High Speed Rail Empire Corridor

Tier 1 Draft Environmental Impact Statement Volume 3

EMPIRE CORRIDOR
HIGH SPEED RAIL • TIER 1 EIS
NEW YORK STATE DEPARTMENT OF TRANSPORTATION

New York State Department of Transportation

U.S. Department of Transportation Federal Railroad Administration

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High Speed Rail Empire Corridor Program
Tier 1 Draft Environmental Impact Statement

This Tier 1 Draft Environmental Impact Statement (EIS) consists of four volumes:

Volume 1 **Environmental Impact Statement**, which includes:

- Executive Summary
- Chapter 1, Introduction and Purpose and Need
- Chapter 2, Existing Transportation Conditions and Major Markets
- Chapter 3, Alternatives
- Chapter 4, Social, Economic, and Environmental Considerations
- Chapter 5, Financial Capacity
- Chapter 6, Comparison of Alternatives
- Chapter 7, Comments and Coordination
- References, Acronyms, Glossary of Terms, and List of Preparers

Volume 2 **Appendix A - Track Schematics**, ***(On CD-ROM at the back of Volume 1)***
Track schematic (11”x17”) plans of the Base Alternative and four Build Alternatives

Volume 3 **Appendices B through H, *(On CD-ROM at the back of Volume 1)***

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- Appendix C Alternatives Development and Screening Report
- Appendix D Rail Network Operations Simulation
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Appendix B Ridership and Revenue Forecasting

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The following report was produced in spring 2011 and describes the target travel markets and the travel demand and subsequent market and revenue forecasting methodologies that were used to forecast travel demand and fare revenues anticipated in a 2018 base and a 2035 horizon year for the Base, or No Action (No-Build), and six build alternatives under consideration for the Empire Corridor High Speed Rail Program at that time. In late 2011, an alternatives screening process was undertaken that led to the rejection of the 79 mph (Maximum Allowable Speed; MAS) alternatives from the program (Alternatives 79A, B and C), and the inclusion of a Very High Speed (VHS) 125 mph MAS alternative, that would serve only the major markets of Albany, Syracuse, Rochester and Buffalo.

The same modeling and forecasting methodologies were applied to the 125 mph alternative as had been applied to the lower-speed alternatives, and the results reported in the EIS are therefore comparable in terms of relative ridership and travel time benefits, revenues, and costs and impacts.

The Alternatives Development and Screening Report is attached as Appendix C.

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Executive Summary

The ***Ridership and Revenue Market Forecast for Empire Corridor High Speed Intercity Passenger Rail Tier EIS*** is a critical element of the Tier I Environmental Impact Statement process. The effort builds on initial market analysis related to the High Speed Intercity Passenger Rail initiative. This report provides a full discussion of the program context, the model development process, and results. Among the key findings are the following:

- A Total Ridership Forecast of 2.75 million for the 110 mph option in 2035 compared to 1.59 million under the Base (No Action) condition for the same 2035 model year. This represents a net increase of 1.15 million riders or a 74 percent increase in ridership over the Base (No Action) condition.

- Ridership responds to even modest increase in speeds.

- As noted in prior presentations during the forecasting process, the bulk of forecast increases in demand derives from the longer trips on the corridor; those from NYC to Syracuse, Rochester and Buffalo. For the entire corridor, rail draws about half of its forecast growth in ridership from the air market and approximately 25 percent from bus and auto trips. This is a positive result and consistent with public policy goals of reducing VMT and regional air travel.

The detailed major market analysis reveals that major market cities on the East-West portion of the Empire Corridor between Albany/Rensselaer and Niagara Falls are projected to experience significant growth in ridership. This result is in response to adjustments in sensitivity that were made to the model that better represented the impact of the competitive advantage accrued from improvements to the Empire Corridor versus other modes. However, this should be put in the perspective of relatively modest ridership in the existing condition. There may be value in testing the impact of other operational approaches which may yield higher ridership as this corridor has a very large potential competitive travel market (primarily auto) from which the rail share may grow.

These results are viewed as positive from a base demand perspective and will be bolstered by further consideration of rail-generated economic impact and attendant induced growth, scaled transit programs and local transit-supportive land use policies around stations. Further, additional operational considerations such as express or limited express routes have the opportunity to connect some of the major markets with faster travel times by removing intermediate stops. It is worth evaluating whether such approaches can make rail more appealing to travelers who currently favor air to make longer trips between corridor destinations.

These and other findings are discussed in greater detail in the report. In the Appendices to this report, forecast tables for any origin-destination pair or mode of travel can be found, further highlighting differences among the alternatives studied and their individual benefits. It must be noted that it cannot yet be determined which of the alternatives definitively yields the best selection relative to capital and operating/maintenance costs. Once this data is generated for the alternatives the Study Team will be better equipped to balance the benefits and equities among the alternatives.

1.0 Introduction

1.1 Overview

In anticipation of implementation of Empire Corridor High Speed Rail service between New York City and Buffalo, this report, a component of the Tier I Programmatic Environmental Impact Statement (EIS), provides ridership and revenue forecasts for each of the program alternatives. The ridership and revenue results are based on a competitive evaluation of existing travel modes (i.e., auto, bus, air, and rail), using various socio-economic, discretionary choice, and travel condition inputs.

1.2 Program Area

The program area is the 465 mile Empire Corridor running from New York City to Niagara Falls; Exhibit B-1. The Corridor is often described using its two distinct geographies – the southern corridor – or EC South -- and the western corridor – EC West. EC South runs from New York City to Albany, while EC West runs from Albany to Niagara Falls.

For analysis purposes, this study looked at three different levels of geographic detail. The first analysis level was the entire corridor, "corridor-wide", which includes all 17 stations that will have Empire Rail HSIPR service. The second analysis level was "Major Markets," which includes the Metropolitan Planning Organizations (MPOs) on the corridor; each MPO is centered around one of six major cities that together contain 13 of the corridor's 17 stations. This is where the majority of new rail ridership is expected to occur. The third level of analysis was "Major Market to Major Market," which allows the study to show which market pairs that are experiencing shifts in ridership and competitive mode share based on more local travel characteristics.

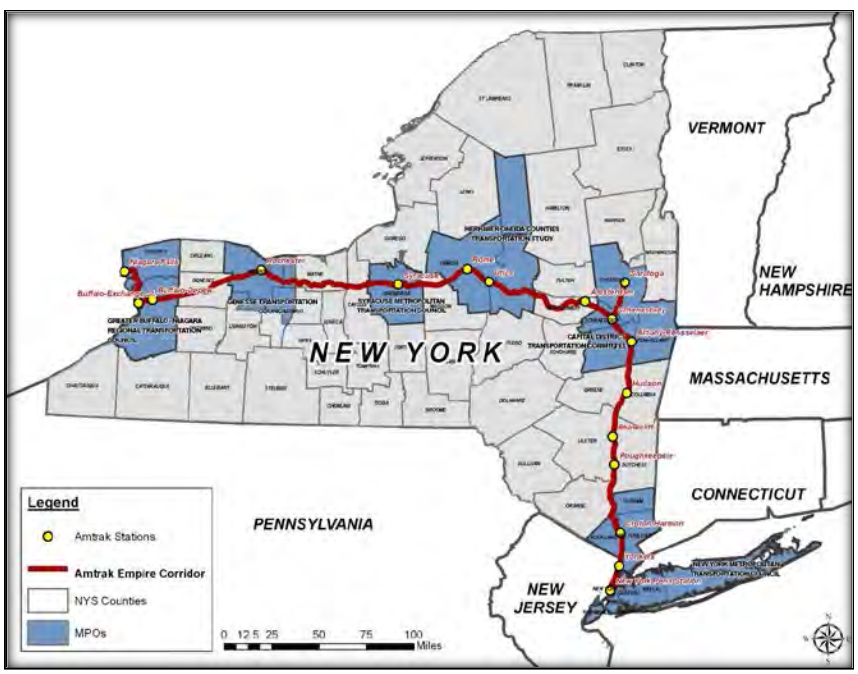


Exhibit B-1: Study Area

Exhibit B-2 below identifies the levels of analysis described above. It explains in specific detail what stations or geographies are included in each analysis level.

Level 1 Analysis	Level 2 Analysis	Level 3 Analysis
Entire Corridor (17 Stations)	**Major Markets (6 Markets/13 stations)**	**Major Market to Major Market Pairs (15 pairs)**
New York	**New York (NYC)**	NYC-ALB
Yonkers		NYC-UTI
Croton-Harmon		NYC-SYR
Poughkeepsie		NYC-ROC
Rhinecliff-Kingston		NYC-BUF
Hudson	**Albany (ALB)**	ALB-UTI
Albany-Rensselaer		ALB-SYR
Schenectady		ALB-ROC
Amsterdam		ALB-BUF
Utica	**Utica (UTI)**	UTI-SYR
Rome		UTI-ROC
Syracuse	**Syracuse (SYR)**	UTI-BUF
Rochester	**Rochester (ROC)**	SYR-ROC
Buffalo Depew	**Buffalo (BUF)**	SYR-BUF
Buffalo Exchange		ROC-BUF
Niagara Falls		

Exhibit B-2: Levels of Analysis

1.3 Objectives of Study

While New York State's (NYS) population continues to grow, increasing demands upon the road and air travel networks, numerous past studies have indicated that providing a high-speed ground transportation system (HSGT) system in New York State can provide significant opportunity to alleviate congestion, reduce carbon emissions and petroleum dependence, improve air quality, and create broad economic opportunities from the creation of a rail-based "high skill, high-wage job base,"[1] to increased mobility creating greater access to jobs, the revitalization of upstate cities, and increased tourism and productivity.

The purpose of this study is to perform a comprehensive market and ridership demand assessment of the Empire Corridor Rail Service (ECRS), with the goal of understanding projected 2035 ridership as a

[1] New York State Department of Transportation "Moving Toward the 21st Century: A proposal for High Speed Ground Transportation in the State of New York" 1995.

function of travel time by city pair, level of service, reliability and projected fare structure. The purpose of these results is to translate future ridership into future gross revenue. This study seeks further to use these gross revenue estimates for each alternative to enable an assessment of their relative costs and benefits. The end product of this report is limited to specific, pre-determined service plans for future improved rail service and will result in a series of travel demand forecasts for these plans. This task in coordination with service planning, capital and environmental planning will facilitate the identification of an optimal rail service level that achieves the highest ridership for a level of investment (both capital and operating) that is attainable and sustainable. The analysis conducted within this task will result in ridership demand forecasting model that will be used to help develop the deliverables associated with other Tasks in the Tier 1 EIS, particularly Task 4: Alternatives Development and Planning and Task 7: Operations Planning and Simulation Modeling.

The analyses conducted within this task will also produce base Service and Operating Plans, which will serve as a basis for creating infrastructure-based Service and Operating Plans for 2018 and 2035 Build scenarios for three different maximum speeds (79, 90 and 110 mph); using supplied service and operating plans through 2012, 2018 and 2035. These results will be compared against existing and forecasted trips in Section 6 of this report.

This report provides additional background information about the corridor as input to the travel demand model, including socioeconomic conditions and existing transportation conditions; as well as consideration and evaluation of other key market drivers that will allow for optimization of revenue and ridership; and presents the methodology used in obtaining, analyzing, and modeling the data.

1.4 History of Empire Corridor HSIPR Demand Forecasting Efforts

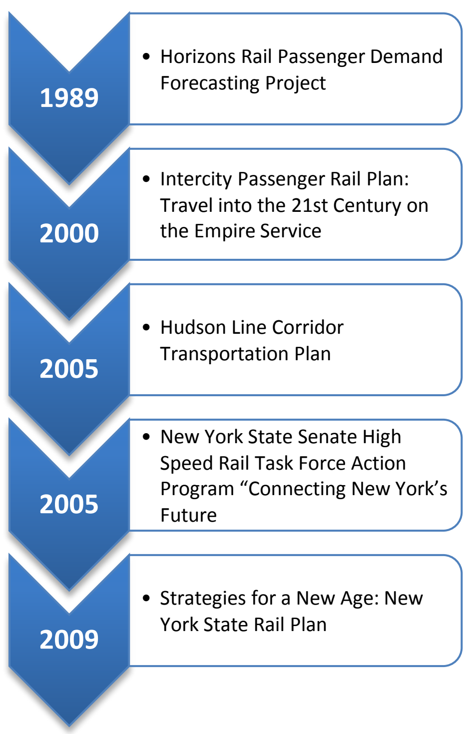


Exhibit B-3: Previous Empire Corridor Demand Forecasting Reports

Since 1989, public and private entities, political leaders and industry experts have collaboratively worked towards the goal of enhancing Empire Corridor passenger rail service to foster an improved transportation mode that would be highly competitive with air and auto travel. Many studies have been undertaken, some of which included travel demand forecasting. The following is a brief review of the travel demand forecasting studies which have been undertaken. Exhibit B-3 provides a graphic summary of the inter-relationships of these previous Empire Corridor Demand Forecasting Reports.

The first Empire Corridor High Speed Rail Study was the Horizons Rail Passenger Demand Forecasting Project commissioned by NYSDOT in 1989. Seeking a review of travel behavior and an assessment of the implications of various rail strategies in the EC West, the report identified approximately 109 million person trips by air, auto and bus on Interstates 87 and 90, and rail. Auto was the predominant travel mode (92.2%), followed by air (4.8%), bus (1.8%) and lastly, train (1%). Applying the then-existing mode shares to future travel demand, the study indicated that rail travel and revenue in the

EC West would increase by 50 percent between 1986 and 2010, , and revenue would grow from $8.3 million to $12.6 million. The study found that providing a 10 to 40 minute time savings over current rail travel-time would result in 4.5 million to 11.3 million additional passenger miles by rail and $0.3 million to $1.3 million in additional rail system revenue.

As Empire Corridor ridership peaked at 1.26 million in 2000, Intercity Passenger Rail Plan: Travel into the 21st Century on the Empire Service was released in February 2000, defining NYSDOT's *Vision for High Speed Passenger Rail Service*. The Vision Plan details specific ridership and frequency improvements; specifies expected public benefits; summarizes capital cost expenses and anticipated cost for each phase; outlines next steps; and suggests future high speed rail projects and services to meet these objectives.

Building on the prior work, the Hudson Line Corridor Transportation Plan, released in 2005, provided a comprehensive study of the train operations and infrastructure needs for the joint users of the corridor (Metro North Railroad (MNR), Amtrak, CSX freight (CSX), Canadian Pacific Railway (CP), and NYSDOT) over a 20 year planning period. The general goals were to determine operational and system improvements that would provide increased capacity, flexibility and train speed as well as improvements in system cost effectiveness and enhanced safety.

Anticipating that Metro-North peak ridership would grow by 50 percent from 2002 to 2022, necessitating a 17percent increase in the number of daily trains, and combined with Amtrak desires to increase the number of daily trains by 88 percent by 2022, the Hudson Line Corridor Transportation Plan assessed current year (2002) and 2022 no-build conditions, and 2022 alternatives using rail simulation software. While the "no build" simulation showed insufficient infrastructure to accommodate 2022 service needs, the alternative scenarios, based on a series of system improvements and revised operating plans (developed through a "charette" session with a team of rail professionals) indicated operating performance equal to or superior to the 2002 base scenario, while processing the projected greater number of trains.

The New York State Senate Rail Task force was established in June 2005. The Task Force released the New York State Senate High Speed Rail Task Force Action Program Connecting New York's Future, on December 23, 2005. Describing how the Empire Corridor service was once a single, unified railroad operation under the New York Central Railroad, the report recognized that the Empire Corridor had become more important than ever, as 90 percent of the NYS population was living there and the EC West segment provides a key route for CSX freight connections to west coast ports and the eastern seaboard through Chicago. Present day control of the Empire Corridor is highly fragmented, however, with CSX and MNR controlling the majority of the 460-mile Empire Corridor, and Amtrak, the operator of intercity passenger rail, controlling only 30 miles. This disaggregated ownership creates reliability problems as only 60 percent of Amtrak trains were arriving on time during that period, with passenger trains receiving the lowest priority for train dispatching by MNR and CSX.

To improve reliability and enhance service towards a high-speed operation, the Task Force Action Program established short term (1-3 years) incremental service and capital improvements, as well as new operational and institutional arrangements. The plan also proposed a longer term phased implementation of a Very High Speed Rail (VHSR)/Maglev system, to be accomplished through a market-based partnership. Given the proposed improvements, the NYC to Albany rail-trip time was estimated to decrease from 2 hrs 25 min to 1 hr 59 min by 2009, increasing ridership to 1.96 million passengers annually, based on a capital investment of $428 million. By 2015 the program was projected to reduce trip time to 1 hr 48 min, increasing ridership to 2.99 million passengers with an additional capital investment of $174 million. By 2025, a Maglev system would be complete, resulting in 6.71 million riders and no further capital investment. The Program was also anticipated to reduce the Albany-to-Buffalo trip time from 5 hrs 45 min to 5 hrs by 2015 and increase ridership on that segment to 0.96 million annually, based on a capital investment of $613 million, eventually reducing trip time to 2-3 hrs under a Maglev system by 2025 with 3.47 million riders, and no further capital investment.

Federal support of passenger rail gained momentum when the Passenger Rail Investment and Improvement Act of 2008 (PRIIA) was passed on June 11. The bill reauthorized Amtrak, while tasking Amtrak, U.S. DOT, FRA and the states to jointly improve operations and facilities so as to enhance intercity passenger rail. In addition to other programs, PRIIA authorized funds to establish and implement a high-speed rail corridor development program, to be administered through DOT. High-Speed Rail was defined as intercity rail passenger service that achieves operating speeds of at least 110 miles per hour.

Concurrently, Strategies for a New Age: New York State Rail Plan 2009, the State's first rail plan in 22 years, set forth a framework for the management, promotion and improvement of New York's rail system through 2030. While the report indicated that passenger ridership increased 23 percent between 2007 and 2008 in the EC West segment of the Corridor, the plan recognized the need for setting and achieving operational goals, including 95 percent on-time performance, and reliable, faster and more frequent service, to make rail competitive with auto travel. The plan also detailed the "Third Track Initiative" to expand, enhance, and support capacity growth for intercity passenger and freight rail service in the EC West segment. Lastly, the plan advised that the future success of passenger and freight rail transportation in NY could only be achieved through the joint effort of the public and private sectors, and a stable and predictable funding partnership.

There have been a series of federal actions to support HSR initiatives in response to the country's post 2008 economic downturn. As part of the American Recovery and Reinvestment Act of 2009 (ARRA), passed by Congress on February 13, 2009, $8 billion was allocated to High-Speed and intercity passenger rail. This funding represents the first appropriation under the three new grant programs established in PRIIA. Following that allocation, on April 16, 2009 President Obama called for a collaborative effort among the Federal Government, states, railroads, and other key stakeholders, to create a national network of High-Speed Rail corridors.

Following the ARRA appropriations, the FRA launched the High-Speed Intercity Passenger Rail (HSIPR) Program in June 2009. Under this program, NYSDOT submitted a grant application to FRA on October 2, 2009, requesting $11.6 billion dollars to fund the Empire Corridor HSR program.

On January 28, 2010, President Obama announced the first recipients selected to share the $8 billion in funding. New York State received $151 million, with $148 million going towards seven Empire Corridor projects. In addition to using this funding to advance the capital program, NYSDOT initiated a Tier 1 Environmental Impact Statement for the proposed New York State Empire Corridor High-Speed Rail System. With its completion, the Empire Corridor will become eligible for additional funding under the HSIPR program.

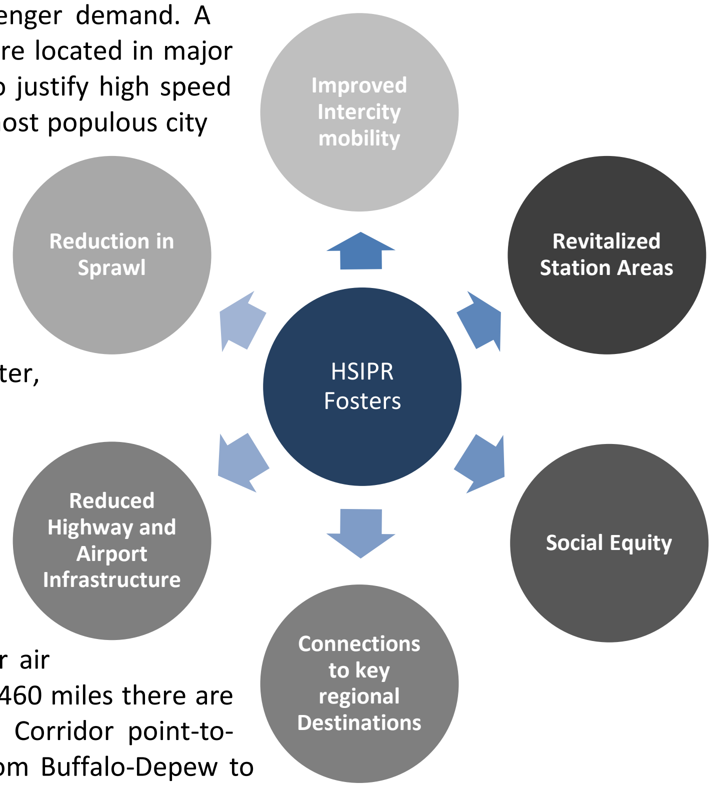
1.5 Market Qualities of Successful High Speed Rail

With varying distances between major markets, different maximum achievable speeds on different segments, and differing condition of the right-of-way,[2] the potential for economic stimulus, congestion relief and environmental benefits of HSIPR differs for each potential market in the EC Corridor. With these factors in mind, the FRA HSIPR Program developed three broad definitions of high speed service:
HSR Express: Service operating in corridors 200-600 miles in length with top speed of over 150 mph on primarily dedicated tracks. These services are expected to be very competitive with air and auto trips in these markets.

HSR Regional: Service operating at a top speed of 110-150 mph on a mix of dedicated tracks and tracks shared with slower passenger and freight trains.

Emerging HSR: Corridors of 100-500 miles in length with service operating at top speeds of 90 - 110 mph on tracks shared with freight and/or commuter services. This service is intended to build a market for intercity rail and is only expected to have a limited effect on passengers from other modes. The FRA is positioning these corridors as having potential to someday achieve high-speed service through incremental investments and service improvements that could build market over time. Empire Corridor High Speed Intercity Passenger Rail falls within this "Emerging HSR" category.[3]
The FRA selected corridors to received stimulus funding where the appropriate conditions existed to support strong passenger demand. A major grant evaluation criterion was ensuring stations are located in major metropolitan areas, creating sufficient travel demand to justify high speed service. The Empire corridor fulfills this criteria, as the most populous city and metropolitan statistical area (MSA) in the country, New York City, part of the New York-Northern New Jersey-Long Island and Southern New Jersey-Pennsylvania MSAs serves as the southern anchor of the Empire Corridor with over 19 million residents as of the 2010 US Census. Additionally, other cities with station locations along the route, namely Albany, Rochester, Utica, Syracuse and Buffalo are classified as MSA's.

Figure B-4: Benefits of High Speed Intercity Passenger Rail



A second condition for successful HSIPR service is having the appropriate distance between stops. HSIPR should be confined to distances between 100-500 miles, and FRA found that stops 250 miles apart should receive the highest value.[4] Shorter trips are best for auto and commuter rail, while longer trips are best for air travel. While the Empire corridor from NY to Buffalo is 460 miles there are sixteen destinations on the route. This means Empire Corridor point-to-point distances may range from as little as 6 miles (from Buffalo-Depew to

[2] Regional Plan Association. America 2050: Where High Speed Rail Works Best. 1. September 2009.

[3] Ibid, 2.

[4] Ibid, 3.

Buffalo-Exchange) to as much as 79 miles between adjacent markets, (between Syracuse and Rochester); See Exhibit B-5. But the overall length of 460 miles between NYC and Niagara Falls certainly meets the definition as FRA intended.

The third condition is locating HSIPR in metropolitan regions with existing transit systems. One of HSIPR's competitive advantages over air is that passengers generally arrive in a city center from where riders can avail themselves of connecting regional rail, commuter rail and local transit networks. For travelers with both their origin and their destination in central cities, HSIPR service is convenient for business and non-business travelers alike if the service offers robust connections to regional transit. With its large population located within easy access to the regional transit system, New York City has optimum transit connections, making HSIPR a viable, competitive service. [5]

Exhibit B-5: Empire Corridor Distance Between Stations

Station	Distance on Corridor (mi)	Distance between Stops (mi)
New York	0	
Yonkers	14	14
Croton-Harmon	32	18
Poughkeepsie	73	41
Rhinecliff-Kingston	88	15
Hudson	114	26
Albany-Rensselaer	141	27
Schenectady	159	18
Amsterdam	177	18
Utica	237	60
Rome	250	13
Syracuse	291	41
Rochester	370	79
Buffalo Depew	431	61
Buffalo Exchange	437	6
Niagara Falls	460	23

Further, High Speed Rail should be located in Metropolitan Regions with strong Gross Domestic Product (GDP). The southern anchor of the Empire Corridor is part of the Northeast Mega-region, accounting for one-fifth the nation's GDP. Despite several of the EC West markets underperforming economically, most of the MPO's have large employment markets and populations which, taken together, are equivalent to a corridor with significant GDP. HSIPR service that directly connects the heart of New York City to city centers on the EC West segment of the Corridor, including Buffalo, Utica, Rochester and Syracuse, may further stimulate the economy of these less economically robust cities.

Competitive High Speed Rail service is also most successful when located in regions with high congestion levels. Under these conditions, auto drivers are more easily influenced to transfer to a transit mode if it is competitive with or faster or cheaper than the trip it replaces. The FRA notes that HSIPR "systems compete more with short-haul air travel than intercity auto trips and have the potential to decongest some of the nation's most congested airports."[6] This includes all three New York metro airports, which have poor on-time performance rates due to both ground-side and air side congestion; see[7] Section 4.5 Auto Trips Data Collection.

Finally, the most successful high speed rail service would be located within a mega-region. When located in such a large and dynamic economy, HSIPR can anchor a greater HSIPR network, fostering rail

[5] Ibid, 4.

[6] Ibid, 5.

[7] Bureau of Transportation Statistics, http://www.bts.gov/programs/airline_information/

connections between major cities. Cities within megaregions also tend to have the population, supportive densities and transit connections best suited to HSIPR systems.[8]

1.6 Empire Corridor Barriers and Strengths

As an Emerging HSR corridor, the Empire Corridor possesses natural strengths, and appropriate conditions, consistent with FRA recommendations, that position it for success. The corridor's principal cities, New York, Poughkeepsie, Albany, Utica, Syracuse, Rochester, and Buffalo, are well spaced for high-speed rail service, and are the most densely settled areas on the corridor; see Exhibit B-1. This is an ideal condition for gaining and sustaining increasing ridership, which in turn justifies frequent service, as dense population centers are more transit-oriented and would be more likely to use a reliable, well-scheduled transit service. However, this means that true success will depend not just on the development of HSIPR, but on the service being supported by the appropriate surrounding land use, development density, and local transit links.

Although the success of HSIPR depends on the appropriate population density in the station cities, many Empire Corridor cities have experienced a population decline over the past thirty years directly resulting from a decline in their core centers, over the past fifty years. This decline is directly linked to the decline of manufacturing industries in both the US and these cities. The United States Regional Plan Association and Lincoln Institute of Land Policy, through their joint venture, America 2050, identified "Underperforming Regions," as compared to overall national economic performance regarding population, employment, and wages. Underperforming geographies tend to be in agricultural and resource-dependent rural regions, as well as former industrial regions. This classification is typical of the EC West segment off the EC Corridor, and as a result, portions of this Corridor do fall into the category of an underperforming region.[9] America 2050 found that the largest underperforming region, in terms of population and economic potential, is the Great Lakes mega-region, which includes portions of the EC West Corridor. With a 2009 population of 54 million, this mega-region has lost more than 1.2 million manufacturing jobs since 1990.[10] By investing in infrastructure-based strategies, such as those provided through the ARRA and FRA's high-speed rail initiative, the Federal Government seeks to provide a catalyst for positive growth and change within these regions.

Meanwhile, land use patterns, supported by the zoning and development practices of the Post-WWII era, have led to highly dispersed development patterns both in urban and rural areas, further reinforcing auto-dependency throughout the Corridor. As Section 4.0, Existing Travel Market Conditions shows, over 65 percent of all trips made along the Corridor are made by auto. To support HSIPR, local and regional governing bodies and agencies must begin to advocate and foster denser, transit-supporting development patterns. Transit authorities, regional planning bodies and county planning boards must work together to provide transit supporting land uses around HSIPR stations as well as transit linkages along major corridors and between local population hubs.

As an example of decline and opportunity for urban restoration, the Buffalo/Niagara Falls metropolitan region, with the City of Buffalo as its major city, serves as the far western market for the Empire

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8 Ibid, 5-6.

9 Lincoln Institute of Land Policy and Regional Plan Association. America 2050 Research Seminar: Discussion Papers and Summary. Healdsburg, California- March 29-31, 2009.

10 Ibid, 13.

Corridor. This region has experienced a near 17 percent population decline between 1990 and 2008. Buffalo, the second largest city in New York State, comprises approximately 28 percent of the Greater Buffalo-Niagara Regional Transportation Council region and is expected to experience population and employment growth between 2012 and 2035.

Meanwhile, the metropolitan Albany region has recognized a growth in population over the past decade based on recent results from the 2010 US Census,[11] yet significant portions of its core metropolitan population has declined while other nearby sprawled suburban and rural areas have gained population – leaving a relatively mixed picture and relatively depopulated city center.[12] Significant density - at least 4,000 persons per square mile in the core area – is vital for HSIPR ridership. The metropolitan populations lying on the suburban fringe often find it more convenient to use their private automobiles and are resistant to efforts to shift them from auto to rail. Still, the City of Albany is anchored by a large university population and the core workforce is dominated by State employees, health-care and education workers. This academic and business population base within the core city could benefit from the convenience of HSIPR, particularly as it links them with increasing ease to major education and health centers in New York City. Section 3 of this Task Report identifies the Capital Region as an MSA which is expected to experience some of the largest percentage gains in employment and population between 2012 and 2035 (Exhibits B-10 and B-11). The form of development to accommodate this expected increase in population and employment, as well as whether they are able to further develop supporting transit links, will have a large impact on HSIPR ridership. Dense development located near the HSIPR station, or located in a hub that is itself linked to the station via fast, reliable transit, will be critical in making HSIPR successful. The Capital District Transportation Committee's existing Community and Transportation Linkage Planning Program, which aims to integrated land use and transportation planning, must continue to seek support from planning authorities from Albany, Rensselaer, Saratoga and Schenectady Counties, and the local transit authorities must continue to evaluate, develop and implement a transit-supporting transportation and land use vision throughout the Capital district region.

1.7 Forecast Development Process

The travel demand forecast development process was based on standard planning principals, evaluation of the required level of detail in available data, and available modeling platforms. The approach can be simplified to the process diagram below. The major components of this forecast development process are briefly discussed in the following narrative section.

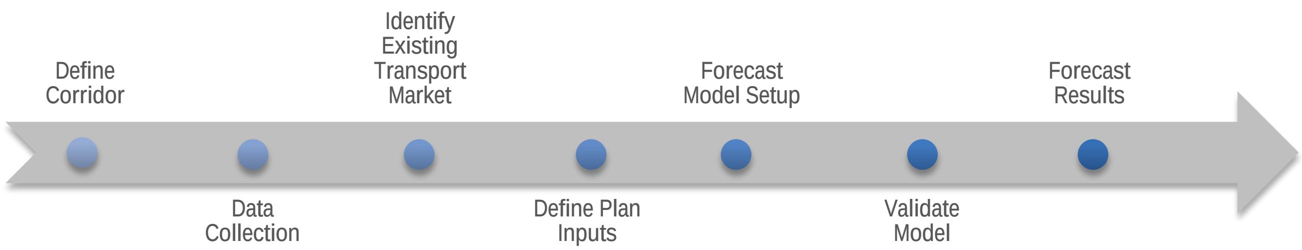


Figure B-6: Forecast Development Process

[11] http://alloveralbany.com/archive/2011/03/25/capital-region-2010-census-population-totals

[12] http://projects.nytimes.com/census/2010/map. See Albany Metro area for assessment of population by census block.

1.7.1 Market Definition

To begin developing the forecast model, (as detailed in Exhibit B-5) it was necessary to understand the extent of the potential market. This was done by defining the corridor based upon the relationship of existing Empire Corridor Amtrak stations to the geographic region in which they are located. Station areas and their identified general and potential market service areas served as the basis by which to compare rail transit and other travel modes (auto, bus, air). This allowed for the assembly of the existing transportation network, and related existing and forecasted socioeconomic and transportation market conditions. This network became the basis through which major markets and sub-markets were evaluated.

Data collection was undertaken to find the necessary information on socioeconomic and transportation conditions. Socioeconomic trends were analyzed to compare the forecasted change over time in relation to population, households and employment. Section 3.0 Socioeconomic Conditions and Projections details these findings. Existing competitive transportation modes were compared in relation to time, frequency, reliability, congestion levels and cost and are detailed in Section 4.0 Existing Travel Market Conditions.

1.7.2 Model Inputs

Existing and Preliminary HSR service options, including, the schedule, speed, number of stops, fares, and mode choice selection criteria were defined and input into the model for 2009, the model Existing Conditions year. The 2009 existing conditions model was then calibrated (and its driving algorithms adjusted) until its outputs matched known travel behavior. The forecasted modal demand, fare price, socioeconomic projections, congestion level, station to station run time, frequency, dwell times, intermediate destinations, and induced demand was input into the model for the following years:

2012 - Projected for Base Conditions / EIS Base Year
2018 - Phase I of Rail Service Improvements Completed (79, 90 and 110 mph)
2035 - All Rail Service Improvements Completed (79, 90 and 110 mph)

The model was also configured to analyze no-build scenarios, which analyze growth in ridership based upon projected socio-economic changes but with no change in transportation service between 2012 and 2018/2035.

1.7.3 Model Development Methodology

Following the completion of data entry and calibration, preliminary model runs were performed. The growth and ridership for all six 2018 and 2035 scenarios (identified above under model input section and defined in more detail in Section 7 Sensitivity Tests) were compared against the 2012 baseline. These results were evaluated and service options were then refined to result in projected ridership levels. This section briefly describes the methodological approach to the model design, data development and implementation. A more complete description is presented in Appendix A: Methodology.

Model Design and Specification

This section describes the basic structure of the Empire Corridor intercity travel demand model. Cube Voyager Software, designed by Citiliabs, was used to construct the model and to provide forecast outputs. The model is configured to produce a forecast of zone-to-zone person-trips by mode (auto, air, bus, and rail). By zone, this report means census block. The zones as shown in Exhibit B-7 include all 1040 census blocks for the State of New York and 40 external census blocks outside of the state. This means that the model evaluates travel between all of these blocks. The capture of rail transit users from this matrix is based on mode selection parameters that consider travel time, cost, level of service, and other factors – and weights the gravity of the train station to transfer from one mode to another based on availability of other modes and their relationship to the zone pair considered.

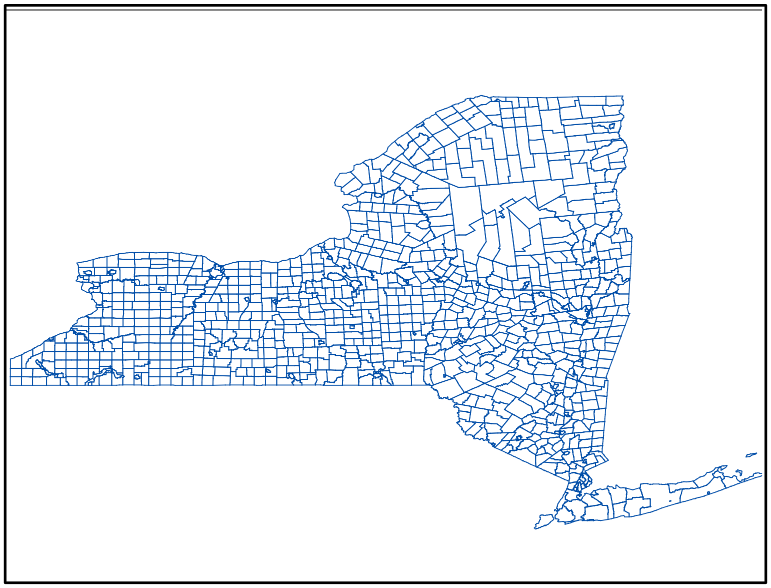


Figure B-7: 1080 Block Zone Used for Ridership Modeling

Furthermore, a design goal of the model is to minimize the number of parameters requiring calibration, instead making maximum use of the observed trip movement data. (This study effort is not intended to collect or include conventional household or personal survey data, as explained further in the next section). Finally, the model structure is intended to be scalable, so that the initial corridor model needed for rail ridership forecasting can be expanded in scope and detail to eventually become a statewide intercity travel demand model.

An initial "pivot" model structure was adapted previously to meet the needs of this program while taking into consideration the other constraints and goals identified above. The pivot model includes the four steps of a conventional Urban Transportation Planning System (UTPS) style model: trip generation, distribution, mode split, and assignment. However in this "pivot" structure each of these steps is formulated incrementally.

In relation to other models surveyed,[13] the structure of this model is similar to that reported in the Thailand high-speed rail feasibility study, while incorporating aspects of the California HSR model and prior New York models. It is important to note that, in addition to being formulated incrementally, the process described above reverses the conventional order of the four steps in the UTPS model, in order to pass information between the steps in an integrated manner.

The mode split and trip distribution steps are incremental multinomial logit models connected using composite impedance terms. Together these combined models forecast the counterfactual number of person-trips that would travel between each zone pair by mode if generalized travel costs changed, without altering the magnitude of trip ends.

13 See Appendix A

In practice, the unobserved characteristics of non–auto modes are correlated, creating unique competition patterns between the highway mode and other modes. The model requires a highway network plus a set of multi-modal public transit lines representing non-auto modes of travel. Zone-to-zone highway generalized costs are extracted by using the Cube Voyager HIGHWAY program to construct minimum-time network paths from origin to destination and tracing (or "skimming") the time, distance, and toll cost associated with each origin-destination pair.

For the Empire Corridor study, highway network congestion was estimated by calibrating a statewide vehicle-trip matrix from Highway Performance Monitoring System[14] (HPMS) counts using maximum likelihood origin-destination matrix estimation techniques, and then assigning this matrix to the highway network using an iterative user equilibrium algorithm. For future years, the vehicle-trip matrix is factored to reflect growth in total vehicle-trip ends, based upon changes in socio-economic zonal variables. The vehicle traffic growth factor is computed as the ratio of future to base population plus two times employment in each zone, a widely used heuristic when more detailed trip generation parameters are not known. These growth factors are then used to compute row and column matrix margin targets for an iterative proportional fitting algorithm implemented using the Cube Voyager FRATAR module to develop a future year vehicle trip matrix.

Similarly, growth factors are computed for intercity person-trips as well, based upon the change in socio-economic zonal variables. However, in this growth factor calculation, employment is weighted based upon the assumed percentage of business travel (identified from Bureau of Transportation Statistics). These growth factors are applied to the forecast person-trip table created after applying the destination shifts indicated by the incremental logit model. Lastly, the shifted mode share percentages calculated using the hierarchical logit mode choice model are applied to derive future year intercity travel by mode.

The "pivot" model described above has only a handful of calibrated parameters, most of which are directly transferrable from other studies or may be asserted based upon conventional industry standards. It is also scalable, working essentially the same way regardless of zone system or network size, and accommodating expansion of detail in future revisions. The counterpoint to this simplicity and scalability is that the model is heavily dependent upon the input base travel matrices-if no travel is observed between two zones by a certain mode in the base scenario, none will be predicted in the future scenario. Thus, although appropriate for analysis of the proposed upgrades to the existing Empire Corridor, the pivot model structure would be inappropriate for analysis of a new location rail corridor or extension of rail service into a presently un-served area. Furthermore, in practice, it is impossible to observe trips by mode from their "true" origin to their "true" destination; rather the data in this study included observed ridership from station to station and similar part-trip data for other modes (i.e. interchange to interchange, airport to airport, and terminal to terminal). Thus most of the effort involved in calibrating the pivot model was dedicated to estimating the true origin and destination zone for these observed partial trips.

[14] http://www.fhwa.dot.gov/policy/ohpi/hpms/abouthpms.cfm

1.7.4 Data Development and Implementation

The modeling approach for this study was structured to make maximum use of available databases. To help quantify the existing shares of travel by the various modes in the corridor, the following existing data sources were used:

Annual 2009 Amtrak boardings and alightings by station

- Annual 2009 Thruway trips by interchange pair
- Annual 2009 air travel (passengers) between major NY airports
- Bus trips between major NY cities in 2009
- Various ESRI GIS format data was also compiled from public sources, including:
  - National Highway Planning Network (NHPN) roadway centerline shapefiles, with attributes describing the functional classification, number of lanes, and Annual
  - Average Daily Traffic (AADT) of major roadways included in the Highway Performance Monitoring System (HPMS)
  - Locations of interchanges and toll plazas on the New York State Thruway
  - Polyline data representing the Amtrak rail network and point data representing actively used and proposed station locations
  - Polyline data representing intercity bus routes and point data representing the current bus station locations
  - Point data representing the locations of major airports in New York City, Albany, Syracuse, Rochester, and Buffalo
  - Census polygon area (e.g. county, subdivision, tract, block) boundaries
  - New York area transit information imported from Google Transit Feed format
- In addition, socio-economic data were compiled from the following sources:
  - Block-level demographics from the decennial U.S. Census 2000 files
  - Block-level employment estimates at places of work from the Longitudinal
  - Employer-Household Dynamics "OnTheMap" synthetic micro-data

Given the scope of the rail ridership forecast effort, to directly estimate parameters for trip generation, distribution, and mode split models, it was necessary to maximize use of the available data while requiring minimal estimation and calibration of new model parameters. Therefore an incremental or "pivot modeling" approach based upon insights from a literature review (discussed further in Appendix A) was utilized.

A base "background travel" vehicle-trip matrix was directly estimated using “Cube Analyst” (A Citilabs software plug-in to Cube) from observed AADT reported in the NHPN network based upon HPMS databases. A capacity-constrained iterative assignment was performed to estimate congested base generalized travel costs between Traffic Analysis Zones (TAZs) throughout the state.

The base travel information by mode (auto, bus, rail, air) was disaggregated to the TAZ system, which is based directly upon Census geography, using County subdivisions as the target scale for intercity travel analysis.

To develop future year no-build forecasts, the networks remain the same, and:

- Growth in total trip productions and attractions is assessed using a standard FRATAR process incorporating socio-economic growth factors derived from Woods and Poole projections.

- After factoring to reflect growth, the "background travel" matrix is assigned to estimate the level of increase in highway travel costs due to congestion.

- Mode shift from auto to other modes is calculated based upon applying a nested multinomial logit model implemented using an incremental formulation. The nest separates auto from the other modes, providing a means of controlling the overall level of diversion and addressing the IIA concerns that initially precluded use of multinomial logit in the 1977 Buffalo-NYC rail ridership study. This nesting structure is also generally consistent with that used in the California statewide HSR forecasting model, as well as the Amtrak Northeast Corridor Model.

- Shifts in destination choice due to changing travel costs between zones may also be calculated by applying a multinomial logit model formulated incrementally, based upon changes in composite cost from mode split. The destination shift model may be turned off, if desired.

- Future year build forecasts are produced in the same manner, with the addition of rail networks coded based upon project assumptions, including service frequency and schedule information

A complete report on methodology is provided in Appendix A: Demand Management Model Methodology.

2.0 Study Area Corridor Description

2.1 Overview

The 463 mile long Empire Corridor spans from the distance between New York City and Niagara Falls, and serves New York's major urban areas and markets, specifically New York City, the Mid-Hudson Region, Albany-Renesselaer, Schenectady, Utica, Rome, Syracuse, Rochester, and Buffalo-Niagara Falls. As shown in Exhibit B-8: Study Corridor Major Markets, the state's most populous cities and largest metropolitan areas are located along the corridor. The counties along this route account for approximately 85 percent of the state's total population and approximately 90 percent of the state's total employment.[15]

2.2 Transportation Network

The cities along this corridor are also serviced by four primary modes of transportation, specifically auto, bus (Megabus, Coach USA, Greyhound, and Adirondack Trailways), direct air service (US Air and JetBlue), and rail (Amtrak and New York Metropolitan Transportation Authority (MTA) Metro North Railway (MNR)). The following is a full description of each mode within the network. See Exhibit B-8 for the relationship of rail stations, bus and airport locations.

2.2.1 Auto Network

The primary vehicular corridor running along the Empire Corridor can be broken down into three major segments, all part of the New York State Thruway: Interstate 87 North from New York City to Albany (approximately 160 miles), Interstate 90 West from Albany to Buffalo (approximately 293 miles) and Interstate 190 from Buffalo to Niagara Falls (approximately 21 miles). These three segments are primarily two lane highways (in each direction) with some three-lane segments in some of the urban areas. All of these segments are part of the 570 mile long system of limited access highways located within the State of New York and operated by the New York State Thruway Authority.

The Thruway segment from the New York City line at Yonkers through Buffalo is a tolled road. The tolling is accomplished through a ticketed system where both an EZ Pass transaction occurs as one enters and exits from the Thruway or a ticket is given and collected at the entry and exit points. The availability of this toll data facilitates the analysis of travel patterns and the building of a dependable origin and destination database.

[15] Woods and Poole 2009.

2.2.2 Bus Network

Nonstop bus service exists between all the major cities along the corridor, and is provided by three major carriers: Adirondack Trailways (which also includes Pine Hill Trailways and New York Trailways), Greyhound and Mega Bus. Adirondack Trailways is the predominant carrier followed by Greyhound. Exhibit B-8, provides the location of the major bus stations serving major markets/MPO's along the Corridor.

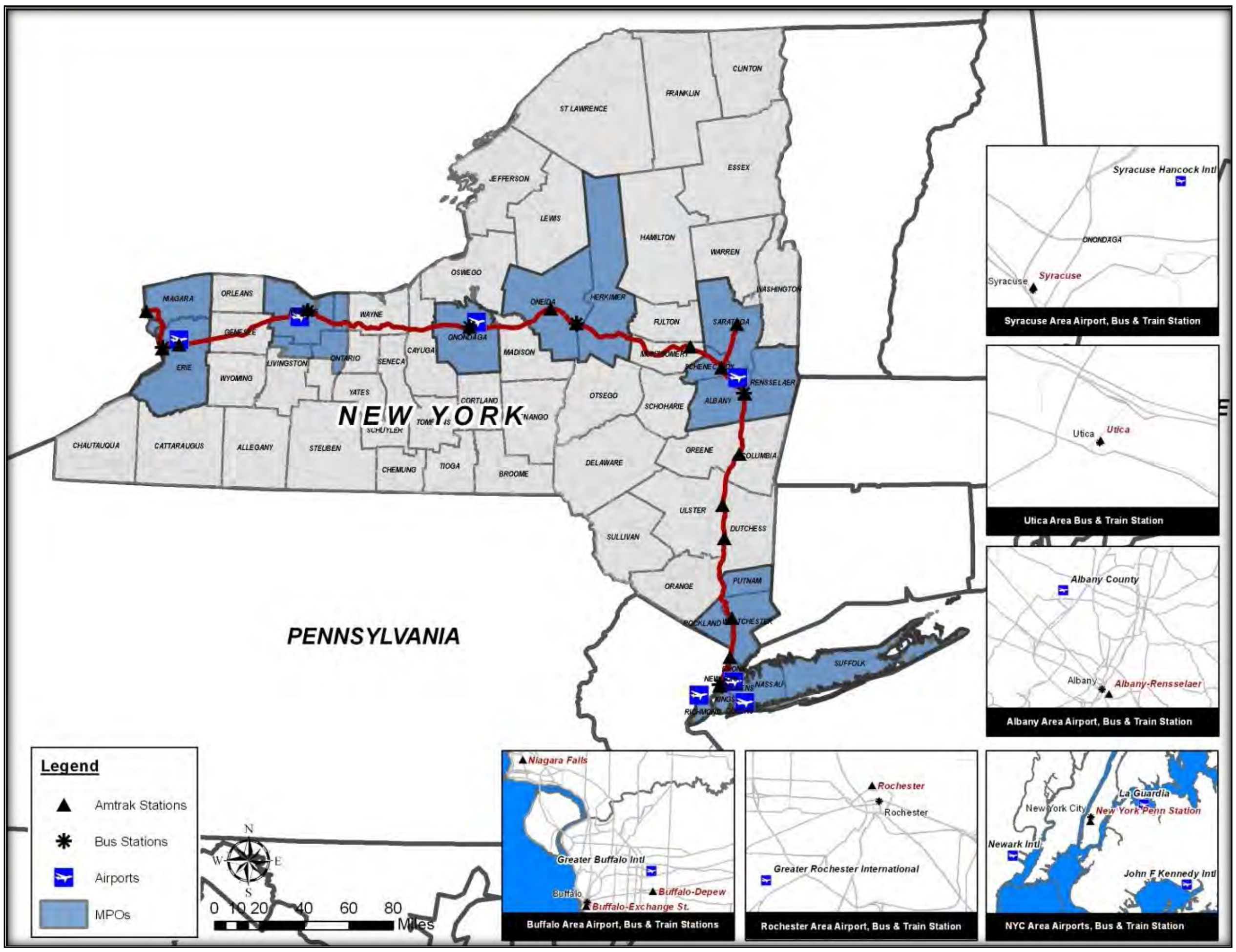


Exhibit B-8:.Empire Corridor Station, Bus and Airport Locations

2.2.3 Air Network

This corridor is served by ten commercial service airports from Niagara Falls to Newark. Specifically these include: Niagara Falls International, Buffalo-Niagara International, Greater Rochester International, Syracuse-Hancock International, Albany International, Stewart International, Westchester County, LaGuardia, John F Kennedy International, and Newark Liberty International. Although Newark Liberty International is outside New York State, it serves a significant segment of the New York metropolitan population and has significantly high numbers of passengers traveling to or from upstate cities such as Albany, Buffalo, Rochester and Syracuse. With relatively quick access from New York City via NJ Transit and Air Train, air passengers using the Newark Liberty International are assumed to be a part of the potential market for high speed rail service. If high speed rail does prove to be competitive with air travel, there is a high likelihood of a shift in some riders preferred mode of travel from Newark Liberty International to upstate destinations over to Empire Corridor HSR service for those trips.

2.2.4 Rail Network

The Empire Corridor Rail line (Empire Corridor) runs parallel to the vehicular New York State Thruway Corridor. This corridor, like the road network, consists of two discreet sections- New York City to Albany and Albany to Buffalo. Amtrak provides intercity service between New York Penn Station and Niagara Falls, NY, with stops in Yonkers, Croton-Harmon, Poughkeepsie, Rhinecliff-Kingston, Hudson (connection to Lake Shore Limited to Boston), Albany-Rensselaer, Schenectady (Adirondack and Ethan Allen Express to Montreal, Canada and Rutland, VT), Amsterdam, Utica, Rome, Syracuse, Rochester, Buffalo-Depew, and Buffalo Exchange. Metropolitan Transportation Authority Metro North Railroad commuter service also runs along this corridor, from NYC to Poughkeepsie.

3.0 Socioeconomic Conditions and Projections

3.1 Overview

Travel characteristics in any area are strongly influenced by socio-economic conditions, principally population, households and employment. There is a direct correlation between these three factors and regional travel characteristics with the foundational premise of larger numbers of people, households and jobs will result in more trips. While there are many other socioeconomic factors to consider for the Tier 1 EIS, for the purposes of the demand management model, these are the three primary factors; therefore this section analyzes trend lines from 2009 through 2035 for population, households and employment for each of the major population centers along the Empire Corridor. Each of the 17 Empire Corridor stations is located in one of the nine metropolitan statistical areas (MSA's) located along the Empire Corridor. Metropolitan Statistical areas, as defined by the United State Office of Management and Budget (OMB), include at least one city with 50,000 or more inhabitants, or an urbanized area (of at least 50,000 inhabitants), and a total metropolitan population of at least 100,000. Each MSA has its own metropolitan planning organization as decreed by federal law. Since the ridership will primarily be drawn from these nine metropolitan areas, this travel demand forecasting study used the MPO unit as the basis for socioeconomic measurement. The following is a review of socioeconomic conditions both individually and compositely within each of the nine MPO's.

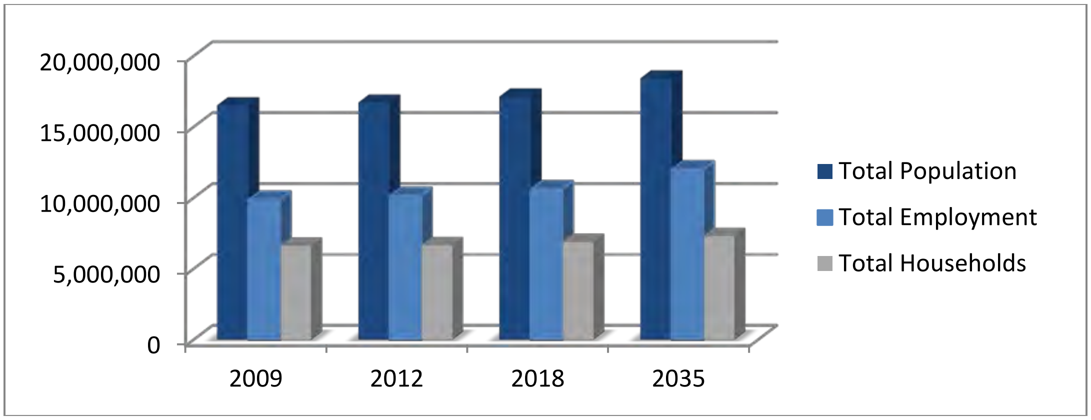
3.1.1 MPO Composite Conditions

Based on Woods and Poole[16] analysis, the nine MPOs have a total 2009 population of 16,522,063, or 85 percent of the entire 2009 NYS population of 19,541,453. By 2035, the population of these nine MPOs is expected to increase 12 percent, to 18,423,566, while the population of the entire state is expected to increase by 11 percent to 21,643,032, keeping these nine MPOs at 85 percent of the entire 2035 projected NYS population.

As of 2009, the nine MPOs along the corridor encompassed 90 percent of New York State's entire employment base, or 9,866,842 of the State's 10,950,869 employed population. The MPOs' employment is expected to increase, 22 percent by 2035 to 12,011,541, thereby continuing to constitute 90 percent of the State's total 2035 projected employment of 13,286,923.

[16] Woods & Poole Woods & Poole Economics, Inc. is an independent firm that specializes in long-term county economic and demographic projections. County projections are updated annually and utilize county models that take into account specific local conditions based on historical data from 1969 to 2008 (1969 to 2009 for population); all data from 2009 to 2040 (2010 to 2040 for population) is projected. One key aspect of Woods & Poole projections is that the economies of counties are linked together: projected economic conditions in one county are reflected in the projected economic conditions in other counties. County population growth is a function of both projected natural increase and migration due to economic conditions. http://www.woodsandpoole.com/

Exhibit B-9: Composite Socioeconomic Conditions of the Empire Corridor MPO's



The 9 MPOs also comprised 88 percent of the state's households, or 6,617,257 of 7,471,503 total households in 2009. By 2035, it is projected that the nine MPOs will consist of 7,307986 households (11% growth), thereby maintaining a fairly consistent proportion of the State's total household population (8,208,957) at 89 percent. See Exhibit B-9.

As seen in Exhibits B-11 – B-16, as a whole the southern corridor will continue to experience increases in population, employment and households anchored by New York City, while the western portion of the corridor from Albany to Niagara Falls, as shown in Exhibits B-16-B-20, will continue to feel the effects of a static or slowly declining population. These projected figures do not take into account any changes in public policy and infrastructure investments, such as HSIPR, which can potentially change the population and employment outlook for the western corridor.

Employment, as shown in Exhibit B-11, will increase the most both percentage-wise and in actual gains along the southern corridor. The greatest percentage gains will be in Orange and Putnam counties, as these counties are located on the fringe of the most populous region New York Metropolitan Transportation Council region (NYMTC). In contrast, counties along the corridor such as Wyoming, Genesee, Onondaga, Oneida, Herkimer, Montgomery, and Albany are expected to experience slight declines in population. All counties are expected to see an increase in employment with Oneida County expecting the biggest percent increase, despite its small population decline. The employment, population, as well as household growth projections are presented in further detail within this section.

Exhibit B-10: Projected Population Growth by County

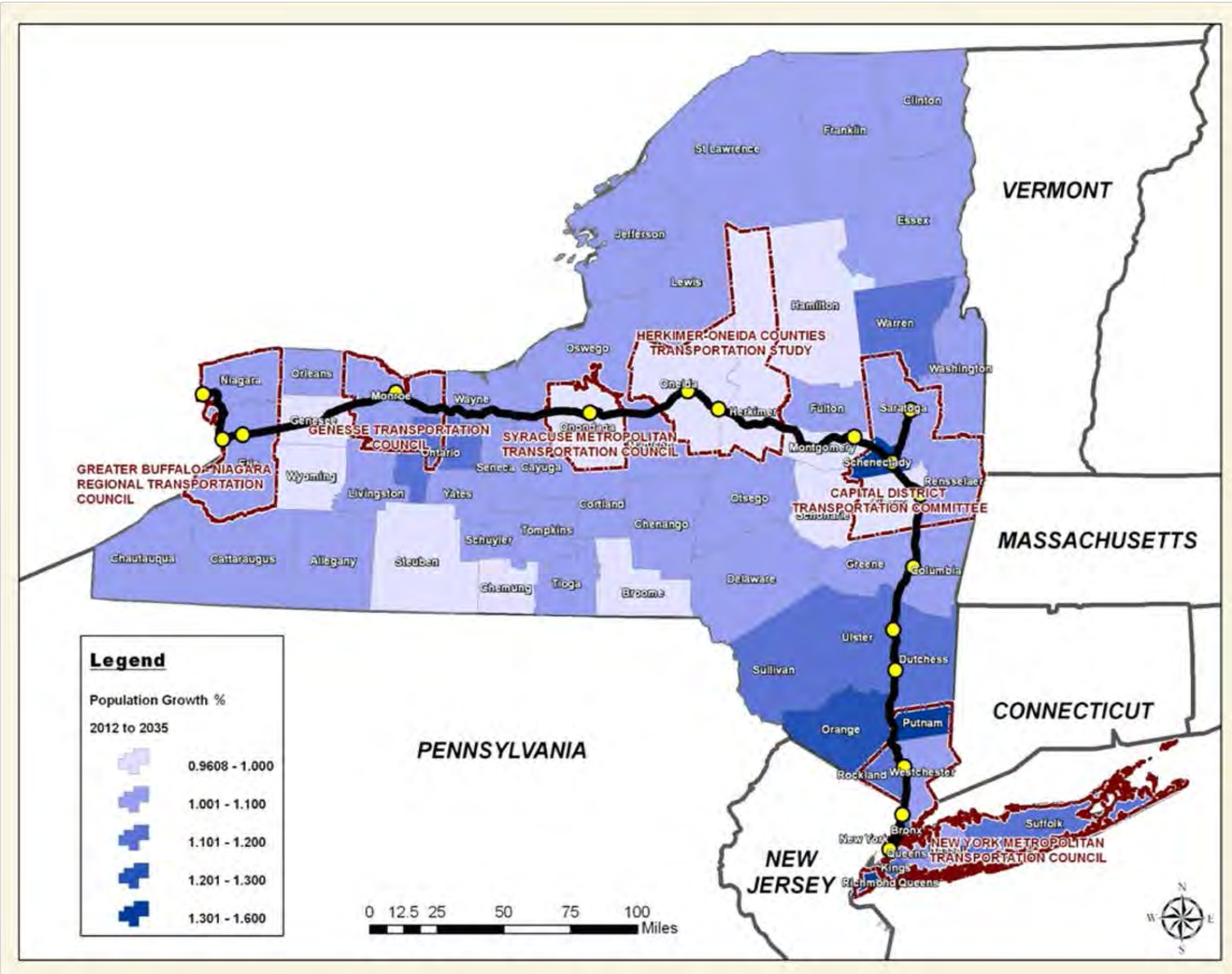
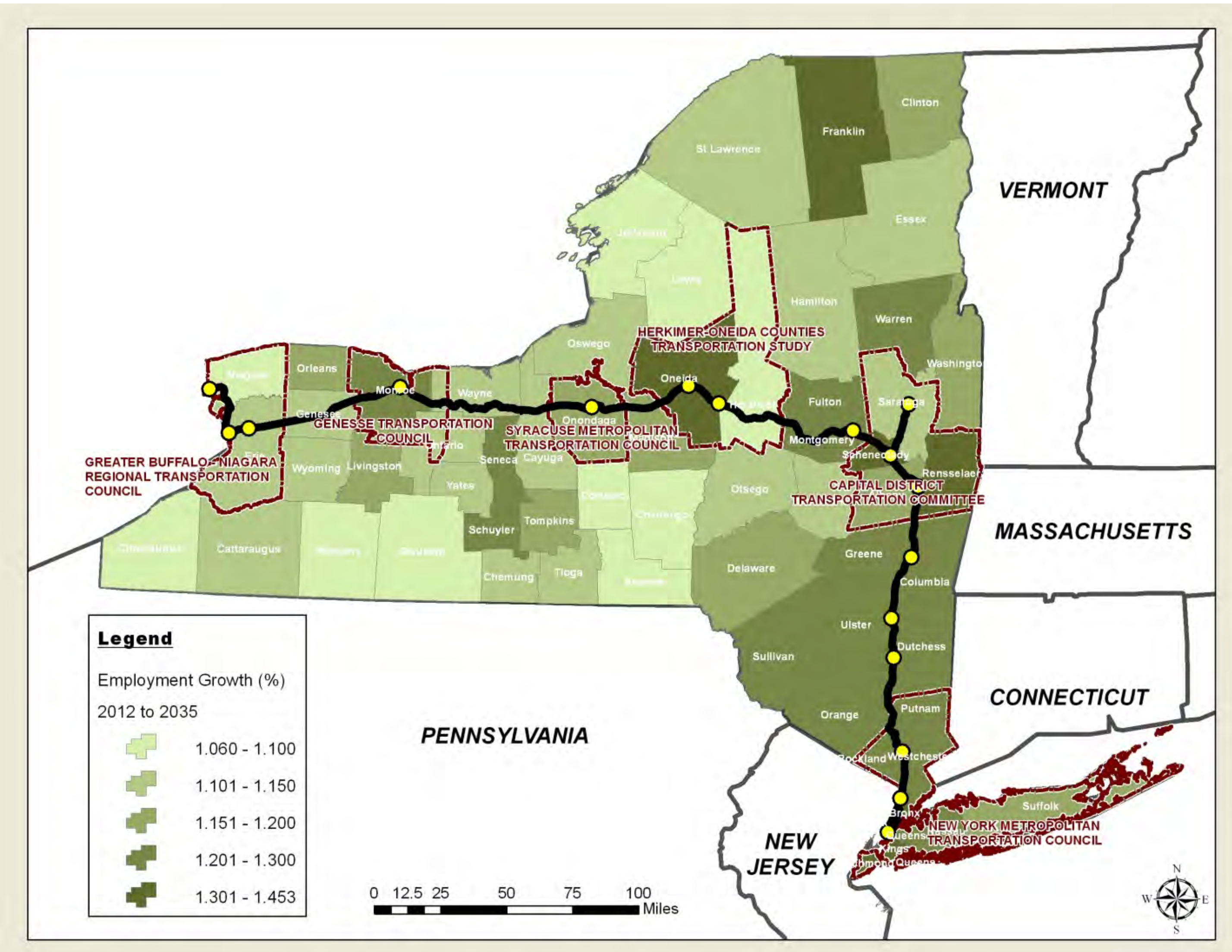


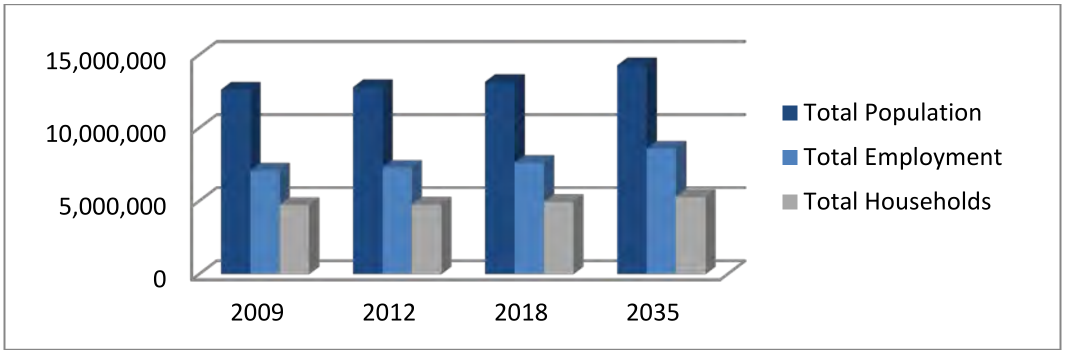
Exhibit B-11: Projected Employment Growth by County



New York Metropolitan Transportation Council

The New York Metropolitan Transportation Council (NYMTC) is the largest metropolitan statistical area (MSA) in not only New York, but in the United States. NYMTC is a ten County Region with a 2009 population of 12,623,185. As shown in Exhibit B-12, the NYMTC region population is expected to increase 13 percent by 2035, bringing the population to 14,291,537, and households are expected to similarly increase by 12 percent from 4,729,433 to 5,291,248. The regional employment is projected to increase by 21 percent over the same time frame from 7,090,526 to 8,595,125.

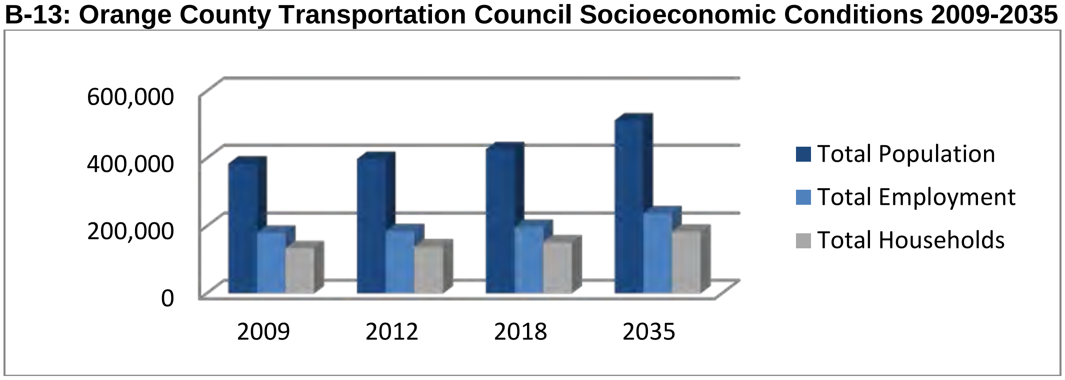
Exhibit B-12: NYMTC Socioeconomic Conditions 2009-2035



Orange County Transportation Council OCTC

Adjacent to the northwest corner of the NYMTC region, Orange County is one of the fastest growing counties in the State, as exhibited by all three socioeconomic factors in this study and shown in Exhibit B-13. From 2009 to 2035, population is expected to increase by 34 percent, from 383,532 to 512,458; households by 37 percent, from 133,754 to 182,683; and employment by 32 percent from 179,629 to 237,400.

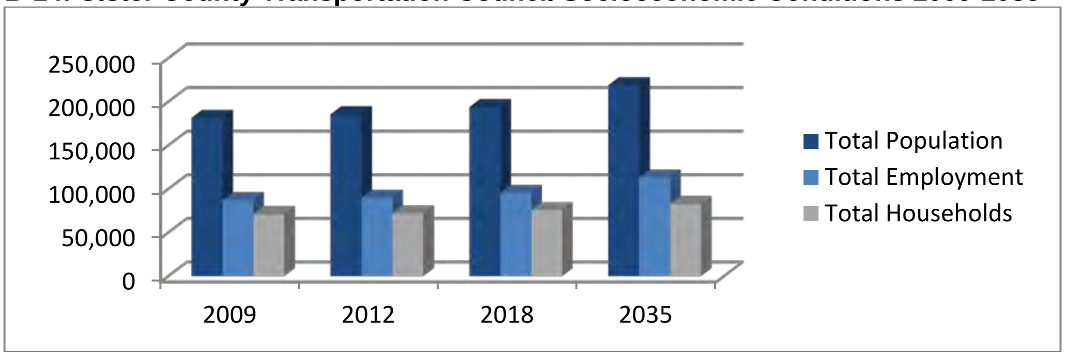
Exhibit B-13: Orange County Transportation Council Socioeconomic Conditions 2009-2035



Ulster County Transportation Council (UCTC)

As is typical of the southern Empire Corridor, the UCTC region has positive growth in all three socioeconomic areas throughout the study time frame of 2009 to 2035. Population is expected to increase by 21 percent from 181,440 to 218,775; households by 17 percent from 70,722 to 82,469; and employment 30 percent from 86,783 to 112,913.

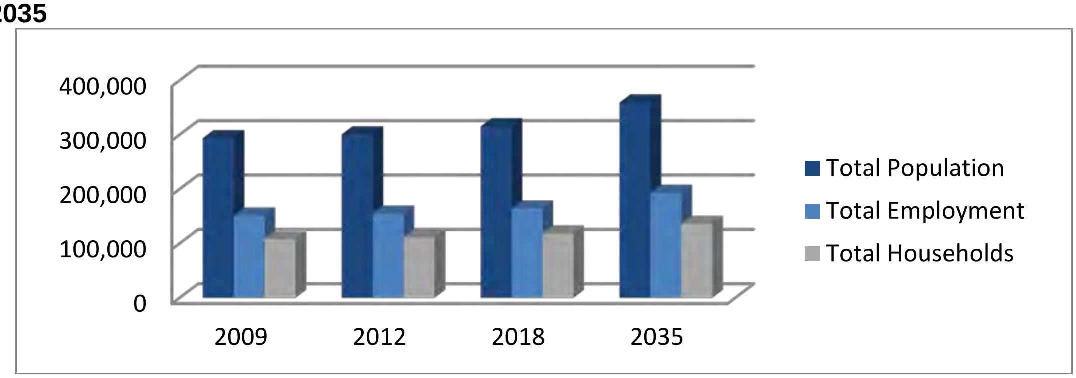
Exhibit B-14: Ulster County Transportation Council Socioeconomic Conditions 2009-2035



Poughkeepsie-Dutchess County Transportation Council (PDCTC)

Bordering the northeast edge of the NYMTC region, PDCTC, as shown in Exhibit B-15, is anticipated to see a 22 percent growth in population from 293,562 to 358,964; a 26 percent increase in households from 107,892 to 136,059; and a 27 percent increase in employment from 151,379 to 192,940 from 2009 – 2035.

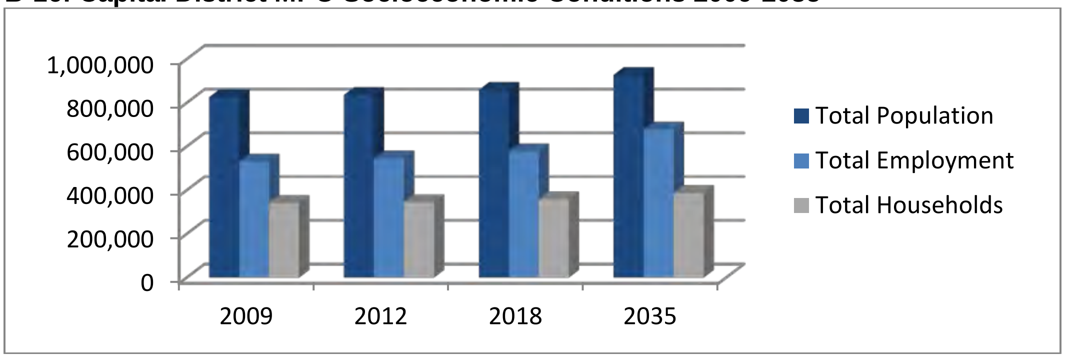
Exhibit B-15: Poughkeepsie-Dutchess County Transportation Council Socioeconomic Conditions 2009-2035



Capital District Transportation Committee

This Capital District region marks the turning point between the Western and Southern Empire Corridors, and its employment characteristics are indicative of its varied nature. As the State Capital, this regions workforce is characterized by a high number of state employees, but also maintains a strong manufacturing and agricultural population. As shown in Exhibit B-16, total population and employment is forecasted to increase from 2018 through 2035.

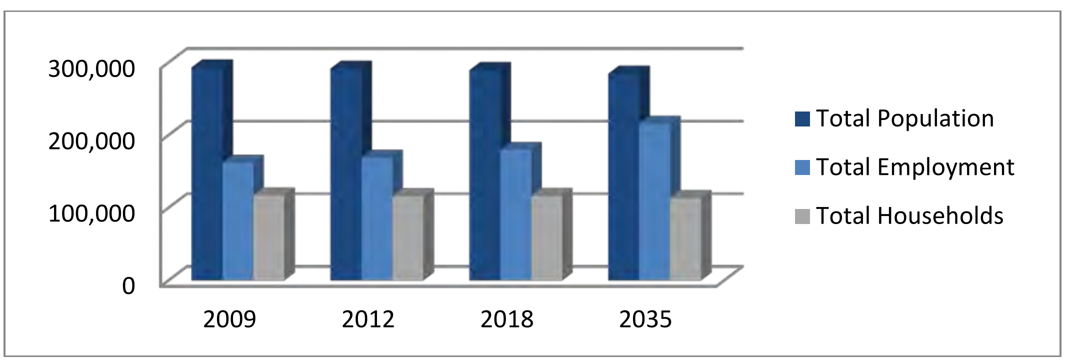
Exhibit B-16: Capital District MPO Socioeconomic Conditions 2009-2035



Herkimer-Oneida Counties Transportation Study (HOCTS)

As the first MPO west of Albany, this region, typical of the western corridor, is expected to experience a continued slow population decline. The 2009 population was 293,280 and the projected 2035 population 284,730, a change of 3 percent. Households are also expected to decline by 3 percent from 116,895 to 113,224. Conversely, as shown in Exhibit B-17, total employment is expected to increase by 33 percent which indicates the potential for a positive increase in travel demand despite the declining population.

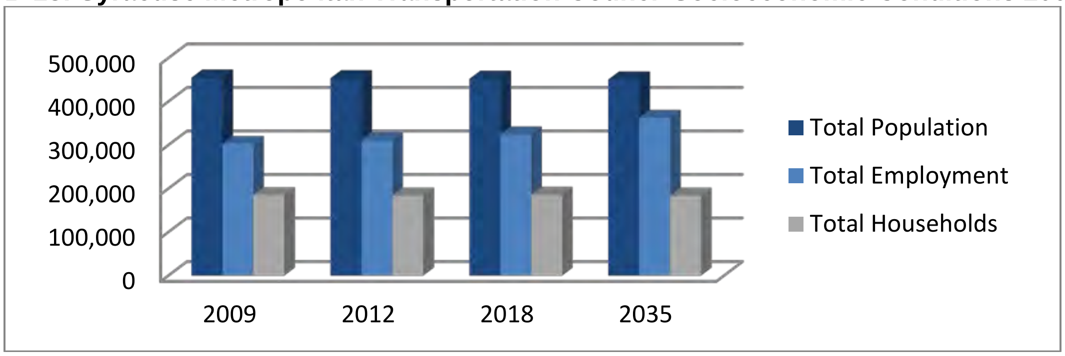
Exhibit B-17: Herkimer-Oneida Counties Transportation Study Socioeconomic Conditions 2009-2035



Syracuse Metropolitan Transportation Council (SMTC)

The SMTC region is experiencing a slowly declining population, and a shift away from the city core to suburban/rural areas. As shown in Exhibit B-18 the region had a 2009 population of 454,753 which is expected to experience a slight 1 percent decline to 450,453 by 2035, as are households from 184,872 to 183,456 in the same period. Like much of the western corridor, this region is expected to experience a large, 20 percent, increase in the employment base, from 302,466 in 2009 to 362,124 in 2035.

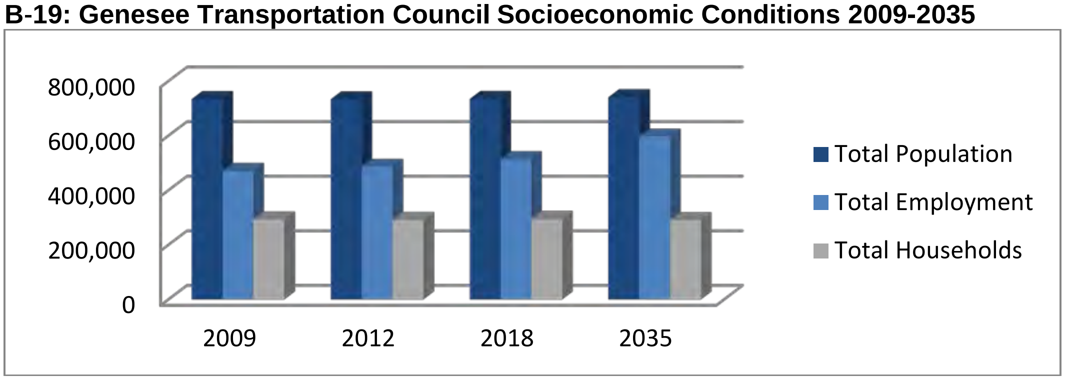
Exhibit B-18: Syracuse Metropolitan Transportation Council Socioeconomic Conditions 2009-2035



Genesee Transportation Council (GTC)

Despite being home to Rochester, the second largest city in New York State, the GTC region is anticipated to have slight 1 percent population and household decline over the 26 year period of 2009 to 2035, from 733,703 to 740,769 and 293,220 to 290,808, respectively as shown in Exhibit B-19. Employment projections are consistent with the projected western corridor trend as a whole, increasing 27 percent from 470,600 to 596,481.

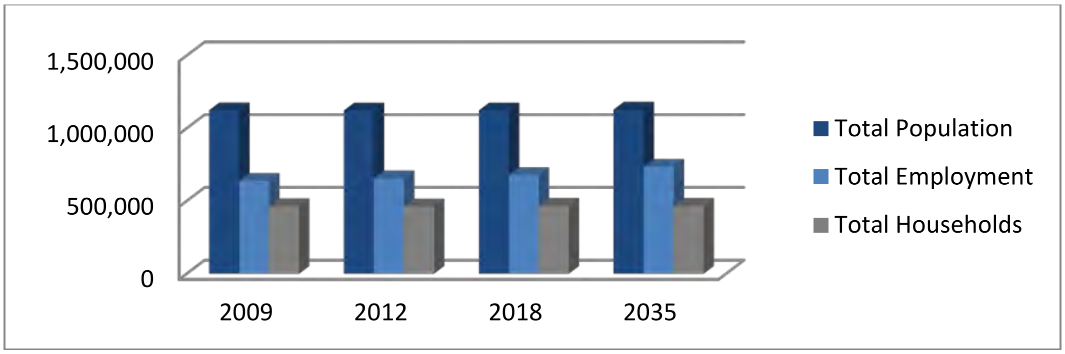
Exhibit B-19: Genesee Transportation Council Socioeconomic Conditions 2009-2035



Greater Buffalo-Niagara Transportation Council (GBNTC)

Although the GBNTC region has been experiencing a major population decline over the past two decades, this trend is expected to change, with a slight (.01%) projected population and household increase of 1,123,804 to 1,128,588 and 463,671 to 465,259, respectively from 2009-2035 as shown in Exhibit B-20. Employment is also expected to increase by 15 percent over the same time frame.

Exhibit B-20: Greater Buffalo-Niagara Transportation Council Socioeconomic Conditions 2009-2035



3.2 Population Density Dispersion in Relation to Station Location

Population density is a critical factor in the success of public transit. Over 4,000 people per square mile (sq.mi) are considered transit supportive.[17] The density of Empire Corridor cities should be considered in planning for the corridor. As presented in Exhibit B-21, within each region, the population is most heavily distributed around each of the urban areas, as compared to the non-urbanized and rural areas of the State. The population density for each of the major markets is reviewed in the following section.

3.2.1 Buffalo-Erie Metropolitan Region

The Buffalo-Erie Metropolitan region consists of three station locations. With a population density of 1,583 p/sq. mi. within a 5 mi radius, and 740 p/sq. mi. within a 10 mile radius, Niagara Falls Station is currently not in a high-density area, nor is it well connected to the central business district (CBD) and tourism locations of Niagara Falls. Buffalo Exchange has a population density of 1,493 p/sq. mi. and 14,692 p/sq. mi., using a 5 and 10 mile radius, respectively. The low 5 mile radius density is due to its location on the waterfront, therefore the 10 mile radius is a better indicator of density in this instance. This station is well connected to other modes of public transit, located in a dense area and is near the heart of the CBD. Buffalo Depew has a 5 mile radius population density of 9,425 p/sq. mi. but a 10 mile radius population density of only 747 p/sq. mi. This station is located on the boundary of the lower density suburban market and also lacks strong transit connections. Exhibit B-22 details the Station locations and the population dispersion for these three station locations.

[17] Federal Transit Administration: Guidelines and Standards for Assessing Transit Supportive Land Use, May 2004

Exhibit B-21: Distribution of Population

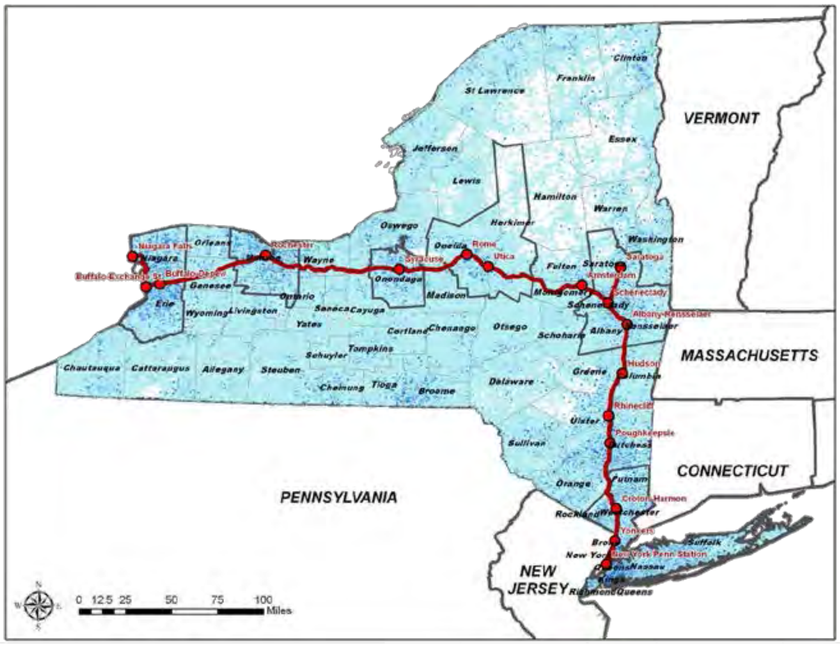
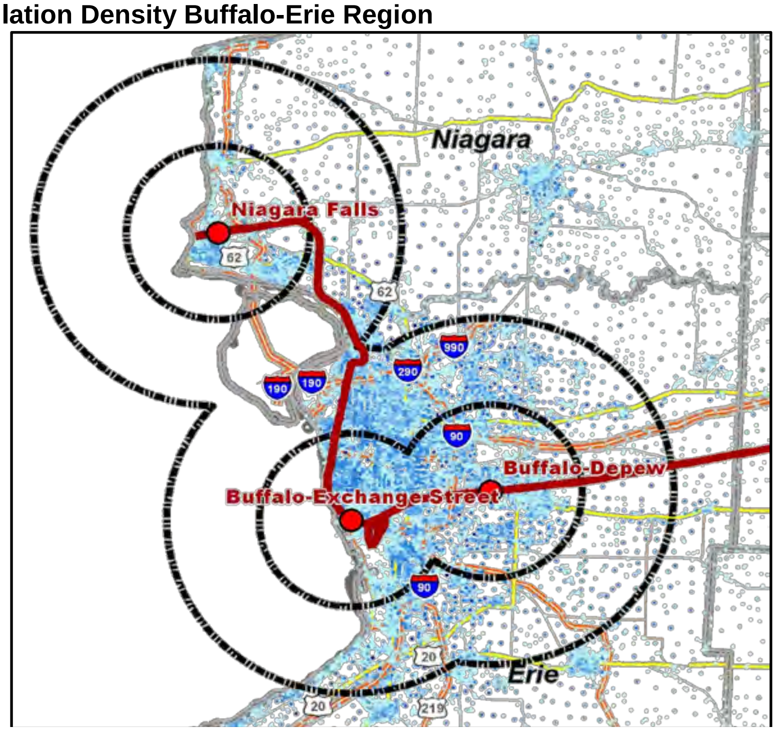


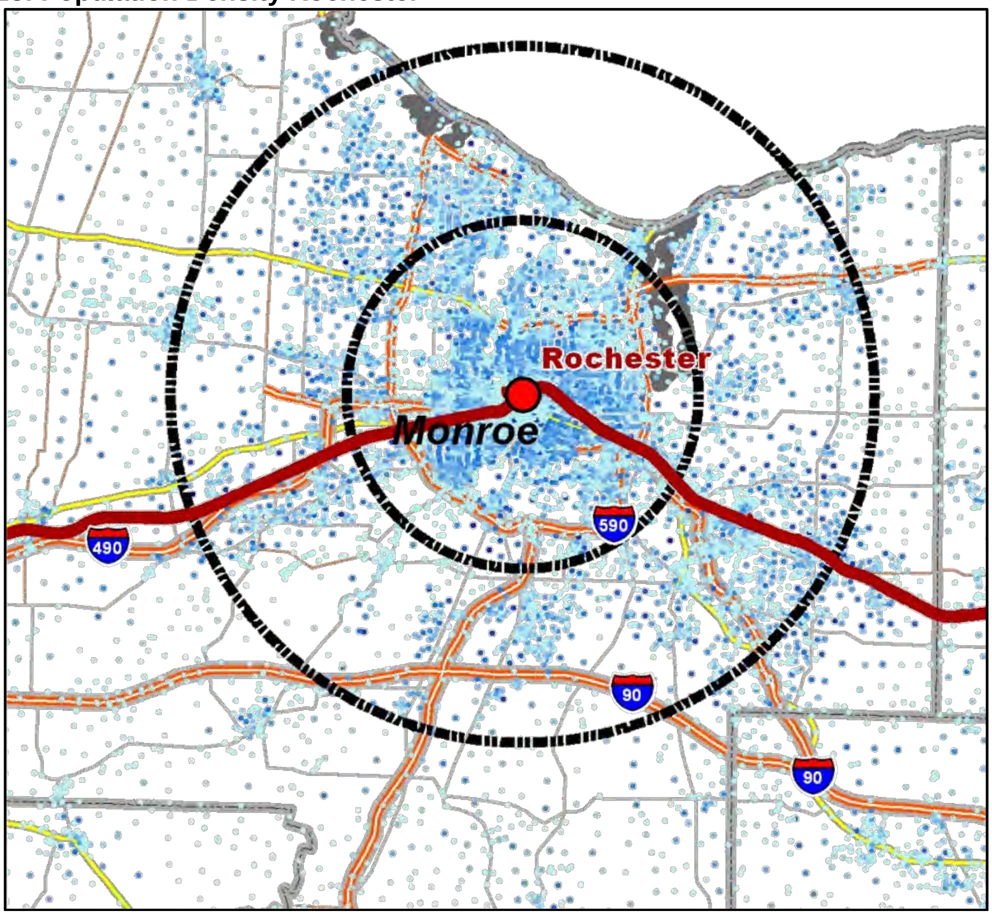
Exhibit B-22: Population Density Buffalo-Erie Region



3.3 Rochester Metropolitan Region

As shown in Exhibit B-23, Rochester station has a density of 8,255 p/sq. mi., which is highly transit supportive. The station is also well-located in the densest portion of downtown Rochester near educational, tourist, institutional and business land uses and attractions.

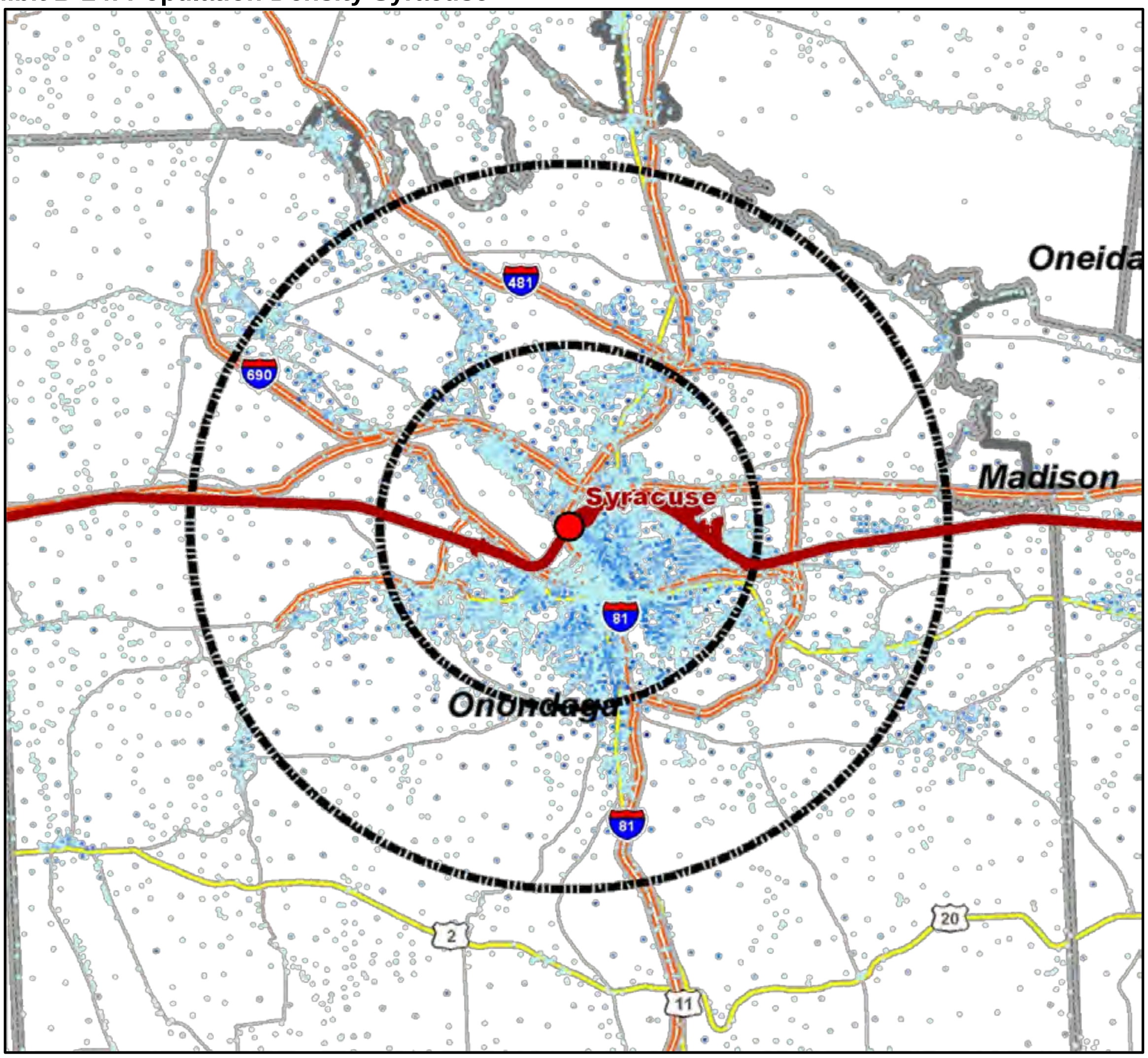
Exhibit B-23: Population Density Rochester



3.3.1 Syracuse Metropolitan Region

Located on the urban fringe, and with a population density of 3,551 p/sq. mi., the Syracuse station as shown in Exhibit B-24, lacks the necessary density to be fully transit supportive. In general, the Syracuse urban area is much dispersed, and has extremely low-density land uses immediately surrounding the station.

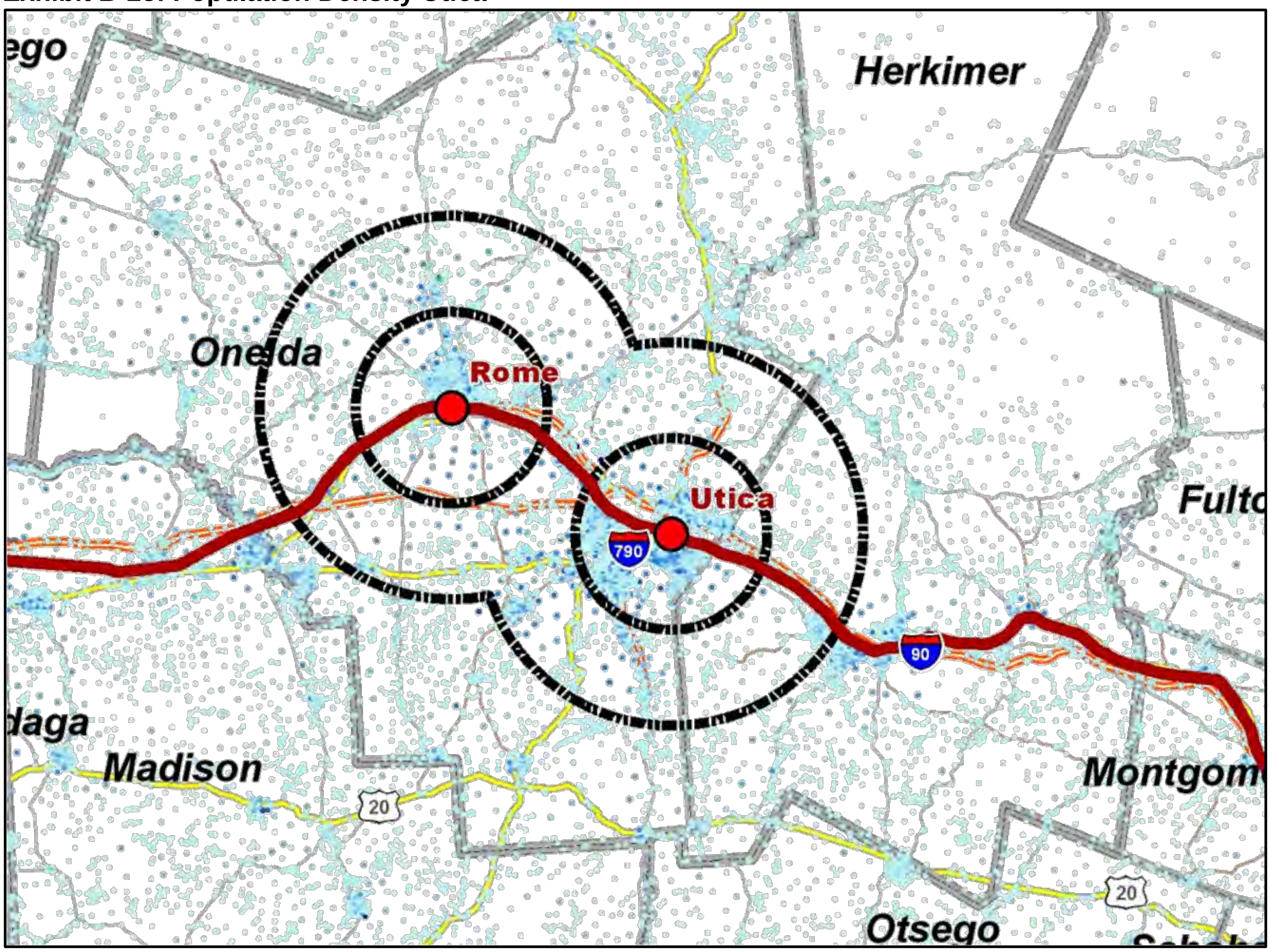
Exhibit B-24: Population Density Syracuse



3.3.2 Utica Metropolitan Region

With a 5 mile population density of 1,241 p/sq. mi. and a 10 mile density of 455 p/sq. mi., the Utica station, as shown in Exhibit B-25, lacks the strong density required for successful transit. While the station has opportunities to attract ridership, as it is located in the central business district, near tourist, institutional and business attractions, it also lacks the transit connections to easily bring riders from other parts of the city. Rome Station is located in a low-density area, only 78 p/sq. mi. with a five-mile radius and 314 p/sq. mi. within 10 miles. Rome station is far from the central business district and supportive land uses. Additionally, there are no local transit connections between the station and downtown Rome.

Exhibit B-25: Population Density Utica

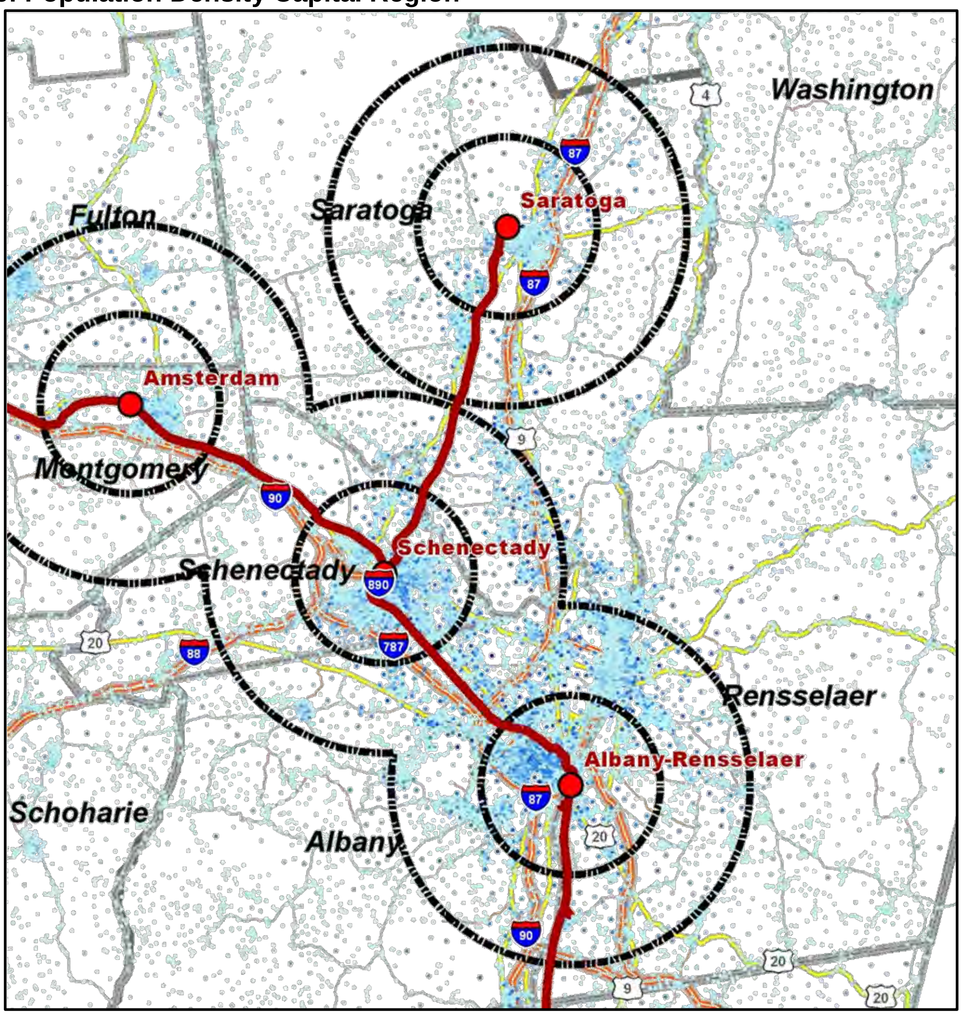


Source of Data: US Census 2000

3.3.3 Capital Region

The Capital Region is home to three stations as shown in Exhibit B-26. Schenectady is the only station in this region located within its city's central business district. Although the station location is in the heart of the CBD, its surrounding population density is only 1,723 p/sq. mi. within a 5 mile radius. The area around Albany station significantly lacks transit supportive density, with a population of 1,924 p/sq. mi. The station is also located on the fringe of the City, but has local bus connections to the by transit to the greater region. Similarly, Saratoga station is not located in the Saratoga Springs CBD, and has a low density, 563 p/sq. mi., within a 5 mile radius. Bus service links the station to the CBD.

Exhibit B-26: Population Density Capital Region

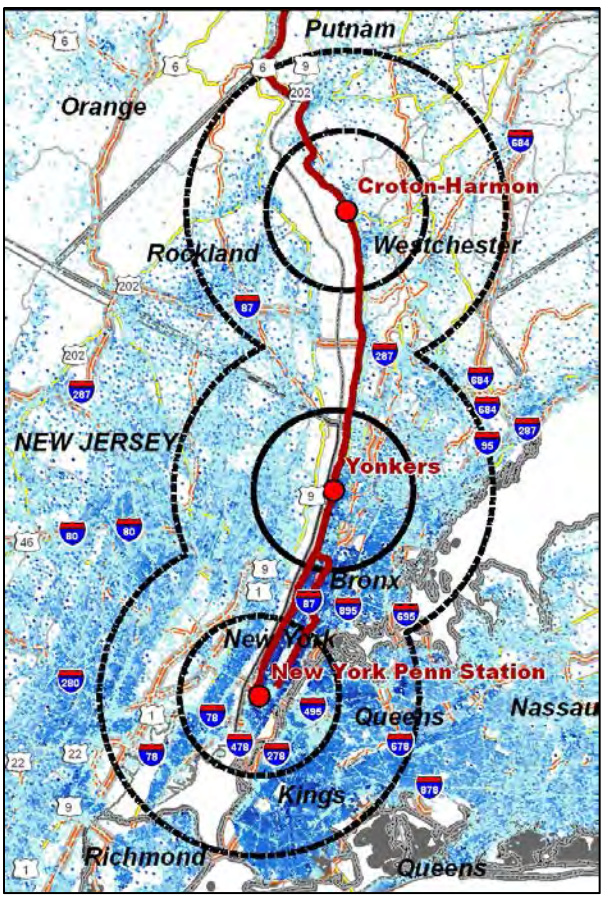


Source of Data: US Census 2000

3.3.4 New York City Region

The NYC or NYMTC MPO region consists of three stations each with highly different densities that are a by-product of the very different context of each station. NY Penn station has a population density perhaps like no other train station with over 43,000 p/sq. mi within 5 miles and 23,500 p/sq. mi within 10 miles, while Yonkers, an inner-ring suburb of NYC has a density of just under 10,000 p/sq. mi within 5 miles and 7,734 p/sq. mi within 10 miles. Croton Harmon, by contrast is a true suburban station with under 750 p/sq. mi within 5 miles and an actually increase in density in a 10 mile radius – at 1050 p/sq.. Each station serves an important and differing purpose – NY Penn Station is the mega-station that draws in riders regionally and locally - its density and destination oriented location drives the Empire Corridor, Yonkers connects the high density inner-ring suburbs to the Empire Corridor – allowing patrons to access Amtrak without having to head into NYC. Croton Harmon serves a similar purpose as Yonkers except it is a catchment area for a larger region of outer-ring rural and small town markets – much as it is for MTA-Metro North. Although Croton Harmon does not have transit supportive density – it is strategically located to capture the more dispersed exurban market that would otherwise bypass rail as a travel option and drive to destinations on the Empire Corridor.

Exhibit B-27: Population Density New York City Region



Source of Data: US Census 2000

4.0 Existing Travel Market Conditions

4.1 Overview

The Empire Corridor can be distinctly split up into two discreet sections, New York City (NYC) to Albany, referred to as the "southern corridor," and Albany to Buffalo, referred to as the "western corridor." The following section describes the overall corridor or overall potential market – which includes the entire area of the NYS Thruway and all Amtrak Stations along the Empire Corridor.

Due to the complexity and extent of data produced for the 17 individual station markets and 15 paired markets, this substantive forecast and comparative mode evaluations focuses on what are referred to as major markets. Further, the section evaluates the collective travel modes present in what are identified as major markets along the Empire Corridor. Major market areas are defined by MPO geographies in the region. Only those station areas subject to significant changes in travel speed, service, and reliability were included in the major markets corridor summary.

Exhibit B-28

Mode	Trips (single person)	Share
Car	210,977,488	96.21%
Rail	1,298,706	0.59%
Bus	4,593,637	2.09%
Air	2,411,033	1.10%
Total	219,280,865	100.00%

Source: Adirondack Trailways, Amtrak, Bureau of Transportation Statistics, Greyhound, Megabus, NYSDOT, New York State Thruway Authority.

4.2 Total Corridor – All Markets

Exhibit B-29

Mode	Single Trips	Share
Car	28,973,177	79%
Air	2,337,801	6%
Bus	4,591,544	12%
Rail	932,801	3%
Total	36,835,323	100%

Source: Adirondack Trailways, Amtrak, Bureau of Transportation Statistics, Greyhound, Megabus, NYSDOT, New York State Thruway Authority.

When considering the entire corridor, as shown in Exhibit B-28, composed of all of the origin and destination pairs present on the travel corridor - accessible by train or an alternative travel mode, there is a total single passenger – one way trip market of 219,280,865. The vast majority of this market is served by automobile. This is the total market in which rail competes and from which an improved Empire Corridor rail service will draw additional passengers. Bus and air followed behind auto with 4.6 and 2.4 million trips, respectively. Rail ridership had the lowest market share of trips. Ridership peaked in 2000 at over 1.26 million, but hit a low point of 1.04 million riders in 2002. This decline can be attributed to the introduction of JetBlue air service from Buffalo in 2001. Since that time, ridership has increased from 1.08 million riders in 2003 to 1.14 million riders in 2004, up to 1.3 million riders in 2009. Most significantly, intercity passenger rail ridership increased 23 percent between Albany-Rensselaer and Niagara Falls from 2007 - 2008.

4.3 Total Corridor – Major Markets

Six cities along the corridor, New York City, Albany, Utica, Syracuse, Rochester and Buffalo will provide the major market for Empire Corridor HSIPR service. Each one of these markets travel mode catchment area has been assigned to its MPO geography for evaluation purposes. All corridor level data that was collected was eventually broken down to city pair level, for a total of 15 city pairs (i.e., New York to Albany, New York to Utica, Albany to Utica, Albany to Rochester) to establish this relationship between the cities and have an understanding of the dynamics between the city pairs. The following is a review of the existing travel market conditions for the 15 major market city pairs.

Exhibit B-30

Region	MPO	Single Trips
NYC	NYMTC	4,890,413
Albany	CDTC	5,196,121
Utica	HOCTS	4,489,598
Syracuse	SMTC	6,212,671
Rochester	GTC	7,564,654
Buffalo	GBNRTC	7,236,248
Total		**35,589,708**

Source: Adirondack Trailways, Amtrak, Bureau of Transportation Statistics, Greyhound, Megabus, NYSDOT, New York State Thruway Authority.

4.4 Existing Conditions: Major Markets

Auto travel remains the primary mode of travel along the Empire Corridor. When considering those exits on the Thruway most closely associated with Amtrak rail station locations, auto trips constitute over 79 percent of trips, as shown in Exhibit B-29, followed by bus, air and then rail. Rail has the lowest market share with fewer than 3 percent of all trips. In 2009, the total trip market (one-way person rides) for the Empire Corridor Major Markets for all four modes was approximately 35.6 million trips see Exhibit B-31.

Exhibit B-31: 2009 Empire Corridor Total Trips for Major Market Pairs

Origin/ Destination	NYC	Albany	Utica	Syracuse	Rochester	Buffalo	Total
NYC	0	2,745,433	284,700	485,258	480,989	876,594	4,872,974
Albany	2,762,873	103	1,213,094	636,423	370,918	330,454	5,313,864
Utica	284,700	1,149,395	0	2,373,015	379,762	239,028	4,425,899
Syracuse	485,258	610,114	2,373,015	0	1,630,386	1,087,591	6,186,364
Rochester	480,989	360,812	379,762	1,630,386	21	4,702,578	7,554,548
Buffalo	876,594	330,265	239,028	1,087,591	4,702,578	5	7,236,059
Total	4,890,413	5,196,121	4,489,599	6,212,672	7,564,655	7,236,248	35,589,708

Source: Adirondack Trailways, Amtrak, Bureau of Transportation Statistics, Greyhound, Megabus, NYSDOT, New York State Thruway Authority.

The greatest number of total trips was made from Rochester to Buffalo, with over 4.7 million trips or over 60 percent of their respective transportation markets. Rochester is the most frequent origin and destination on the Empire Corridor. All of the Cities on the western corridor show solid travel markets between the various markets. This indicates a positive opportunity for HSIPR service, given to enhance the strongly linked markets anchored by medium sized cities. Discretionary choice riders will ride convenient, reliable transit service.

4.4.1 Existing Conditions: Auto

As shown in Exhibit B-28, if considering the Thruway traffic that runs the entire length of the empire corridor, 96 percent, of total Empire Corridor area trips are made by auto. However, when looking at travel between the major market pairs currently served by rail, the potential auto travel market that enhanced rail ridership services would compete with as shown in Exhibit B-32 is 29 million trips or 81 percent of the total potential travel market between the major market cities in 2009. Rochester and Buffalo have the greatest number of automobile trips with over six million trips originating out of each market. This represents the vast majority of travel for these city pairs, as 74 percent of all trips between New York and Albany and 95 percent between Buffalo and Rochester were made by auto. Public transit modes have difficulty in competing with auto, especially between city pairs in close proximity, as there is no need for the traveler to consider schedule, frequency or transit connections.

An analysis of Exhibits B-31 and B-32 indicates that only 5 percent of trips between NYC-Buffalo were made by car, as compared to 76 percent from Albany-Buffalo. As the following sections on air, train and bus will show this is due to a combination of factors including the variation in frequency of transit service between these destinations, as well as time and cost.

Exhibit B-32: 2009 Empire Corridor Auto Trips by Major Market Pairs

Origin/ Destination	**NYC**	**Albany**	**Utica**	**Syracuse**	**Rochester**	**Buffalo**	**Total**
NYC	0	2,019,534	134,243	3,584	25,380	45,129	2,227,869
Albany	2,034,748	0	1,176,909	588,846	325,229	261,330	4,387,062
Utica	134,243	1,113,393	0	2,337,782	361,967	209,413	4,156,797
Syracuse	3,584	562,538	2,337,782	0	1,549,870	929,718	5,383,491
Rochester	25,380	315,125	361,967	1,549,870	0	4,559,912	6,812,253
Buffalo	45,129	261,534	209,413	929,718	4,559,912	0	6,005,705
Total	2,243,084	4,272,123	4,220,313	5,409,799	6,822,357	6,005,501	28,973,177

Source: New York State Thruway Authority, Citilabs

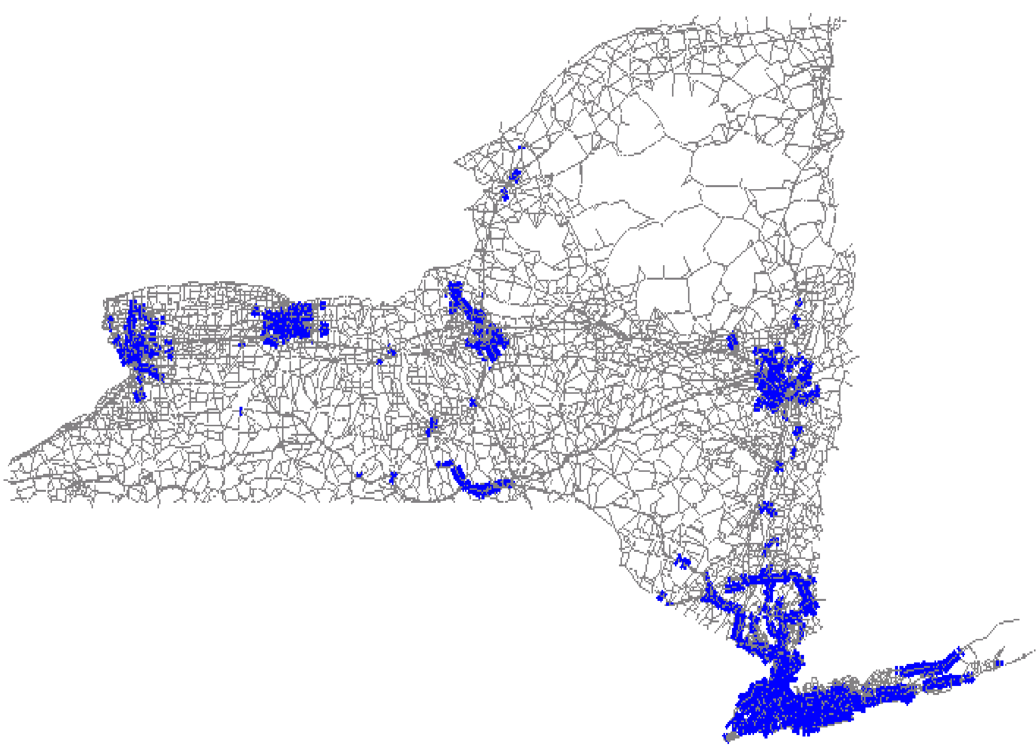
Auto Trips – Travel Mode Characteristics

For purposes of evaluating the automobile market, several key variables were identified and used to define the various travel characteristics associated with auto travel along the corridor. There are two key characteristics associates with auto selection as the preferred mode of travel, travel time and cost. Travel time is a product of congestion and distance between origin and destination and an assumed average speed.

Auto Trips – Congestion

Currently the NYS Thruway is not a heavily congested corridor. However, the major urban areas on the corridor, including Metro NYC, Albany, Syracuse, Rochester, and Buffalo access areas off Thruway which suffer from various levels of congestion leading to significant delays in auto and bus travel. Congestion is particularly severe in the Metro NYC area – constraining the speed of vehicle trips originating out of the NYMTC MPO. Exhibit B-33 below identifies congestion as identified in the forecast model under the existing conditions for 2009 Am Peak. The Exhibit is based on VC ratios or vehicle congestion as factored by the percentage of utilization of a road segment based on its classification and percentage utilization of carrying capacity based on the roads total of lanes and speed limits. Exhibit B-33 below shows those road segments in blue that have a VC ratio of .85, which translates to a level of service D.

Exhibit B-33: AM Peak Congestion 2009



Auto Trips – Cost Factors

Cost, although a seemingly straightforward variable, is actually a complex variable – that is based on the differential value of time based on trip purpose. Exhibit B-34 below identifies some of the key components used for factoring trips and travel costs for auto use. In this study, a perceived value of operating a passenger vehicle was calculated at 16.7 cents.[18] Although national standards put the actually cost of operating a vehicle at approximately 55 cents a mile, users generally do not perceive this cost when considering what travel mode to use from a behavioral standpoint. Further, an average of 1.5[19] occupants per vehicle was used to scale the auto trip market. This is important as the value of the automobile as a travel mode increases as the person loading of a car increases – making it a more cost effective mode of travel compared to ticket prices associated with individual travelers using transit. Finally, for purposes of evaluating cost and time value, the model used to forecast travel mode selection was based on the identification of two types of traveler trip purpose on the corridor, business and non-business users. As the Exhibit shows below, the assumed share of trips for business purposes is 25 percent of the total market[20]. The difference between the two purposes is important as the value of time for business users is nearly a dollar a minute while only 27 cents for all other trip purposes[21]. This distinction is important as rail, through lowered travel times, attempts to compete for the business market with other – currently faster travel modes. A detailed explanation of trip purpose and value of time is discussed in the directly following section on comparative modes.

Exhibit B-34: Auto Market Input Variables

Variables	**Values**
Average Vehicle Operating Cost in Dollars/mile	0.1674
Average Vehicle Occupancy	1.5
Value of time for business purpose trips in Dollars/minute ($/minute)	0.939
Value of time for all "other" trip purposes in Dollars/minute	0.272
Assumed Share of trips for business purposes	0.25

Exhibit B-35 identifies the modeled cost of Auto trips prior to sensitivity adjustment to time for trip purpose as discussed above. Given the fact that an average automobile carries 1.5 passengers per vehicle, this mode is generally found to be the most cost effective of all modes from a behavioral standpoint – i.e. users consider auto to be the most cost effective of travel options given the length and duration of trips on this corridor. The actual cost of individual vehicle trips is far higher when considering fluctuating and rising fuel prices, wear and tear, insurance, and cost to own in conjunction with secondary or collective cost of vehicle trips such as taxes associated with highway projects,

[18] The use of .1674 as a the cost of a vehicle mile is the cost as perceived by user as identified in literature review and as used in previous similar travel demand studies.

[19] Average Vehicle Occupancy and assumed share of trips for business purposes: general value based on inspection of NHTS 2001 survey summaries available from https://www.nysdot.gov/divisions/policy-and-strategy/darb/dai-unit/ttss/2001-nhts

[20] Average Vehicle Occupancy and assumed share of trips for business purposes: general value based on inspection of NHTS 2001 survey summaries available from https://www.nysdot.gov/divisions/policy-and-strategy/darb/dai-unit/ttss/2001-nhts

[21] Value of time for business/other purpose trips: adjusted based upon average income from California HSR model report (Outwater et. al., "California Statewide Model for High-Speed Rail", Journal of choice Modeling, 3(1) 2009, p.75)

environmental impacts from CO2 and other emissions, as well as opportunity costs associated with lost time associated with travel on congested roadways for business purposes and commercial carriers.

Exhibit B-35: Modeled Cost of Auto Trip by Major Market Pair [22]

O Zone \ D Zone	NYC	Albany	Utica	Syracuse	Rochester	Buffalo
NYC	$0	$25	$40	$41	$56	$66
Albany	$25	$0	$16	$24	$38	$48
Utica	$40	$16	$0	$9	$23	$33
Syracuse	$41	$24	$9	$0	$15	$25
Rochester	$56	$38	$23	$15	$0	$12
Buffalo	$66	$48	$33	$25	$12	$0

Auto Trips – Travel Time23

Travel times associated with automobiles for the Empire Corridor are subject to congestion and route selection between city pairs. Auto-travel, given the modest level of congestion on most parts of the corridor, is the second fastest form of travel under existing conditions for most parts of the corridor when compared to other modes. Other than air, which does not serve all markets on the corridor, auto has an advantage in travel time in the Empire Corridor versus current bus and rail service as users are able to leave their origin and arrive at destination without the transfer of modes required of public transit users who must select a secondary transport mode before arrival to and departure from origin and destination transit facilities. Exhibit B-36 identifies the total trip time encountered for each major market pair as accessed by automobile.

[22] Auto costs include perceived cost of car usage plus toll between major market pairs.

[23] Travel times were derived from Google Maps which takes into account congestion in average speed of vehicle from origin to destination.

Exhibit B-36: Auto Travel Times (in minutes) by Major Market Pair

O Zone \ D Zone	NYC	Albany	Utica	Syracuse	Rochester	Buffalo
NYC	0	167	253	262	351	413
Albany	170	0	100	147	225	286
Utica	255	98	0	60	137	199
Syracuse	262	147	60	0	93	154
Rochester	351	225	137	93	0	80
Buffalo	413	286	199	154	81	0

Source: Google Maps/ http://maps.google.com/maps?hl=en&tab=wl

4.5 Auto Trips Data Collection

Auto ridership was created from the travel data obtained from New York State Thruway Authority. The travel data is compiled from the toll transactions (EZ pass and ticketed) that take place at the various entrances / exits to and from the Thruway. To understand the vehicular travel pattern on this corridor, as a first step an auto profile for this corridor was created. This profile is based upon data collected from toll plazas located along the corridor and establishing an origin/ destination (O/D) database for this corridor. The data is based on both kind of transactions – EZ pass based or ticket based. To establish the O/D database Thruway entry and exit numbers were correlated to the destination cities / metropolitan areas and the entry point of the traffic using these specific exits were tabulated to complete the database.

Since the ticketed system of the Thruway ends at the exit 15, the origin destination data obtained from the Thruway does not provide a clear origin or destination of an auto trip going through the toll plaza at exit 15. Hence the data gathered was further disaggregated to the different zones within the NYC metropolitan area with the help of a cube component.

4.5.1 Auto Trips Data Collection Limitations

Although the model utilizes a matrix of 1080 origins to 1080 destination pairs to assign travel for auto – which is the actual market with which rail competes, the complexity of this matrix makes it difficult to show or demonstrate the trip assignment process. To interpret this data, O/D pairs for auto were identified through MPO markets and the Thruway exists within their geographic boundaries. The purpose of this data formatting was to allow readers to understand the competitive markets that rail likely compete within a known or understood geographic framework. Ultimately however, this understates the total market from which the model considers rail to compete – which is the entire state of NY based on a mode choice selection algorithm that considers the likelihood of using rail based on a type of gravity related to the distance of a station from both the origin and destination of the actual trip rather than arbitrarily collecting all auto trips that have origins and destinations within MPO pairs and positing only those pairs as the total market. Ultimately however the MPO geographies are large and likely representative enough of the market to capture a reasonable scenario of the existing auto travel market.

Further, there are various vehicular travel routes between the upstate cities of Syracuse, Rochester, Buffalo and the NYC. Unlike the NYSTA the alternate routes are not tolled and the information about the travel patterns on these routes does not readily exist and the collection of such data would require increasingly significant dedication of resources to conduct surveys and further analyze the findings of such surveys. Finally, the study could not account for the travel from the three upstate cities utilizing a travel route of which passes through Pennsylvania and New Jersey before entering New York City.

Existing Conditions: Bus

Regional Express Bus has been a growing mode of travel throughout the northeast, and in the case of the Empire Corridor - offering better service, more amenities and a lower travel cost than previous bus services or competing Amtrak service. Bus is expected to continue to compete heavily with rail – and may even degrade rail's share of the transit market in the corridor if no improvements to Amtrak are made. Bus travel is the second most popular mode of travel between major city pairs along the corridor, carrying 12 percent of all trips, as shown in Exhibit B-29. In 2009, there were nearly 4.6 million bus passenger trips on the Empire Corridor. This market size is due to the combination of its low-cost, convenience and frequency. As Exhibit B-37 shows, New York City is the most frequented bus origin/destination on the Empire Corridor, with approximately 1.5 million trips. Buffalo was the second most popular bus origin/destination on the corridor with approximately 872,562 trips. The greatest number of these trips is made along the entire length corridor, from NYC - Buffalo, with over 427,700 trips, or 42 percent of the travel market between this city pair. This makes bus travel the second most popular travel mode between New York and Buffalo, following behind air.

Exhibit B-37: Empire Corridor Bus Trips by Major Market Pairs

Origin\ Destination	**NYC**	**Albany**	**Utica**	**Syracuse**	**Rochester**	**Buffalo**	**Total**
NYC		405,460	176,212	266,885	217,272	427,700	**1,493,528**
Albany	410,592		49,915	50,775	38,727	68,848	**618,857**
Utica	176,212	50,775		52,497	23,998	42,169	**345,651**
Syracuse	302,812	50,775	52,497		92,084	187,611	**685,779**
Rochester	236,090	51,636	24,097	104,133		159,211	**575,167**
Buffalo	422,568	63,684	36,145	183,209	166,956		**872,562**
Total	**1,548,274**	**622,331**	**338,866**	**657,498**	**539,037**	**885,539**	**4,591,544**

Source: NYSDOT, Megabus, Greyhound, Adirondack Trailways

While New York-Albany captures just slightly less trips than the New York-Buffalo market with 405,460 trips, this is a small percentage of the total New York- Albany travel market, at approximately 14 percent. This indicates that even if a transit mode cost is low, and has competitive time and frequencies, it will still have a difficult time competing with the convenience of the personal auto in this particular market. Over 20 percent of trips from Albany- Buffalo were made by bus or 68,848 out of a total 341,310 trips, making it the second most popular mode of travel between this city pair.

Bus Trips –Travel Mode Characteristics

Key characteristics that define the bus mode as modeled in the forecast include frequency of service, fare price, and travel time. Although on-time performance is a key additional characteristic of bus service, such data was impossible to access through the private carriers. Additional model input variables include trip purpose/travel time sensitivity, linking access and egress times, and congestion factors.

Bus Frequency

Frequency as a characteristic of transit service is a critical factor in making it a success against other transit modes and competing against car travel. Due to modest capital and operating cost in comparison to rail and air, bus frequency is considerably more robust than those transit modes. Nearly 600 bus trips connect the major markets on the corridor – providing better than hourly service to many of these markets.

Travelers departing from New York City have many options to take the bus to Albany and Buffalo, with a frequency of 41 a day. This convenient scheduling leads to a strong NYC-Buffalo bus travel market.

Exhibit B-38: 2009 Bus Frequency - Major Carriers [24]

O Zone \ D Zone	NYC	Albany	Utica	Syracuse	Rochester	Buffalo	Total
NYC	0	41	19	33	27	41	161
Albany	41	0	9	11	12	10	83
Utica	19	9	0	12	6	8	54
Syracuse	33	11	12	0	23	24	103
Rochester	27	12	6	23	0	21	89
Buffalo	41	10	8	24	21	0	104
Total	161	83	54	103	89	104	594

Source: Megabus, Greyhound, Adirondack Trailways

[24] Frequency identified via online schedules for major bus carriers serving the Empire Corridor

Bus Trip Time and Reliability

Bus trip time includes a number of considerations including access, wait, and travel time. In terms of travel characteristics, bus service is a blend of auto and rail travel, susceptible to the same driving environment as auto and the same scheduling and competitive pricing scheme as rail. As noted above, the analysis for this report was unable to include an on-time performance standard for the many bus companies that operate in the region. Wait and access time were generated by the model based on headways between buses. For the purposes of simplification – an average was used to facilitate – for the reader, the identification of travel times for bus with associated city pairs. The Exhibit below includes a wait time of 10 minutes, 10 minutes, and 25 minutes of combined access and egress time added to the travel time.

Exhibit B-39: 2009 Bus Haul Times by Major Markets [25]

O Zone \ D Zone	NYC	Albany	Utica	Syracuse	Rochester	Buffalo
NYC	0	145	360	345	420	530
Albany	145	0	165	205	345	435
Utica	360	165	0	105	245	335
Syracuse	345	205	105	0	140	225
Rochester	420	345	245	140	0	135
Buffalo	530	435	335	225	135	0

Source: Megabus, Greyhound, Adirondack Trailways

Bus Cost Factors

The key to bus service is price. Historically, regional bus service has served economically disadvantaged populations – which provided valuable mobility to populations that could not afford air travel and to those that did not own an automobile. As Exhibit B-40shows, the average fare structure of the major carriers serving the corridor meets the goal of providing low cost, regular service to the major markets considered in this study. Bus is more dominant than rail in terms of ridership due to the combination of slightly lower fares, better travel time and far more regular and reliable service. Enhanced service and speed along with a competitive price from rail would likely reduce the transit dominance of bus service on the Empire Corridor. In recent years, bus carriers such as Greyhound and Megabus have focused on providing improved service tailored to business and student markets – this focus by bus carriers will

[25] Bus haul times identified by schedules provided by Trailways, Greyhound, and Megabus. Applied Access and wait times identified from professional resources and observation.

challenge the ability of rail to capture this important "choice rider" category – that seek not only value but quality as a substitute to automobile travel.

Exhibit B-40: Existing Bus Service – Major Carriers – Major Markets Fare Structure						
O Zone \ D Zone	**NYC**	**Albany**	**Utica**	**Syracuse**	**Rochester**	**Buffalo**
NYC	$0	$30	$62	$40	$55	$60
Albany	$45	$0	$28	$45	$57	$73
Utica	$62	$28	$0	$19	$40	$0
Syracuse	$38	$45	$19	$0	$52	$36
Rochester	$55	$57	$40	$52	$0	$22
Buffalo	$60	$63	-	$36	$22	$0

Source: NYSDOT, Megabus, Greyhound, Adirondack Trailways

Bus Trips Data Collection

The bus data was a combination of two data sources. Information regarding the bus service, frequency, schedule and travel time was gathered collecting data from each of the websites of the various commercial bus operators servicing the Empire Corridor, primarily Megabus, Greyhound and Adirondack Trailways, in addition to a few smaller operators.

Ridership numbers are not directly available from the commercial bus operators; therefore it was necessary to interpolate ridership numbers by using a loading factor. Different loading factors were obtained from sources at NYSDOT, and applied to buses, depending on whether the origin or the destination was NYC and whether the bus was leaving or reaching within the AM or the PM peak hours.
It is perceived that the major driver of the rail market would be the six major metropolitan areas along the corridor, namely NYC, Albany, Utica, Syracuse, Rochester and Buffalo and hence the bus data was collected for intercity travel between the above mentioned cities. Bus service and ridership related data between the other intermediate cities located along the corridor was not readily and consistently available and the hence could not be incorporated into the model.

Bus Data Collection Limitations

Ridership numbers are not directly available from the commercial bus operators; therefore it was necessary to interpolate ridership numbers by using a loading factor. Different loading factors were obtained from sources at NYSDOT, and applied to buses, depending on whether the origin or the destination was NYC and whether the bus was leaving or reaching within the AM or the PM peak hours. On-time performance information was also not readily available from the bus operators.

4.5.2 Existing Conditions: Air

Air travel is the third most frequented travel mode along the corridor, carrying approximately 6 percent of all trips, as shown in Exhibit B-29. As shown in Exhibit B-41, in 2009 there were nearly 2.4 million air passenger trips on the Empire Corridor. There were 507,546 air trips made between New York City and Buffalo, or 44 percent of all travel for this market, making air travel the most popular mode of travel for this city pair. It is assumed that air passenger trips taken between the Empire Corridor city pairs include travelers from the Toronto, Connecticut and Northern New Jersey market. This is especially true of the Toronto market using the Buffalo to New York Air route. Air is also the most popular mode of travel between New York City and Rochester, with approximately 300,000 trips in 2009, or 52 percent of all travel for this city pair.

Exhibit B-41: Air Trips by Major Market Pairs

Origin/ Destination	NYC	Albany	Utica	Syracuse	Rochester	Buffalo	Total
NYC	0	99,443	0	262,706	298,825	507,489	1,168,463
Albany	98,006	0	0	0	0	0	98,006
Utica	0	0	0	0	0	0	0
Syracuse	266,899	0	0	0	0	0	266,899
Rochester	296,886	0	0	0	0	0	296,886
Buffalo	507,546	0	0	0	0	0	507,546
Total	1,169,338	99,443	0	262,706	298,825	507,489	2,337,801

Source: Bureau of Travel Statistics

Air travel is not the favored mode from NYC- Albany, carrying only 3 percent of all trips in this market. This is due to the fact that air travel is inefficient at short distances. Travelers must access airports located outside the city core, and schedule time for security and check-in processes. These time barriers result in market advantages for an improved HSIPR service rail service within this market.

Air Trips - Travel Market Characteristics

Air travel is a complex travel mode for the user and in the complexity of the entire origin to destination line haul. For today's aviation user, delays, wait times, access and egress issues, and security checks, and baggage pick-up wait make it the most demanding and inconvenient of transit modes. For short regional in air travel trips such as those present on the Empire Corridor –between NYC and the Buffalo, Rochester, Syracuse, and Albany markets, air travel is incredibly inefficient – as wait and access times dwarf the in air travel time – and can often be the most frustrating of travel modes for users. Further, the cost of air travel is the highest of all travel modes and is subject various additional costs such as baggage, access, and parking costs. Given such characteristics, an improved high speed rail, with favorable fares and more competitive travel times should dominate between these two modes. As an example, Acela Express service from NYC to Washington D.C. has over a 50 percent market share between air and train travel and is one of only two Amtrak lines to turn a profit.[26] The related section 4.5.2.1a Frequency describes in more detail the travel time components and fare structures that define Empire Corridor air service.

Frequency

Frequency of air travel servicing the Empire Corridor is fairly robust and competes favorably with bus and rail – particularly on trips to cities on the western portion of the corridor with greater land travel time for bus and rail transit. As shown on Exhibit B-42 below, in 2009, there were 27 round trip flights per day from New York Metropolitan airports to Buffalo, and 8 between New York Metropolitan airports and Albany. In contrast, there is none between Albany and Buffalo.

Exhibit B-42: Frequency of Air Service on Empire Corridor [27]

O Zone\ D Zone	NYC	Albany	Utica	Syracuse	Rochester	Buffalo	Total
NYC	0	8	0	18	19	26	71
Albany	8	0	0	0	0	0	8
Utica	0	0	0	0	0	0	0
Syracuse	17	0	0	0	0	0	17
Rochester	20	0	0	0	0	0	20
Buffalo	27	0	0	0	0	0	27
Total	72	8	0	18	19	26	149

Source: Various commercial air carriers

[26] http://en.wikipedia.org/wiki/Acela_Express

[27] http://www.orbitz.com/

Travel Cost Factors

Air travel is by far the most expensive form of travel in the Corridor. Although airfare costs can vary greatly depending on time of purchase and seasonal variability as well as fluctuate regularly with changes in fuel price – this mode of travel always balances a comparatively high cost with comparatively fast travel times. Further, as noted above – the costs below are usually the bare minimum of total trip costs for air travelers, with baggage, airport access or parking costs adding considerable addition cost to the overall trip. Exhibit B-43 details the costs associated with air trips on the corridor.

Exhibit B-43: Average Air Travel Costs between Major Airports on the Empire Corridor [28]						
O Zone \ D Zone	**NYC**	**Albany**	**Utica**	**Syracuse**	**Rochester**	**Buffalo**
NYC	$0	$145	$0	$101	$102	$103
Albany	$145	$0	$0	$0	$0	$0
Utica	$0	$0	$0	$0	$0	$0
Syracuse	$101	$0	$0	$0	$0	$0
Rochester	$102	$0	$0	$0	$0	$0
Buffalo	$103	$0	$0	$0	$0	$0
Source: Various commercial air carriers						

Air Trips Data Collection

Air travel data has been obtained from the Bureau of Travel Statistics.[29] The website provides data for all flights flying to and from airports within the United States. The data obtained from this website was analyzed to get the air travel data by airport pairs for the selected airports within New York State and the Liberty International at Newark, NJ.

Air Trips Data Collection Limitations

There were no air data collection limitations.

4.5.3 Existing Conditions: Rail

There were approximately 932,801 Empire Corridor major market rail trips in 2009, capturing just fewer than 3 percent of the market, as shown in Exhibit B-44. The most frequented origin and destination was New York City, with approximately 423,000 trips. By far, the city pair most traveled to and from by rail is New York to Albany, with almost 320,000 trips. However, capturing only 11 percent of this market, rail is the third most popular mode of travel from New York to Albany, only beating air. Travel time and the cost do not make air travel competitive between New York and Albany. Travel time is discussed further in Section 4.5.4 Comparative Travel Characteristics: Travel Time and Cost. Similarly, rail is currently not competitive with Air from NY to Buffalo, capturing less than 1 percent of the market.

[28] http://www.orbitz.com/

[29] http://www.transtats.bts.gov/DL_SelectFields.asp?Table_ID=259&DB_Short_Name=Air

Frequency - Level of Service

Exhibit B-44: Rail Trips by Major Market Pairs

Origin/ Destination	NYC	Albany	Utica	Syracuse	Rochester	Buffalo	Total
NYC	0	320,155	19,858	29,787	23,427	29,881	423,108
Albany	320,155	0	2,082	7,013	8,224	11,133	348,607
Utica	19,858	2,082	0	819	1,421	2,480	26,659
Syracuse	29,787	7,013	819	0	1,794	6,466	45,878
Rochester	23,427	8,224	1,421	1,794	0	1,862	36,728
Buffalo	29,881	11,133	2,480	6,466	1,862	0	51,821
Total	423,108	348,607	26,659	45,878	36,728	51,821	932,801

Source: Amtrak

Empire Corridor Service between New York and Albany-Rensselaer consists of thirteen (13) daily roundtrips, while Albany-Rensselaer and Buffalo has a service frequency of just four (4) roundtrips per day. Overall the service is very modest – particularly for the East-West Corridor. The lack of service directly limits the market potential of rail against the other transit modes serving this corridor. Ultimately rail service from NYC to Buffalo and from cities along the East-West Corridor is limited to leisure travel exclusively or multi-day business trips.

Exhibit B-45: Rail Round-Trips Serving Empire Corridor Major Markets

O Zone \ D Zone	NYC	Albany	Utica	Syracuse	Rochester	Buffalo	Total
NYC	0	12	4	4	4	4	28
Albany	12	0	4	4	4	4	28
Utica	4	4	0	4	4	4	20
Syracuse	4	4	4	0	4	4	20
Rochester	4	4	4	4	0	4	20
Buffalo	4	4	4	4	4	0	20
Total	28	28	20	20	20	20	136

Source: Amtrak

Despite the competitive travel time from NYC to Albany, the first train daily train does not arrive in Albany until 9:45 am, slightly later than ideal for business travelers. A one way trip between Albany-

Exhibit B-46: Daily Train Schedule: Albany-Rensselaer to Buffalo Depew

Service	Departure Albany-Rensselaer, NY	Arrival Buffalo-Depew, NY	Duration
63 Maple Leaf	10:03 am	3:10 pm	5 hours 7 minutes
281 Empire Service	12:30 pm	6:02 pm	5 hours 32 minutes
283 Empire Service	4:30 pm	9:57 pm	5 hours 27 minutes
49 Lake Shore Limited	7:05 pm	11:59 pm	4 hours 54 minutes

Source: Amtrak Empire Service: New York, Niagara Falls, and Toronto NRPC Form W8 6/21/2010

Rensselaer and Buffalo has a greater than five (5) hour scheduled travel time. As shown in Exhibit B-46 and 4.19, it is not possible to travel by passenger rail from Albany-Rensselaer to Buffalo for a day trip. The earliest westbound train arriving in Buffalo from Albany-Rensselaer arrives at 3:10 PM while the latest eastbound train departing from Buffalo departs at 1:14 PM. The service also does not serve peak direction trips between cities as there are no scheduled eastbound trains between Buffalo and Albany-Rensselaer that arrive in the Albany-Rensselaer before 9 AM. The limited service between Albany-Rensselaer and Buffalo is insufficient to attract travelers who have other transportation options such as auto, bus or air that provide them with greater flexibility in scheduling their travel.

Exhibit B-47: Daily Train Schedule: Buffalo to Albany-Rensselaer

Service	Departure Buffalo-Depew, NY	Arrival Albany-Rensselaer, NY	Duration
280 Empire Service	4:29 am	9:45 am	5 hours 16 minutes
284 Empire Service	7:59 am	1:45 pm	5 hours 46 minutes
48 Lake Shore Limited	9:08 am	2:50 pm	5 hours 42 minutes
64 Maple Leaf	1:14 pm	6:50 pm	5 hours 36 minutes

Notes: Train 280 does not operate on Sunday
Source: Amtrak Empire Service: New York, Niagara Falls, and Toronto NRPC Form W8 6/21/2010

Trip Time and Reliability

With a scheduled run time of 150 minutes and a total trip time of 190 minutes including access and egress times and 1 standard deviation of average delay with an average cost of $38, rail travel from NYC - Albany, is competitive with all other modes (see Section 4.5.4 Comparative Travel Characteristics: Travel Time and Cost).

Exhibit B-48: Scheduled Travel Times for Major Market Pairs

Origin/ Destination	**New York**	**Albany**	**Schenectady**	**Utica**	**Syracuse**	**Rochester**	**Buffalo**	**Niagara Falls**
New York		2:30	3:20	4:40	5:45	7:06	8:12	9:34
Albany	2:30		0:24	1:42	2:48	4:08	5:15	6:45
Schenectady	3:40	0:41		1:18	2:24	3:44	4:51	6:21
Utica	5:06	2:01	1:21		1:05	2:26	3:32	5:01
Syracuse	6:10	3:05	2:25	1:04		1:20	2:27	3:53
Rochester	7:41	4:36	3:55	2:34	1:30		1:06	2:31
Buffalo Ex St.	8:12	5:35	4:54	3:33	2:29	0:59		1:23
Niagara Falls	9:16	6:25	5:48	4:25	3:21	1:51	0:52	

Notes: Average of scheduled travel times of trains operating Monday through Friday.
Source: Amtrak Empire Service: New York, Niagara Falls, and Toronto NRPC Form W8 6/21/2010

In contrast, at 8:12 min rail haul time between NYC and Buffalo Exchange Street at an average cost of $58 is not competitive with the other modes, see Exhibit B-49. The long trip-time for a transit mode is a contributing factor in discouraging the use of the rail corridor to travel between key cities like Buffalo-New York City by discretionary (i.e., choice) passengers. Furthermore, poor reliability further hinders discretionary choice passengers. (See Section 4.4.5 Comparative Travel Characteristics a complete comparison of trip time between modes.)

Exhibit B-49: Total Haul Times for Major Market Pairs

Origin / Destination	NYC	Albany	Utica	Syracuse	Rochester	Buffalo (ExS)
NYC	0	226	355	429	509	601
Albany	217	0	169	243	323	415
Utica	335	158	0	114	194	286
Syracuse	401	224	106	0	120	212
Rochester	489	312	194	128	0	132
Buffalo Ex St.	568	391	273	207	119	0

Source: Amtrak Empire Service: New York, Niagara Falls, and Toronto NRPC Form W8 6/21/2010

A statistical analysis of May 2008 Empire Corridor west of Albany-Rensselaer operations reveals that the average actual running time was 58 minutes longer than the scheduled running time, with some trains requiring two hours more than the scheduled running time. Moreover, it should be noted that the present scheduled times between Albany-Rensselaer[30] that include scheduled times ranging from 6:10 to 6:55 reflect non-competitive average speeds (52 to 46 MPH) and already reflect significant additional scheduled time to account for rail congestion on the Corridor. For example, standard rail industry practice on primarily double track mainlines call for a 6 percent schedule margin to provide for reliable service, whereas the trains on the Empire Corridor have excessive scheduled margins ranging from 14 percent to 24 percent.

On-time performance records indicate that these scheduled travel times were only met 80.1 percent of the time between Penn Station and Albany-Rensselaer and 44.2 percent of the time between Albany-Rensselaer and Niagara Falls in 2008.[31]

Amtrak routinely collects information on the causes of train delays, which are frequently due to host/owner railroad issues. Exhibit B-50 summarizes the extent of the delays by the responsible entity and the major problems on each corridor. Overall, these problems in the Empire Corridor resulted in over 161,000 minutes of annual delay, according to analysis of Amtrak data provided to NYSDOT.

Of the 6805 Empire Corridor trains operating between July 1, 2009 and June 30, 2010, more than 10 percent were over 30 minute late. More than 4 percent were more than an hour late and more than 1 percent was more than two hours late. The average train trip on the Empire Corridor experienced 35 minutes of delay en route. While some trips can recover some of the delay en route, the vast majority do not, leading to the poor OTP results described above.

30 June 21, 2010 Amtrak public timetable

31 Amtrak Conductor Delay Reports, July 1, 2009 to June 30, 2010

Exhibit B-50: 2009-2010 Empire Corridor Delays			
Corridor Segment	**Entity**	**% of Delay Cause**	**Common Causes**
New York City - Poughkeepsie	Metro-North	75	Commuter train interference
	Amtrak	23	Passenger train interference (New York Penn Station), passenger loading issues
	Other	2	Waiting for scheduled departure time, weather
Poughkeepsie-Albany-Rensselaer	CSX	61	Slow orders, communications and signals issues, freight train interference
	Metro-North	11	Poughkeepsie congestion
	Other	2	Weather
Albany-Rensselaer – Niagara Falls	CSX	73	Freight train interference, slow orders, work zones
	Amtrak	25	Passenger loading issues, crew related delays
	Other	2	Weather, Customs and Immigration
Source: Amtrak Conductor Delay Reports, July 1, 2009 to June 30, 2010			

The cost of rail for travel on the Empire Corridor is very competitive with other forms of travel serving the corridor. Compared with similar distances served by Amtrak – the current fare structures appear subsidized to induce travelers. Exhibit B-50 identifies the fares associated with rail service for the major markets on the Empire Corridor.

Exhibit B-51: Rail Service to Major Markets - Travel Cost						
Origin/Destination	**NYC**	**Albany**	**Utica**	**Syracuse**	**Rochester**	**Buffalo**
NYC	$0	$38	$57	$57	$57	$58
Albany	$38	$0	$23	$27	$41	$46
Utica	$57	$23	$0	$18	$27	$36
Syracuse	$57	$27	$18	$0	$21	$26
Rochester	$57	$41	$27	$21	$0	$19
Buffalo	$58	$46	$36	$26	$19	$0
Source: http://www.amtrak.com/servlet/ContentServer?pagename=Amtrak/HomePage						

Rail Trips Data Collection

The rail ridership data was obtained by analyzing the origin-destination data (for year 2009) obtained from Amtrak. The data was sorted out by station pairs which provided the ridership between the discreet station pairs and also the total boardings at each of the stations.

Rail Trips Data Collection Limitations

There were no rail data collection limitations.

4.5.4 Comparative Travel Characteristics: Travel Time and Cost

The following section comparatively addresses the competiveness of the various modes studied for each of the major markets. Based on distance and existing service characteristics, different modes have competitive strengths over others. This section will discuss where current rail service falls in relation to other modes in its ability to compete and attract riders between the various markets and market pairs. To establish the comparative competitive context, the narrative below will focus on the relationship of travel time and cost for some of the major market pairs and will discuss reliability and level of service between these markets.

Identification of Generalized Cost

Prior to discussing the comparative competitive strengths and weaknesses of each travel mode, this section describes the generalized cost approach used to take into account the differential value of time in terms of monetary cost for different users – i.e. business and non-business user groups.

The application of discrete choice modeling works on the basis of random utility theory wherein the logit models are used to develop utility equations or the total disutility of a travel is estimated in the form of generalized cost. This generalized cost is basically a linear combination of the monetary cost i.e., fare, fuel cost, toll etc. and the non-monetary cost i.e., travel time (walk, wait, in-vehicle time etc.). The monetary cost i.e., currency is converted to time using the value of time figure which again varies according to the traveler's purpose of trip and/or income.

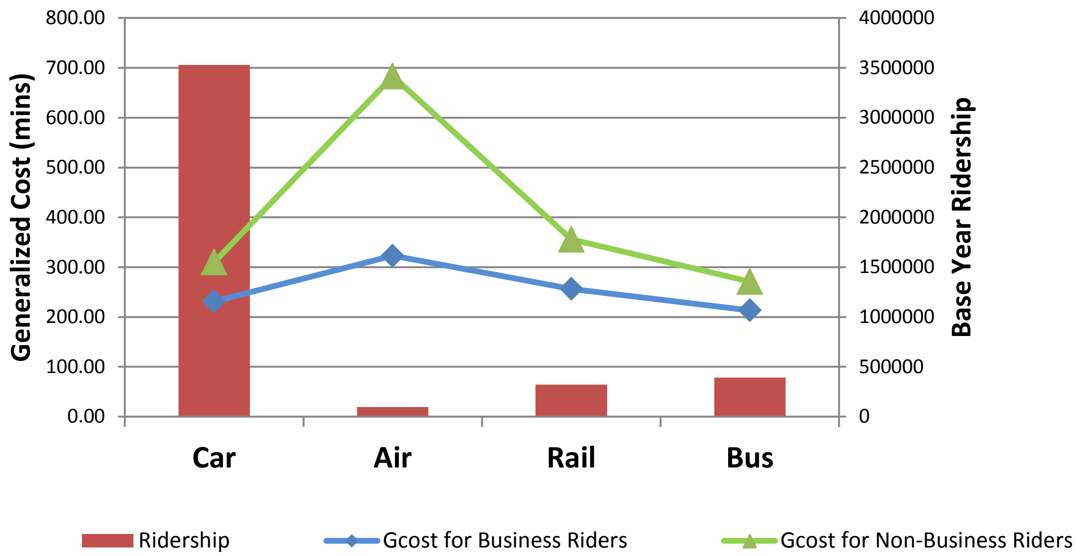
The examples below identify two types of trips present on the Empire Corridor, a relatively short trip defined by NYC-ALB in Exhibit B-53 trip and long trips as defined by NYC-BUF in Exhibit B-54. Generalized cost is calculated and plotted on the base year rail ridership bar chart to eventually analyze the mode shift dynamics between car, air, rail and bus for business and non-business trip. The parameters and criteria defining the generalized cost characteristics associated with trips on the Empire Corridor are defined in Exhibit B-52 directly below and explained by the following defined acronyms.

Exhibit B-52: Generalized Cost Input Parameters

Parameters	Car	Air	Rail	Bus
Fare for PT ($)		138	38	22
Travel Time (mins)	167			
Congested TT (mins)	199.4387			
Distance (miles)	150			
IVTT (mins)		76	186	150
OVTT (mins)		50	15	20
Gcost (mins) Business	231.50	322.96	256.47	213.43
Gcost (mins) Non-Business	168.38	695.93	527.94	446.86
Modeled Ridership	3530404	98006	320155	392362

where,
Gcost= generalized cost in minutes
Gcost (car) = travel time (congested) + distance*(VOC/VOT) + toll/VOT
Gcost (PT) = IVTT + 2*OVTT + fare/VOT
VOC= vehicle operating cost (around 0.1674 $/miles)
VOT = value of time for a business trip (0.939 $/min) and for a non-business trip (0.272 $/min)
IVTT= in-vehicle travel time in minutes[32]
OVTT= out of the vehicle travel time in minutes

Exhibit B-53: New York City to Albany Market Generalized Cost[33]



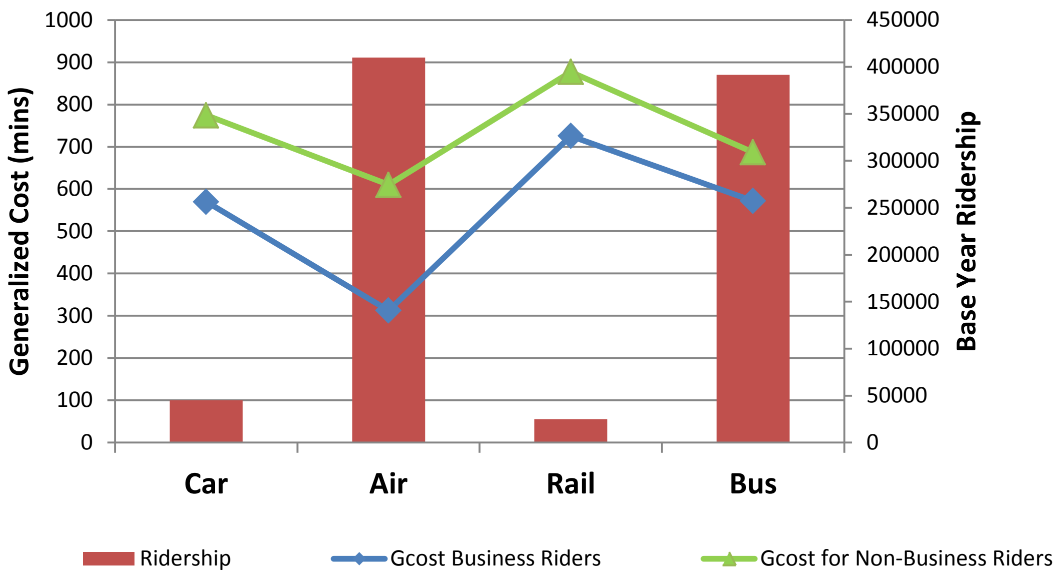
32 *Value of time for business/other purpose trips: adjusted based upon average income from California HSR model report (Outwater et. al., "California Statewide Model for High-Speed Rail", Journal of choice Modeling, 3(1) 2009, p.75)*

33 Ibid, 31

It can be concluded from the charts that the disutility or the generalized cost between NYC-ALB, irrespective of the trip purpose, is highest for the air mode, and then rail, car and bus in progressive order. This also suggest that the bus is highly competitive mode for a trip between New York City to Albany, but car leads in terms of the ridership because of its own advantages to directly reach to the final destination.

The ratio of the generalized cost between the non-business and business trip between NYMTC to ALB for a) car is 1.34 b) air is 2.12 c) rail is 1.39 and d) bus is 1.27. This can be interpreted as the propensity for the air mode to be preferred for a non-business trip is more than twice for a business trip while for all other modes the propensity lies between 1.27 to 1.39, suggesting not a very significant difference between a business and a non-business traveler's mode choice preference for rail, bus and car in terms of parameters weighed in the generalized cost equation.

Exhibit B-54: New York City to Buffalo Market Generalized Cost[34]



When compared to a trip between NYMTC to BUF i.e., a longer trip compared to a shorter trip: NYC-ALB, air mode has the least generalized cost or the disutility and hence highly competitive and preferred mode for both business and non-business trip. The least disutility or the generalized cost after air a) for a business traveler is followed by car, bus and rail, and b) for a non-business traveler is followed by bus, car and rail, in progressive order for both travelers. This suggest that after air, car and bus are the

34 Source: Value of time for business/other purpose trips: adjusted based upon average income from California HSR model report (Outwater et. al., "California Statewide Model for High-Speed Rail", Journal of choice Modeling, 3(1) 2009, p.75)

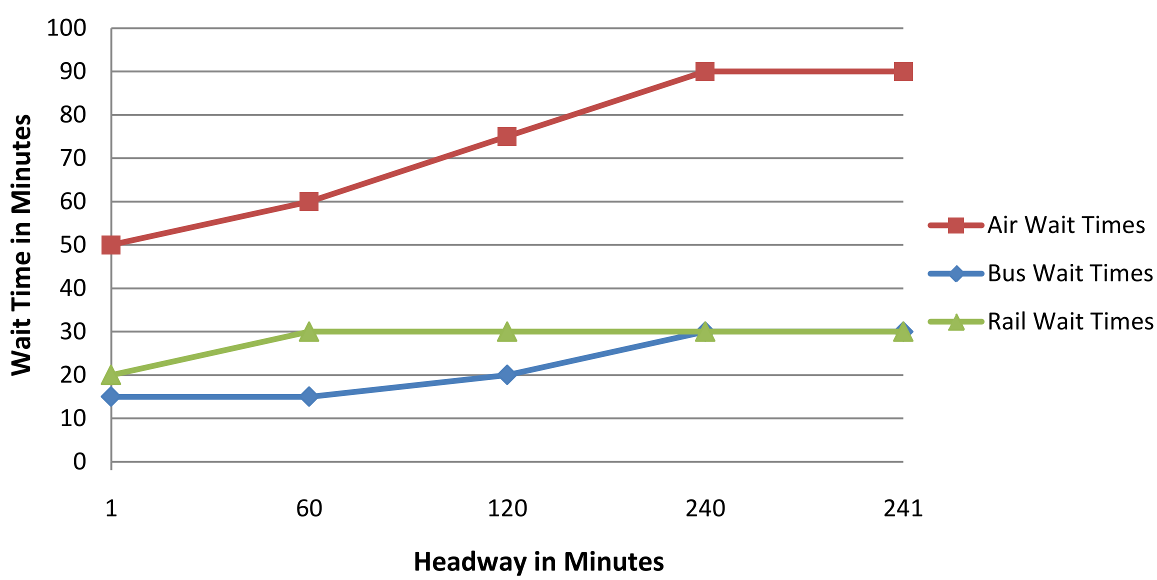
second most competitive mode when analyzed using generalized cost; but the disutility of driving a car for a longer time almost eight hours (not accounted in the generalized cost equation) compared to a sit and travel in a bus illustrates the higher bus ridership compared to car.

The ratio of the generalized cost between the non-business and business trip between NYMTC to BUF for a) car is 1.36 b) air is 1.95 c) rail is 1.21 and d) bus is 1.2. Similar interpretation, as NYMTC to ALB, can be carried out i.e., the propensity for the air mode to be preferred for the non-business trip purpose is almost twice for the business trip purpose while for all other modes, the propensity lies between 1.2 to 1.39, suggesting not a very significant difference between a business and a non-business traveler's mode choice preference for rail, bus and car.

Calculation Wait Times by Transit Mode

One of the key calculations inputted into travel time is an average wait time. Wait time, as shown in Exhibit B-55, for transit mode can considerably increase travel time along with OTP and average delay magnitude as well as access and egress. All of these additional times add to the time disadvantage to slower speed transit compared to car. As a part of the total trip time calculations – wait time is factored by transit modes – as each mode has different average wait time characteristics based on number of headways between departures as well as variable characteristics between mode – such as the heightened level of security for air travel.

Exhibit B-55: Comparative Wait Times for Transit Modes[35]



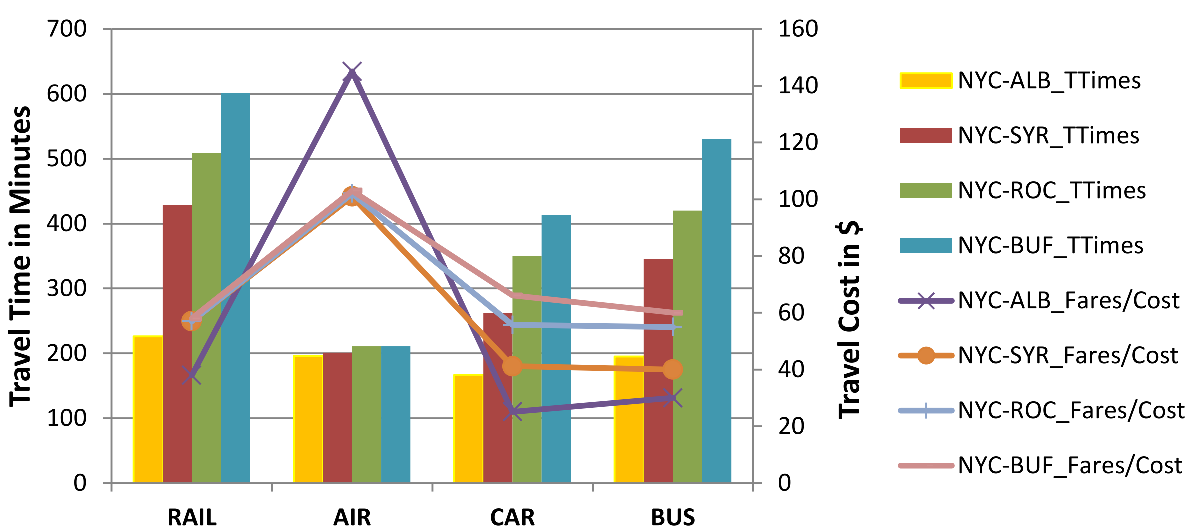
[35] Source: Amtrak, Google, Orbitz, Expedia, Megabus, Greyhound, Adirondack Trailways, Transportation Planning Handbook ITE, 3rd Edition 2009

Comparative Evaluation of Travel Time and Cost – NYC to Major Market Examples

This section describes the interplay between cost and travel time and the relationship to distance between origin and destination in terms of determining ridership. These existing characteristics are important factors to consider when evaluating future forecasts and alternatives to be considered. While some modes of travel are much faster, their cost may be much greater. These are two factors that affect travel behavior and which are applied into the demand management model. The following section evaluates two types of trips to show the relationship between cost and time and trip distance – a range of longer trips as shown by the NYC Market to other Major Markets and a short trip between Syracuse and Rochester to show the sensitivity between Rochester and Syracuse and to show the relationship between three similar cost travel modes, rail, bus and car.

As shown in Exhibit B-54, when considering total travel times[36] alone, all modes are competitive from NYC to Albany. As a result, air becomes much less competitive from NYC to Albany when cost is considered, capturing only 3 percent of this market, as indicated by analysis of the various modes in Section 4.2. Traveling by vehicle from New York to Albany has the lowest overall cost, estimated as 25 dollars[37]. This is slightly lower than the $35 and $38 average costs of bus and rail, respectively, and more than five times lower than the average air travel cost of $134. Given the moderate distance of approximately 147 miles between the two cities, every transit mode is at a disadvantage to the car due to transit linkages, wait time factors, and the need to follow a predetermined schedule. However, if schedules are convenient and service is reliable, rail can be seen as a competitive travel mode from NYC to Albany from a cost and convenience standpoint.

Exhibit B-56: Travel Time and Cost for One-Way Trips from NYC



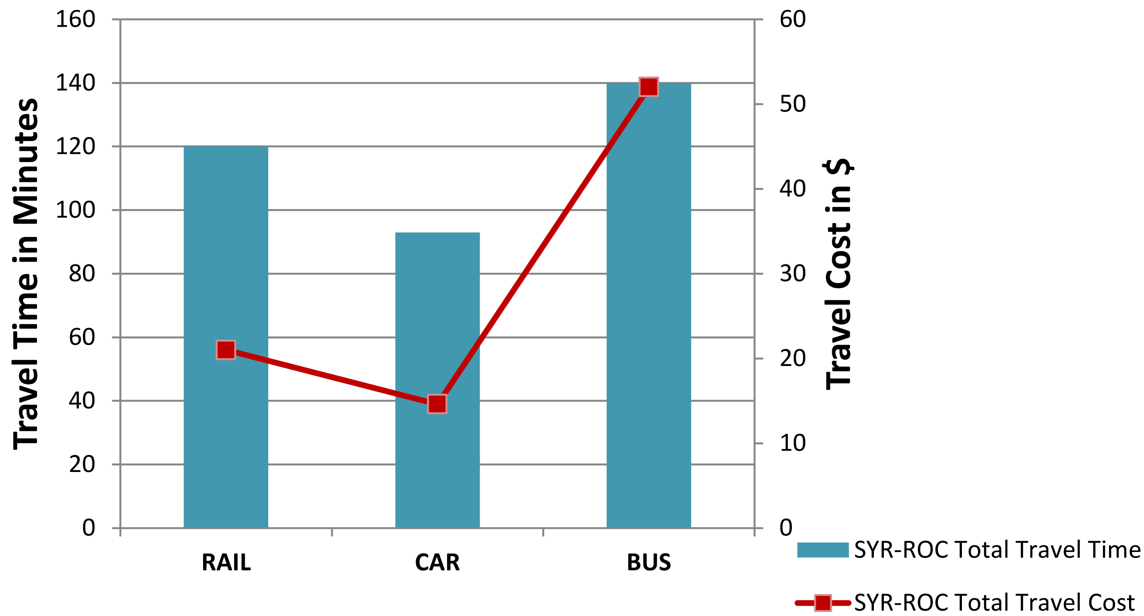
[36] Total travel time includes average delays, dwell times, security clearance.

[37] Car travel cost is determined by a rate of .1674 per mile – which is the perceived rather than actual cost as identified by Transportation Planning Handbook, ITE 2009

Source: Amtrak, Google, Orbitz, Expedia, Megabus, Greyhound, Adirondack Trailways

While trip cost is still the most expensive when traveling from NYC to Buffalo by air, the margin is greatly decreased to about 2 – 3 times the cost of the other modes. However, travel time is 2.5 – 3.5 times less by air. Given the great distance between NYC and Buffalo, traveling by air is a highly competitive mode considering travel time and cost. As a result 51 percent of all trips between New York City and Buffalo are made by air, as discussed in Section 3.4.1 Air Trips. In contrast, rail has the greatest travel time, more than 3.5 times longer than traveling by air, but only half the cost, as shown in Exhibit B-54. Combined with the poor on-time performance and uncompetitive schedules discussed in Section 3.5 Existing Rail, rail is the least competitive mode between New York and Buffalo, capturing only 2 percent of all trips. While no mode comes close to being as fast as air in this market, some travelers do need a cheaper alternative. With 41 percent of this market, bus clearly bus detracts from rail, when cost, in addition to frequency and reliability, not time, is the priority. Bus travel has a slightly shorter overall travel time as compared to rail, and is less expensive, at $44 compared to $58.

Exhibit B-57: Travel Time and Cost for One-Way Trip from Syracuse to Rochester



Source: Amtrak, Google, Orbitz, Expedia, Megabus, Greyhound, Adirondack Trailways

Exhibit B-57 above identifies a shorter trip between Syracuse and Rochester where air travel is not available and dynamics between modes are similar in terms of cost. Car has the best price and travel time when comparing the modes – and as Exhibit B-58 shows, Car dominates travel between this pair. Interestingly though, rail has superior travel time and cost but is a small fraction of travel between these markets compared to bus. The major characteristics for this city pair – explaining this ridership difference is the level of service and on time performance – with four round trips total for rail and 24 for bus and rail On Time Performance (OTP) of less than 60 percent - while bus OTP is likely higher than 85 percent given the number of trips between cities.

Exhibit B-58: Comparative Travel Market : NYMC to Major Markets							
NYMTC	**NYMTC**	**CDTC**	**HOCTS**	**SMTC**	**GTC**	**GBNRTC**	**TOTAL**
Air	0	99,443	0	262,706	298,825	507,489	1,168,463
Bus	0	405,460	176,212	266,885	217,272	427,700	1,493,528
Car	0	320,155	19,858	29,787	23,427	29,881	423,108
Rail	0	320,155	19,858	29,787	23,427	29,881	423,108
Total	0	1,145,213	215,929	589,165	562,950	994,951	3,508,207
Source: Amtrak, Google, Orbitz, Expedia, Megabus, Greyhound, Adirondack Trailways							

Frequency of Service and Competitiveness between Transit Modes

Although trip time and cost are perhaps the most important characteristics when evaluating the competiveness between modes – frequency of service is a critical determinant of mode utilization – particularly when the frequency of service is so low that it eliminates potential markets that other modes successfully serve due to their respective service levels. A clear example of this dynamic is shown in existing Amtrak service between NYC and Albany which has competitive trip time and cost compared to all other modes and competitive level of service – 12 round trips between this particular city pair, by comparison, service between city pairs between Albany and Buffalo which have similar distances and travel times between rail, bus and car as well as competitive fares between all three modes – however rail fails to capture a significant share of any pair market. The only explanation for this phenomenon is that rail has significantly less service – only four round trips between the pairs on the East-West Corridor that it does not serve the market need to the degree that other modes do. Further, poor on-time performance adds to the diminished capacity of rail to serve the travel market present.

On Time Performance and Competitiveness between Transit Modes

Similar to Frequency of Service, On-Time Performance (OTP) – is a factor that can diminish the impact of competitive travel time and fare on selection of mode of travel. Poor OTP effectively adds to travel time – particularly when service is infrequent – causing commuter to have little idea of when they should arrive. Further, poor OTP effectively eliminates business travel – as travelers cannot take chance on the mode of travel not getting them to their destination around their scheduled time. The East-West Empire Corridor has historically low OTP and very extended average delay times – which render the competitively priced service ineffective in terms of serving market needs – that bus is better equipped to serve.

5.0 Operating Plan Alternatives Studied

This section describes the alternatives that were evaluated and forecasted. The alternatives considered are by no means the only potential scenarios available – but an initial test of travel time and schedule variables that allow for an understanding of market dynamics to be developed. In order to not only evaluate the existing transportation market and establish a no-build baseline context for the Empire Corridor, but provide an assessment of a forecasted market under a set of controlled scenarios susceptible of modern transportation demand modeling techniques, a set of alternatives was established based on previous work from the New York State High Speed Rail 2018 & 2030 Vision.[38] This plan was updated to include assumptions for a mostly dedicated third track with alternative maximum speeds of 79, 90, and 110 mph and to extend 2030 to the 2035 forecast year. The proposed 2035 Operating Plan and schedule dramatically increase service on the east-west portion of the Empire Corridor between Albany and Niagara Falls from four to 13 round trips as well as increased speed and reliability. The Vision was based on a certain set of assumptions relating to improvements on the Metro-North Railroad Hudson Line as well as identification of improvements on the East- West portion of the Empire Corridor.

Stated directly, this market study evaluates the comparative competiveness of an updated set of Empire Corridor Rail Service Operating Plans versus other competing modes and provides existing and projected ridership statistics for the following conditions:

- 2009 - Existing Conditions
- 2012 - EIS Base Year
- 2018 - 79, 90, and 110 MPH (Maximum Speed, Mostly Dedicated Third Track) (Phase I of Rail Service Improvements Completed
- 2035 - 79, 90, and 110 (All Rail Service Improvements Completed)
- 2018/2035 - No Build Scenarios

The forecast development process required that 2009 conditions be forecasted to 2012 to match the assumed filing of an EIS from which build and no-build scenarios would be forecast and evaluated. 2012 data was then forecast to 2018 to create a no-build scenario (this scenario would maintain the existing service, speed and assumptions as if rail service had not changed since 2012) as well as maximum speeds of 79, 90, and 110 mph. Finally 2012 data was forecast to 2035 for the no-build scenario and maximum speed alternatives of 79, 90, and 110.

[38] September 17, 2009 LTK

5.1 Alternatives Set-up and Assumptions

Schedules provided for 79, 90, and 110 mph Maximum Speed Mostly Dedicated Third Track– for 2018 and 2035;

- are all associated with dedicated third track alternatives along most (but not all) of the Corridor between Hoffmans and Buffalo.
- reflect maximum speeds for segments not constrained by curves.
- are not average speeds but max allowable speeds. The schedule provided determined the average speed and time.
-

The differences between 2018 and 2035 operating plan and model inputs include:

- Scheduling Changes
  - Frequency of services – number of trains
  - Changes in intermediate destinations
- Change in the socio-economic attributes (population, household, employment)

5.1.1 Study Years

For the purpose of the study three bench mark years were taken into consideration, 2012, 2018 and 2035. Whereas 2012 is considered the base year of the study, 2018 is considered the beginning of the service improvement and 2035 the end of the service improvement. Under both 2018 and 2035 three maximum operating speeds, 79 mph, 90 mph and 110 mph have been considered along with a no-build option.

The base year for the study is 2012, a projection of 2009 into the future. There is no change in the rail operations during this period in terms of speed, schedule and or frequency. The only change factored in the 2012 scenario is the projected change in the socio-economic conditions which have been discussed in Section 2. Along with the change in the socio-economic conditions the model factors in the associated ambient growth in various modes of transportation.

The 2018 no-build operating plan is again based only on the changes of the socio-economic conditions and the ambient growth of in the various modes of transportation.

The 2018 no-build rail service is calculated with the actual run times plus a built in delay equivalent to one standard deviation of the 2009 year delay (based on information obtained from rail operators).

2018 marks the beginning of an improved service plan based on a dedicated third track which would allow for unopposed rail service along this corridor. The schedule developed was based on simulation that assumed a perfect run – or a “Golden Run” of one train set.

The 2018 operating plan incorporates changes in the schedule through the entire corridor (as detailed in Appendix 2) and built-in delay is reduced to 20 percent of the first standard deviation of 2009 year delay to reflect the improved on time performance that is being predicted due to the dedicated third track. The model runs to calculate the ridership is based on three scenarios of maximum speed of rail operations for 2018; 79 mph, 90 mph, 110 mph.

The 2035 no-build rail service is calculated with the actual run times plus a built in delay equivalent to one standard deviation of the 2009 year delay (based on information obtained from rail operators)
The 2035 operating plan incorporates changes in the schedule and adds frequency (as detailed in Appendix 2) and the built in delay is reduced to 20 percent of the first standard deviation of 2009 year delay to reflect the improved on time performance that is being predicted due to the dedicated third track. The model forecasting here is also based on three scenarios of maximum speed of rail operations for 2018; 79 mph, 90 mph, and 110 mph. The 2035, 110 mph operating plan is considered to be the peak alternative considered – with the highest average speed and maximum schedule (all 2035 round trips are the same).

Differences between Speeds

One of the obvious defining features of the speed labeled alternatives is speed. Each one of the maximum speed alternatives 79 mph, 90 mph and 110 mph has a corresponding average speed based on the schedule provided – where the scheduled travel time was divided by distance of trip. Exhibit B-59 shows an example of the impact of the max speed alternative schedules on actual average speeds between NYC and Major Markets on the Corridor. As the exhibit shows – there is not a major difference in actual average travel times in any of the alternatives.

Exhibit B-59: Average Speeds by Alternative - NYC to Major Markets

From New York to	Actual Average Speed Achieved			
	Base	**79mph**	**90mph**	**110mph**
Albany	48.39	63.83	63.83	63.83
Utica	45.71	61.54	63.16	64.29
Syracuse	45.19	60.21	62.34	63.47
Rochester	48.61	62.64	65.33	67.06
Buffalo-Ex	48.56	62.05	64.86	66.93

Exhibit B-60: Travel Time By Alternative - Albany to Other Markets

Westbound from Albany to:	**Amtrak Train 281 Fall 2009**	**79 mph max**	**90 mph max**	**110 mph max**
Amsterdam	0:39	0:35	0:34	0:33
Utica	1:38	1:27	1:21	1:17
Rome	1:53	1:43	1:37	1:32
Syracuse	2:43	2:24	2:14	2:08
Geneva (Branch)		3:25	3:14	3:05
Rochester	3:57	3:35	3:20	3:10
Buffalo Depew	4:57	4:32	4:13	3:59
Buffalo Exchange St	5:11	4:48	4:29	4:15
Niagara Falls	6:20	5:28	5:05	4:51

These average speeds along with the number of stops along the corridor lead to the following trip times between city pairs as shown in Exhibits B-60 and B-61. The maximum speed travel times are compared against the 2009 existing condition. The Exhibit shows considerable time savings when considered on the whole between existing service and 110 mph alternative – such as Albany to Buffalo Exchange – where nearly an hour is saved or 20 percent of travel time. The 125 mph alternative performs better still.

On the longer trips from NYC to East-West Corridor markets – travel time savings are significant – offering real competitive advances versus other travel modes serving the corridor. As Exhibit B-61 shows – travel from NYC to Buffalo is over an hour and 5 minutes less under the 110 mph maximum versus the existing Amtrak 2009 schedule.

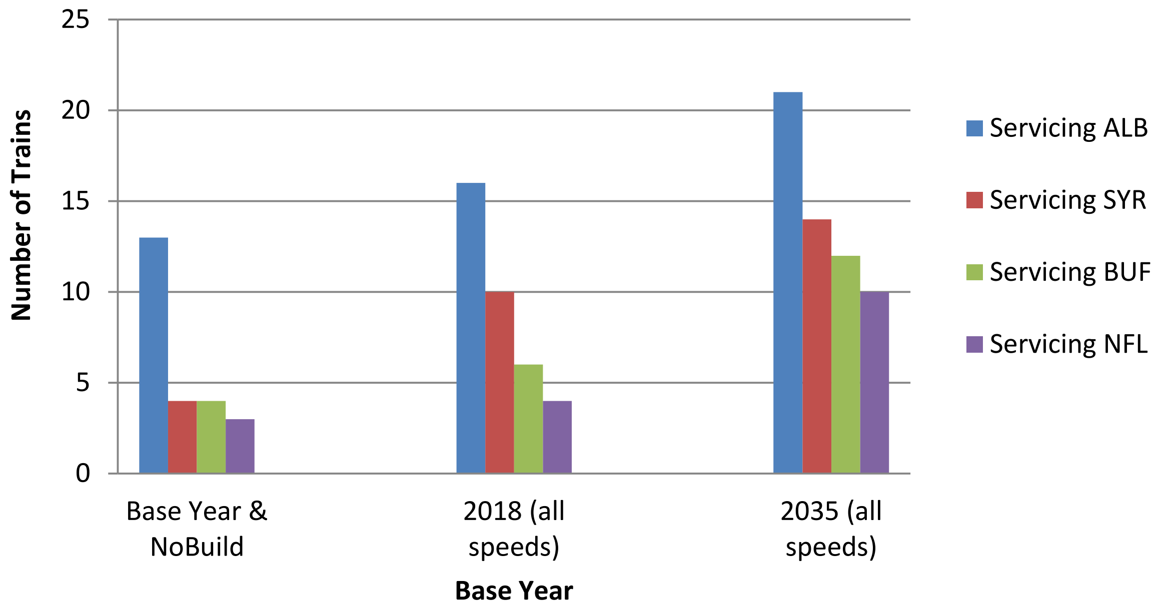
Exhibit B-61: Travel Time By Alternative – New York to Western Corridor Markets

From New York to:	**Amtrak Train 281 Fall 2009**	**79 mph max**	**90 mph max**	**110 mph max**
Amsterdam	3:19	3:05	3:04	3:03
Utica	4:18	3:57	3:51	3:47
Rome	4:33	4:13	4:07	4:02
Syracuse	5:23	4:54	4:44	4:38
Geneva (Branch)		5:55	5:44	5:35
Rochester	6:37	6:05	5:50	5:40
Buffalo Depew	7:37	7:02	6:43	6:29
Buffalo Exchange St	7:51	7:18	6:59	6:45

5.1.2 Differences between train schedules from 2012 to 2018 and 2035

The other key difference that was input into the model for purposes of forecasting was the difference between the number of trains servicing stations in forecast years 2018 and 2035. Exhibit B-62 below shows the difference between the forecast years and the baseline.

Exhibit B-62: Trains Servicing Selected Stations in Forecast years 2012, 2018 and 2035[39]



39 This information was derived from alternative and existing schedules contained in Appendix B.

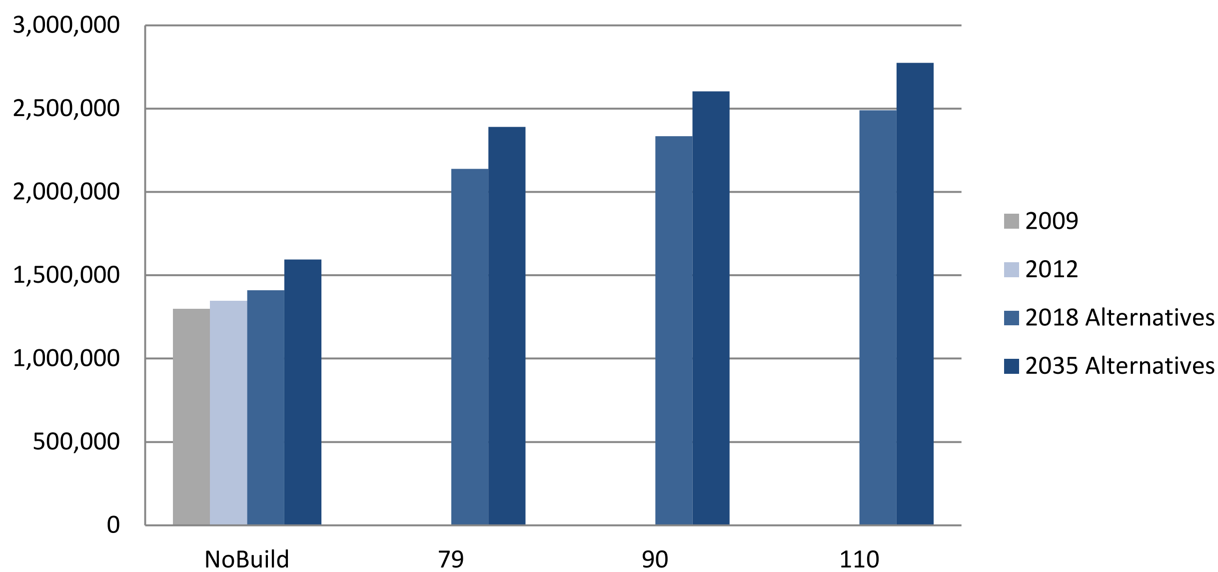
6.0 Forecast Results

6.1 Corridor-wide Ridership

This section discusses ridership projections for 2012, 2018 and 2035 no-build and build alternatives along the entire corridor. Between 2009, this study's existing conditions year, and 2012, the program based year, rail ridership is expected to increase 4 percent, to 1.3 million riders, as shown in Exhibit B-63 Existing and Projected Ridership. The greatest projected ridership occurs under the 110 mph alternatives. With the anticipated population increases and further enhancements in level of service on the corridor, the 2035 110 mph scenario projects the greatest ridership gains, with over 2.7 million trips as shown in Exhibits B-63 and B-64. This represents a 74 percent increase over the no-build scenario for 2035, or a difference of almost 1.2 million trips, as shown in Exhibit B-65. Similarly, the 2018 110 mph scenario forecasts 1.08 million riders over the 2018 no-build scenario. Overall, every build alternative scenario forecasts large ridership gains versus their corresponding no-build scenarios, ranging from 52-74 percent, shown in Exhibit B-65.

Exhibit B-63 and Exhibit B-64: Existing and Projected Ridership

Year\Alternatives	**Base & No-Build**	**79**	**90**	**110**	**125**
2009	1,298,707	NA	NA	NA	
2012	1,346,445	NA	NA	NA	
2018	1,409,899	2,138,961	2,334,490	2,489,350	
2035	1,594,824	2,390,352	2,603,173	2,774,500	4,300,000



6.2 Major Market Boardings

This section describes boardings at the six major market stations for 2012, 2018 and 2035 no-build and build alternatives. As shown in Exhibits B-65 through B-69 each major station experiences the greatest boarding under the 110 mph scenarios; however it varies as to which year, 2018 or 2035, the greatest boardings occur. For all major market stations except Albany, the boardings increase from 2018 and 2035. In contrast, boardings are greater in Albany in 2018 than in 2035 in all alternative scenarios. This decline in ridership could be due to a variety of factors, including an anticipated decrease in the core population of Albany County as well as employment profiles. This projected decline could be reversed if evidence of changes in population projections comes to light or if region specific alternative growth scenarios are considered. Despite this decline, Albany remains the second most frequent station for boardings in both 2018 and 2035, and the 2018 and 2035 figures indicate a 38 percent and 36 percent increase over 2009 existing conditions figures, as shown in Exhibit B-68.

As shown in Exhibits B-66 through B-69 collectively, the western corridor stations of Syracuse, Rochester and Buffalo, are projected to experience a far greater change in boardings than New York City, Albany and Utica, in both 2018 and 2035, ranging from a 124263 percent increase over the same year no-build scenarios. This large percentage increase is to be expected, as currently these cities have low boardings due to limited frequency, slow travel time and poor reliability. The schedule enhancements are anticipated to increase ridership from these western corridor cities, as reflected by strong ridership forecast numbers.

As can be expected, the greatest increase in the number of boardings in all scenarios occurs in NYC, with over 1 million anticipated riders for the 2035 110 mph scenario. This reflects a 148 percent and 177 percent change over 2009 figures shown in Exhibit B-44. In both 2018 and 2035, the greatest percent increase in ridership occurs between the 79 and 90 mph scenarios, increasing 8 percent and 7 percent respectively. Between the 90 mph and 110 mph scenarios, ridership increases 5 percent both years.

Exhibit B-65: Percent Change in Ridership

Year\Alternatives	**79 & No-Build**	**90 & No-Build**	**110 & No-Build**
2018	52%	66%	77%
2035	50%	63%	74%

Exhibit B-66 and Exhibit B-67: 2018 Boardings						
Total Boardings	NYP	ALB	UCA	SYR	ROC	BUF
2018- NO BUILD	615,630	319,356	24,553	50,211	53,556	72,495
2018- 79 MPH	837,956	391,576	41,061	135,312	125,744	178,578
2018- 90 MPH	885,913	408,319	44,840	152,951	144,575	225,887
2018- 110MPH	918,272	422,071	48,572	167,689	160,565	263,478

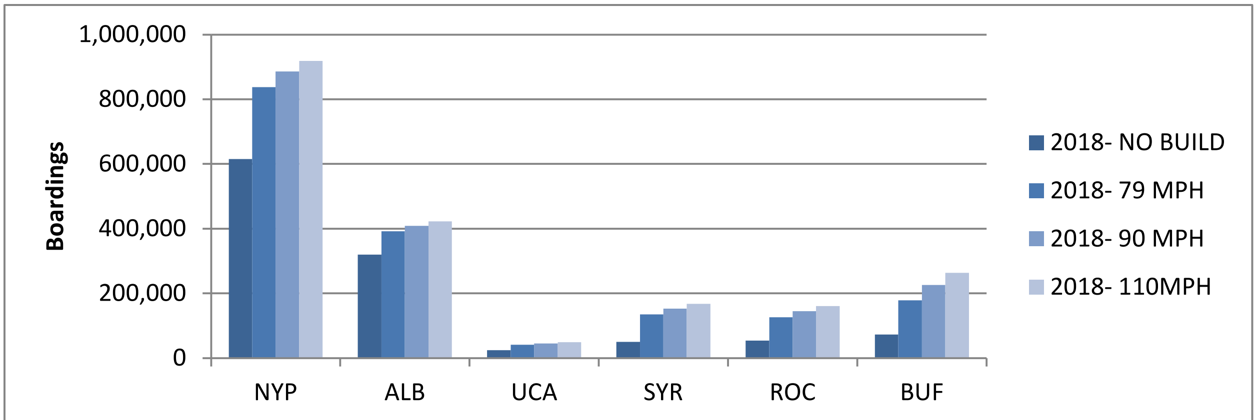
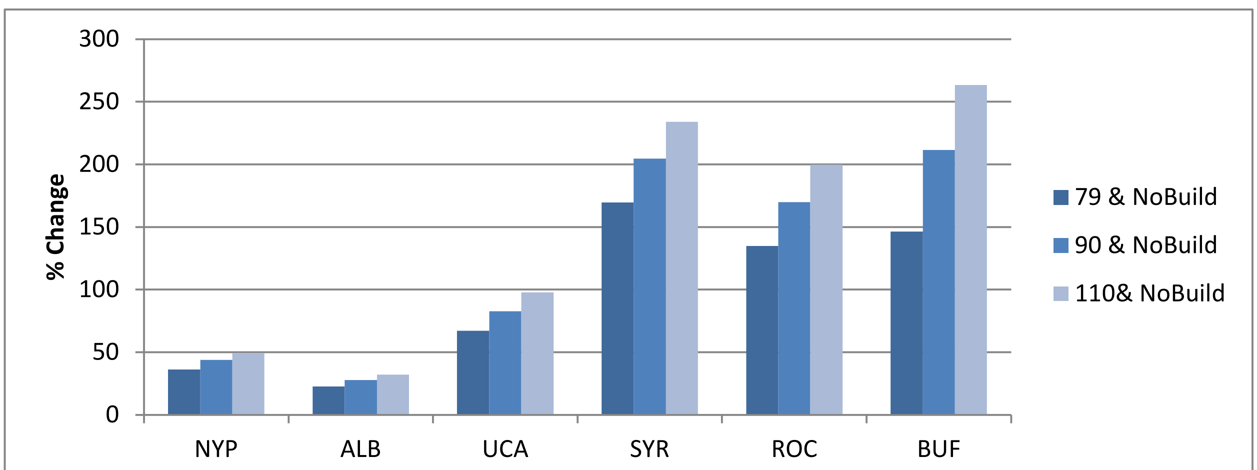


Exhibit B-68 and Exhibit B-69: 2018 - % Change in 2018 Boardings						
% Change	NYP	ALB	UCA	SYR	ROC	BUF
79 & No-Build	36%	23%	67%	169%	135%	146%
90 & No-Build	44%	28%	83%	205%	170%	212%
110 & No-Build	49%	32%	98%	234%	200%	263%

Exhibit B-70 and Exhibit B-71: 2035 Boardings						
Total Boardings	**NYP**	**ALB**	**UCA**	**SYR**	**ROC**	**BUF**
2035- NO BUILD	696,605	309,897	26,422	55,228	60,668	75,776
2035- 79 MPH	942,759	383,219	43,238	139,036	136,010	190,973
2035- 90 MPH	991,414	401,010	47,879	159,755	158,121	241,504
2035- 110MPH	1,026,275	416,012	51,940	176,484	176,144	284,597



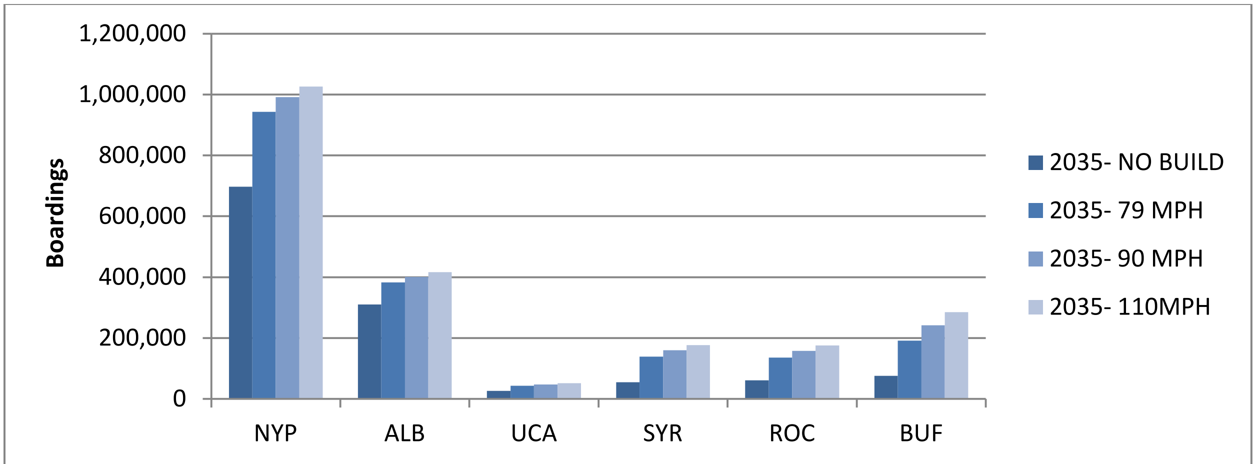
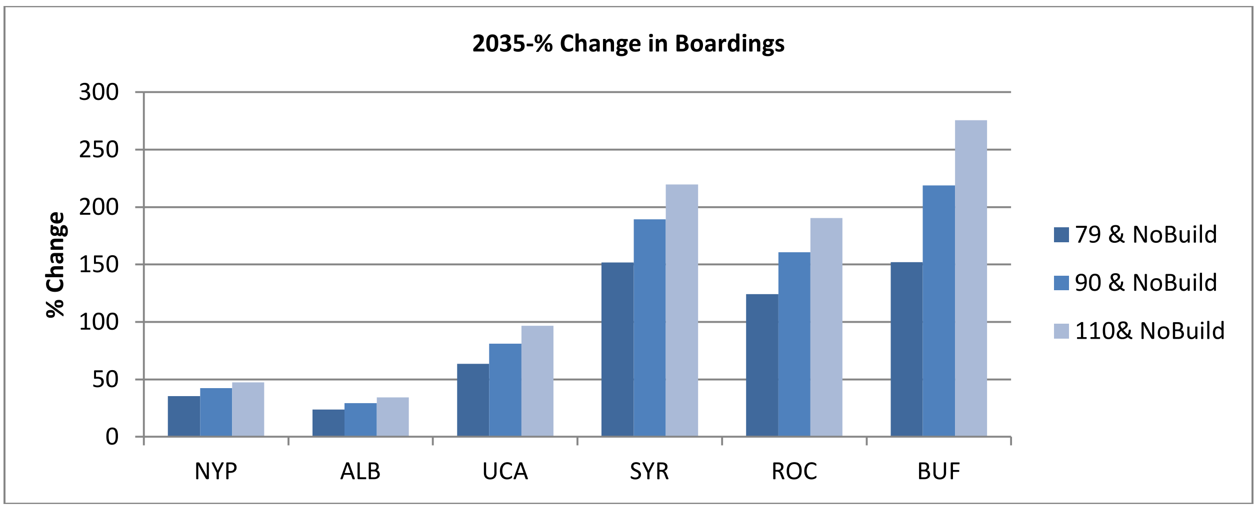


Exhibit B-72 and Exhibit B-73: 2035 Boardings

% Change	NYP	ALB	UCA	SYR	ROC	BUF
79 & No-Build	35%	24%	64%	152%	124%	152%
90 & No-Build	42%	29%	81%	189%	161%	219%
110& No-Build	47%	34%	97%	220%	190%	276%



6.3 Major Market to Major Market Ridership

As Exhibits B-70 – B-79 shows, when considering the major market MPO's and their respective stations on the line, ridership consistently increases with speed and time (2018 vs. 2035).

Under all scenarios, the greatest ridership exists in the NYC – Albany market, however this does not represent the greatest percent gain in ridership. From the 2009 existing conditions to the 2035 110 mph scenario, ridership in this market pair increases by 27 percent, from approximately 320,000 to 409,009, as shown in Exhibits B-63 and B-72. In comparison, Between NYP and Buffalo ridership increases 690 percent under the same time frame and speed parameters, the greatest percent increase between any MPO pair.

In general, the greatest percent ridership gains are always a result of ridership between NYC MPO and the Western Corridor (Utica, Syracuse, Rochester and Buffalo). While the greatest gains and overall boardings from the NYC MPO to a Western Corridor MPO is from NYC MPO to the Buffalo MPO, ridership between the Utica, Syracuse and Rochester MPO's to the NYC MPO is forecast to greatly increase with HSIPR. Rochester to the NYC MPO is projected to have a 419 percent increase, Syracuse 262 percent, and Utica 86 percent, under the 2035 110 mph scenario, all far greater percentage gains than the NYC MPO to the Albany MPO market.

From a pure boarding perspective, the greatest number of gains is projected to occur in the NYC to Buffalo MPO market, increasing by 207,550 annual riders from 2009 to the 2035 110 mph scenario, as shown in Exhibit B-63 and B-72. The NYC to Rochester MPO follows behind with an anticipated increase of almost 92,000 and Albany follows closely behind Rochester with the third greatest physical gains in boardings, expected to reach 89,000. Projections also show the Albany MPO to Buffalo MPO will experience a large percentage increase of 416 percent, an increase of over 46,000 boardings per year in the 2035 110 mph scenario.

High percentage gains are projected between western corridor cities, but because of their low existing ridership, this does not result in large boardings between these cities as compared to the existing auto and bus ridership numbers discussed in Section 4.0. The following is a brief assessment of each of the major market to major market Exhibits.

Exhibit B-74: Major Market to Major Market Rail Boardings							
2009 Existing Conditions	**NYC MPO***	**Albany MPO****	**Utica MPO*****	**Syracuse MPO**	**Rochester MPO**	**Buffalo MPO******	**Total**
NYC MPO*	0	320,155	19,858	29,787	23,427	29,881	423,108
Albany MPO**	320,155	0	2,082	7,013	8,224	11,133	348,607
Utica MPO***	19,858	2,082	0	819	1,421	2,480	26,660
Syracuse MPO	29,787	7,013	819	0	1,794	6,466	45,879
Rochester MPO	23,427	8,224	1,421	1,794	0	1,862	36,728
Buffalo MPO****	29,881	11,133	2,480	6,466	1,862	0	51,821
Total	423,108	348,607	26,659	45,878	36,728	51,821	932,801
Source: Amtrak 2009							

As Exhibit B-74 indicates, there were 932,801 rail boardings in 2009 between major markets. The greatest number of boardings, 45 percent, involves travel to/from NYC. Albany is the second most popular origin/destination, with 37 percent of the total market share. The major market share of any one place then drastically drops off, with the Buffalo market comprising 6 percent, the next largest major market share.

The most frequented market pair is the NYC - Albany market, constituting over 34 percent of the entire 2009 rail market. Although the NYC- Buffalo Market has the second greatest number of boardings, it only totals 3 percent of the entire Empire Corridor Rail Market, as does the New York to Syracuse market Along the western corridor, Albany – Buffalo comprises only 1 percent of the rail market.

Exhibit B-75: 2012 Major Market to Major Market Rail Boardings							
2012 Base Year	**NYC MPO***	**Albany MPO****	**Utica MPO*****	**Syracuse MPO**	**Rochester MPO**	**Buffalo MPO*******	**Total**
NYC MPO*		321,914	20,527	31,101	26,949	37,951	438,442
Albany MPO**	321,914		2,038	6,690	7,785	10,729	349,156
Utica MPO***	20,527	2,038		813	1,393	2,566	27,337
Syracuse MPO	31,101	6,690	813		1,776	6,659	47,039
Rochester MPO	26,949	7,785	1,393	1,776		2,174	40,077
Buffalo MPO****	37,951	10,729	2,566	6,659	2,174		60,079
Total	438,442	349,156	27,337	47,039	40,077	60,079	962,130
Source:							

Base year projections indicate there will be 962,130 rail boardings between major markets in 2012, a 3 percent increase over 2009 figures, as shown in Exhibit B-74. The greatest number of boardings, 45 percent, continues to be for travel to/from NYC. Albany remains the second most popular origin/destination, with 36 percent of the total market share. Consistent with 2009 figures, Buffalo constitutes the next greatest market share, at 6 percent of the total boardings.

The most frequented market pair is the NYC - Albany market, constituting 33 percent of the entire 2012 rail market. NYC- Buffalo Market has the second greatest number of boardings, totaling 4 percent of the entire Empire Corridor Rail Market, a slight increase over 2009 conditions. Along the western corridor, Albany – Buffalo is projected to continue to comprise only 1 percent of the rail market.

Exhibit B-76: 2018 No-Build Major Market to Major Market Rail Boardings							
2018 No-Build	**NYC MPO***	**Albany MPO****	**Utica MPO*****	**Syracuse MPO**	**Rochester MPO**	**Buffalo MPO******	**Total**
NYC MPO*		317,570	20,368	31,352	36,767	60,145	**466,202**
Albany MPO**	317,570		2,041	6,814	8,133	10,784	**345,342**
Utica MPO***	20,368	2,041		822	1,448	2,498	**27,177**
Syracuse MPO	31,352	6,814	822		1,860	6,490	**47,338**
Rochester MPO	36,767	8,133	1,447	1,860		1,955	**50,162**
Buffalo MPO****	60,145	10,784	2,498	6,490	1,955		**81,872**
Total	**466,202**	**345,342**	**27,177**	**47,338**	**50,162**	**81,872**	**1,018,093**

Then 2018 No-Build scenario projections indicate there will be 1,018,093 rail boardings between major markets, a 5 percent increase over 2012 base – year figures, as shown in Exhibit B-75. The NYC market share increases slightly to 46 percent. Albany remains the second most popular origin/destination, but loses some of its market share, dropping to 31 percent of the total market over 2012 figures. Buffalo is anticipated to continue holding the third greatest market share, while increasing to 8 percent of the total boardings.

The most frequented market pair is the NYC – Albany market, constituting 31 percent of the entire 2018 no-build rail market, a 2 percent drop from the base-year. Meanwhile NYC – Buffalo Market has the second greatest number of boardings, increasing to 6 percent of the entire Empire Corridor Rail Market. Along the western corridor, Albany – Buffalo is projected to continue to comprise only 1 percent of the rail market.

Exhibit B-77: 2018 79 mph Major Market to Major Market Rail Boardings							
2018 79 mph	**NYC MPO***	**Albany MPO****	**Utica MPO*****	**Syracuse MPO**	**Rochester MPO**	**Buffalo MPO******	**Total**
NYC MPO*		367,100	31,778	93,802	92,778	159,794	**745,251**
Albany MPO**	367,100		4,144	16,020	16,865	34,558	**438,686**
Utica MPO***	31,778	4,144		1,181	2,514	6,812	**46,428**
Syracuse MPO	93,802	16,020	1,181		2,544	13,579	**127,126**
Rochester MPO	92,778	16,865	2,514	2,544		3,428	**118,128**
Buffalo MPO****	159,794	34,558	6,812	13,579	3,428		**218,171**
Total	**745,251**	**438,686**	**46,428**	**127,126**	**118,128**	**218,171**	**1,693,790**
Source:							

As shown in Exhibit B-77, 2018 79 mph projections indicate there will be 1,693,790 rail boardings between major markets, a 76 percent increase over 2012 base-year figures, and a 66 percent increase over 2018 no-build figures. The NYC market share decreases slightly to 44 percent, as travel between other stations is anticipated to increase. Albany remains the second most popular origin/destination, but also loses some of its market share, dropping to 26 percent of the total market. Buffalo is anticipated to continue to increase its share of the market, comprising 13 percent of the total 2018 79 mph boardings. This indicates a 261 percent increase, or over 158,000 additional boardings, over base-year conditions. Projections also anticipate the NYC-Syracuse market will have a great rise in boardings, increasing by over 62,000 riders, or 201 percent from base-year projections.

The most frequented market pair is the NYC - Albany market, 22 percent of the entire 2018 79 mph rail market. While this indicates a drop in the overall market share, boardings from New York to Albany actually increased by 16 percent over 2018 no-build figures, and 14 percent over base – year figures. Meanwhile the NYC – Buffalo market has the second greatest number of boardings, increasing to 9 percent of the entire Empire Corridor Rail Market. This is an increase of over 121,000 boardings, 321 percent, over base-year figures. The Albany – Buffalo market is projected to maintain a small market share, at 2 percent, yet boardings increases by 23,829, or 222 percent over 2012 figures.

ExhibitB-78: 2018 90 mph Major Market to Major Market Rail Boardings

2018 90 mph	NYC [1]	Albany [2]	Utica [3]	Syracuse	Rochester	Buffalo [4]	Total
NYC MPO*		367,268	32,838	102,119	104,482	201,013	807,720
Albany MPO**	367,268		4,817	19,560	21,013	47,003	459,660
Utica MPO***	32,838	4,817		1,331	3,097	9,534	51,618
Syracuse MPO	102,119	19,560	1,331		2,927	17,693	143,630
Rochester MPO	104,482	21,013	3,097	2,927		4,020	135,539
Buffalo MPO****	201,013	47,003	9,534	17,693	4,020		279,263
Total	807,720	459,660	51,618	143,630	135,539	279,263	1,877,430

[1]Includes New York Penn, Yonkers and Croton Harman

[2]Includes Albany/Rensselaer, Saratoga and Schenectady

[3]Includes Utica and Rome

[4]Includes Buffalo Exchange, Buffalo Depew and Niagara

As shown in Exhibit B-78, 2018 90 mph projections indicate there will be 1,877,430 rail boardings between major markets, a 95 percent increase over 2012 base-year figures, and a 84 percent increase over 2018 no-build figures. While remaining the most frequented origin/destination, the NYC market share decreases slightly to 43 percent, as travel between other stations continues to increase. Albany remains the second most popular origin/destination, but also drops to 24 percent of the total market. Buffalo continues to increase its market share to 15 percent of the total boardings. This indicates a 365 percent increase, or over 219,000 additional boardings, over base-year conditions.

NYC-Albany remains as the most frequented market pair, yet drops to 20 percent of all 2018 90 mph boardings. Still, this indicates a net increase of 16 percent over 2018 no-build figures, and 14 percent over base-year figures. The NYC-Buffalo market has the second greatest number of boardings, recognizing an increase in the market share, garnering 11 percent of the entire Empire Corridor rail market. This is an increase of over 163,000 boardings, 429 percent higher than base-year figures. The Albany – Buffalo market continues to have a small overall market share, at 3 percent, but boardings between the two cities actually increase by 364 percent over base-year conditions.

Exhibit B-79: 2018 110 mph Major Market to Major Market Rail Boardings							
2018 110 mph	**NYC [1]**	**Albany [2]**	**Utica [3]**	**Syracuse**	**Rochester**	**Buffalo [4]**	**Total**
NYC[1]		367,391	34,028	108,669	114,396	230,674	855,157
Albany [2]	367,391		5,406	22,064	24,432	57,478	476,770
Utica[3]	34,028	5,406		1,391	3,516	11,876	52,216
Syracuse	108,669	22,064	1,391		3,269	21,928	157,321
Rochester	114,396	24,432	3,515	3,269		4,556	150,168
Buffalo [4]	230,674	57,478	11,876	21,928	4,556		326,512
Total	855,157	476,770	56,216	157,321	150,168	326,512	2,022,144

[1]Includes New York Penn, Yonkers and Croton Harman

[2]Includes Albany/Rensselaer, Saratoga and Schenectady

[3]Includes Utica and Rome

[4]Includes Buffalo Exchange, Buffalo Depew and Niagara

The 2018 110 mph projections indicate there will be 2,022,144 rail boardings between major markets, a 110 percent increase over 2012 base-year figures, and a 99 percent increase over 2018 no-build figures; see Exhibit B-79. As the largest city on the corridor, NYC remains the most popular origin/destination, with 43 percent of the entire rail major market boardings. Albany remains the second most popular origin/destination, with 24 percent of the total market. Buffalo continues to increase its market share to 16 percent of the total boardings. This indicates a 443 percent increase, or over 266,000 additional boardings, over base-year conditions.

NYC-Albany remains as the most frequented market pair, with 18 percent of all boardings. Projections indicate a net increase of 45,477, in this market, 14 percent greater than base-year figures, but a nominal overall increase between the 90 and 110 mph scenarios. The NYC-Buffalo market has the second greatest number of boardings, with 11 percent of the entire Empire Corridor rail market. This is an increase of almost 193,000 boardings, 507 percent higher than base-year figures. The Albany–Buffalo market continues to have a small overall market share, at 3 percent, but boardings between the two cities greatly increase by 436 percent over base-year conditions.

Exhibit B-80: 2035 No-Build Major Market to Major Market Rail Boardings

2035 No-Build	**NYC 1**	**Albany 2**	**Utica 3**	**Syracuse**	**Rochester**	**Buffalo 4**	**Total**
NYC1		338,627	22,414	32,425	38,833	59,707	**492,005**
Albany 2	338,627		1,901	5,835	7,233	9,347	**362,944**
Utica3	22,414	1,901		807	1,438	2,857	**29,416**
Syracuse	32,425	5,835	807		4,637	8,273	**51,976**
Rochester	38,833	7,233	1,437	4,637		4,511	**56,560**
Buffalo 4	59,707	9,347	2,857	8,273	4,511		**84,694**
Total	**492,005**	**362,944**	**29,416**	**51,976**	**56,650**	**84,694**	**1,077,685**

1Includes New York Penn, Yonkers and Croton Harman

2Includes Albany/Rensselaer, Saratoga and Schenectady

3Includes Utica and Rome

4Includes Buffalo Exchange, Buffalo Depew and Niagara

The 2035 no-build projections as shown in Exhibit B-80 indicate there will be 1,077,685 rail boardings between major markets, a 12 percent increase over 2012 base – year figures. NYC has the most boardings, capturing 46 percent of the market, a 12 percent increase over the base – year. Albany remains the second most popular origin/destination, with 33 percent of the total market. Buffalo constitutes the next greatest market share, at 6 percent of the total boardings. This indicates a 40 percent increase, or over 24,000 additional boardings over base – year conditions.

NYC - Albany remains as the most frequented market pair, with 31 percent of all boardings. This indicates an increase of 5 percent over base-year figures. The NYC – Buffalo market has the second greatest number of boardings, with 6 percent of the entire Empire Corridor rail market. This is a net increase of 21,755 boardings, or 57 percent greater than base – year figures. However, this is a net decrease of 438 boardings, 1 percent lower, then the 2018 no-build scenario. The Albany – Buffalo market is anticipated to decline by 13 percent over base-year conditions under a no-build scenario.

Exhibit B-81 2035 79 mph Major Market to Major Market Rail Boardings

2035 79 mph	NYC [1]	Albany [2]	Utica [3]	Syracuse	Rochester	Buffalo [4]	Total
NYC[1]		408,510	34,232	91,692	96,535	164,461	795,430
Albany [2]	408,510		3,919	14,454	15,935	33,144	475,962
Utica[3]	34,232	3,919		1,156	2,543	7,818	49,668
Syracuse	91,692	14,454	1,156		5,347	17,643	130,292
Rochester	96,535	15,935	2,543	5,347		6,957	127,317
Buffalo [4]	164,461	33,144	7,818	17,643	6,957		230,023
Total	**795,430**	**475,962**	**49,668**	**130,292**	**127,317**	**230,023**	**1,808,692**

[1]Includes New York Penn, Yonkers and Croton Harman

[2]Includes Albany/Rensselaer, Saratoga and Schenectady

[3]Includes Utica and Rome

[4]Includes Buffalo Exchange, Buffalo Depew and Niagara

Projections indicate there will be 1,808,692, rail boardings between major markets under a 2035 79 mph alternative. This represents an 87 percent increase over 2012 base-year figures as shown in Exhibit B-75. NYC has the most boardings, capturing 44 percent of the market, an 81 percent increase over the base-year. Albany remains the second most popular origin/destination, with 26 percent of the total market. Buffalo constitutes the next greatest market share, at 13 percent of the total boardings, a large market share increase over base-year and 2035 no-build scenarios. This is a net increase of almost 170,000 boardings per year, or 282 percent, over base-year conditions.

NYC-Albany remains as the most frequented market pair, with 23 percent of all boardings. This indicates an increase of 27 percent over base-year figures. The NYC-Buffalo Market has the second greatest number of boardings, with 9 percent of the entire Empire Corridor rail market. This is a net increase of 126,510 boardings, or 333 percent greater than base-year figures. The Albany-Buffalo market is anticipated to hold only 2 percent of the 2035 79 mph market, but will increase by 208 percent, or 22,415 more boardings than the base-year conditions.

Exhibit B-82: 2035 90 mph Major Market to Major Market Rail Boardings							
2035 90 mph	**NYC [1]**	**Albany [2]**	**Utica [3]**	**Syracuse**	**Rochester**	**Buffalo [4]**	**Total**
NYC[1]		408,881	35,799	101,207	110,559	205,556	**862,002**
Albany [2]	408,881		4,598	17,979	20,220	46,212	**497,890**
Utica[3]	35,799	4,598		1,306	3,156	11,076	**55,934**
Syracuse	101,207	17,979	1,306		5,723	23,235	**149,449**
Rochester	110,559	20,220	3,156	5,723		7,959	**147,617**
Buffalo [4]	205,556	46,212	11,076	23,235	7,959		**294,037**
Total	**862,002**	**497,890**	**55,934**	**149,449**	**147,617**	**294,037**	**2,006,929**

[1]Includes New York Penn, Yonkers and Croton Harman

[2]Includes Albany/Rensselaer, Saratoga and Schenectady

[3]Includes Utica and Rome

[4]Includes Buffalo Exchange, Buffalo Depew and Niagara

As shown in Exhibit B-82, projections indicate there will be 2,006,929 rail boardings between major markets under a 2035 90 mph alternative. This represents a 108 percent increase over 2012 base-year figures. NYC has the most boardings, capturing 43 percent of the market, a 96 percent increase over the base-year. Albany remains the second most popular origin/destination, with 25 percent of the total market. Buffalo constitutes the next greatest market share, at 15 percent of the total boardings, a net increase of 233,957 boardings per year, or 389 percent, over base-year conditions.

NYC-Albany remains as the most frequented market pair, with 23 percent of all boardings. This indicates an increase of 27 percent over base-year figures. The NYC-Buffalo market has the second greatest number of boardings, with 10 percent of the entire Empire Corridor rail market. This is a net increase of 167,604 boardings, or 441 percent greater than base-year figures. Although the Albany–Buffalo market is anticipated to hold only 2 percent of the 2035 90 mph market, the overall boardings for this market will increase by 330 percent, or 35,483 more boardings than the base-year conditions.

Exhibit B-83: 2035 110 mph Major Market to Major Market Rail Boardings

2035 110 mph	NYC [1]	Albany [2]	Utica [3]	Syracuse	Rochester	Buffalo [4]	Total
NYC[1]		409,082	37,021	107,785	121,555	237,431	**912,874**
Albany [2]	409,082		5,185	20,604	23,876	57,504	**516,250**
Utica[3]	37,021	5,185		1,378	3,626	14,047	**61,256**
Syracuse	107,785	20,604	1,378		6,059	29,154	**164,980**
Rochester	121,555	23,876	3,625	6,059		8,928	**164,043**
Buffalo [4]	237,431	57,504	14,047	29,154	8,928		**347,065**
Total	**912,874**	**516,250**	**61,256**	**164,980**	**164,043**	**347,065**	**2,166,468**

[1]*Includes New York Penn, Yonkers and Croton Harman*

[2]*Includes Albany/Rensselaer, Saratoga and Schenectady*

[3]*Includes Utica and Rome*

[4]*Includes Buffalo Exchange, Buffalo Depew and Niagara*

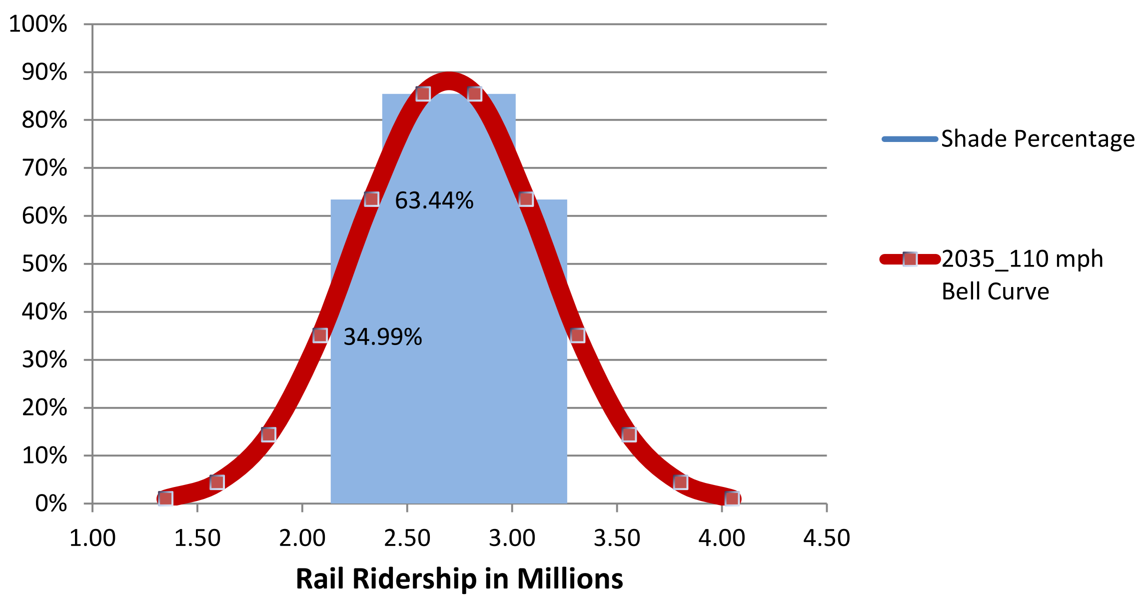
As shown in Exhibit B-83, projections indicate there will be 2,166,648 rail boardings between major markets under a 2035 110 mph alternative. This represents a 125 percent increase over 2012 base-year figures. NYC has the most boardings, capturing 42 percent of the market, a 108 percent increase over the base-year. Albany remains the second most popular origin/destination, with 24 percent of the total market. Buffalo constitutes the next greatest market share, at 16 percent of the total boardings, a net increase of 286,985 boardings per year, or 478 percent, over base-year conditions.

NYC-Albany remains as the most frequented market pair, while dropping to 19 percent of all boardings 2035 110 mph boarding. Still, the actual increase in this market is 27 percent over base-year figures. The NYC- Buffalo market has the second greatest number of boardings, with 11 percent of the entire Empire Corridor rail market. This is a net increase of 199,480 boardings, or 525 percent greater than base-year figures. Although the Albany-Buffalo market is anticipated to hold only 3 percent of the 2035 110 mph market, the overall boardings for this market will increase by 435 percent, or 46,775 more boardings than the base-year conditions.

6.4 Maximum Total Ridership Range

Understanding that the model forecasts ridership into future years based on best available data and sensitivities for mode selection utilized from other studies rather than developed directly from travel market stated user preference surveys – a normal distribution curve stating confidence in a range of potential forecasted demand for 110 mph was developed. As Exhibit B-84 shows a one standard deviation confidence interval shows demand at approximately 2.25 million riders at the low end and 3.2 million on the high end. The mean shown is the max 110 alternative ridership forecast in this study at approximately 2.79 million riders.

Exhibit B-84: Ridership Forecast Normal Distribution Confidence Bell



6.5 Comparative Mode Analysis

All factors and sensitivities which were input into the model were performed on a corridor wide basis; therefore, the most accurate analysis of the comparative modes of trips has also been done on a corridor wide basis. This section assesses rail forecast results in light of forecast results for other travel modes and the resulting shifts from one mode of travel to another given shifts in socio-economic factors and the resultant changes in rail ridership. Although city pair level changes in travel modes were evaluated and forecasts for these results are available in Appendix 3, a detailed assessment of these results is not provided in this Section. The is based upon the amount of information, which is extensive in nature, blunting the impact of the evaluative process, but as also noted elsewhere in this document – because the model is based on generalized sensitivities for mode selection and change rather than market to market sensitivities based on user preference surveys – which were not performed, as well as the complexity of subjective assignment of mode output information into MPO level geographies – the results have some irregularities not consistent with corridor wide or transportation planning principals as developed in evaluation of all the data in this study. Given this backdrop however, trends in smaller scale markets follow almost exactly those of the corridor wide trends in shifts from studied competitive modes to rail. *Appendix 3* describes the irregularities encountered, describes why they may be occurring, and directly states what likely adjustments are required to rationalize the entire data set. Given the complexities noted above, the whole of the output results from the model are consistent and tell a story about how the alternatives would compete with other travel modes compared to the no-build condition.

It should be understood that this corridor is overwhelmingly auto dominated and that any small shift from the auto market (in terms of percentage), can bolster the growth of the other modes. For the purpose of this analysis, the study of the combined category of air, bus and rail trips is being termed “public transportation” (PT). Analysis of the Exhibit B-85 from the base year 2012 to 2018 to 2035 shows growth in all modes of travel and therefore in the total travel market. This increase is generally based on the growth of the socio-economic conditions such as population and employment throughout the whole region. The percentage of trips made on air, bus and rail as compared to the total market increases from the base year of 2012 and the no build scenarios in 2018 and 2035, both as a sum and individually, signifying general growth of the corridor travel market without any service improvements to any of the PT modes.

As shown in Exhibit B-85, for the different scenarios (79 mph, 90 mph and 110 mph maximum operating speed) for both the forecast years, 2018 and 2035 it can be concluded that rail mode draws its share from all the other modes. Reduction in air trips account for approximately 47.87 percent for rail trips growth in 2018 and 48.61 percent for rail trips growth in 2035. Reduction in bus trips account for approximately 29.70 percent of the growth whereas the reduction in the auto traffic accounts for 22.43 percent of the growth of rail trips (comparison for 2035, 110 mph service option).

Exhibit B-85 2035 90 mph Major Market to Major Market Rail Boardings

Corridor wide All to All Trips and Percentages- All Scenarios											
MODE SHARE FOR EACH SCENARIO-NUMBER OF TRIPS						**MODE SHARE FOR EACH SCENARIO-PERCENTAGE**					
YEAR	**CAR**	**RAIL**	**BUS**	**AIR**	**TOTAL**	**YEAR**	**CAR**	**RAIL**	**BUS**	**AIR**	**TOTAL**
2009	210,977,488	1,298,706	4,593,637	2,411,033	219,280,865	**2009**	96.213%	0.592%	2.095%	1.100%	100.00%
2012	212,177,650	1,346,466	5,677,047	2,466,640	221,667,803	**2012**	95.719%	0.607%	2.561%	1.113%	100.00%
2018 NB	217,523,410	1,409,954	5,367,642	2,422,387	226,723,393	**2018 NB**	95.942%	0.622%	2.367%	1.068%	100.00%
2018 79 MPH	217,366,490	2,139,001	5,159,785	2,058,118	226,723,393	**2018 79 MPH**	95.873%	0.943%	2.276%	0.908%	100.00%
2018 90 MPH	217,311,208	2,334,521	5,112,698	1,964,965	226,723,393	**2018 90 MPH**	95.849%	1.030%	2.255%	0.867%	100.00%
208 110 MPH	217,263,088	2,489,382	5,073,216	1,897,707	226,723,393	**208 110 MPH**	95.827%	1.098%	2.238%	0.837%	100.00%
2035 NB	230,454,881	1,595,021	7,798,863	2,701,574	242,550,340	**2035 NB**	95.013%	0.658%	3.215%	1.114%	100.00%
2035 79 MPH	230,302,244	2,390,539	7,551,050	2,306,506	242,550,340	**2035 79 MPH**	94.950%	0.986%	3.113%	0.951%	100.00%
2035 90 MPH	230,243,037	2,603,352	7,494,250	2,209,701	242,550,340	**2035 90 MPH**	94.926%	1.073%	3.090%	0.911%	100.00%
2035 110 MPH	230,190,311	2,774,683	7,448,486	2,136,861	242,550,340	**2035 110 MPH**	94.904%	1.144%	3.071%	0.881%	100.00%

6.5.1 Corridor wide Trips by Comparative Travel Modes

The analysis of trips between the no-build scenarios in 2018 and 2035 and the 79mph, 90mph and 110 mph service options for each of these years shows a trend of increasing rail ridership and a decrease in all the other three modes of travel, air, auto and bus, *(see Exhibits B-86 and B-87)* signifying that the service improvements proposed are leading up to rail being more competitive against each of the other modes of travel.

Exhibit B-86: Market Share Changes in Air, Bus & Rail as % of Total Travel Market-2018

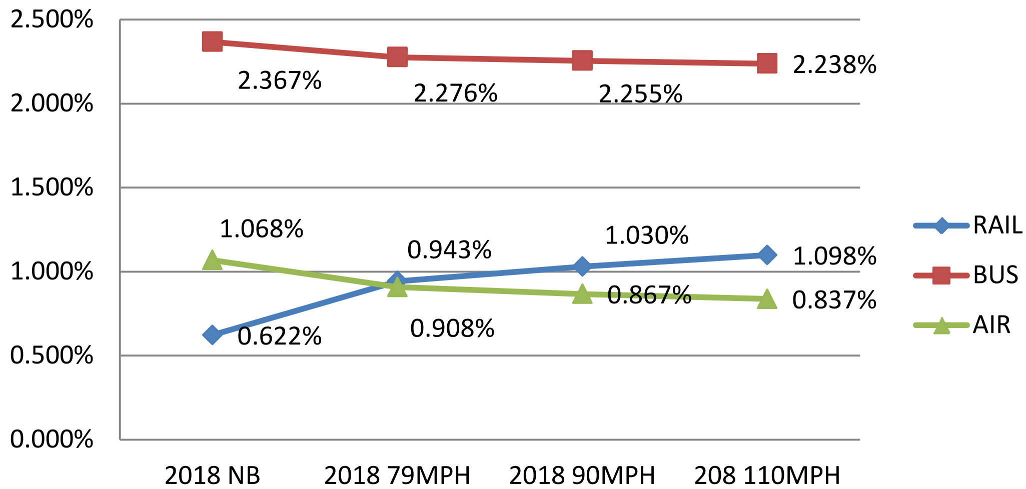
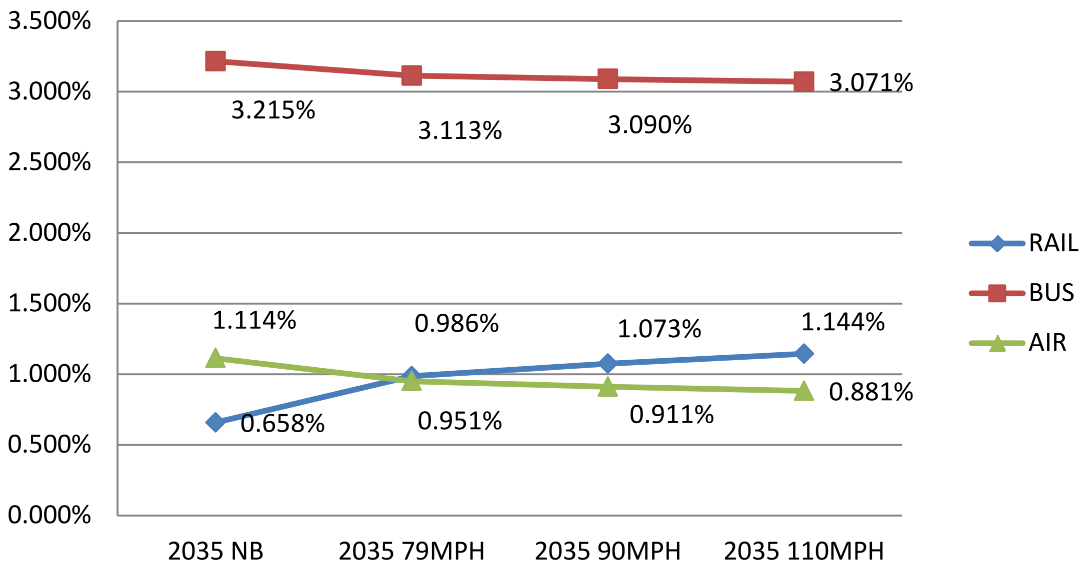


Exhibit B-87: Market Share Changes in Air, Bus & Rail as % of Total Travel Market-2035



The following set of Exhibits identify how the 110 mph alternative draws from other markets to build ridership in both 2018 and 2035. Only 110 is shown here as the relationship trends identified below hold under all options. Despite growth in the absolute numbers of rail trips between the 2018 NB-2018, 110 mph and 2035 NB-2035, 110 mph (1,079,428 for 2018 and 1,179,661 for 2035) the growth rate of the rail trips as percentage of the overall market for the same situation is slightly more in 2018 than in 2035 (76% for 2018 and 74% for 2035) (See Exhibits B-88 & B-90). This indicates that the reduced travel time along the corridor has more effect on ridership than increased frequency of service. Also this decrease can be attributed to the loss of ridership due to the likely continued dispersed population growth in the Albany, Utica, Syracuse, Rochester and Buffalo market which would eventually lead to lesser propensity of the population base in these areas to use the rail service as compared to auto.

Exhibit B-88: 2018 Changes in Mode Share for 110 mph Alternative

	2009 Existing Condition		2018Base (no HSR)		2018 with 110 mph		Base to 110	2018 Mode Conversion	
Mode	Annual Trips	Share %	Annual Trips	Share %	Annual Trips	Share %	Percent Change	Trips	% Share Conversion
Car	210,977,488	96.2	217,523,410	95.94	217,263,088	95.83	-0.12%	-260,322	-24.12%
Air	2,411,033	1.10	2,422,387	1.07	1,897,707	0.84	-21.66%	-524,680	-48.61%
Bus	4,593,637	2.09	5,367,642	2.37	5,073,216	2.24	-5.49%	-294,426	-27.28%
Rail	1,298,706	0.59	1,409,954	0.62%	2,489,382	1.10	76.56%	1,079,428	100.00%

With increase in speed within each of the service years, 2018 and 2035, rail trips have drawn more from air trips followed by bus trips and ultimately the auto trips as shown in Exhibit B-89. Evaluating Exhibit B-88 and B-90 compared to the baseline, air ridership shows a decline of 22 percent and 21 percent respectively for the years 2018 and 2035, between the no-build scenarios and the 110 mph service options. Similarly the bus ridership shows a decline of 5.5 percent and 4.5 percent and the auto ridership a decline of 0.12 percent and 0.11 percent. Despite the modest decline in auto ridership it is clear that enhancements in rail service are dampening growth in auto trips and thereby keeping Thruway congestion at bay.

Exhibit B-89: 2018 - Market Relationship between Rail Trips and other Modes under 110 mph Alterative

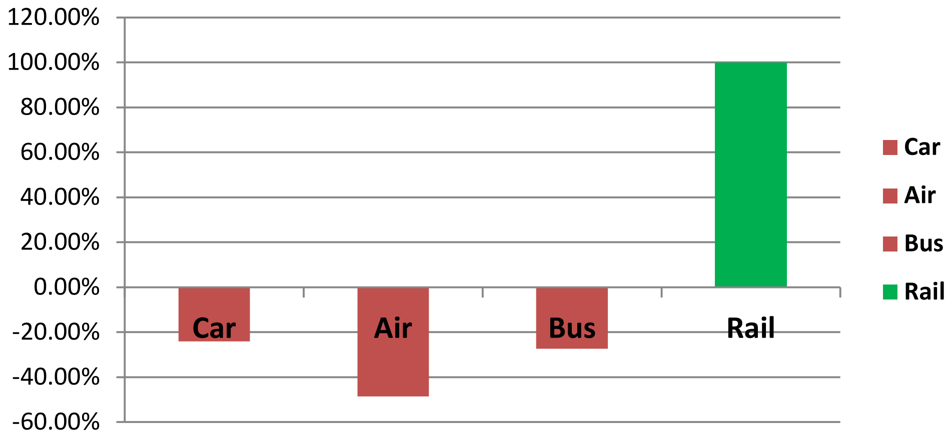
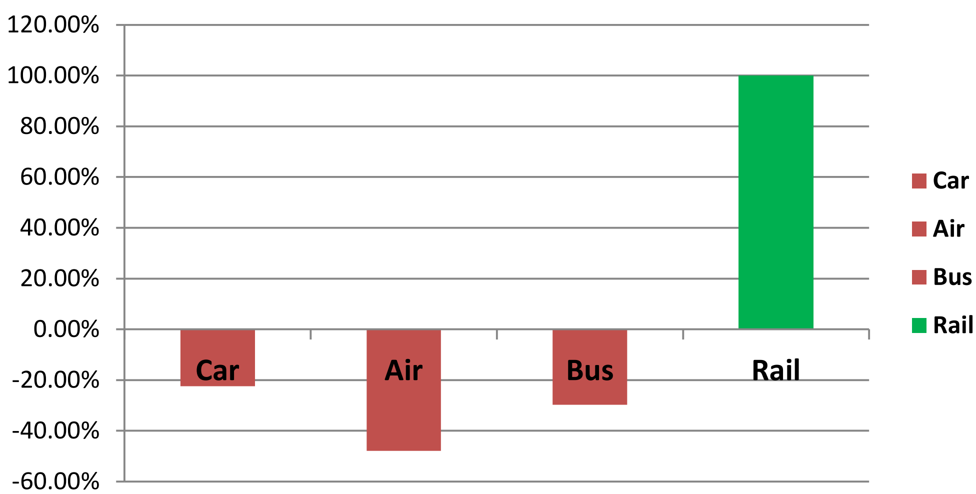


Exhibit B-90: 2035 Changes in Mode Share for 110 mph Alternative									
	2009 Base Year		2035 no HSR		2035 with 110 mph		Base to 110	2035 Mode Conversion	
Mode	Annual Trips	Share %	Annual Trips	Share %	Annual Trips	Share %	Percent Change	Trips	% of Total
Car	210,977,488	96.21	230,454,880	95.01	230,190,310	94.90	-0.11%	-264,570	-22.43
Air	2,411,033	1.10	2,701,574	1.11	2,136,860	0.88	-20.90%	-564,714	-47.87
Bus	4,593,637	2.09	7,798,863	3.22	7,448,486	3.07	-4.49%	-350,377	-29.70
Rail	1,298,706	0.59	1,595,021	0.66	2,774,682	1.14	73.96%	1,179,661	100.00

Exhibit B-91: 2035 - Market Relationship between Rail Trips and other Modes under 110 mph Alterative



6.5.2 Major Market Pair Analysis

Within the corridor there are three distinctive sub categories with different service characteristics in terms of the different modes of travel. The subcategories are as follows:

- NYC- Albany,
- NYC-West of Albany; and
- Albany – Areas west of Albany.

NYC-Albany

The improved rail service from the base year 2012 to 2018, 110 service options and 2035, 110 mph service reduced the travel times most in the corridor west of Albany. There is no change in travel time in the NYC- Albany market between 2018 and 2035 and between the different maximum operating speed options. This basically freezes the growth of the rail ridership for the years 2018 and 2035 irrespective of the operating plan. Though there is an increase in the total rail ridership between 2018 and 2035 reflecting the background growth of population and employment and the added frequency of service for all of the 2035 service options, rail as a percentage of the PT mode decreases due to this stagnation of the travel times between the NYC market and the Albany market. Any shift from the auto mode is primarily captured by the bus and the air modes. As has been mentioned previously the ridership trends are more sensitive to the travel times than the frequency of service and hence between 2018 and 2035 rail becomes less competitive (in terms of percentage share of the market) and both air and bus increase their market share.

NYC- West of Albany

This market shows a significant savings in the travel times which is reflected in the growth of the rail ridership along this corridor, both in terms of percentage of the total market and percentage of the PT mode. Rail ridership growth is accompanied by decline almost similar to the sum of the decline of trips by bus and air, thereby signifying only a modest draw from the auto mode – which is already a small percentage of the existing mode share. The rail ridership percentage as compared to both the total market and the PT mode increases by almost 400 percent when comparing the no-build and the 110 mph service option for both 2018 and 2035. Analysis show that in this segment rail trips compete favorably with bus trips in terms of costs and speed and the very favorably with air mode in terms of cost and to reduced differential in travel time and schedule from rail enhancements.

NYC- Buffalo Market

The NYC- Buffalo market shows a travel time reduction of approximately 35 percent from the base run times and an increased frequency which provides for 12 round trips compared to four under the base condition. This translates to an increase in the rail trips between the two markets by almost 300 percent which is accompanied by a decline equivalent to the sum of the decline in air and bus ridership. This signifies that the improved rail service has minimal total reduction in auto trips between these two markets which is currently at 40,000 annual trips. For 2035, 110 mph service option, the improved service combined with total origin to destination travel times and associated costs for a rail trips becomes competitive with time and cost associated with bus and air, thereby leading to the shift from these two modes to rail.

As mentioned above, the **Albany-West of Albany Market** shows a significant decrease in the travel times due to the improved service. This is reflected in the increase in the rail ridership which is accompanied by reduced bus trips and auto trips. With the improved rail ridership the rail mode increases significantly as a percentage of the PT mode (215% for 2018 and 265% for 2035). Even though there is reduction in the auto trips, auto remains the overwhelming choice of travel along this corridor which can be attributed to the dispersed population distribution, lack of connectivity to the rail stations and low congestion levels which make road travel an easy option. With only 80-100 miles separating some of the major markets along this corridor, car travel still holds a strong position to rail travel which connects travelers between their ultimate origin and destination in a more efficient and expedient fashion. An enhanced transit linkage plan and localized station development would engender greater localized station to station trips along the East-West Corridor.

7.0 Sensitivity Tests

A series of basis sensitivity test were run to evaluate the impact of change in key input characteristics for the HSIPR Alternatives studied. A change in magnitude of variables for population and employment, travel time, and competitive cost changes were run and resulting ridership changes evaluated.
Exhibit B-92 below identifies a generalized trend relationship between reduction in travel times and corresponding forecasted increases in ridership. This trend was extrapolated by observing the impact of assumed reduction in travel time from NYC to Buffalo based on the alternatives studied and then extending that curve based on the trend identified from those data points. This trend was then applied to the entire corridor to extrapolate a corridor wide assessment of the impact of time savings. As the trend line shows, the 110 mph speed is a 30 percent reduction in travel time for trips to Buffalo and represents a similar result in travel time for other trips where most of the ridership gains are accruing – namely between NYC and city pairs on the East-West Corridor and this travel time gain results in approximately 2.75 million riders. Extrapolating from this relationship, a corresponding 40 percent reduction in travel time or average speed of 80 mph - 40 percent greater than the no-build would result in nearly 3.25 million riders.

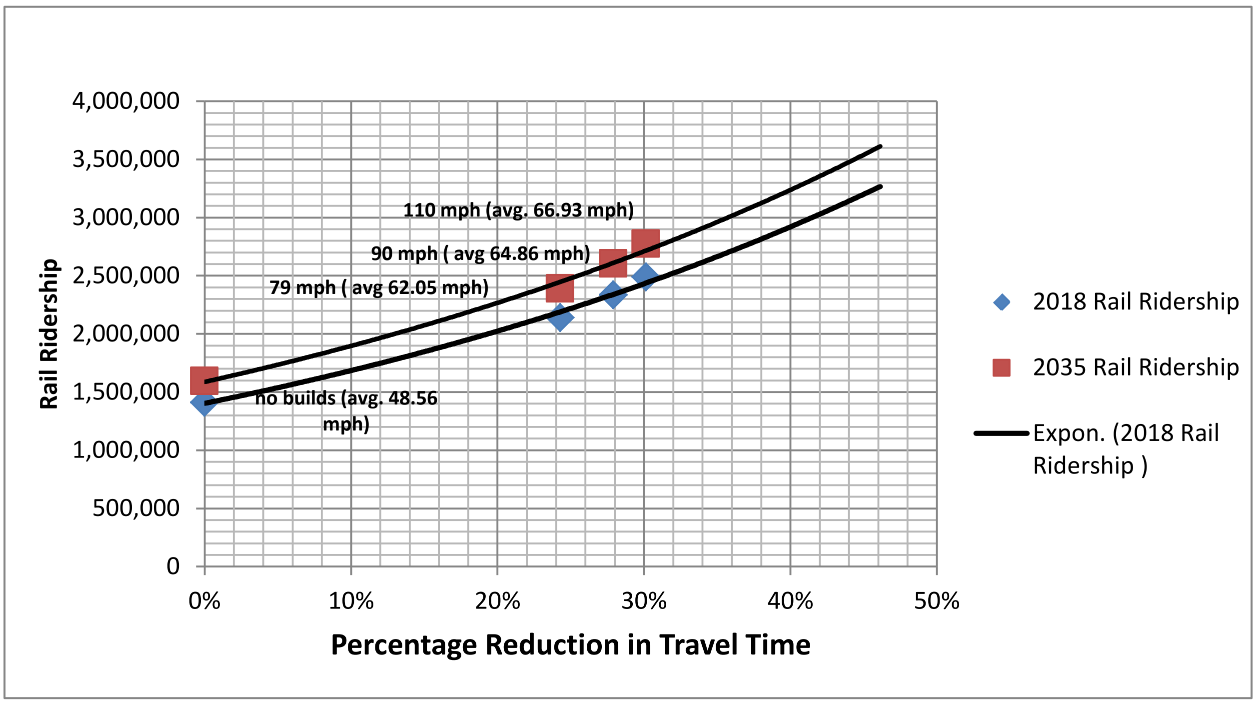


Exhibit B-92: Trends in Travel Time and Ridership

The following section indicates a variety of competitive mode cost sensitivities. What the Exhibit clearly shows is that auto cost are highly inelastic – meaning major changes in travel costs such as an increase of 25 percent and no corresponding increase in cost for rail will not accrue an increase in boardings for rail. Higher airfares however are highly sensitive and on a percent for percent relationship 1, a 1 percent increase in air cost results in a 1 percent increase in rail ridership.

Exhibit B-93: Comparative Cost Sensitivity Tests [40]

Sensitivity Test	Cost Changes	Boardings (% change from base)	
		NYHSR	CAHSR [41]
Higher HSR Fares	25% Increase	-15%	-13%
Higher Air Fares	25% Increase	23%	NA
Higher Auto Cost and Tolls	25% Increase in both	0%	NA
Combined Higher HSR and Higher Air/Auto Costs	25% Increase in fares and 50% increase in air and auto cost	12%	13%
	50% Increase in rail fares and air and auto cost	7%	31%
	100% increase in fares, 50% increase in air/car cost	-2%	-6%

[40] Auto Operating Cost Assumptions: 0.1674 $/miles

[41] California High Speed Rail Market Study – 2008

8.0 Revenue Forecast

Exhibit B-94 displays the forecasted revenue for each of the no build and build scenarios. By 2018, revenue based on the three alternative build scenarios (79, 90 and 110) will range from 66 - 97 percent greater than the corresponding No-Build condition, as shown in Exhibit B-86; and in 2035 it will range from 64 - 94 percent greater than the corresponding No-Build condition. Along with the greatest projected ridership, the greatest projected revenue is for the 2035 110 mph scenario, which at $92.5 million is 94 percent greater than the projected 2035 no-build revenue. The revenue results are calculated from current average fares between each station pair times the ridership. A net reduction of 10 percent could be applied to account for discounted rates for regular users and promotions.

The key to evaluating these forecasts however is not in the numbers themselves but by a cost benefit type analysis that considers operating and maintenance costs and annualized capital costs over a 10 or 20 year time frame.

Exhibit B-94: Revenue Forecast by Alternative and Build Year

	Base Year & NB	79 mph	90 mph	110 mph
2009	$50,042,203	n/a	n/a	n/a
2012	$51,784,687	n/a	n/a	n/a
2018	$55,892,489	$92,676,100	$102,580,612	$110,324,789
2035	$62,547,008	$102,442,809	$113,114,855	$121,578,490

Exhibit B-95: Revenue Forecast by Alternative and Build Year

% Change	2018	2035
79 & No-Build	66%	64%
90 & No-Build	84%	81%
110 & No-Build	97%	94%

9.0 Conclusions

9.1 Market Observations

This final section summarizes key observations related to the overall forecast results as well as specific observations related to the major markets and the behavior of the other competitive modes in the face of improvements to Empire Corridor. The first and most important observation this report has identified is that a considerable market exists for the set of improved speeds and travel schedule alternatives studied in this report. This finding however is not unexpected, as similar improvements to the Amtrak Keystone Corridor yielded strong ridership growth resulting from enhanced speed and level of service. Under that project, completed in 2006, Amtrak and Pennsylvania DOT improved this 104 mile portion of the overall 394 mile corridor to top speeds of 110 mph and resulted in 20 percent year over year gains in ridership in both 2007 and 2008 – with ridership increasing to 1.2 million from about 850,000. However the success of these numbers must be evaluated in light of the cost – $145,000 and a resultant reduction in operational subsidy of 28 cents per passenger mile to 20 cents per passenger mile.[42] The Empire Corridor by comparison is 463 miles long and suffers from greater delays and considerably lower ridership by mile than the Keystone Corridor prior to completion of upgrades. Further comparison shows that similar speed and level of service upgrades would result in substantially greater ridership gains from 1.4 million under the no-build to 2.48 million 2018 build year for the 100 mph alternative or a 56 percent increase in ridership in the initial year. However, these comparative results should be taken in perspective – the Empire Corridor is nearly five times the size (compared to the Harrisbury to Philadelphia segment of the Keystone Corridor) and services 17 stations, is anchored to the largest metropolitan market in America and services five cities with nearly 100,000 or more persons. This comparison indicates that the Empire Corridor has significant potential and that this potential is not only untapped in its current state but the alternatives considered in this report may not have uncovered all of the potential demand in this corridor – however this is to be expected in an initial *base* demand market forecast. The section following will discuss possibilities to evaluate and expand the ridership potential in further investigations.

9.2 Empire Corridor - Key Market Characteristics Observations

It should first be noted that the alternatives studied should not be understood as traditional high speed rail alternatives. The average speeds and number of stops considered in the alternatives falls into an enhanced speed and service class of traditional Amtrak service – and perhaps the logical next step for this corridor which connects NYC – the economic engine of the U.S. to a region that has been recovering from decades of decline after the fall of manufacturing economies in the U.S. However it is important to revisit the success benchmarks identified for HSR at the beginning of this report to offer a perspective from which to evaluate the Empire Corridor as imagined under the various alternatives forecasted. The first characteristic identified was speed – those corridors between 90 mph and 110 mph were identified as emerging HSR, while those between 110 mph and 150 mph were classified as regional HSR, with over 160 mph as express HSR. The problem with these definitions is that they refer to max speeds – as does this study – rather than average speeds identified by time it takes to get from station to station in a certain travel time. As noted in this report, the optimal 110 mph max alternative studied actually only runs at an average speed of 68 mph. The second characteristic of HSR noted is distance between

[42] http://www.thetransportpolitic.com/2009/09/28/learning-from-the-keystone-corridor/

stations – for emerging HSR at speeds of 90 to 110 mph – the benchmark distance is a minimum of 100 miles and optimal distance of 200 miles and a max distance of 500 miles between stations. The Empire Corridor has 17 stations on its run, with the longest distance between two stations at 80 miles. The third key characteristic is the presence of congestion in airspace and roadways serving the corridor. The Empire Corridor has a heavily congestion airspace but a minimally congested roadway corridor that runs the entire length of the rail corridor studied. The fourth key is presence in a mega-region serving cities with high GDP's. The Empire Corridor is located in the largest mega-region and although many of the upstate cities served are underperforming economies – the economies of the major markets are quite large – a function of their sizes. Finally, the fifth key characteristic is the presence of regional transit linkages – to connect station areas to suburban markets and key destinations. On the Empire Corridor, there are robust major market bus transit systems – however they are not generally optimally oriented to connect to station areas – as current Amtrak service on the corridor is modest.

Evaluating this comparison, it is clear first that average speeds considered in this study are short of other comparable emerging HSR programs due to alignment constraints and operational constraints imposed by CSX. Further, given the overall length of this corridor – speeds are not truly optimal to gain maximum market share. In terms of distance between stations, whether or not this corridor is considered an emergent high speed rail corridor is unimportant – 17 stations are too many to function effectively as a regional intercity passenger service, this corridor can capture more riders at key stations by removing stops and reducing travel time – recommendations for further consideration are in the following section. It is clear that the Empire corridor is unique - although it has regional coverage and the purpose of HSR programs is to affect regional intercity travel – the number of stations present on the corridor and the schedules considered to link them make the corridor halfway between a commuter corridor and halfway between a regional intercity corridor. As a result, to capture optimal ridership it needs to serve both its two intercity corridors NYC to Albany and Albany to Buffalo locally between the paired markets within each corridors limits while serving the regional corridor market pairs – or the Buffalo, Rochester, Syracuse to NYC pairs. These service needs exist in near mutual exclusivity on the same corridor and require different considerations to make each type of service successful. In terms of congestion on the corridor, it is clear that the improvements in rail are taking advantage of air congestion while losing to the lack of auto-congestion on Thruway. In terms of transit connections-the ability to capture the heavily distributed and suburbanized populations surrounding station areas would optimize the rail corridor's improvement program and create additional economic impact opportunities at both receiving and sending transit zones. This would require extension of county and regional transit system to support inter-regional linkages to transit facilities or require the development of a dedicated corridor bus system – similar to that operated by New Jersey Transit to support the rail network. Further, in terms of the business of modeling and forecasting rail ridership – a plan for such linkages would effectuate the capture of this market by widening the competitive influence of the station zone.

9.3 Tale of Three Corridors: Rationalizing and Positioning the Corridor with a Dual Approach

Given the forecast results and the above analysis – to ask what the Empire Corridor should be or could be – it is necessary to see what it is through how it functions in light of the modes that serve its sub-corridors and major market areas. Rationalizing the corridor in terms of transportation market position is a study of evaluating a form of applied geometry between nodes – the method of traversing this geometry is a behavioral choice subject to three influence variables - duration, frequency, and cost. Although there exist a "halo" of other influences – mentioned later in this section – these variables form a “decision calculus” that govern how a market performs under the constraints of various modes operating within the market geometry. For the purpose of this analysis – there are really three corridors within the Empire Corridor – each of these corridors has specific geometries and applied influences that will determine what mode will be most successful based on their characteristics

9.3.1 NYC to Albany

This 150 mile corridor is served by rail, bus, air, and auto service. Most of the trips on the inside the corridor are either to NYC or to Albany rather than connections to the small cities and towns within the corridor. The length of this trip is best served by the more efficient mode of travel – in this case, auto, rail, and bus – the trip length is simply too short for air travel with its complex access and egress components to be successful here. The corridor is already 110 mph enabled but is subject to limitations in geometry, control by the Metro North Railroad on the southern tier and CSX on its northern tier, and by train storage at Penn Station limiting the number of departures. As noted in the body of this report – all alternatives performed in the study result in only limited enhancements in travel time between Albany and NYC and therefore growth in ridership within this sub-corridor is limited. However there is a travel market of at least 2.8 million roundtrips of which rail captures slightly above 10 percent. For rail to capture greater market share in service of this market from dominant auto mode or the highly competitive bus market that has twice the number of existing patrons compared to rail – it must either increase speed, reduce the number of stops along the corridor, add service, or offer a host of other compelling factors referred to as “halo” influences which were not investigated in detail for this report. Service enhancements are currently constrained by storage limitation (the parameters of this study did not offer a sensitivity test for level of service – and there are limited differences in schedule considered for this portion of the corridor), and rail travel cost is competitive to both auto and bus and lowering cost of rail was shown in this study to be highly inelastic in terms of shifting demand from auto. The key is simply to get from major boardings market to major boardings market as fast as possible to be more competitive against auto and bus. The existing conditions section showed that total travel time from origin to destination for auto is 167 minutes while rail is 190 minutes (includes wait, access/egress, and allowance for OTP). The simplest way to do this and achieve modest speed gains is to provide express or limited express service. Removing four stops could save approximately 15 to 20 minutes. It is uncertain as to whether this will have the desired effect – as express service introduces a trade off with a loss off ridership at other stations. Further, it is uncertain as to whether a 10 to 15 percent reduction in travel time would “flip the switch” from bus and auto riders and result in increased ridership. It is worth exploring this dynamic further as the potential market is large, and the reductions in travel time required being more competitive are modest compared to the rest of the corridor.

Additional factors that could improve this sub-corridors ridership are transit linkages to metro-Albany’s expansive suburban region, localized station area employment or population growth or some form of development of regional significance. Others efforts such as marketing the corridor, direct selling tickets and offering various travel packages may enhance ridership as well. External factors such as enduring rising fossil fuel costs – such as are currently being experienced may also have a significant impact on ridership increases.

9.3.2 Albany MPO to Buffalo MPO

This 300 mile sub-corridor seemingly should have the greatest rail market potential – with several medium sized cities, distances between stations better spaced, and with a very large travel market dominated by auto travel it is well positioned to compete against other modes. The same elements however are present here as in the NYC to Albany MPO Corridor. Although the improvements to level of service, travel time, and reliability are extensive and are the engine for the overall corridors large gains in ridership - the market is so large – about 20 million trips intra-corridor that there should be more that can be done to capture travel market share. Although the gains in ridership forecast are significant – from only 80,000 of 1.2 million rides on the Empire Corridor in 2009 to 280,000 rides forecast for the 110 mph 2035 or over a 300 percent gain in ridership, it is only 1.4 percent of the potential market. The key in this lack of mode share capture is the basic geometry of the corridor, space between stops and the presence of an uncongested Thruway that provides quick auto trips between the city pairs on this sub-corridor and quickly connects auto users from the origin to their destination – whether it be to center-cities or to the heavily dispersed populations that make up each major market on the corridor. While distances between city pairs may average between 60 to 80 miles apart – each market comprises about 30 miles in radius around the station area or a third to a quarter of the direct station to station distance. Given this situation, the solution is similar to the NYC MPO to Albany MPO approach. The farther each city pair is apart – the greater ability of rail to compete against auto and bus. Therefore, express service focusing on the major markets, namely, Albany to Buffalo with stops perhaps at both Syracuse and Rochester or alternatively between them. The ridership results revealed that there was not a significant increase in ridership between the 2018 and 2035 for the 79 mph, 90 mph, and 110 mph alternatives on this sub-corridor. The differences between 2018 and 2035 schedules – from 7 round trips to 12 indicates that an increase in frequency of service has a declining rate of return and that perhaps express service could replace some of these round-trips with stops at eight stations between the Albany and Buffalo MPO's. Removing up to five cities for express or limited express could save an additional 25 minutes – however those gains may result in an offsetting loss of ridership due to the bypass of other stations. This relationship should be further studied as should additional enhancements to the corridor to further increase speed. Significant additional reductions in travel time would likely result in a much greater percentage of auto-trips being captured – however for the shorter pair trips – further reductions travel time would need to be very large perhaps an additional 30 or 40 percent. Alternatively, it is possible that more frequent service – headways of 30 minutes or less between shorter pairs may result in additional ridership – such as Rochester to Buffalo Exchange or Syracuse to Rochester. Such considerations may warrant further evaluation.

Finally, additional factors, as noted above in the NYC MPO to Albany MPO section such as strong land use policies for station surroundings backed by economic incentives, with facility improvements to maximize security and sense of place supported by new intra-regional transit connections to link stations to the suburban areas easily accessed by automobile would likely enhance ridership significantly.

9.3.3 NYC to Buffalo

NYC to Buffalo is a representation for long trips ranging the entire corridor. Trips this length have greater similarity to emerging HSR –and could be designed to take advantage of the benchmark keys to HSR – namely strong dominance against the air market.

The forecast results show that the longer the trip on the corridor, the greater the impact of the alternatives studied on travel time reductions, resulting in greater increases in ridership. Long Trips on the Empire Corridor – or trips that connect pairs such as NYC to Buffalo, NYC to Rochester, and NYC to Syracuse – account for about 60 percent of all growth forecast in all of the build alternative speeds studied. These pairs capture about 20 percent of the air market and 5 percent of the -bus market on the corridor. Auto is a small amount of the total trips between NYC and the major markets on the western portion of the corridor. Trips from one end of the corridor to the other, although different from the two constituent corridors discussed above which are composed of considerable intra-corridor ,travel captures its market less on frequency of service but more on trip time. Combining the two express or limited express approaches with a total of approximately four or five stops from NYC to Buffalo could eliminate the in station wait time and acceleration and deceleration time loss from stops at 10 stations and cut 50 minutes in travel time from the trip from NYC to Buffalo – almost equal to the time savings for the 110 mph option. This would likely have a dramatic effect on ridership and capture an additional significant portion of air and bus travel.

9.3.4 Combining Service Planning Approach with a Whole Market Approach

The rail service approach suggested above is fairly straightforward - add express service to the corridor and dovetail such service with a large “local” service to maintain the smaller markets and add mobility options for the entire corridor. This approach combined with a “whole market” approach – that perceives successful rail service being considered in step with the points which it connects and the market from which it draws. This means while enhancing rail service, concurrent enhancements to land use policy to support rail service must be implemented concurrently with the enhancement of transit linkages to bring a market to rail – particularly in this market dominated by old manufacturing cities with declining urban cores and growing suburban low density sprawl. The long term goal is to bring people and jobs closer to transit connections – by investing and incentivizing investment in development proximate to stations. Along with rail – The Empire Corridor development program would conceptually include four plans – an operating plan, a transit plan, a land use plan, and a policy plan to incentivize integrated planning and development.

9.4 Further Considerations

This section briefly details additional considerations that can or should be made to support this Study’s findings, the Tier 1 EIS and future Tier 2 EIS as well as the entire NYSHSIPR Program.

<u>Additional Operational Considerations for Evaluation</u>

A maximum average speed should be modeled to clearly establish a trend relationship between speed and ridership growth.

Schedule alterations should be considered to provide for express service or limited express service for

- NYC to Albany with stops at Hudson or Rhinecliff
- Albany to Buffalo with stops at Syracuse and/or Rochester
- NYC to Buffalo with stops at Hudson or Rhinecliff , Albany, Syracuse and/or Rochester
-

Additional Markets for Consideration

Toronto and Quebec should be considered as additions to the corridor with the determination of the impact it would have on corridor ridership – either as a model input or a more informal evaluation. It is possible that the addition of Toronto will transform the Western portion of the corridor and breed significant additional leisure travel between NYC and Toronto market. Clearly such a study would have to consider additional speed to make an impact.

Census – Population / Job Growth Update

The availability of the 2010 census data and questions about growth rates used at certain locations in the corridor based on commercial projections – it may be worthwhile to evaluate a population and job growth sensitivity test that evaluates the impact of a broader range of low medium and high growth scenarios for each of the major markets. The new census would certainly aid in clarifying the socio-economic profile for the market study.

Economic Impacts

In order to capture a full picture of both ridership growth and economic benefits beyond fare box recovery and to put capital and O/M cost investments in perspective for those who will ultimately make decisions regarding investment in the Empire Corridor – an economic impacts study defining primary and secondary economic impacts stemming from enhanced rail service is strongly suggested. Often public investment in transit is not given a fair evaluation in terms of return on public investment – often the results are quite surprising and can greatly facilitate the development of support for a project.

Cost Benefit Analysis

A cost to benefit style assessment should be performed in order to define which alternative studied achieves the goal of gaining the most riders at the best Operating and Maintenance (O/M) per rider mile cost and to define the initial and annualized operating cost by alternative. This would allow for a finding of revenue and potentially secondary benefits versus both fixed annual O/M costs and annualized capital program for all alternative studied.

Land Use, Transportation & Corridor Economic Incentives Plan

A combined land use, transit and economic policy plan would help frame the rail program in the context of a master plan vision for the corridor – ultimately enhancing economic impact and significantly bolstering forecasted ridership. Currently such a feedback loop into the model is absent – essentially leaving out induced demand from economic impact to the markets served.

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10.0 Appendices

10.1 **APPENDIX A: Modeling Methodology**

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New York Empire Corridor Intercity Travel Demand Model

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Contents

About this Document

In 2010 HNTB contracted with Citilabs to provide assistance in developing a model capable of forecasting intercity travel by car, bus, rail, and air within the Empire Amtrak corridor, for purposes of forecasting rail ridership under improved high-speed service. Since most of the State of New York's population lives within the Empire corridor, the tool that can perform this task is an intercity multimodal travel demand forecasting model that is statewide (or nearly so) in scope. This document describes the model, as developed by Citilabs for use by HNTB in forecasting rail ridership for the Empire Corridor study.

Topics include:

- **Literature Review**
- **Model Design and Specification**
- **Data Development and Implementation**
- **Model Calibration and Validation**

Literature Review

Soon after being asked by HNTB to develop the Empire Corridor intercity travel demand forecasting model, Citilabs performed a review of the literature describing existing current practices in statewide and intercity travel demand modeling. The findings of this review are summarized in this section.

Typology of Intercity Travel Models

The *Guidebook on Statewide Travel Forecasting* (Center for Urban Transportation Studies, University of Wisconsin – Milwaukee, 1999) provides an overview of multiple approaches used around the United States for projecting traffic in areas outside of major metropolitan areas, including time series analysis, four-step statewide models, and specialized statewide models. Especially useful is an Appendix to this report describing "The State of the Art in Statewide Travel Demand Forecasting", which includes a section dedicated specifically to intercity passenger models. The report identifies four types of intercity passenger models based upon whether the input data are aggregate or disaggregate and whether demand is calculated in a single step or a set of sequentially applied steps. Thus, the major types of intercity passenger models are:

- Aggregate direct-demand models
- Aggregate sequential models
- Disaggregate direct-demand models
- Disaggregate sequential models

In general direct-demand models preceded sequential models in the development of the field. In particular the first such model was used to project demand in the Northeast Corridor in the 1960s. Almost all direct-demand models are aggregate; only one has been reported using disaggregate data (household travel market stratification by income).

Sequential models developed alongside advances in urban travel forecasting during the 1970s and 1980s, especially in the application of multinomial logit modeling to discrete choice analysis problems, such as mode split. Although such models can be developed from aggregate data, more typically they are estimated using disaggregate household travel survey records. Sequential models may then be applied either through simulation of individual choices or evaluation across several defined travel market segments.

The 1977 New York Intercity Rail Ridership Forecasting Model

Previous forecasts of rail patronage in the New York City to Buffalo corridor were prepared in 1977 using aggregate sequential methods (Cohen, Erlbaum, & Hartgen, 1977). Despite the relative age of this model, it bears further discussion here because of the strong similarity in location, scope and purpose to the current effort.

Preliminary research reports provided by New York State DOT staff who worked on the original Buffalo-NYC rail ridership forecasting effort indicate that the 1977 model was calibrated using a database of intercity travel by mode collected in 1975 (Erlbaum, Trentacoste, Knighton, & Slavick, 1977); similar data had been collected previously, in 1973 (Albertin, 1973). The model structure was informed by a review of the state of the art in forecasting practices conducted between 1973 and 1977 (Hartgen & Cohen, 1976), which at the time included direct demand and time series models as well as what are now termed sequential models ("post-distribution" at the time), including multinomial logit share models. However, the report noted some challenges associated with the logit-based approach:

- Share models suffer from the Independence of Irrelevant Alternatives (IIA) axiom, stating that any new traffic attracted to an alternative will be drawn from the others in proportion to their original shares [if the other alternatives' attributes do not change];
- At the time, such models were considered difficult to calibrate, requiring specialized computer programs and mathematical expertise;
- They require detailed data on all "modal volumes and their attributes";
- The disaggregate data normally used for their calibration in the urban context was generally not available for intercity travel.

The NYS DOT researchers in 1977 also identified a "hybrid" structural category which could potentially overcome some of the problems with both direct demand and sequential logit models by combining the best aspects of the two approaches. The hybrid aspects described include various techniques used to control the outputs to match observed totals or constrain a sequential model to match the equivalent direct demand result. In particular the "pivot-point" analysis technique uses the forecast model to predict the percent change in travel variables, rather than absolute quantities thereof.

The model used to predict rail ridership for the Buffalo-NYC corridor in 1977 belonged to this "hybrid" category. Total person-travel between city pairs (including nearby cities outside the state, such as Boston and Washington) was forecast using a gravity-type model based on socio-economic factors. To estimate mode shift to rail, a series of binary logit "rail competition" models were applied for each non-rail mode, pivoting off of existing mode shares for the origin-destination pairs.

Although it apparently did not survive the transition to computerized modeling with GIS-based networks that has occurred in the decades since then, the 1977 Buffalo-NYC rail ridership forecasting model is interesting from the perspective of a historical window on the evolution of statewide and intercity travel forecasting efforts, and also as an example of how another modeling team addressed challenges involved in forecasting intercity multi-modal travel in this corridor, some of which are still relevant today. The use of a series of binary logit diversion models rather than multinomial logit was adopted in later high-speed rail forecasting models (including as recently as 2000 by Charles River Associates).

Recent Statewide Passenger Travel Models

Returning to the *Guidebook*, in 1999 all of the states that reported having statewide passenger travel models relied upon a "four-step" sequential process using fairly standard UTP procedures. These included ten states: Connecticut, Florida, Indiana, Kentucky, Michigan, New Hampshire, New Jersey, Vermont, Wisconsin, and Wyoming. Of these, however, only four states (Connecticut, Indiana, New Hampshire, and Wisconsin) forecasted non-auto modes of passenger travel, generally using multinomial logit-type models.

Six years later, a "peer exchange" (Transportation Research Board Statewide Multimodal Transportation Planning Committee, 2005) was held at which practitioners shared their perspectives on statewide modeling and reported on recent experiences. Several new statewide models were also reported, including Lousiana, Massachusetts, Missouri, Ohio, and Oregon. The last two cases are particularly noteworthy because they involved the fully disaggregate micro-simulation models of travel behavior, of the so-called "activity-based" or "tour-based" type. In both cases the model design and specification also included integrated economic land use modeling components. Neither of these advanced models were fully completed at the time of writing, and in both cases difficulties were reported relating to their immense data and computational requirements.

The findings of the guidebook as well as the peer exchange were incorporated into the report *Statewide Travel Forecasting Models: A Synthesis of Highway Practice*, published the following year (Horowitz, 2006). Responses to a survey of states engaged in model development (begun in 1999 with the *Guidebook*) were reported. Some common themes in the responses were:

- The most common intended uses for statewide models were to support corridor or system planning, including Environmental Impact Statements (EIS) and project-level traffic forecasts, although many models were also used to either assist or substitute for an MPO model.

- The most common measures of effectiveness were Vehicle-Miles of Travel (VMT) and Vehicle-Hours of Travel (VHT), suggesting most models were intended primarily for forecasting automobile traffic.
- Employment data were gathered from the Census Transportation Planning Package (CTPP), MPO data, and commercial vendors.
- Economic forecasts were derived from state agencies, and regional economic models, but in some cases also commercial forecast vendors.
- Data used to calibrate the passenger component included CTTP, Census Journey-to-Work data, NCHRP Report 365, National Household Travel Survey (NHTS), MPO household survey, and the American Travel Survey (ATS).
- Highway traffic data was obtained from own agency counts as well as the Highway Performance Monitoring System (HPMS).
- Networks were primarily developed from the agency's own road inventories, but also National Highway Planning Network (NHPN) and MPO networks, as well as products provided by commercial vendors.
- All models included passenger automobile traffic among the modes forecasted, and many models included conventional intercity bus and rail, while only a few considered passenger air travel or a separate high-speed rail mode.
- Very few models supported peak period or peak hour (time-of-day) analyses; most forecasted traffic for a 24-hour "typical" day (e.g. average annual day).
- Most models used either MPO zones, aggregations thereof, or Census geographies.
- Trip purposes included home-based work (HBW), home-based other (HBO), non-home based (NHB), long-distance recreation, and long-distance commute/business/other.
- Automobile occupancy rates were used to convert from person-trips to vehicle-trips.
- Gravity models without composite impedance were typically used for trip distribution.
- In multimodal models, mode split was often calculated using a logit expression.
- An increasing number of freight models were based upon commodity flow forecasting, in contrast to traditional truck-only models.
- Several models used origin-destination matrix estimation from traffic counts as either a core, interim, or background component of the model calibration. One of the suggestions for further research generated by the report included innovative methods of estimating origin-destination tables from ground counts.

The California Statewide High-Speed Rail Study Model

Since 2006, statewide modeling efforts have continued the lines of development described above, alongside a new focus on applications to forecasting for specific systems. In particular, the California High-Speed Rail model is of special interest here because the Empire line is a potential HSR corridor, thus the modeling needs are similar.

A version of the California statewide model, generated through software training workshops, existed at the time of the NCHRP synthesis report in 2006. Additional model development work was conducted by a team led by Cambridge Systematics with the specific goal of forecasting rail ridership for a new high-speed statewide network. This version of the model was reported in a paper published in the *Journal of Choice Modelling* (Outwater, Tierney, Bradley, Sall, Kuppam, & Modugula, 2009). More recently, a research project led by the University of California, Davis is attempting to develop a new fully disaggregate simulation-based integrated land use and travel demand forecasting model for California, but this effort was still far from being used for any project-level forecasting as of the writing of this report.

Perhaps the most important innovation introduced by Cambridge Systematics et. al. in their version of California's statewide model is the adoption of a consistent hierarchical nested choice model structure for all model components, instead of the separate gravity-type trip distribution and logit mode split models that had previously dominated statewide modeling methodology. In this approach, the so-called "logsum" composite impedance is extracted from the mode choice model and provided to the trip distribution model, which is evaluated as a behavioral choice among all of the possible destinations available from a given origin. Furthermore, non-auto modes (air, conventional rail, and high-speed rail) are nested within the mode choice model, with composite impedances extracted from the non-auto mode level of the nest and provided to the auto/non-auto choice level. As a result the developers of the California statewide model for high-speed rail forecasting were able to use multinomial logit forms throughout all sub-models without introducing IIA-related issues. It may be noted that the California statewide model system was implemented entirely in Cube, and took advantage of recent software advances making such logit models easier to develop and use.

However, there are several concerns which make it problematic to simply transfer the California statewide high-speed rail forecasting model approach to New York for the present study:

- The model contains many parameters, some of which were either not reported in the 2009 paper or were adjusted between model calibration and application;

- Like most discrete choice travel behavior models, the statewide model was estimated using locally-generated disaggregate travel survey data, and thus it would be difficult to replicate their work in states where similar data are not available (e.g. New York);
- Local MPO travel demand models are used to forecast intraregional travel, and thus the approach requires access to these models as well as completion of the non-trivial task of replicating them within a common model system; and
- In general, the estimation, calibration, and validation of a model based upon this approach involves tasks whose scope vastly exceeds the resources of the Empire Corridor study.

Therefore, the California model structure could not simply be "transferred" to New York. However, the study nonetheless aptly demonstrates that it is possible to forecast high-speed rail ridership on a statewide scale using the hierarchical multinomial logit form.

Incremental Logit Models

One of the powerful features of multinomial logit models is that they can be applied in an incremental or pivot-point form (Ben-Akiva & Lerman, 1985). This technique requires only information regarding base choice shares and information regarding the change in utilities for each alternative. If implemented in this manner, alternative-specific constants are omitted, and therefore need not be calibrated using local data, since the base choice shares provide equivalent information. Furthermore, by expressing the utilities as scaled generalized costs (usually accomplished by dividing the utility expression by the coefficient of in-vehicle travel time), it is possible to assert most of the required parameters by examining ranges from other studies, rather than having to estimate models using local data.

Incremental logit is similar in concept to the "pivot-point" modeling techniques that were used in the 1977 Buffalo-NYC ridership study. Incremental logit models have been successfully used to forecast intercity high-speed rail ridership, e.g. in a nationwide feasibility study conducted for Thailand (Stopher, Metcalf, Wilmot, Catalina, & Schimpeler, 1999). That study offers a complementary incremental approach to trip generation, implemented by factoring total base year observed person trips between city pairs according to growth in population, employment, or other indicators of economic activity, obviating the need for development of local top-down trip generation models.

Based upon this review, it appears that hierarchical multinomial logit is in fact an appropriate, proven form for intercity multimodal passenger demand models. Furthermore, many of the challenges associated with developing such models can be reduced or eliminated by expressing the functions to be used in a cost-based, incremental form.

Model Design and Specification

This section describes the basic structure of the Empire Corridor intercity travel demand model. The purpose of the model is to forecast zone-to-zone person-trips by mode (auto, air, bus, and rail). Furthermore, a design goal of the model is to minimize the number of parameters requiring calibration, instead making maximum use of the observed trip movement data (since no conventional household or personal survey data were made available for this study, as explained further in the next section). Finally, the model structure is intended to be scalable, so that the initial corridor model needed for rail ridership forecasting can be expanded in scope and detail to eventually become a statewide intercity travel demand model.

A "pivot" model structure previously developed for training purposes was adapted by Citilabs to meet the needs of this project while taking into consideration the other constraints and goals identified above. The pivot model includes four steps as in a conventional UTPS-style model—trip generation, distribution, mode split, and assignment—yet each of these steps is formulated incrementally. In other words:

- The skims extracted using network path-building and assignment routines are used to calculate change in zone-to-zone generalized costs, rather than absolute generalized cost.
- Mode split is performed using an incremental hierarchical multinomial logit model, given base trips by mode and changes in cost.
- Trip distribution is expressed in terms of shift in destination choices, calculated using incremental multinomial logit based on change in composite costs extracted from the mode choice model.
- Trip generation is expressed in terms of change (growth or decline) in trip ends. Induced demand effects could be captured by considering destination choice logsum accessibility terms in calculating the change in trips.

In relation to the models surveyed in the previous section, this structure is similar to that reported in the Thailand high-speed rail feasibility study, while incorporating aspects of the California HSR model and prior New York models. Note that, in addition to being formulated incrementally, the process described above reverses the conventional order of the four steps in the UTPS model, in order to pass information between the steps in an integrated manner.

The mode split and trip distribution steps are incremental multinomial logit models connected using composite impedance terms. Together these combined models forecast the counterfactual number of person-trips that would travel between each zone pair by mode if generalized travel costs changed, without altering the magnitude of trip ends:

$T_{ijk} = O_i\text{*}\mathrm{Pr}(D_{j|i})\text{*}\mathrm{Pr}(M_{k|ij})$, where:

T_{ijk} = the number of trips between zones *i and j* by mode *k*

O_i = the base total person-trip ends originating from zone *i*

$\mathrm{Pr}(D_{j|i}) = \mathrm{Sh}(D_{j|i})\text{*}\exp(-\lambda_d \Delta C_{ij}) / \Sigma_j \mathrm{Sh}(D_{i|j})\text{*}\exp(-\lambda_d \Delta C_{ij})$ = the conditional probability of choosing destination *j* given that a trip originates at zone *i*, where:

$\mathrm{Sh}(D_{j|i})$ = the share of trips originating from *i* that choose destination *j* in the base scenario

λ_d = a "scale" parameter representing sensitivity of destination choice to composite cost

$\Delta C_{ij} = (1/\lambda_m)\text{*}\log(\Sigma_k \mathrm{Sh}(M_{k|ij})\text{*}\exp(-\lambda_m \Delta GC_{k|ij}))$ = change in composite cost, where:

λ_m = a "scale" parameter representing sensitivity of mode choice to composite cost

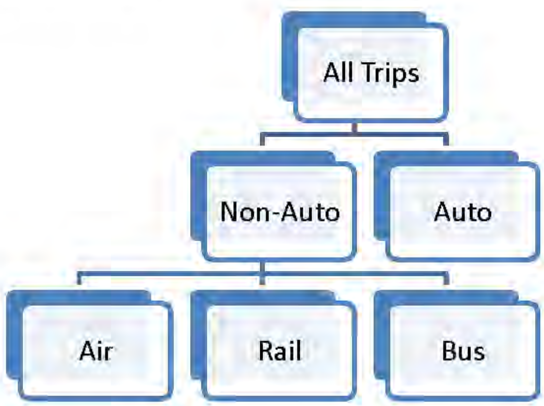
$\mathrm{Sh}(M_{k|ij})$ = the share of trips from *i* to *j* that choose mode *k* in the base scenario

$\Delta GC_{k|ij}$ = the change in generalized travel cost from *i* to *j* by mode *k* from the base scenario

The composite cost is the so-called "logsum" term of an incremental multinomial logit mode choice model:

$\mathrm{Pr}(M_{k|ij}) = \mathrm{Sh}(M_{k|ij})\text{*}\exp(-\lambda_m \Delta GC_{k|ij}) / \Sigma_k \mathrm{Sh}(M_{k|ij})\text{*}\exp(-\lambda_m \Delta GC_{k|ij})$

In practice, the unobserved characteristics of non-auto modes are correlated, creating unique competition patterns between the highway mode and other modes. This is reflected in the mode choice model by introducing a non-automotive nest, resulting in the mode hierarchy shown below:



The model requires a highway network plus a set of multimodal public transit lines representing non-auto modes of travel. Zone-to-zone highway generalized costs are extracted by using the Cube Voyager HIGHWAY program to construct minimum-time network paths from origin to destination and tracing (or "skimming") the time, distance, and toll cost associated with each origin-destination pair. Time, distance and toll costs are combined into generalized cost in time units (minutes) for highway modes using the following expression:

$GC_{car|ij} = time_{ij} + distance_{ij} * (VOC / VOT) + toll_{ij} / VOT$, where

VOC = the average Vehicle Operating Cost, in $/mile, and

VOT = the Value of Time, in $/minute, computed as a weighted average of business and non-business travel values of time, assuming a flat percentage of business travel.

Zone-to-zone public transit generalized costs are extracted by using the Cube Voyager PUBLIC TRANSPORT program to construct minimum-time network paths from origin to destination and tracing (or "skimming") the in-vehicle time, out-of-vehicle time, and fare cost associated with each origin-destination pair. Time and fares are combined into generalized cost for public transit modes in time units using the following expression:

$GC_{pt|ij} = IVTT_{ij} + 2 * OVTT_{ij} + fare_{ij} / VOT$, where

$IVTT_{ij}$ = travel time spent inside a public transit vehicle, and

$OVTT_{ij}$ = the travel time spent outside a public transit vehicle, e.g. traveling to a station or waiting for the next train to arrive.

The weighting factor of two times the in-vehicle travel time applied to out-of-vehicle travel time is borrowed from FTA guidance based upon synthesis results of a large number of fixed-guideway rail studies performed in the United States.

Note that the generalized cost definition applied in this study may be used either with single best-path (all-or-nothing) network skims or the multi-path capabilities provided by Cube Voyager. Multi-path methods allow the user to analyze competition between sub-modes using route choice models; for example toll versus non-toll travel, or conventional versus high-speed rail (if both forms of service are present). If multi-path methods are used, then the generalized costs noted above are actually based upon the "logsum" of a route choice model, embedded in either the highway or public transport assignment processes. In the scenarios analyzed for the Empire Corridor Study, it was not necessary to use multi-path methods, because the proposed service is a wholesale upgrade of the existing service, without any opportunity for competition between high-speed and conventional rail.

Note that, in either the single-best path or multi-path formulation, the zone-to-zone costs or skims for the auto as well as non-auto modes must take into account the level of congestion on the highway network. This requires consideration of local travel, which is not forecasted by the incremental model described above. For the Empire Corridor study, highway network congestion was estimated by calibrating a statewide vehicle-trip matrix from HPMS counts using maximum likelihood origin-destination matrix estimation techniques, and then assigning this matrix to the highway network using an iterative user equilibrium algorithm. For future years, the vehicle-trip matrix is factored to reflect growth in total vehicle-trip ends, based upon changes in socio-economic zonal variables. The vehicle traffic growth factor is computed as the ratio of future to base population plus two times employment in each zone, a widely used heuristic when more detailed trip generation parameters are not known. These growth factors are then used to compute row and column matrix margin targets for an iterative proportional fitting algorithm implemented using the Cube Voyager FRATAR module to develop a future year vehicle-trip matrix.

Similarly, growth factors are computed for intercity person-trips as well, based upon the change in socio-economic zonal variables. However, in this growth factor calculation, employment is weighted based upon the assumed percentage of business travel. These growth factors are applied to the forecast person-trip table created after applying the destination shifts indicated by the incremental logit model described previously, using the iterative proportional fitting algorithm implemented in the FRATAR module. Then, the shifted mode share percentages calculated using the hierarchical logit mode choice model are finally applied to derive future year intercity travel by mode.

The "pivot" model described above has only a handful of calibrated parameters, most of which are directly transferrable from other studies surveyed in the literature review or may be asserted based upon common knowledge in the field. It is also scalable, working essentially the same way regardless of zone system or network size, and accommodating expansion of detail in future revisions. The counterpoint to this simplicity and scalability is that the model is heavily dependent upon the input base travel matrices—if no travel is observed between two zones by a certain mode in the base scenario, none will be predicted in the future scenario. Thus, although appropriate for analysis of the proposed upgrades to the existing Empire Corridor, the pivot model structure would be inappropriate for analysis of a new location rail corridor or extension of rail service into a presently un-served area. Furthermore, in practice, it is impossible to observe trips by mode from their "true" origin to their "true" destination; rather the data provided by HNTB in this study included observed ridership from station to station and similar part-trip data for other modes (i.e. interchange to interchange, airport to airport, terminal to terminal). Thus most of the effort involved in calibrating the pivot model was dedicated to estimating the true origin and destination zone for these observed partial trips.

Data Development and Implementation

Unlike many of the statewide intercity multimodal travel forecasting projects mentioned in the literature review, the Empire Corridor study did not include scope for new data collection. Thus the modeling approach for this study was tailored to make maximum use of available databases. To help quantify the existing shares of travel by these modes in the corridor, HNTB staff provided the following data to Citilabs:

- Annual 2009 Amtrak boardings and alightings by station
- Annual 2009 Thruway trips by interchange pair
- Annual 2009 air travel (passengers) between major NY airports
- Bus trips between major NY cities in 2009

A variety of ESRI GIS format data were also compiled from public sources, including:

- National Highway Planning Network (NHPN) roadway centerline shapefiles, with attributes describing the functional classification, number of lanes, and Annual Average Daily Traffic (AADT) of major roadways included in the Highway Performance Monitoring System (HPMS)
- Locations of interchanges and toll plazas on the New York State Thruway
- Polyline data representing the Amtrak rail network and point data representing actively used and proposed station locations
- Polyline data representing intercity bus routes and point data representing the current bus station locations
- Point data representing the locations of major airports in New York City, Albany, Syracuse, Rochester, and Buffalo
- Census polygon area (e.g. county, subdivision, tract, block) boundaries
- New York area transit information imported from Google Transit Feed format

In addition, socio-economic data were compiled from the following sources:

- Block-level demographics from the decennial U.S. Census 2000 files
- Block-level employment estimates at places of work from the Longitudinal Employer-Household Dynamics "OnTheMap" synthetic micro-data

- Independent county-level socio-economic projections through 2035 purchased from Woods and Poole, a commercial vendor.

The possibility of using National Household Travel Survey (NHTS) 2001 or 2009 data to directly estimate parameters for trip generation, distribution, and mode split models was investigated and ultimately abandoned due to NYS DOT staff concerns about the data's quality and suitability for the intended purpose (source: personal communication with Nathan Erlbaum). Furthermore, although Citilabs' activity-based demonstration model script could in theory have been transferred to the local context, this was agreed to require effort beyond the scope of the rail ridership forecasting project. Therefore, to make the maximum use of the available data while requiring minimal estimation and calibration of new model parameters, Citilabs recommended an incremental or "pivot modeling" approach based upon insights from the literature review, described as follows:

- A base "background travel" vehicle-trip matrix was directly estimated using Cube Analyst from observed AADT reported in the NHPN network based upon HPMS databases, and a capacity-constrained iterative assignment was performed to estimate congested base generalized travel costs between TAZs throughout the state.
- The base travel information by mode (auto, bus, rail, air) collected by HNTB was disaggregated to the TAZ system, which is based directly upon Census geography, using County subdivisions as the target scale for intercity travel analysis.
- To develop future year no-build forecasts, the networks remain the same, and:
    - Growth in total trip productions and attractions is assessed using a FRATAR process incorporating socio-economic growth factors derived from Woods and Poole projections.
    - After factoring to reflect growth, the "background travel" matrix is assigned to estimate the level of increase in highway travel costs due to congestion.
    - Mode shift from auto to other modes is calculated based upon applying a nested multinomial logit model implemented using an incremental formulation. The nest separates auto from the other modes, providing a means of controlling the overall level of diversion and addressing the IIA concerns that initially precluded use of multinomial logit in the 1977 Buffalo-NYC rail ridership study. This nesting structure is also generally consistent with that used in the California statewide HSR forecasting model, as well as the Amtrak Northeast Corridor Model.

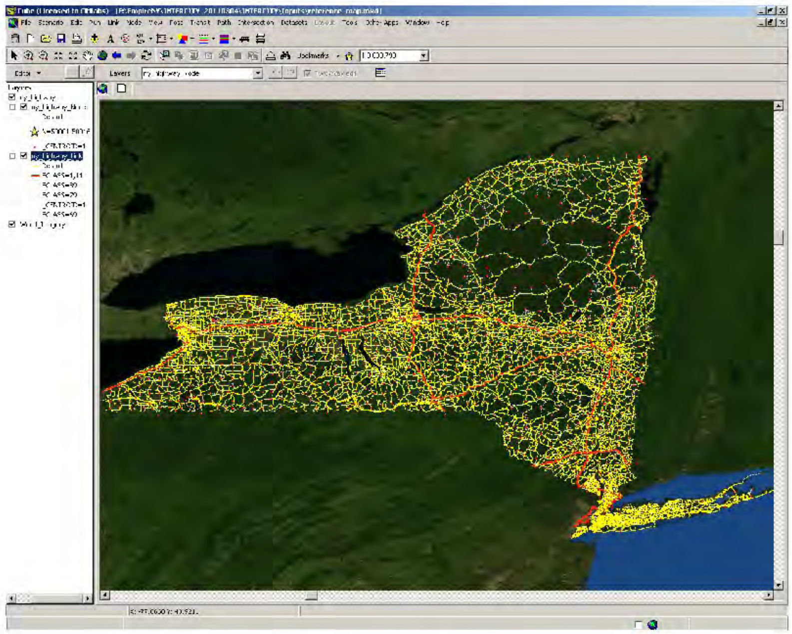
- Shifts in destination choice due to changing travel costs between zones may also be calculated by applying a multinomial logit model formulated incrementally, based upon changes in composite cost from mode split. The destination shift model may be turned off, if desired.

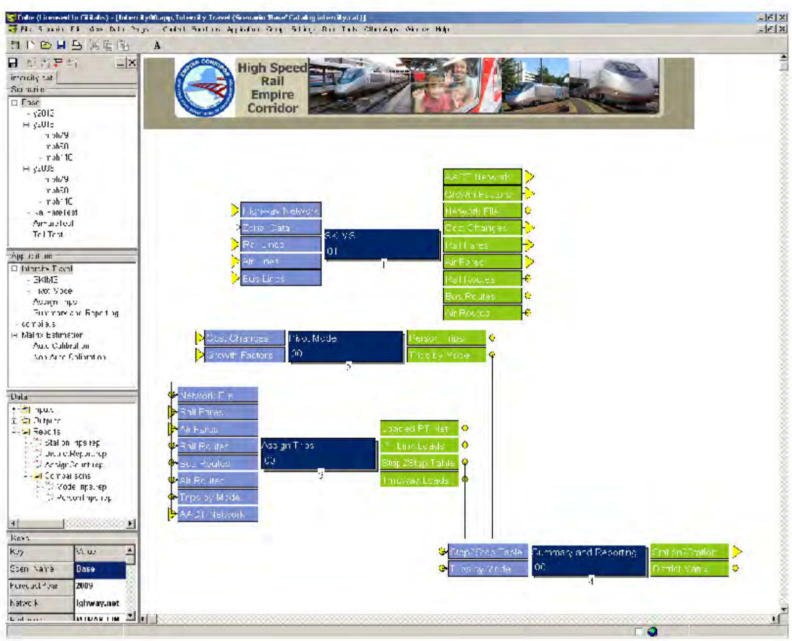
- Future year build forecasts are produced in the same manner, with the addition of rail networks coded based upon project assumptions, including service frequency and schedule information input by the HNTB team.

As noted previously, the incremental formulation described above works in this case because the high-speed rail projects under consideration all constituted improvements in existing corridors, rather than wholly new service, and because the PUBLIC TRANSPORT program enumerates and evaluates multiple routes having different levels and types of service. In the future it may be desirable to convert the pivot model to a more conventional "absolute" hierarchical logit structure.

An especially attractive aspect of the model structure described above is that the process can be scaled in geographic resolution as desired. In the case of this project, the basic programming logic was first implemented in a proof-of-concept model applied to a "test" network connecting the six major cities. Model calibration (to reported ridership trends) was then performed using a more realistic GIS-based network extracted from the NHPN centerlines and Census subdivision boundaries. This generated a model sufficiently detailed and sensitive to produce reliable draft rail ridership forecasts for the Empire Corridor; however the lack of detail afforded by the NHPN network did result in some aggregation biases affecting the intercity highway travel forecasts.

To improve the representation of highway travel in the Empire Corridor model, the team entered a third round of refinement using roadway centerline GIS data previously purchased from NAVTEQ by the State of New York. The NavStreets product is a high-quality source of roadway centerline information for travel demand model development, because it contains data on speeds, lanes, directionality of travel, turn prohibitions, and functional classification, in addition to true shape geometry for links and topology suitable for routing applications. HNTB obtained NAVTEQ NavStreets data from the New York Office of Cyber-Security via the NYS DOT GIS Coordinator. Citilabs staff then converted the roadway centerline files to Cube Voyager network format using a specialized import application previously developed as part of ongoing collaboration and partnership with NAVTEQ. After filtering out minor roads, centroids and connectors were added for a system of 1,040 zones corresponding to Census County subdivisions (effectively, cities and towns), via automated functions in Cube Base. Another automated Cube function was then used to consolidate links with the same attributes while maintaining topological consistency and linkages to the underlying NavStreets shapefile. The resulting network is shown on the next page as well as an image of the model application itself.

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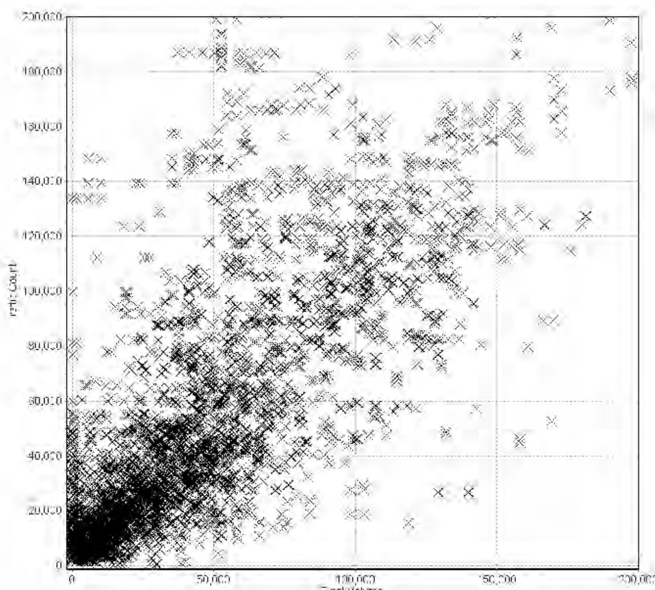
Model Calibration and Validation

This section provides background and summary information regarding the model calibration and validation work performed by Citilabs using the data provided by HNTB.

Statewide Average Daily and Corridor Annual Vehicle Traffic

As mentioned previously, the statewide average daily vehicle travel demand matrix was calibrated directly from HPMS counts in the 2009 NHPN network using Cube Analyst, a maximum likelihood origin-destination matrix estimation (ODME) program. Due to the large size of this problem, Cube Analyst was applied in an iterative manner, re-assigning the calibrated trip table after each iteration to extract new intercept and screenline data, using a different 10% random sample of all link counts on each iteration. Only Principal Arterials (i.e. freeways and tollways) were included in the sampling frame, given the focus of this study on long-distance, rather than local, travel. After three iterations of origin-destination matrix estimation, the total volume on all counted links was 306,417,184, or 90% of the total counted volume of 341,009,023, meeting typical guidelines for highway assignment model validation (Barton-Aschman Associates and Cambridge Systematics, Inc., 1997). Furthermore, a general pattern of linear correlation between assigned and observed volumes is observed in the final loading, as shown in the scatterplot below.



The New York State Thruway interchange-to-interchange annual toll transaction data used to represent base Empire Corridor highway mode travel demand were disaggregated to origin-destination zone pairs based upon a direct analysis of which zones in the average daily vehicle travel matrix used each interchange pair. The average daily traffic for the selected origin-destination zones was then factored to match the annual vehicle travel demand derived from the Thruway data sets while preserving the detailed trip distribution patterns revealed through the origin-destination matrix estimation process.

Intercity Bus Ridership

In general, good data on intercity bus travel within the Empire Corridor were not provided to Citilabs by the project team. Estimates of boarding and alighting passengers at major bus terminals were developed by HNTB based upon the inventories of the number of bus trips (vehicles) derived from operator-published schedules, combined with assumed loading factors based upon expert local knowledge. These were then coded into the model network as link passenger counts entering and leaving the station area via major bus routes. Cube Analyst was used yet again to estimate an origin-destination matrix of approximately 4.3 million intercity bus trips, derived directly from these "assumed" counts.

Commercial Air Travel

For the purposes of this study, corridor air travel demand was defined to include commercial passenger travel between the three major New York City airports (EWR, JFK and LGA) and four "upstate" airports (ALB, SYR, ROC, and BUF). Although data were also provided to Citilabs regarding annual passenger travel between the upstate airports, these trips were very small in number and ultimately determined to likely represent charter plane travel that would be non-competitive with high speed rail. Furthermore, although data were collected by HNTB regarding travel to and from the Toronto airport, it was not possible to include these trips within the definition of eligible corridor demand due to the limited geographic extent of the model. Thus the air mode travel matrix calibration process focused on developing a table of origin-destination trips yielding assignment outputs which compare favorably to observed travel between New York City and upstate airports. As shown in the following tables, this criterion was ultimately met within 1.2% error for all upstate destinations, within 0.9% for upstate origins, and within 0.1% overall.

Year 2009 Annual Air Travel (From NYC)

To Airport	Observed	Modeled	Error	Percent
ALB	100,416	99,887	-529	-0.5%
SYR	273,624	272,814	-810	-0.3%
ROC	302,794	306,432	3638	1.2%
BUF	524,606	521,872	-2734	-0.5%
Total	1,201,440	1,201,005	-435	0.0%

Year 2009 Annual Air Travel (To NYC)

From Airport	Observed	Modeled	Error	Percent
ALB	100,753	99,882	-871	-0.9%
SYR	272,116	272,609	493	0.2%
ROC	305,707	307,834	2127	0.7%
BUF	524,005	520,680	-3325	-0.6%
Total	1,202,581	1,201,006	-1575	-0.1%

Empire Corridor Rail Ridership

Station-to-station boarding and alighting annual passenger counts for existing Amtrak service in the Empire corridor were disaggregated to origin-destination TAZ pairs based upon a two-stage process:

1. Access and egress links were developed from each zone centroid within an assumed 40-minute travel shed to the closest train station based upon shortest-time paths built using the final congested highway network loaded with the background average daily traffic developed as described in the previous section.

2. Annual passenger counts were allocated to origins and destinations associated with the starting or ending nodes of these access/egress links according to a probability of selection derived from a gravity-type expression taking into account station proximity (drive time) and total trip activity (as indicated by trip ends summarized from the average daily vehicle travel matrix).

This rail mode travel demand origin-destination matrix was assigned to the public transport network using Base year 2009 assumptions (i.e. no cost changes or service improvements). Observed and modeled ridership for this base condition are presented and compared in the four tables on the immediately following pages. For all station pairs except HUD-BFX, the assigned rail ridership matches the observed passenger count within one rider; and even at HUD-BFX the error is only 7 riders, or less than 10 percent of the passenger count. All total station boarding and alighting volumes are within 0.2 percent of the observed amount; and the total error for the entire station-to-station matrix is less than 0.01 percent as a whole. This validation report thus demonstrates that the calibrated base year rail ridership produced by the Empire Corridor model is accurate and precise relative to the available data, and that errors were not introduced during disaggregation of observed ridership from stations to transportation analysis zones for network assignment.

Conclusions and Future Directions

The Empire Corridor Intercity Travel Demand Model was successfully calibrated to match the observed travel data provided to Citilabs by HNTB. Validation with high accuracy was achieved thanks to automated techniques such as origin-destination matrix estimation and script-based disaggregation of stop-to-stop trips to zones. In general, however, the present model is highly dependent upon the quality of the input base data provided, because of its incremental formulation. Future efforts to develop a statewide travel demand model for New York State might benefit from a more conventional model estimation and calibration process using household or personal travel survey data.

Empire Corridor Existing Amtrak Service: Station-to-Station Annual 2009 Passenger Ridership, Modeled-Observed (Error)

Row Labels	NYP	YNY	CRT	POU	RHI	HUD	ALB	AMS	SDY	UCA	ROM	SYR	ROC	BUF	BFX	NFL	SAR	Grand Total
NYP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
YNY	0	0	0	0	0	0	0	0	0	0	0	-1	0	0	0	0	0	-4
CRT	0	0	0	0	0	0	0	0	0	0	0	-1	0	0	0	0	0	-4
POU	0	0	0	0	0	0	0	0	0	0	0	-1	0	0	0	0	0	-5
RHI	0	0	0	0	0	0	0	0	0	0	0	-1	0	0	0	0	0	-3
HUD	0	0	0	0	0	0	0	0	-1	-1	0	-1	-1	0	-7	0	0	-12
ALB	0	0	0	0	0	0	0	0	0	0	0	-1	-1	0	0	0	0	-3
AMS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-1
SDY	0	0	0	0	0	-1	0	0	0	-1	0	-1	-1	0	0	0	0	-5
UCA	0	0	0	0	0	-1	0	0	-1	0	-1	-1	-1	-1	0	0	0	-7
ROM	0	0	0	0	0	0	0	0	0	-1	0	-1	-1	0	0	0	0	-6
SYR	0	-1	-1	-1	-1	-1	-1	0	-1	-1	-1	0	-1	-1	0	-1	0	-11
ROC	0	0	0	0	0	-1	-1	0	-1	-1	-1	-1	0	-1	0	0	0	-7
BUF	0	0	0	0	0	0	0	0	0	-1	0	-1	-1	0	0	0	0	-5
BFX	0	0	0	0	0	7	0	0	0	0	0	0	0	0	0	0	0	4
NFL	0	0	0	0	0	0	0	0	0	0	0	-1	0	0	0	0	0	-2
SAR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-2
Grand Total	**0**	**-4**	**-4**	**-5**	**-3**	**2**	**-3**	**-1**	**-5**	**-7**	**-6**	**-11**	**-7**	**-5**	**-9**	**-2**	**-2**	**-74**

Empire Corridor Existing Amtrak Service: Station-to-Station Annual 2009 Passenger Ridership, Percent Error

Row Labels	NYP	YNY	CRT	POU	RHI	HUD	ALB	AMS	SDY	UCA	ROM	SYR	ROC	BUF	BFX	NFL	SAR	Grand Total
NYP	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
YNY	0.0%	0.0%	-2.7%	-1.0%	0.0%	0.0%	0.0%	0.0%	-0.5%	-0.1%	-0.4%	-0.1%	0.0%	-0.1%	-0.1%	-0.1%	-0.1%	0.0%
CRT	0.0%	-2.7%	0.0%	-0.5%	0.0%	0.0%	0.0%	0.0%	-0.6%	-0.1%	-0.4%	-0.1%	0.0%	0.0%	-0.1%	-0.1%	-0.1%	0.0%
POU	0.0%	-1.0%	-0.5%	0.0%	-0.1%	0.0%	0.0%	0.0%	-0.7%	0.0%	-0.4%	-0.1%	0.0%	0.0%	0.0%	0.0%	-0.2%	0.0%
RHI	0.0%	0.0%	0.0%	-0.1%	0.0%	-0.1%	0.0%	0.0%	-3.1%	-0.2%	-1.1%	-0.2%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	0.0%
HUD	0.0%	0.0%	0.0%	0.0%	-0.1%	0.0%	0.0%	0.0%	-1.0%	-0.6%	-2.1%	-0.4%	-0.2%	-0.2%	-6.9%	-0.3%	-0.6%	0.0%
ALB	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-0.8%	0.0%	-0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	-0.1%	0.0%
AMS	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-1.2%	0.0%	-0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
SDY	0.0%	-0.5%	-0.6%	-0.7%	-3.1%	-1.0%	-0.8%	-1.2%	0.0%	-1.6%	-3.0%	-0.3%	-0.1%	-0.1%	-0.1%	-0.5%	0.0%	-0.1%
UCA	0.0%	-0.1%	-0.1%	0.0%	-0.2%	-0.6%	0.0%	0.0%	-1.6%	0.0%	-1.5%	-0.2%	-0.1%	-0.1%	-0.1%	-0.1%	0.0%	0.0%
ROM	0.0%	-0.4%	-0.4%	-0.4%	-1.1%	-2.1%	-0.2%	-0.1%	-3.0%	-1.5%	0.0%	-0.6%	-0.3%	-0.2%	-0.2%	-0.3%	0.0%	-0.2%
SYR	0.0%	-0.1%	-0.1%	-0.1%	-0.2%	-0.4%	0.0%	0.0%	-0.3%	-0.2%	-0.6%	0.0%	-0.1%	0.0%	0.0%	-0.1%	0.0%	0.0%
ROC	0.0%	0.0%	0.0%	0.0%	-0.1%	-0.2%	0.0%	0.0%	-0.1%	-0.1%	-0.3%	-0.1%	0.0%	-0.1%	-0.1%	-0.1%	0.0%	0.0%
BUF	0.0%	-0.1%	0.0%	0.0%	-0.1%	-0.2%	0.0%	0.0%	-0.1%	-0.1%	-0.2%	0.0%	-0.1%	0.0%	-0.2%	-0.1%	0.0%	0.0%
BFX	0.0%	-0.1%	-0.1%	0.0%	-0.1%	8.0%	0.0%	0.0%	-0.1%	-0.1%	-0.2%	0.0%	-0.1%	-0.2%	0.0%	-0.3%	0.0%	0.0%
NFL	0.0%	-0.1%	-0.1%	0.0%	-0.1%	-0.3%	0.0%	0.0%	-0.5%	-0.1%	-0.3%	-0.1%	-0.1%	-0.1%	-0.2%	0.0%	0.0%	0.0%
SAR	0.0%	-0.1%	-0.1%	-0.2%	-0.1%	-0.6%	-0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Grand Total	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**-0.1%**	**0.0%**	**-0.2%**	**0.0%**	**0.0%**	**0.0%**	**-0.1%**	**0.0%**	**0.0%**	**0.0%**

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10.2 APPENDIX B: Alternative Operating and Service Plans

10.2.1 Complete List of Sources

Operating Plans- Empire Service-Eastbound, 2009

EMPIRE SERVICE-Eastbound

Toronto • Niagara Falls • Buffalo • Rochester • Syracuse • Albany • New York

Train Number ▸			230	250	232	234	252	236	280	254	290	238	284	292
Normal Days of Operation ▸			Mo-Fr	SaSu	Mo-Fr	Mo-Fr	Sa	Daily	Mo-Sa	Su	Mo-Fr	Daily	Daily	Sa
Will Also Operate ▸				12/24,12/31, 1/16,2/20			12/24,12/31, 1/16,2/20		1/16,2/20	1/17,2/21				1/16,2/20
Will Not Operate ▸			1/17,2/21		12/24,12/31, 1/17,2/21	12/24,12/31, 1/17,2/21			1/17,2/21	1/16,2/20	1/17,2/21			
TORONTO, ON [11] (ET)	0	Dp												
Niagara Falls, NY	84								3 50A				6 40A	
Buffalo-Exchange St., NY	107								4 28A				7 18A	
Buffalo-Depew, NY	113								4 44A				7 34A	
Rochester, NY QT	174								5 37A				8 27A	
Syracuse, NY	254								7 00A		From		9 50A	
Rome, NY	294								7 41A		Rutland		10 31A	
Utica, NY QT	308								7 57A				10 49A	
Amsterdam, NY	367								8 57A				11 49A	
Fort Edward-Glens Falls, NY / Lake George Village [13][93]	0										9 22A			12 22P
Saratoga Springs, NY [13]	19										9 43A			12 43P
Schenectady, NY QT	385								9 17A		10 23A		12 09P	1 15P
Albany-Rensselaer, NY QT	403	Ar							9 50A		10 53A		12 50P	1 45P
		Dp	5 10A	6 05A	6 20A	6 55A	7 05A	8 05A	10 05A	10 05A	11 05A	12 05P	1 05P	2 05P
Hudson, NY QT	431		5 35A	6 30A	6 45A	7 20A	7 30A	8 30A	10 30A	10 30A	11 30A	12 30P	1 30P	2 30P
Rhinecliff, NY QT	456		5 56A	6 51A	7 06A	7 41A	7 51A	8 51A	10 51A	10 51A	11 51A	12 51P	1 51P	2 51P
Poughkeepsie, NY QT	471			7 05A			8 05A	9 05A	11 05A	11 05A	12 05P	1 05P	2 05P	3 05P
Croton-Harmon, NY QT	512		6 49A	7 45A	8 01A		8 45A	9 45A	11 45A	11 45A	12 45P	1 45P	2 45P	3 45P
Yonkers, NY	530			8 04A			9 04A	10 04A			1 04P	2 04P	3 04P	4 04P
NEW YORK, NY-Penn Sta. QT (ET)	545	Ar	7 35A	8 35A	8 45A	9 15A	9 35A	10 35A	12 35P	12 35P	1 35P	2 35P	3 35P	4 35P

Train Number ▸			256	242	48	244	68	64	296	288
Normal Days of Operation ▸			Su	Mo-Fr	Daily	Daily	Daily	Daily	Su	Su
Will Also Operate ▸			1/17,2/21						1/17,2/21	1/17,2/21
Will Not Operate ▸			1/16,2/20	1/17,2/21					1/16,2/20	1/16,2/20
TORONTO, ON [11] (ET)	0	Dp			From			8 30A		
Niagara Falls, NY	84				Chicago			12 40P		2 50P
Buffalo-Exchange St., NY	107							1 15P		3 28P
Buffalo-Depew, NY	113				9 08A			1 31P		3 44P
Rochester, NY QT	174				10 08A			2 26P		4 38P
Syracuse, NY	254				11 38A		From	3 49P	From	6 01P
Rome, NY	294						Montreal	4 29P	Rutland	6 42P
Utica, NY QT	308				12 42P			4 45P		7 00P
Amsterdam, NY	367							5 45P		8 00P
Fort Edward-Glens Falls, NY / Lake George Village [13][93]	0						3 30P		6 28P	
Saratoga Springs, NY [13]	19						3 53P		6 57P	
Schenectady, NY QT	385				2 00P		4 50P	6 05P	7 28P	8 20P
Albany-Rensselaer, NY QT	403	Ar			D 2 50P		5 40P	6 47P	7 53P	9 00P
		Dp	2 05P	3 05P	D 3 50P	4 15P	6 05P	7 05P	8 05P	9 10P
Hudson, NY QT	431		2 30P	3 30P		4 40P	6 30P	7 30P	8 30P	9 35P
Rhinecliff, NY QT	456		2 51P	3 51P		5 01P	6 51P	7 51P	8 51P	9 56P
Poughkeepsie, NY QT	471		3 05P	4 05P	D 4 47P	5 15P	7 05P	8 05P	9 05P	10 10P
Croton-Harmon, NY QT	512		3 45P	4 45P	D 5 33P	5 55P	7 45P	8 45P	9 45P	10 50P
Yonkers, NY	530		4 04P	5 04P			8 04P	9 04P	10 04P	
NEW YORK, NY-Penn Sta. QT (ET)	545	Ar	4 35P	5 35P	6 35P	6 45P	8 40P	9 35P	10 35P	11 40P

Operating Plans- Empire Service-Westbound, 2009

EMPIRE SERVICE-Westbound

New York • Albany • Syracuse • Rochester • Buffalo • Niagara Falls • Toronto

Train Number ▸				63	69	281	233	283	235	291	255	49
Normal Days of Operation ▸				Daily	Daily	Daily	Daily	Daily	Mo-Fr	DexFr	Fr	Daily
Will Also Operate ▸												
Will Not Operate ▸									1/17,2/21			
NEW YORK, NY–Penn Sta.	QT (ET)	0	Dp	7 15A	8 15A	10 15A	11 45A	1 15P	2 15P	3 15P	3 15P	3 45P
Yonkers, NY		14		7 39A	8 39A		12 09P	1 39P	2 39P	3 39P	3 39P	
Croton-Harmon, NY	QT	32		7 58A	8 58A	10 56A	12 29P	1 58P	2 58P	3 58P	3 58P	R 4 29P
Poughkeepsie, NY	QT	73		8 38A	9 38A	11 36A	1 08P	2 38P	3 38P	4 38P	4 38P	R 5 15P
Rhinecliff-Kingston, NY	QT	88		8 52A	9 52A	11 50A	1 19P	2 52P	3 52P	4 52P	4 52P	
Hudson, NY	QT	114		9 15A	10 15A	12 12P	1 42P	3 15P	4 15P	5 15P	5 15P	
Albany-Rensselaer, NY	QT	141	Ar	9 45A	10 45A	12 45P	2 15P	3 45P	4 45P	5 45P	5 45P	
			Dp	10 03A	11 05A	12 55P		3 55P		6 00P		R 7 05P
Schenectady, NY	QT	159		10 26A	11 29A	1 17P		4 17P		6 24P		7 31P
Saratoga Springs, NY	13	178			11 57A					6 52P		
Fort Edward-Glens Falls, NY / Lake George Village	13 93	197			12 19P					7 13P		
Amsterdam, NY		177		10 43A		1 34P		4 34P				
Utica, NY	QT	237		11 42A		2 29P		5 33P				8 44P
Rome, NY		250		11 58A	To	2 43P		5 48P		To		
Syracuse, NY		291		12 48P	Montreal	3 33P		6 38P		Rutland		9 41P
Rochester, NY	QT	370		2 04P		4 52P		7 52P				11 00P
Buffalo-Depew, NY		431		3 10P		L 5 52P		L 8 52P				12 10A
Buffalo-Exchange St., NY		437		3 24P		L 6 06P		L 9 06P				
Niagara Falls, NY		460	Ar	4 33P		7 15P		10 15P				To
TORONTO, ON	11 (ET)	544	Ar	7 37P								Chicago

Train Number ▸				237	253	239	293	241	243	245	261
Normal Days of Operation ▸				Mo-Fr	SaSu	Mo-Th	Fr	Daily	Daily	Mo-Th	Fr-Su
Will Also Operate ▸					1/17,2/21						1/17,2/21
Will Not Operate ▸				1/17,2/21		1/17,2/21				1/17,2/21	12/31
NEW YORK, NY–Penn Sta.	QT (ET)	0	Dp	4 40P	5 15P	5 45P	5 45P	7 15P	8 50P	10 50P	11 50P
Yonkers, NY		14			5 39P			7 39P	9 14P		
Croton-Harmon, NY	QT	32			5 58P	6 25P	6 25P	7 58P	9 33P	11 31P	12 31A
Poughkeepsie, NY	QT	73			6 38P	7 11P	7 11P	8 38P	10 13P	12 11A	1 11A
Rhinecliff-Kingston, NY	QT	88		L 6 10P	6 52P	L 7 25P	L 7 25P	L 8 52P	L10 27P	L12 25A	L 1 25A
Hudson, NY	QT	114		L 6 33P	7 15P	L 7 48P	L 7 48P	L 9 15P	L10 50P	L12 47A	L 1 47A
Albany-Rensselaer, NY	QT	141	Ar	7 00P	7 45P	8 15P	8 15P	9 45P	11 20P	1 20A	2 20A
			Dp				8 25P				
Schenectady, NY	QT	159					8 49P				
Saratoga Springs, NY	13	178					9 17P				
Fort Edward-Glens Falls, NY / Lake George Village	13 93	197					9 38P				Train 263
Amsterdam, NY		177									will operate
Utica, NY	QT	237									1/1/2011
Rome, NY		250					To				in lieu of
Syracuse, NY		291					Rutland				Train 261
Rochester, NY	QT	370									departing
Buffalo-Depew, NY		431									New York
Buffalo-Exchange St., NY		437									1:00 a.m.
Niagara Falls, NY		460	Ar								
TORONTO, ON	11 (ET)	544	Ar								

Operating Plans- Empire Service-Eastbound, 2018

110 MPH, EASTBOUND, 2018 PLAN

Train	Freq	Train originates at:	Leave Niagara Falls	Leave Buffalo Exchange	Leave Buffalo Depew	Leave Rochester	Leave Geneva	Leave Syracuse	Leave Rome	Leave Utica	Leave Amsterdam	Leave Saratoga	Leave Schenectady	Albany-Rensselaer Arrive	Albany-Rensselaer Leave	Leave Hudson	Leave Rhinecliff	Leave Poughkeepsie	Leave Croton Harmon	Leave Yonkers	Arrive New York
230	Mon-Fri														5:10 AM	5:34 AM	5:55 AM	no stop	6:42 AM	no stop	7:20 AM
232	Daily														6:10 AM	6:34 AM	6:55 AM	no stop	no stop	no stop	8:15 AM
254	Mon-Fri											6:10 AM	6:41 AM	7:05 AM	7:10 AM	7:34 AM	7:55 AM	no stop	no stop	no stop	9:15 AM
256	ExSun											7:10 AM	7:41 AM	8:05 AM	8:10 AM	8:34 AM	8:55 AM	9:09 AM	9:45 AM	no stop	10:25 AM
252	Mon-Fri											8:00 AM	8:31 AM	8:55 AM							
238	Mon-Fri													→	9:10 AM	9:34 AM	9:55 AM	no stop	10:43 AM	11:02 AM	11:25 AM
280	ExSun		5:06 AM	5:36 AM	5:53 AM	6:40 AM		7:43 AM	8:16 AM	8:33 AM	9:15 AM		9:31 AM	9:56 AM	10:10 AM	10:34 AM	10:55 AM	11:09 AM	11:45 AM	no stop	12:25 PM
290	Daily	*Rutland*										10:00 AM	10:31 AM	10:55 AM	11:10 AM	11:34 AM	11:55 AM	no stop	12:43 PM	1:02 PM	1:25 PM
262	Daily						8:45 AM	9:43 AM	10:16 AM	10:33 AM	11:15 AM		11:31 AM	11:56 AM	12:10 PM	12:34 PM	12:55 PM	1:09 PM	1:45 PM	no stop	2:25 PM
284	ExSun		9:05 AM	9:36 AM	9:53 AM	10:40 AM		11:43 AM	12:16 PM	12:33 PM	1:15 PM		1:31 PM	1:56 PM	2:10 PM	2:34 PM	2:55 PM	3:09 PM	3:45 PM	4:04 PM	4:25 PM
244	Daily														3:10 PM	3:34 PM	3:55 PM	no stop	4:43 PM	5:02 PM	5:25 PM
246	ExSat														4:10 PM	4:34 PM	4:55 PM	no stop	no stop	no stop	6:15 PM
48	Daily	*Chicago*			11:35 AM	12:25 PM		1:31 PM	no stop	2:21 PM	no stop		3:22 PM	4:00 PM	4:30 PM	no stop	no stop	no stop	6:00 PM	no stop	6:40 PM
294	Daily	*Cleveland*			12:53 PM	1:40 PM		2:43 PM	3:16 PM	3:33 PM	4:15 PM		4:31 PM	4:56 PM	5:10 PM	5:34 PM	5:55 PM	6:09 PM	6:45 PM	no stop	7:25 PM
68	Daily	*Montreal*										4:50 PM	5:21 PM	5:55 PM	6:10 PM	6:34 PM	6:55 PM	7:09 PM	7:45 PM	8:04 PM	8:25 PM
64	Daily	*Toronto*	2:05 PM	2:36 PM	2:53 PM	3:40 PM		4:43 PM	5:16 PM	5:33 PM	6:15 PM		6:31 PM	6:56 PM	7:10 PM	7:34 PM	7:55 PM	8:09 PM	8:45 PM	9:04 PM	9:25 PM
286	ExSat		4:05 PM	4:36 PM	4:53 PM	5:40 PM		6:43 PM	7:16 PM	7:33 PM	8:15 PM		8:31 PM	8:56 PM	9:10 PM	9:34 PM	9:55 PM	10:09 PM	10:45 PM	11:04 PM	11:25 PM

90 MPH, EASTBOUND, 2018 PLAN

Train	Freq	Train originates at:	Leave Niagara Falls	Leave Buffalo Exchange	Leave Buffalo Depew	Leave Rochester	Leave Geneva	Leave Syracuse	Leave Rome	Leave Utica	Leave Amsterdam	Leave Saratoga	Leave Schenectady	Albany-Rensselaer Arrive	Albany-Rensselaer Leave	Leave Hudson	Leave Rhinecliff	Leave Poughkeepsie	Leave Croton Harmon	Leave Yonkers	Arrive New York
230	Mon-Fri														5:10 AM	5:34 AM	5:55 AM	no stop	6:42 AM	no stop	7:20 AM
232	Daily														6:10 AM	6:34 AM	6:55 AM	no stop	no stop	no stop	8:15 AM
234	Sat-Sun														7:10 AM	7:34 AM	7:55 AM	8:09 AM	8:45 AM	9:04 AM	9:25 AM
254	Mon-Fri											6:10 AM	6:41 AM	7:05 AM	7:10 AM	7:34 AM	7:55 AM	no stop	no stop	no stop	9:15 AM
256	ExSun											7:10 AM	7:41 AM	8:05 AM	8:10 AM	8:34 AM	8:55 AM	9:09 AM	9:45 AM	no stop	10:25 AM
236	Sun Only														8:10 AM	8:34 AM	8:55 AM	9:09 AM	9:45 AM	10:04 AM	10:25 AM
252	Mon-Fri											8:00 AM	8:31 AM	8:55 AM							
238	Mon-Fri													→	9:10 AM	9:34 AM	9:55 AM	no stop	10:43 AM	11:02 AM	11:25 AM
240	Sat-Sun											8:00 AM	8:31 AM	8:55 AM	9:10 AM	9:34 AM	9:55 AM	10:09 AM	10:45 AM	11:04 AM	11:25 AM
280	ExSun		4:50 AM	5:21 AM	5:37 AM	6:28 AM		7:35 AM	8:09 AM	8:27 AM	9:12 AM		9:29 AM	9:55 AM	10:10 AM	10:34 AM	10:55 AM	11:09 AM	11:45 AM	no stop	12:25 PM
290	Daily	*Rutland*										10:00 AM	10:31 AM	10:55 AM	11:10 AM	11:34 AM	11:55 AM	no stop	12:43 PM	1:02 PM	1:25 PM
262	Daily						8:35 AM	9:35 AM	10:09 AM	10:27 AM	11:12 AM		11:29 AM	11:55 AM	12:10 PM	12:34 PM	12:55 PM	1:09 PM	1:45 PM	no stop	2:25 PM
284	ExSun		8:50 AM	9:21 AM	9:37 AM	10:28 AM		11:35 AM	12:09 PM	12:27 PM	1:12 PM		1:29 PM	1:55 PM	2:10 PM	2:34 PM	2:55 PM	3:09 PM	3:45 PM	4:04 PM	4:25 PM
242	Sun Only														2:10 PM	2:34 PM	2:55 PM	3:09 PM	3:45 PM	4:04 PM	4:25 PM
244	Daily														3:10 PM	3:34 PM	3:55 PM	no stop	4:43 PM	5:02 PM	5:25 PM
246	ExSat														4:10 PM	4:34 PM	4:55 PM	no stop	no stop	no stop	6:15 PM
48	Daily	*Chicago*			11:19 AM	12:13 PM		1:23 PM	no stop	2:16 PM	no stop		3:21 PM	4:00 PM	4:30 PM	no stop	no stop	no stop	6:00 PM	no stop	6:40 PM
294	Daily	*Cleveland*			12:37 PM	1:28 PM		2:35 PM	3:09 PM	3:27 PM	4:12 PM		4:29 PM	4:55 PM	5:10 PM	5:34 PM	5:55 PM	6:09 PM	6:45 PM	no stop	7:25 PM
68	Daily	*Montreal*										4:50 PM	5:21 PM	5:55 PM	6:10 PM	6:34 PM	6:55 PM	7:09 PM	7:45 PM	8:04 PM	8:25 PM
64	Daily	*Toronto*	1:50 PM	2:21 PM	2:37 PM	3:28 PM		4:35 PM	5:09 PM	5:27 PM	6:12 PM		6:29 PM	6:55 PM	7:10 PM	7:34 PM	7:55 PM	8:09 PM	8:45 PM	9:04 PM	9:25 PM
286	ExSat		3:50 PM	4:21 PM	4:37 PM	5:28 PM		6:35 PM	7:09 PM	7:27 PM	8:12 PM		8:29 PM	8:55 PM	9:10 PM	9:34 PM	9:55 PM	10:09 PM	10:45 PM	11:04 PM	11:25 PM

79 MPH, EASTBOUND, 2018 PLAN

Train	Freq	Train originates at:	Leave Niagara Falls	Leave Buffalo Exchange	Leave Buffalo Depew	Leave Rochester	Leave Geneva	Leave Syracuse	Leave Rome	Leave Utica	Leave Amsterdam	Leave Saratoga	Leave Schenectady	Albany-Rensselaer Arrive	Albany-Rensselaer Leave	Leave Hudson	Leave Rhinecliff	Leave Poughkeepsie	Leave Croton Harmon	Leave Yonkers	Arrive New York
230	Mon-Fri														5:10 AM	5:34 AM	5:55 AM	no stop	6:42 AM	no stop	7:20 AM
232	Daily														6:10 AM	6:34 AM	6:55 AM	no stop	no stop	no stop	8:15 AM
234	Sat-Sun														7:10 AM	7:34 AM	7:55 AM	8:09 AM	8:45 AM	9:04 AM	9:25 AM
254	Mon-Fri											6:10 AM	6:41 AM	7:05 AM	7:10 AM	7:34 AM	7:55 AM	no stop	no stop	no stop	9:15 AM
256	ExSun											7:10 AM	7:41 AM	8:05 AM	8:10 AM	8:34 AM	8:55 AM	9:09 AM	9:45 AM	no stop	10:25 AM
236	Sun Only														8:10 AM	8:34 AM	8:55 AM	9:09 AM	9:45 AM	10:04 AM	10:25 AM
252	Mon-Fri											8:00 AM	8:31 AM	8:55 AM							
238	Mon-Fri													→	9:10 AM	9:34 AM	9:55 AM	no stop	10:43 AM	11:02 AM	11:25 AM
240	Sat-Sun											8:00 AM	8:31 AM	8:55 AM	9:10 AM	9:34 AM	9:55 AM	10:09 AM	10:45 AM	11:04 AM	11:25 AM
280	ExSun		4:30 AM	5:01 AM	5:17 AM	6:12 AM		7:24 AM	8:02 AM	8:20 AM	9:10 AM		9:28 AM	9:54 AM	10:10 AM	10:34 AM	10:55 AM	11:09 AM	11:45 AM	no stop	12:25 PM
290	Daily	*Rutland*										10:00 AM	10:31 AM	10:55 AM	11:10 AM	11:34 AM	11:55 AM	no stop	12:43 PM	1:02 PM	1:25 PM
262	Daily						8:20 AM	9:24 AM	10:02 AM	10:20 AM	11:10 AM		11:28 AM	11:54 AM	12:10 PM	12:34 PM	12:55 PM	1:09 PM	1:45 PM	no stop	2:25 PM
284	ExSun		8:30 AM	9:01 AM	9:17 AM	10:12 AM		11:24 AM	12:02 PM	12:20 PM	1:10 PM		1:28 PM	1:54 PM	2:10 PM	2:34 PM	2:55 PM	3:09 PM	3:45 PM	4:04 PM	4:25 PM
242	Sun Only														2:10 PM	2:34 PM	2:55 PM	3:09 PM	3:45 PM	4:04 PM	4:25 PM
244	Daily														3:10 PM	3:34 PM	3:55 PM	no stop	4:43 PM	5:02 PM	5:25 PM
246	ExSat														4:10 PM	4:34 PM	4:55 PM	no stop	no stop	no stop	6:15 PM
48	Daily	*Chicago*			11:03 AM	12:02 PM		1:17 PM	no stop	2:12 PM	no stop		3:21 PM	4:00 PM	4:30 PM	no stop	no stop	no stop	6:00 PM	no stop	6:40 PM
294	Daily	*Cleveland*			12:17 PM	1:12 PM		2:24 PM	3:02 PM	3:20 PM	4:10 PM		4:31 PM	4:54 PM	5:10 PM	5:34 PM	5:55 PM	6:09 PM	6:45 PM	no stop	7:25 PM
68	Daily	*Montreal*										4:50 PM	5:21 PM	5:55 PM	6:10 PM	6:34 PM	6:55 PM	7:09 PM	7:45 PM	8:04 PM	8:25 PM
64	Daily	*Toronto*	1:30 PM	2:01 PM	2:17 PM	3:12 PM		4:24 PM	5:02 PM	5:20 PM	6:10 PM		6:31 PM	6:54 PM	7:10 PM	7:34 PM	7:55 PM	8:09 PM	8:45 PM	9:04 PM	9:25 PM
286	ExSat		3:30 PM	4:01 PM	4:17 PM	5:12 PM		6:24 PM	7:02 PM	7:20 PM	8:10 PM		8:28 PM	8:54 PM	9:10 PM	9:34 PM	9:55 PM	10:09 PM	10:45 PM	11:04 PM	11:25 PM

Operating Plans- Empire Service-Westbound, 2018

110 MPH, WESTBOUND, 2018 PLAN

Train	Freq	Leave New York	Leave Yonkers	Leave Croton Harton	Leave Pough keepsie	Leave Rhine cliff	Leave Hudson	Albany-Rensselaer Arrive	Albany-Rensselaer Leave	Arrive Schenec tady	Arrive Saratoga	Arrive Amster dam	Arrive Utica	Arrive Rome	Arrive Syracuse	Arrive Geneva	Arrive Rochester	Arrive Buffalo Depew	Arrive Buffalo Exchange	Arrive Niagara Falls	Train continues to
281	Mon-Fri	4:15 AM	4:37 AM	4:57 AM	5:34 AM	5:47 AM	6:09 AM	6:30 AM	6:45 AM	7:02 AM		7:18 AM	8:02 AM	8:17 AM	8:53 AM		9:55 AM	10:44 AM	11:00 AM	11:36 AM	
63	Daily	7:15 AM	7:37 AM	7:57 AM	8:34 AM	8:47 AM	9:09 AM	9:30 AM	9:45 AM	10:02 AM		10:18 AM	11:02 AM	11:17 AM	11:53 AM		12:55 PM	1:44 PM	2:00 PM	2:36 PM	*Toronto*
69	Daily	8:15 AM	8:37 AM	8:57 AM	9:34 AM	9:47 AM	10:09 AM	10:30 AM	10:45 AM	11:03 AM	11:33 AM										*Montreal*
295	Daily	9:15 AM	no stop	9:54 AM	10:31 AM	10:44 AM	11:07 AM	11:30 AM	11:45 AM	12:02 PM		12:18 PM	1:02 PM	1:17 PM	1:53 PM		2:55 PM	3:47 PM			*Cleveland*
283	Daily	11:15 AM	11:37 AM	11:57 AM	no stop	12:44 PM	1:07 PM	1:30 PM	1:45 PM	2:02 PM		2:18 PM	3:02 PM	3:17 PM	3:53 PM		4:55 PM	5:44 PM	6:00 PM	6:36 PM	
233	Daily	12:15 PM	12:37 PM	12:57 PM	1:34 PM	1:47 PM	2:09 PM	2:30 PM													
261	Daily	1:15 PM	no stop	1:54 PM	2:31 PM	2:44 PM	3:07 PM	3:30 PM	3:45 PM	4:02 PM		4:18 PM	5:02 PM	5:17 PM	5:53 PM	6:50 PM					
291	Daily	2:15 PM	2:37 PM	2:57 PM	no stop	3:44 PM	4:07 PM	4:30 PM	4:40 PM	4:58 PM	5:27 PM										*Rutland*
253	Mon-Fri								5:30 PM	5:48 PM	6:17 PM										
285	Daily	3:15 PM	no stop	3:54 PM	4:31 PM	4:44 PM	5:07 PM	5:30 PM	5:45 PM	6:02 PM		6:18 PM	7:02 PM	7:17 PM	7:53 PM		8:55 PM	9:44 PM	10:00 PM	10:36 PM	
255	Mon-Fri	4:15 PM	no stop	no stop	no stop	5:39 PM	6:01 PM	6:20 PM	6:30 PM	6:48 PM	7:17 PM										
257	ExSat	5:15 PM	no stop	no stop	no stop	6:39 PM	7:01 PM	7:20 PM	7:30 PM	7:48 PM	8:17 PM										
235	Daily	6:15 PM	6:37 PM	6:57 PM	7:34 PM	7:47 PM	8:09 PM	8:30 PM													
49	daily	6:45 PM	no stop	7:25 PM	no stop	no stop	no stop	9:00 PM	9:40 PM	10:00 PM		no stop	11:01 PM	no stop	11:51 PM		12:56 AM	1:52 AM			*Chicago*
241	ExSat	7:15 PM	7:37 PM	7:57 PM	8:34 PM	8:47 PM	9:09 PM	9:30 PM													
243	Daily	8:15 PM	8:37 PM	8:57 PM	9:34 PM	9:47 PM	10:09 PM	10:30 PM													
245	Daily	10:15 PM	10:37 PM	10:57 PM	11:34 PM	11:47 PM	12:09 AM	12:30 AM													

90 MPH, WESTBOUND, 2018 PLAN

Train	Freq	Leave New York	Leave Yonkers	Leave Croton Harton	Leave Pough keepsie	Leave Rhine cliff	Leave Hudson	Albany-Rensselaer Arrive	Albany-Rensselaer Leave	Arrive Schenec tady	Arrive Saratoga	Arrive Amster dam	Arrive Utica	Arrive Rome	Arrive Syracuse	Arrive Geneva	Arrive Rochester	Arrive Buffalo Depew	Arrive Buffalo Exchange	Arrive Niagara Falls	Train continues to
281	Mon-Fri	4:15 AM	4:37 AM	4:57 AM	5:34 AM	5:47 AM	6:09 AM	6:30 AM	6:45 AM	7:02 AM		7:19 AM	8:06 AM	8:22 AM	8:59 AM		10:05 AM	10:58 AM	11:14 AM	11:50 AM	
63	Daily	7:15 AM	7:37 AM	7:57 AM	8:34 AM	8:47 AM	9:09 AM	9:30 AM	9:45 AM	10:02 AM		10:19 AM	11:06 AM	11:22 AM	11:59 AM		1:05 PM	1:58 PM	2:14 PM	2:50 PM	*Toronto*
69	Daily	8:15 AM	8:37 AM	8:57 AM	9:34 AM	9:47 AM	10:09 AM	10:30 AM	10:45 AM	11:03 AM	11:33 AM										*Montreal*
295	Daily	9:15 AM	no stop	9:54 AM	10:31 AM	10:44 AM	11:07 AM	11:30 AM	11:45 AM	12:02 PM		12:19 PM	1:06 PM	1:22 PM	1:59 PM		3:05 PM	4:01 PM			*Cleveland*
283	Daily	11:15 AM	11:37 AM	11:57 AM	no stop	12:44 PM	1:07 PM	1:30 PM	1:45 PM	2:02 PM		2:19 PM	3:06 PM	3:22 PM	3:59 PM		5:05 PM	5:58 PM	6:14 PM	6:50 PM	
233	Daily	12:15 PM	12:37 PM	12:57 PM	1:34 PM	1:47 PM	2:09 PM	2:30 PM													
261	Daily	1:15 PM	no stop	1:54 PM	2:31 PM	2:44 PM	3:07 PM	3:30 PM	3:45 PM	4:02 PM		4:19 PM	5:06 PM	5:22 PM	5:59 PM	6:59 PM					
291	Daily	2:15 PM	2:37 PM	2:57 PM	no stop	3:44 PM	4:07 PM	4:30 PM	4:40 PM	4:58 PM	5:27 PM										*Rutland*
253	Mon-Fri								5:30 PM	5:48 PM	6:17 PM										
285		3:15 PM	no stop	3:54 PM	4:31 PM	4:44 PM	5:07 PM	5:30 PM	5:45 PM	6:02 PM		6:19 PM	7:06 PM	7:22 PM	7:59 PM		9:05 PM	9:58 PM	10:14 PM	10:50 PM	
255	Mon-Fri	4:15 PM	no stop	no stop	no stop	5:39 PM	6:01 PM	6:20 PM	6:30 PM	6:48 PM	7:17 PM										
257	ExSat	5:15 PM	no stop	no stop	no stop	6:39 PM	7:01 PM	7:20 PM	7:30 PM	7:48 PM	8:17 PM										
235	Daily	6:15 PM	6:37 PM	6:57 PM	7:34 PM	7:47 PM	8:09 PM	8:30 PM													
49	daily	6:45 PM	no stop	7:25 PM	no stop	no stop	no stop	9:00 PM	9:40 PM	10:00 PM		no stop	11:04 PM	no stop	11:56 PM		1:05 AM	2:05 AM			*Chicago*
241	ExSat	7:15 PM	7:37 PM	7:57 PM	8:34 PM	8:47 PM	9:09 PM	9:30 PM													
243	Daily	8:15 PM	8:37 PM	8:57 PM	9:34 PM	9:47 PM	10:09 PM	10:30 PM													
245	Daily	10:15 PM	10:37 PM	10:57 PM	11:34 PM	11:47 PM	12:09 AM	12:30 AM													

79 MPH, WESTBOUND, 2018 PLAN

Train	Freq	Leave New York	Leave Yonkers	Leave Croton Harton	Leave Pough keepsie	Leave Rhine cliff	Leave Hudson	Albany-Rensselaer Arrive	Albany-Rensselaer Leave	Arrive Schenec tady	Arrive Saratoga	Arrive Amster dam	Arrive Utica	Arrive Rome	Arrive Syracuse	Arrive Geneva	Arrive Rochester	Arrive Buffalo Depew	Arrive Buffalo Exchange	Arrive Niagara Falls	Train continues to
281	Mon-Fri	4:15 AM	4:37 AM	4:57 AM	5:34 AM	5:47 AM	6:09 AM	6:30 AM	6:45 AM	7:02 AM		7:20 AM	8:12 AM	8:28 AM	9:09 AM		10:20 AM	11:17 AM	11:33 AM	12:13 PM	
63	Daily	7:15 AM	7:37 AM	7:57 AM	8:34 AM	8:47 AM	9:09 AM	9:30 AM	9:45 AM	10:02 AM		10:20 AM	11:12 AM	11:28 AM	12:09 PM		1:20 PM	2:17 PM	2:33 PM	3:13 PM	*Toronto*
69	Daily	8:15 AM	8:37 AM	8:57 AM	9:34 AM	9:47 AM	10:09 AM	10:30 AM	10:45 AM	11:03 AM	11:33 AM										*Montreal*
295	Daily	9:15 AM	no stop	9:54 AM	10:31 AM	10:44 AM	11:07 AM	11:30 AM	11:45 AM	12:02 PM		12:20 PM	1:12 PM	1:28 PM	2:09 PM		3:20 PM	4:20 PM			*Cleveland*
283	Daily	11:15 AM	11:37 AM	11:57 AM	no stop	12:44 PM	1:07 PM	1:30 PM	1:45 PM	2:02 PM		2:20 PM	3:12 PM	3:28 PM	4:09 PM		5:20 PM	6:17 PM	6:33 PM	7:13 PM	
233	Daily	12:15 PM	12:37 PM	12:57 PM	1:34 PM	1:47 PM	2:09 PM	2:30 PM													
261	Daily	1:15 PM	no stop	1:54 PM	2:31 PM	2:44 PM	3:07 PM	3:30 PM	3:45 PM	4:02 PM		4:20 PM	5:12 PM	5:28 PM	6:09 PM	7:10 PM					
291	Daily	2:15 PM	2:37 PM	2:57 PM	no stop	3:44 PM	4:07 PM	4:30 PM	4:40 PM	4:58 PM	5:27 PM										*Rutland*
253	Mon-Fri								5:30 PM	5:48 PM	6:17 PM										
285		3:15 PM	no stop	3:54 PM	4:31 PM	4:44 PM	5:07 PM	5:30 PM	5:45 PM	6:02 PM		6:20 PM	7:12 PM	7:28 PM	8:09 PM		9:20 PM	10:17 PM	10:33 PM	11:13 PM	
255	Daily	4:15 PM	no stop	no stop	no stop	5:39 PM	6:01 PM	6:20 PM	6:30 PM	6:48 PM	7:17 PM										
W255			4:37 PM	4:57 PM	5:34 PM	5:47 PM	6:09 PM	6:30 PM	6:40 PM	6:58 PM	7:27 PM										
257	ExSat	5:15 PM	no stop	no stop	no stop	6:39 PM	7:01 PM	7:20 PM	7:30 PM	7:48 PM	8:17 PM										
235	Daily	6:15 PM	6:37 PM	6:57 PM	7:34 PM	7:47 PM	8:09 PM	8:30 PM													
49	daily	6:45 PM	no stop	7:25 PM	no stop	no stop	no stop	9:00 PM	9:40 PM	10:00 PM		no stop	11:03 PM	no stop	11:59 PM		1:13 AM	2:17 AM			*Chicago*
241	ExSat	7:15 PM	7:37 PM	7:57 PM	8:34 PM	8:47 PM	9:09 PM	9:30 PM													
243	Daily	8:15 PM	8:37 PM	8:57 PM	9:34 PM	9:47 PM	10:09 PM	10:30 PM													
245	Daily	10:15 PM	10:37 PM	10:57 PM	11:34 PM	11:47 PM	12:09 AM	12:30 AM													

Operating Plans- Empire Service-Eastbound, 2035

110 MPH, EASTBOUND, 2035 PLAN

Train	Train originates at	Leave Niagara Falls	Leave Buffalo Exchange	Leave Buffalo Depew	Leave Rochester	Leave Geneva	Leave Syracuse	Leave Rome	Leave Utica	Leave Amsterdam	Leave Saratoga	Leave Schenectady	Albany-Rensselaer Arrive	Albany-Rensselaer Leave	Leave Hudson	Leave Rhinecliff	Leave Poughkeepsie	Leave Croton Harmon	Leave Yonkers	Arrive New York
230														5:10 AM	5:34 AM	5:55 AM	no stop	6:42 AM	no stop	7:20 AM
232														6:10 AM	6:34 AM	6:55 AM	no stop	no stop	no stop	8:15 AM
SYR02							4:43 AM	5:16 AM	5:33 AM	6:15 AM		6:31 AM	6:56 AM	7:10 AM	7:34 AM	7:55 AM	8:09 AM	8:45 AM	9:04 AM	9:25 AM
256											6:10 AM	6:41 AM	7:05 AM	7:10 AM	7:34 AM	7:55 AM	no stop	no stop	no stop	9:15 AM
252											7:45 AM	8:15 AM	8:40 AM							
NFL00		4:05 AM	4:35 AM	4:53 AM	5:40 AM		6:43 AM	7:16 AM	7:33 AM	8:15 AM		8:31 AM	8:56 AM	9:10 AM	9:34 AM	9:55 AM	no stop	10:43 AM	11:02 AM	11:25 AM
280		5:05 AM	5:35 AM	5:53 AM	6:40 AM		7:43 AM	8:16 AM	8:33 AM	9:15 AM		9:31 AM	9:56 AM	10:10 AM	10:34 AM	10:56 AM	11:09 AM	11:45 AM	no stop	12:25 PM
NFL02		6:05 AM	6:36 AM	6:53 AM	7:40 AM		8:43 AM	9:16 AM	9:33 AM	10:15 AM		10:31 AM	10:56 AM	11:10 AM	11:34 AM	11:55 AM	no stop	12:43 PM	1:02 PM	1:25 PM
290	Rutland										10:30 AM	11:01 AM	11:25 AM	11:40 AM	12:04 PM	12:25 PM	12:39 PM	1:15 PM	no stop	1:55 PM
NFL04		7:05 AM	7:35 AM	7:53 AM	8:40 AM		9:43 AM	10:16 AM	10:33 AM	11:15 AM		11:31 AM	11:56 AM	12:10 PM	12:34 PM	12:55 PM	no stop	1:43 PM	2:02 PM	2:25 PM
262						9:45 AM	10:43 AM	11:16 AM	11:33 AM	12:15 PM		12:31 PM	12:56 PM	1:10 PM	1:34 PM	1:55 PM	2:09 PM	2:45 PM	no stop	3:25 PM
284		9:05 AM	9:36 AM	9:53 AM	10:40 AM		11:43 AM	12:16 PM	12:33 PM	1:15 PM		1:31 PM	1:56 PM	2:10 PM	2:34 PM	2:55 PM	no stop	3:43 PM	4:02 PM	4:25 PM
NFL06		10:05 AM	10:36 AM	10:53 AM	11:40 AM		12:43 PM	1:16 PM	1:33 PM	2:15 PM		2:31 PM	2:56 PM	3:10 PM	3:34 PM	3:55 PM	4:09 PM	4:45 PM	no stop	5:25 PM
246														4:10 PM	4:34 PM	4:55 PM	no stop	no stop	no stop	6:15 PM
48	Chicago			11:35 AM	12:25 PM		1:31 PM	no stop	2:21 PM	no stop		3:22 PM	4:00 PM	4:30 PM	no stop	no stop	no stop	6:00 PM	no stop	6:40 PM
NFL08		12:05 PM	12:38 PM	12:53 PM	1:40 PM		2:43 PM	3:16 PM	3:33 PM	4:15 PM		4:31 PM	4:56 PM	5:10 PM	5:34 PM	5:55 PM	6:09 PM	6:45 PM	no stop	7:25 PM
248														5:40 PM	6:04 PM	6:25 PM	no stop	7:13 PM	7:32 PM	7:55 PM
294	Cleveland			1:53 PM	2:40 PM		3:43 PM	4:16 PM	4:33 PM	5:15 PM		5:31 PM	5:56 PM	6:10 PM	6:34 PM	6:55 PM	7:09 PM	7:45 PM	no stop	8:25 PM
68	Montreal										5:20 PM	5:51 PM	6:25 PM	6:40 PM	7:04 PM	7:25 PM	7:39 PM	8:15 PM	8:34 PM	8:55 PM
64	Toronto	2:05 PM	2:36 PM	2:53 PM	3:40 PM		4:43 PM	5:16 PM	5:33 PM	6:15 PM		6:31 PM	6:56 PM	7:10 PM	7:34 PM	7:55 PM	8:09 PM	8:45 PM	9:04 PM	9:25 PM
NFL10		3:05 PM	3:36 PM	3:53 PM	4:40 PM		5:43 PM	6:16 PM	6:33 PM	7:15 PM		7:31 PM	7:56 PM	8:10 PM	8:34 PM	8:55 PM	9:09 PM	9:45 PM	10:04 PM	10:25 PM
286		4:05 PM	4:36 PM	4:53 PM	5:40 PM		6:43 PM	7:16 PM	7:33 PM	8:15 PM		8:31 PM	8:56 PM	9:10 PM	9:34 PM	9:55 PM	10:09 PM	10:45 PM	11:04 PM	11:25 PM

90 MPH, EASTBOUND, 2035 PLAN

Train	Train originates at	Leave Niagara Falls	Leave Buffalo Exchange	Leave Buffalo Depew	Leave Rochester	Leave Geneva	Leave Syracuse	Leave Rome	Leave Utica	Leave Amsterdam	Leave Saratoga	Leave Schenectady	Albany-Rensselaer Arrive	Albany-Rensselaer Leave	Leave Hudson	Leave Rhinecliff	Leave Poughkeepsie	Leave Croton Harmon	Leave Yonkers	Arrive New York
230														5:10 AM	5:34 AM	5:55 AM	no stop	6:42 AM	no stop	7:20 AM
232														6:10 AM	6:34 AM	6:55 AM	no stop	no stop	no stop	8:15 AM
SYR02							4:36 AM	5:09 AM	5:27 AM	6:12 AM		6:29 AM	6:56 AM	7:10 AM	7:34 AM	7:55 AM	8:09 AM	8:45 AM	9:04 AM	9:25 AM
256											6:10 AM	6:41 AM	7:05 AM	7:10 AM	7:34 AM	7:55 AM	no stop	no stop	no stop	9:15 AM
252											7:45 AM	8:16 AM	8:40 AM							
NFL00		3:50 AM	4:21 AM	4:37 AM	5:28 AM		6:35 AM	7:09 AM	7:27 AM	8:12 AM		8:29 AM	8:55 AM	9:10 AM	9:34 AM	9:55 AM	no stop	10:43 AM	11:02 AM	11:26 AM
280		4:50 AM	5:21 AM	5:37 AM	6:28 AM		7:35 AM	8:09 AM	8:27 AM	9:12 AM		9:29 AM	9:55 AM	10:10 AM	10:34 AM	10:55 AM	11:09 AM	11:45 AM	no stop	12:25 PM
NFL02		5:50 AM	6:21 AM	6:37 AM	7:28 AM		8:35 AM	9:09 AM	9:27 AM	10:12 AM		10:29 AM	10:55 AM	11:10 AM	11:34 AM	11:55 AM	no stop	12:43 PM	1:02 PM	1:25 PM
290	Rutland										10:30 AM	11:01 AM	11:25 AM	11:40 AM	12:04 PM	12:25 PM	12:39 PM	1:15 PM	no stop	1:55 PM
NFL04		6:50 AM	7:21 AM	7:37 AM	8:28 AM		9:35 AM	10:09 AM	10:27 AM	11:12 AM		11:29 AM	11:55 AM	12:10 PM	12:34 PM	12:55 PM	no stop	1:43 PM	2:02 PM	2:25 PM
262						9:35 AM	10:35 AM	11:00 AM	11:27 AM	12:12 PM		12:29 PM	12:55 PM	1:10 PM	1:34 PM	1:55 PM	2:09 PM	2:45 PM	no stop	3:25 PM
284		8:50 AM	9:21 AM	9:37 AM	10:20 AM		11:35 AM	12:09 PM	12:27 PM	1:12 PM		1:29 PM	1:55 PM	2:10 PM	2:34 PM	2:55 PM	no stop	3:43 PM	4:02 PM	4:25 PM
NFL06		9:50 AM	10:21 AM	10:37 AM	11:20 AM		12:35 PM	1:09 PM	1:27 PM	2:12 PM		2:29 PM	2:55 PM	3:10 PM	3:34 PM	3:55 PM	4:09 PM	4:45 PM	no stop	5:25 PM
246														4:10 PM	4:34 PM	4:55 PM	no stop	no stop	no stop	6:15 PM
48	Chicago			11:19 AM	12:13 PM		1:23 PM	no stop	2:16 PM	no stop		3:21 PM	4:00 PM	4:30 PM	no stop	no stop	no stop	6:00 PM	no stop	6:40 PM
NFL08		11:50 AM	12:21 PM	12:37 PM	1:28 PM		2:35 PM	3:09 PM	3:27 PM	4:12 PM		4:29 PM	4:55 PM	5:10 PM	5:34 PM	5:55 PM	6:09 PM	6:45 PM	no stop	7:25 PM
248														5:40 PM	6:04 PM	6:25 PM	no stop	7:13 PM	7:32 PM	7:55 PM
294	Cleveland			1:37 PM	2:28 PM		3:35 PM	4:09 PM	4:27 PM	5:12 PM		5:29 PM	5:55 PM	6:10 PM	6:34 PM	6:55 PM	7:09 PM	7:45 PM	no stop	8:26 PM
68	Montreal										5:20 PM	5:51 PM	6:25 PM	6:40 PM	7:04 PM	7:25 PM	7:39 PM	8:15 PM	8:34 PM	8:55 PM
64	Toronto	1:50 PM	2:21 PM	2:37 PM	3:28 PM		4:35 PM	5:09 PM	5:27 PM	6:12 PM		6:29 PM	6:55 PM	7:10 PM	7:34 PM	7:55 PM	8:09 PM	8:45 PM	9:04 PM	9:25 PM
NFL10		2:50 PM	3:21 PM	3:37 PM	4:28 PM		5:35 PM	6:09 PM	6:27 PM	7:12 PM		7:29 PM	7:55 PM	8:10 PM	8:34 PM	8:55 PM	9:09 PM	9:45 PM	10:04 PM	10:25 PM
286		3:50 PM	4:21 PM	4:37 PM	5:28 PM		6:35 PM	7:09 PM	7:27 PM	8:12 PM		8:29 PM	8:55 PM	9:10 PM	9:34 PM	9:55 PM	10:09 PM	10:45 PM	11:04 PM	11:25 PM

79 MPH, EASTBOUND, 2035 PLAN

Train	Train originates at	Leave Niagara Falls	Leave Buffalo Exchange	Leave Buffalo Depew	Leave Rochester	Leave Geneva	Leave Syracuse	Leave Rome	Leave Utica	Leave Amsterdam	Leave Saratoga	Leave Schenectady	Albany-Rensselaer Arrive	Albany-Rensselaer Leave	Leave Hudson	Leave Rhinecliff	Leave Poughkeepsie	Leave Croton Harmon	Leave Yonkers	Arrive New York
230														5:10 AM	5:34 AM	5:55 AM	no stop	6:42 AM	no stop	7:20 AM
232														6:10 AM	6:34 AM	6:55 AM	no stop	no stop	no stop	8:15 AM
SYR02							4:24 AM	5:02 AM	5:20 AM	6:10 AM		6:28 AM	6:54 AM	7:10 AM	7:34 AM	7:55 AM	8:09 AM	8:45 AM	9:04 AM	9:25 AM
256											6:10 AM	6:41 AM	7:05 AM	7:10 AM	7:34 AM	7:55 AM	no stop	no stop	no stop	9:15 AM
252											7:45 AM	8:16 AM	8:40 AM							
NFL00		3:30 AM	4:01 AM	4:17 AM	5:12 AM		6:24 AM	7:02 AM	7:20 AM	8:10 AM		8:28 AM	8:54 AM	9:10 AM	9:34 AM	9:55 AM	no stop	10:43 AM	11:02 AM	11:25 AM
280		4:30 AM	5:01 AM	5:17 AM	6:12 AM		7:24 AM	8:02 AM	8:20 AM	9:10 AM		9:28 AM	9:54 AM	10:10 AM	10:34 AM	10:55 AM	11:09 AM	11:45 AM	no stop	12:25 PM
NFL02		5:30 AM	6:01 AM	6:17 AM	7:12 AM		8:24 AM	9:02 AM	9:20 AM	10:10 AM		10:28 AM	10:54 AM	11:10 AM	11:34 AM	11:55 AM	no stop	12:43 PM	1:02 PM	1:25 PM
290	Rutland										10:30 AM	11:01 AM	11:25 AM	11:40 AM	12:04 PM	12:25 PM	12:39 PM	1:15 PM	no stop	1:55 PM
NFL04		6:30 AM	7:01 AM	7:17 AM	8:12 AM		9:24 AM	10:02 AM	10:20 AM	11:10 AM		11:28 AM	11:54 AM	12:10 PM	12:34 PM	12:55 PM	no stop	1:43 PM	2:02 PM	2:25 PM
262						9:20 AM	10:24 AM	11:02 AM	11:20 AM	12:10 PM		12:28 PM	12:54 PM	1:10 PM	1:34 PM	1:55 PM	2:09 PM	2:45 PM	no stop	3:25 PM
284		8:30 AM	9:01 AM	9:17 AM	10:12 AM		11:24 AM	12:02 PM	12:20 PM	1:10 PM		1:28 PM	1:54 PM	2:10 PM	2:34 PM	2:55 PM	no stop	3:43 PM	4:02 PM	4:25 PM
NFL06		9:30 AM	10:01 AM	10:17 AM	11:12 AM		12:24 PM	1:02 PM	1:20 PM	2:10 PM		2:28 PM	2:54 PM	3:10 PM	3:34 PM	3:55 PM	4:09 PM	4:45 PM	no stop	5:25 PM
246														4:10 PM	4:34 PM	4:55 PM	no stop	no stop	no stop	6:15 PM
48	Chicago			11:03 AM	12:02 PM		1:17 PM	no stop	2:12 PM	no stop		3:21 PM	4:00 PM	4:30 PM	no stop	no stop	no stop	6:00 PM	no stop	6:40 PM
NFL08		11:30 AM	12:01 PM	12:17 PM	1:12 PM		2:24 PM	3:02 PM	3:20 PM	4:10 PM		4:28 PM	4:54 PM	5:10 PM	5:34 PM	5:55 PM	6:09 PM	6:45 PM	no stop	7:25 PM
248														5:40 PM	6:04 PM	6:25 PM	no stop	7:13 PM	7:32 PM	7:55 PM
294	Cleveland			1:17 PM	2:12 PM		3:24 PM	4:02 PM	4:20 PM	5:10 PM		5:31 PM	5:54 PM	6:10 PM	6:34 PM	6:55 PM	7:09 PM	7:45 PM	no stop	8:25 PM
68	Montreal										5:20 PM	6:51 PM	6:25 PM	6:40 PM	7:04 PM	7:25 PM	7:39 PM	8:15 PM	8:34 PM	8:55 PM
64	Toronto	1:30 PM	2:01 PM	2:17 PM	3:12 PM		4:24 PM	5:02 PM	5:20 PM	6:10 PM		6:31 PM	6:54 PM	7:10 PM	7:34 PM	7:55 PM	8:09 PM	8:45 PM	9:04 PM	9:25 PM
NFL08		2:30 PM	3:01 PM	3:17 PM	4:12 PM		5:24 PM	6:02 PM	6:20 PM	7:10 PM		7:28 PM	7:54 PM	8:10 PM	8:34 PM	8:55 PM	9:09 PM	9:45 PM	10:04 PM	10:25 PM
286		3:30 PM	4:01 PM	4:17 PM	5:12 PM		6:24 PM	7:02 PM	7:20 PM	8:10 PM		8:28 PM	8:54 PM	9:10 PM	9:34 PM	9:55 PM	10:09 PM	10:45 PM	11:04 PM	11:25 PM

Operating Plans- Empire Service-Westbound, 2035

110 MPH, WESTBOUND, 2035 PLAN

Train	Leave New York	Leave Yonkers	Leave Croton Harton	Leave Poughkeepsie	Leave Rhinecliff	Leave Hudson	Albany-Rensselaer Arrive	Albany-Rensselaer Leave	Arrive Schenectady	Arrive Saratoga	Arrive Amsterdam	Arrive Utica	Arrive Rome	Arrive Syracuse	Arrive Geneva	Arrive Rochester	Arrive Buffalo Depew	Arrive Buffalo Exchange	Arrive Niagara Falls
281	4:15 AM	4:37 AM	4:57 AM	5:34 AM	5:47 AM	6:09 AM	6:30 AM	6:45 AM	7:02 AM		7:18 AM	8:02 AM	8:17 AM	8:53 AM		9:55 AM	10:44 AM	11:00 AM	11:36 AM
NFL01	6:15 AM	no stop	6:54 AM	7:31 AM	7:44 AM	8:07 AM	8:30 AM	8:45 AM	9:02 AM		9:18 AM	10:02 AM	10:17 AM	10:53 AM		11:55 AM	12:44 PM	1:00 PM	1:36 PM
63	7:15 AM	7:37 AM	7:57 AM	8:34 AM	8:47 AM	9:09 AM	9:30 AM	9:45 AM	10:02 AM		10:18 AM	11:02 AM	11:17 AM	11:53 AM		12:55 PM	1:44 PM	2:00 PM	2:36 PM
69	8:15 AM	8:37 AM	8:57 AM	9:34 AM	9:47 AM	10:09 AM	10:30 AM	10:45 AM	11:03 AM	11:33 AM								to Montreal	
295	9:15 AM	no stop	9:54 AM	10:31 AM	10:44 AM	11:07 AM	11:30 AM	11:45 AM	12:02 PM		12:18 PM	1:02 PM	1:17 PM	1:53 PM		2:55 PM	3:47 PM	to Cleveland	
NFL03	10:15 AM	10:37 AM	10:57 AM	no stop	11:44 AM	12:07 PM	12:30 PM	12:45 PM	1:02 PM		1:18 PM	2:02 PM	2:17 PM	2:53 PM		3:55 PM	4:44 PM	5:00 PM	5:36 PM
283	11:15 AM	no stop	11:54 AM	12:31 PM	12:44 PM	1:07 PM	1:30 PM	1:45 PM	2:02 PM		2:18 PM	3:02 PM	3:17 PM	3:53 PM		4:55 PM	5:44 PM	6:00 PM	6:36 PM
NFL05	12:15 PM	12:37 PM	12:57 PM	no stop	1:44 PM	2:07 PM	2:30 PM	2:45 PM	3:02 PM		3:18 PM	4:02 PM	4:17 PM	4:53 PM		5:55 PM	6:44 PM	7:00 PM	7:36 PM
261	1:15 PM	no stop	1:54 PM	2:31 PM	2:44 PM	3:07 PM	3:30 PM	3:45 PM	4:02 PM		4:18 PM	5:02 PM	5:17 PM	5:53 PM	6:50 PM				
291	1:45 PM	no stop	no stop	no stop	3:09 PM	3:31 PM	4:00 PM	4:10 PM	4:28 PM	4:57 PM								to Rutland	
NFL07	2:15 PM	2:37 PM	2:57 PM	no stop	3:44 PM	4:07 PM	4:30 PM	4:45 PM	5:02 PM		5:18 PM	6:02 PM	6:17 PM	6:53 PM		7:55 PM	8:44 PM	9:00 PM	9:36 PM
253								5:10 PM	5:28 PM	5:57 PM									
285	3:15 PM	no stop	3:54 PM	4:31 PM	4:44 PM	5:07 PM	5:30 PM	5:45 PM	6:02 PM		6:18 PM	7:02 PM	7:17 PM	7:53 PM		8:55 PM	9:44 PM	10:00 PM	10:36 PM
255	3:45 PM	no stop	no stop	no stop	5:09 PM	5:31 PM	5:50 PM	6:00 PM	6:18 PM	6:47 PM									
NFL09	4:15 PM	4:37 PM	4:57 PM	no stop	5:44 PM	6:07 PM	6:30 PM	6:45 PM	7:02 PM		7:18 PM	8:02 PM	8:17 PM	8:53 PM		9:55 PM	10:44 PM	11:00 PM	11:36 PM
257	4:45 PM	no stop	no stop	no stop	6:09 PM	6:31 PM	6:50 PM	7:00 PM	7:18 PM	7:47 PM									
NFL11	5:15 PM	no stop	5:54 PM	6:31 PM	6:44 PM	7:07 PM	7:30 PM	7:45 PM	8:02 PM		8:18 PM	9:02 PM	9:17 PM	9:53 PM		10:55 PM	11:44 PM	12:00 AM	12:36 AM
SYR01	6:15 PM	6:37 PM	6:57 PM	no stop	7:44 PM	8:07 PM	8:30 PM	8:45 PM	9:02 PM		9:18 PM	10:02 PM	10:17 PM	10:59 PM					
49	6:45 PM	no stop	7:25 PM	no stop	no stop	no stop	9:00 PM	9:40 PM	10:00 PM		no stop	11:01 PM	no stop	11:51 PM		12:56 AM	1:52 AM	to Chicago	
241	7:15 PM	no stop	no stop	no stop	8:39 PM	9:01 PM	9:30 PM												
243	8:15 PM	8:37 PM	8:57 PM	9:34 PM	9:47 PM	10:09 PM	10:30 PM												
245	10:15 PM	10:37 PM	10:57 PM	11:34 PM	11:47 PM	12:09 AM	12:30 AM												

90 MPH, WESTBOUND, 2035 PLAN

Weekday schedule shown; weekend exceptions to be completed.

Train	Leave New York	Leave Yonkers	Leave Croton Harton	Leave Poughkeepsie	Leave Rhinecliff	Leave Hudson	Albany-Rensselaer Arrive	Albany-Rensselaer Leave	Arrive Schenectady	Arrive Saratoga	Arrive Amsterdam	Arrive Utica	Arrive Rome	Arrive Syracuse	Arrive Geneva	Arrive Rochester	Arrive Buffalo Depew	Arrive Buffalo Exchange	Arrive Niagara Falls
281	4:15 AM	4:37 AM	4:57 AM	5:34 AM	5:47 AM	6:09 AM	6:30 AM	6:45 AM	7:02 AM		7:19 AM	8:06 AM	8:22 AM	8:59 AM		10:05 AM	10:58 AM	11:14 AM	11:50 AM
NFL01	6:15 AM	no stop	6:54 AM	7:31 AM	7:44 AM	8:07 AM	8:30 AM	8:45 AM	9:02 AM		9:19 AM	10:06 AM	10:22 AM	10:59 AM		12:05 PM	12:58 PM	1:14 PM	1:50 PM
63	7:15 AM	7:37 AM	7:57 AM	8:34 AM	8:47 AM	9:09 AM	9:30 AM	9:45 AM	10:02 AM		10:19 AM	11:06 AM	11:22 AM	11:59 AM		1:05 PM	1:58 PM	2:14 PM	2:50 PM
69	8:15 AM	8:37 AM	8:57 AM	9:34 AM	9:47 AM	10:09 AM	10:30 AM	10:45 AM	11:03 AM	11:33 AM								to Montreal	
295	9:15 AM	no stop	9:54 AM	10:31 AM	10:44 AM	11:07 AM	11:30 AM	11:45 AM	12:02 PM		12:19 PM	1:06 PM	1:22 PM	1:59 PM		3:05 PM	4:01 PM	to Cleveland	
NFL03	10:15 AM	10:37 AM	10:57 AM	no stop	11:44 AM	12:07 PM	12:30 PM	12:45 PM	1:02 PM		1:19 PM	2:06 PM	2:22 PM	2:59 PM		4:05 PM	4:58 PM	5:14 PM	5:50 PM
283	11:15 AM	no stop	11:54 AM	12:31 PM	12:44 PM	1:07 PM	1:30 PM	1:45 PM	2:02 PM		2:19 PM	3:06 PM	3:22 PM	3:59 PM		5:05 PM	5:58 PM	6:14 PM	6:50 PM
NFL05	12:15 PM	12:37 PM	12:57 PM	no stop	1:44 PM	2:07 PM	2:30 PM	2:45 PM	3:02 PM		3:19 PM	4:06 PM	4:22 PM	4:59 PM		6:05 PM	6:58 PM	7:14 PM	7:50 PM
261	1:15 PM	no stop	1:54 PM	2:31 PM	2:44 PM	3:07 PM	3:30 PM	3:45 PM	4:02 PM		4:19 PM	5:06 PM	5:22 PM	5:59 PM	6:59 PM				
291	1:45 PM	no stop	no stop	no stop	3:09 PM	3:31 PM	4:00 PM	4:10 PM	4:28 PM	4:57 PM								to Rutland	
NFL07	2:15 PM	2:37 PM	2:57 PM	no stop	3:44 PM	4:07 PM	4:30 PM	4:45 PM	5:02 PM		5:19 PM	6:06 PM	6:22 PM	6:59 PM		8:05 PM	8:58 PM	9:14 PM	9:50 PM
253								5:10 PM	5:28 PM	5:57 PM									
285	3:15 PM	no stop	3:54 PM	4:31 PM	4:44 PM	5:07 PM	5:30 PM	5:45 PM	6:02 PM		6:19 PM	7:06 PM	7:22 PM	7:59 PM		9:05 PM	9:58 PM	10:14 PM	10:50 PM
255	3:45 PM	no stop	no stop	no stop	5:09 PM	5:31 PM	5:50 PM	6:00 PM	6:18 PM	6:47 PM									
NFL09	4:15 PM	4:37 PM	4:57 PM	no stop	5:44 PM	6:07 PM	6:30 PM	6:45 PM	7:02 PM		7:19 PM	8:06 PM	8:22 PM	8:59 PM		10:05 PM	10:58 PM	11:14 PM	11:50 PM
257	4:45 PM	no stop	no stop	no stop	6:09 PM	6:31 PM	6:50 PM	7:00 PM	7:18 PM	7:47 PM									
NFL11	5:15 PM	no stop	5:54 PM	6:31 PM	6:44 PM	7:07 PM	7:30 PM	7:45 PM	8:02 PM		8:19 PM	9:06 PM	9:22 PM	9:59 PM		11:05 PM	11:58 PM	12:14 AM	12:50 AM
SYR01	6:15 PM	6:37 PM	6:57 PM	no stop	7:44 PM	8:07 PM	8:30 PM	8:45 PM	9:02 PM		9:19 PM	10:06 PM	10:22 PM	11:05 PM					
49	6:45 PM	no stop	7:25 PM	no stop	no stop	no stop	9:00 PM	9:40 PM	10:00 PM		no stop	11:04 PM	no stop	11:56 PM		1:05 AM	2:05 AM	to Chicago	
241	7:15 PM	no stop	no stop	no stop	8:39 PM	9:01 PM	9:30 PM												
243	8:15 PM	8:37 PM	8:57 PM	9:34 PM	9:47 PM	10:09 PM	10:30 PM												
245	10:15 PM	10:37 PM	10:57 PM	11:34 PM	11:47 PM	12:09 AM	12:30 AM												

79 MPH, WESTBOUND, 2035 PLAN

Weekday schedule shown; weekend exceptions to be completed.

Train	Leave New York	Leave Yonkers	Leave Croton Harton	Leave Poughkeepsie	Leave Rhinecliff	Leave Hudson	Albany-Rensselaer Arrive	Albany-Rensselaer Leave	Arrive Schenectady	Arrive Saratoga	Arrive Amsterdam	Arrive Utica	Arrive Rome	Arrive Syracuse	Arrive Geneva	Arrive Rochester	Arrive Buffalo Depew	Arrive Buffalo Exchange	Arrive Niagara Falls
281	4:15 AM	4:37 AM	4:57 AM	5:34 AM	5:47 AM	6:09 AM	6:30 AM	6:45 AM	7:02 AM		7:20 AM	8:12 AM	8:28 AM	9:09 AM		10:20 AM	11:17 AM	11:33 AM	12:13 PM
NFL01	6:15 AM	no stop	6:54 AM	7:31 AM	7:44 AM	8:07 AM	8:30 AM	8:45 AM	9:02 AM		9:20 AM	10:12 AM	10:28 AM	11:09 AM		12:20 PM	1:17 PM	1:33 PM	2:13 PM
63	7:15 AM	7:37 AM	7:57 AM	8:34 AM	8:47 AM	9:09 AM	9:30 AM	9:45 AM	10:02 AM		10:20 AM	11:12 AM	11:28 AM	12:09 PM		1:20 PM	2:17 PM	2:33 PM	3:13 PM
69	8:15 AM	8:37 AM	8:57 AM	9:34 AM	9:47 AM	10:09 AM	10:30 AM	10:45 AM	11:03 AM	11:33 AM								to Montreal	
295	9:15 AM	no stop	9:54 AM	10:31 AM	10:44 AM	11:07 AM	11:30 AM	11:45 AM	12:02 PM		12:20 PM	1:12 PM	1:28 PM	2:09 PM		3:20 PM	4:20 PM	to Cleveland	
NFL03	10:15 AM	10:37 AM	10:57 AM	no stop	11:44 AM	12:07 PM	12:30 PM	12:45 PM	1:02 PM		1:20 PM	2:12 PM	2:28 PM	3:09 PM		4:20 PM	5:17 PM	5:33 PM	6:13 PM
283	11:15 AM	no stop	11:54 AM	12:31 PM	12:44 PM	1:07 PM	1:30 PM	1:45 PM	2:02 PM		2:20 PM	3:12 PM	3:28 PM	4:09 PM		5:20 PM	6:17 PM	6:33 PM	7:13 PM
NFL05	12:15 PM	12:37 PM	12:57 PM	no stop	1:44 PM	2:07 PM	2:30 PM	2:45 PM	3:02 PM		3:20 PM	4:12 PM	4:28 PM	5:09 PM		6:20 PM	7:17 PM	7:33 PM	8:13 PM
261	1:15 PM	no stop	1:54 PM	2:31 PM	2:44 PM	3:07 PM	3:30 PM	3:45 PM	4:02 PM		4:20 PM	5:12 PM	5:28 PM	6:09 PM	7:10 PM				
291	1:45 PM	no stop	no stop	no stop	3:09 PM	3:31 PM	4:00 PM	4:10 PM	4:28 PM	4:57 PM								to Rutland	
NFL07	2:15 PM	2:37 PM	2:57 PM	no stop	3:44 PM	4:07 PM	4:30 PM	4:45 PM	5:02 PM		5:20 PM	6:12 PM	6:28 PM	7:09 PM		8:20 PM	9:17 PM	9:33 PM	10:13 PM
253								5:10 PM	5:28 PM	5:57 PM									
285	3:15 PM	no stop	3:54 PM	4:31 PM	4:44 PM	5:07 PM	5:30 PM	5:45 PM	6:02 PM		6:20 PM	7:12 PM	7:28 PM	8:09 PM		9:20 PM	10:17 PM	10:33 PM	11:13 PM
255	3:45 PM	no stop	no stop	no stop	5:09 PM	5:31 PM	5:50 PM	6:00 PM	6:18 PM	6:47 PM									
NFL09	4:15 PM	4:37 PM	4:57 PM	no stop	5:44 PM	6:07 PM	6:30 PM	6:45 PM	7:02 PM		7:20 PM	8:12 PM	8:28 PM	9:09 PM		10:20 PM	11:17 PM	11:33 PM	12:13 AM
257	4:45 PM	no stop	no stop	no stop	6:09 PM	6:31 PM	6:50 PM	7:00 PM	7:18 PM	7:47 PM									
NFL11	5:15 PM	no stop	5:54 PM	6:31 PM	6:44 PM	7:07 PM	7:30 PM	7:45 PM	8:02 PM		8:20 PM	9:12 PM	9:28 PM	10:09 PM		11:20 PM	12:17 AM	12:33 AM	1:13 AM
SYR01	6:15 PM	6:37 PM	6:57 PM	no stop	7:44 PM	8:07 PM	8:30 PM	8:45 PM	9:02 PM		9:20 PM	10:12 PM	10:28 PM	11:15 PM					
49	6:45 PM	no stop	7:25 PM	no stop	no stop	no stop	9:00 PM	9:40 PM	10:00 PM		no stop	11:03 PM	no stop	11:59 PM		1:13 AM	2:17 AM	to Chicago	
241	7:15 PM	no stop	no stop	no stop	8:39 PM	9:01 PM	9:30 PM												
243	8:15 PM	8:37 PM	8:57 PM	9:34 PM	9:47 PM	10:09 PM	10:30 PM												
245	10:15 PM	10:37 PM	10:57 PM	11:34 PM	11:47 PM	12:09 AM	12:30 AM												

10.3 APPENDIX C: Complete Competitive Mode Output Exhibits and Station to Station Matrices

Model Outputs and Adjustment Methodology

The following Exhibits reflect a direct output from the 1080X1080 matrix from which the zones attributed to each of the six major markets (New York City, Albany, Utica, Syracuse, Rochester and Buffalo) were manually agglomerated to obtain the travel data (trips by mode) between each of the major market pairs for existing year 2009, base year 2012, no-build conditions and for the three service plans associated with the maximum operating speed of 79mph, 90mph and 110mph.

Since the model disaggregates the trips by their true destination and true origin, any trip that does not both begin and end within the geographical boundaries of the major markets will not be captured by the model output. Hence this output only shows a fraction of the trips that are taking place between each of the major market pairs and does not reflect the true travel market between the major market pairs.

Exhibits which are a direct output of the 1080X1080 matrix are a subset of the total inter-MPO traffic. This can be attributed to the fact that these charts fail to capture those MPO to MPO trips which actually have an origin, destination or both beyond the exact boundaries of the MPOs being studied. It is important to assign these trips (especially for air, bus and rail mode) to these MPOs to get a true understanding of the competitive travel market between them. Hence, in the Exhibits following those which reflect the direct output of the 1080X1080matrix the MPO to MPO travel modes are modified to reflect the actual on-ground conditions of travel; e.g.: A rail trip originating within the boundaries of New York City and ending at Buffalo, followed by a car trip to the ultimate destination at a point outside the Buffalo MPO would not be accounted for in the charts shown previously. The adjustments and modifications to those charts make sure that such trips are accounted for as they are in reality a part of the competitive travel market.

To make these adjustments the following steps were undertaken:

- A 17X17 (to account for the 17 stations along the corridor) matrix was created for the rail trips. Stations within each of the major markets were agglomerated together (e.g. the Buffalo market comprised of the Buffalo Depew, Buffalo Exchange and the Niagara Falls Station), to calculate the total major market to major market rail trips.
- For the air mode, the first primary adjustment that was done was to assign the trips in and out of Newark Liberty International Airport (EWR) to the New York City market (n the output of the 1080X1080 they did not show up within the New York City market as EWR lies outside the geographical boundaries). Subsequently the following steps were taken: (i) an air trips matrix for 2009 was set up using the data that was collected from various sources at the beginning of the study; (ii) the number of trips between each MPO pair was converted into a fraction which was calculated by dividing the number of trips for that pair by the sum total number of all air trips for that scenario, between each of the MPO pairs. (iii) finally for each scenario the ratios obtained were multiplied by the total sum of all the air trips as calculated from the output of the 1080X1080 matrix for the various scenarios (e.g. 2012, 2018NB, 2018 79mph etc). This is consistent with the logic that the all air trips must pass through the MPO areas and sum total of all the air trips should match the sum total of all air trips between MPOs.
- The adjustments made at this level show a decrease in the total bus ridership. The total number of bus trips output from the 1080X1080 matrix should match the total bus trips occurring between the major MPO pairs as the only bus terminals that have been considered for the study are within the cities associated with each of the major markets. To adjust the bus trips and get a more realistic number reflecting the bus trips between the MPOs whether the true origin and or the true destination lies within the geographical boundaries of the MPOs the same level of adjustment was done for the bus trips and the steps detailed above for the air trips were repeated.

At this juncture it was noticed that the total bus travel numbers were closely matched but some major market to major market numbers (those separated by shorter distance- like Buffalo to Rochester and

GBNRTC and Syracuse) were outside the expected trend lines of decreased bus ridership with increased speed of rail operations.

A similar exercise of adjustment could not be undertaken for the car trips as they could not be assigned to any particular node and hence there is no way to ascertain the path that a car trip would take between any two points between the major markets.

Model Outputs from 1080X1080 Matrix

2009 AIR

	NYMTC	CDTC	HOCTS	SMTC	GTC	GBNRTC	TOTAL
NYMTC	0	40,297	349	203,731	227,105	410,143	**881,624**
CDTC	40,730	0	0	0	0	0	**40,730**
HOCTS	349	0	0	0	0	0	**349**
SMTC	203,731	0	0	0	0	0	**203,731**
GTC	227,105	0	0	0	0	0	**227,105**
GBNRTC	410,143	0	0	0	0	0	**410,143**
TOTAL	**882,058**	**40,297**	**349**	**203,731**	**227,105**	**410,143**	**1,763,681**

2009 BUS

	NYMTC	CDTC	HOCTS	SMTC	GTC	GBNRTC	TOTAL
NYMTC	0	365,448	130,250	248,156	205,078	391,442	**1,340,374**
CDTC	367,239	102	34,103	40,530	37,456	55,910	**535,340**
HOCTS	130,250	33,920	0	34,415	16,374	27,135	**242,094**
SMTC	248,156	40,530	34,415	0	78,719	151,406	**553,227**
GTC	205,078	37,453	16,374	78,719	0	138,297	**475,922**
GBNRTC	391,442	55,528	27,135	151,406	138,297	0	**763,809**
TOTAL	**1,342,165**	**532,982**	**242,277**	**553,226**	**475,925**	**764,191**	**3,910,765**

2009 CAR

	NYMTC	CDTC	HOCTS	SMTC	GTC	GBNRTC	TOTAL
NYMTC	0	2,019,534	134,243	3,584	25,380	45,129	**2,227,869**
CDTC	2,034,748	0	1,176,909	588,846	325,229	261,330	**4,387,062**
HOCTS	134,243	1,113,393	0	2,337,782	361,967	209,413	**4,156,797**
SMTC	3,584	562,538	2,337,782	0	1,549,870	929,718	**5,383,491**
GTC	25,380	315,125	361,967	1,549,870	0	4,559,912	**6,812,253**
GBNRTC	45,129	261,534	209,413	929,718	4,559,912	0	**6,005,705**
TOTAL	**2,243,084**	**4,272,123**	**4,220,313**	**5,409,799**	**6,822,357**	**6,005,501**	**28,973,177**

2009 RAIL

	NYMTC	CDTC	HOCTS	SMTC	GTC	GBNRTC	TOTAL
NYMTC		274,064	16,905	25,248	20,378	25,084	**361,678**
CDTC	275,328		2,038	6,830	8,203	10,974	**303,372**
HOCTS	16,905	2,030		781	1,387	2,388	**23,491**
SMTC	25,248	6,804	781		1,744	6,165	**40,742**
GTC	20,378	8,173	1,387	1,744		1,800	**33,481**
GBNRTC	25,084	10,932	2,388	6,165	1,800		**46,369**
TOTAL	**362,942**	**302,003**	**23,498**	**40,768**	**33,511**	**46,411**	**809,133**

2009 ALL MODES

	NYMTC	CDTC	HOCTS	SMTC	GTC	GBNRTC	TOTAL
NYMTC	0	2,699,342	281,747	480,719	477,941	871,797	**4,811,544**
CDTC	2,718,045	102	1,213,050	636,206	370,887	328,213	**5,266,504**
HOCTS	281,747	1,149,343	0	2,372,977	379,728	238,936	**4,422,731**
SMTC	480,719	609,872	2,372,977	0	1,630,333	1,087,290	**6,181,191**
GTC	477,941	360,751	379,728	1,630,333	0	4,700,009	**7,548,761**
GBNRTC	871,797	327,993	238,936	1,087,290	4,700,009	0	**7,226,025**
TOTAL	**4,830,248**	**5,147,404**	**4,486,438**	**6,207,524**	**7,558,898**	**7,226,245**	**35,456,757**

		NYMTC	CDTC	HOCTS	SMTC	GTC	GBNRTC	TOTAL
2012 AIR		**NYMTC**	**CDTC**	**HOCTS**	**SMTC**	**GTC**	**GBNRTC**	**TOTAL**
	NYMTC	0	56,184	421	207,389	227,684	412,391	904,069
	CDTC	56,615	0	0	0	0	0	56,615
	HOCTS	421	0	0	0	0	0	421
	SMTC	207,389	0	0	0	0	0	207,389
	GTC	227,684	0	0	0	0	0	227,684
	GBNRTC	412,391	0	0	0	0	0	412,391
	TOTAL	904,500	56,184	421	207,389	227,684	412,391	1,808,569
2012 BUS		**NYMTC**	**CDTC**	**HOCTS**	**SMTC**	**GTC**	**GBNRTC**	**TOTAL**
	NYMTC	0	672,978	155,667	247,761	210,267	409,083	1,695,755
	CDTC	677,718	103	34,591	42,038	37,737	59,946	852,133
	HOCTS	155,667	34,382	0	35,113	16,018	30,131	271,311
	SMTC	247,761	41,980	35,113	0	77,333	168,528	570,715
	GTC	210,267	37,914	16,018	77,333	0	238,421	579,953
	GBNRTC	409,083	59,424	30,131	168,528	238,421	0	905,586
	TOTAL	1,700,496	846,781	271,520	570,772	579,775	906,108	4,875,453
2012 CAR		**NYMTC**	**CDTC**	**HOCTS**	**SMTC**	**GTC**	**GBNRTC**	**TOTAL**
	NYMTC	0	1,727,583	109,576	3,652	24,616	33,436	1,898,863
	CDTC	1,740,795	0	1,195,719	597,250	331,487	261,452	4,126,704
	HOCTS	109,576	1,128,677	0	2,340,261	364,539	207,428	4,150,480
	SMTC	3,652	569,530	2,340,261	0	1,557,332	915,579	5,386,352
	GTC	24,616	320,363	364,539	1,557,332	0	4,491,061	6,757,912
	GBNRTC	33,436	261,246	207,428	915,579	4,491,061	0	5,908,750
	TOTAL	1,912,075	4,007,399	4,217,523	5,414,073	6,769,035	5,908,956	28,229,061
2012 RAIL		**NYMTC**	**CDTC**	**HOCTS**	**SMTC**	**GTC**	**GBNRTC**	**TOTAL**
	NYMTC		275,462	17,518	25,920	20,787	25,399	365,085
	CDTC	276,819		1,990	6,499	7,754	10,557	303,619
	HOCTS	17,518	1,982		776	1,358	2,471	24,105
	SMTC	25,920	6,472	776		1,727	6,345	41,240
	GTC	20,787	7,724	1,358	1,727		2,106	33,702
	GBNRTC	25,399	10,511	2,471	6,345	2,106		46,831
	TOTAL	366,442	302,151	24,113	41,266	33,733	46,878	814,582
2012 ALL MODES		**NYMTC**	**CDTC**	**HOCTS**	**SMTC**	**GTC**	**GBNRTC**	**TOTAL**
	NYMTC	0	2,732,206	283,182	484,722	483,353	880,309	4,863,772
	CDTC	2,751,947	103	1,232,300	645,787	376,978	331,956	5,339,071
	HOCTS	283,182	1,165,041	0	2,376,149	381,916	240,030	4,446,318
	SMTC	484,722	617,982	2,376,149	0	1,636,392	1,090,451	6,205,696
	GTC	483,353	366,002	381,916	1,636,392	0	4,731,588	7,599,250
	GBNRTC	880,309	331,181	240,030	1,090,451	4,731,588	0	7,273,558
	TOTAL	4,883,513	5,212,514	4,513,577	6,233,501	7,610,227	7,274,333	35,727,666

2018 NB AIR

	NYMTC	CDTC	HOCTS	SMTC	GTC	GBNRTC	TOTAL
NYMTC	0	44,872	393	211,504	235,551	422,000	**914,321**
CDTC	45,413	0	0	0	0	0	**45,413**
HOCTS	393	0	0	0	0	0	**393**
SMTC	211,504	0	0	0	0	0	**211,504**
GTC	235,551	0	0	0	0	0	**235,551**
GBNRTC	422,000	0	0	0	0	0	**422,000**
TOTAL	**914,862**	**44,872**	**393**	**211,504**	**235,551**	**422,000**	**1,829,183**

2018 NB BUS

	NYMTC	CDTC	HOCTS	SMTC	GTC	GBNRTC	TOTAL
NYMTC	0	612,028	152,437	244,119	214,455	416,972	**1,640,011**
CDTC	617,389	103	33,933	40,697	37,364	56,739	**786,225**
HOCTS	152,437	33,699	0	34,659	16,124	27,512	**264,430**
SMTC	244,119	40,630	34,659	0	77,215	152,811	**549,433**
GTC	214,455	37,392	16,124	77,215	0	176,099	**521,285**
GBNRTC	416,972	56,259	27,512	152,811	176,099	0	**829,652**
TOTAL	**1,645,371**	**780,112**	**264,664**	**549,500**	**521,257**	**830,132**	**4,591,036**

2018 NB CAR

	NYMTC	CDTC	HOCTS	SMTC	GTC	GBNRTC	TOTAL
NYMTC	0	1,888,668	115,458	10,646	25,339	29,175	**2,069,286**
CDTC	1,903,333	0	1,236,637	621,579	347,531	272,413	**4,381,493**
HOCTS	115,458	1,162,279	0	2,337,745	368,418	210,106	**4,194,006**
SMTC	10,646	590,692	2,337,745	0	1,571,987	930,532	**5,441,602**
GTC	25,339	334,676	368,418	1,571,987	0	4,610,448	**6,910,868**
GBNRTC	29,175	270,909	210,106	930,532	4,610,448	0	**6,051,169**
TOTAL	**2,083,951**	**4,247,225**	**4,268,363**	**5,472,489**	**6,923,723**	**6,052,673**	**29,048,424**

2018 NB RAIL

	NYMTC	CDTC	HOCTS	SMTC	GTC	GBNRTC	TOTAL
NYMTC		271,638	17,388	26,469	21,289	25,864	**362,648**
CDTC	273,152		1,994	6,625	8,109	10,627	**300,507**
HOCTS	17,388	1,985		784	1,413	2,406	**23,977**
SMTC	26,469	6,595	784		1,809	6,188	**41,845**
GTC	21,289	8,072	1,413	1,809		1,891	**34,474**
GBNRTC	25,864	10,576	2,406	6,188	1,891		**46,925**
TOTAL	**364,163**	**298,866**	**23,986**	**41,876**	**34,511**	**46,975**	**810,377**

2018 NB ALL MODES

	NYMTC	CDTC	HOCTS	SMTC	GTC	GBNRTC	TOTAL
NYMTC	0	2,817,206	285,677	492,738	496,634	894,011	**4,986,266**
CDTC	2,839,287	103	1,272,563	668,902	393,004	339,778	**5,513,638**
HOCTS	285,677	1,197,963	0	2,373,188	385,955	240,024	**4,482,806**
SMTC	492,738	637,917	2,373,188	0	1,651,011	1,089,531	**6,244,385**
GTC	496,634	380,141	385,955	1,651,011	0	4,788,438	**7,702,179**
GBNRTC	894,011	337,744	240,024	1,089,531	4,788,438	0	**7,349,747**
TOTAL	**5,008,347**	**5,371,075**	**4,557,406**	**6,275,369**	**7,715,042**	**7,351,781**	**36,279,020**

2018 79 AIR

	NYMTC	CDTC	HOCTS	SMTC	GTC	GBNRTC	TOTAL
NYMTC	0	33,268	330	178,721	202,058	357,357	**771,734**
CDTC	33,667	0	0	0	0	0	**33,667**
HOCTS	330	0	0	0	0	0	**330**
SMTC	178,721	0	0	0	0	0	**178,721**
GTC	202,058	0	0	0	0	0	**202,058**
GBNRTC	357,357	0	0	0	0	0	**357,357**
TOTAL	**772,133**	**33,268**	**330**	**178,721**	**202,058**	**357,357**	**1,543,867**

2018 79 BUS

	NYMTC	CDTC	HOCTS	SMTC	GTC	GBNRTC	TOTAL
NYMTC	0	594,713	144,265	228,962	200,590	390,948	**1,559,477**
CDTC	599,937	0	33,372	37,839	33,644	49,765	**754,558**
HOCTS	144,265	33,138	0	34,569	15,832	26,733	**254,537**
SMTC	228,962	37,783	34,569	0	76,892	150,281	**528,486**
GTC	200,590	33,688	15,832	76,892	0	175,786	**502,788**
GBNRTC	390,948	49,300	26,733	150,281	175,786	0	**793,046**
TOTAL	**1,564,701**	**748,621**	**254,771**	**528,543**	**502,744**	**793,512**	**4,392,892**

2018 79 CAR

	NYMTC	CDTC	HOCTS	SMTC	GTC	GBNRTC	TOTAL
NYMTC	0	1,879,028	113,011	10,611	24,893	28,336	**2,055,879**
CDTC	1,893,660	0	1,235,152	615,620	342,630	256,882	**4,343,944**
HOCTS	113,011	1,160,808	0	2,337,488	367,676	206,787	**4,185,769**
SMTC	10,611	584,800	2,337,488	0	1,571,642	926,404	**5,430,944**
GTC	24,893	329,858	367,676	1,571,642	0	4,609,392	**6,903,460**
GBNRTC	28,336	255,692	206,787	926,404	4,609,392	0	**6,026,610**
TOTAL	**2,070,510**	**4,210,187**	**4,260,114**	**5,461,764**	**6,916,232**	**6,027,800**	**28,946,606**

2018 79 RAIL

	NYMTC	CDTC	HOCTS	SMTC	GTC	GBNRTC	TOTAL
NYMTC		310,197	28,071	74,445	69,093	117,370	**599,176**
CDTC	312,024		4,038	15,456	16,734	33,975	**382,226**
HOCTS	28,071	4,017		1,130	2,447	6,504	**42,169**
SMTC	74,445	15,347	1,130		2,478	12,846	**106,247**
GTC	69,093	16,599	2,447	2,478		3,270	**93,887**
GBNRTC	117,370	33,593	6,504	12,846	3,270		**173,585**
TOTAL	**601,002**	**379,754**	**42,191**	**106,355**	**94,022**	**173,966**	**1,397,290**

2018 79 MPH ALL MODES

	NYMTC	CDTC	HOCTS	SMTC	GTC	GBNRTC	TOTAL
NYMTC	0	2,817,206	285,677	492,738	496,634	894,011	**4,986,266**
CDTC	2,839,287	0	1,272,563	668,915	393,008	340,622	**5,514,395**
HOCTS	285,677	1,197,963	0	2,373,188	385,955	240,024	**4,482,806**
SMTC	492,738	637,930	2,373,188	0	1,651,012	1,089,531	**6,244,398**
GTC	496,634	380,145	385,955	1,651,012	0	4,788,448	**7,702,193**
GBNRTC	894,011	338,585	240,024	1,089,531	4,788,448	0	**7,350,598**
TOTAL	**5,008,347**	**5,371,830**	**4,557,406**	**6,275,383**	**7,715,056**	**7,352,634**	**36,280,655**

2018 90 AIR

	NYMTC	CDTC	HOCTS	SMTC	GTC	GBNRTC	TOTAL

NYMTC	0	33,219	316	173,552	194,262	327,271	**728,619**
CDTC	33,620	0	0	0	0	0	**33,620**
HOCTS	316	0	0	0	0	0	**316**
SMTC	173,552	0	0	0	0	0	**173,552**
GTC	194,262	0	0	0	0	0	**194,262**
GBNRTC	327,271	0	0	0	0	0	**327,271**
TOTAL	**729,020**	**33,219**	**316**	**173,552**	**194,262**	**327,271**	**1,457,639**

2018 90 BUS

	NYMTC	CDTC	HOCTS	SMTC	GTC	GBNRTC	TOTAL
NYMTC	0	594,628	143,575	227,440	198,100	381,182	**1,544,925**
CDTC	599,858	0	33,205	36,930	32,256	46,660	**748,909**
HOCTS	143,575	32,972	0	34,532	15,691	26,246	**253,016**
SMTC	227,440	36,876	34,532	0	76,716	148,897	**524,462**
GTC	198,100	32,306	15,691	76,716	0	175,668	**498,481**
GBNRTC	381,182	46,206	26,246	148,897	175,668	0	**778,198**
TOTAL	**1,550,155**	**742,988**	**253,250**	**524,515**	**498,431**	**778,652**	**4,347,991**

2018 90 CAR

	NYMTC	CDTC	HOCTS	SMTC	GTC	GBNRTC	TOTAL
NYMTC	0	1,879,000	112,753	10,608	24,780	27,882	**2,055,024**
CDTC	1,893,632	0	1,234,665	613,151	339,928	248,028	**4,329,404**
HOCTS	112,753	1,160,325	0	2,337,381	367,255	204,681	**4,182,396**
SMTC	10,608	582,362	2,337,381	0	1,571,446	923,895	**5,425,693**
GTC	24,780	327,204	367,255	1,571,446	0	4,608,951	**6,899,636**
GBNRTC	27,882	247,090	204,681	923,895	4,608,951	0	**6,012,500**
TOTAL	**2,069,656**	**4,195,981**	**4,256,736**	**5,456,481**	**6,912,360**	**6,013,438**	**28,904,653**

2018 90 RAIL

	NYMTC	CDTC	HOCTS	SMTC	GTC	GBNRTC	TOTAL
NYMTC		310,359	29,033	81,138	79,492	157,676	**657,698**
CDTC	312,178		4,693	18,837	20,825	46,175	**402,707**
HOCTS	29,033	4,667		1,274	3,009	9,097	**47,079**
SMTC	81,138	18,694	1,274		2,850	16,738	**120,695**
GTC	79,492	20,636	3,009	2,850		3,834	**109,820**
GBNRTC	157,676	45,529	9,097	16,738	3,834		**232,874**
TOTAL	**659,516**	**399,885**	**47,105**	**120,837**	**110,009**	**233,519**	**1,570,871**

2018 90 MPH ALL MODES

	NYMTC	CDTC	HOCTS	SMTC	GTC	GBNRTC	TOTAL
NYMTC	0	2,817,206	285,677	492,738	496,634	894,011	**4,986,266**
CDTC	2,839,287	0	1,272,563	668,918	393,009	340,862	**5,514,640**
HOCTS	285,677	1,197,963	0	2,373,188	385,955	240,024	**4,482,806**
SMTC	492,738	637,933	2,373,188	0	1,651,012	1,089,531	**6,244,401**
GTC	496,634	380,146	385,955	1,651,012	0	4,788,452	**7,702,199**
GBNRTC	894,011	338,825	240,024	1,089,531	4,788,452	0	**7,350,842**
TOTAL	**5,008,347**	**5,372,073**	**4,557,406**	**6,275,386**	**7,715,062**	**7,352,880**	**36,281,153**

2018 110 AIR

	NYMTC	CDTC	HOCTS	SMTC	GTC	GBNRTC	TOTAL

NYMTC	0	33,191	308	169,750	187,964	305,920	**697,132**
CDTC	33,593	0	0	0	0	0	**33,593**
HOCTS	308	0	0	0	0	0	**308**
SMTC	169,750	0	0	0	0	0	**169,750**
GTC	187,964	0	0	0	0	0	**187,964**
GBNRTC	305,920	0	0	0	0	0	**305,920**
TOTAL	**697,534**	**33,191**	**308**	**169,750**	**187,964**	**305,920**	**1,394,667**

2018 110 BUS

	NYMTC	CDTC	HOCTS	SMTC	GTC	GBNRTC	TOTAL
NYMTC	0	594,566	142,812	225,777	195,525	373,847	**1,532,528**
CDTC	599,800	0	33,064	36,334	31,233	44,175	**744,606**
HOCTS	142,812	32,831	0	34,519	15,597	25,827	**251,586**
SMTC	225,777	36,282	34,519	0	76,561	147,527	**520,665**
GTC	195,525	31,287	15,597	76,561	0	175,571	**494,541**
GBNRTC	373,847	43,734	25,827	147,527	175,571	0	**766,506**
TOTAL	**1,537,762**	**738,700**	**251,820**	**520,717**	**494,487**	**766,947**	**4,310,433**

2018 110 CAR

	NYMTC	CDTC	HOCTS	SMTC	GTC	GBNRTC	TOTAL
NYMTC	0	1,878,970	112,424	10,601	24,623	27,533	**2,054,151**
CDTC	1,893,602	0	1,234,236	611,363	337,590	240,428	**4,317,219**
HOCTS	112,424	1,159,899	0	2,337,337	366,942	202,870	**4,179,472**
SMTC	10,601	580,599	2,337,337	0	1,571,268	921,249	**5,421,052**
GTC	24,623	324,912	366,942	1,571,268	0	4,608,536	**6,896,281**
GBNRTC	27,533	239,745	202,870	921,249	4,608,536	0	**5,999,933**
TOTAL	**2,068,783**	**4,184,125**	**4,253,808**	**5,451,817**	**6,908,959**	**6,000,616**	**28,868,108**

2018 110 RAIL

	NYMTC	CDTC	HOCTS	SMTC	GTC	GBNRTC	TOTAL
NYMTC		310,479	30,133	86,611	88,521	186,710	**702,454**
CDTC	312,292		5,263	21,223	24,187	56,426	**419,390**
HOCTS	30,133	5,233		1,332	3,415	11,327	**51,440**
SMTC	86,611	21,054	1,332		3,183	20,755	**132,935**
GTC	88,521	23,948	3,415	3,183		4,351	**123,418**
GBNRTC	186,710	55,511	11,327	20,755	4,351		**278,654**
TOTAL	**704,268**	**416,225**	**51,470**	**133,104**	**123,657**	**279,569**	**1,708,293**

2018 110 MPH ALL MODES

	NYMTC	CDTC	HOCTS	SMTC	GTC	GBNRTC	TOTAL
NYMTC	0	2,817,206	285,677	492,738	496,634	894,011	**4,986,266**
CDTC	2,839,287	0	1,272,563	668,920	393,010	341,029	**5,514,809**
HOCTS	285,677	1,197,963	0	2,373,188	385,955	240,024	**4,482,806**
SMTC	492,738	637,935	2,373,188	0	1,651,012	1,089,531	**6,244,403**
GTC	496,634	380,147	385,955	1,651,012	0	4,788,458	**7,702,205**
GBNRTC	894,011	338,990	240,024	1,089,531	4,788,458	0	**7,351,013**
TOTAL	**5,008,347**	**5,372,241**	**4,557,406**	**6,275,388**	**7,715,068**	**7,353,051**	**36,281,501**

2035 NB AIR

	NYMTC	CDTC	HOCTS	SMTC	GTC	GBNRTC	TOTAL

NYMTC	0	104,963	650	233,725	259,754	444,584	**1,043,676**
CDTC	105,794	0	0	0	0	0	**105,794**
HOCTS	650	0	0	0	0	0	**650**
SMTC	233,725	0	0	0	0	0	**233,725**
GTC	259,754	0	0	0	0	0	**259,754**
GBNRTC	444,584	0	0	0	0	0	**444,584**
TOTAL	**1,044,508**	**104,963**	**650**	**233,725**	**259,754**	**444,584**	**2,088,184**

2035 NB BUS

	NYMTC	CDTC	HOCTS	SMTC	GTC	GBNRTC	TOTAL
NYMTC	0	971,978	180,616	246,552	239,154	442,690	**2,080,990**
CDTC	979,712	0	39,837	49,510	47,817	77,662	**1,194,537**
HOCTS	180,616	39,401	0	36,926	19,259	42,162	**318,364**
SMTC	246,552	49,039	36,926	0	87,808	244,106	**664,431**
GTC	239,154	48,183	19,259	87,808	0	565,666	**960,069**
GBNRTC	442,690	75,966	42,162	244,106	565,666	0	**1,370,590**
TOTAL	**2,088,724**	**1,184,566**	**318,800**	**664,902**	**959,703**	**1,372,286**	**6,588,981**

2035 NB CAR

	NYMTC	CDTC	HOCTS	SMTC	GTC	GBNRTC	TOTAL
NYMTC	0	1,750,031	93,703	7,401	15,186	18,474	**1,884,795**
CDTC	1,768,526	0	1,371,014	691,433	394,314	280,604	**4,505,891**
HOCTS	93,703	1,274,266	0	2,345,506	381,630	196,889	**4,291,993**
SMTC	7,401	651,424	2,345,506	0	1,611,572	837,317	**5,453,220**
GTC	15,186	375,180	381,630	1,611,572	0	4,410,903	**6,794,470**
GBNRTC	18,474	276,603	196,889	837,317	4,410,903	0	**5,740,186**
TOTAL	**1,903,289**	**4,327,505**	**4,388,742**	**5,493,228**	**6,813,605**	**5,744,187**	**28,670,555**

2035 NB RAIL

	NYMTC	CDTC	HOCTS	SMTC	GTC	GBNRTC	TOTAL
NYMTC		278,573	19,312	27,579	23,069	26,319	**374,851**
CDTC	280,660		1,855	5,663	7,213	9,193	**304,583**
HOCTS	19,312	1,842		769	1,400	2,737	**26,059**
SMTC	27,579	5,621	769		4,469	7,882	**46,319**
GTC	23,069	7,165	1,400	4,469		3,750	**39,853**
GBNRTC	26,319	9,105	2,737	7,882	3,750		**49,792**
TOTAL	**376,939**	**302,306**	**26,072**	**46,361**	**39,900**	**49,880**	**841,457**

2035 NB ALL MODES

	NYMTC	CDTC	HOCTS	SMTC	GTC	GBNRTC	TOTAL
NYMTC	0	3,105,544	294,281	515,256	537,163	932,068	**5,384,313**
CDTC	3,134,691	0	1,412,706	746,606	449,343	367,459	**6,110,805**
HOCTS	294,281	1,315,509	0	2,383,200	402,290	241,787	**4,637,066**
SMTC	515,256	706,085	2,383,200	0	1,703,848	1,089,305	**6,397,694**
GTC	537,163	430,528	402,290	1,703,848	0	4,980,318	**8,054,147**
GBNRTC	932,068	361,674	241,787	1,089,305	4,980,318	0	**7,605,152**
TOTAL	**5,413,460**	**5,919,340**	**4,734,263**	**6,438,215**	**8,072,963**	**7,610,937**	**38,189,178**

2035 79 AIR

	NYMTC	CDTC	HOCTS	SMTC	GTC	GBNRTC	TOTAL
NYMTC	0	86,252	527	200,168	223,602	375,905	**886,454**
CDTC	86,870	0	0	0	0	0	**86,870**
HOCTS	527	0	0	0	0	0	**527**
SMTC	200,168	0	0	0	0	0	**200,168**
GTC	223,602	0	0	0	0	0	**223,602**
GBNRTC	375,905	0	0	0	0	0	**375,905**
TOTAL	**887,073**	**86,252**	**527**	**200,168**	**223,602**	**375,905**	**1,773,526**

2035 79 BUS

	NYMTC	CDTC	HOCTS	SMTC	GTC	GBNRTC	TOTAL
NYMTC	0	938,525	170,927	234,925	225,747	415,335	**1,985,459**
CDTC	946,108	0	39,345	46,842	43,788	68,459	**1,144,542**
HOCTS	170,927	38,910	0	36,844	18,922	40,766	**306,369**
SMTC	234,925	46,384	36,844	0	87,475	240,994	**646,622**
GTC	225,747	44,188	18,922	87,475	0	565,053	**941,385**
GBNRTC	415,335	66,874	40,766	240,994	565,053	0	**1,329,022**
TOTAL	**1,993,042**	**1,134,881**	**306,804**	**647,080**	**940,985**	**1,330,606**	**6,353,400**

2035 79 CAR

	NYMTC	CDTC	HOCTS	SMTC	GTC	GBNRTC	TOTAL
NYMTC	0	1,744,627	92,416	7,368	14,917	18,141	**1,877,470**
CDTC	1,763,083	0	1,369,547	685,841	389,744	267,096	**4,475,311**
HOCTS	92,416	1,272,817	0	2,345,251	380,897	193,588	**4,284,969**
SMTC	7,368	645,923	2,345,251	0	1,611,213	831,593	**5,441,348**
GTC	14,917	370,712	380,897	1,611,213	0	4,409,173	**6,786,913**
GBNRTC	18,141	263,499	193,588	831,593	4,409,173	0	**5,715,995**
TOTAL	**1,895,926**	**4,297,579**	**4,381,699**	**5,481,266**	**6,805,944**	**5,719,592**	**28,582,004**

2035 79 RAIL

	NYMTC	CDTC	HOCTS	SMTC	GTC	GBNRTC	TOTAL
NYMTC		336,141	30,410	72,795	72,897	122,687	**634,930**
CDTC	338,630		3,815	13,930	15,814	32,513	**404,701**
HOCTS	30,410	3,783		1,105	2,471	7,433	**45,201**
SMTC	72,795	13,785	1,105		5,160	16,718	**109,564**
GTC	72,897	15,630	2,471	5,160		6,100	**102,258**
GBNRTC	122,687	31,907	7,433	16,718	6,100		**184,844**
TOTAL	**637,419**	**401,244**	**45,233**	**109,709**	**102,442**	**185,450**	**1,481,498**

2035 79 MPH ALL MODES

	NYMTC	CDTC	HOCTS	SMTC	GTC	GBNRTC	TOTAL
NYMTC	0	3,105,544	294,281	515,256	537,163	932,068	**5,384,313**
CDTC	3,134,691	0	1,412,706	746,614	449,346	368,067	**6,111,424**
HOCTS	294,281	1,315,509	0	2,383,200	402,290	241,787	**4,637,066**
SMTC	515,256	706,092	2,383,200	0	1,703,848	1,089,305	**6,397,702**
GTC	537,163	430,530	402,290	1,703,848	0	4,980,326	**8,054,157**
GBNRTC	932,068	362,280	241,787	1,089,305	4,980,326	0	**7,605,767**
TOTAL	**5,413,460**	**5,919,956**	**4,734,263**	**6,438,223**	**8,072,973**	**7,611,554**	**38,190,428**

2035 90 AIR	NYMTC	CDTC	HOCTS	SMTC	GTC	GBNRTC	TOTAL
NYMTC	0	86,121	500	194,448	214,500	346,127	**841,696**
CDTC	86,741	0	0	0	0	0	**86,741**
HOCTS	500	0	0	0	0	0	**500**
SMTC	194,448	0	0	0	0	0	**194,448**
GTC	214,500	0	0	0	0	0	**214,500**
GBNRTC	346,127	0	0	0	0	0	**346,127**
TOTAL	**842,316**	**86,121**	**500**	**194,448**	**214,500**	**346,127**	**1,684,012**

2035 90 BUS	NYMTC	CDTC	HOCTS	SMTC	GTC	GBNRTC	TOTAL
NYMTC	0	938,346	169,705	232,877	222,352	405,150	**1,968,430**
CDTC	945,934	107	39,189	45,937	42,259	64,171	**1,137,596**
HOCTS	169,705	38,754	0	36,809	18,756	39,902	**303,925**
SMTC	232,877	45,484	36,809	0	87,302	239,219	**641,690**
GTC	222,352	42,673	18,756	87,302	0	564,804	**935,887**
GBNRTC	405,150	62,673	39,902	239,219	564,804	0	**1,311,748**
TOTAL	**1,976,018**	**1,128,037**	**304,360**	**642,144**	**935,473**	**1,313,245**	**6,299,277**

2035 90 CAR	NYMTC	CDTC	HOCTS	SMTC	GTC	GBNRTC	TOTAL
NYMTC	0	1,744,595	92,222	7,358	14,817	17,912	**1,876,903**
CDTC	1,763,051	0	1,369,043	683,383	387,042	258,823	**4,461,342**
HOCTS	92,222	1,272,320	0	2,345,143	380,472	191,362	**4,281,519**
SMTC	7,358	643,510	2,345,143	0	1,611,020	828,064	**5,435,095**
GTC	14,817	368,079	380,472	1,611,020	0	4,408,455	**6,782,843**
GBNRTC	17,912	255,562	191,362	828,064	4,408,455	0	**5,701,354**
TOTAL	**1,895,359**	**4,284,066**	**4,378,242**	**5,474,968**	**6,801,806**	**5,704,615**	**28,539,057**

2035 90 RAIL	NYMTC	CDTC	HOCTS	SMTC	GTC	GBNRTC	TOTAL
NYMTC		336,483	31,854	80,572	85,494	162,879	**697,283**
CDTC	338,967		4,474	17,295	20,045	45,304	**426,084**
HOCTS	31,854	4,435		1,248	3,061	10,523	**51,123**
SMTC	80,572	17,100	1,248		5,527	22,022	**126,470**
GTC	85,494	19,779	3,061	5,527		7,072	**120,932**
GBNRTC	162,879	44,273	10,523	22,022	7,072		**246,769**
TOTAL	**699,766**	**422,070**	**51,161**	**126,665**	**121,199**	**247,800**	**1,668,661**

2035 90 MPH ALL MODES	NYMTC	CDTC	HOCTS	SMTC	GTC	GBNRTC	TOTAL
NYMTC	0	3,105,544	294,281	515,256	537,163	932,068	**5,384,313**
CDTC	3,134,691	107	1,412,706	746,616	449,346	368,297	**6,111,763**
HOCTS	294,281	1,315,509	0	2,383,200	402,290	241,787	**4,637,066**
SMTC	515,256	706,095	2,383,200	0	1,703,848	1,089,305	**6,397,704**
GTC	537,163	430,531	402,290	1,703,848	0	4,980,331	**8,054,162**
GBNRTC	932,068	362,508	241,787	1,089,305	4,980,331	0	**7,605,999**
TOTAL	**5,413,460**	**5,920,294**	**4,734,263**	**6,438,225**	**8,072,978**	**7,611,788**	**38,191,007**

2035 110 AIR

	NYMTC	CDTC	HOCTS	SMTC	GTC	GBNRTC	TOTAL
NYMTC	0	86,061	484	190,448	207,437	323,096	**807,525**
CDTC	86,682	0	0	0	0	0	**86,682**
HOCTS	484	0	0	0	0	0	**484**
SMTC	190,448	0	0	0	0	0	**190,448**
GTC	207,437	0	0	0	0	0	**207,437**
GBNRTC	323,096	0	0	0	0	0	**323,096**
TOTAL	**808,146**	**86,061**	**484**	**190,448**	**207,437**	**323,096**	**1,615,671**

2035 110 BUS

	NYMTC	CDTC	HOCTS	SMTC	GTC	GBNRTC	TOTAL
NYMTC	0	938,222	168,789	231,349	219,497	397,200	**1,955,057**
CDTC	945,814	106	39,059	45,325	41,111	60,697	**1,132,111**
HOCTS	168,789	38,624	0	36,793	18,639	39,120	**301,964**
SMTC	231,349	44,875	36,793	0	87,148	237,399	**637,565**
GTC	219,497	41,535	18,639	87,148	0	564,577	**931,397**
GBNRTC	397,200	59,290	39,120	237,399	564,577	0	**1,297,586**
TOTAL	**1,962,649**	**1,122,652**	**302,399**	**638,015**	**930,973**	**1,298,993**	**6,255,681**

2035 110 CAR

	NYMTC	CDTC	HOCTS	SMTC	GTC	GBNRTC	TOTAL
NYMTC	0	1,744,582	92,019	7,349	14,715	17,697	**1,876,362**
CDTC	1,763,038	0	1,368,605	681,497	384,591	251,429	**4,449,160**
HOCTS	92,019	1,271,887	0	2,345,089	380,137	189,324	**4,278,456**
SMTC	7,349	641,661	2,345,089	0	1,610,844	824,253	**5,429,197**
GTC	14,715	365,696	380,137	1,610,844	0	4,407,737	**6,779,129**
GBNRTC	17,697	248,522	189,324	824,253	4,407,737	0	**5,687,533**
TOTAL	**1,894,818**	**4,272,349**	**4,375,174**	**5,469,033**	**6,798,024**	**5,690,440**	**28,499,838**

2035 110 RAIL

	NYMTC	CDTC	HOCTS	SMTC	GTC	GBNRTC	TOTAL
NYMTC		336,680	32,988	86,110	95,514	194,075	**745,368**
CDTC	339,158		5,043	19,795	23,645	56,339	**443,979**
HOCTS	32,988	4,998		1,318	3,514	13,343	**56,162**
SMTC	86,110	19,560	1,318		5,856	27,652	**140,496**
GTC	95,514	23,300	3,514	5,856		8,021	**136,204**
GBNRTC	194,075	54,861	13,343	27,652	8,021		**297,953**
TOTAL	**747,846**	**439,399**	**56,206**	**140,731**	**136,549**	**299,430**	**1,820,162**

2035 110 MPH ALL MODES

	NYMTC	CDTC	HOCTS	SMTC	GTC	GBNRTC	TOTAL
NYMTC	0	3,105,544	294,281	515,256	537,163	932,068	**5,384,313**
CDTC	3,134,691	106	1,412,706	746,617	449,347	368,464	**6,111,932**
HOCTS	294,281	1,315,509	0	2,383,200	402,290	241,787	**4,637,066**
SMTC	515,256	706,096	2,383,200	0	1,703,848	1,089,305	**6,397,705**
GTC	537,163	430,531	402,290	1,703,848	0	4,980,335	**8,054,167**
GBNRTC	932,068	362,674	241,787	1,089,305	4,980,335	0	**7,606,169**
TOTAL	**5,413,460**	**5,920,460**	**4,734,263**	**6,438,227**	**8,072,983**	**7,611,959**	**38,191,352**

Adjusted MPO to MPO trips by competitive modes.

2009 AIR	NYMTC	CDTC	HOCTS	SMTC	GTC	GBNRTC	TOTAL
NYMTC	0	55,087	477	278,508	310,462	560,683	**1,205,218**
CDTC	55,680	0	0	0	0	0	**55,680**
HOCTS	477	0	0	0	0	0	**477**
SMTC	278,508	0	0	0	0	0	**278,508**
GTC	310,462	0	0	4	0	0	**310,467**
GBNRTC	560,683	0	0	0	0	0	**560,683**
TOTAL	**1,205,811**	**55,087**	**477**	**278,513**	**310,462**	**560,683**	**2,411,033**

2009 BUS	NYMTC	CDTC	HOCTS	SMTC	GTC	GBNRTC	TOTAL
NYMTC		405,460	176,212	266,885	217,272	427,700	**1,493,528**
CDTC	410,592		49,915	50,775	38,727	68,848	**618,857**
HOCTS	176,212	50,775		52,497	23,998	42,169	**345,651**
SMTC	302,812	50,775	52,497		92,084	187,611	**685,779**
GTC	236,090	51,636	24,097	104,133		159,211	**575,167**
GBNRTC	422,568	63,684	36,145	183,209	166,956		**872,562**
TOTAL	**1,548,274**	**622,331**	**338,866**	**657,498**	**539,037**	**885,539**	**4,591,544**

2009 CAR	NYMTC	CDTC	HOCTS	SMTC	GTC	GBNRTC	TOTAL
NYMTC	0	2,019,534	134,243	3,584	25,380	45,129	**2,227,869**
CDTC	2,034,748	0	1,176,909	588,846	325,229	261,330	**4,387,062**
HOCTS	134,243	1,113,393	0	2,337,782	361,967	209,413	**4,156,797**
SMTC	3,584	562,538	2,337,782	0	1,549,870	929,718	**5,383,491**
GTC	25,380	315,125	361,967	1,549,870	0	4,559,912	**6,812,253**
GBNRTC	45,129	261,534	209,413	929,718	4,559,912	0	**6,005,705**
TOTAL	**2,243,084**	**4,272,123**	**4,220,313**	**5,409,799**	**6,822,357**	**6,005,501**	**28,973,177**

2009 RAIL	NYMTC	CDTC	HOCTS	SMTC	GTC	GBNRTC	TOTAL
NYMTC	0	320,155	19,858	29,787	23,427	29,881	**423,108**
CDTC	320,155	0	2,082	7,013	8,224	11,133	**348,607**
HOCTS	19,858	2,082	0	819	1,421	2,480	**26,659**
SMTC	29,787	7,013	819	0	1,794	6,466	**45,878**
GTC	23,427	8,224	1,421	1,794	0	1,862	**36,728**
GBNRTC	29,881	11,133	2,480	6,466	1,862	0	**51,821**
TOTAL	**423,108**	**348,607**	**26,659**	**45,878**	**36,728**	**51,821**	**932,801**

2009 ALL MODES	NYMTC	CDTC	HOCTS	SMTC	GTC	GBNRTC	TOTAL
NYMTC	0	2,800,235	330,791	578,764	576,540	1,063,392	**5,349,723**
CDTC	2,821,175	0	1,228,906	646,634	372,180	341,310	**5,410,206**
HOCTS	330,791	1,166,250	0	2,391,097	387,385	254,062	**4,529,585**
SMTC	614,691	620,326	2,391,097	0	1,643,748	1,123,795	**6,393,657**
GTC	595,359	374,985	387,485	1,655,800	0	4,720,985	**7,734,614**
GBNRTC	1,058,260	336,351	248,038	1,119,393	4,728,730	0	**7,490,771**
TOTAL	**5,420,276**	**5,298,147**	**4,586,315**	**6,391,688**	**7,708,584**	**7,503,544**	**36,908,555**

2012 AIR		NYMTC	CDTC	HOCTS	SMTC	GTC	GBNRTC	TOTAL
	NYMTC	0	76,627	575	282,850	310,529	562,444	1,233,024
	CDTC	77,215	0	0	0	0	0	77,215
	HOCTS	575	0	0	0	0	0	575
	SMTC	282,850	0	0	0	0	0	282,850
	GTC	310,529	0	0	4	0	0	310,533
	GBNRTC	562,444	0	0	0	0	0	562,444
	TOTAL	1,233,612	76,627	575	282,854	310,529	562,444	2,466,640

2012 BUS		NYMTC	CDTC	HOCTS	SMTC	GTC	GBNRTC	TOTAL
	NYMTC	0	783,641	181,265	288,502	244,843	476,352	1,974,603
	CDTC	789,161	0	40,279	48,950	43,942	69,804	992,137
	HOCTS	181,265	40,035	0	40,887	18,652	35,086	315,925
	SMTC	288,502	48,883	40,887	0	90,050	196,240	664,562
	GTC	244,843	44,149	18,652	90,050	0	277,626	675,320
	GBNRTC	476,352	69,196	35,086	196,240	277,626	0	1,054,500
	TOTAL	904,500	58,197	421	207,423	230,217	416,883	5,677,047

2012 CAR		NYMTC	CDTC	HOCTS	SMTC	GTC	GBNRTC	TOTAL
	NYMTC	0	1,727,583	109,576	3,652	24,616	33,436	1,898,863
	CDTC	1,740,795	0	1,195,719	597,250	331,487	261,452	4,126,704
	HOCTS	109,576	1,128,677	0	2,340,261	364,539	207,428	4,150,480
	SMTC	3,652	569,530	2,340,261	0	1,557,332	915,579	5,386,352
	GTC	24,616	320,363	364,539	1,557,332	0	4,491,061	6,757,912
	GBNRTC	33,436	261,246	207,428	915,579	4,491,061	0	5,908,750
	TOTAL	904,500	58,197	421	207,423	230,217	416,883	28,229,061

2012 RAIL		NYMTC	CDTC	HOCTS	SMTC	GTC	GBNRTC	TOTAL
	NYMTC	0	321,914	20,527	31,101	26,949	37,951	438,442
	CDTC	321,914	0	2,038	6,690	7,785	10,729	349,156
	HOCTS	20,527	2,038	0	813	1,393	2,566	27,337
	SMTC	31,101	6,690	813	0	1,776	6,659	47,039
	GTC	26,949	7,785	1,393	1,776	0	2,174	40,077
	GBNRTC	37,951	10,729	2,566	6,659	2,174	0	60,080
	TOTAL	904,500	58,197	421	207,423	230,217	416,883	962,131

2012 ALL MODES		NYMTC	CDTC	HOCTS	SMTC	GTC	GBNRTC	TOTAL
	NYMTC	0	2,909,765	311,942	606,105	606,937	1,110,183	5,544,932
	CDTC	2,929,085	0	1,238,037	652,890	383,214	341,985	5,545,212
	HOCTS	311,942	1,170,750	0	2,381,960	384,584	245,080	4,494,317
	SMTC	606,105	625,103	2,381,960	0	1,649,157	1,118,478	6,380,804
	GTC	606,937	372,298	384,584	1,649,162	0	4,770,861	7,783,841
	GBNRTC	1,110,183	341,170	245,080	1,118,478	4,770,861	0	7,585,773
	TOTAL	904,500	58,197	421	207,423	230,217	416,883	37,334,879

2018 NB AIR

	NYMTC	CDTC	HOCTS	SMTC	GTC	GBNRTC	TOTAL
NYMTC	0	59,424	520	280,095	311,940	558,854	**1,210,833**
CDTC	60,140	0	0	0	0	0	**60,141**
HOCTS	520	0	0	0	0	0	**520**
SMTC	280,095	0	0	0	0	0	**280,095**
GTC	311,940	0	0	4	0	0	**311,944**
GBNRTC	558,854	0	0	0	0	0	**558,854**
TOTAL	**1,211,550**	**59,424**	**520**	**280,099**	**311,940**	**558,854**	**2,422,387**

2018 NB BUS

	NYMTC	CDTC	HOCTS	SMTC	GTC	GBNRTC	TOTAL
NYMTC	0	715,557	178,223	285,413	250,732	487,505	**1,917,430**
CDTC	721,824	121	39,673	47,581	43,684	66,336	**919,220**
HOCTS	178,223	39,399	0	40,522	18,852	32,165	**309,161**
SMTC	285,413	47,503	40,522	0	90,276	178,660	**642,373**
GTC	250,732	43,718	18,852	90,276	0	205,888	**609,465**
GBNRTC	487,505	65,776	32,165	178,660	205,888	0	**969,994**
TOTAL	**914,862**	**46,950**	**393**	**211,540**	**238,231**	**426,701**	**5,367,642**

2018 NB CAR

	NYMTC	CDTC	HOCTS	SMTC	GTC	GBNRTC	TOTAL
NYMTC	0	1,888,668	115,458	10,646	25,339	29,175	**2,069,286**
CDTC	1,903,333	0	1,236,637	621,579	347,531	272,413	**4,381,493**
HOCTS	115,458	1,162,279	0	2,337,745	368,418	210,106	**4,194,006**
SMTC	10,646	590,692	2,337,745	0	1,571,987	930,532	**5,441,602**
GTC	25,339	334,676	368,418	1,571,987	0	4,610,448	**6,910,868**
GBNRTC	29,175	270,909	210,106	930,532	4,610,448	0	**6,051,169**
TOTAL	**914,862**	**46,950**	**393**	**211,540**	**238,231**	**426,701**	**29,048,424**

2018 NB RAIL

	NYMTC	CDTC	HOCTS	SMTC	GTC	GBNRTC	TOTAL
NYMTC	0	317,570	20,368	31,352	36,767	60,145	**466,201**
CDTC	317,570	0	2,041	6,814	8,133	10,784	**345,341**
HOCTS	20,368	2,041	0	822	1,448	2,498	**27,177**
SMTC	31,352	6,814	822	0	1,860	6,490	**47,337**
GTC	36,767	8,133	1,447	1,860	0	1,955	**50,162**
GBNRTC	60,145	10,784	2,498	6,490	1,955	0	**81,872**
TOTAL	**914,862**	**46,950**	**393**	**211,540**	**238,231**	**426,701**	**1,018,089**

2018 NB ALL MODES

	NYMTC	CDTC	HOCTS	SMTC	GTC	GBNRTC	TOTAL
NYMTC	0	2,981,219	314,569	607,506	624,777	1,135,679	**5,663,750**
CDTC	3,002,867	121	1,278,351	675,974	399,349	349,533	**5,706,195**
HOCTS	314,569	1,203,719	0	2,379,088	388,717	244,769	**4,530,863**
SMTC	607,506	645,008	2,379,088	0	1,664,123	1,115,681	**6,411,407**
GTC	624,777	386,527	388,717	1,664,128	0	4,818,290	**7,882,438**
GBNRTC	1,135,679	347,468	244,769	1,115,681	4,818,290	0	**7,661,889**
TOTAL	**914,862**	**46,950**	**393**	**211,540**	**238,231**	**426,701**	**37,856,543**

2018 79 AIR

	NYMTC	CDTC	HOCTS	SMTC	GTC	GBNRTC	TOTAL
NYMTC	0	44,349	440	238,251	269,362	476,389	**1,028,791**
CDTC	44,881	0	0	0	0	0	**44,881**
HOCTS	440	0	0	0	0	0	**440**
SMTC	238,251	0	0	0	0	0	**238,251**
GTC	269,362	0	0	4	0	0	**269,366**
GBNRTC	476,389	0	0	0	0	0	**476,389**
TOTAL	**1,029,323**	**44,349**	**440**	**238,255**	**269,362**	**476,389**	**2,058,118**

2018 79 BUS

	NYMTC	CDTC	HOCTS	SMTC	GTC	GBNRTC	TOTAL
NYMTC	0	698,535	169,450	268,933	235,608	459,198	**1,831,724**
CDTC	704,671	0	39,198	44,445	39,517	58,453	**886,285**
HOCTS	169,450	38,924	0	40,604	18,596	31,400	**298,973**
SMTC	268,933	44,379	40,604	0	90,315	176,516	**620,747**
GTC	235,608	39,569	18,596	90,315	0	206,473	**590,562**
GBNRTC	459,198	57,906	31,400	176,516	206,473	0	**931,493**
TOTAL	**772,133**	**34,488**	**330**	**178,744**	**204,724**	**361,204**	**5,159,785**

2018 79 CAR

	NYMTC	CDTC	HOCTS	SMTC	GTC	GBNRTC	TOTAL
NYMTC	0	1,879,028	113,011	10,611	24,893	28,336	**2,055,879**
CDTC	1,893,660	0	1,235,152	615,620	342,630	256,882	**4,343,944**
HOCTS	113,011	1,160,808	0	2,337,488	367,676	206,787	**4,185,769**
SMTC	10,611	584,800	2,337,488	0	1,571,642	926,404	**5,430,944**
GTC	24,893	329,858	367,676	1,571,642	0	4,609,392	**6,903,460**
GBNRTC	28,336	255,692	206,787	926,404	4,609,392	0	**6,026,610**
TOTAL	**772,133**	**34,488**	**330**	**178,744**	**204,724**	**361,204**	**28,946,606**

2018 79 RAIL

	NYMTC	CDTC	HOCTS	SMTC	GTC	GBNRTC	TOTAL
NYMTC	0	367,100	31,778	93,802	92,778	159,794	**745,251**
CDTC	367,100	0	4,144	16,020	16,865	34,558	**438,686**
HOCTS	31,778	4,144	0	1,181	2,514	6,812	**46,428**
SMTC	93,802	16,020	1,181	0	2,544	13,579	**127,126**
GTC	92,778	16,865	2,514	2,544	0	3,428	**118,128**
GBNRTC	159,794	34,558	6,812	13,579	3,428	0	**218,171**
TOTAL	**772,133**	**34,488**	**330**	**178,744**	**204,724**	**361,204**	**1,693,791**

2018 79 MPH ALL MODES

	NYMTC	CDTC	HOCTS	SMTC	GTC	GBNRTC	TOTAL
NYMTC	0	2,989,012	314,678	611,597	622,641	1,123,716	**5,661,645**
CDTC	3,010,312	0	1,278,495	676,085	399,012	349,893	**5,713,797**
HOCTS	314,678	1,203,876	0	2,379,273	388,786	244,998	**4,531,611**
SMTC	611,597	645,199	2,379,273	0	1,664,501	1,116,499	**6,417,069**
GTC	622,641	386,292	388,786	1,664,505	0	4,819,293	**7,881,516**
GBNRTC	1,123,716	348,156	244,998	1,116,499	4,819,293	0	**7,652,663**
TOTAL	**772,133**	**34,488**	**330**	**178,744**	**204,724**	**361,204**	**37,858,300**

2018 90 AIR

	NYMTC	CDTC	HOCTS	SMTC	GTC	GBNRTC	TOTAL
NYMTC	0	44,781	426	233,955	261,873	441,176	**982,210**
CDTC	45,321	0	0	0	0	0	**45,321**
HOCTS	426	0	0	0	0	0	**426**
SMTC	233,955	0	0	0	0	0	**233,955**
GTC	261,873	0	0	4	0	0	**261,877**
GBNRTC	441,176	0	0	0	0	0	**441,176**
TOTAL	**982,750**	**44,781**	**426**	**233,959**	**261,873**	**441,176**	**1,964,965**

2018 90 BUS

	NYMTC	CDTC	HOCTS	SMTC	GTC	GBNRTC	TOTAL
NYMTC	0	699,209	168,827	267,441	232,941	448,222	**1,816,640**
CDTC	705,359	0	39,046	43,425	37,929	54,866	**880,625**
HOCTS	168,827	38,771	0	40,606	18,451	30,861	**297,515**
SMTC	267,441	43,362	40,606	0	90,209	175,084	**616,702**
GTC	232,941	37,988	18,451	90,209	0	206,563	**586,152**
GBNRTC	448,222	54,333	30,861	175,084	206,563	0	**915,064**
TOTAL	**729,020**	**34,195**	**316**	**173,571**	**196,922**	**330,873**	**5,112,698**

2018 90 CAR

	NYMTC	CDTC	HOCTS	SMTC	GTC	GBNRTC	TOTAL
NYMTC	0	1,879,000	112,753	10,608	24,780	27,882	**2,055,024**
CDTC	1,893,632	0	1,234,665	613,151	339,928	248,028	**4,329,404**
HOCTS	112,753	1,160,325	0	2,337,381	367,255	204,681	**4,182,396**
SMTC	10,608	582,362	2,337,381	0	1,571,446	923,895	**5,425,693**
GTC	24,780	327,204	367,255	1,571,446	0	4,608,951	**6,899,636**
GBNRTC	27,882	247,090	204,681	923,895	4,608,951	0	**6,012,500**
TOTAL	**729,020**	**34,195**	**316**	**173,571**	**196,922**	**330,873**	**28,904,653**

2018 90 RAIL

	NYMTC	CDTC	HOCTS	SMTC	GTC	GBNRTC	TOTAL
NYMTC	0	367,268	32,838	102,119	104,482	201,013	**807,720**
CDTC	367,268	0	4,817	19,560	21,013	47,003	**459,660**
HOCTS	32,838	4,817	0	1,331	3,097	9,534	**51,618**
SMTC	102,119	19,560	1,331	0	2,927	17,693	**143,630**
GTC	104,482	21,013	3,097	2,927	0	4,020	**135,538**
GBNRTC	201,013	47,003	9,534	17,693	4,020	0	**279,263**
TOTAL	**729,020**	**34,195**	**316**	**173,571**	**196,922**	**330,873**	**1,877,430**

2018 90 MPH ALL MODES

	NYMTC	CDTC	HOCTS	SMTC	GTC	GBNRTC	TOTAL
NYMTC	0	2,990,257	314,844	614,124	624,077	1,118,293	**5,661,595**
CDTC	3,011,579	0	1,278,528	676,136	398,870	349,897	**5,715,010**
HOCTS	314,844	1,203,913	0	2,379,318	388,803	245,077	**4,531,954**
SMTC	614,124	645,284	2,379,318	0	1,664,581	1,116,673	**6,419,980**
GTC	624,077	386,205	388,803	1,664,585	0	4,819,534	**7,883,204**
GBNRTC	1,118,293	348,425	245,077	1,116,673	4,819,534	0	**7,648,003**
TOTAL	**729,020**	**34,195**	**316**	**173,571**	**196,922**	**330,873**	**37,859,746**

2018 110 AIR

	NYMTC	CDTC	HOCTS	SMTC	GTC	GBNRTC	TOTAL
NYMTC	0	45,162	419	230,976	255,760	416,261	**948,578**
CDTC	45,709	0	0	0	0	0	**45,709**
HOCTS	419	0	0	0	0	0	**419**
SMTC	230,976	0	0	0	0	0	**230,976**
GTC	255,760	0	0	4	0	0	**255,765**
GBNRTC	416,261	0	0	0	0	0	**416,261**
TOTAL	**949,125**	**45,162**	**419**	**230,980**	**255,760**	**416,261**	**1,897,707**

2018 110 BUS

	NYMTC	CDTC	HOCTS	SMTC	GTC	GBNRTC	TOTAL
NYMTC	0	699,782	168,085	265,731	230,126	440,004	**1,803,727**
CDTC	705,942	0	38,916	42,763	36,760	51,992	**876,373**
HOCTS	168,085	38,640	0	40,628	18,357	30,397	**296,107**
SMTC	265,731	42,702	40,628	0	90,109	173,633	**612,804**
GTC	230,126	36,824	18,357	90,109	0	206,640	**582,056**
GBNRTC	440,004	51,473	30,397	173,633	206,640	0	**902,148**
TOTAL	**697,534**	**33,999**	**308**	**169,767**	**190,619**	**309,350**	**5,073,216**

2018 110 CAR

	NYMTC	CDTC	HOCTS	SMTC	GTC	GBNRTC	TOTAL
NYMTC	0	1,878,970	112,424	10,601	24,623	27,533	**2,054,151**
CDTC	1,893,602	0	1,234,236	611,363	337,590	240,428	**4,317,219**
HOCTS	112,424	1,159,899	0	2,337,337	366,942	202,870	**4,179,472**
SMTC	10,601	580,599	2,337,337	0	1,571,268	921,249	**5,421,052**
GTC	24,623	324,912	366,942	1,571,268	0	4,608,536	**6,896,281**
GBNRTC	27,533	239,745	202,870	921,249	4,608,536	0	**5,999,933**
TOTAL	**697,534**	**33,999**	**308**	**169,767**	**190,619**	**309,350**	**28,868,108**

2018 110 RAIL

	NYMTC	CDTC	HOCTS	SMTC	GTC	GBNRTC	TOTAL
NYMTC	0	367,391	34,028	108,669	114,396	230,674	**855,157**
CDTC	367,391	0	5,406	22,064	24,432	57,478	**476,770**
HOCTS	34,028	5,406	0	1,391	3,516	11,876	**56,216**
SMTC	108,669	22,064	1,391	0	3,269	21,928	**157,321**
GTC	114,396	24,432	3,515	3,269	0	4,556	**150,168**
GBNRTC	230,674	57,478	11,876	21,928	4,556	0	**326,512**
TOTAL	**697,534**	**33,999**	**308**	**169,767**	**190,619**	**309,350**	**2,022,145**

2018 110 MPH ALL MODES

	NYMTC	CDTC	HOCTS	SMTC	GTC	GBNRTC	TOTAL
NYMTC	0	2,991,305	314,954	615,977	624,905	1,114,472	**5,661,613**
CDTC	3,012,644	0	1,278,557	676,191	398,782	349,899	**5,716,072**
HOCTS	314,954	1,203,946	0	2,379,355	388,815	245,143	**4,532,214**
SMTC	615,977	645,365	2,379,355	0	1,664,646	1,116,810	**6,422,153**
GTC	624,905	386,167	388,815	1,664,650	0	4,819,733	**7,884,270**
GBNRTC	1,114,472	348,697	245,143	1,116,810	4,819,733	0	**7,644,854**
TOTAL	**697,534**	**33,999**	**308**	**169,767**	**190,619**	**309,350**	**37,861,177**

2035 NB AIR

	NYMTC	CDTC	HOCTS	SMTC	GTC	GBNRTC	TOTAL
NYMTC	0	135,794	841	302,379	336,055	575,177	**1,350,247**
CDTC	136,870	0	0	0	0	0	**136,870**
HOCTS	841	0	0	0	0	0	**841**
SMTC	302,379	0	0	0	0	0	**302,379**
GTC	336,055	0	0	4	0	0	**336,059**
GBNRTC	575,177	0	0	0	0	0	**575,177**
TOTAL	**1,351,323**	**135,795**	**841**	**302,383**	**336,055**	**575,177**	**2,701,574**

2035 NB BUS

	NYMTC	CDTC	HOCTS	SMTC	GTC	GBNRTC	TOTAL
NYMTC	0	1,150,454	213,781	291,824	283,068	523,978	**2,463,105**
CDTC	1,159,609	0	47,152	58,601	56,597	91,922	**1,413,880**
HOCTS	213,781	46,636	0	43,706	22,796	49,903	**376,823**
SMTC	291,824	58,044	43,706	0	103,931	288,930	**786,435**
GTC	283,068	57,030	22,796	103,931	0	669,534	**1,136,359**
GBNRTC	523,978	89,915	49,903	288,930	669,534	0	**1,622,260**
TOTAL	**1,044,508**	**107,533**	**650**	**233,751**	**262,295**	**449,674**	**7,798,863**

2035 NB CAR

	NYMTC	CDTC	HOCTS	SMTC	GTC	GBNRTC	TOTAL
NYMTC	0	1,750,031	93,703	7,401	15,186	18,474	**1,884,795**
CDTC	1,768,526	0	1,371,014	691,433	394,314	280,604	**4,505,891**
HOCTS	93,703	1,274,266	0	2,345,506	381,630	196,889	**4,291,993**
SMTC	7,401	651,424	2,345,506	0	1,611,572	837,317	**5,453,220**
GTC	15,186	375,180	381,630	1,611,572	0	4,410,903	**6,794,470**
GBNRTC	18,474	276,603	196,889	837,317	4,410,903	0	**5,740,186**
TOTAL	**1,044,508**	**107,533**	**650**	**233,751**	**262,295**	**449,674**	**28,670,555**

2035 NB RAIL

	NYMTC	CDTC	HOCTS	SMTC	GTC	GBNRTC	TOTAL
NYMTC	0	338,627	22,414	32,425	38,833	59,707	**492,005**
CDTC	338,627	0	1,901	5,835	7,233	9,347	**362,944**
HOCTS	22,414	1,901	0	807	1,438	2,857	**29,416**
SMTC	32,425	5,835	807	0	4,637	8,273	**51,976**
GTC	38,833	7,233	1,437	4,637	0	4,511	**56,650**
GBNRTC	59,707	9,347	2,857	8,273	4,511	0	**84,694**
TOTAL	**1,044,508**	**107,533**	**650**	**233,751**	**262,295**	**449,674**	**1,077,685**

2035 NB ALL MODES

	NYMTC	CDTC	HOCTS	SMTC	GTC	GBNRTC	TOTAL
NYMTC	0	3,374,907	330,738	634,030	673,141	1,177,336	**6,190,152**
CDTC	3,403,631	0	1,420,067	755,869	458,144	381,874	**6,419,586**
HOCTS	330,738	1,322,803	0	2,390,018	405,864	249,649	**4,699,073**
SMTC	634,030	715,303	2,390,018	0	1,720,139	1,134,519	**6,594,010**
GTC	673,141	439,443	405,864	1,720,143	0	5,084,948	**8,323,539**
GBNRTC	1,177,336	375,866	249,649	1,134,519	5,084,948	0	**8,022,318**
TOTAL	**1,044,508**	**107,533**	**650**	**233,751**	**262,295**	**449,674**	**40,248,677**

2035 79 AIR

	NYMTC	CDTC	HOCTS	SMTC	GTC	GBNRTC	TOTAL
NYMTC	0	112,172	685	260,322	290,798	488,872	**1,152,848**
CDTC	112,977	0	0	0	0	0	**112,977**
HOCTS	685	0	0	0	0	0	**685**
SMTC	260,322	0	0	0	0	0	**260,322**
GTC	290,798	0	0	4	0	0	**290,802**
GBNRTC	488,872	0	0	0	0	0	**488,872**
TOTAL	**1,153,653**	**112,172**	**685**	**260,326**	**290,798**	**488,872**	**2,306,506**

2035 79 BUS

	NYMTC	CDTC	HOCTS	SMTC	GTC	GBNRTC	TOTAL
NYMTC	0	1,115,442	203,148	279,210	268,302	493,628	**2,359,729**
CDTC	1,124,454	0	46,762	55,673	52,043	81,363	**1,360,295**
HOCTS	203,148	46,244	0	43,789	22,489	48,450	**364,121**
SMTC	279,210	55,128	43,789	0	103,965	286,423	**768,514**
GTC	268,302	52,518	22,489	103,965	0	671,568	**1,118,841**
GBNRTC	493,628	79,480	48,450	286,423	671,568	0	**1,579,550**
TOTAL	**887,073**	**88,206**	**527**	**200,187**	**226,132**	**380,379**	**7,551,050**

2035 79 CAR

	NYMTC	CDTC	HOCTS	SMTC	GTC	GBNRTC	TOTAL
NYMTC	0	1,744,627	92,416	7,368	14,917	18,141	**1,877,470**
CDTC	1,763,083	0	1,369,547	685,841	389,744	267,096	**4,475,311**
HOCTS	92,416	1,272,817	0	2,345,251	380,897	193,588	**4,284,969**
SMTC	7,368	645,923	2,345,251	0	1,611,213	831,593	**5,441,348**
GTC	14,917	370,712	380,897	1,611,213	0	4,409,173	**6,786,913**
GBNRTC	18,141	263,499	193,588	831,593	4,409,173	0	**5,715,995**
TOTAL	**887,073**	**88,206**	**527**	**200,187**	**226,132**	**380,379**	**28,582,004**

2035 79 RAIL

	NYMTC	CDTC	HOCTS	SMTC	GTC	GBNRTC	TOTAL
NYMTC	0	408,510	34,232	91,692	96,535	164,461	**795,430**
CDTC	408,510	0	3,919	14,454	15,935	33,144	**475,962**
HOCTS	34,232	3,919	0	1,156	2,543	7,818	**49,669**
SMTC	91,692	14,454	1,156	0	5,347	17,643	**130,292**
GTC	96,535	15,935	2,543	5,347	0	6,957	**127,317**
GBNRTC	164,461	33,144	7,818	17,643	6,957	0	**230,023**
TOTAL	**887,073**	**88,206**	**527**	**200,187**	**226,132**	**380,379**	**1,808,692**

2035 79 MPH ALL MODES

	NYMTC	CDTC	HOCTS	SMTC	GTC	GBNRTC	TOTAL
NYMTC	0	3,380,751	330,482	638,591	670,552	1,165,101	**6,185,477**
CDTC	3,409,024	0	1,420,227	755,968	457,721	381,603	**6,424,544**
HOCTS	330,482	1,322,980	0	2,390,196	405,929	249,856	**4,699,444**
SMTC	638,591	715,506	2,390,196	0	1,720,524	1,135,659	**6,600,476**
GTC	670,552	439,165	405,929	1,720,528	0	5,087,699	**8,323,872**
GBNRTC	1,165,101	376,124	249,856	1,135,659	5,087,699	0	**8,014,439**
TOTAL	**887,073**	**88,206**	**527**	**200,187**	**226,132**	**380,379**	**40,248,252**

2035 90 AIR	NYMTC	CDTC	HOCTS	SMTC	GTC	GBNRTC	TOTAL
NYMTC	0	113,005	655	255,148	281,459	454,175	**1,104,442**
CDTC	113,818	0	0	0	0	0	**113,818**
HOCTS	655	0	0	0	0	0	**655**
SMTC	255,148	0	0	0	0	0	**255,148**
GTC	281,459	0	0	4	0	0	**281,463**
GBNRTC	454,175	0	0	0	0	0	**454,175**
TOTAL	**1,105,255**	**113,005**	**655**	**255,152**	**281,459**	**454,175**	**2,209,701**

2035 90 BUS	NYMTC	CDTC	HOCTS	SMTC	GTC	GBNRTC	TOTAL
NYMTC	0	1,116,350	201,898	277,054	264,532	482,007	**2,341,842**
CDTC	1,125,377	127	46,623	54,652	50,276	76,344	**1,353,398**
HOCTS	201,898	46,105	0	43,791	22,314	47,471	**361,580**
SMTC	277,054	54,112	43,791	0	103,863	284,599	**763,419**
GTC	264,532	50,768	22,314	103,863	0	671,947	**1,113,424**
GBNRTC	482,007	74,562	47,471	284,599	671,947	0	**1,560,586**
TOTAL	**842,316**	**87,844**	**500**	**194,465**	**217,026**	**350,367**	**7,494,250**

2035 90 CAR	NYMTC	CDTC	HOCTS	SMTC	GTC	GBNRTC	TOTAL
NYMTC	0	1,744,595	92,222	7,358	14,817	17,912	**1,876,903**
CDTC	1,763,051	0	1,369,043	683,383	387,042	258,823	**4,461,342**
HOCTS	92,222	1,272,320	0	2,345,143	380,472	191,362	**4,281,519**
SMTC	7,358	643,510	2,345,143	0	1,611,020	828,064	**5,435,095**
GTC	14,817	368,079	380,472	1,611,020	0	4,408,455	**6,782,843**
GBNRTC	17,912	255,562	191,362	828,064	4,408,455	0	**5,701,354**
TOTAL	**842,316**	**87,844**	**500**	**194,465**	**217,026**	**350,367**	**28,539,057**

2035 90 RAIL	NYMTC	CDTC	HOCTS	SMTC	GTC	GBNRTC	TOTAL
NYMTC	0	408,881	35,799	101,207	110,559	205,556	**862,002**
CDTC	408,881	0	4,598	17,979	20,220	46,212	**497,890**
HOCTS	35,799	4,598	0	1,306	3,156	11,076	**55,934**
SMTC	101,207	17,979	1,306	0	5,723	23,235	**149,449**
GTC	110,559	20,220	3,156	5,723	0	7,959	**147,617**
GBNRTC	205,556	46,212	11,076	23,235	7,959	0	**294,037**
TOTAL	**842,316**	**87,844**	**500**	**194,465**	**217,026**	**350,367**	**2,006,928**

2035 90 MPH ALL MODES	NYMTC	CDTC	HOCTS	SMTC	GTC	GBNRTC	TOTAL
NYMTC	0	3,382,830	330,574	640,767	671,367	1,159,650	**6,185,189**
CDTC	3,411,127	127	1,420,264	756,014	457,538	381,379	**6,426,448**
HOCTS	330,574	1,323,023	0	2,390,240	405,943	249,908	**4,699,688**
SMTC	640,767	715,602	2,390,240	0	1,720,605	1,135,897	**6,603,111**
GTC	671,367	439,067	405,943	1,720,609	0	5,088,361	**8,325,347**
GBNRTC	1,159,650	376,336	249,908	1,135,897	5,088,361	0	**8,010,153**
TOTAL	**842,316**	**87,844**	**500**	**194,465**	**217,026**	**350,367**	**40,249,936**

2035 110 AIR

	NYMTC	CDTC	HOCTS	SMTC	GTC	GBNRTC	TOTAL
NYMTC	0	113,822	640	251,883	274,352	427,321	**1,068,018**
CDTC	114,644	0	0	0	0	0	**114,644**
HOCTS	640	0	0	0	0	0	**640**
SMTC	251,883	0	0	0	0	0	**251,883**
GTC	274,352	0	0	4	0	0	**274,356**
GBNRTC	427,321	0	0	0	0	0	**427,321**
TOTAL	**1,068,839**	**113,822**	**640**	**251,887**	**274,352**	**427,321**	**2,136,861**

2035 110 BUS

	NYMTC	CDTC	HOCTS	SMTC	GTC	GBNRTC	TOTAL
NYMTC	0	1,117,118	200,973	275,462	261,350	472,936	**2,327,839**
CDTC	1,126,157	126	46,506	53,967	48,950	72,270	**1,347,976**
HOCTS	200,973	45,988	0	43,808	22,193	46,579	**359,542**
SMTC	275,462	53,431	43,808	0	103,766	282,666	**759,133**
GTC	261,350	49,455	22,193	103,766	0	672,228	**1,108,992**
GBNRTC	472,936	70,595	46,579	282,666	672,228	0	**1,545,004**
TOTAL	**808,146**	**87,617**	**484**	**190,463**	**209,980**	**327,164**	**7,448,486**

2035 110 CAR

	NYMTC	CDTC	HOCTS	SMTC	GTC	GBNRTC	TOTAL
NYMTC	0	1,744,582	92,019	7,349	14,715	17,697	**1,876,362**
CDTC	1,763,038	0	1,368,605	681,497	384,591	251,429	**4,449,160**
HOCTS	92,019	1,271,887	0	2,345,089	380,137	189,324	**4,278,456**
SMTC	7,349	641,661	2,345,089	0	1,610,844	824,253	**5,429,197**
GTC	14,715	365,696	380,137	1,610,844	0	4,407,737	**6,779,129**
GBNRTC	17,697	248,522	189,324	824,253	4,407,737	0	**5,687,533**
TOTAL	**808,146**	**87,617**	**484**	**190,463**	**209,980**	**327,164**	**28,499,838**

2035 110 RAIL

	NYMTC	CDTC	HOCTS	SMTC	GTC	GBNRTC	TOTAL
NYMTC	0	409,082	37,021	107,785	121,555	237,431	**912,874**
CDTC	409,082	0	5,185	20,604	23,876	57,504	**516,250**
HOCTS	37,021	5,185	0	1,378	3,626	14,047	**61,257**
SMTC	107,785	20,604	1,378	0	6,059	29,154	**164,980**
GTC	121,555	23,876	3,625	6,059	0	8,928	**164,043**
GBNRTC	237,431	57,504	14,047	29,154	8,928	0	**347,065**
TOTAL	**808,146**	**87,617**	**484**	**190,463**	**209,980**	**327,164**	**2,166,469**

2035 110 MPH ALL MODES

	NYMTC	CDTC	HOCTS	SMTC	GTC	GBNRTC	TOTAL
NYMTC	0	3,384,604	330,653	642,478	671,972	1,155,385	**6,185,092**
CDTC	3,412,920	126	1,420,296	756,069	457,416	381,203	**6,428,030**
HOCTS	330,653	1,323,060	0	2,390,276	405,955	249,950	**4,699,895**
SMTC	642,478	715,697	2,390,276	0	1,720,669	1,136,073	**6,605,193**
GTC	671,972	439,027	405,955	1,720,673	0	5,088,893	**8,326,520**
GBNRTC	1,155,385	376,622	249,950	1,136,073	5,088,893	0	**8,006,923**
TOTAL	**808,146**	**87,617**	**484**	**190,463**	**209,980**	**327,164**	**40,251,654**

Station to Station Rail Trips – 2009 and 2012

2009

Stations	NYP	YNY	CRT	POU	RHI	HUD	ALB	SDY	AMS	UCA	ROM	SYR	ROC	BUF	BFX	NFL	SAR	Grand Total
NYP		573	4,490	15,536	68,675	65,322	285,163	11,873	2,298	16,494	2,232	27,607	21,246	14,816	5,491	7,383	12,280	561,480
YNY	573		7	33	224	541	3,915	286	51	311	58	591	703	384	184	144	263	8,268
CRT	4,490	7		70	814	877	5,478	484	64	673	90	1,589	1,478	1,000	291	187	413	18,006
POU	15,536	33	70		213	757	6,674	535	66	635	106	1,819	1,977	1,505	602	254	280	31,061
RHI	68,675	224	814	213		135	1,096	68	6	108	27	366	522	279	119	63	101	72,817
HUD	65,322	541	877	757	135		1,375	179	51	105	19	256	268	216	91	60	82	70,334
ALB	285,163	3,915	5,478	6,674	1,096	1,375		220	47	1,310	179	5,354	6,105	6,380	1,406	789	223	325,714
SDY	11,873	286	484	535	68	179	220		15	463	129	1,659	2,119	1,838	471	249	253	20,843
AMS	2,298	51	64	66	6	51	47	15		41	10	237	362	365	100	42	0	3,756
UCA	16,494	311	673	635	108	105	1,310	463	41		54	653	1,162	1,285	538	190	0	24,022
ROM	2,232	58	90	106	27	19	179	129	10	54		166	259	287	117	62	0	3,795
SYR	27,607	591	1,589	1,819	366	256	5,354	1,659	237	653	166		1,794	3,976	1,518	972	0	48,558
ROC	21,246	703	1,478	1,977	522	268	6,105	2,119	362	1,162	259	1,794		927	515	420	0	39,857
BUF	14,816	384	1,000	1,505	279	216	6,380	1,838	365	1,285	287	3,976	927		32	326	0	33,615
BFX	5,491	184	291	602	119	91	1,406	471	100	538	117	1,518	515	32		36	0	11,512
NFL	7,383	144	187	254	63	60	789	249	42	190	62	972	420	326	36		0	11,178
SAR	12,280	263	413	280	101	82	223	253	0	0	0	0	0	0	0	0		13,893
Grand Total	561,480	8,268	18,006	31,061	72,817	70,334	325,714	20,843	3,756	24,022	3,795	48,558	39,857	33,615	11,512	11,178	13,893	1,298,707

2012 NO BUILD

Stations	NYP	YNY	CRT	POU	RHI	HUD	ALB	SDY	AMS	UCA	ROM	SYR	ROC	BUF	BFX	NFL	SAR	Grand Total
NYP		583	4,533	16,843	73,519	67,522	283,682	12,619	2,456	17,018	2,295	28,882	24,745	18,152	8,739	8,854	14,732	585,175
YNY	583		7	34	233	549	3,967	298	53	370	78	631	721	390	191	147	286	8,538
CRT	4,533	7		72	832	881	5,393	495	65	676	90	1,588	1,483	999	292	187	443	18,035
POU	16,843	34	72		222	777	6,754	563	68	655	109	1,865	2,028	1,545	703	261	313	32,813
RHI	73,519	233	832	222		138	1,101	70	6	110	28	374	533	285	132	64	111	77,759
HUD	67,522	549	881	777	138		1,358	183	52	106	19	258	270	217	121	60	87	72,597
ALB	283,682	3,967	5,393	6,754	1,101	1,358		228	49	1,274	176	5,099	5,763	6,086	1,444	773	236	323,384
SDY	12,619	298	495	563	70	183	228		15	459	130	1,591	2,023	1,734	444	249	268	21,367
AMS	2,456	53	65	68	6	52	49	15		41	10	238	362	365	125	42	0	3,949
UCA	17,018	370	676	655	110	106	1,274	459	41		54	648	1,136	1,263	604	190	0	24,603
ROM	2,295	78	90	109	28	19	176	130	10	54		165	257	284	162	62	0	3,919
SYR	28,882	631	1,588	1,865	374	258	5,099	1,591	238	648	165		1,776	3,792	1,898	970	0	49,774
ROC	24,745	721	1,483	2,028	533	270	5,763	2,023	362	1,136	257	1,776		994	735	445	0	43,270
BUF	18,152	390	999	1,545	285	217	6,086	1,734	365	1,263	284	3,792	994		32	327	0	36,464
BFX	8,739	191	292	703	132	121	1,444	444	125	604	162	1,898	735	32		36	0	15,656
NFL	8,854	147	187	261	64	60	773	249	42	190	62	970	445	327	36		0	12,668
SAR	14,732	286	443	313	111	87	236	268	0	0	0	0	0	0	0	0		16,476
Grand Total	585,174	8,538	18,035	32,813	77,759	72,597	323,384	21,367	3,949	24,603	3,919	49,774	43,270	36,464	15,656	12,668	16,476	1,346,446

Station to Station Rail Trips – 2018 No Build and 2018 79MPH

2018 NO BUILD

Stations	NYP	YNY	CRT	POU	RHI	HUD	ALB	SDY	AMS	UCA	ROM	SYR	ROC	BUF	BFX	NFL	SAR	Grand Total
NYP		599	4,621	17,034	74,619	68,759	279,405	12,295	2,427	16,922	2,286	29,216	34,513	34,568	13,037	10,317	15,012	**615,630**
YNY	599		8	37	247	576	3,884	302	55	323	59	552	739	398	192	149	337	**8,456**
CRT	4,621	8		76	881	918	5,313	503	68	686	91	1,583	1,515	1,005	293	188	520	**18,268**
POU	17,034	37	76		244	842	6,964	595	73	693	115	1,970	2,170	1,626	664	276	399	**33,780**
RHI	74,619	247	881	244		149	1,120	73	7	116	29	392	564	296	128	67	137	**79,069**
HUD	68,759	576	918	842	149		1,366	188	55	110	20	269	284	225	99	62	102	**74,024**
ALB	279,405	3,884	5,313	6,964	1,120	1,366		223	49	1,270	173	5,151	5,952	6,097	1,369	758	261	**319,356**
SDY	12,295	302	503	595	73	188	223		16	468	130	1,663	2,181	1,834	476	250	300	**21,496**
AMS	2,427	55	68	73	7	55	49	16		42	10	243	377	373	106	43	0	**3,944**
UCA	16,922	323	686	693	116	110	1,270	468	42		54	656	1,184	1,287	551	190	0	**24,553**
ROM	2,286	59	91	115	29	20	173	130	10	54		166	263	286	122	62	0	**3,866**
SYR	29,216	552	1,583	1,970	392	269	5,151	1,663	243	656	166		1,860	3,956	1,565	969	0	**50,211**
ROC	34,513	739	1,515	2,170	564	284	5,952	2,181	377	1,184	263	1,860		965	554	435	0	**53,556**
BUF	34,568	398	1,005	1,626	296	225	6,097	1,834	373	1,287	286	3,956	965		32	324	0	**53,272**
BFX	13,037	192	293	664	128	99	1,369	476	106	551	122	1,565	554	32		36	0	**19,223**
NFL	10,317	149	188	276	67	62	758	250	43	190	62	969	435	324	36		0	**14,128**
SAR	15,012	337	520	399	137	102	261	300	0	0	0	0	0	0	0	0		**17,067**
Grand Total	**615,630**	**8,456**	**18,268**	**33,780**	**79,069**	**74,024**	**319,356**	**21,496**	**3,944**	**24,553**	**3,866**	**50,211**	**53,556**	**53,272**	**19,223**	**14,128**	**17,067**	**1,409,899**

2018 79MPH

Stations	NYP	YNY	CRT	POU	RHI	HUD	ALB	SDY	AMS	UCA	ROM	SYR	ROC	BUF	BFX	NFL	SAR	Grand Total
NYP		599	4,621	17,100	75,165	69,379	304,981	19,228	3,413	21,639	4,510	81,130	78,788	77,998	32,397	26,143	20,865	**837,956**
YNY	599		8	38	271	621	7,581	1,153	154	2,002	432	6,125	8,160	6,605	3,599	4,107	1,390	**42,844**
CRT	4,621	8		76	960	965	8,574	1,542	225	2,652	543	6,547	5,830	3,904	2,597	2,444	1,786	**43,274**
POU	17,100	38	76		245	869	10,116	1,496	196	1,922	409	5,111	4,616	2,459	1,438	1,343	1,329	**48,764**
RHI	75,165	271	960	245		150	1,462	204	26	435	126	1,396	1,294	314	221	309	356	**82,933**
HUD	69,379	621	965	869	150		1,438	412	165	412	76	1,233	1,030	832	587	724	139	**79,032**
ALB	304,981	7,581	8,574	10,116	1,462	1,438		308	82	2,735	468	12,826	12,824	15,873	5,541	6,474	294	**391,576**
SDY	19,228	1,153	1,542	1,496	204	412	308		17	717	224	3,194	4,041	3,791	1,509	1,370	300	**39,507**
AMS	3,413	154	225	196	26	165	82	17		59	17	445	674	888	270	274	0	**6,905**
UCA	21,639	2,002	2,652	1,922	435	412	2,735	717	59		54	958	2,041	2,896	1,411	1,128	0	**41,062**
ROM	4,510	432	543	409	126	76	468	224	17	54		222	473	698	344	334	0	**8,930**
SYR	81,130	6,125	6,547	5,112	1,396	1,233	12,826	3,194	445	958	222		2,544	6,669	3,200	3,710	0	**135,312**
ROC	78,788	8,160	5,830	4,616	1,294	1,031	12,824	4,041	674	2,041	473	2,544		1,273	815	1,340	0	**125,744**
BUF	77,998	6,605	3,904	2,459	314	832	15,873	3,791	888	2,896	698	6,669	1,273		32	349	0	**124,581**
BFX	32,397	3,599	2,597	1,438	221	587	5,541	1,509	270	1,411	344	3,200	815	32		36	0	**53,997**
NFL	26,143	4,107	2,444	1,343	309	724	6,474	1,370	274	1,128	334	3,710	1,340	349	36		0	**50,086**
SAR	20,865	1,390	1,786	1,329	356	139	294	300	0	0	0	0	0	0	0	0		**26,458**
Grand Total	**837,956**	**42,844**	**43,274**	**48,766**	**82,934**	**79,032**	**391,576**	**39,507**	**6,905**	**41,061**	**8,930**	**135,311**	**125,743**	**124,581**	**53,997**	**50,086**	**26,458**	**2,138,961**

Station to Station Rail Trips – 2018 90MPH and 2018 110MPH

2018 90MPH

Stations	NYP	YNY	CRT	POU	RHI	HUD	ALB	SDY	AMS	UCA	ROM	SYR	ROC	BUF	BFX	NFL	SAR	Grand Total
NYP		599	4,621	17,102	75,168	69,382	305,048	19,284	3,451	22,058	4,958	88,443	88,078	95,354	40,024	31,478	20,865	885,913
YNY	599		8	38	271	621	7,609	1,162	160	2,007	523	6,725	9,931	10,427	5,850	6,357	1,391	53,678
CRT	4,621	8		76	960	965	8,574	1,549	233	2,649	644	6,951	6,474	4,792	3,416	3,315	1,786	47,013
POU	17,102	38	76		245	869	10,099	1,502	203	1,944	476	5,476	5,149	2,634	1,634	1,761	1,327	50,534
RHI	75,168	271	960	245		150	1,462	205	28	502	179	1,689	1,590	337	265	446	356	83,852
HUD	69,382	621	965	869	150		1,438	414	173	488	114	1,596	1,423	1,249	976	1,385	139	81,382
ALB	305,048	7,609	8,574	10,099	1,462	1,438		308	85	3,149	563	15,604	15,929	20,193	7,707	10,258	294	408,320
SDY	19,284	1,162	1,549	1,502	205	414	308		17	838	267	3,956	5,084	4,721	2,088	2,036	300	43,730
AMS	3,451	160	233	203	28	173	85	17		67	20	561	875	1,165	364	423	0	7,822
UCA	22,058	2,007	2,649	1,944	502	488	3,149	838	67		54	1,078	2,496	3,856	1,915	1,739	0	44,841
ROM	4,958	523	644	476	179	114	563	267	20	54		253	601	992	517	515	0	10,677
SYR	88,443	6,725	6,951	5,476	1,689	1,596	15,604	3,956	561	1,078	253		2,927	8,381	4,210	5,103	0	152,952
ROC	88,078	9,931	6,474	5,149	1,590	1,423	15,929	5,084	875	2,495	601	2,927		1,442	926	1,653	0	144,575
BUF	95,354	10,427	4,792	2,634	337	1,249	20,193	4,721	1,165	3,856	992	8,381	1,442		32	353	0	155,929
BFX	40,024	5,850	3,416	1,634	264	976	7,707	2,088	364	1,915	517	4,210	926	32		36	0	69,958
NFL	31,478	6,357	3,315	1,761	446	1,385	10,258	2,036	423	1,739	515	5,103	1,653	353	36		0	66,857
SAR	20,865	1,391	1,786	1,327	356	139	294	300	0	0	0	0	0	0	0	0		26,457
Grand Total	**885,913**	**53,678**	**47,013**	**50,534**	**83,853**	**81,382**	**408,319**	**43,730**	**7,822**	**44,840**	**10,677**	**152,951**	**144,575**	**155,929**	**69,958**	**66,857**	**26,457**	**2,334,490**

2018 110MPH

Stations	NYP	YNY	CRT	POU	RHI	HUD	ALB	SDY	AMS	UCA	ROM	SYR	ROC	BUF	BFX	NFL	SAR	Grand Total
NYP		599	4,621	17,102	75,168	69,381	305,065	19,356	3,486	22,371	5,183	93,212	94,880	107,425	45,263	34,284	20,877	918,271
YNY	599		8	38	271	621	7,609	1,172	165	2,237	612	7,870	12,203	14,056	8,005	8,101	1,391	64,957
CRT	4,621	8		76	960	965	8,574	1,562	242	2,881	744	7,588	7,313	5,532	4,063	3,946	1,786	50,860
POU	17,102	38	76		245	869	10,099	1,514	211	2,127	542	5,999	5,778	2,771	1,779	2,067	1,326	52,541
RHI	75,168	271	960	245		150	1,463	207	29	557	208	1,887	1,828	357	294	529	356	84,509
HUD	69,381	621	965	869	150		1,439	419	181	552	135	1,852	1,765	1,551	1,255	1,810	139	83,083
ALB	305,065	7,609	8,574	10,099	1,463	1,439		309	89	3,505	660	17,592	18,521	23,855	9,599	13,401	294	422,071
SDY	19,356	1,172	1,562	1,514	207	419	309		17	931	310	4,472	5,911	5,478	2,575	2,570	300	47,103
AMS	3,486	165	242	211	29	181	89	17		73	22	630	1,027	1,394	444	536	0	8,546
UCA	22,371	2,237	2,881	2,127	557	552	3,505	931	73		54	1,134	2,838	4,738	2,357	2,218	0	48,572
ROM	5,183	612	744	542	208	135	660	310	22	54		257	678	1,248	674	641	0	11,969
SYR	93,212	7,870	7,588	5,999	1,887	1,852	17,592	4,472	630	1,134	257		3,269	10,262	5,359	6,307	0	167,689
ROC	94,880	12,203	7,313	5,778	1,828	1,765	18,521	5,911	1,027	2,838	678	3,269		1,641	1,051	1,863	0	160,565
BUF	107,425	14,056	5,532	2,771	357	1,551	23,855	5,478	1,394	4,738	1,248	10,262	1,641		32	353	0	180,693
BFX	45,263	8,005	4,063	1,779	294	1,255	9,599	2,575	444	2,357	674	5,359	1,051	32		36	0	82,785
NFL	34,284	8,101	3,946	2,067	529	1,810	13,401	2,570	536	2,218	641	6,307	1,863	353	36		0	78,664
SAR	20,877	1,391	1,786	1,326	356	139	294	300	0	0	0	0	0	0	0	0		26,470
Grand Total	**918,272**	**64,957**	**50,860**	**52,541**	**84,510**	**83,083**	**422,071**	**47,103**	**8,546**	**48,572**	**11,969**	**167,689**	**160,565**	**180,692**	**82,785**	**78,664**	**26,470**	**2,489,350**

Station to Station Rail Trips – 2035 NO BUILD and 2035 79MPH

2035 NO BUILD

Stations	NYP	YNY	CRT	POU	RHI	HUD	ALB	SDY	AMS	UCA	ROM	SYR	ROC	BUF	BFX	NFL	SAR	Grand Total
NYP		652	4,827	31,820	89,224	95,002	271,351	13,736	3,375	18,498	2,495	30,367	36,298	34,091	12,984	10,331	41,553	696,605
YNY	652		8	46	364	681	4,154	349	90	477	113	527	866	440	218	159	637	9,779
CRT	4,827	8		89	1,021	1,037	5,237	555	79	733	98	1,531	1,669	998	297	188	1,056	19,422
POU	31,820	46	89		306	1,044	7,626	745	91	814	136	2,261	2,614	1,845	1,158	320	1,338	52,253
RHI	89,224	364	1,021	306		179	1,156	83	8	128	32	429	651	325	187	74	402	94,568
HUD	95,002	681	1,037	1,044	179		1,442	212	66	131	24	313	348	253	328	70	215	101,347
ALB	271,351	4,154	5,237	7,626	1,156	1,442		217	52	1,165	163	4,411	5,193	5,073	1,507	704	444	309,897
SDY	13,736	349	555	745	83	212	217		17	445	129	1,424	2,040	1,439	385	238	393	22,407
AMS	3,375	90	79	91	8	66	52	17		44	11	249	405	376	206	45	0	5,113
UCA	18,498	477	733	814	128	131	1,165	445	44		55	642	1,167	1,191	742	191	0	26,422
ROM	2,495	113	98	136	32	24	163	129	11	55		165	271	276	394	62	0	4,423
SYR	30,367	527	1,531	2,261	429	313	4,411	1,424	249	642	165		4,637	3,386	3,932	955	0	55,228
ROC	36,298	866	1,669	2,614	651	348	5,193	2,040	405	1,167	271	4,637		1,308	2,017	1,185	0	60,668
BUF	34,091	440	998	1,845	325	253	5,073	1,439	376	1,191	276	3,386	1,308		32	320	0	51,352
BFX	12,984	218	297	1,158	187	328	1,507	385	206	742	394	3,932	2,017	32		36	0	24,424
NFL	10,331	159	188	320	74	70	704	238	45	191	62	955	1,185	320	36		0	14,880
SAR	41,553	637	1,056	1,338	402	215	444	393	0	0	0	0	0	0	0	0		46,038
Grand Total	696,605	9,779	19,422	52,253	94,568	101,347	309,897	22,407	5,113	26,422	4,423	55,228	60,668	51,352	24,424	14,880	46,038	1,594,824

2035 79MPH

Stations	NYP	YNY	CRT	POU	RHI	HUD	ALB	SDY	AMS	UCA	ROM	SYR	ROC	BUF	BFX	NFL	SAR	Grand Total
NYP		652	4,827	31,858	89,226	95,789	297,831	23,399	5,050	23,529	4,992	81,201	82,357	80,299	33,063	26,886	61,800	942,759
YNY	652		8	47	411	734	7,903	1,311	222	1,962	487	4,323	8,206	6,989	3,941	4,298	2,698	44,191
CRT	4,827	8		89	1,116	1,089	8,346	1,757	263	2,677	585	6,168	5,972	3,955	2,587	2,444	3,465	45,348
POU	31,858	47	89		307	1,076	10,967	1,947	247	2,111	486	5,556	5,336	2,730	1,930	1,528	4,151	70,365
RHI	89,226	411	1,116	307		180	1,495	229	28	448	140	1,419	1,421	344	307	339	1,253	98,662
HUD	95,789	734	1,089	1,076	180		1,517	460	178	446	91	1,316	1,204	928	1,405	815	424	107,654
ALB	297,831	7,903	8,346	10,967	1,495	1,517		300	86	2,572	440	11,659	12,125	14,886	6,296	6,199	597	383,220
SDY	23,399	1,311	1,757	1,947	229	460	300		18	686	221	2,796	3,809	3,266	1,218	1,279	393	43,089
AMS	5,050	222	263	247	28	178	86	18		62	18	454	732	891	380	288	0	8,918
UCA	23,529	1,962	2,677	2,111	448	446	2,572	686	62		55	935	2,055	2,744	1,826	1,130	0	43,238
ROM	4,992	487	585	486	140	91	440	221	18	55		221	488	676	1,106	336	0	10,342
SYR	81,201	4,323	6,168	5,557	1,419	1,316	11,659	2,796	454	935	221		5,347	5,904	8,110	3,629	0	139,038
ROC	82,357	8,206	5,972	5,337	1,422	1,204	12,125	3,809	732	2,055	488	5,347		1,753	2,993	2,211	0	136,012
BUF	80,299	6,989	3,955	2,730	344	928	14,886	3,266	891	2,744	676	5,904	1,753		32	345	0	125,744
BFX	33,063	3,941	2,587	1,930	307	1,405	6,296	1,218	380	1,826	1,106	8,110	2,993	32		36	0	65,230
NFL	26,886	4,298	2,444	1,528	339	815	6,199	1,279	288	1,130	336	3,629	2,211	345	36		0	51,762
SAR	61,800	2,698	3,465	4,151	1,253	424	597	393	0	0	0	0	0	0	0	0		74,781
Grand Total	942,759	44,191	45,348	70,367	98,663	107,655	383,219	43,089	8,918	43,238	10,342	139,036	136,010	125,744	65,230	51,762	74,781	2,390,352

Station to Station Rail Trips – 2035 90MPH and 2035 110MPH

2035 90MPH

Stations	NYP	YNY	CRT	POU	RHI	HUD	ALB	SDY	AMS	UCA	ROM	SYR	ROC	BUF	BFX	NFL	SAR	Grand Total
NYP		652	4,827	31,858	89,226	95,795	297,972	23,531	5,111	23,994	5,457	88,731	92,633	97,183	40,499	32,147	61,800	**991,414**
YNY	652		8	47	413	736	7,965	1,330	230	2,176	579	5,497	10,970	11,100	6,402	6,639	2,706	**57,448**
CRT	4,827	8		89	1,116	1,089	8,346	1,767	272	2,900	692	6,979	6,957	4,868	3,408	3,310	3,465	**50,096**
POU	31,858	47	89		307	1,076	10,967	1,958	256	2,299	564	6,302	6,146	2,919	2,114	1,986	4,150	**73,037**
RHI	89,226	413	1,116	307		180	1,495	231	29	519	183	1,720	1,741	366	370	472	1,253	**99,620**
HUD	95,795	736	1,089	1,076	180		1,517	463	186	532	124	1,713	1,664	1,346	2,021	1,462	424	**110,329**
ALB	297,972	7,965	8,346	10,967	1,495	1,517		300	89	2,997	529	14,458	15,397	19,458	8,963	9,960	597	**401,010**
SDY	23,531	1,330	1,767	1,958	231	463	300		18	808	264	3,521	4,823	4,187	1,729	1,916	393	**47,237**
AMS	5,111	230	272	256	29	186	89	18		71	21	572	954	1,175	489	447	0	**9,919**
UCA	23,994	2,176	2,900	2,299	519	532	2,997	808	71		55	1,055	2,534	3,701	2,498	1,740	0	**47,880**
ROM	5,457	579	692	564	183	124	529	264	21	55		251	622	968	1,652	517	0	**12,478**
SYR	88,731	5,497	6,979	6,302	1,720	1,713	14,458	3,521	572	1,055	251		5,723	7,511	10,736	4,987	0	**159,756**
ROC	92,633	10,970	6,957	6,146	1,741	1,664	15,397	4,823	954	2,534	622	5,723		1,992	3,400	2,566	0	**158,122**
BUF	97,183	11,100	4,868	2,919	366	1,346	19,458	4,187	1,175	3,701	968	7,511	1,992		32	349	0	**157,156**
BFX	40,499	6,402	3,408	2,114	370	2,021	8,963	1,729	489	2,498	1,652	10,736	3,400	32		36	0	**84,348**
NFL	32,147	6,639	3,310	1,986	472	1,462	9,960	1,916	447	1,740	517	4,987	2,566	349	36		0	**68,534**
SAR	61,800	2,706	3,465	4,151	1,253	424	597	393	0	0	0	0	0	0	0	0		**74,789**
Grand Total	**991,414**	**57,448**	**50,096**	**73,037**	**99,622**	**110,330**	**401,010**	**47,237**	**9,919**	**47,879**	**12,478**	**159,755**	**158,121**	**157,156**	**84,348**	**68,533**	**74,789**	**2,603,173**

2035 110MPH

Stations	NYP	YNY	CRT	POU	RHI	HUD	ALB	SDY	AMS	UCA	ROM	SYR	ROC	BUF	BFX	NFL	SAR	Grand Total
NYP		652	4,827	31,858	89,226	95,796	297,986	23,637	5,160	24,301	5,716	93,610	100,200	110,211	46,103	35,136	61,857	**1,026,274**
YNY	652		8	47	413	736	7,965	1,339	236	2,403	666	6,544	13,515	15,021	8,822	8,508	2,706	**69,580**
CRT	4,827	8		89	1,116	1,089	8,346	1,781	281	3,140	795	7,631	7,840	5,615	4,069	3,947	3,465	**54,041**
POU	31,858	47	89		307	1,076	10,967	1,972	264	2,503	639	6,917	6,892	3,068	2,257	2,322	4,150	**75,329**
RHI	89,226	413	1,116	307		180	1,495	233	30	573	211	1,930	2,004	388	421	560	1,253	**100,341**
HUD	95,796	736	1,089	1,076	180		1,517	467	194	601	146	2,007	2,074	1,673	2,480	1,936	424	**112,397**
ALB	297,986	7,965	8,346	10,967	1,495	1,517		302	93	3,356	622	16,568	18,230	23,343	11,329	13,296	597	**416,012**
SDY	23,637	1,339	1,781	1,972	233	467	301		18	900	307	4,036	5,645	4,921	2,174	2,442	393	**50,567**
AMS	5,160	236	281	264	30	194	93	18		78	23	649	1,131	1,418	596	575	0	**10,747**
UCA	24,301	2,403	3,140	2,503	574	601	3,356	900	78		55	1,120	2,916	4,591	3,141	2,260	0	**51,940**
ROM	5,716	666	795	639	211	146	622	307	23	55		258	709	1,227	2,173	655	0	**14,203**
SYR	93,610	6,544	7,631	6,917	1,931	2,008	16,568	4,036	649	1,120	258		6,059	9,235	13,753	6,167	0	**176,485**
ROC	100,200	13,515	7,840	6,892	2,004	2,074	18,230	5,645	1,131	2,916	709	6,059		2,260	3,862	2,806	0	**176,145**
BUF	110,211	15,021	5,615	3,068	389	1,673	23,343	4,921	1,418	4,591	1,227	9,235	2,260		32	349	0	**183,353**
BFX	46,103	8,822	4,069	2,257	422	2,480	11,329	2,174	596	3,141	2,173	13,753	3,862	32		36	0	**101,245**
NFL	35,136	8,508	3,947	2,322	560	1,936	13,296	2,442	575	2,260	655	6,167	2,806	349	36		0	**80,996**
SAR	61,857	2,706	3,465	4,150	1,253	424	597	393	0	0	0	0	0	0	0	0		**74,845**
Grand Total	**1,026,275**	**69,580**	**54,041**	**75,329**	**100,343**	**112,398**	**416,012**	**50,567**	**10,747**	**51,940**	**14,203**	**176,484**	**176,144**	**183,353**	**101,245**	**80,995**	**74,844**	**2,774,500**

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Appendix C Alternatives Development and Screening Report

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List of Exhibits

1. Initial Alternatives Development and Screening

1.1. Overview

The High Speed Rail Empire Corridor Program initially considered six passenger rail service alternatives, defined by their "maximum authorized speed" (MAS) [1] ratings along the Empire Corridor West segment of the Corridor that runs between Albany/Schenectady and Buffalo-Depew/Niagara Falls, in addition to a Base Alternative (No Action). Three of the six proposed MAS services were: 79 mph (the current passenger MAS west of Hoffmans MP169.9), 90 mph and 110 m p h . Each of these speeds has specific regulatory requirements associated with track geometry and topography and, together, they were deemed to represent a reasonable range of alternatives.
Subsequently, as a result of input from Public Scoping meetings held in the fall of 2010, "very high speed" (VHS) alternatives of 125 mph, 160 mph and 220 mph MAS were added to the alternatives development and screening process.

1.2. Base Alternative (No Action)

All alternatives include the improvements made under the Base Alternative (No Action). The Base Alternative consists of eight capital improvement projects that have been funded under TIGER grants and other mechanisms. The Base (Alternative is carried through the Tier 1 EIS as the Base Alternative (BA) to evaluate the cost and impacts of the program Build Alternatives in relation to the benefits gained by the public through this minimal upgrading of existing service on the existing right-of-way.

The Base Alternative represents a continuation of existing Amtrak service with limited operational and service improvements currently planned and funded to address previously identified capacity constraints. Such improvements would consist of new rail vehicles, maintenance, rehabilitation and improvement to track capacity, signal work, highway-rail crossings, and passenger stations. The key improvement projects under the Base Alternative are summarized in Exhibit C-1. Train frequency would remain unchanged from the existing frequency.

Despite increasing ridership, the Base Alternative makes no provision for any improvement of rail service beyond what is already being operated and programmed by Amtrak, Metro-North and/or NYSDOT. It would assume the continued operation of four daily round-trips of conventional speed Amtrak passenger trains between Penn Station, New York City and Niagara Falls on the Metro-North Rail Road and CSXT-owned alignment.

[#]/MAS refers to the maximum allowable speed for specific types of rail equipment based on track geometry and topography. Most passenger services will spend only a portion of the time at the MAS – steep hills and sharper curves interspersed along the right-of-way will require deceleration and acceleration that result in lower average speeds over the entire length of the segment.

Exhibit C-1 — Base (No Action) Alternative Passenger Rail Improvement Projects

Project Name (Milepost)	ARRA Grant Application	Project Description
Hudson Subdivision Signal Reliability (MP 75.8 to 140)	ES-3	Replace old signal poles (for electric power to signals and communication lines) with underground cable between Poughkeepsie and Rensselaer Station.
Highway-Rail Grade Crossings Safety Improvements CSXT Hudson Line (MP 75.8 to 140)	ES-1	Design and install grade crossing active warning device, roadway approach and/or pedestrian improvements to accommodate improved passenger rail operations between Poughkeepsie and Albany-Rensselaer.
Rensselaer Station Fourth Track Capacity Improvements (MP 141 to 143)	ES-9	Add fourth track and extend platform to increase station capacity, operating speeds, train frequency, routing, and reduce delays.
Albany-Schenectady Double Track (MP 143.2 to 160.3)	ES-10	Design, construct and rehabilitate a second main track between the Rensselaer and Schenectady stations to increase capacity, reduce bottleneck, and improve operations in congested single track segment.
Schenectady Station Renovation /Platform Improvements (MP 159.8)	EW-01	Complete station reconstruction, ADA-compliant platform and station access, viaduct repairs and parking improvements.
Syracuse Track Configuration and Signal Improvements (MP 287 to 291)	EW-6	Upgrade existing third track to reduce congestion, delays and interference between passenger and freight trains.
Rochester Subdivision Third Main Track (MP 382 to 393)	EW-20	New third main track and signal system to improve speed, frequency, and reliability.
Niagara Falls Station – New Intermodal Transportation Center (MP 28.2)	EW-13	New station with improved location in downtown Niagara Falls, function, operation, connectivity, border security, less delays.

ES=Empire Corridor South; EW= Empire Corridor West
Source: NYSDOT ARRA Grant Applications.

1.3. Alternatives Screening

The purpose of the screening process was to dismissed from further evaluation, alternatives that fail to meet the program objectives as articulated in the program Purpose and Need. The screening is also intended to ensure that all alternatives fall within an economically, environmentally and technologically feasible range. Given these premises, the 79, 160 and 220 mph MAS alternatives were eliminated from further evaluation in the Tier 1 EIS. The following is a brief description of the alternatives and an assessment of their shortcomings in meeting the program performance objectives. A summary of this analysis is provided in Exhibit C-2.

Exhibit C-2 — Overview of all Alternatives under Initial Consideration

Empire Corridor Alternatives	Maximum Authorized Speed	Average Speed (Including Stops)	Best Scheduled Travel Time NYC-NFL	Est. Capital Costs (Billions USD)	Annual O&M Cost (Millions USD)	Annual Ticket Revenue (Millions USD)	Annual Net Subsidy (Millions USD)	Est. Annual Ridership	Alternative Description	Notes	Train Technology
BA	79 mph	53 mph	8:45	0.35	84.49	80.06	4.43	1,595,000*	Includes previously approved projects which provide improvements to: Station, Capacity, Signal System and Service Reliability	Existing 110 mph speed maintained Hudson-Albany-Schenectady	
79A	79 mph	55 mph	8:21	1.50	84.49	110.85	(26.36)	2,077,000*	Improvements to make service more reliable, including passing sidings, signals and station improvements.	Existing 110 mph speed maintained Hudson-Albany- Schenectady	*"79 mph Series:" Current limit on CSXT Empire Corridor West based on Class 4 track standards and lack of in-cab signaling. Uses current vehicle technology with possibility of integrated trainset.*
79B	79 mph	59 mph	7:51	2.00	137.65	119.19	18.46	2,200,000*	Adds trains to increase frequency, including 4 express service trains. Infrastructure same as Alt. 79A.	Existing 110 mph speed maintained Hudson-Albany- Schenectady	
79C	79 mph	60 mph	7:41	8.10	151.60	131.13	20.47	2,379,000*	Adds a new dedicated single main track to existing alignment (15-ft. track centers). Adds 4 express service trains.	Existing 110 mph speed maintained Hudson-Albany- Schenectady	
90A	90 mph	60 mph	7:43	2.50	137.65	123.51	14.41	2,267,000*	Same improvements as 79B, but includes train control improvements to allow 90 MPH operation where supported by the alignment. Includes grade crossing warning system upgrades at all public crossings.	Existing 110 mph speed maintained Hudson-Albany- Schenectady	*"90 mph Series:" Next step up (Class 5) in track standards (also requires PTC with in-cab signaling). Uses current vehicle technology with possibility of integrated trainset.*
90B	90 mph	64 mph	7:09	9.90	152.60	144.79	7.81	2,589,000*	Adds a new dedicated single main track to existing alignment (15-ft. track centers) / Includes PTC Signal System for new main track.	Existing 110 mph speed maintained Hudson-Albany-Schenectady	
110	110 mph	67 mph	6:51	10.80	154.70	155.62	(0.92)	2,775,000 *	Adds trains to increase frequency, including 4 express service trains/Adds a new dedicated single main track to existing alignment (30-ft. track centers)/Includes PTC Signal System, including cab signals/Includes warning system upgrades		*110 mph: Next step up (Class 6) in track standards (current top speed along dedicated track between Hudson-Albany/Rensselaer and Schenectady). Uses current vehicle technology with possibility of integrated trainset.*
125	125 mph	74 mph	5:38	15.00	278.63	183.60	95.03	3,188,000 **	New alignment on sealed corridor / Electrification of new track / Adds trains to increase frequency beyond level in 110 alternative/ New stations / Elimination of grade crossings / New PTC Signal System	Ridership analysis based on the prior developed model and ridership numbers have a conservative bias. Buffalo to Albany is 18 miles shorter than existing Corridor, Albany - NYC on existing. Niagara Falls via 10 minute platform connection at Buffalo.	*125 mph: the first speed threshold for electrified operation and the performance benefits achieved through electrically-powered trains*
160	160 mph	85 mph	4:54	27.00	321.50	237.65	83.85	4,067,000 ***	New alignment on sealed corridor / Electrification of new track / Adds additional trains in excess of 110 alternative / New stations / Elimination of grade crossings / New PTC Signal System	Ridership analysis based on the prior developed model and ridership numbers have a conservative bias. Buffalo to Albany is 18 miles shorter, Albany - NYC is 39 miles longer than existing Corridor via connection to Northeast Corridor at Rye, NY. Niagara Falls via 10 minute platform connection at Buffalo.	*160 mph: practical upper limit of electrified dynamic tilt trains, such as the Amtrak Acela, that provide faster operating speeds on curves*
220	220 mph	93 mph	4:29	39.00	333.40	298.83	34.57	5,122,000 ****	New alignment on sealed corridor / Electrification of new track / Adds trains to increase frequency beyond level in 110 alternative, including 4 express service trains / New stations / Elimination of grade crossings / New PTC Signal System / 220 mph includes specialized train sets	Ridership analysis based on the prior developed model and ridership numbers have a conservative bias. Buffalo to Albany is 18 miles shorter, Albany - NYC is 39 miles longer than existing Corridor via connection to Northeast Corridor at Rye, NY. Niagara Falls via 10 minute platform connection at Buffalo.	*220 mph: practical upper limit of world class high speed rail operations in France, Germany, Spain, Japan and China*

* Ridership numbers are based on initial operating plans with 13 round trips between NYP (Penn Station) and Buffalo

** Ridership numbers are based on operating plan with 125 MPH MAS operating speed in conjunction with the existing service plan along the Empire Corridor. Total number of 15 round trips between NYP-NFL, with stops at ALB, UCA, SYR, ROC and BFX

*** Ridership numbers are based on operating plans with 160 MPH MAS operating speed in conjunction with the existing service plan along the Empire Corridor. Total number of 15 round trips between NYP-NFL, with stops at ALB, UCA, SYR, ROC and BFX

**** Ridership numbers are based on operating plans with 220 MPH MAS operating speed in conjunction with the existing service plan along the Empire Corridor. Total number of 15 round trips between NYP-NFL, with stops at ALB, UCA, SYR, ROC and BFX

1 Original Ridership model was designed to analyze the effect in the improvement of the Empire Corridor Rail Service. This model does not fully capture the ridership benefits associated with Very High Speed Rail which would be an much enhanced and new travel mode along this corridor.

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1.3.1. Alternative 79

The 79 mph MAS alternative was developed with three variations, each of which represented different levels of rail infrastructure improvements, and, therefore, associated costs. These sub-alternatives were termed Alternative 79A, Alternative 79B and Alternative 79C. All three of the 79 mph alternatives were to provide greater reliability and fewer conflicts with existing and future CSXT freight movements along the Empire Corridor West segment (under all cases, service characteristics along Empire Corridor South between Albany-Rensselaer and New York Penn Station would remain unchanged).

Alignment and Service

Alternative 79A is focused on improving the reliability of existing passenger rail service. The frequency of service would remain at four round trips a day. Current on-time performance is low, discouraging ridership and adding to Amtrak operating costs. The goal of the 79 alternatives is to incorporate sufficient capital improvements to the rail system to ensure 85-90 percent on- time performance between Albany, Buffalo and Niagara Falls. To accomplish this, under Alternative 79A, the existing Empire Corridor track alignment would be used, which includes track, signal and station projects already approved by FRA as part of the Base Alternative, and additional capacity and station improvements.

Alternative 79B includes each of the improvements identified under Alternative 79A, along with service improvements that increase train frequency from four (4) to eight (8) round trips a day. Under Alternative 79C, all capacity and service improvements made under Alternative 79B would be made in addition to the construction of a dedicated third main track reserved largely for passenger trains, and segregated both physically and operationally from virtually all freight rail traffic. For Alternative 79C, the conceptual track improvements include a dedicated passenger track between MP 167 and MP 433, and the addition of five segments of fourth main track to facilitate “flying meets” between opposing direction passenger trains, in which trains can pass at normal speeds, with neither train needing to slow or stop to allow the other to pass.

Ridership Travel Time and Capital Costs

As indicated in Exhibit C-2, Alternatives 79A-79C have an estimated cost of 4.3 to 23 times greater than the Base Alternative cost of $350 million, and result in a 30 - 50 percent increase in ridership. Alternative 79A results in a minimal 24 minute time savings over the Base Alternative with a $1.15 billion dollar greater investment required, while 79C results in a 54 minute time savings and a $7.8 billion dollar greater investment over the base. When compared to the other alternatives, a similar or even lesser investment results in much greater time savings and slightly more ridership gains.

Conclusion

None of the 79 mph MAS alternatives provide a significant operational or cost advantage over the 90 mph MAS alternatives, which are distinguished primarily by track structure improvements to support higher passenger train speeds where feasible within the existing corridor alignment.

Because there was no substantive and positive differentiator of the 79 mph alternatives, they were not advanced for further consideration, as they did not meet the program purpose and need. In each case, the comparable 90 mph alternative showed superior trip time and ridership with a relatively small variance in estimated cost, resulting in the 90 mph MAS alternatives being retained over their slightly inferior 79 mph counterparts.

1.3.2. Alternative 160 and Alternative 220

The Very High Speed (VHS) Alternative 160 represents the practical upper limit of the existing Amtrak Acela-like electrified dynamic-tilt trains. The VHS Alternative 220 represents the current practical upper limit of world-class high speed rail operations as seen in France, Germany, Spain, Japan and China. Both involve the construction of a new, sealed two-track electrified railway paralleling Empire Corridor West and South, dedicated exclusively to high-speed passenger train service.

Alignment and Service

As distinct from current operations running along the west side of Manhattan and over the Spuyten Duyvil bridge, the VHS alternatives would emerge from New York City on the existing Northeast Corridor heading east towards New Haven along the I-95 corridor. On Empire Corridor South, it is not feasible to augment or supplant the existing right-of-way parallel to the Hudson River with a VHS alignment, due to the lack of physical space: the current railway is bounded to its immediate west by the Hudson River and by various town centers and rock formations to its immediate east, such that widening the right-of-way could only be accomplished with severe disruption to the natural River environment and local communities and their town centers, and at extraordinary cost. The course of the river and the surrounding terrain being densely developed and relatively undulating would not support the addition of new tracks or the much straighter geometry required to attain VHS.

Given the difficulties associated with VHS train operation in the existing Empire Corridor South, a number of new corridors between New York City and Albany were considered, all of which include difficult terrain in their own right, as well as service through densely populated areas or aligned with intensively used regional highways for much of the route. The corridors selected, however, while complicated by highway geometry, overpasses and interchanges, are designated as transportation corridors and could potentially support additional infrastructure, should it prove appropriate and affordable.

The proposed VHS routing would branch onto a new, high-speed alignment just north of New Rochelle/Rye, heading northwest along the I-684 median on structure or at grade. The routing would merge onto I-84 and cross the Hudson River via a new heavy rail bridge (the I-84 Bridge cannot be cost-effectively re-engineered to accommodate the additional load of heavy inter-city trains). Roughly paralleling the I-84 alignment, the routing would either loop around Stewart Airport or proceed directly up the New York State Thruway (I-87) median to Albany, generally on viaduct structure to allow smoothing of tight curves while minimizing property acquisition and environmental impacts. This would result in an entirely new station and market configuration. In either case, however, conflicts with existing highway overpasses would require extraordinary solutions, with the VHS right-of-way passing either deeply beneath or well above them, with concomitant engineering challenges and high costs.

On the western corridor, the VHS options would connect the northern cities of Buffalo, Rochester, Syracuse and Albany, with new “rural” corridors away from the existing right-of-way, through generally open land. These new segments would re-connect with the existing right-of-way as it passes through the major cities via open areas or on structure, with some property acquisition likely required.

Presuming an entirely separate VHS right-of-way between New York City and Albany as described above, attaining the high average speeds commensurate with the proposed investment would result in the likely diversion of VHS service from all but four of the existing Empire Corridor West stations. Albany-Rensselaer, Syracuse, Rochester and Buffalo-Exchange Street stations would serve both the VHS and any continued “legacy” Empire Corridor passenger service; the other stations – Utica, Rome, Schenectady – would be provided only the existing service, with no VHS stop in those cities. As such, there would be no synergies between existing commuter rail and high speed rail services in the corridor under these alternatives. With displacement of the VHS Empire Corridor South right-of-way to a corridor west of the Hudson River, it would not be possible to use Metro-North Railroad (MNR) commuter services to originate at a suburban station and connect to a high speed rail train.

Ridership, Travel Time and Capital Costs

The dedication of segregated right-of-way under the VHS alternatives would result in significant travel time savings between New York City and Niagara Falls (4:54 and 4:29 respectively for Alternative 160 and Alternative 220, versus the current 9:00 hour travel time using existing services), and commensurately higher estimated ridership (4.06 and 5.12 million respectively for Alternative 160 and Alternative 220). Travel gains for Alternative 160 and Alternative 220 would be roughly proportionate with the increase in speed, as the overall alignments would be of generally similar length, number of stops and service offerings.

The costs for the two VHS alternatives include 40 additional route miles between Albany and New York and complex and costly viaduct construction for portions of the route. If Alternative 160 or 220 options were advanced further, a “compromise” corridor alignment could possibly result that better balances use of existing and new corridors, which might result in lower viaduct costs. For purposes of this analysis, however, the VHS alignment is assumed to require a fully separate right-of-way, and therefore, results in a conservative estimate of capital cost.

Mile-by-mile infrastructure quantities were not developed for the VHS alternatives. Rather, the work items associated with constructing the alternatives were aggregated into broad categories using average costs from industry standards. Property acquisition, miles of viaduct, major and minor river crossings, grade separations, and average track, signal and electric catenary wire system construction values were taken from other high-speed systems. Overall, the estimated costs for Alternatives 160 and 220, in 2015 dollars, are $27 billion and $39 billion, respectively. These costs range from 1.8 to 2.6 times more than the cost of Alternative 125, as shown in Exhibit C-2.

Conclusion

Both the 160 and 225 mph MAS alternatives have been screened from this Tier 1 EIS, as only modest (compared to Alternative 125) ridership and travel time gains would be gained at an immense cost, and with significant environmental and community impacts. An extraordinary level of capital investment would be required for straight, electrified track in a tightly constrained corridor where the right-of-way occupies a narrow sliver of land between the Hudson River to the west and challenging natural (rock outcroppings) and community features (densely populated towns surrounding the stations) to the east. Although these alternatives would meet program performance objectives and thereby satisfy the Purpose and Need, the improvements would come at a cost that is, by any current measure, financially infeasible at $37 billion (160 mph MAS) and $39 billion (220 mph MAS), costs that are 30 to 43 times greater than the Amtrak intercity rail capital program for the entire United States was in FY2011.

For all of these reasons, the VHS alternatives are not advanced for further development in the Tier 1 Draft EIS. More prudent and feasible alternatives exist which confer transportation benefits more proportional to their costs, and which do not have such substantial negative costs, including property-takings, and community and environmental impacts.

1.4. Feasible Alternatives Advanced for Further Study

As a result of the preliminary screening, it was determined that Alternatives 90, 110 and 125 were appropriate for further development. Within Alternative 90, sub-alternatives were developed that were distinguished by their degree of reliance on existing CSXT mainline track for movement of passenger trains or by their inclusion of a new dedicated third main track (with fourth main track in selected locations) that would support most passenger train movements on tracks that do not also host freight trains.

During alternatives screening, future ridership was forecast using a methodology that would permit a reasonable assessment of the mobility benefits of each alternative. From this analysis, it was clear that all of the alternatives considered would produce higher inter-city rail ridership in response to higher speed and shorter trip times compared to the Base Condition. Therefore, ridership was not a primary factor in eliminating any of the alternatives. For the alternatives retained for further analysis, these preliminary ridership estimates were further refined using a statistical ridership model based on detailed simulations of passenger rail service that were conducted to minimize conflicts between passenger and freight trains sharing Empire Corridor tracks and switches.

The following is an overview of the four build alternatives plus the Base Alternative that were advanced for further study:

- **Base Alternative:** consists of eight capital improvement projects that have been funded from TIGER grants and other sources.

- **Alternative 90A:** consists of 20 capital improvement projects previously identified for potential TIGER grants and other funding. This alternative would provide a 90 mph MAS and limited express service, and also includes the Base Alternative projects.

- **Alternative 90B:** consists of additional areas of third track and fourth track and station improvements to accommodate a 90 mph MAS. This alternative also incorporates the 20 Alternative 90A improvements, in addition to the eight Base Alternative projects.

- **Alternative 110:** consists of additional areas of third track and fourth track and station improvements to permit of 110 mph MAS. This alternative also incorporates the 20 Alternative 90A improvements, in addition to the eight Base Alternative improvements.

- **Alternative 125:** maintains existing ("legacy") Empire Service and incorporates express service over a new, electrified, grade-separated two-track right-of-way for the Empire Corridor West segment, providing a 125 mph MAS between Albany-Rensselaer and Buffalo Exchange Street. At Syracuse and Rochester, the segregated right-of-way rejoins existing CSXT tracks and serves those stations. Alternative 125 incorporates Base Alternative improvements and those Alternative 90A improvements along the Hudson Line and Niagara Branch and the portions of Empire Corridor West that overlap with the new route.

1.4.1. Alternatives without Significant New Mainline Track

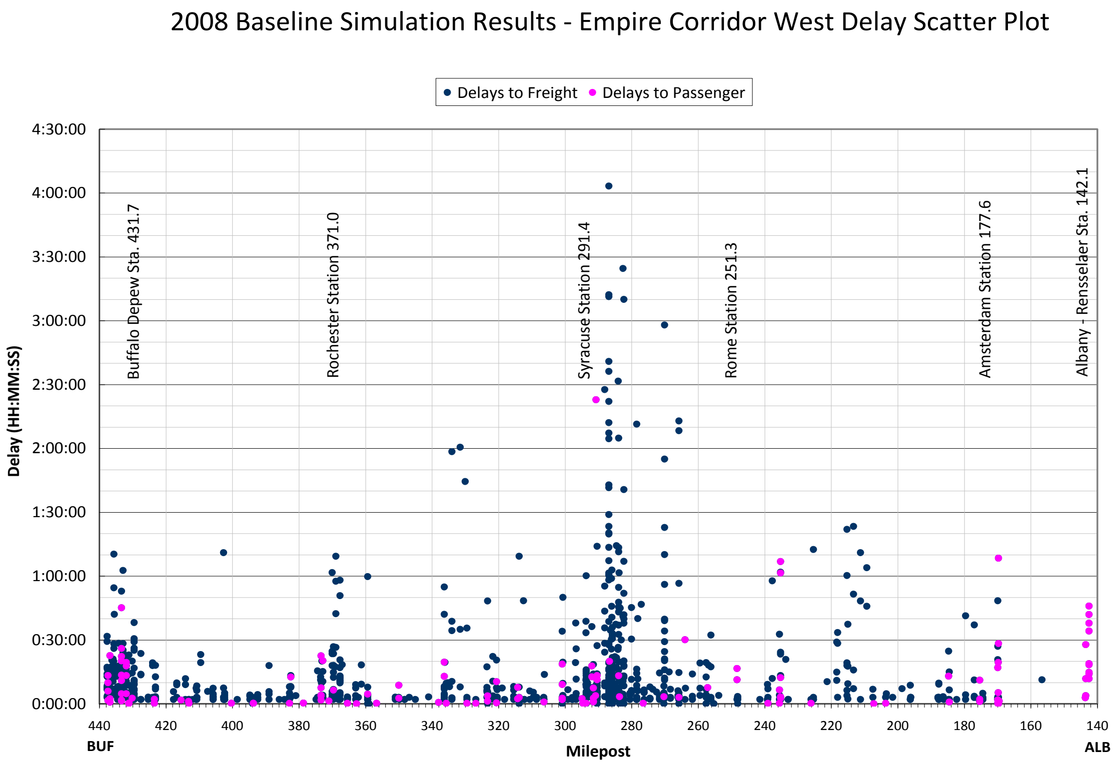
Alternative 90A features significant capital improvements, but not a new third or fourth main track on the existing Empire Corridor. The specific improvements included are based on an evaluation of potential capital projects developed for each segment of the corridor. Between New York and Albany-Rensselaer, improvements are based on those identified in the *Hudson Line Corridor Railroad Transportation Plan* (2005), a joint effort among NYSDOT, CSXT, MNR and Amtrak. These fourteen improvements were identified in the plan with a likely year of implementation, based on operational need, capital cost, available funding and permitting/design status.

West of Albany, some 33 improvement projects not already included in the Base Alternative were identified. These include projects from:

- NYSDOT ARRA grant applications to the FRA, which are, in turn, based on CSXT suggestions;
- The New York State Rail Plan; and
- Improvements suggested by the HNTB Team.

As with New York-to-Albany projects, these improvements were designated with a likely year of implementation based on operational need, capital cost, available funding and permitting/design status. Priority was given to projects that reduce the incidence and severity of delays caused by passenger and freight trains conflicts on shared tracks. These delays were identified from the 2008 Empire Corridor baseline simulation model, which was calibrated to reflect current operations in 2010, when this analysis was performed. The scatter plot shown in Exhibit C-3 — Empire Corridor West: 2008 Delays shows the location of the current delays, along with their magnitude (the vertical axis represents the duration of a single delay event, with the top of the chart representing a single delay lasting 4 ½ hours). While passenger train delays (shown in magenta in the graph) were given highest priority for resolution, freight train delay (shown in blue) mitigation was also pursued. This is because the program Purpose and Need includes a goal to avoid degradation of freight rail service in the corridor as passenger rail service improvements are implemented. Further, delayed freight trains often result in secondary delays to passenger trains due to congestion and loss of dispatching flexibility, so it is in the interest of both passenger and freight rail services to minimize them.

Exhibit C-3 — Empire Corridor West: 2008 Delays



West of Albany, the locations with the greatest magnitude of passenger delays in the simulation model are Syracuse, Rochester and Buffalo-Depew. Each of these stations has just a single passenger train platform edge, meaning that passenger trains are likely to be delayed by opposing direction passenger trains seeking to make a station stop at the same time. For this reason, double edge (one west-bound and one east-bound) platforms were given priority in the development of Alternative 90A at these three stations.

1.4.2. Alternatives with Significant New Mainline Track

Alternatives 90A, 90B and 110 present an incremental approach to providing improved rail services on the Empire Corridor. The improvements common to all three alternatives include installation of increasing lengths of new third track along the Empire Corridor West right-of-way, straightening of curves to allow higher speeds, improvements to signal systems, improvements to existing or installation of new interlockings, and reconfigured stations and platforms. These options result in improved operational flexibility and reduced trip times. However, conflicts with freight trains are only reduced, not eliminated, and curves with reduced allowable speeds remain. Compared to Alternative 90A, Alternatives 90B and 110 feature significant new mainline track between Schenectady and Niagara Falls. These two alternatives are distinguished largely by the higher design speed, 90 mph and 110 mph, respectively. Alternative 110 therefore produces somewhat faster service due to its higher speed and the inclusion of additional passing sidings (fourth track) that are not included in Alternative 90B.

Per FRA regulations, both of these alternatives will all require a new train control system (such as Positive Train Control) over the Empire Corridor West right-of-way to support operating speeds higher than the current 79 mph.

The alternatives with significant new mainline track include new Empire Corridor tracks between milepost (MP) 167 (just east of the junction with the Selkirk Branch at a location known as Hoffmans within the town of Glenville), to MP 433 (just west of Depew Station, Buffalo). These alternatives have been developed based on the requirements of single train simulations and meet locations, levels of service, desire to limit potential freight impacts and engineering requirements.

Each alternative, at a minimum, would provide the same level of freight operational flexibility as exists currently, and each seeks to improve freight capacity by moving the passenger trains off of freight mainlines onto dedicated passenger tracks.

For Alternative 90B, the conceptual track alignment consists of a dedicated passenger track between MP 167 and MP 433 with five additional segments of fourth main track to facilitate "flying meets" between opposing direction passenger trains. The new passenger track mainline is generally located 15 feet (ft.) to the north of the existing freight mainlines with the fourth main track segments located 15 ft. to the north of the dedicated passenger third track.

To limit conflicts between passenger and freight trains, several grade separations have been included in Alternative 90B. These are located near MP 279 (the east side of Dewitt Yard), MP 366 (the east side of Rochester Yard), and MP 427 (just east of Buffalo-Depew), which are the locations of the most significant freight-passenger conflicts.

Alternative 110 adheres to a May 2010 framework agreement between CSXT and NYSDOT. It is intended to support 110 mph maximum speed passenger train operation, while remaining in compliance with CSXT design and safety standards, guidelines and policies. Most notably, it provides for a separated and dedicated track for any passenger train operating at speeds in excess of 90 mph, with a minimum of 30 ft. measured from the center line of the freight track to the center line of the proposed passenger track. In locations where it was not practical to meet the required 30 ft. offset, the dedicated passenger track is located 15 ft. from the freight mainline and the maximum speed is 90 mph. Alternative 110 includes six segments of dedicated fourth main track to facilitate "flying meets" between opposing direction passenger trains. Because the existing two mainline tracks and former (now removed) third and fourth tracks are at 13-foot track centers or less, the 30-foot minimum separation has significant implications for this alternative. While it is possible to locate the new passenger third mainline 30 ft. from the existing freight tracks, providing a further 15 ft. for any fourth main track (a full 45 ft. from the existing freight mainlines) is problematic and possibly cost- prohibitive. Therefore, the segments of fourth main track have been located between the existing freight mainline and the proposed passenger third track; the maximum allowable speed on the fourth main track will be limited to 90 mph to comply with CSXT requirements.

1.4.3. Very High Speed Alternatives with Complete Grade Separation

The upper speed limit for dual-mode diesel and electric locomotives is 125 mph. As previously discussed, it is not feasible to augment or supplant the existing Empire Corridor South/Hudson River right-of-way between New York City and Albany, with a VHS alignment that could support 125 mph train operation. Such an alignment would result in significant impacts to existing communities and infrastructure along the Hudson River, or to the River itself. Under Alternative 125, train operation would be diesel between New York City and Albany at the current maximum authorized speed of 110 mph, and electric operation via overhead catenary wire on a new Empire West Corridor built for a 125 mph MAS to Buffalo, with a transfer at Buffalo Depew Station for the final leg to Niagara Falls.

For passenger train speeds exceeding 110 mph up to 125 mph, FRA standards for protection of rail and road traffic state that "the railroad shall submit for FRA's approval a complete description of the proposed barrier/warning system to address the protection of highway traffic and high-speed trains." FRA guidelines indicate that such a barrier/warning system technology may not exist at this time. Alternatives to grade separation include consolidation and closure of highway, public or private crossings, which is possible at some locations, but impractical at others if rail freight services are to be maintained. At this time, therefore, complete grade separation at all crossings is assumed for Alternative 125.

In general, Alternative 125 connects the major Empire Corridor West cities of Buffalo, Rochester, Syracuse and Albany with a new "rural" corridor away from but parallel to the existing right-of-way, through generally open land. These new segments re-connect with the existing right-of-way in the major cities via open areas or on structure, with some property acquisition likely to be required. This new, high speed passenger train-dedicated corridor at 125 mph MAS, making express stops only, reduces trip time by 45percent.

2. Engineering Assumptions and Discussion: Alternatives 90, 110 and 125

The following engineering assumptions were derived based on review of both the NYSDOT/CSXT Framework Agreement (May 2010) and program goals. These assumptions served as initial information for discussion of the alternatives, and have since been modified based on further input:

2.1. Alternative 90A

Proposed tracks are assumed to be mixed use tracks and have been primarily laid out using CSXT design criteria of 5 inch Ea (superelevation), with 1.5 inch Eu (underbalance) for freight and 5 inch Eu for Passenger, and No. 20 turnouts where feasible.

- Proposed Tracks will be offset 15 feet from the existing tracks where feasible.
- Existing track centers will be maintained in location where right-of-way is constrained.
- Proposed improvements will be constructed within the existing right-of-way.

- Proposed tracks will allow 79 mph MAS where feasible. There are several existing physical constraints that prevent the proposed projects from obtaining 79 mph MAS.

- Private and public crossings will be modified to accommodate the proposed tracks alignments. Crossing protection will be upgraded as necessary to accommodate the additional tracks and/or reconfigurations.

- Passing sidings (4th track) have been provided where feasible under alternative 79C to provide opportunities for meets without incurring delays.

- In some locations, the existing tracks were shifted or realigned to meet the program requirements.

2.2. Alternatives 90B and 110

- New passenger tracks are assumed to be dedicated passenger tracks. The only time freight would be on these tracks is for local freight operations over short distances and occasional use during major track maintenance windows or operational emergencies. This means that 6” Ea, 5” Eu, and No. 32.75 turnouts would be used on the new passenger tracks instead of the CSXT design criteria of 5” Ea, 1.5” Eu, and No. 20 turnouts.

- Private and public crossings locations will be identified. Crossing protection options will be evaluated in Tier 2 consistent with the FRA’s Highway Rail Grade Crossing Guidelines for High Speed Rail.

- For 110 mph operations, passing sidings (4th track) were assumed to have a 90 mph MAS and located 15 ft. from the existing mainline (that is between the existing mainline and the 30 ft. offset to a proposed 110 mph passenger track). Due to 80 mph operation through the diverging side of the number 32.75 turnouts at each end of the sidings and the distance required for the typical diesel powered train consist to accelerate from 80 mph to 110 mph (approximately 7.5 miles compared to a little over one mile from 80 to 90 mph), the 90 mph limitation would not be considered significant to overall run times on a 10 mile long segment of fourth track. The cost of placing the sidings to the outside of the proposed passenger main, or 45 ft. from the existing number 1 track, exceeds the value of the slight improvement in run times of trains running through the sidings. The 110 mph alternative would include sections of dedicated single passenger mainline that would require significant right-of-way to achieve speeds greater than 90 mph , and have been designed using a 15 ft. track center from the existing mainline and assigned a maximum speed of 90 mph. An example can be found from MP 328 to MP 350 shown on the 110 mph engineered track schematic.

- Where existing/relocated local freight sidings are present, it is assumed that the 110 mph track can be as close as 15 ft. to the freight siding. (If a 30-ft. track spacing is desired in these types of locations to achieve 110 mph, the passenger track MAS may need to be reduced to 90 mph through the area in question due to proximity of additional industry tracks and buildings, or may require relocation to create greater physical separation.)

- Where passenger trains need to co-mingle with freight, No. 20 turnouts were used; where passenger only, No. 32.75 turnouts were used, generally at the ends of the passenger train passing sidings.

- In some locations, the existing tracks were shifted or realigned to meet the design requirements. Grade separations of the new passenger mainline from the existing mainlines were used to avoid significant conflicts with freight trains at critical locations including the east approaches to Syracuse/ Dewitt Yard, Rochester, Buffalo-Depew.

2.2.1. Alternative 110 – Brief Overview from a Track Engineering Perspective

A conceptual alignment to achieve 110 mph operation with 30 ft. track centers from the existing mainline tracks was developed in CADD using an ideal design approach to curve modifications, if it were physically possible to achieve the curve geometry and 30 ft. track centers, along with engineer's judgment to determine the highest speed attainable. Isolated curves with a design speed less than 110 mph and locations where 30 ft. track centers were not feasible were given close scrutiny to determine an optimum balance among the goal of reduced trip time, cost, and environmental consequences. In some locations, a design speed of 90 mph was considered the best alignment possible and a 23- mile segment of very restrictive curves west of Syracuse, where an increase above 80 mph would incur miles of major realignment.

2.2.2. Examples of Where Desired Speeds Were Attained With Additional Work

1. Big Nose Curve

At Big Nose curve (MP 192.5, west of Amsterdam), 60 mph is the highest speed if the present alignment is retained. Recognizing the significant impact that an isolated 60 mph curve has on the 110 mph alternative, a 90 mph curve easement was defined onto the present NY State Route 5 location at the foot of the significant rock cut at the "nose." Since NY State Route 5 is about 20 ft. higher than the railroad at the base of the rock cut, it was determined that, rather than cutting the highway alignment further into the steep rock face, NY State Route 5 could instead straddle the relocated railroad on a viaduct more or less parallel to the railroad. Construction phasing of this improvement under both rail and highway traffic would be difficult and even slight alteration to the significant regional visage of the "nose" could generate opposition. However, a workable solution to this very restrictive curve would provide significant benefits to the program.

2. Tribes Hill Curve

At Tribes Hill curve (MP 182 west of Amsterdam), an existing curve of 60 mph is followed immediately by an eased curve in the opposite direction of 80 mph. A 90 mph design was achieved through both curves with a major realignment, including a 3,000 ft. cut up to 65 ft. deep through adjacent forest and farmland.

2.2.3. Examples of Where Desired Speeds Were Not Attained Due to Physical Constraints

1. Little Falls

Little Falls (east of Utica) remains highly problematic due to both a very restrictive right-of-way width and sharp curves. Currently, a double-ended freight siding passes through Little Falls between CP215 and CP218. There is not enough room to maintain both the siding and a new passenger track through the narrowest part of the right-of-way in the town center. With several apparent freight consignees in Little Falls, access was maintained for local freight service from the west at CP218, with a separate siding ending in the center of Little Falls before the most restrictive section, where a short runaround track was provided at the end of that track. An existing three-degree curve in the center of town dictates a speed of only 60 mph. Several curves on both approaches to Little Falls have speeds less than 110 mph, which is not a significant issue since actual speeds on those curves will be much lower in light of the governing 60 mph curve at Little Falls.

2. Restrictive Curves West of Syracuse

From MP328 to 351, there is a series of consecutive curves that limits speeds from 70 to 100 mph, with many at 80 mph. Although it may be possible to remedy a few of these curves, given the fact that it takes so long for a train to recover speeds in the range of 80 to 110 mph, unless all of the curves can be modified, there is little to be gained in modifying the few curves that can be feasibly realigned for 110 mph operation.

2.3. Alternative 125

- Two-track, electrified, dedicated high speed passenger corridor between Albany and Buffalo.
- In general, Alternative 125 connects the major Empire Corridor West cities of Buffalo, Rochester, Syracuse and Albany with a new “rural” corridor away from and parallel to the existing right-of-way, through generally open land. These new segments re-connect with the existing right-of-way in the major cities via open areas or on structure, with some property acquisition likely to be required.
- New York City to Albany will be diesel operation on existing Empire Corridor track.

3. High-Level Costs for Alternatives 90, 110 and 125

3.1. Engineering Cost Estimate Methodology and Assumptions for Alternatives 90 and 110

Infrastructure Capital Costs

The cost estimates for the alternatives are derived from the conceptually engineered track alignments created to define the infrastructure improvements necessary for each alternative. In conjunction with the engineered track alignments, aerial photography, approximate right-of-way lines, locations of existing freight mainlines and sidings, grade crossings, overhead and undergrade bridge locations, and existing topography were used to develop the associated order-of-magnitude cost estimates. Signal costs (where applicable) have been developed using a per-mile cost based on the proposed infrastructure.

Rolling Stock Assumptions and Costs

The cost estimates assume that only the additional rolling stock necessary to allow the incremental additional trips between New York City Pennsylvania Station and Niagara Falls will be included in the cost estimates for the alternatives. The cost of rolling stock necessary to operate the current service is not considered part of this analysis. The program assumes that out of the four additional round trips, two trips will be addressed with two train sets, while the other trips will be covered by one-way daily trips per train set. This means a total of six new train sets with two spare train sets; therefore, a total of eight train sets are assumed for this program. For conventional locomotive-hauled train sets, $5 million per locomotive and $3 million per coach were assumed, including spare parts, training programs, manuals, soft costs, etc. In sum, $26 million per train set, or $208 million for new rolling stock, was assumed. As rolling stock values are reasonably well documented, a 5percent contingency is applied to account for uncertainties in final specifications for the particular service characteristics and signal control requirements yet to be determined.

Contingency Factor

Planning studies typically have large contingency factors (30%-35% or greater). Considering the length of this study area at 463 miles (over approximately 300 miles of which there are to be considerable infrastructure improvements), the diversity of the proposed alternatives (the 90 mph and 110 mph alternatives have considerable lengths of proposed track re-alignments outside the current railroad right-of-way), and the sheer magnitude of unknowns (bridge replacements vs. rehabilitations, volume of earthwork, property/building acquisitions, station design and amenities, final interlocking configurations, utility relocations, construction phasing issues, stakeholder requirements, etc.), a contingency of 35percent was applied to estimates for alternatives with maximum operating speeds of 90 mph and higher. The Base Alternative has no contingency, since the component improvements have been approved and funded, and design is far along or complete.

Design/Engineering Costs

It was assumed that an additional 20percent of the infrastructure costs would be allocated for engineering, permitting, construction inspection, administration and force account fees.

Escalation Costs

The estimates were developed with 2015 as the base year, to allow easy comparison among alternative capital costs in relatively current dollars. Where costs were estimated (or, as in the case of rolling stock purchases, known) in 2009, 2010, or 2011 dollars, these costs were escalated at 4percent compounded annually until the 2015 base year value was established.

Details of Alternative-specific estimates

3.2. Alternative 90A

Alternative 90A is essentially contained within the current and/or historic New York Central/CSXT railroad footprint. Estimating its cost was accomplished with five major categories of improvements: Track, Control Points, Grade Crossings, Bridges, and Station Facilities. Refer to Exhibit C- 4 for additional information.

Exhibit C-4 —Unit Cost Assumptions for All Alternatives

Property		Track & Signals		Bridges & Structures		Roads & Crossings	
Property Acq. (Per Acre)		**Subgrade Prep. & Sub-Ballast**		**Erosion Control**		**Highway Reloc. (Per Sy)**	
$40,000	Marsh	$12.00	per SY	$12	per LF	$140	Secondary
$85,000	Farmland					$224	Highway
$200,000	Suburban						
$800,000	Town						
Building Acquisition And Removal (Per Sf)		**New Track (Per Track-Foot)**		**Drainage Pipes & Box Culverts (Per Sf)**		**Grade Crossings Private (Each)**	
$200	Residence	$175	Yard or Spur	$125	Pipe		
$350	Business	$225	Main Track	$1,000	60-100 sf	$5,000 per track	
				$1,800	100-140 sf		
Clearing (Per Acre)		**Track Throws (Per Track-Foot)**		**Bridge Demo (Per Sf)**		**Grade Crossings Public (Per Track-Foot)**	
$12,000	Country	$40	5 feet or less	$175	Conc.	$2,800	Single Trk.
$16,000	Town	$80	5 to 13 feet	$85	Steel Girder	$3,200	Double Trk.
$20,000	City			$125	Steel Truss	$3,600	Triple Trk.
Fill Section (Per Cy)		**Retire Track (Per Track-Foot)**		**New Bridges (Per Sf)**		**Warning System (Each)**	
$12	Open	$25	Main Trk.	$400	Conc. 36-48'	$350,000	Small Rural
$20	Retained	$15	Yard Trk.	$375	Steel 30-60'	$400,000	Medium
		$12	Unused Trk.	$650	Steel 60-80'	$500,000	Larger Crossing
				$900	Steel 80-120'	$8,000	Farm/Private
Excavation (Per Cy)		**Retire Turnouts (Each)**		**Walls (Per Sf)**			
$12	Earth	$30,000	No. 8	$75	11-20' MSE		
$50	Rock	$32,000	No 10	$65	2-10' Conc		
		$54,000	No. 15	$120	10-20' Cant.		
		$72,000	No. 20	$180	20' + Cant.		
Fencing (Per Lf)		**Turnouts (Each)**					
$20	8' CLF	$85,000	No 8				
$24	8' w/BW	$95,000	No 10				
$40	Security	$195,000	No. 15				
		$235,000	No. 20				
		$2,000,000	No 32.7				
Ditching (Per Lf)		**Additive For Complex Phasing**					
$8	2 ft. or less	Variable	20% to 150% of Trackwork Value				
$12	2 to 4 feet						

3.3. Alternative 90B and 110

Alternatives 90B and 110 encompass a combination of new and existing right-of-way requirements. For these alternatives, a more in-depth analysis was performed to capture as many potential costs as possible. For example, property acquisitions, highway relocations, retaining walls and an additive for complex phasing are a few examples of items quantified for Alternatives 90B 110. These costs have been totaled on a per-mile basis. For a complete list of items quantified, refer to Exhibit C-4 —Unit Cost Assumptions for All Alternatives.

3.3.1. Engineering Cost Estimate Methodology and Assumptions for Alternative 125

The estimating methodology described in Section *V. Engineering Cost Estimate Methodology and Assumptions: 90 and 110* was used as a basis for cost estimating Alternative 125. However, since mile-by-mile infrastructure quantities were not developed, the work items associated with constructing the alternatives were aggregated into the following broad categories: Right-of-way; Roadbed, Drainage, Access & Security; Structures; Track and Systems; Yards and Shops; and Station Improvements, as shown in Exhibit C-4 —Unit Cost Assumptions for All Alternatives.

3.3.2. Additional Details on Selected Estimate Items

Property Acquisitions.

Due to the geographically extensive occurrence of property acquisition under both alternatives, five *land* categories were established: Prime City, Town, Suburban, Farmland and Marsh, to each of which was assigned a per-acre cost. With regard to *building* acquisition, three distinct categories were developed: Business, Residence, and Outbuilding. The costs were then assigned using a dollars-per-square-foot-(SF)-of-building-size factor based on the building footprint.

Additive for Complex Track Construction Phasing.

Various locations along the corridor will require complex construction phasing plans to maintain existing freight and passenger service during construction. An additional cost ranging from 20 percent to 150 percent of the standard trackwork cost, was assigned based on expected complexity.

Status of PTC

CSXT is in the early stages of implementing a PTC system for the Empire Corridor, having filed an Implementation Plan with the FRA. If additional tracks are implemented for passenger-only operation at speeds exceeding 90 mph, they will be required to include PTC. Therefore, capital costs for Alternatives 90, 110 and 125 include the cost of PTC on all new (and assumed to be dedicated passenger) mainline tracks. The cost of PTC implementation on existing CSXT track is the responsibility of CSXT, however, and is not included in the Tier 1 EIS capital cost estimates.

4. Constructability and Phasing Implications

4.1. Constructability and Phasing Implications for Alternatives 90 and 110

The following section has been prepared pursuant to the Program Scope to identify the optimal sequencing of construction staging in order to verify constructability. It also documents the operational implications of track outages and temporary speed restrictions. This has been done for the following two improvement scenarios:

1) Construction of new passenger mainline tracks adjacent to existing mixed use mainlines
    a. Example chosen from Alternative 90mph - MP 204 to MP 215
2) Construction of proposed flyover
    a. Example chosen from Alternative 110mph - MP 278 to MP 281

4.1.1. Example 1 – New Passenger Mainline Tracks in Alternative 90mph - MP 204 to MP 215

Major Construction Components

The track work proposed in Alternative 90mph between MP 204 and MP 215 consists primarily of the following:

- Approximately 12 miles of new dedicated passenger track (3rd track)
- Approximately 10 miles of new dedicated passenger track (4th track/second main)
- Installation of two new No. 32.75 turnouts
- Approximately three miles of existing freight siding realignments
- Installation of four new No. 20 crossovers
- Reconfiguration of four existing freight turnouts
- Rehabilitation\Extension of six Under Grade Bridges to accommodate the 3rd and 4th tracks
- Rehabilitation\extension of existing culverts to accommodate 3rd and 4th tracks, as well as relocated freight siding and potential service road
- One major curve geometry realignment and associated earth work

- Two minor curve geometry realignments
- One public railroad-highway grade crossing reconstruction
- Fifteen private grade crossings
- Up to 12 miles of service road construction.

Construction Phasing/Sequencing Considerations

All construction activities along the Empire Corridor shall be sequenced and phased to minimize negative impact on existing freight and passenger services. Additional consideration and planning will need to occur outside this Tier 1 analysis to ensure minimal delays and impacts on service. Some noteworthy items that need further investigation in Tier 2 are highlighted below:

- Determine whether existing under grade bridge bays can be reused for the proposed tracks or if the bridges need to be extended;
- Determine whether the existing overhead bridge can accommodate the proposed tracks without modifications;
- Determine the type of grade crossing protection to be required at both the public and private crossing;
- Determine the length and times work windows can be obtained for work near existing mainlines and track tie-ins;
- Determine property acquisition requirements; and
- Identify construction vehicle access points and obtain construction easements.

Potential Construction Sequencing

There are numerous construction sequences that would allow for the construction of the proposed program. One of those logical construction sequences is detailed below:

- Obtain construction access easements and prepare the subgrade up to the clearance limits allowed, while still maintaining existing service;
- Extend culverts as necessary;
- Extend/modify existing under grade bridges to accommodate proposed tracks;
- Finish preparing subgrade up through and including tie-in points. Coordinate work windows;
- Install crossovers from existing mainline to relocated freight tracks to maintain service;
- Build as much of the relocated freight track in the clear. Tie the ends back to existing track over a work window, potentially without service delays;

- Remove existing freight track no longer in service;
- Build passenger tracks up to tie-in points;
- Initiate grade crossing work;
- Staged signal installation and testing to occur throughout construction; and
- Finalize track and signal tie-ins.

4.1.2. Example 2 – Proposed Flyover in Alternative 110mph - MP 278 to MP 281

Major Construction Components

The track work proposed in Alternative 110mph between MP 278 and MP 281 is a grade separated overhead bridge and consists of primarily of the following:

- Approximately two miles of new dedicated passenger track (3rd track)
- Approximately four miles of rehabilitated passenger track (3rd and 4th track)
- Installation of one new No. 32.75 turnout
- Approximately nine miles of existing freight mainline realignments
- Installation of three new No. 20 crossovers
- Installation of one new No. 20 turnout
- Construction of retaining walls and Bridge Structure
- Rehabilitation\extension of three Under Grade Bridges
- Rehabilitation\extension of existing culverts
- One major curve geometry realignment and associated earth work
- Two minor curve geometry realignments
- Two public railroad-highway grade crossing reconstruction
- Two private grade crossings
- Up to two miles of service road construction

Construction Phasing/Sequencing Considerations

All construction activities along the Empire Corridor shall be limited in their negative impact on existing freight and passenger services. Additional consideration and planning will need to occur outside this Tier 1 analysis to ensure minimal delays and impacts on service. Some noteworthy items that need further investigation in the Tier 2 are highlighted below:

- Determine if the existing under grade bridge bays can be reused for the proposed tracks or if the bridges need to be extended;
- Due to the large quantity of existing mainline relocations through this area, take great care to build as much of the new track while the existing mainlines stay in service. Minimize cutover and tie-in limits and complete within the allowable work windows;

- Determine the type of grade crossing protection required at both the public and private crossings;
- Determine the length and times work windows can be obtained for work near existing mainlines and track tie-ins;
- Identify property acquisition; and
- Finalize construction vehicle access points and obtain temporary construction easements .

Potential Construction Sequencing

There are many different construction sequences that would allow for the construction of the proposed program. One of those logical construction sequences is detailed below:

- Obtain construction access easements and prepare the subgrade up to the clearance limits allowed – while still maintaining existing service. This includes retained fill areas approaching the bridge structure;
- Build new sections of track up to the clearance limits allowed;
- Tie-in the new freight track ends with the existing mainlines;
- Build the bridge structure and remaining retaining walls;
- Install remaining new passenger track;
- Initiate grade crossing work; and
- Finalize signal installation and testing to occur throughout construction.

4.2. Constructability and Phasing Implications for Alternative 125

The constructability and phasing implications of the very high speed corridor alternatives differ considerably from the alternatives that construct and modify track on the existing CSXT/Amtrak/Metro-North railroad corridors. In general, these differences are as follows:

Advantages

- Reduced need for freight railroad Roadway Worker Protection (RWP) support during construction;
- Eliminated or reduced complexity of staging modifications to active freight tracks;
- Eliminated conflicts with existing industrial and branch lines; and
- Eliminated complexity of expanding/modifying existing at-grade roadway crossings.

Disadvantages

- Increased permitting and remediation requirements;
- Significantly greater right-of-way acquisition for both right-of-way and for new power distribution substations and power line towers;
- No potential for re-use of previously-constructed four-track right-of-way; and
- Increased need for construction and management-related infrastructure and institutional processes.

Appendix D Rail Network Operations Simulation

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Table of Contents

List of Exhibits

1. Executive Summary

As part of the High Speed Rail Empire Corridor Program, detailed rail operations simulations were developed to model the alternatives and compare them against the future Base Alternative. The simulation analyses show that the four Empire Corridor “Build” alternatives are operationally feasible with highly acceptable passenger train schedule adherence and fluid freight operations. The dedicated third track alternatives (Alternatives 90B and 110) as well as the dedicated high speed corridor (Alternative 125) perform best, although the in-corridor improvements of Alternative 90A also support a much higher level of passenger service with only modest additional freight train congestion. All four Build alternatives produce simulated on-time performance results of 90 percent or better (based on 10 minute lateness thresholds at terminal end points). On-time performance is measured with respect to train schedules, which include successively shorter scheduled trip times as the maximum speed of each alternative increases.

Average passenger train speed in the simulations (including intermediate station stops) increases as the maximum speed of each alternative increases. Passenger train delay (in terms of minutes of train delay per 100 passenger train-miles operated) shows improvement with the Base Alternative (No Action) infrastructure and significantly greater improvement with the Build alternatives.

The Average Train Lateness statistic decreases with the Build improvements, though Alternative 125 has somewhat greater train lateness than the others. This is because Alternative 125 includes not only a new two-track electrified high speed rail line (with virtually no delays) but “legacy” service of four round trips per day on the existing Empire Corridor with only the Base Alternative infrastructure improvements. It is congestion on the existing corridor that accounts for the train arrival lateness in Alternative 125.

In terms of freight train average speed, the passenger-focused capital improvements in the Base Alternative provide ancillary benefits to freight train operation. Average speed increases from 27.4 to 30.3 MPH, both as a result of the Base Alternative improvements and CSXT’s emphasis on future intermodal service growth. Comparing the Base Alternative with the four “Build” alternatives (where freight operating volumes were held constant across all five simulations), Alternative 90A shows some degradation in freight train average speed while the other alternatives are the same or better than the Base Alternative.

Including future CSXT growth, freight train delay (minutes of delay per 100 miles operated) remains unchanged in both the existing and Base Alternative simulations. Comparing the Base Alternative versus the Build alternatives, Alternative 90A shows increased delays while the other alternatives have the same delay or reduced delay. This analysis was performed prior to the final definition of the Base Alternative. As simulated, the Base Alternative included the Rochester Area Third Track (CP 382 to CP 393) that provides freight capacity benefits. With this project no longer included in the Base Alternative, its freight performance is likely somewhat degraded. This means that Alternative 90A may no longer show increased freight delays versus the Base Alternative.

Corridor average travel times between Selkirk Yard and Buffalo improve from 9:17 in the Current (2008) simulation to 8:14 in the simulation of the Base Alternative due to capacity improvements on the line and the increased prevalence of higher performance intermodal trains. The average freight train trip increases slightly to 8:23 in Alternative 90A; the other three “Build” alternatives have identical or superior freight trip times compared with the Base Alternative. As was noted above, the final definition of the Base Alternative likely results in Alternative 90A freight average travel times comparable to the Base.

This appendix details the development of operating plans for the alternatives developed for the High Speed Empire Corridor Program Tier 1 Draft EIS and presents the rail operations network simulations analysis for these alternatives. The operating plans have been developed for the entire Empire Corridor rail network between Niagara Falls and New York City. For the Empire Corridor West, between Niagara Falls and Albany-Rensselaer, new network simulations were developed. For the Empire Corridor South, between Albany-Rensselaer and New York City, network simulations and results previously developed as a part of the 2005 *Hudson Line Corridor Railroad Transportation Plan* were utilized for this program.

This document summarizes operating plans for existing operations and the five alternatives developed as a part of this program including:

1. Existing Conditions based on 2008 Operations
2. Base Alternative
3. Alternative 90A – Trips operate over an upgraded existing corridor at a maximum of 90 MPH
4. Alternative 90B – Trips operate over the corridor using a designated "passenger only" track and long passing sidings/sections of double "passenger only" track) with a maximum speed of 90 MPH,
5. Alternative 110 – Trips operate over the corridor using a designated "passenger only" track and long passing sidings/sections of double "passenger only" track) with a maximum speed of 110 MPH
6. Alternative 125 – Trips operate over the existing corridor and also over a new double track electrified line that parallels the existing corridor with a maximum speed of 125 MPH.

Existing conditions are based on 2008 operations, rather than more recent data, because Empire Corridor freight volumes declined significantly in the 2009-2010 timeframe due to the economic downturn. From 1990 through 2008, CSXT experienced daily train growth at an annualized rate of 2.96 percent. From 2008 to 2009, CSXT train volume system-wide fell by about 13 percent. CSXT traffic levels are expected to recover over the next several years as the economy improves, leading to the selection of 2008 volumes as representative of current train volumes absent the impact of the economic downturn. Exhibit D-1 shows a velocity profile comparison of a single train traveling from Schenectady to Buffalo. The 79, 90 and 110 plots reflect dedicated third track alignments, rather than travel on the existing shared use passenger/freight tracks. Alternative 125 shows the higher performance of an electrified dedicated high speed rail line.

Exhibit D-1 - Simulated Velocity Profiles of Trains in Alternatives 79C, 90B, 110 and 125

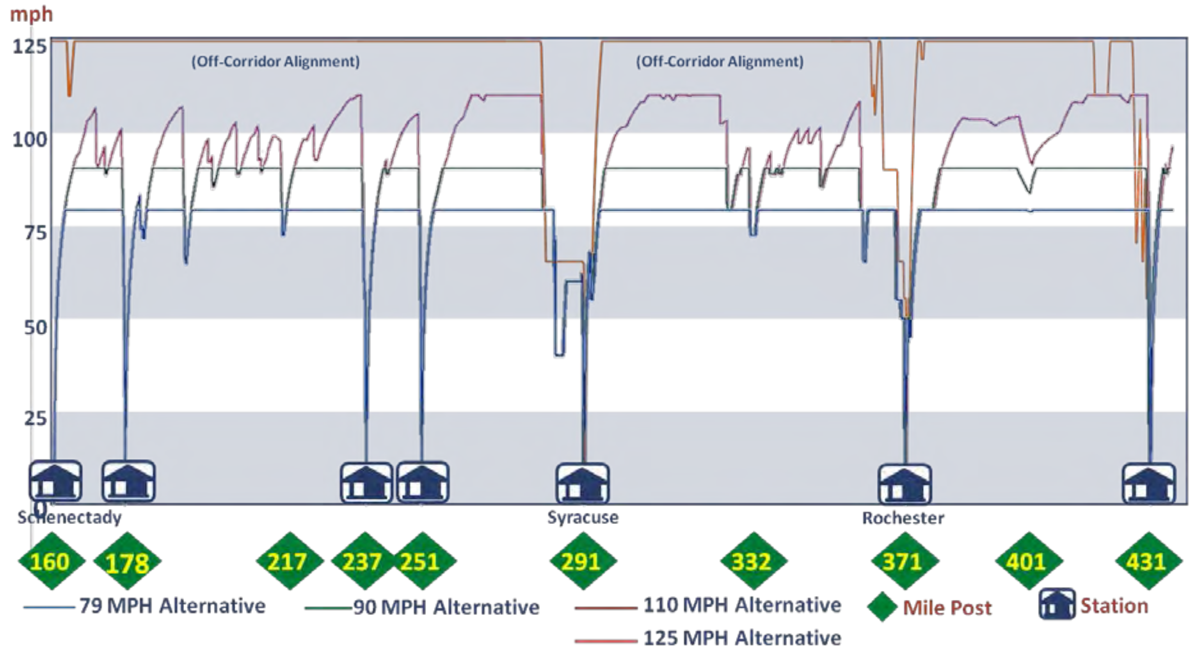


Exhibit D-2 provides a comparison of trip times from New York City to cities along the corridor for each of the operating plans. The travel times for current (2008) and Base Alternative operations are virtually the same; only "Current" values are shown. With the exception of the current operating plan, results indicate reduced trip times for each successive plan.

Exhibit D-2 - Operating Plan Trip Time Comparisons From New York City

	Alternative					
To:	**Base**	**90A***	**90B**	**110**	**125 Express**	**125 Regional**
Albany	2:30	2:13	2:13	2:13	2:15	2:19
Schenectady	3:06	2:53	2:47	2:50		2:59
Amsterdam	3:15	3:01	3:04	3:03		3:07
Utica	4:23	4:13	3:55	3:51		4:19
Rome	4:29	4:15	4:07	4:02		4:24
Syracuse	5:24	4:51	4:48	4:42	3:39	5:24
Rochester	6:41	6:06	5:55	5:45	4:25	6:42
Buffalo Depew	7:45	7:04	6:48	6:34		
Buffalo Exchange Street	7:49	7:06	6:57	6:45	5:10**	7:52
Niagara Falls	9:06	8:08	7:36	7:22	6:02***	8:40

Note: All speed values refer to maximum passenger train speed between Schenectady and Niagara Falls. All alternatives will operate at speeds up to 110 MPH between Albany-Rensselaer and Schenectady, 125 MPH for Alternative 125, as well as between Albany-Rensselaer and Hudson.

* Note 1: Based on average of express and local services

** Note 2: New station just south of Buffalo Exchange

*** Note 3: Via shuttle train from Buffalo; through service from NY also operated.

Exhibit D-3 provides a comparison of trip times from Albany to Empire Corridor West destinations for each of the operating plans. With the exception of the current (2008) operating plan, results indicate reduced trip times for each successive plan.

Exhibit D-3 - Operating Plan Trip Time Comparisons from Albany

	Alternative					
To:	**Base**	**90A***	**90B**	**110**	**125 Express**	**125 Regional**
Schenectady	0:18	0:18	0:17	0:17		0:19
Amsterdam	0:35	0:35	0:34	0:33		0:36
Utica	1:33	1:33	1:21	1:17		1:36
Rome	1:48	1:49	1:37	1:32		1:53
Syracuse	2:34	2:22	2:14	2:08	1:14	2:42
Rochester	3:51	3:38	3:21	3:11	2:00	3:59
Buffalo Depew	4:55	4:35	4:14	4:00		
Buffalo Exchange Street	5:09	4:47	4:27	4:15	2:45**	5:09
Niagara Falls	6:26	5:48	5:06	4:52	3:37***	6:08

Note: All speed values refer to maximum passenger train speed between Schenectady and Niagara Falls. All Alternatives will operate at speeds up to 110 MPH between Albany-Rensselaer and Schenectady, as well as between Albany-Rensselaer and Hudson.
* Note 1: Based on average of express and local services
** Note 2: New Station just south of Buffalo Exchange.
*** Note 3: Via shuttle train from Buffalo; through service from NY also operated.

An analysis of fleet needs for each alternative provides data on the number of trainsets required to meet service levels included in each alternative's operating plan. A spare factor of 20 percent is included in all current and future fleet needs, reflecting industry standard allowance for rolling stock in need of repair, undergoing repair, or undergoing long-term heavy overhaul. The total and incremental trainset requirements are shown in Exhibit D-4. The Base Alternative has the same rolling stock requirement as current operations. Alternatives 90A, 90B and 110 each require six additional train sets, while Alternative 125 (with a richer level of service than the others) requires 17 additional train sets.

Exhibit D-4 - NYSDOT Empire Corridor Fleet Needs

Start Location	2008 Current		2035 Base Alternative		2035 Alt 90A		2035 Alt 90B		2035 Alt 110		2035 Alt 125	
	Required	Incremental	Required	Incremental	Required	Incremental	Required	Incremental	Required	Incremental	Required	Incremental
Albany	6	0	6	0	6	0	7	1	7	1	6	0
Niagara Falls	2	0	2	0	5	3	5	3	5	3	2	0
New York (Sunnyside Yard)	2	0	2	0	4	2	3	1	3	1	2	0
Rutland	1	0	1	0	1	0	1	0	1	0	1	0
Montreal	1	0	1	0	1	0	1	0	1	0	1	0
Toronto	1	0	1	0	1	0	1	0	1	0	1	0
Buffalo (Dual Mode)											8	8
New York (Dual Mode)											6	6
TOTAL (Before Spares)	**13**	**0**	**13**	**0**	**18**	**5**	**18**	**5**	**18**	**5**	**27**	**14**
Spare Factor	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%
TOTAL (With Spares)	**16**	**0**	**16**	**0**	**22**	**6**	**22**	**6**	**22**	**6**	**33**	**17**

Exhibit D-5 summarizes the rail network simulation results with respect to passenger service between Albany-Rensselaer and Niagara Falls. On-time performance is based on a 10-minute lateness threshold at end terminal points and includes not only the Empire Corridor service but the Amtrak *Adirondack* and *Ethan Allen Express* services that operate on the corridor between New York, Albany-Rensselaer and Schenectady. On-time performance is measured with respect to train schedules, which include successively shorter scheduled trip times as the maximum speed of each alternative increases.

Exhibit D-5 - Simulated Results – Passenger Trains

Simulation	2008 Current	2035 Base Alt	2035 Alt 90A	2035 Alt 90B	2035 Alt 110	2035 Alt 125
Passenger train on-time performance (%)(1)	47.6%	83.0%	92.4%	95.4%	94.9%	96.4%
Average speed (MPH)	50.53	51.21	57.19	62.64	65.72	67.86(2)
Delay (Minutes per 100 Miles Operated)	7.47	1.75	1.87	0.34	0.11	0.45(3)
Average Train Lateness(5)	27.73	7.14	3.72	0.87	0.84	2.11(4)

(1) Based on 10 minute lateness threshold.
(2) Figure represents the average of both conventional and high speed trains. Conventional trains average 51 MPH while High Speed Trains average 74 MPH.
(3) Figure represents the average of both conventional and high speed trains. Conventional trains average 1.75 delay-minutes per 100 miles operated while High Speed Trains (on a dedicated two-track corridor) experience no delay.
(4) Figure represents the average of both conventional and high speed trains. Conventional trains average 7.14 minutes of lateness while High Speed Trains (on a dedicated two-track corridor) experience no lateness.
(5) No credit for early train arrivals.

Average passenger train speed in the simulations (including intermediate station stops) increases as the maximum speed of each alternative increases. Passenger train delay (in terms of minutes of train delay per 100 passenger train-miles operated) shows improvement with the Base Alternative infrastructure and significantly greater improvement with the Build alternatives.

The Average Train Lateness statistic in Exhibit D-5 decreases with the Build improvements, though Alternative 125 has somewhat greater train lateness than the others. This is because Alternative 125 includes not only a new two-track electrified high speed rail line (with virtually no delays) but "legacy" service of four round trips per day on the existing Empire Corridor with only the Base Alternative infrastructure improvements. It is congestion on the existing corridor that accounts for the average 2.11 minutes arrival lateness in Alternative 125.

Exhibit D-6 summarizes the freight train performance over the corridor under the current, Base Alternatives and future "Build" alternatives, including average speed, train-minutes of delay per 100 miles operated and average trip times. The average trip times include point-to-point times for those freight trains operating between Selkirk Yard (southwest of Albany), Syracuse and Buffalo, as well as standard deviation statistics. These statistics reflect the "spread" of the individual average trip times in the simulation; the lower the number, the more reliable the freight service. This is an important consideration for CSXT's intermodal (trailer on flat car and container on flat car) services because the railroad has numerous contracts with customers that include incentive payments for consistent on-time performance.

Exhibit D-6 - Simulated Freight Trip Time Statistics and Reliability – All Alternatives

		2008 Current	2035 Future	2035 Alt 90A	2035 Alt 90B	2035 Alt 110	2035 Alt 125
Average Speed		27.4	30.3	29.4	31.1	30.8	30.3
Delay per 100 Miles Operated		36.83	36.31	42.10	32.78	34.95	36.31
Selkirk - Syracuse	**Average Trip Time**	4:43:58	4:14:33	4:11:12	3:49:54	3:57:39	4:14:33
	Standard Deviation	1:39:28	1:20:34	1:21:22	1:03:00	1:17:32	1:20:34
Syracuse - Buffalo	**Average Trip Time**	4:34:25	4:11:14	4:31:35	4:25:20	4:40:11	4:11:14
	Standard Deviation	1:58:25	0:57:51	0:54:38	0:57:25	1:37:34	0:57:51
Syracuse - Selkirk	**Average Trip Time**	4:58:34	4:06:31	3:55:31	4:09:00	4:09:31	4:06:31
	Standard Deviation	1:54:59	1:15:07	1:04:27	1:32:33	1:58:42	1:15:07
Buffalo - Syracuse	**Average Trip Time**	4:27:26	4:04:16	4:04:20	4:17:19	4:11:11	4:04:16
	Standard Deviation	1:41:11	1:22:23	1:20:26	1:46:01	1:23:48	1:22:23
Selkirk - Buffalo (Both Dir.)	**Average Trip Time**	9:06:55	8:13:39	8:23:18	8:09:14	8:03:41	8:13:39
	Standard Deviation	2:19:39	1:37:01	2:04:26	1:50:52	1:39:20	1:37:01

In terms of average speed, the passenger-focused capital improvements in the Base Alternative provide ancillary benefits to freight train operation as well. Average speed increases from 27.4 to 30.3 MPH, both as a result of the Base Alternative improvements and CSXT's emphasis on future intermodal service growth. Comparing the Base Alternative with the four "Build" alternatives (where freight operating volumes were held constant across all five simulations), Alternative 90A shows some degradation in freight train average speed while the other alternatives are the same or better than the Base Alternative for this metric. This analysis was performed prior to the final definition of the Base Alternative. As simulated, the Base Alternative included the Rochester Area

Third Track (CP 382 to CP 393) that provides freight capacity benefits. With this project no longer included in the Base Alternative, its freight performance is likely somewhat degraded. This means that Alternative 90A may longer show increased freight delays or decreased average speed versus the Base Alternative.

Including future CSXT growth, freight train delay (minutes of delay per 100 miles operated) remains unchanged in both the existing and Base Alternative simulations. Comparing the Base Alternative and the Build alternatives, Alternative 90A shows increased freight train delays while the other alternatives have the same delay or reduced delay.

Corridor travel times between Selkirk Yard and Buffalo are also shown in Exhibit D-6. The 2008 average trip time of 9:17 drops to 8:14 in the simulation of the Base Alternative due to capacity improvements on the line and the increased prevalence of higher performance intermodal trains. The average freight train trip over the entire corridor (both directions) increases slightly to 8:23 in Alternative 90A; the other three "Build" alternatives have identical or shorter (faster) freight trip times compared with the Base Alternative.

2. Methodology

2.1. Simulation Software

The single train passenger trip time simulations used to build the alternatives' operating plans are based on the TrainOps® Rail Simulation Software from LTK. The multiple train network simulations used to evaluate the performance of the alternatives use the Rail Traffic Controller (RTC) software from Berkeley Simulation Software. RTC simulations were processed for seven days, plus one "warm up" day and one "cool down" day. The "warm up" day is used to populate all of the trains in the network, ensuring that, when output statistics are generated for the seven day period, the corridor is operating with trains from end to end.

The RTC model includes all of the corridor trackage between Albany-Rensselaer and Niagara Falls, as well as connecting lines and branches. A companion simulation model, developed for the Hudson Line Railroad Corridor Transportation Plan, was used previously to model the corridor trackage between Albany-Rensselaer and New York City. The Transportation Plan was completed in 2005 as the "blueprint" for improvements to the Hudson Line corridor between Albany and New York and reflects the technical leadership of NYSDOT, Metro-North, Amtrak, CSXT Transportation and Canadian Pacific Railway. With corridor improvements organized into short, medium and long term projects, the long-term improvements will support a New York-Albany 2:15 trip time with five stops, a 15 minute trip time improvement compared to the existing schedule).

In order to assure the network simulation accurately represents conditions on the Empire Corridor; New York State Department of Transportation and CSXT have agreed that CSXT will review and assist NYSDOT in the network simulations associated with this program. This allows CSXT transportation planners and operations managers to comment on the dispatching reflected in the model and to identify changes to better represent "real world" operations. The Empire Corridor West model for the Base Alternative (No Action) has been reviewed by CSXT and the final simulation model used in the analysis includes simulation model clarifications suggested by CSXT's modeling experts:

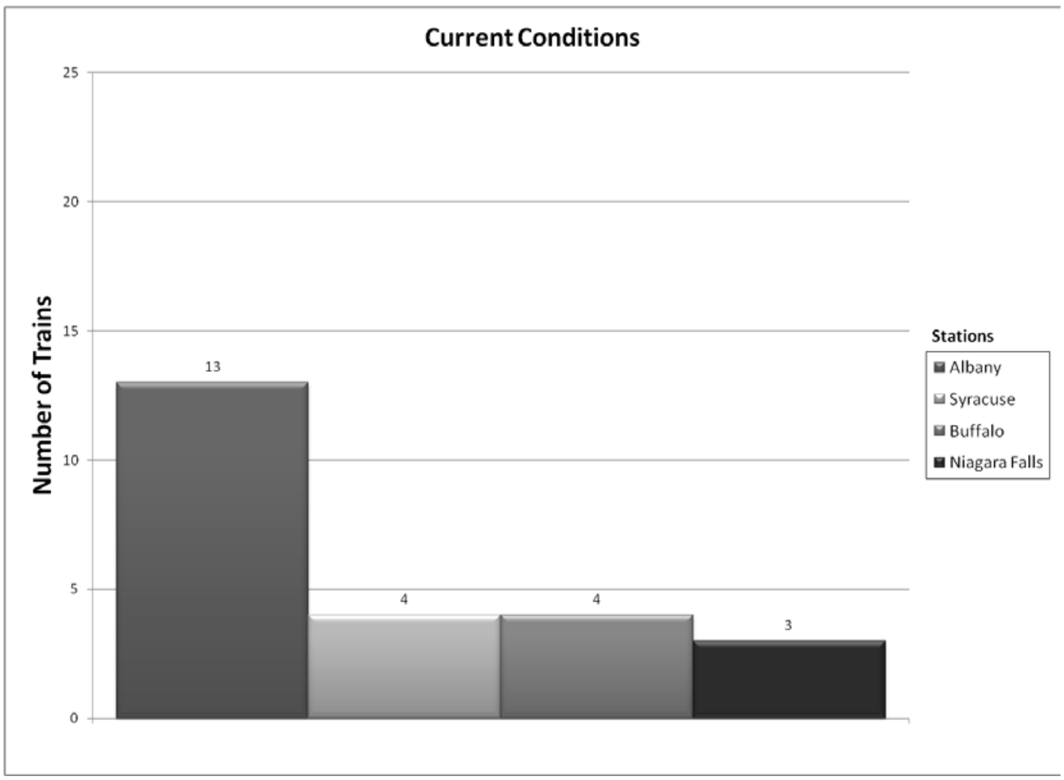
- Extended yard leads,
- Greater Canadian Pacific Railways operating detail (Delanson-Schenectady-Saratoga),
- Updates to baseline CSXT operating plan,
- Additional detail on Norfolk Southern movements over CSXT in Buffalo,
- Additional detail on Mohawk, Adirondack & Northern movements over CSXT near Utica.

Additional review comments from CSXT are expected as a result of its review of the "Future Build" simulation models.

2.1.1. Future Passenger Train Service

This section includes a description of each alternative, along with supporting timetables and trip travel times. Additional data is provided in Exhibit D-7 through Exhibit D-11 indicating the number of train trips originating in New York City under each of the alternative's operating plans, specified in terms of daily round trips.

Exhibit D-7 - 2008 Existing – Number of Trains Originating from New York City and Servicing Other Stations



The Base Alternative has the same number of passenger train round trips per day as current conditions, as shown in Exhibit D-8.

Exhibit D-8 - 2035 Base Alternative– Number of Trains Originating from New York City and Servicing Other Stations

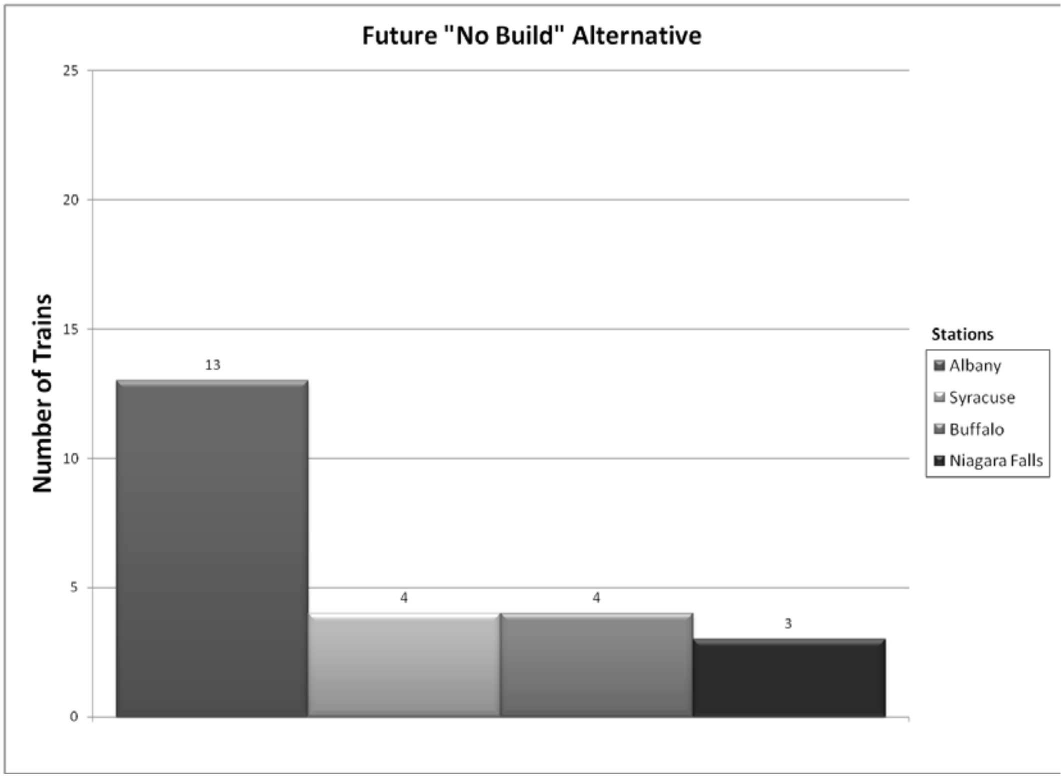


Exhibit D-9 displays Alternative 90A train volumes serving New York City. Service to Albany increases from the present 13 round trips to 16 round trips, while service from New York to Buffalo increases from the present 4 round trips to 7 round trips (an 8th frequency is also added, but it originates westbound in Albany). Alternatives 90B and 110 (Exhibit D-10) train volumes are virtually the same as Alternative 90A. Alternative 125 has the highest scheduled train volumes, as shown in Exhibit D-11.

Exhibit D-9 - 2035 Alternative 90A – Number of Trains Originating from New York City and Servicing Other Stations

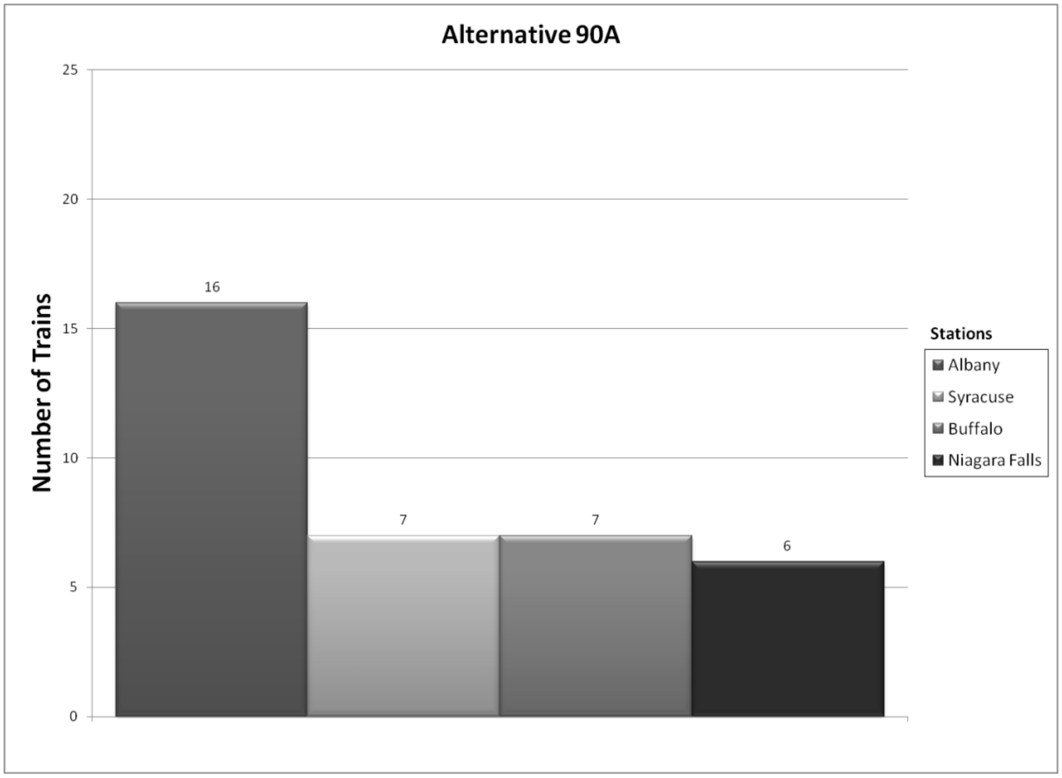


Exhibit D-10 - 2035 Alternative 90B/110 – Number of Trains Originating from New York City and Servicing Other Stations

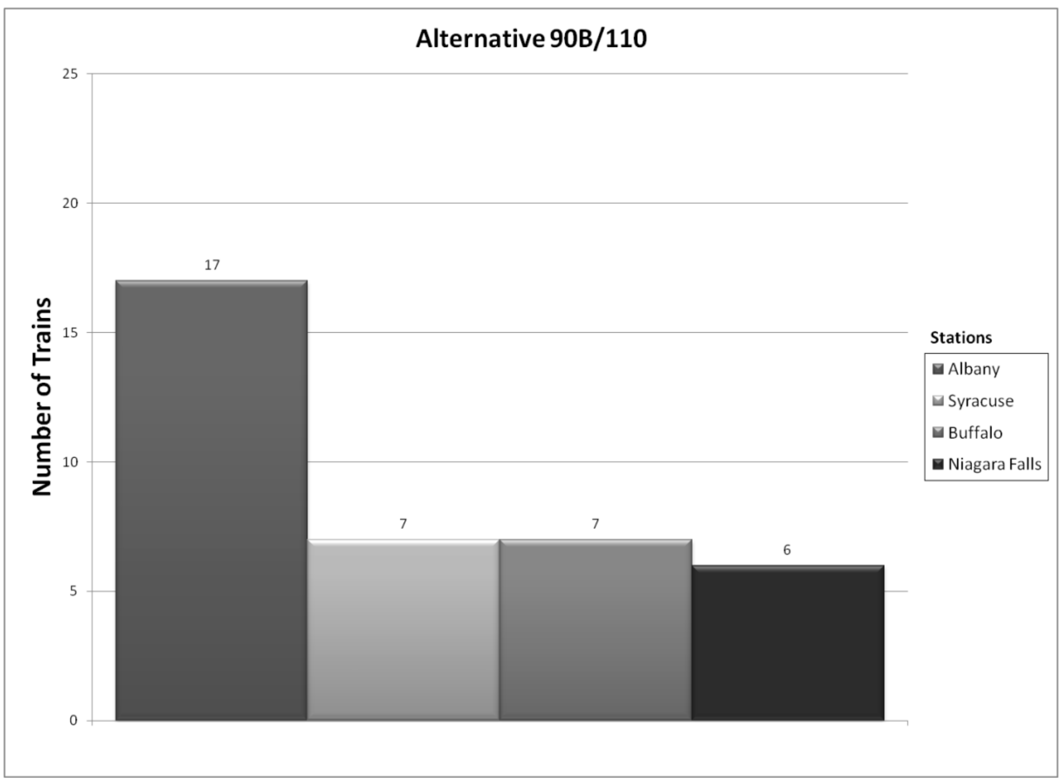
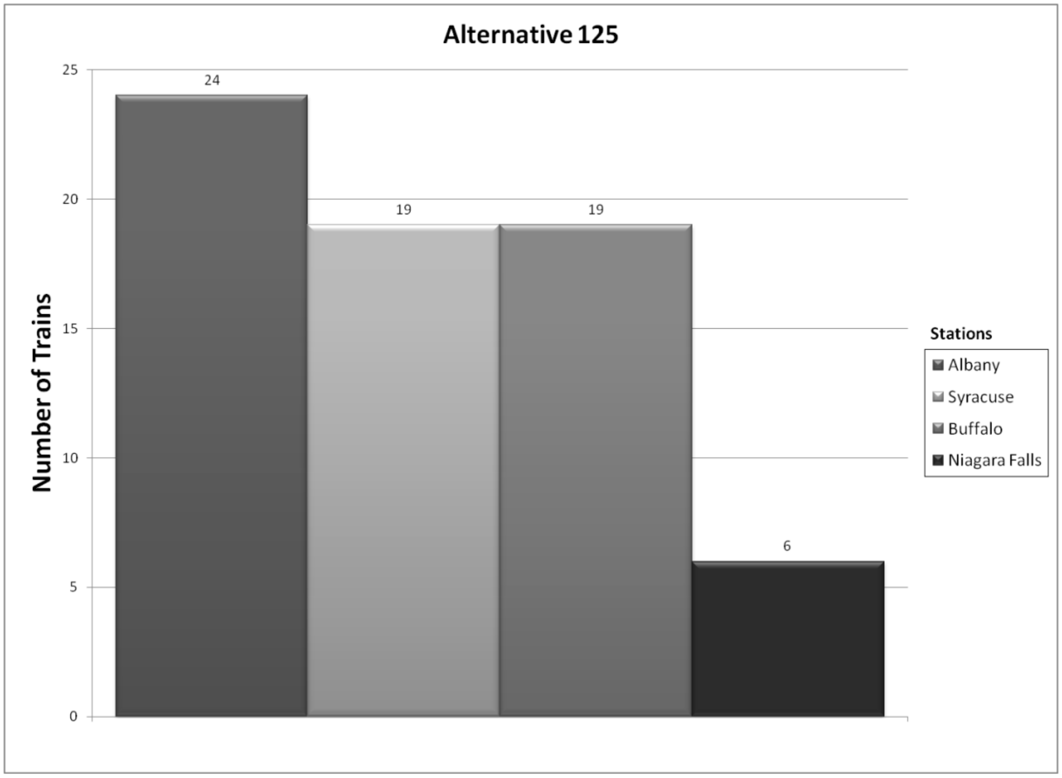


Exhibit D-11 - 2035 Alternative 125 – Number of Trains Originating from New York City and Servicing Other Stations



2.1.2. 2008 Existing Operations

Current (2008) scheduled service on the Empire Corridor shows a range of scheduled travel times between cities along the route. Exhibit D-12 provides a sample of running times for trips along with the eastbound and westbound timetables provided in Exhibit D-13 and Exhibit D-14. Trains 48 and 49, highlighted in yellow in the tables, are the long-distance Amtrak *Lake Shore Limited* between New York and Chicago. This train does not carry local passengers between New York, Albany-Rensselaer and intermediate points.

Exhibit D-12 - Scheduled Trip Times – Existing Operations (October 27, 2008)

From/To:	**280 ExSun**	**284 Daily**	**64 Daily**	**288 Sun only**
Niagara Falls-Albany	5:45	5:50	6:15	6:50
Niagara Falls-New York	8:35	8:35	9:00	9:35
Buffalo Depew-Albany	4:55	5:00	5:25	6:00
Buffalo Depew-New York	7:45	7:45	8:10	8:45
Buffalo Exchange-Albany	5:10	5:15	5:40	6:15

Exhibit D-13 - Scheduled Current Conditions – Eastbound Timetable (October 27, 2008)

	Stations	Trains									
		280 - ExSun	**290 - Mon-Fri**	**284 - ExSun**	**292 - Sat only**	**286 - Sun only**	**48 - Daily**	**68 - Daily**	**64 - Daily**	**296 - Sun only**	**288 - Sun only**
Dep	**Montreal**										
Dep	**Plattsburgh**										
Dep	**Rutland**										
Dep	**Saratoga**		9:43 AM		12:43 PM			3:53 PM		6:57 PM	
Dep	**Niagara Falls (New Station)**										
Dep	**Niagara Falls (Current Station)**	4:00 AM		7:00 AM		8:50 AM			12:35 PM		2:00 PM
Arr	**Buffalo Exchange Street**										
Dep		4:35 AM		7:35 AM		9:25 AM			1:10 PM		2:35 PM
Arr	**Buffalo Depew**										
Dep		4:50 AM		7:50 AM		9:40 AM	9:35 AM		1:25 PM		2:50 PM
Arr	**Rochester**										
Dep		5:47 AM		8:47 AM		10:37 AM	10:43 AM		2:27 PM		3:57 PM
Arr	**Syracuse**										
Dep		7:05 AM		10:05 AM		11:55 AM	12:11 PM		3:50 PM		5:30 PM
Arr	**Rome**										
Dep		7:45 AM		10:45 AM		12:35 PM			4:35 PM		6:10 PM
Arr	**Utica**										
Dep		8:02 AM		11:02 AM		12:52 PM	1:17 PM		4:57 PM		6:34 PM
Arr	**Amsterdam**										
Dep		9:00 AM		12:00 PM		1:49 PM			5:55 PM		7:35 PM
Arr	**Schenectady**										
Dep		9:20 AM	10:23 AM	12:20 PM	1:15 PM	2:10 PM	2:55 PM	4:50 PM	6:15 PM	7:28 PM	8:15 PM
Arr	**Albany-Rensselaer**	**9:45 AM**	**10:50 AM**	**12:50 PM**	**1:45 PM**	**2:50 PM**	**3:40 PM**	**5:40 PM**	**6:50 PM**	**7:50 PM**	**8:50 PM**
Dep		**10:05 AM**	**11:05 AM**	**1:05 PM**	**2:05 PM**	**3:05 PM**	**4:50 PM**	**6:05 PM**	**7:05 PM**	**8:05 PM**	**9:05 PM**
Arr	**Hudson**										
Dep		10:30 AM	11:30 AM	1:30 PM	2:30 PM	3:30 PM	5:16 PM	6:30 PM	7:30 PM	8:30 PM	9:30 PM
Dep	**Rhinecliff**	10:51 AM	11:51 AM	1:51 PM	2:51 PM	3:51 PM	5:43 PM	6:51 PM	7:51 PM	8:51 PM	9:51 PM
Dep	**Poughkeepsie**	11:06 AM	12:06 PM	2:06 PM	3:06 PM	4:06 PM	5:55 PM	7:06 PM	8:06 PM	9:06 PM	10:06 PM
Dep	**Croton-Harmon**	11:45 AM	12:45 PM	2:45 PM	3:45 PM	4:45 PM	6:35 PM	7:45 PM	8:45 PM	9:45 PM	10:45 PM
Dep	**Yonkers**		1:04 PM	3:04 PM	4:04 PM	5:04 PM		8:04 PM	9:04 PM	10:04 PM	
Arr	**New York**	**12:35 PM**	**1:35 PM**	**3:35 PM**	**4:35 PM**	**5:35 PM**	**7:25 PM**	**8:35 PM**	**9:35 PM**	**10:35 PM**	**11:35 PM**

Exhibit D-14 - Current Conditions – Westbound Timetable (October 27, 2008)

Stations		Trains								
		63 -- Daily	**69 -- Daily**	**281 – Daily**	**283 -- Mon-Fri**	**285 - SaSu**	**291 -- ExFri**	**49 – Mon-Fri**	**49 – SaSu**	**293 -- Fri only**
Dep	**New York**	**7:15 AM**	**8:20 AM**	**10:20 AM**	**1:20 PM**	**2:20 PM**	**3:20 PM**	**4:00 PM**	**3:45 PM**	**5:45 PM**
Dep	**Yonkers**	7:39 AM	8:44 AM		1:44 PM	2:44 PM	3:44 PM			
Dep	**Croton-Harmon**	7:58 AM	9:03 AM	11:01 AM	2:03 PM	3:03 PM	4:03 PM	4:43 PM	4:28 PM	6:26 PM
Dep	**Poughkeepsie**	8:37 AM	9:42 AM	11:40 AM	2:42 PM	3:42 PM	4:42 PM			7:10 PM
Dep	**Rhinecliff**	8:52 AM	9:57 AM	11:55 AM	2:57 PM	3:57 PM	4:57 PM			7:25 PM
Dep	**Hudson**	9:15 AM	10:20 AM	12:18 PM	3:20 PM	4:20 PM	5:20 PM			7:48 PM
Arr	**Albany-**	**9:45 AM**	**10:50 AM**	**12:48 PM**	**3:50 PM**	**4:50 PM**	**5:50 PM**	**6:30 PM**	**6:15 PM**	**8:15 PM**
Dep	**Rensselaer**	**10:00 AM**	**11:05 AM**	**1:05 PM**	**4:05 PM**	**5:05 PM**	**6:05 PM**	**7:05 PM**	**7:05 PM**	**8:25 PM**
Arr	**Schenectady**									
Dep		10:23 AM	11:29 AM	1:28 PM	4:28 PM	5:28 PM	6:29 PM	7:31 PM	7:31 PM	8:49 PM
Arr	**Amsterdam**									
Dep		10:40 AM			4:45 PM	5:45 PM				
Arr	**Utica**									
Dep		11:39 AM		2:42 PM	5:44 PM	6:44 PM		8:44 PM	8:44 PM	
Arr	**Rome**									
Dep		11:53 AM			5:58 PM	6:58 PM				
Arr	**Syracuse**									
Dep		**12:40 PM**		**3:40 PM**	**6:45 PM**	**7:45 PM**		**9:41 PM**	**9:41 PM**	
Arr	**Rochester**									
Dep		1:58 PM		5:00 PM	8:05 PM	9:05 PM		11:00 PM	11:00 PM	
Arr	**Buffalo Depew**									
Dep		**2:56 PM**		**6:00 PM**	**9:05 PM**	**10:05 PM**		**11:59 PM**	**11:59 PM**	
Arr	**Buffalo**									
Dep	**Exchange Street**	3:09 PM		6:15 PM	9:20 PM	10:20 PM				
Arr	**Niagara Falls (Current Station)**	4:10 PM		7:10 PM	10:20 PM	11:15 PM				
Dep	**Saratoga**		11:57 AM				6:57 PM			9:17 PM
Arr	**Rutland**									
Dep	**Plattsburgh**									
Arr	**Montreal**									

As part of the current conditions, analysis is provided in indicating the results of average scheduled speeds for the fastest trips between Niagara Falls and New York City and Buffalo to Albany as shown in Exhibit D-15.

Exhibit D-15 - Fastest Scheduled Trip Time Calculations

From/To:	Train Number	Trip Time (HH:MM)	Trip Time (Minutes)	Average Speed
Niagara Falls-New York	280	8:45	525	53
Buffalo Exchange-Albany	280	5:24	324	54

2.1.3. Base Alternative

The "Base Alternative" alternative assumes that only committed infrastructure improvements are made to the corridor and that train trips continue to operate at existing maximum speeds. This alternative's operating plan is similar to current conditions, though a number of scheduled running time changes were made to reflect infrastructure changes on the corridor. These are shown in Exhibit D-16. Exhibit D-18 and Exhibit D-19 show the resultant operating plan; the train volumes are identical to those under current conditions.

Exhibit D-16 - 2035 Base Alternative and Associated Scheduled Adjustments

PROJECT	TRAINS	SCHEDULE ADJUSTMENTS
Albany-Rensselaer Station Improved signal and interlocking layout south of the station.	Westbound trains Approaching Albany-Rensselaer	Trip time from Hudson to Albany was reduced by 2 minutes.
	Eastbound trains departing Albany-Rensselaer	Current Albany departure times were maintained, and no adjustment was made to Albany-Hudson trip time. Trains accelerating do not suffer the same penalty as trains approaching the station. At this point, no analysis has been undertaken regarding any adjustments which might be necessary for trains arriving earlier at Poughkeepsie to fit with Poughkeepsie-Grand Central commuter trains.
Albany-Rensselaer Station Improved signal and interlocking layout north of the station.	All westbound trains All eastbound trains	Trip time between Albany-Rensselaer and Schenectady was reduced by two minutes.
Albany-Schenectady Double Track	Westbound trains continuing to the CPR	Trip time between Albany-Rensselaer and Schenectady reduced an additional one minute due to eliminating the need for a crossover move at Schenectady.
	Eastbound trains arriving from the CPR	No trip time adjustment. It was assumed that trains will still make a crossover move from Track 1 to Track 2 east of Schenectady Station.
	Carrying time savings north to/from CPR points	The time saved in Train 69 was carried through to Saratoga, but not to Plattsburgh or Montreal due to the meet with Train 68 at Howards. Time savings were also carried through to Rutland for northbound trains but not for southbound trains due to contractual issues and the meet between 291 and 296.
	Trains 64/291	Train 64 current waits at CP156 to meet Train 291 coming off the single track. The double track project will eliminate this conflict, and time attributed to the meet was removed from Train 64's schedule.
	Delay analysis	Delay analysis has not yet been performed to quantify reduction in delay minutes resulting from holding for meets when trains are out of slot. All existing recovery allowances were maintained.
Syracuse Track improvements east of Syracuse Station including upgrading Tk 7 to 60 mph with bidirectional signals.	All westbound trains All eastbound trains	Trip time between Syracuse and Rome was reduced by one minute for all trains. However, all existing recovery allowances were maintained.
Niagara Falls New station	Westbound trains	Trip time from Exchange Street to Niagara Falls was increased by six minutes. The new station is approximately two miles further west than the current Lockport Road station. Track speed is 20 MPH. It takes three minutes to travel one mile at 20 MPH. Absent any track upgrades, the trip from Exchange Street to the new station will require six additional minutes. It was also assumed that the current practice of turning westbound 280 series trains on the Tuscarora wye prior to entering the station would continue.
	Eastbound 280 series trains.	Three minutes additional trip time was added to 280 series trains which originate at Niagara Falls. It was assumed that the six-minute trip time penalty would be partially mitigated by no longer pulling out from station tracks with hand thrown switches.
	Eastbound Train 64	Six minutes trip time was added.

Exhibit D-17 shows a color-coded service diagram of the New York State intercity rail services. The *Lake Shore Limited,* which connects New York City and Boston with Chicago, is shown in blue. The *Adirondack*, which connects New York City with Montreal via Albany and Plattsburgh, is shown in yellow. The *Maple Leaf,* which connects New York City and Toronto via Albany and Buffalo, is shown in magenta. *Empire Service,* some of which operates as New York-Albany round trips and some of which operates as New York-Niagara Falls round trips, is shown in green.

Exhibit D-17 - Base Alternative Service Diagram

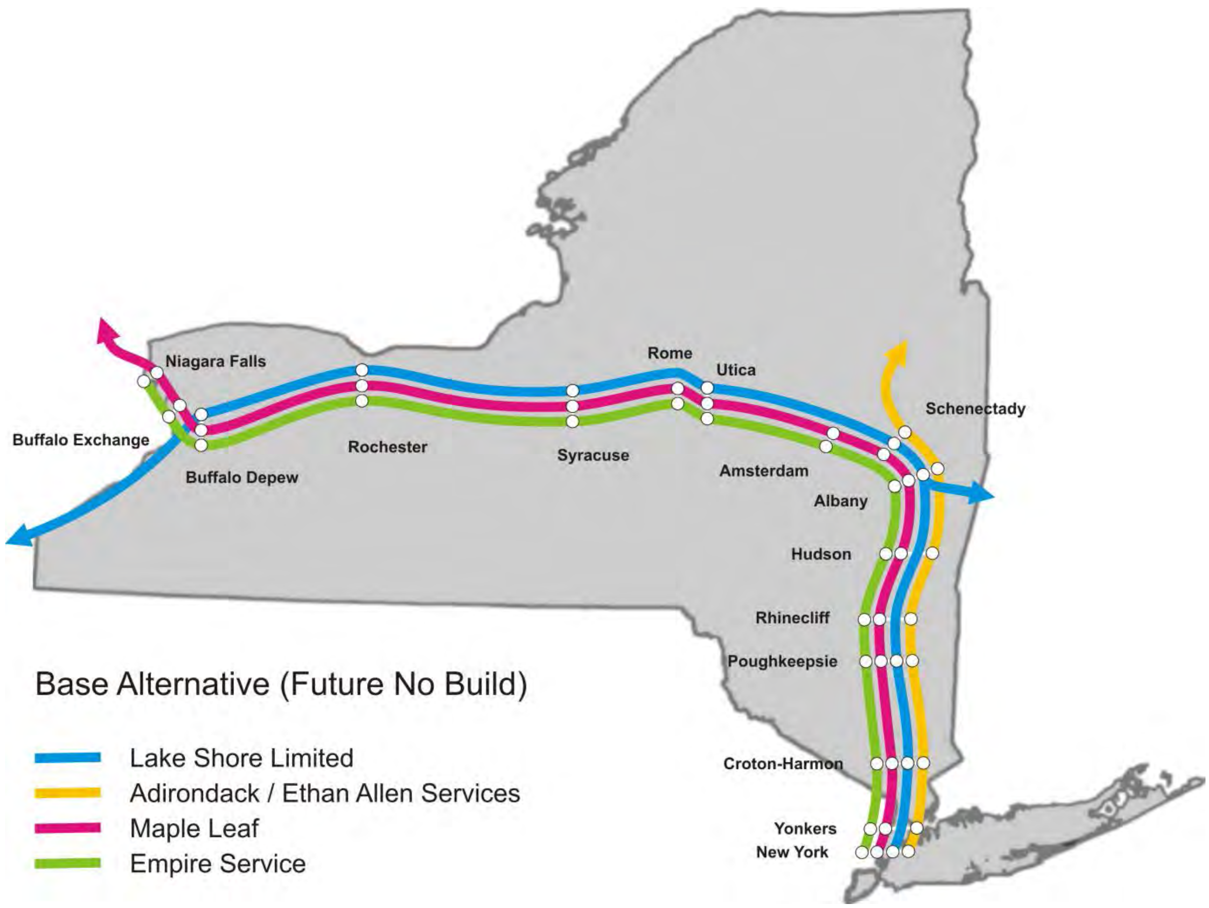


Exhibit D-18 - Base Alternative– Eastbound Timetable

Stations/Train Numbers		Trains								
		280 - ExSun	**290 - Mon-Fri**	**284 – Daily**	**292 - Sat only**	**48 - Daily**	**68 - Daily**	**64 – Daily**	**296 - Sun only**	**288 - Sun only**
Dep	**Montreal**						9:30 AM			
Dep	**Plattsburgh**						12:35 PM			
Dep	**Rutland**		7:40 AM		10:35 AM				4:45 PM	
Dep	**Saratoga**		9:43 AM		12:43 PM		3:53 PM		6:57 PM	
Dep	**Niagara Falls (New station)**	3:50 AM		6:40 AM				12:43 PM		2:55 PM
Dep	**Niagara Falls (Current Station)**	--		--				--		--
Arr	**Buffalo**	4:29 AM		7:19 AM				1:22 PM		3:34 PM
Dep	**Exchange Street**	4:31 AM		7:21 AM				1:24 PM		3:36 PM
Arr	**Buffalo Depew**	4:43 AM		7:33 AM		8:58 AM		1:36 PM		3:48 PM
Dep		4:47 AM		7:37 AM		9:08 AM		1:40 PM		3:52 PM
Arr	**Rochester**	5:36 AM		8:26 AM		10:03 AM		2:31 PM		4:42 PM
Dep		5:40 AM		8:30 AM		10:08 AM		2:35 PM		4:46 PM
Arr	**Syracuse**	6:58 AM		9:48 AM		11:33 AM		3:53 PM		6:04 PM
Dep		7:03 AM		9:53 AM		11:38 AM		3:58 PM		6:09 PM
Arr	**Rome**	7:41 AM		10:31 AM		no stop		4:36 PM		6:47 PM
Dep		7:43 AM		10:33 AM				4:37 PM		6:49 PM
Arr	**Utica**	7:56 AM		10:48 AM		12:37 PM		4:50 PM		7:04 PM
Dep		7:59 AM		10:51 AM		12:42 PM		4:53 PM		7:07 PM
Arr	**Amsterdam**	8:57 AM		11:49 AM		no stop		5:51 PM		8:05 PM
Dep		8:59 AM		11:51 AM				5:53 PM		8:07 PM
Arr	**Schenectady**	9:17 AM	10:21 AM	12:09 PM	1:14 PM	1:55 PM	4:48 PM	6:11 PM	7:26 PM	8:25 PM
Dep		9:19 AM	10:23 AM	12:11 PM	1:15 PM	2:00 PM	4:50 PM	6:13 PM	7:28 PM	8:27 PM
Arr	**Albany-Rensselaer**	**9:50 AM**	**10:51 AM**	**12:50 PM**	**1:43 PM**	**2:50 PM**	**5:38 PM**	**6:47 PM**	**7:51 PM**	**9:05 PM**
Dep		**10:05 AM**	**11:05 AM**	**1:05 PM**	**2:05 PM**	**3:50 PM**	**6:05 PM**	**7:05 PM**	**8:05 PM**	**9:15 PM**
Arr	**Hudson**	10:29 AM	11:29 AM	1:29 PM	2:29 PM	no stop	6:29 PM	7:29 PM	8:29 PM	9:39 PM
Dep		10:30 AM	11:30 AM	1:30 PM	2:30 PM		6:30 PM	7:30 PM	8:30 PM	9:40 PM
Dep	**Rhinecliff**	10:51 AM	11:51 AM	1:51 PM	2:51 PM	no stop	6:51 PM	7:51 PM	8:51 PM	10:01 PM
Dep	**Poughkeepsie**	11:05 AM	12:05 PM	2:05 PM	3:05 PM	4:51 PM	7:05 PM	8:05 PM	9:05 PM	10:15 PM
Dep	**Croton-Harmon**	11:45 AM	12:45 PM	2:45 PM	3:45 PM	5:33 PM	7:45 PM	8:45 PM	9:45 PM	10:55 PM
Dep	**Yonkers**	no stop	1:04 PM	3:04 PM	4:04 PM	no stop	8:04 PM	9:04 PM	10:04 PM	11:14 PM
Arr	**New York**	**12:35 PM**	**1:35 PM**	**3:35 PM**	**4:35 PM**	**6:35 PM**	**8:40 PM**	**9:35 PM**	**10:35 PM**	**11:45 PM**

Exhibit D-19 - Base Alternative– Westbound Timetable

Stations/Train Numbers		Trains						
		63 -- Daily	69 – Daily	281	283	291	49 - Daily	293
Dep	New York	7:15 AM	8:15 AM	10:15 AM	1:15 PM	3:15 PM	3:45 PM	5:45 PM
Dep	Yonkers	7:39 AM	8:39 AM	10:39 AM	1:39 PM	3:39 PM		
Dep	Croton-Harmon	7:58 AM	8:58 AM	10:58 AM	1:58 PM	3:58 PM	4:29 PM	6:25 PM
Dep	Poughkeepsie	8:38 AM	9:38 AM	11:38 AM	2:38 PM	4:38 PM	5:15 PM	7:11 PM
Dep	Rhinecliff	8:52 AM	9:52 AM	11:52 AM	2:52 PM	4:52 PM		7:25 PM
Dep	Hudson	9:15 AM	10:15 AM	12:15 PM	3:15 PM	5:15 PM		7:48 PM
Arr	Albany-	9:43 AM	10:43 AM	12:43 PM	3:43 PM	5:43 PM	6:25 PM	8:16 PM
Dep	Rensselaer	10:00 AM	11:03 AM	12:53 PM	3:53 PM	5:58 PM	7:05 PM	8:26 PM
Arr	Schenectady	10:19 AM	11:21 AM	1:11 PM	4:11 PM	6:16 PM	7:27 PM	8:44 PM
Dep		10:21 AM	11:23 AM	1:13 PM	4:13 PM	6:18 PM	7:31 PM	8:46 PM
Arr	Amsterdam	10:36 AM		1:28 PM	4:28 PM			
Dep		10:38 AM		1:30 PM	4:30 PM			
Arr	Utica	11:35 AM		2:23 PM	5:27 PM		8:40 PM	
Dep		11:37 AM		2:25 PM	5:29 PM		8:44 PM	
Arr	Rome	11:51 AM		2:38 PM	5:43 PM			
Dep		11:53 AM		2:39 PM	5:44 PM			
Arr	Syracuse	12:38 PM		3:24 PM	6:29 PM		9:37 PM	
Dep		12:42 PM		3:28 PM	6:33 PM		9:41 PM	
Arr	Rochester	1:54 PM		4:43 PM	7:43 PM		10:56 PM	
Dep		1:58 PM		4:47 PM	7:47 PM		11:00 PM	
Arr	Buffalo Depew	3:01 PM		5:44 PM	8:44 PM		12:02 AM	
Dep		3:04 PM		5:47 PM	8:47 PM		12:10 AM	
Arr	Buffalo	3:16 PM		5:59 PM	8:59 PM			
Dep	Exchange Street	3:18 PM		6:01 PM	9:01 PM			
Arr	Niagara Falls (Current Station)	--		--	--			
Arr	Niagara Falls (New Station)	4:33 PM		7:16 PM	10:16 PM			
Dep	Saratoga		11:51 AM			6:46 PM		9:14 PM
Arr	Rutland					8:59 PM		11:27 PM
Dep	Plattsburgh		3:15 PM					
Arr	Montreal		7:10 PM					

2.1.4. Alternative 90A

Under Alternative 90A , trains would operate at a maximum speed of 90 MPH on the corridor between Schenectady Station and Buffalo Exchange Station. This alternative features four new round trips (eight one way trips) between Albany-Rensselaer Station and Niagara Falls Station as shown in Exhibit D-21 and Exhibit D-22. One of the westbound trips (the 6:00 AM westbound departure from Albany) originates in Albany while the remaining trips originate from New York Penn Station. New round trips would provide express service in western New York, stopping at Albany-Rensselaer, Syracuse, Rochester, Buffalo Depew, Buffalo Exchange Street and Niagara Falls Stations. The express service reduces trip times by eliminating some station stops.

Exhibit D-23 shows the TrainOps simulation results for a single train trip over the corridor. These results were used to construct the Alternative 90A operating plan. In this alternative passenger trains and freight share tracks west of Hoffmans. For this scenario due to the sharing of tracks, a schedule margin of 10 percent (equivalent to increasing scheduled times by 10 percent over the best possible trip times) is appropriate.

Exhibit D-20 shows the service diagram for Alternative 90A. The light purple color represents the new express train service in this alternative, with stops only at New York, Albany, Syracuse, Rochester, Buffalo Depew, Buffalo Exchange and Niagara Falls.

Exhibit D-20 - Alternative 90A Service Diagram

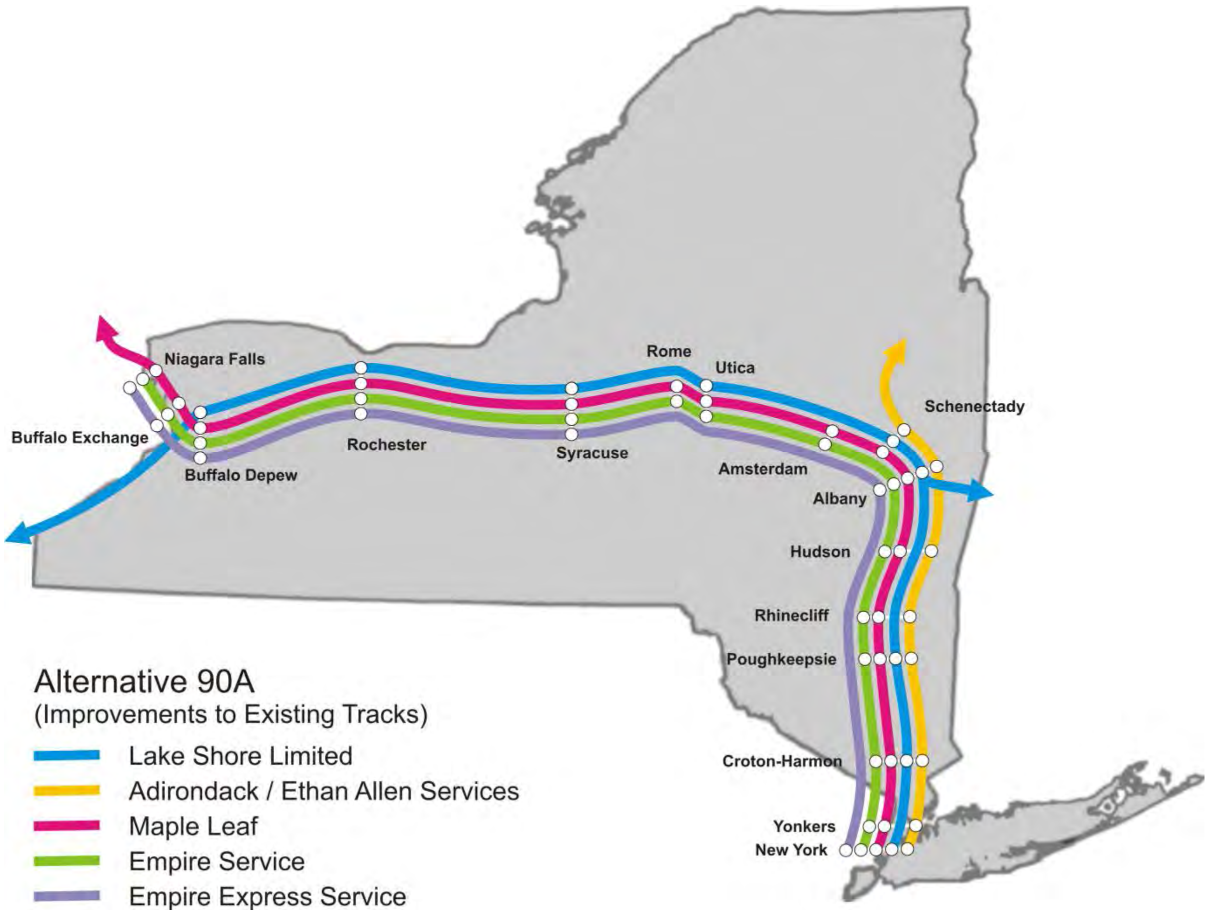


Exhibit D-21 - Alternative 90A – Eastbound Timetable

Stations/Train Numbers		230	232	234	2XX	WNY Express WNY-02	290	280	WNY Express WNY-04	244	242	284	48	WNY Express WNY-06	68	64	WNY Express WNY-08
		Mo-Fr	Mo-Fr	Mo-Fr	Mo-Fr	Daily	Mo-Fri	ExSun	Daily	Mo-Fr	Mo-Fr	Daily	Daily	Daily	Daily	Daily	Daily
Dep	Niagara Falls (New Station)					4:25 AM		6:05 AM	7:55 AM			10:15 AM		11:40 AM		1:20 PM	3:10 PM
Arr	Buffalo					5:01 AM		6:41 AM	8:31 AM			10:51 AM		12:16 PM		1:56 PM	3:46 PM
Dep	Exchange Street					5:03 AM		6:43 AM	8:33 AM			10:53 AM		12:18 PM		1:58 PM	3:48 PM
Arr	Buffalo Depew					5:15 AM		6:55 AM	8:45 AM			11:05 AM	9:30 AM	12:30 PM		2:10 PM	4:00 PM
Dep						5:19 AM		6:59 AM	8:49 AM			11:09 AM	9:40 AM	12:34 PM		2:14 PM	4:04 PM
Arr	Rochester					6:05 AM		7:43 AM	9:35 AM			11:53 AM	10:35 AM	1:20 PM		2:58 PM	4:50 PM
Dep						6:10 AM		7:48 AM	9:40 AM			11:58 AM	10:40 AM	1:25 PM		3:03 PM	4:55 PM
Arr	Syracuse					7:26 AM		9:04 AM	10:56 AM			1:14 PM	12:05 PM	2:41 PM		4:19 PM	6:11 PM
Dep						7:30 AM		9:09 AM	11:00 AM			1:19 PM	12:10 PM	2:45 PM		4:24 PM	6:15 PM
Arr	Rome							9:45 AM				1:55 PM				5:00 PM	
Dep								9:47 AM				1:57 PM				5:02 PM	
Arr	Utica					8:20 AM		10:00 AM	11:50 AM			2:10 PM	1:09 PM	3:35 PM		5:15 PM	7:05 PM
Dep						8:22 AM		10:03 AM	11:52 AM			2:13 PM	1:14 PM	3:37 PM		5:18 PM	7:07 PM
Arr	Amsterdam							11:00 AM				3:10 PM				6:15 PM	
Dep								11:02 AM				3:12 PM				6:17 PM	
Arr	Schenectady						10:30 AM	11:20 AM				3:30 PM	2:27 PM		5:55 PM	6:35 PM	
Dep							10:32 AM	11:22 AM				3:32 PM	2:32 PM		5:57 PM	6:37 PM	
Arr	Albany-Rensselaer					10:05 AM	11:00 AM	12:00 PM	1:35 PM			4:10 PM	3:22 PM	5:20 PM	6:25 PM	7:15 PM	8:50 PM
Dep		5:20 AM	6:30 AM	7:00 AM	9:15 AM	10:15 AM	11:15 AM	12:15 PM	1:45 PM	2:15 PM	3:15 PM	4:25 PM	4:25 PM	5:30 PM	6:40 PM	7:30 PM	9:00 PM
Arr	Hudson	5:45 AM	6:55 AM	7:25 AM	9:39 AM		11:39 AM	12:39 PM		2:39 PM	3:39 PM	4:49 PM			7:04 PM	7:54 PM	
Dep		5:46 AM	6:56 AM	7:26 AM	9:40 AM		11:40 AM	12:40 PM		2:40 PM	3:40 PM	4:50 PM			7:05 PM	7:55 PM	
Dep	Rhinecliff	6:06 AM	7:16 AM	7:46 AM	10:00 AM		12:00 PM	12:59 PM		3:00 PM	4:00 PM	5:09 PM			7:25 PM	8:14 PM	
Dep	Poughkeepsie				10:14 AM		12:14 PM	1:13 PM		3:14 PM	4:14 PM	5:23 PM			7:39 PM	8:28 PM	
Dep	Croton-Harmon	6:54 AM	8:04 AM		10:50 AM		12:50 PM	1:49 PM		3:50 PM	4:50 PM	5:59 PM	6:10 PM		8:15 PM	9:04 PM	
Dep	Yonkers						1:09 PM				5:09 PM				8:34 PM	9:24 PM	
Arr	New York	7:35 AM	8:45 AM	9:15 AM	11:35 AM	12:20 PM	1:35 PM	2:35 PM	3:50 PM	4:35 PM	5:35 PM	6:45 PM	7:00 PM	7:35 PM	9:00 PM	9:50 PM	11:05 PM

Exhibit D-22 - Alternative 90A – Westbound Timetable

Stations/Train Numbers		WNY EXPRESS WNY-01	63	69	WNY EXPRESS WNY-03	281	233	WNY EXPRESS WNY-05	283	291	WNY EXPRESS WNY-07	2XX	49	239	241	243	247X	245
		Mo-Fr	Daily	Daily	Daily	Daily	Daily	Daily	Daily	Rut – ExFr/Alb- Daily	Daily	Daily	Daily	Rut – Fri/Alb - Daily	Daily	Daily	Daily	Daily
Dep	New York		7:15 AM	8:15 AM	9:15 AM	10:15 AM	11:15 AM	12:15 PM	1:15 PM	2:15 PM	3:15 PM	3:45 PM	4:15 PM	5:45 PM	7:15 PM	8:50 PM	9:50 PM	10:50 PM
Dep	Yonkers		7:37 AM	8:37 AM		10:37 AM	11:37 AM		1:37 PM	2:37 PM					7:37 PM	9:12 PM	10:12 PM	11:14 PM
Dep	Croton-Harmon		7:57 AM	8:57 AM		10:57 AM	11:57 AM		1:57 PM	2:57 PM			4:59 PM	6:24 PM	7:57 PM	9:32 PM	10:32 PM	11:33 PM
Dep	Poughkeepsie		8:34 AM	9:34 AM		11:34 AM	12:34 PM		2:34 PM	3:34 PM			5:45 PM	7:01 PM	8:34 PM	10:09 PM	11:09 PM	12:13 AM
Dep	Rhinecliff		8:47 AM	9:47 AM		11:47 AM	12:47 PM		2:47 PM	3:47 PM		5:05 PM		7:14 PM	8:47 PM	10:22 PM	11:22 PM	12:27 AM
Dep	Hudson		9:09 AM	10:09 AM		12:09 PM	1:09 PM		3:09 PM	4:09 PM		5:28 PM		7:36 PM	9:09 PM	10:44 PM	11:44 PM	12:50 AM
Arr	Albany-		9:30 AM	10:30 AM	11:15 AM	12:30 PM	1:30 PM	2:15 PM	3:30 PM	4:30 PM	5:15 PM	5:55 PM	6:55 PM	7:57 PM	9:30 PM	11:05 PM	12:05 AM	1:18 AM
Dep	Rensselaer	6:00 AM	9:45 AM	10:45 AM	11:25 AM	12:40 PM		2:25 PM	3:40 PM	4:45 PM	5:25 PM		7:35 PM	8:12 PM				
Arr	Schenectady	-	10:03 AM	11:03 AM	-	12:58 PM		-	3:58 PM	5:03 PM	-		7:57 PM	8:30 PM				
Dep		-	10:05 AM	11:05 AM	-	1:00 PM		-	4:00 PM	5:05 PM	-		8:01 PM	8:32 PM				
Arr	Amsterdam	-	10:20 AM		-	1:15 PM		-	4:15 PM		-							
Dep		-	10:22 AM		-	1:17 PM		-	4:17 PM		-							
Arr	Utica	-	11:18 AM		-	2:13 PM		-	5:13 PM		-		9:10 PM					
Dep		-	11:20 AM		-	2:15 PM		-	5:15 PM		-		9:14 PM					
Arr	Rome	-	11:34 AM		-	2:29 PM		-	5:29 PM		-							
Dep		-	11:35 AM		-	2:30 PM		-	5:30 PM		-							
Arr	Syracuse	8:13 AM	12:18 PM		1:38 PM	3:13 PM		4:38 PM	6:13 PM		7:38 PM		10:07 PM					
Dep		8:17 AM	12:22 PM		1:42 PM	3:17 PM		4:42 PM	6:17 PM		7:42 PM		10:11 PM					
Arr	Rochester	9:30 AM	1:30 PM		2:55 PM	4:25 PM		5:55 PM	7:25 PM		8:55 PM		11:26 PM					
Dep		9:34 AM	1:34 PM		2:59 PM	4:29 PM		5:59 PM	7:29 PM		8:59 PM		11:30 PM					
Arr	Buffalo Depew	10:26 AM	2:26 PM		3:51 PM	5:21 PM		6:51 PM	8:21 PM		9:51 PM		12:32 AM					
Dep		10:29 AM	2:29 PM		3:54 PM	5:24 PM		6:54 PM	8:24 PM		9:54 PM		12:40 AM					
Arr	Buffalo	10:41 AM	2:41 PM		4:06 PM	5:36 PM		7:06 PM	8:36 PM		10:06 PM							
Dep	Exchange Street	10:43 AM	2:43 PM		4:08 PM	5:38 PM		7:08 PM	8:38 PM		10:08 PM							
Arr	Niagara Falls (New Station)	11:40 AM	3:45 PM		5:05 PM	6:40 PM		8:05 PM	9:40 PM		11:05 PM							
			Train continues to Toronto	Train continues to Montreal						Train continues to Rutland			Train continues to Chicago	Train continues to Rutland				

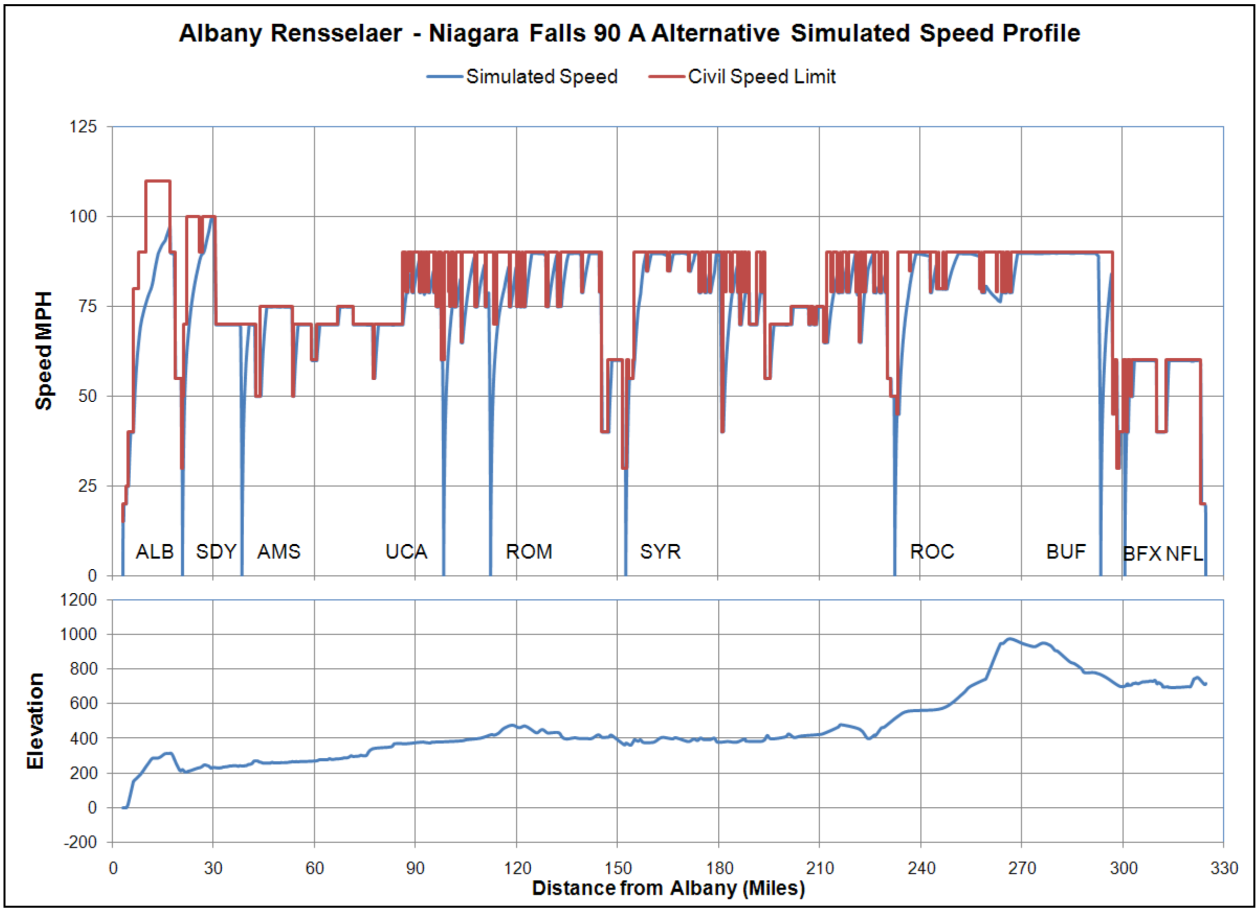
Exhibit D-23 - Alternative 90A Scheduled Run Times (with 10% Schedule Margin)

Station	Dwell	Arrive	Depart
Albany Rensselaer	0:00:00	0:00:00	0:00:00
Schenectady	0:02:00	0:21:58	0:24:10
Amsterdam	0:02:00	0:41:05	0:43:17
Utica	0:02:00	1:41:20	1:43:32
Rome	0:02:00	1:57:28	1:59:40
Syracuse	0:04:00	2:37:58	2:42:22
Rochester	0:04:00	3:54:38	3:59:02
Buffalo-Depew	0:03:00	4:48:54	4:52:12
Buffalo-Exchange	0:02:00	5:02:51	5:05:03
Niagara Falls (New Station)	0:00:00	5:37:55	5:37:55

Schedule margin is uniformly allocated over the entire trip.
Speed Improvements in 90A are limited to sections and curves currently at 79 MPH and assume a 3" cant deficiency.

Exhibit D-24 shows the TrainOps software simulated trip graph (velocity versus distance) for Alternative 90A. The red line represents speed restrictions due to geometry and the blue line represents the simulated velocity of the train including station stops. Alternative 90A uses shared passenger/freight tracks with several speed restrictions (especially in the 75 to 90 MPH range) as indicated by the dips in trip graph.

Exhibit D-24 - Alternative 90A Trip Graph



2.1.5. Alternative 90B

Alternative 90B supports the same maximum speed (90 MPH) between Schenectady and Buffalo Exchange as 90A with different infrastructure designs. Alternatives 90B and 110 feature dedicated third tracks between Hoffmans and Buffalo that are designed to passenger train friendly geometry. Under this design, trains in both directions operate on a largely single track railroad with passing tracks ("fourth track") at carefully chosen locations which allow two trains to pass at speed, provided that they are both on schedule. Limiting the passing locations (lengths of fourth track) to what is needed to run hourly bidirectional service allows for trains in opposite directions to "meet" at exactly the same location. This means that they must follow the same schedule and have the same elapsed time from "meet" to "meet". With this design the overall length of track miles needed is optimized, reducing the infrastructure cost of these two alternatives.

Providing express service as a component of Alternatives 90B and 110 was also considered. A train that is more than a few minutes off this planned schedule, such as an express service, would need to wait 15 to 20 minutes at the previous passing track ("meet" location) for a train in the opposite direction to clear single track. Although the express service would save 3 to 5 minutes of travel time saved with each station stop eliminated, the travel time is increased will waiting at the next "meet" location under the design for Alternatives 90B and 110. The design of Alternatives 90B and 110 could be adjusted by providing additional locations of fourth track, significantly increasing the cost of each of these alternatives. It would also be possible to run express service very early in the morning (eastbound) and late at night (westbound) when there are no trains operating in the opposite direction. However, considering the increase in cost needed to provide additional fourth track to accommodate express service; and considering the limited timeframe available for express service without this added fourth track and that this scenario eliminates the passenger convenience of "memory schedules;" Alternatives 90B and 110 were developed without express service.

The operating plan has eight round trips between Albany and Buffalo, the same frequency as Alternative 90A. The alternative's operating plan is shown in Exhibit D-26 and Exhibit D-27.

Exhibit D-25 shows the service diagram for Alternative 90B.

Exhibit D-25 - Alternative 90B Service Diagram

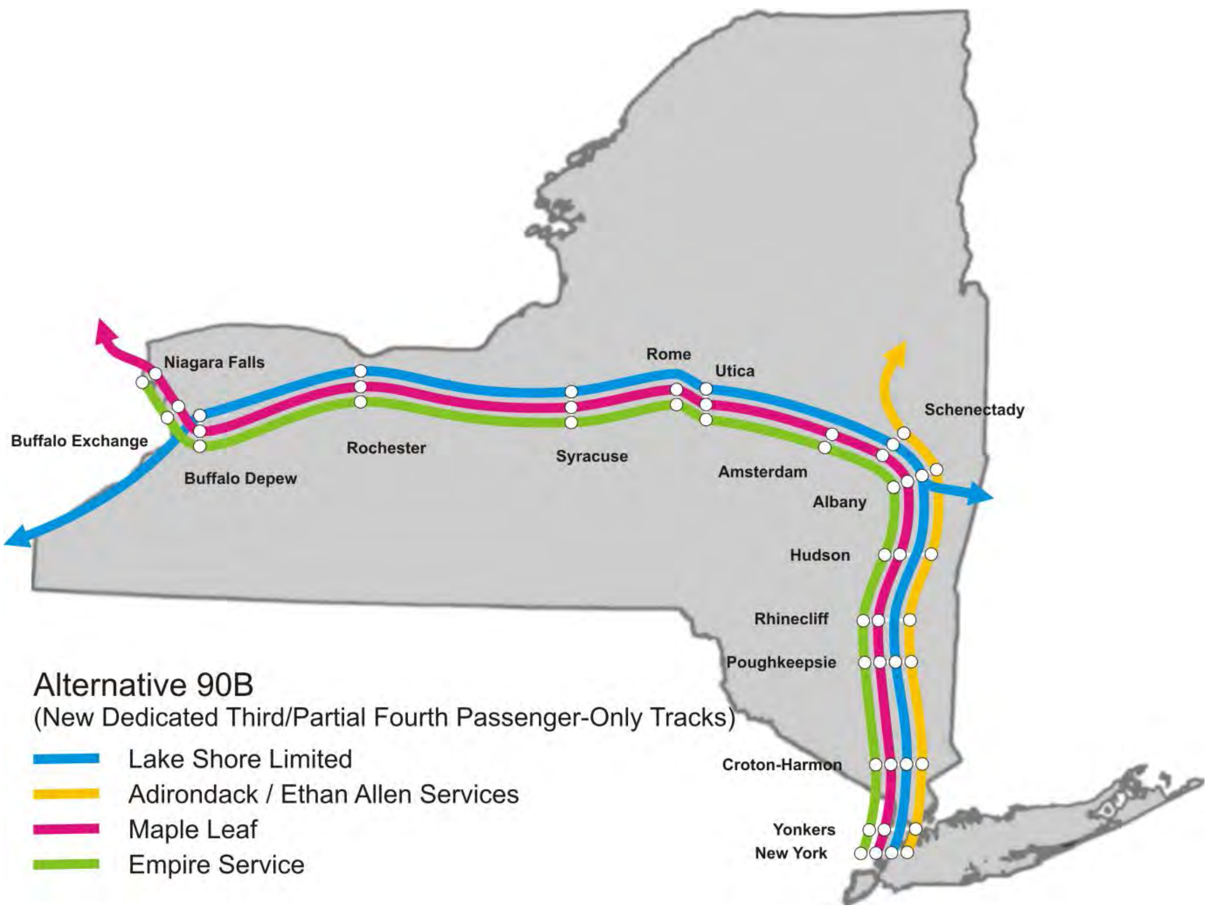


Exhibit D-28 shows the TrainOps simulation results for a single passenger train operating over the Alternative 90B infrastructure. A schedule margin was of 8 percent is considered appropriate due to the use of dedicated third and fourth tracks for most of the corridor in this alternative.

Exhibit D-26 - Alternative 90B – Eastbound Timetable

Stations/Train Numbers		230	232	234	236	280	238	282	290	284	240	286	242	48	288	68	64	298
Dep	Montreal								Train originates at Rutland					Train originates at Chicago		Train originates at Montreal	Train originates at Toronto	
Dep	Plattsburgh																	
Dep	Rutland																	
Dep	Saratoga																	
Dep	Niagara Falls (New Station)					3:49 AM		5:49 AM		7:49 AM		9:49 AM			11:49 AM		1:49 PM	3:49 PM
Dep	Buffalo Exchange Street					4:22 AM		6:22 AM		8:22 AM		10:22 AM			12:22 PM		2:22 PM	4:22 PM
Dep	Buffalo Depew					4:39 AM		6:39 AM		8:39 AM		10:39 AM		11:06 AM	12:39 PM		2:39 PM	4:39 PM
Dep	Rochester					5:29 AM		7:29 AM		9:29 AM		11:29 AM		11:59 AM	1:29 PM		3:29 PM	5:29 PM
Dep	Syracuse					6:34 AM		8:34 AM		10:34 AM		12:34 PM		1:34 PM	2:34 PM		4:34 PM	6:34 PM
Dep	Rome					7:07 AM		9:07 AM		11:07 AM		1:07 PM			3:07 PM		5:07 PM	7:07 PM
Dep	Utica					7:28 AM		9:28 AM		11:28 AM		1:28 PM		2:37 PM	3:28 PM		5:28 PM	7:28 PM
Dep	Amsterdam					8:13 AM		10:13 AM		12:13 PM		2:13 PM		.....	4:13 PM		6:13 PM	8:13 PM
Dep	Schenectady					8:30 AM		10:30 AM	11:26 AM	12:30 PM		2:30 PM		3:41 PM	4:30 PM	5:16 PM	6:30 PM	8:30 PM
Arr	Albany-					8:56 AM		10:56 AM	11:50 AM	12:56 PM		2:56 PM		4:20 PM	4:56 PM	5:50 PM	6:56 PM	8:56 PM
Dep	Rensselaer	5:10 AM	6:10 AM	7:10 AM	8:10 AM	9:10 AM	10:10 AM	11:10 AM	12:10 PM	1:10 PM	2:10 PM	3:10 PM	4:10 PM	4:45 PM	5:10 PM	6:10 PM	7:10 PM	9:10 PM
Dep	Hudson	5:34 AM	6:34 AM	7:34 AM	8:34 AM	9:34 AM	10:34 AM	11:34 AM	12:34 PM	1:34 PM	2:34 PM	3:34 PM	4:34 PM	.....	5:34 PM	6:34 PM	7:34 PM	9:34 PM
Dep	Rhinecliff	5:55 AM	6:55 AM	7:55 AM	8:55 AM	9:55 AM	10:55 AM	11:55 AM	12:55 PM	1:55 PM	2:55 PM	3:55 PM	4:55 PM	.....	5:55 PM	6:55 PM	7:55 PM	9:55 PM
Dep	Poughkeepsie	.....	.....	.....	9:09 AM	.....	.....	.....	.....	.....	3:09 PM	.....	.....	.....	6:09 PM	7:09 PM	8:09 PM	10:09 PM
Dep	Croton-Harmon	6:42 AM	.....	.....	9:45 AM	10:43 AM	11:43 AM	12:43 PM	1:43 PM	2:43 PM	3:45 PM	4:43 PM	.....	6:00 PM	6:45 PM	7:45 PM	8:45 PM	10:45 PM
Dep	Yonkers	.....	.....	.....	.....	11:02 AM	12:02 PM	1:02 PM	2:02 PM	3:02 PM	.....	5:02 PM	.....	.....	.....	8:04 PM	9:04 PM	11:04 PM
Arr	New York	7:20 AM	8:15 AM	9:15 AM	10:25 AM	11:25 AM	12:25 PM	1:25 PM	2:25 PM	3:25 PM	4:25 PM	5:25 PM	6:20 PM	6:55 PM	7:25 PM	8:30 PM	9:30 PM	11:30 PM

Exhibit D-27 - Alternative 90B – Westbound Timetable

	Stations/Train Numbers	299	63	69	281	231	283	285	291	287	255	289	257	233	49	241	243	245	247
Dep	New York		7:15 AM	8:15 AM	9:15 AM	10:15 AM	11:15 AM	1:15 PM	2:15 PM	3:15 PM	3:45 PM	4:15 PM	4:45 PM	5:45 PM	6:45 PM	7:15 PM	8:15 PM	9:15 PM	11:15 PM
Dep	Yonkers		7:37 AM	8:37 AM	.....	.....	11:37 AM	.....	2:37 PM	.....	.....	4:37 PM	.....	.....	.....	7:37 PM	8:37 PM	9:37 PM	11:37 PM
Dep	Croton-Harmon		7:57 AM	8:57 AM	9:54 AM	10:54 AM	11:57 AM	1:54 PM	2:57 PM	3:54 PM	.....	4:57 PM	.....	6:24 PM	7:25 PM	7:57 PM	8:57 PM	9:57 PM	11:57 PM
Dep	Poughkeepsie		8:34 AM	9:34 AM	10:31 AM	11:31 AM	.....	2:31 PM	.....	4:31 PM	.....	.....	.....	7:01 PM	.....	.....	9:34 PM	10:34 PM	12:34 AM
Dep	Rhinecliff		8:47 AM	9:47 AM	10:44 AM	11:44 AM	12:44 PM	2:44 PM	3:44 PM	4:44 PM	5:09 PM	5:44 PM	6:09 PM	7:14 PM	.....	8:44 PM	9:47 PM	10:47 PM	12:47 AM
Dep	Hudson		9:09 AM	10:09 AM	11:07 AM	12:07 PM	1:07 PM	3:07 PM	4:07 PM	5:07 PM	5:31 PM	6:07 PM	6:31 PM	7:37 PM	.....	9:07 PM	10:09 PM	11:09 PM	1:09 AM
Arr	Albany-		9:30 AM	10:30 AM	11:30 AM	12:30 PM	1:30 PM	3:30 PM	4:30 PM	5:30 PM	5:50 PM	6:30 PM	6:50 PM	7:59 PM	9:00 PM	9:30 PM	10:30 PM	11:30 PM	1:30 AM
Dep	Rensselaer	5:45 AM	9:45 AM	10:55 AM	11:45 AM		1:45 PM	3:45 PM	4:40 PM	5:45 PM	6:00 PM	6:45 PM	7:00 PM		9:40 PM				
Arr	Schenectady	6:02 AM	10:02 AM	11:13 AM	12:02 PM		2:02 PM	4:02 PM	4:58 PM	6:02 PM	6:18 PM	7:02 PM	7:18 PM		10:00 PM				
Arr	Amsterdam	6:19 AM	10:19 AM		12:19 PM		2:19 PM	4:19 PM		6:19 PM		7:19 PM			.....				
Arr	Utica	7:06 AM	11:06 AM		1:06 PM		3:06 PM	5:06 PM		7:06 PM		8:06 PM			11:04 PM				
Arr	Rome	7:22 AM	11:22 AM		1:22 PM		3:22 PM	5:22 PM		7:22 PM		8:22 PM			.....				
Arr	Syracuse	7:59 AM	11:59 AM		1:59 PM		3:59 PM	5:59 PM		7:59 PM		8:59 PM			11:58 PM				
Arr	Rochester	9:05 AM	1:05 PM		3:05 PM		5:05 PM	7:05 PM		9:05 PM		10:05 PM			1:12 AM				
Arr	Buffalo Depew	9:56 AM	1:56 PM		3:56 PM		5:56 PM	7:56 PM		9:56 PM		10:56 PM			2:16 AM				
Arr	Buffalo Exchange Street	10:12 AM	2:12 PM		4:12 PM		6:12 PM	8:12 PM		10:12 PM		11:12 PM							
Arr	Niagara Falls (New Station)	10:51 AM	2:51 PM		4:51 PM		6:51 PM	8:51 PM		10:51 PM		11:51 PM							
Dep	Saratoga		Train continues to Toronto	Train continues to Montreal					Train continues to Rutland						Train continues to Chicago				
Arr	Rutland																		
Dep	Plattsburgh																		
Arr	Montreal																		

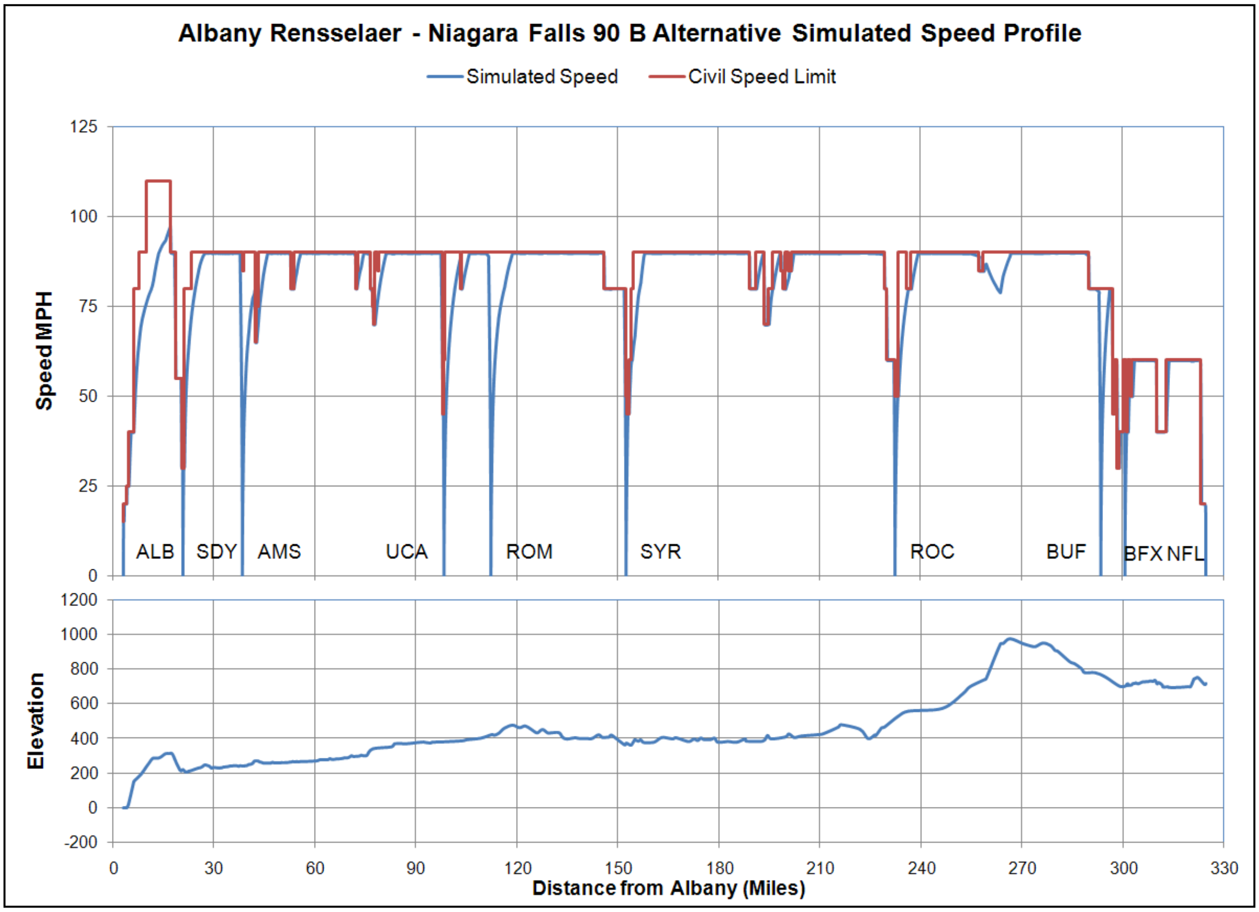
Exhibit D-28 - Alternative 90B Scheduled Run Times (with 8% Schedule Margin)

Station	Dwell	Arrive	Depart
Albany Rensselaer	0:00:00	0:00:00	0:00:00
Schenectady	0:02:00	0:21:40	0:23:50
Amsterdam	0:02:00	0:39:25	0:41:35
Utica	0:02:00	1:28:39	1:30:49
Rome	0:02:00	1:43:32	1:45:42
Syracuse	0:04:00	2:17:52	2:22:11
Rochester	0:04:00	3:24:44	3:29:03
Buffalo-Depew	0:03:00	4:16:57	4:20:11
Buffalo-Exchange	0:02:00	4:30:39	4:32:48
Niagara Falls (New Station)	0:00:00	5:05:05	5:05:05

Schedule margin is uniformly allocated over the entire trip.

Exhibit D-29 shows the TrainOps software simulated trip graph (velocity versus distance) for Alternative 90B. The red plot represents civil speed restrictions while the blue represents the simulated velocity of the train. Alternative 90B uses dedicated passenger-only tracks and less stringent curve speed criteria than Alternative 90A. Therefore, Alternative 90B has fewer speed restrictions (especially in the 75 to 90 MPH range) than Alternative 90A.

Exhibit D-29 - Alternative 90 B Trip Graph



2.1.6. 2035 Alternative 110

Alternative 110 is similar to Alternative 90B but increases the maximum speed of the third main track to 110 MPH between Schenectady and Buffalo Exchange stations. The fourth main track, where included, is limited to 90 MPH in this alternative. The Alternative 110 operating plan has eight round trips between Albany and Buffalo, the same frequency as Alternatives 90A and 90B. The alternative's operating plan is shown in Exhibit D-31 and Exhibit D-32. The passenger service operates on long sections of single track with carefully-scheduled "meets" between opposing direction trains where both the third and fourth tracks are constructed. Therefore, all passenger train trips must operate with a "clockface" pattern and have identical run times. This means that Alternative 110 has a stopping pattern similar to Alternative 90B and does not have the express service that Alternative 90A does.

As with Alternative 90B, Alternative 110's train schedules have been developed based on the best-possible simulated trip times along with 8 percent schedule margin. This accounts for train delays and temporary speed restrictions. The single train simulation results are shown in Exhibit D-33.

Exhibit D-30 shows the service diagram for Alternative 110. It is identical to the Alternative 90B and Base Alternative service diagrams.

Exhibit D-30 - Alternative 110 Service Diagram

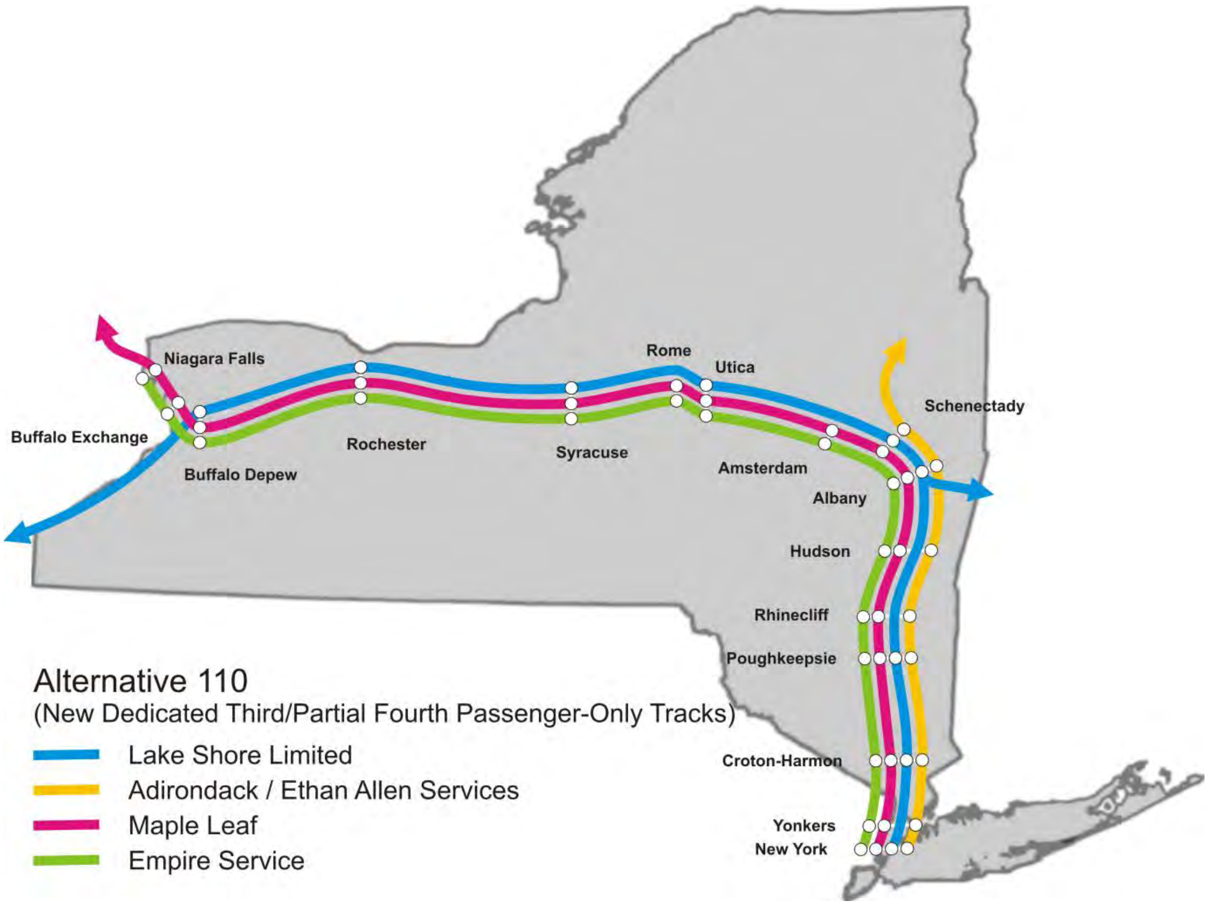


Exhibit D-31 - Alternative 110 – Eastbound Timetable

	Stations/Train Numbers	230	232	234	236	280	238	282	290	284	240	286	242	48	288	68	64	298
Dep	Montreal								Train originates at Rutland					Train originates at Chicago		Train originates at Montreal	Train originates at Toronto	
Dep	Plattsburgh																	
Dep	Rutland																	
Dep	Saratoga																	
Dep	Niagara Falls (New Station)					4:05 AM		6:05 AM		8:05 AM		10:05 AM			12:05 PM		2:05 PM	4:05 PM
Dep	Buffalo Exchange Street					4:36 AM		6:36 AM		8:36 AM		10:36 AM			12:36 PM		2:36 PM	4:36 PM
Dep	Buffalo Depew					4:53 AM		6:53 AM		8:53 AM		10:53 AM		11:20 AM	12:53 PM		2:53 PM	4:53 PM
Dep	Rochester					5:40 AM		7:40 AM		9:40 AM		11:40 AM		12:10 PM	1:40 PM		3:40 PM	5:40 PM
Dep	Syracuse					6:43 AM		8:43 AM		10:43 AM		12:43 PM		1:45 PM	2:43 PM		4:43 PM	6:43 PM
Dep	Rome					7:16 AM		9:16 AM		11:16 AM		1:16 PM			3:16 PM		5:16 PM	7:16 PM
Dep	Utica					7:33 AM		9:33 AM		11:33 AM		1:33 PM		2:32 PM	3:33 PM		5:33 PM	7:33 PM
Dep	Amsterdam					8:15 AM		10:15 AM		12:15 PM		2:15 PM			4:15 PM		6:15 PM	8:15 PM
Arr	Schenectady			7:10 AM		.....		.....		.....		.....						
Dep				.....		8:31 AM		10:31 AM	11:26 AM	12:31 PM		2:31 PM		3:33 PM	4:31 PM	5:16 PM	6:31 PM	8:31 PM
Arr	Albany-Rensselaer			7:34 AM		8:56 AM		10:56 AM	11:50 AM	12:56 PM		2:56 PM		4:15 PM	4:56 PM	5:50 PM	6:56 PM	8:56 PM
Dep		5:10 AM	6:10 AM	.....	8:10 AM	9:10 AM	10:10 AM	11:10 AM	12:10 PM	1:10 PM	2:10 PM	3:10 PM	4:10 PM	4:45 PM	5:10 PM	6:10 PM	7:10 PM	9:10 PM
Dep	Hudson	5:34 AM	6:34 AM	.....	8:34 AM	9:34 AM	10:34 AM	11:34 AM	12:34 PM	1:34 PM	2:34 PM	3:34 PM	4:34 PM	.....	5:34 PM	6:34 PM	7:34 PM	9:34 PM
Dep	Rhinecliff	5:55 AM	6:55 AM	7:55 AM	8:55 AM	9:55 AM	10:55 AM	11:55 AM	12:55 PM	1:55 PM	2:55 PM	3:55 PM	4:55 PM	.....	5:55 PM	6:55 PM	7:55 PM	9:55 PM
Dep	Poughkeepsie	.....	.....	9:15 AM	9:09 AM	.....	.....	12:09 PM	.....	.....	3:09 PM	.....	.....	.....	6:09 PM	7:09 PM	8:09 PM	10:09 PM
Dep	Croton-Harmon	6:42 AM	.....	.....	9:45 AM	10:43 AM	11:43 AM	12:45 PM	1:43 PM	2:43 PM	3:45 PM	4:43 PM	.....	6:00 PM	6:45 PM	7:45 PM	8:45 PM	10:45 PM
Dep	Yonkers	.....	.....	.....	.....	11:02 AM	12:02 PM	.....	2:02 PM	3:02 PM	.....	5:02 PM	.....	.....	.....	8:04 PM	9:04 PM	11:04 PM
Arr	New York	7:20 AM	8:15 AM	9:15 AM	10:25 AM	11:25 AM	12:25 PM	1:25 PM	2:25 PM	3:25 PM	4:25 PM	5:25 PM	6:20 PM	6:55 PM	7:25 PM	8:30 PM	9:30 PM	11:30 PM

Exhibit D-32 - Alternative 110 – Westbound Timetable

	Stations/Train Numbers	299	63	69	281	231	283	285	291	287	233	289	235	237	49	239	241	243	245
Dep	New York		7:15 AM	8:15 AM	9:15 AM	10:15 AM	11:15 AM	1:15 PM	2:15 PM	3:15 PM	3:45 PM	4:15 PM	4:45 PM	5:45 PM	6:45 PM	7:15 PM	8:15 PM	9:15 PM	11:15 PM
Dep	Yonkers		7:37 AM	8:37 AM	.....	.....	11:37 AM	.....	2:37 PM	.....	.....	4:37 PM	.....	.....	.....	7:37 PM	8:37 PM	9:37 PM	11:37 PM
Dep	Croton-Harmon		7:57 AM	8:57 AM	9:54 AM	10:54 AM	11:57 AM	1:54 PM	2:57 PM	3:54 PM	.....	4:57 PM	.....	6:24 PM	7:25 PM	7:57 PM	8:57 PM	9:57 PM	11:57 PM
Dep	Poughkeepsie		8:34 AM	9:34 AM	10:31 AM	11:31 AM	.....	2:31 PM	.....	4:31 PM	.....	.....	.....	7:01 PM	.....	.....	9:34 PM	10:34 PM	12:34 AM
Dep	Rhinecliff		8:47 AM	9:47 AM	10:44 AM	11:44 AM	12:44 PM	2:44 PM	3:44 PM	4:44 PM	5:09 PM	5:44 PM	6:09 PM	7:14 PM	.....	8:44 PM	9:47 PM	10:47 PM	12:47 AM
Dep	Hudson		9:09 AM	10:09 AM	11:07 AM	12:07 PM	1:07 PM	3:07 PM	4:07 PM	5:07 PM	5:31 PM	6:07 PM	6:31 PM	7:37 PM	.....	9:07 PM	10:09 PM	11:09 PM	1:09 AM
Arr	Albany-		9:30 AM	10:30 AM	11:30 AM	12:30 PM	1:30 PM	3:30 PM	4:30 PM	5:30 PM	5:50 PM	6:30 PM	6:50 PM	7:59 PM	9:00 PM	9:30 PM	10:30 PM	11:30 PM	1:30 AM
Dep	Rensselaer	5:45 AM	9:45 AM	10:55 AM	11:45 AM		1:45 PM	3:45 PM	4:40 PM	5:45 PM		6:45 PM			9:40 PM				
Arr	Schenectady	6:02 AM	10:02 AM	11:13 AM	12:02 PM		2:02 PM	4:02 PM	4:58 PM	6:02 PM		7:02 PM			10:00 PM				
Arr	Amsterdam	6:18 AM	10:18 AM		12:18 PM		2:18 PM	4:18 PM		6:18 PM		7:18 PM			.....				
Arr	Utica	7:02 AM	11:02 AM		1:02 PM		3:02 PM	5:02 PM		7:02 PM		8:02 PM			11:03 PM				
Arr	Rome	7:17 AM	11:17 AM		1:17 PM		3:17 PM	5:17 PM		7:17 PM		8:17 PM			.....				
Arr	Syracuse	7:53 AM	11:53 AM		1:53 PM		3:53 PM	5:53 PM		7:53 PM		8:53 PM			11:55 PM				
Arr	Rochester	8:55 AM	12:55 PM		2:55 PM		4:55 PM	6:55 PM		8:55 PM		9:55 PM			1:05 AM				
Arr	Buffalo Depew	9:42 AM	1:42 PM		3:42 PM		5:42 PM	7:42 PM		9:42 PM		10:42 PM			2:05 AM				
Arr	Buffalo Exchange Street	10:00 AM	2:00 PM		4:00 PM		6:00 PM	8:00 PM		10:00 PM		11:00 PM							
Arr	Niagara Falls (New Station)	10:37 AM	2:37 PM		4:37 PM		6:37 PM	8:37 PM		10:37 PM		11:37 PM							
Dep	Saratoga		Train continues to Toronto	Train continues to Montreal					Train continues to Rutland						Train continues to Chicago				
Arr	Rutland																		
Dep	Plattsburgh																		
Arr	Montreal																		

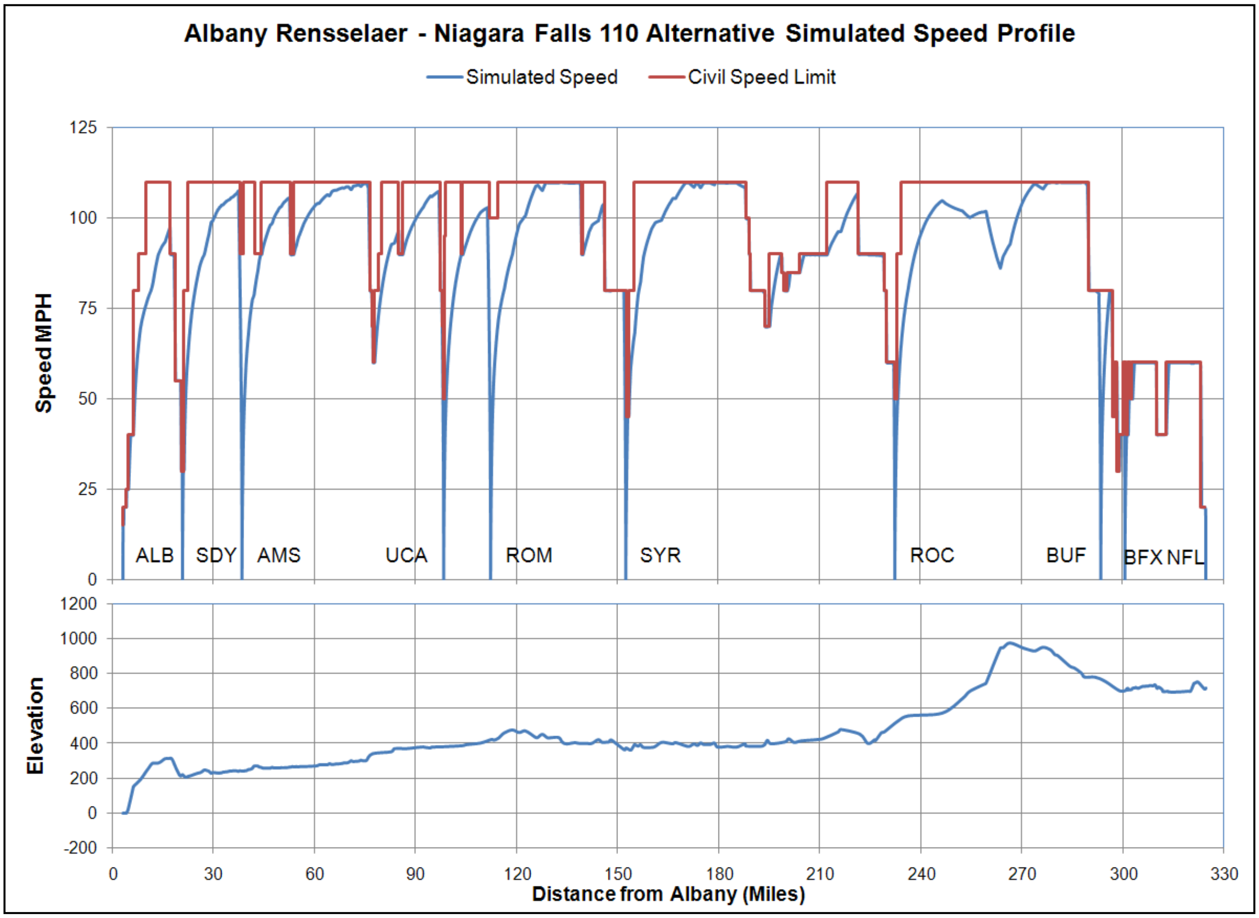
Exhibit D-33 - Alternative 110 Scheduled Run Times (with 8% Schedule Margin)

Station	Dwell	Arrive	Depart
Albany Rensselaer	0:00:00	0:00:00	0:00:00
Schenectady	0:02:00	0:21:40	0:23:50
Amsterdam	0:02:00	0:38:37	0:40:46
Utica	0:02:00	1:23:32	1:25:42
Rome	0:02:00	1:37:51	1:40:00
Syracuse	0:04:00	2:09:33	2:13:52
Rochester	0:04:00	3:12:40	3:17:00
Buffalo-Depew	0:03:00	3:59:45	4:02:59
Buffalo-Exchange	0:02:00	4:13:26	4:15:36
Niagara Falls (New Station)	0:00:00	4:47:52	4:47:52

Schedule margin is uniformly allocated over the entire trip.

Exhibit D-34 shows the TrainOps software simulated trip graph (velocity versus distance) for Alternative 110. As with Alternative 90B, Alternative 110 uses dedicated passenger-only tracks and less stringent curve speed criteria than Alternative 90A.

Exhibit D-34 - Alternative 110 Trip Graph



2.1.7. 2035 Alternative 125

This alternative provides a dedicated high speed rail corridor on a new alignment from the current Empire Corridor between Albany and a new Buffalo Downtown Station. This segment is assumed to be electrified and completely grade-separated. Using "dual mode" (electric and diesel) locomotives, trains are assumed to operate in diesel mode on the Niagara Branch (Buffalo Downtown to Niagara Falls) and on the Hudson Line from Albany south. The maximum speed on the dedicated corridor between Albany and Buffalo is assumed to be 125 MPH. Given the capital-intensive nature of an electrified rail corridor and the need to financially support this major investment, Alternative 125 has more frequent service than the other alternatives, offering with hourly service operated between Albany-Rensselaer and Buffalo Downtown, as shown in Exhibit D-36 through Exhibit D-39. This level of service is consistent with the Alternative's ridership forecasts and available operating capacity on a dedicated, passenger-only, two-track rail corridor.

Exhibit D-35 shows the Alternative 125 service diagram, including the new high speed service between Albany and Buffalo Downtown. North of Buffalo, a shuttle service to Niagara Falls is assumed, though this could also represent dual mode high speed trains (in diesel mode) operating in through service to Niagara Falls.

Exhibit D-35 - Alternative 125 Service Diagram

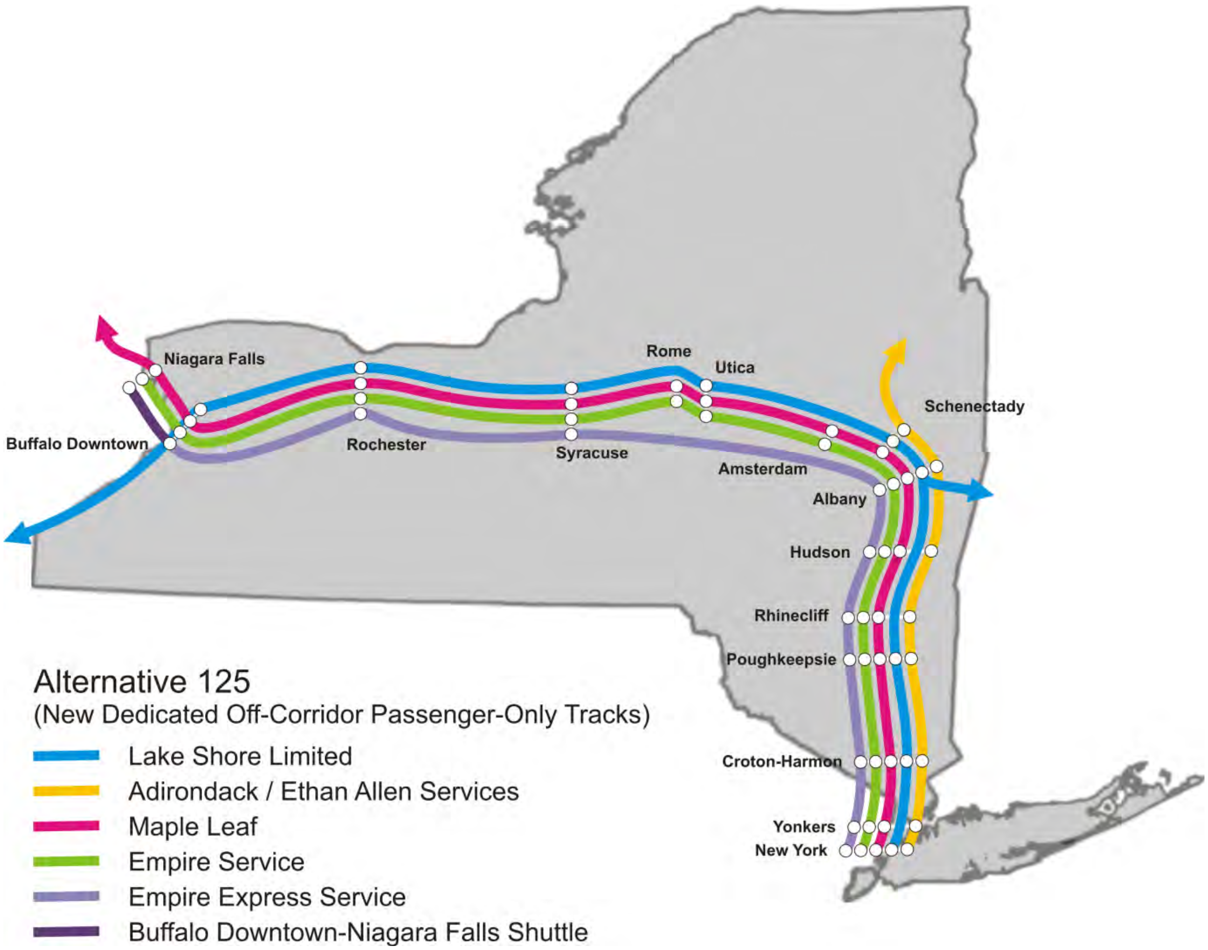


Exhibit D-36 - Alternative 125 – Eastbound Timetable (AM)

	Stations/Train Numbers	230	232	234	*HST-02*	*HST-04*	NFL-06	*HST-06*	280	*HST-08*	290	*HST-10*	*HST-12*	284	*HST-14*	NFL-16
Dep	Niagara Falls (New Station)						6:20 AM		4:20 AM		Train originates in Rutland			7:20 AM		11:20 AM
Arr	Buffalo Exchange (New Station)						7:00 AM		5:00 AM					8:00 AM		12:00 PM
Dep					5:15 AM	6:15 AM		7:15 AM	5:05 AM	8:15 AM		9:15 AM	10:15 AM	8:05 AM	11:15 AM	
Arr	Rochester (HST)				5:54 AM	6:54 AM		7:54 AM		8:54 AM		9:54 AM	10:54 AM		11:54 AM	
Dep					5:57 AM	6:57 AM		7:57 AM		8:57 AM		9:57 AM	10:57 AM		11:57 AM	
Arr	Rochester (Central Ave)								6:02 AM					9:02 AM		
Dep									6:06 AM					9:06 AM		
Arr	Syracuse (HST)				6:39 AM	7:39 AM		8:39 AM		9:39 AM		10:39 AM	11:39 AM		12:39 PM	
Dep					6:43 AM	7:43 AM		8:43 AM		9:43 AM		10:43 AM	11:43 AM		12:43 PM	
Arr	Syracuse (RTC)								7:24 AM					10:24 AM		
Dep									7:29 AM					10:29 AM		
Arr	Rome								8:07 AM					11:07 AM		
Dep									8:08 AM					11:08 AM		
Arr	Utica								8:22 AM					11:22 AM		
Dep									8:25 AM					11:25 AM		
Arr	Amsterdam								9:23 AM					12:23 PM		
Dep									9:25 AM					12:25 PM		
Arr	Schenectady								9:43 AM					12:43 PM		
Dep									9:46 AM		10:55 AM			12:46 PM		
Arr	Albany-Rensselaer				8:00 AM	9:00 AM		10:00 AM	10:25 AM	11:00 AM	11:25 AM	12:00 PM	1:00 PM	1:25 PM	2:00 PM	
Dep		5:40 AM	6:40 AM	7:10 AM	8:10 AM	9:10 AM		10:10 AM	10:40 AM	11:10 AM	11:40 AM	12:10 PM	1:10 PM	1:40 PM	2:10 PM	
Dep	Hudson	6:04 AM	7:04 AM	7:34 AM	8:34 AM	9:34 AM		10:34 AM	11:04 AM	11:34 AM	12:04 PM	12:34 PM	1:34 PM	2:04 PM	2:34 PM	
Dep	Rhinecliff	6:25 AM	7:25 AM	7:55 AM	8:55 AM	9:55 AM		10:55 AM	11:25 AM	11:55 AM	12:25 PM	12:55 PM	1:55 PM	2:25 PM	2:55 PM	
Dep	Poughkeepsie	6:39 AM			9:09 AM			11:09 AM	11:39 AM		12:39 PM	1:09 PM		2:39 PM	3:09 PM	
Dep	Croton	7:15 AM		8:43 AM	9:45 AM	10:43 AM		11:45 AM	12:15 PM	12:43 PM	1:15 PM	1:45 PM	2:43 PM	3:15 PM	3:45 PM	
Dep	Yonkers			9:02 AM		11:02 AM			12:34 PM	1:02 PM	1:34 PM		3:02 PM	3:34 PM		
Arr	New York	7:55 AM	8:45 AM	9:25 AM	10:25 AM	11:25 AM		12:25 PM	1:00 PM	1:25 PM	2:00 PM	2:25 PM	3:25 PM	4:00 PM	4:25 PM	

Exhibit D-37 - Alternative 125 – Eastbound Timetable (PM)

Stations/Train Numbers		***HST-16***	***HST-18***	**48**	***HST-20***	**68**	***HST-22***	**64**	***HST-24***	***HST-26***	**NFL-28**	***HST-28***	***HST-30***
Dep	**Niagara Falls (New Station)**			Train originates in Chicago		Train originates in Montreal		12:20 PM			5:20 PM		
Arr	**Buffalo Exchange (New Station)**							1:00 PM			6:00 PM		
Dep		12:15 PM	1:15 PM		2:15 PM		3:15 PM	1:05 PM	4:15 PM	5:15 PM		6:15 PM	7:15 PM
Arr	**Rochester (HST)**	12:54 PM	1:54 PM		2:54 PM		3:54 PM		4:54 PM	5:54 PM		6:54 PM	7:54 PM
Dep		12:57 PM	1:57 PM		2:57 PM		3:57 PM		4:57 PM	5:57 PM		6:57 PM	7:57 PM
Arr	**Rochester (Central Ave)**			11:09 AM				2:02 PM					
Dep				11:17 AM				2:06 PM					
Arr	**Syracuse (HST)**	1:39 PM	2:39 PM		3:39 PM		4:39 PM		5:39 PM	6:39 PM		7:39 PM	8:39 PM
Dep		1:43 PM	2:43 PM		3:43 PM		4:43 PM		5:43 PM	6:43 PM		7:43 PM	8:43 PM
Arr	**Syracuse (RTC)**			12:37 PM				3:24 PM					
Dep				12:47 PM				3:29 PM					
Arr	**Rome**							4:07 PM					
Dep								4:08 PM					
Arr	**Utica**			1:40 PM				4:22 PM					
Dep				1:47 PM				4:25 PM					
Arr	**Amsterdam**							5:23 PM					
Dep								5:25 PM					
Arr	**Schenectady**			3:03 PM				5:43 PM					
Dep				3:09 PM		4:45 PM		5:46 PM					
Arr	**Albany-Rensselaer**	3:00 PM	4:00 PM	3:50 PM	5:00 PM	5:20 PM	6:00 PM	6:25 PM	7:00 PM	8:00 PM		9:00 PM	10:00 PM
Dep		3:10 PM	4:10 PM	4:20 PM	5:10 PM	5:40 PM	6:10 PM	6:40 PM	7:10 PM	8:10 PM		9:10 PM	10:10 PM
Dep	**Hudson**	3:34 PM	4:34 PM		5:34 PM	6:04 PM	6:34 PM	7:04 PM	7:34 PM	8:34 PM		9:34 PM	10:34 PM
Dep	**Rhinecliff**	3:55 PM	4:55 PM		5:55 PM	6:25 PM	6:55 PM	7:25 PM	7:55 PM	8:55 PM		9:55 PM	10:55 PM
Dep	**Poughkeepsie**		5:09 PM	5:21 PM		6:39 PM	7:09 PM	7:39 PM		9:09 PM		10:09 PM	11:09 PM
Dep	**Croton**	4:43 PM	5:45 PM	6:06 PM	6:43 PM	7:15 PM	7:45 PM	8:15 PM	8:43 PM	9:45 PM		10:45 PM	11:45 PM
Dep	**Yonkers**	5:02 PM			7:02 PM	7:34 PM		8:34 PM	9:02 PM	10:04 PM		11:04 PM	12:04 AM
Arr	**New York**	5:25 PM	6:25 PM	7:00 PM	7:25 PM	8:00 PM	8:25 PM	9:00 PM	9:25 PM	10:30 PM		11:30 PM	12:30 AM

Exhibit D-38 - Alternative 125 – Westbound Timetable (AM)

	Stations/Train Numbers	HST-01	NFL-01	HST-03	HST-05	63	HST-07	NFL-07	69	HST-09	HST-11	281	HST-13
Dep	New York	4:15 AM		6:15 AM	7:15 AM	7:45 AM	8:15 AM		8:45 AM	9:15 AM	10:15 AM	10:45 AM	11:15 AM
Dep	Yonkers	4:37 AM		6:37 AM		8:07 AM	8:37 AM		9:07 AM		10:37 AM	11:07 AM	
Dep	Croton	4:57 AM		6:57 AM	7:54 AM	8:27 AM	8:57 AM		9:27 AM	9:54 AM	10:57 AM	11:27 AM	11:54 AM
Dep	Poughkeepsie	5:34 AM			8:31 AM	9:04 AM			10:04 AM	10:31 AM		12:04 PM	12:31 PM
Dep	Rhinecliff	5:47 AM		7:44 AM	8:44 AM	9:17 AM	9:44 AM		10:17 AM	10:44 AM	11:44 AM	12:17 PM	12:44 PM
Dep	Hudson	6:09 AM		8:07 AM	9:07 AM	9:39 AM	10:07 AM		10:39 AM	11:07 AM	12:07 PM	12:39 PM	1:07 PM
Arr	Albany-Rensselaer	6:30 AM		8:30 AM	9:30 AM	10:00 AM	10:30 AM		11:00 AM	11:30 AM	12:30 PM	1:00 PM	1:30 PM
Dep		6:40 AM		8:40 AM	9:40 AM	10:20 AM	10:40 AM		11:20 AM	11:40 AM	12:40 PM	1:15 PM	1:40 PM
Arr	Schenectady					10:39 AM			11:39 AM			1:34 PM	
Dep						10:41 AM						1:36 PM	
Arr	Amsterdam					10:56 AM						1:51 PM	
Dep						10:58 AM						1:53 PM	
Arr	Utica					11:55 AM						2:50 PM	
Dep						11:58 AM						2:53 PM	
Arr	Rome					12:13 PM						3:08 PM	
Dep						12:14 PM						3:09 PM	
Arr	Syracuse (HST)	7:54 AM		9:54 AM	10:54 AM		11:54 AM			12:54 PM	1:54 PM		2:54 PM
Dep		7:58 AM		9:58 AM	10:58 AM		11:58 AM			12:58 PM	1:58 PM		2:58 PM
Arr	Syracuse (RTC)					1:00 PM						3:55 PM	
Dep						1:04 PM						3:59 PM	
Arr	Rochester (HST)	8:40 AM		10:40 AM	11:40 AM	Train continues to Toronto	12:40 PM		Train continues to Montreal	1:40 PM	2:40 PM		3:40 PM
Dep		8:43 AM		10:43 AM	11:43 AM		12:43 PM			1:43 PM	2:43 PM		3:43 PM
Arr	Rochester (Central Ave)					2:16 PM						5:11 PM	
Dep						2:20 PM						5:15 PM	
Arr	Buffalo Exchange (New Station)	9:25 AM		11:25 AM	12:25 PM	3:25 PM	1:25 PM			2:25 PM	3:25 PM	6:20 PM	4:25 PM
Dep			9:40 AM			3:30 PM		1:40 PM				6:30 PM	
Arr	Niagara Falls (New Station)		10:17 AM			4:25 PM		2:17 PM				7:25 PM	

Exhibit D-39 - Alternative 125 – Westbound Timetable (PM)

		HST-15	HST-17	283	HST-19	NFL-19	291	HST-21	49	HST-23	HST-25	HST-27	HST-29
Dep	New York	12:15 PM	1:15 PM	1:45 PM	2:15 PM		2:45 PM	3:15 PM	3:45 PM	4:15 PM	5:15 PM	6:15 PM	7:15 PM
Dep	Yonkers	12:37 PM		2:07 PM	2:37 PM		3:07 PM			4:37 PM		6:37 PM	
Dep	Croton	12:57 PM	1:54 PM	2:27 PM	2:57 PM		3:27 PM	3:54 PM	4:29 PM	4:57 PM	5:54 PM	6:57 PM	7:54 PM
Dep	Poughkeepsie		2:31 PM	3:04 PM			4:04 PM	4:31 PM	5:15 PM		6:31 PM		8:31 PM
Dep	Rhinecliff	1:44 PM	2:44 PM	3:17 PM	3:44 PM		4:17 PM	4:44 PM		5:44 PM	6:44 PM	7:44 PM	8:44 PM
Dep	Hudson	2:07 PM	3:07 PM	3:39 PM	4:07 PM		4:39 PM	5:07 PM		6:07 PM	7:07 PM	8:07 PM	9:07 PM
Arr	Albany-	2:30 PM	3:30 PM	4:00 PM	4:30 PM		5:00 PM	5:30 PM	6:25 PM	6:30 PM	7:30 PM	8:30 PM	9:30 PM
Dep	Rensselaer	2:40 PM	3:40 PM	4:15 PM	4:40 PM		5:20 PM	5:40 PM	7:00 PM	6:40 PM	7:40 PM	8:40 PM	9:40 PM
Arr	Schenectady			4:34 PM			5:39 PM		7:21 PM				
Dep				4:36 PM					7:27 PM				
Arr	Amsterdam			4:51 PM									
Dep				4:53 PM									
Arr	Utica			5:50 PM					8:41 PM				
Dep				5:53 PM					8:47 PM				
Arr	Rome			6:08 PM									
Dep				6:09 PM									
Arr	Syracuse (HST)	3:54 PM	4:54 PM		5:54 PM			6:54 PM		7:54 PM	8:54 PM	9:54 PM	10:54 PM
Dep		3:58 PM	4:58 PM		5:58 PM			6:58 PM		7:58 PM	8:58 PM	9:58 PM	10:58 PM
Arr	Syracuse (RTC)			6:55 PM					9:49 PM				
Dep				6:59 PM					9:58 PM				
Arr	Rochester (HST)	4:40 PM	5:40 PM		6:40 PM		Train continues to Rutland	7:40 PM	Train continues to Chicago	8:40 PM	9:40 PM	10:40 PM	11:40 PM
Dep		4:43 PM	5:43 PM		6:43 PM			7:43 PM		8:43 PM	9:43 PM	10:43 PM	11:43 PM
Arr	Rochester			8:11 PM					11:10 PM				
Dep	(Central Ave)			8:15 PM					11:19 PM				
Arr	Buffalo	5:25 PM	6:25 PM	9:20 PM	7:25 PM			8:25 PM	12:24 AM	9:25 PM	10:25 PM	11:25 PM	12:25 AM
Dep	Exchange (New Station)			9:30 PM		7:40 PM			12:35 AM				
Arr	Niagara Falls (New Station)			10:25 PM		8:17 PM							

2.1.8. Operating Plan Comparison

Exhibit D-40 shows average scheduled time (not simulated time) travel speeds between New York and Niagara Falls. The travel times and speeds are based on the average of all westbound services, For Alternative 125, the New York to Niagara Falls travel time and average speeds are based on a transfer to a Niagara Branch shuttle service in Buffalo. The alternatives all provide average speed improvements when compared with Current Conditions and the Base Alternative.

The alternatives differ in terms of the range of train-by-train trip time improvements on the Empire Corridor. For the Base, 90B, 110 and 125 (both express and regional), most train trips have the same scheduled travel time over the course of the day. Alternative 90A differs in that it provides some limited stops service with faster trip times (3 round trips New York – Niagara Falls with one additional round trip Albany – Niagara Falls). Exhibit D-40 presents average travel times between New York City and Niagara Falls. The scheduled trip times of Alternative 90A range from 7:50 to 8:30, with the overall average of 8:08.

When the data is presented solely for Albany to Buffalo (Exhibit D-41), the range of scheduled train speeds becomes more pronounced because the alternatives' capital improvements are focused in this area. The current scheduled speed across Empire Corridor West is 57 MPH. Each of the alternatives, including the Base Alternative, provides higher average speeds. The 125 Alternative provides the highest average speed – 108 MPH for Express service.

Exhibit D-40 - Average Scheduled Time Travel Speeds -New York to Niagara Falls

Trip Alternative	Average Travel Time (HH:MM)	Distance (Miles)	Average Speed (MPH)
Current Conditions	9:06	463	51
Base Alternative	9:06	465	51
Alternative 90A	8:08	465	57
Alternative 90B	7:36	465	61
Alternative 110	7:22	465	63
Alternative 125 (Express)	6:02	465	77
Alternative 125 (Regional)	8:40	465	54

Exhibit D-41 - Average Scheduled Time Travel Speeds - Albany to Buffalo Exchange

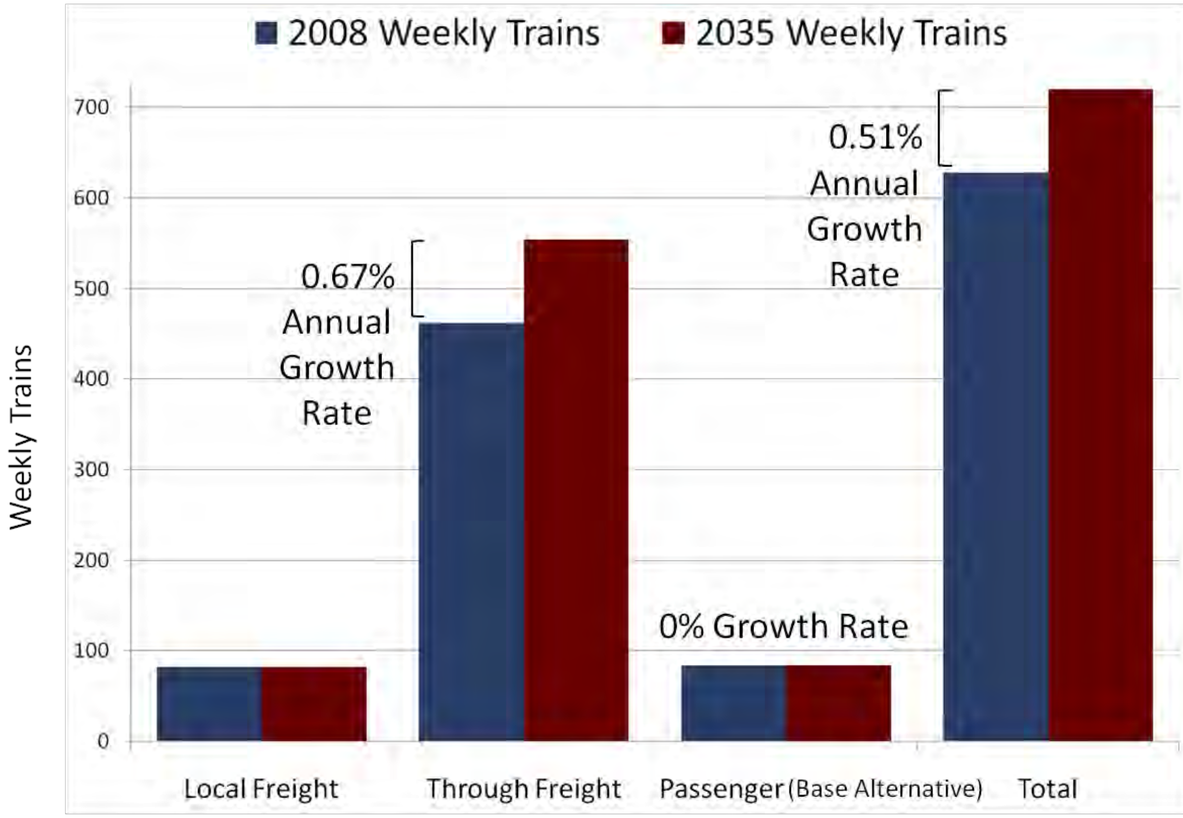
Trip Alternative	Average Travel Time (HH:MM)	Distance (Miles)	Average Speed (MPH)
Current Conditions	5:14	298	57
Base Alternative	5:09	298	58
Alternative 90A	4:47	298	62
Alternative 90B	4:27	298	67
Alternative 110	4:15	298	70
Alternative 125 (Express)	2:45	298	108
Alternative 125 (Regional)	5:09	298	58

2.2. Future Freight Train Service

CSXT provided a detailed future freight operating plan for the corridor as part of the High Speed Rail Empire Corridor Program. The future freight operating plan includes CSXT business segment-by-segment assessments of future freight traffic and how it would be moved (by lengthening existing trains and/or adding trains).

Exhibit D-42 shows the current (2008) and Base Alternative train volumes on the Empire Corridor, broken down by local freight, through freight and passenger services. For the Base Alternative, no passenger service growth is included. CSXT freight projections include no growth in local freight and a growth of about 100 weekly through freight trains. This represents compounded annual growth of 0.67 percent for CSXT through freight trains and 0.51 for the corridor overall. The CSXT 2035 operating plan was held constant for all future alternatives – the Base and Alternatives 90A, 90B, 110 and 125.

Exhibit D-42 - Weekly Empire Corridor CSXT Freight Train Movements – 2008 and 2035



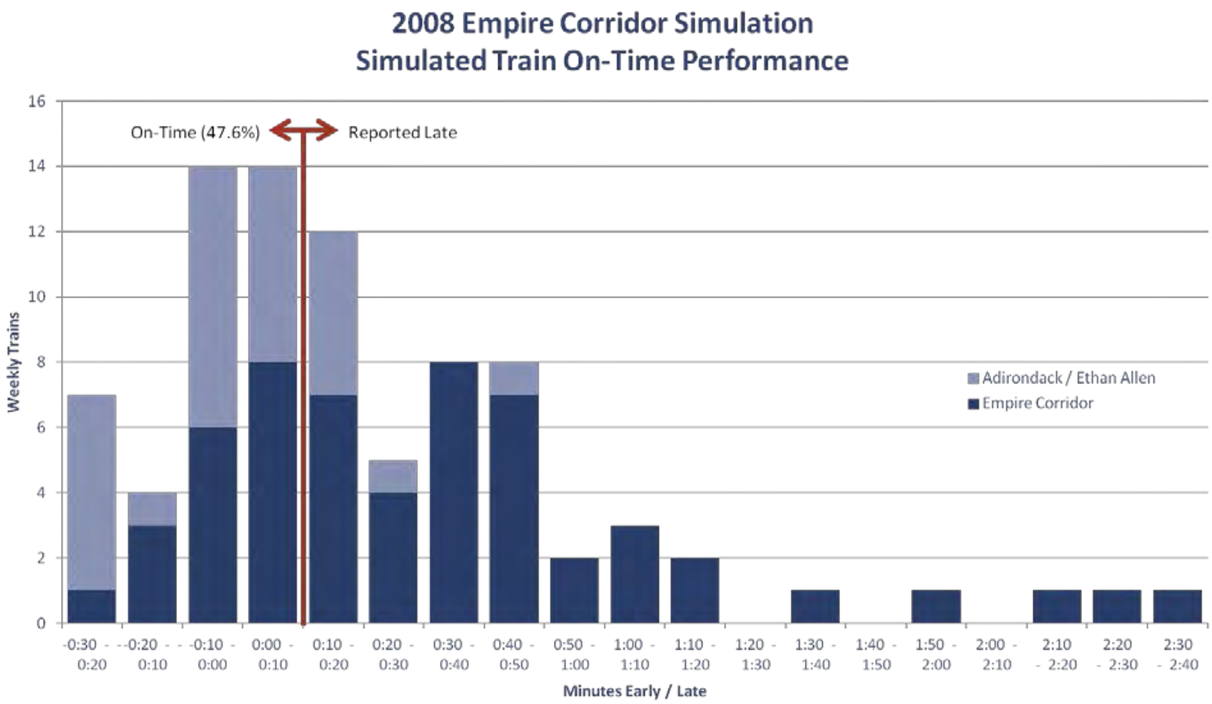
3. Simulation Results

3.1. Current (2008) Operations

The RTC network simulation model was the subject of extensive calibration efforts to ensure that its 2008 results matched actual operations during that year. The calibration effort focused primarily on passenger train on-time performance and involved "tuning" the priorities of freight and passenger trains in the model's dispatching logic.

Exhibit D-43 shows the resultant passenger train on-time performance for Empire Corridor West operations in 2008. The 47.6 percent on-time performance (based on the standard 10 minute lateness threshold) includes both Empire Corridor and Adirondack/Ethan Allen (Saratoga Springs – Albany-Rensselaer only) services. The figure shows the typical distribution of train lateness – some trains modestly early, most on-time and some very late (more than 2 hours late). The simulation result of 47.6 percent on-time arrivals is close to the actual Empire Corridor West 2008 on-time performance computed by the HNTB Team (57 percent). The actual data is averaged over the entire year whereas the simulation reflects seasonal high freight volumes (in essence, the busiest freight movement week of the year). Therefore, the RTC calibration is deemed to be reasonable, despite the lower OTP result.

Exhibit D-43 - 2008 Existing Operations – Simulated Train OTP



At the initiation of the High Speed Rail Empire Corridor program in 2008, Amtrak trains were operating at approximately 84 percent OTP between New York and Albany and 57 percent on-time between Albany and Niagara Falls. The average reported 2008 reliability for the entire Empire Corridor for 2008 was 77 percent.

3.1.1. Passenger Operations

Exhibit D-44 displays an RTC "string" (time-distance) chart for a 12-hour weekday morning period while Exhibit D-45 displays the same information of the following 12 hours (the evening period). The charts represent 24 hours of the 7+ day simulation. The "strings" (train traces) are color-coded according to which track is being used by each train – red for Track 1, blue for Track 2 and green for other tracks. Niagara Falls is at the top of the chart and Albany-Rensselaer is at the bottom. The slopes of the passenger trains ("P" prefixes) are steeper than those of the freight trains, indicating higher average speeds. The overall corridor shows that "right hand running" is a favored dispatching strategy in the RTC model with westbound trains on Track 1 and eastbound trains on Track 2. However, there are many exceptions and the corridor's bidirectional signaling readily supports this type of complex dispatching.

The current passenger trains must serve Amsterdam on the north side (Track 1), Syracuse on the south side (Track 7), Rochester on the south side (Track 2) and Buffalo Depew on the south side (Track 2) in both directions. These constraints lead to a number of unusual train routings that deviate from the "right hand running" rule.

Exhibit D-46 shows the simulated on-time performance for 2008 passenger train operations. Overall, the 2008 RTC run shows a 47.6 percent on-time performance based on a 10 minute lateness threshold.

Exhibit D-44 - 2008 Existing Operations – AM String Chart

Exhibit D-45 - 2008 Existing Operations – PM String Chart

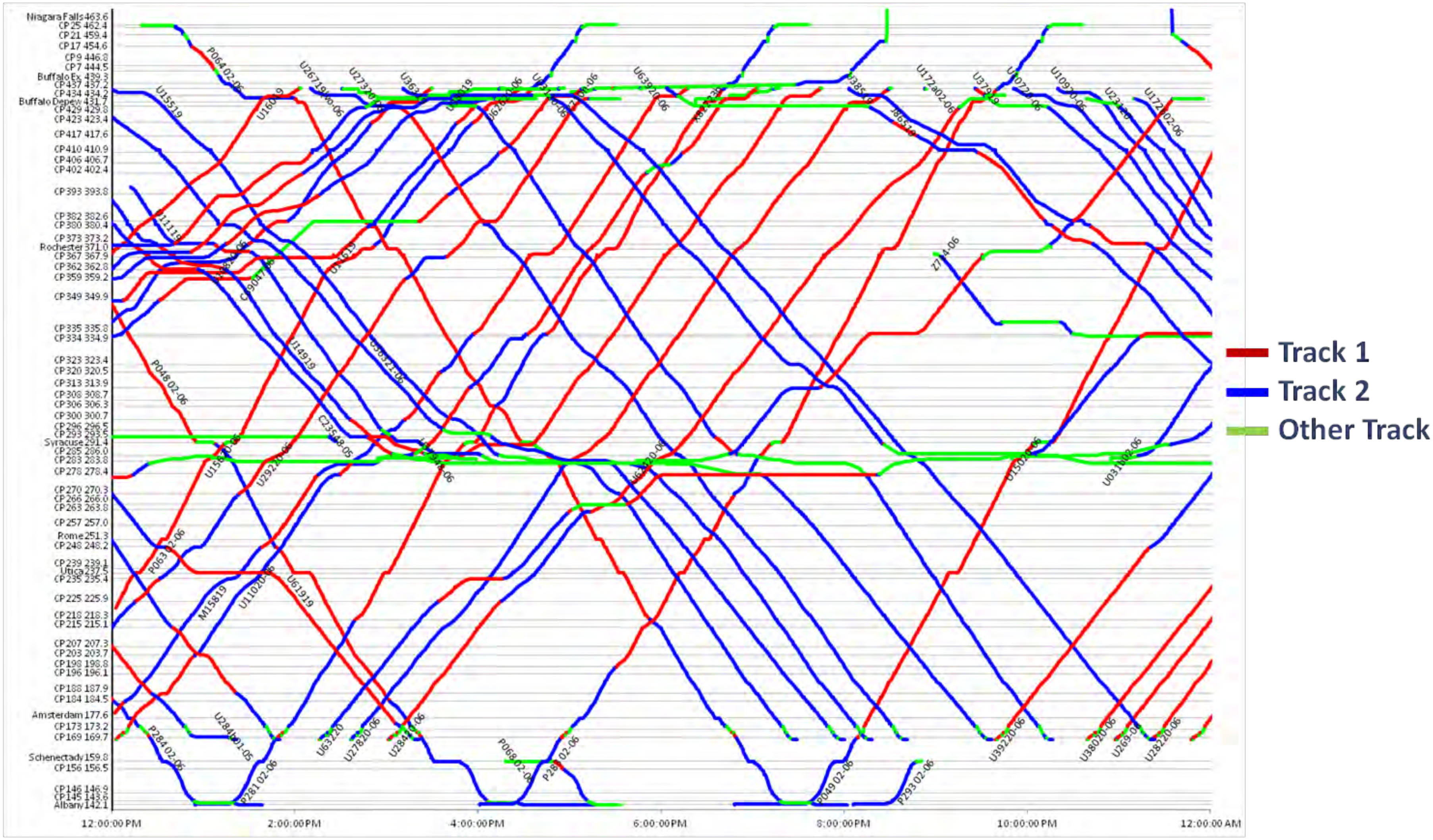


Exhibit D-46 - Existing (2008) Simulated On-Time Performance – Passenger Trains

Threshold (min. late)	1	5	10	15
Adirondack / EAE	60.7%	67.9%	75.0%	89.3%
Lake Shore Limited	0.0%	7.1%	21.4%	21.4%
Empire	26.2%	28.6%	38.1%	47.6%
LSL + Empire	19.6%	23.2%	33.9%	41.1%
Amtrak Total	33.3%	38.1%	47.6%	57.1%

3.1.2. Freight Operations

Exhibit D-47 shows simulated freight performance for the 2008 calibration model. For CSXT, schedule adherence is less of a concern (with some exceptions for high priority intermodal trains) than overall corridor flow and efficiency. Overall, the 2008 benchmark features 36.83 train minutes of delay (congestion ahead) per 100 freight train miles operated. Of the 721 freight trains in the simulation, an average speed of 27.4 MPH (including en route switching) was computed by the simulation software.

Exhibit D-47 - Existing (2008) Simulated Performance – Freight Trains

Train Group	Run-Time Train Count	Average Speed with Dwell	True Delay DD:HH:MM	Ideal Run Time DD:HH:MM	Train Miles	Delay per 100 Train Miles
Expedited*	247	32.2	15:12:16	63:16:23	61166.3	36.52
Freight**	474	21.8	13:06:10	85:00:32	51301.7	37.21
Total	**721**	**27.4**	**28:18:26**	**149:16:55**	**112468.0**	**36.83**

*Includes Auto, Intermodal, Guaranteed Intermodal
**Includes Bulk, Empty Unit Coal, Grain, Local, Merchandise, Road Switcher , Unit, Yard, Coal

Exhibit D-48 shows another important metric for CSXT – simulated trip time statistics (Selkirk Yard to Syracuse to Buffalo) and the standard deviation (statistical measure of variability) of this data. CSXT desires to see the shortest reasonable trip time and a small standard deviation in the variability of simulated trip time, representing consistency of service. Overall, measuring CSXT freight trip times between Selkirk Yard and Buffalo, the existing case RTC model shows an average trip time of 9:07, with a standard deviation of 2:40. The variability in trip time reflects a wide variety of freight train types (with different performance characteristics), variation in stopping patterns and congestion along the corridor.

Exhibit D-48 - Existing (2008) - Simulated Freight Trip Time Statistics and Reliability (Standard Deviation)

	Buffalo - Syracuse	Syracuse - Selkirk Yard	Syracuse - Buffalo	Selkirk Yard - Syracuse
Average	4:27:26	4:36:23	4:34:25	4:26:24
Min	3:06:16	2:58:46	2:48:31	2:49:52
Max	15:25:10	10:33:01	17:07:59	11:48:53
Std Dev	1:41:11	1:23:59	1:58:25	1:30:48

3.2. 2035 Base Alternative

3.2.1. Passenger Operations

The operating philosophy for the Base Alternative (No Action) is similar to that for current conditions. The platform edge constraints at Amsterdam, Syracuse, Rochester and Buffalo-Depew remain. Exhibit D-49 shows the 2035 Base Alternative simulation results for a typical AM period of 12 hours while Exhibit D-50 shows the comparable data for a typical PM period. The scheduled passenger train trip times reflect some tightening to take advantage of Base Alternative improvements at Albany-Rensselaer, between Albany-Rensselaer and Schenectady and at Syracuse. They also reflect some lengthening to account for the fact that the new Niagara Falls station is some two miles north of the present location with a track speed of just 20 MPH for these two additional miles.

The Base Alternative operations show use of the Rochester Area Third Track between CP 382 and CP 393. There is a pair of three-way freight train meets just after midnight in Exhibit D-49. At about 5:30 AM, Amtrak Train 280 benefits from a three-way meet at the same location, passing by both eastbound and westbound CSXT freight trains.

The Base Alternative capital improvements, coupled with no additional passenger train traffic to compound delays, produce a passenger train on-time performance of about 83 percent (based on the standard Amtrak lateness threshold of 10 minutes). Exhibit D-51 shows the breakdown, including on-time performance for a variety of lateness thresholds. The on-time performance improvement is nearly 35 percentage points versus the 2008 (current) operations RTC run.

Exhibit D-49 - 2035 Base Alternative– AM String Chart

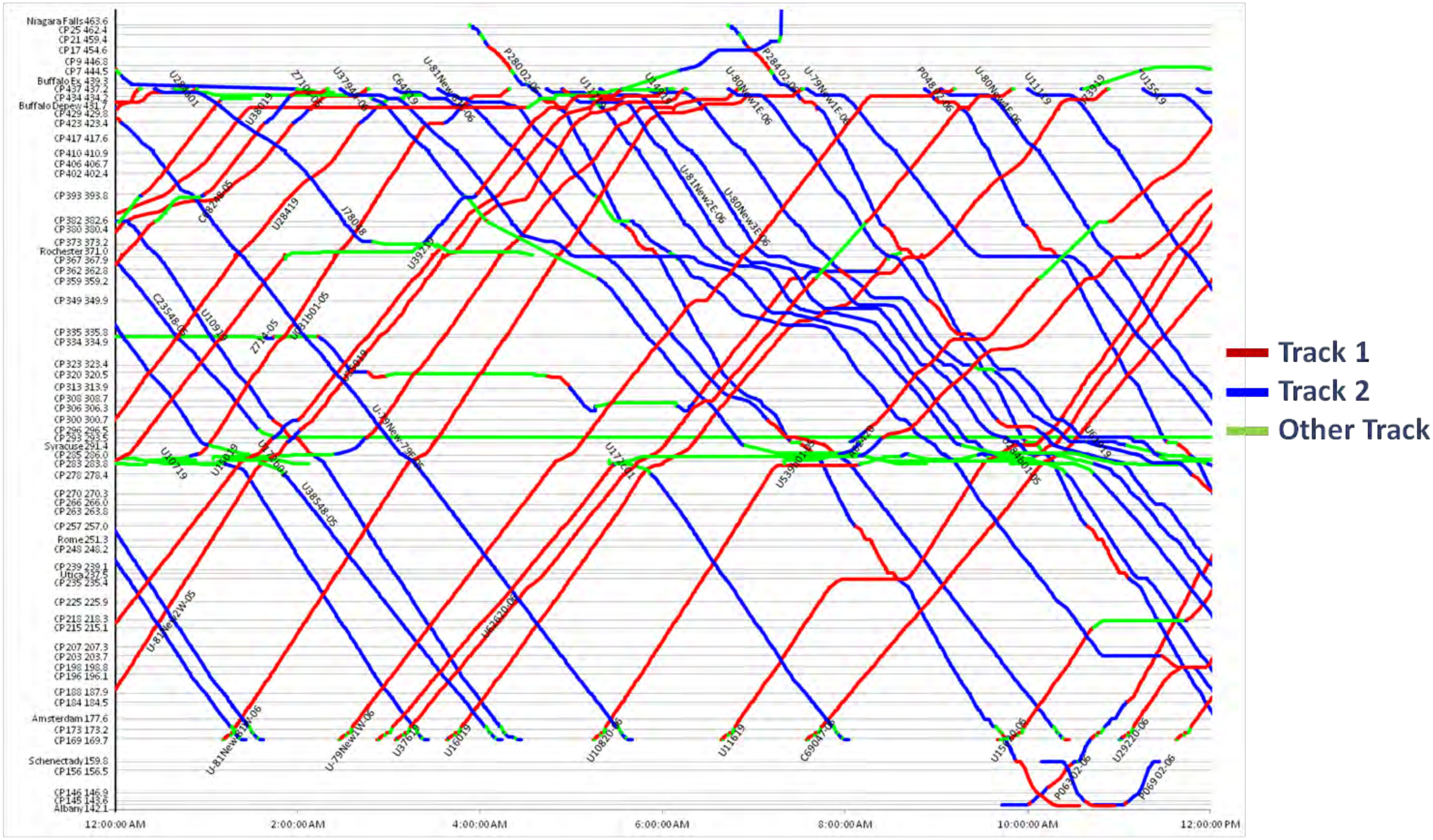


Exhibit D-50 - 2035 Base Alternative– PM String Chart

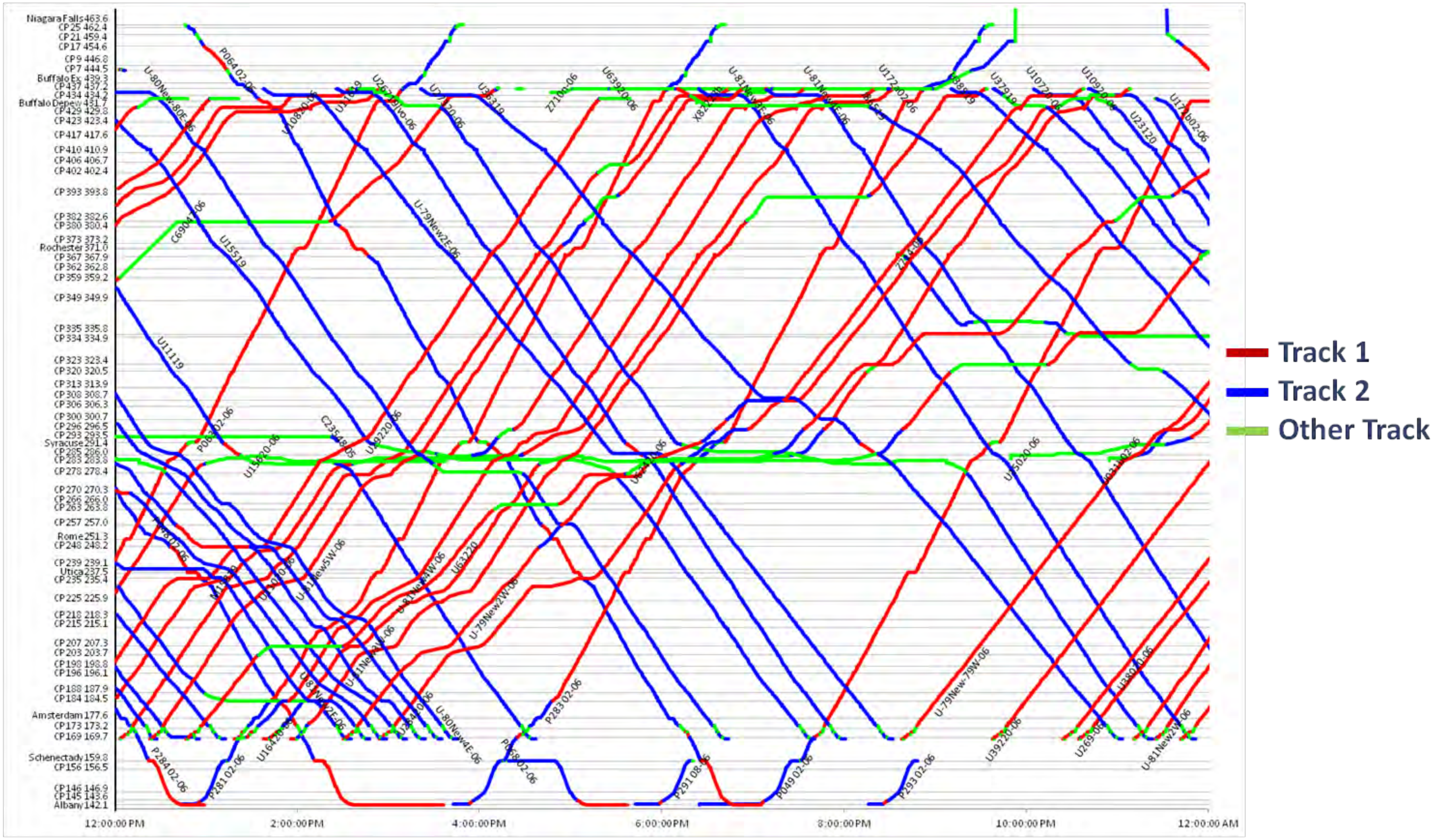


Exhibit D-51 - Base Alternative Simulated On-Time Performance – Passenger Trains

Threshold (min. late)	1	5	10	15
Adirondack / EAE	89.7%	93.1%	100.0%	100.0%
Lake Shore Limited	71.4%	71.4%	71.4%	78.6%
Empire	57.8%	64.4%	75.6%	82.2%
LSL + Empire	61.0%	66.1%	74.6%	81.4%
Amtrak Total	70.5%	75.0%	83.0%	87.5%

3.2.2. Freight Operations

Exhibit D-52 shows the simulated results for 2035 CSXT operations under the Base Alternative. Overall, the Base Alternative shows similar delay per 100 miles operated statistic (36.31 train delay-minutes per 100 miles operated versus the 2008 benchmark of 36.83 train delay-minutes). Freight volume increases by some 119 trains during the seven day simulation period. Average speed improves with the Base Alternative, increasing from the 2008 average speed of 27.4 MPH to 30.3 MPH in 2035. This reflects the fact that the majority of future CSXT growth is projected to be high priority intermodal trains; the performance of this group raises the average speed for the freight train population as a whole.

Exhibit D-52 - 2035 Base Alternative Simulated Performance – Freight Trains

Train Group	Run-Time Train Count	Average Speed with Dwell	True Delay DD:HH:MM	Ideal Run Time DD:HH:MM	Train Miles	Delay per 100 Train Miles
Expedited*	335	34.8	19:15:39	86:09:00	88534.3	31.96
Freight**	505	23.5	17:11:53	86:22:11	58780.8	42.86
Total	**840**	**30.3**	**37:03:32**	**173:07:11**	**147315.1**	**36.31**

*Includes Auto, Intermodal, Guaranteed Intermodal
**Includes Bulk, Empty Unit Coal, Grain, Local, Merchandise, Road Switcher , Unit, Yard, Coal

Exhibit D-53 shows freight trip times on the corridor in the 2035 Base Alternative. Overall, measuring CSXT freight trip times between Selkirk Yard and Buffalo, the Base Alternative RTC model shows an average trip time of 8:14 (versus 9:07 in the 2008 model), with a standard deviation of 1:37 (versus 2:40 in the 2008 model). The reduced variability (greater reliability) in trip time reflects the more predictable passenger train performance (which, in turn, results from the Albany, Albany-Schenectady, Syracuse and Rochester area improvements) as well as the future focus on better-performing intermodal trains.

Exhibit D-53 - 2035 Base Alternative - Simulated Freight Trip Time Statistics and Reliability (Standard Deviation)

	Buffalo - Syracuse	Syracuse - Selkirk Yard	Syracuse - Buffalo	Selkirk Yard - Syracuse
Average	4:04:16	4:06:31	4:11:14	4:14:33
Min	2:52:59	2:51:50	2:52:14	2:51:58
Max	16:30:37	9:07:45	8:57:31	9:15:37
Std Dev	1:22:23	1:15:07	0:57:51	1:20:34

3.3. 2035 Alternative 90A

Alternative 90A features passenger trains operating on shared passenger/freight tracks with a maximum operating speed of 90 MPH. In addition to track structure upgrades, it includes targeted capital projects along the corridor to reduce/eliminate conflicts between passenger and freight trains.

3.3.1. Passenger Operations

Exhibit D-54 shows the RTC time-distance “string” chart for a representative morning period for Alternative 90A while Exhibit D-55 shows the same information for the following 12 hours (PM period). The steeper slopes of the passenger trains (“P” train symbol prefix) are evident, including the four new round trips on the corridor. Overall, the corridor shows fluid operation with extensive use of the existing bidirectional signaling capability move higher priority trains around those with lower priority.

Exhibit D-54 - 2035 Alternative 90A – AM String Chart

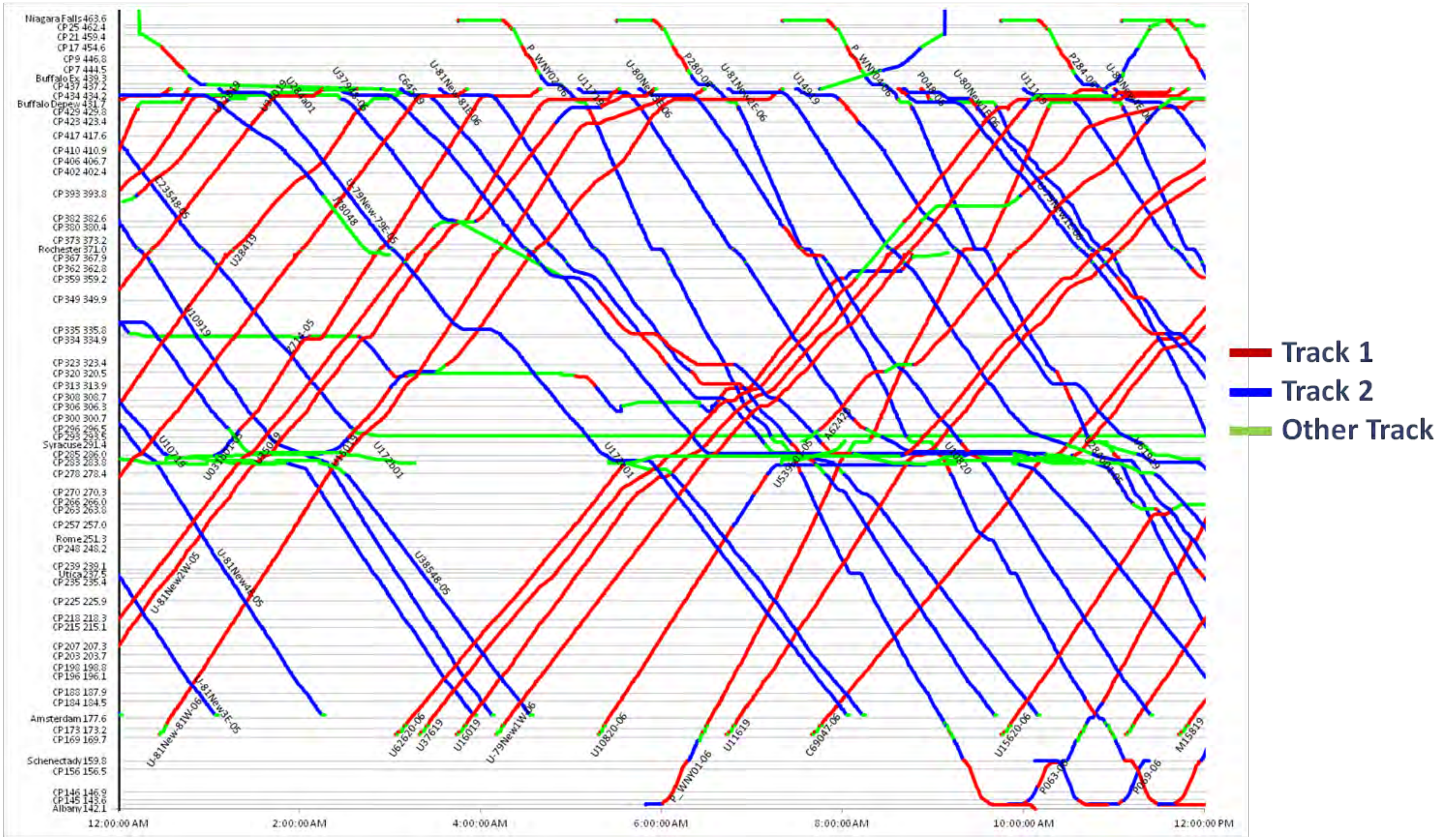


Exhibit D-55 - 2035 Alternative 90A – PM String Chart

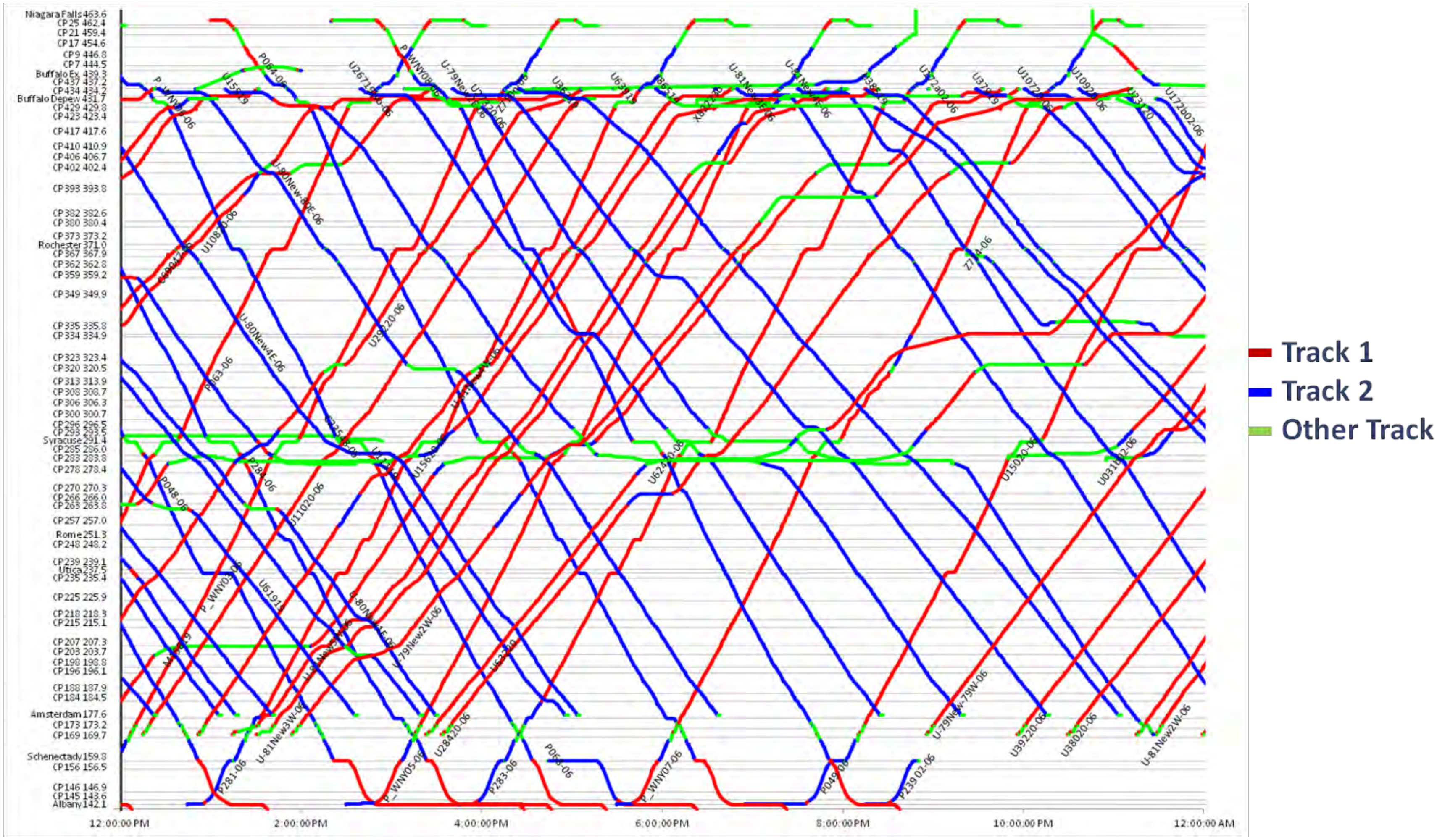


Exhibit D-56 shows simulated passenger train on-time performance for Alternative 90A. The results exceed the program's goal of 90 percent OTP with simulated OTP of 92.4 percent, based on the standard Amtrak lateness tolerance of 10 minutes. The results exceed the Base Alternative OTP of 83 percent despite the addition of four passenger train round trips. The results indicate that the infrastructure investments of Alternative 90A more than compensate for the added corridor congestion stemming from the four express train round trips added in this alternative.

Exhibit D-56 - 2035 Alternative 90A Simulated On-Time Performance – Passenger Trains

Threshold (min. late)	1	5	10	15
Adirondack / EAE	76.9%	96.2%	100.0%	100.0%
Lake Shore Limited	100.0%	100.0%	100.0%	100.0%
Empire	86.8%	87.9%	89.0%	90.1%
LSL + Empire	88.6%	89.5%	90.5%	91.4%
Amtrak Total	86.3%	90.8%	92.4%	93.1%

3.3.2. Freight Operations

Exhibit D-57 shows the simulated results for 2035 CSXT operations under Alternative 90A. Overall, this alternative shows some degradation in freight train operation versus the 2008 case and the Base Alternative in terms of delay per 100 miles operated statistic (42.10 train delay-minutes per 100 miles operated versus the 2008 benchmark of 36.83 train delay-minutes and the Base Alternative value of 36.31). Average speed shows improvement over the 2008 value (29.4 MPH versus 27.4 MPH) and is close to the Base Alternative (29.4 versus 30.3 MPH). While there is some increased congestion in the corridor in Alternative 90A versus the two previous cases with half the passenger train frequency, the results of this case reflect the fact that the preponderance of future CSXT growth is projected to be high priority intermodal trains.

Exhibit D-57 - 2035 Alternative 90A Simulated Performance – Freight Trains

Train Group	Run-Time Train Count	Average Speed with Dwell	True Delay DD:HH:MM	Ideal Run Time DD:HH:MM	Train Miles	Delay per 100 Train Miles
Expedited*	334	33.6	24:07:01	85:04:17	88298.5	39.62
Freight**	502	23.1	18:17:23	87:12:54	58839.3	45.83
Total	**836**	**29.4**	**42:24:24**	**172:17:11**	**147137.8**	**42.10**

*Includes Auto, Intermodal, Guaranteed Intermodal
**Includes Bulk, Empty Unit Coal, Grain, Local, Merchandise, Road Switcher , Unit, Yard, Coal

Exhibit D-58 shows average CSXT freight train trip times over the corridor in the Alternative 90A RTC run. Overall (Selkirk Yard to Buffalo, in both directions), Alternative 90A shows minor degradation versus the Base Alternative (8:23 versus 8:14) and significant improvement over today's operation (8:23 versus 9:07). The trend in freight train reliability, as measured by the standard deviation of trip times over the corridor shows similar results. The Alternative 90A results show a standard deviation of 2:04 versus the Base Alternative value of 1:37 and the 2008 case value of 2:40.

Exhibit D-58 - 2035 Alternative 90A - Simulated Freight Trip Time Statistics and Reliability (Standard Deviation)

	Buffalo - Syracuse	Syracuse - Selkirk Yard	Syracuse - Buffalo	Selkirk Yard - Syracuse
Average	4:04:20	3:55:31	4:31:35	4:11:12
Min	2:51:08	2:48:55	3:01:12	2:45:41
Max	15:41:40	9:40:05	7:52:10	9:02:59
Std Dev	1:20:26	1:04:27	0:54:38	1:21:22

3.4. 2035 Alternative 90B

Alternative 90B constructs a new dedicated passenger-only third track within the corridor, along with connections to the existing shared use tracks and sections of passenger-only fourth track to support “flying meets” between passenger trains. The existing shared use tracks remain at their current maximum speed of 79 MPH.

3.4.1. Passenger Operations

Collectively, Exhibit D-59 and Exhibit D-60 show a representative 24 hour period of simulated Alternative 90B operations. The third and fourth passenger-only tracks are represented in green and use of these tracks show the steeply-sloped higher speed passenger trains. The use of the existing shared use tracks in Syracuse, Rochester and the Buffalo Exchange Street area (CP 437) can also be seen as these green lines change color briefly at those locations. The passenger train movements across the shared used tracks to access south side platforms at Syracuse, Rochester and Buffalo Depew do not appear to significantly delay freight trains, which have crossing path conflicts at these locations.

Exhibit D-59 - 2035 Alternative 90B – AM String Chart

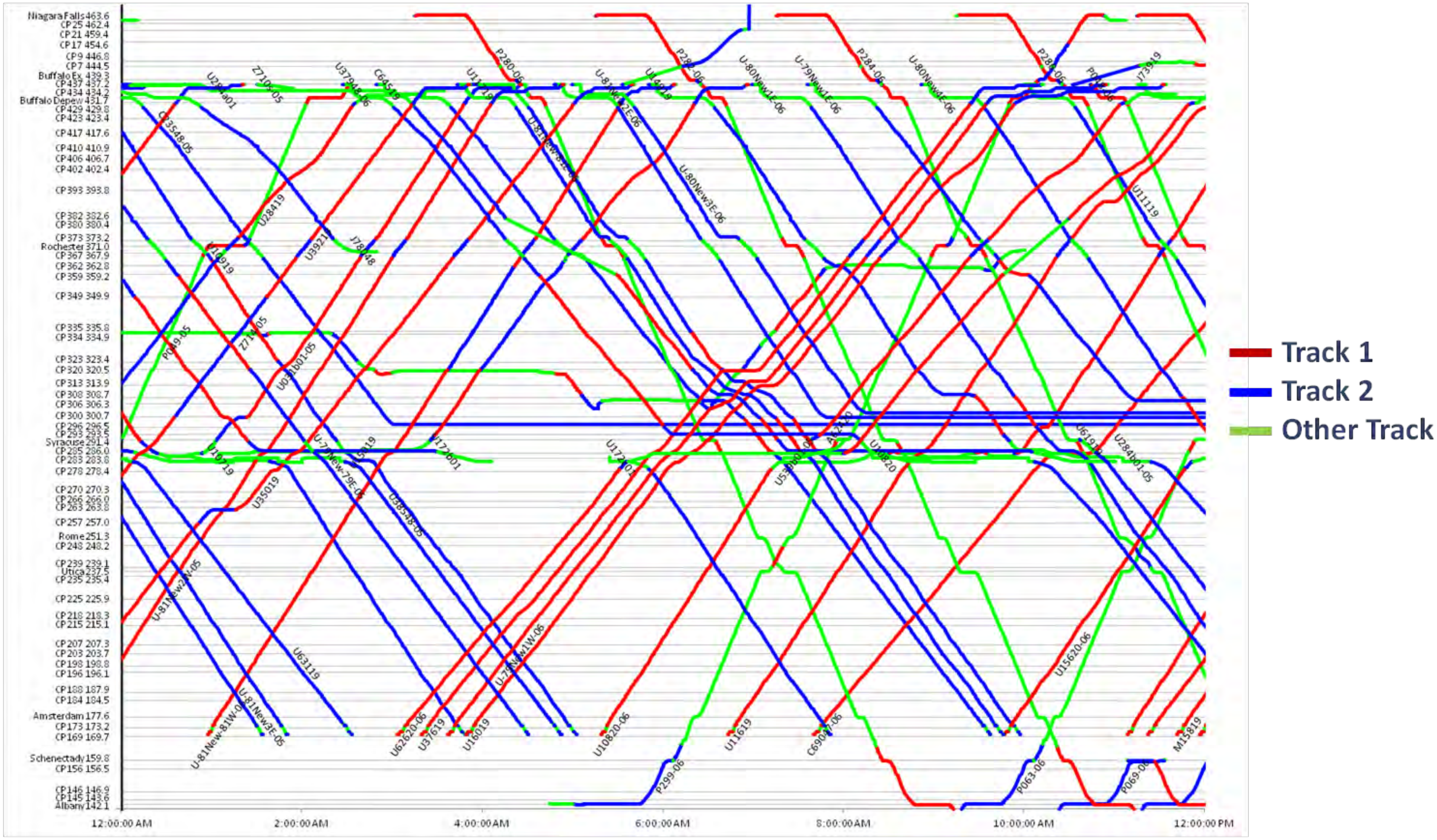


Exhibit D-60 - 2035 Alternative 90B – PM String Chart

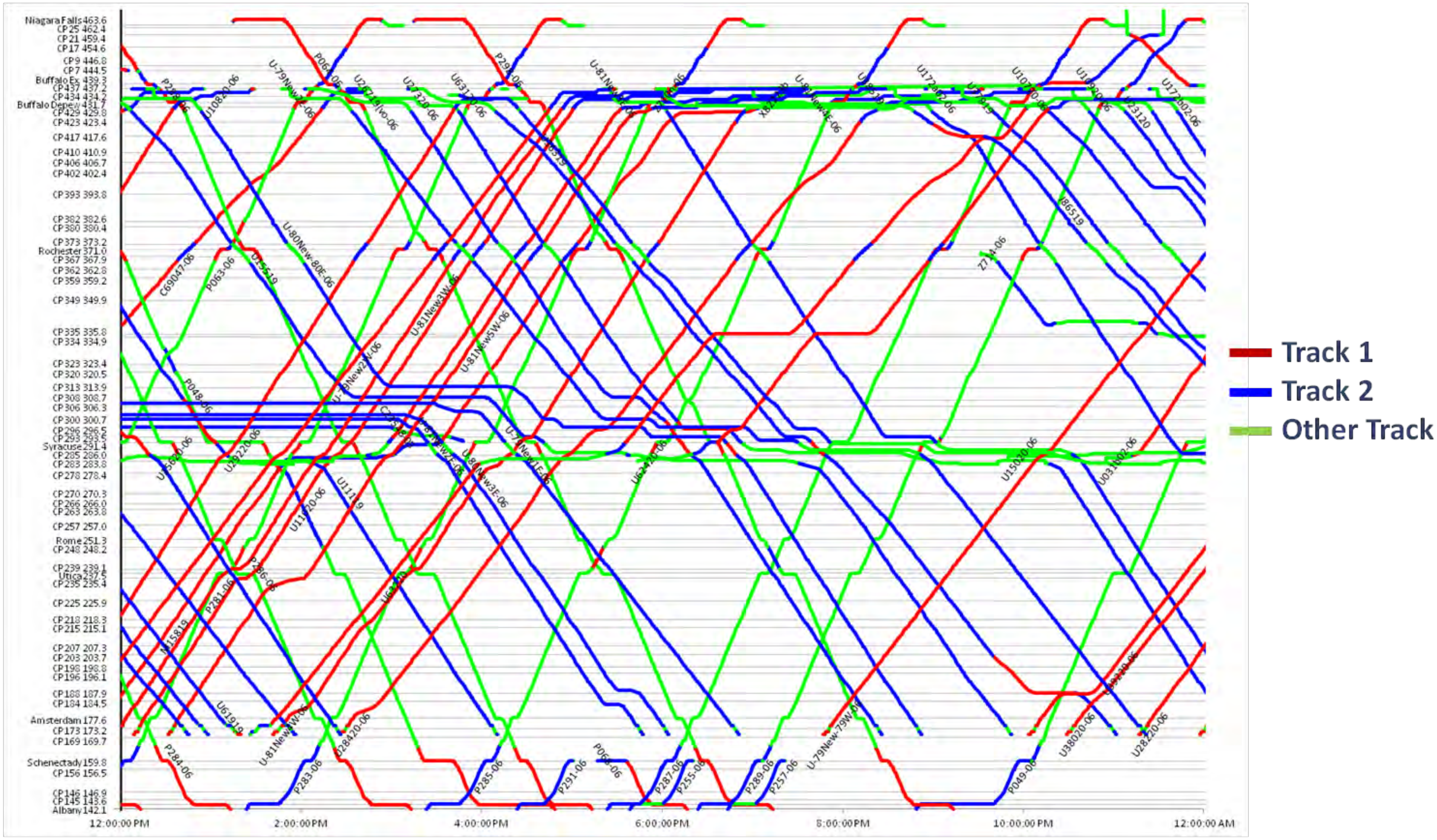


Exhibit D-61 shows simulated passenger train on-time performance for Alternative 90B. The results exceed the program's goal of 90 percent OTP with simulated OTP of 95.4 percent, based on the standard Amtrak lateness tolerance of 10 minutes. These results are notable in that, compared with the previously-presented RTC cases, the improved OTP was achieved while at same time significantly tightening the scheduled passenger train times.

Exhibit D-61 - 2035 Alternative 90B On-Time Performance – Passenger Trains

Threshold (min. late)	1	5	10	15
Adirondack / EAE	64.3%	83.3%	83.3%	97.6%
Lake Shore Limited	100.0%	100.0%	100.0%	100.0%
Empire	99.0%	99.0%	100.0%	100.0%
LSL + Empire	99.1%	99.1%	100.0%	100.0%
Amtrak Total	89.5%	94.8%	95.4%	99.3%

3.4.2. Freight Operations

Exhibit D-62 shows the simulated results for 2035 CSXT operations under Alternative 90B. Overall, this alternative shows improvement in freight train operation versus the 2008 case and the Base Alternative in terms of delay per 100 miles operated statistic (32.78 train delay-minutes per 100 miles operated versus the 2008 benchmark of 36.83 train delay-minutes and the Base Alternative value of 36.31). Average speed shows improvement over the 2008 value (31.1 MPH versus 27.4 MPH) and over the Base Alternative (31.1 versus 30.3 MPH). While this alternative introduces some passenger-freight crossing conflicts at Syracuse, Rochester and CP 437, the overall separation of freight and passenger trains along the corridor clearly have reliability benefits for both services.

Exhibit D-62 - 2035 Alternative 90B Simulated Performance – Freight Trains

Train Group	Run-Time Train Count	Average Speed with Dwell	True Delay DD:HH:MM	Ideal Run Time DD:HH:MM	Train Miles	Delay per 100 Train Miles
Expedited*	335	36.3	17:04:03	83:16:50	87925.6	28.12
Freight**	510	23.4	16:16:43	91:15:59	60852.1	39.51
Total	**845**	**31.1**	**33:20:46**	**175:08:49**	**148777.7**	**32.78**

*Includes Auto, Intermodal, Guaranteed Intermodal
**Includes Bulk, Empty Unit Coal, Grain, Local, Merchandise, Road Switcher , Unit, Yard, Coal

Exhibit D- shows average CSXT freight train trip times over the corridor in the Alternative 90B RTC run. Overall (Selkirk Yard to Buffalo, in both directions), Alternative 90B shows modest improvement in trip time versus the Base Alternative (8:09 versus 8:14) and significant improvement over today's operation (8:09 versus 9:07). The Alternative 90B results show modest increases in freight train trip time variability, as measured by a standard deviation of 1:51 versus the Base Alternative value of 1:37. The results are significantly improved versus the 2008 case value of 2:40.

Exhibit D-63 - 2035 Alternative 90B - Simulated Freight Trip Time Statistics and Reliability (Standard Deviation)

	Buffalo - Syracuse	Syracuse - Selkirk Yard	Syracuse - Buffalo	Selkirk Yard - Syracuse
Average	4:17:19	4:09:00	4:25:20	3:49:54
Min	2:47:12	2:47:04	2:51:51	2:47:30
Max	17:09:38	12:19:13	7:02:44	7:45:39
Std Dev	1:46:01	1:32:33	0:57:25	1:03:00

3.5. 2035 Alternative 110

Alternative 110, similar to Alternative 90B, features a new dedicated passenger-only track within the Empire Corridor. The track is designed for a maximum operating speed of 110 MPH. A dedicated fourth track is provided at some locations to support “flying meets” between opposing direction trains; this track is designed for a maximum operating speed of 90 MPH.

3.5.1. Passenger Operations

A representative 24 hour RTC simulation set of time-distance string charts are shown in Exhibit D-64 (AM period) and Exhibit D-65 (PM period). As with Alternative 90B, the dedicated third and fourth tracks are shown in green. The slopes of the passenger train plots are steeper than 90B, indicating the faster average speeds versus the previous alternative.

Exhibit D-64 - 2035 Alternative 110 – AM String Chart

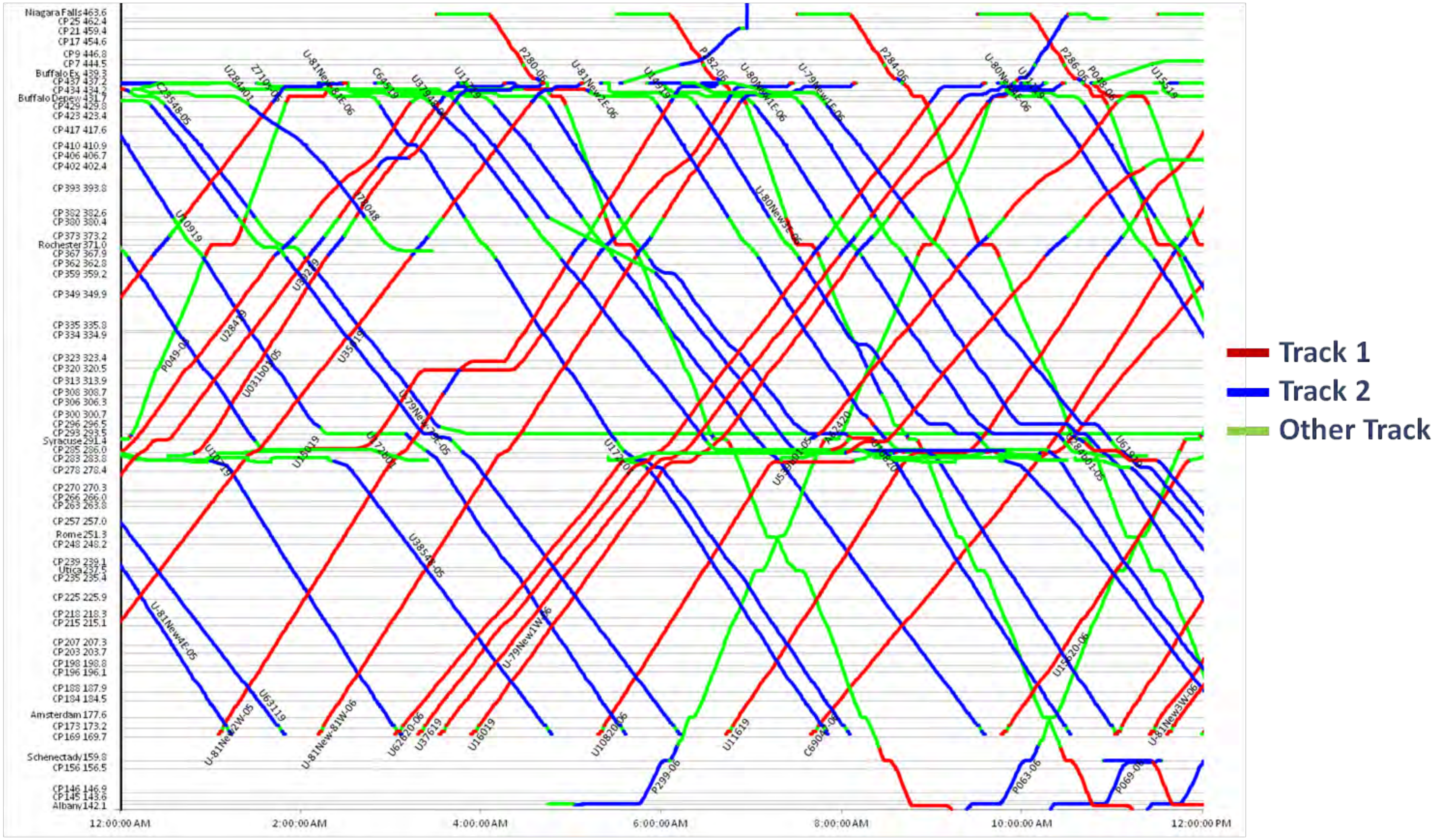


Exhibit D-65 - 2035 Alternative 110 – PM String Chart

Exhibit D-66 shows simulated passenger train on-time performance for Alternative 110. The results exceed the program's goal of 90 percent OTP with simulated OTP of 94.9 percent, based on the standard Amtrak lateness tolerance of 10 minutes. These results are notable in that, compared with the previously-presented RTC cases, the improved OTP was achieved while at same time significantly tightening the scheduled passenger train times.

Exhibit D-66 - 2035 Alternative 110 Simulated On-Time Performance – Passenger Trains

Threshold (min. late)	1	5	10	15
Adirondack / EAE	75.0%	75.0%	75.0%	92.9%
Lake Shore Limited	100.0%	100.0%	100.0%	100.0%
Empire	97.9%	99.0%	100.0%	100.0%
LSL + Empire	98.2%	99.1%	100.0%	100.0%
Amtrak Total	93.5%	94.2%	94.9%	98.6%

3.5.2. Freight Operations

Exhibit D-67 shows the simulated results for 2035 CSXT operations under Alternative 110. Overall, this alternative has comparable results to Alternative 90B and shows improvement in freight train operation versus the 2008 case and the Base Alternative in terms of delay per 100 miles operated statistic (34.95 train delay-minutes per 100 miles operated versus the 2008 benchmark of 36.83 train delay-minutes and the Base Alternative value of 36.31). Average speed shows improvement over the 2008 value (30.8 MPH versus 27.4 MPH) and over the Base Alternative (30.8 versus 30.3 MPH). While this alternative introduces some passenger-freight crossing conflicts at Syracuse, Rochester and CP 437, the overall separation of freight and passenger trains along the corridor clearly have reliability benefits for both services.

Exhibit D-67 - 2035 Alternative 110 Simulated Performance – Freight Trains

Train Group	Run-Time Train Count	Average Speed with Dwell	True Delay DD:HH:MM	Ideal Run Time DD:HH:MM	Train Miles	Delay per 100 Train Miles
Expedited*	339	35.9	18:15:13	84:20:16	89191.1	30.09
Freight**	509	23.2	17:17:16	91:10:26	60592.1	42.11
Total	**848**	**30.8**	**36:08:29**	**176:06:42**	**149783.2**	**34.95**

*Includes Auto, Intermodal, Guaranteed Intermodal
**Includes Bulk, Empty Unit Coal, Grain, Local, Merchandise, Road Switcher , Unit, Yard, Coal

Exhibit D-68 shows average CSXT freight train trip times over the corridor in the Alternative 110 RTC run. Overall (Selkirk Yard to Buffalo, in both directions), Alternative 110 shows modest improvement in trip time versus the Base Alternative (8:04 versus 8:14) and significant improvement over today's operation (8:04 versus 9:07). The Alternative 110 results show modest increases in freight train trip time variability, as measured by a standard deviation of 1:39 versus the Base Alternative value of 1:37. The results are significantly improved versus the 2008 case value of 2:40.

Exhibit D-68 - 2035 Alt 110 - Simulated Freight Trip Time Statistics and Reliability (Standard Deviation)

	Buffalo - Syracuse	Syracuse - Selkirk Yard	Syracuse - Buffalo	Selkirk Yard - Syracuse
Average	4:11:11	4:09:31	4:40:11	3:57:39
Min	2:47:06	2:46:08	2:54:10	2:48:17
Max	15:11:32	22:34:40	10:41:25	8:56:18
Std Dev	1:23:48	1:58:42	1:37:34	1:17:32

3.6. 2035 Alternative 125

Alternative 125 features a dedicated high speed rail alignment that diverges from the existing Corridor between Albany-Rensselaer and Buffalo. This alignment does not serve all existing Empire Corridor stations in this segment. Therefore, the existing service is retained on the shared passenger/freight corridor but no improvements to the existing shared used tracks are included except for those embodied in the Base Alternative.

3.6.1. Passenger Operations

Alternative 125 time-distance “string” charts are shown in Exhibit D-69 and Exhibit D-70. The 125 MPH dedicated high speed corridor tracks are represented by the purple and light blue lines. Operation of Base Alternative freight trains and the four round trip “legacy” passenger train service is represented by the red, blue and green colors used in the time-distance charts of the other alternatives. The dedicated high speed corridor was not simulated as its full double track configuration (no train meets or overtakes) and hourly headway supports highly reliable service.

Exhibit D-69 - 2035 Alternative 125 – AM String Chart

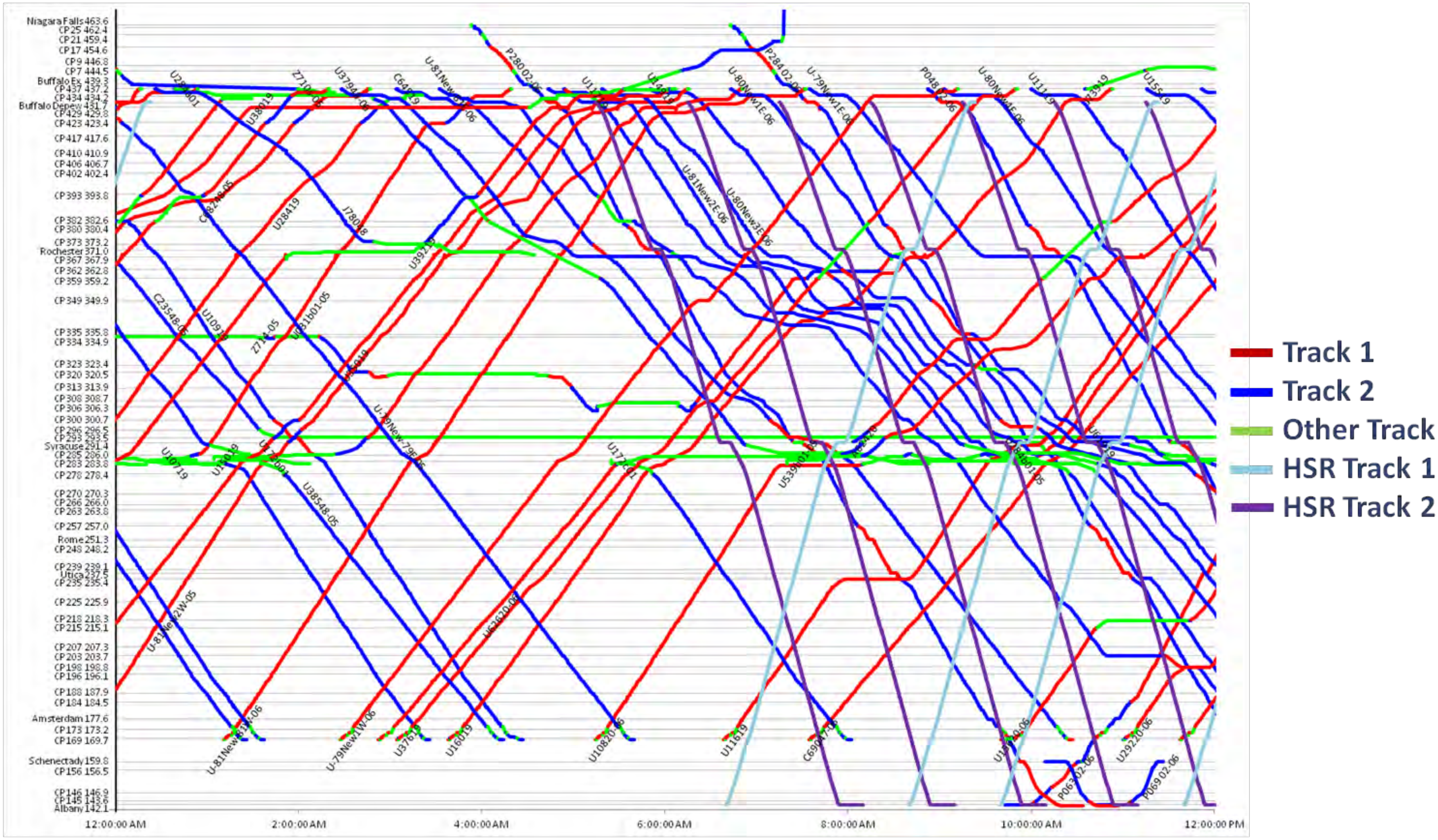


Exhibit D-70 - 2035 Alternative 125 – PM String Chart

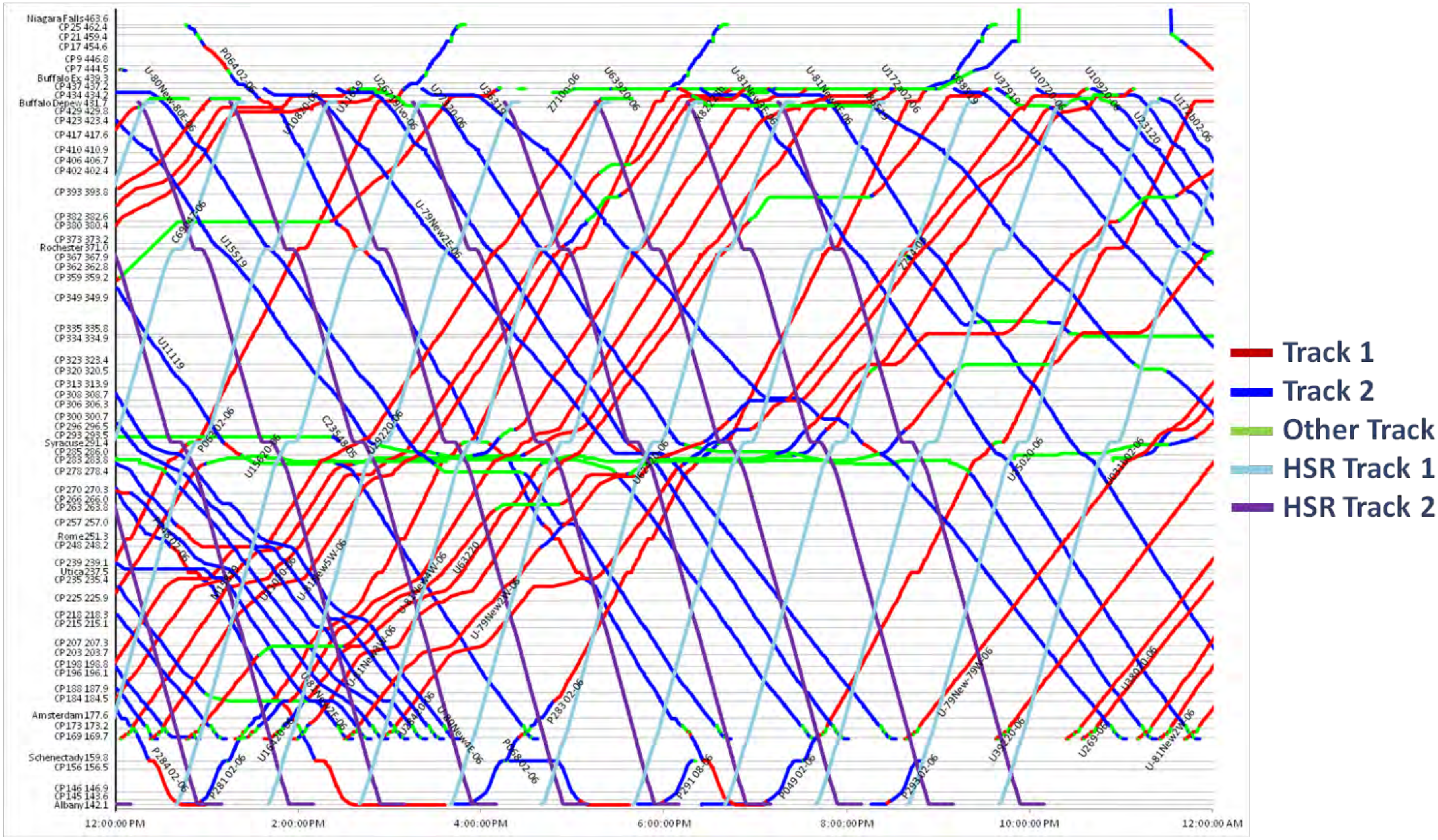


Exhibit D-71 shows passenger train on-time performance in the Alternative 125 case. The "legacy" results are the same as the Base Alternative results, with an OTP result of 83 percent (based on a 10 minute lateness threshold). The dedicated two-track high speed rail line is assumed to have an OTP of 100 percent. Overall, the weighted average of the passenger train services is 95.6 percent, significantly exceeding the program goal of 90 percent.

Exhibit D-71 - 2035 Alternative 125 Simulated On-Time Performance

Threshold (min. late)	1	5	10	15
Adirondack / EAE	89.7%	93.1%	93.4%	100.0%
Lake Shore Limited	71.4%	71.4%	71.4%	78.6%
Empire	57.8%	64.4%	75.6%	82.2%
LSL + Empire	61.0%	66.1%	74.6%	81.4%
High Speed Rail	100.0%	100.0%	100.0%	100.0%
Passenger Train Overall	91.3%	92.6%	95.6%	96.3%

3.6.2. Freight Operations

Exhibit D-72 shows freight train results for Alternative 125 simulation. These are identical to the Base Alternative Overall, Alternative 125 shows virtually the same delay per 100 miles operated statistic (36.31 train delay-minutes per 100 miles operated versus the 2008 benchmark of 36.83 train delay-minutes). Freight volume increases by some 119 trains during the seven day simulation period. Average speed actually improves with the Alternative 125 versus the 2008 benchmark, increasing from the 2008 average speed of 27.4 MPH to 30.3 MPH in this alternative.

Exhibit D-72 - 2035 Alternative 125 Simulated Performance – Freight Trains

Train Group	Run-Time Train Count	Average Speed with Dwell	True Delay DD:HH:MM	Ideal Run Time DD:HH:MM	Train Miles	Delay per 100 Train Miles
Expedited*	335	34.8	19:15:39	86:09:00	88534.3	31.96
Freight**	505	23.5	17:11:53	86:22:11	58780.8	42.86
Total	**840**	**30.3**	**37:03:32**	**173:07:11**	**147315.1**	**36.31**

*Includes Auto, Intermodal, Guaranteed Intermodal
**Includes Bulk, Empty Unit Coal, Grain, Local, Merchandise, Road Switcher , Unit, Yard, Coal

Exhibit D-73 shows freight trip times on the corridor in the Alternative 125 which are the same as the Base Alternative. Overall, measuring CSXT freight trip times between Selkirk Yard and Buffalo, the alternative shows an average trip time of 8:14 (versus 9:07 in the 2008 model), with a standard deviation of 1:37 (versus 2:40 in the 2008 model). The reduced variability (greater reliability) in trip time reflects the more predictable passenger train performance (which, in turn, results from the Albany, Albany-Schenectady, Syracuse and Rochester area improvements) as well as the future focus on better-performing intermodal trains.

Exhibit D-73 - 2035 Alternative 125 - Simulated Freight Trip Time Statistics and Reliability (Standard Deviation)

	Buffalo - Syracuse	Syracuse - Selkirk Yard	Syracuse - Buffalo	Selkirk Yard - Syracuse
Average	4:04:16	4:06:31	4:11:14	4:00:54
Min	2:52:59	2:51:50	2:52:14	2:51:58
Max	16:30:37	9:07:45	8:57:31	8:56:32
Std Dev	1:22:23	1:15:07	0:57:51	1:06:53

Appendix E Committed Highway, Bus, and Airport Improvement Projects

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List of Exhibits

1. Overview

The Base Alternative represents the future condition of the transportation network, given committed rail, highway, bus, and airport improvement projects that are within the Intercity Travel Market Study Area (i.e., the general geographic area served by the Empire Corridor). Exhibit 3-8 in Section 3.3.1 of Volume 1 of this EIS describes eight committed rail improvement projects that form the basis for the Base Alternative. The committed highway, bus and airport improvement projects that form the basis for the Base Alternative are described in Appendix E.

Sources of information used to develop the year 2035 Base Alternative include:

- New York State Department of Transportation, Statewide Transportation Improvement Program (STIP),
- Metropolitan Planning Organization (MPO), financially constrained Long Range Transportation Improvement Plans (LRTPs), and Transportation Improvement Plans (TIPS),
- Federal Aviation Administration (FAA) Terminal Area Forecast Summary, Fiscal Years 2010-2030, and
- Relevant Airport Master Plans.

Planned infrastructure improvements to the highway infrastructure (automobile and bus modes) and airport infrastructure were accounted for in forecasts of market demand and ridership as part of the Base Alternative (refer to Appendix B).

2. Highway Network

The Base Alternative highway system that currently serves the Intercity Travel Market Study Area is shown in Exhibit E-1, Exhibit E-2, and Exhibit E-3 The primary vehicular corridor in the Base Alternative runs along the Empire Corridor and can be broken down into three major segments, all part of the New York State Thruway. These segments are: Interstate Route 87 (I-87) north from New York City to Albany (approximately 160 miles); Interstate Route 90 (I-90) west from Albany to Buffalo (approximately 293 miles); and, Interstate Route 190 (I-190) north from Buffalo to Niagara Falls (approximately 21 miles). The three segments are primarily four lane highways with the exception of six lane segments in some of the urban areas. All segments are part of the 570 mile long system of limited access highways located within New York State and operated by the New York State Thruway Authority. The Thruway segments stretching from the New York City border at Yonkers through Buffalo are toll roads.

Drivers traveling between the New York City downstate region and upstate cities of Syracuse, Rochester and Buffalo are likely to travel one or more of the following nine highways:

- Interstate Route 87 (I-87),
- Interstate Route 287 (I-287),
- State Route 17 (Rt. 17),
- Interstate Route 81 (I-81),

- State Route 15 (Rt. 15),
- Interstate Route 90 (I-90),
- Interstate Route 190 (I-190),
- Interstate Route 390 (I-390),
- Interstate Route 86 (I-86).

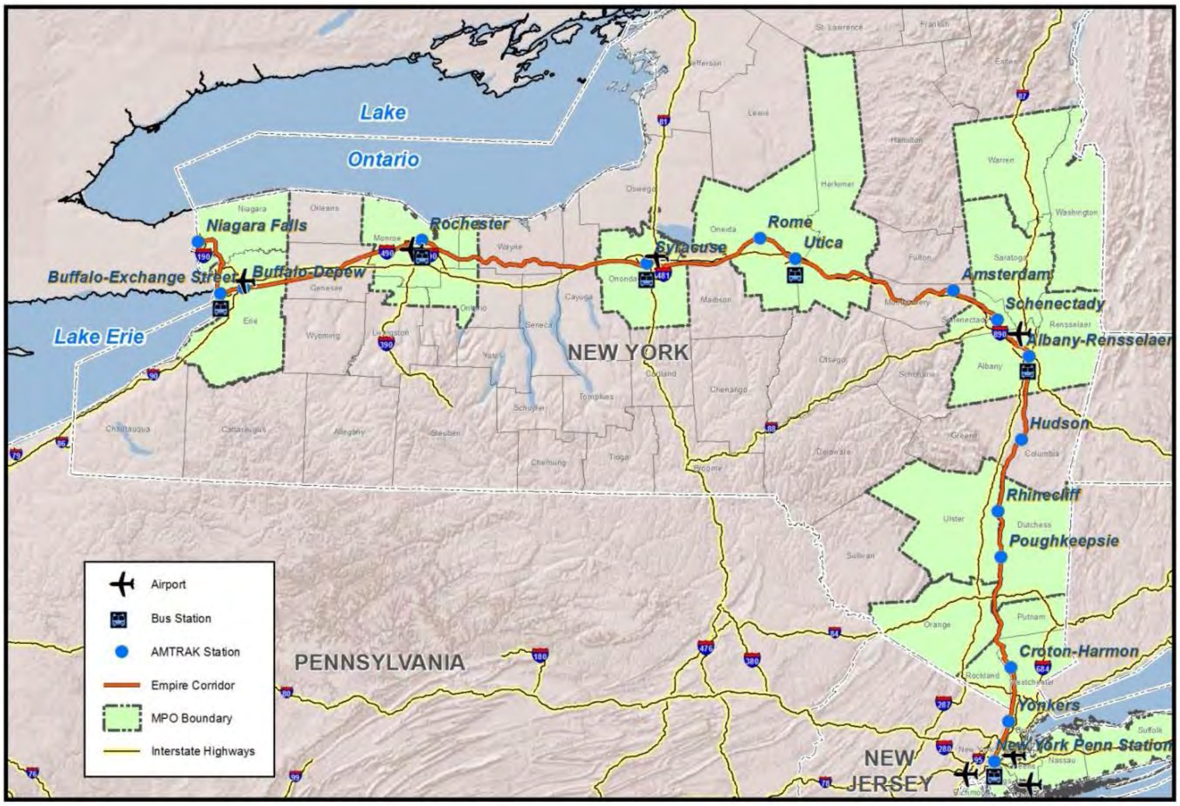

Exhibit E-1 - Empire Corridor Station, Bus and Airport Locations

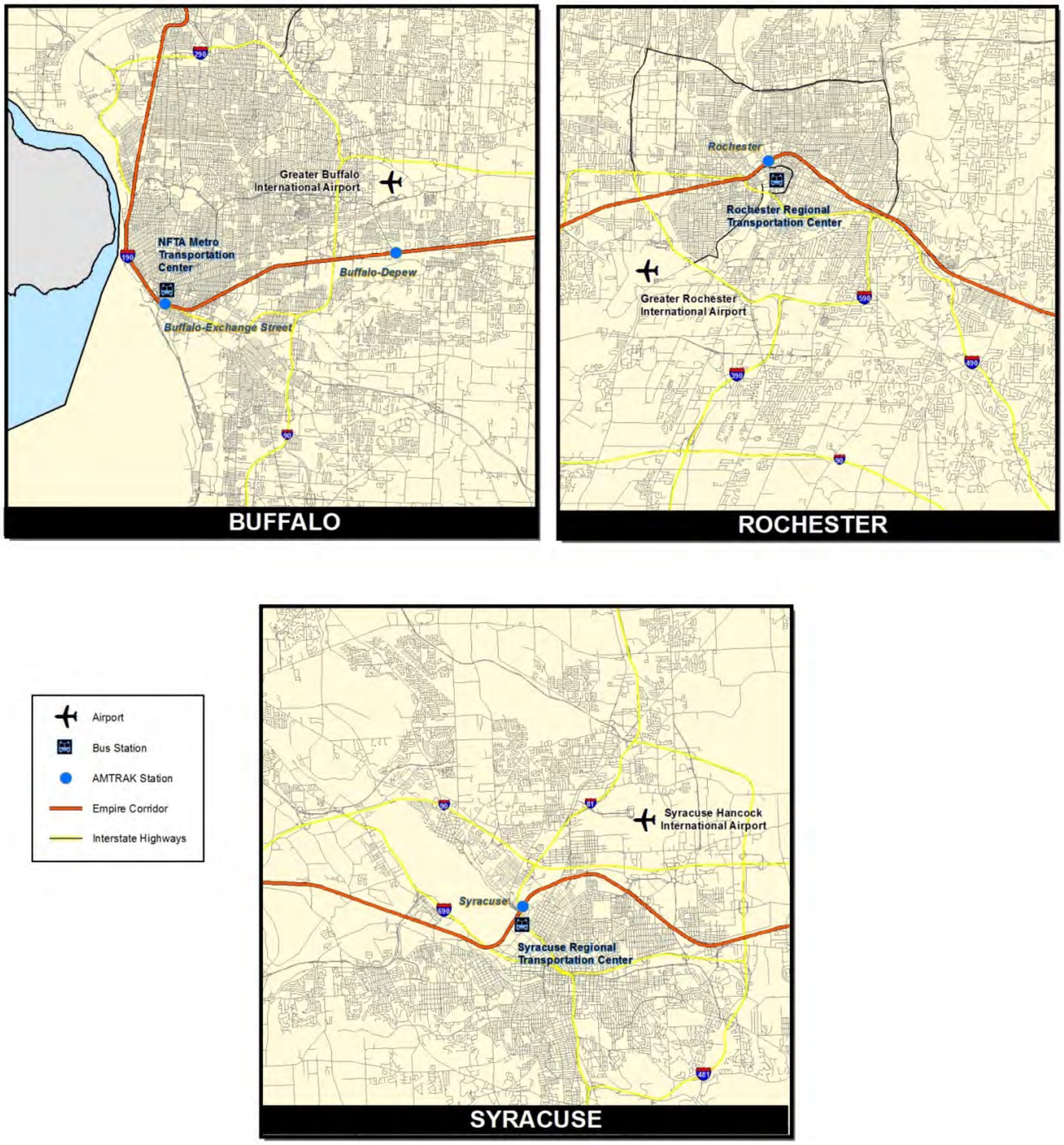

Exhibit E-2 - Amtrak Station, Bus and Airport Locations in Buffalo, Rochester and Syracuse Areas

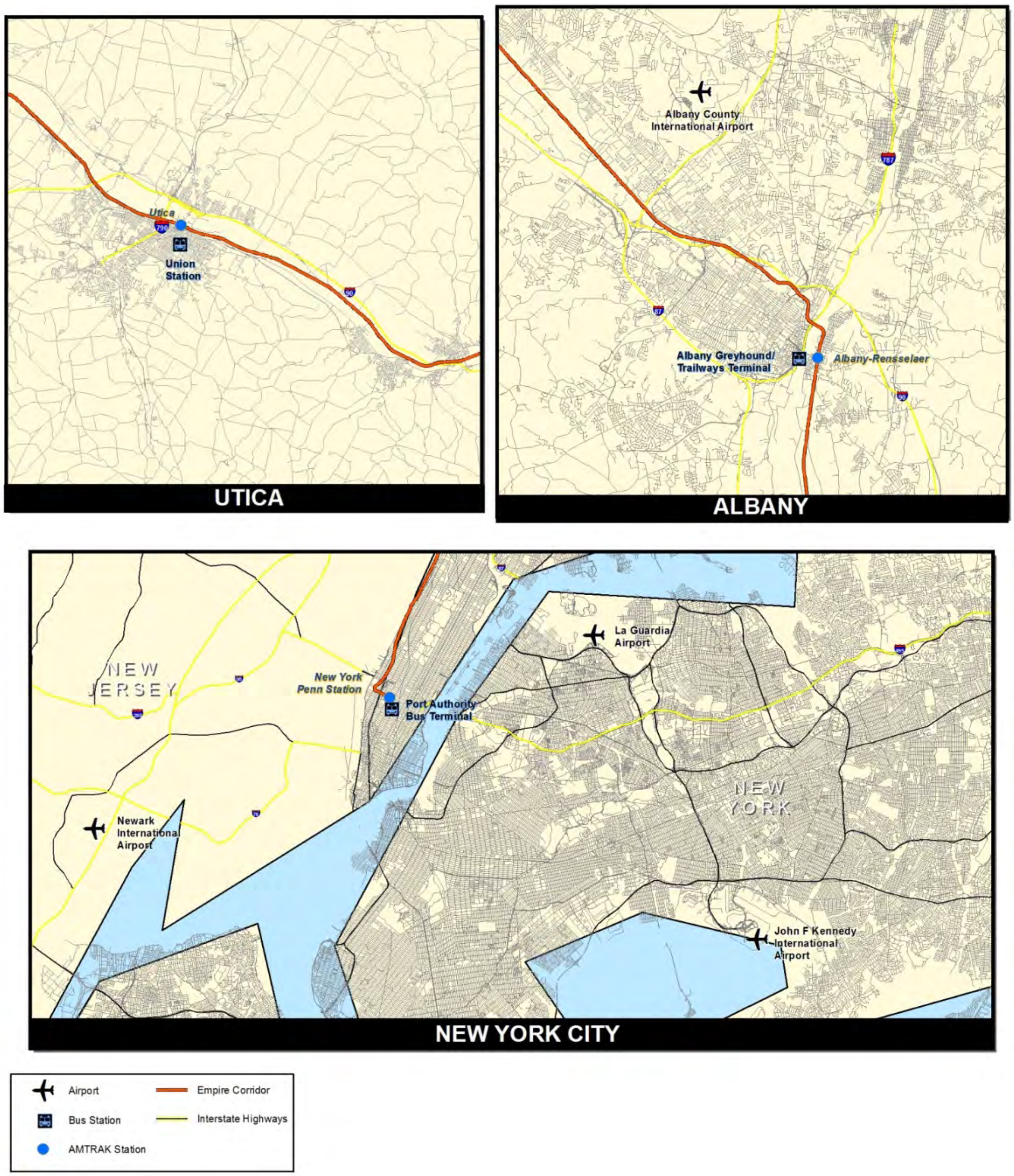

Exhibit E-3 – Amtrak Station, Bus and Airport Locations in Utica, Albany and New York City Areas

Committed Highway Improvements

The Base Alternative includes the existing highway system as well as funded and programmed improvements on the intercity highway network based on financially constrained Long Range Transportation Plans (LRTP) and Transportation Improvement Programs (TIP) developed by metropolitan transportation planning agencies. Intercity highway improvements included as part of the Base Alternative include projects that would increase the capacity of the roadways and thus reduce travel time. These improvements consist primarily of individual interchange improvements and roadway widening projects on limited segments of the highway network that are programmed to be in operation by 2035. In addition, there are various major highway and bridge capacity improvements under evaluation throughout the study area, particularly in the New York City region. Refer to Section 4.24 of Volume 1 of this EIS for a list of fully funded and programmed improvements that are part of the Base Alternative. Other projects in the LRTPs and TIPs are for items such as: the replacement of existing bridges, drainage upgrades, bridge repainting and inspection, roadway surface repaving, local roadway traffic signal upgrades, and bicycle/pedestrian access improvements. These types of improvement projects, while important to maintaining and enhancing the highway network, do not in themselves add considerable additional highway capacity, and so they were not included in this section.

3. Intercity Bus Service

Nonstop bus service exists between all the major cities along the Empire Corridor and is provided by three major private carriers: Adirondack Trailways (which also includes Pine Hill Trailways and New York Trailways), Greyhound, and Mega Bus. Adirondack Trailways is the predominant carrier followed by Greyhound. Exhibit E-1, Exhibit E-2, and Exhibit E-3 show the location of the largest bus stations serving major markets in the Intercity Travel Market Study Area. As described in Section 2.2.2, Transportation Market Study, of Volume 1 of this EIS, there were nearly 1.5 million Empire Corridor major market bus trips in 2009.

Committed Intercity Bus Improvements

No long-range planning data are available to estimate the future number of intercity bus trips that will operate between Niagara Falls/Buffalo and New York City, as well as other intercity travel markets in the program study area. Therefore, it was assumed that by 2035, the number of intercity bus trips will increase proportionately to meet the projected bus travel demand growth. Buses will continue to use the Thruway and interstate highway system.

4. Air Travel Service

The Intercity Travel Market Study Area is served by the following ten commercial service airports, which are illustrated on Exhibit E-1, Exhibit E-2, and Exhibit E-3:

- Newark Liberty International,
- John F. Kennedy International,
- LaGuardia Airport,
- Westchester County Airport,
- Stewart International,

- Albany International,
- Syracuse-Hancock International,
- Greater Rochester International,
- Buffalo-Niagara International,
- Niagara Falls International.

It is important to note that many of these airports do not provide direct commercial service between the same New York State intercity markets as the Amtrak Empire Service. The Intercity Travel Market Study Area is also served by a number of smaller municipal, county and general aviation airports. As airlines continue to consolidate into major hub airports and focus on the more profitable long-haul services, passenger service to these airports may be further reduced. One recent example of this occurrence is Pinnacle's Colgan Air unit (which operated flights for US Airways), which discontinued air service from the Buffalo-Niagara International Airport to Albany International in October of 2010.

Committed Air Facility Improvements

Exhibit E-4 provides a general overview of the committed improvements at the ten major airports that serve the Intercity Travel Market Study Area. It is important to note that the primary corridor for intercity airline travel in New York State is between airports in Niagara Falls/Buffalo, Rochester and the New York City area. The other cities located between these locations have more attractive travel options available, such as automobile, bus and intercity rail; and so the committed airport enhancements noted below are less likely to be as critical for such travelers.

Committed airport improvements noted here focus on operational improvements benefiting runway capacity and consider airspace, surface, gate, and terminal/passenger flow constraints. The FAA's Next Generation Air Transportation System (NextGen) program will transform air traffic control from current ground-based technologies such as radar and radio beacons to satellite-based technologies such as GPS and digital communications. In anticipation of future air traffic growth, NextGen capabilities will help commercial airports accommodate the demand for additional capacity. For example, the use of newly available surface surveillance data to track aircraft and vehicles will enhance safety and allow airports to make better use of existing capacity. Additionally, the FAA is implementing Performance Based Navigation procedures, designed to allow aircraft to operate simultaneously on closely spaced parallel runways. This first phase of NextGen features actions that the FAA is currently committed to implement within the next ten years.[1] NextGen I will likely expand capacity and permit realignment of departure and arrival airspace patterns. This action will produce capacity increases for each airport.

Westchester County Airport's passenger volume is capped at 2.24 million passengers as a result of limitations placed on it by agreement with the surrounding communities of Purchase, New York, and Greenwich, Connecticut. In 2009, 1.93 million passengers used this airport, and if it were unconstrained, its volume could grow well beyond that. There are no new terminal or existing terminal expansion plans at Westchester County Airport. Current terminal plans are limited to terminal upgrades to better accommodate passengers and improve safety operations.[2]

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[1] /Federal Aviation Administration. *NextGen Implementation Plan*. March 2012.

[2] /Westchester County Planning Board. 2012 *Capital Project Requests; Report of the Westchester County Planning Board*. Adopted August 2, 2011.

Criteria for airport development were derived to review proposed projects and determine their likelihood for implementation and operation by the year 2035. Proposed airport improvements were evaluated based on a review of available documentation, local area knowledge, and public agency input. An airport improvement is deemed likely to be implemented and operational by 2035 if the improvement meets the following criteria:

- Has been identified in an approved or under-development airport master planning program, environmental document, regional aviation system planning document, or capital improvement program, and
- Is reasonably practical to be placed into operation by 2035.

By applying this approach, the airport improvements likely to be funded, programmed, and operational by 2035 are summarized in Exhibit E-4.

Exhibit E-4 - Committed Improvements at the Major Airports in the Study Area

Airport	Committed Improvements
Newark Liberty International	Terminal B modernization. Terminal A modernization, expansion and structural parking. Terminal and roadway improvements. Additional major terminal, parking, and runway/taxiway improvements are being studied.
John F. Kennedy International	New JetBlue terminal, roads and garages. New American Airlines terminal parking garage and other terminal and roadway improvements. Additional, major terminal, parking, and runway/taxiway improvements are being studied.
LaGuardia	Central terminal building modernization, terminal and roadway improvements are programmed. Additional major terminal and parking improvements are being studied.
Westchester County	***There are no major capital improvements programmed that will enhance airport operations or multi-modal access.***
Stewart International	The Port Authority is investing $150 million dollars between 2011 and 2020 to address runway, terminal, and airfield shortfalls, with much of this spending marked for airside improvements (new taxiways, rehabilitation of runways, etc.).
Albany International	A recently completed multi-million dollar capital redevelopment project included a new 230,000 sq. ft. terminal parking garage, Air Traffic Control Tower, and cargo facility. The airport has embarked on a five-year $232 million capital plan to improve and maintain safety.
Syracuse-Hancock International	***There are no major capital improvements programmed that will enhance airport operations or multi-modal access.***
Greater Rochester International	Final phase of terminal renovation project. Runway 10-28 extension to construct 600 feet of new runway at the east end of Runway 10-28. The new runway segment will be used for aircraft taking off in the westerly direction. This project also includes extending Taxiway B by 600 feet to connect to the new runway end.
Buffalo-Niagara International	***There are no major capital improvements programmed that will enhance airport operations or multi-modal access.*** Per the Master Plan, an environmental assessment for future capital plan projects will be prepared (FY 2012-2015 time frame).
Niagara Falls International	Runway 6/24 safety improvements.

Sources: *The Port Authority Strategic Plan, Transportation for Regional Prosperity*, August 2006.
Syracuse-Hancock International website: **http://www.syrairport.org/about/projects/current.cfm**
Greater Rochester International website: **http://www.monroecounty.gov/airport-plans.php**
Buffalo - Niagara International website: **http://www.buffaloairport.com/pdfs/Projects.pdf**

Appendix F Capital, Operating and Maintenance Costs Estimating Methodology

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List of Exhibits

1. Introduction

In configuring alternatives for the Empire Corridor High Speed Rail Program, it was necessary to develop costs for required additional rail rolling stock (coaches and locomotives), and for the infrastructure improvements that would produce the intended service improvements.

2. Rolling Stock Cost Estimating Methodology

The following material presents the results of an analysis prepared to estimate a reasonable capital cost (in November 2011 economics) for the following types of equipment:

- 79 to 110 mph diesel locomotive hauled, five car train sets
- 125 mph, 400 seat (five passenger car) electrically powered dual mode train sets, either dual mode locomotive hauled or dual mode Diesel/Electric Multiple Units
- 160 mph, 400 seat electrically powered train sets, either locomotive hauled or EMU
- 220 mph electrically powered High Speed Rail (HSR) EMU train sets.

The vehicles operating up to 125 mph will likely be similar to equipment currently in operation on Amtrak's Empire and Northeast Corridors (for either Amtrak or New Jersey Transit). This equipment already complies with the Federal Railway Administration (FRA) Tier I structural requirements. The vehicles operating over 150 mph will need to comply with the FRA's Tier III requirements. As there is no equipment currently operating in North America that operates at these speeds, high speed trains now operating in both Europe and Asia would need to be re-developed to meet these requirements. This higher speed equipment was analyzed in support of the alternatives scoping process through which the five alternatives selected for detailed analysis was conducted.

Vehicle capital costs were estimated based largely on contract values for vehicles of similar capacities and capabilities. Allowances for the additional development cost needed to produce vehicles suitable for service in this corridor were included. It was assumed that there would be not be an already developed Tier III compliant vehicle available.

The estimated capital cost per train set in current dollars is in Exhibit F-1:

Exhibit F-1 - Capital Cost Per Train

Capital Cost Per Train set	Baseline Estimate	Suggested Range (-5% to +5%)
Order of 14 Five Car Diesel Train sets (79-110 mph)	$23.6 million	$22.4 - $24.8 million
Order of 29 Five Car Diesel Train sets (79-110 mph)	$21.8 million	$20.7 - $22.8 million
Order of 19 Five Car Dual Mode Train sets (125 mph)	$25.2 million	$23.9 - $26.4 million
Order of 17 Seven Car Electric Train sets (160 mph)	$56.9 million	$54.0 - $59.7 million
Order of 16 Eight Car Electric HSR Train sets (220 mph)	$67.4 million	$64.0 - $70.8 million

Note: Capital costs have been updated to reflect the Programmatic EIS base year for capital costing of 2015.

The 125 mph dual mode train is assumed to be comprised of one dual mode locomotive and five unpowered coaches for the purpose of capital cost estimates. Capital costs at the top-end of the suggested range were used to ensure that the program budgets are conservatively estimated and to avoid the public perception of appearing to under-estimate vehicle procurement costs.

NYSDOT is in the early stages of developing their next generation of passenger equipment to service the Empire Corridor in New York State. To support this development process, HNTB was asked to estimate capital costs for these new generation train sets. The options costed were:

- 79-110 mph corridor utilizing dual mode diesel-electric locomotives hauling five passenger cars
- 125 mph, 400 seat (five passenger car) electrically powered dual mode train sets, either dual mode locomotive hauled or dual mode Diesel/Electric Multiple Units
- 160 mph corridor utilizing 400 seat electrically powered train sets
- 220 mph corridor utilizing 400 seat electrically powered train sets

Included in all of the above cases are food service cars in each train. It was assumed that all the trains would be single level and that they would need to be delivered in time for service to begin in 2018.

All of the equipment options are assumed to comply with the relevant FRA structural requirements. That is to say that the equipment would be built to US standards and would not be expected to operate under an FRA waiver. For the lower speed corridors (i.e. 125 mph or less), there already exists FRA Tier I compliant equipment similar to, if not identical to equipment that would be suitable for service on the Empire Corridor. It is more problematic to develop methods of costing equipment for the higher speed alternatives (160 mph and 220 mph). The only true HSR equipment operating on the Amtrak network are the Tier II compliant 150 mph Acela train sets first put into operational service approximately 10 years ago. However, these train sets are not suitable for the NYSDOT higher speed service and instead trains built to the FRA's Tier III regulations would be required. To date, no Tier III compliant equipment has been built. While most recent HSR trains have been more or less standard in design, some suppliers have recently built unique vehicles as in the case of the Siemens built Russian Velaro HSR train set. These procurements allow for a comparative analysis to be performed as verification of the estimated vehicle capital costs.

The estimated market capital costs for the NYSDOT train sets were developed using an escalated average of several contract values from recent procurements. The pricing for the Tier I compliant vehicles was largely based on similar recent domestic procurements. The estimated capital costs for the higher speed Tier III vehicles were based primarily on European vehicle procurements.

With the exception of the dual mode diesel locomotives and the lower speed passenger cars, it is expected that the vehicles will be based on existing European designs and built with European components. Consequently, an escalation factor based on European (Eurostat) economic indicators was used to inflate all of vehicle unit capital costs to current economics. The specific data used is as follows:

<u>Material (50% of original vehicle capital cost):</u>

- Eurostat C25 – Manufacture of metal products except machinery and equipment
- Eurostat MIG – Intermediate and Capital Goods Industry

<u>Labor (40% of original vehicle capital cost):</u>

- Eurostat C27 – Manufacture of electrical equipment
- Eurostat C30 – Manufacture of other transport equipment
- Eurostat CAP - Capital Goods

Note that only 90 percent of the vehicle capital cost was inflated using this data. The remaining 10 percent was assumed to be fixed. After inflating the vehicle capital costs in Euros, the costs were converted to US dollars using currency exchange rate data from Olsen and Associates (oanda.com).

This analysis does not consider any physical variation in the different train sets. Interior appointments, power supply and train control systems and even the numbers of passenger cars can differ from one order to the next. As such, the average capital cost developed from this analysis provides only a starting point. In addition, a 10percent contingency was added to the average vehicle capital cost to account for some of these discrepancies.

The NYSDOT HSR train sets will be, like the Amtrak Acela train sets already in service, considerably different from more or less standard Velaro or TGV/AGV train sets in service overseas. As noted above, this is because the vehicles will need to meet the much more stringent FRA Tier III crashworthiness standards and not the UIC standards generally in effect elsewhere. Consequently, considerable re-design and testing will be needed to develop a satisfactory vehicle. This effort is accounted for by estimating the incremental engineering, material and set-up costs needed to produce this vehicle.

The other vehicles under consideration will also need varying degrees of incremental engineering. For example, there currently is no dual mode diesel-electric locomotive on the market that will be able to meet the diesel emissions standards that will be in effect by 2018. These costs, including production set-up costs, were estimated for each vehicle type.

In all cases, the engineering costs were developed by estimating the additional engineering hours needed for the duration of the program and then by applying standard industry hourly rates. For the high speed equipment, a five year development and three year production schedule was assumed based on the schedules included in the January 2010 UIC report titled "Necessities for Future High Speed Rolling Stock". Shorter development schedules were assumed for the 125 mph and slower equipment.

Material and set-up costs were estimated based on the scope of the program using several recent domestic railcar procurements as points of reference.

These additional recurring and non-recurring costs were added to the average escalated capital cost developed as noted above to come up with estimated capital costs for each train type. In the case of the diesel powered trains, the non-recurring costs were applied to two different order sizes (14 and 29 trains). The results are listed in the table above. These capital costs include the following:

- Engineering, testing and project management costs for the duration of the program
- Manufacturing set-up costs
- Other non-recurring costs including vehicle mock-ups, training, manuals, spare parts, special tools and diagnostic equipment

The estimated vehicle capital costs do not include any maintenance facilities or contracts, management contracts as well any internal costs for NYSDOT needed to manage this program.

Given the very preliminary nature of the proposed high speed corridor, a simple comparative analysis was done between the estimated capital cost per NYSDOT HSR train sets and two other non-standard HSR train sets.

The two HSR train sets that were used to compare pricing were the eight Russian Railways Velaro (Velaro RUS) train sets ordered from Siemens in 2006 and the Amtrak Acela train sets. Both projects include considerable engineering effort needed for these projects (the Velaro RUS had to be redesigned for the larger Russian loading gauge and for different power supplies).

The average escalated capital cost for these two projects is approximately $70 million per vehicle as compared to the $55-60 million capital cost estimate for the NYSDOT HSR train sets. However, the Velaro RUS order was only for eight vehicles and the Acela train sets were ordered some time ago (13 years) from Bombardier/Alstom. To provide a better comparison, the engineering and other non-recurring costs that were developed for the NYSDOT HSR train sets were applied over eight 'standard' HRS vehicles instead of the 16 vehicles as above. The resulting capital cost estimate is within 10 percent of the escalated Velaro Russian Railways capital cost, thus validating the estimated incremental costs.

Exhibit F-2 shows the Empire Corridor fleet requirements for each of the Alternatives, comparing them incrementally versus the Base Alternative (No Action).

Exhibit F-2 – NYSDOT Empire Corridor Fleet Requirements

Table 1. NYSDOT Empire Corridor Fleet Requirements												
	Current		**Base Alternative**		**90A**		**90B**		**110**		**125**	
Start Location	**Required**	**Incremental**	**Required**	**Incremental**	**Required**	**Incremental**	**Required**	**Incremental**	**Required**	**Incremental**	**Required**	**Incremental**
Albany	6	0	6	0	6	0	7	1	7	1	6	0
Niagara Falls	2	0	2	0	5	3	5	3	5	3	2	0
New York (Sunnyside Yard)	2	0	2	0	4	2	3	1	3	1	2	0
Rutland	1	0	1	0	1	0	1	0	1	0	1	0
Montreal	1	0	1	0	1	0	1	0	1	0	1	0
Toronto	1	0	1	0	1	0	1	0	1	0	1	0
Buffalo (Dual Mode)											8	8
New York (Dual Mode)											6	6
TOTAL (Before Spares)	**13**	**0**	**13**	**0**	**18**	**5**	**18**	**5**	**18**	**5**	**27**	**14**
Spare Factor	**20%**	**20%**	**20%**	**20%**	**20%**	**20%**	**20%**	**20%**	**20%**	**20%**	**20%**	**20%**
TOTAL (With Spares)	**16**	**0**	**16**	**0**	**22**	**6**	**22**	**6**	**22**	**6**	**33**	**17**

The Base Alternative has no incremental fleet requirement versus today's operation. Exhibit F-3 shows the estimated Empire Corridor fleet capital costs by Alternative in 2015 dollars. The total figures at the bottom of the table include a 5 percent contingency. In addition to the figures shown, a 12 percent allowance for procurement support should be included. This sum reflects the cost of specification development (to the extent not already specified by the current PRIIA Next Generation Equipment Committees), manufacturing inspections, testing and commissioning.

Exhibit F-3 -NYSDOT Empire Corridor Fleet Capital Costs

Table 2. NYSDOT Empire Corridor Fleet Capital Costs
(In 2015 Dollars)

	Base Alternative	90A	90B	110	125
Incremental Fleet Requirement (With Spares) - Diesel	0	6	6	6	0
Incremental Fleet Requirement (With Spares) - Dual Mode	0	0	0	0	17
2011 Capital Cost Estimate (Per Train Set)	$ 23,600,000	$ 23,600,000	$ 23,600,000	$ 23,600,000	$ 25,200,000
Contingency (5%) (Per Train Set)	$ 1,180,000	$ 1,180,000	$ 1,180,000	$ 1,180,000	$ 1,260,000
2011 Capital Cost Estimate (with Contingency) (Per Train Set)	$ 24,780,000	$ 24,780,000	$ 24,780,000	$ 24,780,000	$ 26,460,000
2015 Capital Cost Estimate (with Contingency) (Per Train Set)	$ 28,436,000	$ 28,436,000	$ 28,436,000	$ 28,436,000	$ 30,363,000
Total 2015 Capital Cost – Vehicles	**$ -**	**$ 170,616,000**	**$ 170,616,000**	**$ 170,616,000**	**$ 516,171,000**

Note: 3.5% Annual Inflation Rate Assumed

3. Infrastructure Capital Cost Estimating Methodology

The New York State Department of Transportation (NYSDOT) is evaluating investment alternatives to increase speed, reduce travel time, and improve the schedule reliability of Amtrak's Empire Corridor passenger rail service. NYSDOT, with FRA concurrence, has identified five alternatives by which to achieve these program goals. A major factor in evaluating the relative merits of these alternatives is their capital cost, which includes the cost of upgrading existing or building new track, grade crossings, signal and switch systems, and propulsion improvements, combined with the cost of locomotives and passenger coaches (rolling stock or "equipment") and the cost of new or expanded maintenance facilities and train stations. This document explains the methodology by which these capital costs were developed for the five Empire Corridor High Speed Rail Program alternatives, covering property acquisition, design and permitting, construction, and overall contingency estimates to address uncertainty at this early stage of the program.

In general, for a Tier 1 EIS, costs of alternatives are estimated at a high level. They are not detailed for two reasons:

1. There is insufficient engineering detail available at this stage to permit precise estimates; alignments are conceptual, and it is not possible to be precise about the

number and specific design of bridges, new track and signals, structural and earth work (cut and fill) requirements, grade separations at rail/road crossings, etc.; and

2. The actual year of construction of each improvement is not known, so the precise net present value of the future year investment cannot be reliably predicted in current dollar terms.

Given these two conditions, it is not possible to produce precise cost estimates. Rather, unit costs are applied consistently across all alternatives. For example, a unit cost for simple bridge structures may be stated as $20,000/linear foot (for a two-track bridge). Thus, if the bridge is 60' long (spanning, perhaps, a simple two-lane road), the construction cost of the bridge would be estimated to be $1,200,000, irrespective of the intended year of construction. As such, the cost of alternatives for which improvements will be constructed further into the future will be understated relative to alternatives for which most of the improvements will be constructed sooner, since the erosive effects of inflation will ultimately lead to higher costs in absolute dollar terms as time passes. Thus, if inflation is estimated at 3.5 percent over a five year period, a bridge which costs $1M in the first year, will be likely to cost 3.5 percent more each successive year, $1,003,500 in the second year, $1,007,015 in the third year, and so forth.

The purpose of a Tier I EIS is to ensure that costs are estimated in consistent terms across the alternatives being evaluated, such that values for each alternative can be reasonably compared. This approach supports rational decision making by NYSDOT and the public based on common understandings of the likely relative cost of each alternative compared to the others.

To ensure such commonality in the final cost estimates, this analysis has employed unit costs for all major elements of the required railroad system improvements. These unit costs are taken either from recent costs in the marketplace or from recognized industry values typically employed in estimating construction costs. Unit costs may be different by region or type of construction. For example, the cost of trenching for utilities may be higher in the Northeast than in the Southwest, reflecting both the different costs of living and labor, and, possibly, the simpler work of excavating in sandy desert material than in rock-laden heavy, wet soils. In many cases, "typical" costs for construction activities and elements are listed by city or region, to address these distinctions.

Exhibit F-4 gives unit costs for the various components from which the infrastructure estimates were compiled for each alternative.

Exhibit F-4 - Unit Costs by Category of Work

Property

PROPERTY ACQ. (per Acre)	
$40,000	Marsh
$85,000	Farmland
$200,000	Suburban
$800,000	Town
BUILDING ACQUISTION AND REMOVAL (per SF)	
$200	Residence
$350	Buisness
CLEARING (per Acre)	
$12,000	Country
$16,000	Town
$20,000	City
FILL SECTION (per CY)	
$12	Open
$20	Retained
EXCAVATION (per CY)	
$12	Earth
$50	Rock
FENCING (per LF)	
$20	8' CLF
$24	8' w/BW
$40	Security
DITCHING (per LF)	
$8	2 ft. or less
$12	2 to 4 feet

Track & Signals

SUBGRADE PREP. & SUB-BALLAST	
$12.00	per SY
NEW TRACK (per Track-Foot)	
$175	Yard or Spur
$225	Main Track
TRACK THROWS (per Track-Foot)	
$40	5 feet or less
$80	5 to 13 feet
RETIRE TRACK (per Track-Foot)	
$25	Main Trk.
$15	Yard Trk.
$12	Unused Trk.
RETIRE TUNROUTS (Each)	
$30,000	No. 8
$32,000	No 10
$54,000	No. 15
$72,000	No. 20
TURNOUTS (Each)	
$ 85,000	No 8
$ 95,000	No 10
$ 195,000	No. 15
$ 235,000	No. 20
$ 2,000,000	No 32.7
ADDITIVE FOR COMPLEX PHASING	
Variable	20% to 150% of Trackwork Value

Bridges & Structures

EROSION CONTROL	
$12	per LF
DRAINAGE PIPES & BOX CULVERTS (per SF)	
$125	Pipe
$1,000	60-100 sf
$1,800	100-140 sf
$2,300	140-180 sf
BRIDGE DEMO (per SF)	
$175	Conc.
$85	Steel Girder
$125	Steel Truss
NEW BRIDGES (per SF)	
$400	Conc. 36-48'
$375	Steel 30-60'
$650	Steel 60-80'
$900	Steel 80-120'
RETAINING WALLS (per SF)	
$75	11-20' MSE
$65	2-10' Conc
$120	10-20' Cant.
$180	over 20' Cant.

Roads & Crossings

HIGHWAY RELOC. (per SY)	
$140	Secondary
$224	Highway
GRADE CROSSINGS PRIVATE (Each)	
$5,000	per track
GRADE CROSSINGS PUBLIC (per Track-Foot)	
$2,800	Single Trk.
$3,200	Double Trk.
$3,600	Tripple Trk.
$4,200	Four Trks.
WARNING SYSTEM (Each)	
$350,000	Small Rural
$400,000	Medium
$500,000	Larger Crossing
$8,000	Farm or Private

For the Empire Corridor program, these unit costs were applied to the estimated or measured amount of each item. For example, for Alternative 110, a total of 1,118,890 linear feet of fencing were estimated to be required, at an average cost of $4,248/mile, for a total of $90,203,000 for this item. Similarly, costs were generated for all of the other cost categories, based on measurements along the entire 463-mile Empire Corridor right of way for each alternative.

Engineering design and permitting costs are generally derived on the basis of the scale and complexity of the intended construction job, and range between 8-15 percent of the cost of construction. Thus, for purposes of high level project cost estimating, a project that was estimated to cost $100 million would be expected to have a design and permitting cost between $8-$15 million. Since rail construction is quite intricate, the engineering and permitting costs are generally anticipated to be in the higher range, and the 15 percent multiplier was applied to the derived construction costs for each alternative.

Property acquisition was estimated based on the need to straighten curved track sections, as well as for land with which to implement grade separations in place of at-grade vehicular crossings. Depending upon the location of each improvement, distinctions were made among rural, suburban and urban land, and property unit costs were applied to each, on the basis of current average values in each geographic area applied to the acreage required in that area.

A contingency is a factor applied to capital cost estimates associated with unknown or unknowable conditions. Until geotechnical analysis is performed, for example, the structural support requirements for a bridge cannot be precisely estimated. Therefore, after applying average unit costs with which to estimate the bridge cost, a contingency factor is applied to accommodate the possibility of the bridge being more expensive in unfavorable geology. Equally, since property values cannot be known until the actual acquisition, average unit costs are subjected to a significant contingency factor as well. Applying these contingency factors ensures that a realistic appraisal of the true potential cost of an alternative can be assessed. Normally, at the initiation of a project, a contingency as high as 50 percent may be assigned, reflecting the absence of specific technical data with which to precisely estimate costs of each element of the project. Combining the unit-cost-derived project estimate with the contingency gives a reasonable value to carry going into design. As design advances and more is known, actual costs can be estimated with greater precision and the contingency reduced.

In the Empire Corridor High Speed Rail program, mile-by-mile engineering analysis of the existing rail infrastructure was undertaken to determine the approximate length of new track, straight track, higher-speed switches, new switches, grade crossings, earth work, bridge structures, signal system augmentation and improvement, and propulsion system that would be needed for each alternative. The cost of these improvements were then estimated based on unit costs for equivalent work in current dollar terms. Despite the mile-by-mile assessment, however, considerable uncertainty remains associated with the timing of each improvement, work-around issues flowing from the need to maintain both freight and passenger service during construction, community issues associated with local traffic requirements where grade crossings must be maintained, site-specific geotechnical information for bridges, environmental permitting requirements for bridges over regulated waterways and wetland areas, contamination levels in soils to be disturbed during construction or requiring disposal off site, and utility agreements necessary to address utility relocations that may be required. All of these factors can significantly influence actual construction costs when the improvement finally goes to construction.

To establish practical, comparable costs among the alternatives in view of these uncertainties, a hard-construction contingency of 35percent has been applied to the estimated construction costs of the elements contained in each alternative. Because the complexity of designing the rail improvements remains uncertain without further clarification as to final alignments, and because the amount and type of property required also cannot be precisely defined until final alignments are established, a 35 percent contingency was applied to the engineering design, permitting and property acquisition costs as well. This contingency is felt to be appropriate to the level of detail developed for the alternatives at this stage in the program. It is not as high as a 50 percent contingency that might be applied if the program cost were estimated on an overall “cost/mile” value for generalized new rail construction, nor is it as low as the 10 percent contingency that might be applied when detailed design has been completed and most of these facts are reasonably well understood. Rather, it strikes a balance between the mile-by-mile specific decisions about the particular track, signal and propulsion improvements that will be needed, and the lack of specific design work necessary to ensure that these improvements can be built as envisioned.

The Empire Corridor High Speed Rail program capital costs for infrastructure improvements were estimated on the basis of unit costs for specific track, signal, switch, propulsion, earthwork and property elements applied to a mile-by-mile assessment of exactly which of these improvements will be needed for each alternative, these capital costs then adjusted with a 35 percent contingency to reflect uncertainty about actual conditions and design feasibility for each identified improvement.

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Appendix G Existing Conditions Supporting Documentation

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Table of Contents

List of Exhibits

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1. Land Use

1.1 Empire Corridor South

The Empire Corridor South segment, from New York City to Rensselaer, extends 142 miles and in many locations closely follows the east bank of the Hudson River. The study area extends through Manhattan (New York County) and the Bronx (Bronx County). This program segment also includes the study area counties of Westchester County, Putnam County, Dutchess County, Columbia County, and Rensselaer County. The location of the rail line in close proximity to the river's edge in many locations is reflected by the predominance of surface waters, wetlands, and undeveloped forest area in many locations where the river bank is undeveloped or consists of parkland.

The most urbanized segment of the study area extends roughly 10 miles through New York City from Pennsylvania Station (southern terminus of the Empire Corridor) in Manhattan to the northern border of the city of Yonkers in Westchester County. In New York City, the county boundaries coincide with the boroughs. In **Manhattan (New York County)**, the Empire Corridor rail line runs under and along the west side of Manhattan Island parallel to the Hudson River. Penn Station is situated under the Pennsylvania Plaza/Madison Square Garden complex between Seventh Avenue and Eighth Avenue and 31st and 33rd Streets in midtown Manhattan. The high-density development around Pennsylvania Station are primarily mixed urban uses including hotels, retail, restaurants, office buildings, retail and other services. Future plans being overseen by various public entities are to create an annex to Penn Station in the James Farley Post Office Building across Eighth Avenue and provide an aboveground entrance, as part of the Moynihan Station improvements. The Empire Corridor travels west underground from Pennsylvania Station, under the Hudson Yards and then continues north under Hell's Kitchen (crossing the Lincoln Tunnel) and the west side of Midtown Manhattan. This underground segment of railroad crosses over to Route 9A along the Hudson River (known as the West Side Highway, or Joe DiMaggio Highway, becoming Henry Hudson Parkway at 72nd Street) west of Central Park. The railroad eventually surfaces to street level in Riverside Park, east of the Henry Hudson Parkway and west of Riverside Avenue north of 123rd Street and crosses into the Bronx over the Harlem River Bridge. The Empire Corridor and the Metro-North Railroad Hudson Line commuter rail meet in the Spuyten Duyvil section of the Bronx. In Manhattan, approximately 63 percent of the land cover in the study area is characterized as mixed urban, which includes high density retail, office, and residential uses. Transportation and utilities comprise 19 percent of the land cover in Manhattan, which includes Route 9A, and commercial services total 13 percent of the total land area.

In **Bronx County**, 2.6 miles of the rail line closely borders the east side of the Hudson River, and surface waters account for roughly 50 percent of the land cover in the study area. Approximately 30 percent of the land cover within the study area is classified as mixed urban uses or commercial services, and residential uses account for 17 percent of the land cover. Riverdale is the major urban center of the Bronx, primarily consisting of medium to high density residential uses and retail, commercial, and other services. Riverdale Park is the major recreational and natural area along the rail corridor in Bronx County.

The Hudson Valley Region north from New York City include Westchester, Putnam, Dutchess, and Columbia counties, which extend along the east side of the Hudson River. Approximately 31.5 miles of the railroad extends through **Westchester County**. The study area in Westchester County includes residential (16%), commercial/industrial (20%), and mixed urban (10%) uses, with transportation/utilities accounting for another 8 percent. Surface waters, principally the Hudson

River, and forested areas account for approximately 46 percent of the land cover in the Westchester County study area. The southern portion of Westchester County contains moderate to high-density residential areas with mixed urban uses that occur predominantly in the more developed communities along the Hudson River from Yonkers north to Tarrytown, where the New York State Thruway (Interstate Routes 287/87) crosses the railroad at the Tappan Zee Bridge. The northern portion of Westchester County contains a higher proportion of forested areas with several developed areas near Peekskill and Croton-on-Hudson abutting the Hudson River.

Within Westchester County, the city of Yonkers consists of mixed urban (30%), commercial or industrial (53%), or transportation/utilities (17%) in the study area. The Yonkers Amtrak/Metro-North Railroad Station, 14 miles north of Penn Station, serves the downtown area of Yonkers and was renovated by the Metro-North Railroad in 2004. The adjoining land uses include the New York Department of Motor Vehicles and the Yonkers Public Library to the northeast and the U.S. Post Office to the southeast. The land uses around the station include the Science Barge docked on the Hudson River, a floating science museum and working urban farm, on the west side of the tracks and restaurants, shopping and residential complexes and transportation uses, and associated parking facilities.

in Westchester County, the land uses around the Croton-Harmon Station, 22 miles to the north of Yonkers Station, include Croton Point County Park on a peninsula in the Hudson River to the southwest of the station, a rail layover facility on the west side of the tracks, and a residential complex and marina to the west (on the other side of the layover facility) along the Hudson River. To the east of the station, a large wetland area and Paradise Island County Park are situated on the southeast and areas east of the station include a grocery store, Goodwill Industries, a health club, and other services (gas station and restaurants) and residential neighborhoods.

In **Putnam County**, the 600-foot-wide land use study area includes increasingly rural or undeveloped areas. In the study area in Putnam County, land uses bordering the 9.3-mile-long corridor are primarily natural areas. Forested, surface water bodies, and associated wetlands account for 98 percent of the total area. The incorporated village of Cold Spring is the only community that abuts the rail corridor and includes a mix of residential and commercial uses.

The land cover types in **Dutchess County** are primarily forested areas and surface waters, which account for 77 percent of the study area. Only 15 percent of the land area within the 45.6-mile-long study area in Dutchess County is in residential, industrial use, mixed urban use, or transportation. Agricultural, wetlands, and barren land comprise the remaining 8 percent of the study area. The Empire Corridor passes through several smaller communities including Beacon, Poughkeepsie, and Rhinebeck, which are located adjacent to the Hudson River.

In Dutchess County, the city of Poughkeepsie is located in the Hudson Valley approximately midway between New York City and Albany. The city is bordered by the Hudson River to the west and the town of Poughkeepsie on the north, east and south. A majority of the land cover (59%) in the study area in the city of Poughkeepsie is characterized as either forested or surface water (the Hudson River). Within the central business district, the principal land uses include industrial, commercial, and mixed urban totaling approximately 23 percent of the corridor, with transportation/utilities totaling another 8 percent. Land uses around the Poughkeepsie Amtrak/Metro-North Railroad Station, 41 miles north of the Croton-Harmon Station, include several surface parking facilities for rail passengers and park users, a new residential condominium development, referred to as the Piano Factory, and the Mid-Hudson Children's Museum to the north, and a waterfront park to the west along the Hudson River side of the railroad tracks. Approximately ¼ mile to the north is the

Walkway over the Hudson State Park, a former rail bridge and associated interpretive uses, spanning the Hudson River. The east side of the tracks border NY Route 9, with low to medium density housing to the east of the highway and the station.

Within Dutchess County, the Rhinecliff–Kingston Amtrak Station, 15 miles north of the Poughkeepsie Station, lies adjacent to the east bank of the Hudson River and is characterized by residential uses and the historic hamlet of Rhinecliff on it eastern side, within the town of Rhinecliff.

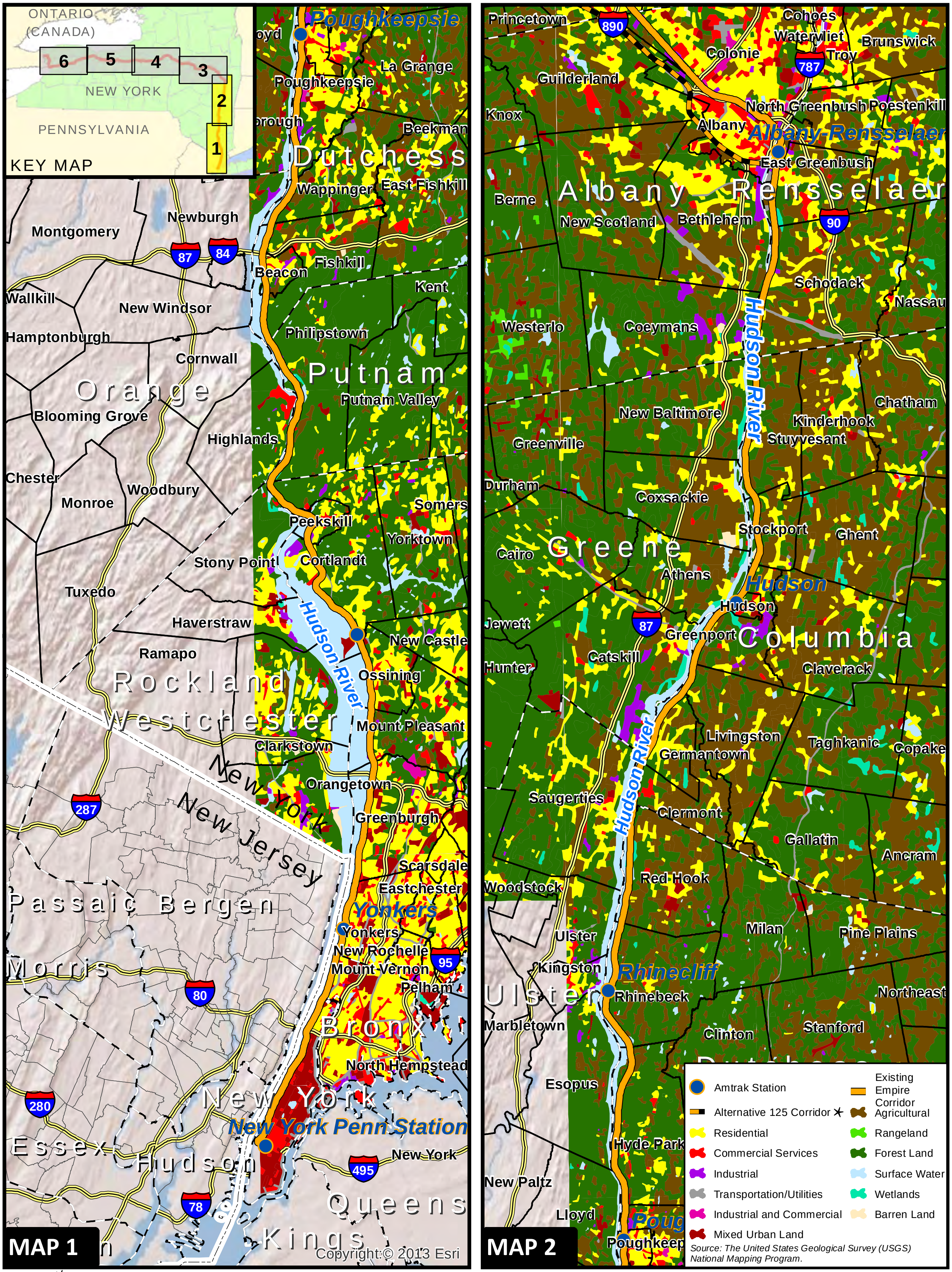
Columbia County is predominantly rural in nature within 300 feet of the railroad, which extends 29.5 miles through the county. The major land use classification is forested lands, which account for 50 percent of the study area. Nineteen percent (19%) of the corridor is developed, primarily residential and retail commercial uses, concentrated within the city of Hudson. Agricultural lands account for 19 percent of the study area.

In Columbia County, the land uses adjacent to the Hudson Station, 26 miles north of the Rhinecliff-Kingston Station, include a waterfront park and state boat ramp along the Hudson River on the west side of the track. To the east and south, the neighborhoods within the city of Hudson include the business district and residential properties. A non-profit theater (Stageworks) is located in close proximity to the station.

Rensselaer County (along with Albany and Schenectady counties along the Empire Corridor West program segment) is part of the Capital District Region. Rensselaer County is primarily rural or undeveloped within 300 feet of the existing (90/110 Study Area) rail corridor, which extends 13.4 miles through the county. In Rensselaer County, where the 125 Study Area would begin, it extends north to Albany-Rensselaer Station, doubles back on the Empire Corridor South for one mile, before turning east and crossing the Hudson River. The new 125 Study Area diverges from the existing railroad approximately 1.6 miles south of where the existing Empire Corridor West turns west (for a total of 13.5 rail miles in Rensselaer County).

In the southern part of Rensselaer County, the major land cover types are primarily forested and agricultural. Forestlands comprise 36 percent (90/110 Study Area) to 38 percent (125 Study Area) of the study area in the county. Agricultural lands comprise 28 percent (90/110 Study Area) to 30 percent (125 Study Area) of the county's land study area. The urban center of this county is the city of Rensselaer. The majority of the mix of urban uses including residential, commercial, industrial and transportation uses (30% for the 90/110 Study Area and 27% for the 125 Study Area) in the study area for the county are located within the city of Rensselaer.

Within Rensselaer County in the city of Rensselaer, the Albany-Rensselaer Station is situated about 1.5 miles south of downtown Albany. The land uses in the vicinity of the current station include several large surface parking facilities and medium-density detached single family housing located to the west and east of the station. Areas west of the train station also include commercial, institutional, and industrial uses, including New York State Adoptive Services, and several dining establishments.



* Alt. 125 as shown is a potential corridor used to analyze the potential operating characteristics, environmental impacts and cost for this speed (125 mph) threshold.

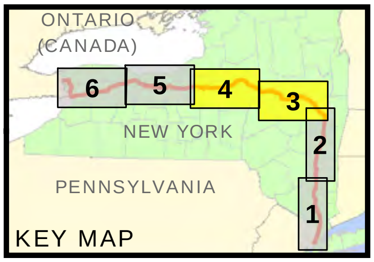
N

0 2.5 5 10
Miles

Land Cover Map

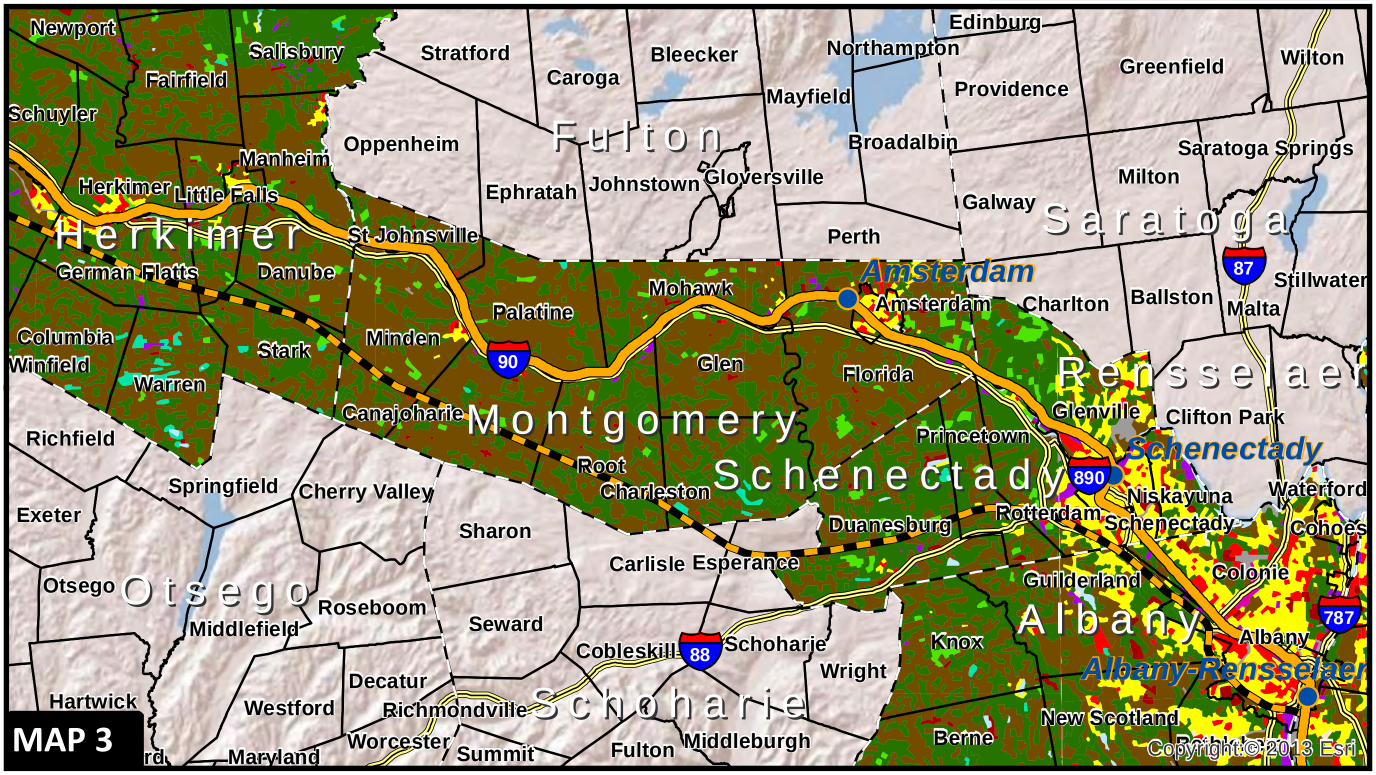
Exhibit G-1

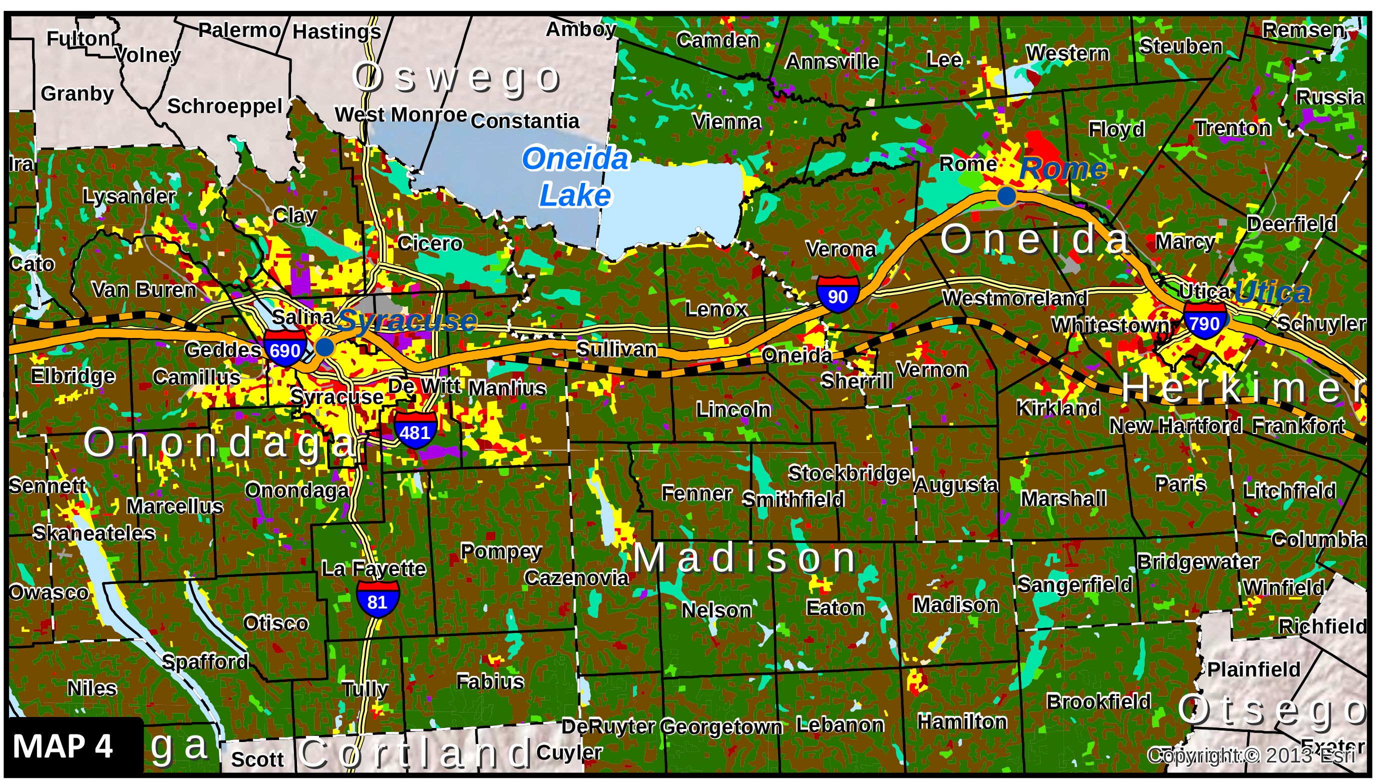
Tier 1 EIS
High Speed Rail
Empire Corridor Program



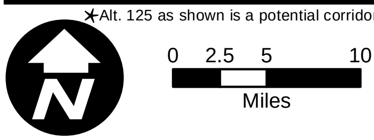
- Amtrak Station
- Alternative 125 ⁕ Corridor
- Residential
- Commercial Services
- Industrial
- Transportation/Utilities
- Industrial and Commercial
- Mixed Urban Land
- Existing Empire Corridor
- Agricultural
- Rangeland
- Forest Land
- Surface Water
- Wetlands
- Barren Land

Source: The United States Geological Survey (USGS) National Mapping Program.





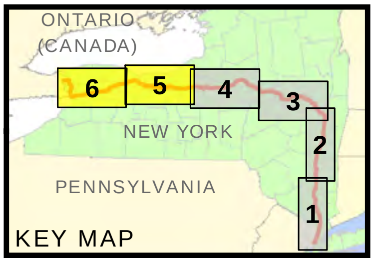
⁕Alt. 125 as shown is a potential corridor used to analyze the potential operating characteristics, environmental impacts and cost for this speed (125 mph) threshold.



Land Cover Map

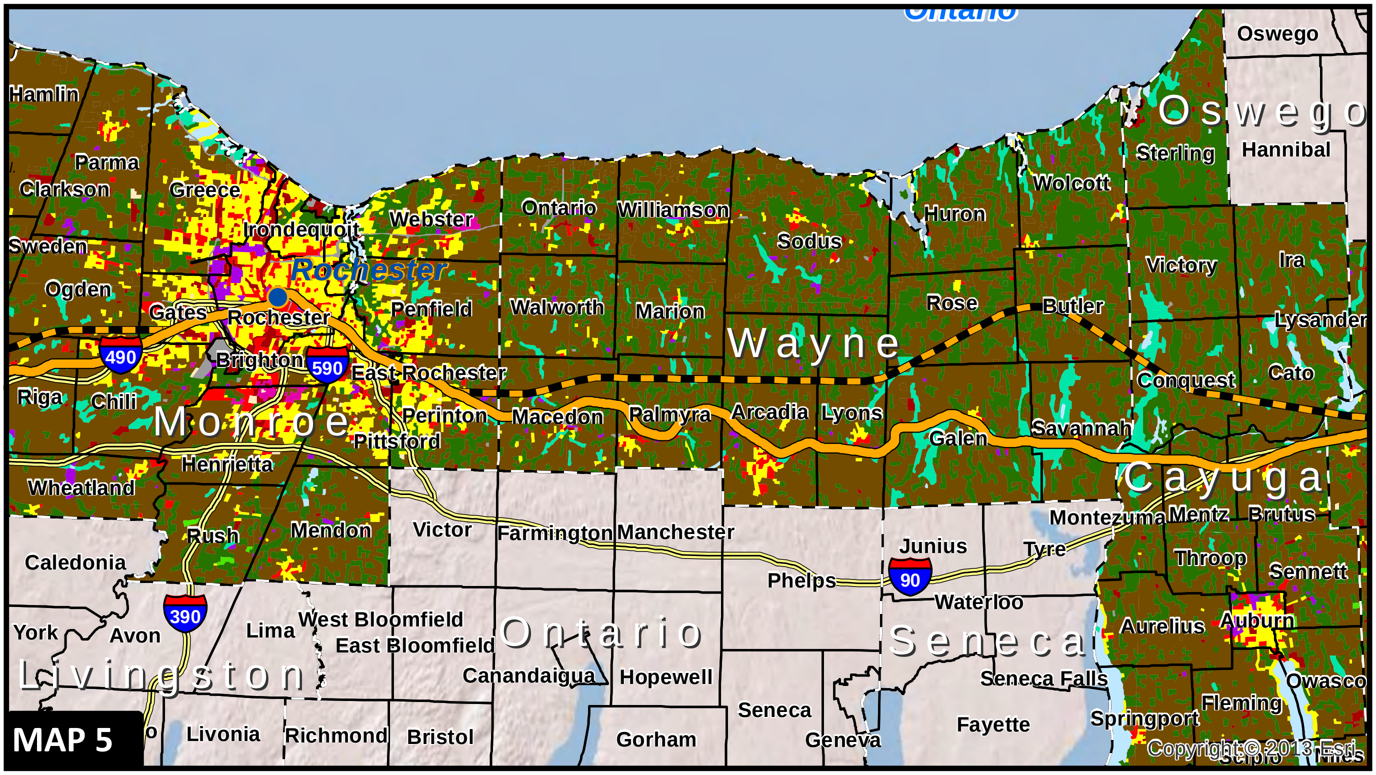
Exhibit G-1

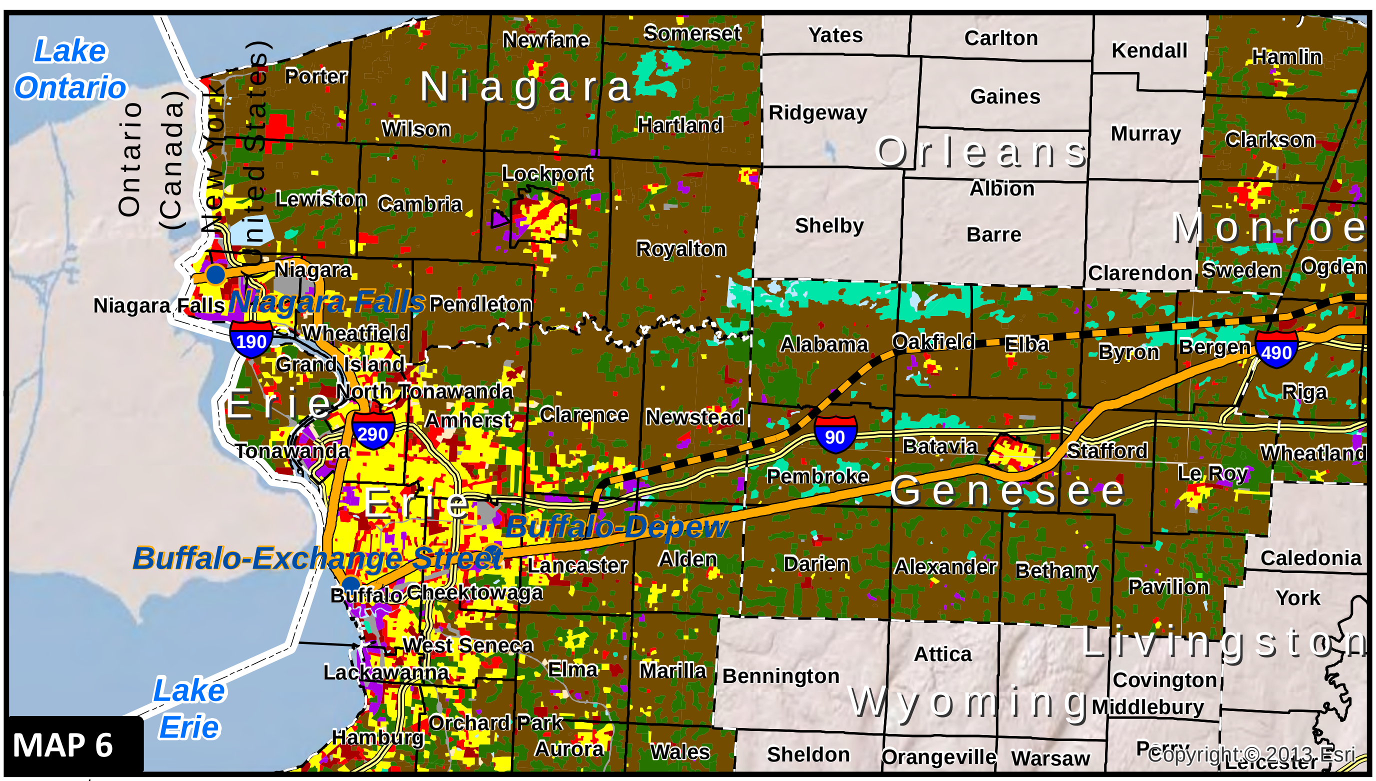
Tier 1 EIS
High Speed Rail
Empire Corridor Program



Amtrak Station
Alternative 125 ✶ Corridor
Residential
Commercial Services
Industrial
Transportation/Utilities
Industrial and Commercial
Mixed Urban Land
Existing Empire Corridor
Agricultural
Rangeland
Forest Land
Surface Water
Wetlands
Barren Land

Source: The United States Geological Survey (USGS) National Mapping Program.





✶ Alt. 125 as shown is a potential corridor used to analyze the potential operating characteristics, environmental impacts and cost for this speed (125 mph) threshold.

N

0 2.5 5 10
Miles

Land Cover Map
Exhibit G-1

Tier 1 EIS
High Speed Rail
Empire Corridor Program

1.2 Empire Corridor West/Niagara Branch: 90/110 Study Area

The 322-mile-long Empire Corridor West/Niagara Branch, with the exception of the metropolitan areas within and surrounding the major cities, has a rural agricultural character. The Empire Corridor West generally follows or parallels several major natural and man-made features, including the Mohawk River/New York Canal System and the New York State Thruway. The Niagara Branch turns north at Buffalo on Lake Erie, generally paralleling the Lake Erie shoreline and then extending north parallel to the Niagara River.

In Rensselaer, the railroad crosses over the Hudson River at the Livingston Avenue Bridge and enters Albany. The rail bridge crosses approximately one mile north of the Albany-Rensselaer Station. Within **Albany County**, the city of Albany is located on the west bank of the Hudson River approximately 150 miles north of New York City. Within the city limits of Albany, the land area along the corridor consists of primarily industrial and transportation/utility uses totaling 57 percent of the corridor. Commercial establishments, including warehouses and vehicle garages occupy an additional 20 percent of the corridor.

In Albany County, the land cover in the study area along the 11.8-mile-long corridor consists of a mix of mixed urban land, residential, commercial and industrial uses, comprising 47 percent of the total. The majority of these urban, developed areas are located in the city of Albany. The rail line then generally parallels the New York State Thruway (Interstate Route 90), passing south of the Albany International Airport. Transportation and utilities account for another 10 percent of study area land cover. Proceeding west beyond the Albany city limits, the land uses in the study area assume a more rural character with pockets of industrial uses (26%) with the remaining classified as undeveloped or forested areas (38%) to the west and south of Albany County.

Approximately 14.7 miles of the rail corridor extends through **Schenectady County**, where land cover in the study area is a mix of developed areas, agricultural lands and forested areas. Fifty-five percent (55%) of the corridor contains developed uses, predominantly residential, while another 43 percent consists of agricultural and forested areas.

Within Schenectady County, the city of Schenectady is approximately 15 miles northwest of Albany. A majority of the land use consists of residential neighborhoods accounting for 66 percent of the total along the corridor. Twenty-six (26%) percent of the corridor is occupied by industrial and commercial development.

Within Schenectady County, approximately 18 miles west of the Albany-Rensselaer Station, Schenectady Station is located in the heart of the downtown business district, surrounded by restaurants, theaters, and other commercial uses and services. The land uses surrounding the station consist of mixed urban uses, and the railroad crosses NY Route 5 immediately south of the station. Adjoining uses on Route 5 include the Empire State College of the State University of New York, a bank, and a U.S. Naval Reserve office.

In the remainder of Schenectady County north of the city of Schenectady, the railroad corridor crosses the Mohawk River and generally follows the river and, further to the southwest, the New York State Thruway (I-90), passing north of the Mohawk Valley Airport.

The railroad closely follows both the Erie Canal and the New York State Thruway (I-90) where it extends 40.3 miles through primarily rural areas of **Montgomery County**. The land cover types in

Montgomery County are primarily forested, rangeland, or agricultural lands totaling 68% of the study corridor. Another 22 percent of the land area is classified as residential, commercial, or mixed urban lands, with much of this development centered on Amsterdam, the largest city along the railroad corridor in Montgomery County.

In Montgomery County, the Amsterdam Amtrak Station is located in the western outskirts of the city of Amsterdam, 18 miles west of Schenectady Station, on the north bank of the Mohawk River just south of Route 5/Route 67. A mixed residential and commercial neighborhood surrounds the station, and includes several medical offices, St. Mary's Hospital, a church, and other services.

The railroad extends 25.3 miles through rural areas of **Herkimer County**. The railroad follows the Mohawk River and the New York State Thruway (to the south of the river) on the eastern half of Herkimer County, and, west of Herkimer, follows the Erie Canal and the New York State Thruway (to the north of the canal). Surface waters account for 7 percent of total land area. The major land use types include agricultural lands and rangeland (40%) and forested areas (29%), totaling 69 percent of the corridor. The developed lands, principally residential and commercial land uses, are clustered in the communities of Little Falls and Herkimer.

Proceeding west, the Empire Corridor extends 28.6 miles through **Oneida County**, paralleling the Erie Canal between Utica and Rome. Wetlands account for 16 percent of the land cover. The railroad also parallels portions of the New York State Thruway (I-90) and sections of NY Routes 69, 26, and 365, and transportation accounts for 10 percent of the land cover. The county is primarily rural; agricultural lands, rangeland, and forest constitute 59 percent of the land cover in the 600-foot-wide study area. Residential, commercial, and industrial land use accounts for 15 percent of the land cover in the study area and is clustered around the urbanized portions of Utica and Rome.

Within Oneida County, the study area in the city of Utica consists primarily of transportation/utilities (48%) and commercial and industrial development (43%) totaling 91 percent. The Utica Boehlert Transportation Center, located 60 miles west of Amsterdam Station, is surrounded on the west, south, and east by commercial and industrial uses, with a few government buildings. The station adjoins the Children's Museum of History and Science on the west. The northwest side of the station adjoins the Genesee Street overpass, and industrial areas are north of the railroad tracks.

Within Oneida County, the Amtrak Rome Station is located 13 miles west of the Utica Station, immediately south of the Erie Canal. The area around and south of the station includes commercial services and sparsely developed, agricultural areas. The station is immediately east of a bridge carrying NY Routes 26, 49, and 69 over the canal and railroad. To the north of the canal are more densely developed, industrialized areas of Rome, including the Rome Industrial Park.

The Central New York Region encompasses the counties of Madison, Cayuga, and Onondaga. The railroad extends 13.8 miles through rural Madison County, generally paralleling the Old Erie Canal and the New York State Thruway (I-90). A majority of the land cover is rural in nature, with 91 percent of the study corridor classified as forest (50%), agricultural (26%), rangeland (11%), or wetlands or barren land (5%). A small percentage of the study area in the county (7%) consists of residential or commercial use. The railroad passes five miles south of Oneida Lake in Oswego County, part of the Finger Lakes.

The Finger Lakes Region is a regional tourism destination centered on the chain of lakes that includes two that are among the deepest in America (Cayuga and Seneca Lakes), includes the study area counties of Onondaga, Cayuga, Wayne, and Monroe. The cities of Syracuse (Onondaga County) and Rochester (Monroe County) are major centers for employment, commerce and culture within this four-county region of New York State.

The railroad extends 31.3 miles through **Onondaga County**, roughly paralleling the New York State Thruway to the south and passing south of the Syracuse Hancock International Airport and Onondaga Lake in the city of Syracuse. Roughly half of the land cover in the study area in the county consists of forestland (25%), agricultural (15%), wetlands (75%), and surface water or barren land (3%). Built-up lands, consisting of industrial (15%), transportation/utilities (13%), mixed urban land (13%), and commercial/residential (10%), are largely situated within the city of Syracuse, with small pockets on the communities of Minoa on the east and Jordan on the west.

Within Onondaga County, most of the study area in the city of Syracuse is built up (94%), with only 6 percent consisting of surface waters. Mixed urban uses accounts for 63 percent of the land cover, followed by transportation/utilities (18%), industrial (10%), and commercial (3%).

In Syracuse, Amtrak serves the William F. Walsh Regional Transportation Center, which opened in 1999, and is located 41 miles west of the Rome Station. The station occupies the area on the west side of the grade-separated interchange of I-81 and NY Routes 370 and 298 at the southeast corner of Onondaga Lake. A regional shopping center (Carousel Mall) is southwest of the interchange and other retail, commercial, and industrial uses are south and east of the station. The northeast side includes MacArthur Stadium and areas to the north, on the opposite side of the tracks, include the ITT Technical Institute and residential neighborhoods. Wetlands, undeveloped/barren land, and commercial/industrial uses occupy the areas north of tracks and Ley Creek, which closely borders the northwest side of the tracks. West of the station and the I-81 Interchange area, the Onondaga Lake County Park is located along the lake shoreline.

West of the Syracuse Station, the railroad passes close by the State Fairgrounds, on the north, and Camillus Airport, on the north, and extends through largely rural agricultural areas.

The railroad extends 11.5 miles through rural **Cayuga County**, which consists primarily of agricultural lands (77%), forestland (13%), and wetlands and surface waters (8%) in the study area. The railroad closely follows and parallels, to the south, the New York State Thruway (I-90) through the eastern half of the county, passing south of Whitford Airport in Weedsport, and crosses the Cayuga-Seneca Canal at the west end of the county. At the west end of the county, the railroad borders the Northern Montezuma Wetlands State Wildlife Management Area (WMA) and the Howland Island WMA.

The railroad extends 37.1 miles through rural **Wayne County**, which is 97 percent undeveloped in the study area, paralleling portions of the Erie Canal and NY Route 31. The land cover in the study area consists predominantly of agricultural land (61%), forestland (24%), wetlands (11%), and barren land (1%). The railroad crosses through the Northern Montezuma WMA and the Montezuma National Wildlife Refuge.

The railroad extends 30.9 miles through **Monroe County**, closely paralleling the Erie Canal and Route 31F on the easternmost part, then roughly paralleling I-490 around Rochester and continuing west through the county. This is reflected in land cover totals for the study area, with 4 percent wetlands and 6 percent transportation/utilities. The predominant land use in the study area in Monroe County is agricultural (37%), with 6 percent forested lands. The built-up areas (44%) are centered on Rochester and the outlying communities of East Rochester, Fairport, and

Gates. Developed areas in the study area consist of commercial and industrial uses (27%), residential uses (10%), and mixed urban land (7%). The railroad in Rochester extends within roughly five miles of Lake Ontario and within two miles of Irondequoit Bay on the lake. West of the city center of Rochester, the railroad passes north of the Greater Rochester International Airport, with access provided off I-390.

Within Monroe County, the city of Rochester in the study area is largely built up, with 79 percent consisting of industrial (44%), commercial (34%), and mixed urban land. Transportation/utilities accounts for 21 percent of land cover within 300 feet of the centerline of the railroad.

The Amtrak Rochester Station, located 79 miles east of the Syracuse Regional Transportation Center, is situated in the heart of the downtown area, just east of the I-490 Inner Loop crossing over the Genesee River. Access to the station from I-490 is provided by North Clinton Avenue. A new multimodal transit center is planned by the City of Rochester and Amtrak. The area south of the station and between the railroad tracks and the Inner Loop is heavily industrialized, with commercial uses, restaurants, heavy industry, and government uses (Judicial Process Commission). Directly north of the station, on the opposite side of the railroad tracks, are residential neighborhoods that are flanked by heavy industry and businesses on both the west/river side and the east, with a school within a half-mile northeast of the station.

The railroad extends 30 miles through rural **Genesee County**, closely following and paralleling NY Route 33, which generally parallels the New York State Thruway (I-90). The study area is predominantly agricultural, which comprise 84 percent of the land cover, with forest, wetlands, and surface waters comprising 8 percent. Developed lands comprise 9 percent of the study area in the county, including residential (5%), mixed urban uses (2%), and industrial and commercial uses. The built-up areas are clustered in the city of Batavia, at the geographic center of the county where many of the major highways converge, and the railroad extends south of the Genesee County Airport.

The Buffalo-Niagara region includes the counties of Erie (and the city of Buffalo) and Niagara (and the city of Niagara Falls). The railroad extends 32.7 miles through **Erie County**. The eastern segment follows NY Route 33, then NY Route 130 to the city of Buffalo, a distance of 20 miles. The railroad alignment turns north to follow the Lake Erie shoreline and then follows Route 265 north, roughly parallel to the Niagara River, a distance of 12.7 miles. The eastern 10 miles of the study area is predominantly undeveloped (33%), comprised of agricultural lands (27%) and forest (6%). The remainder of the study area in the county is primarily developed (65%) coinciding with development in and surrounding the village of Depew and town of Cheektowaga on the eastern outskirts of Buffalo, the city of Buffalo, and, to the north, Tonawanda near the Niagara County border.

Within Erie County, the city of Buffalo is entirely urbanized within the study area, with 53 percent industrial uses, 24 percent commercial services, and 16 percent transportation/utilities. Two stations in Buffalo provide Amtrak service, the Buffalo-Depew Station, on the eastern outskirts of Buffalo, 61 miles west of the Rochester station, and the Buffalo-Exchange Street Station, 6 miles further west in downtown Buffalo.

Within Erie County, the Buffalo-Depew Station is located in the village of Depew, which is east of the town of Cheektowaga, the second largest suburb of Buffalo. The station is situated in a warehouse/industrial area located between Walden Avenue and Broadway (NY Route 130), which parallels the railroad, just west of Dick Road. The area immediately to the east consists of landlocked undeveloped land and wetlands between two railroad lines. Areas surrounding the station and tracks are industrial and commercial, with a variety of services and large businesses and warehouses in this industrialized zone. North and east of the industrial zone are residential neighborhoods along and adjoining Scajaquada Creek, which parallels the railroad. South of NY Route 130 is undeveloped lands and wetlands along Cayuga Creek, and a large gravel pit/mining operation is located to the southwest. The station is approximately 1 ½ miles south of the Buffalo-Niagara International Airport, with access from the station provided by Dick Road.

Within Erie County, the Buffalo-Exchange Street Station is located in the heart of downtown Buffalo, within the northwest quadrant of the I-190/NY Route 16 Interchange, which is directly east of the I-190/NY Route 5 Interchange. The station is situated south of Exchange Street adjoining the interchange ramps, and is directly south of a parking garage and the Coca Cola Field baseball stadium. To the northwest are the One HSBC Center, the Canadian Consulate and the Buffalo-Niagara Visitor Center. Immediately south of I-190 and the station are offices for the Associated Press and a Disability Benefits office, and the two blocks to the south are occupied by parking lots and the HSBC Arena and Ira G. Ross Aerospace Museum. To the east, on the opposite side of two sets of ramps for NY Route 16 and Carroll Street/Center Street/Elm Street are businesses, government offices, and the Buffalo Transportation Museum. To the west are the site of the former Buffalo Memorial Auditorium and elevated ramps for the I-190/NY Route 5 Interchange. On the other side of this interchange and south of the HSBC Arena is the Buffalo River waterfront, which outlets into Lake Erie to the northwest.

The railroad extends 14.4 miles through **Niagara County**, to the north of Erie County. The railroad follows the shoreline of the Niagara River, then extends north towards the Niagara Falls International Airport and turns west north of the airport to the western terminus of the Empire Corridor at Niagara Falls. Approximately half of the land cover in the study area is undeveloped, with agricultural uses and undeveloped land (50%) predominating in the stretch between the city of North Tonawanda, on the south end of the county, and the city of Niagara Falls on the northwest. Remaining land uses that predominate in the two cities on either end of the county consist of commercial and industrial uses (19%), residential development (12%), transportation/utilities (11%), and mixed urban land (9%).

Within Niagara County, the Amtrak Niagara Falls Station is located 23 miles north of the Buffalo-Exchange Street Station at the northern terminus of the railroad on the east side of NY Route 61 that crosses south over the railroad south of the station. Lockport Road parallels the railroad to the north, and Seneca Avenue parallels the railroad to the south. These two streets bracket a primarily industrial and commercial zone surrounding the station, with residential uses predominating on the opposing sides of the streets. Adjoining uses surrounding the station include an automotive repair shop, ambulance service, restaurant, and hardware store.

1.3 Empire Corridor West/Niagara Branch: 125 Study Area

The 125 Study Area, extending 308 miles from the Rensselaer County line to Niagara Falls, takes a more direct route than Empire Corridor West through rural and agricultural areas between Rensselaer County and Buffalo. The 125 Study Area bypasses several of the major metropolitan areas and existing stations along the Empire Corridor West, with the exception of two 16-mile sections roughly centered on the Syracuse and Rochester metropolitan areas.

The 125 Study Area bypasses the existing corridor over a distance of 126 miles between Rensselaer County and a point 8.5 miles east of the Syracuse Station. The 125 Study Area extends south of the existing corridor (by approximately 1.6 miles on the existing railroad along the Hudson River up to 14 miles at Amsterdam Station) to bypass the cities and Amtrak Stations in Schenectady, Amsterdam, Utica, and Rome. West of the Syracuse area, the 125 Study Area bypasses, and extends up to 7.5 miles north of, the Empire Corridor West over a distance of 62 miles, before merging again with the existing rail corridor east of Rochester. West of Rochester, the 125 Study Area bypasses, and extends up to 7 miles north of, the existing corridor over a distance of 51 miles, before rejoining the existing rail corridor at a point 5 miles east of Buffalo-Depew Station in Buffalo.

Within the study area in **Albany County**, the city of Albany, along the west bank of the Hudson River, is primarily urban. The 125 Study Area crosses the Hudson River to closely parallel I-787 and, further west, I-87 (New York State Thruway), in the interchange area, continuing west along the median of the New York State Thruway (I-87/I-90) through the city. This is reflected in the transportation/utility uses totals for the city's land cover, which accounts for 55 percent of the 600-foot study area. The remainder of the study area consists of residential, commercial, and industrial uses (23%), and forestland, barren land, and surface water (21%). On the western end of the city and continuing west of the city, the New York State Thruway and rail corridor adjoin the Albany Pine Bush Preserve, a state unique area.

The 125 Study Area extends through 14 miles of Albany County, continuing to follow the median of the New York State Thruway (I-87/I-90) through the remainder of the county. This is reflected in the predominance of transportation/utilities (66%) within the 600-foot-wide study area. The remainder of the study area in the county consists of 18 percent undeveloped areas (forest, agricultural, barren land, or water), and 16 percent developed areas, of which residential accounts for 10 percent.

The 125 Study Area extends a total distance of 17 miles through **Schenectady County**, bypassing the city of Schenectady and the existing Schenectady Station, located 3.3 miles to the north. The 125 Study Area continues along the New York State Thruway (I-90) a distance of approximately 4 miles into Schenectady County to the junction with I-88. This portion of the corridor accounts for the transportation utilities (10%), residential (7%), and commercial (4%) totals in the county. The majority of land cover in the county consists primarily of agricultural lands (51%) and forestlands/rangeland (28%), which accounts for land cover along the remainder of the corridor. The 125 Study Area passes north of the Duanesburg Airport, then closely parallels U.S. Route 20 along the western 5 miles of the county.

The 125 Study Area extends 6.5 miles through **Schoharie County**, closely paralleling U.S. Route 20 through the eastern half. The 600-foot-wide study area in the county is primarily agricultural (47%) or forestland (41%), with mixed urban uses (12%) located in Esperance and Sloansville.

The 125 Study Area extends 21.3 miles through the southern portion of **Montgomery County**, through predominantly agricultural (71%) and forested (25%) lands. The remaining 4 percent of the county land cover within 300 feet consists of wetlands. The 125 Study Area bypasses the city of Amsterdam and Amtrak Amsterdam Station, located approximately 15 miles to the northeast.

The 125 mph extends 25.3 miles through the southern portion of **Herkimer County**, roughly paralleling Route 168 on the eastern half of the county and extending north of the Frankfort-Highland Airport on the west end of the county. The study area in Herkimer County is predominantly undeveloped (97%), consisting large of forestland (52%) and farmland or rangeland

(45%). Mixed urban/residential land comprises only 3 percent of the study area. This corridor largely bypasses development centered along the existing railroad, including the communities of Herkimer and Little Falls.

The 125 Study Area extends 22 miles through **Oneida County**, extending approximately 4 miles south of the Utica Station and 7 miles south of the Rome Station. The study area is predominantly rural (94%), consisting of agricultural (58%), forestland (31%), and wetlands (6%). Mixed use and residential uses comprise 6 percent of the total land cover.

The 125 Study Area extends 14.6 miles through **Madison County**, paralleling the existing rail corridor to the south. The corridor parallels Route 5 to the south through the eastern 2/3 of the county. The study area consists predominantly of agricultural lands (64%), with forestland, rangeland, and barren land comprising 29 percent. Mixed urban land, residential, and commercial uses comprise only 5 percent of the land cover in the study area.

The 125 Study Area extends a distance of 31.6 miles through **Onondaga County**, merging back with the existing railroad corridor over a distance of approximately 16 miles around the Syracuse Station. The 125 Study Area extends approximately 4½ miles west on new alignment until it meets the existing Empire Corridor West, then follows the existing railroad approximately 9¼ miles to the Amtrak Syracuse Station at the northernmost city limit. West of the station, the 125 Study Area follows the existing railroad over a distance of 6.4 miles through the Syracuse area, before diverging at the Camillus Airport to the north of the existing railroad.

Onondaga County study area includes agricultural lands (26%) and forestlands (26%), and other undeveloped areas (10%), such as wetlands, barren land, and water, located largely on the eastern and western ends of the county outside Syracuse. The Syracuse study area includes much of the developed areas (38%) in the county, including industrial (11%), transportation/utilities (10%), mixed urban (10%), commercial (5%), and residential (2%). The study area within the city of Syracuse includes 6 percent mixed urban land, 18 percent transportation/utilities, and 13 percent industrial/commercial. The existing rail corridor adjoins the southern edge of Onondaga Lake and its adjoining county park and the State Fairgrounds. Surface waters account for 6 percent of the study area in the city.

The 125 Study Area extends through **Cayuga County** over a distance of 11 miles, on a route north of the existing rail corridor that is largely undeveloped. The predominant land cover in the study area is agriculture (72%), with forestland (18%), wetlands (7%), and surface waters (1%) comprising 26 percent. Transportation/utilities accounts for 1 percent of the land cover.

The 125 Study Area extends 35.5 miles through **Wayne County**, through areas that are predominantly rural. Agricultural uses comprise 66 percent of the 600-foot-wide study area, followed by forestland (23%), and wetlands (8%). The 125 Study Area extends within a half-mile north of the Montezuma National Wildlife Refuge. Developed land (mixed urban, residential, commercial, and industrial uses) comprises only 4 percent of the total study area.

In **Monroe County**, the 125 Study Area merges with the Empire Corridor West approximately three miles west of the county line in Fairport. The 125 Study Area follows the existing railroad corridor approximately 10¼ miles to the Amtrak Rochester Station, extending north of the Greater Rochester International Airport, then diverges to the north approximately 5.7 miles west of the station. The 125 Study Area extends north of the Churchville County Park at the western county line. Agricultural uses (44%), forestland (11%), wetlands (3%), and barren land (1%) in the study area are located primarily outside the Rochester city limits. Residential uses and transportation/utilities, and mixed urban land account for 22 percent of the study area. The majority of commercial and industrial development, which comprises 20 percent of the study area, is centered on Rochester. Within the city limits, land uses in the study area consist of industrial development (39%), commercial services (30%), transportation/utilities (19%), residential (12%), and mixed urban uses (1%).

The 125 Study Area extends 29.7 miles through **Genesee County**. The corridor extends north of the Genesee County Airport in the center of the county, turning to the southwest to parallel the New York State Thruway (I-90) on the west end of the county, extending within one mile south of the Tonawanda Indian Reservation. Genesee County is predominantly rural (96%) in the study area, with 84 percent agricultural, 6 percent wetlands, 5 percent forestland, and only 5 percent residential, mixed urban, and industrial uses.

In Erie County, the 125 Study Area extends approximately 11½ miles before merging back with the Empire Corridor West, 4.6 miles east of the Buffalo-Depew Station. The 35.3 miles of the 125 Study Area in Erie County is predominantly urban, with the exception of the segment on the new alignment. This eastern segment accounts for the majority of the agricultural (37%) and forestland (9%) along the 125 Study Area in the county. Development within the village of Depew, Cheektowaga on the eastern outskirts of Buffalo, the city of Buffalo, and, to the north, Tonawanda near the Niagara County border accounts for the majority of development (47%) within the study area in the county, consisting of industrial (17%), residential (14%), commercial (10), and mixed urban/transportation (7%). Barren land, wetlands, and surface waters comprise 5 percent of the study area. Within the city of Buffalo, land cover in the study area is entirely built out, consisting of industrial development (37%), residential (30%), commercial (17%), transportation/utilities (11%), and mixed urban (5%).

The 125 Study Area follows the Niagara Branch 14.4 miles through Niagara County, where land uses in the city of North Tonawanda on the south end and the city of Niagara Falls on the northwest are predominantly developed. Commercial and industrial uses account for 19 percent of the study area, followed by residential uses (12%), transportation/utilities (11%), and mixed urban land (9%). The undeveloped areas of the study area are located primarily between the two cities and consist of agricultural (46%) and barren land (4%).

Exhibit G-2—Consistency Summary of State and County Master Plans

Master Plans	Rail Transportation Objective
State Plans	
New York State Rail Plan – Strategies for a New Age(2009) , New York State Department of Transportation (NYSDOT)	This Statewide Plan ***recommends the development of High Speed Rail and infrastructure improvements to the Empire Corridor*** from NYC Penn Station to its terminus at Niagara Falls Station. The overall objectives are to improve efficiency, lower service costs for the commuter, provide enhanced intercity passenger service and improve freight rail operations.
Multimodal Transportation Program Submission: 2009-2014 (March 2008), New York State Department of Transportation (NYSDOT)	This program ***identified actions needed to improve rail service along each of its corridors including; service frequency, and improved on-time performance along its rail corridors***.
Metropolitan Planning Organization/County Plans	
New York and Bronx County 2010 - 2035 NYMTC Regional Transportation Plan – A Shared Vision for a Shared Future (2009) **New York Metropolitan Transportation Council** (NYMTC)	NYMTC ***supports upgrading intercity rail service along the Empire Corridor*** as part of its Strategic Regional Investment Options as noted in the Plan. The RTP supports and encourages the use of TOD development near existing and planned transit stations and hubs.
Westchester County Westchester 2025/Plan Together: a partnership for Westchester's future (May 2008, amended January 2010)	This policy plan ***endorses increases in opportunities for transit service and regional mobility***. No specific mention of HSR.
Putnam County Vision 2010: Guiding Putnam into the Next Decade, Putnam County Division of Planning and Development, Vision 2010 Steering Committee (August 2003)	The plan ***supported to continue to work with Metro-North to improve service and expand ridership along the Hudson Line***. No mention of HSR. The plan also recommended continued participation in the New York Metropolitan Transportation Council (NYMTC).
Dutchess County Moving Dutchess: The Metropolitan Transportation Plan for Dutchess County (Adopted November 18, 2011) Prepared by the **Poughkeepsie- Dutchess County Transportation Council**	The Plan ***recommends improving and expanding links between complementary transportation services including commuter rail***. Focus new development in existing growth centers and along major transit corridors. One of the goals of the plan is to maintain the transit system in a state of good repair and increase ridership to reduce traffic and promote sustainable development.
Columbia County City of Hudson Comprehensive Plan: Diversity Through Balance (April 2002)	One of the goals of the Plan is to ***improve and strengthen gateways to the City***. ***One of these is to improve access and use of the existing Amtrak Station in Hudson***.
Albany – Rensselaer Counties Comprehensive Economic Development Strategy for the Capital District, prepared by **Capital District Regional Planning Commission** (September 2009)	The Plan calls for bringing transit options and residential areas closer together***. Enhance and develop transit corridors and environments that support transit activities***.
Schenectady County Refer to discussion above under Albany-Rensselaer.	The Capital District Transportation Authority (CDTA) has plans to build a replacement structure on the current site of the existing Schenectady Station. This new station would serve Amtrak and local transit service.

Exhibit G-2—Consistency Summary of State and County Master Plans

Master Plans	Rail Transportation Objective
Montgomery County -City of Amsterdam Comprehensive Plan, Prepared by Saratoga Associates and the Montgomery County Department of Planning and Development (2003)	The County is currently preparing a Comprehensive Plan that will emphasize Smart Growth and Transit-Oriented Design for new developments. Although Montgomery County has not yet finalized a Comprehensive Plan, the City of Amsterdam has developed a Comprehensive Plan. Amsterdam's Comprehensive Plan ***recommends relocating the Amtrak Station to a more central location***.
Herkimer - Oneida Counties Herkimer-Oneida Counties Long Range Transportation Plan, Destinations 2010-2030 - prepared by the **Herkimer-Oneida Counties Transportation Study** (HOCTS) (2009)	This Study recommends continuing efforts to upgrade the physical appearance and operations of Union Station in Utica. The HOCTS ***supports plans for High Speed Rail service*** and its potential impact on the two counties. The plan recommended public awareness of the use of rail as a means of travel.
Madison County Coordinated Public Transit-Human Services Transportation Plan, Madison County, NY - prepared by Madison County Planning Department (May 2010)	Madison County has prepared a coordinated transportation plan for local transit services. There is no passenger rail service in Madison County, situated between Syracuse and Utica stations.
Onondaga County Long Range Transportation Plan: Syracuse Metropolitan Planning Area - 2011 Update – Final Report, prepared by the **Syracuse Metropolitan Transportation Council** (July 2011)	The plan ***supports the use of High Speed Rail for improving passenger rail service in Central new York***. Changes would be required at the William F. Walsh Regional Transportation Center in order to accommodate the increase in ridership on the high speed trains.
Cayuga County -Cayuga County Comprehensive Plan (1997) -Community Visioning Forum on Economic Development (July 29, 2009)	The County has been addressing an update of its Comprehensive County Plan through a series of visioning forums. The Forum on Economic Development ***indicated support for rail infrastructure and transportation*** throughout the County.
Wayne County -Wayne County Master Plan (1997) -Wayne County Comprehensive Plan Public Opinion Survey prepared by Wayne County Planning Department (2004)	A Public Opinion Survey performed in 2004 for an update of the Wayne County Comprehensive Plan established economic revitalization as a priority and pointed out need for railroad station in Lyons/the county. The County has been ***attempting to establish an Amtrak Station in the Village of Lyons which would service the Finger Lakes region***. This station would be located ***between Rochester and Syracuse Stations***.
Genesee and Monroe Counties -Long Range Transportation Plan for the Genesee – Finger Lakes Region - prepared by the **Genesee Transportation Council** (June 2011) -Genesee County Comprehensive Plan (1997) -Genesee-Finger Lakes Region Coordinated Public Transit-Human Services Transportation Plan Update, prepared for the Genesee Transportation Council (August 2011)	The LRTP is ***supportive of introducing high speed rail service to the Empire Corridor for passenger service in the Finger Lakes region***. The objective of the Coordinated Public Transit-Human Services Transportation Plan Update is to update local and regional transportation needs and continue to develop a more efficient, integrated and coordinated network of service.

Exhibit G-2—Consistency Summary of State and County Master Plans

Master Plans	Rail Transportation Objective
Erie and Niagara Counties Framework for Regional Growth – Erie and Niagara Counties, New York, Final Report (October 2006) – prepared by Erie and Niagara Counties 2035 Long-Range Transportation Plan (LRTP) Update (May 2010) for the Erie and Niagara Counties Region **Greater Buffalo-Niagara Regional Transportation Council**	The Regional Growth Plan and Long-Range Plan support ***maintaining existing transportation system to support current and future development through reuse of existing facilities*** and ***encouraging concentration of employment and activity sites within transit corridors.*** The plan also ***promotes… improving muli-modal facilities and system connectivity to capitalize on growing international and trans-border trade opportunities***. The City of Niagara Falls/NYSDOT is in the process of building a new multimodal facility at the U.S. Customhouse to replace the existing facility.
Major Cities	
City of New York **-**PlaNYC 2030, Prepared by NY Metropolitan Transportation Council, Update April 2011	PlaNYC ***supports improvements to the Empire Corridor*** and the reintegration of transportation planning and land use development at the local and regional levels. Use of TOD is emphasized as an appropriate use of land near train stations.
City of Poughkeepsie - City of Poughkeepsie Comprehensive Plan (November 1998)	Plan recommended the ***introduction of a Trolley Shuttle bus from Main Street to the Waterfront to improve access to the Metro-North train station***. Metro-North is building a three story parking deck to accommodate parking needs at the station.
City of Albany -Comprehensive Economic Development Strategy for the Capital District, prepared by the Capital District Regional Planning Commission (September 2009)	The Plan states that ***the Capital District should serve as the major transportation and distribution center in the Northeast***. The City is currently seeking assistance to begin the preparation of its first Comprehensive Plan.
City of Schenectady -City of Schenectady Comprehensive Plan 2020: Reinventing the City of Invention (Adopted March 2008)	The Plan Implementation Program indicated that the City would be interested in ***improving the Amtrak Station facility to create a quality transportation center with efficient intermodal connections***.
City of Utica Utica Master Plan (2010)	The Master Plan is under review and is expected to be adopted in June 2011. The only inference to a transit service was formation of a multimodal facility at the former Utica Railroad Station principally for bus and taxi. No mention of HSR or train station upgrades in the plan.
City of Rochester Rochester Amtrak Station Revitalization Study (March 2002) prepared for the Genesee Transportation Council.	The City of Rochester is ***proposing a new Intermodal Transit Center at the current Amtrak station***. NYSDOT plans to initiate design and environmental studies in 2011.
City of Syracuse -City of Syracuse Comprehensive Plan 2025, January 2005.	This Plan ***acknowledges the need for improving rail service in the Central New York Region***. The current train facility, the William F. Walsh Regional Transportation Center, will need to make track configuration modifications in order to accommodate the introduction of High Speed Rail.

Exhibit G-2—Consistency Summary of State and County Master Plans

Master Plans	Rail Transportation Objective
City of Buffalo -The Queen City in the 21st Century: the Buffalo Comprehensive Plan (February 7, 2006) -2030 Long Range Transportation Plan (LRTP) for the Buffalo-Niagara region, prepared by the Greater Buffalo-Niagara Regional Transportion Council (GBNRTC) (June 22, 2007). 2035 LRTP update May 2010	The Buffalo Plan ***promotes the implementation of key transportation projects*** in accordance with the 2030 Long Range Transportation Plan (LRTP). The LRTP ***endorses the implementation of improvements to intercity transit service*** for commuters and passengers between major cities and their connections. Local economic development officials have expressed interest in considering ***relocation of the Buffalo-Depew Station closer to the downtown business district***.

2. Population

2.1 Empire Corridor South

The counties of New York, Bronx, Westchester, Rockland, Putnam, Orange, Dutchess, Ulster, Columbia, Greene, and Rensselaer, comprise the more urbanized and populous segment of the Empire Corridor. These counties had a 2010 population of 5,456,031 persons, comprising almost 2/3 of the study area population. The total population is projected to grow by 779,322 persons or 14.3 percent by the year 2035. Exhibit 4-5 in Chapter 4 of the Tier 1 Draft EIS compares the 2010 and 2035 populations by county for the entire Empire Corridor.

New York City had a total population of 8,175,133 persons in 2010 based on the U.S. Census and is the most populous city in the state and nation. **Manhattan (New York County)**, one of five boroughs of New York City (that are also coterminous with counties), is the most densely populated county in the country. Three of the five New York City boroughs (Brooklyn, Queens, and Staten Island) are outside the study area. The two study area counties of New York (Manhattan) and the Bronx have a combined 2010 population of 2,970,981 persons or 33.2 percent of the study area. These two counties (or boroughs) are projected to grow by 340,623 persons, or 11.5 percent, by the year 2035. Manhattan is forecasted to grow by 114,805 persons (or 7.24%) by 2035, and **Bronx County** is projected to grow by 225, 818 persons, an increase of 16.3 percent.

Within the Hudson Valley north of New York City are the counties of Westchester, Rockland, Putnam, Orange, Dutchess, Ulster, Columbia, and Greene, situated along the east and west banks of the Hudson River. The resident population within these Hudson Valley counties totaled 2,325,621 persons in 2010 or approximately 26.0 percent of the study area.

Population is densest in the more urbanized areas closest to New York City. **Westchester County** accounted for 949,113 persons, or 10.6 percent, in 2010 of the study area population. The largest city in this region is Yonkers in southern Westchester County and bordering Bronx County, with a 2010 population of 195,976 persons. **Rockland County** accounted for 311,687 persons, or 3.5 percent of the study area population, and **Orange County** had 372,813 residents in 2010, or 4.16 percent of the study area total.

The remaining five counties to the north in this portion of the Hudson Valley each represent between 0.55 percent (Greene County, with 49,221 residents) to 3.32 percent (Dutchess County with 297,488 persons) of the study area population. Poughkeepsie, located in Dutchess County, is the second largest city in this region with a 2010 population of approximately 32,700 persons.

These eight counties in the Hudson Valley region are forecasted to experience the largest population growth rates outside of New York City, reflecting their attractiveness as bedroom communities within the New York City and Capital District commutersheds. The population of these eight counties is projected to increase by 439,745 persons or 18.9 percent by the year 2035, with the highest growth rates in the areas outlying New York City. The largest increases are expected in Orange County, which is forecasted to increase by 139,645 persons, or 37.5 percent, between 2010 and 2035. Westchester County is projected to increase by 103,702 persons in 2035, an increase of 10.9 percent. The largest percentage increase is forecasted for Putnam County, with an increase of 42.0 percent, or 41,936 persons. Rockland County is expected to experience an increase of 48,270 persons, or 15.5 percent, by 2035.

Population growth rates by 2035 generally decrease with increasing distance from the city. Growth projected by 2035 in **Dutchess County** is 20.7 percent (or 61,476 persons) and is 19.9 percent (or 36,282 persons) in **Ulster County**. To the north, the populations of more rural areas within **Columbia and Greene Counties** are forecasted to grow by 7.3 percent (4,628 persons) and 7.7 percent (3,806 persons), respectively, by 2035.

To the north, **Rensselaer County** is part of the Capital District Region. In 2010, the population of Rensselaer County totaled 159,429 persons or approximately 1.8 percent of the study area population and is forecasted to experience a drop in population of 1,046 persons (or -0.66%) by the year 2035. This forecasted drop in population reflects historic job losses in the region that have occurred dating back to 1960, with the decline of the manufacturing and industrial base.

2.2 Empire Corridor West/Niagara Branch

The population in the fourteen counties (Albany, Schenectady, Schoharie, Montgomery, Herkimer, Oneida, Madison, Onondaga, Cayuga, Wayne, Monroe, Genesee, Erie and Niagara) along Empire Corridor West/Niagara Branch totaled 3,495,494 persons in 2010. In contrast to the counties to the south, this region is forecasted to experience a loss in population, totaling 62,432 persons (or -1.79) by 2035. This decline follows historic population losses precipitated by the decline of the region's core manufacturing and industrial base. Schoharie County is projected to experience the largest future percentage increases in population in 2035, with a projected growth of 6.24 percent.

Albany and Schenectady Counties are part of the Capital District, along with, Rensselaer County, and Saratoga County (outside the study area). Albany and Schenectady Counties compromise 458,931 persons or 5.1 percent of the population in 2010. These counties are projected to lose approximately 4.5 percent of their total population by 2035 (21,076 persons).

Schoharie County, along Alternative 125, accounted for 32,749 persons in 2010, or 0.37 percent of the study area population. Schoharie County is projected to increase in population by 2,044 persons to 34,793 in 2035, an increase of 6.24 percent.

To the west, the counties of Montgomery and Herkimer are predominantly rural. Combined, these two counties accounted for 1.3 percent of the 2010 study area population, and are forecasted to experience a population loss of 6,417 persons by 2035. The population of **Montgomery County** is expected to decline by 7.7 percent, and **Herkimer County** is projected to decrease by 4.0 percent.

Oneida County had a population of 234,878 persons in 2010, and is forecasted to lose 5.2 percent of its population in 2035. Utica is the largest city in the county, with a 2010 population of 62,235.

Madison County, along with Onondaga and Cayuga Counties, is part of the Central Region of New York. Madison County, which is predominantly rural, comprises 0.8 percent of the 2010 study area population and is projected to lose 1.0 percent of its population by 2035.

Onondaga County, along with Cayuga, Wayne, and Monroe Counties, is part of the Finger Lakes District, a key tourism region in the state. Onondaga County had a 2010 population of 467,026 persons in 2010 (5.2% of the study area population), and is projected to lose 3.6 percent of its population by 2035. The largest city in the county is Syracuse, with a 2010 population of 145,170 persons.

Cayuga and Wayne Counties are predominantly rural agricultural, and combined, comprised 1.9 percent of the study area population in 2010. This area is forecasted to gain 6.1 percent in population by 2035.

Monroe County is one of the more populous counties, with 744,344 persons in 2010, or 8.3 percent of the study area population. The county is expected to lose 0.5 percent of its population by 2035. The largest city in the county is Rochester, which had a population in 2010 of 210,565.

Genesee County is predominantly rural and comprised only 0.7 percent of the study area population in 2010. This county is projected to lose 4.3 percent of its population by 2035.

At the western end of the study area are Erie and Niagara Counties, which combined constituted 12.7 percent of the study area population in 2010 (a total of 1,135,509 persons). The largest city in Erie County is Buffalo, which had a 2010 population of 261,310. These counties are expected to experience a loss of population of 6,921 persons in 2035. **Erie County** is projected to lose 0.7 percent of its total population of 919,040 persons. **Niagara County**, which includes the last station stop at Niagara Falls, a major tourism destination, is expected to lose 0.3 percent of its total population of 216,469 persons by 2035.

3. Employment

3.1 Empire Corridor South

The eleven counties along Empire Corridor South accounted for the majority of study area employment and provided 4,394,880 jobs in 2009. This labor market is projected to increase by 16.8 percent by 2035, with an increase projected of 738,867 jobs.

The two study area counties within New York City, **New York (Manhattan Borough) and Bronx Counties** accounted for almost half (47.7%) of 2009 study area employment, and this does not account for employment within the remainder of New York City. This labor market is projected to expand by 382,715 jobs (12.4%) by 2035. 2010 average annual employment stood at 8.0 percent in Manhattan, and Bronx County had the highest unemployment rate in the study area (12.8%).

Westchester County was the second largest labor market, outside of Manhattan, comprising 569,421 jobs in 2009. This job base is projected to expand to 24.7 percent by 2035 (140,631 jobs). 2010 average annual unemployment rate in Westchester County stood at 7.2 percent.

The remaining five counties close to New York City similarly provided a significant job base, with the smallest number of jobs provided in Putnam County (40,457 jobs in 2009). These five counties accounted for 607,866 jobs in 2009, or 9.4 percent of study area employment. This job base is projected to expand by 28.5 percent (an increase of 173,531 jobs) by 2035. These five counties had an average annual unemployment rate of 7.7 percent in 2010.

The Hudson Valley rural counties to the north (Columbia and Greene Counties) included 52,342 jobs in 2009, or 0.8 percent of the study area labor market. This labor market is expected to grow by 32 percent by 2035. In 2010, the average annual unemployment rate was 7.6 percent in **Columbia County** and 8.6 percent in **Greene County**.

Rensselaer County, part of the Capital District Region, provided 1.1 percent of the study area employment in 2009 (71,143 jobs). This labor market is expected to grow by 25,195, or 35.4 percent, by 2035. The 2010 average annual unemployment rate was 7.8 percent in Rensselaer County.

3.2 Empire Corridor West/Niagara Branch

The fourteen counties along Empire Corridor West/Niagara Branch accounted for 2,086,895 jobs in 2009. This labor market is forecasted to expand by 21.1 percent by 2035, with a projected increase of 440,770 jobs by 2035.

The Capital District counties of Albany and Schenectady provided 5.35 percent of the study area employment in 2009 (415,675 jobs). This labor market is expected to grow by 69,044, or 19.9 percent by 2035. The 2010 average unemployment rate was 7.2 percent in **Albany County** and 7.7 percent in **Schenectady County**. **Schoharie County** comprised 0.20 percent of the study area labor market in 2010, or 12,720 jobs. This is projected to increase by 3,923 (or 30.84 %) by 2035.

The six rural, agricultural counties along this program segment of Montgomery, Herkimer, Madison, Cayuga, Wayne, and Genesee counties each accounted for between 22,857 jobs (Montgomery County) and 37,227 jobs (Wayne County) in 2009, for a total job base of 182,623. These counties are expected to add 32,492 jobs by 2035, an increase of 17.8 percent. Annual average unemployment in 2010 ranged from 7.6 percent in Genesee County to 9.8 percent in Montgomery County.

Large employment numbers in the five remaining counties reflect the labor markets of the metropolitan areas of Utica-Rome (Oneida County), Syracuse (Onondaga County), Rochester (Monroe County), and Buffalo (Erie County)/Niagara Falls (Niagara County).

Erie County had the largest employment base in 2009, with 552,085 jobs, followed by **Monroe County** (468,811 jobs), **Onondaga County** (301,733 jobs), **Oneida County** (134,560 jobs) and **Niagara County** (87,732 jobs). Together, these five counties accounted for 23.9 percent of the study area employment in 2009, and are forecasted to grow by 24.5 percent (or 1,880,332 jobs) by 2035. The 2010 unemployment rate was highest in the western counties. Niagara County had the highest unemployment rate (9.1%), and the remaining counties had unemployment rates that ranged from 7.8 percent (Oneida County) to 8.2 percent (Erie County).

3.3 Business Districts

The eight major business districts along the study area are described below. All of these business districts are located directly along the Empire Corridor for the 90/110 Study Area, and all but Schenectady and Utica are located directly along the 125 Study Area. However, under Alternative 125, the existing Amtrak service provided to all of these cities would remain the same.

New York City

New York City is the financial capital of the country, and along with London and Tokyo regarded as a global financial center. Midtown Manhattan is the largest central business district in the U.S., and Lower Manhattan is the third largest. If the two study area counties, New York County (Manhattan) and Bronx County, were cities, they would each rank among the top 10 cities nationwide in terms of population.

New York City is the center of one of the most populous metropolitan areas in the world. New York City is the center of the New York-Northern New Jersey-Long Island, New York-New Jersey-Pennsylvania Metropolitan Statistical Area (MSA), which had a population of 18,897,109 in the 2010 U.S. Census. In 2007 to 2009, the gross metropolitan product of the New York metropolitan area (New York-Northern New Jersey-Long Island, New York-New Jersey-Pennsylvania MSA) was 1.210 trillion dollars, larger than the combined gross domestic product of Pennsylvania and New Jersey, and larger than all but one state (California)[1]. Based on commuting patterns, a wider region is defined by the U.S. Census Bureau as the New York-Newark-Bridgeport, New York-New Jersey-Connecticut-Pennsylvania Combined Statistical Area. One of every fifteen Americans lives within this wider region.

New York City's labor market totaled 4,722,352 in 2009, comprising 43.2 percent of New York State's employment. The city is critical to the state's economic vitality and is a driver of the national economy. In terms of economic recovery from the current recession, the State of New York had the second highest percentage increase of any state in the country in gross domestic product from 2009 to 2010 (5.1% increase).

New York City is also one of the wealthiest areas in the country. In 2009, the New York metropolitan area (MSA) ranked 10th in the country in per capita income ($52,037). Per capita income in New York County (Manhattan) was $105,554 in 2009, the third highest in the nation. Manhattan consistently ranks at the top or close to the top in county rankings of wages.

Yonkers

Yonkers is part of the New York City metropolitan area and is the fourth largest city in the state. It is the largest city in Westchester County and is situated within 12 miles of midtown Manhattan and approximately 10 miles from the Westchester County seat in White Plains. The city borders are Bronx County on the south and the Hudson River on the west, the Bronx River on the east and the town of Greenburg to the north. The Yonkers central business district serves a largely local population with major retail activity and anchors, similar to the retail mall complexes in nearby White Plains. The downtown waterfront that has historically played an important role in the city's economy, and the city is embarking on an ambitious, mixed-use waterfront revitalization program.

Recent projects completed include the recent renovations of the four Metro-North Stations on the Hudson Line in Yonkers and the addition of the Ella Fitzgerald Park adjacent to the historic Yonkers Station on Main Street as a gateway to the new development. Projects underway include daylighting of the Saw Mill River. Other projects that have been approved include the Alexander

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[1]/ Global Insight, *U.S. Metro Economies: GMP—The Engines of America's Growth, Gross Metropolitan Product with Housing Update.* Prepared for the U.S. Conference of Mayors and the Council for the New American City, June 2008; Updated using U.S. Bureau of Economic Analysis, "Gross Domestic Product by State/Metropolitan Area." Accessed June 17, 2011. <**http://www.bea.gov/iTable/iTable.cfm?reqid=70&step=1&isuri=1&acrdn=1**>, <**http://www.bea.gov/iTable/iTable.cfm?reqid=70&step=1&isuri=1&acrdn=2**>.

Street Master Plan and River Park Center[2]. The Alexander Street Master Plan, approved in May 2009, envisions redeveloping 55 acres of the former industrial waterfront district as a vibrant mixed-use community including a public open space esplanade along the Hudson River. River Park Center, a 650 million dollar project approved in 2010, is a mixed-use residential, commercial, and entertainment complex to be constructed on an approximately 13 acre site in Yonkers Central Business District that will include a sports arena for minor league baseball.

Poughkeepsie

Poughkeepsie is the seat of Dutchess County and the de facto center of the Hudson Valley. It is located midway between New York City and Albany, and is the largest principal city of the Poughkeepsie-Newburgh-Middletown Metropolitan Statistical Area, which encompasses all of Dutchess and Orange Counties. According to the U.S. Bureau of Economic Analysis, this metropolitan statistical area had a per capita income of $39,070 and a gross domestic product of 21.499 billion dollars in 2009. Poughkeepsie is the mid-Hudson Valley's regional governmental, educational, and cultural center. Poughkeepsie has become a civic center for federal, state, and county, government offices, and private industry includes a major campus of IBM.

The city has a Local Waterfront Revitalization Program in place that has included a series of completed and planned developments. Waterfront development plans have been developed in conjunction with the Metro-North Station and Walkway over the Hudson, a former railroad bridge that has been converted to a pedestrian path over the Hudson River. The walkway has attracted over 750,000 visitors since it opened in October 2009. [3]

New waterfront redevelopment on certain waterfront parcels is now required by the city to provide water-related or enhanced recreation use (such as public walkways) if feasible[4]. Waterfront plans include construction of an elevator to link the Walkway over the Hudson with the Poughkeepsie Station, a project that received federal stimulus funds.[5] For one of the most ambitious projects, construction has started on the 14-acre former DeLaval site, which was abandoned for 40 years, on which the state financed remediation of on-site contamination[6]. The $25 million development plan calls for 100,000 square feet spread over four buildings of retail, restaurant and office space, along with a park, amphitheater for summer concerts and kayak/canoe launch. Another brownfields redevelopment project, totaling 100 million dollars, calls for 450 condominiums to be constructed on the 14-acre former Dutton Lumber site.

Albany/Schenectady within the Capital District

The City of Albany is the State Capital and is the seat of Albany County. Albany is the heart of the Capital District that includes the neighboring city of Schenectady. The City of Schenectady is the

[2] / City of Yonkers Planning and Development, Downtown and Waterfront Development, "Projects in Progress." Accessed June 19, 2011. <**http://www.yonkersny.gov/index.aspx?page=87**>

[3] / Karen Angel, Daily News, "Walkway Over the Hudson: Poughkeepsie Footbridge Spurs Development and Retail Boom." January 28, 2011. Accessed June 19, 2011. <**http://www.walkway.org/dynamic.php?id=dailynews**>

[4] /City of Poughkeepsie, *Local Waterfront Revitalization Plan, Section III: State and Local Policies*. Adopted 1998. Accessed June 19, 2011. <**http://www.cityofpoughkeepsie.com/downloads?dl_cat=24**>

[5] / Mid-Hudson News, "Walkway, Stairs to enhance Walkway Over the Hudson." September 3, 2010. Accessed June 20, 2011. < **http://www.walkway.org/dynamic.php?id=stairs**>

[6] / New York State Department of Environmental Conservation, " More than 9 million earmarked for Brownfield Cleanup in Poughkeepsie." November 2006. Accessed June 20, 2011. <**http://www.dec.ny.gov/environmentdec/18823.html**>

seat for Schenectady County. Both cities are part of the Albany-Schenectady-Troy Metropolitan Statistical Area, which had a total 2010 population of 870,716, the fourth largest in the state. According to the BEA, this MSA region had a per capita income in 2009 of $42,206, ranking 50th in the nation, and with gross domestic product of $39.597 billion. Based on commuting patterns, Albany and Schenectady are part of a larger area defined by the federal government as the Albany-Schenectady-Amsterdam, New York Combined Statistical Area. In terms of population, the cities of Albany and Schenectady were the 6th and 9th largest in the state, respectively.

Albany and Schenectady have been a center for higher education as well as government and healthcare, for over a century, and the economies of both cities has historically been dependent on these three sectors. In Schenectady, two prominent businesses historically have been General Electric and American Locomotive Company. However, plant closings and relocation of GE's manufacturing operations contributed to significant population declines in the late twentieth century that totaled a third of the population in Schenectady since 1950. Despite these setbacks, the economic health of the Capital Region has been bolstered by an expanding high technology sector, and Albany, in particular, is becoming a center for nanotechnology and the center of a 19-county "Tech Valley" in eastern New York.

Albany is home to major institutions of higher learning including the Albany Medical Center, Albany Law School, Albany College of Pharmacy and Health Sciences, and University of Albany, State University of New York (aka SUNY Albany). According to the City of Albany's website[7], investments in the city, since 1994, the City of Albany's economic development strategy has been instrumental in bringing nearly 300 development projects to the City, totaling more than $6 billion in new investment. Recent developments include the Hudson River Way and Albany Riverfront Park (which include an amphitheater, floating docks, pedestrian bridge to downtown, and bikeways) south of the Livingston Avenue Bridge. Projects that are in the planning stages include the Albany Convention Center.

With the exception of General Electric, the largest employers located in the city of Schenectady are government agencies and health care and education sector employers including Ellis Hospital, St. Clare's Hospital, Schenectady County, Schenectady City School District, MVP Health Plan and Union College. According to the City of Schenectady's web site, since 2004, more than $150 million in new investment has been made in the downtown, and upcoming projects include the completion of a new hotel, cinema, restaurants, high technology companies, a YMCA, cafes and loft housing in downtown.

Utica

Utica is the seat of Oneida County and, along with the neighboring city of Rome, is the principal urban centers of the Utica-Rome Metropolitan Statistical Area. In 2010, the population of the Utica-Rome Metropolitan Statistical Area was 299,397. In 2009, according to the BEA, the per capita income of the Utica-Rome Metropolitan Statistical Area was $33,269, and the gross domestic product was $8.801 billion.

Historically, the construction of the canals led to industrial growth in Utica as a center of the textile

[7] / City of Albany, Albany Local Development Corporation, "30th Anniversary, 2009 Annual Report of the Albany Local Development Corporation." Accessed June 20, 2011.
<**http://www.albanyny.org/_files/ALDC%20Annual%20Report%2009.pdf**>

and later the tool and die industries. Both of these industries were substantially gone from the city by the late 1990's. In the early to mid-twentieth century, radio manufacturing by General Electric was an important industry that also relocated, and eventually closed by the turn of the twenty-first century. With these significant losses, population had been steadily declining from a peak in 1950, but has rebounded in the past decade. Economic revitalization efforts have included introduction and expansion of cultural venues.

Syracuse

Syracuse is the seat of Onondaga County and the fifth largest city in the state. It is the center of the Syracuse Metropolitan Statistical Area, which had a population in 2010 of 662,577, and is part of a larger Syracuse-Auburn, New York Combined Statistical Area. According to the BEA, in 2009 the Syracuse MSA had a per capita income of $36,833 and a gross domestic product of $26.352 billion.

Syracuse is the economic and educational hub of Central New York. It has access to major convention sites in the downtown convention center complex and, west of the city, the Empire Expo Center (site of the annual Great New York State Fair). It is also home to Syracuse University, a major research institution; the State University of New York Upstate Medical University; the State University of New York College of Environmental Science and Forestry; and other smaller colleges and universities.

Syracuse was the nation's premier producer of salt until the early twentieth century, and during the Industrial Revolution became host to a diverse manufacturing industry. Declines in manufacturing in the 1970s occurred with plant closings and dislocations, reflected in population declines from the 1950s through today. Today, Syracuse's economy is centered on education and service industries, with few large employers, notably SUNY Upstate Medical Center and Syracuse University, along with a large number of smaller employers, all of which contribute to a more stable economy.

Rochester

Rochester is the third largest city and the second largest regional economy in New York. Rochester is the county seat for Monroe County. The 2010 population of the Rochester MSA was 1,054,323. In 2009, according to the BEA, the Rochester Metropolitan Statistical Area had a per capita income of $39,036, and a gross domestic product of $43,517 billion. Based on commuting patterns, a larger area has been defined by the federal government as the Rochester-Batavia-Seneca Falls, New York Combined Statistical Area.

Rochester is an international center for higher learning and medical/technological development. It is the home of the University of Rochester, Rochester Institute of Technology, as well as companies such as Eastman Kodak, Bausch and Lomb, and Xerox. Because of the presence of imaging and optical science among the industries and universities, Rochester has become known as the capital of imaging. It is also corporate headquarters to a host of companies (including Eastman Kodak and Bausch and Lomb).

Buffalo

Buffalo is the second most populous city in the state and the seat of Erie County. It is located on the eastern shore of Lake Erie and at the head of the Niagara River. It is the principal city of the

Buffalo-Niagara Falls Metropolitan Statistical Area, which had a 2010 population of 1,135,509. In 2009, according to the BEA, the per capita income of the Buffalo-Niagara Falls MSA was $37,469, and the gross domestic product was $43.157 billion. A larger area, the Buffalo-Niagara-Cattaraugus Combined Statistical Area has also been defined by the federal government. In 2009, Buffalo was the third largest economy in the state, close behind Rochester.

Its location at the head of the Erie Canal made Buffalo one of the largest cities in the country by 1950, as it became a major railroad hub and manufacturing and industrial center (steel, grain storage, automobile, and aircraft production). However, in the latter half of the twentieth century, the opening of the St. Lawrence Seaway rerouted Great Lakes shipping and industrial declines resulted with relocation of heavy industry. Population declined by half from its peak in 1950, and has declined every decade since, although the rate of population losses may be stabilizing.

Today, healthcare and education are major stalwarts of the economy, with expansion of the Buffalo Niagara Medical Center and the University of Buffalo contributing to the city's economic growth. The economy has diversified beyond manufacturing, education, and healthcare to include service-oriented industries and, technology. The retail industry has also been a growing sector of the economy. In an attempt to revitalize the economy, spending on development projects has escalated over the past decade and totaled $4 billion in 2007, compared to an average of $50 million over the prior 10 years. Projects in the planning stages include plans for expansion of the international crossing between Buffalo and Canada at the Peace Bridge.

4. Environmental Justice

4.1 Empire Corridor South

The Empire Corridor South segment, from New York City to Rensselaer, extends 142 miles and in many locations closely follows the east bank of the Hudson River. All of the Build alternatives follow the existing Empire Corridor South for the majority of its length, deviating only in Rensselaer County, where the 125 Study Area splits off 1.6 miles south of where the existing Empire Corridor (the 90/110 Study Area) turns to the west. This program segment includes the study area counties of New York County (Manhattan Borough), Bronx County, Westchester County, Putnam County, Dutchess County, Columbia County, and Rensselaer County.

The most urbanized segment of the study area extends roughly 10 miles through New York City from Pennsylvania Station (the southern terminus of the Empire Corridor) in Manhattan north to the border of Yonkers in Westchester County. The study area extends through Manhattan (New York County) and the Bronx (Bronx County). Minority populations in New York County and Bronx County are the highest of any county in the Empire Corridor study area. Minority populations are 42.6 percent for **New York County** and 72.1 percent for **Bronx County**, compared to 34.3 percent for the state as a whole. However, only Bronx County exceeded the NYSDEC criterion (51.1%) for minority populations. Low-income populations are also the highest of all Empire Corridor counties, with 17.3 percent and 27.9 percent of persons living below the poverty level in New York County and Bronx County, respectively. Both counties have low-income populations above statewide averages (13.8%), although only Bronx County exceeded the applicable NYSDEC criterion of 23.59 percent. In addition, New York City itself, which includes three other counties/boroughs outside the program area, has a minority population of 56.0 percent and 19.1 percent of persons living below the poverty level. The minority population of the city exceeds the applicable NYSDEC

(51.1%) for minority populations in an urban area.

As the alignment moves north, it enters the Hudson Valley Region consisting of Westchester, Putnam, Dutchess and Columbia Counties. The major populated center in **Westchester County** is the city of Yonkers . Outside these populated centers, the area around the alignment is dominated by surface waters and forested land associated with the Hudson River. The minority population remains fairly high at 31.9 percent, which is below both the statewide averages and the NYSDEC criterion, and the low-income population drops to 7.9 percent. The city of Yonkers itself continues to have a high minority population (44.2%), but a lower low-income population (13.8%), both below the NYSDEC criterion.

Entering **Putnam County**, the alignment passes through the village of Cold Springs; however, the area around the alignment is primarily natural areas consisting of forested land and surface waters. The minority population and low-income population in Putnam County are fairly low at 9.3 percent and 6.6 percent, respectively. The low-income population in Putnam County is the lowest of any of the counties in the Empire Corridor study area.

In **Dutchess County**, the minority population increases to 19.9 percent while the low-income population remains relatively low at 8.0 percent. The increase in minority population in this County is likely due to the alignment passing through the major urban center of Poughkeepsie, which has a minority population of 49.1 percent and a low-income population of 23.9 percent. Although the minority population in Poughkeepsie is below the NYSDEC criterion, the low-income population is slightly above the 23.59 percent NYSDEC criterion. As the alignment enters Columbia County, it passes through less developed land and the minority population drops to 9.4 percent and the low-income population remains low at 9.5 percent. The major urban center located along the alignment in Columbia County is the city of Hudson.

Entering **Rensselaer County**, the alignment leaves the Hudson Valley Region and enters the Capitol District Region (made up of Rensselaer, Albany and Schenectady counties). Primarily, the area around the alignment is rural or residential in the south portion of this area; however, as the alignment approaches the city of Rensselaer in the north, the population density increases, and the suburbs of the Albany-Rensselaer area are located along the alignment. There is a slight increase in minority and low-income populations associated with this urban area. Rensselaer County has a minority population of 12.5 percent and a low-income population of 11.1 percent.

4.2 Empire Corridor West/Niagara Branch: 90/110 Study Area

The 322-mile long Empire Corridor West/Niagara Branch 90/110 Study Area, with the exception of the metropolitan areas within and surrounding the major cities, has a distinctively more rural agricultural character than the segment to the south.

As the railroad leaves Rensselaer County and enters **Albany County**, it crosses the Hudson River and passes through the city of Albany before heading northwest towards the city of Schenectady in **Schenectady County**. The area between these cities is generally more populated and developed and there is a slight increase in minority and low-income populations in these two counties. The minority population is 21.8 percent in Albany County and 20.4 percent in Schenectady County. The low-income population is 12.4 percent in Albany County and 10.8% in Schenectady County. The minority population is below the NYSDEC criterion (51.1%) at 43.0 percent in the city of Albany;

however, the low-income population is slightly above the 23.59 percent NYSDEC criterion at 25.3 percent. Both the minority and low-income populations in the city of Schenectady are below the NYSDEC criterion, 38.6 percent and 20.6 percent, respectively.

As the railroad leaves Schenectady County and the Capitol District Region and heads primarily west, it enters **Montgomery County** and then **Herkimer County**. These counties are generally more rural along the alignment, but pass through the populated centers of Amsterdam in Montgomery County and Little Falls and the city of Herkimer in Herkimer County. The minority population is 9.4 percent in Montgomery County and 3.4 percent in Herkimer County, the lowest of any county in the Empire Corridor study area. Low-income populations in Montgomery and Herkimer counties are 15.4 percent and 12.0 percent, respectively. The low-income population in Montgomery County is higher than the statewide average (13.8%), but is below the NYSDEC criterion (23.59%).

The railroad enters **Oneida County** west of Herkimer County. Oneida County is primarily rural with urban populations centered on the city of Utica. There is a minority population of 12.9 percent and a low-income population of 14.5 percent in Oneida County. This is a slight increase from the adjacent Herkimer County to the east. The minority population is below the NYSDEC criterion (51.1%) at 31.0 percent in the city of Utica; however, the low-income population is above the 23.59 percent NYSDEC criterion at 29.0 percent.

Continuing west, the railroad enters the Central New York Region, which is made up of Madison, Onondaga and Cayuga counties. **Madison County** is generally rural and the minority and low-income populations are generally low at 5.0 percent and 9.7 percent, respectively. As the railroad moves west into **Onondaga County**, it passes through the larger city of Syracuse. In this county the minority and low-income populations increase to 18.9 percent and 13.2 percent, respectively, likely due to the city of Syracuse. The minority population is below the NYSDEC criterion (51.1%), at 44.0 percent, in the city of Syracuse; however, the low-income population is above the 23.59 percent NYSDEC criterion at 31.1. percent. Only a small segment of the railroad passes through the more rural **County of Cayuga**. The minority population is 7.5 percent and the low-income population is 12.4 percent in Cayuga County.

The Finger Lakes Region consists of four counties: Onondaga, Cayuga (also included in the Central New York Region), Wayne and Monroe. **Wayne County** is similar to Cayuga County with a minority population of 7.1 percent and a low-income population of 11.0 percent. However, as the railroad enters **Monroe County** it passes through the major city of Rochester and its suburbs of East Rochester, Fairport and Gates. There is an increase in the minority population to 23.9 percent in Monroe County, whereas the low-income population stays relatively the same at 13.1 percent. Both the minority population and the low-income population are above the NYSDEC criterion in the city of Rochester, 56.3 percent and 30.4 percent, respectively.

The railroad leaves the Rochester area and enters **Genesee County** to the west where it transitions back to a more rural area. The minority population drops to 7.1 percent in Genesee County and the low-income population is 11.1 percent. Entering the Buffalo-Niagara region, the railroad passes through Erie and Niagara Counties and terminates in Niagara Falls. In **Erie County**, the rail corridor passes through the city of Buffalo. The minority population in Erie County increases to 20.0 percent and the low-income population increases slightly to 13.9 percent. The percentage of persons at or below the poverty level is slightly above the statewide average of 13.8 percent, but is below the NYSDEC criterion of 23.59 percent. The minority population is below the NYSDEC criterion (51.1%), at 49.6 percent, in the city of Buffalo; however, the low-income population is above the 23.59 percent NYSDEC criterion at 29.6 percent. Niagara Falls is the main urban center in **Niagara County** and the terminus of the Empire Corridor. The minority population is 11.5 percent and the low-income population is 12.3 percent in Niagara County.

4.3 Empire Corridor West/Niagara Branch: 125 Study Area

Minority and low-income percentages are county-wide; therefore, the percentages for Albany, Schenectady, Montgomery, Herkimer, Oneida, Madison, Onondaga, Cayuga, Wayne, Monroe, Genesee, Erie, and Niagara counties remain the same as for the Empire Corridor West/Niagara Branch 90/110 Study Area. Although this alignment is generally either south or north of the existing Empire Corridor West/Niagara Branch Study Area over a combined distance of 240 miles, the two alignments do converge through the major urban centers of Syracuse, Rochester, and Buffalo, where they merge to continue to Niagara Falls.

West of Rensselaer County, the 125 Study Area branches off to extend south of the cities of Albany and Schenectady, following the New York State Thruway, then leaves the New York State Thruway to traverse through primarily rural land through Schenectady, Schoharie, Montgomery, Herkimer, Oneida, and Madison counties.

Schoharie County is the only county that falls within the 125 Study Area that the existing Empire Corridor West/Niagara Branch 90/110 Study Area does not traverse. Of all the study area counties, Schoharie has the second lowest minority population (3.7%). The low-income population remains similar to the western portion of the Empire Corridor study area at 11.0 percent.

Like the 90/110 Study Area, the 125 Study Area also passes through the cities of Albany, Schenectady, Syracuse, Rochester and Buffalo; however, the 125 Study Area does not pass through the city of Utica. Existing Amtrak passenger service to all existing station stops along the Empire Corridor West (including the stations bypassed by the 125 Study Area) will be maintained under the 125 mph alternative, so these populations' centers will continue to be serviced.

5. Community Facilities

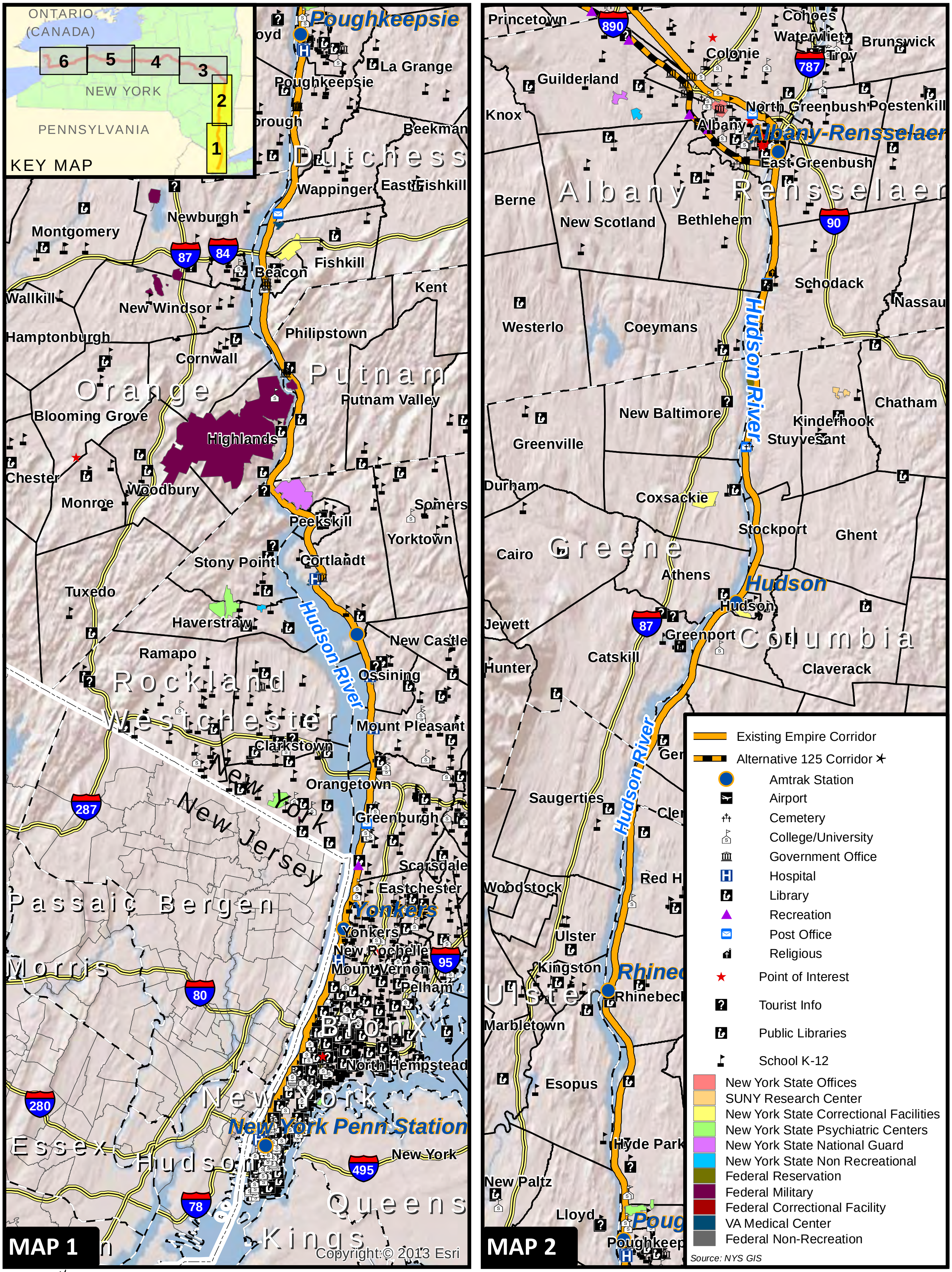
As illustrated in Exhibit G-3, Community Facilities Maps (3 of 3) within the 90/110 Study Area, there were a total of:

- Twelve colleges or institutes and thirty-three K-12 schools;
- Eight fire stations and four police stations (including a police station for the Oneida Indian Nation);
- Sixteen medical facilities, including hospitals, medical offices, and emergency ambulance services;
- Twenty-two post offices;
- Nineteen libraries;
- Twenty-two churches and religious institutions;
- Twenty-three government offices, including a foreign consulate, courthouses, federal, state, county, and municipal government offices;
- Four military installations, including Camp Smith New York State Military Reservation, U.S. Military Academy at West Point, a U.S. Naval Recruiting office in Schenectady, and Niagara Falls Air Force Reserve Base;
- Twenty-five cultural sites, including museums, arenas, auditoriums, and tourist information centers;
- Nine facilities that are either Department of Public Works maintenance facilities, sewer facilities, or solid waste/landfill/recycling facilities;
- Five correctional facilities;
- Three airports; and
- Seventeen cemeteries.

Within the 125 Study Area, there were a total of:

- Nine colleges or institutes and thirty-three K-12 schools;
- Three fire stations and two police stations;
- Thirteen medical facilities, including hospitals, medical offices, and emergency ambulance services;
- Twelve post offices;
- Ten libraries;
- Eleven churches and religious institutions;
- Thirteen government offices, including a foreign consulate, courthouses, federal, state, county, and municipal government offices;
- Four military installations, including Camp Smith New York State Military Reservation, U.S. Military Academy at West Point, New York Army National Guard Heliport in Albany, and Niagara Falls Air Force Reserve Base;
- Twenty-eight cultural sites, including museums, arenas, auditoriums, and tourist information centers;

- Five facilities that are either Department of Public Works maintenance facilities, sewer facilities, or solid waste/landfill/recycling facilities;
- One correctional facility;
- Four airports; and
- Thirteen cemeteries.



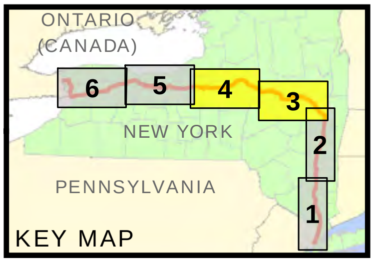
✶Alt. 125 as shown is a potential corridor used to analyze the potential operating characteristics, environmental impacts and cost for this speed (125 mph) threshold.

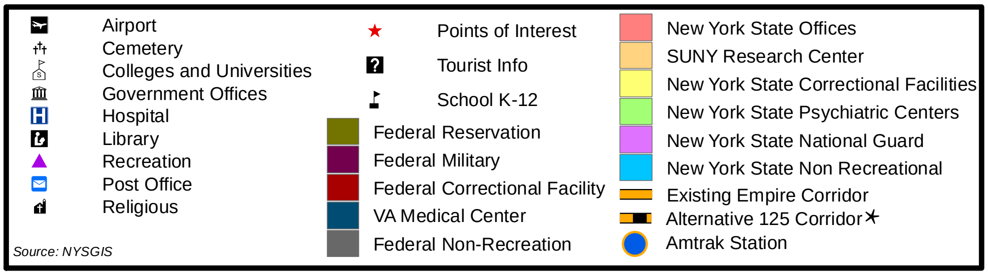
0 2.5 5 10
Miles

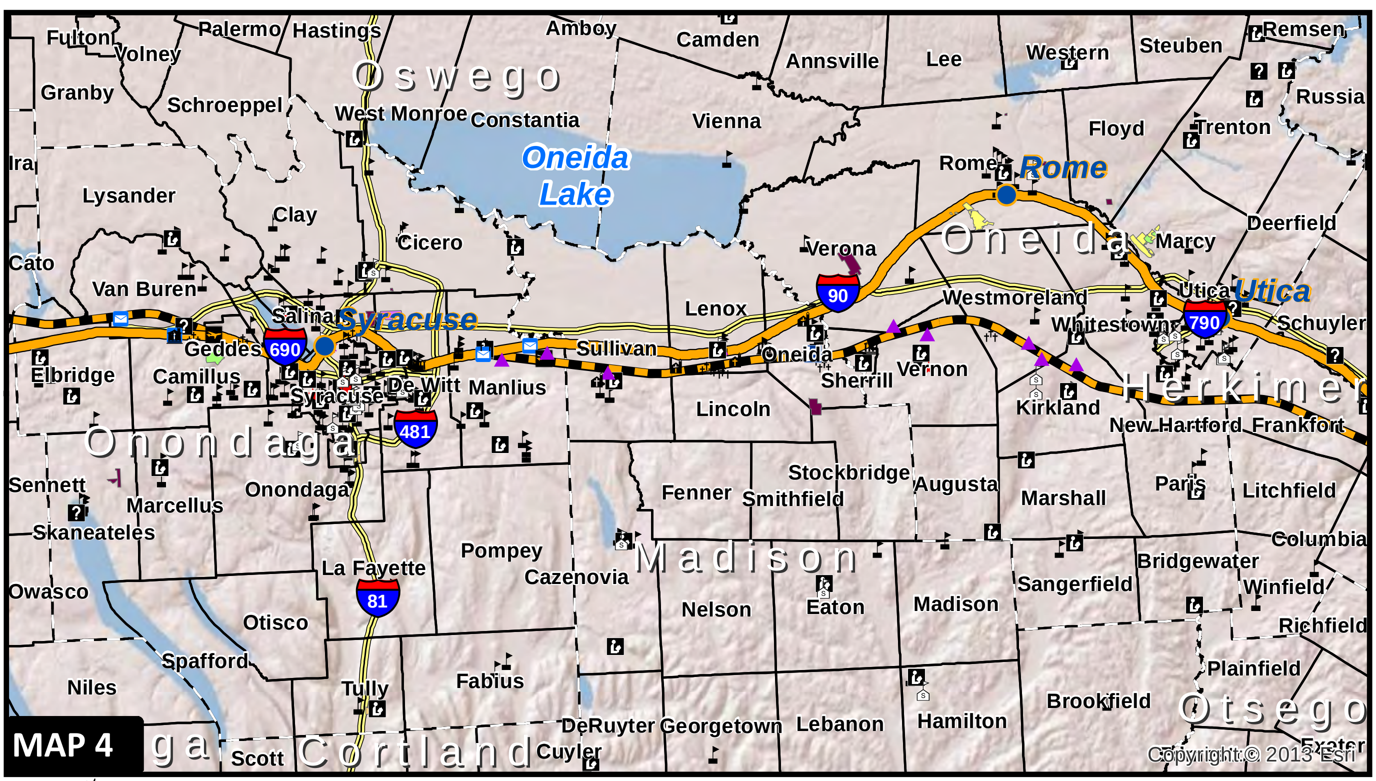
Community Facilities Map

Exhibit G-3

Tier 1 EIS
High Speed Rail
Empire Corridor Program







✶Alt. 125 as shown is a potential corridor used to analyze the potential operating characteristics, environmental impacts and cost for this speed (125 mph) threshold.

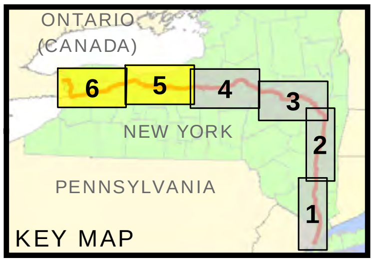
N

0 2.5 5 10
Miles

Community Facilities Map

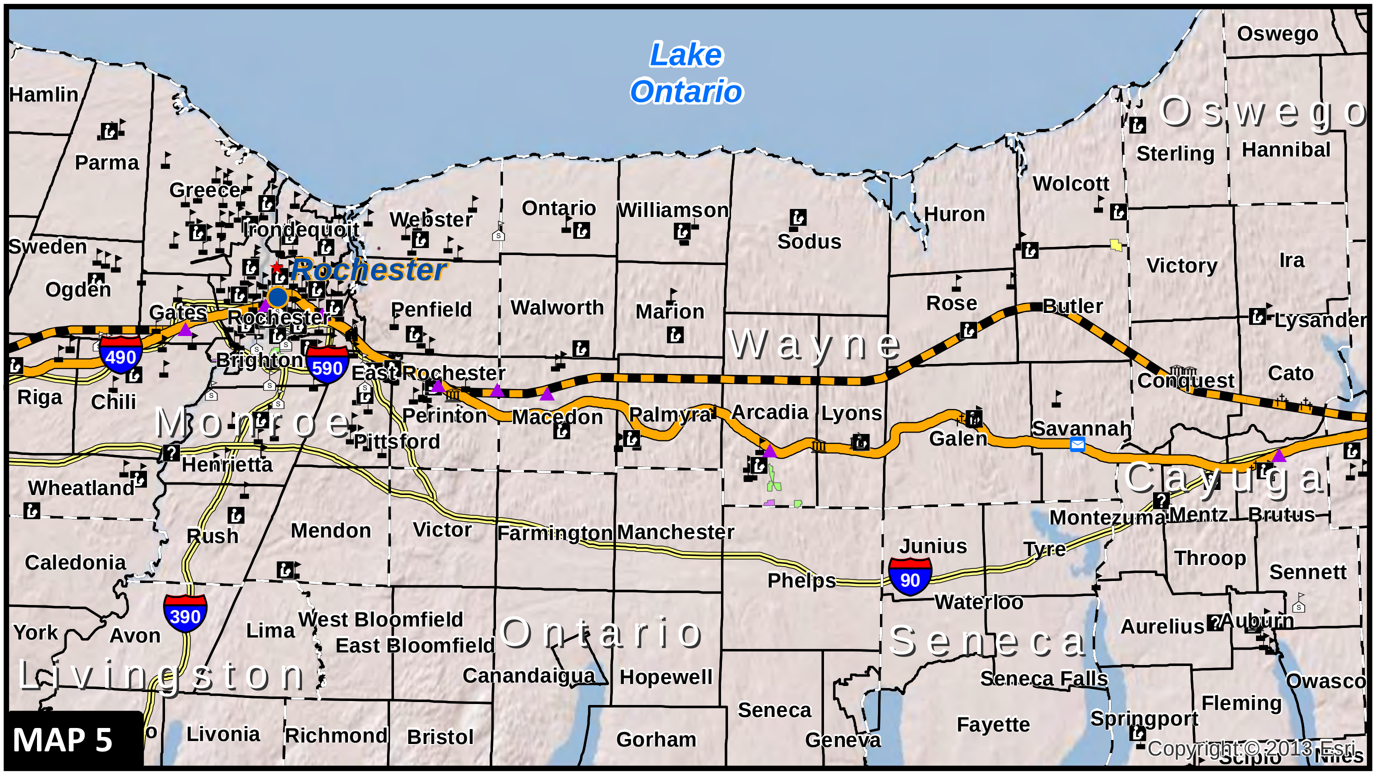
Exhibit G-3

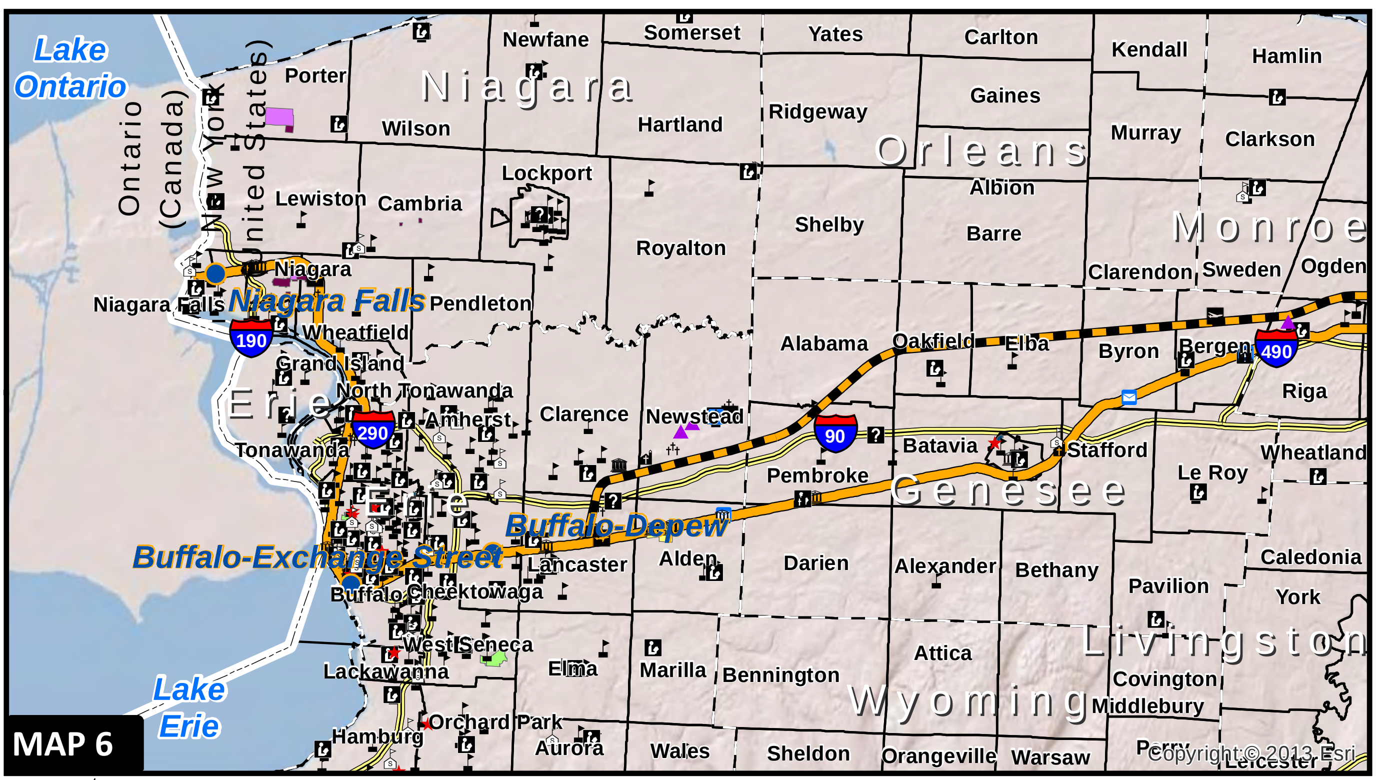
Tier 1 EIS
High Speed Rail
Empire Corridor Program



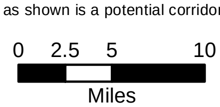
- Airport
- Cemetery
- Colleges and Universities
- Government Offices
- Hospital
- Library
- Recreation
- Post Office
- Religious
- Points of Interest
- Tourist Info
- School K-12
- Federal Reservation
- Federal Military
- Federal Correctional Facility
- VA Medical Center
- Federal Non-Recreation
- New York State Offices
- SUNY Research Center
- New York State Correctional Facilities
- New York State Psychiatric Centers
- New York State National Guard
- New York State Non Recreational
- Existing Empire Corridor
- Alternative 125 Corridor ✶
- Amtrak Station

Source: NYSGIS





✶Alt. 125 as shown is a potential corridor used to analyze the potential operating characteristics, environmental impacts and cost for this speed (125 mph) threshold.



Community Facilities Map

Exhibit G-3

Tier 1 EIS
High Speed Rail
Empire Corridor Program

6. Surface Waterbodies and Watercourses

6.1 Empire Corridor South

The Empire Corridor South segment, from New York City to Rensselaer, extends 142 miles and in many locations closely follows the east bank of the Hudson River. This program segment includes the study area counties of New York County (Manhattan Borough), Bronx County, Westchester County, Putnam County, Dutchess County, Columbia County, and Rensselaer County. The entire corridor in this segment is located in the Lower Hudson River watershed.

The rail corridor extends approximately 10.25 miles north through **Manhattan (New York County)** from its southern terminus, daylighting from a rail tunnel just north of Milepost 5. The Hudson River is generally within 150 to 300 feet of the western side of the railroad for the majority of the county. The entire length of the Hudson River in New York County is listed as an impaired water. Just before leaving New York County, the railroad crosses the Harlem River (also known as Spuyten-Duyvil Creek) at a swing-span bridge north of Milepost 10 and just east of the outlet into the Hudson River, before entering Bronx County. The Harlem River is listed as an impaired water by the NYSDEC at this crossing.

After crossing the Harlem River, the rail corridor enters and extends through **Bronx County** a distance of approximately 2.6 miles. There are no waterway crossings in Bronx County, however, the corridor closely adjoins the west bank of the Hudson River throughout the county.

The railroad continues to closely adjoin the Hudson River through 31.5 miles of the rail corridor as it extends through **Westchester County**, largely remaining within 50 to 500 feet of the river. The majority of the rail corridor remains in close proximity to the Hudson River, with the exception of a 1-mile section north of Tarrytown (MPs 25 to 26), another 1-mile section at Croton Point (MPs 33 to 34) that includes the Croton-Harmon Station, north of the Croton Bay crossing, and a roughly 5-mile section between the crossing of Furnace Brook and Peekskill.

There are approximately 23 waterway crossings in Westchester County, including a crossing of the Saw Mill River, a protected water, south of Yonkers Station, and Croton Bay, both a protected and impaired waterway. Of these river crossings, 18 are protected waters (Class C(t) or B or above), and 11 are impaired 303(d) waters. The protected and impaired streams include Kemmeys Cove/Sparta Brook (MP 29.5), Croton Bay (MPs 32.5 to 33, a U.S. Coast Guard permitted Metro-North Bridge), and five unnamed streams (MPs 24, 28.5, 31, 37.5, and 40.5). The protected streams include Saw Mill River (MP 15), Wickers Creek North (MP 21), Gory Brook (MP 26.5), Brinton Brook (MP 36), Furnace Brook (MP 37), Peekskill Bay (MP 42, a U.S. Coast Guard permitted Metro-North Bridge), Broccy Creek (MP 44), and five other unnamed streams (MPs 19.5, 23, 27, 34.5, and 43). Impaired waterways include Dickey Brook, Broccy Creek, and two unnamed streams (MPs 25 and 29).

The railroad continues to closely adjoin the Hudson River through 9.3 miles of the rail corridor as it extends through **Putnam County**, largely remaining within 50 to 500 feet of the river. The majority of the rail corridor remains in close proximity to the Hudson River, with the exception of a 1-mile section south of Cold Springs (MPs 51 to 52), where the Hudson River meanders about ¾-mile to the west of the rail corridor before extending in close proximity to the railroad at Foundry Cove (MP 52).

There are approximately 12 waterway crossings in Putnam County, including several bridges over the inlets and coves of the Hudson River (MP 51, MP 52 [Foundry Cove], and MP 53). Of these 12 crossings, 11 are protected waters (Class C(t) or B or above), and nine are impaired 303(d) waters. The protected and impaired streams include Copper Mine Brook (MP 47), Arden Brook (MP 49.5), Hudson River (MPs 51 and 53), Breakneck Brook (MP 54), and four unnamed streams (MPs 45.5, 47.5, 48 and 48.5). Other protected streams include Foundry Cove (MP 52) and one unnamed stream (MP 46).

The railroad traverses approximately 45.6 miles across **Dutchess County**. The majority of the railroad is within 50 to 300 feet of the Hudson River and crosses several coves and inlets of the river as it passes through the county. The entire Hudson River is listed as an impaired waterway in Dutchess County. There are two areas in Dutchess County where the Hudson River is outside of the railroad's 300-foot buffer: a 1-mile section through the town of Poughkeepsie (MPs 72 to 73), and a roughly 2-mile section through the small town of Staatsburg (MPs 83 to 85).

There are approximately 38 waterway crossings in this county, including several tributaries of the Hudson River (MPs 58, 66, 69, 71.5, 77, 85-86, 87, 90, 91, 93.5, 95.5-97 and 98). Of the 38 crossings, 34 are protected waters (Class C(t) or B or above), and 28 are impaired 303(d) waters. The protected and impaired streams include Cascade Brook (MP 56), Gordons Brook/Melzingha Brook (MP 56.5), Hudson River (MPs 66, 69, 77, 87, 90 and 93.5), Casper Creek/Tributary to Cobalt Lake (MP 67), Crum Elbow Creek (MP 79.5), Bard Rock Creek (MP 80.5), Indian Kill (MP 83), Mudder Kill (MP 94.5), South Bay of Hudson River (MPs 95.5 to 97), North Bay of Hudson River (MP 98), and eleven unnamed streams (MPs 61, 63, two at 74.5, 75.5, 81.5, 87.5, 89.5, 90.5, 92.5, and 94). The protected streams include Fishkill Creek/Hudson River (MP 58), Wappinger Creek (MP 65, also known as the New Hamburg Railroad Bridge), Maritje Kill (MP 77), Vandenburgh Cove (MPs 85 to 86), Astor Cove (MP 91), and three unnamed streams (two at MP 55.5 and MP 60). Impaired waterways include Casper Creek/Tributary to Cobalt Lake, Fall Kill Creek (MP 73.5), and North Staatsburg Creek (MP 84.5).

The railroad continues to closely adjoin the Hudson River through the majority of the 29.5 miles of the rail corridor as it extends through **Columbia County**, largely remaining within 50 to 300 feet of the river. The majority of the rail corridor remains in close proximity to the Hudson River, with the exception of two areas: a 3-mile section between the towns of Newton Hook and Stuyvesant (MPs 121 to 124), where the Hudson River meanders about ¼-mile to the west of the rail corridor before extending in close proximity to the railroad at just before the town of Stuyvesant, and a 1-mile section between MP 126 and MP 127 where, again the Hudson River meanders to the west about ¼ -mile from the rail corridor.

There are approximately 22 waterway crossings in Columbia County, including several bridges over the inlets of the Hudson River. Of the 22 crossings, 14 are protected waters (Class C(t) or B or above), and 19 are impaired 303(d) waters. The protected streams include the Hudson River (at least four crossings at MPs 105, 106, 117.5 and 120), which is also an impaired water. Protected and impaired waters include Roeliff Jensen Kill (MP 108), North Bay of the Hudson, and eight unnamed tributaries of the Hudson River (MPs 103.5, 104.5, 107.5, 109.5, 112, 114, 118 and 123.5). Impaired waterways include the Foxes Creek (MP 109), North Bay of the Hudson River (MPs 115-116.5), Mill Creek (MP 126), and three unnamed streams (MPs 121.5, 126.5 and 127.5).

All of the Build alternatives follow the existing Empire Corridor South for the majority of its length, deviating only in **Rensselaer County**, where Alternative 125 splits off 1.6 miles south of where the existing Empire Corridor turns to the west. The rail corridor continues to closely border the

Hudson River through the southern portion of Rensselaer County, but as it approaches Castleton-on-Hudson (MPs 134 to 135), the railroad moves inland and runs parallel to, but further east of, the Hudson River bank. To the north, the river remains outside of the 300-foot buffer study area, extending up to approximately a half-mile away from the river in certain areas. Approximately one mile north of Albany-Rensselaer Station, the existing Empire Corridor (90/110 Study Area) crosses the Hudson River into Albany County at the Livingston Avenue Bridge. There are approximately 10 waterway crossings along the 13.4 miles within the existing Empire Corridor (90/110 Study Area) in Rensselaer County. Of the 10 crossings, none are protected waters (Class C(t) or B or above), and seven are impaired 303(d) waters. The impaired streams include Muitzes Kill (MP 133), Papscanee Creek (MPs 136 and 139), Mill Creek (MP 141.5) and three unnamed streams (MPs 129, 131 and 142.5). The Hudson River is also an impaired water way adjacent to the railroad in this county.

Nearing the county line, the 125 Study Area would cross the Hudson River at MP QH143.5 on a new bridge structure. There are approximately nine waterway crossings in Rensselaer County along the 125 Study Area. Of the nine crossings, none are protected waters (Class C(t) or B or above), and six are impaired 303(d) waters. The impaired streams include Muitzes Kill (MP 133), Papscanee Creek (MPs 136 and 139), Mill Creek (MP QH142.5), and two unnamed streams (MPs 129 and 131). The Hudson River is also an impaired waterway adjacent to the railroad in this county.

Exhibit G-4—Empire Corridor South Surface Water Crossings (for both 90/110 and 125 Study Areas unless otherwise noted)

County (Appx. Mile Post)	River/Stream Crossing (Appx. Mile Post)	Name	Impaired (303(d))/ Priority Water	Protected
New York (0-11.5)	10	Harlem River	Y (MS4)	N
Bronx (11.5-14)	none	NA	NA	NA
Westchester (14-45)	15	Saw Mill River	Y (MS4)	Y
	19.5	Unnamed Tributary to the Hudson River	N	N
	21	Wickers Creek North	N	Y
	22.5	Barney Brook	N	N
	23	Unnamed Tributary to the Hudson River	N	Y
	24	Unnamed Tributary to the Hudson River	Y	Y
	25	Unnamed Tributary to the Hudson River	Y	Y
	26.5	Gory Brook	N	Y
	27	Unnamed Tributary to the Hudson River	N	Y
	28.5	Unnamed Tributary to the Hudson River	Y	Y
	29	Unnamed Tributary to the Hudson River	Y	Y
	29.5	Kemmeys Cove/Sparta Brook	Y	Y
	31	Unnamed Tributary to the Hudson River	Y	N
	32.5-33	Croton Bay	Y	Y
	34.5	Unnamed Tributary to the Hudson River	N	Y
	36	Brinton Brook	N	Y
	37	Furnace Brook	N	Y
	37.5	Unnamed Tributary to the Hudson River	Y	N
	40	Dickey Brook	Y	N
	40.5	Unnamed Tributary to the Hudson River	Y	Y
	42	Peekskill Bay	N	Y
	43	Unnamed Tributary to the Hudson River	N	Y
	44	Broccy Creek	Y	Y
Putnam (45 -54.5)	45.5	Unnamed Tributary to the Hudson River	Y	Y
	46	Unnamed Tributary to the Hudson River	N	Y
	47	Copper Mine Brook	Y	Y
	47.5	Unnamed Tributary to the Hudson River	Y	Y
	48	Unnamed Tributary to the Hudson River	Y	Y
	48.5	Unnamed Tributary to the Hudson River	Y	Y
	49.5	Arden Brook	Y	Y
	51	Hudson River	Y	Y
	52	Foundry Cove	N	Y
	53	Hudson River	Y	Y
	54	Breakneck Brook	Y	Y
	54.5	Catskill Aqueduct	N	N
Dutchess (54.5-75/76-100.5)	55.5	Unnamed Tributary to the Hudson River	N	Y
	55.5	Unnamed Tributary to the Hudson River	N	Y
	56	Cascade Brook	Y	Y
	56.5	Gordons Brook/Melzingha Brook	Y	Y
	58	Fishkill Creek/Hudson River	N	Y
	60	Unnamed Tributary to the Hudson River	N	Y
	61	Unnamed Tributary to the Hudson River	Y	Y
	63	Unnamed Tributary to the Hudson River	Y	Y
	65	Wappinger Creek	N	Y
	66	Hudson River	Y	Y
	66.5	Unnamed Tributary to the Hudson River	N	N
	67	Casper Creek/Tributary to Cobalt Lake	Y	Y
	69	Hudson River	Y	Y
	71.5	Sunfish Cove	N	N
	73.5	Fall Kill Creek	Y (C), (MS4)	N
	74.5	Unnamed Tributary to the Hudson River	Y	Y
	74.5	Unnamed Tributary to the Hudson River	Y	Y
	75.5	Unnamed Tributary to the Hudson River	Y	Y
	77	Maritje Kill	N	Y
	77	Hudson River/Franklin D Roosevelt Home	Y	Y
		Pond	Y	Y
	79.5	Crum Elbow Creek	Y	Y

Exhibit G-4—Empire Corridor South Surface Water Crossings (for both 90/110 and 125 Study Areas unless otherwise noted)

County (Appx. Mile Post)	River/Stream Crossing (Appx. Mile Post)	Name	Impaired (303(d))/ Priority Water	Protected
	80.5	Bard Rock Creek	Y	Y
	81.5	Unnamed Tributary to the Hudson River	Y	Y
	83	Indian Kill	Y	N
	84.5	North Staatsburg Creek	N	Y
	85-86	Vandenburgh Cove	Y	Y
	87	Hudson River	Y	Y
	87.5	Unnamed Tributary to the Hudson River	Y	Y
	89.5	Unnamed Tributary to the Hudson River	Y	Y
	90	Hudson River/Pond	Y	Y
	90.5	Unnamed Tributary to the Hudson River	N	Y
	91	Astor Cove	Y	Y
	92.5	Unnamed Tributary to the Hudson River	Y	Y
	93.5	Unnamed/Hudson River	Y	Y
	94	Unnamed Tributary to the Hudson River	Y	Y
	94.5	Mudder Kill	Y	Y
	95.5-97	South Bay of Hudson River	Y	Y
	98	North Bay of Hudson River	Y	Y
Columbia (100.5-129.5)	103.5	Unnamed Tributary to the Hudson River	Y	Y
	104.5	Unnamed Tributary to the Hudson River	Y	Y
	105	Hudson River	Y	Y
	106	Hudson River and Unnamed Pond	Y	Y
	107.5	Unnamed Tributary to the Hudson River	Y	Y
	108	Roeliff Jensen Kill	Y	Y
	109	Foxes Creek	Y	N
	109.5	Unnamed/Hudson River	Y	Y
	112	Unnamed Tributary to the Hudson River	Y	Y
	114	Unnamed Tributary to the Hudson River	Y	Y
	115-116.5	North Bay of Hudson River	Y	Y
	117.5	Hudson River	Y	Y
	118	Unnamed Tributary to the Hudson River	Y	Y
	118.5	Stockport Creek	N	N
	120	Hudson River	Y	Y
	121.5	Unnamed Tributary to the Hudson River	Y	N
	122.5	Unnamed Pond	N	N
	123	Unnamed Pond	N	N
	123.5	Unnamed Tributary to the Hudson River	Y	Y
	126	Mill Creek	Y	N
	126.5	Unnamed Tributary to the Hudson River	Y	N
	127.5	Unnamed Tributary to the Hudson River	Y	N
Rensselaer (129.5-143)	129	Unnamed Tributary to the Hudson River	Y	N
	129.5	Unnamed Tributary to the Hudson River	N	N
	131	Unnamed Tributary to the Hudson River	Y	N
	133	Muitzes Kill	Y	N
	134	Vlockie Kill	N	N
	135	Moordener Kill	N	N
	136	Papscanee Creek	Y	N
	139	Papscanee Creek	Y	N
	141.5 (90/110 mph only	Mill Creek	Y	N
	142.5 (90/110 mph only)	Unnamed Tributary to the Hudson River	Y	N
	QH 142.5 (125 mph only)	Mill Creek	Y	N

Notes: Appx. = Approximate, NA = Not Applicable, Y = Yes, N = No
(C) = 303(d) segments impaired by pollutants related to construction, as specified in Appendix E of the NYSDEC SPDES General Permit for Stormwater Discharges from Construction Activity (Permit No. GP-0-10-001), January 29, 2010.
(MS4) = 303(d) segments impaired by pollutants of concern for municipal separate storm sewer systems (MS4s), as specified in Appendix 2 of the SPDES General Permit for Stormwater Discharges from MS4s (Permit No. GP-0-10-002), October 14, 2011.
The 90/110 Study Area is used for analysis of Alternatives 90A, 90B, and 110 and consists of the existing 465-mile long Empire Corridor alignment. The 125 Study Area is used for analysis of Alternative 125 and consists of portions of the existing Empire Corridor and new

Exhibit G-4—Empire Corridor South Surface Water Crossings (for both 90/110 and 125 Study Areas unless otherwise noted)

County (Appx. Mile Post)	River/Stream Crossing (Appx. Mile Post)	Name	Impaired (303(d))/ Priority Water	Protected

alignment and is 451 miles long. The study area width is defined as being within 300 feet of the corridor centerline.
Source: NY GIS Clearinghouse, 2011; NYSDEC GIS Data, 2011

6.2 Empire Corridor West/Niagara Branch: 90/110 Study Area

The Empire Corridor West/Niagara Branch (90/110 Study Area) extends a distance of 322 miles through 13 counties. The Empire Corridor West generally follows or parallels several geographic features, including the Mohawk River or New York Canal System, and the New York State Thruway. The Niagara Branch turns north at Buffalo on Lake Erie, generally paralleling the Lake Erie shoreline and then extending north along the Niagara River.

The railroad crosses over the Hudson River (MP 143) at the Livingston Avenue Bridge where it enters Albany, approximately one mile north of the Albany-Rensselaer Station. The city of Albany sits on the west bank of the Hudson River approximately 150 miles north of New York City. The railroad traverses approximately 11.8 miles across **Albany County**, extends across four waterways at nine crossings. Of the four water features, two are protected waters (Class C(t) or B or above), and three are impaired 303(d) waters. The protected and impaired streams include Patroons Creek (six crossings at MPs 144, 145, 146, 147, 148 and 149) and Lisha Kill (MP 154). Impaired waterways include the Hudson River (MP 143). The southeastern portion of Albany County is within the Lower Hudson River watershed, but just after the railroad crosses Rensselaer Lake (MP 149), there is a transition to the Mohawk River watershed. Therefore, Lisha Kill is the only crossing of a water body in the Mohawk River watershed within Albany County.

The entire 14.7 miles of the Empire Corridor that pass through **Schenectady County** are located within the Mohawk River watershed. The Mohawk River/Erie Canal cross the railroad just west of the Schenectady Station (MP 160). West of this crossing, the Mohawk River/Erie Canal meanders along the south side of the railroad throughout the remainder of the county at distances between75 feet to 1 ¼-miles from the railroad.

There are approximately nine waterway crossings in Schenectady County. Of the nine crossings, two are protected waters (Class C(t) or B or above), and all are impaired 303(d) waters. The protected and impaired streams include the Mohawk River/Erie Canal and an unnamed tributary of the Mohawk River (MPs 161 to 164.5). Impaired waterways include the Collins Creek (MP 161), Washout Creek (MP 166), Verf Kill (MP 168), Chaughtanoonda Creek (MP 169.5), and four unnamed tributaries of the Mohawk River (MPs 158 to 158.5, 161 to 164.5 and two at MP 168.5).

The railroad continues to closely adjoin the north bank of the Mohawk River/Erie Canal through the 40.3 miles of **Montgomery County**, largely remaining within 50 to 1,000 feet of the river/canal. The entire county remains within the Mohawk River watershed. There are approximately 35 waterway crossings in this county, all of which are tributaries to the Mohawk River. Of the 35 crossings, ten are protected waters (Class C(t) or B or above), and all are impaired 303(d) waters. The protected streams include McQueen Creek (MP 178.75), Briggs Run (MP 190.5), Knauderack Creek (MP 193.5), Zimmerman Creek (MP 207), Timmerman Creek (MP 207.5), Crum Creek (MP 209.5) and four unnamed tributaries of the Mohawk River (three between MPs 180 to 181 and MP 202.5).

Impaired waterways in **Montgomery County**, in addition to the streams above, include Compaanen Kill (MP 170.5), Cranes Hollow Creek (MP 172.5), Degraff Creek (MP 174), North Chuctanunda (MP 176), Danascara Creek (MP 183), Cayadetta Creek (MP 186.5), Caroga Creek (MP 203.5), Mother Creek (MP 204), and 17 other unnamed tributaries to the Mohawk River (MPs 172, 174.5, 177.5, 178.5, 185, 187.5, 188, 194.5, 196, 197, 198, 199, three between MPs 201 to 202, 205 and 206).

The railroad traverses through **Herkimer County** for approximately 25.3 miles, extending parallel and close to the Mohawk River/Erie Canal. The Mohawk River/Erie Canal continues to parallel the south side of the railroad until the town of Frankfurt (MP 228.5), where the Mohawk River separates from the Erie Canal and extends further south. The Erie Canal crosses the railroad at roughly MP 231.5 and the Mohawk River crosses further west at roughly MP 234. Both waterways remain north of the railroad (until Oneida County), west of these crossings.

There are approximately 19 waterway crossings in Herkimer County. Of the 19 crossings, four are protected waters (Class C(t) or B or above), and all are impaired 303(d) waters. The protected streams include East Canada Creek (MP 210), Beaver Brook (MP 220), West Canada Creek (MP 223) and Ferguson Creek (MP 234.5). In addition to the above-mentioned crossings, impaired waterways include the Bridenbecker Creek (MP 229.5), the Erie Canal (MP 231.5), Mohawk River (MP 234) and 12 unnamed tributaries of the Mohawk River (nine between MPs 211 to 219.5 and three between MPs 223 to 229).

The Empire Corridor extends 28.6 miles through **Oneida County**, paralleling the Erie Canal between Utica and Rome, where the canal diverges west to flow into Oneida Lake. The eastern half of Oneida County is within the Mohawk River watershed, but west of the Rome Station (MP 261.5) is the drainage divide with the Oswego River/Finger Lakes watershed. There are approximately 12 waterway crossings in this county, of which four are protected waters (Class C(t) or B or above) and all are impaired 303(d) waters. The protected streams include Starch Factory Creek (MP 235.5), Sauquoit Creek (MP 240.5), Oriskany Creek (MP 244.5) and the Mohawk River (MP 248.5). In addition to the above-mentioned crossings, impaired waterways also include Mad Creek (MPs 256 to 256.5), Stony Creek (MP 261) and five unnamed tributaries to Wood Creek between MPs 250.5 and 255.

The railroad extends 13.8 miles through **Madison County**, which is situated entirely within the Oswego River/Finger Lakes watershed. In the eastern half of the county, the railroad generally parallels the Old Erie Canal, within 100 to 1,000 feet to the south. At MP 272, the Old Erie Canal flows under the railroad, extending south and out of the study area. There are approximately 11 waterway crossings in this county. Of the 11 crossings, four are protected waters (Class C(t) or B or above), and all are impaired 303(d) waters. The protected streams include Oneida Creek (MP 264), Canastota Creek (MP 270), Old Erie Canal/Owlville Creek (MP 272) and Chittenango Creek (MP 276.5). In addition to the above-mentioned crossings, impaired waterways also include Cowaselon Creek (MP 266), Duck Settlement Creek (MPs 268 to 268.5), Canaseraga Creek (MP 273.5) and four unnamed streams (MPs 274, 275, 277 and 278).

The railroad extends 31.3 miles through **Onondaga County**, roughly paralleling the New York State

Thruway and skirting the southeast shores Onondaga Lake in the city of Syracuse. There are approximately 16 waterway crossings in this county and all are within the Oswego River/Finger Lakes watershed. Of the 16 crossings, four are protected waters (Class C(t) or B or above), and 13 are impaired 303(d) waters. The protected streams include Lake Brook (MP 280.5), Dead Creek/White Bottom Creek (MP 303.5), Carpenters Brook (MP 305.5) and Skaneateles Creek (MP 308). In addition to the above-mentioned crossings, impaired waterways also include Pools Brook (MP 278.5), Limestone Creek (MP 282.5), Butternut Creek (MP 285), South Branch Ley Creek (MP 287), Barge Canal (MP 292), Geddes Brook (MP 295) and three unnamed streams (MPs 281, 288 and 308.5). Three other streams, none of which are protected or impaired, cross the railroad in this county: Nine Mile Creek (MP 296.5), Bitter Brook (MP 302) and the Old Erie Canal (MPs 302.5 to 303.

The Empire Corridor extends 11.5 miles through **Cayuga County**, roughly paralleling the New York State Thruway. There are approximately five waterway crossings in this county and all are within the Oswego River/Finger Lakes watershed. Of the five crossings, none are protected waters (Class C(t) or B or above), and all are impaired 303(d) waters. Impaired waterways include Putnam Brook (MP 312), Spring Brook (MP 312.5), Owasco Outlet (MP 316), Swamp Brook (MP 316.5) and the Seneca River (MP 319.5).

The railroad extends 37.1 miles through **Wayne County**, paralleling portions of the Erie Canal and Route 31. The Erie Canal meanders back and forth along the railroad for much of the county, crossing the rail corridor east of the town of Lyons (MP 335) and east of the town of Newark (MP 339.5). Approximately 98 percent of the railroad is located with the Oswego River/Finger Lakes watershed in Wayne County. Just before the western border of the county, the railroad enters the Lake Ontario Tributaries watershed (MP 357).

There are approximately 18 waterway crossings in this county, including the two Erie Canal crossings mentioned above. Of the 18 crossings, five are protected waters (Class C(t) or B or above), and all are impaired 303(d) waters. The protected streams include Canandaigua Creek (MP 336), Marbletown Creek/tributaries (MPs 327 to 329), Ganargua Creek (MPs 342 to 347), Red Creek (MPs 351 to 352) and an unnamed tributary to the Erie Canal (MPs 354.5 to 355). In addition to the above-mentioned crossings, impaired waterways also include the Seneca River (MP 320), Black Creek (MPs 324 and 325), the Old Erie Canal (MP 326.5), Clyde River (MPs 328 to 330), Black Brook/Old Erie Canal (MP 332), Erie Canal and five unnamed streams (two at MP 322; MPs 323, 325.5, 341 and 345).

The railroad extends 30.9 miles through **Monroe County**, closely paralleling the Erie Canal from the county's eastern county line to west of the town of Fairport (MP 361.5), where the canal meanders south. The canal extends within the study area again west of the city of Rochester and crosses the railroad just east of Interstate 390 (MP 374.5), extending north out of the study area (until Niagara County). The eastern portion the county remains in the Lake Ontario Tributaries watershed, and the drainage divide with the Genesee River watershed (MP 370.5), is just east of Rochester and the Genesee River crossing (MP 371.5).

There are approximately 19 waterway crossings in Monroe County, including the Erie Canal crossing mentioned above. Of the 19 crossings, six are protected waters (Class C(t) or B or above), and 18 are impaired 303(d) waters. The protected streams include Thomas Creek (MPs 359.5 to 362), Irondequoit Creek (MP 363), Allen Creek (MP 365.5), Genesee River, Erie Canal and Little Black Creek (MP 377.5). In addition to the above-mentioned crossings, impaired waterways also include and additional crossing of Irondequoit Creek (MP 367.5) and nine unnamed streams (MP

379, six between MPs 380.5 to 383.5 and two between MPs 385 to 385.5).

The railroad traverses approximately 30 miles through **Genesee County**, generally following Route 33. The railroad remains in the Genesee River watershed through the eastern portion of the county and passes into the Niagara River/Lake Erie watershed east of the town of Batvia (MP 401). There are approximately 17 waterway crossings in Genesee County. Of the 17 crossings, four are protected waters (Class C(t) or B or above), and 16 are impaired 303(d) waters. The protected streams include Bigelow Creek/Godfrey Pond (MP 398.5), Tonawanda Creek (MP 403.5) and two unnamed streams (MPs 399.5 and 407). In addition to the above-mentioned crossings, impaired waterways also include Robins Brook (MPs 392.5 and 394), Black Creek (MP 396.5), Bowen Creek (MP 408.5), Murder Creek (MP 414), and seven unnamed streams (MPs 389, 395, 401, 412, 415, 416 and 417.5). The railroad also crosses an unnamed pond in Genesee County (MP 402), which is neither protected nor impaired.

The railroad extends 32.7 miles through **Erie County**, which is situated entirely within the Niagara River/Lake Erie watershed. The eastern segment follows Route 33, then Route 130 to the city of Buffalo, a distance of 20 miles. The Niagara Branch of the railroad turns north to follow the Lake Erie shoreline and then follows Route 265 north, roughly parallel to, and within 50 feet to 2.5 miles east of, the Niagara River, for a distance of 12.7 miles. Of the seven waterway crossings in this county, three are protected waters (Class C(t) or B or above), and six are impaired 303(d) waters. The protected and impaired waters include Ellicott Creek (MP 422.5), Scajaquada Creek (MP QDN6), and an unnamed tributary to Ellicott Creek (MP 418.5). The other impaired waterways include Ellicott Creek (MP QDN12.5), the North Branch of Plum Bottom Creek (MP 425.5), and one other unnamed stream (MP QDN7.5).

The railroad extends 14.4 miles through **Niagara County** within the Niagara River/Lake Erie watershed. The railroad follows the shoreline of the Niagara River, then extends north towards the Niagara Falls International Airport, turning west to terminate at Niagara Falls. Of the nine waterway crossings in the county, none are protected waters (Class C(t) or B or above), and eight are impaired 303(d) waters. The impaired waterways include Tonawanda Creek/Erie Canal (MP QDN13.5), Black Creek (MP QDN18), East Branch of Black Creek (MP QDN18.5), Sawyer Creek (MP QDN19.5), Bergholtz Creek (MP QDN20), Cayuga Creek (MP QDN21), Branch Gill Creek (MP QDN25) and Gill Creek (MP QDN26).

Exhibit G-5—Empire Corridor West/Niagara Branch Surface Water Crossings in the 90/110 Study Area

County (Appx. Mile Post)	River/Stream Location (Mile Post)	Name	Impaired (303(d))/ Priority Water	Protected
Albany (143-155)	143	Hudson River	Y	N
	144, 145, 146, 147, 148, 149	Patroons Creek	Y	Y
	149	Rensselaer Lake	N	N
	154	Lisha Kill	Y	Y
Schenectady (155-170/42	158-158.5	Unnamed Tributary to Mohawk River	Y	N
	160	Mohawk River/ Erie Canal	Y	Y
	161	Collins Creek	Y	N
	161-164.5	Unnamed Tributary to Mohawk River	Y	Y
	166	Washout Creek	Y	N
	168	Verf Kill	Y	N
	168.5	Unnamed Tributary to Mohawk River	Y	N
	168.5	Unnamed Tributary to Mohawk River	Y	N
	169.5	Chaughtanoonda Creek	Y	N
Montgomery (170/42-210)	170.5	Compaanen Kill	Y	N
	172	Unnamed Tributary to Mohawk River	Y	N
	172.5	Cranes Hollow Creek	Y	N
	174	Degraff Creek	Y	N
	174.5	Unnamed Tributary to Mohawk River	Y	N
	176	North Chuctanunda	Y	N
	177.5	Unnamed Tributary to Mohawk River	Y	N
	178.5	Unnamed Tributary to Mohawk River	Y	N
	178.75	McQueen Creek	Y	Y
	180	Unnamed Tributary to Mohawk River	Y	Y
	180.5	Unnamed Tributary to Mohawk River	Y	Y
	181	Unnamed Tributary to Mohawk River	Y	Y
	183	Danascara Creek	Y	N
	185	Unnamed Tributaries to Mohawk River	Y	N
	186.5	Cayadetta Creek	Y	N
	187.5	Unnamed Tributary to Mohawk River	Y	N
	188	Unnamed Tributary to Mohawk River	Y	N
	190.5	Briggs Run	Y	Y
	193.5	Knauderack Creek	Y	Y
	194.5	Unnamed Tributary to Mohawk River	Y	N
	196	Unnamed Tributary to Mohawk River	Y	N
	197	Unnamed Tributary to Mohawk River	Y	N
	198	Unnamed Tributary to Mohawk River	Y	N
	199	Unnamed Tributary to Mohawk River	Y	N
	201	Unnamed Tributary to Mohawk River	Y	N
	201.5	Unnamed Tributary to Mohawk River	Y	N
	202	Unnamed Tributary to Mohawk River	Y	N
	202.5	Unnamed Tributary to Mohawk River	Y	Y
	203.5	Caroga Creek	Y	N
	204	Mother Creek	Y	N
	205	Unnamed Tributary to Mohawk River	Y	N
	206	Unnamed Tributary to Mohawk River	Y	N
	207	Zimmerman Creek	Y	Y
	207.5	Timmerman Creek	Y	Y
	209.5	Crum Creek	Y	Y
Herkimer (210-235)	210	East Canada Creek	Y	Y
	211	Unnamed Tributary to Mohawk River	Y	N
	212.5	Unnamed Tributary to Mohawk River	Y	N
	213.5	Unnamed Tributary to Mohawk River	Y	N
	214	Unnamed Tributary to Mohawk River	Y	N
	215	Unnamed Tributary to Mohawk River	Y	N
	216	Unnamed Tributary to Mohawk River	Y	N
	217	Unnamed Tributary to Mohawk River	Y	N
	217.5	Unnamed Tributary to Mohawk River	Y	N
	219.5	Unnamed Tributary to Mohawk River	Y	N
	220	Beaver Brook	Y	Y
	223	West Canada Creek	Y	Y
	223	Unnamed TributarY to Mohawk River	Y	N

Exhibit G-5—Empire Corridor West/Niagara Branch Surface Water Crossings in the 90/110 Study Area

County (Appx. Mile Post)	River/Stream Location (Mile Post)	Name	Impaired (303(d))/ Priority Water	Protected
	224.5	Unnamed Tributary to Mohawk River	Y	N
	229	Unnamed Tributary to Mohawk River	Y	N
	229.5	Bridenbecker Creek	Y	N
	231.5	Erie Canal	Y	N
	234	Mohawk River	Y (MS4)	N
	234.5	Ferguson Creek	Y	Y
Oneida (235-264)	235.5	Starch Factory Creek	Y	Y
	240.5	Sauquoit Creek	Y	Y
	244.5	Oriskany Creek	Y	Y
	248.5	Mohawk River	Y (MS4)	Y
	250.5	Mohawk River	Y (MS4)	N
	251.5	Unnamed Tributary to Wood Creek	Y	N
	251.5	Unnamed Tributary to Wood Creek	Y	N
	252	Unnamed Tributary to Wood Creek	Y	N
	254.5	Unnamed Tributary to Wood Creek	Y	N
	255	Unnamed Tributary to Wood Creek	Y	N
	256-256.5	Mad Creek	Y	N
	261	Stony Creek	Y	N
Madison (264-278)	264	Oneida Creek	Y	Y
	266	Cowaselon Creek	Y	N
	268-268.5	Duck Settlement Creek	Y	N
	270	Canastota Creek	Y (MS4)	Y
	272	Old Erie Canal/Owlville Creek	Y	Y
	273.5	Canaseraga Creek	Y	N
	274	Unnamed Tributary to Canaseraga Creek	Y	N
	275	Unnamed Tributary to Canaseraga Creek	Y	N
	276.5	Chittenango Creek	Y	Y
	277	Unnamed Tributary to Chittenango Creek	Y	N
	278	Unnamed Tributary to Chittenango Creek	Y	N
Onondaga (278-309)	278.5	Pools Brook	Y	N
	280.5	Lake Brook	Y	Y
	281	Unnamed Tributary to Chittenango	Y	N
	282.5	Creek Limestone Creek	Y	N
	285	Butternut Creek	Y	N
	287	South Branch Ley Creek	Y (C), (MS4)	N
	288	Unnamed Tributary to Ley Creek	Y (C), (MS4)	N
	292	Barge Canal	Y	N
	295	Geddes Brook	Y	N
	296.5	Nine Mile Creek	Y (C), (MS4)	N
	302	Bitter Brook	N	N
	302.5-303	Old Erie Canal	N	N
	303.5	Dead Creek/White Bottom Creek	Y	Y
	305.5	Carpenters Brook	Y	Y
	308	Skaneateles Creek	Y	Y
	308.5	Unnamed Tributary to Skaneateles Creek	Y	N
Cayuga (309-320)	312	Putnam Brook	Y	N
	312.5	Spring Brook	Y	N
	316	Owasco Outlet	Y	N
	316.5	Swamp Brook	Y	N
	319.5	Seneca River	Y	N
Wayne (320-357)	320	Seneca River	Y	N
	322	Unnamed Tributary to Crusoe Creek	Y	N
	323	Unnamed Tributary to Black Creek	Y	N
	324 and 325	Black Creek	Y	N
	325.5	Unnamed Tributary to Black Creek	Y	N
	326.5	Old Erie Canal	Y	N
	328-330	Clyde River/Erie Canal	Y	N

Exhibit G-5—Empire Corridor West/Niagara Branch Surface Water Crossings in the 90/110 Study Area

County (Appx. Mile Post)	River/Stream Location (Mile Post)	Name	Impaired (303(d))/ Priority Water	Protected
	332	Old Erie Canal/Black Brook	Y	N
	335	Erie Canal	Y	N
	336	Canandaigua Creek	Y	Y
	327-329	Marbletown Creek/Tributaries	Y (C)	Y
	339.5	Erie Canal	Y	N
	341	Unnamed Tributary to Ganargua Creek	Y	N
	342-347	Ganargua Creek	Y	Y
	348	Unnamed Tributary to Ganargua Creek	Y	N
	349.5	Red Creek	Y	N
	351-352	Red Creek	Y	Y
	354.5-355	Unnamed Tributaries to Erie Canal	Y	Y
Monroe (357-388)	359.5-362	Thomas Creek	Y (C), (MS4)	Y
	363	Irondequoit Creek	Y (C), (MS4)	Y
	365.5	Allen Creek	Y	Y
	367.5	Irondequoit Creek	Y (C), (MS4)	N
	371.5	Genesee River	Y (C), (MS4)	Y
	374.5	Erie Canal	Y	Y
	376	Unnamed Tributary to Erie Canal	N	N
	377.5	Little Black Creek	Y	Y
	379	Unnamed Tributary to Little Black Creek	Y	N
	380.5	Unnamed Tributary to Black Creek	Y (C), (MS4)	N
	381	Unnamed Tributary to Black Creek	Y (C), (MS4)	N
	381.5	Unnamed Tributary to Black Creek	Y (C), (MS4)	N
	382	Unnamed Tributary to Black Creek	Y (C), (MS4)	N
	382.5	Unnamed Tributary to Black Creek	Y (C), (MS4)	N
	383	Unnamed Tributary to Black Creek	Y (C), (MS4)	N
	383.5	Little Black Creek	Y	N
	385	Unnamed Tributary to Black Creek	Y (C), (MS4)	N
	385.5	Unnamed Tributary to Black Creek	Y (C), (MS4)	N
	386	Black Creek	Y (C), (MS4)	N
Genesee (388-418)	389	Unnamed Tributary to Black Creek	Y (C), (MS4)	N
	392.5	Robins Brook	Y	N
	394	Robins Brook	Y	N
	395	Unnamed Tributary to Black Creek	Y (C), (MS4)	N
	396.5	Black Creek	Y (C), (MS4)	N
	398.5	Bigelow Creek/Godfrey Pond	Y (C), (MS4)	Y
	399.5	Unnamed Tributary to Bigelow Creek	Y (C), (MS4)	Y
	401	Unnamed Tributary of Horseshoe Lake	Y	N
	402	Unnamed Pond	N	N
	403.5	Tonawanda Creek	Y (C), (MS4)	Y
	407	Unnamed Tributary to Tonawanda Creek	Y (C), (MS4)	Y
	408.5	Bowen Creek	Y (C), (MS4)	N
	412	Unnamed Tributary to Murder Creek	Y	N
	414	Murder Creek	Y	N
	415	Unnamed Tributary to Murder Creek	Y	N
	416	Unnamed Tributary to Ellicott Creek	Y	N
	417.5	Unnamed Tributary to Murder Creek	Y	N
Erie (418-439/QDN1-QDN13)	418.5	Unnamed Tributary to Ellicott Creek	Y (C), (MS4)	Y
	422.5	Ellicott Creek	Y (C), (MS4)	Y
	425.5	North Branch of Plum Bottom Creek	Y	N
	6	Scajaquada Creek	Y (C), (MS4)	Y
	7.5	Unnamed Tributary to Niagara River	Y	N
	12	Unnamed Tributary to Ellicott Creek	N	N
	12.5	Ellicott Creek	Y (C), (MS4)	N

Exhibit G-5—Empire Corridor West/Niagara Branch Surface Water Crossings in the 90/110 Study Area

County (Appx. Mile Post)	River/Stream Location (Mile Post)	Name	Impaired (303(d))/ Priority Water	Protected
Niagara (QDN13-QDN28)	13.5	Tonawanda Creek/Erie Canal	Y	N
	14.5	Unnamed Tributary to Niagara River	N	N
	18	Black Creek	Y	N
	18.5	East Branch of Black Creek	Y	N
	19.5	Sawyer Creek	Y	N
	20	Bergholtz Creek	Y (C), (MS4)	N
	21	Cayuga Creek	Y	N
	25	Branch Gill Creek	Y	N
	26	Gill Creek	Y	N

Notes: Appx.= Approximate, Y = Yes, N = No
(C) = 303(d) segments impaired by pollutants related to construction, as specified in Appendix E of the NYSDEC SPDES General Permit for Stormwater Discharges from Construction Activity (Permit No. GP-0-10-001), January 29, 2010.
(MS4) = 303(d) segments impaired by pollutants of concern for municipal separate storm sewer systems (MS4s), as specified in Appendix 2 of the SPDES General Permit for Stormwater Discharges from MS4s (Permit No. GP-0-10-002), October 14, 2011.
The 90/110 Study Area is used for analysis of Alternatives 90A, 90B, and 110 and consists of the existing 465-mile long Empire Corridor alignment. The study area width is defined as being within 300 feet of the corridor centerline.
Source: NY GIS Clearinghouse, 2011, NYSDEC GIS Data, 2011

6.3 Empire Corridor West/Niagara Branch: 125 Study Area

The Empire Corridor West/Niagara Branch 125 Study Area follows a more direct route between Rensselaer and Buffalo, and does not closely adjoin the New York State Canal system. The 125 Study Area crosses over the Hudson River (MP QH143.5), entering **Albany County** 1.8 miles south of the Livingston Avenue Bridge. The railroad skirts the southern boundary of the city of Albany and continues through Albany County over a distance of roughly 14 miles, crossing over Krum Kill at two locations. Of the two waterways crossed, only Krum Kill is a protected water (Class C(t) or B or above), and both the Hudson River and Krum Kill are impaired 303(d) waters. The entire county is within the Lower Hudson River watershed.

The 125 Study Area extends 17 miles through **Schenectady County** and remains in the Lower Hudson River watershed for approximately 1.5 miles before crossing into the Mohawk River watershed. It then passes back into the Lower Hudson River watershed for a majority of the county before crossing back into the Mohawk River watershed, just before MP QH171. The 125 Study Area crosses approximately 18 waterway crossings in Schenectady County. Of the 18 crossings, three are protected waters (Class C(t) or B or above), and 15 are impaired 303(d) waters. The protected and impaired streams include three unnamed tributaries to Norman's Kill (MPs QH161.5, QH168.25 and QH170.5). Impaired waterways include the Bonny Brook (MP QH163.5) and 11 unnamed tributaries (MPs QH158.75, QH160.5, QH162.75, QH164.5, QH166, QH166.5, QH167.5, QH168.25, QH168.5, QH171.25 and QH172.25).

The 125 Study Area remains in the Mohawk River watershed throughout the 6.5 miles in **Schoharie County**. The 125 Study Area crosses approximately nine waterway crossings in Schoharie County. Of the nine crossings, none are protected waters (Class C(t) or B or above), and all are impaired 303(d) waters. The impaired streams include Schoharie Creek (crossings at MPs QH174 and QH174.5 to QH175.75), Fly Creek (MPs QH179.5, QH180.25 and QH180.5), and four unnamed tributaries to Schoharie Creek (MPs QH174.25, QH176, QH177.5 and QH177.75).

The 125 Study Area continues within the Mohawk River watershed along the 21.3-miles through **Montgomery County**. The entire county remains within the Mohawk River watershed. There are approximately 21 waterway crossings in this county, most of which are tributaries to the Fly Creek, Mohawk River or Canajoharie Creek. Of the 21 crossings, one is a protected water (Class C(t) or B or above), and all are impaired 303(d) waters. The protected and impaired streams include an unnamed tributary to the Mohawk River (MP QH201.5). Impaired waterways in Montgomery County, in addition to the streams above, include Fly Creek (MPs QH181 and QH181.25), Flat Creek (MP QH188), Canahoharie Creek (MP QH192.5), four unnamed tributaries to Fly Creek (MPs QH182, QH182.5, QH185.5 and QH186.5), three unnamed tributaries to Canajoharie Creek (MPs QH190.75, QH191 and QH193) and nine other unnamed tributaries to the Mohawk River (MPs QH196.25, QH196.5, QH196.75, QH197.5, QH199.25, QH200, QH200.5, QH200.75 and QH201).

The 125 Study Area traverses through rural **Herkimer County** for approximately 25.3 miles. The entire county remains within the Mohawk River watershed. There are approximately 39 waterway crossings in Herkimer County. Of the 39 crossings, 15 are protected waters (Class C(t) or B or above), and 37 are impaired 303(d) waters. Protected streams include one unnamed tributary to the Erie Canal (MP QH223.5) and the unnamed tributary to Starch Factory Creek (MP QH257). The impaired and protected streams include Otsquago Creek (MP QH202.5), Ohisa Creek (MP QH206.5), Fulmer Creek (MPs QH212 and QH215), two unnamed tributaries to the Mohawk River (MPs QH202.5 and QH208), one unnamed tributary to Ohisa Creek (MP QH207), and six unnamed tributaries to the Erie Canal (MPs QH218, QH221.5, QH222.5, QH222.75, QH223, and QH223.25). In addition to the above-mentioned crossings, impaired waterways include two unnamed tributaries to Otsquago Creek (MPs QH203.75 and QH204), two unnamed tributaries to Ohisa Creek (MPs QH206 and QH206.25), one unnamed tributary to the Mohawk River (MP QH209.5), seven unnamed tributaries to Fulmer Creek (MPs QH210.75, QH211.5, QH212.5, QH213.75, QH214.25, QH214.5 and QH215.25), eight unnamed tributaries to the Erie Canal (MPs QH216.75, QH217.75, QH218.75, QH219.5, QH219.75, QH220, QH220.5 and QH221), one unnamed pond (MP QH224.25), one unnamed tributary to Ferguson Creek (MP QH225.5), and two unnamed tributaries to Starch Factory Creek (MPs QH226 and QH226.5).

The 125 Study Area extends 22 miles through **Oneida County**, primarily traversing rural properties. The eastern half of Oneida County is within the Mohawk River watershed, but as the corridor crosses County Road 26 (Rome Road) (MP QH242) the corridor enters the Oswego River/Finger Lakes watershed. There are approximately 18 waterway crossings in this county, of which seven are protected waters (Class C(t) or B or above) and all are impaired 303(d) waters. The protected streams include Sauquoit Creek (MP QH230.25), Mud Creek (MP QH234.5), Sherman Brook (MP QH235.5), Oriskany Creek (MP QH236), Sconondoa Creek (MP QH248), one unnamed tributary to Sauquoit Creek (MP QH228) and two unnamed tributaries to Mud Creek (MPs QH232.5 and QH233.25). In addition to the above-mentioned crossings, impaired waterways also include Palmer Creek (MP QH229.5), one unnamed tributary to Sauquoit Creek (MP QH230.25), three unnamed tributaries to Oriskany Creek (MPs QH237, QH238.25 and QH238.5), three unnamed tributaries to Deans Creek (MPs QH239.75, QH240 and QH240.75) and two unnamed tributaries to Stony Creek (MPs QH245 and QH246).

The corridor extends 14.6 miles through **Madison County**, which is situated entirely within the Oswego River/Finger Lakes watershed. At MP QH260.5 and QH262.5, the Old Erie Canal flows under the corridor, extending south and out of the study area. There are approximately 20 waterway crossings in this county. Of the 20 crossings, five are protected waters (Class C(t) or B or above), and all are impaired 303(d) waters. The protected streams include Canastota Creek (MP QH255.75), Owlville Creek (MP QH257.5), Canaseraga Creek (MP QH260), Chittenango Creek (MP QH262.25) and one unnamed tributary to Canaseraga Creek (MP QH260.25). In addition to the above-mentioned crossings, impaired waterways also include Oneida Creek (MP QH249.5), Cowselon Creek (MP QH253), Dutch Settlement Creek (MP QH254.5), the Old Erie Canal, three unnamed tributaries to Oneida Creek (MPs QH249.75, QH250 and QH251), an unnamed pond (MP QH252.5), five unnamed tributaries to the Old Erie Canal (MPs QH253.5, QH254, QH259, QH262.75 and QH264) and one unnamed tributary to Owlville Creek (MP QH258.25).

The corridor extends 31.6 miles through **Onondaga County**, merging with the Empire Corridor West 90/110 Study Area just east of Syracuse. At this location it roughly parallels the New York State Thruway and skirts the southeast shores of Onondaga Lake in the city of Syracuse. There are approximately 20 waterway crossings in this county and all are within the Oswego River/Finger Lakes watershed. Of the 20 crossings, five are protected waters (Class C(t) or B or above), and 15 are impaired 303(d) waters. The protected streams include Pools Brook (MP QH264.75), Lake Brook (MP QH266.5), two unnamed tributaries to Pools Brook (MPs QH265 and 265.25), and one unnamed tributary to the Seneca River (MP QH292). In addition to the above-mentioned crossings, impaired waterways also include Limestone Creek (MP QH268.5), Butternut Creek (MP QH270.5), South Branch Ley Creek (MP QH272.5), Barge Canal (MP QH278.5), Geddes Brook (MP QH281.75), Dead Man Creek (MP QH289.75), one unnamed tributary to Ley Creek (MP QH274), one unnamed tributary to Nine Mile Creek (MP QH286), and two unnamed tributaries to Dead Man Creek (MPs QH290 and QH290.75). Three other streams, none of which are protected or impaired, cross the corridor in this Onondaga County: the old Erie Canal (MP QH265.75), Nine Mile Creek (MP QH283) and three unnamed tributaries to Nine Mile Creek (MPs QH285, QH285.25 and QH286.5).

The 125 Study Area extends 11.1 miles through **Cayuga County**, north of the Empire Corridor West (90/110 Study Area). There are approximately 15 waterway crossings in this county, all of which are within the Oswego River/Finger Lakes watershed. Of the 15 crossings, one is a protected water (Class C(t) or B or above), and 12 are impaired 303(d) waters. Protected waters include the Seneca River (MP QH295.75). In addition to the Seneca River, impaired waterways include Muskrat Creek (MP QH297.5), Spring Lake Outlet (MPs QH305.5, QH305.75 and QH306.25), one unnamed pond (MPs QH298.5 to QH299) and six unnamed tributaries to the Seneca River (MPs QH299.5, QH300, QH301.25, QH301.75, QH303.5, and QH304).

The 125 Study Area extends 35.5 miles through **Wayne County**. Approximately 98 percent of the railroad is located with the Oswego River/Finger Lakes watershed in Wayne County. Just before the western border of the county, the railroad enters the Lake Ontario Tributaries watershed (MP 357).

There are approximately 43 waterway crossings in Wayne County. Of the 43 crossings, three are protected waters (Class C(t) or B or above), and 42 are impaired 303(d) waters. The protected streams include Millpond (MP QH310.5), Sodus Creek (MP QH316.5) and an unnamed tributary to Mudge Creek (MP QH313.5). In addition to the above-mentioned crossings (with the exception of the unnamed tributary to Mudge Creek), impaired waterways also include Butler Creek (MP QH308.5), Wolcott Creek (MP QH311.75), Black Creek (MP QH312.5), Red Creek (MPs QH331.75 and QH335.75), an unnamed tributary to the Seneca River (MP QH306.75), an unnamed tributary to Butler Creek (MP QH309), two unnamed streams (MPs QH310.5 and QH310.75), two unnamed tributaries to Black Creek (MPs QH314.5 and QH315.25), two unnamed tributaries to Sodus Creek (MPs QH316 and QH316.75), 10 unnamed tributaries to the Clyde River (MPs QH317.75, QH318.5, QH319, QH319.5, QH320.25, QH320.75, QH321.5, QH322.5, QH323 and QH323.75), 10 unnamed tributaries to Ganargua Creek (MPs QH324.5, QH325.5, QH326.5, QH327, QH327.25, QH329.5, QH333, QH333.5, QH333.75 and QH334.75) and seven unnamed tributaries to Red Creek (MPs QH331, QH332.5, QH334, QH337.5, QH338.25, QH338.75 and QH340.5-QH341.

The 125 Study Area extends 29.5 miles through **Monroe County**. The county remains in the Lake Ontario Tributaries watershed until just east of Rochester where the railroad enters the Genesee River watershed, just before crossing the Genesee River (MP QH356). The corridor merges with the Empire Corridor West (90/110 Study Area) east of Rochester continuing west through the city before the 125 Study Area diverges to the north. The Erie Canal crosses the corridor at MP QH359.

The 125 Study Area crosses approximately 23 waterway crossings in Monroe County, including the Erie Canal crossing mentioned above. Of the 23 crossings, 9 are protected waters (Class C(t) or B or above), and 18 are impaired 303(d) waters. The protected streams include Thomas Creek (MPs QH345.5 to QH346.5), Irondequoit Creek (MP QH347.5), Allen Creek (MP QH350.25), Genesee River (MP QH356.75), Erie Canal (MP QH359), three unnamed tributaries to Thomas Creek (MPs QH342.5, QH343.5 and QH344) and an unnamed pond (MP QH342.75). In addition to the above-mentioned crossings, impaired waterways also include and additional crossing of Irondequoit Creek (MP QH351.75), Little Black Creek (MPs QH363.75 and QH365.25), and six unnamed tributaries to Black Creek and Little Black Creek (MPs QH363, QH363.5, QH367.25, QH369, QH371 and QH371.5).

The 125 Study Area traverses approximately 29.7 miles through **Genesee County**. The county remains in the Lake Ontario Tributaries watershed until just east of Rochester where the railroad enters the Genesee River watershed, just before crossing the Genesee River (MP QH356). There are approximately 25 waterway crossings in Genesee County. Of the 25 crossings, one is a protected water (Class C(t) or B or above), and 22 are impaired 303(d) waters. The protected stream includes Tonawanda Creek (MP QH397.5). In addition to the above-mentioned crossings, impaired waterways also include Black Creek (MPs QH375.75 and QH377), Oak Orchard Creek (MP QH383.5), Whitney Creek (MP QH395.5), Murder Creek (MP QH400.5), four unnamed tributaries to Black Creek (MPs QH372.5, QH373.25, QH374.25 and QH377.25), two unnamed tributaries to Spring Creek (MP QH381 and MPs QH382 to QH383), six unnamed tributaries to Oak Orchard Creek (MPs QH385, QH385.5, QH386, QH387.25, QH388 and QH389.25), an unnamed pond (MP QH389.75), an unnamed tributary to Brinningstool Creek (MP QH393), an unnamed tributary to Tonawanda Creek (MPs QH396.5 to QH397) and an unnamed tributary to Murder Creek (MP QH401).

The 125 Study Area extends 35.3 miles through **Erie County**, which is situated entirely within the Niagara River/Lake Erie watershed. The eastern segment merges with the Empire Corridor West/Niagara Branch (90/110 Study Area) east of Depew. The Empire Corridor then turns north to follow the Lake Erie shoreline. The corridor then continues north, roughly parallel to, and within 50 feet to 2.5 miles east of, the Niagara River, for a distance of 12.7 miles. Of the 10 waterway crossings in this county, two are protected waters (Class C(t) or B or above), and six are impaired 303(d) waters. The protected and impaired waters include Ellicott Creek (MP QH411.5) and Scajaquada Creek (MP QDN6). The other impaired waterways include Ransom Creek (MPs QH406.5 and QH408.75), Ellicott Creek (MP QDN12.5), and one other unnamed stream (MP QDN7.5).

The railroad extends 14.4 miles through **Niagara County** within the Niagara River/Lake Erie watershed. The railroad follows the shoreline of the Niagara River, then extends north towards the Niagara Falls International Airport, turning west to terminate at Niagara Falls. Of the nine waterway crossings in the county, none are protected waters (Class C(t) or B or above), and eight are impaired 303(d) waters. The impaired waterways include Tonawanda Creek/Erie Canal (MP QDN13.5), Black Creek (MP QDN18), East Branch of Black Creek (MP QDN18.5), Sawyer Creek (MP QDN19.5), Bergholtz Creek (MP QDN20), Cayuga Creek (MP QDN21), Branch Gill Creek (MP QDN25) and Gill Creek (MP QDN26).

Exhibit G-6—Empire Corridor West/Niagara Branch Surface Water Crossings in the 125 Study Area

County (Appx. Mile Post)	River/Stream Crossing(Appx. Mile Post)	Name	Impaired (303(d))/ Priority Water	Protected
Albany (QH 143.5-157)	QH 143.5	Hudson River	N	N
	QH 147.75	Krum Kill	Y	Y
	QH 149.75	Krum Kill	Y	Y
Schenectady (QH 157-174)	QH 158.75	Unnamed Tributary to Norman's Kill	Y	N
	QH 160.5	Unnamed Tributary to Norman's Kill	Y	N
	QH 161.5	Unnamed Tributary to Norman's Kill	Y	Y
	QH 162.75	Unnamed Tributary to Norman's Kill	Y	N
	QH 163.5	Bonny Brook	Y	N
	QH 164.5	Unnamed Pond	N	N
	QH 164.5	Unnamed Tributary to Norman's Kill	Y	N
	QH 166	Unnamed Tributary to Norman's Kill	Y	N
	QH 166.5	Unnamed Tributary to Norman's Kill	Y	N
	QH 167.5	Unnamed Tributary to Norman's Kill	Y	N
	QH 168.25	Unnamed Tributary to Norman's Kill	Y	Y
	QH 168.25	Unnamed Tributary to Norman's Kill	Y	N
	QH 168.5	Unnamed Tributary to Norman's Kill	Y	N
	QH 170.5	Unnamed Tributary to Delanson Reservoir and Norman's Kill	Y	Y
	QH 171.25	Unnamed Tributary to Schoharie Creek	Y	N
	QH 172	Unnamed Pond	N	N
	QH 172.5	Unnamed Tributary to Schoharie Creek	Y	N
	QH 173.5	Unnamed Pond	N	N
Schoharie (QH 174-180.5)	QH 174	Schoharie Creek	Y	N
	QH 174.25	Unnamed Tributary to Schoharie Creek	Y	N
	QH 174.5-175.75	Schoharie Creek	Y	N
	QH 176	Unnamed Tributary to Schoharie Creek	Y	N
	QH 177.5	Unnamed Tributary to Schoharie Creek	Y	N
	QH 177.75	Unnamed Tributary to Schoharie Creek	Y	N
	QH 179.5	Fly Creek	Y	N
	QH 180.25	Fly Creek	Y	N
	QH 180.5	Fly Creek	Y	N
Montgomery (QH 180.5-202)	QH 181	Fly Creek	Y	N
	QH 181.25	Fly Creek	Y	N
	QH 182	Unnamed Tributary to Fly Creek	Y	N
	QH 182.5	Unnamed Tributary to Fly Creek	Y	N
	QH 185.5	Unnamed Tributary to Flat Creek	Y	N
	QH 186.5	Unnamed Tributary to Flat Creek	Y	N
	QH 188	Flat Creek	Y	N
	QH 190.75	Unnamed Tributary to Canajoharie Creek	Y	N
	QH 191	Unnamed Tributary to Canajoharie Creek	Y	N
	QH 192.5	Canajoharie Creek	Y	N
	QH 193	Unnamed Tributary to Canajoharie Creek	Y	N
	QH 196.25	Unnamed Tributary to Otsquago Creek/Mohawk River	Y	N
	QH 196.5	Unnamed Tributary to Otsquago Creek/Mohawk River	Y	N
	QH 196.75	Unnamed Tributary to Otsquago Creek/Mohawk River	Y	N
	QH 197.5	Unnamed Tributary to Otsquago Creek/Mohawk River	Y	N
	QH 199.25	Unnamed Tributary to Otsquago Creek/Mohawk River	Y	N
	QH 200	Unnamed Tributary to Otsquago Creek/Mohawk River	Y	N
	QH 200.5	Unnamed Tributary to Otsquago Creek/Mohawk River	Y	N
	QH 200.75	Unnamed Tributary to Otsquago Creek/Mohawk River	Y	N
	QH 201	Unnamed Tributary to Otsquago Creek/Mohawk River	Y	N
	QH 201.5	Unnamed Tributary to Otsquago Creek/Mohawk River	Y	Y
Herkimer (QH 202-227.5)	QH 202.5	Unnamed Tributary to Otsquago Creek/Mohawk River	Y	Y
	QH 202.5	Otsquago Creek	Y	Y
	QH 203.75	Unnamed Tributary to Otsquago Creek/Mohawk River	Y	N
	QH 204	Unnamed Tributary to Otsquago Creek/Mohawk River	Y	N
	QH 206	Unnamed Tributary to Ohisa Creek	Y	N
	QH 206.25	Unnamed Tributary to Ohisa Creek	Y	N
	QH 206.5	Ohisa Creek	Y	Y
	QH 207	Unnamed Tributary to Ohisa Creek	Y	Y
	QH 208	Unnamed Tributary to Nowadaga Creek/Mohawk River	Y	Y

Exhibit G-6—Empire Corridor West/Niagara Branch Surface Water Crossings in the 125 Study Area

County (Appx. Mile Post)	River/Stream Crossing(Appx. Mile Post)	Name	Impaired (303(d))/ Priority Water	Protected
	QH 209.5	Unnamed Tributary to Nowadaga Creek/Mohawk River	Y	N
	QH 210.75	Unnamed Tributary to Fulmer Creek	Y	N
	QH 211.5	Unnamed Tributary to Fulmer Creek	Y	N
	QH 212	Fulmer Creek	Y	Y
	QH 212.5	Unnamed Tributary to Fulmer Creek	Y	N
	QH 213.74	Unnamed Tributary to Fulmer Creek	Y	N
	QH 214.25	Unnamed Tributary to Fulmer Creek	Y	N
	QH 214.5	Unnamed Tributary to Fulmer Creek	Y	N
	QH 215	Fulmer Creek	Y	Y
	QH 215.25	Unnamed Tributary to Fulmer Creek	Y	N
	QH 216.75	Unnamed Tributary to Erie Canal	Y	N
	QH 217.75	Unnamed Tributary to Erie Canal	Y	N
	QH 218	Unnamed Tributary to Erie Canal	Y	Y
	QH 218.75	Unnamed Tributary to Erie Canal	Y	N
	QH 219.5	Unnamed Tributary to Erie Canal	Y	N
	QH 219.75	Unnamed Tributary to Erie Canal	Y	N
	QH 220	Unnamed Tributary to Erie Canal	Y	N
	QH 220.5	Unnamed Tributary to Erie Canal	Y	N
	QH 221	Unnamed Tributary to Moyer Creek/Erie Canal	Y	N
	QH 221.5	Unnamed Tributary to Moyer Creek/Erie Canal	Y	Y
	QH 222.5	Unnamed Tributary to Moyer Creek/Erie Canal	Y	Y
	QH 222.75	Unnamed Tributary to Moyer Creek/Erie Canal	Y	Y
	QH 223	Unnamed Tributary to Moyer Creek/Erie Canal	Y	Y
	QH 223.25	Unnamed Tributary to Moyer Creek/Erie Canal	Y	Y
	QH 223.5	Unnamed Tributary to Moyer Creek/Erie Canal	N	Y
	QH 224.25	Unnamed Pond	Y	N
	QH 225.5	Unnamed Tributary to Ferguson Creek	Y	N
	QH 226	Unnamed Tributary to Starch Factory Creek	Y	N
	QH226.5	Unnamed Tributary to Starch Factory Creek	Y	N
	QH 227	Unnamed Tributary to Starch Factory Creek	N	Y
Oneida (QH 227.5-249)	QH 228	Unnamed Tributary to Sauquoit Creek	Y	Y
	QH 229.5	Palmer Creek	Y	N
	QH 230.25	Sauquoit Creek	Y	Y
	QH 230.25	Unnamed Tributary to Sauquoit Creek	Y	N
	QH 232.5	Unnamed Tributary to Mud Creek	Y	Y
	QH 233.25	Unnamed Tributary to Mud Creek	Y	Y
	QH 234.5	Mud Creek	Y	N
	QH 235.5	Sherman Brook	Y	Y
	QH 236	Oriskany Creek	Y	Y
	QH 237	Unnamed Tributary to Oriskany Creek	Y	N
	QH 238.25	Unnamed Tributary to Oriskany Creek	Y	N
	QH 238.5	Unnamed Tributary to Oriskany Creek	Y	N
	QH 239.75	Unnamed Tributary to Deans Creek	Y	N
	QH 240	Unnamed Tributary to Deans Creek	Y	N
	QH 240.75	Unnamed Tributary to Deans Creek	Y	N
	QH 245	Unnamed Tributary to Stony Creek	Y	N
	QH 246	Unnamed Tributary to Stony Creek	Y	N
	QH 248	Sconondoa Creek	Y	Y
Madison (QH 249-264)	QH 249.5	Oneida Creek	Y	N
	QH 249.75	Unnamed Tributary to Oneida Creek	Y	N
	QH 250	Unnamed Tributary to Oneida Creek	Y	N
	QH 251	Unnamed Tributary to Oneida Creek	Y	N
	QH 252.5	Unnamed Pond	Y	N
	QH 253	Cowselon Creek	Y	N
	QH 253.5	Unnamed Tributary to Old Erie Canal	Y	N
	QH 254	Unnamed Tributary to Old Erie Canal	Y	N
	QH 254.5	Dutch Settlement Creek	Y	N
	QH 255.75	Canastota Creek	Y (MS4)	Y
	QH 257.5	Owlville Creek	Y	Y
	QH 258.25	Unnamed Tributary Owlville Creek	Y	N
	QH 259	Unnamed Tributary to Old Erie Canal	Y	N

Exhibit G-6—Empire Corridor West/Niagara Branch Surface Water Crossings in the 125 Study Area

County (Appx. Mile Post)	River/Stream Crossing(Appx. Mile Post)	Name	Impaired (303(d))/ Priority Water	Protected
	QH 260	Unnamed Tributary to Canaseraga Creek	Y	Y
	QH 260.25	Canaseraga Creek	Y	Y
	QH 260.5	Old Erie Canal	Y	N
	QH 262.25	Chittenango Creek	Y	Y
	QH 262.5	Old Erie Canal	Y	N
	QH 262.75	Unnamed Tributary to Old Erie Canal	Y	N
	QH 264	Unnamed Tributary to Old Erie Canal	Y	N
Onondaga (QH 264-295.5)	QH 264.75	Pools Brook	Y	Y
	QH 265	Unnamed Tributary to Pools Brook	Y	Y
	QH 265.25	Unnamed Tributary to Pools Brook	Y	Y
	QH 265.75	Old Erie Canal	N	N
	QH 266.5	Lake Brook	Y	Y
	QH 268.5	Limestone Creek	Y	N
	QH 270.5	Butternut Creek	Y	N
	QH 272.75	South Branch Ley Creek	Y (C), (MS4)	N
	QH 274	Unnamed Tributary to Ley Creek	Y (C), (MS4)	N
	QH 278.5	Barge Canal	Y	N
	QH 281.75	Geddes Brook	Y	N
	QH 283	Nine Mile Creek	Y (C), (MS4)	N
	QH 285	Unnamed Tributary to Nine Mile Creek	N	N
	QH 285.25	Unnamed Tributary to Nine Mile Creek	Y (C), (MS4)	N
	QH 286	Unnamed Tributary to Nine Mile Creek	Y (C), (MS4)	N
	QH 286.5	Unnamed Tributary to Nine Mile Creek	N	N
	QH 289.75	Dead Man Creek	Y	N
	QH 290	Unnamed Tributary to Dead Man Creek	Y	N
	QH 290.75	Unnamed Tributary to Dead Man Creek	Y	N
	QH 292	Unnamed Tributary to Seneca River	Y	Y
Cayuga (QH 295-306.5)	QH 295.75	Seneca River	Y	Y
	QH 297.5	Muskrat Creek	Y	N
	QH 298.5-299	Unnamed Pond	Y	N
	QH 299.25	Unnamed Pond	N	N
	QH 299.5	Unnamed Tributary to Seneca River	Y	N
	QH 300	Unnamed Tributary to Seneca River	Y	N
	QH 301.25	Unnamed Tributary to Seneca River	Y	N
	QH 301.75	Unnamed Tributary to Seneca River	Y	N
	QH 302.25	Unnamed Tributary to Seneca River	N	N
	QH 303.5	Unnamed Tributary to Seneca River	Y	N
	QH 304	Unnamed Tributary to Seneca River	Y	N
	QH 305.5	Spring Lake Outlet	Y	N
	QH 305.75	Spring Lake Outlet	Y	N
	QH 306.25	Spring Lake Outlet	Y	N
	QH 306.5	Unnamed Tributary to Spring Lake Outlet	N	N
Wayne (QH 306.5-342)	QH 306.75	Unnamed Tributary to Seneca River	Y	N
	QH 308.5	Butler Creek	Y	N
	QH 309	Unnamed Tributary to Butler Creek	Y	N
	QH 310.5	Millpond	Y	Y
	QH 310.5	Unnamed Tributary	Y	N
	QH 310.75	Unnamed Tributary	Y	N
	QH 311.75	Wolcott Creek	Y	N
	QH 312.5	Black Creek	Y	N
	QH 313.5	Unnamed Tributary to Mudge Creek	N	Y
	QH 314.5	Unnamed Tributary to Black Creek	Y	N
	QH 315.25	Unnamed Tributary to Black Creek	Y	N
	QH 316	Unnamed Tributary to Sodus Creek	Y	N
	QH 316.5	Sodus Creek	Y	Y
	QH 316.75	Unnamed Tributary to Sodus Creek	Y	N
	QH 317.75	Unnamed Tributary to Clyde River	Y	N
	QH 318.5	Unnamed Tributary to Clyde River	Y	N
	QH 319	Unnamed Tributary to Clyde River	Y	N
	QH 319.5	Unnamed Tributary to Clyde River	Y	N
	QH 320.25	Unnamed Tributary to Clyde River	Y	N

Exhibit G-6—Empire Corridor West/Niagara Branch Surface Water Crossings in the 125 Study Area

County (Appx. Mile Post)	River/Stream Crossing(Appx. Mile Post)	Name	Impaired (303(d))/ Priority Water	Protected
	QH 320.75	Unnamed Tributary to Clyde River	Y	N
	QH 321.5	Unnamed Tributary to Clyde River	Y	N
	QH 322.5	Unnamed Tributary to Clyde River	Y	N
	QH 323	Unnamed Tributary to Clyde River	Y	N
	QH 323.75	Unnamed Tributary to Clyde River	Y	N
	QH 324.5	Unnamed Tributary to Ganargua Creek	Y	N
	QH 325.5	Unnamed Tributary to Ganargua Creek	Y	N
	QH 326.5	Unnamed Tributary to Ganargua Creek	Y	N
	QH 327	Unnamed Tributary to Ganargua Creek	Y	N
	QH 327.25	Unnamed Tributary to Ganargua Creek	Y	N
	QH 329.5	Unnamed Tributary to Ganargua Creek	Y	N
	QH 331	Unnamed Tributary to Red Creek	Y	N
	QH 331.75	Red Creek	Y	N
	QH 332.5	Unnamed Tributary to Red Creek	Y	N
	QH 333	Unnamed Tributary to Ganargua Creek	Y	N
	QH 333.5	Unnamed Tributary to Ganargua Creek	Y	N
	QH 333.75	Unnamed Tributary to Ganargua Creek	Y	N
	QH 334	Unnamed Tributary to Red Creek	Y	N
	QH 334.75	Unnamed Tributary to Ganargua Creek	Y	N
	QH 335.75	Red Creek	Y	N
	QH 337.5	Unnamed Tributary to Red Creek	Y	N
	QH 338.25	Unnamed Tributary to Red Creek	Y	N
	QH 338.75	Unnamed Tributary to Red Creek	Y	N
	QH 340.5-341	Unnamed Tributary to Red Creek	Y	N
Monroe (QH 342-371.5)	QH 342.5	Unnamed Tributary to Thomas Creek	Y (C), (MS4)	Y
	QH 342.75	Unnamed Pond	Y	Y
	QH 343.5	Unnamed Tributary to Thomas Creek	Y (C), (MS4)	Y
	QH 344	Unnamed Tributary to Thomas Creek	Y (C), (MS4)	Y
	QH 345.5-346.5	Thomas Creek	Y (C), (MS4)	Y
	QH 347.5	Irondequoit Creek	Y (C), (MS4)	Y
	QH 350.25	Allen Creek	Y	Y
	QH 351.75	Irondequoit Creek	Y (C), (MS4)	N
	QH 356.75	Genesee River	Y (C), (MS4)	Y
	QH 359	Erie Canal	Y	Y
	QH 360.5	Unnamed Tributary to Erie Canal	N	N
	QH 362	Unnamed Tributary to Little Black Creek	N	N
	QH 363	Unnamed Tributary to Little Black Creek	Y	N
	QH 363.5	Unnamed Tributary to Little Black Creek	Y	N
	QH 363.75	Little Black Creek	Y	N
	QH 365.25	Little Black Creek	Y	N
	QH 367	Little Black Creek	N	N
	QH 367.25	Unnamed Tributary to Little Black Creek	Y	N
	QH 367.5	Unnamed Tributary to Little Black Creek	N	N
	QH 368.5	Unnamed Tributary to Black Creek	N	N
	QH 369	Unnamed Tributary to Black Creek	Y (C), (MS4)	N
	QH 371	Unnamed Tributary to Black Creek	Y (C), (MS4)	N
	QH 371.5	Black Creek Tributary	Y (C), (MS4)	N
Genesee (QH 371.5-401.5)	QH 372.5	Unnamed Tributary to Black Creek	Y (C), (MS4)	N
	QH 373.25	Unnamed Tributary to Black Creek	Y (C), (MS4)	N
	QH 374.25	Unnamed Tributary to Black Creek	Y (C), (MS4)	N
	QH 375.75	Black Creek	Y (C), (MS4)	N
	QH 377	Black Creek	Y (C), (MS4)	N
	QH 377.25	Unnamed Tributary to Black Creek	Y (C), (MS4)	N
	QH 381	Unnamed Tributary to Spring Creek	Y	N
	QH 381.5	Unnamed Tributary to Spring Creek	N	N
	QH 382-383	Unnamed Tributary to Spring Creek	Y	N
	QH 383.5	Oak Orchard Creek	Y	N
	QH 385	Unnamed Tributary to Oak Orchard Creek	Y	N
	QH 385.5	Unnamed Tributary to Oak Orchard Creek	Y	N
	QH 386	Unnamed Tributary to Oak Orchard Creek	Y	N
	QH 387.25	Unnamed Tributary to Oak Orchard Creek	Y	N

Exhibit G-6—Empire Corridor West/Niagara Branch Surface Water Crossings in the 125 Study Area

County (Appx. Mile Post)	River/Stream Crossing(Appx. Mile Post)	Name	Impaired (303(d))/ Priority Water	Protected
	QH 388	Unnamed Tributary to Oak Orchard Creek	Y	N
	QH 389.25	Unnamed Tributary to Oak Orchard Creek	Y	N
	QH 389.75	Unnamed Pond	Y	N
	QH 390.5	Unnamed Pond	N	N
	QH 393	Unnamed Tributary to Brinningstool Creek	Y	N
	QH 395.5	Whitney Creek	Y	N
	QH 395.75	Unnamed Pond	N	N
	QH 396.5-397	Unnamed Tributary to Tonawanda Creek	Y (C), (MS4)	N
	QH 397.5	Tonawanda Creek	Y (C), (MS4)	Y
	QH 400.5	Murder Creek	Y	N
	QH 401	Unnamed Tributary to Murder Creek	Y	N
Erie (QH 401.5-QDN 13)	QH 406.5	Ransom Creek	Y (MS4)	N
	QH 408.75	Ransom Creek	Y (MS4)	N
	QH 409	Unnamed Pond	N	N
	QH 409.25	Unnamed Pond	N	N
	QH 409.5	Unnamed Pond	N	N
	QH 411.5	Ellicott Creek	Y (C), (MS4)	Y
	QDN 6	Scajaquada Creek	Y (MS4)	Y
	QDN 7.5	Unnamed Tributary to Niagara River	Y	N
	QDN 12	Unnamed Tributary to Ellicott Creek	N	N
	QDN 12.5	Ellicott Creek	Y (C), (MS4)	N
Niagara (QDN13-QDN28)	QDN 13.5	Tonawanda Creek/Erie Canal	Y	N
	QDN 14.5	Unnamed Tributary to Niagara River	N	N
	QDN 18	Black Creek	Y	N
	QDN 18.5	East Branch of Black Creek	Y	N
	QDN 19.5	Sawyer Creek	Y	N
	QDN 20	Bergholtz Creek	Y (C), (MS4)	N
	QDN 21	Cayuga Creek	Y	N
	QDN 25	Branch Gill Creek	Y	N
	QDN 26	Gill Creek	Y	N

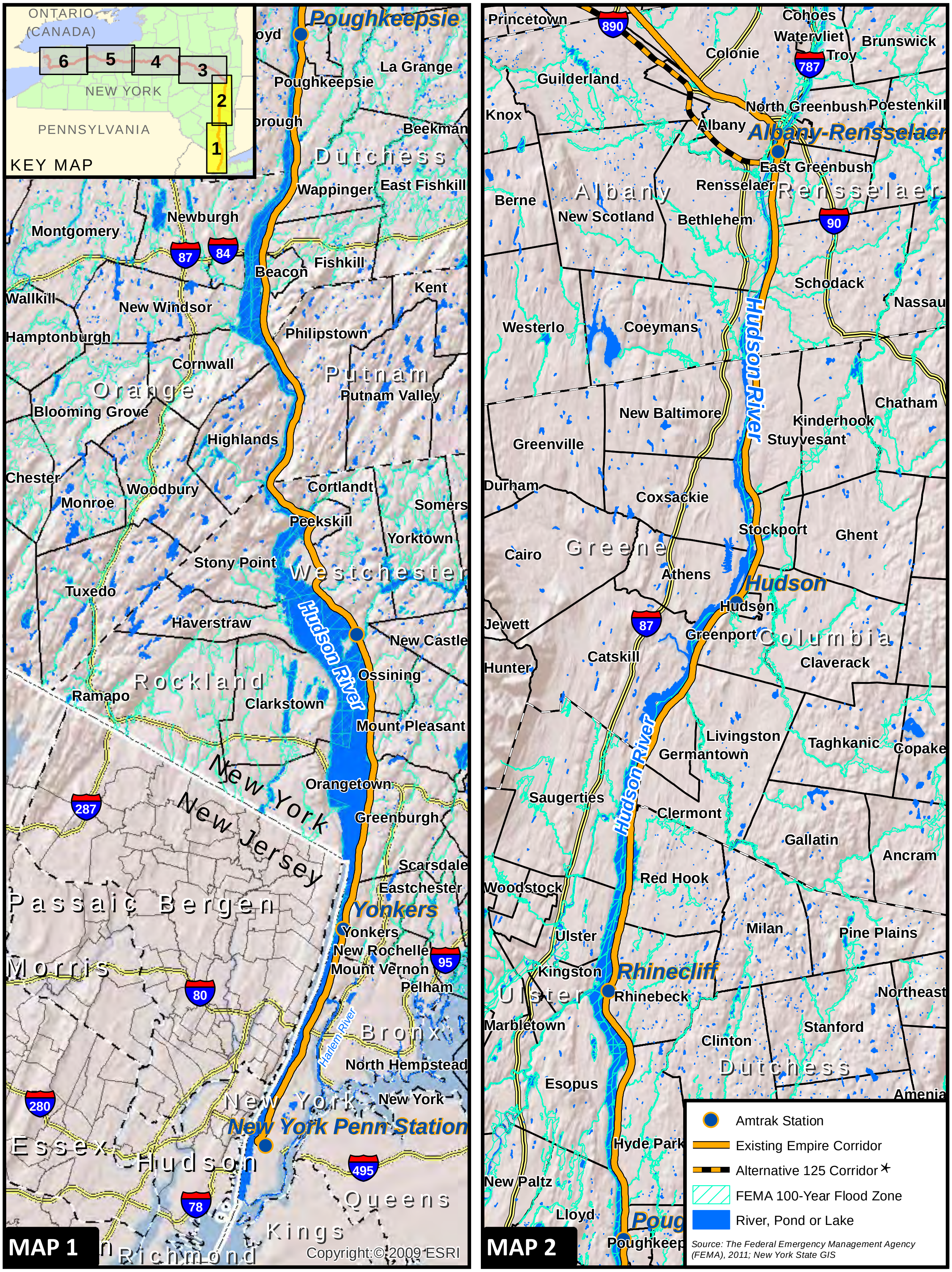
Notes: Appx.= Approximate, Y = Yes, N = No

(C) = 303(d) segments impaired by pollutants related to construction, as specified in Appendix E of the NYSDEC SPDES General Permit for Stormwater Discharges from Construction Activity (Permit No. GP-0-10-001), January 29, 2010.

(MS4) = 303(d) segments impaired by pollutants of concern for municipal separate storm sewer systems (MS4s), as specified in Appendix 2 of the SPDES General Permit for Stormwater Discharges from MS4s (Permit No. GP-0-10-002), October 14, 2011.

The 125 Study Area is used for analysis of Alternative 125 and consists of portions of the existing Empire Corridor and new alignment and is 451 miles long. The study area width is defined as being within 300 feet of the corridor centerline.

Source: NY GIS Clearinghouse, 2011, NYSDEC GIS Data, 2011



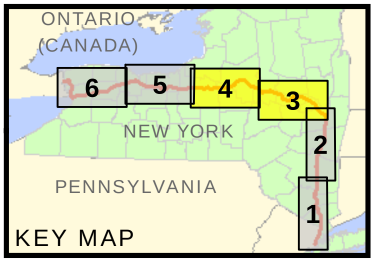
*Alt. 125 as shown is a potential corridor used to analyze the potential operating characteristics, environmental impacts and cost for this speed (125 mph) threshold.

0 2.5 5 10
Miles

Surface Waters/Floodplains

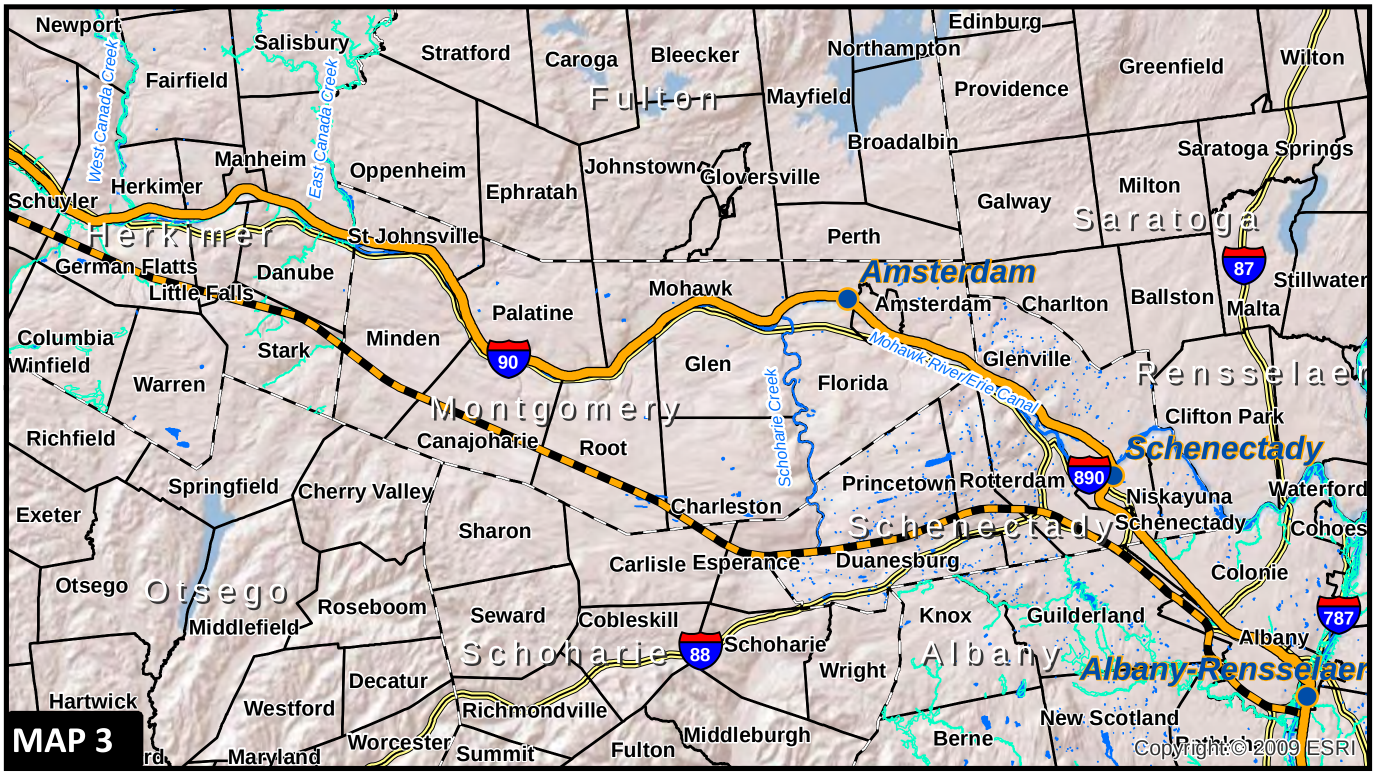
Exhibit G-7

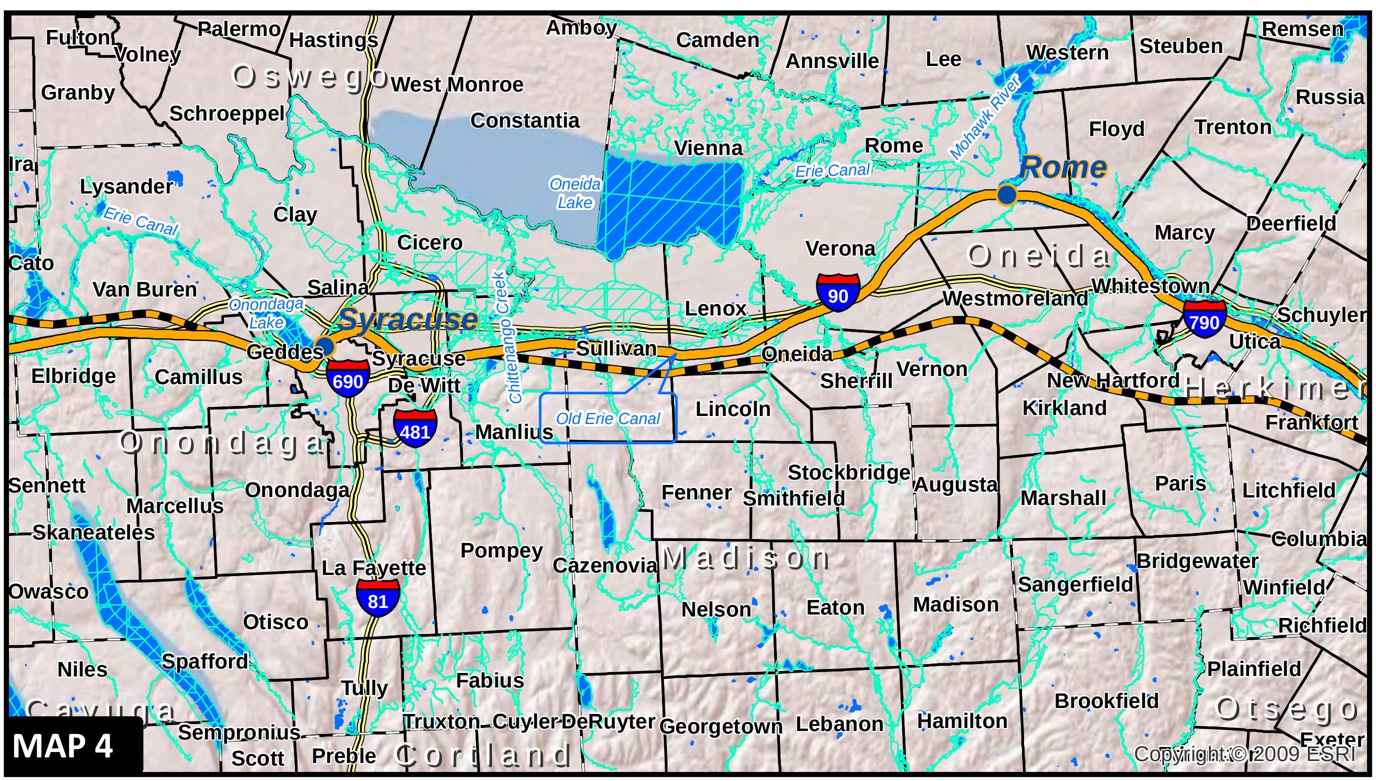
Tier 1 EIS
High Speed Rail
Empire Corridor Program



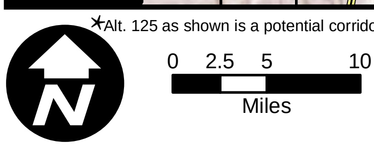
Amtrak Station
Existing Empire Corridor
Alternative 125 Corridor*
FEMA 100-Year Flood Zone
River, Pond or Lake

Source: Federal Emergency Management Agency (FEMA), 2011; New York State GIS





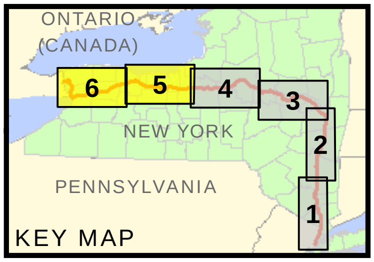
*Alt. 125 as shown is a potential corridor used to analyze the potential operating characteristics, environmental impacts and cost for this speed (125 mph) threshold.



Surface Waters/Floodplains

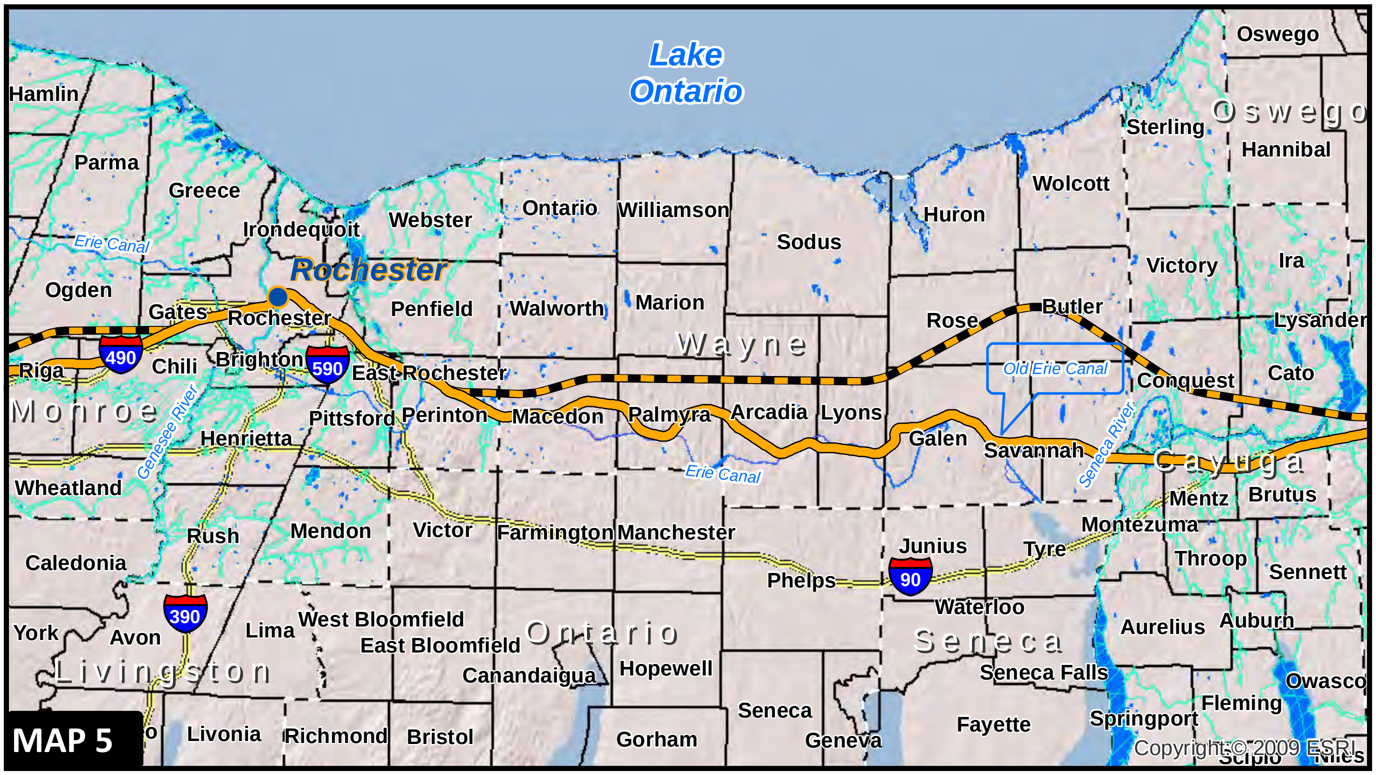
Exhibit G-7

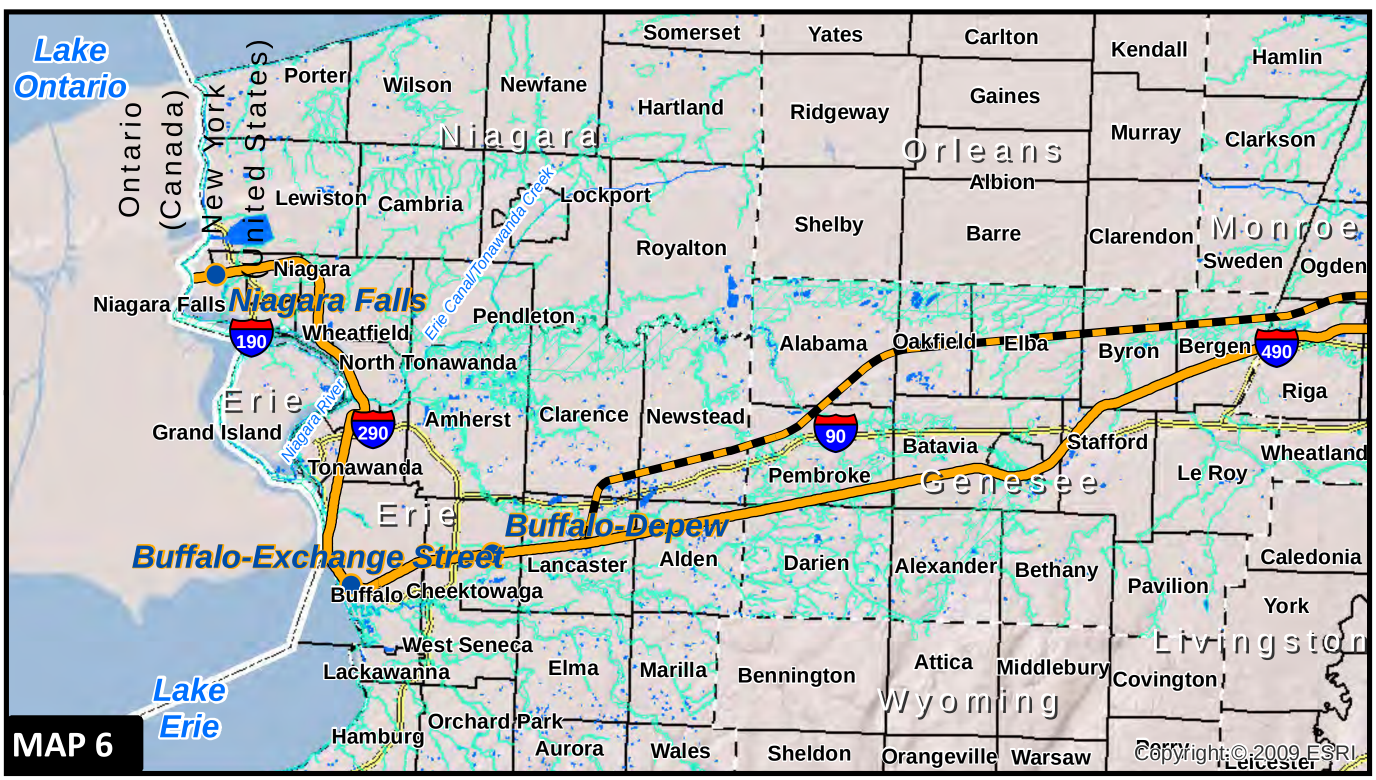
Tier 1 EIS
High Speed Rail
Empire Corridor Program



- Amtrak Station
- Existing Empire Corridor
- Alternative 125 Corridor ✶
- FEMA 100-Year Flood Zone
- River, Pond or Lake

Source: Federal Emergency Management Agency (FEMA), 2011; New York State GIS





✶Alt. 125 as shown is a potential corridor used to analyze the potential operating characteristics, environmental impacts and cost for this speed (125 mph) threshold.

N

0 2.5 5 10
Miles

Surface Waters/Floodplains

Exhibit G-7

Tier 1 EIS
High Speed Rail
Empire Corridor Program

7. Navigable Waters

7.1 Empire Corridor South

All of the Build alternatives follow the existing Empire Corridor South for the majority of its length, deviating only in Rensselaer County, where Alternative 125 splits off 1.6 miles south of where the existing Empire Corridor (the 90/110 Study Area) turns to the west. The Hudson River, a navigable water, is within the 300-foot railroad buffer in all counties in the Empire Corridor South segment. There are several navigable tributaries and inlets of the Hudson River that the railroad crosses. The Spuyten Duyvil railroad bridge crosses over the Harlem River at MP 10. Two Metro-North railroad bridges in Westchester County pass over the Hudson River: Croton Bay (MPs 32.5 to 33) and Peekskill Bay (MP 42). The New Hamburg Railroad Bridge crosses over Wappinger Creek at MP 65.

7.2 Empire Corridor West/Niagara Branch: 90/110 Study Area

There are several navigable waterways along the 322 miles of the Empire Corridor West/Niagara Branch 90/110 Study Area. The Erie Canal and Mohawk River and other navigable waterways, and crossings of navigable waters, are described in the following section.

The railroad crosses the Hudson River over the Livingston Avenue Railroad bridge as it passes into **Albany County**. The Hudson River at this location is a navigable water, and the bridge is permitted by the U.S. Coast Guard.

The Erie Canal is part of the Mohawk River in **Schenectady County**. This waterway meanders in and out of the 300-foot buffer and crosses the railroad, as it passes west of the city of Schenectady (MP 160).

The Mohawk River and Erie Canal meander through the 300-foot buffer area as a single water channel in **Montgomery County** and the eastern part of **Herkimer County**, never crossing the railroad alignment. The Mohawk River and Erie Canal split at the town of Frankfort (MP 228). The Mohawk River and Erie Canal parallel the south side of the railroad before crossing the railroad and heading north. The Erie Canal crosses the railroad at approximately MP 231.5 and the Mohawk River crosses at approximately MP 234.

The Mohawk River and the Erie Canal continue into **Oneida County**, with both located north of the railroad. The Mohawk River crosses the railroad, extending from the north to the south side, just east of Rome (MP 248.5).

There are no navigable waters in **Madison County**. In **Onondaga County**, there are two navigable waterways: the Barge Canal and Onondaga Lake. Onondaga Lake parallels the north side of the railroad alignment for a small section through Syracuse. The Barge Canal crosses the alignment in this same area (MP 292) and connects to Onondaga Lake.

There are no navigable waters in the study area in **Cayuga County**. The Erie Canal is the only navigable water in the study area in **Wayne County**, meandering in and out of the 300-foot buffer within this county and crossing the railroad three times. It crosses once as part of the Clyde River near the town of Clyde (MPs 328 to 330), once near the town of Lyons (MP 335) and once just before Newark (MP 339.5).

The Genesee River and the Erie Canal are the two navigable waters within the study area in **Monroe County**. The Genesee River crosses the rail alignment in the city of Rochester (MP 371.5). The Erie Canal crosses the rail alignment just west of Rochester (MP 374.5). There are no navigable waters in the study area in **Genesee County**.

There are three navigable waters in the study area in **Erie County**. Two of these, Ellicott Creek and Scajaquada Creek, cross the railroad. The third, Lake Erie, is located within the 300-foot buffer on the west side of the railroad. Ellicott Creek crosses the rail alignment twice, once before entering Buffalo (MP 422.5) and a second time in Tonawanda (MP QDN12.5). Scajaquada Creek crosses the railroad once in Buffalo (MP QDN6).

There is one navigable water in **Niagara County**, Tonawanda Creek. The creek is also part of the Erie Canal and crosses the railroad in the center of Tonawanda (MP QDN13.5).

7.3 Empire Corridor West/Niagara Branch: 125 Study Area

There are several navigable waterways along the 308 miles of the Empire Corridor West/Niagara Branch 125 Study Area. The corridor crosses the Hudson River at MP QH143.5 as it passes into **Albany County**. The Hudson River at this location is a navigable water.

There are no navigable waters in the study area through Schenectady, Schoharie, Montgomery, Herkimer, Oneida or Madison counties. The 125 Study Area bypasses several crossings of the Mohawk River/Erie Canal along the Empire Corridor West in Schenectady, Montgomery, Herkimer, and Oneida counties.

In **Onondaga County**, there are two navigable waterways: Onondaga Lake and the Barge Canal. Onondaga Lake parallels the north side of the corridor for a small section through Syracuse. The Barge Canal crosses the corridor in this same area (MP QH278.5) and connects to Onondaga Lake.

There are no navigable waters in the study area in **Cayuga** or **Wayne Counties**. The 125 Study Area bypasses several crossings of the Erie Canal and Clyde River along the Empire Corridor West in Wayne County. The Genesee River and the Erie Canal are two navigable waters within the study area in **Monroe County**.

The Genesee River crosses the corridor in the city of Rochester (MP QH356.75). The Erie Canal crosses the corridor just west of Rochester (MP QH359). There are no navigable waters in the study area in **Genesee County**.

There are three navigable waters in the study area in **Erie County**. Two of these, Ellicott Creek and Scajaquada Creek, cross the alignment. The third, Lake Erie, is located within the 300-foot buffer on the west side of the alignment. Ellicott Creek crosses the rail alignment twice, once before entering Buffalo (MP 411.5) and a second time in Tonawanda (MP QDN12.5). Scajaquada Creek crosses the railroad once in Buffalo (MP QDN6).

There is one navigable water in **Niagara County**, Tonawanda Creek. The creek is also part of the Erie Canal and crosses the railroad in the center of Tonawanda (MP QDN13.5).

8. Floodplains

8.1 Empire Corridor South

The Empire Corridor South, from New York City to Rensselaer, extends 142 miles and in many locations closely follows the east bank of the Hudson River. All of the Build alternatives follow the existing Empire Corridor South for the majority of its length, deviating only in Rensselaer County, where the 125 Study Area splits off 1.6 miles south of where the existing Empire Corridor (the 90/110 Study Area) turns to the west. This corridor segment includes the study area counties of New York County (Manhattan Borough), Bronx County, Westchester County, Putnam County, Dutchess County, Columbia County, and Rensselaer County. The entire corridor in this segment is located in the Lower Hudson River Watershed.

The rail corridor extends approximately 10.3 miles north through **Manhattan (New York County)** from its southern terminus, daylighting from a rail tunnel just north of Milepost 5. The Hudson River is generally within 150 to 300 feet of the western side of the railroad for the majority of the county and floodplains associated with the Hudson River are located within 300 feet of the rail centerline; however, GIS data was not available.

After crossing the Harlem River, the railroad enters and extends through **Bronx County** after crossing the Harlem River for a distance of approximately 2.6 miles. There are no waterway crossings in Bronx County; however, the corridor closely adjoins the west bank of the Hudson River throughout the county and 100-year floodplains are located within 300 feet of the railroad centerline. GIS mapping was not available for this county.

The railroad continues to closely adjoin the Hudson River through 31.5 miles of the rail corridor as it extends through **Westchester County**, largely remaining within 50 to 500 feet of the river. There are approximately 703 acres of mapped 100-year floodplains within 300 feet of the rail centerline, associated with the Hudson River and its tributaries (encountered at 23 waterway crossings) in this county.

The railroad traverses through 9.3 miles of **Putnam County**, largely remaining within 50 to 500 feet of the Hudson River. The majority of the rail corridor remains in close proximity to the Hudson River, with the exception of a 1-mile section south of Cold Springs (MPs 51 to 52). There are approximately 12 waterway crossings in this county, including several bridges over the inlets and coves of the Hudson River (MPs 51, 52 [Foundry Cove], and 53). Digital floodplain GIS data was not available for Putnam County; however, there are likely acres of 100-year floodplains within 300 feet of the railroad centerline associated with the Hudson River and its tributaries.

The rail corridor traverses approximately 45.6 miles across **Dutchess County**. The majority of the railroad is within 50 to 300 feet of the Hudson River and crosses several coves and inlets of the river as it passes through the county. There are approximately 1,766 acres of 100-year floodplains mapped within 300 feet of the rail centerline associated with the Hudson River and the roughly 38 waterway crossings in this county.

The rail corridor continues to closely adjoin the Hudson River through the majority of the 29.5 miles of the rail corridor as it extends through **Columbia County**, largely remaining within 50 to 300 feet of the river. There are approximately 22 waterway crossings in this county, including several bridges over the inlets of the Hudson River. Approximately 1,244 acres of 100-year floodplains are located within 300 feet of the rail centerline in this county associated with the Hudson River and its numerous tributaries.

The railroad extends 13.4 miles through **Rensselaer County**, paralleling the Hudson River and closely adjoining the river through the southern portion of the county. In the 90/110 Study Area, there are roughly 751 acres of 100-year floodplains. In the 125 Study Area, there are 752 acres of 100-year floodplains. These floodplains are primarily associated with the Hudson River.

8.2 Empire Corridor West/Niagara Branch: 90/110 Study Area

The 322-mile-long Empire Corridor West/Niagara Branch for the 90/110 Study Area, with the exception of the metropolitan areas within and surrounding the major cities, has a distinctively more rural agricultural character than the segment to the south. The Empire Corridor West generally follows or parallels several geographic features, including the Mohawk River or New York Canal System, and the New York State Thruway. The Niagara Branch turns north at Buffalo on Lake Erie, generally paralleling the Lake Erie shoreline and then extending north along the Niagara River.

The railroad crosses over the Hudson River (MP 143) at the Livingston Avenue Bridge and enters **Albany County**. The railroad extends approximately 11.8 miles across Albany County. The 600-foot-wide study area in this county contains approximately 90 acres of 100-year floodplains associated with the Hudson River and other crossing waterways, including Patroons Creek, Rensselaer Lake, and Lisha Kill. The southeastern portion of Albany County is within the Lower Hudson River watershed, but just after the railroad crosses Rensselaer Lake (MP 154), there is a transition to Mohawk River watershed.

The entire 14.7 miles of the Empire Corridor that pass through **Schenectady County** are located within the Mohawk River watershed. There are approximately nine waterway crossings in Schenectady County, including the Mohawk/Erie Canal that parallels the railroad west of Schenectady Station, extending between 75 feet to 1 ¼ miles of the railroad. However, digital floodplain data was not available to calculate the number of acres of 100-year floodplains within 300 feet of the rail centerline.

The railroad continues to closely adjoin the north banks of the Mohawk River/Erie Canal through the 40.3 miles of the rail corridor as it extends through **Montgomery County**, largely remaining within 50 to 1,000 feet of the river/canal. The entire county remains within the Mohawk River watershed, and there are approximately 35 waterway crossings in this county. However, digital floodplain data was not available to calculate the number of acres of 100-year floodplains within 300 feet of the railroad.

The railroad traverses through **Herkimer County** for approximately 25.3 miles. There are approximately 904 acres of 100-year floodplains within 300 feet of the rail centerline. The floodplains are associated with the Mohawk River/ Erie Canal, which parallel the railroad throughout the county.

The Empire Corridor extends 28.6 miles through **Oneida County**, paralleling the Erie Canal through the eastern half of the county between Utica on the east and Rome. The eastern half of the county remains within the Mohawk River watershed, but west of the Rome Station (MP 261.5) the railroad enters the Oswego River/Finger Lakes watershed. There are approximately 780 acres of mapped

100-year floodplains within the study area. These floodplains are associated with certain waterbodies that cross the railroad in Oneida County (11 in total), including the Mohawk River, Mud Creek, Stony Creek, and Oneida Creek.

Madison County is entirely within the Oswego River/Finger Lakes watershed, and the railroad traverses through approximately 13.8 miles of this county. In the eastern half of the county, the railroad generally parallels the Old Erie Canal, with the canal within 100 to 1,000 feet on the north side, before it crosses the railroad around MP 272 and heads south, out of the study area. There are approximately 226 acres of 100-year floodplains within 300 feet or the rail centerline. These floodplains are associated with certain waterbodies that cross the railroad in Madison County (11 in total), including Old Erie Canal, Cowelson Creek, Canastota Creek, Owlville Creek, and Canseraga Creek.

The railroad extends 31.3 miles through **Onondaga County**, roughly paralleling the New York State Thruway and skirting the southeast shores of Onondaga Lake in the city of Syracuse. There are approximately 712 acres of 100-year floodplains in the study area associated with certain waterway crossings in this county (16 in all). Floodplains adjoin Pools Brook, Lake Brook, Limestone Creek, Butternut Creek, Onondaga Lake itself and its tributaries (Ley Creek, Geddes Brook, Ninemile Creek), and Old Erie Canal. All waters are within the Oswego River/Finger Lakes watershed in this county.

The Empire Corridor extends 11.5 miles through **Cayuga County**, roughly paralleling the New York State Thruway. There are 316 acres of 100-year floodplains mapped in the study area in this county. These floodplains are associated with the five water body crossings: the Seneca River (which crosses the railroad at the west end of the county) and its tributaries Putnam Brook, Coldspring Brook, Owasco Outlet, and Swamp Brook.

The railroad extends 37.1 miles through rural **Wayne County**, paralleling portions of the Erie Canal and Route 31. The Erie Canal meanders back and forth along the railroad for much of the county, crossing the railroad twice. Most (98%) of the railroad is located with the Oswego River/Finger Lakes watershed, and the railroad enters the Lake Ontario Tributaries watershed (MP 357) on the western end. There are approximately 18 waterway crossings in this county, including the two Erie Canal crossings mentioned above; however, digital floodplain data was not available to calculate the number of acres of 100-year floodplains within 300 feet of the railroad.

The railroad extends 30.9 miles through **Monroe County**, closely paralleling the Erie Canal from the county's eastern border to just west of the town of Fairport (MP 361.5). The canal extends close to the study area west of Rochester. The county remains in the Lake Ontario Tributaries watershed until just east of Rochester where the railroad enters the Genesee River watershed (MP 370.5), just before crossing the Genesee River (MP 371.5). There are approximately 237 acres of 100-year floodplains associated with the certain waterway crossings within the study area (19 in all), including the Erie Canal and Genesee River.

The railroad traverses approximately 30 miles through **Genesee County**, and generally follows Route 33. The railroad remains in the Genesee River watershed through the eastern portion of the county and passes into the Niagara River/Lake Erie watershed just before the town of Batvia (MP 401). There are 234 acres of 100-year floodplains within the study area associated with certain waterway crossing in the county (17 in total), including Black Creek and Tonawanda Creek, and Murder Creek.

The rail corridor extends 32.7 miles through **Erie County**. The Niagara River/Lake Erie watershed is the only watershed the railroad traverses in this county. There are approximately 15 acres of 100-year floodplains within the study area associated with waterway crossings in this county, including Ellicot Creek, Scajaquada Creek, and Erie Canal.

The railroad extends 14.4 miles through **Niagara County**, to the north of Erie County. The Niagara River/Lake Erie watershed is the only watershed the rail corridor traverses in this county. There are approximately 22 acres of 100-year floodplains within the study area associated with waterway crossings, including Sawyer Creek, Bergholtz Creek, Cayuga Creek, and Gill Creek.

8.3 Empire Corridor West/Niagara Branch: 125 Study Area

The 125 Study Area crosses over the Hudson River (MP QH143.5) and enters **Albany County**. Currently, there is not an existing bridge structure that supports this alignment over the Hudson River. The corridor extends approximately 14 miles across Albany County. The 600-foot-wide study area in this county contains approximately 43 acres of 100-year floodplains associated with the Hudson River and other crossing waterways, including Krum Kill. This portion of Albany County is within the Lower Hudson River watershed.

The corridor extends 17 miles through **Schenectady County** and remains in the Lower Hudson River watershed for approximately 1.5 miles before crossing into the Mohawk River watershed. It then passes back into the Lower Hudson River watershed for a majority of the county before heading back into the Mohawk River watershed, just before MP QH171. The remainder of the county remains in the Mohawk River watershed. There are approximately 18 waterway crossings in Schenectady County, including Bonny Brook and numerous small tributaries to Norman's Kill to the south. However, digital floodplain data was not available to calculate the number of acres of 100-year floodplains within 300 feet of the proposed centerline.

The corridor remains in the Mohawk River watershed throughout the 6.5 miles in **Schoharie County**. Digital floodplain data was not available to calculate the number of acres of 100-year floodplains within 300 feet of the proposed centerline; however the corridor would have approximately nine waterway crossings, including Schoharie Creek and several crossings of Fly Creek. The corridor continues within the Mohawk River watershed through 21.3 miles as it extends through **Montgomery County**. There are approximately 21 waterway crossings in this county, including Fly Creek, Flat Creek and Canajoharie Creek. However, digital floodplain data was not available to calculate the number of acres of 100-year floodplains within 300 feet of the proposed centerline in Montgomery County.

The corridor then traverses through **Herkimer County** for approximately 25.3 miles. There are approximately 45 acres of 100-year floodplains within 300 feet or the rail centerline. The floodplains are associated with crossings of Otsquago Creek, Ohisha Creek, Fulmer Creek and numerous smaller tributaries.

The 125 Study Area extends 22 miles through **Oneida County**, remaining in the Mohawk River watershed in the eastern half of the county before entering into the Oswego River/Finger Lakes watershed at approximately MP QH243.5. There are approximately 81 acres of mapped 100-year floodplains within the study area. These floodplains are associated with certain waterbodies that cross the proposed centerline in Oneida County (18 in total), including Palmer Creek, Sauquoit

Creek, Mud Creek, Sherman Brook, Oriskany Creek and Sconondoa Creek.

Madison County is entirely within the Oswego River/Finger Lakes watershed, and the corridor traverses through approximately 14.6 miles of this county. There are approximately 110 acres of 100-year floodplains within 300 feet or the proposed centerline. These floodplains are associated with certain waterbodies that cross the corridor in Madison County (20 in total), including Oneida Creek, Cowelson Creek, Dutch Settlement Creek, Canastota Creek, Owlville Creek, Canseraga Creek, Old Erie Canal and Chittenango Creek.

The corridor extends 31.6 miles through **Onondaga County**, roughly paralleling the New York State Thruway and skirting the southeast shores of Onondaga Lake in the city of Syracuse. There are approximately 547 acres of 100-year floodplains in the study area associated with certain waterway crossings in this county (20 in all). Floodplains adjoin Pools Brook, Lake Brook, Limestone Creek, Butternut Creek, Onondaga Lake itself and its tributaries (Ley Creek, Geddes Brook, Ninemile Creek), Deadman Creek and Old Erie Canal. All waters are within the Oswego River/Finger Lakes watershed in this county.

The 125 Study Area extends 11.1 miles through **Cayuga County** and remains in the Oswego River/Finger Lakes watershed. There are approximately 45 acres of 100-year floodplains mapped in the study area in this county. These floodplains are associated with the 15 water body crossings: the Seneca River (which crosses the railroad at the east end of the county) and its tributaries, Muskrat Creek and Spring Lake Outlet.

The corridor extends 35.5 miles through rural **Wayne County**, primarily remaining within the Oswego River/Finger Lakes watershed, with a small portion in the eastern portion of the county crossing into the Lake Ontario Tributaries watershed before crossing back to Oswego River/Finger Lakes watershed. There are approximately 43 waterway crossings in this county; however, digital floodplain data was not available to calculate the number of acres of 100-year floodplains within 300 feet of the proposed centerline.

The corridor extends 29.5 miles through **Monroe County**. The county remains in the Lake Ontario Tributaries watershed until just east of Rochester where the railroad enters the Genesee River watershed, just before crossing the Genesee River (MP QH356). There are approximately 296 acres of 100-year floodplains associated with the certain waterway crossings within the study area (23 in all), including Thomas Creek, Irondequoit Creek, Allen Creek, Erie Canal, Genesee River and Little Black Creek.

The 125 Study Area traverses approximately 29.7 miles through **Genesee County**, and crosses the Genesee River watershed, Lake Ontario Tributaries watershed and the Niagara River/Lake Erie watershed east to west. There are approximately 247 acres of 100-year floodplains within the study area associated with certain waterway crossing in the county (25 in total), including Black Creek, Oak Orchard Creek, Whitney Creek, Tonawanda Creek and Murder Creek.

The rail corridor extends 24.3 miles through **Erie County**. The Niagara River/Lake Erie watershed is the only watershed the railroad traverses in this county. There are approximately 20 acres of 100-year floodplains within the study area associated with waterway crossings in this county, including Ransom Creek, Ellicot Creek, Scajaquada Creek, and Erie Canal.

The railroad corridor extends 14.4 miles through **Niagara County**, to the north of Erie County. The Niagara River/Lake Erie watershed is the only watershed the rail corridor traverses in this county.

There are approximately 22 acres of 100-year floodplains within the study area associated with waterway crossings, including Sawyer Creek, Bergholtz Creek, Cayuga Creek, and Gill Creek.

9. Wetlands

9.1 Empire Corridor South

Wetlands in the 600-foot-wide study area along Empire Corridor South are primarily associated with the Hudson River. The study area includes approximately 106 acres of mapped NWI wetlands in **New York County (Manhattan)** and 133 acres in **Bronx County**. In both New York and Bronx counties, all NWI wetlands are classified as estuarine deepwater.

In **Westchester County**, the study area includes a total 770 acres of mapped wetlands within 300 feet of the railroad centerline. This includes 328 acres mapped of NWI wetlands, 347 acres of NWI and NYSDEC tidal wetlands, and 84 acres of NYSDEC tidal wetlands. NWI wetlands include 93 percent of estuarine deepwater and 3 percent of estuarine wetland. NYSDEC tidal wetlands include approximately 90 percent open water and 5 percent gramminoid vegetation. In addition, there are 1,048 acres of adjacent areas of tidal wetlands mapped. NYSDEC freshwater wetlands include approximately 66 percent of Class I wetlands and 34 percent of Class II Wetlands.

In **Putnam County**, there are a total of 285 acres of wetlands mapped in the study area. Of the 285 acres, 197 acres are NWI and NYSDEC tidal wetlands and 46 acres are NYSDEC tidal wetlands. NWI wetlands include: 71 percent of estuarine deepwater, 19 percent of estuarine wetland, and 9 percent of palustrine forested/shrub or emergent wetlands. NYSDEC tidal wetlands include approximately 70 percent open water and 24 percent gramminoid vegetation wetlands. In addition, there are a total of 392 acres of adjacent areas to tidal wetlands mapped. NYSDEC freshwater wetlands include approximately 43 percent of Class I wetlands and 57 percent of Class II wetlands.

In **Dutchess County**, the study area passes through a total of 1,317 acres of mapped wetlands. This includes 1,018 acres of NWI and NYSDEC tidal wetlands, 185 acres of NWI and NYSDEC tidal/freshwater wetlands, and 108 acres of NYSDEC tidal wetlands. NWI wetlands include: 48 percent riverine, 33 percent estuarine wetlands, 10 percent palustrine emergent wetland or forested/shrub wetlands, 4 percent of ponds, and 6 percent of lakes. NYSDEC tidal wetlands include approximately 79 percent of open water, 8 percent of broad-leaf vegetation, and 9 percent of gramminoid vegetation. In addition, there are a total of 1,996 acres of adjacent areas to tidal wetlands mapped. NYSDEC freshwater wetlands include approximately 67 percent of Class I wetlands and 33 percent of Class II wetlands.

In **Columbia County**, the study area includes a total of 966 acres of mapped wetlands. This includes 449 acres of NWI and NYSDEC tidal wetlands, 427 acres of NWI and NYSDEC tidal/freshwater wetlands, 62 acres of NYSDEC tidal wetlands, and 28 acres of NYSDEC tidal and freshwater wetlands. NWI wetlands include: 61 percent riverine, 17 percent palustrine emergent wetland, 17 percent palustrine forested/shrub wetlands, and 5 percent pond. NYSDEC tidal wetlands include approximately 56 percent of open water, 21 percent of gramminoid vegetation, and 12 percent of broad-leaf vegetation. In addition, there are a total of 1,178 acres of adjacent areas to tidal wetlands mapped. NYSDEC freshwater wetlands include approximately 90 percent of Class I wetlands and 10 percent of Class II wetlands.

In **Rensselaer County**, the existing Empire Corridor 90/110 Study Area passes through a total of 165 acres of mapped wetlands. Of the 165 acres, 66 acres are NWI and NYSDEC tidal wetlands, 76 acres are NWI and NYSDEC tidal and freshwater wetlands, 13 acres are NYSDEC tidal wetlands, and 10 acres are NYSDEC tidal and freshwater wetlands. NWI wetlands include: 46 percent of palustrine forested/shrub wetlands, 39 percent of riverine, and 14 percent of palustrine emergent wetland. NYSDEC tidal wetlands include approximately 53 percent of open water; 24 percent of gramminoid vegetation; 7 percent broad-leaf vegetation; 7 percent coastal shoals, bars, and mudflats; and 9 percent swamp tree. In addition, there are a total of 806 acres of adjacent areas to tidal wetlands mapped. NYSDEC freshwater wetlands include approximately 96 percent of Class I wetlands and 4 percent of Class II wetlands.

In Rensselaer County, the 125 Study Area passes through a total of 162 acres of mapped wetlands. Of the 162 acres, 63 acres are NWI and NYSDEC tidal wetlands, 76 acres are NWI and NYSDEC tidal and freshwater wetlands, 13 acres are NYSDEC tidal wetlands, and 10 acres are NYSDEC tidal and freshwater wetlands. NWI wetlands include: 46 percent of palustrine forested/shrub wetlands, 38 percent of riverine, 14 percent of palustrine emergent wetland, and 2 percent of ponds. NYSDEC tidal wetlands include approximately 53 percent of open water; 24 percent of gramminoid vegetation; 7 percent broad-leaf vegetation; 7 percent coastal shoals, bars, and mudflats; and 9 percent swamp tree. In addition, there are a total of 806 acres of adjacent areas to tidal wetlands mapped. NYSDEC freshwater wetlands include approximately 96 percent of Class I wetlands and 4 percent of Class II wetlands.

9.2 Empire Corridor West/Niagara Branch: 90/110 Study Area

In **Albany County**, the study area passes through a total of 130 acres of mapped wetlands. The mapped wetlands include 70 acres of NWI wetlands, 27 acres of NWI and NYSDEC freshwater wetlands, 26 acres of NYSDEC freshwater wetlands, and 6 acres are NWI and NYSDEC tidal wetlands. NWI wetlands include: 72 percent of palustrine forested/shrub wetlands, 11 percent of palustrine emergent wetland, 10 percent pond, and 5 percent riverine. NYSDEC tidal wetlands include approximately 100 percent open water. In addition, there are a total of 165 acres of adjacent areas to tidal wetlands mapped. NYSDEC freshwater wetlands include only Class I wetlands.

West of Albany County, there are no NYSDEC tidal wetlands mapped. In **Schenectady County**, the study area includes a total of 103 acres of mapped wetlands. Of the 103 acres, 59 acres are NWI wetlands, 25 acres are NYSDEC freshwater wetlands, and 19 acres are NWI and NYSDEC freshwater wetlands. NWI wetlands include: 67 percent of palustrine forested/shrub wetlands, 21 percent of lakes, 7 percent of palustrine emergent wetland, and 4 percent of ponds. NYSDEC freshwater wetlands include approximately 51 percent of Class I wetlands and 49 percent of Class II wetlands.

In **Montgomery County**, the study area crosses a total of 340 acres of mapped wetlands in the study area. Complete digital data for NWI wetlands was not available for the entire county; therefore the wetland totals for this category are likely higher. The study area includes 297 acres of NYSDEC freshwater wetlands, 34 acres of NWI wetlands, and 9 acres of NWI and NYSDEC freshwater wetlands. The mapped NWI wetlands include: 51 percent of lakes, 34 percent of palustrine forested/shrub wetlands, and 15 percent of riverine. NYSDEC freshwater wetlands include approximately 25 percent of Class I wetlands, 70 percent of Class II wetlands, and 5 percent of Class IV wetlands.

In **Herkimer County**, the study area includes a total of 50 acres of mapped wetlands. Complete digital data for NWI wetlands was not available for the entire county; therefore the wetland totals for this category are likely higher. The mapped wetlands include 47 acres of NYSDEC freshwater wetlands and 3 acres of NWI wetlands. The mapped NWI wetlands include: 65 percent of palustrine forested/shrub wetlands, 21 percent of palustrine emergent wetlands, and 14 percent of riverine. NYSDEC freshwater wetlands are comprised entirely of Class II wetlands.

The study area crosses a total of 593 acres of mapped NYSDEC freshwater wetlands in **Oneida County** and 88 acres in **Madison County**. Complete digital data for NWI wetlands was not available for the counties; therefore the wetland totals are likely higher. In Oneida County, NYSDEC freshwater wetlands include approximately 92 percent of Class II wetlands and 8 percent of Class IV wetlands. In Madison County, NYSDEC freshwater wetlands include 23 percent Class I wetlands and 77 percent Class II wetlands.

In **Onondaga County**, the study area crosses a total of 555 acres of mapped wetlands. This includes 135 acres of NWI wetlands, 183 acres of NWI and NYSDEC freshwater wetlands, and 237 acres of NYSDEC freshwater wetlands. NWI wetlands include: 77 percent of palustrine forested/shrub wetlands, 15 percent of palustrine emergent wetland, 5 percent of lakes, and 3% of pond. NYSDEC freshwater wetlands include approximately 43 percent of Class I wetlands, 49 percent of Class II wetlands, and 8 percent of Class III wetlands.

In **Cayuga County**, the study area crosses a total of 221 acres of mapped wetlands. Of the 221 acres, 68 acres are NWI wetlands, 111 acres are NWI and NYSDEC freshwater wetlands, and 42 acres are NYSDEC freshwater wetlands. NWI wetlands include: 59 percent of palustrine forested/shrub wetlands, 35 percent of palustrine emergent wetlands, and 4 percent of riverine. NYSDEC freshwater wetlands include approximately 78 percent of Class II wetlands and 22 percent of Class III wetlands.

In **Wayne County**, the study area crosses a total of 901 acres of mapped wetlands. This includes 287 acres of NWI wetlands, 474 acres of NWI and NYSDEC freshwater wetlands, and 140 acres of NYSDEC freshwater wetlands. NWI wetlands include: 62 percent of palustrine forested/shrub wetlands, 23 percent of palustrine emergent wetlands, 11 percent of riverine, and 3 percent of ponds. NYSDEC freshwater wetlands include approximately 27 percent of Class I wetlands, 70 percent of Class II wetlands, 1 percent of Class III wetlands, and 2 percent of Class IV wetlands.

In **Monroe County**, the study area crosses a total of 308 acres of mapped wetlands. These include 134 acres of NWI wetlands, 131 acres of NWI and NYSDEC freshwater wetlands, and 43 acres of NYSDEC freshwater wetlands. NWI wetlands include: 76 percent of palustrine forested/shrub wetlands, 11 percent of palustrine emergent wetland, 6 percent of ponds, and 6 percent of lakes. NYSDEC freshwater wetlands include approximately 33 percent of Class I wetlands and 67 percent of Class II wetlands.

In **Genesee County**, the study area crosses a total of 409 acres of mapped wetlands. This includes 240 acres of NWI wetlands, 117 acres of NWI and NYSDEC freshwater wetlands, and 52 acres of NYSDEC freshwater wetlands. NWI wetlands include: 64 percent of palustrine forested/shrub wetlands, 21 percent of palustrine emergent wetland, 9 percent of ponds, and 5 percent of lakes. NYSDEC freshwater wetlands include approximately 13 percent of Class I wetlands, 72 percent of Class II wetlands, and 15 percent of Class III wetlands.

In **Erie County**, the study area crosses a total of 179 acres of mapped wetlands. This includes 144 acres of NWI wetlands, 25 acres of NWI and NYSDEC freshwater wetlands, and 10 acres of NYSDEC freshwater wetlands. NWI wetlands include: 90 percent of palustrine forested/shrub wetlands, 5 percent of ponds, and 4 percent of riverine. NYSDEC freshwater wetlands include only Class II wetlands.

In **Niagara County**, the study area crosses a total of 64 acres of mapped NWI wetlands. NWI wetlands include: 71 percent of palustrine forested/shrub wetlands, 19 percent of palustrine emergent wetland, 5 percent of ponds, and 5 percent of riverine.

9.3 Empire Corridor West/Niagara Branch: 125 Study Area

In **Albany County**, the study area passes through a total of nine acres of mapped wetlands. The mapped wetlands include three acres of NWI wetlands and six acres of NWI and NYSDEC tidal wetlands. There are no NWI and NYSDEC freshwater wetlands or NYSDEC freshwater wetlands mapped in the study area in Albany County. NWI wetlands include: 61 percent riverine, 16 percent of palustrine forested/shrub wetlands, 13 percent lake, and 10 percent of palustrine emergent wetland. NYSDEC tidal wetlands include 100 percent open water. In addition, there are a total of 75 acres of adjacent areas to tidal wetlands mapped.

West of Albany County, there are no NYSDEC tidal wetlands mapped. In **Schenectady County**, the study area includes a total of 44 acres of mapped wetlands. All of the 44 acres are NWI wetlands. NWI wetlands include: 95 percent of palustrine forested/shrub wetlands, and 4 percent of palustrine emergent wetland.

There are no NYSDEC wetlands mapped in the study area in **Schoharie County**, and NWI digital data was not available.

In **Montgomery County**, the study area crosses a total of 144 acres of mapped wetlands. Complete digital data for NWI wetlands was not available for the entire county; therefore the wetland totals for this category are likely higher. The study area includes 36 acres of NWI wetlands and 108 acres of NYSDEC freshwater wetlands. The mapped NWI wetlands include: 65 percent of palustrine emergent wetland, 31 percent of palustrine forested/shrub wetlands, and 4 percent of lakes. NYSDEC freshwater wetlands include approximately 98 percent of Class I wetlands and 2 percent of Class II wetlands.

In **Herkimer County**, the study area includes a total of 29 acres of mapped wetlands. Complete digital data for NWI wetlands was not available for the entire county; therefore the wetland totals for this category are likely higher. The mapped wetlands include nine acres of NYSDEC freshwater wetlands and 20 acres of NWI wetlands. The mapped NWI wetlands include: 79 percent of palustrine forested/shrub wetlands, 15 percent of palustrine emergent wetlands, and 6 percent of lakes. NYSDEC freshwater wetlands are comprised entirely of Class II wetlands.
The study area crosses a total of 190 acres of mapped NYSDEC freshwater wetlands in Oneida County and 11 acres in Madison County. Complete digital data for NWI wetlands was not available for the counties; therefore the wetland totals are likely higher. In Oneida County, NYSDEC freshwater wetlands include approximately 79 percent of Class II wetlands, 17 percent of Class III wetlands, and 4 percent of Class IV wetlands. In Madison County, NYSDEC freshwater wetlands

include 99 percent Class II wetlands and 1 percent Class III wetlands.

In **Onondaga County**, the study area crosses a total of 461 acres of mapped wetlands. This includes 80 acres of NWI wetlands, 98 acres of NWI and NYSDEC freshwater wetlands, and 283 acres of NYSDEC freshwater wetlands. NWI wetlands include: 81 percent of palustrine forested/shrub wetlands, 9 percent of ponds, 7 percent of palustrine emergent wetland, and 3 percent of lakes/riverine. NYSDEC freshwater wetlands include approximately 47 percent of Class I wetlands, 42 percent of Class II wetlands, and 11 percent of Class III wetlands.

In **Cayuga County**, the study area crosses a total of 157 acres of mapped wetlands. Of the 157 acres, 45 acres are NWI wetlands, 85 acres are NWI and NYSDEC freshwater wetlands, and 27 acres are NYSDEC freshwater wetlands. NWI wetlands include: 91 percent of palustrine forested/shrub wetlands, 5 percent of palustrine emergent wetlands, and 4 percent of riverine. NYSDEC freshwater wetlands include approximately 87 percent of Class II wetlands and 13 percent of Class III wetlands.

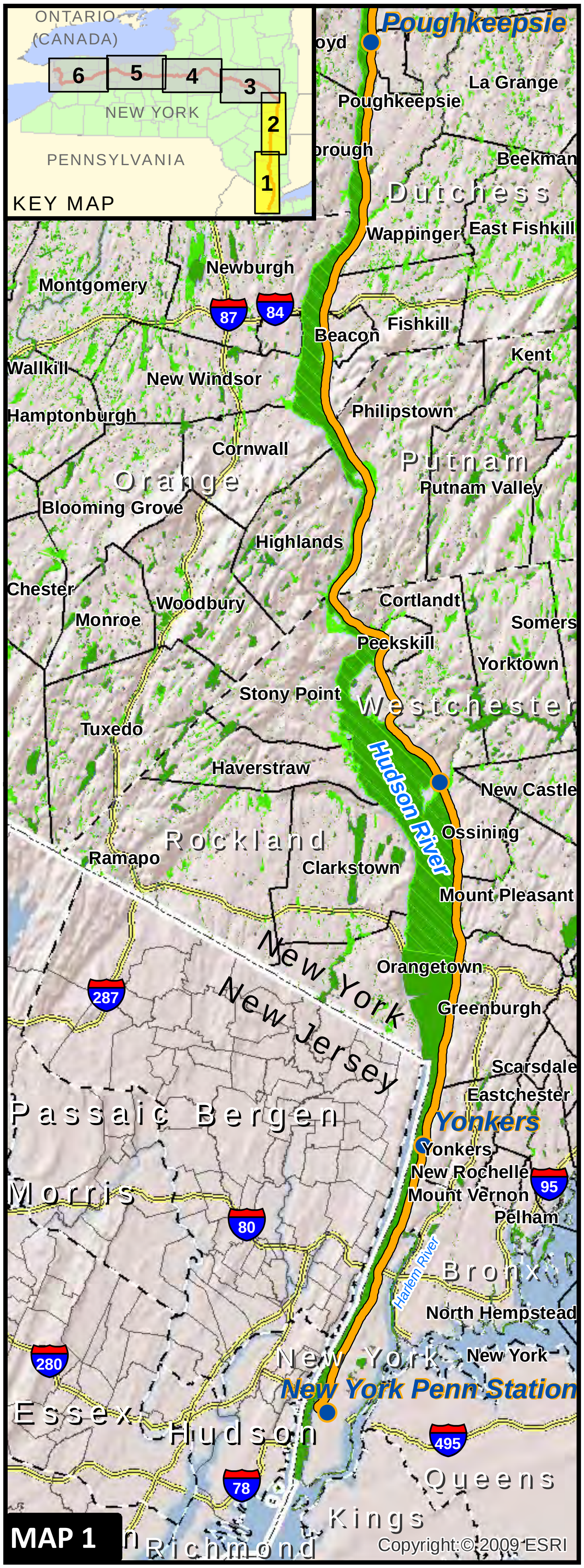
In **Wayne County**, the study area crosses a total of 335 acres of mapped wetlands. This includes 107 acres of NWI wetlands, 190 acres of NWI and NYSDEC freshwater wetlands, and 38 acres of NYSDEC freshwater wetlands. NWI wetlands include: 89 percent of palustrine forested/shrub wetlands, 7 percent of palustrine emergent wetlands, and 4 percent of lakes/ponds. NYSDEC freshwater wetlands include approximately 30 percent of Class II wetlands and 70 percent of Class III wetlands.

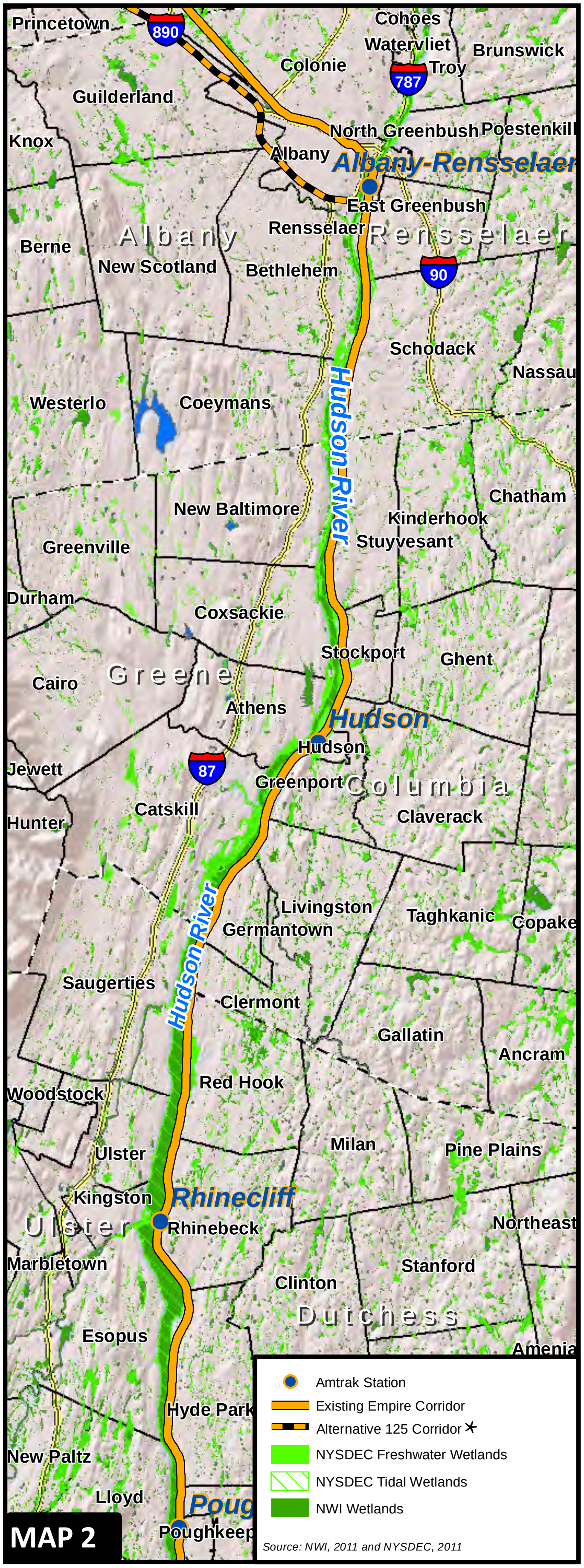
In **Monroe County**, the study area crosses a total of 253 acres of mapped wetlands. These include 126 acres of NWI wetlands, 106 acres of NWI and NYSDEC freshwater wetlands, and 21 acres of NYSDEC freshwater wetlands. NWI wetlands include: 89 percent of palustrine forested/shrub wetlands, 5 percent of palustrine emergent wetland, and 6 percent of ponds, riverine, and lakes. NYSDEC freshwater wetlands include approximately 10 percent of Class I wetlands, 72 percent of Class II wetlands, and 18 percent of Class III wetlands.

In **Genesee County**, the study area crosses a total of 420 acres of mapped wetlands. This includes 226 acres of NWI wetlands, 182 acres of NWI and NYSDEC freshwater wetlands, and 12 acres of NYSDEC freshwater wetlands. NWI wetlands include: 89 percent of palustrine forested/shrub wetlands, 7 percent of palustrine emergent wetland, and 4 percent riverine/lakes. NYSDEC freshwater wetlands include approximately 50 percent of Class I wetlands, 18 percent of Class II wetlands, and 32 percent of Class III wetlands.

In **Erie County**, the study area crosses a total of 247 acres of mapped wetlands. This includes 151 acres of NWI wetlands, 83 acres of NWI and NYSDEC freshwater wetlands, and 13 acres of NYSDEC freshwater wetlands. NWI wetlands include: 81 percent of palustrine forested/shrub wetlands, 8 percent of palustrine emergent wetland, and 11 percent of ponds/riverine/lakes. NYSDEC freshwater wetlands include approximately 65 percent of Class I wetlands and 35 percent of Class II wetlands.

In **Niagara County**, the study area crosses a total of 64 acres of mapped NWI wetlands. NWI wetlands include: 71 percent of palustrine forested/shrub wetlands, 19 percent of palustrine emergent wetland, 5 percent of ponds, and 5 percent of riverine.





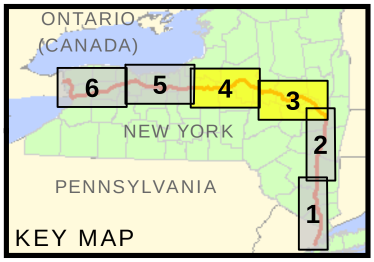
✶Alt. 125 as shown is a potential corridor used to analyze the potential operating characteristics, environmental impacts and cost for this speed (125 mph) threshold.

0 2.5 5 10
Miles

Wetlands

Exhibit G-8

Tier 1 EIS
High Speed Rail
Empire Corridor Program



Amtrak Station

Existing Empire Corridor

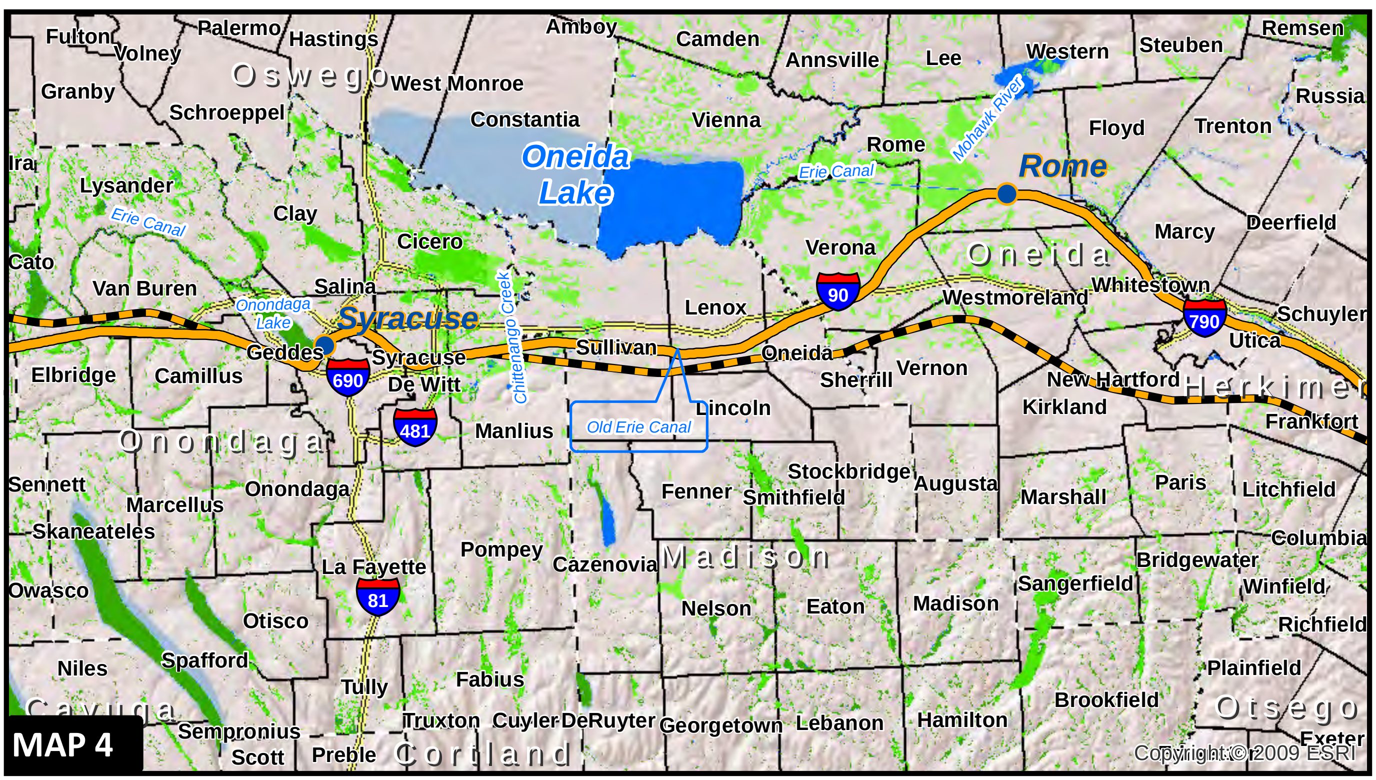
Alternative 125 Corridor ✶

NYSDEC Freshwater Wetlands

NYSDEC Tidal Wetlands

NWI Wetlands

Source: NWI, 2011 and NYSDEC, 2011



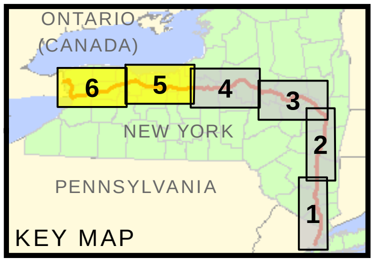
✶Alt. 125 as shown is a potential corridor used to analyze the potential operating characteristics, environmental impacts and cost for this speed (125 mph) threshold.

0 2.5 5 10
Miles

Wetlands

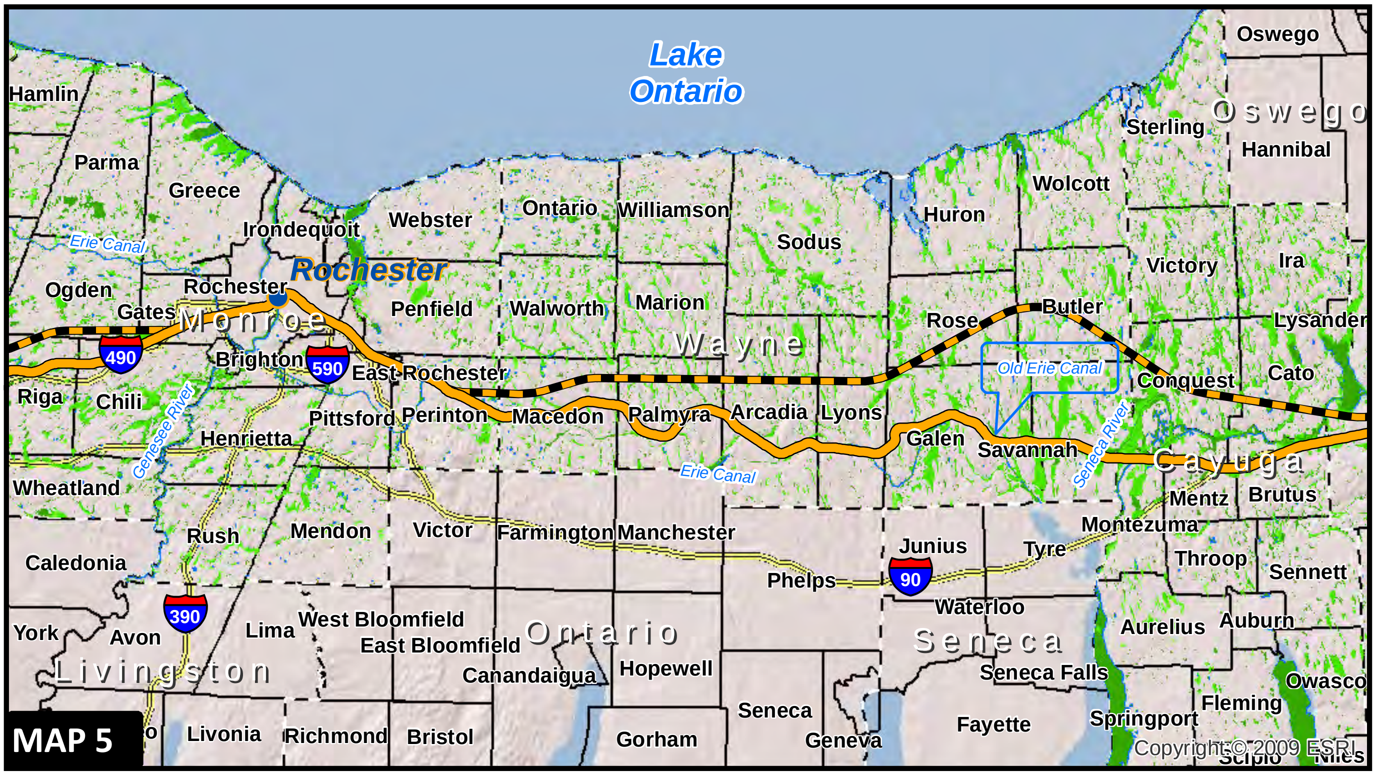
Exhibit G-8

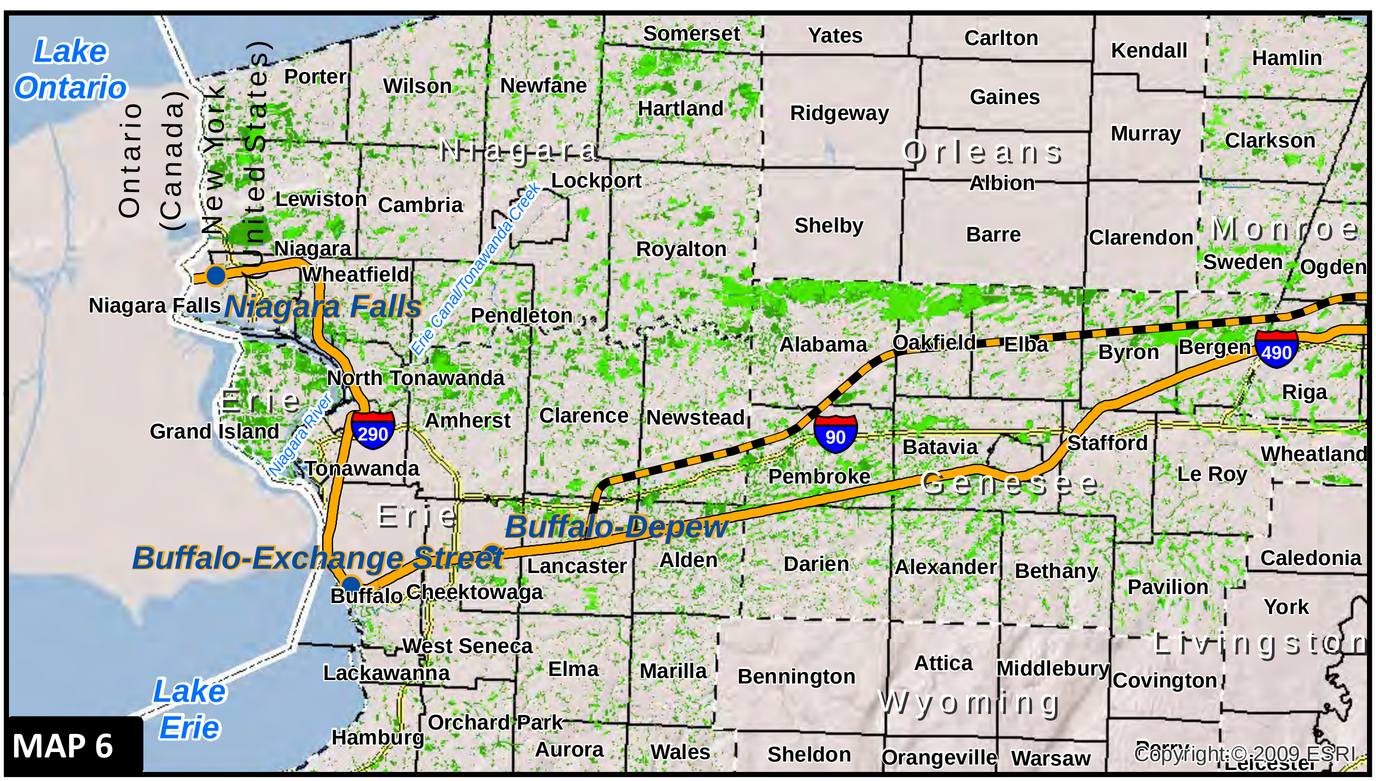
Tier 1 EIS
High Speed Rail
Empire Corridor Program



Amtrak Station
Existing Empire Corridor
Alternative 125 Corridor ✶
NYSDEC Freshwater Wetlands
NWI Wetlands

Source: NWI, 2011 and NYSDEC, 2011





✶Alt. 125 as shown is a potential corridor used to analyze the potential operating characteristics, environmental impacts and cost for this speed (125 mph) threshold.

N

0 2.5 5 10
Miles

Wetlands

Exhibit G-8

Tier 1 EIS
High Speed Rail
Empire Corridor Program

10. Aquifers

10.1 Empire Corridor South

All of the Build alternatives follow the existing Empire Corridor South for the majority of its length, deviating only in Rensselaer County, where Alternative 125 splits off 1.6 miles south of where the existing Empire Corridor turns to the west. In New York and Bronx Counties, the rail alignment study area does not pass over any U.S. EPA regulated SSAs or any primary or principal aquifers of New York State.

In **Westchester County**, the rail alignment study area crosses over both primary and principal aquifers of New York State. The corridor passes over approximately 0.26 square mile of the Croton-Ossining Primary Aquifer north and south of the Croton-Harmon Station and approximately 0.03 square mile of principal aquifers just north of Peekskill.

In the remaining counties (Putnam, Dutchess, Columbia and Rensselaer counties), the Empire Corridor does not pass over any U.S. EPA regulated SSAs or New York State primary aquifers. However, the corridor does pass over small segments of New York State principal aquifers in all four counties. In **Putnam County**, the rail corridor crosses over 0.09 square feet of principal aquifers just south of Cold Spring. In **Dutchess County**, the rail corridor passes over approximately 0.03 square mile of principal aquifers south of New Hamburg.

There is approximately 0.41 square mile of principal aquifers underlying the rail corridor in **Columbia County**, mainly between Hudson and the northern county line. In **Rensselaer County**, the majority of the 90/110 Study Area passes over 0.80 square mile of principal aquifers and the 125 Study Area passes over 0.83 square mile of principal aquifers.

10.2 Empire Corridor West/Niagara Branch: 90/110 Study Area

There are two aquifer types that underlie the study area in **Albany County**: the Schenectady-Niskayuna SSA (0.43 square mile) and a New York State principal aquifer (0.93 square mile).

The study area passes over the same two aquifer types in **Schenectady County**: the Schenectady-Niskayuna SSA (1.60 square miles) and New York State principal aquifers (0.30 square mile). In addition to these two aquifer types, the study area also crosses over approximately 1.29 square miles of the Schenectady Primary Aquifer. The study area is completely underlain with one or more of the above-mentioned aquifer types in this county.

The study area in **Montgomery County** is completely underlain with approximately 4.47 square miles of New York State principal aquifers. There are no Sole-Source Aquifers or primary aquifers in the study area in this county, or in Herkimer or Oneida counties.

The study area in Herkimer and Oneida Counties is underlain with New York State principal aquifers (2.70 square miles in Herkimer and 1.83 square miles in Oneida). In **Herkimer County**, the majority of the study area is underlain with principal aquifers with the exception of a small area near Little Falls. In **Oneida County**, principal aquifers underlie the study area for the majority of the eastern portion of the county, until just west of Rome, where no aquifer types are found under the study area. In **Madison County**, there are no aquifers located beneath the study area.

In **Onondaga County**, the study area overlies approximately 1.95 square miles of Baldwinsville Primary Aquifer. Where the railroad enters Syracuse, it passes over this primary aquifer, which extends to just east of the county line at which point it transitions to a New York State principal aquifer (0.20 square mile).

The study area also passes over only New York State principal aquifers in portions of Cayuga and Wayne counties. In **Cayuga County**, there is approximately 0.71 square mile of principal aquifers beneath the study area, mainly in the eastern half of the county. In **Wayne County**, the study area passes over approximately 2.41 square miles of principal aquifers, mainly in the western half of the county.

Monroe and Genesee counties are both underlain with portions of New York State primary aquifers. In **Monroe County**, the study area passes over approximately 0.88 square mile of the Irondongenessee Primary Aquifer, primarily between the eastern county boundary and Rochester. In **Genesee County**, the study area passes over approximately 0.37 square mile of the Batvia Primary Aquifer near the town of Batvia. There is also 0.37 square mile of New York State principal aquifers under the study area in Monroe County.

In **Erie County**, the study area passes over only one aquifer type. There is approximately 0.04 square mile of New York State principal aquifers scattered throughout the county. There are no aquifers beneath the study area in **Niagara County**.

10.3 Empire Corridor West/Niagara Branch: 125 Study Area

There are two aquifer types that underlie the study area in **Albany County**: the Schenectady-Niskayuna SSA (0.06 square mile) and a New York State principal aquifer (1.23 square miles).

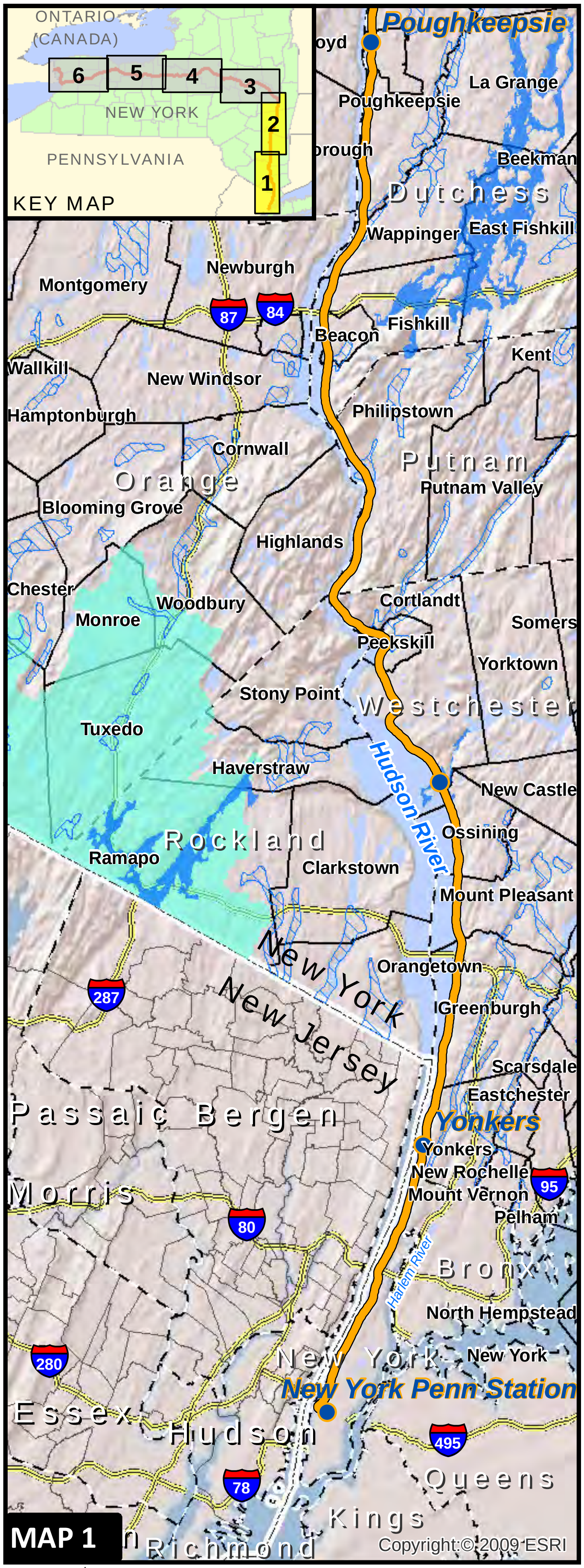
The study area passes over only New York State principal aquifers in Schenectady, Schoharie, Montgomery, Herkimer, Oneida and Madison counties. In **Schenectady County**, only the eastern portion of the study area passes over 0.59 square mile of principal aquifers. The study area in eastern **Schoharie County** and a small area near the Montgomery County border are underlain with principal aquifers. In total, the study area passes over 0.33 square mile of principal aquifers in Schoharie County.

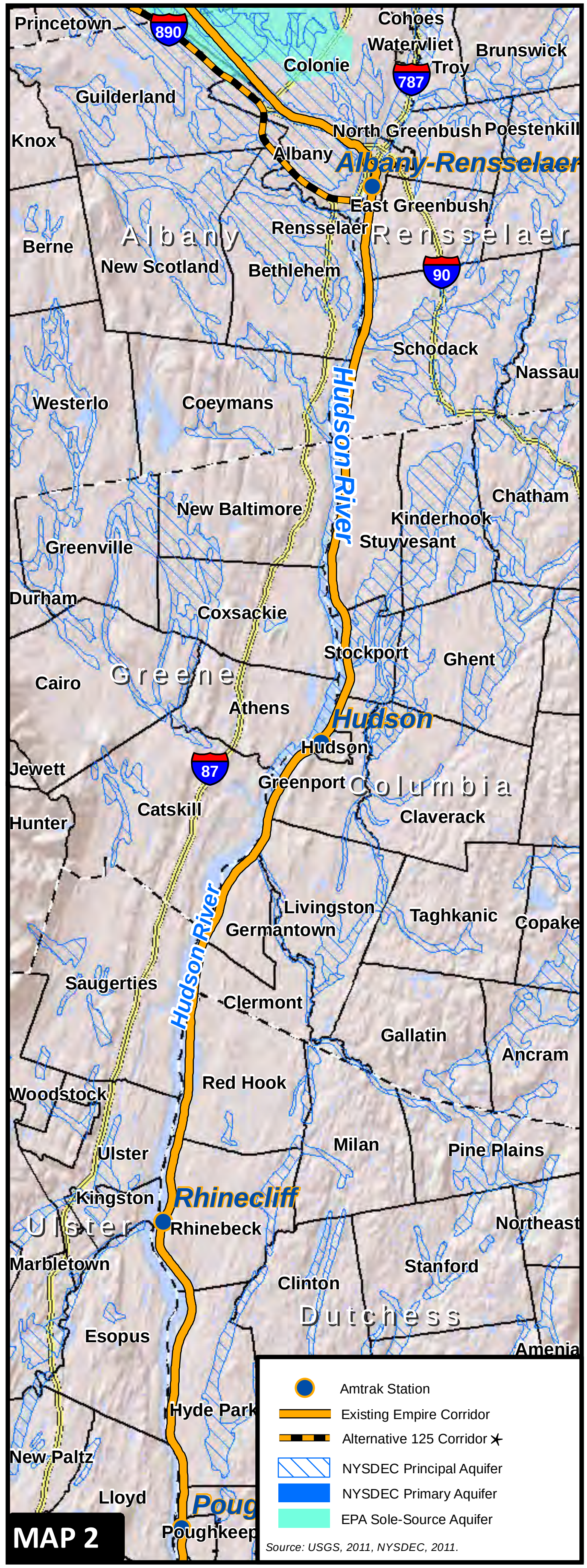
The study area in **Montgomery County** is underlain with approximately 0.41 square mile of New York State principal aquifers, primarily in the eastern part of the county. Principal aquifers occur sporadically in Herkimer, Oneida, and Madison counties and underlay 0.73 square mile in **Herkimer County**, 0.47 square mile in **Oneida County**, and 0.10 square mile in **Madison County**.

In **Onondaga County**, the study area overlies approximately 1.52 square miles of Baldwinsville Primary Aquifer. Where the railroad enters Syracuse, it passes over this primary aquifer, which continues along the study area to just east of the county line at which point it transitions to a New York State principal aquifer (0.20 square mile).

In **Cayuga County**, there is approximately 0.23 square mile of principal aquifers beneath the study area, mainly in the eastern half of the county. In **Wayne County**, the study area passes over approximately 0.84 square mile of principal aquifers, sporadically throughout the county. As the corridor approaches the western border of Wayne County, it passes over 0.02 square mile of the Irondongenessee Primary Aquifer. The study area continues over approximately 0.87 square mile of the Irondongenessee Primary Aquifer in **Monroe County**, primarily between the eastern county boundary and Rochester. In addition, there is 0.29 square mile of New York State principal aquifers underneath the corridor in eastern Monroe County.

In Genesee and Erie counties, the study area passes over only one aquifer type: New York State principal aquifers. There is 0.12 square mile of principal aquifers under the study area in **Genesee County** and 0.28 square mile in **Erie County**. There are no aquifers beneath the study area in **Niagara County**.





✶Alt. 125 as shown is a potential corridor used to analyze the potential operating characteristics, environmental impacts and cost for this speed (125 mph) threshold.

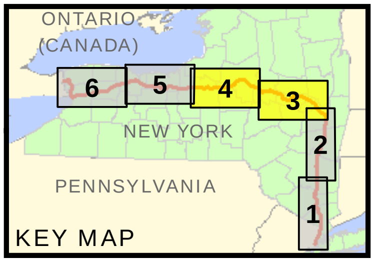
N

0 2.5 5 10
Miles

Aquifers

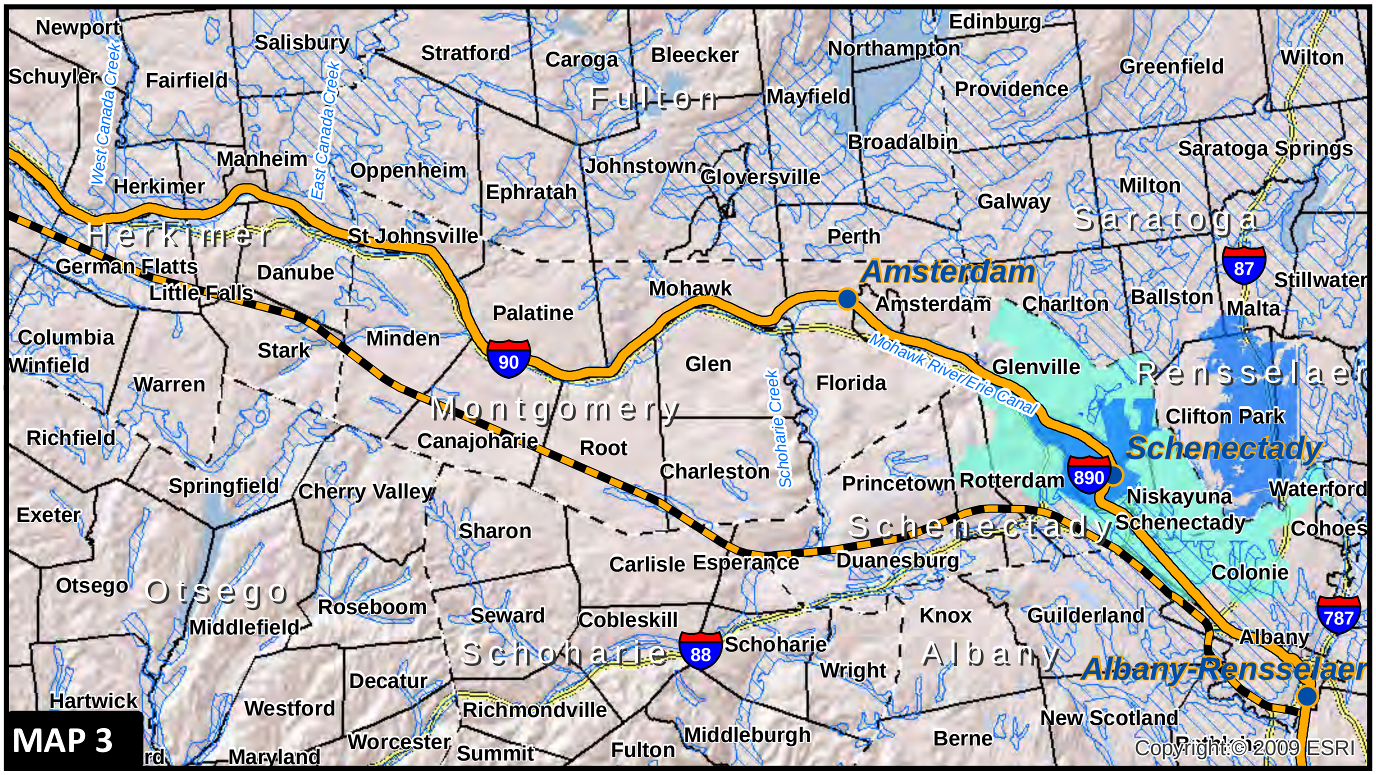
Exhibit G-9

Tier 1 EIS
High Speed Rail
Empire Corridor Program



- Amtrak Station
- Existing Empire Corridor
- Alternative 125 Corridor ✶
- NYSDEC Principal Aquifer
- NYSDEC Primary Aquifer
- EPA Sole-Source Aquifer

Source: USGS, 2011, NYSDEC, 2011.



✶Alt. 125 as shown is a potential corridor used to analyze the potential operating characteristics, environmental impacts and cost for this speed (125 mph) threshold.

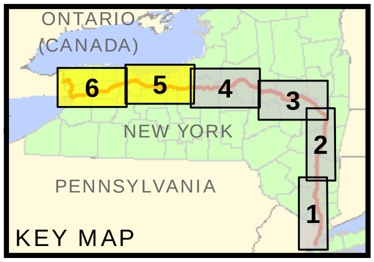
N

0 2.5 5 10
Miles

Aquifers

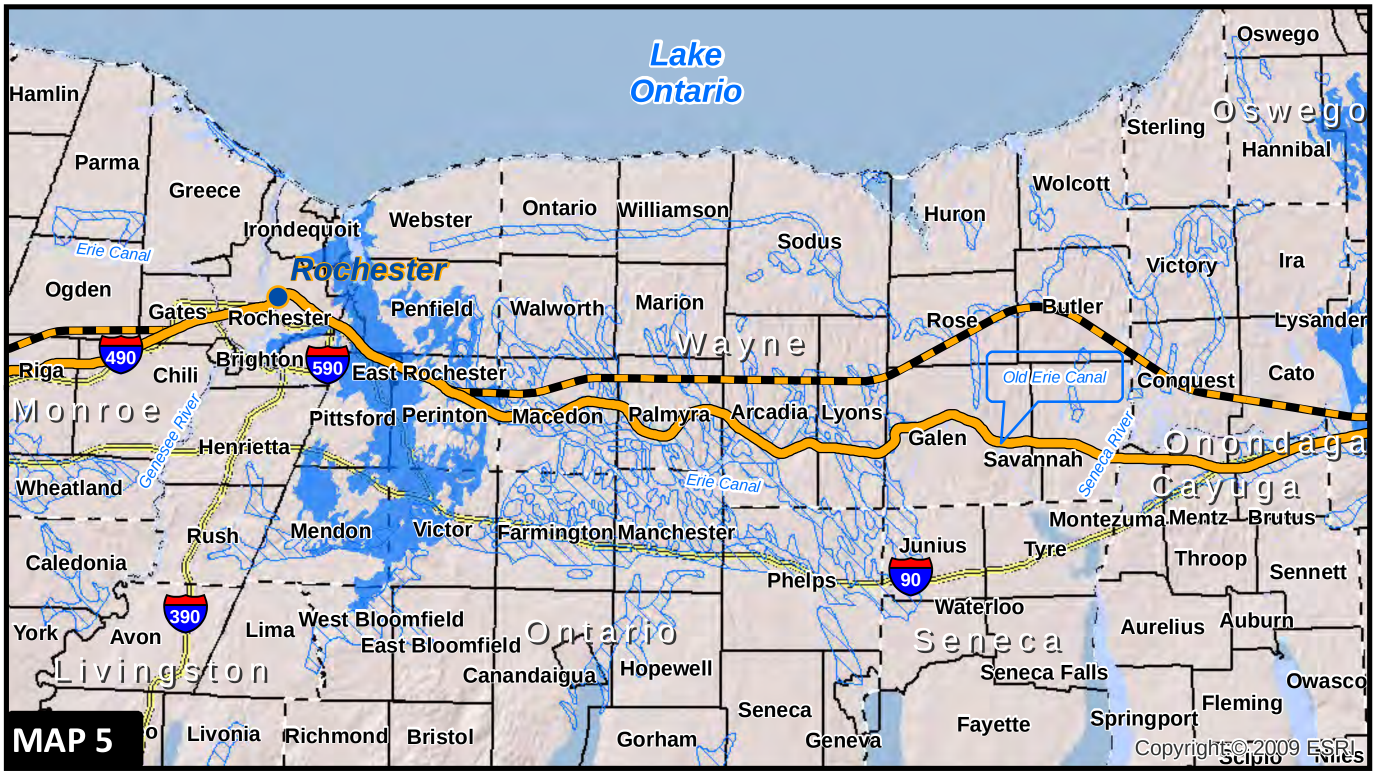
Exhibit G-9

Tier 1 EIS
High Speed Rail
Empire Corridor Program



●	Amtrak Station
—	Existing Empire Corridor
- -	Alternative 125 Corridor ✶
▨	NYSDEC Principal Aquifer
■	NYSDEC Primary Aquifer
■	EPA Sole-Source Aquifer

Source: USGS, 2011, NYSDEC, 2011.



✶Alt. 125 as shown is a potential corridor used to analyze the potential operating characteristics, environmental impacts and cost for this speed (125 mph) threshold.

0 2.5 5 10
Miles

Aquifers
Exhibit G-9

Tier 1 EIS
High Speed Rail
Empire Corridor Program

11. Historic and Cultural Resources

11.1 Archaeology

11.1.1 Historic Context

The Paleo Indian Period (c. 10,500 B.C. - c. 8000 B.C.) represents the earliest known human occupation of the land area that now known as New York. Approximately 14,000 years ago the Wisconsin Glacier retreated from the area leading to the emergence of a cold dry tundra environment. Sea levels were considerably lower than modern levels during this period. [8] For many years, archaeologists characterized Paleo Indians as "big game hunters;" however, more recent studies have redefined how we think of these early Americans. The recovery of fish scales, charred nutshells and plant and animal remains, has resulted in a changing picture of the Paleoindian diet, settlement, and subsistence patterns suggesting a complex and flexible lifestyle among the earliest Americans. The highly mobile nomadic bands of this period specialized in hunting large game animals such as mammoth, moose-elk, bison, and caribou and gathering plant foods. It has been theorized that the end of the Paleo-Indian Period arose from the failure of over-specialized, big-game hunting (Snow 1980:150-157). Based on evidence from excavated Paleo-Indian sites in the Northeast, there was a preference for high, well-drained areas in the vicinity of streams or wetlands.[9] Sites have also been found near lithic sources, rock shelters and lower river terraces. [10]

During the Archaic Period (c. 8000 B.C. - 1000 B.C.) a major shift occurred in the subsistence and settlement patterns of Native Americans. Archaic period peoples still relied on hunting and gathering for subsistence, but the emphasis shifted from hunting large animal species, which were becoming unavailable, to smaller game and collecting plants in a deciduous forest. The settlement pattern of the Archaic people consisted of small bands that occupied larger and relatively more permanent habitations sites along waterways. [11] Typically such sites are located on high ground overlooking water courses. This large period has been divided up into four smaller periods, the Early, Middle, Late and Terminal Archaic.

The environment during the Early Archaic (c. 8000 B.C. - 6000 B.C.) displayed a trend toward a milder climate and the gradual emergence of a deciduous-coniferous forest. [12] The large Pleistocene fauna were gradually replaced by modern species such as elk, moose, bear, beaver, and deer. New species of plant material suitable for human consumption became abundant. The increasing diversification of utilized food sources is further demonstrated by a more complex tool kit, including bifurcated or basally notched projectile points and a wide variety of plant processing equipment such as grinding stones, mortars and pestles. A population increase took place during the Middle Archaic Period (c. 6000 - c. 4000 B.C.), which is characterized by a moister and warmer climate and the emergence of an oak-hickory forest. The settlement pattern during this period displays specialized sites and increasing cultural complexity. The exploitation of the diverse range

[8] /Boesch, Eugene J. Archaeological Evaluation and Sensitivity Assessment of Staten Island, New York. Prepared for the New York City Landmarks Preservation Commission. 1994.

[9] /Boesch, Eugene J. Archaeological Evaluation and Sensitivity Assessment of Staten Island, New York. Prepared for the New York City Landmarks Preservation Commission. 1994.

[10] /Ritchie, William A. The Archaeology of New York State (Revised Edition). Harrison: Harbor Hill Books. 1980,

[11] /Boesch, Eugene J. Archaeological Evaluation and Sensitivity Assessment of Staten Island, New York. Prepared for the New York City Landmarks Preservation Commission. 1994.

[12] /Ritchie, William A. and Robert E. Funk,Evidence for Early Archaic Occupation on Staten Island. *Pennsylvania Archaeologist* 31 (3): 45-60. 1971.

of animal and plant resources continued with an increasing importance of aquatic resources such as mollusks and fish.[13] In addition to projectile points, grinding stones, mortars, and pestles, are found in Middle Archaic period sites.[14] Late Archaic people (c. 4000 - c. 1000 B.C.) were specialized hunter-gatherers who seasonally exploited a variety of upland and lowland settings. As the period progressed, the dwindling melt waters from disappearing glaciers and the reduced flow of streams and rivers promoted the formation of swamps and mudflats, congenial environments for migratory waterfowl, edible plants and shellfish. The new mixed hardwood forests of oak, hickory, chestnut, beech and elm attracted white-tailed deer, wild turkey, moose and beaver. The large herbivores of the Pleistocene were rapidly becoming extinct and the Archaic Indians depended increasingly on smaller game and the plants of the deciduous forest. The tool kit of these peoples included new projectile point types as well as milling equipment, stone axes, and adzes[15]. During the Terminal Archaic Period (c. 1700 B.C. - c. 1000 B.C.), native peoples developed new and radically different broad bladed projectile points (Boesch 1994a).

The Woodland Period (c. 1000 B.C. - 1600 A.D.) is generally divided into Early, Middle and Late Woodland on the basis of cultural materials and settlement-subsistence patterns. The Early Woodland was essentially a continuation of the tool design traditions of the Late Archaic. During this period, clay pottery vessels gradually replaced the soapstone bowls. Cord marked vessels became common during the Middle Woodland Period (c. A.D. 1 to c. 1000 A.D.). The Early and Middle Woodland periods display significant evidence for a change in settlement patterns toward a more sedentary lifestyle. The discovery of large storage pits and larger sites in general has fueled this theory. Some horticulture may have been utilized at this point but not to the extent that it was in the Late Woodland period. In the Late Woodland period (c. 1000 A.D. - 1600 A.D.), triangular projectile points such as the Levanna and Madison types, were common throughout the Northeast.[16] Made both of local and non-local stones, these artifacts bear witness to the broad sphere of interaction between groups of native peoples in the Northeast. This period saw the emergence of collared ceramic vessels, many with decorations. Horticulture flourished during this period and with it, the appearance of large, permanent or semi-permanent villages. Plant and processing tools became increasingly common, suggesting an extensive harvesting of wild plant foods. Maize cultivation may have begun as early as 800 years ago. The bow and arrow, replacing the spear and javelin, pottery vessels instead of soap stone ones, and pipe smoking, were all introduced at this time. A semi-sedentary culture, the Woodland Indians moved seasonally between villages within palisaded enclosures and campsites, hunting deer, turkey, raccoon, muskrat, ducks and other game and fishing with dug-out boats, bone hooks, harpoons and nets with pebble sinkers. Their shellfish refuse heaps, called "middens," sometimes reached immense proportions.[17]

11.1.2 Methodology

As noted in Chapter 4, information concerning the location and character of previously-identified archaeological sites in the direct APEs was collected through a review of the site files of SHPO and NYSM. Exhibit G-10 identifies the number and type of sites in each county in the direct APEs for the

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[13] /Snow, Dean R. *The Archaeology of New England.* Academic Press: New York. 1980.

[14] /Boesch, Eugene J. Archaeological Evaluation and Sensitivity Assessment of Staten Island, New York. Prepared for the New York City Landmarks Preservation Commission. 1994.

[15] /Boesch, Eugene J. Archaeological Evaluation and Sensitivity Assessment of Staten Island, New York. Prepared for the New York City Landmarks Preservation Commission. 1994.

[16] /Lenik, Edward J. “Cultural Contact and Trade in Prehistoric Staten Island.” Proceedings of the Staten Island Institute of Arts and Sciences, vol. 34, no. 1. 1989, 27.

[17] /Ritchie, William A. The Archaeology of New York State (Revised Edition). Harrison: Harbor Hill Books. 1980, 80, 267.

90/110 Study Area and the 125 Study Area. To assist in the Tier 1 analysis, the sites were grouped into various basic site type categories developed in coordination with SHPO. NYSM sites have been divided into point and polygon sites. In general, NYSM polygon sites are mapped as polygons and typically denote sites that were identified less recently and whose boundaries are not clearly defined. NYSM point sites were typically identified more recently.

The previously-identified Native American sites in the direct APEs were grouped into the following site type categories:

- Burial Site/Mound;
- Campsite/Workshop;
- Cave/Rockshelter;
- Habitation/Village Site;
- Midden;
- Other;
- Pictograph/Petroglyph;
- Quarry;
- Stray Find/ Traces of Occupation;
- Trail;
- Unknown.

Historic-period sites types located in the direct APEs were fit into the following broad historic site categories:

- Cemetery/Burial/Funerary;
- Domestic;
- Industrial/Commercial;
- Maritime;
- Transportation/ Infrastructure;
- Other;
- Unspecified/Unknown.

11.1.3 Direct APE: 90/110 Study Area

A total of 166 previously-identified archaeological sites have been identified within the direct APE for the 90/110 Study Area that extends along the Empire Corridor South/West and the Niagara Branch. Of these sites, 47 are SHPO archaeological sites,117 are NYSM sites (13 point sites and 104 polygon sites), and two are sites identified by the Oneida Nation (Sites 1 and 2). There are a total of 36 burial/habitation sites.

11.1.4 Direct APE: 125 Study Area

A total of 126 previously-identified archaeological sites have been identified within the direct APE for the 125 Study Area that extends along the Empire Corridor South/West and the Niagara Branch. Of these, 27 are SHPO archaeological sites, 96 are NYSM sites (8 point sites and 88 polygon sites), and three are sites identified by the Oneida Nation (Sites 3 through 5). There are a total of 27 burial/habitation sites.

Exhibit G-10—Catalog of Previously Identified Archaeological Sites within the Direct APEs

	SHPO Sites		**NYSM Point Sites**		**NYSM Polygon Sites**		**Oneida Nation Sites**	
	90/110 Study Area	125 Study Area	90/110 Study Area	125 Study Area	90/110 Study Area	125 Study Area	90/110 Study Area	125 Study Area
New York	N (U); H (O); N (M)	N (U); H (O); N (M)			N (H, M); N (M); N (C); N (R)	N (H, M); N (M); N (C); N (R)		
Bronx					N (M)	N (M)		
Westchester			N (R); N (M); 2 N (U)	N (R); N (M); 2 N (U)	2 N (U); 3 N (H, B); 4 N (H); N (B); 3 N (S); N (M); 2 N (C)	2 N (U); 3 N (H, B); 4 N (H); N (B); 3 N (S); N (M); 2 N (C)		
Putnam					N (C); H (U); N (B); N (H); N (S)	N (C); H (U); N (B); N (H); N (S)		
Dutchess	N (C); N (S); H (U); H (I, M)	N (C); N (S); H (U); H (I, M)			4 N (U); 2 N (C); 2 N (C, B); 5 N (H); N (Q); 6 N (S)	4 N (U); 2 N (C); 2 N (C, B); 5 N (H); N (Q); 6 N (S)		
Columbia	N (C); N (R)	N (C); N (R)	N (U)	N (U)	4 N (C); N (H); 2 N (U)	4 N (C); N (H); 2 N (U)		
Rensselaer	H (I); 2 N (C); H (M, I)	H (I); 2 N (C); H (M, I)			N (S)	N (S)		
Albany		**H (I)**				**N (C)**		
Schenectady	N (U); X; 2 H (U); N (B)				N (B); 2 N (U); N (S); N (H); N (C)	N (U); **N (C)**		
Schoharie				**N (U)**				
Montgomery	4 N (U); 8 X; N (C); 2 H (U); 2 N (P); H (I)	**N (S); N (S), H (U)**	N (S); 2 N (U); 3 N (H); N (B, H)		N (U); 5 N (H); N (C); N (P); N (B); N (S); 3 N (T)			
Herkimer	X; N (U); H (M)	**H (B)**			N (H); 4 N (S, T)			
Oneida					3 N (C); N (B)	**N (H); N (B); N (C)**	Site 1; Site 2	Site 3
Madison		**N (C)**				**2 N (S)**		Site 4; Site 5
Onondaga	H (I); H (U)	**2 H (D)**; H (I)		**N (S)**	N (H); N (C, H); 4 N (S); N (C); N (U)	**N (C); 2 N (H)**; N (C); N (C, H); 4 N (S); N (U)		
Cayuga			N (U)			**N (S); N (B)**		
Wayne					N (S)	**N (S); N (C)**		
Monroe					N (B); N (U); N (T, S); N (C); N (S)	N (B); N (U); N (T, S); N (C)		
Genesee	2 N (C, S); N (S); H (D)	**N (S)**		**N (C)**	2 N (T)	**N (C)**		
Erie	N (U); H (F)	N (U); H (F); **2 N (C); N (C, S)**			2 N (S); N (T); N (C)	2 N (S); N (T); N (C); **N (S)**		
Niagara	H (F)	H (F)			N (C); N (H) ; N (T)	N (C); N (H) ; N (T)		
TOTALS	**47**	**27**	**13**	**8**	**104**	**88**	**2**	**3**

Note: Native American Sites (N): (B) Burial; (C) Camp site/Tool Production/ Workshop; (H) Habitation/Village/Hamlet; (M) Midden; (O) Other; (P) Petroglyph/Pictograph; (Q) Quarry; (R) Rockshelter; (S) Stray Finds/"Traces of

Occupation"; (T) Trail; (U) Unspecified/Unknown Historic-Period Sites (H): (B) Burial/Cemetery; (D) Domestic; (F) Transportation/Infrastructure/Utilities; (I) Industrial or Commercial Deposits; (M) Maritime; (O) Other; (U) Unspecified/Unknown (X): Unknown whether Precontact or Historic Period Resources shown in bold indicate archaeological sites located only in the direct APE for new track proposed for the 125 Alternative

11.2 Architectural Resources

11.2.1 Historic Context

The earliest transportation networks in the State of New York consisted of waterways and Native American trails. The Hudson River was a natural highway for the region, and in the 1620s the Dutch established New Amsterdam at its mouth and built Fort Orange at the mouth of its principal tributary, the Mohawk River. Trading posts were defined between these two points and the surrounding area became known as the province of New Netherland. In 1664, New Netherland became the province of New York under British establishment.

Ferries, canals, and railroads have all been important to the development of transportation in New York State. Canals and railroads dominated transportation development in the first half of the 19th century. Efficient transportation was an important means of getting goods to market and a major factor in the value of land in different parts of the state. The Erie Canal, completed in 1825, spurred the westward migration of American settlers, opened the only trade route west of the Appalachians, and secured New York as the preeminent commercial city in the United States.[18] As a result of the increase in trade and traffic, the cities of Albany, Syracuse, Rochester, and Buffalo were formed. During the same period, the first railroad company in New York State, the Mohawk and Hudson, began operation between Albany and Schenectady in 1831.[19] The success of this railroad sparked a rail boom. Money flowed into lines that linked other Erie Canal towns, and within a decade through service was available from Albany to Buffalo.[20] In 1837, the Buffalo & Niagara Falls Railroad also began operations, and the 22-mile stretch became a three mile journey powered by a wood-stoked steam locomotive. In 1852, the railroad developed tracks west of the Erie Canal, and in December of 1853, the Buffalo & Niagara Falls railroad was leased to the newly founded New York Central Railroad.[21] During the Civil War, the Mississippi River was closed to commercial traffic. As a result, passengers and freight increased on established east-west railroads, such as the Erie and New York Central. The Erie Railroad became the first through line to the Midwest and Great Lakes in 1861, with financial control of lines to Buffalo and Chicago.[22] Following in 1869, Cornelius Vanderbilt, merged the Hudson River Railroad and the New York Central Railroad into the New York Central and Hudson River Railroad.

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[18]/ New York State Canal Corporation. Unlock the Legend of The New York State Canal System." Pamphlet. 1999.

[19]/ Ellis, Edward Robb. *The Epic of New York City.* New York: Old Town Books. 1966, 259.

[20]/ Burrows, Edwin G. and Mike Wallace. *Gotham, A History of New York City to 1898*. New York: Oxford University Press. 1999, 564.

[21]/ "Buffalo & Niagara Falls Railroad 1834." Website Niagara Frontier.com, accessed August 24, 2011 <http://www.niagarafrontier.com/railroadhistory.html#B7>. 2011..

[22]/ A.G. Lichtenstein & Associates, Inc. "New Jersey Historic Bridge Survey." 1994, 26.

11.2.2 Overview of APE

Previously-identified architectural resources located within the direct and indirect APEs for the 90/110 Study Area and the 125 Study Area are summarized in Exhibit 4-27 in Chapter 4 of the EIS and Exhibit G-11 respectively. The NHLs, S/NR-listed- and -eligible historic districts are noted in the text below. Detailed tables listing the S/NR-listed and -eligible individual resources are provided in Exhibit G-12, and Exhibit G-13, respectively. The approximate locations of these resources are illustrated in Exhibit G-14, Historic and Cultural Maps (3 of 3).

11.2.3 Direct APE: 90/110 Study Area

A total of 79 previously-identified architectural resources are located in the direct APE for the 90/110 Study Area that extends along the Empire Corridor South/West and the Niagara Branch. These resources are summarized by county in Exhibit 4-27 in Chapter 4 of the EIS. Of the 79 architectural resources, two resources are NHLs: Fort Klock in St. Johnsville, Montgomery Country and the Hudson River Historic District in Dutchess and Columbia Counties. Fort Klock was designated a National Historic Landmark District by the U.S. Secretary of the Interior in 1973. Fort Klock, a fortified stone homestead built in 1750, is part of a 30-acre complex that includes the historic homestead, a renovated Colonial Dutch Barn, blacksmith shop, and 19th century schoolhouse. The Hudson River National Historic Landmark District was designated by the U.S. Secretary of the Interior in 1990. The 32-square-mile district stretches from Germantown in Columbia County to Hyde Park in Dutchess County. It includes over 40 riverfront estates, two villages, four hamlets, and significant designed landscapes and farmlands.

There are 53 S/NR-listed resources within the direct APE. Of these, 41 are individually listed while 12 are historic districts. The 53 individually listed resources are identified in Exhibit G-12. The 12 historic districts include:

- <u>Putnam County</u> (**2 total**)
  - Cold Spring Historic District - comprised of 208 contributing buildings and 11 noncontributing buildings, the earliest of which dates from 1780. The majority of the buildings in the district date from the mid-19th century.
  - Garrison Landing Historic District - the 53-acre district contains 15 buildings and one structure consisting mainly of a small commercial and residential area located between what is now the Metro-North Hudson Line and the Hudson River in Garrison, New York. Its buildings were mostly erected in the 1850s, around the time the Hudson River Railroad, later the New York Central, laid the tracks.

- <u>Dutchess County</u> (**2 total**)
  - Stone Street Historic District - composed of a one-acre site containing four houses constructed in the mid-19th century in the vernacular Greek Revival and Second Empire styles.
  - Wheeler Hill Historic District – composed of 49 contributing buildings, 15 contributing sites, and four contributing structures, and encompasses the estates of Obercreek,

Elmhurst, Edge Hill, Henry Suydam, William Crosby, and Carnwarth Farms that were developed between 1740 and 1940.

- Columbia County (**2 total**)
  - Clermont Estates Historic District - composed of 44 contributing buildings, was subsumed into the Hudson River National Historic Landmark District in 1990.
  - Hudson Historic District - consists of 756 contributing properties in a 139-acre area stretching from the Hudson River to the town of Hudson's eastern boundary.

- Rensselaer County (**1 total**)
  - Schodack Landing Historic District - consists of 86 contributing buildings located in the hamlet of Schodack Landing and includes a variety of buildings dated from the 18th through early 20th centuries.

- Albany County (**1 total**)
  - Broadway-Livingston Avenue Historic District - consists of 20 contributing buildings, including a collection of two-and three-story rowhouses built 1829-1876 and a railroad bridge built in 1900.

- Schenectady County (**1 total**)
  - Stockade Historic District - district is located in the northwest corner of Schenectady on the banks of the Mohawk River, and contains a variety of Dutch and English 17th and 18th century buildings.

- Montgomery County (**1 total**)
  - Nelliston Historic District – consists of 56 contributing buildings on three residential streets developed between 1860 and 1890 and a 1902 railroad station.

- Monroe County (**1 total**)
  - Brown's Race Historic District - located in Rochester along the Genesee River, the district contains 15 contributing buildings, 2 contributing structures, and 14 contributing sites in a primarily 19th century industrial complex.

- Genesee County (**1 total**)
  - Lake Street Historic District - located in Bergen, the district contains several of Romanesque Revival buildings from the last decades of the late 19th and early 20th centuries.

At least seven S/NR-listed resources directly associated with the railroad are located in the direct APE. These include the Bear Mountain Bridge and Toll House in Westchester County; the Croton North Railroad Station and the Philipse Manor Railroad Station in Westchester County; the Poughkeepsie Railroad Station and Hyde Park Railroad Station in Dutchess County; the New York Central Terminal in Buffalo, Erie County; and the Stuyvesant Railroad Station in Columbia County.

There are 24 resources that SHPO has previously determined S/NR-eligible within the direct APE. Of these, 20 are individual resources and four are historic districts. The 20 individual resources are identified inExhibit G-13. The four S/NR-eligible historic districts are: the Lord Burnham Factory Complex located in Westchester County (contains two historic resources); the non-contiguous New York Canal System Historic District located in Schenectady, Montgomery, Wayne, and Monroe counties (contains 12 historic resources); the Little Falls Historic District located in Herkimer County (contains 10 historic resources); and the Seneca Industrial Center located in Erie County (contains seven historic resources).

At least four S/NR-eligible resources directly associated with the railroad are located in the direct APE. These include the Scarborough Railroad Station in Westchester County; the Metro-North Railroad Bridge (BIN 5524010) in Dutchess County; the Livingston Avenue Bridge in Rensselaer County; and the Oriskany Railroad Station in Oneida County.

It should be noted that approximately 350 bridges meeting the 50 year age criterion for S/NR eligibility are located within the existing railroad alignment and thus within the direct APE. Any bridges 50 years old or older would also be evaluated for potential S/NR eligibility as part of the Tier 2 analysis. In order to evaluate the significance of these bridges, an architectural historian would conduct a field visit and would perform documentary research. The New York State Department of Transportation's Contextual Study of New York State's pre-1961 Bridges (November 1999), Evaluation of National Register Eligibility (January 2002), and Historic Bridge Management Plan (September 2002), would be consulted among other documentary sources.

11.2.4 Direct APE: 125 Study Area

A total of 61 previously-identified architectural resources are located in the direct APE for the 125 Study Area that extends along the Empire Corridor South/West and the Niagara Branch. These resources are summarized by county in Exhibit 4-27 in Chapter 4 of the EIS. Of the 61, one is an NHL: the Hudson River Historic District in Dutchess and Columbia Counties (described above).

There are 47 S/NR-listed resources within the direct APE. Of these, 39 are individually-listed and eight are historic districts. The 39 individually-listed resources are identified in Exhibit G-12. Three individually-listed S/NR resources are located within the portion of the direct APE where new track is proposed for this alternative. These include: the Robert Liddle Farmhouse (MP 167) in Schenectady County; the Deferriere House (MP 253) in Madison County; and the Warren Hull House (MP 411) located in Erie County. The eight historic districts include: Cold Spring Historic District; Garrison Landing Historic District; Stone Street Historic District; Wheeler Hill Historic District; Clermont Estates Historic District; Hudson Historic District; Schodack Landing Historic District; and Brown's Race Historic District (described above). There are no S/NR-listed historic districts located in the portion of the direct APE where new track is proposed.

There are 13 resources in the direct APE that SHPO has previously determined S/NR-eligible. Of these, 10 are individual resources and three are historic districts. None of the S/NR-eligible resources are located in the portion of the direct APE where new track is proposed. These resources are all located in areas where track for this alternative would overlap with existing track. The 10 individual resources are identified in Exhibit G-13. The three S/NR-eligible historic districts are: the Lord Burnham Factory Complex located in Westchester County (contains two historic resources); the non-contiguous New York Canal System Historic District located in Schenectady, Montgomery, Wayne, and Monroe counties (contains 12 historic resources); and the Seneca Industrial Center located in Erie County (contains seven historic resources).

11.2.5 Indirect APE: 90/110 Study Area

A total of 356 previously-identified architectural resources are located in the indirect APE for the 90/110 Study Area that extends along the Empire Corridor South/West and the Niagara Branch. These resources are summarized in Exhibit G-11. Of the 356 architectural resources, four are NHLs. These include the two NHLs described above, the General Electric Research Laboratory in Schenectady County, and Sunnyside in Westchester County. The General Electric Research Laboratory is the first industrial lab research facility established in 1900. Sunnyside, formerly the home of noted early American author Washington Irving, is a historic house set on 10 acres alongside the Hudson River in Tarrytown.

There are 146 S/NR-listed resources within the indirect APE for the 90/110 Study Area. Of these, 122 are individually listed and 27 are historic districts. The 122 individually listed resources are identified in Exhibit G-12. The 27 historic districts in the indirect APE include the 12 resources within the direct APE (described above) and the additional 15 described below:

- New York County (**2 total**)
  - Riverside Drive – West 80th-81st Streets Historic District - contains 32 rowhouses and town houses of the 1890s and three turn-of-the-century tenements, exhibiting a variety of architectural influences, and one later neo-Classical style apartment building of the 1920s.
  - Riverside Drive – West 105th Street Historic District - district is an L-shaped area extending along one block of West 105th Street, Riverside Drive and a part of the south side of West 106th Street, comprising 30 buildings on a block and a half.

- Westchester County (**1 total**)
  - Scarborough Historic District - district contains 26 contributing buildings, two contributing sites, and one contributing structure. They are associated with three estates, a school complex, a cemetery, and two religious properties.

- Dutchess County (**3 total**)
  - Mill Street-North Clover Street Historic District - district is 27 acres in size, located between downtown Poughkeepsie and the Hudson River. Contains approximately 139 historic buildings dating primarily to the mid-19th century.
  - Union Street Historic District - district is an eight-block area located southwest of downtown Poughkeepsie dating to the late-18th century.
  - Main Street Historic District - the district, composed of six contributing structures including three houses and three commercial buildings, is located just west of the train station. The six buildings located on a single acre are an intact remnant of the hamlet as it developed in the mid-19th century, prior to the Hudson River Railroad's construction, which cut it in half.

- Albany County (**1 total**)
  - Clinton Avenue Historic District - the district is a 70-acre site in Albany composed of approximately 600 contributing buildings consisting primarily of 19th-century row houses in a variety of architectural styles.

- Schenectady County (**1 total**)
  - Union Street Historic District - the 65-acre district area includes 184 buildings built over the course of the 19th century.

- Oneida County (**1 total**)
  - Lower Genesee Street Historic District - located in Utica, the district contains 45 contributing buildings dating from 1830 to 1929 north of the city center.

- Madison County (**1 total**)
  - South Peterboro Street Commercial Historic District - The district, located in Canastota, contains 20 contributing primarily two and three-story brick buildings built between 1870 and 1930.

- Monroe County (**5 total**)
  - Bridge Square Historic District - district contains 24 contributing buildings that consist primarily of two-, three-, and four-story brick masonry commercial and industrial buildings dating from 1826 to 1928.
  - East Avenue Historic District - the district, located in Rochester, consists of approximately 700 buildings dating from the 19th and early 20th centuries.
  - Madison Square-West Main Street Historic District - located in Rochester, the district consists of 102 contributing structures and two contributing sites. 65 of the contributing structures are residential, with three contributing dependencies. Also in the district are 24 contributing commercial buildings and nine industrial buildings.
  - St. Paul-North Water Streets Historic District - district consists of a relatively intact cluster of 17 commercial, manufacturing, and warehouse structures in Rochester.
  - State Street Historic District - district consists of the last surviving continuous row of 19th century masonry commercial buildings within Rochester's Inner Loop. They were developed between 1825 and 1900 and the row forms an unpretentious unbroken wall of 12 buildings.

At least eight S/NR-listed resources directly associated with the railroad are located within the indirect APE. These include the seven resources within the direct APE (described above) and the Andrews Street Bridge in Rochester, Monroe County.

There are 203 architectural resources within the indirect APE for the 90/110 Study Area that SHPO has previously determined eligible for S/NR listing. Of these, 183 are individual resources and 20 are historic districts. The 183 individual resources are identified in Exhibit G-13. The 20 historic districts include the four districts described in the direct APE and the additional 16 described below:

- New York County – Broadway-Riverside Drive Historic District (contains one resource); Riverside Drive–West 135th-136th Streets Historic District (contains five resources); Riverside–West End Historic District (contains 30 resources); Upper Broadway Historic District (contains one resource); and West End Collegiate Historic District (contains 21 resources)
- Westchester County - Anaconda Wire & Cable Company (contains three resources)
- Montgomery County - Amsterdam East Main Street Historic District (contains nine resources); and Fonda Fairgrounds & Speedway Historic District (contains two resources)
- Monroe County - Birch Crescent Historic District (contains 12 resources); Prince Alexander Historic District (contains 12 resources); and Public Market Historic District (contains ten resources)
- Onondaga County - New York State Fairgrounds Historic District (contains one resource)

- Wayne County - Village of Clyde Historic District (contains eight resources)
- Genesee County - Village of Bergen Historic District (contains five resources)
- Erie County - Joseph Ellicott Downtown Historic District (contains one resource); and Wende Correctional Facility Historic District (contains one resource)

At least eight S/NR-eligible resources directly associated with the railroad are located within the indirect APE. These include the four resources within the direct APE (described above), and the Yonkers Railroad Station and the Tarrytown Railroad Station in Westchester County; the Mid-Hudson Bridge in Dutchess County; and the Rip Van Winkle Bridge in Columbia County.

Exhibit G-11—Architectural Resources within the Indirect APEs

County	NHL		S/NR-Listed Resources - individual		S/NR-Listed Resources - districts		**S/NR-Listed Resources Total**		S/NR-Eligible Resources-individual		S/NR-Eligible Resources – districts		**S/NR-Eligible Resources Total**		**Total Resources**	
	90/110	125	90/110	125	90/110	125	90/110	125	90/110	125	90/110	125	90/110	125	90/110	125
New York			15	15	2	2	**17**	**17**	47	47	5	5	**52**	**52**	**69**	**69**
Bronx			4	4			**4**	**4**					**0**	**0**	**4**	**4**
Westchester	1	1	17	17	1	1	**18**	**18**	19	19	2	2	**21**	**21**	**39**	**39**
Putnam			5	5	2	2	**7**	**7**					**0**	**0**	**7**	**7**
Dutchess			27	27	5	5	**32**	**32**	4	4			**4**	**4**	**36**	**36**
Columbia			5	5	2	2	**7**	**7**	2	2			**2**	**2**	**9**	**9**
Greene							**0**	**0**					**0**	**0**	**0**	**0**
Rensselaer			1	1	1	1	**2**	**2**	31	12			**31**	**12**	**33**	**14**
Albany			3	1	2		**5**	**1**	3	1			**3**	**1**	**8**	**2**
Schenectady	1		4	2	2		**6**	**2**		1			**0**	**1**	**6**	**3**
Montgomery	1		10		1		**11**	**0**	40		2		**42**	**0**	**52**	**0**
Herkimer			4				**4**	**0**	13		1		**14**	**0**	**18**	**0**
Oneida			6		1		**7**	**0**	2				**2**	**0**	**9**	**0**
Madison			6	1	1		**7**	**1**					**0**	**0**	**6**	**1**
Onondaga			1	1			**1**	**1**			1	1	**1**	**1**	**2**	**2**
Cayuga							**0**	**0**					**0**	**0**	**0**	**0**
Wayne			1				**1**	**0**			1		**1**	**0**	**2**	**0**
Monroe			6	6	6	6	**12**	**12**	14	13	3	3	**17**	**16**	**28**	**28**
Genesee					1		**1**	**0**	1		1		**2**	**4**	**3**	**4**
Erie			4	5			**4**	**5**	4	4	3	2	**7**	**5**	**11**	**10**
Niagara			3	3			**3**	**3**	3	3			**3**	**0**	**6**	**3**
Multiple Counties	1	1					**0**	**0**			1	1	**1**	**1**	**1**	**1**
TOTALS	**4**	**2**	**122**	**93**	**27**	**19**	**149**	**112**	**183**	**106**	**20**	**14**	**203**	**120**	**356**	**234**

Note: Counties are listed from south to north, then east to west.
Resources that fall within the direct APE are also within the boundaries of the indirect APE.
The 90/110 Study Area is used for analysis of Alternatives 90A, 90B, and 110 and consists of the existing 464-mile long Empire Corridor alignment. The 125 Study Area is used for analysis of Alternative 125 and consists of portions of the existing Empire Corridor and new alignment and is 450 miles long.

11.2.6 Indirect APE: 125 Study Area

A total of 234 previously-identified architectural resources are located in the indirect APE for the 125 Study Area that extends along the Empire Corridor South/West and the Niagara Branch. These resources are summarized by county in Exhibit G-11. Of the 234 resources, two are NHLs, including the Hudson River Historic District in Dutchess and Columbia Counties and Sunnyside, located in Westchester County (both described above).

There are 112 S/NR-listed resources within the indirect APE. Of these, 93 are individually listed and 19 are historic districts. The 112 individually listed resources are identified in Exhibit G-12. Three individually-listed S/NR resources are located within the portion of the indirect APE where new track is proposed for this alternative. These are: Nut Grove (MP 144) in Albany County; and the Reformed Presbyterian Church Parsonage (MP 169) and the Halladay House (MP 172) in Schenectady County. The 19 historic districts include the eight resources within the direct APE (described above) and the following additional 11 districts: Riverside Drive – West 80th-81st Streets Historic District; Riverside Drive – West 105th Street Historic District; Mill Street-North Clover Street Historic District; Union Street Historic District; Main Street Historic District; Bridge Square Historic District; East Avenue Historic District; Madison Square-West Main Street Historic District; St. Paul-North Water Streets Historic District; State Street Historic District (described above). There are no S/NR-listed historic districts located in the portion of the indirect APE where new track is proposed.

There are 120 resources in the indirect APE that SHPO has previously determined S/NR-eligible. Of these, 106 are individual resources and 14 are historic districts. None of the S/NR-eligible historic districts are located in the portion of the indirect APE where new track is proposed. These resources are all located in areas where track for this alternative overlap with existing track. Two S/NR-eligible individual resources are located in the portion of the indirect APE where new track is proposed. These are: 924 New Scotland Road (MP 147) in Albany County; and U.S. 20 between Knight and Mudge Roads (MP 170.5) in Schenectady County.

Exhibit G-12—S/NR-Listed Individual Resources within the APEs

Name	Location	County	90/110 Study Area	125 Study Area
Direct APE				
Chapel of the Intercession Complex and Trinity Cemetery	550 W. 155th St.	New York	X	
Chatsworth Apartments and Anex	340-346 West 72nd Street	New York	X	
Riverside Park and Drive	From 72nd St. to 129th St.	New York	X	
U.S. General Post Office	8th Ave. between 31st and 33rd Sts.	New York	X	
Fonthill Castle and Administration Building of the College of Mount St. Vincent	W. 261st St. and Riverdale Ave.	Bronx	X	
Bear Mountain Bridge and Toll House	NY 6/202	Westchester	X	
Brandreth Pill Factory	Water St.	Westchester	X	
Croton North Railroad Station	Senasqua Rd.	Westchester	X	
Lord and Burnham Building	2 Main Street	Westchester	X	
Lyndhurst	635 S. Broadway	Westchester	X	
Peekskill Freight Depot	41 South Water Street	Westchester	X	
Philipse Manor Railroad Station	Jct. of Riverside Dr. and Millard	Westchester	X	
Standard House	50 Hudson Avenue	Westchester	X	
Sunnyside	Sunnyside Lane	Westchester	X	
Trevor, John Bond, House	511 Warburton Ave.	Westchester	X	
Yonkers Trolley Barn	92 Main Street	Westchester	X	
Eagle's Rest	NY 9-D	Putnam	X	
U.S. Military Academy	NY 218	Putnam	X	
West Point Foundry	Foundry Cove between NY 90 and NY Central RR tracks	Putnam	X	
Capt. Moses W. Collyer House	River Rd. S.	Dutchess	X	
Cornelius Carman House	River Rd. S.	Dutchess	X	
Home of Franklin D. Roosevelt National Historic Site	2 mi. S of Hyde Park on U.S. 9	Dutchess	X	
Hyde Park Railroad Station	River Rd.	Dutchess	X	
Innis Dye Works, Poughkeepsie MRA	80 North Water Street	Dutchess	X	
Mount Gulian	N of Beacon off I-84	Dutchess	X	
National Biscuit Company Carton-Making and Printing Plant	Beekman Street	Dutchess	X	
Poughkeepsie Railroad Bridge	Spans Hudson River	Dutchess	X	
Poughkeepsie Railroad Station	Main St.	Dutchess	X	
Rhinecliff Hotel	Schatzell Ave.	Dutchess	X	
Roosevelt Point Cottage and Boathouse	River Point Rd. at the Hudson River	Dutchess	X	
Vanderbilt Mansion National Historic Site	N edge of Hyde Park, U.S. 9	Dutchess	X	
Oak Hill	N of Linlithgo on Oak Hill Rd.	Columbia	X	
Stuyvesant Railroad Station	Riverview Street	Columbia	X	
Joachim Staats House and Gerrit Staats Ruin	N of Castleton-on-Hudson	Rensselaer	X	
Robert Liddle Farmhouse	Little Dale Farm Road	Schenectady		X
Fort Klock	2 mi. E of St. Johnsville on NY 5	Montgomery	X	
Guy Park	W. Main St.	Montgomery	X	
Montgomery County Farm (Montgomery County Buildings Thematic Group)	NY 5	Montgomery	X	
Palatine Bridge Freight House	E of Palatine Bridge on NY 5	Montgomery	X	
Union Station	Main St. between John and 1st	Oneida	X	

Exhibit G-12—S/NR-Listed Individual Resources within the APEs

Name	Location	County	90/110 Study Area	125 Study Area
	Sts.			
Deferriere House	2089 Genesee St.	Madison		X
New York Central Terminal	495 Paderewski Dr.	Erie	X	
Waren Hull House	5976 Genesee St.	Erie		X
U.S. Customhouse	2245 Whirlpool St.	Niagara	X	
Indirect APE				
69th Street Transfer Bridge	West 69th Street at Hudson River	New York	X	
Delta Psi, Alpha Chapter	434 Riverside Drive	New York	X	
Fort Tryon Park and the Cloisters	Broadway and Dyckman St.	New York	X	
General Grant National Memorial	Riverside Dr. and W. 122nd St.	New York	X	
Isaac L. Rice Mansion	346 W. 89th St.	New York	X	
Jeffrey's Hook Lighthouse	Fort Washington Park	New York	X	
Red House	350 W. 85th St.	New York	X	
Schinasi House	351 Riverside Dr.	New York	X	
St. Walburgas Academy	630 Riverside Drive	New York	X	
Townhouses at 352 and 353 Riverside Drive	352-353 Riverside Drive	New York	X	
Union Theological Seminary	W. 120th St. and Broadway	New York	X	
Colgate, Robert, House	5225 Sycamore Ave.	Bronx	X	
Dodge, William E., House	690 W. 247th St.	Bronx	X	
Wave Hill	675 W. 252nd St.	Bronx	X	
Bear Mountain Bridge Rd.	NY 6/202, between Bear Mt. Bridge	Westchester	X	
Hyatt-Livingston House	152 Broadway	Westchester	X	
Nuits	Hudson Rd. and Clifton Pl.	Westchester	X	
Old Croton Aqueduct	N from Yonkers to New Croton Dam	Westchester	X	
Untermyer Park	Warburton Ave. and N. Broadway S. of Jct. with Odell Ave.	Westchester	X	
US Post Office—Yonkers	79--81 Main St.	Westchester	X	
Rock Lawn and Carriage House	NY 9-D	Putnam	X	
Wilson House	Lower Station Rd.	Putnam	X	
Abraham Brower House	2 Water St.	Dutchess	X	
Adolph Brower House	1 Water St.	Dutchess	X	
Bannerman's Island Arsenal	Pollepel Island, off NY 9-D	Dutchess	X	
Chelsea Grammar School	Liberty St.	Dutchess	X	
Church of the Holy Comforter	13 Davies St.	Dutchess	X	
Free Church Parsonage	Jct. of William and Grinnell Sts.	Dutchess	X	
Hoffman House, Poughkeepsie MRA	North Water Street	Dutchess	X	
Morton Memorial Library	Kelly St.	Dutchess	X	
O'Brien General Store and Post Office	Jct. of Schatzell Ave. and Charles St.	Dutchess	X	
Old St. Peter's Roman Catholic Church and Rectory, Poughkeepsie MRA	97 Mill Street	Dutchess	X	
Pelton Mill	110 Mill St.	Dutchess	X	
Riverside Methodist Church and Parsonage	Charles and Orchard Sts.	Dutchess	X	
Shay's Warehouse and Stable	Rear of 32 Point St.	Dutchess	X	
William Shay Double House	18 Point St.	Dutchess	X	
Zion Memorial Chapel	37 Point St.	Dutchess	X	

Exhibit G-12—S/NR-Listed Individual Resources within the APEs

Name	Location	County	90/110 Study Area	125 Study Area
Clermont	Clermont State Park	Columbia	X	
Requa House	Ridge Rd	Columbia	X	
Wiswall, Oliver, House	W of Hudson	Columbia	X	
Buildings at 744, 746, 748, 750 Broadway	744-750 Broadway	Albany	X	
Church of the Holy Innocents	275 N. Pearl St.	Albany	X	
Lil's Diner	893 Broadway	Albany	X	
Nut Grove	McCarty Avenue	Albany		X
Central Fire Station	Erie Blvd.	Schenectady	X	
F.F. Proctor Theatre and Arcade	432 State St.	Schenectady	X	
General Electric Research Laboratory	General Electric main plant	Schenectady	X	
Hallady Farmhouse	US 20	Schenectady		X
Reformed Presbyterian Church Parsonage	Duanesburg Churches Road	Schenectady		X
Swart House and Tavern	120 Johnson Road	Schenectady	X	
Fort Johnson	Jct. of NY 5 and 67	Montgomery	X	
Frey House	West Grand Street (NY 5)	Montgomery	X	
Nellis Tavern	SR 5	Montgomery	X	
New Courthouse, Montgomery County Buildings Thematic Group		Montgomery	X	
Walrath-Van Horne House	West Main Street	Montgomery	X	
Webster Wagner House	E. Grand St.	Montgomery	X	
Herkimer County Trust Company Building	Corner of Ann and Albany Sts.	Herkimer	X	
Herkimer House	Near NY 5 S.	Herkimer	X	
Palatine German Frame House (Wilder House)	4217 NY 5	Herkimer	X	
US Post Office-Little Falls	25 W. Main St.	Herkimer	X	
Byington Mill (Frisbie & Stansfield Knitting Company)	421--423 Broad St.	Oneida	X	
Doyle Hardware Building	330--334 Main St.	Oneida	X	
Hieber, John C. & Co., Building	311 Main Street	Oneida	X	
Hurd & Fitzgerald Building	400 Main St.	Oneida	X	
Utica Daily Press Building	310--312 Main St.	Oneida	X	
Canastota Public Library	102 W. Center St.	Madison	X	
House at 115 South Main Street	115 South Main Street	Madison	X	
House at 233 James Street	233 James St.	Madison	X	
United Church of Canastota	144 W. Center St.	Madison	X	
Residence at 203 South Main Street, Canastota MRA	203 South Main Street	Madison	X	
US Post Office—Canastota	118 S. Peterboro St.	Madison	X	
Alvord House	N of Syracuse on Berwick Rd.	Onondaga	X	
Butler Center Methodist Episcopal Church*	Butler Center and Washburn Roads	Wayne	X	
East Palmyra Presbyterian Church	2102 Whitbeck Road	Wayne	X	
Andrews Street Bridge	Andrews St. at Genesee River	Monroe	X	
Brick Presbyterian Church Complex, Inner Loop MRA	121 N. Fitzhugh St.	Monroe	X	
Federal Building	N. Fitzhugh and Church Streets	Monroe		X
German United Evangelical Church Complex, Inner Loop MRA	60-90 Bittner St.	Monroe	X	
Leopold Street Shule	30 Leopold St.	Monroe	X	
Washington Street Rowhouses	30-32 N. Washington St.	Monroe	X	
Buffalo Gas Light Company Works	249 W. Genesee St.	Erie	X	

Exhibit G-12—S/NR-Listed Individual Resources within the APEs

Name	Location	County	90/110 Study Area	125 Study Area
Delaware Park-Front Park System	Front Park, Porter Ave. to Symphony Cir., N along Richmond Ave., Bidwell Pkwy., Gates Cir. and Delaware Park	Erie	X	
Kibler High School	284 Main Street	Erie	X	
Riviera Theatre	27 Webster St.	Niagara	X	
US Post Office--North Tonawanda	141 Goundry St.	Niagara	X	
Note: Resources that fall within the direct APE are also within the boundaries of the indirect APE.				

Exhibit G-13—S/NR-Eligible Individual Resources within the APEs

Name/Location	County	90/110 Study Area	125 Study Area
Direct APE			
Former NY Central Railroad Substation No. 11; 2350-236 Twelfth Avenue	New York	X	
Lincoln Tunnel (Route 495)	New York	X	
Present Centro Maria; 539 West 54th Street	New York	X	
21 Alexander Street	Westchester	X	
Dobbs Ferry Railroad Station-Hudson Line; Station Plaza	Westchester	X	
Scarborough Railroad Station-Hudson Line	Westchester	X	
Metro-North Railroad Bridge BIN5524010; Dennings Avenue Extension	Dutchess	X	
Prinns Insurance/Old I.O.O.F; 56 South Main Street	Rensselaer	X	
Livingston Avenue Bridge	Rensselaer	X	
BIN 77090212 Railroad Bridge	Albany	X	
BIN 7092900 Railroad Bridge	Albany	X	
Cut Limestone Retaining Wall and Bridge Abutment; NY 10	Montgomery	X	
Hexagonal Limestone Well Shelter; NY 5	Montgomery	X	
H.D.F. Veeder House; 3642 NY 5	Montgomery	X	
West Main Street; North Side–20 Miles North of Ann Street	Montgomery	X	
West Main Street; Culvert–Dove Creek Under Railroad	Montgomery	X	
Gilbert Knitting Mill; 151 Elizabeth Street	Herkimer	X	
Railroad Station; River Street; West Side	Oneida	X	
Coldwater Station	Monroe	X	
60 South Main Street	Monroe	X	
Indirect APE			
125 Riverside Drive	New York	X	
352 Riverside Drive	New York	X	
353 Riverside Drive	New York	X	
247 West 30th Street	New York	X	
259-261 West 30th Street	New York	X	
236-248 West 31st Street	New York	X	
406-426 West 31st Street	New York	X	
424 West 33rd Street	New York	X	
500 West 37th Street	New York	X	
Cheyenne Diner; 411 Ninth Avenue	New York	X	
Fairmont Building; 239-241 West 30th Street	New York	X	
Former 53rd Street Industrial School; 552 West 53rd Street	New York	X	
Former Franco-American Baking Company; 509-517 West 38th Street	New York	X	
Former French Hospital; 326-330 West 30th Street	New York	X	
Former Gledhill Wall Paper Company; 541-545 West 34th Street	New York	X	
Former Hess Brothers Confectionary Factory; 502-504 West 30th Street	New York	X	
Former Lee Brothers Storage Building; 571 Riverside Drive	New York	X	
Former New York Public Library West 40th Street Branch; 457 West 40th Street	New York	X	
Former Pinehill Crystal Water Company; 500-504 West 36th Street	New York	X	
Former Sheffield Farms Dairy; 632 West 125th Street	New York	X	
Fur Craft Building; 242-246 West 30th Street	New York	X	
George Washington Bridge	New York	X	
Glad Tidings Tabernacle; 325-329 West 33rd Street	New York	X	
High Line; Tenth Avenue	New York	X	
High School of Printing (now Graphic Communication Arts	New York	X	

Exhibit G-13—S/NR-Eligible Individual Resources within the APEs

Name/Location	County	90/110 Study Area	125 Study Area
H.S.); 439 West 49th Street			
Hill Building; 469-475 Tenth Avenue	New York	X	
Houbigant Company Warehouse; 539 West 45th Street	New York	X	
Interborough Rapid Transit Company Power House/Con Ed; 857 Eleventh Avenue	New York	X	
Kleeberg Residence; 3 Riverside Drive	New York	X	
Master Printers Building; 406-416 Tenth Avenue	New York	X	
Model Tenements, Ernest Flagg; 500-506 West 42nd Street	New York	X	
New York Improvement & Tunnel Extension of the Pennsylvania Railroad; beneath Hudson River	New York	X	
P.S. 51; 520 West 45th Street	New York	X	
P.S. 111; 440 West 53rd Street	New York	X	
River Diner; 452 Eleventh Avenue	New York	X	
Riverside Church; 490-498 Riverside Drive	New York	X	
Riverside Drive Viaduct	New York	X	
Riverside Park and Riverside Drive-North End	New York	X	
St. Michael's Roman Catholic Church; 414-424 West 34th Street	New York	X	
St. Raphael Roman Catholic Church and Rectory; 502-504 West 41st Street	New York	X	
US Post Office; 341 Ninth Avenue	New York	X	
West 59th Street Recreation Center/West 60th Street Public Bath; 533 West 59th Street	New York	X	
West Market Diner; 659 West 131st Street	New York	X	
William F. Sloan Memorial YMCA; 360 West 34th Street	New York	X	
24 Alexander Street	Westchester	X	
104 Buena Vista Avenue	Westchester	X	
108 Buena Vista Avenue	Westchester	X	
116 Buena Vista Avenue	Westchester	X	
152-154 Buena Vista Avenue	Westchester	X	
155-157 Buena Vista Avenue	Westchester	X	
168-170 Buena Vista Avenue	Westchester	X	
192 Buena Vista Avenue	Westchester	X	
Municipal Building & Library; 7 Maple Avenue	Westchester	X	
North Yonkers Pumping Station; 11 Alexander Street	Westchester	X	
Purusco Residence; 22 Cottage Street	Westchester	X	
Riverside Hose Company; Franklin Street	Westchester	X	
Symond's School/Snowden Court	Westchester	X	
Tarrytown Railroad Station; Depot Quare	Westchester	X	
Yonkers Canoe Club; Alexander Street	Westchester	X	
Yonkers Railroad Station-Hudson Line; Buena Vista Avenue	Westchester	X	
Cornell Boathouse	Dutchess	X	
Johnson Plumbing Complex; 35 Main Street	Dutchess	X	
Mid-Hudson Bridge; US 44	Dutchess	X	
Hudson and Boston Railroad Shop; Water Street	Columbia	X	
Rip Van Winkle Bridge; US 23	Columbia	X	
472 Broadway	Rensselaer	X	
487-483 Broadway	Rensselaer	X	
908 Broadway	Rensselaer	X	
920 Broadway	Rensselaer	X	
926 Broadway	Rensselaer	X	
927 Broadway	Rensselaer	X	
941 Broadway	Rensselaer	X	
943 Broadway	Rensselaer	X	

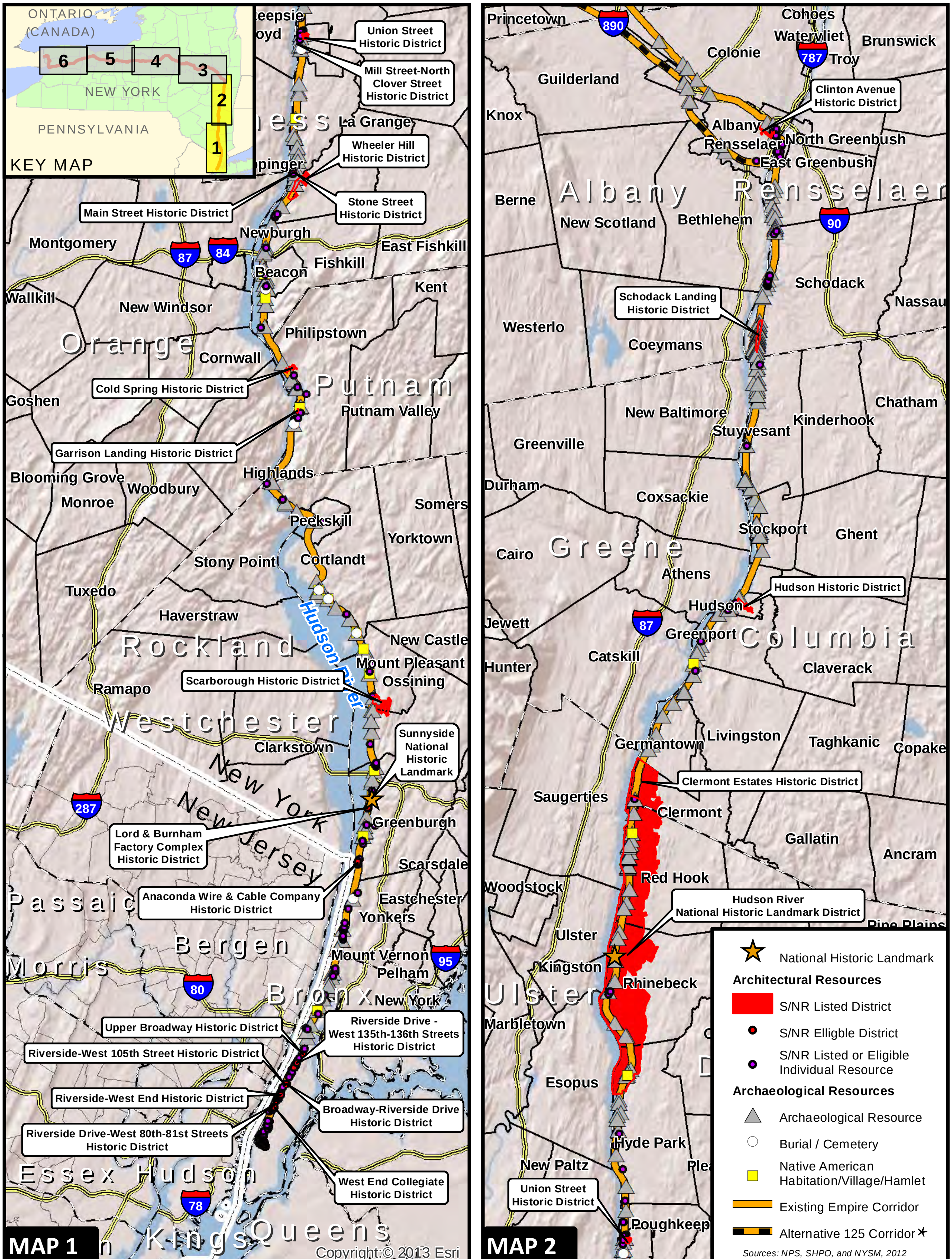
Exhibit G-13—S/NR-Eligible Individual Resources within the APEs

Name/Location	County	90/110 Study Area	125 Study Area
1019 Broadway	Rensselaer	X	
404 East Street	Rensselaer	X	
550 East Street	Rensselaer	X	
134 South Main Street	Rensselaer	X	
A. Harder House/ National Bank; 11 South Main Street	Rensselaer	X	
Hans Van Buren House; 99 South Main Street	Rensselaer	X	
Harder/Culver Residence; 58 North Main Street	Rensselaer	X	
Hogeboom/Price Residence; 42 North Main Street	Rensselaer	X	
Isaac V. Schermerhorn House (Cooper Residence); 40 North Main Street	Rensselaer	X	
Marra Residence; 47 South Main Street	Rensselaer	X	
Rensselaer City Library (former Rensselaer County Bank); 810 Broadway	Rensselaer	X	
Village Hall & Library; 85 South Main Street	Rensselaer	X	
924 New Scotland Road	Albany		X
U.S. Route 20 between Knight and Mudge Roads	Schenectady		X
1 Cayadutta Street	Montgomery	X	
29 East Main Street	Montgomery	X	
31 East Main Street	Montgomery	X	
6-8 Voorhees Street	Montgomery	X	
4 West Main Street	Montgomery	X	
399 West Main Street	Montgomery	X	
401 West Main Street	Montgomery	X	
A. Doxtader House; 46 West Main Street	Montgomery	X	
Barbara's Restaurant; 12 West Main Street	Montgomery	X	
Brunswick Hotel; 30 West Main Street	Montgomery	X	
Catholic Church (American Legion Hall); 37 East Main Street	Montgomery	X	
Delaurandis Block; 40 West Main Street	Montgomery	X	
Fonda House; 56 West Main Street	Montgomery	X	
Fonda Methodist Church; 42 West Main Street	Montgomery	X	
Guy Park Manor; 366 West Main Street	Montgomery	X	
Jansen Building; 14-16 West Main Street	Montgomery	X	
Johnson House; 6 West Main Street	Montgomery	X	
Judy Larman Dance Studio; 25 East Main Street	Montgomery	X	
Mancini Barber Shop; 32 West Main Street	Montgomery	X	
Mazes Hotel; 18 West Main Street	Montgomery	X	
Mitchell Commercial; 10 West Main Street	Montgomery	X	
Mogawk River Bank; 34 West Main Street	Montgomery	X	
Mohawk Valley Democrat; 2 East Main Street	Montgomery	X	
Nelson & Reese House, w/cemetery & barn foundations; 7573 State Route 5	Montgomery	X	
Peeler Apartments; 8 West Main Street	Montgomery	X	
Princeton Industries; 4 East Main Street	Montgomery	X	
Stearns Residence; 19 East Main Street	Montgomery	X	
Stearns Residence; 23 East Main Street	Montgomery	X	
Voorhees Residence; 9 East Main Street	Montgomery	X	
Voorhees Residence; 11 East Main Street	Montgomery	X	
Vunk Apartments; 3 East Main Street	Montgomery	X	
World War I Memorial; West Main Street	Montgomery	X	
Wyman's Drug Store; 26 West Main Street (Auto Parts)	Montgomery	X	
Wyman's Drug Store; 22 West Main Street (Jeannette's)	Montgomery	X	
Zion Episcopal Church; 27 East Main Street	Montgomery	X	
591 East John Street	Herkimer	X	
401 South Ann Street	Herkimer	X	

Exhibit G-13—S/NR-Eligible Individual Resources within the APEs

Name/Location	County	90/110 Study Area	125 Study Area
403 South Ann Street	Herkimer	X	
407 South Ann Street	Herkimer	X	
48-54 West Main Street	Herkimer	X	
338 West Main Street	Herkimer	X	
56 West Mill Street	Herkimer	X	
Fleet Bank; West Main Street	Herkimer	X	
Little Planing Mill; 55 West Mill Street	Herkimer	X	
Ligneous Paper Mill; 25 West Mill Street	Herkimer	X	
McKinnon Warehouse; 24 West Mill Street	Herkimer	X	
Snyder Apartments; West Main Street	Herkimer	X	
Foster Bros Manufacturing Company; 807-811 Broad Street	Oneida	X	
1255-1257 University Avenue	Monroe	X	
1320 University Avenue	Monroe	X	
Building C2 (H.F. Snyder and Son); Main Street	Monroe	X	
Building Z (former Richmond Residence); 70 Main Street	Monroe	X	
Foster Armstrong Piano Warehouses; Commercial Street	Monroe	X	
Huther Company; 1290 University Avenue	Monroe	X	
Jenkins Motor Car Company; 1239 University Avenue	Monroe	X	
J. Hungerford Smith Company; 410 North Goodman Street	Monroe	X	
Otis Lumber Company; 936-960 East Main Street	Monroe	X	
Rochester Public Market; Railroad Street	Monroe	X	
Schwalb Coal & Oil Company; 92 Portland Avenue	Monroe	X	
Taylor Instrument Company; 95-111 Ames Street	Monroe	X	
1032 Niagara Street	Erie	X	
1073 Niagara Street	Erie	X	
City Wide Trucking Company; 253 Exchange Street	Erie	X	
Erie Freight Station; 391 Exchange Street	Erie	X	
1043 Fairfield Avenue	Niagara	X	
947 Ontario Avenue	Niagara	X	
Commercial Warehouse 1910; 2212 11th Street	Niagara	X	

Note: Resources that fall within the direct APE are also within the boundaries of the indirect APE. Resources are listed by county. Counties are listed from south to north, then east to west.



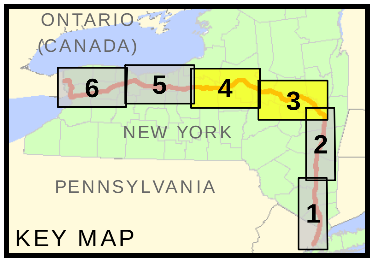
*Alt. 125 as shown is a potential corridor used to analyze the potential operating characteristics, environmental impacts and cost for this speed (125 mph) threshold.

0 2.5 5 10
Miles

Historic Resources Map

Exhibit G-14

Tier 1 EIS
High Speed Rail
Empire Corridor Program



National Historic Landmark

Architectural Resources

S/NR Listed District

S/NR Eligible District

S/NR Listed or Eligible Individual Resource

Archaeological Resources

Archaeological Resource

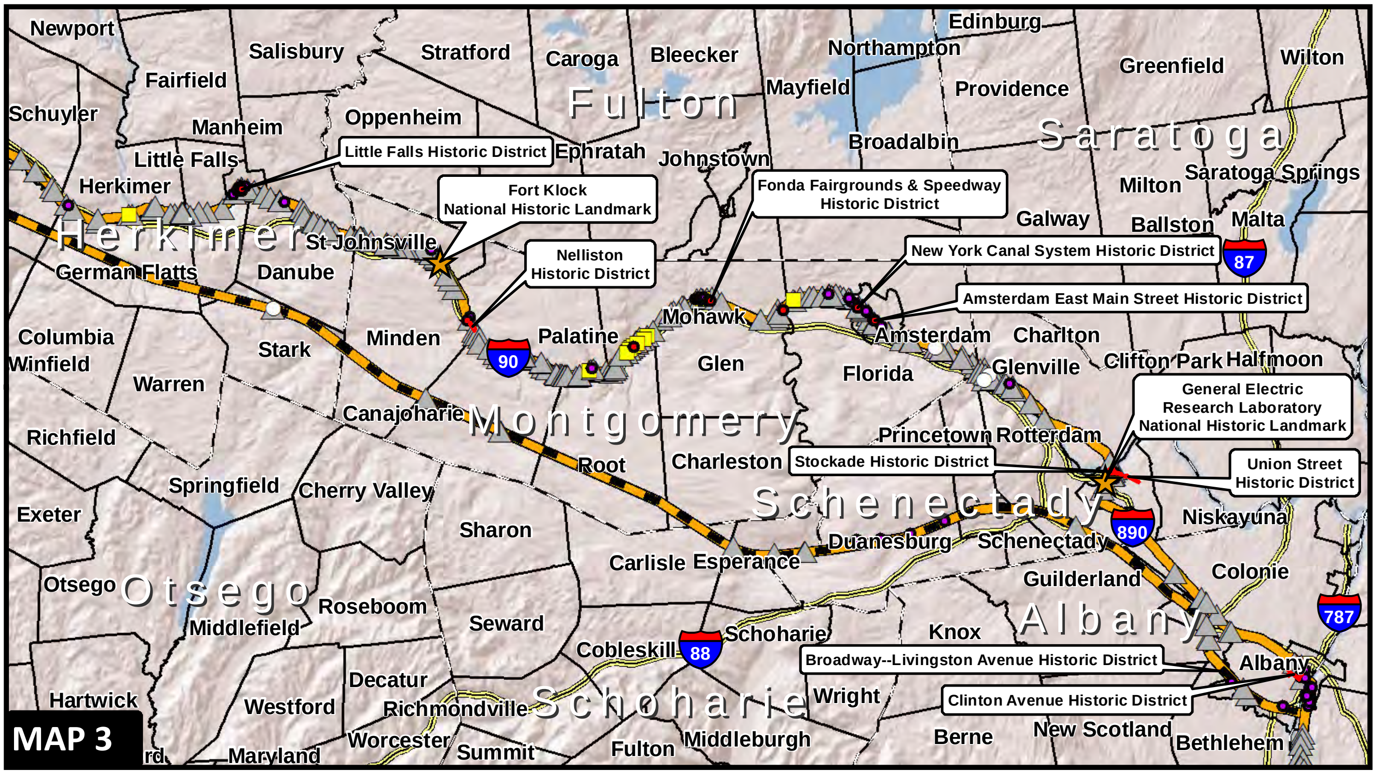
Burial / Cemetery

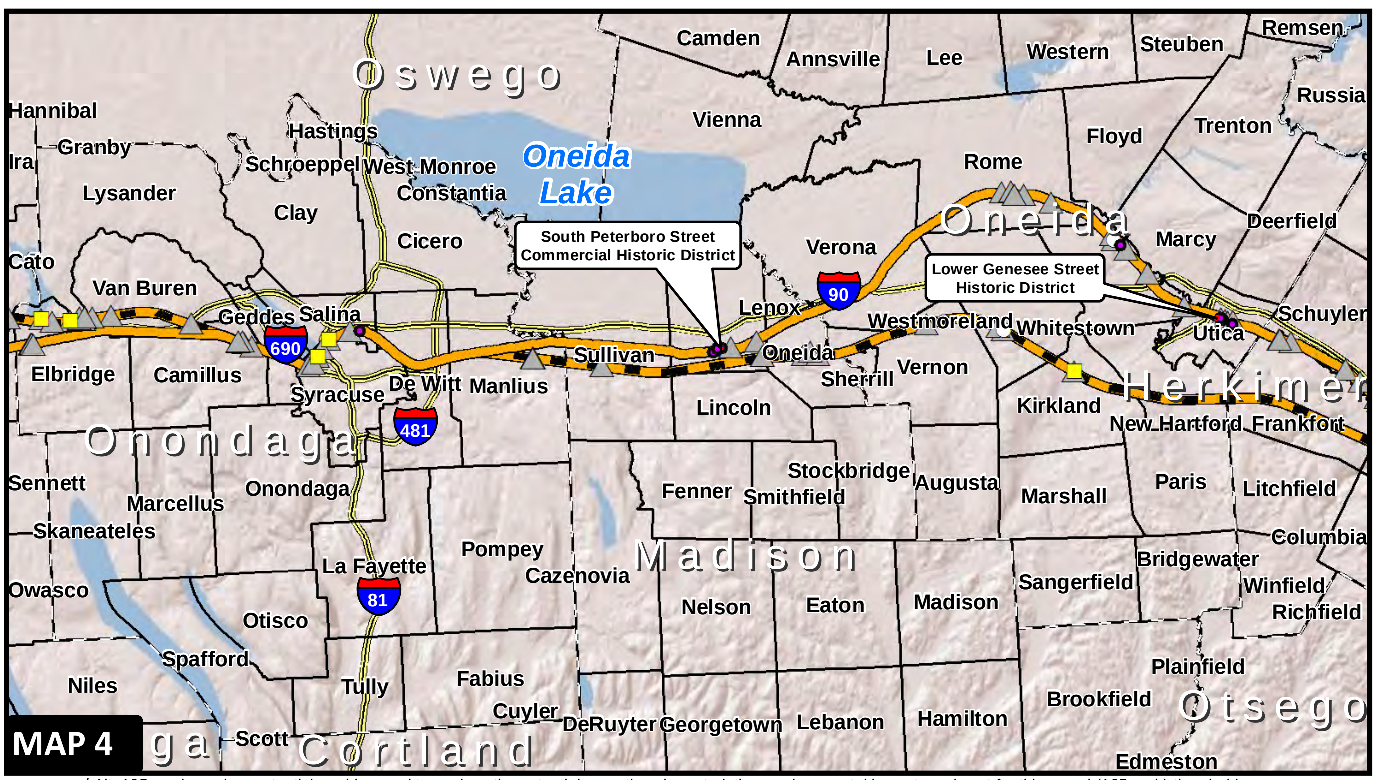
Native American Habitation/Village/Hamlet

Existing Empire Corridor

Alternative 125 Corridor*

Sources: NPS, SHPO, and NYSM, 2012





*Alt. 125 as shown is a potential corridor used to analyze the potential operating characteristics, environmental impacts and cost for this speed (125 mph) threshold.

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0 2.5 5 10

Miles

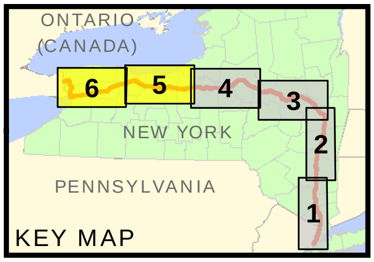
Historic Resources Map

Exhibit G-14

Tier 1 EIS

High Speed Rail

Empire Corridor Program



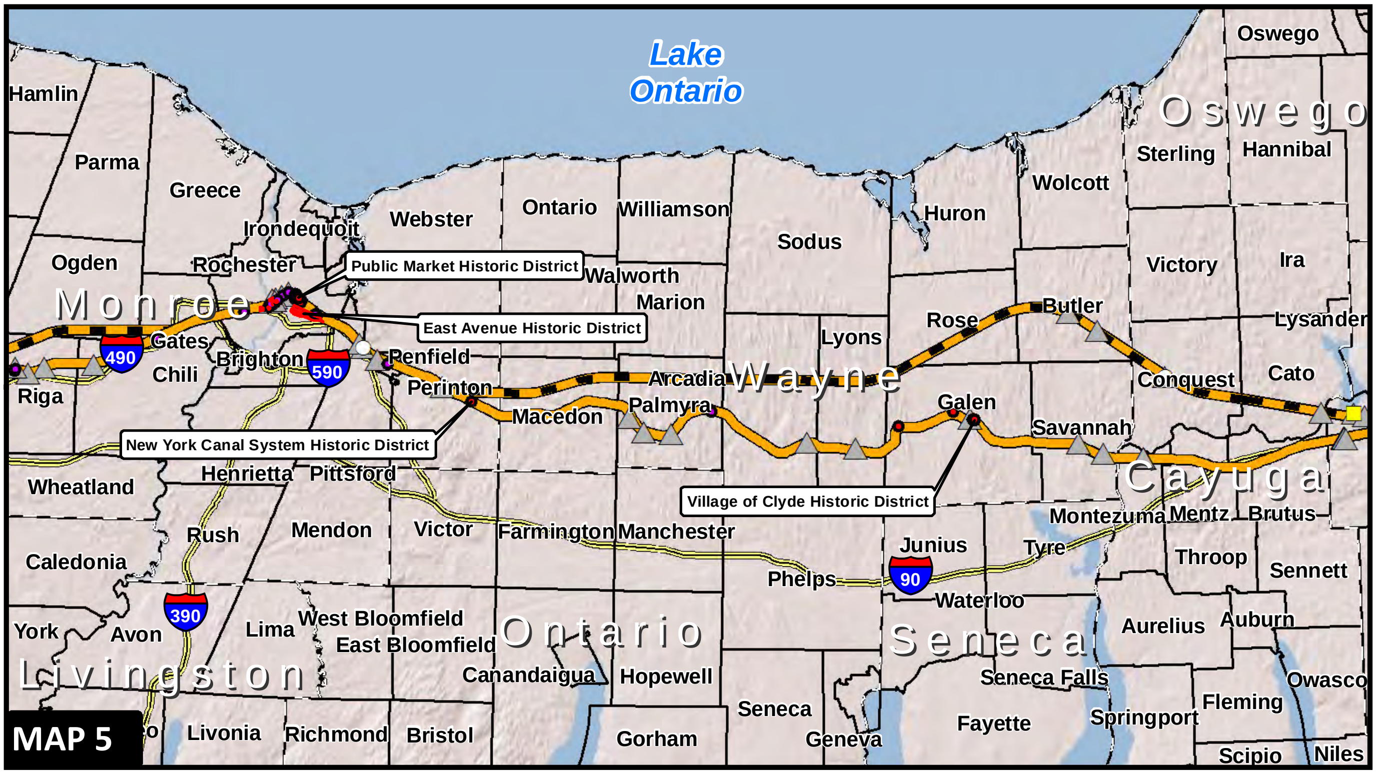
National Historic Landmark

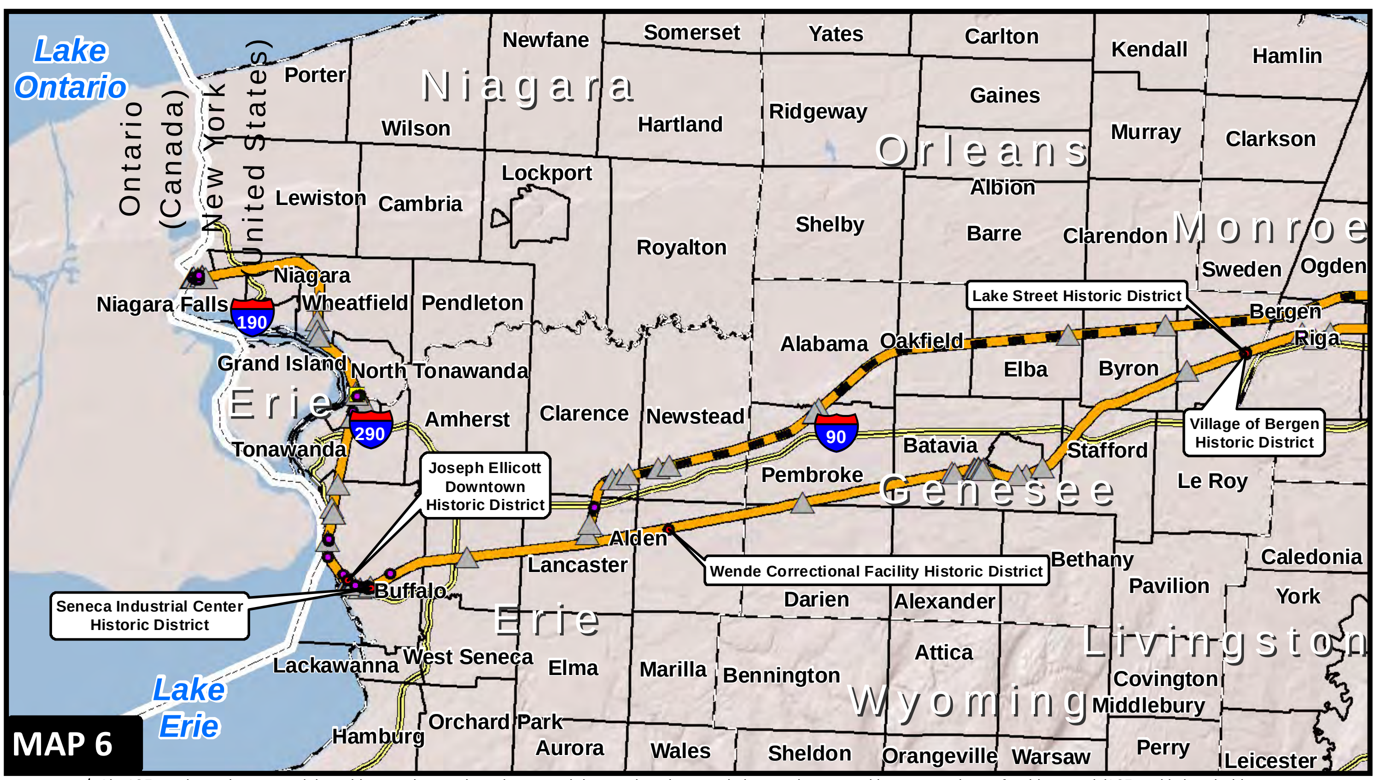
Architectural Resources
- S/NR Listed District
- S/NR Elligble District
- S/NR Listed or Eligible Individual Resource

Archaeological Resources
- Archaeological Resource
- Burial / Cemetery
- Native American Habitation/Village/Hamlet

- Existing Empire Corridor
- Alternative 125 Corridor✶

Sources: NPS, SHPO, and NYSM, 2012





✶ Alt. 125 as shown is a potential corridor used to analyze the potential operating characteristics, environmental impacts and cost for this speed (125 mph) threshold.

N

0 2.5 5 10
Miles

Historic Resources Map

Exhibit G-14

Tier 1 EIS
High Speed Rail
Empire Corridor Program

Exhibit G-15—Counties, Cities/Towns and Villages within the APEs

County	City/Town	Village
New York	New York City* (Manhattan)	
Bronx**	New York City* (Borough of Bronx)	
Westchester	City of Peekskill	
	City of Yonkers*	
	Town of Cortlandt	Buchanan
		Croton-On-Hudson
	Town of Greenburgh*	Dobbs Ferry
		Hastings-On-Hudson
		Irvington
		Tarrytown
	Town of Mount Pleasant	Sleepy Hollow
	Town of Ossining	Briarcliff Manor
		Ossining*
Putnam	Town of Phillipstown	Cold Spring*
Dutchess	City of Beacon	
	City of Poughkeepsie	
	Town of Fishkill	
	Town of Hyde Park	
	Town of Poughkeepsie*	
	Town of Red Hook	Tivoli
	Town of Rhinebeck	
	Town of Wappinger	
Columbia	City of Hudson	
	Town of Clermont	
	Town of Germantown	
	Town of Greenport	
	Town of Livingston	
	Town of Stockport	
	Town of Stuyvesant	
Greene	Town of Athens	Athens
	Town of New Baltimore	
Rensselaer	City of Rensselaer	
	Town of East Greenbush	
	Town of Schodack	Castleton-On-Hudson
Albany*	City of Albany	
	Town of Bethlehem	
	Town of Colonie	Colonie
	Town of Guilderland	
Schenectady	City of Schenectady*	
	Town of Duanesburg†	
	Town of Glenville	Scotia
	Town of Princetown†	
	Town of Rotterdam	
Schoharie	Town of Carlisle†	
	Town of Esperance†	Esperance†

Exhibit G-15—Counties, Cities/Towns and Villages within the APEs

County	City/Town	Village
Montgomery	Town of Amsterdam	Fort Johnson
	Town of Canajoharie	Canajoharie
	Town of Charleston†	
	Town of Florida	
	Town of Glen	
	Town of Minden	Fort Plain
	Town of Mohawk	Fonda
	Town of Palatine	Nelliston
		Palatine Bridge
	Town of Root	
	Town of St. Johnsville	St. Johnsville
Herkimer	Town of Danube	
	Town of Frankfort	Frankfort
	Town of German Flatts	Ilion
		Mohawk
	Town of Herkimer	Herkimer
	Town of Little Falls	Little Falls
	Town of Manheim	
	Town of Schuyler	
	Town of Stark†	
Oneida	City of Rome	
	City of Utica*	
	Town of Kirkland†	Clinton†
	Town of Marcy	
	Town of New Hartford†	
	Town of Sherrill†	
	Town of Vernon†	Oneida Castle†
	Town of Verona	
	Town of Westmoreland	
	Town of Whitestown	Oriskany
		Whitesboro
		Yorkville
Madison	City of Oneida	
	Town of Lenox	Canastota
		Wampsville
	Town of Sullivan	
Onondaga	City of Syracuse*	
	Town of Camillus	
	Town of De Witt	East Syracuse
	Town of Elbridge	Jordan
	Town of Geddes	Solvay
	Town of Manlius	Minoa
	Town of Salina	
	Town of Van Buren	
Cayuga	Town of Brutus	Weedsport
	Town of Cato†	
	Town of Conquest†	
	Town of Mentz	
	Town of Montezuma	
Wayne	Town of Macedon	Macedon
	Town of Palmyra	Palmyra*
	Town of Arcadia	Newark
	Town of Lyons	Lyons
	Town of Galen	Clyde
	Town of Savannah	

Exhibit G-15—Counties, Cities/Towns and Villages within the APEs

County	City/Town	Village
Monroe	Town of Riga	Churchville
	Town of Chili	
	Town of Gates	
	City of Rochester*	
	Town of Brighton	
	Town of Penfield	
	Town of Pittsford	East Rochester
	Town of Perinton	Fairport*
Genesee	Town of Pembroke	Corfu
	Town of Darien	
	Town of Batavia	Batavia
	Town of Stafford	
	Town of Byron	
	Town of bergen	Bergen
Erie	Town of Tonawanda	Kenmore
	City of Buffalo*	
	Town of Cheektowaga	Sloan
		Depew
	Town of Lancaster	Lancaster*
	Town of Alden	
Niagara	Town of Niagara	
	City of Niagara Falls*	
	Town of Wheatfield	
	City of North Tonawanda*	

Notes: * Indicates Certified Local Government (CLG)
** Bronx County is located in the New York MCD
†Within the Direct/Indirect APEs for Alternative 125 only

12. Visual

12.1 Empire Corridor South

Views from the Railroad

In **Manhattan** (MPs 0 to 11.5), the railroad runs primarily in a tunnel from Pennsylvania Station to 123rd Street. However, there are some sections that are daylighted: 36th Street to 39th Street, 43rd Street to 46th Street, 48th Street to 49th Street and 60th Street to 61st Street. Where the railroad runs aboveground, the viewshed in Manhattan is entirely urban and the landform is flat.

After the railroad daylights north of 123rd Street, the railroad is bracketed by the Henry Hudson Parkway (Route 9A) on the west and Riverside Drive on the east. The railroad passes underneath elevated Riverside Drive from 153rd Street to 155th Street, and underneath the Henry Hudson Parkway just past MP 7. North of where the railroad crosses under the parkway, the railroad extends through the greenway along the Hudson River and continues under the George Washington Bridge (I-95) at MP 8, closely following the river's edge north of I-95. The tracks again pass underneath the elevated Henry Hudson Parkway interchange ramps between MP 9 and MP 10.

The views at the crossing of the Spuyten-Duyvil swing span bridge into Bronx County are primarily of the Harlem River and Hudson River to the west. In **Bronx County** (MPs 11.5 to 14), the railroad closely follows the edge of the Hudson River. Views to the west are of the Hudson River, and a forested buffer, including Riverdale Park on the south (MPs 11.5 and 13), dominates the views to the east. The northernmost section in the county includes the Metro-North Riverdale Station (MP 13) and the campus of the College of Mount Saint Vincent to the east of the railroad is buffered by forested vegetation.

In **Westchester County** (MPs 14 to 45), the railroad continues to closely follow the east river bank, but transitions from a primarily urban landscape on the south at the Yonkers Station MP 15, to more rural forested landscapes with coves and high bluffs to the north. The viewshed consists of the Hudson River to the west, and includes urban development along the more urban waterfronts, and views to the east are generally buffered by vegetation along the tracks. The viewshed in the northern part of the county is a mix of urban and forest land along the corridor. The landscape becomes more rural north of Yonkers, and the railroad extends under the Tappan Zee Bridge (MP 25) and north through more urban areas of Tarrytown, Ossining, Croton-on-Hudson, and Peekskill.

With but a few exceptions, the railroad closely follows the east bank of the Hudson River through most of Westchester County, particularly to the south. South of Peekskill there are several long, fairly sharp curves that bring the railroad well inland. The rail corridor is within the Hudson Highlands Scenic Area of Statewide Significance (SASS) between MP 40.5 to the Westchester County line. This segment is especially scenic, passing through the Hudson Highlands, requiring several short tunnels where the Hudson River narrows and the landscape on both sides rises precipitously from zero to 1,000 feet in several locations. At the northern end of the county, the railroad passes under the Bear Mountain Bridge (MP 45) and through four tunnels along this section of the railroad, which temporarily obstruct views to and from the train:

- Osca Tunnel (MP 36.80), approximately 250 feet long
- Little Tunnel (MP 43.62), approximately 75 feet long
- Middle Tunnel (MP 44.40), approximately 300 feet long
- Route 6 Tunnel (MP 45.07), approximately175 feet long

There are also a number of bays that intrude inland where the railroad is built on causeways that include a small bridge to drain Peekskill Bay and associated streams and small rivers. In areas where the railroad heads inland the views from the railroad are generally of forest or marsh areas from both sides of the train.

Upon crossing into **Putnam County** (MPs 45 to 54.5) the railroad continues to closely follow the east bank of the river, and the primary viewshed is dominated by the river and high forested bluffs and several coves and marshlands along this section. Near MP 50 to 52, there are scenic views of the West Point Military Academy high on the banks of the west river bank. The entire county is located within the Hudson Highlands SASS, and at the northern end of the county, the railroad passes through Hudson Highlands State Park. The railroad passes through two tunnels, Garrison Tunnel (MP 50.06), approximately 450 feet long, and Breakneck Tunnel (MP 54.52), approximately 550 feet long, before continuing into Dutchess County.

In **Dutchess County** (MPs 54.5 to 100.5), the railroad continues to closely border the east river bank. The railroad passes north through the Hudson Highlands State Park, before entering urban areas in Beacon and passing under the Newburgh-Beacon Bridge (I-84) (MP 60). The railroad extends through Scenic Areas of Scenic Significance (SASSs) throughout the length of the county, with the exception of the section of railroad between the state park (the Hudson Highlands District SASS at MPs 54.5 to 58) and just south of Poughkeepsie. The railroad extends along the river bank, continuing on causeway across several coves, before passing through Poughkeepsie, and extending under the Mid-Hudson Bridge (U.S. Route 44 and State Route 55) and the Walkway over the Hudson State Park Bridge, just south of the Poughkeepsie Station. North of Poughkeepsie, the railroad extends through the Estates District SASS (MPs 70 to 100.5), adjoins Esopus/Lloyd SASS (MPs 70 to 87), and extends in the vicinity of a number of historic estates and parks between Hyde Park and Staatsburg. The railroad does move inland away from the Hudson River at Staatsburg.

To maintain a relatively straight alignment, the railroad constructed a large number of causeways where bays and marsh areas intrude inward from a straight path. One of two causeways in Dutchess County that are notable for their length includes the 0.8 mile-long Vanderburgh Cove. To the north, the railroad closely follows the river's edge, passing through the Rhinecliff-Kingston Station before passing through the approximately 230-foot-long Rhinecliff Tunnel (MP 91.33) and under the Kingston-Rhinecliff Bridge (MP 93). To the north, the railroad passes over the other notable causeway, the 1.5-mile-long Tivoli Bay at Annadale, and passes through the Tivoli Bays State Wildlife Management Area between MPs 95.5 and 98.5. The Tivoli Bays is also included in the Mid-Hudson Historic Shorelands Scenic District designated under Article 49 of the Environmental Conservation Law.

In **Columbia County** (MPs 100.5 to 129.5), the railroad continues to closely follow the eastern river bank, particularly on the southern half of the county. Views from the railroad are dominated by forested vegetation, open space, and the Hudson River and its islands and marshes on the southern half of the county. The railroad extends through either designated scenic areas or parks through the majority of the county. The corridor runs through Estates SASS District from the Dutchess County line (MP 100) to MP 103.5. The other SASS districts that the corridor runs through in Columbia County are the Catskill Olana District (MPs 107 to 112) and the Columbia/Greene North District (MPs 115 to 129.5), which extends into Rensselaer County. The railroad extends past several islands where it extends along the shoreline. The railroad adjoins Roger's Island where it passes under the Rip Van Winkle Bridge at MP 111.5. To the north, the railroad passes another island (Middle Ground Flats), north of the Hudson Station, where the railroad extends across a long, 1.6-mile-long causeway over North Bay. To the north, the railroad extends past the Hudson River Islands where it extends on causeway over several coves. To the north, the railroad moves further inland in sections and away from the Hudson River shoreline, roughly parallel to New York State Bicycle Route 9/Route 9J. The railroad extends along the edge of Muitzes Kill, a branch of the river that adjoins Houghtaling Island at the north end of the county, where it extends into Rensselaer County.

The viewshed in the **Rensselaer County** (MPs 129.5 to 143) section varies from forested and agricultural to urban, with the urban areas clustered in and around the city of Rensselaer at the north end of the county. The Columbia-Greene SASS extends on the southernmost part of the county, from the county line (MP 129.5) to MP 131.5. The southern third of Rensselaer County continues alongside the island in the Hudson River (Schodack Island/Castleton Island State Park), bracketed by Muitzes Kill on the west and New York State Bicycle Route 9/Route 9J on the east. The railroad extends under the Castleton Bridge (Berkshire Connector of the New York State Thruway) and continues along the bank of the Hudson River past the north end of Schodack Island, passing through the village of Castleton-on-Hudson. North of the village, the railroad extends inland, passing between Moordener Kill on the west and Route 9J on the east, and continuing north through forested and agricultural lands and alongside the east side of the Papscanee Island Nature Preserve (MPs 137.5 to 139). Where the railroad rejoins Route 9J, just outside the city of

Rensselaer, the adjoining uses along the river and extending into the city include industrialized uses and fuel tank farms. Approaching the Albany-Rensselaer Station, there are views of the Albany skyline across the river, and adjoining urbanized areas also include residential neighborhoods and office buildings. After leaving the Albany-Rensselaer Amtrak station (MP 142) the railroad continues north through urban/industrial areas. The railroad crosses the Hudson River at the Livingston Avenue Bridge, a swing-span bridge, (west of MP 143) where the river is fronted by parks and greenways.

12.2 Empire Corridor West/Niagara Branch (90/110 Study Area/125 Study Area)

Views from the Railroad: 90/110 Study Area

After crossing the Livingston Avenue Bridge into **Albany County** (MPs 143 to155), the viewshed includes parks/greenways along the river and industrialized waterfront development in the city of Albany. The eastern half of the county includes views of industrial urban development, and views from the railroad are screened by forest vegetation and include views of adjoining or overpassing highways and interchange ramps where the railroad roughly parallels I-90 (New York State Thruway) and crosses under the Adirondack Northway (I-87), just past the city limits. The views along the western half of the county are dominated by screening by forest vegetation within a patchwork of parklands (including the Albany Pine Bush State Unique Area) and undeveloped lands.

In **Schenectady County** (MPs 155 to 170), even though the tracks pass through urbanized areas that include residential neighborhoods on the southern half of the county, the tracks are adjoined by trees in many locations that screen views of adjacent areas. In the city of Schenectady, the views from the train include views of institutional uses and the downtown business district. The railroad extends along a 0.2-mile section of Erie Boulevard, the western end of the Mohawk Towpath Scenic Byway, a New York State scenic byway. The views north of the downtown area include the Mohawk River/Erie Canal at the river crossing, and the railroad extends through increasingly more rural forested areas with pockets of farmlands to the north where views are buffered in many locations by trees. North of the river crossing, the middle third of the county extends through more developed and residential areas in and north of the village of Scotia, although trees shield views of adjoining properties in many locations. The northern third of the county views includes intermittent views of Route 5 and the Mohawk River/Erie Canal where the railroad parallels these features.

The Revolutionary Trail Scenic Byway (Route 5/29) extends alongside the length of the Empire Corridor and the Mohawk River/Erie Canal from Route 5 in Schenectady County to Herkimer, then follows Route 5S and the Erie Canal to Utica and continues northwest along Route 49 and the Erie Canal to Rome in Oneida County. The eastern half of the Empire Corridor West is quite scenic as the railroad closely follows the Mohawk River/Erie Canal to Herkimer where West Canada Creek flows into the Mohawk River to drain part of the Adirondack Highlands. The east-west passage of the Mohawk River follows a natural divide between the southern Adirondack uplands to the north and the northern fringes of the Catskills to the south. Both of these uplands bordering the Mohawk River can be described as a peneplain; an eroded plateau with a rolling surface. The Mohawk River is considerably less than straight and in places plateaus rise steeply over 800 feet. West of Herkimer, the railroad follows the New York State Barge Canal and follows the natural lower path to the west exploited by the builders of the Erie Canal. The landscape becomes less vertical approaching Utica.

In **Montgomery County** (MPs 170 to 210), the railroad closely parallels and extends between Route 5, on the north, and the Mohawk River/Erie Canal on the south, throughout much of the county. Views throughout the county are dominated by Route 5 and adjoining uses, which are predominantly rural agricultural, forested, and residential, with views of the river where it closely adjoins and is not screened by forest vegetation. In the eastern sections of the county, rock ledges adjoin Route 5, and the slopes adjoining the railroad steepen, and generally flatten throughout the rest of the county. Where the railroad closely adjoins the riverbanks, views include uses on the opposing river bank where the river narrows, and there are several islands in the river. In some locations, the railroad is set back from Route 5, and views of the highway are obscured by trees. Urban viewsheds are largely limited to the city of Amsterdam, with the Amsterdam Amtrak Station (MP 177.5); the village of Fonda; and the village of St. Johnsville. In the villages of Palatine Bridge and Nelliston, where the railroad follows the riverbank, it is set back from the village centers and screened by forest vegetation.

The railroad continues to parallel Route 5 and the Mohawk River/Erie Canal throughout much of **Herkimer County** (MPs 210 to 235). The viewshed along the railroad consists of forest, agricultural, and rural residential uses outside the cities of Little Falls and Herkimer. In many locations, where the railroad does not closely adjoin Route 5 or the river, views of these features are obscured by trees. A majority of the landform along the rail corridor is flat with the exception of moderate to severe slopes near Little Falls and Herkimer. The railroad passes through the southern outskirts of both cities, and views from the tracks are screened from view to varying extents by trees and limited by steeper slopes. Scenic islands in the river/canal include the Moss Island National Natural Landmark in Little Falls (near MP 216), where intermittent views of the rock ledges may be visible through trees adjoining the tracks, and Plantation Island State Wildlife Management Area south of the city of Herkimer (MP 222). The New York State Thruway (I-90) crosses over the railroad in the southwest part of the city of Herkimer (MP 225). At MP 231.5, the railroad crosses the Erie Canal just south of Lock 19, which is visible at the canal crossing.

In **Oneida County** (MPs 235 to 264), west of the county line, the railroad is shielded by trees and surrounded by forested areas where it extends past industrialized areas. The railroad closely adjoins a section of Route 5S to the west, passing into industrialized areas surrounding the Utica Boehlert Transportation Center (MP 237.5) at the northern edge of city. The railroad extends through flat open and industrial areas adjoining the station area, then extends west under the I-790 interchange ramps. West of these ramps, the views from the railroad are screened by forested areas, which occupy the majority of area north of the tracks where there are large expanses of marshland, forestland, and farmland and scattered industrial uses. At MP 241.8, the tracks cross under the New York State Thruway (I-90). The south side of the tracks are bordered by residential neighborhoods, many of which are screened by trees, and industrial/commercial uses. Further west, the railroad extends through the Oriskany Flats State Wildlife Management Area at MPs 244.8 to 246.6 and other undeveloped lands and continues through the southern, less developed half of the city of Rome, including the Rome Station (MP 251.3). The railroad is set back from the Erie Canal in Rome, and views of the canal are screened by trees. Further west, the railroad continues through farmlands, wetlands, forestlands, and the Rome State Wildlife Management Area (MPs 253.6 to 255.8).

In **Madison County** (MPs 264 to 278), the viewshed is predominantly forest land and agricultural land with urban development concentrated in the middle of the county in the village of Canastota.

The corridor is almost entirely flat. West of the Oneida county line, the railroad extends through the northern, less developed areas of the city of Oneida, where views of adjoining areas are screened to a large extent by trees that either adjoin the right-of-way or are part of extensive areas of forest along the railroad. The Old Erie Canal State Park/Erie Canalway Trail extends north of or alongside the railroad between MPs 266.5 to 269, and the Old Erie Canal and adjoining areas of swamp adjoins the tracks in several locations, continuing north of, and further from, the railroad through Canastota. In Canastota, the views from the tracks are of more densely developed residential neighborhoods, businesses, and industrial uses. West of Canastota, the Old Erie Canal rejoins the north side of the railroad, north of Barlow Street, at MP 270.5, eventually crossing the railroad at MP 272. Agricultural lands are a more prominent feature of the surrounding landscape in the western part of the county, where the railroad continues through rural, partially forested landscape.

Crossing into **Onondaga County** (MPs 278 to 309), the viewshed continues to be primarily agricultural and forested, paralleling Saintsville Road and adjoining residences and businesses to the north, before crossing on the south side of Dewitt Yard (MPs 282.5 to 286) in and west of the village of Minoa. Views south of the tracks are of forested and residential areas through forested buffers alongside the railroad, transitioning to industrial uses approaching the I-481 Bridge in East Syracuse. West of this area, the railroad extends through increasingly urbanized and industrial/commercial areas in and around the city of Syracuse, with some views from the railroad screened by forest vegetation. In downtown Syracuse, the railroad is buffered by trees where it extends between Ley Creek on the west and the Alliance Bank Stadium and the Syracuse Regional Transportation Center (MP 291.5) on the east. Past the station, the railroad extends under the I-81 bridge and interchange ramps, and between Onondaga Lake and park on the west, and the Carousel Place shopping mall on the east. The railroad extends over the Barge Canal outlet along the lakefront and is buffered by trees to the south where it extends past industrial uses on the east, under I-690, and continues through industrial urban development (including the State Fairgrounds) west of the city of Syracuse. West of the fairgrounds, the railroad is buffered by trees where it extends through increasingly rural forested and agricultural areas and scattered industrial and residential areas. Although sections of the railroad closely parallel the New York State Thruway (I-90) and the Erie Canalway Trail, views are largely obscured by forested vegetation.

Leaving Onondaga County, the railroad extends west following a broad, level valley generally drained by the west to east flowing Seneca River/Erie Canal. In **Cayuga County** (MPs 309 to 320), the primary viewshed consists of agricultural and forest lands with rural, low-density development, and no viewsheds in major urban centers. The landform is generally flat with some small areas of mild to moderate slopes along either side of the rail corridor, which limits views. The Canalway Trail – Erie Section is located along the corridor between MPs 311 and 312. The railroad extends under the New York State Thruway (I-90) at MP 315. Approaching the Wayne County line, the railroad crosses the Seneca River/Erie Canal at MP 319.30 and then the extensive marshes within the wide floodplain of the now narrow Seneca River, adjoining the south side of Howland Island within the Northern Montezuma State Wildlife Management Area. The crossing of the Seneca River, on the other (west) side of Howland Island, forms the Wayne County line at MP 320.2.

The predominant viewshed in **Wayne County** (MPs 320 to 357) is mostly agricultural with large areas of forestland and wetlands. On the eastern end of the county, the railroad adjoins the Northern Montezuma State Wildlife Management Area (MPs 320 to 321.5). Views from the railroad include Route 31, which roughly parallels sections of the railroad, after crossing it in the village of Savannah (MP 322.5), through the eastern half of the county. The railroad also extends across the Montezuma National Wildlife Refuge (MPs 323.3 to 325.6), where views of adjoining Route 31 and, to some extent, surrounding swamp and marsh areas, are obscured by heavy forest and shrub vegetation. The landform along the railroad in the county is generally flat with some areas of moderate to steep slopes. Approaching Clyde at MP 328 and continuing west through the county (around these major drainages), the railroad encounters a region of prominent north-south oriented drumlins. These rounded, elongated ridges were formed during periods of glaciation that eroded the Allegheny Plateau – Finger Lakes Region to the south. Viewsheds include the Erie Canal, which extends in close proximity to the railroad in portions of the county, where it closely adjoins the railroad through Clyde, crosses the railroad in Lyons and again near Newark. Urban views in the villages of Savannah, Clyde, Lyons, and Newark are limited by screening by trees and the location of the railroad in the outskirts of these villages. However, views of urbanized areas along the track include the business and agricultural industrial district in and around Clyde, the rail yard and businesses and neighborhoods in Lyons, and industrial areas in Newark. Although the canal runs parallel to the railroad and alongside the Canalway Trail-Erie Canal Heritage Trail (between MPs 354.5 and 357) approaching the Monroe County line, the canal is offset by a forested buffer, which largely obscures views from the railroad.

Entering **Monroe County** (MPs 357 to 388), the railroad closely parallels the bank of the Erie Canal, to the south, extending through largely forested, undeveloped areas. Forested buffers, including several park areas, adjoin the railroad through the eastern part of the county. The railroad extends further from the canal as it continues west through increasingly urbanized areas, extending close to the canal before the two diverge. The railroad passes under the I-590 Bridge and I-490 interchange ramps near the city limits. West of the interchange, entering the city of Rochester, the viewshed becomes increasingly urban and dominated by hardscape, with parking lots, businesses, and industries closely adjoining the railroad and limited or no screening by trees. The railroad adjoins the south side of the Rochester railyard (MP 369) and continues alongside commercial and industrial areas, and south of the Rochester public market. To the west, approaching the Rochester Station (MP 371), the railroad continues above the grade of underpassing roadways and includes a tree buffer that partially screens views of the adjoining commercial/industrial areas. To the west, the railroad extends over the Genesee River (MP 371.3) just upstream (south) of the High Falls, or Upper Falls, and downstream (north) of the Inner Loop bridge. The railroad continues through the downtown business district adjacent to the Inner Loop, passing by Frontier Field just east before passing over the I-490/Inner Loop Interchange bridges (MP 371.85), with views to the north screened to some extent by trees. The viewshed through the remainder of the city is screened to some extent by trees, but views consist of commercial and residential buildings, before crossing at the Erie Canal and the Canalway Trail-Erie Canal Heritage Trail (MP 374.5). To the west, the viewshed includes increasing areas of forested/undeveloped areas with lower density development outside of the city, continuing through industrialized areas and crossing under I-390 at MP 374.75 and under I-490 at MP 377. The viewshed in the remainder of the county is rural and forested, with low density residential uses and farmlands closer to the county line.

In **Genesee County** (MPs 388 to 418) the viewshed is primarily agricultural with smaller areas of forest and views of residential and scattered commercial/industrial uses. The eastern half has views largely of agricultural fields, although forested buffers screen views in many locations. Urban views in the county are limited as the railroad extends through the outskirts of the city of Batavia in the middle of the county, passing through several parks and recreational areas in and just outside the city limits. The railroad crosses over the New York State Thruway (I-90) at MP 399.3. The western half of the county provides viewsheds of forest and farmlands, with scattered residential and commercial buildings, and parallels Route 33 to the north, which is offset and largely screened by vegetation or buildings.

Entering **Erie County** (MPs 418 to 439/QDN1 to QDN13), the viewshed from the railroad consists primarily of agricultural and forested lands. The viewshed becomes increasingly urban in the village areas approaching the Buffalo-Depew Station (MP 431.6) and the town of Cheektowaga, where views from the railroad include adjoining Ellicot Road/Route 130, to the south, and an overhead crossing of I-90 (Governor Thomas Dewey Thruway). Approaching and passing into the city of Buffalo, the views from the railroad include industrialized areas (including the Frontier railyard and the Buffalo Terminal) and higher density neighborhoods. In the downtown area, views include commercial buildings, to the north, and the elevated Niagara Thruway (I-190) structure, on the south. At the Buffalo Exchange Street Station, interchange ramps and elevated I-190 extend overhead, and the Buffalo skyline, including Coca Cola Field and parking facilities, are visible to the north. The railroad passes under the I-190/Route 5 Interchange through a 500-foot tunnel and a 565-foot tunnel. Route 5 in this location is part of the Great Lakes Seaway Trail, a National Scenic Byway and 518-mile driving route, which extends along the Lake Erie and Niagara River waterfront. The railroad borders I-190 to the west, and views of the Black Rock Canal (segregated from Lake Erie by Bird Island Pier) are obstructed by landscaping and developments. To the north, views to the west include Lasalle Park and industrial/waterfront uses, including a Frank Lloyd Wright boathouse and marinas/boat clubs. The railroad extends northeast under the elevated I-190 highway and continues north under the Peace Bridge (MP QDN4.6), between I-190, at the edge of Black Rock Canal, and Route 266. The Great Lakes Seaway Trail follows Route 266 where it is set back from the railroad along the canal from MPs QDN4.8 to QDN6.3. Steep slopes and vegetation obscure views from the railroad in some locations of Route 266 businesses. Where slopes flatten, views from the railroad include the nearby canal, adjoining Squaw Island, and businesses on Route 266. The railroad extends inland under the I-190/Route 198 Interchange (MP QDN6.2), between a transmission line right-of-way (that extends north to MP QDN8), on the west, and industrial uses on the east. The viewshed includes industrial uses along the railroad through the remainder of the city of Buffalo and town of Tonawanda. The railroad crosses I-290 at MP QDN10.75, and extends through flat industrial areas/institutional areas at-grade passing into the outskirts of the city of Tonawanda. The railroad continues north on elevated, forested embankment through the remainder of the city, where the views consist of more densely developed residential and commercial buildings and institutions in neighborhoods adjoining the railroad. The railroad passes over the Erie Canal/Ellicot Creek at MP QDN12.7 and the Erie Canal at a swing span bridge (MP QDN13.4).

Entering **Niagara County** (MPs QDN13 to QDN28), the railroad passes through the Gateway Park on the Erie Canal and continues on a raised forested embankment through densely developed neighborhoods in the city of North Tonawanda, and continues at-grade through less densely developed industrial areas approaching the riverfront to the north. Although the railroad extends close to the riverfront off Tonawanda Island, views of the Little River are obstructed by industrial buildings. Continuing north, the views from the railroad include industries and more densely developed neighborhoods on the east. Where the railroad extends alongside Routes 265/384 (River Road) and Gratwick Riverside Park (MP QDN15.7), the Niagara River is visible, and lands on the east side become more sparsely developed, transitioning to farmlands and forestlands at the outskirts of the city. The Great Lakes Seaway Trail follows River Road where it closely adjoins the railroad in this area (MPs QDN15.5 to QDN16.8). To the north, outside the city limits, views of the riverfront are obscured by forest vegetation and residences, and the railroad turns north, with viewsheds predominantly consisting of agricultural and forestlands, with scattered residences and businesses visible from the tracks, as the railroad extends north through the rural/suburban areas between the major metropolitan areas. Approaching the city of Niagara Falls, the viewshed becomes more urban. The railroad crosses under I-190 near a transmission line right-of-way in the vicinity of a tow lot and trailer/industrial storage yard, and then extends north of the Niagara Falls yard to the Niagara Falls Station (MP QDN27).

Views from the Railroad: 125 Study Area

In **Rensselaer County** (MPs QH142 to QH143), Alternative 125 would follow along the existing the Empire Corridor north to the Albany-Rensselaer Station, then would continue south to a new crossing of the Hudson River. The views along this mile would be largely residential and industrial, along with the views of the Hudson River to the west.

In **Albany County** (MPs QH143 to QH157), the 125 Study Area extends through industrialized waterfront, then would follow interstate highways between MP QH144, at the I-787 convergence with the New York State Thruway (I-87) (to MP QH145), and MP QH157 at the Schenectady county line. The majority of the areas adjoining the highway consist of forested, undeveloped areas, particularly south of the interstate highway, with urban development clustered at interchanges. The New York State Thruway and I-787 extend through the outskirts of the city of Albany, forming a dividing line between the urban areas of the city, on the north, and largely undeveloped areas and parks on the south, including Albany Pine Bush State Unique Area and a golf course. The viewshed along the highway is heavily buffered by forest along the majority of the highway right-of-way, and the median along the New York State Thruway consists of grass and becomes wide and forested in many locations, particularly on the west end of the county. Views of adjoining properties are limited, but adjoining buildings and urban areas are more visible within the city of Albany, on the east end of the county.

Entering **Schenectady County** (MPs QH157 to QH174), the 125 Study Area continues to follow the New York State Thruway (I-90) to MP QH159. The corridor extends north of I-90 alongside industrial and residential areas, passing along the outskirts of the more urbanized area in the town of Rotterdam, crossing west again across I-90 and I-88 between MPs QH161 and QH162. To the west, the 125 Study Area extends through primarily undeveloped forested or farmlands, extending across only six low-density development roads in the seven miles until the corridor approaches and extends across U.S. Route 20. The corridor parallels the highway to the south, and extending across crossroads that intersect the highway to the north, crossing into Schoharie County at Schoharie Creek.

In **Schoharie County** (MPs QH174 to QH180.7), the corridor continues adjacent to, and south of, U.S. Route 20, a New York State scenic byway, over a distance of approximately 8.5 miles, crossing northwest across the highway at MP QH177.5. The corridor extends through primarily forested and agricultural lands, with scattered developments close to crossing roads. West of MP QH178, where the corridor crosses Routes 162/30A and an intersecting road, north of U.S. Route 20, the corridor crosses only two more crossroads where it extends west to the county line, passing primarily through forested, undeveloped lands.

In **Montgomery County** (MPs QH180.7 to QH202), the 125 Study Area extends through predominantly rural agricultural and forested areas that bypass urban areas and villages. The corridor crosses 19 through roads, of which only five are state highway routes, and viewsheds of buildings are largely restricted to development along these crossroads. However, many buildings may be shielded from view by forest and vegetated buffers. Forested areas are more prominent on the eastern part of the county, and the viewsheds in the western half consist primarily of farmlands.

In **Herkimer County** (MPs QH202 to QH227.3), the viewsheds consist predominantly of rural agricultural and forestlands, where the corridor crosses the northernmost portion of the county. The majority of urban views (cross streets and buildings) are in the central portion of the county, where the corridor crosses the southern outskirts of the village of Ilion. The corridor crosses approximately 23 through roads, of which seven are numbered state routes.

The 125 Study Area would provide views of primarily rural agricultural and forested lands in **Oneida County** (MPs QH227.3 to QH249.3). The corridor would cross 28 through roads, of which nine are state routes. The corridor extends through the outskirts of the city of Sherrill on the western end of the county.

In **Madison County** (MPs QH249.3 to QH264), the corridor would provide views of largely rural forested and agricultural lands, passing through relatively undeveloped lands on the outskirts of the city of Oneida. The buildings and developments are largely restricted to the seventeen through roads, including two state routes, that the corridor would cross. The corridor would also cross through the Old Erie Canal/Erie Canal State Park at MPs QH 260.1 and QH262.3.

In **Onondaga County** (MPs QH264 to QH295.6), the 125 Study Area provides views of primarily agricultural and forested areas where it extends through the eastern part of the county, rejoining the 90/110 Study Area (MP 283) at MP QH268.7, on the south side of the rail yard. Views of buildings and development are limited largely to the five through streets crossed by the corridor. The corridor passes over the Old Erie Canal/Eric Canal State Park at MP QH265.8. The 125 Study Area follows the 90/110 Study Area through downtown Syracuse, as described in the previous section. Just east of the Camillus Airport, the 125 Study Area deviates from the 90/110 Study Area (MP 297.5) to the northwest (at MP QH284), extending through primarily rural agricultural and forested lands, with development largely restricted to the 14 through roads and one state highway that the corridor would cross. The corridor would also cross the New York State Thruway (I-90) at MP QH286.2.

In **Cayuga County** (MPs QH295.6 to QH306.6), the viewshed consists primarily of rural agricultural and forested lands, with development largely limited to buildings on the 13 through roads and two state highways.

In **Wayne County** (MPs QH306.6 to QH342), the corridor crosses the Erie Canal/Seneca River at the eastern county line. The viewsheds in the county consist largely of farm or forestlands through this rural landscape. Development is very low-density, and views of buildings would largely be restricted to the 47 local roads and 7 state highways crossed by the corridor.

In **Monroe County** (MPs QH342 to QH371.6), the 125 Study Area extends through primarily residential neighborhoods, crossing Route 31F, which is fronted by commercial uses before rejoining the 90/110 Study Area (MP 360.8) at MP QH345.25 near the Fairport Village line and following the railroad to MP QH361. The viewsheds consist largely of rural agricultural or forestland, with buildings primarily located along the 15 roads, and 2 state highways along the corridor. The 125 Atudy Area diverges from the 90/110 Study Area (MP 376.5) just east of the I-490 crossing west of the city of Rochester. The corridor crosses through more urban/industrial viewsheds closer to the interstate, but extends through largely forested viewsheds, with more rural agricultural lands to the west. Residential developments and buildings are more visible along the five state highways and the six through roads, although the corridor extends through or near other residential developments.

In **Genesee County** (MPs QH371.6 to QH401.4), the viewsheds consist primarily of rural agricultural and forested rural landscapes. Views of buildings and development are largely restricted to the 23 through roads crossed by the corridor and the five state highways.

In **Erie County** (MPs QH401.4 to QH426), the viewsheds consist of rural agricultural and forested landscape, extending through one trailer park and becoming more residential to the west. Where the 125 Study Area turns south, crossing the New York State Thruway at MP QH410.5, views of more urban, commercial/industrial areas are more prominent along Route 31 and where the corridor merges with the 90/110 Study Area (MP 427) at MP QH413.

13. Farmlands

13.1 Empire Corridor South

The Empire Corridor South extending north from (and including) New York through the Hudson Valley to Rensselaer County includes three urbanized counties. All of the Build alternatives follow the existing Empire Corridor South for the majority of its length, deviating only in Rensselaer County, where Alternative 125 splits off 1.6 miles south of where the existing Empire Corridor turns to the west. The study area within the seven counties of Empire Corridor South contains 405 acres of prime farmland (31 additional acres of prime farmland if drained), 393 acres of farmland of statewide importance, and 387 acres of Agricultural Districts.

The study area within New York, Bronx, and Westchester Counties is urbanized as defined by the U.S. Census Bureau and therefore, by definition does not contain federally protected prime farmland. There are also no prime farmland soils mapped in New York and the Bronx, and there are 59 acres mapped in **Westchester County**, but these do not meet the federal definition of protected prime farmland since Westchester County is within a Census-defined urbanized area. There are no Agricultural Districts within these three urbanized counties.

Putnam County is not defined as an urbanized area, but the portion of the county within the study area contains only 9 acres of prime farmland, one acre of prime farmland if drained, and one acre of farmland of statewide importance. There are no Agricultural Districts in the study area in Putnam County.

More than half of **Dutchess County** in the study area is within a Census-defined urbanized area, and the remaining areas contain 120 acres of prime farmland, 21 acres of prime farmland if drained, and 233 acres of farmland of statewide importance. Dutchess County also has 112 acres within state-designated Agricultural Districts. About one-third of Columbia County within the study area is an urbanized area, and most of the mapped farmland soils are situated outside the urbanized area. In **Columbia County**, there are 69 acres of prime farmland (7 acres of prime farmland if drained), 102 acres of farmland of statewide importance, and 148 acres within Agricultural Districts.

Roughly half of the study area in **Rensselaer County** is within an urbanized area where the 90/110 and 125 Study Areas diverge, and the remaining area contains 148 acres of prime farmland, and 17 acres of farmland of statewide importance. There are 126 acres within Agricultural Districts in Rensselaer County.

13.2 Empire Corridor West/Niagara Branch: 90/110 Study Area

The Empire Corridor West and Niagara Branch extending west of (and including) Albany to Niagara Falls includes large tracts of agricultural land within the 600-foot-wide study area. The study area in the thirteen counties contains a total of 3,610 acres of prime farmland, an additional 1,952 acres of prime farmland if drained, and 1,647 acres of farmland of statewide importance. Approximately 3,280 acres of the study area between (and including) Albany County and Niagara County are within state-designated Agricultural Districts.

Albany County is within an urbanized area; however, there are 8 acres of prime farmland and 26 acres of farmland of statewide importance within this county. There are no Agricultural Districts in the study area within Albany County.

Most of **Schenectady County** lies within an urbanized area, and the remaining areas contain 163 acres of prime farmland, and 39 acres of farmland of statewide importance. There are 12 acres within Agricultural Districts in the study area in Schenectady County. The study area in **Montgomery County** is primarily rural and contains 484 acres of prime farmland (an additional 6 acres if drained) and 88 acres of farmland of statewide importance. Within Montgomery County, approximately 610 acres are within Agricultural Districts. **Herkimer County** has urbanized areas that follow the rail corridor, and contains 328 acres of prime farmland, 4 acres of prime farmland if drained, 19 acres of farmland of statewide importance, and 159 acres are within Agricultural Districts.

More than two-thirds of the rail corridor in **Oneida County** consists of urbanized areas around the cities of Utica and Rome. The remainder of the Oneida County within the study area contains 295 acres of prime farmland, 270 acres of prime farmland if drained, and 87 acres of farmland of statewide importance. The area within 300 feet of the corridor centerline in Oneida County contains 24 acres within Agricultural Districts. Approximately half of the rail corridor in **Madison County** consists of urbanized areas within the city of Oneida, but the remainder contains 133 acres of prime farmland (an additional 193 acres of prime farmland if drained), and 154 acres of farmland of statewide importance. The study area in Madison County contains 132 acres within Agricultural Districts.

Almost half of the study area in **Onondaga County** consists of urbanized areas surrounding the city of Syracuse, but the remaining area contains 351 acres of prime farmland, 256 acres of prime farmland if drained, and 169 acres of farmland of statewide importance, for a total of 776 acres of farmland. There are 39 acres within Agricultural Districts within the county. **Cayuga County** is predominantly rural and agricultural. The study area within Cayuga County contains 266 acres of prime farmland, 24 acres of prime farmland if drained, 284 acres of farmland of statewide importance, and 223 acres within Agricultural Districts.

Wayne County is primarily rural and agricultural, with 609 acres of prime farmland, 138 acres of prime farmland if drained, and 268 acres of farmland of statewide importance. The county contains 1,004 acres within Agricultural Districts.

Most of **Monroe County** within the study area consists of urbanized areas surrounding the city of Rochester, but the remaining area contain 155 acres of prime farmland, 214 acres of prime farmland if drained, and 33 acres of farmland of statewide importance. The areas within 300 feet of the corridor centerline in Monroe County include 118 acres within Agricultural Districts.

Genesee County within the study area is primarily rural and agricultural and areas within 300 feet of the corridor centerline contain 755 acres of prime farmland, 463 acres of prime farmland if drained, and 338 acres of farmland of statewide importance. There are 650 acres within Agricultural Districts within the study area in Genesee County.

Most of **Erie County** within the study area consists of urban areas surrounding the cities of Buffalo, Tonawanda, and Niagara Falls, but the remainder of the study area within the county contains 60 acres of prime farmland, 332 acres of prime farmland if drained, and 133 acres of farmland of statewide importance. There are 225 acres within Agricultural Districts within the study area in Erie County. All of **Niagara County** along the remainder of the Niagara Branch consists of urbanized area, although there are 3 acres of prime farmland, 52 acres of prime farmland if drained, and 9 acres of farmland of statewide importance within the 600-foot wide study area. There are also 84 acres within Agricultural Districts in Niagara County.

13.3 Empire Corridor West/Niagara Branch: 125 Study Area

The 125 Study Area follows a more direct route between Rensselaer and Buffalo, which bypasses several of the major metropolitan areas and stations sites (Schenectady, Amsterdam, Utica, and Rome) along the Empire Corridor West and extends through more rural and agricultural areas. Within the 600-foot wide study area of the 125 Study Area in the Empire Corridor West/Niagara Branch, there are fourteen counties containing a total of 5,139 acres of prime farmland, an additional 3,346 acres of prime farmland if drained, and 3,076 acres of farmland of statewide importance. Approximately 7,779 acres of the study area between (and including) Albany County and Niagara County are within state-designated Agricultural Districts.

As noted above, **Albany County** is within an urbanized area. However, there are 64 acres of prime farmland and 89 acres of farmland of statewide importance in this county within the 125 Study Area. Albany County does not include any Agricultural Districts within the 125 Study Area.

The 125 Study Area follows a more southerly, rural route through **Schenectady County**, with the exception of the eastern third of the route, which lies within an urbanized area. The remaining areas contain 56 acres of prime farmland (an additional 403 acres if drained), and 263 acres of farmland of statewide importance. There are 159 acres within Agricultural Districts within the 125 Study Area in Schenectady County.

The 125 Study Area passes through **Schoharie County**. The study area in the county contains 132 acres of prime farmland (an additional 104 acres if drained), and 79 acres of farmland of statewide importance. Within Schoharie County, approximately 25 acres are within agricultural districts.

The study area in Montgomery and Herkimer counties bypasses urban areas along the Empire Corridor in Amsterdam and Herkimer and other communities that developed along the railroad. The study area in **Montgomery County** is primarily rural and contains 56 acres of prime farmland (an additional 770 acres if drained) and 488 acres of farmland of statewide importance. Within Montgomery County, approximately 1,078 acres are within Agricultural Districts. **Herkimer County** along the 125 mph rail corridor is predominantly rural, and contains 216 acres of prime farmland (an additional 286 acres if drained), 460 acres of farmland of statewide importance, and 82 acres of Agricultural Districts.

The 125 Study Area bypasses the cities of Utica and Rome, although the eastern half of the study area extends through urbanized areas to the south of these cities. The remainder of **Oneida County** within the study area contains 827 acres of prime farmland, 357 acres of prime farmland if drained, and 111 acres of farmland of statewide importance. The area within 300 feet of the 125 Study Area corridor centerline in Oneida County contains 374 acres within Agricultural Districts.

Although the 125 Study Area bypasses the city of Oneida, almost half of the rail corridor in **Madison County** consists of urbanized areas surrounding the city. The remainder of the county contains 244 acres of prime farmland (an additional 60 acres of prime farmland if drained), and 335 acres of farmland of statewide importance. The study area in Madison County contains 366 acres within Agricultural Districts.

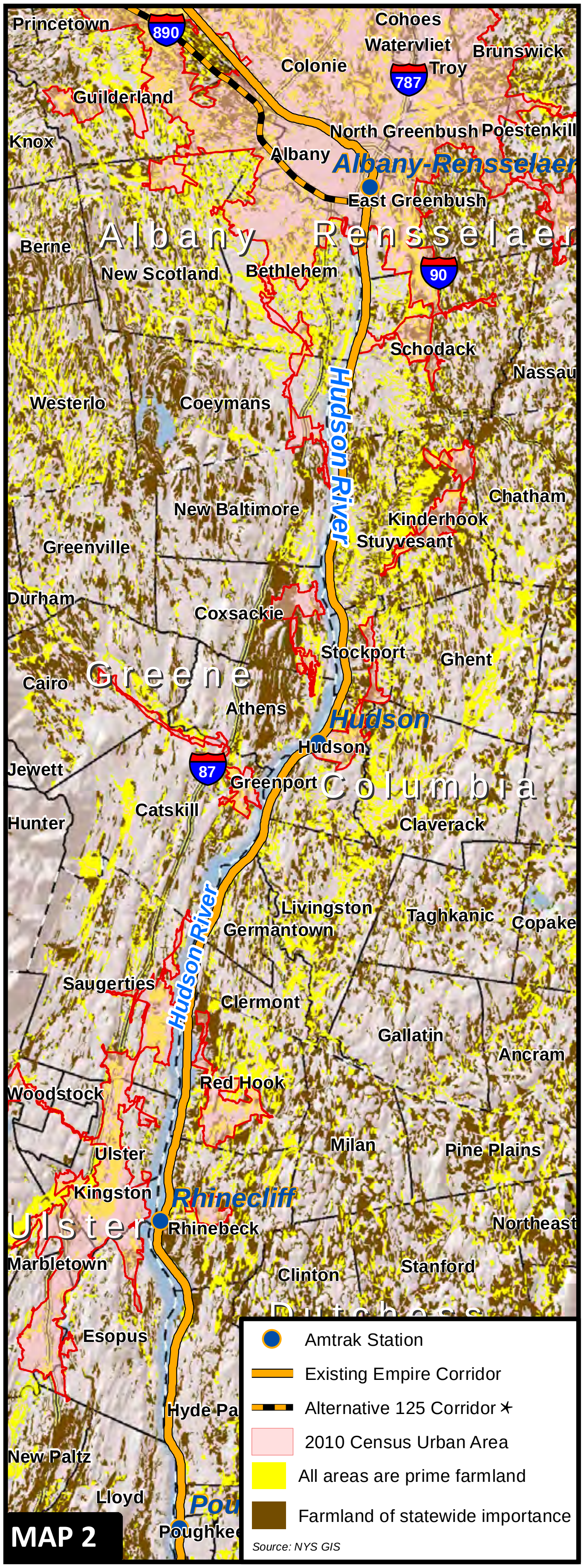
The 125 Study Area parallels and merges with the Empire Corridor West in **Onondaga County** through the Syracuse area. Almost half of the study area in Onondaga County consists of urbanized areas surrounding the city of Syracuse, but the remaining area contains 473 acres of prime farmland, 140 acres of prime farmland if drained, and 319 acres of farmland of statewide importance, for a total of 932 acres of farmland. There are 464 acres within Agricultural Districts within the county.

The 125 Study Area takes a more northerly route bypassing the existing railroad corridor through Cayuga and Wayne counties. Cayuga and Wayne counties are predominantly rural and agricultural. The 125 mph study area within the **Cayuga County** contains 362 acres of prime farmland, 90 acres of prime farmland if drained, 160 acres of farmland of statewide importance, and 806 acres within Agricultural Districts. The study area in **Wayne County** contains 1,246 acres of prime farmland, 298 acres of prime farmland if drained, and 271 acres of farmland of statewide importance. The county contains 2,214 acres within Agricultural Districts.

The 125 Study Area bypasses the Empire Corridor West to the north and merges with the existing rail corridor through the Rochester area, before splitting off to the north again on the west end of the county. Most of **Monroe County** within the study area consists of urbanized areas surrounding the city of Rochester, but the remaining area contains 215 acres of prime farmland, 76 acres of prime farmland if drained, and 43 acres of farmland of statewide importance. The areas within 300 feet of the 125 mph corridor centerline in Monroe County include 267 acres within Agricultural Districts.

The 125 Study Area extends on a more northerly route through **Genesee County**, bypassing an urban area in Batavia. Genesee County within the 125 mph study area is primarily rural and agricultural and areas within 300 feet of the 125 mph corridor centerline contain 1,002 acres of prime farmland, 427 acres of prime farmland if drained, and 369 acres of farmland of statewide importance. There are 1,476 acres within Agricultural Districts within the 125 mph study area in Genesee County.

The 125 Study Area turns south to merge with the Empire Corridor West five miles east of the Buffalo-Depew Station in eastern Erie County. Most of **Erie County** within the study area consists of urban areas surrounding the cities of Buffalo, Tonawanda, and Niagara Falls, but the remainder of the 125 mph study area within the county contains 243 acres of prime farmland, 283 acres of prime farmland if drained, and 80 acres of farmland of statewide importance. There are 384 acres within Agricultural Districts within the study area in Erie County. All of **Niagara County** along the remainder of the Niagara Branch consists of urbanized areas, although there are 3 acres of prime farmland, 52 acres of prime farmland if drained, and 9 acres of farmland of statewide importance in the 125 Study Area. There are also 84 acres within Agricultural Districts in Niagara County.



✶Alt. 125 as shown is a potential corridor used to analyze the potential operating characteristics, environmental impacts and cost for this speed (125 mph) threshold.

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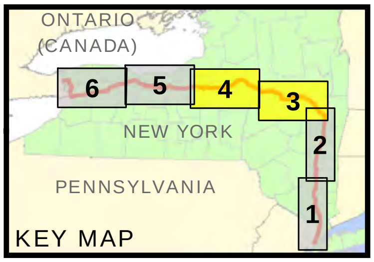
Miles

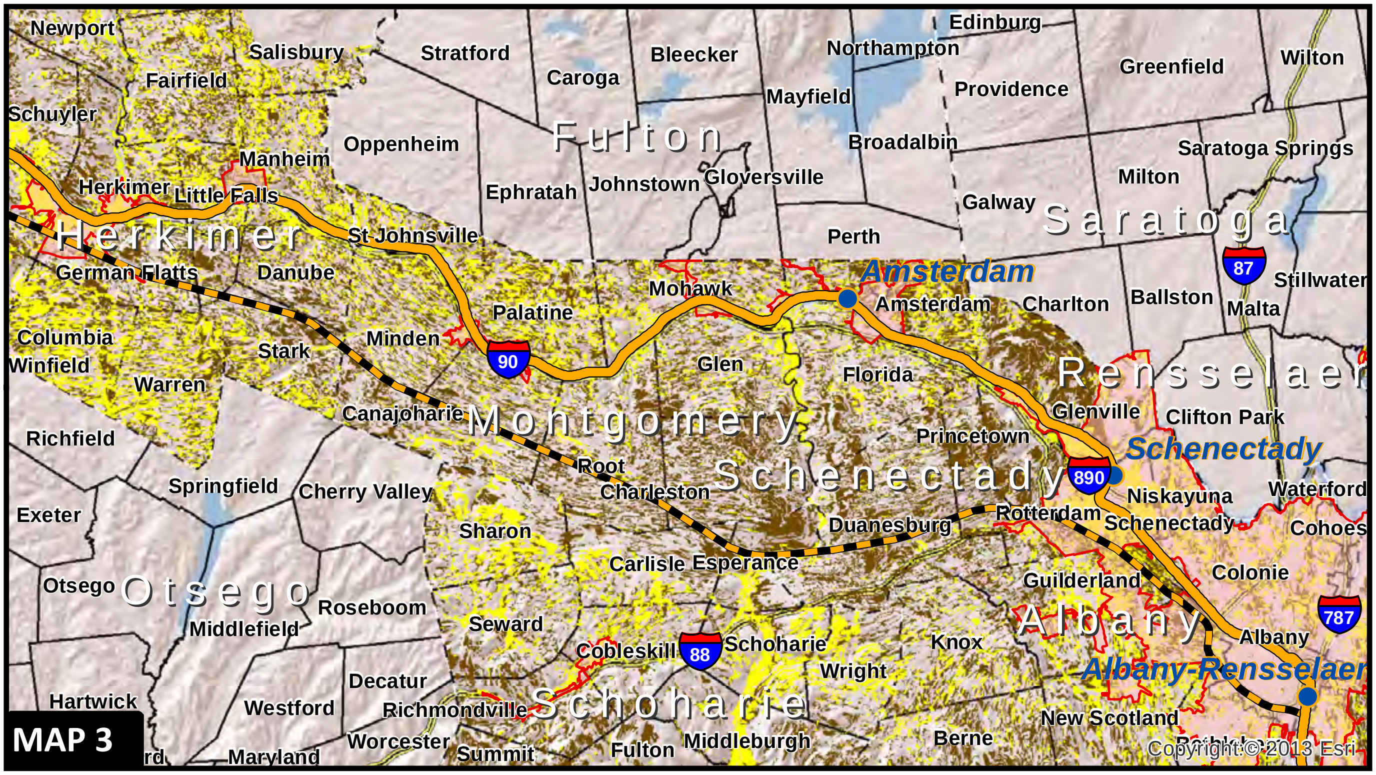
Farmland Map

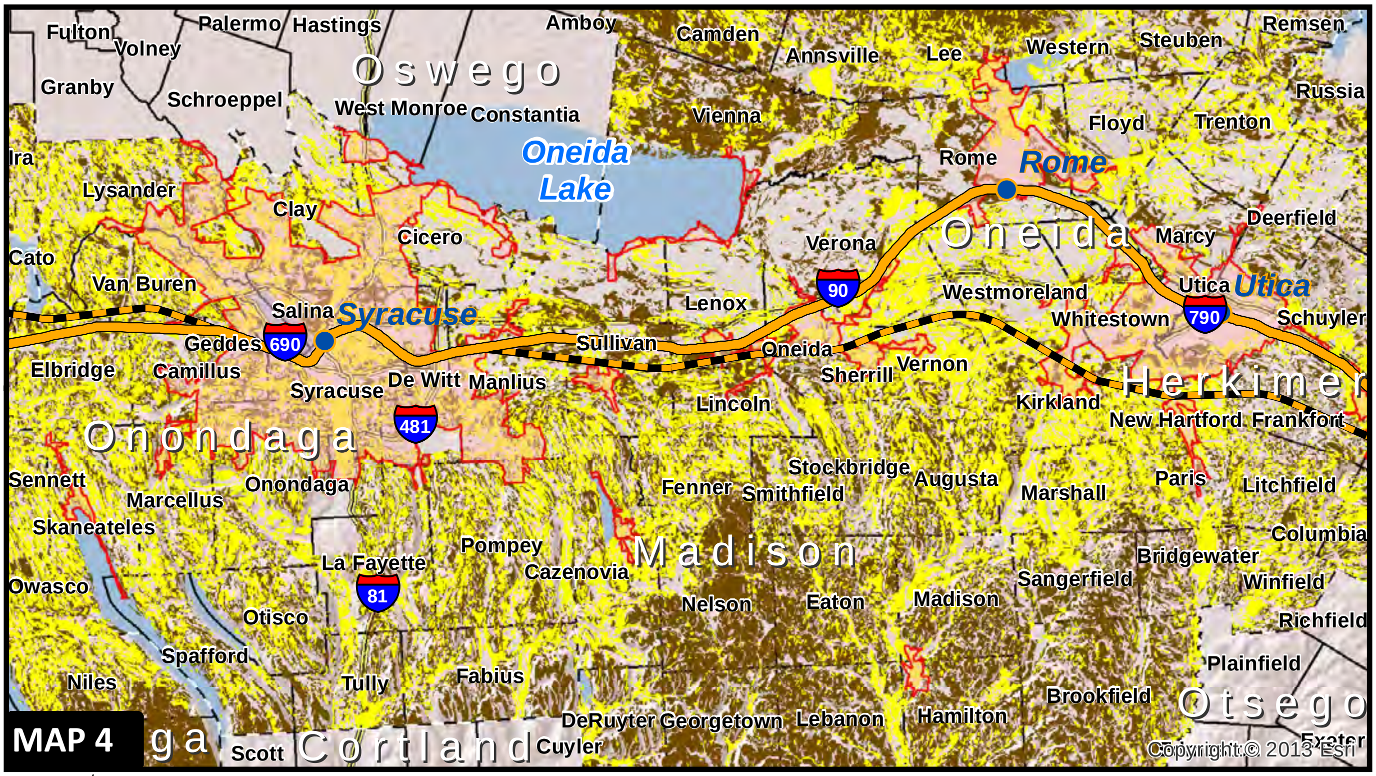
Exhibit G-16

Tier 1 EIS
High Speed Rail
Empire Corridor Program



Amtrak Station
Existing Empire Corridor
Alternative 125 Corridor ✶
2010 Census Urban Area
All areas are prime farmland
Farmland of statewide importance
Source: NYS GIS



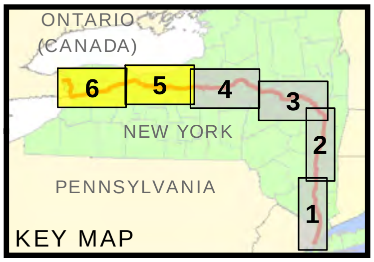


✶Alt. 125 as shown is a potential corridor used to analyze the potential operating characteristics, environmental impacts and cost for this speed (125 mph) threshold.

0 2.5 5 10
Miles

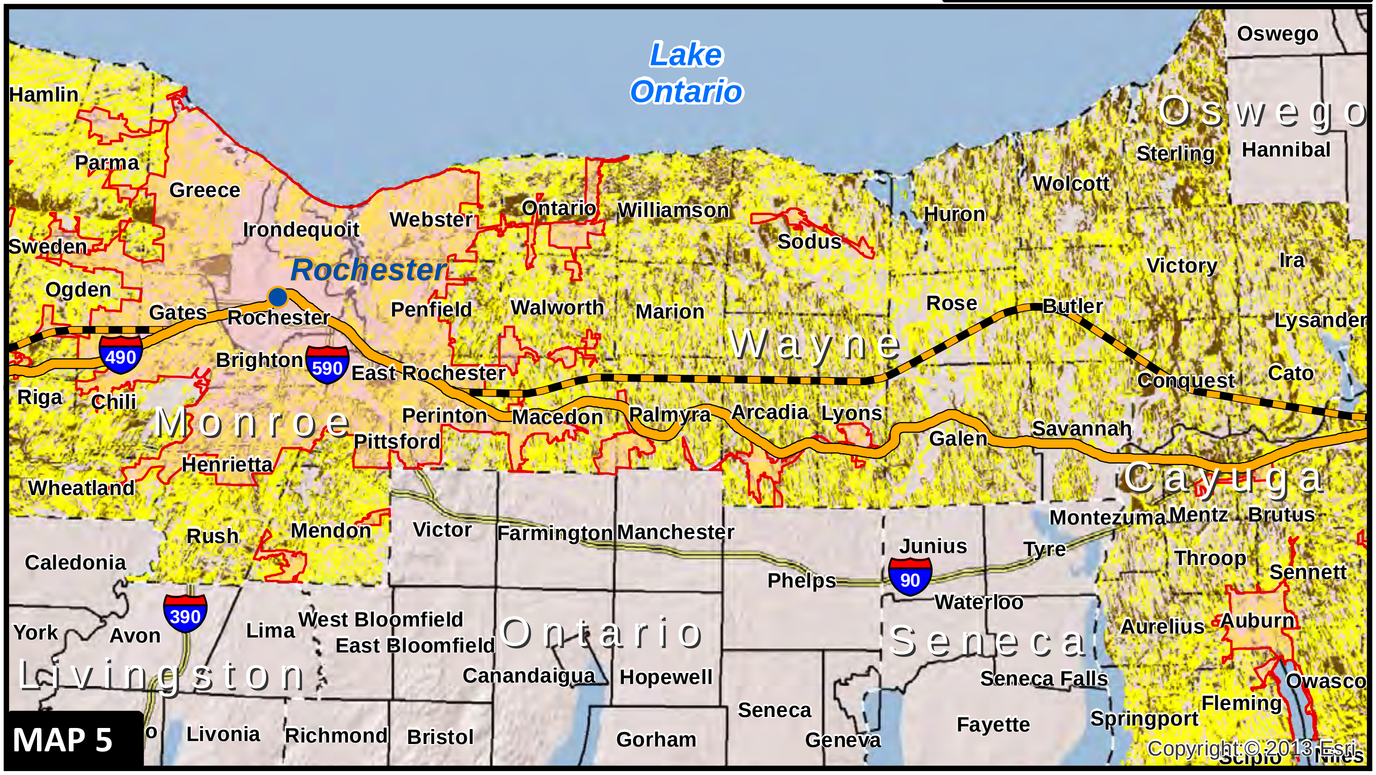
Farmland Map
Exhibit G-16

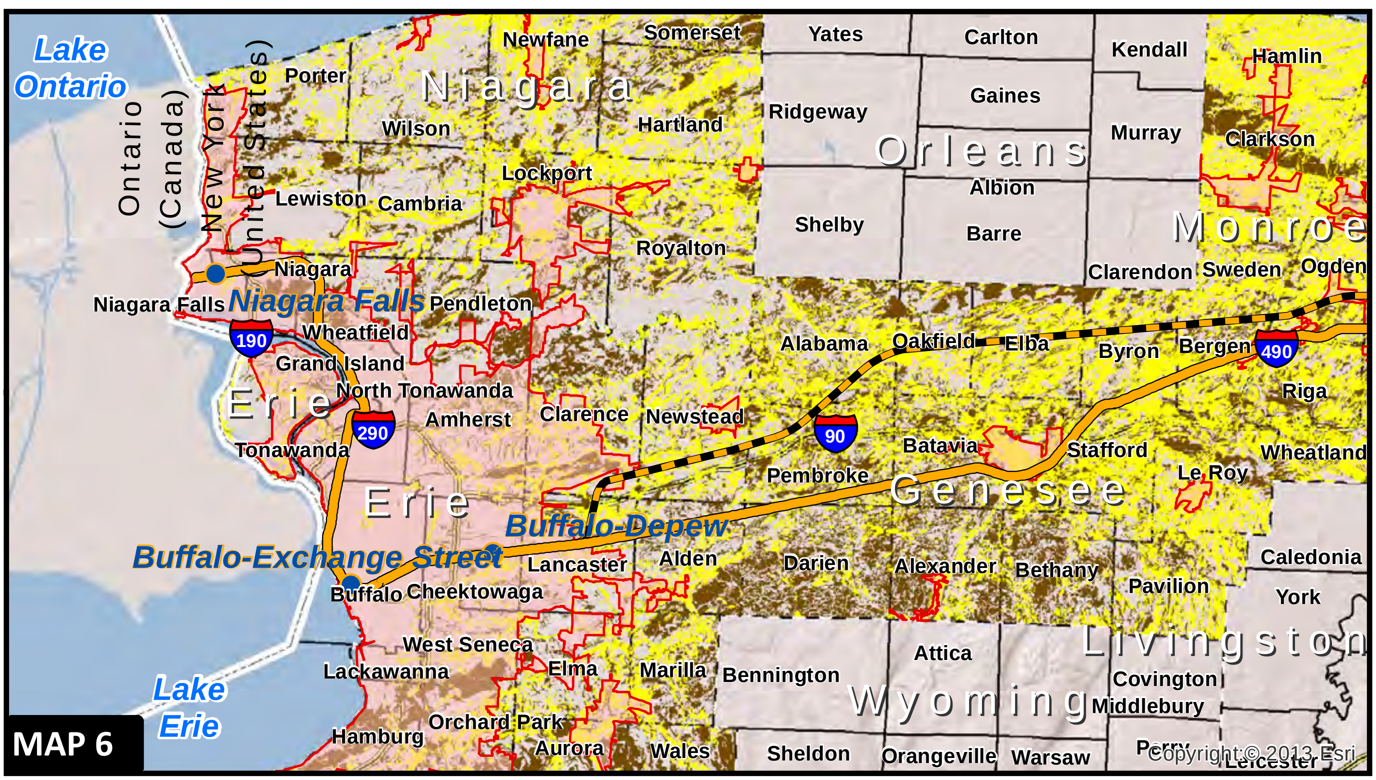
Tier 1 EIS
High Speed Rail
Empire Corridor Program



- Amtrak Station
- Existing Empire Corridor
- Alternative 125 Corridor ✶
- 2010 Census Urban Area
- All areas are prime farmland
- Farmland of statewide importance

Source: NYS GIS



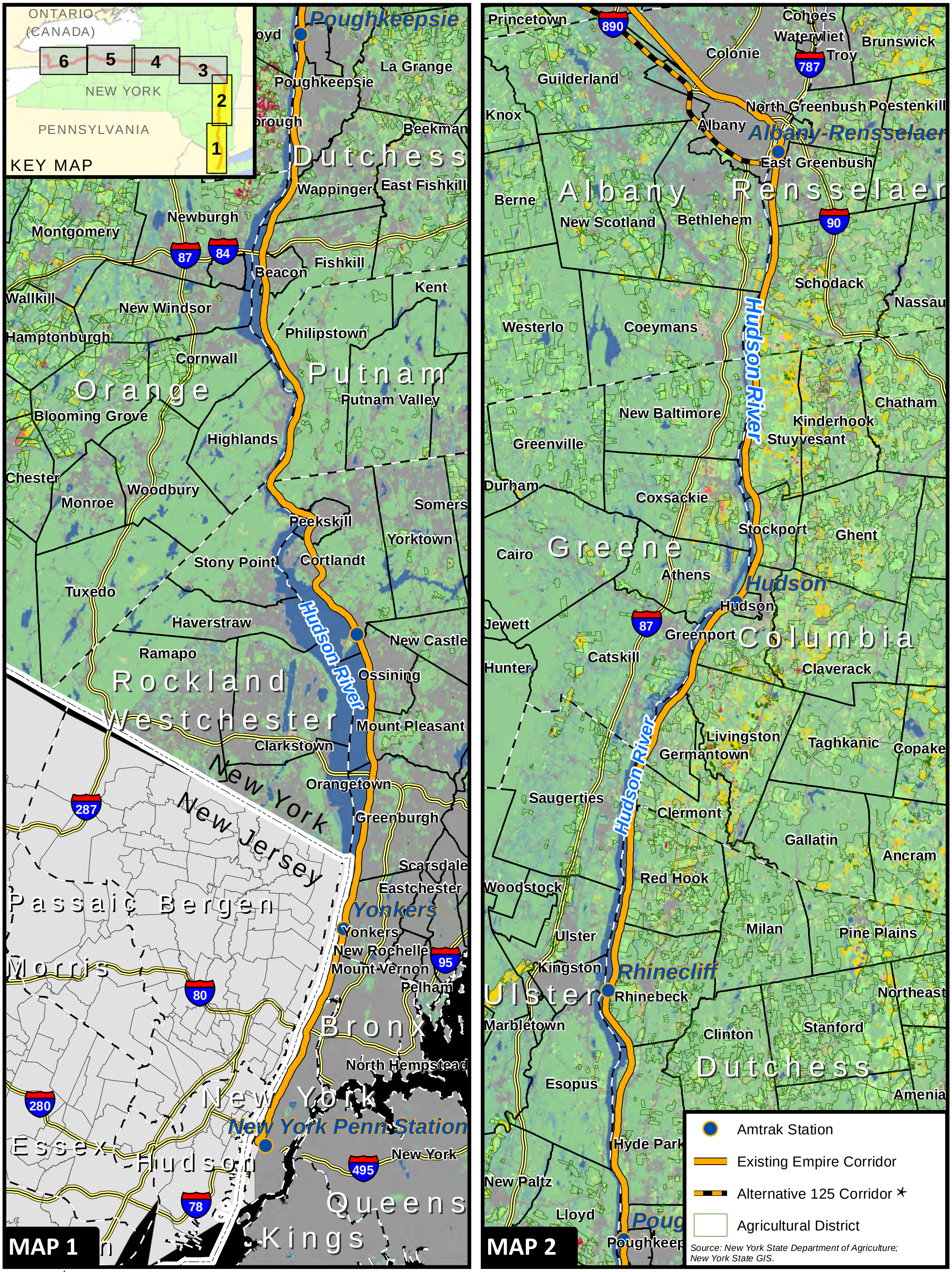


✶Alt. 125 as shown is a potential corridor used to analyze the potential operating characteristics, environmental impacts and cost for this speed (125 mph) threshold.

0 2.5 5 10
Miles

Farmland Map
Exhibit G-16

Tier 1 EIS
High Speed Rail
Empire Corridor Program



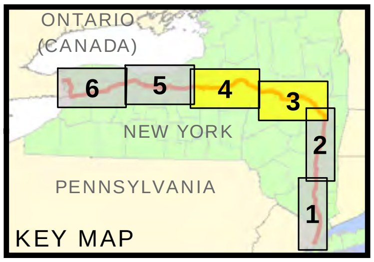
✶Alt. 125 as shown is a potential corridor used to analyze the potential operating characteristics, environmental impacts and cost for this speed (125 mph) threshold.

0 2.5 5 10
Miles

Cropland Map

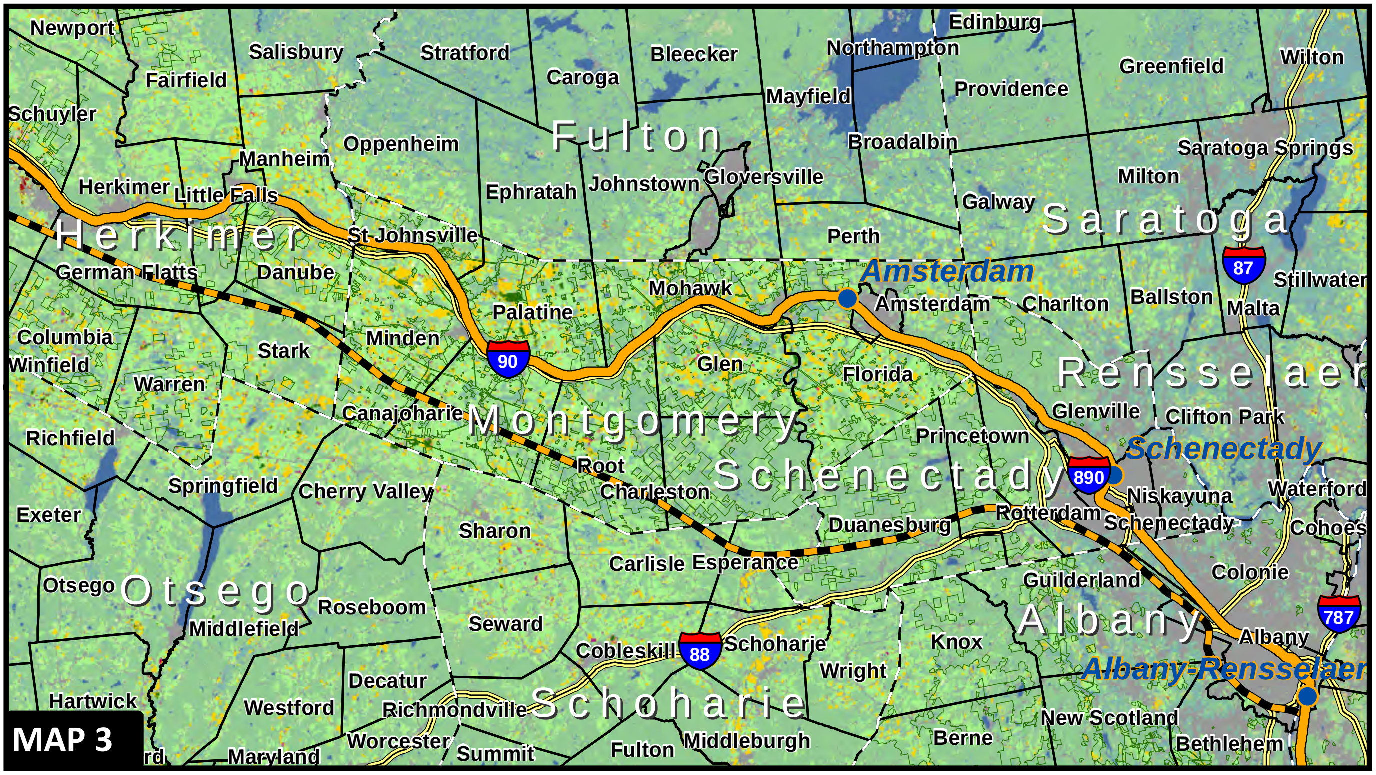
Exhibit G-17

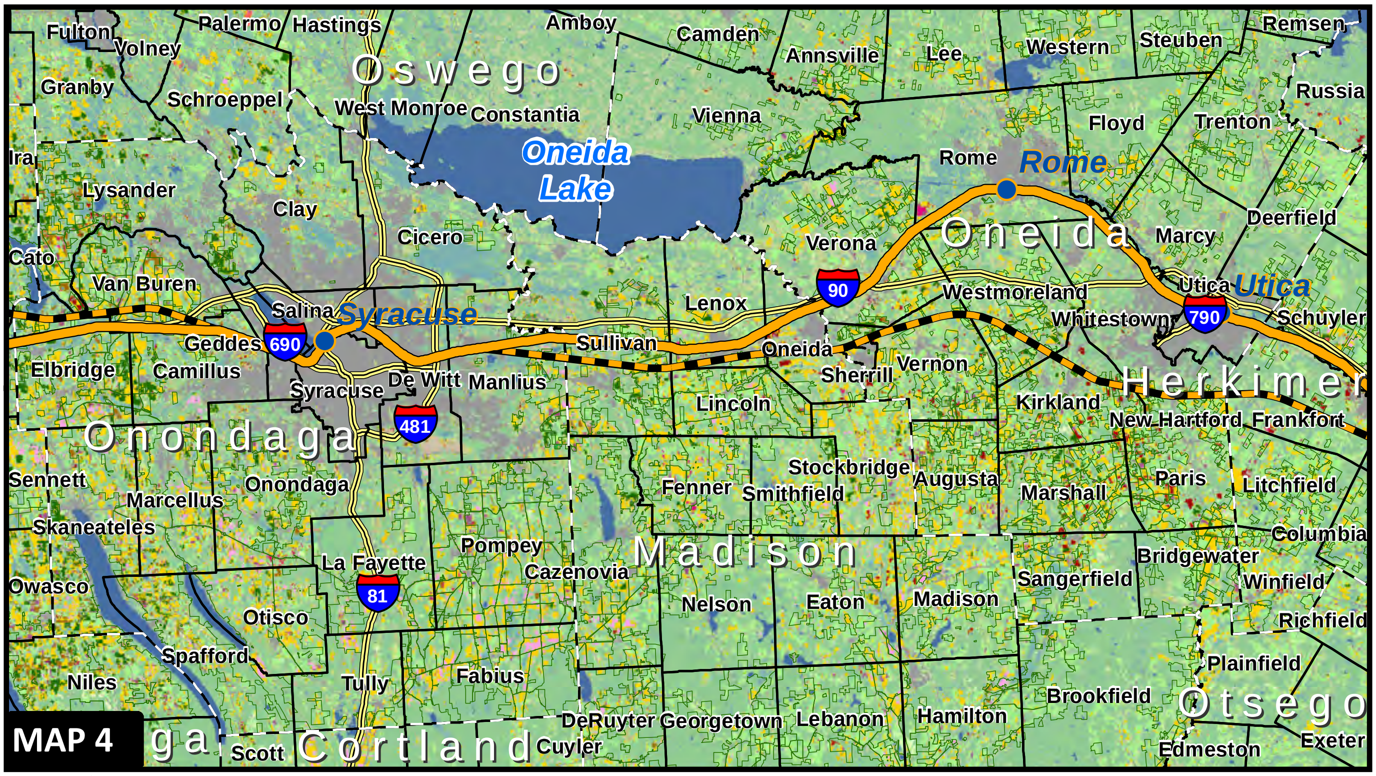
Tier 1 EIS
High Speed Rail
Empire Corridor Program



- Amtrak Station
- Existing Empire Corridor
- Alternative 125 Corridor ✶
- Agricultural District

Source: New York State Department of Agriculture; New York State GIS.





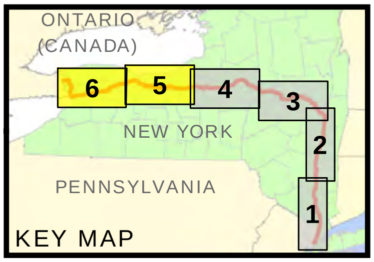
✶Alt. 125 as shown is a potential corridor used to analyze the potential operating characteristics, environmental impacts and cost for this speed (125 mph) threshold.

0 2.5 5 10
Miles

Cropland Map

Exhibit G-17

Tier 1 EIS
High Speed Rail
Empire Corridor Program



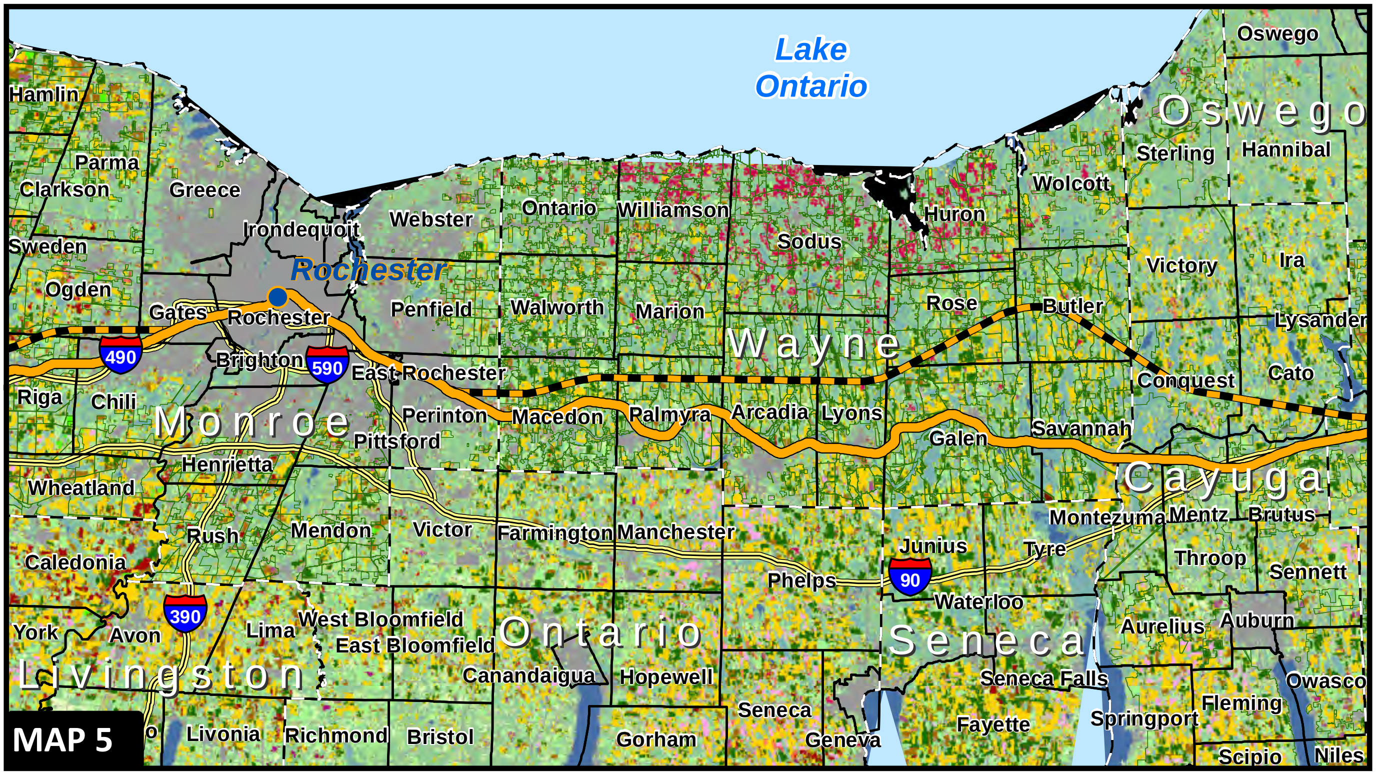
Amtrak Station

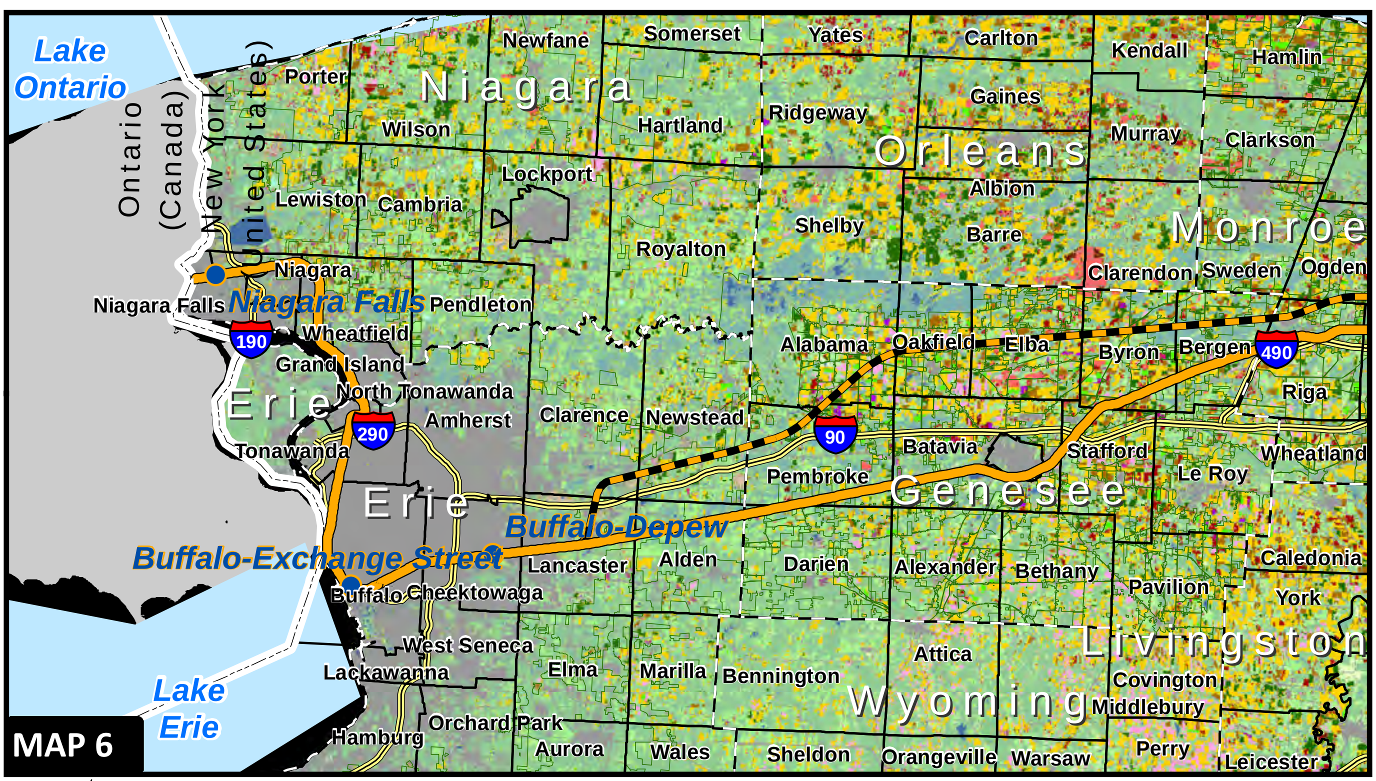
Existing Empire Corridor

Alternative 125 Corridor ✶

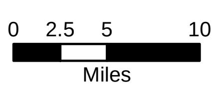
Agricultural District

Source: New York State Department of Agriculture; New York State GIS.





✶Alt. 125 as shown is a potential corridor used to analyze the potential operating characteristics, environmental impacts and cost for this speed (125 mph) threshold.



Cropland Map

Exhibit G-17

Tier 1 EIS
High Speed Rail
Empire Corridor Program

14. Contaminated and Hazardous Material

14.1 Empire Corridor South

All of the Build alternatives follow the existing Empire Corridor South for the majority of its length, deviating only in Rensselaer County, where Alternative 125 splits off 1.6 miles south of where the existing Empire Corridor turns to the west. The 90/110 Study Area has a total of 4,140 sites, of which 3,748 are in Manhattan (New York County). The 125 Study Area has a total of 4,135 sites, of which the same 3,748 are in Manhattan (New York County). The major feature along the Empire Corridor South is the Hudson River.

The Hudson River PCBs (polychlorinated biphenyl) Superfund Site is located in all of the counties along the 142-mile Empire Corridor South. This site encompasses a nearly 200-mile stretch of the Hudson River extending from Hudson Falls to Battery Park in New York City.[23] From approximately 1947 to 1977, General Electric Company (GE) discharged as much as 1.3 million pounds of PCBs from its capacitor manufacturing plants at the Hudson Falls and Fort Edward facilities into the Hudson River. As a result, the primary health risk associated with the site is the accumulation of PCBs in the human body through eating contaminated fish. PCBs are considered probable human carcinogens and are linked to other adverse health effects such as low birth weight, thyroid disease, and learning, memory, and immune system disorders. PCBs in the river sediment also affect fish and wildlife.

In February 2002, the U.S. EPA issued a Record of Decision (ROD) for the Hudson River PCBs Superfund Site that calls for targeted environmental dredging of approximately 2.65 million cubic yards of PCB-contaminated sediment from a 40-mile section of the Upper Hudson River extending north of Troy, upstream of the study area. The cleanup will occur in two phases. Phase 1 of the project was conducted by GE with oversight by the U.S. EPA from May to November 2009. During this phase, approximately 283,000 cubic yards of PCB-contaminated sediment was removed from a six-mile stretch of the Upper Hudson River near Fort Edward, New York. In the study area, removal of PCB and lead in contaminated soils was also performed on Rogers Island in Columbia County. The U.S. EPA determined it was necessary to remove contaminated soils on the north side of the island. Phase 2 will remove the remainder of the contaminated river sediment targeted for dredging and it will take five to seven years to complete.

Exhibit 4-59 in Chapter 4 of the EIS summarizes the contaminated and hazardous materials sites within the Empire Corridor. **New York County** has the most contaminated and hazardous material sites of any county in the Empire Corridor South Segment. The majority of these, 3,667, are Petroleum Bulk Storage (PBS) sites. In addition, there are 64 RCRA sites, six TRIS sites and 11 Chemical Bulk Storage (CBS) sites.

Bronx County has a total of 116 sites, mostly PBS (115) and RCRA (one).

[23] United States Environmental Protection Agency, "Hudson River PCBs." Accessed September 26, 2011. <http://www.epa.gov/hudson/>.

Westchester County has 52 contaminated and hazardous material sites with 16 RCRA sites, 15 TRIS sites, 12 CBS sites, five MOSF sites, three PBS sites and one Superfund site. The majority of these sites are located near the cities of Yonkers, Tarrytown, Ossining and Peekskill.

Putnam County has the fewest contaminated and hazardous material sites in Empire Corridor South with 12 PBS sites, one NPL and one Superfund site. The majority of these sites are located in the town of Cold Spring.

Dutchess County has 106 contaminated and hazardous material sites, the majority of which are located in the city of Beacon, Crown Heights and in/around the city of Poughkeepsie. There are 87 PBS sites, five RCRA sites, five TRIS and CBS sites, three MOSF sites and one Superfund site.

Columbia County has 13 contaminated and hazardous material sites with 11 PBS sites and two TRIS sites. The majority of these sites are located in the city of Hudson.

In **Rensselaer County** the 90/110 Study Area has 91 contaminated and hazardous material sites with 51 PBS sites, nine RCRA sites, 10 TRIS and CBS sites, nine MOSF sites and two Superfund sites. The 125 Study Area has 86 contaminated and hazardous material sites with 47 PBS sites, nine RCRA sites, 10 TRIS and CBS sites, eight MOSF sites and two Superfund sites. The majority of these are located in the city of Rensselaer.

14.2 Empire Corridor West/Niagara Branch: 90/110 Study Area

The Empire Corridor West/Niagara Branch 90/110 Study Area has a total of 2,271 sites, less than the Empire Corridor South. The majority are located in the more urbanized counties in: Erie County (447 sites), Monroe County (373 sites), Oneida County (281 sites), and Onondaga County (238 sites).

Albany County has 188 contaminated and hazardous material sites, the majority of which are located in the city of Albany. There are 155 PBS sites, 13 RCRA sites, nine TRIS and CBS Sites, one NPL and one Superfund site.

Schenectady County has 114 contaminated and hazardous material sites with 106 PBS sites, one RCRA site, three TRIS sites, two CBS and two MOSF sites. The majority of these sites are located in and around the city of Schenectady.

Montgomery County has 139 contaminated and hazardous material sites with 119 PBS sites, 10 RCRA sites, five CBS sites, four TRIS sites and one Superfund site. The sites are generally located in the larger cities/towns such as the city of Amsterdam, Fonda, the town of Canajoharie, Fort Plain and the town of St. Johnsville.

Herkimer County has 127 contaminated and hazardous material sites, mostly located in the city of Little Falls and Ilion. There are 110 PBS sites, seven RCRA sites, six TRIS sites and four CBS sites.
Oneida County has 281 contaminated and hazardous material sites with 244 PBS sites, 11 RCRA sites, 12 TRIS sites, eight CBS sites, three Superfund sites, two MOSF sites and one NPL site. The majority of these sites are located in and around the city of Utica and the city of Rome.

Madison County has 18 contaminated and hazardous material sites with 12 PBS sites, four CBS sites and two TRIS sites. The majority of these sites are located in the city of Oneida and the village of Canastota.

Onondaga County has 238 contaminated and hazardous material sites, the majority of which are located in and around the city of Syracuse. There are 178 PBS sites, 17 RCRA sites, 23 TRIS sites, 17 CBS sites, two Superfund sites and one MOSF site.

Cayuga County has 11 contaminated and hazardous material sites, the fewest in the Empire Corridor West/Niagara Branch segment including one RCRA site, nine PBS sites and one CBS site. The majority of these sites are located in the village of Weedsport.

Wayne County has 80 contaminated and hazardous material sites, the majority of which are located in the town of Savannah, village of Clyde, village of Lyons and the town of Palmyra. There are 59 PBS sites, seven RCRA sites, eight TRIS sites, five CBS sites and one MOSF site.

Monroe County has 373 contaminated and hazardous material sites with 41 RCRA sites, 265 PBS sites, 43 TRIS sites, 17 CBS sites, six Superfund sites and one MOSF site. The majority of these sites are located in and around the city of Rochester.

Genesee County has 164 contaminated and hazardous material sites with 148 PBS sites, two RCRA sites, eight CBS sites and six TRIS sites. The majority of these sites are located in the town of Bergen and the city of Batavia.

Erie County has 447 contaminated and hazardous material sites, the most in the Empire Corridor West/Niagara Branch segment. The majority of these sites are located in the city of Buffalo and the city of Tonawanda. There are 35 RCRA sites, 334 PBS sites, 54 TRIS sites, 13 CBS sites, 10 Superfund sites and one MOSF site.

Niagara County has 91 contaminated and hazardous material sites in the Empire Corridor West/Niagara Branch segment with eight RCRA sites, 56 PBS sites, seven CBS sites, 12 TRIS sites, five Superfund sites, two NPL sites and one MOSF site. The majority of these sites are located in the city of North Tonawanda and the city of Niagara Falls.

14.3 Empire Corridor West/Niagara Branch: 125 Study Area

The 125 Study Area follows a more direct route between Rensselaer and Buffalo, which bypasses several of the major metropolitan areas and stations sites (Schenectady, Amsterdam, Utica, and Rome). The Empire Corridor West/Niagara Branch 125 Study Area has a total of 1,347 sites. The majority are located in the more urbanized counties in: Erie County (435 sites), Monroe County (365 sites), and Onondaga County (239 sites).

Albany County has 68 contaminated and hazardous material sites, the majority of which are located in the city of Albany. There are 51 PBS sites, 10 RCRA, two TRIS, four CBS, one MOSF site.

Schenectady County has 36 contaminated and hazardous material sites with 34 PBS sites and two TRIS sites. The majority of these sites are located in and around the city of Rotterdam.

Schoharie, Montgomery and Herkimer counties have very few contaminated and hazardous material sites. There is a single PBS site in the study area within **Schoharie County** and only three total sites in **Montgomery County**: two TRIS sites and one PBS site. The study area within **Herkimer County** has a total of four contaminated and hazardous materials sites: three PBS and one CBS site. The corridor passes through primarily rural land in these three counties, which likely accounts for the low number of contaminated and hazardous materials sites.

Oneida and Madison counties both have 29 contaminated and hazardous material sites. In **Oneida County**, there are 20 PBS sites, three RCRA, two TRIS, two CBS, and two Superfund sites. The majority of these sites are located in and around the towns of Clinton and Sherrill. In **Madison County**, there are 23 PBS sites, three TRIS and three CBS sites. The majority of these sites are located in and around the cities of Oneida and Canastota.

Onondaga County has 239 contaminated and hazardous material sites, the majority of which are located in and around the city of Syracuse. There are 180 PBS sites, 17 RCRA, 22 TRIS, 17 CBS, two Superfund sites and one MOSF site.

Cayuga County only has a single contaminated and hazardous material site, a PBS site. Along with Schoharie County, this has the fewest sites in the Empire Corridor West/Niagara Branch 125 Study Area.

Wayne County has 25 contaminated and hazardous material sites scattered along the corridor. There are 23 PBS sites, one TRIS and one Superfund site.

Monroe County has 365 contaminated and hazardous material sites with 38 RCRA sites, 262 PBS sites, 42 TRIS sites, 16 CBS sites, six Superfund sites and one MOSF site. The majority of these sites are located in and around the city of Rochester.

Genesee County has 21 contaminated and hazardous material sites scattered along the corridor, all of which are PBS sites.

Erie County has 435 contaminated and hazardous material sites, the most in the Empire Corridor West/Niagara Branch 125 Study Area, the majority of which are located in the city of Buffalo and the city of Tonawanda. There are 35 RCRA sites, 322 PBS, 53 TRIS, 14 CBS, 10 Superfund sites and one MOSF site.

Niagara County has 91 contaminated and hazardous material sites in the Empire Corridor West/Niagara Branch segment with eight RCRA sites, 56 PBS sites, seven CBS sites, 12 TRIS sites, five Superfund sites, two NPL sites and one MOSF site. The majority of these sites are located the city of North Tonawanda and the city of Niagara Falls.

15. Additional Supporting Exhibits

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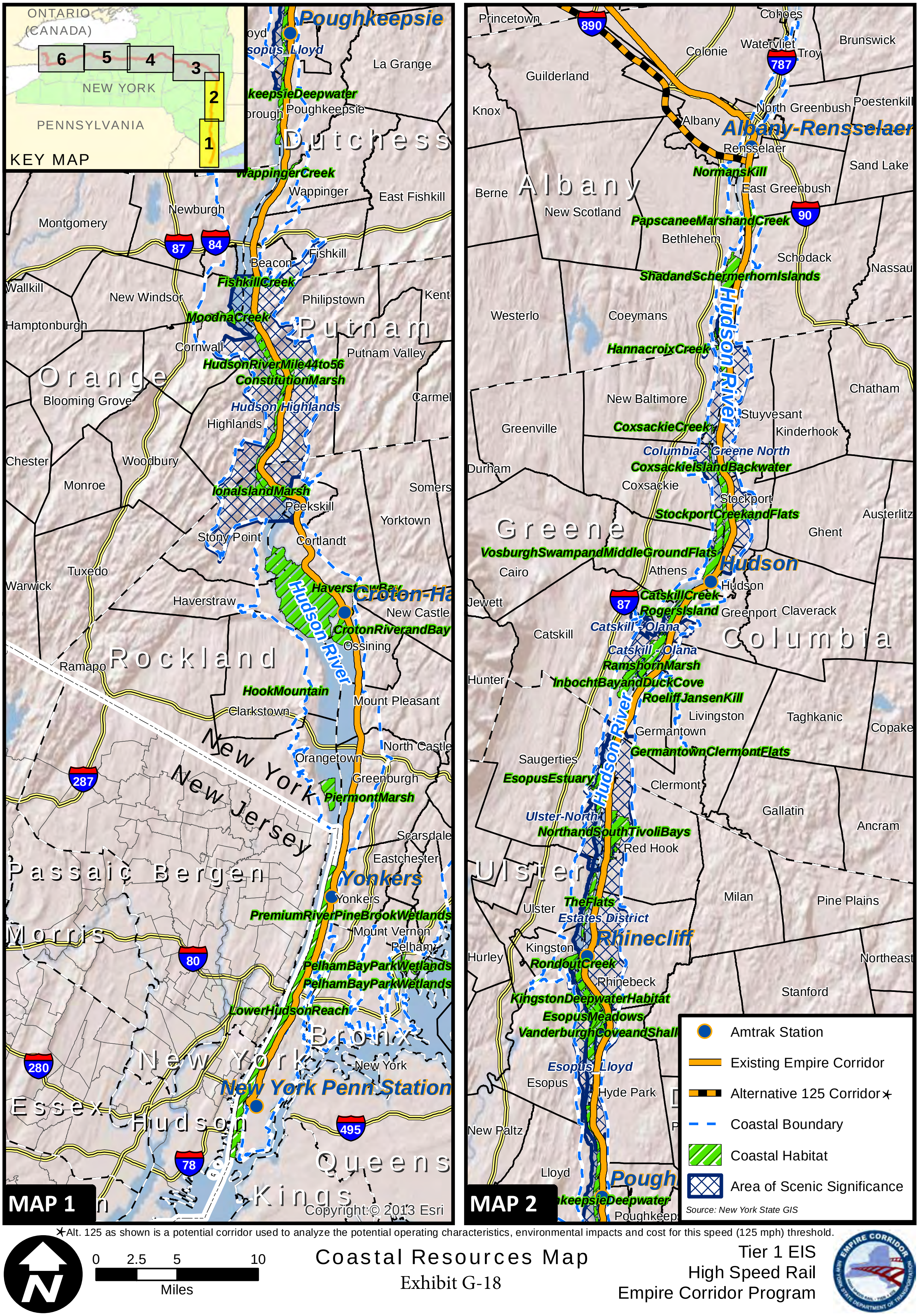
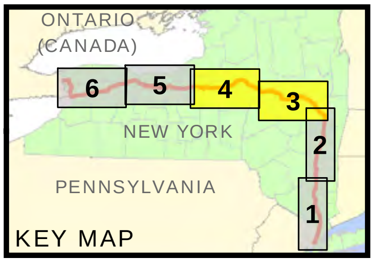


✶Alt. 125 as shown is a potential corridor used to analyze the potential operating characteristics, environmental impacts and cost for this speed (125 mph) threshold.

Coastal Resources Map

Exhibit G-18

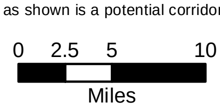
Tier 1 EIS
High Speed Rail
Empire Corridor Program



- Amtrak Station
- Existing Empire Corridor
- Alternative 125 Corridor ✶
- Coastal Boundary
- Coastal Habitat
- Area of Scenic Significance

Source: New York State GIS

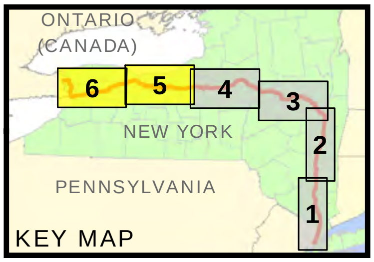
✶Alt. 125 as shown is a potential corridor used to analyze the potential operating characteristics, environmental impacts and cost for this speed (125 mph) threshold.



Coastal Resources Map

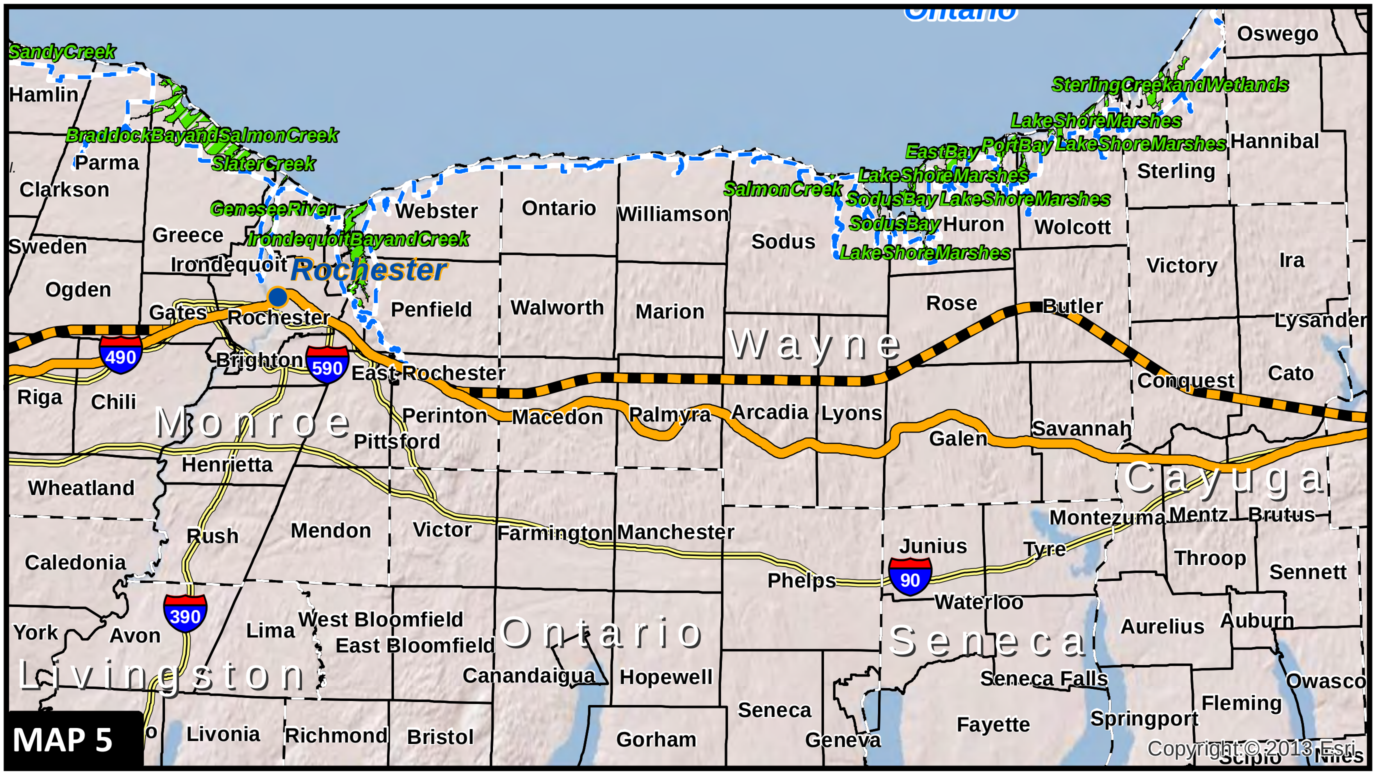
Exhibit G-18

Tier 1 EIS
High Speed Rail
Empire Corridor Program



Amtrak Station
Existing Empire Corridor
Alternative 125 Corridor ✶
Coastal Boundary
Coastal Habitat
Area of Scenic Significance

Source: New York State GIS



✶Alt. 125 as shown is a potential corridor used to analyze the potential operating characteristics, environmental impacts and cost for this speed (125 mph) threshold.

N

0 2.5 5 10
Miles

Coastal Resources Map

Exhibit G-18

Tier 1 EIS
High Speed Rail
Empire Corridor Program

Exhibit G-19—Federally & State Endangered-Threatened Species Occurrences in the 90/110 Study Area

County	# Endangered and Threatened Species		Species Names (Listing) (Probability of Occurrence)
	Federal	State	
New York	1	4	Shortnose Sturgeon(FE/SE)(H), Atlantic Sturgeon (FE) (H), Peregrine Falcon(SE)(H), Saltmarsh Bulrush(SE)(L), Bluegrass(SE)(U)
Bronx	1	6	Shortnose Sturgeon(FE/SE)(H), Atlantic Sturgeon (FE) (H), Narrow-leaved Sedge(SE)(M), Schweinitz's Sedge(ST)(H), Heartleaf Plantain(ST)(H), Yellow Giant-hyssop(ST)(M), Woodland Agrimony(ST)(M)
Westchester	3	20	Shortnose Sturgeon(FE/SE)(H), Atlantic Sturgeon (FE) (H), Indiana Bat(FE/SE)(M), Bog Turtle(FT/SE)(M), Peregrine Falcon(SE)(H), Short-eared Owl(SE)(M), Reflexed Sedge(SE)(M), Small- flowered Tick-trefoil(SE)(M), Saltmarsh Bulrush(SE)(L), Eastern Mud Turtle(SE)(L), Puttyroot(SE)(U), Rattlebox(SE)(U), Virginia False Gromwell(SE)(U), Hooker's Orchid(SE)(U), Torrey's Mountain-mint(SE)(U), Bald Eagle(ST)(H), Fence Lizard(ST)(H), Northern Harrier(ST)(M), Shrubby St. John's-wort(ST)(M), Eastern Grasswort(ST)(M), Globe-fruited Ludwigia(ST)(U)
Rockland	4	9	Shortnose Sturgeon(FE/SE)(H), Atlantic Sturgeon (FE) (H), Indiana Bat(FE/SE)(M), Bog Turtle(FT/SE)(M), Small Whorled Pogonia(FT/SE)(L), Peregrine Falcon(SE)(H), Bald Eagle(ST)(H), Spongy Arrowhead(ST)(H), Saltmarsh Aster(ST)(H), Fence Lizard(ST)(H)
Putnam	3	17	Shortnose Sturgeon(FE/SE)(H), Atlantic Sturgeon (FE) (H), Indiana Bat(FE/SE)(M), Bog Turtle(FT/SE)(M), Peregrine Falcon(SE)(H), Gypsywort(SE)(M), Water Pigmyweed(SE)(L), Large Twayblade(SE)(L), Slender Marsh-pink(SE)(U), Bald Eagle(ST)(H), Least Bittern(ST)(H), Smooth Bur-marigold(ST)(H), Long's Bittercress(ST)(H), Spongy Arrowhead(ST)(H), Saltmarsh Aster(ST)(H), Fence Lizard(ST)(H), Clustered Sedge(ST)(M), Violet Wood-sorrel(ST)(M)
Orange	5	12	Shortnose Sturgeon(FE/SE)(H), Atlantic Sturgeon (FE) (H), Indiana Bat(FE/SE)(M), Dwarf Wedge-mussel(FE/SE)(L), Bog Turtle(FT/SE)(M), Small Whorled Pogonia(FT/SE)(L), Peregrine Falcon(SE)(H), Rough Avens(SE)(M), Saltmarsh Bulrush(SE)(L), Bald Eagle(ST)(H), Spongy Arrowhead(ST)(H), Fence Lizard(ST)(H), Marsh Straw Sedge(ST)(M)
Dutchess	4	27	Shortnose Sturgeon(FE/SE)(H), Atlantic Sturgeon (FE) (H), Indiana Bat(FE/SE)(M), Dwarf Wedge-mussel(FE/SE)(L), Bog Turtle(FT/SE)(M), Peregrine Falcon(SE)(H), Hudson River Water-nymph(SE)(H), Estuary Beggar-ticks(SE)(M), Drummond's Rock-cress(SE)(M), Blunt-lobe Grape Fern(SE)(M), Narrow-leaved Sedge(SE)(M), Northern Tansy-mustard(SE)(M), Shining Bedstraw(SE)(M), American Waterwort(SE)(L), Bald Eagle(ST)(H), Least Bittern(ST)(H), Smooth Bur-marigold(ST)(H), Davis' Sedge(ST)(H), Golden Club(ST)(H), Heartleaf Plantain(ST)(H), Swamp Cottonwood(ST)(H), Spongy Arrowhead(ST)(H), Pied-billed Grebe(ST)(M), King Rail(ST)(M), Woodland Agrimony(ST)(M), Cat-tail Sedge(ST)(M), Marsh Horsetail(ST)(M), Blanding's Turtle(ST)(L)
Ulster	5	15	Shortnose Sturgeon(FE/SE)(H), Atlantic Sturgeon (FE) (H), Indiana Bat(FE/SE)(M), Bog Turtle(FT/SE)(M), Small Whorled Pogonia(FT/SE)(L), Northern Wild Monkshood(FT/ST)(L), Hudson River Water-nymph(SE)(H), Estuary Beggar-ticks(SE)(M), Water Pigmyweed(SE)(L), American

Exhibit G-19—Federally & State Endangered-Threatened Species Occurrences in the 90/110 Study Area

County	# Endangered and Threatened Species		Species Names (Listing) (Probability of Occurrence)
	Federal	State	
			Waterwort(SE)(L), Virginia Snakeroot(SE)(U), Riverbank Quillwort(SE)(U), Bald Eagle(ST)(H), Heartleaf Plantain(ST)(H), Fernald's Sedge(ST)(M), Douglas' Knotweed(ST)(U)
Columbia	3	16	Shortnose Sturgeon(FE/SE)(H), Atlantic Sturgeon (FE) (H), Indiana Bat(FE/SE)(M), Bog Turtle(FT/SE)(M), Hudson River Water-nymph(SE)(H), Estuary Beggar-ticks(SE)(M), American Waterwort(SE)(L), Bald Eagle(ST)(H), Least Bittern(ST)(H), Smooth Bur-marigold(ST)(H), Long's Bittercress(ST)(H), Davis' Sedge(ST)(H), Golden Club(ST)(H), Heartleaf Plantain(ST)(H), Spongy Arrowhead(ST)(H), Shrubby St. John's-wort(ST)(M), Swamp Lousewort(ST)(M)
Greene	2	12	Shortnose Sturgeon(FE/SE)(H), Atlantic Sturgeon (FE) (H), Indiana Bat(FE/SE)(M), Hudson River Water-nymph(SE)(H), Estuary Beggar-ticks(SE)(M), American Waterwort(SE)(L), Navel-fruited Corn-salad(SE)(U), Bald Eagle(ST)(H), Least Bittern(ST)(H), Smooth Bur-marigold(ST)(H), Davis' Sedge(ST)(H), Golden Club(ST)(H), Heartleaf Plantain(ST)(H)
Rensselaer	2	6	Shortnose Sturgeon(FE/SE)(H), Atlantic Sturgeon (FE) (H), Indiana Bat(FE/SE)(M), Estuary Beggar-ticks(SE)(M), American Waterwort(SE)(L), Bald Eagle(ST)(H), Golden Club(ST)(H)
Albany	4	19	Shortnose Sturgeon(FE/SE)(H), Atlantic Sturgeon (FE) (H), Karner Blue(FE/SE)(H), Indiana Bat(FE/SE)(M), Bog Turtle(FT/SE)(M), Peregrine Falcon(SE)(H), Estuary Beggar-ticks(SE)(M), Persius Duskywing(SE)(L), American Waterwort(SE)(L), Small's Knotweed(SE)(L), Virginia False Gromwell(SE)(U), Bald Eagle(ST)(H), Frosted Elfin(ST)(H), Davis' Sedge(ST)(H), Carey's Smartweed(ST)(H), Yellow Giant-hyssop(ST)(M), Troublesome Hedge(ST)(M), False Hop Sedge(ST)(M), Little-leaf Tick-trefoil(ST)(M), Mock-pennyroyal(ST)(L)
Schenectady	2	4	Karner Blue(FE/SE)(H), Indiana Bat(FE/SE)(M), Side-oats Grama(SE)(H), Carey's Smartweed(ST)(H)
Montgomery	0	1	Timber Rattlesnake(ST)(M)
Herkimer	0	0	
Oneida	1	9	Indiana Bat(FE/SE)(M), Cypress-knee Sedge(SE)(M), Frank's Sedge(SE)(M), Sparse-flowered Sedge(SE)(U), Least Bittern(ST)(H), Schweinitz's Sedge(ST)(H), Sedge Wren(ST)(M), Pied-billed Grebe(ST)(M), Creeping Sedge(ST)(M)
Madison	3	5	Indiana Bat(FE/SE)(M), Chittenango Ovate Amber Snail(FT/SE)(L)American Hart's-tongue Fern(FT/ST)(L), Northern Harrier(ST)(M), Little-leaf Tick-trefoil(ST)(M)
Onondaga	5	11	Indiana Bat(FE/SE)(M), Bog Turtle(FT/SE)(M), Small Whorled Pogonia(FT/SE)(L), American Hart's-tongue Fern(FT/ST)(L), , Eastern Prairie Fringed Orchid(FT/ST)(L), Eastern Massasauga(SE)(M), Straight-leaf Pondweed(SE)(L), Northern Wild Comfrey(SE)(U), Bald Eagle(ST)(H), Red Pigweed(ST)(M), Little-leaf Tick-trefoil(ST)(M)
Cayuga	2	7	Indiana Bat(FE/SE)(M), Bog Turtle(FT/SE)(M), Short-eared Owl(SE)(M), Black Tern(SE)(L), Bald Eagle(ST)(H), Pied-billed Grebe(ST)(M), Sartwell's

Exhibit G-19—Federally & State Endangered-Threatened Species Occurrences in the 90/110 Study Area

County	# Endangered and Threatened Species		Species Names (Listing) (Probability of Occurrence)
	Federal	State	
			Sedge(ST)(M)
Wayne	3	12	Indiana Bat(FE/SE)(M), Bog Turtle(FT/SE)(M), Eastern Prairie Fringed Orchid(FT/ST)(L), Short-eared Owl(SE)(M), Spreading Chervil(SE)(M), Black Tern(SE)(L), Marsh Valerian(SE)(L), Bald Eagle(ST)(H), Big Shellbark Hickory(ST)(H), Pied-billed Grebe(ST)(M), Yellow Giant-hyssop(ST)(M), Twin-leaf(ST)(M)
Monroe	1	7	Bog Turtle(FT/SE)(M), Peregrine Falcon(SE)(H), Log Fern(SE)(M), Sweet-scented Indian-plantain(SE)(M), Pied-billed Grebe(ST)(M), Northern Bog Aster(ST)(M), Green Gentian(ST)(L),
Genesee	3	7	Bog Turtle(FT/SE)(M), Houghton's Goldenrod(FT/ST)(L), Eastern Prairie Fringed Orchid(FT/ST)(L), Log Fern(SE)(M), Eastern Massasauga(SE)(M), Bald Eagle(ST)(H), Woodland Agrimony(ST)(M),
Erie	0	7	Peregrine Falcon(SE)(H), Four-flowered Loosestrife(SE)(M), Northern Harrier(ST)(M), Lake Sturgeon(ST)(M), Marsh Horsetail(ST)(M), Wiry Panic Grass(ST)(M), Stiff-leaf Goldenrod(ST)(L)
Niagara	1	5	Eastern Prairie Fringed Orchid(FT/ST)(L), Puttyroot(SE)(U), Bald Eagle(ST)(H), Northern Harrier(ST)(M), Stiff-leaf Goldenrod(ST)(L)

Sources: U.S. FWS, 2011; NYSDEC, 2011
Note: FE=Federally Endangered; FT=Federally Threatened; SE=State Endangered; ST=State Threatened
H, M, L= High, Medium or Low probability of occurrence
The 90/110 Study Area is used for analysis of Alternatives 90A, 90B, and 110 and consists of the existing 465-mile long Empire Corridor alignment. The study area width is defined as being within a ½ mile of the corridor centerline.

Exhibit G-20—Federally and State Endangered-Threatened Species Occurrences in the 125 Study Area

County	# Endangered and Threatened Species		Species Names (Listing) (Probability of Occurrence)
	Federal	State	
New York	1	4	Shortnose Sturgeon(FE/SE)(H), Atlantic Sturgeon (FE) (H), Peregrine Falcon(SE)(H), Saltmarsh Bulrush(SE)(L), Bluegrass(SE)(U)
Bronx	1	6	Shortnose Sturgeon(FE/SE)(H), Atlantic Sturgeon (FE) (H), Narrow-leaved Sedge(SE)(M), Schweinitz's Sedge(ST)(H), Heartleaf Plantain(ST)(H), Yellow Giant-hyssop(ST)(M), Woodland Agrimony(ST)(M)
Westchester	3	20	Shortnose Sturgeon(FE/SE)(H), Atlantic Sturgeon (FE) (H), Indiana Bat(FE/SE)(M), Bog Turtle(FT/SE)(M), Peregrine Falcon(SE)(H), Short-eared Owl(SE)(M), Reflexed Sedge(SE)(M), Small- flowered Tick-trefoil(SE)(M), Saltmarsh Bulrush(SE)(L), Eastern Mud Turtle(SE)(L), Puttyroot(SE)(U), Rattlebox(SE)(U), Virginia False Gromwell(SE)(U), Hooker's Orchid(SE)(U), Torrey's Mountain-mint(SE)(U), Bald Eagle(ST)(H), Fence Lizard(ST)(H), Northern Harrier(ST)(M), Shrubby St. John's-wort(ST)(M), Eastern Grasswort(ST)(M), Globe-fruited Ludwigia(ST)(U)
Rockland	4	9	Shortnose Sturgeon(FE/SE)(H), Atlantic Sturgeon (FE) (H), Indiana Bat(FE/SE)(M), Bog Turtle(FT/SE)(M), Small Whorled Pogonia(FT/SE)(L), Peregrine Falcon(SE)(H), Bald Eagle(ST)(H), Spongy Arrowhead(ST)(H), Saltmarsh Aster(ST)(H), Fence Lizard(ST)(H)
Putnam	3	17	Shortnose Sturgeon(FE/SE)(H), Atlantic Sturgeon (FE) (H), Indiana Bat(FE/SE)(M), Bog Turtle(FT/SE)(M), Peregrine Falcon(SE)(H), Gypsywort(SE)(M), Water Pigmyweed(SE)(L), Large Twayblade(SE)(L), Slender Marsh-pink(SE)(U), Bald Eagle(ST)(H), Least Bittern(ST)(H), Smooth Bur-marigold(ST)(H), Long's Bittercress(ST)(H), Spongy Arrowhead(ST)(H), Saltmarsh Aster(ST)(H), Fence Lizard(ST)(H), Clustered Sedge(ST)(M), Violet Wood-sorrel(ST)(M)
Orange	5	12	Shortnose Sturgeon(FE/SE)(H), Atlantic Sturgeon (FE) (H), Indiana Bat(FE/SE)(M), Dwarf Wedge-mussel(FE/SE)(L), Bog Turtle(FT/SE)(M), Small Whorled Pogonia(FT/SE)(L), Peregrine Falcon(SE)(H), Rough Avens(SE)(M), Saltmarsh Bulrush(SE)(L), Bald Eagle(ST)(H), Spongy Arrowhead(ST)(H), Fence Lizard(ST)(H), Marsh Straw Sedge(ST)(M)
Dutchess	4	27	Shortnose Sturgeon(FE/SE)(H), Atlantic Sturgeon (FE) (H), Indiana Bat(FE/SE)(M), Dwarf Wedge-mussel(FE/SE)(L), Bog Turtle(FT/SE)(M), Peregrine Falcon(SE)(H), Hudson River Water-nymph(SE)(H), Estuary Beggar-ticks(SE)(M), Drummond's Rock-cress(SE)(M), Blunt-lobe Grape Fern(SE)(M), Narrow-leaved Sedge(SE)(M), Northern Tansy-mustard(SE)(M), Shining Bedstraw(SE)(M), American Waterwort(SE)(L), Bald Eagle(ST)(H), Least Bittern(ST)(H), Smooth Bur-marigold(ST)(H), Davis' Sedge(ST)(H), Golden Club(ST)(H), Heartleaf Plantain(ST)(H), Swamp Cottonwood(ST)(H), Spongy Arrowhead(ST)(H), Pied-billed Grebe(ST)(M), King Rail(ST)(M), Woodland Agrimony(ST)(M), Cat-tail Sedge(ST)(M), Marsh Horsetail(ST)(M), Blanding's Turtle(ST)(L)
Ulster	5	15	Shortnose Sturgeon(FE/SE)(H), Atlantic Sturgeon (FE) (H), Indiana Bat(FE/SE)(M), Bog Turtle(FT/SE)(M), Small Whorled Pogonia(FT/SE)(L), Northern Wild Monkshood(FT/ST)(L), Hudson River Water-nymph(SE)(H), Estuary Beggar-ticks(SE)(M), Water Pigmyweed(SE)(L), American

Exhibit G-20—Federally and State Endangered-Threatened Species Occurrences in the 125 Study Area

County	# Endangered and Threatened Species		Species Names (Listing) (Probability of Occurrence)
	Federal	State	
			Waterwort(SE)(L), Virginia Snakeroot(SE)(U), Riverbank Quillwort(SE)(U), Bald Eagle(ST)(H), Heartleaf Plantain(ST)(H), Fernald's Sedge(ST)(M), Douglas' Knotweed(ST)(U)
Columbia	3	16	Shortnose Sturgeon(FE/SE)(H), Atlantic Sturgeon (FE) (H), Indiana Bat(FE/SE)(M), Bog Turtle(FT/SE)(M), Hudson River Water-nymph(SE)(H), Estuary Beggar-ticks(SE)(M), American Waterwort(SE)(L), Bald Eagle(ST)(H), Least Bittern(ST)(H), Smooth Bur-marigold(ST)(H), Long's Bittercress(ST)(H), Davis' Sedge(ST)(H), Golden Club(ST)(H), Heartleaf Plantain(ST)(H), Spongy Arrowhead(ST)(H), Shrubby St. John's-wort(ST)(M), Swamp Lousewort(ST)(M)
Greene	2	12	Shortnose Sturgeon(FE/SE)(H), Atlantic Sturgeon (FE) (H), Indiana Bat(FE/SE)(M), Hudson River Water-nymph(SE)(H), Estuary Beggar-ticks(SE)(M), American Waterwort(SE)(L), Navel-fruited Corn-salad(SE)(U), Bald Eagle(ST)(H), Least Bittern(ST)(H), Smooth Bur-marigold(ST)(H), Davis' Sedge(ST)(H), Golden Club(ST)(H), Heartleaf Plantain(ST)(H)
Rensselaer	2	6	Shortnose Sturgeon(FE/SE)(H), Atlantic Sturgeon (FE) (H), Indiana Bat(FE/SE)(M), Estuary Beggar-ticks(SE)(M), American Waterwort(SE)(L), Bald Eagle(ST)(H), Golden Club(ST)(H)
Albany	4	23	Shortnose Sturgeon(FE/SE)(H), Atlantic Sturgeon (FE) (H), Karner Blue(FE/SE)(H), Persius Duskywing (SE) (L), Frosted Elfin (ST) (H), Indiana Bat(FE/SE)(M), Bog Turtle(FT/SE)(M), Peregrine Falcon(SE)(H), Bald Eagle (ST) (H), Yellow Giant-hyssop (ST) (M), Woodland Agrimony (ST) (M), Estuary Beggar-ticks (SE) (M), Green Rock-cress (ST) (U), Clustered Sedge (ST) (M), Troublesome Sedge (ST) (M), False Hop Sedge (ST) (M), Little-leaf Tick-trefoil (ST) (M), American Waterwort (SE) (L), Mock-pennyroyal (ST) (L), Virginia False Gromwell (SE) (U), Carey's Smartweed (ST) (H), Small's Knotweed (SE) (L), Whip Nutrush (ST) (L), Nodding Pogonia (ST) (H), ,
Schoharie	1	1	Indiana Bat (SE/FE) (M)
Schenectady	2	3	Karner Blue(FE/SE)(H), Indiana Bat(FE/SE)(M), Side-oats Grama(SE)(H)
Montgomery	0	0	
Herkimer	0	1	Short-eared Owl (SE) (M)
Oneida	1	6	Indiana Bat(FE/SE)(M), Cypress-knee Sedge(SE)(M), Frank's Sedge(SE)(M), Sparse-flowered Sedge(SE)(U), Least Bittern(ST)(H), Pied-billed Grebe(ST)(M)
Madison	3	8	Indiana Bat(FE/SE)(M), Chittenango Ovate Amber Snail(FT/SE)(L)American Hart's-tongue Fern(FT/ST)(L), Northern Harrier(ST)(M), Little-leaf Tick-trefoil(ST)(M), Schweinitz's Sedge (ST) (H), Golden-seal (ST) (H), Marsh Arrow-grass (ST) (U)
Onondaga	5	11	Indiana Bat(FE/SE)(M), Bog Turtle(FT/SE)(M), Small Whorled Pogonia(FT/SE)(L), American Hart's-tongue Fern(FT/ST)(L), Eastern Prairie Fringed Orchid(FT/ST)(L), Eastern Massasauga(SE)(M), Straight-leaf Pondweed(SE)(L), Northern Wild Comfrey(SE)(U), Bald Eagle(ST)(H), Red

Exhibit G-20—Federally and State Endangered-Threatened Species Occurrences in the 125 Study Area

County	# Endangered and Threatened Species		Species Names (Listing) (Probability of Occurrence)
	Federal	State	
			Pigweed(ST)(M), Little-leaf Tick-trefoil(ST)(M)
Cayuga	2	11	Indiana Bat(FE/SE)(M), Bog Turtle(FT/SE)(M), Short-eared Owl(SE)(M), Black Tern(SE)(L), Bald Eagle(ST)(H), Pied-billed Grebe(ST)(M), , Button-bush Dodder (SE) (U), Spiny water-nymph (SE) (U), Hooker's Orchid (SE) (U), Northern Bog Aster (ST) (M), Nodding Pogonia (ST) (H)
Wayne	3	11	Indiana Bat(FE/SE)(M), Bog Turtle(FT/SE)(M), Eastern Prairie Fringed Orchid(FT/ST)(L), Short-eared Owl(SE)(M), Spreading Chervil(SE)(M), Black Tern(SE)(L), Bald Eagle(ST)(H), Big Shellbark Hickory(ST)(H), Pied-billed Grebe(ST)(M), Yellow Giant-hyssop(ST)(M), Twin-leaf(ST)(M)
Monroe	1	8	Bog Turtle(FT/SE)(M), Peregrine Falcon(SE)(H), Log Fern(SE)(M), Sweet-scented Indian-plantain(SE)(M), Pied-billed Grebe(ST)(M), Northern Bog Aster(ST)(M), Green Gentian(ST)(L), Purple bluets (SE) (U)
Genesee	3	22	Houghton's Goldenrod (ST/ FT) (L), Eastern Prairie Fringed Orchid (ST/ FT) (L), Bog Turtle (SE/FT) (M), Northern Harrier (ST) (M), Bald Eagle (ST) (H), Woodland Agrimony (ST) (M), Dragon's Mouth Orchid (ST) (H), Mountain Death Camas (ST) (H), Calypso (SE) (U), Northern Bog Sedge (SE) (H), Small White Ladyslipper (SE) (H), Northern Wild Comfrey (SE) (U), Log Fern (SE) (M), Creeping Juniper (SE) (H), Ohio Goldenrod (ST) (H), Wiry Panic Grass (ST) (M), Whorled Mountain-mint (ST) (L), Deer's Hair Sedge (ST) (H), Marsh Arrow-grass (ST) (U), Marsh Valerian (SE) (L), Queen Snake (SE) (H), Eastern Massasauga (SE) (M)
Erie	0	7	Peregrine Falcon(SE)(H), Four-flowered Loosestrife(SE)(M), Northern Harrier(ST)(M), Lake Sturgeon(ST)(M), Marsh Horsetail(ST)(M), Upland Sandpiper (ST) (M), Pied-billed Grebe (ST) (M)
Niagara	1	4	Eastern Prairie Fringed Orchid(FT/ST)(L), Puttyroot(SE)(U), Bald Eagle(ST)(H), Northern Harrier(ST)(M)

Sources: U.S. FWS, 2011; NYSDEC, 2011
Note: FE=Federally Endangered; FT=Federally Threatened; SE=State Endangered; ST=State Threatened
H, M, L= High, Medium or Low probability of occurrence
The 125 Study Area is used for analysis of Alternative 125 and consists of portions of the existing Empire Corridor and new alignment and is 451 miles long. The study area width is defined as being within a ½ mile of the corridor centerline.

Exhibit G-21—Essential Fish Habitat in the Study Area

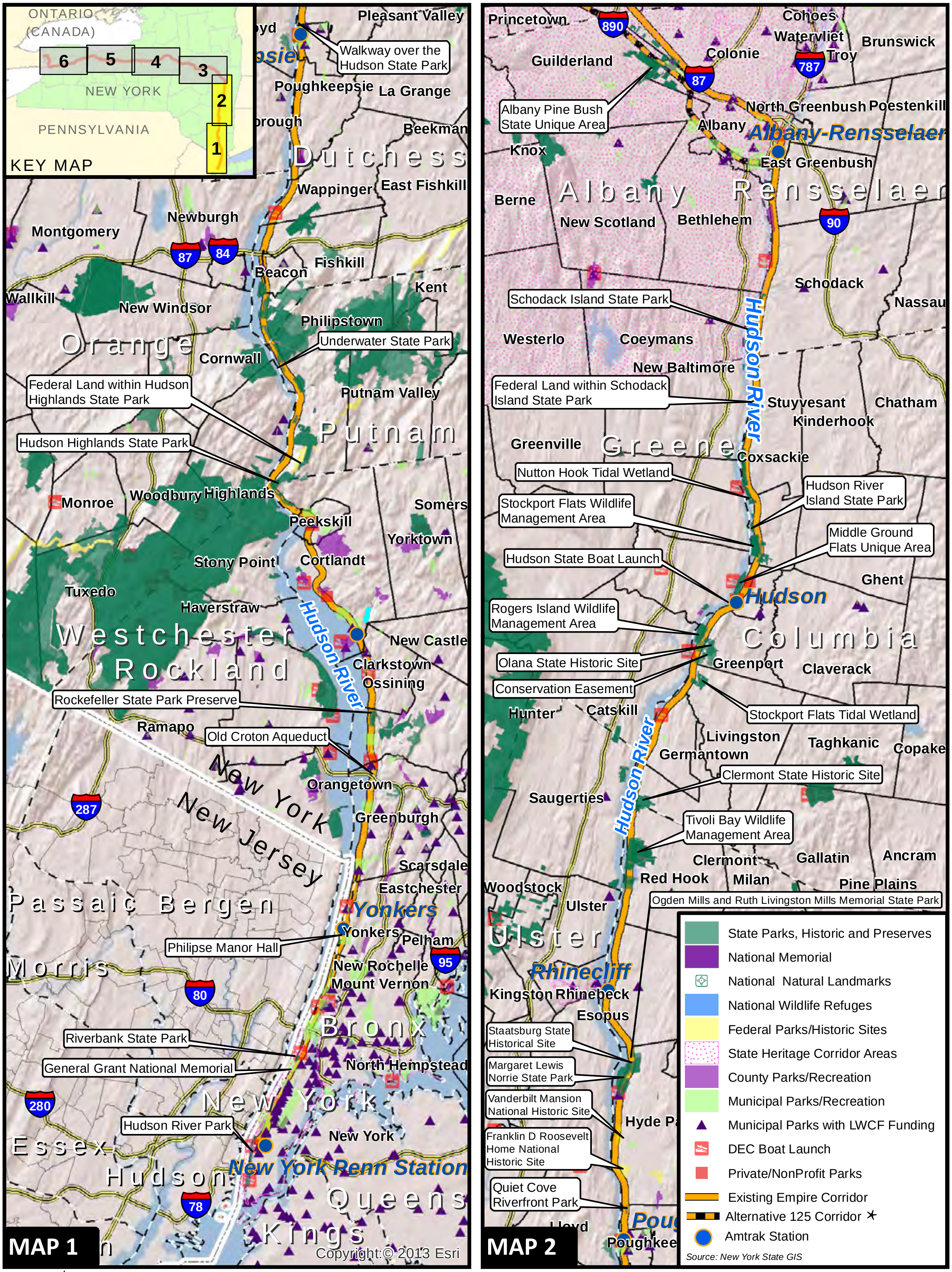
EFH Species/Stages		County of Potential Occurrence*									
Common Name *Scientific Name*	Life Stage	New York	Bronx	West-chester	Rockland	Putnam	Orange	Dutchess	Ulster	Columbia	Greene
Red Hake *Urophycis chuss*	Larvae	x	x	x	x	x	x				
	Juveniles	x	x	x	x	x	x				
	Adults	x	x	x	x	x	x				
Winter Flounder *Pseudopleuronectes americanus*	Eggs	x	x	x	x	x	x				
	Larvae	x	x	x	x	x	x				
	Juveniles	x	x	x	x	x	x				
	Adults	x	x	x	x	x	x				
	Spawning Adults	x	x	x	x	x	x				
Window-pane Flounder *Scopthalmus aquosus*	Eggs	x	x	x	x	x	x				
	Larvae	x	x	x	x	x	x				
	Juveniles	x	x	x	x	x	x				
	Adults	x	x	x	x	x	x				
	Spawning Adults	x	x	x	x	x	x				
Atlantic Sea Herring *Clupea harengus*	Larvae	x	x	x	x	x	x				
	Juveniles	x	x	x	x	x	x				
	Adults	x	x	x	x	x	x				
Bluefish *Pomatomus saltatrix*	Juveniles	x	x	x	x	x	x				
	Adults	x	x	x	x	x	x				
Atlantic butterfish *Peprilus triacanthus*	Larvae			x	x						
	Juveniles	x	x	x	x						
	Adults	x	x	x	x						
Atlantic mackerel *Scomber scombrus*	Juveniles	x	x								
	Adults	x	x								
Summer flounder *Paralicthys dentatus*	Larvae	x	x	x	x	x	x	x	x	x	x
	Juveniles	x	x	x	x	x	x				
	Adults	x	x	x	x	x	x				
Scup *Stenotomus chrysops*	Eggs	x	x								
	Larvae	x	x								
	Juveniles	x	x								
	Adults	x	x								
Black sea bass *Centropristus striata*	Juveniles	x	x	x	x	x	x				
	Adults	x	x	x	x	x	x				

Exhibit G-21—Essential Fish Habitat in the Study Area

EFH Species/Stages		County of Potential Occurrence*									
Common Name *Scientific Name*	Life Stage	New York	Bronx	West-chester	Rockland	Putnam	Orange	Dutchess	Ulster	Columbia	Greene
King mackerel *Scomberomorous cavalla*	Eggs	x	x								
	Larvae	x	x								
	Juveniles	x	x								
	Adults	x	x								
Spanish mackerel *Scoberomorous maculatus*	Eggs	x									
	Larvae	x									
	Juveniles	x									
	Adults	x									
Cobia *Rachycentron canadum*	Eggs	x	x								
	Larvae	x	x								
	Juveniles	x	x								
	Adults	x	x								

*Essential Fish Habitat conditions are not present for listed species north of Greene County

Sources: **http://www.nero.noaa.gov/hcd/list.htm**
http://library.fws.gov/pubs5/web_link/text/low_hud.htm#Table21-1
http://hrnerr.org/public/Benthic/bathy/GE_hudson_bathy.html



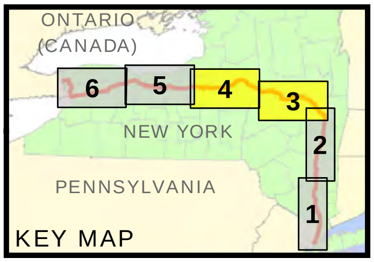
✶Alt. 125 as shown is a potential corridor used to analyze the potential operating characteristics, environmental impacts and cost for this speed (125 mph) threshold.

0 2.5 5 10
Miles

Parks and Recreation Map

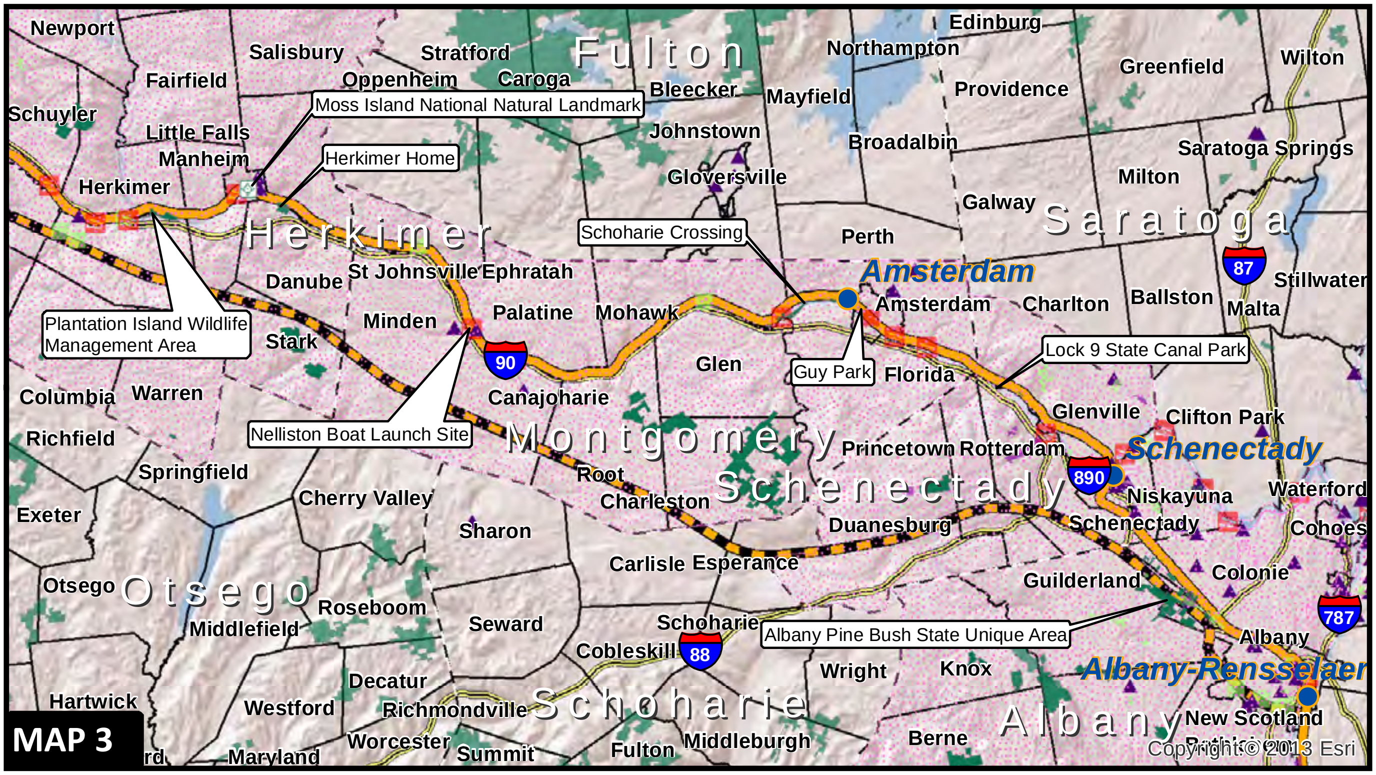
Exhibit G-22

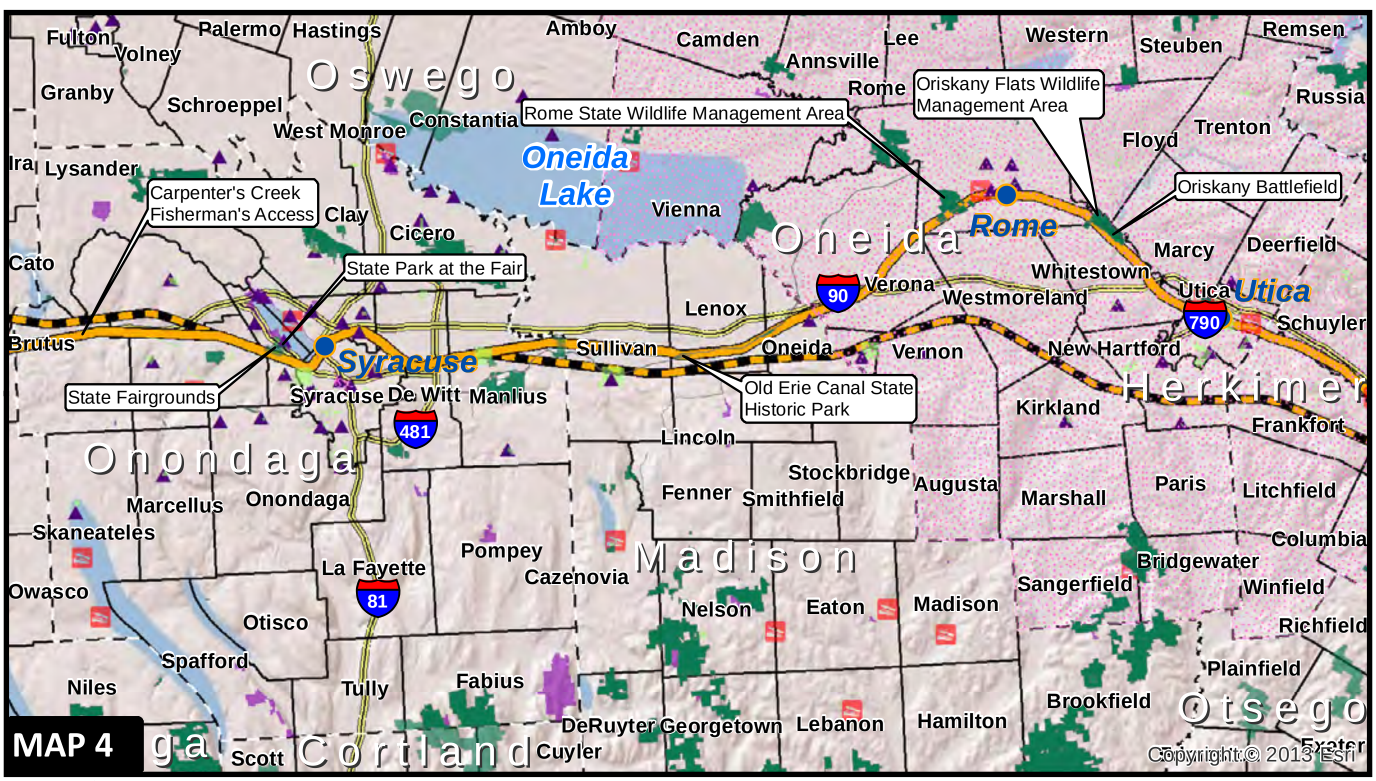
Tier 1 EIS
High Speed Rail
Empire Corridor Program



- Amtrak Station
- Existing Empire Corridor
- Alternative 125 Corridor ✶
- National Natural Landmarks
- National Memorial
- National Wildlife Refuges
- Federal Parks/Historic Sites
- State Heritage Corridor Areas
- State Parks, Historic and Preserves
- County Parks/Recreation
- Municipal Parks/Recreation
- Municipal Parks with LWCF Funding
- Private/NonProfit Parks

Source: NYS GIS





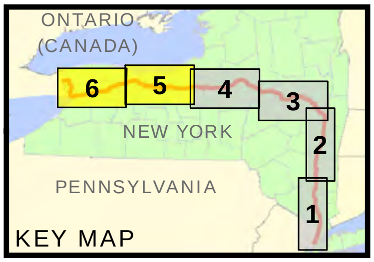
✶Alt. 125 as shown is a potential corridor used to analyze the potential operating characteristics, environmental impacts and cost for this speed (125 mph) threshold.

0 2.5 5 10
Miles

Parks and Recreation Map

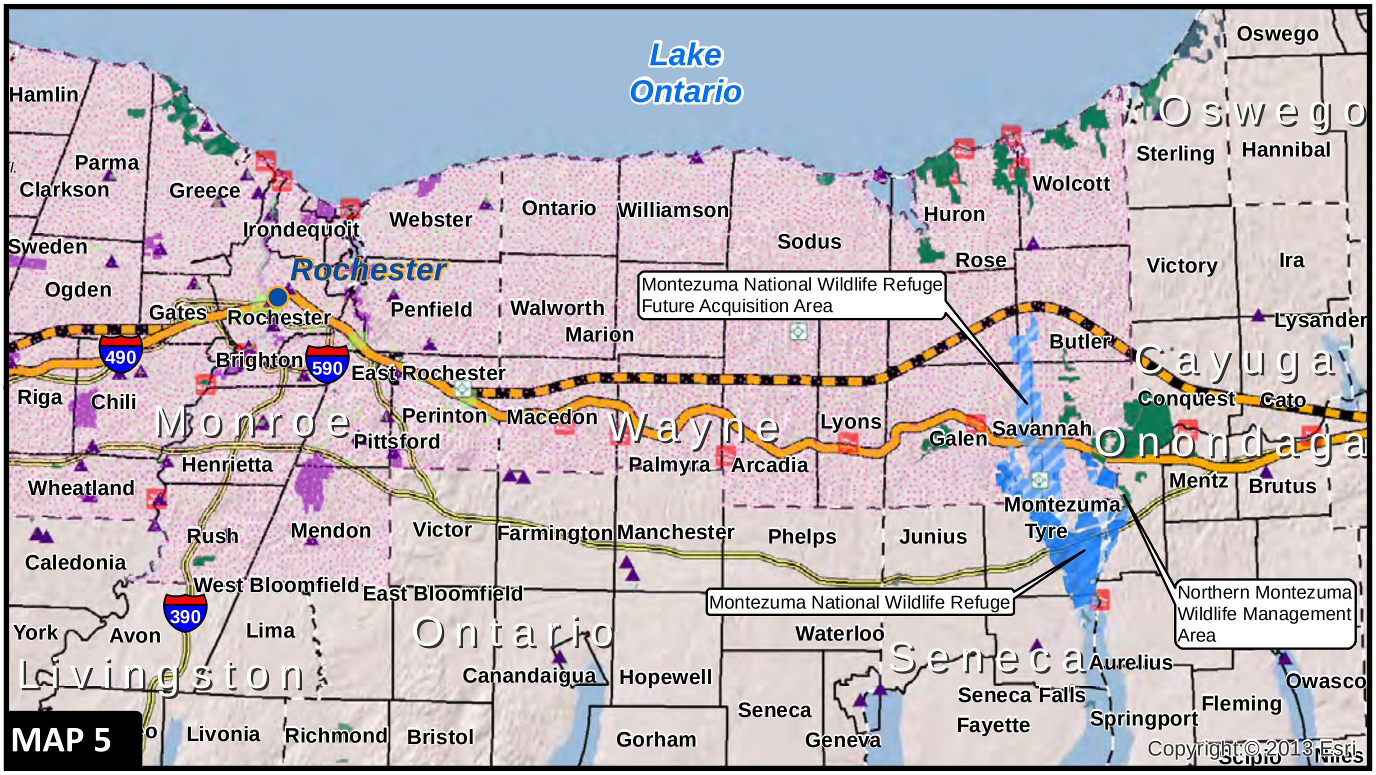
Exhibit G-22

Tier 1 EIS
High Speed Rail
Empire Corridor Program

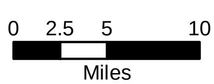


Alternative 125 Corridor ✶
Existing Empire Corridor
Amtrak Station
National Natural Landmarks
National Memorial
National Wildlife Refuges
Federal Parks/Historic Sites
State Heritage Corridor Areas
State Parks, Historic and Preserves
County Parks/Recreation
Municipal Parks/Recreation
Municipal Parks with LWCF Funding
Private/NonProfit Parks

Source: NYS GIS



✶Alt. 125 as shown is a potential corridor used to analyze the potential operating characteristics, environmental impacts and cost for this speed (125 mph) threshold.



Parks and Recreation Map

Exhibit G-22

Tier 1 EIS
High Speed Rail
Empire Corridor Program

Appendix H Draft Programmatic Agreement

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PROGRAMMATIC AGREEMENT AMONG
THE FEDERAL RAILROAD ADMINSTRATION,
THE NEW YORK STATE DEPARTMENT OF TRANSPORTATION,
AND
THE NEW YORK STATE HISTORIC PRESERVATION OFFICER
REGARDING
THE HIGH SPEED RAIL EMPIRE CORRIDOR PROGRAM

WHEREAS, the Federal Railroad Administration (FRA), in cooperation with the New York State Department of Transportation (NYSDOT), proposes to construct the High Speed Rail Empire Corridor Program, a program of proposed improvements to intercity passenger rail service along the Empire Corridor between New York City and Niagara Falls, New York ("the Program"); and

WHEREAS, the FRA has determined the Program constitutes an undertaking as defined in 36 CFR 800.16(y), and is subject to review in accordance with Section 106 of the National Historic Preservation Act (NHPA), 16 U.S.C. 470f, and its implementing regulations at 36 CFR Part 800; and

WHEREAS, FRA is the lead federal agency for compliance with the National Environmental Policy Act (NEPA) and, in cooperation with NYSDOT, will address the potential environmental impacts of the Program in accordance with the requirements of NEPA, using a tiered process, as provided for in 40 CFR 1508.28; and

WHEREAS, FRA, in cooperation with NYSDOT, is preparing a Tier 1 Environmental Impact Statement ("Tier 1 EIS"), which will address broad corridor-level issues and proposals of the Program, as part of the initial phase of the tiered process; and

WHEREAS, FRA in cooperation with NYSDOT will prepare, site-specific environmental documentation for component projects in subsequent phases or tiers of the program (Tier 2) in accordance with NEPA; and

WHEREAS, in coordination with the tiered process under NEPA, Section 106 of NHPA is being progressed using a phased process to conduct identification and evaluation efforts and to apply the criteria of adverse effect pursuant to 36 CFR 800.5; and

WHEREAS, FRA, in cooperation with NYSDOT, initiated consultation with the New York State Historic Preservation Officer (NYSHPO) pursuant to 36 CFR 800.2(c)(4) for the Undertaking covered by this Programmatic Agreement (PA); and

WHEREAS, FRA has invited the Advisory Council on Historic Preservation (ACHP) to participate in the Section 106 consultation for this Undertaking and ACHP has declined via e-mail dated July 20, 2012; and

WHEREAS, FRA and NYSDOT, in consultation with NYSHPO and federally recognized tribes, including the Cayuga Nation, the Delaware Nation, the Delaware Tribe, the Stockbridge-Munsee Band of Mohican Indians, the Oneida Indian Nation, the Onondaga Nation, the Saint Regis Mohawk Tribe, the Seneca Cayuga Tribe of Oklahoma, the Seneca Nation of Indians, the Shinnecock Indian Nation, the Tonawanda Seneca Nation, and the Tuscarora Nation, have defined an area of potential effects (APE) in accordance with 36 CFR 800.4(a)(1), based on the five (5) alternatives advanced for study in the Tier 1 EIS, as shown on Attachment A and the APE may be modified for each component project advanced as part of the Program, based on the individual scope of the subsequent component projects; and

WHEREAS, FRA and NYSDOT in consultation with NYSHPO and federally recognized tribes, have conducted preliminary identification efforts, established the likely presence of historic properties within the APE for each of the Tier 1 alternatives, and determined that the Program has the potential to affect

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historic properties included on or eligible for inclusion on the National Register of Historic Places (NRHP); and

WHEREAS, in accordance with 36 CFR 800.14(b)(1)(ii) and except as otherwise stated in this PA, this PA sets forth the process by which FRA will fulfill its obligations under Section 106 of NHPA for Tier 2 undertakings, given that the final identification of historic properties and effects on any such properties cannot be fully determined prior to approval of the undertaking; and

WHEREAS, this PA also serves to provide Program-wide consistency in consultation procedures, documentation standards, and Federal agency oversight in compliance with Section 106 of the NHPA for the component projects that will be undertaken as part of the Program; and

WHEREAS, pursuant to the requirements of NEPA, NHPA, and SEQRA, NYSDOT and FRA conducted a public involvement process as part of the environmental review for the Tier 1 EIS. As part of this outreach, information was provided to federal, state, and local agency representatives; elected officials; property owners; interested persons; and interested organizations; and

WHEREAS, FRA in coordination with NYSDOT, has consulted with federally recognized tribes with a known interest in geographical areas included in the proposed High Speed Rail Empire Corridor (as detailed in Attachment B), considered their views, and offered them an opportunity to sign this PA as Concurring Parties; and

WHEREAS, a Concurring Party has participated in the Section 106 process as a consulting party, accepts the outcome of the process and content of the PA, but their concurrence is not required to execute, amend, or terminate the PA; and

WHEREAS, FRA has approved requests from the following organizations to consult on historic preservation matters of interest to them associated with this Program and has invited those organizations to sign this PA as Concurring Parties: the Preservation League of New York State; Preservation Buffalo Niagara; and the National Park Service/ Erie Canalway National Heritage Corridor;

WHEREAS, tribal lands are considered to be "all lands within the exterior boundaries of any Indian reservation and all dependent Indian communities," as defined in Section 301(14) of the NHPA and 36 CFR § 800.16(x); and

WHEREAS FRA, NYSDOT, and NYSHPO are signatories pursuant to 36 CFR 800.6(c)(1) and have sole authority to execute, amend, or terminate this PA.

NOW, THEREFORE, the FRA, NYSDOT, and NYSHPO agree that, except as otherwise stated in this PA, Tier 2 undertakings shall be administered in accordance with the following stipulations to satisfy Section 106 requirements for the Program.

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STIPULATIONS

I. APPLICABILITY

A. Unless the signatories amend or terminate this PA, and except as provided in Stipulation I.B, this PA shall apply to this Undertaking and all component projects advanced as part of the Program.

B. This PA shall not apply to effects of this Undertaking that occur on or affect tribal lands as defined in Section 301(14) of the NHPA and 36 CFR 800.16(x). Notwithstanding this, Stipulation IV below addresses the process by which FRA and NYSDOT intend to consult with federally recognized tribes and comply with Section 106 of the NHPA for effects that occur on or affect tribal lands. If undertakings occur on tribal lands, the THPO will serve in the role of the SHPO as described in 36 CFR 800.3 and Section 101(d) of NHPA if there is a THPO. If a tribe has no THPO, FRA will consult with that tribe's designated representative in addition to and on the same basis as consultation with the SHPO. In accordance with the referenced statute and regulations, the FRA, the lead Federal agency, will follow appropriate tribal consultation procedures for the identification of historic properties and resolution of adverse effects.

C. In the event that NYSDOT applies for additional federal funding or approvals for the undertakings from another agency that is not party to this PA and the Undertaking, as described herein remains unchanged, such funding or approving agency may choose to comply with Section 106 by agreeing in writing to the terms of this PA and notifying and consulting with FRA and NYSHPO. Any necessary modifications will be considered in accordance with Stipulation XVIII.B of this PA.

   1. Routine maintenance activities that would not adversely affect historic properties as specifically described in Attachment C will be exempt from the Section 106 review procedures described in this PA.

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II. ROLES AND RESPONSIBILITIES AS SIGNATORIES

A. FRA

As the lead Federal agency, FRA has primary responsibility pursuant to 36 CFR 800.2(a)(2) to ensure that the provisions of this PA are carried out. FRA will conduct government-to-government consultation with federally recognized tribes, execute MOAs and programmatic agreements to address or resolve adverse effects as necessary for the component projects advanced in the Tier 2, and participate in the resolution of disputes. FRA is responsible for all determinations of eligibility and findings of Effect of the projects. Consistent with the requirements of 36 CFR 800.2(a) and 800.2(c)(4), FRA remains legally responsible for ensuring that the terms of this PA are carried out and for all findings and determinations made pursuant to this PA.

B. NYSDOT

Pursuant to 36 CFR 800.2(a)(3), FRA delegates to the NYSDOT the responsibility to conduct cultural resource studies in coordination with FRA; and to prepare documents and reports with recommendations for required findings of eligibility and effect in coordination with the FRA and submit them to the SHPO for concurrence. In addition, FRA authorizes NYSDOT to initiate consultation with the NYSHPO, federally recognized tribes, and other consulting parties, in accordance with 36 CFR 800.2(c)(4). NYSDOT shall be responsible for the following, where applicable:

- Consult with other consulting parties and the public;

- In coordination with FRA, delineate the Area of Potential Effect for each component project as needed in consultation with the SHPO;
- Prepare documentation for NYSHPO and FRA including determinations of eligibility and effect;
- Circulate comments on Section 106 documents from the NYSHPO, federally recognized tribes, other consulting parties, and the public;
- Maintain documentation of the Section 106 compliance for each component project within the Program;
- Develop a Draft MOA for each applicable project within the Undertaking as required;
- Identify individuals and organizations with a potential interest in participating in Section 106 consultation for component projects;
- Develop and implement project MOAs in consultation with MOA signatories for component projects as appropriate; and
- Develop and implement treatment plans for component projects where applicable which set forth measures to avoid, minimize, or mitigate adverse effects on historic properties' treatment plans may be included as provisions or attachments in the MOAs for applicable component projects.

C. NYSHPO

Pursuant to 36 CFR 800.3(c)(4), the NYSHPO shall review and comment on all adequately documented project submittals within 30 calendar days of receipt. No response from the NYSHPO within 30 calendar days of receipt shall indicate concurrence with the project submittal and FRA findings.

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III. CONSULTATION WITH THE NYSHPO

A. For each component project, NYSDOT, in coordination with FRA, shall initiate consultation with the NYSHPO to seek input on refining the APE based on the scope of the individual project, and to identify potential consulting parties.

B. NYSDOT, in coordination with FRA, will direct cultural resource consultants to conduct archaeological and architectural surveys as needed to identify historic properties within the APE. NYSDOT will provide copies of Draft Cultural Resource Survey (CRS) reports to FRA for review. Based on CRS reports, FRA will make findings regarding NR eligibility of historic properties.

C. NYSDOT will direct cultural resource consultants to prepare Final CRS reports based on FRA findings.

D. NYSDOT will provide Final CRS reports to NYSHPO for 30-calendar day review. Submittals to NYSHPO shall be made using NYSHPO's preferred report format and submission process at the time of submittal; allowance shall be made for changes in NYSHPO's submission process and forms resulting from updates to NYSHPO's computer system, which is expected to be in place by 2014. NYSDOT will seek the concurrence of NYSHPO with the report's findings. In coordination with FRA, NYSDOT will address comments or requests for additional information from NYSHPO within the 30-calendar day review period. NYSHPO will be provided a 30-calendar day review period for each separate report.

E. FRA, in coordination with NYSDOT and in consultation with the NYSHPO, will apply the criteria of adverse effects (36 CFR 800.5(a)(1)) to identified historic properties within the APE, and document the assessment of effects. The Finding Documentation will be provided to the NYSHPO for 30-calendar day review and comment. If no adverse effects are identified, the process will be concluded if NYSHPO does not object within 30 calendar days, as described in VI.E.

F. FRA shall notify the ACHP of any adverse effect finding, and provide the ACHP with the Finding Documentation prepared in accordance with 36 CFR 800.11(e).

G. FRA shall notify the ACHP of any undertaking that may adversely affect an NHL, and shall invite ACHP to participate in consultation to resolve adverse effects. FRA shall also notify the Secretary of the Department of the Interior of any consultation involving an NHL, and formally invite the Secretary to participate in the Section 106 consultation process when there may be an adverse effect to these properties.

H. FRA, in coordination with NYSDOT, will consult with the NYSHPO and ACHP, if participating, to consider measures to avoid, minimize, or mitigate adverse effects on historic properties. If adverse effects cannot be avoided, FRA will request written concurrence from the NYSHPO, issue an adverse effect determination for the project, and move forward with consultation to develop a Memorandum of Agreement (MOA), including mitigation measures agreed-upon through consultation.

IV. CONSULTATION WITH FEDERALLY RECOGNIZED TRIBES

A. FRA

1. As the Lead Federal agency with responsibility for Section 106 compliance, FRA is responsible for all government-to-government consultation with federally recognized tribes. Attachment B contains a list of federally recognized tribes with an identified interest in the geographical area of the High Speed Rail Empire Corridor.
2. FRA shall ensure that consultation with federally recognized tribes takes place early in the project development process for each project addressed in the Tier 2 process to identify cultural, confidentiality, or other concerns including those about historic properties, and to allow adequate time for consideration of such concerns whenever they may be expressed.
3. In accordance with 36 CFR 800.2(c)(2), individual federally recognized tribes may be identified as consulting parties for each component project based on the project location relative to areas of interest for Section 106 consultation.
4. Consultation with federally recognized tribes shall take place throughout the development of subsequent component projects within this Undertaking, regardless of whether such tribes are concurring parties to this PA or have actively participated in Section 106 consultation during the Tier 1 phase of the Program.
5. In accordance with Section VIII.A of this PA, if FRA determines that a component project occurring on tribal land will cause adverse effects to historic properties, and a MOA to resolve those effects is necessary, the affected tribe shall be a required signatory to the MOA.
6. In accordance with Section VIII.A of this PA, if FRA determines that a component project not occurring on tribal land will cause adverse effects to historic properties of a religious or cultural significance to a tribe, and a MOA to resolve those effects is necessary, FRA shall consult with the affected tribe and shall invite the tribe to be a concurring party or signatory to that MOA, as appropriate.

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B. Consultation for Each Project

1. FRA shall invite federally recognized tribes with an identified interest in the geographical area that may be affected by a component project to participate in consultation for that component project. The FRA may delegate some of its consultation responsibilities to NYSDOT for a project component, but only with an affected tribes' written consent. Communication for the purpose of providing opportunities to participate in consultation may take the form of meetings, written correspondence, review of reports and documents, emails, and/or phone calls

2. FRA shall consult on a government-to-government basis with federally recognized tribes at key milestones in the Section 106 process to gain input. The consultation with federally recognized tribes may occur at the following points in the Section 106 process:

   i. During identification of historic properties, to assist in the identification of properties of religious and cultural significance.

   ii. During assessment of adverse effects, to provide views regarding the project's effects on identified cultural and historic properties, and to participate in the development of avoidance, minimization and treatment measures for adverse effects to both archaeological and built resources as appropriate.

   iii. During resolution of adverse effects, to participate in the development of mitigation measures to be incorporated into an MOA developed by FRA in consultation with the NYSHPO, federally recognized tribes, and other consulting parties.

3. NYSDOT in coordination with FRA will provide copies of CRS report(s) and Finding Documentation for 30-day calendar review period, concurrent with review by the NYSHPO. The views and comments of federally recognized tribes will be considered by FRA as part of the consultation process for the identification of historic properties and assessment of effects.

4. For Native American groups that are not federally recognized, FRA will consider requests to participate as other consulting parties based on their statement of interest in the project.

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V. PARTICIPATION OF OTHER CONSULTING PARTIES AND THE PUBLIC

A. Public Involvement

Public involvement in planning and implementation of undertakings covered by this PA shall be governed by NYSDOT's established Public Involvement procedures for planning and conducting public outreach. Historic resources will be identified and effects will be disclosed to the extent allowable under 36 CFR 800.2(d)(1-2), 800.3(e), and 800.11(c)(1 and 3) and Stipulation XIII of this PA.

Public involvement and the release of information hereunder shall be consistent with 36 CFR 800.2(d)(1-2), 800.3(e), and 800.11(c)(1 and 3), and the Freedom of Information Act, 5 U.S.C. 552, and the implementing regulation applicable to the U.S. Department of Transportation, at 49 CFR Part 7.

Pursuant to 36 CFR 800.11(e) through (g), summaries of any views provided by consulting parties or the public will be included in documentation of project effects to historic properties and any individual MOAs.

B. Consulting Parties

Consulting parties shall participate in undertakings covered by this PA in accordance with 36 CFR 800.2(c)(3) through (5) and 800.3(f). Consulting parties may include other federal, state, regional, or local agencies that may have responsibilities for historic properties and may want to review reports and findings for a project within their jurisdiction.

FRA, in coordination with NYSDOT, will consult with NYSHPO early in the process for each component project to identify potential consulting parties and methods to be used for involving consulting parties in the process.

VI. IDENTIFICATION AND EVALUATION OF HISTORIC PROPERTIES

A. Area of Potential Effects

The Area of Potential Effects (APE) for each undertaking will be determined by FRA in coordination with NYSDOT in accordance with the APE Delineation guidelines (Attachment D). As described in Attachment D, throughout the design process, FRA in coordination with NYSDOT, and in consultation with federally recognized tribes, as appropriate, will determine if revisions to an undertaking require modifications to the APE established as part of Tier 1. If an APE requires revisions, FRA in coordination with NYSDOT will inform the SHPO and other consulting parties, and take appropriate measures to modify the scope of identification efforts.

B. Identification of Historic Properties

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1. The NYSDOT, in coordination with FRA, will be responsible for carrying out appropriate studies to identify historic properties within the APE in accordance with 36 CFR 800.4(b), and to prepare documentation in accordance with Attachment E. As appropriate, these methods may be modified for the specific needs of component projects in consultation with the NYSHPO and participating federally recognized tribes, as appropriate, based on the review of the Principal Investigator (PI) and current professional standards. FRA shall make determinations of eligibility based on NRHP criteria (36 CFR 60.4) and evaluated in accordance with provisions of 36 CFR 800.4(c). Evaluation methods and criteria shall be consistent with the Secretary of the Interior's Standards and Guidelines for Evaluation (48 Fed. Reg. 44729-44738) (36 CFR 63) and shall be completed by PIs qualified in the appropriate discipline: archaeology, architectural history, or history.
2. The NYSHPO and New York State Museum (NYSM) archaeological site files contain highly sensitive archaeological site locational information, including information relating to human burials, and are not a public record (36 CFR 800.6(a)(5); 800.11(c)). Any project documents intended for public review should not include sensitive archaeological site locational information. Any documentation prepared with this information should be prominently labeled "Confidential. Not for Public Release," and the distribution strictly controlled. Alternatively, an alternate public version of the documents may be prepared that summarizes information relevant to understanding the nature of historic properties and the project's potential effects on those properties without disclosing specific locations or sensitive information. NYSHPO shall be consulted prior to disseminating this information.
3. A reasonable and good faith effort shall be made to identify historic properties within the APE for each of the component projects that are advanced at the Tier 2 level and will be documented in individual CRS Reports as described in Attachment E. The content, methodology, level of effort, and documentation requirements for historic property evaluations in the CRS shall be conducted in accordance with State Education Department (SED) Work Scope Standards, which incorporate the standards of the New York Archaeological Council (NYAC), as described in detail in Attachment E. The CRS reports will be submitted for review by the NYSHPO, tribal historic

preservation officers (THPOs) and/or designated tribal representatives for federally recognized tribes who are participating in Section 106 consultation for the project, and any additional consulting parties.

i. Archaeological properties include precontact and historic period archaeological sites, properties identified as per 36 CFR 800.4(b), objects and districts. The goal of the archaeological survey is to locate and identify any significant archaeological resources that may be affected by the project. Evaluations shall be made by PIs fully qualified in the discipline of archaeology. Archaeological properties within the APE shall be documented in the CRS report.

A list of archaeological resources exempt from evaluation is provided in Attachment F.

Any archaeological investigations that may be required on New York State-owned land shall be conducted under a State Archaeologist's permit (Education Law Section 233). A State Archaeologist's permit application shall be submitted to the NYSM by a qualified professional archaeologist retained by the project sponsors.

ii. Historic architectural properties include historic buildings, structures, objects, sites, and districts. Evaluations shall be made by PIs. Historic architectural properties within the APE that are identified by PIs as historic properties shall be documented in the CRS report. Historic architectural properties evaluated as ineligible for the NRHP by PIs shall be documented in the CRS report. The content, methodology, level of effort, and documentation requirements for historic architectural evaluations in the CRS report are provided in detail in Attachment E. A list of historic architectural property types exempt from evaluation is provided in Attachment F.

C. Procedures for Evaluation of Historic Properties

1. FRA shall review the identified historic properties presented in the Draft CRS Report, which would include documentation of identified historic properties in the APE including those that are listed in the NRHP, previously determined eligible for the NRHP, recommended eligible for the NRHP in the CRS report, or that are recommended not eligible for the NRHP. FRA shall make determinations regarding the NRHP eligibility of previously unevaluated properties identified in the approved CRS Report.
2. NYSDOT shall prepare a Final CRS report based on FRA's review and approval.
3. NYSDOT shall submit the Final CRS report to the NYSHPO, federally recognized tribes participating in consultation identified as a result of Stipulations IV.B and V.B and any consulting parties, who shall have 30 calendar days to review the CRS report findings and provide their comments.
4. Known archaeological properties whose NRHP eligibility cannot be evaluated prior to approval of an undertaking will be presumed NRHP eligible until archaeological investigation to evaluate their eligibility can occur. Project-specific MOAs may include a provision for treatment plans that include archaeological testing, monitoring, and/or a data recovery program.
5. If, after the submission of the Final CRS report to NYSHPO, federally recognized tribes, and any consulting parties, there are changes to the APE that include additional properties not exempt from evaluation or information is received that there may be additional historic properties within the APE, a Supplemental CRS report will be prepared, and distributed following review by FRA, to NYSHPO and all parties who received the Final CRS report for a review and comment period

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of 30 days. If no objection is made, consistent with Stipulation VI.D, within the 30-calendar day period, the findings for those historic properties in the Supplemental CRS report would become final.

D. Eligibility Disagreements

Should a disagreement arise regarding the NRHP eligibility of a property in the APE for an undertaking, FRA shall forward a Determination of Eligibility documentation to the Keeper of the National Register (Keeper) for resolution in accordance with 36 CFR 800.4(c)(2) if:

1. NYSHPO or a federal agency with jurisdiction over the involved lands objects in writing within 30 calendar days to a finding of eligibility, or
2. A Native American tribe or group that ascribes traditional religious and cultural significance to a property objects in writing within 30 calendar days to a Finding of Eligibility regarding that property; and
3. FRA is not able to resolve that objection through consultation with the NYSHPO and the objecting party as provided for in Stipulation XVIII.A.

Should a member of the public disagree with any NRHP eligibility determinations, NYSDOT shall inform the FRA and any affected signatories and take the appropriate objection into account. NYSDOT shall consult for no more than 30 calendar days with the objecting party and, with any or all of the other signatories. NYSDOT shall document such consultation efforts and submit the findings in writing to the FRA for review. FRA's decision regarding resolution of the objection from a member of the public will be final.

E. No Historic Properties Affected

If FRA determines that no historic properties are affected by the proposed project as defined in 36 CFR 800.4(d)(1), NYSDOT shall provide documentation of this finding, consistent with 36 CFR 800.11(d), to the NYSHPO and participating federally recognized tribes and shall notify consulting parties, If the NYSHPO does not object within 30 calendar days of receipt of an adequately documented finding, the Section 106 process shall be complete. If NYSHPO objects to the finding within the 30-day period, and/or if the proposed project is located on tribal lands and the applicable federally recognized tribe objects to the finding, the FRA shall follow the protocol for resolution set forth in 36 CFR 800.4(d)(ii) and (iv).

VII. ASSESSMENT OF ADVERSE EFFECTS

A. If historic properties are identified in the APE for a project, NYSDOT in coordination with FRA shall assess adverse effects in accordance with 36 CFR 800.5 and document its assessment in a Draft Finding Documentation in accordance with 36 CFR 800.11(e) for each undertaking where historic properties were identified within the APE. The Draft Finding Documentation shall describe the undertaking, the area of potential effects, steps taken to identify historic properties, affected properties and the assessment of adverse effects to historic properties, consideration of measures to avoid or minimize effects, and mitigation measures to resolve the project's adverse effects, if any. The Draft Finding Documentation will also incorporate a record of consultation with the NYSHPO, federally recognized tribes, other consulting parties, and the public. Following FRA review, NYSDOT shall distribute the Draft Finding Documentation to the NYSHPO, federally recognized tribes, and other consulting parties identified as a result of Stipulations IV.B and V.B, who shall have a 30-day review and comment period. NYSDOT, in coordination with FRA, will ensure that comments are considered and prepare a revised Draft Finding Documentation for FRA review and

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approval as the basis for FRA's effect determination for the project. NYSDOT, on behalf of FRA will submit the Final Finding Documentation to the NYSHPO requesting concurrence with FRA's effect determination. The Final Finding Documentation will also be provided to federally recognized tribes and other consulting parties. If an adverse effect is found, FRA will notify the ACHP and continue consultation to resolve the project's adverse effects on historic properties.

B. FRA will notify and invite the Secretary of the Interior (represented by the National Park Service regional office's program coordinator) when any project section may adversely affect a National Historic Landmark (NHL) pursuant to 36 CFR 800.10 and Section 110(f) of the NHPA.

C. Consistent with 36 CFR 800.5(b) and (d)(1), FRA may determine that there is no adverse effect on historic properties within the APE for an undertaking when the effects of the undertaking would not meet the Criteria of Adverse Effect at 36 CFR 800.5(a)(1), the undertaking is modified to avoid adverse effects, or if conditions agreed upon by NYSHPO are imposed, such as subsequent review of plans for rehabilitation by the NYSHPO/THPO to ensure consistency with the Secretary's Standards for the Treatment of Historic Properties (36 CFR Part 68) and applicable guidelines, to avoid adverse effects. Any conditions would be documented by the written concurrence of the NYSHPO and federally recognized tribes, as appropriate. NYSDOT will submit all such written concurrence documents to FRA, which is responsible for ensuring compliance with all conditions to avoid adverse effects.

VIII. RESOLUTION OF ADVERSE EFFECTS

A. Memoranda of Agreement

1. A MOA will be developed by NYSDOT in coordination with FRA for each component project that FRA determines will cause adverse effects on historic properties. The MOA will describe measures to avoid, minimize, and/or mitigate adverse effects, as agreed upon through consultation. A Draft MOA shall be circulated amongst NYSDOT, NYSHPO, FRA, participating federally recognized tribes, and consulting parties for review and comment. A revised MOA reflecting the input of these parties will be subsequently circulated for review and comment.
2. Each MOA will include a process for efficiently addressing unanticipated discoveries in the post-review period, including the inadvertent discovery of human remains.
3. Should federally recognized tribes decline to participate in the MOA for a specific project, they will be provided documentation regarding treatment that is called for in that MOA.
4. Pursuant to 36 CFR 800.11(e) through (g), views of the public will be considered and included where appropriate in individual MOAs.
5. Upon review, concurrence, and execution of the MOA, Section 106 review will be considered concluded for that specific project or undertaking, though coordination and compliance efforts would continue according to the terms of this PA and the MOA.

B. Mitigation Measures

1. FRA, NYSDOT, and the project sponsors where applicable shall develop and implement avoidance, minimization, and/or mitigation measures where adverse effects on cultural resources are identified for a component project. Mitigation measures will be developed in consultation with the NYSHPO, participating federally recognized tribes, and any consulting parties.
2. Measures to avoid, minimize, or mitigate adverse effects on historic properties may require the development of project-specific or resource-specific treatment plans. NYSDOT and/or the project

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sponsor shall prepare a Treatment Plan documents where appropriate, for review and approval by NYSHPO, FRA, and participating federally recognized tribes. Treatment plans shall set forth specific protocols to avoid, minimize, or mitigate adverse effects and may include Archaeological Monitoring Plans, Data Recovery Plans, Archaeological Avoidance Plans, Construction Protection Plans, Historic American Building Survey (HABS)/ Historic American Engineering Record (HAER) recordation, or other measures, as appropriate.

C. Treatment Plan Reviews

1. NYSDOT will provide a draft of any treatment plan to the FRA and or NYSHPO for review, prior to circulating the plan to consulting parties for a 30-day review and comment period. Based on comments received, treatment plans may be revised and will be incorporated as attachments to the MOA.

D. Treatment Plan Implementation

1. Upon execution of each MOA, each related treatment plan shall be implemented. Depending upon the nature of the treatment, the treatment may not be completed until after the specific project is completed. Termination of the project after initiation of the treatment plans will require completion of any work in progress, and amendment of each treatment plan as described below. Amendments to the treatment plans will be incorporated by written agreement among the signatories to the MOA. Each MOA will outline appropriate reporting processes for the treatment plans.
2. Dispute Resolution

   The parties participating in the development and implementation of the treatment plans will come to agreement on the treatment prescribed in and the implementation of the treatment plan in the MOA. If the parties are unable to come to agreement on the treatment of adverse effects in the MOA, the procedures outlined in XVII.A will be followed to resolve the dispute.

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IX. CHANGES IN ANCILLARY AREA/CONSTRUCTION RIGHT-OF-WAY

NYSDOT will notify NYSHPO and potentially affected federally recognized tribes participating in Section 106 consultation on this Program (see Attachment B), and potentially affected consulting parties of any changes in the Program scope that result in changes to the APE, or effects on historic properties, and will reopen Section 106 consultation with appropriate potentially affected parties to address these changes.

X. CONSTRUCTION APPROVAL

Upon the completion of any preconstruction activities required according to the provisions of the applicable MOA, if any such activities are required, NYSDOT may authorize construction within portions of the APE. If concurrence of the approval to proceed cannot be reached among the signatories, the dispute will be resolved in accordance with Stipulation XVIII.A.

XI. DISCOVERIES, UNANTICIPATED ADVERSE EFFECTS, UNANTICIPATED DAMAGE

In accordance with 36 CFR 800.13(a)(2), if a previously undiscovered archaeological, historic, or cultural property is encountered during construction, or previously known properties will be affected or have been affected in an unanticipated adverse manner, NYSDOT will implement the following procedures. These procedures may be modified for individual component projects, to address specific concerns identified through consultation.

A. NYSDOT shall ensure that all operations for the portion of the undertaking with the potential to affect an historic property are immediately ceased and will contact the FRA and the NYSHPO upon unanticipated resource discovery. Federally recognized tribes with an identified interest in the project location will also be notified as appropriate, based on the nature of the unanticipated discovery.

B. If historic properties are discovered or unanticipated effects on historic properties are identified after construction commences, NYSDOT will follow the procedures for *Discoveries without prior planning* outlined in CFR 800.13(b)(3),

C. If a NHL is affected, FRA shall include the Secretary of the Interior represented by the National Park Service regional office's program coordinator and the ACHP in the notification process.

XII. CONFIDENTIALITY

All parties to this PA shall ensure that shared data, including data concerning the precise location and nature of historic properties and properties of religious and cultural significance are protected from public disclosure to the greatest extent permitted by law, including conformance to Section 304 of the NHPA, as amended and Section 9 of the Archaeological Resource Protection Act and Executive Order on Sacred Sites 13007 FR 61-104 dated May 24, 1996.

As noted under VI.B.2, NYSHPO and NYSM archaeological site files contain highly sensitive archaeological site locational information, including information relating to human burials, and are not a public record (36 CFR 800.6(a)(5); 800.11(c)). Any project documents intended for public review should not include sensitive archaeological site locational information. Any documentation prepared with this information should be prominently labeled as confidential and the distribution strictly controlled. Alternatively, an alternate public version of the documents may be prepared that summarize information relevant to understanding the nature of historic properties and the project's potential effects on those properties without disclosing specific locations or sensitive information. NYSHPO shall be consulted prior to disseminating this information.

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XIII. HUMAN REMAINS

If human remains are unexpectedly encountered during construction, NYSDOT in coordination with FRA will follow procedures in accordance with the NYSHPO Human Remains Discover Protocol:

A. In accordance with the NYSHPO's Human Remains Discovery Protocol (2005), the following steps shall be taken in the event of the unanticipated discovery of human remains:

1. Construction activities in the vicinity of the discovery shall immediately cease and the site shall be secured;
2. Human remains and any associated artifacts shall be left in place until appropriate consultation has taken place and a plan has been developed;
3. The county coroner, local law enforcement and the NYSHPO shall be notified and a determination shall be made as to whether the remains are forensic or archaeological in nature;
4. If the human remains are determined to be Native American, they shall be left in place until consultation with appropriate federally recognized tribes has occurred to identify a plan of action consistent with the Native American Graves Protection and Repatriation Act (NAGPRA);
5. If the remains are determined not to be Native American, they will be left in place until consultation with NYSHPO and any other appropriate parties has taken place to identify an appropriate plan of action for avoidance or removal.

B. All human remains shall be treated in a manner consistent with ACHP "Policy Statement regarding Treatment of Human Burial Sites, Human Remains and Funerary Objects" February 23, 2007; http//www.achp.gov/docs/hrpolicy0207.pdf

XIV. CURATION

A. Collections from Federal Lands

FRA will be responsible for ensuring that curation of all records and other archeological items resulting from identification and data recovery efforts on Federal lands is completed in accordance with 36 CFR Part 79, and if the archaeological materials are determined to be of Native American origin, FRA will follow NAGPRA regulations and procedures set forth in 43 CFR Part 10. NYSDOT shall ensure that documentation of the curation of these materials is prepared and provided to the affected parties to this PA within 10 days of receiving the archaeological materials.

B. Collections from Private Lands

Materials collected from private lands should be returned to the landowner, or acquired through a Deed of Gift from the landowner. Materials from private lands to be returned to the private landowners after completion of the undertaking shall be maintained in accordance with 36 CFR Part 79, and 43 CFR Part 10 if the archaeological materials are determined to be of Native American origin, until all necessary analysis has been completed. NYSDOT shall document the return of materials to private landowners or alternate curation facilities and submit copies of this documentation to the affected parties to this PA.

C. State Lands

Any archaeological investigations on New York State-owned land shall be conducted under a Section 233 permit (New York State Education Law Section 233).

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XV. PROFESSIONAL QUALIFICATIONS STANDARDS

All actions prescribed by this PA that involve the identification, evaluation, analysis, recording, treatment, monitoring, or disposition for historic properties, or that involve reporting or documentation of such actions in the form of reports, forms, or other records, shall be carried out by or under the direct supervision of a person or persons who meet, at a minimum, the Secretary of the Interior's Professional Qualifications Standards (48 FR 44738-44739) (Appendix A to 36 CFR Part 61) in the appropriate discipline. Hereinafter, such persons shall be referred to as PIs. NYSDOT shall ensure that consultants meeting these qualification standards conduct the work outlined in this PA. However, nothing in this stipulation may be interpreted to preclude FRA or NYSDOT or any agent or contractor thereof from using the services for persons who are not PIs, as long as their activities are overseen by PIs.

XVI. DOCUMENTATION STANDARDS

A. All documentation that supports the findings of effect made under this PA shall be consistent with 36 CFR 800.11 and shall be in accordance with the attachments to this PA. Documentation shall be submitted to NYSDOT and prepared by professionals experienced in the preparation of Section 106 documents. NYSDOT shall review the documentation for adequacy, and transmit all documentation cited herein as stipulated by this PA.

B. All documentation prepared under this PA shall be kept on file at NYSDOT and FRA and made available to the public in a manner consistent with the respective agencies' policies for public access to environmental documents, and without the inclusion of culturally sensitive information that may jeopardize confidentiality as stipulated by this PA, consistent with applicable confidentiality requirements and Federal records management requirements.

XVII. AUTHORITIES

Compliance with the provisions of this PA does not relieve FRA or other federal agencies of any other responsibilities not described in this PA to comply with other legal requirements, including those imposed by NAGPRA (25 U.S.C. 3001 and 43 CFR 10), the ARPA (16 U.S.C. 470 aa-47011), and NEPA (42 U.S.C. 4321-4347), and applicable Executive Orders.

XVIII. ADMINISTRATIVE STIPULATIONS

A. Dispute Resolution

1. Should any signatory to this PA object within 30 calendar days to any action proposed or any document provided for review pursuant to this PA, FRA shall consult with the objecting signatory to resolve the objection. If FRA determines that the objection cannot be resolved within 15 calendar days, FRA shall forward all documentation relevant to the dispute, including FRA's proposed resolution, to the ACHP. FRA will also provide a copy to all signatories and consulting parties for the undertaking. ACHP shall provide FRA with its advice on the resolution of the objection within 30 calendar days of receiving adequate documentation. Prior to reaching a final decision on the dispute, FRA shall prepare a written response that takes into account any timely advice or comments regarding the dispute from the signatories and consulting parties, including federally recognized tribes, and provide them with a copy of this written response. FRA will then implement any action determined by this dispute resolution process and proceed according to its final decision.

   If ACHP does not provide its advice regarding the dispute within calendar 30 days, FRA may make a final decision on the dispute and proceed accordingly. Prior to reaching such a final decision, FRA shall prepare a written response that takes into account any timely comments regarding the dispute from the signatories and consulting parties for the undertaking, and provide them and ACHP with a copy of such written response.

B. Amendment

1. The signatories to this PA may request that it be amended, whereupon the signatories will consult to consider such amendment. This PA may be amended only upon written concurrence of all signatory parties.
2. To address changes in the treatment of specific historic or archeological properties affected by the undertaking, NYSDOT may propose revisions to the treatment plans or MOAs, as appropriate, rather than to this PA. Upon concurrence of the signatories, NYSDOT and FRA may revise the treatment plans to incorporate the agreed upon changes without executing a formal amendment to this PA. An MOA may be amended only upon written concurrence of all signatory parties.
3. Revisions to an attachment to this PA would be implemented through consultation and include any necessary revisions to the PA itself that may result from modification of an attachment.
4. Pursuant to 36 CFR 800.14(b)(2)(iii), if this PA is amended to cover or apply to an individual component project occurring on tribal lands, the affected tribe shall be a signatory to the amended PA.

C. Review and Reporting

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Each year following the execution of this PA until it expires or is terminated, NYSDOT shall provide all parties to this PA a summary report detailing work carried out pursuant to its terms. Such report shall include any scheduling changes proposed, any problems encountered, and any disputes and objections received in FRA's efforts to carry out the terms of this PA.

D. Termination

FRA, NYSHPO, or NYSDOT may terminate this PA by providing 30 calendar days written notice to the other signatories; the signatories shall consult during the 30-day period prior to termination to seek agreement on amendments or other actions that would avoid termination. Should such consultation result in an agreement on an alternative to termination, the signatory parties shall proceed in accordance with that agreement. Should a signatory party propose termination of this PA, they will notify the other parties in writing. If any of the signatories individually terminates their participation in the PA, then the PA may be terminated in its entirety. In the event of termination, then FRA shall either consult in accordance with 36 CFR 800.14(b) to develop a new agreement or request the comments of the ACHP pursuant to 36 CFR Part 800. Beginning with the date of termination, FRA shall ensure that until and unless a new agreement is executed for the actions covered by this PA, such undertakings shall be reviewed individually in accordance with 36 CFR 800.4-800.6.

E. Duration of this Programmatic Agreement

In the event that the terms of this PA are not carried out within 10 years, this PA shall be assessed by the signatories to determine if it still needed and working effectively, or whether it should be terminated. If the PA is effective and its duration needs to be extended, the signatories can decide to extend the duration of the PA. If the signatories determine that the PA is effective, but needs revisions, revisions will be made. In the event the signatories determine that the PA is not effective and cannot be amended to address concerns, the PA shall be considered null and void, memorialized in a letter to the signatories from FRA. If FRA chooses to continue with the undertaking, it shall re-initiate review of the undertaking in accordance with 36 CFR Part 800.

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F. Execution and Implementation of the Programmatic Agreement

This PA and its attachments shall take effect following execution by FRA. Additional attachments or amendments to this PA shall take effect on the dates they are fully executed by FRA, NYSHPO, and NYSDOT.

Execution of this PA by FRA, NYSHPO, and NYSDOT and implementation of its terms evidence that FRA has taken into account the effects of this undertaking on historic properties and afforded ACHP an opportunity to comment.

SIGNATORIES

Federal Railroad Administration

By: ________________________________ Date: ________________

New York State Historic Preservation Officer

By: ________________________________ Date: ________________

Commissioner New York State Department of Transportation

By: ________________________________ Date: ________________

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CONCURRING PARTIES

Cayuga Nation

By: ______________________________ Date: _______________

Delaware Nation

By: ______________________________ Date: _______________

Delaware Tribe

By: ______________________________ Date: _______________

Stockbridge Munsee Community Band of Mohican Indians

By: ______________________________ Date: _______________

Oneida Indian Nation

By: ______________________________ Date: _______________

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Onondaga Nation

By: ________________________________ Date: ________________

Saint Regis Mohawk Tribe

By: ________________________________ Date: ________________

Seneca Cayuga Tribe of Oklahoma

By: ________________________________ Date: ________________

DRAFT

Seneca Nation of Indians

By: ________________________________ Date: ________________

Shinnecock Indian Nation

By: ________________________________ Date: ________________

Tonawanda Seneca Nation

By: ______________________________ Date: _______________

Tuscarora Seneca Nation

By: ______________________________ Date: _______________

The Preservation League of New York State

DRAFT

By: ______________________________ Date: _______________

Preservation Buffalo Niagara

By: ______________________________ Date: _______________

National Park Service/ Erie Canalway National Heritage Corridor

By: ______________________________ Date: _______________

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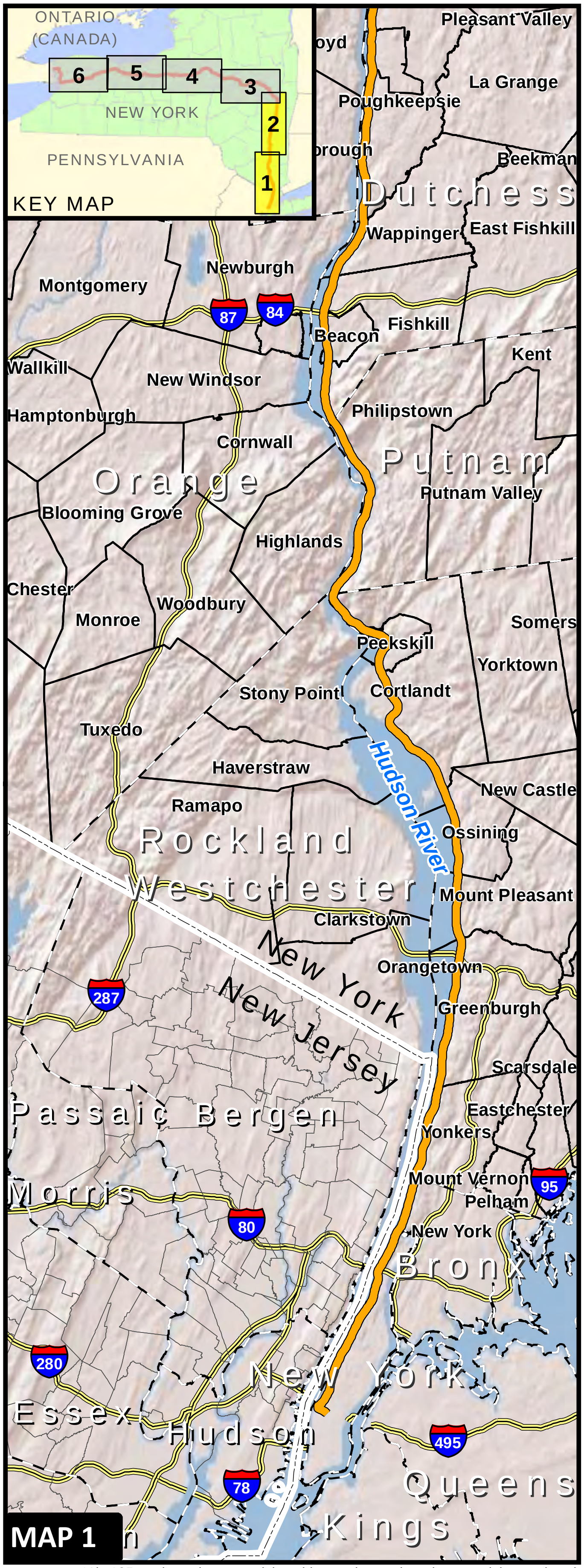

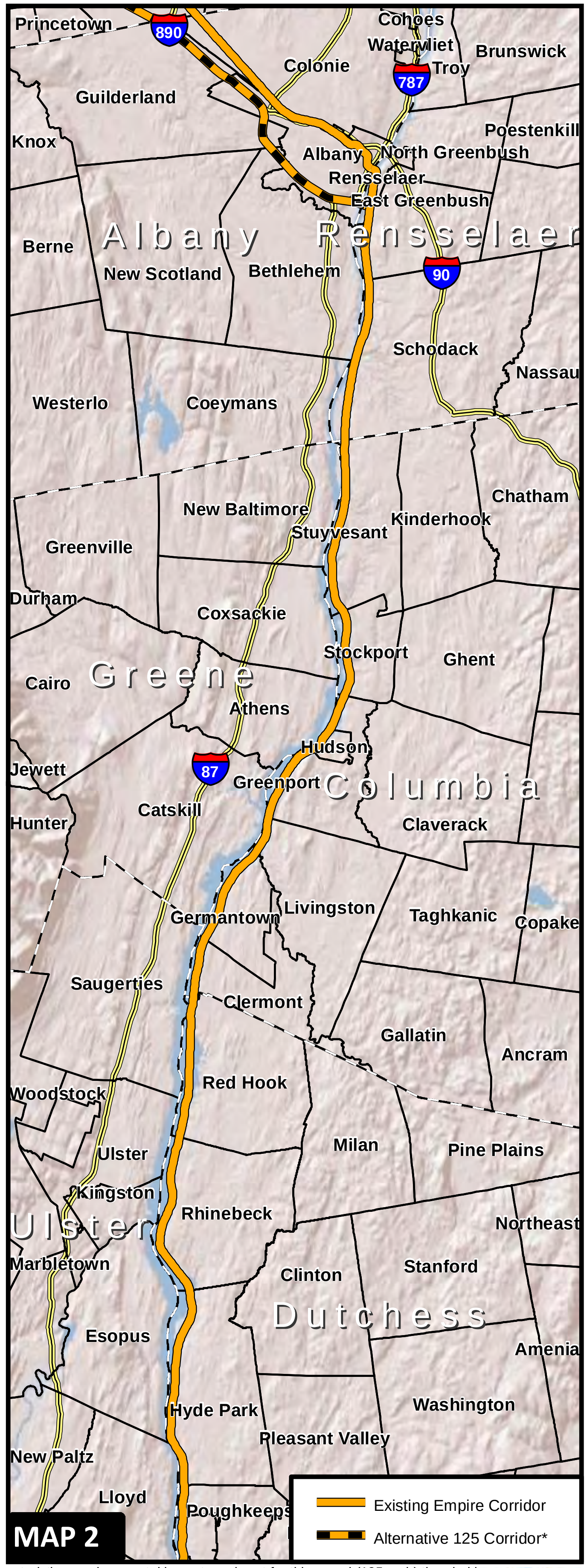

*Alt. 125 as shown is a potential corridor used to analyze the potential operating characteristics, environmental impacts and cost for this speed (125 mph) threshold.

N

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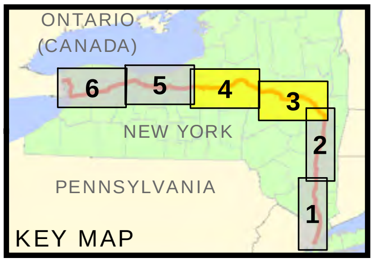
Miles

ATTACHMENT A

Tier 1 EIS
High Speed Rail
Empire Corridor Program



Existing Empire Corridor

Alternative 125 Corridor*

*Alt. 125 as shown is a potential corridor used to analyze the potential operating characteristics, environmental impacts and cost for this speed (125 mph) threshold.

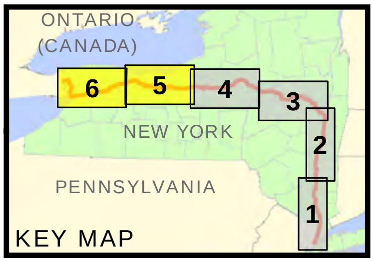
N

0 2.5 5 10

Miles

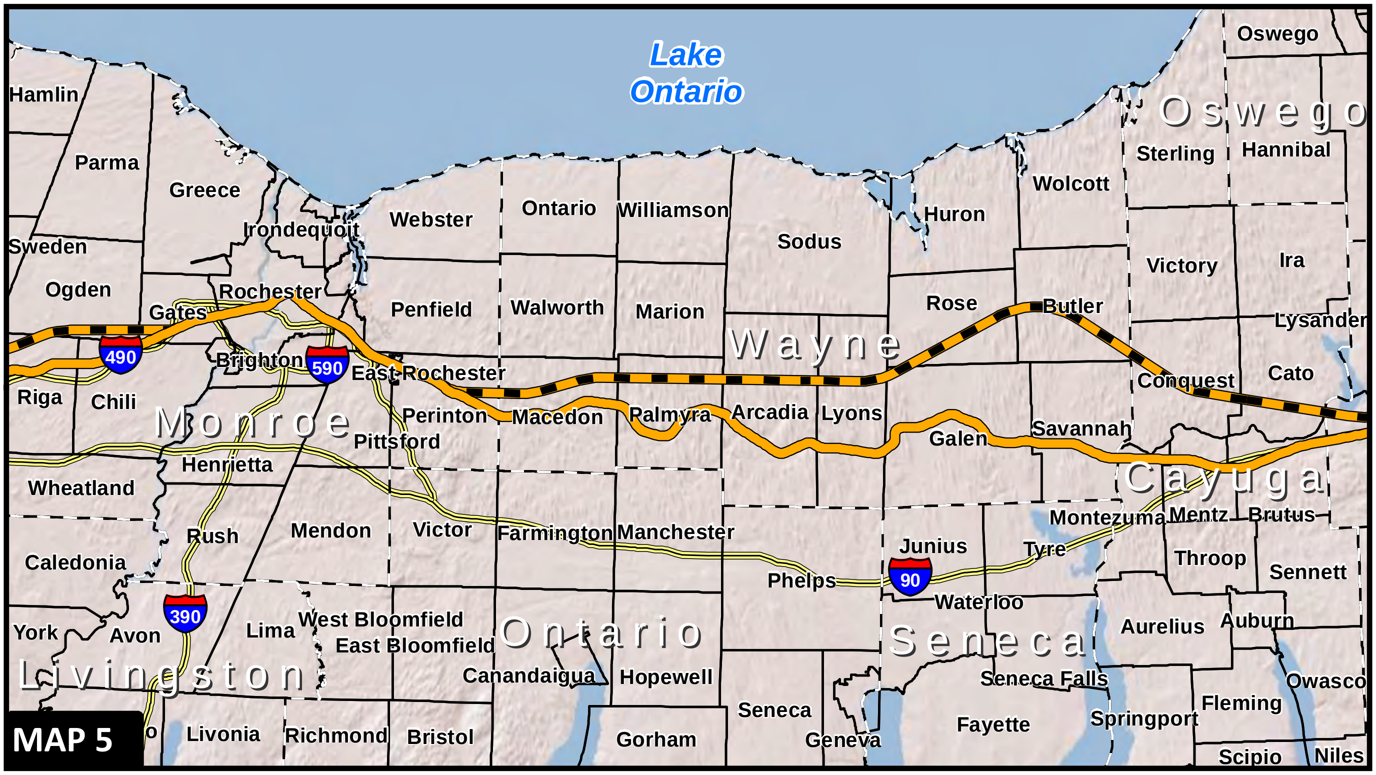
ATTACHMENT A

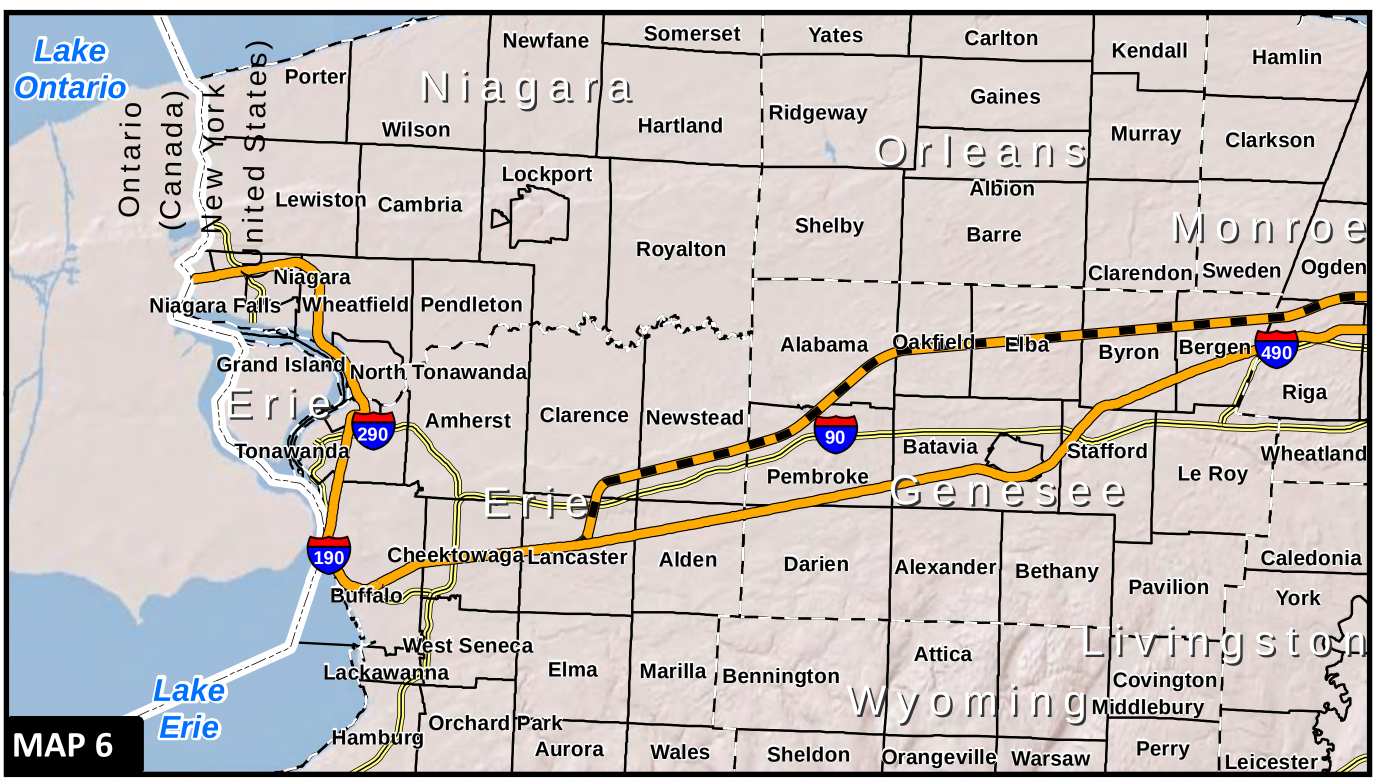
Tier 1 EIS
High Speed Rail
Empire Corridor Program



Existing Empire Corridor

Alternative 125 Corridor*





*Alt. 125 as shown is a potential corridor used to analyze the potential operating characteristics, environmental impacts and cost for this speed (125 mph) threshold.

N

0 2.5 5 10

Miles

ATTACHMENT A

Tier 1 EIS
High Speed Rail
Empire Corridor Program

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DRAFT PROGRAMMATIC AGREEMENT
HIGH SPEED RAIL EMPIRE CORRIDOR PROGRAM

ATTACHMENT B

Federally Recognized Native American Tribal Nations Participating in Section 106 Consultation

Cayuga Nation

Delaware Nation

Delaware Tribe

Stockbridge-Munsee Community Band of Mohican Indians

Oneida Indian Nation

Onondaga Nation

Saint Regis Mohawk Tribe

Seneca Cayuga Tribe of Oklahoma

Seneca Nation of Indians

Shinnecock Indian Nation

Tonawanda Seneca Nation

Tuscarora Nation

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DRAFT PROGRAMMATIC AGREEMENT
HIGH SPEED RAIL EMPIRE CORRIDOR PROGRAM

ATTACHMENT C

Routine Maintenance Activities within the Empire Corridor that are Exempt from Review

PURPOSE

Section 106 regulations require a “reasonable and good faith effort” to identify historic properties (36 CFR 800.4[b][1]). This attachment identifies routine maintenance activities that may reasonably be anticipated to have no potential for adverse effects on historic properties. This attachment defines categories of maintenance activities that do not warrant review unless deemed otherwise in the professional judgment of PIs. The following activities do not require review or documentation:

1. Maintenance of railroad structures or infrastructure either within or outside of a Historic District where no substantial ground disturbance is required and the affected structures or infrastructure are:
   a. Not individually listed or eligible for individual listing in the National Register of Historic Places; or
   b. Have not been determined to be a contributing resource to a National Register listed or eligible Historic District.

2. Repairs to historic properties where such repairs are undertaken in accordance with the Secretary of the Interior’s Standards for the Treatment of Historic Properties (36 CFR 68).

3. Replacement of structural elements or other components of historic bridges, culverts, or structures where the affected elements or components do not contribute to the historic significance of the structure AND;
   a. Where the replacement requires only minimal alterations to historic fabric of the structure; and
   b. Where the alterations to the appearance of the historic structure are not visible from the public right of way.

4. Replacement of ties or rail where there are no changes in vertical or horizontal geometry.

5. Repointing of masonry joints in bridges, culverts, or buildings where the color, texture, aggregate of the grout and the rake of the joint matches the existing.

6. Repairs to historic stone masonry culverts that are not individually listed in the National Register or have been previously determined to be individually eligible for listing in the National Register AND where the exterior appearance of the culvert, including existing stone masonry wing walls and headwalls, is unaffected.

7. Replacement of existing security cameras where no substantial visual alterations to the building or structure result from the replacement.

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DRAFT PROGRAMMATIC AGREEMENT
HIGH SPEED RAIL EMPIRE CORRIDOR PROGRAM

ATTACHMENT D

Area of Potential Effect Delineation Guidelines

In accordance with Stipulation VI.A. of this PA, NYSDOT or other project applicant shall establish the Area of Potential Effects (APE) for undertakings covered by this PA. The project sponsor, in coordination with NYSDOT, is responsible for establishing and describing the APE in consultation with the New York State Historic Preservation Office (SHPO) and taking into consideration the views of any federally recognized tribal nation with an interest in the project area.

As defined in 36 CFR 800.16(d), an APE is “the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist. The area of potential effects is influenced by the scale and nature of an undertaking and may be different for different kinds of effects caused by the undertaking.”

Different APEs may be established for archeological properties and historic architectural properties:

Archaeological Resources

For archeological properties, an APE is typically established based on an undertaking’s potential for direct effects from ground-disturbing activities.

The APE for archaeological properties is the area of ground proposed to be disturbed during construction of the undertaking, including grading, cut-and-fill, easements, staging areas, utility relocation, borrow pits, and biological mitigation areas, if any.

Historic Architectural Resources

The APE for historic architectural properties includes all categories of properties listed below that contain buildings, structures or objects more than 50 years of age at the time the cultural resources survey is completed:

1. Properties within the proposed right-of-way;
2. Properties where historic materials or associated landscape features would be demolished, moved, or altered by construction;
3. Properties near the undertaking where railroad materials, features, and activities **have not** been part of their historic setting and where the introduction of visual or audible elements may affect the use or characteristics of those properties that would be the basis for their eligibility for listing in the National Register; and
4. Properties near the undertaking that were either used by a railroad, served by a railroad, or where railroad materials, features, and activities **have** long been part of their historic setting, but only in such cases where the undertaking would result in a substantial change from the historic use, access, or noise and vibration levels that were present 50 years ago, or during the period of significance of a property, if different.

For this project, a key phrase in the APE definition in the Section 106 regulations contained within 36 CFR 800.16(d) is “may...cause alterations in the **character** or **use** of historic properties” (emphasis added) because many of the undertakings involve the construction of additional, relocated, and/or high speed rail alongside existing railroads. In such cases, potential historic properties near the proposed undertaking historically had railroad features, materials, and activities within their setting that contributed to their character, or may even have been used by or served by the railroad. For example:

- The character and use of a historic railroad passenger or freight depot or railroad bridge **would not change** unless it would be put out of service, destroyed, altered, or moved for the undertaking;
- The character and use of an industrial building next to existing railroad tracks **would not change**, unless freight railroad service was an important association and the spur lines or loading areas would be removed by the undertaking;
- The character and use of buildings **would not change** if they would be separated from the undertaking by an existing railroad; however,
- The character of a non-railroad or non-industrial building **would likely change** if the building is visually sensitive and the proposed undertaking introduces an elevated grade separation or other large building or structure;
- The use of a non-railroad or non-industrial building **would likely change** if the building is sensitive to noise, like a school, museum or library, and the frequency of noise or vibration events from passing trains is increased over historic-era railroad events.

When delineating the APE, the project applicant shall follow the identification methodology described in Stipulation VI.B., which is different for archaeological properties and historic architectural properties. The project applicant shall take into account the nature of the proposed undertaking and whether or not it has the potential to affect the characteristics that might qualify the property for eligibility to the NRHP. Whenever an individual phase is revised (e.g., design changes, utility relocation, or additional off-site mitigation areas), the project applicant will determine if changes require modifying the APE. If an APE proves to be inadequate, NYSDOT or the project applicant is responsible for informing SHPO, federally recognized tribal nations, and any appropriate consulting parties in a timely manner of needed changes. The APE should be revised commensurate with the nature and scope of the changed potential effects.

NEW YORK STATE EDUCATION DEPARTMENT

CULTURAL RESOURCES SURVEY PROGRAM

WORK SCOPE SPECIFICATIONS

FOR

CULTURAL RESOURCE INVESTIGATIONS

ON

NEW YORK STATE DEPARTMENT OF TRANSPORTATION PROJECTS

March 2004

THESE SPECIFICATIONS ARE IN EFFECT FOR ALL STUDIES CONDUCTED BY AND FOR THE NEW YORK STATE MUSEUM AS OF APRIL 1, 1979 AND UNTIL FURTHER NOTICE.

(Established April 1, 1979)

(Revised April 1, 1980)

(Revised April 1, 1981)

(Revised April 1, 1984)

(Revised April 1, 1985)

(Revised April 1, 1986)

(Revised July 15, 1992)

(Revised December 10, 1994)

(Revised January 30, 1998)

(Revised March 31, 2004)

These specifications represent a refinement of guidelines that were developed by the State Museum in 1979 in consultation with the Department of Transportation and the Office of Parks, Recreation and Historic Preservation, and the several revisions made thereafter. These guidelines apply specifically to projects done for the New York State Department of Transportation.

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INTRODUCTION

The work done for the New York State Department of Transportation (DOT) by the New York State Museum (NYSM), State Education Department's (SED) Cultural Resource Survey Program (CRSP) is designed to help DOT meet its cultural resource compliance needs under Section 106 of the National Historic Preservation Act of 1966 (as amended) for federally sponsored projects and Section 14.09 of Parks, Recreation and Historic Preservation Law of 1980 for state sponsored projects. Under Section 106 DOT must "take into account the effect of the undertaking on any district, site, building, structure, or object that is included in or eligible for inclusion in the National Register." Under Section 14.09, DOT must consult with the Commissioner of the Office of Parks, Recreation and Historic Preservation (OPRHP) "concerning the impact of the project if it appears that any aspect of the project may or will cause any change, beneficial or adverse, in the quality of historic, architectural, archaeological, or cultural property that is listed on the National Register of Historic Places or property listed on the State Register of Historic Places or is determined to be eligible for listing on the state register by the commissioner." Standards and specifications described in this document apply to work conducted in accordance with both federal and state regulations.

The purpose of cultural resource investigation services provided to DOT by CRSP is to identify and assess historic properties against the State and/or National Registers of Historic Places (S/NRHP) criteria if such properties exist within the DOT's Area of Potential Effect (APE) that may be affected by DOT undertakings. The initial identification of archaeological sites is done on reconnaissance surveys, while recommendations for eligibility for listing on the S/NRHP generally occur after site examinations. Both of these phases of work are described below. Historic districts, buildings, structures, and objects are identified and evaluated during architectural surveys that generally are done concurrently with archaeological reconnaissance surveys. Procedures for architectural surveys, historic bridge inventories, historic setting analysis, and building/structure evaluation are also described below. Finally, if a historic property determined eligible for listing on the S/NRHP cannot be avoided and will be affected by a DOT undertaking, mitigation may include data recovery in the case of archaeological sites or Historic American Building Survey/Historic American Engineering Record (HABS/HAER) recordation for bridges or other structures, buildings, and objects. These are also described below.

The work done by CRSP for DOT is also designed to meet the goals of SED's Strategic Plan as outlined in the NYSM Plan. Specifically, the work is designed to satisfy Museum Goal 4.1: "The Museum's research advisory services and advisory and regulatory services to museums, historical societies, professionals, and government agencies will meet the highest standards, will be delivered in a timely and cost-effective fashion, and will assure accountability for assets held in the public trust."

This document represents the ninth revision to work scope specifications for cultural resource investigations originally developed in 1979 for CRSP. The previous revisions were made to update and clarify aspects of the work scope to reflect changes in professional standards, and SED, DOT, and/or State Historic Preservation Office/Office of Parks, Recreation and Historic Preservation (SHPO/OPRHP) expectations for cultural resource investigations. The present document provides additional revisions to the work scope specifications for DOT projects based on changes in CRSP during the past several years brought about through negotiations between SED, DOT, and SHPO/OPRHP. Of particular importance are new Section 106 procedures established between DOT, SHPO/OPRHP, and the Federal Highway Administration (FHWA) based on revised regulations that went into effect in January 2001(Appendix A). As a result of these changes, DOT has assumed responsibility for making recommendations for National Register eligibilities (through the CRSP) for historic properties. While these determinations were previously made by the SHPO/OPRHP, the revised 106 procedures specify review and concurrence by SHPO/OPRHP with recommendations presented in Cultural Resource Survey reports. Other revisions to the work scope were developed to assist the DOT with project planning/design and effect recommendations, including guidelines for historic setting analysis for historic districts that the CRSP recommends as eligible for the S/NRHP. New report guidelines have also been developed for documenting and evaluating bridges based on the statewide DOT Historic Bridge Inventory completed in 2002.

The reconnaissance survey report outline (Appendix B) was developed in 1995 and 1996 by the Report Quality Task Force that was to develop a report outline that focused on presenting information important to the goals of CRSP projects for DOT as summarized above and in Appendix A. DOT has required CRSP to include the page number of each historic resource form, prehistoric and historic site form, the table summarizing the location of S/NRHP eligible and listed buildings/structures in the table of contents. The new site exam report outline (Appendix C) was developed with the same goal by CRSP with input from DOT and State University of New York.

This document also reflects the adoption by SHPO/OPRHP in September 1995 of the New York Archaeological Council's (NYAC) *Standards for Cultural Resource Investigations and Curation of Archaeological Collections* (1994). As indicated by SHPO/OPRHP, the NYAC standards for investigation have been recommended for use by the New York State Board for Historic Preservation and have also been reviewed by the National Park Service, which found them to be consistent with the Secretary of Interior's Standards and Guidelines for Archaeology and Historic Preservation (36 CFR Part 800.)

Whereas previous versions of the CRSP work scope provided detailed guidelines for cultural resource field investigations, the present document refers to the attached NYAC standards (Appendix D) for guidance on archaeological fieldwork and the Report Quality Task Force report outline. The document also provides details on requirements specific to DOT projects. All questions regarding these requirements should be addressed to the director of CRSP or his designate prior to initiation of work assignments.

DEFINITIONS

Area of Potential Effect (APE): The geographic area or areas in which an undertaking may directly or indirectly cause changes in the character or use of historic properties, if any such properties exist. The area of potential effect is influenced by the scale and nature of an undertaking and may be different for different kinds of effects caused by the undertaking. DOT provides the APE to SED in the initial project description.

Environmental Analysis Bureau: The office within the New York Department of Transportation that coordinates and manages the statewide Cultural Resources Survey Program.

Evaluation: Process by which the significance and integrity of a historic property are judged and eligibility for National Register listing is determined.

Historic Context: An organizing structure for interpreting history that groups information about historic properties that share a common theme, common geographical area, and a common time period. The development of historic contexts is a foundation for decisions about the identification and evaluation of historic properties, based on comparative historic significance.

Historic Property: Any prehistoric or historic district, site, building, structure or object.

Identification: Process through which information is gathered about historic properties.

Integrity: The unimpaired ability of a property to convey its historical significance.

Office of Parks, Recreation and Historic Preservation (OPRHP): The office within New York State Government charged with overseeing the state's historic preservation program and assisting with compliance with Section 14.09 of the Parks, Recreation and Historic Preservation Law for 100% state funded projects.

Map Documented Structure (MDS): Buildings or structures documented by historic maps during background research and identified through field inspection as no longer standing. MDS locations are indicators of historic archaeological site sensitivity.

Project Area: Within the APE, area associated with actual ground disturbance and/or alterations to historic properties, including setting or landscape features.

Regional Cultural Resource Coordinator (CRC): In each NYSDOT Region, the person designated with responsibility for coordinating the Region's Cultural Resource Survey Program and procedures associated with compliance with state and federal statutes protecting cultural resources.

Section 106: Implementing regulation of the National Historic Preservation Act of 1966 (16 USC 470), pertaining to NYSDOT projects that are federally licensed, permitted or funded.

Section 14.09: Implementing regulations of the NYS Historic Preservation Act of 1980 (Chapter 354 of Parks, Recreation and Historic Preservation Law), pertaining to NYSDOT projects that are entirely state licensed, permitted or funded. These regulations parallel the federal Section 106 regulations and apply to projects with no federal agency involvement.

Significance: Importance of a historic property as defined by the National Register criteria in one or more areas of significance.

*State Historic Preservation Office (SHPO/*OPRHP): Established under the National Historic Preservation Act, the SHPO administers the national program at the state level. Under Section 106, the SHPO reviews projects that are federal undertakings. In New York State, the SHPO resides in the Office of Parks, Recreation and Historic Preservation.

I. RECONNAISSANCE (PHASE I) SURVEY

APPLICATION: For survey of areas of potential affects from DOT capital projects.

PURPOSE: Reconnaissance surveys are designed to:

1. locate and identify on project maps all existing prehistoric and historic archaeological sites (sites), to the extent possible given current professional standards for field work, and locate, inventory/photograph, and identify on project maps standing buildings / structures (including bridges and other engineering features) districts, and objects within the project area that are eligible for listing on the S/NRHP , and

2. provide adequate information on buildings/structures for the SHPO/OPRHP and FHWA concurrence to the S/NRHP eligibility recommendations or require site examination (Phase II testing; see Section II) if additional information is needed for that recommendation.

Definition of the survey APE includes all areas that may be disturbed by the proposed project including settings of districts, buildings, and structures and their associated landscape features.

I.A. GENERAL METHODS ARCHAEOLOGICAL AND ARCHITECTURAL SURVEYS

PROJECT DEFINITION: A project map or maps and Form A with project information will be provided by DOT for each project. This information will be provided to the investigator by the CRSP director or his designate at the time of project assignment. Reconnaissance surveys may include only architecture or archaeology but usually include both. In some cases only a Historic Setting Analysis will be completed if S/NRHP eligibilities have previously been determined or if it is a S/NRHP listed property. The type of survey and the APE is determined by the DOT Regional Cultural Resource Coordinator (CRC) and specified on the Form A (Cultural Resource Survey Checklist, Appendix E).

1. Review project maps and the project information contained on the Form A. The project area should be clearly plotted by the CRC on the project map(s). At least two sets of duplicate survey maps should be provided by DOT, one for field use and one for the working file of the investigator that will be used to develop the project map for the final report. Duplicate maps should be obtained directly from the CRC.

2. Discuss deficiencies or ambiguities in the project-area definitions with the appropriate CRC. If the CRC is unable to clearly define project area limits on project maps, the investigator should do so, after consultation with CRC, and obtain CRC's written concurrence that the project area definition is adequate for their purposes.

3. Immediately report changes to or clarifications of the project area in writing to the CRSP director or his designate. *No changes in survey scope that will affect the project budget or schedule should be made without written authorization from the CRSP Project Director.*

BACKGROUND RESEARCH: Conduct background research before the initiation of fieldwork to develop prehistoric and historic contexts for the project area. Contexts are used to assess the project area's sensitivity for prehistoric and historic archaeological sites and help to assess the S/NRHP eligibility of districts, buildings, structures, and objects in the project area. Background research involves several steps:

1. *Site, Building/Structure, and Report File Checks.* File searches must include the SHPO/OPRHP/New York State Museum (NYSM) statewide site and structure files, the OPRHP and NYSM report files, local museum and university site and report files, files of county and town historians, local libraries and Heritage Areas.

    a. Review inventories of previously recorded archaeological sites and cultural resources survey and archaeological investigation reports to determine if cultural resources have been previously recorded in and/or near (generally within 3.2 km) the project area. Include an area in the site file checks large enough relative to the size of the project area to determine what kinds of landforms and soil conditions are most sensitive for the presence of prehistoric archaeological sites in the region for comparison with the project area. Compile a table or list of previously reported archaeological sites for inclusion in the report. Plot the location of all previously identified sites with their name and number within the project area, previous cultural resource surveys and archaeological investigations within the project area on the project map and prepare a list of those surveys and summarize their results for inclusion in the project report.

b. Contact SHPO/OPRHP and arrange an appointment to examine building/structure inventory files and discuss the project with the SHPO/OPRHP regional National Register staff. Information from these sources is critical for determining previously identified S/NRHP eligible historic properties, as well as properties already on, nominated to, or proposed for nomination to the S/NRHP or currently listed in the State inventory.

c. Obtain complete copies of all documents and maps on file at SHPO/OPRHP for properties already on, nominated to, or proposed for nomination to the S/NRHP or in the State inventory. Plot S/NRHP eligible, listed or nominated properties on the survey map with appropriate labels.

2. *Documentary Research.* Conduct research on the project area's environmental and cultural settings to help develop prehistoric and historic contexts, define field environment, and locate actual or potential site locations. Focus environmental research on the identification of the kinds of landforms and soils that are located in the project area and the influence of these on the project area's sensitivity for archaeological sites. Thoroughly assess the project area for the presence of alluvial and colluvial deposits with the potential for buried late Pleistocene and Holocene surfaces. Consult the literature on regional prehistoric settlement patterns to aid in the development of the general prehistoric context for the project area. Use regional settlement pattern models with the site file and environmental information and information on disturbances and current land use obtained during the initial project walkover (see below) to develop a sensitivity assessment for prehistoric archaeological sites in the project area.

Consult appropriate primary and secondary sources on local and regional history to develop an historic context for the project area. Identify the major historic trends, events and activities and themes, and their potential or known expression in the project area. Assess the potential of the project area to contain historic archaeological resources that predate historic maps. Sources consulted should include the State Museum, Library and Archives, SHPO/OPRHP, county and local libraries and records of historical societies, town and county clerks, historian and residents. Identify potential historic archaeological sites in the project area including the yards of historic standing buildings/structures and no-longer standing buildings/structures (Map Documented Structures [MDSs]) from historic maps and other documentary information. Plot all potential MDS locations on the project area map as a circle and label each with a unique number or letter designation. Compile a table listing these potential resources indicating the historic maps on which each MDS is plotted and any identifying label on those maps for inclusion in the report. Use all of these sources of information with information on disturbances and current land use obtained during the initial walk over of the project area (see below) to determine the project area's sensitivity for archaeological sites.

LANDOWNER NOTIFICATION: Distribute landowner notification letters, obtained from the CRC, in advance of field work to all landowners to inform them of the pending survey. In all cases, permission of the landowner is needed to enter onto private property for the purposes of this research. If no owner or tenant can be found, and a letter of notice and explanation is left at the residence, exterior inspection and archeological testing may be conducted, but no interior inspections (except of ruins or open and unused outbuildings) should be made. Recording and photographing executed from public lands, such as highway right-of-way, may be conducted without landowner permission. However, it is a matter of courtesy to inform the landowner or occupant of the building of the purpose of your recording before proceeding.

In the event that a landowner or tenant denies access to a property contact the CRC immediately and inform her/him of the problem. Inform the CRC if lack of access to that property will affect the results of the survey. The CRC and/or other regional DOT staff will work to obtain property access permissions. This information should be included in the report.

For projects on Native American reservation lands, consult with the CRC at the time of project initiation. Surveys on reservations will be conducted in accordance with the procedures and scope acceptable to the involved Native American nation.

I.B. RECONNAISSANCE SURVEY ARCHAEOLOGICAL FIELD METHODS

Archaeological surveys must be directed by an individual who meets current NPS standards (36 CFR Part 61) for professional archaeologists.

Field investigations for the identification of archaeological sites take place in several steps:

1. Conduct a walkover survey of the entire project area and take detailed notes on observed natural and manmade features, visible evidence for sites, and disturbances that will allow for a more effective subsurface survey design. Assess the nature and extent of any disturbances, and eliminate from subsurface testing only those areas where there is no potential for intact archaeological resources. Take several general-view photographs showing the project's setting. Plot the position and angle of each photograph on the project map(s). These photographs must show field conditions, not just the road and its shoulders. Photograph and plot on the map(s) areas of disturbance. Determine if buried utilities are located in the project area that have caused disturbance that might be impacted by subsurface testing procedures. If buried utilities are present or anticipated where subsurface testing is planned, contact the Underground Facilities Protective Organization (UFPO) at 1-800-962-7962 at least two days prior to excavation.

2. Interview local landowners and residents to obtain information on previously unreported archaeological sites.

3. Refine previous site information on the project map based on new information. Plot all additional sites identified during preliminary field survey on the project map and add to appropriate lists. Compile an interview informant list, including name, address, telephone, number and brief summary of information supplied for inclusion in the project report.

4. Develop and implement a survey strategy based on Section 2.3 of the NYAC *Standards for Cultural Resource Investigations* (Appendix D). Take into account all information gathered to this point in the development of the strategy including background research, the walkover survey and the sensitivity assessment for prehistoric and historic archaeological sites.

    a. When there is a potential for buried late Pleistocene and Holocene surfaces, design a deep testing plan to sample those deposits for archaeological sites. This plan may include mechanical excavations, hand excavations, or some combination thereof. The plan should be reviewed with the CRSP director or his designate prior to implementation. OSHA safety standards must be followed in all deep-testing plans.

    b. If cultural material is encountered in only one shovel test pit, excavate additional shovel test pits to ensure that it does not represent a larger site. Begin additional shovel test excavations at one-half the interval between the find and the next sterile shovel test. Excavate additional shovel tests closer to and/or farther from the initial positive shovel test as necessary to ensure that the initial positive shovel test did not intersect a larger site.

    c. When an archaeological site is found its lateral boundaries must be defined within the project area. Excavate additional shovel tests or do additional surface survey transects as appropriate to determine how close artifact deposits extend to the road. Extend the additional survey to the maximum extent of obvious disturbance associated with the road (e.g., shoulder, drainage ditch, road edge) and to the outside edge of the project area. Extend testing onto the shoulder when possible if a site has deep deposits that may extend under disturbance associated with the shoulder. If survey conditions prevent additional survey, and site boundaries are based on some other criterion, that criterion must be clearly described and justified in the report.

    d. Define the vertical extent and physical integrity of the site to the extent possible with reconnaissance survey field techniques. Determine the depth of artifactual deposits and identify from where in the soil profile artifacts originate. The report must include a brief description of the site's soils and a statement as to where in the soil profile artifacts originate. In some situations (e.g., alluvial or colluvial settings), it might be necessary to provide a statement as to whether testing methods were sufficient to document the full potential vertical extent of the site.

    e. If numerous sites are found during a survey, and a procedure is followed to define horizontal and vertical boundaries for all of the sites, this procedure should be explained before the individual site descriptions. However, this does not obviate the need for explanation of the implementation of that procedure in each site description. For example, if site boundaries exclude nearby positive shovel test pits or surface finds, the rationale for these exclusions must be explained in the site description. If boundaries are drawn that extend significantly beyond the locations of positive shovel test pits or surface finds, this needs to be explained. Site boundaries should include all portions of a site, not just those portions that are recommended for additional investigations. Although testing is restricted to the project area, indicate if the site appears to extend outside the project area boundary.

    f. Each site identified must be assigned a NYSM site file number and a name. Submit a NYS site inventory form to the CRSP director or his designate prior to report submission so that a NYSM number can be assigned. Site names, numbers, and boundaries, as well as test units and their numbers must be noted on the project area map regardless of whether or not the sites are considered to be potentially eligible for listing on the S/NRHP.

5. At the completion of the survey analyze all data sets to determine if sites that are potentially eligible for S/NRHPs are present in the project area. The analysis of artifactual and other information must be done under the prehistoric and/or historic context developed for the project. This analysis should also include information on site integrity to the extent possible with reconnaissance survey data. Use this analysis to make recommendations as to whether or not a site examination is needed to determine the eligibility of the site for S/NRHP.

   A site does not require site examination (Phase II testing) if it does not have the potential to yield important information about prehistory or history, if its context is disturbed, or if it lacks provenience or association. Report any potentially significant site to the CRSP director or his designate to determine the need for site examination through a site exam request (see Section II). This information will be presented to DOT to determine whether the site(s) can be avoided by design revisions.

   Historic Setting Analysis should be applied when a S/NRHP eligible district is identified as a result of reconnaissance survey. Historic Setting Analysis alone may also be conducted for existing S/NRHP listed and eligible districts, or at the request of the Regional Cultural Resource Coordinator.

I.C. RECONNAISSANCE SURVEY ARCHITECTURAL FIELD METHODS

Architectural surveys must be done by an architectural historian who meets current NPS standards (36 CFR Part 61) and has been approved by SED, DOT, and OPRHP. The credentials of the architectural historian must be on file at SED, DOT, and SHPO/OPRHP.

Architectural fieldwork is accomplished through several steps:

1. Conduct a walkover survey of the project area to correlate existing buildings/structures with those shown on historic maps. Determine which buildings/structures is at least 50 years old and record street or fire address for each property.

2. Interview local landowners and residents to identify the building/structure's age and history or clarify information already noted for historic properties where such information is ambiguous or contradictory.

3. Identify which buildings/structures are eligible for the S/NRHP and record information needed to complete the New York State DOT Historic Resource Inventory Form (Appendix F) with appropriate photograph(s). Determine if there are eligible S/NRHP historic districts in the project area or partially within the project area but extend beyond project limits. Consult with SHPO/OPRHP staff when proposing an historic district or expanding an existing historic district. Record proposed boundaries of the recommended district on the project survey map. Complete an historic district form (Appendix F) with appropriate photo documentation. Inventory all *eligible* buildings/structures and/or districts unless they have been previously inventoried. Provide updated photographs of existing National S/NRHP listed or eligible properties or districts. Identify major changes to properties since original inventory that could affect existing eligibility status. Include the original form and new photographs in the report.

4. Photograph all buildings/structures in Historic Districts within the project area and all buildings/structures that are at least 50 years old within the project area or that have property extending into the project area and accurately plot them on project map and label with street or fire addresses. Photograph special architectural details of each building/structure, its surroundings and visual character relative to other properties and environmental features (cultural and natural), and the area of impact and relationship to the highway. Plot photo angles on the map and key them to the photographs within the report. Photograph outbuildings with associated buildings/structures. Photograph isolated outbuildings as primary buildings (unassociated).

5. When a S/NRHP eligible district is identified as a result of reconnaissance survey, Historic Setting Analysis should be applied. Historic Setting Analysis alone may also be requested for existing S/NRHP listed and eligible districts. Conduct detailed site-specific research and document contributing features of the district, including elements of the setting and spatial relationships between buildings and the natural/ cultural landscape. Photograph contemporary views of the streetscape for comparison with historic photographs, including vegetation and landscape features, street furnishings, buildings and structures. Provide mapping of the district that shows contributing elements of the setting, and buildings/structures identified

by street address and function. Photographic views, summary tables of historic landscape features, and other descriptive information should be included in the Historic District inventory. Guidance for Historic Setting Analysis is provided in Appendix F.

6. The method of survey and reporting historic bridges is different from the previous work scopes. In 2002 a statewide inventory of historic bridges was completed. The three-year project updates a previous inventory of pre-1925 bridges conducted in the 1980s. The scope of the current inventory includes bridges built prior to 1961 that are located on public highways, including both state and locally-owned bridges. Over 6,600 bridges have been evaluated for eligibility for listing in the S/NRHP. A total statewide population of nearly 600 historic bridges has been identified.

The following documents were prepared as part of the Historic Bridge Inventory project:

- *Historic Bridge Database*
  The database contains collected data and a Historic Determination, the eligibility status, for each inventoried bridge. The Historic Bridge Database was incorporated into the existing database for DOT's Bridge Inventory and Inspection System (WinBolts). Available from DOT Regional Cultural Resource Coordinators.
- *Contextual Study of New York State's Pre-1961 Bridges, November 1999*
  The contextual study establishes a framework for understanding the historic and engineering significance of New York's bridges. The study includes an overview of national trends in bridge engineering, the history of bridge design and construction in New York State, and the development of New York's transportation networks.
- *Evaluation of S/NRHP Eligibility, January 2002*
  The evaluation report presents background information on the purpose and scope of the inventory, chronology of project activities, evaluation criteria, and methodology for evaluating S/NRHP eligibility. Recommendations for bridges selected for field survey are discussed within the context of bridge type.
- *Historic Bridge Management Plan, September 2003*
  The Management Plan presents practices and recommendations consistent with the needs of transportation and preservation, that NYSDOT and other bridge owners can apply to their historic bridges.

If a bridge was included in the inventory of bridges built prior to 1961 include only the S/NRHP eligibility in the cultural resource survey report. This inventory is available from the CRC. No bridge inventory forms are needed for bridges previously evaluated even if those structures are to be removed.

If the bridge has not been evaluated, a bridge inventory form (Appendix F) with photograph(s) is required only if the bridge is eligible individually or as part of a district. Information on the bridge, such as construction date, type, length, etc., may be gathered from the WinBolts database or the CRC. Evaluation of the bridge within the context of bridge type and sub-group is detailed in the *NYSDOT Guidelines for Evaluating Historic Bridges (*Appendix F) and the January 2002 report *Evaluation of National Register Eligibility*: Task C3 of the Historic Bridge Inventory and Management Plan prepared for the DOT and FHWA by Mead & Hunt, Inc. If there is any question as to how to present a bridge in the report contact the CRSP director or his designate. If the BIN (bridge identification number) is not known, the investigator should obtain the BIN from the CRC and include the number in the report.

Note that bridges determined not individually S/NRHP eligible in the bridge inventory may be contributing features of a historic district. If an inventoried bridge is located within or adjacent to a historic district, it should be evaluated for its potential as a contributing resource to the district.
Culverts were outside the scope of the bridge inventory and were not evaluated. Although usually not S/NRHP eligible, there are cases where a culvert may be S/NRHP eligible, such as a stone arch culvert or a former raceway. Culverts may be contributing features of a historic district.

7. Follow the minimal standards for documentation for buildings/structures inside the project area to ensure that sufficient visual information is available in the report for review and to support the S/NRHP eligibility and non-eligibility recommendations.

a) Documentation Procedures:

1. One representative photograph is sufficient for a building/structure when a building is clearly architecturally significant because of design and integrity unless vegetation obscures the view. The relationship of the property and roadway should always be depicted in the photograph. An angled frontal shot is suggested. If a building is architecturally simple, a single photograph that captures two facades is sufficient. Additional photographs should be taken as needed if obstructions are present. Each qualitatively

different face, whether contributing to or detracting from the over-all style or integrity of the building/structure, should be clearly shown in photographs.

2. If the architectural historian finds a building/structure's eligibility difficult to illustrate additional photographs should be taken as follows:

   The level of detail photography depends on the amount and type of detail present, the degree to which it already shows adequately in the representative photography and the degree to which detail is significant in the evaluation of architectural significance.

   (Example: If an ornate Victorian house that has no intrusive modifications and is in a good state of preservation, individual photographs of the many architectural details are not necessary. However, if a house with aluminum siding, awnings, a car port and concrete faced foundation has evidence that suggests an early 19th century origin, photographs of windows, porches, trim and hardware may be necessary to confirm or reject the early date and provide a basis for determination of the S/NRHP eligibility or non-eligibility for the property.)

   Usually exterior documentation is sufficient, particularly when the architectural characteristics are the major contributing factors to significance. However, interior photographs should be provided if exterior photographs alone do not capture unique features that make the property S/NRHP eligible.

   (Example: If the exterior of the building does not have architecturally significant features and it has no remnant exterior features indicating an early construction date, and yet is supposed, from documentary evidence, to be a house standing in 1767, interior details [doors, moldings, floors] or structural features [hand-hewn beams, rose-head nails] may be the only information on which to base a description of the resource and from which to facilitate an evaluation of historic significance.) The level of internal documentation depends on the subject and the need for detailed information. Photographs are part of this documentation.

b) Technical aspects of the recording process

1. All photography should be in color. A standard 3.5 x 5 inch print size is adequate. Digital photos are not acceptable.

2. Efforts should be made to "match" old or "historic" views with duplicate views taken as part of the field of study. (This greatly aids evaluation of integrity and helps document contributing elements in the environment or setting.)

3. All photographs should be affixed to the pages of the report with double sided cellophane tape (a single 2 inch strip is adequate).

4. To the extent possible, the bulk resulting from photographs in the report should be evenly distributed; i.e. one photo in the center of the page; one photo on top half of page, then later one photo on bottom half of another page; two photos to a page (top and bottom); three photos to a page; etc. so that the report lies flat for binding.

8. All aboveground cultural resources greater than 50 years old identified within the project area should be evaluated for S/NRHP eligibility:
   1. categorize the property type (district, building, structure, object);
   2. determine the historic context represented;
   3. determine significance under National Register Criteria A, B, C, and/or D, and identify the applicable criteria;
   4. determine if the property retains integrity, the ability to convey its significance through physical features.

Evaluations should be made within the historic context(s) developed as a result of background research and with reference to local, State, or National level of significance. Note that the project area should not be considered in isolation as a level of significance (i.e. a building is not eligible because it is the only example of its style/ type/ period within the project area).

Historic Resource Inventory forms and Historic District forms should include a definitive statement of eligibility, reflecting the evaluation process. Aboveground resources that do not meet the National Register Criteria for Evaluation should clearly be identified as not eligible. Consult *National Register Bulletin #15: How to Apply the National Register Criteria for Evaluation* for guidance.

I.D. RECONNAISSANCE SURVEY PRODUCT

The outline for CRSP reconnaissance survey reports is attached (Appendix B). Follow this outline in the preparation of the report. Mark maps or descriptions specifically locating sites **"Confidential, Not for Public Distribution"**. Submit one unbound copy of each report to the CRSP director or his designate for review according to the project schedule. Include with the draft report all maps, appropriately highlighted, and one copy of all photographs. After review by the CRSP director or his designate make all necessary revisions and submit six (6) bound copies of the report, one on acid-free paper, to the CRSP director or his designate. Each report should contain original copies of photographs and project maps. Additional copies of the report may be requested for distribution to DOT and other interested parties involved in the consultation process.

II. SITE EXAMINATION (PHASE II)

APPLICATION: To determine S/NRHP eligibility of archaeological sites in the project area.

PURPOSE: To present all information necessary to determine eligibility for listing on the S/NRHP, including, but not limited to, horizontal and vertical extent of the site in the project area, the types of information the site can produce (subsurface features, postmold patterns, charcoal for dating, ceramic samples, information on technology, etc.), the temporal and cultural affiliation(s) of the site and its physical, prehistoric and/or historic integrity, and an identification of the context(s) and research questions, if any, that may be addressed through data recovery. Eligibility requirements for the S/NRHP are presented in *National Register Bulletin* 15 and 36.

PROCEDURE FOR REQUESTING SITE EXAMINATION: A request for site examination must be prepared for SED prior to the initiation of site exams, regardless of remaining project funds, since DOT may be able to avoid a site with change in project design. Prepare a request in writing for the CRSP director or his designate. Although delays are common after a site has been located and before funding is approved for site exams, the following procedures must be followed unless otherwise directed.

Steps followed for site exam request:

1. Prepare a site examination request that includes:
   - descriptions of the site's environmental context, previous excavations, artifacts, and features
   - a statement on the site's physical integrity
   - a prehistoric and/or historic context and a statement on the site's research potential
   - proposed site exam methodology including test unit placement consistent with Section 3.0 of the NYAC *Standards for Cultural Resource Investigations* (Appendix D)
   - appropriate portion of the project map depicting location of site and excavation units of previous investigations in relation to the project area boundaries
   - cost and time estimate required to complete the proposed site examination. Do not include this in the Phase I survey report.

2. Include the site examination request in the Phase I report under the recommendation section. The cost and time estimate is submitted to DOT at the same time, but as a separate document.. The site exam request contained in the report and the separate proposed budget will be forwarded to the DOT Environmental Analysis Bureau (EAB) and the CRC.

3. The CRSP director or his designate will coordinate with EAB and the CRC to determine if the site can be avoided.

4. The schedule, including a revised due date, and budget approval will be coordinated by SED, EAB, and CRC.

5. After the review is completed, and if it is determined that the site cannot be avoided, the CRC will submit a Form A to the CRSP director authorizing the site examination. The CRSP director will then authorize initiation of the site exam per contractual agreement with the investigator's institution.

Once the site exam has been approved, it is critical that the work be done according to the approved work plan, budget, and schedule. Any deviation must be approved in writing by the CRSP director or his designate.

METHODS:

1. Develop and implement a site examination strategy based on Section 3.0 of the NYAC *Standards for Cultural Resource Investigations* (Appendix D).

2. Notify landowner of pending site examination. Discuss with the landowner a deed of gift for the artifact collection.

3. When premature termination of investigations, either vertically or horizontally, is caused by conditions or situations that are under the control of either the SED or the CRC, immediately notify the CRSP director or his designate.

4. Test units should be distributed to include a determination of the limits of site productivity in the direction of the edge of pavement.

5. Boundaries of the site should be depicted on the project area map. Refine site limits by testing results and include an assessment of the extent to which significant deposits approach the road.

6. Contact CRC to obtain highway mapping for the site area. If the CRC is unable to provide mapping, prepare site maps that approximate highway map design and include highway, environmental, and cultural landmarks.

7. Prepare detailed artifact inventories, with descriptive cultural and provenience information. Consult appropriate experts during the identification and evaluation process. Summaries of expert opinion should be adequately cited in the site analysis notes.

8. Prepare line drawings of test unit profiles for inclusion in the report to illustrate soil descriptions and discussions of physical integrity.

9. Photograph site areas, excavation units, features and artifacts if illustrative of site significance.

10. Promptly and completely backfill all excavations unless written permission has been obtained from the landowner to delay backfilling or to leave excavation open. (During excavation, all appropriate OSHA specifications must be complied with, without exception.)

RECOMMENDATIONS: Sites should be evaluated for eligibility following procedures outlined in *National Register Bulletin #36: Guidelines for Evaluating and Registering Archeological Properties*. To qualify for eligibility under National Register Criterion D, a property must have information that can contribute to our understanding of human history of any period, and the information must be considered important. The property must also have the necessary configuration of data sets and integrity to address important research questions.

Recommendations should include an explicit statement of S/NRHP eligibility. For sites that do not qualify, the report should state that the site is not eligible and no further investigation is necessary. If the site meets the National Register criteria, the significance assessment should include discussion of the rationale for evaluation of collected data and justification for a definitive recommendation that the site is eligible. Recommendations for avoidance of significant sites should address requirements for protection of the site before, during, and after construction to avoid accidental impact. Data recovery should be recommended in the event that an eligible site with additional research potential cannot be avoided.

PRODUCT: Follow the outline for CRSP site examination reports (Appendix C). This outline should be adjusted as appropriate though consultations with the CRSP director or his designate when more than one site examination is included in the report. Mark maps or descriptions specifically locating sites "**Confidential, Not for Public Distributions**". Submit one unbound copy of each report to the CRSP director or his designate for review according to the project schedule. Include all maps, appropriately highlighted, and one unbound copy of all photographs. Make all necessary revisions to the report based on comments by the CRSP director or his designate and submit six (6) bound copies of the report, one acid-free paper, to the CRSP director or his designate. Additional copies of reports may be requested for distribution to DOT or other parties to the consultation process. Each report should contain original copies of photographs and project maps.

MITIGATION (PHASE III)

APPLICATION: An investigation conducted when historic properties have been determined eligible for the S/NRHP and DOT cannot avoid impact. Archaeological site may also involve alternative mitigation activities in lieu of and/or in conjunction with the more standard technical data recovery treatments and reports, as provided in Section 4.0 of the NYAC Standards.

III.A. ARCHAEOLOGICAL SITE DATA RECOVERY

PURPOSE: To excavate the designated site within project limits to obtain the data necessary to describe and interpret the site, address research topics developed in the Data Recovery Plan (see below), and preserve the information that would be lost to construction impact.

METHOD: The investigator will be provided with a general project plan showing the limits of impact. The investigator will be responsible for developing a Data Recovery Plan based on Section 4.0 of the NYAC *Standards for Cultural Resource Investigations* that includes research design, methodology, schedule, and budget. SED, DOT, and OPRHP/SHPO will review the plan and request revision if warranted. SED will provide directions for any other form of mitigation. Once approved, the data recovery plan will be executed according to project schedule.

PRODUCT: Submit an end-of-field letter briefly summarizing the investigations and results to the CRSP director or his designate within four (4) weeks after the completion of fieldwork. The CRSP director or his designate will submit this letter to DOT. The formal report is due within one year of fieldwork completion. Submit one copy of the draft report to SED for review. When approved by SED an additional copy of the draft report will be provided to DOT for review. After review by SED and DOT is completed and revisions resulting from these reviews have been made by the investigator, submit six (6) bound copies with original photographs to SED, one of which should be printed on acid-free paper. Each report should contain site plans, and project maps. Submittal of the final report must be made within six (6) months of receipt of comments on the draft report from SED and DOT, or by the end of the contract term, which ever comes first. One unbound copy of the report with original photographs and all site plans and project maps shall be maintained either by the investigator or the SED for future copy use. Additional reports may be requested for distribution to local and regional repositories.

III.B. BUILDINGS AND ENGINEERING PROPERTIES

PURPOSE: To record and document standing buildings/structures as part of the Section 106/14.09 mitigation process.

METHOD: Follow the *Secretary of the Interior's Standards and Guidelines for Architectural and Engineering Documentation* (Federal Register, Vol. 48, No. 190, Thursday, September 29, 1983, pp. 44730-34) and/or the New York State Office of Parks, Recreation, and Historic preservation guidelines for the appropriate level of documentation. Procedures for appropriate levels of documentation and instructions for completion of documentation are provided in the following documents, copies of which are available from the CRSP director or his designate.

- OPRHP October 24, 1995 Memorandum on Mitigation Documentation
- National Park Service August 1989 *Guidance for the Preparation of Written and Descriptive Data in Accordance with the Standards of the Historic American Engineering Record.*
- OPRHP 1987 Specifications on Photographic Documentation (*Association for Preservation Technology Bulletin* 14(4):6-7, 54)
- National Park Service, March 1991 *Guide for the Preparation of Photographic Documentation in Accordance with the Standards of the Historic American building Survey/Historic American Engineering Record.*
- National Park Service, October 1990 *Guide to Written reports for the Historic American Building Survey.*

PRODUCT: Submit two draft copies of the HABS or HAER documentation with appropriate drawings and figures to the CRSP director or his designate according to project schedule. The draft documentation will be reviewed by the CRSP director or his designate and DOT/EAB. Make necessary revisions based on CRSP and DOT/EAB comments and submit three copies to the CRSP director or his designate for distribution to DOT who will forward copies to SHPO/OPRHP for comment. After approval by SHPO/OPRHP, make required number of final copies and submit to the CRSP director or his designate according to project schedule. Additional copies may be requested by SHPO/OPRHP for distribution to local repositories.

APPENDIX A

REVISED SECTION 106 IMPLEMENTATION PROCEDURES

The following procedures outline New York State Department of Transportation (NYSDOT) responsibilities for implementing Section 106 of the National Historic Preservation Act, as delegated by the Federal Highway Administration (FHWA). The New York State Museum participates in this process through its role in the identification of historic properties (800.4) on behalf of NYSDOT. As outlined in Step 2, cultural resource survey reports prepared by SED and its subconsultants provide eligibility recommendations for review and concurrance by the SHPO and FHWA.

REVISED SECTION 106 PROCEDURES FOR NYSDOT

STEP 1 – INITIATE THE SECTION 106 PROCESS (800.3)

The NYSDOT, early in the NEPA process, shall consult with SHPO/THPO, to identify consulting parties and invite them to participate in the Section 106 process (i.e. local officials, other federal/state agencies, public organizations/groups) (800.8(a)(2)).

Region establishes if project has potential to cause effect on historic properties (800.3(a))

I. Determines project has no potential to cause effect on historic properties
   - A. Document in Design Report
   - B. Section 106 complete

II. Determines project may cause effect on historic properties
   - A. Go to STEP 2

STEP-2 IDENTIFY HISTORIC PROPERTIES (800.4)

The NYSDOT, in consultation with SHPO/THPO and identified consulting parties, shall take steps necessary to identify historic properties within the Area of Potential Effects (800.4. (b)).

Region applies screening/survey criteria

I. Determines screening needed – screening conducted
   - A. No potential historic properties identified
     - 1. Document in Design Report
     - 2. Section 106 complete
   - B. Potential historic properties identified (12 or less) in consultation with EAB (above ground concerns only)
     - a. Proceed to STEP 2.III.B for Assessing Affects
   - C. Determines survey needed (12 or more potential historic properties identified or archaeologically sensitive and no prior ground disturbance demonstrated)
     - a. Proceed to STEP 2.II
   - D. Entirely w/in S/NRHP listed or eligible historic district prepares inventory forms for potential historic properties
     - a. Proceed to STEP 2.II

II. Determines survey needed
   - A. Determine survey type
     - 1. Survey needed for buildings/structure (12 or more) & archaeology
     - 2. Survey needed for building/structures only (12 or more)
     - 2. Survey needed for archaeology only
   - B. Initiate survey – prepares and submits Form A & maps to SED and EA B
     - 1. SHPO copied – early project notification

III. Survey report results
   - A. No historic properties identified – SED sends all reports to EAB
     - 1. EAB agrees with SED's eligibility recommendations
       - a. EAB requests FHWA's concurrence that no historic properties affected
       - b. EAB notifies SHPO of finding concurrently with FHWA and distributes survey report to SHWA, SHPO & regions
         - (1) No response form SHPO within 30 days
           - (a) assume agreement
           - (b) FHWA provides notification to NYSDOT & SHPO that Section 106 is complete
         - (2) SHPO objects within 30 days – copies FHWA &NYSDOT
           - (a) SHPO identifies potential historic properties
             - i) NYSDOT does not agree with SHPO's eligibility recommendations
               - a) FHWA requests Department of Interior (DOI) opinion on eligibility
                 - 1.1 DOI determines property eligible
                 - 1.2 Proceed to STEP 3.I to assess project effect

ii) NYSDOT agrees with SHPO's eligibility recommendations
a) Proceeds to STEP 3.I to assess project affects
2. EAB/Region disagree with SED's eligibility recommendations
b. EAB distributes reports to SHPO, FHWA and Region with potential historic property recommendations
c. Proceed to STEP 2.III.B.1a.

B. Historic Properties Identified
1. SED survey report/regional inventory forms sent to SHPO – NYSDOT & FHWA copied
a. No response from SHPO within 45 days regarding historic property recommendations
(1) Assume agreement w/SED eligibility recommendations
(2) Region proceeds to STEP 3.I to assess project affects
b. SHPO responds with disagreement on all or several eligibility determinations within 45 days – copies NYSDOT and FHWA on all or part of SED's recommendations
(1) If SHPO finds historic properties eligible
(a) EAB/Region disagree with SHPO's eligibility determinations
i) Go to STEP 2.III.A.1.b.(2)(a)I)a)
(b) EAB/Region agrees with SHPO's eligibility determinations
i) Go to STEP 3.
(2) If SHPO finds no historic properties eligible
(a) NYSDOT requests FHWA's concurrence that no historic properties affected
i) FHWA concurs – copies SHPO & NYSDOT
iii) 36 CFR, Part 800 is complete
c. SHPO requests more information
(1) SED or Region provides information to SHPO – FHWA and EAB copied
(2) Proceed to STEP 2.III.B.1

STEP 3 – ASSESS EFFECTS TO HISTORIC PROPERTIES (800.5)

The NYSDOT, in consultation with SHPO/THPO and identified consulting parties, shall consult regarding the undertaking's effect on historic properties during the NEPA scoping and the preparation of the NEPA Documents (i.e. EA or DEIS/EIS), and hold public hearings, publish notice of EA/EIS availability in local papers, publish notice of opportunity for a design or combined corridor design for public hearings (800.5(c)(2)). Also through this consultation, alternatives & proposed measures that might avoid, minimize or mitigate any adverse effects on historic properties will be described in the EA or DEIS/EIS.

I. Region Evaluates Affect to Historic Properties
A. Avoids affecting historic properties – prepares finding documentation & requests FHWA's concurrence that no historic properties affected 0 SHPO notified (no effect)
1. No response from SHPO within 30 days
a. Assume agreement with finding
b. FHWA provides concurrence letter to region – copies SHPO & EAB
c. Section 106 complete
2. SHPO objects within 30 days
a. FHWA &NYSDOT notified of objection
b. Additional consultation needed
c. Proceed to STWP 4 if issues not resolved
B. Region finds, in consultation with EAB & SHPO, that historic properties affected – Proceed with STEP 4

STEP 4 – APPLY CRITERIA OF ADVERSE EFFECT 9800.5(a))

I. Region applies criteria of adverse effect (800.5(a))
A. Determines project will have an adverse effect on historic properties – proceed to STEP 5 for assessment of adverse effects
II. Region proposes finding of no adverse effect (800.5(b))
A. Prepares finding documentation & sends to SHPO, EAB & FHWA

1. No response from SHPO within 45 days
   a. Assume agreement
   b. FHWA gives concurrence – copies SHPO & EAB
2. SHPO responds to finding to NYSDOT within 45 days – copies to FHWA
   a. Additional information requested
   b. Conditions modified/added
   c. Return to STEP 4.I.
3. SHPO disagrees to finding to NYSDOT within 45 days – copies FHWA
   a. Proceed to STEP5 if no adverse effect is not resolved

STEP 5 – RESOLUTION OF ADVERSE EFFECT (800.6)

I. NYSDOT explore avoidance/modifications alternatives
   A. Successful – avoids adverse effect
      1. Return to STEP3, if recommended no historic properties affected
      2. Return to STEP 4, if recommend no adverse effect
   B. Region concludes adverse effect
      1. Provides finding documentation to SHPO (800.11(e)) – copies other consulting parties, FHWA & EAB
      2. SHPO concurs within 45 days
         a. Issues adverse effect letter and draft MOA to region – copies other consulting parties, FHWA & EAB
         b. FHWA concurs – notifies Council (Council has 15 days to respond)
            (1) Requests Council's involvement
            (2) Determines Council will not be involved
         c. FHWA forwards Council response to region – copies other consulting parties, EAB & SHPO
      3. SHPO does not concur – proceed to STEP 5.I.

II. Region progresses draft MOA
   A. Agrees with MOA/Stipulations & signs agreement – circulates to SHPO & FHWA for signatures
   B. Disagrees with MOA/Stipulations
      1. Consults with SHPO &FHWA on stipulations & modifies MOA with agreed upon stipulations
      2. Signs MOA & circulates to SHPO & FHWA for signatures

III. Council participation
   A. If Council not consulting party, FHWA provides Council with copy of signed MOA and summary documentation (if not previously submitted) – copies to SHPO, NYSDOT, & other consulting parties
      1. Date of FHWA notification letter to Council – Section 106 process complete
   B. If Council participates
      1. FHWA provides Council with original MOA and draft design approval document
      2. FHWA requests Council concurrence & signature
         a. Council agrees & signs MOA – returns to FHWA
            (1) FHWA distributes copies to NYSDOT, SHPO & consulting parties – Section 106 process complete
         b. Council disagrees
            (1) Consults with FHWA & SHPO

APPENDIX B

CRSP RECONNAISSANCE (PHASE I) SURVEY

REPORT OUTLINE FOR DOT PROJECTS

CRSP RECONNAISSANCE SURVEY (PHASE I SURVEY)
REPORT OUTLINE FOR DOT PROJECTS

I. TITLE PAGE
- A. Cultural Resource Survey Type
- B. Program Year
- C. PIN, BIN, and PR# (if available)
- D. Project Name – Location
- E. Author/Institution
- F. Prepared For NYS Museum
- G. Date
- H. Sponsor – NYSDOT and FHWA (federal projects)

II. MANAGEMENT SUMMARY (OUTLINE FORMAT)
- A. DOT PIN and BIN and PR# (if available): _________ _________ __________
- B. DOT project type (from Form A) and funding (state or federal): ____________________________ ____________________________
- C. Cultural resource survey type: ________________________________
- D. LOCATION INFORMATION
  Route (from – to): ____
  Minor Civil Division (give MCD number): ______________________
  County: ____
- E. SURVEY AREA
  Length: ____
  Width: ____
  Acres: ____
- F. U.S.G.S. 7.5 Minute Quadrangle Map: __________________________
- G. SENSITIVITY ASSESSMENT
  Prehistoric (high, medium, low): _______________________________
  Historic (high, medium, low): __________________________________
- H. ARCHAEOLOGICAL SURVEY METHODOLOGY
  Number of shovel test pits: _______
  Number of units: _______________
  Surface survey (yes/no): _________
- I. RESULTS OF ARCHAEOLGICAL SURVEY
  Number of prehistoric sites identified: _______________
  Number of historic sites identified: __________________
  Number of sites recommended for investigation: _______
  Number of listed/eligible or potentially eligible S/NRHP sites identified: ________________________________
- J. RESULTS OF ARCHITECTURAL SURVEY
  (Reference page number of summary charts)
  Number of buildings/structures in project area: _________________
  Number of known NR listed/eligible buildings/structures: ________
  Number recommended eligible buildings/ structures or districts: ______
  Number of S/NRHP listed/eligible or recommended eligible buildings/ structures identified:________
- K. AUTHOR/INSTITUTION: ___________________________
- L. DATE: ____
- M. SPONSOR: <u>NYSDOT & FHWA</u> (if appropriate)

IIII. TABLE OF CONTENTS (includes the page number of each historic resource inventory form, archaeological site form, table summarizing the location of S/NRHP eligible buildings/structures, and summary of identified S/NRHP eligible buildings/structures within the project area).
List of Photographs and Figures.

IV. ARCHAEOLOGICAL SURVEY
- A. DOT project description (reference source of information)
  1. Details on project work scope and location (If area to be surveyed does not include the entire area give reason provided by DOT on Form A.)

2. Survey Width – specify from centerline
3. Survey Length – total length of surveyed area

B. General Project Area
1. Maps of project location (i.e. state, county, town)
2. Photographs of current land use (commercial, rural, suburban etc.)

C. Background Research
1. Site file search (table format preferred). Include the site name/number, site type, location, whether it is listed (L), eligible (E), or inventoried (I) and source information:
   New York State Museum (NYSM)
   State Historic Preservation Office/Office of Parks, Recreation & Historic Preservation (SHPO/OPRHP)
   Universities
   County/town
   Interviews
2. Environmental Setting (Brief and Relevant)
   a. Topography
   b. Soils (summary of dominant series)
   c. Drainage and distance to nearest water source
   d. Type and extent of disturbance with documentation if available
3. Prehistoric Context
   a. Brief overview of settlement pattern focusing on site types expect to find in project area (The scope of this overview should be specific to project area based on existing knowledge.)
   b. Prehistoric site sensitivity (Based on integration of environmental information, site file data, overview, and current land use/disturbances)
4. Historic Context (For archaeological sites, buildings, districts, structures and objects)
   a. Major historic trends or themes for project area.
   b. Historic maps – map documented structure (MDS) and structures summary table
   c. Historic site sensitivity (Based on historic map results, information about settlement prior to historic maps, and current land use/disturbance)

D. Archaeological Survey Methodology
1. Project walkover
   a. Areas eliminated from testing (steep slope, standing water, disturbance, access denied)
2. Testing procedures
   a. Surface survey
   b. Subsurface testing
      i. size/placement and interval/depth
      ii. total number of tests

E. Archaeological Survey Results
1. Brief overview of results, including negative results
2. Table summarizing the results of archaeological investigations at MDS and standing buildings/structures (Example Table 1, attached)
3. Site descriptions
   a. Context statement
   b. Site size (horizontal and vertical)
   c. Site location
   d. Site characteristics (including period of significance)
   e. Summary of quantity and kinds of artifacts
   f. Artifact distributions – horizontal and vertical
   g. Identified features
   h. Integrity
   i. Research potential
   j. Potential impacts (include site exam request information)
4. SHPO/OPRHP site form follows each site description. This form includes the brief summary of the site, a summary of S/NRHP eligibility, and under which criteria the site is eligible to S/NRHP.

V. ARCHITECTURAL SURVEY
(If no archaeological survey is required include from above items IV. A, IV.B, IV.C.4)

A. Methodology
(Include review o f SHPO/OPRHP database/discussions with SHPO/OPRHP staff)

B. Results – begin with a brief summary of findings under subheadings: Recommended S/NRHP eligible buildings/structure, historic districts, non S/NRHP eligible properties, etc.

1. Table of all buildings/structures and objects (include bridges, monuments, and cemeteries) (Include in table local street name, if known, with street address grouped by MCD then address. Example Table 2, attached.)
2. Table of recommended S/NRHP eligible (inventoried) buildings/structures and districts. (Example Table 3, attached.)
3. DOT Historic Resource Inventory Form for all eligible buildings/structures (sample attached). For proposed historic districts include Historic Setting Analysis, District Form and photos of each building/structure. Include a table listing contributing and non-contributing properties. Include DOT Bridge Inventory form if the bridge has not been previously evaluated and is recommended S/NRHP eligible.
4. Photographs
   a. Separate photographs placed after forms for all buildings/structures at least 50 years old showing associated landscape features and outbuildings
   b. Streetscapes to show the general setting for recommended S/NRHP eligible districts
5. Organization of Photographs and Inventory Forms
   a. Inventory forms with photograph and location map ordered sequentially by address and location
   b. Buildings/structures forming recommended S/NRHP eligible districts grouped together as district with photographs of streetscapes showing district boundaries. Preliminary district boundaries drawn on project map
   c. Photographs of buildings/structures at least 50 years old recommended not S/NRHP eligible placed at end of the report, ordered sequentially with and by address or location
   d. Associated outbuildings grouped and labeled with the principal building/structure

VI. APPENDICES

A. References and interviews

B. Test pit data/artifact catalog

C. Correspondence (include survey request Form A, SHPO/OPRHP letters, DOT Region letters, S/NRHP and/or inventory forms)

D. Project map (Metric/English)

   a. Project area boundary
   b. Shovel test pits (w/ and w/out artifacts)
   c. Buildings and structures (NRE/ not NRE)
   d. MDS locations
   e. Photo angles
   f. Site names, numbers, and boundaries
   g. Areas not tested (standing water, steep slope, disturbance, access denied)
   h. Boundaries of recommended S/NRHP eligible and S/NRHP listed historic districts

E. Nomination forms for S/NRHP listed properties

EXAMPLE TABLE 1. Summary of the Results of Archaeological Investigations at MDS/Standing Structures.

Structure/MDS	Map #	First Known Identification	Inside Project Area?	Field Conditions	Testing Interval	STPs	Artifacts	Comments/Impacts
Cincinnatus Ambulance (MDS1)	8	L.N. Hopkins barn	no	Post-1950 structure with partially paved front	15 m	1	0	No cultural remains recovered. No further work recommended.
2761 Taylor Ave. (MDS 2)	8	H.B. Boyd barn	yes	modern gas station with paving	no testing	-	-	Area extensively disturbed by modern building construction. No further work recommended.
MDS 3	4, 8	barn	yes	lawn and brush next to creek, area graded	7.5 m	3-7	40	Barn associated with dwelling to the north. Artifacts recovered include mostly coal, ash, and cinders/slag along with nails and other architectural debris. Only a few fragments of domestic refuse were recovered such as ceramic and bottle glass likely associated with the dwelling. No structural features were found and the area appeared to be extensively disturbed. No further work is recommended.
2769 Telephone Rd.	4,5,6,8, 10	L. White	yes	lawn, sidewalk, driveway	15 m	8-10	19	Artifacts consist of low density sheet scatter from late 19th and early 20th century found in unstratified A horizon. No features found. Little research potential. No further work recommended.
2781 Taylor Ave. (NY 26)	4,5,6,7, 10	Pres. Church	no	lawn, sidewalk	15m	11, 12	3	Two whiteware fragments and one bottle glass fragment recovered in the A horizon. Little research potential. No further work recommended.
5681Main St. (MDS 4)	4,5,6,7, 8	O. Kingman, Res. & Store	yes	lawn, sidewalk in front of 1930s public library	7.5 m	21-25	109	O. Kingman House and Store Site (NYSM #10919). See Site Description Section.

EXAMPLE TABLE 2

Table 2. List of Architectural Properties in Project Area

Address/Location	**NR-Eligible**	**Not NR-Eligible**	**≤ 50 years old**	**Existing NR Status / Comments**
Town of Hoosick, Rensselaer County - MCD 08305 (Hamlet of North Hoosick)				
NY 22				
North Hoosick Fire Dept 22106 NY 22			x	
Jacob Chace House 22109 NY 22	x			
22112 NY 22		x		
22114 NY 22	x			
22126 NY 22		x		
North Hoosick Post Office 22157 NY 22		x		
22159 NY 22		x		
22169 NY 22		x		
22179 NY 22		x		
22182 NY 22		x		
22184 NY 22		x		
22186 NY 22		x		
Delaney Hotel 22198 NY 22				NR-Listed 95NR0892
BIN 1-01700-0 NY 22 / Walloomsac River				Excluded from 2000 Historic Bridge Inventory (on 5-year Capital Program)
NY 67				
Stewart's 4702 NY 67			x	
Baby Lane				
7 Baby Lane		x		
Foxy's Antiques 8 Baby Lane		x		
Factory Hill Road				
1 Factory Hill Road		x		
3 Factory Hill Road		x		
5 Factory Hill Road	x			
7 Factory Hill Road		x		
11 Factory Hill Road		x		
15 Factory Hill Road		x		
21 Factory Hill Road		x		
North Hoosick United Methodist Church 8 Factory Hill Road	x			
12 Factory Hill Road		x		
32 Factory Hill Road		x		
50 Factory Hill Road	x			
BIN 2-20166-0 Factory Hill Road over Walloomsac River				2000 DOT Historic Bridge Inventory determined bridge NRE
Mahar Road				
19 Mahar Road	x			
20 Mahar Road		x		

EXAMPLE TABLE 3

Table 3. Contributing Landscaping of NR-Listed and NR-Eligible Properties

Name/Address	**SHPO Unique Site Number**	**Other Inventory**	**Contributing Landscaping Within /Adjacent to Project Area**
Town of Hoosick, Rensselaer County - MCD 08305 (Hamlet of North Hoosick)			
Delaney Hotel	08305.000003		Property has a dirt parking lot and narrow lawn strip along Route 67
Jacob Chace House 22109 NY 22			mature trees, lawn
22114 NY 22			mature trees, lawn, concrete path
5 Factory Hill Rd			mature tree, lawn
North Hoosick United Methodist Church 8 Factory Hill Rd	08305.000104		trees, lawn along back edge of lot
50 Factory Hill Rd			trees, lawn
19 Mahar Road			mature tree, lawn
BIN 2-20166-0	08305.000020		

APPENDIX C

CRSP ARCHAEOLOGICAL SITE EXAMINATION (PHASE II)

REPORT OUTLINE FOR DOT PROJECTS

CRSP ARCHAEOLOGICAL SITE EXAMINATION (PHASE II)

REPORT OUTLINE FOR DOT PROJECTS

I. Title page (as described in Phase I report outline)
II. Management Summary
   1. Project Goal
   2. Site Identification (include Unique Site No.)
   3. Location (following SPHINX guidelines)
   4. DOT PIN
   5. DOT BIN
   6. Project Limits
   7. U.S.G.S. Quadrangle
   8. Area Tested (square meters, square feet)
   9. Description of Site and Testing Results
      1. Setting (brief)
      2. Type
      3. Age
      4. Function
   10. Significance Statement
      1. Integrity
      2. Significance of Site/Research Topics
   11. Potential Impacts
   12. Recommendations (eligibility, additional work). Reference page of site inventory form or include brief summary of the site, a summary of S/NRHP eligibility, and under which criteria the site is S/NRHP eligible.
   13. Author/Institution
   14. Date of Report
   15. Sponsor
III. Table of Contents
IV. Introduction
   1. Site Identification
   2. Site Location
   3. Summary of information on site based on previous investigations
      1. Time Period
      2. Function (general)
      3. Size
   4. Justification for Site Examination investigation
V. Background Research
   1. Environmental Context
      1. Regional
      2. Site-specific
   2. Historic Context Development (prehistoric and/or historic as appropriate) sufficient to aid in determination of S/NRHP Eligibility
VI. Methodology
   1. Field
      1. Test unit size(s)
      2. Placement
      3. Depth
      4. Rationale
      5. Screening
      6. Other methods as appropriate
      7. Mapping
   2. Laboratory
      1. Processing
      2. Analytical procedures for specific artifact classes (e.g., chipped stone, pottery, historic ceramics, glass, nails)
      3. Repository of artifacts, field notes, and other records
VII. Results
   1. Site boundaries within project area

1. Horizontal
2. Vertical

2. Site stratigraphy and chronology (with appropriate illustrations)
    1. Soils (should include representative test unit profiles)
    2. Diagnostic artifacts (should include photographs and/or drawings)
    3. Radiocarbon dates (when appropriate)

Features

5. Artifact analysis
    1. technology
    2. style
    3 function
6. Specialty analysis (where appropriate)
7. Site structure
    1. Artifact distributions
    2. Feature distributions
8. Physical integrity

VIII. Interpretation

(Specifically referencing results of all sources of information including artifact analysis, stratigraphy, features, site structure, etc.)

1. Site age
2. Site function
3. Relationship to local and regional context

IX. Significance Assessment

1. Integrity
2. Adequacy of horizontal and vertical boundary definition
3. Significant research topics that can be addressed by site
    1. Reference contextual development
    2. Reference results
    3. Statement of ability of site to yield important information to address research topics (positive or negative)
    4. Methodology needed to achieve research goals (if appropriate)

X. Assessment of proposed work on site integrity

1. Identification of specific impacts
2. Maps

XI. Recommendations

1. Data Recovery
2. No further work
3. Avoidance

XII. Appendices (double sided)

1. Reference and interviews
2. Test pit data/artifact catalog
3. Correspondence (include survey request Form A., SHPO/OPRHP letters, DOT Region letters)
4. Project map (Metric/English)

APPENDIX D

STANDARDS FOR CULTURAL RESOURCE INVESTIGATIONS AND THE CURATION OF ARCHAEOLOGICAL COLLECTIONS IN NEW YORK STATE

by

THE NEW YORK ARCHAEOLOGICAL COUNCIL

Standards for Cultural Resource Investigations and the Curation of Archaeological Collections in New York State

by

The New York Archaeological Council

Adopted by the New York State
Office of Parks, Recreation and Historic Preservation

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Table of Contents

1.0 INTRODUCTION

Standards for Phase IA, IB II and III Cultural Resource Investigations; the Production of Cultural Resource Management Reports; and the Curation of Archaeological Collections, have been developed in order to ensure a degree of uniformity in the approach taken by archaeologists in New York State. It is hoped that all archaeologists, private developers, local, state and federal agencies will make use of these standards toward the fulfillment of their preservation obligations under a variety of federal, state and local laws and preservation ordinances.

The purpose of these guidelines is to ensure that archaeological work of the highest caliber is carried out in New York. These guidelines will help to clarify expectations for the often diverse approaches to cultural resource investigations utilized by the increasing number of individuals and corporate groups that are becoming involved in cultural resource compliance reviews. All professional/Supervisory level personnel must meet the qualifications set forth in 36 CFR 61. Their aim is to promote consistent, high quality performance, and documentation. Although detailed in some cases, these guidelines are not intended to be all-encompassing nor to address all possible situations.

It is likewise expected that published guidelines will result in more acceptable, efficient, and cost-effective research on New York archaeological sites. Innovation beyond the scope of these recommended procedures is expected and encouraged.

Good judgement and common sense must prevail. These guidelines will be subject to periodic revision and refinement.

2.0 PHASE I CULTURAL RESOURCE INVESTIGATIONS: RECONNAISSANCE

2.1 Goals of Phase I Investigations

The primary goal: of Phase I Cultural Resource Investigations are to identify archaeologically sensitive areas, cultural/sacred areas and standing structures that are at least 50 years old, that may be affected by a proposed project and to locate all prehistoric and historic cultural/archaeological resources that may exist within the proposed project area. The goals of Phase I work need to be flexible to reflect the size of the project and stage of project planning and can be undertaken in subphases (Phase IA and IB) if appropriate.

When a review process determines that a project will not affect any known or recorded sites(s) but is located in an area where insufficient previous survey has been conducted, and where there is a moderate or high probability that previously unrecorded sites may occur, Phase I culture resource investigations should be conducted. The purpose of these investigations is to locate *all* surface and/or subsurface sites that occur within the project area. Site locations are frequently discovered as a result of documentary search, informant interviews, land surface inspection and subsurface testing.

Due to the complexities often characterizing projects and sites located in urban settings, these guidelines apply primarily to projects situated in non-urban environments. At some point in the near future, guidelines will be established for Phase I work in urban environments (cf. Pennsylvania guidelines) as well as underwater contexts.

2.2 Phase IA Literature Search and Sensitivity Assessment

Phase IA investigations are intended to gather information concerning the environmental/physical setting of a specific project area as well as its cultural setting. It is the interrelationship of the physical environment and the cultural, historical setting that provide the basis for the sensitivity assessment. This research should include a consideration of relevant geomorphology and soils information, culture history, and previous archaeological research to provide for the development of explicit expectations or predictions regarding the nature and locations of sites. Regardless of the project size, archaeologists should consider all relevant data in developing these expectations. The specific source from which background information should be drawn will vary according to project size and the availability of comparative data. The information presented and analyses performed should assist reviewers in understanding and evaluating the importance of environmental and cultural /historical resources within and surrounding the project area. Finally, it should also provide the rationale for developing the research design, the sensitivity assessment, and for selecting appropriate Phase IB field methodology as well as for evaluating project impacts.

2.2.1 Environmental/Physical Setting

A summary of relevant information, with accompanying maps (where appropriate), concerning the environmental/physical setting should address the following: geology, soils, hydrology, physiography/geomorphology, climate, flora, fauna, and recent human/natural -disturbances.

2.2.2 Background Research

Background research should include a preliminary review of manuscripts, maps, atlases, and historical documents, unpublished notes, previous surveys, State and local site inventories, and published material relevant to the project area to locate possible sites and provide the basis for documenting the cultural setting for the project area. The specific sources from which background information should be drawn will vary according to project size and the availability of comparative data. Where information pertaining to the specific project area or environs is not available, expectations should be developed from regional or state plans for the conservation of archaeological resources, investigations of similar environments outside the local area, or other environmental data. The results of this background research should be included in the report as documentation and justification for the sensitivity assessment and site location predictions.

The following list of topics may be useful in considerations of cultural setting. A comprehensive treatment of the cultural setting of a project area will most likely only involve some subset of this list. These have been adapted from a list of historic contexts developed by the New York State Historic Preservation Office (NYS SHPO).

- Transportation
- Economy
  - Industry
  - Agriculture
- Social Organization
  - Government
  - Education
- Social Change
  - Contact and Settlement Post-Revolutionary War Expansion
  - Social and Political Movements
- Religion
- Communication
- Recreation
  - Entertainment
  - Tourism
- Demography
  - Immigration
  - Emigration
- Community Planning and Development
- Engineering
- Architecture
- Science
- Art and Literature
- Ethnicity

It is recognized that a variety of individuals, especially those interested in or living near a specific project area, may have information not available from any other source. Such information can enhance the data gathered from the written record alone. Informant interviews with persons (e.g. avocational archaeologists, landowners, state or local government agency staff) who may be familiar with the project area and possible archaeological sites can make a valuable contribution to these investigations.

A field visit to the project area should be undertaken to determine the possibility of prior disturbance/destruction and the physiographic evidence for potential sites. Where conditions at the time of the field visit differ from those portrayed on map resources, the current conditions should be described and the map resources amended accordingly. If the initial field check shows that any sites have been previously destroyed, or that for other obvious reasons no sites exist there, the appropriate review agency should be consulted. It maybe determined that no further Phase I survey is required. The basis for such conclusions must be submitted in writing with supporting documentation (e.g. building/grading plans, photographs).

2.2.3 Sensitivity Assessment

An estimate of the archaeological sensitivity of a given area provides the archaeologist with a tool with which to design appropriate field procedures for the investigation of that area. These sensitivity projections are generally band upon the following factors: statements of locational preferences or tendencies for particular settlement systems, characteristics of the local environment which provide essential or desirable resources (e.g. proximity to perennial water sources, well-drained soils, floral and faunal resources, raw materials, and/or trade and transportation routes), the density of known archaeological and historical resources within the general area, and the extent of known disturbances which can potentially affect the integrity of sites and the recovery of material from them.

The analysis of data gathered for the environmental/physical setting and the cultural setting must address the following questions: Given the data gathered for the environmental/physical setting and the cultural setting of the project area what is the likelihood of finding prehistoric or historic cultural/ archaeological resources? What types of sites are likely to be found? What is the likely condition of sites that might be found?

2.3 Phase IB Field Investigation Guidelines

Appropriate field investigations comprise a systematic, on-site field inspection designed to assess archaeologically sensitive areas and environmental characteristics relevant to site locations and formation processes. Such investigations include, but are not limited to systematic surface survey, subsurface shovel testing, and remote sensing studies.

Subsurface testing is often the major component of this level of investigation and is required except in those cases in which the presence or absence of resources can be determined by direct observation (e.g. surface survey), by the examination of specific documented references, or by the detailed documentation of prior disturbance of such a degree that all traces of intact cultural resources have been erased.

Field-testing procedures for Phase IB Field Investigations should verify site locations provided by informants, confirm site locations suggested by the literature search, and discover previously unknown sites. The areas to be subjected to a field survey are selected on the basis of the data gathered during the Phase IA evaluation and all probable locations of project construction, staging areas, or any other areas of potential impact. Detailed evaluation of specific resources is not carried out at this level; however, it is necessary to record and describe sites as fully as possible to aid in the formulation of recommendations for avoidance if site boundaries are adequately defined or further evaluation. The precise locations of identified resources with respect to areas of impact of the proposed project must be clearly established.

Because portions of project areas often differ in the likelihood of containing sites, contracted archaeologists encountering or anticipating considerable diversity in site densities within the project area should devise survey strategies in consultation with the appropriate review agency. In cases where sampling specific portions (or strata) of a project area is planned, sampling designs that ensure equal probability of identifying sites in all surveyed locales must be devised. Some areas may, however, be eliminated from survey due to the lesser probability that sites would occur. Areas characterized by more than 12-15 per cent slope may fall into this category; obvious exceptions to elimination of such areas of slope would include terraces and possible rockshelter sites. Where the field testing or literature search reveals areas of disturbance in which no sites could remain intact, documentation of this disturbance via photographs, construction plans, stratigraphic profiles, soil borings, etc. must be included in the report. Areas of standing water may also he excluded from testing, if appropriate and if reasonable explanations for avoiding such areas are presented. Areas not subjected to intensive archaeological investigations should be documented photographically in the archaeological report and on project area maps.

2.3.1 **Systematic Surface Survey**

Areas that have not been plowed and disked in the past should not be plowed or disked to facilitate a systematic surface survey. If previous plowing cannot he documented, a limited shovel testing program to document the presence of a plowzone should be undertaken. Each systematic surface survey should he performed according to the following standards, unless alternative methods have been developed in consultation with the appropriate review agency. A limited -subsurface shovel-testing program should also be conducted in conjunction with (and prior to) all surface surveys in order to assess plowzone depths and characteristics of underlying soils.

If all non-wooded, previously cultivated portions of the project area can be plowed and disked, a systematic surface investigation can he undertaken once the area has been prepared and subjected to a steady rainfall. Systematic controlled surface survey may only be performed if adequate side visibility (i.e. 70% or better) exists. Plowing and disking in strips with intervening areas of unplowed ground no wider than 15 meters may be an acceptable means of field preparation if and only if shovel tests are excavated at 15-meter intervals throughout the unplowed areas.

Archaeological field crews should align themselves at 3-meter to 5-meter intervals in a straight line and pass across the prepared areas searching the surface for artifacts. Each artifact find spot or artifact concentration should be clearly marked and assigned a unique field number. After the artifacts have been flagged, a surface map identifying artifact locations and/or concentrations, depending upon the specific situation and number of artifacts, should be prepared.

2.3.2 Subsurface Shovel Testing

Subsurface shovel-testing programs should he performed according to the following standards, unless alternative methods have been developed in consultation with the appropriate review agency. Where surface visibility is impaired (e.g. grass lawns, wooded areas), the field survey consists of the excavation of 30 to 50-centimeter minimum diameter test units to undisturbed or non-artifact bearing subsoil at a maximum of 15-meter intervals (or 2 per 460 square meters of surface area = 16 tests per acre = 44 tests per hectare). All excavated soils should be screened through ¼-inch hardware cloth.

Transects should he established with a compass and taped and/or paced measurements depending upon local conditions. Transects and shovel tests should be numbered in a systematic fashion. Soils excavated from shovel tests should he carefully screened as noted above in order to recover cultural material. All stratigraphic profiles should be described in field notebooks or on appropriate field forms. Information recorded in notebooks should include, but not he confined to, descriptions of soil type, texture, color, condition, and the presence or absence of cultural materials or cultural features.

Documentation of field work activities should include the recording of field observations in notebooks and on appropriate forms. Photography should be employed to document field conditions, observations, and field techniques.

When cultural materials are discovered in isolated shovel-test units, a minimum of four additional units should he dug in the vicinity or the initial test units should he expanded to insure against mistaking evidence of actual sites for "stray finds."

If no cultural resources identified through the Phase IA and/or Phase IB surveys will be impacted by the proposed project, then the survey process is complete. If cultural resources identified by these studies are within the proposed impact area, further evaluation may be required to determine the potential eligibility of the resource(s) for inclusion in the State or National Register of Historic Places (NRHP). The extent of additional cultural resource study may be reduced by project modifications (e.g. realignment, relocations) that avoid or minimize potential impacts, only if sufficient testing to define valid site boundaries or buffer zones has been completed.

2.4 Phase IB Report

The final Phase IB report should present the results of the field investigations, including a description of the survey design and methodology; complete records of soil stratigraphy and an artifact catalog including identification, estimated date range, and quantity or weight, as appropriate. The locations of all test units must be accurately plotted on a project area map, with locations of identified resources clearly defined. Photographs that illustrate salient points of the survey are an important component of the final report. Detailed recommendations and supporting rationale for additional investigation must be incorporated into the conclusions of the Phase IB study. For a detailed summary of the requirements for Phase I Reports refer to the NYAC Standards for the Production of CRM Reports (Section 6).

2.5 Disposition of Collections

Provisions for the responsible curation of the archaeological collection (material remains and associated records) generated as a result of Phase I investigations, is an integral part of any reconnaissance level survey. Collections made during Phase I field investigations are often the only collections made from a site, especially if mitigation measures include site avoidance. These collections may represent the remains of resources eligible for listing on the State and/or National Register. However, since the sites will be avoided, no Phase II investigations are conducted and evaluation of the site cannot be completed based solely upon the results of Phase I work. Arrangements must be made in advance of any field work for the proper processing, documentation, and curation of collections as outlined in Standards for the Curation of Archaeological Collections (Section 7).

3.0 PHASE II CULTURAL RESOURCE INVESTIGATIONS: SITE EVALUTION

3.1 Goals of Phase II Investigations

The primary goals of Phase II Cultural Resource Investigations are to obtain detailed information on the integrity, limits, structure, function, and cultural/historical context of an archaeological site sufficient to evaluate its Potential National Register eligibility. These objectives necessitate the recovery and analysis of artifacts, their context and distribution, and any other pertinent data necessary for an adequate evaluation. Based on this information, each site can be assessed to determine its eligibility for the State or National Registers of Historic Places. A site's significance and eligibility are directly related to data collected during a Phase II investigation, the site's integrity, research questions that maybe answered at the site, and the site's importance in relation to the known archaeological database.

A Site is eligible the National Register if it meets one or more of the following criteria (as set forth in, NYCRR 427 and 428 or 36 CFR 800):

A. Associated with events that have made a Significant contribution to the broad patterns of our History
B. Associated with the lives of persons significant in our past;
C. Embodies the distinctive characteristics of a type, period or method of construction or represents a significant and distinguishable entity whose components may lack individual distinction; or,
D. Has yielded. or may be likely to yield, information important in prehistory or history.

Specific data are needed to adequately address these criteria and to prepare a proper site significance evaluation. These include, but may not be limited, site boundaries and an estimate of site size: temporal and/or cultural affiliation; intra-site artifact/feature patterning; site function; and placement within geographic and interpretive contexts. Additional important actors include the potential that the data present on the Site have for yielding additional important information and both the physical and temporal integrity of the site. This multivariate evaluation of site significance will also provide the initial framework on which to base a subsequent data recovery program if one is required as part of the data recovery plan for the site.

3.1.1. Site Boundaries/Site Size

An estimate of the extent of the site is one dimension of variability important in interpreting site significance. Establishing site boundaries is also essential in determining how much of an impact a proposed project will have on a potentially eligible site. Since project limits are arbitrarily defined in geographic space, it maybe necessary to estimate the likelihood that the site extends outside the project boundaries. National Register Bulletin Number 12 outlines various ways of estimating site boundaries. Site size is also an important factor in placing the occupation within regional and cultural settlement systems.

3.1.2 Temporal and/or Cultural Affiliation

Assigning a site to a general time period or specific cultural phase or tradition is an integral aspect of significance. This information helps place the site within an initial context for interpretation and may interface with divisions of interest in the State Plan. Temporal/cultural divisions may horizontally across the site or vertically within the natural stratigraphy of the soils.

3.1.3 Intra-site Artifact/Feature Patterning

Artifacts may be distributed across site area in a uniform, random, or clustered fashion. Identifying the characteristics of the horizontal and vertical distribution pattern provides the initial structure for interpreting the site. The presence of features (e.g. hearths, pits. cisterns, privy, well, postmolds) adds an additional component to the structure of the occupation as well as an information-rich element for analyzing the site's placement within the tempora1/cultural and subsistence/settlement systems. Power assisted stripping should not be undertaken as part of site evaluation unless accompanied by intensive recovery and analysis of plowzone data. As a rule, power machinery use should be restricted to data recovery (Phase III) and the removal of sterile overburden.

3.1.4. Site Function and Context

Using the existing information on intra-site clustering, artifact type distributions, and feature presence, a preliminary assessment of site function allows the tentative placement of the site within known temporal, regional and developmental context of the area. This classification and placement may also relate to study units defined as important in the State Plan.

3.1.5. Data Potential and Site Integrity

The criteria for eligibility to the State and National Registers specifically requires the archaeologist to assess whether data present on the site have the potential to yield information important to understanding the area's history and prehistory. Part of this assessment necessitates and evaluation of whether the site has suffered physical impacts that have destroyed its research potential. Likewise, archaeologists must determine if temporal components exist in unmixed contexts, whether they be horizontal or vertical, and evaluate to what extent mixing has affected the research potential of the site.

Certain methods have a proven record of efficiently obtaining information relevant to the State or National Register criteria for archaeological sites. These procedures are outlined below.

3.2 Phase II documentary Research

For both prehistoric and historic sites, Phase II documentary research provides two types of information: (1) information on the types of data expected from the site as derived form previous work on the site and/or on known sites in the locale and region; and (2) local, regional and national contexts within which to evaluate the importance of the site and to identify research questions that can be addressed. Research efforts should include more intensive interviews with local informants as well as regional and state experts; specific research of published and unpublished site reports from the region to determine how the site may fit within local and regional chronologies, subsistence/settlement systems, and established theoretical contexts; construction of expectations concerning the types of data that may be present and the types of field strategies appropriate for obtaining these data; and review of research issues and theoretical contexts within the disciplines of anthropology, archaeology, and history to which the data on the site might be relevant. Research questions for historic sites should focus on issues that can not be addressed solely through written records. The results of this review should form the basis for any future data recovery plans.

3.3 Phase II Field Work/Excavation Guidelines

Phase II field work is not limited to the documentation of the presence/absence of artifacts as in the Phase IB investigations, nor to a specific impact zone as in a Phase m data recovery program. The Phase II investigation is often the last time a site will be examined and the last opportunity for an archaeologist to collect information from the entire site area. It is essential that basic or "base-line" information be collected at the Phase II level of investigation for future reference and research.

3.3.1. Surface Investigation Guidelines

Systematic controlled surface surveys may only be performed if adequate surface visibility (70% or better) exists. A systematic survey of the project/site area may help to provide a tentative estimate of the site's horizontal boundaries s and the presence/absence of artifact concentrations. With landowner permission, it may be possible to quickly check outside the project limits to determine if the site extends beyond these arbitrary boundaries. No area should be plowed that has not been previously plowed. Depth of plowing should not exceed the depth of existing plow zone. This depth can be determined from the Phase I shovel testing program.

Systematic surface survey will provide information only on those items present within the plow zone. If the Phase IB investigations showed that sub-plowzone components are present, then additional subsurface excavations will be necessary to estimate site boundaries. In either case subsurface testing is warranted to maximize the recovery of information from the plowzone, sub-plowzone, and to appropriately address the criteria for eligibility.

Systematic surface survey includes, but is not limited to, walking close interval transects (5 meter intervals or less) and marking each artifact location for point provenience mapping or collection within standard units or cells established at a systematic interval across the project/site. All artifact locations identified during a systematic surface survey must be documented either through piece plotting or by surface collection cell.

If artifacts are collected by surface cells, both the size and spacing of the units should be determined on the basis of the results of the Phase IB survey and any other appropriate considerations. If a site appears to have low artifact density (e.g. less than 5 artifacts per collect cell), then a larger collection cell may be justified. Collection cell size should not exceed 5 meter x 5 meter since it is unlikely that the plowing process moved artifacts more than this. In general, the size and spacing of the cells should be less than that used in the Phase IB investigations. If the artifacts appear to be evenly distributed across the project area, then an interval as large as 10 meters could be justified. If the artifacts appear to be tightly clustered, then intervals of 5 meters or less may be warranted.

In the case of historic sites, where evidence of a foundation was found during the Phase IB investigation, a more clustered or radial pattern of collection could occur using the foundation walls or an historic feature as a focal point.

3.3.2 Subsurface Testing/Excavation Guidelines

Subsurface testing is an essential component of a site evaluation. Methods included, but are not limited to, a systematic shovel-test program, test unit excavations, and remote sensing. In most cases, the majority of the information used in evaluating a sites' significance and eligibility for inclusion on the State or National Registers derives from this testing. As with surface inspection, subsurface investigation should be designed to gather sufficient data to provide an accurate estimate of site boundaries, both for plowzone and sub-plowzone components. In addition, information on the presence and degree of artifact clustering is derived form this method. Artifacts analyzed by cluster contribute to interpretations of site function as does evidence for features collected during testing. Subsurface methods increase the volume of soil examined, thereby increasing the chances of recovering diagnostic cultural material and radiocarbon samples that will help identify the temporal component present. Recovery of tools assists in identifying intra-site structure and contribute to the overall interpretation of site types. Subsurface testing is a major means of assessing the physical and cultural integrity of a site and provides valuable information on the data potential present.

Shovel Tests: The excavation of shovel-test units (round or square no larger than 0.25 meters) within a project/site area is a quick and efficient method of obtaining site-specific information. In order to obtain data on site boundaries and artifact variability both horizontally and vertically on the site, the spacing and depth of units should be carefully selected. As previously discussed under Surface Investigation Guidelines (Section 3.3.1) information from the Phase IB survey should be used to establish these parameters.

For example, if the results of the Phase IB investigations revealed that a large, uniform distribution of artifacts was present, then shovel tests spaced at 10-meter intervals may be justified. However, if discreet artifact clustering is identified, then interval no greater than 5 meters are warranted. Similarly, if the Phase IB investigations isolated a sub-plowzone component, then depth of all shovel tests should exceed the maximum depth of artifacts previously identified by at least 10 centimeters. On deep, floodplain deposited soils, it may be prudent to extend all shovel -tests to a minimum depth of 1.0 meter. If information obtained in the previous Phase I investigations, Phase II excavations or soil borings indicate that deeply buried stratified cultural deposits may exist in a project area, mechanically excavated trenches may be appropriate to determine the presence/absence of such phenomena.

All excavated soils should be screened through hardware cloth no greater than 1/4 inch in size. If it is expected that large number of small artifacts may be present, such as beads and micro-flakes, then a sample of the soil should be passed through 1/8 inch or smaller mesh, as well. Artifacts from the plowzone and different soil levels should be provenienced separately.

The results of the shovel-testing program should be sufficient to provide an accurate estimation of the site boundaries, at least within the project limits and to prepare a distribution map identifying the amount, degree, and type of artifact clustering present.

Test-Unit Excavations: Test-unit excavations are larger, more rigorously controlled excavation units that shove-test units. Common types of test units are squares and trenches. Units usually measure a minimum of 1.00 square meters and rarely exceed 5.00 square meters. This range accommodates 1.00 x 1.00 meter squares as well as 1.00 meter wide x 5.00 meter long trenches. The size, configuration, and depth of excavation units are contingent upon parameters derived from the Phase IB survey as well as the information collected during surface survey and shovel-testing.

Excavation units should be placed in those areas of the site most likely to yield data relevant to adequately address the goals and objectives of the Phase II investigations. Placement of test units should reflect the results of the systematic surface survey and/or shovel-testing program as well as the expectations regarding site type/function. For prehistoric sites, this may mean excavation of test units within clusters of high artifact concentrations; on historic sites, placement of units adjacent to foundation walls or in suspected midden locations may be appropriate.

During Phase II field work, it is not necessary to aim for excavation of a specific sampling fraction of the entire site area. Rather, it is more important to provide coverage of all the artifact clusters and structural features present since these are the areas likely to yield the most information on the site.

The choice of natural vs. arbitrary excavation levels and level thickness should facilitate the controlled collection of information necessary for evaluating site significance. Units should be excavated by hand using trowels or shovel skimmed; features should always be trowelled. It is common for the plowzone to be removed as one natural layer. However, it is rarely appropriate to remove the subsoil as a layer. Instead the subsoil (and unplowed topsoils) should be excavated in arbitrary levels within natural stratigraphic layers. The thickness of each arbitrary level should never exceed 10 centimeters.

In general, all measurements should be recorded in the metric system with English equivalents reported in parentheses. However, in cases of historic sites, when considered appropriate and approved by the SHPO, measurements may be recorded in feet and inches with metric equivalents reported in parentheses. In urban settings, where mechanized equipment is used to remove asphalt and fill, particular care must be taken to maintain vertical and horizontal control via careful measurements in those instances where excavation in predetermined thicknesses is not possible.

All excavation units must have appropriate documentation including profiles of at least one wall, feature plans and profiles and photographic documentation. All appropriate samples should be collected even when funds are not immediately available for their analysis. For instance, soil samples from features and unit levels and carbon samples should be routinely collected for present or future analysis .

Remote Sensing: Remote sensing covers all techniques that use other than excavation and physical inspection methods to observe and record subsurface phenomena. Frequently, techniques include soil resistivity, proton magnetometer, gradiometer, ground penetrating radar (GPR), and various photographic techniques (aerial, infrared, etc.).

In order for the data collected through the use of remote sensing techniques to be of value in evaluation the nature, extent, and importance of an archaeological resource, caution is necessary in using these techniques and interpreting their results. First, the archaeologist must clearly understand the characteristic of the data recovered and the potential limitations of the technique being utilized. Second, the natural geophysical properties of an area are important and will directly affect the results. Close coordination between the archeologist and the geophysical specialist are thus necessary to ensure accurate interpretation of the data. Third, the nature and importance of phenomena identified through remote sensing must be evaluated through actual excavation and recording of some, or all the phenomena unless anomalies will be avoided.

3.4 Phase II Analysis and Report

The archaeologist must provide sufficient information about the site to allow the review agency to make a determination of eligibility to the State or National Register of Historic Places; to assess the expected impacts to the site from the proposed construction; and to offer recommendations to mitigate the adverse impact either through avoidance, redesign, data recovery, recordation, or a combination of these. The archaeologist should provide an explicit discussion of the sites(s) eligibility, or non-eligibility for listing on the State or Nation Register based on the data collected during the Phase II investigation. The rationale for evaluation of significance should be clearly stated and justified. The report should also include a discussion of the impacts that are likely to occur on the site(s) if the project proceeds as planned and offer appropriate recommendations for resource management or impact mitigation.

If site avoidance is recommended for a cultural resource, the report should include detailed site protection requirements to be implemented before, during and after construction to ensure that the resource is not accidentally impacted. If Phase III data recovery investigations are recommended for all or part of a site as an appropriate means of mitigation, the archaeologist should provide recommendations that should he used the basis for developing a data recovery plan (see Section 4.2).

3.5 Urban Contexts

Due to the complex and diverse of implementing regulations methods in urban contexts, Phase II field strategies should be undertaken only after intensive documentary and map research has been completed for the parcel under study. The field strategies selected to obtain sufficient information for addressing the State or National Register criteria should he formulated in consultation with the appropriate reviewing agency.

3.6 Underwater Sites

As with urban contexts, submerged sites constitute a special category of cultural resources. Phase II methods should be designed in cooperation with the reviewing agency in compliance with specific guidelines for the systematic and scientific conduct of these types of investigations.

3.7 Supplemental Phase II Investigations

In specific cases, where a site with unique, historically documented data is excavated, but the Phase II excavations do not recover the physical evidence expected, it may be appropriate for all involved parties to consider additional Phase II investigations, undertaking archaeological monitoring during the initial phases of construction, or site stripping. As an example, if strong documentary evidence exists for the presence of human burials, but none is discovered during the field investigations, it may be appropriate to conduct supplemental monitoring during preliminary site preparations or construction to identify such features if present. Where such monitoring is employed, contingency plans should be made to implement resource evaluation and data recovery and such plans should be accounted for in archaeological and construction schedules. Monitoring is, however, never a substitute for adequate Phase II Investigations.

3.8 Disposition of Collections

Provision for the responsible curation of the archaeological collection (material remains and associated record) generated as a result of Phase II investigation at an acceptable repository is an integral part of any site evaluation. Arrangements must be made in advance of any field work for the proper processing, documentation, and curation of collections as outlined in the Standard for the Curation of Archaeological Collections (Section 7).

4.0 PHASE III CULTURAL RESOURCE INVESTIGATIONS: DATA RECOVERY

Phase III Cultural Resource Investigations are required if an archaeological/historical resource listed on or eligible for inclusion on the State or National Register of Historic Places is identified and impacts to this resource by a proposed project are anticipated. When a data recovery plan is developed, it should be based on a balanced combination of resource-preservation, engineering, environmental and economic concerns. Mitigation may take the form of avoidance through project redesign, reduction of the direct impacts on the resource with data recovery on the portion to be destroyed, data recovery prior to construction, recordation of structural remains, and/or a combination of the above.

4.1 Goals of Phase III Data Recovery/Impact Mitigation

While varying quantities and quality of data are collected during Phase I and Phase II cultural resource investigations, Phase III investigations are specifically designed to recover information contained in a significant archaeological site before all or part of it is destroyed. Thus the goals of Phase III Data Recovery/Impact Mitigation excavations focus on collecting and preserving cultural, environmental, and any other data of value form a site before it is lost. Due to the project-specific nature of this phase, data recovery plans should be development on a case-by case basis in consultation with the SHPO, project sponsor, interested parties, and other involved state and federal agencies.

4.2 Phase II Research Design/Data Recovery Plan

A research design is an integral part of any professional archaeological project. In any Phase III investigations, a research design takes the form of a data recovery plan that must be approved by the SHPO and other involved state and federal agencies prior to commencement of work. The data recovery plan shall be consistent with the Secretary of the Interior's Standards and guidelines for Archaeological Documentation (48 FR 44734-37) and take into account the Council's publication, Treatment of Archaeological Properties (Advisory Council on Historic Preservation, (draft) 1980). The data recovery plan should reflect a knowledge of the existing archaeological/historic database and research questions considered important at the local, regional and/or national level. The data recovery plan must provide a detailed discussion of the research topics and questions to be addressed; the types of data that must be gathered in order to address these questions; strategies and methodology for recovery of the necessary data; methods of analysis and interpretation; a schedule for completion of various aspects of the investigations; the name and background of all key project personnel and consultants who will participate in the research; disposition of collections and field records; and any other necessary information deemed appropriate by the SHPO and other involved state and federal agencies or the Advisory Council on Historic Preservation.

4.3 Phase III field Work/Excavation Guidelines

Data Recovery should be as complete as possible. It should be tailored to the research questions established in the data recovery plan, and to whatever degree possible, to future archaeological research. The basic field work and excavation guidelines established for Phase I and Phase II investigations should be followed for any similar work undertaken in this phase. As a general rule, artifactual information should not be sacrificed for feature information and vice versa. Whenever possible, mechanized stripping should be restricted to that portion of the site expected to be destroyed.

When preparing to undertake field work for a Phase III data recovery program an archaeologist must be prepared to provide the following; an explicit statement of the procedures used to collect the archaeological data; an explanation and justification of the methodology employed in data collection and recording; a discussion of the system for identifying and recording the spatial and contextual provenience of cultural material and other physical data; detailed descriptions of specialized procedures such as flotation, soil chemistry (pH, phosphates, etc), and collection of radiocarbon samples; and any other relevant information as deemed appropriate by the reviewing agency.

Structural components such as depositional strata and cultural features identified during subsurface testing should be fully and accurately described and documented by acceptable means. Locations of all sampling and testing units should be recorded on project/site maps. Any important contextual relationships and associations between objects, cultural features, and environmental features should be described and explained.

Unless a site is to be completely destroyed, permanent reference points should be established at the site to facilitate relocation of excavation units and features.

4.4 Phase III Analysis and Report

The Phase III report is expected to be special in both content and format. The description, analysis, and interpretation of information collected should consider all forms of data collected. The reader should be given as complete and accurate an understanding of the site, its function, temporal and cultural affiliations, etc. as possible. All types of data analyzed (e.g. faunal, floral, geological or geomorphological, architectural, historical) should be integrated into site interpretation.

Any additions or modifications to the approved data recovery plan should be explained and justified. In addition, decisions made after field work has been completed as to whether or not to analyze all data collected should be addressed.

Excavation units and any other subsurface tests should be described in detail including stratigraphic profiles, soil conditions and characteristics, depths of deposits; and description and justification for excavation techniques. Depending on the nature and complexity of the site, it may be appropriate to discuss individual excavation units separately or to treat common deposits located in more than one unit together.

All laboratory procedures relevant to artifact and special sample processing, differential handling of certain classes of material, artifact identification and cataloging, and storage should be discussed.

Any previous applicable work should be incorporated into the analysis of the site. Examples of such work would include, but not be restricted to local and regional work that is directly related to the site, culture(s), or time period(s) represented; related work in other geographic areas; theoretical or descriptive archaeological work; and any relevant research or information from other disciplines that have direct bearing on the analyses and interpretation of data collected at this site.

The report should include a discussion of contributions and potential contributions the Phase III investigations have made or could make to state, local, or national prehistory or history as appropriate. It may also be possible to discuss the study's contributions to broad anthropological and theoretical issues or to the State Plan if data generated during the investigations are suitable for such purposes.

Finally, the archaeologist should disseminate the information to the archaeological community and the lay public. An integral part of any data recovery should be publications, presentations at meetings and/or community programs, such slide talks and exhibits.

4.5 Supplemental Phase III Investigations

If an approved Phase III data recovery plan does not result in recovery of the physical evidence known to exist at a particular site and if the site will be destroyed, then all involved parties should strongly consider undertaking archaeological monitoring during the initial phase of construction or additional Phase III investigations which could possibly include mechanized site stripping. Archaeologically supervised stripping or site destruction under archaeological control can be a very effective means of evaluating the validity of a project field research design, particularly if the data recovery plan employs a sampling regime. It provides a means of assuring that data collected during the implementation of the data recovery plane are representative of the true nature of the archaeological site. Destruction under control may also be applicable to situations where looting of uncollected materials within the project impact zone may occur following the completion of data recovery. As previously noted, Phase III investigations are specifically designed to recover information contained in a significant archaeological site before all or part of is destroyed. If deemed appropriate, this supplemental work should ensure that the goals of Phase III are satisfied before the site and its associated data are lost. Under no circumstances should such activities be undertaken on sites or portions of sites not subject to imminent destruction. Monitoring is not a substitute for an adequate Phase III investigation.

4.6 Disposition of Collections

Provisions for the responsible curation of the archaeological collection (material remains and associated collections) generated as a result of Phase III investigations at an acceptable repository is an integral part of any data recovery plan. Arrangements must be made in advance of any field work for the proper processing, documentation, and curation of collections as outlined in Standards for the Curation of Archaeological Collections (Section 7).

5.0 DISCOVERY OF HUMAN REMAINS

The discovery of human remains and items of cultural patrimony as defined by Section 3001 of the Native American Graves Protection and Repatriation Act (NAGPRA) in any phase of cultural resource investigations requires special consideration and care. Any discoveries of human remains on State lands must be reported to the State Museum. At all times human remains must be treated with the utmost dignity and respect. Should human burials be encountered, the location should immediately be secured and protected from damage and disturbance. Unless burial excavation is the purpose of or an explicit component of the approved research design, human remains should be left in-situ until consultation with the project sponsor, the SHPO, federally recognized Native American groups, concerned parties, and involved state and federal agencies has taken place. The excavation, study and disposition of human remains should take place in accordance with all applicable federal, state, and local laws. The NYAC Policy on Human Remains (dated 1972. Appendix B) and Guidelines for Consideration of Traditional Cultural Values in Historic Preservation Review published by the President's Advisory Council on Historic Preservation can provide helpful guidance on the proper treatment of human remains.

6.0 STANDARDS FOR THE PRODUCTION OF CRM REPORTS

The following report guidelines summarize general content and suggested formats for any CRM report. It is understood that reports written for agencies that have their own specific report requirements should be written accordingly, but these reports should also include the information outlined in these standards. The National Park Service report format is also an appropriate model for reports.

These standards have not been designed to exclude categories of information not listed, nor to offer a rigid format for final reports. It is also important to note that repots are expected to pertain only to the level of research and analysis appropriate to the level of cultural resource investigation undertaken. In addition, these standards have been prepared under the assumption that CRM reports must fulfill the needs of the lead agency involved as well as those of any other reviewer. Finally, any report prepared in accordance with NYAC standards should include completed New York State Prehistoric or Historic Archaeological Site Forms and Building Structure Inventory forms where appropriate.

For the purposes of these guidelines, a "reviewer" is anyone who reads, examines, or studies the report for a lead agency, municipality, citizen group. university, or similar body in order to evaluate the cultural resource investigations completed, the results and the recommendations.

Given the potential distribution of the CRM report, it is also important to provide information that will allow appropriate reviewers the opportunity to make informed evaluations but at the same time protect the fragile archaeo1ogical/histoircal resource base from potential dangers posed by unscrupulous individuals. As such some type of non-disclosure statement or method of site location protection within the report will be required.

6.1 Title Page

Each report should contain a title page that provides at least the following: the title of the report, including the level of investigation (e.g. Phase IA. lB, I, II, or III); the name and location of the minor civil subdivision (city/village/town, county, state) of the project; any pertinent project identification number (e.g. Highway PIN, Permit Number); author(s). contributor(s), project director(s), principal investigator(s); date report was prepared; name and address of the project sponsor for whom the report was prepared; and the organizational affiliation with address of the archaeological consultant.

6.2 Table of Contents

The table of contents should be arranged in a logical manner and should constitute a list of primary and secondary internal divisions of the report with their beginning page numbers. Lists of figures, tables, and plates (with page numbers) should immediately follow the list of section headings. They may be listed on separate pages if the lists are lengthy. It may also be appropriate to list authors of sections and subsections in the proper place within the table of contents.

A typical report table of contents may include the following: Management Summary; Introduction; Environmental/Physical Setting; Background Research and Sensitivity Assessment; Research Design; Field Methods and Procedures; Results; Summary, conclusions, and recommendations; References Cited; Acknowledgements; Appendixes: List of figures; List of Tables; and List of Photographs/Plates.

6.3Management Summary

The management summary, like an abstract, should serve as a brief, clear outline of the proposed project, the investigations, results, and recommendations. It is often used by non-archaeologists and should be written with this category of reader as well as any agency reviewer in mind.

The management summary should include sections outlining the following: project location, project description, project size; regulatory and/or lead agency, landform/environment, work completed, problems encountered, results, and conclusions and recommendations.

6.4 Introduction

The introduction should outline and summarize all pertinent sections of the report and should include at least the following:

(1) The names of the project sponsor and the contact person; the date on which the consultant was contacted to perform the work; the date on which the parties contracted to perform the investigations; contract numbers and permit/project numbers; legislation relevant to the work.

(2) A written description of the proposed project including the nature of the construction or land alteration, geographic limits of the project areas, potential impacts, and project alternatives, if any are known

(3) The purpose of the investigations, discussion of the scope of work, and the report format

(4) The composition of the research staff and the dates of investigation

(5) The temporary and permanent repositories of field data, artifacts, and other import project materials

(6) Sufficient maps and illustrations to identify the project location including, but not necessarily restricted to, the location of the project within the state and county, the location of the project area on a named USGS 7.5' topographic map or DOT map, and a project area map

6.5 Environmental/ Physical Setting

This section of the report should summarize the environmental factors relating to actual and potential cultural resources, including archaeological sites, landscapes and extant structures within or adjacent to the project area. This information is necessary for both developing research methods and for evaluating project impact. Minimally, the following should be included, with accompanying maps where appropriate; geology, soils, hydrology, physiography/ geomorphology, climate, flora, fauna, and recent human/ natural disturbance.

6.6 Background Research and Sensitivity Assessment

The section summarizing the background research and sensitivity assessment should be written in such a manner as to assist reviewers in understanding and evaluating the importance of archaeological resources in the project area as well as the rationale for any further research recommended. The following general guidelines apply for reporting the results of the background literature search and sensitivity assessment: specify the steps taken in obtaining information; cite all sources including oral testimony, and provide full references in the report; explain omissions and lack of cultural activity where pertinent to the conclusions of the sensitivity assessment; provide a summary of the cultural background and environmental attributes and limitations of the area; review information on known archaeological and other cultural resources and previous studies in the area; include information on the foci and extent of previous coverage of the area and the research questions addressed; and specify where all records resulting from the background research will be curated. DO NOT provide specific site locations in reports for public distribution;

6.6.1 Background Research

Summaries of the following should be covered under Background Research: site file searches at the state and local levels; archaeological literature search, including both published and unpublished sources; examination of historic maps and archival information; searches of State and National Register files at SHPO, specifying SRHP/NRHP-listed, SRHP/NRHP-eligible, and SRHW/NRHP-inventoried sites; informant interviews; examination of institutional and private artifact collections; consultation with other professional archaeologists, locally active historians, and municipal authorities; field visit(s); the person(s) involved, the date of the visit, and the observations made.

A table listing the known cultural resources within a one-mile radius of project area should be included in the report with maps (see above *re* reports for public distribution) and photographs where appropriate.

6.6.2 Sensitivity Assessments

Summaries of the following should be covered under Sensitivity Assessment: the sensitivity rating expressed as low, moderate, high, or mixed, that reflects the likelihood that cultural resources are present within the project area; definition of the rating system used and its implications for further research; discussion of the types and conditions of cultural resources likely to be found within the project area; rationale for assigning the sensitivity rating; and relevant environmental and/or historic contexts such as those in SHPO's list developed for state-wide planning (see Section 2.21).

6.7 Research Design

The research design should reflect a knowledge of the existing database and research questions considered important at least at the local and regional levels. The degree of complexity or detail should be appropriate to the level of investigations undertaken.
This section of the report should include the following: an identification of the theoretical goals as stated in the form of specific hypothesis to be tested or problems to be investigated: the identification of the relevant analytical variables; specification of the data necessary for empirical testing: specification and justification of the methods and techniques for collecting and studying the data; and discussion of possible outcomes of the analyses.

6.8 Field Methods and Procedures

This section of a Phase I report should include discussions of the following: walkover survey strategies designed to determine the presence of visible foundations, artifact scatters, disturbed ground, Excessive slope, etc.; the type and size of excavation/ collection unit used to locate resources and the reasons for this selection (e.g. shovel-test units for artifact recovery, larger units for surface collections, trenches for identifying buried historic foundations or deeply buried prehistoric sites); testing interval and design (e.g. single transect, regular grid, staggered grid) and rationale for this selection; when plowing and collecting, the length and interval between furrows, whether cultural material was piece-plotted or collected in systematically placed units, type weather and ground conditions (e.g. cloudy vs. bright sun, dry vs. moist soil, adequacy of potential artifact visibility); excavation and artifact recovery techniques (e.g. shovel vs. machine excavation, natural vs. arbitrary layers/ levels, depth to sterile soil, remote sensing methods, soil stripping strategies) and rationale; average depth of test units; typical soil profiles; the size of screen mesh; the adequacy of horizontal and vertical survey coverage; areas not surveyed and reasons why; and the potential biases in results (if any) from gaps in coverage.

This section of a Phase II report should, in addition, include discussions of the following: the type and size of excavation/ collection units used during the site examination; the field sampling strategy and rationale for its selection; the excavation/ collection techniques and how these relate to the data expected; and any impediments to the site examination that may have influenced the results.

This section of a Phase III report should, in addition, include discussions of the following: explanation of and justifications for the data recovery field strategy and methods; the treatment and analysis of floral, faunal, or other organic matter recovered; and all laboratory procedures relating to the stabilization, labeling, cataloging, and storage of artifacts and records, including the curation facility.

6.9 Results

The results section of a report should clearly outline in the text and on maps the project boundaries, testing strategies, and cultural resources identified during testing. Depending upon the specific nature of the project and the investigations undertaken, it may be the site(s), standing structures, single test units, or single artifacts recovered from a plowed field that serve as the primary unit of discussion. Descriptions may be organized by starting at one end of a project area and moving to the other or by grouping similar resources together (e.g. all prehistoric resources separate from historic resources and standing structures).

6.9.1 Components of a Phase I Report

Key components of this section of the text for a Phase I report should include the following: project site; the number of and intervals between shovel test units (with the shovel-test unit records included as an appendix); the number of tests actually excavated; the number of units, if any, that produced cultural material; the numbers and types of artifacts recovered and their cultural affiliation, if known (with the artifact list/ catalog included as an appendix); the nature of the artifact distribution (e.g., clusters of artifacts, uniform scatter, random distribution, features); physiographic context of the artifacts (e.g., floodplain. Terrace, swamp, lake); stratigraphic context of the artifacts (e.g. surface, plowzone, buried); lists of all standing structures that are at least 50 years old as well as structures that are less than 50 years old and are exempt from Office of Parks, Recreation and Historic Preservation (OPRHP) guidelines; site and structure inventory forms for all prehistoric and historic archaeological sites and standing structures that are at least 50 years old; and a master project map that details the testing strategy and results.

6.9.2 Components of a Phase II Report

Key components of this section of the text for a Phase II report should include the following: the number of each type of excavation unit used in the site examination including detailed descriptions of typical and unusual profiles of excavation units; the range of artifact types recovered from testing (with the artifact Catalog included as an appendix); the average density of material per unit as well as other summary statistics that help describe the site; the estimated site size and the Proportion of the site contained within the project boundaries; the size of the area actually excavated (total sq. m); the nature of the vertical stratification of the site (e.g. site contained within the plow zone, sub-plowzone, layered in the sub-plowzone); any internal clustering within the site; the types of features present (with photographs, floor plans, and profiles included as appropriate); temporal associations of the sites based on diagnostic artifacts or radiocarbon dating if available; summaries of floral, faunal and, other specialized analyses; summaries of functional, technological, and stylistic analyses of specific artifact groups; interpretations of site function; interpretations of the place of the site within a larger temporal, regional, or theoretical context and research potential of the site.

6.9.3 Components of a Phase III Report

Key components of this section of the text for a Phase III report should include the following: complete artifact inventories integrating all phases of investigation; results of artifact analyses; results of all floral, faunal, and radiocarbon analyses; integration and interpretation of the results of all tests and analyses; the application of these integrated results to the research questions and goals of the study as made explicit in the research design; all pertinent plans and sections of excavation units and features encountered; and any biases or extraneous factors that may have affected the outcome of the excavations and analyses. All Phase III report photographs, tables, maps, and other graphics should be of publishable quality and follow National Park Service guidelines.

6.9.4 Project Map Specifications

Project maps should include the following: an outline of the project boundaries in reference to fixed features such as roadways, power lines, rivers, canals, and railroads; the locations of all important features within the project boundaries such as standing structures, ditches, and disturbed areas; the locations of all test units actually excavated or collected differentiated according to those that contained artifacts and those that did not; the locations of all suspected artifact clusters and features such as foundations, wells, and middens; the identification of all structures that are at least 50 years old or other important standing structures in the project area; numbered photo angles of all photographs included in the text: a title block identifying the project name, location, date of investigation, and contractor performing the survey; key to all symbols used on the map; a bar scale using both English and metric measurements; and a north arrow (specify whether grid, magnetic, or geographic).

Maps accompanying a Phase II report should, in addition to the information listed for project maps. Include the following: estimates of site boundaries; detailed maps of all individual site excavations; site locations labeled with site name and number locations of features and any radiocarbon dated samples. Maps accompanying a Phase III report should also include the locations of all excavation units, backhoe trenches, and areas of machine stripping.

6.10 Summary, Conclusions and Recommendations

The final section of an archaeological survey report should serve as a stand-alone summary of the activities and findings reported in detail in the body of the report.

6.10.1 Components of a Phase I Report

For a Phase I report, this section should summarize the scope, methodology, areal coverage, and findings of the investigations; identify any areas where archaeological materials were discovered; point out gaps in survey coverage or areas where weather, owner-access refusal, or other conditions prevented or necessitated less than thorough investigations; indicate the institutional repository for artifacts, field notes, and records for the project; evaluate the results of the investigations in terms of the project's theoretical orientation, bias., and assumptions identified in the research design; compare the results of the investigations to those of others conducted in the area; place the study within a regional context in terms of its contribution to regional knowledge and the degree to which its results reflect what is known of the area; assess the project impact; explain the need for and general scope of additional work, if any; make and justify recommendations for project modifications to protect sites if accurate site boundaries can be established; and consider secondary effects of the project as well as the direct impacts (e.g. housing development resulting from road, sewer, or waterline construction or site isolation resulting from gravel mining.

6.10.2 Components of a Phase II Report

For a Phase II report, this section should summarize the arguments regarding the significance or non-significance of the resources investigated; state whether or not sufficient information has been collected to address the criteria for eligibility for listing on the State of National Registers of Historic Places such as information pertinent to the integrity, research potential, and the adequacy of horizontal and vertical boundary information; and present possible options for the treatment of ant resources considered significant (e.g. avoidance through redesign, protective conditions, and/or data recovery) along with specific recommendations as to how these might be implemented.

6.10.3 Components of a Phase III Report

For a Phase III report this section should include summaries of the research design and of the recovery, analysis, and interpretation of information collected during the data recovery program; an evaluation of the success of the data recovery plan and any modifications made to it; an interpretation of data recovered from the site(s) and their importance in relation to the relevant to the historic context(s) established for the region; a discussion of contributions the Phase III investigations have made to the current state of knowledge of prehistory or history and the state plan; recommendations for updating or revising research questions, goals, and preservation priorities in the state historic preservation plan; recommendations for supplemental Phase III investigations, if appropriate (Section 4.5); recommendations for the conservation, short-term, and long-term curation of the collection; and finally, recommendations for dissemination of all appropriate information to the archaeological community and public outreach programs.

6.11.1 References Cited

Every effort should he made to insure that this part of the report is complete and accurate. We urge the consistent adoption of the American Antiquity format and refer readers to its most recently Published style guide.

7.0 STANDARDS FOR THE CURATION OF ARCHAEOLOGICAL COLLECTIONS[1]

7.1. Definitions

For the Purposes of these standards, the following definitions apply:

7.1.1. Collection means material remains that are excavated or removed during a survey, excavation or other study of a prehistoric or historic resource, and associated records that are prepared or assembled in connection with the survey, excavation, or other study.

7.1.2 Material remains means artifacts, objects, specimens and other physical evidence that are excavated or removed in connection with efforts to locate, evaluate, document, study, preserve or recover a prehistoric or historic resource. Classes of material remains (and illustrative examples) that maybe in a collection include, but are not limited to:

(A) Components of structures and features (such as houses, mills, piers, fortifications, raceways, earthworks, and mounds);
(B) Intact or fragmentary artifacts of human manufacture (such as tools, weapons, pottery, pottery, basketry, and textiles);
(C) Intact or fragmentary natural objects used by humans (such as rock crystals, feathers , and pigments);
(D) By-products, waste products or debris resulting from the manufacture or use of man-made or natural materials (such as slag, dumps, cores, and debitage);
(E) Organic material (such as vegetable and animal remains, and coprolites);
(F) Human remains (such as bone, teeth, mummified flesh, burials, and cremations);
(G) Components of petroglyphs, pictographs, intaglios or other works of artistic or symbolic representation;
(H) Components of shipwrecks (such as pieces of the ship's hull, rigging, armaments, apparel, tackle, contents, and cargo);
(I) Environmental and chronometric specimens (such as pollen, seeds, wood, shell, bone, charcoal, tree core samples, soil, sediment cores, obsidian, volcanic ash, and baked clay);and
(J) Paleontological specimens that are found in direct physical relationship with the prehistoric or historic resource.

1 Adapted from Department of the Interior, National Park Service 356 CFR 79 and the Standards of Research Performance of the Society of Professional Archaeologists.

7.1.3. Associated records means original records (or copies thereof) that are prepared, assembled and document efforts to locate, evaluate, record, study, preserve, or recover a prehistoric or historic resource. Some records such as field notes, artifact inventories, and oral histories may be originals that are prepared as a result of the fieldwork, analysis, and report preparation. Other records such as deeds, survey plans, historical maps and diaries may be copies of original public or archival documents that are assembled and studied as a result of historical research.

Classes of associated records (and illustrative examples) that may be in a collection include, but are not limited to:

(A) Records relating to the identification, evaluation, documentation, study, preservation or recovery of a resource (such as site forms, field notes, drawings, maps, photographs, slides, negatives, films, video and audio cassette tapes, oral histories, artifact inventories, laboratory reports, computer cards and tapes, computer disks and diskettes, printouts of computerized data, manuscripts, reports, and accession, catalog, and inventory records);

(B) Records relating to the identification of a resources using remote sensing methods and equipment (such as satellite and aerial photography and imagery, side scan sonar, magnetometers, subbottom profilers, radar, and fathometers);

(C) Public records essential to understanding the resource)such as deeds, survey plats, military and census records, birth, marriage, and death certificates, immigration and naturalization papers, tax forms, and reports);

(D) Archival records essential to understanding the resource (such as historical maps, drawings and photographs, manuscripts, architectural and landscape plans, correspondence, diaries, ledgers, catalogs, and receipts);and

(E) Administration records relating to the survey excavation or other study of the resource (such as scopes of work, requests for proposals, research proposals, contracts, antiquities permits, reports, documents relating to compliance with Section 106 of the National Historic Preservation Act [16 U.S.C. 47f], and National Register of Historic Places nomination and determination of eligibility forms).

7.1.4 Curatorial services means providing curatorial services means managing and preserving a collection according to professional museum and archival practices, including but not limited to:

(A) Inventorying, accessioning, labeling, and cataloging a collection;

(B) Identifying, evaluating, and documenting a collection;

(C) Storing and maintaining a collection using appropriate methods and containers, under appropriate environmental conditions and physically secure controls;

(D) Periodically inspecting a collection and taking actions as may be necessary to preserve it;

(E) Providing access and facilities to study a collection; and

(F) Handling, cleaning, stabilizing, and conserving a collection in such a manner to preserve it.

7.1.5 Qualified museum professional means a person who possesses training, knowledge, experience and demonstrable competence in museum methods and techniques appropriate to the nature and content of the collection under the person's management and care, and commensurate with the person's duties and responsibilities. In general, a graduate degree in museum science or subject matter applicable to archaeology, or equivalent training and experience, and three years of professional experience are required for museum positions that demand independent professional responsibility as well as subject specialization (archaeology) and scholarship. Standards that may be used, as appropriate, for classifying positions and evaluating a person’s qualifications include, but are not limited to, the following federal guidelines:

(A) The Office of Personnel Management's “Position Classification Standards for Positions under the General Schedule Classification System" (U.S. Government Printing Office, stock No. 906-028-00000-0, 1981) are used by Federal agencies to determine appropriate occupational series and grade levels for positions in the Federal service. Occupational series most commonly associated with museum work are the museum curator series (GS/GM-1O15) and the museum technician and specialist series (GS/GM-1016). Other scientific and professional series that may have collateral museum duties include, but are not limited to, the archivist series (GS/GM-1420), the archeologist series (GS/GM-193), the anthropologist series (GS/GM-190), and the historian series (GS/GM-170). In general, grades GS-9 and below are assistants and trainees while grades GS-11 and above are determined according to the level of independent professional responsibility, degree of specialization and scholarship, and the nature, variety, complexity, type, and scope of the work.

(B) The Office of Personnel Management’s "Qualification Standards for Positions under the General Schedule (Handbook X-118)" (U.S. Government Printing Office stock No. 906-030-00000-4, 1986) establish educational, experience, and training requirements for employment with the Federal Government under the various occupational series. A graduate degree in museum science or applicable subject matter, or equivalent training and experience, and three years of professional experience are required for museum positions at grades GS-11 and above.

(C) The "Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation" (48 FR 44716, Sept. 29, 1983) provide technical advice about archeological and historic preservation activities and methods for use by Federal, State and local Governments and others. One section presents qualification standards for a number of historic preservation professions. While no standards are presented for collections manager, museum curators or technicians, standards are presented for other professions (i.e. historians, archeologists, architectural historians, architects, and historic architects) that may have collateral museum duties.

7.2 Responsibilities of the Archaeologist

1. If material remains are collected as a result of a survey, excavation, or other study of a prehistoric or historic resource, a system for identifying and recording their proveniences must be maintained.

2. All associated records from an archaeological project should be intelligible to other archaeologists. If terms lacking commonly held referents are used, they should be clearly defined.

3. During accessioning, analysis, and storage of the material remains and associated records in the laboratory, the archaeologist must take precautions to ensure that correlations between the material remains and the associated records are maintained, so that provenience, contextual relationships, and the like are not confused or obscured.

4. The archaeologist must ensure that a collection resulting from a project will be deposited at a repository that can provide curatorial services, that employs at least one qualified professional with experience in collections management/curation.

5. The initial processing of the material remains (including appropriate cleaning, sorting, labeling, cataloging, stabilizing, and packaging) must be completed, and associated records prepared and organized in accordance with the repository's processing and documentation procedures.

6. A professional archaeologist should refuse to participate in any research, which does not comply with the above criteria.

7.3 Guidelines for Selecting a Repository

1. When possible, collections from New York should be deposited in a repository that:

(i) is in the state;

(ii) stores and maintains other collections from the same site or project location; or

(iii) houses collections from a similar geographic region or cultural area.

2. The collection should not be subdivided and stored at more than a single repository unless such subdivision in necessary to meet special storage, conservation, or research needs.

3. Material remains and associated records should be deposited in the same repository to maintain the integrity and research value of the collection.

7.4 Criteria for Institutions Serving as Repositories for Archaeological Collections

1. The institution must be chartered as a museum by the Board of Regents of the State of New York or similar body, or be an institution of higher education recognized by the State of New York.

2. The repository must certify, in writing, that the collection shall be cared for, maintained, and made accessible in accordance with the standards in this part.

3. The repository must be able to provide adequate, long-term curational services including:

(A) Accessioning, labeling, cataloging, storing, maintaining, inventorying and conserving the particular collection on a long-term basis using professional museum and archival practices; and

(B) Comply with the following, as appropriate to the nature and content of the collection;

(1) Maintain complete and accurate records of the collection, including:

(a) records on acquisitions;
(b) catalog and artifact inventory lists;
(c) descriptive information, including field notes, site forms and reports
(d) photographs, negatives, and slides;
(e) locational information, including maps;
(f) information on the condition of the collection, including any completed conservation treatments;
(g) approved loans and other uses:
(h) inventory and inspection records, including any environmental monitoring records;
(i) records on any deaccessions and subsequent transfers, repatriations, or discards;

(2) Dedicating the requisite facilities, equipment, and space in the physical plant to properly store, study, and conserve the collection. Space used for storage, study, conservation, and, if exhibited, any exhibition must not be used for non-curatorial purposes that would endanger or damage the collection;

(3) Keeping the collection under physically secure conditions with storage, laboratory, study, and any exhibition areas by

(a) having the physical plant meet local electrical, fire, building, health and safety codes;
(b) having an appropriate and operational fire detection and suppression system;
(c) having an appropriate and operational intrusion detection and deterrent system;
(d) having an adequate emergency management plan that establishes procedures for responding to fires, floods, natural disasters, civil unrest, acts of violence, structural failures, and failures of mechanical systems within the physical plant;
(e) providing fragile or valuable items in a collection with additional security such as locking the items in a safe, vault, or museum specimen cabinet, as appropriate;
(f) limiting and controlling access to keys, the collection, and the physical plant; and
(g) periodically inspecting the physical plant for possible security weaknesses and environmental control problems, and taking necessary actions to maintain the integrity of the collection;

(4) Requiring staff and any consultants who are responsible for managing and preserving the collection, and for conducting inspections and inventories as described in sections 3.(B)(7) and 3.(B)(8), to be either qualified museum professionals or professional archaeologists guided by a professional museum conservation consultant.

(5) Handling, storing, cleaning, conserving and, if exhibited, exhibiting the collection in a manner that:

(a) is appropriate to the nature of the material remains and associated records;
(b) protects them from breakage and possible deterioration from adverse temperature and relative humidity, visible light, ultraviolet radiation, dust, soot, gases, mold, fungus, insects, rodents, and general neglect; and
(c) preserves data that may be studied in future laboratory

analyses. When material remains in a collection are to be treated with chemical solutions or preservatives that will permanently alter the remains, when possible, retain untreated representative samples of each affected artifact type, environmental specimen or other category of material remains to be treated. Untreated samples should not be stabilized or conserved beyond dry brushing;

(6) Storing site forms, field notes, artifacts, inventory lists, computer disks and tapes, catalog forms, and a copy of the final report in a manner that will protect them from theft and fire such as

(a) storing the records in a an appropriate insulated, fire resistant, locking cabinet, safe, vault or other container, or in a location with a fire suppression system;

(b) storing a duplicate set of records in a separate location; or

(c) ensuring that records are maintained and accessible through another party. For example, copies of final reports and site forms frequently maintained by the State Historic Preservation Officer, the State Archaeologist or the State museum or university. The Tribal Historic Preservation Officer and Indian tribal museum ordinarily maintain records on collections recovered from sites located on Indian lands. The National Technical Information Service and the Defense Technical Information Service maintain copies of final reports that have been deposited by Federal agencies. The National Archeological Database maintains summary information on archeological reports and projects, including information on the location of those reports.

(7) Periodically inspecting the collection or having a professional conservation assessment done regularly for the collection for the purposes of assessing the condition of the material remains and associated records, and monitoring those remains and records for possible deterioration and damage; and performing only those actions as are absolutely necessary to stabilize the collection and rid it of any agents of deterioration.

(a) Material remains and records of a fragile or perishable nature should be inspected for deterioration and damage on a more frequent basis than lithic or more stable remains or records.

(b) Because frequent handling will accelerate the breakdown of fragile materials, material remains and records should be viewed but handled as little as possible during inspections

(8) Periodically inventorying the collection by accession, lot, or catalog record for the purpose of verifying the location of the material remains and associated records

(a) Material remains and records of a valuable nature should be inventoried on a more frequent basis than other less valuable remains or records.

(b) Because frequent handling will accelerate the breakdown of fragile materials, material remains and records should be viewed but handled as little as possible during inventories.

9) Providing access to the collection for scientific, educational, and religious uses, subject to such terms and conditions as are necessary to protect and preserve the condition, research potential, religious or sacred importance, and uniqueness of the collection, such as

(a) Scientific and educational uses. A collection shall be made available to qualified professionals for study, loan and use for such purposes such as in-house and travelling exhibits, teaching, public interpretation, scientific analysis, and scholarly research. Qualified professionals would include, but not be limited to, curators, conservators, collection managers, exhibitors, researchers, scholars, archaeological contractors, and educators. Students may use a collection when under the direction of a qualified professional.

(b) Religious uses. Religious remains in a collection shall be made available to persons for use in religious rituals or spiritual activities. Religious remains generally are of interest to medicine men and women, and other religious practitioners and persons from Indian tribes, and other indigenous and immigrant ethnic, social, and religious groups that have aboriginal or historic ties to the lands from which the remains are recovered, and have traditionally used the remains or class or remains in religious rituals or spiritual activities.

(c) The repository shall not allow uses that would alter, damage, or destroy an object in a collection unless the repository determines that such use is necessary for scientific studies or public interpretation, and the potential gain in scientific or interpretive information outweighs the potential loss of the object. When possible, such use should be limited to unprovenienced, non-unique, non-fragile objects, or to a sample of objects drawn from a larger collection of similar objects.

(d) No collection (or part thereof) shall be loaned to any person without a written agreement between the repository and the borrower that specifies the terms and conditions of the loan. At a minimum, a loan agreement shall specify

(1) the collection or object being loaned;

(2) the purpose of the loan;

(3) the length of the loan

(4) any restrictions on scientific, educational or religious uses, including whether any object may be altered, damaged or destroyed;

(5) except as provided in section 2(9)(c), the stipulation that the borrower shall handle the collection or object being borrowed during the term of the loan so as to not damage or educe its scientific, educational, religious, or cultural value; and

(6) any requirements for insuring the object or collection being borrowed for any loss, damage or destruction during transit and while in the borrowers possession.

(e) The repository shall maintain administrative records that document approved scientific, educational, and religious uses of the collection.

Appendix A

FEDERAL LAWS, REGULATIONS AND GUIDELINES

National Historic Preservation Act of 1966, as amended.

36 CFR Part 800 Protection of Historic Properties

36 CFR Part 60 National Register of Historic Places

36 CFR Part 61 Procedures for Approved State and Local Government Historic Preservation Programs

36 CFR Part 79 Curation of Federally Owned and Administered Archaeological Collections

Archaeology and Historic Preservation: Secretary of Interior's Standards and Guidelines

Department of Transportation Act of 1966

National Environmental Policy Act of 1969

Archaeology and Historic Preservation Act of 1974

Archaeological Resource Protection Act of 1979

434 CFR Part 7 Protection of Archaeological Resources: Uniform Regulations

Abandoned Shipwreck Act of 1987

Abandoned Shipwreck Act Guidelines

Native American Grave and Repatriation Act of 1990

NEW YORK STATE LAWS AND REGULATIONS

State Historic Preservation Act- Article 14 of Parks, Recreation and Historic Preservation Law

9 NYCRR Part 426 Authority and Purpose

9 NYCRR Part 427 State Register of Historic Places

9 NYCRR Part 428 State Agency Activities Affecting Historic and Cultural Properties

State Environmental Quality Review Act • Article 8 of Environmental Conservation Law

6 NYCRR Part 617 Sate Environmental Quality Review

The SEQR Handbook (1992 edition)

PERTINENT GUIDANCE DOCUMENTS AND "HOW TO" MATERIALS

Advisory Council on Historic Preservation

The Treatment of Archaeological Properties

Section 106 step-by-step.

U. S. Department of the Interior

Technical Brief No.11 Legal Background of Archaeological Resource Protection

National Register Bulletins

#12 Definition of National Register Boundaries for Archaeological Properties

#15 How to Apply the National Criteria for Evaluation

#16A How to Complete National Register Registration Forms

#16B How to Complete National Register Multiple Property Documentation Form

#29 Guidelines for Restricting Information About Historic and Prehistoric Resources

#36 Evaluating and Registering Historical Archaeology Sites and Districts

#38 Guidelines for Evaluating and Documenting Traditional Cultural Properties

#41 Guidelines for Evaluating and Registering Cemeteries and Burial Places

#43 Defining Boundaries for National Register Properties

To obtain copies and or updated versions of the above documents, please address your request to the relevant agencies listed below.

Advisory Council on Historic Preservation
1100 Pennsylvania Avenue, NW, Suite 809
Washington, DC 20004

National Register of Historic Places
National Park Service
U.S. Dept. of Interior
P.O. Box 37127
Washington, DC 20013-7127

Archaeological Assistance Division
National Park Service
U.S. Dept. of Interior
P.O. Box 37127
Washington, DC 20013-7127

New York State Office of Parks, Recreation and Historic Preservation
Historic Preservation Field Services Bureau
Peebles Island
P.O. Beet 189
Waterford, NY 12188-0189
Phone 518-237-8643

New York State Museum
Cultural Education Center
Empire State Plaza
Albany, NY 12230

New York State Department of Environmental Conservation
50 Wolf Road
Albany, NY 12233

Appendix B
NYAC BURIAL RESOLUTION
15 September 1972

Whereas, the Native Americans of New York State regard the disturbance of their burial's in the ground as disrespectful to their dead; and

Whereas, the New York Archaeological Council, the representatives of the majority of the professional archaeologists working in New York State recognizes that the same legal and ethical treatment should be accorded all human burials irrespective of racial or ethic origins; and

Whereas, NYAC recognizes that despite our position the disturbance of burials by others is and will be a reality; therefore,

Resolved,

1) That the New York Archaeological Council urges a moratorium on planned burial excavation of Indian skeletons in New York State until such time as public opinion regards the recovery of skeletal data as a scientific endeavor irrespective of racial or ethnic identity,

2) That we oppose the excavation of burials for teaching purposes as pedagogically unnecessary and scientifically destructive,

3) That we agree in the future to reburial of Indian skeletons in a manner and at a time prescribed by the Native Americans whenever burials are chance encounters during archaeological excavations or other earth moving activities,

4)That we request the opportunity to study these skeletons for their scientific and historic significance before reburial, and

5)That when a burial ground is being disturbed by untrained individuals, a committee of local Native Americans and archaeologists should jointly plan the salvage of information and the preservation of remains.

Appendix C
NYAC CODE OF ETHICS AND PRACTICE
Archaeology is a profession, and the privilege of professional practice requires professional morality and professional responsibility, as well as professional competence, on the part of each practitioner.

A. The Archaeologist's responsibility to the Public:

(1) An archaeologist shall:

a. recognize a commitment to present archaeology and its research results to the public in a responsible manner;

b. actively support conservation of the archaeological resource base;

c. be sensitive to, and respect the legitimate concerns of, groups whose cultural histories are the subjects of archaeological investigations;

d. avoid and discourage exaggerated, misleading, or unwarranted statements about archaeological matters that might induce others to engage in unethical or illegal activity;

e. support and comply with the terms of the UNESCO Convention on the means of prohibiting and preventing the illicit import, export, and transfer of ownership of cultural property.

(2) An archaeologist shall not:

a. engage in any illegal or unethical conduct involving archaeologist matters or knowingly permit the use of his/her name in support of any illegal or unethical activity involving archaeological matters;

b. give a professional opinion, make a public report, or give legal testimony involving archaeological matters without being as thoroughly informed as might reasonably be expected;

c. engage in conduct involving dishonesty, fraud, deceit, or misrepresentation about archaeological matters;

d. undertake any research that affects the archaeological resource base for which he/she is not qualified.

B. The Archaeologist's Responsibility to Her/His Colleagues:

(1) An archaeologist shall:

a. give appropriate credit for work done by others

b. keep informed and knowledgeable about developments in her/his field or fields of specialization;

c. accurately, and without undue delay, prepare and properly disseminate a description of research done and its results;

d. communicate and cooperate with colleagues having common professional interests;

e. give due respect to colleagues' interest in, and right to, inform about, sites, areas, collections, or data where there is mutual active or potentially active research concern;

f. know and comply with all laws applicable to her/his archaeological research, as well as with any relevant procedures promulgated by duly constituted professional organizations;

g. report knowledge of violations of this Code to proper authorities.

(2) An archaeologist shall not:

a. falsely or maliciously attempt to injure the reputation of another archaeologist;

b. commit plagiarism in oral or written communication;

c. undertake research that affects the archaeological resource base unless reasonably prompt, appropriate analysis and reporting can be expected;

d. refuse a reasonable request from a qualified colleague for research data.

C. The Archaeologist's Responsibility to Employers and Clients:

(1) An archaeologist shall:

a. respect the interests of her/his employer or client, so far as is consistent with the public welfare and this Code of Standards.

b. Refuse to comply with any request or demand of an employer or client which conflicts with the Code or Standards;

c. Recommend to employers or clients the employment of other archaeological or other expert consultants upon encountered archaeological problems beyond her/his competence;

d. Exercise reasonable care to prevent her/his employees, colleagues, associates and others whose services are utilized by her/him from revealing or using confidential information. Confidential Information means information of a non-archaeological nature gained in the coarse of employment which the employer or client has requested be held inviolate, or the disclosure of which would be embarrassing or would be likely to be detrimental to the employer or client. Information ceases to be confidential when the employer or client so indicates or when such information becomes publicly known.

(2) An archaeologist shall not:

a. reveal confidential information, unless required by law;

b. use confidential information to the disadvantage of the client or employer; or

c. use confidential information for the advantage of herself/himself or a third person, unless the client consents after full disclosure;

d. accept compensation or anything of value for recommending the employment of another archaeologist or other person, unless such compensation or thing of value is fully disclosed to the potential employer or client;

e. recommend or participate in any research which does not comply with the requirements of the SOPA Standards of Research Performance

Appendix D
GLOSSARY

Adverse impact: A damaging Change to the quality of the cultural resource's significant characteristics. An adverse impact will result in the loss of important information.

Archaeological resources: The subsurface remains of buildings, fireplaces. storage pits, habitation areas, and other features of past human activity. Investigating archaeological resources requires the use of a specialized set of techniques and methods for extracting the maximum information from the ground. Archaeological resources can be either prehistoric or historic in origin.

Archaeological sites: One type of cultural resource, unique in That they are the only way to learn about people who kept no written records. They also can be used to confirm, correct, and expand upon the written records left by our ancestors.

Archaeology: A set of methods and techniques designed to recover important information about the life-ways of past peoples and cultures from the remains they left in the ground.

Artifact: See Material remains.

Collection: Any material remains that are excavated or removed during a survey, excavation or other study of a prehistoric or historic resource, and associated records that are prepared or assembled in connection with the survey, excavation, or other study.

Cultural resources: The collective evidence of the past activities and accomplishments of people. They include buildings. objects, features, locations, and structures with scientific, historic, and cultural value.

Extant resources: Buildings or structures which are still standing in much the same form as when they were first constructed. Historic houses, bridges, and farmsteads are examples.

Feature: Intact evidence of cultural activity, typically in the form of hearths, pits. cisterns, privies, wells, postmolds, or other intentional, permanent alterations of the ground surface.

Historic property: Any building, structure, object. district, place, site, or area significant in the history, architecture, archaeology, or culture of the State of New York, its communities, or the Nation.

Impact: Any Change, whether good or bad, in the quality of a cultural resource's significant historic, architectural, or archaeological characteristics.

Impact mitigation: A course of action, which lessens the harm that will be inflicted upon a cultural resource. It may include work restrictions, repair, restoration, documentation, the installation of a protective covering, or the planned removal of a resource. In the case of archaeological sites, the latter typically involves full-scale excavations.

Material remains: Objects, specimens and other physical evidence that are excavated or removed in connection with efforts to locate, evaluate, document, study, preserve or recover a prehistoric or historic resource.

National Register of Historic Places: The nation's official list of historic, architectural, archaeological, and cultural resources worthy of preservation. The Register contains individual sites and historic districts of national, state, or local significance. The Register is maintained by the United States Department of the Interior.

NYAC: New York Archaeological Council, a not-for-profit association of professional archaeologists with an interest in New York State archaeology.

Prehistoric/historic resources: Prehistoric resources date to the time before written records for a specific area, while historic resources are those dating to the time or written records. In North America, the time of written records began about A.D. 1500 with the arrival of European explorers. However, some parts of the country were not visited by outsiders until much later.

Reviewer: Anyone who reads, examines, or studies the report for a lead agency. Municipality, citizen group, university, or similar body in order to evaluate the cultural resource investigations completed, the results, and the recommendations.

SHPO: State Historic Preservation Officer, who is an appointed official responsible for administering the National Historic Preservation Act (NHPA) within a state government or jurisdiction.

Significant Property: A cultural resource that meets the criteria of the State or National Register of Historic Places.

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APPENDIX E

DEPARTENT OF TRANSPORATION
CULTURAL RESOURCE SURVEY CHECKLIST
FORM A

FORM A - CULTURAL RESOURCE SURVEY CHECKLIST

Today's Date _______

SURVEY_____ ADDENDUM ___ SITE EXAM____ DATA RECOVERY PLAN___ DATA RECOVERY__
HABS/HAER ___ Indicate HABS/HAER Level I, II, III _______________
IS THIS A ROLL-OVER PROJECT (Y/N) ____ IF YES, DATE PREVIOUSLY REQUESTED ________

TYPE OF SURVEY NEEDED:
ARCHEOLOGICAL:__ ARCHITECTURAL:__ BOTH: __ HISTORIC SETTING ANALYSIS ONLY: __

ANY PREVIOUS SURVEYS (Y/N) _____ IF YES, SURVEY DATE _______P.R. # _______

PIN (must have nine digits): FUNDING: FEDERAL ____ STATE ____

UNIQUE SITE NUMBER(S) (USN):

PROJECT BOUNDARIES: ROUTE: __ (give local name, e.g. CR18/Main St.)
FROM: TO:

MINOR CIVIL DIVISION(S) & COUNTY:

PROJECT DESCRIPTION & PROPOSED WORK: (include ROW acquisition & borrow, on-site detours, staging and temporary access areas) ____

ESTIMATED LENGTH: ESTIMATED WIDTH: (show impact area on project map)

ESTIMATED NUMBER OF BUILDINGS IN PROJECT AREA: ____________
ESTIMATED NUMBER OF BUILDINGS TO BE ACQUIRED/REMOVED __________

BRIDGE(S) - BIN, Year Built & Type:
____

RESULTS OF 2002 HISTORIC BRIDGE INVENTORY: Eligible__ Not Eligible __ Nat'l Register Listed__ Unevaluated__
NYSDOT Bridge Inventory Form Needed for Unevaluated Bridge(s):(Y/N) __

FEDERAL PERMITS REQUIRED: (include Nationwide) (Y/N)_____

DATE SURVEY NEEDED BY: (MONTH/YEAR)

PRESENT PROJECT STAGE: IPP____ SCOPING____ DESIGN____ SCHEDULED DESIGN APPROVAL _____

USGS QUAD OR DOT PLANIMETRIC (location map) MAP INCLUDED: (Y/N) ____
(include quad name and show project survey limits on map) ELECTRONIC MAPS AVAILABLE (Y/N) _____

TWO COPIES OF RECENT PLANS WITH PROJECT BOUNDARIES: (Y/N) ___ (Show cultural resource survey limits on plans)

ADDITIONAL COMMENTS:

REGIONAL CONTACT: TELEPHONE: EMAL:

TRIBAL CONTACT:

Form A Package: 4(+) Form A's - (2 SED, 1 SHPO, 1 EAB, + Tribal Contact(s) as applicable
4(+) Location Maps - (2 SED, 1 SHPO, 1 EAB, + Tribal Contact(s) as applicable
2 Project Plans - (SED)
2 WinBolts Screen - (SED)
4(+) Screening Information - (2 SED, 1 SHPO, 1 EAB, + Tribal Contact(s) as applicable

(revised 1/04)

APPENDIX F

NEW YORK STATE PREHISTORIC SITE INVENTORY FORM

NEW YORK STATE HISTORIC SITE INVENTORY FORM

NEW YORK STATE HISTORIC RESOURCE INVENTORY FORM

NEW YORK STATE HISTORIC DISTRICT FORM WITH INSTRUCTIONS

HISTORIC SETTING ANALYSIS GUIDANCE FOR
NYSDOT PROJECTS

NEW YORK STATE BRIDGE INVENTORY FORM
AND GUIDELINES FOR EVALUATING HISTORIC BRIDGES

NEW YORK STATE PREHISTORIC SITE INVENTORY FORM

For Office Use Only – Site Identifier: ___________________________________

Project Identifier:

Date:

Name:

Phone: (518) 473-1503

Address: Room 3122 Cultural Education Center
Albany, NY 12230

Organization (if any): New York State Museum

1. **Site Identifier(s)**:

2. **County**:
   City:
   Township:
   Incorporated Village:
   Unincorporated Village or Hamlet:

3. **Present Owner**:
   Address:

4. **Site Description (check all appropriate categories):**

Site:
☐ Stray find ☐ Cave/Rock shelter ☐ Workshop
☐ Pictograph ☐ Quarry ☐ Mound
☐ Burial ☐ Shell midden ☐ Village
☐ Surface evidence ☐ Camp ☐ Material in plow zone
☐ Material below plow zone ☐ Buried Evidence ☐ Intact occupation floor
☐ Single Component ☐ Multi-component ☐ Stratified
☐ Evidence of features

Location:
☐ Under cultivation ☐ Never cultivated ☐ Previously cultivated
☐ Pastureland ☐ Woodland ☐ Floodplain
☐ Upland ☐ Sustaining erosion

Soil Drainage: ☐ Excellent ☐ Good ☐ Fair ☐ Poor

Slope: ☐ Flat ☐ Gentle ☐ Moderate ☐ Steep

Distance to nearest water from site (approx.):
Elevation:

5. **Site Investigation** (append additional sheets if necessary):
   Surface Testing Date(s):
   ☐ **Site Map** (Submit with form*)
   ☐ **Collection**
   Subsurface Testing Date(s):
   Testing: ☐ **Shovel** ☐ **Coring** ☐ **Other**:
   Unit size:
   Number of Units: (Submit plan of unit with form)
   Investigator:
   Manuscript or published report(s) (reference fully)**:**
   Present repository of materials: New York State Museum

*** Submission should be 8 ½” by 11” if feasible**

6. Components(s) (Cultural affiliation and dates)**:**

7. List of material remains (be as specific as possible in identifying object and material):
If historic materials are evident, check here and fill out historic site form. ☐

8. Map References: Map or maps showing exact location and extent of site must accompany this form and must be identified by source and date. Keep this information to 8½" by 11" if possible.

USGS 7 ½ Minute Series Quad. Name:

For Office Use Only – UTM Coordinates: ____________________________

9. Photography (optional for environmental impact survey): Please submit 5" by 7" black and white print(s) showing the current state of the site. Provide a label for the print(s) on a separate sheet.

NEW YORK STATE HISTORIC SITE INVENTORY FORM

For Office Use Only? Site Identifier ____

Project Identifier:______________________________ **Date: ______________________________**

Your Name: ________________________________ **Phone: ______________________________**
Address:

Organization (if any):____

1. **Site Identifier(s): ______________________________**
2. **County: ______________________________________**
One of following ? City:
Township:
Incorporated Village:
Unincorporated Village or Hamlet:

3. **Present Owner: ________________________________**
Address: _______________________________________

4. **Site Description** (check all appropriate categories):
Structure/site:
Superstructure: complete___ partial___ collapsed___ not evident___
Foundation: above__ below__ (ground level) not evident____
Structural subdivisions apparent___Only surface traces visible ___Buried traces___Undetected ____

List construction materials (be as specific as possible):

Grounds: Under cultivation __ Sustaining erosion ____ Woodland _______ Upland ___
Never cultivated ___ Previously cultivated __ Floodplain ____ Pastureland___
Drainage: excellent __ good___ fair ___ poor ____
Slope: flat___ gentle___ moderate___ steep___.
Distance to nearest water from site (approx.): _m (ft)
Elevation: _m (ft).

5. **Site Investigation** (append additional sheets, if necessary):
Surface Testing date(s):
Site Map (Submit with form*):
Collection:
Subsurface Testing date(s) :
Testing: shovel__ coring___ other __ unit size___________
Number of units ____________________ (Submit plan of units with form*)
Excavation: unit sizes ___ no. of units ___ (Submit plan of units with form*)
* Submission should be 8"x ll", if feasible
Investigator:
Manuscript or published report(s)(reference fully):
Present repository of materials:

6. **Site inventory:**
a. Date constructed or occupation period:
b. Previous owners, if known:
c. Modifications, if known:
(append additional sheets, if necessary)

7. **Site documentation:** (append additional sheets, if necessary):
a. Historic map references
1) Name __ Date ___ Source __.
Present location of original, if known ____.

b. Representation in existing photography:
1) Photo date ____ Where located
2) Photo date _____ Where located _______

Primary and secondary source documentation (reference fully):____

d. Persons with memory of site:
1) Name_____________________________ Address____________________________________
2) Name _____________________________ Address ___________________________________

8. **List of material remains other than those used in construction** (be as specific as possible in identifying object and material):

If prehistoric materials are evident, check here and fill out prehistoric site form.

9. **Map References:** Map or maps showing exact location and extent of site must accompany this form and must be identified by source and date. Keep this information to 81/2 by 11 inches if possible.

USGS 7.5 Minute Series Quad Name:____

For Office Use Only--UTM Coordinates: _______________________________________

10. **Photography** (optional for environmental impact survey):
Please submit a 5"x 7" black and white print(s) showing the current state of the site. Provide a label for the print(s) on a separate sheet.

HISTORIC RESOURCE INVENTORY FORM

For NYSDOT Projects

(NYS Education Department Cultural Resources Survey Program Work Scope Specifications, Section I.C. (January 1998)

OFFICE OF PARKS, RECREATION, HISTORIC PRESERVATION
NEW YORK STATE
Bernadette Castro
Commissioner

NYS OFFICE OF PARKS, RECREATION
& HISTORIC PRESERVATION
P.O. BOX 189, WATERFORD, NY 12188
(518) 237-8643

OFFICE USE ONLY

USN:

IDENTIFICATION

Property name (if any) ____________________

Address or Street Location ____________________ Rural Fire Number ____________________

County ____________________ Town/City ____________________ Village/Hamlet: ____________________

Original use ____________________ Current use ____________________

Architect/Builder, if known ____________________ Construction Date* ____________________

DESCRIPTION

Please check those that are applicable

Exterior Walls: G wood clapboard G wood shingle G vertical boards G plywood G stone
G brick G poured concrete G concrete block G vinyl siding G aluminum siding
G cement-asbestos
G other: ____________________

Roof: G asphalt, shingle G asphalt, roll G wood shingle G metal G slate

Foundation: G stone G brick G poured concrete G concrete block

Alterations: ____________________ Date(s)(if known): ____________

Condition: G excellent G good G fair G deteriorated

Associated Building: G garage G silo G privy G shed G barns
G carriage house G other ____________________

Landscape Features: G gardens G pond G mature trees G slate sidewalks
G fountain G hitching post G carriage steps G walls G historic marker (describe narrative)
G well G mile post G monument/sculpture
G other ____________________

Prepared by: ____________________ **Address** ____________________

Telephone: ____________________ **Email** ____________________ **Date** ____________________

PIN: ____________________ **Organization:** ____________________

Building Surroundings: G open land G woodland G scattered buildings G densely built-up

G commercial G industrial G residential G agricultural

G other ____

Photos:
Provide clear, original color photographs of the property recommended for National Register eligibility. Submitted views should represent the property as a whole and its relationship to the road. Include general setting, outbuildings and landscape features.

Maps:
Maps included in the survey report will indicate the location of the property in relationship to streets, intersections or other widely recognized features so that the property can be accurately identified. Photo angles and location of the properties will be shown on these maps.

Narrative Description of Property: Briefly describe the property's location (e.g., north side of NY 17, west of Jones Road); a general description of the building, structure or feature including such items as architectural style (if known), number of stories, type and shape of roof (flat, gabled, mansard, shed or other), and materials. Describe in detail the property's setting and contributing landscape features. (use additional space as needed)

Narrative Description of National Register Eligibility: Briefly describe those characteristics by which this property meets the National Register eligibility criteria. The narrative should support the eligibility recommendation, citing all specific National Register criteria that apply: **Associative Value (Criteria A & B)**: Properties significant for their association in or linkage to events (Criterion A) or persons (Criterion B) important in the past. **Design or Construction value (Criterion C)**: (use additional space as needed)

***Sources:** Include sources that document/support the construction date along with the National Register eligibility recommendations. This would include architectural guidebooks, interviews, articles, county histories, newspapers, oral histories, building cornerstones, previous Cultural Resource Survey reports, and primary sources (deeds, census records).

Historic Maps: Cite historic maps that document the property's history.

Other Sources:

NEW YORK STATE
OFFICE OF PARKS, RECREATION, HISTORIC PRESERVATION
Bernadette Castro
Commissioner

HISTORIC DISTRICT INVENTORY FORM

For NYSDOT Projects
New York State Education Department Cultural Resources Survey Program Work Scope Specifications

NYS OFFICE OF PARKS, RECREATION
& HISTORIC PRESERVATION
P.O. BOX 189, WATERFORD, NY 12188
(518) 237-8643

OFFICE USE ONLY
USN:

IDENTIFICATION

Name of District: ______________________________

Street / Route ______________________________

County: ____________ Town/City: ____________ Village/Hamlet: ____________

DESCRIPTION

Describe the location, physical characteristics (boundaries, topography, street pattern, building setback), building/property characteristics (function, dates of construction, styles, materials) and landscape (trees, sidewalks, street lamps, hitching posts, etc.). Identify whether existing street and landscape features reflect historic improvements, based on historic photographs, postcards, views, and maps.

Prepared by: ____________ Address ____________

Telephone: ____________ Email ____________ Date ____________

PIN: ____________ Organization: ____________

LIST OF INDIVIDUAL PROPERTIES

List and briefly describe each property in the historic district, including approximate date of construction, architectural style, and whether contributing or non contributing. Include landscape features that contribute to the district as a whole but are not necessarily associated with individual properties.

SIGNIFICANCE

Discuss how the historic district meets the National Register eligibility criteria. How does the district fit within the historic context and reflect historic events of the city/village/town (**Criterion A)?** Does the district have association with people important to the history of the city/village/town **(Criterion B)?** Are properties typical or outstanding examples of architecture/design for their respective era, and how do landscape features contribute **(Criterion C**)?

Period of significance ______________________________ **National Register Criterion/ Criteria**_______________________________

PHOTOS

Provide clear, original color photographs of each contributing property within the historic district. Submitted views should represent each property as a whole and its relationship to the street. Include general setting, outbuildings and landscape features. Streetscape views should capture significant physical characteristics of the district.

MAPS

Provide a quadrangle map or tax map showing the historic district location and boundaries. Project maps included in the survey report will more specifically indicate the locations of individual properties in relationship to streets, intersections or other widely recognized features. Photo angles will be shown on these maps.

SOURCES Typical sources include county and town histories, historic maps and images, historian interviews, previous Cultural Resource Survey Reports and Building Structure Inventories, architecture guide books and census records.

HISTORIC SETTING ANALYSIS GUIDANCE FOR NYSDOT PROJECTS

Following the principles of Context Sensitive Solutions, the design approach for projects in historic districts should incorpor understanding of the physical features that define and contribute to the significance of the district. This approach involves bo… preservation, to the extent possible, of existing historic resources, and creation of new features compatible with the historic character of the project area.

In order to avoid creating a false sense of history, the project design must reference the documented historic context of the specific time and place. Knowledge of site-specific context is achieved through focused research that includes detailed documentation and analysis of historic maps, local records, period illustrations, and historic photographs. This process will provide project designers with the necessary background to guide project development toward a context sensitive design.

This guidance is to be used by the SED when proposing an eligible architectural district or individual properties with large tracts of land. It can also be applied when requested by the Regional Cultural Resource Coordinator (CRC) for a known eligible or listed district.

Research Objectives:

? Identify and support contributing/non-contributing features.
? Look at historic maps and photographs to document the evolution of the town.
? What did the town look like at the turn of the century, in the 1920's and 1950's?
? Observe the town today. What historic features remain?
? What historic features have been lost?
? What historic features define the streetscape?
? Consider spatial relationships - open space, setback & density of buildings, scale.
? Describe the changes in setting, roadside features and streetscape elements.
? Determine & identify period(s) of significance for proposed district.
? Take photographic views showing current and historic views at same location.

Potential Sources:

? Maps – Sanborn Fire Insurance maps, DOT As-Built plans, Historic Maps and Atlases in chronological sequence (i.e. change over time)
? Images - Postcards, Photographs, Newspapers, Lithographs, Birds Eye Views, 19th century maps with inset views of prominent buildings and structures
? Documents – City/ village council or board minutes, Ordinances, Newspapers

Elements of Historic Setting**:**

? Street Widening/Narrowing
? Traffic Islands
? Street Width, Alignment and Intersection Configuration
? Building Setback and Density
? Surface Treatments - brick, cobblestone, bluestone, pavers
? Trees – planting scheme, species
? Curb Lines - extension, parking areas, curb material
? Street Lights - types, locations
? Street Furniture - benches, fountains, monuments, statues, clocks
? Traffic Islands
? Fences/ Walls - construction and material type, location
? Open Spaces - spatial relationship
? Walkways/ Crosswalks/ Sidewalks
? Boulevards, Planted Medians
? Driveways, Alleys
? Traffic Signals
? Signs & Street Markers
? Dates & Names Stamped in Concrete
? Awnings

Form A:

Historic Setting Analysis should be incorporated in the development of proposed National Register eligible districts by the SED. In addition, the CRC may request this analysis. The FORM A has been revised to include under TYPE OF SURVEY NEEDED a Historic Setting Analysis check off box to show this particular request. The CRC will provide a detailed description of proposed work (i.e. proposed intersection reconfiguring, sidewalk installation, tree planting, street widening or narrowing). The CRC should be contacted with questions about the project.

BRIDGE INVENTORY FORM
NEW YORK STATE DEPARTMENT OF TRANSPORTATION
DATE: ________________________ PIN:________________________BIN:__________________

PREPARER/AFFILIATION:____

EVALUATION APPLYING METHODOLOGY OF NYSDOT 2002 HISTORIC BRIDGE INVENTORY
National Register Eligible _____ National Register Criteria ____________________ Not Eligible ____

IDENTIFICATION

1. BRIDGE NAME(S): (if known) ____

2. TOWN/CITY/VILLAGE (MCD): _________________ _____HAMLET:________________________

3. COUNTY:____

4. FEATURE CARRIED (street, route no., railroad): ____

5. FEATURE CROSSED (river, highway, railroad): ____

6. YEAR BUILT: ________________________

DESCRIPTION

7. BRIDGE TYPE: ____

7a. Number of Spans: ______________ 7b. Length of Span(s): ________________________________

8. STRUCTURAL MATERIAL: a. timber ___ b. stone__ c. steel __ d. concrete __e. cast/ wrought iron _f. other ___
8a. Abutment Material: concrete__ stone faced__ laid-up stone ___ other______________________________

9. PHOTOS: (see attached)

10. INTEGRITY: a. list major alterations and dates (if known):

b. previous use ____________________ c. moved__ if so, when? ______________

11. RELATED BUILDINGS AND PROPERTY (check more than one if necessary): a. power house __ b. railroad station __ c. bridge operators house __ d. landscape features (specify) (i.e. stone walls, light standards) __________________________ e. other ______________________

12. BRIDGE SURROUNDINGS (check more than one if necessary): a. open land__ b. woodland__ c. scattered buildings__ d. densely built-up__ e. commercial__ f. industrial__ g. residential__ h. potentially eligible historic district ____ i. other___

13. OTHER NOTABLE BRIDGE FEATURES (e.g. aesthetic treatment, multiple spans, cantilevered):

14. HISTORIC IMPORTANCE/ ASSOCIATION (include plate information): Engineer or builder __________________

15. LOCATION MAP: (see attached)

NEW YORK STATE DEPARTMENT OF TRANSPORTATION
GUIDELINES FOR EVALUATING HISTORIC BRIDGES

September 2002

The recently completed statewide Historic Bridge Inventory resulted in evaluations of National Register eligibility for over 6,000 bridges built prior to 1961. During the early phase of the project, a group of bridges on the 5-Year Capital Program was identified and excluded from the inventory. Since that time, many of these bridges were individually evaluated; however other bridges that were subsequently taken off the program remain unevaluated. Additional bridges may be unevaluated due to an excluded owner (e.g. railroad), or if identified by the Historic Bridge Database under exclusion code 21: needs individual assessment.

These guidelines summarize procedures to apply the methodology developed under the Historic Bridge Inventory for an evaluation of National Register eligibility. The methodology for evaluation within the context of bridge type and sub-group is explained in greater detail in the report, *Evaluation of National Register Eligibility* (January 2002).
E = Consider eligible unless there is a significant integrity problem

COLLECT DATA FOR HISTORIC BRIDGE

- Identify Unevaluated bridge (WinBolts Historic card, Historic Determination field records eligibility status; bridges with Exclusion Codes 1, 6, 7, 8, 9, 10, 15, 19, and 20 do not require separate evaluation
- Gather data from WinBolts: Year built, bridge type, span length, material, etc. are found on Identification, Structural Details, and Spans Inventory cards)
- Conduct field investigation as part of Cultural Resources Screening or Survey
- Photograph bridge; note historic integrity, setting, bridge plate information

ANALYZE BRIDGE WITHIN SUBGROUP
Identify Bridge Type / Subgroup and Year Built

Arch Bridges
- Concrete Arches (deck and half-through)
- Masonry - E
- Steel - E

Beam and Girder Bridges
- Jack arches
  Plate girders
- Rigid frames
- Rolled beams
- Slabs
- T-Beams
- Timber beams

Movable Bridges
- Bascule - E
- Lift - E
- Retractile - E
- Swing - E

Truss Bridges
- Common: Pratt and Warren
- Uncommon - E: Baltimore, Bowstring Arch, Camelback, King Post, Lenticular, Parker, Pennsylvania, Unusual Configurations

Suspension Bridges - E

Does the bridge represent a rare or uncommon type?
The following sub-types are relatively rare, and should be considered eligible unless they have a significant integrity problem:
- Open spandrel concrete deck arch - E
- Half-through concrete arch - E
- Steel arch - E
- Movable - E
- Suspension - E
- Uncommon truss types - E

Assess Historic Integrity
To be eligible, a bridge must have sufficient historic integrity to convey its particular significance. An uncommon bridge type or rare surviving example of a type may have alterations and still be eligible, provided that the bridge retains the essential characteristics that convey its historic identity (e.g. 19th century stone arch; King Post Truss). Alterations that may affect the integrity of historic bridges include:

- replacement of original rail or parapet
- replacement of main structural members
- adding non-original, main structural members
- widening a bridge with new structural members
- adding a concrete veneer to the original masonry superstructure
- in-filling the underside of an arch rib or girder
- removing main members that were integral to the superstructure
- removing the superstructure
- lengthening a superstructure with additional spans

Were bridge plans standardized?
For bridge types associated with standardized plans, determine if the bridge pre-dates the standardization period. Standardized plans were developed for the following bridge types:

- **Concrete arch**

  Standardized plans for concrete arch bridges were developed ca. 1911 and came into widespread use in 1926. Filled spandrel deck arches built before 1911 (prior to standardization) or ca. 1911-26 (the early period of standardization) should be considered eligible unless they have a significant integrity problem. Post-1925 filled spandrel deck arches would not be eligible unless they possess special features.

  Due to their relatively small numbers, both pre- and post-standardized open spandrel deck arches and half-through arches would be eligible unless they have a significant integrity problem.

- **Beams/ girders**
  - **Pre-1929 Beam and Girder bridges**

    Following 1908, standardized plans were used with increasing frequency statewide and had taken firm hold by 1930. The date of standardization varies by subgroup: Jack arches 1920s; plate girders, rolled beams, and slabs, 1909; T-beams 1910. Pre-standardized bridges that retain their historic integrity may be eligible as uncommon or innovative examples, or as representative of the evolution of the type.

  - **Post-1929 Beam and Girder bridges**

    The implementation of standardized plans resulted in a large group of bridges that vary little from each other. Due to the ubiquity of post-1929 beam and girder bridges, they would be not eligible unless they possess a special feature or warrant special consideration for the following: bridges with historical associations; bridges with high artistic value; box girders (standardized after 1929); cantilever spans; continuous spans; prestressed concrete T-beams.

- **Pratt and Warren trusses**

  Standardization of plans for Pratt and Warren truss bridges began in 1908, and by 1926, were in widespread use throughout the state. As examples of pre-standardized or early standardized design, Pratt and Warren trusses built prior to 1926 would be eligible unless they have a significant integrity problem. Post-1925 Pratt and Warren trusses show little variation and are considered not eligible unless there is a significant variation, historical association, or high artistic value.

Does the bridge exhibit significant variations?

- multiple spans
- cantilever spans (beam and girder)
- continuous spans (beam and girder)
- prestressed concrete

Does the bridge exhibit artistic value or aesthetic treatment?
Aesthetic features may enhance a bridge's potential for National Register eligibility. Examples of aesthetic treatments that are present in the bridge population include:

- decorative portal
- decorative rail or parapet

- decorative panels
- masonry veneer
- decorative arch
- decorative tower or cable stays
- decorative lighting
- concrete modillions or added features

Does the bridge haven any Special Recognition factors?
These factors may contribute to potential eligibility under National Register Criteria A-1 or A-2.

- **Historical association**
  - Depression-era funding
  - association with an individual, memorial, or bridge marker
- **Considered historically important by local community**
  - town/ county historian, local historical society, preservation or ? friends? groups
- **Distinctive features or trends**
  - construction material such as timber or prestressed concrete
  - support system such as cantilevered

APPLY NATIONAL REGISTER CRITERIA

- **Evaluate National Register eligibility within context of subgroup**
  Eligible bridges should meet one or more of the following criterion:
  - A-1: associated with historic event(s) or activities
  - A-2: associated with historic trends
  - C-3: represents the work of a master
  - C-4: possesses high artistic value
  - C-5: demonstrates pattern of features common to a particular bridge type
  - C-6: demonstrates individuality or variation of features within bridge type
  - C-7: demonstrates evolution of a particular bridge type
  -
- **Consider whether the bridge may contribute to an eligible historic district**

DOCUMENTATION

- **Eligible bridges: Complete NYSDOT Bridge Inventory Form**

  Cultural Resources Screening - CRC should complete form; follow screening procedures
  - **Cultural Resources Survey** - SED should complete form; include in CRS Report
  - **Example of Suggested Wording**: Applying the methodology of the 2002 Historic Bridge Inventory, BIN 2226120 is eligible under National Register Criteria A-1, C-4, and C-6. Built in 1936, this multi-span, open spandrel concrete deck arch represents a significant variation of an uncommon bridge type. The decorative lighting and parapets represent high artistic values that enhance the design. The bridge is also significant for its association with historic events through Depression-era funding for construction.

- **Not Eligible bridges: No form needed**

  - **Cultural Resources Screening** - follow screening procedures
  - **Cultural Resources Survey** - include photograph only with other buildings / structures recommended Not Eligible
  - **Example of Suggested Wording**: Based on an application of the methodology developed for the 2002 Historic Bridge Inventory, BIN 1045680 is Not Eligible. Built in 1938, this Jack Arch bridge post-dates the implementation of standardized plans, and lacks a significant historical association or aesthetic treatment to distinguish it from the large population of this type.

SOURCES

WinBolts Historic Card / Historic Bridge Database

Evaluation of National Register Eligibility: Task C3 of the Historic Bridge Inventory and Management Plan. Prepared for the New York State Department of Transportation and Federal Highway Administration by Mead & Hunt, Inc.

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DRAFT PROGRAMMATIC AGREEMENT
HIGH SPEED RAIL EMPIRE CORRIDOR PROGRAM

ATTACHMENT F

Properties Exempt from Evaluation

This attachment defines categories of properties that do not warrant evaluation for National Register eligibility, unless deemed otherwise in the professional judgment of the qualified professional archaeologist or architectural historian, respectively. Exempted properties do not require documentation.

ARCHEOLOGICAL PROPERTIES (PRECONTACT AND HISTORIC) EXEMPT FROM EVALUATION

Based on an initial field survey, the following properties are exempt from further evaluation at the discretion of the PI:

- Isolated non-diagnostic prehistoric artifacts consisting of fewer than three items per 100 square meters;
- Isolated historic finds consisting of fewer than ten artifacts per 100 square meters (e.g., several fragments from a single glass bottle are one artifact);
- Refuse scatters less than 50 years old (scatters containing no material that can be dated with certainty as older than 50 years old);
- Features known to be less than 50 years old;
- Isolated refuse dumps and scatters over 50 years old that lack specific associations;
- Foundations and mapped locations of buildings or structures more than 50 years old with few or no associated artifacts or ecofacts, and with no potential for subsurface archeological deposits; or
- Building and structural ruins and foundations less than 50 years old.

PIs qualified in archaeology shall apply professional judgment as to the level of identification effort, in consultation with consulting Native American Tribe(s) where appropriate. This exemption process does not include archeological sites, traditional cultural properties, or other cultural remains or features that may qualify as contributing elements of districts or landscapes.

HISTORIC ARCHITECTURAL PROPERTIES EXEMPT FROM EVALUATION

The following types of historic architectural properties are exempt from evaluation and documentation:

1. Properties less than 50 years old at the time of the Phase I survey unless they may have achieved exceptional significance in accordance with NRHP Bulletin 22.
2. Properties moved within the past 50 years unless they are among the exceptions noted in “Criteria Consideration B: Moved Properties” of National Register Bulletin 15.

The historical architectural property types listed below may be exempt from evaluation and may not require documentation, based on the professional judgment of PIs qualified in the disciplines of history or architectural history.

Railroad Related Features:

- Railroad maintenance facilities, such as repair buildings and equipment storage structures
- Railroad communication and signaling systems
- Railroad structures such as grade separations, pedestrian overcrossings and underpasses
- Railroad fencing and other right-of-way features
- Access roads for railroads
- Railroad maintenance materials (e.g., ties, track, ballast, etc.)
- Railroad grades converted to other uses, such as roads, levees, or bicycle/pedestrian paths

Recent Transportation or Pedestrian Facilities:

- Light rail systems, including shelters, benches, and platforms
- Bus shelters and benches
- Airstrips and helicopter landing pads
- Vista points and rest stops
- Toll booths
- Truck scales and inspection stations
- City streets, alleys, and park strips
- Sidewalks, curbs, berms, and gutters
- Bike paths, off-road vehicle trails, equestrian trails, and hiking trails
- Parking lot and driveways

Highway and Roadside Features:

- Isolated segments or bypassed or abandoned roads
- Curbs, gutters, and walkways
- Highway fencing, soundwalls, guard rails, and barriers
- Cattle crossing guards
- Roadside, median, and interchange landscaping and associated irrigation systems
- Street furniture and decorations
- Signs and reflectors
- Parking meters
- Street lighting and controls
- Traffic lights and controls
- Highway operation control, maintenance, and monitoring equipment
- Telecommunications services, including towers, poles, dishes, antennas, boxes, lines, cables, transformers, and transmission facilities
- Utility services, including towers, poles, boxes, pipes, lines, cables, and transformers
- Oil and gas pipelines and associated control devices

Adjacent Features:

- Prefabicated buildings less than 50 years old not associated with permanent buildings or a historic district
- Fences, walls, gates, and gateposts
- Isolated rock walls and stone fences
- Telephone booths, call boxes, mailboxes, and newspaper receptacles

- Fire hydrants and alarms
- Non-Rail Markers,
- Signs, and billboards
- Fragments of bypassed or demolished bridges
- Temporary roadside structures, such seasonal vendors' stands
- Pastures, fields, crops, and orchards
- Corrals, animal pens, and dog runs

Movable or Minor Objects:

- Movable vehicles
- Stationary vehicles less than 50 years old or moved within the last 50 years
- Agricultural, industrial, and commercial equipment and machinery
- Sculpture, statuary, and decorative elements less than 50 years old or moved within the last 50 years.

These exemptions do not apply to properties 50 years old or older that could be important, nor do they apply to properties that may contribute to the significance of larger historic properties such as districts or landscapes.

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