



TIER 1 FINAL ENVIRONMENTAL IMPACT STATEMENT
VOLUME 1 (PREFERRED ALTERNATIVE)

5. Transportation

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5. Transportation

This chapter describes the transportation effects associated with implementation of the NEC FUTURE Tier 1 Final Environmental Impact Statement (Tier 1 Final EIS) Preferred Alternative, compared to the No Action Alternative. This chapter is organized as follows:

- ▶ Section 5.1 presents a summary of the findings of the Transportation Effects Assessment.
- ▶ Section 5.2 describes changes to the Federal Railroad Administration’s (FRA) methodology and approach to Transportation Effects Assessment, since the Tier 1 Draft EIS.
- ▶ Section 5.3 assesses the effects of the No Action Alternative and Preferred Alternative to the passenger rail network.
- ▶ Section 5.4 describes subsequent analysis to be conducted at the Tier 2 level.

5.1 SUMMARY OF FINDINGS

Implementation of the Preferred Alternative would dramatically change rail transportation in the Northeast. There would be up to 5 times as much Intercity service, with reductions in trip time. The number and frequency of Regional trains also would increase, attracting a greater proportion of trips to rail and accommodating the growth in population and employment projected for the Northeast. The Preferred Alternative would also result in improved reliability and greater Intercity and Regional rail options for travelers compared to the No Action Alternative. These improvements would effectively change how people travel in the Northeast. The benefits from the various improvements implemented as part of the Preferred Alternative—new segments, new tracks, reduced chokepoints, minimized freight rail conflicts, eliminated localized speed restrictions, better coordinated services, and new operational efficiencies—are reflected in the projected levels of increased Intercity and Regional rail ridership.

- ▶ **The Preferred Alternative would affect overall travel mode share throughout the Study Area, elevating the role of rail.** Compared to the No Action Alternative, projected ridership on Intercity service would double by 2040 in the entire Study Area. Increases in Regional rail ridership of up to 20 percent are also predicted by the NEC FUTURE Travel Demand Model. In selected metropolitan-area pairs, Intercity ridership would increase more than 200 percent by 2040.
- ▶ **The number of Intercity trains per day would change the importance and subsequent use of many stations in the NEC.** This is reflected in both the dramatic increase in the types of services available at stations under the Preferred Alternative, compared to the No Action Alternative, but also in the frequency of service and anticipated changes in the volume of Regional rail service.
- ▶ **The incorporation of the Hartford/Springfield Line into the Preferred Alternative would expand the area of mobility and benefits provided by the Preferred Alternative.** Use of recent and ongoing investments in the Hartford/Springfield Line would be greatly maximized by more-integrated Intercity service.

- ▶ **Reduced Intercity travel time would make rail more appealing.** For example, the Preferred Alternative would reduce travel time for Intercity service between Washington, D.C., and Boston by more than one hour, compared to the No Action Alternative. With the incorporation of the Hartford/Springfield Line, the travel-time savings between Hartford, CT, and Boston, MA, would exceed three hours, as more-frequent and direct service expands the appeal of Intercity travel. Operators would have options to further refine service and operating plans to provide even greater travel-time savings.
- ▶ **Opportunities for stronger connections between the Study Area’s Intercity network and airports would further increase mobility for travelers.** The Preferred Alternative would create convenient airport services with frequent Intercity and Regional rail service. In addition to high-frequency Intercity service to Baltimore-Washington International (BWI), Newark, and T.F. Green Airports, a new segment allows a connection to Philadelphia International Airport, as well as improved service to Bradley International Airport.

5.2 METHODOLOGY

As in the Tier 1 Draft EIS, the FRA analyzed transportation effects of the No Action Alternative and Preferred Alternative at a “corridor-wide” level and a locally focused “stations” level. The corridor-wide analysis focuses on Intercity travel. The analysis compares forecast travel conditions for metropolitan-area to metropolitan-area passenger travel by automobile, aviation, and rail. It also considered shifts in the mode of travel and summarized these shifts by states and metropolitan areas in the Study Area. In the stations analysis, the FRA considered changes in travel modes within a metropolitan area with a focus on changes to local connectivity and passenger rail service, using the stations along the NEC as the focus of analysis.

While the FRA followed the same methodology for the Transportation Effects Assessment in this Tier 1 Final EIS, the FRA made three adjustments to the analysis presented in this chapter, compared to the Tier 1 Draft EIS. These changes, described in the next sections, include the following:

- ▶ Revised the list of representative stations and stations-pairs to better highlight the markets served by the Preferred Alternative
- ▶ Adjusted the interregional travel demand model in response to public comments and issues identified
- ▶ Included the Hartford/Springfield Line into the effects assessment to reflect its incorporation into the Preferred Alternative
- ▶ Expanded on the integration of the rail network, including connecting corridors, other long-distance and off-corridor service, and freight service

5.2.1 Representative Stations and Station-Pairs

Of the Major Hub, Hub, and Local stations considered as part of the NEC, the FRA identified 25 representative stations to highlight the type and magnitude of benefits and effects on travel in each of the Action Alternatives, when compared to the No Action Alternative in the Tier 1 Draft EIS (see Volume 2, Appendix C). These 25 rail stations were highlighted to demonstrate the types of impacts that stations would experience as part of the No Action Alternative and Action Alternatives. In addition, the FRA selected 17 station-pairs assembled from the 25 representative stations, to highlight how the No Action Alternative and Action Alternatives provide new Intercity travel linkages between markets or offer improved Intercity connections between existing markets.

For this Tier 1 Final EIS, the FRA reexamined the representative stations to:

- ▶ Remove stations that were served by one of the Action Alternatives, but are not served by the Preferred Alternative.
- ▶ Add stations that highlight the markets served by the Preferred Alternative.

Similarly, the FRA revised the representative station-pairs to include stations-pairs that highlight improved market connections that would result from the Preferred Alternative. This reexamination resulted in a total of 21 representative stations and 15 representative station-pairs, as presented in Table 5-1 and Table 5-2.

Table 5-1: Representative Stations and Existing Station Type

Station	Existing Station Type
Washington Union Station	Major Hub
Odenton	Local
Baltimore Penn Station	Hub
Newark, DE	Hub
Wilmington	Major Hub
Philadelphia 30th Street	Major Hub
Trenton	Hub
Newark Liberty	Hub
Newark Penn Station	Major Hub
Secaucus	Local
Penn Station New York	Major Hub

Station	Existing Station Type
New Rochelle	Hub
Cross Westchester	—
Stamford	Major Hub
New Haven	Major Hub
New London	Hub
Hartford	Hub
Providence	Hub
T.F. Green	Local
Route 128	Local
Boston South Station	Major Hub

Source: NEC FUTURE team, 2016

Table 5-2: Representative Station-Pairs

Station 1	Station 2
Washington Union Station	Newark, DE
	Philadelphia 30 th Street Station
	Penn Station New York
	Secaucus
	Boston*
Baltimore Penn Station	New Haven
Philadelphia 30 th Street Station	Odenton
Penn Station New York	Baltimore Penn Station
	Wilmington
	Philadelphia 30 th Street Station
	Boston
Stamford	Providence
New London	Penn Station New York
Hartford	Newark Penn Station
Boston*	Philadelphia 30 th Street Station

Source: NEC FUTURE team, 2016

* Ridership estimation for Intercity passenger rail service to and from Boston includes both Boston South Station and Boston Back Bay Station

5.2.2 Ridership Model

For this Tier 1 Final EIS, the FRA adjusted the NEC FUTURE Interregional Model based on issues identified during the Tier 1 Draft EIS comment period and a reassessment of the overall model outcomes. These adjustments did not affect the relative findings of the Action Alternatives (when compared to the No Action Alternative), but did result in modifications to the total numbers of trips and their distribution by station or metropolitan area. These adjustments are summarized below. Appendix BB, Technical Analysis on the Preferred Alternative, contains a detailed description of the reasoning for these model adjustments, the process used, and a summary of the changes in the model results, compared to the results presented in the Tier 1 Draft EIS.

After the Tier 1 Draft EIS was finalized, a forecasting issue related to air trips was discovered in the base trip table by mode. The cause was traced to the use of the FAA T-100 Market dataset (which represents air trips by segment) instead of the FAA DB1B dataset (which represents air trips by ultimate origin and destination). While the FAA T-100 Market dataset has shown to be a reliable forecast of true origin to destination travel, in this case there were a number of trips that were connected to other final destinations and the FRA analyzed as complete trips. This resulted in an overall inflation of air trips. To correct this, the FRA adjusted the base trip table by replacing the previous air trips with the FAA DB1B database air trips, using the same methodology to distribute trips to the zone system as described in Volume 2, Appendix B.08.

After taking a closer look at the base trip table, the FRA also found the previous analysis included some zone pairs that were less than 50 miles apart, which was inconsistent with the Interregional model that was estimated using only trips that were 50 miles or longer. As such, the FRA adjusted the base trip table to exclude these zone pairs. This change reduced the total number of trips by approximately 24 percent, which is a more representative picture of Intercity travel.

A third adjustment to the model involved splitting large zones into smaller zones to provide a finer level of detail and show more distinctions among the Action Alternatives. The FRA split the following large zones:

- ▶ Off-corridor zones, which were typically an entire county, and did not adequately communicate the differences among the Action Alternatives because of their large size
- ▶ Zones around Philadelphia and Providence, which were too large
- ▶ Zones east of Hartford and Springfield (which were too large), making it difficult to assign stations and, as a result, station assignment was not consistent across the Action Alternatives between the shoreline and the Springfield routings

After these adjustments were made to the model, the FRA recalibrated the base model run for 2013 to match the output trip table by mode to the actual trip table by mode by metropolitan statistical area (MSA) pairs. To test the differences in the revised forecast results versus the ridership results reported for the Tier 1 Draft EIS, the Action Alternatives were rerun using the revised model. Using the revised model, the Intercity service increased across all Action Alternatives. As a result of the recalibration of the model, the previous excess of air mode share was proportionally reassigned to the other modes. Although the number of rail trips estimated for the No Action Alternative and Action Alternatives have changed as a result of the revisions to the model, the conclusions made from the previous ridership estimates are still valid, given that each alternative was affected similarly by the adjustments and the magnitude of overall ridership changes.

5.2.3 Integrated Rail Network

As described in Chapter 4, Preferred Alternative, service between Penn Station New York and Boston, MA, would be provided along the existing NEC with expanded capacity from new segments, new track, chokepoint relief projects, and station expansions. The Preferred Alternative also includes electrification and track upgrades to the Hartford/Springfield Line to support more-frequent service via New Haven to Hartford, CT, and Springfield, MA. At Springfield, passengers can connect for rail service north to St. Albans, Vermont, or east to Boston (Chapter 4). With the Preferred Alternative, full double-track is completed on the Hartford/Springfield Line and it is upgraded to an electrified rail line supporting up to two Metropolitan, two Intercity-Corridor, and two Regional rail trains per hour during peak hours in each direction.

Beyond improvements to the Hartford/Springfield Line, the FRA envisions a future integrated rail network that includes the Keystone Corridor and other connecting corridor services. Further exploration of opportunities created by the Preferred Alternative will be the subject of subsequent planning processes. In addition to the Keystone Corridor, the FRA considered connecting corridors south of Washington, D.C., the Empire Corridor to Albany, NY, and services north and east of Springfield, MA, in development of representative Service Plans and associated infrastructure. These connecting corridors today have services that operate onto the NEC. Depending on the characteristics of each connecting corridor—electrified or not, available or planned capacity, frequency of service—improvements proposed with the Preferred Alternative could be leveraged to improve connecting corridor services and enhance the benefits of the Preferred Alternative as a larger integrated network.

In response to public comments, this Tier 1 Final EIS also expands on the FRA's commitment to enhancing the passenger rail network, while considering how investments in the Study Area can highlight opportunities to accommodate future growth and improvement of freight service (see Section 5.3.3.3).

5.3 TRANSPORTATION EFFECTS

As described in Chapter 4, Preferred Alternative, the Preferred Alternative meets four key objectives. Two of these—freedom of mobility and enhancement of efficiency—relate to transportation effects. The Preferred Alternative improves the mobility for travelers in the Study Area and expands the efficiency, convenience, and operations of the NEC to enable the role of rail to grow. These benefits are enabled by the addition of new tracks and new segments that expand rail capacity, the reduction of chokepoints and other infrastructure constraints, and operational modifications and enhancements to increase the efficiency of passenger rail services. Passenger rail services would be faster, more convenient, and more frequent compared to the No Action Alternative, resulting in anticipated changes in mode choice for travelers in 2040. In addition to the benefit to passenger rail service, added capacity with new track and new segments proposed for the Preferred Alternative maintain access to the NEC for freight operators and minimize delays for goods.

As described in Chapter 3, Purpose and Need, the NEC FUTURE program Purpose and Need and Goals address the role of passenger rail in meeting mobility challenges of the Northeast region, in a multimodal context. For NEC FUTURE, the FRA considered the capacity constraints of the total transportation system (rail, highway, air) in evaluating future transportation needs. However, the FRA did not evaluate modal alternatives to passenger rail. Instead, the FRA focused on how rail can contribute to the overall mobility of the region. Therefore, the cost-effectiveness of passenger rail relative to air or highway improvements was not part of the overall study effort.

This chapter describes the effects of the Preferred Alternative on the multimodal transportation system within the Study Area and focuses specifically on the impact to Intercity and Regional rail travel compared to the No Action Alternative. The analysis considers how the Preferred Alternative would affect trip time and frequency of passenger rail travel compared to the No Action Alternative. The analysis also considers how the Preferred Alternative would accommodate growth in demand for both passenger and freight rail operations.

Integration of Passenger Rail and Airports

In developing the Preferred Alternative, the FRA considered opportunities for better integrated travel between the rail network and airports within the Study Area. Improved linkages between airports and rail maximize airport access for travelers in the Study Area and create mobility benefits through expanded connectivity for airports, particularly for those that could see passenger volume increase by 2040.

For example, improving the accessibility at Baltimore-Washington International Airport, Bradley International Airport, and T.F. Green Airport, affords air passengers a convenient alternative to other congested airports in the Washington, D.C., New York City, and Boston areas, respectively. Additionally, modernizing the NEC would provide opportunities for more passenger airlines to explore code share agreements—such as those in place between Amtrak and United Airlines—where passengers are able to seamlessly transfer between the train and plane to complete their journey to/from select Northeast cities.

5.3.1 Corridor-wide Analysis

The FRA’s analysis of corridor-wide effects focuses on Intercity travel in the Study Area. The analysis compares forecast travel conditions for metropolitan-area to metropolitan-area passenger travel for automobile, aviation, and rail. It also considers shifts in mode choice by selected metropolitan areas within the Affected Environment.

5.3.1.1 Tripmaking by Mode

For the Preferred Alternative, the NEC FUTURE Travel Demand Model predicts how travelers would select their mode of travel in 2040. Table 5-3 presents annual predicted travel by mode for the No Action Alternative and Preferred Alternative within the Study Area for 2040. The Preferred Alternative would expand the role of rail within the Study Area as more-frequent and better-integrated services become available to travelers. Intercity highway travel, intercity bus travel, and aviation are predicted to decrease as an overall percentage of the total travel market since the improved passenger rail service assumed in the Preferred Alternative would present a more appealing travel choice.

Table 5-3: Annual Trips (1,000s) by Mode for the No Action Alternative and Preferred Alternative (2040)

Mode	No Action Alternative	Preferred Alternative	Change vs. No Action (%)
Intercity rail	19,400	40,200	107%
Regional rail	416,400	499,000	20%
Highway	377,800	362,600	-4%
Air	10,200	9,100	-11%
Bus	12,100	10,700	-12%

Source: NEC FUTURE Travel Demand Model, 2016

The model outputs, presented in Table 5-3, reflect the added connectivity and convenience of a fundamentally changed passenger experience that the Preferred Alternative would provide since Intercity tripmaking by rail would double by 2040. Regional rail tripmaking—defined as trips that occur by rail within one market normally provided by the eight commuter rail authorities within the Study Area—would also grow substantially by 2040 with enhanced Regional rail service and improved intermodal connectivity throughout the NEC that would influence travel choice.

5.3.1.2 Comparisons of Mode Share by Selected Metropolitan-Area Pairs

The Preferred Alternative would change the way travel occurs across the varying types of trips that occur within the Study Area, including business, non-business, and commuter travel. Table 5-4 highlights how the NEC FUTURE Travel Demand Model predicts changes in intercity travel (as a sum of each of these trip types) by mode share between selected metropolitan-area pairs.¹ The table further emphasizes the degree to which the Preferred Alternative would change the way passengers select their mode for intercity travel, as the anticipated percentages for all modes drop

¹ The NEC FUTURE interregional model is based on Moody’s data. Moody’s data uses actual census data (not the same as census projections) to make projections. For metropolitan-areas, the FRA drew boundaries based on markets served, which do not match up specifically to the MSA boundaries. For a description of these boundaries, please refer to Appendix BB, Technical Analysis on the Preferred Alternative.

or stay the same compared to the No Action Alternative. Markets that would experience gains in Intercity passenger rail travel include Boston-New York/North Jersey (where the mode share for Intercity more than doubles) and Washington, D.C.–Philadelphia.

Table 5-4: Annual Percentage of Mode Share for Intercity Travel between Representative Metropolitan-Area Pairs for No Action Alternative and Preferred Alternative (2040)

Selected Metropolitan-Area Pairs	Automobile		Air		Intercity Bus		Intercity Rail*	
	No Action	Preferred Alternative	No Action	Preferred Alternative	No Action	Preferred Alternative	No Action	Preferred Alternative
Washington, D.C.–Philadelphia	82.1%	70.6%	0.3%	0.2%	1.8%	1.4%	15.8%	27.8%
New York/North Jersey–Washington, D.C.	64.2%	52.3%	5.3%	3.7%	10.0%	7.3%	20.4%	36.7%
New York/North Jersey–Philadelphia	88.9%	85.2%	0.0%	0.0%	3.3%	3.0%	7.8%	11.7%
Boston–Washington, D.C.	29.6%	27.6%	67.1%	62.7%	0.4%	0.4%	2.9%	9.3%
Boston–Philadelphia	78.0%	72.6%	18.2%	17.1%	0.8%	0.6%	3.0%	9.7%
Boston–New York/ North Jersey	86.6%	80.6%	4.0%	3.3%	4.9%	4.2%	4.6%	11.9%
Study Area Total†	88.6%	84.5%	2.4%	2.1%	2.8%	2.3%	6.1%	10.9%

Source: NEC FUTURE Travel Demand Model, 2016

*Intercity Rail includes Intercity-Express, Intercity-Corridor, and selected commuter tripmaking

†Study Area Total includes areas not listed

5.3.1.3 Metropolitan-Area to Metropolitan-Area Intercity Passenger Rail Travel

Table 5-5 highlights the number of passenger rail trips projected to occur in 2040 between selected metropolitan-area pairs for the No Action Alternative and the Preferred Alternative. The FRA selected these markets to understand the degree to which the Preferred Alternative represents new and expanded transportation choices for Intercity travelers. The projected number of Intercity trips assumed for the Preferred Alternative compared to the No Action Alternative reflects the benefits of the Preferred Alternative: more-frequent Intercity trains, increased one-seat-ride opportunities, and expanded integration of service to Springfield, MA, and Hartford, CT, via the Hartford/Springfield Line.

Table 5-5: Annual Intercity Ridership by Selected Metropolitan-Area Pair for the No Action Alternative and Preferred Alternative (2040)

Metropolitan-Area Pairs	No Action Alternative	Preferred Alternative	% Change vs. No Action
Washington, D.C.–Baltimore	167,800	298,200	78
Washington, D.C.–New York/North Jersey	1,974,000	3,655,200	85
Washington, D.C.–Boston	56,700	179,900	217
Philadelphia–New York/North Jersey	1,446,700	2,733,400	89
New York/North Jersey–Hartford	172,200	560,300	225
New York/North Jersey–Boston	1,148,800	2,972,200	159
Hartford–Providence	19,000	67,800	258
Hartford–Boston	75,600	226,600	200

Source: NEC FUTURE Travel Demand Model, 2016.

In critical markets, the Preferred Alternative would dramatically increase the number of Intercity passengers with the addition of faster, better coordinated, and more-frequent service. The presence of the improvements defined in the Preferred Alternative would entice more users out of automobiles and into passenger rail as Intercity travel by train becomes more appealing and convenient, along with a frequent lower-cost option with the addition of Metropolitan service.

5.3.2 Stations Analysis

The FRA analyzed Intercity stations along the NEC to consider changes in travel modes within a metropolitan-area with a focus on changes to local connectivity and passenger rail service. At the stations level, the FRA considered the local effects of the No Action Alternative and Preferred Alternative both at individual stations and station-pairs. The FRA selected 21 representative stations to highlight the type and magnitude of benefits and effects on travel. In addition, the FRA selected 15 representative station-pairs to evaluate the passenger rail network via a discussion of service frequency, changes to types of services, and ridership. A more comprehensive evaluation of anticipated local effects of the Preferred Alternative in and around stations, including how changes in passenger rail service could change how users access the stations along the NEC—such as by taxi, bicycle, on foot, car- and bike-sharing, on-demand transportation (e.g. Uber and Lyft) and by local transit services—will be examined in subsequent Tier 2 project studies.

5.3.2.1 Connectivity

In 2040, connectivity at the representative stations would depend on a variety of factors, including Intercity service, Regional rail service, and public transit and intercity bus travel at each station as part of the overall transportation network connectivity. Cities without rail-based public transit may have new systems by 2040; stations without public-transit service or intercity bus service may be connected to such networks by 2040.

Many of the stations served today by Intercity and Regional rail face capacity constraints during peak hours, when platforms, waiting areas and parking areas may be overcrowded and inadequate for existing and future growth. As service levels and ridership increase under the No Action Alternative, most stations will see a degradation in station operations and functionality in the absence of improvements to expand capacity and access.

The FRA measured the changes in connectivity that would result from the Preferred Alternative in three categories:

- ▶ **Frequency** is measured by the number of trains per day for both Intercity and Regional rail services.
- ▶ **Service Type** is measured by the change in service at stations for both Intercity and Regional rail services at each station.
- ▶ **Integrated passenger rail operations** is a qualitative measure that describes the existing connections available at stations (Intercity, Regional rail, public transit, intercity bus) and the proposed new rail service types within the No Action Alternative and the Preferred Alternative to highlight how additional rail services could integrate into existing connections in the transportation system.

The representative Service Plans developed for both Intercity and Regional rail services in the Preferred Alternative are operator neutral, meaning that the FRA developed representative Service Plans to define frequency, stopping patterns, and travel times but did not make assumptions about who would operate those services. The representative Service Plans allowed the FRA to evaluate Intercity and Regional rail operations without being constrained by existing jurisdictional boundaries or other interagency operating agreements. In this regard, the representative Service Plans are not intended to be prescriptive regarding how or who should operate service in the future.

Frequency

The increased frequency associated with the Preferred Alternative would provide more daily trains to existing stations along with connections to new stations. This in turn would provide passengers with increased convenience and extends the reach of the rail system. Some stations, such as Boston South Station and New Haven, would experience large gains in frequency of service, elevating the role of rail. In these markets, travelers would rely more on rail as a frequent, predictable mode. For other markets, the Preferred Alternative would cause some shifts from nearby stations or shifts to new or upgraded stations.

Intercity

Table 5-6 highlights the changes in the number of Intercity trains per day by representative station for the No Action Alternative and Preferred Alternative. The Preferred Alternative would provide more-frequent Intercity service and trains per day by representative station, compared to the No Action Alternative. The number of Intercity trains per day would also increase for Major Hub stations such as Newark Penn Station and Washington Union Station. Moreover, the integration of service to Hartford and Springfield to the NEC would provide access to and from cities on the Hartford/Springfield Line compared to the No Action Alternative. Some representative stations that the No Action Alternative does not serve—such as Odenton, Cross Westchester, T.F. Green, and Secaucus—would experience an increase in daily Intercity service in the Preferred Alternative. For other representative stations—including New Haven, Stamford, and New Rochelle—the increases in frequency would more than double compared to the No Action Alternative.

Regional Rail

In addition to changes in the frequency of Intercity service at the representative stations, the Preferred Alternative provides for additional Regional rail service. At all stations, the frequency of Regional rail service assumed for 2040 increases and would expand opportunities for better-integrated Intercity and Regional passenger rail travel at stations served by both. Table 5-7 highlights the changes in the frequency of Regional rail service at representative stations.

Service Type

The Preferred Alternative introduces Intercity service at some representative stations that do not currently have Intercity service. These stations include Odenton, Secaucus, Cross Westchester, and T.F. Green. For all other representative stations, the Preferred Alternative expands service, compared to the No Action Alternative, for both Intercity and Regional rail, since the expanded infrastructure and service changes would provide greater capacity for both service types.

Table 5-6: Changes in Total Bi-Directional Intercity Trains Per Day by Representative Stations for the No Action Alternative and Preferred Alternative (2040)

Representative Station	No Action Alternative	Preferred Alternative	% Change
Washington Union Station	84	276	229%
Odenton	0	116	—
Baltimore Penn Station	84	228	171%
Newark, DE	0	116	—
Wilmington, DE	84	182	117%
Philadelphia 30 th Street	102	312	206%
Trenton	70	186	166%
Newark Liberty	70	186	166%
Newark Penn Station	102	312	206%
Secaucus	0	140	—
Penn Station New York	128	301	135%
New Rochelle	20	152	660%
Cross Westchester	0	152	—
Stamford	38	290	663%
New Haven	37	290	684%
New London	20	64	220%
Hartford	18	78	333%
Providence	38	177	366%
T.F. Green	0	112	—
Route 128	38	176	363%
Boston South Station	38	188	395%

Source: NEC FUTURE team, 2016

Table 5-7: Changes in Regional Passenger Rail Trains Per Day for Representative Stations

Representative Station	No Action Alternative	Preferred Alternative	% Change
Washington Union Station	127	436	243%
Odenton	59	122	107%
Baltimore Penn Station	59	164	178%
Newark, DE	20	104	420%
Wilmington, DE	34	60	76%
Philadelphia 30 th Street	750	1,024	37%
Trenton	141	244	73%
Newark Liberty	83	192	131%
Newark Penn Station	263	790	200%
Secaucus	367	782	113%
Penn Station New York	740	1,512	104%
New Rochelle	124	688	455%
Cross Westchester	0	0	—
Stamford	184	480	161%
New Haven	118	454	285%
New London	4	8	100%
Hartford	16	44	175%
Providence	36	94	161%
T.F. Green	10	42	320%
Route 128	58	96	66%
Boston South Station	290	414	43%

Source: NEC FUTURE team, 2016

Integrated Passenger Rail Operations

Several different owners and operators share responsibility for passenger rail services along the NEC. These operators adhere to different service requirements, which limits connectivity and reliability for travelers that require services of more than one passenger rail operator. The Preferred Alternative would provide more-frequent service and create opportunities to employ operational efficiencies such as common ticketing, reducing the need for travelers to consult a schedule. This would result in a more seamless passenger travel experience compared to the No Action Alternative. Coordinated schedules and additional Intercity service coupled with the potential for additional Regional rail service, could also result in easier transfers and increased opportunities for cross-platform connections. Other station-related improvements to expand linkages between services to encourage transfers include enhanced signage and improved wayfinding to further improve the passenger experience to help realize the true increased mobility benefits provided by the Preferred Alternative. Integrated passenger rail operations would also result in opportunities to match service and schedules of one service type with another.

While the changes in connectivity related to public transit and intercity bus networks are not estimated within the No Action Alternative and Preferred Alternative, the presence of bus services today and the estimated changes in Intercity and Regional rail within the Preferred Alternative can be used to measure the ease of integrating passenger rail services with other existing transportation services at each station.

Chapter 4, Preferred Alternative, lists chokepoint relief projects, new track, and new segments for the Preferred Alternative. The reduction of these infrastructure constraints and improvement in system reliability creates opportunities for better-integrated passenger service.

The Preferred Alternative would result in enhancement of efficiency through the following opportunities:

- ▶ Schedule Intercity services to permit easy transfers between different rail types and service corridors.
- ▶ Use scheduling and infrastructure to allow two trains to simultaneously board and alight on either side of the same platform to permit passengers to transfer quickly from one train to the other. Expanded passenger rail service frequency creates more opportunities for these connections, known as cross-platform transfers.
- ▶ Time schedules so Regional rail trains arrive before Intercity trains and depart after Intercity trains at convenient intervals. This will allow passengers to use Regional rail to connect to and from Intercity trains at stations without concern about extended waiting times. The additional services proposed for the Preferred Alternative compared to the No Action Alternative would result in greater opportunities for this kind of scheduling (known as timed-transfer scheduling). For example, infrastructure changes outside of Philadelphia 30th Street Station enable the

station to operate as a pulse-hub² with coordinated transfers between train services at timed intervals.

- ▶ Establish Intercity (or Regional rail) schedules so that trains arrive at a station at the same time every hour so that passengers know that a train is always available, reducing the need for schedules, resulting in a more predictable and less intimidating service interval.
- ▶ Increase the frequency of services, including Intercity, Regional rail, and local transit, so that the particular schedules for these services become less important as passengers know that another trip will always be available in a conveniently short amount of time.

5.3.2.2 Performance

In 2040, future performance of rail services at the representative stations would depend on a variety of factors, including travel speeds and trip times, the frequency of Intercity service, and the changes in service types for trips between stations. The Preferred Alternative expands linkages between markets across the Study Area by increasing Intercity train service frequency, connecting to new markets not served in the No Action Alternative, and making travel more convenient by reducing travel times with increased travel speed and efficiencies. The new infrastructure that allows for expanded Intercity services also provides opportunities to expand the frequency of Regional rail services at many stations and affords new connections between stations and markets. In many instances the Preferred Alternative would result in direct (one-seat-ride) service for trips that require transfers today. Finally, the Preferred Alternative would also introduce new rail markets to the passenger rail network, resulting in expanded access.

The FRA has selected 15 representative station-pairs to evaluate how the Preferred Alternative would affect travel between stations. The 15 representative station-pairs were selected from the representative stations to reflect the diversity of new and expanded tripmaking opportunities created by the Preferred Alternative. Station-pairs represent combinations of geographies, anticipated levels of rail service, and the existing level of passenger rail integration.

The evaluation of the No Action Alternative and the Preferred Alternative on the 15 representative station-pairs focuses on three measures of performance:

- ▶ Travel time is measured by the time required to travel station-to-station on Intercity services.
- ▶ Frequency is measured in the number of trains per day between station-pairs (trains in both directions) for Intercity service.
- ▶ Changes in service type describes how service changes are realized (eliminated, reduced, expanded, new service, no change) for Intercity service between station-pairs.

² Pulse-hub is a special application of service coordination, where multiple trains converge on a single hub station concurrently or in close succession, dwell simultaneously for a period of time while passengers transfer from one service to another, and then depart toward their various destinations. For additional details, refer to Appendix BB, Technical Analysis on the Preferred Alternative.

Travel Time

The Preferred Alternative includes upgrades to the passenger rail network, such as the elimination of chokepoints, upgraded tracks, improved reliability, increased capacity, and other benefits resulting from achieving a state of good repair, that create travel-time savings for both Intercity and Regional rail passengers. The representative Service Plan for the Preferred Alternative assumes the presence of 11 at-grade crossings on the existing NEC and 42 at-grade crossings on the Hartford/Springfield Line. A discussion of safety-related considerations of these grade crossings can be found in Chapter 7.18, Safety.

Table 5-8 shows the average travel time (hours:minutes) between representative station-pairs for the No Action Alternative and Preferred Alternative. Some of the station-pairs with Major Hubs demonstrate time savings that would also benefit many commuters, including Washington Union Station–Penn Station New York (where passengers would save roughly half an hour) or Penn Station New York–Philadelphia (where trains would be within an hour of each other). The Preferred Alternative average Intercity travel time by representative station-pair is comparable to Alternative 2, which reports the travel times for the same station-pairs as 2:15 and 0:55, respectively.

Table 5-8: Average Intercity Travel Time (Hours:Minutes) by Representative Station-Pair Rounded to the Nearest Five Minutes (2040)

Station 1	Station 2	No Action Alternative		Preferred Alternative	
		Express	Corridor	Express	Corridor
Washington Union Station	Newark, DE	—	1:25	—	1:10
	Philadelphia	1:35	1:55	1:20	1:40
	Secaucus	—	—	—	2:55
	Penn Station New York	2:45	3:25	2:15	2:55
	Boston	6:35	8:00	5:10	6:50
Baltimore	New Haven	3:55	4:40	3:05	3:45
Philadelphia	Odenton	—	—	—	1:20
Penn Station New York	Baltimore	2:10	2:40	1:50	2:20
	Wilmington	1:30	1:50	1:15	1:40
	Philadelphia	1:10	1:25	0:55	1:10
Stamford	Providence	2:05	2:40	1:40	2:20
Hartford	Newark Penn Station	—	3:25	2:15	2:15
New London	Penn Station New York	2:15	2:35	—	2:05
Boston	Philadelphia	4:55	6:00	3:50	5:00
	Penn Station New York	3:30	4:15	2:45	3:40

Source: NEC FUTURE team, 2016.

Note: Boston includes Boston Back Bay and South Station.

— = No service

The Preferred Alternative would result in savings in travel time for Intercity trips for station-pairs in addition to those identified above in Table 5-8. The benefits of the Preferred Alternative are particularly notable compared to the No Action Alternative for station-pairs where new through services and more-frequent service are introduced. Further discussion of the travel-time benefits of the Preferred Alternative compared to the No Action Alternative, including a summary of the shortest travel times for trips between Major Hubs and Hubs that include additional station-pairs, can be found in Chapter 4, Preferred Alternative.

For Regional rail passengers, the Preferred Alternative would also result in saved travel time. Based on the NEC FUTURE regional models, the FRA estimated the overall Study Area travel-time savings for users of the Regional rail network by metro area (Washington, D.C./Baltimore, Philadelphia, New Jersey, New York/Connecticut, and Boston). The Preferred Alternative would result in an average of approximately 8 minutes of time savings per Regional rail trip.

Frequency

Table 5-9 shows the average number of trains per day in one direction between representative station-pairs for the No Action Alternative and Preferred Alternative. The number of trains per day between station-pairs represents the number of non-transfer options that passenger rail travelers have for these specific city-pair journeys. The more direct trips that are offered during the day, the more options a passenger has to make that journey and the more convenient rail becomes. The Preferred Alternative increases the number of trips per day offered between the representative station-pairs compared to the No Action Alternative.

Table 5-9: Average Number of Intercity Trains Per Day (One-Way) by Representative Station-Pair for the No Action Alternative and Preferred Alternative (2040)

Average Trains Per Day by Service Type		No Action Alternative		Preferred Alternative	
Station 1	Station 2	Express	Corridor	Express	Corridor
Washington Union Station	Newark, DE	—	1	—	58
	Philadelphia	16	22	57	81
	Secaucus	—	—	—	56
	Penn Station New York	16	22	57	79
	Boston South Station	10	8	43	30
Baltimore	New Haven	9	10	29	60
Philadelphia	Odenton	—	—	—	58
Penn Station New York	Baltimore	16	22	33	79
	Wilmington	16	22	33	56
	Philadelphia	16	32	63	93
Stamford	Providence	10	9	56	32
Hartford	Newark Penn Station	—	1	—	32
New London	Penn Station New York	1	9	—	32
Boston South Station	Philadelphia	10	8	49	32
Boston	Penn Station New York	10	9	56	38

Source: NEC FUTURE team, 2016.

— = No service

As an example of the changes offered by the Preferred Alternative, the Washington Union Station – Boston (Back Bay and South Station) pair will have 10 Intercity-Express trains per day and 8 Intercity-Corridor trains per day under the No Action Alternative. In the Preferred Alternative, the frequency of service will increase almost five-fold to 43 Intercity-Express trains and 30 Intercity-Corridor trains per day. This pattern is matched for other stations-pairs between the No Action Alternative and Preferred Alternative.

Service Type

The FRA also considered service types available for representative station-pairs. The Preferred Alternative introduces Intercity service for some representative station-pairs that will not have

Intercity service in the No Action Alternative. These include Washington, D.C., to Secaucus and Philadelphia to Odenton. For all other representative station-pairs, Intercity service would increase as a result of the infrastructure and service improvements that would provide greater capacity. Some of these benefits would result from the introduction of the Metropolitan service—a new service concept that offers improved service to new and intermediate markets and key transfer locations, and stops at more stations than the current Amtrak Northeast Regional service (including some stations that are served today by only Regional trains). The introduction of Metropolitan service, as part of the Intercity-Corridor service type, would improve service to new and intermediate markets.

5.3.2.3 Ridership

The FRA estimated ridership—a measure of the number of trips taken—using population demographics, employment, and service characteristics, including the travel time, frequency, and service types offered between stations. Ridership estimates are representational of the proposed Service Plans created for the No Action Alternative and Preferred Alternative and are consistent with a Tier 1 Final EIS level of detail. The Service Plans are intended to be representational only—required for analysis of capacity, performance, and costs, as well as assessment of environmental impacts—and are not intended to be prescriptive regarding how service should be operated in the future. Improvements to Intercity and Regional rail—such as better network connectivity, connections to new travel markets, increased trip frequency, and decreased trip times—make new and expanded services more appealing and more convenient, resulting in increased estimated ridership.

Intercity

Table 5-10 shows the forecast number of annual one-way trips between the representative station-pairs for the Intercity services included in the No Action Alternative and Preferred Alternative. The table demonstrates the degree to which the Preferred Alternative would expand Intercity ridership between the representative station-pairs. Under the Preferred Alternative, representative station-pairs that include Boston would see the greatest percentage change because of the improved integration of passenger rail service serving Boston and decreased travel times, compared to the No Action Alternative.

Table 5-10: Annual One-Way Intercity Trips by Representative Station-Pairs for the No Action Alternative and Preferred Alternative (2040)

Station 1	Station 2	No Action Alternative	Preferred Alternative	% Change
Washington Union Station	Newark, DE	0	48,050	—
	Philadelphia	350,850	458,050	31%
	Secaucus	0	56,100	—
	Penn Station New York	1,186,250	1,654,050	39%
	Boston*	20,700	56,500	173%
Baltimore	New Haven Station	23,300	42,900	84%
Philadelphia	Odenton	0	34,600	—
Penn Station New York	Baltimore	198,350	277,950	40%
	Wilmington	152,900	150,650	0%
	Philadelphia	1,124,500	1,677,850	49%
Stamford	Providence	11,200	22,400	100%
New London	Penn Station New York	0	169,500	—
Hartford	Newark Penn Station	600	4,200	600%
Boston*	Philadelphia	50,150	98,450	96%
Boston*	Penn Station New York	407,300	1,295,000	218%

Source: NEC FUTURE team, 2016.

*Boston includes Boston Back Bay and South Station.

Note: Intercity ridership between Penn Station New York and Wilmington is influenced by the addition of Intercity service to nearby stations, resulting in long-distance travel to/from Wilmington spread to other proximate stations such as Newark, DE, Aberdeen, MD, and the Philadelphia Airport Station.

Regional Rail

Regional rail networks include multiple branch lines and more closely spaced stations than those served by Intercity trains. For the analysis of Regional rail market potential, the FRA developed representative Service Plans. Forecast station-specific boardings are more appropriate for project-level assessments, which allow for more station-to-station balancing of service by the rail operators. For NEC FUTURE, the FRA presents Regional rail ridership (total linked trips) by metropolitan-area and for select screenlines to show the relative change in overall Regional rail attractiveness, when compared to the No Action Alternative.

The FRA selected metropolitan areas where Regional rail service exists to represent the changes in ridership throughout the Study Area. As presented in Table 5-11, overall Regional rail trips would increase for the Preferred Alternative with and without Metropolitan service when compared to the No Action Alternative. These increases demonstrate the forecast growth in Regional rail travel and the attractiveness of Regional rail in meeting that demand.

For three Major Hub stations—Washington Union Station, Penn Station New York, and Boston South Station—relief of capacity constraints in the Preferred Alternative would create opportunities for ridership growth (Table 5-11 and Table 5-12). Ridership estimates include all Regional rail trains approaching each of the Major Hub stations—from Virginia and Maryland into Washington Union Station; from New Jersey, New York, and Connecticut into Penn Station New York; and from Rhode Island and Massachusetts into Boston South Station. As noted, ridership would increase as the service frequencies increase, and travel times decrease in the Preferred Alternative, compared to the No Action Alternative.

Table 5-11: Annual Regional Rail Trips by Selected Metropolitan Areas for the No Action Alternative and Preferred Alternative (2040)

Metropolitan Area	No Action Alternative	Preferred Alternative	% Change
Greater Washington, D.C., Area	17,999,000	38,564,500	114%
Greater Baltimore Area	4,574,000	7,091,500	55%
Greater Philadelphia Area	32,794,000	37,692,500	15%
New York – North Jersey Area	318,876,000	361,128,500	13%
Greater Providence Area	3,091,000	8,009,000	159%
Greater Boston Area	39,022,000	46,526,500	19%
TOTAL	416,356,000	499,012,500	20%

Source: NEC FUTURE team, 2016.

Table 5-12: Daily Two-Way Trips at Select Station Screenlines for the No Action Alternative and Preferred Alternative (2040)

Select Station Screenlines	No Action Alternative	Preferred Alternative	% Change
Washington Union Station	47,593	86,011	81%
Penn Station New York	367,543	624,445	70%
Boston South Station	58,960	87,471	48%

Source: NEC FUTURE team, 2016.

5.3.3 Integrated Rail Network

This section describes how the FRA envisions a future integrated rail network in the Northeast that includes the Keystone Corridor and other connecting corridors, long-distance services, and freight operations.

5.3.3.1 Connecting Corridors

Connecting corridors are passenger rail corridors that connect directly to another rail corridor (in this instance, the NEC) via a transfer at an NEC station or via through-train service. These travel corridors include (1) corridor service south of Washington Union Station to markets in Virginia (e.g., Lynchburg, Richmond, Newport News, Norfolk) and North Carolina (e.g., Charlotte); (2) Keystone service in Pennsylvania (connecting at Philadelphia 30th Street Station); and (3) Empire service in New York (connecting at Penn Station New York); and (4) through-train and connecting services at Springfield to points north and east.³ Connecting corridor services use the existing NEC for a portion of their operations, sharing stations, signals, track, and other infrastructure elements with both Intercity and Regional rail services. As such, the Preferred Alternative would convey mobility benefits to the NEC as well as its connecting corridors and would create additional mobility choices for travelers to markets where non-automobile travel is possible but inconvenient.

As noted, the Preferred Alternative incorporates the Hartford/Springfield Line. It includes electrification and some track upgrades to the Hartford/Springfield Line to support more-frequent

³ The Hartford/Springfield Line is incorporated into the Preferred Alternative. Connecting services beyond Springfield Union Station would be north via White River Junction and St. Albans, VT, or east to Worcester and Boston, MA, on the Inland Route (as described in Chapter 4).

service via New Haven to Hartford, CT, and Springfield, MA, where passengers can continue north to Vermont via White River Junction and St. Albans and east to Boston. The Preferred Alternative leverages the CTrail Hartford Line improvements already in progress, completing double-track, and adding electrification to support up to two Metropolitan, two Intercity-Corridor, and two Regional trains per hour in peak hours in each direction. Users of the connecting corridors would benefit from the service and infrastructure improvements associated with the Preferred Alternative. Increases in service, the implementation of service operational efficiencies, the alleviation of chokepoints, and the addition of new tracks and new segments would create spillover benefits that would also be realized on the connecting corridors. For example, improvements in the speed and frequency of service between Philadelphia and Washington, D.C., would make rail travel between Richmond, VA, and Penn Station New York quicker and more appealing.

The Preferred Alternative allows for increased service between Philadelphia and Harrisburg, PA, on the existing Keystone Corridor. These service enhancements would further expand the integrated network of passenger rail in the Northeast. Possible service improvements could include introduction of Metropolitan service at 30-minute headways during peak periods. Considering recent improvements to the Keystone Corridor, the enhanced service levels could be accommodated within the corridor’s existing capacity and physical footprint. Further exploration of opportunities created by the Preferred Alternative would be the subject of subsequent planning processes.

The FRA estimated demand for Intercity travel between locations on the connecting corridors and Major Hub stations along the NEC for 2040, using the NEC FUTURE Travel Demand Model. Table 5-13 highlights anticipated Intercity travel on selected connecting corridor stations for the No Action Alternative and Preferred Alternative.

Table 5-13: Annual Two-Way Ridership by Station-Pair Including Selected Connecting Corridor Stations (2040)

To/From	Major Hub	No Action Alternative	Preferred Alternative	% Change
Richmond, VA	Penn Station New York	82,100	172,000	110%
	Washington, D.C.	117,100	177,300	51%
Harrisburg, PA	Penn Station New York	60,100	101,300	69%
	Philadelphia	185,400	262,300	42%
	Washington, D.C.	60,200	122,000	103%
Albany, NY	Boston*	6,600	25,700	289%
	Penn Station New York	484,900	677,100	40%

Source: NEC FUTURE team, 2016.

* Boston includes Boston South Station and Back Bay

5.3.3.2 Other Long-Distance and Off-Corridor Services

The Preferred Alternative creates additional capacity to allow for more long-distance and off-corridor train services to operate along the NEC linking the NEC to destinations throughout the United States and Canada. The Preferred Alternative permits up to two slots per hour for use by long-distance services and other off-corridor trains, including services that today connect destinations as far away as Chicago, New Orleans, and Miami, as well as locations in Virginia, North Carolina, Vermont, Pennsylvania, New York, and the Canadian provinces of Ontario and Quebec.

The additional capacity also allows for more flexibility in circumstances where delays to long-distance services occur outside the NEC.

5.3.3.3 Freight

The Preferred Alternative reflects the FRA's commitment to expand the passenger rail network, while considering how passenger-focused investments in the Study Area can highlight opportunities to accommodate future growth and improvement of freight rail service. While freight rail service is operated privately and outside the NEC FUTURE scope of planning, the FRA recognizes that freight rail service is critical to the continued vitality and competitiveness of the Northeast economy. Chapter 4, Preferred Alternative, provides a detailed description of freight railroads operating on the NEC, and Chapter 6, Economic Effects and Growth, and Indirect Effects, provides information on the role of freight in the Study Area.

Throughout the alternatives development process, the FRA met with freight railroad operators and considered their issues and interests, including design elements such as platform and overhead clearance requirements and the availability of daytime operating slots. Specific locations along the NEC noted during these discussions included Baltimore, MD; Wilmington, DE; New Haven, CT; and Pawtucket, RI.

In developing the representative Service Plan for the Preferred Alternative, the FRA defined specific assumptions for NEC FUTURE regarding the mixed operations of freight and passenger traffic on the same tracks and in the same right-of-way, consistent with the current FRA railroad safety regulatory framework. The FRA considered areas where freight and passenger service must co-exist and where there is concern about potential conflicts. Specifically, the FRA reviewed the Preferred Alternative with respect to potential effects on four specific freight traffic growth opportunities:

- ▶ Freight rail access to the Port of Baltimore, Port of Wilmington, and Delmarva Peninsula
- ▶ Freight rail access along the NEC in southeastern Connecticut and Rhode Island
- ▶ Potential high-capacity, high-clearance freight rail line parallel to the NEC between Washington, D.C., and northern New Jersey
- ▶ Freight rail access to Long Island and New England

The FRA also considered opportunities to accommodate future growth and improvement of freight rail service within the Study Area when defining infrastructure requirements for passenger services. New segments, new tracks, and chokepoint relief projects defined as part of the infrastructure elements of the Preferred Alternative would reduce conflicts at locations where the freight rail network and the passenger rail network share facilities, such as around Newark, DE, and Kingston to Davisville, RI. These infrastructure improvements provide additional system capacity available for freight rail to reduce circumstances where freight rail trains are idling as passenger rail trains operate on the NEC. The benefits of reducing conflicts between freight rail operators and passenger rail operators include improved air quality from decreased freight rail idling and more-efficient freight rail movements resulting from reduced opportunities for delay. The representative Service Plan for the Preferred Alternative also provides for "windows" of daytime through freight operations for portions of the NEC between Baltimore, MD, and Wilmington, DE, and New Haven,

CT, and Pawtucket, RI, in addition to overnight freight operations. The Preferred Alternative preserves freight rail access to and from the existing NEC and Hartford/Springfield Line to seaports, inland ports, and dedicated freight rail corridors within the Study Area. The Preferred Alternative does not preclude future freight rail expansion opportunities to create a dedicated north-south high-clearance, high-density freight rail line.

Impacts to, and possible opportunities to enhance, freight service will be important considerations in subsequent Tier 2 project studies for improvements included in the Preferred Alternative. Moreover, the FRA will continue to work with freight railroad operators to appropriately minimize constraints to freight rail services as the Preferred Alternative is further developed during subsequent project phases. In order to minimize or avoid potential effects, continued coordination with freight railroads will be needed to define specific locations where the construction of the Preferred Alternative could result in impacts to freight railroad facilities or operations.

5.4 TIER 2 ASSESSMENTS

The assessment of transportation effects for this Tier 1 Final EIS is consistent with the level of detail necessary to consider how the No Action Alternative and Preferred Alternative would create overall impacts in the way users of the transportation system would travel based on the changes to speed, frequency, and availability of passenger rail services. The goal of the transportation effects assessment is to highlight how travel could occur based on the service assumptions that frame the No Action Alternative and Preferred Alternative.

Subsequent Tier 2 project studies directly related to the implementation of the Preferred Alternative will provide greater detail on how the transportation improvements to be described in the Tier 2 project analysis could result in more localized impacts and changes to connecting services that are only briefly discussed in this Tier 1 Final EIS. Continued NEC planning processes and Tier 2 project studies will provide the following:

- ▶ Greater details on how the transportation improvements could affect travel conditions in and around stations
- ▶ How station-specific demand for Regional rail service would be assessed
- ▶ How connecting transportation services could be modified to better integrate with the new and increased service associated with the Preferred Alternative
- ▶ How changes to land use and development could affect demand and mode choice
- ▶ How the Preferred Alternative could expand linkages for users of the bicycle and pedestrian network
- ▶ How the transportation system of 2040 would accommodate growth in demand for passenger service as well as freight services in the Affected Environment