

**A. INTRODUCTION**

This chapter includes an evaluation of the proposed project alternatives, including the No Action Alternative, and identifies a preferred alternative for the Portal Bridge Capacity Enhancement Project. In selecting a preferred alternative, the four build alternatives and the No Action Alternative were compared and their ability to meet the project goals and objectives that were identified in Chapter 2, “Project Purpose and Need” was assessed. This was followed by a detailed analysis of constructability and project schedules that were prepared for the FEIS. Finally, the environmental impacts of the alternatives were considered and the project costs for each build alternative were compared.

**B. PROJECT GOALS AND OBJECTIVES**

Six goals were established for the Portal Bridge Capacity Enhancement Project relating to capacity, reliability, safety, compatibility, cost-effectiveness, and environmental considerations. The objectives further define the goals and provide specific and measurable means by which to evaluate project alternatives. The six project goals and their respective objectives are as follows:

- GOAL 1: Enhance capacity to meet current and future demand—including new service—along the Northeast Corridor.
- Reduce the total number of locations between Swift and Allied Interlockings where trains must merge;
  - Provide sufficient capacity to maintain adequate passenger rail service, prevent future overcrowding, and accommodate emerging markets for commuter and intercity rail passenger service;
  - Prevent future overcrowding of passenger rail trains.
- GOAL 2: Improve service reliability and operational flexibility.
- Upgrade the nearly century-old moveable bridge to a state-of-good-repair or replace the structure;
  - Reduce the vulnerability of the existing capacity-constrained rail infrastructure to unexpected train delays, including weather-related incidents, breakdowns, and unusual travel demand.
- GOAL 3: Provide a redundant Hackensack River crossing to facilitate maintenance and enhance passenger safety and security.
- Construct additional tracks to allow for continued rail operations during off-peak maintenance periods;

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<sup>1</sup> This chapter is new to the FEIS.

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- Provide a secondary crossing to enable continued rail operations in the event of an unplanned closure.

GOAL 4: Minimize conflicts with maritime traffic.

- Avoid or minimize disruptions to marine traffic during construction, while maintaining uninterrupted service to rail traffic;
- Minimize delays to trains or marine vessels due to bridge operations;
- Provide sufficient vertical and horizontal clearance for larger marine vessels.

GOAL 5: Optimize existing infrastructure and planned improvements.

- Ensure project alternatives do not preclude completion of planned projects, including the proposed ARC project.

GOAL 6: Minimize impacts on the surrounding environment.

- Minimize impacts to wetlands and other ecologically sensitive areas;
- Minimize impacts to cultural resources;
- Minimize short-term construction impacts to the environment.

### **GOAL 1: ENHANCE CAPACITY TO MEET CURRENT AND FUTURE DEMAND—INCLUDING NEW SERVICE—ALONG THE NORTHEAST CORRIDOR.**

The No Action Alternative would provide none of the capacity improvements of the build alternatives and would fail to meet any of the three objectives under Goal 1. All four build alternatives would fully meet this goal by increasing the capacity over the Hackensack River from two to five tracks. Three of the tracks would be on a fixed bridge that would not be subject to any bridge openings. The other two tracks would be on a moveable bridge, 40 feet above mean-high-water (MHW) that would open occasionally. All build alternatives would include additional tracks between Swift Interlocking and Secaucus Transfer Station to remove the bottleneck in this area of the Northeast Corridor. In addition, all build alternatives would include a grade-separated crossing of the Northeast Corridor for trains travelling from the southern bridge to the westbound Kearny Junction connecting track and onto the existing Morris & Essex (M&E) Line. All four build alternatives would meet this goal. From an operational perspective, however, the duck-under alternatives (Alternatives DE and DS) would be preferred. The duck-under alternatives offer a better vertical profile and train braking distances.

### **GOAL 2: IMPROVE SERVICE RELIABILITY AND OPERATIONAL FLEXIBILITY.**

While the No Action Alternative would bring the existing structure to a state of good repair, it would still be vulnerable to reliability issues and would not provide operational flexibility over the long-term. The bridge would still be subjected to the reliability issues of a nearly 100-year-old bridge and the operational inflexibility of a 23 foot clearance over a navigable channel. These issues would continue to adversely affect marine and rail traffic at this critical crossing. All of the build alternatives would meet the first objective by removing the existing Portal Bridge. Similarly, they would all meet the second objective by constructing a new fixed bridge 50 feet above MHW and a new moveable lift bridge 40 feet above MHW. The Northeast Corridor would no longer be vulnerable to capacity constraints and congestion from the reliability issues associated with the nearly century-old moveable swing bridge 23 feet above MHW. This type of moveable bridge is generally regarded as obsolete for heavily-trafficked rail lines. This is primarily due to its inherently slow rate of opening and closing (which does not

lend itself to remedy short of replacing the bridge) and depending upon the age of the span and the stability of the site, the reliability of the locking mechanism.

**GOAL 3: PROVIDE A REDUNDANT HACKENSACK RIVER CROSSING TO FACILITATE MAINTENANCE AND ENHANCE PASSENGER SAFETY AND SECURITY.**

All of the build alternatives would provide additional tracks and a second crossing of the Hackensack River, which would fully meet the two objectives of this goal. All build alternatives would provide the same configuration for this crossing and there would be no difference among the build alternatives with respect to this goal. However, the No Action Alternative would meet neither objective and therefore would fail to meet this goal.

**GOAL 4: MINIMIZE CONFLICTS WITH MARITIME TRAFFIC.**

All build alternatives would provide the same structures across the Hackensack River—a three-track fixed bridge, 50 feet above MHW and north of the existing alignment, and a two-track moveable bridge, 40 feet above MHW and either on or south of the existing alignment. These clearances above MHW were selected in conjunction with the United States Coast Guard (USCG) to reduce the conflicts between marine and rail traffic and to minimize delays to both river and rail traffic. Based on an analysis of marine traffic from 2004 to 2006, 96 percent of the vessels would be able to pass beneath the moveable bridge without requiring an opening. The number of required openings for marine traffic would decrease from over 300 per year to less than 15 per year. Since the clearances above MHW are the same in the four build alternatives, they would all meet this goal to the same degree.

From April 2004 to April 2006, there were over 600 conflicts between marine and rail users related to the existing Portal Bridge. Under the No Action Alternative, there would be no reduction in the number of these conflicts. Furthermore, it is expected that delays to both rail and marine traffic would increase in the future as the operational reliability of the current moveable swing bridge decreases. Therefore, the No Action Alternative would not meet this project goal.

**GOAL 5: OPTIMIZE EXISTING INFRASTRUCTURE AND PLANNED IMPROVEMENTS.**

All build alternatives would connect to the existing Secaucus Transfer Station, the Kearny Junction connection tracks leading to the M&E Line and the Northeast Corridor at Swift Interlocking. All build alternatives could provide connectivity to the proposed ARC tracks by extending Tracks 5 and 6 from the southern bridge to the south side of Secaucus Transfer Station. All build alternatives could accommodate turnouts from Track 6 for a possible future connection to lead tracks that would connect with the proposed Kearny Yard via the Diamond Shamrock and Standard Chlorine properties. The No Action Alternative would not provide infrastructure for future connections to the ARC project.

**GOAL 6: MINIMIZE IMPACTS ON THE SURROUNDING ENVIRONMENT**

The No Action Alternative would not result in any short-term construction-related impacts to the environment that would result from implementation of the build alternatives. However, it would not provide any of the long-term environmental benefits accruing from the build alternatives' positive effect on rail operations and its secondary beneficial effects on environmental issues

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such as regional mobility, traffic congestion, and air quality. Therefore, over the long term the No Action Alternative would not meet this project goal.

Generally, the environmental benefits accruing from the build alternatives' improvements to the rail infrastructure of the Northeast Corridor would be the same for all alternatives. However, there are substantial differences in potential adverse impacts depending upon the alternative. Most of the differences can be attributed to whether the southern bridge is on the existing alignment or south of the existing right-of-way. There are also some differences in environmental effects between the methods for grade separation (i.e., fly-over versus duck-under of Track 5 with respect to the Northeast Corridor). All build alternatives would result in adverse effects to parklands, cultural resources, contaminated materials, and ecological resources. The build alternatives would also require the acquisition of a number of properties, including two with operating businesses on-site.

### *PARKLANDS*

All build alternatives would require the acquisition and use of two acres of the recently expanded Laurel Hill Park, which is owned by Hudson County. The use of the parkland is required for the approach to the northern bridge on the east bank of the Hackensack River. As described in the Section 4(f) Evaluation (see Chapter 8 of this EIS), there is no prudent and feasible alternative to the use of this land. Since all build alternatives require a fixed northern bridge, as discussed in the Section 4(f) Evaluation, none of the build alternatives could avoid the use of this land. Consideration of effects to Laurel Hill Park under Section 4(f) would not influence the selection of a preferred alternative.

### *CULTURAL RESOURCES*

All alternatives would require the demolition and removal of the existing Portal Bridge, a national-eligible and state-listed historic structure, which would constitute an adverse effect under Section 106 of the NHPA and a "use" of a Section 4(f) resource. Similarly, all build alternatives would result in an adverse effect on the Pennsylvania Railroad Historic District by contributing to the continued alteration of its fabric and appearance. Finally, all build alternatives may disturb portions of the Historic Cemeteries of Hudson County that are sensitive for human remains and funerary archaeological artifacts. Similar to the discussion above regarding parkland, the adverse effects on cultural resources would not affect the selection of a preferred alternative since all build alternatives would have the same adverse effects and incorporate the same mitigation and measures to minimize harm for these resources.

### *PROPERTY ACQUISITION*

Alternatives FS and DS would require the most property acquisition (45.4 acres and 41 acres, respectively) since the southern bridge and its approaches would be located south of the existing alignment. These alternatives would require acquisition of over 12 acres on the Diamond Shamrock property west of the Hackensack River and nearly 5 acres in the Riverbend Wetland Preserve east of the Hackensack River. The acquisition of these parcels would not be required for either Alternative DE or FE. Alternative DE would require the least amount of property acquisition (24.2 acres), followed by Alternative FE (29.2 acres). The fly-over alternatives (Alternatives FE and FS) would require more land than their respective duck-under counterparts (Alternatives DE and DS). The additional land requirements for the fly-over alternatives would

include a larger portion of Landfill 1-A than the duck-under alternatives. A small portion of land in Cedar Creek Marsh would also be required with Alternatives FE and FS.

All alternatives would require acquisition of the Jana Corporation site and relocation of Royale Linens, an operating business located within the 11-acre parcel. All alternatives would also require acquisition of the 4-acre parcel that is presently occupied by the Professional Environmental Services Corporation. While Alternatives DS and FS would require more property acquisition than Alternatives DE and FE, the adverse impacts on existing businesses would be the same for all alternatives.

### *ECOLOGICAL RESOURCES*

In the DEIS, it was estimated that the potential acreage of wetlands impacted by the project would range from a minimum of 8.4 with Alternative DE to 13.1 with Alternative FS. Alternatives FE and DS would impact 9.1 and 12.3 acres, respectively. Between the DEIS and the FEIS, as discussed in Chapter 5.6, "Ecology," the wetland impacts have been refined in several respects as follows:

- The fill in the wetlands on the east bank of the Hackensack River for the approach structures has been revised to account for the actual pier design that will be used to support the these elevated structures. In the DEIS, it was conservatively assumed that the footprint of the entire track structure would constitute a fill for the purposes of determining impacts on adjacent wetlands. The revised analysis only accounts for the actual area of wetland to be filled due to the placement of piers to support the elevated structure.
- The shading estimates were also refined by taking into account the width of the proposed structure and its height above the surface (ground or water) to more accurately depict these impacts.
- The permanent access road for the southern bridge in Alternatives DS and FS was moved from the Riverbend Wetland Preserve to the existing Northeast Corridor embankment resulting in a reduction in impacts for these alternatives. A temporary access road/construction platform would still be required in the preserve to allow construction of the elevated structure.
- The embankment for Alternatives DE and FE on the east side of the Hackensack River was widened to allow a new permanent access road to be constructed in lieu of the road that would be lost from increasing the elevation of the current embankment. This resulted in a slight increase in wetland impacts for these alternatives.

As shown in Table 9-1, the overall result of these changes was a substantial reduction in the proposed project's impact on wetlands. The open water and benthic habitat impacts remain essentially unchanged since the DEIS and are similar for all build alternatives. The impact assessment on wetlands, open water and benthic habitat and shading effects, which was shown in Table 5.6-5 (in Chapter 5.6, "Ecology") by individual section, is summarized below.

As shown in Table 9-1, the difference in permanent impacts to wetlands from the placement of fill between Alternatives DS and DE is now estimated to be approximately 0.3 acres, as compared to the 3.9 acres shown in the DEIS. Most of the change has occurred in the area of the Riverbend Wetland Preserve on the east side of the Hackensack River and south of the existing Northeast Corridor right-of-way. As described above, the two major issues contributing to that reduction in impacts are the relocation of the permanent access road and the use of elevated structure within the preserve.

**Table 9-1**  
**Permanent Ecological Effects (in acres) by Alternative**

Type	DS	DE	FE	FS
Wetlands	5.7	5.4	6.1	6.4
Benthic Habitat	0.1	0.1	0.1	0.1
Open Water	0.8	0.8	0.8	0.8
Shading	2.0	1.5	1.5	1.9
<b>Note:</b> Shading impacts occur when the height of the structure above MHW is less than 0.7 of the width of the structure. Temporary impacts would be in addition to those shown above.				

The shading impacts have also been revised for the FEIS. In some areas, the potential impacts from shading have increased while in others they have been reduced. For the higher structures, such as the two main crossings of the Hackensack River, it has been determined that there would be no impacts due to shading. On the east bank of the Hackensack River, potential shading impacts are now being considered where the height above the ground surface is less than 70 percent of the width of the structure. Therefore, a portion of the approach viaducts that were conservatively assumed to constitute a “fill” in the DEIS are now more accurately considered shading impacts in the FEIS. The overall potential adverse impacts from shading of open water and wetland areas have been substantially reduced.

In terms of short-term construction phase impacts, all build alternatives would result in similar impacts with an approximately 0.6-acre difference between Alternatives DS and DE. All build alternatives would require temporary access roads and construction platforms in the same locations including Cedar Creek Marsh, Kearny Brackish Marsh, the Hackensack River, the Riverbend Wetland Preserve and the portion of the newly expanded Laurel Hill Park north of the existing right-of-way.

*CONTAMINATED MATERIALS*

There are a number of sites with hazardous and/or contaminated material concerns in the project study area that could be potentially affected by construction of the build alternatives. The sites that would be most affected by the build alternatives include: Landfill 1-A, Jana Corporation, Diamond Shamrock, Malanka Landfill, several chromite ore processing residue sites, and sediments in the Hackensack River. The potential impacts on the Jana Corporation property and some of the chromite ore processing residue sites would be same for all build alternatives and would be a result of construction of the approach to the northern bridge.

Potential impacts within the Hackensack River would also be the same for all build alternatives, since four piers (two for each bridge) would be constructed within the river. The removal of the existing Portal Bridge and the potential for disturbance to sediments (related to the removal of the existing bridge’s substructure) would be the same for all build alternatives. With respect to the Malanka Landfill, all build alternatives would most likely result in a small disturbance on this property, as it relates to the subsurface work required for the foundations supporting the east side of the bridges carrying Tracks 5 and 6 over the Boonton Line.

Alternatives FS and FE would result in a greater property impact and disturbance to Landfill 1-A than Alternatives DS and DE, due to the increase right-of-way requirements for the Track 5 fly-over. In all cases, any disturbance to the landfill would require careful coordination in the design and construction phases of the project to avoid any adverse environmental effects.

The only substantial difference among the build alternatives with respect to contaminated materials is that Alternatives FS and DS would require construction within a portion of the Diamond Shamrock property while Alternatives FE and DE would not. The required work would include subsurface disturbance and excavation for foundation work related to bridge abutments and piers. It is likely that a portion of the Diamond Shamrock property may be required for construction staging or access under any build alternative.

In evaluating each alternatives performance with respect to contaminated materials, it should be noted that the effects of construction within these areas could be both beneficial as well as adverse. The adverse effects would be related to the potential for release of materials which could impact public health or the environment and their impact on project construction cost and schedule. In terms of benefits, construction within these sites provides an opportunity for long-term positive effects by remediating some, if not all, of the contamination present. Therefore, while Alternatives FS and DS may have greater potential for short-term impacts, they would result in a greater long-term benefit with respect to contaminated materials by contributing to the remediation of additional contaminated sites and/or accelerating the schedule of planned remedial activities.

### **C. CONSTRUCTION SCHEDULE**

As discussed in Chapter 6, "Construction Impacts," the construction schedule for two possible construction sequencing scenarios (sequential and concurrent) have been refined for the FEIS. The sequential scenario represents Alternative DE while the concurrent scenario represents Alternative DS. The construction schedules for the Alternatives FE and FS would have similar phasing but would last several months longer than their counterparts. While there would be some difference in construction staging and scheduling for the fly-over, the major factor in determining the overall construction duration is whether the main river spans and their approach structures are constructed sequentially or concurrently.

Based on the current schedule for preliminary engineering, right-of-way acquisition, permitting and final design, it is expected that construction of any alternative would not begin until the end of 2011. Furthermore, as discussed in Chapter 6, construction of any build alternative would involve additional complexity due to the constraints of working within and adjacent to an operating railroad. Therefore, the construction duration of all build alternatives has been increased from that shown in the DEIS.

Construction of Alternatives DS and FS, where construction of the two Hackensack River bridges could be constructed concurrently, would take approximately 66 months and revenue service would commence in June 2017. Alternatives DE and FE, which would require sequential construction of the two main river crossings, would take approximately 94 months to construct and revenue service would commence in October of 2019. Due to the constraints of working within and adjacent to the nation's busiest passenger railroad, sequential construction of the two Hackensack River spans and their respective approach structures would increase the construction period by 28 months. This difference in construction duration would have the following adverse effects:

- As discussed below, it would increase the cost of constructing Alternative DE (and Alternative FE) due to the increase in finance charges over the construction period.

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- It would extend by two and one-half years the length of time that construction-related impacts would occur in the adjacent wetlands and open water thereby increasing the potential for adverse effects on water quality and aquatic resources.
- The existing terrestrial and avian wildlife resources in the area would be subject to an additional 28 months of disturbance, including construction-related noise and light.
- It would extend by two and one-half years the potential adverse effects on rail operations and passenger inconvenience, particularly in the off-peak periods that may result from construction of the project.
- It would require an additional year of construction in the Hackensack River and its related effects on marine navigation.
- It would delay the initiation of revenue service on the new bridges from 2017 to 2019 as demand for this service continues to increase.

**D. PROJECT COST**

Table 9-2 shows the project cost for each alternative in 2008 dollars.

**Table 9-2**  
**Capital Cost—Build Alternatives (in Millions)**

<b>Cost</b>	<b>DS</b>	<b>DE</b>	<b>FE</b>	<b>FS</b>
Guideway	\$551	\$503	\$515	\$549
Track	\$26	\$25	\$26	\$27
Site/Civil	\$152	\$150	\$160	\$159
Systems	\$66	\$63	\$65	\$68
Right-of-Way Costs	\$15	\$7	\$13	\$16
Soft Costs	\$317	\$295	\$303	\$319
Unallocated Contingency	\$159	\$148	\$153	\$160
Finance Charges	\$58	\$52	\$55	\$58
<b>Total</b>	<b>\$1,344</b>	<b>\$1,243</b>	<b>\$1,290</b>	<b>\$1,356</b>
<b>Note:</b> All costs in 2008 dollars. Guideway includes all track support structures including bridges, abutments and foundations but not embankment which is included in Site/Civil. Site/Civil includes transport and disposal of contaminated materials and wetland mitigation. Soft costs include engineering, project and construction management, insurance, legal and force account labor.				

As shown, the costs in 2008 dollars range from approximately \$1.243 billion for Alternative DE to \$1.356 billion for Alternative FS. Generally, the differences are the result of (1) the increased structural cost for the southern alignment alternatives to span the wetland areas of the Riverbend Wetland Preserve and (2) the costs associated with acquiring the additional land outside of the Amtrak right-of-way. The fly-over alternatives are more costly than their duck-under counterparts due to the additional elevated structures required and a small amount of additional property acquisition. As a result, Alternative FS is the most expensive alternative.

As discussed above and previously in Chapter 6, “Construction Impacts,” the construction schedules for the build alternatives have been updated for the FEIS. Because of the difference in construction duration between Alternatives DS and FS and Alternatives DE and FE, the actual project costs should reflect the time value of money. Therefore, the difference in construction cost for the southern alignment alternatives would be less than that shown in the above table. For

example, the difference in construction cost in 2008 dollars between Alternatives DS and DE is \$101 million. However, the difference after escalating costs using the current construction schedule would be \$52 million. Therefore, the additional 28 months of construction would increase the cost of Alternative DE in relation to Alternative DS by \$49 million when funds are actually expended.

## **E. SELECTION OF PREFERRED ALTERNATIVE**

Since the build alternatives were developed in consideration of the above project goals and objectives, the differences among alternatives with respect to these goals and objectives are relatively minor. All four build alternatives would fully satisfy the first five goals described above. While there are some operational and engineering benefits to the duck-under as compared to the fly-over option, either group of alternatives would meet the stated goals relating to the operational, reliability, and capacity problems associated with the current rail infrastructure. Therefore, the selection of a preferred alternative is a function of three issues—environmental effects, construction cost, and schedule.

There is no apparent benefit to selecting Alternative FS or FE over their respective duck-under counterparts (Alternatives DS or DE). The duck-under alternatives are cheaper, operationally superior (due to a material difference in grade on Track 5 and related braking distances) and require less right-of-way. Therefore, the selection of the preferred alternative becomes a choice between Alternatives DS and DE. These two alternatives were compared with respect to the three issues identified above: project cost; construction duration and risk; and environmental impacts.

In terms of project cost, when the year of expenditure and the time value of money are considered, the difference between the Alternatives DE and DS would be approximately \$52 million or about 3 percent of the inflated cost. With the refinements in design and analysis between the DEIS and the FEIS, the differences in adverse environmental effects has also been substantially reduced. With respect to adverse environmental effects, the major difference among the alternatives was their potential to result in impacts to ecological resources, particularly *Phragmites*-dominated coastal wetlands. While the difference in the amount of wetlands to be filled by Alternatives DS and DE was nearly four acres in the DEIS, the refined design has reduced the difference to 0.3 acres. The difference in shading impacts is less than 0.5 acres.

The most substantial difference among the duck-under Alternatives DS and DE is the construction duration and the potential adverse effects related to prolonging the construction period. In addition to the effects on construction cost described above, the additional time required to complete Alternative DE would result in adverse effects for a longer period of time on a number of environmental concerns. The difference in construction duration would prolong the number of seasons that terrestrial and aquatic resources would be subject to the temporary effects of project construction, including intrusions from construction noise. This would also increase the length of time that short-term effects to water quality from various construction activities would occur including an additional year for work in the Hackensack River. This longer construction duration (an approximate 40 percent increase) would increase the potential for indirect or secondary effects on the ecological resources of the Meadowlands since the direct effects would be occurring for that much longer.

The additional 28 months of construction would also potentially result in greater adverse effects on NJ TRANSIT and Amtrak passengers by increasing the time that they may experience

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disruptions to service or inconvenience. As discussed in Chapter 6, the number of weekday evening and nighttime scheduled train movements has increased dramatically over the past several years and is expected to further increase in the future. The relentless increase in the demand for surface transportation along the Northeast Corridor makes it increasingly difficult to identify productive work “windows” on the existing rail line, even at night. Shorter work “windows” are inherently less efficient because setup and clear-up times are constant; therefore, it takes longer to accomplish the same productive work. As the project construction period is increased the availability of potential work “windows” will decrease further exacerbating the potential adverse effects on the riding public and the environment.

Finally, Alternative DS would enable revenue service for NJ TRANSIT and Amtrak 28 months earlier than Alternative DE. This new infrastructure would improve rail operations and eliminate much of the cause for delays and reliability issues in this portion of the Northeast Corridor. After careful consideration and evaluation, the project sponsors have identified Alternative DS as the preferred alternative for the Portal Bridge Capacity Enhancement Project. The FRA concurs in the selection of a preferred alternative. \*