CONNECTICUT RIVER BRIDGE

REPLACEMENT PROJECT

Environmental Assessment & Section 4(f) Evaluation

MAY 2014

U.S. Department of Transportation
Federal Railroad Administration

AMTRAK

Amtrak Connecticut River Bridge Environmental Assessment (EA)

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Lead Agency

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A. INTRODUCTION

The National Railroad Passenger Corporation (Amtrak) is proposing to improve the operation of the Connecticut River Bridge, a rail crossing over the Connecticut River on the Northeast Corridor. The Federal Railroad Administration (FRA) is serving as the lead federal agency for this Environmental Assessment (EA), prepared in accordance with the National Environmental Policy Act (NEPA).

The American Bridge Company began construction of the existing Connecticut River Bridge in 1904 and it became operational in 1907. The bridge is located between the Town of Old Saybrook in Middlesex County and the Town of Old Lyme in New London County, Connecticut, along Amtrak's Northeast Corridor (MP 106.89) at approximately 41°18′39″N, 72°20′57″W (see Figure S-1). It spans the Connecticut River, 3.4 miles from its mouth at Long Island Sound. The Connecticut River Bridge is one of several moveable rail bridges along the Northeast Corridor. The existing bridge is a two-track, ten-span steel rail bridge with an open deck and stone masonry piers. The bridge is over 1,500 feet long and has two abutments and nine piers. Seven of the ten spans are through-truss spans (roughly 185 feet in length each). Two of the spans are deck-girder spans (one 38 feet in length and one 70 feet in length). One span is a 160-foot-long moveable rolling lift bascule span. The lift span opens to allow boats and other marine vessels to traverse the Connecticut River. In the closed position, the bridge has a vertical clearance of 18 feet, which is adequate clearance for smaller recreational boats. Larger boats and marine vessels require opening of the bridge. With the rolling lift span in the open position, the vertical clearance is 68 feet for the full channel width. For marine vessels requiring a channel width less than 71 feet, the vertical clearance is unlimited. The U.S. Army Corps of Engineers (USACE) maintains a channel depth of 15 feet in this stretch of the Connecticut River Bridge. The bridge is owned by Amtrak and used primarily for passenger rail. Providence and Worcester Railroad (P&W) also uses the bridge for freight transport.

The sections that follow summarize the purpose and need for the proposed project, the range of alternatives evaluated, and the potential impacts during construction and operation of the proposed project.

B. PROJECT PURPOSE AND NEED

PROBLEM IDENTIFICATION AND NEED

BRIDGE STRUCTURE

The primary concern with the existing Connecticut River Bridge is its age, since it is nearing the end of its useful life. At times, the operational reliability of the aging bridge results in cascading delays to rail and maritime traffic due to its failure to open and close properly. In 2006, a bridge inspection was performed on behalf of Amtrak. The inspection found certain aspects of the existing bridge to be particularly problematic, including the mechanical operating system, the bascule span rolling tread plates, and the approach span truss pin and eyebar connection. Amtrak's contractor also identified the curved tread plates and mating track plates of the heel end of the rolling lift span as concerns. Disruptive rehabilitations of the treads and tracks are required approximately every 20 years, which limits the retrofit options. At the time of the inspection, the existing track and tread structure, and the supporting steel segmental box girder exhibited cracks. The approach spans have truss pin and eyebar connections, which typically loosen after years of service. Amtrak has determined retrofit devices installed during the 1970s to be ineffective.

Amtrak installed a moveable catenary unit on the bridge as part of its electrification project in the 1990s. The complex structure extends the length of time required to open and close the bridge and adds weight to the bridge. The weight of the electrification facilities was not factored into the original bridge design, and has therefore increased stresses and bearing pressures. The moveable span counterweight balance is a concern, as is potential deterioration of structural members. Additional concerns include: tight working clearances within the machinery house, limited access for maintenance and routine inspection, and uncertainty in the seismic resistance of the existing stone masonry piers.

NAVIGATION CHANNEL

The existing bridge timber fenders that mark the channel are deteriorated and substandard. Reconstructed fenders will provide greater protection of the bridge piers. Widening the horizontal clearance of the channel and/or relocating it westward towards the center of the river could potentially provide additional navigation advantages and reduce the risk of vessel impact. Because of the off-center nature of the existing channel and its location close to the eastern shoreline, the ebb tide current tends to pull marine vessels into Pier 5 (the west channel pier). Relocating the moveable span westward of the existing channel will, however, require deeper pier foundations.

A Navigation Survey[1], prepared on behalf of Amtrak, determined that increasing the vertical clearance of the bridge when in the closed position will result in a minor reduction in bridge openings. The current practice of leaving the bridge in the open position during the summer months is acceptable to Amtrak given the current and projected future rail traffic.

PROJECT GOALS AND OBJECTIVES

FRA and Amtrak recognize the need to address the problems posed by the existing Connecticut River Bridge. The purpose of the Connecticut River Bridge Replacement Project is to improve the aging bridge, enhance its reliability and long-term serviceability, and ensure continued passenger and freight rail operations along the Northeast Corridor as well as navigation along the Connecticut River.

To compare and contrast the project alternatives developed as part of the environmental review process, Amtrak identified specific project goals and objectives to be used as the basis for developing the criteria and screening methodology for evaluating the project alternatives.

[1] Hardesty and Hanover, LLP for National Railroad Passenger Corporation Office of Engineering, *Inspection and Conceptual Engineering for the Reconstruction or Replacement of the Connecticut River Bridge, MB 106.89; Navigation Survey Report*, October 2006.

6.19.12

Aerial Source: Connecticut 2010 Color NAIP, USDA-FSA-APFO, Connecticut Department of Energy and Environmental Protection, 2010

Project Site Boundary

1/4-Mile Study Area Boundary

0 2000 FEET
SCALE

Figure S-1
Project Site

Amtrak established three goals for the Connecticut River Bridge Replacement Project. The objectives further define the goals and provide specific and measurable means by which to evaluate project alternatives. While cost effectiveness is not an explicit project goal, the estimated capital and operation and maintenance costs of each project alternative will be considered in tandem with the project goals. Cost effectiveness will not, however, affect the selection of a Preferred Alternative for NEPA analysis. The three project goals and their respective objectives are as follows:

Goal 1: Improve the reliability and long-term serviceability of the Connecticut River Bridge and its approach structures.

- Objective: Maintain a state-of-good-repair for the bridge and its approaches.

Goal 2: Minimize conflicts with maritime traffic.

- Objective: Minimize delays to trains and/or marine traffic due to bridge operations.
- Objective: Provide sufficient vertical clearance and channel width for commercial and recreational traffic on the Connecticut River.
- Objective: Minimize construction-period impacts to rail operations and navigation.

Goal 3: Minimize permanent and temporary impacts to the surrounding environment.

- Objective: Minimize temporary and permanent impacts to wetlands and other ecologically sensitive areas.
- Objective: Minimize impacts to cultural resources.
- Objective: Minimize short-term construction impacts.

C. PROJECT ALTERNATIVES

Amtrak considered a number of build alternatives involving the rehabilitation, reconstruction, and/or replacement of the Connecticut River Bridge. As a first step, Amtrak developed a list of feasible project alternatives that considered the project's logical termini, constructability requirements, navigability requirements, and track requirements. Amtrak then evaluated these alternatives based on specific criteria, including: construction-period impacts to rail service and navigation; operational improvements to rail service and navigation; long-term serviceability and reliability of the bridge and its approach structures; impacts to railroad facilities, such as electrification; and permanent and temporary environmental impacts. In all, Amtrak studied 21 different build alternatives in seven groups; these are summarized in Table S-1.

Amtrak eliminated the rehabilitation alternatives in Group 1 due to concerns with the performance of the rehabilitated components, particularly with the long-term serviceability and reliability of the existing piers. The project team also discarded partial replacement alternatives and those associated with complete on-line replacement alternatives in Groups 2 and 3 because of the need to maintain uninterrupted train operations during on-line construction.

Amtrak identified Groups 4 and 5 as warranting further consideration, since they would provide long-term serviceability and reliability and would allow for uninterrupted rail operations. Amtrak gave additional consideration to all of the Groups 4 and 5 alternatives, except the use of swing-type bridge replacement. Through consultation USACE and the U.S. Coast Guard (USCG), Amtrak and the consulting agencies determined that relocating the channel would require an extensive regulatory process and would present unacceptable navigation difficulties during construction. Amtrak therefore eliminated those alternatives within Groups 4 and 5 that proposed to relocate the channel location.

Table S-1
Connecticut River Bridge Replacement Alternative Groups

Alternative Group	Channel Location	Channel Width	Bridge Type	Approach Spans
0 – No Action Alternative	Off-Center	150'	Bascule	Thru-Truss Open Deck
1 – Rehabilitation	Off-Center	150'	Bascule	Thru-Truss Open Deck
2 – Rehab Approach / Replace Moveable Span	Off-Center or Moved West	150-200'	Bascule or Vertical Lift	Thru-Truss Open Deck
3 – Moveable On-Line Replacement	Off-Center or Moved West	150-200'	Bascule or Vertical Lift	Thru-Truss Ballast Deck
4 – Moveable Replacement / North Alignment	Off-Center or Moved West	150-200'	Bascule or Vertical Lift	Thru-Truss Ballast Deck or Composite Box Girders
5 – Moveable Replacement / South Alignment	Off-Center or Moved West	150-200'	Bascule or Vertical Lift	Ballast Deck Girders
6 – Fixed Replacement / South Alignment (1.5% Grade)	Moved West	200'	Network Tied Arch or Subdivided Warren Truss	Ballasted Tub and Deck Girders
7 – Fixed Replacement / South Alignment (1.9% Grade)	Moved West	200'	Network Tied Arch or Subdivided Warren Truss	Ballasted Tub and Deck Girders

Sources: Final Concept Design Engineering Report, Hardesty & Hanover, LLP, March 2007
Final Fixed Span Crossing Preliminary Concept Design Engineering Report, Hardesty & Hanover, LLP, Oct 2010

To determine whether the existing piers could be reused and/or extended for the northern alignment alternatives (Group 4), Amtrak performed additional conceptual engineering and a construction feasibility study[1]. Minimal information is available regarding the structural integrity of the existing piers, and Amtrak and its contractors concluded that their potential reuse could cause problems with seismic resistance and structural capacity. Furthermore, installing new piles or drilled shafts near the existing piers (which would be required for any of the Group 4 alternatives) raised concerns about damaging vibrations and potential pier settling occurring during the construction process. Installing new foundations for the southern alignment alternatives (Group 5) would provide more distance from the existing piers and would therefore lessen the risk of damage to the existing bridge during its continued operation throughout the construction period. Based on the need for continued operation of the existing bridge during the construction phase, Amtrak determined that Group 4 alternatives presented unreasonable constructability and safety risks, and therefore eliminated the remaining Group 4 alternatives from further consideration.

The alternatives within Groups 6 and 7 would involve a high-level fixed-span crossing. Since this segment of the Connecticut River is heavily used by tall sailboats, a vertical clearance of at

[1] Source: URS Corporation, *Conceptual Engineering Review,* November 17, 2011.

least 90 feet would be required. This would in turn require lengthy approach structures, land acquisition beyond Amtrak's right-of-way, and extensive wetland impacts. The high-level nature of the bridge would require relatively steep grades, which could be present operational impacts for the freight trains not equipped to handle steep grade changes. Furthermore, Amtrak estimated that these fixed bridge alternatives would be cost-prohibitive. Using these combined considerations, Amtrak determined that Group 6 and 7 fixed-bridge alternatives did not appropriately meet the purpose and need without significant impacts, and therefore eliminated the Groups 6 and 7 alternatives from further consideration.

NO ACTION ALTERNATIVE

The No Action Alternative consists of planned improvements in the primary and secondary study areas that are scheduled for the near future or are included in the long range transportation plans for the region and are expected to be completed by 2030. Included are major investment projects that involve substantial improvements to the regional transportation system as well as minor projects that maintain the system in a state of good repair. Some of these projects include:

- State of Good Repair Program (Amtrak)
- New Shore Line East Stations (Connecticut Department of Transportation [ConnDOT])
- Pearl Harbor Memorial Bridge (Q-Bridge) Construction (ConnDOT)
- New Haven–Hartford–Springfield Rail Program (ConnDOT)
- CTTRANSIT New Britain – Hartford Rapid Transit (ConnDOT)
- Metro-North Railroad New Haven Line Improvements (Metropolitan Transportation Authority [MTA])

The No Action Alternative assumes the Connecticut River Bridge will remain in service as is, with continued maintenance and minimal repairs. No major improvements to or replacement of the Connecticut River Bridge will be undertaken under the No Action Alternative. The No Action Alternative will not include any changes to the existing track configuration.

PREFERRED ALTERNATIVE

As explained above, Amtrak considered a range of improvement alternatives, including minor repairs, rehabilitation of the existing bridge, partial replacement, and complete replacement. Amtrak evaluated 21 build alternatives and identified the Preferred Alternative. The Preferred Alternative will involve complete replacement of the existing superstructure with a two-track moveable bridge. It will be built along a new southern alignment, with an offset of 48 feet from the centerline of the existing bridge to the centerline of the new bridge. It will not reuse the existing piers, and will therefore require a new substructure. The upland portions of the Preferred Alternative will be built entirely within Amtrak's existing right-of-way. The channel will remain in its existing location. Upon completion of the new bridge, the existing Connecticut River Bridge will be decommissioned and removed. The Preferred Alternative will also include relocation of communication and signal systems, new catenary supports and wires, and new approaches.

Amtrak identified two feasible options for the Preferred Alternative. One option (Option A) will replace the existing bridge with a bascule bridge and will maintain the existing 150-foot channel width. Option A will provide a vertical clearance of 18 feet in the closed position. In the open position, it will likely provide a similar vertical clearance as the existing bridge (i.e., 68 feet for full channel width and unlimited for vessels requiring less than 71 feet in width).

The other option (Option B) will replace the existing bridge with a vertical lift bridge. This option could potentially provide for a wider channel. The exact channel width for Option B will be determined during preliminary engineering; however, it will provide a minimum of 150 feet and a maximum of 200 feet. Option B will provide a vertical clearance of 18 feet in the closed position. When in the open position, the vertical clearance of the lift bridge will be at least 90 feet. For the purposes of this EA, both options have been analyzed.

Regardless of the type of moveable bridge and channel width, the Preferred Alternative will include ballast deck girders for the approach spans. It will require widening of the existing rail embankment for the bridge approaches. Based on Amtrak's previous experience with similar bridge replacement projects, a combination of embankments and retaining walls will likely be required for the bridge approaches. The Preferred Alternative will include new navigation channel fenders, regardless of whether the channel is expanded.

D. POTENTIAL IMPACTS OF THE PREFERRED ALTERNATIVE

TRANSPORTATION

INTERCITY RAIL

The Preferred Alternative will not alter train speed, schedule, or capacity. The Preferred Alternative will improve the reliability of the bridge structure and moveable span, which will decrease unscheduled train delays caused by bridge malfunctions and improve service. The Preferred Alternative will not result in significant adverse impacts to intercity rail operations.

FREIGHT SERVICE

The Preferred Alternative will result in a long-term benefit to freight service, as it will improve the reliability of the bridge. The Preferred Alternative will not result in significant adverse impacts to freight rail operations.

PUBLIC TRANSPORTATION

The Preferred Alternative will not affect the Metro-North Railroad New Haven Line, and there will be minimal effects to Shore Line East (SLE) service to New London Station during the construction period (see Chapter 12, "Construction Impacts"). The Preferred Alternative will improve the reliability of the Connecticut River Bridge, thereby improving the reliability of SLE service to New London. The Preferred Alternative will not result in significant adverse impacts to commuter rail operations, ferry service, or bus service.

NAVIGABLE WATERS

The Preferred Alternative will result in an improvement to navigability along this segment of the Connecticut River. The project will improve the reliability of the bridge and will therefore reduce delays to maritime traffic caused by bridge openings and closings. Option A will retain the alignment and width of the existing channel and replace the existing bridge with a bascule moveable span, which will provide unlimited vertical clearance for a portion of the channel. Option B could potentially expand the navigation channel to 200 feet in width (which could further benefit navigation by reducing the likelihood of fender collisions) and will include a vertical lift span with a vertical clearance of 90 feet.

As described in Chapter 12, "Construction Impacts", the Preferred Alternative will result in some temporary adverse impacts to mariners. Impacts to navigability will be temporary, non-significant, and limited only to the construction of the replacement bridge.

REGIONAL HIGHWAY SYSTEM

The Preferred Alternative will not result in significant adverse impacts to the regional highway system.

LAND USE, ZONING AND PUBLIC POLICY

LAND USE

The Preferred Alternative will not adversely affect existing or planned land uses in the study area. The proposed project will not require any permanent upland land acquisition. The upland portions of the new bridge will be located entirely within the existing Amtrak right-of-way. The Amtrak right-of-way will continue to be used for rail transportation and surrounding land uses will not change as a result of the proposed project.

ZONING AND PUBLIC POLICY

Amtrak is not subject to local zoning ordinances. Nonetheless, because all upland improvements will be contained within the existing Amtrak right-of-way, local zoning districts and legislation will remain unaffected. The proposed project will not result in any zoning changes within the study area.

Master plans and vision statements adopted by the towns of Old Saybrook and Old Lyme express a desire to preserve the small-town qualities of each municipality. In addition, protecting the unique natural environment of the Lower Connecticut River Valley and its historic integrity is also vital to the towns, as well as the State of Connecticut. Since the Preferred Alternative is expected to only improve the reliability and long-term serviceability of the Connecticut River Bridge and its approach structures and to minimize conflict between rail and maritime traffic, and will not result in increased train speed or frequency of service, the proposed project will not alter the existing neighborhood character. The Preferred Alternative will not result in adverse impacts to zoning or public policy.

PARKLAND AND OPEN SPACE

The proposed project will not have significant adverse effects on the two parks located within the study area—Ferry Landing Park and the Elizabeth B. Karter Watch Rock Natural Preserve ("Watch Rock"). Access to a portion of the boardwalk located in Ferry Landing Park, which is owned by the Connecticut Department of Energy and Environmental Protection (CTDEEP) and is located directly beneath the Connecticut River Bridge, will be affected in the short-term during bridge construction (for a period of up to three years). As discussed in Chapter 12, "Construction Impacts," Amtrak and its contractors will take appropriate measures during construction to minimize short-term impacts to the boardwalk. Additionally, Chapter 18, "Section 4(f) Evaluation" includes an evaluation of the short-term park impacts in accordance with Section 4(f) of the U.S. Department of Transportation (USDOT) Act of 1966. The project's impacts to the boardwalk at Ferry Landing Park will be temporary and of short duration. Therefore, the project will not result in significant adverse impacts to parkland and open space. While the project would require a use of this Section 4(f) resource, there are no prudent and feasible alternatives to the use of this resource. Amtrak will work with CTDEEP to minimize boardwalk closures and provide adequate signage and information to users of the park.

SOCIOECONOMIC CONDITIONS

While Option B may improve navigation on the Connecticut River by potentially expanding the navigation channel, the proposed project is not expected to increase marine traffic in the project area or adversely impact the marine-related businesses. The proposed project will not spur rapid population growth or development and therefore will not adversely impact local or regional public policies or interfere with the master plans for Old Saybrook or Old Lyme. The project will not adversely affect socioeconomic conditions, employment, or community cohesion.

VISUAL AND AESTHETIC CONSIDERATIONS

The Preferred Alternative will result in the removal of the Connecticut River Bridge, which contributes to the character of the Connecticut River View Corridor. In replacing the historic bridge with a new bridge, this aspect of the corridor will be altered. The magnitude of the change will vary somewhat according to whether Option A or Option B is selected. Both options will likely result in the removal of the existing stone pier structure. Option A will be of the same bridge type and will have dimensions and height similar to the existing bridge. Insofar as the bascule bridge design will minimize impacts to the Connecticut River View Corridor, Option A will result in less change to visual conditions, while Option B will result in more change. Neither will block views along the Connecticut River View Corridor. Throughout the NEPA process, Amtrak has coordinated with the Connecticut State Historic Preservation Office (CTSHPO). The design of the new bridge will be undertaken by Amtrak in coordination with CTSHPO, as described in the Memorandum of Agreement (MOA), in Appendix A and will include consultation to incorporate historically compatible designs. This process will, to the extent practicable, result in a new bridge design that reflects the historic character of the existing bridge and will further minimize any visual changes or intrusions along the Connecticut River View Corridor.

The Preferred Alternative will not have an adverse impact on the Ferry Road view corridors. Views to the project site from Ferry Road in Old Saybrook and Old Lyme are limited. These views are relatively distant and of short duration, and the replacement of the existing railroad bridge with a new railroad bridge will not be expected to substantially change the overall character of the views. The differences in dimension and design proposed under the options of the Preferred Alternative will not be substantial enough to be strongly perceived from these vantage points.

In summary, the Preferred Alternative will not substantially alter the visual character of the study area or block important views to visually sensitive resources. Therefore, the project will not result in adverse impacts on visual character and visually sensitive resources in the study area.

CULTURAL RESOURCES

ARCHAEOLOGICAL RESOURCES

An adverse archaeological effect is defined as any disturbance or damage to an archaeological resource. Such an effect could occur if construction were to disturb the soil at the same depth where that resource was present. Construction of the Ragged Rock Marina channel in the early

20th century likely destroyed any resources that may have once been located in the Old Saybrook portion of the area of potential effect (APE). Since the extent of previous disturbances associated with rail construction within the Old Lyme portion of the APE but beyond the embankments is not known, Amtrak considers those areas to have moderate potential for prehistoric archaeological resources. Should Amtrak determine that the area adjacent to the embankments has been previously disturbed, Amtrak will then consider these areas to have low to no potential for prehistoric archaeological resources.

The Preferred Alternative involves modification of portions of the Northeast Corridor within the archaeological APE. Embankment extensions required for the Preferred Alternative will impact ground surfaces to the south of the current alignment for a length of up to 1,200 feet in Old Saybrook and 1,100 feet in Old Lyme. As described in the MOA to be executed by FRA, CTSHPO, and Amtrak (and any consulting parties), Amtrak will develop and implement an archaeological testing plan, in coordination with the CTSHPO, to determine the presence or absence of archaeological resources in Old Lyme that could be affected by the Preferred Alternative. If archaeological resources are found to be present in the APE, further field testing may be necessary to determine whether these resources are significant (S/NR eligible). If Amtrak determines that S/NR-eligible archaeological resources will be impacted by the project, avoidance or mitigation measures will be developed in coordination with the CTSHPO (see Mitigation section below).

ARCHITECTURAL RESOURCES

The Preferred Alternative will not directly affect any known or potential architectural resources identified in the study area, with the exception of the Connecticut River Bridge. Because these architectural resources are far removed (between 400 feet and a ¼-mile) from the project site, they are not at risk for inadvertent damage due to project-related construction activities. Furthermore, while the context of these resources will be somewhat altered by the removal of the Connecticut River Bridge and the construction of a new bridge over the Connecticut River, the overall context of these resources will not substantially change. The project will replace existing railroad-related structures with new railroad-related structures, and therefore, the use, atmosphere, and overall conditions of the resources' context will remain largely the same. The history and significance of these historic resources is not associated with the railroad, and therefore, their relationship to the railroad is not an important character-defining feature. Lastly, under the Preferred Alternative, the new bridge will not differ substantially in height, dimension, or alignment, and therefore, is not expected to block existing views to and from historic resources.

The Preferred Alternative will result in the removal of the existing Connecticut River Bridge and the construction of a new bridge. The Preferred Alternative will therefore have an adverse effect on the Connecticut River Bridge, which is SR-listed and NR-eligible as a contributing element within the Moveable Railroad Bridges on the Northeast Corridor in Connecticut Thematic Resource. FRA documented this adverse effects finding in its correspondence to CTSHPO, dated July 31, 2012 (see Appendix A). In response, CTSHPO concurred and provided input on the Draft MOA, as discussed below.

MITIGATION MEASURES

As project engineering proceeds, Amtrak and FRA will continue to participate in a consultation process with the CTSHPO to identify potential effects on archaeological and architectural resources, as mandated by Section 106 of the National Historic Preservation Act (NHPA) of 1966. As part of this process, measures to avoid, minimize, or mitigate, to the extent practicable, any adverse effects to archaeological and architectural resources will be explored. Development of these measures is set forth in the Draft MOA (included in Appendix A, "Cultural Resources"). Amtrak will implement the various provisions of the Draft MOA in consultation with FRA and CTSHPO.

The Draft MOA describes the continuing consultation process that will be conducted as project designs evolve and the measures to be implemented during the project's design process to avoid, minimize, or mitigate adverse effects of the project on historic resources. Amtrak will undertake the design of the replacement bridge in coordination with the CTSHPO and will make an effort to incorporate historically compatible designs. Mitigation for adverse effects on the Connecticut River Bridge (a contributing element of the Moveable Railroad Bridges of the Northeast Corridor in Connecticut Thematic Resource), may include Historic American Engineering Record (HAER) documentation for the Connecticut River Bridge and development of an interpretive exhibit in a park, greenway, or public space that will present the history of the bridge and other moveable railroad bridges on the Northeast Corridor in Connecticut. This exhibit could possibly include salvaged elements of the bridge, signage, etc.

As described above and detailed in the Draft MOA, if archaeological testing determines that S/NR-eligible archaeological resources are present in the APE and could be affected by the project, and if avoidance of these resources during construction is not feasible, mitigation measures, such as data recovery, may be required. Data recovery and additional mitigation, if appropriate, will be carried out in consultation with the CTSHPO.

AIR QUALITY

The Preferred Alternative will not result in an increase in capacity over the Connecticut River and the project will not increase the number of trains traveling over the bridge on the Northeast Corridor. Therefore, the project will not substantially increase the number of new transit riders and will not measurably reduce vehicle-miles-traveled in the region. The Preferred Alternative will not cause any change in current conformity designations and will not result in significant adverse effects on air quality. While the proposed improvements will lead to an improvement in service along the Northeast Corridor that could slightly increase passenger travel and reduce auto usage in the region, the air quality benefits will be negligible.

NOISE AND VIBRATION

There are two options of the Preferred Alternative for the proposed project; both will result in comparable noise levels since rail traffic will be identical, and the track alignment will be the same with either option. The distance between the boardwalk receptor and the track will not change, as the track runs directly over the boardwalk in both options of the Preferred Alternative as well as the existing condition. The distance between the Clark Street receptors and the track will increase with either option, as compared to the existing condition. The noise levels at the Clark Street receptors generated by rail traffic on the bridge will not be noticeably changed by the slight increase in distance, according to the Federal Transit Administration's (FTA) General Noise Assessment. The results of the assessment are shown in Appendix B, "Noise and Vibration." In summary, the Preferred Alternative will not result in significant adverse noise or vibration impacts.

INFRASTRUCTURE AND ENERGY

The Preferred Alternative will operate more efficiently than the existing bridge, using state-of-the-art electric motors and modern construction materials. Both bascule bridges and vertical lift bridges require relatively little power to operate the moveable span since the weight of the span is balanced by the counterweight. There is no meaningful difference in energy requirements for a bascule bridge versus a vertical lift bridge; therefore, neither option of the Preferred Alternative presents a benefit over the other in terms of energy consumption.

Amtrak does not expect the number of year-round bridge openings to be affected by the proposed project. The Preferred Alternative will not result in any increases in train service, or create a demand for additional energy. Amtrak does not expect the Preferred Alternative to substantially reduce the number of vehicle miles traveled by replacing automobile trips with rail ridership. Overall, changes in energy consumption in the study area as a result of the proposed project will be negligible, and the Preferred Alternative will not result in significant adverse impacts to energy consumption or resources.

NATURAL RESOURCES

TERRESTRIAL RESOURCES

Terrestrial resources potentially affected by the project are confined to those within Amtrak's right-of-way and possible construction staging areas. The removal of some scrub/shrub vegetation along the existing embankment may be necessary to accommodate the new alignment and construction access. These areas have relatively little value as terrestrial habitat, and as such, no significant permanent impacts to terrestrial natural resources are expected. The proposed project will not result in increases in rail traffic or train speed; therefore, no long-term noise impacts on local reptile, bird, and mammal reproduction, foraging, or movement will be occur.

FLOODPLAINS

The Preferred Alternative will not significantly impact floodplains. In-water piers and other support structures do not constrict tidal or freshwater flows, and are expected to be virtually identical to the existing structures with respect to flood water throughput. The bottom of steel of the new bridge superstructure will be located above the 100-year flood elevation. Small areas of fill in tidal floodplains associated with embankment widening and pier installation encroach into the floodplain. Because the Connecticut River and adjacent coastal floodplains are entirely tidal in the project area, this fill will not impact the capacity of the river to absorb flood waters. Since the project area is located near the mouth of the river at Long Island Sound, the ultimate flood storage capacity that should be considered for the site is that of Long Island Sound and the Atlantic Ocean.

COASTAL ZONE

According to CTDEEP, a formal coastal management consistency review should be performed during the subsequent preliminary engineering and permitting phase, rather than during the environmental review phase. At that time, Amtrak will submit a complete "Coastal Management Consistency Review Form for Federal Activities" along with all required attachments and will seek a formal Coastal Zone Consistency Determination from CTDEEP.

However, as part of this EA, Amtrak performed a preliminary coastal zone consistency analysis to determine the project's anticipated effects on coastal resources. The applicability of and consistency with each individual coastal zone policy is discussed in Appendix C. Overall, the proposed project is consistent with Connecticut's Coastal Management Program.

WETLANDS AND OPEN WATER

Due to the nature and location of the river crossing and the need for continuous operations along the Northeast Corridor, complete avoidance of wetland and open water areas will not be feasible. Based on the conceptual bridge design, Amtrak estimates that the Preferred Alternative will result in approximately 2.8 acres of permanent wetland impacts and 0.74 acres of permanent open water impacts. Removal of the existing Connecticut River Bridge may result in approximately 0.33 acres of restored open water, for a net project impact of 0.41 acres.

As discussed in Chapter 12, "Construction Impacts", temporary access roadways and construction platforms will temporarily impact wetlands and open water. Based on the conceptual bridge design and the anticipated construction means and methods, Amtrak estimates that approximately 3.2 acres of wetlands and 2.0 acres of open water will be temporarily impacted during the construction period. The differences in impacts between Option A and Option B are expected to be minor.

To the extent practicable, Amtrak will minimize environmental impacts through the use of retaining walls and by locating the new bridge alignment close to the existing alignment. After appropriate mitigation measures are implemented, the proposed project will not result in significant adverse wetland or open water impacts.

AQUATIC RESOURCES

Water quality impacts from the Preferred Alternative will comprise sediment resuspension, a temporary impact associated with in-water construction. Estuarine-dependent and anadromous fish species, bivalves and other macroinvertebrates, including those present in the lower Connecticut River and near the Connecticut River Bridge, are generally tolerant of elevated suspended sediment concentrations and have evolved behavioral and physiological mechanisms for dealing with variable concentrations of suspended sediment. Due to its coarse nature, the Connecticut River sediment will not remain suspended for extended periods of time, especially since in-water work will be performed intermittently as various project elements are constructed. Therefore, temporary increases in suspended sediment resulting from in-water construction activities will not be expected to result in significant adverse impacts to fish and mobile benthic macroinvertebrates.

An Essential Fish Habitat (EFH) assessment was conducted for the proposed project, and is included in Appendix C. For those EFH species likely to occur in the vicinity of the project area, the short duration and localized extent of construction activities and similar operation of existing and replacement bridges means that the proposed project will not result in significant adverse impacts.

THREATENED AND ENDANGERED SPECIES

Fish

Shortnose sturgeon, Atlantic sturgeon, and blueback herring are likely to occur at least seasonally within the study area. Because the proposed project is for bridge replacement, long-term future operational effects will be similar to those of the existing bridge and no adverse operational impacts are anticipated. If present in the study area, these highly mobile fishes will be expected to avoid noise associated with construction activities. The use of pile drilling (rather than impact pile driving) is expected to minimize the potential for noise impacts by ensuring that construction noise does not reach levels associated with the onset of physiological impacts, recoverable physical injury, or mortality. Therefore, noise-related impacts to fishes are not expected to result from the proposed project. Furthermore, no dredging is planned for the proposed project, which will avoid any indirect impacts caused by increased turbidity and the removal of benthic forage organisms. Increases in suspended sediment concentrations will be minimized through the use of containment measures during pile drilling. Overall, construction and demolition activities associated with the proposed project are not expected to have an adverse impact on listed fish species in the Connecticut River.

As shown in Appendix C, the National Marine Fisheries Service (NMFS) has confirmed that no further consultation pursuant to Section 7 of the Endangered Species Act (ESA) is required. Since all three of these species are likely to occur at least seasonally within the study area, and Atlantic sturgeon have recently been listed under the Section 7 of the ESA, Amtrak will continue to coordinate with NMFS and any other involved federal agencies during the final design and permitting process. If necessary, in-water work restrictions will be implemented to minimize the potential impacts. Permits issued by USCG, USACE, and through USDOT’s ESA Section 7 Consultation process for similar bridge construction projects have included in-water work restrictions designed to protect fishes. Since construction will adhere to the in-water work restrictions anticipated for this project, no adverse impacts to federally or state listed fish populations are expected.

Plants

CTDEEP identified saltmarsh bulrush and pygmy weed as being potentially within or immediately adjacent to the project site. Although bayonet grass, mudwort, eastern prickly pear, and Lilaeopsis have not been documented in the immediate vicinity of the project site, they have been documented within the 0.5 mile study area and habitat is present within the vicinity of the project site for these species. While Amtrak did not observe any of these plant species during preliminary field surveys, they may be present within the project site and there is the potential for an adverse impact to these plants as a result of the proposed project. During the preliminary engineering and permitting phase, additional surveys will be conducted in coordination with CTDEEP to determine the presence or absence of these species and the size of the populations within the area of disturbance. Should these plants be present in the area of disturbance, then measures to avoid and/or minimize impacts to these species where possible will be developed in coordination with CTDEEP.

Birds

Several threatened or endangered bird species may be seasonally present within the tidal wetlands affected by the Preferred Alternative. Further coordination with CTDEEP and species-specific surveys will likely be required during the preliminary engineering and permitting phase of the project to confirm the presence of these birds. Should these species be determined to be present, CTDEEP may include construction restrictions (i.e., “work windows”) in its permits to minimize disturbance and ensure that the project will not result in significant adverse impacts to these bird species.

CONTAMINATED MATERIALS

NEW BRIDGE CONSTRUCTION

The Preferred Alternative will involve shallow soil disturbance in areas where the proposed track will be placed on existing embankment. Deeper excavations will be required for catenary and signal support structures, new or relocated utilities, and embankment retaining walls. Due to the presence of compressible soils, deep foundations for the river crossing will be necessary. Construction of the foundation could potentially require the removal and off-site disposal of soil and river sediments up to 90 feet or more below existing grade, depending on the foundation type that is chosen. Amtrak will import clean fill for grading during construction, e.g., to widen the bridge embankments.

Construction Health and Safety Plan (CHASP)

Amtrak will perform all work in accordance with applicable local, state, and federal regulatory requirements. Prior to commencing site disturbance, Amtrak will prepare a CHASP to address the potential of encountering contamination during soil disturbance activities. The CHASP will describe in detail the health and safety procedures to minimize exposure to contaminated materials by workers and the public. The CHASP will evaluate the hazards by determining the potential subsurface contaminants of concern and their chemical and physical characteristics; it will also consider health hazards within the potential exposure associated with the work to be performed. The CHASP will be developed in accordance with Occupational Safety and Health Administration (OSHA) regulations and guidelines. The CHASP will include designation and training of appropriate personnel, monitoring for the presence of contamination (e.g., soil which shows evidence of potential contamination, such as discoloration, staining, or odors) and appropriate response plans. To prevent the potential off-site transport of dust, the CHASP will define dust control requirements for all soil-disturbing operations.

Waste Management

Amtrak will handle excavated soil or sediment in accordance with all applicable regulations and will classify all excavated material (e.g., historical fill, uncontaminated native soils, petroleum-contaminated wastes, etc.). The extent and parameters of any testing depend on the classification and any requirements of off-site waste disposal facilities.

EXISTING BRIDGE DEMOLITION

Prior to the demolition of the existing bridge, Amtrak will survey the structure for asbestos, lead-based paint, and PCB-containing equipment.

- Amtrak will remove any identified asbestos-containing materials prior to demolition, and will implement controls to minimize asbestos exposure
- If lead paint is present, Amtrak will perform an exposure assessment to determine whether lead exposure will occur during the demolition and/or removal of the existing bridge. If the exposure assessment indicates the potential to generate airborne dust or fumes with lead levels exceeding health-based standards, Amtrak will employ a higher personal protection equipment standard to counteract the exposure.
- Amtrak will survey and evaluate any suspected PCB-containing equipment (e.g., transformers, electrical feeder cables, hydraulic equipment, and fluorescent light ballasts) that would require removal, disturbance or relocation. Amtrak will remove and dispose of

PCB-containing equipment that the work would disturb in accordance with applicable federal and state regulations. Generally, unless suspected PCB-containing equipment is labeled to be "non-PCB," it must be tested or assumed to be PCB-containing and disposed of at properly licensed facilities.

With the implementation of these measures, construction and demolition activities on the project site will result in no adverse impacts related to hazardous materials. After the completion of the project, there is no potential for adverse impacts from hazardous materials.

CONSTRUCTION

OVERVIEW OF CONSTRUCTION ACTIVITIES

Amtrak based its analysis of construction activities on a representative construction approach and schedule that is typical for a moveable bridge replacement project. The actual project schedule will require consideration of in-water work restrictions and other limitations likely to be required by the permits issued. Amtrak expects that construction of the replacement bridge will begin in 2018 and be completed in 2021.

The Preferred Alternative will require construction in the Connecticut River and adjacent wetlands. Prior to initiation of construction, Amtrak's contractor will establish construction staging areas and mobilize heavy equipment. Temporary access roads and platforms will be required for construction over wetlands and/or open water; the contractor will also use barges to minimize wetland and open water impacts. The contractor will transport materials and remove debris through a combination of barge, rail, and truck transport.

For the construction of the Preferred Alternative, the contractor will rehabilitate and modify existing abutments, extend the existing embankments to the south, and build nine new piers (seven approach piers and two moveable span piers). The contractor will assemble bridge spans, including the moveable span, off-site and deliver them to the project site by barge, and float them in for installation. The contractor will install new track, a new catenary system, a new communication and signals system, and a new channel fender system. Once the contractor has constructed the replacement bridge and diverted all train traffic from the existing span, the contractor will decommission and remove the existing Connecticut River Bridge including both the superstructure and the substructure. The contractor will likely float out the existing moveable span on barges.

SUMMARY OF CONSTRUCTION PERIOD IMPACTS

Transportation

During the construction period, passenger and freight trains operating through the project area may need to operate at slower speeds to ensure safety. A track outage may also be required to reconnect the newly constructed bridge approach spans to the existing track.

There will be no adverse impacts on vehicular traffic in the project area; Amtrak will deliver and transport material through a combination of rail, barge, and truck trips to minimize vehicular traffic, and employee trips will be negligible.

Construction may impede navigation during the construction of the replacement moveable span, which will be placed in alignment with the existing channel. Intensive construction activities in the Connecticut River during the high season for recreational boating (May through October) could result in a problematic impairment to navigation, since this stretch of the river is heavily used by the boating community during those months. Amtrak will schedule construction in the river outside of that time period to the extent practicable. However, navigation will be maintained even in the winter months (November through April) since commercial traffic continues during that time. Amtrak will arrange channel closures through coordination with USCG and the maritime community. Overall, river closures are expected to be limited to brief periods during winter months. Amtrak anticipates that river navigation closures will occur only during the installation of the moveable span and a portion of the existing bridge demolition and will last approximately two days.

Land Use and Socioeconomic Conditions

Construction will result in temporary impacts to the elevated wooden boardwalk which runs from Ferry Landing Park, underneath the existing bridge, and out to the wetland complex to the southeast. This will require the closure (and possible temporary removal) of the portion of boardwalk that extends over the river, from the gazebo area in Ferry Landing Park to a bird watching platform approximately 600 feet southeast of the existing bridge. Additionally, if permitted, the contractor may use a portion of the CTDEEP Marine Headquarters (adjacent to Ferry Landing Park) for staging of equipment during the construction of the eastern portion of the replacement bridge and its embankments. The construction-related impacts to Ferry Landing Park and the marinas will be temporary and of short duration. Therefore, no significant adverse impacts to land use and social conditions are expected from the project.

Cultural Resources

Archaeological Resources

Construction of the Ragged Rock Marina channel in the early 20th century likely destroyed any resources that may have once been located in the Old Saybrook portion of the APE. Since the extent of previous disturbances associated with rail construction within the Old Lyme portion of the APE but beyond the embankments is not known, those areas are considered to have moderate potential for prehistoric archaeological resources. Should Amtrak determine that the area adjacent to the embankments has been previously disturbed, Amtrak will then consider these areas as having low to no potential for prehistoric archaeological resources. The Preferred Alternative involves modification of portions of the Northeast Corridor within the archaeological APE. Embankment extensions required for the Preferred Alternative will impact ground surfaces to the south of the current alignment for a length of up to 1,200 feet in Old Saybrook and 1,100 feet in Old Lyme. As described in the Draft MOA in Appendix A, “Cultural Resources,” Amtrak will develop and implement an archaeological testing plan, in coordination with the CTSHPO, to determine the presence or absence of archaeological resources in Old Lyme that could be affected by the Preferred Alternative. If archaeological resources are found to be present in the APE, Amtrak may need to conduct further field testing necessary, to determine whether these resources are significant (S/NR eligible). If Amtrak determines that the project will impact S/NR-eligible archaeological resources, Amtrak will develop avoidance or mitigation measures in coordination with the CTSHPO.

Architectural Resources

The Preferred Alternative is not expected to directly affect any known or potential architectural resources identified in the study area, with the exception of the Connecticut River Bridge. Other architectural resources are far removed from the project site and are not at risk for inadvertent damage due to project-related construction activities. Construction of a replacement bridge will obviously impact the Connecticut River Bridge since the final stage of construction will include the demolition of the existing bridge. The Preferred Alternative will therefore have an adverse effect on the Connecticut River Bridge, which is SR-listed and NR-eligible as a contributing element within the Moveable Railroad Bridges on the Northeast Corridor in Connecticut Thematic Resource. Measures to mitigate this adverse effect are described in detail in Chapter 6.

Visual

The Connecticut River View Corridor is the central visual resource in the study area. Viewer groups in the area consist of pedestrians, motorists, rail passengers, and boaters. Rail passengers traveling on the Northeast Corridor and motorists passing on I-95 are not expected to be greatly impacted by change in the visual character of the bridge since their view of the bridge is limited and of short duration. Boaters in the immediate vicinity of the bridge and pedestrians in Ferry Point Park in Old Lyme will experience the longest duration and closest range views of the replacement bridge construction area. For the duration of construction, cranes, barges and other construction equipment, as well as staging areas on both sides of the Connecticut River will be visible to boaters and pedestrians. These temporary changes will not constitute an adverse impact to visual resources.

Air Quality

Air pollutant emissions from construction of the Preferred Alternative will include emissions from on-site non-road construction equipment (potentially including both construction vehicles and small generators), emissions from on-road vehicles, including worker and delivery vehicles, emissions from marine engines and possibly locomotives delivering and removing materials from the site, and fugitive dust emissions from land-clearing operations, demolition, grading, excavation, and transfer of debris and loose material.

Emission Controls

In order to ensure that pollutant concentrations do not cause significant adverse air quality impacts in nearby publicly accessible areas, the project will require the following emission controls. The contractor will prepare an emissions control plan and submit the plan to Amtrak, identifying the incorporation, documentation, and enforcement of the following control measures in the project.

Diesel Engines:

- All non-road diesel engines will be U.S. Environmental Protection Agency (USEPA) Tier 2 certified or higher.
- All non-road diesel engines greater than 50 hp will be retrofit with diesel particulate filters (DPFs) unless they are Tier 4 certified.
- Truck routes for deliveries will be established so as to minimize the use of local truck trips in populated areas.
- Idling of delivery trucks or construction equipment when not in active use will be strictly prohibited.
- The contractor will coordinate as early as possible with Connecticut Light & Power to ensure the availability of grid power on-site, and will distribute power throughout the site as necessary. The contractor will use a combination of grid power and catenary power in lieu of

generators to the extent practicable, including, but not limited to, lighting, signage, and small power tools.

- If rail transfer is used, locomotives would idle only as necessary at the sidings in Old Saybrook and would do so to maximize the distance from the nearest residence (i.e., at least 200 feet from the nearest residence).

Dust Suppression:

- The contractor will be responsible for control of dust at all times during contract, 24 hours a day, seven days a week, including non-working hours, weekends, and holidays.
- Exposed unpaved areas and access roads will be watered at regular intervals or treated with water soluble, non-toxic, non-reactive, and non-foaming dust suppression agents as necessary to avoid fugitive dust resuspension by vehicles.
- Stock piles will be covered or watered at regular intervals to avoid windblown dust.
- Vehicles leaving the construction site will not have loose mud or dirt on the vehicle body or wheels and will be cleaned as necessary before leaving sites to control tracking.
- Haul truck cargo areas will be securely covered during material transport on public roadways. Trucks will have tight fitting tailgates that can be secured in the closed position.
- Vehicle mud and dirt carryout, material spills, and soil washout onto public roadways and walkways and other paved areas will be cleaned up immediately.
- Demolition, excavation, dumping, and transfer of materials will be accompanied by wet suppression so as to avoid the release of dust.

Noise and Vibration

Noise

Construction activities related to the bridges, approach structures, embankment and retaining walls, and new track and ancillary equipment along each alignment will result in short-term noise increases in the vicinity of the actual work site. The project will result in temporary noise increases at CTDEEP Marine Headquarters and Ferry Point Park from deliveries of materials that will be needed for construction purposes. Any impacts will be temporary and will most likely occur due to weekday truck trips concentrated in the morning and afternoon peak periods, with occasional late night deliveries of oversized materials (e.g., bridge girders).

Vibration

Since the use of driven piles will be limited, and since this analysis anticipates no controlled blasting, the likelihood of vibration-related adverse effects is small. Furthermore, as identified in Chapter 6, “Cultural Resources,” the project will not directly affect any known or potential architectural resources identified in the study area, with the exception of the Connecticut River Bridge itself. Any identified resources are far removed from the potential construction activity area, and therefore do not require special protection from construction-related vibration impacts.

Natural Resources

The construction-period impacts to natural resources were presented in conjunction with the permanent impacts above (see section titled “Natural Resources” on page S-11).

Contaminated Materials

The construction-period impacts to contaminated materials were presented in conjunction with the permanent impacts above (see section titled "Contaminated Materials" on page S-13).

Utilities

Amtrak will coordinate relocation of all utilities with the utility provider to minimize service disruptions. The contractor will use a combination of grid power and catenary power in lieu of generators to the extent practicable, including, but not limited to, lighting, signage, and small power tools.

SAFETY AND SECURITY

EMPLOYEES

Amtrak will design, build, and operate the proposed project to comply with all relevant federal, state, and local safety regulations, including: 49 CFR 214: Railroad Workplace Safety; 49 CFR 237: Bridge Safety Standards; National Fire Protection Agency (NFPA) regulations; OSHA regulations; American Railway Engineering and Maintenance-of-Way Association (AREMA) regulations; the Connecticut State Fire Safety Plan; Connecticut State Building Code; and Old Saybrook and Old Lyme Fire and Building Codes. During construction of the proposed project, Amtrak will develop written Safe Work Plans to identify potential hazards and safety measures to be implemented for the protection of workers on the project site and the general public in the vicinity of the project.

With the implementation of the safety measures described above, no adverse impacts to safety or security of employees will result from the proposed project.

PASSENGERS

The Preferred Alternative will improve the structural and operational reliability of the existing Connecticut River Bridge and increase the safety of passengers traveling on SLE and Amtrak trains over the bridge.

MARINE USERS

The Preferred Alternative will provide navigational benefits by improving the reliability of the bridge and minimizing delays during bridge openings and closings. Option A (which will retain the existing channel width and alignment) will maintain the current navigational conditions. Widening the channel (a possibility under Option B) can improve navigation further and may reduce the likelihood of boat collisions due to tidal currents. To prevent and/or minimize future accidents due to an off-center channel, Amtrak will provide navigation channel fenders and a dolphin system designed to protect the piers from all aberrant vessels.

SECONDARY AND CUMULATIVE EFFECTS

The proposed project will not result in an increase in train frequency or speed, nor will it result in measurable new rail ridership. The proposed project will not have an adverse impact on the population, land use, or economic activities in the study area. The project will not result in new development or population/employment growth. Therefore, no positive or negative secondary effects will result from the proposed project.

The planned major and minor improvement projects discussed under the No Action Alternative are located outside of the primary study area used for this analysis and are not expected to have an effect on any environmental resource in the study area. The construction and operation of the Preferred Alternative in conjunction with the planned projects identified in this EA will not result in an adverse cumulative impact to any environmental resource in the region around the project site.

Amtrak's Northeast Corridor Improvement Project includes infrastructure improvements to the Northeast Corridor system between Washington, D.C. and Boston. The Northeast Corridor Improvement Project, together with the Connecticut River Bridge Replacement Project, will improve the operations and reliability of the Northeast Corridor and result in a cumulative benefit. Similarly, the NEC FUTURE program, which is being led by FRA, is a comprehensive planning effort focused on the 457-mile rail transportation system extending from Boston's South Station in the north to Washington's Union Station in the south. The Connecticut River Bridge Project will be informed by the outcome of that planning effort and will be designed so as not to preclude the NEC FUTURE project.

COMMITMENT OF RESOURCES

Construction of the Preferred Alternative will require the irreversible and irretrievable commitment of construction materials such as concrete, steel, wood, and other building materials. Amtrak and its contractors will consume energy in the form of fossil fuels and electricity during the construction and operation of the facility. These materials are available and their use for the proposed project will not have an adverse impact on their continued availability for other purposes. In addition to materials, Amtrak will require funding and human labor to design, build, and operate the proposed project.

Construction of the proposed project will have greater short-term impacts on the environment than the No Action Alternative. However, the environmental impacts that will result from the proposed construction activities would be temporary and non-significant. The proposed project will be a component of the long-term viability of the intercity rail system, as well as the area's maritime industry, and will help to promote the region's economic vitality. Based on this information, the localized short-term impacts that will result from construction of the proposed project will be temporary, and will facilitate the maintenance and enhancement of long-term productivity in the region through the provision of improved rail and marine operations.

ENVIRONMENTAL JUSTICE

Amtrak conducted an environmental justice analysis for the proposed project, following the guidance and methodologies recommended in the federal Council on Environmental Quality's (CEQ) *Environmental Justice Guidance under the National Environmental Policy Act* (December 1997) and USDOT's *Final Order on Environmental Justice* (April 1997). Based on this analysis, the proposed project will not result in any disproportionately high and adverse effects on minority and low-income populations.

PUBLIC INVOLVEMENT AND AGENCY COORDINATION

During the early phases of the proposed project, Amtrak and FRA prepared a Public Involvement and Agency Coordination Plan. Amtrak and FRA considered recent experience from similar bridge replacement projects in Connecticut to identify potentially interested parties and obtain comprehensive community representation. The plan included outreach to marina operators, boaters, trade associations, elected officials, local businesses, and private citizens who rely upon Northeast Corridor rail service, use the Connecticut River, or live or work in the project study area.

FRA and Amtrak hosted a joint public involvement and agency coordination meeting in Old Lyme, Connecticut on July 8, 2008. The meeting included an overview of the project purpose and the project alternatives being considered. Attendees of the meeting included members of local marine businesses, officials of the towns of Old Lyme and Old Saybrook, and representatives of state and federal agencies. Amtrak and FRA solicited input on the proposed project during the meeting.

Amtrak also developed a list of potentially involved and interested federal, state, and local agencies in the initial stages of the project and included this list in the Public Involvement and Agency Coordination Plan. Numerous agency representatives attended the coordination meeting on July 8, 2008 and provided input on the project and the regulatory process. Throughout the environmental review process, Amtrak has been coordinating with multiple regulatory agencies, including USACE, USCG, U.S. Fish and Wildlife Service (USFWS), USEPA, NMFS, CTDEEP, CTSHPO, and ConnDOT.

SECTION 4(F) EVALUATION

Section 4(f) of the USDOT Act of 1966 prohibits the Secretary of Transportation from approving any program or project that requires the use of: (1) any publicly owned land in a public park, recreation area, or wildlife and waterfowl refuge of national state, or local significance, or (2) any land from a historic site of national, state, or local significance (collectively "Section 4(f) resources"), unless there is no feasible and prudent alternative to the use of such land and the project includes all possible planning to minimize harm to the resource.

The Preferred Alternative would require the use of the following Section 4(f) resources:

- The Connecticut River Bridge. The Preferred Alternative will require the decommissioning and removal of the existing bridge. As part of the Moveable Railroad Bridges on the Northeast Corridor in Connecticut Thematic Resource, the bridge is SR- listed and NR-eligible. Amtrak is participating in an ongoing consultation process with the CTSHPO regarding the potential effects on archaeological and architectural resources. Development of mitigation measures is set forth in the draft MOA, included in Appendix A.
- Ferry Landing Park Boardwalk. The Preferred Alternative would involve construction of a new bridge over the existing boardwalk within Ferry Landing Park, a waterfront park owned by CTDEEP. The proposed project will not permanently adversely affect either the park or the boardwalk; however, it is likely that a portion of the boardwalk will be temporarily closed (and possibly removed and replaced) during the construction phase of the project. Amtrak will work closely with CTDEEP to minimize these closures and provide adequate signage and information to the users of the park.

As described in detail in Chapter 18, "Section 4(f) Evaluation," there are no prudent and feasible alternatives to the use of these two resources.

PERMITS REQUIRED

The Preferred Alternative will potentially require a number of federal, state, and local permits and approvals (see Table S-2). The project must also comply with numerous laws, including those regarding worker and public safety, use of parkland and historic resources, and endangered and protected species.

Table S-2
List of Potential Federal, State, and Local Permits

Permits/Certifications	Responsible Agency	Activity
Federal		
Section 404 Permit	US Army Corps of Engineers	Discharge of dredged or fill material into U.S. waters.
Section 10 Permit	US Army Corps of Engineers	Construction of structures in navigable waters
Section 9 Permit	US Coast Guard	Construction over navigable waters
Hazards to Navigation Assessment	US Coast Guard	Obstructions in navigable waters
State		
Coastal Consistency Review	Connecticut DEEP	Excavation and fill in navigable waters
401 Water Quality Certificate	Connecticut DEEP	Discharges to surface waters
Stream Encroachment	Connecticut DEEP	Coastal development
Tidal Conveyance	Connecticut DEEP	Activities that affect tidal wetlands
Construction General Permit	Connecticut DEEP	Stormwater and dewatering/wastewaters from construction activities
Note: Other federal, state and local permits and approvals may be required.		

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A. INTRODUCTION

This chapter provides a description of the proposed project, identifies the problems posed by the existing situation, describes the regional planning context, and states the project purpose, goals, and objectives.

B. PROJECT DESCRIPTION

Amtrak is proposing improvements to the Connecticut River Bridge. FRA is serving as the lead federal agency for this EA, prepared in accordance with NEPA. The bridge is located between the Town of Old Saybrook in Middlesex County and the Town of Old Lyme in New London County (See Figures 1-1 and 1-2). The bridge is located along Amtrak's Northeast Corridor (MP 106.89) and spans the Connecticut River, 3.4 miles from its mouth at Long Island Sound (see Figure 1-3). The Connecticut River Bridge is one of several moveable rail bridges along the Northeast Corridor. The existing bridge is a two-track, ten-span steel rail bridge with an open deck and stone masonry piers. The bridge is over 1,500 feet long and has two abutments and nine piers. Seven of the ten spans are through-truss spans (roughly 185 feet in length each). Two of the spans are deck-girder spans (one 38 feet in length and one 70 feet in length). One span is a 160-foot-long moveable rolling lift bascule span (see Figure 1-4). The lift span opens to allow boats and other marine vessels to traverse the Connecticut River. The bridge is owned by Amtrak and used primarily for passenger rail. P&W also uses the bridge for freight transport.

Construction of the existing Connecticut River Bridge began in 1904 and it became operational in 1907. It is nearing the end of its serviceable life. Amtrak is initiating the Connecticut River Bridge Replacement Project to identify problems posed by the current rail crossing and propose necessary improvements. As discussed in Chapter 2, "Project Alternatives," Amtrak has considered a range of improvement alternatives, including minor repairs, rehabilitation of the existing bridge, partial replacement, and complete replacement.

C. EXISTING CONDITIONS

REGIONAL PASSENGER RAIL SYSTEM

The Northeast Corridor is the most heavily used passenger rail line in the U.S., both in terms of ridership and service frequency.[1] The Northeast Corridor extends from Washington, D.C. in the south to Boston, Massachusetts in the north, serving the densely populated northeast region including Pennsylvania Station in New York City (PSNY). Amtrak, the nationwide inter-city passenger rail operator, owns much of and operates over all of the Northeast Corridor. Amtrak

[1] Source: BGL Rail Associates, for the Amtrak Reform Council, "*A Recommended Approach to Funding the Estimated Capital Investment Needs of the Northeast Corridor Rail Infrastructure*", April 2002.

operates regional service, long distance service, and high-speed Acela Express service along the line. Several commuter rail agencies provide local and semi-express regional passenger services along the Northeast Corridor. Amtrak provides service to over 500 destinations in 46 states on 21,000 miles of routes. An average of nearly 78,500 passengers travel on more than 300 Amtrak trains per day across the nation. In FY 2012, Amtrak's total ridership was 31.2 million passengers, the most in Amtrak's history. Nearly 11.4 million of these riders traveled along the Boston-New York-Washington segment of the Northeast Corridor.

BRIDGE HISTORY

The American Bridge Company began constructing the existing bridge in 1904 and it became operational in 1907. The bridge was initially owned by the New York, New Haven & Hartford Railroad, subsequently by Penn Central Railroad, and eventually by Amtrak. The bridge piers were constructed to allow for the future addition of parallel spans to the north. Regular maintenance and structural repairs have been made to the bridge over its lifetime, including: mechanical, electrical, and structural repairs to the moveable span; structural repairs to the approach span floor systems and trusses; and bridge cleaning and painting. Amtrak installed a moveable catenary unit on the bridge in the 1990s as part of the Northeast Corridor Electrification Project between New Haven and Boston.

CURRENT BRIDGE OPERATIONS

The existing Connecticut River Bridge is used by Amtrak, P&W, and by ConnDOT's SLE service. Roughly 38 Amtrak trains, 12 SLE trains (including 2 non-revenue trains), and 6 freight trains travel across the bridge each weekday. Between 1999 and 2011, the rolling lift span has opened approximately 3,400 times per year to allow marine vessels to pass. Since approximately 80 percent of these openings are needed during the summer months, the bridge largely remains open for navigation between May 15 and October 15 and closes for rail traffic as needed.[1]

The maximum allowable speed over the bridge is 60 miles per hour (mph). Speed over the bridge is limited by the east and west approach curves and by the miter rails, special rail connections that allow the rails to disengage and the bridge to open and close. The bridge approaches consist of fill material and rise approximately 28 feet above the surrounding open waters and tidal wetlands.

The Connecticut River Bridge is part of the CONN Interlocking. The existing communication and signals (C&S) system on the bridge includes systems for both rail and marine traffic, and the C&S lines are housed in a concrete duct parallel to the right-of-way (ROW) on the north side. Control of the bridge openings and signal protection can be performed locally at the bridge or remotely from Boston. Submarine fiber optic and copper cables, owned by AT&T and MCI, are also located along the north side of the ROW and cross the river to the north of the bridge. The electrification system for the existing bridge comprises an auto-tension type wire catenary with feeder arrangement. Steel poles and bracket arms support the catenaries along the ROW. The steel poles are in reinforced concrete caisson foundations. An emergency generator is located near the northeast corner of bridge.

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[1] Source: Hardesty and Hanover, LLP for National Railroad Passenger Corporation Office of Engineering, *Inspection and Conceptual Engineering for the Reconstruction or Replacement of the Connecticut River Bridge, MB 106.89; Navigation Survey Report*, October 2006.

5.23.12

Aerial Source: Connecticut 2010 Color NAIP, USDA-FSA-APFO, Connecticut Department of Energy and Environmental Protection, 2010

Project Site Boundary

1/4-Mile Study Area Boundary

0 2000 FEET

SCALE

Figure 1-1

Project Site

6.16.08

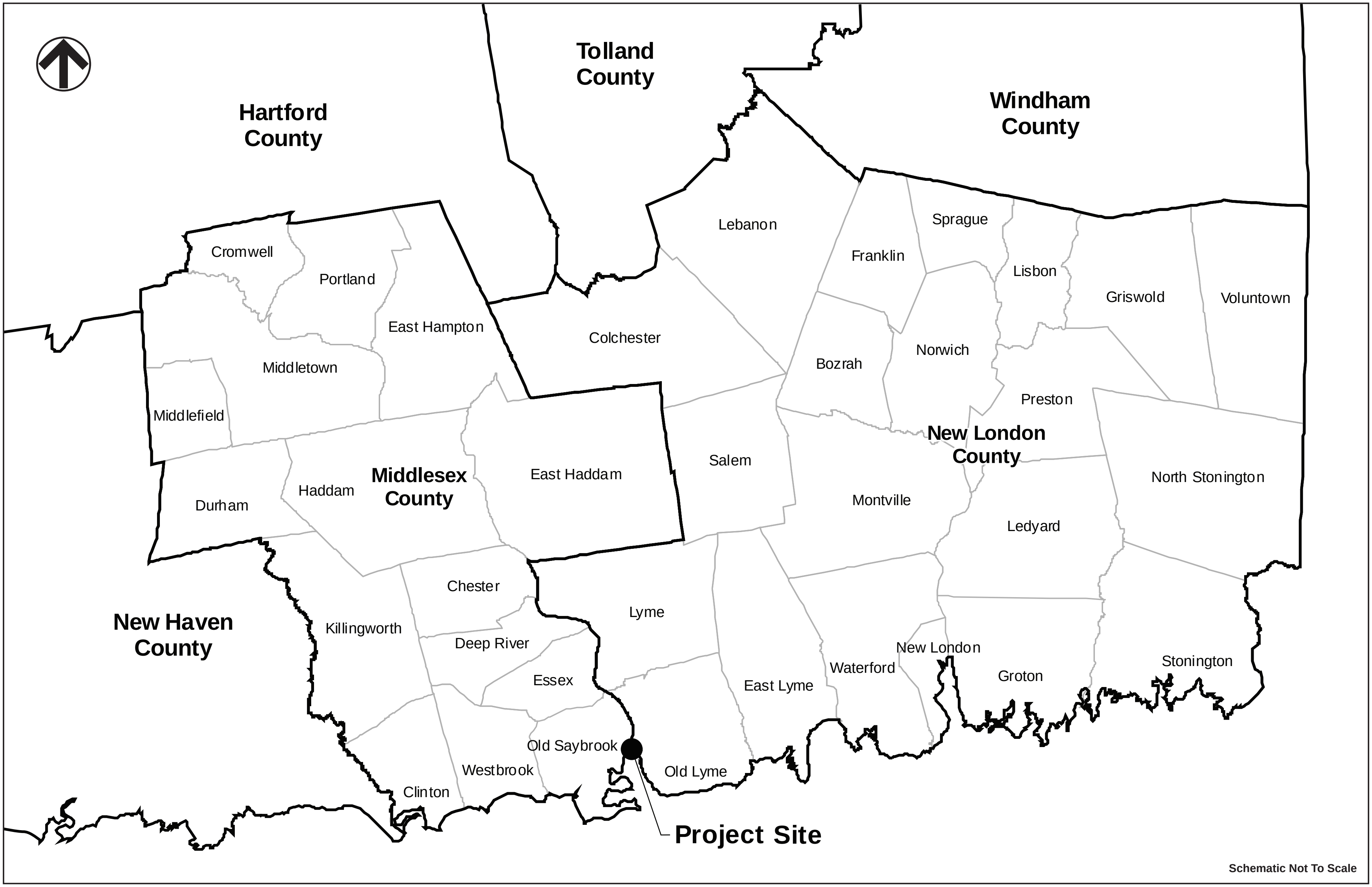
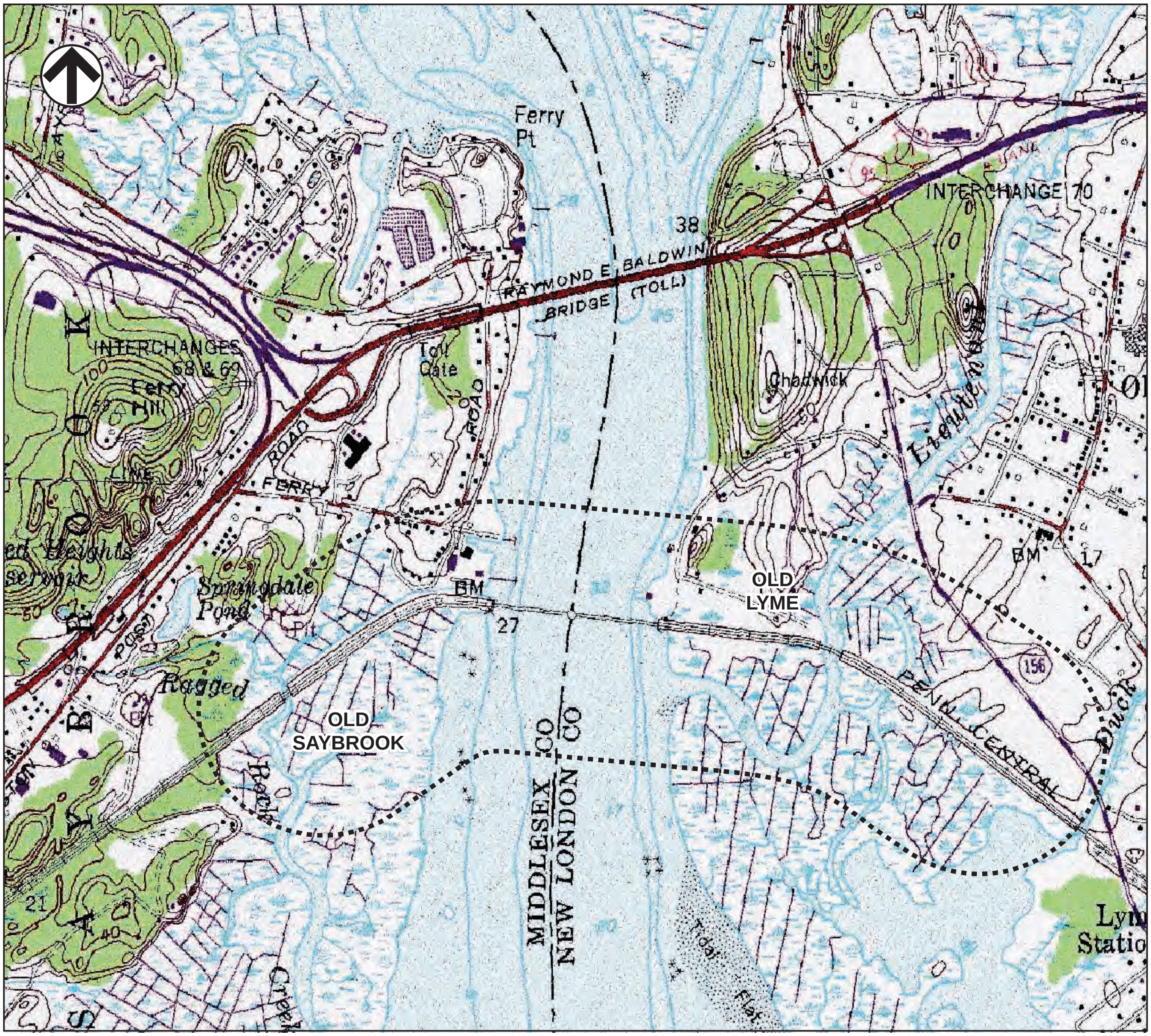


Figure 1-2
Regional Project Context

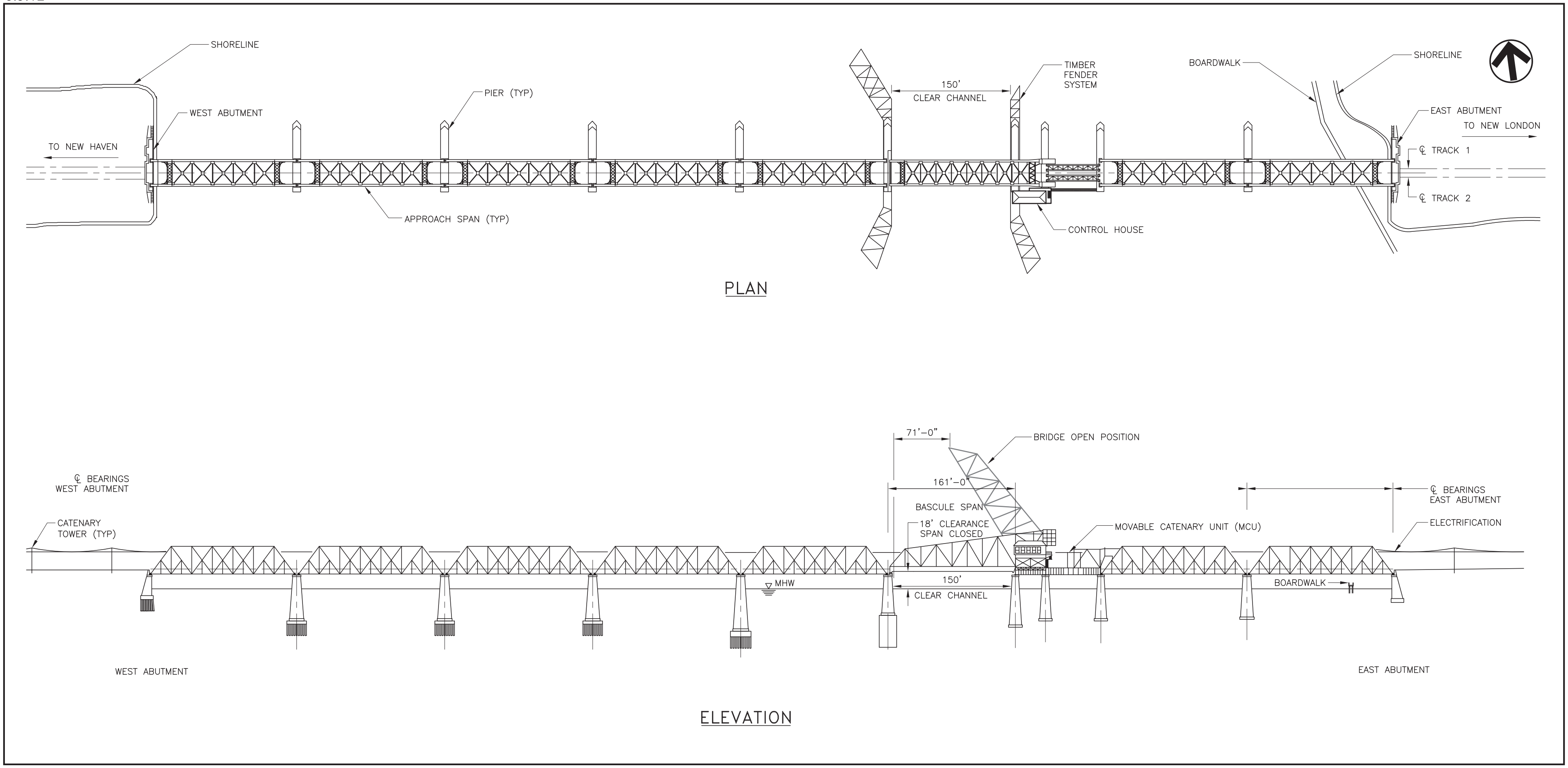
6.16.08



1/4-Mile Study Area Boundary

0 800 1600 FEET
SCALE

Figure 1-3
USGS Map



SOURCE: Hardesty & Hanover, LLP, “Final Concept Design Engineering Report”, March 2007

Figure 1-4

Existing Bridge (General Plan and Elevation)

NAVIGATION ALONG THE CONNECTICUT RIVER

The Connecticut River is 407 miles long, stretching from northern New Hampshire to its mouth at Long Island Sound, between the towns of Old Saybrook and Old Lyme, Connecticut. The river is tidally influenced as far as Hartford, the practical head of navigation, approximately 50 miles from the mouth of the river. Several marinas serving recreational users are located on either side of the bridge. In the town of Old Saybrook, several facilities associated with the "Between the Bridges Marina" operate north of the project site. Additionally, the "Ragged Rock Marina" is located in a small inlet west of the project site. CTDEEP's Marine Headquarters, with several support facilities, is located on the eastern bank of the river in Old Lyme, immediately north of the existing bridge approach.

The existing Connecticut River Bridge has a navigable channel width of approximately 150 feet, located between the fenders of the moveable span (i.e., not in the center of the river). During the original construction of the bridge, the moveable span was built east of center in a shallow portion of the river so the bridge piers could be more easily anchored. In the closed position, the bridge has a vertical clearance of 18 feet, which is adequate clearance for smaller recreational boats. Larger boats and marine vessels require opening of the bridge. With the rolling lift span in the open position, the vertical clearance is 68 feet for the full channel width. For marine vessels requiring a channel width less than 71 feet, the vertical clearance is unlimited. USACE maintains a channel depth of 15 feet in this stretch of the Connecticut River Bridge.

Between the bridge and the mouth of the river, the navigable channel width is 300 feet. Upstream of the bridge, the navigable channel width is 150 feet. The Raymond E. Baldwin Bridge, an eight-lane fixed highway bridge carrying I-95, is located 1/3-mile to the north of the study area (see Figure 1-3). The Baldwin Bridge was reconstructed in 1993 using a modern segmental concrete design with a vertical clearance of 81 feet. The next crossing of the Connecticut River, the Route 82 swing auto bridge, is located about 12 miles to the north of the project site.

Recreational use of the Connecticut River has been increasing steadily in the last 20 years due to an improvement in environmental quality of the river and its designation as an American Heritage River in 1998 by the Clinton administration[1]. Recreational boaters are the primary users of the Connecticut River between late spring and early autumn. The majority of recreational craft are power boats but a substantial number of sailing vessels also use the river. There are approximately 30 yacht marinas and four boat launches between the mouth of the river and the head of navigation. In 2006, a navigation survey of the Connecticut River Bridge vicinity was performed on behalf of Amtrak, referred to herein as the Navigation Survey.[2] The survey was conducted through conversations with various marinas, contractors, and commercial users of the river, interviews with USCG and USACE, reviews of bridge operating practices, and observations at the site. The Navigation Survey concluded that the existing channel width and alignment are adequate for current navigation, and further suggested that widening and centering the channel could possibly improve navigation and reduce vessel impact risk. The tallest recreational vessels using the river were identified as tall as 90 feet high, although these vessels

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[1] http://water.epa.gov/type/watersheds/named/heritage/connecticut.cfm. Accessed March 16, 2011.

[2] Source: Hardesty and Hanover, LLP for National Railroad Passenger Corporation Office of Engineering, *Inspection and Conceptual Engineering for the Reconstruction or Replacement of the Connecticut River Bridge, MB 106.89; Navigation Survey Report*, October 2006.

are known to have trouble navigating under the 81-foot-tall Baldwin Bridge immediately to the north of the study area.

Commercial traffic on the Connecticut River consists mainly of general contractors and the shipping of coal and oil by Moran Towing during the colder months. Self-propelled vessels include dry cargo ships, towboats and tugboats. Non-propelled vessels on the river include barges and tankers. Barges from Moran Towing make up the largest vessels on the Connecticut River, displacing roughly 11,000 tons when fully loaded with coal or oil.

D. PROBLEM IDENTIFICATION AND NEED

BRIDGE STRUCTURE

The primary concern with the existing Connecticut River Bridge is its age, since it is nearing the end of its useful life. At times, the operational reliability of the aging bridge results in cascading delays to rail and maritime traffic due to its failure to open and close properly. In 2006, a bridge inspection was performed on behalf of Amtrak. As discussed below, Amtrak's contractor found certain aspects of the existing bridge to be particularly problematic, including the mechanical operating system, the bascule span rolling tread plates, and the approach span truss pin and eyebar connection, the curved tread plates, and mating track plates of the heel end of the rolling lift span. Disruptive rehabilitations of the treads and tracks are required approximately every 20 years, which limits the retrofit options. At the time of the inspection, the existing track and tread structure, and the supporting steel segmental box girder exhibited cracks. The approach spans have truss pin and eyebar connections, which typically loosen after years of service. Amtrak has determined retrofit devices installed during the 1970s to be ineffective.

Amtrak installed a moveable catenary unit on the bridge as part of its Northeast Corridor Electrification Project. The complex structure extends the length of time required to open and close the bridge and adds weight to the bridge. The original bridge design did not factor in the weight of the electrification facilities and, as a result, the electrification facilities have increased stresses and bearing pressures on the bridge. The moveable span counterweight balance is a concern, as is potential deterioration of structural members. Additional concerns include: tight working clearances within the machinery house, limited access for maintenance and routine inspection, and uncertainty in the seismic resistance of the existing stone masonry piers.

NAVIGATION CHANNEL

The existing bridge timber fenders that mark the channel are deteriorated and substandard. Reconstructed fenders will provide greater protection of the bridge piers. As explained above, widening the horizontal clearance of the channel and/or relocating it westward towards the center of the river will potentially provide additional navigation advantages and reduce the risk of vessel impact. Because of the off-center nature of the existing channel and its location close to the eastern shoreline, the ebb tide current tends to pull marine vessels into Pier 5 (the west channel pier). Relocating the moveable span westward of the existing channel would, however, require deeper pier foundations.

The Navigation Survey determined that increasing the vertical clearance of the bridge when in the closed position will not result in a meaningful reduction of bridge openings. The current practice of leaving the bridge in the open position during the summer months is acceptable to Amtrak given the current and projected future rail traffic.

E. PLANNING CONTEXT

RELATED PRIOR PROJECTS

In the 1980s, FRA financed the Northeast Corridor Improvement Project (NECIP) which, for a total cost of nearly $4 billion, included a major overhaul to fully electrify and improve the system between Washington, D.C. and Boston. In the late 1990s, in preparation for the launch of the Acela Express service, Amtrak upgraded the portion of the Northeast Corridor north of New York City again to eliminate grade crossings, modify approach curves, and rebuild bridges to accommodate the new trains. Amtrak replaced the Mystic River Bridge in Mystic, Connecticut and the Shaw's Cove Bridge in New London as part of this effort in the 1980s.

ARRA AND PRIIA

As is evident in recent legislation, the federal government is making substantial investments in intercity rail service. Two important new sources of federal funding have emphasized extensive capital investment into Amtrak infrastructure on the state and corridor level:

- The Passenger Rail Investment and Improvement Act of 2008 (PRIIA) set objectives for Amtrak by focusing on intercity passenger rail, including Amtrak's service on the Northeast Corridor. Programs authorized under PRIIA represent a shift in rail project funding to state-lead planning, positioning Amtrak to ensure that service planning and development proceed in a consistent manner along each long-distance corridor and throughout the entire network.
- The American Recovery and Reinvestment Act of 2009 (ARRA) has provided a much-needed infusion of funds to allow Amtrak to begin making capital investments that may otherwise have been backlogged.

Using the framework established under PRIIA and ARRA, and the authorized funding, FRA launched the High-Speed Intercity Passenger Rail (HSIPR) Program in June 2009. HSIPR emphasizes a corridor-level approach to planning rail services to support the state-centric funding. The administration's initial vision for establishing high-speed rail was documented in the *High-Speed Rail Strategic Plan (April 2009)*[1], and clarified by the FRA's Interim Program Guidance (June 2009), which outlined the eligibility requirements and procedures for obtaining funds under the program, and the criteria by which applications are evaluated.

The *Northeast Corridor Infrastructure Master Plan (May 2010)*[2] has identified the capital needs to meet the increase in service of Amtrak and commuter railroads, together with the remaining state of good repair backlog. The next step in the planning process is to prepare more detailed plans of the proposed improvements, more clearly defining the service improvements, costs, and environmental impacts. This step will help focus investment in those areas that will best serve the needs of Amtrak and its partners.

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[1] http://www.fra.dot.gov/downloads/rrdev/hsrstrategicplan.pdf. Accessed March 21, 2011.

[2] http://www.amtrak.com/servlet/ContentServer?c=Page&pagename=am%2FLayout&p=1237608345018&cid=1241245669222. Accessed March 21, 2011.

STATE OF GOOD REPAIR

On April 15, 2009, Amtrak issued the *Northeast Corridor State of Good Repair Spend Plan*[1] as required by Section 211 of PRIIA. The plan cited then-Secretary of Transportation Mary E. Peters' definition of state of good repair: "A condition in which the existing physical assets, both individually and as a system, (a) are functioning as designed within their useful lives and (b) are sustained through regular maintenance and replacement programs; state of good repair represents just one element of a comprehensive capital investment program that also addresses system capacity and performance."

Amtrak's planned state of good repair projects include normalized replacement (sustaining assets in a state of good repair) and backlog of deferred investments (replacing assets that are no longer functioning as designed within their useful lives). It will include replacement of infrastructure elements such as: track, bridges, tunnels, overhead catenary wire, power supply systems, cable, transformers and converters, signals, communications and dispatching systems, stations, and facilities. The program also includes the procurement of new rolling stock throughout the Amtrak system.

As part of the State of Good Repair program, Amtrak has two similar moveable bridge projects along the Connecticut segment of the Northeast Corridor. The Thames River Bridge Replacement Project was completed in July 2008. The Niantic River Bridge Replacement Project was completed in May 2013. The Connecticut River Bridge Replacement Project will be the next major improvement project to address the operational reliability of Northeast Corridor drawbridges.

AMTRAK'S 2012 UPDATE REPORT

Amtrak's recent summary document, *The Amtrak Vision for the Northeast Corridor, 2012 Update Report*[2] outlined actions and initiatives taken in the preceding years, identified critically needed near-term Master Plan projects benefiting the Northeast Corridor, and established a phasing strategy for the implementation of next generation high-speed rail operations within the next 5 to 15 years. The report reaffirmed the Connecticut River Bridge as one of the critical components for improving Northeast Corridor operations from Washington to Boston. The plan noted that the approach of the NECIP going forward will be to integrate suites of state-of-good-repair projects—designed to repair the network and increase reliability—with capacity enhancements that would allow next-generation initiatives such as high-speed rail service.

NEC FUTURE TIER I EIS

The NEC FUTURE program is a comprehensive planning effort focused on the 457-mile rail transportation system extending from Boston's South Station in the north to Washington's Union Station in the south[3]. The program is being led by FRA with FTA acting as a cooperating agency for the initiative. A unique partnership with the White House Council on Environmental Quality (CEQ) has been established for NEC FUTURE to promote early collaboration with

[1] http://www.amtrak.com/servlet/ContentServer?c=Page&pagename=am%2FLayout&p=1237608345018&cid=1241245669222. Accessed March 21, 2011.

[2] http://www.amtrak.com/ccurl/453/325/Amtrak-Vision-for-the-Northeast-Corridor.pdf. Accessed on October 21, 2013.

[3] http://www.necfuture.com/. Accessed on December 10, 2013.

federal and state environmental agencies for efficient environmental decision-making. NEC FUTURE aims to define, evaluate, and prioritize future investments in the NEC, and will include new ideas and approaches to grow the region's intercity, commuter, and freight rail services.

The first phase of the program took place in 2012 and entailed stakeholder and public outreach, data collection and analysis, a scoping process in accordance with NEPA requirements, and development of initial alternatives. In 2013, principal activities included preliminary alternatives development and a screening process to identify a smaller set of reasonable alternatives for analysis in the Tier 1 Environmental Impact Statement (EIS). Additional activities included an existing conditions analysis of the NEC FUTURE study area and ongoing public outreach and agency coordination. In 2014, FRA anticipates preparation of the Draft Tier 1 EIS (DEIS) and Draft Service Development Plans, with the selection of a preferred investment program for the Northeast Corridor. The Final Tier 1 EIS (FEIS) and Final Service Development Plan are expected to be completed in 2015. The Connecticut River Bridge Project is within the Tier I EIS study area. Amtrak is coordinating with FRA regarding both projects. The Connecticut River Bridge Project will be informed by the outcome of the Tier I EIS and will be designed so as not to preclude the NEC FUTURE project.

F. PROJECT PURPOSE, GOALS, AND OBJECTIVES

FRA and Amtrak recognize the need to address the problems posed by the existing Connecticut River Bridge. The purpose of the Connecticut River Bridge Replacement Project is to improve the aging bridge, enhance its reliability and long-term serviceability, and ensure continued passenger and freight rail operations along the Northeast Corridor as well as navigation along the Connecticut River.

To compare and contrast the project alternatives developed as part of the environmental review process, Amtrak has identified specific project goals and objectives to be used as the basis for developing the criteria and screening methodology for evaluating the project alternatives. Amtrak has established three goals for the Connecticut River Bridge Replacement Project. The objectives further define the goals and provide specific and measurable means by which to evaluate project alternatives. While cost effectiveness is not an explicit project goal, the estimated capital and operation and maintenance costs of each project alternative will be considered in tandem with the project goals. Cost effectiveness will not, however, affect the selection of a Preferred Alternative for NEPA analysis. The three project goals and their respective objectives are as follows:

Goal 1: Improve the reliability and long-term serviceability of the Connecticut River Bridge and its approach structures.

- Objective: Maintain a state-of-good-repair for the bridge and its approaches.

Goal 2: Minimize conflicts with maritime traffic.

- Objective: Minimize delays to trains and/or marine traffic due to bridge operations.
- Objective: Provide sufficient vertical clearance and channel width for commercial and recreational traffic on the Connecticut River.
- Objective: Minimize construction-period impacts to rail operations and navigation.

Goal 3: Minimize permanent and temporary impacts to the surrounding environment.

- Objective: Minimize temporary and permanent impacts to wetlands and other ecologically sensitive areas.
- Objective: Minimize impacts to cultural resources.
- Objective: Minimize short-term construction impacts.

G. ENVIRONMENTAL REVIEW PROCESS

In accordance with NEPA, 42 U.S.C. §4321 *et seq*., FRA is performing this EA to analyze the potential environmental impacts from each feasible project alternative. Subsequent chapters in this EA describe the project alternatives being considered, describe the current state of the surrounding environment, and identify possible effects of the project alternatives. This EA also documents compliance with applicable federal environmental laws, rules, and regulations, including Section 106 of the NHPA, Section 4(f) of the USDOT Act, and Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations." ✷

A. INTRODUCTION

Amtrak is initiating the Connecticut River Bridge Replacement Project (project) to identify problems posed by the current rail bridge and propose necessary improvements. Consistent with NEPA requirements and FRA guidance, this EA evaluates several build alternatives. Also evaluated is a "no build" scenario, referred to as the "No Action Alternative", wherein none of the project elements will be constructed and the existing Connecticut River Bridge will remain in place. Amtrak developed the project alternatives evaluated in this EA through a comprehensive alternatives development and screening process that considered bridge rehabilitation, partial bridge replacement, and full on-line and off-line bridge replacement options. Upon completion of the screening process, the project team evaluated potential build options and identified a Preferred Build Alternative as best meeting the project goals and objectives. The Preferred Build Alternative will be fully constructed and operational by the year 2018. Amtrak identified the year 2030 as the long-term planning year for all project alternatives and the environmental impact analysis year for this EA.

This chapter identifies the APE, explains the alternatives development and screening methodology, describes the No Action Alternative and identifies the Preferred Build Alternative as the Preferred Alternative for purposes of this EA. The estimated project costs and a list of potential permits and approvals required to build the project are also provided.

B. AREA OF POTENTIAL EFFECT

The APE (also referred to as the "project study area") includes the Connecticut River Bridge, its eastern approach in the Town of Old Lyme, and its western approach in the Town of Old Saybrook. Amtrak has generally defined the primary study area as the area within a quarter-mile of this segment of the existing Northeast Corridor ROW (as shown in Figure 1-1). The primary study area also represents the area within which project elements will be constructed and where environmental impacts could occur. As described in subsequent chapters of this EA, each impact analysis may also consider a larger secondary study area to appropriately assess the potential for the project to result in regional impacts or benefits.

C. ALTERNATIVES DEVELOPMENT AND SCREENING

Amtrak considered a number of build alternatives involving the rehabilitation, reconstruction, and/or replacement of the Connecticut River Bridge. As a first step, Amtrak developed a list of feasible project alternatives that considered the project's logical termini, constructability requirements, navigability requirements, and track requirements. These alternatives were then evaluated based on specific criteria, including: construction-period impacts to rail service and navigation; operational improvements to rail service and navigation; long-term serviceability and reliability of the bridge and its approach structures; impacts to railroad facilities, such as electrification; and permanent and temporary environmental impacts.

The list of feasible project alternatives was formulated based on the following alternative groups:

- Alternative Group 0—No Action Alternative. Only minimal repairs and maintenance needed to keep the existing bridge in service will be performed.
- Alternative Group 1—Rehabilitation of the existing bridge. This will include rehabilitation of the existing bridge approach spans and substructures. These alternatives are assumed to extend the service life of the bridge for 40 years.
- Alternative Group 2—Partial bridge replacement. This will include rehabilitation of the approach spans and substructures. The moveable span will be replaced in its entirety. These alternatives are assumed to extend the service life of the bridge for 40 years.
- Alternative Group 3—On-line bridge replacement. This will include replacement of the entire bridge superstructure, the approach spans, and the moveable span. The bridge will be replaced on its current alignment. These alternatives are assumed to extend the service life of the bridge for 75 years.
- Alternative Group 4—Off-line moveable bridge replacement to the north. This will include the replacement of the entire bridge superstructure, the approach spans, and the moveable span. As discussed in Chapter 1, the existing bridge piers were constructed to allow for the future addition of parallel spans to the north. The northern alignment alternatives could extend and reuse the existing bridge piers, if determined to be structurally sufficient. If not, construction of a new substructure will be required. These alternatives assume the service life of the replacement bridge to be 75 years.
- Alternative Group 5—Off-line moveable bridge replacement to the south. This will include the replacement of the entire bridge superstructure, the approach spans, and the moveable span. The construction of a new substructure will be required. These alternatives assume the service life of the replacement bridge to be 75 years.
- Alternative Group 6—Off-line fixed bridge replacement to the south. This will include the complete replacement of the bridge superstructure and substructure, and new approach spans. The vertical alignment for this alternative group will include a 1.5 percent grade. These alternatives assume the service life of the replacement bridge to be 100 years.
- Alternative Group 7—Off-line fixed bridge replacement to the south. This will include the complete replacement of the bridge superstructure and substructure, and new approach spans. The vertical alignment for this alternative group will include a 1.9 percent grade. These alternatives assume the service life of the replacement bridge to be 100 years.

Amtrak further categorized the build alternatives according to navigation channel location, channel width, moveable bridge type, and approach span type. As described in Chapter 1, “Purpose and Need”, during the original construction of the bridge, the moveable span was built east of center in a shallow portion of the river where the bridge piers could be more easily anchored. The existing 150-foot-wide navigable channel is therefore located closer to the eastern riverbank (i.e. not in the center of the river). Amtrak studied several build alternatives that proposed centering the channel in the river. Several build alternatives entailed widening the channel up to 200 feet. A wider channel, either in the existing location or moved to the west, likely requires either a fixed span or a different type of moveable bridge, since a bascule bridge is appropriate for spans of less than 150 feet. During the alternatives development process, Amtrak determined that any fixed span or vertical lift bridge alternatives will need to provide a vertical clearance of at least 90 feet to accommodate tall sailboats. Amtrak also determined that, for a moveable bridge in the closed position, providing a higher vertical clearance than the existing 18 feet will not meaningfully reduce the number of bridge openings (due mostly to the number of tall sailboats using the river). Therefore, Amtrak considered raising the profile of the entire bridge only for the fixed bridge alternatives. All alternatives maintain the existing two-track configuration, since two tracks will provide sufficient capacity to meet the projected 2030 rail operations. Table 2-1 summarizes the permutations within each alternative group. In all, Amtrak studied 21 different build alternatives.

Table 2-1
Connecticut River Bridge Replacement Alternative Groups

Alternative Group	Channel Location	Channel Width	Bridge Type	Approach Spans
0 – No Action Alternative	Off-Center	150’	Bascule	Thru-Truss Open Deck
1 – Rehabilitation	Off-Center	150’	Bascule	Thru-Truss Open Deck
2 – Rehab Approach / Replace Moveable Span	Off-Center or Moved West	150-200’	Bascule or Vertical Lift	Thru-Truss Open Deck
3 – Moveable On-Line Replacement	Off-Center or Moved West	150-200’	Bascule or Vertical Lift	Thru-Truss Ballast Deck
4 – Moveable Replacement / North Alignment	Off-Center or Moved West	150-200’	Bascule or Vertical Lift	Thru-Truss Ballast Deck or Composite Box Girders
5 – Moveable Replacement / South Alignment	Off-Center or Moved West	150-200’	Bascule or Vertical Lift	Ballast Deck Girders
6 – Fixed Replacement / South Alignment (1.5% Grade)	Moved West	200’	Network Tied Arch or Subdivided Warren Truss	Ballasted Tub and Deck Girders
7 – Fixed Replacement / South Alignment (1.9% Grade)	Moved West	200’	Network Tied Arch or Subdivided Warren Truss	Ballasted Tub and Deck Girders

Sources: Final Concept Design Engineering Report, Hardesty & Hanover, LLP, March 2007
Final Fixed Span Crossing Preliminary Concept Design Engineering Report, Hardesty & Hanover, LLP, Oct 2010

ALTERNATIVE GROUPS 1, 2, AND 3

Amtrak eliminated the rehabilitation alternatives in Group 1 due to concerns with the performance of the rehabilitated components, particularly with the long-term serviceability and reliability of the existing piers. The project team also discarded partial replacement alternatives and those associated with complete on-line replacement alternatives in Groups 2 and 3 because of the need to maintain uninterrupted train operations during on-line construction. The estimated loss of revenue for each two track outage is unacceptable; thus Amtrak determined that Groups

1, 2, and 3 did not appropriately meet the project purpose and need and eliminated them from further project consideration.

ALTERNATIVE GROUPS 4 AND 5

Amtrak identified Groups 4 and 5 as warranting further consideration, since they provide long-term serviceability and reliability and allow for uninterrupted rail operations. Within Groups 4 and 5, Amtrak considered multiple moveable bridge types. As explained below, moveable bridge types include swing, vertical lift, and bascule bridges.

MOVEABLE BRIDGE TYPES

Swing bridges employ a primary structural support on which a turning span can pivot horizontally. Swing bridges can pivot on a central support, creating two side by side navigation channels, or on one end of the span, opening as a gate. Swing bridge alternatives were deemed unreasonable for the proposed project due to constructability concerns. To accommodate construction with the current bridge intact, a new swing bridge will need to be built approximately 200 feet off-line from the current bridge, an effort that will involve extensive land use and potential environmental impacts. Additionally, a central support swing bridge will not satisfy the 150 foot minimum channel width that is needed for navigation at this site. The extensive substructure required to support the pivot of a center-bearing swing bridge will decrease the channel width available for navigation. Swing bridges also generally require more complex mechanical devices than either vertical lift or bascule bridges.

Vertical lift bridges operate by moving a center span vertically to allow the passage of vessels underneath. The center span operates along two towers that house the counterweights required to raise and lower the moveable span. Vertical lift bridge designs offer several advantages at the project site. A vertical lift bridge offers a longer span than other moveable bridge types, which will allow for a wider navigation channel than presently exists. The Navigation Survey[1], performed on behalf of Amtrak, found that the existing channel of 150 feet was adequate for navigation, but that widening the channel may ease congestion and should be considered. Vertical lift bridges can also more easily accommodate electrification facilities.

With a bascule bridge, a counterweight balances the moveable span through an upward swing. A bascule bridge can be double or single-leafed. A bascule bridge will be a feasible alternative for the proposed project. The typical types of bascule bridges include rolling lift, articulated, and simple trunnion. All of these bascule bridge types utilize an overhead counterweight similar to the current bridge. Maintenance simplicity and operational reliability are paramount considerations in a moveable bridge structure. Therefore, simple trunnion or rolling lift bridge structures offer definite advantages for their utilization in this crossing. A bascule bridge typically can provide for a channel width up to 150 feet, but a few have been documented beyond this limit.

[1] Source: Hardesty and Hanover, LLP for National Railroad Passenger Corporation Office of Engineering, *Inspection and Conceptual Engineering for the Reconstruction or Replacement of the Connecticut River Bridge, MB 106.89; Navigation Survey Report*, October 2006.

SCREENING OF ALTERNATIVES GROUPS 4 AND 5

Amtrak gave additional consideration to all of the Groups 4 and 5 alternatives, except the use of swing-type bridge replacement. Through consultation with USACE and USCG, Amtrak and the consulting agencies determined that relocating the channel will require an extensive regulatory process and will present unacceptable navigation difficulties during construction. Amtrak therefore eliminated those alternatives within Groups 4 and 5 that proposed to relocate the channel location.

To determine whether to reuse and/or extend the existing piers for the northern alignment alternatives (Group 4), Amtrak performed additional conceptual engineering and a construction feasibility study[1]. Minimal information is available regarding the structural integrity of the existing piers, and Amtrak concluded that their potential reuse could cause problems with seismic resistance and structural capacity. Furthermore, installing new piles or drilled shafts near the existing piers (which will be required for any of the Group 4 alternatives) was not recommended due to concerns about damaging vibrations and potential pier settling occurring during the construction process. Installing new foundations for the southern alignment alternatives (Group 5) will provide more distance from the existing piers and will therefore lessen the risk of damage to the existing bridge during its continued operation throughout the construction period. Based on the need for continued operation of the existing bridge during the construction phase, Amtrak determined that Group 4 alternatives presented unreasonable constructability and safety risks, and therefore eliminated the remaining Group 4 alternatives from further consideration.

ALTERNATIVE GROUPS 6 AND 7

The alternatives within Groups 6 and 7 will involve a high-level fixed-span crossing. Since this segment of the Connecticut River is heavily used by tall sailboats, a vertical underclearance of at least 90 feet will be required. This will in turn require lengthy approach structures, land acquisition beyond Amtrak's ROW, and extensive wetland impacts. The high-level nature of the bridge will require relatively steep grades, which could be present operational impacts for the freight trains not equipped to handle steep grade changes. Furthermore, it was estimated that these fixed bridge alternatives will be cost-prohibitive. Using these combined considerations, Amtrak determined that Group 6 and 7 fixed-bridge alternatives did not appropriately meet the purpose and need without significant impacts, and therefore eliminated the Groups 6 and 7 alternatives from further consideration.

D. NO ACTION ALTERNATIVE

The No Action Alternative assumes the Connecticut River Bridge will remain in service as is, with continued maintenance and minimal repairs. No major improvements to or replacement of the Connecticut River Bridge will be undertaken under the No Action Alternative. The No Action Alternative will not include any changes to the existing track configuration. The No Action Alternative consists of planned improvements in the primary and secondary study areas that are scheduled for the near future or are included in the long range transportation plans for the region and are expected to be completed by 2030. Included are major investment projects

[1] Source: URS Corporation, *Conceptual Engineering Review*, November 17, 2011.

that involve substantial improvements to the regional transportation system as well as minor projects that maintain the system in a state of good repair, as detailed below.

REPLACEMENT OF NIANTIC RIVER BRIDGE

The Connecticut River Bridge is one of several moveable Northeast Corridor bridges located in southern Connecticut. Amtrak began to address the operational reliability of these bridges with the Thames River Bridge Replacement Project (between New London and Groton) completed in July 2008. Similarly, Amtrak replaced the Niantic River Bridge (between Waterford and East Lyme) with a trunnion type bascule bridge. That project was completed in May 2013.

NEW SHORE LINE EAST STATIONS

The SLE service runs parallel to the shore of the Long Island Sound on this segment of the Northeast Corridor. SLE is operated by Amtrak under contract with ConnDOT. SLE service is currently available along nine Connecticut stations, from New Haven Union Station to the west to Old Saybrook and New London to the east. ConnDOT constructed and opened a new SLE/New Haven Line station in New Haven (State Street Station) in 2003 and new SLE stations in Branford, Clinton, and Guilford in 2005 as part of the New Haven Harbor Crossing Corridor Improvement Program. The Madison Station was completed in 2007 and upgrades to the Westbrook Station are nearing completion. North side high level platforms are planned for Branford and Westbrook, and will be designed for Madison and Clinton. An additional 272 parking spots at the Branford Station were completed in June 2011. ConnDOT expects to complete further station upgrades by 2015. Ridership has been increasing steadily since the inception of the SLE service in 1990. Station improvements will allow SLE to accommodate the anticipated continued increase in ridership.

PEARL HARBOR MEMORIAL BRIDGE (Q-BRIDGE) CONSTRUCTION

The new Pearl Harbor Memorial Bridge, also known as the “Q-Bridge”, is currently being constructed by ConnDOT as part of the I-95 New Haven Harbor Crossing Improvement Program. The bridge will replace the current six-lane structure carrying the Connecticut Turnpike over the Quinnipiac River with a ten lane design that will incorporate the capacity of a concrete box girder bridge into a cable-stayed bridge design. The new northbound side of the Q-Bridge is complete and open to traffic[1]. ConnDOT is now constructing the new southbound side of the Q-Bridge, with an expected completion date of 2015. ConnDOT began work on a related project—the reconstruction and widening of the I-95/I-91/Route 34 interchange—in April 2011. ConnDOT expects that project to be complete in 2016.

CONNDOT NEW HAVEN - HARTFORD – SPRINGFIELD RAIL PROGRAM

ConnDOT conducted an EA for the New Haven-Hartford-Springfield Rail Program (NHHS), an upgrade of Amtrak’s existing 62-mile-long Springfield Line between New Haven and Springfield, Massachusetts. In August of 2012, ConnDOT obtained a Finding of No Significant Impact (FONSI) from FRA[2].The corridor has been identified as a key component in meeting

[1] http://www.i95newhaven.com/contractor/#. Accessed December 23, 2013.

[2] http://www.nhhsrail.com/ea/. Accessed December 11, 2013.

regional transit goals and sustaining regional economic viability[1]. The NHHS program will provide new equipment and facilities, including several new stations; improve tracks and crossings; and increase capacity by double-tracking large portions of the corridor. These changes will enable a greater number and variety of intercity and regional trains to provide frequent service along the NHHS corridor throughout the day. In addition to serving those traveling between the towns and cities along the corridor, the service will provide a connection to Bradley International Airport in northern Connecticut, multiple links to Amtrak service, and a direct connection to the existing MTA Metro-North Railroad (MNR) and SLE service in New Haven, as well as direct service to New York City on certain trains. Additional new service to points in Massachusetts, Vermont, and Quebec will also travel along the corridor. While ConnDOT has not yet developed a firm implementation plan, the line is scheduled to be operational by 2016[2].

AMTRAK STATE OF GOOD REPAIR PROGRAM

The No Action Alternative assumes that Amtrak will continue its "State of Good Repair" program, which aims to restore Amtrak's aging infrastructure and continue to improve operations. As discussed in Chapter 1, "Purpose and Need," Amtrak's planned state of good repair projects include normalized replacement (sustaining assets in a state of good repair) and backlog of deferred investments (replacing assets that are no longer functioning as designed within their useful lives). It will include replacement of infrastructure elements such as: track, bridges, tunnels, overhead catenary wire, power supply systems, cable, transformers and converters, signals, communications and dispatching systems, stations, and facilities. The program also includes the procurement of new rolling stock throughout the Amtrak system. Besides the replacement of the Connecticut River Bridge, Amtrak is seeking to address a substantial backlog of Northeast Corridor projects between FY 2009 and FY 2023, including many bridges, tunnels, interlocking, and electric traction systems.

MTA METRO-NORTH RAILROAD NEW HAVEN LINE IMPROVEMENTS

The *MTA Capital Program 2010-2014*[3] *(June 2010)* includes a number of state of good repair and replacement projects for the MTA-MNR, which provides service in Connecticut on its New Haven Line. A fleet modernization project will address the MNR New Haven Line, for which the current 1970s M-2 fleet will be replaced with new M-8 models. Other projects along the New Haven Line will include: the replacement of Substation Bridge 23 at Mount Vernon East; an aging AC traction power station that supplies the New York section of the New Haven Line; replacement and major repair of various New Haven Line equipment; the replacement of four under-grade bridges on the New Haven Line; and a number of station improvements.

CTTRANSIT NEW BRITAIN – HARTFORD RAPID TRANSIT

As part of an initiative to improve congestion along I-84 in the Hartford area, ConnDOT is developing a dedicated 9.4-mile long busway linking downtown New Britain with Hartford's Union Station[4]. The Bus Rapid Transit system, also referred to as "CT*fastrak*", will be the first in the State of Connecticut and will run along active and inactive railroad ROWs through four

[1] http://www.ct.gov/dot/cwp/view.asp?a=3535&q=425114. Accessed February 24, 2012.

[2] http://www.nhhsrail.com. Accessed February 24, 2012.

[3] http://www.mta.info/news/pdf/cap10/capital_program.pdf. Accessed February 24, 2012.

[4] http://www.ctfastrak.com/about/what-is-ctfastrak. Accessed December 23, 2013.

cities/towns: New Britain, Newington, West Hartford, and Hartford. Eleven new transit stations will be constructed to serve the route. The facility will permit bus access at intermediate points, with circulator bus routes that will serve surrounding neighborhoods and enter the busway as needed, providing a one-seat ride. Construction began in the spring of 2012 and ConnDOT expects the busway to be operational in 2015.

E. PREFERRED BUILD ALTERNATIVE

Based on the criteria discussed above, Amtrak evaluated the 21 build alternatives discussed above and identified the Preferred Build Alternative. The Preferred Build Alternative is a Group 5 alternative and includes replacing the existing bridge with a new moveable bridge along a new alignment to the south of the existing alignment. For the purposes of this EA, the Preferred Build Alternative is adopted as the Preferred Alternative, and is analyzed in detail throughout this document. The details of the Preferred Alternative are discussed below.

SUPERSTRUCTURE AND SUBSTRUCTURE

The Preferred Alternative will involve complete replacement of the existing superstructure with a two-track moveable bridge. It will be built along a new southern alignment, with an offset of 48 feet from the centerline of the existing bridge to the centerline of the new bridge. It will not reuse the existing piers, and will therefore require a new substructure. The upland portions of the Preferred Alternative will be built entirely within Amtrak's existing ROW. The channel will remain in its existing location. Upon completion of the new bridge, the existing Connecticut River Bridge will be decommissioned and removed.

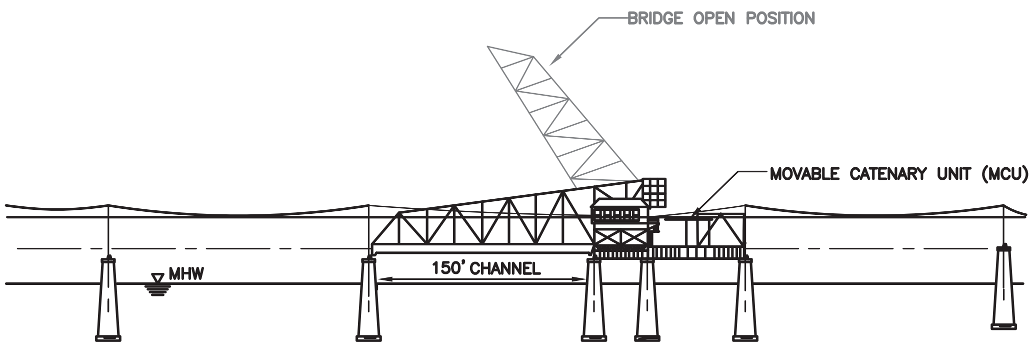
Amtrak has identified two feasible options for the Preferred Alternative (see Figures 2-1 and 2-2). One option (Option A) will replace the existing bridge with a bascule bridge and will maintain the existing 150-foot channel width. As explained above, a bascule bridge is typically appropriate to span a navigational channel with a maximum width of 150 feet. Option A will provide a vertical clearance of 18 feet in the closed position. In the open position, it will likely provide a similar vertical clearance as the existing bridge (i.e., 68 feet for full channel width and unlimited for vessels requiring less than 71 feet in width).

The other option (Option B) will replace the existing bridge with a vertical lift bridge. This option could potentially provide for a wider channel. The exact channel width for Option B will be determined during preliminary engineering; however, it will provide a minimum of 150 feet and a maximum of 200 feet. Option B will provide a vertical clearance of 18 feet in the closed position. When in the open position, the vertical clearance of the lift bridge will be at least 90 feet.

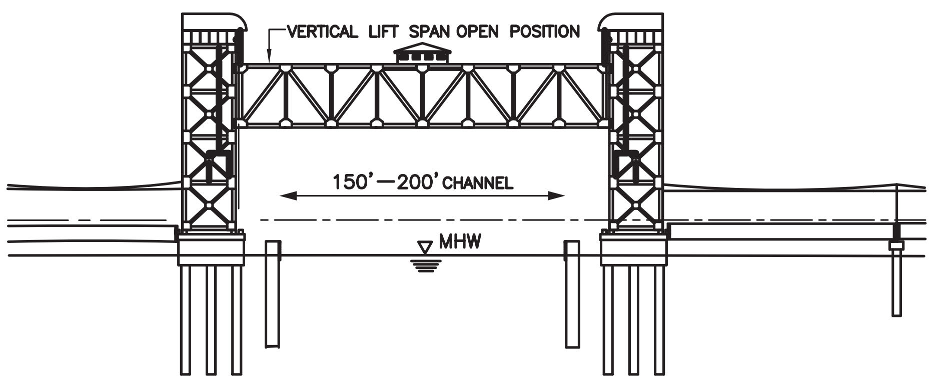
Both options are evaluated in this EA. As stated throughout the environmental analyses, the differences in environmental impacts between the two options are minimal, unless otherwise noted. Amtrak will decide which of these options to pursue during the preliminary engineering phase, based on a variety of factors including cost and constructability.

Regardless of the type of moveable bridge and channel width, the Preferred Alternative will include ballast deck girders for the approach spans. It will require widening of the existing rail embankment for the bridge approaches. Based on Amtrak's previous experience with similar bridge replacement projects, a combination of embankments and retaining walls will likely be required for the bridge approaches. The use of retaining walls in certain locations will minimize

5.29.12



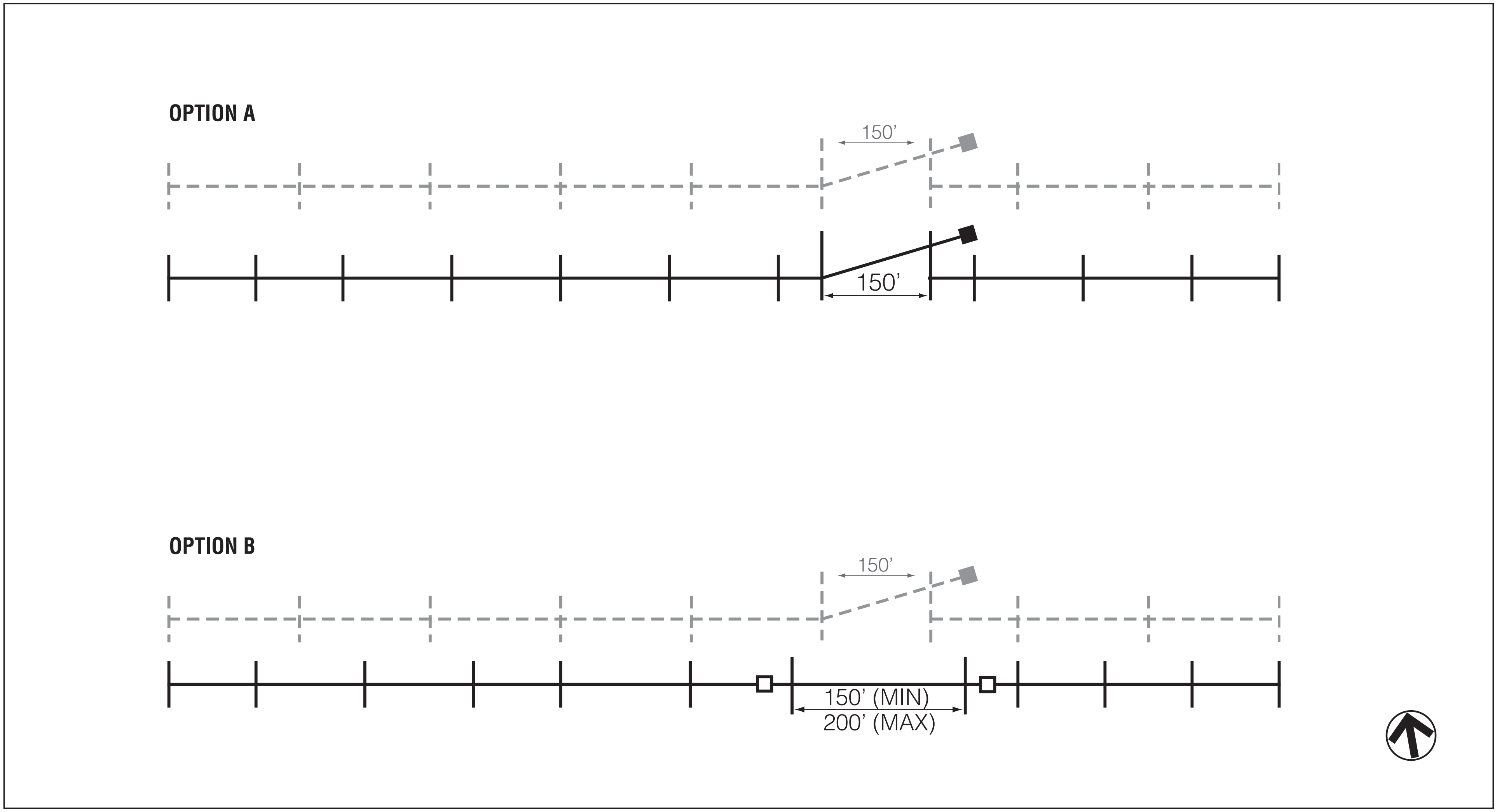
OPTION A: BASCULE BRIDGE



OPTION B: VERTICAL LIFT BRIDGE

Figure 2-1
Preferred Alternative: Bridge Type

5.29.12



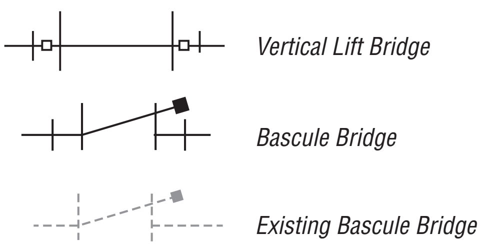


Figure 2-2
Preferred Alternative: Alignment

wetland impacts, as discussed later in this EA. The Preferred Alternative will include new navigation channel fenders and a dolphin system, regardless of whether the channel is expanded.

COMMUNICATIONS AND SIGNALING

Fiber optic and copper cables are located parallel to the Northeast Corridor tracks on the north side of the ROW of both approaches. These cables are mounted on the north side of the existing box girder structure until they reach the bascule span of the bridge, at which point the cables become submarine and cross beneath the river’s channel. Existing signal, communication, and traction power system cables are located on the south side of the bridge. The contractor will have to relocate these cables prior to construction in addition to relocating several signals, on both the east and west bridge approaches. A new signal system will have to be installed on the moveable span.

CATENARY AND TRACTION POWER

The Preferred Alternative will require removal of existing catenary poles and wire. Amtrak and its contractors will install new catenary supports and wire. Due to differences in moveable bridge type, there will be certain differences between Option A and Option B in the positioning of catenary poles and wire on the bridge superstructure, particularly on either side of the moveable span.

The bascule bridge replacement option (Option A) will require a new moveable catenary unit that will span the gap between the fixed conductor rail on the lift span and the bascule roll back point. The new fixed termination, variable tension catenary from the east will dead-end on a termination structure at the moveable catenary unit, and from the west at a termination structure on the fixed span before the channel. The vertical lift bridge option (Option B) will require new moveable catenary skids that will span the gap between the fixed conductor rail on the vertical lift span and the fixed skid at each tower. The new fixed termination (variable tension) catenary from the east and west will dead-end on termination structures at each vertical lift tower.

The placement of catenary equipment will be identical on the bridge approaches under both options. The Preferred Alternative will also require the replacement of an emergency generator currently located north of the existing bridge on the east approach.

F. CAPITAL COSTS

The estimated maximum capital costs for the Preferred Alternative ranges from $225 to $300 million (in 2012 dollars). This cost includes the construction of the bridge superstructure and substructure, deck, machinery, channel fender and dolphin system, catenaries, the construction of new approaches, the demolition of the existing bridge, and engineering and project costs.

G. POTENTIAL PERMITS REQUIRED

The Preferred Alternative will potentially require a number of federal, state, and local permits and approvals (see Table 2-2). The project must also comply with numerous laws, including those regarding worker and public safety, use of parkland and historic resources, and endangered and protected species.

Table 2-2
List of Potential Federal, State, and Local Permits

Permits/Certifications	Responsible Agency	Activity
Federal		
Section 404 Permit	US Army Corps of Engineers	Discharge of dredged or fill material into U.S. waters.
Section 10 Permit	US Army Corps of Engineers	Construction of structures in navigable waters
Section 9 Permit	US Coast Guard	Construction over navigable waters
Hazards to Navigation Assessment	US Coast Guard	Obstructions in navigable waters
State		
Coastal Consistency Review	Connecticut DEEP	Excavation and fill in navigable waters
401 Water Quality Certificate	Connecticut DEEP	Discharges to surface waters
Stream Encroachment	Connecticut DEEP	Coastal development
Tidal Conveyance	Connecticut DEEP	Activities that affect tidal wetlands
Construction General Permit	Connecticut DEEP	Stormwater and dewatering/wastewaters from construction activities
Note: Other federal, state and local permits and approvals may be required.		

✷

A. INTRODUCTION AND METHODOLOGY

This chapter assesses the potential benefits and impacts of the proposed project on transportation conditions in the project area and in southern Connecticut. Since several intercity, commuter, and freight service lines operate via the Northeast Corridor and traverse the Connecticut River Bridge, the project could result in effects over a larger area. Therefore, this transportation analysis considers a larger secondary study area and includes a discussion of the regional transportation network, with a focus on southern Connecticut. It includes an evaluation of current and future transportation infrastructure, including intercity rail, public transportation (including commuter rail, public and private bus service, and ferry services), freight service, navigable waters, and the roadway system. Construction period impacts to transportation in the project area and overall region are documented in Chapter 12, “Construction Impacts”.

B. EXISTING CONDITIONS

INTERCITY RAIL

Amtrak is the nation’s only intercity passenger railroad, transporting an average of nearly 78,500 passengers on more than 300 trains per day. Amtrak operates passenger rail service to over 500 destinations in 46 states on 21,000 miles of routes. As part of this network, Amtrak runs the Northeast Regional service between Newport News, Virginia and Boston, Massachusetts, including service to PSNY in New York City. PSNY is the busiest station served by Amtrak, the busiest railroad station in the country, and accommodates more passengers each working weekday than all three of the major New York City area airports combined (Kennedy, LaGuardia, and Newark Liberty).[1]

The premium time-sensitive Acela Express service operates along the Northeast Corridor, serving Boston, PSNY, Baltimore, Philadelphia, and Washington, D.C. Launched in 2000, Acela became the nation’s first high-speed rail service, allowing passengers to travel from New York City to Boston in three and a half hours, and between New York and Washington, D.C. in two and a half hours. The Acela Express service has become increasingly competitive with plane shuttles in the northeast, particularly after September 11, 2001. The Connecticut River Bridge is utilized by both Northeast Regional and Acela trains (see Table 3-1). Within the larger study area, Amtrak also operates the Vermonter. This line follows the Northeast Corridor north from Washington, D.C. and branches off in New Haven, west of the project site, to continue through Massachusetts and Vermont. Vermonter trains do not cross the Connecticut River Bridge.

[1] Federal Railroad Administration. *Notice of Intent to Prepare an Environmental Impact Statement for the Expanded Moynihan/Penn Station Redevelopment Project, New York, NY*. Federal Register: November 9, 2007 (Volume 72, Number 217)

Table 3-1
Existing Train Traffic Across Connecticut River Bridge (average weekday)

Train Type	No. Trains
Amtrak Northeast Regional	18
Amtrak Acela	20
P&W Freight	6
Shore Line East	12*
Total	56

Notes: * Includes 2 non-revenue trains.

FREIGHT SERVICE

Two regional freight companies operate freight service along the Northeast Corridor in the secondary study area. P&W operates in Massachusetts, Rhode Island, Connecticut and New York and has exclusive rights to conduct freight operations over the Northeast Corridor between New Haven and the Massachusetts/Rhode Island border. P&W operates approximately six daily freight trains over the Connecticut River Bridge. Freight service west of New Haven is operated by CSX Corporation.

PUBLIC TRANSPORTATION

COMMUTER RAIL SERVICE

MTA Metro-North Railroad

The MTA's MNR was founded in 1983 when the MTA assumed control of commuter train operations in New York and Connecticut. MNR encompasses 384 route miles, serving 120 stations in seven counties in New York State and two counties in Connecticut. In 2011, MNR reached its second-highest ridership record of over 82 million trips[1]. MNR's 2010 average weekday ridership was 277,169.[2] While MNR service does not extend to the Connecticut River Bridge, the New Haven Line provides connectivity to Amtrak and SLE trains that cross the Connecticut River Bridge. MNR runs two main lines west of the Hudson River—the Port Jervis Line and the Pascack Valley Line—which operate out of the New Jersey Transit terminal in Hoboken with connections to PSNY via Secaucus. MNR runs three main lines east of the Hudson River—the Hudson Line, the Harlem Line, and the New Haven Line—which operate out of Grand Central Terminal in New York City. The New Haven Line originates in Grand Central Terminal and follows the shore of Long Island Sound (along the Northeast Corridor) to Union Station and State Street Station in New Haven. In New Haven, MNR customers can switch to Amtrak's Hartford/Springfield Line, Amtrak's Northeast Regional service to Boston, or to SLE service (described below).

[1] http://www.mta.info/mta/news/releases/?agency=mnr&en=120123-MNR5. Accessed February 9, 2012.

[2] http://www.mta.info/mta/network.htm. Accessed February 9, 2012.

Shore Line East Service

In 1990, ConnDOT established the SLE service to temporarily alleviate traffic congestion resulting from construction work on Interstate 95, which runs parallel to the shore of the Long Island Sound and the Connecticut segment of the Northeast Corridor. SLE is operated by Amtrak under contract with ConnDOT. Service was extended from New Haven's Union Station to New London when the SLE line was made permanent in 1996. Connecticut commuters can transfer at Union Station, Bridgeport, or Stamford for MNR New Haven Line service to New York City.

In 2006, as part of a state-wide effort to improve public transportation, the Connecticut State Legislature mandated that ConnDOT study the feasibility of the expansion of SLE service. The resulting report, *Expanding Rail Service on Shore Line East*[1], released in January 2007, identified obstacles to improved SLE service and outlined several phases of expansion of service. Phase One, implemented in July 2008, added weekend train service at the six SLE stops from New Haven to Old Saybrook. Phase Two added one round trip to New London in February 2010 and an additional 3 round trips to New London in May 2010.

SLE service is currently available along nine Connecticut stations from New Haven Union Station to the west to Old Saybrook and New London to the east (Figure 3-1). Service to the ninth station, New London, is limited to five daily westbound trains and five daily eastbound trains. SLE trains to/from New London cross the Connecticut River Bridge. As an additional travel option, passengers with monthly, weekly, or ten-ride SLE passes have the option of boarding eight "select" daily Amtrak trains serving Old Saybrook and New London stations. Two SLE weekday trains operate west of New Haven.

During the weekday, SLE operates 13 westbound trains, with an additional summer schedule "Friday Special" train operating between June and August. Westbound trains from Old Saybrook/New London operate mainly during early morning (5:22 AM to 9:14 AM) and during the afternoon/early evening (2:05 PM to 8:35 PM). There are 13 eastbound trains, with an additional summer schedule "Friday Special" train. SLE eastbound trains from New Haven Union Station operate during the morning (5:20 AM to 8:10 AM) and during the afternoon/evening (1:00 PM to 10:05 PM). Of the above-mentioned eight "select" Amtrak trains (which operate between Old Saybrook/New London and New Haven Union Station and accept SLE multi-ride tickets), three are westbound morning trains and five are eastbound trains, which operate throughout the day. SLE operates 16 revenue trains on Saturdays, Sundays and Holidays; however, these trains do not serve New London and therefore do not use the Connecticut River Bridge. Currently, SLE has 10 revenue trains and 2 non-revenue trains crossing the Connecticut River Bridge on weekdays[2].

Ridership on SLE continues to increase, with over 614,000 annual passenger trips and over 13 million passenger miles in 2011[3]. Due to the limited number of trains continuing to New

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[1] Connecticut Department of Transportation, *Expanding Rail Service on Shore Line East, pursuant to Public Act 06-136, Section 2(d)*. January 1, 2007

[2] http://www.shorelineeast.com/service_info/schedules.php. Accessed June 20, 2012.

[3] http://www.ct.gov/dot/lib/dot/documents/dplansprojectsstudies/plans/state_rail_plan/State_Rail_Plan_Final_Draft_2-8-12.pdf. Accessed March 2012.

London, SLE New London service has lower ridership; in 2010, there were 12,700 annual weekday rides.

Valley Railroad Company Essex Steam Train

The Valley Railroad Company operates a historic, recreational steam train (and associated steam boat rides) along the Connecticut River from Essex Junction to Chester and East Haddam, Connecticut. Although the train's proximity to business districts in the towns of Old Saybrook, Essex, Chester, and East Haddam could be used for a local commuter connection, currently the train is used only for seasonal recreational purposes. These trains do not utilize the Connecticut River Bridge.

BUS SERVICE

Connecticut Transit (CTTRANSIT) is the state bus service, operated by several companies under contract with ConnDOT. Most Connecticut bus service is concentrated in the Capital Region in the central area of the state. The Hartford/New Haven/Stamford metro areas include over 30 local and 12 express bus routes. CTTRANSIT New Haven connects with the MNR New Haven Line and SLE. CTTRANSIT Stamford also connects with the MNR Harlem Line and several bus lines for service to White Plains, New York and Westchester County. CTTRANSIT Waterbury, New Britain/Bristol, and Meriden/Wallingford lines focus on service in the Capital Region.

The Estuary Transit District (ETD) operates a public transit service along two routes immediately near the project site, serving the towns of Chester, Clinton, Deep River, Essex, Killingworth, Lyme, Old Lyme, Old Saybrook, and Westbrook. ETD is able to cover a larger service area by providing flexible route options. Flex-Route lines run several buses along a designated route, with regular stops at selected locations. Passengers also have the option to request drop-off and pick-up one mile from the designated route, or to schedule a pick-up by the By-Request service for an additional fee.

FERRY SERVICE

The Chester-Hadlyme Ferry is operated by ConnDOT on the Connecticut River between the towns of Chester and Hadlyme, Connecticut, approximately nine miles north of the project site. The ferry allows for the passage of eight to nine cars and approximately 50 people. The ferry operating season is limited to April 1 through November 30. The service is therefore most often used for seasonal recreational travel and emergency services for the towns of Chester and Hadlyme.

Several cross-sound ferries operate between Connecticut, New York, and Rhode Island in Long Island Sound. The privately-operated vehicle ferry between Bridgeport, Connecticut and Port Jefferson, New York has ten to fourteen runs per day. Passengers can connect to Amtrak's Northeast Regional service or the MNR New Haven Line. Three ferry lines operate to the east of the project site from New London where passengers can connect to Amtrak Regional service. The Cross Sound Ferry operates a vehicle ferry between New London and Orient Point, New York, on the north fork of Long Island, with seven to fourteen runs available per day. The Fishers Island Ferry operates five to nine runs per day between New London and Fishers Island, New York. Several of these ferries operate on a more limited schedule during the off-peak months. The Block Island Express operates a high speed ferry between New London and Block Island, Rhode Island, with three to four runs on select days during the summer months.

Figure 3-1
Project Area Rail System

NAVIGABLE WATERS

The Connecticut River has a total length of 407 miles and is the largest river in New England. The river stretches from the Connecticut lakes in New Hampshire to its mouth at Long Island Sound, between the towns of Old Saybrook and Old Lyme, Connecticut. The river is tidally influenced as far as Hartford, approximately 50 miles upstream.

The Connecticut River Bridge is the southernmost crossing of the Connecticut River at river navigation mile 3.4. There are eight crossings of the river between the Connecticut River Bridge and the head of navigation at Hartford, approximately 50 miles from the mouth of the river. Two of these structures are moveable bridges and six are bridges of fixed elevation. Fixed bridges are constructed at an elevation that allows marine vessels to pass underneath the bridge. The bridge elevation is measured with respect to the mean high water (MHW) of the navigable waterway. Moveable bridges, which may be constructed at a lower elevation, are designed to open when needed to accommodate the passage of a vessel that could not pass under the bridge in its closed position. Types of moveable bridges include swing-span bridges (which rotate horizontally, open to a perpendicular position using a center pivot in the river), lift bridges (where a section of the bridge is raised vertically), and bascule bridges (which are lifted from one or both sides of the river, like a drawbridge).

Table 3-2 shows the characteristics of the rail and highway bridges located between the mouth of the river and the head of navigation at Hartford. They are listed in order from the southernmost to the northernmost bridge, and each bridge's location is identified in terms of its distance (in nautical miles) from the mouth at Long Island Sound. The vertical clearance describes the distance between MHW and the bottom of the bridge structure (for moveable bridges, vertical clearance is provided for both the open and closed positions). Horizontal clearance describes the width of the navigable channel at that location.

Table 3-2
Connecticut River Bridges

		Bridge Name	Location (Miles from Mouth of River)	Bridge Type	Vertical Clearance		Horizontal Clearance
					Open*	Closed	
	1	Connecticut River	3.4	Bascule Rail Bridge	68'-71'**	19'	139'
Bridges Upstream of Connecticut River Bridge	2	Raymond E. Baldwin	4	Fixed Auto Bridge (I-95)	81'		258'
	3	Route 82 Bridge	16.8	Swing Auto Bridge (Rt. 82)	>89'	22'	180'-200'
	4	Middletown-Portland	32	Swing Rail Bridge	>89'	25'	100'
	5	Arrigoni	32.2	Fixed Auto Bridge (Rt. 66)	89'		480'
	6	W. H. Putnam Memorial	46	Fixed Auto Bridge (Rt. 3)	80'		300'
	7	Charter Oak	49	Fixed Auto Bridge (Rt. 15)	69'		215'
	8	Founders	50	Fixed Auto Bridge (Rts. 2 and 6)	49'		155'
	9	Bulkeley	50.3	Fixed Auto Bridge (I-84)	39'		100'

Notes: * Swing-span bridges have an infinite vertical clearance when in the open position, denoted above as >89'.
** The Connecticut River Bridge has a 68' vertical clearance for full 150' channel width and an unlimited vertical clearance for 71' width.
Sources: NOAA Connecticut River Navigation Charts, 2001

MARINE TRAFFIC

Commercial traffic on the Connecticut River consists mainly of general contractors and the shipping of coal and oil by Moran Towing during the colder months. Self-propelled vessels include dry cargo ships, towboats and tugboats. Non-propelled vessels on the river include barges and tankers. Barges from Moran Towing make up the largest vessels on the Connecticut River, displacing roughly 11,000 tons when fully loaded with coal or oil.

Recreational boaters are the primary users of the Connecticut River between late spring and early autumn, and recreational use of the Connecticut River has been increasing steadily in the last 20 years due to an improvement in environmental quality of the river and its designation as an American Heritage River in 1998. The majority of recreational craft are power boats but a large number of sailing vessels also use the river. There are approximately 30 yacht marinas and approximately 4 boat launches between the mouth of the river and the head of navigation.

The required vertical clearance for a marine vessel depends on the size and weight of the vessel and the tide conditions. Vessels require the most vertical clearance when traveling empty at high tide. The least vertical clearance is needed when a vessel is fully loaded at low tide. The need to open the Connecticut River Bridge and other moveable bridges is correlated with certain vessels. Amtrak logs information about each opening of these moveable bridges and the type of boat or tug that passes. In addition, USACE maintains information regarding marine traffic along the Connecticut River.

As mentioned in Chapter 1, "Purpose and Need," the Navigation Survey[1] found that the existing channel width and alignment was adequate for current navigation. Some users reported that the ebb tide current pulls the ships into the western channel pier as a result of the existing channel being located close to the eastern shoreline. The report identified the tallest recreational vessels using the river were 90 feet high. These vessels often have trouble navigating under the 81-foot-tall Raymond E. Baldwin Bridge immediately to the north of the study area. Between 1999 and 2011, the Connecticut River Bridge opened approximately 3,400 times per year, with 80 percent of those openings occurring in the summer months between May and October.

REGIONAL HIGHWAY SYSTEM

The secondary study area includes the Connecticut Turnpike (I-95), also known as the Governor John Davis Lodge Turnpike, which runs west to east from Greenwich to Killingley, at the border with Rhode Island. The westbound Connecticut Turnpike passes through the New Haven metropolitan area and connects to the New England Thruway, leading to the Bronx, NY via the Bruckner Expressway and Queens, NY via the Throgs Neck Bridge. The eastbound Connecticut Turnpike continues as I-95 to connect to Providence, Rhode Island, Boston, Massachusetts and further north to New Hampshire and Maine. The Chester Bowles Highway (Route 9) in the project area connects with I-91, a major thoroughfare leading to Hartford, Connecticut and north into Massachusetts, New Hampshire, and Vermont

Congestion on most of the region's road network is partially dependent on seasonal traffic and road accidents. Congestion along I-95 is not seasonally dependent, as it supports commuter traffic also in addition to a large volume of through-state traffic.

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[1] Hardesty and Hanover, LLP for National Railroad Passenger Corporation Office of Engineering, *Inspection and Conceptual Engineering for the Reconstruction or Replacement of the Connecticut River Bridge, MB 106.89; Navigation Survey Report*, October 2006.

C. NO ACTION ALTERNATIVE

The project team identified short- and long-term projects evaluated as part of the No Action Alternative through review of the ConnDOT Long Range Transportation Plan for 2004-2030, the Regional Transportation Plan of the Connecticut River Estuary Metropolitan Planning Organization (CREMPO) for 2007-2035, the ConnDOT Master Transportation Plan for 2008-2017, and the MTA Capital Program for 2010-2014. As discussed in Chapter 2, "Project Alternatives," the No Action Alternative assumes the Connecticut River Bridge will remain in service as is, with continued maintenance and minimal repairs. Amtrak expects that service over the bridge will worsen in the future without the proposed project, as the bridge will continue to age and problems will occur more frequently.

POPULATION AND EMPLOYMENT GROWTH

Changes to population occur due to natural changes in the existing population as well as immigration and emigration of residents. Employment changes occur due to changes in size, number or location of businesses as economies grow or shrink throughout the region, and as dominant industries expand or contract. Changes in population and employment in the region affect both the number of trips as well as their distribution throughout the transportation network.

In Old Lyme, Old Saybrook, Clinton, and Westbrook, the shoreline towns surrounding the project site, the availability of undeveloped, usable land in the area and the attraction of Long Island Sound have resulted in the conversion of a number of seasonal dwellings to year-round homes. Coupled with the increased density in the surrounding communities, this pattern has created a greater need for intermodal commuting options, as problems of vehicular access begin to develop.

Over the past hundred years, population has grown in the Connecticut River Estuary region, which includes the towns of Chester, Clinton, Deep River, Essex, Killingworth, Lyme, Old Lyme, Old Saybrook, and Westbrook. From 1950 to 1970, the region witnessed explosive growth, and population more than doubled. Growth slowed considerably in the last two decades of the 20th century, but still continues at about ten percent per decade, and local governments expect this trend to continue in the coming decades.[1]

INTERCITY RAIL

As described in Chapter 2, the Connecticut River Bridge is one of several moveable Northeast Corridor bridges located in southern Connecticut. Amtrak began to address the operational reliability of these bridges with the Thames River Bridge Replacement Project (between New London and Groton) completed in July 2008. Similarly, Amtrak replaced the Niantic River Bridge (between Waterford and East Lyme) with a rolling lift bascule bridge. Amtrak completed that project in 2013. Also as discussed in Chapter 2, the No Action Alternative will include Amtrak's State of Good Repair program. Amtrak's 2030 service plan includes an increase in the number of average weekday Acela trains crossing the Connecticut River Bridge from 20 to 32; the number of Northeast Regional trains is expected to remain the same. ConnDOT is planning

[1] Connecticut River Estuary Metropolitan Planning Organization. *Regional Transportation Plan 2007-2035*. 2007.

to increase the number of SLE trains traveling between Old Saybrook and New London from 12 to 24 trains per average weekday.

Table 3-3
Projected 2030 Train Traffic Across Connecticut River Bridge (average weekday)

Train Type	No. Trains
Amtrak Northeast Regional	18
Amtrak Acela	32
P&W Freight	6
Shore Line East	24
Total	80

FREIGHT SERVICE

As part of its Maritime Policy, released in 2005, the State of Connecticut has reemphasized its support of projects that will facilitate the intermodal connection of water, rail, and highway systems. The State has pledged to develop and provide incentives for public-private maritime investment projects that will facilitate intrastate and interstate freight movement from the region's ports. ConnDOT is currently undertaking a study to investigate rail access to Connecticut's deep water sea ports at New London, New Haven, and Bridgeport. If freight service is increased across the Northeast Corridor near Connecticut ports, the reliability and maintenance concerns presented by the existing Connecticut River Bridge will continue to present a limiting factor.

PUBLIC TRANSPORTATION

COMMUTER RAIL SERVICE

As described in Chapter 2, the No Action Alternative assumes the completion of ConnDOT's New Haven-Hartford-Springfield Rail Program and MTA-MNR's planned improvements to the New Haven Line. Neither of these projects will affect train traffic over the Connecticut River Bridge.

Shore Line East Service

As discussed above, a 2007 ConnDOT report[1] identified a number of obstacles to expanding SLE service and presented a phased plan for expansion. Phase One of the plan, additional weekend SLE service, has been implemented. The report states that Phase Two, the expansion of daily service to New London, is contingent upon a number of issues, including improving the reliability of the Connecticut River Bridge. With planned New London weekend service, overall SLE ridership to New London is projected to increase to over 22,000 annual rides for calendar year 2014. Under the No Action Alternative, the deteriorating Connecticut River Bridge could inhibit further expansion of SLE service beyond the planned service level.

[1] Connecticut Department of Transportation, *Expanding Rail Service on Shore Line East, pursuant to Public Act 06-136, Section 2(d)*. January 1, 2007

BUS SERVICE

CTTRANSIT New Britain – Hartford Rapid Transit

As part of an initiative to improve congestion along I-84 in the Hartford area, ConnDOT is developing a dedicated 9.4-mile long busway linking downtown New Britain with Hartford's Union Station[1]. The Bus Rapid Transit system, also referred to as "CT*fastrak*", will be the first in the State of Connecticut and will run along active and inactive railroad ROWs through four cities/towns: New Britain, Newington, West Hartford, and Hartford. ConnDOT will construct eleven new transit stations to serve the route. The facility will permit bus access at intermediate points, with circulator bus routes that will serve surrounding neighborhoods and enter the busway as needed, providing a one-seat ride. The project is currently in the final design phase. Construction began in 2012 and ConnDOT expects the busway to be operational in 2015.

There are no other major planned capital improvements to bus service in the project region. This EA assumes that bus ridership will see a natural amount of growth due to an increase in the regional population.

FERRY SERVICE

There are no major planned improvements for ferry service between New York and Connecticut in the short and long term. This EA assumes that ferry ridership will experience slight amounts of natural growth due to increases in the regional population and growing popularity of recreational destinations in New York and Connecticut.

NAVIGABLE WATERS

There are no large maritime facilities planned for the Connecticut River. The river will likely continue to see a heavy emphasis on recreational uses in the summer months. Commercial traffic on the river is expected to remain stagnant. Navigation limitations cited by the Navigation Survey included the height of the nearby Raymond E. Baldwin Bridge, and the east-shore alignment of the existing channel. Without the proposed project, navigation near the Connecticut River Bridge will likely not improve but will continue to be adequate.

REGIONAL HIGHWAY SYSTEM

PEARL HARBOR MEMORIAL BRIDGE (Q BRIDGE) CONSTRUCTION

As described in Chapter 2, ConnDOT is currently constructing the new Pearl Harbor Memorial Bridge, also known as the "Q-Bridge", as part of the I-95 New Haven Harbor Crossing Improvement Program. The bridge will replace the current six-lane structure carrying the Connecticut Turnpike over the Quinnipiac River with a ten lane design that will incorporate the capacity of a concrete box girder bridge into a cable-stayed bridge design. The new northbound side of the Q-Bridge is open to traffic. ConnDOT expects construction of the new southbound side of the Q-Bridge will be complete in 2015. Work on a related project—the reconstruction and widening of the I-95/I-91/Route 34 interchange—began in April 2011, and ConnDOT expects it to be complete in 2016. Completion of this project will not affect train traffic over the Connecticut River Bridge.

[1] http://www.ctfastrak.com/about/what-is-ctfastrak. Accessed December 23, 2013.

D. PROBABLE IMPACTS OF THE PREFERRED ALTERNATIVE

This section discusses the potential impacts to transportation from the Preferred Alternative. The Preferred Alternative will enhance the reliability of the Connecticut River Bridge and thereby provide benefits to marine traffic, Amtrak service, SLE service, and freight operations.

INTERCITY RAIL

The Preferred Alternative involves off-line construction of the replacement bridge on a new southern alignment, which will be used for intercity rail service. During the construction period, trains operating through the project area may need to operate at slower speeds to ensure safety (as discussed in Chapter 12, "Construction Impacts"). A track outage may also be required to reconnect the newly constructed bridge approach spans to the existing track. The project team will determine the length of this delay and mitigation measures to minimize impact during the final design and construction of the replacement bridge.

The Preferred Alternative will not alter train speed, schedule, or capacity. The Preferred Alternative will improve the reliability of the bridge structure and moveable span, which will decrease unscheduled train delays caused by bridge malfunctions and improve service. In summary, the Preferred Alternative will not result in significant adverse impacts to intercity rail operations.

FREIGHT SERVICE

During the construction period, freight trains operating through the project area may need to operate at slower speeds to ensure safety. A track outage may also be required to reconnect the newly constructed bridge approach spans to the existing track. Amtrak will determine the length of this delay and mitigation measures to minimize impact during the final design and construction of the replacement bridge.

The proposed project will result in a long-term benefit to freight service, as it will improve the reliability of the bridge. The Preferred Alternative will not result in significant adverse impacts to freight rail operations.

PUBLIC TRANSPORTATION

COMMUTER RAIL SERVICE

The Preferred Alternative will not affect the MNR New Haven Line, and there will be minimal effects to SLE service to New London Station during the construction period (see Chapter 12, "Construction Impacts"). The Preferred Alternative will improve the reliability of the Connecticut River Bridge, thereby improving the reliability of SLE service to New London. In summary, the Preferred Alternative will not result in significant adverse impacts to commuter rail operations.

FERRY SERVICE

The Preferred Alternative will not result in significant adverse impacts to ferry service.

BUS SERVICE

The Preferred Alternative will have only a minimal effect on bus service. Some riders may temporarily switch to bus service to avoid any train service delays caused by the construction of the new bridge; however, this effect will be temporary. The Preferred Alternative will not result in significant adverse impacts to bus service.

NAVIGABLE WATERS

The Preferred Alternative will provide benefits to navigation. The project will improve the reliability of the bridge and will therefore reduce delays to maritime traffic caused by bridge openings and closings. Option A will retain the alignment and width of the existing channel and replace the existing bridge with a bascule moveable span, which will provide unlimited vertical clearance for a portion of the channel. Option B may potentially expand the navigation channel to 200 feet in width (which could further benefit navigation by reducing the likelihood of fender collisions) and will include a vertical lift span with a vertical clearance of 90 feet.

In summary, the Preferred Alternative will result in an improvement to navigability along this segment of the Connecticut River. As described in Chapter 12, “Construction Impacts”, the Preferred Alternative will result in some temporary adverse impacts to mariners. Impacts to navigability will be temporary, non-significant, and limited only to the construction of the replacement bridge.

REGIONAL HIGHWAY SYSTEM

The Preferred Alternative will not result in significant adverse impacts to the regional highway system. ✷

A. INTRODUCTION

This chapter evaluates the land use and social conditions for areas potentially affected by the Preferred Alternative. This evaluation considers current and future land uses, parkland, zoning, public policy, community facilities, land acquisition, and socioeconomic conditions within the project study area.

Land use is the activity occurring on a particular piece of land and in the structures that occupy the land. Land uses may be categorized broadly (e.g., residential, commercial, industrial) or in more detail (e.g., single-family residential, multi-family residential, warehousing, and storage). Zoning is the classification and regulation of land according to use categories, usually developed by local jurisdictions. Zoning controls the type, density, and bulk of development in a given jurisdiction by establishing districts where specific land uses are allowed. Community facilities include religious institutions, daycare centers, police and fire stations, and schools, all of which contribute to the overall character of an area. The regulatory context and methodology for the analysis of land use and social conditions are discussed below, followed by a description of existing and future land use and social conditions, and the potential for impacts from the Preferred Alternative.

B. REGULATORY CONTEXT AND METHODOLOGY

REGULATORY CONTEXT

For purposes of environmental review, FRA follows guidance provided by the CEQ and internal procedures dated May 26, 1999.[1] These procedures stipulate consideration of a project's impacts on existing and planned land uses. Environmental review involves evaluating local land use plans as well as comprehensive regional plans with respect to the project to identify conflicts. An environmental review must also identify open space and areas devoted to recreation (passive and active) to determine whether a proposed project could adversely affect these sites. As discussed below, the Connecticut River Bridge is located between the towns of Old Saybrook and Old Lyme, Connecticut. Land use planning and public policy are established at the municipal level, giving authority over planning and zoning issues to the local towns' planning commissions. The Old Lyme Planning Commission and the Old Saybrook Planning Commission periodically review and update their respective local master plans and zoning regulations. While Amtrak is exempt from local zoning and public policy, this EA provides an overview of these regulations for analysis context.

Following FRA's procedures, environmental reviews also consider a proposed project's potential to adversely impact the socioeconomic environment—including available jobs (number

[1] http://www.fra.dot.gov/Downloads/RRDev/FRAEnvProcedures.pdf

and type), community disruption or cohesion, demographic shifts, and the need for and availability of relocation housing. An environmental review also considers the potential impacts on existing businesses and local government services and revenues. Transportation projects often require property acquisition and relocation. A federally funded project must adhere to the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as codified in Title 42, Section 4601 et seq. of the United States Code, and the applicable implementing regulations set forth in Title 49, Part 24 of the Code of Federal Regulations (collectively, "the Uniform Act") with regard to relocation services, moving payments, replacement housing payments, and other allowable payments related to commercial and residential moving costs and displacement. The rights of owners and tenants of real property acquired to implement the proposed project are protected under the Uniform Act, which provides for fair uniform and equitable treatment of persons displaced from their homes, businesses, or farms by federal and federally assisted programs. The Uniform Act recognizes that displacement of businesses often results in their closure, and aims to minimize the adverse impact of displacement to maintain the economic and social well-being of communities. The Uniform Act is designed to ensure that individuals do not suffer disproportionate injuries as a result of programs and projects designed for the benefit of the public as a whole, and to minimize the hardship of displacement on such persons.

METHODOLOGY

As discussed in Chapter 1, "Purpose and Need," the project site is located along the Northeast Corridor and includes the existing Connecticut River Bridge and its approaches. The project study area extends a quarter-mile around the project site and occupies the east and west banks of the Connecticut River (See Figure 4-1). The project team based the size of the study area on a consideration of potential project impacts during construction and operation. The boundaries of the study area consider existing physical and visual boundaries, such as the Connecticut River and Long Island Sound.

LAND USE, ZONING, PUBLIC POLICY, OPEN SPACE, AND PARKLAND

The project team performed the analysis of land use, zoning, public policy, open space, and parkland through the following six steps:

1. Identification of land uses and land use patterns, community facilities, parklands, and open space.
2. Review of local and regional government regulations (including zoning), policies, and plans influencing growth, development, and preservation in the study area;
3. Identification of development trends and planned transportation and development projects;
4. Projection of future conditions with the proposed project and the potential impacts related to land use, community facilities, and open space.
5. Determination of the proposed project's consistency with the various land use and zoning plans and policies and future developments;
6. Where impacts are identified, description of mitigation measures to eliminate or reduce the magnitude and/or severity of the impacts.

5.23.12

Aerial Source: Connecticut 2010 Color NAIP, USDA-FSA-APFO, Connecticut Department of Energy and Environmental Protection, 2010

Figure 4-1

Project Site Aerial

SOCIOECONOMIC CONDITIONS

The analysis of socioeconomic conditions was performed by identifying the existing and projected population within the study area. The purpose of this analysis was to consider the potential for the Preferred Alternative to bifurcate neighborhoods, adversely affect community cohesiveness and neighborhood character (e.g., through increased noise and traffic), and alter pedestrian circulation and accessibility to local businesses.

C. EXISTING CONDITIONS

LAND USE

As mentioned above, the Connecticut River Bridge is located along the Connecticut River, 3.4 miles from the mouth of the river at Long Island Sound. The western half of the study area is located in the Town of Old Saybrook, within Middlesex County, and the eastern half of the study area is located in the Town of Old Lyme, within New London County.

OLD SAYBROOK

Land uses within the study area in the Town of Old Saybrook are shown on Figure 4-2. Much of the area immediately surrounding the Connecticut River Bridge is characterized by undisturbed tidal marshes with tall grasses and expansive views. These marshes are within the Connecticut River Gateway Conservation Zone (“the Gateway Conservation Zone”) and are protected by the Connecticut River Gateway Commission (“the Gateway Commission”) and CTDEEP, described further in “Zoning and Public Policy” below. A few rural roads travel through this section of the study area. Just north of the project site, the Between the Bridges Marina operates several facilities along the waterfront, accessible via Ferry Road and Clark Street. Clark Street is a short, dead-end, local rural street comprising primarily single-family residences and several small fishing and boating-related businesses, most of which appear to be run out of private residences.

West of the existing Connecticut River Bridge, the Ragged Rock Marina, also accessible by car from Ferry Road, is located at the end of a small inlet. Ferry Road is a lightly traveled rural arterial that experiences heavier traffic during the summer months due to its location adjacent to the marinas. The remaining portion of Ferry Road within the study area consists of single-family residences and vacant or undeveloped land. The Boston Post Road (Route 1), another rural arterial, runs just west of the study area. The Boston Post Road is a quiet roadway in this area, although it becomes a more principal thoroughfare west of the study area where it merges with U.S. Highway 1 and commercial and industrial land uses become more prevalent. Several industrial, commercial, and institutional establishments are accessible from the Boston Post Road and are located within or near the study area, including the Gladeview Health Care Center. However, these various uses make up a small portion of the study area, which is characterized predominantly by marshland and forests.

OLD LYME

Land uses within the study area in the Town of Old Lyme are shown on Figure 4-2. Similar to Old Saybrook, tidal marshes surround the Connecticut River Bridge approaches east of the rail bridge in Old Lyme. The Lieutenant River also crosses through this portion of the study area. The CTDEEP Marine Headquarters, comprising an office building, a large garage, and several other small structures, sits adjacent to the north side of the existing bridge approach. Next to the

CTDEEP Marine Headquarters is Ferry Landing Park, a waterfront park owned by CTDEEP. An elevated wooden boardwalk begins at Ferry Landing Park near the CTDEEP Marine Headquarters and continues underneath the existing bridge, providing recreational access to the marshes. The tidal marshes are a protected natural area in which activities are strictly regulated by CTDEEP.[1]

Three roads are located within the Old Lyme portion of the quarter-mile study boundary: Ferry Road, Sandpaper Point Road, and Shore Road. These roads are lightly traveled rural roads with little development. Ferry Road is a local rural roadway that terminates at the CTDEEP Marine Headquarters and is characterized primarily by low-density residential uses comprising single-family homes on large, wooded lots. Other uses along Ferry Road include several small boat docking areas and a boat refueling station along the Connecticut River waterfront. Sandpiper Point Road, another local rural road accessible from Ferry Road, ends in a cul-de-sac and also comprises single-family residences surrounded largely by forests and undisturbed land.

Shore Road, a rural arterial roadway, traverses the easternmost portion of the study area where it crosses over the Northeast Corridor tracks. Land west of Shore Road is primarily wetlands, whereas land uses east of Shore Road are more varied, yet are accessible only from roads located outside the study area. Land uses in the eastern portion of the study area include low-density residential uses, a condominium complex, a church facility, and large expanses of forest. The Elizabeth B. Karter Watch Rock Nature Preserve, a property of the Old Lyme Conservation Trust, is located at the southeastern border of the study area.

ZONING AND PUBLIC POLICY

Zoning and public policy are under the jurisdiction of the local municipalities, in this case, the respective Planning Commissions of Old Saybrook and Old Lyme. While Amtrak is exempt from local zoning and public policy, this section includes an overview of zoning and public policy within the towns of Old Saybrook and Old Lyme.

OLD SAYBROOK ZONING AND PUBLIC POLICY

Zoning

The study area includes four zoning districts pursuant to the “Zoning Regulations of the Town of Old Saybrook, Connecticut,” adopted in 1948 and last amended in October 2009. These zoning designations include the Marine Commercial (MC) district, the Residence (AA-2) district, the Industrial (I-1) district, and the Residence (A) district (see Figure 4-3).

Much of the land north of and adjacent to this segment of the Northeast Corridor is zoned MC, including most of Clark Street and waterfront properties along Ferry Road. The MC district promotes uses that are water-dependent and provide waterfront access. Permitted uses include docks, boat sale and service establishments, fish markets, and boat storage areas. In addition, detached single-family dwellings, schools, parks, and other open space lands are permitted.

Land immediately south of and adjacent to this segment of the Northeast Corridor is zoned AA-2. Permitted uses in the AA-2 district include detached single-family residences, home offices, accessory rental units, schools, parks, and farms. The following uses are allowed with a special

[1] Personal communication with CTDEEP, Office of Long Island Sound Programs and Marine District Headquarters Office, May 17, 2011.

5.25.12

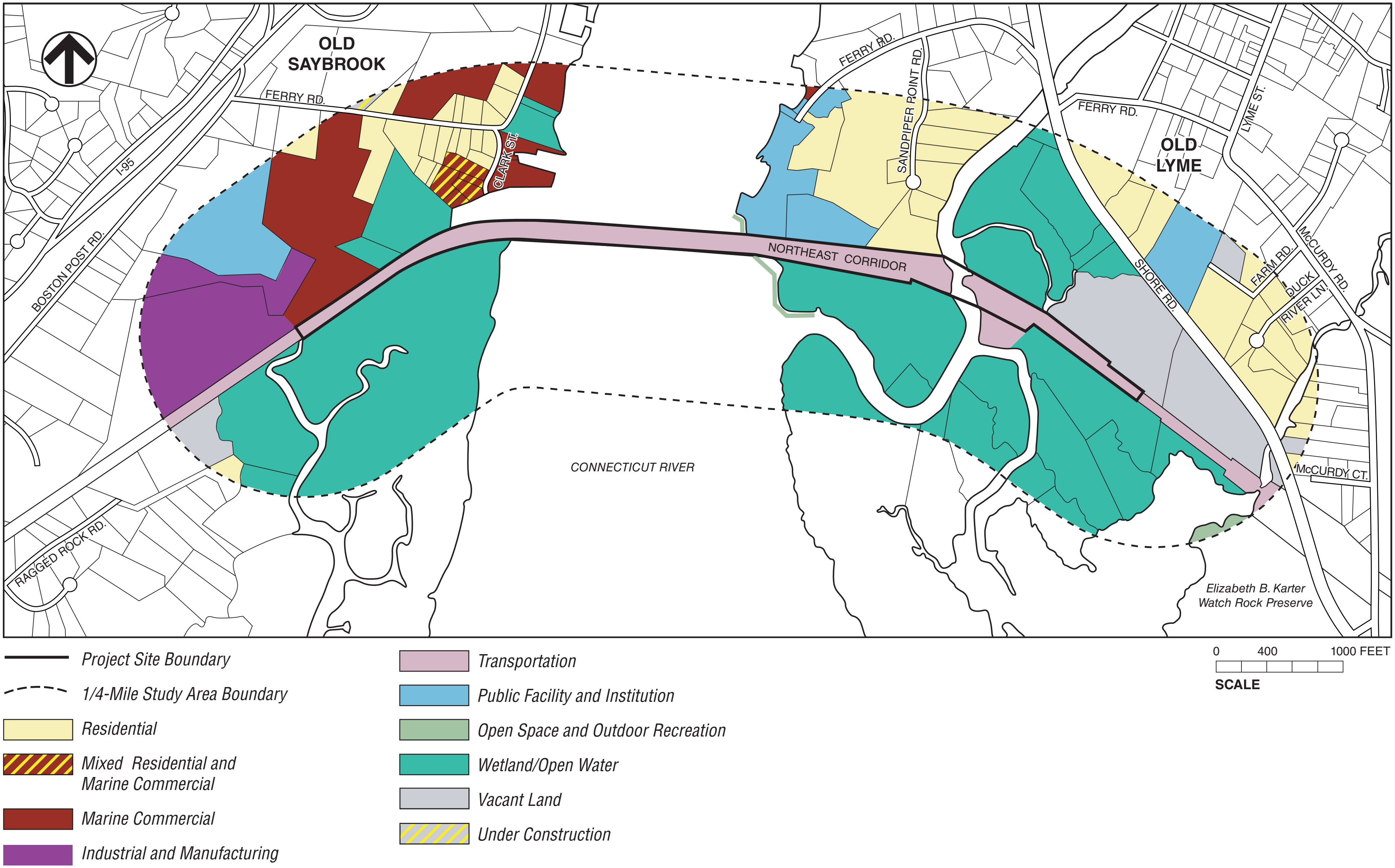
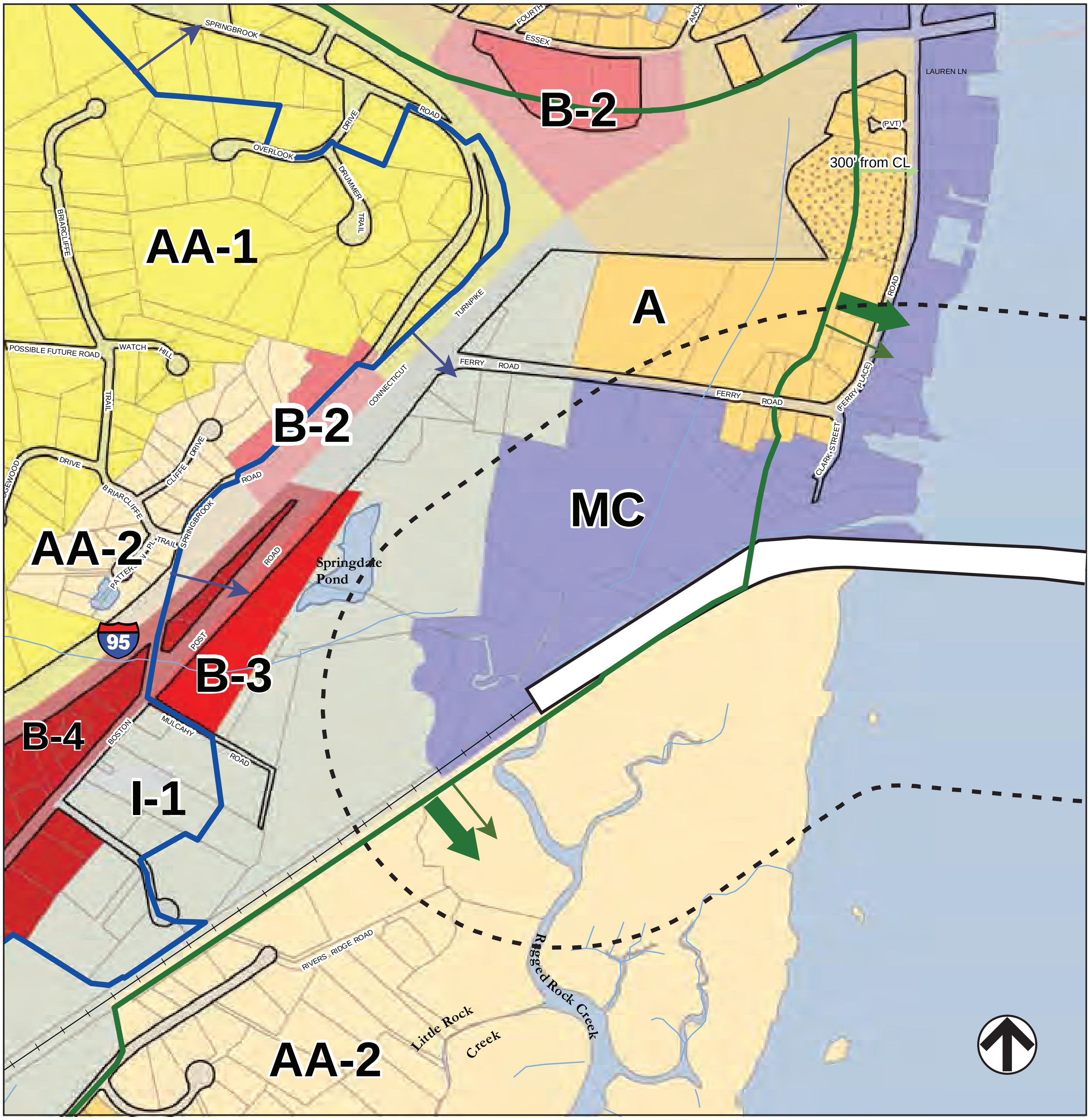


Figure 4-2
Existing Land Use



Project Site Boundary	
1/4-Mile Study Area Boundary	
AA-1	Residential District
AA-2	Residential District
A	Residential District
B-2	Shopping Center Business District
B-3	Restricted Business District
B-4	Gateway Business District
I-1	Industrial District
MC	Marine Commercial
	Connecticut Coastal Management Zone
	Connecticut River Gateway Conservation Zone

0 400 1000 FEET
SCALE

Figure 4-3

Existing Zoning - Old Saybrook

permit: convalescent homes and hospitals, colleges, religious institutions, recreational clubs and facilities, nature preserves, agricultural nurseries, utilities, and railroad ROWs.

The northernmost portion of the study area within Old Saybrook is zoned as an A district. Similar to the AA-2 district, permitted uses in the A district include detached single-family residences, home offices, accessory rental units, parks, and farms. Uses permitted by special permit include convalescent homes and hospitals, residential life care facilities, religious institutions, schools, colleges, recreational clubs and facilities, agricultural nurseries, utilities, and railroad ROWs.

Western portions of the study area, primarily along the Boston Post Road, are zoned I-1 (Note: this district is mapped as I-1 but described as the I district in the Zoning Code). The I district is intended to allow offices and light industrial uses without compromising the important natural features of the town. Permitted uses include research and manufacturing facilities, office buildings, medical clinics, hotels, retail establishments, utilities, railroad ROWs, parks, and other various light industrial uses. Special exception uses include indoor restaurants or other indoor food establishments, nursing home facilities, and town government buildings or facilities.

In addition to the aforementioned zoning districts, the study area is also located within several special state- and local-designated districts, including the Flood Plain Zone, the Gateway Conservation Zone, and the Coastal Area Management Zone. The project site is located within a 100-year floodplain and is classified as an area of minimal flooding. However, before any new construction or improvements to existing structures or sites can take place within a Flood Plain Zone, a Flood Hazard Area Permit must be obtained from the Town of Old Saybrook Engineer.

Most of the study area, with the exception of the northwestern portion, is within the Gateway Conservation Zone, discussed further below in “Connecticut River Public Policy.” Within this zone, pursuant to Section 25-102g of the Connecticut General Statues (CGS), the Gateway Commission has the authority to establish minimum zoning standards that must be adopted into each affected municipality’s zoning code. The Gateway Conservation Zone aims to preserve the scenic, ecological, and historic character of areas within the lower Connecticut River Valley. Strict guidelines within this special district limit development. In some instances, the Town of Old Saybrook has expanded upon the minimum standards created by the Gateway Commission and has established more stringent regulations. For instance, the town has established a 100-foot riparian buffer area from the high-tide line of the Connecticut River and associated tributaries and wetlands as opposed to the 50-foot buffer area established by the Gateway Commission. Within this riparian buffer area, the removal of vegetation and the destruction of wildlife habitat is restricted, as well as other activities that may be harmful to the lower Connecticut River environment.

The entire study area is within the Coastal Area Management Zone, which has been established pursuant to CGS Sections 22a-90 through 22a-111 and is intended to protect vegetation, wildlife, soils, and other natural features in coastal regions. Limited development is permitted within the Coastal Area Management Zone provided that a Coastal Site Plan is prepared, with several exceptions and exemptions. Certain minor activities and improvements that will not have a substantial negative effect on important coastal and tidal natural features are exempt from Coastal Site Plan review.

Public Policy

In addition to zoning, the Planning Commission of the Town of Old Saybrook has developed a master plan for the town, the *Old Saybrook Plan of Conservation & Development*, which was last updated in 2006. The master plan further outlines the Planning Commission's vision for the town and emphasizes the importance of maintaining the small-town character of Old Saybrook by encouraging appropriate future development that is compatible in size, character, and design to the town's existing small-town aesthetic. An Architectural Review Board was established in 1998 to ensure that proposed new developments are in keeping with the existing small-town, New England character of Old Saybrook.

The Old Saybrook Conservation Commission—a subdivision of the Planning Commission—in conjunction with the Old Saybrook Land Trust—a nonprofit committed to preserving open space—completed the Old Saybrook Conservation Plan in 1994. The plan promotes ongoing efforts of the Town's Conservation Commission and Land Trust to conserve the town's important natural resources through the acquisition of undeveloped land, which in turn will be preserved as public open space and potential greenway belts. Old Saybrook's special location on the eastern bank of the Connecticut River at the mouth of Long Island Sound creates a unique natural environment, which is recognized on state, national, and international levels, as discussed below in "Connecticut River Public Policy." In 2003, the Old Saybrook Harbor Management Commission completed a Harbor Management Plan that includes both general goals and objectives and specific guidelines for promoting the balanced use of the Old Saybrook Harbor Management Area, which encompasses largely Old Saybrook's municipal jurisdiction along the Connecticut River, including a portion of the proposed project site. The plan works to balance the protection of environmental quality, the safe and enjoyable use of waterfront resources, and marine commercial interests in the Old Saybrook Harbor Management Area.

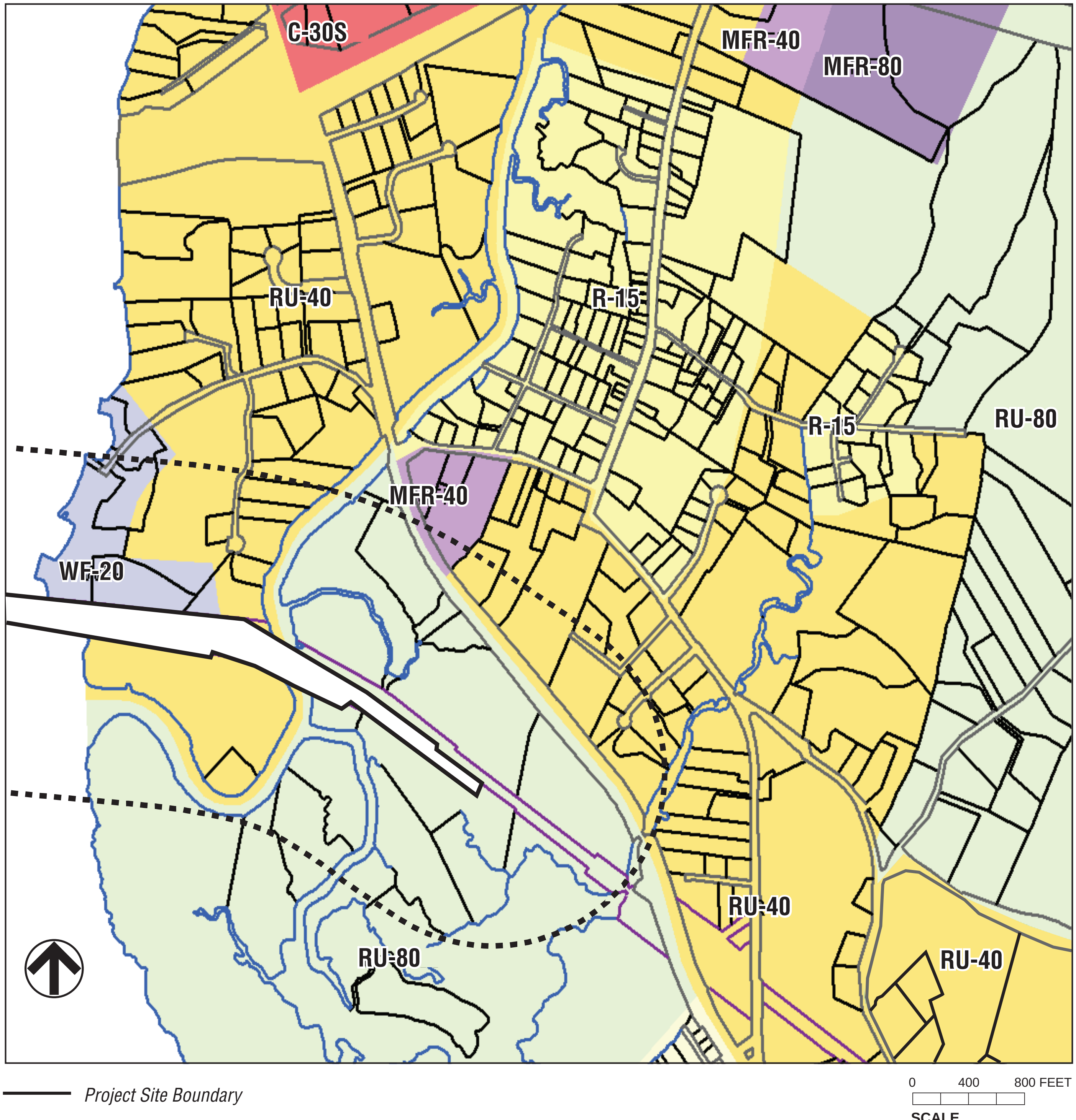
OLD LYME ZONING AND PUBLIC POLICY

Zoning

The study area comprises four separate zoning districts pursuant to the "Zoning Regulations for the Town of Old Lyme," originally adopted in 1941 with the most recent comprehensive revisions dated April 2009 with additional periodic amendments through July 2011. The zoning designations in the study area include the Waterfront Business (WF-20) district, the Rural Residential (RU-80) district, the Rural Residential (RU-40) district, and the Multi-Family Residential (MFR-40) district (see Figure 4-4).

The WF-20 district makes up a small portion of the study area, primarily limited to the CTDEEP property and adjacent waterfront parcels just north of the railroad tracks in the westernmost portion of the Town of Old Lyme. Permitted uses in the WF-20 district include marine facilities, boat livery, and other water-related businesses. Special permit uses include retail businesses, professional offices, restaurants, governmental services, parks, and public utilities.

The RU-40 district comprises a large area within the quarter-mile study boundary. Much of the land east of Shore Road is within the RU-40 zoning district. A small area in the western portion of Old Lyme, including parcels along Sandpiper Point Road and marshland adjacent to the south side of the rail tracks, is also zoned as RU-40. Permitted uses in the RU-40 zoning district include single-family residences, seasonal dwellings, community residences for mentally ill or disabled persons, farms, small commercial horticultural establishments, and small horse stables and riding academies. A number of uses are allowed by special permit including planned residential cluster development, private schools, religious institutions, convalescent and nursing homes, governmental services, parks, and public utilities.



Project Site Boundary

1/4-Mile Study Area Boundary

RU-80 Rural Residential District

RU-40 Rural Residential District

R-15 Residential District

MRF-80 Multi-Family Residence District

MFR-40 Multi-Family Residence District

WF-20 Waterfront Business District

C-30S Commercial District

Figure 4-4

Existing Zoning - Old Lyme

Much of the study area is within the RU-80 zoning district. Land in the eastern portion of the study area and west of Shore Road is classified as RU-80. Within the study area, much of the land designated as RU-80 comprises undeveloped land or tidal marshland. Similar to the RU-40 district, permitted uses in the RU-80 district include single-family residences, seasonal dwellings, community residences for mentally ill or disabled persons, farms, small commercial horticultural establishments, and small horse stables and riding academies. Special permit uses include planned residential cluster development, private schools, religious institutions, convalescent and nursing homes, governmental services, parks, and public utilities.

A small portion of the quarter-mile study area, near the intersection of Shore Road and Ferry Road, is zoned as an MFR-40 district. The Lyme Regis condominium complex is located here. The MFR-40 district allows single-family residences, seasonal dwellings, community residences for mentally ill or disabled persons, farms, small commercial horticultural establishments, and small horse stables and riding academies. Special permit uses include planned residential cluster developments, two-family dwellings, private schools, religious institutions, convalescent and nursing homes, governmental services, parks, and public utilities.

As stated earlier, and as described later in greater detail under “Connecticut River Public Policy,” the study area is within the State-designated Gateway Conservation Zone. This includes the entire portion of the study area within the Town of Old Lyme. Through enacted legislation, the State of Connecticut aims to preserve the unique ecological and historical integrity of the lower Connecticut River Valley and therefore requires development to adhere to strict guidelines within the Gateway Conservation Zone. As required, the Town of Old Lyme has adopted the standards established by the Gateway Commission into its zoning code. Similar to Old Saybrook, the Old Lyme Zoning Code strictly regulates activities within 100 feet of the high tide line of the Connecticut River and its tributaries or associated wetlands.

Due to its close proximity to the Long Island Sound, the Old Lyme portion of the study area is also within the Coastal Boundary, another State-designated protection zone. Development in these areas, other than minor activities or structure modifications, is subject to Coastal Site Plan Review requirements as administered by CTDEEP.

Public Policy

In addition to zoning, the Old Lyme Planning Commission presides over a master plan for the Town of Old Lyme, *Plan of Conservation and Development Revisions*, originally adopted in 1965 and most recently updated December 2010. The master plan outlines the community’s vision for Old Lyme. Overall, the vision statement focuses on maintaining the small town character of Old Lyme by preserving its important and unique natural, cultural, and historic resources and ensuring that future commercial and residential development is compatible with the existing town aesthetic and scale. The master plan also discusses the Amtrak Northeast Corridor railroad bridge over the Connecticut River, which is the subject of this EA. While the town recognizes the benefits of having access to rail service to the New York and Boston metropolitan areas, it also expresses concerns over balancing both rail and boat traffic. Since the railroad bridge is a drawbridge that needs to be opened to allow boat traffic, there are concerns that if rail service increases, it may be less accommodating to boat traffic.

Old Lyme’s unique location, situated near the mouth of the Connecticut River where it meets Long Island Sound, provides for an important natural environment, recognized on the local, national, and international level for its environmental resources (see “Connecticut River Public Policy” below). In addition to the already protected natural resources of Old Lyme, there is a new effort to preserve open space in the town. The Open Space Committee, a subcommittee of the Planning Commission, advocates for this cause and completed the *Town of Old Lyme Open Space Plan* in 1997, which was updated in 2004. With the help of the Old Lyme Conservation Trust (OLCT), a non-profit conservation group founded in 1966, the Town has begun to annually allocate funds to be used for the acquisition of open space. This emphasis on preserving open space is in accordance with the State's goal to preserve 21 percent of its land for open space.[1]

To further protect the sensitive ecological habitat of the Connecticut River and tidal marshes, as well as to protect residents and property, the Town of Old Lyme has established a Harbor Ordinance. This ordinance regulates boating and other recreational activities in the harbor area to ensure safe and orderly conduct.

CONNECTICUT RIVER PUBLIC POLICY

As described above, the Connecticut River has received much recognition on the state, national, and international level and therefore benefits from significant environmental protection and conservation from various public interest groups. In 1991, the USFWS created the Silvio O. Conte National Fish and Wildlife Refuge to restore the biological diversity of the Connecticut River watershed. The refuge includes several parcels in Connecticut, Massachusetts, New Hampshire, and Vermont (none of which are located within the project study area).

As mentioned further in Chapter 10, "Natural Resources," the tidal marshes at the mouth of the Connecticut River were recognized as "Wetlands of International Significance" by the Ramsar Treaty in 1994. The Ramsar Treaty was originally signed in 1971 in Ramsar, Iran and provides a framework for the protection of wetlands and the correct and wise use of these resources. The treaty promotes international cooperation for the preservation of sensitive environmental resources. In addition to being recognized as "Wetlands of International Significance," the lower Connecticut River is also just one out of 15 designated "Wetlands of International Importance with Respect to Waterfowl."

In 1993, the Nature Conservancy, an international nonprofit conservation organization, recognized the "Tidelands of the Connecticut River" as one of its Last Great Places campaign. The Nature Conservancy's mission is to preserve plants, wildlife habitats, and other important ecological features. Since 1960, the Nature Conservancy has protected over 4,000 acres of land in the Tidelands region of the Connecticut River Valley. The Conservancy works closely with CTDEEP to conduct marsh restoration projects in the area, and has protected 109 acres in Old Saybrook alone.[2]

In 1998, the Clinton Administration recognized the Connecticut River as an "American Heritage River" by; it is only one of 14 rivers in the United States with this designation. The American Heritage Rivers program promotes the protection of the natural environment, economic revitalization, and preservation of historic and cultural resources. The initiative allows riverfront communities, such as Old Saybrook and Old Lyme, to seek federal assistance to attain these goals.

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[1] Old Lyme Planning Commission, Plan of Conservation and Development Revisions: Town of Old Lyme, CT. May 2000

[2] Old Saybrook Planning Commission, Plan of Conservation and Development, February 2006, p. H.

On the state level, the Connecticut General Assembly established the Gateway Commission in 1973 to protect the Lower Connecticut River through a state-local contract. The Gateway Conservation Zone was delineated along the shores of the Connecticut River, extending 30 miles upstream from the Long Island Sound, which encompasses much of the study area. Pursuant to CGS Section 25-102g, the Gateway Commission is granted the authority to establish minimum development and use standards within the Gateway Conservation Zone, which are required to be adopted into the local zoning codes of all municipalities within the zone.[1] The Commission has successfully preserved over 1,000 acres of land since its inception through gifts and purchases of scenic easements and development rights.[2]

PARKLAND AND OPEN SPACE

There are two designated public parks located within the quarter-mile study area boundary; both are located in Old Lyme: the Elizabeth B. Karter Watch Rock Nature Preserve and Ferry Landing Park at the CTDEEP Marine Headquarters.

The Elizabeth B. Karter Watch Rock Preserve is located at the southeastern edge of the study area and is maintained by OLCT. "Watch Rock," as it is commonly known, is a 25-acre preserve along the Duck River—a tributary to the Connecticut River—that provides wooded hiking trails and picnic areas open year-round to the public. OLCT acquired the preserve in 1986. The park is also unique for its archeological significance; in the early 1980s, archeologists discovered Native American artifacts dating back several thousand years. Watch Rock was renamed in 2005 after the passing of Elizabeth B. Karter, a valued member of the Trust and a respected philanthropist.

Ferry Landing Park is located just north of the project site in Old Lyme and includes the CTDEEP Marine Headquarters. The park extends along the east bank of the Connecticut River and is furnished with picnic benches and a gazebo. The park features an elevated wooden boardwalk that extends from the park into the marshes and offers access to various recreational uses, such as fishing and crabbing. The pier also provides scenic vistas of the Connecticut River and tidal marshlands.

The Connecticut River and surrounding marshes also provide recreational opportunities to local residents and tourists. The presence of numerous marinas in the study area indicates that boating and fishing are popular recreational activities in this area. As discussed above, the lower Connecticut River's natural and scenic integrity is protected by a collaborative effort of the Gateway Commission, CTDEEP, various non-profit organizations, and several national and international environmental protection agencies.

SOCIOECONOMIC CONDITIONS

There are approximately eight businesses in the project study area. Most of the business are related to the fishing industry and include fishing supply stores, fish markets, boat sales and service shops, and boat storage areas. The majority of the businesses are located within the marinas in Old Saybrook, including Ragged Rock Marina, south of Ferry Road, and the Between the Bridges Marina along the Connecticut River waterfront east of Ferry Road and Clark Street.

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[1] Connecticut River Gateway Commission, http://www.ctrivergateway.org/standards.html. Accessed May 13, 2011.

[2] Connecticut River Gateway Commission, http://www.crerpa.org/gateway.html. Accessed March 11, 2008.

Many of the businesses are housed in detached one- and two-story shingled buildings, many of which also serve as the residences of the business owners.

Both the Town of Old Saybrook and the Town of Old Lyme contain small residential communities that maintain a substantial number of seasonal residents who have summer vacation homes within the two towns. As discussed above under "Land Use", there are several residential enclaves located in the study area, including those to the north and south of Ferry Road in Old Saybrook, and on either side of Sandpiper Point Road and north of Shore Road in Old Lyme. The majority of homes are single-family one- and two-story detached residences which are located on large wooded plots of land.

As detailed below in Table 4-1, there is a majority white population in each of the three census tracts located in the study area. The residents of the Town of Old Saybrook are approximately 92 percent white and the Town of Old Lyme is approximately 94 percent white. This also reflects the racial composition within the counties, as Middlesex County is approximately 86 percent white and New London County is 78 percent white. The majority of residents in the study area live above the poverty level. Approximately five percent of persons in the Town of Old Saybrook and four percent of persons in the Town of Old Lyme live below the poverty level. In accordance with Executive Order 12898, an environmental justice analysis has been performed for the project and is presented in Chapter 16, "Environmental Justice".

Table 4-1
Study Area Population and Economic Characteristics

	2010 Census												2005-2009 American Community Survey
		Race and Ethnicity*											Persons Below Poverty Level (%)***
Study Area	**2010 Total**	**White**	**%**	**Black**	**%**	**Asian**	**%**	**Other**	**%**	**Hispanic**	**%**	**Total Minority (%)**	
Middlesex County	165,676	143,144	86.4	7,256	4.4	4,207	2.5	3,235	2.0	7,834	4.7	13.6	5.8
New London County	274,055	214,605	78.3	14,488	5.3	11,248	4.1	10,500	3.8	23,214	8.5	21.7	6.7
Town of Old Saybrook	10,242	9,404	91.8	96	0.9	243	2.4	157	1.5	342	3.3	8.2	5.1
Town of Old Lyme	7,603	7,142	93.9	35	0.5	154	2.0	88	1.2	184	2.4	6.1	3.9
Census Tract 6701 (Old Saybrook) **	4,848	4,467	92.1	42	0.9	98	2.0	75	1.5	166	3.4	7.9	4.0
Census Tract 6702 (Old Saybrook) **	5,394	4,937	91.5	54	1.0	145	2.7	82	1.5	176	3.3	8.5	6.2
Census Tract 6601.01 (Old Lyme)**	3,356	3,181	94.8	13	0.4	63	1.9	31	0.9	68	2.0	5.2	3.4

Notes:
* The racial and ethnic categories provided are further defined as: White (White alone, not Hispanic or Latino); Black (Black or African American alone, not Hispanic or Latino); Asian (Asian alone, not Hispanic or Latino); Other (American Indian and Alaska Native alone, not Hispanic or Latino; Native Hawaiian and Other Pacific Islander alone, not Hispanic or Latino; Some other race alone, not Hispanic or Latino; Two or more races, not Hispanic or Latino); Hispanic (Hispanic or Latino; Persons of Hispanic origin may be of any race).
** Census Tracts 6701, 6702, and 6601.01 include the project study area and surrounding areas.
*** Percent of individuals with incomes below established poverty level. The U.S. Census Bureau's established income thresholds for poverty levels defines poverty level.
Source: U.S. Census Bureau, Census 2010 and American Community Survey 2005-2009 Estimates

D. NO ACTION ALTERNATIVE

In the future without the proposed project, no development is planned to occur in the primary study area within the Town of Old Lyme.[1] However, the Town of Old Lyme is reviewing a sizeable mixed residential and commercial project proposed on a site in the Old Saybrook portion of the study area. That development site comprises four parcels on both sides of Ferry Road, just north of Clark Street. Approximately half of the total development site is within the quarter-mile study area boundary, shown on Figure 4-2. That development project will include a reconfiguration and expansion of existing businesses including a restaurant. The residential component of the development project includes 90 condominium/townhouse-type units as well as apartments above commercial uses.[2]

No immediate improvements to state roadways or local railways are planned in the primary study area.[3] However, the “I-95 Southeast CT Feasibility Study” issued by ConnDOT in July 2004 recommended several highway improvements in the Old Lyme and Old Saybrook area, including widening I-95 from four to six lanes and improving Exits 71 and 72.[4] These improvements will improve traffic flow and safety, but will not have a meaningful effect on land use or socioeconomic conditions in the study area. The planned major and minor improvement projects discussed under the No Action Alternative in Chapter 2, “Project Alternatives,” are located outside of the primary study area and will not meaningfully change the land use and socioeconomic conditions in the area.

The Town of Old Saybrook and the Town of Old Lyme have each recently adopted revisions to their zoning ordinances. The most recent amendments to the Old Saybrook Zoning Regulations were effective as of 2009. The Old Lyme Zoning Code was last revised May 2011. The most recent zoning regulations within the study area are reflected in this chapter.

E. PROBABLE IMPACTS OF THE PREFERRED ALTERNATIVE

This section discusses the potential impacts to land use, zoning and public policy from the Preferred Alternative. The Preferred Alternative will not have any adverse impacts on land use, zoning, and public policy.

LAND USE

Overall, the Preferred Alternative will not adversely affect existing or planned land uses in the study area. The proposed project will not require any permanent upland land acquisition. The upland portions of the new bridge will be located entirely within the existing Amtrak ROW. The Amtrak ROW will continue to be used for rail transportation and surrounding land uses will not change as a result of the proposed project.

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[1] Personal communication with Ann Brown, Town of Old Lyme Zoning Department, May 13, 2011.

[2] Personal communication with Christine Nelson, Town of Old Saybrook Land Use Department, May 17, 2011.

[3] Connecticut Department of Transportation, http://www.ct.gov/dot, accessed May 11, 2011.

[4] Old Lyme Planning Commission, Plan of Conservation and Development, December 28, 2010.

ZONING AND PUBLIC POLICY

As noted earlier, Amtrak is not subject to local zoning ordinances. Nonetheless, because all upland improvements and railroad modifications will be contained within the existing Amtrak ROW, local zoning districts and legislation will remain unaffected. The proposed project will not result in any zoning changes within the study area.

Master plans and vision statements adopted by the towns of Old Saybrook and Old Lyme express a desire to preserve the small-town qualities of each municipality. In addition, protecting the unique natural environment of the Lower Connecticut River Valley and its historic integrity is also vital to the towns, as well as the State of Connecticut. Since the Preferred Alternative is expected to only improve the reliability and long-term serviceability of the Connecticut River Bridge and its approach structures and to minimize conflict between rail and maritime traffic, and will not result in increased train speed or frequency of service, the proposed project will not alter the existing neighborhood character. The Preferred Alternative will not result in significant adverse impacts to zoning or public policy.

PARKLAND AND OPEN SPACE

The proposed project will not have significant adverse effects on the two parks located within the study area—Ferry Landing Park and the Elizabeth B. Karter Watch Rock Natural Preserve ("Watch Rock"). Access to a portion of the boardwalk located in Ferry Landing Park, directly beneath the Connecticut River Bridge, may be affected in the short-term during bridge construction (for a period of up to three years). As discussed in Chapter 12, "Construction Impacts," Amtrak and its contractors will take appropriate measures during construction to minimize short-term impacts to the boardwalk. Additionally, Chapter 18, "Section 4(f) Evaluation" includes an evaluation of the short-term park impacts in accordance with Section 4(f) of the USDOT Act of 1966. The project impacts to the boardwalk at Ferry Landing Park will be temporary and of short duration. Therefore, no significant adverse impacts to parkland and open space are expected from the project.

SOCIOECONOMIC CONDITIONS

While Option B may improve navigation on the Connecticut River by potentially expanding the navigation channel, the proposed project is not expected to increase marine traffic in the project area or adversely impact the marine-related businesses. The proposed project will not spur rapid population growth or development and therefore will not adversely impact local or regional public policies or interfere with the master plans for Old Saybrook or Old Lyme. The project will not adversely affect socioeconomic conditions, employment, or community cohesion. ✷

Chapter 5: Visual and Aesthetic Conditions

A. INTRODUCTION AND METHODOLOGY

This chapter considers the effects of the Connecticut River Bridge Replacement Project on the visual character and aesthetic conditions of the surrounding area. The project team has prepared this chapter in accordance with the guidelines for visual analyses contained in federal documents prepared by the Federal Highway Administration (FHWA), including *Guidance for Preparing and Processing Environmental and 4(f) Documents* (1987), *Environmental Impact Statement Visual Impact Discussion* (undated), and *Guidance Material on the Preparation of Visual Impact Assessments* (1986), which is the standard USDOT methodology for assessing potential impacts to visual and aesthetic resources.

The proposed project will replace the existing Connecticut River Bridge, a two-track moveable rail bridge along Amtrak's Northeast Corridor. This analysis considers the effects of the proposed project on locations from which it will be visible. The project team delineated the study area for visual resources as a quarter-mile from the project site (see Figure 5-1). Where there are substantial views to the project site in locations outside of the quarter-mile study area, this EA also takes these locations into account, as noted throughout this chapter. To prepare this analysis, the project team collected information through field visits. The team identified visually sensitive locations and viewer groups, and assessed the duration of views to determine any potential effects.

B. EXISTING CONDITIONS

EXISTING VISUAL CHARACTER

The study area is characterized by a relatively rural maritime landscape traversed by transportation corridors, and containing residential development and recreational facilities. Amtrak's existing Northeast Corridor runs along the center of the study area, oriented roughly east-west. The track sits on an embankment in the study area, with the exception of the Connecticut River Bridge and a smaller bridge that carries the railroad over the Lieutenant River in Old Lyme.

The Connecticut River Bridge is a two-track, moveable rail bridge over the Connecticut River. It appears as a long, low, steel structure, one of two river crossings in the vicinity (Raymond E. Baldwin Bridge is located immediately to the north of the study area). As described in Chapter 6, "Cultural Resources," the Connecticut River Bridge has been determined eligible for the National Register of Historic Places (NR) and is listed on the State Register of Historic Places (SR) as part of a thematic grouping of Moveable Railroad Bridges on the Northeast Corridor in Connecticut (see Figures 5-2 and 5-3, Photo 1). Built in 1904, the 1,535-foot-long steel through-truss bridge has ten spans including a rolling-lift bascule span. With the moveable span closed, the bridge has a vertical clearance of 18 feet above MHW and its tallest point is approximately 75 feet above MHW. With the moveable span open, the tallest point of the bridge is approximately 170 feet above MHW. The bridge piers and abutments are constructed of rusticated stone blocks.

As described in greater detail in Chapter 4, "Land Use and Socioeconomic Conditions" and Chapter 6, "Cultural Resources", the Connecticut River is roughly a third of a mile wide where it runs through the study area and was designated as an American Heritage River by Executive Order 13061 in 1997. In the area south of the Connecticut River Bridge, the shoreline is characterized by areas of marsh reeds and grasses, woodlands, and tributary waterways (see Figures 5-2 and 5-3, Photo 2). North of the project site, marinas, residential development, and woodlands characterize the shoreline (see Figures 5-2 and 5-4, Photo 3). The Lieutenant River, a roughly 200-foot-wide tributary of the Connecticut River, passes through the study area in Old Lyme (see Figures 5-2 and 5-4, Photo 4). Ragged Rock Creek, a smaller tributary of the Connecticut River, passes through the study area in Old Saybrook. Much of the marshland in the study area is within the Connecticut River Gateway Conservation Zone and is protected by the Connecticut River Gateway Commission and CTDEEP.

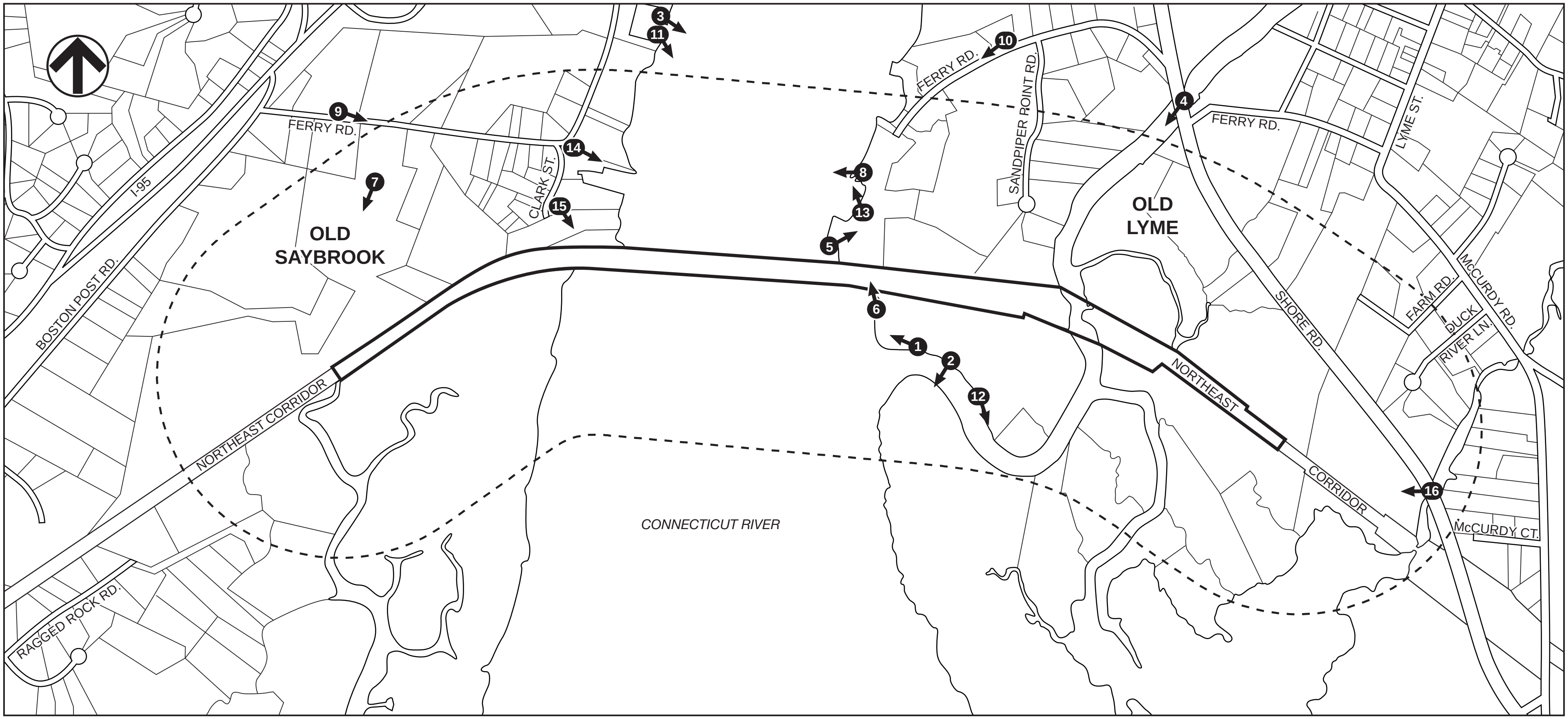
Two public parks are located in the study area, both in Old Lyme. One of these, Ferry Landing Park, is associated with the CTDEEP Marine Headquarters, located at the western terminus of Ferry Road in Old Lyme. The Marine Headquarters includes a large office building, a garage, and several smaller structures (see Figures 5-2 and 5-5, Photo 5). The public park space is located adjacent to these structures, along the shore of the Connecticut River, both north and south of the Connecticut River Bridge. The park contains a boat dock, a wide grassy jetty with a gazebo, and open and wooded areas (see Figures 5-2 and 5-5, Photo 5). A long wood boardwalk runs along the shore from the jetty to the mouth of the Lieutenant River, passing beneath the Connecticut River Bridge, and affording pedestrian access to a substantial portion of the Old Lyme waterfront in the study area (see Figures 5-2 and 5-5, Photo 6). A second park, the Elizabeth B. Karter Watch Rock Nature Preserve, is located at the southeastern edge of the study area. The portion of the park located in the study area is characterized by marshes, while south of the study area, the park is forested and contains a nature trail.

In addition to the CTDEEP Marine Headquarters boat dock in Old Lyme, there are several marinas in the study area. In Old Saybrook, the Ragged Rock Marina is located on the south side of Ferry Road between the railroad and the Connecticut Turnpike (I-95) (see Figures 5-2 and 5-6, Photo 7). It is located a short distance inland, accessible from the Connecticut River via a channel. Further northeast, the Between the Bridges Marina operates a facility on the Connecticut River shore at the intersection of Ferry Road and Clark Street (see Figures 5-2 and 5-6, Photo 8). Just north of the study area in Old Saybrook, the Baldwin Boat Launch provides docks for vessels of various sizes (see Figures 5-2 and 5-4, Photo 3). Immediately north of the study area in Old Lyme, the Lieutenant River State Boat Launch, located on the west side of Shore Road just south of Ferry Road, provides public access for launching small craft.

There are only a few roads that run through the study area, and most of these are rural and residential in character. Ferry Road (in both Old Saybrook and Old Lyme) is flanked by stone walls in many locations (see Figures 5-2 and 5-7). Properties along this roadway are generally older single-family homes on relatively large parcels of land. Shore Road, in Old Lyme, contains less residential development and is carried over marshes and waterways on a series of bridges. The Boston Post Road (Route 1) runs southwest-northeast through Old Saybrook, a short distance west of the study area. It is slightly busier and a number of small businesses are located along this road. The heavily trafficked I-95 runs east-west approximately quarter-mile north of the study area. Both I-95 and the Boston Post Road cross the Connecticut River on the Raymond

5.23.12

Figure 5-1
Visual Resources Study Area



Project Site Boundary

1/4-Mile Study Area Boundary

Photo Location

0 400 1000 FEET

SCALE

Figure 5-2

Photo Location Map

The Connecticut River Bridge, which carries Amtrak's Northeast Corridor over the Connecticut River, as seen from the Ferry Landing Park in Old Lyme, looking northwest. **1**

Looking south from the wood walkway in the Ferry Landing Park in Old Lyme, a view showing the Connecticut River and the marshes and woodlands associated with it. The mouth of the Lieutenant River is pictured in the foreground. The Lynde Point Lighthouse, and beyond it the Long Island Sound, are visible in the distance. **2**

Figure 5-3
Visual Resources

A view from the Baldwin Boat Launch, just north of the study area in Old Saybrook, looking east across the Connecticut River. Residences and woodlands in the northern portion of the study area in Old Lyme are visible. **3**

The Lieutenant River in Old Lyme, looking west from Shore Road where it crosses this waterway, adjacent to the Lieutenant River State Boat Launch. The embankment and catenary system of the Northeast Corridor are visible in the distance. **4**

Figure 5-4
Visual Resources

Ferry Landing Park in Old Lyme, looking northeast from the wide grassy jetty within the park. A gazebo and picnic tables are pictured in the foreground. In the background, the CTDEEP Marine Headquarters Building and associated structures can be seen. **5**

Looking north from the wood walkway in the Ferry Landing Park in Old Lyme, immediately south of the Connecticut River Railroad Bridge. The Baldwin Bridge, which carries I-95 and the Boston Post Road over the Connecticut River, is pictured in the background. **6**

Figure 5-5
Visual Resources

A view looking south from the Ragged Rock Marina in Old Saybrook. **7**

A view of the Between the Bridges Marina in Old Saybrook, as seen from the Ferry Landing Park in Old Lyme. **8**

Figure 5-6
Visual Resources

Looking southeast along Ferry Road in Old Saybrook, showing the John Whittlesey Jr. property (State/National Register-listed) and the stone walls and trees that characterize the roadway. **9**

Looking west along Ferry Road in Old Lyme, from a hill just west of Sandpiper Point Road. Note the stone walls, houses, and trees that flank the roadway; a historic milestone is also visible in the foreground. The Connecticut River and Connecticut River Bridge can be discerned in the background. **10**

Figure 5-7
Visual Resources

E. Baldwin Bridge (see Figures 5-2 and 5-5, Photo 6). The Baldwin Bridge is an 11-lane concrete segmental box-girder bridge, originally constructed in 1948, and rebuilt in 1993. The bridge is over 2,500 feet long and has a vertical clearance of 81 feet.

VISUALLY SENSITIVE RESOURCES

FHWA's *Guidance Material on the Preparation of Visual Impact Assessments* defines visual resources as those physical features that make up the visible landscape, including land, water, vegetation, and man-made elements to which viewers attach visual value. Visual resources may include historic buildings, open spaces such as parks and landscaped plazas, and views to natural resources such as water features and natural vegetation.

The Connecticut River View Corridor is the central visual resource in the study area. It is characterized by an expansive open view shed that includes the Connecticut River, the tributaries, marshes, wetlands, and woods that surround it, and the Connecticut River Bridge (see Figures 5-2; 5-3; 5-4, Photo 3; and 5-8). As a historic and visually interesting structure, the Connecticut River Bridge contributes to the visual character of the Connecticut River View Corridor. The corridor also includes distant views of the Lynde Point Lighthouse and the Long Island Sound, both over two miles south of the Connecticut River Bridge. Among the waterways associated with the Connecticut River in the study area are Ragged Rock Creek in Old Saybrook and the Lieutenant River in Old Lyme. The Baldwin Bridge which carries the I-95 and the Boston Post Road over the Connecticut River just north of the study area is not considered to contribute to the aesthetic or cultural aspects of the corridor.

Ferry Road in both Old Saybrook and Old Lyme is also a scenic corridor in the study area (see Figures 5-2 and 5-7). One of the earliest routes constructed in the region, the winding rural road is flanked by trees, stone walls, and several historic houses (see Chapter 6, "Cultural Resources"), and provides views to the Connecticut River.

The Old Lyme Historic District, a small portion of which is in the eastern portion of the study area, is a historic downtown area containing churches and residences. While the location is visually sensitive, it is not substantially visible from the project site, and no views to the project site are afforded from the historic district.

VIEWER GROUPS AND VIEW DURATIONS

Viewer groups in the area consist of pedestrians, motorists, rail passengers, and boaters. In terms of visual resources, viewer groups may be divided into two categories: those that have views of visual resources and those that have views from visual resources or visually sensitive locations. Within the study area, visual resources include the Connecticut River View Corridor and Ferry Road in Old Saybrook and Old Lyme.

PEDESTRIANS

The majority of pedestrian traffic in the study area is located at Ferry Landing Park in Old Lyme. The park's waterfront access areas, including a wood boardwalk that runs along the shore of the Connecticut and Lieutenant Rivers, provide pedestrians with clear views along the Connecticut River View Corridor, including the Connecticut and Lieutenant Rivers and their associated wetlands, and the Connecticut River Bridge (see Figures 5-2; 5-3; and 5-8, Photo 12). Looking south from the park, there are distant views of the Lynde Point Lighthouse (see Figures 5-2 and 5-3, Photo 2). Looking north, the Baldwin Bridge, which does not contribute to the defined view shed quality, interrupts the otherwise clear view corridor (see Figures 5-2 and 5-9, Photo 13).

The only other public park in the study area is the Elizabeth J. Karter Watch Rock Preserve. However, only a small portion of the park, consisting of inaccessible wetlands, is in the study area. A nature trail is located in the southern section of the park, outside of the study area, yet due to the thickly wooded nature of this trail there are no significant views to the project site.

As described above, there are several marinas and boat launches in and around the study area. These include the Ragged Rock Marina, Between the Bridges Marina, and the Baldwin Boat Launch in Old Saybrook, and the CTDEEP Marine Headquarters-Ferry Landing Park and the Lieutenant River State Boat Launch in Old Lyme. All of these marinas and boat launches are located in waterfront locations and provide clear views of the Connecticut River View Corridor (see Figures 5-2; 5-4; 5-8, Photo 11; and 5-9, Photo 14). The Ragged Rock Marina in Old Saybrook has less expansive views of the Connecticut River View Corridor than the others due to its location further inland (see Figures 5-2 and 5-6, Photo 7).

MOTORISTS

Motorists travel on multiple roadways that pass through the study area. These roadways include Ferry Road, Clark Street, Sandpiper Point Road, and Shore Road. The Boston Post Road and I-95 are two major roads that are located just beyond the study area.

As described above, Ferry Road in the study area in both Old Saybrook and Old Lyme is a visually sensitive corridor. Motorists traveling along Ferry Road have the primary views of the Ferry Road corridor. In Old Lyme, however, views of the corridor are best at the northern edge of the study area and east of the study area (see Figures 5-2 and 5-7, Photo 10). Motorists traveling along Ferry Road also enjoy views of the Connecticut River View Corridor. The Connecticut River Bridge is visible from certain limited locations on Ferry Road, including the western end of the road in Old Lyme, west of Sandpiper Point Road, where the highest point of the roadway is located. There are fewer views of the Connecticut River in Old Saybrook, and these are limited primarily to where Ferry Road intersects with Clark Street (see Figures 5-2 and 5-9, Photo 14). Views afforded along Ferry Road are of relatively long duration due to the low speed of traffic along the winding rural roadway.

Clark Street, also known as Ferry Place, is a short road segment located in the northern portion of the study area in Old Saybrook. Motorists on Clark Street looking south and east have brief views of the Connecticut River Bridge and marshes associated with the Connecticut River. Views are partly blocked, however, by the railroad embankment (see Figures 5-2 and 5-10, Photo 15).

Sandpiper Point Road in Old Lyme is a short residential street adjoining Ferry Road and terminating in a cul-de-sac. Views of the Ferry Road corridor are accessible from portions of this roadway. Views of the Connecticut River, however, are limited.

Shore Road is a relatively busy roadway located in the eastern portion of the study area in Old Lyme. The roadway is carried over the Lieutenant River and surrounding wetlands on bridges, and crosses over the Northeast Corridor railroad at the southeastern edge of the study area. Due to the flat, open nature of the surrounding topography and the relative lack of trees and structures along this roadway, there are relatively clear views of the wetlands associated with the Connecticut and Lieutenant Rivers (see Figures 5-2 and 5-4, Photo 4). Looking west from Shore Road in the southern portion of the study area, views of the Connecticut River are partially

The Connecticut River View Corridor, as seen looking south from the Baldwin Boat Launch in Old Saybrook, immediately north of the study area. The Connecticut River Bridge is pictured centrally. **11**

Looking east towards the Lieutenant River and associated marshes from the south-eastern end of the wood walkway in the Ferry Landing Park in Old Lyme. **12**

Figure 5-8

Visual Resources

Looking northwest from the Ferry Landing Park in Old Lyme, a view of the Connecticut River, and the Baldwin Bridge. **13**

A view looking southeast from the Between the Bridges Marina in Old Saybrook. The Connecticut River and Connecticut River Bridge are visible in the background. **14**

Figure 5-9
Visual Resources

From the south end of Clark Street in Old Saybrook, a view looking southeast towards the Connecticut River and Connecticut River Bridge. The embankment of the Northeast Corridor partially blocks views of the Connecticut River View Corridor. **15**

A view looking west from Shore Road where it crosses a creek associated with the Lieutenant River. The embankment of the Northeast Corridor partially blocks views of the Connecticut River View Corridor. **16**

Figure 5-10

Visual Resources

obstructed by the intervening Northeast Corridor tracks, which run on an embankment, roughly parallel to Shore Road (see Figures 5-2 and 5-10, Photo 16).

Motorists traveling on I-95 and the Boston Post Road cross the Connecticut River on the Baldwin Bridge. While the Baldwin Bridge is outside the study area, these motorists have clear and expansive views of the Connecticut River View Corridor. Due to the high speeds at which motorists travel over this bridge, these views are of relatively short duration. Looking north from the Baldwin Bridge, the Connecticut River and associated wetlands north of the study area are visible. Looking south from the Baldwin Bridge, towards the study area, views include the Connecticut and Lieutenant Rivers and associated wetlands, and the Connecticut River Bridge (see Figures 5-2 and 5-11). With the exception of the Baldwin Bridge segment, no other portions of these routes afford significant views of the study area.

RAIL PASSENGERS

Rail passengers traveling on Amtrak's Northeast Corridor, including on the Connecticut River Bridge, are afforded brief but clear views of the Connecticut River View Corridor as they pass through the study area. To the south, the Lynde Point Lighthouse and Long Island Sound can be seen at a distance. Looking north, the Baldwin Bridge intervenes in the view corridor.

While some buildings on Ferry Road in Old Lyme and Old Saybrook are briefly visible, the Ferry Road corridors can not be seen by rail passengers traveling through the study area due to intervening vegetation and topography.

BOATERS

The Connecticut River and associated waterways in the study area are relatively well-trafficked by recreational and commercial vessels. As described above, several marinas and boat launches are located in or near the study area.

Boaters traveling on the Connecticut River and the Lieutenant River in the study area have expansive views of the Connecticut River View Corridor, including the waterway itself, associated wetlands and woods, and the Connecticut River Bridge. Looking south from the study area, the Lynde Point Lighthouse and Long Island Sound are distantly visible. Looking north from the study area, the Baldwin Bridge intervenes in the view shed.

Views of the Ferry Road corridors in Old Saybrook and Old Lyme are very limited from the Connecticut River and associated waterways. Buildings and properties at the terminus of the roads in both towns are distantly visible, however, very little of the roadways can be seen from the water to allow the boater to take in their visual character due to topography and intervening vegetation.

C. NO ACTION ALTERNATIVE

As described in Chapter 2, "Project Alternatives," under the No Action Alternative, the existing Connecticut River Bridge will remain in service as is, with continued maintenance and minimal repairs. The planned major and minor improvement projects discussed under the No Action Alternative are located outside of the primary study area used for this visual analysis. Therefore, in the future without the proposed project, no changes to the aesthetic character of the study area or to visually sensitive resources are anticipated.

D. PROBABLE IMPACTS OF THE PREFERRED ALTERNATIVE

As described in detail in Chapter 2, "Project Alternatives," the Preferred Alternative evaluated in this EA will result in the removal of the existing Connecticut River Bridge substructure and superstructure and its replacement with a new bascule bridge or a vertical lift bridge.

Option A will replace the existing bascule bridge with a new bascule bridge. As described above, the existing bascule bridge has a vertical clearance of 18 feet above MHW; its tallest point is approximately 75 feet above MHW when the moveable span is closed and 170 feet above MHW when the span is open. The width of the existing channel is 150 feet. Under Option A, the replacement bridge will have similar height and dimensions, and the channel width will remain the same.

Option B will replace the existing bascule bridge with a new vertical lift bridge (see Figure 2-1). The vertical lift bridge will have a vertical clearance of roughly 18 feet when in a closed position. The moveable span, which will be approximately 43 feet in height (from top to bottom), will be roughly 61 feet above MHW at its highest point when in a closed position. When in an open position, the moveable span will have a clearance of 90 feet above MHW and a total height of approximately 133 feet above MHW. The two towers flanking the moveable span will be approximately 170 feet tall. The channel width could potentially be widened to 200 feet under Option B.

The Preferred Alternative will follow a southern alignment and will require the construction of a new substructure and removal of existing piers. The new alignment will not diverge from the existing alignment by more than 50 feet at any point (as measured from center line of existing track to center line of proposed track). The Preferred Alternative will maintain the existing channel location, closer to the eastern shore of the river.

CONNECTICUT RIVER VIEW CORRIDOR

The Preferred Alternative will result in the removal of the Connecticut River Bridge, which contributes to the character of the Connecticut River View Corridor. In replacing the historic bridge with a new bridge, this aspect of the corridor will be altered. The magnitude of the change will vary somewhat according to whether Option A or Option B was selected. Both options will likely result in the removal of the existing stone pier structure.

Option A will incorporate a new bascule span rather than a vertical lift span, and will minimize the changes that will result in the visual character of the Connecticut River View Corridor. This option will be of the same bridge type and will have dimensions and height similar to the existing bridge. Insofar as the bascule bridge design will minimize impacts to the Connecticut River View Corridor, Option A will result in less change to visual conditions, while Option B will result in more change.

While the magnitude of change will differ somewhat according to the option of the Preferred Alternative that is chosen, neither will result in significant adverse impacts to the Connecticut River View Corridor. Under Option B, the highest fixed point of the new vertical lift bridge (the towers) will be 170 feet above MHW, as compared to the dimensions of the existing bridge, at 75 feet above MHW when the moveable span is closed and 170 feet above MHW when open. Under Option A, the new bridge will have dimensions similar to the existing bridge. Therefore, neither the vertical lift nor bascule bridge option will block views along the Connecticut River View Corridor.

Taken from a vehicle traveling across the Baldwin Bridge, a view looking south towards the Connecticut River View Corridor including the Connecticut River Bridge. **17**

The extent to which the various viewer groups identified above will perceive the change caused by the Preferred Alternative varies. Rail passengers are not expected to perceive the change in the visual character of the bridge since their view of the bridge is limited and of short duration. Rail passengers' views to other aspects of the Connecticut River View Corridor, such as the river and surrounding wetlands, will not change. Motorists traveling on I-95 currently experience expansive but brief views of the Connecticut River View Corridor. When looking south from I-95, the Connecticut River Bridge is a visible but relatively distant element of this View Corridor. Because the alignment, height, and dimensions of the new bridge will likely not differ substantially from the existing bridge, views to the Connecticut River View Corridor as a whole will not be substantially changed and the change in design of the new bridge will be minimally perceptible. Motorists traveling on other roadways in the study area currently experience only limited views of the Connecticut River View Corridor. From the few vantage points where motorists do have clear views of the corridor, such as Clark Street in Old Saybrook, the change in view will be limited to the change in design of the new bridge. Views to other aspects of the Connecticut River View Corridor will not be blocked or substantially changed, and the durations of these views will remain the same.

The viewer groups that currently experience the longest duration and closest range views of the Connecticut River Bridge are boaters in the immediate vicinity of the bridge and pedestrians in Ferry Landing Park in Old Lyme. These viewer groups will likely notice the change in bridge design and alignment more than any other viewer group due to their proximity to the project site. However, the project will replace an existing railroad structure with a new railroad structure on a similar alignment, and thus the use and overall character and location of the feature will not change. Neither the bascule nor vertical lift bridge designs proposed under the Preferred Alternative will differ substantially in height, dimension, or alignment from the existing bridge and will not obstruct views to other aspects of the Connecticut River View Corridor from vantage points in Ferry Landing Park and the Connecticut River. Furthermore, as described in Chapter 6, "Cultural Resources," the design of the new bridge will be undertaken in coordination with CTSHPO and will include consultation to incorporate historically compatible designs. This process, which will, to the extent practicable, result in a new bridge design that reflects the historic character of the existing bridge, will further minimize any visual changes or intrusions along the Connecticut River View Corridor.

FERRY ROAD VIEW CORRIDORS

The Preferred Alternative will not have an adverse impact on the Ferry Road corridors. Views to the project site from Ferry Road in Old Saybrook and Old Lyme, experienced almost exclusively by motorists, are limited. The western portion of Ferry Road in Old Lyme, where the elevation is highest (see Figures 5-2 and 5-7, Photo 10) and the portion of Ferry Road in Old Saybrook near the intersection of Clark Street (see Figures 5-2 and 5-9, Photo 14) are among the few locations along Ferry Road where views to the project site are afforded. These views of the project site are relatively distant and of short duration, and the replacement of the existing railroad bridge with a new railroad bridge will not be expected to substantially change the overall character of the views. The differences in dimension and design proposed under the options of the Preferred Alternative will not be substantial enough to be strongly perceived from these vantage points.

CONCLUSIONS

The options of the Preferred Alternative will affect visual character and visually sensitive resources as follows:

- Option A—Bascule bridge will minimize visual change. Will not block views along the Connecticut River View Corridor.
- Option B—Will not block views along the Connecticut River View Corridor.

In summary, the Preferred Alternative will not substantially alter the visual character of the study area or block important views to visually sensitive resources. Therefore, the project will not result in adverse impacts on visual character and visually sensitive resources in the study area. ✷

A. INTRODUCTION

This section considers the potential of the proposed project to affect historic resources in the project's APE. The Preferred Alternative is described in detail in Chapter 2, "Project Alternatives." Potential in-ground disturbances of the project site may result from construction of various components of a replacement bridge over the Connecticut River. Modifications and/or additions to existing railroad tracks and other railroad infrastructure could occur throughout the APE as well.

This EA has been prepared in accordance with NEPA, Section 4(f) of the USDOT Act, and Section 106 of the NHPA of 1966 (as amended) and associated implementing regulations in 36 C.F.R. 800. Per Subpart A, Section 800.2(a)(3) and 800.2(c)(4) of 36 C.F.R., FRA is authorizing the project sponsor, as an applicant for federal approvals, to prepare information, analyses, and recommendations regarding Section 106 consultation for the referenced project.

METHODOLOGY

Amtrak and the project team, in consultation with CTSHPO, identified APEs for the Preferred Alternative to assess the potential effects of the Connecticut River Bridge Replacement Project on historic resources (see Appendix A for CTSHPO correspondence). Once the APEs were determined, the project team compiled an inventory of officially recognized historic resources within the APEs based on the files of the CTSHPO and the Connecticut State Museum (CTSM). This inventory includes properties or districts listed on the NR and/or the SR, or determined eligible for such listing, National Historic Landmarks (NHL), and archaeological sites on file at the CTSM. Amtrak also compiled a list of potential architectural resources (i.e., properties that may be eligible for listing on the S/NR) within the architectural APE based on field surveys, and prepared Historic Resource Inventory Forms for the potential architectural resources.

Amtrak and the project team then assessed the archaeological APE for areas that may be sensitive for archaeological resources, and conducted documentary research to identify areas where prehistoric or historic-period activities may have occurred and resulted in archaeological resources. For each area where prehistoric or historic-period activities may have left archaeological remains, Amtrak evaluated construction activities and other ground disturbances that occurred later on the site to identify locations where any archaeological resources, if originally present, may have survived.

Once the historic resources in the APEs were identified, Amtrak assessed the effects of the project on those resources. Project effects on architectural resources may include both direct (i.e., physical) and indirect (i.e., contextual) impacts. Amtrak also considered direct and indirect effects. Direct effects could include physical destruction, demolition, damage, or alteration of a historic resource. Indirect effects could include changes in the appearance of a historic resource or in its setting, including the introduction of incompatible visual, audible, or atmospheric elements to a resource's setting, or elimination of publicly accessible views to the resource. In addition, Section 106 requires consideration of reasonably foreseeable effects that may occur later in time, be further removed in distance, or be cumulative.

Amtrak also assessed the Preferred Alternative's effects on the potential archaeological resources identified. Construction–rather than operation–of the project alternatives would affect any archaeological resources present. For all potential adverse effects identified, Amtrak identified mitigation measures.

APE DELINEATION

In consultation with CTSHPO, Amtrak and the project team delineated APEs for historic and archaeological resources to take into account the direct, indirect, secondary, and cumulative impacts on these resources types (see Figures 6-1 and 6-2). Correspondence with CTSHPO is provided in Appendix A. The APEs are described below.

APE FOR ARCHAEOLOGICAL RESOURCES

The area of potential effect for archaeological resources includes all areas that could experience ground disturbance under the Preferred Alternative. The archaeological APE, shown in Figure 6-2, includes the Amtrak ROW and extends 1,648 feet west of the Connecticut River shoreline in Old Saybrook and 2,953 feet east of the Connecticut River shoreline in Old Lyme.

APE FOR ARCHITECTURAL RESOURCES

The APE for architectural resources (shown in Figure 6-1) was sized to account for any potential impacts that may occur where proposed construction activities could physically alter architectural resources or be close enough to them to potentially cause physical damage or visual or contextual impacts. The architectural resources APE extends quarter-mile from the project site.

B. BACKGROUND HISTORY

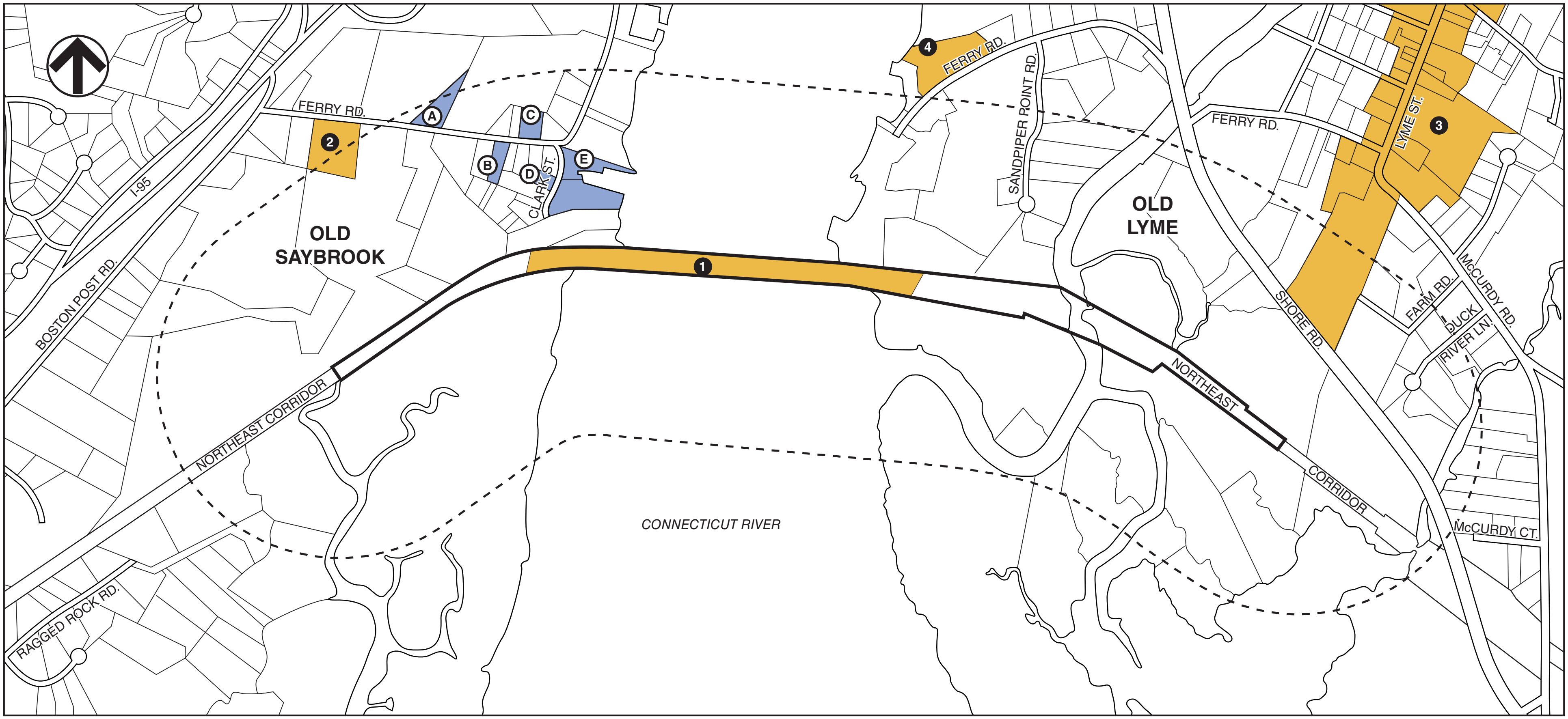
PREHISTORIC CONTEXT

Archaeologists have divided the time between the arrival of the first humans in northeastern North America and the arrival of Europeans more than 10,000 years later into three precontact periods: Paleo-Indian (11,000-10,000 before present, or BP), Archaic (10,000-2,700 BP), and Woodland (2,700 BP-AD 1500). These divisions are based on certain changes in environmental conditions, technological advancements, and cultural adaptations, which are observable in the archaeological record. The Woodland period ended with the arrival of the first Europeans in the early 1500s, which initiated the Contact period (AD 1500-CA. 1700). A more detailed prehistoric context is provided in Appendix A, "Cultural Resources."

HISTORIC CONTEXT

COLONIAL PERIOD OLD SAYBROOK AND OLD LYME

The towns of Old Lyme and Old Saybrook continued to thrive at the beginning of the Historic Period in the 18th century. Early on, the marshy areas bordering the river on the eastern side were used for the harvesting of salt hay (Ely and Plimpton 1991). Soon, however, Old Lyme



Project Site Boundary

Architectural APE (1/4-mile Boundary)

1 Previously Designated Architectural Resource

A Potential Architectural Resource

1 Connecticut River Bridge (NR-eligible, SR-listed as part of thematic nomination)

2 John Whittlesey Jr. House (S/NR-listed)

3 Old Lyme Historic District (S/NR-listed, Local Landmark)

4 Enoch Noyes House, 317 Ferry Road (SR-Listed)

0 400 1000 FEET

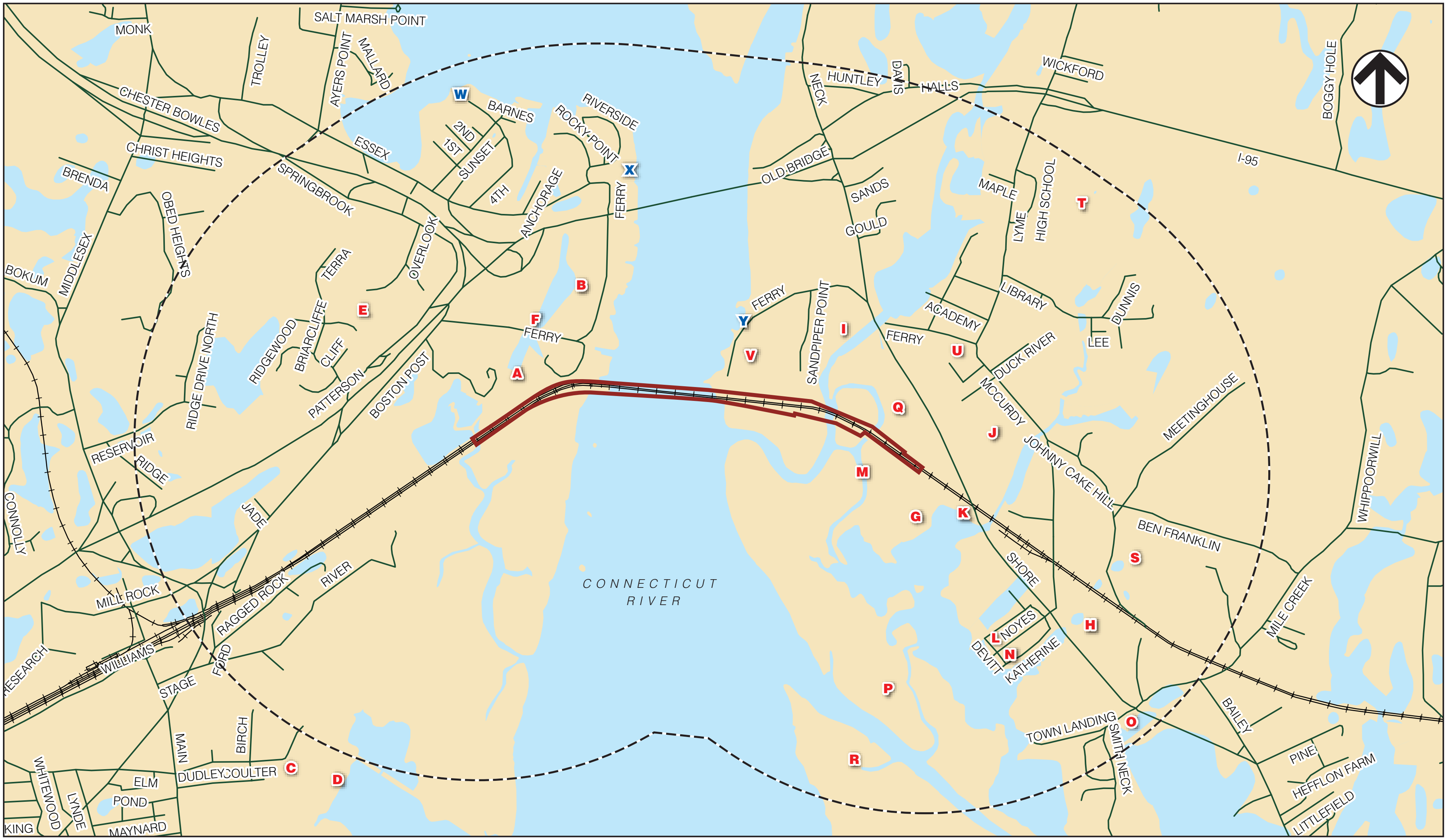
SCALE

NOTE: See Table 6-3 for Reference

Figure 6-1

Architectural Resources APE and Architectural Resources

5.25.12



Project Site Boundary and Archaeological APE

1-mile Boundary

A Approximate Location of Previously Identified Precontact Archaeological Site (See Table 6-1 for Reference)

W Approximate Location of Previously Identified Historic-Period Archaeological Site (See Table 6-2 for Reference)

Figure 6-2

Previously Identified Archaeological Sites in Vicinity

became a major center of the shipping industry and at one point "a sea captain lived at every house" (WPA 1938: 283). In addition to shipping, the area was also known for fishing, ship building, and salt production (ibid). Old Saybrook experienced similar growth and also became a center for ship building in the 18th century (Morgan 1904). The town was famous for being the first home of Yale, established in Old Saybrook in 1701 and remained there until approximately 1716 (Sargent 1916). Old Saybrook's convenient location at the mouth of the Connecticut River at the half-way point between New York and Boston on the Boston Post Road, contributed to its success (ibid). The Saybrook Ferry played a key role in this route as well, and the areas surrounding the ferry terminals on both shores—known on the Saybrook side as "the Ferry District"—became prosperous communities (NR Nomination Form 1984). Ferry Road was constructed in the town of Old Lyme in 1729 (Ely and Plimpton 1991). While neighboring towns such as New London became increasingly industrialized and more involved in foreign trade (TAMS et al. 1998), Old Lyme and Old Saybrook were hindered because of a large sandbar situated at the mouth of the Connecticut River that prevented large ships from entering the river.

The Connecticut River Valley continued to thrive as the Revolution approached and although most towns situated along the Connecticut waterfront aided the British fleet as it passed through Long Island Sound, Old Saybrook residents "slept with one eye open and the other eye on the watch" for British supporters along the shore (Roberts 1906: 37). Several years before the war John MacCurdy, an Old Lyme resident, published manuscripts drafted by the Sons of Liberty even though he was legally committing treason (ibid). After the British-imposed tax on tea that resulted in the infamous Boston Tea Party, the town of Old Lyme had its own tea party, on a much smaller scale, when bags of tea carried through town by a peddler were burned by local residents (Roberts 1906). During the Revolutionary War, the British fleet took advantage of the strategic location of the Connecticut River as dozens of ships passed through it headed for northern states (WPA 1938). During the war, Old Saybrook also gained notoriety for being the place where the first submarine torpedo boat was constructed. Its inventor, patriot David Bushell, intended to "[blow] the entire British Navy on the American coast out of the water" and began building his craft near the site of the Old Saybrook Ferry (Roberts 1906: 37).

NINETEENTH AND EARLY TWENTIETH CENTURY DEVELOPMENT

The towns on the mouth of the Connecticut River, especially Old Lyme, became increasingly prominent as ship-building and shipping centers in the early 19th century. During the War of 1812, the British Navy was once again stationed in the Long Island Sound and near the mouth of the Connecticut River. Although the British fleet destroyed several shipyards in the area, Old Lyme escaped the war unharmed (Burt 1912).

In 1782, at the end of the Revolutionary War, a writer declared that the town of Old Saybrook had "fallen from its ancient grandeur" (McCormick 1877: 124). However, this assertion may have been due to the increasing population and development of the area. The increased population was caused, in part, by the linking of the Connecticut River towns with other parts of Connecticut via new methods of transportation. In 1807, the New London and Lyme Turnpike Company was founded, and maintained the road which began at the ferry terminal on the eastern shore of the Connecticut River in Old Lyme and continued east; there was no turnpike on the Old Saybrook side of the river (Wood 1919). By 1824, the Connecticut River Steamboat Company had opened, transporting commuters between New York and Calves Island, within the Connecticut River near the northern boundary of the town of Old Lyme.

Perhaps the most significant change to the transportation infrastructure of the Connecticut River Valley was the introduction of railroad lines in the mid-19th century, which rendered the old Boston Post Road and the Saybrook Ferry somewhat obsolete. The first railroad lines in the area were established in the early 1850s, although these lines experienced financial difficulties and suffered as a result of the poor construction of railroad tracks (NR Nomination Form 1984). In 1872, the railroad line, which crossed the Connecticut River, fell under the control of the New York, New Haven, and Hartford Railroad (NYNHHRR), a major line that connected Connecticut with New York City (ibid). The Connecticut Valley Railroad, also established in the mid-19th century, ran to the south of the NYNHHRR in the vicinity of Saybrook Point.

The railroad originally relied on ferryboats to transport both train cars and passengers over the Connecticut River. In Old Lyme, a wood trestle was constructed over Ben Marvin's Crick and the Lieutenant River to enable trains to travel to the ferry. Several attempts at creating a bridge to replace the inefficient ferries took place in the late-19th century. Construction began on a wood railroad bridge over the River in the 1860s, yet it was damaged before it could be completed. It was reconstructed in 1870 by the Shore Line Railroad, a predecessor of the NYNHHRR (Ely and Plimpton 1991). A replacement steel bridge was constructed in 1889. However, the single track of the 1889 bridge was insufficient for the railroad's new double-track system and quickly became outdated (HPI 2006 and Clouette 2004).

The American Bridge Company constructed the existing steel railroad bridge to the south of the former bridge beginning in 1904. The bridge became operational in 1907, revolutionizing transportation in the region and further promoting economic and population growth in the area. To facilitate construction of the new bridge, a portion of Ben Marvin's Crick, a small estuary associated with the Lieutenant River, and the wetlands that surrounded it were filled in. A new channel south of the railroad, known as the Dugway, was then cut between the southern portion of Ben Marvin's Crick and the Lieutenant River (Ely and Plimpton 1991). It is said that pilings from the former wood trestle that carried trains to the ferry slip in the late 19th century are visible a short distance north of the Connecticut River Railroad Bridge (ibid).

To the north of the railroad bridge, a highway bridge (known as the Saybrook Bridge or the Great Bridge) was constructed in 1911 to allow motorcar and trolley traffic to cross the Connecticut River, where previously there was only a ferry connection. The bridge included a two-arm Scherzer drawbridge over the channel, allowing 200-foot wide clearance for the passage of schooners and other vessels (Hubbard 1993). By the mid-20th century, the highway bridge was found incapable of carrying the increasing volume of automobile traffic, and traffic bottlenecked during the frequent openings of the moveable span for boat traffic. Between 1947 and 1948, a new steel-girder twelve-span highway bridge was constructed a short distance south of the Saybrook Bridge, which it replaced. The new bridge carried four lanes of traffic over the Connecticut River and was high enough that no moveable spans were necessary. It was named the Baldwin Bridge after Senator Raymond E. Baldwin. Within a few decades, this bridge had also become obsolete, unable to support the high volumes of traffic through the corridor. In the early 1990s, ConnDOT replaced the former bridge with a new precast concrete bridge, which was also named the Baldwin Bridge. The new Baldwin Bridge was located a short distance south of the 1948 bridge.

In 1910, an electric trolley system known as the Shore Line Electric Railway opened, with service between New Haven and New London and between Old Saybrook and Middletown, running along the western shore of the Connecticut River. The trip between New Haven and New London was two hours in duration, and stops were made in both Old Saybrook and Old

Lyme. The trolley crossed the Connecticut River on the Great Bridge when the latter was completed in 1911. Despite the trolley system's popularity, the line was shut down only nine years after its inception due to a major collision in 1917 and a workers' strike in 1919 ("Connecticut Shore Line Electric Railway," December 2007). The company reorganized as the New Haven & Shore Line Railway in 1923, but it resumed its service through Old Saybrook with buses rather than trolleys.

With the increasing population came the transformation of the waterfront areas in both Old Saybrook and Old Lyme into summer resort communities (Sargent 1916). One of the first of these developments was located on the former Lynde family farm the small peninsula once known as Lynde's Point (now referred to as Lighthouse Point), after the lighthouse that was built there in 1866 (WPA 1938). As the 19th century drew to a close, a large population of artists moved to Old Lyme after Henry Ranger established an artist colony there in 1899 (Sargent 1916).

C. EXISTING CONDITIONS

ARCHAEOLOGICAL RESOURCES

PREVIOUSLY IDENTIFIED ARCHAEOLOGICAL SITES

Previously Identified Prehistoric Sites

A review of the files at the CTSHPO and the CTSM indicates a very high density of previously identified precontact sites in the immediate vicinity of the APE. There are 22 Native American archaeological sites within a one-mile radius of the project site, 6 in Old Saybrook and 16 in Old Lyme. Extensive local surveys in the 1970s and 1980s identified many of these sites. The sites range in date from the Archaic to the Contact period, and the vast majority were found in or near wetlands adjacent to the Connecticut River (see Table 6-1).

<u>Old Saybrook</u>

In Old Saybrook, sites within one mile of the project site include camp and village sites from the Archaic and Woodland period which, though generally characterized by substantial disturbance, yielded stone tools, lithics, pottery, and other materials. All but one of the Old Saybrook sites, the Obed Heights Rock Shelter (Site Number 106-018, "E"), were situated in or near marshes or waterfront areas along Connecticut River coves and tributaries. The North Cove Site ("D," Site Number 106-017) and the Ferry Road Site ("F," Site Number 106-020) contained large numbers of artifacts encountered during dredging operations in the marshes along the west bank of the Connecticut River. The Jones Site ("C," Site Number 106-013), a large camp site, was located in close proximity to the North Cove Site on a partially sheltered portion of the Connecticut River. The Ragged Rock/Chimney Point Marina Site ("A," Site Number 106-110), an extensive village site, was located in a salt marsh on a tributary of the Connecticut River, roughly 500 feet north of the project site. The files reviewed by Amtrak indicate that materials recovered from the site reflect the range of activities conducted in Native American settlements along the Connecticut coast, including hunting and fishing.

Table 6-1
Previously Identified Precontact Archaeological Sites Within One Mile of the Project Site

Key to Fig 6-2	Site Name	Site #	Approximate Distance from Project Site	Time Period	Site Type
Old Saybrook					
A	Ragged Rock Marina/ Chimney Point Marina	106-009	500 feet	Archaic (2255 +/-85BP)	Large village site on coast. Variety of material recovered; substantial disturbance.
B	Ferry Point Facility	106-110	0.25 miles	Archaic/Woodland	Camp site; largely disturbed by development.
C	Jones Site	106-013	1 mile	Archaic/Woodland	Coastal camp site
D	North Cove Site	106-017	1 mile	Archaic/Woodland	Coastal camp site containing material dredged from North Cove, representing a location now inundated
E	Obed Heights Rock Shelter	106-018	0.5 miles	Middle Woodland	Rock Shelter containing lithic and pottery artifacts
F	Ferry Road Site	106-020	1,000 feet	Precontact	Artifacts found in tidal marsh after dredging
Old Lyme					
G	Broeder Point/Duck River Site	105-001 (has been confused with105-024) (6-NL-24)	600 feet	Late Archaic/ Early, Middle, and Late Woodland/Contact	Camp site with long temporal duration and continuity through periods. Located on wooded peninsula.
H	Murdock Site	105-006	0.65 miles	Late Archaic	Camp site, possibly associated with Griffin Site (105-041) across creek
I	Lieutenant River Site	105-016 (6-NL-6027)	0.25 miles	Precontact	Camp site/Village site in tidal marsh
J	156 Site	105-020 (6-NL-54)	0.25 miles	Woodland	Camp site. Highly disturbed half-acre site near railroad tracks, Ducks River, and Lieutenant River
K	Johnnycake Hill #1	105-022 (6-NL-44)	1,000 feet	Precontact	Disturbed remains of a hunting and/or habitation camp site.
L	Bliss Site	105-023	0.25 miles	Ca. 4688 BP	Cremation burial complex. Evidence of five individuals cremated at one point in time, possible ritual killing. Grave offerings; exotic lithics
M	Natcon Site	105-024 (has been confused with 105-001)	500 feet	Middle Woodland	Seasonal camp in marsh near Lieutenant River and railroad tracks. Lithics and faunal remains
N	Griffin Site	105-041 (6-NL-79)	0.55 miles	Terminal Archaic (3200 BP)	Cemetery/ cremation site/ mortuary complex. Cremains, bones, and lithics present
O	Chadwick Site	105-042	0.90 miles	Terminal Archaic (4280 BP)	Subsistence and settlement site
P	Great Island II	105-043	0.65 miles	Precontact	Unknown site type; aboriginal pottery
Q	Railroad Access Site	105-044	500 feet	Precontact	Unknown site type; lithics and soapstone bowl fragments
R	Great Island I	105-045	0.80 miles	Early Woodland	Unknown site type; pottery and lithics
S	MacDonald Site	105-048	0.70 miles	Precontact	Subsistence and settlement site
T	Old Lyme School Site	105-049	0.90 miles	Late Archaic	Unknown site type; lithics
U	Salisbury Place	105-058	0.30 miles	Late Archaic	Cremation burial complex
V	Ferry Tavern	105-059	700 feet	Late Archaic	Camp site

Note: See Figure 6-2 for reference.
Sources: Files of the Connecticut State Museum

Old Lyme

The large number of precontact sites within one mile of the APE in Old Lyme is made up almost entirely of camp and village sites in or near wetlands, including the Connecticut River and associated marshes and tributaries such as the Lieutenant River and Duck River. The Broeder Point/Duck River Site ("G," Site Number 105-001), located on a wooded peninsula, contained artifact assemblages ranging in date from the Terminal Archaic to the Contact Period, indicating long temporal duration and continuity of settlement. Camp sites showing evidence of hunting and tool maintenance, containing lithic debitage; and short-duration subsistence and settlement sites, containing pottery, domestic tools, and shell middens, are also located in the area. Several sites were located in close proximity to the railroad, including the Railroad Access Site ("Q," Site Number 105-044) and the Johnnycake Hill #1 Site ("K," Site Number 105-022). The CTSHPO and CTSM files reviewed by Amtrak indicate a high degree of archeological disturbance.

In addition to the camp sites and both short-term and long-term settlement sites found in the area, three burial sites have also been documented within one mile of the project site in Old Lyme. The Bliss Site ("L," Site Number 105-023) was a cremation burial complex dating to 4688 years BP, believed to be associated with a single-episode ritual killing. The site contained the cremated remains of five individuals and grave offerings such as sheet mica, exotic lithic materials, and hickory nuts. The nearby Griffin Site ("N," Site Number 105-041), was a Terminal Archaic-period mortuary complex containing human remains, skull and bone fragments, and stone tools. The Salisbury Place site ("U," Site Number 105-058), first surveyed in 1916, included cremated burials and other materials.

Previously Identified Historic Period Sites

Three previously identified historic period archaeological sites are located within a mile of the project site, including two marine railway industrial archaeological sites in Old Saybrook and one historic tavern site in Old Lyme (see Table 6-2).

Table 6-2
Previously Identified Historic-Period Archaeological Sites in the Vicinity of the Project Site

Key to Fig 6-2	Site Name	Site Number	Approximate Distance from APE	Time Period	Site Type	Additional Reference
Old Saybrook						
W	Brockway Boatworks Marine Railway Site	106-033	0.90 miles	1931-1996	Marine railway industrial archaeological site	Raber (Nov. 30, 2006)
X	Presson Yard Marine Railway Site	106-034	0.65 miles	1934-2005	Marine railway remains, demolished	Raber (Nov. 30, 2006)
Old Lyme						
Y	Ferry Tavern Site	105-067	1,000 feet	1835-1971	Inn site. Standing ruins, surface finds, cellar hole, and historic artifacts	McBride (1985)

Note: See Figure 6-2 for reference.
Sources: Files of the Connecticut State Museum.

Both of the marine railways were surveyed by others in November 2006. The Brockway Boatworks Marine Railway Site (Site Number 106-033, identified as Site W on Table 6-2 and Figure 6-2), is located roughly 0.9 miles north of the project site on the Connecticut River shore in Old Saybrook.

The 20th century industrial archaeological site consists of the remains of a marine railway which was part of a small shipyard, such as hand-powered hoisting mechanisms to move boats. The Presson Yard Marine Railway Site (Site Number 106-034, identified as Site X on Table 6-2 and Figure 6-2), located roughly 0.65 miles north of the study area, also included remains, now demolished, associated with a marine railyard. Both sites were considered significant as components of a once important vessel repair and marina operations along the Atlantic coast.

The Ferry Tavern Site, located on Ferry Road in Old Lyme, consisted of standing ruins, a cellar hole, and surface finds including historic period ceramics, metal, glass, brick, and shell fragments. The site was associated with a former inn, which stood on the site from roughly 1835 to 1971, when it was destroyed by fire. The site was surveyed in 1985.

ARCHAEOLOGICAL POTENTIAL OF APE

Based on the results of background research, archaeological resources dating to both the prehistoric and historic periods are likely located within the APE. The prehistoric sensitivity is based primarily on the large number of precontact archaeological sites that have been previously identified in the vicinity of the APE. Based on regional precedents, the project site's geography and topography, at the mouth of the Connecticut River, near Long Island Sound, and inclusive of marshes, wetlands, and creeks, makes it a prime location for precontact settlement, foraging, and camping.

The project team's review of historic maps has indicated that no dwellings appear to have been located within or immediately adjacent to the archaeological APE in the historic period. A comparison of mid-19th century atlases with current conditions, however, indicates that several former railroad structures appear to have overlapped with the APE. In Old Saybrook, an 1874 Beers map shows that an "Engine House," a "Depot," an unidentified round building, and several short rail spurs were located in the northern portion of the APE (see Figure 6-3). These structures were in locations currently occupied by the current railroad embankment and by the navigable channel leading to the Ragged Rock Marina. In Old Lyme, the 1868 Beers map shows an "Engine House," "Lyme Station," and a short rail spur located in the western portion of the APE in Old Lyme (see Figure 6-4). As described above, pilings associated with the former railroad trestle over the marshes in Old Lyme are still visible in some locations (Ely and Plimpton 1991). However, since the exact location of these pilings is not known, they and any other remnants of the former trestle that may exist are not considered archaeologically sensitive, due to the highly limited information their investigation could provide.

Construction of the existing Connecticut River Bridge and removal of the earlier rail alignment during the early 20th century involved extensive site preparation, grading, filling, and excavation. These activities likely disturbed the first few feet of soil where the existing bridge and its approaches are now located. It is also likely that staging activities and temporary roads were present adjacent to the rail line during the construction process, which could have disturbed the ground surface beyond the edge of the embankment, although evidence of such disturbance is not visible in these areas today.

Furthermore, excavation associated with construction of a channel located immediately north of the current alignment in Old Saybrook likely destroyed any resources once present in that area. Based on historic maps and aerial photographs, the narrow east-west-oriented channel was constructed at some point between 1893 and 1934. On a 1934 aerial map, this channel is shown running from the Connecticut River (immediately north of the project site) southwest, to join with the northern tip of the western finger of Ragged Rock Creek. The eastern portion of the

5.29.12

Figure 6-3
1874 Old Saybrook Map

5.29.12

General Location of Project Site

0 500 1000 FEET
SCALE

Figure 6-4
1868 Old Lyme Map

channel was widened later in the 20th century, and now connects to a large inland basin currently functioning as part of Ragged Rock Marina.

While several railroad structures and features existed in the APE in Old Lyme and Old Saybrook in the mid to late 19th century, as described above, any remains of these buildings were likely destroyed by the construction of the channel in Old Saybrook and by the construction of the current railroad embankments and bridge in the early 20th century. Therefore, the APE has little or no potential to contain significant historic-period archaeological resources.

There is a high probability that pre-contact period sites were once present within the APE; however, it is very unlikely that any such resources remain intact under the current bridge piers and embankments. Since the extent of disturbances associated with rail construction within the Old Lyme portion of the APE but beyond the embankments is not known, Amtrak considers those areas to have moderate potential for prehistoric archaeological resources. Should Amtrak determine that the area adjacent to the embankments has been disturbed, it will then consider these areas to have low to no potential for prehistoric archaeological resources.

ARCHITECTURAL RESOURCES

There are three previously identified architectural resources in the Connecticut River Bridge APE, as described below and in Table 6-3. One of these, the Connecticut River Bridge, is located within the project site.

Table 6-3
Architectural Resources within APE

Ref No	Resource Name	Location	Municipality in Study Area	NR-Listed	SR-Listed	NR-Eligible	SR-Eligible	Potential S/NR-eligible
KNOWN RESOURCES								
1	Moveable RR Bridges on the NE Corridor in CT	Various (Includes Amtrak Connecticut River Bridge)	Various (Includes Old Saybrook and Old Lyme)		X	X		
2	John Whittlesey Jr. House	40 Ferry Road	Old Saybrook	X	X			
3	Old Lyme Historic District*	Lyme Street from Rose Lane to McCurdy Road	Old Lyme	X	X			
4	Enoch Noyes House	317 Ferry Road	Old Lyme		X			
POTENTIAL RESOURCES								
Study Area								
A	61 Ferry Road**	61 Ferry Road	Old Saybrook					X
B	94 Ferry Road	94 Ferry Road	Old Saybrook					X
C	101 Ferry Road	101 Ferry Road	Old Saybrook					X
D	9 Clark Street	9 Clark Street	Old Saybrook					X
E	2-20 Clark Street	2-20 Clark Street	Old Saybrook					X

Notes: See Figure 6-1 for reference.
* Also a locally designated Town of Old Lyme historic district
**Based on preliminary comments given by CTSHPO staff member, Dan Forrest, this structure likely does not qualify as S/NR-eligible

KNOWN RESOURCES

Connecticut River Railroad Bridge, (NR-eligible; SR-listed) (referred to in this document as the Connecticut River Bridge) as part of the **Moveable Railroad Bridges on the Northeast Corridor in Connecticut Thematic Resource**. Connecticut's moveable railroad bridges date from the late 19th through the early 20th century, and span such rivers as the Pequonnock, Mianus, Norwalk, Housatonic, Saugatuck, Niantic, and Thames. The Connecticut River Bridge, which carries the Northeast Corridor over the Connecticut River between Old Saybrook and Old Lyme, is also part of this thematic grouping (see Figures 6-1 and 6-5, View 1). Constructed between 1904 and 1907 by the American Bridge Company, the Connecticut River Bridge is the longest railroad bridge in the state, with ten spans totaling over 1,500 feet long. The approach spans are constructed with Baltimore through-trusses (a variant on the Pratt-type truss), while the Scherzer rolling-lift bascule is a Warren through-truss. The first railroad was constructed in the area in the 1850s; trains were initially carried across the Connecticut River on a ferry, rather than a bridge. In 1870, the Shore Line Railway completed the first rail drawbridge across the river in the area. Two years later, the railroad fell under the control of the larger New York & New Haven Railroad. The wood bridge was replaced with an iron structure in 1889. This too became quickly outdated as the railroad developed a new double-track system, however, and the present bridge was commissioned in 1904. The thematic resource was listed on the SR and determined eligible for the NR in 1986.

John Whittlesey, Jr. House (S/NR-Listed) Located at 40 Ferry Road in Old Saybrook (roughly a ¼-mile from the project site), the John Whittlesey Jr. House is a two-and-a-half-story timber-framed vernacular dwelling (see Figures 6-1 and 6-5, View 2). The main (front) portion of the building is an example of the Georgian style, with a central stone chimney and symmetrical fenestration. The house is sided in wood clapboard, the roof is clad in wood shingles, and the windows contain twelve-over-twelve and twelve-over-eight-light double-hung sash. While the main section of the house dates to ca. 1750, the rear ell, built in 1693, constituted the original house. A shed-roofed side addition is of more recent construction. John Whittlesey Jr., who documented the construction of the 1693 portion of the house in his diaries, was a shoemaker and a farmer. He also participated in operating the ferry between Saybrook and Lyme with his father, uncle, and brother-in-law William Dudley of Guilford. The house was occupied by descendents of John Whittlesey, Jr. until 1919. In 1925, a wealthy insurance executive, William B. Goodwin, purchased the property. Goodwin, an amateur archaeologist and history enthusiast, intended to move the house to Saybrook Point to include it in a reconstruction of the Revolutionary War-period Saybrook Fort built there during the Revolutionary War. His plans were never carried out. The house remained on its original site, and was listed on the S/NR in 1984.

Old Lyme Historic District (S/NR-listed; Local Historic District) A small portion of the Old Lyme Historic District falls within the eastern section of the APE, over 600 feet north of the project site. The historic district includes properties on both sides of Lyme Street from Rose Lane on the north to McCurdy Road on the south. It contains a mix of architectural styles ranging from 18th century vernacular dwellings to the Town Hall and an early 20th century reconstruction of a Greek Revival-style church. Within the APE, the structure at 1 McCurdy Road, also known as the Marvin-Griffin House, is a Federal-style dwelling (see Figures 6-1 and 6-6, View 3). The structure was commissioned by the three sons of Benjamin Marvin for their father and was constructed ca. 1820 by an Albany builder (Ladies Library Association 1968:10). A porch with Ionic columns was added slightly later. The building now serves as the Parish House for the adjacent Christ the King Church. The structure had a gable roof with brick chimneys, windows containing six-over-six-light double-hung sash, a half-round gable window, and a Colonial Revival-style porch supported by Ionic

Looking northwest from Ferry Landing Park in Old Lyme, a view of the Connecticut River Bridge, which carries Amtrak's Northeast Corridor across the Connecticut River. The bridge is listed on the State Register of Historic Places (SR) and has been determined eligible for the National Register of Historic Places (NR) as part of the Moveable Railroad Bridges on the Northeast Corridor in Connecticut Thematic Resource. **1**

The S/NR-listed John Whittlesey Jr. House at 40 Ferry Road in Old Saybrook. This historic resource is located on the northwestern edge of the study area, roughly one quarter of a mile from the project site. **2**

Figure 6-5

Known Historic Resources

The Federal-style Marvin-Griffin House at 1 McCurdy Road in Old Lyme is located within the S/NR-eligible Old Lyme Historic District. The property is the only parcel within the historic district that is located within the project study area; it is located in the northeastern portion of the study area.

3

Figure 6-6

Known Historic Resources

columns. The Old Lyme Historic District became a Town of Old Lyme local historic district in 1971 in accordance with the Town Enabling Ordinance of that year and the provisions of Section 7-147 of the Connecticut General Statutes, as amended.

The Enoch Noyes House ("House on the Hill"), 317 Ferry Road (Old Lyme) (SR-listed, per personal communication with Dan Forrest, CTSHPO). This two-story five-bay house is prominently situated on a hill on the north side of Ferry Road, a short distance before its terminus at the historic location of the ferry to Old Saybrook, a ¼-mile north of the project site (see Figures 6-1 and 6-7). The ca. 1820 Federal-style house is clad in wood clapboard and has brick side chimneys. It is symmetrically fenestrated, with a central doorway flanked by windows containing twelve-over-twelve-light double-hung sash. A tripartite flat-headed Palladian window occupies the central bay of the upper story. The doorway itself is flanked by three-quarter sidelights defined by striated and attenuated pilasters and surmounted by a narrow frieze and a large scalloped fanlight. The house has a side-gable roof and a raking cornice with mutules. The tympana are faced in flushboard and contain semi-circular windows. A widow's walk and a balustered parapet surmount the structure's peaked roof. Based on historic photographs and oral history, these features, as well as the fanlight over the front door, represent late 20th century alterations. The fanlight was reportedly salvaged from a house on Nantucket of similar vintage. Historic photographs show that a small flat-roofed entry porch, no longer extant, was in place until at least the 1960s. A small single-story addition on the west façade is believed to be an early 20th century addition. The parcel contains lawns, a number of stone walls, and several small relatively recently constructed outbuildings. A brownstone mile marker, known locally as a Benjamin Franklin mile marker, is located along Ferry Road on the eastern portion of the property (Ladies Library Association of Old Lyme 1968: 26). Inscribed in the marker are the words "16 M/ N.L," denoting 16 miles to New London.

This house was built ca. 1820 for Enoch Noyes by his father, Captain Joseph Noyes, who purchased the land from his relative, Captain Timothy Mather. The high promontory of coastal land was known by the name "Mathers Neck." An early gambrel-roofed Mather house stood on the land until the early 20th century, and "there was formerly on the place a fort made of earthworks thrown up at the time the British went up the river and burned the town of Essex" (CT Society of Colonial Dames of America 1923: 139). Noyes was a sergeant in the War of 1812. Among Enoch Noyes' children was Ellen Noyes Chadwick (1824-1900) a painter and a member of the Old Lyme Art Colony. The Colony, which has been called "one of the largest and most significant art colonies in America," was a group of Tonalist and Impressionist artists that gathered in Old Lyme in the late 19th century (Anderson, accessed April 1, 2008). Among Ellen Noyes Chadwick's paintings is *View of Ferry Point* (ca. 1860) a picturesque view of the Connecticut River as seen from the vicinity of the Enoch Noyes House. Following Enoch Noyes' death, the house was inherited by his son, Charles Rockwell Noyes, who subsequently left the property to his nephew (Ellen Noyes Chadwick's son), Charles Noyes Chadwick. As Commissioner of the New York Board of Water Supply, Chadwick spearheaded and oversaw the plan to construct the Catskill Aqueduct. He and his wife also cofounded the Froebel Academy in Brooklyn and were active in reforming public education in New York.

POTENTIAL RESOURCES

Five resources within the study area appear to meet the criteria for S/NR eligibility (see Table 6-3 and Figure 6-1).

61 Ferry Road (Old Saybrook) 61 Ferry Road, located just less than a ¼-mile northwest of the project site, is a one-and-a-half-story wood-frame dwelling with a front-gable roof (see Figures 6-1 and 6-8, View 6). It is clad in wood shingles and has a stone foundation. The house displays several Gothic Revival-style elements, while its proportions are more evocative of the Greek Revival style. It may either represent a transitional blend of these two styles, or a Greek Revival-style house that was later updated. The gable is ornamented with decorative quatrefoil vergeboard and a finial. A frieze band window is visible under the eaves on the side (west) façade. The front (south) façade of the house has a central doorway with a six-panel door with round moldings, which is flanked by a window on each side containing six-over-six-light double-hung sash. On the upper story is a central paired window, each element of which contains four-over-four-light double-hung sash. A small single-story ell addition is appended to the west façade of the house. This addition has a brick end chimney, diamond-pane casement-sash windows, and appears to have a concrete foundation.

The house is shown on the 1859 Walling map of the area as belonging to Capt. J. D. Billiard. Joseph Billiard is listed on the 1850 federal census as a New York State-born fisherman living in Saybrook with his wife, Fanny, two children, and an Irishwoman, likely a domestic. The 1874 Beers map depicts the house as belonging to C. Richardson.

94 Ferry Road (Old Saybrook) The house at 94 Ferry Road, roughly 500 feet north of the project site, is a three-bay front-gable dwelling clad in wood clapboard, with a stone foundation (see Figures 6-1 and 6-8, View 7). Designed in the late Federal style, the house has a raking cornice and a door casing composed of pilasters surmounted by an entablature with a simple frieze. A rectangular gable window bears an ornamented keystone and corner medallions and contains geometrical tracery. Windows of this sort are relatively commonly found in early 19th century New England dwellings and were promoted in early builders' guides such as those of Asher Benjamin (1773-1845). While the gable window of 94 Ferry Road is in excellent condition, the rest of the windows on the façade have lost their original sash and now contain one-over-one-light double-hung sash. Based on its architectural style, the house was probably constructed during the first quarter of the 19th century.

While documentary sources shed little light on the early history of the house, the 1859 Walling map and 1874 Beers map of Saybrook show that the structure was owned by Samuel Miner (a.k.a. Minor) of Connecticut. The 1850 and 1860 censuses list Samuel W. Miner as living in Saybrook with his wife Phebe, and several children. The 1870 census also lists Miner and his wife in the same location, then living alone.

101 Ferry Road (Old Saybrook) Located roughly 700 feet north of the project site, this Federal-style, wood-frame, wood clapboard-clad dwelling has a two-story three-bay façade (see Figures 6-1 and 6-9, View 8). It is distinguished by a front-gable roof with a denticulated raking cornice forming a pediment. Within the pediment is a variant on a Palladian window, composed of a keystoned semi-elliptical window surmounting a tripartite window in which each section is separated by a pilaster. A six-light fixed sash occupies the central section, the only apparent retrofitting within the Federal-style feature. The façade is flanked with pilasters, which are echoed on the casing of the door, which occupies the easternmost bay. The doorway is occupied by an eight-panel door and surmounted by a toplight with leaded tracery and an entablature with a simple wide frieze. The windows throughout the house contain twelve-over-twelve-light double-hung sash. The windows are flanked by shutters, which appear to be modern retrofits. The house has a stone foundation. Stylistically, the house appears to have been constructed ca. 1800.

The front (south) façade of the Enoch Noyes House (the "House on the Hill"), located at 317 Ferry Road in Old Lyme, roughly a quarter of a mile north of the project site. The ca. 1820 Federal-style house is clad in wood clapboard and has brick side chimneys **4**

Looking west on Ferry Road in Old Lyme, a view of the east (side) façade of the Enoch Noyes House, also showing the extensive property that surrounds it. This property is edged in stone walls; a "Benjamin Franklin" brownstone mile marker is located on the southeastern edge of the property, a short distance northeast of the study area **5**

Figure 6-7

Known Historic Resources

On the north side of Ferry Road in Old Saybrook (just less than a quarter mile northwest of the project site) the house at 61 Ferry Road displays elements of the Gothic Revival style. The front-gable wood-frame structure is clad in wood shingles. Its gable is ornamented with decorative quatrefoil vergeboard and a drop finial. **6**

The house at 94 Ferry Road in Old Saybrook, roughly 500 feet north of the project site, is a late Federal-style house with a raking cornice, classical door frame, and a decorative gable window. It is clad in wood clapboard. Most of the windows have been replaced with modern sash. **7**

Figure 6-8
Potential Historic Resources

The Federal-style house at 101 Ferry Road in Old Saybrook, roughly 700 feet north of the project site, is a front-gable structure with a denticulated raking cornice and a Palladian window in the gable tympanum. It is clad in wood clapboard, has windows containing twelve-over-twelve-light double-hung sash, and retains its original pilasters and door surround. **8**

A view of the east façade of the large masonry building at 2-20 Clark Street, located at the intersection of Clark Street and Ferry Road on the western shore of the Connecticut River in Old Saybrook. This photograph is taken from Ferry Landing Park in Old Lyme, looking west across the river. The structure was built ca. 1910 as a power plant for the Shore Line Electric Railway, an 'interurban' trolly system. It is located roughly 400 feet north of the project site. **9**

Figure 6-9

Potential Historic Resources

While no early history of 101 Ferry Road has been found, maps and censuses indicate that the structure was owned by members of the Tryon family in the mid and late 19th century. An 1859 Walling map indicates that the house was owned by J. Tryon, likely Jedidiah Tryon (1806-1859). According to census and other records, Tryon was a "mariner." He married Wealthy Ann Williams in 1827, and by 1850, they had six children, including Charles W., a fisherman, and Henry K., a ferryman and merchant who ran the H.K. Tryon store located across Ferry Road from the house. After Jedidiah Tryon died in 1859, Wealthy Ann continued to occupy the house with her children until her death in 1874.

2-20 Clark Street (Old Saybrook) Located on the western shore of the Connecticut River at the intersection of Ferry Road and Clark Street in Old Saybrook, roughly 400 feet north of the project site, 2-20 Clark Street, now occupied by Between the Bridges Marina, is a large Renaissance Revival-style industrial building (see Figures 6-1; 6-9, View 9; and 6-10). It is a large flat-roofed rectangular-plan concrete building, with a parged exterior. The building is banked, standing two-and-a-half stories tall on its front (east) façade, along the river; and one-and-a-half stories tall on its rear façade, along Clark Street. A smokestack rises from the center of the building's roof; it appears to be constructed of concrete, and is painted with red and white stripes. The building has a low parapet, which wraps around the front and side facades, terminating at the corners of the rear façade. Beneath the parapet, wide eaves supported by large modillion brackets, project over a tightly spaced row of six-light clerestory windows. The five bays of the building are delineated by simple pilasters and are occupied on the side facades by large twenty-light windows with simple lintels. The windows on the front façade have all been altered; some contain multi-light sash while others have been partially or entirely sealed. On the rear (west) façade, a narrow horizontal multi-light window occupies the upper portion of each bay; only the center window has been sealed. A single-story shed-roofed addition is appended to the rear façade. A small flat-roofed concrete structure has been added to the south façade, which connects to a large Quonset hut-type building clad in corrugated metal. This building in turn connects to a large low utilitarian building with a shallowly pitched metal roof.

This building was constructed ca. 1910 as a power house for the Shore Line Electric Railway, an electric trolley system that both ran east-west between New Haven and New London (through Old Saybrook) and north-south along the western shore of the Connecticut River, between Old Saybrook and Middletown (Diane Hoyt, Old Saybrook Historical Society, pers.comm.). At its height, the Shore Line was an important competitor of the New Haven Railroad, and operated nearly 230 miles of track, but it had a short lifespan (Cummings 2007). It opened in 1910 and closed in 1919, after a devastating collision in 1917 and a workers' strike in 1919 ruined the company financially ("Connecticut Shore Line Electric Railway," December 2007). The company reorganized as the New Haven & Shore Line Railway in 1923, and ran trolleys between New Haven and Branford. The sections of the route from Guildford to New London (through Old Saybrook), and between Old Saybrook and Middletown, however, was replaced by bus service; and in 1929, the company terminated trolley service completely and ran only buses. The Shore Line Trolley Museum in East Haven, Connecticut, interprets the history of the line and runs vintage trolley cars; it is the oldest trolley museum in the country.

The original 1910 Shore Line system included two car barns, one in Guilford and one in Old Saybrook (located west of the structure, near downtown Old Saybrook). The structure at 2-20 Clark Street served as a power house, or electric generator, for the trolley. With its location immediately adjacent to the ferry to Old Lyme, it was likely also the location of a station stop, where passengers crossing the Connecticut River embarked and disembarked on the ferry. The structure was constructed ca. 1910, and likely went out of use as a power house in 1919. A 1934 aerial map shows 2-20 Clark Street (including smokestack) in its present location. The additions on the west and south sides of the structure were not standing at that time.

Architecturally, the building is an unusual example of the Renaissance Revival style applied to an industrial building. Although the historic integrity of the structure is compromised somewhat due to the changes in fenestration and the multiple additions, it retains significance for its association with the Shore Line Electric Railway.

9 Clark Street (Old Saybrook) This Cape Cod-style three-bay “half house” faces east on Clark Street just south of Ferry Road, roughly 400 feet north of the project site (see Figures 6-1 and 6-11). The single-story structure has a stone foundation and is sided in wood clapboard. Its roof is clad in wood shingles and is pierced by a roughly central brick chimney, accessed by stone steps. The structure has a doorway containing a six-paneled door and three windows on the front façade containing six-over-nine-light double-hung sash. Windows on the side elevations contain six-over-six-light double-hung sash. The window openings throughout the house have simple wood ship-lap frames. The dwelling has a molded cornice. A small one-bay single-story addition on the south façade is also clad in wood clapboard and has six-over-nine-light double-hung sash windows and a stone foundation. Based on stylistic features, the dwelling most likely dates to the late 18th or early 19th century. A small brick side chimney on the north façade was likely a mid-20th century addition.

The house at 9 Clark Street is depicted on an 1859 Walling map as the J.J. Tryon House. The house very likely belonged to Jeremiah J. Tryon Sr. The latter was born in Saybrook in 1804, and is listed in the 1850 federal census as living there with his wife, Lucinda, seven children, and an Irish woman, Mary Higgins (presumably a boarder or a domestic servant). Tryon is listed in the census as being employed in “Fisheries.” In the 1860 census, Tryon is listed as a farmer, still living in Saybrook with his wife and five remaining children (his eldest son, Jeremiah, had moved to his own house further south on Ferry Road). Tryon died before 1870, and in the census of this year, Lucinda Tryon is listed as living in the household of Orison B. Champion, possibly at 9 Clark Street. An 1874 Beers map shows the property as belonging to Mrs. J. Tryon, presumably Lucinda.

D. NO ACTION ALTERNATIVE

As described in Chapter 2, “Project Alternatives,” under the No Action Alternative, the existing Connecticut River Bridge will remain in service, with continued maintenance and minimal repairs. The planned transportation projects and development projects previously mentioned in this EA will not be expected to change architectural or archaeological resources in the study area absent the proposed project.

It is possible that in a future without the proposed project, one or more of the potential resources within the study area may be determined eligible for listing on the State or National Registers or designated as locally designated historic properties.

Architectural resources that are listed on the National Register or that have been found eligible for listing are given a measure of protection from the effects of federally sponsored or assisted projects under Section 106 of the NHPA. Although the Act does not mandate preservation, federal agencies must attempt to avoid adverse impacts on such resources through a notice, review, and construction process. The Connecticut Environmental Policy Act (CEPA) and other regulations provide similar protections against impacts resulting from state-sponsored or state-assisted projects to properties listed on the State Register. Private property owners using private

The west and south facades of the building at 2-20 Clark Street, viewed from the southern portion of Clark Street in Old Saybrook. The parged masonry structure has decorative eaves brackets, large metal windows and simple pilasters. A single-story addition has been appended to the west façade (left); and a large corrugated metal structure has been connected to the south façade (right). **10**

The north and west facades of the building at 2-20 Clark Street. Note the single-story addition appended to the west façade. While most of the clerestory windows remain intact, many of the larger windows along the facades have been truncated or sealed. **11**

Figure 6-10

Potential Historic Resources

A view of the front (east) and north facades of the single-story Cape Cod-style house at 9 Clark Street in Old Saybrook; located roughly 400 feet north of the project site. The small ca. 1800 clapboard-clad "half house" has a stone foundation, a central brick chimney, and six-panel wood door. Its roof is clad in wood shingles and the windows contain six-over-six-light double-hung sash. **12**

The south and front façades of 9 Clark Street in Old Saybrook, showing the small single-story addition on the south façade. **13**

Figure 6-11
Potential Historic Resources

funds can, however, alter or demolish their properties without such a review process. In the Town of Old Lyme, the Old Lyme Historic District Council holds the regulatory authority in accordance with Town Ordinances and Connecticut General Statutes. The Historic District Council must issue a Certificate of Appropriateness before any structure in the Old Lyme Historic District is erected, altered, removed, or demolished. The Town of Old Saybrook's Historic District Commission retains similar authority in reviewing construction within Old Saybrook's North Cove Historic District.

E. PROBABLE IMPACTS OF THE PREFERRED ALTERNATIVE

ARCHAEOLOGICAL RESOURCES

As described above, an adverse archaeological effect is defined as any disturbance or damage to an archaeological resource. Such an effect could occur if construction were to disturb the soil at the same depth where that resource was present. Construction of the Ragged Rock Marina channel in the early 20th century likely destroyed any resources that may have once been located in the Old Saybrook portion of the APE. Since the extent of previous disturbances associated with rail construction within the Old Lyme portion of the APE but beyond the embankments is not known, Amtrak considers those areas to have moderate potential for prehistoric archaeological resources. Should Amtrak determine that the area adjacent to the embankments has been previously disturbed, Amtrak will then consider these areas to have low to no potential for prehistoric archaeological resources.

The Preferred Alternative involves modification of portions of the Northeast Corridor within the archaeological APE. Embankment extensions required for the Preferred Alternative will impact ground surfaces to the south of the current alignment for a length of up to 1,200 feet in Old Saybrook and 1,100 feet in Old Lyme. As described in the Draft Memorandum of Agreement (MOA) in Appendix A, "Cultural Resources," Amtrak will develop and implement an archaeological testing plan, in coordination with the CTSHPO, to determine the presence or absence of archaeological resources in Old Lyme that could be affected by the Preferred Alternative. If archaeological resources are found to be present in the APE, further field testing may be necessary to determine whether these resources are significant (S/NR eligible). If it is determined that S/NR-eligible archaeological resources will be impacted by the project, avoidance or mitigation measures will be developed in coordination with the CTSHPO (see Mitigation section below).

ARCHITECTURAL RESOURCES

The Preferred Alternative will not directly affect any known or potential architectural resources identified in the study area, with the exception of the Connecticut River Bridge. Because these resources are far removed (between 400 feet and a quarter-mile) from the project site, they are not at risk for inadvertent damage due to project-related construction activities. Furthermore, while the context of these resources will be somewhat altered by the removal of the Connecticut River Bridge and the construction of a new bridge over the Connecticut River, the overall context of these resources will not substantially change. The project will replace existing railroad-related structures with new railroad-related structures, and therefore, the use, atmosphere, and overall conditions of the resources' context will remain largely the same. The history and significance of these historic resources is not associated with the railroad, and therefore, their relationship to the railroad is not an important character-defining feature. Lastly, under the Preferred Alternative, the new bridge will not differ substantially in height, dimension, or alignment, and therefore, is not expected to block existing views to and from historic resources.

As described in detail in Chapter 2, “Project Alternatives,” the Preferred Alternative will result in the removal of the existing Connecticut River Bridge and the construction of a new bridge. The Preferred Alternative will therefore have an adverse effect on the Connecticut River Bridge, which is SR-listed and NR-eligible as a contributing element within the Moveable Railroad Bridges on the Northeast Corridor in Connecticut Thematic Resource, as described above. FRA documented this adverse effects finding in its correspondence to CTSHPO, dated July 31, 2012 (see Appendix A). In response, CTSHPO concurred and provided input on the Draft MOA, as discussed below.

F. MITIGATION MEASURES

As project engineering proceeds, Amtrak and FRA will continue to participate in a consultation process with the CTSHPO to identify potential effects on archaeological and architectural resources, as mandated by Section 106 of the NHPA of 1966. As part of this process, Amtrak will explore measures to avoid, minimize, or mitigate, to the extent practicable, any adverse effects to archaeological and architectural resources. Development of these measures is set forth in the Draft MOA (included in Appendix A), to be executed by FRA, CTSHPO, and Amtrak (and any consulting parties). Amtrak will implement the various provisions of the Draft MOA in consultation with FRA and CTSHPO.

The Draft MOA describes the continuing consultation process that will be conducted as project designs evolve and the measures to be implemented during the project’s design process to avoid, minimize, or mitigate adverse effects of the project on historic resources. Amtrak will undertake the design of the replacement bridge in coordination with the CTSHPO and will make an effort to incorporate historically compatible designs. Mitigation for adverse effects on the Connecticut River Bridge (a contributing element of the Moveable Railroad Bridges of the Northeast Corridor in Connecticut Thematic Resource), may include Historic American Engineering Record (HAER) documentation for the Connecticut River Bridge and development of an interpretive exhibit in a park, greenway, or public space that will present the history of the bridge and other moveable railroad bridges on the Northeast Corridor in Connecticut. This exhibit could possibly include salvaged elements of the bridge, signage, etc.

As described above and detailed in the Draft MOA, if archaeological testing determines that S/NR-eligible archaeological resources are present in the APE and could be affected by the project, and if avoidance of these resources during construction is not feasible, mitigation measures, such as data recovery, may be required. Data recovery and additional mitigation, if appropriate, will be carried out in consultation with the CTSHPO.

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A. INTRODUCTION AND METHODOLOGY

This chapter assesses the potential long-term impacts on ambient air quality due to operation of the Preferred Alternative. Potential short-term air quality impacts from construction of the Preferred Alternative are discussed in Chapter 12, "Construction Impacts."

The Preferred Alternative is designed to improve reliability of operations for the Connecticut River Bridge and will not provide additional rail capacity. These improvements in service and reliability are likely to lead to negligible increases in ridership and are therefore unlikely to have any effects on regional and local air quality. As described in Chapter 2, the emergency generator will be used exclusively for emergency situations and required periodic testing. Therefore, the project's effects on air quality will not be measurable and subsequently no detailed analysis is presented in this chapter. This chapter discusses the regulatory context for air quality analysis and presents a qualitative discussion of the existing air quality conditions in the greater study area.

POLLUTANTS FOR ANALYSIS

Air pollutants produced by motor vehicles and stationary sources affect ambient air quality. Emissions from motor vehicles are referred to as mobile source emissions, while emissions from fixed facilities are referred to as stationary source emissions. Mobile source emissions impact ambient concentrations of carbon monoxide (CO). Both mobile and stationary sources emit particulate matter (PM), volatile organic compounds (VOCs), and nitrogen oxides (NO and NO_2, collectively referred to as NO_x). Fine PM is also formed when emissions of NO_x, sulfur oxides (SO_x), ammonia, organic compounds, and other gases react or condense in the atmosphere. Emissions of sulfur dioxide (SO_2) are associated mainly with stationary sources, as well as sources utilizing non-road diesel fuel, such as diesel trains, marine engines, and non-road vehicles (e.g., construction engines). On-road diesel vehicles currently contribute very little to SO_2 emissions since the sulfur content of on-road diesel fuel, which is federally regulated, is extremely low. Complex photochemical processes that include NO_x and VOCs, emitted mainly from industrial processes and mobile sources, result in the formation of ozone in the atmosphere.

CARBON MONOXIDE

CO, a colorless and odorless gas, is produced primarily in urban areas by the incomplete combustion of gasoline and other fossil fuels. In urban areas, approximately 80 to 90 percent of CO emissions are from motor vehicles. Since CO is a reactive gas, which does not persist in the atmosphere, CO concentrations can vary greatly over relatively short distances; elevated concentrations are usually limited to locations near crowded intersections, heavily traveled and congested roadways, parking lots, and garages. Consequently, CO concentrations must be predicted on a local, or microscale, basis.

NITROGEN OXIDES, VOLATILE ORGANIC COMPOUNDS, AND OZONE

NO_x are emitted from both mobile and stationary sources primarily as a result of the combustion of fossil fuels. VOCs include a wide range of organic compounds emitted principally from solvents, coatings, petroleum production and distribution, and combustion of fossil fuels. NO_x and VOC emissions are of principal concern because of their role as precursors in the formation of ozone. Ozone is formed through a series of reactions that take place in the atmosphere in the presence of sunlight. Because the reactions are slow and occur as the pollutants are transported downwind, elevated ozone levels are often found many miles from sources of the precursor pollutants. The effects of NO_x and VOC emissions from all sources are, therefore, generally examined on a regional basis. However, with the promulgation of the 2010 1-hour average standard for NO_2, local sources such as vehicular emissions may become of greater concern for this pollutant.

LEAD

Airborne lead emissions are principally associated with industrial sources. Effective January 1, 1996, the Clean Air Act (CAA) banned the sale of the small amount of leaded fuel that was still available in some parts of the country for use in on-road vehicles, concluding a 25-year effort to phase out lead in gasoline. As a result, ambient concentrations of lead have declined significantly.

RESPIRABLE PARTICULATE MATTER—PM_{10} AND $PM_{2.5}$

PM is a class of air pollutants that includes discrete particles of a range of sizes and chemical compositions that are either liquid droplets (aerosols) or solids suspended in the atmosphere. PM is emitted from a variety of sources, both natural and anthropogenic (man-made). Major anthropogenic sources include the combustion of fossil fuels (e.g., vehicular exhaust, power generation, boilers, engines, and home heating); chemical and manufacturing processes; construction and agricultural activities; and wood-burning stoves and fireplaces.

PM is regulated in two size categories: particles with an aerodynamic diameter of less than or equal to 2.5 micrometers ($PM_{2.5}$) and particles with an aerodynamic diameter of less than or equal to 10 micrometers (PM_{10}) which includes the smaller $PM_{2.5}$. $PM_{2.5}$ has the ability to reach the lower regions of the respiratory tract, delivering with it other compounds that adsorb to the surfaces of the PM; $PM_{2.5}$ is also extremely persistent in the atmosphere. Diesel-powered vehicles are a significant source of respirable PM, most of which is $PM_{2.5}$. PM concentrations may, consequently, be locally elevated near roadways with high volumes of heavy diesel powered vehicles.

SULFUR DIOXIDE

SO_2 emissions are primarily associated with the combustion of sulfur-containing fuels: oil and coal. Due to the federal restrictions on the sulfur content in diesel fuel for on-road vehicles, vehicle sources emit no significant quantities of SO_2. Therefore, an analysis of SO_2 is typically only performed for large stationary sources (e.g., coal-fired power generating facility).

REGULATORY CONTEXT

NATIONAL AND STATE AIR QUALITY STANDARDS

The Clean Air Act mandated the establishment of primary and secondary National Ambient Air Quality Standards (NAAQS) for six major air pollutants: CO, NO_2, ozone, respirable PM (both $PM_{2.5}$ and PM_{10}), SO_2, and lead. The primary standards represent levels that are necessary to protect the public health, allowing an adequate margin of safety. The secondary standards are intended to protect the nation's welfare, and account for air pollutant effects on soil, water, visibility, materials, vegetation, and other aspects of the environment. The primary and secondary standards are the same for NO_2 annual, ozone, lead, and PM, respectively, and there is no secondary standard for CO and the 1-hour NO_2 standard.

USEPA revised the NAAQS for PM, effective December 18, 2006; it lowered the level of the 24-hour $PM_{2.5}$ standard from the former level of 65 micrograms per cubic meter ($\mu g/m^3$) to 35 $\mu g/m^3$ and retained the level of the annual standard at 15 $\mu g/m^3$. In addition, USEPA maintained the PM_{10} 24-hour average standard and revoked the annual average PM_{10} standard. USEPA recently lowered the primary annual-average standard from 15 $\mu g/m^3$ to 12 $\mu g/m^3$, effective March 2013. USEPA also revised the 8-hour ozone standard, lowering it from 0.08 to 0.075 parts per million (ppm), effective as of May 2008. USEPA lowered the primary and secondary standards for lead to 0.15 $\mu g/m^3$, effective January 12, 2009. USEPA revised the averaging time to a rolling 3-month average and the form of the standard to not-to-exceed across a 3-year span.

USEPA also established a 1-hour average NO_2 standard of 0.100 ppm, effective April 12, 2010 and a 1-hour average SO_2 standard of 0.075 ppm, effective August 23, 2010. The 1-hour average NO_2 standard is in addition to the annual standard, while the 1-hour SO_2 standard replaced the 24-hour and annual primary standards.

The NAAQS are presented in Table 7-1. Connecticut has adopted the NAAQS as the state's ambient air quality standards.

LOCAL AIR QUALITY REQUIREMENTS

Connecticut has not established local air quality impact thresholds for criteria air pollutants. Therefore, for the purposes of this analysis, an adverse impact occurs if the project causes a violation of the NAAQS, worsens an existing violation, or delays timely attainment of the NAAQS.

NAAQS ATTAINMENT STATUS AND STATE IMPLEMENTATION PLANS

As amended in 1990, the CAA defines non-attainment areas (NAA) as geographic regions that have been designated as not meeting one or more of the NAAQS. When USEPA designated an area as non-attainment, the state must develop and implement a State Implementation Plan (SIP), which delineates how a state plans to achieve air quality that meets the NAAQS under the deadlines established by the CAA.

The proposed project site falls within areas that are designated as non-attainment for ozone and maintenance for CO. In 2008, CTDEEP recommended that USEPA designate the entire State of Connecticut as nonattainment for the 2008 8-hour ozone NAAQS. Middlesex County and New London County are in attainment of the $PM_{2.5}$ NAAQS. USEPA has designated the entire state of Connecticut as "unclassifiable/attainment" for the new 1-hour NO_2 standard effective February 29, 2012. Since additional monitoring is required for the 1-hour standard, areas will be reclassified once three years of monitoring data are available (2016 or 2017).

Table 7-1
National Ambient Air Quality Standards (NAAQS)

Pollutant	Primary		Secondary	
	ppm	µg/m^3	ppm	µg/m^3
Carbon Monoxide (CO)				
8-Hour Average [(1)]	9	10,000	None	
1-Hour Average [(1)]	35	40,000		
Lead				
Rolling 3-Month Average [(2)]	NA	0.15	NA	0.15
Nitrogen Dioxide (NO_2)				
1-Hour Average [(3)]	0.100	188	None	
Annual Average	0.053	100	0.053	100
Ozone (O_3)				
8-Hour Average [(4)]	0.075	150	0.075	150
Respirable Particulate Matter (PM_{10})				
24-Hour Average [(1)]	NA	150	NA	150
Fine Respirable Particulate Matter ($PM_{2.5}$)				
Annual Mean [(5)]	NA	12	NA	15
24-Hour Average [(5)]	NA	35	NA	35
Sulfur Dioxide (SO_2)				
1-Hour Average[(7)]	0.075	196	NA	NA
Maximum 3-Hour Average [(1)]	NA	NA	0.50	1,300

Notes:
ppm – parts per million
µg/m^3 – micrograms per cubic meter
NA – not applicable
All annual periods refer to calendar year.
Standards are defined in ppm. Approximately equivalent concentrations in µg/m^3 are presented.

(1) Not to be exceeded more than once a year.
(2) USEPA has lowered the NAAQS down from 1.5 µg/m^3, effective January 12, 2009.
(3) 3-year average of the annual 98th percentile daily maximum 1-hr average concentration. Effective April 12, 2010.
(4) 3-year average of the annual fourth highest daily maximum 8-hr average concentration.
(5) 3-year average of annual mean. USEPA has lowered the primary standard from 15 µg/m3, effective March 2013.
(5) Not to be exceeded by the annual 98th percentile when averaged over 3 years.
(6) 3-year average of the annual 99th percentile daily maximum 1-hr average concentration. Effective August 23, 2010.

Source: 40 CFR Part 50: National Primary and Secondary Ambient Air Quality Standards.

GENERAL CONFORMITY

In November 1993, USEPA promulgated the General Conformity Regulations to prohibit federal entities from taking actions that do not conform to the SIPs attainment and maintenance of the NAAQS. Federal actions with FRA as the lead agency are subject to the General Conformity Rule, pursuant to 40 C.F.R. 51.851. A conformity determination is needed for each pollutant of concern in the non-attainment or maintenance area affected by a federal action. It is assumed that actions resulting in emissions of pollutants of concern less than established (*de minimis*) screening criteria emissions rates will conform to SIPs. Conforming actions will not:

1. Cause or contribute to any new violation of any standard in any area;
2. Interfere with provisions in the applicable SIP for maintenance of any standard;
3. Increase the frequency or severity of any existing violation of any standard in any area; or
4. Delay timely attainment of any standard or any required interim emission reductions or other milestones in any area.

As an FRA action, the proposed project must conform to the purpose of SIPs for ozone and CO to meet and maintain the NAAQS in Connecticut and multi-state nonattainment and maintenance areas. The applicable *de minimis* threshold for CO and NO_x (as an ozone precursor) is 100 tons per year. The applicable *de minimis* for VOCs (ozone precursors) is 50 tons per year. The proposed project will not exceed these *de minimis* thresholds for any criteria pollutant either during construction or operation of the project. The project will not result in additional train capacity and increases in ridership are likely to be negligible. The project is therefore be unlikely to result in substantial increases or decreases in air quality pollutants emissions.

B. EXISTING CONDITIONS

EXISTING MONITORED AIR QUALITY CONDITIONS

The project team compiled air quality data using CTDEEP and USEPA AirData databases for 2010, the latest calendar year for which these data are available. Representative monitoring sites are shown in Table 7-2.

Table 7-2
Most Recent Monitored Ambient Air Quality Data – Connecticut

Pollutant	Location	Averaging Period	Concentration	NAAQS
CO	1 James Street, New Haven	8-hour	1.6 ppm	9 ppm
		1-hour	2.2 ppm	35 ppm
SO_2	1 James Street, New Haven	3-hour	0.0015 ppm	0.5 ppm
		1-hour	39.5 ppb	75 ppb
PM_{10}	1 James Street, New Haven	24-hour	34 µg/m^3	150 µg/m^3
$PM_{2.5}$	1 James Street, New Haven	Annual	8.9 µg/m^3	15 µg/m^3
		24-hour[1]	25.5 µg/m^3	35 µg/m^3
NO_2	1 James Street, New Haven	Annual	14 ppb	53 ppb
		1-hour	57 ppb	100 ppb
Ozone	Hammonasset State Park, New Haven	8-hour	0.079 ppm	0.075 ppm

Source: http://www.epa.gov/region01/oeme/AnnualReport2010.pdf

With the exception of ozone, monitored levels for the criteria pollutants do not exceed National or State ambient air quality standards in the project area.

C. NO ACTION ALTERNATIVE

Chapter 2, “Project Alternatives,” describes several regional transportation projects. In the future without the proposed project, air quality in the region should continue to improve due to the effect of federally mandated emission control programs scheduled to be implemented over the next several years. Many of these programs were part of the 1990 CAA Amendments or are included as part of each state’s SIP to meet the NAAQS. These programs cover a wide range of sources, both mobile and stationary, and will reduce emissions of NO_x, SO_2, CO, particulate matter, and volatile organic compounds.

D. PROBABLE IMPACTS OF THE PREFERRED ALTERNATIVE

Amtrak does not expect the Preferred Alternative to result in an increase in capacity over the Connecticut River Bridge and the project will not increase the number of trains traveling over the bridge on the Northeast Corridor. Therefore, the project will not substantially increase the number of new transit riders and would not measurably reduce vehicle-miles-traveled in the region. As a result there will be no significant adverse effect on air quality due to the Preferred Alternative, and the Preferred Alternative will not cause any change in current conformity designations. While the proposed project will lead to an improvement in service along the Northeast Corridor that may slightly increase passenger travel and reduce auto usage in the region, the air quality benefits will be negligible. ✷

A. INTRODUCTION

This chapter assesses the potential for noise and vibration impacts from the Connecticut River Bridge Replacement Project. The Preferred Alternative has the potential to affect noise and vibration levels adjacent to the rail ROW by shifting the existing alignment of the Northeast Corridor. Potential impacts during construction are discussed in Chapter 12, "Construction Impacts." This chapter includes a discussion of the fundamentals of airborne noise, vibration and ground-borne noise impacts, along with the applicable standards, analysis methodologies, and impact criteria for each.

Airborne noise is noise that travels through the air—such as the sound of traffic on a nearby roadway, or children on a playground. Ground-borne noise is the rumbling sound caused by vibration (or oscillatory motion). This chapter assesses the Preferred Alternative's potential to create both types of noise, as well as vibrations.

Amtrak conducted an analysis of the effects of the Preferred Alternative on noise following the methodology set forth in FTA's guidance manual, *Transit Noise and Vibration Impact Assessment* (May 2006). This FTA guidance document sets forth methodologies for analyzing noise and vibration from commuter and inter-city rail operations and as such is the standard USDOT methodology for assessing potential impacts of new and expanded rail transit systems. This chapter describes the analysis conducted and conclusions reached.

B. NOISE FUNDAMENTALS, STANDARDS, AND IMPACT CRITERIA

AIRBORNE NOISE FUNDAMENTALS

Quantitative information on the effects of airborne noise on people is well documented. If sufficiently loud, noise may adversely affect people in several ways. For example, noise may interfere with human activities, such as sleep, speech communication, and tasks requiring concentration or coordination. It may also cause annoyance, hearing damage, and other physiological problems. Several noise scales and rating methods are used to quantify the effects of noise on people. These scales and methods consider such factors as loudness, duration, time of occurrence, and changes in noise level with time. However, all the stated effects of noise on people are subjective.

Sound pressure levels are measured in units called "decibels" (dB). The particular character of the noise that we hear is determined by the rate, or "frequency," at which the air pressure fluctuates, or "oscillates." Frequency defines the oscillation of sound pressure in terms of cycles per second. One cycle per second is known as 1 Hertz (Hz). People can hear over a relatively limited range of sound frequencies, generally between 20 Hz and 20,000 Hz, and the human ear does not perceive all frequencies equally well. High frequencies are more easily discerned and therefore more intrusive than many of the lower frequencies.

"A"-Weighted Sound Level (dBA)

To bring a uniform noise measurement that simulates people's perception of loudness and annoyance, the decibel measurement is weighted to account for those frequencies most audible to the human ear. This is known as the A-weighted sound level, or "dBA," and it is the most often used descriptor of noise levels where community noise is the issue. As shown in Table 8-1, the threshold of human hearing is defined as 0 dBA; very quiet conditions (as in a library, for example) are approximately 40 dBA; levels between 50 dBA and 70 dBA define the range of acceptable daily activity; levels above 70 dBA are considered noisy, and then loud, intrusive, and deafening as the scale approaches 130 dBA. For most people to perceive an increase in noise, it must be at least 3 dBA. At 5 dBA, the change will be readily noticeable (Bolt, Beranek and Newman, 1973). An increase of 10 dBA is generally perceived as a doubling of loudness.

Table 8-1
Common Noise Levels

Sound Source	(dBA)
Military jet, air raid siren	130
Amplified rock music	110
Jet takeoff at 500 meters	100
Freight train at 30 meters	95
Train horn at 30 meters	90
Heavy truck at 15 meters	
Busy city street, loud shout	80
Busy traffic intersection	
Highway traffic at 15 meters, train	70
Predominantly industrial area	60
Light car traffic at 15 meters, city or commercial areas or residential areas close to industry	
Background noise in an office	50
Suburban areas with medium density transportation	
Public library	40
Soft whisper at 5 meters	30
Threshold of hearing	0

Note: A 10 dBA increase in level appears to double the loudness, and a 10 dBA decrease halves the apparent loudness.
Source: Cowan, James P. Handbook of Environmental Acoustics. Van Nostrand Reinhold, New York, 1994. Egan, M. David, Architectural Acoustics. McGraw-Hill Book Company, 1988.

Combinations of different sources are not additive in an arithmetic manner, because of the dBA scale's logarithmic nature. For example, two noise sources—a vacuum cleaner operating at approximately 72 dBA and a telephone ringing at approximately 58 dBA—do not combine to create a noise level of 130 dBA, the equivalent of a jet airplane or air raid siren (see Table 8-1). In fact, the noise produced by the telephone ringing may be masked by the noise of the vacuum cleaner and not be heard. The logarithmic combination of these two noise sources would yield a noise level of 72.2 dBA.

Effects of Distance on Noise

Noise varies with distance. For example, highway traffic 50 feet away from a receptor (such as a person listening to the noise) typically produces sound levels of approximately 70 dBA. The same highway noise measures 66 dBA at a distance of 100 feet, assuming soft ground conditions (such as grass). This decrease is known as "drop-off." The outdoor drop-off rate for line sources, such as traffic, is a decrease of approximately 4.5 dBA (for soft ground) for every doubling of distance between the noise source and receptor. For hard ground (such as concrete), the outdoor drop-off rate is 3 dBA for line sources. Assuming soft ground, for point sources, such as amplified rock music, the outdoor drop-off rate is a decrease of approximately 7.5 dBA for every doubling of distance between the noise source and receptor (for hard ground the outdoor drop-off rate is 6 dBA for point sources).

Noise Descriptors Used in Impact Assessment

The sound-pressure level unit of dBA describes a noise level at just one moment, but since very few noises are constant, other ways of describing noise over more extended periods have been developed. One way of describing fluctuating sound is to describe the fluctuating noise heard over a specific period as if it were a steady, unchanging sound (i.e., as if it were averaged over that time period). For this condition, a descriptor called the "equivalent sound level" ($L_{eq)}$ can be computed. L_{eq} is the constant sound level that, in a given situation and period (e.g., 1 hour, denoted by $L_{eq(1)}$, or 24 hours, denoted as $L_{eq(24)}$), conveys the same sound energy as the actual time-varying sound.

A descriptor for cumulative 24-hour exposure is the day-night sound level, abbreviated as L_{dn}. This is a 24-hour measure that accounts for the moment-to-moment fluctuations in A-weighted noise levels due to all sound sources during 24 hours, combined. Mathematically, the L_{dn} noise level is the energy average of all $L_{eq(1)}$ noise levels over a 24-hour period, where nighttime noise levels (10 PM to 7 AM) are increased by 10 dBA before averaging.

Following FTA guidance, either the maximum $L_{eq(1)}$ sound level or the L_{dn} sound level is used for impact assessment, depending on land use category as described below.

VIBRATION FUNDAMENTALS

Fixed railway operations have the potential to produce high vibration levels, since railway vehicles contact a rigid steel rail with steel wheels. Train wheels rolling on the steel rails create vibration energy that is transmitted into the track support system. The amount of vibrational energy is strongly dependent on such factors as how smooth the wheels and rails are and the vehicle suspension system. The vibration of the track structure "excites" the adjacent ground, creating vibration waves that propagate through the various soil and rock strata to the foundations of nearby buildings. As the vibration propagates from the foundation through the remaining building structure, certain resonant, or natural, frequencies of various components of the building may be excited.

The effects of ground-borne vibration may include discernable movement of building floors, rattling of windows, and shaking of items on shelves or hanging on walls. In extreme cases, the vibration can cause damage to buildings. The vibration of floors and walls may cause perceptible vibration, rattling of such items as windows or dishes on shelves. The movement of building surfaces and objects within the building can also result in a low-frequency rumble noise. The rumble is the noise radiated from the motion of the room surfaces, even when the motion itself cannot be felt. This is called ground-borne noise.

Vibrations consist of rapidly fluctuating motions in which there is no "net" movement. When an object vibrates, any point on the object is displaced from its initial "static" position equally in both directions so that the average of all its motion is zero. Any object can vibrate differently in three mutually independent directions: vertical, horizontal, and lateral. It is common to describe vibration levels in terms of velocity, which represents the instantaneous speed at a point on the object that is displaced. In a sense, the human body responds to an average vibration amplitude, which is usually expressed in terms of the root mean square (rms) amplitude.

All vibration levels in this document are referenced to $1x10^{-6}$ inches per second. "VdB" (referenced to $1x10^{-6}$ inches per second) is used for vibration decibels to reduce the potential for confusion with noise decibels.

EFFECT OF PROPAGATION PATH

Vibrations are transmitted from the source to the ground, and propagate through the ground to the receptor. Soil conditions have a strong influence on the levels of ground-borne vibration. Stiff soils, such as some clay and rock, can transmit vibrations over substantial distances. Sandy soils, wetlands, and groundwater tend to absorb movement and thus reduce vibration transmission. Because subsurface conditions vary widely, measurement of actual vibration conditions, or transfer mobility, at the site can be the most practical way to address the variability of propagation conditions.

HUMAN RESPONSE TO VIBRATION LEVELS

Although the perceptibility threshold for ground-borne vibration is about 65 VdB, the typical threshold of human annoyance is 72 VdB. As a comparison, buses and trucks rarely create vibration that exceeds 72 VdB unless there are significant bumps in the road, and these vehicles are operating at moderate speeds. Vibration levels for typical human and structural responses and sources are shown in Table 8-2.

NOISE STANDARDS AND CRITERIA

AIRBORNE NOISE STANDARDS AND CRITERIA

The FTA guidance manual defines noise criteria based on the specific type of land use that would be affected, with explicit operational noise impact criteria for three land use categories. These impact criteria are based on either peak 1-hour L_{eq} or 24-hour L_{dn} values. Table 8-3 describes the land use categories defined in the FTA report, and provides noise metrics used for determining operational noise impacts. As described in Table 8-3, categories 1 and 3—which include land uses that are noise-sensitive, but where people do not sleep—require examination using the 1-hour L_{eq} descriptor for the noisiest peak hour. Category 2, which includes residences, hospitals, and other locations where nighttime sensitivity to noise is very important, requires examination using the 24-hour L_{dn} descriptor.

Table 8-2
Typical Levels of Ground-Borne Vibration

Human/Structural Response	Velocity Level (VdB)	Typical Sources (at 50 feet)
Threshold, minor cosmetic damage fragile buildings	100	Blasting from construction projects
		Bulldozers and other heavy tracked construction equipment
Difficulty with vibration-sensitive tasks, such as reading a video screen	90	Locomotive powered freight train
Residential annoyance, infrequent events	80	Rapid Transit Rail, upper range
		Commuter Rail, typical range
Residential annoyance, frequent events		Bus or Truck over bump
	70	Rapid Transit Rail, typical range
Limit for vibration-sensitive equipment. Approximate threshold for human perception of vibration	60	Bus or truck, typical
		Typical background vibration
	50	
Source: U.S. Dept of Transportation, FTA, *Transit Noise and Vibration Impact Assessment,* May 2006.		

Table 8-3
FTA's Land Use Category and Metrics for Transit Noise Impact Criteria

Land Use Category	Noise Metric (dBA)	Description of Land Use Category
1	Outdoor $L_{eq(h)}$*	Tracts of land where quiet is an essential element in the intended purpose. This category includes lands set aside for serenity and quiet, and such land uses as outdoor amphitheaters and concert pavilions, as well as National Historic Landmarks with significant outdoor use. Also included are recording studios and concert halls.
2	Outdoor L_{dn}	Residences and buildings where people normally sleep. This category includes homes, hospitals, and hotels, where a nighttime sensitivity to noise is assumed to be of utmost importance.
3	Outdoor $L_{eq(h)}$*	Institutional land uses with primarily daytime and evening use. This category includes schools, libraries, and churches, where it is important to avoid interference with such activities as speech, meditation, and concentration on reading material. Places for study or meditation associated with cemeteries, monuments, museums, campgrounds and recreational facilities can also be considered to be in this category. Certain historical sites and parks are also included.

Note: * L_{eq} for the noisiest hour of transit-related activity during hours of noise sensitivity.
Source: *Transit Noise and Vibration Impact Assessment*, FTA, May 2006.

Figure 8-1 shows FTA's noise impact criteria for transit projects. The FTA impact criteria are keyed to the noise level generated by the project (called "project noise exposure") in locations of varying existing noise levels. Two types of impacts—moderate and severe—are defined for each land use category, depending on existing noise levels. Thus, where existing noise levels are 40 dBA, for land use categories 1 and 2, the respective L_{eq} and L_{dn} noise exposure from the project would create moderate impacts if they were above approximately 50 dBA, and would create severe impacts if they were above approximately 55 dBA. For category 3, a project noise exposure level above approximately 55 dBA would be considered a moderate impact, and above approximately 60 dBA would be considered a severe impact. The difference between "severe impact" and "moderate impact" is that a severe impact occurs when a change in noise level occurs that a significant percentage of people would find annoying, while a moderate impact occurs when a change in noise level occurs that is noticeable to most people but not necessarily sufficient to result in strong adverse reactions from the community.

VIBRATION STANDARDS AND CRITERIA

With the construction of new rail rapid transit systems in the past 20 years, the acoustical industry has gained considerable experience about how communities react to various levels of building vibration. This experience, combined with the available national and international standards, represents a good foundation for predicting annoyance from ground-borne noise and vibration in residential areas. Table 8-2 summarizes typical human or structural responses to various levels of vibration.

The FTA criteria for environmental impact from ground-borne vibration and noise are based on the maximum levels for a single event. The impact criteria as defined in the FTA guidance manual are shown in Table 8-4. The criteria for acceptable ground-borne vibration are expressed in terms of rms velocity levels in decibels and the criteria for acceptable ground-borne noise are expressed in terms of A-weighted sound level. As shown in the table, the FTA methodology provides three different impact criteria—one for "infrequent" events, when there are fewer than 30 vibration events per day, one for "occasional" events, when there are between 30 and 70 vibration events per day, and one for "frequent" events, when there are more than 70 vibration events per day. It should be noted that these impacts occur only if a project causes ground-borne noise or vibration levels that are higher than existing vibration levels. Thus, if the vibration level for a building in Category 1 is already 70 VdB (5 VdB above the 65 VdB threshold listed in Table 8-4) but a hypothetical project will not increase that level, then the project will not be considered to have an impact.

Table 8-4
Ground-Borne Vibration and Ground-Borne Noise Impact Criteria for General Assessment

Land Use Category	GBV Impact Levels (VdB re 1 micro-inch/sec)			GBN Impact Levels (dB re 20 micro Pascals)		
	Frequent Events[1]	Occasional Events[2]	Infrequent Events[3]	Frequent Events[1]	Occasional Events[2]	Infrequent Events[3]
Category 1: Buildings where vibration would interfere with interior operations	65 VdB[4]	65 VdB[4]	65 VdB[4]	N/A[4]	N/A[4]	N/A[4]
Category 2: Residences and buildings where people normally sleep	72 VdB	75 VdB	80 VdB	35 dBA	38 dBA	43 dBA
Category 3: Institutional land uses with primarily daytime use	75 VdB	78 VdB	83 VdB	40 dBA	43 dBA	48 dBA

Notes:
1 "Frequent Events" is defined as more than 70 vibration events of the same source per day. Most rapid transit projects fall into this category.
2 "Occasional Events" is defined as between 30 and 70 vibration events of the same source per day. Most commuter trunk lines have this many operations.
3 "Infrequent Events" is defined as fewer than 30 vibration events of the same kind per day. This category includes most commuter rail systems.
4 This criterion limit is based on levels that are acceptable for most moderately sensitive equipment such as optical microscopes. Vibration-sensitive manufacturing or research will require detailed evaluation to define the acceptable vibration levels. Ensuring lower vibration levels in a building often requires special design of the HVAC systems and stiffened floors.
5 Vibration-sensitive equipment is not sensitive to ground-borne noise.

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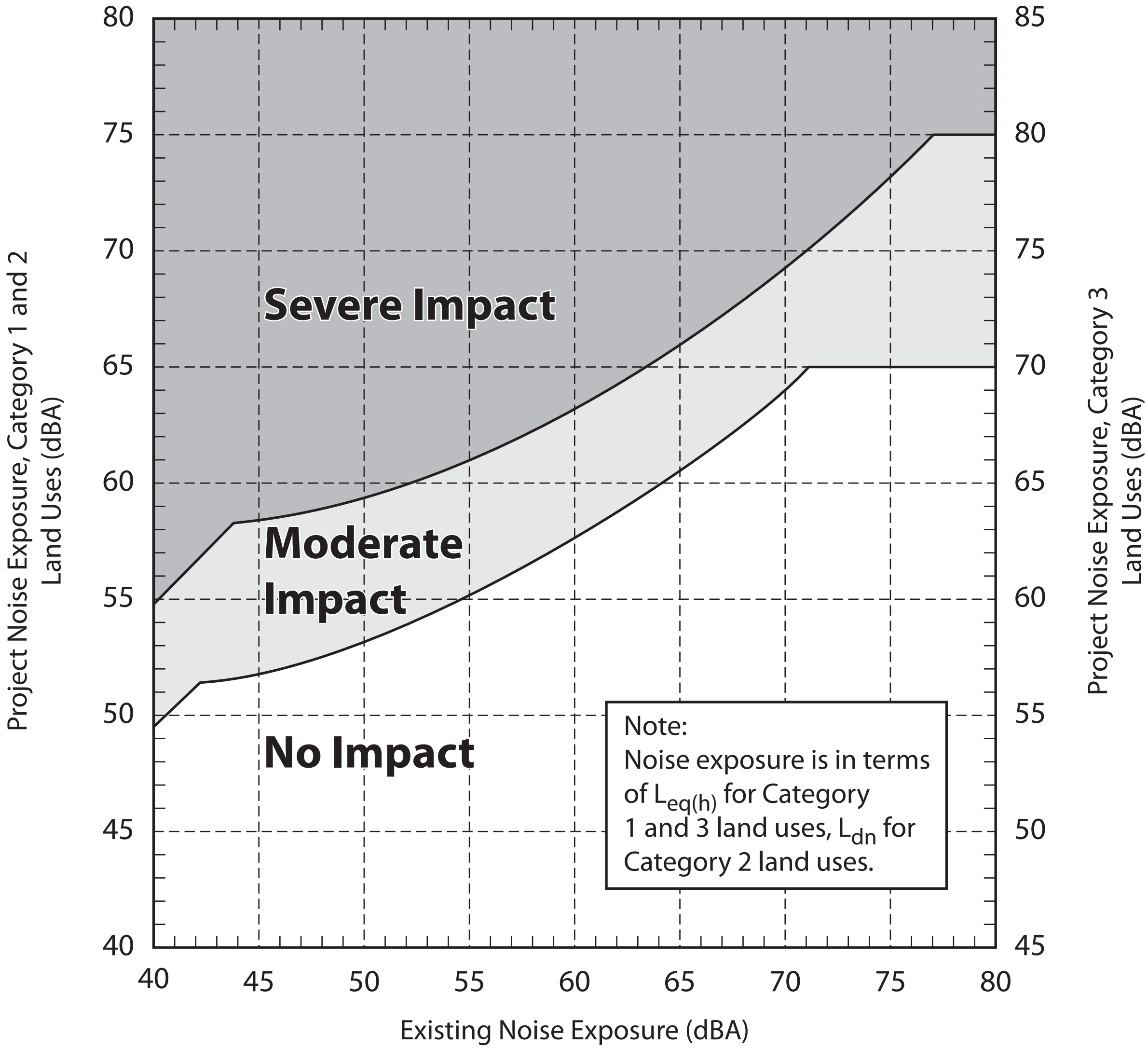

Source: Transit Noise and Vibration Impact Assessment, FTA-VA-90-1003-06, May 2006

Figure 8-1

FTA's Noise Impact Criteria for Transit Projects

The limits are specified for the three land use categories defined below:

- **Vibration Category 1: High Sensitivity**—Buildings where low ambient vibration is essential for the operations within the building, which may be well below levels associated with human annoyance. Typical land uses are vibration-sensitive research and manufacturing, hospitals, and university research operations.
- **Vibration Category 2: Residential**—This category covers all residential land uses and any buildings where people sleep, such as hotels and hospitals. No differentiation is made between different types of residential areas. This is primarily because ground-borne vibration and noise are experienced indoors and building occupants have practically no means to reduce their exposure. Even in a noisy urban area, the bedrooms often will be quiet in buildings that have effective noise insulation and tightly closed windows. Hence, an occupant of a bedroom in a noisy urban area is likely to be just as sensitive to ground-borne noise and vibration as someone in a quiet suburban area.
- **Vibration Category 3: Institutional**—This category includes schools, churches, other institutions, and quiet offices that do not have vibration-sensitive equipment, but still have the potential for activity interference.

There are some buildings, such as concert halls, TV and recording studios, auditoriums, and theaters that can be very sensitive to vibration and ground-borne noise, but do not fit into any of these three categories. Special vibration level thresholds are defined for these land uses. In addition, FTA has established vibration criteria for fragile buildings (94 VdB, 0.2 in/sec) and very fragile buildings (90 VdB, 0.12 in/sec). The operational activities associated with the project will not reach these levels and therefore, these criteria are only evaluated in the construction impacts assessment (see Chapter 12, “Construction Impacts”).

C. REGULATORY CONTEXT AND METHODOLOGY

AIRBORNE NOISE ANALYSIS METHODOLOGY

Amtrak performed the analysis of airborne noise using procedures set forth in the FTA guidance manual, *Transit Noise and Vibration Impact Assessment* (May 2006). Following the methodologies set forth in this document, airborne noise impacts are analyzed using a three-step process that consists of a screening procedure, a general noise assessment, and a detailed noise analysis. The screening procedure is performed first to determine whether any noise-sensitive receptors are within distances where impacts are likely to occur. If the screening reveals that there are noise-sensitive receptors in locations where impacts are likely to occur, then a general noise assessment is performed to determine locations where noise impacts could occur. If this general assessment indicates that a potential for noise impact does exist, then a detailed noise analysis may be necessary. FTA’s detailed analysis methodology is used to predict impacts and evaluate the effectiveness of mitigation with greater precision than can be achieved with the general noise assessment. The methodology and results of the FTA noise analysis screening procedure are presented below.

STEP 1: NOISE SCREENING

The FTA methodology begins with a noise screening to determine whether any noise-sensitive receptors are within a distance where an impact is likely to occur. According to the FTA screening methodology, potential impacts may occur if noise receptors are within 750 feet of the centerline of a commuter rail mainline if the pathway between the track and the receptor is unobstructed, or 375 feet from the track centerline if the pathway is obstructed (since obstructions block some noise and therefore reduce the distance the noise will travel).

Based on a review of current aerial photography, site visits, and land use maps, it was determined that two noise-sensitive receptors are located within the screening distances of the proposed project site: (1) the waterfront boardwalk accessory to the CTDEEP Marine Headquarters; and (2) a group of residences located along Clark Street in Old Saybrook.

STEP 2: GENERAL NOISE ASSESSMENT

Since sensitive receptors are present within the screening distance, Amtrak conducted a general noise assessment to examine the effect of the change in alignment on noise levels using the procedures contained in the FTA guidance manual. According to FTA's guidance document, the potential for noise impacts at sensitive land use locations will occur if the project-generated noise levels, or "noise exposure," exceed the levels shown in Figure 8-1.

The general noise assessment methodology consists of determining the project noise exposure at 50 feet from the centerline of track, and comparing the calculated levels with the criteria based on land use categories. The calculations to predict the noise levels from the increased train speed and change in the alignment along the rail line branch take into account: the type of trains and type of locomotives, number of trains and number of locomotives on each train, the speed of the trains, characteristics of the track, and the time of day.

The waterfront boardwalk accessory to the CTDEEP Marine Headquarters is an FTA land use Category 3, which uses the 1-hour L_{eq} noise metric. Since the dominant noise source at this location is already the rail traffic over the Connecticut River Bridge, the project team calculated the existing noise levels at this location using the FTA's General Noise Assessment methodology. The existing $L_{eq(1)}$ was calculated to be 74 dBA.

The residences on Clark Street in Old Saybrook are an FTA land use Category 2, which uses the L_{dn} noise metric. Since the dominant noise source at this location is already the rail traffic over the Connecticut River Bridge, the project team calculated the existing noise levels at this location using the FTA's General Noise Assessment methodology. The existing $L_{eq(1)}$ was calculated to be 59 dBA.

VIBRATION ANALYSIS METHODOLOGY

Amtrak performed the vibration analysis for the Preferred Alternative using the procedures described in the FTA guidance manual, *Transit Noise and Vibration Impact Assessment* (May 2006). To examine potential impacts during operation, the FTA guidance document (similar to the approach for assessing noise) lays out a three-step approach for the analysis of vibration and ground-borne noise: a screening procedure, a general assessment methodology, and a detailed analysis methodology. The screening procedure is used to determine whether any noise-sensitive receptors are within distances where impacts are likely to occur; the general assessment methodology is used to determine locations or rail segments where there is the potential for impacts; and the detailed analysis methodology is used to predict impacts and evaluate the effectiveness of mitigation with greater precision than can be achieved with the general assessment.

The first step in the FTA vibration analysis determines if there is the potential for a vibration impact based on the type of project. Since the Connecticut River Bridge and its approaches are of the steel-wheel/steel-rail type, the project team performed a vibration screening analysis. Table 8-5 shows screening distances based upon the type of project and the category of land use involved.

Table 8-5
Screening Distances for Vibration Assessment

Type of Project	Critical Distance for Land Use Categories* Distance from ROW or Property Line (feet)		
	Category 1	Category 2	Category 3
Conventional Commuter Railroad	600	200	120
Rail Rapid Transit	600	200	120
Light Rail Transit	450	150	100
Intermediate Capacity Transit	200	100	50
Bus Project (if not previously screened out)	100	50	N/A

Note:
* The land-use categories are defined in Chapter 8 of the FTA Manual. Some vibration-sensitive land uses are not included in these categories. Examples are: concert halls and TV studios which, for the screening procedure, should be evaluated as Category 1; and theaters and auditoriums which should be evaluated as Category 2.
Source: Transit Noise and Vibration Impact Assessment, FTA, May 2006, page 9-4.

Based on a review of current aerial photography and land-use maps, Amtrak found that no vibration-sensitive uses are located within the vibration-screening distances of the proposed project.

D. NO ACTION ALTERNATIVE

Chapter 2, "Project Alternatives," describes the two options of the Preferred Alternative, either of which will be complete by 2018. In the No Action Alternative, train traffic will remain at its current level on the existing bridge, and will result in no change in noise levels over the existing conditions and be identical to the current noise environment at the site.

E. PROBABLE IMPACTS OF THE PREFERRED ALTERNATIVE

There are two options of the Preferred Alternative for the proposed project; both will result in comparable noise levels since rail traffic will be identical, and the track alignment will be the same with either option. The distance between the boardwalk receptor and the track will not change, as the track runs directly over the boardwalk in both options of the Preferred Alternative as well as the existing condition. The distance between the Clark Street receptors and the track will increase with either option, as compared to the existing condition. The noise levels at the Clark Street receptors generated by rail traffic on the bridge will not be noticeably changed by the slight increase in distance, according to the FTA's General Noise Assessment. As described in Chapter 2, the replacement emergency generator will be used exclusively for emergency situations and required periodic testing. Amtrak expects the new generator assembly will generate similar or lower noise levels than the existing generator assembly. The results of the assessment are shown in Appendix B, "Noise and Vibration." In summary, the Preferred Alternative will not result in significant adverse noise or vibration impacts. ✷

A. INTRODUCTION

This chapter describes the potential for the Preferred Alternative to affect energy consumption. The energy assessment considers potential impacts on energy sources and transmission of energy. NEPA guidelines require a discussion of major direct energy (e.g., energy consumed by vehicles using a proposed facility) and/or indirect energy (e.g., increase in automobiles due to a new roadway) consumption, and detailed energy analyses are required for large-scale projects. Infrastructure and energy needs during the construction period are discussed in Chapter 12.

B. EXISTING CONDITIONS

Connecticut Light and Power (CL&P) delivers electricity to most of the state of Connecticut, including Middlesex and New London counties where the proposed project site is located. Electricity delivered by CL&P is generated by a number of independent power suppliers.

Overhead catenary systems power Amtrak trains operating within the project area. Electrically operated Amtrak trains use 2,706 British Thermal Units (BTUs)[1] per passenger mile, and are 18 percent more energy efficient than domestic plane or automobile travel.[2] SLE trains and P&W freight trains operating through the project site are all powered by diesel locomotives.

C. NO ACTION ALTERNATIVE

Amtrak expects adequate electrical capacity to be available to meet Connecticut's future energy demand through the analysis year of 2030. The planned major and minor improvement projects discussed under the No Action Alternative in Chapter 2, "Project Alternatives," are located outside of the primary study area used for this analysis and are not expected to change energy use in the area.

D. PROBABLE IMPACTS OF THE PREFERRED ALTERNATIVE

The Preferred Alternative will operate more efficiently than the existing bridge, using state-of-the-art electric motors and modern construction materials. Both bascule bridges and vertical lift bridges require relatively little power to operate the moveable span since the weight of the span is balanced by the counterweight. There is no meaningful difference in energy requirements for a

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[1] British Thermal Units, or BTUs, are a measure of energy used to compare consumption of energy from different sources, such as gasoline, electricity, etc., taking into consideration how efficiently those sources are converted to energy. One BTU is the quantity of heat required to raise the temperature of one pound of water by one Fahrenheit degree.

[2] Oak Ridge National Laboratory for U.S. Department of Energy. *Transportation Energy Data Book: Edition 26.* Oak Ridge, Tennessee. 2007

bascule bridge versus a vertical lift bridge; therefore, neither option of the Preferred Alternative presents a benefit over the others in terms of energy consumption. As mentioned in Chapter 2, the existing emergency generator will likely be replaced as part of the project with a generator of similar size.

Amtrak does not expect the number of year-round bridge openings to be affected by the proposed project. The Preferred Alternative will not result in any increases in train service, or create a demand for additional energy. The energy consumed by the electrically operated trains will not change. Amtrak does not expect the Preferred Alternative to substantially reduce the number of vehicle miles traveled by replacing automobile trips with rail ridership. Overall, changes in energy consumption in the study area as a result of the proposed project will be negligible, and no significant adverse impacts to energy consumption or resources will result under the Preferred Alternative. ✷

A. INTRODUCTION AND METHODOLOGY

This chapter assesses the potential for the proposed project to impact terrestrial, wetland, and aquatic natural resources and floodplains in the project area. Natural resources include plant and animal species, and any area capable of providing habitat for plant and animal species or capable of functioning to support ecological systems and maintain a study area's environmental balance. As such, resources such as surface and ground waters, soils, drainage systems, wetlands, dunes, beaches, grasslands, woodlands, landscaped areas, gardens, parks, and built structures used by wildlife may be considered in a natural resource analysis.

The general study area for this natural resources analysis includes the area within and immediately adjacent to the proposed project site, portions of the tidal Connecticut River, and associated tidal wetlands. The study area for threatened, endangered, and special concern species and habitats is ½-mile radius from the project site.

Amtrak summarized existing conditions for natural resources, water quality, and floodplains within the study area using:

- Observations made during field visits.
- CTDEEP (formerly known as CTDEP) and USFWS National Wetlands Inventory (NWI) wetlands maps.
- Existing information identified in the available literature and obtained from governmental and non-governmental agencies such as: CTDEEP; USFWS; USEPA; USEPA Environmental Monitoring and Assessment Program (USEPA EMAP); Federal Emergency Management Agency (FEMA); U.S. Geological Survey (USGS); and others.
- USFWS, NMFS, and CTDEEP responses to requests for information on rare, threatened or endangered species, or critical habitats in the vicinity of the project area.

B. REGULATORY CONTEXT

Project activities in wetlands or open water or within a coastal zone require compliance with relevant federal and state laws and regulations. A summary of these laws and regulations is provided below.

FEDERAL LAWS AND REGULATIONS

CLEAN WATER ACT (33 USC §§ 1251 TO 1387)

The objective of the Clean Water Act, also known as the Federal Water Pollution Control Act, is to restore and maintain the chemical, physical, and biological integrity of U.S. waters. The Act regulates point sources of water pollution such as discharges of municipal sewage and industrial wastewater, the discharge of dredged or fill material into navigable waters and other U.S. waters, and non-point source pollution such as runoff from streets, agricultural fields, and construction sites.

Under Section 401 of the Act, any applicant for a federal permit or license for an activity that may result in a discharge to navigable waters must provide a certificate to the relevant federal agency stating that the discharge will comply with Sections 301, 302, 303, 306, 307, and 316 (b) of the Act.

Section 404 of the Act requires authorization from the Secretary of the Army, acting through the USACE, for the permanent or temporary discharge of dredged or fill material into navigable waters and other waters of the United States. The term "waters of the United States," as defined in 33 CFR 328.3, includes streams, rivers, wetlands, mudflats, and sandflats that meet the specified requirements. Activities authorized under Section 404 must also comply with Section 401 of the Act.

RIVERS AND HARBORS ACT OF 1899

Section 10 of the Rivers and Harbors Act of 1899 requires authorization from the Secretary of the Army, acting through the USACE, for the construction of any structure in or over any navigable waters of the United States, the excavation from or deposition of material into these waters, or the introduction of any obstruction or alteration into these waters. Any structures placed in navigable waters such as pilings, piers, or bridge abutments up to the MHW line are regulated pursuant to this Act.

FEDERAL COASTAL ZONE MANAGEMENT ACT OF 1972 (16 USC §§ 1451 TO 1465)

The Federal Coastal Zone Management Act of 1972 established a voluntary participation program to encourage coastal states to develop programs to manage development within the state's designated coastal areas in order to reduce conflicts between coastal development and protection of resources within the coastal area. Federal permits issued in Connecticut must be accompanied by a Coastal Zone Consistency Determination, which evaluates consistency with Connecticut's federally approved Coastal Zone Management Program.

MAGNUSON-STEVENS ACT (16 USC §§ 1801 TO 1883)

Section 305(b)(2)-(4) of the Magnuson-Stevens Act outlines the process for NMFS and the Regional Fishery Management Councils (in this case, the New England Fishery Management Council) to comment on activities proposed by federal agencies that may adversely impact areas designated as Essential Fish Habitat (EFH). EFH is defined as those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity (16 USC §1802(10)).

Adverse impacts, as defined in 50 CFR 600.910(A), include any impacts that reduce the quality and/or quantity of EFH. Examples include:

- Direct impacts, such as physical disruption or the release of contaminants;
- Indirect impacts, such as the loss of prey or reduction in the fecundity (number of offspring produced) of a managed species; and
- Site-specific or habitat-wide impacts that may include individual, cumulative or synergistic consequences of a federal action.

ENDANGERED SPECIES ACT OF 1973 (16 USC §§ 1531 TO 1544)

The ESA recognizes that endangered species of wildlife and plants are of aesthetic, ecological, educational, historical, recreational, and scientific value to the nation and its people. The Act provides for the protection of these species, and the critical habitats on which they depend for survival. The proposed project, as a discretionary federal action with the potential to affect a listed species, must undergo consultation pursuant to Section 7 of the ESA, as amended. As discussed below, correspondence related to this consultation is provided in Appendix C.

FISH AND WILDLIFE COORDINATION ACT (PL 85-624; 16 USC 661-667D)

The Fish and Wildlife Coordination Act entrusts the Secretary of the Interior with providing assistance to, and cooperating with, federal, state and public or private agencies and organizations, to ensure that wildlife conservation receives equal consideration with other water-resource development programs. These programs can include the control (such as a diversion), modification (such as channel deepening), or impoundment (through the construction of a dam) of a body of water.

EXECUTIVE ORDER 11988 (FLOODPLAIN MANAGEMENT)

Executive Order 11988 requires that agencies provide leadership and take action to reduce the risk of flood loss, to minimize the impact of floods on human safety, health and welfare, and to restore and preserve the natural and beneficial values served by floodplains.

EXECUTIVE ORDER 11990 (PROTECTION OF WETLANDS)

Executive Order 11990 directs federal agencies to provide leadership and take action to minimize the destruction, loss or degradation of wetlands, and to preserve and enhance wetland quality. New activities in wetlands, either undertaken or supported by a federal agency, are to be avoided unless there is no practicable alternative and all practical measures have been taken to minimize the potential impacts to the wetlands.

EXECUTIVE ORDER 13112 (INVASIVE SPECIES)

Executive Order 13112 requires federal agencies to prevent, to the extent practicable and permitted by law, the introduction of invasive species and provide for their control and to minimize the economic, ecological, and human health impacts that invasive species cause.

STATE LAWS AND REGULATIONS

CONNECTICUT COASTAL MANAGEMENT PROGRAM

Connecticut's Coastal Management Program is administered by CTDEEP and is approved by the National Oceanic and Atmospheric Administration (NOAA) under the Federal Coastal Zone Management Act. Under the guidance of the Connecticut Coastal Management Act (CCMA), enacted in 1980, the Program ensures balanced growth along the coast, restores coastal habitat, improves public access, protects water-dependent uses, public trust waters and submerged lands, promotes harbor management, and facilitates research. The Connecticut Coastal Management Program also regulates work in tidal, coastal and navigable waters, and tidal wetlands under the CCMA (Section 22a-90 through 22a-112 of the Connecticut General Statutes), the Structures Dredging and Fill statutes (Section 22a-359 through 22a-363f) and the Tidal Wetlands Act (Section 22a-28 through 22a-35).

At the local level, development of the shoreline is regulated under the policies of the CCMA through municipal zoning boards and commissions, with technical assistance and oversight provided by Connecticut Coastal Management Program staff.

STORMWATER AND DEWATERING/DISCHARGE REGULATIONS

CTDEEP serves as the responsible agency for administering the state's National Pollution Discharge Elimination System (NPDES) storm water management program. Connecticut's storm water program is closely modeled after the federal NPDES program, which requires storm water be treated to the maximum extent practicable. Best Management Practices must be designed to remove 80 percent of the total suspended solids (TSS) load. At the state level, all construction sites disturbing more than one acre, many industrial sites, and all designated Municipal Separate Storm Sewer Systems are required to obtain a NPDES permit.

Construction activities that involve disturbance of more than one acre must develop and implement site erosion control and storm water management plans. Most construction activities are eligible for coverage under state-issued general permits. A CTDEEP Stormwater and Dewatering Wastewaters from Construction Activities General Permit ("General Permit") applies to all discharges of stormwater and dewatering wastewater from construction activities which result in the disturbance of one or more total acres of land area, regardless of project phasing. In the case of a larger plan of development, the estimate of total acres of site disturbance shall include, but is not limited to, road and utility construction, individual lot construction (i.e., house, driveway, septic system, etc.), and all other construction associated with the overall plan, regardless of the individual parties responsible for construction of these various elements.

There are a number of established and proposed total maximum daily loads (TMDLs) on Connecticut's watersheds, which often impact stormwater treatment requirements. For construction projects that have a total disturbed area of between one and five acres, the project owner shall agree to adhere to the erosion and sediment control land use regulations of the town in which the construction activity is conducted. No registration of a General Permit is required for construction activity that receives the town's review and written approval of its erosion/sediment control measures. If no review is conducted by the town, the permittee must register and comply with Section 6 of the General Permit which includes requirements for a Stormwater Pollution Control Plan. For construction projects with a total disturbed area of greater than five acres, registration is required to be submitted in order for the discharges to be authorized by this General Permit.

SECTION 401 WATER QUALITY CERTIFICATE

The Section 401 Water Quality Certification program is administered by the Inland Water Resources Division and Office of Long Island Sound Programs within the CTDEEP Bureau of Water Protection and Land Reuse. The program regulates any applicant for a federal license or permit who seeks to conduct an activity that may result in any discharge into the navigable waters, including all wetlands, watercourses, and natural and man-made ponds. Such persons must obtain certification from CTDEEP that the discharge is consistent with the Federal Clean Water Act and the Connecticut Water Quality Standards. Any conditions contained in a water quality certification become conditions of the federal permit or license. In making a decision on a request for 401 Water Quality Certification, CTDEEP must consider the effects of proposed discharges on ground and surface water quality and existing and designated uses of waters of the state.

CONNECTICUT NATURAL DIVERSITY DATABASE REVIEW

Section 26-310 of the Connecticut General Statutes requires that any activity that is authorized by a state agency, including any activity issued a permit by CTDEEP, must not threaten the continued existence of any endangered or threatened species. If an activity is located in an area of concern, CTDEEP's Connecticut Natural Diversity Database (CT NDDB) program will conduct a detailed review to determine any impact from the proposed project.

CONNECTICUT RIVER WATERSHED DESIGNATIONS

The Connecticut River, the largest river in New England, flows south 407 miles, from the Connecticut Lakes in northern New Hampshire, through Vermont, western Massachusetts, and central Connecticut into Long Island Sound. The estuarine portion of the river extends about thirty miles upstream from the river's mouth. The river serves as a major migratory route for diadromous fish, linking the estuarine waters of Long Island Sound and the marine environment of the Atlantic Ocean to freshwater inland rivers, streams, and lakes. The Connecticut River Valley is a major bird migration route between wintering grounds and summer nesting areas for many species of waterfowl, shore and wading birds, rails, raptors, and neo-tropical migratory song birds. The estuary, its wetlands, and surrounding buffer areas all provide important habitats and nutrients for a wide array of plant, invertebrate, fish, bird, and other wildlife species, including many listed as federal and/or state endangered, threatened, or of special concern.

There are several designations associated with the Connecticut River. It is an important river that is recognized on the international, national, and state levels for its unique environmental significance. On the international level, the tidal marshes at the mouth of the Connecticut River were recognized as "Wetlands of International Significance" by the Ramsar Treaty in 1994[1]. The Ramsar Treaty was originally signed in 1971 in Ramsar, Iran and provides a framework for the protection of wetlands and the correct and wise use of these resources. Under the same treaty, the lower Connecticut River is designated a "Wetlands of International Importance with Respect to Waterfowl." In 1993, the Nature Conservancy, an international nonprofit conservation organization, recognized the "Tidelands of the Connecticut River" as one of its Last Great Places campaign. The river was designated as one of 14 American Heritage Rivers by the Clinton Administration in the 1990s[2].

On the state level, the Connecticut General Assembly established the Connecticut River Gateway Commission in 1973 to protect the Lower Connecticut River through a state-local contract. The Gateway Conservation Zone was delineated along the shores of the Connecticut River, extending 30 miles upstream from the Long Island Sound, which encompasses much of the study area. The Commission has successfully preserved over 1,000 acres of land since its inception through gifts and purchases of scenic easements and development rights.

Portions of the Connecticut River watershed are part of the Silvio O. Conte National Fish and Wildlife Refuge, which was established "to conserve the abundance and diversity of the native plants and animals and their habitats in the 7.2 million acre Connecticut River watershed"[3]. The

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[1] http://www.ramsar.org/cda/en/ramsar-documents-list-anno-list-usa/main/ramsar/1-31-218%5E15774_4000_0__ (Accessed March 23, 2012).

[2] http://www.ct.gov/deep/lib/deep/long_island_sound/coastal_management/gatewaycommissionmission.pdf (Accessed March 23, 2012).

[3] http://www.fws.gov/r5soc/ (Accessed March 23, 2012).

parcels acquired by USFWS and designated as Conte Refuge property are not located within the project study area. Designations specific to the study area are discussed in the context of wetlands, terrestrial resources, and aquatic resources below.

C. EXISTING CONDITIONS

TERRESTRIAL RESOURCES

The existing ROW includes rail embankments located on both sides of the Connecticut River. The vegetation near the top of the embankment consists of upland species, whereas vegetation at the toe of the embankment resembles a transition area to extensive marsh and wildlife management areas. The vegetation near the top of the embankment comprises primarily woody and herbaceous species that are tolerant of disturbed conditions (e.g., the invasive tree-of-heaven [*Ailanthus altissima*]). As ground elevation approaches MHW at the embankment toe of slope, the vegetation transitions to estuarine scrub/shrub species that are tolerant of occasional tidal flooding (e.g., groundsel bush [*Baccharus halimifolia*] and northern bayberry [*Morella pensylvanica*]).

The fauna associated with these vegetative communities reflect the transitional nature of the site. Field visits were performed in 2008 and 2012 to confirm the existing natural resource conditions in the area. While specific species were not field-surveyed, this section describes the types of species likely to be found in present habitat. Bird species often found in both estuarine scrub/shrub vegetation and in upland plant communities common to disturbed ROW areas include seaside sparrows (*Ammodramus maritimus*), marsh wren (*Cistothorus palustris*), Connecticut warbler (*Oporornis agilis*), and brown-headed cowbird (*Molothrus ater*), among others. The superstructure of the existing Connecticut River Bridge may also provide nesting opportunities for barn swallows (*Hirundo rustica*). Examples of waterfowl that may occur in the study area include American black duck (*Anas rubripes*), mallard (*Anas platyrhynchos*), common merganser (*Mergus merganser*), Canada goose (*Branta canadensis*), and double-crested cormorant (*Phalacrocorax auritus*). Waterfowl hunting is permitted in the adjacent Wildlife Management Areas.

Mammalian species in the area likely include various rodents that inhabit tidal wetlands or upland wetland buffers (e.g., muskrat [*Ondatra zibethicus*] and meadow vole [*Microtus pennsylvanicus*]) or other species that opportunistically utilize the wetland/upland transition area (e.g., raccoons [*Procyon lotor*]). Reptiles and amphibians likely to occur within the upland and transitional zones of the site are those that are habitat generalists that are tolerant of the disturbed conditions along the ROW, and may include snapping turtles (*Chelydra s. serpentina*), Fowler's toad (*Bufo fowleri*), eastern American toad (*Bufo a. americanus*), northern spring peeper (*Pseudacris c. crucifer*), and garter snake (*Thamnophis sirtalis*).

FLOODPLAINS

The 100-year and 500-year floodplains for the project area are shown in Figure 10-1. The 100-year floodplain is the area with a 1 percent chance of flooding each year, and the 500-year floodplain is the area with a 0.2 percent chance of flooding each year. As shown in Figure 10-1, the majority of the ROW is within the 100-year floodplain. However, the tracks are above both the 100-year and 500-year floodplains, with the exception of the easterly bridge approaches just east of the Lieutenant River crossing. Small areas in the ROW on the Old Lyme side of the river are in the 500-year floodplain.

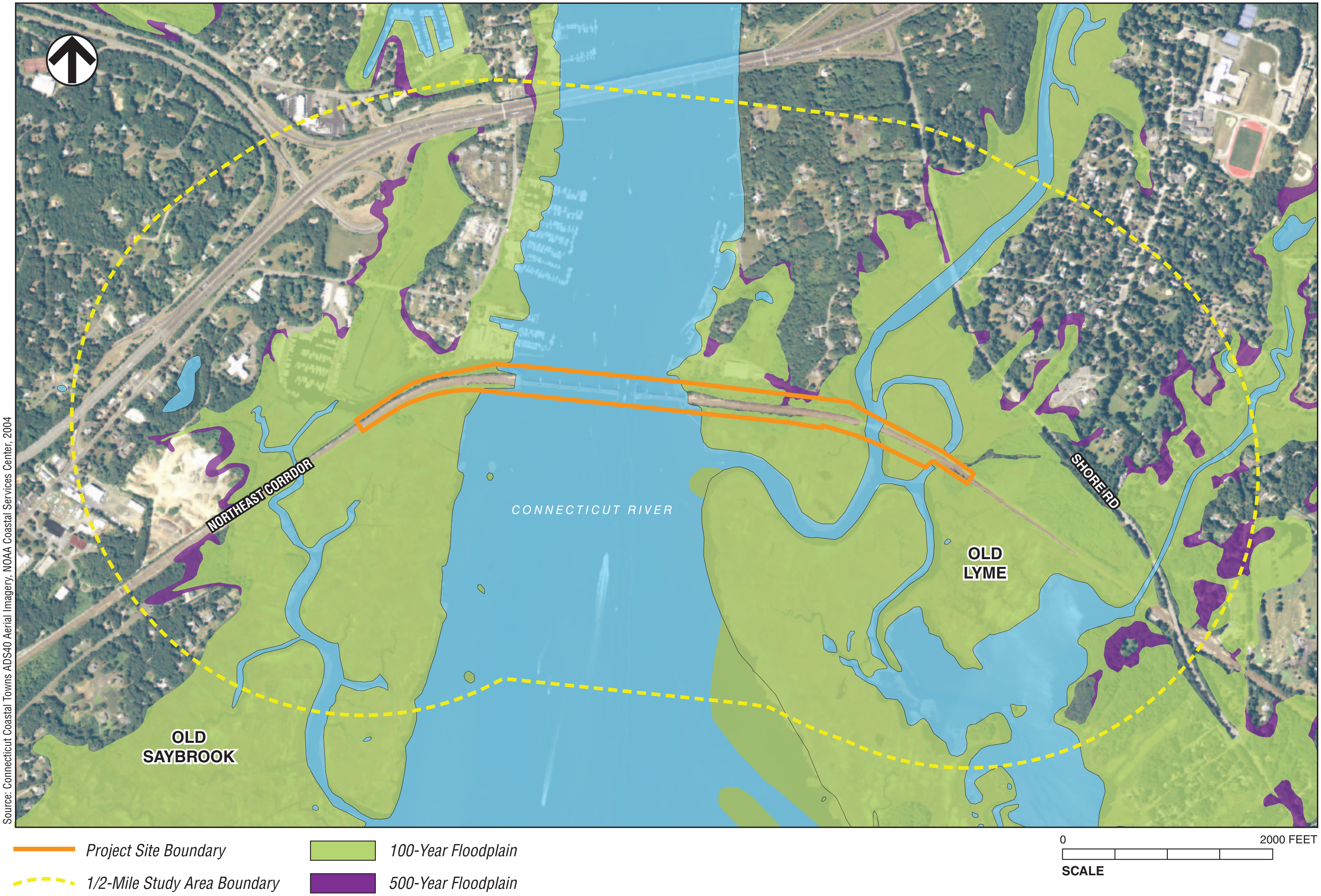


Figure 10-1
FEMA Floodplain

The study area is influenced by coastal flooding (i.e., long and short wave surges that affect the shores of the Atlantic Ocean and Long Island Sound) and tidal flooding along tidally influenced rivers, streams, and inlets (FEMA 2007) which is caused by astronomic tides and meteorological forces (e.g., northeasters and hurricanes (FEMA 2007)). The flood elevations within the study area range from 10.0 to 13.0 feet.[1] The embankments leading up to the bridge are classified as areas without wave action (Zone A8) and areas of minimal flooding (Zone C), with areas of wave action (Zone V9) associated with the areas in the immediate vicinity of wetlands. The existing bridge serves as a wave attenuating structure.

COASTAL ZONE

A description of coastal resources located within the project study area is provided in Appendix C.

WETLANDS

As shown in Figure 10-2, portions of the study area, particularly to the south of the bridge, consist of an extensive tidal marsh complex mapped by CTDEEP. On both sides of the river, these areas are designated as wildlife areas. In the Town of Old Saybrook, the marsh area to the south of the existing bridge (beyond the existing Amtrak ROW) is known as the Ragged Rock Creek Marsh Wildlife Management Area (WMA). In Old Lyme, the marsh area to the south of the existing bridge (beyond the existing Amtrak ROW) is known as the Roger Tory Peterson Wildlife Area, formerly called the Great Island Wildlife Area.[2]

These CTDEEP-mapped tidal wetlands and CTDEEP-designated wildlife areas roughly coincide with estuarine wetlands mapped by the NWI (see Figure 10-3). The majority of NWI-mapped vegetated wetlands within this portion of the Connecticut River, including the project site, are partially ditched or drained estuarine intertidal wetlands that are dominated by emergent vegetation that is irregularly flooded with mesholaine waters (i.e., salinity is 5.0 to 18.0 parts per thousand [ppt]) (E2EMP5d). The open waters of the Connecticut River in the vicinity of the project site are estuarine intertidal waters with a rocky shore that are irregularly flooded (E2RSP). NWI-mapped non-tidal freshwater wetlands are not present within the vicinity of the study area.

Vegetation of these wetlands consist of cordgrass species such as smooth cordgrass (*Spartina alterniflora*), salt meadow cordgrass *(S. patens)*, and the non-native, highly invasive common reed *(Phragmites australis*). The tidal wetlands on both sides of the river in the vicinity of the study area are considered to be brackish meadows dominated by cordgrasses. Other plant and herbaceous species such as seaside goldenrod (*Solidago sempervirens)*, arrow-grass (*Triglochin maritimum*), common three-square (*Scirpus pungens*), Olney three square (*Scirpus americanus*), and salt marsh fleabane (*Pluchea odorata*) are also present.

Although submerged aquatic vegetation (SAV) tends to occur in eastern Long Island Sound (mostly as eelgrass [*Zostera marina*]), the fluctuating salt wedge present in the project area precludes the establishment of eelgrass in the Connecticut River. Recent eelgrass mapping efforts conducted by the USFWS along Connecticut's shoreline confirm that eelgrass beds are not found the Connecticut River (USFWS 2006).

[1] Elevations are in NGVD29 Datum.

[2] http://www.depdata.ct.gov/wildlife/hunting/hntareas.asp (accessed March 23, 2012).

AQUATIC RESOURCES

SURFACE WATER RESOURCES IN THE PROJECT AREA

As mentioned above, the Connecticut River flows south 407 miles, from the Connecticut Lakes in northern New Hampshire, through Vermont, western Massachusetts, and central Connecticut into Long Island Sound. The river's drainage basin extends over 11,250 square miles (29,100 km^2). The mean freshwater discharge into Long Island Sound is nearly 16,000 cubic feet per second (cfs), or 453 m^3/s, providing about 70 percent of all freshwater input into the Long Island Sound. The flow of the river can range as high as 282,000 cfs (7985 m^3/s) and as low as 971 cfs (27 m^3/s). The river is tidally influenced up to Windsor Locks, near Hartford, approximately 60 miles (97 km) from the mouth. In addition to the Lieutenant River, significant tributaries of the Connecticut River include the Ashuelot, West, Miller's, Mill, Deerfield, White, and Chicopee Rivers (USFWS 1997).

The lower valley of the Connecticut River is tightly constrained by hills of bedrock. Because of its small cross-sectional area, the river supports little tidal volume flux. Its ratio of tidal inflow volume to freshwater flow volume during flood tide is about 0.5 for average conditions, compared to ratios of 10 and 140 for the Hudson and Delaware rivers, respectively. Figure 10-4 illustrates the typical limited excursion of saltwater from flood tide where lower density freshwater from upriver floats above saltier water from Long Island Sound. This results in a classic "salt wedge," where salinity values vary dramatically from surface to bottom at locations within the wedge. The formation of a salt wedge is ecologically significant, because organisms living within these areas of salinity variability have evolved physiological measures to tolerate these changes. As discussed below in "Aquatic Biota," this variability can lead to the presence of freshwater and saltwater species in the same area at the same time.

The Connecticut River transports a large amount of silt, especially during spring snow melt. As with many large rivers, the often heavy silt load results in the formation of a large and shifting sandbar near the mouth. Historically, this sandbar provided an obstacle to navigation, which is the primary reason that no large cities are located near the mouth of the river.

Several important tributary watercourses are present near the project area. A network of tidal creeks and ditches known as Ragged Rock Creek flows through a large marsh within the Ragged Rock Creek Marsh WMA in Old Saybrook. At the southeastern end of the project site in Old Lyme, the Lieutenant River represents a substantial input with a 12.1 mi^2 (3133 ha) watershed. This tributary flows through the Roger Tory Peterson Wildlife Area, under the eastern bridge approach, and discharges into the Connecticut River approximately 500 ft (150 m) south of the existing bridge.

The Connecticut River, Ragged Rock Creek, and the Lieutenant River within the vicinity of the study area are classified by CTDEEP as SB waterbodies. Class SB waters are designated for habitat for marine fish, other aquatic life and wildlife, commercial shellfish harvesting, recreation, industrial water supply, and navigation.

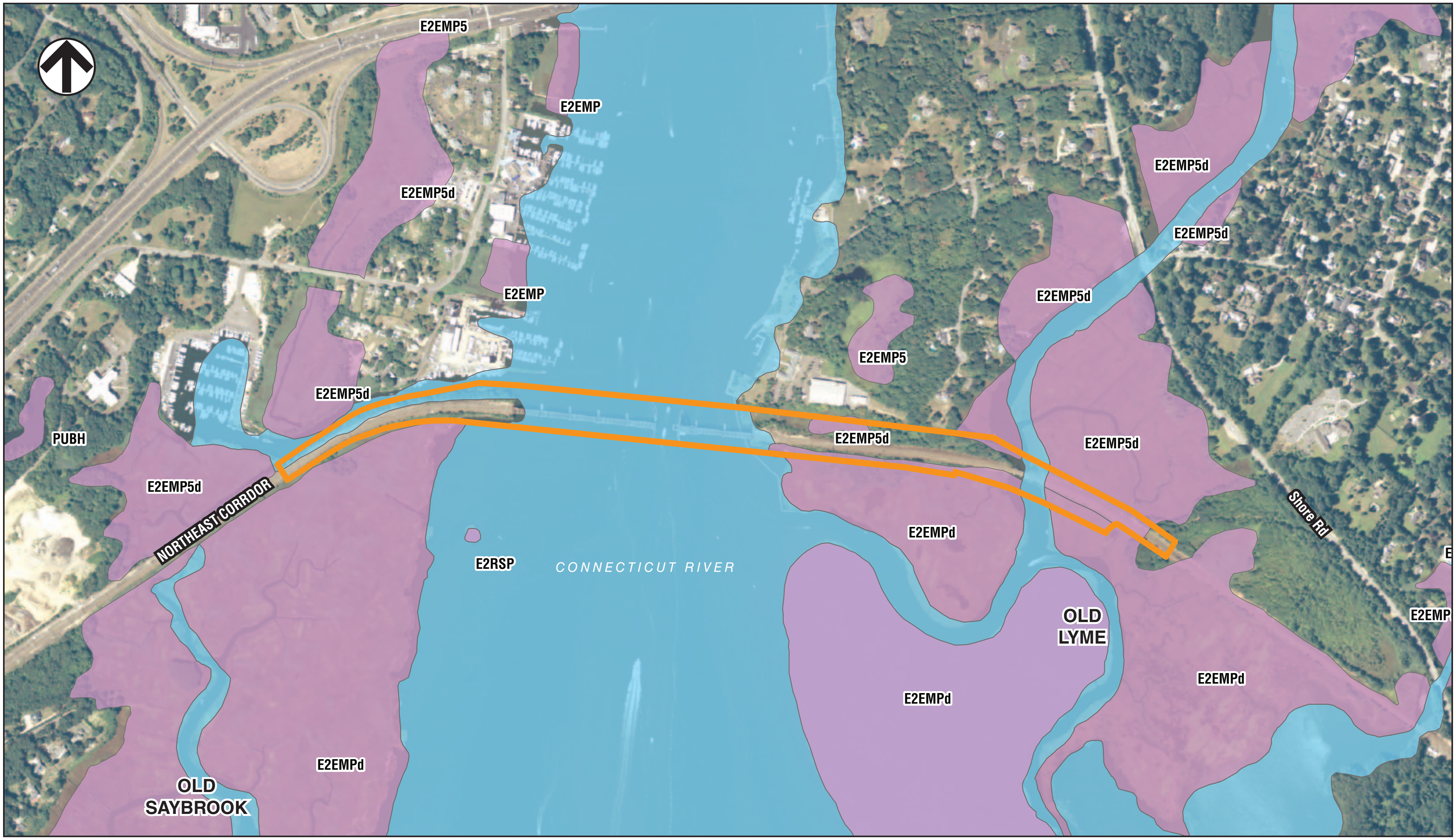
SEDIMENT QUALITY

The Connecticut River carries a heavy amount of silt, especially during spring snow melt, from as far away as Canada. As a fluvial source of sediments to Long Island Sound, the Connecticut River contributes approximately 42,000 tons (3.5×10^8 kg) of suspended solids per year (Gordon 1980, cited in Knebel et al. 1999).

5.23.12

Figure 10-2
CTDEEP Tidal Wetlands

5.23.12



Project Site Boundary

Estuarine and Marine Deepwater

Estuarine and Marine Wetland

(E2EMP) Estuarine Intertidal Emergent Irregularly Flooded

(E2EMPd) Estuarine Intertidal Emergent Irregularly Flooded /Drained

(E2EMP5d) Estuarine Intertidal Emergent Irregularly Flooded Mesohaline, Drained

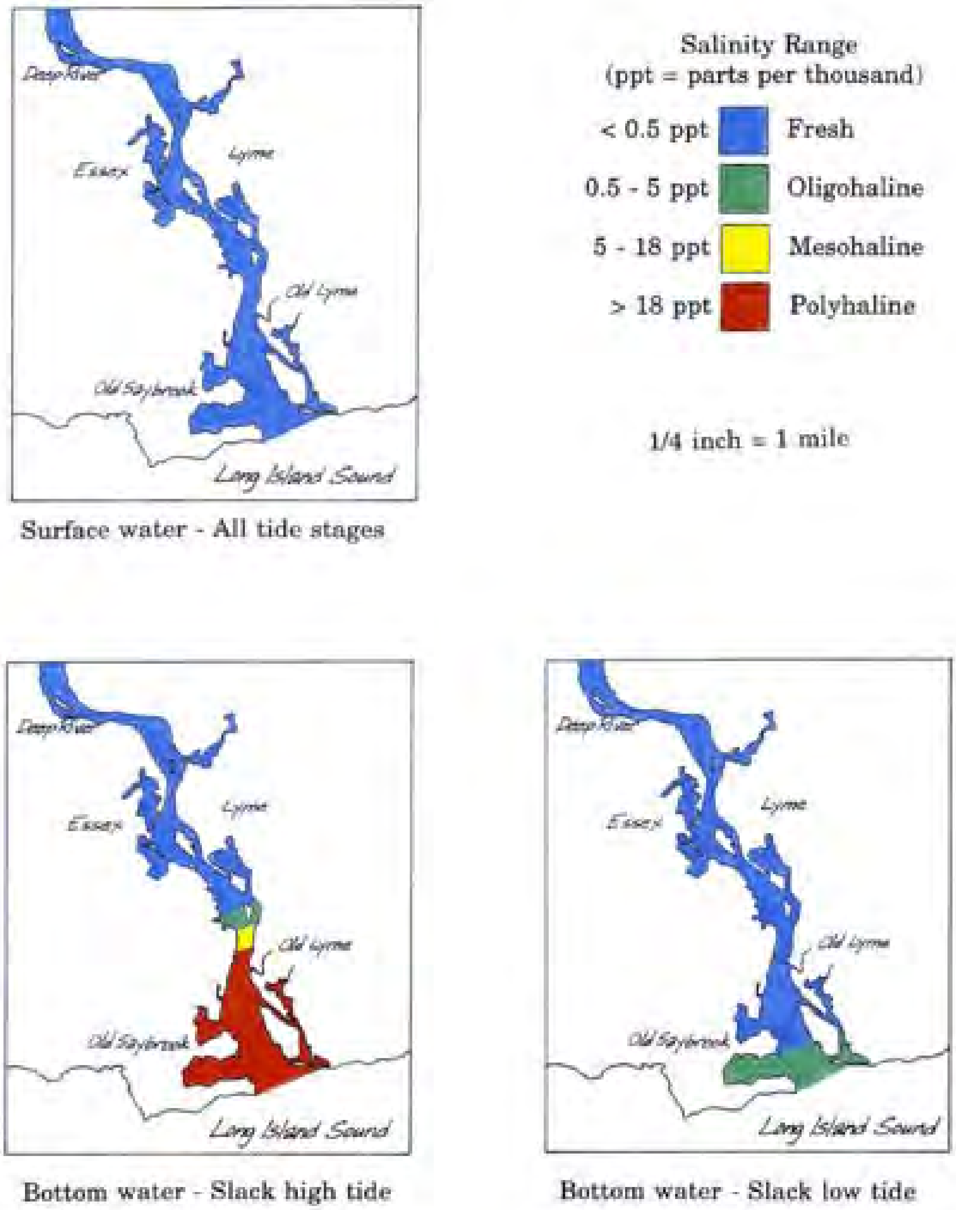
(E2RSP) Estuarine Intertidal Rocky Shore Irregularly Flooded

(E1UBL) Estuarine Subtidal Unconsolidated Bottom

Figure 10-3

National Wetlands Inventory (NWI)

6.20.08



Source: http://training.fws.gov/library/pubs5/ramsar/web_link/intro.htm

NOT TO SCALE

Figure 10-4

Spring Salinity Profile, Connecticut River (Early May 1993)

In general, sediments near the project area are coarse-grained sand overlain with a silt/sand surficial layer. Silt/sand is more predominant in the shallows on the nearshore portions of the river, while coarser sediments mixed with shell hash appear to be more predominant in the deeper channel areas (Hardesty and Hanover, LLP 2007). This grain-size distribution is consistent with that of other southern New England rivers and is similar to grain sizes reported from EMAP stations in Long Island Sound near the mouth of the Connecticut River.

Sediment contaminant data is available from USEPA EMAP from a 2000 sampling. The sediments indicated the presence of metals, including iron (13,200 µg/g), aluminum (5,560 µg/g), manganese (511 µg/g), zinc (49.5 µg/g), chromium (23.6 µg/g), lead (19.5 µg), copper (7.8 µg/g), nickel (6.36 µg/g), and arsenic (3.78 µg/g). Tin, silver, cadmium, and mercury were also present in concentrations of less than 1 µg/g. The presence of some these metals in the Connecticut River sediments near the project site may not imply anthropogenic sources. Some of these elements (e.g., aluminum and iron) are common in rocks and soils within the watershed. Silver, cadmium, chromium, copper, mercury, lead, and zinc, however, are considered anthropogenic metals. The concentrations of poly-aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), DDT congeners, and pesticides in the sediments near the project area were all below analytical detection limits in the EMAP sampling.

Currently, Connecticut Department of Public Health (CTDPH) advises against the consumption of bluefish or striped bass from waters of Long Island Sound and tributary rivers for high risk individuals, and recommends limited consumption for these species for lower risk consumers. The contaminants of concern associated with this restriction are PCBs, and although these contaminants do not originate in the Connecticut River, they are common regionally, as described above.[1]

AQUATIC BIOTA

Aquatic habitats within the project area include deep channel areas, shallow near-shore flats, intertidal mudflats, and tidal wetlands. A full aquatic biota discussion is provided in Appendix C; a summary is presented below.

Phytoplankton

CTDEEP published the results of photopigment-based plankton monitoring conducted between April 2002 and June 2004 (CTDEEP 2005). In these samples, diatoms represented over 51 percent of phytoplankton present. Fourteen percent of the samples were members of the class cryptophyceae (historically classified as diatoms, but more recently assigned a separate taxonomic class), and nine percent were dinoflagellates. Other taxa present included members of Euglenaphyceae, Prymnesiophyceae, and Cyanobacters (so-called “blue green algae”). The CTDEEP fact sheet for the monitoring program provides example illustrations of several species common in collections, including *Eucampia zoodiacus*, *Thalassionema nitzschoides*, *Skeletonema costatum*, and *Dinophysis* spp.

[1] Connecticut Department of Public Health. If I Catch It, Can I Eat It? A Guide to Eating Fish Safely 2011 Connecticut Fish Consumption Advisory Available: http://www.ct.gov/dph/cwp/view.asp?a=3140&Q=387460 (accessed March 29, 2012).

Zooplankton

Zooplankton taxa common in Long Island Sound include ctenophores, copepod crustaceans (especially *Acartia tonsa* and *Eurytemora* spp.) and the early life stages of fish, crabs, barnacles, shrimp, worms, mollusks, and echinoderms (sea stars and urchins). Zooplankton abundance in Long Island Sound peaks in spring and summer when organism density can reach over 200,000 individuals per cubic meter.

Benthic Invertebrates

A number of commercially and recreationally important shellfish are found in the lower Connecticut River Estuary. These include infaunal species such as the soft clam (*Mya arenaria*) and hard clam (*Mercenaria mercenaria*). In addition, epifaunal species such as eastern oysters (*Crassostrea virginica*), bay scallops (*Argopecten irradians*), blue mussels (*Mytilus edulis*), and blue crabs (*Callinectes sapidus*) may be present in the lower mixing zone of the estuary. The presence of these species may be ephemeral in the project area given widely and rapidly fluctuating salinity concentrations.

This mix of infaunal species near the proposed project is indicative of a highly dynamic waterbody with daily fluctuating salinity regime (salt wedge) driven by normal tidal exchange interacting with the geology of the Connecticut River. Benthic organisms permanently inhabiting the area of the existing bridge are tolerant of alternating exposure to salt and fresh water. In addition to daily fluctuations, the zone of mixing moves up or downriver in response to seasonal, annual, or longer-term changes in freshwater discharge, moving upriver during dry periods and extending well into Long Island Sound during rainy periods.

Fish

Several factors have contributed to the Connecticut River's importance as fish habitat. First, as discussed above, historic sandbar formation precluded the development of an urban center near the River's mouth. Therefore the lower part of the river has not experienced many of the impacts associated with urbanization such as large nutrient loads from urban combined sewer overlows, which can lead to toxic algae blooms and dissolved oxygen barriers that effectively prevent upstream and downstream movement of fish at critical times of the year. Secondly, the wetland complexes present near the mouth of the Connecticut River remain relatively undisturbed. These tidal marshes serve as vital nurseries to many species of juvenile fish, by providing forage, shelter from predators, and warmer temperatures that promote the development of early life stages of fish. Lastly, the Connecticut River's large drainage area (11,250 square miles (29,100 km^2) and associated tributaries provide extensive spawning areas for anadromous species (e.g., herring, shad, and salmon). Despite the installation of a number of upstream dams, the river still provides many miles of suitable fish habitat for important estuarine species.

Marine, estuarine, anadromous, and catadromous species are exist in the Connecticut River. Marine species include winter flounder, windowpane flounder, scup, red hake, and bluefish. Estuarine species common to the Connecticut River include resident species such as bay anchovy, Atlantic silverside, striped killifish (*Fundulus majalis*), mummichog (*Fundulus heteroclitus*), American sand lance (*Ammodytes americanus*) and summer flounder. Anadromous species that use the Connecticut River as a migration route include Atlantic salmon, striped bass, tomcod, and members of the herring family. The single catadromous species occurring in the Connecticut River is the American eel. Eels spawn in the Atlantic Ocean and the young move into the estuary in the spring (Fahay 1978, Moriarty 1978).

In addition, because of the complex tidal dynamic and typically short zone of freshwater/saltwater mixing, a number of common freshwater fish species can also occur in the lower Connecticut River near the project area under certain high flow, low salinity conditions. These species may include northern pike (*Esox lucius*), largemouth bass (*Micropterus salmoides*), smallmouth bass (*Micropterus dolomieu*), channel catfish (*Ictalurus punctatus*), white perch (*Morone americana*), and yellow perch (*Perca flavescens*), among others.

ESSENTIAL FISH HABITAT

The project area is located within the tidal Connecticut River and within an EFH-designated area bounded by: 41˚ 20.0 N; 72˚ 20.0 W; 41˚ 10.0 N; and 72˚ 30.0 W. Specific waterbodies identified as EFH within the Connecticut River estuary including those of the study area are the Connecticut River, Ragged Rock Creek, and southwest Lieutenant River. Within this area, EFH has been designated for 13 species, which are listed in Table 10-1.

Table 10-1
Essential Fish Habitat Designated Species for the Connecticut River

Species	Eggs	Larvae	Juveniles	Adults
Atlantic salmon (*Salmo salar*)			X	X
Pollock (*Pollachius virens*)			X	X
Red hake (*Urophycis chuss*)	X	X	X	X
Winter flounder (*Pseudopleuronectes americanus*)	X	X	X	X
Windowpane (*Scophthalmus aquosus*)	X	X	X	X
Atlantic sea herring (*Clupea harengus*)			X	X
Bluefish (*Pomatomus saltatrix*)			X	X
King mackerel (*Scomberomorus cavalla*)	X	X	X	X
Spanish mackerel (*Scomberomorus maculatus*)	X	X	X	X
Cobia (*Rachycentron canadum*)	X	X	X	X
Sand tiger shark (*Carcharias taurus*)		X*		
Little skate (*Leucoraja erinacea*)			X	X
Winter skate (*Leucoraja ocellata*)			X	X

Note: "X" denotes that the river is designated as EFH for the life stage; * denotes neonates.
Source: National Marine Fisheries Service. "Summary of Essential Fish Habitat (EFH) Designation." Available: http://www.nero.noaa.gov/hcd/STATES4/conn_li_ny/41107220.html (accessed on March 29, 2012).

Juvenile Atlantic salmon and bluefish use these habitats, as are winter flounder and windowpane. The nine other EFH species are more commonly found in deeper habitats and higher salinities, particularly king mackerel, Spanish mackerel, and cobia. For those EFH species likely to occur in the vicinity of the project area, the short duration and localized extent of construction activities and similar operation of the existing and replacement bridges means that the proposed project will not result in adverse impacts to the populations. Limitations on in-water construction activities during the migration window will protect anadromous species, including Atlantic salmon, which could move through the project area to freshwater spawning habitat upstream in the Connecticut River. See Appendix C for the full EFH Assessment.

MARINE TURTLES

The diamondback terrapin is the only marine species of turtle that regularly occurs in Connecticut. The turtles hibernate during winter submerged in the mud of tidal creeks. It is most often found west of the Connecticut River, but has the potential to occur within the Connecticut River within the project site (CTDEEP 2008).

Four other species of marine turtles, Kemps ridley (*Lepidochelys kempii*), loggerhead (*Caretta caretta*), green sea turtle (*Chelonia mydas*) and leatherback sea turtle (*Dermochelys coriacea*), all state and federally listed, occasionally occur in northeastern waters and Long Island Sound (LISS 2009). The Kemps ridley occurs in Long Island Sound and, in New York, has been documented as the most abundant sea turtle (CTDEEP 1999). Although the loggerhead is found in concentrated numbers within New England, it is rarely found in Connecticut Waters (CTDEEP 2011). Green turtles have never been found along Connecticut's shorelines, but they may occasionally migrate through Connecticut's waters (CTDEEP 2011). Leatherback sea turtles are usually restricted to the higher salinity areas (Turtle Expert Working Group 1998). These four species neither nest in the Connecticut River, nor reside there year-round. Therefore, these species are not likely to occur within the Connecticut River except as transients.

ENDANGERED, THREATENED, AND SPECIAL CONCERN SPECIES

CONNECTICUT DEPARTMENT OF ENERGY AND ENVIRONMENTAL PROTECTION

According to information received from CTDEEP in 2012,[1] CTDEEP has documented three state-listed fish species and six plant species as occurring within a 0.5 mile study area of the proposed project. Brief descriptions of these species are provided below.

Fish

In the project area, three species of fish are state and/or federally listed as endangered, threatened, or species of special concern: shortnose sturgeon, Atlantic sturgeon, and blueback herring.

The shortnose sturgeon (*Acipenser brevirostrum*) is a federally- and state-listed endangered species. It is typically an anadromous species, migrating from saline estuaries (and occasionally the Atlantic Ocean into fresh water to spawn. Shortnose sturgeon are found along the Atlantic coast of North America in estuaries and large rivers such as the Hudson, Delaware, and Susquehanna (Chesapeake Bay). Shortnose sturgeon are distributed throughout the Connecticut River from the mouth at Long Island Sound (RM 0) to the Turners Falls Dam (RM 123). Over this range there are two mostly discontinuous populations of shortnose sturgeon separated by the Holyoke Dam (RM 87; NMFS 2011a). Within the river, shortnose sturgeon can be found in discrete "concentration areas" located at Deerfield above the Holyoke Dam (RM 89-119), Agawam (RM 71-74) and in the lower Connecticut River (RM 0-68) (Kynard et al. 2012). These concentration areas serve as habitat for summer feeding, spawning, and overwintering depending on season and life stage (Buckley and Kynard 1985). In general, shortnose sturgeon remain within the freshwater portion of the river above the salt front, based on acoustic telemetry studies in the Connecticut River (Buckley and Kynard 1985).

[1] Correspondence dated May 08, 2012 from Nelson DeBarros, CTDEEP Wildlife Division to Aubrey McMahon, AKRF, Inc.; and email correspondence dated May 18, 2012 between Elaine Hinsch, CTEEP Wildlife Division, and Aubrey McMahon, AKRF, Inc.

Shortnose sturgeon spawn in the spring between late April and late May at spawning grounds located well upstream of the project area near Montague, MA (RM 120) (NMFS 2011a). Due to the location of spawning areas well upstream of the salt front and the project area, early life stages of shortnose sturgeon (eggs, larvae, juveniles age-0 and 1) do not occur in the project area (NMFS 2012, Kynard et al. 2012). Older juveniles are also not likely to occur in the project area during the spring and summer months as they typically migrate upstream during this time of the year (NMFS 2011b). Even during the rest of the year, juveniles are more commonly found upstream of the salt front.

Shortnose sturgeon are most likely to occur in the project area between late April and mid-May when river flows are greatest and salinities are low (NMFS 2011a). By mid-June, most shortnose sturgeon migrate to foraging areas upstream of RM 12 where they spend the summer months (August – October) foraging near the Holyoke Dam (RM 87; NMFS 2011a). During the fall months, adult shortnose sturgeon migrate to overwintering habitats near the spawning grounds in the freshwater portion of the river and remain there until spring (Savoy 2004, NMFS 2011b).

The Atlantic sturgeon (*Acipenser oxyrinchus*) is a federally-listed endangered[1] and state-listed threatened species. It is also typically anadromous, sharing much of their range with the closely-related shortnose sturgeon. Of the two species, Atlantic sturgeon can grow considerably larger. In terms of life history, in relatively unperturbed rivers the Atlantic sturgeon tends to be more oceanic than shortnose sturgeon and does not typically migrate as far upstream to spawn. Although shortnose and Atlantic sturgeon are both expected to occur at least intermittently in the study area, neither species is found there in exceptionally high abundance based on their distribution within the Connecticut River and Long Island Sound and their association with deep-water areas of the river (Savoy and Pacileo 2003, Savoy and Benway 2004). The majority of Atlantic sturgeon (post-migrant juveniles) collected during trawl surveys in Long Island Sound and the lower portion of coastal rivers have been found in the Central Basin area of Long Island Sound (Savoy and Pacileo 2003, Savoy and Benway 2004). Only a small percentage of those Atlantic sturgeon have been observed in the lower part of the river. Atlantic sturgeon occurring in the project area are subadults (<1,100 mm fork length) primarily from the Hudson River population (Savoy and Pacileo 2003, Savoy and Benway 2004). Once they enter the river during late spring (May), the majority of Atlantic sturgeon are found in discrete, deep-water areas (>9 m in depth) upstream (RM 6-16) of the project area (Savoy and Pacileo 2003). Atlantic sturgeon leave the Connecticut River during early fall (September). There is not a spawning population in the Connecticut River (Kynard et al. 2012); therefore, Atlantic sturgeon eggs, larvae, and early juveniles (age-0 and 1) are not expected to occur in the project area.

Blueback herring (*Alosa aestivalis*) is a state-listed species of concern, in response to declining stocks. In Connecticut, populations have seen a sharp decline since around 1990. Major causes for the decline in populations are dams, habitat degradation, fishing, and predation. Blueback herring are anadromous, spending their adult lives schooling in pelagic waters and feeding on plankton (NOAA 2007). Adult blueback herring are transient inhabitants of the Connecticut River, migrating from Long Island Sound to shallow, freshwater sections of the river to spawn between mid-April and June (USFWS 2010). Similarly larval and juvenile blueback herring

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[1] On February 2, 2012, certain distinct population segments (DPS) were designated as federally endangered. The New York Bight DPS, which includes species that are spawned in the watersheds that drain into coastal waters, including the Connecticut River and Long Island Sound, is one of the populations that have been recently listed under the ESA.

reside primarily in the freshwater portions of the Connecticut River, and only until they reach approximately 5 cm in length. Because the site of the proposed project is located in a high-salinity (30 ppt) section of the river, larval blueback herring are not likely to be present in the study area, and juveniles are only likely to occur seasonally as they migrate out to the ocean during the late summer and fall (August-September; USFWS 2010, NOAA 2007). Blueback herring are not expected to occur in the Connecticut River between fall and spring.

All three fish species have the potential to occur within the vicinity of the proposed project.

Plants

As stated above, the CTDEEP NDDB reported six state-listed plant species within a ½-mile radius of the project site. Two of these species, pygmy weed (*Crassula aquatic*) and saltmarsh bulrush (*Bolboschoenus novae-angliae*), are documented as occurring within or immediately adjacent to the project site (CTDEEP 2012). Pygmy weed is a state-listed endangered species and is found on the margins of pools and along fresh to tidal shores (Fernald 1950), as well as muddy shores near the coasts usually within the limits of the tide (Gleason and Cronquist 1963). Saltmarsh bulrush is a state-listed species of special concern and is found in brackish to saline marshes along the coast (Gleason and Cronquist 1963) and brackish to fresh tidal shores (Fernald 1950).

The other four species listed by the NDDB including bayonet grass (*Bolboschoenus maritimus ssp. paludosus*), lilaeopsis (*Lilaeopsis chinensis*), mudwort (*Limosella australis*), and eastern prickly pear (*Opuntia humifusa*)have the potential to occur within the project site and have been documented within the 0.5 mile study area but have not been documented as occurring within or immediately adjacent to the site. All of these species are listed as special concern species by the state. Bayonet grass is found in salt marshes and alkaline marshes (Gray and Fernald 1987). Lilaeopsis is found in brackish tidal mudflats (NYNHP 2011). Mudwort is found on wet sands, as well as brackish to freshwater shorelines, and tends to grow in the mid to lower intertidal zone (MDC 2010). Eastern prickly pear is found on sandy or rocky soils, and is tolerant of salt-spray (Newcomb 1977). Due to the proximity to tidal marshes, shores, and upland areas of the ROW, all of these species have the potential to occur within the study area.

Birds

During an earlier phase of the project in 2007, CTDEEP NDDB also reported that several state-listed wetland birds had the potential to occur within the project study area[1]. These birds included the state-listed endangered black rail (*Laterallus jamaicensis*), state-listed threatened bald eagle (*Haliaeetus leucocephalus*), and state-listed threatened least bittern (*Ixobrychus exilis*). While these birds were not referenced in the most recent correspondence from CTDEEP, they have been considered in this EA to provide a conservative analysis.

Bald eagles regularly use the Connecticut River as a travel corridor during the winter months, from December through March. The black rail is a secretive wetland bird that prefers high coastal marshes (upper portions of salt and estuarine marshes) and wet meadows as nesting and foraging habitat. The least bittern is also a secretive wetland bird that nests in marsh complexes and is most susceptible to human disturbance during the breeding season. CTDEEP indicated that the breeding season for both species is approximately mid-April through the end of July, and

[1] Correspondence dated February 3, 2007 from Jenny Dickson, CTDEEP Wildlife Division to Priscilla Bailie, Marine and Freshwater Service. (see Appendix C).

recommended that construction along salt marsh areas be conducted outside the breeding season to reduce potential disturbance to these species.

U.S. FISH & WILDLIFE SERVICE

The project team sent a letter requesting information on threatened and endangered species to the USFWS Connecticut River Coordinator on June 16, 2008. In a response dated July 16, 2008 (see Appendix C “Natural Resources”), the USFWS confirmed that no federally-listed or proposed threatened or endangered species, or critical habitat were known to occur in the project area and that no further consultation with the USFWS under Section 7 of the ESA is required. In its correspondence, the USFWS indicated that future Section 7 requests should be made first by reviewing the “Federally Listed Endangered and Threatened Species in Connecticut” available on the New England Field Office’s Website. On March 5, 2012, this list was reviewed. The only species that is listed for Old Saybrook and Old Lyme is the state-listed threatened piping plover (*Charadrius melodus*). The piping plover is found along seacoasts, on isolated, sandy beaches with little vegetation and access to mudflats for feeding (CTDEEP 1999). The piping plover is not expected to occur within the project area as the preferred habitats are not present.

NATIONAL MARINE FISHERIES SERVICE

The project team sent a letter requesting information on threatened and endangered species on June 16, 2008 and October 13, 2011 to the Protected Resources Division within the NMFS Northeast Division. In responses dated July 2, 2008 and October 24, 2011 (see Appendix C), NMFS identified the shortnose sturgeon as occurring within the project a rea. In addition, on October 24, 2011, the NMFS indicated that the Distinct Population Segments (DPS) of the Atlantic sturgeon (*Acipenser oxyrinchus*)—including the New York DPS (which encompasses the Connecticut River)—were proposed for listing under the ESA. On February 2, 2012, the New York DPS of Atlantic sturgeon was listed and is now covered under Section 7 of the ESA. As explained below and in Appendix C, NMFS subsequently confirmed that no further consultation pursuant to Section 7 of the ESA is required.

D. NO ACTION ALTERNATIVE

The No Action Alternative consists of planned improvements in the primary and secondary study areas that are scheduled for the near future or are included in the long range transportation plans for the region and are expected to be completed by 2030. Included are small scale projects that maintain the system in a state of good repair and larger investment projects that involve substantial improvements to the transportation system in the region; however, no changes to the ecology of the study area from these projects are expected in the future.

The No Action Alternative assumes the Connecticut River Bridge will remain in service as is, with continued maintenance and minimal repairs. The existing rail ROW, embankment, and bridge structures will remain intact.

E. PROBABLE IMPACTS OF THE PREFERRED ALTERNATIVE

As discussed in Chapter 2, “Project Alternatives,” the Preferred Alternative involves off-line replacement to the south of the existing bridge. Amtrak has identified two feasible options of the Preferred Alternative; Option A will include a bascule bridge, while Option B will include a vertical lift bridge. The natural resource impacts associated with the two options of the Preferred Alternative are similar to one another, unless otherwise noted below.

TERRESTRIAL RESOURCES

As discussed above under "Existing Conditions", terrestrial resources potentially affected by the project are confined to those within Amtrak's ROW and possible construction staging areas. The removal of some scrub/shrub vegetation along the existing embankment may be necessary to accommodate the new alignment and construction access, but Amtrak will minimize the extent of vegetation removal to the extent practical. These areas have relatively little value as terrestrial habitat, and as such, no significant permanent impacts to terrestrial natural resources are expected. The proposed project will not result in increases in rail traffic or train speed, therefore no long-term noise impacts on local reptile, bird, and mammal reproduction, foraging, or movement will be occur.

FLOODPLAINS

The Preferred Alternative will not significantly impact floodplains. In-water piers and other support structures do not constrict tidal or freshwater flows, and are expected to be virtually identical to the existing structures with respect to flood water throughput. The bottom of steel of the new bridge superstructure will be located above the 100-year flood elevation. Small areas of fill in tidal floodplains associated with embankment widening and pier installation encroach into the floodplain. Because the Connecticut River and adjacent coastal floodplains are entirely tidal in the project area, this fill will not impact the capacity of the river to absorb flood waters. Since the project area is located near the mouth of the river at Long Island Sound, the ultimate flood storage capacity that should be considered for the site is that of Long Island Sound and the Atlantic Ocean.

COASTAL ZONE

CTDEEP has confirmed that a formal coastal management consistency review should be performed during the subsequent preliminary engineering and permitting phase, rather than during the environmental review phase[1]. At that time, Amtrak will submit a complete "Coastal Management Consistency Review Form for Federal Activities" along with all required attachments and will seek a formal Coastal Zone Consistency Determination from CTDEEP.

However, as part of this EA, the project team performed a preliminary coastal zone consistency analysis to determine the project's anticipated effects on coastal resources. The applicability of and consistency with each individual coastal zone policy is discussed in Appendix C. Overall, the proposed project is consistent with Connecticut's Coastal Management Program.

WETLANDS AND OPEN WATER

Due to the nature and location of the river crossing and the need for continuous operations along the Northeast Corridor, complete avoidance of wetland and open water areas will not be feasible. Based on the conceptual bridge design, it is estimated that the Preferred Alternative will result in

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[1] Personal communication between Leslie Mesnick-Uretsky of AKRF, Inc., and Susan Bailey of CTDEEP on April 3, 2012 and between Leslie Mesnick-Uretsky of AKRF, Inc. and Frederick Riese of CTDEEP on April 4, 2012.

approximately 2.8 acres of permanent wetland impacts and 0.74 acres of permanent open water impacts. Removal of the existing Connecticut River Bridge may result in approximately 0.33 acres of restored open water, for a net project impact of 0.41 acres. As discussed in Chapter 12, “Construction Impacts”, temporary access roadways and construction platforms will temporarily impact wetlands and open water. Based on the conceptual bridge design and the anticipated construction means and methods, it is estimated that approximately 3.2 acres of wetlands and 2.0 acres of open water will be temporarily impacted during the construction period. The differences in impacts between Option A and Option B are expected to be minor.

To the extent practicable, Amtrak will minimize environmental impacts through the use of retaining walls and by locating the new bridge alignment close to the existing alignment. These impact estimates (shown in Table 10-2) have been based on conceptual engineering performed to date and will be refined during the preliminary engineering and permitting phase. Mitigation measures to address these impacts are described in Section F, below. After appropriate mitigation measures are implemented, no significant adverse wetland or open water impacts will result from the proposed project.

Table 10-2
Estimated Wetland and Open Water Impacts

Impact Type	Western Approach	Eastern Approach	New Bridge	Total
Permanent Wetland	1.28	1.49	-	**2.77**
Permanent Open Water	0.23	0.26	0.25*	**0.74***
Temporary Wetland	2.40	0.78	-	**3.18**
Temporary Open Water	-	-	2.04	**2.04**

Note: * The removal of the existing bridge may restore approximately 0.33 acres of open water, for a net project impact of 0.41 acres of open water (0.74 – 0.33 = 0.41 acres).

AQUATIC RESOURCES

Because the proposed project is for bridge replacement, long-term future operational effects will be similar to those of the existing bridge and no adverse operational impacts to aquatic resources are anticipated. The potential for impacts to aquatic resources during the construction period are assessed in Chapter 12, “Construction Impacts”.

THREATENED OR ENDANGERED SPECIES

Because the proposed project is for bridge replacement, long-term future operational effects will be similar to those of the existing bridge and no adverse operational impacts to threatened and endangered species are anticipated. The potential for impacts to threatened and endangered species during the construction period are assessed in Chapter 12, “Construction Impacts”. As shown in Appendix C, USFWS and NMFS have confirmed that no further consultation pursuant to Section 7 of the ESA is required.

F. MITIGATION MEASURES

Due to the nature and location of the river crossing and the need for continuous operations along the Northeast Corridor, complete avoidance of wetland and open water areas will not be feasible for the Preferred Alternative. Consistent with Executive Order 11990, Amtrak has determined that there is no prudent and feasible alternative to avoid construction in wetlands and therefore measures to minimize harm have been considered. Amtrak has incorporated efforts to minimize wetland impacts into the conceptual design for the proposed project. Amtrak will continue to minimize these impacts to the extent practical as the project proceeds into the preliminary and final engineering stages. Amtrak may add other sedimentation control measures, such as silt fences, hay bales, sedimentation basins, slope stabilization measures, and sediment booms, during the final design phase for the Preferred Alternative.

Amtrak conservatively estimated the impacts on wetlands, open water, and benthic habitat presented in this EA using mapping resources and conceptual engineering alignments. Once engineering design has sufficiently progressed and the permitting phase of the project has begun, Amtrak will field-verify the acres of ecological resource impact. Field reviews will follow scientifically acceptable methods based on the 1987 USACE Wetland Delineation Manual, Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region (Version 2.0) and methods outlined by the American Society of Testing and Materials (ASTM). Based on these field reviews and the final engineering design, Amtrak will calculate the exact impacts to wetlands and open water for use as the final basis for mitigation measures. Amtrak will then determine the appropriate mitigation measures through coordination with CTDEEP, USACE, USCG, and other relevant regulatory bodies during the permit process. The most likely mitigation measures include:

- Purchasing credits from a state- and/or federally-approved wetland mitigation bank;
- Completion of a project-specific mitigation at a nearby site. This could include the establishment, restoration, or enhancement of wetlands;
- Assistance with or contributions to other mitigation measures being implemented as part of other nearby transportation or development projects.

Amtrak will develop the exact mitigation ratios in coordination with natural resource management agencies. These ratios will be based on factors including but not limited to: value, function, and type of wetland impacted; existing contamination within the project area; and the availability of suitable in-kind restoration areas. With the implementation of these mitigation measures, no significant adverse wetland or open water impacts will result from the proposed project.

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Chapter 11: Contaminated Materials

A. INTRODUCTION

This chapter addresses the potential for the presence of contaminated materials resulting from past and present uses of the site and adjacent areas, and potential risks from the proposed project with respect to any such materials. The Preferred Alternative will involve the construction of a replacement bridge to the south of the existing bridge alignment and the subsequent demolition of the existing bridge. The Preferred Alternative will also involve the placement of fill to extend existing embankments and subsurface excavation on the bridge approaches to replace track and ties, creating the potential to discover contaminated materials.

Contaminated materials are potentially harmful substances that may be present in soil, groundwater, or building materials and may pose a threat to human health or the environment. These materials are frequently encountered during construction activities in areas that have been subject to past disturbance from construction, excavation, filling and industrial uses. Generally, "contaminated material" is used interchangeably with "regulated material" or "hazardous material," but none should be confused with the term "hazardous waste," which is a regulatory term.[1] This chapter assesses the potential for the presence of contaminated materials on the project site, the potential for exposure to them during and after the construction of the project, and the specific measures that will be employed to protect public health, worker safety, and the environment in the event of contaminated materials' presence within the project boundaries.

The analysis begins by considering the location, type, and extent of contaminated materials that may be present. As described below, Amtrak conducted this assessment through a review of historic maps and aerial photos, regulatory records and databases. This evaluation focuses on the potential for encountering contaminated materials during demolition and construction activities rather than post-construction use of the new bridge, since bridge demolition and construction work will disturb the soil and, in some locations, groundwater. Finally, the chapter describes the measures that Amtrak will implement to avoid potential impacts both during construction and once the project is completed and operational.

POTENTIAL CONTAMINANTS OF CONCERN

Soil and groundwater in the project site can be contaminated as a result of past or present uses on the project site or adjacent properties. Most of the area affected by the project is currently or was historically used for railroad purposes. Over time, railroad-related maintenance, train traffic, freight hauling and related activities could have led to contamination from spills or leaks. Along rail lines, common contaminants include volatile and semi-volatile organic compounds, heavy

[1] "Hazardous waste" is defined in the USEPA regulations (40 C.F.R. Part 261) and refers to a subset of solid wastes that are either specific wastes listed in the regulations (listed wastes) or solid wastes possessing the characteristics of ignitability, reactivity, corrosivity, or toxicity (characteristic wastes).

metals, pesticides, and herbicides. The project site may also have been contaminated by past or present uses of neighboring properties. In addition, much of the rail ROW was built on fill material of unknown origin, which could contain contaminants such as PAHs and heavy metals. Some of the potential common contaminants of concern for the project site and adjacent uses are discussed below.

- *PCBs*. Commonly used as a dielectric fluid in train-mounted or other electrical transformers.
- *Heavy metals, including lead, cadmium, chromium, and mercury*. These have been widely used in many industries, including printers, foundries, and metal working facilities, and are found in paint, ink, petroleum products, and coal ash. Lead is also a common component of paint on bridges or other steel structures.
- *VOCs*. These include aromatic compounds (such as benzene, toluene, ethyl benzene, and xylene [BTEX]), which are found in petroleum products used in fuels, equipment repair and metal works, as well as many other industries; and chlorinated compounds (such as tricholoroethene and tetrachloroethene, common ingredients in solvents and cleansers) used in degreasing, dry cleaners, and other industrial facilities. Soil and groundwater can become contaminated with VOCs and vapors can be released, especially during excavation activities. In addition, some VOCs, such as methane, can be flammable if the vapors are confined. Methane is produced from the breakdown of organic materials and can be associated with marsh deposits as well as landfilling with putrescible wastes.
- *Semivolatile Organic Compounds (SVOCs)*. These include PAHs (which are common constituents of partially combusted coal or petroleum-derived products); coal-derived products such as creosote applied to protect rail ties; and coal and coal ash used as fill material.
- *Pesticides and Herbicides*. These are commonly used to control rodents and/or insects, and vegetation along rail lines.
- *Fuel Oil and Gasoline Storage Tanks*. Rail operations, businesses, and industries currently or formerly located in the vicinity of the site may have used aboveground storage tanks (ASTs) or underground storage tanks (USTs) for fuels. Some of these tanks may have been removed. Other tanks, although no longer in use, may remain buried in place. Soils and groundwater in proximity to fuel oil and gasoline storage tanks may be contaminated because of ongoing or past leaks or spills. Fuel oil and gasoline from off-site sources may have migrated to the project site, contaminating soil and groundwater on-site.
- *Asbestos*. Potentially asbestos-containing materials may be located within structures or on underground steam pipes, or at (illegal) dumping sites.

B. REGULATORY CONTEXT AND METHODOLOGY

APPLICABLE REGULATIONS

There are numerous regulations regarding contaminated materials at the federal and state levels. The applicable industry standards, regulatory requirements, guidelines and rules for contaminated materials investigations are listed in Table 11-1.

Table 11-1
Federal and State Regulations for Contaminated Materials

Regulation Type	Regulation
Federal	U.S. Environmental Protection Agency (USEPA) – National Environmental Policy Act (NEPA), 42 U.S.C. s/s 4321 (1969)
	USEPA – Clean Water Act (CWA), 33 U.S.C. s/s 1251 et seq. (1977)
	USEPA – Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 U.S.C. s/s 9601 et seq. (1980)
	USEPA – Resource Conservation and Recovery Act (RCRA), 42 U.S.C. s/s 321 et seq. (1976)
	USEPA – Safe Drinking Water Act (SDWA), 42 U.S.C. s/s 300f et seq. (1974)
	USEPA – National Emissions Standards for Hazardous Air Pollutants (NESHAPS), 40 C.F.R. Part 61
	USEPA – 40 C.F.R. Parts 260, 261, 262, 263, 266, 268, and 280
	USEPA – Asbestos Hazardous Emergency Response Act (AHERA), 40 C.F.R. Part 763
	USEPA – Lead: Requirements for Lead-Based Paint Activities in Target Housing and Child-Occupied Facilities; Final Rule, 40 C.F.R. Part 745
	Occupational Safety and Health Administration (OSHA) – 29 C.F.R. 1910.120, 1910.1001,1910.1101, 1926.62, and 1929.58
	U.S. Department of Housing and Urban Development (HUD) – Guideline for the Evaluation and Control of Lead Based Paint Hazards in Housing pursuant to Title X of the Housing and Community Development Act of 1992
	Toxic Substances Control Act (TSCA), 15 U.S.C. s/s 2601 et seq. (1976)
	OSHA – Lead: Occupational Health and Environmental Controls, 29 C.F.R. 1926.62
	OSHA – Asbestos, 29 C.F.R. 1926.1101
	Federal Highway Administration (FHWA) – Technical Advisory, T6640.8A (1987)
	FHWA – Supplementary Hazardous Waste Guidance (1997)
	FHWA – Hazardous Wastes in Highway Rights-of-Way (1994)
	FHWA – Interim Guidance, Hazardous Waste Sites Affecting Highway Project Development (1988)
	FHWA – Policy Revision to Support the Brownfield Economic Redevelopment Initiative (1998)
Connecticut	Connecticut Environmental Protection Act, 22a-1g
	CTDEEP Remediation Standards, 22a-133
	CTDEEP Underground Storage Tank Regulations, 22a-449(d)
American Society for Testing and Materials Guidelines	ASTM E1527-05 Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process

ASTM PHASE I ENVIRONMENTAL SITE ASESSMENT

The typical assessment of a property used to determine the potential presence of contaminated materials is referred to as a Phase I Environmental Site Assessment (ESA) and includes a records search within radii specified in ASTM[1] E1527-05; a review of available documents with the federal, state and local regulatory agencies; review and interpretation of historical data that may reveal evidence of historical activities and their potential to impact the environment; a site inspection; and interviews with the current and past operators at the parcel. Normally, the focus of the investigation is to determine past and current uses of a site as related to contaminated materials usage and potential for subsurface contamination. The intent of the Phase I ESA is to also identify and evaluate Recognized Environmental Conditions (REC) associated with a property to allow the user to qualify for the innocent landowner defense under CERCLA.

[1] American Society of Testing and Materials Standards

The findings of a Phase I ESA include information available from a review of existing conditions and identify any required remedial or mitigation measures that may be required prior to or during construction as well as any specific areas of concern where subsurface (Phase II) investigations (typically laboratory analysis of soil and groundwater samples) are warranted to better characterize areas or media that are potentially impacted.

METHODOLOGY

Amtrak initially conducted a contaminated materials assessment for the Connecticut River Bridge Project study area in 2008. The assessment began with identifying all potential sites of concern within the primary study area (defined as a quarter-mile radius surrounding the project site). Amtrak categorized the sites either as: (1) potentially requires further investigation; or (2) further investigation not required. The assessment included a review of federal and state databases and regulatory records, including listings of spills, petroleum storage facilities, and state and federally listed contaminated materials sites, to determine the regulatory status of each site. Amtrak conducted the search of federal and state environmental agency records in general accordance with ASTM E1527-05 for the secondary study area surrounding the primary study area. A report summarizing the environmental database search was prepared by Environmental Data Resources, Inc. (EDR) of Milford, Connecticut. A copy of the report is attached as Appendix D, "Contaminated Materials." Table 11-2 shows the federal and state databases that EDR searched as part of the preliminary site screening methodology. The project team also conducted a visual inspection of the project site and surrounding area. In 2012, the project team updated the assessment with a review of regulatory databases (also included in Appendix D), aerial photographs and an additional site visit.

The project team did not consider groundwater flow direction and proximity to the project site, making this analysis conservative since potentially contaminated sites in any direction from the project site reviewed. Thus, some of the sites identified as potentially requiring further investigation were located in an anticipated downgradient or cross-gradient groundwater flow direction, i.e., groundwater will not be expected to flow towards the project site. Sites located upgradient (with respect to groundwater) of the project site are of greater concern because contaminants may travel towards the project site in the groundwater. Proximity to the rail line is also an important factor in determining the potential for impact. All other factors being equal, the closer a concern is to the project site, the greater the likelihood for impact.

Table 11-2
Databases Searched

Database Searched	Description
Federal ASTM Standard Databases	
National Priority List (NPL)	Identifies site for priority cleanup under the Superfund Program.
Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) List	Data on potentially hazardous waste sites that have been reported to the USEPA pursuant to Section 103 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).
CERCLIS No Further Remedial Action Planned (CERC-NFRAP) List	CERCLIS sites that have been removed from CERCLIS.
Corrective Action Report (CORRACTS) List	Identifies hazardous waste handlers with Resource Conservation and Recovery Act (RCRA) corrective action activity.
Resource Conservation and Recovery Information System (RCRIS) List	Includes information on sites which generate, transport, treat and/or dispose of hazardous waste as defined by RCRA.
Emergency Response Notification System (ERNS) List	Data on reported releases of oil and hazardous substances.
State ASTM Standard Databases	
State Hazardous Waste Site (SHWS)	Sites in Connecticut which have contamination levels greater than applicable cleanup criteria soil and/or groundwater standards.
Site Discovery and Assessment Database (SDADB)	All sites where it is suspected that hazardous waste has been disposed.
Leaking UST (LUST) List	Inventory of reported leaking underground storage tank incidents.
Underground Storage Tank (UST) List	Inventory of USTs regulated under Subtitle I of RCRA.
Federal ASTM Supplemental Databases	
CERCLA Consent Decrees (CONSENT)	Major legal settlements that establish responsibility and standards for cleanup at NPL (Superfund) sites.
Records of Decision (ROD)	ROD documents mandate a permanent remedy at an NPL (Superfund) site.
De-Listed NPL	Sites deleted from the NPL in accordance with 40 C.F.R. 300.425(e).
Facility Index System (FINDS)	Includes facility information and “pointers” to other sources that contain more detail.
Hazardous Materials Information Reporting System (HMIRS)	Includes hazardous material spill incidents reported to the Department of Transportation.
Material Licensing Tracking System (MLTS)	Database of sites which possess or use radioactive materials and which are subject to Nuclear Regulatory Commission requirements.
Mines Master Index File (MINES)	Inventory of mines active or opened since 1971.
NPL Liens	Inventory of sites where the USEPA has filed liens against real property in order to recover remedial action expenditures.
PCB Activity Database System (PADS)	Inventory of generators, transporters, commercial storers and/or brokers and disposers of PCB’s.

Table 11-2 (cont'd)
Databases Searched

Database Searched	Description
Federal ASTM Supplemental Databases	
Department of Defense (DOD)	Sites Inventory of federally owned or administered lands, administered by the DOD, that have any area equal to or greater than 640 acres.
U.S. Brownfields	Listing of brownfields properties addressed by Cooperative Agreement Recipients and brownfields addressed by Targeted Brownfields Assessments.
RCRA Administrative Action Tracking System (RAATS)	Includes data on enforcement actions issued under RCRA pertaining to major violators and includes administrative and civil actions brought by the USEPA.
Toxic Chemical Release Inventory System (TRIS)	Inventory of facilities which release toxic chemicals to the air, water and land in reportable quantities under SARA Title III Section 313.
Toxic Substances Control Act (TSCA)	Manufacturers and importers of chemical substances included on the TSCA Chemical Substance Inventory list.
Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)/Toxic Substances Control Act (TSCA) Tracking System (FTTS)	Data on administrative cases and pesticide enforcement actions and compliance activities related to FIFRA, TSCA and EPCRA (Emergency Planning and Community Right-to-Know Act).
State or Local ASTM Supplemental Databases	
Connecticut Manifest	Facilities where manifests are documented and track hazardous waste from the generator to the TSD facility
Connecticut Spills	Initial notification information of hazardous material incidents.
Landfills/Transfer Stations	Inventory of landfills in Connecticut.
Connecticut Leachate and Wastewater Discharge Sites (LWDS)	Locates surface and groundwater discharge that receive wastewater discharge, are waste sites, or are locations of accidental spills.
Marine Terminals and Tank Information	A listing of bulk petroleum facilities that receive petroleum by vessel.
Voluntary Remediation Sites	Sites involved in the Voluntary Remediation Program
Drycleaner Sites	Inventory of drycleaner facilities.
Brownfields (CTDEEP)	Former or current commercial or industrial use sites that are presently vacant or underutilized, on which there is suspected contamination to the soil or groundwater at concentrations greater than applicable cleanup criteria.
Connecticut Property Transfer Filings	Listing of sites that meet the definition of a hazardous waste establishment and have been sold to another owner.

C. EXISTING CONDITIONS

The following assessment summarizes conditions at the project site and within ¼-mile of the project site (i.e., within the APE) and is based on the results of the records research, review of historical aerial photographs, and a site visit. Appendix D, "Contaminated Materials," provides the aerials and the complete EDR report, including a map that shows the locations of sites identified in the regulatory databases.

SITE VISIT

The project team conducted visual inspections of the site and surrounding area on February 28, 2008 and on May 18, 2012. The project site was occupied by the existing steel two-track rail bridge with an electrically operated bascule span. The bridge is supported by two soil embankments (on the eastern and western shores of the Connecticut River), which were constructed over 100 years ago, and by nine stone piers under the bridge spans. The surrounding land is moderately developed, with many vegetated areas as well as a mixture of residential and marine commercial uses northwest of the bridge, mainly residential and institutional uses to the northeast, and wetlands to the south.

HISTORY

The existing bridge was constructed beginning in 1904 and it became operational in 1907. An 1868 historical map of the project site and surrounding area showed the present rail line, with a ferry at the approximate location of the existing bridge; and an 1874 map showed an earlier rail bridge. Historical aerial photographs showed the present bridge from 1957 (the earliest date for which aerials were available) onward, and showed that by 1957 the land to the north of the bridge appeared to be occupied mainly by small-boat marinas and wetlands, with more development with marinas and small buildings occurring between approximately 1961 and 1986. No significant changes were noted in the vicinity of the project site in 1997 (the latest year for which aerials were available). No significant changes from the 1997 aerial were noted on a 2011 online (Google Earth) aerial photograph. The land to the south of the bridge appeared to contain wetlands throughout this time.

REGULATORY DATABASE REVIEW

The project team performed the initial screening of the project site and surrounding area using the methodology described above. Four off-site locations in Old Saybrook, within the primary study area, required additional investigation (see Table 11-3). These include marine terminals and a former industrial facility. A summary of these four sites is listed below in Table 11-3.

SAYBROOK MARINE SERVICE, INC.

Saybrook Marine Service, Inc., located at 2 Clark Street, approximately 1,500 feet northwest of the project site, was listed on the CT Property and Site Discovery and Assessment Database (SDADB). The site was sold by Saybrook Marine Service, Inc. and purchased by Between the Bridges, LLC in 1998. A Property Transfer Form III is associated with the site. A Form III is required by the CTDEEP Property Transfer Program when environmental conditions are unknown or when a discharge, spill, uncontrolled loss, seepage, or filtration of hazardous waste has occurred at the parcel and has not been fully remediated. The Form III indicates that investigation and necessary remediation will be completed. According to the database report, CTDEEP completed and approved the remediation on October 19, 1998. However, no additional information or documents were available to confirm this status.

Table 11-3
Secondary Screening – Sites Potentially Requiring Further Investigation

Item No.	Site Identification	Site Address	Reference	Potential Contaminants
1	Saybrook Marine Service, Inc.	2 Clark Street Old Saybrook, CT	CT Property SDADB: Facility ID 4842 CT Manifest	Unknown
2	Max Snyder	145 Ferry Road Old Saybrook, CT	CT Manifest	Gasoline
3	Between the Bridges Marina	142 Ferry Road Old Saybrook, CT	UST: Facility ID 1915 LWDS No. 4000102 CT Spills: Case No. 200007388, 200008884, 200305061, 200306725 CT Manifest NPDES Permit No. UI0000373, GSI001382	Petroleum products, transformer oil
4	Oppell Estate	203 Ferry Road Old Saybrook, CT	LUST: Case No. 45217 CT Spills: Case No. 9604501 SDADB: Facility ID 2884	Petroleum products

The database search identified a manifest (a type of document generated when hazardous waste is excavated and disposed of off-site) for the site, associated with 1998 disposal of lead waste to a facility identified as Clean Harbors of Connecticut, Inc. (EPA ID # CTD000604488).

A small tributary of the Connecticut River is located between the project site and Saybrook Marine Service, Inc. Any subsurface contamination associated with this site is not likely to have migrated across the tributary to affect the project site. Due to the distance and the anticipated groundwater flow direction, it is not likely that this site has impacted the project site.

MAX SNYDER

Max Snyder, located at 145 Ferry Road, approximately 1,600 feet northwest of the project site, was listed on the CT Manifest database. The project team identified a 2004 manifest for the site, associated with disposal of gasoline and ignitable waste to Bridgeport United Recycling, Inc. (EPA ID # CTD002593887). A small tributary of the Connecticut River is located between the project site and Max Snyder. Any subsurface contamination associated with this site is not likely to have migrated across the tributary to affect the project site. Due to the distance and the anticipated groundwater flow direction, it is not likely that this site has impacted the project site.

BETWEEN THE BRIDGES MARINA

Between the Bridges Marina, located at 142 Ferry Road, approximately 1,600 feet northwest of the project site, was listed on the Underground Storage Tank database. Two diesel tanks installed in 1999 were listed as currently in-use: one with a capacity of 10,000 gallons and the other with a capacity of 6,000 gallons. Two gasoline tanks were listed as closed and removed in 1999: each had a capacity of 8,000 gallons. Four CT Spills listings were reported for this site. Spill No. 200007388 reported a release of approximately 135 gallons of transformer oil to the Connecticut River in 2000, and was listed with a status of “not terminated.” The remaining spills involved a less than one-gallon release of gasoline onto pavement (No. 200008884, reported in

November 2000), an approximately 10-gallon release of transformer oil within a transformer vault (No. 200305061, reported in July 2003), and an observation of a diesel-like sheen on the Connecticut River (No. 200306725, reported in September 2003). All of these spills were assigned a status of "terminated."

This site was listed as an LWDS site with reported active leachate. The site was also listed in the USEPA NPDES with permit UI0000373 for installation of a subsurface sewage disposal system, and with permit GSI001382 for stormwater discharge associated with industrial activities.

The project team identified two manifests for the site. The first (undated) was associated with disposal of benzene and unspecified solid hazardous waste to the offsite Northland Environmental, Inc. facility (EPA ID # RID040098352). The second manifest was associated with 1988 disposal of ignitable waste to Hitchcock Gas Engine Co. (EPA ID # CTD002593887).

A small tributary of the Connecticut River is located between the project site and Between the Bridges Marina. Any subsurface contamination associated with this site is not likely to have migrated across the tributary to affect the project site. Although the releases to the Connecticut River may have affected the project site, given the distance and the likelihood of the spills' dilution in the river, it is not likely that this site has affected the project site.

OPPELL ESTATE

The Oppell Estate, located at 203 Ferry Road, was mapped as located approximately 1,900 feet west-northwest of the project site in the regulatory database search for the 2008 assessment; however, the 2012 report reflected a revised location of approximately 2,900 feet north of the project site. This site was listed on the Leaking Underground Storage Tank, SDADB, and CT Spills databases. According to the database report, four aboveground storage tanks were identified that leaked oil and gas due to a tank failure. The spill was reported on September 4, 1996 and issued case number 45217. The database reported that the site remediation case was still pending and the property has been transferred to the state. The remedial activities included surface sampling and well installations.

A small tributary of the Connecticut River is located between the project site and the Oppell Estate. Any subsurface contamination associated with this site is not likely to have migrated across the tributary to affect the project site. Due to the distance and the anticipated groundwater flow direction, it is not likely that this site has impacted the project site.

SUMMARY

Amtrak's site inspection and review of available documents and databases did not identify any potential sources of hazardous materials that likely impacted the project site. However, based on the age of the existing bridge, potential lead-based paint, asbestos-containing materials and PCB-containing electrical equipment may be present on or otherwise associated with the bridge itself. Additionally, the embankments were constructed from historic fill of unknown origin. Such fill may contain elevated levels of contaminants such as SVOCs or metals. Railroad ties may contaminate surrounding soils with creosote or other treatment chemicals. Finally, releases of petroleum or PCBs related to leaks from train-mounted fuel tanks or electrical transformers could have occurred, although no spills on the on-site tracks were identified in regulatory databases.

D. NO ACTION ALTERNATIVE

The No Action Alternative will include only minimal repairs and maintenance on the existing bridge as needed. No excavation for new structures will be required. Amtrak will follow applicable state and federal regulations if the potential lead paint on the existing bridge were to be disturbed. Additionally, remediation activities could occur in the future on the properties discussed in Section C. The planned major and minor improvement projects discussed under the No Action Alternative in Chapter 2, "Project Alternatives," are located outside of the primary study area used for this analysis and are not expected to change hazardous materials conditions in the area.

E. PROBABLE IMPACTS OF THE PREFERRED ALTERNATIVE

Although the exact extent of subsurface disturbance associated with the Preferred Alternative will not be determined until final engineering, Amtrak expects that construction will involve the excavation, disturbance, and likely removal for off-site disposal of some existing soil (including soil from the embankments), potential removal and off-site disposal of river sediments, and demolition of the existing bridge. These activities will take place along the new southern bridge alignment, as discussed in Chapter 2. Amtrak also expects that the new catenary pole foundations (roughly 3 feet in diameter) will be installed to a depth of up to 20 feet.

The presence of contaminated materials only presents a threat if exposure to these materials occurs. Even then, a health risk requires both a complete exposure pathway to the contaminants and a sufficient dose to produce adverse health effects. The most likely route of exposure will be through breathing volatile/semi-volatile compounds or particulate-laden air released during demolition, excavation, and construction activities. Other potential routes of exposure are dermal contact and accidental ingestion. In order to prevent any of these exposure pathways and doses, the proposed project will include measures such as:

- Following established regulatory requirements for pre-construction removal of asbestos and appropriate management of lead-based paint and of PCB-containing equipment.
- Development and implementation of a CHASP that will include detailed procedures for managing potential contamination (e.g., railroad ties, creosote-contaminated soil and any underground storage tanks unexpectedly encountered). The CHASP will also include procedures for minimizing the generation of dust that could affect workers, the surrounding community and the environment as well as the monitoring necessary to ensure that no such impacts are occurring.

With these measures, there will be no significant impacts due to contaminated materials during the construction period. Following the construction of the proposed project, there will be no significant potential for continued exposure. There will be no significant impacts due to the contaminated materials during the construction period.

NEW BRIDGE CONSTRUCTION

The Preferred Alternative will involve construction of a new bridge, widening of existing embankments, construction of new bridge piers, and construction of retaining walls, catenary support structures, etc. Shallow soil disturbance will occur in areas where the proposed track will be placed on existing embankment. Deeper excavations will be required for catenary and signal support structures, new or relocated utilities, and embankment retaining walls.

Due to the presence of compressible soils, deep foundations for the river crossing will be necessary. While the foundation type will be determined during subsequent engineering phases, it is likely to comprise drilled shafts, which could require the disposal of soil up to 90 feet or more below existing grade. Amtrak will import clean fill for grading during construction, e.g., to widen the bridge embankments.

CONSTRUCTION HEALTH AND SAFETY PLAN

Amtrak will perform all work in accordance with applicable local, state, and federal regulatory requirements. Prior to commencing site disturbance, Amtrak will prepare a CHASP to address the potential of encountering contamination during soil disturbance activities. The CHASP will describe in detail the health and safety procedures to minimize exposure to contaminated materials by workers and the public. Amtrak will evaluate the hazards by determining the potential subsurface contaminants of concern and their chemical and physical characteristics, and will consider health hazards within the potential exposure associated with the work to be performed. Amtrak will develop the CHASP in accordance with OSHA regulations and guidelines. The CHASP will include designation and training of appropriate personnel, monitoring for the presence of contamination (e.g., soil which shows evidence of potential contamination, such as discoloration, staining, or odors) and appropriate response plans. To prevent the potential off-site transport of dust, Amtrak will define dust control requirements for all soil-disturbing operations.

WASTE MANAGEMENT

Amtrak will handle excavated soil or sediment in accordance with all applicable regulations. Amtrak will characterize excavated material to classify the material (e.g., historical fill, uncontaminated native soils, petroleum-contaminated wastes, etc). The extent and parameters of any testing will be dependent on the classification and any requirements of off-site waste disposal facilities.

Wastes containing contaminated materials require special handling, storage, transportation, and disposal methods to prevent releases that could impact human health or the environment. Depending on the nature of the material, federal, state, and local regulations require the use of special containers or stockpiling practices for on-site storage of the material to prevent the release of contaminated materials. The federal and state Departments of Transportation have requirements for transportation of wastes containing contaminated materials. Facilities that receive contaminated materials require federal, state, and local permits to accept the waste, and generally require that specific representative waste sampling and laboratory analysis protocols be conducted prior to accepting material for disposal.

EXISTING BRIDGE DEMOLITION

Prior to the demolition of the existing bridge, Amtrak will survey the structure for asbestos and lead-based paint. Amtrak will remove any identified asbestos-containing materials (ACM) prior to demolition in accordance with the applicable federal, state and local requirements. Amtrak will implement appropriate engineering controls (e.g., containment, wetting and other dust control measures) to minimize asbestos exposure.

If lead paint is present, Amtrak will perform an exposure assessment to determine whether lead exposure will occur during the demolition and/or removal of the existing bridge. If the exposure assessment indicates the potential to generate airborne dust or fumes with lead levels exceeding health-based standards, Amtrak will employ a higher personal protection equipment standard to counteract the exposure. Amtrak will perform the demolition activities in accordance with the applicable OSHA regulation (OSHA 29 CFR 1926.62 - *Lead Exposure in Construction*).

Amtrak will survey and evaluate any suspected PCB-containing equipment (e.g., transformers, electrical feeder cables, hydraulic equipment, and fluorescent light ballasts) that will require removal, disturbance or relocation. Amtrak will remove and properly dispose of any PCB-containing equipment that will be disturbed by the work in accordance with applicable federal and state regulations. Generally, unless suspected PCB-containing equipment is labeled to be "non-PCB," it must be tested or assumed to be PCB-containing and disposed of at properly licensed facilities.

With the implementation of these measures, no adverse impacts related to hazardous materials will result from construction and demolition activities on the project site. After the completion of the project, there will be no potential for adverse impacts from hazardous materials. ✷

A. INTRODUCTION

This chapter describes the anticipated construction process for the Preferred Alternative and assesses the potential for temporary environmental and socioeconomic impacts associated with these activities. The two options of the Preferred Alternative will likely be constructed using the same general construction sequencing and methods. Since both options will be similar from a construction perspective, this chapter includes a general description of the construction means and methods anticipated for the project. The No Action Alternative will not involve any construction and is therefore not discussed in this chapter. Section B of this chapter includes an overall description of the construction sequencing for the Preferred Alternative and the estimated project schedule. Section C describes the construction of the key project elements. Section D analyzes the potential environmental impacts and mitigation. This analysis addresses the potential for temporary impacts that could occur during the construction period.

The construction means and methods presented in this chapter are based on the current conceptual engineering design and Amtrak's past experience on similar projects. While Amtrak's construction contractor will ultimately determine the construction techniques utilized for the, the potential for environmental impacts and types of mitigation measures described herein will likely be the same.

B. CONSTRUCTION SCHEDULE AND SEQUENCING

CONSTRUCTION SCHEDULE

This section presents a general construction schedule that is typical for a moveable rail bridge replacement project. However, the actual project schedule will require consideration of in-water restrictions and other limitations likely to be required by permits. Much of the bridge replacement work and existing bridge demolition will occur within coastal wetlands or open water, limiting equipment access and the techniques that may be used for construction. In general, based on information about the spawning and migration of fish species found in the Connecticut River, in-water work may be restricted during certain times of the year. Federal and state natural resource and permitting agencies typically enforce such restrictions to prevent disturbance to the channel bottom during shellfish gestation and development or disturbance of migratory fish during spawning. These agencies may impose additional schedule restrictions to protect birds or other species. Such construction windows will be more clearly defined during the final design and permitting stage and in conjunction with the natural resource agencies.

Taking into account these potential schedule limitations, Amtrak anticipates construction of the Preferred Alternative will take approximately three years. Amtrak expects that construction of the replacement bridge will begin in 2018 and be completed in 2021.

CONSTRUCTION SEQUENCE

While the contractor will determine the exact construction methods and sequencing, a conceptual outline is presented in Table 12-1, along with the approximate duration of each step in the sequence. The outline is based on engineering work performed to date and Amtrak's experience with similar bridge replacement projects. Several of the construction steps below could potentially occur simultaneously.

Table 12-1
Construction Sequence and Duration

No.	Construction Step	Approximate Duration
1	Mobilization and establishment of staging areas	1 month
2	Relocation of local utility power and communications around the project site	10 to12 months
3	Construction of access roads and construction trestles	8 to 10 months
4	Construction of embankments and retaining walls	12 to14 months, assuming concurrent work on both approaches.
5	Construction of abutments and concrete piers	5 months for each abutment; 2 to 3 months for each pier. Work on abutments and piers can be performed concurrently.
6	Construction of the moveable span (off-site)	10 to12 months, for both the bascule and vertical lift alternatives
7	Construction of tower piers	3 to 4 months
8	Erection of the approach spans superstructures	3 to 4 months per span; multiple spans can be erected simultaneously.
9	Construction of portions of the new fender system	3 months
10	Construction of the new control house	6 months
11	Float-in of the new moveable span	48 hours (will require a channel closure).
12	Make the moveable span operational	2 to 3 weeks
13	Installation of track work	2 months
14	Installation of communication & signals equipment and cables	7 to 10 months*
15	Installation of catenary system	12 months
16	Cut over train service to new track	2 weekends
17	Demolition of existing bridge	1-2 months**
18	Construction of remaining portion of the new fender system	3 months
	Total	**36-40 months**

Notes:

* The duration of this task will be determined by the type of cable system that will be installed on the replacement bridge. A cable trough system will take about 7 to 9 months to install; a conduit system will require 8 to 10 months.

** Demolition of the approach span superstructure will likely require 2 weeks per span, with multiple spans deconstructed simultaneously. The float-out of the existing moveable span will take place within a 48-hour window. The demolition of any remaining piers will require 2 months per pier if the pier has to be taken down to below the mud line of the river bottom.

Several of these steps, such as the installation of the moveable span or the construction of the fender system, may require the temporary suspension of marine navigation in the project area. The contractor may have to complete certain steps for the construction of a replacement bridge after the existing bridge is demolished. For example, existing bridge piers may interfere with the completion of replacement channel fenders. The contractor will complete these fenders after the existing bridge is demolished. Amtrak will coordinate with the contractor and the maritime community to minimize the duration and frequency of navigation restrictions.

C. CONSTRUCTION OF KEY ELEMENTS

MOBILIZATION AND STAGING

Prior to initiation of construction, the contractor will establish construction staging areas and mobilize heavy equipment. Temporary access roads of approximately 30 feet in width may be required for the duration of construction since some sections of the replacement bridge (such as the embankment extensions) will be located over wetlands and/or open water. The contractor will secure any necessary easements for staging areas and access roads. If permitted, the contractor may use the parking lot and storage areas of the CTDEEP Marine Headquarters for staging on the east side of the Connecticut River Bridge. The contractor will use temporary platforms, constructed of driven steel piles, steel framing and timber matting decks for both east and west approaches. These temporary platforms will vary in width, from approximately 20 feet to as much as 40 feet, and will need to support heavy equipment such as crawler cranes, excavators, bulldozers and trucks. To decrease the need for additional platform width and its associated impacts, temporary barges may be used. On the west side of the bridge, options are limited due to the presence of wetlands. As a result, on the west shore of the river, the contractor may have to construct temporary platforms over adjacent wetlands to construct the new approach embankment, retaining walls, and approach spans. While the larger equipment may be transported to the west temporary platforms by barge, the contractor will most likely need a second staging area and truck access to the west platform. A potential site for a second staging area could be the industrial property directly adjacent to the Amtrak ROW approximately 0.6 miles west of the bridge. There is an existing Amtrak access road that runs along the north side of the tracks between this industrial property and the Connecticut River Bridge that may be suitable for construction access. If it is not possible to use or improve this access road for construction vehicles, the contractor may build a temporary access road or trestle along the south side of the existing rail corridor. This option could temporarily impact up to an additional 1.3 acres of wetlands. To provide a conservative analysis, this EA assumes these wetland areas will be impacted. It is possible that these impacts will be further minimized during preliminary and final engineering.

Currently, fiber optic and copper cables are mounted on the north side of the existing box girder structure until they reach the bascule span of the bridge, at which point the cables become submarine and cross beneath the river’s channel. Existing signal, communication, and traction power system cables are located on the south side of the bridge. The contractor will relocate these cables prior to construction of the Preferred Alternative.

PIERS

The Preferred Alternative will not reuse any existing piers. It will require the construction of nine new piers—seven approach piers comprising drilled shafts supporting a reinforced concrete pier cap, and two moveable span piers comprising drilled shafts supporting a large concrete cap. As opposed to other methods of pile installation such as vibratory or impact pile driving, drilling provides a relatively quiet option by which to install piles (HDR 2011). The piers of the existing Connecticut River Bridge are founded either on rock or on timber piles driven into dense sand or gravel. This subsurface is anticipated to provide adequate foundation for new piers.

All new piers will require in-water construction in the Connecticut River. The contractor will construct the piers from barges placed in the river with an effort to minimize disruption to marine navigation. Three barges may be required—one to support the shaft drilling equipment, one to store materials, and one to hold any spoils or excavated material. It is assumed that 4.5-foot diameter drilled shafts will be sufficient for most piers, except at the west approaches, where 7-foot diameter drilled shafts may be required. Three drilled shafts will be required for each approach pier. During shaft drilling, the drilling operations will be isolated using the appropriate containment measures to prevent drilling fluids and debris from contacting water or entering the river channel. Once each set of shafts is constructed, the contractor will construct a concrete pile cap on top.

In total, each new pier will take approximately two to three months to construct. Multiple piers will be constructed simultaneously. The in-water construction will be scheduled to occur during work windows that will minimize the potential environmental impacts to aquatic resources.

ABUTMENTS

The contractor will rehabilitate and modify existing abutments for the construction of the Preferred Alternative. The contractor will prepare existing masonry before the embankments could be extended; therefore, the contractor may have to demolish portions of existing abutments in order to begin construction. The track embankment may require temporary measures to ensure stability during this phase.

EMBANKMENT AND RETAINING WALLS

The Preferred Alternative will require embankment extensions to the south of the existing embankments. These embankments will likely comprise fill material with precast or poured-in-place concrete retaining walls for the length of the extension. The contractor will likely extend the existing embankments by constructing portions of the retaining walls and compacting the fill material in approximately one-foot vertical sections behind these walls. Precast concrete sheet piling retaining walls can be manufactured off site in four-foot widths at various lengths, transported to the job site, and installed into the existing soil or marsh with a minimal amount of ground disturbance.

SUPERSTRUCTURE

The approach spans will comprise ballast deck girders. The contractor may assemble the bridge spans off-site, deliver them to the project site by barge, and float them in for installation. Construction crews will most likely assemble the towers for the vertical lift option (Option B) on site, using conventional steel erection methods. Construction of the new control houses could take place prior to or concurrent with tower construction. The contractor will then float in the moveable span, erect it, and make it operational to allow marine traffic to resume.

CHANNEL AND FENDERS

The contractor will install a new channel fender system. The new fender system will be built out of composite material, as opposed to the existing treated timber fender system. It is possible that construction crews will only install portions of the new fender system before the existing bridge is demolished due to interference with existing bridge piers. Therefore, the contractor will complete this work after rail traffic is cut over to the new bridge (allowing for the demolition of the existing bridge), scheduling it to minimize interruptions in marine navigation.

TRACK WORK

The Preferred Alternative will require the construction of new track—approximately 1,700 feet of track on the western embankment, nearly 3,000 feet on the eastern embankment, and approximately 1,600 feet on the bridge itself. Amtrak will construct new tracks with a centerline distance of up to 48 feet to the centerline of the existing tracks. This will ensure that new track is constructed close enough to the existing track to minimize changes to the approach curve. At the same time, the track will be built far enough from the existing track that continuity of operations on the existing line is maintained during construction.

Once the girders and deck work are in place, the contractor will install the required track work, including concrete ties, plates, fastening clips and rail. Construction crews will use a Track Laying Machine (TLM) or conventional methods such as railcar-mounted Burro cranes for material handling, and conventional mechanized track construction machinery. Concrete ties will come pre-equipped with plates used to affix the sections of rail. Rail will come in quarter-mile long sections of continuously welded steel. Construction crews will then fit the rail into the plates, affix it with ties, and clamp it into place. In locations where track work is placed on embankment, the contractor will use a final layer of ballast to hold the cross ties in place. Elsewhere, construction crews will affix the cross ties to the steel deck plate. After the rail service cutover to the newly constructed track is complete, the contractor will dismantle existing track which, depending on age and condition of the materials, will be reused off-site or disposed of as scrap or salvage.

CATENARY SYSTEM

The existing electrification system must remain in operation to maintain train traffic until the contractor completes a cutover to the new track. To facilitate an easy transition from the old alignment to the new alignment, the contractor may install new catenary portals at the interface locations. The Preferred Alternative will require installation of a new traction power feeder.

The bascule bridge replacement option (Option A) will require a new moveable catenary unit that will span the gap between the fixed conductor rail on the lift span and the bascule roll back point. The new fixed termination, variable tension catenary from the east will dead-end on a termination structure at the moveable catenary unit, and from the west at a termination structure on the fixed span before the channel. The vertical lift bridge option will require new moveable catenary skids that will span the gap between the fixed conductor rail on the vertical lift span and the fixed skid at each tower. The new fixed termination (variable tension) catenary from the east and west will dead-end on termination structures at each vertical lift tower.

The contractor will likely install elements of the electric traction systems in two ways. On the replacement bridge itself, construction crews will affix steel catenary poles directly to the bridge structure. On the approaches, where embankments are used, the contractor will install foundations for the poles by first excavating holes (roughly 20 feet deep and 3 feet in diameter) and then either by using pre-cast segments or by pouring concrete into constructed forms. The contractor will make all efforts to ensure that this construction does not interfere with in-service tracks. Once the catenary poles are installed, the contractor will affix messenger wire, auxiliary wire, and contact wire to the poles using a wire train which consists of specialized equipment to reach, install, and adjust the catenary system and transport necessary supplies to the work site.

COMMUNICATIONS AND SIGNALS

As mentioned above, communication and signals cables run to the south of the existing bridge, on the bridge structure itself and on the river bottom. The Preferred Alternative could employ a cable trough system in conjunction with the ballasted deck girder design. Cable installation will be modular and thus, less labor intensive than other types of installations, and safer for the construction crew during installation. The contractor will expand construction staging to support conduit installation; construction crews will thread fish lines in each conduit and install the cables.

The contractor will also relocate several signals on both the east and west bridge approaches. Construction crews will install a new signalized interlocking on the moveable span of the Preferred Alternative to replace the existing interlocking on the bridge (known as Conn Interlocking). The contractor will need to interface the new interlocking controls and electronic track circuit system with Crescent Interlocking to the east of the project site and View Interlocking to the west. Recently, system improvements associated with the replacement of the Niantic Bridge in New London, to the east of the project site, included the retirement of existing split point derails, a track safety mechanism that deliberately derails a train that is headed into an open moveable bridge. This system-wide upgrade may require a re-evaluation of the existing signal block safe braking distances and a re-spacing of the wayside signals. Amtrak will confirm the final signal spacing for the replacement bridge and approaches during the design and engineering phases of the project.

REMOVAL OF EXISTING CONNECTICUT RIVER BRIDGE

The contractor will remove the existing Connecticut River Bridge after constructing the replacement bridge and diverting all train traffic from the existing span. The contractor will likely float out the existing moveable span on barges. Construction crews could lift the approach spans off their piers with a crane and place them on a barge for removal. To lighten the spans, the contractor could remove track work ahead of time.

After the removal of the superstructure, the contractor will remove the substructure. Construction crews could break up the piers that will be removed using an expansion demolition agent, which will break the piers into smaller and more easily removed pieces without using explosives. This task will entail drilling holes into the piers and injecting an expandable compound, which will place pressure on the masonry piers and cause them to crack and break. The contractor will remove the smaller pieces with a barge mounted crane. Depending upon USCG requirements, the contractor will remove the existing timber piles from the pier foundations and fender system, either completely or cut off two feet below the mudline. The contractor will place turbidity curtains in the river around the work area during demolition to control any sediment that might be disturbed. The removal of the existing bridge will take one to two months and will be scheduled so as to minimize potential environmental impacts to aquatic resources

MATERIAL TRANSPORT AND DEBRIS REMOVAL

The contractor will accomplish material transport and debris removal through a combination of barge, rail, and truck transport. Construction crews could transport materials such as aggregate and dry concrete materials for foundation work, steel sheeting, wood for formwork, precast concrete retaining wall panels, steel reinforcement bars, and steel beams to the project site by barge along the Connecticut River and unload them in quantities as necessary.

Embankment material, stone for the track subballast, and possibly a pre-ballast pad will most likely arrive by truck to ease delivery and installation. Numerous other smaller quantity materials such as pre-wired instrument houses, signal components, and concrete will most likely arrive by truck.

The contractor will remove most of the construction and demolition debris by barge. The contractor will dismantle and remove the existing river bridge structure by barge. Construction crews will remove some debris by truck.

D. POTENTIAL SOCIAL, ENVIRONMENTAL, AND ECONOMIC IMPACTS

This section addresses the potential adverse social, environmental, and economic impacts due to construction of the Preferred Alternative. Since the No Action Alternative will only require maintenance and minimal repairs of the existing Connecticut River Bridge and no new major construction activities, this EA does not analyze it any further for construction-related impacts.

As discussed in Chapter 2, the Preferred Alternative will minimize impacts on railroad operations during construction, affecting train operations only during tie-in periods required to cut-over new track to the existing alignment. It will present challenges to marine navigation as a result of temporary closures of the navigation channel during the float-in of the moveable span. Other environmental impacts that may result in the project area from the construction of the Preferred Alternative are discussed further below.

TRANSPORTATION

In general, the Preferred Alternative, which involves off-line replacement of the existing bridge, presents the opportunity for performing construction during normal hours while maintaining train operations without impediment.

COMMUTER/INTERCITY/FREIGHT RAIL

The Preferred Alternative will require short-term interruptions in SLE and Amtrak service during construction. Maintenance of freight and passenger rail service and marine traffic is a priority during the construction period; however, some service interruptions are inevitable. Amtrak will strive to minimize service interruptions through careful planning and construction staging. Much of the construction will be performed without impacting rail service. The Preferred Alternative will minimize impacts to rail operations since the replacement bridge will be constructed off-line. It will require rail service interruptions mainly during the final tie-in stage toward the end of construction when Amtrak cuts train service over from the existing tracks to the newly constructed tracks, after installation and testing of the catenary and communication and signals systems. Amtrak expects that this outage will last approximately two days and could be scheduled during the weekend, at a time when train traffic is at a minimum. While Amtrak will make every effort to ensure that trains begin operations over the new alignment as soon as possible, in the event of any unforeseen delays, a limited number of trains may begin operating over the replacement bridge, at reduced speed, before the replacement signal system is fully tested and commissioned. This option will further ensure that train service over the Connecticut River is not interrupted for more than two days and may be employed at Amtrak's discretion.

VEHICULAR TRAFFIC

No adverse impacts on vehicular traffic in the project area will result from the construction of the Connecticut River Bridge replacement. I-95 may experience slight increases in traffic volume during the periods when commuter or intercity rail service experiences outages associated with bridge construction. These periods will be infrequent and brief, and therefore any effects will be negligible. As stated above, material delivery and transport will occur through a combination of rail, barge, and truck trips to minimize vehicular traffic. Employee trips will be negligible.

NAVIGATION

The Preferred Alternative will include the construction of new navigation channel fenders. It may impede navigation during the construction of the replacement moveable span, which will be placed in alignment with the existing channel.

Intensive construction activities in the Connecticut River during the high season for recreational boating (May through October) could result in a problematic impairment to navigation, since this stretch of the river is heavily used by the boating community during those months. Thus, to the extent practicable, Amtrak will schedule construction in the river outside of that time period. However, navigation will be maintained even in the winter months (November through April) since commercial traffic continues during that time. Amtrak will arrange channel closures through coordination with USCG and the maritime community. Overall, river closures are expected to be limited to brief periods during winter months. It is assumed that river navigation closures will occur only during the installation of the moveable span and a portion of the existing bridge demolition and will last approximately two days.

LAND USE AND SOCIOECONOMIC CONDITIONS

Construction of the temporary access platforms, eastern abutment and adjacent piers will temporarily impact the elevated wooden boardwalk, which runs from Ferry Landing Park near CTDEEP Marine Headquarters, underneath the existing bridge, and out to the wetland complex to the southeast. Activities associated with construction of this portion of the replacement bridge will require the closure (and possible temporary removal) of the portion of boardwalk that extends over the river, from the gazebo area in Ferry Landing Park to a bird watching platform approximately 600 feet southeast of the existing bridge. This closure will be required primarily for public safety and could last the duration of the project. Public waterfront access will likely be available throughout the construction period in the gazebo area to the north of the boardwalk. Amtrak and the contractor will work closely with CTDEEP to minimize these temporary impacts.

If permitted, the contractor may use a portion of the CTDEEP Marine Headquarters (adjacent to Ferry Landing Park) for staging of equipment during the construction of the eastern portion of the replacement bridge and its embankments. The access to Amtrak’s ROW on this side of the existing bridge begins at the CTDEEP Marine Headquarters parking lot; the contractor may use a portion of this lot for equipment access and storage during the construction of the replacement bridge.

Local businesses will not be affected during the construction period, although the marinas and their customers may be affected by the short-term navigation restrictions. The construction-related impacts to Ferry Landing Park and the marinas will be temporary and of short duration, as detailed above. Therefore, no significant adverse impacts to land use and social conditions are expected from the project.

CULTURAL RESOURCES

ARCHAEOLOGICAL RESOURCES

Construction of the Ragged Rock Marina channel in the early 20th century likely destroyed any resources that may have once been located in the Old Saybrook portion of the APE. Since the extent of previous disturbances associated with rail construction within the Old Lyme portion of the APE but beyond the embankments is not known, Amtrak considers those areas to have moderate potential for prehistoric archaeological resources. Should Amtrak determine that the area adjacent to the embankments has been previously disturbed, Amtrak will then consider these areas to have low to no potential for prehistoric archaeological resources. The Preferred Alternative involves modification of portions of the Northeast Corridor within the archaeological APE. Embankment extensions required for the Preferred Alternative will impact ground surfaces to the south of the current alignment for a length of up to 1,200 feet in Old Saybrook and 1,100 feet in Old Lyme. As described in the Draft MOA in Appendix A, "Cultural Resources," Amtrak will develop and implement an archaeological testing plan, in coordination with the CTSHPO, to determine the presence or absence of archaeological resources in Old Lyme that could be affected by the Preferred Alternative. If Amtrak finds archaeological resources present in the APE, further field testing may be necessary to determine whether these resources are significant (i.e., S/NR eligible). If Amtrak determines that S/NR-eligible archaeological resources will be impacted by the project, Amtrak will develop avoidance or mitigation measures in coordination with the CTSHPO.

ARCHITECTURAL RESOURCES

As mentioned in Chapter 6, "Cultural Resources," the Preferred Alternative is not expected to directly affect any known or potential architectural resources identified in the study area, with the exception of the Connecticut River Bridge. Because the other architectural resources—comprising a S/NR listed historic house in Old Saybrook, a historic house and historic district in Old Lyme, and a number of potentially S/NR eligible houses in both Old Saybrook and Old Lyme—are far removed (between 400 feet and a quarter-mile) from the project site they are not at risk for inadvertent damage due to project-related construction activities; however, construction of a replacement bridge will impact the Connecticut River Bridge since the final stage of construction will include the demolition of the existing bridge. The Preferred Alternative will therefore have an adverse effect on the Connecticut River Bridge, which is SR-listed and NR-eligible as a contributing element within the Moveable Railroad Bridges on the Northeast Corridor in Connecticut Thematic Resource. Chapter 6 describes measures to mitigate this adverse effect.

VISUAL AND AESTHETIC CONDITIONS

The Connecticut River View Corridor is the central visual resource in the study area. It is characterized by an expansive open view shed that includes the Connecticut River, the tributaries, marshes, wetlands, and woods that surround it, and the Connecticut River Bridge. During construction, there will be an increase in the level of activity within the study area. As the project proceeds, cranes and other large pieces of equipment will be visible.

Viewer groups in the area consist of pedestrians, motorists, rail passengers, and boaters. The extent to which the various viewer groups identified above will perceive the change caused by construction of the Preferred Alternative varies. Rail passengers traveling on the Northeast Corridor and motorists passing on I-95 are not expected to be greatly impacted by change in the visual character of the bridge since their view of the bridge is limited and of short duration. Views to other aspects of the Connecticut River View Corridor will not be blocked or substantially changed, and the durations of these views will remain the same. Boaters in the immediate vicinity of the bridge and pedestrians in Ferry Point Park in Old Lyme will experience the longest duration and closest range views of the replacement bridge construction area. For the duration of construction, cranes, barges and other construction equipment, as well as staging areas on both sides of the Connecticut River will be visible to boaters and pedestrians. These temporary changes will not constitute an adverse impact to visual resources.

AIR QUALITY

Air pollutant emissions from construction of the Preferred Alternative will include emissions from on-site non-road construction equipment (potentially including both construction vehicles and small generators), emissions from on-road vehicles, including worker and delivery vehicles, emissions from marine engines and possibly locomotives delivering and removing materials from the site, and fugitive dust emissions from land-clearing operations, demolition, grading, excavation, and transfer of debris and loose material.

SOURCE DESCRIPTION

Major construction activities will occur simultaneously at a number of locations throughout the project area. Non-road construction engines will include equipment such as crawler cranes, excavators, bulldozers, and other various heavy and light equipment, as well as some small generators. Large construction engines are typically diesel powered, while some small engines may be gasoline powered. The primary pollutants of concern from diesel engines are nitrogen oxides (NO_x) and particulate matter (PM). Small gasoline engines emit relatively larger quantities of carbon dioxide (CO) and in some instances PM, but CO will not generally be of concern due to the small quantity of these engines and the distance to nearby sensitive uses and other areas with public access.

Fugitive dust emissions from construction operations can result from excavation, hauling, loading, dumping, transferring, spreading, grading, compaction, wind erosion, and traffic over unpaved areas. The quantity of emissions can vary widely depending on the extent and nature of the clearing operations, the type of equipment employed, the physical characteristics and moisture content of the material, the speed at which vehicles are operated, wind speed, direction, and duration, and the type of fugitive dust control methods employed. Much of the fugitive dust generated by construction activities consists of relatively large-size particles, which settle within a short distance from the construction site. Some of the resuspended dust (i.e., dust that does not settle) is smaller, within the size categories of regulated PM, but is nonetheless easily suppressible using water and other methods (see more on preventing emissions below). An important factor in limiting the amount of fugitive dust generated by construction of the replacement Connecticut River Bridge is that some of the activity will occur in the water. For example, material removed from the river will be wet and will not easily disperse at the time of removal.

During construction, trucks delivering construction materials and removing debris and workers' private vehicles may result in on-road emissions. Other transportation-related emissions will include tugboats removing and delivering materials and other small marine vessels that may be required, and may include diesel-powered locomotives for delivery or removal of materials. Tug boats will not operate continuously on site. If Amtrak delivers or removes materials via rail, Amtrak will transfer the materials to and from rail cars within the work site and will assemble the loaded cars along the existing sidings in Old Saybrook.

EMISSION CONTROLS

In order to ensure that pollutant concentrations do not cause significant adverse air quality impacts in nearby publicly accessible areas, the project will require the following emission controls. The contractor will prepare and submit to Amtrak an emissions control, identifying the incorporation, documentation, and enforcement of the following control measures in the project.

Diesel Engines:

- All non-road diesel engines will be EPA Tier 2 certified or higher.
- All non-road diesel engines greater than 50 hp will be retrofit with diesel particulate filters (DPFs) unless they are Tier 4 certified.
- Truck routes for deliveries will be established so as to minimize the use of local truck trips in populated areas.
- Idling of delivery trucks or construction equipment when not in active use will be strictly prohibited.
- The contractor will coordinate as early as possible with CL&P to ensure the availability of grid power on-site, and will distribute power throughout the site as necessary. The contractor will use a combination of grid power and catenary power in lieu of generators to the extent practicable, including, but not limited to, lighting, signage, and small power tools.
- If rail transfer is used, locomotives will minimize idling at the sidings in Old Saybrook and will idle as far as possible from the nearest residence (i.e., at least 200 feet from the nearest residence).

Dust Suppression

- The contractor will be responsible for control of dust at all times during contract, 24 hours a day, seven days a week, including non-working hours, weekends, and holidays.
- Exposed unpaved areas and access roads will be watered at regular intervals or treated with water soluble, non-toxic, non-reactive, and non-foaming dust suppression agents as necessary to avoid fugitive dust resuspension by vehicles.
- Stock piles will be covered or watered at regular intervals to avoid windblown dust.
- Vehicles leaving the construction site will not have loose mud or dirt on the vehicle body or wheels and will be cleaned as necessary before leaving sites to control tracking.
- Haul truck cargo areas will be securely covered during material transport on public roadways. Trucks will have tight fitting tailgates that can be secured in the closed position.
- Vehicle mud and dirt carryout, material spills, and soil washout onto public roadways and walkways and other paved areas will be cleaned up immediately.

- Demolition, excavation, dumping, and transfer of materials will be accompanied by wet suppression so as to avoid the release of dust.

NOISE AND VIBRATION

Noise and vibration from construction equipment operation and noise from construction vehicles and delivery vehicles traveling to and from the project area may occur during construction of the project. The level of impact of these noise sources depends on the noise characteristics of the construction equipment and activities, the schedule, and the location of potentially sensitive noise receptors. Noise and vibration levels at a given location are dependent on the kind and number of pieces of construction equipment being operated, as well as the distance from the construction site. Like most construction projects, construction will result in increased noise and vibration levels for a limited time period.

NOISE

Typical noise levels of construction equipment that the contractor may employ during the construction process are provided in Table 12-2. Noise from construction equipment is regulated by USEPA noise emission standards. These federal requirements mandate that: (1) certain classifications of construction equipment and motor vehicles meet specified noise emissions standards; and (2) construction materials be handled and transported in such a manner as not to create unnecessary noise. Amtrak will ensure that the contractor will follow these regulations carefully. In addition, the contractor will use appropriate low-noise emission level equipment and will implement operational procedures. Amtrak will ensure compliance with noise control measures by including them in the contract documents as material specifications and by directives to the construction contractor. Amtrak will encourage the contractor to use quiet construction equipment.

Noise generated by construction equipment decreases with distance. In general, the outdoor drop-off rate for moving noise sources is a decrease of 4.5 dBA for every doubling of distance between the noise source and the receiver. For stationary sources, the outdoor drop-off rate is a decrease of 6 dBA for every doubling of distance between the noise source and the receiver. In general, noise caused by construction activities will vary widely in volume, duration and location, depending on the task and the type of equipment. Noise caused by delivery trucks, employees traveling to and from the site, and other construction vehicles will not be severe in volume or duration, and will be limited to the major access roadways leading to the project site. Highway access to the project site is good, minimizing the need for project-related trucks to travel on local roads. Furthermore, trucks to and from the project site, and their potential effect on noise, will be limited due to the availability of barge and rail access at the project site. The contractor will assemble major elements of the project—such as the steel trusses for the river crossings—off-site, and deliver them by barge. While the contractor will deliver some components by truck, on a daily basis, the number of trucks will not result in substantial noise increases at any residential receptors.

Table 12-2
Construction Equipment Noise Emission Levels

Equipment	Typical Noise Level (dBA) 50 feet from source
Air compressor	81
Backhoe	80
Bulldozer	85
Compactor	82
Concrete Mixer	85
Concrete Pump	82
Concrete Vibrator	76
Crane, Derrick	88
Crane, Mobile	83
Generator	81
Grader	85
Impact Wrench	85
Jackhammer	88
Loader	85
Paver	89
Pile Driver (Impact)	101
Pile Driver (Sonic)	96
Pneumatic Tool	85
Pump	76
Rail Saw	90
Rock Drill	98
Roller	74
Saw	76
Scarifier	83
Scraper	89
Shovel	82
Spike Driver	77
Tie Cutter	84
Tie Handler	80
Tie Inserter	85
Truck	88

Source: Transit Noise and Vibration Impact Assessment, FTA-VA-90-1003-06, May 2006.

Construction activities related to the bridges, approach structures, embankment and retaining walls, and new track and ancillary equipment along each alignment will result in short-term noise increases in the vicinity of the actual work site. The project may result in temporary noise increases at CTDEEP Marine Headquarters and Ferry Point Park from deliveries of materials that may be needed for construction purposes. Any impacts will be temporary and will most likely occur due to weekday truck trips concentrated in the morning and afternoon peak periods, with occasional late night deliveries of oversized materials (e.g., bridge girders).

VIBRATION

Tables 12-3 and 12-4 show architectural and structural damage risk and perceptibility distances for residential and historic structures in proximity to the types of construction activities that will occur during construction of the proposed project. Architectural damage usually includes cosmetic damage, such as cracked plaster, etc. Architectural damage is not considered potentially dangerous. As shown in Table 12-3, pile driving has the greatest potential to result in architectural damage to most building types. While not shown in the table, controlled blasting also can result in high vibration levels in excess of 100 VdB with resultant damage to existing structures; however, Amtrak does not expect blasting to be required for the construction of the Preferred Alternative. Most other construction activities require very small (i.e., less than 25 feet) distances between the structure and the construction equipment or the presence of highly fragile buildings for impacts to occur. For fragile and highly fragile buildings respectively, FTA recommends a limit of peak particle velocities of 0.2 and 0.12 inches per second or 94 and 90 VdB. Since the use of driven piles will be limited, and since this analysis anticipates no controlled blasting, the likelihood of vibration-related adverse effects will be small. Furthermore, as identified in Chapter 6, "Cultural Resources," the project will not directly affect any known or potential architectural resources identified in the study area, with the exception of the Connecticut River Bridge itself. Any identified resources are far removed from the potential construction activity area, and therefore will not require special protection from construction-related vibration impacts.

Table 12-3
Vibration Source Levels for Construction Equipment

Equipment	PPV at 25 ft (in/sec)	Approximate L_{V^*} at 25 ft
Pile Driver (impact)	0.644	104
Pile Driver (sonic)	0.170	93
Clam Shovel drop (slurry wall)	0.202	94
Hydromill (slurry wall in soil)	0.008	66
Hydromill (slurry wall in rock)	0.017	75
Vibratory Roller	0.210	94
Hoe Ram	0.089	87
Large bulldozer	0.089	87
Caisson drilling	0.089	87
Loaded trucks	0.076	86
Jackhammer	0.035	79
Small bulldozer	0.003	58

Note: * RMS velocity in decibels (VdB) re 1 micro-inch/second
Source: *Transit Noise and Vibration Impact Assessment*, FTA-VA-90-1003-06, May 2006.

Table 12-4
Construction Vibration Damage Criteria

Building Category	PPV (in/sec)	Approximate L_{V^*}
I. Reinforced-concrete, steel or timber (no plaster)	0.5	102
II. Engineered concrete and masonry (no plaster)	0.3	98
III. Non-engineered timber and masonry buildings	0.2	94
IV. Buildings extremely susceptible to vibration damage	0.12	90

Note: * RMS velocity in decibels (VdB) re 1 micro-inch/second
Source: *Transit Noise and Vibration Impact Assessment*, FTA-VA-90-1003-06, May 2006.

NATURAL RESOURCES

Because the Preferred Alternative involves in-water elements such as removing and installing piers in the Connecticut River, this section assesses potential construction-related impacts to aquatic resources. Because the proposed project is for bridge replacement, long-term effects from future bridge operations are not expected to differ from those associated with the operation of the existing bridge.

TERRESTRIAL RESOURCES

As discussed above under “Existing Conditions”, terrestrial resources that could be affected by the project are confined to those resources within Amtrak’s ROW and possible construction staging areas. The removal of some scrub/shrub vegetation along the existing embankment may be necessary to accommodate the new alignment and construction access. These areas have relatively little value as terrestrial habitat, and as such, permanent impacts to terrestrial natural resources are expected to be minor.

WETLANDS AND OPEN WATER

Due to the nature and location of the river crossing and the need for continuous operations along the Northeast Corridor, complete avoidance of wetland and open water areas will not be feasible for the Preferred Alternative. Based on the conceptual bridge design, the project team estimates the Preferred Alternative will result in approximately 2.8 acres of permanent wetland impacts to *Spartina* and *Phragmites* marsh and 0.74 acres of permanent open water impacts. Benthic habitat in the area of permanent open water impacts consists of unvegetated coarse-grained sand and silt/sand substrate. There are no oyster reefs and no submerged aquatic vegetation (SAV) in the permanently impacted area. However, there may be hard clam beds within the 0.23 acres of permanently impacted open water habitat along the western approach embankment/retaining wall. Removal of the existing Connecticut River Bridge may result in approximately 0.33 acres of restored open water, for a net project impact of 0.41 acres. Temporary access roadways and construction platforms will temporarily impact wetlands and open water. Based on the conceptual bridge design and the anticipated construction means and methods, the project team estimates approximately 3.2 acres of wetlands and 2.0 acres of open water will be temporarily impacted during the construction period. The differences in impacts between Option A and Option B are expected to be minor. As discussed in Chapter 10, Amtrak will determine appropriate mitigation measures to offset the permanent loss of wetland and open water habitats (e.g., restoration and/or purchasing of wetland banking credits) through coordination with CTDEEP, USACE, USCG, and other involved agencies during the permitting process.

WATER QUALITY

Water quality impacts from the Preferred Alternative will comprise sediment resuspension, a temporary impact associated in this case with in-water construction. Estuarine-dependent and anadromous fish species, bivalves and other macroinvertebrates, including those present in the lower Connecticut River and near the Connecticut River Bridge are generally tolerant of elevated suspended sediment concentrations and have evolved behavioral and physiological mechanisms for dealing with variable concentrations of suspended sediment (Birtwell et al. 1987, Dunford 1975, Levy and Northcote 1982 and Gregory 1990 in Nightingale and Simenstad 2001, LaSalle et al. 1991). Fish are mobile and generally avoid unsuitable conditions such as increased suspended sediment and noise (Clarke and Wilber 2000). In addition, many estuarine fish species have the ability to expel materials that may clog their gills when they return to cleaner, less sediment-laden waters. The shellfish species found in the Connecticut River are necessarily adapted to naturally turbid conditions and can tolerate short-term exposures by closing valves or reducing pumping activity. Mobile benthic invertebrates that occur in estuaries have been found to be tolerant of extremely elevated suspended sediment concentrations. In studies involving the tolerance of crustaceans to suspended sediments for up to two weeks, nearly all mortality was caused by the full-time exposure to high suspended sediment concentrations (greater than 10,000 mg/L) (Clarke and Wilber 2000).

Due to its coarse nature, the Connecticut River sediment, which is composed primarily of coarse-grained sand in deeper channel areas and silt/sand near the shorelines, will not remain suspended for extended periods of time, especially since in-water work will be performed intermittently as various project elements are constructed. While a localized increase in suspended sediment may cause fish to temporarily avoid the area where bottom disturbing activities are occurring, the area affected will be confined to the project site. Suitable habitats similar to the Connecticut River will be available nearby for use by disturbed fish. Therefore, temporary increases in suspended sediment resulting from in-water construction activities will not be expected to result in significant adverse impacts to fish and mobile benthic macroinvertebrates.

The Preferred Alternative will not result in any permanent, significant adverse impacts to water quality.

PHYSICAL HABITAT

Potential Noise Caused by Project Construction and Operation

Anthropogenic noise in the environment has the potential to impact aquatic organisms. Impacts range from behavioral avoidance of ensonified areas to sublethal physiological stress and physical injury, to mortality (Hastings and Popper 2005). In the case of sublethal and lethal impacts, the spatial extent of the impacts is typically smaller than the area of behavioral avoidance. Research on noise produced by pile driving, dredging, offshore wind farms, and vessel operation has provided a better understanding of the potential impacts of these activities (Vella et al 2001), whereas those resulting from radiated noise produced by bridge traffic and the operation of moving bridges (noise likely to result from the proposed project) are less well understood.

Pile driving in particular can produce underwater sound pressure waves that can affect fishes, although the type and intensity of pile-driving noise vary with factors such as the type and size of the pile and pile driver, firmness of the substrate, and water depth. Larger piles driven in firmer substrates require greater energy to install resulting in higher sound pressure levels (SPL). Hollow steel piles produce higher SPLs than similarly sized timber piles (Hastings and Popper 2005). Sound attenuates more rapidly in shallow waters than in deep waters (Rogers and Cox 1988 in Hanson et al. 2003). Fish with swim bladders have been shown to be more vulnerable to these impacts than fish without swim bladders (Hanson et al. 2003, Halvorsen et al. 2012). The noise levels associated with the potential onset of physiological effects and recoverable physical injury appear to be considerably higher than the currently accepted noise levels used to assess impacts to fishes (Halvorsen et al. 2012).

A number of factors determine the intensity and frequency of sound radiated into the aquatic environment during bridge construction and normal bridge operations. The factors include, but are not limited to, bridge design, construction materials, degree of coupling to the water column, typical uses, and water depth (Hazelwood 1994). The effect of radiated noise from the existing Connecticut River Bridge on the aquatic biota of the Connecticut River is largely unknown, however many other sources of natural and anthropogenic sounds exist in the Connecticut River estuary and in Long Island Sound; it is expected that fishes moving through the estuary will encounter an acoustic environment that is at least as noisy as that encountered in the vicinity of the Connecticut River Bridge. It is likely that fishes will habituate to the noise produced by the bridge (Wysocki et al. 2007; Popper and Schilt 2008).

As discussed above, Amtrak will construct the bridge substructure using drilled shafts rather than pile driving, which will minimize the extent of underwater noise impacts. Compared to other methods of pile installation such as vibratory or impact pile driving, drilling provides a relatively quiet option by which to install piles (HDR 2011). Noise at close range to pile drilling (30 m from the drilling operation) has been shown to be well below the level thought to cause behavioral avoidance by fishes (i.e., 150 dB re 1μPa root mean square sound pressure level; SPL_{rms}) and only slightly higher on average (122 dB re 1μPa) than ambient noise levels (116 dB re 1μPa; HDR 2011). Because the nature of the sound produced during drilling is continuous rather than percussive (as with impact pile driving), the amplitude of the sound is far less than that created during impact pile driving and thus the spatial extent of the ensonified area, and the likelihood that fish will be exposed, is also considerably smaller.

Furthermore, because the length of time for in-water construction is expected to be relatively short, individual fish should not be exposed to SPLs of the magnitude known to result in sublethal or lethal injury. To further protect fish populations, in-water construction activities will be limited to periods outside of the spawning season for anadromous fishes as identified by regulatory authorities. Therefore, noise produced during in-water construction activities will not be expected to result in significant adverse impacts to aquatic biota.

Potential Obstruction of Fish Migration

In-water structures can serve as barriers to fish migration, especially when these structures create significant areas of turbulence, cause a rapid change in hydraulic head, or physically restrict passage (USACE 1991). Typically, these types of obstructions (or restrictions) are found in flowing rivers blocked by hydroelectric dams, low-head weirs, or culverts. In the case of the Preferred Alternative, the width of the navigable bridge passage will be preserved at 150 feet (45.7 m), with substantial open water areas remaining beneath the fixed spans. As with the existing structure, these wide passages are not expected to obstruct fish movements. In general, natural resources agencies may require work windows where in-water construction and demolition activities may be restricted during the spawning and migration of fish and shellfish species found in the Connecticut River. Such restrictions are typically enforced to prevent potential disturbance of migratory fish during spawning. Amtrak will more clearly define any required work windows in conjunction with the natural resource agencies during the final design and permitting stage. Therefore, construction and operation of the Preferred Alternative is not expected to obstruct fish migration within the Connecticut River.

Essential Fish Habitat

An EFH assessment was conducted for the proposed project, and is included in Appendix C, "Natural Resources." With respect to temporary impacts during the construction of the Preferred Alternative, the EFH assessment concludes that:

- Sediment resuspension resulting from in-water construction activities is not likely to cause adverse impacts to EFH by reducing water clarity or by increasing concentrations of total suspended sediments because of the coarse grain size of the sediment and the implementation of containment measures (e.g., turbidity curtains);
- Noise from pile-driving activities will not adversely impact EFH or EFH species because Amtrak will install piles in drilled shafts rather than driving with impact hammers; and
- Shading by temporary construction platforms is not expected to cause significant adverse impacts to EFH as the size of their underwater footprint will be minimal and Amtrak will use barges when possible.

In terms of permanent impacts, the EFH assessment concludes that:

- Adverse impacts to EFH caused by changes to, or loss of, benthic habitat as a result of construction activities will be limited to a localized area within the project area;
- Shading by the replacement bridge is not expected to have an adverse effect on EFH or EFH species at the project site;
- Operation of the Preferred Alternative is not expected to radiate substantially more sound into the water than the existing bridge; and
- Construction of the replacement bridge is not expected to obstruct migration of EFH species in the Connecticut River.

The bridge replacement project will result in the permanent loss of a small area of open water benthic habitat and tidal wetlands, which will affect four of the EFH species. Juvenile Atlantic salmon and bluefish are known to use these habitats, as are winter flounder and windowpane. For the four EFH species likely to occur in the vicinity of the project area, the short duration and localized extent of construction activities and similar operation of existing and replacement bridges means that the proposed project is not likely to adversely affect EFH or EFH species in the Connecticut River. Limitations on in-water construction activities during the migration window will protect anadromous species, including Atlantic salmon that could move through the project area to freshwater spawning habitat upstream in the Connecticut River.

Marine Turtles

Because state-listed and federally-listed marine turtles neither nest nor reside in the area year-round, and are only rarely observed in the Connecticut River estuary, they will not be expected to be impacted by the construction or operation of the proposed project.

THREATENED OR ENDANGERED SPECIES

Fish

According to the response to an information request on the presence of threatened and endangered species in the study area, NMFS indicated that shortnose sturgeon are vulnerable to direct (injury, mortality) and indirect (removal of forage items, increase in sediment etc.) effects of in-water construction activities, including the driving of large piles and blasting, which are often associated with bridge projects (Colligan 2008 and 2011). If present in the study area, these highly mobile fishes will be expected to avoid noise associated with construction activities, which as discussed earlier in the "Physical Habitat" section, is not expected to reach levels associated with the onset of physiological impacts, recoverable physical injury, or mortality. Because of the distance between the project area near the mouth of the Connecticut River (RM 3.5) and the spawning grounds (RM 120) and the location of sturgeon concentration areas upstream of the project area, the likelihood that the proposed project will obstruct migration of shortnose sturgeon is low. Therefore, noise impacts to sturgeon are not expected to result from the proposed project. Furthermore, Amtrak does not foresee dredging for the proposed project, which will avoid any indirect impacts caused by the removal of benthic forage organisms. Increases in suspended sediment concentrations will be minimized through the use of containment measures during pile drilling. Overall, construction and demolition activities associated with the proposed project may affect but are not expected to adversely affect shortnose sturgeon or Atlantic sturgeon in the Connecticut River.

As discussed in Chapter 10, adult blueback herring occur only seasonally in the Connecticut River, migrating to shallow, freshwater sections of the river to spawn between mid-April and June (USFWS 2010). Larval and juvenile blueback herring remain in the freshwater portions of the Connecticut River, and only until they reach approximately 5 cm in length. Because of the high salinity (30 ppt) of the project area, larval blueback herring are not likely to be present in the study area, and juveniles and adults are only likely to occur seasonally as they migrate out to the ocean during the late summer and fall (August-September). As with sturgeon, blueback herring are highly mobile and will likely avoid construction noise during their migrations to and from the river. Blueback herring are not expected to occur in the Connecticut River between fall and spring. Because blueback herring spend most of the year in freshwater habitats well upstream of the project area or in marine habitats of Long Island Sound and the Atlantic Ocean, and because the Preferred Alternative will not obstruct fish migration through the project area, the proposed project is not expected to adversely affect the blueback herring population.

As shown in Appendix C, NMFS has confirmed that no further consultation pursuant to Section 7 of the ESA is required. Since all three of these species are likely to occur at least seasonally within the study area, and Atlantic sturgeon have recently been listed under the Section 7 of the ESA, Amtrak will continue to coordinate with NMFS and any other involved federal agencies during the final design and permitting process. If necessary, Amtrak will abide by in-water work restrictions to minimize the potential impacts. Permits issued by USCG, USACE, and through USDOT's ESA Section 7 Consultation process for similar bridge construction projects have included in-water work restrictions designed to protect fishes. Since construction will adhere to the in-water work restrictions anticipated for this project, the proposed project is not expected to adversely affect any federally or state listed fish populations.

Plants

As stated in Chapter 10, the saltmarsh bulrush and pygmy weed were identified, by CTDEEP, as being within or immediately adjacent the project site. Although bayonet grass, mudwort, eastern prickly pear, and *Lilaeopsis* have not been documented in the immediate vicinity of the project site, they have been documented within the 0.5 mile study area and habitat is present within the vicinity of the project site for these species. While Amtrak did not observe any of these plant species during preliminary field surveys, they may be present within the project site and there is the potential for an adverse impact to these plants as a result of the proposed project. During the preliminary engineering and permitting phase, Amtrak will conduct surveys in coordination with

CTDEEP to determine the presence or absence of these species and the size of the populations within the area of disturbance. Should these plants be present in the area of disturbance, then measures to avoid and/or minimize impacts to these species where possible will be developed in coordination with CTDEEP.

Birds

As discussed in Chapter 10, several threatened or endangered bird species may be seasonally present within the tidal wetlands affected by the Preferred Alternative. Further coordination with CTDEEP and species-specific surveys will likely be required during the preliminary engineering and permitting phase of the project to confirm the presence of these birds. Should these species be determined to be present, CTDEEP may include construction restrictions (i.e., “work windows”) in its permits to minimize disturbance and ensure that the project will not result in significant adverse impacts to these bird species.

CONTAMINATED MATERIALS

Although the exact extent of subsurface disturbance associated with the Preferred Alternative will not be determined until final engineering, Amtrak expects that construction will involve the excavation, disturbance, and likely removal for off-site disposal of some existing soil (including soil from the embankments), potential removal and off-site disposal of river sediments, and demolition of the existing bridge. These activities will take place along the new southern bridge alignment, as discussed in Chapter 2. Amtrak also expects that the new catenary pole foundations (roughly 3 feet in diameter) will be installed to a depth of up to 20 feet.

The presence of contaminated materials only presents a threat if exposure to these materials occurs. Even then, a health risk requires both a complete exposure pathway to the contaminants and a sufficient dose to produce adverse health effects. The most likely route of exposure will be through breathing volatile/semi-volatile compounds or particulate-laden air released during demolition, excavation, and construction activities. Other potential routes of exposure are dermal contact and accidental ingestion. In order to prevent any of these exposure pathways and doses, the proposed project will include measures such as:

- Amtrak will follow established regulatory requirements for pre-construction removal of asbestos and appropriate management of lead-based paint and of PCB-containing equipment.
- Amtrak will develop and implement a CHASP that will include detailed procedures for managing potential contamination (e.g., railroad ties, creosote-contaminated soil and any underground storage tanks unexpectedly encountered). The CHASP will also include procedures for minimizing the generation of dust that could affect workers, the surrounding community and the environment as well as the monitoring necessary to ensure that no such impacts are occurring.

With these measures, there will be no significant impacts due to contaminated materials during the construction period.

NEW BRIDGE CONSTRUCTION

The Preferred Alternative will involve construction of a new bridge, widening of existing embankments, construction of new bridge piers, and construction of retaining walls, catenary support structures, etc. Shallow soil disturbance will occur in areas where the proposed track will be placed on existing embankment. Deeper excavations will be required for catenary and signal support structures, new or relocated utilities, and embankment retaining walls.

Due to the presence of compressible soils, deep foundations for the river crossing will be necessary. While Amtrak will determine the foundation type during subsequent engineering phases, it is likely to comprise drilled shafts, which could require the disposal of soil up to 90 feet or more below existing grade. Amtrak will import clean fill for grading during construction, e.g., to widen the bridge embankments.

CONSTRUCTION HEALTH AND SAFETY PLAN (CHASP)

Amtrak will perform all work in accordance with applicable local, state, and federal regulatory requirements. Prior to commencing site disturbance, Amtrak will prepare a CHASP to address the potential of encountering contamination during soil disturbance activities. The CHASP will describe in detail the health and safety procedures to minimize exposure to contaminated materials by workers and the public. Amtrak will evaluate the hazards by determining the potential subsurface contaminants of concern and their chemical and physical characteristics, and health hazards will be considered within the potential exposure associated with the work to be performed. Amtrak will develop the CHASP in accordance with OSHA regulations and guidelines. The CHASP will include designation and training of appropriate personnel, monitoring for the presence of contamination (e.g., soil which shows evidence of potential contamination, such as discoloration, staining, or odors) and appropriate response plans. To prevent the potential off-site transport of dust, Amtrak will define dust control requirements for all soil-disturbing operations.

WASTE MANAGEMENT

Amtrak and its contractors will handle excavated soil or sediment in accordance with all applicable regulations. Amtrak will characterize excavated material to classify the material (e.g., historical fill, uncontaminated native soils, petroleum-contaminated wastes, etc). The extent and parameters of any testing will be dependent on the classification and any requirements of off-site waste disposal facilities.

Wastes containing contaminated materials require special handling, storage, transportation, and disposal methods to prevent releases that could impact human health or the environment. Depending on the nature of the material, federal, state, and local regulations require the use of special containers or stockpiling practices for on-site storage of the material to prevent the release of contaminated materials. The federal and state Departments of Transportation have requirements for transportation of wastes containing contaminated materials. Facilities that receive contaminated materials require federal, state, and local permits to accept the waste, and generally require that specific representative waste sampling and laboratory analysis protocols be conducted prior to accepting material for disposal.

EXISTING BRIDGE DEMOLITION

Prior to the demolition of the existing bridge, Amtrak will survey the structure for asbestos and lead-based paint. Amtrak will remove any identified ACM prior to demolition in accordance with the applicable federal, state and local requirements. Amtrak will implement appropriate engineering controls (e.g., containment, wetting and other dust control measures) to minimize asbestos exposure.

If lead paint is present, Amtrak will perform an exposure assessment to determine whether lead exposure will occur during the demolition and/or removal of the existing bridge. If the exposure assessment will indicate the potential to generate airborne dust or fumes with lead levels exceeding health-based standards, Amtrak will employ a higher personal protection equipment standard to counteract the exposure. Amtrak will perform the demolition activities in accordance with the applicable OSHA regulation (OSHA 29 CFR 1926.62 - *Lead Exposure in Construction*).

Amtrak will survey and evaluate any suspected PCB-containing equipment (e.g., transformers, electrical feeder cables, hydraulic equipment, and fluorescent light ballasts) that will require removal, disturbance or relocation. Amtrak will remove and dispose PCB-containing equipment that will be disturbed by the work in accordance with applicable federal and state regulations. Generally, unless suspected PCB-containing equipment is labeled to be "non-PCB," it must be tested or assumed to be PCB-containing and disposed of at properly licensed facilities.

With the implementation of these measures, no adverse impacts related to hazardous materials will result from construction and demolition activities on the project site. After the completion of the project, there will be no potential for adverse impacts from hazardous materials.

UTILITIES

As described above, Amtrak will further evaluate the fiber optic and copper lines located north of the existing bridge (within the Amtrak ROW) during the preliminary engineering stage. The project team will also confirm the presence or absence of other aboveground and underground utilities including sanitary and stormwater sewers and electric and gas lines at that time. Amtrak will coordinate relocation of such utilities with the utility provider to minimize service disruptions. As stated above, the contractor will coordinate as early as possible with CL&P to ensure the availability of grid power on-site, and will distribute power throughout the site as necessary. The contractor will use a combination of grid power and catenary power in lieu of generators to the extent practicable, including, but not limited to, lighting, signage, and small power tools.

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✷

A. INTRODUCTION

This chapter identifies safety and security considerations related to the design and operation of the proposed project. The safety procedures and security systems that Amtrak will implement to protect rail employees, passengers, marine users, and the general public are described below. FRA guidance requires that environmental reviews address safety and security concerns, including the short-term construction effects and long-term operational effects on residents and other users of the project area. The review should also include potential pedestrian and traffic hazards as well as transit user and employee security issues. Specific regulations relevant to safety and security are discussed below. Safety and security concerns pertaining to the construction of the proposed project are described in Chapter 12, “Construction Impacts.”

B. EXISTING CONDITIONS

EMPLOYEES

Amtrak complies with all applicable federal safety regulations and industry standards, including FRA 49 CFR 214: Railroad Workplace Safety; FRA 49 CFR 237: Bridge Safety Standards; NFPA regulations; OSHA regulations; and AREMA regulations. Adequate signaling and communications are currently in place to prevent any trains from entering the bridge when the moveable span is open or when personnel are on site for repairs. Personnel undergo Amtrak Safety Training before they are permitted on site. Amtrak inspects all bridge structural components regularly and repairs them as needed.

In 2006, Amtrak instituted a System Safety Program that applies to all Amtrak facilities, including the project site. The program provides guidance on hazard management, incident reporting, inspection, maintenance and repair of current facilities and stock, training and certification, emergency response, environmental management, drug and alcohol programs, and a number of security policies. One section of the System Safety Program is devoted to employee safety, with a particular focus on field safety.

PASSENGERS

Amtrak maintains and updates a Passenger Train Emergency Response Plan, approved by the FRA. The plan includes train operations on the Northeast Corridor and therefore also covers the project site. Amtrak also conducts Passenger Train Emergency Response Training. In 2006, training was conducted for more than 500 local emergency response agencies along Amtrak routes across the U.S and more than 6,500 individual responders participated.

MARINE USERS

As discussed in the *Navigation Survey*[1], some boaters have reported that the ebb tide current pulls ships into Pier 5, the west channel pier, as a result of the existing channel being located close to the eastern shoreline. At least one major accident occurred on September 9, 2006, involving an oil barge damaging the bridge fender system. Subsequent minor incidents with no damage to the bridge or the fender system occurred on February 29, 2008, involving a tug boat rubbing against the fender system; and on August 30, 2011, involving a sailboat striking the bridge due to floating debris in the water.

C. NO ACTION ALTERNATIVE

Under the No Action Alternative, Amtrak will continue to adhere to current regulations regarding worker and passenger safety. The planned major and minor improvement projects discussed under the No Action Alternative in Chapter 2, “Project Alternatives,” are located outside of the primary study area used for this analysis and would not affect rail employee, passenger, and marine user safety in the area.

As part of a separate ARRA-funded project, Amtrak plans to implement a series of security measures at Amtrak-owned or operated stations and facilities across the U.S, including the Connecticut River Bridge. This separate project will include a number of enhanced security features to improve the safety of workers as well as rail passengers. In particular, Amtrak will implement security measures to protect against potential terrorist threats. Amtrak will install upgraded or new access control systems, including electronic card readers, to prevent unauthorized access to restricted areas. This enhanced system will also improve data collection and monitoring to support future risk management decisions. Other measures that Amtrak will put in place to restrict access to secure areas include high-impact fencing, precast architectural concrete or metal units, and connections/vehicular barriers capable of withstanding specific design loads. Additionally, Amtrak will install a state-of-the-art Closed Circuit Television (CCTV) surveillance system that will comprise new video cameras and a hybrid analog and digital surveillance system. This security project is proceeding and is currently in the design phase, with fit-out and construction scheduled for completion by 2014.

D. PROBABLE EFFECTS OF THE PREFERRED ALTERNATIVE

EMPLOYEES

Amtrak will design, build, and operate the proposed project to comply with all relevant federal, state, and local safety regulations, including: FRA 49 CFR 214: Railroad Workplace Safety; FRA 49 CFR 237: Bridge Safety Standards; NFPA regulations; OSHA regulations; AREMA regulations; the Connecticut State Fire Safety Plan; Connecticut State Building Code; and Old Saybrook and Old Lyme Fire and Building Codes.

[1] Hardesty and Hanover, LLP for National Railroad Passenger Corporation Office of Engineering, *Inspection and Conceptual Engineering for the Reconstruction or Replacement of the Connecticut River Bridge, MB 106.89; Navigation Survey Report*, October 2006

During construction of the proposed project, Amtrak will develop written Safe Work Plans to identify potential hazards and safety measures to be implemented for the protection of workers on the project site and the general public in the vicinity of the project.

Examples of specific safety design elements for the proposed project include:

- Manufacturer-recommended work areas, service clearances, and staging requirements for all bridge operation equipment;
- Old Lyme and Old Saybrook Fire Department approvals and/or permits as may be required for systems and equipment such as: diesel fueling system, sprinkler and standpipe systems, and certain air conditioning systems and air compressors;
- Material Safety Data Sheets (MSDSs) for paints, coatings, sealers, and chemical substances;

With the implementation of the safety measures described above, no adverse impacts to safety or security of employees will result from the proposed project.

PASSENGERS

The Preferred Alternative will improve the structural and operational reliability of the existing Connecticut River Bridge and increase the safety of passengers traveling on Shore Line East and Amtrak trains over the bridge.

MARINE USERS

The Preferred Alternative will provide navigational benefits by improving the reliability of the bridge and minimizing delays during bridge openings and closings. Option A (which would retain the existing channel width and alignment) will maintain the current navigational conditions. Widening the channel (a possibility under Option B) may improve navigation further and may reduce the likelihood of boat collisions due to tidal currents. To prevent and/or minimize future accidents due to an off-center channel, Amtrak will provide navigation channel fenders and a dolphin system designed to protect the piers from all aberrant vessels. ✷

A. INTRODUCTION

Secondary effects are those that are "caused by an action and are later in time or farther removed in distance but are still reasonably foreseeable" (40 CFR 1508.8). Generally, these effects are induced by a proposed project. These can include growth-inducing effects as well as changes in land use, economic vitality, neighborhood character, traffic congestion, and their associated effects on air quality and noise, water resources, and other natural resources.

Cumulative effects result from the incremental consequences of an action (the project) when added to other past and reasonably foreseeable future actions (40 CFR 1508.7). The cumulative effects of an action may be undetectable when viewed in the individual context of direct and even secondary effects, but when added to other actions can eventually lead to a measurable environmental change. Summarized in this chapter is the potential for the proposed project to result in secondary and cumulative effects.

B. SECONDARY EFFECTS

As discussed in previous chapters, the proposed project will not result in an increase in train frequency, capacity, or speed, and will not result in measurable new rail ridership. Chapter 4, "Land Use and Socioeconomic Conditions," included an assessment of the project's potential to cause direct and indirect socioeconomic effects, and concluded that the proposed project will not have an adverse impact on the population, land use, or economic activities in the study area. The project will result in no new development or population/employment growth. Therefore, no positive or negative secondary effects will result from the proposed project.

C. CUMULATIVE EFFECTS

The planned major and minor improvement projects discussed under the No Action Alternative in Chapter 2, "Project Alternatives," are located outside of the primary study area used for this analysis and are not expected to have an effect on any environmental resource in the study area. The construction and operation of the Preferred Alternative in conjunction with the planned projects identified in this EA will not result in an adverse cumulative impact to any environmental resource in the region around the project site.

As discussed in Chapter 1, the NEC FUTURE program is a comprehensive planning effort focused on the 457-mile rail transportation system extending from Boston's South Station in the north to Washington's Union Station in the south[1]. The program is being led by FRA with FTA acting as a cooperating agency for the initiative. NEC FUTURE aims to define, evaluate, and prioritize future investments in the NEC, and will include new ideas and approaches to grow the region's intercity, commuter, and freight rail services. The first phase of the program took place

[1] http://www.necfuture.com/. Accessed on December 10, 2013.

in 2012 and entailed stakeholder and public outreach, data collection and analysis, a scoping process in accordance with NEPA requirements, and development of initial alternatives. In 2013, principal activities included preliminary alternatives development and a screening process to identify a smaller set of reasonable alternatives for analysis in the Tier 1 EIS. Additional activities included an existing conditions analysis of the NEC FUTURE study area and ongoing public outreach and agency coordination. In 2014, FRA anticipates preparation of the Draft Tier 1 EIS (DEIS) and Draft Service Development Plans, with the selection of a preferred investment program for the Northeast Corridor. The final Tier 1 EIS (FEIS) and Final Service Development Plan are expected to be completed in 2015. The Connecticut River Bridge Project is within the Tier I EIS study area. Amtrak is coordinating with FRA regarding both projects. The Connecticut River Bridge Project will be informed by the outcome of the Tier I EIS and will be designed so as not to preclude the NEC FUTURE project.

The Northeast Corridor Improvement Project (discussed in Chapter 1, "Purpose and Need") includes improvements to the Northeast Corridor system between Washington, D.C. and Boston. The Mystic River Bridge and the Shaw's Cove Bridge, both in Connecticut, were replaced as part of that effort in the 1980s. The Thames River Bridge replacement was completed in July 2008 and the Niantic River Bridge replacement was completed in May 2013. All of these projects, together with the Connecticut River Bridge Replacement Project, will improve the operations and reliability of the Northeast Corridor and result in a cumulative benefit. ✷

Chapter 15: Commitment of Resources

A. INTRODUCTION

In accordance with NEPA and CEQ's implementing procedures under Title 40, Part 1502 of the CFR, this EA includes an analysis of the relationship between short-term uses of the environment and the maintenance and enhancement of long-term productivity, and of any irreversible or irretrievable commitments of resources that will occur if the proposed project is constructed.

B. IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Construction of the Preferred Alternative, described in Chapter 2, "Project Alternatives," will require the irreversible and irretrievable commitment of construction materials such as concrete, steel, wood, and other building materials. Amtrak and its contractors will consume energy in the form of fossil fuels and electricity during the construction and operation of the facility. These materials are available and their use for the proposed project will not have an adverse impact on their continued availability for other purposes. In addition to materials, Amtrak will require funding and human labor to design, build, and operate the proposed project.

Amtrak endeavors to minimize the use of irretrievable resources and to conserve and reuse resources whenever possible. To that end, Amtrak has established and implemented an Environmental Management System (EMS) pursuant to International Organization for Standardization (ISO) 14001, with a focus on minimizing consumption of raw materials, energy usage, pollutant emissions, and generation of wastes.

C. RELATIONSHIP BETWEEN SHORT-TERM USES OF THE ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

Short-term effects on the environment typically result from construction impacts. Long-term effects relate to the maintenance and enhancement of long-term productivity, including consistency of a project with local and regional economic, social, planning, and sustainability objectives.

SHORT-TERM USES

Construction of the proposed project will have greater short-term impacts on the environment than the No Action Alternative. However, the environmental impacts that will result from the proposed construction activities will be temporary and non-significant, as discussed in greater detail in Chapter 12, "Construction Impacts." Amtrak will endeavor to reduce any construction-related environmental impacts through the implementation of best management practices.

LONG-TERM PRODUCTIVITY

The proposed project will be a component of the long-term viability of the intercity rail system, as well as the area's maritime industry, and will help to promote the region's economic vitality.

SHORT-TERM USES VERSUS LONG-TERM PRODUCTIVITY

Based on the information presented above, the localized short-term impacts that will result from construction of the proposed project will be temporary, and will facilitate the maintenance and enhancement of long-term productivity in the region through the provision of improved rail and marine operations. ✷

Chapter 16: Environmental Justice

A. INTRODUCTION AND BACKGROUND

In accordance with Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* (February 11, 1994) Amtrak has prepared this environmental justice analysis to identify and address any disproportionate and adverse impacts on minority or low-income populations that could result from the proposed project.

Executive Order 12898 also requires federal agencies to work to ensure greater public participation in the decision-making process. For the proposed project, this requirement has been satisfied by the review process for this EA under NEPA.

This chapter analyzes the proposed project's potential effects on minority and low-income populations, to determine if disproportionately high and adverse impacts on those populations will result from the proposed project. This environmental justice analysis assesses the potential effects of the proposed project over the full range of environmental impacts on minority and low-income populations.

B. REGULATIONS

The environmental justice analysis for the proposed project follows the guidance and methodologies recommended in CEQ's *Environmental Justice Guidance under the National Environmental Policy Act* (December 1997) and USDOT's *Final Order on Environmental Justice* (April 1997).

CEQ GUIDANCE

CEQ, which has oversight of the federal government's compliance with Executive Order 12898 and NEPA, developed its guidance to assist federal agencies with their NEPA procedures so that environmental justice concerns are effectively identified and addressed. Federal agencies are permitted to supplement this guidance with more specific procedures tailored to their particular programs or activities, as USDOT has done.

The CEQ methodology involves collecting demographic information on the area where the project may cause significant and adverse effects; identifying low-income and minority populations in that area using census data; and identifying whether the project's adverse effects are disproportionately high on the low-income and minority populations, in comparison to the effects on other populations. The federal agency should develop and implement mitigation measures for any disproportionately high and adverse effects. Under NEPA, the potential for disproportionately high and adverse effects on minority and/or low-income populations should be one of the factors the federal agency considers in making its finding on a project and issuing a FONSI or a Record of Decision (ROD).

USDOT'S FINAL ORDER ON ENVIRONMENTAL JUSTICE

USDOT Order 5610.2(a) *Final Order on Environmental Justice* establishes the procedures for USDOT to use in complying with Executive Order 12898. The order applies to all of USDOT's operating administrations, including FRA. Following the procedures set forth in Executive Order 12898, the consideration of environmental justice begins with a determination of whether the project will have an adverse impact on minority and low-income populations and whether that adverse impact will be disproportionately high. Disproportionately high and adverse effects on minority and low-income populations are adverse effects that are predominantly borne by a minority population and/or low-income population or that are appreciably more severe or greater in magnitude than the adverse effects that will be suffered by the non-minority or non-low-income population. In making determinations regarding disproportionately high and adverse effects, the federal agency may take into account the mitigation and enhancement measures that it will implement and all offsetting benefits to the affected minority and low-income populations, as well as the design, comparative impacts, and relevant number of similar existing system elements in non-minority and non-low-income areas.

Federal agencies must ensure that they will only carry out a project having a disproportionately high and adverse effect on minority populations or low-income populations if (1) further mitigation measures or alternatives that will avoid or reduce the disproportionately high and adverse effect are not practicable; and (2) a substantial need for the program, policy, or activity exists, based on the overall public interest, and alternatives that will have fewer adverse effects on protected populations that will still satisfy that need will either have other adverse social, economic, environmental, or human health impacts that will be more severe, or will involve increased costs of extraordinary magnitude.

USEPA GUIDANCE

USEPA's guidance on conducting an environmental justice analysis follows the same methodology as the CEQ guidance, which was discussed above.

C. METHODOLOGY

Amtrak based its assessment of environmental justice for the proposed project on the guidance documents described above. The assessment involved four basic steps:

1. Identify the area where the project may cause significant and adverse effects;
2. Compile population and economic characteristics for the area of potential effect and identify potential environmental justice areas;
3. Identify the proposed project's potential adverse effects on potential environmental justice areas; and
4. Evaluate the proposed project's potential adverse effects on minority and low-income communities relative to its overall effects to determine whether any potential adverse impacts on those communities will be disproportionate.

DELINEATION OF STUDY AREA

The study area for environmental justice encompasses the area most likely to be affected by the proposed project and considers the area where potential impacts resulting from construction and operation of the proposed project could occur. The study area for environmental justice follows the ¼-mile study area used for the analysis of land use and social conditions in Chapter 4, "Land Use and Socioeconomic Conditions." The study area includes Census Tracts 6702 and 6701 on the west side of the study area in Old Saybrook and Census Tract 6601.01 in Old Lyme on the east side of the project area.

IDENTIFICATION OF POTENTIAL ENVIRONMENTAL JUSTICE AREAS

Amtrak gathered data on race and poverty status from the U.S. Census Bureau's *Census 2010* and *2005-2009 American Community Survey Estimates (05-09 ACS)*, respectively, for the three census tracts within the study area, and then aggregated the data for the study area as a whole. For comparison purposes, the project team also compiled data for Middlesex and New London Counties. Based on census data on racial and ethnic characteristics and poverty status and the guidance documents described above, Amtrak identified potential environmental justice areas as follows:

- *Racial and ethnic characteristics:* The guidance documents define minorities to include American Indians or Alaskan Natives, Asian and Pacific Islanders, African Americans or Black persons, and Hispanic persons. Following CEQ guidance, Amtrak identified minority populations where either: (1) the minority population of the affected area exceeds 50 percent; or (2) the minority population percentage of the affected area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis. For this analysis, Middlesex and New London Counties are the project's primary statistical reference area. In Middlesex County, the minority population in 2010 was 13.6 percent. The minority population in New London County as a whole in 2010 was 21.7 percent.
- *Income:* Amtrak used the percentage of individuals below poverty level in each census tract, as estimated in the 05-09 ACS, to identify low-income communities. Poverty levels are established annually by the U.S. Census Bureau and vary based on family size and number of children. For example, the established poverty level for 2009 for a family of four with two children was $21,756. This analysis used Middlesex and New London counties as the statistical reference areas. In Middlesex County, 5.8 percent of persons lived below poverty level as of the survey; in New London County, 6.7 percent of persons.

D. ENVIRONMENTAL JUSTICE POPULATIONS IN THE STUDY AREA

MINORITY AND LOW-INCOME POPULATIONS

The environmental justice study area includes three census tracts, as described above, with a total population of 13,598 in 2010. Table 16-1 details the study area's population and economic characteristics in terms of race and ethnicity and poverty status. Some 7.4 percent of the residents of this study area are minority, which is a smaller proportion than in Middlesex County (13.6 percent) or in New London County (21.7 percent). Because the study area's total minority percentage does not exceed CEQ's 50 percent threshold, this analysis does not identify the study area as a whole as a minority community.

Only one of the census tracts in the study area has a higher proportion of low-income individuals than in Middlesex or New London counties as a whole. Census Tract 6702 has an estimated 6.2 percent of persons living below the poverty level. However, the study area as whole has an estimated 4.7 percent of individuals living below poverty level, compared with 5.8 percent in Middlesex County and 6.7 percent in New London County. Because the poverty rate of individuals in census tract 6702 is not significantly greater than the percentage of low income individuals in the statistical reference area and the percentage of low income individuals in the study area as a whole does not exceed the percentage of low income individuals in the statistical reference area, Amtrak did not identify the study area as a low-income community. Therefore, this analysis identified no potential environmental justice areas.

Table 16-1
Study Area Population and Economic Characteristics

Study Area	2010 Census												2005-2009 American Community Survey
	2010 Total	Race and Ethnicity*											Persons Below Poverty Level (%)***
		White	%	Black	%	Asian	%	Other	%	Hispanic	%	Total Minority (%)	
Middlesex County	165,676	143,144	86.4	7,256	4.4	4,207	2.5	3,235	2.0	7,834	4.7	13.6	5.8
New London County	274,055	214,605	78.3	14,488	5.3	11,248	4.1	10,500	3.8	23,214	8.5	21.7	6.7
Town of Old Saybrook	10,242	9,404	91.8	96	0.9	243	2.4	157	1.5	342	3.3	8.2	5.1
Town of Old Lyme	7,603	7,142	93.9	35	0.5	154	2.0	88	1.2	184	2.4	6.1	3.9
Census Tract 6701 (Old Saybrook) **	4,848	4,467	92.1	42	0.9	98	2.0	75	1.5	166	3.4	7.9	4.0
Census Tract 6702 (Old Saybrook) **	5,394	4,937	91.5	54	1.0	145	2.7	82	1.5	176	3.3	8.5	6.2
Census Tract 6601.01 (Old Lyme)**	3,356	3,181	94.8	13	0.4	63	1.9	31	0.9	68	2.0	5.2	3.4

Notes:
* The racial and ethnic categories provided are further defined as: White (White alone, not Hispanic or Latino); Black (Black or African American alone, not Hispanic or Latino); Asian (Asian alone, not Hispanic or Latino); Other (American Indian and Alaska Native alone, not Hispanic or Latino; Native Hawaiian and Other Pacific Islander alone, not Hispanic or Latino; Some other race alone, not Hispanic or Latino; Two or more races, not Hispanic or Latino); Hispanic (Hispanic or Latino; Persons of Hispanic origin may be of any race).
** Census Tracts 6701, 6702, and 6601.01 include the project study area and surrounding areas.
*** Percent of individuals with incomes below established poverty level. The U.S. Census Bureau has established income thresholds which define the poverty level based on family unit size and number of children[1].
Source: U.S. Census Bureau, Census 2010 and American Community Survey 2005-2009 Estimates.

E. PUBLIC PARTICIPATION

Executive Order 12898 requires federal agencies to work to ensure greater public participation in the decision-making process. CEQ guidance suggests that federal agencies should acknowledge and seek to overcome linguistic, cultural, institutional, geographic, and other barriers to meaningful participation. Similarly, the USDOT's *Final Order on Environmental Justice* indicates that project sponsors should seek public involvement opportunities, including soliciting input from affected minority and low-income populations in considering alternatives. Although no minority and low-income populations are located within the project study area, Amtrak has conducted this EA in accordance with the public review process requirements under NEPA.

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[1] http://www.census.gov/hhes/www/poverty/data/threshld/index.html.

Amtrak conducted an initial agency and public coordination meeting at CTDEEP Marine Headquarters in Old Lyme on July 8, 2008 (see Appendix E).

F. CONCLUSION

Because this analysis did not identify any potential environmental justice areas, the proposed project will not result in any disproportionately high and adverse effects on minority and low-income populations. This EA anticipates no significant adverse impacts from the proposed project. In conclusion, there are no environmental justice concerns associated with the proposed project. ✷

Chapter 17: Public Involvement and Agency Coordination

A. INTRODUCTION

This chapter describes the process used to solicit public and agency participation for the environmental review phase of the Connecticut River Bridge Replacement Project. Federally-funded mass transportation projects are required to be developed in accordance with NEPA, which provides a role for the public in the planning and decision-making process. FRA guidance encourages citizen involvement at every stage of the environmental assessment of a proposed FRA action. As described below, Amtrak has undertaken public and community outreach efforts for the proposed project, along with federal, state, and local agency coordination.

B. PUBLIC INVOLVEMENT

During the early phases of the proposed project, Amtrak and FRA prepared a Public Involvement and Agency Coordination Plan. The plan identified a proactive approach to effectively engaging input from key interest groups and community leaders. Amtrak and FRA considered recent experience from similar bridge replacement projects in Connecticut to identify potentially interested parties and obtain comprehensive community representation. The plan included outreach to marina operators, boaters, trade associations, elected officials, local businesses, and private citizens who rely upon Northeast Corridor rail service, use the Connecticut River, or live or work in the project study area.

FRA and Amtrak hosted a joint public involvement and agency coordination meeting at the CTDEEP Marine Headquarters in Old Lyme, Connecticut on July 8, 2008. The meeting included an overview of the project purpose and the project alternatives being considered. Attendees of the meeting included members of local marine businesses, officials of the towns of Old Lyme and Old Saybrook, and representatives of state and federal agencies. Amtrak and FRA solicited input on the proposed project during the meeting. A complete list of attendees and meeting minutes can be found in Appendix E, "Public Involvement and Agency Coordination."

NEPA and the implementing regulations of the CEQ require public involvement for environmental assessments to include, at a minimum, reasonable public notice of availability of the EA and the FONSI. Regulations do not require a formal public scoping process for environmental assessments. Reasonable public notice of availability of this EA and subsequent documentation of comments will be provided.

C. AGENCY COORDINATION

Amtrak also developed a list of potentially involved and interested federal, state, and local agencies in the initial stages of the project and included this list in the Public Involvement and Agency Coordination Plan. Numerous agency representatives attended the coordination meeting on July 8, 2008 and provided input on the project and the regulatory process. Throughout the environmental review process, Amtrak has been coordinating with multiple regulatory agencies, including:

- USACE
- USCG
- USFWS
- USEPA
- NMFS
- CTDEEP
- CTSHPO
- ConnDOT

Amtrak will continue coordination with these agencies and other appropriate agencies, in addition to the Towns of Old Saybrook and Old Lyme, throughout the environmental review, engineering design and permitting, and construction phases of the project.

D. SECTION 106

Section 106 of the National Historic Preservation Act of 1966 requires that any federal agency having direct or indirect jurisdiction over a proposed federal or federally assisted undertaking or license thereof, take into account the effect of the undertaking on any district, site, building, structure, or other object that is included in or eligible for inclusion in the National Register. As part of this environmental review, Amtrak has consulted with and solicited comments from agencies that oversee the resources protected under Section 106 regulations. Amtrak invited groups and organizations with special interest in these resources (referred to as Section 106 Consulting Parties) to participate in the Section 106 process and invited them to the July 8, 2008 public involvement and agency coordination meeting, which also served as the initial Section 106 consultation meeting. Invited groups included local historical societies, historical organizations, Native American tribes, and CTSHPO. Amtrak will continue Section 106 consultation throughout the environmental review, engineering design and permitting, and construction phases of the project. ✷

Chapter 18: Section 4(f) Evaluation

A. INTRODUCTION AND METHODOLOGY

Section 4(f) of the USDOT Act of 1966 (49 USC § 303) prohibits the Secretary of Transportation from approving any program or project that requires the use of: (1) any publicly owned land in a public park, recreation area, or wildlife and waterfowl refuge of national, state, or local significance, or (2) any land from a historic site of national, state, or local significance (collectively "Section 4(f) resources"), unless there is no feasible and prudent alternative to the use of such land and the project includes all possible planning to minimize harm to the resource.

FHWA and the FTA updated their joint Section 4(f) regulations (23 CFR Part 774) in March 2008 to modify the procedures for granting Section 4(f) approvals. FHWA and FTA updated the regulations to clarify language regarding to the factors to be considered and the standards to be applied when determining if a project alternative that would avoid the use of a Section 4(f) property is feasible and prudent, and in the case of selecting a project alternative when all alternatives would use some Section 4(f) property. In addition, the new regulations established procedures for determining that the use of a Section 4(f) property has a *de minimis* impact on the property, described further below. While the regulations do not apply directly to FRA projects, they do provide guidance that FRA uses in making its own Section 4(f) determinations.

The USDOT and FRA consider three possible ways in which a project could "use" a resource:

- When land is permanently incorporated into a transportation facility;
- When there is a temporary occupancy of land that is adverse in terms of the statute's preservation purpose; or
- When there is a constructive use of land.

Constructive use occurs when a project does not directly incorporate land from a Section 4(f) property but the impacts of that project on the Section 4(f) property are so severe that the activities, features, or attributes that qualify the property for Section 4(f) protection are substantially diminished (23 CFR 771.135(p)(2)). This requires that mitigation measures have been taken into consideration but the value of the resource (with respect to its significance under Section 4(f)) will nonetheless be meaningfully reduced or lost.

Pursuant to 49 USC § 303(d)(2), FRA may satisfy the requirements of Section 4(f) by finding that a transportation project will have a *de minimis* impact on a historic resource. A finding of *de minimis* impact is, in essence, a finding that the project will not adversely affect the qualities of the resource that make it eligible for protection under Section 4(f). FRA can make a finding of *de minimis* impact for a historic site if: (1) FRA determines through the Section 106 consultation process that a transportation project will have "no adverse effect" on the site; (2) the State Historic Preservation Office (SHPO) (and the Advisory Council on Historic Preservation, if participating) concurs in writing with FRA's *de minimis* impact finding; and (3) FRA has developed its finding in consultation with parties consulting as part of the Section 106 process.

In making a finding of *de minimis* impact, FRA shall consider to be part of the transportation program or project “any avoidance, minimization, mitigation, or enhancement measures that are required to be implemented as a condition of approval” of the project. This means that the finding of *de minimis* impact takes into account any measures that may offset the impacts of the project on a Section 4(f) resource. For historic sites, a finding of *de minimis* impact satisfies the requirements of Section 4(f) in full. Therefore, if a finding of *de minimis* impact is made for a historic site, no further Section 4(f) analysis is required for that site.

The sections below describe the applicability of Section 4(f) to the project, the use of Section 4(f) properties, avoidance alternatives to the use of the Section 4(f) properties, and measures to minimize harm to the Section 4(f) properties.

B. APPLICABILITY OF SECTION 4(F) TO THE PROJECT

PROJECT DESCRIPTION

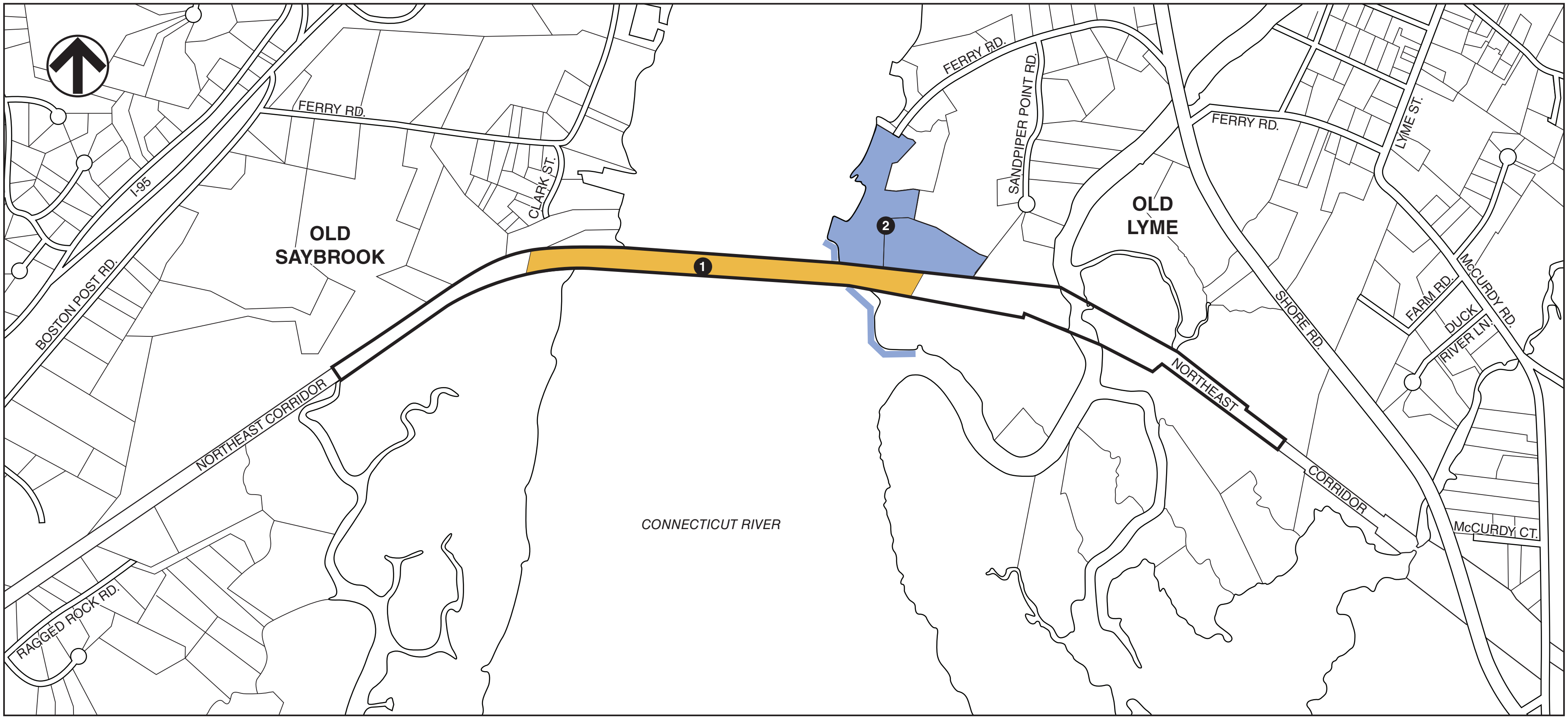
Amtrak has proposed the Connecticut River Bridge Replacement Project to improve the operations and reliability of the Connecticut River Bridge, a passenger and freight rail bridge over the Connecticut River. The project would include the following elements: the decommissioning and removal of the existing two-track Connecticut River Bridge, off-line construction of a two-track replacement bridge, relocation of communication and signal systems, and replacement of catenary supports and wires. Amtrak has identified a Preferred Alternative, analyzed in this EA. The upland portions of the Preferred Alternative would be located within the existing Amtrak ROW. It would involve complete replacement of the existing bridge with a new moveable bridge along a new alignment to the south of the existing alignment. Amtrak has identified two feasible options of the Preferred Alternative. Option A would replace the existing bridge with a bascule bridge and maintain the existing 150-foot channel width. Option B would replace the existing bridge with a vertical lift bridge, and would provide a channel of between 150 and 200 feet wide. Both options would retain the existing channel location. Further detail regarding the Preferred Alternative can be found in Chapter 2 of the EA, “Project Alternatives”.

SECTION 4(F) APPLICABILITY

The Section 4(f) Evaluation identified individual Section 4(f) resources and determined whether the proposed project would use these resources. The Preferred Alternative would require the decommissioning and removal of the existing bridge. The Connecticut River Bridge, as part of the Moveable Railroad Bridges on the Northeast Corridor in Connecticut Thematic Resource, was determined eligible for the National Register of Historic Places (NR) and was listed on the Connecticut State Register of Historic Places (SR) in 1986. The Preferred Alternative would involve construction of a new bridge over the existing boardwalk within Ferry Landing Park, a waterfront park owned by CTDEEP. The proposed project would constitute a use of these two Section 4(f) resources (shown in Figure 18-1) and therefore a Section 4(f) analysis is needed.

Amtrak identified additional parklands, wildlife areas, and cultural resources in the EA. The Elizabeth B. Karter Watch Rock Nature Preserve, a property of the Old Lyme Conservation Trust, is located at the southeastern border of the study area. There are two CTDEEP-owned and managed wildlife areas adjacent to the project site: the Roger Tory Peterson Wildlife Area, located south of the project site on the western side of Connecticut River, and the Ragged Rock Creek Marsh WMA, located south of the project site on the eastern side of the river. CTDEEP defines a wildlife area as “an area where wildlife habitat is managed to maintain stable, healthy

6.5.12



Project Site Boundary

1 *Connecticut River Bridge*

2 *CTDEEP Marine Headquarters/Ferry Landing Park*

Figure 18-1

Section 4(f) Properties

populations of wildlife". This definition appears to be consistent with the Section 4(f) definition of a wildlife refuge, and therefore these two properties may be considered Section 4(f) resources. Besides the Connecticut River Bridge itself, three known historic resources—the John Whittlesey Jr. House (S/NR-Listed), the Old Lyme Historic District (S/NR-Listed and a Local Landmark), and the Enoch Noyes House at 317 Ferry Road (SR-Listed)—are located within the project study area. Additionally, the project team identified five potential historic resources (61 Ferry Road, 94 Ferry Road, 101 Ferry Road, 9 Clark Street, and 2-20 Clark Street) within the study area. The Preferred Alternative would not adversely affect any of these additional resources; therefore, the project would not constitute a Section 4(f) use of these properties and no further analysis is necessary.

Section 4(f) regulations apply to archaeological sites (including those discovered during construction) if their value derives from their preservation in place. As described in Chapter 6, "Cultural Resources," there is the possibility that S/NR-eligible archaeological resources are present within the Old Lyme portion of the project site. These potential archaeological resources, if present, would be important for the information they might yield and not for preservation in place. Therefore, at this time, Amtrak does not consider these potential archaeological resources as Section 4(f) properties. If, however, based on further study and consultation with CTSHPO, Amtrak determines that any archaeological resources present within the project site derive their value from preservation in place, then Amtrak will supplement this Section 4(f) evaluation to address these properties.

C. USE OF SECTION 4(F) PROPERTIES

CONNECTICUT RIVER BRIDGE

DESCRIPTION OF SECTION 4(F) PROPERTY

The Connecticut River Bridge carries the Northeast Corridor over the Connecticut River between Old Saybrook and Old Lyme. The Connecticut River Bridge is eligible for listing on the National Register of Historic Places, and is listed on the State Register of Historic Places as part of the Moveable Railroad Bridges on the Northeast Corridor in Connecticut Thematic Resource. Connecticut's moveable railroad bridges date from the late 19th through the early 20th century, and span such rivers as the Pequonnock, Mianus, Norwalk, Housatonic, Saugatuck, Niantic, and Thames. The American Bridge Company began construction of the bridge in 1904 and it became operational in 1907. The Connecticut River Bridge is over 1,500 feet long and has ten spans. The bridge is a two-track, ten-span steel rail bridge with an open deck and stone masonry piers. The Preferred Alternative would require the decommissioning and replacement of this Section 4(f) property.

PROBABLE USE OF THE SECTION 4(F) PROPERTY

Construction of either option of the Preferred Alternative will involve the decommissioning and removal of the existing Connecticut River Bridge. Amtrak will build a new moveable bridge and a new substructure on a new alignment to the south of the existing bridge. The removal of the existing bridge will constitute a use of this Section 4(f) property.

AVOIDANCE ALTERNATIVES

Under Section 4(f), the project sponsor must demonstrate that any alternatives that avoid the use of the historic structure, known as "Avoidance Alternatives," are either not feasible or would not be prudent to undertake. To demonstrate that no feasible and prudent alternatives to the use of the Section 4(f) resource exist, location alternatives and design options should be considered. Amtrak considered the following alternatives, which would avoid removal of the historic bridge:

- Perform minimal repairs and maintenance of the existing Connecticut River Bridge in order to keep the bridge in service for rail traffic.
- Rehabilitate the existing bridge including the approach spans and substructures without affecting the historic integrity of the structure as determined by NHPA and reuse the bridge for rail traffic.
- Construct a new bridge on a new alignment and leave the existing bridge in-place and out of service.

In finding that an avoidance alternative is not feasible or prudent, adverse factors such as environmental impacts, safety, engineering/operational deficiencies, poor transportation service, increased costs, and other factors may be considered collectively. Amtrak has considered these factors in determining whether the avoidance alternatives would be feasible and prudent.

Minimal Repairs and Maintenance of Existing Connecticut River Bridge

Under this avoidance alternative, minimal repairs and maintenance would be employed to keep the Connecticut River Bridge in service (similar to the "No Action Alternative" analyzed in the EA). The existing bridge was constructed beginning in 1904 and it became operational in 1907. It has been in continuous operation for over 100 years and, due to its age, it is nearing the end of its useful life. In 2006, Amtrak's contractors performed a bridge inspection. The inspection found several aspects of the existing bridge to be particularly problematic, including the mechanical operating system, the bascule span rolling tread plates, and the approach span truss pin and eyebar connection. The curved tread plates and mating track plates of the heel end of the rolling lift span were specifically identified as concerns. Disruptive rehabilitations of the treads and tracks are required approximately every 20 years, which limits the retrofit options. At the time of the inspection, the existing track and tread structure, and the supporting steel segmental box girder exhibited cracks. The approach spans have truss pin and eyebar connections, which typically loosen after years of service. Amtrak has determined retrofit devices installed during the 1970s to be ineffective.

Amtrak installed a moveable catenary unit on the bridge as part of the electrification project. The complex structure extends the length of time required to open and close the bridge and adds weight to the bridge. The weight of the electrification facilities was not factored into the original bridge design, and has therefore increased stresses and bearing pressures. The moveable span counterweight balance is a concern, as is potential deterioration of structural members. Amtrak identified additional concerns such as: tight working clearances within the machinery house, limited access for maintenance and routine inspection, and uncertainty in the seismic resistance of the existing stone masonry piers.

Amtrak considered performing minimal repairs and maintenance on the existing bridge and allowing it to remain in service. This avoidance alternative would permit the Connecticut River Bridge to remain in place with its historical integrity unaffected. Amtrak determined that substantial maintenance would be required roughly every 20 years. This avoidance alternative would not provide a reliable structure and would be expected to perform poorly. It would fail to meet several of the project goals and objectives, including long-term serviceability and reliability. While this avoidance alternative would be feasible, it would not be prudent to expend capital funds and still fail to meet the goals and objectives of the proposed project.

Rehabilitation of Existing Connecticut River Bridge

This avoidance alternative would result in the rehabilitation of the existing bridge approach spans, the moveable span, and minimal rehabilitation of the substructure. This avoidance alternative would likely extend the service life of the bridge for 40 years. This avoidance alternative would permit the Connecticut River Bridge to remain in place with its historical integrity unaffected. This avoidance alternative would not provide a reliable structure and would be expected to perform poorly. It would fail to meet several of the project goals and objectives, including long-term serviceability and reliability. While this avoidance alternative would be feasible, it would not be prudent to expend capital funds and still fail to meet the goals and objectives of the proposed project.

Construct a New Bridge and Leave Existing Bridge in Place

This avoidance alternative would involve construction of a new rail bridge far enough away from the existing bridge to leave its historical integrity intact. This would pose several engineering and planning challenges. The bridge approaches and existing infrastructure would need to be modified to align with the new bridge. Amtrak would need to expand its ROW and therefore substantial property acquisition would be required. Based on the surrounding land uses, the properties to be acquired would likely be a combination of private residences, commercial uses, wetland preserves, and fish and wildlife refuges.

The existing bridge could not remain in the closed position as it would preclude the passage of all marine vessels requiring more than 18 feet in vertical clearance. It would need to be fixed in the open position or Amtrak would need to continue to open and close the bridge regularly. This would not be feasible from an operational and cost perspective. The bridge could remain in-place and fixed in the open position; however, it would still present navigational challenges due to the narrow and off-center channel. Boats would be required to navigate around three bridges in close proximity—the existing I-95 Baldwin Bridge, the existing Connecticut River Bridge, and the new replacement bridge. This would not satisfy one of the main project goals—to minimize conflicts with marine traffic. Amtrak determined this avoidance alternative to be neither feasible nor prudent.

MEASURES TO MINIMIZE HARM

As required by Section 106 of NHPA, Amtrak is participating in an ongoing consultation process with the CTSHPO regarding the potential effects on archaeological and architectural resources. As part of this ongoing process, Amtrak has explored measures to avoid or minimize any adverse effects to such resources. Development of these mitigation measures is set forth in the draft MOA, included in Appendix A of the EA, to be executed by CTSHPO, FRA, and Amtrak.

The draft MOA describes the continuing consultation process that Amtrak will conduct as project designs evolve, and the measures Amtrak will implement during the project's design process to avoid, minimize, or mitigate adverse effects of the project on historic resources. Amtrak will undertake the design of the replacement bridge in coordination with CTSHPO and make an effort to incorporate historically compatible designs. Mitigation for adverse effects on the Connecticut River Bridge (a contributing element of the Moveable Railroad Bridges of the Northeast Corridor in Connecticut Thematic Resource) could include HAER documentation for the Connecticut River Bridge and development of an interpretive exhibit in a park, greenway, or public space that presents the history of the bridge and other moveable railroad bridges on the Northeast Corridor in Connecticut. This exhibit could possibly include salvaged elements of the bridge, signage, etc.

FERRY LANDING PARK

DESCRIPTION OF THE SECTION 4(f) PROPERTY

Ferry Landing Park is located on the east bank of the Connecticut River within the confines of the CTDEEP Marine Headquarters and just north of the project site in Old Lyme. The waterfront park is open to the public year-round and is furnished with picnic benches and a gazebo, and features an elevated wooden boardwalk that extends south from the park, passing underneath the bridge into the marshes. The boardwalk offers access to various recreational uses such as fishing and crabbing. The pier also provides scenic vistas of the Connecticut River and tidal marshlands. The park is owned and maintained by CTDEEP.

PROBABLE USE OF THE SECTION 4(f) PROPERTY

The Preferred Alternative eastern approach will be constructed over the existing boardwalk. The proposed project will not require permanent acquisition of any upland portion of the park. Neither the park nor the boardwalk will be permanently adversely affected by the proposed project. However, it is likely that a portion of the boardwalk will be temporarily closed (and possibly removed and replaced) during the construction phase of the project. Because these activities will temporarily interfere with the intended purpose of the boardwalk, they constitute a "use" of the Section 4(f) property.

AVOIDANCE ALTERNATIVES

As stated above, project sponsors should consider location alternatives and design options to demonstrate that no feasible and prudent alternatives to the use of the Section 4(f) resource exist. Decommissioning and removing the existing bridge will require temporary closure of the boardwalk. Performing minimal repairs, minor rehabilitation, or major rehabilitation of the existing bridge will also require temporary closure of the boardwalk. Complete avoidance of Ferry Landing Park will only be possible with the following avoidance alternative:

- Construct a new bridge on a new alignment far away from Ferry Landing Park and the boardwalk and leave the existing bridge in-place and out of service.

This avoidance alternative would involve construction of a new rail bridge far enough away from the existing bridge to avoid Ferry Landing Park and the boardwalk. This would pose several engineering and planning challenges. The bridge approaches and existing infrastructure would need to be modified to align with the new bridge. Amtrak would need to expand its ROW and therefore substantial property acquisition would be required. Based on the surrounding land uses, the properties to be acquired would likely be a combination of private residences, commercial uses, wetland preserves, and fish and wildlife refuges.

The existing bridge could not remain in the closed position as it would preclude the passage of all marine vessels requiring more than 18 feet in vertical clearance. It would need to be fixed in the open position or Amtrak would need to continue to open and close the bridge regularly. This would not be feasible from an operational and cost perspective. The bridge could remain in-place and fixed in the open position; however, it would still present navigational challenges due to the narrow and off-center channel. Boats would be required to navigate around three bridges in close proximity—the existing I-95 Baldwin Bridge, the existing Connecticut River Bridge, and the new replacement bridge. This would not satisfy one of the main project goals—to minimize conflicts with marine traffic. Amtrak determined this avoidance alternative to be neither feasible nor prudent.

MEASURES TO MINIMIZE HARM

The proposed project will require a temporary closure of a portion of the boardwalk to facilitate construction of the new bridge and ensure the safety of the public. Amtrak will work closely with CTDEEP to minimize these closures and provide adequate signage and information to the users of the park. Good construction practices will be implemented to ensure the boardwalk is protected during the construction period and rebuilt as necessary. The project will not result in any permanent adverse effects to Ferry Landing Park or the boardwalk. ✷