



High Speed Rail Empire Corridor Program



2017 Service Development Plan with Errata



Department of
Transportation



FEDERAL RAILROAD ADMINISTRATION

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1.0 EXECUTIVE SUMMARY

Rail has long been important to New York's economy, and passenger trains have connected cities along the Empire Corridor since the early-1800s. The Empire Corridor from New York City to Buffalo and Niagara Falls is and has always been one of the most vital rail lines in the nation. The route between New York City and Albany-Rensselaer, offering 13 daily round-trips, is the third busiest intercity rail route in the nation. This passenger rail service is an important link among the cities and communities along the Corridor, providing transportation that uses energy effectively while delivering environmentally friendly public transportation between downtowns, and serving business and non-business travelers alike.

Given the Empire Corridor's importance, it is New York's vision to develop a modern intercity passenger rail operation that operates side-by-side with a modern, efficient freight rail network, without conflict and with broad economic benefits to passengers and shippers. On the Empire Corridor, upgraded passenger rail services can link the major cities across the state with high-quality, fast, frequent, and reliable transportation that can be competitive with automobiles, intercity bus services, and air travel. Improved Empire Corridor rail service can offer better mobility choices for passengers and an efficient system for moving goods and materials. An improved rail system will create jobs from the Port of New York to the Canadian Border as a vital part of our nation's freight rail network, while reducing our transportation carbon footprint and protecting the environment.

In the past 20 years, annual ridership on intercity passenger trains along the Empire Corridor has grown by over 500,000 passengers. Passenger trains along the Empire Corridor provide a convenient alternative to automobiles, reducing highway congestion. Recognizing the importance of intercity rail passenger service, New York has continually invested in new stations and vital infrastructure that has increased rail network capacity and provided passengers with modern facilities along the route. Carrying forward a vision for the future, New York has one of the largest state-supported programs for improving intercity rail passenger service in the nation, that has included installation of a second track between Albany-Rensselaer and Schenectady. New York has actively supported intercity rail passenger service on the Empire Corridor for over fifty years. It was one of the first states to add a state-supported train to the national network with restoration in 1974 of the train from New York City to Montreal, Quebec.

Rail service is an important component in New York's transportation network and the improvements outlined in the High Speed Rail Empire Corridor Program will initiate a new era of investments in the state's passenger railroad network. Enhancements to the intercity rail passenger network will complement the extensive commuter train system in the New York City metropolitan area that has become an integral part of lives of residents of 11 city and suburban counties served by the Metropolitan Transportation Authority (MTA). New York State-supported rail projects for both the Long Island Rail Road (LIRR) and Metro-North Railroad (MNR) have seen introduction of completely new fleets of electric multiple unit passenger equipment that was built in New York. This continual investment has created a reputation that New York commuter railroads are considered among the best and most reliable in the nation, with their focus on New York City at the heart of the Northeast Corridor. Now, investments as part of the High Speed Rail Empire Corridor Program will support rail as a modern, fast, and reliable part of the transportation network that spans the state from New York City to Niagara Falls.

As New York moves forward with its High Speed Rail Empire Corridor Program, with support from the Federal Railroad Administration (FRA), the state continues its commitment to supporting the

improvement of Empire Corridor intercity passenger rail service. This program lays the foundation for a greater level of investments and improvements than previously, continuing New York's 200-year legacy of supporting public transportation as far back as the Erie Canal and Mohawk and Hudson Railroad of the 1800s.

This Service Development Plan (SDP) outlines a series of short- and long-term investments to expand service and improve rail infrastructure across the state, building on a series of recent and ongoing projects sponsored over the past several years by the New York State Department of Transportation (NYSDOT). The plan is focused on delivering a set of program goals for New York State's High Speed Intercity Passenger Rail Program, that will move people and freight more efficiently along the Empire Corridor. This ensures that the corridor will continue to be a catalyst for business, jobs, and regional economic growth. Other critical components of the SDP focus on delivering world-class service that is safe for the communities served by the railroads, while preserving the environment and reducing carbon emissions. The SDP outlines how the New York rail system will meet the program's goals and demonstrates what can be achieved through a constructive partnership among federal, state, and local governments, private freight railroads, shippers, local business, and intercity rail passengers.

This SDP outlines in detail how the rail system is to be improved, how new services will be operated, funding needs, equipment requirements, and management systems to guide 25 years of continued investment. Chapters 2 and 3 provide background and explain the rationale for the program. Chapter 4 reviews alternatives considered during the National Environmental Policy Act (NEPA) process. Chapter 5 explains the development of the SDP and explores ridership trends. Chapter 6 discusses how the service will be operated, including equipment requirements, schedules, and travel benefits. Chapter 7 provides the phased sequence of capital projects that will be constructed over a 25-year period to accomplish the program, and the funding requirements. Chapter 8 explains funding and management of the work. Chapter 9 assesses the benefits expected to result from program implementation.

The program's benefits are extraordinary. Investment in intercity passenger rail and high speed rail is motivated by the desire to realize direct passenger benefits associated with faster, safer, and more reliable travel, and broad-based community benefits of improved environmental quality, reduced air and highway congestion, and economic development. Passenger rail improvements create economic impacts in the form of travel time savings for rail users, reduced congestion on other transportation modes, and regional productivity gains resulting from more efficient access to larger labor and trade markets. These savings cascade through the economy, creating jobs, increasing overall economic activity, and raising personal income.

The program requires the phased expenditure of \$7.323 billion over 25 years, to continually grow track and signal capacity and straighten sharp curves to support higher operating speeds.¹ The program would add 283 miles of new passing track and 39 miles of new fourth track and upgrade antiquated signal systems, greatly increasing operating flexibility for both freight and passenger trains. Stations are to be upgraded a modernized and station sidings expanded, adding platform flexibility and capacity so that trains no longer stack at stations while awaiting platform space.

For travelers, the 9 hour 6 minute New York City-Niagara Falls trip would be cut by 1 hour and 30 minutes, to 7 hours and 36 minutes. The greatest share of this travel time savings would occur between Albany and Niagara Falls, where current passenger/freight train conflicts are most

¹ The Tier 1 Environmental Impact Statement (EIS) evaluates a 20-year improvement program. The program is extended in this SDP to align work with past and expected future rates of spending of approximately \$240 - \$250 million annually.

frequent and severe. For this segment, travel times would improve by 75-80 minutes, from 5 hours 58 minutes to under 5 hours, a dramatic improvement. Schedule reliability – the percent of trains arriving on time at their final destination – would improve from fewer than 80% of trains reaching their terminus on time to more than 95% doing so. Four new round trip trains would be added over the 464-mile length of the Corridor, bringing scheduled service from 13 to 17 daily trains between NYC and Albany – and introducing hourly service during weekday morning and evening peak periods² over this busy segment. Two of these 17 trains will take advantage of the new track improvements and, by servicing selected stops, offer for the first time a 2-hour trip run time between New York City and Albany, providing a new standard for High Speed rail. The additional 4 daily trains will increase service between Albany and Niagara Falls from 4 daily trains to 8 trains, a doubling of train frequency among the major upstate cities. Together, these improvements and additional service will make intercity rail far more attractive as an alternative to driving and flying. The program is predicted to attract more than one million additional annual rail trips by 2040³, for a total of 2.7 million annual trips; this would be nearly a 68% increase over the 1.6 million annual trips recorded for 2016.⁴

In addition to these direct travel benefits, the program will address pressing safety, environmental and energy concerns. By speeding trains and shifting more than one million travelers to rail from other modes, the program will reduce locomotive fuel consumption by over 500,000 gallons of diesel fuel, eliminate or avoid 67 million pounds of air pollutant and greenhouse gas emissions, conserve nearly 400,000 billion British Thermal Units (BTUs) of energy as travelers switch to more energy-efficient rail services, and avoid 117 roadway accidents. Over its 25-year implementation period, the program investments will create 55,676 job-years of employment, and the direct hiring of 150 additional rail system workers. Yet these investments will add only \$68 million in annual cost to operate and maintain Empire Corridor passenger rail service, while generating \$62 million in annual ticket revenues, increasing the line's operating deficit by only \$6 million annually (all costs in 2017 dollars). These direct travel and indirect benefits are quantified in Exhibit ES-1.

New York's economy and its communities have enjoyed the power and efficiency of a robust rail system for more than a century. As population and employment continues to grow, and as upstate cities evolve beyond their industrial origins to increasingly thought-content economies (education, medicine, technology), the importance of the rail system only increases. The program discussed in this report offers a cost-effective and efficient set of improvements that leverage past investments to grow local and regional economies, increase travel choices, and broaden job opportunities for half the state's 20 million residents.⁵ Through this program, New York can remain among the nation's pre-eminent economic engines while continuing to attract top talent and offer its citizens a high quality of life by continuing its strong rail orientation and building on past success.

² The weekday peak period is normally considered to be a facility's (or a line's) highest volume 3-hour use period, typically 6:30 – 9:30 a.m. and 4:00 – 7:00 p.m. (although this can vary depending upon travelers' use habits for a particular facility or service). This concept does not apply to Saturday or Sunday travel.

³ These data refer to one-way trips, one traveler making a single trip from an origin to a destination. The number of round trips would be half these values.

⁴ Although the Tier 1 Final EIS forecast one million additional riders over 20 years in response to a 90-minute total travel time savings, this SDP recognizes a 25-year period and slightly greater travel time benefits (94 minutes), including four minutes of additional time savings from double-tracking the Schenectady-Albany single track segment that was not considered in the Tier 1 EIS. Applying travel and cost elasticities from the demand forecasting model to the additional four minutes of travel time benefit generates 83,000 more riders, for a total of 1.083 million one-way trips.

⁵ Based on 2010 Census and counted population 2011-2015;
<http://population2016.com/population-of-new-york-in-2016.html>.

Exhibit ES-1 Benefits of High Speed Rail Empire Corridor Program

Benefits (5-Year Periods)	Years 1-5	Years 6-10	Years 11-15	Years 16-20	Years 21-25
Travel Time Savings per Train Each Year, Summed over 5-Year Periods (minutes)	10	36	14	10	24
Cumulative Totals	10	46	60	70	94
Total Minutes of Delay Saved Each Year, Summed over 5-Year Periods (minutes)	35,272	10,120	7,328	14,657	18,490
Cumulative Totals	35,272	45,392	52,720	67,377	85,867
Ridership Increase Each Year, Summed over 5-Year Periods (one-way trips)	221,952	393,536	122,695	87,564	257,674
Cumulative Totals	221,952	615,488	738,183	825,747	1,083,421
Mode Shift Fare Cost Savings Each Year, Summed over 5-Year Periods (dollars)	6,965,434	3,833,964	1,492,886	1,064,115	2,244,224
Cumulative Totals	6,965,434	10,799,398	15,600,624	13,356,399	15,600,624
Passenger Train Energy Savings Each Year, Summed over 5-Year Periods (gallons of diesel fuel)	174,011	132,015	56,243	51,167	103,332
Cumulative Totals	174,011	306,026	362,269	413,435	516,767

Benefits (5-Year Periods)	Years 1-5	Years 6-10	Years 11-15	Years 16-20	Years 21-25
Passenger Train Emissions Savings Each Year, Summed over 5-Year Periods (metric tons)	1,753	1,330	567	515	1,041
Cumulative Totals	1,753	3,082	3,649	4,164	5,205
Mode Shift Energy Savings Each Year, Summed over 5-Year Periods (millions of BTUs)	80,148	142,108	44,306	31,620	93,047
Cumulative Totals	80,148	222,256	266,562	298,182	391,229
Mode Shift Emissions Savings Each Year, Summed over 5-Year Periods (metric tons of regulated pollutants + greenhouse gas (GHG))	6,823	12,096	3,771	2,691	7,920
Cumulative Totals	6,823	18,919	22,690	25,381	33,301
Mode Shift Safety Savings Each Year, Summed over 5-Year Periods (accidents)	29	45	14	10	19
Cumulative Totals	29	74	88	98	117
Job Creation Each Year, Summed over 5-Year Periods (job-years)	9,419	10,134	11,541	12,190	12,494
Cumulative Totals	9,419	19,552	31,093	43,283	55,777

Benefits (5-Year Periods)	Years 1-5	Years 6-10	Years 11-15	Years 16-20	Years 21-25
Direct Employment Each Year, Summed over 5-Year Periods (rail system jobs)	24	42	31	29	47
Cumulative Totals	24	66	97	126,118	173

Key

Travel Time Savings per Train Each Year, Summed over 5-Year Periods (minutes)	The total scheduled minutes saved due to increased train speeds in each year for each train to which the travel time benefit applies, totaled over each 5-year period. Thus, in Year 1 there is no change in travel time for any Empire Corridor trains (no projects are yet completed); in Year 2 every train will gain 2 minutes more than in Year 1 (since all trains traverse the Empire Corridor South segment); in Year 3 every train will travel 2 minutes faster than in year 2; in Year 4 every train will travel 2 minutes faster than in Year 3; and in Year 5 every train will travel 4 minutes faster than in Year 4. The total effect of the Years 1-5 improvements is that every Empire Corridor train in Year 5 will travel 10 minutes faster than they did in Year 1. In Years 6-25, improvements ultimately producing an 84-minute additional time savings will be confined to the Empire Corridor West segment, and only the eight trains traveling beyond Albany to Niagara Falls and back will receive the travel time benefits for each year of improvements; the other 13 NYC-Albany trains will not see any additional travel time improvements.
Total Minutes of Delay Saved Each Year, Summed over 5-Year Periods (minutes)	The product of the reduction of train operating minutes for each train due to improved on-time performance (NYC – Niagara Falls) and the number of trains to which the reduction applies in each year, totaled over each 5-year period. Thus, if the improvement in on-time performance in a particular year results in a 3-minute reduction of delay for four weekday trains, and a 1-minute reduction of delay for nine other weekday trains, the total delay reduction over the entire year would be 5,460 minutes. Over five years, the reductions in delay accomplished in each of the five years are added together to express the reduction in delay at the end of the five-year period compared to the delay at the beginning of the five-year period.
Ridership Increase Each Year, Summed over 5-Year Periods (one-way trips)	The total increase in one-way trips by passengers for all origin-destination pairs (among 17 stations, including Saratoga) in a given year, totaled over each 5-year period. For example, in Year 3, the 2-minute travel time savings achieved through program improvements will draw approximately 55,219 new passengers (each making a single trip) from auto/bus/air to rail. ⁶

⁶ The same travel time savings may produce slightly different ridership gains in different years because the savings occurs at different areas along the Empire Corridor, with benefits flowing to different origin/ destination pairs with different base ridership values.

<p>Mode Shift Fare Cost Savings Each Year, Summed over 5-Year Periods (dollars)</p>	<p>Total fare costs saved by passengers switching to rail from other modes each year (auto mode uses \$0.17/mile + tolls; bus, air and rail use 2010 fares, inflated to 2017 on the basis of northeast Consumer Price Index; https://www.ssa.gov/OACT/STATS/cpiw.html), totaled over each 5-year period.</p>
<p>Passenger Train Energy Savings Each Year, Summed over 5-Year Periods (gallons of diesel fuel)</p>	<p>Gallons of diesel fuel saved due to the reduction in total minutes of delay for locomotives as a consequence of improved on-time performance, plus the reduction in total minutes of operation due to higher speeds, each year, totaled over each 5-year period. This metric is derived based on locomotives burning 70 gallons of diesel fuel per hour of operation (as an average value across all speeds, including stopped). Thus, if the program improvements in a particular year reduce delay by 6,000 minutes (100 hours), then the savings would be $100 \times 70 = 7,000$ gallons of diesel fuel saved. For Years 1-5, 35,272 minutes – or 588 hours – of delay are saved, and daily trains also receive annual travel time savings of (Year 1) 0 minutes, (Year 2) 2 minutes for all 26 trains, (Year 3) 2 minutes for 30 trains, (Year 4) 2 minutes for 32 trains, and (Year 5) 4 minutes for 34 trains, adding 113,880 – or 1,898 hours – of travel time improvement. The total time savings resulting from reduced delay and faster speeds is therefore 149,152 minutes, or 2,486 hours. This reduced time of operation yields a diesel fuel savings Years 1-5 of 2,486 hours \times 70 gallons/hour = 174,010 gallons.</p>
<p>Passenger Train Emissions Savings Each Year, Summed over 5-Year Periods (metric tons of regulated pollutants + GHG)</p>	<p>Metric tons of diesel-range pollutants + CO₂ emissions avoided in each year (based on 22.2⁷ pounds of CO₂ conserved for each gallon of diesel conserved), totaled over each 5-year period. Thus, for Years 1-5, given a savings of 174,010 gallons of diesel fuel, then $174,010 \times 22.2 = 3,863,037$ pounds of pollutants saved. As a metric ton is 2,204 pounds, this translates into 1,753 metric tons of pollutant emissions saved.</p>

⁷ Emission factors for diesel fuel were provided at https://www.epa.gov/sites/production/files/2015-07/documents/emission-factors_2014.pdf

<p>Mode Shift Energy Savings Each Year, Summed over 5-Year Periods (millions of BTUs)</p>	<p>Millions of British Thermal Units (BTUs) of energy conserved in each year (totaled over each 5-year period): the net of total additional energy used or conserved from increased rail operations and maintenance (increased) and reduced on-road operations and maintenance due to mode shift of travelers to rail. The Tier 1 Final EIS notes an overall reduction in energy consumption by Empire Corridor travelers of 391,227 million BTUs saved in 2035 due to full program implementation and the diversion of 1,083,000 trips from auto/bus/air to rail. Allocating this total savings on the basis of ridership diverted each year in response to gradual improvements in reliability and speed, an equivalent portion of the overall energy savings is assigned. The value in the Tier 1 Final EIS is derived from industry standard energy profiles for auto, bus, air and rail travel, with increases in rail energy consumption (due to more trains to carry more passengers) offset by decreases in energy use by auto/bus/air as travelers divert to rail. Thus, if the total energy savings is due to the diversion of 1.083 million trips from auto/bus/air to rail in 2035, then the proportion of that diversion represented by each year’s ridership gains (totaled over Years 1-5) applied to the total 391,227 million BTUs conserved yields the energy savings in that year due to mode shifts among Empire Corridor travelers. In Years 1-5, 221,952 trips – or 20.4% of the total 1.083 million trips diverted by Year 25 – are diverted from auto/bus/air to rail. Applying the 20.4% to the total 391,227 million BTUs saved over the entire 25-year program produces a result of 80,148 million BTUs saved.</p>
<p>Mode Shift Emissions Savings (metric tons of regulated pollutants + greenhouse gas [GHG])</p>	<p>Metric tons of emissions avoided for all regulated pollutants⁸ + CO₂ in that year (totaled over each 5-year period): the net of total additional emissions produced or avoided from increased rail operations and maintenance (increased) and reduced on-road operations and maintenance due to mode shift of travelers to rail (avoided). The Tier 1 Final EIS notes an overall reduction in energy consumption by Empire Corridor travelers of 33,188 metric tons of CO₂ saved in 2035 due to full program implementation and the diversion of 1,083,000 trips from auto/bus/air to rail. Allocating this total savings on the basis of ridership diverted each year in response to gradual improvements in reliability and speed, an equivalent portion of the overall energy savings is assigned. The value in the Tier 1 Final EIS is derived from industry standard energy profiles for auto, bus, air and rail travel, with increases in rail energy consumption (due to more trains to carry more passengers) offset by decreases in energy use by auto/bus/air as travelers divert to rail. Thus, if the total energy savings is due to the diversion of 1.083 million trips from auto/bus/air to rail in 2035, then the proportion of that diversion represented by each year’s ridership gains (totaled over Years 1-5) applied to the total 33,188 metric tons of CO₂ conserved yields the emissions reduction in that year due to mode shifts among Empire Corridor travelers. In Years 1-5, 221,952 trips – or 20.4% of the total 1.083 million trips diverted by Year 25 – are diverted from auto/bus/air to rail. Applying the 20.4% to the total 33,188 metric tons of CO₂ saved over the entire 25-year program produces a result of 6,799 metric tons of CO₂ saved. Adding the small amount of criteria pollutant emissions avoided (dwarfed by the amount of CO₂ generated burning diesel fuel) produces the result in the table of 6,823 metric tons of emissions saved.</p>

⁸ Regulated Pollutants include CO, HC, NOx, SOx, PM_{2.5}, PM₁₀, Ozone, Lead (Pb). Reductions in regulated pollutants are dwarfed by reductions in CO₂ due to cleaner engines and the conversion of 99% of diesel fuel to CO₂ during combustion.

<p>Mode Shift Safety Savings (accidents)</p>	<p>Total accidents avoided due to mode shift from auto/bus/air to rail in each year, totaled over each 5-year period. This metric is derived using data provided by the National Transportation Safety Board and other official sources for accidents per million passenger-miles of travel by air, bus, auto and rail. The accident rates used are:⁹</p> <p>Auto 1.602941802 accidents/million passenger miles Bus 0.203433744 accidents/million passenger miles Air 0.000046892 accidents/million passenger miles Rail 0.011235955 accidents/million passenger miles</p> <p>Employing these drivers, for each 100 passengers diverted to rail, and applying the diversion percentages derived from the travel demand forecasting model of 50/30/20 for bus/air/auto, and the average trip lengths among origin-destination pairs embedded in the 2010 trip table that is the basis for all travel demand forecasting associated with this program, the reduction in accidents is derived as $(50 \times 0.203433744 \times \text{the average trip distance}) + (30 \times 0.000046892 \times \text{the average trip distance}) + (20 \times 1.602941802 \times \text{the average trip distance}) - (100 \times 0.011235955 \times \text{the average trip distance}) = \text{the net accidents avoided for each 100 travelers diverted to rail.}$</p>
<p>Job Creation Each Year, Summed over 5-Year Periods (job-years)</p>	<p>Total job-years created across all economic sectors due to construction activity, increased rail operations (direct employment), and increased related economic activity (indirect employment) in each year, totaled over each 5-year period. Although the metric provides a final number in the 25th year, the additional job-years created by the 25th year of the program due to increased rail operations is perpetual, resulting in 2,702 additional permanent employees on the railroad system. A Transportation Economic Development Impact System (TREDIS) model was used to develop total economic activity flowing from rail improvement investments, across all economic sectors. A total of 55,777 total job years¹⁰ were predicted to result from the construction over the 25-year program term.¹¹ These were allocated proportionally by year on the basis of annual program investments accumulated in five-year segments.</p>

⁹ Multiple sources.

¹⁰ An analysis by HNTB resulted in an estimate of 2,129 job-years/year for the program at a \$6 billion funding level. Escalating this to \$7.323 billion and adding the job-years created due to the ripple effect of permanent railroad jobs added as infrastructure maintenance and operational needs expand, and then subtracting the direct rail jobs created to staff this infrastructure maintenance and operations produces the 55,777 job-years value attributed to the program.

¹¹ On a national standard, each \$1 billion of investment typically generates 7,700-8,100 job-years. Applying that metric range produces a range of potential economic impacts for the \$7.323 billion program of 56,378 – 59,316 job years created.

Direct Employment Each Year, Summed over 5-Year Periods (rail system jobs)	Additional rail jobs required to operate and maintain new infrastructure and additional trains, as needed in each year as improvements are built or new train service is added, totaled over each 5-year period. These were derived using industry-standard metrics of workers per unit of rail infrastructure (miles of track or number of switches, square footage of stations, per train crew requirements). For train crews, a distinction is made if trains are weekday only (two crews) or seven days a week (three crews). Train crew values also recognize contractual requirements for layover, hours of service limitations, and other factors that affect staffing requirements. Infrastructure maintenance staffing is a direct function of unit values, as maintenance staff are typically assigned to and pick jobs on a single-shift basis.
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2.0 INTRODUCTION

The Federal Railroad Administration (FRA) and the New York State Department of Transportation (NYSDOT) are completing a Tier 1 Environmental Impact Statement (EIS) that evaluates options for improving intercity passenger rail services along the 464-mile Empire Corridor between Pennsylvania (Penn) Station in New York City and Niagara Falls Station in Niagara Falls, New York. In 2010, NYSDOT received a grant from the FRA with which to develop alternatives for improving the Empire Corridor rail system, to conduct the evaluation of these alternatives pursuant to the National Environmental Policy Act (NEPA), and to prepare this Service Development Plan (SDP) for the selected alternative to describe its feasibility, costs, sources of funding, and operation.

The SDP serves as the business, institutional and organizational plan guiding implementation of the High Speed Rail Empire Corridor Program. The SDP lays out the approach for implementing proposed capital projects and higher-speed rail services that will meet the program goals outlined in the Tier 1 Final EIS. The implementation plan for the SDP requires the generation of a prioritized capital program, a ten-year financial plan, institutional and stakeholder arrangements and agreements, and a program management plan. The institutional arrangements will address asset owners, program sponsors, and railroad and stakeholder agreements defining roles and responsibilities for implementation of the proposed program and new and expanded service. The SDP is required for the program to be eligible to receive FRA funding. A completed SDP demonstrates to the FRA that the program has been defined in sufficient detail – and proven physically, financially, and operationally feasible – to be ready to progress to the implementation phase.

High quality transportation links between New York’s northern metropolitan areas and New York City have been key to its economic success for over 200 years. Past investments in the Erie Canal, railroads, the New York State Thruway (Thruway), and airports have played major roles in the growth and prosperity of the state. In each case, New York was a leader in recognizing the role of transportation in growing and sustaining the state’s economy.

New York has been planning to improve its intercity rail service along the Empire Corridor from New York City to Niagara Falls for more than 30 years. In the past 20 years, annual ridership on intercity passenger trains traveling on the Empire Corridor has grown by over 500,000 passengers, to 1.6 million in 2016. Recognizing this growth and the importance of the rail system to sustain it, the state has invested with increasing focus on the provision of high quality, fast, and efficient intercity passenger rail services – and the equipment, facilities, new development, jobs, and community revitalization that are a direct result – are statewide benefits. Further enhancements to the New York City-Niagara Falls rail network will complement the New York City metropolitan area’s already extensive commuter rail system, considered the best and most reliable in the nation. This rail network helps people in 11 counties live and work with less dependence on automobiles and more time for business and families, lower levels of traffic congestion, less air pollution, in denser and more walkable towns and cities oriented around train stations rather than highway interchanges.

With support from New York State, both the LIRR and Metro-North Railroad (MNR) have seen the introduction of new fleets of electric multiple unit passenger equipment that was itself built in New York. Future investments under the High Speed Rail Empire Corridor Program will build on these successes by creating a rail network spanning the state’s major cities from New York City to Niagara Falls. With Buffalo’s emerging resurgence as a post-industrial educational and

research center to Albany's development of a world-class nano-tech hub to Rochester's recalibration of its economy from film to optics, the key transportation linkages provided by the Empire Corridor are the backbone of the state's continued economic development among its major cities.

The benefits of increased state investment are obvious. New York has consistently invested in the MTA's commuter rail systems, providing critical support for New York City's continued growth and development as a world financial, science, educational, arts and business center. The result of years of investment in New York City metropolitan area mass transit is the largest, most reliable, and most intensively used commuter and subway network in the nation.

New York's intercity rail system needs a similar set of investments. The Northeast Corridor from Washington D.C. to Boston serves a critical megalopolis housing 15% of the nation's population and accounting for 20% of the nation's Gross Domestic Product. The Empire Corridor branch of this network plays the crucial role of joining New York's major cities of Buffalo, Rochester, Syracuse, and Albany to this economic hub, and must receive the focus appropriate to so important a resource. It is the Empire Corridor that enabled these cities to grow and prosper through the 20th Century, and that must continue to support their local economies through higher-speed service that broadens their economic bases, extends their reach, expands job markets, and facilitates business connectivity in a key economic corridor. Recent investments for improvements at Rochester, Albany, Niagara Falls, and Schenectady are already freeing passenger rail service from freight rail conflicts that have resulted in years of unreliable and slow service. Building on these initial investments, the state must add tracks and switches, upgrade signals, improve and modernize stations, expand platform space to add critical train capacity, smooth curves for higher speed, and remove one-track bottlenecks that delay passenger trains behind slower-moving freight trains. Only through a focused and comprehensive program of such rail improvements will New York be able to support the continued growth of upstate economies and, by extension, the economic fortunes of the state as a whole.

This SDP outlines such a program. After five years of careful analysis, NYSDOT has identified a suite of improvements that can be built with available and anticipated funding without interfering with existing passenger and freight services. It will confer gradual and continuing benefits to both passenger and freight services sharing the busy Empire Corridor section between Albany and Niagara. In so doing, it will bolster center-city renaissance while supporting key business and educational institutions and improve linkages between upstate towns and the capital and New York City.

The program will have broad benefits, improving freight and goods movement, train travel, the local and regional economy, town centers and surrounding communities, and the environment.

Moving More People and Goods

New York City metropolitan area transportation facilities are at capacity for large periods of every workday. The transport of people and goods by rail is one of the few remaining viable options for continuing to grow the City's and the State's economies. Rail freight volumes on CSXT and Canadian Pacific (CP) Rail will continue to grow, and only through carefully designed improvements in the existing right-of-way over which Empire Corridor trains and CSXT/CP Rail freight trains share tracks can these critical economic trends be sustained. The need to upgrade the track and signal infrastructure is immediate and pressing and must be addressed for New York to remain economically competitive.

The improvements outlined in this report will accelerate the movement of people and goods by rail, increasing reliability and decreasing trip times between major destinations for business travelers, students, and recreational travelers alike. In response, ridership is anticipated to grow significantly, from the 1.6 million current Empire Corridor passengers to 2.7 million after implementation of the full program.¹²

Travel time is expected to be reduced by 75-80 minutes between Albany and Niagara Falls, and between 10-15 minutes between Albany and New York City. Two of the 17 daily trains between New York City and Albany will bypass some stops in order to achieve a 2-hour travel time, a breakthrough that is expected to induce even more demand for passenger rail services on this already heavily traveled leg. Thousands of students and educators at colleges and universities in Albany, Syracuse, Rochester, and Buffalo will enjoy quicker and more reliable connections to research centers in New York City, broadening the reach of tech centers and analytical research and fostering continued evolution of upstate cities as major educational hubs. And more freight will be able to be moved on a “just in time” basis rather than “as scheduled,” reducing costs, simplifying supply chain logistics, and providing a competitive edge for New York businesses and manufacturing centers.

Catalyzing Economic Growth

New York’s origins as an industrial manufacturing center remain important today; the state was once the center of rail transportation technology and innovation. The remaining industries that are still tied to the rail network are a mix of advanced and traditional technology involving both blue- and white-collar labor forces. To provide the capital improvements, equipment and services proposed for the Empire Corridor in this report, 173 permanent jobs would be created to operate the rail system, and some 55,777 job-years of additional employment created in constructing and operating it over a 25-year implementation period.¹³ This economic infusion will be multiplied as dollars invested in the rail system play through upstate economies, fostering greater economic activity broadly beneficial to the entire Empire Corridor.

Revitalizing Communities

In addition to speeding main-line passenger and freight rail services, the program fosters improved intermodal connections in upstate cities. This intermodal access to local economic activity centers is central to local community revitalization, as it provides non-auto-based mobility solutions that free cities from auto dominance, opens downtowns to walkable environments, and propels greater community interaction centered around rail stations and their feeder bus and light-rail systems. As such, speeding of the Empire Corridor intercity passenger and freight services helps bolster in-city economic initiatives while linking upstate cities together and to the economic engine that is New York City.

Preserving the Environment

Investments in rail strengthen the environment, even as they help solidify communities and in-city economies. Rail is the most space and energy efficient means of moving people and goods, enjoys standard technologies long proven in service, and reduces air pollution and noise generated through other means of travel. Overall, investments in rail continue to repay significant

¹² Although the Tier 1 Final EIS forecast 1 million additional riders over 20 years, this SDP recognizes a 25-year growth period, and slightly greater travel time benefits (94 minutes rather than 90 minutes as per the EIS), resulting in slightly more ridership (1.1 million).

¹³ The long-term impact of 173 permanent rail system jobs continues past the 25-year analysis horizon. Construction jobs – and their multiplier effect on local economies – dissipate after completion of the program.

environmental and economic dividends measured in decades, propelling economic growth while preserving communities and the region from the environmental degradation that results from dependence on automobiles.

The High Speed Rail Empire Corridor Program outlined in this report does all of these things. It eliminates bottlenecks and chokepoints on one of the nation's most heavily used freight and passenger rail lines. In so doing, it will improve reliability from the current condition, where more than 20% of trains arrive late, to a dependable and consistently reliable service where more than 95% of trains can be expected to arrive on time. By renewing and modernizing stations and station track switch and signal systems, it increases platform capacity, allowing more trains to operate and to grow with increasing ridership. And it provides all these benefits while accommodating continued growth in the essential rail freight market on this central freight spine between Albany, Chicago and Toronto, and points west.

With completion of the environmental analysis of the corridor in the Tier 1 Final EIS, and with selection of the best alternative for accomplishing these critical mobility objectives, New York is poised to engage the program and to work with its transportation partners to make this vision a reality. The technology has been identified. And the need for action is fully evident. New York will now engage funding opportunities and work with the owners and operators of these freight and passenger services to begin delivering on a plan for fast, efficient, reliable, and attractive intercity rail services to benefit New York residents and businesses, in keeping with its laudatory history of continued rail-oriented economic development.

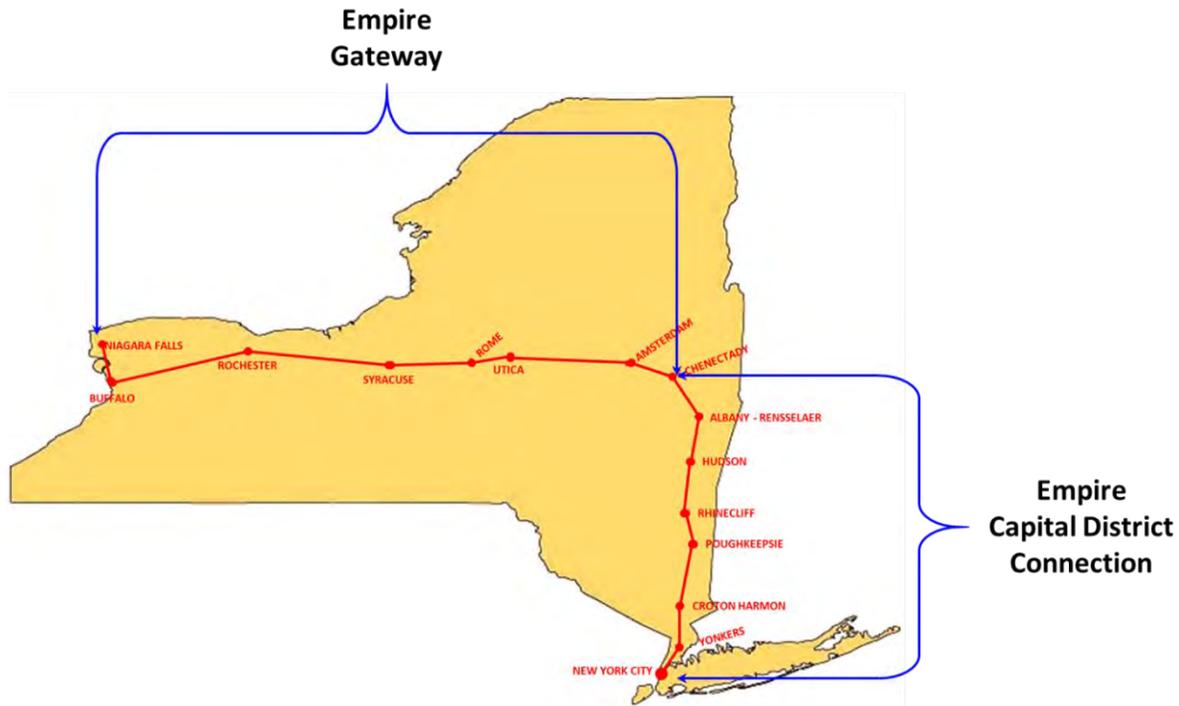
2.1 What is the Empire Corridor?

The 464-mile Empire Corridor is a rail network that links all of the State's major cities, extending from New York City's Pennsylvania Station north through Yonkers and Poughkeepsie to Albany, and turning west to travel through Schenectady, Rome, Utica, Syracuse, Rochester, and Buffalo to terminate at Niagara Falls. The Corridor consists of three main geographic segments which were defined in the Tier 1 Final EIS:

- **Empire Corridor South (ES)**, extending 142 miles north from Penn Station to just north of Albany-Rensselaer Station;
- **Empire Corridor West (EW)**, extending 294 miles west from approximately one mile north of the Albany-Rensselaer Station to just east of the Buffalo-Exchange Street Station; and
- **Niagara Branch (NF)**, extending 28 miles west from a point located just east of Buffalo-Exchange Street Station to Niagara Falls.

These project segments have been defined to support infrastructure project construction packaging and phasing, and to more precisely address stakeholder railroad ownership and operation. NYSDOT has recently redefined the Corridor as comprising two major segments: the **Empire Capital District Connection**, from New York City to Albany and Schenectady, and the **Empire Gateway**, extending west from Schenectady to Niagara Falls. These designations capture recent system improvements as they relate to travelers' daily experience. Exhibit 2-1 shows these designations.

Exhibit 2-1 Empire Gateway and Empire Capital District Connection Segments



In subsequent sections of this SDP, both naming conventions are used. For purposes of analysis of the rail system operation, the Corridor is subdivided into smaller segments, to aid understanding of service and infrastructure improvements as they involve different asset owner(s) and operator(s), and as they relate to future packaging of infrastructure upgrades. These sub-segments are as follows (Exhibit 2-2):

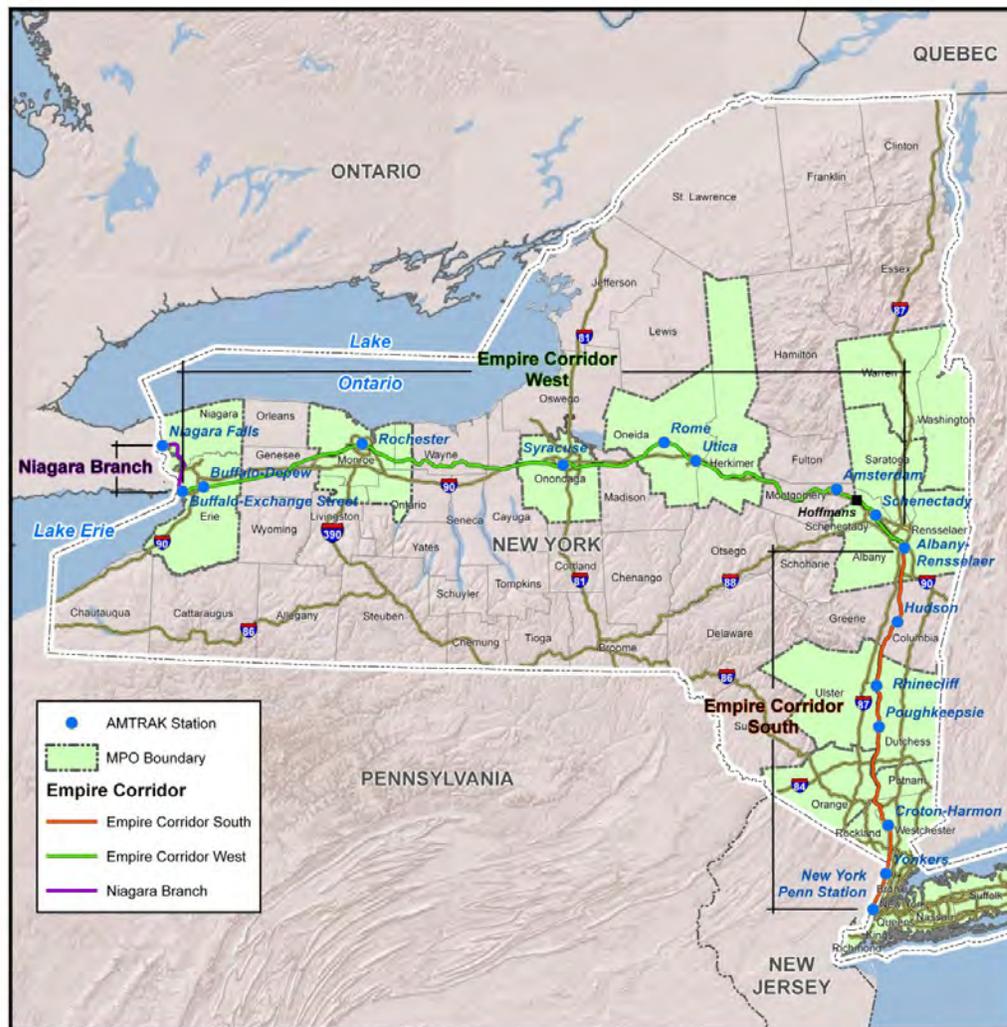
Exhibit 2-2 Empire Corridor Sub-Segments

Operating Segment	Primary Segment	Limits
West Side Connection	Empire Corridor South	New York City to Spuyten Duyvil Milepost 0 - 12
Lower & Mid-Hudson Valley	Empire Corridor South	Spuyten Duyvil to Poughkeepsie (CP75) Milepost 12 – 75
Upper Hudson Valley	Spans Empire Corridor South and Empire Corridor West	Poughkeepsie (CP75) to Hoffman's Milepost 75 – 169
Empire Corridor – West	Empire Corridor West	Hoffman's to Niagara Falls Milepost 169 – 464

2.2 Related Improvements

In recent years, NYSDOT has invested heavily in improved service and infrastructure upgrades for the Empire Corridor (Exhibit 2-3). As part of the original “Base” condition for the corridor¹⁴, NYSDOT identified a series of infrastructure enhancements that would relieve or eliminate significant bottlenecks and choke points along the Corridor, with estimated costs of approximately \$500 million (2015 dollars). To date, NYSDOT has already accomplished many of these projects, setting the stage for implementation of the Preferred Alternative that is the subject of this SDP.

Exhibit 2-3 Project Location Map



Among the improvements NYSDOT has completed are the following (project designations key to NYSDOT project lists)

- Hudson Line Signal Reliability; ES-3

¹⁴ See *Empire Corridor Tier 1 Final Environmental Impact Statement* for a complete description of the alternatives considered to improve service in the Empire Corridor.

- Hudson Line Highway-Rail Grade Crossing Safety Improvements; ES-1
- Albany-Rensselaer Station Fourth Track Capacity Improvements; ES-9
- Niagara Falls International Railway Station and Intermodal Transportation Center – New Intermodal Transportation Center; EW-13

In addition, projects funded and in construction include:

- Albany – Schenectady Double Track; ES-10
- Schenectady Station Renovation / Platform Improvements; EW-01
- Syracuse Track Configuration and Signal Improvements; EW-6, and
- Rochester Station Re-development / Operating Improvements; EW-19.

Together, these projects have and will continue to increase train speeds in the most heavily traveled sections of the Empire Corridor, increase capacity to enable more trains to operate without conflicts, and substantially improve schedule reliability. As such, NYSDOT's efforts since 2015 set the stage for the next wave of improvements needed to further upgrade passengers' experience and increase ridership. Some of NYSDOT's more prominent accomplishments to date are below.

Albany-Rensselaer Station and Track Improvements

Service on the Empire Corridor is anchored at Albany-Rensselaer Station. Track projects recently completed at this station included lengthening the platform to accommodate longer trains and the installation of a fourth station track. Signal and track improvements at Albany-Rensselaer now allow for the station to accommodate four passenger trains at platforms while also handling other yard movements and locomotive changes. Exhibit 2-4 shows the new Albany-Rensselaer Station with the recently completed improvements to the Interlocking CP 142 and installation of the fourth station track. This improvement increases platform and switch capacity, permitting more trains to operate through the station than previously.

Exhibit 2-4 Interlocking CP 142 and New Fourth Station Track at Albany-Rensselaer, New York



At Niagara Falls, a new state-of-the-art station has streamlined station operations and accommodation of passengers crossing the international border from Canada, including new facilities for the Department of Homeland Security used for screening of passengers. Exhibit 2-5 shows the new station. The station's new Custom and Immigration facilities allows passengers entering the United States from Canada to pass through customs more reliably.

Exhibit 2-5 New Niagara Falls Station



A new Rochester Station was recently completed. It will allow two passenger trains to serve the station on a new high-level platform, which will reduce conflicts and increase capacity of the CSXT's Rochester Subdivision. Another station project underway at Schenectady will provide a new station replacing a facility nearing the end of investment life. This new station at Schenectady will complement other improvements in the city with the opening of new tourist and art attractions in the area near the station location.

Also at Syracuse, interlocking and signal projects now under development will help improve operations for both passenger and freight trains. The Rochester station is shown in Exhibit 2-6.

Exhibit 2-6 New, recently completed station at Rochester



3.0 PROGRAM PURPOSE AND NEED

The purpose of the High Speed Rail Empire Corridor Program is to introduce higher passenger train speeds on the Empire Corridor and improve reliability, travel times, service frequency, and passenger amenities. The High Speed Rail Empire Corridor Program will improve passenger rail service along the corridor and, in so doing, attract additional passengers, increase travel choices, and contribute to a balanced, multi-modal transportation system.

Improved service along the Empire Corridor will better connect the principal population centers of western New York State with Albany and New York City, further enhancing connections to Northeast Corridor passenger rail service (Philadelphia and Washington) and other markets (Midwest and New England) and facilitating international travel to Canada. Its location within one of the most populated regions in the country, as well as its importance to national and international freight traffic, underscores the importance of the Empire Corridor to regional development. Providing time-sensitive and efficient service will, in turn, promote economic vitality, improve quality of life for residents, and reduce automotive travel and emissions.

3.1 Program Needs

The High Speed Rail Empire Corridor Program was undertaken to address two primary transportation and mobility needs:

- Reduce Infrastructure Constraints – eliminate chokepoints and bottlenecks where insufficient track, signal or station platform capacity impedes the ability of trains to progress along the right-of-way or causes conflicts between freight and passenger services sharing the same track(s); and
- Accommodate Existing and Projected Future Travel Demand - ensure the provision of attractive, cost-competitive, and modern passenger rail services to enable those wishing to travel by rail to do so, and to draw travelers from other, less efficient modes in response to speed and reliability improvements.

To address these two fundamental Corridor needs, the following program objectives were defined:

- Improve On-Time Performance (OTP), a key measure of schedule reliability;
- Reduced travel time;
- Increase service frequency;
- Increase ridership;
- Reduced dependency on automobiles in the corridor; and
- Minimize interference with freight rail operations.

By designing a program of projects and service improvements to accomplish these program objectives, NYSDOT intends to deliver cost effective, modern, efficient, reliable, and speedy passenger rail service over the entire Empire Corridor, leveraging anticipated population and economic growth to increase ridership, reduce local road congestion, support and focus downtown development, draw local investment to city centers, and thus strengthen New York's and the nation's economies.

3.2 Description of Transportation Network in the Corridor

Travelers along the Empire Corridor enjoy a robust transportation network, with train, bus, airplane, and automobile alternatives to access the Corridor's major destinations. These are described in the following sections.

3.2.1 Auto Network

During 2015, there were over 55 million automobile trips on the New York State Thruway between Exit 26 (Schenectady - Scotia - I-890 - NY Routes 5 and 5S) and Exit 50 at Buffalo/Niagara Falls - I-290. Travelers destined for the western cities of Syracuse, Rochester and Buffalo from New Jersey may also travel via I-80 west to I-81 as an alternative routing.

3.2.2 Bus Network

Along the Empire Corridor motor coach operations provide services between New York City, Albany, Utica, Rome, Syracuse, Rochester, Buffalo and Niagara Falls. These buses are generally less expensive than Amtrak services and are somewhat faster barring significant traffic on the major highways on which they rely. They are considered less comfortable than rail or air travel and are generally not preferred by travelers except for reasons of economy or for trips to destinations other than the central business district. Buses from New York City originate at the Port Authority Bus Terminal in midtown Manhattan, and typically confront high levels of traffic congestion entering and exiting the facility, and congestion and delay on the Hudson River crossings. Buses from Newark use the New Jersey Turnpike or I-80 depending upon their destination.

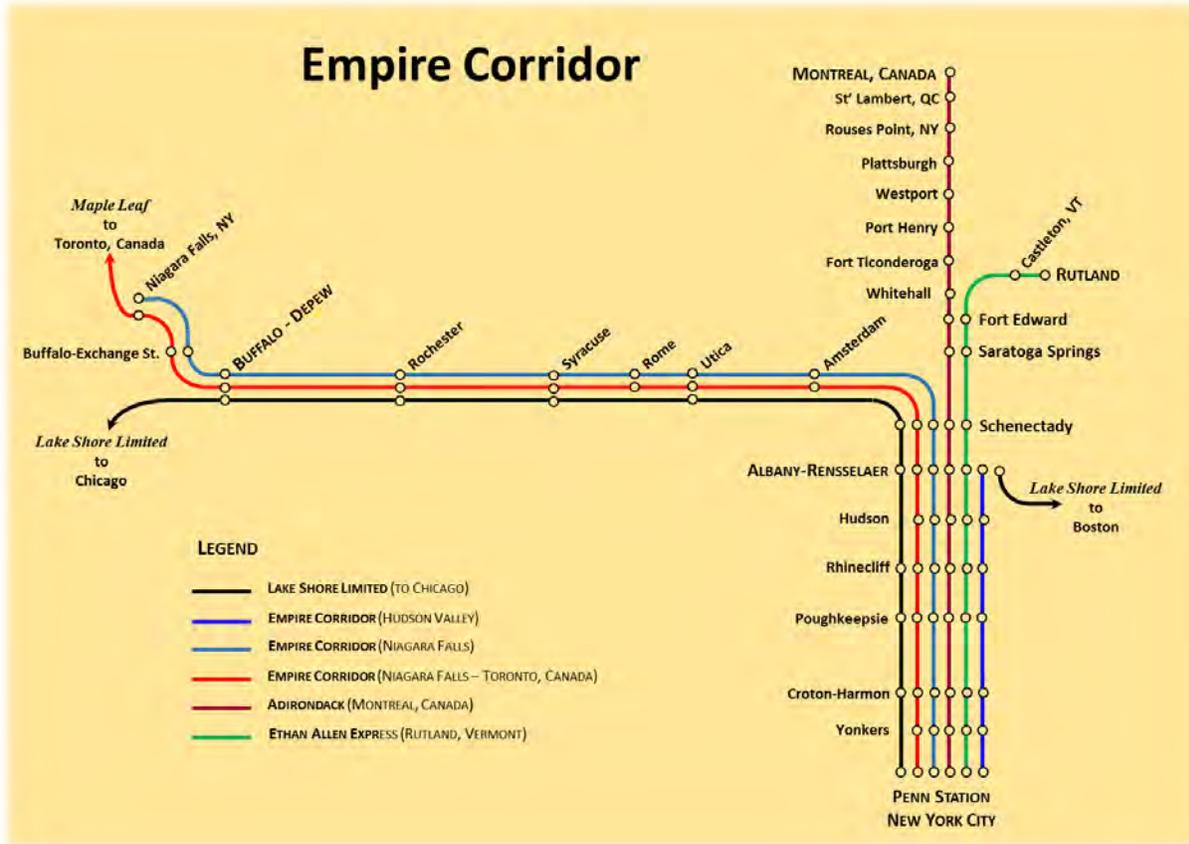
3.2.3 Air Network

Air service to Empire Corridor cities is available from New York City to Albany, Syracuse, Rochester, and Buffalo. Fares are significantly higher than those for either rail or bus, and airports require additional travel from central business districts by auto, bus, or ride-sharing services (taxi and Uber or Lyft-type services). There is currently no air service among the cities of Albany, Syracuse, Rochester, and Buffalo, as the trip distances are too short to justify air service, and flights cannot compete economically with available bus, rail, ride-sharing, auto and auto rental options.

3.2.4 Rail Network

NYSDOT contracts the operation of the Empire Corridor passenger rail service (Amtrak is the current operator). The route between New York City and Albany-Rensselaer, offering 13 daily round-trips, is the third busiest intercity rail route in the nation. The segment between Albany and Niagara Falls is owned by CSXT, a freight rail company, which allows Amtrak to run passenger service on shared tracks by contract with NYSDOT. The Empire Corridor is one of the primary freight routes between Boston and New York City, featuring favorable grades for train movements across the Appalachian Mountains to Buffalo, the Great Lakes, and to points in the Midwest and Chicago. Passenger trains serve the towns of Yonkers, Croton-Harmon, Poughkeepsie, Rhinecliff, and Hudson between New York City and Albany, and Amsterdam, Utica, Rome, Syracuse, Rochester, Buffalo, and Niagara Falls west of Albany. The rail network serving the Corridor is shown in Exhibit 3-1.

Exhibit 3-1 Intercity Rail Service Diagram for New York State

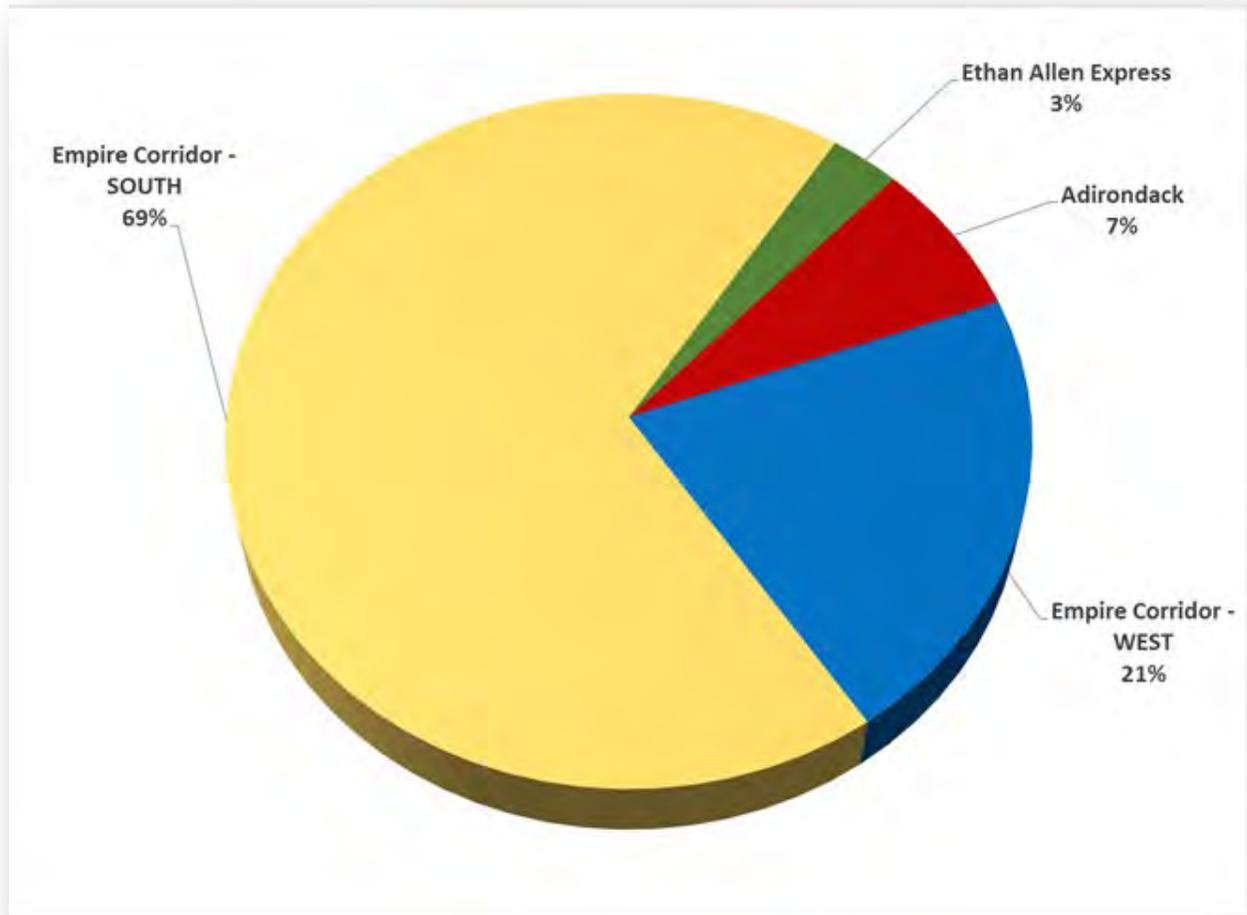


In addition to its primary New York City – Niagara Falls service, the Empire Corridor train system supports trains that travel beyond these boundaries. The Ethan Allen train runs northeast beyond Albany to Rutland, VT. Trains #63 and #64 (the “Maple Leaf”) are operated by VIA RAIL Canada from Niagara Falls, New York to Toronto, with U.S. and Canadian rail crews switching places at the border. Trains #68 and #69 (the “Adirondack”) are continuations of two Empire South trains that run north beyond Albany to Montreal, Canada, with the U.S. crews operating the trains over the entire route. The Lake Shore Limited runs west past Buffalo to Cleveland and Chicago, and east past Albany to Boston, Massachusetts. These services were included as part of the network simulation for the program, to ensure that the proposed train improvements are feasible, that the program can be delivered as intended, and that it will meet program objectives. These trains have also been recognized in discussions of ridership in the Tier 1 EIS and this SDP.

3.2.5 Rail Ridership Trends

The geographic distribution of ridership on the Empire Corridor is shown in Exhibit 3-2. The majority of the route's ridership is concentrated between NYC and Albany.

Exhibit 3-2 Empire Corridor Ridership by Segment



The route between Albany-Rensselaer and New York City is the third busiest rail route in the nation and is used by Empire Corridor trains as well as trains serving Montreal and Vermont. Ridership on the Empire Corridor has been growing steadily for the past decade, reaching 1.6 million passengers in 2016. As NYSDOT improves Empire Corridor infrastructure and services, Corridor ridership will continue to grow in response to faster trips and improved reliability.

4.0 ENVIRONMENTAL REVIEW PROCESS

To comply with the National Environmental Policy Act (NEPA), beginning in 2009, NYSDOT and FRA conducted a NEPA Scoping process and then developed a project Purpose and Need Statement and a series of higher-speed Empire Corridor rail alternatives that could provide improved Empire Corridor service, all documented in a Tier 1 Draft Environmental Impact Statement (Draft EIS circulated in 2014). The owners and operators of current freight and passenger rail services participated in the development of these alternatives in terms of operational feasibility and constructability. Subsequently, the impacts of these alternatives on local communities and the natural environment were assessed and compared, along with capital and annual operating and maintenance costs for each. Members of the general public, federal, state, and local agencies, and identified stakeholders (e.g., political jurisdictions, special purpose organizations, corridor owners and operators) were fully engaged in the development, assessment and comparison among these alternatives as members of the Empire (Corridor) Project Advisory Committee (EPAC). Four EPAC meetings were held during the Tier 1 Draft EIS process.

Formal public hearings were held in six cities across the state to explain the program and gather public input. Following the public hearings, a *Response to Comments* document was prepared. Finally, based on public comments received and the analytical findings, a **Preferred Alternative** (PA) was selected by NYSDOT. This PA is proposed in a Tier 1 Final Environmental Impact Statement (Final EIS) that is being published in parallel with this SDP.

The alternatives developed through the NEPA process were:

- **Base Alternative:** The slowest of the alternatives, the Base Alternative would constitute the current system improved through a series of basic upgrades that would be completed whether the Empire Corridor program advances or not. (Many of these have been completed at this writing; see Chapter 2 of this report.)
- **Alternative 90A:** This would involve a slight improvement over the Base Alternative, permitting some sections of the route to feature 90 miles per hour (mph) operation.
- **Alternative 90B:** This would involve a more significant improvement over the Base Alternative, permitting maximum speeds of 90 mph over a significant portion of the 464-mile route.
- **Alternative 110:** This would involve a modest improvement over the 90-mph Alternatives and permit some portions of the route to operate at 110 mph.
- **Alternative 125:** This alternative would involve an entirely new alignment designed for consistent 125 mph speeds.

Each of the alternatives were defined in terms of specific infrastructure and service improvements that would be made along the 464-mile Empire Corridor to achieve the higher speeds. These are described in the following section.

4.1 Base Alternative

The **Base Alternative** would maintain the current operating plan featuring thirteen round-trips between New York City and Albany-Rensselaer, with four trains continuing to Buffalo and three to Niagara Falls, in each direction. The **Base Alternative** comprises a series of supporting projects to improve the current level of service, including:

- Highway – Rail Grade Crossing Safety Improvements CSXT Hudson Line (MP75.8- 140): ES-1 (Completed)
- Improvements to the signal system and grade crossings between Poughkeepsie and Albany-Rensselaer: ES-3 (Completed)
- Installation of a second track from Albany to Schenectady: ES-10 (Completion in 2017)
- An additional fourth track in the Albany-Rensselaer Station: ES-9 (Completed)
- A complete renovation of the station building at Schenectady and other improvements: EW-01 (Construction Underway)
- Station improvements at Syracuse to reduce congestion between passenger and freight trains: EW-6 (Construction Underway)
- A new station building at Rochester: EW-19 (Completion in 2017)
- Niagara Falls Station – new intermodal Transportation Center: EW-13 (Completed)

4.2 Build Alternatives

All the **Build Alternatives** involve the addition of passing sidings and tracks, along with bridge replacements and station improvements. All require a replacement of the Livingston Avenue Moveable Bridge over the Hudson River between Rensselaer and Albany. The supporting projects for each of the **Build Alternatives** go beyond the initial improvements to be completed for the **Base Alternative**. These elements are shown in Exhibit 4-1.

Exhibit 4-1 Summary New/Improved Infrastructure needed for Alternatives¹⁵

Improvement/Addition	Alternative				
	Base	90A	90B	110	125
Miles of new mainline track	36	54	---	---	243 Double track
Miles of dedicated third track		10	283	283	10
Miles of dedicated fourth track		---	39	59	---
Miles of elevated track		---	---	---	56
Flyovers		3	2		---
Bridges (undergrade)	34	74	284*	284*	74*
Station Buildings	2	6	5	5	4
Station Facilities and Trackwork	4	6	11	11	9
Bridges (overhead)		90	90	---	---
Grade crossings	25	17	103	102	17

* Totals are for Empire Corridor West Only

4.2.1 Alternative 90A

Alternative 90A incorporates the **Base Alternative** projects and additional infrastructure improvements that reduce conflicts with freight services and improve reliability. This alternative will add 54 miles of track to the main line and 10 miles of additional third track in the Hudson Highlands (on right-of-way owned by Metro-North Railroad), and on right-of-way owned by CSXT between Amsterdam and Fonda, near Utica Station, at Syracuse and in the Rochester area. **Alternative 90A** is able to produce meaningful reductions in trip times by having trains bypass Rhinecliff and Hudson stations between New York City and Albany-Rensselaer, and Utica and Rome stations between Schenectady and Syracuse. As such, **Alternative 90A** offsets any gains in speed with losses of service to the less-heavily used stations. Further reductions in trip time would require additional track capacity that is not provided under this alternative to conserve cost. **Alternative 90A** permits 90 mph operation over significant portions of the Empire Corridor West right-of-way. The **Alternative 90A** includes the following infrastructure improvements:

- West Side Connection Spuyten Duyvil Second Track (MPs 9 to 13); SRP-1¹⁶
- Metro-North – Tarrytown; Pocket Track / Interlocking (MPs 23.8 to 25.0); SRP-2
- Metro-North New Signal System (CP 33 to CP 75) and (MPs 32.8 to 75.8); ES-12¹⁷
- Metro-North – New Third Track; (CP 53 to CP 63) and (MPs 53 to 63.5); SRP-3
- Metro-North Poughkeepsie Yard / Storage Facility Track / Signals (CP 71 to CP 75) (MPs 71 to 75.8); ES-13
- Rhinecliff Station Improvements (MP 89.2); SRP-11
- Hudson Line Reliability Improvements New Control Points; (CP 82, CP 99, CP 136) and (MPs 82 to 136); ES-05

¹⁵ High Speed Rail Empire Corridor Program, Tier 1 Draft EIS, Chapter 3: Exhibit 3-5; page 3-12

¹⁶ SRP means State Rail Plan.

¹⁷ ES means Empire Corridor South.

- Hudson Line Reliability Improvements Rock Slope Stabilization; (10 locations) (MPs 105.3 to 130); ES-04
- Hudson Station / Track Geometry Improvements (MPs 114.5 to 115); ES-14
- Livingston Avenue Bridge Replacement Project (MPs 143); ES-15
- Mohawk Subdivision – New Main Track (CP 169 to CP 179) (MPs 169 to 178.5); EW-14a¹⁸
- Mohawk Subdivision Congestion Relief (CP 175, CP 239 and CP 248) and (MPs 175 to 294); EW-05
- Amsterdam Station Improvements (MP 177.6); EIS-1¹⁹
- Belle Isle Capacity Improvements; (CP 290 to CP 293) and Syracuse Station Track Improvements; (MPs 290 to 294); EIS-6
- Rochester Subdivision - Reliability Third Main Track; (CP 373 to CP 382) and (MPs 373 to 382); EW-16
- Rochester Subdivision - Third Main Track; (MP 382 to 393); EW-20
- Buffalo Depew Station Improvements; (MPs 429.5 to 432.5); EIS-10
- Niagara Subdivision Double Track; (CP 17 to CP 22) and (MPs QDN17 to QDN23.8); EW-17
- Niagara Falls Maintenance Facility / Yard Improvements (MP QDN27); EW-18
- Niagara Falls Track Improvements; (MPs QDN25 to QDN28); EIS-12

4.2.2 Alternative 90B

Alternative 90B builds significantly upon the **Alternative 90A** and **Base Alternative** infrastructure improvements with a series of short- and long-range improvements, adding 283 miles of third track and 39 miles of fourth track to enable nearly complete separation of freight and passenger trains on reserved tracks.²⁰ Additional trains are added and serve all stations, producing meaningful trip time reductions. **Alternative 90B** allows 90 mph operation over most of the Empire Corridor West right-of-way. As Alternative 90B has been selected by NYSDOT as its **Preferred Alternative**, rather than list the supporting infrastructure improvements here, they have been organized into 20 segments (discussed in Section 7.0 of this SDP), to demonstrate detailed costing, phasing, and operational benefits over the 25-year life of the program.

4.2.3 Alternative 110

Alternative 110 builds on **Alternative 90B** and adds 20 miles of 4th track parallel to the existing freight tracks, providing a completely separate two-track passenger service and virtually eliminating any conflicts between passenger and freight trains between Albany and Niagara Falls. These improvements enable trains to attain a top speed of 110 mph, increasing average speeds

¹⁸ EW means Empire Corridor West.

¹⁹ EIS means High Speed Rail Empire Corridor Tier 1 Final EIS

²⁰ Freight and passenger trains can operate on non-designated tracks when necessary but would normally be confined to their designated track assignments.

over the corridor above what can be achieved with either **Alternative 90A** or **90B**. In considering **Alternative 110**, it is important to understand that CSXT, the owner of the right-of-way, requires for reasons of safety that the new 110-mph passenger train tracks be separated at least 30 feet from the existing freight tracks. In many places along the route, it is only possible to produce this separation by acquiring additional property beyond the existing footprint of the existing railroad right-of-way. In other places, even with the separate passenger tracks, it is not possible to achieve a 110-mph operation due to curves in the track alignment. Because of these encumbrances, **Alternative 110** produces its higher speed over a relatively small portion of the route. Because of the required property acquisition and the separation requirement, **Alternative 110** has higher costs than **Alternative 90B** while achieving only a modest improvement in overall performance.

4.2.4 Alternative 125

Alternative 125 would construct an entirely new two-track grade-separated electrified corridor (with overhead catenary wire for power delivery to the trains) between Albany and Buffalo dedicated to High Speed passenger rail service and would fall into FRA’s “Core Express” category. While offering the highest operating speeds, **Alternative 125** requires significantly more property to enable the creation of an entirely new rail right-of-way apart from the existing CSXT freight/passenger right-of-way used under all other alternatives. Around Albany, Syracuse, Rochester, and Buffalo, the new corridor would roughly parallel the existing corridor on a combination of new and existing right-of-way to provide express service (15 round trips) to existing stations in these cities. The existing four daily round trips to Buffalo (of which three continue to Niagara Falls) would be maintained on the existing right-of-way. Between Albany and Buffalo, the new corridor would follow an alignment designed to balance the competing demands of operating speed, cost and environmental impacts. Along Empire Corridor West, existing service to all existing stations would be maintained, but express service along **Alternative 125** would only be provided to Albany-Rensselaer, Syracuse, Rochester, and Buffalo Exchange Street stations. **Alternative 125** would not include station improvements proposed for **Alternatives 90B** and **110** for Utica, Rome, Amsterdam and Schenectady. **Alternative 125** is far more costly than any of the other **Build Alternatives** (more than double the cost of **Alternative 90B**). Overall, **Alternative 125** requires the highest level of public investment with the longest lead time for achieving beneficial use. It was estimated that with the environmental review process, construction and funding requirements, **Alternative 125** would take 15 years before the first segment between Albany-Rensselaer and Syracuse could be completed and operational.

4.3 Preferred Alternative

From an evaluation of the benefits, costs and impacts of the alternatives, **Alternative 90B** was determined to be the best means of achieving the program objectives and meeting the purpose and need for the program. Implementation of **Alternative 90B** can be phased over time, in line with available funding, and produce measurable improvements in both speed and reliability as the program advances. Accordingly, **Alternative 90B** was selected as the **Preferred Alternative** for the program.

The SDP for the **Preferred Alternative** employs a strategy of phased expansion of service frequency on the Empire Capital District Connection portion of the Empire Corridor from the current 13 round-trips to a total of 17 round-trips per day by year 5 of a 25-year implementation schedule. Overall, by the end of the fifth year of the program, all Empire Capital District Connection trains will save 10-15 minutes from the current 2-½ hour trip time between Albany-

Rensselaer and New York City; trip time for selected express trains would be reduced to 2 hours. Key elements of the **Preferred Alternative** include projects to deliver 110 mph operating speeds in areas north of Poughkeepsie, along with strategic upgrades on Metro-North Railroad south of Poughkeepsie to increase operating flexibility. The Capital District Connection serves over 90 percent of the Empire Corridor's total ridership, and the **Preferred Alternative** would provide hourly service at key travel times during the day over this segment, ensuring that the line keeps pace with anticipated ridership growth.

For the Empire Corridor Gateway, service frequencies would be increased from four daily trains to eight within the first five years of program implementation. Further increases in speed and improvements in reliability would emerge gradually over the subsequent twenty years as track and signal improvements eliminate bottlenecks and increase train throughput capacity over critical sections.

5.0 SERVICE DEVELOPMENT PLAN

The SDP demonstrates the physical and operational feasibility of the Preferred Alternative. It amplifies and expands information contained in the Tier 1 EIS to establish practical schedules for construction of its separate elements (bridges, signals, switches, tracks) and for the introduction of expanded service as system capacity is increased. The SDP shows how system performance can be improved as funding is provided for specific improvements aimed at eliminating bottlenecks, increasing separation between freight and passenger services, and improving stations. The SDP engages train simulations and detailed operational modeling to establish specific train operating solutions that advance towards program goals and objectives, continually improving service and growing ridership. The following sections explain the detailed technical methodologies employed during development of the SDP.

5.1 Strategic Considerations

The SDP (see Exhibit 5-1) addresses specific strategic considerations and operating strategies that serve as program drivers.

Exhibit 5-1 Service Development Plan Factors



Strategic considerations include:

- A **Concept of Operations** defines how the intercity rail passenger service will operate to achieve program objectives.
- **Service Standards** set minimum levels of performance to be achieved through program implementation.
- Establishing an **Appearance of the Service**, creates a “brand” or distinctive visual signature by which travelers can recognize and develop loyalty to the service.
- Recognizing available **Operating Resources** (personnel) defines how the service can be upgraded in terms of labor rules and availability.
- The availability of **Operating Assistance** and **Investment Funding** for rolling stock and infrastructure improvements controls the pace at which infrastructure improvements can be implemented.

These elements are discussed in greater detail later in this section.

5.1.1 Concept of Operations

A Concept of Operations is developed by identifying deficiencies in existing services and establishing feasible changes to services that will achieve the program objectives.

The Concept of Operations provides the framework for the development of the train schedules, providing a general approach to:

- **Schedule Format** – consistent arrangement of departure times for trains; use of memory patterns, the extent to which trains depart at the same time each day.
- **Frequency of Service** – days of operations for the trains, and route segments being served.
- **Headways** – periods of the day, when it will be advantageous for trains to operate on hourly or uniform time spacing between trains.
- **Stopping Pattern** – stations that will be served by each train and determining the load factor that can be achieved by offering express or local trains.
- **Capacity** – determine the number of passenger coaches required to meet ridership goals and evaluate consist formulation and operability based on the schedule.

From the program's Concept of Operations, an operating timetable is developed with supporting train schedules and the necessary operating plans, including Train and Engine Crews Assignments and Equipment Utilizations necessary to operate the railroad.

Key goals of the **Concept of Operations** include:

- Provide the seat capacity to keep pace with **Ridership Growth**.
- Increase corridor **Mode Share**.
- Support corridor **Economic Growth** and revitalization.
- Realize **Environmental Benefits** due to the shift of travelers from more polluting travel modes to less polluting and more energy efficient rail services.

5.1.2 Service Standards

Standards for service development:

- Defines the composition of trains with coaches and Business Class to accommodate anticipated ridership demands;
- Identifies the service amenities to be offered to passengers including seats, luggage storage areas, seat lighting, availability of Wi-Fi and lavatory design;
- Establishes the criteria for trains being assigned Café Cars as a component of the strategy to demonstrate the superiority of intercity rail service to other travel modes; and
- Identifies amenities offered to passengers at each station, including ticketing, bicycle storage and baggage handling and storage, wi-fi, parking, and rental cars.

5.1.3 Appearance of the Service – “Branding” the Service

Create a strong service identity and visual brand for the service and initiate activities to develop a culture focused on customer satisfaction. Build brand awareness through the consistent application of visual elements such as an identifying logo, graphic standards, colors, and personnel uniforms.

5.1.4 Operating Resources

Determine the availability of operating resources with a focus on:

- Certifying the availability of **Route and Track Capacity** to support schedules and running times for the operating timetable developed from the Concept of Operations;
- Identifying the **Operational Capabilities** of the existing Infrastructure and deficiencies preventing support of the operating timetable developed from the Concept of Operations, and the improvements necessary to rectify them;
- Determining the ability of **shops and yards** to support the planned service, identify deficiencies, and the improvements necessary to rectify them;
- Using the Equipment Utilization Plan, evaluating the potential of the existing **Rolling Stock Fleet** to operate the planned service, and determining further equipment needs; and
- Securing the **commitment of the host railroads** along the route to partner with NYSDOT in supporting the planned operation and identifying factors that must be addressed to avoid interference with host railroad (CSXT/Metro-North) operations.

5.1.5 Operating Assistance and Investment Funding

The Empire Corridor Program is built around an expectation of \$240-\$250 million annually for capital project design and construction, of which 80% will be sought from federal sources, and the balance provided by local, state and private investments. To deliver this level of funding, the following sub-tasks will need to be managed:

- Work through the FRA grant process to identify and solicit federal funding;
- Work with municipalities to coordinate local station-area funding with ongoing Empire Corridor program activities;
- Provide for additional funding where necessary to support operations and maintenance costs;
- Explore and develop private-public partnership opportunities for selected program elements; and
- Secure federal eligibility through MPO and NEPA processes for Empire Corridor projects.

NYSDOT will develop and maintain a program project list from which to drive funding requests to the FRA and other potential funding sources. This list will be meshed with the state budget process to ensure state funding is available to match federal funds that may be secured.

5.2 Operating Strategies

Operating strategies define the level and quality of service NYSDOT will deliver through the Empire Corridor Program. Choices as to train service and passenger amenities will dictate service costs and funding needs. From the Concept of Operations, NYSDOT will define these service attributes as a framework within which to structure the improved services. By dimensioning these service qualities, NYSDOT will define a railroad improvement program in concert with capital construction of projects to eliminate sources of delay and speed train operations. Chapter 6 of this report lays out the specific operating specifications for the proposed service, demonstrates its operational feasibility, and identifies how these drivers will be shaped to ensure the service meets the program needs. Some of the key elements to be included in defining its operating strategy include:

- **Service Plan** – A service plan outlines how trains will operate over the route, which and in what way communities and stations will be served by the rail system, station attributes and amenities, incremental and overall staffing requirements, and the intended positioning of the rail service in the transportation market.
- **Schedule** – The schedule establishes a detailed timetable of train frequencies and trip times, express or skip-stop and local services, and other time-related considerations by which customers can understand their choices in using the service. Defining a schedule establishes the intensity of use of the equipment, crew requirements, yarding and maintenance cycles to be employed, and the implications for shop activities.
- **Crew Assignments** – Crew assignments respond to the Schedule to ensure adequate coverage of all personnel functions in accordance with the Service Plan. Crew assignments must accommodate contractual requirements among rail craft unions and/or of contracted operators and must respect FRA hours of service limitations and other regulatory obligations. Crews are primarily the train and engine crews who operate the trains, along with station personnel as required to address station operating and maintenance requirements, parking operations, baggage handling and storage, ticket sales, and general station facility management and upkeep.
- **Equipment Utilization** – This feature of the SDP prescribes how locomotives and rail coaches will be assigned to achieve the maximum number of trips and capacity using the available equipment fleet in line with operating rules and preventive maintenance requirements. Train consist requirements, yard requirements, and preventive maintenance requirements all determine equipment needs to achieve a specific schedule and type and level of services offered.
- **Amenities** – It will be necessary to define amenities that will be offered to passengers including food and beverage services, choices of seating and accommodations, Wi-Fi, and other services, potentially extending to porter services, bicycle storage and baggage handling in stations and on trains, the provision of wi-fi services on trains or in stations, café and/or meal cars, quiet cars, and other features designed to provide competitive, attractive, and appealing service that wins ridership loyalty.
- **Revenue Policy** – It will be necessary to establish revenue goals that align with desired ridership intentions while also addressing operating and maintenance costs.
- **Customer Service** – A customer service program can range from simple coverage of trains and stations for minimal customer support to an airline-level service orientation. The

decision how to structure the customer service aspects of the service drive certain cost elements that must be addressed in financial planning.

5.2.1 Operating and Financial Performance

This system of oversight and monitoring establishes the measures by which the effectiveness of the program will be tracked. On the basis of these metrics, program progress can be measured and synchronized with funding and other factors, including:

- local support for specific project initiatives;
- operator and owner ability to accommodate projects on the basis of normal preventive maintenance activities; and
- availability of sufficient work windows, technical support, Force Account capabilities, and other support needs by system owners.

Of specific concern is economic performance for the program. This performance can be evaluated through tracking of ridership and revenue compared to forecasts. Achieving ridership and revenue goals are important objectives; while infrastructure improvements are important, the service must attract additional ridership and gain revenue to be successful. While many metrics may be tracked in monitoring implementation progress, key performance objectives of ridership and revenue give the sharpest picture of success and provide critical guidance in shaping subsequent program investments year by year.

5.2.1.1 Ridership

The desired ridership growth must be supported by the capacity to accommodate the new passengers, if the service is to realize the revenue increases gained therefrom. While travel demand forecasts are driven by a combination of train frequency and travel time, it is difficult to assign proportions of riders responding to either or both service qualities. Using cost and travel-time elasticities derived from current travel behavior in the corridor, ridership projections were generated on the basis of specific increments of increasing speed and additional train frequency. Applying these elasticities to increments of travel time improvement and increasing train frequency permitted an estimation of increasing ridership as system service is improved. This forecast projected 1.083 million additional one-way trips over the entire Empire Corridor upon completion of all improvements and attainment of speed, travel time and reliability goals.²¹ This estimate can be tracked to assess how well investments – and the resulting improvements in speed and travel time – are driving ridership growth over time.

5.2.1.2 Revenue

To the extent that additional trains and faster service drive ridership growth, and providing fares are managed properly with respect to competing travel modes, the program can be expected to generate revenue growth in line with projections. It is forecast that the total rail patronage resulting from program implementation will generate \$143 million in annual fare revenues by 2035, of which

²¹ *High Speed Rail Empire Corridor Program, Tier 1 Draft Environmental Impact Statement, Chapter 5: Section 5.6, Exhibit 5-13*

\$62 million would be due to new ridership.²² Using a method similar to that employed to estimate future ridership, it is possible to monitor incremental revenue increases as the program is implemented and adjust program implementation plans as necessary.

²² *High Speed Rail Empire Corridor Program, Tier 1 Draft Environmental Impact Statement, Chapter 5: Section 5.6, Exhibit 5-13*

6.0 SERVICE AND OPERATING PLAN FOR EMPIRE CORRIDOR PREFERRED ALTERNATIVE

The Service and Operating Plan demonstrates through simulation and analytics that the Preferred Alternative is operationally feasible, from the standpoint of train movements, crewing, equipment utilization and cycling, and passenger handling/management.

Beginning with the existing operation, the Service Plan offers specific data in terms of additional train service, coordinated movement of anticipated freight and proposed passenger train operations, stationing, platforming and dwell times, and yard and shop cycles to demonstrate how the service would work, at what cost, and with what revenue.

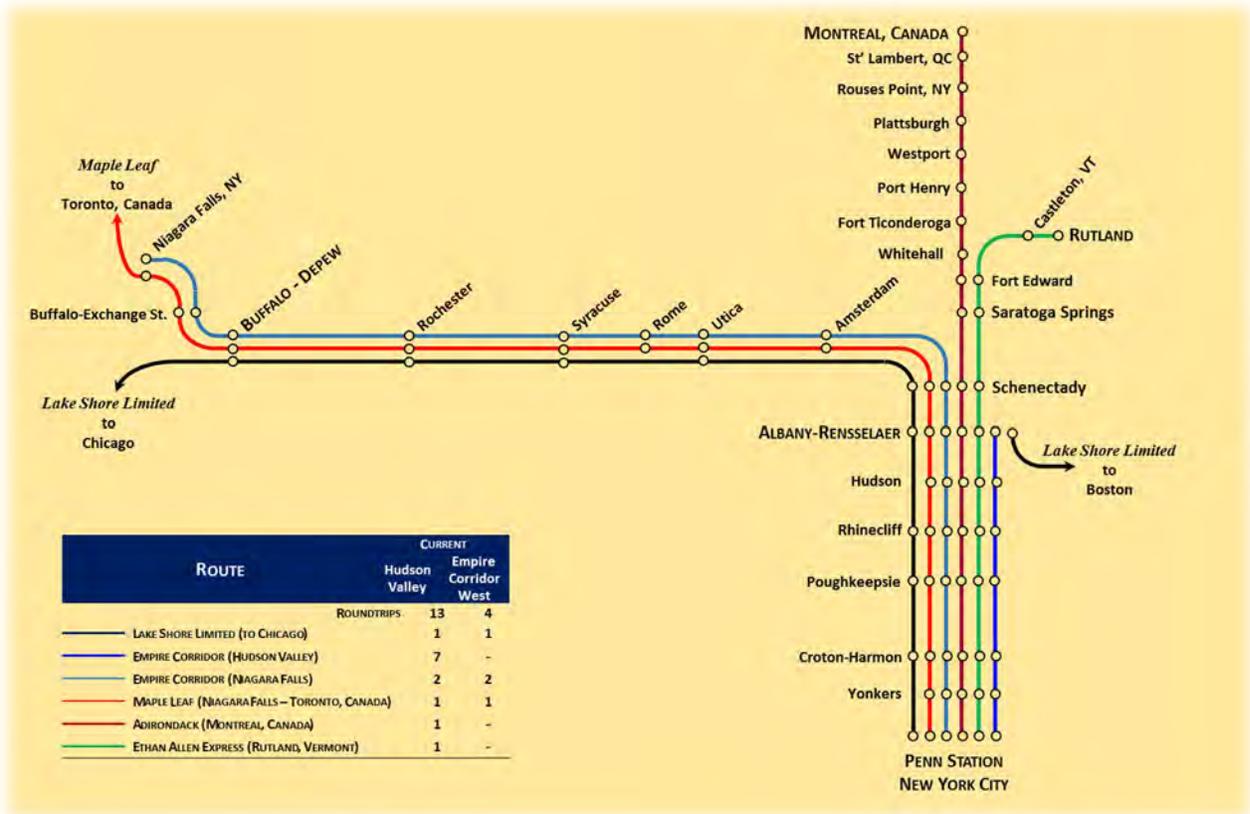
6.1 Existing Train Operation

Currently, the intercity rail passenger service is composed of a main trunk extending from New York City to Albany. At Albany-Rensselaer certain trains terminate their runs while other trains continue (or originate from Albany) to Rutland, Vermont; Montreal and Toronto, Canada; and Buffalo and Niagara Falls. From Buffalo, some “Lake Shore” trains continue to Chicago and points north and west. Exhibit 6-1 shows the distribution of trains and routes that make up the Empire Corridor.

6.2 Proposed Train Operation

The Preferred Alternative changes existing train service on both the Empire Corridor South and the Empire Corridor West segments, with its primary focus on additional service and meaningful trip time reductions. The major change is to add within the first five years of the program 4 daily round trip trains between New York City and Niagara Falls, increasing train service on the Empire Corridor South segment from 13 to 17 daily round trips, and on the Empire Corridor West segment from four to eight daily round trips. An associated goal of this additional service and the accompanying infrastructure improvements is to speed service and eliminate track bottlenecks on Empire Corridor South. This will enable a two-hour express service for certain trains operating between Albany-Rensselaer and New York City (the two-hour threshold is an important perceptual consideration in attracting travelers to this line). Supporting projects focus on upgrading portions of the line between Poughkeepsie and Albany-Rensselaer to 110 mph operation.

Exhibit 6-1 Empire Corridor and Distribution of Intercity Passenger Services



Other Empire Corridor South trains will see up to a 15-minute travel time reduction between New York City and Albany during the first five years, while the travel time for Empire Corridor West trains between Albany and Niagara Falls will shrink from 6 hours to 4-3/4 hours, a reduction of one hour and fifteen minutes. Additionally,

over the 25-year implementation time frame, the entire corridor will see an improvement in on-time performance from the current 80% or less to an anticipated 95.4%, due to the additional capacity allowing trains to pass each other rather than follow in sequence.

Operational improvements under the **Preferred Alternative** include:

- Increasing the number of round-trips between New York City and Albany-Rensselaer from the current 13 round-trips to 17 round-trips
- Increasing the number of round-trips on the Empire Corridor West to Niagara Falls from the current 4 round-trips to 8 round-trips
- Operating certain trains with a 2-hour trip time between Albany-Rensselaer and New York City. All other Empire Corridor South trains will achieve a 15-minute trip time reduction as part of an overall trip time reduction of 90 minutes over the entire run from Niagara Falls to Penn Station New York City. Trains from Empire Corridor West operating through Albany and into the Hudson Valley will be able to achieve greater trip time reductions, at least 75 minutes and potentially somewhat more.

- Improving reliability with an on-time performance target of 95.4 % by the time the program is complete, with significant improvements above current levels as program elements are constructed and bottlenecks and choke points eliminated.

6.3 Concept of Operations

In developing the train schedule for the **Preferred Alternative**, key factors are targeted in the Concept of Operations (numbered below and designated with the prefix, “C”):

- C-1** Achieve a 90-minute trip time reduction for trains operating between New York City and Niagara Falls;
- C-2** Achieve a 15-minute trip time reduction for trains operating between New York City and Albany-Rensselaer;
- C-3** Achieve a 2-hour trip time for designated trains in the Hudson Valley using the 110 miles per hour infrastructure that is part of the Empire Capital District Connection program;
- C-4** Operate an earlier morning train to Albany from New York City to arrive at 9:00 a.m., with a corresponding later evening return trip;
- C-5** Establish all-day hourly service between New York City and Albany;
- C-6** Inaugurate hourly service during mornings and afternoons from Schenectady as part of the completion of the Albany-Rensselaer to Schenectady Double Track Project;
- C-7** Introduce two new morning trains with returning afternoon trains serving Saratoga Springs as part of the Empire Capital District Connection;
- C-8** Operate trains on two-hour headway during daytime hours from Syracuse;
- C-9** Assign equipment to provide nine trains on the western portion of the corridor from Albany-Rensselaer; and
- C-10** Introduce a new morning departure that originates in Albany for Buffalo and Niagara Falls with a later afternoon return trip. This targets an important niche in the transportation market for the Empire Corridor not served by airlines.

6.4 Track Configuration and Operation Modeling

The track arrangements with notations of improvements in speeds for the High Speed Rail Empire Corridor Program EIS are included as Appendix B.

6.4.1 No-Build Track Configuration

The program must begin with the current infrastructure as it is improved with the projects outlined in the **Base Alternative**. As noted in Section 4.1, these include some recent improvements sponsored (and, in some cases, already completed or in currently construction) by NYSDOT.

NYSDOT has supported other improvements in the Hudson Valley (Empire Corridor South) that improve service reliability through installation of a new direct buried signal and communication cable as well as with extensive tie and rail renewal and roadbed surfacing, new grade crossing warning apparatus, and continual upgrading of the signal system. These conditions constitute the

pre-implementation condition and establish the base condition upon which the **Preferred Alternative** will further improve service capabilities and train operating capacity and speed.

6.4.2 Preferred Alternative Track Configuration

Supporting projects of the **Preferred Alternative** focus on upgrading portions of the line between Poughkeepsie and Albany-Rensselaer to 110 mph operation, where they are currently limited by geometry and/or signal controls to 80 mph.

The track configuration required for the **Preferred Alternative** is shown in Volume 2 of the High Speed Rail Empire Corridor Program EIS and is included for reference as Appendix B to this SDP. The required supporting infrastructure improvements for Empire Corridor South, as part of the Empire Capital District Connection, are outlined in Exhibit 6-2.

Exhibit 6-2 Empire Corridor South Infrastructure Improvements

Improvement	Addition
Total Miles of Additional New Track	22
Miles of New Third Track	19
Miles of New Fourth Track	3
Miles of Upgraded Track to 110 mph	108
Miles of Upgraded Track to 90 mph	3
New Interlockings	6
Miles of Upgraded Signal System	67
New High Level Station Platforms	2
Upgraded Bridges	10
Miles of Fence Improvements	42

The required supporting infrastructure improvements for Empire Corridor West are outlined in Exhibit 6-3.

Exhibit 6-3 Empire Corridor West Infrastructure Improvements

Improvement	Addition
Total Miles of Additional New Track	322
Miles of dedicated third track	283
Miles of dedicated fourth track	39
Flyovers	3
Bridges (undergrade)	284
Station Buildings	5
Station Facilities and Trackwork	11
Bridges (overhead)	90
Grade crossings	103

A further explanation of infrastructure improvements and implementation strategy is discussed in Chapter 7, Program Implementation.

6.5 Operations Simulation Modeling

To demonstrate operational feasibility for the **Preferred Alternative**, a series of network models were developed using Berkeley Simulations – Rail Traffic Controller, and the results are listed in Appendix D – Rail Network Simulation Report in Volume 3 of the High Speed Rail Empire Corridor Tier 1 EIS. They demonstrate a largely conflict-free operation with a high degree of schedule reliability upon completion of all program track, signal, bridge, and station initiatives contained in the Preferred Alternative.

6.5.1 Methodology

The methodology for developing the Operations Simulation models followed industry practices to produce data and reports that would support the development of the operating schedules and programs for the expanded passenger rail service, integrated with existing freight rail services. Deliverables from the Operation Simulation modeling for the **Base** and four **Build Alternatives** included:

- Train Performance Calculations
- Time + Distance (Stringlines)

Information from CSXT, Amtrak and MNR, including Employee Timetables, Operating Rule Books, Track Charts and Diagrams and Signal Control Line Drawings were used to develop a network model of the existing infrastructure that formed the foundation for the Base Alternative. Working from this Base Alternative scenario, modifications were made to the simulation model to represent additional tracks and switches that would enable greater operational flexibility between tracks, to support the operating requirements and characteristics for each Build Alternative. A test case was conducted using the Base Alternative model and the results validated to calibrate the model. The model was then used to develop the outputs used to develop schedules. Time + Distance Charts were then developed to identify any constraints in the operating plan and potential conflicts so corrections could be made to avoid any future challenges in operating the service for this alternative. Additional simulations and analysis were performed to determine any impacts on freight train operations and the determination of possible On Time Performance.

6.5.2 Results/Model Outputs: Preferred Alternative Operating Plan

Further results with supporting schedules for the **Base** and four **Build Alternatives** are included in Appendix D of Volume 3 of the High Speed Rail Empire Corridor Program Tier 1 Final EIS.

6.5.2.1 Time + Distance Charts

The supporting **Time + Distance Charts (Stringlines)** are included in Exhibit 6-4 for both east and westbound trains. These charts demonstrate the capacity of the improved Empire Corridor to accommodate the planned passenger and freight traffic in 2035 at the intended speeds of operation and headways. As such, the charts demonstrate that the system will run conflict-free under normal operating conditions.

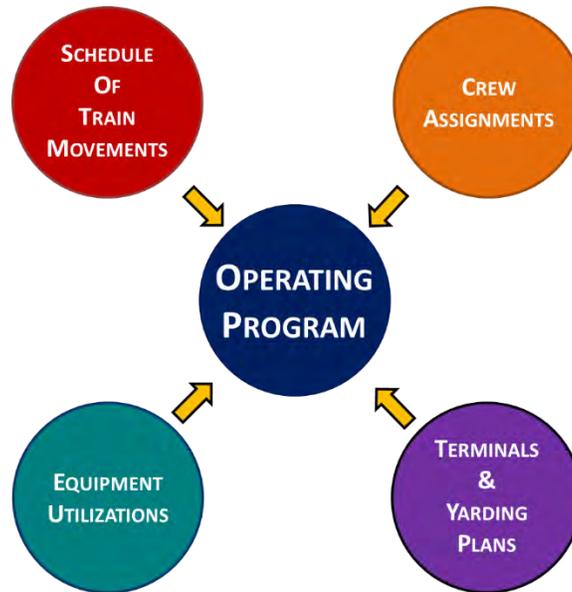
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6.6 Operating Program

The operating program for the Preferred Alternative is built from the Concept of Operations, as shown in Exhibit 6-5. It addresses the detailed requirements for overall system operations, including Crew Assignments, Schedules, Train Cycling Requirements and Equipment Utilization, and Terminal and Yarding Plans. These are described below.

Exhibit 6-5 Operating Program Components



6.6.1 Timetables

The timetable for the Preferred Alternative was built from the existing service on the Empire Corridor and was designed to incorporate the key improvements outlined in the Concept of Operations. These trains are numbered below as even (eastbound or southbound) and odd (westbound or northbound) and designated with the prefix 'C' (relating to NYSDOT's project management system), as follows:

C-1 Trains #'s: - 63, 273, 281, 283, 285, 287, 275 and 64, 270, 280, 282, 284, 286, 274

90-minute overall trip time reduction for trains operating between New York City and Niagara Falls

C-2 Schedule adjusted for all trains in the Hudson Valley, to achieve trip time reduction

15-minute trip time reduction for most trains operating between New York City and Albany-Rensselaer

C-3 Trains #'s – 273, 283, 234, 284 (NYC-Albany)

2-hour trip time for certain trains in the Hudson Valley, taking full advantage of the 110 miles per hour infrastructure that is part of the Empire Capital District Connection program.

C-4 Trains #'s - 231 and 272

Operate an earlier morning train to Albany from New York City to arrive by 9:00 a.m., with a corresponding later evening return trip.

C-5 Hourly service pattern established at Albany-Rensselaer from 5:00 AM to 8:00 PM with 18 departures and hourly service pattern from New York City from 6:15 AM to 7:00 PM with 16 departures; with two late evening trains to balance service with 18 trains in each direction.

Establish hourly service between New York City and Albany

C-6 Hourly service from Schenectady to Niagara Falls from 6:30 AM to 11:25 AM with 6 departures, and 7 arrivals from Niagara Falls to Schenectady from 4:50 pm to 8:50 pm.

Inaugurate hourly service from Schenectady during mornings and afternoons, as part of the completion of the Albany-Rensselaer to Schenectady Double Track Project

C-7 Trains #'s - 234, 238 and 237, 239

Introduce two new morning trains with returning afternoon trains serving Saratoga Springs as part of the Empire Capital District Connection.

C-8 Bi-hourly service pattern established with expanded fleet of locomotives and coaches

Operate trains on two-hour headway during daytime hours from Syracuse to New York City

C-9 Service pattern established

Assign equipment to provide nine trains on the western portion of the corridor from Albany-Rensselaer

C-10 Trains #'s – 271 and 274

Introduce a new morning departure originating in Albany for Buffalo and Niagara Falls, with later afternoon return trip. Designed to target important niche in the transportation market for the Empire Corridor that is not served by commercial airlines.

6.6.2 Schedules

The operating schedules are shown in Exhibits 6-6 and 6-7, and were developed to meet the following criteria:

- Meet the program goals for trip time reductions and expanded frequency of service.
- Achieve a 7 hour and 36-minute run time from Niagara Falls to New York City.
- Introduce trip time savings between Albany-Rensselaer and New York City.
- Maximize equipment and crew utilizations by introducing Syracuse as an intermediate terminal. The 4 hour and 50-minute run time from Syracuse to New York City is competitive with air service to mid-town Manhattan and has the capacity and trip time savings to attract passengers from airlines and from their automobiles, supporting program goals.

Exhibit 6-6 Preferred Alternative Westbound Schedule

Conceptual - Westbound

Western Corridor	1	***	2	***	3	***	4	***	5	***	6	7	***	8	***	9	***	***	***
Hudson Valley	***	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Destination	Niagara Falls	Albany	Toronto	Montreal	Syracuse	Albany	Niagara Falls	Albany	Niagara Falls	Saratoga Springs	Niagara Falls	Chicago	Rutland	Niagara Falls	Saratoga Springs	Syracuse	Albany	Albany	Albany
Train Number	#271	#231	#63	#69	#273	#233	#281	#235	#283	#237	#285	#49	#291	#287	#239	#275	#241	#243	#245
Frequency	Mon - Fri	Daily	Daily	Daily	Daily	Daily	Daily	Daily	Daily	Daily	Daily	Daily	Daily	Daily	Mon-Fri	Daily	Daily	Daily	Daily
New York City	...	6:15 AM	7:15 AM	8:15 AM	9:00 AM	10:00 AM	11:00 AM	12:00 PM	1:00 PM	2:00 PM	3:00 PM	3:45 PM	4:30 PM	5:00 PM	5:30 PM	6:00 PM	7:00 PM	9:00 PM	11:00 PM
Yonkers	...	...	...	...	...	10:15 AM	11:15 AM	12:15 PM	...	2:15 PM	...	...	...	...	...	...	...	9:15 PM	...
Croton-Harmon	...	7:00 AM	8:00 AM	9:00 AM	...	10:45 AM	11:45 AM	12:45 PM	...	2:45 PM	3:45 PM	4:30 PM	5:15 PM	...	...	6:45 PM	7:45 PM	9:45 PM	11:45 PM
Poughkeepsie	...	7:30 AM	8:30 AM	9:30 AM	...	11:15 AM	12:15 PM	1:15 PM	...	3:15 PM	4:15 PM	...	5:45 PM	...	...	...	8:15 PM	10:15 PM	12:15 AM
Rhinecliff	...	7:45 AM	8:45 AM	9:45 AM	...	11:30 AM	12:30 PM	1:30 PM	...	3:30 PM	4:30 PM	...	6:00 PM	6:30 PM	7:00 PM	7:30 PM	8:30 PM	10:30 PM	12:30 AM
Hudson	...	8:05 AM	9:05 AM	10:05 AM	...	11:50 AM	12:50 PM	1:50 PM	...	3:50 PM	4:50 PM	...	6:20 PM	6:50 PM	7:20 PM	7:50 PM	8:50 PM	10:50 PM	12:50 AM
ALBANY - RENSSELAER	...	8:30 AM	9:30 AM	10:30 AM	11:00 AM	12:15 PM	1:15 PM	2:15 PM	3:00 PM	4:15 PM	5:15 PM	6:00 PM	6:45 PM	7:15 PM	7:45 PM	8:15 PM	9:15 PM	11:15 PM	1:15 AM
	6:30 AM	...	9:45 AM	10:45 AM	11:15 AM	...	1:30 PM	...	3:15 PM	4:30 PM	5:30 PM	6:30 PM	7:00 PM	7:30 PM	8:00 PM	8:30 PM	...	...	...
Schenectady	6:50 AM	...	10:05 AM	11:05 AM	11:35 AM	...	1:50 PM	...	3:35 PM	4:50 PM	5:50 PM	6:50 PM	7:20 PM	7:50 PM	8:20 PM	8:50 PM	...	...	...
Amsterdam	7:10 AM	...	10:25 AM	...	11:55 AM	...	2:10 PM	...	3:55 PM	...	6:10 PM	...	...	8:10 PM	...	9:10 PM	...	...	...
Utica	7:55 AM	...	11:10 AM	...	12:40 PM	...	2:55 PM	...	4:40 PM	...	6:55 PM	7:50 PM	...	8:55 PM	...	9:55 PM	...	...	...
Rome	8:10 AM	...	11:25 AM	...	12:55 PM	...	3:10 PM	...	4:55 PM	...	7:10 PM	...	...	9:10 PM	...	10:10 PM	...	...	...
SYRACUSE	8:50 AM	...	12:05 PM	...	1:35 PM	...	3:50 PM	...	5:35 PM	...	7:50 PM	8:45 PM	...	9:50 PM	...	10:50 PM	...	...	...
Rochester	10:00AM	...	1:15 PM	...	...	...	5:00 PM	...	6:45 PM	...	9:00 PM	9:55 PM	...	11:00 PM	...	...	...	...	...
BUFFALO - DEPEW	10:50 AM	...	2:05 PM	...	...	...	5:50 PM	...	7:35 PM	...	9:50 PM	10:45 PM	...	11:50 PM	...	...	...	...	...
Buffalo-Exchange Street	11:05 AM	...	2:20 PM	...	...	...	6:05 PM	...	7:50 PM	...	10:05 PM	...	...	12:05 AM	...	...	...	...	...
NIAGARA FALLS	11:41 AM	...	2:51 PM	...	...	...	6:36 PM	...	8:21 PM	...	10:36 PM	...	...	12:36 AM	...	...	...	...	...
Canadian Border	...	...	3:05 PM	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Toronto	...	...	6:05 PM	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Saratoga Springs	...	...	...	11:35 AM	...	...	...	...	...	5:20 PM	...	...	7:50PM	...	8:50 PM	...	...	...	...
Fort Edward	...	...	...	12:00 PM	...	...	...	...	...	...	...	...	8:15 PM	...	...	...	...	...	...
RUTLAND	...	...	...	...	...	...	...	...	...	...	...	...	9:15 PM	...	...	...	...	...	...
Whitehall	...	...	...	12:25 PM	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Fort Ticonderoga	...	...	...	12:58 PM	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Port Henry	...	...	...	1:15 PM	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Westport	...	...	...	1:35 PM	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Port Kent	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Plattsburgh	...	...	...	2:55 PM	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Rouses Point	...	...	...	3:20 PM	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
MONTREAL-Central Station	...	...	...	5:00 PM	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...

New: Albany-Rensselaer - New York City (Penn Station)

New: Western Empire Corridor

Exhibit 6-7 Preferred Alternative Eastbound Schedule

Conceptual - Eastbound

Western Corridor Hudson Valley	***	***	***	***	1	***	2	***	3	***	4	***	5	6	***	7	***	8	9
Originates	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	***
Train Number	Albany	Albany	Saratoga Springs	Albany	Syracuse	Saratoga Springs	Niagara Falls	Rutland	Niagara Falls	Albany	Niagara Falls	Albany	Chicago	Niagara Falls	Montreal	Toronto	Albany	Syracuse	Niagara Falls
Frequency	Mon-Fri	Daily	Mon-Fri	Daily	Daily	Mon-Fri	Daily	Daily	Daily	Daily	Daily	Mon-Fri	Daily	Daily	Daily	Daily	Daily	Daily	Mon-Fri
MONTREAL-Central Station	10:50 AM	...	...	...	...
Rouses Point	12:15 PM	...	...	...	...
Plattsburgh	12:45 PM	...	...	...	...
Port Kent
Westport	1:45 PM	...	...	...	...
Port Henry	2:10 PM	...	...	...	...
Fort Ticonderoga	2:35 PM	...	...	...	...
Whitehall	3:05 PM	...	...	...	...
RUTLAND	8:30 AM	...	...	...	...	...	...	...	...	...	...	...
Fort Edward	9:30 AM	...	...	...	...	...	...	3:30 PM	...	...	...	...
Saratoga Springs	6:00 AM	...	...	8:00 AM	...	9:55 AM	...	...	...	...	...	...	3:55 PM	...	...	...	...
Toronto	9:30 AM	...	...	...
Canadian Border	11:30 AM	...	...	...
NIAGARA FALLS	4:40 AM	...	6:40 AM	...	8:40 AM	...	...	10:40 AM	...	12:40 PM	...	...	3:40 PM
Buffalo-Exchange Street	5:10 AM	...	7:10 AM	...	9:10 AM	...	...	11:10 AM	...	1:10 PM	...	...	4:10 PM
BUFFALO-DEPEW	5:25 AM	...	7:25 AM	...	9:25 AM	...	10:25 AM	11:25 PM	...	1:25 PM	...	...	4:25 PM
Rochester	6:15 AM	...	8:15 AM	...	10:15 AM	...	11:15 AM	12:15 PM	...	2:15 PM	...	...	5:15 PM
SYRACUSE	5:25 AM	...	7:25 AM	...	9:25 AM	...	11:25 AM	...	12:25 PM	1:25 PM	...	3:25 PM	...	5:25 PM	6:25 PM
Rome	6:05 AM	...	8:05 AM	...	10:05 AM	...	12:05 PM	...	...	2:05 PM	...	4:05 PM	...	6:05 PM	7:05 PM
Utica	6:20 AM	...	8:20 AM	...	10:20 AM	...	12:20 PM	...	1:20 PM	2:20 PM	...	4:20 PM	...	6:20 PM	7:20 PM
Amsterdam	7:05 AM	...	9:05 AM	...	11:05 AM	...	1:05 PM	...	...	3:05 PM	...	5:05 PM	...	7:05 PM	8:05 PM
Schenectady	6:30 AM	...	7:25 AM	8:30 AM	9:25 AM	10:25 AM	11:25 AM	...	1:25 PM	...	2:25 PM	3:25 PM	4:25 PM	5:25 PM	...	7:25 PM	8:25 PM
ALBANY - RENSSELAER	6:50 AM	...	7:45 AM	8:50 AM	9:45 AM	10:45 AM	11:45 AM	...	1:45 PM	...	2:45 PM	3:45 PM	4:45 PM	5:45 PM	...	7:45 PM	8:45 PM
Hudson	5:00 AM	6:00 AM	7:00 AM	7:30 AM	8:00 AM	9:00 AM	10:00 AM	11:00 AM	12:00 PM	1:00 PM	2:00 PM	3:00 PM	3:30 PM	4:00 PM	5:00 PM	6:00 PM	7:00 PM	8:00 PM	...
Rhinecliff	5:25 AM	6:25 AM	...	7:50 AM	8:25 AM	9:25 AM	10:25 AM	11:25 AM	12:25 PM	1:25 PM	...	3:25 PM	...	4:25 PM	5:25 PM	6:25 PM	7:25 PM	8:25 PM	...
Poughkeepsie	5:50 AM	6:50 AM	...	8:10 AM	8:50 AM	9:50 AM	10:50 AM	11:50 AM	12:50 PM	1:50 PM	...	3:50 PM	...	4:50 PM	5:50 PM	6:50 PM	7:50 PM	8:50 PM	...
Croton-Harmon	9:05 AM	10:05 AM	11:05 AM	12:05 PM	1:05 PM	2:05 PM	...	4:05 PM	...	5:05 PM	6:05 PM	7:05 PM	8:05 PM	9:05 PM	...
Yonkers	6:35 AM	7:35 PM	...	...	9:35 AM	10:35 AM	11:35 AM	12:35 PM	1:35 PM	2:35 PM	...	4:35 PM	5:10 PM	5:35 PM	6:35 PM	7:35 PM	8:35 PM	9:35 PM	...
New York City	10:55 AM	...	12:55 PM	...	2:55 PM	...	4:55 PM	...	...	6:55 PM	...	8:55 PM	...	...	...
New York City	7:10 AM	8:10 AM	9:00 AM	9:40 AM	10:15 AM	11:15 AM	12:15 PM	1:15 PM	2:15 PM	3:15 PM	4:00 PM	5:15 PM	5:45 PM	6:15 PM	7:15 PM	8:15 PM	9:15 PM	10:15 PM	...

New: Albany-Rensselaer - New York City (Penn Station)

New: Western Empire Corridor

6.6.3 Equipment

Consists

Currently all Empire Corridor trains operate with a fixed assignment of equipment, with all trains consisting of:

- 1 – Locomotive: Genesis P32AC-DM (required for operation Albany-Rensselaer to New York City)
- 4 – Amfleet I Capstone Standard Coaches
- 1 – Club / Dinette (Café Car with Business Class Section)

Additional coaches may cycle on certain trains between New York City and Albany-Rensselaer, based on availability for maintenance and repair.

A 15-minute station dwell time is included in most westbound schedules of Empire Corridor at Albany-Rensselaer for fueling or locomotive changes.

Assigning trains so that the line runs with all trains having the same number of coaches in the future will streamline the car assignment process of coaches to trains, favorably impacting operations in several ways:

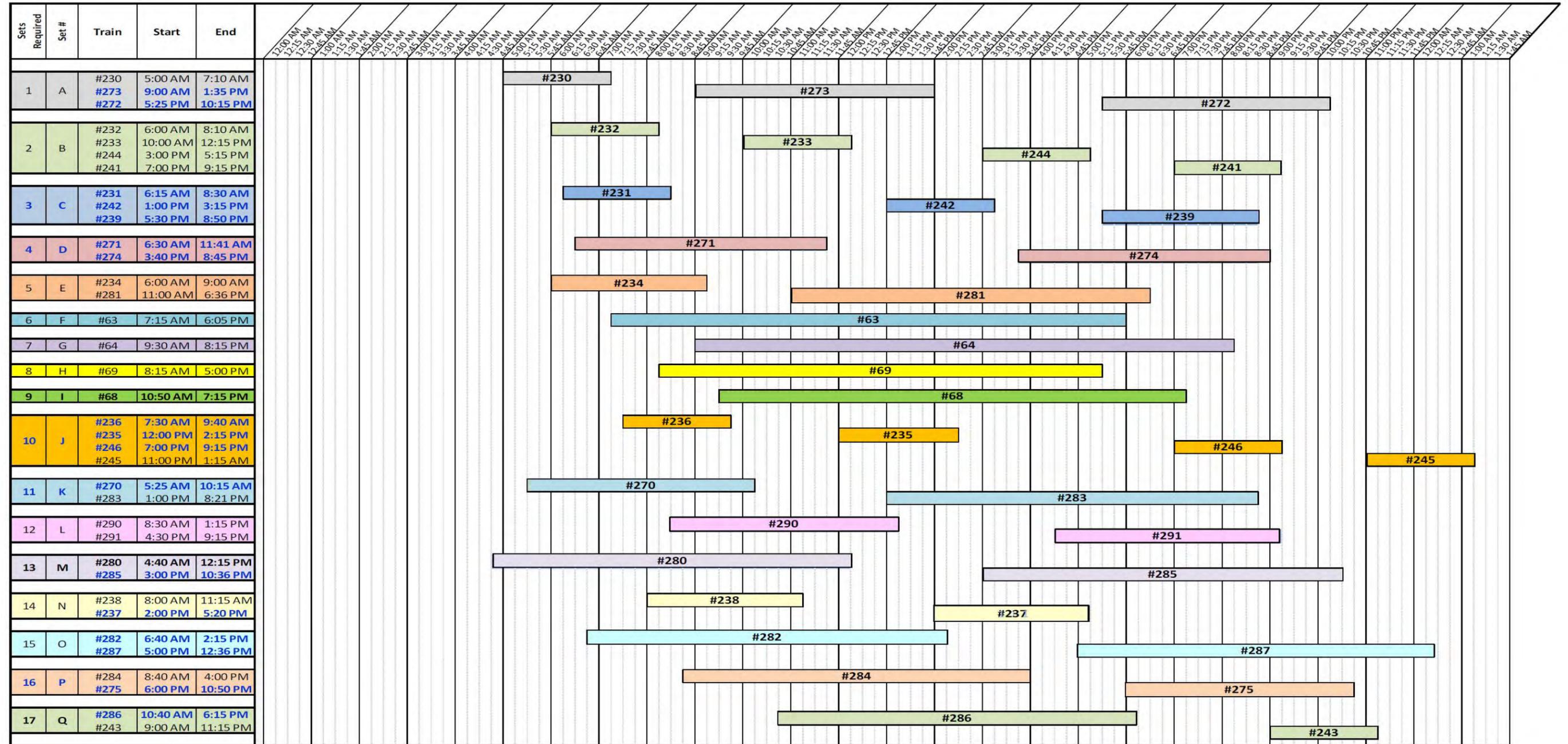
- Less yard activity making up trains; lower personnel-count for operation.
- Simpler preventive maintenance routines based on predictable and standard cycling of equipment.

Equipment Utilization

Equipment utilization diagrams are shown for the current assignment in Exhibits 6-8 and 6-9, outlining the equipment assignments for the **Preferred Alternative**.

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Exhibit 6-9 Preferred Alternative Equipment Utilization Assignments



6.6.4 Train Crew Scheduling

Train and Engine (T&E) crew assignments for the Empire Corridor are largely made from a central control point with crews based from a home terminal or central location at Albany-Rensselaer. Basing the crews at Albany-Rensselaer provides the greatest efficiency in optimizing crew time for trips and the maintenance of crew “extra” lists (personnel available to fill in for workers who call in sick or take vacation). Working from this central location also enables crews to become cross-qualified between the different service segments west and south of Albany, maximizing the availability of employees with fewer constraints for assignments.

Crew assignments are established with the process outlined in Exhibit 6-10, Days of Operation, for each service are given in Exhibit 6-11.

Exhibit 6-10 Days of Operation



The process starts with the determination of a run, a train schedule, and identification of the T&E crews required to operate all the trains for that schedule. Runs are then organized into round-trip couplets against which train crews are assigned by day of the week, thus allowing crews to return to their points of origin at the ends of their shifts. These assignments also recognize designated crew relief days. The couplets on the Empire Corridor are organized by route (Ethan Allen, Lake Shore Limited, Montreal runs, Niagara Falls trains).

Factors that come into play in organizing the crew couplets are:

- Organized within the parameters of the existing labor agreements;
- Consistent with the Federal “Railroad Hours of Service Law;”
- Couplets are organized for outlying terminals “first-in & first-out” to minimize total hours on duty for crews;
- The assignments are organized for gaining future crew hour efficiencies between Albany-Rensselaer and Niagara Falls or Niagara Falls, Ontario; and
- The crew couplets integrate the increased service with existing trains to maximize crew efficiencies. New trains are shown in **BLUE BOLD** in the crew couplet tables.

Exhibit 6-11 Days of Operations

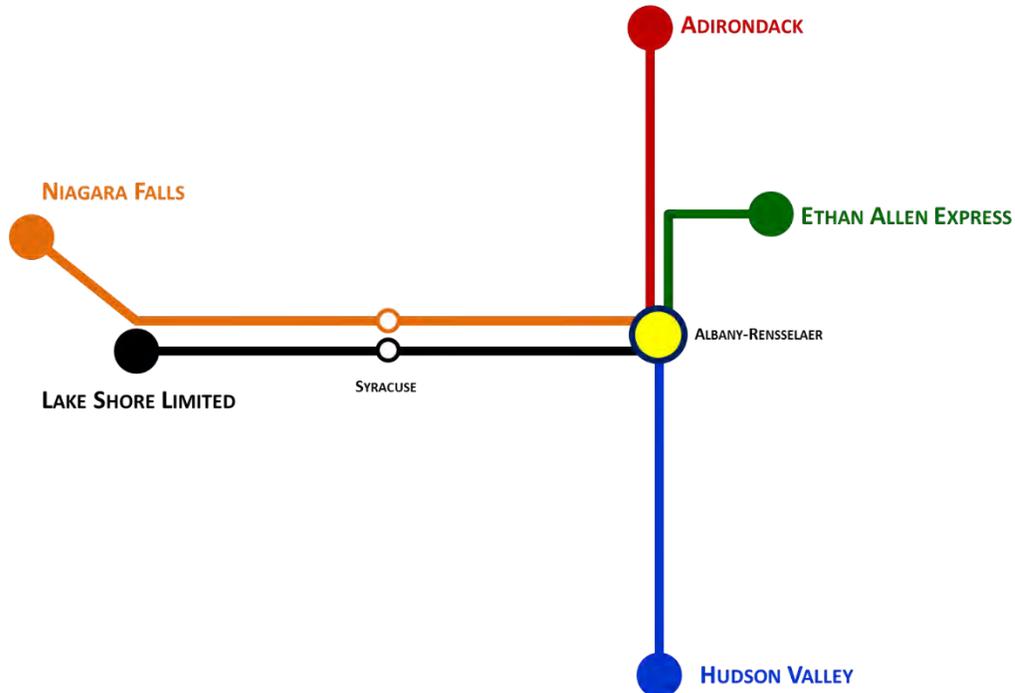
No.	Schedule	MON	TUES	WED	THUR	FRI	SAT	SUN
#230	ALB-NYC	✓	✓	✓	✓	✓		
#232	ALB-NYC	✓	✓	✓	✓	✓	✓	✓
#234	SAR-NYC	✓	✓	✓	✓	✓		
#236	ALB-NYC	✓	✓	✓	✓	✓	✓	✓
#270	SYR-NYC	✓	✓	✓	✓	✓	✓	✓
#238	SAR-NYC	✓	✓	✓	✓	✓		
#280	NFL-NYC	✓	✓	✓	✓	✓	✓	✓
#290	Rutland-NYC	✓	✓	✓	✓	✓	✓	✓
#282	NFL-NYC	✓	✓	✓	✓	✓	✓	✓
#242	ALB-NYC	✓	✓	✓	✓	✓	✓	✓
#284	NFL-NYC	✓	✓	✓	✓	✓	✓	✓
#244	ALB-NYC	✓	✓	✓	✓	✓	✓	✓
#48	Chicago-NYC	✓	✓	✓	✓	✓	✓	✓
#286	NFL-NYC	✓	✓	✓	✓	✓	✓	✓
#68	Montreal - NYC	✓	✓	✓	✓	✓	✓	✓
#64	Toronto - NYC	✓	✓	✓	✓	✓	✓	✓
#246	ALB-NYC	✓	✓	✓	✓	✓		
#272	SYR-NYC	✓	✓	✓	✓	✓	✓	✓
#274	NFL-ALB	✓	✓	✓	✓	✓		
#271	ALB-NFL	✓	✓	✓	✓	✓		
#231	NYC-ALB	✓	✓	✓	✓	✓	✓	✓
#63	NYC-Toronto	✓	✓	✓	✓	✓	✓	✓
#69	NYC-Montreal	✓	✓	✓	✓	✓	✓	✓
#273	NYC-SYR	✓	✓	✓	✓	✓	✓	✓
#233	NYC-ALB	✓	✓	✓	✓	✓	✓	✓
#281	NYC-NFL	✓	✓	✓	✓	✓	✓	✓
#235	NYC-ALB	✓	✓	✓	✓	✓	✓	✓
#283	NYC-NFL	✓	✓	✓	✓	✓	✓	✓
#237	NYC-SAR	✓	✓	✓	✓	✓	✓	✓
#285	NYC-NFL	✓	✓	✓	✓	✓	✓	✓
#49	NYC-Chicago	✓	✓	✓	✓	✓	✓	✓
#291	NYC-Rutland	✓	✓	✓	✓	✓	✓	✓
#287	NYC-NFL	✓	✓	✓	✓	✓	✓	✓
#239	NYC-SAR	✓	✓	✓	✓	✓	✓	✓
#275	NYC-SYR	✓	✓	✓	✓	✓	✓	✓
#241	NYC-ALB	✓	✓	✓	✓	✓	✓	✓
#243	NYC-ALB	✓	✓	✓	✓	✓	✓	✓
#245	NYC-ALB	✓	✓	✓	✓	✓	✓	✓

On the Empire Corridor, the crew couplets are organized as shown in Exhibit 6-12 into five patterns, and are listed in Exhibit 6-13:

- Hudson Valley (Albany-Rensselaer to New York City)
- Ethan Allen Express (Albany-Rensselaer to Rutland, Vermont and Return)

- Adirondack (Albany-Rensselaer to Montreal, Quebec, and Return)
- Empire Corridor West (Albany-Rensselaer to Niagara Falls, NY or Ontario and Return)
- Lake Shore Limited (Albany-Rensselaer to Buffalo-Depew and Return)

Exhibit 6-12 Crew Couplet Districts



In the future, further crew efficiencies may be able to be gained by reexamining the initial terminal for some of the Empire Corridor West T&E crews by expanding the Buffalo/Niagara Falls crew start location.²³

6.6.5 Terminal, Yard and Support Operations

Equipment disposition programs are included for Empire Corridor Terminals and Yards. New trains are shown in **BLUE BOLD**, Exhibits 6-14 and 6-15.²⁴

²³ As more trains operate to/from Niagara Falls, it will be necessary to have spare or relief T/E personnel at that location. Currently the main location for T/E crew extra lists is at Albany-Rensselaer. The length of the run from Albany-Rensselaer to Niagara Falls requires that relief crews be available at Niagara to comply with Hours of Service rules. It is not practicable nor do the Union Collective Bargaining agreements allow for shifting employees randomly; they must be permanently assigned to one location or the other.

²⁴ "EQ" in Exhibits 6-14 and 6-15 means "equipment" (locomotives and coaches).

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Exhibit 6-13 Crew Couplets

Empire Corridor South; Hudson Valley (Albany-Rensselaer to New York City)									
On-Duty Location	On-Duty Time	Outbound Train	Departure Time	Arrival Time	Return Train	Return Trip Location	Departure Time	Arrival Time	Off Duty Time
NYC		Crew from #64 previous day			#231	NYC		6:15-AM	8:30-AM
NYC		Crew from #246 previous day			#63	NYC		7:15-AM	9:30-AM
NYC		Crew from #272 previous day			#69	NYC		8:15-AM	10:30-AM
ALB	4:20-AM	#230	5:00-AM	7:10-AM	#273	NYC	9:00-AM	11:00-AM	11:25-AM
ALB	5:20-AM	#232	6:00-AM	8:10-AM	#233	NYC	10:00-AM	12:15-PM	12:40-PM
ALB	6:20-AM	#234	7:00-AM	9:00-AM	#281	NYC	11:00-AM	1:15-PM	1:40-PM
ALB	6:50-AM	#236	7:30-AM	9:40-AM	#235	NYC	12:00-PM	2:15-PM	2:40-PM
ALB	7:20-AM	#270	8:00-AM	10:15-AM	#283	NYC	1:00-PM	3:00-PM	3:25-PM
ALB	8:20-AM	#238	9:00-AM	11:15-AM	#237	NYC	2:00-PM	4:15-PM	4:40-PM
ALB	9:20-AM	#280	10:00-AM	12:15-PM	#285	NYC	3:00-PM	5:15-PM	5:40-PM
ALB	10:20-AM	DH	11:00-AM	1:15-PM	#49	NYC	3:45-PM	6:00-PM	6:25-PM
ALB	10:20-AM	#290	11:00-AM	1:15-PM	#291	NYC	4:30-PM	6:45-PM	7:10-PM
ALB	11:20-AM	#282	12:00-PM	2:15-PM	#287	NYC	5:00-PM	7:15-PM	7:40-PM
ALB	12:20-PM	#242	1:00-PM	3:15-PM	#239	NYC	5:30-PM	7:45-PM	8:10-PM
ALB	1:20-PM	#284	2:00-PM	4:00-PM	#275	NYC	6:00-PM	8:15-PM	8:40-PM
ALB	2:20-PM	#244	3:00-PM	5:15-PM	#241	NYC	7:00-PM	9:15-PM	9:40-PM
ALB	2:50-PM	#48	3:30-PM	5:45-PM	DH	NYC	7:00-PM	10:15-PM	10:40-PM
ALB	3:20-PM	#286	4:00-PM	6:15-PM	#243	NYC	9:00-PM	11:15-PM	11:40-PM
ALB	4:20-PM	#68	5:00-PM	7:15-PM	#245	NYC	11:00-PM	1:15-AM	1:40-AM
ALB	5:20-PM	#64	6:00-PM	8:15-PM	Crew for #231 next day				8:40-PM
ALB	6:20-PM	#246	7:00-PM	9:15-PM	Crew for #63 next day				9:40-PM
ALB	7:20-PM	#272	8:00-PM	10:15-PM	Crew for #69 next day				10:40-PM

Empire Corridor West; (Niagara Falls)										
On Duty Location	On Duty Time	Outbound Train	Departure Time	Arrival Time	Return Train	Return Trip Location	Departure Time	Arrival Time	Off Duty Time	
ALB	5:30 AM	#271	6:30 AM	11:41 AM						12:41 PM
ALB	8:45 AM	#63	9:45 AM	3:05 PM						4:05 PM
ALB	12:30 PM	#281	1:30 PM	6:41 PM 6:36?						7:41 PM
ALB	2:15 PM	#283	3:15 PM	8:20 PM 8:21?						9:20 PM
ALB	4:30 PM	#285	5:30 PM	10:36 PM						11:36 AM
ALB	6:30 PM	#287	7:30 PM	12:36 AM						1:36 AM
NFL		Crew from #271 previous day			#280	NFL	3:40 AM	4:40 AM	9:45 AM	10:10 AM
NFL		Crew from #63 previous day			#282	NFL	5:40 AM	6:40 AM	11:45 AM	12:10 PM
NFL		Crew from #281 previous day			#284	NFL	7:40 AM	8:40 AM	1:45 PM	2:10 PM
NFL		Crew from #283 previous day			#286	NFL	9:40 AM	10:40 AM	3:45 PM	4:10 PM
NFL		Crew from #285 previous day			#64	NFL	11:40 AM	12:40 PM	5:45 PM	6:10 PM
NFL		Crew from #287 previous day			#272	NFL	2:40 PM	3:40 PM	8:45 PM	9:10 PM

Empire Corridor West; (Syracuse)										
On Duty Location	On Duty Time	Outbound Train	Departure Time	Arrival Time	Return Train	Return Trip Location	On Duty Time	Departure Time	Arrival Time	Off Duty Time
SYR		Crew from #275 previous day			#270	SYR	4:40 AM	5:25 AM	7:45 AM	8:20 AM
ALB	10:15 AM	#273	11:15 AM	1:35 PM	#272	SYR	4:45 PM	5:25 PM	7:45 PM	9:10 PM
ALB	7:30 PM	#275	8:30 PM	10:50 PM						11:20 PM
		Crew for #270 next day								

Empire Corridor West; (Buffalo)										
On Duty Location	On Duty Time	Outbound Train	Departure Time	Arrival Time	Return Train	Return Trip Location	On Duty Time	Departure Time	Arrival Time	Off Duty Time
ALB	5:00 PM	#49	6:00 PM	10:45 PM			Crew for #48 next day			11:45 PM
BUF		Crew from #49 previous day			#48	BUF	9:25 AM	10:25 AM	2:45 PM	3:10 PM

Adirondack; (Montreal)										
On Duty Location	On Duty Time	Outbound Train	Departure Time	Arrival Time	Return Train	Return Trip Location	On Duty Time	Departure Time	Arrival Time	Off Duty Time
ALB	9:45 AM	#69	10:45 AM	5:00 PM			Crew for #68 next day			7:00 PM
MTR		Crew from #69 previous day			#68	MTR	8:50 AM	10:50 AM	4:45 PM	5:10 PM

Ethan Allen Express; (Rutland)										
On Duty Location	On Duty Time	Outbound Train	Departure Time	Arrival Time	Return Train	Return Trip Location	On Duty Time	Departure Time	Arrival Time	Off Duty Time
ALB	6:00 PM	#291	7:00 PM	9:15 PM			Crew for #290 next day			10:15 PM
RUD		Crew from #291 previous day			#290	RUD	7:50 AM	8:30 AM	10:45 AM	11:10 AM

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Exhibit 6-14 Equipment Disposition at Yards—New York City

New York City						
Remarks	Train #	Arriving Time	Disposition	Departing Time	Train #	Remarks
	<i>from Yard</i>		Start	6:15 AM	#231	⋮
⋮	#230	7:10 AM	EQ' to #273	⋮	⋮	⋮
	<i>from Yard</i>		Start	7:15 AM	#63	⋮
⋮	#232	8:10 AM	EQ' to #233	⋮	⋮	⋮
	<i>from Yard</i>		Start	8:15 AM	#69	⋮
⋮	#234	9:00 AM	EQ' to #281	⋮	⋮	⋮
⋮	⋮	⋮	Turn from #230	9:00 AM	#273	⋮
⋮	#236	9:45 AM	EQ' to #235	⋮	⋮	⋮
⋮	⋮	⋮	Turn from #232	10:00 AM	#233	⋮
⋮	#270	10:15 AM	EQ' to #283	⋮	⋮	⋮
⋮	⋮	⋮	Turn from #234	11:00 AM	#281	⋮
⋮	#238	11:15 AM	EQ' to #237	⋮	⋮	⋮
⋮	⋮	⋮	Turn from #236	12:00 PM	#235	⋮
⋮	#280	12:15 PM	EQ' to #285	⋮	⋮	⋮
⋮	⋮	⋮	Turn from #270	1:00 PM	#283	⋮
⋮	#290	1:15 PM	EQ' to #291	⋮	⋮	⋮
⋮	⋮	⋮	Turn from #238	2:00 PM	#237	⋮
⋮	#282	2:15 PM	EQ' to #287	⋮	⋮	⋮
⋮	⋮	⋮	Turn from #280	3:00 PM	#285	⋮
⋮	#242	3:15 PM	EQ' to #239	⋮	⋮	⋮
	<i>from Yard</i>		Start	3:45 PM	#49	⋮
⋮	#284	4:00 PM	EQ' to #275	⋮	⋮	⋮
⋮	⋮	⋮	Turn from #290	4:30 PM	#291	⋮
⋮	#244	5:15 PM	EQ' to #241	⋮	⋮	⋮
⋮	⋮	⋮	Turn from #282	5:00 PM	#287	⋮
⋮	#48	5:45 PM	Terminates		<i>to Yard</i>	
⋮	⋮	⋮	Turn from #242	5:30 PM	#239	⋮
⋮	#286	6:15 PM	EQ' to #243	⋮	⋮	⋮
⋮	⋮	⋮	Turn from #284	6:00 PM	#275	⋮
⋮	#68	7:15 PM	Terminates		<i>to Yard</i>	
⋮	⋮	⋮	Turn from #244	7:00 PM	#241	⋮
⋮	#64	8:15 PM	Terminates		<i>to Yard</i>	
⋮	⋮	⋮	Turn from #286	9:00 PM	#243	⋮
⋮	#246	9:15 PM	EQ' to #245	⋮	⋮	⋮
⋮	#272	10:15 PM	Terminates		<i>to Yard</i>	
⋮	⋮	⋮	Turn from #246	11:00 PM	#245	⋮
	#271				#274	

Exhibit 6-15 Equipment Disposition at Yards—Niagara Falls and Syracuse

Niagara Falls

Remarks	Train #	Arriving Time	Disposition	Departing Time	Train #	Remarks
		<i>from Yard</i>	Start	4:40 AM	#280	
		<i>from Yard</i>	Start	6:40 AM	#282	
		<i>from Yard</i>	Start	8:40 AM	#284	
		<i>from Yard</i>	Start	10:40 AM	#286	
	#271	11:51 AM	EQ to #274			
			Thru	12:40 PM	#64	
	#63	2:51 PM	Thru			
			From #271	3:40 PM	#274	
	#281	6:36 PM	Terminates	to Yard		
	#283	8:21 PM	Terminates	to Yard		
	#285	10:36 PM	Terminates	to Yard		
	#287	12:36 AM	Terminates	to Yard		

Syracuse

Remarks	Train #	Westbound Train Time	Disposition	Eastbound Train Time	Train #	Remarks
		<i>from Yard</i>	Start	5:25 AM	#270	
			Thru	7:25 AM	#280	from Niagara Falls
<i>from Albany</i>	#271	8:50 AM	Thru			
			Thru	9:25 AM	#282	from Niagara Falls
			Thru	11:25 AM	#284	<i>from Niagara Falls</i>
<i>from New York City</i>	#63	12:05 PM	Thru			
			Thru	12:25 PM	#48	from Chicago
			Thru	1:25 PM	#286	<i>from Niagara Falls</i>
<i>from New York City</i>	#273	1:35 PM	EQ' to #272			
			Thru	3:25 PM	#64	from Toronto
<i>from New York City</i>	#281	3:50 PM	Thru			
			From #273	5:25 PM	#272	
<i>from New York City</i>	#283	5:30 PM	Thru			
<i>from New York City</i>	#285	7:50 PM	Thru			
<i>from New York City</i>	#49	8:45 PM	Thru			
<i>from New York City</i>	#287	9:50 PM	Thru			
<i>from New York City</i>	#275	10:50 PM	Thru	to Yard		

6.7 Stations

In recent years, NYSDOT has had an active improvement program upgrading, modernizing, and replacing passenger stations along the Empire Corridor. A summary of station improvements is included on the following Exhibits 6-16 and 6-17.

Exhibit 6-16 Empire Corridor West – Station Improvements

Empire Corridor West	
City	Status
Amsterdam	Station relocation to the central business district and modernization study is underway sponsored by NYSDOT.
Utica	Constructed westbound platform with improvements to station parking.
Rome	Completed improvements to provide better access to station platforms.
Syracuse	Constructed Intermodal Facility and NYSDOT is currently supporting an analysis to reduce congestion for freight and rail passenger service in the Syracuse Terminal area of the CSXT – Syracuse Terminal. Completed planning improvements for the station stop at the New York State Fairgrounds.
Rochester	Completion is nearing for a new station building with a high-level center platform, and an expanded facility for passenger train operations.
Buffalo–Depew	NYSDOT completed parking and other passenger amenities improvements.
Buffalo–Exchange Street	NYSDOT is working with the City of Buffalo and other stakeholders to plan a new station that will provide better connections to the local transit system and support downtown economic growth.
Niagara Falls, NY	Completed a new intermodal facility that provides the International crossing staffed by the Department of Homeland Security. This allows significant reduction in the schedule time for trains crossing the border from Canada, improving both overall run times and service reliability.

Exhibit 6-17 Empire Corridor South – Station Improvements

Empire Corridor South (Hudson Valley / Empire Capital District Connection)	
City	Status
Saratoga Springs	NYS DOT remodeled the station in 2004.
Schenectady	NYS DOT sponsored construction of a new station is underway with completion expected in 2018.
Albany–Rensselaer	NYS DOT recently completed: <ul style="list-style-type: none"> • Installation of a fourth station track • Platforms lengthened to accommodate 10 car trains
Hudson	High-level platforms and accessibility improvements will be part of the Empire Capital District Connection program.
Rhinecliff	High-level platforms and accessibility improvements will be part of the Empire Capital District Connection program.
Poughkeepsie	MNR modernized and restored the station.
Croton–Harmon	MNR modernized the station.
Yonkers	MNR modernized the station.
New York City	The “Moynihan Station” project, currently underway, is supported by NYSDOT and other stakeholders, to transform the former Farley Post Office Building on 8th Avenue. It will provide a new entrance and passenger amenities and increases station capacity for both intercity and commuter trains.

6.7.1 Station and Access Analysis

The following section includes a summary of the accessibility features included at each of the Empire Corridor West and South stations, Exhibits 6-18 and 6-19.

Exhibit 6-18 Empire Corridor West – Station Access

Empire Corridor West	
City	Access
Amsterdam	Low Level Platform with Wheelchair Lift is available.
Utica	2 - Low Level Platforms with Wheelchair Lifts are available for east and westbound tracks.
Rome	Center Island Low Level Platform with Wheelchair Lifts are available for both tracks, with elevator access to the platform.
Syracuse	High level platform with completely barrier free access for Americans with Disabilities Act (ADA) accessibility.
Rochester	New station will feature center-island platform that will provide for a barrier-free ADA accessible facility.
Buffalo–Depew	The station currently has a low-level platform with wheelchair lift available, and a station parking area has been designated with parking spaces for drivers with “handicap” placards and ramps from the parking area to station boarding platforms.
Buffalo–Exchange Street	Station currently has a low-level platform with Wheelchair Lift available.
Niagara Falls, NY	New station features a barrier-free high-level platform providing an ADA-accessible facility.

Exhibit 6-19 Empire Corridor South – Station Access

Empire Corridor South (Hudson Valley / Empire Capital District Connection)	
City	Access
Saratoga Springs	Low Level Platform with Wheelchair Lift is available.
Schenectady	There will be a new low level platform with two platform edges. A wheelchair lift is available. The new platform will also have a redundant egress.
Albany–Rensselaer	High-Level platforms accommodating all tracks with elevators in station completely barrier free for ADA accessibility.
Hudson	Low-Level Platform with Wheelchair Lift is available.
Rhinecliff	Low-Level Platform with Wheelchair Lift is available.
Poughkeepsie	High-Level platforms accommodating all tracks and a station that is completely barrier free for ADA accessibility.
Croton–Harmon	High-Level platforms accommodating all tracks and a station that is completely barrier free for ADA accessibility.
Yonkers	High-Level Platforms accommodating all tracks and a station that is completely barrier free for ADA accessibility.
New York City	High-Level platforms accommodating all tracks and a station that is completely barrier free for ADA accessibility.

6.7.2 Station Location Analysis

Station locations and parking facilities are provided in Exhibits 6-20 and 6-21.

Exhibit 6-20 Empire Corridor West – Station Location

Empire Corridor West		
City	Address	Parking
Amsterdam	466 West Main Street Route 5 West Amsterdam, NY 12010	3 Short Term Parking Spaces 13 Long Term Parking Spaces
Utica	321 Main Street Boehlert Transportation Center Utica, NY 13501	200 Long Term Parking Spaces
Rome	6599 Martin Street Rome, NY 13440	5 Long Term Parking Spaces
Syracuse	1 Walsh Circle Regional Transportation Center Syracuse, NY 13208	266 Long Term Parking Spaces
Rochester	320 Central Avenue Rochester, NY 14605	40 Long Term Parking Spaces
Buffalo–Depew	55 Dick Road Depew, NY 14043	40 Short Term Parking Spaces 40 Long Term Parking Spaces
Buffalo–Exchange Street	75 Exchange Street Buffalo, NY 14203	10 Short Term Parking Spaces 10 Long Term Parking Spaces
Niagara Falls, NY	825 Depot Avenue West Niagara Falls, NY 14305	30 Short Term Parking Spaces 30 Long Term Parking Spaces

Exhibit 6-21 Empire Corridor South – Station Location

Empire Corridor South (Hudson Valley / Empire Capital District Connection)		
City	Address	Parking
Saratoga Springs	26 Station Lane Saratoga Springs, NY 12866	40 Short Term Parking Spaces 40 Long Term Parking Spaces
Schenectady	332 Erie Boulevard Schenectady, NY 12305	Currently No Short Term Parking Spaces 20 Long Term Parking Spaces ²⁵
Albany–Rensselaer	525 East Street Rensselaer, NY 12144	500 Short Term Parking Spaces 500 Long Term Parking Spaces
Hudson	69 South Front Street Hudson, NY 12534	35 Short Term Parking Spaces 150 Long Term Parking Spaces
Rhinecliff	455 Rhinecliff Road Rhinecliff, NY 12574	42 Short Term Parking Spaces 141 Long Term Parking Spaces
Poughkeepsie	41 Main Street Metro-North Station Poughkeepsie, NY 12601	10 Short Term Parking Spaces 50 Long Term Parking Spaces
Croton–Harmon	4 Veteran's Plaza and 1 Croton Point Avenue Croton-on-Hudson, NY 10520	1,903 Short Term Parking Spaces 600 Long Term Parking Spaces
Yonkers	5 Buena Vista Avenue Metro-North Station Yonkers, NY 10701	250 Long Term Parking Spaces
New York City	8th Avenue and West 31st Street Pennsylvania Station New York, NY 10001	Privately operated parking garages available near station on 31 st Street

²⁵ Station currently under construction; final parking values still to be determined.

6.7.3 Station Operations

Station operational conditions and ownership characteristics are provided in Exhibits 6-22 and 6-23.

Exhibit 6-22 Empire Corridor West – Station Operations

Empire Corridor West		
City	Staff	Remarks
Amsterdam	Caretaker	Study currently underway to relocate the station closer to central business district.
Utica	Staffed	Facility Ownership: County of Oneida Parking Lot Ownership: County of Oneida
Rome	Unstaffed	Owned by the City of Rome.
Syracuse	Staffed	Facility Ownership: Intermodal Transportation Center, Inc. Parking Lot Ownership: Intermodal Transportation Center, Inc. (Central New York Transportation Authority–CENTRO)
Rochester	Staffed	Currently being replaced with new facility to open in 2017.
Buffalo–Depew	Staffed	Facility Ownership: State of New York Parking Lot Ownership: State of New York
Buffalo–Exchange Street	Staffed	Facility Ownership: City of Buffalo Parking Lot Ownership: City of Buffalo
Niagara Falls, NY	Staffed	Facility Ownership: City of Niagara Falls Parking Lot Ownership: City of Niagara Falls

Exhibit 6-23 Empire Corridor South– Station Operations

Empire Corridor South (Hudson Valley / Empire Capital District Connection)		
City	Staff	Remarks
Saratoga Springs	Staffed	Facility Ownership: Canadian Pacific Railway Parking Lot Ownership: Canadian Pacific Railway
Schenectady	Staffed	NYS DOT is currently building a new facility.
Albany–Rensselaer	Staffed	Facility Ownership: Capital District Transportation Authority Parking Lot Ownership: Capital District Transportation Authority
Hudson	Staffed	Facility Ownership: National Railroad Passenger Corporation Parking Lot Ownership: Amtrak, City of Hudson
Rhinecliff	Staffed	Facility Ownership: Dutchess County Parking Lot Ownership: Dutchess County/CSXT
Poughkeepsie	Staffed	Station Operated by: Metro-North MNR Facility Ownership: Metro-North MNR Parking Lot Ownership: Metro-North MNR
Croton–Harmon	Staffed	Station Operated by: Metro-North MNR Facility Ownership: Metro-North MNR Parking Lot Ownership: Metro-North MNR
Yonkers	Staffed	Station Operated by: Metro-North MNR Facility Ownership: Metro-North MNR Parking Lot Ownership: Metro-North MNR
New York City	Staffed	Facility Ownership: National Railroad Passenger Corporation

6.7.4 Intermodal Connectivity

The current intermodal connectivity options found at each station are listed in Exhibits 6-24 and 6-25.

Exhibit 6-24 Empire Corridor West – Intermodal Connections

Empire Corridor West	
City	Remarks
Amsterdam	Local Bus Connections provided by: City of Amsterdam Transit System
Utica	Local Bus Connections provided by: Utica – CENTRO (Central New York Regional Transportation Authority) Station served by: Adirondack Scenic Railroad, Greyhound, Adirondack Trailways, Birnie Bus Service
Rome	Local Bus Connections provided by: Rome - Oneida – CENTRO (Central New York Regional Transportation Authority)
Syracuse	Local Bus Connections provided by: CENTRO (Central New York Regional Transportation Authority) Station served by: Greyhound, New York Trailways
Rochester	Local Bus Connections provided by: RTS - Regional Transit Services The Rochester-Genesee Regional Transportation Authority (RGRTA)
Buffalo–Depew	Local Bus Connections provided by: NFTA - METRO Niagara Frontier Transportation Authority (NFTA)
Buffalo–Exchange Street	Local Bus Connections provided by: NFTA - METRO Niagara Frontier Transportation Authority (NFTA)
Niagara Falls, NY	Local Bus Connections provided by: NFTA - METRO Niagara Frontier Transportation Authority (NFTA)

Exhibit 6-25 Empire Corridor South – Intermodal Connections

Empire Corridor South (Hudson Valley / Empire Capital District Connection)	
City	Remarks
Saratoga Springs	Local Bus Connections provided by: Capital District Transportation Authority
Schenectady	Local Bus Connections provided by: Capital District Transportation Authority
Albany - Rensselaer	Local Bus Connections provided by: Capital District Transportation Authority
Hudson	Local Bus Connections provided by: Columbia County Public Transit
Rhinecliff	Taxi service available at station
Poughkeepsie	Local Bus Connections provided by: Dutchess County Public Transit (Division of Public Transit)
Croton-Harmon	Local Bus Connections provided by: Westchester Transportation County; Bee-Line Bus
Yonkers	Local Bus Connections provided by: Westchester Transportation County; Bee-Line Bus
New York City	Multiple Routes and Services Operated by Amtrak NJ Transit, MTA New York City Transit

6.8 Operating Results

Monitoring the operational performance of the service will focus on:

- On Time Performance
- Customer Satisfaction
- Financial Results
- Cost Recovery
- Operating Statistics
- Safety

- Market Share

The performance measurements will be part of a continuing process of identifying trends and determining actions that may need to be taken to ensure that the service is meeting the program goals.

6.8.1 On Time Performance

For many passengers, On Time Performance is the basis for measuring the entire trip experience. On Time Performance will be analyzed by both the performance across:

- All Trains Operating on the Route
- Individual Trains

The monitoring system will employ a matrix by which to analyze location and causes of delay:

- Railroads Providing Trackage and Dispatching
- Full Route
- Segment
- Types of Delays

6.8.2 Customer Satisfaction

Measures of customer satisfaction will employ a yardstick based on performance and surveys. The process will result in the creation of a Customer Service Index (CSI). Program managers will routinely cross reference the intangible and tangible attributes of the service to measure customer perception and value of the service. A Customer Comment Matrix will be used to record customer comments as to service quality; these will be applied to the CSI and measured against ridership to determine if service/performance is affecting ridership and to address significant weaknesses. The program management team will also undertake routine Service Standard Audits to compare service delivery against standards in particular performance areas and to gauge whether improvements are warranted.

6.8.3 Financial Results

Financial results will be tracked using two metrics:

- Cost Recovery
 - Revenue
 - Analyzing Fixed, Incremental and Variable Costs
 - Profit / Loss statement

- Operating Statistics (Costs and Revenues)
 - Ridership (Seat Miles Created and Utilized, Load Factor, Passenger Miles, Trip Length, Seat Turnover)
 - Mechanical Integrity (Equipment Availability, Mean Time Between Failures, Failure Analysis)
 - Train Operation (Train Miles, Locomotive Miles, Coach Miles, Matrix against Operating Segment)

6.8.4 Safety

The program team will develop an assessment process for safety focusing on:

- Employees – days without injuries; injury/train-mile
- Passengers – injuries/train-mile
- Trespassers – non-fatal injuries; fatal injuries; causes of injury

The process will apply the results to create a process of continual improvement.

6.8.5 Market Share

An annual assessment of market position based on regional and corridor data will help program managers determine further actions to improve service and attract riders. This process will require monitoring of other transportation modes to recognize changes to:

- Service Frequency and Amenity
- Schedules, Speed, Trip Times, and Fares/Costs
- New Initiatives – Capacity Improvements

7.0 PRIORITIZED CAPITAL PROGRAM OF PROJECTS – IMPLEMENTATION STRATEGY

The High Speed Rail Empire Corridor Program will build on recent and current projects sponsored by NYSDOT. Infrastructure improvements to date have included new stations, upgraded tracks and expanded capacity along the route from New York City to Niagara Falls. In the future, the capital program will focus on improvements that are coupled to increases in service frequency, shorter trip times, and increased operating capacity. By prioritizing projects to maximize benefits to operations, the program will advance towards its objectives in the most direct manner, driving public support for further investments as the benefits of the improvements are experienced by travelers.

The program implementation strategy has thus been designed to optimize the relationship between funding/spending and accrued benefits. Investments are sequenced to give the greatest travel time and operational benefits in the earliest phases, while ensuring minimum interference with live freight and passenger operations. The program has a 25-year life-span primarily to align with anticipated funding; based on past recent history and anticipated funding programs, it is expected that an annual program of \$250 million is affordable and manageable in the context of existing and anticipated future freight and passenger operations.²⁶ The program will need to be reassessed periodically, as each phase of work is completed, metrics are assessed, and future operating constraints are better known (level of freight traffic, evolving safety requirements, evolving travel demands).

The overall program is estimated to cost \$7.323 billion (2017 dollars). Although the Tier 1 Final EIS for this program indicates a capital cost over 20 years of just under \$6 billion, as this program was developed in more detail for this SDP, it was realized that the most efficient approach to rail infrastructure upgrades on an increasingly heavily used operating line is to visit each repair location once, and to upgrade to a state of good repair all elements at that location, even if they are not directly related to program objectives. Thus, if the program seeks the realignment and upgrade of a single track over a three-track bridge, it makes sense for both reasons of efficiency and reasons of collateral benefit to the service to upgrade the other two tracks as well. This avoids the need to return sometime later to address the other two tracks and, more importantly, leaves CSXT as the operator with greater flexibility to dispatch freight and passenger trains such that the passenger trains can still operate at the allowable speed, regardless to which track they are assigned. This improved dispatch and operational flexibility gives much greater likelihood of consistent, reliable, High Speed passenger service regardless of the freight traffic running in parallel. This decision increases the program cost, by bringing the entire freight/passenger network up to higher speed track standards.

The following sections detail the specific waves of program improvements, their cost, and the reason for the sequence of projects.

7.1 Capital Program - State of Good Repair

In recent years, NYSDOT has sponsored a series of infrastructure improvements along the Empire Corridor, outlined in Exhibit 7-1. These improvements constitute the Base condition and

²⁶ Projects are selected based on maximum passenger benefit and by geographic segment to minimize the impact of construction on railroad operations. This produces slight fluctuations in total annual costs around the \$250m annual target.

set the stage for significant additional ridership growth as Alternative 90B projects are implemented in coming years.

Exhibit 7-1 Recent Projects Sponsored by New York State – Department of Transportation

Project Name (Milepost)	ARRA Grant Application	Project Description	Project Status
ES-1	Highway-Rail Grade Crossings Safety Improvements CSXT Hudson Line (MP 75.8 to 140)	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.	Completed
ES-3	Hudson Subdivision Signal Reliability (MP 75.8 to 140)	Replace old signal poles (for electric power to signals and communication lines) with underground cable between Poughkeepsie and Rensselaer Station.	Completed
ES-9	Albany-Rensselaer Station Fourth Track Capacity Improvements (MP 141 to 143)	Add a fourth track and extend platform to increase station capacity, operating speeds, train frequency, and routing flexibility, and reduce delays.	Completed
ES-10	Albany-Schenectady Double Track (MP 143.2 to 160.3)	Design, construct and rehabilitate a second main track between the Rensselaer and Schenectady stations to increase capacity, eliminate a bottleneck, and improve operations along a congested single-track segment.	Completed
EW-01	Schenectady Station Renovation / Platform Improvements (MP 159.8)	Complete station reconstruction, ADA compliant platform and station access, viaduct repairs, and parking improvements.	Under Construction
EW-6	Syracuse Track Configuration and Signal Improvements (MP 287 to 291)	Upgrade existing third track to reduce congestion, delays and interference between passenger and freight trains.	Under Design
EW-19	Rochester Station Redevelopment / Operating Improvements (MP 368 to 373)	New station building with new high-level center island platforms, new tracks/siding/interlocking to improve train operation efficiency, reduce congestion and improve passenger safety.	Completed
EW-13	Niagara Falls Station – New Intermodal Transportation Center (MP ODN28.2)	New station with improved location in downtown Niagara Falls, for improved function, operation, connectivity, border security, and reduced delays.	Completed

7.2 Summary of Implementation Strategy

The **Preferred Alternative** aims to increase service frequency, speed, and reliability for intercity passenger trains, without interfering with freight rail operations. Projects are aligned with anticipated funding and are sequenced to minimize impacts of construction on daily operations while yielding the greatest ridership and operational benefits. Key milestones in implementing this program include:

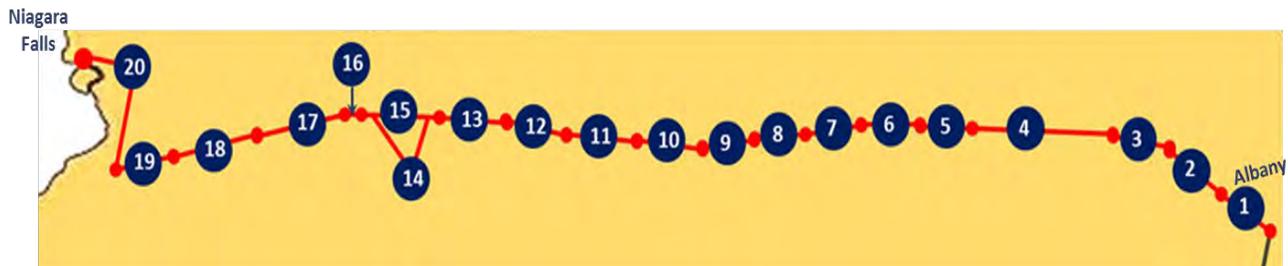
- Acquisition of new locomotives and passenger coaches

- Creation of additional capacity on the route through track, signal, and switch improvements
- Reconfiguration
- Increased train speeds and reduced trip times by flattening curves

The improvements intended for Empire Corridor South will be completed in the first five years of the twenty-five-year implementation schedule. These receive first priority in the program as they do not engage CSXT freight operations, and they address the largest ridership component on the Corridor. Empire Corridor South improvements also affect nearly two thirds of total Corridor travelers who travel between New York City and Albany and provide benefits to Empire Corridor West travelers who either originate in or are destined to Empire Corridor South stations. Finally, success on Empire Corridor South is expected to create support for continuing the program west of Albany in subsequent years.

Similar improvements for Empire Corridor West will be introduced gradually over the following twenty years on a priority basis keyed to ridership levels. Exhibit 7-2 illustrates the supporting infrastructure improvements intended for Empire Corridor West, organized into twenty segments. Each of the segments can be built independently, minimizing the impact on existing CSXT operations. As each segment is completed, Albany – Buffalo/Niagara Falls trip times and congestion will be reduced.

Exhibit 7-2 Empire Corridor and Distribution of Intercity Passenger Services



7.2.1 Summary of Service Growth

Additional trains would be added to the Empire Corridor schedule as outlined in Exhibit 7-3.

Exhibit 7-3 Additional Frequency Service Introduction Strategy

Year	Service Improvement	Train Numbers	Frequency	Trip Count Roundtrips	
				NYC / ALB	ALB / NFL
1				13	4
2				13	4
3	1 – New Round Trip Saratoga Springs – New York City 1-Round Trip (ext.) Albany-Rensselaer – Saratoga 1 New Round Trip Albany-Rensselaer- New York City	234 – 237 238 - 239 242 -235	Monday – Friday Monday – Friday Daily	15	4
4	1 – Round Trip Albany-Rensselaer – New York City	231 – 272	Daily	16	4
5	1 – Round Trip Albany-Rensselaer – New York City	236 - 273	Daily	17	4
6				17	4
7				17	4
8				17	4
9				17	4
10	1 – Round Trip Albany-Rensselaer – Niagara Falls	271 – 274 (A)	Monday - Friday	17	5
11				17	5
12				17	5
13	1 – Round Trip Albany-Rensselaer – Syracuse	273 – 272 (A)	Daily	17	6
14				17	6
15	1 – Round Trip Albany-Rensselaer – Niagara Falls	285 - 284	Daily	17	7
16				17	7
17				17	7
18	1 – Round Trip Albany-Rensselaer – Niagara Falls	287 – 286 (A)	Daily	17	8
19				17	8
20	1 – Round Trip Albany-Rensselaer – Syracuse	270 – 275	Daily	17	9

Note A: Trip will be extended from Syracuse to Niagara Falls in Year 25.

7.3 Short Term Capital Plan (0 – 5 years)

Years 1-5 focus on Empire Corridor South between New York City and Albany and are aimed at capacity and speed. These projects are anticipated to result in approximately a 15-minute savings in travel time between NYC and Albany, reducing a 150-minute trip to a scheduled 135-minute trip, and elevating average speeds from 64 mph to 70 mph over this segment. Starting the

program improvements between Albany-Rensselaer and New York City will provide benefits to large numbers of passengers who traverse both the Empire Capital District Connection (Empire Corridor South) and the Empire Gateway section (Empire Corridor West). Sections of the right-of-way now limited to 80 mph would be improved to permit 90 mph and 110 mph operation, and some track constraints would be removed to enable overtaking where current operations require following at slower speed. By reducing conflicts at compromised track locations, it is anticipated that these projects will improve on-time performance (OTP) from slightly below 80% to 85% of trains arriving on time. Approximately \$1.2 billion is programmed for the Empire Corridor South Year 1-5 improvements.

In addition to these speed and capacity infrastructure improvements, the first five years of the program will involve the addition of four round-trip trains (and a fifth additional one-way trip to Syracuse) to the Empire Corridor, with the additional train runs terminating further and further west as infrastructure improvements can be completed to support the extended operation. To enable the additional trains, approximately \$200 million worth of locomotives and coaches will be added to the fleet, sufficient to create six full train sets (five operating trains; one in for repairs and upkeep on a rotating, preventive maintenance cycle). Two trains will operate as limited-stop expresses, servicing certain stations to deliver a two-hour travel time between NYC and Albany.

The program implementation strategy for the first 5-year period is outlined in Exhibits 7-4 and 7-5.

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Exhibit 7-4 High Speed Rail Empire Corridor Program - Empire Capital Connection Improvements for Preferred Alternative: Years 1 - 5

Project Number	Project Area	Primary Project Type	Goals	Year 1 \$214	Year 2 \$257	Year 3 \$250	Year 4 \$255	Year 5 \$247	Estimated Project Cost (2017 \$ M)
ESC-04	Rhinecliff to Rensselaer	Rock Slope Stabilization	SAFETY <ul style="list-style-type: none"> Reduce Delays Improve Reliability 	Start ESC-04	COMPLETE ESC-04				\$ 9
ESC-05	Staatsburg to Stuyvesant CP 82 – CP 99 – CP 136	Additional Interlocking's	RELIABILITY <ul style="list-style-type: none"> Reduce Delays Safety Increase Capacity 		Start ESC-05	ESC-05 Continues	COMPLETE ESC-05		\$ 23
SC-14	Hudson Station	High Level Platform	RELIABILITY <ul style="list-style-type: none"> Reduce Delays, Improve Safety ADA Improvement 	Start ESC-14	COMPLETE ESC-14				\$ 42
ESC-51	Staatsburg to Jansenkil MP 85 – MP 108	Hudson Line Bridge Replacement	TRIP TIME REDUCTION <ul style="list-style-type: none"> Capacity Speed Improvements State of Good Repair 	Start ESC-51	ESC-51 Continues	COMPLETE ESC-51			\$ 30
ESC-47	New Signal System CP 75 – CP 169	Communications & Signals	TRIP TIME REDUCTION <ul style="list-style-type: none"> Capacity Speed Improvements Safety 		Start ESC-47	ESC-47 Continues	COMPLETE ESC-47		\$ 47
ESC-20	Rhinecliff Station	High Level Platform	RELIABILITY <ul style="list-style-type: none"> Reduce Delays Improve Safety ADA Improvement 		Start ESC-20	ESC-20 Continues	COMPLETE ESC-20		\$ 15
ESC-26	Poughkeepsie CP 72 – CP 75	Upgrade Track Speeds & Yard Improvements	TRIP TIME REDUCTION <ul style="list-style-type: none"> Improve Reliability Capacity Improvements 		Start ESC-26	ESC-26 Continues	COMPLETE ESC-26		\$ 15
ESC-35	CP 75 – CP 114	110 MPH Speed Improvement Project	TRIP TIME REDUCTION <ul style="list-style-type: none"> Speed Improvements 		Start ESC-35 & ESC-36	ESC-35 & ESC-36 Continues	COMPLETE ESC-35 & ESC-36		\$ 230
ESC-36	C P114 – CP 124								

Exhibit 7.4 (cont.) - High Speed Rail Empire Corridor Program - Empire Capital Connection Improvements for Preferred Alternative: Years 1 - 5

Project Number	Project Area	Primary Project Type	Goals	Year 1 \$214	Year 2 \$257	Year 3 \$250	Year 4 \$255	Year 5 \$247	Estimated Project Cost (2017 \$ M)
ESC-25	Hudson Highlands Metro North Railroad between Croton-Harmon and CP 75	3rd Track for Overtakes & Raise Operating Speeds	TRIP TIME REDUCTION <ul style="list-style-type: none"> Capacity Speed Improvements State of Good Repair 			Start ESC-25	ESC-25 Continues	COMPLETE ESC-25	\$ 85
ESC-18	Metro North Railroad Tarrytown	Pocket Track CP 25 Additional 3rd Rail	RELIABILITY <ul style="list-style-type: none"> Reduce Delays Safety Increase Capacity 	Start ESC-18	COMPLETE ESC-18				\$ 10
ESC-06	Stuyvesant CP 124 + CP 125	Third Track & Interlocking Improvements	RELIABILITY <ul style="list-style-type: none"> Reduce Delays, Improve Safety ADA Improvement 	Start ESC-14	COMPLETE ESC-14			COMPLETE ESC-14	\$ 47
ESC-15	Livingston Avenue Moveable Bridge	Replacement of Bridge	RELIABILITY <ul style="list-style-type: none"> Capacity Safety State of Good Repair 	Start ESC-51	ESC-51 Continues	COMPLETE ESC-51			\$ 280
HSR-2	EMPIRE GATEWAY	Double Track Project Schenectady (CP 161 to CP 169)	TRIP TIME REDUCTION <ul style="list-style-type: none"> Capacity Speed Improvements Safety 					Start HSR-2	\$ 200
HSR	Acquisition of additional locomotives and coaches to support service expansion	Equipment	SERVICE GROWTH <ul style="list-style-type: none"> Increase Capacity Improve Reliability Improve Passenger Experience 		Start Procurement of New Locomotives & Coaches	Procurement of New Locomotives & Coaches Continues	Procurement of New Locomotives & Coaches Continues	COMPLETED Procurement of New Locomotives & Coaches	\$ 200
Total Investment Years 1 through 5									\$ 1,233 M

7.4 Mid Term Capital Plan (6 – 10 years)

Years 6-10 of the program focus on select bridge replacements, track and signal improvements between Albany and Niagara Falls. Approximately \$1.2 billion will be spent during this phase, or \$240 million annually. These improvements address speed and capacity and are distributed along the Empire Corridor West right-of-way to avoid a circumstance where overly concentrated construction activity in one area might interfere with freight or passenger services. The next phase of the work starts at Utica Station, as this will provide the most immediate operational flexibility and capacity increase for the system. With an expanded interlocking west of the station, the program enables increased platform and track capacity where it is most needed to accommodate planned train moves. The program will then continue expanding capacity to the east and west from Utica Station, focused on conflict-free meets (passing of one train by another) of east and westbound trains on separate or passing tracks. Beyond Utica Station, the Niagara Falls branch single track chokepoint is addressed to enable two-way operation that better accommodates the increased service resulting from Years 1-5 and saves significant time in the schedule (which cascades back through the entire Corridor including trains on Empire Corridor South). These projects will reduce Albany-Niagara Falls travel times by 10 minutes for all trains and significantly improve reliability, increasing on-time performance from 78% to 87%, reducing delays, and yielding more consistent and dependable service. As program improvements provide additional capacity to the west, the four trains added to the schedule in Years 1-5 would be extended to Rochester, then Buffalo/Depew, and, finally, to Niagara Falls. The program implementation strategy for Years 6 through 10 are outlined in Exhibit 7-5.

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Exhibit 7-5 High Speed Rail Empire Corridor Program - Empire Gateway Improvements for Preferred Alternative: Years 6 - 10

Project Number	Project Area	Primary Project Type	Goals	Year 6 \$260	Year 7 \$265	Year 8 \$265	Year 9 \$220	Year 10 \$255	Estimated Project Cost (2017 \$ M)
HSR-2	Capital District <i>New Trackage eliminates single track operation and rehabilitate Mohawk River Bridge</i>	Track & Signal Install 2nd Track from CP 161 (Schenectady) to CP 169 (Hoffman's)	<ul style="list-style-type: none"> Capacity Improvement Better Reliability Increase Speed Trip Time reduction 	COMPLETE Double Track \$160 m					\$160
HSR-3	Mohawk Valley <i>Adds trackage and increases operating speeds to support trip time reductions</i>	Track & Signal Add Main Tracks from CP 169 (Hoffman's) to CP 184 (Fonda)	<ul style="list-style-type: none"> Capacity Improvement Better Reliability Increase Speed Trip Time reduction 	Start Installation \$100 m	COMPLETE Installation \$135 m				\$235
HSR-6	Mohawk Valley <i>Adds trackage and increases operating speeds to support trip time reductions</i>	Track & Signal Additional Main Tracks from CP 226 (Herkimer) to CP 235 (Utica)	<ul style="list-style-type: none"> Capacity Improvement Better Reliability Increase Speed Trip Time reduction 					COMPLETE Installation of Track \$ 105 m	\$105
HSR-7	Utica Union Station <i>Improves operation of passenger trains and freight trains at Utica Union Station</i>	Track & Signal Add Main Tracks from CP 235 (Utica) to CP 239 (Oriskany)	<ul style="list-style-type: none"> Capacity Improvement Better Reliability Trip Time reduction Improve Station Operations 				COMPLETE Installation of Track \$120 m		\$120
HSR-8	Mohawk Valley <i>Adds trackage and increases operating speeds to support trip time reductions</i>	Track & Signal Add Main Tracks from CP 239 (Whitesboro) to CP 246 (Oriskany)	<ul style="list-style-type: none"> Capacity Improvement Better Reliability Increase Speed Trip Time reduction 			COMPLETE Installation of Track \$ 90 m			\$90
HSR-9	Mohawk Valley <i>Adds trackage and increases operating speeds to support trip time reductions</i>	Track & Signal Additional Main Tracks CP 246 (Oriskany) – CP 259 (Vernon)	<ul style="list-style-type: none"> Capacity Improvement Better Reliability Increase Speed Trip Time reduction 				Start Installation \$ 100 m	COMPLETE Installation \$ 120 m	\$220
HSR-16	Rochester Station <i>Improve interlocking to improve operation of freight and passenger trains west of Rochester Station</i>	Track & Signal Rebuild Interlocking at CP 373	<ul style="list-style-type: none"> Capacity Improvement Better Reliability Trip Time reduction Improves Station Operation 					COMPLETE Rebuild Interlocking CP 373 \$ 30 m	\$ 30
HSR-20	Niagara Branch <i>Additional capacity eliminates single track operation</i>	Track & Signal North Tonawanda to CP 23	<ul style="list-style-type: none"> Capacity Improvement Better Reliability Increase Speed Trip Time reduction 		Start Installation of Double Track & Eliminate Single Track Operation \$ 130 m	COMPLETE Installation of Double Track Eliminate Single Track Operation \$ 175 m			\$305
Total Investment Years 6 through 10									\$ 1,265 M

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7.5 Extended Term Capital Plan (11 years and beyond)

The program implementation strategy for Years 11 through 25 are outlined in Exhibits 7-6, 7-7, and 7-8. The subsequent program work is concentrated almost entirely on Empire Corridor West, and continues the effort to decongest the track system, relieve bottlenecks (in descending order of impact), speed train operations by smoothing curves, increase platform flexibility at stations through the addition of track interlockings, and upgrade elements of passengers' experience. These projects complete the program with additional track and signal system improvements to further speed train operations, reduce freight/passenger conflicts, improve reliability, and reduce delays. It remains essential to complete the entire program, since the failure to complete improvements on the Empire Corridor West segment would result in slower schedules that would cascade along both Empire Corridor West and Empire Corridor South operations, limiting the benefits of the earlier investments in these more heavily traveled Corridor segments.

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Exhibit 7-6 High Speed Rail Empire Corridor Program - Empire Gateway Improvements for Preferred Alternative: Years 11 - 15

Project Number	Project Area	Primary Project Type	Goals	Year 11 \$280	Year 12 \$280	Year 13 \$330	Year 14 \$330	Year 15 \$330	Estimated Project Cost (2017 \$ M)
HSR-5	Mohawk Valley <i>Adds trackage to allow passenger train faster operation with freight trains</i>	Track & Signal Additional Main Tracks CP 218 (Little Falls) – CP 226 (Herkimer)	<ul style="list-style-type: none"> Capacity Improvement Better Reliability Increase Speed Trip Time reduction Improved Station Operations 	Start Installation \$ 100 m	Continue Installation \$ 100 m	COMPLETE Installation \$ 50 m			\$ 250
HSR-10	Syracuse Terminal Subdivision <i>Increased Capacity that will support trip time reductions</i>	Track & Signal Additional Main Tracks CP 259 (Vernon) to CP 283 (East End of DeWitt Yard)	<ul style="list-style-type: none"> Capacity Improvement Better Reliability Increase Speed Trip Time reduction 	Start Installation \$ 100 m	Continue Installation \$ 100 m	Continue Installation of \$ 50 m	Continue Installation \$ 50 m	Continue Installation \$ 50 m	\$ 350
HSR-12	East of Seneca River Bridge <i>Adds trackage and increases operating speeds to support trip time reductions</i>	Track & Signal Additional Main Tracks CP 310 (Warner's) – CP 320 (east end of Seneca River)	<ul style="list-style-type: none"> Capacity Improvement Better Reliability Increase Speed Trip Time reduction 				Start Installation Increase operating speeds for trip time reduction \$ 160 m	COMPLETE Installation Increase operating speeds for trip time reduction \$ 100 m	\$ 260
HSR-14	Rochester "West Shore By-pass" <i>Routes freight trains away from downtown Rochester and Station area increasing capacity</i>	Track & Signal Additional Main Tracks "West Shore By-Pass" CP 347 (Waynesport) –CP 368 (Chili Jct.)	<ul style="list-style-type: none"> Capacity Improvement Better Reliability Increase Speed Trip Time reduction Improved Station Operations 					Start Installation \$ 180 m	\$ 180
HSR-17	Rochester Subdivision <i>Adds capacity to allow for better operation of freight and passenger trains east of Rochester Station</i>	Track & Signal Additional Main Tracks CP 374 – CP 388 in the Rochester area	<ul style="list-style-type: none"> Capacity Improvement Better Reliability Increase Speed Trip Time reduction Improved Station Operations 	Start Installation \$ 80 m	Continue Installation \$ 80 m	COMPLETE Installation \$ 130 m			\$ 290
HSR-18	Rochester Subdivision <i>Adds trackage to increase operating speeds and support trip time reductions</i>	Track & Signal Additional Main Tracks CP 399 (Chili Jct.) – CP 409 (South Byron)	<ul style="list-style-type: none"> Capacity Improvement Better Reliability Increase Speed Trip Time reduction Improved Station Operations 				Start Installation Contribute to Trip Time Reduction \$ 100 m	COMPLETE Installation Contribute to Trip Time Reduction \$ 120 m	\$ 220
Total Investment Years 11 through 15									\$ 1,550 M

Exhibit 7-7 High Speed Rail Empire Corridor Program - Empire Gateway Improvements for Preferred Alternative: Years 16 – 20

Project Number	Project Area	Primary Project Type	Goals	Year 16 \$300	Year 17 \$300	Year 18 \$350	Year 19 \$350	Year 20 \$350	Estimated Project Cost (2017 \$ M)
HSR-4	Mohawk Valley <i>Adds trackage to allow passenger trains faster operation on the multiple curves along the Mohawk River</i>	Track & Signal Additional Main Tracks CP 184 (Fonda) to CP 217 (Little Falls)	<ul style="list-style-type: none"> Capacity Improvement Better Reliability Increase Speed Trip Time reductions 			Start Installation \$100 m	Continue Installation \$100 m	Continue Installation \$100 m	\$ 300
HSR-10	Syracuse Terminal Subdivision <i>Increased Capacity that will support trip time reductions</i>	Track & Signal Additional Main Tracks CP 259 (Vernon) to CP 283 (East End of DeWitt Yard) -	<ul style="list-style-type: none"> Capacity Improvement Better Reliability Increase Speed Trip Time reductions 	Continue Installation Significant Trip Reduction \$ 50 m	COMPLETE Installation Significant Trip Reduction \$ 50 m				\$ 100
HSR-13	Seneca River Bridge <i>Eliminate 40 MPH Speed Restriction on Seneca River Bridge</i> <i>Significant Trip Reduction</i>	Track & Signal Additional Main Tracks CP 320 (Seneca River Bridge) to CP 359 (Palmyra)	<ul style="list-style-type: none"> Capacity Improvement Better Reliability Increase Speed Trip Time reductions 	Start Installation Replacement Seneca River Bridge Eliminate Speed Restriction \$ 150 m	Continue Installation Replacement Seneca River Bridge Eliminate Speed Restriction \$ 100 m	Continue Installation Replacement Seneca River Bridge Eliminate Speed Restriction \$ 100 m	Continue Installation Replacement Seneca River Bridge Eliminate Speed Restriction \$ 100 m	COMPLETE Installation Replacement Seneca River Bridge Eliminate Speed Restriction \$ 100 m	\$ 550
HSR-14	Rochester “West Shore By-pass” <i>Routes freight trains away from downtown Rochester and Station area increasing capacity</i>	Track & Signal Additional Main Tracks “West Shore By-Pass” CP 347 (Waynesport) –CP 368 (Chili Jct.)	<ul style="list-style-type: none"> Capacity Improvement Better Reliability Increase Speed Trip Time reductions 	COMPLETE Installation \$ 100 m					\$100
HSR-19	Buffalo Terminal & Rochester Subdivision <i>Increased Capacity that will support trip time reductions Significant Trip Time Reduction</i>	Track & Signal Additional Main Tracks CP 399 (South Byron) to CP 432 (East Buffalo)	<ul style="list-style-type: none"> Capacity Improvement Better Reliability Increase Speed Trip Time reductions 		Start Installation Significant Trip Time Reduction \$ 150 m	Continue Installation Significant Trip Time Reduction \$ 150 m	Continue Installation Significant Trip Time Reduction \$ 150 m	Continue Installation Significant Trip Time Reduction \$ 150 m	\$600
Total Investment Years 16 through 20									\$ 1,650 M

Exhibit 7-8 High Speed Rail Empire Corridor Program - Empire Gateway Improvements for Preferred Alternative: Year 21 - 25

Project Number	Project Area	Primary Project Type	Goals	Year 21 \$325	Year 22 \$375	Year 23 \$375	Year 24 \$325	Year 25 \$235	Estimated Project Cost (2017 M)
HSR-4	Mohawk Valley <i>Adds trackage to allow passenger trains faster operation on the multiple curves along the Mohawk River</i>	Track & Signal Additional Main Tracks in the Mohawk Valley CP 184 (Fonda) – CP 217 (Little Falls)	<ul style="list-style-type: none"> Capacity Improvement Better Reliability Increase Speed Trip Time reductions 	Continue Installation \$150 m	Continue Installation \$100 m	COMPLETE Installation \$100 m			\$350
HSR-11	Syracuse Terminal Subdivision <i>Provides passenger trains their own station tracks to eliminate interferences with freight trains</i>	Track & Signal Additional Main Tracks CP 283 (East Syracuse) to CP 310 (West Syracuse)	<ul style="list-style-type: none"> Capacity Improvement Better Reliability Increase Speed Trip Time reduction Improved Station Operations 		Start Installation \$ 125 m	Continue Installation \$ 125 m	Continue Installation \$ 175 m	COMPLETE Installation \$ 160 m	\$585
HSR-15	Rochester Subdivision <i>Adds track capacity and supports better passenger train operations at Rochester</i>	Track & Signal Additional Main Tracks to "Main Line" CP 374 (Rochester) – CP 388 (Chili Jct.)	<ul style="list-style-type: none"> Capacity Improvement Better Reliability Increase Speed Trip Time reduction Improved Station Operations 	Start Installation \$ 75 m	Continue Installation \$ 150 m	Continue Installation \$ 150 m	Continue Installation \$ 150 m	COMPLETE Installation \$ 75 m	\$600
HSR-19	Buffalo Terminal & Rochester Subdivision <i>Significant Trip Time Reduction</i>	Track & Signal Additional Main Tracks CP 399 (South Byron) to CP 432 (East Buffalo)	<ul style="list-style-type: none"> Capacity Improvement Better Reliability Increase Speed Trip Time reduction Improved Station Operations 	COMPLETE Installation \$ 100 m					\$100
Total Investment Years 21 through 25									\$ 1,635 M

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7.6 Staffing Plan for Supporting Service Growth

Based on the foregoing summaries of the program capacity improvement sequence over the 25-year implementation period and noting the introduction of expanded frequency of service in the first five years, crewing and staffing of rail operator forces to sustain the enhanced physical plant and additional train service is outlined in Exhibits 7-9 through 7-14. Additional trains are added in early program phases because ridership on the Empire Corridor between Albany and New York City is reaching saturation, and studies show that adding service to crowded transit services is necessary to maintain existing ridership while positioning the service to accommodate growth.

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Exhibit 7-9 High Speed Rail Empire Corridor Program - Empire Capital District Connection (New York City to Albany and Schenectady) – Staffing Plan

Train Service Improvements	Year 1 - 5	Year 6 – 10	Year 11 - 15	Year 16 – 20	Year 21 - 25	New Roundtrips
Trips Added	Round Trips Saratoga Springs / NYC Saratoga Springs / NYC Albany-Rensselaer / NYC Albany-Rensselaer / NYC	Round Trips Albany-Rensselaer / NFL	Round Trips Albany-Rensselaer / Syracuse Albany-Rensselaer / NFL	Round Trips Albany-Rensselaer / NFL Albany-Rensselaer / Syracuse	Round Trips Syracuse / NFL	ALB/NYC + 4 ALB/NFL + 4 ALB/SYR + 1

Additional Infrastructure	Year 1 - 5	Year 6 – 10	Year 11 - 15	Year 16 – 20	Year 21 - 25	Total
Segment Completed	All Projects between NYC and Albany-Rensselaer COMPLETED	HSR-2 HSR-3 HSR-6 HSR-7 HSR-8 HSR-9 HSR-16 HSR-20	HSR-5 HSR-17 HSR-12 HSR-18	HSR-14 HSR-10 HSR-13	HSR-19 HSR-4 HSR-11 HSR-15	All Segments COMPLETED
New Miles of Track	48	97	105	45	109	404
Upgraded Interlockings	7	15	8	4	12	46
Grade Crossings		13	31	20	61	125
Bridges	12	8	5	8	21	54

Job Creation	Year 1 - 5	Year 6 – 10	Year 11 - 15	Year 16 – 20	Year 21 - 25	Total
Train Crews	16	3	8	8	5	40
Train Movement Management	5					5
Stations		2	3			5
Track		12	8	6	18	44
Signal		25	12	12	18	67
Structures	3			3	6	12
Total	24	42	31	29	47	173

Exhibit 7-10 High Speed Rail Empire Corridor Program - Empire Capital District Connection (New York City to Albany and Schenectady) - Staffing Plan

Train Service Improvements	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Trips Added			1 - New Round Trip Saratoga Springs - New York City 1-Round Trip (ext.) Albany-Rensselaer - Saratoga 1 New Round Trip Albany-Rensselaer - New York City	<u>New Round Trip:</u> New York City - Albany 231 - 272	<u>New Round Trip:</u> Albany-Rensselaer - New York City 236 - 273	

Additional Infrastructure	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Segment Completed						
New Miles of Track		1		3	44	48
Upgraded Interlockings				4	3	7
Grade Crossings						
Bridges			6	6		12

Job Creation	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Train Crews			6	5	5	16
Train Movement Management		2	2		1	5
Stations						
Track						
Signal						
Structures		3				3
Total		5	8	5	6	24

Exhibit 7-11 High Speed Rail Empire Corridor Program - Empire Gateway – Staffing Plan

Train Service Improvements	Year 6	Year 7	Year 8	Year 9	Year 10	Total
Trips Added					<u>New Round Trip:</u> Albany-Rensselaer - Niagara Falls 271 - 274	

Additional Infrastructure	Year 6	Year 7	Year 8	Year 9	Year 10	Total
Segments Completed	HSR-2	HSR-3	HSR-8 + HSR-20	HSR-7	HSR-6, HSR-9 + HSR-16	
New Miles of Track	12	10	19	8	48	97
Upgraded Interlockings	2	2	4	2	5	15
Grade Crossings	1	11	1	-	-	13
Bridges	1	1	4	-	2	8

Job Creation	Year 6	Year 7	Year 8	Year 9	Year 10	Total
Train Crews					3	3
Train Movement						
Stations					2	2
Track	6	3	3			12
Signal	3	3	6	3	10	25
Structures						
Total	9	6	9	3	15	42

Exhibit 7-12 High Speed Rail Empire Corridor Program - Empire Gateway – Staffing Plan

Train Service Improvements	Year 11	Year 12	Year 13	Year 14	Year 15	Total
Trips Added			<u>New Round Trip:</u> Albany-Rensselaer - Syracuse 273 - 272		<u>New Round Trip:</u> Albany-Rensselaer - Niagara Falls 285 - 284	

Additional Infrastructure	Year 11	Year 12	Year 13	Year 14	Year 15	Total
Segments Completed			HSR-5 + HSR-17		HSR-12 + HSR-18	
New Miles of Track			52		53	105
Upgraded Interlockings			4		4	8
Grade Crossings			17		14	31
Bridges			3		2	5

Job Creation	Year 11	Year 12	Year 13	Year 14	Year 15	Total
Train Crews			5		3	8
Train Movement						
Stations			2		1	3
Track			8			8
Signal			6		6	12
Structures						
Total			21		10	31

Exhibit 7-13 High Speed Rail Empire Corridor Program - Empire Gateway – Staffing Plan

Train Service Improvements	Year 16	Year 17	Year 18	Year 19	Year 20	Total
Trips Added			New Round Trip: Albany-Rensselaer - Niagara Falls 287 - 286		New Round Trip: Albany-Rensselaer - Niagara Falls 270 - 275	

Additional Infrastructure	Year 16	Year 17	Year 18	Year 19	Year 20	Total
Segments Completed	HSR-14	HSR-10			HSR-13	
New Miles of Track	21	24			39	45
Upgraded Interlockings	2	2			4	4
Grade Crossings	11	9			27	20
Bridges	4	1			3	8

Job Creation	Year 16	Year 17	Year 18	Year 19	Year 20	Total
Train Crews			3		5	8
Train Movement						
Stations						
Track	3	3				6
Signal	3	3			6	12
Structures		3				3
Total	6	9	3		11	29

Exhibit 7-14 High Speed Rail Empire Corridor Program - Empire Gateway – Staffing Plan

Train Service Improvements	Year 21	Year 22	Year 23	Year 24	Year 25	Total
Trips Added					<u>New Round Trip:</u> Syracuse - Niagara Falls 271 - 274	

Additional Infrastructure	Year 21	Year 22	Year 23	Year 24	Year 25	Total
Segments Completed	HSR-19		HSR-4		HSR-11 + HSR-15	
New Miles of Track	44		34		31	109
Upgraded Interlockings	4		4		4	12
Grade Crossings	22		36		3	61
Bridges	3		8		10	21

Job Creation	Year 21	Year 22	Year 23	Year 24	Year 25	Total
Train Crews					5	5
Train Movement						
Stations						
Track	6		6		6	18
Signal	6		6		6	18
Structures			3		3	6
Total	12		15		20	47

8.0 PROGRAM IMPLEMENTATION STRATEGY

The program implementation strategy has been designed to optimize the relationship between funding and accrued benefits. Investments are sequenced to give the greatest travel time and operational benefits in the earliest phases, while ensuring minimum interference with freight operations over the life of the program. The program has a 25-year life-span both to align with anticipated funding and to enable projects to be sequenced to avoid impacts to existing freight and passenger services. The latter stages of the program will need to be reassessed as early work is completed, metrics are assessed, and future operating constraints are better known (level of freight traffic, evolving safety requirements, evolving travel demands, etc.). This section of the SDP describes the administrative, financial, legal, and managerial infrastructure that must be in place to support program implementation.

8.1 Financial Plan – 10 years

Funding the initial 10-year program phase is limited to available Federal and State capital funding (plus the possibility of modest municipal investments for station-related improvements). An annual target of \$250 million has been established for the program to address anticipated rates of federal support and to ensure that infrastructure work is not undertaken at a level that might interfere with daily passenger and freight services.²⁷ Based on project schedules and the capacity of the existing rail network to tolerate track, signal and station work, it is expected that this level of investment would continue for the duration of the program, providing funding can be identified and programmed.

8.1.1 Revenue

By increasing speed, train frequency, and reliability, the program will draw riders to rail from other modes, primarily airlines, intercity bus, and automobiles. Travel demand forecasting conducted during the NEPA process indicated a potential shift of approximately one million new riders by 2035, increasing ridership from its current level of 1.6 million annual riders to 2.6 million annual riders.²⁸ While it is difficult to project fares over the implementation time frame, using current (2017) fares, 2035 revenues would be expected to increase from \$79 million to approximately \$143 million by 2035 due to increased ridership, an increase of \$64 million (2017 dollars).

8.1.2 Cost

The program operating and capital costs are discussed below. Operating and maintenance costs grow as program elements are implemented (both capital infrastructure improvements and additional train service). Capital costs of \$7.323 billion (2017 dollars) are spread over the entire 25-year implementation time frame for the program. Equipment costs amount to approximately \$200 million, with infrastructure improvements costing \$7.123 billion.

²⁷ Projects are selected based on maximum passenger benefit and by geographic segment to minimize the impact of construction on railroad operations. This produces slight fluctuations in total annual costs around the \$250 million annual target.

²⁸ This SDP recognizes additional travel time benefit of 4 minutes that was not considered in the Tier 1 EIS, resulting in a slightly larger ridership gain of 1.083 million new riders by 2040.

8.1.3 Train Operations

The program will increase total round train trips from four to eight between New York City and Buffalo/Depew-Niagara Falls. (One additional train will operate between Albany-Syracuse on a loop basis.) The total Train and Engine additional complement would be expected to be 40 personnel once all five trains have been added. This includes all service requirements and extra-list additional staffing.

8.1.4 Maintenance

Costs will increase due to the need for additional train crews and station, track and signal maintenance personnel associated with the improvements. By the time the program is completed in 2045, it is estimated that the additional trains and improved and expanded track and signal system will require approximately 141 additional train, station, and track/signal maintenance personnel above current allocations.

8.1.5 Total Operating and Maintenance Costs

Overall, including train crews and track/signal/station maintenance and operating personnel, the **Preferred Alternative** will add \$70 million to the base Empire Corridor operating cost of \$106 million (2017 dollars) by 2035. The annual Empire Corridor operating and maintenance costs would then total \$176 million.

8.1.6 Deficits

Including all infrastructure and train operations and infrastructure maintenance costs, implementation of the **Preferred Alternative** will result in an increase in the Empire Corridor deficit of about \$6 million, from \$27 million to \$33 million (2017 dollars).

8.2 Capital Cost

The program is structured to require approximately \$250 million annually for capital investment (Exhibit 8-1).²⁹ The first five years emphasize Capital Empire District (Empire Corridor South) infrastructure and additional train equipment, with the balance beyond Year 5 focused on the Empire Gateway (Empire Corridor West) Albany – Buffalo/Niagara Falls right-of-way. Capital costs are divided generally by type of improvement as shown in Exhibit 8-2.

²⁹ *The first year shows a reduced program value recognizing administrative planning and organization, and initial contractor mobilization, resulting in a lower spending level Year 1.*

Exhibit 8-1 Annual Apportionment of Total Program Capital Costs (Empire Capital District Connection and Empire Corridor Gateway)

Empire Corridor Capital Program Annual Budget			
Year	Empire Capital District Connection	Empire Gateway	Total Program
1	\$214		\$214
2	\$257		\$257
3	\$250		\$250
4	\$255		\$255
5	\$47	\$200	\$247
6		\$260	\$260
7		\$265	\$265
8		\$265	\$265
9		\$220	\$220
10		\$255	\$255
11		\$280	\$280
12		\$280	\$280
13		\$330	\$330
14		\$330	\$330
15		\$330	\$330
16		\$300	\$300
17		\$300	\$300
18		\$350	\$350
19		\$350	\$350
20		\$350	\$350
21		\$325	\$325
22		\$375	\$375
23		\$375	\$375
24		\$325	\$325
25		\$235	\$235
Total	\$1,023	\$6,300	\$7,323

Exhibit 8-2 Capital Costs by Category

Item	EC South (millions \$)	EC West (millions \$)	Total (millions \$)
Bridges	\$310		\$310
New Tracks/Passing Sidings	\$147		\$147
Curve Straightening	\$220		\$220
Signal System Upgrades	\$79		\$79
Rolling Stock	\$200		\$200
Station Upgrades	\$67		\$67
High Speed Rail Construction (track, signals, sidings)		\$6,300	\$6,300
Total	\$1,023	\$6,300	\$7,323

The program will cost about \$7.323 billion over 25 years (2017 dollars). About \$2.4 billion will be required in the first ten years, with the balance over the remaining fifteen years. Exhibits 7-4 - 7-8 show the allocation of costs across the 35 separate program initiatives that comprise the program, as well as year-by-year over the 25-year investment period.

Funding for the program is expected from ticket sales, lease and concession revenues, and federal and state grants. Operating costs will be funded from ticket sales and station concession lease revenues and state funds. Capital funds will be generated from federal (likely FRA) and state budgets via NYSDOT and appropriations, and some municipal contributions toward station or station area improvements. Under the Passenger Rail Investment and Improvement Act of 2008, states are obligated to share the capital costs of improvements and daily operating and maintenance costs of services provided by Amtrak over portions of the Northeast Corridor and its branches. For the Empire Corridor, NYSDOT will share both the capital and operating and maintenance costs of the program according to formulas based on shared benefits and intensity of use of the infrastructure by the parties.

8.3 Capital Program

NYSDOT maintains a State Rail Plan that is developed by NYSDOT and processed through the various Metropolitan Planning Organizations and Regional Transportation Districts (RTDs) that represent political jurisdictions through which the Empire Corridor passes. The NYSDOT program provides a framework for repair and expansion of the state's road and rail networks. Projects are incorporated into the program and then approved by the appropriate MPO to ensure eligibility for federal funding. Some projects are funded entirely with state funds, although most are funded with a mix of state and federal funds, matched with local municipal or RTD funds where appropriate.

8.4 Program Management Plan and Schedule

The program will be managed according to a Program Management Plan, incorporating a schedule by which the various program elements will be implemented and laying out the procedures by which the program will be implemented. The Plan will span program organization and staffing, procurement procedures, design procedures, federal and state compliance procedures, notification procedures, required agreements and permits, utility management plans, and all other facets of standard project management. The schedule will integrate CSXT, MNR and Amtrak daily train operating requirements, notification requirements, and ongoing system maintenance needs with program design, procurement, construction, and testing/commissioning requirements to ensure routine operations are unaffected by program activities. Individual projects will be sequenced to maintain all essential rail and local road and emergency response operations and to optimize construction and minimize costs for flagging, Force Account, local police/traffic/utility, and other support services. The Program Management Plan will be written and submitted upon approval of the first federal grant for the program.

8.5 Institutional Arrangements and Organizational Responsibilities

The Program Management Plan will identify the right-of-way and asset owners and other parties responsible for program implementation. Owners of right-of-way include Amtrak, MNR and CSXT. NYSDOT will serve as the Program Manager, with responsibility for securing all necessary agreements and NEPA findings for specific projects, coordinating with the owners for access to and occupation of the right-of-way, and scheduling and monitoring the conduct of the work at a high level. The individual projects will be constructed by the owners or contractors working under their supervision. Testing and commissioning will be performed by the owners and Amtrak. NYSDOT will serve as the recipient of federal funding and will maintain program budgets.

8.6 Stakeholder Agreements

8.6.1 Program Sponsor Agreements

NYSDOT is the sole program sponsor. However, NYSDOT will require support from – and will need to coordinate with – MNR, Amtrak, and CSXT. How these agreements will be structured will be a function of negotiations to clearly identify roles and responsibilities, program schedule requirements, cost allocation, and trackage rights agreements. Separate agreements will be required with each operator, except for areas of the program where more than two parties must cooperate to effectuate the improvements. It is also possible that NYSDOT will need to execute agreements with other governmental units, such as the State Historic Preservation Office, or municipalities where local funds are to be provided or where municipal station work needs to be coordinated with other program improvements.

8.6.2 Railroad Agreements

Railroad operating agreements are required to define track sharing/occupancy arrangements, dispatching responsibilities and protocols, and vehicle, station, and track/signal infrastructure obligations. Canadian Pacific Rail and Norfolk Southern have trackage rights agreements and may have to be engaged for formal agreements regarding their service requirements.

8.7 Other Responsibilities

As program sponsor, NYSDOT will also be responsible for securing any necessary federal or state permits and approvals, for securing property, for managing municipal and stakeholder engagement, and for interfacing with FRA. NYSDOT also has responsibility for developing and securing agreements, funding and guiding design, coordinating with municipalities around station area plans and improvements and intermodal services at stations, and contracting with MNR, Amtrak and CSXT for the required switch, track and signal work. NYSDOT must also complete all required NEPA documentation and secure all required NEPA findings, and secure state and federal environmental permits. NYSDOT will also set minimum standards for customer service, contract the operation of the Empire Corridor passenger services, and monitor program metrics to ensure ridership growth and related financial conditions track against expectations.

9.0 ASSESSMENT OF BENEFITS

Investment in intercity passenger rail and high speed rail is motivated by the desire to realize direct passenger benefits associated with faster, safer, and more reliable travel, and broader-based community benefits of improved environmental quality, reduced air and highway congestion, and economic development. Passenger rail improvements create economic impacts in the form of travel time savings for rail users, reduced congestion on other transportation modes, and regional productivity increases from more efficient access to larger labor and trade markets. These savings cascade through the economy, creating jobs, increasing overall activity, and raising personal income.

The direct benefits of a transportation improvement typically involve measures of improved travel service: time savings due to faster travel and/or greater reliability that reduces delay for travelers on the trains. Indirect benefits flow from regional productivity improvements due to greater efficiency in moving people and the economic ripple effects of higher spending levels on enhanced service.

For the High Speed Rail Empire Corridor Program, the direct benefits are a 94-minute reduction of overall travel time from 9 to 7.5 hours between NYC and Niagara Falls, and an increase in reliability from fewer than 75% to more than 90% of trains arriving on time. Of the 94 minutes of travel time savings, 80 minutes occurs along the Empire Corridor West segment between Albany and Niagara Falls. This is significant, as this section is most affected by freight conflicts and unreliability; in 2012, the “average delay” penalty assigned in the travel demand forecasting model was 90 minutes, with the great majority allocated to the Empire Corridor West section. Thus, the program will provide direct quantifiable benefits where the current service is most needing.

Indirect benefits of the program are improved environmental conditions (air quality, open land), reduced traffic congestion on key roads, the enhancement of rail stations as economic engines for downtown areas, and the freeing of airline capacity for longer-range travel that cannot be effectively served by rail.

The program costs are as specified in previous chapters. The program will cost \$7.323 billion (2017 dollars) to construct over 25 years, with improved travel time and reduced delay benefits accruing gradually as improvements are made. The maintenance and operation of the new infrastructure and the additional four daily trains intended to be added to the existing service will cost \$70 million annually at the completion of the program in 2040.

The benefits specific to the different segments of the Empire Corridor are described below, and these are summarized in a series of quantitative metrics for the program overall in Section 9.3.

9.1 Benefits Empire Corridor South

9.1.1 Travel Benefits (Direct Benefits)

- **Trip Time Reduction:** The 2-hour trip time target represents a 30-minute savings for passengers between Albany and New York City. The 30-minute trip time reduction will be accrued incrementally as the supporting projects are completed. This reduction benefits 90% of the ridership on the Empire Corridor.

- **Increase Frequency:** Train frequencies increase in early program phases, providing hourly service during peak periods. The number of round-trips New York City - Albany will grow from the current 13 to 17 roundtrips.
- **Direct Travel Cost Savings:** Passenger ridership forecasts for High Speed Rail Empire Corridor Program project ridership increasing to 2.7 million riders in 2040. It is estimated that over \$14 million in reduced travel costs would be saved by travelers shifting to rail for its higher speed, reduced trip times, and more reliable performance.
- **Improving On-Time Performance and Reliability:** The additional tracks support improvements in OTP and reliability. It is anticipated that a reliability of 95.4% can be achieved, compared to the current value below 80%.

9.1.2 Non-Travel (Indirect) Benefits

- **Environmental Impacts:** All improvements are within the existing right-of-way, resulting in minimal environmental impacts. Some projects contained in the program will require more focused environmental analysis before they can be built.
- **Employment and Jobs:** Operation of trains at higher speeds between Albany-Rensselaer and New York City creates opportunities for “super-commuters” to live and work from greater distances away from job centers while enjoying shorter commuting time and expanded employment opportunities. Employers gain the benefit of drawing upon a larger geographic area for a trained and skilled labor force.
- **Gradual and Continuing Improvement:** For Empire Corridor South, trip time reductions and service improvements will take effect as infrastructure improvements are completed between New York City and Albany-Rensselaer. Thus, program benefits will be realized steadily over time.
- **Ability to Implement:** System simulations show that the work can be sustained at the program levels without interfering with freight or passenger rail services. None of the work requires unproven or special technology and is all well within railroad industry standards.
- **Freight Train Operations:** Service frequency increases, along with future trip time reductions are achieved without interfering with freight rail service.

9.2 Benefits Empire Corridor West:

9.2.1 Travel Benefits (Direct Benefits)

- **Trip Time Reduction:** Overall trip time between Albany/Schenectady—Niagara Falls will be reduced by 1 hour 15 minutes, from the current 5 hour 58 minutes to 4 hours 43 minutes.
- **Increased Frequency:** Service west of Albany to Syracuse and Niagara Falls would grow to 8 roundtrips. The number of trains from Albany-Rensselaer to Syracuse would be increased, and as ridership grows and tracks are improved further west, these increased service frequencies would be gradually extended to Rochester, then Buffalo, and, finally, Niagara Falls.

- **Direct Travel Cost Savings:** Passenger ridership forecasts for High Speed Rail Empire Corridor Program project ridership increasing to 2.7 million riders in 2040. It is estimated that over \$14 million in reduced travel costs would be saved by travelers shifting to rail for its higher speed, reduced trip times, and more reliable performance.
- **Freight Train Operations:** Freight service is not impacted as the programs add 283 miles of third track and 39 miles of fourth track, significantly increasing the overall capacity of the system in keeping with projected increasing demand. These additional tracks are constructed in segments, minimizing the impact to freight and existing passenger train operations during construction. As projects are completed, improvement in freight rail service is expected as well.
- **Improving On-Time Performance and Reliability:** The additional tracks support improvements in OTP and reliability. It is anticipated that a reliability of 95.4% can be achieved, compared to the current value below 80%.

9.2.2 Non-Travel (Indirect) Benefits

- **Environmental Impacts:** All improvements are within the existing right-of-way, resulting in minimal environmental impacts. Some projects contained in the program will require more focused environmental analysis before they can be built. Air quality improvements result as travelers divert from more polluting auto and bus to less polluting trains.
- **Employment and Jobs:** Construction and operation of the improvements Albany-Rensselaer and Niagara Falls will confer significant economic benefit and jobs on upstate cities due to the multiplier effect of spending on material and construction work as well as additional staffing of local businesses in response to the economic infusion created by the program. Employers gain the benefit of drawing upon a larger geographic area for a trained and skilled labor force.
- **Gradual and Continuing Improvement:** For Empire Corridor West, trip time reductions and service improvements will take effect as infrastructure improvements are completed between Niagara Falls and Albany-Rensselaer. Thus, program benefits will be realized steadily over time.
- **Ability to Implement:** System simulations show that the work can be sustained at the program levels without undue interference with freight or passenger rail services. None of the work requires unproven or special technology and is all well within railroad industry standards.
- **Freight Train Operations:** Service frequency increases, along with future trip time reductions are achieved without undue interference with freight rail service.
- **Contribute to Economic Revitalization:** Economic benefits start with the construction activities necessary to complete the supporting projects. Further economic benefits flow from the multiplier effect of increased passenger spending in downtown station areas and the corridor as a whole.

9.3 Operational and Transportation Metrics

It is possible to express the program benefits in terms of travel/mobility, environment, energy, and economics. Exhibit 9-1 displays these benefits over 5-year implementation periods. The cumulative benefits of the program as a whole are shown at the end of the complete 25-year implementation period. (Appendix A shows the year-by-year detail underlying these metrics.) These benefits are driven by gains in ridership which result from improved on-time performance, reduced train delays, and travel time savings due to higher-speed operation. The metrics displayed show metric tons of air pollutant emissions avoided, gallons of diesel fuel saved, direct travel costs avoided by passengers switching from other travel modes to rail, millions of British Thermal Units (BTUs) of energy conserved, and jobs created to build and staff the improvements. The economic benefits are both direct employment for the rail system, indirect employment at businesses supporting the rail system, and as a result of the multiplier effect of construction activity and permanent job increases on local economies.³⁰

Exhibit 9-1 Benefits of High Speed Rail Empire Corridor Program

Benefits (5-Year Periods)	Years 1-5	Years 6-10	Years 11-15	Years 16-20	Years 21-25
Travel Time Savings per Train Each Year, Summed over 5-Year Periods (minutes)	10	36	14	10	24
Cumulative Totals	10	46	60	70	94
Total Minutes of Delay Saved Each Year, Summed over 5-Year Periods (minutes)	35,272	10,120	7,328	14,657	18,490
Cumulative Totals	35,272	45,392	52,720	67,377	85,867
Ridership Increase Each Year, Summed over 5-Year Periods (one-way trips)	221,952	393,536	122,695	87,564	257,674
Cumulative Totals	221,952	615,488	738,183	825,747	1,083,421

³⁰ Diverting Empire Corridor travelers from auto and air services to train will reduce revenue for air carriers and the New York State Thruway Authority. The diversion from auto, while significant in terms of rail riders gained, is quite small in terms of total Corridor auto trips (approximately 1/10th of 1%), however, and the loss of toll revenues due to this diversion is not likely to be of consequence. Air carriers will likely redeploy craft and crew to more heavily used routes to maintain revenue.

Benefits (5-Year Periods)	Years 1-5	Years 6-10	Years 11-15	Years 16-20	Years 21-25
Mode Shift Fare Cost Savings Each Year, Summed over 5-Year Periods (dollars)	6,965,4341	3,833,964	1,492,886	1,064,115	2,244,2246
Cumulative Totals	6,965,434	10,799,398	15,600,624	13,356,399	15,600,624
Passenger Train Energy Savings Each Year, Summed over 5-Year Periods (gallons of diesel fuel)	174,011	132,015	56,243	51,167	103,332
Cumulative Totals	174,011	306,026	362,269	413,435	516,767
Passenger Train Emissions Savings Each Year, Summed over 5-Year Periods (metric tons)	1,753	1,330	567	515	1,041
Cumulative Totals	1,753	3,082	3,649	4,164	5,205
Mode Shift Energy Savings Each Year, Summed over 5-Year Periods (millions of BTUs)	80,148	142,108	44,306	31,620	93,047
Cumulative Totals	80,148	222,256	266,562	298,182	391,229

Benefits (5-Year Periods)	Years 1-5	Years 6-10	Years 11-15	Years 16-20	Years 21-25
Mode Shift Emissions Savings Each Year, Summed over 5-Year Periods (metric tons of regulated pollutants + greenhouse gas (GHG))	6,823	12,096	3,771	2,691	7,920
Cumulative Totals	6,823	18,919	22,690	25,381	33,301
Mode Shift Safety Savings Each Year, Summed over 5-Year Periods (accidents)	29	45	14	10	19
Cumulative Totals	29	74	88	98	117
Job Creation Each Year, Summed over 5-Year Periods (job-years)	9,419	10,134	11,541	12,190	12,494
Cumulative Totals	9,419	19,552	31,093	43,283	55,777
Direct Employment Each Year, Summed over 5-Year Periods (rail system jobs)	24	42	31	29	47
Cumulative Totals	24	66	97	126,118	173

Key³¹

Travel Time Savings per Train Each Year, Summed over 5-Year Periods (minutes)	The total scheduled minutes saved due to increased train speeds in each year for each train to which the travel time benefit applies, totaled over each 5-year period. Thus, in Year 1 there is no change in travel time for any Empire Corridor trains (no projects are yet completed); in Year 2 every train will gain 2 minutes more than in Year 1 (since all trains traverse the Empire Corridor South segment); in Year 3 every train will travel 2 minutes faster than in year 2; in Year 4 every train will travel 2 minutes faster than in Year 3; and in Year 5 every train will travel 4 minutes faster than in Year 4. The total effect of the Years 1-5 improvements is that every Empire Corridor train in Year 5 will travel 10 minutes faster than they did in Year 1. In Years 6-25, improvements ultimately producing an 84-minute additional time savings will be confined to the Empire Corridor West segment, and only the eight trains traveling beyond Albany to Niagara Falls and back will receive the travel time benefits for each year of improvements; the other 13 NYC-Albany trains will not see any additional travel time improvements.
Total Minutes of Delay Saved Each Year, Summed over 5-Year Periods (minutes)	The product of the reduction of train operating minutes for each train due to improved on-time performance (NYC – Niagara Falls) and the number of trains to which the reduction applies in each year, totaled over each 5-year period. Thus, if the improvement in on-time performance in a particular year results in a 3-minute reduction of delay for four weekday trains, and a 1-minute reduction of delay for nine other weekday trains, the total delay reduction over the entire year would be 5,460 minutes. Over five years, the reductions in delay accomplished in each of the five years are added together to express the reduction in delay at the end of the five-year period compared to the delay at the beginning of the five-year period.
Ridership Increase Each Year, Summed over 5-Year Periods (one-way trips)	The total increase in one-way trips by passengers for all origin-destination pairs (among 17 stations, including Saratoga) in a given year, totaled over each 5-year period. For example, in Year 3, the 2-minute travel time savings achieved through program improvements will draw approximately 55,219 new passengers (each making a single trip) from auto/bus/air to rail. ³²
Mode Shift Fare Cost Savings Each Year, Summed over 5-Year Periods (dollars)	Total fare costs saved by passengers switching to rail from other modes each year (auto mode uses \$0.17/mile + tolls; bus, air and rail use 2010 fares, inflated to 2017 on the basis of northeast Consumer Price Index; https://www.ssa.gov/OACT/STATS/cpiw.html), totaled over each 5-year period.

³¹ See Appendix A for detailed year-by-year results.

³² The same travel time savings may produce slightly different ridership gains in different years because the savings occurs at different areas along the Empire Corridor, with benefits flowing to different origin/ destination pairs with different base ridership values.

Passenger Train Energy Savings Each Year, Summed over 5-Year Periods (gallons of diesel fuel)	<p>Gallons of diesel fuel saved due to the reduction in total minutes of delay for locomotives as a consequence of improved on-time performance, plus the reduction in total minutes of operation due to higher speeds, each year, totaled over each 5-year period. This metric is derived based on locomotives burning 70 gallons of diesel fuel per hour of operation (as an average value across all speeds, including stopped). Thus, if the program improvements in a particular year reduce delay by 6,000 minutes (100 hours), then the savings would be $100 \times 70 = 7,000$ gallons of diesel fuel saved. For Years 1-5, 35,272 minutes – or 588 hours – of delay are saved, and daily trains also receive annual travel time savings of (Year 1) 0 minutes, (Year 2) 2 minutes for all 26 trains, (Year 3) 2 minutes for 30 trains, (Year 4) 2 minutes for 32 trains, and (Year 5) 4 minutes for 34 trains, adding 113,880 – or 1,898 hours – of travel time improvement. The total time savings resulting from reduced delay and faster speeds is therefore 149,152 minutes, or 2,486 hours. This reduced time of operation yields a diesel fuel savings Years 1-5 of 2,486 hours \times 70 gallons/hour = 174,010 gallons.</p>
Passenger Train Emissions Savings Each Year, Summed over 5-Year Periods (metric tons of regulated pollutants + GHG)	<p>Metric tons of diesel-range pollutants + CO₂ emissions avoided in each year (based on 22.2³³ pounds of CO₂ conserved for each gallon of diesel conserved), totaled over each 5-year period. Thus, for Years 1-5, given a savings of 174,010 gallons of diesel fuel, then $174,010 \times 22.2 = 3,863,037$ pounds of pollutants saved. As a metric ton is 2,204 pounds, this translates into 1,753 metric tons of pollutant emissions saved.</p>
Mode Shift Energy Savings Each Year, Summed over 5-Year Periods (millions of BTUs)	<p>Millions of British Thermal Units (BTUs) of energy conserved in each year (totaled over each 5-year period): the net of total additional energy used or conserved from increased rail operations and maintenance (increased) and reduced on-road operations and maintenance due to mode shift of travelers to rail. The Tier 1 Final EIS notes an overall reduction in energy consumption by Empire Corridor travelers of 391,227 million BTUs saved in 2035 due to full program implementation and the diversion of 1,083,000 trips from auto/bus/air to rail. Allocating this total savings on the basis of ridership diverted each year in response to gradual improvements in reliability and speed, an equivalent portion of the overall energy savings is assigned. The value in the Tier 1 Final EIS is derived from industry standard energy profiles for auto, bus, air and rail travel, with increases in rail energy consumption (due to more trains to carry more passengers) offset by decreases in energy use by auto/bus/air as travelers divert to rail. Thus, if the total energy savings is due to the diversion of 1.083 million trips from auto/bus/air to rail in 2035, then the proportion of that diversion represented by each year's ridership gains (totaled over Years 1-5) applied to the total 391,227 million BTUs conserved yields the energy savings in that year due to mode shifts among Empire Corridor travelers. In Years 1-5, 221,952 trips – or 20.4% of the total 1.083 million trips diverted by Year 25 – are diverted from auto/bus/air to rail. Applying the 20.4% to the total 391,227 million BTUs saved over the entire 25-year program produces a result of 80,148 million BTUs saved.</p>

³³ Emission factors for diesel fuel were provided at https://www.epa.gov/sites/production/files/2015-07/documents/emission-factors_2014.pdf

<p>Mode Shift Emissions Savings (metric tons of regulated pollutants + greenhouse gas [GHG])</p>	<p>Metric tons of emissions avoided for all regulated pollutants³⁴ + CO₂ in that year (totaled over each 5-year period): the net of total additional emissions produced or avoided from increased rail operations and maintenance (increased) and reduced on-road operations and maintenance due to mode shift of travelers to rail (avoided). The Tier 1 Final EIS notes an overall reduction in energy consumption by Empire Corridor travelers of 33,188 metric tons of CO₂ saved in 2035 due to full program implementation and the diversion of 1,083,000 trips from auto/bus/air to rail. Allocating this total savings on the basis of ridership diverted each year in response to gradual improvements in reliability and speed, an equivalent portion of the overall energy savings is assigned. The value in the Tier 1 Final EIS is derived from industry standard energy profiles for auto, bus, air and rail travel, with increases in rail energy consumption (due to more trains to carry more passengers) offset by decreases in energy use by auto/bus/air as travelers divert to rail. Thus, if the total energy savings is due to the diversion of 1.083 million trips from auto/bus/air to rail in 2035, then the proportion of that diversion represented by each year’s ridership gains (totaled over Years 1-5) applied to the total 33,188 metric tons of CO₂ conserved yields the emissions reduction in that year due to mode shifts among Empire Corridor travelers. In Years 1-5, 221,952 trips – or 20.4% of the total 1.083 million trips diverted by Year 25 – are diverted from auto/bus/air to rail. Applying the 20.4% to the total 33,188 metric tons of CO₂ saved over the entire 25-year program produces a result of 6,799 metric tons of CO₂ saved. Adding the small amount of criteria pollutant emissions avoided (dwarfed by the amount of CO₂ generated burning diesel fuel) produces the result in the table of 6,823 metric tons of emissions saved.</p>
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³⁴ Regulated Pollutants include CO, HC, NOx, SOx, PM_{2.5}, PM₁₀, Ozone, Lead (Pb). Reductions in regulated pollutants are dwarfed by reductions in CO₂ due to cleaner engines and the conversion of 99% of diesel fuel to CO₂ during combustion.

<p>Mode Shift Safety Savings (accidents)</p>	<p>Total accidents avoided due to mode shift from auto/bus/air to rail in each year, totaled over each 5-year period. This metric is derived using data provided by the National Transportation Safety Board and other official sources for accidents per million passenger-miles of travel by air, bus, auto and rail. The accident rates used are:³⁵</p> <p>Auto 1.602941802 accidents/million passenger miles Bus 0.203433744 accidents/million passenger miles Air 0.000046892 accidents/million passenger miles Rail 0.011235955 accidents/million passenger miles</p> <p>Employing these drivers, for each 100 passengers diverted to rail, and applying the diversion percentages derived from the travel demand forecasting model of 50/30/20 for bus/air/auto, and the average trip lengths among origin-destination pairs embedded in the 2010 trip table that is the basis for all travel demand forecasting associated with this program, the reduction in accidents is derived as (50 X 0.203433744 X the average trip distance) + (30 X 0.000046892 X the average trip distance) + (20 X 1.602941802 X the average trip distance) – (100 X 0.011235955 X the average trip distance) = the net accidents avoided for each 100 travelers diverted to rail.</p>
<p>Job Creation Each Year, Summed over 5-Year Periods (job-years)</p>	<p>Total job-years created across all economic sectors due to construction activity, increased rail operations (direct employment), and increased related economic activity (indirect employment) in each year, totaled over each 5-year period. Although the metric provides a final number in the 25th year, the additional job-years created by the 25th year of the program due to increased rail operations is perpetual, resulting in 2,702 additional permanent employees on the railroad system. A Transportation Economic Development Impact System (TREDIS) model was used to develop total economic activity flowing from rail improvement investments, across all economic sectors. A total of 55,777 total job years³⁶ were predicted to result from the construction over the 25-year program term.³⁷ These were allocated proportionally by year on the basis of annual program investments accumulated in five-year segments.</p>

³⁵ Multiple sources.

³⁶ An analysis by HNTB resulted in an estimate of 2,129 job-years/year for the program at a \$6 billion funding level. Escalating this to \$7.323 billion and adding the job-years created due to the ripple effect of permanent railroad jobs added as infrastructure maintenance and operational needs expand, and then subtracting the direct rail jobs created to staff this infrastructure maintenance and operations produces the 55,777 job-years value attributed to the program.

³⁷ On a national standard, each \$1 billion of investment typically generates 7,700-8,100 job-years. Applying that metric range produces a range of potential economic impacts for the \$7.323 billion program of 56,378 – 59,316 job years created.

Direct Employment Each Year, Summed over 5-Year Periods (rail system jobs)	Additional rail jobs required to operate and maintain new infrastructure and additional trains, as needed in each year as improvements are built or new train service is added, totaled over each 5-year period. These were derived using industry-standard metrics of workers per unit of rail infrastructure (miles of track or number of switches, square footage of stations, per train crew requirements). For train crews, a distinction is made if trains are weekday only (two crews) or seven days a week (three crews). Train crew values also recognize contractual requirements for layover, hours of service limitations, and other factors that affect staffing requirements. Infrastructure maintenance staffing is a direct function of unit values, as maintenance staff are typically assigned to and pick jobs on a single-shift basis.
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Appendix A
Corridor Investment Strategy

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High Speed Rail Empire Corridor Program - Investment Strategy for Preferred Alternative for Years 1 – 25: Empire Capital District Connection & Empire Gateway

Program Area	Year																									Totals
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	
Empire Capital District Connection	\$214	\$257	\$250	\$255	\$47																					\$1,023
Empire Gateway					\$200	\$260	\$265	\$265	\$220	\$255	\$280	\$280	\$330	\$330	\$330	\$300	\$300	\$350	\$350	\$350	\$325	\$375	\$375	\$325	\$235	\$6,300
Total Annual Investment (Millions)	\$214	\$257	\$250	\$255	\$247	\$260	\$265	\$265	\$220	\$255	\$280	\$280	\$330	\$330	\$330	\$300	\$300	\$350	\$350	\$350	\$325	\$375	\$375	\$325	\$235	\$7,323

High Speed Rail Empire Corridor Program - Investment Strategy for Preferred Alternative for Years 1 – 25: Empire Capital District Connection (NYC to Albany and Schenectady)

Project Number	Project Description – Location	Year																									Totals
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	
ESC-04	Rock Slope Stabilization	\$9																									\$9
ESC-05	New Interlockings CP 82 / CP 99 / CP 136	\$23																									\$23
ESC-14	High Level Platforms - Hudson Station	\$42																									\$42
ESC-18	Tarrytown Pocket Track / Install 3 rd Rail CP 19 to CP 25 & CP 26 to CP 32	\$10																									\$10
ESC-51	Hudson Line Bridge Replacement MP 85 – 108	\$30																									\$30
ESC-47	Hudson Line - New Signal System CP 75 – 169		\$27	\$20																							\$47
ESC-20	High-Level Platform -Rhinecliff Station		\$15																								\$15
ESC-26	Poughkeepsie Yard & Track #3 raised to 90mph		\$15																								\$15
ESC-35	110 MPH: Speed Improvement Project; CP 75 – CP 114		\$50	\$50	\$70																						\$170
ESC-36	110 MPH: Speed Improvement Project; CP 114 - CP 124				\$50																						\$50
ESC-25	Hudson Highlands – 3rd Track for Overtakes & Raise Operating Speeds on Metro North Railroad between Croton-Harmon and CP 75			\$30	\$55																						\$85
ESC-06	Stuyvesant Third Track & Interlocking Improvements					\$47																				\$47	
ESC-15	Livingston Avenue Moveable Bridge Replacement	\$100	\$100	\$50	\$30																						\$280
ESC-04	Rock Slope Stabilization	\$9																									\$200
Total Annual Investment (Millions)		\$214	\$257	\$250	\$255	\$47																					\$1,023

High Speed Rail Empire Corridor Program - Investment Strategy for Preferred Alternative for Years 1 – 25: Empire Gateway (Schenectady to Niagara Falls)

Project Number	Project Description – Location	Year																									Total		
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25			
HSR-2	Schenectady - Hoffman’s (Rehabilitate Mohawk River Bridge)					\$200	\$160																				\$360		
HSR-3	Hoffman’s (CP 169) - Amsterdam						\$100	\$135																			\$235		
HSR-4	Fonda – Little Falls																		\$100	\$100	\$100	\$150	\$100	\$100			\$650		
HSR-5	Little Falls – Herkimer											\$100	\$100	\$50													\$250		
HSR-6	Herkimer – Utica											\$105															\$105		
HSR-7	Utica Station Area												\$120														\$120		
HSR-8	Whitesboro – Oriskany													\$90													\$90		
HSR-9	Oriskany – Vernon												\$100	\$120													\$220		
HSR-10	Vernon - East End of DeWitt Yard												\$100	\$100	\$50	\$50	\$50	\$50	\$50								\$450		
HSR-11	Syracuse Station Area																								\$125	\$125	\$175	\$160	\$585
HSR-12	Warner’s – East End of Seneca River															\$160	\$100										\$260		
HSR-13	East End of Seneca River Bridge – Palmyra																	\$150	\$100	\$100	\$100	\$100					\$550		
HSR-14	Rochester (West Shore By-pass) Waynesport – Chili Jct.																\$180	\$100									\$280		
HSR-15	Rochester – Chili Jct.																							\$75	\$150	\$150	\$150	\$75	\$600
HSR-16	Interlocking CP 373												\$30															\$30	
HSR-17	West Rochester												\$80	\$80	\$130													\$290	
HSR-18	Chili Jct. – South Byron														\$100	\$120												\$220	
HSR-19	South Byron – East Buffalo																		\$150	\$150	\$150	\$150	\$100					\$700	
HSR-20	North Tonawanda – CP 23								\$130	\$175																		\$305	
Total Annual Investment (Millions)						\$200	\$260	\$265	\$265	\$220	\$255	\$280	\$280	\$330	\$330	\$330	\$300	\$300	\$350	\$350	\$350	\$325	\$375	\$375	\$325	\$235	\$6,300		

High Speed Rail Empire Corridor Program - Empire Capital Connection Improvements for Preferred Alternative: Years 1 - 5

Project Number	Project Area	Primary Project Type	Goals	Year 1 \$214	Year 2 \$257	Year 3 \$250	Year 4 \$255	Year 5 \$247	Estimated Project Cost (2017 \$ M)
ESC-04	Rhinecliff to Rensselaer	Rock Slope Stabilization	SAFETY <ul style="list-style-type: none"> Reduce Delays Improve Reliability 	Start ESC-04	COMPLETE ESC-04				\$ 9
ESC-05	Staatsburg to Stuyvesant CP 82 – CP 99 – CP 136	Additional Interlocking's	RELIABILITY <ul style="list-style-type: none"> Reduce Delays Safety Increase Capacity 		Start ESC-05	ESC-05 Continues	COMPLETE ESC-05		\$ 23
SC-14	Hudson Station	High Level Platform	RELIABILITY <ul style="list-style-type: none"> Reduce Delays, Improve Safety ADA Improvement 	Start ESC-14	COMPLETE ESC-14				\$ 42
ESC-51	Staatsburg to Jansenville MP 85 – MP 108	Hudson Line Bridge Replacement	TRIP TIME REDUCTION <ul style="list-style-type: none"> Capacity Speed Improvements State of Good Repair 	Start ESC-51	ESC-51 Continues	COMPLETE ESC-51			\$ 30
ESC-47	New Signal System CP 75 – CP 169	Communications & Signals	TRIP TIME REDUCTION <ul style="list-style-type: none"> Capacity Speed Improvements Safety 		Start ESC-47	ESC-47 Continues	COMPLETE ESC-47		\$ 47
ESC-20	Rhinecliff Station	High Level Platform	RELIABILITY <ul style="list-style-type: none"> Reduce Delays Improve Safety ADA Improvement 		Start ESC-20	ESC-20 Continues	COMPLETE ESC-20		\$ 15
ESC-26	Poughkeepsie CP 72 – CP 75	Upgrade Track Speeds & Yard Improvements	TRIP TIME REDUCTION <ul style="list-style-type: none"> Improve Reliability Capacity Improvements 		Start ESC-26	ESC-26 Continues	COMPLETE ESC-26		\$ 15
ESC-35	CP 75 – CP 114	110 MPH Speed Improvement Project	TRIP TIME REDUCTION <ul style="list-style-type: none"> Speed Improvements 		Start ESC-35 & ESC-36	ESC-35 & ESC-36 Continues	COMPLETE ESC-35 & ESC-36		\$ 230
ESC-36	CP 114 – CP 124								

High Speed Rail Empire Corridor Program - Empire Capital Connection Improvements for Preferred Alternative: Years 1 – 5 (cont.)

Project Number	Project Area	Primary Project Type	Goals	Year 1 \$214	Year 2 \$257	Year 3 \$250	Year 4 \$255	Year 5 \$247	Estimated Project Cost (2017 \$ M)	
ESC-25	Hudson Highlands Metro North Railroad between Croton-Harmon and CP 75	3rd Track for Overtakes & Raise Operating Speeds	TRIP TIME REDUCTION <ul style="list-style-type: none"> Capacity Speed Improvements State of Good Repair 			Start ESC-25	ESC-25 Continues	COMPLETE ESC-25	\$ 85	
ESC-18	Metro North Railroad Tarrytown	Pocket Track CP 25 Additional 3rd Rail	RELIABILITY <ul style="list-style-type: none"> Reduce Delays Safety Increase Capacity 	Start ESC-18	COMPLETE ESC-18				\$ 10	
ESC-06	Stuyvesant CP 124 + CP 125	Third Track & Interlocking Improvements	RELIABILITY <ul style="list-style-type: none"> Reduce Delays, Improve Safety ADA Improvement 	Start ESC-14	COMPLETE ESC-14			COMPLETE ESC-14	\$ 47	
ESC-15	Livingston Avenue Moveable Bridge	Replacement of Bridge	RELIABILITY <ul style="list-style-type: none"> Capacity Safety State of Good Repair 	Start ESC-51	ESC-51 Continues	COMPLETE ESC-51			\$ 280	
HSR-2	EMPIRE GATEWAY	Double Track Project Schenectady (CP 161 to CP 169)	TRIP TIME REDUCTION <ul style="list-style-type: none"> Capacity Speed Improvements Safety 					Start HSR-2	\$ 200	
HSR	Acquisition of additional locomotives and coaches to support service expansion	Equipment	SERVICE GROWTH <ul style="list-style-type: none"> Increase Capacity Improve Reliability Improve Passenger Experience 		Start Procurement of New Locomotives & Coaches	Procurement of New Locomotives & Coaches Continues	Procurement of New Locomotives & Coaches Continues	COMPLETED Procurement of New Locomotives & Coaches	\$ 200	
									Total Investment Years 1 through 5	\$ 1,233 M

High Speed Rail Empire Corridor Program - Capital District Connection - Improvements and Benefits for Preferred Alternative (Years 1-5)

Benefits	Year 1	Year 2	Year 3	Year 4	Year 5
Service Improvements		Trip Time Savings (for all 26 trains) - 2 min ECS benefit location	Two New Round Trips: Saratoga – NYC NYC – Albany Trip Time Savings (for all 30 trains) –4 min ECS benefit location	New Round Trip: NYC – Albany Trip Time Savings (cumulative for all 32 trains) - 6 min ECS benefit location	New Round Trip: NYC – Albany Trip Time Savings (cumulative for all 34 trains) - 10 min ECS benefit location
		Projected On Time Performance – 78.2%	Projected On Time Performance – 80.3%	Projected On Time Performance – 80.9%	Projected On Time Performance – 85.3%
State of Good Repair	2 new bridges	23 ½ miles new signal system 16 miles of Upgraded 110 mph track New Platform at Hudson Station 6 new bridges	47 miles new signal system 2 new bridges	23 ½ miles new signal system 3 miles new track 10 miles new Third Track 16 miles of Upgraded 110 mph track New Platform at Rhinecliff Station	8 miles new Third Track New Locomotives & Passenger Coaches in service
Passenger Travel Time Savings		2 minutes	2 minutes	2 minutes	4 minutes
Reduction in Annual Minutes of Delay		4,324 minutes (CP 12 – CP 33)		6,615 minutes (CP 75 – CP 142) 3,159 minutes (CP 72 – CP 75)	21,174 minutes (CP 33 – CP 72)
Ridership increase	0	52,630	55,219	41,436	72,667
Mode Shift Fare Cost Savings	0	\$1,946,072	\$1,768,493	\$1,320,203	\$1,930,665
Passenger Train Energy Savings	0	27,188	25,550	38,656	82,616
Passenger Train Emissions Savings	0	274	257	389	832
Mode Shift Energy Savings	0	19,005	19,940	14,963	26,240
Mode Shift Emissions Savings	0	1,618	1,697	1,274	2,234
Mode Shift Safety Savings	0	6	6	7	10

Economic Impact	Year 1	Year 2	Year 3	Year 4	Year 5
Job Creation	1,555	1,994	1,947	1,952	1,970
Direct Employment	0	5	8	5	6

High Speed Rail Empire Corridor Program - Empire Gateway Improvements for Preferred Alternative: Years 6 - 10

Project Number	Project Area	Primary Project Type	Goals	Year 6 \$260	Year 7 \$265	Year 8 \$265	Year 9 \$220	Year 10 \$255	Estimated Project Cost (2017 \$ M)
HSR-2	Capital District <i>New Trackage eliminates single track operation and rehabilitate Mohawk River Bridge</i>	Track & Signal Install 2nd Track from CP 161 (Schenectady) to CP 169 (Hoffman's)	<ul style="list-style-type: none"> Capacity Improvement Better Reliability Increase Speed Trip Time reduction 	COMPLETE Double Track \$160 m					\$160
HSR-3	Mohawk Valley <i>Adds trackage and increases operating speeds to support trip time reductions</i>	Track & Signal Add Main Tracks from CP 169 (Hoffman's) to CP 184 (Fonda)	<ul style="list-style-type: none"> Capacity Improvement Better Reliability Increase Speed Trip Time reduction 	Start Installation \$ 100 m	COMPLETE Installation \$135 m				\$235
HSR-6	Mohawk Valley <i>Adds trackage and increases operating speeds to support trip time reductions</i>	Track & Signal Additional Main Tracks from CP 226 (Herkimer) to CP 235 (Utica)	<ul style="list-style-type: none"> Capacity Improvement Better Reliability Increase Speed Trip Time reduction 					COMPLETE Installation of Track \$ 105 m	\$105
HSR-7	Utica Union Station <i>Improves operation of passenger trains and freight trains at Utica Union Station</i>	Track & Signal Add Main Tracks from CP 235 (Utica) to CP 239 (Oriskany)	<ul style="list-style-type: none"> Capacity Improvement Better Reliability Trip Time reduction Improve Station Operations 				COMPLETE Installation of Track \$120 m		\$120
HSR-8	Mohawk Valley <i>Adds trackage and increases operating speeds to support trip time reductions</i>	Track & Signal Add Main Tracks from CP 239 (Whitesboro) to CP 246 (Oriskany)	<ul style="list-style-type: none"> Capacity Improvement Better Reliability Increase Speed Trip Time reduction 			COMPLETE Installation of Track \$ 90 m			\$90
HSR-9	Mohawk Valley <i>Adds trackage and increases operating speeds to support trip time reductions</i>	Track & Signal Additional Main Tracks CP 246 (Oriskany) – CP 259 (Vernon)	<ul style="list-style-type: none"> Capacity Improvement Better Reliability Increase Speed Trip Time reduction 				Start Installation \$ 100 m	COMPLETE Installation \$ 120 m	\$220
HSR-16	Rochester Station <i>Improve interlocking to improve operation of freight and passenger trains west of Rochester Station</i>	Track & Signal Rebuild Interlocking at CP 373	<ul style="list-style-type: none"> Capacity Improvement Better Reliability Trip Time reduction Improves Station Operation 					COMPLETE Rebuild Interlocking CP 373 \$ 30 m	\$ 30
HSR-20	Niagara Branch <i>Additional capacity eliminates single track operation</i>	Track & Signal North Tonawanda to CP 23	<ul style="list-style-type: none"> Capacity Improvement Better Reliability Increase Speed Trip Time reduction 		Start Installation of Double Track & Eliminate Single Track Operation \$ 130 m	COMPLETE Installation of Double Track Eliminate Single Track Operation \$ 175 m			\$305
Total Investment Years 6 through 10									\$ 1,265 M

High Speed Rail Empire Corridor Program - Empire Gateway - Improvements and Benefits for Preferred Alternative (Years 6-10)

Benefits	Year 6	Year 7	Year 8	Year 9	Year 10
Service Improvements	HSR-1 + HSR-2 COMPLETE <u>Trip Time Savings</u> (for all 8 trains) - 8 minute Projected On Time Performance – 85.8%	HSR-3 COMPLETE <u>Trip Time Savings</u> (for all 8 trains) - 1 minute Projected On Time Performance – 86.1%	HSR-8 COMPLETE (13 miles) HSR-20 COMPLETE (6 miles) <u>Trip Time Savings</u> (for all 6 trains) - 17 minutes Projected On Time Performance – 86.6%	HSR-7 COMPLETE (4 miles) Projected On Time Performance – 86.8%	HSR-6 COMPLETE (11 miles) HSR-9 COMPLETE (13 miles) HSR-16 COMPLETE <u>Trip Time Savings</u> (for all 8 trains) - 10 minutes Projected On Time Performance – 87.6%
State of Good Repair	12 miles new signal system 12 miles new track Rehabilitate Mohawk River Bridge	10 miles new signal system 10 miles new track 1 new bridge	19 miles new signal system 19 miles new track 4 new bridges	4 miles new signal system 4 miles new Third Track 4 miles new Fourth Track	24 miles new signal system 24 miles new Third Track 24 miles new Fourth Track 5 new bridges New Interlocking at CP 373
Passenger Travel Time Savings	8 minutes	1 minute	0 minutes (HSR-8) 17 minutes (HSR-20)	0 minutes	6 minutes (HSR-6) 1 minutes (HSR-11) 3 minutes (HSR-15)
Reduction in Annual Minutes of Delay	2,443 minutes	1,745 minutes	1,221 minutes (HSR-8) 1,047 minutes (HSR-20)	698 minutes	1,570 minutes (HSR-6) 2,268 minutes (HSR-9) 174 minutes (HSR-16)
Ridership Increase	101,790	10,412	184,636	0	96,698
Mode Shift Fare Cost Savings	\$915,827	\$164,150	\$1,718,007	\$0	\$1,035,980
Passenger Train Energy Savings	30,104	3,436	58,914	814	38,747
Passenger Train Emissions Savings	303	35	593	8	390
Mode Shift Energy Savings	36,757	3,760	66,673	0	34,918
Mode Shift Emissions Savings	3,129	320	5,675	0	2,972
Mode Shift Safety Savings	12	8	16	0	9

Economic Impact	Year 6	Year 7	Year 8	Year 9	Year 10
Job Creation (job-years)	2,135	1,946	2,378	1,596	2,080
Direct Employment	9	6	9	3	15

High Speed Rail Empire Corridor Program - Empire Gateway Improvements for Preferred Alternative: Years 11 - 15

Project Number	Project Area	Primary Project Type	Goals	Year 11 \$280	Year 12 \$280	Year 13 \$330	Year 14 \$330	Year 15 \$330	Estimated Project Cost (2017 \$ M)
HSR-5	Mohawk Valley <i>Adds trackage to allow passenger train faster operation with freight trains</i>	Track & Signal Additional Main Tracks CP 218 (Little Falls) – CP 226 (Herkimer)	<ul style="list-style-type: none"> Capacity Improvement Better Reliability Increase Speed Trip Time reduction Improved Station Operations 	Start Installation \$ 100 m	Continue Installation \$ 100 m	COMPLETE Installation \$ 50 m			\$ 250
HSR-10	Syracuse Terminal Subdivision <i>Increased Capacity that will support trip time reductions</i>	Track & Signal Additional Main Tracks CP 259 (Vernon) to CP 283 (East End of DeWitt Yard)	<ul style="list-style-type: none"> Capacity Improvement Better Reliability Increase Speed Trip Time reduction 	Start Installation \$ 100 m	Continue Installation \$ 100 m	Continue Installation of \$ 50 m	Continue Installation \$ 50 m	Continue Installation \$ 50 m	\$ 350
HSR-12	East of Seneca River Bridge <i>Adds trackage and increases operating speeds to support trip time reductions</i>	Track & Signal Additional Main Tracks CP 310 (Warner's) – CP 320 (east end of Seneca River)	<ul style="list-style-type: none"> Capacity Improvement Better Reliability Increase Speed Trip Time reduction 				Start Installation Increase operating speeds for trip time reduction \$ 160 m	COMPLETE Installation Increase operating speeds for trip time reduction \$ 100 m	\$ 260
HSR-14	Rochester “West Shore By-pass” <i>Routes freight trains away from downtown Rochester and Station area increasing capacity</i>	Track & Signal Additional Main Tracks “West Shore By-Pass” CP 347 (Waynesport) –CP 368 (Chili Jct.)	<ul style="list-style-type: none"> Capacity Improvement Better Reliability Increase Speed Trip Time reduction Improved Station Operations 					Start Installation \$ 180 m	\$ 180
HSR-17	Rochester Subdivision <i>Adds capacity to allow for better operation of freight and passenger trains east of Rochester Station</i>	Track & Signal Additional Main Tracks CP 374 – CP 388 in the Rochester area	<ul style="list-style-type: none"> Capacity Improvement Better Reliability Increase Speed Trip Time reduction Improved Station Operations 	Start Installation \$ 80 m	Continue Installation \$ 80 m	COMPLETE Installation \$ 130 m			\$ 290
HSR-18	Rochester Subdivision <i>Adds trackage to increase operating speeds and support trip time reductions</i>	Track & Signal Additional Main Tracks CP 399 (Chili Jct.) – CP 409 (South Byron)	<ul style="list-style-type: none"> Capacity Improvement Better Reliability Increase Speed Trip Time reduction Improved Station Operations 				Start Installation Contribute to Trip Time Reduction \$ 100 m	COMPLETE Installation Contribute to Trip Time Reduction \$ 120 m	\$ 220
Total Investment Years 11 through 15									\$ 1,550 M

High Speed Rail Empire Corridor Program - Empire Gateway - Improvements and Benefits for Preferred Alternative (Years 11-15)

Benefits	Year 11	Year 12	Year 13	Year 14	Year 15
Service Improvements			HSR-5 – COMPLETE (15 miles) HSR-17 – COMPLETE (11 miles) Trip Time Savings (for all 8 trains) - 8 minutes Projected On Time Performance – 88.3%		HSR-12 – COMPLETE (10 miles) HSR-18 – COMPLETE (33 miles) Trip Time Savings (for all 8 trains) - 6 minutes Projected On Time Performance – 89.1%
			26 miles new signal system 26 miles new Third Track 26 miles new Fourth Track 1 new bridge		43 miles new signal system 43 miles new Third Track 10 miles new Fourth Track 3 new bridges
Passenger Travel Time Savings			2 minutes (HSR-5) 6 minutes (HSR-17)		2 minutes (HSR-12) 4 minutes (HSR-18)
Reduction in Annual Minutes of Delay			2,268 minutes (HSR-5) 1,396 minutes (HSR-17)		1,745 minutes (HSR-12) 1,919 minutes (HSR-18)
Ridership Increase	0	0	70,107	0	52,588
Mode Shift Fare Cost Savings	\$0	\$0	\$872,001	\$0	\$620,886
Passenger Train Energy Savings	0	0	31,528	0	24,715
Passenger Train Emissions Savings	0	0	318	0	249
Mode Shift Energy Savings	0	0	25,316	0	18,990
Mode Shift Emissions Savings	0	0	2,155	0	1,616
Mode Shift Safety Savings	0	0	8	0	6

Economic Impact	Year 11	Year 12	Year 13	Year 14	Year 15
Job Creation	2,035	2,035	2,552	2,399	2,520
Direct Employment	0	0	21	0	10

High Speed Rail Empire Corridor Program - Empire Gateway Improvements for Preferred Alternative: Years 16 – 20

Project Number	Project Area	Primary Project Type	Goals	Year 16 \$300	Year 17 \$300	Year 18 \$350	Year 19 \$350	Year 20 \$350	Estimated Project Cost (2017 \$ M)
HSR-4	Mohawk Valley <i>Adds trackage to allow passenger trains faster operation on the multiple curves along the Mohawk River</i>	Track & Signal Additional Main Tracks CP 184 (Fonda) to CP 217 (Little Falls)	<ul style="list-style-type: none"> Capacity Improvement Better Reliability Increase Speed Trip Time reductions 			Start Installation \$100 m	Continue Installation \$100 m	Continue Installation \$100 m	\$300
HSR-10	Syracuse Terminal Subdivision <i>Increased Capacity that will support trip time reductions</i>	Track & Signal Additional Main Tracks CP 259 (Vernon) to CP 283 (East End of DeWitt Yard) -	<ul style="list-style-type: none"> Capacity Improvement Better Reliability Increase Speed Trip Time reductions 	Continue Installation Significant Trip Reduction \$ 50 m	COMPLETE Installation Significant Trip Reduction \$ 50 m				\$100
HSR-13	Seneca River Bridge <i>Eliminate 40 MPH Speed Restriction on Seneca River Bridge</i> <i>Significant Trip Reduction</i>	Track & Signal Additional Main Tracks CP 320 (Seneca River Bridge) to CP 359 (Palmyra)	<ul style="list-style-type: none"> Capacity Improvement Better Reliability Increase Speed Trip Time reductions 	Start Installation Replacement Seneca River Bridge Eliminate Speed Restriction \$ 150 m	Continue Installation Replacement Seneca River Bridge Eliminate Speed Restriction \$ 100 m	Continue Installation Replacement Seneca River Bridge Eliminate Speed Restriction \$ 100 m	Continue Installation Replacement Seneca River Bridge Eliminate Speed Restriction \$ 100 m	COMPLETE Installation Replacement Seneca River Bridge Eliminate Speed Restriction \$ 100 m	\$550
HSR-14	Rochester “West Shore By-pass” <i>Routes freight trains away from downtown Rochester and Station area increasing capacity</i>	Track & Signal Additional Main Tracks “West Shore By-Pass” CP 347 (Waynesport) –CP 368 (Chili Jct.)	<ul style="list-style-type: none"> Capacity Improvement Better Reliability Increase Speed Trip Time reductions 	COMPLETE Installation \$ 100 m					\$100
HSR-19	Buffalo Terminal & Rochester Subdivision <i>Increased Capacity that will support trip time reductions Significant Trip Time Reduction</i>	Track & Signal Additional Main Tracks CP 399 (South Byron) to CP 432 (East Buffalo)	<ul style="list-style-type: none"> Capacity Improvement Better Reliability Increase Speed Trip Time reductions 		Start Installation Significant Trip Time Reduction \$ 150 m	Continue Installation Significant Trip Time Reduction \$ 150 m	Continue Installation Significant Trip Time Reduction \$ 150 m	Continue Installation Significant Trip Time Reduction \$ 150 m	\$600
Total Investment Years 16 through 20									\$1,650 M

High Speed Rail Empire Corridor Program - Empire Gateway - Improvements and Benefits for Preferred Alternative (Years 11-15)

Benefits	Year 16	Year 17	Year 18	Year 19	Year 20
Service Improvements	HSR-14 – COMPLETE Expands Capacity of Train Operations in Rochester area with freight trains operating “West Shore By-pass”	HSR-10 COMPLETE			HSR-13 – COMPLETE
	Projected On Time Performance – 89.8%	Projected On Time Performance – 90.7%			Projected On Time Performance – 92.1%
State of Good Repair	21 miles new signal system 21 miles new track 5 new bridges	24 miles new signal system 24 miles new Third Track 1 new bridge			39 miles new signal system 39 miles new Third Track
Passenger Travel Time Savings		1 minute			9 minutes
Reduction in Annual Minutes of Delay	3,664 minutes	4,188 minutes			6,805 minutes
Ridership Growth	0	4,601	0	0	82,963
Mode Shift Fare Cost Savings	\$0	\$173,152	\$0	\$0	\$890,963
Passenger Train Energy Savings	4,275	8,293	0	0	38,599
Passenger Train Emissions Savings	43	84	0	0	389
Mode Shift Energy Savings	0	1,662	0	0	29,958
Mode Shift Emissions Savings	0	141	0	0	2,550
Mode Shift Safety Savings	0	2	0	0	8

Economic Impact	Year 16	Year 17	Year 18	Year 19	Year 20
Job Creation	2,174	2,183	2,544	2,544	2,745
Direct Employment	6	9	3	0	116

High Speed Rail Empire Corridor Program - Empire Gateway Improvements for Preferred Alternative: Years 21 - 25

Project Area	Primary Project Type	Goals	Year 21 • \$325	Year 22 \$375	Year 23 \$375	Year 24 \$325	Year 25 \$235	Estimated Project Cost (2017 M)	Project Area
HSR-4	Mohawk Valley <i>Adds trackage to allow passenger trains faster operation on the multiple curves along the Mohawk River</i>	Track & Signal Additional Main Tracks in the Mohawk Valley CP 184 (Fonda) – CP 217 (Little Falls)	<ul style="list-style-type: none"> Capacity Improvement Better Reliability Increase Speed Trip Time reductions 	Continue Installation \$150 m	Continue Installation \$100 m	COMPLETE Installation \$100 m			\$350
HSR-11	Syracuse Terminal Subdivision <i>Provides passenger trains their own station tracks to eliminate interferences with freight trains</i>	Track & Signal Additional Main Tracks CP 283 (East Syracuse) to CP 310 (West Syracuse)	<ul style="list-style-type: none"> Capacity Improvement Better Reliability Increase Speed Trip Time reduction Improved Station Operations 		Start Installation \$ 125 m	Continue Installation \$ 125 m	Continue Installation \$ 175 m	COMPLETE Installation \$ 160 m	\$585
HSR-15	Rochester Subdivision <i>Adds track capacity and supports better passenger train operations at Rochester</i>	Track & Signal Additional Main Tracks to "Main Line" CP 374 (Rochester) – CP 388 (Chili Jct.)	<ul style="list-style-type: none"> Capacity Improvement Better Reliability Increase Speed Trip Time reduction Improved Station Operations 	Start Installation \$ 75 m	Continue Installation \$ 150 m	Continue Installation \$ 150 m	Continue Installation \$ 150 m	COMPLETE Installation \$ 75 m	\$600
HSR-19	Buffalo Terminal & Rochester Subdivision <i>Significant Trip Time Reduction</i>	Track & Signal Additional Main Tracks CP 399 (South Byron) to CP 432 (East Buffalo)	<ul style="list-style-type: none"> Capacity Improvement Better Reliability Increase Speed Trip Time reduction Improved Station Operations 	COMPLETE Installation \$ 100 m					\$100
								Total Investment Years 21 through 25	\$ 1,635 M

High Speed Rail Empire Corridor Program - Empire Gateway - Improvements and Benefits for Preferred Alternative (Years 21-25)

Benefits	Year 21	Year 22	Year 23	Year 24	Year 25
Service Improvements	HSR-19 COMPLETE		HSR-4 COMPLETE		HSR-11 COMPLETE (17 miles) HSR-15 COMPLETE (14 miles)
	Projected On Time Performance – 93.3%		Projected On Time Performance – 94.5%		Projected On Time Performance - 96%
State of Good Repair	22 miles new signal system 22 miles of new Third Track 22 miles of new Fourth Track 1 new bridge		34 miles new signal system 34 miles new Third Track 8 new bridges		31 miles new signal system 31 miles new Third Track 3 new bridges
Passenger Travel Time Savings	13 minutes		7 minutes		1 minutes (HSR-11) 3 minutes (HSR-15)
Reduction in Annual Minutes of Delay	5,758 minutes		5,578 minutes		4,711 minutes (HSR-11) 2,443 minutes (HSR-15)
Ridership Growth	130,438	0	74,963	0	52,273
Mode Shift Fare Cost Savings	\$1,143,985	\$0	\$658,864	\$0	\$441,375
Passenger Train Energy Savings	51,004	0	30,354	0	21,973
Passenger Train Emissions Savings	514	0	306	0	221
Mode Shift Energy Savings	47,102	0	27,069	0	18,876
Mode Shift Emissions Savings	4,009	0	2,304	0	1,607
Mode Shift Safety Savings	10	0	6	0	3

Economic Impact	Year 21	Year 22	Year 23	Year 24	Year 25
Job Creation	2,687	2,726	2901	2,362	1,818
Direct Employment	12	0	15	0	20

Notes/Definitions

Per Train Travel Time Savings is the total scheduled minutes saved due to increased train speeds in each year for each train to which the travel time benefit applies, totaled over each 5-year period. Thus, in Year 1 there is no change in travel time for any Empire Corridor trains (no projects are yet completed); in Year 2 every train will gain 2 minutes more than in Year 1 (since all trains traverse the Empire Corridor segment); in Year 3 every train will travel 2 minutes faster than in year 2; in Year 4 every train will travel 2 minutes faster than in Year 3; and in Year 5 every train will travel 4 minutes faster than in Year 4. The total effect of the Years 1-5 improvements is that every Empire Corridor train in Year 5 will travel 10 minutes faster than they did in Year 1. In Years 6-25, improvements ultimately producing an 84-minute time savings will be confined to the Empire Corridor West segment, and only the eight trains traveling beyond Albany to Niagara Falls and back will receive the travel time benefits for each year of improvements. Passengers traveling between NYC and Albany during Years 6-25 will receive no further travel time benefit after Year 5, as the improvements in speed and travel time occur west of Albany during that period.

Annual Minutes of Delay Saved is the product of the reduction of train operating minutes for each train due to improved on-time performance (NYC – Niagara Falls) and the number of trains to which the reduction applies in each year, totaled over each 5-year period. Thus, if the improvement in on-time performance in a particular year results in a 3-minute reduction of delay for four weekday trains, and a 1-minute reduction of delay for nine other weekday trains, the total delay reduction over the entire year would be 5,460 minutes, or 455 hours of delay saved in that year. Over five years, the reductions in delay accomplished in each of the five years are added together to express the reduction in delay at the end of the five-year period compared to the delay at the beginning of the five-year period.

Ridership Increase is the total increase in one-way trips by passengers for all origin-destination pairs (among 17 stations, including Saratoga) in a given year, totaled over each 5-year period. For example, in Year 3, the 2-minute travel time savings achieved through program improvements will draw approximately 55,219 new passengers (each making a single trip) from auto/bus/air to rail.³⁸

Mode Shift Fare Cost Savings is the total fare costs saved by passengers switching to rail from other modes each year (auto mode uses \$0.17/mile + tolls; bus, air and rail use 2010 fares, inflated to 2017 on the basis of northeast CPI; <https://www.ssa.gov/OACT/STATS/cpiw.html>), totaled over each 5-year period.

Passenger Train Energy Savings is the gallons of diesel fuel saved due to the reduction in total minutes of delay for locomotives as a consequence of improved on-time performance, plus the reduction in total minutes of operation due to higher speeds, each year, totaled over each 5-year period. This metric is derived based on locomotives burning 70 gallons of diesel fuel per hour of operation (as an average value across all speeds, including stopped). Thus, if the program improvements in a particular year reduce delay by 6,000 minutes (100 hours), then the savings would be $100 \times 70 = 7,000$ gallons of diesel fuel saved. For Years 1-5, 35,272 minutes – or 588 hours – of delay are saved, and daily trains also receive annual travel time savings of (Year 1) 0 minutes, (Year 2) 2 minutes for all 26 trains, (Year 3) 2 minutes for 30 trains, (Year 4) 2 minutes for 32 trains, and (Year 5) 4 minutes for 34 trains, adding 113,880 – or 1,898 hours – of travel time improvement. The total time savings resulting from reduced delay and faster speeds is therefore 149,152 minutes, or 2,486 hours. This reduced time of operation yields a diesel fuel savings Years 1-5 of 2,486 hours \times 70 gallons/hour = 174,010 gallons.

Passenger Train Emission Savings is the metric tons of diesel-range pollutants + CO₂ emissions avoided in each year (based on 22.2³⁹ pounds of CO₂ conserved for each gallon of diesel conserved), totaled over each 5-year period. Thus, for Years 1-5, given a savings of 174,010 gallons of diesel fuel, then $174,010 \times 22.2 = 3,863,037$ pounds of pollutants saved. As a metric ton is 2,204 pounds, this translates into 1,753 metric tons of pollutant emissions saved.

Mode Shift Energy Savings is the millions of BTUs of energy conserved in each year (totaled over each 5-year period): the net of total additional energy used or conserved from increased rail operations and maintenance (increased) and reduced on-road operations and maintenance due to mode shift of travelers to rail. The Tier 1 Final EIS notes an overall reduction in energy consumption by Empire Corridor travelers of 391,227 million BTUs saved in 2035 due to full program implementation and the diversion of 1,083,000 trips from auto/bus/air to rail. Allocating this total savings on the basis of ridership diverted each year in response to gradual improvements in reliability and speed, an equivalent portion of the overall energy savings is assigned. The value in the Tier 1 Final EIS is derived from industry standard energy profiles for auto, bus, air and rail travel, with increases in rail energy consumption (due to more trains to carry more passengers) offset by decreases in energy use by auto/bus/air as travelers divert to rail. Thus, if the total energy savings is due to the diversion of 1.083 million trips from auto/bus/air to rail in 2035, then the proportion of that diversion represented by each year's ridership gains (totaled over Years 1-5) applied to the total 391,227 million BTUs conserved yields the energy savings in that year due to mode shifts among Empire Corridor travelers. In Years 1-5, 221,952 trips – or 20.4% of the total 1.083 million trips diverted by Year 25 – are diverted from auto/bus/air to rail. Applying the 20.4% to the total 391,227 million BTUs saved over the entire 25-year program produces a result of 80,148 million BTUs saved.

Mode Shift Emissions Savings is the metric tons of emissions avoided for all regulated pollutants⁴⁰ + CO₂ in that year (totaled over each 5-year period): the net of total additional emissions produced or avoided from increased rail operations and maintenance (increased) and reduced on-road operations and maintenance due to mode shift of travelers to rail (avoided). The Tier 1 Final EIS notes an overall reduction in energy consumption by Empire Corridor travelers of 33,188 metric tons of CO₂ saved in 2035 due to full program implementation and the diversion of 1,083,000 trips from auto/bus/air to rail. Allocating this total savings on the basis of ridership diverted each year in response to gradual improvements in reliability and speed, an equivalent portion of the overall energy savings is assigned. The value in the Tier 1 Final EIS is derived from industry standard energy profiles for auto, bus, air and rail travel, with increases in rail energy consumption (due to more trains to carry more passengers) offset by decreases in energy use by auto/bus/air as travelers divert to rail. Thus, if the total energy savings is due to the diversion of 1.083 million trips from auto/bus/air to rail in 2035, then the proportion of that diversion represented by each year's ridership gains (totaled over Years 1-5) applied to the total 33,188 metric tons of CO₂ conserved yields the emissions reduction in that year due to mode shifts among Empire Corridor travelers. In Years 1-5, 221,952 trips – or 20.4% of the total 1.083 million trips diverted by Year 25 – are diverted from auto/bus/air to rail. Applying the 20.4% to the total 33,188 metric tons of CO₂ saved over the entire 25-year program produces a result of 6,799 metric tons of CO₂ saved. Adding the small amount of criteria pollutant emissions avoided (dwarfed by the amount of CO₂ generated burning diesel fuel) produces the result in the table of 6,823 metric tons of emissions saved.

³⁸ The same travel time savings may produce slightly different ridership gains in different years because the savings occurs at different areas along the Empire Corridor, with benefits flowing to different origin/ destination pairs with different base ridership values.

³⁹ Emission factors for diesel fuel were provided at https://www.epa.gov/sites/production/files/2015-07/documents/emission-factors_2014.pdf

⁴⁰ Regulated Pollutants include CO, HC, NO_x, SO_x, PM_{2.5}, PM₁₀, Ozone, Lead (Pb). Reductions in regulated pollutants are dwarfed by reductions in CO₂ due to cleaner engines and the conversion of 99% of diesel fuel to CO₂ during combustion.

Mode Shift Safety Savings is the total accidents avoided due to mode shift from auto/bus/air to rail in each year, totaled over each 5-year period. This metric is derived using data provided by the National Transportation Safety Board and other official sources for accidents per million passenger-miles of travel by air, bus, auto and rail. The accident rates used are:⁴¹

Auto 1.602941802 accidents/million passenger miles

Bus 0.203433744 accidents/million passenger miles

Air 0.000046892 accidents/million passenger miles

Rail 0.011235955 accidents/million passenger miles

Employing these drivers, for each 100 passengers diverted to rail, and applying the diversion percentages derived from the travel demand forecasting model of 50/30/20 for bus/air/auto, and the average trip lengths among origin-destination pairs embedded in the 2010 trip table that is the basis for all travel demand forecasting associated with this program, the reduction in accidents is derived as $(50 \times 0.203433744 \times \text{the average trip distance}) + (30 \times 0.000046892 \times \text{the average trip distance}) + (20 \times 1.602941802 \times \text{the average trip distance}) - (100 \times 0.011235955 \times \text{the average trip distance}) = \text{the net accidents avoided for each 100 travelers diverted to rail.}$

Job Creation is the total job-years created across all economic sectors due to construction activity, increased rail operations (direct employment), and increased related economic activity (indirect employment) in each year, totaled over each 5-year period. Although the metric provides a final number in the 25th year, the additional job-years created by the 25th year of the program due to increased rail operations is perpetual, resulting in 2,702 additional permanent employees on the railroad system. A Transportation Economic Development Impact System (TREDIS) model was used to develop total economic activity flowing from rail improvement investments, across all economic sectors. A total of 55,777 total job years⁴² were predicted to result from the construction over the 25-year program term.⁴³ These were allocated proportionally by year on the basis of annual program investments accumulated in five-year segments.

Direct Employment is the additional rail jobs required to operate and maintain new infrastructure and additional trains, as needed in each year as improvements are built or new train service is added, totaled over each 5-year period. These were derived using industry-standard metrics of workers per unit of rail infrastructure (miles of track or number of switches, square footage of stations, per train crew requirements). For train crews, a distinction is made if trains are weekday only (two crews) or seven days a week (three crews). Train crew values also recognize contractual requirements for layover, hours of service limitations, and other factors that affect staffing requirements. Infrastructure maintenance staffing is a direct function of unit values, as maintenance staff are typically assigned to and pick jobs on a single-shift basis.

⁴¹ Multiple sources.

⁴² An analysis by HNTB resulted in an estimate of 2,129 job-years/year for the program at a \$6 billion funding level. Escalating this to \$7.323 billion and adding the job-years created due to the ripple effect of permanent railroad jobs added as infrastructure maintenance and operational needs expand, and then subtracting the direct rail jobs created to staff this infrastructure maintenance and operations produces the 55,777 job-years value attributed to the program.

⁴³ On a national standard, each \$1 billion of investment typically generates 7,700-8,100 job-years. Applying that metric range produces a range of potential economic impacts for the \$7.323 billion program of 56,378 – 59,316 job years created.

Mode Shift Safety Savings is the total accidents avoided due to mode shift from auto/bus/air to rail in each year, totaled over each 5-year period. This metric is derived using data provided by the National Transportation Safety Board and other official sources for accidents per million passenger-miles of travel by air, bus, auto and rail. The accident rates used are:⁴¹

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Employing these drivers, for each 100 passengers diverted to rail, and applying the diversion percentages derived from the travel demand forecasting model of 50/30/20 for bus/air/auto, and the average trip lengths among origin-destination pairs embedded in the 2010 trip table that is the basis for all travel demand forecasting associated with this program, the reduction in accidents is derived as $(50 \times 0.203433744 \times \text{the average trip distance}) + (30 \times 0.000046892 \times \text{the average trip distance}) + (20 \times 1.602941802 \times \text{the average trip distance}) - (100 \times 0.011235955 \times \text{the average trip distance}) = \text{the net accidents avoided for each 100 travelers diverted to rail.}$

Job Creation is the total job-years created across all economic sectors due to construction activity, increased rail operations (direct employment), and increased related economic activity (indirect employment) in each year, totaled over each 5-year period. Although the metric provides a final number in the 25th year, the additional job-years created by the 25th year of the program due to increased rail operations is perpetual, resulting in 2,702 additional permanent employees on the railroad system. A Transportation Economic Development Impact System (TREDIS) model was used to develop total economic activity flowing from rail improvement investments, across all economic sectors. A total of 55,777 total job years⁴² were predicted to result from the construction over the 25-year program term.⁴³ These were allocated proportionally by year on the basis of annual program investments accumulated in five-year segments.

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⁴¹ Multiple sources.

⁴² An analysis by HNTB resulted in an estimate of 2,129 job-years/year for the program at a \$6 billion funding level. Escalating this to \$7.323 billion and adding the job-years created due to the ripple effect of permanent railroad jobs added as infrastructure maintenance and operational needs expand, and then subtracting the direct rail jobs created to staff this infrastructure maintenance and operations produces the 55,777 job-years value attributed to the program.

⁴³ On a national standard, each \$1 billion of investment typically generates 7,700-8,100 job-years. Applying that metric range produces a range of potential economic impacts for the \$7.323 billion program of 56,378 – 59,316 job years created.

SDP Errata

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Errata for Service Development Plan

The following table contains additions, corrections, and clarifications to the Service Development Plan (SDP) for the High Speed Rail Empire Corridor Program that was originally prepared in 2017. Additions to the original text are shown in bold text, and deletions are shown in red strike-outs. These additions, corrections, and clarifications do not reflect any changes to the technical analysis reflected in the SDP, which may be subject to updating as elements of the Tier 1 Final EIS are advanced into Tier 2 environmental analysis.

Errata Sheet for Service Development Plan

#	Page #	Original SDP Text	Revised SDP Text	Reason for Changes
1	p. 1	Carrying forward a vision for the future, New York has one of the largest state-supported programs for improving intercity rail passenger service in the nation, that has included installation of a second track between Albany-Rensselaer and Schenectady.	Carrying forward a vision for the future, New York has one of the largest state-supported programs for improving intercity rail passenger service in the nation, that has included installation of a second track between Albany-Rensselaer and Schenectady and station reconstruction at Buffalo-Exchange Street, Niagara Falls, Schenectady, and Rochester.	Text has been updated to reflect major station reconstructions over the past 10 years.
2	p. 1	Enhancements to the intercity rail passenger network will complement the extensive commuter train system In the New York City metropolitan area that has become an integral part of lives of residents of 11 city and suburban counties served by the Metropolitan Transportation Authority (MTA).	Enhancements to the intercity rail passenger network will complement the extensive commuter train system in in the New York City metropolitan area that has become an integral part of lives of residents of 11 city and suburban counties served by the Metropolitan Transportation Authority (MTA), the busiest commuter railroad in the country.	Clarified high use of MTA railroad when compared with other commuter railroads nationally.
3	p. 2	Now, investments as part of the High Speed Rail Empire Corridor Program will support rail as a modern, fast, and reliable part of the transportation network that spans the state from New York City to Niagara Falls.	Now, investments as part of the High Speed Rail Empire Corridor Program will support rail as a modern, fast, and reliable part of the transportation network that spans the state from New York City to Niagara Falls. The Empire Corridor is one of eleven designated high-speed rail corridors nationwide, initially authorized under the Intermodal Surface Transportation Efficiency	Added history of federal high-speed rail designations and historic transportation use of the corridor. Highlighted the importance of Empire Corridor nationally for both passenger and freight rail.

High Speed Rail Empire Corridor Service Development Plan Errata

#	Page #	Original SDP Text	Revised SDP Text	Reason for Changes
		<p>As New York moves forward with its High Speed Rail Empire Corridor Program, with support from the Federal Railroad Administration (FRA), the state continues its commitment to supporting the improvement of Empire Corridor intercity passenger rail service. This program lays the foundation for a greater level of investments and improvements than previously, continuing New York’s 200-year legacy of supporting public transportation as far back as the Erie Canal and Mohawk & Hudson Railroad of the 1800s.</p>	<p>Act of 1991 (ISTEA) and supplemented by the Transportation Equity Act for the 21st Century of 1998 (TEA-21).</p> <p>As New York moves forward with its High Speed Rail Empire Corridor Program, with support from the Federal Railroad Administration (FRA), the state continues its commitment to supporting the improvement of Empire Corridor intercity passenger rail service. This program lays the foundation for a greater level of investments and improvements than previously, continuing New York’s 200-year legacy of supporting public transportation as far back as the Erie Canal and Mohawk & Hudson Railroad of the 1800s. The Empire Corridor developed along the historic “Water Level Route” that followed the canal system connecting Lake Erie and the Hudson River to transport goods and services to and from New York City. The corridor helped to strengthen New York City as the preeminent U.S. trade center, by connecting markets in Canada and the Midwest with Albany, Montreal, Boston, and New York City. For many decades, the railroad was operated by the New York Central Railroad as a four-track mainline between Albany and Buffalo carrying passenger and freight trains on express and local tracks. As rail passenger travel declined post-World War II, the New York Central Railroad (NYCRR) began to reduce its operating costs by removing tracks, starting in the late 1950s, and thinning service. The line exists today as a two-track system between Albany and Buffalo (where it is a heavily used shared-use corridor with freight), continuing as a single track right-of-way on portions of the line extending north beyond Buffalo to Niagara Falls. This two-track line along Empire Corridor West is the busiest freight track in the state, carrying one of the highest volumes on the CSXT system nationwide.</p> <p>In addition to improving mainline passenger rail service among the State’s major population centers of</p>	

#	Page #	Original SDP Text	Revised SDP Text	Reason for Changes
			<p>New York City, Albany, Schenectady, Utica, Rome, Syracuse, Rochester, and Buffalo, the program will benefit regional services operating along portions of the Empire Corridor for:</p> <ul style="list-style-type: none"> ▪ the Lake Shore Limited (from Boston to Albany), ▪ the Adirondack (from Schenectady to Montreal), ▪ the Ethan Allen Express (from Schenectady to Rutland, VT), ▪ the Lake Shore Limited West (from Buffalo to Chicago), and ▪ the Maple Leaf Service (from Niagara Falls to Toronto). <p>The Empire Corridor is therefore essential to New York in that it will significantly enhance this rail corridor’s ability to transport large numbers of passengers and goods among these key population centers using energy and space-efficient rail services rather than highways and air travel corridors. The corridor is distinguished by its diversity of ownership and operating control and the mix of passenger and freight usage it supports, as the National Railroad Passenger Corporation’s (Amtrak’s) Empire Service shares tracks with CSXT and the Metropolitan Transportation Authority’s Metro-North Railroad (Metro-North) commuter rail between NYC and its northern counties of Westchester and Dutchess.</p>	

High Speed Rail Empire Corridor Service Development Plan Errata

#	Page #	Original SDP Text	Revised SDP Text	Reason for Changes
4	p. 2	<p>These savings cascade through the economy, creating jobs, increasing overall activity, and raising personal income.</p> <p>The program requires the phased expenditure of \$7.323 billion over 25 years, to continually grow track and signal capacity and straighten sharp curves to support higher operating speeds.¹ The program would add 283 miles of new third track¹ and 39 miles of new fourth track¹ and upgrade antiquated signal systems, greatly increasing operating flexibility for both freight and passenger trains.</p>	<p>These savings cascade through the economy, creating jobs, increasing overall economic activity, and raising personal income.</p> <p>The program requires the phased expenditure of \$7.323 \$8.5 billion (expressed in 2017 dollars) over 25 years, to continually involving a strategically sequenced set of track, bridge, and signal capacity projects that will update signal controls, provide separate tracks for passenger and freight services, and straighten sharp curves to support higher operating speeds.¹ The program would add 283 miles of new third track¹ along much of the corridor's two-track right-of-way and 39 miles of new fourth track¹ and. It will upgrade antiquated signal systems, greatly increasing operating flexibility for both freight and passenger trains.</p>	<p>Clarified final program estimate. Change made globally.</p>
5	p. 2	<p>¹ The Tier 1 Environmental Impact Statement (EIS) evaluates a 20-year improvement program. The program is extended in this SDP to align work with past and expected future rates of spending of approximately \$240-\$250 million annually.</p>	<p>¹ The Tier 1 Environmental Impact Statement (EIS) evaluates a 25-20-year improvement program. The program is extended in this SDP to align work with past and expected future rates of spending of approximately \$240-\$250 \$350 million annually.</p>	<p>Updated annual program costs. Changes made globally.</p>
6	p. 2	<p>The program would add 283 miles of new passing tracks and 39 miles of new fourth track and upgrade antiquated signal systems, greatly increasing operating flexibility for both freight and passenger trains.</p>	<p>The program would add 283 miles of new third passing tracks² and 39 miles of new fourth track and upgrade antiquated signal systems, greatly increasing operating flexibility for both freight and passenger trains.</p> <p>² The Tier 1 Final EIS estimates that the length of new tracks added with the program would total approximately 370 miles.</p>	<p>Clarification added on the types and length of new third and fourth track were added in the text, and footnote 2 clarifies total approximate length of new tracks.</p>

High Speed Rail Empire Corridor Service Development Plan Errata

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7	p. 3	<p>The program is predicted to attract more than one million additional annual rail trips by 2040⁴, for a total of 2.7 million annual trips; this would be nearly a 68% increase over the 1.6 million annual trips recorded for 2016.⁵</p>	<p>The program is predicted to attract more than one million additional annual rail trips by 2035 2040⁴, for a total of 2.7 2.6 million annual trips; this would be nearly a 68% increase over the 1.6 million annual trips recorded for 20192016.⁵</p> <p>In 2019, Amtrak operated a total of four daily roundtrips along Empire Corridor West. Amtrak operates three daily round trips to Niagara Falls (Empire Service), with one continuing on to Toronto (Maple Leaf Service). The other daily service trip continues from Buffalo-Depew Station to Chicago (Lake Shore Limited). In addition to these four trips, two trips offer service to Schenectady, one (the Adirondack Service) continuing to Montreal and one (the Ethan Allen Express) continuing to Rutland, Vermont. Thus, the Empire Corridor serves as a trunk rail line from which regional branches operate daily to Vermont (Rutland), Canada (Toronto and Montreal), and Chicago, creating a robust and economically important rail passenger network over a significant service area.</p>	<p>Updated for 2019 ridership and project year. Changes made globally. Added discussion of the national and regional importance of Empire Corridor. Added discussion of regional services.</p>

High Speed Rail Empire Corridor Service Development Plan Errata

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8	p. 3	<p>⁵Although the Tier 1 Final EIS forecast one million additional riders over 20 years in response to a 90-minute total travel time savings, this SDP recognizes a 25-year period and slightly greater travel time benefits (94 minutes), including four minutes of additional time savings from double-tracking the Schenectady-Albany single track segment that was not considered in the EIS. Applying travel and cost elasticities from the demand forecasting model to the additional four minutes of travel time benefit generates 83,000 more riders, for a total of 1.083 million one-way trips.</p>	<p>⁵Although theThe Tier 1 Final EIS forecast one million additional riders over 20 years in response to a 90-minute total travel time savings, this SDP recognizes a 25-year period. The 1.6 million Amtrak 2019 ridership estimate include trips to Toronto (on the Maple Leaf Service). and slightly greater travel time benefits (94 minutes), including four minutes of additional time savings from double-tracking the Schenectady-Albany single track segment that was not considered in the EIS. Applying travel and cost elasticities from the demand forecasting model to the additional four minutes of travel time benefit generates 83,000 more riders, for a total of 1.083 1 million one-way trips.</p>	<p>Updated forecast for timeframe and ridership. Changes made globally.</p>

High Speed Rail Empire Corridor Service Development Plan Errata

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9	p. 3	By speeding trains and shifting more than one million travelers to rail from other modes, the program will reduce locomotive fuel consumption by over 500,000 gallons of diesel fuel, eliminate or avoid 67 million pounds of air pollutant and greenhouse gas emissions, conserve nearly 400,000 billion British Thermal Units (BTUs) of energy as travelers switch to more energy-efficient rail services, and avoid 117 roadway accidents. Over its 25-year implementation period, the program investments will create 55,676-years of employment, and the direct hiring of 150 additional rail system workers.	By speeding trains increasing train speeds and shifting more than one million travelers to rail from other modes, the program will reduce locomotive fuel consumption by over 500,000 gallons of diesel fuel, eliminate or avoid 67 million pounds of air pollutant and greenhouse gas emissions, conserve nearly 400,000 billion British Thermal Units (BTUs) of energy as travelers switch to more energy-efficient rail services, and avoid 117 roadway accidents. Over its 25-year implementation period, the program investments will create 55,676 68,048 -years of employment, and the direct hiring of 150 210 additional rail system workers.	Corrected grammar and revised employment based on higher program costs.
10	p. 4 and 108	Exhibit ES-1 and Exhibit 9-1: Benefits of High-Speed Rail Empire Corridor Program: Travel Time Savings per Train Each Year, Summed over 5-year periods (minutes/Cumulative Totals) Years 1-5 (10/10), Years 6-10 (36/46), Years 11-15 (14/60), Years 16-20 (10/70), Years 21-25 (24/94)	Exhibit ES-1: Benefits of High-Speed Rail Empire Corridor Program: Travel Time Savings per Train Each Year, Summed over 5-year periods (minutes/Cumulative Totals) Years 1-5 (10/10), Years 6-10 (36/46) (35/45) , Years 11-15 (14/60) (13/58) , Years 16-20 (10/70) (9/67) , Years 21-25 (24/94) (23/90)	Adjusted travel time savings to be more conservative.

High Speed Rail Empire Corridor Service Development Plan Errata

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11	pp. 4 and 108	<p>Exhibit ES-1 and Exhibit 9-1: Benefits of High-Speed Rail Empire Corridor Program: Total Minutes of Delay Saved Each Year, Summed over 5-Year Periods (minutes/Cumulative Totals)</p> <p>Years 1-5 (35,272/35,272), Years 6-10 (10,120/45,392), Years 11-15 (7,328/52,720), Years 16-20 (14,657/67,377), Years 21-25 (18,490/85,867)</p>	<p>Exhibit ES-1: Benefits of High-Speed Rail Empire Corridor Program: Total Minutes of Delay Saved Each Year, Summed over 5-Year Periods (minutes/Cumulative Totals)</p> <p>Years 1-5 (35,272/35,272), Years 6-10 (10,120/45,392) (9,831/44,095), Years 11-15 (7,328/52,720) (7,119/51,214), Years 16-20 (14,657/67,377) (14,238/65,452), Years 21-25 (18,490/85,867) (17,692/83,414)</p>	Adjusted travel time savings to be more conservative.
12	pp. 5 and 110	<p>Exhibit ES-1 and Exhibit 9-1: Benefits of High-Speed Rail Empire Corridor Program: Job Creation Each Year, Summed over 5 Year Periods (job-years/Cumulative Totals)</p> <p>Years 1-5 (9,419/9,419), Years 6-10 (10,134/19,552), Years 11-15 (11,541/31,093), Years 16-20 (12,190/43,283), Years 21-25 (12,494/55,777)</p>	<p>Exhibit ES-1: Benefits of High-Speed Rail Empire Corridor Program: Job Creation Each Year, Summed over 5 Year Periods (job-years/Cumulative Totals)</p> <p>Years 1-5 (9,419/9,419) (11,491/11,491), Years 6-10 (10,134/19,552) (12,363/23,853), Years 11-15 (11,541/31,093) (14,080/37,933), Years 16-20 (12,190/43,283) (14,872/52,805), Years 21-25 (12,494/55,777) (15,243/68,048)</p>	Adjusted job creation based on higher program costs.

High Speed Rail Empire Corridor Service Development Plan Errata

#	Page #	Original SDP Text	Revised SDP Text	Reason for Changes
13	pp. 6 and 110	Exhibit ES-1 and Exhibit 9-1: Benefits of High-Speed Rail Empire Corridor Program: Direct Employment Each Year, Summed over 5 Year Periods (rail system jobs/Cumulative Totals) Years 1-5 (24/24), Years 6-10 (42/66), Years 11-15 (41/97), Years 16-20 (29/126118), Years 21-25 (47/173)	Exhibit ES-1: Benefits of High-Speed Rail Empire Corridor Program: Direct Employment Each Year, Summed over 5 Year Periods (rail system jobs/Cumulative Totals) Years 1-5 (24/24) (27/27) , Years 6-10 (42/66) (47/74) , Years 11-15 (41/97) (43/117) , Years 16-20 (29/126118) (41/158) , Years 21-25 (47/173) (52/210)	Adjusted staffing based on projects proposed.
14	p. 6	Key (for Exhibit ES-1: Benefits of High-Speed Rail Empire Corridor Program)	Key (for Exhibit ES-1: Benefits of High-Speed Rail Empire Corridor Program) Note: Refer to Key to Exhibit 9-1 in Section 9.3 for further explanation of benefits and methodology.	Refer to Key for Exhibit 9-1.

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#	Page #	Original SDP Text	Revised SDP Text	Reason for Changes
15	p. 11	<p>The Federal Railroad Administration (FRA) and the New York State Department of Transportation (NYSDOT) are completing a Tier 1 Environmental Impact Statement (EIS) that evaluates options for improving intercity passenger rail services along the 464-mile Empire Corridor between Pennsylvania (Penn) Station in New York City and Niagara Falls Station in Niagara Falls, New York. In 2010, NYSDOT received a grant from the FRA with which to develop alternatives for improving the Empire Corridor rail system, to conduct the evaluation of these alternatives pursuant to the National Environmental Policy Act (NEPA), and to prepare this Service Development Plan (SDP) for the selected alternative to describe its feasibility, costs, sources of funding, and operation.</p>	<p>The Federal Railroad Administration (FRA) and the New York State Department of Transportation (NYSDOT) are completing a Tier 1 Final Environmental Impact Statement (EIS) that evaluates options for improving intercity passenger rail services along the 464-mile Empire Corridor between Pennsylvania (Penn) Station in New York City and Niagara Falls Station in Niagara Falls, New York. In December 1998, the U.S. Secretary of Transportation announced the official designation of the TEA-21-authorized Empire Corridor as a high-speed rail corridor. In 2010, NYSDOT received a grant from the FRA with which to develop alternatives for improving the Empire Corridor rail system, to conduct the evaluation of these alternatives pursuant to the National Environmental Policy Act (NEPA), and to prepare this Service Development Plan (SDP) for the selected alternative to describe its feasibility, costs, sources of funding, and operation.</p>	<p>Identified federal high-speed rail designation.</p>
16	p. 11	<p>The implementation plan for the SDP requires the generation of a prioritized capital program, a ten-year financial plan, institutional and stakeholder arrangements and agreements, and a program management plan.</p>	<p>The implementation plan for the SDP requires the generation of a prioritized capital program, a multi-ten-year-financial plan, institutional and stakeholder arrangements and agreements, and a program management plan.</p>	<p>Clarified timeframe for financial plan.</p>

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#	Page #	Original SDP Text	Revised SDP Text	Reason for Changes
17	p. 11	In the past 20 years, annual ridership on intercity passenger trains traveling on the Empire Corridor has grown by over 500,000 passengers, to 1.6 million in 2016.	In the past 20 years, annual ridership on intercity passenger trains traveling on the Empire Corridor has grown by over 500,000 passengers, to 1.6 million in 2019 2016. ¹³ ¹³ The 2019 Amtrak ridership includes trips to Toronto (on the Maple Leaf Service). The total Amtrak ridership including all of the other services (Lake Shore Limited, Adirondack, Ethan Allen Express) in 2019 was 2.1 million.	Clarified Amtrak ridership statistics and provided ridership updates for 2019.
18	p. 11	This rail network helps people in 11 counties live and work with less dependence on automobiles and more time for business and families, lower levels of traffic congestion, less air pollution, in denser and more walkable towns and cities oriented around train stations rather than highway interchanges.	This rail network helps people in 11 counties live and work with less dependence on automobiles and more time for business and families, lower levels of traffic congestion, less air pollution, in denser and more walkable towns and cities oriented around train stations rather than highway interchanges. The nine Metropolitan Planning Organizations along the route account for approximately 90 percent of the state's total population and employment and form the bulk of the high-speed rail ridership market.	Clarified potential market area for high speed rail ridership for Empire Corridor.
19	p. 12	Recent investments for improvements at Rochester, Albany, Niagara Falls, and Schenectady are already freeing passenger rail service from freight rail conflicts that have resulted in years of unreliable and slow service.	Recent investments for improvements at Rochester, Albany, Buffalo , Niagara Falls, and Schenectady are already freeing passenger rail service from freight rail conflicts that have resulted in years of unreliable and slow service.	Updated station construction to include investments at Buffalo-Exchange Street Station and Buffalo-Depew Station.

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#	Page #	Original SDP Text	Revised SDP Text	Reason for Changes
20	p. 12	<p>This SDP outlines such a program. After five years of careful analysis, NYSDOT has identified a suite of improvements that can be built with available and anticipated funding without interfering with existing passenger and freight services. It will confer gradual and continuing benefits to both passenger and freight services sharing the busy Empire Corridor section between Albany and Niagara. In so doing, it will bolster center-city renaissance while supporting key business and educational institutions, and provide increasingly essential linkages between upstate towns, and the capital and New York City.</p>	<p>This SDP outlines such a program. After five years of careful analysis of investments in intercity passenger rail, which was addressed in the Tier 1 Final Environmental Impact Statement (EIS). After careful analysis of options and impacts in the Tier 1 Final EIS, NYSDOT has identified a suite of improvements that can be built with available and anticipated funding without interfering with existing passenger and freight services. # These will confer gradual and continuing benefits to both passenger and freight services sharing the busy Empire Corridor section between Albany and Niagara Falls. In so doing, itthey will bolster center-city renaissance while supporting key business and educational institutions, and provide increasingly essential improve linkages between upstate towns and, the State capital (Albany), and New York City.</p>	<p>Corrected and clarified references.</p>
21	p. 13	<p>In response, ridership is anticipated to grow significantly, from the 1.6 million current Empire Corridor passengers to 2.6 million after implementation of the full program.¹³</p>	<p>In response, ridership is anticipated to grow significantly, from the 1.6 million current Empire Corridor passengers to 2.6 2.7 million after implementation upon completion of the full program.¹⁴</p>	<p>Updated ridership for full implementation of the program. Change made globally.</p>

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#	Page #	Original SDP Text	Revised SDP Text	Reason for Changes
22	p. 13	<p>¹³Although the Tier 1 Final EIS forecast 1 million additional riders over 20 years, this SDP recognizes a 25-year growth period, and slightly greater travel time benefits (94 minutes rather than 90 minutes as per the EIS), resulting in slightly more ridership (1.1 million).</p>	<p>¹⁴Although itThe Tier 1 Final EIS forecast 1 million additional riders over 20 years, this SDP recognizes a 25-year growth period, and slightly greater travel time benefits (94 minutes rather than 90 minutes as per the EIS), resulting in slightly more ridership (1.1 million).</p>	<p>Clarified travel time savings benefits. Change made globally.</p>
23	p. 13	<p>To provide the capital improvements, equipment and services proposed for the Empire Corridor in this report, 173 permanent jobs would be created to operate the rail system, and some 55,777 job-years of additional employment created in constructing and operating it over a 25-year implementation period.¹⁵ This economic infusion will be multiplied as dollars invested in the rail system play through upstate economies, fostering greater economic activity broadly beneficial to the entire Empire Corridor.</p> <p>Revitalizing Communities</p> <p>In addition to speeding main-line passenger and freight rail services, the program fosters improved intermodal connections in upstate cities.</p>	<p>To provide the capital improvements, equipment and services proposed for the Empire Corridor in this report, 173-210 permanent jobs would be created to operate the rail system, and some 55,777-68,048 job-years of additional employment created in constructing and operating it program construction and operation over a 25-year implementation period.¹⁵ This economic infusion will be multiplied as dollars invested in the rail system play through rejuvenate upstate economies, fostering greater economic activity broadly beneficial to the entire Empire Corridor.</p> <p>Revitalizing Communities</p> <p>In addition to speeding increasing train speeds for main-line passenger and freight rail services, the program fosters improved intermodal connections in upstate cities.</p>	<p>Clarification and revised employment estimates based on updated project listing and revised project costs. Made these changes globally.</p>

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#	Page #	Original SDP Text	Revised SDP Text	Reason for Changes
24	p. 13	<p>¹⁴ The long-term impact of 173 permanent rail system jobs continues past the 25-year analysis horizon. Construction jobs – and their multiplier effect on local economies – dissipate after completion of the program.</p>	<p>¹⁵ The long-term impact of 173210 permanent rail system jobs continues past the 25-year analysis horizon. Construction jobs – and their multiplier effect on local economies – dissipate after completion of the program.</p>	<p>Revised staffing based on updated projects.</p>
25	p. 13	<p>Rail is the most space and energy efficient means of moving people and goods, enjoys standard technologies long proven in service and reduces air pollution and noise generated through other means of travel. Overall, investments in rail continue to repay significant environmental and economic dividends measured in decades, propelling economic growth while preserving communities and the region from the environmental degradation that results from dependence on automobiles.</p>	<p>Rail is the most space and energy efficient means of moving people and goods, enjoys. Rail transportation employs standard technologies long proven in service and reduces air pollution and noise generated through other means of travel. Overall, investments in rail continue to repay significant environmental and economic dividends measured continuing to accrue benefits (e.g., reduction in greenhouse gas emissions) over decades, propelling economic growth while preserving communities and the region from the environmental degradation that results from dependence on automobiles.</p>	<p>Clarified language.</p>
26	p. 16	<p>To date, NYSDOT has already accomplished many of these projects, setting the stage for implementation of the Preferred Alternative that is the subject of this SDP.</p>	<p>To date, NYSDOT has completed all already accomplished many of these projects, setting the stage for implementation of the Preferred Alternative that is the subject of this SDP.</p>	<p>Revised to reflect completion of Base projects.</p>

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#	Page #	Original SDP Text	Revised SDP Text	Reason for Changes
27	p. 16	<p>Among the improvements NYSDOT has completed are the following (project designations key to NYSDOT project lists)</p> <ul style="list-style-type: none"> ▪ Hudson Line Signal Reliability; ES-3 ▪ Hudson Line Highway-Rail Grade Crossing Safety Improvements; ES-11 ▪ Albany-Rensselaer Station Fourth Track Capacity Improvements; ES-9, and ▪ Niagara Falls International Railway Station and Intermodal Transportation Center – New Intermodal Transportation Center; EW-13. <p>In addition, projects funded and in construction include:</p> <ul style="list-style-type: none"> ▪ Albany – Schenectady Double Track; ES-10 	<p>Among the improvements NYSDOT has completed are the following (project designations key to NYSDOT project lists)</p> <ul style="list-style-type: none"> ▪ Hudson Line Signal Reliability; ES-3 ▪ Hudson Line Highway-Rail Grade Crossing Safety Improvements; ES-1 ▪ Albany-Rensselaer Station Fourth Track Capacity Improvements; ES-9, and ▪ Niagara Falls International Railway Station and Intermodal Transportation Center – New Intermodal Transportation Center; EW-13. <p>In addition, projects funded and in construction include:</p> <ul style="list-style-type: none"> ▪ Albany – Schenectady Double Track; ES-10 	Revised to reflect completion of Base projects.
28	p. 17	<p>As such, NYSDOT’s efforts since 2015 set the stage for the next wave of improvements needed to further upgrade passengers’ experience and increase ridership.</p>	<p>As such, NYSDOT’s efforts since 2015 to date set the stage for the next wave of improvements needed to further upgrade improve the speed of service, improve passengers’ experience, and increase ridership.</p>	Updated for current conditions.
29	p. 17	<p>Albany-Rensselaer and Station and Track Improvements</p>	<p>Albany-Rensselaer and Station Track Improvements and Other Base Station Projects</p>	Clarified content of section.

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#	Page #	Original SDP Text	Revised SDP Text	Reason for Changes
30	p. 17	Exhibit 2-4 shows the new Albany Rensselaer Station with the recently completed improvements to the Interlocking CP142 and installation of the fourth station track.	Exhibit 2-4 shows the new Albany-Rensselaer Station with the recently completed improvements to the Interlocking CP142 and installation of the fourth station track.	Updated for current conditions.
31	p. 18	Another station project underway at Schenectady will provide a new station replacing a facility nearing the end of investment life. This new station at Schenectady will complement other improvements in the city with the opening of new tourist and art attractions in the area near the station location.	Another Other station projects underway-completed at Schenectady and Buffalo-Exchange Street Stations will provide a new stations replacing a facilities near the end of their investment life. This-These new stations in at Schenectady and Buffalo will complement other improvements in the cities with the opening of new tourist and art attractions in the areas near the station locations.	Provided station construction updates.
32	p. 18	Exhibit 2-6-New station recently completed at Rochester. A new Rochester station was recently completed... Also at Syracuse, interlocking and signal projects now under development will help improve operations for both passenger and freight trains. The Rochester station is shown in Exhibit 2-6.	Added to the Addenda new image for: Exhibit 2-6-New, recently completed station Also at the Syracuse Station , interlocking and signal projects now under development will help improve operations for both passenger and freight trains. The Rochester station is shown in Exhibit 2-6.	Provided recent image of Rochester Station in Addendum and modified station/exhibit references.

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#	Page #	Original SDP Text	Revised SDP Text	Reason for Changes
33	p. 20	The route between New York City and Albany-Rensselaer, offering 13 daily round-trips, is the third busiest intercity rail route in the nation. The segment between Albany and Niagara Falls is owned by CSXT, a freight rail company, which allows Amtrak to run passenger service on shared tracks by contract with NYSDOT.	The route between New York City and Albany-Rensselaer, offering 13 daily round-trips, is the third busiest intercity rail route in the nation. With the exception of one short (6.8-mile) segment owned by Amtrak west of the Schenectady Station, between Albany the station and Hoffmans, the segment between Poughkeepsie and Niagara Falls is predominantly owned by CSXT, a freight rail company, which allows Amtrak to run passenger service on shared tracks by contract with NYSDOT.	Clarified.

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#	Page #	Original SDP Text	Revised SDP Text	Reason for Changes
34	p. 21	<p>The Ethan Allen train runs northeast beyond Albany to Rutland, Vt. Trains #63 and #64 (the “Maple Leaf”) are operated by VIA RAIL Canada from Niagara Falls, New York to Toronto, with U.S. and Canadian rail crews switching places at the border. Trains #68 and #69 (the “Adirondack”) are continuations of two Empire South trains that run north beyond Albany to Montreal, Canada, with the U.S. crews operating the trains over the entire route. The Lake Shore Limited runs west past Buffalo to Cleveland and Chicago, and east past Albany to Boston, Massachusetts. These services were included as part of the network simulation for the program, to ensure that the proposed train improvements are feasible, that the program can be delivered as intended, and that it will meet program objectives. These trains have also been recognized in discussions of ridership in the EIS and this SDP.</p>	<p>The Ethan Allen train (Trains #290-293, #295-296) runs northeast beyond Albany to Rutland, Vermont-Vt. Trains #63 and #64 (the “Maple Leaf”) are operated by VIA RAIL Canada from Niagara Falls, New York to Toronto, with U.S. and Canadian rail crews switching places at the border. Trains #68 and #69 (the “Adirondack”) are continuations of two Empire South trains that run north beyond Albany to Montreal, Canada, with the U.S. crews operating the trains over the entire route. The Lake Shore Limited (Trains #48 and #49) runs west past Buffalo to Cleveland and Chicago, and east past Albany to Boston, Massachusetts. These services were included as part of the network simulation for the program, to ensure that the proposed train improvements are feasible, that the program can be delivered as intended, and that it will meet program objectives. These trains have also been recognized in discussions of ridership in the Tier 1 EIS and this SDP.</p> <p>In addition to these services, a pilot service for the Berkshire Flyer operated on weekends in the summer of 2022 from New York City to Pittsfield, Massachusetts. This seasonal pilot program, sponsored by MassDOT, in cooperation with NYSDOT, is expected to continue in the summer of 2023.</p> <p>NYSDOT is currently planning improvements to the Syracuse Station for provide improved access to the New York State Fairgrounds Stop. This stop also operates on a seasonal basis, depending on events at the Fairgrounds.</p>	<p>Clarified train numbers for Ethan Allen and Lake Shore Limited routes for consistency. Updated discussion of regional services, as well as recent updates for season services.</p>

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#	Page #	Original SDP Text	Revised SDP Text	Reason for Changes
35	p. 22	<p>The geographic distribution of ridership on the Empire Corridor is shown in Exhibit 3-2. The majority of the route’s ridership is concentrated between NYC and Albany. The route between Albany-Rensselaer and New York City is the third busiest rail route in the nation, and is used by Empire Corridor trains as well as trains serving Montreal and Vermont. Ridership on the Empire Corridor has been growing steadily for the past decade, reaching 1.6 million passengers in 2016. As NYSDOT improves Empire Corridor infrastructure and services, Corridor ridership will continue to grow in response to faster trips and improved reliability.</p>	<p>The geographic distribution of ridership (2019) on the Empire Corridor is shown in Exhibit 3-2. The majority of the route’s ridership is concentrated between NYC and Albany.</p> <p>The route between Albany-Rensselaer and New York City is the third busiest rail route in the nation, and is used by Empire Corridor trains as well as trains serving Boston (on the Lake Shore Limited), Montreal (on the Adirondack), and Vermont (on the Ethan Allen Express). The route west of Albany to Buffalo is used by trains serving destinations to the west, such as Cleveland, Toledo, and Chicago (Lake Shore Limited West) and trains traveling to Niagara Falls can continue on to Toronto (Maple Leaf). Ridership on the Empire Corridor has been growing steadily for the past decade, reaching 1.6 million passengers in 2019²⁰¹⁶. This Amtrak estimate includes Albany-Niagara Falls Toronto trips which includes trips on the Maple Leaf Service. The other services along the Adirondack, Ethan Allen Express, and Lake Shore Limited totaled approximately 526,000 trips, for a total of 2.1 million passengers traveling on Empire Corridor in 2019. Exhibit 3-2 shows the relative proportion of these services. As NYSDOT improves Empire Corridor infrastructure and services, Corridor ridership willis expected to continue to grow in response to faster trips and improved reliability.</p>	<p>Provided ridership updates for 2019, clarified ridership on other Amtrak Services using Empire Corridor, and add updated Exhibit 3-2 (in Addenda).</p>
36	p. 22	<p>Exhibit 3-2 Empire Corridor Ridership by Segment</p>	<p>Revised Exhibit 3-2, Empire Corridor Ridership by Segment.</p>	<p>Updated Exhibit 3-2.</p>

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37	p. 23	<p>To comply with the National Environmental Policy Act (NEPA), beginning in 2009, NYSDOT and FRA conducted a NEPA Scoping process and then developed a project Purpose and Need Statement and a series of higher-speed Empire Corridor rail alternatives that could provide improved Empire Corridor service, all documented in a Tier 1 Draft Environmental Impact Statement (Tier 1 Draft EIS circulated in 2014).</p> <p>Formal public hearings were held in six cities across the state to explain the program and gather public input. Following the public hearings, a <i>Response to Comments</i> document was prepared. Finally, based on public comments received and the analytical findings, a Preferred Alternative (PA) was selected by NYSDOT. This PA is proposed in a Final Environmental Impact Statement (Final EIS) that is being published in parallel with this SDP.</p>	<p>To comply with the National Environmental Policy Act (NEPA), beginning in 2009, NYSDOT and FRA conducted a NEPA Scoping process and then developed a project Purpose and Need Statement and a series of higher-speed Empire Corridor rail alternatives that could provide improved Empire Corridor service, all documented in athe Tier 1 Draft Environmental Impact Statement (Tier 1 Draft EIS circulated in 2014).</p> <p>Formal public hearings were held in six cities across the state to explain the program and gather public input. Following the public hearings, a <i>Response to Comments</i> document was prepared (included as Appendix K of the Tier 1 Final EIS). Finally, based on public comments received and the analytical findings, a Preferred Alternative (PA) was selected by NYSDOT. This PA is proposed in the Tier 1 Final Environmental Impact Statement (Final EIS) that is being published in parallel with this SDP.</p>	<p>Clarified NEPA process and references to Appendix K.</p>

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38	p. 23	<ul style="list-style-type: none"> ▪ Base Alternative: The slowest of the alternatives, the Base Alternative would constitute the current system improved through a series of basic upgrades that would be completed whether the Empire Corridor program advances or not. (Many of these have been completed at this writing; see Chapter 2 of this report.) 	<ul style="list-style-type: none"> ▪ Base Alternative: The slowest of the alternatives, the Base Alternative would constitute the current system improved through a series of basic upgrades that would be completed whether the Empire Corridor program advances or not. (Many All of these have been completed at this writing; see Chapter 2 of this report.) 	Updated status of Base Alternative projects.
39	p. 24	<ul style="list-style-type: none"> ▪ A complete renovation of the station building at Schenectady and other improvements: EW-01 (Construction Underway) ▪ Station improvements at Syracuse to reduce congestion between passenger and freight trains: EW-6 (Construction Underway) 	<ul style="list-style-type: none"> ▪ A complete renovation of the station building at Schenectady and other improvements: EW-01 (Completed Construction Underway) ▪ Station improvements at Syracuse to reduce congestion between passenger and freight trains: EW-6 (Completed Construction Underway) 	Updated status of Base Alternative project construction.
40	p. 26	<p>Alternative 90B allows 90 mph operation over most of the Empire Corridor West right of way and includes all of the improvements in Alternative 90A.</p>	<p>Alternative 90B allows 90 mph operation over most of the Empire Corridor West right-of-way and includes all of the improvements in Alternative 90A.</p>	Clarified that Alternative 90B includes 90A improvements.

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41	p. 27	Overall, by the end of the fifth year of the program, all Empire Capital District Connection trains will save 10-15 minutes from the current 2-½ hour trip time between Albany-Rensselaer and New York City; trip time for selected express trains would be reduced to 2 hours.	Overall, by the end of the fifth year of the program, all Empire Capital District Connection trains will save 10-15 minutes from the current 2-½ hour trip time between Albany-Rensselaer and New York City; trip time for selected express trains would be reduced to 2-¼ hours.	Clarified trip times.
42	p. 31	The Empire Corridor Program is built around an expectation of \$240-\$250 million annually for capital project design and construction, of which 80% will be sought from federal sources, and the balance provided by local, state and private investments.	The Empire Corridor Program is built around an expectation of \$240-\$250 \$350 million annually for capital project design and construction, of which 80% will be sought from federal sources, and the balance provided by local, state and private investments.	Updated program annual cost. Change made globally.
43	p. 33	This forecast projected 1.083 million additional one-way trips over the entire Empire Corridor upon completion of all improvements and attainment of speed, travel time and reliability goals. ²³ ²³ High Speed Rail Empire Corridor Program, Tier 1 Draft Environmental Impact Statement, Chapter 5: Section 5.6, Exhibit 5-13	This forecast projected 1 1.083 million additional one-way trips over the entire Empire Corridor upon completion of all improvements and attainment of speed, travel time and reliability goals. ²³ ²³ High Speed Rail Empire Corridor Program, Tier 1 Draft-Final Environmental Impact Statement, Chapter 5: Section 5.6, Exhibit 5-13	Clarified ridership and updated reference to the Tier 1 Final EIS. These changes were made globally.

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#	Page #	Original SDP Text	Revised SDP Text	Reason for Changes
44	p. 36	Other Empire Corridor South trains will see a 15-minute travel time reduction between New York City and Albany during the first five years, while the travel time for Empire Corridor West trains between Albany and Niagara Falls will shrink from 6 hours to 4-3/4 hours, a reduction of one hour and fifteen minutes.	Other Empire Corridor South trains will see up to a 15-minute travel time reduction between New York City and Albany during the first five years, while the travel time for Empire Corridor West trains between Albany and Niagara Falls will shrink from 6 hours to 4-3/4 hours, a reduction of up to one hour and fifteen minutes.	Clarified travel time savings.
45	p. 36	<ul style="list-style-type: none"> ▪ Operating certain trains with a 2-hour trip time between Albany-Rensselaer and New York City. All other Empire Corridor South trains will achieve a 15-minute trip time reduction as part of an overall trip time reduction of 90 minutes over the entire run from Niagara Falls to Penn Station New York City. Trains from Empire Corridor West operating through Albany and into the Hudson Valley will be able to achieve greater trip time reductions, at least 75 minutes and potentially somewhat more. 	Operating certain trains with a 2-hour trip time between Albany-Rensselaer and New York City. All other Empire Corridor South trains will achieve up to a 15-minute trip time reduction as part of an overall trip time reduction of 90 minutes over the entire run from Niagara Falls to Penn Station New York City. Trains from Empire Corridor West operating through Albany and into the Hudson Valley will be able to achieve greater trip time reductions, up to at least 75 minutes and potentially somewhat more.	Clarified travel time reductions.
46	p. 37	C-2 Achieve a 15-minute trip time reduction for trains operating between New York City and Albany-Rensselaer;	C-2 Achieve up to a 15-minute trip time reduction for trains operating between New York City and Albany-Rensselaer;	Clarified travel time reductions.

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47	p. 37	The track arrangements with notations of improvements in speeds for the High Speed Rail Empire Corridor Program EIS are included as Appendix B.	The track arrangements with notations of improvements in speeds for the High Speed Rail Empire Corridor Program Tier 1 EIS are included as Appendix B-A of the Tier 1 EIS.	Clarified references to the Tier 1 EIS. Change made globally.
48	p. 37	As noted in Section 4.1, these include some recent improvements sponsored (and, in all cases, already completed or in currently construction) by NYSDOT.	As noted in Section 4.1, these include some recent improvements sponsored (and, in some all cases, already completed or in currently construction) by NYSDOT.	Clarified status of Base Alternative projects. Change made globally.
49	p. 38	The track configuration required for the Preferred Alternative is shown in Volume 2 of the High Speed Rail Empire Corridor Tier 1 Program EIS, and is included for reference as Appendix B to this SDP. The required supporting infrastructure improvements for Empire Corridor South, as part of the Empire Capital District Connection, are outlined in Exhibit 6-2.	The track configuration required for the Preferred Alternative is shown in Volume 2/ Appendix A of the High Speed Rail Empire Corridor Tier 1 Program EIS and is included for reference as Appendix B to this SDP. The required supporting infrastructure improvements for Empire Corridor South, as part of the Empire Capital District Connection and as described in the Tier 1 EIS , are outlined in Exhibit 6-2.	Clarified references.
50	p. 43	C-2 Schedule adjusted for all trains in the Hudson Valley, to achieve trip time reduction <i>15-minute trip time reduction for most trains operating between New York City and Albany-Rensselaer</i>	C-2 Schedule adjusted for all trains in the Hudson Valley, to achieve trip time reduction <i>Up to a 15-minute trip time reduction for most trains operating between New York City and Albany-Rensselaer</i>	

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#	Page #	Original SDP Text	Revised SDP Text	Reason for Changes
51	p. 50	Exhibit 6-9, Preferred Alternative Equipment Utilization Assignments	In Exhibit 6-9, adjusted timeline for equipment utilization assignment for Train # 237, consistent with the train schedule.	
52	p. 51	Crew assignments are established with the process outlined in Exhibit 6-10, Days of Operation, for each service are given in Exhibit 6-11.	Crew assignments we are established with the process outlined in Exhibit 6-10, Days of Operation, and the trains and proposed weekly schedule for each service are given in Exhibit 6-11.	Clarified content of Exhibit 6-11.
53	p. 51	Organized within the parameters of the existing labor agreements;	The schedule is organized Organized within the parameters of the existing labor agreements;	Clarified content.
54	p. 51	Consistent with the Federal "Railroad Hours of Service Law;"	The schedule is consistent Consistent with the Federal "Railroad Hours of Service Law;"	Clarified content.
55	p. 51	Couplets are organized for outlying terminals "first-in & first-out" to minimize total hours on duty for crews;	The couplets Couplets are organized for outlying terminals "first-in & and first-out" to minimize total hours on duty for crews;	Clarified content.
56	p. 51	The crew couplets integrate the increased service with existing trains to maximize crew efficiencies. New trains are shown in BLUE BOLD in the crew couplet tables.	The crew couplets integrate the increased service with existing trains to maximize crew efficiencies. New trains are shown in BLUE BOLD in the crew couplet tables, shown in Exhibit 6-13.	Clarified reference.

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#	Page #	Original SDP Text	Revised SDP Text	Reason for Changes
57	p. 61	<p>Constructed Intermodal Facility and NYSDOT is currently supporting an analysis to reduce congestion for freight and rail passenger service in the Syracuse Terminal area of the CSXT – Syracuse Terminal.</p> <p>NYSDOT is currently planning improvements for the station stop at the New York State Fairgrounds.</p>	<p>Constructed Intermodal Facility and NYSDOT is currently supporting an analysis to reduce congestion for freight and rail passenger service in the Syracuse Terminal area of the CSXT – Syracuse Terminal.</p> <p>NYSDOT is currently Completed planning improvements for the station stop at the New York State Fairgrounds.</p>	Updated status of project construction.
58	p. 61	<p>Completion is nearing for a new station building that will have a high-level center platform, and an expanded facility for passenger train operations in Rochester.</p>	<p>Completion is nearing for Completed a new station building that will have with a high-level center platform, and an expanded facility for passenger train operations in Rochester.</p>	Updated status of project construction.
59	p. 61	<p>NYSDOT is working with the City of Buffalo and other stakeholders to plan a new station that will provide better connections to the local transit system and support economic growth in the downtown area.</p>	<p>NYSDOT is working worked with the City of Buffalo and other stakeholders to plan rebuild a new station that will provide better connections to the local transit system and support downtown economic growth in the downtown area.</p>	Updated status of project construction.
60	p. 62	<p>NYSDOT sponsored construction of a new station is underway with completion expected in 2018.</p>	<p>NYSDOT sponsored construction of Completed a new station is underway with completion expected in 2018.</p>	Updated status of Schenectady Station project construction.

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#	Page #	Original SDP Text	Revised SDP Text	Reason for Changes
61	p. 62	<p>NYSDOT recently completed:</p> <ul style="list-style-type: none"> ▪ Installation of a fourth station track; ▪ Platforms lengthened to accommodate 10 car trains. 	<p>NYSDOT recently Completed:</p> <ul style="list-style-type: none"> ▪ Installation of a fourth station track; ▪ Platforms lengthened to accommodate 10 car trains. 	Updated status of Albany-Rensselaer Station project construction.
62	p. 62	The “Moynihan Station” project currently underway, is supported by NYSDOT and other stakeholders to transform the former Farley Post Office Building on 8th Avenue. It will provide a new entrance and passenger amenities and increase station capacity for both intercity and commuter trains.	The “Moynihan Station” project currently underway, is supported by NYSDOT and other stakeholders, to transform transformed the former Farley Post Office Building on 8th Avenue. It will provide provides a new entrance and passenger amenities and increase increases station capacity for both intercity and commuter trains	Updated status of project construction.
63	p. 63	New station will feature center-island platform that will provide for a barrier-free ADA accessible facility.	New station will feature center- Center-island high-level platform that will provide for a barrier-free ADA accessible facility.	Updated status of Rochester Station project construction.
64	p. 63	Station currently has a low-level platform with Wheel-chair Lift available.	Station currently has a low-level platform with Wheel-chair Lift available. High-level platform with barrier-free access for ADA accessibility. Wheelchairs are available.	Updated status of Buffalo-Exchange Street Station project construction.
65	p. 63	New station features a barrier-free high-level platform providing an ADA-accessible facility.	New station features a barrier-free high-level platform providing an ADA-accessible facility. High-level platform with barrier-free access for ADA accessibility. Wheelchairs are available.	Updated status of Niagara Falls Station project construction.

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#	Page #	Original SDP Text	Revised SDP Text	Reason for Changes
66	p. 64	There will be a new low level platform with two platform edges. A wheel chair lift is available. The new platform will also have a redundant egress.	There will be a new Low -level platform with two platform edges. A wheel chair lift is available. The new platform will also have has a redundant egress.	Updated status of Schenectady Station project construction.
67	p. 65	200 Long Term Parking Spaces	Short Term Parking Spaces Available 200 Long Term Parking Spaces	Updated Utica Station entry to current conditions.
68	p. 65	5 Long Term Parking Spaces	Short Term Parking Spaces Available 5 Long Term Parking Spaces	Updated Rome Station entry to current conditions.
69	p. 65	40 Long Term Parking Spaces	40-13 Long Term Parking Spaces 215 Long Term Parking Spaces	Updated Rochester Station entry to current conditions.
70	p. 65	10 Short Term Parking Spaces 10 Long Term Parking Spaces	10 Short Term Parking Spaces 40 75 Long Term Parking Spaces	Updated Buffalo-Exchange Street Station entry to current conditions.
71	p. 66	40 Short Term Parking Spaces 40 Long Term Parking Spaces	40-150 Short-Term Parking Spaces 40-Long-Term-Parking-Spaces	Updated Saratoga Springs Station entry to current conditions.
72	p. 66	Currently No Short Term Parking Spaces 20 Long Term Parking Spaces	Currently No Short Term Parking Spaces 20-Long-Term 190 Parking Spaces	Updated Schenectady Station entry to current conditions.
73	p. 66	10 Short Term Parking Spaces 50 Long Term Parking Spaces	Garage parking provides 600 40-Short-Term Parking Spaces 50-Long-Term-Parking-Spaces	Updated Poughkeepsie Station entry to current conditions.

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#	Page #	Original SDP Text	Revised SDP Text	Reason for Changes
74	p. 66	250 Long Term Parking Spaces	Garage parking provides 600 spaces 250 150 Long Term Parking Spaces	Updated Yonkers Station entry to current conditions.
75	p. 67	Study currently underway to relocate the station closer to central business district.	Facility Ownership: Amtrak Parking Lot Ownership: Amtrak Study currently underway to relocate the station closer to central business district.	Updated Amsterdam Station entry for consistency with other entries.
76	p. 67	Owned by the City of Rome.	Facility Ownership: Owned by the City of Rome. Parking Lot Ownership: City of Rome	Updated Rome Station entry for consistency with other entries.
77	p. 67	Currently being replaced with new facility to open in 2017.	Facility Ownership: Amtrak Parking Lot Ownership: Amtrak Currently being replaced with new facility to open in 2017.	Updated Rochester Station entry for consistency with other entries.
78	p. 67	Facility Ownership: City of Buffalo Parking Lot Ownership: City of Buffalo	Facility Ownership: NYSDOT City of Buffalo Parking Lot Ownership: NYSDOT City of Buffalo	Corrected Buffalo-Exchange Street Station entry.
79	p. 67	Facility Ownership: City of Niagara Falls Parking Lot Ownership: City of Niagara Falls	Facility Ownership: City of Niagara Falls Parking Lot Ownership: City of Niagara Falls/ NYSDOT	Corrected Niagara Falls Station entry.
80	p. 68	NYSDOT is currently building a new facility.	Facility Ownership: Amtrak Parking Lot Ownership: Amtrak/Schenectady Metroplex Development Authority NYSDOT is currently building a new facility.	Updated Schenectady Station entry for consistency with other entries.

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#	Page #	Original SDP Text	Revised SDP Text	Reason for Changes
81	p. 68	Facility Ownership: National Railroad Passenger Corporation Parking Lot Ownership: Amtrak, City of Hudson	Facility Ownership: National Railroad Passenger Corporation Amtrak Parking Lot Ownership: Amtrak, City of Hudson	Updated Hudson Station entry for consistency with other entries.
82	p. 68	Facility Ownership: Dutchess County Parking Lot Ownership: Dutchess County/CSXT	Facility Ownership: Dutchess County Amtrak Parking Lot Ownership: Amtrak-Dutchess County /CSXT	Updated Rhinecliff Station entry to current conditions.
83	p. 68	Station Operated by: Metro-NorthMNR Facility Ownership: Metro-NorthMNR Parking Lot Ownership: Metro-NorthMNR	Station Operated by: Metro-North_MNR Facility Ownership: Metro-North_MNR Parking Lot Ownership: Metro-NorthMNR Yonkers Parking Authority	Corrected Yonkers Station entry.
84	p. 68	Facility Ownership: National Railroad Passenger Corporation	Facility Ownership: Moynihan Train Hall – Empire State Development Corporation / New York Penn Station – Amtrak National Railroad Passenger Corporation	Updated New York City/Penn Station entry to current conditions.
85	p. 69	Local Bus Connections provided by: Utica – CENTRO (Central New York Regional Transportation Authority) Station served by; Greyhound, Adirondack Trailways, Birnie Bus Service	Local Bus Connections provided by: Utica – CENTRO (Central New York Regional Transportation Authority) Station served by;: Adirondack Scenic Railroad , Greyhound, Adirondack Trailways, Birnie Bus Service	Updated Utica Station entry to current conditions.

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#	Page #	Original SDP Text	Revised SDP Text	Reason for Changes
86	p. 70	Multiple Routes and Services Operated by New York City Transit	Multiple Routes and Services Operated by Amtrak, NJ Transit, MTA/Metro-North, Long Island Railroad , New York City Transit	Updated to current conditions.
87	p. 73	<p>The program has a 25-year life-span primarily to align with anticipated funding; based on past recent history and anticipated funding programs, it is expected that an annual program of \$250 million is affordable and manageable in the context of existing and anticipated future freight and passenger operations.²⁷</p> <p>²⁷Projects are selected based on maximum passenger benefit and by geographic segment to minimize the impact of construction on railroad operations. This produces slight fluctuations in total annual costs around the \$250 million annual target.</p>	<p>The program has a 25-year life-span primarily to align with anticipated funding; based on past recent history and anticipated funding programs, it is expected that an annual program of \$250350 million is affordable and manageable in the context of existing and anticipated future freight and passenger operations.²⁷</p> <p>²⁷Projects are selected based on maximum passenger benefit and by geographic segment to minimize the impact of construction on railroad operations. This produces slight fluctuations in total annual costs around the \$350250m million annual target.</p>	Updated program cost and approach globally.

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#	Page #	Original SDP Text	Revised SDP Text	Reason for Changes
88	p. 73	<p>The overall program is estimated to cost \$7.323 billion (2017 dollars). Although the Tier 1 Final EIS for this program indicates a capital cost over 20 years of just under \$6 billion, as this program was developed in more detail for this SDP, it was realized that the most efficient approach to rail infrastructure upgrades on an increasingly heavily used operating line is to visit each repair location once, and to upgrade to a state of good repair all elements at that location, even if they are not directly related to program objectives.</p>	<p>The overall program is estimated to cost \$8.8 \$7.323 billion (2017 dollars). Although the Tier 1 Final EIS for this program indicates a capital cost over 20 years of just under \$6 billion, as this program was developed in more detail for this SDP, it was realized that the most efficient approach to rail infrastructure upgrades on such an increasingly heavily used operating line is to visit each repair location only once, and to upgrade to a state of good repair all infrastructure elements at that location, even if every repair or upgrade is indirectly they are not directly related to program objectives.</p>	<p>Updated program cost and approach. Program cost updated globally.</p>
89	p. 73	<p>Thus, if the program seeks the realignment and upgrade of a single track over a three-track bridge, it makes sense for both reasons of efficiency and reasons of collateral benefit to the service to upgrade the other two tracks as well.</p>	<p>Thus, if the program seeks the realignment and upgrade of a single track over a three-track bridge, it makes sense for both reasons of efficiency and reasons of collateral benefit to both the passenger and freight services service to upgrade the other two tracks as well.</p>	<p>Updated approach.</p>
90	p. 73	<p>This avoids the need to return sometime later to address the other two tracks and, more importantly, leaves CSXT as the operator with greater flexibility to dispatch freight and passenger trains such that the passenger trains can still operate at the allowable speed, regardless to which track they are assigned.</p>	<p>This avoids the need to return to the same location sometime at a later time to address the other two tracks and, more importantly, leaves CSXT as the operator with greater flexibility to dispatch freight and passenger trains such that the passenger trains can still operate at the allowable speed, regardless to which track they are assigned.</p>	<p>Updated approach.</p>

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#	Page #	Original SDP Text	Revised SDP Text	Reason for Changes
91	p. 73	This improved dispatch and operational flexibility gives much greater likelihood of consistent, reliable, High Speed passenger service regardless of the freight traffic running in parallel.	This improved dispatch and operational flexibility gives much greater likelihood of consistent, reliable, High-high Speed speed passenger service regardless of whether there is of the freight traffic running in parallel over the same segment of right-of-way .	Updated approach.
92	p. 73	This decision increases the program cost, by bringing the entire freight/passenger network up to higher speed track standards.	This decision to address all State of Good Repair elements at a work location necessarily increases the overall program cost. ; However, doing this benefits the program by bringing the entire freight/passenger network rail infrastructure up to a State of Good Repair and to the higher speed track standards required to enable higher-speed passenger service, regardless of which tracks CSXT may dispatch passenger trains on any given day. In addition to the decision to broaden the implementation of high-speed infrastructure and State of Good Repair conditions over the entire right-of-way, the program also incorporates other improvements that were not specifically itemized in the Tier 1 Final EIS, but that fulfill the program objectives (without incurring additional impacts) for the section of track north of Poughkeepsie (MP 75), at the end of Metro-North territory; i.e., curve straightening along the Hudson Line to facilitate 110 mph operation and signalization to improve capacity.	Updated approach.
93	p. 74	Complete station reconstruction, ADA compliant platform and station access, viaduct repairs and parking improvements. Under Construction	Complete station reconstruction, ADA compliant platform and station access, viaduct repairs and parking improvements. Under Construction Completed	Updated status of Base Project EW-01, Schenectady Station Renovation/Platform Improvements.

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#	Page #	Original SDP Text	Revised SDP Text	Reason for Changes
94	p. 74	Upgrade existing third track to reduce congestion, delays and interference between passenger and freight trains. Under Design	Upgrade existing third track to reduce congestion, delays and interference between passenger and freight trains. Under Design Completed	Updated status of Base Project EW-6, Syracuse Track Configuration and Signal Improvements.
95	p. 75	The improvements intended for Empire Corridor South will be completed in the first five years of the twenty-five year implementation schedule.	The improvements intended for Empire Corridor South will largely be completed in the first five years of the twenty-five year implementation schedule.	Updated to current conditions.
96	p. 75	Additional trains would be added to the Empire Corridor schedule as outlined in Exhibit 7-3:	Additional trains would be added to the Empire Corridor schedule as outlined in Exhibit Exhibits 7-3 and 7-4.	Updated to account for new exhibit.
97	p. 75	n/a	Exhibit 7-4 Comparison of Service Improvements	Added new table (see Addenda) to show comparison of service improvements.
98	p. 76	These projects are anticipated to result in approximately a 15-minute savings in travel time between NYC and Albany, reducing a 150-minute trip to a scheduled 135-minute trip, and elevating average speeds from 64 mph to 70 mph over this segment.	These projects are anticipated to result in up to approximately a 15-minute savings in travel time between NYC and Albany, reducing a 150-minute trip to a scheduled 135-minute trip, and elevating average speeds from 64 mph to 70 mph over this segment.	Clarify time savings.
99	p. 77	Approximately \$1.2 billion is programmed for the Empire Corridor South year 1-5 improvements.	Approximately \$1.2 \$1.964 billion is programmed for the Empire Corridor South y Year 1-5 capital improvements, which includes equipment purchases.	Updated capital improvements program costs.

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#	Page #	Original SDP Text	Revised SDP Text	Reason for Changes
100	p. 77	To enable the additional trains, approximately \$200 million worth of locomotives and coaches will be added to the fleet, sufficient to create six full train sets (five operating trains; one in for repairs and upkeep on a rotating, preventive maintenance cycle).	To enable the additional trains, approximately \$200 \$341 million worth of locomotives and coaches will be added to the fleet, sufficient to create six full train sets (five operating trains; one in for repairs and upkeep maintenance on a rotating, preventive maintenance cycle).	Updated costs. This change has been updated globally.
101	p. 77	The program implementation strategy for the first 5-year period is outlined in Exhibits 7-4 and 7-5.	The program implementation strategy for the first 5-year period is outlined in Exhibits 7- 54 and 7-5 . A detailed description of the individual capital projects is included in Appendix A.	Added clarification and updated exhibit numbering.
102	p. 79	Exhibit 7-4 High Speed Rail Empire Corridor Program - Empire Capital Connection Improvements for Preferred Alternative: Years 1 - 5	Revisions to program for Years 1 through 5 are shown in revised Exhibit 7-5 included in the Addenda.	Updated projects, schedule and costs in revised exhibit in Addenda.
103	p. 81	Approximately \$1.2 billion will be spent during this phase, or \$240 million annually.	Approximately \$1.2 \$1.7 billion will be spent during this phase, or \$240 \$350 million annually.	Updated for mid-term capital plan phase.
104	p. 83	Exhibit 7-5 High Speed Rail Empire Corridor Program - Empire Gateway Improvements for Preferred Alternative: Years 6 - 10	Revisions to program for Years 6 through 10 are shown in revised Exhibit 7-6 included in the Addenda.	Updated projects, schedule and costs in revised exhibit in Addenda.
105	p. 87	Exhibit 7-6 High Speed Rail Empire Corridor Program - Empire Gateway Improvements for Preferred Alternative: Years 11 - 15	Revisions to program for Years 11 through 15 are shown in revised Exhibit 7-7 included in the Addenda.	Updated projects, schedule and costs in revised exhibit in Addenda.

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#	Page #	Original SDP Text	Revised SDP Text	Reason for Changes
106	p. 88	Exhibit 7-7 High Speed Rail Empire Corridor Program - Empire Gateway Improvements for Preferred Alternative: Year 16 - 20	Revisions to program for Years 16 through 20 are shown in revised Exhibit 7-8 included in the Addenda.	Updated projects, schedule and costs in revised exhibit in Addenda.
107	p. 89	Exhibit 7-8 High Speed Rail Empire Corridor Program - Empire Gateway Improvements for Preferred Alternative: Year 21 - 25	Revisions to program for Years 21 through 25 are shown in revised Exhibit 7-9 included in the Addenda.	Updated projects, schedule and costs in revised exhibit in Addenda.
108	p. 91	Based on the foregoing summaries of the program capacity improvement sequence over the 25-year implementation period, and noting the introduction of expanded frequency of service in the first five years, crewing and staffing of rail operator forces to sustain the enhanced physical plant and additional train service is outlined in Exhibits 7-10 through 7-15.	<p>Based on the foregoing summaries of the The staffing plan was developed based on the program capacity improvement sequence over the 25-year implementation period, and noting taking into account the introduction of expanded frequency of service in the first five years.²⁹ Exhibits 7-10 through 7-15 display the crewing and staffing of rail operator forces to sustain the enhanced physical plant and additional train service is outlined in Exhibits 7-10 through 7-15.</p> <p>²⁹ The staffing plan reflects the sequence of capital improvements shown in Exhibits 7-5 through 7-9 and in Appendix A. The information on the other project elements in each phase – miles of track, grade crossings, bridges, etc.—in Exhibits 7-10 through 7-15, is also based on the project information presented in Appendix A.</p>	Clarified staffing plan discussion.
109	p. 93	Exhibit 7-9 High Speed Rail Empire Corridor Program-Empire Capital District Connection (New York City to Albany and Schenectady)- Staffing Plan	Exhibit 7- 109 High Speed Rail Empire Corridor Program- Empire Capital District Connection (New York City to Albany and Schenectady) Staffing Plan for Supporting Service Growth	Renumbered/retitled exhibit and included revised table in Addenda.

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#	Page #	Original SDP Text	Revised SDP Text	Reason for Changes
110	p. 94	Exhibit 7-10 High Speed Rail Empire Corridor Program-Empire Capital District Connection (New York City to Albany and Schenectady) - Staffing Plan	Exhibit 7- 11 10 High Speed Rail Empire Corridor Program-Empire Capital District Connection (New York City to Albany and Schenectady) Improvements- Staffing Plan for Supporting Service Growth (Years 1-5)	Renumbered/retitled exhibit and included revised table in Addenda.
111	p. 95	Exhibit 7-11 High Speed Rail Empire Corridor Program-Empire Gateway- Staffing Plan	Exhibit 7- 12 10 High Speed Rail Empire Corridor Program-Empire Gateway Improvements- Staffing Plan for Supporting Service Growth (Years 6-10)	Renumbered/retitled exhibit and included revised table in Addenda.
112	p. 96	Exhibit 7-12 High Speed Rail Empire Corridor Program-Empire Gateway- Staffing Plan	Exhibit 7- 13 10 High Speed Rail Empire Corridor Program-Empire Gateway Improvements- Staffing Plan for Supporting Service Growth (Years 11-15)	Renumbered/retitled exhibit and included revised table in Addenda.
113	p. 97	Exhibit 7-13 High Speed Rail Empire Corridor Program-Empire Gateway- Staffing Plan	Exhibit 7- 14 10 High Speed Rail Empire Corridor Program-Empire Gateway Improvements- Staffing Plan for Supporting Service Growth (Years 16-20)	Renumbered/retitled exhibit and included revised table in Addenda.
114	p. 98	Exhibit 7-14 High Speed Rail Empire Corridor Program-Empire Gateway- Staffing Plan	Exhibit 7- 15 10 High Speed Rail Empire Corridor Program-Empire Gateway Improvements- Staffing Plan for Supporting Service Growth (Years 20-25)	Renumbered/retitled exhibit and included revised table in Addenda.

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#	Page #	Original SDP Text	Revised SDP Text	Reason for Changes
115	p. 99	<p>An annual target of \$250 million has been established for the program to address anticipated rates of federal support and to ensure that infrastructure work is not undertaken at a level that might interfere with daily passenger and freight services.³⁰</p> <p>³⁰ Projects are selected based on maximum passenger benefit and by geographic segment to minimize the impact of construction on railroad operations. This produces slight fluctuations in total annual costs around the \$250 million annual target.</p>	<p>An annual target of \$250 \$350 million has been established for the program to address anticipated rates of federal support and to ensure that infrastructure work is not undertaken at a level that might interfere with daily passenger and freight services.³⁰</p> <p>³⁰ Projects are selected based on maximum passenger benefit and by geographic segment to minimize the impact of construction on railroad operations. This produces slight fluctuations in total annual costs around the \$350 \$250 million annual target.</p>	Updated costs and approach globally.
116	p. 99	<p>³¹ This SDP recognizes additional travel time benefit of 4 minutes that was not considered in the EIS, resulting in a slightly larger ridership gain of 1.083 million new riders, by 2040.</p>	Deleted this footnote.	Clarified travel time savings.
117	p. 99	<p>Capital costs of \$7.323 billion (2017 dollars) are spread over the entire 25-year implementation time frame for the program. Equipment costs amount to approximately \$200 million, with infrastructure improvements costing \$7.123 billion.</p>	<p>Capital costs of \$8.8 billion 7.323 billion (2017 dollars) are spread over the entire 25-year implementation time frame for the program. Equipment costs amount to approximately \$200 million \$341 million, with infrastructure improvements costing \$7.123 billion \$8.5 billion.</p>	Updated equipment and infrastructure improvements cost.

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#	Page #	Original SDP Text	Revised SDP Text	Reason for Changes
118	p. 100	By the time the program is completed in 2045, it is estimated that the additional trains and improved and expanded track and signal system will require approximately 141 additional train, station, and track/signal maintenance personnel above current allocations.	By the time the program is completed in 2045 after 25 years , it is estimated that the additional trains and improved and expanded track and signal system will require approximately 141 210 additional train, station, and track/signal maintenance personnel above current allocations.	Clarified program timeframes and staffing.
119	p. 100	The first five years emphasize Capital Empire District (Empire Corridor South) infrastructure and additional train equipment, with the balance beyond Year 5 focused on the Empire Gateway (Empire Corridor West) Albany – Buffalo/Niagara right of way. Capital costs are divided generally by type of improvement as shown in Exhibit 8-2.	The first five years emphasize Capital Empire District (Empire Corridor South) infrastructure and additional train equipment, with the balance beyond Year 5 focused on the Empire Gateway (Empire Corridor West) Albany – Buffalo/Niagara right of way. Capital costs for individual projects are divided generally by type of improvement as shown in Exhibit 8-2 presented in detail in Appendix A.	Clarified text and removed Exhibit 8-2.
120	p. 101	Exhibit 8-1 Annual Apportionment of Total Program Capital Costs (Empire Capital District Connection and Empire Corridor Gateway)	Updated costs in Exhibit 8-1, as shown in the Addenda. Added note: Note: Capital costs shown above are for millions of dollars and exclude equipment costs (locomotives and train cars).	Updated project costs as presented in revised exhibit included in the Addenda.
121	p. 102	Exhibit 8-2 Capital Costs by Category	Removed table.	Removed table and updated appendix to include lists and description of specific projects.

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#	Page #	Original SDP Text	Revised SDP Text	Reason for Changes
122	p. 102	The program will cost about \$7.323 billion over 25 years (2017 dollars). About \$2.4 billion will be required in the first ten years, with the balance over the remaining fifteen years. Exhibits 7-4 - 7-9 show the allocation of costs across the 35 separate program initiatives that comprise the program, as well as year-by-year over the 25-year investment period.	The program will cost about \$7.323 \$8.8 billion over 25 years (2017 dollars). About \$2.4 \$3.4 billion will be required in the first ten years for capital projects and including equipment, this total would be \$3.7 billion , with the balance over the remaining fifteen years. Exhibits 7-4 - 7-9 show the allocation of costs across the 43 35 separate program initiatives that comprise the program (as detailed in Appendix A) , as well as year-by-year over the 25-year investment period. Funding Sources	Clarified and updated project costs globally.
123	p. 105	Investment in intercity passenger rail and high speed rail is motivated by the desire to realize direct passenger benefits associated with faster, safer, and more reliable travel and broader-based community benefits of improved environmental quality, reduced air and highway congestion, and economic development.	Investment in intercity passenger rail and high speed rail is motivated by the desire to realize direct passenger benefits associated with faster, safer, and more reliable travel ⁷ . These travel benefits and confer broader-based community benefits of improved environmental quality, reduced air and highway congestion, and economic development.	Clarified.

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#	Page #	Original SDP Text	Revised SDP Text	Reason for Changes
124	p. 105	<p>Passenger rail improvements create economic impacts in the form of travel time savings for rail users, reduced congestion on other transportation modes, and regional productivity increases from more efficient access to larger labor and trade markets. These savings cascade through the economy, creating jobs, increasing overall economic activity, and raising personal income.</p>	<p>Passenger rail improvements create economic impacts benefits in the form of travel time savings for rail users, reduced congestion on other transportation modes, and regional productivity increases from more efficient access to larger labor and trade markets. These savings cascade through the economy, creating jobs, increasing overall economic activity, and raising personal income.</p>	<p>Clarified economic benefits discussion.</p>
125	p. 105	<p>For the High Speed Rail Empire Corridor Program, the direct benefits are a 94-minute reduction of overall travel time from 9 to 7.5 hours between NYC and Niagara Falls, and an increase in reliability from fewer than 75% to more than 90% of trains arriving on time. Of the 90 minutes of travel time savings, 80 minutes occurs along the Empire Corridor West segment between Albany and Niagara Falls. This is significant, as this section is most affected by freight conflicts and unreliability; in 2012, the “average delay” penalty assigned in the travel demand forecasting model was 90 minutes, with the great majority allocated to the Empire Corridor West section.</p>	<p>For the High Speed Rail Empire Corridor Program, the direct benefits are a 94-an approximately 90-minute reduction of overall travel time from 9 to 7.5 hours between NYC and Niagara Falls, and an increase in reliability from fewer than 75% to more than 90% of trains arriving on time. Of the 90 94-minutes of travel time savings, approximately 75-80 minutes occurs along the Empire Corridor West segment between Albany and Niagara Falls. This is significant, as this section is most affected by freight conflicts and unreliability; in 2012, the “average delay” penalty assigned in the travel demand forecasting model was 90 minutes, with the great majority allocated to the Empire Corridor West section.</p>	<p>Clarified travel time savings.</p>

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#	Page #	Original SDP Text	Revised SDP Text	Reason for Changes
126	p. 105	Indirect benefits of the program are improved environmental conditions (air quality, open land), reduced traffic congestion on key roads, the enhancement of rail stations as economic engines for downtown areas and the freeing of airline capacity for longer-range travel that cannot be effectively served by rail	Indirect benefits of the program are improved environmental conditions (air quality, open land); and reduced traffic congestion on key roads. Other indirect benefits include the enhancement of rail stations as economic engines for downtown areas and the freeing of airline capacity for longer-range travel that cannot be effectively served by rail	Clarified.
127	p. 105	The program will cost \$7.32 billion (2017 dollars) to construct over 25 years, with improved travel time and reduced delay benefits accruing gradually as improvements are made. The maintenance and operation of the new infrastructure and the additional four daily trains intended to be added to the existing service will cost \$70 million annually at the completion of the program in 2040.	The program will cost \$7.32 \$8.8 billion (2017 dollars) to construct over 25 years, with improved travel time and reduced delay benefits accruing gradually as improvements are made. The maintenance and operation of the new infrastructure and the additional four daily trains intended to be added to the existing service will cost \$70 million annually at the completion of the program in 2035 2040 .	Updated program costs and completion year. Change made globally.

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#	Page #	Original SDP Text	Revised SDP Text	Reason for Changes
128	p. 105	The 2-hour trip time target represents a 15-minute savings for passengers between Albany and New York City. The 30-minute trip time reduction will be accrued incrementally as the supporting projects are completed. This reduction benefits 90% of the ridership on the Empire Corridor.	The 2-hour and 15-minute trip time target represents a 30- 15-minute savings for passengers between Albany and New York City. The 30-15-minute trip time reduction will be accrued incrementally as the supporting projects are completed. This reduction benefits 90% of the ridership on the Empire Corridor.	Clarified trip time savings. This change has been made globally.
129	pp. 106 and 107	Passenger ridership forecasts for High Speed Rail Empire Corridor Program project ridership increasing to 2.7 million riders in 2040.	Passenger ridership forecasts for High Speed Rail Empire Corridor Program project ridership increasing to 2.7 2.6 million riders in with implementation of the full program 2040 .	Updated project ridership forecast. This change has been made globally.
130	p. 107	All improvements are within the existing right-of-way, resulting in minimal environmental impacts. Some projects contained in the program will require more focused environmental analysis before they can be built.	All improvements are situated within the existing right-of-way, resulting in minimal environmental impacts. Some projects contained in the program will require more focused environmental analysis before they can be built. The program is anticipated to result in a diversion from highways of 209,279 one-way trips, which will result in benefits in terms of both relieving traffic congestion and reducing air quality emissions. The long-term impact on greenhouse gas emissions is positive. The Tier 1 Final EIS concluded that the net annual operational benefits for the Preferred Alternative would be roughly equivalent to eliminating the emissions associated with the energy and electricity consumption of 2,500 to 4,200 average U.S. single family homes every year. ³³ ³³ Based on U.S. EPA's GHG Equivalencies Calculator, < http://www.epa.gov/cleanenergy/energy-resources/calculator.html >.	Updated project benefits discussion.

High Speed Rail Empire Corridor Service Development Plan Errata

#	Page #	Original SDP Text	Revised SDP Text	Reason for Changes
131	p. 106	<p>Operation of trains at higher speeds between Albany-Rensselaer and New York City creates opportunities for “super-commuters” to live and work from greater distances away from job centers while enjoying shorter commuting time and expanded employment opportunities. Employers gain the benefit of drawing upon a larger geographic area for a trained and skilled labor force.</p>	<p>Operation of trains at higher speeds between Albany-Rensselaer and New York City creates opportunities for “super-commuters” to live and work from greater distances away from job centers, while enjoying shorter commuting time and expanded employment opportunities. Employers gain the benefit of drawing upon a larger geographic area for a trained and skilled labor force. According to a U.S. Conference of Mayor’s Report,³⁴ which examined the impact of high-speed rail on the City of Albany, the introduction of high-speed rail along the corridor can contribute substantially to economic growth by driving higher-density, mixed-use development at train stations; expanding visitor markets and generating additional spending; broadening regional labor markets; and supporting the growth of technology clusters. This report projects that economic benefits of New York City to Albany high-speed rail service to the Albany metropolitan area alone would range from \$358 million (with 79/90 mph service). The economic analysis of the construction of the program estimated that the program would create approximately 68,048 job-years, and other benefits are presented in Exhibit 9-1.</p> <p>³⁴ Economic Development Research Group, Inc. The Economic Impact of High Speed Rail and Cities and their Metropolitan Areas. Prepared for the U.S. Conference of Mayors (undated), released June 2010.</p>	<p>Updated to include U.S. Conference of Mayor’s Report which examined the impact of high-speed rail in Albany.</p>

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#	Page #	Original SDP Text	Revised SDP Text	Reason for Changes
132	p. 106	For Empire Corridor South, trip time reductions and service improvements will be take effect as infrastructure improvements are completed between New York City and Albany-Rensselaer. Thus, program benefits will be realized steadily over time.	For Empire Corridor South, trip time reductions and service improvements will take effect as infrastructure improvements are completed between New York City and Albany-Rensselaer. Thus, program benefits will be realized steadily over time. The focus for travel time improvements was on the most frequently traveled corridor between New York City and Albany-Rensselaer, with most of these improvements occurring over the first 1 to 5 years of the start of construction and all being completed within 10 years.	Updated project benefits discussion.
133	p. 106	Overall trip time between Albany/Schenectady—Niagara Falls will be reduced by 1 hour 15 minutes, from the current 5 hour 58 minutes to 4 hours 43 minutes.	Overall trip time between Albany/Schenectady—Niagara Falls will be reduced by approximately 1 hour 15 minutes, from the current 5 hour 58 minutes to 4 hours 43 minutes.	Clarified travel time savings.
134	p. 107	Freight service is not impacted as the programs add 283 miles of third track and 39 miles of fourth track, significantly increasing the overall capacity of the system in keeping with projected increasing demand.	Freight service is not impacted as the programs will add 283 miles of third track and 39 miles of fourth track, significantly increasing the overall system capacity of the system in keeping with projected increasing demand. The program would provide a 10 percent decrease in freight train delay minutes over the Base Alternative.	Updated freight service benefits.
135	p. 107	All improvements are within the existing right-of-way, resulting in minimal environmental impacts. Some projects contained in the program will require more focused environmental analysis before they can be built. Air quality improvements result as travelers divert from more polluting auto and bus to less polluting trains.	All The majority of the track improvements are situated within the existing right-of-way, resulting in minimal environmental impacts. Some projects contained in the program will require more focused environmental analysis before they can be built. Air quality improvements would result as travelers divert from more polluting auto and bus to less polluting trains. As summarized in the prior section and presented in the Tier 1 EIS, the program would result in a substantial diversion of passengers to rail from automotive uses, resulting in a substantial decrease in pollutant emissions.	Clarified project benefits discussion.

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#	Page #	Original SDP Text	Revised SDP Text	Reason for Changes
136	p.107	Construction and operation of the improvements Albany-Rensselaer, and Niagara Falls will confer significant economic benefit and jobs on upstate cities due to the multiplier effect of spending on material and construction work, as well as additional staffing of local businesses in response to the economic infusion created by the program. Employers gain the benefit of drawing upon a larger geographic area for a trained and skilled labor force.	Construction and operation of the improvements between Albany-Rensselaer, and Niagara Falls will confer significant economic benefit and jobs on upstate cities. Moreover, benefits will also accrue due to the multiplier effect of spending on material and construction work, as well as additional staffing of local businesses in response to the economic infusion created by the program. In addition to making upstate cities more accessible to and from major metropolitan areas for tourism and commerce, employers Employers gain the benefit of drawing upon a larger geographic area for a trained and skilled labor force.	Updated and clarified indirect benefits.
137	p. 107	Service frequency increases, along with future trip time reductions are achieved without undue interference with freight rail service.	Service frequency increases, along with future trip time reductions are achieved without undue interference with freight rail service. Moreover, the provision of exclusive tracks for passenger rail travel would provide direct benefits for parallel freight operations, reducing conflicts with passenger trains and providing improved travel times for freight along the heavily used Empire Corridor West, which provides links with Canada, the Midwest, and the international ports of New York and New Jersey.	Provided additional clarification on indirect benefits.
138	p. 107	Further economic benefits flow from the multiplier effect of increased passenger spending in downtown station areas and the Corridor as a whole.	Further economic benefits flow from the multiplier effect of increased passenger spending in downtown station areas and the Corridor as a whole. Benefits in terms of jobs created are described in the following section.	Clarified economic benefits discussion.
139	p. 108	(Appendix A shows the year-by-year detail underlying these metrics.)	(Appendix A shows the year-by-year detail underlying these metrics.)	Removed reference to appendix.

High Speed Rail Empire Corridor Service Development Plan Errata

#	Page #	Original SDP Text	Revised SDP Text	Reason for Changes
140	111	Key to Exhibit 9-1: Travel Time Savings per Train Each Year, Summed over 5-Year Periods (minutes): In Years 6-25, improvements ultimately producing an 84-minute time savings will be confined to the Empire Corridor West segment, and only the eight trains traveling beyond Albany to Niagara Falls and back will receive the travel time benefits for each year of improvements.	Key to Exhibit 9-1: Travel Time Savings per Train Each Year, Summed over 5-Year Periods (minutes): In Years 6-25, improvements ultimately producing up to an approximately 80-84 -minute time savings will be confined to the Empire Corridor West segment, and only the eight trains traveling beyond Albany to Niagara Falls and back will receive the travel time benefits for each year of improvements.	Clarified travel time savings.

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#	Page #	Original SDP Text	Revised SDP Text	Reason for Changes
141	p. 113	<p>Key to Exhibit 9-1: Mode Shift Emissions Savings (metric tons of regulated pollutants + GHG): The Tier 1 Final EIS notes an overall reduction in energy consumption by Empire Corridor travelers of 33,188 metric tons of CO₂ saved in 2035 due to full program implementation and the diversion of 1,083,000 trips from auto/bus/air to rail.</p> <p>...Thus, if the total energy savings is due to the diversion of 1.083 million trips from auto/bus/air to rail in 2035, then the proportion of that diversion represented by each year's ridership gains (totaled over Years 1-5) applied to the total 33,188 metric tons of CO₂ conserved yields the emissions reduction in that year due to mode shifts among Empire Corridor travelers. In Years 1-5, 221,952 trips – or 20.4% of the total 1.083 million trips diverted by Year 25 – are diverted from auto/bus/air to rail. Applying the 20.4% to the total 33,188 metric tons of CO₂ saved over the entire 25-year program produces a result of 6,799 metric tons of CO₂ saved.</p>	<p>Key to Exhibit 9-1: Mode Shift Emissions Savings (metric tons of regulated pollutants + GHG): The Tier 1 Final EIS notes an overall reduction in energy consumption by Empire Corridor travelers of 33,188 metric tons of CO_{2e} (carbon dioxide equivalent⁴¹) saved in 2035 due to full program implementation and the diversion of 1,0083,000 trips from auto/bus/air to rail.</p> <p>...Thus, if the total energy savings is due to the diversion of 1 million trips from auto/bus/air to rail in 2035, then the proportion of that diversion represented by each year's ridership gains (totaled over Years 1-5) applied to the total 33,188 metric tons of CO_{2e} conserved (presented in the Tier 1 FEIS) yields the emissions reduction in that year due to mode shifts among Empire Corridor travelers. In Years 1-5, 221,952 trips – or 20.4% of the total 1.083 million trips diverted by Year 25 – are diverted from auto/bus/air to rail. Applying the 20.4% to the total 33,188 metric tons of CO_{2e} saved over the entire 25-year program produces a result of 6,799 metric tons of CO_{2e} saved.</p> <p>⁴¹ To present a complete inventory of all GHGs, component emissions are added together and presented as CO2 equivalent (CO2e)—a unit representing the quantity of each GHG weighted by its effectiveness using CO2 as a reference. This is achieved by multiplying the quantity of each GHG emitted by a factor called global warming potential (GWP).</p>	<p>Revised emissions savings discussion. Made this change globally.</p>

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#	Page #	Original SDP Text	Revised SDP Text	Reason for Changes
142	p. 114	<p>Key to Exhibit 9-1: Job Creation Each Year, Summed over 5-Year Periods (job-years): A total of 55,777 total job years⁴³ were predicted to result from the construction over the 25-year program term.⁴⁴</p> <p>⁴³ An analysis by HNTB resulted in an estimate of 2,129 job-years/year for the program at a \$6 billion funding level for a total of 55,777 jobs created during construction. Escalating this to \$7.323 billion, and adding the job-years created due to the ripple effect of permanent railroad jobs added as infrastructure maintenance and operational needs expand, and subtracting the direct rail jobs created to staff this infrastructure maintenance and operations, produces the 55,777 job-years value attributed to the program.</p> <p>⁴⁴ On a national standard, each \$1 billion of investment typically generates 7,700-8,100 job-years. Applying that metric range produces a range of potential economic impacts for the \$7.323 billion program of 56,378-59,316 job years created.</p>	<p>Key to Exhibit 9-1: Job Creation Each Year, Summed over 5-Year Periods (job-years): A total of 55,777 68,048 total job years⁴³ were predicted to result from the construction over the 25-year program term.⁴⁴</p> <p>⁴³ An economic analysis performed for the study by HNTB resulted in an estimate of 2,129 job-years/year for the program as presented in the Tier 1 EIS at a \$6 billion funding level for a total of 55,777 job years created during construction. The earlier estimate was created by Escalating this to \$7.323 billion, and adding the job-years created due to the ripple effect of permanent railroad jobs in the entire system added as infrastructure maintenance and operational needs expand and subtracting the direct rail jobs created to staff this infrastructure maintenance and operations. Escalating this earlier year engineering estimate to the \$8.8 billion program outlined in this SDP to encompass the State of Good Repair and additional speed improvement projects included in the program, produces the 55,777 68,048 job-years value attributed to the construction program.⁴⁴</p> <p>⁴⁴ On a national standard, each \$1 billion of investment typically generates 7,700-8,100 job-years. Applying that metric range produces a range of potential economic impacts for the \$8.8 \$7.323 billion program of 56,378-59,316 67,760 – 71,280 job years created.</p>	<p>Clarified updates to job creation projected in economic analysis due to program construction.</p>

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#	Page #	Original SDP Text	Revised SDP Text	Reason for Changes
143	p. 115	Key to Exhibit 9-1: Direct Employment Each Year, Summed over 5-Year Periods (rail system jobs): Additional rail jobs required to operate and maintain new infrastructure and additional trains, as needed in each year as improvements are built or new train service is added, totaled over each 5-year period. These were derived using industry-standard metrics of workers per unit of rail infrastructure (miles of track or number of switches, square footage of stations, per train crew requirements).	Key to Exhibit 9-1: Direct Employment Each Year, Summed over 5-Year Periods (rail system jobs): Additional rail jobs required to operate and maintain new infrastructure and additional trains, as needed in each year as improvements are built or new train service is added, totaled over each 5-year period. As shown in Exhibits 7-10 through 7-15, these were derived using industry-standard metrics of workers per unit of rail infrastructure (miles of track or number of switches, square footage of stations, per train crew requirements).	Clarified basis for permanent railroad employment estimates.
144	p. App-1	Appendix A	Updated tables in Appendix A to reflect greater clarity in project descriptions and geographic locations, as presented in the Addenda. Deleted series of tables showing the High Speed Rail Empire Corridor Program Improvements for the Preferred Alternative (Years 1-5, 6-10, 11-15, 16-20, and 21-25) and accompanying tables showing Improvements and Benefits for the Preferred Alternative for the same timeframes. Added detailed NYSDOT project list for the 25-year Capital Improvement Program.	Project lists, descriptions, and costs adjusted to reflect consistent base year of 2017 and to reflect updates in NYSDOT's program of improvements.

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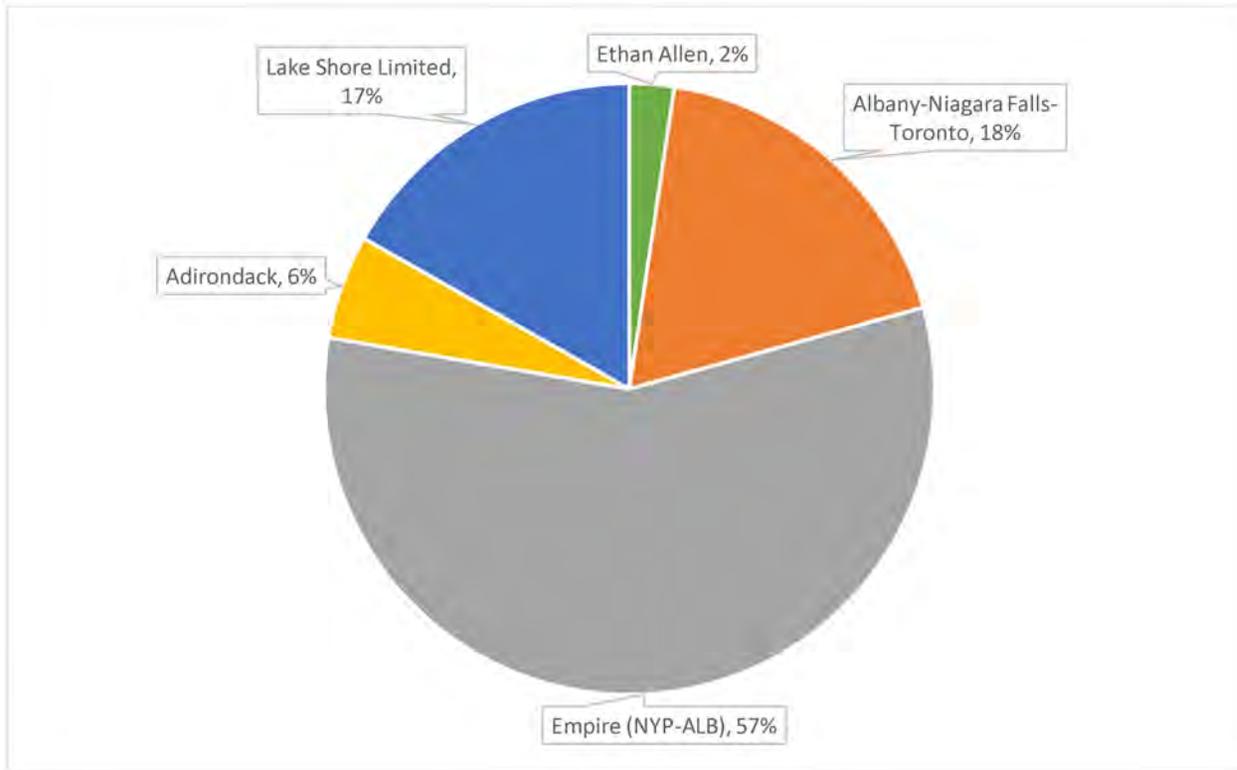
Addenda

Exhibit 2-2 New, recently completed station at Rochester



High Speed Rail Empire Corridor Service Development Plan Errata

Exhibit 3-3 Empire Corridor Ridership by Segment



High Speed Rail Empire Corridor Service Development Plan Errata

Exhibit 7-4 Comparison of Service Improvements

Route	CURRENT Roundtrips		PROPOSED Roundtrips		Increase in Trains Operated Roundtrips	
	Hudson Valley	Empire Corridor West	Hudson Valley	Empire Corridor West	Hudson Valley	Empire Corridor West
Total Roundtrips	13	4	18	9	5	5
Lake Shore Limited (to Chicago)	1	1	1	1	0	0
Empire Corridor (Hudson Valley)	7	0	8	0	1	0
Empire Corridor (Syracuse-Niagara Falls) (a)	2	2	6 (a)	7 (a)	4	5
Maple Leaf (Niagara Falls – Toronto)	1	1	1	1	0	0
Adirondack (Montreal, Canada) (b)	1	0	1	0	0	0
Ethan Allen Express (Burlington, VT) (c)	1	0	1	0	0	0

19 - Total Round Trips on the route; and increase of 6 new roundtrips, with a focus on improving service on the Empire Corridor West of Albany-Rensselaer; totals reflect weekdays (maximum) since only 14 trains will operate daily and 5 trains will operate on weekdays only (2 trains servicing NYC-ALB, 2 trains between NYC-Saratoga Springs, and 1 ALB-NFL train)

Notes:

(a) – includes a new train that starts from Albany-Rensselaer for Niagara Falls (Monday-Friday) and provides a late afternoon departure return and totals also include two new trains providing daily service between Syracuse and NYC

(b) – two of the Hudson Valley trains are now extended to Saratoga Springs providing four roundtrips from that station each weekday

(c) – this train has been extended from Rutland to Burlington, Vermont

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Exhibit 7-5 High Speed Rail Empire Corridor Program - Empire Capital Connection Improvements for Preferred Alternative: Years 1 - 5

Project Number	Project Area	Primary Project Type	Goals	Year 1 \$310 M	Year 2 \$438 M	Year 3 \$439 M	Year 4 \$394 M	Year 5 \$383 M	Estimated Project Cost (2017 \$ M)
SRP-01	Spuyten-Duyvil MP 9- MP 13	Second track, bridge upgrade	RELIABILITY <ul style="list-style-type: none"> ▪ Reduce Delays ▪ Safety ▪ Increase Capacity 			Start SRP-01	SRP-01 Continues	COMPLETE SRP-01	\$90
ESC-04	Rhinecliff to Rensselaer MPs 105 – 130	Rock Slope Stabilization	SAFETY <ul style="list-style-type: none"> ▪ Reduce Delays ▪ Improve Reliability 	Start ESC-04	COMPLETE ESC-04				\$ 9
ESC-05	Staatsburg to Stuyvesant CP82 – CP99 – CP136	Additional Interlockings	RELIABILITY <ul style="list-style-type: none"> ▪ Reduce Delays ▪ Safety ▪ Increase Capacity 		Start ESC-05	ESC-05 Continues	COMPLETE ESC-05		\$ 24
SRP-03	Hudson Line Croton-Harmon Third Track and Interlockings MP 53 – MP 63	3rd Track and Interlockings	RELIABILITY <ul style="list-style-type: none"> ▪ Reduce Delays ▪ Safety ▪ Increase Capacity 				COMPLETE SRP-03		\$129
ESC-14	Hudson Station MP 114 – MP115	High Level Platform	RELIABILITY <ul style="list-style-type: none"> ▪ Reduce Delays, ▪ Improve Safety ▪ ADA Improvement 	Start ESC-14	COMPLETE ESC-14				\$ 44
ESC-02	Staatsburg to Stockport MP 85 – MP 118	Hudson Line Bridge Replacements	TRIP TIME REDUCTION <ul style="list-style-type: none"> ▪ Capacity ▪ Speed Improvements ▪ State of Good Repair 	Start ESC-51	ESC-51 Continues	ESC-51 Continues	ESC-51 Continues	COMPLETE ESC-51	\$ 303

Project Number	Project Area	Primary Project Type	Goals	Year 1 \$310 M	Year 2 \$438 M	Year 3 \$439 M	Year 4 \$394 M	Year 5 \$383 M	Estimated Project Cost (2017 \$ M)
ESC-47	New Signal System CP 75 – CP169	Communications & Signal	TRIP TIME REDUCTION <ul style="list-style-type: none"> Capacity Speed Improvements Safety 				Start ESC-47 (Complete in Year 6)	ESC-47 Continues	\$96 (\$144 total)
ESC-20	Rhinecliff Station MP 89	High Level Platform	RELIABILITY <ul style="list-style-type: none"> Reduce Delays Improve Safety ADA Improvement 		Start ESC-20	ESC-20 Continues	COMPLETE ESC-20		\$ 40
ESC-13	Poughkeepsie CP 72 – CP75	Upgrade Track Speeds & Yard Improvements	TRIP TIME REDUCTION <ul style="list-style-type: none"> Improve Reliability Capacity Improvements 		Start ESC-26	ESC-26 Continues	COMPLETE ESC-13		\$ 64
ESC-36	CP75 – CP114	110 MPH Speed Improvement Project	TRIP TIME REDUCTION <ul style="list-style-type: none"> Speed Improvements 	Start ESC-35 & ESC-36	ESC-35 & ESC-36 Continues	COMPLETE ESC-35 & ESC-36			\$ 261
ESC-35	CP114 – CP124								
ESC-18	Metro North Railroad Tarrytown MP 24 – MP 25	Pocket Track CP25 Additional 3rd Rail	RELIABILITY <ul style="list-style-type: none"> Reduce Delays Safety Increase Capacity 	Start ESC-18	COMPLETE ESC-18				\$ 5
ESC-12	Hudson Line High Capacity Signal System Croton Harmon to Poughkeepsie MP 33 – MP 76	Communications and Signal	TRIP TIME REDUCTION <ul style="list-style-type: none"> Capacity Speed Improvements Safety 					COMPLETE ESC-12	\$100
ESC-01	Livingston Avenue Moveable Bridge MP 143	Replacement of Bridge	RELIABILITY <ul style="list-style-type: none"> Capacity Safety State of Good Repair 	Start ESC-15	ESC-01 Continues	COMPLETE ESC-01			\$ 400

Project Number	Project Area	Primary Project Type	Goals	Year 1 \$310 M	Year 2 \$438 M	Year 3 \$439 M	Year 4 \$394 M	Year 5 \$383 M	Estimated Project Cost (2017 \$ M)
ESC-30, ESC-33	EMPIRE GATEWAY Schenectady CP161 to CP169	Double Track Project Reconfigure CP 169	TRIP TIME REDUCTION <ul style="list-style-type: none"> ▪ Capacity ▪ Speed Improvements ▪ Safety 					Start ESC-30 & ESC-33 (Complete in Year 6)	\$ 60 (\$120 Total)
HSR	Acquisition of additional locomotives and coaches to support service expansion	Equipment	SERVICE GROWTH <ul style="list-style-type: none"> ▪ Increase Capacity ▪ Improve Reliability ▪ Improve Passenger Experience 		Start Procurement of New Locomotives & Coaches	Procurement of New Locomotives & Coaches Continues	Procurement of New Locomotives & Coaches Continues	COMPLETED Procurement of New Locomotives & Coaches	\$ 340
Total Investment Years 1 through 5									\$1,964 M

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Exhibit 7-6 High Speed Rail Empire Corridor Program - Empire Gateway Improvements for Preferred Alternative: Years 6 - 10

Project Number	Project Area	Primary Project Type	Goals	Year 6 \$313 M	Year 7 \$332 M	Year 8 \$379 M	Year 9 \$311 M	Year 10 \$396 M	Estimated Project Cost (2017 \$ M)
ESC-47	New Signal System CP 75 – CP169	Communications & Signal	TRIP TIME REDUCTION <ul style="list-style-type: none"> Capacity Speed Improvements Safety 	COMPLETE] (Start in Year 4) Signalization CP 75-169					\$48 (\$140 total)
ESC-30, ESC-33	Capital District New Trackage eliminates single track operation and rehabilitate Mohawk River Bridge	Track & Signal Install 2nd Track from CP161 (Schenectady) to CP169 (Hoffman's)	<ul style="list-style-type: none"> Capacity Improvement Better Reliability Increase Speed Trip Time reduction 	COMPLETE (Start in Year 5) Double Track CP161-169 Reconfigure CP 169					\$ 60 (\$120 Total)
HSR-2, HSR-3, EWC-3, EWC-5	Mohawk Valley Congestion Relief Adds trackage and increases operating speeds to support trip time reductions Mohawk Valley Empire Corridor Congestion Relief (CP 175, CP239 & CP248) (MPs175 to 294)	Track & Signal Add Main Tracks from CP169 (Hoffman's) to CP184 (Fonda), Amsterdam Station upgrades	<ul style="list-style-type: none"> Capacity Improvement Better Reliability Increase Speed Trip Time reduction 		Start Installation	COMPLETE 3rd track MP 169-179 4th track MP 170-174 3rd & 4 th tracks MP 174 to MP 184 Amsterdam Station CP 175, CP 239, CP 248			\$664
HSR-6	Mohawk Valley Adds trackage and increases operating speeds to support trip time reductions	Track & Signal Additional Main Tracks from CP226 (Herkimer) to CP235 (Utica)	<ul style="list-style-type: none"> Capacity Improvement Better Reliability Increase Speed Trip Time reduction 	COMPLETE 3rd Track MP 226 to MP 235					\$105
HSR-7 EWC-26	Utica Union Station Improves operation of passenger trains and freight trains at Utica Union Station	Track & Signal Add Main Tracks from CP235 (Utica) to CP239 (Yorkville) Union Station upgrades	<ul style="list-style-type: none"> Capacity Improvement Better Reliability Trip Time reduction Improve Station Operations 				Start Installation	COMPLETE 3 rd & 4 th Track MP 235 to MP-239 Union Station	\$132
HSR-8, EWC-27	Mohawk Valley Adds trackage and increases operating speeds to support trip time reductions and includes Rome Station upgrades	Track & Signal Add Main Tracks from CP239 (Yorkville) to CP246 (Whitestown) Rome Station Upgrades	<ul style="list-style-type: none"> Capacity Improvement Better Reliability Increase Speed Trip Time reduction 	COMPLETE 3 rd Track MP 239 to MP 246 Rome Station					\$100

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Project Number	Project Area	Primary Project Type	Goals	Year 6 \$313 M	Year 7 \$332 M	Year 8 \$379 M	Year 9 \$311 M	Year 10 \$396 M	Estimated Project Cost (2017 \$ M)
HSR-9	Mohawk Valley Adds trackage and increases operating speeds to support trip time reductions	Track & Signal Additional Main Tracks CP246 (Rome) – CP259 (Verona)	<ul style="list-style-type: none"> Capacity Improvement Better Reliability Increase Speed Trip Time reduction 					Start Installation (Complete in Year 11) 3 rd Track MP 246 to MP-259	\$116 (\$232 Total)
HSR-16	Rochester Station Improve interlocking to improve operation of freight and passenger trains west of Rochester Station	Track & Signal Rebuild Interlocking at CP3 73	<ul style="list-style-type: none"> Capacity Improvement Better Reliability Trip Time reduction Improves Station Operation 				COMPLETE Rebuild Interlocking CP-373 3 rd & 4 th Track MP 373 to 374.3		\$ 30
EWC-18	Niagara Falls High Speed Rail Maintenance Facility	Maintenance Facility MP QDN27	<ul style="list-style-type: none"> Capacity Improvement Better Reliability Trip Time reduction Improves Station Operation 			Start installation	Continue Installation	COMPLETE Maintenance Facility	\$141
HSR-20, EWC-21	Niagara Branch Additional capacity eliminates single track operation	Track & Signal Install second track MPs QDN 2-7 and MPs QDN 17-22.8, MPs Upgrade existing track QDN 25-28, Signalization.	<ul style="list-style-type: none"> Capacity Improvement Better Reliability Increase Speed Trip Time reduction 				Start Installation of Double Track & Eliminate Single Track Operation	COMPLETE Installation of Double Track Eliminate Single Track Operation	\$335
Total Investment Years 6 through 10									\$ 1,731 M

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Exhibit 7-7 High Speed Rail Empire Corridor Program - Empire Gateway Improvements for Preferred Alternative: Years 11 - 15

Project Number	Project Area	Primary Project Type	Goals	Year 11 \$320 M	Year 12 \$321 M	Year 13 \$320 M	Year 14 \$355 M	Year 15 \$363 M	Estimated Project Cost (2017 \$ M)
HSR-5	Mohawk Valley <i>Adds trackage to allow passenger train faster operation with freight trains</i>	Track & Signal Additional Main Tracks Third Track MP218 (Little Falls) – MP226 (Herkimer)	<ul style="list-style-type: none"> ▪ Capacity Improvement ▪ Better Reliability ▪ Increase Speed ▪ Trip Time reduction ▪ Improved Station Operations 				Start Installation (Complete in Year 16) 3 rd Track MPs 218-226	Continue Installation	\$ 174 (\$261 Total)
HSR-9	Mohawk Valley <i>Adds trackage and increases operating speeds to support trip time reductions</i>	Track & Signal Additional Main Tracks CP246 (Rome) – CP259 (Verona)	<ul style="list-style-type: none"> ▪ Capacity Improvement ▪ Better Reliability ▪ Increase Speed ▪ Trip Time reduction 	COMPLETE (Start Installation in Year 10) 3 rd Track MP 246 to MP-259					\$116 (\$232 Total)
HSR-10	Syracuse Terminal Subdivision <i>Increased Capacity that will support trip time reductions</i>	Track & Signal Additional Main Tracks Third Track MP259 (Verona) to MP283 (East End of DeWitt Yard)	<ul style="list-style-type: none"> ▪ Capacity Improvement ▪ Better Reliability ▪ Increase Speed ▪ Trip Time reduction 	Start Installation	Continue Installation	Continue Installation	Continue Installation	COMPLETE 3 rd Track MP 259 to MP 283	\$ 520
HSR-12	East of Seneca River Bridge <i>Adds trackage and increases operating speeds to support trip time reductions</i>	Track & Signal Additional Main Tracks Third Track MP310 (Weedsport) – MP359 (east end of Seneca River)	<ul style="list-style-type: none"> ▪ Capacity Improvement ▪ Better Reliability ▪ Increase Speed ▪ Trip Time reduction 				Start Installation (Complete in Year 17) 3 rd Track MP 310 to MP 359	Continue Installation	\$ 188 (\$547 Total)
HSR-14	Rochester “West Shore Bypass” <i>Routes freight trains away from downtown Rochester and Station area increasing capacity</i>	Track & Signal Additional Main Tracks “West Shore Bypass” Double Track CP347.4 (Palmyra) –CP369 (Rochester)	<ul style="list-style-type: none"> ▪ Capacity Improvement ▪ Better Reliability ▪ Increase Speed ▪ Trip Time reduction ▪ Improved Station Operations 				Start Installation (Complete in Year 18) 2 nd Track MP 347 to MP 369	Continue Installation	\$ 148 (\$297 TOTAL)

Project Number	Project Area	Primary Project Type	Goals	Year 11 \$320 M	Year 12 \$321 M	Year 13 \$320 M	Year 14 \$355 M	Year 15 \$363 M	Estimated Project Cost (2017 \$ M)
HSR-17	Rochester Subdivision <i>Adds capacity to allow for better operation of freight and passenger trains east of Rochester Station</i>	Track & Signal Additional Main Tracks Third Track MP374 (Churchville) – MP388 (Gates) in the Rochester area	<ul style="list-style-type: none"> ▪ Capacity Improvement ▪ Better Reliability ▪ Increase Speed ▪ Trip Time reduction ▪ Improved Station Operations 	Start Installation	Continue Installation	COMPLETE 3 rd Track MP 374 to MP 388]			\$ 298
HSR-18	Rochester Subdivision <i>Adds trackage to increase operating speeds and support trip time reductions</i>	Track & Signal Additional Main Tracks Third Track MP388 (Gates) to MP 399 (Bergen)	<ul style="list-style-type: none"> ▪ Capacity Improvement ▪ Better Reliability ▪ Increase Speed ▪ Trip Time reduction ▪ Improved Station Operations 		Start Installation	COMPLETE 3 rd Track MP 388 to MP 399			\$ 235
Total Investment Years 11 through 15									\$ 1,679 M

High Speed Rail Empire Corridor Service Development Plan Errata

Exhibit 7-8 High Speed Rail Empire Corridor Program - Empire Gateway Improvements for Preferred Alternative: Years 16 – 20

Project Number	Project Area	Primary Project Type	Goals	Year 16 \$337 M	Year 17 \$359 M	Year 18 \$314 M	Year 19 \$265 M	Year 20 \$264 M	Estimated Project Cost (2017 \$ M)
HSR-4	Mohawk Valley <i>Adds trackage to allow passenger trains faster operation on the multiple curves along the Mohawk River</i>	Track & Signal Additional Main Tracks Third Track MP184 (Fonda) to MP218 (Little Falls), fourth track MPs 204 to 214	<ul style="list-style-type: none"> Capacity Improvement Better Reliability Increase Speed Trip Time reductions 			Start Installation (Complete in Year 25) 3rd Track MPs 184-218 4th Track MPs 204-214	Continue Installation	Continue Installation	\$ 344 (\$688 Total)
HSR-5	Mohawk Valley <i>Adds trackage to allow passenger train faster operation with freight trains</i>	Track & Signal Additional Main Tracks Third Tracks MP218 (Little Falls) – MP226 (Herkimer)	<ul style="list-style-type: none"> Capacity Improvement Better Reliability Increase Speed Trip Time reduction Improved Station Operations 	COMPLETE (Start in Year 14) 3 rd Track MPs 218-226					\$87 (\$261 Total)
HSR-12	East of Seneca River Bridge <i>Adds trackage and increases operating speeds to support trip time reductions</i>	Track & Signal Additional Main Tracks Third Track MP310 (Weedsport) – MP359 (east end of Seneca River)	<ul style="list-style-type: none"> Capacity Improvement Better Reliability Increase Speed Trip Time reduction 	Continue Installation	COMPLETE (Start in Year 14) 3 rd Track MP 310 to MP 359				\$359 (\$547 Total)
HSR-14	Rochester "West Shore Bypass" <i>Routes freight trains away from downtown Rochester and Station area increasing capacity</i>	Track & Signal Additional Second Main Tracks "West Shore Bypass" Double MP347.4 (Palmyra) – CP369 (Rochester)	<ul style="list-style-type: none"> Capacity Improvement Better Reliability Increase Speed Trip Time reductions 	Continue Installation	Continue Installation	COMPLETE (Start in Year 14) nd Track MP 347 to MP 369			\$149 (\$297 Total)
HSR-19 EWC-34	Buffalo Terminal & Rochester Subdivision/ Buffalo-Depew Station <i>Increased Capacity that will support trip time reductions Significant Trip Time Reduction</i>	Track & Signal & Station Additional Main Tracks Third Track MP399 (Corfu) to MP432 (Batavia), New Buffalo Depew Station improvements	<ul style="list-style-type: none"> Capacity Improvement Better Reliability Increase Speed Trip Time reductions 		Start Installation (Complete in Year 21) 3 rd Track MP 399 to MP 432 New Buffalo-Depew Station	Continue Installation	Continue Installation	Continue Installation	\$600 (\$760 Total)
Total Investment Years 16 through 20									\$ 1,539 M

High Speed Rail Empire Corridor Service Development Plan Errata

Exhibit 7-9 High Speed Rail Empire Corridor Program - Empire Gateway Improvements for Preferred Alternative: Year 21 - 25

Project Number	Project Area	Primary Project Type	Goals	Year 21 \$357 M	Year 22 \$390 M	Year 23 \$390 M	Year 24 \$389 M	Year 25 \$388 M	Estimated Project Cost (2017 M)
HSR-4	Mohawk Valley <i>Adds trackage to allow passenger trains faster operation on the multiple curves along the Mohawk River</i>	Track & Signal Additional Main Tracks in the Mohawk Valley Third track from MP184 (Fonda) – MP218 (Little Falls), fourth track from MPs 204-214.	<ul style="list-style-type: none"> Capacity Improvement Better Reliability Increase Speed Trip Time reductions 	Continue Installation	Continue Installation	Continue Installation	Continue Installation	COMPLETE (Start in Year 18) 3 rd Track MPs 184-218 4 th Track MPs 204-214	\$344 (\$688 Total)
HSR-11, EWC-40	Syracuse Congestion Relief <i>Provides passenger trains their own station tracks to eliminate interferences with freight trains</i>	Track & Signal Additional Main Tracks Third track MP283 (East Syracuse) to MP310 (West Syracuse). Fourth track from 301-309, Syracuse Station MPs 290-294	<ul style="list-style-type: none"> Capacity Improvement Better Reliability Increase Speed Trip Time reduction Improved Station Operations 		Start Installation	Continue Installation	Continue Installation	COMPLETE 3 rd Track MPs 283-310 4 th Track 301-309 Syracuse Station Trackage	\$770
HSR-15	Rochester Subdivision <i>Adds track capacity and supports better passenger train operations at Rochester</i>	Track & Signal Additional Main Tracks to "Main Line" Third Track MP 359 (Brighton) to MP 373 (Rochester)	<ul style="list-style-type: none"> Capacity Improvement Better Reliability Increase Speed Trip Time reduction Improved Station Operations 	Start Installation	Continue Installation	Continue Installation	Continue Installation	COMPLETE 3 rd Track MP 359 to MP 373	\$639
HSR-19, EWC-34	Buffalo Terminal & Rochester Subdivision/Buffalo-Depew Station <i>Significant Trip Time Reduction</i>	Track & Signal & Station Additional Main Tracks CP399 (Corfu) to CP432 (Batavia), station improvements	<ul style="list-style-type: none"> Capacity Improvement Better Reliability Increase Speed Trip Time reduction Improved Station Operations 	COMPLETE (Start in Year 17) 3 rd Track MP 399 to MP 432 New Buffalo-Depew Station					\$160 (\$760 total)
Total Investment Years 21 through 25									\$ 1,914 M

Exhibit 7-10 High Speed Rail Empire Corridor Program - Staffing Plan for Supporting Service Growth

Train Service Improvements	Year 1 - 5	Year 6 – 10	Year 11 - 15	Year 16 – 20	Year 21 - 25	New Roundtrips
Trips Added	Round Trips Saratoga Springs/NYC Saratoga Springs / NYC Albany-Rensselaer / NYC Albany-Rensselaer / NYC	Round Trips Albany-Rensselaer / NFL	Round Trips Albany-Rensselaer / Syracuse Albany-Rensselaer / NFL	Round Trips Albany-Rensselaer / NFL Albany-Rensselaer / Syracuse	Round Trips Syracuse / NFL	ALB/NYC + 4
						ALB/NFL + 4 ALB/SYR + 1

Additional Infrastructure	Year 1 - 5	Year 6 – 10	Year 11 - 15	Year 16 – 20	Year 21 - 25	Total
Segment Completed	Most Projects between NYC and ALB COMPLETED SRP-01, ESC-02, ESC-04, EXC-05, SRP-03, ESC-12, ESC-13, ESC-14, ESC-18, ESC-20, ESC-35, ESC-36, ESC-01, ESC-30/ESC-33, ESC-47, HSR	HSR-6 (cont'd.) HSR-8/EWC-27 (cont'd.) ESC-47, ESC-30/ESC-33 HSR-2/HSR-3/EWC-3/EWC-5 HSR-7/EWC-26, HSR-9 HSR-16, EWC-18 HSR-20/EWC-21	HSR-9 (cont'd.) HSR-5 HSR-10 HSR-12 HSR-14 HSR-17 HSR-18	HSR-5 (cont'd.) HSR-12 (cont'd.) HSR-14 (cont'd.) HSR-4 HSR-19/EWC-34	HSR-4 (cont'd.) HSR-19/EWC-34 (cont'd.) HSR-11/EWC-40 HSR-15	All Segments COMPLETED
New Miles of Track	23	44	62	100	108	337
Upgraded Interlockings	15	13	8	8	12	56
Grade Crossings	---	17	38	46	71	172
Bridges	12	7	12	20	41	92

Job Creation	Year 1 - 5	Year 6 – 10	Year 11 - 15	Year 16 – 20	Year 21 - 25	Total
Train Crews	19	8	20	20	10	77
Train Movement Management	5	---	---	---	---	5
Stations	---	2	3	---	---	5
Track	---	12	12	6	18	44
Signal	---	25	12	12	18	67
Structures	3	---	---	3	6	12
Total	27	47	43	41	52	210

Exhibit 7-11 Empire Capital District Connection (New York City to Albany and Schenectady) Improvements – Staffing Plan for Supporting Service Growth (Years 1-5)

Train Service Improvements	Year 1	Year 2	Year 3	Year 4	Year 5
Trips Added			1 – <u>New Round Trip</u> Saratoga Springs - New York City 1-Round Trip (ext.) Albany-Rensselaer - Saratoga 1 <u>New Round Trip</u> Albany-Rensselaer - New York City	<u>New Round Trip:</u> New York City - Albany 231 - 272	<u>New Round Trip:</u> Albany-Rensselaer - New York City 236 - 273

Additional Infrastructure	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Segment Completed		ESC-04, ESC-14, ESC-18	ESC-35, ESC-36, ESC-01	ESC-05, SRP-03, ESC-13, ESC-20	SRP-01, ESC-02, ESC-1	
New Miles of Track		1		18	4	23
Upgraded Interlockings		1		11	3	15
Grade Crossings						
Bridges			1	6	5	12

Job Creation	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Train Crews			9	5	5	19
Train Movement Management		2	2		1	5
Stations						
Track						
Signal						
Structures		3				3
Total		5	11	5	6	27

Exhibit 7-12 Empire Gateway Improvements– Staffing Plan for Supporting Service Growth (Years 6-10)

Train Service Improvements	Year 6	Year 7	Year 8	Year 9	Year 10	
Trips Added					New Round Trip: Albany-Rensselaer - Niagara Falls 271 - 274	

Additional Infrastructure	Year 6	Year 7	Year 8	Year 9	Year 10	Total
Segments Completed	ESC-47, ESC-30/ESC-33, HSR-6, HSR-8/EWC-27		HSR-2/HSR-3/EWC-3/ EWC-5	HSR-16	HSR-7/EWC-26, EWC-18, HSR-20/EWC-21	
New Miles of Track	16	7	7	3	11	44
Upgraded Interlockings	2	2	2	2	5	13
Grade Crossings	2	7	8	-	-	17
Bridges	4	1	1	-	1	7

Job Creation	Year 6	Year 7	Year 8	Year 9	Year 10	Total
Train Crews					8	8
Train Movement						
Stations					2	2
Track	6	3	3			12
Signal	3	3	6	3	10	25
Structures						
Total	9	6	9	3	20	47

Exhibit 7-13 Empire Gateway Improvements– Staffing Plan for Supporting Service Growth (Years 11-15)

Train Service Improvements	Year 11	Year 12	Year 13	Year 14	Year 15
Trips Added			<u>New Round Trip:</u> Albany-Rensselaer - Syracuse 273 - 272		<u>New Round Trip:</u> Albany-Rensselaer - Niagara Falls 285 - 284

Additional Infrastructure	Year 11	Year 12	Year 13	Year 14	Year 15	Total
Segments Completed	HSR-9		HSR-17, HSR-18		HSR-10	
New Miles of Track	13	13	12	12	12	62
Upgraded Interlockings		2	2	2	2	8
Grade Crossings	5	11	10	6	6	38
Bridges			1	5	6	12

Job Creation	Year 11	Year 12	Year 13	Year 14	Year 15	Total
Train Crews			10		10	20
Train Movement						
Stations			2		1	3
Track			8			8
Signal			6		6	12
Structures						
Total			26		17	43

Exhibit 7-14 Empire Gateway Improvements– Staffing Plan for Supporting Service Growth (Years 16-20)

Train Service Improvements	Year 16	Year 17	Year 18	Year 19	Year 20
Trips Added			<u>New Round Trip:</u> Albany-Rensselaer - Niagara Falls 287 - 286		<u>New Round Trip:</u> Albany-Rensselaer - Niagara Falls 270 - 275

Additional Infrastructure	Year 16	Year 17	Year 18	Year 19	Year 20	Total
Segments Completed	HSR-5	HSR-12	HSR-14			
New Miles of Track	8	49	21	11	11	100
Upgraded Interlockings	2	2			4	8
Grade Crossings	5		11	15	15	46
Bridges	2	1	7	5	5	20

Job Creation	Year 16	Year 17	Year 18	Year 19	Year 20	Total
Train Crews			10		10	20
Train Movement						
Stations						
Track	3	3				6
Signal	3	3			6	12
Structures		3				3
Total	6	9	10		16	41

High Speed Rail Empire Corridor Service Development Plan Errata

Exhibit 7-15 High Speed Rail Empire Corridor Program - Empire Gateway – Staffing Plan for Supporting Service Growth (Years 21-25)

Train Service Improvements	Year 21	Year 22	Year 23	Year 24	Year 25	
Trips Added						<u>New Round Trip:</u> Syracuse - Niagara Falls 271 - 274

Additional Infrastructure	Year 21	Year 22	Year 23	Year 24	Year 25	Total
Segments Completed	HSR-19/EWC-34				HSR-4, HSR-11/ EWC-40 HSR-15	
New Miles of Track	11	24	24	24	25	108
Upgraded Interlockings	4		4		4	12
Grade Crossings	18	13	13	13	14	71
Bridges	5	9	9	9	9	41

Job Creation	Year 21	Year 22	Year 23	Year 24	Year 25	Total
Train Crews					10	10
Train Movement						
Stations						
Track	6		6		6	18
Signal	6		6		6	18
Structures			3		3	6
Total	12		15		25	52

High Speed Rail Empire Corridor Service Development Plan Errata

Exhibit 8-16 Annual Apportionment of Total Program Capital Costs (Empire Capital District Connection and Empire Corridor Gateway)

Empire Corridor Capital Program Annual Budget			
Year	Empire Capital District Connection	Empire Gateway	Total Program
1	\$177	\$133	\$310
2	\$220	\$133	\$353
3	\$220	\$133	\$354
4	\$309		\$309
5	\$238	\$60	\$298
6	\$48	\$265	\$313
7		\$332	\$332
8		\$379	\$379
9		\$311	\$311
10		\$396	\$396
11		\$320	\$320
12		\$321	\$321
13		\$320	\$320
14		\$355	\$355
15		\$363	\$363
16		\$337	\$337
17		\$359	\$359
18		\$314	\$314
19		\$265	\$265
20		\$264	\$264
21		\$357	\$357
22		\$390	\$390

High Speed Rail Empire Corridor Service Development Plan Errata

Empire Corridor Capital Program Annual Budget			
Year	Empire Capital District Connection	Empire Gateway	Total Program
23		\$390	\$390
24		\$389	\$389
25		\$388	\$388
Total	\$1,213	\$7,274	\$8,487

Note: Capital costs shown above are for millions of dollars and exclude equipment costs (locomotives and train cars).

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High Speed Rail Empire Corridor Program - Investment Strategy for Preferred Alternative for Years 1 – 25: Empire Capital District Connection & Empire Gateway

Program Area	Year																								Totals	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		25
Empire Capital District Connection	\$177	\$220	\$220	\$309	\$238	\$48																				\$1,213
Empire Gateway	\$133	\$133	\$133		\$ 60	\$265	\$332	\$379	\$311	\$396	\$320	\$321	\$320	\$355	\$363	\$337	\$359	\$314	\$265	\$264	\$357	\$390	\$390	\$389	\$388	\$7,274
Total Annual Investment (Millions)	\$310	\$353	\$354	\$309	\$298	\$ 313	\$332	\$379	\$311	\$396	\$320	\$321	\$320	\$355	\$363	\$337	\$359	\$314	\$265	\$264	\$357	\$390	\$390	\$389	\$388	\$8,487

Note: Years 2 through 5 exclude equipment spending of \$85 million annually.

High Speed Rail Empire Corridor Service Development Plan Errata

High Speed Rail Empire Corridor Program - Investment Strategy for Preferred Alternative for Years 1 – 25: Empire Capital District Connection (NYC to Albany and Schenectady)

Project Number	Project Description – Location	Year																							Totals		
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23		24	25
SRP-01	Spuyten-Duyvil, MP 9-MP 13			\$30	\$30	\$30																					\$90
ESC-04	Rock Slope Stabilization	\$5	\$4																								\$9
ESC-05	New Interlockings CP 82 / CP99 / CP136		\$8	\$8	\$8																						\$24
SRP-03	Hudson Line Third Track, MPs 53-63				\$129																						\$129
ESC-12	Hudson Line High Capacity Signal System, MPs 33-76					\$100																					\$100
ESC-14	High Level Platforms - Hudson Station	\$22	\$22																								\$44
ESC-18	Tarrytown Pocket Track / Install 3 rd Rail CP-19 to CP25 & CP26 to CP32	\$3	\$2																								\$5
ESC-02	Hudson Line Bridge Replacement MP 85 – 118	\$61	\$61	\$61	\$60	\$60																					\$303
ESC-47	Hudson Line - New Signal System CP 75 – 169				\$48	\$48	\$48																				\$96
ESC-20	Hi-Level Platform -Rhinecliff Station		\$14	\$13	\$13																						\$40
ESC-13	Poughkeepsie Yard & Track #3 raised to 90 mph		\$22	\$21	\$21																						\$64
ESC-35	110 MPH: Speed Improvement Project; CP75 - CP114	\$43.5	\$43.5	\$43.5																							\$130.5
ESC-36	110 MPH: Speed Improvement Project; CP114 - CP124	\$43.5	\$43.5	\$43.5																							\$130.5
HSR	New Locomotives & Rolling Stock		\$85	\$85	\$85	\$85																					\$341
Total Annual Investment (Millions)		\$177	\$305	\$305	\$394	\$323	\$48																				\$341

High Speed Rail Empire Corridor Service Development Plan Errata

High Speed Rail Empire Corridor Program - Investment Strategy for Preferred Alternative for Years 1 – 25: Empire Gateway (Schenectady to Niagara Falls)

Project Number	Project Description – Location	Years																									Total			
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25				
ESC-1	Livingston Avenue Moveable Bridge Replacement	\$133	\$133	\$133																							\$400			
ESC-30, ESC-33	Double Track Project, Schenectady, MPs 160-169					\$60	\$60																				\$120			
HSR-2, HSR-3, EWC-3, EWC-5	Mohawk Valley 3 rd Track MPs 169-184, 4 th track, MPs 170-184, CP175-CP239-CP248, Amsterdam Station								\$332	\$332																	\$664			
HSR-4	Fonda – Little Falls, 3 rd track MPs184-218, 4 th track MPs 204-214																		\$115	\$115	\$114	\$69	\$69	\$69	\$69	\$68	\$688			
HSR-5	Little Falls – Herkimer, 3 rd track MPs 218-226														\$87	\$87	\$87										\$261			
HSR-6	Herkimer – Utica, 3 rd track MPs 226-235						\$105																				\$105			
HSR-7, EWC-26	Utica Station, 3 rd & 4 th track, MPs 235-239									\$66	\$66																\$132			
HSR-8, EWC-27	Rome Station, 3 rd track MPs 239-246						\$100																				\$100			
HSR-9	Rome – Verona, 3 rd Track, MPs 246-259										\$116	\$116															\$232			
HSR-10	Vernon - East End of DeWitt Yard, 3 rd Track, MPs 259-283											\$104	\$104	\$104	\$104	\$104											\$520			
HSR-11, EWC-40	Syracuse Station, 3 rd Track, MPs 283-310 4 th track, MPs 301-309																									\$193	\$193	\$192	\$192	\$770
HSR-12	3 rd Track, MPs 310-359, East end of Seneca River														\$94	\$94	\$200	\$159										\$547		
HSR-14	Rochester (West Shore Bypass) 2 nd Track, MPs 347-369														\$70	\$78	\$50	\$50	\$49									\$297		
HSR-15	Rochester, Third Track, MPs 359-373																								\$128	\$128	\$128	\$128	\$128	\$639

Project Number	Project Description – Location	Years																									Total
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	
HSR-16	Rochester Station, 3 rd & 4 th Track, MPs 373-374.3 Rebuild CP-373									\$30																	\$30
HSR-17	West Rochester, 3 rd Track, MPs 374-388											\$100	\$99	\$99													\$298
HSR-18	Rochester Subdivision, 3 rd Track, MPs 388-399												\$118	\$117													\$235
HSR-19, EWC-34	South Byron – East Buffalo, 3 rd Track, MPs 399-432 Buffalo-Depew Station																	\$150	\$150	\$150	\$150	\$160					\$760
EWC-18	Niagara Falls Maintenance Facility								\$47	\$47	\$47																\$141
HSR-20, EWC-21	North Tonawanda – Niagara Branch 2 nd Track, MPs QDN2-7 and QDN17-22.8, Upgrade existing single track QDN25-28									\$168	\$167																\$335
Total Annual Investment (Millions)		\$133	\$133	\$133	0	\$60	\$265	\$332	\$379	\$311	\$396	\$320	\$321	\$320	\$355	\$363	\$337	\$359	\$314	\$265	\$264	\$357	\$390	\$390	\$389	\$388	\$7,274

High Speed Rail Empire Corridor Service Development Plan Errata

High Speed Rail Empire Corridor Program – 25-Year Capital Improvement Program

Project Number	Project Name	Project Description	Corridor	Operator	City/Town	Counties	Project Type	Goals	To Mile Post	From Mile Post	Estimated Cost (\$2017)
SRP-01 (ESC-19,ESC 21)	Empire Line - Spuyten Duyvil 2nd Track	This project will add second track between Mile Post 9 and Mile Post 13, including across the Spuyten Duyvil Movable Bridge, eliminating conflicts between Amtrak trains traveling in opposite directions, and provide Amtrak trains higher speed crossovers at Control Point 13, where Amtrak trains to and from New York converge/diverge with MetroNorth Trains to and from Grand Central Station, which will decrease delays.	Empire South	Amtrak MetroNorth	Bronx	Bronx	Track, Signals, Interlockings	Reduce Delay, Add Capacity, Improve Operation	9.32	13	\$90,229,715
ESC-18	Hudson Line - Tarrytown 3rd Track and Interlockings	This project will construct new Tarrytown 3rd track and new Control Point 24. This project will enhance capacity and improve reliability by providing for trains to change direction at the existing Control Point 25 without having to change ends while blocking the mainline track.	Empire South	MetroNorth	Tarrytown	Westchester	New or restored sidings/passing tracks	Reduce Delay, Add Capacity, Improve Operation	25	24	\$5,388,547
SRP-03 (ESC17, ESC-25)	Hudson Line - Croton Harmon 3rd Track and Interlockings	This project will provide capacity, and minimizing delays by constructing 3rd track beginning at Control Point 53 (Hudson Highlands) to Control Point 59 (Beacon) and from Control Point 61 (Beacon) to Control Point 63 (Chelsea). This project will also construct double-track section between Control Point 63 (Chelsea) and Control Point 72 (Poughkeepsie). This project will also construct new high speed cross-overs at interlockings including Control Point 53, Control Point 58, new Control Point 63 (replacing Control Point 61), and Control Point 72. This project will include signal upgrades needed to support the additional track and new interlockings.	Empire South	MetroNorth	Willsboro, Westport, Essex	Essex	Track, Signals, Interlockings	Reduce Delay, Add Capacity, Improve Operation	63	53	\$128,528,340
ESC-12	Hudson Line High Capacity Signal System - Croton Harmon to Poughkeepsie	This project will construct a new signal system capable of closer-headway between passenger trains between Croton-Harmon and Poughkeepsie, where the existing signal block spacing is far apart, in order to increase capacity. The new signal system will also all freight trains to continue to operate at speed up to 50 MPH.	Empire South	MetroNorth	Poughkeepsie	Dutchess, Putnam, Westchester	Communication, Signaling, and Control	Reliability, Capacity	76	33	\$99,910,482
ESC-13	Poughkeepsie Capacity Improvements, Poughkeepsie Yard	This project will reduce congestion between Amtrak trains and MetroNorth Commuter trains by installing two new interlockings, adding three new yard tracks, upgrading, and realigning existing tracks. This project will also consolidate and reconfigure storage tracks to reduce train movements across the main lines. The new Track 3 will provide capacity for MetroNorth trains originating and terminating in Poughkeepsie while allowing for Amtrak trains to have the through movement on Tracks 1 and 2. The area between Mile Post 76 and Mile Post 71 consists of Poughkeepsie Station, which is serviced by both Amtrak and MetroNorth and the MetroNorth Poughkeepsie Yard. Currently passenger trains are delayed in this area due to interference with commuter trains, the proximity of the station to the yard, and the existing yard configuration, which requires trains to cross the mainline tracks to access the yard contribute to these delays.	Empire South	MetroNorth	Poughkeepsie	Dutchess	New or restored sidings/passing tracks	Reduce Delay, Add Capacity, Improve Operation	76	71	\$64,155,768

High Speed Rail Empire Corridor Service Development Plan Errata

Project Number	Project Name	Project Description	Corridor	Operator	City/Town	Counties	Project Type	Goals	To Mile Post	From Mile Post	Estimated Cost (\$2017)
ESC-20	Rhinecliff Station High Level Platform, Vertical Circulation	This project will replacing the existing low-level platform with a new high level platform at Rhinecliff Station. This project will also include necessary drainage work, replace the platform canopy, install new lighting, and replacing the elevator and stairs to and from the station (vertical circulation), construct areas of refuge and emergency egress as required by code. The project will also rehabilitate the interlocking at Control Point 89 and install a new interlocking at Control Point 88 to facilitate platform construction and improve overall reliability on the Hudson Line. This project will also rehabilitate and realign Tracks 1 and 2 between the two interlockings as necessary to accommodate the new platform footprint.	Empire South	Amtrak	Rhinecliff	Dutchess	High Level Platform	Reliability, Safety, Reduce Trip Time	89	89	\$40,318,425
ESC-14	Hudson Station Passenger Grade Crossing Elimination, New High Level Platform and Vertical Circulation	This project will eliminate the need for passengers to cross active tracks to board the train, by constructing a new high level platform with stairs, elevators, pedestrian bridge at the Hudson Station. This project will improve train operations by allowing two trains to serve the station at the same time. Currently, the ticket agent must use a "Wheel Chair Lift" to raise the passenger from the platform to the vestibule of the passenger coach, this project will provide for ADA compliant level boarding of trains. The benefits of this project include reducing the station dwell time for accommodating passengers boarding and exiting trains, and in conjunction with the project at Rhinecliff Station, this project will provide for all train stations between New York City and Albany-Rensselaer to have high level platforms.	Empire South	Amtrak	Hudson		Grade Crossing Elimination, High Level Platform, Vertical Circulation	Reliability, Safety, Reduce Trip Time	115	114	\$44,370,183
ESC-04	Hudson Line - Slope Stabilization	This project will improve reliability by stabilizing slopes adjacent to the tracks at 10 locations (5 locations between, Mile Posts 105.3-106, one location at Mile Post 119.5, and 4 locations at Mile Posts 128.1-130), and upgrading slide detector fences to improve safety and reduce delays. Currently, there are locations on the Hudson Line, where rock/earth falls onto the tracks from unstable slopes, causing train delays. This project will enhance safety for rail passengers, railroad employees, and the surrounding community by preventing rocks/earth from falling onto the tracks, which has the potential to delay trains through speed restrictions imposed by the slide fences, and to cause train derailments.	Empire South	Amtrak		Columbia, Dutchess	Safety, State of Good Repair	Operational Benefits, Safety	130	105	\$8,739,582
ESC-05	Hudson Line - New Interlockings CP 82 / 99 / 136 (north of Hyde Park, Tivoli, and Stony Point)	This project will construct three new interlockings, improving reliability by reducing spacing between the existing interlockings, improving dispatching options to meet and pass trains, especially during routine maintenance, which will decrease delays. Approximate locations on the Hudson Line are north of Hyde Park, Tivoli, and Stony Point.	Empire South	Amtrak	Hudson, Rhinecliff, Germantown	Columbia, Dutchess	Signal and Interlockings	Reduce Delay, Add Capacity, Improve Operation	136	82	\$23,881,294

Project Number	Project Name	Project Description	Corridor	Operator	City/Town	Counties	Project Type	Goals	To Mile Post	From Mile Post	Estimated Cost (\$2017)
ESC-36	Hudson Line Speed Improvements Phase 1 CP-75 to CP-114	This project will straightening vertical and horizontal curves to permit higher speed, realign tracks to reduce curvature, increase spiral lengths, and increase superelevation in order to facilitate speed increases on sections of the Hudson Line. This project includes locations where realigned track curve corrections fall within the existing railroad right-of-way. This project will also include surfacing and tie replacement to improve track resiliency, and keep the track within the higher maintenance standards required for 110 MPH operations. This project will also rehabilitate existing bridges to facilitate new track alignments, and comply with the track maintenance standards for operating at higher speeds. Within the curve realignment sections, the condition of the tracks and bridges will be brought to a State of Good Repair. This project will also include needed signal upgrades, including signal block length reductions, along with upgrades of grade crossing warning devices.	Empire South	Amtrak		Columbia, Dutchess	Track, Speed Improvements, State of Good Repair	Increase speed, reduce trip time	114	75	\$131,399,840
ESC-35	Hudson Line Speed Improvements Phase 2: CP-114 to CP-125	This project will straightening vertical and horizontal curves to permit higher speed, realign tracks to reduce curvature, increase spiral lengths, and increase superelevation in order to facilitate speed increases on sections of the Hudson Line. This project includes locations where realigned track curve corrections may require additional right-of-way. This project will also include surfacing and tie replacement to improve track resiliency, and keep the track within the higher maintenance standards required for 110 MPH operations. This project will also rehabilitate existing bridges to facilitate new track alignments, and comply with the track maintenance standards for operating at higher speeds. Within the curve realignment sections, the condition of the tracks and bridges will be brought to a State of Good Repair. This project will also include needed signal upgrades, including signal block length reductions, along with upgrades of grade crossing warning devices.	Empire South	Amtrak		Columbia	Track, Speed Improvements, State of Good Repair	Increase speed, reduce trip time	125	114	\$131,399,840
ESC-02	Hudson Line - Bridge Replacement Project	This project will replace 5 bridges on the Hudson Line (Mile Post 85.45 (Staatsburg), Mile Post 97.35 (Tivoli Bay), Mile Post 108.18 (Jansen Kill), Mile Post 118.30 (Stockport), Mile Post 118.58 (Stockport)) including replacing fixed decks with ballasted decks to remove/prevent speed restrictions, improving track geometry and bridge conditions to increase resiliency.	Empire South	Amtrak		Columbia, Dutchess	Structures	Resiliency, State of Good Repair, Speed Increases	118.58	84.45	\$302,730,000
ESC-47	Hudson Line New Signal System from CP 75 to CP 169	This project will install signalization to increase track capacity, including new signal houses and wayside signal equipment from Schenectady to Hoffmans and from Control Point 143, Rensselaer, to Poughkeepsie.	Empire South	Amtrak			Communication, Signaling, and Control	Operational Benefits, Safety	169	75	\$140,000,000
ESC-01	Livingston Avenue Bridge Replacement	This project will replace the Livingston Avenue Rail Bridge that spans the Hudson River between the cities of Albany and Rensselaer, fortifying a critical link for Passenger Rail Service in New York State. This bridge provides the only upstate New York passenger rail crossing of the Hudson River and is vital to connecting all points west from Niagara Falls to New York City by rail. The bridge was originally constructed in 1866 and has significant loading and speed restrictions. The new bridge will replace the deficient moveable bridge and improve safety, reliability, travel time. This project will also remove speed and weight restrictions imposed by the current structure, increase capacity and improving resiliency for passenger rail service.	Empire West	Amtrak	Albany, Rensselaer	Albany, Rensselaer	Bridge, Safety, State of Good Repair, Reliability	Safety, Capacity, State of Good Repair	143	143	\$400,000,000

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ESC-33	Schenectady - Hoffmans Double Track	This project will construct a 2nd main track between Schenectady and Hoffmans, NY. This project includes bridge rehabilitation for three (3) undergrade bridges. This project will improve on time performance, reduce train delays, and add capacity.	Empire West	Amtrak	Schenectady, Pattersonville	Schenectady	Track, Signals, Interlockings	Reduce Delay, Add Capacity, Improve Operation	169	160	\$99,705,372
ESC-30	Empire Corridor Congestion Relief, Reconfigure CP 169	This project will reconfigure the junction of Empire Corridor with the CSX Selkirk Branch at CP169 (Hoffmans). Freight trains traveling west enter the Empire Corridor at CP 169 and exit to reach the CSX Selkirk Yard. Passenger trains servicing upstate cities including Syracuse, Rochester, Buffalo, and Niagara Falls, enter the Empire Corridor West from the Hudson Line at CP 169 and continue on to Albany and New York City when traveling south. This project includes the construction of an additional track along the 110 mph section of the Hudson Subdivision in Colonie, Albany County.	Empire West	Amtrak	Scotia	Schenectady	New or restored sidings/passing tracks	Reduce Delay, Add Capacity, Improve Operation	169	169	\$19,476,810
HSR-02	3rd Track - Hoffmans to Amsterdam (MP 169 to 179) and 4th track from MPs 170 to 174.	This project will construct new 3rd and 4th tracks between Hoffmans and Amsterdam. The project will include two new bridges, signal and interlocking work, embankment, retaining walls, drainage and erosion control measures. The project also includes 9 grade crossing upgrades/replacements. This project requires Right of Way acquisition.	Empire West	CSXT	Scotia, Schenectady, Amsterdam, Glenville	Montgomery, Schenectady	Track, Signals, Interlockings	Reduce Delay, Add Capacity, Improve Operation	174	160	\$382,037,326
EWC-03	Amsterdam Station, Platform and Interlockings Project	This project will construct a new Amsterdam Station, new high level platform and new interlockings. This project will also include necessary drainage work, provide elevators and stairs to and from the station (vertical circulation), construct areas of refuge and emergency egress as required by code. This project will also rehabilitate and realign Tracks as necessary to accommodate the new platform footprint. This project will improve reliability and provide ADA compliant level boarding.	Empire West	CSXT	Amsterdam	Montgomery	Station, Platform, Track and Interlockings	Reduce Delay, Add Capacity, Improve Operation	178	178	\$16,755,174
HSR-03	3rd and 4th Track - Kellogg's Yard to Danascara Creek	This project will construct new 3rd and 4th track from Kellogg's Yard to Danascara Creek. (Mile Post 173.9 to Mile Post 183.5) This project also includes two new bridges at Mile Post 181- Mile Post 182 and at Danascara Creek, signal system improvements and interlockings, embankment, retaining walls, drainage and erosion control measures. This project also includes improvements at 15 grade crossing locations. This project requires Right of Way acquisition.	Empire West	CSXT	Tribes Hill, Fort Johnson, Amsterdam	Montgomery	New Track, Signals, Interlockings	Reduce Delay, Add Capacity, Improve Operation	184	174	\$247,677,837
HSR-04	3rd Track Fonda to Little Falls (Mile Post 184 to Mile Post 218) 4th Track from Mile Posts 204-214	This project will construct a new 3rd track from Fonda to Little Falls (MP 184 to MP 218). This project includes 17 new bridges, including bridges over Cayadutta Creek, Knauderack Creek, Mohawk River Creek, and a major structure at East Canada Creek. This project also includes signal and interlocking improvements, embankment, retaining walls and other structures, drainage, and erosion control measures. This project will also include upgrades to approximately 45 grade crossings. This project requires Right of Way acquisition.	Empire West	CSXT	Yost, Tribes Hill, Nelliston, Fonda, St. Johnsville, Palatine, Mohawk, Manheim, Little Falls	Herkimer, Montgomery	New Track, Signals, Interlockings	Reduce Delay, Add Capacity, Improve Operation	218	184	\$688,100,370

Project Number	Project Name	Project Description	Corridor	Operator	City/Town	Counties	Project Type	Goals	To Mile Post	From Mile Post	Estimated Cost (\$2017)
HSR-05	3rd Track, Little Falls to Herkimer, from Mile Post 218 to Mile Post 225.9.	This project will construct new 3rd track from Mile Post 218 to Mile Post 225.9. This project also Includes two new bridges, including a major structure at Mile Post 222.5 West Canada Creek. The project also includes new signals and interlockings, embankment, retaining walls and other structures, and drainage and erosion control measures. This project includes improvements at 5 grade crossing locations.	Empire West	CSXT	Herkimer	Herkimer	New Track, Signals, Interlockings	Reduce Delay, Add Capacity, Improve Operation	226	218	\$260,795,039
HSR-06	3rd Track, Herkimer to Utica, from Mile Post 226 to Mile Post 235	This project will construct new 3rd track from Herkimer to Utica, Mile Post 226 to Mile Post 235. The project also includes new signals and interlockings, embankment, retaining walls and other structures, and drainage and erosion control measures.	Empire West	CSXT	Herkimer, Frankfort, Utica	Herkimer, Oneida	Track, Signals, Interlockings	Reduce Delay, Add Capacity, Improve Operation	226	235	\$105,000,000
EWC-26	Utica Station -Track, Interlocking, High Level Platform, Vertical Circulation	This project will construct new high-level side platforms, and realign the tracks at Utica Station. This project will also include necessary drainage work, provide elevators and stairs to and from the station (vertical circulation), construct areas of refuge and emergency egress as required by code. This project will also rehabilitate and realign tracks as necessary to accommodate the new platform footprint. This project will improve reliability and provide ADA compliant level boarding.	Empire West	CSXT	Utica	Oneida	Station, Platform, Track and Interlockings	Reliability, Safety, Reduce Trip Time	238	238	\$10,288,010
HSR-07	3rd and 4th Tracks, Utica to Yorkville from Mile Post 235 to Mile Post 239.1	This project will construct new 3rd and 4th track from Utica to Yorkville (Mile Post 235 to Mile Post 239.1). This project includes signal improvements, new interlockings, embankment, retaining walls and other structures, drainage, and erosion control measures.	Empire West	CSXT	Utica	Oneida	New Track, Signals, Interlockings	Reduce Delay, Add Capacity, Improve Operation	239	235	\$121,660,766
HSR-08	3rd Track, Yorkville to Whitestown, from Mile Post 239 to Mile Post 246.	This project will construct new 3rd tracks from Yorkville to Whitestown (Mile Post 239 to Mile Post 246). This project includes 4 new bridges, signal improvements, new interlockings, embankment, retaining walls and other structures, drainage, and erosion control measures. This project also includes upgrades at 2 grade crossing locations. This project requires Right of Way acquisition.	Empire West	CSXT	Whitestown	Oneida	New Track, Signals, Interlockings	Reduce Delay, Add Capacity, Improve Operation	246	239	\$94,023,813
EWC-05	Mohawk Valley Empire Corridor Congestion Relief (Control Point 175, Control Point 239 and Control Point 248) Amsterdam to Solvay (Mile Post 175 to Mile Post 294)	This project will improve travel times, operational capacity, and safety for intercity passenger trains and freight trains by upgrading signals, control points, and interlockings along approximately 76 miles of the Selkirk and Mohawk Subdivisions.	Empire West	CSXT	Utica, Amsterdam	Herkimer, Montgomery, Oneida	Communication, Signaling, and Control	Reduce Delay, Add Capacity, Improve Operation	251	169	\$16,589,691

High Speed Rail Empire Corridor Service Development Plan Errata

Project Number	Project Name	Project Description	Corridor	Operator	City/Town	Counties	Project Type	Goals	To Mile Post	From Mile Post	Estimated Cost (\$2017)
EWC-27	Rome Station - Track, Interlocking, High Level Platform, Vertical Circulation	This project will construct new high-level platform and new interlockings. This project will also include necessary drainage work, provide elevators and stairs to and from the station (vertical circulation), construct areas of refuge and emergency egress as required by code. This project will also rehabilitate and realign tracks as necessary to accommodate the new platform footprint. This project will improve reliability and provide ADA compliant level boarding.	Empire West	CSXT	Rome	Oneida	Station, Platform, Track and Interlockings	Reliability, Safety, Reduce Trip Time	251	251	\$6,429,863
HSR-09	3rd Track Rome to Verona, from Mile Post 246 to Mile Post 259	This project will construct a new 3rd track from Rome to Verona (Mile Post 246 to Mile Post 259). This project includes 7 new bridges including bridges over the Mohawk River. The project includes signal improvements and new interlockings, embankment, retaining walls and other structures, drainage, and erosion control measures. This project also includes upgrades to 5 grade crossing locations. This project requires Right of Way acquisition.	Empire West	CSXT	Rome, Verona	Oneida	New Track, Signals, Interlockings	Reduce Delay, Add Capacity, Improve Operation	259	246	\$231,893,570
HSR-10	3rd Track Verona to Lenox, from Mile Post 259 to Mile Post 283	This project will construct a new 3rd track from Verona to Lenox, Mile Post 259 to Mile Post 283. This project includes 10 new bridges, including Oneida Creek and a Flyover at DeWitt Yard. This project includes signal improvements, new interlockings, embankment, retaining walls and other structures, drainage and erosion control measures. This project also includes upgrades at 12 grade crossing locations. This project requires Right of Way acquisition.	Empire West	CSXT	Verona, Sullivan, Manlius, Lenox	Madison, Oneida, Onondaga	New Track, Signals, Interlockings	Reduce Delay, Add Capacity, Improve Operation	283	259	\$520,104,607
EWC-40	Syracuse Congestion Relief (Multiple Phases)	This project will increase capacity by providing additional freight capacity between DeWitt and Belle Isle Pocket Yard. This project will add track capacity in the vicinity of Syracuse Station and reconfigure signals at the station including new interlockings. This project will also replace the bridge over Park Street with multiple bridges capable of carrying 5 tracks. This project will construct a new high level platform capable of allowing two trains to service the station at the same time at Syracuse Station.	Empire West	CSXT	Syracuse	Onondaga	New Track, Signals, Interlockings, New Platform, Vertical Circulation	Operational Benefits, Safety	294	290	\$150,000,000
HSR-11	3rd Track Salina to Camillus, Mile Post 283 to Mile Post 310, 4th Track between Mile Post 301 to Mile Post 309	This project will construct a new 3rd track from Salina to Camillus (Mile Post 283 to Mile Post 310) and a new 4th track from Werners to Jordan (Mile Post 301 to Mile Post 309). This project includes 9 new bridges. This project includes signal improvements, new interlockings, embankment, retaining walls and other structures, drainage and erosion control measures. This project also includes upgrades at 6 grade crossing locations. This project requires Right of Way acquisition.	Empire West	CSXT	Salina, DeWitt (De Witt), Camillus	Onondaga	New Track, Signals, Interlockings	Reduce Delay, Add Capacity, Improve Operation	310	283	\$620,883,861
HSR-12	3rd Track Weedsport to Wayneport, Mile Post 310 to Mile Post 359	This project will construct a new 3rd track from Weedsport to Wayneport (Mile Post 310 to Mile Post 359). This project includes signal improvements, new interlockings, embankment, retaining walls and other structures, drainage and erosion control measures.	Empire West	CSXT	Camilus/Fox Ridge	Onondaga	New Track, Signals, Interlockings	Reduce Delay, Add Capacity, Improve Operation	310	359	\$547,430,000
HSR-14	2nd Track Palmyra to Rochester from Mile Post 347.4 to Mile Post 368.8	This project will install new 2nd track from Palmyra to Rochester, Mile Post 347.4 to Mile Post 368.8. This project also includes 7 new bridges. This project includes new interlockings, embankment, retaining walls and other structures, and drainage and erosion control measures. This project also includes upgrades at 11 grade crossing locations.	Empire West	CSXT	Pittsfield, Perinton, Henrietta, Chili, Brighton	Monroe	New Track, Signals, Interlockings	Operational Benefits	369	348	\$297,014,182

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Project Number	Project Name	Project Description	Corridor	Operator	City/Town	Counties	Project Type	Goals	To Mile Post	From Mile Post	Estimated Cost (\$2017)
HSR-15	3rd Track Fairport to Brighton from Mile Post 359 to Mile Post 373	This project will construct new 3rd track from Fairport to Brighton (Mile Post 359 to Mile Post 373). This project also includes 9 new bridges. This project includes signal improvements, new interlockings, embankment, retaining walls and other structures, drainage and erosion control measures. This project also includes upgrades at 2 grade crossing locations. This project requires approximately 20 acres of Right of Way acquisition.	Empire West	CSXT	Fairport, Rochester, Perinton, Brighton	Monroe	New Track, Signals, Interlockings	Reduce Delay, Add Capacity, Improve Operation	373	359	\$638,720,261
HSR-16	3rd Track and 4th Track Rochester from MP 373 to 374.3	This project will construct new 3rd and 4th tracks in Rochester from Mile Post 373 to Mile Post 374.3. This project includes signal improvements, new interlockings, embankment, retaining walls and other structures, drainage and erosion control measures.	Empire West	CSXT	Rochester	Monroe	New Track, Signals, Interlockings	Reduce Delay, Add Capacity, Improve Operation	374	373	\$30,129,452
HSR-17	3rd Track Churchville to Gates from MP 374.3 to MP 388	This project will construct a new 3rd track from Churchville to Gate (Mile Post 374.3 to Mile Post 388). This project includes 6 new bridges. This project includes signal improvements, new interlockings, embankment, retaining walls and other structures, drainage, and erosion control measures. This project also includes upgrades to 11 grade crossing locations. This project requires Right of Way acquisition.	Empire West	CSXT	Churchville, Rochester, Gates	Monroe	New Track, Signals, Interlockings	Reduce Delay, Add Capacity, Improve Operation	388	374	\$298,048,055
HSR-18	3rd Track Gates to Bergen from MP 388 to 399	This project will construct 3rd track from Gates to Bergen (Mile Post 388 to Mile Post 399). This project includes 1 new bridge. This project includes signal improvements, new interlockings, embankment, retaining walls and other structures, drainage, and erosion control measures. This project also includes upgrades to 10 grade crossing locations. This project also requires Right of Way acquisition.	Empire West	CSXT	Churchville, Byron, Bergen	Genesee, Monroe	New Track, Signals, Interlockings	Reduce Delay, Add Capacity, Improve Operation	399	388	\$235,307,988
EWC-34	New Buffalo-Depew Station, Track, Interlocking, High Level Platform, Vertical Circulation	This project will construct a new Buffalo Depew Station, and new high-level platform and new interlockings. This project will also include necessary drainage work, provide elevators and stairs to and from the station (vertical circulation), construct areas of refuge and emergency egress as required by code. This project will also rehabilitate and realign tracks as necessary to accommodate the new platform footprint. This project will improve reliability and provide ADA compliant level boarding.	Empire West	CSXT	Depew	Erie	Station, Platform, Track and Interlockings	Reliability, Safety, Reduce Trip Time	431	431	\$9,001,578
HSR-19	3rd Track Corfu to Batavia from MP 399 to MP 432	This project will construct a new 3rd track from Corfu to Batavia (Mile Post 399 to Mile Post 432). This project also includes 15 new bridges. This project includes signal improvements, new interlockings, embankment, retaining walls and other structures, drainage, and erosion control measures. This project also includes upgrades to 38 grade crossing locations. This project requires Right of Way acquisition.	Empire West	CSXT	Corfu, Alden, Lancaster, Darien, Batavia	Erie, Genesee	New Track, Signals, Interlockings	Reduce Delay, Add Capacity, Improve Operation	432	399	\$751,299,121
HSR-20 (EWC-17)	Niagara Branch Double Track	This project will construct 2nd track on the Niagara Branch in Buffalo from Mile Post QDN 2 to Mile Post QDN 7 and from Buffalo to North Tonawanda, Mile Post QDN 17 to Mile Post QDN 22.8. This project includes signal improvements, new interlockings, embankment, retaining walls or other structures, drainage, and erosion control measures.	Empire West - Niagara Branch	CSXT	Black Rock, Wheatfield, Niagara Falls	Erie, Niagara	Track, Signals, Interlockings	Reduce Delay, Add Capacity, Improve Operation	2	22.8	\$333,000,000

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EWC-18	Niagara Falls High Speed Rail Maintenance Facility	This project will construct a new maintenance facility to provide shore power, potable water, inspection, cleaning, and light repair capabilities. The project will also add storage tracks and a train shed. The facility will be designed to be scalable, initially constructed to accommodate existing service levels, but with an ability to expand in the future.	Empire West - Niagara Branch	Amtrak	Niagara Falls	Niagara	Support Facilities	Operational Benefits, State of Good Repair	27	27	\$141,000,000
EWC-21	Niagara Falls Track Improvements (Mile Post QDN 25 to Mile Post QDN 28)	This project will improve reliability by upgrading the existing track between the Niagara Falls Maintenance Facility and the Niagara Falls Station.	Empire West - Niagara Branch	CSXT	Niagara Falls		Track Rehabilitation	State of Good Repair, Safety	28	25	\$2,103,740