NEC FUTURE

TIER 1 FINAL ENVIRONMENTAL IMPACT STATEMENT

VOLUME 2

10. Phasing and Implementation

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10. Phasing and Implementation

As discussed in Chapter 1, Introduction, the outcome of NEC FUTURE is that the Federal Railroad Administration (FRA) will select a long-term vision for passenger rail in the Study Area. The Preferred Alternative, which the FRA will describe in the Tier 1 Final Environmental Impact Statement (Tier 1 Final EIS), will define that vision. As discussed in Chapter 4, Alternatives Considered, the FRA anticipates that implementation of the Action Alternatives would follow an incremental or phased approach. The FRA will develop and describe a phasing plan for the Preferred Alternative in the Tier 1 Final EIS. The phasing plan will identify the priorities and describe the proposed approach for incrementally implementing new service in the Study Area and building the proposed improvements necessary to support and maximize the benefits of the Preferred Alternative.

In advance of identifying a Preferred Alternative, it is useful to understand the approach, feasibility, and benefits of incrementally implementing any one of the proposed Action Alternatives. The FRA does not intend to use this initial phasing discussion as a factor in evaluating the Action Alternatives. Furthermore, the Preferred Alternative could include components of one or more Action Alternatives. Therefore, the FRA developed a representative initial phase that could apply to any one of the Action Alternatives. The purpose of this chapter is to illustrate a representative first phase of projects that respond to market and service needs relevant to all the Action Alternatives. As defined, the initial phase is a collection of projects that would improve service and address critical infrastructure improvements for any of the Action Alternatives. This initial phase is referred to as a Universal First Phase since it does not prejudice the outcome of the subsequent decisions about a Preferred Alternative and a Selected Alterative. [1]

The ability to implement expanded passenger rail service as envisioned in the Action Alternatives, and to make the improvements necessary to support such service, will depend on many factors, including funding, environmental approvals, market growth, regional cooperation, and practical constraints relating to construction on a very busy rail corridor. Therefore, project sponsors will implement improvements incrementally. Some work, such as state-of-good-repair projects, could advance on a continual basis through annual bridge, track, electric-traction, systems, and structures programs, while larger projects would be planned and implemented separately.

The Service Development Plan—to be prepared following completion of the Tier 1 Final EIS and Record of Decision—will provide a detailed phasing plan for the Selected Alternative. The Universal First Phase described in this chapter includes the fundamental building blocks applicable to any of the Action Alternatives. These building blocks collectively address the Study Area's most pressing capacity and state-of-good-repair challenges. While the future project proponents would refine the scope and design of the projects within the Universal First Phase based on specific requirements of the Selected Alternative, implementation of these projects creates a starting point from which to advance the Selected Alternative. Importantly, the improvements would enable the states and the NEC railroads to realize near-term benefits of investment in the NEC (e.g., increased service, improved reliability, shorter travel time, and advancing state-of-good-repair priorities). The

[1] See Chapter 1 for the discussion of and differences between the Preferred Alternative and Selected Alternative.

successful implementation of the complex, integrated program of service and infrastructure improvements included in the Universal First Phase will require ongoing partnerships. While there is no target date for completion of the Universal First Phase, projects included could be constructed and be in service within 10 to 15 years.

The FRA did not assess environmental or economic effects of the Universal First Phase separately in the Tier 1 Draft EIS (Chapters 5, 6, and 7). While the FRA will consider the feasibility of incrementally implementing each Action Alternative in its recommendation of a Preferred Alternative, the FRA did not consider the representative Universal First Phase in the evaluation of alternatives described in Chapter 9, Evaluation of Alternatives. Moreover, the Universal First Phase, as defined, applies to each of the Action Alternatives and therefore is not a differentiator among them. However, by defining a Universal First Phase, the FRA describes how the collection of projects included in this Universal First Phase could be implemented and the benefits that could be achieved from them in the near term.

In addition to projects that address the NEC's most pressing capacity and state-of-good-repair priorities for each of the three Action Alternatives, the Universal First Phase also includes implementation of operational efficiencies and corridor-wide service enhancements that would change the way passenger service is operated today. These changes could influence cost-sharing agreements that are discussed by the NEC railroads through the Northeast Corridor Infrastructure and Operations Advisory Commission (NEC Commission). Cost-effective and timely implementation of the types and quantity of service included in the Action Alternatives would reflect the ability of NEC stakeholders to make changes to existing institutional, governance, or cost-sharing agreements. These changes would affect the funding, feasibility, and schedule of any of the Action Alternatives.

10.1 NO ACTION ALTERNATIVE

The Universal First Phase is not part of the No Action Alternative. The passenger rail improvements included in the No Action Alternative, by definition, already are planned, programmed, and in some cases, under construction. The Universal First Phase would build on the completion of those No Action Alternative projects already programmed for the near term. In this way, the FRA can incorporate the No Action Alternative projects, and their associated operational and capacity benefits, into the service and construction planning for the Universal First Phase. The Universal First Phase does not include the following improvements already included in the No Action Alternative:

- Mid-Line Loop project in New Brunswick, NJ
- East Side Access Project in New York City, NY
- Harold Interlocking upgrade in Queens, NY
- Walk (movable) Bridge replacement in Norwalk, CT
- Third-Track Project in Rhode Island

10.2 UNIVERSAL FIRST PHASE

The Universal First Phase of work consists of the projects required to implement any of the three Action Alternatives. It builds upon the No Action Alternative and incorporates those projects included in *all* Action Alternatives, but does not include projects specific to *each* Action Alternative's distinct long-term service objective (maintain, grow, transform). As noted, in some cases, the specific scope and design of a project in this Universal First Phase would be determined in subsequent project-level (Tier 2) analyses and could vary depending on the Action Alternative selected by the FRA. Implementation of this phase would support a modest increase in both Intercity and Regional rail services, greatly enhance the overall reliability of passenger rail on the NEC, and prepare the NEC for future phases of work.

The Universal First Phase consists of the following:

- Major projects to replace aging infrastructure (as part of the effort to return the NEC to a state of good repair) and to address major chokepoints
- Projects necessary to minimize adverse impacts on passengers and rail operations during construction (e.g., additional interlockings so that trains can change tracks more frequently, and additional trackage at some locations)
- Operational, efficiency, and appropriate organizational changes required to maximize the benefit and cost-effectiveness of investment in the NEC and provide for an enhanced passenger experience
- Passenger equipment with consistent performance standards across the NEC

Universal Projects to Replace Aging Infrastructure and Address Major Chokepoints

The Universal First Phase includes major projects to replace aging infrastructure and relieve chokepoints. While these projects are universal in need across the Action Alternatives, they could differ to some extent in scope and design. For example, a new bridge could require two to four tracks in Alternative 1 or Alternative 2, but six tracks for Alternative 3.

Table 10-1 lists the projects included in the Universal First Phase intended to replace aging infrastructure and address major chokepoints for the Action Alternatives. The table also indicates if the improvement would take place primarily on the existing NEC right-of-way (requiring lengthy outages during construction that could adversely affect ongoing passenger rail operations) or primarily off the NEC (where construction work could proceed with fewer outages and impacts).

Table 10-1: Universal First Phase Projects – Aging Infrastructure and Major Chokepoints

Project	Construction Generally On or Off the NEC	Description
Replace Aging Infrastructure		
Electrification System Modernization: Washington, D.C.—New Rochelle, NY	On	Modernization of the existing electrification system, including constant-tension catenary
Signal System Modernization: Washington, D.C.–New Rochelle, NY	On	Modernization of the existing signal and traffic control systems
Replacement of Major Bridges ■ Gunpowder River (MD) ■ Bush River (MD) ■ Susquehanna River (MD) ■ Pelham Bay (NY) ■ Cos Cob (CT) ■ Saugatuck River (CT) ■ Devon (CT) ■ Connecticut River (CT)	Off the NEC if built as new structure; on the NEC if rebuilt or upgraded in place	Replacement generally in kind with movable or fixed structures
Address Chokepoints		
Washington Union Station, Master Plan Phase 1 and Phase 2 (Washington, D.C.)	On	Expand existing Main Concourse and increase east side tracks/platforms
Hanson Interlocking (Landover, MD)	On	Reconfiguration of existing Landover Interlocking
New Carrollton Station Improvements (New Carrolton, MD)	On	Additional track and platforms to create a station with platforms on all four tracks
Odenton Station improvements (Odenton, MD)	On	Additional track and platforms on express and local tracks; new interlocking south of Odenton
Baltimore-Washington International Airport Station Center-Island Platform (Ann Arundel County, MD)	On	Additional track and center-island platform
Fourth track between Odenton and Halethorpe (Maryland)	On	Eliminates chokepoint and supports expansion of BWI Airport station
Baltimore and Potomac Tunnel Replacement (Baltimore, MD)	Off	Replacement of existing two-track tunnel with four new tunnel tracks
Aberdeen Station Platforms (Aberdeen, MD)	On	New four-track station with platforms on express and local tracks
Newark Transportation Center and Davis Interlocking Reconfiguration (Newark, DE)	On	Partial chokepoint relief; station reconstruction, track shifts and new interlockings
Trenton improvements (Trenton, NJ)	On	Chokepoint relief; grade separated track connections for Regional rail yard access and turn-backs
Metropark Station – express track platforms (Metropark, NJ)	On	Reconfiguration of station and track alignments in station area to provide platforms on the express tracks
North Brunswick Station (North Brunswick, NJ)	On	New station
Hunter Flyover (Newark NJ)	On	Eliminates at-grade rail connection between Raritan Valley line and NEC
Newark Penn Station capacity improvements (Newark, NJ)	On	Track, interlocking, signaling and station improvements to maximize throughput capacity of existing station

Table 10-1: Universal First Phase Projects – Aging Infrastructure and Major Chokepoints (continued)

Project	Construction Generally On or Off the NEC	Description
Address Chokepoints (continued)		
Portal Bridge replacement (Newark NJ)	Off	Replacement of existing movable Portal Bridge with fixed-span two-track north and two-track south bridges
Secaucus Station Expansion (Secaucus, NJ)	Off	Expands existing station to accommodate platforms on tracks feeding the new Hudson River Tunnel and to provide parallel movement capability between the new tunnels and the new third and fourth tracks between Newark and Secaucus
4-track Mainline between Newark and Secaucus (New Jersey)	On	Supports increased capacity resulting from Portal Bridge, Secaucus Loop and Hudson River tunnel projects
Hudson River Tunnel Replacements (NJ/NY)	Off	Additional of two new tracks under the Hudson River and restoration of the two existing tracks to provide four-track capacity
Penn Station NY Expansion (New York City, NY)	Off	Six to eight additional platform tracks
Hell Gate Line 4-tracking and four new Bronx stations (Bronx, NY)	On	Initial phase of New Haven Line Penn Station New York access
Shell Flyover (New Rochelle, NY)	On	Construct flyover connecting Hell Gate Line tracks to center tracks of the New Haven line
Cross-Westchester turn-back (Port Chester, NY)	On	Facilitates conflict-free Regional rail train turns
Barnum Station at East Bridgeport (East Bridgeport, CT)	Off	Track reconfiguration and new station with platforms on express and local tracks
Canton Jct. to Readville 3rd track	On	Add third track to NEC main line
South Station Expansion (Boston)	On	Addition of tracks and platforms; interlocking reconstruction; yard capacity expansion

Source: NEC FUTURE, 2015

Projects to Support Construction

The Universal First Phase includes temporary and permanent improvements to the NEC to support the management of train traffic during construction and to minimize adverse effects to customers and ongoing passenger rail operations. These projects include the following types of improvements:

- Additional interlockings approaching and through construction areas to better manage train traffic
- Additional segments of track to bypass construction work and to support operations when other tracks are out of service

The location for these temporary and permanent traffic management enhancements would be determined during the National Environmental Policy Act (NEPA) Tier 2 project-level analysis and would depend on the location of specific projects and the construction staging and sequencing planned for the work. These traffic management enhancements would be identified and designed in parallel with the underlying projects and would be installed prior to construction.

Importantly, segments of new track added to support construction could be planned during the NEPA Tier 2 project-level analysis to serve in the future as segments of a second spine or to provide additional capacity for train traffic. Thus, the planning for such construction mitigation should be strategic in nature to support future opportunities.

Projects and Actions to Enhance Service Efficiency and Customer Experience

The infrastructure projects included in the Universal First Phase would eliminate chokepoints and expand the capacity of the railroad. Thus, these improvements would support an increase in both Intercity and Regional train service. However, the extent to which service is improved—and the degree to which passengers benefit—would be greatly enhanced if the NEC railroads were to jointly implement key changes in the operation and scheduling of trains. These coordinated efforts—building off work today to operate across the NEC—would further increase capacity, reduce operating costs, and support more convenient service to NEC passengers.

Key operational and efficiency improvements include the following:

- **Passenger Capacity –** Train consists should maximize carrying capacity through use of longer trains and high-capacity coaches.
- **Service Integration –** The customer experience would be greatly enhanced through development of better-coordinated Intercity and Regional train schedules on the NEC. This would facilitate scheduled transfers between services and from one operator to another, with fewer delays and faster connections.
- **Slot-Based Operations –** Comprehensive expansion of a standardized slot-based service schedule across the NEC network, which would optimize the use of available capacity, improve reliability, and assist with the coordination of corridor-wide service.
- **Reduced Dwell Time –** Enforcement of standardized dwell times, and changes in boarding and de-boarding practices, would improve reliability and reduce travel time.
- **Common Fare System –** A common ticketing and fare collection system (supporting use of a single fare medium for all NEC operations) and consolidated corridor-wide schedules, train information and trip-planning applications, which would simplify the travel experience.

Incorporation of these operating efficiencies across the NEC becomes feasible with completion of the Universal First Phase projects, which would help to maximize the benefits of the physical improvements to the NEC and enhance the passenger experience. Importantly, they would also demonstrate the ability and commitment of the NEC railroads to work together to transition the NEC to a more integrated passenger rail network. Implementation of these operational changes is sufficiently important for achieving the full benefit of NEC investment that the FRA may consider making their timely implementation a condition for future federal funding awarded to advance Universal First Phase projects. Stakeholder and public comment on such a requirement will help to shape the FRA's policy in this regard.

Equipment

The acquisition of new Intercity passenger rail equipment would be essential to expand and enhance Intercity rail service on the NEC. State-of-the-art high-performance train equipment operates at higher speeds, accelerates and decelerates faster, and accommodates a greater number of passengers per car than existing trains. These attributes are critical to maximizing the benefits from physical improvements to the NEC infrastructure.

Modernization of train equipment used by the NEC commuter rail authorities, and expansion of their fleets to maximize the number of seats per train, would further enhance the benefits from implementation of the Universal First Phase. While the FRA makes no specific assumptions in this regard, the FRA anticipates that the operators of regional service would move toward building a fleet that incorporates state-of-the-art technology and efficiencies, and provides more consistent and better performance characteristics.

The Universal First Phase assumes that Amtrak would acquire new Intercity-Express train equipment to supplement or replace the current Acela trainsets. While not specifically included as a Universal First Phase component, the phased replacement of the Intercity-Corridor equipment used wholly on the NEC with high-performance train equipment would expand carrying capacity and performance, and facilitate introduction of Metropolitan service.

10.2.1 Service Benefits

Implementation of the Universal First Phase would relieve the most serious capacity constraints on the NEC and accommodate near-term ridership growth.

- **Intercity-Express –** Washington, D.C.-New York City Intercity-Express service would expand to two trains per hour during portions of the day. The seating capacity of Intercity-Express trains would grow by replacing current Acela trainsets with new higher-capacity equipment. This would help to address current constraints on Intercity-Express service across the NEC. New equipment and elimination of chokepoints would reduce travel time and recovery (pad).
- **Intercity-Corridor –** A second hourly Washington, D.C.-Boston Intercity-Corridor train would be added during portions of the day to support growing demand. Some additional stations would be added to the stopping pattern for Intercity-Corridor trains if existing train equipment is replaced with new high-performance trains. As noted, the FRA does not assume replacement of the Intercity-Corridor fleet—a prerequisite for introduction of Metropolitan service—as part of the Universal First Phase.
- **Regional Rail Service –** Regional rail service would increase incrementally, generally following the growth plans of the current operators. Improvements would be targeted to those lines and service zones that are overcrowded or that are expected to grow beyond the limits of current capacity. The length and capacity of existing trains would be increased to the extent practical, given the physical limitations of platform and yard track lengths. Service frequencies would be increased where capacity is needed beyond what is achievable by lengthening trains. Specific Regional rail service initiatives could include the following:

- VRE:
  - Lengthen existing trains as practical to increase capacity
  - Increase peak service and introduce reverse-peak and off-peak service as planned, as projects are completed to expand capacity in the Long Bridge corridor and at the Washington Terminal yards
- MARC:
  - Lengthen existing trains as practical to increase capacity
  - Increase frequency of peak service on Penn Line as 4th track project through BWI Airport is completed and yard capacity is expanded
- DelDOT:
  - Increase express service to Philadelphia, PA from Wilmington and Newark, DE
- SEPTA:
  - Lengthen existing trains as needed to accommodate growth
- NJ TRANSIT:
  - Increase in peak service on existing lines to Penn Station New York, following completion of new Hudson River tunnels (and rehab of existing tunnels) and construction of the Mid-Line Loop and Hunter Flyover projects
- LIRR:
  - Following opening of East Side Access project and initial break-in period, ramp up to full service to Grand Central Terminal
  - Potential temporary reduction in service to Penn Station New York following institution of full service to Grand Central Terminal, to facilitate reconstruction and upgrading infrastructure serving the Penn Station New York complex, with service to be restored as demand grows
- New Haven Line:
  - Existing trains lengthened to the extent practical
  - Operations are streamlined to enable improved utilization of existing tracks
  - Investment is made in island platforms at express stations (e.g., Port Chester, South Norwalk, Bridgeport) to support introduction of limited-stop service
  - Increase in total service consistent with planned initial increment of Penn Station Access
- Shore Line East:
  - Additional service to New London, CT, as currently planned

- MBTA:
  - Introduction of limited South Coast service as currently planned
  - Increased zone express service beyond Canton Junction, with Stoughton and South Coast trains preserving headways at local stops north of Canton Junction
  - Lengthen existing trains as practical to increase capacity, within limits of available platform capacity at Boston South Station

10.2.2 Transportation Benefits

Demonstrating tangible service benefits from the implementation of early projects will assist NEC stakeholders in making the case for future investment in the NEC. The Universal First Phase generates the following important service benefits:

- Relieves current overcrowding on Intercity and Regional rail trains and accommodating the continuing underlying growth in travel demand in existing NEC markets
- Improves service reliability
- Provides shorter travel time for Intercity service
- Integrates scheduling of trains to support easier and faster connections between different services and operators
- Develops an integrated NEC train schedule and trip-planning information and a common ticketing and fare collection system

Table 10-2 compares projected ridership upon completion of the Universal First Phase (estimated for this purpose as the increase in underlying growth between the years 2025 and 2030) with existing (2014) ridership.

Table 10-2: Universal First Phase – Estimated Rail Ridership

Type of Service	**2014 Total Ridership** (millions of annual trips)	**2015–2030 Projected Ridership Universal First Phase** (millions of annual trips)
Intercity	14.3	18.2–19.5
Regional	180.0	220.0–240.0

Source: NEC FUTURE team, 2015

10.2.3 Capital Cost

Consistent with Appendix B, *Capital Costs Technical Memorandum*, the capital cost estimate provides a conceptual cost estimate to implement the Universal First Phase. The conceptual level of detail is a function of deliberation, analysis, engineering assessment, and understanding of those components aggregated by the capital cost model. As such, the FRA did not develop a cost estimate for each individual improvement, but instead applied the same programmatic approach that was used to estimate the capital cost for each Action Alternative to estimate the system-wide capital cost for the Universal First Phase.

Table 10-1 identifies the Universal First Phase projects to replace aging infrastructure and address major chokepoints. This list of projects includes linear element costs (e.g., new segments and new tracks) and supporting infrastructure costs (e.g., stations and junctions, and rolling stock requirements). These costs are included in the capital cost estimate of the Action Alternatives. For consistency purposes, the FRA relied on the capital cost estimate for Alternative 1 to develop a representative capital cost for the Universal First Phase projects.

The capital cost includes the following:

- New Tracks – catenary upgrades, signal upgrades, and the addition of one or two additional tracks to the existing NEC
- New Segments – construction of new major bridges and new tunnels
- Stations – construction of new stations, station upgrades, and other capacity or pedestrian circulation improvements
- Junctions – construction of new junctions, interchanges, and connections

Table 10-3 presents a range for the capital cost estimate of the Universal First Phase projects in 2014 dollars.

Table 10-3: Universal First Phase – Capital Costs

Category	Capital Cost Range ($2014 billions)
Infrastructure	$21–22
Vehicles	$3
Subtotal	$24–25
No Action Alternative Projects	$9
TOTAL	**$33–34**

Source: NEC FUTURE, 2015

10.3 IMPLEMENTATION STRATEGIES AND CHALLENGES

The scope and schedule for implementation of any of the projects included in Universal First Phase depend on a broad range of factors, including funding, regulatory and permitting approvals, completion of planning and engineering, duration of construction, and coordination of construction activities with railroads operating on the NEC. Thus, implementation of the Universal First Phase would be challenging and require a higher degree of coordination and planning by all the NEC railroads than has been required in the past.

In addition, there are two unique challenges that the NEC railroads and states must address:

- Changes in the way the NEC railroads plan and pay for projects and operate their services
- Detailed construction staging and operations planning

10.3.1 Coordinated Corridor-Wide Planning

Eight commuter rail operators and Amtrak provide passenger rail service on the NEC today. Each controls its own operations and schedules. Despite the growth in demand for passenger rail service that extends well beyond the service area of each commuter rail operator, there has been little movement toward integrating service planning across systems. The planning and funding of capital projects that benefit multiple operators also has been challenging and a source of focus by the railroads through the NEC Commission.

As noted, the Universal First Phase assumes, and the FRA expects, improvements in the operation and scheduling of NEC trains to address these issues. If achieved, the NEC would begin the important transition from today's separate service areas to a rail network of integrated services. In addition, construction of some of the improvements included in the Action Alternatives may require financial support from multiple states and railroads, and would require construction and operations planning by all entities across the NEC.

Numerous institutional, governance, and organizational issues must be addressed to achieve a network approach to NEC operations and to facilitate the long-term upgrade of the NEC. Some of these require forums for discussion, planning, and negotiation between railroad operators and states; others may require legislative and statutory changes at the national and state levels. These issues include the following:

- Operation of trains beyond the service area and/or in another state. This would occur with through-service options—e.g., at Penn Station New York (LIRR and NJ TRANSIT trains) and at Washington, D.C. (MARC and VRE trains)—affecting labor agreements, liability, maintenance, and the scheduling of trains.
- Expenditure of state funds on improvements located in another state. Implementation of a long-term, multi-billion dollar program of improvements may require the means to pool funds from NEC states to support major projects with corridor-wide benefits, such as new tunnels or expansion of major terminals.
- Development of program phasing plans and the prioritization of projects between different program phases.
- Consensus on future rolling stock specifications and possible corridor-wide equipment purchases.
- Management of operations across the NEC, particularly during construction when capacity may be most constrained.
- Allocation of revenue from integrated and through-train train operations.

The No Action and Action Alternatives include improvements to the existing NEC and new off-corridor segments. However, specific details about who owns, operates, or maintains both the new infrastructure and proposed passenger rail service have yet to be determined. As such, it is premature to assign either benefits or costs to a specific state or jurisdiction based on the geographic location of a proposed improvement. Investments in the NEC may be subject to the provisions of the Passenger Rail Investment and Improvement Act of 2008 (PRIIA). In particular, PRIIA, Section 212, directs all NEC infrastructure owners and service operators to develop cost-sharing agreements for

shared-benefit capital and operating expenses associated with the NEC. The FRA anticipates working with the NEC Commission, Amtrak, the NEC commuter authorities, and the eight states plus the District of Columbia to develop finance strategies and funding plans that reflect the corridor-wide value of proposed improvements.

Resolving these issues is beyond the scope of NEC FUTURE. Nonetheless, the degree and depth of coordination and planning by the NEC stakeholders would largely determine the success and speed at which the Universal First Phase and subsequent phases of work are implemented. As noted, the FRA considers these issues of great importance and would consider conditioning future federal funding on the commitment to achieving necessary governance and institutional changes upon completion of projects.

The NEC Commission—which includes the NEC states, the District of Columbia, and passenger and freight railroads operating on the NEC—is one forum for defining and advancing corridor-wide collaboration on some of the changes necessary to plan, coordinate, and expedite implementation of needed service and infrastructure projects. The NEC Commission is working with its stakeholders to develop a prioritized short-term capital plan and to develop the mechanism for allocating funds pooled from railroad users under PRIIA, Section 212.

Public and stakeholder input on how best to coordinate and integrate service and project planning will play an important role in framing a solution to these issues.

10.3.2 Construction Staging and Planning Strategies

Railroad operators have only limited ability to take tracks out of service to make repairs or implement projects without shutting down or severely limiting ongoing operations. With the NEC already at capacity in numerous key locations, implementing many of the major projects included in the Universal First Phase without adversely affecting train operations would be extremely challenging. Moreover, construction work must be implemented without impinging on annual maintenance activities and other state-of-good-repair work and priority projects (such as those included in the No Action Alternative). Thus, it would be essential for the NEC railroads and states to extensively plan how and when projects are to be implemented, and to understand and mitigate potential adverse impacts on train operations.

The NEC railroads have decades of experience planning major work on the NEC, such as the electrification of the New Haven-Boston segment of the NEC in the 1990s, and the recent replacement of the Niantic River Bridge in Connecticut. While improvements on the scale included in the Universal First Phase and subsequent phases of the Selected Alternative would exceed any such prior coordinated action, these projects have demonstrated that, with adequate planning, trains can continue to safety and reliably operate during periods of heavy construction on or adjacent to the railroad right-of-way. How much service is to be affected, and the degree to which impacts are acceptable to passengers, would be important factors in scheduling construction activities. Engagement with passengers through a robust communications program would be essential to finding the appropriate balance between the efficient scheduling of construction activities and continued operation of the rail services.

Funding is a critical element and would be a determining factor in the sequencing and scheduling of projects. As noted, the timeframe to implement the Universal First Phase projects must also reflect other work planned for the NEC, including maintenance and other planned projects. With so many unknowns, it would be essential for NEC stakeholders planning the improvements to be flexible and creative, and to be able to expedite planning and construction activities to take advantage of opportunities that may arise.

Chapter 8, Construction Effects, describes the potential construction sequencing that would likely be required for implementing any of the Action Alternatives and identifies potential construction effects from the work. Many of the same approaches and effects would be applicable to implementation of the Universal First Phase. Implementation planning for the Universal First Phase should include several additional key strategies to reduce impacts to customers and passengers:

- **Integrated Projects** – Some individual projects combine as a system and should be implemented in an integrated manner in order to fully achieve desired benefits. For example, the numerous projects planned between Newark Penn Station in New Jersey and Penn Station New York are designed to function together to eliminate major chokepoints and increase capacity. Planned benefits from each individual project would not be realized until all are completed. Therefore, implementation of these projects should be planned and sequenced in an integrated and mutually beneficial way.

  Examples of integrated project groups within the Universal First Phase include the following:

  – Projects located between New Carrollton and Halethorpe, MD (i.e., New Carrollton Station improvements, Hanson interlocking, Odenton Station improvements, the BWI Airport Station center-island platform; and fourth track Odenton to Halethorpe)

  – Newark NJ-Penn Station New York (i.e., Newark Penn Station capacity improvements, the four-track Mainline between Newark and Secaucus, Portal Bridge replacement, Secaucus Station expansion, Hudson River Tunnel replacements, and Penn Station New York expansion)

  – Hell Gate Line to Port Chester, NY (i.e., Hell Gate Line four-tracking and four new Bronx stations, Pelham Bay bridge replacement, Shell Flyover and the Cross-Westchester turn-back)

  Integrated projects should be planned together to leverage outages, reduce construction time, plan train operations to minimize disruption to service, and optimize benefits on completion.

- **On or Off Corridor**. As indicated on **Table 10-1**, projects in the Universal First Phase would be built either primarily adjacent to and off the existing NEC right-of-way (minimizing long-term operational impacts) or require work on the existing right-of-way (necessitating extended track outages and potential slow orders).

  Fortunately, many of the largest and most complex projects included in the Universal First Phase could be built largely off the NEC. These projects include many (and possibly all) of the nine major bridge replacements as well as the B&P Tunnel replacement and the new tracks under the Hudson River. Construction of this new infrastructure off the NEC right-of-way would not entirely eliminate operational impacts—the new infrastructure must be built in close proximity to and connect with the existing NEC—but extended impacts would be minimized through night-time and weekend scheduling of work and shorter-term outages as required.

In contrast, projects built on the NEC right-of-way, including the system-wide replacement of the electric catenary system and station improvements at Washington, D.C., New Carrolton, and Boston South Station, must be carefully planned and staged to avoid serious disruptions to service. Strategies for managing adverse impacts include the following:

- Space out the scheduling of major projects across the NEC to reduce extended service disruptions in the same area.
- Sequence work to maximize the use of available track outages.
- Shut down service (and provide substitute transportation) for specific periods of time to permit the acceleration of work.
- Build project components off-site.
- Create a robust public outreach and communications program to ensure passengers are aware of scheduled work and potential disruptions of service.

- **Enhancing Train Movement Flexibility** – Adding interlockings and signal blocks in proximity to construction areas can greatly enhance the flexibility of dispatchers to mitigate operational impacts from track outages. During the mid-1990s electrification of the NEC between New Haven, CT, and Boston, a number of permanent and temporary interlockings were added to facilitate the timely dispatching of trains across a 157-mile construction zone in which crews worked up to 12 geographic areas at any given time. While train schedules would be lengthened and some frequencies adjusted, the added flexibility enabled train dispatchers to meet performance objectives and keep the trains running.

The planning, staging, and implementation of NEC upgrades should be coordinated on a corridor-wide basis to provide efficiencies in construction and to minimize impacts to train operations and passenger service.

10.4 DIFFERENCES IN DESIGN AND IMPLEMENTATION BETWEEN THE ACTION ALTERNATIVES

The projects in the Universal First Phase are the same regardless of which Action Alternative would be selected as the Preferred Alternative. However, both the design and implementation of these projects may differ by alternative. While all three Action Alternatives expand service on the existing NEC, Alternative 2 adds a supplemental route between New Haven and Providence via Hartford, and Alternative 3 includes construction of a second spine from Washington, D.C., to Boston. For some of the projects in the Universal First Phase, these differences would generate unique designs and offer opportunities for different implementation strategies.

There are three types of projects where the design could differ, depending on which Action Alternative is selected:

- **Bridges** – The Universal First Phase includes nine major river bridge crossing projects: the Gunpowder, Bush, and Susquehanna Bridges in Maryland; Portal Bridge in New Jersey; Pelham Bay Bridge in New York; and the Cos Cob, Saga, Devon and Connecticut River Bridges in

Connecticut. While the design objective for these bridges in Alternatives 1 and 2 would generally support a 2- to 4-track NEC, those designs may differ in Alternative 3, which contemplates a 6-track NEC. Because the route for the second spine is representative only at this point, and several route options remain, specific design issues regarding how best to accommodate the second spine, and whether the bridges must be expanded or configured to support additional tracks, would be made after selection of an alternative.

- **Major Stations –** The design of both Washington Union Station and Penn Station New York would be similar for the three Action Alternatives, but each would incorporate unique elements that differ by Action Alternative.
  - Washington Union Station: Phase 2 of the Washington Union Station Master Plan, included in the Universal First Phase, expands the number of tracks at ground level at the station sufficient to accommodate the growth in service assumed in Alternatives 1 and 2. However, if a second spine is to be added to the NEC, a lower level of tracks would eventually be required, which might necessitate the addition of slurry walls to preserve the ability to excavate below ground level to add the second spine tracks.
  - Penn Station New York: The tracks leading to and from the new Penn Station New York platforms would be designed differently in all three Action Alternatives:
    - Alternative 1: The two additional tracks from New Jersey would stub end at the new platforms at Penn Station New York.
    - Alternative 2: Two new tracks would eventually be added under the East River, bringing a total of six tracks under the East River. As a result, the platform tracks at Penn Station New York would be configured to provide through connections between New Jersey and Queens and facilitate moves between multiple sets of tracks within the Penn Station New York complex.
    - Alternative 3: The second-spine tracks would be built under the new Penn Station New York platforms connecting to a new set of tunnels (Tracks 5 and 6) to New Jersey and into the six-track East River tunnels assumed in Alternative 2. This might necessitate the addition of slurry walls to preserve the ability to excavate below the new platform level to add the second-spine tracks.

Differences between the Action Alternatives may also result in different implementation strategies. This primarily relates to Alternative 3, which includes the addition of a second spine. It may be possible to leverage the early construction of portions of the new second spine to reduce impacts to trains operating on the existing NEC. For example:

- Early construction of the second-spine segment from New Carrollton to Baltimore would provide an alternative route for Intercity trains and some Regional trains during construction on the NEC, such as the fourth track Halethorpe-Odenton and BWI center-island platform. This would reduce impacts to passengers and speed construction.
- If the Preferred Alternative included the New York-Danbury-Hartford second-spine routing, early construction of the second-spine segment through New Rochelle would provide an alternate

route for Intercity trains and some Regional trains during construction of the Shell Flyover, reducing adverse impacts to one of the most congested areas of the NEC.

The FRA will explore project implementation strategies in more detail focused specifically on the Selected Alternative in the phasing plan included in the Service Development Plan. The NEC Commission and the NEC railroads can build off the more detailed phasing plan to develop a long-term implementation plan that better reflects funding realities and project complexities.