NEC FUTURE

TIER 1 DRAFT ENVIRONMENTAL IMPACT STATEMENT

6. Economic Effects and Growth, and Indirect Effects

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6. Economic Effects and Growth, and Indirect Effects

This chapter describes the economic and indirect effects that would occur with implementation of the NEC FUTURE Tier 1 Draft Environmental Impact Statement (Tier 1 Draft EIS) No Action and Action Alternatives.

This chapter is organized as follows:

- Section 6.1 describes the methodology, definition and assumptions, and approach to environmental consequences
- Section 6.2 presents a summary of the findings of the economic effects and indirect effects assessment
- Section 6.3 assesses the economic effects and indirect effects of the No Action and Action Alternatives

6.1 INTRODUCTION

While transportation investment alone does not generate economic activity, it can influence the pace and location of economic growth when other factors such as available skilled labor, competitive business costs, and other regional competitive advantages are favorable. A transportation system supports a region's economic activity to the degree that it 1) has sufficient capacity to meet demand; 2) offers connections to markets where travelers want to visit; 3) provides a range of prices and travel times that serve a variety of markets; and 4) offers reliable and safe options. Conversely, congestion, unreliable travel times, comparatively high travel costs (in time or fares), and the inability to readily connect and access locations within the region hinder economic activity and impose a penalty on an area's economic potential.

Beyond the transportation system's potential impact on the operation of an urban economy, the frequency, reliability, pattern, and accessibility of transportation influences how urban economies compete or cooperate in the larger national and global economy. Urban economies such as those that regularly dot the Northeast Corridor (NEC) are part of a larger interdependent cluster of cities, towns, and developed areas. Changes in the connections and interdependencies within the urban system—viewed regionally, nationally, or even globally—influence economic prospects and growth. Changes in transportation cost, connectivity, and mobility directly influence the connections among urban economies and can alter these relationships—allowing a place to become a hub or focal point for commerce, or conversely, making a place more peripheral to the region's commercial center. Changes in these interdependencies influence urban growth along the corridor thereby increasing the potential for indirect effects to occur within the region.

The Northeast Regional Economy in the Context of the National Economy

The Northeast regional economy, which approximates the Northeast and Mid-Atlantic regions, is unique among U.S. regional economies in that it is the most densely urban[1] region in the United States, with the NEC connecting some of the nation's largest and most mature urban economies. The region has the following distinct characteristics that shape its outlook for future growth:

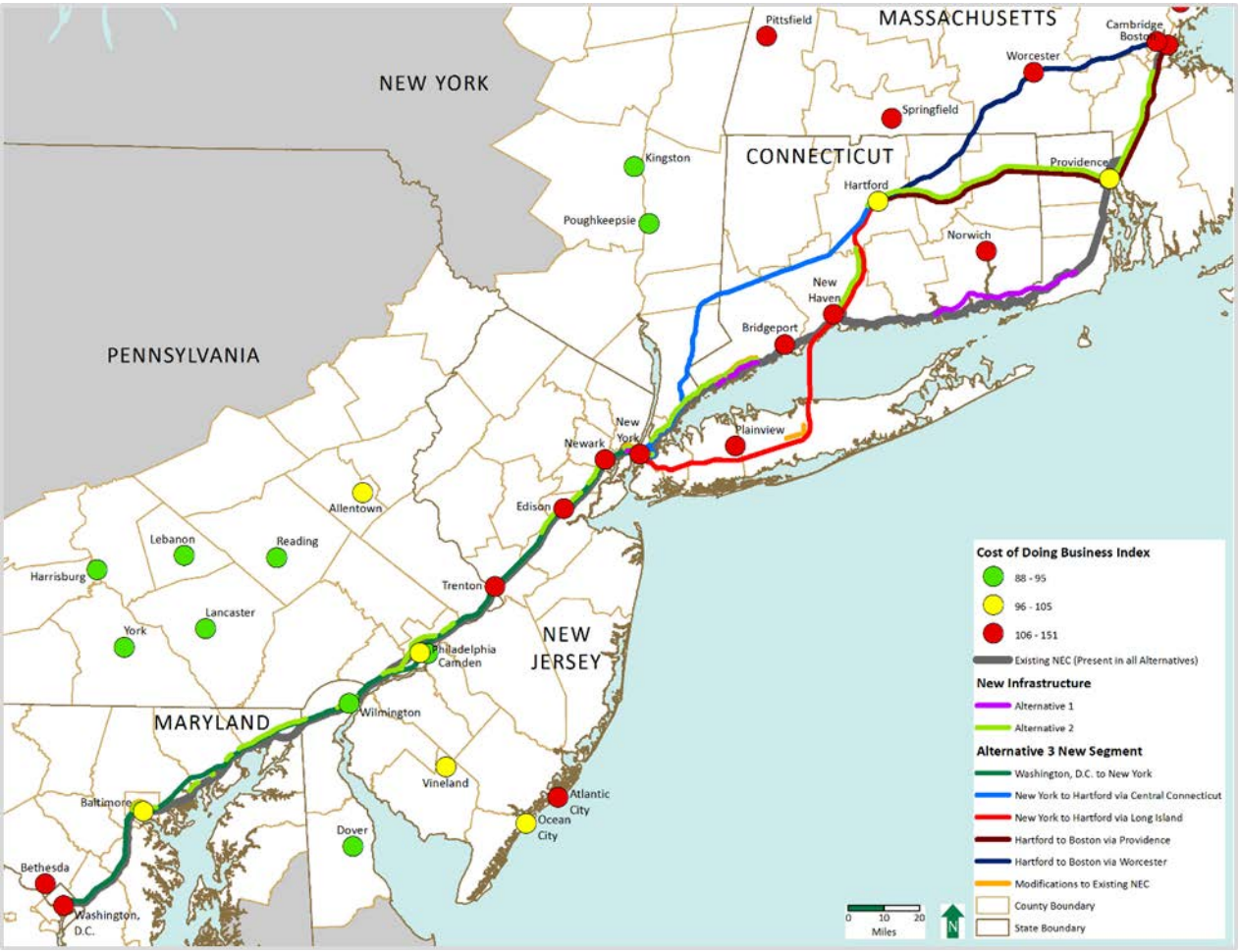
- *Gross Domestic Product (GDP):* The region accounts for roughly one-fifth of the national GDP and hosts four of the nation's ten largest metropolitan areas, including both the nation's commercial and political capitals. Compared to the balance of the U.S. economy, these economies were some of the earliest to be established and are the most economically mature. New York City serves as the nation's global gateway and is a peer to the world's other major commercial capitals. The urban core of the Northeast region is very productive, generating 10 times more GDP per square mile than the national average.[2] In short, the economic health of the region is critical for the nation's economic health as a whole.
- *Cost of Doing Business:* Because it already has a high cost of doing business in the region relative to other parts of the United States, the region is particularly vulnerable to congestion costs. Nearly every metro area on the corridor exceeds the national average of the cost of doing business. On average, areas north of New York City have a higher cost of doing business than areas south of New York City. Figure 6-1 shows the cost of doing business index values along the Action Alternatives.
- *Connection between Business Costs and Industrial Mix:* Reflecting the region's cost structure, the industrial mix has a large share of high–value-added and knowledge-based services as well as a heavy reliance on finance-related occupations that are regulated to a greater extent than prior to the 2009 recession. While these are highly sought industries for their high wages, they do not create jobs at the same pace as manufacturing or distribution centers.
- *Demographic Profile:* The region's population is growing at a slower pace and has a higher median household income when compared to the United States as a whole. In addition, the region's population is older than average, which correlates with the slower population growth and higher household income characteristic of the region.

Within the region, the economic fortunes of individual economies are linked through commuting patterns (bedroom community and job center), connections between the nation's financial and government centers, and connections among knowledge-based industries that benefit from frequent in-person collaboration. One example is the bio-tech, medicine, and pharmaceutical industrial cluster. The region hosts numerous major research universities and national laboratories (e.g., the National Institutes of Medicine and Health), and leading bio-tech and pharmaceutical firms in Boston, Wilmington, DE, and New York City.

[1] For the 2010 census, an urban area comprises a densely settled core of census tracts and/or census blocks that meet minimum population density requirements, along with adjacent territory containing non-residential urban land uses as well as territory with low population density included to link outlying densely settled territory with the densely settled core. To qualify as an urban area, the territory identified according to criteria must encompass at least 2,500 people, at least 1,500 of which reside outside institutional group quarters. For more information on urban areas, see *https://www.census.gov/geo/reference/ua/uafaq.html*

[2] Center, A. M. (2003). Northeast Corridor Action Plan. Rutgers University and Hamilton, Rabinovitz & Alschuler, Inc.

Figure 6-1: Cost of Doing Business Index (2009) along the Action Alternatives



Source: NEC FUTURE team, 2015
Note: Total Business Costs Index, U.S. Average = 100

The degree to which the regional economies within the NEC are fragmented or functioning in a complementary way influences how urban areas within the NEC compete against urban economies in the rest of the United States. On a global scale, the interconnected cities along the NEC are competing with established and emerging global centers of commerce for access to labor, knowledge, capital, and quality of life.

The region's infrastructure has some of the oldest assets in the nation's transportation network. To maintain its role as a global economic center, the region must modernize its aging infrastructure and add capacity to support future growth. Absent the ability to efficiently move large numbers of people in, out, and between these large economic centers daily, the negatives of large metropolitan economies begin to cancel the positives, tempering economic development and incentivizing businesses to expand elsewhere in the United States. Moreover, investments to aid in this circulation must be able to channel the flow of travelers around the region's dense stock of development that is already in place.

6.1.1 Definitions

This assessment considers the economic effects of the Tier 1 Draft EIS Action Alternatives that result from the following:

- **Construction Activity** – Added jobs and earnings during the construction period.[3]
- **Rail Sector Employment** – Added jobs and earnings associated with changes in railroad operations when passenger rail services are implemented under the Action Alternatives. These changes may be positive or negative, depending on the volume of service provided, the relative efficiency, and the degree to which it replaces existing service.
- **Travel Market Changes** – Monetized value of changes in travel times, safety and travel-related air quality caused by changes in transportation services (e.g., faster, more-frequent rail service) and travelers' resultant shifts among travel modes (auto and air).
- **Operating Cost and Revenue/Subsidy Effects** – Potential change in operating costs relative to the No Action Alternative due to operating efficiencies and the resulting potential impact on an operating subsidy/surplus. The data to make this assessment is available at a representational level for this Tier 1 assessment, but will be refined and subsequently included in the Benefit-Cost Analysis developed as part of the Service Development Plan.
- **Market Effects** – Potential change in development patterns near stations and in surrounding areas as a result of changes in transportation connectivity and accessibility within/among metropolitan areas. These typically longer-term economic effects include induced growth and other indirect effects, which are further described in Appendix D, Indirect Effects-Assessment Methodology.
- **Labor Productivity and Agglomeration Effects** – Large complex urban areas such as those along the NEC exist because they are focal points for commercial transactions. Urban areas provide access to large diversified pools of labor, frequent and relatively inexpensive transportation options, specialized technical and professional services, and a large client base. These factors and others provide so-called **agglomeration** economies that diminish the cost of transactions and make the urban area's firms more productive.
- **Freight and Commuter Impacts** – Potential impact of new and/or expanded passenger rail service investments on freight and commuter rail operators that serve the NEC. These may be positive or negative.
- **Fiscal Impacts** – The potential need for an operating subsidy for Intercity rail service represents a type of potential fiscal impact that is described and estimated in the fiscal impacts section.
- **Indirect effects** – As defined in regulations promulgated by the Council on Environmental Quality, those effects that "…are caused by the action and are later in time and farther removed in distance, but still reasonably foreseeable." For the purposes of this Tier 1 analysis, this chapter presents information on those indirect effects that "include growth-inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate,

[3] Any job displacement related to construction activities (i.e., potential property or business impacts) would be evaluated in subsequent project-level assessments since that level of detail is not known during the Tier 1 analysis.

and related effects on air and water and other natural systems, including ecosystems." (40 CFR 1508.8). (Appendix D provides more-detailed definitions of the terms used to define indirect effects.)

6.1.2 Effects-Assessment Methodology

This section presents an overview of the methodology used for the economic effects and indirect effects assessments. (Appendix D contains the full methodologies.) The assessment evaluates the potential for each of the Action Alternatives to result in economic and indirect effects within a defined Affected Environment, which is equivalent to the NEC FUTURE Study Area.

The Action Alternatives may each generate near-term economic effects during the construction period and initial periods of operation. Longer-term economic effects may include market response to improved and new rail services. Those economic effects associated with construction would be realized over the construction period and for the purposes of this Tier 1 Draft EIS the Federal Railroad Administration (FRA) assumed construction would be completed by 2040. The assessment for all other types of economic effects focuses on full build-out conditions reached in 2040.

The FRA evaluated the following near-term economic effects for the Affected Environment as a whole:

- Construction Effects: jobs and earnings during construction
- Rail Sector Employment Effects: jobs and earnings for ongoing operations
- Travel Market Effects:
  - Changes in travel time, reliability, cost, and safety
  - Changes in emissions
  - Passenger and freight rail conflicts
  - Potential for additional rail capacity
  - Potential changes in net revenue contributions

The FRA will include potential economic effects driven by changes in travel time, reliability, cost, safety, and emissions and possibly additional rail capacity in the Benefit-Cost Analysis and incorporate them in the Service Development Plan.

The FRA evaluated the following longer-term economic effects within the Affected Environment at the metropolitan or station level:

- Market Effects – Market-response effects—potential change in the location and level of economic activity—are often treated as indirect effects as defined by National Environmental Policy Act, and would receive more-detailed attention at the Tier 2 project level. However, the FRA qualitatively assessed market-related factors influenced by the Action Alternatives and the likely nature of such market changes as part of the economic effects assessment. Economic Development Workshops held in 2014 helped to identify potential market impacts and to provide

information on development decision-making and the factors that would influence those decisions. *Economic Development Workshop Summary* in Appendix D provides information on the role, process, and findings of the workshops.

Market-response effects are categorized into three groups – station area development, agglomeration, and labor market effects. Metrics developed under each of these categories include the following:

- *Station Area Development:*
  - Station connectivity: Summarizes the differences in the numerical count of Local, Hub and Major Hub stations by Action Alternative and metropolitan area
  - Summary of planning by market: Indicates if station areas are anticipated to be market ready or prepared for growth
  - Range of pricing: Summarizes the range of passenger rail service pricing offered across the No Action and Action Alternatives at the metropolitan area level. The analysis uses the range of rail services available in a market as a proxy to determine the range of pricing.
- *Agglomeration:*
  - Rail capacity: Summarizes the additional number of daily trains on average serving a metropolitan area
  - Accessibility (new connections and associated frequencies): Summarizes the number of new locations accessible by direct connections and the frequency of trains to the newly accessible connections
  - Trains connecting to the broader New York market: Summarizes the number of new train connections traversing the broader New York region between Long Island to Connecticut, Long Island to New Jersey, and New Jersey to Connecticut.
  - Travel time to New York City
    - Shortest travel time to New York City: Summarizes the shortest travel time to Penn Station New York for each of the Action Alternatives at the metropolitan area level
    - Longest travel time to New York City: Summarizes the longest travel time to Penn Station New York for each of the Action Alternatives at the metropolitan area level
  - Number of trains to New York City: Summarizes the numerical count of trains to Penn Station New York from each of the metropolitan areas, illustrating the rail capacity to the New York market across the Action Alternatives
  - Air–rail connections: The number of airports directly served by rail link. For the No Action Alternative, the number of air–rail connections a based on direct Amtrak connections and does not include regional rail connections.
- *Labor Market Effects:* For select markets, the FRA analyzed stations along the NEC Spine that are reachable within 30 minutes of rail travel.

In addition, this assessment considers the potential indirect effects of the Action Alternatives. The FRA assessed potential indirect effects on resource topics presented in the Tier 1 Draft EIS that could occur in metropolitan areas served by the Action Alternatives based on the potential for each Action Alternative to result in program-related induced growth. The FRA evaluated the potential for program-related induced growth based on how each Action Alternative performs with respect to identified factors:

- Potential for station area development and agglomeration effects
- Forecasted high population and employment growth without implementation of the Action Alternatives (i.e., those trends that occur under the No Action Alternative)
- Few or no environmental resources that could constrain development
- Catalysts for development and/or few to no development limitations

The indirect effects assessment presents the potential for indirect effects to occur by Action Alternative and highlights areas of particular sensitivity for further consideration during Tier 2 analysis.

6.2 SUMMARY OF FINDINGS

The construction and operation of the rail improvements and services in the No Action and Action Alternatives would result in changes to economic activity throughout the Study Area. Some changes would be immediate, while others would take place over a longer period. These economic effects include Economic Development Response, Travel Market Effects, Construction and Rail Sector Employment Effects, and Indirect Effects associated with potential economic growth, as summarized below.

<u>Economic Development Response</u>

The Action Alternatives accommodate greater numbers of rail travelers and allow these travelers to make their trips faster and to a greater variety of destinations within and between the urban economies that line the corridor. The expansion of regional travel choices would allow households to access a greater range of employment and leisure options via rail from their home location—thereby improving quality of life. Businesses gain access to a larger, more diverse, and specialized pool of labor—thereby increasing productivity. The Action Alternatives would also accommodate a greater flow of people between major commercial centers and metropolitan areas.

- The largest potential economic impact of the Action Alternatives would be a greater flow of people within the major metropolitan economies through the increased volume of Regional rail relative to the No Action Alternative.
- The No Action Alternative is capacity constrained and insufficient for future demand. Potential rail travelers would be forced to take their second-best choice, imposing a cost on the economy. Alternative 1 offers an improvement over the No Action Alternative that would lessen this economic penalty. Alternatives 2 and 3 fully address the capacity constraints present in the No

Action Alternative. Alternative 3 provides service levels and capacity to accommodate demand beyond that forecast for 2040.

- More-frequent service, faster travel times, and connections to new markets not currently served by rail would create opportunities for station area development. The support for station area development generally rises with the increase in travel-time savings, frequencies, and direct connections achieved across the Action Alternatives; gains are generally largest in the northern portion of the corridor.
- Discussions with experts from academic, development, business, and planning communities highlighted the importance of other local factors—such as quality schools, supportive infrastructure, or planning and zoning—in creating opportunities for station area development. (See Economic Development Workshop description in Chapter 6.)
- Improved passenger rail service to new markets has the potential to transform development patterns and in turn create greater demand for passenger rail. For the economics effects analysis, the FRA did not model local alternative economic growth or development scenarios, but did rely on insights from discussions with experts to understand the potential for economic growth with passenger rail improvements proposed in the Action Alternatives.

Travel Market Effects

Changes in mobility and connectivity proposed for each Action Alternative can be monetized to estimate the economic effects of transportation improvements as a function of travel time and cost savings as well as other factors such as safety and air quality impacts. The Action Alternatives offer faster travel times for many existing rail-served markets, expand service to markets not currently served, and offer a greater range of pricing.

- The volume of Intercity trips more than doubles under Alternative 3, over what is experienced in the No Action Alternative. All Action Alternatives would result in growth in intercity travel.
- Collectively, the changes in service frequencies, pricing, and markets in the Action Alternatives would allow travelers to make different travel choices than under the No Action Alternative. This change in travel behavior can influence economic outcomes.
- One of the key changes in travel behavior observed is that when offered a greater range of travel options, some travelers selected travel modes with longer travel times in order to save money. Thus, some existing rail and air travelers would shift from faster trains and planes to slower, less expensive rail options. When the value of the change in travel time was compared against the savings in travel cost, travelers realized a net savings. The travel cost savings, which are the smallest in Alternative 1 and greatest in Alternative 3, represent real gains in disposable income that support economic activity in the region.
- All of the Action Alternatives offer an increase in direct connections relative to the No Action Alternative. The magnitude of the gains varies by Action Alternative and by individual market, but the general pattern is that markets between the Greater Boston metropolitan area and the New York—North Jersey metropolitan area would experience the greatest gains in direct connectivity.

- All three Action Alternatives would help ease select chokepoints in the corridor, offering benefits for freight movements as well as passenger service compared to the No Action Alternative. The Action Alternatives do not differ measurably with regard to freight-related economic outcomes.

Construction and Rail Sector Employment Effects

- Potential construction effects occur primarily within the Affected Environment and represent a large, one-time stimulus to the economy. Construction jobs (measured as job-years) range from approximately 300,000 under the No Action Alternative to a high of 3.5 million for Alternative 3 (average of Alternative 3 route options), rising with the level of capital investment.
- Additional hiring would be required to operate and maintain the expanded rail service; the amount of employment supported rises incrementally across the No Action (lowest at 3,100 job-years) and Action Alternatives. Alternative 3 offers the greatest expansion and accordingly supports the greatest employment gain (24,200 job-years).
- The expansion of Intercity service proposed in the Action Alternatives would generate revenues in excess of projected operation and maintenance (O&M) costs. As such, no additional public subsidy would be required for the operation of the representative Intercity service included in the Action Alternatives.

Indirect Effects

- Induced growth can result in both positive and negative indirect effects. The potential for induced growth effects is higher under the Action Alternatives relative to the No Action Alternative and rises incrementally across Action Alternatives 1 through 3 with expansion of rail service offered.
- The north region would have the highest potential for indirect effects—the Greater Providence and Boston metropolitan areas under all Action Alternatives, and the greater Hartford metropolitan area under Alternatives 2 and 3. The New York-North Jersey metropolitan area also has the potential for indirect effects, largely attributed to improvements in travel time and capacity within the area to New York City.
- Across the Action Alternatives, the Greater New York-North Jersey, Greater Philadelphia and Greater Baltimore markets have the greatest gains in station connectivity. These markets have the greatest gains under Alternative 3 than other Action Alternatives. Moreover, each Action Alternative gains one or more hub stations, which are focal points for development in the surrounding area. Hubs support greater development intensity than stations with just rail service. These stations have potential for indirect effects to occur as a result of induced growth.

6.3 ECONOMIC EFFECTS AND INDIRECT EFFECTS

6.3.1 Introduction

The FRA estimated the economic effects of the Action Alternatives for each stage of project implementation. First, the Action Alternative is built, generating construction effects discussed in Section 6.3.2. Once constructed, the Action Alternative begins service, supporting employment through its operation and travel user benefits through its use. For example, travel user benefits

include travel time, travel cost, and safety benefits. Section 6.3.3 and 6.3.4 discuss these effects. Finally, once the Action Alternative is in use, the market responds to the availability of this new service. Section 6.3.5 describes the market response. Section 6.3.6 describes potential indirect effects that could result from induced growth.

6.3.2 Construction Effects

The construction of the Action Alternatives would influence economic activity along the NEC. Building the requisite rail facilities would expand payrolls for the duration of the construction cycle. As noted in the Construction and Rail Sector Employment section of the Economic Effects Summary (Section 6.2), potential construction effects occur primarily within the Affected Environment and represent a large, one-time stimulus to the economy. Construction jobs (measured as job-years) range from approximately 300,000 under the No Action Alternative to a high of 3.5 million for Alternative 3 (average of Alternative 3), rising with the level of capital investment required to build each Alternative.

Construction effects estimates are expenditure driven—the larger the capital investment, the larger the construction activity and level of employment. Thus, the pattern of relative jobs and earnings across the Action Alternatives follows the pattern of costs.

The construction hiring associated with the Action Alternatives represents the direct effects of investment in the NEC. The earnings of these newly hired construction workers would translate into a proportional increase in consumer demand as these workers purchase goods and services in the region. As employers hire to meet this increase in local consumer demand and to provide materials and supplies for the Action Alternatives, a further increase of new employment across a variety of industrial sectors and occupational categories is expected. This latter hiring represents some of the Action Alternatives' potential indirect and induced impact.

This analysis focuses on the net effects generated by new investment in the regional economy resulting from the Action Alternatives and based on capital cost estimates developed for each of the Action Alternatives. (See Appendix B.6, *Capital Costs Technical Memorandum*.)

The analysis includes construction effects for the following:

- The No Action Alternative, which includes Funded and Unfunded costs. The Funded No Action Alternative includes projects with approved funding plans, and the Unfunded No Action Alternative includes projects that are unfunded but necessary to keep the railroad running.
- The Action Alternatives, which focus only on the potential additional incremental economic impacts attributable to the Action Alternative (i.e., the marginal difference between the future conditions under the No Action Alternative and with implementation of each Action Alternative). This analysis assumes that transportation system improvements included in the No Action Alternative are also included in each of the Action Alternatives.

6.3.2.1 Capital Expenditures

The capital expenditures for construction of the Action Alternatives are estimated to cost between $63.6 billion and $307.9 billion (in 2014 dollars), depending on the Action Alternative, as discussed in Chapter 4 of this Tier 1 Draft EIS. There are four main categories of capital expenditures:

- **General Construction**: track elements, stations and terminals, yards and shops, sitework, communication systems, traction, and contingencies
- **Vehicles**: rolling stock manufacturing and assembly
- **Right-of-Way**: all rights-of-way, land and existing improvements
- **Professional Services/Soft Costs**: engineering and related professional services

The potential economic impact of these capital expenditures would vary significantly by activity and depend on the amount of regionally produced goods and services embodied in the purchase.

6.3.2.2 Job-Years Associated with Full Build-Out (2040)

Construction of the Action Alternatives represents significant capital investment in the local economies within the Affected Environment. This spending would increase employment for the duration of the construction process. This section describes the potential direct and total employment impacts.[4]

The employment effects of the No Action and Action Alternatives are expressed in job-years, which is defined as one full-time job for one person for one year. For example, three job-years are equal to three people doing a job for one year, or one person doing a job for three years.

In order to isolate the potential economic effects of each of the alternatives within the Affected Environment, an economic impact analysis typically distinguishes between resources that are new to the economy and that would not be invested in counties within the Affected Environment but for the Action Alternatives from resources that would still be spent in the region with similar economic effects (e.g., funds that would be allocated to other transportation construction projects in the region). The analysis makes this distinction because only potential impacts from new funding sources would support employment in the Affected Environment that would not otherwise occur. At this stage of planning, the funding sources are not known. Thus, in the absence of information on how funds would be secured, the FRA applied the full cost of the Action Alternatives and assumed that the rolling stock is constructed in the United States but not necessarily in the Affected Environment.

The effect of capital spending for Alternative 1, for example, would result in nearly 809,900 job-years, of which approximately 384,600 are direct job-years, assuming that the rolling stock is manufactured in the United States, but outside of the Affected Environment.

[4] The potential direct and total employment impacts are based on the RIMS II multiplier analysis. (See Appendix D for more details on RIMS II.)

Construction would result in an average of nearly 40,500 total jobs per year.[5] Compared to the typical Walmart with 250 employees, construction of Alternative 1 is like hiring employees for 162 new Walmart locations within the Affected Environment every year.[6] Table 6-1 shows the results for the No Action and Action Alternatives. The employment impacts for the four Alternative 3 route options are similar, so ranges are shown in the table.

6.3.2.3 Earnings Associated with Full Build-Out (2040)

Construction of any of the Action Alternatives represents significant capital investment in the local economies of the NEC region. This spending would increase earnings for the duration of the construction process. This section describes the potential total earnings impacts.

The effect of capital spending for Alternative 1, for example, would result in up to $39,240 million in earnings (2014 dollars),[7] assuming that the rolling stock is manufactured in the United States, but outside of the Affected Environment. This would result in average earnings of about $48,500 per job-year, assuming the rolling stock is manufactured outside of the Affected Environment but inside the United States.[8]

To put these results into context, the No Action Alternative would result in average earnings of about $47,400 per job-year.[9] Table 6-2 shows the results for the No Action and Action Alternatives. The earnings impacts for the four Alternative 3 route options are similar, so ranges are shown in the table. While the average wage reported above is low for many building trades, it reflects an average wage across the direct construction jobs and jobs supported across a variety of industries as construction workers spend their wages for goods and services and materials and supplies are purchased.

The building activity needed to construct the No Action Alternative and each of the Action Alternatives represents the most-immediate economic outcome associated with implementation. These are large economic effects that last for the duration of the construction cycle only. The estimates of construction effects are expenditure driven—the larger the investment, the larger the construction effect. Thus, the pattern of relative jobs and earnings across the Action Alternatives follows the pattern of costs.

[5] Estimated by dividing the total job-years (809,900) by an assumed 20-year construction period.
[6] Estimated by dividing the average total jobs per year (40,500) by 250 employees in a typical Walmart.
[7] Found by totaling the earnings in the Affected Environment and the US-Outside Affected Environment.
[8] Found by dividing the Alternative 1 earnings ($39,240 million) by total employment in job-years (809,900).
[9] Found by dividing the No Action Alternative earnings ($14,120 million) by total employment in job-years (297,800).

Table 6-1: Potential Construction Employment Impacts

	No Action Alternative Total	Alternative 1		Alternative 2		Alternative 3*	
		Affected Environment	U.S.–Outside Affected Environment	Affected Environment	U.S.–Outside Affected Environment	Affected Environment	U.S.–Outside Affected Environment
Direct Employment (in Job-Years)	147,300	377,200	7,410	761,000	15,800	1,543,600–1,823,000	16,600
Total Employment (in Job-Years)	297,800	773,670	36,200	1,561,100	77,400	3,166,500–3,739,900	81,000

Source: NEC FUTURE team, 2015
* Range of Alternative 3 route options

Table 6-2: Potential Construction Earnings Impacts

In millions of $2014						
	Alternative 1		Alternative 2		Alternative 3*	
No Action Alternative	Affected Environment	U.S.–Outside Affected Environment	Affected Environment	U.S.–Outside Affected Environment	Affected Environment	U.S.–Outside Affected Environment
$14,120	$37,530	$1,710	$75,750	$3,650	$153,660–$181,495	$3,815

Source: NEC FUTURE team, 2015
* Range of Alternative 3 route options

6.3.3 Rail Sector Employment Effects

Unlike the construction effects that represent a one-time stimulus to the economy, employment and earnings effects associated with an Action Alternative's O&M are recurring impacts that would last for the duration of the system's operation. As highlighted in the Construction and Rail Sector Employment Effects portion of Section 6.2, additional hiring would be required to operate and maintain the expanded rail service; the amount of employment supported rises incrementally across the No Action (lowest at 3,100 job-years) and Action Alternatives. Alternative 3 offers the greatest expansion and accordingly supports the greatest employment gain (24,200 job-years). Operating and maintaining the rail service proposed for each Action Alternative would expand payrolls in each year of operation. The O&M hiring associated with the Action Alternatives represents the direct effects within the Affected Environment. The earnings of these newly hired rail sector employees would translate into a proportional increase in consumer demand as these workers purchase goods and services in the region. Purchases of materials and supplies to support operations would further support jobs and earnings. A further increase of new employment across a variety of industrial sectors and occupational categories would occur as employers hire to meet this increase in demand. This latter hiring represents some of the Action Alternative's potential indirect and induced impact.

Although implementation of an Action Alternative would be incremental and phased over time, this assessment assumes additional employment and earnings in the rail sector (in 2014 dollars) for the fully implemented Action Alternative in the horizon year of 2040. The Action Alternatives comprise three service types: Intercity-Express, Intercity-Corridor, and Regional rail. This chapter presents the rail-sector employment and earnings estimates for the three service types for the Affected Environment as a whole. Though not estimated for this analysis, there is likely to be an increase in employment in the commuter rail sector, which can have multiplier effects within the Affected Environment in addition to the effects measured in this analysis.

The results shown focus only on the potential additional incremental economic impacts attributable to the Action Alternative (i.e., the marginal difference between future conditions assuming existing rail service levels and the future conditions under implementation of each Action Alternative) in 2040.

6.3.3.1 Job-Years Associated with Full Build-Out (2040)

Jobs supported through expenditures for rail operations and maintenance are recurring jobs; they are anticipated to remain as long as the service is operated. The following section describes the potential direct and total employment impacts from O&M of the Action Alternatives.

The employment effects are expressed in job-years, or one job for one person for one year. If one person held the same job for three years, this would be equivalent to three job-years. For this analysis, the FRA assumed that funding for O&M would be procured from federal and local

On a yearly basis, operation of each Action Alternative is equivalent to hiring for:*

- 12 new Walmart locations in the No Action Alternative
- 44 new Walmart locations in Alternative 1
- 88 new Walmart locations in Alternative 2
- 97 new Walmart locations in Alternative 3, on average

*Calculated by dividing Total Employment from Table 6-3 by 250 employees in a typical Walmart

government funds as well as project-generated funds such as ticket revenues and food and beverage purchases. Although some of these expenses would originate from local sources, this represents spending that would not take place but for the implementation of the Action Alternative service along the NEC. The expansion of rail passenger service associated with these Action Alternatives represents an expansion of economic activity within the Affected Environment and thus generates potential recurring net economic impacts (long-term).

The analysis considers the change in direct and total employment as compared to the existing service. Because O&M costs are defined by the three service types (Intercity-Express, Intercity-Corridor, and Regional rail), the employment may be higher or lower than the existing service, resulting in positive potential impacts when there is greater service anticipated than existing, or negative potential impacts when less service is anticipated than existing.

The O&M costs for the Action Alternatives assume existing Intercity fares similar to today, as adjusted to normalize the premium placed on travel through New York City and to balance ridership, revenue, and cost. (Refer to Appendix B.9, *Operations and Maintenance (O&M) Costs Technical Memorandum* for more information.)

Table 6-3 shows the results for the No Action and Action Alternatives. The employment impacts for the four Alternative 3 route options are similar, so ranges are shown in the table.

6.3.3.2 Earnings Associated with Full Build-Out (2040)

The pattern of earnings across the Action Alternatives follows that for operating and maintenance employment, and the general framework under which the estimates are made is also the same. Briefly, the annual O&M of the Action Alternatives would increase employee earnings in the region as long as the service is operated. These potential impacts are long-term annual impacts that would continue for the life of the service. This section describes the potential anticipated earnings impacts from the Action Alternatives. Table 6-4 summarizes the results for each Action Alternative, expressed in millions of 2014 dollars. In order to estimate the potential earnings impacts that result from employment for the full build-out, the analysis converted O&M expenses from 2013 dollars to 2014 dollars using GDP Chained Price Index deflators.[10]

The analysis considers the change in total earnings as compared to the existing service. Because O&M costs are defined by the three service types, the earnings may be higher or lower than the existing service, resulting in positive potential impacts when there is greater service anticipated than existing, or negative potential impacts when less service is anticipated than existing.

The effect of O&M spending for Alternative 1, for example, would result in a total of $359 million in earnings in 2040.

[10]Budget, O. O. (2015). Historical Tables. Retrieved 2015, from Table 10.1 - Gross Domestic Product and Deflators Used in the Historical Tables: 1940-2020: *https://www.whitehouse.gov/omb/budget/Historicals*

Table 6-3: 2040 Potential Employment Impacts for Full O&M Only

Service Type	No Action Alternative		Alternative 1		Alternative 2		Alternative 3*	
	Direct Employment (Job-Years)	Total Employment (Job-Years)	Direct Employment (Job-Years)	Total Employment (Job-Years)	Direct Employment (Job-Years)	Total Employment (Job-Years)	Direct Employment (Job-Years)	Total Employment (Job-Years)
Intercity-Express	1,000	1,400	-500	-700	3,000	4,200	5,600–6,000	7,900–8,500
Intercity-Corridor	1,300	1,700	7,300	10,100	12,500	17,300	13,200–14,900	18,400–20,700
Regional Rail	0	0	1,100	1,600	200	400	1,800–2,200	2,600–3,100
TOTAL	**2,300**	**3,100**	**8,000**	**11,000**	**15,700**	**21,900**	**20,600–23,100**	**28,900–32,300**

Source: NEC FUTURE team, 2015
* Range of Alternative 3 route options

Table 6-4: 2040 Potential Earnings Impacts for Full O&M Only

Net of existing service, in millions of $2014				
Service Type	**No Action Alternative**	**Alternative 1**	**Alternative 2**	**Alternative 3***
Intercity-Express	$44	-$22	$142	$269–$289
Intercity-Corridor	$55	$327	$571	$606–$685
Regional Rail	$0	$53	$16	$90–$108
TOTAL	**$98**	**$359**	**$730**	**$965–$1,082**

Source: NEC FUTURE team, 2015
Note: For the Action Alternatives, counts shown are the change from No Action Alternative.
* Range of Alternative 3 route options

Table 6-4 shows the results for the No Action and Action Alternatives. The earnings impacts for the four Alternative 3 route options are similar, so ranges are shown in the table.

6.3.4 Travel Market Effects

Even with its large existing rail transportation network, the NEC corridor is capacity constrained under the No Action and this tempers potential economic growth. One of the most important findings of the NEC analysis is that there is currently unmet demand for rail travel in the corridor. The demand for transportation is derived demand because the large majority of travel is not for the purposes of the transportation itself, but as a means to reach a destination. When travelers are unable to make trips in their preferred manner and must select the second-best option, this imposes a cost on the consumers' or businesses' economic choice. When large numbers of travelers must repeatedly select their second-best option or when there are capacity constraints on urban economies' abilities to reliably move large numbers of workers in and around the economy, the growth potential of this already high-cost corridor (see Section 6.1) is tempered.

Although Alternative 1 offers greater capacity over the No Action Alternative, neither fully meets demand for rail service. By contrast, Alternatives 2 and 3 fully meet demand. Only Alternative 3 provides capacity for rail market growth beyond the analysis period.

The tightest constraint in the corridor is at the Hudson River where 6,600 more passengers want to travel by rail per hour than can be accommodated under the No Action Alternative. Alternative 1 offers an improvement over the No Action Alternative but would remain constrained with demand for rail service exceeding available seats by roughly 2,900 passengers per hour. Alternatives 2 and 3 fully address the capacity constraints present in the No Action Alternative and would accommodate projected demand. In short, Alternative 1 provides an incremental reduction in the cost penalty for the region, while Alternatives 2 and 3 completely remove this burden on the region's economy.

In concert with the reduction or complete removal of the rail service capacity constraint, the Action Alternatives offer faster travel times for many existing rail-served markets, expand service to markets not currently served, and offer a greater range of pricing. Collectively, as highlighted in the Travel Market Effects portion of Section 6.2, these changes allow travelers to make different travel choices than under the No Action Alternative. This change in travel behavior is important because transportation investment influences economic outcomes when and only it first solves a transportation challenge or fills a gap in the market. This section describes the economic value of changes in travel behavior in terms of time saved, travel costs avoided, greater safety through the avoidance of crashes, and the avoidance of emissions. The following section, Section 6.3.5, qualitatively describes the characteristics of the Action Alternatives that would influence the character and location of economic development as the rail travel market achieves a higher level of performance.

Transportation investment by itself cannot cause economic development beyond supporting construction activity. To influence long-term economic outcomes, the transportation investment must allow travelers to make better choices and companies to access different or expanded markets. These changes in traveler behavior and market access, in turn, spark economic development.

One of the key changes in travel behavior observed is that when offered a greater range of travel options, travelers selected slower modes of travel in order to save money. Thus, some existing rail travelers shifted from faster trains to slower less expensive rail options and some air travelers diverted to rail. Bus travelers, by contrast, were willing to pay a higher fare for the greater comfort offered by rail when a wider range of frequencies and fare options were available to them. Auto travelers saw that largest benefits, gaining both time and cost savings by shifting to rail.

For existing rail travelers, Alternative 1 offers the greatest improvement in combined travel time and travel cost savings. Alternatives 2 and 3 also offer savings but the magnitude is less than for Alternative 1. By contrast, for all other travelers who divert to rail (air, bus, and auto) the estimated savings rise across the alternatives with Alternative 1 offering the smallest gains in combined travel time and cost savings and Alternative 3 offering the greatest gains. Travel cost savings represent real gains in disposable income that supports economic activity in the region.

The balance of this Travel Market Effects section describes the benefits to rail travelers in terms of reduced travel time, travel cost, and the reduced likelihood of crashes. All residents of the corridor—whether a rail traveler or not—would benefit from reduced emissions. The effects associated with the Action Alternatives are expressed as net benefits or costs, with positive values showing benefits within the Affected Environment and negative values showing costs within the Affected Environment, between the 2040 No Action and Action Alternatives. All values are reported in 2014 dollars. In addition to monetized changes in travel time, travel costs, safety incidents, and emissions, estimates of capacity changes for the network, the potential for passenger-freight conflicts are qualitatively described.

6.3.4.1 The Value of Travelers Making Different Choices—Trading off Time and Cost

While the value of travel time savings and cost savings are described in greater detail later in this section, Table 6-5 displays the net change in the value of travel time and travel cost savings for diverted users by mode, and shows the trade-off that some travelers make for travel costs and time. For example, air travelers who shift to rail predictably pay a penalty (or loss) in travel time—ranging between $77 million for Alternative 1 and $105 million for Alternative 3. They more than make up this loss, however, in travel cost savings. When both the value of travel time and travel cost are considered jointly, the net benefit for air travelers diverting to rail ranges from an estimated $75 million under Alternative 1 to an estimated $104 million under Alternative 3. Table 6-5 illustrates similar travel time and travel cost tradeoffs for each mode and alternative. These travel cost savings represent real gains in disposable income that is available for other types of expenditures or saving.

Travelers weigh a variety of attributes when making travel choices. While it may seem counter-intuitive, passengers may shift from air to rail under an Action Alternative because they find it more convenient due to increased frequencies, time of day travel needs, and spacious seating. Easy access from rail stations to downtowns, absence of screening, and availability of free wireless internet and power plugs may ease the experience and make rail travel more productive than air.

Table 6-5: Net Change in Value of Travel Time and Travel Cost Savings by Mode for Diverted Users

		In millions of $2014		
		Alternative 1	**Alternative 2**	**Alternative 3***
Travelers Shifting from Air to Rail	Change in value of travel time	-$77	-$95	-$105
	Change in travel cost	$152	$187	$209
	Net change	**$75**	**$92**	**$104**
Travelers Shifting from Auto to Rail	Change in value of travel time	$354	$437	$560
	Change in travel cost	$592	$668	$705
	Net change	**$946**	**$1,105**	**$1,265**
Travelers Shifting from Bus to Rail	Change in value of travel time	$100	$127	$152
	Change in travel cost	-$48	-$72	-$90
	Net change	**$52**	**$55**	**$62**
Travelers Shifting from Rail to Rail**	Change in value of travel time	-$3	-$72	-$37
	Change in travel cost	$470	$407	$367
	Net change	**$467**	**$335**	**$330**

		Alternative 3			
		Central Connecticut/ Providence (3.1)	**Long Island/ Providence (3.2)**	**Long Island/ Worcester (3.3)**	**Central Connecticut/ Worcester (3.4)**
Travelers Shifting from Air to Rail	Change in value of travel time	-$134	-$74	-$139	-$74
	Change in travel cost	$210	$205	$215	$207
	Net change	**$76**	**$131**	**$76**	**$133**
Travelers Shifting from Auto to Rail	Change in value of travel time	$458	$663	$458	$661
	Change in travel cost	$697	$686	$719	$717
	Net change	**$1,155**	**$1,349**	**$1,177**	**$1,378**
Travelers Shifting from Bus to Rail	Change in value of travel time	$135	$167	$140	$165
	Change in travel cost	-$88	-$89	-$95	-$88
	Net change	**$47**	**$78**	**$45**	**$77**
Travelers Shifting from Rail to Rail**	Change in value of travel time	$6	-$64	-$3	-$85
	Change in travel cost	$331	$349	$383	$404
	Net change	**$337**	**$285**	**$380**	**$319**

Source: NEC FUTURE team, 2015
Note: Positive values indicate a benefit to users while negative values indicate a cost.
* Average of Alternative 3 route options
** Rail excludes base passengers.

6.3.4.2 Monetized Value for Changes in Travel Time

This section describes the travel time benefits associated with the Action Alternatives for Intercity and Regional rail services.

Intercity Rail Travel Time Savings

Improvements to Intercity rail capacity and service would result in travel time savings for Intercity rail users, which can be broken down into three components:

4 Base passengers – Travelers using Intercity rail service in the No Action Alternative would experience travel time savings in the Action Alternatives.

- Passengers diverting from other modes of transport – Travelers using auto, bus and air modes to complete their trip in the No Action Alternative may divert to Intercity passenger rail service in the Action Alternatives and would experience some travel time savings. Although the travel times for passengers diverting from air to Intercity rail may be longer, Intercity rail may still provide a more consistent, comfortable and cost-effective alternative, thus resulting in some mode shifts. Any increases in travel times between the No Action and Action Alternatives are included as costs in the analysis.
- Passengers diverting between Intercity rail services – Due to lower fares, improved frequency, and better connectivity, passengers using Intercity-Express service in the No Action Alternative may divert to Intercity-Corridor service in the Action Alternatives. Although travel times for passengers diverting from Intercity-Express service may be longer, Intercity-Corridor service provides an option with lower travel cost and consistent frequency, causing some passengers to make the shift. Any increases in travel times between the No Action and Action Alternatives are included as costs in the analysis.

The FRA calculated changes in travel times for Intercity rail service within the Affected Area by metropolitan area and summed. To derive the travel time savings, the FRA compared Travel Demand Model outputs associated with each Action Alternative with the No Action Alternative model outputs, for year 2040, for the 14 metropolitan areas. The FRA measured travel times (of what), including in-vehicle and out-of-vehicle time in minutes. For base Intercity rail trips, the FRA calculated the total time savings associated with each of the Action Alternatives by multiplying the number of base trips with the change in travel times between the No Action and Action Alternatives, and then summed at the metropolitan area level. For trips diverted from other modes of transport and between the Intercity rail services, the FRA calculated the total time savings by multiplying the number of trips diverted from each mode/service by the change in travel times between the two modes/service for each zone pair, and then summed at the metropolitan area level. The FRA converted annual minutes to hours and multiplied by the value of time for business and personal travel. Comparing the No Action Alternative to the annual travel time savings for auto, air, bus, and rail users diverting to Intercity passenger rail results in the net change in travel times for each Action Alternative. Positive values for change in travel times indicate travel time savings, while negative values indicate that travelers would not save time by using Intercity passenger rail.

Due to improved Intercity rail capacity and service, people traveling by auto, bus, rail, and air in the region may divert to Intercity passenger rail in the Action Alternatives, which would lead to greater connectivity. Passenger rail users may experience some travel time savings.

The FRA derived the Intercity value of travel time benefits for year 2040 by applying the values of time for personal and business trips to the 2040 travel time savings by Action Alternative, mode, and metropolitan area for diversions to Intercity passenger rail. Table 6-6 shows the 2040 value of travel time savings associated with the Action Alternatives as compared to the No Action Alternative.

Table 6-6: 2040 Annual Intercity Value of Travel Time Savings

	In millions of $2014		
	Alternative 1	**Alternative 2**	**Alternative 3***
Air	($77)	($95)	($105)
Auto	$354	$437	$560
Bus	$100	$127	$152
Rail	$1,597	$1,472	$1,500
TOTAL	**$1,973**	**$1,941**	**$2,106**

	Alternative 3			
	Central Connecticut/ Providence (3.1)	**Long Island/ Providence (3.2)**	**Long Island/ Worcester (3.3)**	**Central Connecticut/ Worcester (3.4)**
Air	($134)	($74)	($139)	($74)
Auto	$458	$663	$458	$661
Bus	$135	$167	$140	$165
Rail	$1,743	$1,306	$1,728	$1,222
TOTAL	**$2,202**	**$2,062**	**$2,186**	**$1,974**

Source: NEC FUTURE team, 2015
Note: Rail includes travel time savings for base and diverted riders.
* Average of Alternative 3 route options

The mix of diversions to and from modes may result in positive time savings for users who divert from slower modes to faster modes, or negative time savings (with cost savings) for users diverting from faster modes to slower modes. As shown, the travel time savings for air are negative across the Action Alternatives, indicating it would take longer to use Intercity-Corridor service than air. Rail users would divert between Intercity-Express and Intercity-Corridor modes; though passengers who divert from Intercity-Express to Intercity-Corridor services lose time, the overall time savings would be positive for all Action Alternatives because of the time savings experienced by base passengers using Intercity rail and passengers diverting from autos.

There may be a number of reasons why riders choose to divert from Intercity-Express and air to Intercity-Corridor services, which results in the negative travel time savings. The Intercity-Corridor fare is lower than the other two modes, and although the travel time is longer, there are other factors contributing to the decisions to divert. Passengers may find Intercity-Corridor service to be more convenient due to the increased frequencies, time of day travel needs, more spacious seats than on an airplane, the availability of wireless internet and power plugs may make travel time more productive than air, and easier access from rail stations to downtowns than airports. The more frequent and affordable Intercity-Corridor service results in diversions from Intercity-Express rail and air.

Regional Rail User Benefits

By contrast to the value of Intercity passenger rail savings (presented in Table 6-6), the FRA does not monetize Regional travel time savings for this Tier 1 Draft EIS with the same methodology. The reason is that the primary savings for regional travelers is in reduced wait times, and the travel time savings are estimated instead by a metric called User Benefits. Since all Action Alternatives allow the NEC to operate reliably, the magnitude of the benefit to Regional travelers would vary with the degree to

which Regional trains operate on the NEC. (Many Regional trains begin an inbound trip off the NEC and only operate on the NEC for a portion of the total trip.) The FRA estimated User Benefits of Regional rail according to Federal Transit Administration guidance, and are a measure of both travel time and travel cost savings. User Benefits are a proxy measure, representing travel utility as the difference in user costs between alternatives. It includes prices in terms of out-of-pocket costs and the cost of time. As a result, User Benefits are valued approximately as travel time savings in total annual hours. The FRA measured User Benefits for base Regional rail riders as well as Regional rail diversions from transit and autos. The FRA applied the value of time for local travel, all purposes of $13.20 per hour[11] for all geographies and all Action Alternatives, relative to the No Action Alternative.

Table 6-7 shows the millions of hours of User Benefits in the metropolitan areas that result from diversions to Regional rail service. The millions of annual auto diversions are shown for the Action Alternatives compared to the No Action Alternative, with Alternative 3 representing all Alternative 3 route options.

Table 6-7: Annual Hours and Auto Diversions to Regional Rail Resulting in User Benefits

	Net of No Action Alternative, in millions		
	Alternative 1	**Alternative 2**	**Alternative 3***
Annual Hours of User Benefits (Travel Time Savings)	47	72	94
Annual Auto Diversions	36	42	74

Source: NEC FUTURE team, 2015
* Average of Alternative 3 route options

As shown in Table 6-7, the auto diversions contribute a relatively low percentage of User Benefits. As a result, Regional rail customers would realize most of the User Benefits. As shown in Table 6-8, the estimated value of User Benefits ranges from $620 million in Alternative 1 to $1,244 million in Alternative 3. Because User Benefits include travel cost metrics, the FRA did not estimate travel cost savings separately for Regional rail. This equates to an average of $13 in User Benefits per regional rail trip (across the five regional markets of Washington, D.C./Baltimore, Philadelphia, New Jersey, New York/Connecticut, and Boston) under Alternative 1, to an average of $23 per regional rail trip for Alternative 3.

Table 6-8: User Benefits of Regional Rail Net of No Action Alternative

	Net of No Action Alternative, in millions of $2014		
	Alternative 1	**Alternative 2**	**Alternative 3***
Annual Estimated Value of User Benefits (Travel Time Savings)	$620	$946	$1,244

Source: NEC FUTURE team, 2015
* Average of Alternative 3 route options

[11] Value of Time for Local Travel All purposes in 2013 dollars was $13.00 and converted to 2014 dollars using the GDP Deflator. This value of time was used because trip purpose and wages and income were not available to the same degree of detail in the Regional analysis as in Intercity. As a result, the national average, per U.S. DOT guidance, was used. Source: Transportation, U. D. (n.d.). Revised Departmental Guidance on Valuation of Travel Time in Economic Analysis. Retrieved from *http://www.transportation.gov/sites/dot.gov/files/docs/Revised%20Departmental%20Guidance%20on%20Valuation%20of%20Travel%20Time%20in%20Economic%20Analysis.pdf*

6.3.4.3 Value for Change in Reliability

Across all nine Economic Development workshops conducted along the NEC corridor as part of the Economic Effect analysis, participants uniformly valued reliability of service as the most important service quality of service. Reliable service was viewed as a necessary condition for rail to be adopted by travelers and to spark economic development, without which travel time savings, additional frequencies and connectivity were not useful to the traveler—a faster unreliable train is not valued more than a slower unreliable train because travelers cannot plan and incur an opportunity cost. Although investments will be made to the corridor under the No Action Alternative, these investments will not be sufficient to return the corridor to a state of good repair. Thus, rail travel is projected to, at best, retain a similar level of reliability as is present in today's service. By contrast, all Action Alternatives offer reliable travel by design. Thus, while reliability is an outcome of the Action Alternatives relative to the No Action Alternative, it does not distinguish among the individual Action Alternatives—all are designed to provide reliable performance. While the increase in reliability for the Action Alternatives is indeed a benefit to users and operators, the metric is difficult to calculate with the level of available information at this stage of the planning process; thus, the FRA did not undertake further estimation of this outcome as part of the economic effects analysis.

6.3.4.4 Monetized Value for Change in Travel Cost

The quantitative analysis focuses on the travel cost savings associated with Intercity rail only. Travel cost savings for Intercity rail include two components: 1) savings incurred by base Intercity-Corridor passengers who use the service in the No Action and Action Alternatives and experience lower fares in all Action Alternatives. (The base Intercity-Express riders do not incur travel cost savings since the fares do not change across alternatives.); and 2) savings incurred by passengers diverted from other modes of transport to Intercity passenger rail service. This includes savings incurred by passengers diverted from Intercity-Express rail service to Intercity-Corridor rail services in the Action Alternatives, due to the lower fares and increased frequency for the Intercity-Corridor service. The travel cost savings of diversions to Regional rail from other modes (primarily auto or bus for Regional services) accommodated by additional NEC capacity utilized by regional providers is included in the User Benefits estimation described in the Travel Time Savings section. The utility function used to estimate User Benefits considers travel times and costs; as a result, travel costs are not shown separately for Regional rail.

The FRA developed annual travel cost savings corresponding to the No Action Alternative as part of the Intercity travel demand modeling for 14 metropolitan areas. The travel cost savings take into account the net change in access/egress costs, fares or vehicle operating costs, and parking costs for trips diverted to Intercity rail from all other modes. Total potential cost impacts are calculated by multiplying the number of trips diverted from (by each mode) with by the difference in costs between the two modes for each zone pair, and then summed up to at the metropolitan statistical areas metropolitan area level. This analysis estimated costs in 2013 dollars and escalated to 2014 dollars using GDP Chained Price Index Deflators.

Table 6-9 shows the 2040 Intercity travel cost savings associated with Action Alternatives relative to the No Action Alternative in millions of 2014 dollars. The table summarizes the Intercity effects for the Action Alternatives for all four modes. The negative total for bus indicates that the diversion to

passenger rail from bus would cost more to users than the No Action Alternative. However, all Action Alternatives result in travel cost savings overall, with Alternative 3.4 (Central Connecticut/Worcester) having the greatest savings of $1.98 billion. To put these values into context, Alternative 1 would save users enough travel costs to buy 95,000 new automobiles costing $20,000 each, or to buy 12.6 million train trips between Washington, D.C., and New York Penn Station at an average cost of $150.

Table 6-9: 2040 Potential Intercity Travel Cost Impacts by Mode

Trips	Net of No Action Alternative, in millions of $2014		
	Alternative 1	Alternative 2	Alternative 3*
Air	$152	$187	$205–$215
Auto	$592	$668	$686–$719
Bus	($48)	($72)	($95)–($88)
Rail	$1,204	$1,147	$1,061–$1,139
TOTAL All Modes	**$1,900**	**$1,929**	**$1,857–$1,985**

Source: NEC FUTURE team, 2015

Note: Travel cost savings are reported for the Balanced Fare Scenario for each Action Alternative. The base Intercity-Express riders do not incur travel cost savings since the fares do not change across alternatives. Base Intercity-Corridor riders incur reduced the fares by 30 percent for all the Action Alternatives when compared to the No Action Alternative, and hence incur travel cost savings.

* Range of Alternative 3 route options

6.3.4.5 Monetized Value for Change in Safety (Value of Crashes Avoided)

Additional passenger rail capacity provides an opportunity for commuters to divert from transportation modes such auto, bus, and air to Intercity and Regional rail service, and between rail services. This diversion has the potential to reduce the likelihood of being in a crash for those substituting their current mode of transportation for rail transportation. The avoidance of crashes prevents loss of life, protects quality of life and human capital, as well as property damage.

The analysis does not estimate the effects on safety for diversions from bus, rail, and air transportation because those modes of transportation will continue to provide service. Even if some travelers divert to Intercity and Regional rail from bus or auto, or to Intercity-Express from all other Intercity rail modes, the analysis assumes those services will continue to operate and contribute to crashes at the same rate. The travel market analysis conducted for this assessment is unable to predict if there would be a reduction in the number of routes or the frequency for these other modes if load factors were to fall below a certain criteria. As a result, changes to safety are estimated only for passengers who divert from auto to Intercity and Regional rail.

Passenger rail provides an alternative to using congested highway corridors and improves safety for travelers who divert from auto travel while increasing the accessibility for the region's populations to jobs, education, and recreational opportunities. Better access to rail would result in vehicle-miles traveled (VMT) saved with passenger rail users no longer using autos. This reduces the likelihood of crashes and associated deaths, injuries, and property damage as travelers use the new and expanded passenger rail services.

Table 6-10 shows the safety benefits for each Action Alternative for Intercity and Regional rail based on diverted auto VMT and the associated crash rates and value of crashes avoided.

Table 6-10: Safety Benefits for VMT diverted to Intercity and Regional Rail Service in 2040

	Net of No Action Alternative, in millions of $2014		
	Alternative 1	**Alternative 2**	**Alternative 3**
Auto Safety Costs Avoided: Intercity	$196	$266	$277–$303*
Auto Safety Costs Avoided: Regional	$223	$278	$400
Auto Safety Costs Avoided: TOTAL	**$420**	**$543**	**$677–$703***

Source: NEC FUTURE team, 2015
Note: Figures shown for all Action Alternatives include Intercity and Regional service. Totals may not add due to rounding. Figures for each of the Alternative 3 options include the total for Alternative 3 Regional service.
* Range of Alternative 3 route options

6.3.4.6 Monetized Value for Change in Emissions

The FRA developed annual changes in criteria pollutants corresponding to the 2040 Action Alternatives as part of the air quality analysis, described in more detail in Chapter 7, Section 7.12. The air quality analysis estimated the potential annual impacts of each Action Alternative in comparison to the No Action Alternative, with respect to changes in tons of criteria pollutants associated with roadways (diverted VMT), diesel trains, and electric trains. The emissions consider Intercity, Regional, and freight rail services for an existing energy profile and a future energy profile.

Table 6-11 shows the total emissions effects in the region by Action Alternative. Positive values of emissions indicate the Action Alternative reduces emissions costs in the region; negative values of emissions indicate that the Action Alternative generates additional emissions costs in the region. As shown, all Action Alternatives result in emissions savings to the region compared to the No Action Alternative, assuming future, more efficient energy profiles (described in Chapter 7, Air Quality). Even with existing energy profiles, only Alternative 3.2 (Long Island/Providence) would generate negative values. Alternatives 1, 2, and 3.4 (Central Connecticut/Worcester) show the greatest environmental benefits under both energy profiles, but compared to other travel market effects, the emissions benefits are small.

Table 6-11: Total Value of 2040 Potential Emissions Impacts

	Net of No Action Alternative, in millions of $2014		
	Alternative 1	**Alternative 2**	**Alternative 3***
Existing Energy Profile	$22	$20	$6
Future Energy Profile	$25	$28	$18

	Alternative 3			
	Central Connecticut/ Providence (3.1)	**Long Island/ Providence (3.2)**	**Long Island/ Worcester (3.3)**	**Central CT/ Worcester (3.4)**
Existing Energy Profile	$3	($1)	$2	$21
Future Energy Profile	$14	$11	$15	$30

Source: NEC FUTURE team, 2015
* Average of Alternative 3 route options

6.3.4.7 Passenger–Freight Rail Conflicts

Although the NEC economies are concentrated in services, they retain a small goods production base, host some of the nation's largest marine ports requiring efficient landside access, and account for a

large share of the U.S. consumer market. These are all factors that underscore the need for continued and efficient goods movement in the corridor for continued economic health. All three Action Alternatives would help ease select chokepoints in the corridor, offering benefits for freight movements as well as the passenger service. The Action Alternatives do not differ measurably in the freight-related economic outcomes that they offer. The Action Alternatives assume that current service levels for freight rail will be preserved along the NEC. This means that the volume of freight moved through the corridor would not differ under the No Action or Action Alternatives.

In addition to preserving current service levels for freight railroads, the FRA considered opportunities to accommodate the future growth and improvement of freight rail service within the Affected Environment. As noted in Chapter 5, Transportation, representative freight opportunities considered in the development and analysis of the Action Alternatives include the following:

- Daytime through freight service on the NEC Spine where it is provided today between Baltimore, MD, and Wilmington, DE. The largest volume of freight trains currently moving on the NEC is located between Baltimore, MD, and Newark, DE. There are currently 24 daily freight trains (in both directions) between Baltimore and Perryville, MD, and 20 daily freight trains (in both directions) between Perryville and Newark.
- Additional daytime “slots” between New Haven, CT, and Central Falls, RI.

The preservation of existing freight service levels combined with opportunities to add capacity at key locations along corridor is important for the health of freight-dependent industries in the corridor. For example, the Delmarva Peninsula hosts small manufacturers and a large agricultural industry that relies on regular shipments of grain. Moreover, many of the nation’s Atlantic seaports are east of the corridor but serve markets along and west of the corridor. Maritime freight volumes are anticipated to grow between now and 2040. This is a result of growth in the U.S. population as well as changes in trade patterns driven by the expansion of the Panama Canal, the industry’s shift to greater use of larger ships that require efficient loading/unloading and distribution capabilities, and economic growth among world trading partners. Ports’ competitiveness and the region’s ability to retain and attract freight-dependent industries are supported by the preservation of existing service levels and opportunities to add capacity at key locations.

6.3.4.8 Potential for Additional Rail Capacity

This Travel Market section began with a discussion of how NEC capacity constraint acts as a brake on the region’s economic potential. The following discussion quantifies the constraint and elaborates on other benefits associated with gaining capacity. The No Action Alternative is capacity constrained; that is, it cannot accommodate the full volume of passengers who want to travel by rail. As the travel market effects discussion and Table 6-5 and Table 6-7 in particular describe, there are tangible economic benefits when travelers are able to utilize rail to make their trips.

Detailed more fully in Appendix B.I, *Ridership Analysis Technical Memorandum*, an analysis of peak-hour peak-direction rail demand at key screenlines along the corridor concluded that the tightest constraint in the corridor was at the Hudson River where 6,600 more passengers want to travel by rail per hour than can be accommodated under the No Action Alternative. Alternative 1 offers an improvement over the No Action Alternative, but remains constrained with demand for rail service exceeding available seats by roughly 2,900 passengers per hour. Alternatives 2 and 3 fully address the capacity constraints present in the No Action Alternative and accommodate projected demand. The ability to accommodate future demand also benefits current operations since Alternatives 2 and 3 (especially Alternative 3) provide sufficient capacity that may provide physical redundancy at key locations such as tunnels and elsewhere along the corridor, fostering greater operational resilience. The additional capacity allows for greater flexibility and faster recovery from unanticipated incidents, though the degree to which network resilience improves would depend on how the corridor would be operated.

Alternative 2, and to a greater extent, Alternative 3, provide capacity that may permit physical redundancy at locations such as tunnels and other key junctures, fostering greater operational resilience, flexibility, and ability to recover from unexpected events.

6.3.4.9 Fiscal Impact – Potential Changes in the Need for Public Financial Assistance for Rail Service in the Corridor

This section describes the anticipated net revenue contributions associated with the O&M of the Action Alternatives. The Intercity services proposed in the Action Alternatives would offset increased annual O&M costs with a corresponding increase in passenger fare and food and beverage revenues. For all Action Alternatives, Intercity annual revenues would exceed annual O&M costs, which would generate excess revenues that could be used to pay for additional services or the capital investments required by the services.

This assessment estimates the net revenue contributions (in 2014 dollars) for the horizon year of 2040, assuming full operations of the Action Alternatives. These estimates are presented for the Affected Environment as a whole for the combined Intercity service only. In light of the individual railroad operator policies regarding fares and operating subsidies, the FRA did not estimate revenues for Regional services, and net revenue contributions are only estimated for Intercity service.

The analysis also includes net revenue contributions for the existing Intercity rail service in 2040. Therefore, the results shown for the No Action and Action Alternatives focus on the additional incremental impacts attributable to the Action Alternatives, i.e. the marginal difference between future conditions assuming existing rail service levels and the future conditions under implementation of each alternative. Table 6-12 shows the Intercity net revenue contributions under the No Action and Action Alternative using a balanced fare.

The net revenue contribution, as compared to the No Action Alternative is substantially higher for the Action Alternatives for two reasons. First, minimal additional infrastructure is included in the No Action Alternative, whereas very significant infrastructure expansion is included in all of the Action Alternatives, requiring significant expenditures for O&M, particularly in Alternatives 2 and 3. Second, the additional capacity provided in the Action Alternatives provides more options for train travel

across various types of Intercity services at lower fares, resulting in greater travel volumes and increased revenues. Capacity constraints in the No Action Alternative result in higher fares, higher revenues, and comparatively lower O&M costs. Therefore, higher revenues and less infrastructure to maintain generate higher net revenue contributions for the No Action Alternative than the Action Alternatives. These impacts exclude impacts to government costs and revenues that may result from development, including induced and secondary impacts.

Table 6-12: Intercity Net Revenue Contributions

	No Action Alternative	Net of existing service, in millions of $2014		
		Alternative 1	Alternative 2	Alternative 3*
Net Revenue Contribution	$625	$493	$327	$218

	Alternative 3			
	Central Connecticut/ Providence (3.1)	Long Island/ Providence (3.2)	Long Island/ Worcester (3.3)	Central Connecticut/ Worcester (3.4)
Net Revenue Contribution	$88	$237	$307	$240

Source: NEC FUTURE team, 2015
* Average of Alternative 3 route options

6.3.5 Economic Development Response

The evolution of the travel market described in Section 6.3.4 above removes a burden on the region's economy, and allows travelers to make different travel choices—trading off time for cost in many cases. This section focuses on the qualitative attributes of the service that could influence the nature of the economic development opportunities that could occur as the market adapts the change in travel patterns. Businesses would adapt to capitalize on access to new and expanded labor markets. Travelers will be able to use rail more often and for a greater variety of trips than possible under the No Action Alternative. The economic development response may have a variety of dimensions that range from station area development (which is the most local) to labor market effects (which are typically regional) to agglomeration effects (which can vary in scale from a single metropolitan economy to an economically integrated urban megaregion).

In this analysis, changes in the travel market are applied to understand the potential nature of possible economic development outcomes. In order to understand this dynamic, FRA conducted a series of Economic Development Workshops with knowledgeable experts drawn from the academic, development, business and planning communities. The purpose of the Economic Development Workshops was to supplement the data-driven portion of the economic effects assessment with expert opinion on the probable market response to the new passenger rail services offered under these alternatives. The travel demand forecasting tools used by the FRA did not estimate the effects of potential local growth on ridership and revenue. The FRA used the insights from the Economic Development Workshops to qualitatively understand the potential for change in response to passenger rail improvements.

The benefits of effective density accrue to workers as well by expanding their ability to access a wider range of offices, retail, entertainment centers, and other land uses within the same travel time. Residents' value of being able to access a variety of activity centers and land uses within the urban

economy was at the heart of the "City Region User" concept described in the Economic Development Workshops completed as part of the Economic Effects assessment. The City Region User is a traveler with the ability to utilize a greater range of amenities within a single metropolitan region such as New York because of enhanced metro region mobility. Greater mobility allows the City Region User to expand his range of activities in the local economy—making the region more attractive for households and supporting local consumption and associated economic activity.

As noted earlier in this Chapter, transportation investment influences economic outcomes when and only if it first solves a transportation challenge. For this reason, the key findings of the Transportation Chapter (Chapter 5) and *Ridership Analysis Technical Memorandum* (Appendix B.6) are cited here for reference (Section 6.1, Impacts to Linked Trips).

- Relative to the No Action Alternative, Alternative 1 accomplishes the greatest incremental gain in rail travel. Regional rail accounts for the overwhelming percentage of existing and forecasted rail-linked trips (a linked trip is a full end-to-end one-way trip that may span one or more vehicles or transfers). Table 6-13 shows the number of annual interregional and regional linked rail trips in 2040. Figure 6-2 and Figure 6-3 show the projected change in regional and interregional passenger rail trips respectively.
- The interregional share of the NEC rail market rises to over 6 percent under Alternative 1 and a maximum share of 7 percent under Alternative 2.
- Interregional trips account for less than 5 percent of all rail trips made on the corridor based on existing conditions.

In summary, the operation of the Action Alternatives provides travelers with reliable and more-frequent rail service, offers options for faster trips, and offers a greater variety of pricing options. As a result, the market share for Intercity rail grows relative to the No Action Alternative, rising from 4 percent of the rail market to 7 percent for each of the Action Alternatives.

Corridor-wide Economic Development Workshops

Information gathered from nine Economic Development Workshops held across the corridor in October 2014 helped in understanding the probable market response to the new passenger rail services offered under the Action Alternatives. Workshops helped inform an understanding of the following:

- Relative importance respondents placed on travel time, frequency, and reliability
- Economic connection among urban markets on the corridor as part of understanding agglomeration potential
- Possible labor market effects
- Importance of airport access for respondents, and
- Potential for station area development

The workshops helped identify metrics used to measure agglomeration effects, labor market effects, and potential localized station area development.

Table 6-13: 2040 Annual Interregional and Regional Linked Rail Trips

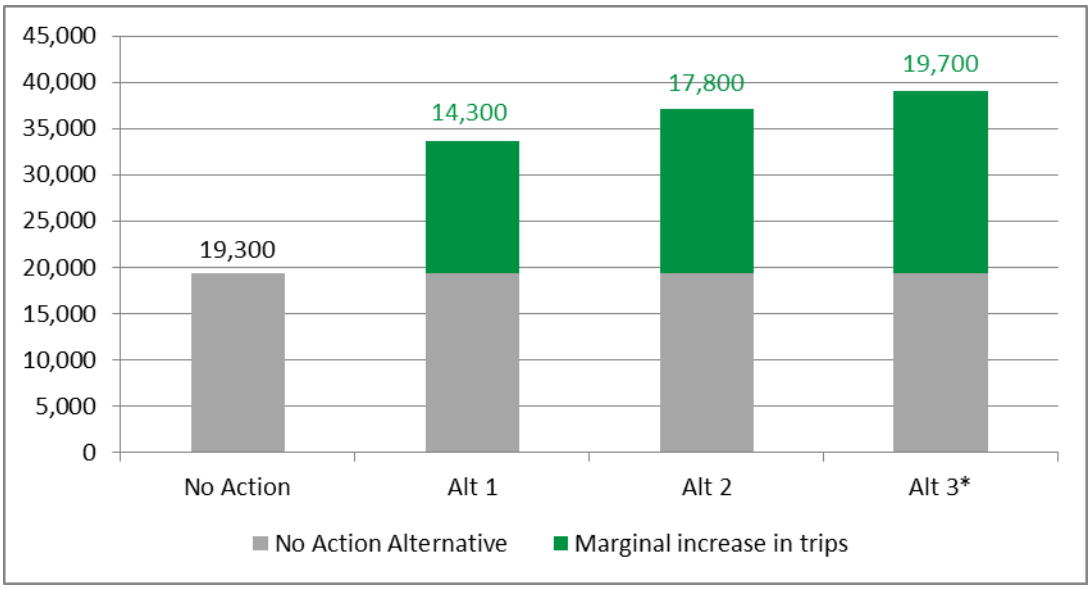
Passenger Rail Trips	In thousands of one-way trips unless otherwise labeled				
	Existing	No Action Alternative	Alternative 1	Alternative 2	Alternative 3*
Interregional	14,700	19,300	33,700	37,100	39,000
Regional	324,500	419,800	474,500	495,400	545,500
TOTAL Rail Trips	**339,200**	**439,100**	**508,200**	**532,500**	**584,500**
% Interregional	4%	4%	7%	7%	7%
% Regional	96%	96%	93%	93%	93%
Net Change Interregional Relative to Existing Interregional	—	4,600	19,000	22,400	24,300
Net Change Regional Relative to Existing Regional	—	95,300	150,000	170,900	221,000
Net Change Interregional Relative to 2040 No Action Alternative Interregional	—	—	14,400	17,800	19,700
Net Change Regional Relative to 2040 No Action Alternative Regional	—	—	54,700	75,600	125,700

Passenger Rail Trips	Central Connecticut/ Providence (3.1)	Long Island/ Providence (3.2)	Long Island/ Worcester (3.3)	Central Connecticut/ Worcester (3.4)
Interregional	38,900	38,700	39,800	38,600
Regional	545,500	545,500	545,500	545,500
TOTAL Rail Trips	**584,400**	**584,200**	**585,300**	**584,100**
% Interregional	7%	7%	7%	7%
% Regional	93%	93%	93%	93%
Net Change Interregional Relative to Existing Interregional	24,200	24,000	25,100	23,900
Net Change Regional Relative to Existing Regional	221,000	221,000	221,000	221,000
Net Change Interregional Relative to 2040 No Action Interregional	19,600	19,400	20,500	19,300
Net Change Regional Relative to 2040 No Action Regional	125,700	125,700	125,700	125,700

Source: Derived from Table 32 of Section 6.1 of the *Ridership Analysis Technical Memorandum* (Appendix B.I)

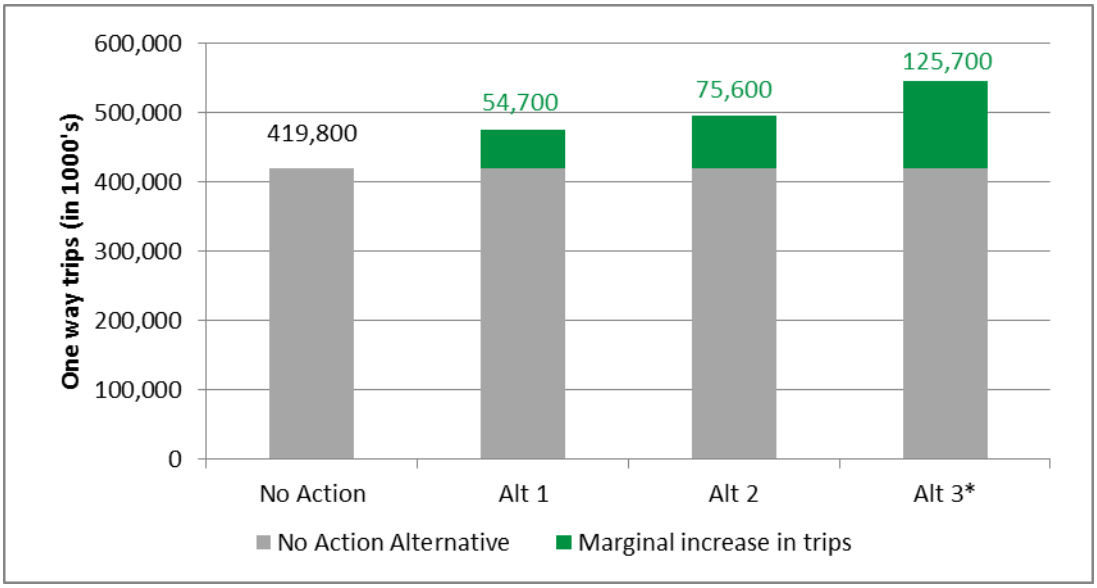
* Average of Alternative 3 route options

Figure 6-2: 2040 Interregional Passenger Rail Trips



Source: NEC FUTURE team, 2015
*Average of Alternative 3 route options

Figure 6-3: 2040 Regional Passenger Rail Trips



Source: NEC FUTURE team, 2015
*Average of Alternative 3 route options

What this means is that the potential for labor market effects and the ability to move even larger numbers of workers efficiently in and out of the NEC's commercial centers is large, given the size of the market in absolute terms. However, the potential for agglomeration and economic "collaboration" among the metropolitan economies is enhanced by the increase in intercity travel—through the enhanced ability to share specialized labor, partner for research, or coordinate with multiple business units or contractors to compete in the larger market.

The FRA's ridership analyses confirm that New York dominates both the regional and interregional travel market across the Affected Environment. Approximately 75 percent of projected Regional rail trips are concentrated in the Northern New Jersey, New York, and Southwestern Connecticut geographic area. More than 80 percent of interregional rail trips have at least one trip end in the Northern New Jersey, New York, and Southwestern Connecticut geographic area. The balance of the linked trips (25 percent regional and less than 20 percent of interregional trips) is distributed across the balance of the corridor. This is borne out by the findings of the Economic Development Workshops conducted for the Economic Effects and Growth analysis. The participants at each workshop along the NEC selected New York as the most important market for greater rail service connectivity—even when other major markets were physically closer to them. New York City itself sought better mobility within its own economy; participants did not identify the need for greater rail capacity to connect to other major NEC markets except for areas surrounding New York that could supply labor. This suggests that the corridor will remain a New York-centric economy even as smaller individual markets become more integrated over time. Table 41 in Section 6.4 of the *Ridership Analysis Technical Memorandum* (Appendix B) compares projected demand to projected supply and finds the following:

- As noted earlier, there is unmet demand for rail travel under the No Action Alternative across the Affected Environment—in Washington, D.C., north of Union Station, at the Hudson River, at the East River, and south of Boston. The greatest unmet demand is at the Hudson River. Put another way, the New York market is the most constrained. This is consistent with the consensus in the New York Economic Development Workshop that accessing additional labor was a key objective for the market's continued economic health.
- Alternative 1 provides sufficient service capacity to accommodate demand at all places along the corridor except at the Hudson River. Thus, Alternative 1 relieves the constraint for all local markets except New York/New Jersey. That said, because of the corridor's New York focus, economies south of New York such as Philadelphia, Wilmington, Baltimore, and Washington, D.C., are affected as well as their access this important commercial center is limited by capacity. The capacity limitation also prevents a growth of off-corridor trips—connections from Harrisburg to New York, for example.
- Alternative 2 provides sufficient service capacity to accommodate demand at the Hudson River and provides excess demand at other locations along the corridor to accommodate additional off-corridor trips or future growth post 2040. Thus, under Alternative 2, economic development opportunities may extend beyond the NEC corridor to markets that gain new or expanded connecting service.
- Alternative 3 provides excess service capacity at all locations along the corridor to accommodate additional off-corridor trips and future growth post 2040. As with Alternative 2, economic

development opportunities may extend beyond the NEC corridor to markets that gain new or expanded connecting service. The capacity could also accommodate growth from the Southeast High Speed Rail Corridor being developed to the south of the NEC, connecting in Washington, D.C.

These results demonstrate that the first and largest potential economic impact to the region is greater flow of people *within* the major metropolitan economies through the increased volume of commuter rail accommodated by the Action Alternatives relative to the No Action Alternative. Alternative 1 accommodates more than 54 million additional annual one-way trips in the corridor compared to the No Action Alternative. Alternative 2 accommodates an additional 20.9 million annual one-way trips more than what Alternative 1 provides. Alternative 3 provides even greater capacity, which based on the supply-demand analysis, exceeds what will be need before 2040—accommodating growth beyond that date.

The additional commuting capacity enables greater accessibility for workers and employers. Business productivity benefits from employers' access to a broader and more diverse labor market with a better fit of workers skills, and access to a wider customer market. Such accessibility improvements provide increased efficiency through reduced labor costs, improved communication, higher utilization of infrastructure and thus lower costs per user, and increased interaction with similar businesses. Collectively, accessibility and the associated efficiency that comes with businesses' ability to draw from a large labor pool support increases in the effective economic density (or clustering) of economic activities in those urban markets where the labor gains are achieved.

The second most important potential economic impact is the greater flow of people *between* the major commercial centers. As metropolitan economies grow in size and become more productive with gains in regional accessibility (described above) this, in turn, sparks greater demand for intercity travel since these larger markets have greater demand for trade and commerce with one another within the corridor. This demand is driven by the need for specialized services not available in their local economy, efforts to expand market share by establishing a presence in new markets, and efforts to take advantage of lower cost locations in proximity to the main business centers for those functions that do not benefit from being located in the corridor's largest urban economies.

By accommodating this intercity exchange of services—information and innovation through expanded opportunities for face-to-face contact—the greater provision of Regional rail allows the major economies along the corridor to grow larger and more productive than they would in the absence of such capacity. The Action Alternatives fully accommodate this demand. Though a small part of the overall travel market, the volume of Intercity trips more than doubles over what is experienced today. Alternative 2 nearly doubles what would be anticipated under the No Action Alternative. Alternative 3 adds excess capacity beyond what is projected to be needed before 2040. The reliability and mobility of the service improves the overall quality of life–both businesses and employees are attracted to the region–which supports additional growth and development.

Finally, the third potential economic impact is the development that occurs around stations as the real estate market capitalizes on the travel time savings enjoyed by rail travelers, and the increase in station use and ridership generated by access to more trains and locations. Economic

development effects are some of the largest potential outcomes of the Action Alternatives; failure to consider them on some level would result in an incomplete analysis. Balanced against this need for information are the limitations of a quantitative modeling approach at this stage of planning. As a result, the analysis incorporated knowledgeable experts from the development, academic/non-profit, and planning professions to help identify what characteristics of the alternatives or the places created the greatest potential for economic development to occur in response to the rail investment. Based on this information, the FRA identified a series of metrics to measure those development potential factors. (Appendix D, *Economic Development Workshop Summary* describes this process in detail.) The FRA populated the metrics that were developed out of the workshops based on the description of the Action Alternatives and other study information and are presented in the following sections. These metrics provided as a barometer or leading indicators of economic development potential as a means to compare possible economic outcomes associated with the Action Alternatives.

Effects on Connecting Corridors

Although the primary focus of this analysis is along the physical rail corridor of the Action Alternatives, connecting corridors may also experience economic development effects in terms of station area development, labor market effects, and agglomeration economies. While all of the Action Alternatives assume the same level of connecting corridor service as available today—that is, no capital or operating investment in the connecting corridors—once a connecting train reaches the NEC, it benefits from the investments made under the Action Alternative for the balance of the trip.

For example, consider a passenger traveling from Harrisburg, PA, to New York City. The trip from Harrisburg to Philadelphia takes 1 hour 40 minutes. The trip from Philadelphia to New York City takes 1 hour 11 minutes by Intercity-Express, excluding wait time between trains. The trip from Harrisburg to New York City in total would take 2 hours 50 minutes without any wait time, or roughly 3 hours 30 minutes, assuming a 40-minute wait time[12] in Philadelphia to transfer. Some of the Action Alternatives are designed with a pulse-hub style system with regular, scheduled, cross-platform transfers for this style of trip. This time estimate excludes the time that it takes for the traveler to get to the station from home. This makes the train a reasonable option for a day trip for business for Harrisburg travelers, but not one with a measurable advantage over auto travel. Drive time from Harrisburg to New York City is estimated at about 3 hours, in the absence of congestion delays. While parking in New York City may be challenging, travelers have the advantage of starting the trip directly from their residence.

More connections in Philadelphia and faster service to New York City offer the potential to change this trade-off in rail's favor. For example, Alternative 3.1 (Central Connecticut/Providence) would reduce the Philadelphia to New York City time to about 40 minutes for a total rail travel time of 2 hours 20 minutes, exclusive of wait time. Alternatively, for those travelers not taking the Intercity-Express train, the trip from Philadelphia to New York City would be about 1 hour 15 minutes for a total travel time of about 2 hours 30 minutes exclusive of wait time. Assuming more-frequent service and well-timed transfers between trains in Philadelphia and Harrisburg, travelers could access New

[12] The 40-minute wait time reflects a high range of transfer times and/or times that trains are held at the platform while passengers remain on the train.

York City by rail in less than 3 hours, making rail more competitive with an auto trip, and roughly the time of an Acela trip between Washington, D.C., and New York City today.

This offers the potential for station area development in Harrisburg as well as potential agglomeration economies as the effective distance between Harrisburg and New York City is reduced.

6.3.5.1 Potential for Station Area Development and Agglomeration

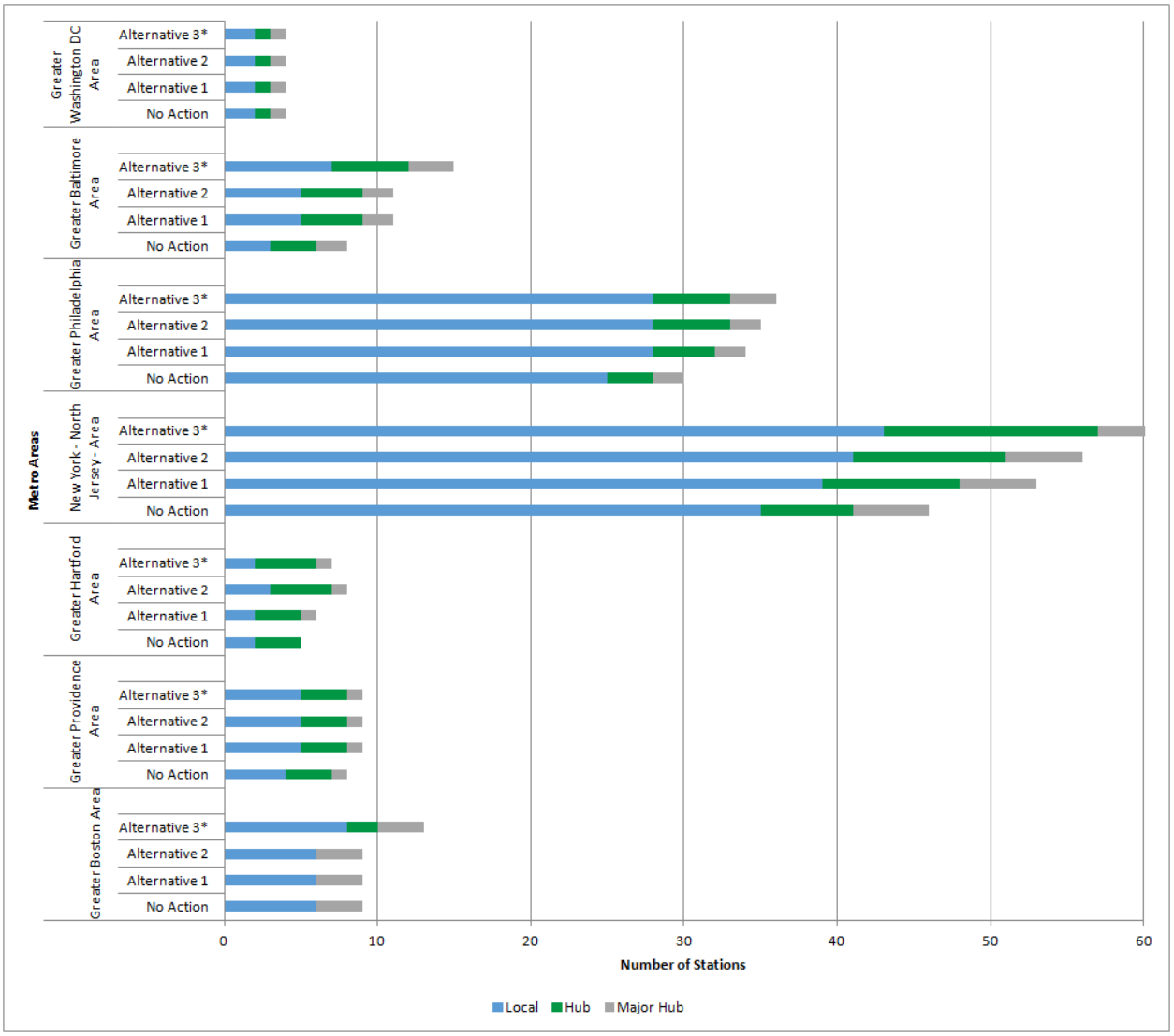
Development around station access points is among the most visible market change. It is also the most local in terms of geographic scale. The scale and character of the development is influenced by the nature of the rail service provided, as well as the ability of the surrounding area to plan for and provide the other necessary factors to support development around stations. Connecting infrastructure, available parcels of sufficient size to accommodate the new developments, and appropriate zoning are all examples of these necessary and complementary elements of station area development.

Furthermore, in considering economic effects of the three Action Alternatives, one of the largest questions is whether the cumulative changes in travel times and patterns of connectivity may change the way the individual metropolitan economies relate to one another as well. For example, do the changes in market access reinforce the dominance of the New York market, or by contrast, do the smaller cities realize greater benefit and close some of the gap with New York City? The FRA considered the potential for agglomeration in this analysis.

Station Area Connectivity

Figure 6-4 summarizes the differences in the number of Local, Hub, and Major Hub stations by alternative and location. As stations move along the spectrum from Local station to Major Hub, they increase the number of modal options and rail services clustered at their locations: The greater the number of connections, the greater the potential for station area development. Across the Action Alternatives, the Greater New York-North Jersey, Greater Philadelphia, and Greater Baltimore markets have the greatest gains in stations. Moreover, each gains one or more hub stations, which are focal points for development in the surrounding area. In several workshops, participants noted the economic development value of clustering modes in one place; hubs support greater development intensity than stations with just rail service. By contrast, the change in number and type of station in the Greater Washington, D.C., Greater Hartford, Greater Providence, and Greater Boston (except for Alternative 3) are modest at best.

Figure 6-4: Number of Stations of Each Category in the NEC FUTURE Station Typology



Source: NEC FUTURE team, 2015

Station Area Planning

There is evidence of planning for rail and/or transit-oriented development across the corridor. The greatest concentration is in the New York market, the area of the corridor that has had the greatest experience and success to date with such initiatives. Table 6-14 summarizes the percentage of counties covered by some type of planning activity. Greater Baltimore and Greater Providence also stand out as markets that are proactively preparing to utilize rail investment as part of a larger economic development strategy. While there is ample time for a market to plan for rail or transit-oriented development between now and 2040, this is a current indicator of the market's focus and preparation. The working assumption is that those markets actively thinking about how to plan around rail are likely to develop around existing rail absent improved service. Economic Development Workshop participants uniformly agreed that while rail service was an important contributor to economic development, many other factors need to be in place to have a full "development package." The most commonly noted economic development factors included the presence of good schools, low crime rates, availability of land, ability to assemble parcels, willing institutional and local government partners, the presence of transit services (preferably a variety of modes), appropriate zoning that permits sufficient density for developers to build, utilities, and supporting infrastructure such as sidewalks and parking.

Range of Pricing

The range of rail services available in a market is a proxy for the range of rail service prices—a factor that developers consider when determining what type of construction to build for the market. Table 6-15 summarizes the range of services available in the markets across the Action Alternatives. The working assumption is that Intercity-Express would have the highest cost and Regional rail would have the lowest cost. Intercity-Corridor would provide service for a cost that falls somewhere between Intercity-Express and Regional rail.

Across the Action Alternatives, there would be no change in the range of prices offered in the Southern and Central regions of the corridor.

Developers build for the market that exists, and the mix of rail services and prices offered at a station influences the market. Premium services used more heavily by business travelers, for example, provide support for office, luxury residential, or hotels. A station focused on serving commuters, by contrast, provides greater support for more moderately priced housing options, convenience services, and retail.

Table 6-14: Summary of Planning by Market

Geographic Scale	Rail Transportation	Transit-Oriented Development	Preservation of Built or Natural Environments	Fully Compatible[1]	Partially Compatible[2]	Partially Compatible; TOD Development[3]	Not Compatible[4]	Number of Counties within the Metropolitan Area
Greater Washington Area	23%	23%	23%	23%	0%	0%	77%	22
Greater Baltimore Area	75%	75%	75%	75%	0%	0%	25%	8
Greater Philadelphia Area	79%	64%	79%	64%	14%	0%	21%	14
New York—North Jersey Area	85%	85%	85%	85%	0%	0%	15%	26
Greater Hartford Area	60%	60%	60%	60%	0%	0%	40%	5
Greater Providence Area	100%	86%	100%	86%	14%	0%	0%	7
Greater Boston Area	70%	70%	70%	70%	0%	0%	30%	10
Average/Total	70%	66%	70%	66%	4%	0%	30%	92

Source: NEC FUTURE team, 2015

Note: The table summarizes the percentage of counties that have development plans for each Metropolitan area that fall within the Affected Environment; data is representative of current conditions.

[1] Percentage of counties that is compatible with all development plans (Fully Compatible)

[2] Percentage of counties that is compatible with some but not all development plans (Partially Compatible)

[3] Percentage of counties that is partially compatible and at least compatible with Transit-Oriented Development

[4] Percentage of counties that is not compatible (either fully or partially)

In the northern region of the corridor, the No Action and Action Alternatives offer the same range for a market with the exception of the Greater Hartford, CT, area (measured at Hartford Station). The No Action Alternative and Alternative 1 offer mid-range service. Alternatives 2 and 3 add Intercity-Express service. This suggests that the potential for high-end residential development and perhaps office development would be greatest for this market in Alternatives 2 and 3. Furthermore, at Hartford Station, Alternative 3.1 (Central Connecticut/Providence) and Alternative 3.2 (Long Island/ Providence) offer greater Intercity-Express options—53 Intercity-Express—while Alternative 3.3 (Long Island/ Worcester) and Alternative 3.4 (Central Connecticut/ Worcester) offer 32 Intercity-Express. As summarized in Table 6-15, the mix of services within the range varies by market and across alternatives. For example, in Baltimore, MD, Alternative 2 has 111 train stops at its two downtown hub stations (Baltimore Penn and Baltimore Downtown Stations) allocated across Intercity-Express, and Intercity-Corridor service. Alternative 3 has a greater number of Intercity-Express options—52 Intercity-Express under Alternative 3 as compared to 41 for Alternative 2. Alternative 3 serves the high-end market to a greater extent while Alternative 2 offers more options in the mid-range of the market. These differences drive the type of development constructed near the stations—luxury residential and office or mid-range residential with mixed use retail, for example.

Rail Capacity

The frequency of train service was highlighted in the Economic Development Workshops as one of the most desirable service features, following reliability. The ability to make plans without having large service gaps in the schedule made rail service more attractive. Moreover, in those markets that can already accomplish a day trip to New York by rail, frequency of service was more important than speed for prospective travelers.

At the Economic Development Workshop in Philadelphia, participants voiced interest in Alternatives 2 and 3, which offer greater frequencies as well as a greater variety of service types. In particular, Alternative 3 would provide the greatest positive "shock" to the Northeast's economy as a whole.

Table 6-16 summarizes the number of additional daily trains serving the market across the Action Alternatives. Consistent with other markets' preferences to access the Greater New York market, New York gains great increases in new daily trains in each of the Action Alternatives. Setting New York aside, the greatest net gains (net of the No Action) in Alternative 1 are in the Greater Providence and Greater Boston Markets, although all major metropolitan markets achieve some gain. Under Alternative 2, Greater Washington, Greater Baltimore, Greater Hartford, Greater Providence and Greater Boston all gain double or more the number of additional trains compared to Alternative 1. Greater Hartford sees the greatest increase by far in Alternative 2. Under Alternative 3, all markets see incremental increases with roughly 100 or more additional trains relative to the No Action Alternative. Alternative 2, Alternative 3.1 (Central Connecticut/Providence), and Alternative 3.2 (Long Island/ Providence) offer the greatest gains in frequency. With respect to additional daily trains, Alternatives 3 route options do not show variation except for Hartford, CT and Providence, RI. Alternative 3.1 (Central Connecticut/Providence) and Alternative 3.2 (Long Island/Providence) add 132 and 103 additional daily one-directional trains at Hartford, CT, and Providence, RI, respectively; while Alternative 3.3 (Long Island/Worcester) and

Alternative 3.4 (Central Connecticut/Worcester) add 111 and 26 additional daily one-directional trains at Hartford, CT, and Providence, RI, respectively.

Table 6-15: Range of Pricing/Service Type Options Serving Metropolitan Areas Daily

Geographic Scale	No Action Alternative	Alternative 1	Alternative 2	Alternative 3*
Greater Washington Area (Union Station)	Low-High 16 EXP 26 IC Regional Service	Low-High 24 EXP 48 IC Regional Service	Low-High 41 EXP 70 IC Regional Service	Low-High 72 EXP 80 IC Regional Service
Greater Baltimore Area (Baltimore Penn Station, Baltimore Downtown Station)	Low-High 16 EXP 26 IC Regional Service	Low-High 24 EXP 48 IC Regional Service	Low-High 41 EXP 70 IC Regional Service	Low-High 52 EXP 80 IC Regional Service
Greater Philadelphia Area (Philadelphia 30th Street Station, Philadelphia Market East Station)	Low-High 16 EXP 35 IC Regional Service	Low-High 24 EXP 64 IC Regional Service	Low-High 41 EXP 78 IC Regional Service	Low-High 72 EXP 112 IC Regional Service
New York—North Jersey Area (Penn Station New York)	Low-High 16 EXP 48 IC Regional Service	Low-High 24 EXP 87 IC Regional Service	Low-High 41 EXP 111 IC Regional Service	Low-High 75 EXP 142 IC Regional Service
Greater Hartford Area (Hartford Station)	Medium 0 EXP 6 IC Regional Service	Medium 0 EXP 13 IC Regional Service	Medium-High 41 EXP 66 IC Regional Service	Medium-High 32–53 EXP 85 IC Regional Service
Greater Providence Area (Providence Station)	Low-High 9 EXP 10 IC Regional Service	Low-High 19 EXP 30 IC Regional Service	Low-High 41 EXP 58 IC Regional Service	Low-High 21–53 EXP 24–69 IC Regional Service
Greater Boston Area (Boston South Station)	Low-High 9 EXP 10 IC Regional Service	Low-High 19 EXP 33 IC Regional Service	Low-High 41 EXP 62 IC Regional Service	Low-High 75 EXP 73 IC Regional Service

Source: NEC FUTURE team, 2015

Note: Numerical Count of Daily trains presented in this table represent one-directional counts. Numerical Count of Daily trains for Penn Station New York, Philadelphia 30th Street Station and Washington D.C., Union Station may be lower than the actual train counts.

*Range of Alternative 3 route options

EXP = Intercity-Express

IC = Intercity-Corridor

Table 6-16: Daily Trains Serving Metropolitan Area (Number of Daily Trains at a Hub Station within Metropolitan Area)

Hub Station	No Action Alternative	Net of No Action Alternative		
		Alternative 1	Alternative 2	Alternative 3*
Greater Washington Area (Union Station)	42	30	69	110
Greater Baltimore Area (Baltimore Penn Station, Baltimore Downtown Station)	42	30	69	90
Greater Philadelphia Area (Philadelphia 30th Street Station, Philadelphia Market East Station)	51	37	68	133
New York—North Jersey Area (New York Penn Station)	64	47	88	153
Greater Hartford Area (Hartford Station)	6	7	101	111–132
Greater Providence Area (Providence Station)	19	30	80	26–103
Greater Boston Area (Boston South Station)	19	33	84	129

Source: NEC FUTURE team, 2015
Note: Numerical Count of Daily trains presented in this table represent one-directional counts. For the Action Alternatives, counts shown are the change from No Action Alternative. Train counts include Intercity-Express and Intercity-Corridor services and do not include Regional service.
*Range of Alternative 3 route options

Accessibility

Aside from the comparative time savings associated with a direct connection versus transfer, a direct connection was perceived to reduce the risk of delay by participants in the Economic Development Workshops. Moreover, locations with ready direct access to a variety of markets were favored for private development investment. In addition, because of the greater ease of access, market locations with higher densities of direct connections to other markets have greater agglomeration potential, all else being equal. Relative to the No Action, Greater Boston sees the greatest increase in new direct connections under each of the Action Alternatives. Under Alternative 1, Greater Boston gains 16 additional new direct connections with little variation among the remaining markets—ranging from 4 to 9 additional new direct connections. The pattern changes a bit under Alternative 2; Greater Boston still leads, but Greater Hartford and Greater Providence also post large gains. Under Alternative 3, all markets reported see at least a double-digit gain in direct connections.

Alternatives 3.1 (Central Connecticut/Providence) through 3.4 (Central Connecticut/Worcester) generally offer the greatest gains in the number of new locations accessible via a direct rail connection. The difference among the Alternatives 3 route options is not large, except for Providence, RI, for which Central Connecticut/Providence and Long Island/Providence add more new direct connections than Long Island/Worcester and Central Connecticut/Worcester. Overall, the northern region of the corridor would see a greater change in the number of new places accessible via rail—Boston gains 29 new direct connections (max), followed by Hartford, CT, at 26 under Long Island/Worcester. Table 6-17 summarizes the change by market and alternative.

Table 6-17: Number of Locations Accessible via Direct Connections

Geographic Scale	No Action Alternative	Net of No Action Alternative		
		Alternative 1	Alternative 2	Alternative 3*
Greater Washington Area (Union Station)	39	7	8	15–20
Greater Baltimore Area (Baltimore Penn Station, Baltimore Downtown Station)	39	7	8	15–20
Greater Philadelphia Area (Philadelphia 30th Street Station, Philadelphia Market East Station)	40	6	13	14–19
New York—North Jersey Area (Penn Station New York)	40	6	13	14–19
Greater Hartford Area (Hartford Station)	24	4	23	23–26
Greater Providence Area (Providence Station)	30	9	17	12–20
Greater Boston Area (Boston South Station)	30	16	23	24–29

Source: NEC FUTURE team, 2015
Note: Numerical Count of Daily trains presented in this table represent one-directional counts. For the Action Alternatives, numbers shown are the change from the No Action Alternative. Connections include Intercity-Express and Intercity-Corridor services and do not include Regional service.
*Range of Alternative 3 route options

In addition to the number of new locations directly accessible via rail, the frequency of that new service would affect ridership. For example, 1 train a day to a new location is not as beneficial as 20. Table 6-18 summarizes the frequency of new direct connections. Overall, Alternative 2 would offer a large increase relative to Alternative 1, but the greatest frequency of new direct service would be offered under Alternatives 3. Regionally, the north and central regions of the corridor would experience the greatest increase. In the south sub-region, Washington, D.C., would benefit from its role as a Major Hub and the southern terminus. Baltimore, MD, and Philadelphia would experience more modest increases in frequency to directly accessible markets under Alternative 3 (all route options), and would experience the highest increase under Alternative 2.

Table 6-18: Frequency of Direct Connections

Geographic Scale	No Action Alternative	Net of No Action Alternative		
		Alternative 1	Alternative 2	Alternative 3*
Greater Washington Area (Union Station)	500	160	453	691–914
Greater Baltimore Area (Baltimore Penn Station, Baltimore Downtown Station)	546	160	453	585–808
Greater Philadelphia Area (Philadelphia 30th Street Station, Philadelphia Market East Station)	355	144	476	637–885
New York—North Jersey Area (Penn Station New York)	345	213	674	892–1,244
Greater Hartford Area (Hartford Station)	72	25	934	1,122–1,299
Greater Providence Area (Providence Station)	323	190	648	207–945
Greater Boston Area (Boston South Station)	323	214	677	869–1,169

Source: NEC FUTURE team, 2015
Note: The table presents the numerical count of daily trains (one-direction) to new directly accessible locations. For the Action Alternatives, counts shown are the change from No Action Alternative. Connections include Intercity-Express and Intercity-Corridor services and do not include Regional service.
*Range of Alternative 3 route options

Trains Traversing New York Region

In the large New York market, it can be difficult to access some locations by rail without multiple transfers. Thus, the concept of the City Region User arose out of the Economic Development Workshops. There is not a lot of variation across the alternatives for this metric. Long Island gains access to New Jersey as under Alternative 3. Connecticut and New Jersey gain two routes. As a proxy for how the alternatives would help mobility within the market, the analysis considered the number of routes connecting the following three points outside of Manhattan: Long Island to Connecticut, Long Island to New Jersey, and New Jersey to Connecticut. Long Island does not gain new routes to the broader region except under Alternative 3.2 (Long Island/Providence) and Alternative 3.3 (Long Island/Worcester) where six new routes would become available. Connectivity between New Jersey and Connecticut would improve in all alternatives uniformly by two new routes.

Table 6-19: Number of Intercity (non-Regional) Routes Traversing Broad New York Region

Geographic Scale	No Action Alternative	Net of No Action Alternative		
		Alternative 1	Alternative 2	Alternative 3*
Long Island–Connecticut	0	0	0	0
Long Island–New Jersey	0	0	0	0–6
Connecticut–New Jersey	6	2	2	2

Source: NEC FUTURE team, 2015
Note: The table presents the number of additional Origin-Destination pairs served by direct rail service. For the Action Alternatives, counts shown are the change from the No Action Alternative. Connections include Intercity-Express and Intercity-Corridor services and do not include Regional service.
*Range of Alternative 3 route options

Travel Time to New York City

The ability to make a day trip to New York City from locations along the corridor is an important metric for that market's ability to support the New York City market and also to benefit from its own comparatively lower business costs to attract businesses that complement the headquarters and high valued added activities in the New York City core. Table 6-20 summarizes the changes in travel times across the No Action and Action Alternatives by market. While most markets would see some improvement in travel times to New York City across the Action Alternatives, the northern part of the corridor would see the greatest gains. Although the travel time from the Boston market appears low in this table, this is because the Boston market's geographic definition includes stations located south of Boston that are closer to New York City and hence have shorter travel times. The largest gains in travel time savings would generally be achieved in the move from Alternative 2 to Alternative 3.1 (Central Connecticut/Providence), but in many markets Alternative 2 would substantially improve travel times over the No Action Alternative. For Boston, both Alternatives 1 and 2 would improve travel time over the No Action Alternative sufficient to permit rail travelers to easily make a round trip in a day—an important threshold for business travelers. Table 6-21 offers the slowest travel time as a comparator.

For the Greater Boston market, both Alternative 1 and Alternative 2 would offer travel times sufficient to permit rail travelers to easily make a round trip to New York City in one day.

Table 6-20: Shortest Travel Time to New York City

Geographic Scale	In hours and minutes			
	No Action Alternative	Alternative 1	Alternative 2	Alternative 3 (range)
Greater Washington Area	2:45	2:43	2:26	1:37
Greater Baltimore Area	2:09	2:11	1:56	1:23
Greater Philadelphia Area	1:00	1:01	0:55	0:38–0:39
New York—North Jersey Area	0:14	0:12	0:05	0:06
Greater Hartford Area	2:04	1:50	1:31	0:51–1:08
Greater Providence Area	2:50	2:17	2:01	1:18–2:20
Greater Boston Area	3:11	2:38	2:20	1:17–1:31

Geographic Scale	In hours and minutes			
	Alternative 3			
	Central Connecticut/ Providence (3.1)	Long Island/ Providence (3.2)	Long Island/ Worcester (3.3)	Central Connecticut/ Worcester (3.4)
Greater Washington Area	1:37	1:37	1:37	1:37
Greater Baltimore Area	1:23	1:23	1:23	1:23
Greater Philadelphia Area	0:39	0:39	0:38	0:39
New York—North Jersey Area	0:06	0:06	0:06	0:06
Greater Hartford Area	0:52	1:08	1:04	0:51
Greater Providence Area	1:18	1:29	2:20	2:20
Greater Boston Area	1:30	1:31	1:30	1:17

Source: NEC FUTURE team, 2015
Note: The analysis considered the shortest travel times to New York City from various stations within a given metro area and the table summarizes the minimum of the shortest travel time.

Table 6-21: Longest Travel Time to New York City

Geographic Scale	In hours and minutes			
	No Action Alternative	Alternative 1	Alternative 2	Alternative 3
Greater Washington Area	4:47	3:20	3:30	3:19
Greater Baltimore Area	3:23	3:00	2:50	2:43
Greater Philadelphia Area	2:08	1:55	1:51	1:47
New York—North Jersey Area	2:28	1:47	1:40	1:40
Greater Hartford Area	3:12	2:23	2:16	2:13
Greater Providence Area	3:52	3:08	3:00	2:54
Greater Boston Area	4:44	4:42	5:02	5:02

Source: NEC FUTURE team, 2015
Note: The analysis considered the longest travel times to New York City from various stations within a given metro area and the table summarizes the maximum of the longest travel time.

Number of New Trains to New York City

Rail capacity to the New York market is also considered (Table 6-22). The pattern of gains across Action Alternatives varies by market. For most markets, Alternative 3 offers the greatest number of trains and the largest increase in service to New York City. For Philadelphia, Alternative 2 offers no more than four additional trains to New York City than Alternative 3, depending on the Alternative 3 route option. Increased frequency to New York City provides important support for the health of the New York market as it aids intra-regional connectivity.

Table 6-22: Average Number of Daily Trains to New York City per Station

Geographic Scale	No Action Alternative	Net of No Action Alternative		
		Alternative 1	Alternative 2	Alternative 3*
Greater Washington Area	13	13	42	69–70
Greater Baltimore Area	11	21	34	43–44
Greater Philadelphia Area	13	23	41	37–39
New York—North Jersey Area	7	18	40	47–56
Greater Hartford Area	3	7	20	23–29
Greater Providence Area	6	17	26	16–41
Greater Boston Area	8	13	30	50–65

Geographic Scale	Alternative 3 (Net of No Action Alternative)			
	Central Connecticut/ Providence (3.1)	Long Island/ Providence (3.2)	Long Island/ Worcester (3.3)	Central Connecticut/ Worcester (3.4)
Greater Washington Area	69	69	69	70
Greater Baltimore Area	43	43	43	44
Greater Philadelphia Area	37	38	37	39
New York—North Jersey Area	47	55	56	47
Greater Hartford Area	24	23	26	29
Greater Providence Area	41	40	16	16
Greater Boston Area	50	50	64	65

Source: NEC FUTURE team, 2015

Note: Counts in the table represent the average number of trains to New York (for a metropolitan area, average number of trains per station). Train counts include Intercity-Express and Intercity-Corridor services and do not include Regional service.

*Range of Alternative 3 route options

Number of Airports Served by Rail Link

Airports serve as gateways to the national and global economy. Excluding Regional rail, the No Action Alternative includes two air-rail links where Intercity rail offers an efficient landside connection. Each of the Action Alternatives adds air-rail links:

- Alternative 1 adds one connection at T.F. Green Airport in Providence, RI.
- Alternatives 2, 3.1 (Central Connecticut/Providence), and 3.4 (Central Connecticut/Worcester) uniformly add two air-rail links at T.F. Green Airport in Providence, RI, and Philadelphia International Airport.
- Alternatives 3.2 (Long Island/Providence) and 3.3 (Long Island/Worcester) add four new air-rail links, including T.F. Green Airport, Philadelphia International Airport, and connections at Jamaica, Queens, and Ronkonkoma in New York to John F. Kennedy International Airport and Long Island MacArthur Airport, respectively.

6.3.5.2 Labor Market Effects

Improved rail service also creates the potential for labor markets to become more interlinked as additional places fall within a 30- minute travel shed. While there would be a general expansion of places reachable by rail, there would not be a major change in market connections under Alternatives 1 and 2, with the exception that Hartford and New Haven, CT, would become just 30 minutes apart under Alternative 2. Under Alternative 3, markets would begin to expand; these gains would all be in the northern part of the corridor. Boston would connect to Providence, RI, and Worcester, MA, in 30 minutes. Hartford may reach Worcester in 30 minutes as well.

Table 6-23 summarizes a representational change in labor pools that would be reachable by 30 minutes of travel by the No Action and Action Alternative for the Major Hub stations in each market considered. The table shows that the greatest gains in accessibility would be located in the New York metropolitan region—Penn Station New York, Trenton, and Nassau Hub and Newark Penn Stations. Nassau Hub would gain access to over 8 million jobs under certain Alternative 3 route options. Among smaller markets, New Haven, CT, would experience particularly dramatic increases in job accessibility. Alternative 1 offers modest gains in net labor access. By contrast, Alternative 2 offers substantial gains in access across all markets, ranging from 240,000 to over 1.4 million. Alternative 3 improves labor access even further for the Greater New York market and markets north. Markets to south do not see significant changes in labor access under Alternative 3.

Table 6-23: Jobs Accessible in a 30-Minute Train Travel Time

Hub Station	No Action Alternative	Net of No Action Alternative		
		Alternative 1	Alternative 2	Alternative 3*
Washington Union	1,570,000	60,000	440,000	430,000
Baltimore	1,640,000	60,000	1,030,000	1,030,000
Wilmington Station	1,210,000	0	320,000	430,000
Philadelphia	1,030,000	0	730,000	730,000
Trenton	1,760,000	0	1,440,000	2,940,000
Newark Penn Station	4,940,000	0	400,000	680,000–1,420,000
Penn Station New York	3,360,000	840,000	1,410,000	1,240,000–2,460,000
Nassau Hub	—	—	—	8,150,000**
New Haven	410,000	30,000	410,000	30,000–900,000
Hartford	300,000	0	240,000	320,000–570,000
Boston South Station	510,000	0	330,000	330,000–410,000

Hub Station	Net of No Action Alternative			
	Alternative 3			
	Central Connecticut/ Providence (3.1)	Long Island/ Providence (3.2)	Long Island/ Worcester (3.3)	Central Connecticut/ Worcester (3.4)
Washington Union	430,000	430,000	430,000	430,000
Baltimore	1,030,000	1,030,000	1,030,000	1,030,000
Wilmington Station	430,000	430,000	430,000	430,000
Philadelphia	230,000	230,000	230,000	230,000
Trenton	2,940,000	2,940,000	2,940,000	2,940,000
Newark Penn Station	680,000	1,420,000	1,420,000	680,000
Penn Station New York	1,240,000	2,460,000	2,460,000	1,240,000
Nassau Hub	—	8,150,000	8,150,000	—
New Haven	30,000	900,000	900,000	190,000
Hartford	560,000	570,000	330,000	320,000
Boston South Station	330,000	330,000	410,000	410,000

Source: NEC FUTURE team, 2015

Note: Philadelphia includes Philadelphia 30th Street Station and Philadelphia Market East. Baltimore includes Baltimore Penn Station and Baltimore Downtown. Counts shown exclude Regional Rail service. Job counts are representative of those within a 10-mile radius of stations accessible in a 30-minute travel time, exclusive of jobs surrounding the origin station. Estimates are based on 2010 employment data and were adjusted where station buffers overlap. For the Action Alternatives, counts shown are the change from No Action Alternative.

*Range of Alternative 3 route options

** Applies only to certain Alternative 3 route options

— = Not applicable within that alternative.

6.3.6 Indirect Effects

6.3.6.1 Factors Influencing the Potential for Induced Growth and Range of Effects

Indirect Effects may occur in areas that have high potential for induced growth. Generally, the potential for induced growth, and thus indirect effects, to occur is greater in areas that:

- **Have potential for station area development and agglomeration effects** as a result of implementation of the Action Alternatives (see Section 6.3.5.1), including:
  - **Notable improvements in station area connectivity** as measured by the number of Local, Hub and Major Hub stations
  - **Notable improvements in new rail capacity** as measured by daily train service
  - **Notable improvements in accessibility** as measured by the number of locations accessible via direct connections and the frequency of those direct connections
  - **Notable improvements in travel time and rail capacity (measured by number of trains) to New York City**
  - **Planning resources and readiness for growth** as measured by the percentage of counties or metropolitan planning organizations that have plans that support rail transportation, transit-oriented development (TOD), and the preservation of the built and natural environments. These geographic areas are thus better prepared to respond to increases in growth than areas that do not support these goals or do not have plans to manage growth at all.
- **Are forecast to see high population and employment growth** without implementation of the Action Alternatives (i.e., those trends that occur under the No Action Alternative)
- **Contain few or no environmental resources that could constrain development:** Areas that are surrounded by significant environmental resources, such as a parks, ecologically sensitive lands, or prime farmland, are less likely to experience induced growth due to regulatory challenges to development.
- **Contain other catalysts for development and/or contain few to no development limitations:** Areas that have other development catalysts, as identified by stakeholders at the NEC FUTURE Economic Development Workshops, are more likely to experience induced growth. Areas that have development limitations face further challenges to responding to demand for growth. Examples of factors that could influence the potential for induced growth include:
  - Local policies
  - Zoning
  - School quality
  - Supporting infrastructure and parking
  - Ability to assemble small parcels
  - Access and connectivity of the station to a variety of modes
  - Amenities near the station (e.g., retail)
  - Willingness of the community to accept growth (e.g., growth, slow growth, no growth cultures)

The degree to which areas perform with regard to the factors noted above, as well as the following two factors, would influence *the type* of induced growth and *the range of indirect effects* that would result from that growth:

- Range of rail services available in a market
- The character of the surrounding land

The character of the land around the station (i.e., developed, undeveloped, mixed) and available space for development could also influence the potential and type of induced growth. In general, the areas around existing stations along the NEC are developed or are characterized by a mix of developed and undeveloped land. In areas that are heavily developed, induced growth could take place in urban infill locations (i.e., vacant land within existing built environments). Induced growth in urban infill locations would likely increase the density of the existing developed environment. In areas characterized by a mix of developed land closest to the station and undeveloped land on the fringe, induced growth could occur in urban infill locations closest to the station as well as on the undeveloped land on the fringe. In areas that are characterized by an even mix of developed and undeveloped land around the station, development pressures and induced growth may occur on the undeveloped land. In the cases where most of the land around the station is undeveloped, induced development is likely to occur. The type and amount of development depends on additional factors noted below.

Induced growth could encourage positive investment in resources or put a strain on resources within the Affected Environment. The potential to cause effects on certain types of resources differs based on if induced growth occurs on developed land versus undeveloped land. Generally, the potential to cause effects on the built and human environment is higher where induced growth occurs on developed land. The potential to cause effects on the natural environment and historic/cultural resources is higher where induced growth occurs on undeveloped land. A bulleted list of the types of indirect effects that could occur on developed versus undeveloped land types is provided below.

The types of indirect effects of induced growth on <u>developed land</u> would likely include the following:

- **Environmental Justice (EJ) populations:** Concentrations of environmental justice populations are more likely to exist in developed areas. As growth occurs in developed areas, disproportionately high acquisitions and displacements of EJ populations may occur as a direct result of development, as well as the gradual displacement of low-income and minority populations as a result of gentrification. If development is implemented with careful attention to these communities, the growth could provide benefits to these populations, such as increased access to jobs, retail, as well as investment in community resources.

The types of indirect effects of induced growth on <u>undeveloped land</u> would likely include the following:

- **Agricultural Lands:** Prime farmland and prime timberlands are more prevalent in rural, undeveloped areas. Induced growth could have effects on agricultural lands.

- **Hydrologic Resources:** The Affected Environment contains many hydrologic resources, such as major water bodies, rivers, streams, wetlands, and floodplains. While these resources are present in both developed and undeveloped areas, the potential for induced growth to affect these types of resources is higher in undeveloped areas.
- **Ecological Resources:** While ecological resources exist within developed and undeveloped areas, induced growth is more likely to effect resources in undeveloped areas.

In addition, there are potential induced growth effects regardless of characterization of land cover type as developed or undeveloped:

- **Land Conversions:** Land Conversions on developed land would be from one developed use to another. One example would be a change from low-intensity to high-intensity developed land cover. Land Conversions on undeveloped land would be from undeveloped land cover to developed land cover. A conversion from undeveloped land to developed land is of particular importance since once the conversion occurs the converted land would no longer be available for that use. For example, if undeveloped land that served an agricultural purpose was developed that land would no longer be available to serve an agricultural use.
- **Acquisitions and Displacements:** Acquisitions and Displacements resulting from induced growth would occur where conversions of land occur.
- **Transportation:** Transportation infrastructure may not be adequate to support induced growth. In developed and undeveloped areas, indirect effects of induced growth, such as congestion, could require additional investment in transit, parking, and road facilities.
- **Cultural and Historic Resources:** Induced growth would have the potential to affect National Register of Historic Places-listed resources, National Historic Landmarks, and other resources of concern, including archaeological, tribal, and state and local historic resources.
- **Parklands:** Within the Affected Environment, parklands exist both in developed and undeveloped settings. Induced growth in developed areas would likely have the potential to affect parks, whereas induced growth in undeveloped areas would more likely have the potential to affect parklands that correspond to wildlife preserves, bird sanctuaries, resource management areas, and federal or state forests.
- **Air Quality:** Induced growth could contribute to more vehicle miles traveled and other activities that may contribute to degradation in air quality.

6.3.6.2 Induced Growth and the Potential for Indirect Effects of the Action Alternatives

The indirect effects analysis focuses on the metropolitan areas served by the Action Alternatives. This section focuses on the potential for induced growth by Action Alternative, with a focus on these metropolitan areas and how each performs with regard to the factors identified in Section 6.3.6.1 that influence the potential, type, and amount of induced growth. These factors also identify the range of indirect effects that could occur as a result of that induced growth.

Potential for Induced Growth by Action Alternative

Alternative 1

Potential for Induced Growth Spurred by Improvements in Station Area Connectivity: The Greater New York-North Jersey, Greater Philadelphia, and Greater Baltimore markets have the greatest gains in stations. Moreover, each gains one or more hub stations, which are focal points for development in the surrounding area. Hubs support greater development intensity than stations with just rail service. These stations have potential for indirect effects to occur as a result of induced growth.

Potential for Induced Growth Spurred by Improvements in Rail Capacity and Accessibility: Potential for induced growth spurred by additional rail capacity and accessibility under Alternative 1 would be greatest in the north region of the corridor, with the highest potential in the Greater Boston Area, followed by the Greater Providence Area. For example, rail capacity would grow approximately 160 to 175 percent in these areas. While there is potential for induced growth attributed to these factors in other metropolitan areas along the Alternative 1, the potential would be lower, with increases in rail capacity ranging from 71 to 73 percent and lower improvements in accessibility. The New York-North Jersey Area, however, would rival Boston in accessibility via increases in frequency of direct connections, and would therefore have the potential for induced growth under Alternative 1.

Potential for Induced Growth Spurred by improvements in travel time and rail capacity to New York City: Potential for induced growth spurred by these improvements under Alternative 1 would be greatest for the north region of the corridor as well, with travel times improving by almost 20 percent in the Greater Boston and Greater Providence areas. Additional rail capacity to New York City, however, would be greatest within the New York-North Jersey Area, as well as to the north in the Greater Hartford and Greater Providence areas.

Alternative 2

Potential for Induced Growth Spurred by Improvements in Station Area Connectivity: Similar to Alternative 1, the Greater New York-North Jersey, Greater Philadelphia, and Greater Baltimore markets have the greatest gains in stations under Alternative 2. Moreover, each gains one or more hub stations, which are focal points for development in the surrounding area. Hubs support greater development intensity than stations with just rail service. These stations have the potential for indirect effects associated with induced growth.

Potential for Induced Growth Spurred by Improvements in Rail Capacity and Accessibility: Potential for induced growth spurred by additional rail capacity and accessibility under Alternative 2 would be greatest in the north region of the corridor, with the highest potential in the Greater Hartford Area, followed by the Greater Boston and Providence areas. For example, rail capacity would grow approximately 1,683 percent in the Greater Hartford Area, and over 400 percent in the Greater Boston and Providence areas. While there is potential for induced growth attributed to these factors in other metropolitan areas along the Action Alternatives, the potential would be lower.

Potential for Induced Growth Spurred by improvements in travel time and rail capacity to New York City: Potential for induced growth spurred by improvements in travel time and rail capacity to New York City under Alternative 2 would be greatest within the New York-North Jersey Area, as well as to the north in the Greater Hartford Area.

Alternative 3 (All Route Options)

Potential for Induced Growth Spurred by Improvements in Station Area Connectivity: Similar to Alternatives 1 and 2, the Greater New York-North Jersey, Greater Philadelphia, and Greater Baltimore markets have the greatest gains in stations under Alternative 3. These markets have the greatest gains under Alternative 3 than other Action Alternatives. Moreover, each gains one or more hub stations, which are focal points for development in the surrounding area. Hubs support greater development intensity than stations with just rail service. These stations have potential for indirect effects associated with induced growth. .

Potential for Induced Growth Spurred by Improvements in Rail Capacity and Accessibility: Potential for induced growth spurred by additional rail capacity and accessibility under all Alternative 3 route options would be greatest in the north region of the corridor with the highest potential in the Greater Hartford Area, followed by the Greater Boston and Providence areas. However, the Greater Providence Area would see this growth only under the Alternative 3 route options that provide an additional rail route through Providence (i.e., the Central Connecticut/Providence and Long Island/Providence routes).

Rail capacity growth would range from 1,850 to 2,200 percent in the Greater Hartford Area, and from approximately 550 to 675 percent in the Greater Boston and Providence areas. The New York-Northern New Jersey Area would also see some improvements in accessibility; however, the improvements in accessibility for this area and the Greater Providence and Boston areas would be much lower than that for the Greater Hartford Area. While there is potential for induced growth attributed to these factors in other metropolitan areas along the Action Alternatives, the potential would be lower.

Potential for Induced Growth Spurred by improvements in travel time and rail capacity to New York City: Potential for induced growth spurred by improvements in travel time and rail capacity to New York City under Alternative 3 would be greatest within the New York-North Jersey Area, as well as to the north in the Greater Hartford, Providence, and Boston areas.

Potential Indirect Effects in Three Metropolitan Areas and Representative Station Areas

The following case studies present three different scenarios of potential for indirect effects across the Action Alternatives.

Greater Baltimore Area

The Greater Baltimore area would see the greatest potential for induced growth based on improvements proposed under Alternatives 2 and 3. However, the potential for induced growth would be lower in the Greater Baltimore area than in other locations along the Action Alternatives.

This area is forecast to see population and employment growth ranging from approximately 15 to 20 percent, which is higher than most other metropolitan areas along the Action Alternatives. Also, 75 percent of the counties in this area are subject to planning documents that include goals, objectives, and recommendations regarding rail transportation, TOD, and preservation of the built or natural environments. Thus, the Greater Baltimore area is growing and the area is well prepared to respond to increases in growth attributable to the Action Alternatives.

However, in the Baltimore Economic Development Workshop held in October 2014, participants identified circulation within Baltimore and the ability to access Baltimore's station as key concerns. Participants noted that transportation network conditions makes access to the station difficult and is a limiting factor on Baltimore's ability to capitalize on potential rail development.

As discussed in Section 6.3.5.1, there is no change in the range of prices—a factor that developers consider when determining what type of construction to build for the market—offered in the Greater Baltimore area under the Action Alternatives. However, because Alternative 3 has a greater number of Intercity-Express options than other Action Alternatives, it would serve the high-end market to a greater extent while other Action Alternatives offer more options in the mid-range of the market. These differences would drive the type of development constructed near stations in the Greater Baltimore area—luxury residential and office or mid-range residential with mixed-use retail, for example. The type of development that occurs would affect the surrounding community as well as the demand on public infrastructure and services, including transit services, changes.

Example of Potential Indirect Effects Near Odenton Station

Odenton station is upgraded from an existing Local station to a Hub station in the Action Alternatives. The character of the land surrounding the existing station is mixed (developed and undeveloped), which indicates that there is physical space for development. However, ecological resources and agricultural lands surrounding the station could either constrain development opportunities or be adversely affected by induced growth. (Refer to Section 6.3.6.1 for types of indirect effects that could occur on mixed [developed and undeveloped] land near the station.)

New York-North Jersey Area

The New York-North Jersey Area would see the greatest potential for induced growth, based on improvements attributable to the Action Alternatives, under Alternative 3 followed by Alternative 2. Out of all areas subject to the analysis, the New York-North Jersey Area shows the greatest improvements in travel time to New York City under Alternative 2 and Alternative 3. The growth in rail capacity to New York City is also notable under these alternatives, but highest under the Long Island/Providence and Long Island/Worcester route options of Alternative 3. This suggests a great improvement in capacity between New York City and Long Island.

This area is forecast to see population and employment growth of approximately 12 percent, which is close to the average for population and employment growth in the Affected Environment. Also, 85 percent of the counties in this area are subject to planning documents that include goals, objectives, and recommendations regarding rail transportation, TOD, and preservation of the built or natural environment. These are indicators that the New York-North Jersey Area is growing at the same pace as the Northeast as a whole and is positioned to respond to increases in growth.

However, in the New Jersey, New York City, and Long Island Economic Development Workshops held in October 2014:

4 There was a wide-ranging discussion on the difficulties of planning for station area development in New Jersey. Participants identified fragmented planning across the state and along the corridor as a major impediment to obtaining a full return on rail investment.

4 Participants reported that Long Island is reinventing itself around transit hubs, but that local village variability in planning and expertise in managing TOD were concerns in making the most of rail investment. Resistance to growth, changing the character of Long Island, and sewage treatment were also concerns and could be impediments to development.

Across the Action Alternatives, there is no change in the range of prices—a factor that developers consider when determining what type of construction to build for the market—offered in the New York-North Jersey Area. However, because Alternative 3, has a greater number of Intercity-Express options than other Action Alternatives, it would serve the high-end market to a greater extent while other Action Alternatives offer more options in the mid-range of the market. These differences would drive the type of development constructed near stations in the area as well as indirect impacts on the surrounding community and supporting infrastructure and services.

Example of Potential Indirect Effects Near Ronkonkoma Station

Ronkonkoma station would be upgraded from an existing Local station to a Hub station in the Action Alternatives. The character of the land surrounding the existing station is mixed (developed and undeveloped), which indicates that there is physical space and opportunity for development. Improvements in travel time from Long Island to New York City under Alternatives 2 and Alternative 3 as well as growth in rail capacity to New York City suggest a potential for induced growth at the Ronkonkoma station. Alternative 3 would likely bring higher-end development to the station area than Alternative 2. Shorter travel times and greater rail capacity to New York could encourage development not only in the immediate station area but also at locations within a reasonable commute time to the train station. Factors influencing the likelihood or nature of development were qualitatively discussed in the Long Island Economic Development Workshop and included availability of supporting infrastructure, resistance to growth, and variability in planning and expertise in managing TOD. These factors add to the uncertainty with regard to potential induced growth and the nature of indirect effects. (Refer to Section 6.3.6.1 for types of indirect effects that could occur on mixed [developed and undeveloped] land near the station.)

Greater Hartford Area

The Greater Hartford Area could see the greatest potential for induced growth, based on improvements attributable to the Action Alternatives, under Alternatives 3, followed by Alternative 2. The Greater Hartford Area would see the most growth in rail service and accessibility under these Action Alternatives than any other metropolitan area.

However, this area is forecast to see population growth of about 6 percent, lower than the average for the Affected Environment, and employment growth of approximately 12 percent, which is close to the average for employment growth in the Affected Environment. Furthermore, only 60 percent of the counties in Greater Hartford area are subject to planning documents that include goals, objectives, and recommendations regarding rail transportation, TOD, and preservation of the built or natural environment. These factors could affect potential induced growth in the Greater Hartford Area, as well as the nature of indirect effects should growth occur in a manner that is not consistent with desired station area planning.

In addition, in the New Haven, Hartford, and Springfield Economic Development Workshop held in October 2014, participants reported that cities are small and do not always have the political ability to assemble land to support significant TOD. There was concern that planning was fragmented to a degree that local communities along the corridor would not have the capacity to respond and prepare to capitalize on NEC investment. Beyond the required planning work, participants noted that in some cases significant utilities, zoning, and investment in supportive infrastructure would be required.

Across the Action Alternatives, the range of service types and fares—a factor that developers consider when determining what type of construction to build for the market—offered in the Greater Hartford Area differs from Alternative 1 (Medium) to Alternatives 2 and 3 (Medium-High). Alternatives 2 and 3 add Intercity-Express service. This suggests that the potential for high-end residential development and perhaps office development is greatest for this market in Alternatives 2 and 3. This development opportunity could have indirect effects on the existing community and supporting infrastructure and services provided.

Example of Potential Indirect Effects Near Hartford Station

Hartford station is upgraded from an existing Hub station to a Major Hub station in the Action Alternatives. The character of the land surrounding the existing station is mixed (developed and undeveloped), which indicates that there is physical space and opportunity for development. The observation that the Greater Hartford Area would see the most growth in rail capacity and accessibility under Alternatives 2 and 3 than any other metro area suggests that it has some of the highest potential for induced growth and development not only in the immediate station area, but at locations within reasonable commute times to the train station. Alternatives 2 and 3 would likely bring higher-end development to the station area than Alternative 1. Concerns noted in the New Haven, Hartford, and Springfield Economic Development Workshop regarding limited political ability to support TOD, fragmented planning, and insufficient infrastructure contribute to the possible indirect effects associated with the potential for growth outside the immediate station area. (Refer to Section 6.3.6.1 for types of indirect effects that could occur on mixed [developed and undeveloped] land near the station.)

Development in the Greater Hartford Area could occur in the immediate station area and in locations within reasonable commute times to the station. Growth in urban infill locations could encourage positive investment in or a strain on resources within the built and human environment and growth on undeveloped land could result in effects on the natural environment.

Potential Indirect Effects Along Connecting Corridors

Areas along connecting corridors could also experience indirect effects. The types of indirect effects resulting from induced growth in these areas would be the same as those described for the metropolitan areas served by the Action Alternatives. However, the indirect effects of Action Alternatives in areas along connecting corridors could be less intense than the indirect effects that could occur in metropolitan areas served by the Action Alternatives, which are the focus of this analysis.

Potential Indirect Effects on Freight and Connecting Commuter Rail Operations

The Action Alternatives have the potential to induce growth in many locations throughout the Northeast, which could increase demand for passenger commuter rail and other transit services on and off the NEC and have indirect effects on these operations and infrastructure. For example, an Alternative 3 route option proposes Intercity rail service to Ronkonkoma Station, an existing Long Island Rail Road commuter rail station in New York. As a result of Intercity rail service at Ronkonkoma Station, the Ronkonkoma Branch commuter rail line that serves Ronkonkoma Station and other stations along that line could experience an increase in passenger volumes.

Congestion on rail corridors that share passenger and freight operations could also increase, thus limiting capacity for freight rail operations. Induced growth could also increase or shift demand for consumer goods, which could affect freight rail operations as well.

Rail and transit operators may need to respond as demand increases for passenger rail, freight rail, and transit services. For example, transit service providers could respond to increases in demand by expanding service and making improvements in infrastructure, station amenities, and ancillary facilities such as parking facilities and traction power substations.

6.3.6.3 Potential Mitigation Strategies

While the Action Alternatives have the potential to influence changes in land development patterns and uses associated with growth, decisions related to proposed development and the approval of development would occur at the local level. Many of the areas for potential development along the Action Alternatives have planning initiatives in place to prepare for growth; however, the following mitigation strategies implemented at the local level could help minimize indirect effects that would occur:

- Development of a vision for growth around station areas that is supported by local government, stakeholders, and public involvement
- Phased investment in public infrastructure and services by the state, local governments, and transit providers to support new growth and/or acquire contributions from developers for capital investment
- Appropriate coordination with local agencies and regulatory authorities regarding sensitive environmental resources that could be affected by induced growth, including cultural and historic, hydrological, ecological, and agricultural resources, parklands, and air quality.
- Sensitivity to existing community concerns and identification of developer incentives (i.e., tax breaks, allowing increases in density of development), such as affordable housing requirements for new development.

6.3.6.4 Subsequent Tier 2 Analysis

Subsequent Tier 2 analysis would require more-detailed data gathering at the local level to determine more-specific indirect effects associated with potential induced growth around a station area.

In addition, the FRA did not evaluate community-specific resources or infrastructure in this Tier 1 Draft EIS. Induced growth could place additional strain on these resources and existing resources may not be sufficient to support the amount of growth that could occur in these areas. Additional analysis regarding these types of resources would be required during Tier 2 analyses.