

Appendix 1

Matrix of Alternatives Investigated

MATRIX OF ALTERNATIVES INVESTIGATED

2/22/2018

| Item/Alternate | No Build <i>(Maintenance to extend bridge life 5 years. After 5 years, bridge would need to be closed or another alternative chosen.)</i> | Alternate 1 - Replacement Bridge | Alternate 2 - Replacement Bridge | Alternate 3 - Rehabilitate Existing Truss Bridge <i>(Westerly sidewalk remains. No easterly sidewalk proposed.)</i> | Alternate 4 - Rehabilitate Existing Truss Bridge <i>(Westerly sidewalk remains. Proposed new addition of easterly sidewalk.)</i> | Alternate 5 - Replacement Bridge |
|---------------------------------|--|--|--|--|--|--|
| Alignment | Existing alignment | Existing alignment | Curved upstream alignment | Existing alignment | Existing alignment | Parallel tangent downstream alignment |
| Bridge Section | Two 11' lanes with two 4' shoulders and one 5' sidewalk. Shoulders include 2' wide continuous open grating for drainage. | Two 11' lanes with two 5' shoulders and two 5' sidewalks | Two 11' lanes with two 5' shoulders and two 5' sidewalks | a. Two 11' lanes with two 4' shoulders and one 5' sidewalk, OR b. Two 10' lanes with two 5' shoulders (accommodating bicyclists) and one 5' sidewalk | a. Two 11' lanes with two 4' shoulders and two 5' sidewalks, OR b. Two 10' lanes with two 5' shoulders (accommodating bicyclists) and two 5' sidewalks | Two 11' lanes with two 5' shoulders and two 5' sidewalks |
| Spans | 805' three span (310' – 310' – 175') ¹ | 800' five span (137.5' – 175' – 175' – 137.5') | 835' five span (80' simple span and 200' – 205' – 205' – 145' continuous) | 805' three span (310' – 310' – 175') ¹ | 805' three span (310' – 310' – 175') ¹ | 800' five span (137.5' – 175' – 175' – 137.5') |
| Bridge Superstructure | Existing steel truss rehabilitated as described in August 2016 Inspection Report to get 5 years remaining life | Metalized steel girder with composite concrete deck | Metalized steel girder with composite concrete deck | Existing painted steel truss with composite concrete deck on new structural floor system | Existing painted steel truss with composite concrete deck on new structural floor system | Metalized steel girder with composite concrete deck |
| Meet Purpose & Need | No | Yes | Yes | Yes | Yes | Yes |
| Hydraulics | Match existing conditions | Not studied, expected to closely match existing conditions 1 pier located near center of Brunswick side powerhouse channel | Closely match existing conditions 2 piers located near edges of Brunswick side powerhouse channel | Match existing conditions | Match existing conditions | Regulatory Q ₁₀₀ water surface elevation > 6 ft above existing conditions along Bowdoin Mill complex and 4 to 5 ft above existing Seadog Restaurant patio deck and finish floor elevation. Unacceptable water surface variance. |
| Estimated Construction Duration | 2 to 3 months | 3.5 years (includes removal of existing bridge and construction of new bridge) | 2.5 years (includes removal of existing bridge and construction of new bridge) | 3 years (includes rehabilitation construction and painting) | 3 years (includes rehabilitation construction and painting) | 2.5 years (includes removal of existing bridge and construction of new bridge) |
| Maintenance of Traffic Impacts | 2 to 3 months total continuous single NB lane closure. | Maintain two-way traffic with temporary bridge. 3 months total non-continuous single NB lane closure needed for installation and removal of temporary bridge approaches. | Maintain two-way traffic on existing bridge. 2 months total continuous single NB lane closure and detour needed to construct approaches of replacement bridge before shifting traffic onto replacement bridge. | Maintain two-way traffic with temporary bridge. 3 months total non-continuous single NB lane closure needed for installation and removal of temporary bridge approaches. | Maintain two-way traffic with temporary bridge. 3 months total non-continuous single NB lane closure needed for installation and removal of temporary bridge approaches. | Maintain two-way traffic on existing bridge. 2 months total continuous single NB lane closure and detour needed to construct approaches of replacement bridge before shifting traffic onto replacement bridge. |
| Constructability | Conventional construction means and methods, | Conventional construction means and methods | Conventional construction means and methods, | Conventional construction means and methods, | Conventional construction means and methods, | Conventional construction means and methods |

¹ Total bridge length is 805' between centerline bearings at the abutments. At each of the piers, there is about 5' between the two bearing lines for the individual spans, hence the additional 10' of length.

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|--|---|---|---|---|---|---|
| Alignment | Existing alignment | Existing alignment | Curved upstream alignment | Existing alignment | Existing alignment | Parallel tangent downstream alignment |
| | limited access within and below truss | | except 2 heavy (250 Ton) cranes needed to erect Span 2 girders | limited access within and below truss | limited access within and below truss | |
| Impacts under Section 106 of the National Historic Preservation Act <i>(Protected Resources Present in the Area: the NR-eligible Brunswick-Topsham Industrial Historic District and its contributing properties (including the Frank J. Wood Bridge); the NR-eligible Cabot Mill; the NR-eligible Summer Street Historic District and its contributing properties; and the NR-listed Pejepscot Paper Company.)</i> | No effect on the Brunswick-Topsham Industrial Historic District, Cabot Mill, Summer Street Historic District, or the Pejepscot Paper Company. | Due to the removal of the Frank J. Wood Bridge, there would be an “adverse effect” on the Brunswick-Topsham Industrial Historic District, the Cabot Mill, and the Pejepscot Paper Company. This alternative would result in a “no effect” to the Summer Street Historic District. Potential presence of archaeological resources is currently under review by the Maine Historic Preservation Commission. | Due to the removal of the Frank J. Wood Bridge, there would be an “adverse effect” on the Brunswick-Topsham Industrial Historic District, the Cabot Mill, and the Pejepscot Paper Company. This alternative would result in a “no adverse effect” to the Summer Street Historic District. Potential presence of archaeological resources is currently under review by the Maine Historic Preservation Commission. | Due to rehabilitation of the Frank J. Wood Bridge with similar in-kind materials, there would be a “no adverse effect” on the Brunswick-Topsham Industrial Historic District. This alternative would result in a “no adverse effect” to the Cabot Mill and the Pejepscot Paper Company. This alternative would result in a “no effect” to the Summer Street Historic District. Potential presence of archaeological resources is currently under review by the Maine Historic Preservation Commission. | Due to rehabilitation of the Frank J. Wood Bridge with similar in-kind materials, there would be a “no adverse effect” on the Brunswick-Topsham Industrial Historic District. This alternative would result in a “no adverse effect” to the Cabot Mill and the Pejepscot Paper Company. This alternative would result in a “no effect” to the Summer Street Historic District. Potential presence of archaeological resources is currently under review by the Maine Historic Preservation Commission. | Due to the removal of the Frank J. Wood Bridge, there would be an “adverse effect” on the Brunswick-Topsham Industrial Historic District, the Cabot Mill, and the Pejepscot Paper Company. This alternative would result in a “no effect” to the Summer Street Historic District. Potential presence of archaeological resources is currently under review by the Maine Historic Preservation Commission. |

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|--|---|---|---|--|--|---|
| Alignment | Existing alignment | Existing alignment | Curved upstream alignment | Existing alignment | Existing alignment | Parallel tangent downstream alignment |
| Impacts under Section 4(f) of the U.S. Department of Transportation Act <i>(Protected Resources Present in the Area: the NR-eligible Brunswick-Topsham Industrial Historic District and its contributing properties (including the Frank J. Wood Bridge); the NR-eligible Cabot Mill; the NR-eligible Summer Street Historic District and its contributing properties; the NR-listed Pejepscot Paper Company Historic District and its contributing properties; and the Town of Brunswick Park.)</i> | No Section 4(f) use on the Brunswick-Topsham Industrial Historic District, Cabot Mill, Summer Street Historic District, the Pejepscot Paper Company Historic District, or the Town of Brunswick Park. | This alternative would require the use of the Frank J. Wood Bridge, a contributing element to the Brunswick-Topsham Industrial Historic District, due to its removal. Additionally, this alternative would likely require the use of the Section 4(f)-protected Pejepscot Paper Company Historic District, Cabot Mill, and Town of Brunswick Park. This alternative would result in no use to the Summer Street Historic District. In accordance with 23 USC Section 144 (5), MaineDOT is required to offer the historic bridge for alternative use. | This alternative would require the use of the Frank J. Wood Bridge, a contributing element to the Brunswick-Topsham Industrial Historic District, due to its removal. Additionally, this alternative would likely require the use of the Section 4(f)-protected Pejepscot Paper Company Historic District, Cabot Mill, and Town of Brunswick Park. This alternative would result in no use to the Summer Street Historic District. In accordance with 23 USC Section 144 (5), MaineDOT is required to offer the historic bridge for alternative use. | This alternative would likely require the use of the Section 4(f)-protected Brunswick-Topsham Industrial Historic District (but no use on the Frank J. Wood Bridge), Pejepscot Paper Company Historic District, Cabot Mill, and Town of Brunswick Park. This alternative would result in no use to the Summer Street Historic District. | This alternative would likely require the use of the Section 4(f)-protected Brunswick-Topsham Industrial Historic District (but no use on the Frank J. Wood Bridge), Pejepscot Paper Company Historic District, Cabot Mill, and Town of Brunswick Park. This alternative would result in no use to the Summer Street Historic District. | This alternative would require the use of the Frank J. Wood Bridge, a contributing element to the Brunswick-Topsham Industrial Historic District, due to its removal. Additionally, this alternative would likely require the use of the Section 4(f)-protected Pejepscot Paper Company Historic District, Cabot Mill, and Town of Brunswick Park. This alternative would result in no use to the Summer Street Historic District. In accordance with 23 USC Section 144 (5), MaineDOT is required to offer the historic bridge for alternative use. |
| In-water Impacts | <u>Permanent impacts:</u> None <u>Temporary impacts:</u> None | <u>Permanent impacts:</u> 4 piers Riprap Shading <u>Temporary impacts:</u> Temporary work trestle Temporary bridge Cofferdams Rock removal | <u>Permanent impacts:</u> 4 piers Riprap Shading <u>Temporary impacts:</u> Temporary work trestle Cofferdams Rock removal | <u>Permanent impacts:</u> None <u>Temporary impacts:</u> Temporary bridge Cofferdam (Abutment 1) | <u>Permanent impacts:</u> None <u>Temporary impacts:</u> Temporary bridge Cofferdam (Abutment 1) | <u>Permanent impacts:</u> 4 piers Riprap Shading <u>Temporary impacts:</u> Temporary work trestle Cofferdams Rock removal |

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| Alignment | Existing alignment | Existing alignment | Curved upstream alignment | Existing alignment | Existing alignment | Parallel tangent downstream alignment |
| <p>Impacts under Section 7 of the Endangered Species Act</p> <p><i>(Protected Resources Present in the Action Area under National Marine Fisheries Service (NMFS) jurisdiction: Atlantic sturgeon (ATST), proposed Atlantic sturgeon critical habitat (ATST CH), Atlantic salmon (ATS), Atlantic salmon critical habitat (ATS CH), and Shortnose sturgeon (SNS).)</i></p> <p><i>(Protected Resources Present in the Action Area under U.S. Fish and Wildlife Service (USFWS) jurisdiction: Northern long-eared bat (NLEB).)</i></p> | <p>No effect. No Section 7 consultation with USFWS would be required.</p> | <p>Preliminary determination of impacts to threatened and endangered species and critical habitat: *ATST: LAA *ATST CH: No jeopardy *ATS: LAA *ATS CH: LAA *SNS: LAA</p> <p>Formal Section 7 consultation with NMFS would be required.</p> <p>*NLEB: NLAA</p> <p>Informal Section 7 consultation, under the FHWA Programmatic Consultation, with USFWS would be required.</p> | <p>Preliminary determination of impacts to threatened and endangered species and critical habitat: *ATST: LAA *ATST CH: No jeopardy *ATS: LAA *ATS CH: LAA *SNS: LAA</p> <p>Formal Section 7 consultation with NMFS would be required.</p> <p>*NLEB: NLAA</p> <p>Informal Section 7 consultation, under the FHWA Programmatic Consultation, with USFWS would be required.</p> | <p>Preliminary determination of impacts to threatened and endangered species and critical habitat: *ATST: LAA *ATST CH: No jeopardy *ATS: LAA *ATS CH: LAA *SNS: LAA</p> <p>Formal Section 7 consultation with NMFS would be required.</p> <p>*NLEB: NLAA</p> <p>Informal Section 7 consultation, under the FHWA Programmatic Consultation, with USFWS would be required.</p> | <p>Preliminary determination of impacts to threatened and endangered species and critical habitat: *ATST: LAA *ATST CH: No jeopardy *ATS: LAA *ATS CH: LAA *SNS: LAA</p> <p>Formal Section 7 consultation with NMFS would be required.</p> <p>*NLEB: NLAA</p> <p>Informal Section 7 consultation, under the FHWA Programmatic Consultation, with USFWS would be required.</p> | <p>Preliminary determination of impacts to threatened and endangered species and critical habitat: *ATST: LAA *ATST CH: No jeopardy *ATS: LAA *ATS CH: LAA *SNS: LAA</p> <p>Formal Section 7 consultation with NMFS would be required.</p> <p>*NLEB: NLAA</p> <p>Informal Section 7 consultation, under the FHWA Programmatic Consultation, with USFWS would be required.</p> |
| <p>Permit Level under Section 404 and Section 10 of the Clean Water Act (U.S. Army Corps of Engineers)</p> | <p>No permit needed.</p> | <p>Individual Permit for jurisdictional in-water work</p> | <p>Individual Permit for jurisdictional in-water work.</p> |
| <p>Essential Fish Habitat (EFH) Impacts under the Magnuson-Stevens Fishery Conservation and Management Act</p> <p><i>(Project is located within designated EFH for Atlantic salmon; Other NOAA Trust Resources Present in the Action Area include Alewives, American shad, Blueback herring, smelt, eels.)</i></p> | <p>No effect. No EFH consultation with NMFS would be required.</p> | <p>Due to the temporary and permanent in-water work proposed, this alternative would result in "adverse effects" to EFH.</p> <p>EFH consultation with NMFS would be required.</p> | <p>Due to the temporary and permanent in-water work proposed, this alternative would result in "adverse effects" to EFH.</p> <p>EFH consultation with NMFS would be required.</p> | <p>Due to the temporary in-water work proposed, this alternative would result in "adverse effects" to EFH.</p> <p>EFH consultation with NMFS would be required.</p> | <p>Due to the temporary in-water work proposed, this alternative would result in "adverse effects" to EFH.</p> <p>EFH consultation with NMFS would be required.</p> | <p>Due to the temporary and permanent in-water work proposed, this alternative would result in "adverse effects" to EFH.</p> <p>EFH consultation with NMFS would be required.</p> |

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|--|---|---|---|--|--|--|
| Alignment | Existing alignment | Existing alignment | Curved upstream alignment | Existing alignment | Existing alignment | Parallel tangent downstream alignment |
| Impacts to the Brookfield Dam and Fish Ladder | No effect. | No permanent effects. Potential temporary affects if temporary bridge or trestles are placed upstream of existing bridge. | Potential permanent and temporary effects to be determined. Currently evaluating noise, vibration and shadow effects. | No permanent effects. Potential temporary effects if temporary bridge or trestles are placed upstream of existing bridge. | No permanent effects. Potential temporary affects if temporary bridge or trestles are placed upstream of existing bridge. | No effect. |
| Utility Impacts | None | Existing water and communications service may be relocated to new bridge | Existing water and communications service may be relocated to new bridge | Temporary support or relocation of water and communications service within limits of existing bridge required | Temporary support or relocation of water and communications service within limits of existing bridge required | Existing water and communications service may be relocated to new bridge |
| Right of Way Impacts | No permanent property impacts | No permanent property impacts | Permanent impacts to 2 Brunswick properties and 1 Topsham property | No permanent property impacts | No permanent property impacts | Permanent impacts to 2 Topsham properties |
| Maintainability | High maintenance. The bridge will no longer function after 5 years. | Low maintenance. 1 future painting and 6 pavings estimated over 100 years with minimal traffic disruption | Low maintenance. 1 future painting and 6 pavings estimated over 100 years with minimal traffic disruption | High maintenance. 3 future paintings, 1 deck replacement, and 2 substructure rehabilitations estimated over 75 years. Estimated 8 months of future traffic disruptions for each painting | High maintenance. 3 future paintings, 1 deck replacement, and 2 substructure rehabilitations estimated over 75 years. Estimated 8 months of future traffic disruptions for each painting | Low maintenance. 1 future painting and 6 pavings estimated over 100 years with minimal traffic disruption |
| Estimated Initial Construction Cost | \$805,000 | \$16,000,000 | \$13,000,000 | \$15,000,000 | \$17,000,000 | Not estimated |
| Estimated Life Cycle Cost | Not estimated | Not estimated, future inspection and maintenance costs similar to Alternate 2 | \$13,700,000 | \$21,000,000 | \$23,200,000 | Not estimated, future inspection and maintenance costs similar to Alternate 2 |
| Estimated Total Cost over Service Life of Bridge | Not estimated | Not estimated, future inspection and maintenance costs similar to Alternate 2 | \$17,300,000 | \$35,200,000 | \$38,200,000 | Not estimated, future inspection and maintenance costs similar to Alternate 2 |