

Additional design-related treatments that could be implemented for the purpose of enhancing and improving bridge aesthetics include:

- › Design structural features to blend with the surrounding built and natural environments to complement the visual landscape.
- › Select low-sheen and non-reflective surface materials to reduce potential for glare.
- › Choose durable paint colors with a dull, flat, or satin finish (not glossy) to reduce potential for glare.
- › Develop an aesthetically pleasing design to minimize effects of visual intrusion upon the natural and built landscape.
- › Design bridge lighting to maximize energy efficiency, safety and security, and be aesthetically pleasing.

The list above is meant to provide examples of final-design features that could benefit viewers, visual resources, and visual quality.

3.13 Construction Impacts

Construction activities have the potential to adversely impact adjacent populations or natural resources by exposing them to impacts or hazards they are otherwise not regularly exposed to. This section describes anticipated construction period impacts resulting from the Project and proposes mitigation measures for those impacts. Potential construction impacts include noise and vibration, air quality, truck traffic, construction staging areas, and traffic control measures.

3.13.1 Affected Environment

See each resource section within **Chapter 3, *Affected Environment and Environmental Consequences***, for a discussion of what specific resources are present within the Study Area.

3.13.2 Environmental Consequences

All construction-related impacts are temporary, since construction would take place for a limited duration. Potential construction impacts are related to potential noise and vibration, air quality emissions, water quality impacts, generation of truck traffic, use of property for construction staging areas, and implementation of traffic control measures. The resources affected by the Project are generally the same for all Action Alternatives, with additional transportation and noise impacts under Action Alternatives 6 and 7. It is important to note there are no statewide noise regulations that relate to construction activities in New Hampshire. NHDOT would coordinate construction activities with the Town of Newington and City of Dover.

Construction phasing and contractor access would be further defined during the final design and construction phases of the GSB Project. While conceptual construction plans show the placement of temporary structures in Little Bay (**Appendix D**), the final design of these structures is dependent on contractor means and methods.

3.13.2.1 Direct Impacts

Direct temporary impacts were evaluated for each alternative. As noted above, construction impacts are resource specific and largely dependent on the activities necessary to build each alternative. For example, Action Alternatives which propose superstructure replacement would result in similar construction impacts. The potential impacts from construction are also dictated by the estimated construction duration, which vary from 1.5 to 3 years depending on the alternative.

No-Action Alternative

No construction would take place under the No-Action Alternative; therefore, no direct construction impacts would occur.

Alternative 1

Alternative 1 has the longest construction period of the five Action Alternatives evaluated for the Project with an estimated construction period of 3 years. Predominant work under this alternative would involve removal and replacement of the existing bridge floor system, removal and replacement in-kind of upper and lower lateral braces, in-kind replacement of several sway braces, rehabilitation of the Newington abutment, steel truss repair work, repointing the existing stone masonry piers, cleaning and painting existing structural steel, and installing a pedestrian bridge railing. A longer construction period means temporary impacts would persist longer than other alternatives.

Emissions from stationary and mobile sources during construction would include oxides of nitrogen and sulfur, carbon monoxide, and particulate matter. The use of construction equipment would continue throughout rehabilitation of the GSB. The air quality impact assessment concluded that although the duration is longer, the rehabilitation work would likely be less pollutant intensive than the complete replacement of spans and piers occurring under other Action Alternatives. These emissions would be temporary and the locations at which they occur would change over time.

Due to the location of the Project, adjacent to and over Little Bay, temporary impacts to water quality are possible during earthwork activities through siltation and erosion. Additional temporary impacts are possible from the presence of mechanical fluids (*e.g.*, effluents, solvents, or oils) typically present at construction sites. With the proper mitigation measures, temporary impacts to water quality are not anticipated to be adverse.

Temporary impacts to approximately 0.2 acre of the northern portion of the blue mussel shellfish bed under the GSB may occur during the installation and removal of the causeways and trestle at the beginning and end of construction. The causeways and trestles would be in place throughout the duration of construction, which is anticipated to take approximately 3 years. Standard marine construction BMPs would be implemented wherever feasible to mitigate the potential for suspension of sediments and consequent siltation.

Construction access anticipated to require the installation of two temporary causeways and trestles. The placement of these structures would divert floodwaters to other areas of the Great Bay Estuary; however, these impacts would be negligible due to the extensive area of the Little

Bay and Great Bay Estuary. The Great Bay National Estuarine Research Reserve (part of the Great Bay Estuary) encompasses 10,235 total acres, approximately 7,300 acres of open water and wetlands. The approximate size of the causeways and trestles equals 0.72 total acre, or 0.007 percent of the total area of Great Bay National Estuarine Research Reserve. Post construction, coastal and marine habitats would be restored to pre-construction conditions (e.g., sloping and grading). Conditions are anticipated to rebound to existing conditions.

The placement of causeways and trestles would temporarily alter hydrodynamics on a localized scale in the areas directly adjacent to temporary structures. Current water flow in the area is complex and has a wide range of directional components and speeds due to the dynamic tidal changes within Little and Great Bay. The placement of temporary structures would result in minor shifts or changes in tidal flows, currents, and wave patterns. The temporary causeways would be located approximately 60 feet from the causeway locations evaluated in the 2007 FEIS and 2010 Hydraulic Modeling Report.⁶⁰ The hydrodynamic models predicted a minor increase in tidal maxima of 0.02 to 0.35 inches across Little Bay and the Great Bay Estuary from the placement of temporary causeways and trestles. Temporary impacts on hydrodynamics from the temporary structures would increase the current velocity at a maximum of 10 percent through the navigation channel (between GSB Piers 4 and 5). These temporary shifts or changes would persist the longest under Alternative 1, when compared to the other alternatives.

Construction-related equipment used during construction phases of Alternative 1 is not anticipated to result in an adverse effect from hazardous materials. The operation of construction equipment involves the use of mechanical fluids (e.g., solvents, oils, and gasoline) that have the potential to result in spills or leaks when not maintained in good working order. Some of these materials may be considered hazardous to the general public, workers or the environment. Although the spill or release of these materials or fluids during construction is unlikely, spill prevention plans would be required to prevent and control any such spills. Construction debris can also contain hazardous materials, for example, lead-based paint or asbestos. Any construction debris removed from the site would be handled and disposed of off-site to not impact public health, or the environment. The abatement of these materials would be performed in accordance with appropriate regulations in order to ensure that there would be no adverse effects such as releases or misdirected wastes.

Under Alternative 1 (and all Action Alternatives), the construction access, laydown, and staging would only occur within the western side of Hilton Park; no access, laydown, or staging is proposed within the eastern side of Hilton Park. During construction, approximately 48,000 square feet of the western side of Hilton Park would not be publicly accessible because the area would be used for access and staging. The Hilton Park driveway off of Dover Point Road would be used for construction access under Alternative 1 (and all Action Alternatives) but would not be fenced off, allowing for continued public use and access to the west side of Hilton Park. The remaining 14.9 acres of the 16-acre Hilton Park would remain open to the public throughout construction. NHDOT would determine relocation details for the pavilion, such as the structure's final location and whether the structure would be relocated or replaced. The construction staging area would be fenced for safety. Under Alternative 1, temporary impacts to Hilton Park

would last for the duration of construction, which is estimated to take three years. The sidewalk along Wentworth Terrace, which passes underneath the Spaulding Turnpike and runs along Dover Point Road, connects the east and west sides of Hilton Park. This sidewalk would remain open for continued public use, which would retain the existing connectivity of the east and west sides of Hilton Park.

Temporary noise impacts caused by Alternative 1 would persist the longest of the alternatives. However, although the estimated duration of construction is longer, the equipment associated with the rehabilitation work would likely be less noise intensive than the complete replacement of spans and piers occurring in other Action Alternatives.

Temporary visual changes would occur under Alternative 1 due to the estimated 3-year construction period because construction equipment and fenced areas for staging would temporarily alter views of the GSB, most notably from Hilton Park. These temporary changes to the viewshed would be present through the duration of construction. Fencing or barriers around construction staging areas are necessary to ensure public safety and to protect equipment and materials.

Alternative 3

Generally, Alternative 3 would have similar construction impacts described under Alternative 1; however, the partial rehabilitation would result in slightly more temporary impacts related to noise and hazardous materials, due to the use of heavy machinery and an increase in construction debris. Abatement of construction debris would still need to be performed in accordance with appropriate regulations in order to ensure that there would be no adverse effects, such as releases or misdirected wastes. Construction debris would be created through the replacement of spans 1, 2, 3, 7, 8 and 9. Work would require the use of heavy machinery which would cause minor, temporary increases in ambient noise levels in the surrounding area. Construction of Alternative 3 is anticipated to take two years. As with Alternatives 1 and 9, the sidewalk along Wentworth Terrace, which passes underneath the Spaulding Turnpike and runs along Dover Point Road, would remain open for continued public use during construction, which would retain the existing connectivity of the east and west sides of Hilton Park. Conversely, a shorter construction period (relative to Alternative 1) would reduce the potential impacts on other resources, including, air quality, water quality, wildlife and fisheries, hydrodynamics, parks and recreation, noise, and visual resources.

Alternative 6

Alternative 6 would generally have similar construction impacts as Alternative 1, with additional temporary impacts to transportation, connectivity of Hilton Park, hazardous materials and noise. Under Alternative 6, the deck of the southbound LBB would be widened approximately 17.5 feet to the west to accommodate the new multi-use path. The GSB superstructure would be removed, and the Dover approach span and northernmost pier (GSB Pier 1) would be replaced. At the Newington approach, the existing abutment would be removed in its entirety and replaced, due to changes in geometry and bridge type. Construction of Alternative 6 is anticipated to take

⁶⁰ AECOM. 2010. Hydraulic Modeling Analysis – Spaulding Turnpike Improvements, Little Bay Bridges Newington to Dover, New Hampshire. Prepared for VHB.

1.5 years. This shorter construction period would reduce impacts on natural resources in the Study Area; however, the additional transportation and noise impacts would result in more impacts than Alternative 9, which also has a construction duration of 1.5 years.

In contrast to Alternatives 1, 3, and 9, Alternative 6 would involve partial closure of the sidewalk along Dover Point Road, which passes underneath the Spaulding Turnpike and runs along Wentworth Terrace (**Appendix D**). This portion of sidewalk connects the east and west sides of Hilton Park. This sidewalk would remain closed during construction for public safety reasons, resulting in a temporary loss of connectivity between the east and west sides of Hilton Park.

The use of traffic control measures on the southbound LBB during construction would cause temporary, direct impacts to transportation. Traffic control measures would potentially cause congestion on the Spaulding Turnpike due to the temporary lane closures and speed limit decreases. These traffic control measures are necessary to provide safe worker and motorist conditions.

Construction debris would be created from the removal and replacement of GSB Pier 1, the Dover approach span, and GSB superstructure. All construction debris would be handled and disposed of off-site to not impact public health or the environment.

Work associated with construction of Alternative 6 would involve the use of heavy machinery, which would temporarily increase ambient noise levels. The replacement of Pier 1 would also require foundation work to secure the new pier which would likely require pile driving, creating more noise impacts. Although the construction duration is shorter, noise associated with the LBB deck widening, approach span replacement, and pier replacement would be more intensive than the other Action Alternatives.

Alternative 7

Construction impacts under Alternative 7 are similar to Alternative 6. The difference between these Alternatives 6 and 7 is minor, as Alternative 7 would construct the multi-use path adjacent to the southbound LBB (7.5 feet away) on an independent deck. The construction of the independent deck would require traffic control measures, similar to what would be needed under Alternative 6.

Similar to Alternative 6, Alternative 7 would involve partial closure of the sidewalk along Dover Point Road, which passes underneath the Spaulding Turnpike and runs along Wentworth Terrace (**Appendix D**). This portion of sidewalk connects the east and west sides of Hilton Park. This sidewalk would remain closed during construction for public safety reasons, resulting in a temporary loss of connectivity between the east and west sides of Hilton Park.

Alternative 9 (Preferred Alternative)

Generally, Alternative 9 would have similar construction impacts as Alternative 1; however, the superstructure replacement would result in slightly more temporary impacts to noise and hazardous materials from the use of heavy machinery and increase in construction debris. Alternative 9 would have similar temporary construction impacts on air quality, water quality, wildlife and fisheries, hydrodynamics, parks and recreation, noise, and visual resources as Alternative 1; however, all temporary impacts would be less due to the shorter construction

duration. Construction of Alternative 9 is estimated to take about 1.5 years, which is half the time estimated for Alternative 1, and equivalent to construction of Alternatives 6 and 7.

As with Alternatives 1 and 3, the sidewalk along Wentworth Terrace, which passes underneath the Spaulding Turnpike and runs along Dover Point Road, would remain open for continued public use during construction, which would retain the existing connectivity of the east and west sides of Hilton Park.

As other Action Alternatives, Alternative 9 would cause temporary increases in noise levels in the Study Area for short periods of time. Although the construction period for Alternative 9 is less than Alternative 1 and 3, noise levels resulting from the superstructure replacement would be more intensive since Alternative 9 proposes full replacement of the GSB superstructure. During construction, heavy machinery would be used to replace the existing superstructure. Alternative 9 does not propose the replacement of GSB piers, therefore no pile driving, or foundation work would be needed.

The majority of construction debris created would be due to replacement of the entire superstructure of the GSB. All construction debris removed or created would be handled and disposed of off-site to not impact to public health or the environment.

3.13.2.2 Indirect Impacts

Indirect or secondary impacts are unlikely to occur as a result of construction. The temporary impacts resulting from construction activities would not cause impacts on resources that are reasonably foreseeable or removed from time or space from the Project. Post construction, areas impacted by staging and temporary structures would be restored to pre-construction conditions; these areas are anticipated to rebound to existing conditions.

3.13.3 Mitigation

Construction activities are not anticipated to result in permanent direct impacts to any of the above-mentioned resource areas. Mitigation measures and BMPs to be incorporated to minimize or eliminate construction-related impacts to nearby natural, cultural, and social resources are described in the resource-specific sections of **Chapter 3** of this FSEIS. Mitigation measures would be implemented in accordance with applicable laws and regulations during construction. Examples of resource-specific, construction-related mitigation measures include but are not limited to siltation or erosion control barriers, spill prevention plans, and wetting soils during excavation. No long-term construction mitigation measures are anticipated.

3.14 Social and Economic Resources and Environmental Justice

Potential socioeconomic impacts resulting from transportation projects can relate to population size, property acquisitions, economic growth (or loss), residential or commercial property values, and household income. The 2007 FEIS included an extensive analysis of the regional economics in New Hampshire, spanning 33 municipalities and three counties: Strafford, Rockingham and Carroll. The analysis for this FSEIS focuses on the potential for impacts to the Town of Newington and City of Dover because the scope of the Project is substantially smaller in scale than the