5. **Financial Capacity**

5.1. **Introduction**

Transportation infrastructure and services are typically supported by a combination of capital and operating funding from various sources. These funding sources may have conditions and restrictions as to how they may be applied to New York's HSIPR program, and these restrictions can have significant implications for the affordability and the feasibility of the High Speed Rail Empire Program's alternatives. Matching the particular requirements and restrictions among federal, state, municipal and private funding sources with the costs of each alternative helps determine the time frame over which the alternative could be implemented.

In general, public transportation systems are built and equipped using capital funding from various sources, and are operated day-to-day using operating funds. These two categories of funding – and the sources for these funds – are described in Sections 5.3 and 5.4.

Chapter 5 describes the costs, ridership and ticket revenues, subsidy requirements, and sources of funding support that are available to advance the High Speed Rail Empire Corridor Program. After the selection of a preferred alternative, a Service Development Plan will be developed. It will include detailed operating plans as well as a capital program, including costs and projected fiscal construction years. This chapter presents information that will be considered and incorporated into the Service Development Plan. Appendix B presents additional information on how the ridership forecasts were developed, and Appendix F presents additional information on how cost estimates were developed.

5.2. **Cost and Revenue Methodology**

The capital and operating costs and operating revenues anticipated for each alternative are based upon uniform ridership forecasting and costing methodologies, to ensure consistency. Based on proposed operating plans (service frequency and trip time) for each alternative, the ridership was forecast and operating costs generated. Track alignments, signal system configuration, number and length of passing sidings, and rolling stock requirements were defined in sufficient detail for a Tier 1 analysis to permit reasonable capital construction cost estimates, and to establish the feasibility of proposed train operating plans, service frequency, stopping patterns and express/local/regional service overlays.

Standard practice for quantifying and comparing costs of different investment programs that transpire over different time frames is to schedule all the future improvements based on the likely time of their implementation and then inflate the current cost of each element to its anticipated implementation year. These future costs are then discounted back to the target comparison year using net present value analysis techniques so that they are comparable in constant-dollar terms. For example, if a locomotive is to be purchased in 2020, but the analysis target comparison year is 2015, the current (2012) cost of a locomotive would be inflated to 2020, and the resulting value then discounted back to 2015 using an approved discount rate. Discount rates address a combination of inflation and the "opportunity cost" of using the funding for the subject project rather than for some other purpose (which might give greater or lesser returns). Discount rates typically range between 6 percent and 10 percent, depending on a wide variety of factors. Following this procedure enables the comparison in a specific analysis year (in the above case,
2015) of various future investments with varying implementation dates. Projected investments of the Empire Corridor Program would span from 2015 to 2035.

For a Tier 1 investigation, the cost and timing for the specific investments are estimated in general terms. Therefore, the Tier 1 analysis is focused on the year 2015 as the point for comparison across alternatives. The present (2011) costs of elements, such as track, coaches, locomotives, bridge construction, etc., are inflated to 2015 costs at a uniform inflation rate of 3.5 percent. While the exact costs or future year of implementation are not precisely known for each alternative, the common treatment of all cost elements across all categories, as if occurring in 2015, allows reasonable comparisons among alternatives.

### 5.2.1. Capital Cost Estimating Methodology

Capital cost estimates for the alternatives used industry standards for all major components. Infrastructure capital costs were determined on a unit basis. Construction costs for each alternative were derived by multiplying the quantity of each major item by the unit cost for that item, based on standard values or the most recent costs, with appropriate regional adjustments applied as necessary. Land costs were developed for urban, suburban and rural property. Train and maintenance staffing costs were based on current Amtrak values, projected to the target analysis year. Use of these common factors allows meaningful comparisons among the alternatives in terms of their likely future ridership potential and their capital and operating costs and revenues.

**Rolling Stock**

The method by which costs for rolling stock were developed is described in Appendix F. In brief, equipment costs are a function of the operating plan intended for each alternative, that is, the number of train sets to be operated along the route, and the number of locomotives and passenger coaches to be needed for each alternative, including spare trains to substitute for trains scheduled for maintenance.

**Track and Infrastructure**

Track and signal system installation costs were based on standard unit values used throughout the railroad industry. Track installation costs are typically recognized on a cost-per-mile basis. Infrastructure costs, for bridges, culverts, grade separations, and retaining walls, involved gross cost estimates based on current experience. Bridge costs were estimated based on length of span and width, culvert costs were estimated based on diameter and length under the ROW, and retaining wall costs were estimated based on volume of concrete required.

**Overhead Catenary Infrastructure**

For overhead catenary system, a per-mile installation cost was used. Catenary system costs also include electric power source, substations on a one per-twenty-five-mile unit of length of the corridor, and associated support equipment."
Signals

Since signal systems must be linked via cable along the ROW to communicate with trains and the various interlockings and crossovers, a per-mile installation cost was used. Signal system costs include electric power for signals, control houses, switches, and associated support equipment such as snow melters, and installation.

Maintenance Facilities

Maintenance and repair shops were estimated on a cost-per-square-foot basis for industrial or commercial buildings (depending upon scale), adjusted for the additional costs for structural support sufficient to house heavy locomotives, and for the cost of typical rail maintenance equipment (cranes, tables, lifts, etc.) that must be used to fit out such facilities.

Stations

Station costs were estimated on the basis of approximate square footage, at typical commercial construction cost values, adjusted regionally. At this Tier 1 level of analysis, all alternatives were assumed to require the same station improvements, carrying identical costs for this element.

Property Acquisition

Both Alternatives 110 and 125 would involve more substantial property acquisitions, which would be greatest for Alternative 125. (Alternative 90B also involves property acquisition on a much reduced scale than what is required for the additional track and right-of-way to be constructed as part of these higher speed alternatives.) Alternative 110 would require additional land to augment the existing ROW on the south side for an extra track. Alternative 125 would require property acquisition for a new ROW at some distance from the existing alignment.

Since the exact position and routing of additional trackage necessary to improve curves to allow higher speed is not yet known for either alternative, it was difficult to estimate property acquisition costs for these higher speed alternatives. Property acquisition was therefore estimated based on apparent need to modify curves, add parallel main-line or passing tracks, install additional grade separations to meet safety requirements, or expand yards. Three indices of cost were then applied: prime city, suburban, and rural. Costs for each index were based on recent property values along the corridor. No correction was made for inflation to 2015, as the current real estate market cannot be reliably predicted on the basis of standard inflation drivers.

Upon completion of Tier 1, and as the program moves into the next phase of work, more precise information will be developed, associated with the specific track, bridge, yard, station, and signal system construction projects. Additionally, a Service Development Plan will be developed for the preferred alternative. The Service Development Plan will include detailed operating plans, and increasingly precise capital construction costs and project schedules from which annual cash requirements for both capital and operating funds can be determined.

As set forth in the Agreements in Appendix J between CSXT and NYSDOT, CSXT is entitled to compensation for the use, acquisition, or diminishment in value of its property resulting from any

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[193] Alternative 90 requires some property, but on a smaller scale than either of the higher speed alignments.
project advanced as a result of the EIS. The development of the cost of alternatives must and will include the recognition of this principle, although the negotiation of the actual value of any compensation to CSXT is not part of this Tier 1 EIS, but will be developed if and when necessary during detailed analysis (Tier 2).

5.2.2. Operating and Maintenance (O&M) Cost Estimating Methodology

Operating and maintenance (O&M) costs for Empire Corridor high speed intercity rail services were based on unit costs for a variety of elements including but not limited to:

- Number of train crews needed to operate the prescribed number of trains – based on typical, industry standards;
- The number and size of train cleaning crews – based on hourly pay rate plus fringe and overhead costs;
- Track and signal system maintenance costs – based on annualized cost/track-mile, an industry standard, adjusted by region;
- Propulsion costs – based on locomotive mileage standards (gallons/mile or gallons/hour) at pre-determined speeds, typical cost of fuel, projected to the target analysis year, based on accepted industry methods;
- Janitorial and landscaping services – estimate of annual contract values and number of locations;
- Dispatching functions for trains, personnel, equipment.

By applying industry standard costs for labor hours, fuels, maintenance tools and supplies, rents, and general custodial and cleaning contracts, an approximate operating cost could be estimated for each alternative. These costs were compared among the alternatives to better understand how the different elements of each alternative affect annual operating costs.

Estimates of future annual operating and maintenance (O&M) costs for the proposed passenger rail system improvements and for the existing system were based on Amtrak accounting conventions, developed in response to the state-supported service provisions of the Passenger Rail Investment and Improvement Act of 2008 (PRIIA). Costs were initially derived for 2014, which is the first year for which PRIIA-mandated state operating cost payments are required (see Appendix F). These costs were then increased to account for the effects of inflation between 2014 and 2015, to permit their comparison with 2015 forecast revenues, and the derivation of 2015 subsidies for the alternatives. Annual operating expenses for the alternatives were based on the forecast of scheduled trains, train miles operated and per-train-mile O&M costs (for rolling stock), and per-track-mile infrastructure maintenance costs, acknowledging the anticipated increased costs for track and bridge maintenance due to greater wear from higher-speed operation. The methodologies by which operating costs were derived for the High Speed Rail Empire Corridor Program alternatives are detailed in Appendix F.

For all Build Alternatives except for Alternative 125, detailed operating plans require six additional train sets, each containing one diesel locomotive and five passenger coaches (including a 20 percent
sparing factor). Alternative 125 would involve electrification of the ROW west of Albany up to a proposed new Buffalo station, and its operating plan calls for 17 additional train sets, each containing one dual mode locomotive and five coaches (including a 20 percent spare factor). Each alternative involves an operating schedule necessary to permit sufficient service to attract the forecast ridership, as described in Chapter 3. The proposed train schedules were proposed based on the following:

- The number of trains that could be accommodated on the corridor under the Base (No Action) Alternative and proposed higher-speed alternatives without creating unacceptable conflicts with freight operations;
- A level of service sufficient to produce the forecast ridership, while also achieving the MAS and required average speed for each alternative.

5.2.3. Revenue Estimating Methodology

Annual ticket revenues are estimated based on ridership between station pairs, multiplied by the current Amtrak fare for travel between those pairs, assigned to the 2035 target year. This approach is consistent with the computation of the O&M costs for each alternative, which are also presented in near-current (2015) dollars.

5.2.4. Deficit/Subsidy Estimating Methodology

Few public transportation services earn enough money in fare and non-fare revenue to cover their entire annual O&M cost. Most transportation services require subsidy from government to balance their annual operating budgets. The operating deficits projected in this Tier 1 EIS are simply the difference between the estimated O&M costs and the estimated ticket revenues. Although ticket revenues are normally supplemented by lease, concession, rent, and advertising revenues (“non-ticket” revenues), these additional revenue streams are generally small compared with ticket revenues paid by passengers; therefore, ticket revenues alone are sufficient to give a reasonable picture of the scale of subsidy likely required for each alternative.

At the Tier 1 level of analysis, where increased train speed and shorter travel times would be the project benefits resulting in increased ridership, other factors that might influence travelers’ mode choices – higher or lower gasoline prices, tolls, air fares, bus fares, etc. – were held constant at their 2015 values and applied to the 2035 analysis year. By holding all 2015 cost relationships constant, the effect of speed and time on ridership can be observed alone, independent of any other factors.

5.3. Capital Funding Needs, Requirements and Sources

In the public transportation sector, where the majority of costs are funded by federal, state, and local governments, capital funding is defined as sources provided to agencies for the purchase of assets with significant useful life, generally greater than five years. Assets, such as buildings, rail yards and track, signal systems, bridges and culverts, real property, rolling stock, and long-life maintenance equipment (cranes, drop tables, turntables, wheel true installations, fork lifts, etc.), are
generally considered to have useful lives over five years, and are therefore purchased with capital funds.

As the costs of rail infrastructure and equipment are substantial, major capital improvements are undertaken by the host Class 1 railroads, federal agencies, states, and major municipalities (and occasionally other private sector participants, typically for location-specific improvements). Federal capital grants for passenger rail systems typically require a local match of a minimum of 10 percent to 20 percent of the value of the purchase, and sometimes more, with the amount depending upon the apparent public benefit of the project and other factors. To qualify for federal capital funding, and in accordance with federal grant requirements, a state or municipal sponsor – NYSDOT or the individual municipalities along the route in the case of the High Speed Rail Empire Corridor Program – must contribute capital funds as well, in partnership with the federal agency funding the improvement.

For the High Speed Rail Empire Corridor Program, capital funds would be provided primarily by FRA, the Federal Transit Administration (FTA), and NYSDOT. Where station upgrades are incorporated into the project, municipal governments and regional transportation authorities would provide capital funds, as well. Capital funds would be used for the following:

- **Purchase of property and equipment, such as locomotives and passenger coaches, or “rolling stock;”**
- **Upgrade and construction of facilities, such as stations, maintenance facilities at rail yards, rail yard expansions;**
- **Improvement or expansion of railway infrastructure, such as track, signals, switches, bridge structures;**
- **Acquisition of additional ROW, as required to add tracks or expand yards, or to straighten curves to allow higher speed operation; and**
- **Repayment of debt service and/or lease payments on long-term equipment purchases or construction costs, where private sector investors have participated on a lease or debt basis. (Note that lease payments used to retire debt for rail construction or rolling stock are typically funded as capital costs during the lease term.)**

### 5.3.1. The Capital Plan

The primary source of high-speed rail funding is anticipated to be FRA, using PRIIA and successor authorizations. For projects to be eligible for FRA funds, they must be advanced through the grant process, as described in Section 5.3.2. Projects are included in the New York State Rail Plan, which outlines all of the state’s rail system needs for both passenger and freight service. NYSDOT also includes rail projects on its Statewide Transportation Improvement Program (STIP) for informational purposes. The STIP is a four-year forecast of capital needs across all federally-funded transportation services. The STIP is updated by NYSDOT every two years and projects five years ahead as improvements from prior year plans are completed and new elements are identified for future implementation. Where additional funding may be sought from FTA or other federal grant programs, a project must be represented in the STIP.
5.3.2. Capital Funding Programs

The federal government has enacted laws and provided grant funding opportunities that have enabled states to invest in passenger rail service, particularly higher-speed operations. The Empire Corridor was initially designated for investment by U.S. DOT in the 1990s:

- **High-Speed Rail Corridor Designations:** Section 1010 of the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA, P.L. 102-240) directed the U.S. Secretary of Transportation to designate not more than five “high-speed” corridors where trains operating at speeds of 90 mph could be reasonably expected. Section 1103(c) of the Transportation Equity Act for the 21st Century (TEA 21, P.L. 105-178) directed the U.S. Secretary of Transportation to designate six additional corridors named in the law or based on criteria described in the law, for a total of 11 corridors.

- **Empire Corridor Designation:** The 463-mile Empire Corridor from New York City-to-Albany-to-Buffalo was designated by the U.S. Secretary of Transportation as a High-Speed Rail Corridor on October 20, 1992.

**Federal Capital Funding Programs**

The federal funding programs supporting intercity/high-speed passenger rail, and associated commuter rail projects are summarized below:

- **FY 2008 Appropriations Act: Capital Assistance to States – Intercity Passenger Rail Service:** The FY 2008 U.S. Department of Transportation (U.S. DOT) Appropriations Act (P.L. 110-161) established a new pilot program for joint federal-state intercity passenger rail capital investment. Under this program, $30 million in federal funding was made available to states on a competitive basis to fund up to 50 percent of the capital cost of improving intercity passenger rail service. Up to 10 percent of the $30 million was available for rail corridor planning grants.

- **Passenger Rail Investment and Improvement Act of 2008:** PRIIA (P.L. 110-432) authorized a high-speed grant program for FY 2009 through FY 2013 to improve intercity passenger rail service, operations, and facilities. PRIIA also directed the U.S. Secretary of Transportation to develop a long-range national rail plan that is consistent with approved state rail plans and the rail needs of the nation. This directive resulted in the publication of the Preliminary National Rail Plan in October, 2009. PRIIA established three new competitive grant programs for funding intercity rail capital improvements:
  - **Intercity Passenger Rail Service Corridor Capital Assistance Program:** Section 301 of PRIIA established grants for capital improvements to benefit all types of intercity passenger rail service, including the capital costs of facilities, infrastructure, and equipment necessary to provide or improve intercity passenger rail transportation. Eligible applicants included states (including the District of Columbia), groups of states, interstate compacts, and public intercity passenger rail agencies.
  - **High-Speed Rail Corridor Development:** Similar to Section 301, Section 501 of PRIIA restricted eligibility for grants to the U.S. Department of Transportation (U.S. DOT) - designated high-speed rail corridors (including the Empire Corridor). Grants could be used for acquiring, constructing, or improving rail structures and equipment. High-speed
rail was defined as passenger rail services that may reasonably be expected to reach speeds of at least 110 mph. Section 501 broadened Section 301 to include Amtrak as well.

- **Congestion Grants**: Section 302 of PRIIA authorized grants to states or to Amtrak (in cooperation with states) for facilities, infrastructure, and equipment for high-priority rail corridor projects to reduce congestion or facilitate ridership growth in intercity rail passenger transportation.

- **FY 2008 Appropriations Act: Capital Assistance to States – Intercity Passenger Rail Service**: The FY 2008 U.S. Department of Transportation (U.S. DOT) Appropriations Act (P.L. 110-161) established a new pilot program for joint federal-state intercity passenger rail capital investment. Under this program, $30 million in federal funding was made available to states on a competitive basis to fund up to 50 percent of the capital cost of improving intercity passenger rail service. Up to 10 percent of the $30 million was available for rail corridor planning grants.

- **American Recovery and Reinvestment Act of 2009**: The American Recovery and Reinvestment Act of 2009 (ARRA, P.L. 111-5), enacted on February 17, 2009, appropriated a total of $787 billion, including $8 billion specifically for the grant programs established by PRIIA and $1.3 billion for Amtrak capital grants. ARRA sought from states “shovel ready” transportation projects, among them programs and projects to advance high-speed rail. The appropriation references the authorities included in Sections 301, 302, and 501 of PRIIA, but states that the federal share of costs may be up to 100 percent.

- **A Vision for High-Speed Rail**: On April 16, 2009, the President announced a new vision for developing high-speed rail in America to develop a national network of high-speed rail corridors in collaboration with states, railroads, and other key stakeholders. The U.S. DOT issued a *High-Speed Rail Strategic Plan* in April, 2009. On June 23, 2009, the FRA issued interim program guidance (74 CFR 29900) establishing the selection process, priorities, and evaluation criteria for grants made under financial assistance appropriated under ARRA: approximately $1.9 million in unobligated FY 2008 U.S. DOT appropriations (P.L. 110-161) funding and $90 million for intercity passenger rail grants in the FY 2009 U.S. DOT appropriations (P.L. 111-8) funding. FRA combined the three PRIIA grant programs into the HSIPR Program.

- **State of New York HSIPR Awards**: On January 28, 2010, the first grant selections for the HSIPR program were announced. The State of New York has successfully competed for a total of $151 million in ARRA high-speed rail funding.

- **FY 2009 U.S. DOT Appropriations Act**: An additional $90 million was appropriated as part of the FY 2009 U.S. DOT Appropriations Act (P.L. 111-8), similar to the FY 2008 Capital Assistance to states’ grants. Following awards made by U.S. DOT under the solicitation issued in June 2009, $65 million of the original $90 million of FY 2009 Appropriations Act funds remained unused. On April 1, 2010, U.S. DOT issued notice of funding availability for these FY 2009 U.S. DOT Appropriations Act funds, to be used for construction projects with a 50 percent non-federal match.

- **FY 2010 Transportation, Housing and Urban Development and Related Agencies Appropriations Act**: Division A of the Consolidated Appropriations Act, 2010 (PL 111-117) appropriated a total of $2.5 billion for the HSIPR program. Of that amount, $50 million was made available by the U.S. DOT for planning projects, including multi-state proposals, with a 20 percent non-federal match. In June 2010, the U.S. DOT announced funding availability of $2.37 billion in FY 2010 appropriations funding for final design/construction and/or preliminary
engineering/NEPA projects for individual projects or corridor programs with a 20 percent non-
federal match. Remaining FY 2010 U.S. DOT appropriations were allocated to the HSIPR program for administration and research.

- **State of New York Awards:** The State of New York successfully competed for $28.5 million in FY 2010 transportation appropriations funds.

- **Redistribution of ARRA Funds:** On December 9, 2010, the U.S. DOT announced a redistribution of some ARRA funds to other corridors after the incoming governors of Wisconsin and Ohio indicated that they would not move forward with $703 million designated for Wisconsin and $400 million designated for Ohio high-speed rail projects. In 2011, Florida cancelled its high-speed rail project, and approximately $2.3 billion was redistributed among New York and other states; New York State received an additional $354.4 million, plus $7.3 million in supporting funding. Thus, from all sources, New York has received $558 million in federal funds and $110 million in state funding for New York State passenger rail, including projects on the Empire Corridor.

President Obama’s proposed budget for FY 2014 includes $6.4 billion to support passenger and freight rail projects across the country, under a new coordinated program called the National High-Performance Rail System (NHPRS). Over the next five years, the President’s total request for the NHPRS is $40 billion, of which $13 billion would support existing services, and $27 billion would be invested in improving and enhancing the Nation’s rail network.

**State Capital Funding Programs**

Section 14-d of the New York State Transportation Law authorizes the Commissioner to enter into contracts for the purpose of maintaining and improving rail transportation service. New York State has participated in capital funding for intercity rail services through a number of grant and bond programs, as follows:

- **Rail Service Preservation Program:** This $100 million, multi-year freight and passenger rail program was established in FY 2005-06 by the State Legislature, with portions of the funding being appropriated on an annual basis; some of these funds have been made available.

- **Transportation Capital Bonds:** New York State voters approved a *Rebuild and Renew New York Transportation Bond Act of 2005*, providing $2.9 billion for transportation funding, of which $27 million was allocated each year for rail and port projects. The Empire Corridor work is supported in part with a portion of these bond funds.

The New York State FY 2012 budget includes $26.6 million for passenger and freight rail projects. Of this total, $16.6 million will be used to subsidize Amtrak services, leaving $10 million to be divided between freight rail and high-speed passenger rail improvements. In addition, the Legislature and Governor agreed to a Memorandum of Understanding (MOU) that will direct NYSDOT to develop a two-year capital plan for FY 2013 and FY 2014. The MOU defines a program of infrastructure capital projects covering all modes under NYSDOT jurisdiction, at a level $100 million over the levels originally proposed in the Governor’s 2012-13 Executive Budget. Rail freight projects will be eligible for funding under a second round of Regional Economic Council Program funding.
5.3.3. Program Capital Funding Financial Roles

Federal Railroad Administration (FRA)

FRA is charged with promulgating and enforcing rail safety regulations, administering railroad assistance programs, and conducting research and development in support of improved railroad safety and national rail transportation policy. More recently, in addition to its responsibility for regulating rail operating protocols, FRA has received Congressional authorization and funding to distribute funds in support of high-speed passenger and freight rail operations. In this capacity, FRA is responsible for implementing and ensuring compliance with PRIIA, which provides the regulatory framework by which this funding is to be distributed to states and railroad operators.

With HSIPR, FRA established a sequence of activities that facilitates the evaluation of various high-speed rail proposals across the nation. The first level of effort – Tier 1 – requires the identification and conceptualization of alternatives for implementing high-speed rail improvements in a defined corridor, the creation of a practical framework for evaluation and comparison among these alternatives, and the selection of a preferred alternative to be advanced for detailed analysis. The next phase (Tier 2) requires that applicants develop details about the specific project elements proposed for investment, such as bridges, new track segments, grade separations, new stations, etc., and completion of detailed environmental review, to ensure that individual investments will not have unacceptable impacts. Upon receipt of NEPA clearance via Records of Decision (RODs), Categorical Exclusions (CEs), or Findings of No Significant Impact (FONSI), and completion of preliminary engineering, these individual elements become eligible for FRA funding for final design, property acquisition, and construction.

NYSDOT is following the HSIPR process for this High Speed Rail Empire Corridor Program, and this Tier 1 Draft EIS in part satisfies FRA’s procedural requirements for service development programs and corridor investment plans.

New York State Department of Transportation (NYSDOT)

NYSDOT is responsible for coordinating and developing comprehensive transportation policy for the state; coordinating and assisting in the development and operation of transportation facilities and services for highways, railroads, mass transit systems, ports, waterways and aviation facilities; and formulating and maintaining a long-range, comprehensive statewide master plan for the balanced development of public and private commuter and general transportation facilities.

NYSDOT also administers a public safety program for railroads and motor carriers engaged in intrastate commerce; and provides oversight in matters relative to the safe operation of bus lines, commuter railroads and subway systems that are publicly subsidized.

Section 14-d(2)(d) of the State Transportation law authorizes the Commissioner to “utilize federal monies” to improve rail transportation service or rail transportation facilities. NYSDOT can also spend non-federal funds which are appropriated to the agency for this service and facilities. Pursuant to Section 209 of PRIIA, the states in which Amtrak operates intercity passenger rail services for the benefit of the states, must work with Amtrak to establish a basis for allocating both direct and a portion of general operating and maintenance costs to each state in proportion to the service Amtrak provides. Effective April 2012, this element of PRIIA obligates NYSDOT to budget for and subsidize some portions of the Empire Service that were heretofore paid by Amtrak.
directly. Conversely, this regulation may vary the amount that NYSDOT has been paying Amtrak to operate the Empire Service, based on an allocation formula selected and implemented by the Surface Transportation Board.

**Amtrak**

As the passenger rail service provider and the owner of many of the stations on the Empire Corridor, Amtrak may contribute financially to high-speed passenger rail operations. Participation could involve providing train service; covering operating deficits; participating in funding capital improvements; or providing construction, maintenance, or dispatching resources along the ROW. This participation could be in part a function of Amtrak's annual budget and past practices regarding cost sharing, property and operating agreements with NYSDOT and CSXT. Future cost sharing arrangements would be governed by Section 209 of PRIIA, as previously discussed.

**CSX Transportation, Inc.**

CSXT, as the host railroad, owns 85 percent of the 463-mile Empire Corridor ROW from Poughkeepsie to Buffalo and Niagara Falls. Where CSXT owns the ROW, the company would, through its labor agreements, be involved in program construction and construction oversight. However, for the section of railroad from Poughkeepsie to Hoffmans, where Amtrak has entered into a lease agreement with CSXT, Amtrak, and NYSDOT will be responsible for program construction and oversight.

CSXT would be involved in the High Speed Rail Empire Corridor Program as necessary to ensure that construction projects along that portion of the corridor over which it operates would be implemented without adverse effects on its freight operations. CSXT is also a member of the program steering committee, the Empire Project Advisory Committee (EPAC) and, in that capacity, is providing technical and operational input and reviewing analyses and findings to ensure that its operating needs are addressed.

**Metro-North Railroad**

Metro-North, the host railroad and owner of the 61-mile Empire Corridor South segment between Spuyten Duyvil and a point just beyond Poughkeepsie station, would be involved in the High Speed Rail Empire Corridor Program as necessary to ensure that construction projects located along that portion of the corridor over which it operates would be implemented without adverse effects on its daily commuter rail services. Metro-North also could participate in funding capital improvements along its section of the corridor. Where Metro-North is responsible for the ROW, it would, through its labor agreements, be involved in program construction and construction oversight. Metro-North is also a member of the EPAC and, in that capacity, is providing technical and operational input and reviewing findings to ensure that its operating needs are addressed. Finally, it is likely that along portions of the Empire Corridor South over which it operates, Metro-North will participate in specific improvements that were a product of the Hudson Line Railroad Corridor Transportation Plan.
**Regional Transportation Authorities and Municipalities**

Transportation funding and services are frequently coordinated at the sub-regional and municipal level by regional transportation authorities (RTAs). The RTAs are active partners in project studies, advocacy and implementation, and frequently partner with NYSDOT on projects that will affect their jurisdictions. For the High Speed Rail Empire Corridor Program, the following RTAs are involved:

- Niagara Frontier Transportation Authority (Niagara Falls & Buffalo),
- Rochester-Genesee Regional Transportation Authority,
- Central New York Regional Transportation Authority,
- Capital District Transportation Authority.

These organizations could be involved in capital funding for station upgrades and/or parking improvements at stations. As federal funds provided to states and municipalities for rail system improvements are likely to require local match, in addition to state matching funds, some of the match could be provided by the state, municipality, or RTA.

**Private/Public Partnerships**

Private/public partnerships are often employed to gain coordinated benefits for complex and costly transportation projects. Private sector financing is often used for those elements of a project which are likely to generate a defined revenue stream that can be dedicated to debt repayment. In the case of the High Speed Rail Empire Corridor Program, private sector participation could involve station rehabilitation or replacement, where food concessions and rental payments from tenants create a revenue stream for debt repayment. There are also provisions within the tax law that permit the acceleration of depreciation on hard assets – in this case, locomotives and coaches – such that private financing may be available to acquire the rolling stock and lease it to the operator/owner (whether that be NYSDOT or Amtrak), where the lease payments, combined with the tax advantage, provide the profit necessary to justify the initial private sector involvement.

**5.4. Operations and Maintenance Funding Requirements and Sources**

Operating funds are used to pay the day-to-day costs of operating a transportation service. Labor costs include salaries, plus benefits. Fuel and utility costs cover vehicle propulsion, either combustion fuels or electric power, and heating, lighting, air conditioning, phones, and data network fees. Custodial and janitorial fees include cleaners, custodians, trash removal, recycling apparatus and hauling agreements, rent, license and permit renewal fees (except where these are incurred in support of a capital project, on a one-time basis), gardeners and landscapers, and professional services (legal, accounting, etc.). Repair costs include the costs for facility and equipment upkeep and minor component replacement. Major component campaigns, as in the replacement of brakes across an entire fleet on a programmed basis, are typically funded out of capital sources.

As previously indicated in Section 5.2.2, operating costs are generally covered by a combination of ticket revenue and other non-ticket revenue sources. By comparing the operating costs with the annual anticipated revenues from both ticket and non-ticket revenues, the annual operating
subsidy that the service will require is derived. These operating subsidies are typically provided by state or municipal governments.

Most public transportation in the U.S. requires subsidy; ticket revenues are rarely sufficient to cover the full cost of the service. Metro-North receives operating subsidies from the New York Metropolitan Transportation Authority (MTA). In New York, Amtrak receives operating subsidies from the U.S. DOT and NYSDOT. Except for payments to Amtrak, the federal government terminated its operating subsidy program in the 1970s.

Operating subsidies are generally likely to be available for the High Speed Rail Empire Corridor Program as follows:

- **Federal Operating Assistance:** Amtrak receives federal operating funds. Following implementation of PRIIA Section 209 on October 1, 2013, however, use of these funds will be limited to the Northeast Corridor and long distance services. The Lake Shore Limited, which operates over the corridor en route to Chicago, will receive continuing federal operating support. The balance of the corridor operating subsidies will need to derive from state and local sources.

- **State Operating Assistance:** NYSDOT works collaboratively with Amtrak on a number of projects. NYSDOT has led the effort to transform the 94-mile-long Hudson Line from Schenectady to Poughkeepsie, currently a CSXT-freight controlled line, to an Amtrak-controlled line. Additionally, NYSDOT has entered into a long-term agreement with Amtrak on further developing the Hudson Line for passenger rail use, providing operating subsidies and other funding when necessary and available, thus ensuring Amtrak’s continuing control over maintenance, operations, and dispatching.

- **Section 209 of PRIIA** establishes that Amtrak’s operating losses be covered through a combination of ticket revenue and state support. Historically, New York State has provided support to the Adirondack Service, and with the implementation of PRIIA 209, NYSDOT will provide financial support to the Empire Service, effective October 1, 2013. Although this new law creates new funding responsibilities for NYSDOT, it represents an opportunity for the state to have even greater control over the Amtrak service. Through the Hudson Line lease and the implementation of PRIIA 209, NYSDOT and Amtrak have developed a strong collaborative relationship that will be strengthened with the implementation of any of the Build Alternatives.

- **Regional Transportation Authorities or Municipal Operating Assistance:** Some costs associated with operation of stations or parking areas at stations could be assumed by municipalities or RTAs, as previously discussed in Section 5.3.3.

## 5.5. Financial Performance of Alternatives

Tier 1 concept level design and operations of the High Speed Rail Empire Corridor Program alternatives required the consideration of several operating scenarios and associated capital improvements. The goal of each scenario was to minimize passenger and freight train schedule conflicts, address critical congestion and delay locations, and sequence investments to yield continual improvement in corridor train service without unacceptably interfering with existing service. These operating scenarios considered the following:
Tier 1 Draft EIS  
Chapter 5 – Financial Capacity

- Upgrade tracks, signals, switch and interlockings, and communication systems to gain speed and reliability;
- Provide sufficient additional track to segregate to the greatest degree practical passenger from freight services; and
- Reduce the number of at-grade crossings or provide controls to restrict vehicle interference with train operations and satisfy FRA safety requirements associated with higher-speed train operation.

For Alternative 90A, the investment primarily would involve improving existing track and signal systems to gain speed and reliability. For Alternatives 90B, 110 and 125, the reduction in conflicts between freight and passenger trains would be achieved through the construction of longer passing sidings and/or new dedicated passenger track, allowing one train to bypass the other without delay to either.

While Empire Corridor South currently experiences relatively few conflicts between passenger and freight services, Empire Corridor West has significant freight and passenger train route sharing, with concomitant impacts on passenger service speed and reliability. For the western segment, Alternatives 90B, 110, and 125 would achieve greater or total separation of freight trains and passenger trains by using a new dedicated passenger track in the existing corridor (Alternatives 90B and 110) or by purchasing and constructing an entirely new, straighter and flatter, fully electrified ROW (Alternative 125). The Base Alternative and Alternative 90A would involve additional passing sidings and switches to permit passenger trains to pass freight trains, but would not involve an entirely new, segregated high-speed passenger rail track parallel to the existing mixed freight and passenger service tracks now shared by both operations. South of Albany, the High Speed Rail Empire Corridor Program would modify existing tracks, eliminate minor conflicts through some track improvements and better signaling, and construct other upgrades to improve already good (110 mph) speed performance between New York and Albany. In its entirety, the Empire Corridor would realize the following improvements:

- South of Albany, create track connections, modify interlockings, and make additional operational improvements that would result in segments of track where freight and passenger train conflicts would be better managed without slowing passenger service;
- West of Albany, eliminate selected grade crossings to enable higher speeds while meeting FRA safety requirements;
- West of Albany, add double track segments (including property acquisition to permit expanded right-of-way) and some selected “fourth track” passing sidings to eliminate freight and passenger train conflicts; and
- Over the entire route, schedule the added, higher-speed services to avoid conflicts with freight operations.

The various improvements proposed under each alternative would impose very different capital costs, ranging from $290 million for the Base Alternative to $14.71 billion for Alternative 125. Exhibit 5-1 shows these values graphically.
5.5.1. Capacity of Empire Corridor Service to Absorb Infrastructure Improvements

There is a limit as to how much interference operating rail services can absorb before train schedules are adversely affected due to slow-orders at work sites, or the requirement to manage two-way traffic on a single track, while the other track (or passing siding) is improved. In the case of the High Speed Rail Empire Corridor Program, the potential for adverse effect would likely be most pronounced for Alternative 90A, in which additional parallel track and passing sidings, and associated switches and turnouts to and from the main freight line, would be constructed in close proximity to operating trains. Because the improvements proposed under Alternative 90A also would occur under Alternatives 90B and 110, operating rail service under those alternatives also would be affected by proposed infrastructure improvements. The improvements proposed for Alternative 90A along Empire Corridor South and Niagara Branch would occur in Alternative 125. Alternative 125, with a new, separate corridor, would therefore present the least impact to the existing Empire Service.

Specific corridor construction impacts upon train service operations will be further defined in Tier 2 as detailed engineering is advanced on a preferred alternative. During Tier 2, the rate at which capital funding will be provided and the ability of existing train operations to absorb the effects of nearby construction will be more precisely assessed.
5.5.2. **Sequence of Capital Investments**

Depending upon the alternative selected, the High Speed Rail Empire Corridor Program would result in continuing investment over most or all of the 20-year program life, from 2015 through 2035. The existing rail corridor would remain in service as the improvements are made. The program improvements would be constructed in a sequence that minimizes interference with daily service, as a result, service improvements would occur and the benefits would be realized incrementally over the entire implementation time frame.

Exhibit 5-2 presents a proposed schedule of capital investments for each alternative. Capital costs are shown in 2015 dollars to enable comparison of total cost and overall benefit among alternatives. In subsequent phases of program evaluation (Tier 2), costs will be forecast with greater precision, based on the sequence of proposed improvements, which in turn will depend upon the level of available funding.
5.5.3. Estimates of Annual Operating and Maintenance Costs, Ridership and Revenues

Operating and Maintenance Responsibilities and Costs

Amtrak is responsible for operation of intercity passenger rail service along the entire Empire Corridor. Amtrak and CSXT currently share maintenance responsibilities between Poughkeepsie and Hoffmans. Recently, Amtrak and CSXT signed an agreement, which would transfer these CSXT maintenance and dispatching responsibilities to Amtrak. This agreement has been submitted to NYSDOT for approval. CSXT maintains responsibility for maintenance and dispatching on the portion of the corridor it owns between Hoffmans and Niagara Falls, and Amtrak continues these responsibilities on the portion of the corridor it owns between Penn Station and Spuyten Duyvil. Metro-North is responsible for ownership, maintenance, and dispatching along the corridor between Spuyten Duyvil and Poughkeepsie.

Exhibit 5-3 indicates the total annual operating cost for each Build Alternative as compared to the Base Alternative. Projected operating costs are based on existing Amtrak operating procedures and crew assignment protocols. The Base Alternative would include the existing four daily round-trips between Albany and Niagara Falls; the higher-speed alternatives would presume a doubling, from four to eight daily round trips. For Alternative 125, there would be almost five times the service (from four to 19 daily round trips) provided by the Base Alternative. The costs are shown in constant 2015 dollars to allow comparison across the alternatives.

Exhibit 5-3—Estimated Annual Operating and Maintenance Costs
The higher operating costs for Alternatives 90B and 110 relative to Alternative 90A would be due to the addition of a dedicated passenger-only mainline track for the 294-mile-long Empire Corridor West. In comparison, Alternative 90A would implement only selected passing sidings to permit more fluid corridor dispatching. Alternative 125 would have the highest O&M costs, reflecting higher track maintenance standards and the costs of maintaining electric power distribution infrastructure (overhead catenary, substations, protection) for the dedicated high-speed track.

**Ridership**

Both operating costs and ticket revenues are driven by the number of passengers carried, which determines the required number of trains, and, in turn, the number of crews, cleaning and maintenance staff, etc. Forecasting ridership for transportation services is a complex statistical process, which predicts travelers’ future behavior, based on analysis of past behavior in similar circumstances. The forecasting methodology employed for this Tier 1 EIS presumes that travelers:

1. Determine trips by the most appealing travel mode available for each journey;

2. Choose among the various available options based on (in generally descending order): cost and time, reliability, convenience (accessibility), comfort, and amenity;

3. Consider the difficulty of accessing the transport service in choosing how to travel (e.g., traffic congestion to a station, lack of parking, long walks to get to bus or train platforms); and

4. Act rationally – that is, in every case, they use the least costly or most efficient travel product (in terms of the above features) available.

Given the above “drivers” of travel mode choice (bus, car, plane, train, bicycle, walking), a computer model was used that recognizes the comparative speed, cost, accessibility, etc. of the travel modes between trip origins and destinations. For this program, the model assigned every trip in New York State that both begins and ends within the Empire Corridor. The model placed the Empire Corridor train service in competition with automobile, bus, and airplane travel modes. Assessing comparative cost, time, convenience, etc., the model forecast for the various alternatives the number of people that would elect to ride the train over automobile, bus, or airplane.

Ridership forecasts are a function of market size and frequency of train service, as well as speed, cost, and convenience (e.g., number of transfers required, ease of access to stations). While more frequent service might attract more riders, there is a point of diminishing returns, as the capital and operating costs of the additional train sets grow beyond the value of the additional ridership the increased service may attract. The alternatives were therefore structured to maximize ridership at practical levels of investment in rolling stock and maintenance costs, given likely federal and state funding over the program’s implementation period. Refer to Appendix B, *Ridership and Revenue Forecasting Report for the High Speed Rail Empire Corridor Program*, for additional details regarding the ridership forecasting methodology.

Exhibit 5-4 presents the 2035 annual ridership forecasts for the Empire Corridor under the five alternatives.
Exhibit 5-4—2035 Ridership Forecasts

Operating Revenue

Annual operating revenue forecasts are based on ridership forecasts between station pairs, multiplied by the current Amtrak travel fare between those pairs, assigned to the target comparison year. This allows comparison among the alternatives in terms of capital investments, annual O&M costs, and anticipated gross annual revenue and resulting required subsidy all in 2015 dollars. Exhibit 5-5 presents the estimated range of annual operating revenue in 2015 dollars for the five alternatives.
Annual Operating Deficits

Exhibit 5-6 summarizes the annual operating deficits for the five alternatives. These deficits account for the difference between total operating costs and combined anticipated ticket revenues. Non-ticket revenues derived from advertising, station concessions and leases, and utility leases along the ROW, while salutary and contributory to the program, do not generally produce sufficient additional income that would alter the operating deficit. These additional revenues would likely be similar across all alternatives.

Exhibit 5-6 indicates that deficits, and corresponding subsidies, would be lowest for Alternative 110 and greatest for Alternative 125. In general, while faster trains incur lower labor costs, as hourly wage train crews spend fewer hours on each run, propulsion costs are higher at high speeds, as are the costs of track maintenance, since high speed operations cause greater track wear. In addition, the greater number of daily trains intended to be operated under Alternative 125 would lead to higher crew and equipment maintenance costs.
5.5.4. Financial Profiles of Alternatives

Exhibit 5-7 shows projected Tier 1 capital costs for the five alternative, divided by category: rolling stock purchases; planning, engineering design, and permitting; property acquisition costs; infrastructure construction costs; and Empire Corridor South improvement costs. Capital cost estimates also include a 35 percent contingency factor to account for uncertainties at the Tier 1 program level of analysis for infrastructure improvements. As there are fewer uncertainties in rolling stock costs, equipment cost estimates include only a 5 percent contingency factor.

The capital costs for the five alternatives would range from $290 million for the Base Alternative, to $14.71 billion for Alternative 125. While the analysis shows all costs in 2015 dollars, actual investments would be made gradually over the 20-year project life. A staged implementation approach is based on two factors: first, federal and state governments have limited financial capacity in any single year; second, existing rail operations can only support a limited amount of infrastructure renewal or new construction along the ROW before construction activities interfere with daily service.
The anticipated financial performance of each of the five alternatives is as follows.

**Base Alternative**

The Base Alternative would be comprised of previously funded infrastructure upgrades west of Albany and key congestion relief projects south of Albany. Because much of the Base Alternative work is already in the final stages of NEPA documentation or final design, construction could begin as early as 2013, and would be completed prior to 2020. The Base Alternative would maintain the existing four round trips between Albany and Buffalo, and 13 round trips between New York City and Albany. Because there would be no change from the current operation, no additional rolling stock would be required to implement the Base Alternative. Operating costs would continue as they are currently incurred by Amtrak, approximately $103 million annually. Ridership is forecast to be 1.6 million in 2035, generating ticket revenue of $77 million, and resulting in a deficit of $26 million. Infrastructure costs to implement the Base Alternative would be $290 million; no new property would be required.

The Base Alternative would be completed by 2020, and its benefits (reduced congestion) would accrue gradually over the five-year construction period, with gradual improvements in reliability (on-time performance) and some modest increases in average speed.
Alternative 90A

Alternative 90A would include considerably more infrastructure improvements beyond those programmed in the Base Alternative. It also would provide for an increase in train service from four to eight daily round trips between Albany and Buffalo, and from 13 to 16 daily round trips between New York City and Albany. The additional service would require purchase of six additional train sets, each with a locomotive and five passenger coaches, to supplement the existing fleet. The acquisition of additional rolling stock would add $0.19 billion in capital costs. Alternative 90A would include $1.46 billion in infrastructure costs for additional passing track and various signal, grade crossing and switch improvements to reduce freight/passenger train conflicts,
increase permissible speeds through curves, improve system reliability, and secure the highest possible speed profile for the existing alignment. In total, capital costs would reach $1.66 billion for Alternative 90A; no property would be required. The required additional train maintenance and additional service would increase operating costs to $156 million. Based on shorter travel times due to increased speed, ridership would grow to 2.3 million annual passengers by 2035. Ticket revenue would be $119 million, resulting in a deficit of $37 million, annually.

Exhibit 5-9—Characteristics of Alternative 90A

Alternative 90A would be completed by 2035, and its benefits would accrue in steps, with approximately 25 percent of the maximum and average speed benefit accruing at the end of each five-year interval, with the completion of each segment of segregated track.
**Alternative 90B**

Alternative 90B would add one additional round trip between New York City and Albany over Alternative 90A, for a total of eight round trips between Albany and Buffalo, and 17 round trips between New York City and Albany. The increase in service would be accomplished with the same fleet as required for Alternative 90A, involving six additional train sets and rolling stock costs of $0.19 billion. The central aspect of Alternative 90B would involve the provision of a third track west of Albany, to be constructed within the existing CSXT ROW, giving significant separation between freight and passenger traffic. With the additional property required to grade separate the ROW and to reduce or eliminate curves to permit higher maximum speeds, infrastructure costs would be $5.39 billion. The total capital cost for Alternative 90B would be $5.58 billion in 2015 dollars. Operating costs would rise to $171 million, accounting for the additional daily round trip (compared to the Alternative 90A). Ridership is forecast at 2.6 million, generating ticket revenues of $139 million, and resulting in a deficit of $32 million.

**Exhibit 5-10—Characteristics of Alternative 90B**

![Diagram showing characteristics of Alternative 90B](image)
Alternative 90B is projected to be completed by 2035, and its maximum and average speed benefits would accrue in steps, with approximately 25 percent of the benefit accruing at the end of each five-year interval, with the completion of each new segment of dedicated track.

**Alternative 110**

Alternative 110 would involve slightly more new track west of Albany; the higher speed of Alternative 110 would require more property acquisition to support straighter track, more grade separations and flatter terrain. The number of trips would be unchanged from that of Alternative 90B. While rolling stock costs would remain at six additional sets and $0.19 billion, increasingly stringent track standards for the higher speed would involve $6.06 billion in additional infrastructure, resulting in total capital costs of $6.25 billion. Operating costs would increase only

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**Exhibit 5-11—Characteristics of Alternative 110**

- **How many people will ride the train?** 2.8 Million
- **How much will it cost?** $6.25 Billion
- **Additional Train Sets**
- **Cost/Revenue Summary**
  - **Infrastrucure:** $6.06 B
  - **Rolling Stock:** $0.19 B
  - **Operating Cost:** $173 M
  - **Ticket Revenue:** $149 M
  - **Deficit:** $24 M
slightly, to $173 million. Ridership would grow to 2.8 million in response to the higher speed, generating ticket revenues of $149 million, and producing the smallest annual deficit among the five alternatives, $24 million.

Alternative 110 is projected to be completed by 2035, and its maximum and average speed benefits would be achieved in steps, with approximately 25 percent of the benefit accruing at the end of each five-year interval, with the completion of each new segment of segregated track.

**Alternative 125**

Alternative 125 would retain the existing “legacy” regional service on existing CSXT tracks, while also constructing a new, entirely separate ROW at a significant distance from the existing Empire Corridor on which to introduce limited stop 125 mph service. The new ROW would be fully grade separated, and straighter and flatter than that of any other alternative. The higher speed of operation, and consequently shorter trip times between endpoints, would allow the operation of 19 daily round trips between Albany and Buffalo; New York City-to-Albany trips would increase to 24 daily. This increased service frequency, and the electrified ROW would require more and different equipment: “dual mode” diesel and electric locomotives in place of diesel-only locomotives. Alternative 125 would have a substantial increase in fleet size: 17 additional train sets would be required. The dual mode locomotive fleet would have substantial costs, $0.58 billion; and a new, fully segregated ROW would require an infrastructure investment of $14.13 billion, for a total capital cost of $14.71 billion. The increase in average speeds, combined with increased service frequency on both segments and high-speed express service between major stops, would attract the highest additional ridership, forecast at 4.3 million, and generating revenues of $245 million annually. Operating costs for this increased level of service would be the highest of all the alternatives, at $304 million, producing an annual deficit of $59 million.

Alternative 125 would be completed by 2035. Its reliance on an entirely new ROW between Albany and Syracuse, however, would not be completed until the tenth year, indicating that the first 50 percent of service benefits would not accrue until 2025. The next 25 percent service benefit would accrue about five years later, with completion of the new ROW to Rochester; and the remaining 25 percent benefit would accrue at the twentieth year, as the new corridor would reach Buffalo.
Exhibit 5-12—Characteristics of Alternative 125

**5.6. Summary of Capital, Operating and Maintenance Costs, Revenues and Subsidies for Empire Corridor Alternatives**

Exhibit 5-13 summarizes the capital and operating costs and revenues for each alternative to facilitate comparison.
Exhibit 5-13—Summary of Costs and Revenues for High Speed Rail Empire Corridor Alternatives

<table>
<thead>
<tr>
<th>Metric</th>
<th>Base</th>
<th>90A</th>
<th>90B</th>
<th>110</th>
<th>125</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Capital Costs</strong>*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Additional train sets</td>
<td>0</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>17**</td>
</tr>
<tr>
<td>Equipment Cost</td>
<td>$0.00</td>
<td>$0.19</td>
<td>$0.19</td>
<td>$0.19</td>
<td>$0.58</td>
</tr>
<tr>
<td>Infrastructure Cost</td>
<td>$0.29</td>
<td>$1.47</td>
<td>$5.39</td>
<td>$6.06</td>
<td>$14.13</td>
</tr>
<tr>
<td>Total Capital Cost</td>
<td>$0.29</td>
<td>$1.66</td>
<td>$5.58</td>
<td>$6.25</td>
<td>$14.71</td>
</tr>
<tr>
<td><strong>Operating &amp; Maintenance Costs</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>O&amp;M Cost (millions, 2015)</td>
<td>$103</td>
<td>$156</td>
<td>$171</td>
<td>$173</td>
<td>$304</td>
</tr>
<tr>
<td>Revenue (millions)</td>
<td>$77</td>
<td>$119</td>
<td>$139</td>
<td>$149</td>
<td>$245</td>
</tr>
<tr>
<td>Surplus/(Deficit)</td>
<td>($26)</td>
<td>($37)</td>
<td>($32)</td>
<td>($24)</td>
<td>($59)</td>
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<tr>
<td><strong>Benefits</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2035 Ridership (millions annual one-way trips)</td>
<td>1.6</td>
<td>2.3</td>
<td>2.6</td>
<td>2.8</td>
<td>4.3</td>
</tr>
<tr>
<td>Ridership Gain vs. Base</td>
<td>0.7</td>
<td>1.0</td>
<td>1.2</td>
<td>2.7</td>
<td></td>
</tr>
<tr>
<td>Average Speed</td>
<td>51</td>
<td>57</td>
<td>61</td>
<td>63</td>
<td>77</td>
</tr>
<tr>
<td>Time, NYC – Niagara Falls (hours: minutes)</td>
<td>9:06</td>
<td>8:08</td>
<td>7:36</td>
<td>7:22</td>
<td>6:02</td>
</tr>
<tr>
<td>Time Improvement vs. Base (hours: minutes)</td>
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<td>58</td>
<td>1:30</td>
<td>1:44</td>
<td>3:04</td>
</tr>
<tr>
<td>Round Trips Albany – Buffalo</td>
<td>4</td>
<td>8</td>
<td>8</td>
<td>8</td>
<td>19</td>
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<tr>
<td>Round Trips Albany – Niagara Falls</td>
<td>3</td>
<td>7</td>
<td>7</td>
<td>7</td>
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<tr>
<td>Round Trips NYC – Albany</td>
<td>13</td>
<td>16</td>
<td>17</td>
<td>17</td>
<td>24</td>
</tr>
</tbody>
</table>

*Costs in billions of 2015 year US dollars except where noted.
**Dual Mode locomotives required for Alternative 125

5.7. Funding Assumptions, Risks and Requirements

For the High Speed Rail Empire Corridor Program, it is assumed that a combination of federal high-speed rail funds and state and local revenue sources would be used for various infrastructure improvements and/or equipment purchases, as appropriate to funding source requirements and restrictions. Some of these funding sources would require local match. It is assumed that the state’s participation through some combination of local investments in stations or parking, the dedication of state bond funds, or direct subsidies from state general revenues could satisfy the local match requirements. At the Tier 1 level of analysis, and given the uncertainties associated with current high-speed rail funding, the rate at which federal funding will be provided for the program over the 20-year implementation period can only be estimated in broad terms, based on historical multi-year averages, adjusted for inflation.
All capital costs are shown as if they would be received in 2015. This allows for an appraisal of the relative capital costs of the program alternatives in total value, without regard for the rate at which funding would be available for the different alternatives.

5.7.1.  Financial Capacity Analysis

NYSDOT’s financial capacity to undertake major passenger rail improvement projects is constrained by limited resources and competing needs. Other NYSDOT major passenger rail improvement initiatives underway include participation in a wide range of capital investments required to maintain and improve rail transportation services in New York City and its Long Island and northern suburbs, as well as bus and rail rolling stock needs for other transit properties in the state’s smaller municipalities. NYSDOT is also involved in improving statewide freight rail services, in partnership with private freight rail owners. To a great degree, NYSDOT’s capacity to advance high-speed rail improvements will depend on dedicated local funding sources and federal support.

5.7.2.  Risk and Uncertainty and Risk Mitigation Strategies

Due to limitations associated with current funding sources, general budget pressures, and the need for continued maintenance of existing infrastructure, the pace of program implementation is difficult to project. Absent significant federal funding, NYSDOT currently has limited capacity to undertake major long-term investments in high-speed passenger rail projects. Moderate incremental investments are feasible within the context of existing and anticipated future funding. This Tier 1 financial analysis assumes substantial federal participation in the construction of any of the Build Alternatives. Furthermore, the federal programs outlined in Section 5.3.2 are primarily discretionary grants for capital improvements and related environmental and engineering studies, for which there is significant national competition.

NYSDOT has a history of providing operating support for inter-city and commuter rail transit, although there is no companion federal operating program. The financial analysis provided in Chapter 5 has defined a likely financial plan based on historic and potential future national funding trends. There are several operating and capital risks associated with the High Speed Rail Empire Corridor Program that would have to be addressed in formulating a detailed financial plan, however. Some additional fiscal capacity-related risks to NYSDOT and Amtrak are present as well. These risks are noted and described in the following subsections.

5.7.3.  Capital Cost Risks

There remain considerable uncertainties in the capital cost estimates for the High Speed Rail Empire Corridor Program, due to the limitations noted earlier in this chapter. This uncertainty is not unusual at the Tier 1 conceptual planning level for a program of this magnitude. More refined cost estimates will be prepared for the Service Development Plan, and again during Tier 2, when the specific infrastructure improvements of the selected program alternative are advanced through detailed design. Exhibit 5-14 summarizes capital cost risks and Tier1–level mitigation strategies for the High Speed Rail Empire Corridor Program.

At the Tier 1 planning level, it is difficult to anticipate and mitigate for these and other potential
risks and uncertainties. During Tier 2, NYSDOT will further develop planning, analysis, and engineering design data for these alternatives. NYSDOT also will conduct a public review process to generate support for a preferred alternative. The High Speed Rail Empire Corridor Program will then be positioned to compete effectively for federal, state, and private sector funding with which to initiate implementation.

5.7.4. Operating Cost Risks

As previously discussed, changes in fare structure affect ridership, with a resulting impact on fare revenue and cost recovery. Ridership affects service levels, which in turn affect maintenance and operating costs. Ridership and revenue are sensitive to on-time performance and to fare levels, which in turn affect the revenue forecasts and the operating ratio (the ratio of operating costs covered by fare revenues). Therefore, if the overall quality, speed, reliability, and availability of the new service would not meet customer demand, ridership could be lower than forecast, producing higher operating deficits and requiring additional state subsidies. Conversely, if the overall quality, speed, reliability, and availability of the new service would meet customer demand, ridership could be higher than forecast, resulting in lower operating deficits and requiring less state subsidies.
## Exhibit 5-14—Summary of Tier 1 Capital Costs Risks and Mitigation

<table>
<thead>
<tr>
<th>Risk</th>
<th>Mitigation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Negotiations with railroads.</strong> No provision is included for costs arising from negotiations with operating railroads regarding their potential contribution to capital, or potential costs involved in protecting freight crossings (necessary to permit high-speed passenger service) or the use of ROW based on sharing agreements.</td>
<td>The uncertainty associated with costs of CSXT participation is reasonably accommodated in the broad 35% construction contingency factor.</td>
</tr>
<tr>
<td><strong>Property costs.</strong> ROW acquisition costs are difficult to estimate in an uncertain commercial and residential real-estate market.</td>
<td>As corridors are more precisely defined during Tier 2 work, it will be possible to sharpen the estimate for required property for the selected alternative.</td>
</tr>
<tr>
<td><strong>Broad unit costs</strong> (per ton, per cubic yard, per linear foot, etc.) have been applied for key elements rather than estimates based upon specific designs.</td>
<td>During Tier 2 work on the selected alternative, as design detail is refined, costs specific to each element of infrastructure improvement will be more precisely defined.</td>
</tr>
<tr>
<td><strong>Mitigation costs.</strong> No allowances have been provided for utilities, wetlands mitigation, and preservation of historic structures, potential hazardous materials or other special site conditions.</td>
<td>These uncertainties have been addressed to a considerable degree: the 35% contingency factor is applied to property acquisition as well as to construction; the engineering design/permitting cost category has been applied at 15%, rather than a more conservative 10-12% as is normally the case in standard construction. As the design becomes more refined, mitigation costs will be better defined and may be either more or less than the costs as accounted for in this Tier 1 analysis.</td>
</tr>
<tr>
<td><strong>Inflation rate.</strong> The rate of inflation is uncertain; moreover, inflation as represented in the consumer price index is not always representative of inflation for heavy construction or, more specifically, heavy rail construction, which tends to depend on competitive worldwide demand for concrete and steel at the time a project is designed and ready to bid.</td>
<td>Application of a 35% contingency factor for both construction and property acquisition addresses this concern to a degree. It is virtually impossible, however, to forecast these factors beyond a 5-10 year time frame, so a 20-year program schedule is necessarily burdened with some additional risk.</td>
</tr>
<tr>
<td><strong>Financial market.</strong> Financial risks and interest rates may increase as capital markets respond to changes in the financial market and global economy. To the extent that project elements are funded by CSXT or through private-public partnerships involving debt, costs of debt service can vary dramatically.</td>
<td>Government typically reserves low-interest debt programs through its economic development function. Where commercial debt becomes too costly, Government can sometimes guarantee debt, and thereby reduce its risk and associated costs, so that the debt-service costs can be maintained within reasonable ranges commensurate with these initial cost estimates.</td>
</tr>
<tr>
<td><strong>Federal participation.</strong> The level of federal participation may be lower than estimated.</td>
<td>Because the High Speed Rail Empire Corridor Program constitutes a large number of individual infrastructure improvements, should federal funding be insufficient, the program could be implemented more slowly and over a longer time period, still delivering steady improvement in corridor rail service.</td>
</tr>
<tr>
<td><strong>Local participation.</strong> The level of local funding commitment may be lower than estimated.</td>
<td>With sufficient public support, through referendum or bonding, it may be possible for NYSDOT to dedicate funding to the program to immunize it from the ebb and flow of local tax revenues and annual budgeting and legislative appropriations.</td>
</tr>
</tbody>
</table>