the goals and objectives and purpose and need, which are described in Chapter 1. The FTA Section 5309 New Starts evaluation includes the project justification and local financial commitment criteria, and corresponding ratings assigned by the FTA.

NJ TRANSIT's New Starts funding request in this FEIS ($2.5 billion) is consistent with the FY2008 New Starts submittal. This information is being updated for the FY2009 submittal, which will include contributions from the Port Authority of New York and New Jersey and a $3 billion New Starts funding request.

B. NEPA EVALUATION PROCESS

The following provides a description of the No Build and Build Alternatives' ability to meet the stated goals and objectives.

IMPROVE TRANS-HUDSON MOBILITY

TRANSIT CAPACITY

The current Northeast Corridor (NEC) infrastructure and North River Tunnels allow for a maximum of 23 trains per hour (TPH) from New Jersey to Manhattan in the AM peak hour (7:30 AM to 8:30 AM arrivals into Manhattan). This existing operation includes 20 NJ TRANSIT TPH and 3 Amtrak TPH. In the No Build Alternative, even with its systemwide infrastructure and signal system improvements, the constraints of the NEC and North River Tunnels would remain and would restrict service because of a lack of additional capacity. The number of peak hour trains to New York would be unchanged at 23 TPH. In the Build Alternative, the new ARC infrastructure would increase the TPH to 48 (44 NJ TRANSIT and four Amtrak). This peak hour train volume would occur during a two hour-span in the AM peak (7:00 AM to 9:00 AM arrivals into Manhattan).

TABLE 9-1: ARC GOALS AND OBJECTIVES, PURPOSE AND NEED

Goals and Objectives	Project Purpose/Need
IMPROVE TRANS-HUDSON MOBILITY • Expand transit capacity to meet current and forecast demand between midtown Manhattan and points in New Jersey and New York • Increase transit ridership • Extend the reach and improve the connectivity of the region's commuter rail systems • Increase direct one-seat-ride opportunities • Improve access, travel time, comfort, convenience, and reliability of the region's commuter rail systems	**TRANSIT CAPACITY** Increase capacity of the trans-Hudson commuter rail system, which is at capacity during peak travel periods **TRANSFERS** Provide new one-seat-ride service to midtown Manhattan from areas not served today
UTILIZE AND IMPROVE THE REGION'S EXISTING TRANSIT INFRASTRUCTURE TO THE MAXIMUM EXTENT POSSIBLE • Maximize the use of existing transportation facilities • Enhance PSNY network rail and passenger capacity and operating reliability • Coordinate with other transit providers and ongoing transportation-related studies in the region to achieve efficiencies and synergy • Implement improvements that optimize the maintainability of the PSNY-related infrastructure to sustain transit operations over the long-term	**FACILITY CROWDING** Provide a new station facility to relieve severely overcrowded and inadequate conditions at PSNY **RELIABILITY** Eliminate commuter rail delays caused by unanticipated events or routine maintenance
MAINTAIN A SAFE AND SECURE TRANSIT SYSTEM	**SAFETY AND SECURITY** Enhance commuter rail system safety and security
MAINTAIN AND ENHANCE THE ECONOMIC VIABILITY OF THE REGION • Support transit-oriented land uses that are consistent with New Jersey and New York Smart Growth policies • Support the West Midtown residential and commercial development initiatives • Ensure accessibility to jobs in Manhattan, New Jersey and New York • Improve transit connectivity to support the region's economic viability and continuing development	**ECONOMIC GROWTH** Provide increased rail capacity to meet growth in west-of-Hudson population and jobs in NYC
PRESERVE AND PROTECT THE ENVIRONMENT • Avoid/minimize adverse impact on communities and neighborhoods • Preserve and enhance the natural and built environment • Improve air quality by providing rail transit alternatives that contribute to reduced vehicle miles traveled and vehicle emissions • Work towards achieving compliance with the Clean Air Act	**ROADWAY CONGESTION** Increase capacity of the trans-Hudson transportation system, which is at or near capacity during peak travel periods

Source: Transit Link Consultants, 2008

The volume/capacity (V/C) ratio measures the number of people in a train compared to the train capacity. The V/C ratio provides a measure of capacity utilization. When the V/C exceeds 1.0, the system (or train) is considered over-capacity. In the No Build Alternative, the average passenger V/C ratio of Manhattan-bound peak hour trains would be 0.95, with individual trains exceeding 1.27. Under the 2030 No Build Alternative, with increased ridership and no change in the number of peak hour trains into Manhattan, trains would be crowded and over-capacity. With the Build Alternative's increased train service to New York, the average V/C would drop 37 percent, to 0.60, providing a more comfortable ride for more passengers, and providing a seat for each passenger traveling to New York.

In the No Build Alternative, approximately 174,000 daily rail trips would occur to and from PSNY. With the Build Alternative's increased rail service to New York, expanded capacity and improved rail connectivity, daily ridership would increase by over 46 percent to 254,190, as shown in **Table 9-2**. Ridership statistics for the Build Alternative were developed by NJ TRANSIT, and are contained in the *ARC FEIS Ridership Forecasting Methodology Report* in Appendix 3.1. The ARC ridership methodology has been reviewed and approved by the FTA (April 7, 2006). The selection of the 2030 forecast year conforms to current FTA guidelines and is consistent with regional long-range population and employment forecasts developed by both New Jersey and New York MPOs.

TABLE 9-2: DAILY TRANS-HUDSON TRIPS BY FACILITY – 2030: BUILD ALTERNATIVE

Facilities	2005 Existing	2030 No Build	2030 Build	Change	% Change from No Build
TRANS-HUDSON TRANSIT FACILITIES					
Existing PSNY (NJ TRANSIT)	135,000	174,003	120,607	-53,396	-30.70%
NYPSE	0	0	133,585	133,585	
Total PSNY (new + existing)	*135,000*	*174,003*	*254,192*	*80,189*	*46.10%*
World Financial Center	11,700	24,831	18,532	-6,299	-25.40%
Midtown Ferry Terminal	13,300	33,471	22,702	-10,769	-32.20%
Pier 11 Ferry Terminal	13,400	21,463	18,301	-3,162	-14.70%
PABT Buses (Lincoln Tunnel)	167,700	201,656	192,964	-8,692	-4.30%
George Washington Bridge Bus Term	12,600	15,168	13,159	-2,009	-13.20%
Holland Tunnel Buses	11,700	10,233	10,291	-58	-0.60%
World Trade Center PATH	104,000	155,096	146,080	-9,016	-5.80%
North Tube PATH	80,400	124,460	116,663	-7,797	-6.30%
TOTAL	**549,800**	**760,383**	**792,884**	**32,501**	**4.30%**

Source: NJ TRANSIT, July 2007

Complementing this 46 percent ridership growth, ridership increases would be expected with the addition of NJ TRANSIT's other rail initiatives listed below. Under the No Build Alternative, NJ TRANSIT's ongoing rail expansion projects would not directly access New York or be able to serve the New York market easily. These new service proposals include the Northern Branch project located between Tenafly, New Jersey and the Hudson-Bergen Light Rail System in North Bergen, New Jersey, where passengers can access the LRT to reach ferry and PATH services to New York City. Current studies of the Northern Branch do not include a direct connection to proposed ARC tunnels. Other rail initiatives, including the Monmouth-Ocean-Middlesex Rail Line, West Trenton Line, West Shore Rail Line, the Lackawanna Cutoff, and Passaic–Bergen Diesel Multiple Unit (DMU) Service are being designed to accommodate the anticipated future rail ridership and service demand throughout central and northern New Jersey. The planning for each of these projects takes into consideration current rail capacity limitations from Secaucus to midtown Manhattan. In the No Build Alternative, these services would need

to terminate in Newark or Hoboken, and passengers would need to transfer for service to New York. Under the Build Alternative, many of these proposed new services could potentially have the opportunity to provide one-seat-ride service to New York, optimize the attractiveness, ridership, and benefits of each of these new services, and extend the reach and improve the connectivity of the region's commuter rail systems.

PASSENGER TRANSFERS

By providing new one-seat ride, dual-powered service for the NJ TRANSIT services listed below, the Build Alternative would improve the overall connectivity of the commuter rail system.

- North Jersey Coast Line (NJCL) Bay Head Service, south of Long Branch
- Montclair-Boonton Line, west of Montclair
- Pascack Valley Line, including New York MTA Metro-North express service to Rockland County
- Main and Bergen County Lines, including New York MTA Metro-North express service on the Port Jervis Line
- Raritan Valley Line

In the No Build Alternative, passengers on these NJ TRANSIT rail lines destined for Manhattan would need to change trains at Frank R. Lautenberg Station, Newark Penn Station, or other transfer points, such as Long Branch and Newark Broad Street. In the No Build Alternative, 32,100 daily trips would transfer between NJ TRANSIT services to travel to or from PSNY. In the Build Alternative, approximately 31,100 or 97 percent of these trips would benefit from a one-seat ride to Manhattan.

In the No Build Alternative, none of this new one-seat-ride service to Manhattan would be possible. With the Build Alternative, the new one-seat ride opportunities would result in significant increases in ridership to Manhattan. As shown in **Table 9-3**, Port Jervis Line peak period ridership to Manhattan would increase by over 210 percent, Main/Bergen Lines would increase by over 165 percent, Montclair-Boonton Line would increase by 97 percent, Pascack Valley Line would increase by over 160 percent, and Raritan Valley Line would increase by 68 percent. The Port Jervis and Pascack Valley Lines serve Rockland and Orange Counties in New York. In the No Build Alternative, these Manhattan-bound passengers would be required to transfer.

UTILIZE AND IMPROVE THE REGION'S EXISTING TRANSIT INFRASTRUCTURE TO THE MAXIMUM EXTENT POSSIBLE

FACILITY CROWDING

As shown in **Table 9-4**, in the No Build Alternative, peak hour (7:30 AM–8:30 AM) ridership into PSNY would increase 48 percent, from 18,590 in 2005 to 27,830 in 2030. As a result, crowding in existing PSNY would be significantly worse than current conditions. Passengers arriving in PSNY in 2030 in the AM peak would have an average exit time of 80 seconds.

TABLE 9-3: PEAK PERIOD (6:00-10:00 AM) RAIL TRIPS BY LINE AND TERMINAL – 2030: BUILD ALTERNATIVE

NJ TRANSIT Lines	2005 Existing			2030 No Build			2030 Build			Change			% Change from No Build		
	New York	Newark Penn	Hoboken	New York	Newark Penn	Hoboken	New York	Newark Penn	Hoboken	New York	Newark Penn	Hoboken	New York	Newark Penn	Hoboken
NEC and NJCL	23,400	8,700	650	32,718	20,642	455	38,337	19,336	160	5,619	-1,646	-295	17.20%	-6.30%	-64.90%
Morris & Essex	9,600		3,600	13,012		4,744	16,886		3,489	3,874		-1,255	29.80%		-26.50%
Montclair-Boonton	1,200		1,950	3,653		1,995	7,198		1,428	3,545		-567	97.00%		-28.40%
Raritan Valley	3,000*	3,650		4,661*	5,944		7,856	5,674		3,195	-733		68.50%	-4.50%	
Pascack Valley	500†		2,500	2,040†		3,747	5,329		1,994	3,289		-1,753	161.30%		-46.80%
Main/Bergen	1,150†		5,500	4,775†		7,618	12,783		4,258	8,007		-3,360	167.70%		-44.10%
Port Jervis	370†		1,700	937†		2,899	2,928		1,247	1,990		-1,651	212.30%		-57.00%
TOTALS	**39,220**	**12,350**	**15,900**	**61,797**	**26,587**	**21,457**	**91,317**	**25,010**	**12,575**	**29,520**	**-1,576**	**-8,882**	**47.80%**	**-5.90%**	**-41.40%**

Source: NJ TRANSIT, January 2007

* Indicates transfers to Northeast Corridor Line or North Jersey Coast Line electric service at Newark Penn Station

† Denotes transfers to Northeast Corridor Line or North Jersey Coast Line or Montclair-Boonton Line electric service at Frank R. Lautenberg Station

TABLE 9-4: PEAK HOUR (7:30-8:30 AM) RAIL TRIPS BY NJ TRANSIT RAIL FACILITY – 2030: BUILD ALTERNATIVE

NJ TRANSIT Rail Terminal	2005 Existing	2030 No Build	2030 Build	Change from No Build	% Change from No Build
Existing PSNY (NJ TRANSIT)	18,589	27,831	17,157	-10,223	-37.30%
NYPSE	---	---	23,525	23,525	---
Total PSNY (new + existing)	*18,589*	*27,831*	*40,682*	*13,301*	*48.60%*
Hoboken*	6,660	9,035	5,282	-3,754	-41.50%
Newark Penn Station*	6,052	13,028	12,255	-773	-5.90%
TOTAL	31,301	49,444	58,219	8,775	17.70%

Source: NJ TRANSIT, January 2007

* Includes transfers to PATH

With the Build Alternative, peak hour ridership into PSNY would be 37 percent less than the No Build due to construction of NYPSE between Sixth and Eighth Avenues. NYPSE would provide capacity for this shift, as well as for new passengers due to increased service to New York. With the Build Alternative, peak hour ridership to PSNY (new and existing) would increase over 48 percent from 27,830 to 40,680. With the Build Alternative, the average exit time of passengers arriving into PSNY in 2030 in the AM peak hour would be approximately 60 seconds, a savings of 20 seconds (25 percent), due to reduced congestion on stairs and escalators. The calculation of 60 seconds was derived by distributing arriving passengers from trains on each NJ TRANSIT platform to the various stairs and escalators and then to the concourses, for the Build and No Build Alternatives. The estimated time to clear the volume at each vertical circulation element was then calculated. The methodology and results of the pedestrian egress analysis can be found in Appendix 3.4.

RELIABILITY

The nearly 100-year-old rail network and stations in the project area, built and designed for intercity transportation, are not well suited to function primarily as a commuter rail system. The system's pinch point is between Secaucus and New York City and, especially, in the trans-Hudson tunnels. Since the network is operated at practical capacity during the peak period, it is extremely susceptible to delays. Train congestion levels are such that problems with any particular train result in a series of cascading delays throughout the system. This situation is exacerbated by the lack of alternate track and tunnel options to continue service in the event of a disruption in the existing trans-Hudson tunnels. When it occurs during the peak period, one short-term train disruption of less than 15 minutes causes delays to 10 to 15 additional trains. Between December 2003 and November 2004, 128 total short-term incidents caused delays to 728 additional trains, causing roughly 60,000 total hours of passenger delays. Major disruptions, which are classified as train disruptions of more than two hours, may have much more serious impacts. Five major incidents during this time period caused more than 50,000 total hours of passenger delays.[1] Long Island Rail Road and Amtrak, which also serve PSNY, could be impacted by such incidents within the station and tunnels.

In the No Build Alternative, NJ TRANSIT peak period, peak direction schedule recovery of 44 percent would certainly increase to reflect these delays. With the Build Alternative, the schedule recovery is reduced to 11 percent—still higher than the commuter rail industry standard of 5 to 8 percent, but a significant reduction from the current and No Build schedule recovery. With the Build Alternative, the

[1] Source: NJ TRANSIT. Total passenger delay is based on average daily ridership and therefore understates actual delays, as peak-hour incidents have a disproportionate impact on passengers.

average scheduled time of Newark-to-New York trains drops by about 5 minutes in the peak and 3.5 minutes in the off-peak.

NJ TRANSIT operates commuter rail service throughout the day and evening hours as well as on weekends.[2] The earliest weekday revenue train leaves Long Branch Station on the North Jersey Coast Line at 12:24 AM and the last weekday revenue train leaves PSNY for Montclair State University on the Montclair-Boonton Line at 11:55 PM. NJ TRANSIT operates a total of 711 revenue trains per day. On weekends, NJ TRANSIT operates 8 of 10 lines serving northern New Jersey. The volume of weekend service is limited by closures of one North River Tunnel track from Friday night to Monday morning by Amtrak for maintenance.

Amtrak operates high-speed and regional-rail service throughout the day and evening hours with the earliest weekday scheduled arrival into PSNY at 12:15 AM and the last weekday departure from PSNY at 10:25 PM. Amtrak also provides a comprehensive weekend schedule based on the market they serve. However, this service is similarly limited by necessary North River Tunnels closures for maintenance.

In the No Build Alternative, the flexibility of re-routing trains as a result of an incident at PSNY or in the North River Tunnels is limited and is a significant source of train delay. With the Build Alternative, the segregated operation between the new tunnels and NYPSE would allow for uninterrupted service during outages or other unanticipated events in the existing tunnels and station, and vice versa.

The No Build Alternative illustrates a serious lack of system redundancy in the trans-Hudson system, which was also exposed after the events of September 11, 2001, and subsequently in the power blackout in August 2003. Those events revealed vulnerability in the trans-Hudson network's ability to recover efficiently from a national emergency capable of disrupting critical trans-Hudson infrastructure.

In the No Build Alternative, the overall reliability and train delay would worsen beyond the current conditions just described. In the Build Alternative, improvements to the NEC between Frank R. Lautenberg Station and New York, two additional rail tunnels, and NYPSE would eliminate many of the sources of lack of operational reliability and provide opportunities for route flexibility when needed.

MAINTAIN A SAFE AND SECURE TRANSIT SYSTEM

The East River and North River tunnels are almost one hundred years old, and will continue to need infrastructure improvements relating to tunnel structure, catenary, communications, signals and track to maintain and secure this major transportation corridor. Both the No Build and Build Alternatives' safety and security demands would require continued improvements for safe train operations, utilizing communications and train movement. However, with the Build Alternative, there is more flexibility in conducting the required infrastructure improvements as alternate tunnel and station options are available. The tunnel redundancy also provides a back-up in case of emergencies related to passenger security, enhancing system reliability.

With the No Build, the safety and security of passengers utilizing NEC stations will become more difficult as station congestion increases. Compared to the No Build, which offers only one station, the Build Alternative's NYPSE allows for distribution of passengers between the stations, which allows for safer conditions and faster evacuation in case of emergency.

[2] Indicated NJ TRANSIT and Amtrak schedules are from 2006.

MAINTAIN AND ENHANCE THE ECONOMIC VIABILITY OF THE REGION

The No Build Alternative does not support economic development to the extent that the Build Alternative would. For example, the Hudson Yards redevelopment will create new commercial and residential development on the west side of Manhattan; however, the New Jersey workers that want to access this expansive redevelopment project will be severely restricted by the limitations of the trans-Hudson transportation system.

In the Build Alternative, the region would experience significant economic benefits as a result of the more than doubling of peak hour service into New York. As shown in Section 5.14, during construction, the tri-state region would benefit by:

- Direct on-site employment of 59,900 jobs
- Over 98,300 jobs throughout businesses
- Over $1.5 billion in local, state, and federal taxes
- Almost $4.0 billion in personal income
- Over $9 billion in business activity

The Build Alternative would support the Hudson Yards development by providing access to New Jersey labor pools and convenient access to the proposed development. As shown in Section 4.14, the Build Alternative would permanently benefit the economy of the tri-state region by adding:

- Over 750 jobs throughout businesses
- Nearly $15.5 million in local, state and federal taxes
- Over $46 million in personal income
- Over $120 million in business activity

PRESERVE AND PROTECT THE ENVIRONMENT

In the No Build Alternative, the daily one-way auto trips over the primary trans-Hudson crossings (George Washington Bridge, Holland Tunnel, and Lincoln Tunnel) would grow from 405,700 (year 2000) to 432,900 in the 2030 No Build Alternative. In the Build Alternative, this is reduced to 410,800, a reduction of approximately 22,100 daily trans-Hudson vehicle trips and related air quality benefits.

In the Build Alternative, air quality would be improved by eliminating a significant number of daily trans-Hudson auto trips. As shown in **Table 9-5**, some 589,600 daily automobile vehicle miles traveled (VMT) and 21,700 daily vehicle hours traveled (VHT) would be eliminated throughout the NJ TRANSIT service area because of the Build Alternative.

The Build Alternative has been configured and aligned to minimize impacts to natural and manmade resources, as well as to the communities through which the project would traverse. Expanding existing alignments in New Jersey, and being situated up to 250 feet below municipalities in Hudson County, New Jersey and in Manhattan, enables the project to achieve transportation goals and objectives, with minimum disruption to the uses, activities and people above. Based on the assessment of various environmental resource categories contained in Chapters 3, 4, and 5, ranging from land use and community facilities, to air quality and noise, constructing and operating the Build Alternative would cause relatively few adverse impacts. Moreover, those predicted impacts would be mitigated by realistic and effective measures sanctioned by environmental review agencies.

TABLE 9-5: BUILD ALTERNATIVE DAILY CHANGE IN AUTO VEHICLE MILES TRAVELED AND VEHICLE HOURS TRAVELED

Auto Trip	Build Alternative vs. No Build	
	VMT	VHT
Auto Mode Trips		
Subtotal Peak – Auto	(480,347)	(21,319)
Subtotal Off-Peak – Auto	(197,735)	(4,809)
Subtotal All-Day Auto	(678,082)	(26,128)
Drive-Access Transit Trips		
Subtotal Peak – Transit	71,374	3,511
Subtotal Off-Peak – Transit	17,116	900
Subtotal All-Day Transit	88,490	4,410
TOTAL Peak – Auto + Transit	*(408,972)*	*(17,809)*
TOTAL Off-Peak – Auto + Transit	*(180,619)*	*(3,909)*
TOTAL All-Day	**(589,592)**	**(21,718)**

Source: NJ TRANSIT, January 2007

( ) = Reduction

PROJECT COSTS

CAPITAL COSTS

The estimated incremental capital cost for the Build Alternative over the No Build Alternative is $6.6 billion in 2007 dollars, as shown in **Table 9-6**. The Build Alternative year of expenditure (YOE) capital cost is $7.6 billion. Capital cost and funding information can be found in Chapter 10. The Build Alternative cost estimate includes construction components, engineering, oversight and management costs, required railroad safety and operational systems, railroad rolling stock, property acquisition and one-time operational startup costs. The maximum contingency has been set at 30 percent, and design costs vary by stage, up to 10 percent of the total project cost. The *ARC EIS Capital Cost Methodology and Results Report*, describing the methods by which this capital cost was calculated, is found in Appendix 10.

TABLE 9-6: CAPITAL COST – BUILD ALTERNATIVE

Item	Total Cost (millions – 2007 dollars)*
Guideway and Track	$2,233.1
Stations	$1,680.5
Support Facilities (Yards, Shops)	$283.5
Site Work	$492.5
Systems	$320.6
Right-of-Way, Land	$410.0
Vehicles	$471.4
Professional Services	$742.5
TOTAL	**$6,634.1**

Source: THE Partnership, January 2007

* Includes contingency and design costs

OPERATING AND MAINTENANCE (O&M) COSTS AND REVENUE

The incremental annual operating and maintenance (O&M) cost of the Build Alternative over the No Build Alternative is estimated at $99.8 million (2007 dollars) as shown in **Table 9-7**. A more detailed cost breakdown is provided in **Table 4.14.-1** of Section 4.14. The *ARC EIS Operating and Maintenance Cost Methodology and Results Report,* describing the methods by which this operating cost was calculated, is found in Appendix 10.

TABLE 9-7: ANNUAL OPERATING & MAINTENANCE COSTS AND REVENUE – BUILD ALTERNATIVE

Item	Total Cost (millions – 2007 dollars)
Train Operations	$33.1
Train Maintenance	$23.2
Maintenance of Way	$3.9
Yard Operation and Maintenance	$3.1
Station Operation and Maintenance	$15.8
Revenue Collection	$0.2
Access Fees	$2.5
Utilities	$0.3
Professional Service Contracts	$0.3
Administration	$4.1
Contingency	$13.3
TOTAL O&M COST (2007$)	**$99.8**
TOTAL PASSENGER REVENUE (2007$)	**$120.5**

Source: Transit Link Consultants, September 2008 (O&M), NJ TRANSIT September 2008 (Revenue)

As shown in **Table 9-7**, the Build Alternative would generate an additional $120.5 million in net annual rail system passenger revenue. The farebox recovery ratio (net annual revenue divided by net annual operating costs) for the Build Alternative is projected to exceed the nationwide average commuter rail farebox recovery of 48 percent (2002 data). Unlike intrastate transit, interstate services, especially trans-Hudson, produce a more favorable farebox ratio, and are less of a burden on NJ TRANSIT's overall operating budget.

EVALUATION MEASURES

Information contained in **Table 9-8** provides a link between the ARC goals and objectives and the evaluation measures that support the implementation of the Build Alternative versus the No Build Alternative.

The Build Alternative would provide opportunities for certain optimum service enhancements throughout the NJ TRANSIT rail system that would not be possible under the No Build Alternative. These enhancements are related to the various rail line improvement initiatives that NJ TRANSIT is advancing throughout northern and central New Jersey, which ideally would have their final destination in Manhattan. However, without the added Build Alternative rail capacity between Frank R. Lautenberg Station and midtown Manhattan, these rail line improvements would need to terminate in Hoboken or Newark. Such an arrangement would provide some benefit, but not the one-seat ride efficiency or additional Build Alternative capacity east of Frank R. Lautenberg Station.

TABLE 9-8: EVALUATION RESULTS

Goal/Purpose & Need	Evaluation Measure/Results
IMPROVE TRANS-HUDSON MOBILITY	
TRANSIT CAPACITY Increase capacity of the trans-Hudson commuter rail system, which is at capacity during peak travel periods	• Trans-Hudson peak train capacity – AM peak train service would increase from 23 to 48 trains per hour • Peak hour train V/C ratio – Average V/C would decrease 37 percent from 0.95 to 0.60 • Trans-Hudson ridership – Daily rail trips to and from Manhattan would increase 46 percent from 174,000 to 254,190 • Ability to accommodate future services – one-seat-ride service to Manhattan would optimize the attractiveness and benefits of NJ TRANSIT's other rail expansion initiatives
TRANSFERS Provide new one-seat-ride service to midtown Manhattan from areas not served today	• Improved connectivity – New one-seat-ride service to Manhattan would be provided on seven NJ TRANSIT lines that currently require passengers to transfer • Number of transfers – Daily passenger transfers (for travel to/from Manhattan) would be decrease 97 percent from 32,100 to 1,000
UTILIZE, IMPROVE, AND EXPAND THE CAPACITY OF THE REGION'S EXISTING TRANSIT INFRASTRUCTURE TO THE MAXIMUM EXTENT POSSIBLE	
FACILITY CROWDING Provide a new station facility to relieve severely overcrowded and inadequate conditions at PSNY	• Average egress time from PSNY – Average passenger egress time from the platform to the concourse in the AM peak hour would decrease by 25 percent from 80 to 60 seconds • Number passengers arriving into PSNY – Peak hour ridership into existing PSNY would decrease by 37percent from 27,830 to 17,160
RELIABILITY Eliminate commuter rail delays caused by unanticipated events or routine maintenance	• Train schedule recovery for delays – Peak period peak direction schedule recovery would drop from 44% to 11%; Average scheduled time from Newark to Manhattan would decrease by 5 minutes in the peak hour and 3.5 minutes in the off-peak • Tunnel maintenance – Continuous rail service to Manhattan would be possible during weekends, since the new tunnels would remain open while the existing tunnels undergo routine maintenance.
MAINTAIN A SAFE AND SECURE TRANSIT SYSTEM	
SAFETY AND SECURITY Enhance commuter rail system safety and security	• Redundancy for maintenance and emergency – The new tunnels and station expansion would enable responses to emergency situations for Amtrak and NJ TRANSIT • Station evacuation during emergencies – the Build Alternative's independent station areas would distribute passengers between the stations, which allows for safer conditions and faster evacuation in case of emergency
MAINTAIN AND ENHANCE THE ECONOMIC VIABILITY OF THE REGION	
ECONOMIC GROWTH Provide increased rail capacity to meet growth in west-of-Hudson population and jobs in NYC	• Jobs – Permanent increase of 750 jobs throughout businesses • Tax revenue – Permanent increase of $15.5 million in local, state and federal taxes • Income – Permanent increase of $46 million in personal income • Business activity – Permanent increase of $120 million in business activity
PRESERVE AND PROTECT THE ENVIRONMENT	
ROADWAY CONGESTION Increase capacity of the trans-Hudson transportation system, which is at or near capacity during peak travel periods	• Auto VMT and VHT – Daily trans-Hudson auto trips would be reduced by 22,100, daily auto VMT would be reduced by 589,600 and daily auto VHT would be reduced by 21,700

Moreover, not constructing the Build Alternative would result in more indirect commutation for those passengers on the improved NJ TRANSIT lines that would need to terminate at Newark or Hoboken. These individuals would need to transfer to other trans-Hudson services, such as PATH or ferries, or New York-bound trains. Such a transfer would add time to each of these trips, and inconvenience, if the existing NEC trains continue to experience delays in reaching PSNY. It is also possible that as these time and inconvenience issues worsen, would-be west-of-Hudson commuter rail passengers from New Jersey and Orange and Rockland counties would switch to alternative means of travel, such as autos, ferries or buses, which would lengthen their respective trips and increase their energy consumption, due to already overcapacity operations on the Lincoln Tunnel, Holland Tunnel and George Washington Bridge. As these alternative means deteriorate, economic impacts would occur throughout the region.

C. NEW STARTS EVALUATION PROCESS

The Section 5309 "New Starts" program is the Federal government's primary program for providing financial support to locally-planned, implemented, and operated fixed guideway transit major capital investments. The New Starts evaluation process is used in conjunction with the evaluation process under NEPA, for which this EIS is being prepared. This section describes the how the FTA evaluates projects for its New Starts funding recommendations. The ARC Project is seeking New Starts funding and, therefore, will be subject to this evaluation and rating process.

Each year the FTA submits its Annual Report on Funding Recommendations to Congress as a companion document to the annual budget submitted by the President. The report provides recommendations for the allocation of New Starts funds under Section 5309 of Title 49 of the United States Code. As required by the Safe Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU), the FTA uses the following project justification criteria to evaluate New Starts projects: mobility improvements; environmental benefits; cost effectiveness; operating efficiencies; transit-supportive existing land use, policies and future patterns; and other factors. The FTA must also consider the local financial commitment for the proposed project. In total, the criteria are intended to measure the overall merits of the project and the sponsor's ability to build and operate it.

FTA reviews the project justification and local financial commitment criteria for each candidate project and assigns a rating for each criterion. For some of the project justification criteria, the proposed project is compared against a New Starts "baseline alternative." The New Starts baseline alternative consists of improvements to the transit system that are relatively low in cost and represent the "best that can be done" to improve transit without major capital investment in new guideway infrastructure. As such, it is usually different than the baseline (represented by the no-build condition) against which environmental impacts are measured in the NEPA document.

A candidate project is given an overall rating of "High", "Medium-High", "Medium", "Medium-Low" or "Low", based on ratings assigned by the FTA to each of the project justification and local financial commitment criteria described above. These ratings are important, as the FTA considers them in its decision to recommend projects for New Starts funding. Specifically, the FTA will not recommend funding for projects which are rated "Medium-Low" or "Low." It is important to note, moreover, that a "High", "Medium-High" or "Medium" rating does not automatically translate into a funding recommendation, although the potential for receiving New Starts funding is much greater.

Project evaluation is an on-going process. FTA evaluation and rating occurs annually in support of budget recommendations presented in the Annual Report on Funding Recommendations and when projects request FTA approval to enter into preliminary engineering or final design. Consequently, as

proposed New Starts projects proceed through the project development process, information concerning costs, benefits, and impacts is refined and the ratings are updated to reflect new information.

CURRENT RATINGS FOR ACCESS TO THE REGION'S CORE

Overall Rating: Medium-High

PROJECT JUSTIFICATION

Rating: Medium-High

Mobility Improvements

Rating: Medium-High

In its evaluation of the mobility improvements that would be realized by implementation of a proposed project, the FTA evaluates four measures:

- User Benefits per Passenger Mile on the Project
- Number of Transit Dependents Using the Project
- Transit Dependent User Benefits per Passenger Mile on the Project
- Share of User Benefits Received by Transit Dependents Compared to Share of Transit Dependents in the Region

User Benefits per Passenger Mile on the Project. User benefits essentially represent all of the travel time savings to transit riders in the forecast year that result from the New Starts project as compared to not building the project (the baseline alternative). They include reductions in walk times, wait times, transfers, and, most importantly, in-vehicle times. In order to rate projects in comparison to other proposed New Starts, this measure is normalized by the annual passenger miles traveled on the New Starts project in the forecast year. The result is a measure of the intensity of the user benefits.

Number of Transit Dependent Individuals Using the Project and Transit Dependent User Benefits per Passenger Mile on the Project. These two measures represent the number of transit dependents affected by the project and the intensity of the benefit per passenger. The first is self-explanatory while the second is defined identically to the user benefits per passenger mile measure above but for transit dependent passengers.

Share of User Benefits Received by Transit Dependents Compared to Share of Transit Dependents in the Region. This measure represents the extent to which the project benefits transit dependents compared to their regional representation. For example, if 10 percent of the user benefits for the project accrued to transit dependents, but they represented 20 percent of the region's population, the measure would be 0.5, indicating that the project did not benefit transit dependents compared to their share of the region's population.

Table 9-9 presents the mobility improvement measures for the ARC project.

TABLE 9-9: MOBILITY IMPROVEMENT MEASURES

Measure	New Starts v. Baseline
Transportation System User Benefits Per Project Passenger Mile for all Riders (minutes)	4.0
Project Trips by Transit Dependents	13,089,468
Transit Dependent User Benefits per Passenger Mile for Transit Dependents (minutes)	5.3
Share of User Benefits Received by Transit Dependents Compared to the Share of Transit Dependents in the Region	85.1%

Source: NJ TRANSIT, August 2007

Environmental Benefits

Rating: High

In its evaluation of environmental benefits that would be realized through the implementation of a proposed project, the FTA considers the current air quality designation by EPA. This measure is defined for each of the transportation-related pollutants (ozone, CO, and PM_{10}) as the current air quality designation by the EPA for the metropolitan region in which the proposed project is located, indicating the severity of the metropolitan area's noncompliance with the health-based EPA standard (NAAQS) for the pollutant, or its compliance with that standard. The FTA has found that information submitted in support of the environmental benefits criterion does not distinguish with any meaning the merits of competing New Starts projects. While the FTA reports the information submitted by project sponsors on environmental benefits to Congress in the Annual Report on Funding Recommendations, it does not formally incorporate this measure in its evaluation of New Starts projects.

Operating Efficiencies

Based upon its prior experience in evaluating New Starts projects, the FTA has previously determined that locally-generated and reported information in support of the operating efficiencies criterion does not distinguish in any meaningful way differences between competing major transit capital investments. The FTA further believes that the anticipated operating efficiencies of proposed New Starts projects are adequately captured under its measure for evaluating project cost effectiveness.

Cost Effectiveness

Rating: Medium

Significant among the project justification criteria is cost effectiveness, which is the annualized capital and operating cost per hour of user benefits for the forecast year. It captures the additional costs of the New Start project compared to the transportation benefits to transit riders. User benefits are defined identical to the measure used in the mobility improvements criterion.

New Starts projects must be rated "Medium" for cost effectiveness, in addition to receiving an overall "Medium" rating, in order to be considered by the FTA for New Starts funding.

Table 9-10 summarizes the ARC project cost effectiveness.

TABLE 9-10: ARC COST EFFECTIVENESS

Measure	New Starts v. Baseline
Cost per Hour of Transportation System User Benefits	$18.51
Cost per New Transit Trip	$37.58

Source: NJ TRANSIT, August 2007

Transit-Supportive Land Use and Future Patterns

Rating: High

This criterion addresses the extent that transit-oriented development is likely to occur in the New Start project's corridor. The FTA explicitly considers the following transit supportive land use categories and factors:

- Existing Land Use
- Transit Supportive Plans and Policies, including the following factors:
  - Growth management;
  - Transit supportive corridor policies;
  - Supportive zoning regulations near transit stations; and
  - Tools to implement land use policies.
- Performance and Impacts of Policies, including the following factors:
  - Performance of land use policies; and
  - Potential impact of transit project on regional land use.

Other Factors

Consistent with SAFETEA-LU Section 5309(d) and (e), the FTA also includes a variety of other factors when evaluating project justification, including:

- Effect of the project on economic development;
- The nature and extent of the transportation problem or opportunity in the project corridor as described in the "Making the Case" document;
- If the project is a principal element of a congestion management strategy, in general, and an auto pricing strategy, in particular; and
- Any other factor which the project sponsor believes articulates the benefits of the proposed major transit capital investment but which is not captured within the other project justification criteria.

LOCAL FINANCIAL COMMITMENT

Rating: Medium

Proposed New Starts projects must be supported by evidence of stable and dependable financing sources to construct, operate and maintain the transit system. The measures that FTA uses to evaluate local financial commitment are:

Local Share

Rating: Medium

The FTA examines the proposed share of total project costs from sources other than Section 5309 New Starts, including Federal formula and flexible funds, the local match required by federal law, and any additional capital funding.

Strength of Capital Financing Plan

Rating: Medium

The FTA looks at the stability and reliability of the proposed capital financing plan, including the current capital condition of the project sponsor, the level of commitment of capital funds to the project, the financial capacity of the project sponsor to withstand cost overruns or funding shortfalls, and the reliability of the capital cost estimates and planning assumptions.

Strength of Operating Financing Plan

Rating: Medium

The FTA looks at the ability of the sponsoring agency to fund operation and maintenance of the entire system (including existing service) as planned, once the guideway project is built. This includes: an examination of the current operating condition of the project sponsor; the level of commitment of operating funds for the transit system; the financial capacity of the project sponsor to operate and maintain all proposed, existing and planned transit services; and the reliability of the operating cost estimates and planning assumptions.

The quantitative measures listed below in **Table 9-11** represent some of what the FTA relies on in rating a project's local financial commitment. The data listed below are for the ARC project.

TABLE 9-11: CAPITAL FINANCIAL PLAN

Measure (in Year of Expenditure Dollars)	Cost (millions)
Total Capital Cost	$7,621.33
Proposed Federal Section 5309 New Starts Share of Capital Costs	$2,500.00
Proposed State Sources for Capital Funding	$3,308.55
Other Federal Sources	$1,454.92
Estimated Annual Incremental Operating Costs in the Forecast Year (2017)	$35.00

Source: NJ TRANSIT, August 2007

Note: $357.85 million vehicle cost (not required for project start-up) is not included

The FTA notes that NJ TRANSIT's New Starts funding request of $2.5 billion for the project—including an assumed FTA payout of nearly $230 million per year for 11 years—is higher than what has ever been provided by FTA to any New Start in the history of the program.

Additional information on the financial plan for this project can be found in Chapter 10 of this document.

D. CONCLUSION

This FEIS compares the No Build Alternative to the Build Alternative and shows that the Build Alternative addresses the goals and objectives, and that the region would benefit from the construction and implementation of the Build Alternative. The evaluation findings are summarized in **Table 9-8**. The Build Alternative would provide opportunities for certain optimum service enhancements throughout the NJ TRANSIT rail system that would not be possible under the No Build Alternative:

- AM Peak train service to Manhattan would increase from 23 to 48 trains per hour
- The average peak hour train volume-to-capacity (V/C) would decrease 37 percent from 0.95 to 0.60
- New one-seat-ride service would be provided on seven NJ TRANSIT lines that currently require passengers to transfer
- Daily passenger transfers (for travel to/from Manhattan) would decrease 97 percent from 32,100 to 1,000
- Average PSNY passenger egress time (from platform to concourse) would decrease by 25 percent from 80 to 60 seconds
- Daily rail trips to and from Manhattan would increase 46 percent from 174,000 to 254,190

The Federal New Starts evaluation process is used in conjunction with the evaluation process under NEPA. The FTA requires that projects proposed for New Starts funding be justified based on a comprehensive review of the following criteria: Mobility Improvements, Environmental Benefits, Operating Efficiencies, Cost Effectiveness, Transit-Supportive Land Use Policies and Future Patterns, and Local Financial Commitment.

The ARC project overall rating for FY 2009 is Medium-High.